

JVWCD
BRIDGING POLYMER SYSTEM
IMPROVEMENTS
OPERATION & MAINTENANCE MANUAL

OWNER



JORDAN VALLEY WATER
CONSERVANCY DISTRICT

Jordan Valley Water Conservancy District
8215 S 1300 W
West Jordan UT 84088

Suppliers

UGSI CHEMICAL FEED

A cleanwater¹ Company

CONTRACTOR

C O R R I O

Corrio Construction
P.O. Box 712319
Salt Lake City, UT 84171

UGSI CHEMICAL FEED

A cleanwater¹ Company

Jordan Valley Water Conservancy SERWTP
Dry Polymer Feed System

UGSI Chemical Feed # 556386

Corrio Construction, PO # 3134

UGSI Chemical Feed, Inc.

OPERATION & MAINTENANCE MANUAL

Submitted To:

Corrio Construction, Inc.
P.O. 712319
Salt Lake City, UT 84171
Phone: 801-864-4908

Manufacturer:

UGSI Chemical Feed, Inc.
1901 W. Garden Rd.
Vineland, NJ 08360
Phone: 856.896.
Project Manager - Timothy Horrox

Prepared Date: 04/26/2024

POLYBLEND[®]
DD4

PROJECT NO. 556386

EQUIPMENT SERIAL NO. _____

DATE OF START-UP _____

START-UP BY _____

Prompt service available from nationwide authorized service contractors.

ORDERING INFORMATION

In order for us to fill your order immediately and correctly, please order material by description and part number, as shown in this book. Also, please specify the serial number of the equipment on which the parts will be installed.

Statements and instructions set forth herein are based upon the best information and practices known to UGSI Chemical Feed, Inc., but it should not be assumed that every acceptable safety procedure is contained herein. UGSI Chemical Feed, Inc. does not guarantee that actions in accordance with such statements and instructions included in this manual will result in the complete elimination of hazards and it assumes no liability for accidents that may occur.

WARRANTY STATEMENT

(a.) Limited Product Warranty Statements. For each Product purchased from Seller or an authorized reseller, Seller makes the following limited warranties: (i) the Product is free from defects in material and workmanship, (ii) the Product materially conforms to Seller's specifications that are attached to, or expressly incorporated by reference into, these terms, and (iii) at the time of delivery, Seller has title to the Product free and clear of liens and encumbrances (collectively, the "Limited Warranties"). Warranties with respect to software which may be furnished by Seller as part of the Product, if any, are expressly set forth elsewhere in these terms. The Limited Warranties set forth herein do not apply to any software furnished by Seller.

(b.) Conditions to the Limited Warranties. The Limited Warranties are conditioned on (i) the Product being stored, installed, operated and maintained in accordance with Seller's instructions, (ii) no repairs, modifications or alterations being made to the Product other than by Seller or its authorized representatives, (iii) the Product being used in compliance with any conditions or parameters set forth in specifications that are attached to, or expressly incorporated by reference into, these terms, (iv) use of the Product being discontinued after the Buyer or user has, or should have had, knowledge of any defect in the Product, (v) Buyer providing prompt written notice of any warranty claims within the warranty period described below, (vi) at Seller's discretion, Buyer either removing and shipping the Product or non-conforming part thereof to Seller, at Buyer's expense, or Buyer granting Seller access to the Products at all reasonable times and locations to assess the warranty claims, and (vii) Buyer not being in default of any payment obligation to Seller.

(c.) Exclusions from Limited Warranty Coverage. The Limited Warranties specifically exclude any equipment comprising part of the Product that is not manufactured by Seller or not bearing its nameplate. To the extent permitted, Seller hereby assigns any warranties made to Seller for such equipment. Seller shall have no liability to Buyer under any legal theory for such equipment or any related assignment of warranties. Additionally, any Product that is described as being experimental, developmental, prototype, or pilot is specifically excluded from the Limited Warranties and is provided to Buyer "as is" with no warranties of any kind. Also excluded from the Limited Warranties are normal wear and tear items including any expendable items that comprise part of the Product, such as fuses, light bulbs and lamps.

(d.) Limited Warranty Period. Buyer shall have 12 months from initial operation of the Product or 18 months from shipment, whichever occurs first, to provide Seller with prompt, written notice of any claims of breach of the Limited Warranties. Continued use or possession of the Product after expiration of the warranty period shall be conclusive evidence that the Limited Warranties have been fulfilled to the full satisfaction of Buyer and user, unless Buyer has previously provided Seller with notice of a breach of the Limited Warranties.

(e.) Remedies for Breach of Limited Warranty. Buyer's sole and exclusive remedies for any breach of the Limited Warranties are limited to Seller's choice of repair or replacement of the Product, or non-conforming parts thereof, or refund of all or part of the purchase price for the subject Product or part. The warranty on repaired or replaced Product or parts is limited to the remainder of the original warranty period. Buyer shall be responsible for any labor required to gain access to the Product so that Seller can assess the available remedies and (ii) Buyer shall be responsible for all costs of installation of repaired or replaced Products or parts. All Products or parts replaced under this Limited Warranty will become the property of Seller.

(f.) Transferability. The Limited Warranties shall be transferable during the warranty period to the initial end-user of the Product. THE LIMITED WARRANTIES SET FORTH IN THIS SECTION ARE Seller's SOLE AND EXCLUSIVE WARRANTIES AND ARE SUBJECT TO THE LIMITS OF LIABILITY SET FORTH IN SECTION 8 BELOW. Seller MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY WARRANTIES THAT MIGHT ARISE FROM COURSE OF DEALING AND USAGE OF TRADE.

UGSI CHEMICAL FEED, INC. HEADQUARTERS

INSTALLATION, OPERATION, MAINTENANCE, AND SERVICE INFORMATION

Direct any questions concerning this equipment that are not answered in this instruction book to the reseller from whom the equipment was purchased. If the equipment was purchased directly from UGSI Chemical Feed, Inc., Vineland, NJ, contact the office indicated below.

UNITED STATES

1901 West Garden Road
Vineland, NJ 08360
Tel: (856) 896-2160

IMPORTANT NOTICE:

INVENTORY and INSPECTION VERIFICATION

- UPON RECEIPT OF EQUIPMENT, INSPECT AND INVENTORY SHIPMENT IMMEDIATELY.
- ANY VISIBLE DAMAGE SHOULD BE MARKED ON THE FREIGHT BILL AND THE CARRIER NOTIFIED IMMEDIATELY.
- YOU HAVE SEVEN (7) CALENDAR DAYS FROM THE DATE THIS SHIPMENT WAS SIGNED FOR TO REPORT ANY DISCREPANCY TO UGSI CHEMFEED, INC.
- AFTER SEVEN (7) DAYS, UGSI CHEMICAL FEED, INC. WILL CONSIDER THE SHIPMENT COMPLETE AND UNDAMAGED.
- WE HAVE TAKEN EVERY PRECAUTION TO INSURE SAFE ARRIVAL. HOWEVER, OUR RESPONSIBILITY CEASED WHEN THE SHIPMENT WAS PASSED OVER TO THE CARRIER. CLAIMS FOR DAMAGES MUST BE MADE TO THE CARRIER.

SHIPPING AND HANDLING/STORAGE INSTRUCTIONS

Shipping and Handling

- 1.) Follow directions on package.
- 2.) Open packages immediately to check for damage.
- 3.) Handle with care. Fragile components and factory aligned parts are enclosed.
- 4.) Keep all packages in one area. Minimize re-handling.

Storage

- 1.) Store in atmosphere controlled environment. Protect from extreme temperatures (above 120 F, 52 C, below 32 F, 0 C) and wide ambient temperature fluctuations.
- 2.) Protect from direct weather exposure, i.e., sun, rain, high wind, etc.
- 3.) Consult factory with special situations.

Pre-Start Up Equipment Check List

PLEASE COMPLETE, SIGN, AND RETURN THIS FORM TO:

UGSI Chemical Feed, Inc.
1901 W. Garden Rd.
Vineland, NJ 08360

Please note factory start-ups require 4-6 weeks advance notice.

Name:	Date:
Company:	Project:
Address:	P.O. No.:
	Sales Order No.:
Phone No.:	Fax No.:

EQUIPMENT COMMISSIONING

All equipment will be checked mechanically and electrically during start-up service. Technician will hydraulically operate system. Certificate of proper installation and operation will be issued. Equipment should be ready to turn over to owner. Owner training and instruction will be provided during this visit.

Circle Equipment Type: **Feeders** **PolyBlend System** **Pumps** **Tank System**

(YES or NO)	Question
	Is all equipment on site for start-up?
	Has unit been placed in an area where it will be permanently installed?
	Are all required feed chemicals available and on site?
	Are all interconnecting plumbing and electrical connections completed?
	If installation problems occur, will there be a plumber and electrician available for corrections?
	Is there adequate water supply available for the provided equipment to run properly? For example, minimum water supply of 40 gpm at 40 psi should be sufficient for most applications involving Dry Prep Systems. Other components requiring dilution water must be supplied water from another source or in volumes sufficient to maintain the 40 psi and 40 gpm to the Dry Prep System.
	Is polymer of sufficient type (dry, liquid, or both) available?
	Can pump system be tested with water (if necessary) to complete start-up?
	Is plant process ready for automatic operation of equipment?
	Are all plant control signals (milliamp, etc.,) operational?
	Are simulated control signals acceptable for verification of proper equipment operation?
	Can equipment be placed in permanent operation?
	Will personnel be available for equipment instruction and training?
	Is correct electrical service provided? Consult factory if there are questions.

Additional Comments:

Authorized Signature:
Name (please print):
Date verified:
Phone no.:

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4	DD4 Information - <ul style="list-style-type: none">System Components<ul style="list-style-type: none">• Pressure Gauge• Check Valve• Solenoid Valve• Flow Control• Ball Valve Actuator• Barksdale Pressure Switch• Ball Valve• Air Actuated Ball Valve• Needle Valve• Pressure Regulator• Air Compressor• Volumetric Feeder• Hopper Level Switch• Motor• Tank Gear Box• Float Switch• Tank Weigh Scale (Shipped Loose)• Scale Indicator (Shipped Loose)• Control Panel Components
5	Mechanical – Bill of Materials & Drawings
6	Electrical- Bill of Materials & Drawings

Polymer Preparation System
Model # DD4 w/ Control Panel
INSTALLATION, OPERATION, AND MAINTENANCE INFORMATION

INSTALLATION

READ THIS MANUAL BEFORE YOU
INSTALL, OPERATE, OR SERVICE THIS
UNIT.

OVERVIEW

SAFETY PRECAUTIONS

- Ensure that the control panel and motor are grounded to avoid possible electrical shock or damage to equipment.
- Before servicing, turn off all power and assure power “lockout” to avoid possible electric shock.
- To avoid possible electric shock, do not touch other circuit components when making adjustments to the SCR control board.
- Disconnect external power to the control panel before removing or replacing fuses.

SPECIFICATIONS

Model:	DD4
Tank Size:	N/A
Water Supply: Main	30 GPM
Minimum Operating Water Pressure:	40 PSI, Dynamic
Water Connection:	1-1/2” NPT Dilution
Compressed Air Requirement:	None, Integral Compressor
Electrical Supply:	480/3/60

LOCATION

Select a location that provides:

- Electrical Supply
- Potable Water (Clean)
- Proximity to the Point of Use
- Easy Handling and Storage of Polymer
- Access to Unit
- Protection against Severe Weather

UNPACKING

Examine package contents for damage. Report any to freight forwarder. Check plastic bag(s) for contents against individual packing list(s).

NOTE: Disregard any moisture; this unit was wet tested.

CONNECTIONS

- Use Teflon tape on threads.
- Do not over-tighten fittings.
- Insure that supply water pressure is at least 40 psi and does not exceed 75 psi.
- Install water isolation valve with unions.

NOTE: Pieces have been color-coded with tape for ease of installation. Connect the colored fitting with its match during assembly.

STORAGE

Store in atmosphere controlled environment. Protect from extreme temperature (above 110°F, 52° C, below 32°F, 0°C) and wide ambient temperature fluctuations.

Protect from direct weather exposure, i.e., sun, rain, high wind, etc.

OPERATION

SYSTEM PROCESS DESCRIPTION

System will consist of one (1) polymer wetting device (DD4), one (1) system control with Allen Bradley Micrologix PLC, one (1) dispensing hopper assembly to accommodate different style of bags of dry polymer.

The process starts with pressing system start/on button on the HMI. The water control valve is opened and the disperser and tank mixer motors are energized in a timed sequence. Water flows through the disperser and a vortex is formed in the interface bowl. After a time delay, the volumetric feeder begins metering dry polymer into the vortex. The suction force of the disperser pulls the polymer granules into the center of the vortex and down into the high shear mixing impeller, then out through the piping to the designated mix tank or to the application point.

STARTUP & SEQUENCE OF OPERATION

1. Verify that the water supply line has adequate pressure and volume. See specifications. We have supplied an inlet pressure gauge for the incoming water supply line. It is labeled WATER. The unit monitors this pressure during normal operation. If the water pressure gets too low, 10-15 psi, the unit will alarm and shutdown.
2. Verify that the power supplied to the unit matches the unit requirement. See the electrical drawings located in the appendix, for the correct power information.
3. Turn on the power disconnect located in the control panel door. The power light should come on. We have supplied a pressure gauge for the air pressure, labeled AIR. The unit also monitors the air pressure during normal operation. If the air pressure gets too low, the unit will alarm, and shutdown. This fail-safe may cause an alarm on initial start-up. On the touchscreen, go to the alarm screen and press ALARM SILENCE. After the air pressure builds, press ALARM RESET to clear this alarm.
4. On the touchscreen, go to the feeder screen and place the polymer feeder in OFF mode. It is best to run one batch with water ONLY, to be sure that all connections are correct.
5. On the touchscreen place all other switches in AUTO mode, saving the disperser switch for last.
6. Observe the liquid funnel developing in the clear dry/liquid interface, located below the dry feeder discharge tube. The water level of the liquid funnel can be adjusted to an optimum level, and this will greatly reduce the amount of polymer build-up in the interface. The water level in the interface should be up to the clear baffle located inside the dry/liquid interface about 3 inches deep at the edge, and form a much defined funnel. If the water level is too high, the turbulence will prevent the funnel formation. If the water level is too low, then lack of water will prevent the funnel formation. Adjust the needle valve located in the small supply line coming to the clear interface to achieve the correct funnel formation. Trace the small supply line to the red flow control valve, the needle valve is located on this red valve.
7. While the tank is filling, observe the differential pressure gauge, labeled PSID. A reading of 10 psi or higher is required. This insures that the unit is getting adequate water flow, and prevents the unit from feeding polymer when the flow is insufficient, which will also cause the unit to alarm and shutdown. (NOTE: If unit has been off for an extended period and this gauge reads zero while the water pressure gauge shows adequate pressure, the piston in the PSID gauge may be stuck. Simply remove the black plastic nut, located on the right hand side when facing the gauge. Insert the eraser end of a pencil, and press the piston in, the piston should spring back. You can observe the gauge while doing this, and the needle should follow the piston's travel. Once the piston is free, replace the black plastic nut. Be sure that the unit is OFF before performing this operation.)

8. On the touchscreen, go to the feeder screen and place the POLYMER SELECT switch to DRY.
9. The dry powder feeder must be calibrated using the actual polymer. Once this is done, it should not have to be repeated, unless the polymer changes. To do this, a timed feed must be performed, and the polymer sample weighed. Remove the top portion of the clear dry/liquid interface by loosening the quick release clamp holding it in place. The airline for the cylinder does not have to be removed. Open the control panel door and set the 3-digit potentiometer for 200. This potentiometer sets the speed of the feed motor. Place a plastic bag under the discharge tube of the dry powder feeder. On the touchscreen go to the calibrate screen, enter the time wanted for sampling (one minute samples are recommended) and press the CALIBRATE button. After a 10 second delay, the feeder will start to feed for the time entered on the touchscreen. Simply weigh the sample, and plot the weight point on the supplied graph. Repeat the above procedure for settings of 400, 600, 800, and 999. Plot each point, and then draw a line from point to point. This will create a feed curve for the polymer being fed and can be used when determining the batch concentration strengths
10. Determine the amount of polymer needed per batch to achieve the desired concentration strength. If you are unsure of the concentration strength required, start at .25%. If you see that your process requires more polymer, then this concentration strength can be increased on the following batch. Since the batch size is the working gallons of the tanks, the weight of the water will be working gallons of tank multiplied by 8.347. Using the weight and the desired concentration strength, you can derive the weight of polymer required per batch. $\text{Pounds} \times .0025 = \text{pounds of polymer}$. This formula may be used for any concentration strength, simply replace the .0025 with the desired strength. Do not exceed 1% concentration strength
11. On the touch screen, go to the timer screen and set the internal FEED TIMER for the desired feed time. It is better to feed the polymer over the entire fill time, if possible. Twenty minutes is the optimum setting.
12. Determine the amount of polymer needed per minute. Divide the pounds of polymer (from step 10 by the feed time, from step #11, 20 minutes. This would be the pounds per minute.
13. Using the graph from step #9, determine the speed setting to get the required pounds per minute and adjust the 3-digit potentiometer for this setting. If the speed setting is too low, the FEED TIME may be decreased so that the speed can be increased. Be sure to allow for the new FEED TIME in step #12.
14. Observe the dry polymer entering the liquid funnel. The polymer should be falling into the center of the funnel. If not, remove the front cover of the dry polymer feeder and adjust the discharge snout in or out so that the polymer falls into the center of the liquid funnel. This will greatly reduce the amount of polymer build-up in the interface.

Jordan Valley DP2000 Polymer Blending System PLC/HMI Control Panel Operation

Overview:

This PLC/HMI based control has been developed for use with two(2) UGSI Chemical Feed, Inc., PolyBlend® Model DD4 Dry Polymer Mixing and Batching systems and two Mix/Hold tanks. The polymer mixing system consists of a skid mounted DD4 with: a Dry Polymer Volumetric feeder and hopper, wetting/ mixing chamber, dilution water flow control valve, pneumatic manifold, pressure switches, solenoid operated pneumatic valves and air compressor. There are two complete DD4 feeder systems. The Operator selects which feeder to use from the local HMI screen. There is a manual diverter valve the Operator must operate to direct polymer solution from the selected feeder. Only one feeder can be used at a time. It is not recommended to switch feeders while a batch is in progress.

The DD4 will mix dry polymer with water and deliver the solution to a two-tank mixing system that operates with one, or two tanks filling and discharging the solution, individually, based on their levels. Each mix tank has level sensors for sensing solution levels in the tank, a dongle style float switch for Overflow level backup, a motor driven mixing impeller and a solenoid operated, pneumatic, solution inlet and a solution discharge valve. Solution inlet valves divert the polymer solution from the DD4 to one of the two active mix tanks. Each discharge valve allows solution to be available from a single tank to the final feed pumps delivering polymer solution to the point of use and activates a feed pump transfer permissive to the pump controls. During two-tank flip-flop operation, one tank will fill while another one discharges, ensuring a continuous flow of activated polymer solution to the feed pumps. During single tank operation the active tank will fill and then discharge the solution, but will interrupt the flow of polymer solution to the feed pumps while the tank is filling and the polymer solution is being fully activated.

The system control consists of an Modicon Schneider M340 PLC with digital and analog I/O, an Schneider Harmony ST6 7" Operator Interface, motor contactors, interposing relays and power supplies. All field devices connect easily to the terminals located at the bottom of the control panel. An internal Ethernet switch allows for connection to a remote process control system over an Ethernet network.

Turning Power ON:

When power is turned on, the Power ON indicators on the PLC and HMI should illuminate. The PLC Run LED should illuminate after 15 seconds. The PLC application program has a built-in power up delay timer that prevents operation of the machine until the HMI is running; about 80 seconds. Once the HMI displays the Start Screen, a pop-up message shows the time remaining before resuming machine operation. The navigation button to the Main Menu does not display until the power up time delay has expired. Once machine operation is ready, place the System Mode in HAND. Then, proceed to all control screens (Feeder, Mixer, etc.) and turn each device on manually to check its operation. ***Follow all safety procedures in the manufacturer's equipment manuals while performing these operations.***

The HMI Screen Shots on the following pages provide a narrative on the operation of this system.



Start Screen:

When power is applied to the control panel the HMI and PLC go through a Boot-Up sequence before running their respective application programs and initiating Ethernet communications. The Power and RUN LEDs on the PLC will illuminate and the Start Screen, shown above, will be displayed on the HMI once communications has been established. A power up timer in the PLC program delays operation of the system until both HMI and PLC have completed their respective startup processes. A rectangular box showing the time remaining before the power-up sequence is complete is displayed in the area of the “Main System Screen” navigation button (as shown below). Once the Power Up delay time has elapsed, the Main System Screen navigation button will appear. Navigation to any screen is prohibited until the Main System Screen navigation button appears.

The Main System Screen:

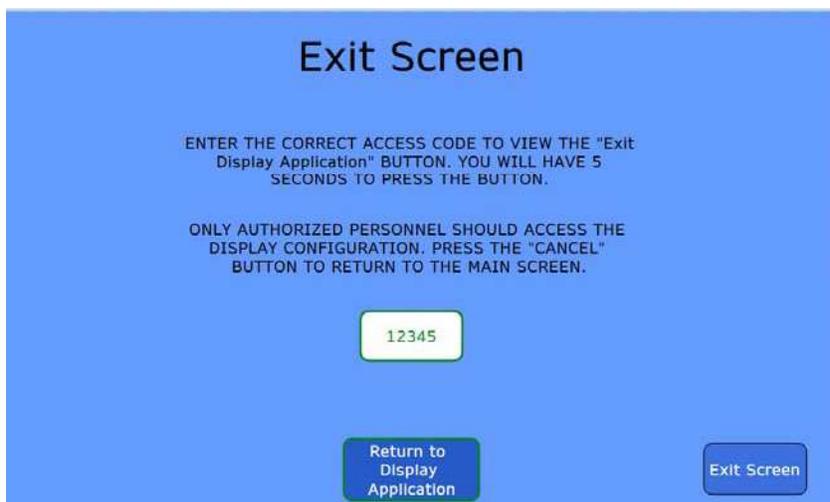
This HMI application does not have a Main Menu Screen. Access to all control and setup functions and viewing the status of all components and flows are performed and monitored from the Main System Screen. Most navigation buttons are located at the bottom of the screen whereas, control screens are actuated by touching a particular component device on the animated graphic parts of the display. *See examples shown later in this write-up.*

Pressing the “Clean Screen” button will display a screen with a timer and no Touch Buttons. This allows the user to wipe off the face of the screen without unintentionally activating a controlled device or having to remove power. *See Clean Screen description below.*

The “Exit Display Application” button displays a screen requiring successful entry of a passcode before the application can be exited. If this window is chosen in error, the user of this equipment can close the screen and return to the Status screen. Since, HMI application files can be removed and communication settings can be changed, the Passcode should only be given to authorized personnel. When the FactoryTalk View ME Station screen is visible, touching the “Run Application” button on the HMI or cycling power will resume operation.

Precautionary note: The HMI Configuration allows access to the settings and application program in the HMI. The operation of the HMI can be modified and/or the application program can be accidentally deleted while running the HMI ME Station application.

Accessing the Terminal Settings and changing settings or deleting files can adversely affect the operation of the HMI and prevent normal operation of the equipment.



Pressing this button on the Main System Screen displays the screen at left.

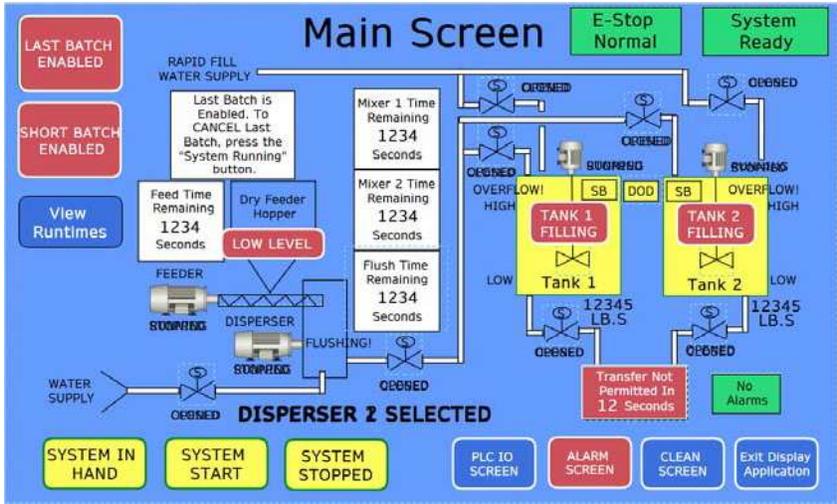
A valid passcode must be entered in the white passcode entry box. Once entered, the operator has 5 seconds to press the “Exit Display Application” button and gain access to the FactoryTalk View Desktop. *See last page of this write-up for Access Code information.* Press the “Cancel” button to close the screen without exiting the HMI application.



Clean Screen

This screen is displayed after the “Clean Screen” button has been pressed while viewing the Main System Screen. It allows a user to clean the surface of the display without activating devices because of the typical touch sensitive buttons. A count-down timer appears on the screen for 30 seconds. Press the “Back” button to return to the previous screen, (Main System Screen).





Main System Screen:

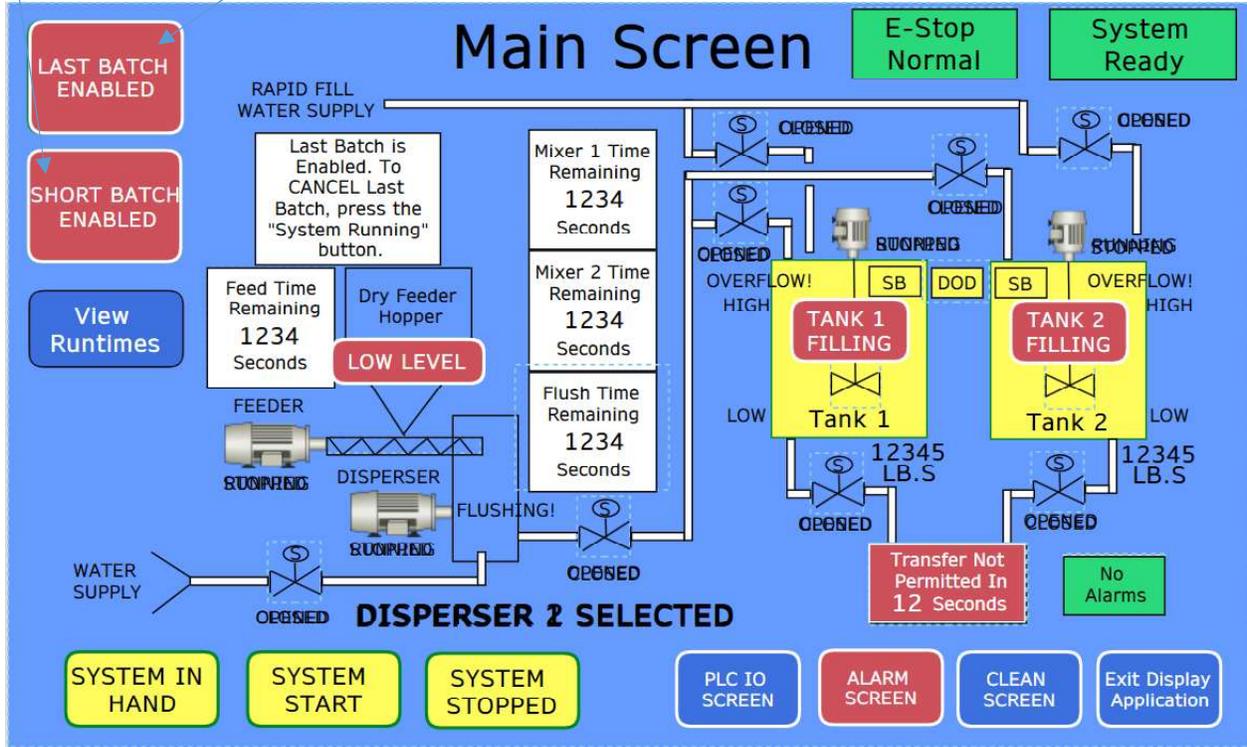
The Main System Screen is typically displayed while the system is running in Automatic. Some control buttons and the status of all system devices (On/Off Status, tank levels, etc.) are shown on this screen. Example: A “Last Batch” touch button, located in the upper-left corner of the screen, provides a method to obtain an orderly shut-down when the equipment is used for intermittent duty or prior to performing scheduled maintenance. The Last Batch button can be activated at any time while a mix tank is filling and is above a Low Level. When activated, the Last Batch button displays a “Last Batch Enabled” message that will continue to blink until the Last Batch mode has been cancelled. The selected mix tank will fill to a High Level and activate polymer normally, but the process will pause until the Last Batch mode has been terminated. The mode can be terminated by pressing the “System Running” or “System Stop” touch buttons in the System Mode area of the screen.

The following pages will highlight the available navigation and control buttons and the areas of the screen where touching will display a related screen.

Navigation and Control Buttons:

Short Batch

Last Batch



System Mode HOAC Selector and Start / Stop Control

Display PLC I/O Status

Display Alarm Screen

Press to Clean Screen

Press to Exit Application

Control Buttons

System Mode Selector (HAND-OFF-AUTO-CALIBRATE)

System Start PB
System Stop PB

Last Batch PB
Short Batch PB

Navigation Buttons

Alarm Screen
Clean Screen

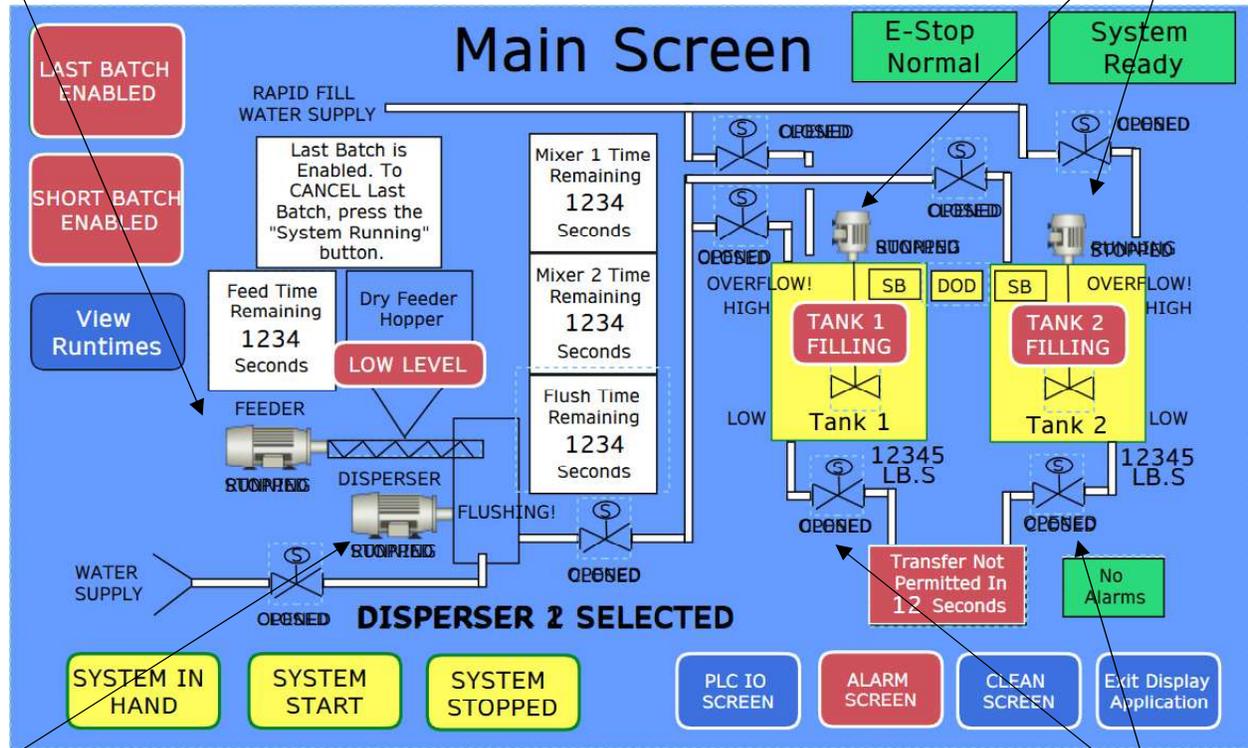
PLC I/O Status and Setups
Exit Display Application

Control and Navigation buttons discussed in more detail later in this document.

Touch Area Screens:

Touch in the area of Mixer Motors 1 & 2 to view the Mixer Control screens.

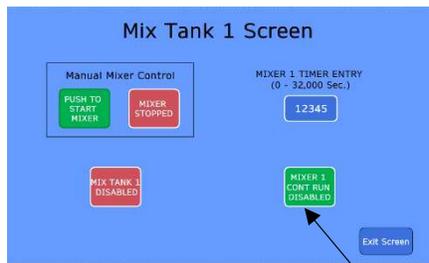
Touch for Feeder Control



Touch for Dispenser Control

Touch for Tank Valve Control

Touching in an area displays a screen providing controls and data entry parameters for that object. As an example: pressing in the area of the Tank 1 Mixer Motor displays a screen showing controls for Mix Tank and Mixer 1. *Shown on next page.*



The two-tank system can act like a typical Flip-Flop System filling and mixing polymer solution in one tank while discharging solution from one of the other tanks. Any and all of the tanks can be enabled by pressing in the area of the Mixer Motor of each tank to display the Mixer Control screen. E.g. the text “TANK 1 ENABLED” will be displayed, as shown at left, if Tank 1 is enabled. *Tank 1 currently shows that it is NOT Enabled.*

Pressing the MIX TANK DISABLED button enables the mix tank. A Mix Tank must be ENABLED using the appropriate Mix Tank Mixer screen before the tank mixers or valves can be manually operated.



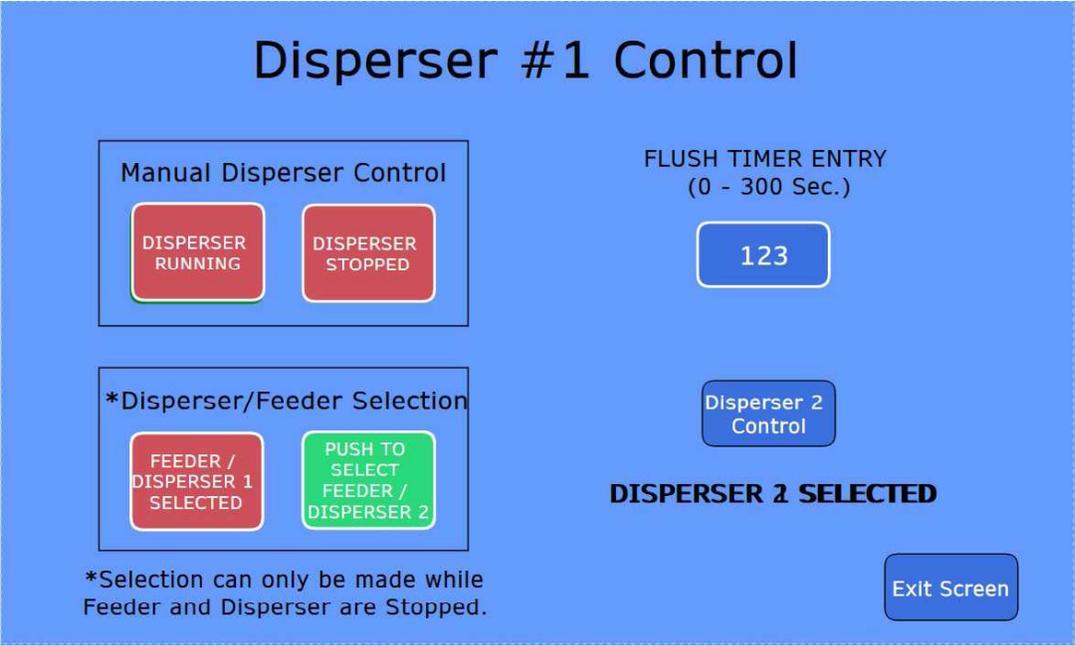
Tank Mixer Control Screens:

Each Tank Mixer has a screen that provides a means to manually control each mixer when the System Mode is set to HAND. In order to run a mixer in any mode, the appropriate Mix Tank must be enabled. Pressing the “Push to Start” button will turn on the selected mixer motor; pushing the “Push to Stop” button will turn it OFF. Only the tanks that are enabled will fill during an Automatic Cycle. The Tank Enable/Disable selector provides a means to run the system while performing maintenance on the disabled tank.

When the System HOA is in Auto, the mixer will run while the tank is filling and for a user entered time period, after the solution in the mix tank has reached a high level. When the “Mixer Cont Run” selector is set to Enabled and the system is running, the mixer motor will run continuously, as long as the level is above a Low Level, until the system is stopped.

The DP2000 can be configured for single tank operation, allowing maintenance to be performed on one tank while the enabled tank(s) continue to be used.

When more than one tank is enabled and are at a Low Level, the tank that will fill first is always from Tank 1 to Tank 2.

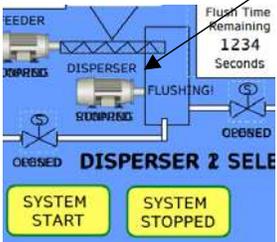


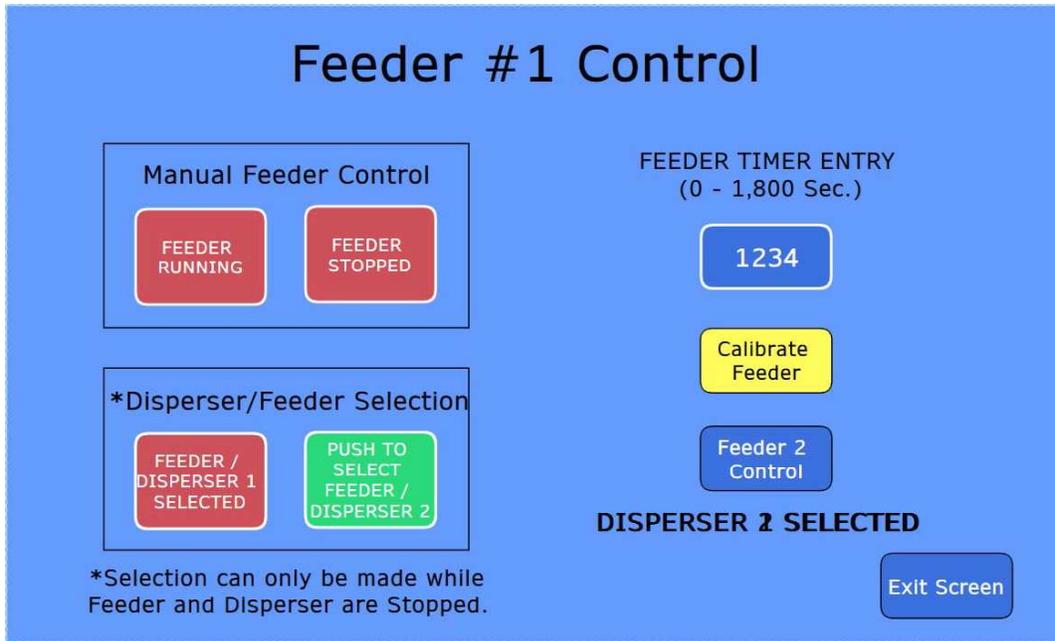
Disperser Control Screen:

The Disperser Control Screen is used to manually activate the disperser system water valve and motor when the HOA button is in HAND and to select which feeder is to be used. Pressing the “Push to Start” button will turn on the disperser; pushing the “Push to Stop” button will turn it OFF. When the Disperser is running, the legend on the buttons change to show the new state. Touching the “Push to Stop” button or changing the HOA selector setting will turn it OFF. Make sure the HOA button is in AUTO when planning to run the system in Auto. Press here to display the Disperser Control Screen.

Use this screen to add a Flush time at the end of a fill cycle. Flush cycles range from 0 to 120 seconds.

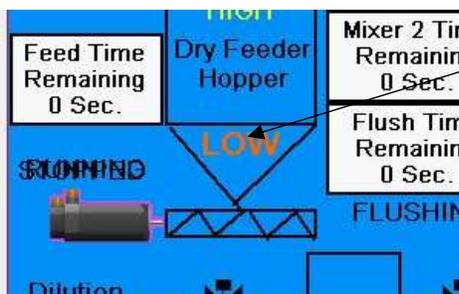
Use the Exit button when done.



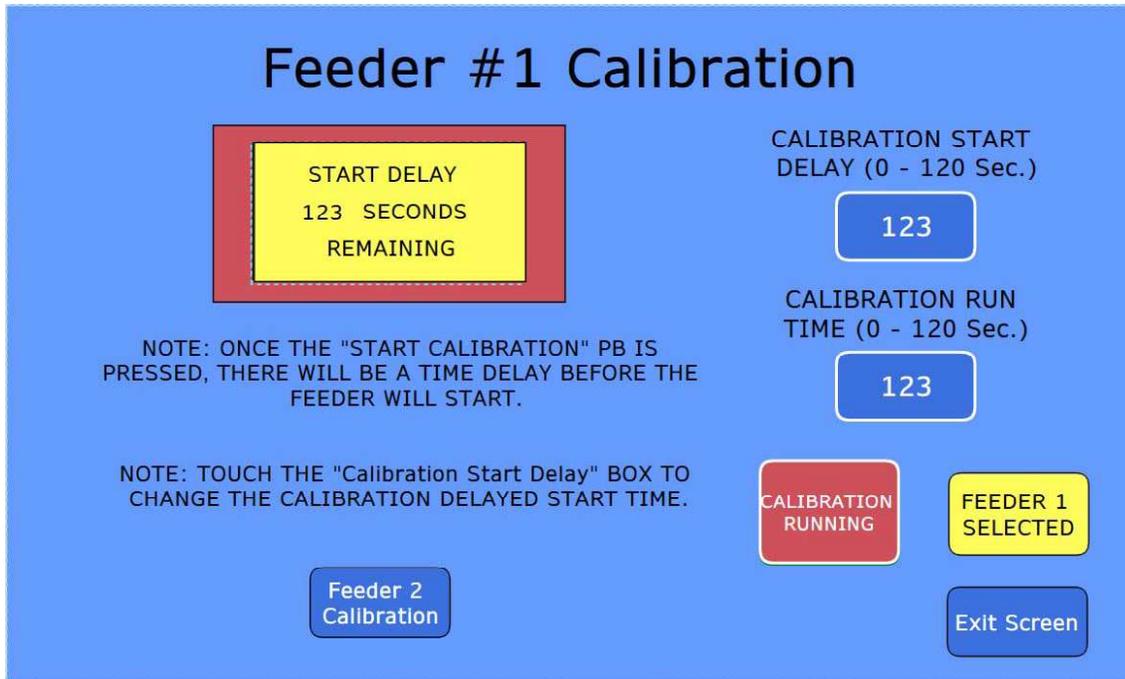


Feeder Control Screen:

The Feeder Control Screen is used to manually activate the Dry Feeder motor when the System HOA button is in HAND Mode and to select which feeder will be used. Pressing the “Push to Start” button will turn on the feeder motor; pressing the “Push to Stop” button will turn it OFF. Make sure that the HOA button is in AUTO when planning to run the system in Auto. The feeder controls are disabled on this screen when a feeder is being calibrated. Press here to display the Feeder Control screen.



Use this screen to enter the amount of time the selected feeder needs to run, during AUTO operation, to dose the proper polymer solution concentration. Determining the feeder runtime will depend on the feeder delivery rate and the type of polymer being used. The Feeder Timer can be set from 0 to 1800 seconds (0 – 30 minutes). The Dry Polymer delivery rate is set using the speed control device inside the control panel. The necessary feeder runtime is calculated outside of this control. Calibrate the feeder before setting feeder speed and runtime.

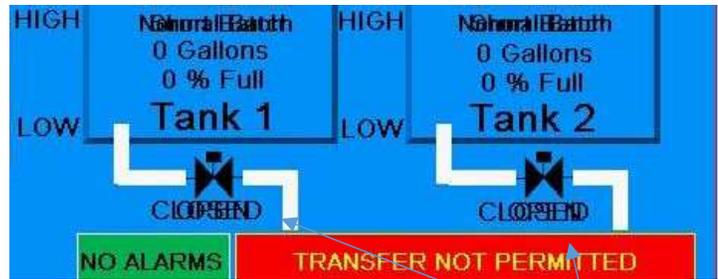


Feeder Calibration Screen:

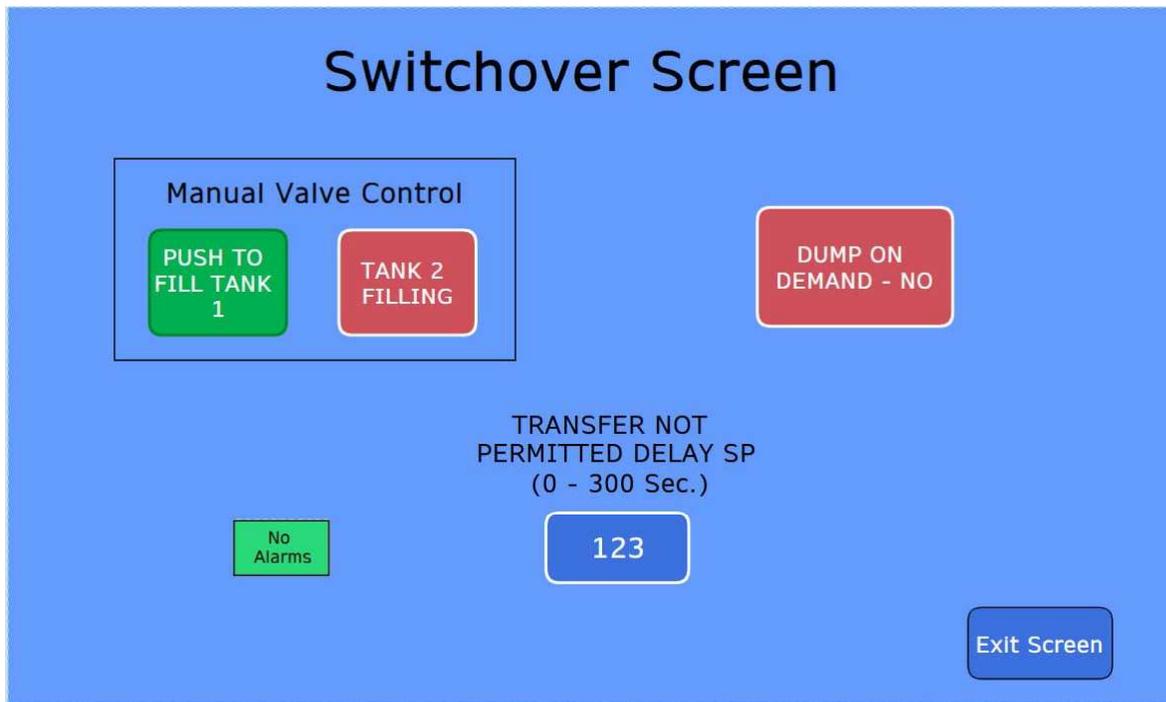
The Feeder Calibration Screen is used to initiate a timed run sequence of the Dry Polymer feeder to determine the output capabilities of the feeder. There are 2 calibration screens, one for each feeder.

The Calibration Run-Time setting must be entered before starting calibration. Typical calibration times are 30 to 120 seconds and depends on the container used to catch the polymer. Disperser operation and manual operation of the Feeder are disabled during Calibration. Press the “Push to Start Calibration” button when ready to calibrate. There is an adjustable time delay before the feeder will activate. This allows time to position someone at the feeder output before the feeder will turn on. The time remaining before actuation of the feeder is shown next to the Start Delay Timer. Touch the Calibrate Time Delay box to display a keypad for adjusting the Delay Timer. Calibration start can be delayed up to 30 seconds. The Calibration Run Time Timer can be adjusted from 0 to 120 Seconds (Max. 2 Minutes).

Each Mix Tank has two individual valves to control the flow of water or solution. Each tank has its own Mix Tank Valve Control screen that can be displayed when the area around a tank discharge valve is touched and be used to control the individual valves.



Touch for Tank Valve Control



Valve Control Screens:

On this system, the Inlet and Discharge valves for both tanks all operate from a single pneumatic solenoid valve. When the solenoid valve is de-energized, one tank is filling, and the other tank is discharging. When the solenoid valve is energized, the opposite tanks are filling and draining. Use the above Valve Control screen to manually fill one tank or the other when the System HOA button is in HAND Mode. The Rapid Fill Valve Control screen can be accessed from this screen. Use the "PUSH TO FILL..." buttons to fill or drain a specific tank. Make sure the HOA button is in AUTO when planning to run the system in Auto.

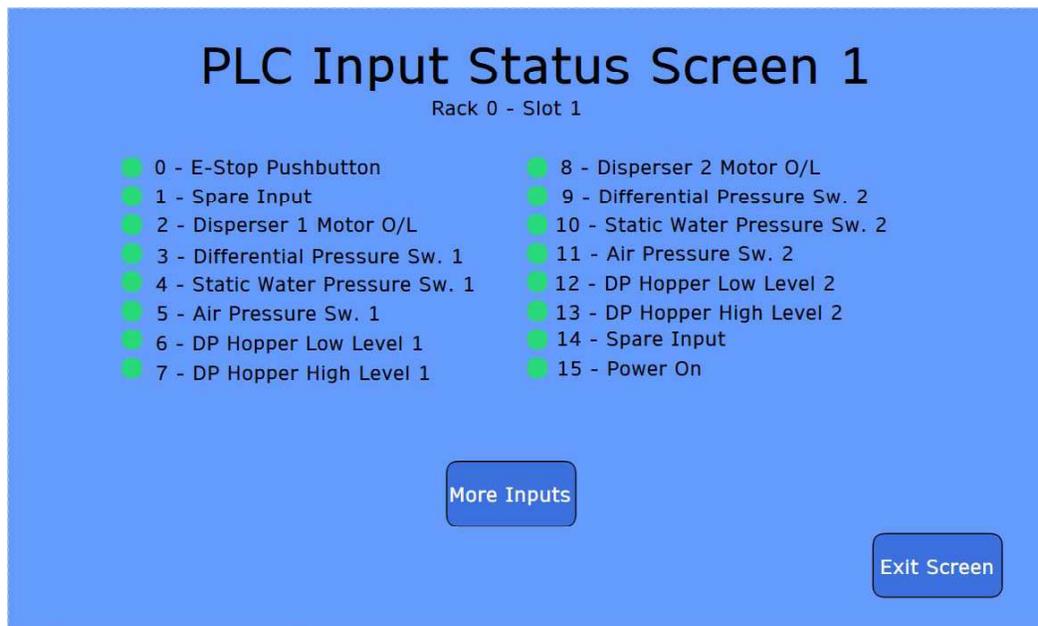
The "Dump On-Demand" (DOD) selector affects the operation of the Transfer Permissive relay output used to signal when polymer solution can be discharged from a mix tank. When the DOD Selector is set to NO and a tank is filling, the Transfer Permissive relay will not energize until the tank is at High Level and the Mixer Timer has completed a timed mix cycle. When YES

is selected, the Transfer Permissive relay will energize as soon as the filling Mix Tank has reached a High level.

Pressing the PLC I/O STATUS button displays the first of several screens that allow monitoring the status of all PLC I/O points, without opening the control panel to view the I/O module status lights. From the PLC Input Status Screen the Mix Tank Level setup screens can be accessed.



Display PLC I/O Status



PLC Input Status Screen 2

Rack 0 - Slot 2

- | | |
|-----------------------------|--------------------|
| ● 0 - Mixer 1 Motor O/L | ● 8 - Spare Input |
| ● 1 - Mix Tank 1 Overflow | ● 9 - Spare Input |
| ● 2 - Mix Tank 1 High Level | ● 10 - Spare Input |
| ● 3 - Mix Tank 1 Low Level | ● 11 - Spare Input |
| ● 4 - Mixer 2 Motor O/L | ● 12 - Spare Input |
| ● 5 - Mix Tank 2 Overflow | ● 13 - Spare Input |
| ● 6 - Mix Tank 2 High Level | ● 14 - Spare Input |
| ● 7 - Mix Tank 2 Low Level | ● 15 - Spare Input |

More Inputs

Exit Screen

PLC Input Status Screen 3

Rack 0 - Slot 5

- | | | | |
|-------|--|-----------------|-------|
| 12345 | 0 - Tank 1 Weight Scale Raw X Scale Factor | 12.345 = Pounds | 12345 |
| 12345 | 1 - Tank 2 Weight Scale Raw X Scale Factor | 12.345 = Pounds | 12345 |
| 12345 | 2 - Spare Analog Input | | |
| 12345 | 3 - Spare Analog Input | | |
| 12345 | 4 - Spare Analog Input | | |
| 12345 | 5 - Spare Analog Input | | |
| 12345 | 6 - Spare Analog Input | | |
| 12345 | 7 - Spare Analog Input | | |
- NOTE: All analog inputs are configured to produce a range of zero to 10,000 counts when 4 to 20ma is applied to the input.

Outputs

Exit Screen

PLC Input Status Screen:

An Input is active when the box to the left of the described input turns **RED**. Analog values are shown on the third screen.

PLC Output Status Screen 1

Rack 0 - Slot 3

- | | |
|---------------------------------------|--|
| ● 0 - Alarm Horn | ● 8 - Disperser 2 Water Control Relay |
| ● 1 - System Ready | ● 9 - Tank 1 Mixer Run Relay |
| ● 2 - Spare Output | ● 10 - Tank 2 Mixer Run Relay |
| ● 3 - Disperser 1 Run Relay | ● 11 - Tank 1 Rapid Fill Solenoid |
| ● 4 - Disperser 2 Run Relay | ● 12 - Tank 2 Rapid Fill Solenoid |
| ● 5 - Feeder 1 Control Relay | ● 13 - Spare Output |
| ● 6 - Feeder 2 Control Relay | ● 14 - Air Compressors Power Control Relay |
| ● 7 - Disperser 1 Water Control Relay | ● 15 - Spare Output |

More
Outputs

Exit Screen

PLC Output Status Screen 2

Rack 0 - Slot 4

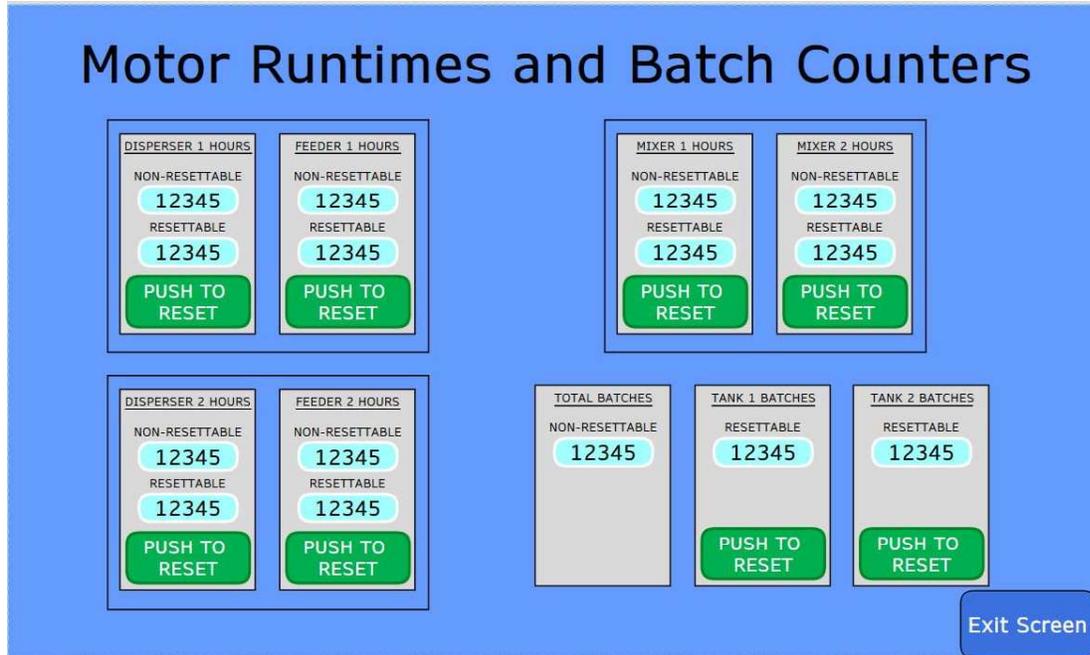
- | | |
|-----------------------------|---------------------|
| ● 0 - Switchover Solenoid 1 | ● 8 - Spare Output |
| ● 1 - Switchover Solenoid 2 | ● 9 - Spare Output |
| ● 2 - Spare Output | ● 10 - Spare Output |
| ● 3 - Spare Output | ● 11 - Spare Output |
| ● 4 - Spare Output | ● 12 - Spare Output |
| ● 5 - Spare Output | ● 13 - Spare Output |
| ● 6 - Spare Output | ● 14 - Spare Output |
| ● 7 - Spare Output | ● 15 - Spare Output |

Inputs

Exit Screen

PLC Output Status Screen:

A PLC digital output is active when the box to the left of the described output turns RED. When the MOTOR RUNTIMES navigation button is pressed, a screen displaying a summation of the running hours for each motor is displayed inside the boxes.



Motor Run-Times and Batch Counters Screen:

The Motor Runtimes and Batch Counters Screen is used to view the amount of hours that the Dispenser, Feeder, and Mixer motors have been in operation. The number counts inside the box marked "Resettable" can be used for periodic maintenance and are resettable; the number counts "Non-Resettable" box are not resettable. Maximum displayed non-resettable hours are 9999999. If the counter exceeds its capacity, "#####" will be displayed inside the window instead of a number. Maximum displayed resettable hours are 32767.

The Batch Counters maintain the current count of batches delivered to the Mix Tanks. One counter maintains the total number of batches made since the system was put in operation. This counter cannot be reset. Each of the Tank Batch Counts can be reset by pressing the appropriate "Push to Reset" button. These counters are used to keep track of the total number of batches made in a specific time period.

Press the EXIT SCREEN button to exit.

Alarm Screen

Date	Time	AlarmMessage	AlarmStatus	AlarmType

Silence Alarm Horn Alarm Reset Exit Screen

Alarm Screen:

The Alarm Screen displays line descriptions of all active and previous alarms. When an alarm occurs, an audible alert sounds in the control panel, the Alarm Active icon becomes visible, and a line of text appears to describe the alarm condition. Pressing the “Silence Alarm Horn” button turns off the audible alert, but the alarm text and the alarm icon remain until the alarm condition is cleared. Active alarms are cleared by pressing the “Alarm Reset” button. The active alarm will show the time it is acknowledged will move to the inactive state. Find the reason for the alarm condition, fix the problem, then press “Reset Alarm” to reset the alarm condition. Alarms are maintained in the Alarm History even through power interruptions. A list of all monitored alarm conditions is shown on the following page. Alarms marked as “Info” do not cause the System to stop running.

Monitored alarm listing:

Note: Alarms that are marked with an (A) suffix will stop machine operation. Alarms that are marked with an (I) suffix are for information only and will not stop machine operation.

DD4 #1 DRY POLYMER HOPPER LOW LEVEL (I)
DD4 #1 LOSS OF WATER FLOW PS (A)
DD4 #1 LOW STATIC WATER PRESSURE (A)
DD4 #1 LOW STATIC AIR PRESSURE (A)
DD4 #1 DISPERSER MOTOR OVERLOAD (A)
DD4 #2 DRY POLYMER HOPPER LOW LEVEL (I)
DD4 #2 LOSS OF WATER FLOW PS (A)
DD4 #2 LOW STATIC WATER PRESSURE (A)
DD4 #2 LOW STATIC AIR PRESSURE (A)
DD4 #2 DISPERSER MOTOR OVERLOAD (A)
MIXER TANK 1 MOTOR OVERLOAD (A)
MIXER TANK 2 MOTOR OVERLOAD (A)
MIX TANK 1 OVERFLOW FLOAT SW (A)
MIX TANK 2 OVERFLOW FLOAT SW (A)

Communication Settings:

The HMI and PLC Processor pass information over an Ethernet connection. An RJ-45 female connector on the back of the HMI and on the bottom of the PLC accept the mating connector of a CAT-5E/CAT-6E Ethernet cable. If an Ethernet switch is not provided, the cable can connect the HMI directly to the PLC. The CompactLogix PLC has a built-in switching device and performs its own polarity checking. All network devices have an IP Address and a Subnet Mask identifying its position on the network. The following IP Addresses and Subnet Masks apply to the devices listed below:

Modicon M340 PLC Processor Ethernet Connection

IP Address: 10.100.38.108

Subnet Mask: 255.255.255.0

Schneider Harmony ST6 HMI (Control Panel Door)

IP Address: 10.100.38.109

Subnet Mask: 255.255.255.0

Gateway: 0.0.0.0

Passcode Protected Screen - Passcode Box Info:

Passcode: Enter “2000” (200 – the numbers representing the model DP2000) to exit the HMI application and enter FactoryTalk View ME Station.

MAINTENANCE

SCHEDULED ACTION

Tank Mixer Gear Drive – This synthetic lubrication does not require periodic changing. The lubrication should only be replaced when maintenance is performed that requires disassembly.

Air Compressor Tank (if applicable) - Drain condensate monthly.

Mixing Chamber (shutdown longer than one week) - Flush by turning polymer feed off and allowing system to batch with water only until all polymer residue disappears.

MAINTENANCE

1. Clean ancillary water and/or polymer strainers weekly.
2. Flush system monthly following one-week procedure.
3. Refer to the appendix for specific information on drawings, part identification, and components.

SPECIAL TOOLS

No special tools needed for operation, maintenance, and repair of components.

It is a good idea to have the following tools on hand for maintenance or disassembly.

- combination wrenches: 3/8-3/4"
- drive tools: drive ratchet; 3" and 6" extension bars; universal joint
- sockets: 7/16-7/8"
- screwdrivers: slotted (1/4 x 4", 5/16 x 6"); Phillips (#1 x 3", #2 x 4")
- hex keys: 5/64-1/4"
- pliers: 6" slip joint; 10" tongue & groove
- 8" adjustable wrench
- 12-oz. ball pein hammer and utility knife

PREDICTED LIFE SPAN

There is no predicted life span of wear parts as each application and operation varies.

OPERATING PROCEDURES

For normal operation, once settings are adjusted based on operation parameters, the system can simply be turned ON or OFF. Special operating instructions for Seasonal operation do not apply.

EMERGENCY OPERATING INSTRUCTIONS

Emergency operating instructions do not apply to UGSI Chemical Feed, Inc. Products equipment. In case of an emergency, **TURN OFF POWER TO STOP RUNNING.**

Recommended Spare Parts

- (1) 7802918 Mechanical Seal
- (4) 6091801 O-Ring
- (2) 4422502 Fuse, Volumetric Feeder
- (1) 3140001 Cylinder Feeder Snout
- (1) 7804805 Bellows Seal
- (1) 2968004 Snout Cover (red)

Manufacturer

Phone Customer Service @ 856.896.2160
Hours are 8 a.m. to 5 p.m., Eastern Time, Monday - Friday.

Fax Fax number is 856.457.5920

Web Address www.ugsichemicalfeed.com UGSI
Chemical Feed, Inc.
1901 W. Garden Rd.
Vineland, NJ USA

**DP2000/DD4
DRY POLYMER SYSTEM
ALARM TROUBLESHOOTING**

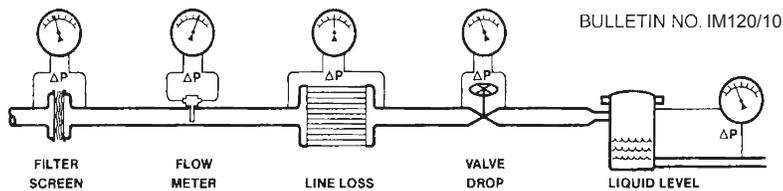
All alarms are displayed on the Operator Interface screen in plain text to indicate the problem as clearly as possible. Here is a list of alarm messages along with possible causes and solutions. When an alarm occurs press F1 (alarm silence) to silence the audible alarm. Then refer to the following list. Once the cause of the alarm is corrected, press F2 (alarm reset).

ALARM	POSSIBLE CAUSE	CORRECTIVE ACTION
Low Water Flow	Triggered while the disperser is running and water flow through the disperser is lower than the setpoint of the differential pressure switch.	<ul style="list-style-type: none"> • Check that systems water supply can provide sufficient water flow to the unit. • Check that the piston in the differential pressure switch/gauge moves freely. The piston can be accessed from the black nut on the right side of the switch/gauge. • Check that the blue pneumatic ball valve opens when the disperser starts. • Check the set-point of the differential pressure switch /gauge. It should be set to alarm at 7-10 PSID.
Low Water Pressure	Triggered while the disperser is running and static water pressure in the supply pipe is lower than the setpoint of the water pressure switch.	<ul style="list-style-type: none"> • Check the water pressure gauge. It should read at least 35 PSI static. • Check that the water supply to the system can maintain sufficient water pressure to the unit while it is running. • Check the setpoint of the water pressure switch. It should alarm at 20 PSI.
Low Air Pressure	Triggered at any time the air pressure to the unit drops below setpoint (60 PSI).	<ul style="list-style-type: none"> • Check the air pressure gauge. It should show 100 PSI. • Check the setpoint of the air pressure switch. It should be set to alarm at 60 PSI. • Check that the air compressor has power to it.
Disperser Motor Overload	Triggered by a contact from the disperser motor starter.	<ul style="list-style-type: none"> • Press the E-STOP button. Turn the power off at the panel disconnect switch. Check for obstruction in the disperser interface bowl and check the motor coupling. • If motor is hot, allow to cool. • Locate the disperser manual starter inside the panel. To reset, press the red button followed by the green button. Turn disconnect switch on, reset the alarm and pull the E-STOP button out. Check the amp draw of the motor.

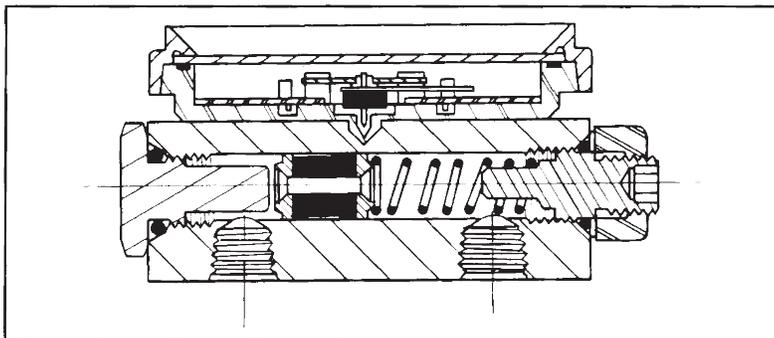
DD4 Information

System Components

Pressure Gauge



Model 120 Series "Filter Minder"[®] Installation and Operating Instructions



INSPECTION

Before installation check the nameplate on each instrument against the receiving paperwork and the intended application for correct part number, materials of construction, working pressure, dial range, etc. If equipped with switches, check electrical rating, type of enclosure, etc. Inspect for shipping damage and, if damaged, report it immediately.

NOTE - Before attempting repairs contact your local Mid-West Representative or our factory. Failure to do so will void any warranty.

PRODUCT DESCRIPTION

The Model 120 Series "Filter Minder"[®] is a rugged, medium-range differential pressure instrument available as a switch, a gauge, or both. See "Part Numbering System". (Fig. 4) for available options.

Differential pressure is sensed by the movement of a floating piston magnet against a calibrated spring. The magnetically coupled gauge pointer outside the pressure housing follows the movement of the piston magnet and indicates differential pressure on the dial scale.

When equipped with switches, a contact is made or broken by the magnetic field of the piston magnet. See Bulletin ELECIM120/latest for gauges with switches.

The unit provides full over-range protection to the rated working pressure of the housing in either direction.

The precise piston/bore fit allows minimal leakage from high to low sides. This leakage is only 5 to 15 SCFH air at ambient conditions and a pressure differential of 100 PSID.

INSTALLATION

Model 120 Series "Filter Minder"[®] is calibrated and tested prior to shipment and is ready for immediate installation. Use of the following installation procedures should eliminate potential damage and provide optimum trouble-free operation.

1. CONNECTIONS

1/4" FNPT are provided as standard but check paperwork for connections ordered. There are two connections on the housing identified as "hi" and "lo" for high pressure and low pressure (Fig. 2). Be sure these get plumbed to the proper connections on your system. Improper connection will not damage the instrument, but it will not function properly. Flexible tubing is recommended to minimize the effect of any vibration that may exist.

2. INSTRUMENT LOCATION

On liquid service the instrument should be mounted **below** the process connections to facilitate self-bleeding. On gas service it should be located **above** the process connections to promote self-draining. If the process contains particulates, a "pigtail" loop or drop leg (manometer "U-tube" configuration) in the tubing will minimize the possibility of it migrating into the instrument.

3. PANEL MOUNTING

Gauges with 2-1/2" dials can **only** be mounted through the **rear** of the panel. Make the proper panel cutout as indicated in (Fig.1). Remove the (4) bezel screws. Insert the gauge front through the rear of the panel and reinstall the bezel screws through the **front** of the panel and into the gauge bezel. Tighten the screws securely, alternating in a **diagonal** pattern.

Gauges with 3-1/2" dial should be mounted from the front of the panel. Contact factory for mounting information and dimensional data.

Gauges with 4-1/2" dial should be mounted from the **front** of the panel. Make the cutout as indicated in (Fig. 1). Insert the (4) panel mounting studs, finger tight, into the metal inserts located in the rear of the bezel. Insert the gauge through the panel, aligning the panel mounting studs with the holes in the panel. Install the (4) #8-32 nuts onto the studs and tighten securely.

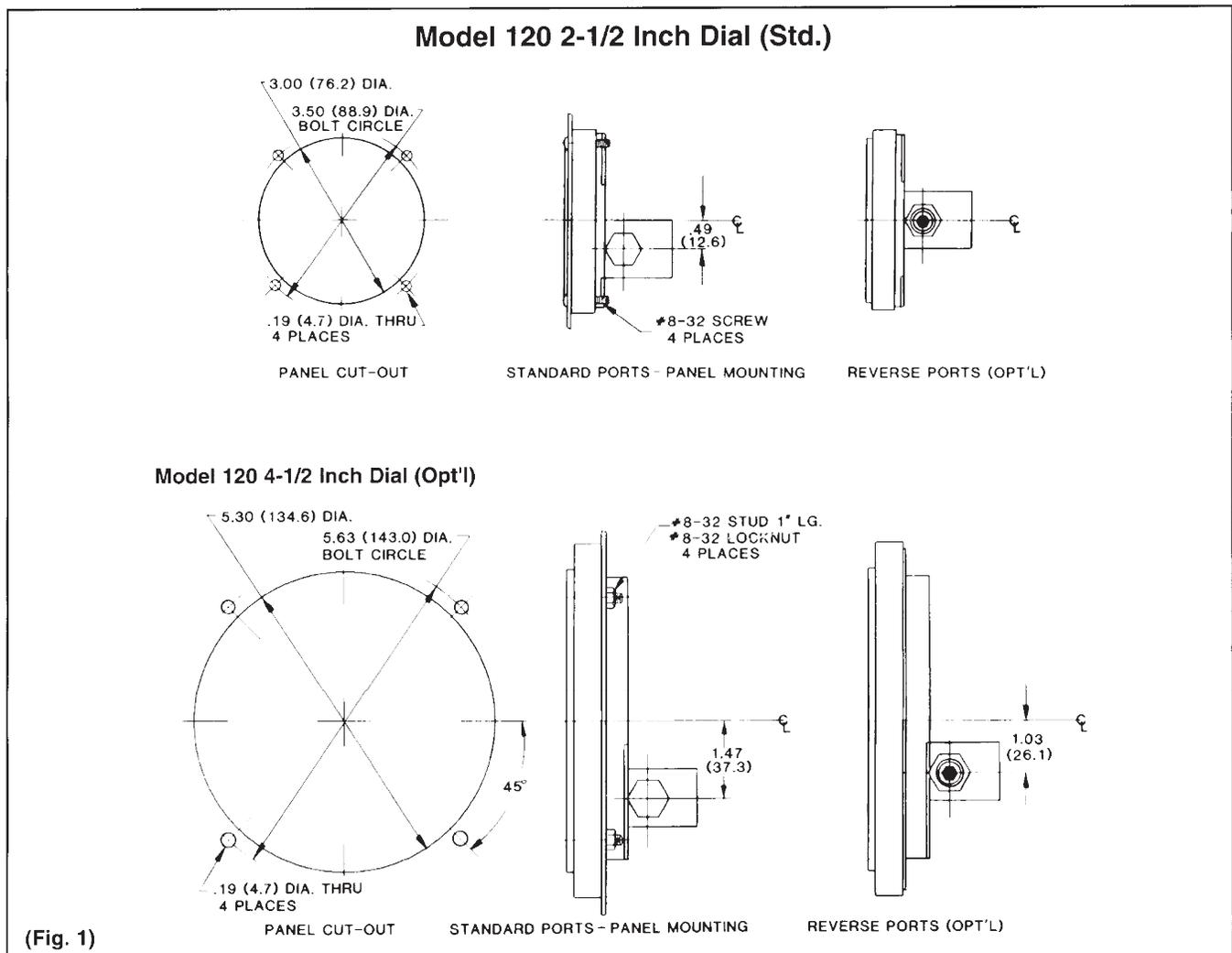
4. PIPE MOUNTING

An optional pipe mounting kit is available for mounting the gauge to a 2" vertical or horizontal pipe (Fig. 3).

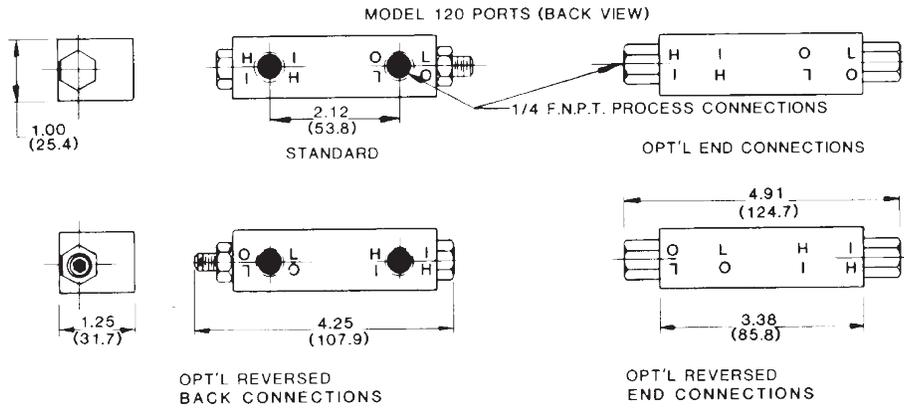
TROUBLE SHOOTING

1. Gauge does not indicate differential.

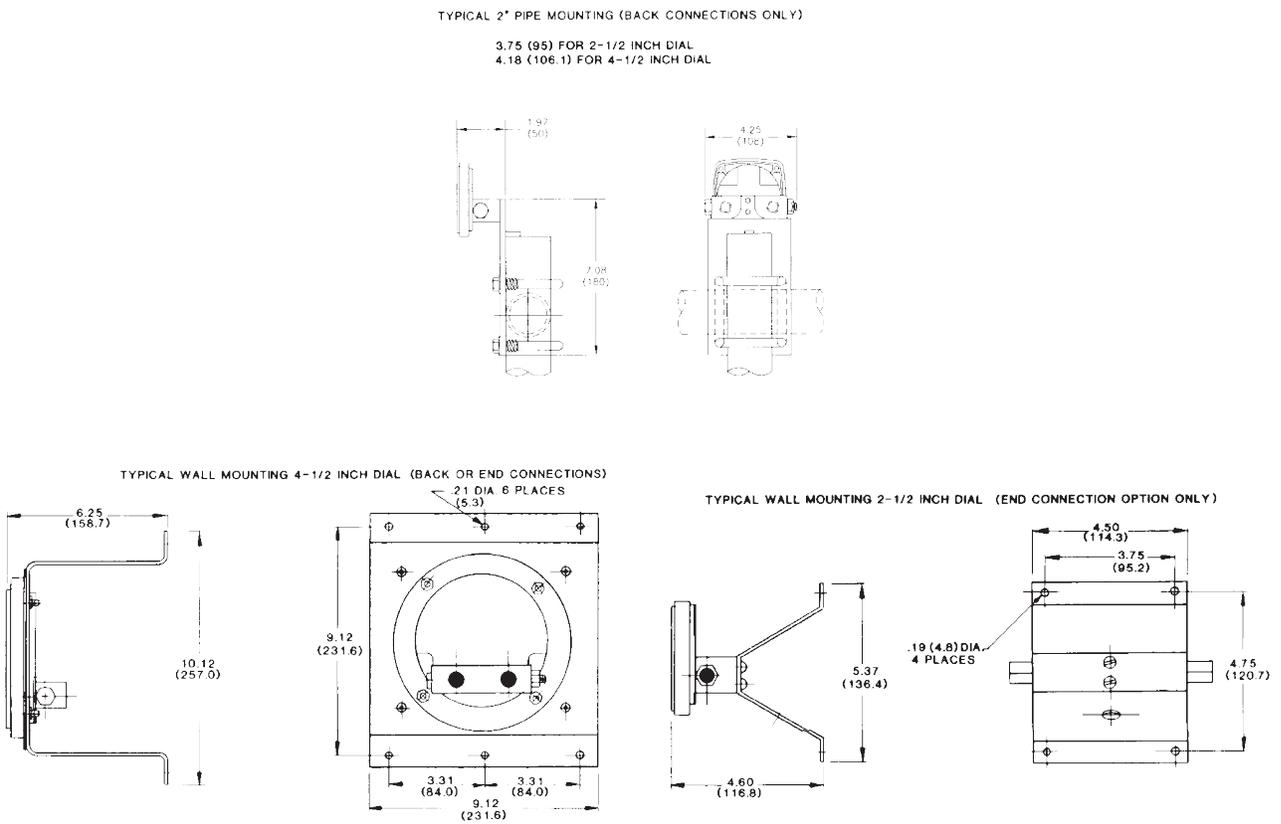
- A. Check for proper hook up, high to "hi" and low to "lo".
- B. Make certain block valves are open and, if using a 3-valve manifold, that the equalizer (balance) valve is closed.
- C. If A & B check out correctly, loosen or disconnect the high pressure line to determine if there is pressure to the instrument.
- D. If there is pressure to the instrument, check to determine that there is differential across the unit being monitored. If so, contact the factory for assistance and/or an "RGA" (return goods authorization) number to return the instrument for repair or replacement.



Supplementary 120 Dimensional/Mounting Data



(Fig. 2)



(Fig. 3)

- NOTES: 1. Drawings show standard gauge nominal dimensions. (not to scale)
 2. Dimensions shown in parentheses are in millimeters.
 3. Manufacturer reserves the right to change specifications without prior notice.

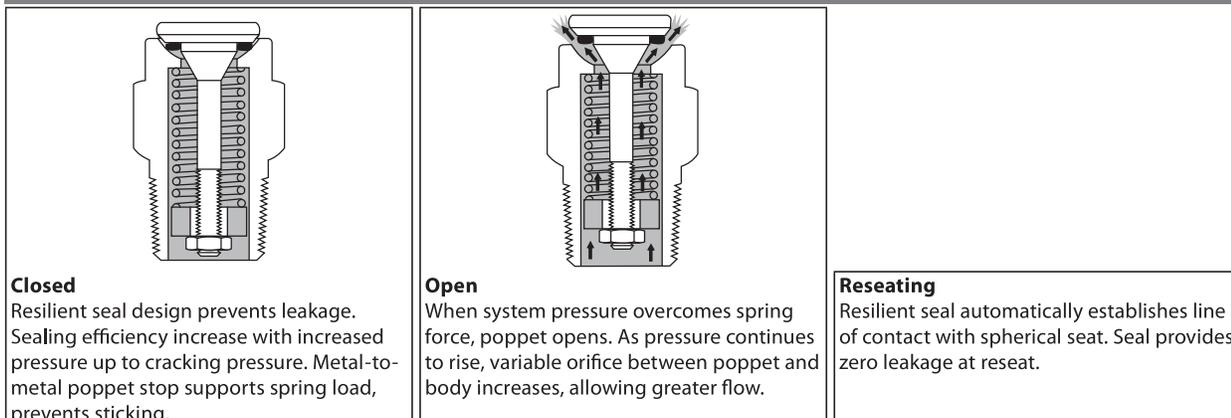
Check Valve

Polymer Injection Check Valve

- Poppet Typed Check Valve
- Viton O-Ring
- 1/2" connections
- -20 to +400 deg/ F
- 20 PSI Cracking Pressure
- Circle Seal Part Number 532T1-4M-20

* The check valve is mounted to the mixing chamber so the emulsion polymer meets the dilution water as close to the mixing energy as possible to avoid plugging. The poppet design allows the polymer to be injected as a thin film into the mixing chamber, increasing the chemical surface area, and aiding in the mixing performance.

How it Works



Circle Seal Controls

2301 Wardlow Circle • Corona, CA 92880
Phone (909) 270-6200 Fax (909) 270-6201
www.circle-seal.com

ADJUSTING INFORMATION

Two tools for adjusting cracking pressure range are listed in the chart below; the adjusting tool, 10086 and nut driver, 10087. Use them as follows:

1. Remove Valve from service.
2. Fit proper size adjusting tool (see chart below) over the spring guide (3-fingered spider) in the inlet end.
3. Place nut driver (10087) inside the adjusting tool (10086) and loosen lock nut. Remove nut driver leaving adjusting tool engaged with spider nut. Press down on valve housing to compress spring, causing poppet to raise above housing seat. Turn poppet head with your fingers clockwise or counter clockwise to increase or decrease cracking pressure.
4. On inline models (500-*MP) proceed as in step 3 until it is necessary to turn poppet head. Insert screwdriver into slot in poppet head and turn screwdriver clockwise or counter clockwise to increase or decrease cracking pressure.

NOTE: Older models, which do not have a slot in the poppet head, require the use of a wood spacer, secured by a pipe plug, to hold poppet while adjusting.

5. Test for desired adjustment.
6. Hold spring seat spider nut stationary with adjusting tool and cinch lock nut against spider with nut driver after desired setting is obtained.
7. Retest to be sure adjustment is not changed.

CIRCLE SEAL CONTROLS

RELIEF VALVES 500 SERIES

Popoff, inline .5-150 PSI

ADJUSTMENT TOOLS

SIZE	1M/2MP	2M/3MP	3M/4MP	4M/6MP 6M/8MP	8M/10MP
ADJUSTING TOOL	10086-1	10086-2	10086-3	10086-4	10086-5
NUT DRIVER	10087-1	10087-2	10087-3	10087-4	10087-5

Solenoid Valve

Design:

2-way solenoid valve, direct acting, normally closed (Circuit function A), normally open (Circuit function B).

3-way solenoid valve, direct acting, normally closed (Circuit function C), normally open (Circuit function D), mixer function (Circuit function E) or diverter function (Circuit function F).

Seal Materials and Fluids handled:

See Table1.

Fluid and Ambient Temperature:

For Hazardous Locations Div. 1 (T4 rated)

Max. Ambient Temperature 104 °F (40 °C)

Max. Fluid Temperature 194 °F (90 °C)

For Hazardous Locations Div. 2 and Ordinary Locations:

See Table1.

Pressure Range:

Maximum inlet pressure see label on valve.

Type 0330: PTFE tape is recommended for sealing ports. Mounting is accomplished by means of four M4 x 8 mm tapped holes located on the valve underside.

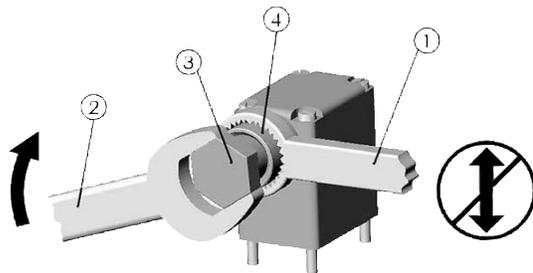
Type 0331: Ports A (B) are coded on side of body. For common pressure, align "A(B)" markings on valve and manifold. Valve operation C and D valves can be mounted on the same manifold but the manual override buttons will point in opposite directions. To remove valve from manifold loosen only the two unsealed screws. Manifolds can be connected together with nipples. Blanking plugs, Order No. 0315-1016, should be screwed into the unused ports. Manifolds can be fixed in position using M5 screws.

Manual override:

The manual override can be retained in position if, after depressing the button, it is turned in a clockwise direction.

Assembly instructions:

The conduit connector on the coil (4) must be supported against torque during the assembly using appropriate tools (1) (i.e. pliers, gripper...) (for example a gripper). While tightening for example a fitting (3) into the conduit connector attention must be paid to the fact that a max. torque of 20Nm (177lbf in) is not exceeded.



Marking (example):

Body Material

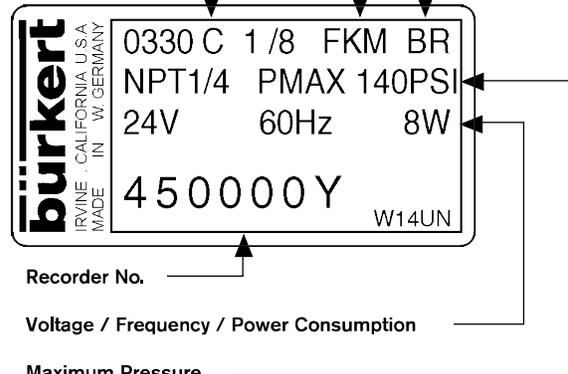
BR = Brass
SS = Stainless Steel

Seal Material

EPDM = EPDM
NBR = NBR
FKM = FKM

Circuit Function

A = 2-way - Normally Closed
B = 2-way - Normally Open
C = 3-way - Normally Closed
D = 3-way - Normally Open
E = Mixer Function
F = Diverter Function



Recorder No.

Voltage / Frequency / Power Consumption

Maximum Pressure

Approvals

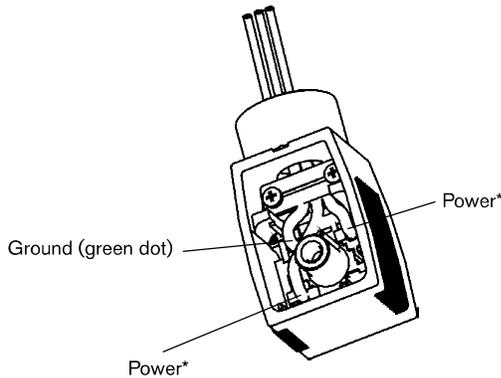
The valve is FM/CSA approved as
Explosion Proof valve for Hazardous Locations
Class I, Division 1, Group A, B, C, D
Class II, Division 1, Group E, F, G
Class III, Division 1 and 2
Operating Temperature T 4

or FM approved as
Nonincendive for Hazardous Locations
Class I, Division 2, Group A, B, C, D
Class II, Division 2, Group F, G
Class III, Division 1 and 2
Operating Temperature T 4A
CSA approved for Ordinary Locations
UL Recognized and UL Listed for General Purpose and Fire Protection Services.

See label on the valve.

Operating Instructions 1103/13_EU-EN_00893144

		Seal materials		
Fluid	Temperatures [°F]	NBR	EPDM	FKM
Air	Fluid	+ 32 to + 176	- 22 to + 194	+ 32 to + 194
	Ambient	+ 32 to + 131	+ 14 to + 131	+ 32 to + 131
Water	Fluid	+ 41 to + 176	+ 41 to + 194	+ 41 to + 194
	Ambient	+ 32 to + 131	+ 14 to + 131	+ 32 to + 131
Neutral gas	Fluid	+ 32 to + 176	- 22 to + 194	+ 32 to + 194
	Ambient	+ 32 to + 131	+ 14 to + 131	+ 32 to + 131
Light oil	Fluid	+ 32 to + 140		+ 32 to + 140
	Ambient	+ 32 to + 131		+ 32 to + 131
LP-gas	Fluid	+ 32 to + 140		+ 32 to + 140
	Ambient	+ 32 to + 131		+ 32 to + 131

Wiring Diagram**Electrical Connection Type 2509**

* Orientation is not important

Electrical Connection:

Ensure supply voltage/frequency corresponds with that on label.
Voltage tolerance is $\pm 10\%$.
Available Electrical Connections see "Marking".
Wiring diagram see above.

For this product to be considered UL-listed and CSA approved for General Purpose and FM approved for Hazardous Locations Division 2, it must be in conjunction with the type 2509 cable plug connector (Electrically Operated Valves Parts, YSYI2). The connector and gasket must be assembled to the valve with the screw provided after the connection of the wire leads. This valve and connector assembly is delivered together and is to be used as one unit.

For valves to be used in Intrinsically Safe Applications the positive pole is identified by a "+" on the pin or wire No. 1 has to be connected to the "+".
See Control Drawing for the Rules of Interconnection.

Warning:

All valves to be used in Intrinsically Safe Applications must be clearly marked as Intrinsically Safe Apparatus.

Trouble-Shooting:

Check port connections, minimum operating pressure differential if required and supply voltage. Ensure pilot hole in piston is clear and pilot bore in the valve outlet is not obstructed. If core does not pull in, check for short circuit, coil burn-out or foreign matter impeding core movement. A jammed or missing core causes the coil to overheat in the case of AC supply.

Warning:

These products are designed to operate in a wide variety of applications, it is the user's responsibility to select a model that is appropriate for the application. This product is designed to be installed only by suitably qualified and trained personnel. Specifications should not be exceeded under any circumstances.

The torque for the terminal screw on type 2509 is 0,5 Nm (4,4 lbf-in.).

Changes made to this product will render any applicable warranty null and void.

Specifications subject to change without notice.

Any questions? Please call Bürkert Contromatic Technical Service at (949) 223 31 00.

bürkert**Germany**

Contact address:

Bürkert Fluid Control Systems
Sales Center
Chr.-Bürkert-Str. 13-17
D-74653 Ingelfingen
Tel. + 49 (0) 7940 - 10 91 111
Fax + 49 (0) 7940 - 10 91 448
E-mail: info@de.buerkert.com

International

Contact addresses can be found on the Internet at:

www.burkert.com → Bürkert → Company → Locations

Design:

4-way solenoid valve, internally piloted, P connected to port B and R connected to port A when deenergized.

Seal Materials and Fluids handled:

See Table 1.

Fluid and Ambient Temperature:

For Hazardous Locations Div. 1 (T4 rated)
 Max. Ambient Temperature 104 °F (40 °C)
 Max. Fluid Temperature 140 °F (60 °C)
 The UL-listed valve for Hazardous Locations is suitable for the fluids air, inert gas, water and gasoline.

For Hazardous Locations Div. 1 (T6 rated)

Max. Ambient Temperature 104 °F (40 °C)
 Max. Fluid Temperature 140 °F (60 °C)

For Intrinsically Safe Apparatus for use in Class I, II and III, Division 1 Hazardous Locations.

Max. Ambient Temperature 140 °F (60 °C)
 Max. Fluid Temperature 140 °F (60 °C)

For Hazardous Locations Div. 2 and Ordinary Locations:

See Table 1.

Pressure Range:

Maximum inlet pressure see label on valve.

Installation:

Before installing valve ensure that piping etc. is free of foreign matter (metal shavings, pipe sealing materials, welding scale etc.). Installation as required but preferable with coil uppermost. Installation in this position tends to prevent foreign matter remaining in core tube (increased life). Do not put any loads on coil unit.

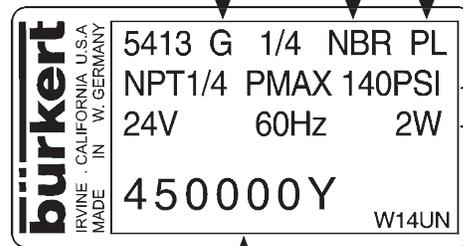
PTFE tape is recommended for sealing ports. Mounting is accomplished by means of four M4 x 8 mm tapped holes located on the valve underside. Letters on valve body indicate pressure port, exhaust and outlet of the valve.

Marking (example):

Body Material
 PL = Polyamide

Seal Material
 NBR = NBR
 FKM = FKM

Circuit function
 G = 4-way



Item No. _____

Voltage / Frequency / Power Consumption _____

Maximum Pressure _____

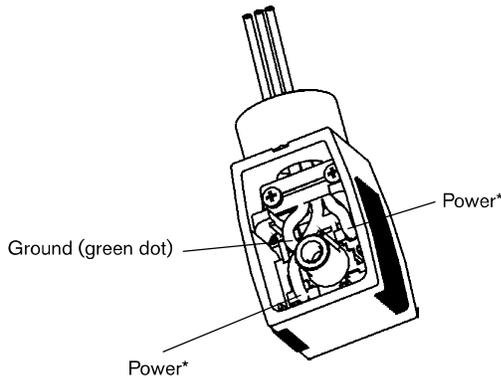
Approvals

- The valve is either approved as
- General Purpose valve for Hazardous Locations
 - Class I, Division 1, Group A, B, C, D
 - Class II, Division 1, Group E, F, G
 - Class III, Division 1 and 2
 - Operating Temperature T 4
 - or
 - General Purpose valve for Hazardous Locations
 - Class I, Division 1, Group A, B, C, D
 - Class II, Division 1, Group E, F, G
 - Class III, Division 1 and 2
 - Operating Temperature T 6
 - or
 - Intrinsically Safe Apparatus for Hazardous Locations
 - Class I, Division 1, Group A, B, C, D
 - Class II, Division 1, Group E, F, G
 - Class III, Division 1
 - Operating Temperature T 6
 - or
 - FM approved as
 - Nonincendive for Hazardous Locations
 - Class I, Division 2, Group A, B, C, D
 - Class II, Division 2, Group F, G
 - Class III, Division 1 and 2
 - Operating Temperature T 4
 - UL listed for General Purpose
 - CSA approved for General Purpose
- See label on the valve.

Operating Instructions 0605/09_EN-EN_00801869

MAN 1000010157 EN Version: J Status: PL (released | freigegeben) printed: 18.08.2014

Table 1		Seal Materials	Seat / O-ring
Fluid	Temperatures [°F]	Buna "N" NBR	FKM
Air	Fluid Temp.	+ 14 to +140	+ 14 to +140
	Ambient	+ 14 to +130	+ 14 to +130
Neutral gas	Fluid Temp.	+ 14 to +140	+ 14 to +140
	Ambient	+ 14 to +130	+ 14 to +130

Wiring Diagram**Electrical Connection Type 2509**

* Orientation is not important

Electrical Connection:

Ensure supply voltage/frequency corresponds with that on label.
Voltage tolerance is $\pm 10\%$.
Available Electrical Connections see "Marking".
Wiring diagram see above.

For this product to be considered UL-listed and CSA approved for General Purpose and FM approved for Hazardous Locations Division 2, it must be in conjunction with the type 2509 cable plug connector (Electrically Operated Valves Parts, YSYI2). The connector and gasket must be assembled to the valve with the screw provided after the connection of the wire leads. This valve and connector assembly is delivered together and is to be used as one unit.

For valves to be used in Intrinsically Safe Applications the positive pole is identified by a "+" on the pin or wire No. 1 has to be connected to the "+".
See Control Drawing for the Rules of Interconnection.

Warning:

All valves to be used in Intrinsically Safe Applications must be clearly marked as Intrinsically Safe Apparatus.

Trouble-Shooting:

Check port connections, minimum operating pressure differential if required and supply voltage. Ensure pilot hole in piston is clear and pilot bore in the valve outlet is not obstructed. If core does not pull in, check for short circuit, coil burn-out or foreign matter impeding core movement. A jammed or missing core causes the coil to overheat in the case of AC supply.

Warning:

These products are designed to operate in a wide variety of applications, it is the user's responsibility to select a model that is appropriate for the application. This product is designed to be installed only by suitably qualified and trained personnel. Specifications should not be exceeded under any circumstances.

The torque for the terminal screw on type 2509 is 0,5 Nm (4,4 lbf-in.).

Changes made to this product will render any applicable warranty null and void.

Specifications subject to change without notice.

Any questions? Please call Bürkert Contromatic Technical Service at (949) 223 31 00.

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Tel. + 49 (0) 7940 - 10 91 111
Fax + 49 (0) 7940 - 10 91 448
E-mail: info@de.buerkert.com

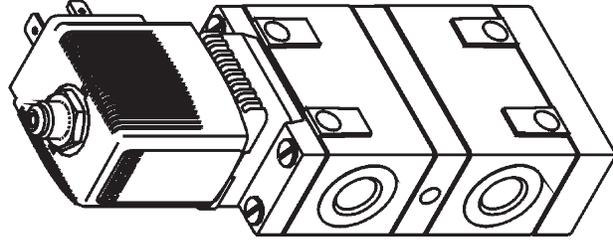
International

Contact addresses can be found on the Internet at:

www.burkert.com → Bürkert → Company → Locations

Type 5413

4/2-Wege-Magnetventil für Pneumatik
4/2 solenoid valve
for pneumatic systems
Electrovanne 4/2 voies
pour pneumatique
Válvula magnética de 4/2 pasos
para neumática



bürkert
Fluid Control Systems

Sicherheit

(D)

Bestimmungsgemäße Verwendung



Bitte beachten Sie die Hinweise dieser Betriebsanleitung sowie die Einsatzbedingungen und zulässigen Daten gemäß Datenblatt Typ 5413, damit das Gerät einwandfrei funktioniert und lange einsatzfähig bleibt. Bei Nichtbeachtung dieser Hinweise sowie bei unzulässigen Eingriffen in das Gerät entfällt jegliche Haftung unsererseits, ebenso erlischt die Garantie auf Geräte u. Zubehörteile! Das Gerät dient ausschließlich als 4/2-Wege-Magnetventil für die lt. Datenblatt zulässigen Medien. Eine andere oder darüber hinausgehende Benutzung gilt als **nicht bestimmungsgemäß**. Für hieraus resultierende Schäden haftet Bürkert nicht. Das Risiko trägt allein der Anwender.



ACHTUNG!

- Halten Sie sich bei Einsatzplan und Betrieb des Gerätes an die einschlägigen allgemein anerkannten sicherheitstechnischen Regeln.
 - Treffen Sie geeignete Maßnahmen, um unbeabsichtigtes Betätigen oder unzulässige Beeinträchtigungen aususchließen.
 - Beachten Sie, daß in Systemen, die unter Druck stehen, Leitungen und Ventile nicht gelöst werden dürfen.
 - Schalten Sie vor Eingriffen in das System in jedem Fall die Spannung ab!
 - Achten Sie auf den einwandfreien Sitz der Dichtung beim Verschrauben der Spule mit der Geräteresteckdose.
 - Festsitzender Kern bewirkt bei Wechselspannung (AC) Spulenüberhitzung!
- WARNUNG!**
- Verletzungsgefahr! Bei Dauerbetrieb kann die Spule sehr heiß werden.

MAN 1000010015 ML Version: J Status: RL (released | freigegeben) printed: 18.08.2014

Safety

(GB)

Proper Usage



To ensure the proper function of the device and promote long service life, you must comply with the information in these Operating Instructions and the application conditions and specifications provided in the Type 5413 Data Sheet. Usage of the device in a manner that is contrary to these Operating Instructions or the application conditions and specifications provided in the Type 5413 Data Sheet is improper and will void your warranty.

This device serves exclusively as a 4/2-way solenoid valve for the media stated to be permissible on the data sheet. Any other use is considered improper use. **Bürkert will not be responsible for any improper use of the device.**



ATTENTION!

- Be sure to observe generally accepted safety rules when planning, installing and using this device. For example, take suitable measures to prevent unintentional operations of the device.
 - Do not impair the operation of the device.
 - Do not attempt to detach or unscrew any lines or valves in the system that are under pressure, and always be sure to switch off the voltage supply before working on the system.
 - When attaching the coil to the plug socket, be sure the seal is properly seated.
 - Jammed coils can cause coil overheating with AC!
- WARNING!**
- Do not touch the coil during use as it becomes very hot.

Utilisation conforme aux prescriptions



Afin que l'appareil puisse fonctionner parfaitement et pendant longtemps, veuillez observer les instructions contenues dans cette notice d'utilisation ainsi que les conditions d'utilisation et les données admissibles mentionnées dans la fiche technique du type 5413. En cas d'observation de ces instructions et d'interventions non autorisées dans l'appareil, nous déclinons toute responsabilité et la garantie couvrant l'appareil et les accessoires s'éteint! L'appareil sert uniquement technique. Une autre utilisation ou une utilisation excédant ce contexte sera considérée comme **non conforme aux prescriptions**. Pour les dommages qui en résulteraient, le fabricant/fournisseur décline toute responsabilité. L'utilisateur seul en assume le risque.



ATTENTION!

- Pour la planification de l'utilisation et l'exploitation de l'appareil, veuillez vous en tenir aux règles applicables et généralement reconnues en matière de technique de sécurité.
 - Prenez les mesures nécessaires pour exclure tout actionnement involontaire ou des altérations inadmissibles.
 - Notez qu'il n'est pas permis de desserrer des conduites ou des vannes se trouvant sous pression dans des systèmes! Avant d'intervenir dans le système, coupez l'alimentation électrique dans tous les cas!
 - Veillez à ce que le joint repose parfaitement lorsque vous visserez la bobine avec le connecteur.
 - Un noyau bloqué provoque en cas d'alimentation en tension alternative (AC) une surchauffe de la bobine!
- AVERTISSEMENT!**
- Risque de blessure! En cas de fonctionnement permanent, la bobine peut devenir très chaude.

Utilización con arreglo a las disposiciones



Se ruega observar las indicaciones contenidas en este Manual de instrucciones así como las condiciones de uso y datos admisibles con arreglo a la hoja de servicio Tipo 5413, de modo que el aparato funcione impecablemente y permanezca durante largo tiempo apto para el empleo. La inobservancia de estas indicaciones así como las intervenciones inadmisibles en el aparato suponen la declinación por nuestra parte de toda clase de responsabilidad, además de la extinción de la garantía de los aparatos y de las piezas de los accesorios. El aparato sirve exclusivamente como válvula magnética de 4/2 pasos para los medios autorizados según la hoja de datos. Cualquier otra utilización que vaya más allá **no será conforme a las disposiciones**. El fabricante / suministrador no es responsable de los daños que de ello pudieran resultar. El riesgo corresponde únicamente al usuario.



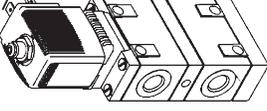
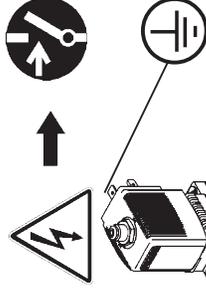
¡ATENCIÓN!

- Para la planificación y operación del aparato atenerse a las correspondientes reglas generales y reconocidas de la técnica de seguridad.
 - Tomar las medidas apropiadas para excluir accionamientos no intencionados o perjuicios inadmisibles; prestar atención a que en el caso de sistemas que se encuentren bajo presión no deben desconectarse conducciones y válvulas.
 - Antes de proceder a intervenciones en el sistema desconectar siempre la tensión.
 - Prestar atención al asiento impecable de la empaquetadura al atornillar la válvula con la caja de enchufe para aparatos eléctricos.
 - Con tensión alterna (AC), el macho de asiento duro provoca sobrecalentamiento de la bobina!
- ¡AVISO!**
- ¡Peligro de lesiones! En estado de operación continua la bobina puede ponerse muy caliente.

Safety / Sécurité / Seguridad

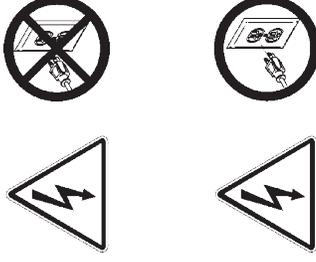
①

Spannungsfreie Montage / Voltage-free assembly
Montage sans tension / Montaje libre de tensión



②

Elektrischer Anschluß / Electrical connection /
Raccordement électrique / Conexión eléctrica

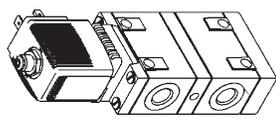
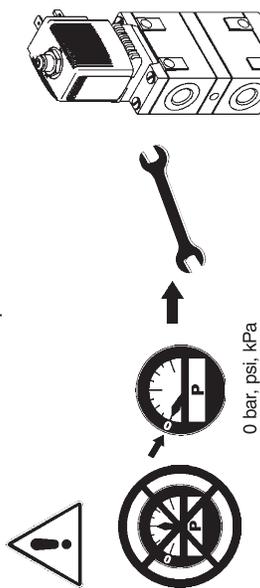


Sicherheit

D GB F E

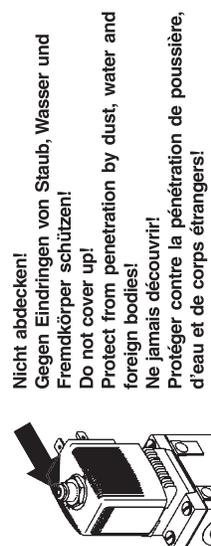
Safety / Sécurité / Seguridad

③ Fluidischer Anschluß / Fluid connection /
Raccordement fluide / Conexión fluidica



Anschluß P und R nicht vertauschen!
Do not interchange the P and R ports!
Ne pas permuter les raccords P et R!
No cambiar las conexiones P y R!

④ Entlüftungsausgänge / Vent ports / Sorties d'échappement
d'air / Salidas de desaireación

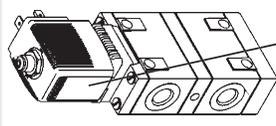


Nicht abdecken!
Gegen Eindringen von Staub, Wasser und
Fremdkörper schützen!
Do not cover up!
Protect from penetration by dust, water and
foreign bodies!
Ne jamais découvrir!
Protéger contre la pénétration de poussière,
d'eau et de corps étrangers!

Technische Daten

D GB

Technical Data



Temperatur / Temperature
Umgebung / Surroundings



Gehäuse/Housing
Polyamid/Polyamide

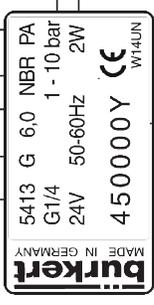
Dichtwerkstoff
Sealing material
NBR

Temp.
Medium
-10 .. +60 °C

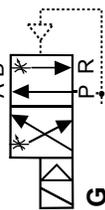
Nennweite/Nominal size

Wirkungsweise
Circuit function

Typ / Type



Beispiel
Example



Bestell-Nr. / Id. No.

Spannung (±10 %) - Frequenz - Leistung
Voltage (±10 %) - Frequency - Power

Nenndruck/Nominal pressure

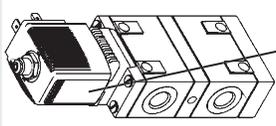
**Druckdifferenz zwischen Anschluß P und R > 1 bar
Pressure difference between connections P and R > 1 bar**

Technische Änderungen vorbehalten
We reserve the right to make technical changes without notice
MAN 1000010015 ML Version: J Status: RL (released | freigegeben)

Technische Daten

F E

Caractéristiques techniques / Datos técnicos



Température d' ambiante
Temperatura de ambiente



Boîtier/Caja
Polyamide/Poliámidida

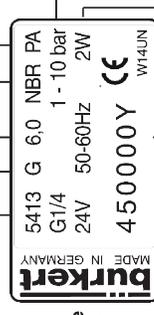
Matériau d'étanchéité
Material de estanqueidad
NBR

Temp.
Fluide/Medio
-10 .. +60 °C

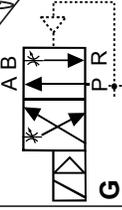
Dimension nominale
Anchura nominal

Fonctionnement
Funcionamiento

Type/Typo



Exemple
Ejemplo



N° id. / N° de pedido

Tension (±10%) - fréquence - puissance
Tensión (±10 %) - frecuencia - potencia

Pression nominale/Presión nominal

**Différence de pression entre raccords P et R > 1 bar
Diferencia de presión entre conexión P y R > 1 bar**

Sous réserve de modification techniques.
Nos reservamos el derecho de llevar a cabo modificaciones técnicas
MAN 1000010015 ML Version: J Status: RL (released | freigegeben)

Contact address

Germany **Deutland** **Alle** **an** **e**
 Boschert Fluid Control System
 Sales Centre
 Boschert Str 13
 D 74653 Inningen
 Tel 49 794 191 111
 Fax 49 794 191 448
 Email info@boschert.com

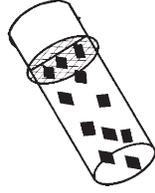
International

Contact addresses can be found on the internet at
 Die Kontaktadressen finden Sie im Internet unter
 Les adresses se trouvent sur internet sous

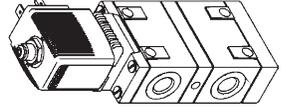
www.boschert.com Company Locations

Montage / Assembly / Montage / Montaje

① Filter verwenden
 Use a filter
 Utiliser filtre
 Usar filtro

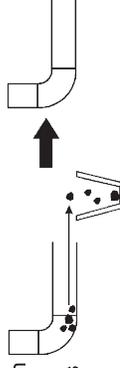


② Einbaulage beliebig
 Any assembly position
 Position de montage quelconque
 Sentido de montaje discrecional

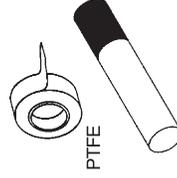


Vorzugsrichtung
 Preferred direction
 Orientation préférentielle
 Colector de lodo

③ Rohrleitungen reinigen
 Cleaning the pipeworks
 Nettoyer les conduites
 Limpieza tuberías



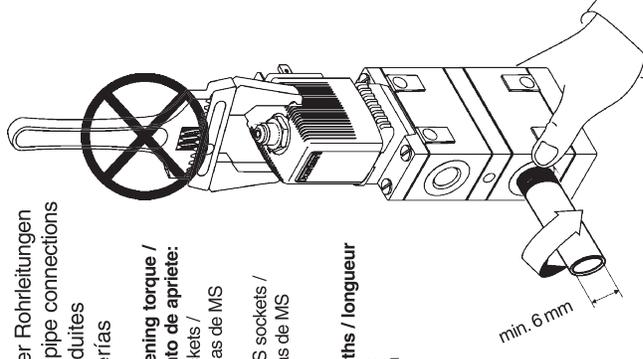
④ Abdichtung
 Seal
 Etanchéification
 Atornillado



PTFE

Montage / Assembly / Montage / Montaje

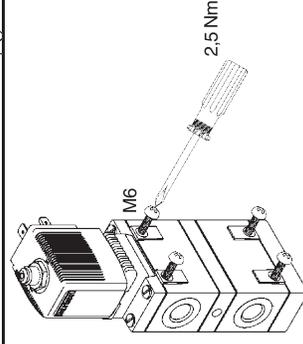
⑤ Einschrauben der Rohrleitungen
 Screwing in the pipe connections
 Vissage les conduites
 Averías las tuberías



Anzugsdrehmoment / tightening torque /
 couple de serrage / momento de apriete:
 mit MS-Buchse / with MS sockets /
 avec douille MS / con hembrillas de MS
 max. 8 Nm
 ohne MS-Buchse / without MS sockets /
 sans douille MS / sin hembrillas de MS
 max. 3 Nm

Gewindelänge / thread lengths / longueur
 du filet / longitud de rosca:
 max. 12 mm

⑥ Befestigung
 Fixing
 Fixation
 Sujeción

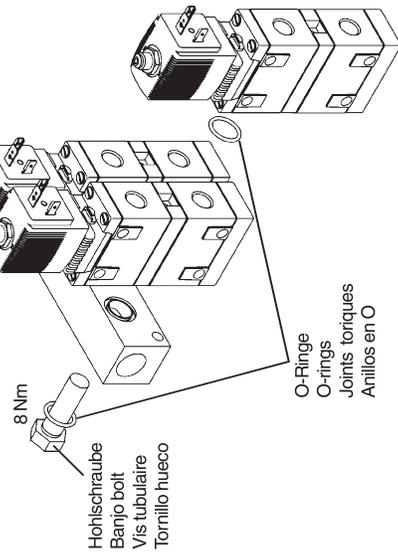


Montage

D GB F E

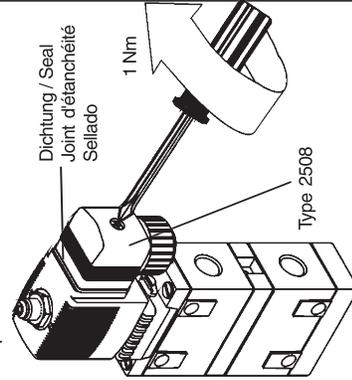
Montage / Assembly / Montage / Montage

7 Anschlussplattenmontage / Mounting the connection plate / Montage de la plaque de raccordement / Montage de las conexiones



8 Gerätesockdose / Instrument socket / Connecteur
Caja de enchufe para aparatos eléctricos

Schutzleiter immer anschließen!
Always connect the protective conductor!
Raccordez dans tous les cas le conducteur de protection!
Conectar en todo caso el conductor de puesta a tierra!

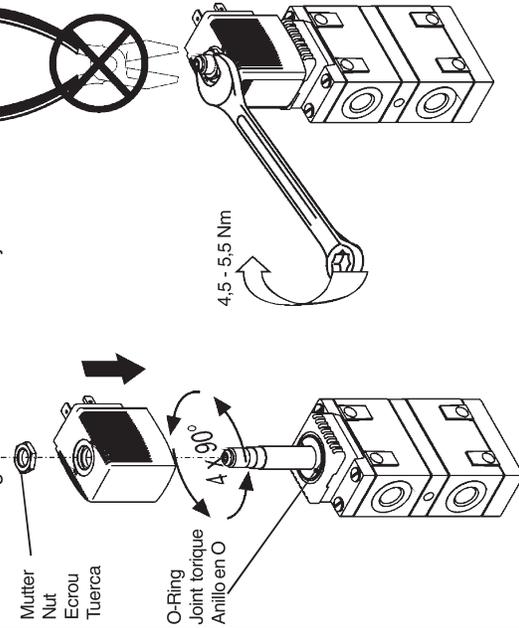


Montage

D GB F E

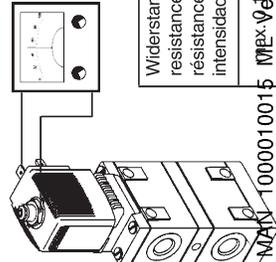
Montage / Assembly / Montage / Montage

9 Spulenmontage / Coil assembly
Montage de la bobine / Montage de bobina



10 Schutzleiterfunktion / Protective conductor function
Fonctionnement du conducteur de protection
Función del conductor de protector

Nach Spulenmontage immer prüfen!
Always test function after assembly of coil!
Toujours vérifier après montage de la bobine!
¡Tras el montaje de bobina pruébese siempre la función!



Widerstand resistance résistance intensidad	Prüfspannung test voltage tension d'essai tensión de prueba	Prüfstrom test current courant d'essai corriente de prueba
--	--	---

1000010015 MEX-VerSign: J Status: RL (released / freigegeben)

Störungen

D GB F E

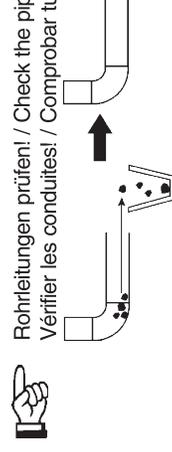
Troubleshooting / Dérangements / Averías

Spannung, Stromart und Betriebsdruck prüfen!
Check the voltage, the type of current and pressure!
Vérifier la tension, le genre de courant et la pression!
Comprobar tensión, clase de corriente y presión!

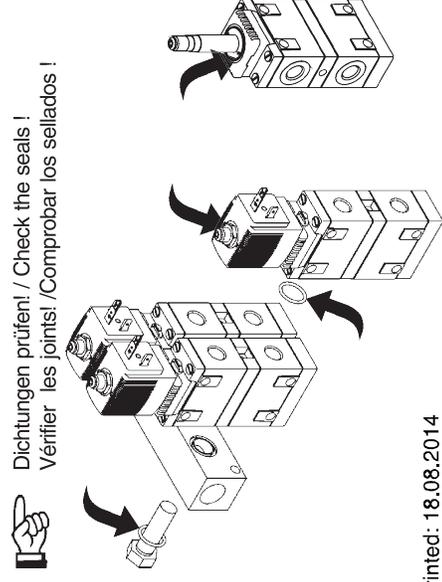


bar, psi, kPa

Rohrleitungen prüfen! / Check the pipework!
Vérifier les conduites! / Comprobar tuberías!

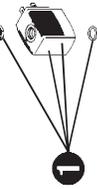
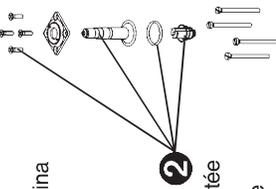
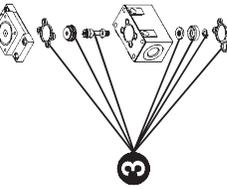
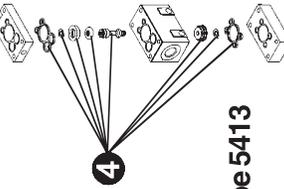


Dichtungen prüfen! / Check the seals!
Vérifier les joints! / Comprobar los sellados!



printed: 18.08.2014

Spare parts / Pièces de rechange / Pieza de repuesto

- 1**  Verschleißteilsatz Spule
 Set of wearing parts coil
 Jeu de pièces d'usure de bobine
 Juego de piezas de cierre de bobina
- 2**  Verschleißteilsatz Vorsteuerung
 Set of wearing parts pilot control
 Jeu de pièces d'usure vanne de pilotée
 Juego de piezas de cierre válvula de mando previo
- 3**  Verschleißteilsatz Ventil 2
 Set of wearing parts valve 2
 Jeu de pièces d'usure vanne 2
 Juego de piezas de cierre válvula 2
- 4**  Verschleißteilsatz Ventil 1
 Set of wearing parts valve 1
 Jeu de pièces d'usure vanne 1
 Juego de piezas de cierre válvula 1

Type 5413

Spare parts / Pièces de rechange / Pieza de repuesto

1 Europa / Europe

Spannung Voltage Tensión Tensión [V]	Leistung Power Puissance Potencia [W]	Id-Nr. Id. No. No cde. No de pedido
24 / DC	2	645 564
24 / 56	2	645 565
110 / 56	2	645 566
230 / 56	2	645 567

1 A.P.A.C.

Spannung Voltage Tensión Tensión [V]	Leistung Power Puissance Potencia [W]	Id-Nr. Id. No. No cde. No de pedido
24 / DC	2	645 564
24 / 56	2	645 565
100 / 56	2	645 568
110 / 56	2	645 566
200 / 56	2	645 569
230 / 56	2	645 567

MAN_10000100145_ML_Version: J-Status: RL (released/freigegeben)

Spare parts/Pièces de rechange/Pieza de repuesto

2

Strom Current Courant Corriente	Id-Nr. Id. No. No cde. No de pedido
AC	645 583
DC	645 584

Satz Set Jeu Juego	Id-Nr. Id. No. No cde. No de pedido
4	645 585
3	645 586

D Bitte geben Sie bei der Bestellung von Ersatzteilen auch die Bestellnummer Ihres Kompletterätes an.

GB When ordering replacement parts, please quote the order number of the complete device in addition to the order number of the replacement part.

F Lors de la commande de pièces de rechange, veuillez également indiquer le numéro de commande de votre appareil complet.

E Con ocasión del pedido de las piezas de repuesto, rogamos indicar además del número de pedido de la pieza de repuesto también el número de pedido de su aparato completo.

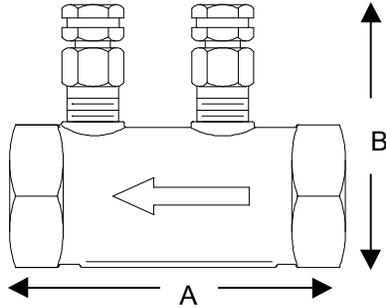
printed: 18.08.2014

Flow Control Valve

AUTOMATIC FLOW CONTROL

1/2" - 1-1/2" THREADED MINI

SPECIFICATIONS:



- PSI / Temperature Rating:** 450 PSI / 250° F
- Cartridge:** AISI Type 304 stainless steel
AISI Type 17-7 PH stainless steel spring
- Body Material:** Ductile-Iron ASTM A445-70
- End Connections:** Female NPT
- Body Tappings:** 1/4" NPT with Pressure test valves
- Assembly:** Valve comes fully assembled

FLOW RATES (+/-5%)

SIZE	MODEL NO.	HEAD LOSS IN FEET ¹	PSID RANGE	GPM
1/2", 3/4"	3521	3.5	1-14	.33, .50, .67, 1.00, 1.33, 1.67, 2.00, 2.33, 2.67, 3.33, 4.00, 4.67, 5.00
	3522	7.4	2-32	.55, .75, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 5.00, 6.00, 7.00, 8.00
	3524	13.4	4-57	.75, 1.00, 1.33, 2.00, 2.67, 3.33, 4.00, 4.67, 5.33, 6.67, 8.00, 9.33, 10.00
	3528	30.0	8-128	1.10, 1.50, 2.00, 3.00, 4.00, 5.00, 6.00, 7.00, 8.00, 10.00, 12.00, 14.00, 16.00
1", 1-1/4", 1-1/2"	3531	3.5	1-14	3.0, 3.33, 4.00, 4.67, 5.33, 6.00, 6.67, 7.33, 8.00, 8.67, 9.33, 10.00, 10.67, 11.33, 12.00, 12.67, 13.33, 14.00, 14.67
	3532	7.4	2-32	4.5, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0, 16.0, 17.0, 18.0, 19.0, 20.0, 21.0, 22.0
	3534	13.4	4-57	6.00, 6.67, 8.00, 9.33, 10.67, 12.00, 13.33, 14.67, 16.00, 17.33, 18.67, 20.00, 21.33, 22.67, 24.00, 25.33, 26.67, 28.00, 29.33
	3538	30.0	8-128	9.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0, 28.0, 30.0, 32.0, 34.0, 26.0, 38.0, 40.0, 42.0, 44.0

DIMENSIONS & WEIGHTS (NOMINAL)

SIZE ²	MODEL NO.	A LENGTH	B HEIGHT	WEIGHT (LBS.)
1/2"	352	5.13	3.00	1
3/4"		3.50	3.00	1
1"	353_	7.50	4.15	3.5
1-1/4", 1-1/2"		6.00	4.15	3.5

NOTES

¹ Head Loss in Feet is provided for pump head calculations. (1 PSI = 2.307 Feet of Water)
² 3/4", 1-1/4", and 1-1/2" NPT are basic body sizes. 1/2" and 1" include reducer bushings.

Ball Valve Actuator

**HAYWARD FLOW CONTROL
TRUE UNION LATERAL THREE WAY BALL VALVE
INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS**

PLEASE READ THE FOLLOWING INFORMATION PRIOR TO INSTALLING AND USING ANY HAYWARD PRODUCT. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PRODUCT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY, OR EVEN DEATH.

- Hayward Flow Control (Hayward), a division of Hayward Industries, guarantees its products against defective material and workmanship only. Hayward assumes no responsibility for property damage or personal injury resulting from improper installation, misapplication, or abuse of any product.
- Hayward assumes no responsibility for property damage or personal injury resulting from chemical incompatibility between its products and the process fluids to which they are exposed. Determining whether a particular PVC, CPVC, or PP product is suitable for an application is the responsibility of the user. Chemical compatibility charts provided in Hayward literature are based on ambient temperatures of 70°F and are for reference only.
- Hayward products are designed for use with non-compressible liquids.

WARNING

Hayward PVC and CPVC products should NEVER be used or tested with compressible fluids such as compressed air or nitrogen. Use of PVC and CPVC products in compressible fluid applications may result in product damage, property damage, personal injury, or even death.

- The maximum recommended fluid velocity through any Hayward product is eight feet per second (8 ft/s). Higher fluid velocity can result in damage due to the water hammer effect.
- Piping systems must be designed and supported to prevent excess mechanical loading on Hayward products due to system misalignment, weight, shock, vibration, and the effects of thermal expansion and contraction.
- The effect of temperature on plastic piping systems must be considered when the systems are initially designed. The pressure rating of plastic systems must be reduced with increasing temperature. Maximum operating pressure is dependent upon material selection as well as operating temperature. Before installing any Hayward product, consult Hayward product literature for pressure vs. temperature curves to determine any operating pressure or temperature limitations.
- PVC and CPVC plastic products become brittle below 40°F. Use caution in their installation and operation below this temperature.

WARNING

Hayward PVC and CPVC products should not be used in services with operating temperature below 34°F.

- Due to differential thermal expansion rates between metal and plastic, transmittal of pipe vibration and pipe loading forces, **DIRECT INSTALLATION OF HAYWARD FLOW CONTROL PRODUCTS INTO METAL PIPING SYSTEMS IS NOT RECOMMENDED.** Wherever installation of Hayward product into metal piping systems is necessary, it is recommended that at least 10 pipe diameters in length of plastic pipe be installed upstream and downstream of the product to compensate for the factors mentioned above.
- Published operating requirements are based on testing of new products using clean water at 70°F. Performance is affected by many factors including fluid chemistry, viscosity, specific gravity, flow rate, and temperature. These should be considered when sizing Hayward products.
- Systems should always be depressurized and drained prior to installing or maintaining any Hayward product.

WARNING

Failure to depressurize and drain system prior to installing or maintaining any Hayward product may result in product damage, property damage, personal injury, or even death.

SOCKET CONNECTION:

Socket end connections are manufactured to ASTM D2467-94. Solvent cementing of socket end connections to pipe should be performed per ASTM specifications D2855-87. Cut pipe square. Chamfer and deburr pipe. Surfaces must be cleaned and free of dirt, moisture, oil and other foreign material. Remove assembly nuts and end connectors from valve body. Slide assembly nuts, with threads facing valve, onto pipe to which the end connector is to be cemented. Apply primer to inside socket surface of end connector. Never allow primer or cement to contact valve ball or end connector o-ring sealing surfaces, as leaking may result. Use a scrubbing motion. Repeat applications may be necessary to soften the surface of the socket. Next, liberally apply primer to the male end of the pipe to the length of the socket depth. Again apply to the socket, without delay apply cement to the pipe while the surface is still wet with primer. Next apply cement lightly, but uniformly to the inside of the socket. Apply a second coat of cement to the pipe, and assemble the end connector to the pipe, rotating the end connector 1/4 turn in one direction as it is slipped to full depth on to the pipe. The end connector should be held in position for approx. 30 seconds to allow the connection to "set". After assembly wipe off excess cement. Full set time is a minimum of 30 minutes at 60 to 100 °F. Full cure time should be based on the chart below.

JOINT CURE SCHEDULE:

The cure schedules are suggested as guides. They are based on laboratory test data, and should not be taken to be the recommendations of all cement manufacturers. Individual manufacturer's recommendations for their particular cement should be followed.

Temperature Range During Cure Period(B) °F(°C)	Test Pressures for Pipe Sizes ½" to 1-1/4"		Test Pressures for Pipe Sizes 1-1/2" to 3"		Test Pressures for Pipe Sizes 4" & 5"		Test Pressures for Pipe Sizes 6" to 8"	
	Up to 180 PSI (1240 kPa)	Above 180 to 370 PSI (1240 to 2550 kPa)	Up to 180 PSI (1240 kPa)	Above 180 to 315 PSI (1240 to 2172 kPa)	Up to 180 PSI (1240 kPa)	Above 180 to 315 PSI (1240 to 2172 kPa)	Up to 180 PSI (1240 kPa)	Above 180 to 315 PSI (1240 to 2172 kPa)
60 to 100 (15 to 40)	1 hour	6 hours	2 hours	12 hours	6 hours	18 hours	8 hours	1 day
40 to 60 (5 to 15)	2 hours	12 hours	4 hours	1 day	12 hours	36 hours	16 hours	4 days
20 to 40 (-7 to 5)	6 hours	36 hours	12 hours	3 days	36 hours (A)	4 days (A)	3 days (A)	9 days (A)
10 to 20 (-15 to 7)	8 hours	2 days	16 hours	4 days	3 days (A)	8 days (A)	4 days (A)	12 days (A)

Colder than 10 (-15) Extreme care should be exercised on all joints made where pipe, fittings or cement is below 10°F.

A: It is important to note that at temperatures colder than 20°F on sizes that exceed 3 in., test results indicate that many variables exist in the actual cure rate of the joint. The data expressed in these categories represent only estimated averages. In some cases, cure will be achieved in less time, but isolated test results indicate that even longer periods of cure may be required.

B: These cure schedules are based on laboratory test data obtained on Net Fit Joints (NET FIT=in a dry fit the pipe bottoms snugly in the fitting socket without meeting interference).

THREADED CONNECTION:

Threaded end connections are manufactured to ASTM specifications D2464-88, F437-88 and ANSI B2.1. Wrap threads of pipe with PTFE tape of 3 to 3-1/2 mil thickness. The tape should be wrapped in a clockwise direction starting at the first or second full thread. Overlap each wrap by 1/2 the width of the tape. The wrap should be applied with sufficient tension to allow the threads of a single wrapped area to show through without cutting the tape. The wrap should continue for the full effective length of the thread. Pipe sizes 2" and greater will not benefit with more than a second wrap, due to the greater thread depth. To provide a leak proof joint, the pipe should be threaded into the end connection "hand tight". Using a strap wrench only. (Never use a stillson type wrench) tighten the joint an additional 1/2 to 1-1/2 turns past hand tight. Tightening beyond this point may induce excessive stress that could cause failure.

FLANGED CONNECTION:

Flange bolts should be tight enough to slightly compress the gasket and make a good seal, without distorting or putting excessive stress on the flanges. Suitable washers should be used between the bolt head and flange and the nut and flange. Bolts should be tightened in alternating sequence.

RECOMMENDED FLANGE BOLT TORQUE

FLANGE SIZE	BOLT DIA.	TORQUE FT. LBS.	FLANGE SIZE	BOLT DIA.	TORQUE FT. LBS.
1/2	1/2	10-15	2	5/8	15-25
3/4	1/2	10-15	2-1/2	5/8	20-25
1	1/2	10-15	3	5/8	20-25
1-1/4	1/2	10-15	4	5/8	20-25
1-1/2	1/2	10-15	6	3/4	30-40

NOTE: USE WELL LUBRICATED METAL BOLTS AND NUTS. USE SOFT RUBBER GASKETS.

ADJUSTMENT:

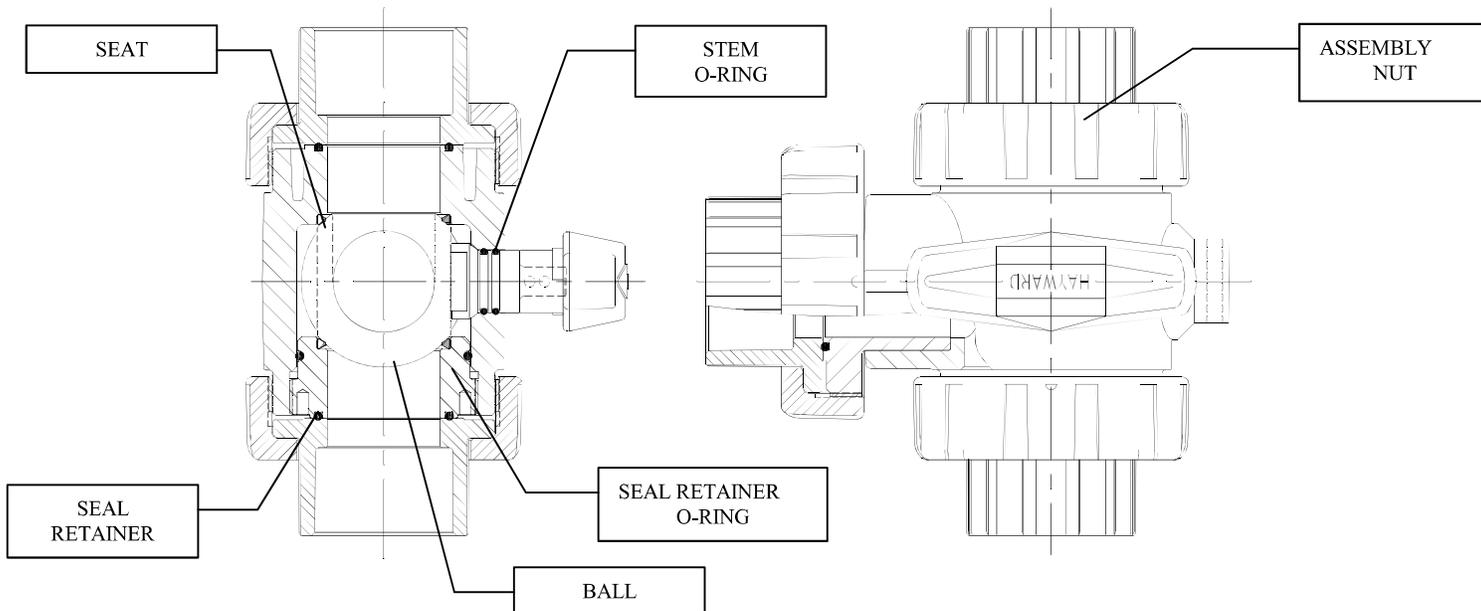
EXTREME CAUTION MUST BE TAKEN WHEN WORKING ON THIS VALVE.

THE PIPING SYSTEM MUST BE DEPRESSURIZED AND DRAINED. PROPER CARE MUST BE TAKEN. CONSULT M.S.D.S. (MATERIAL SAFETY DATA SHEETS) INFORMATION REGARDING YOUR SPECIFIC APPLICATION.

Remove the assembly nut and end connector from the "adjust" end of the body which is always the right port as viewed from the top with the tab up; or the complete valve body from the piping system. The direction of rotation is right hand tightens (clockwise rotation), counterclockwise loosens. The assembly nut should be installed on the valve "hand tight". Using a strap wrench only the joint may be tightened 1/2 to 3/4 of a turn past hand tight.

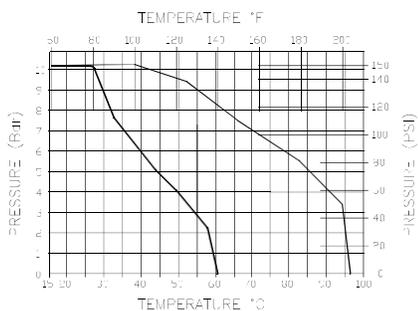
REPAIR:

Follow the adjustment sequence and information above, but rotating the seal retainer completely in the "loosen" direction and remove it from valve body. The o-rings and seals are now accessible for replacement using a "seal" repair kit. Carefully remove the o-rings from their respective locations taking care not to scratch their sealing surfaces. Insert o-rings and re-assemble. See table below.



OPERATION:

The valve flow pattern is in or out one side port and down through the bottom port or straight through the valve. Ball pattern DOES NOT allow both side ports to be blocked at the same time. Valve can be rotated 90° or 180° to change ports.



Recommended valve stem torque to rotate the ball 360° when valve is reassembled.

VALVE SIZE	TORQUE IN*LB
1/2"	40
3/4"	50
1"	60
1 1/2"	70
2"	80
3" & 2 1/2"	140
4" & 6"	170

COMPACT II

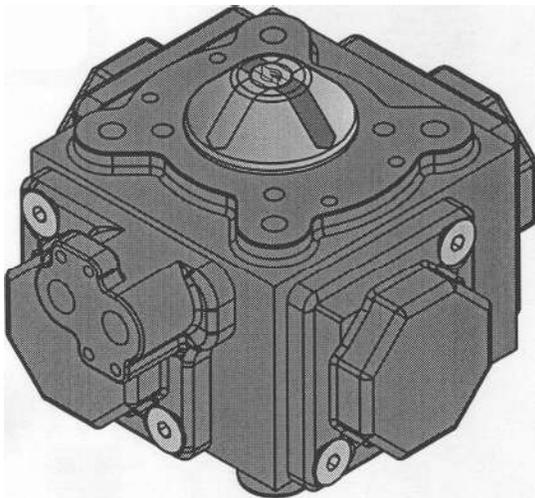
Installation, Operating & Maintenance

The Four Piston Pneumatic Actuator

Sizes Included:

C15, C20, C25, C30, C35

C45, C60, C75



1. GENERAL

This Installation, Operating & Maintenance manual covers the instructions required for safe use of the **Compact II** pneumatic actuator. Before using the actuator, read the entire IOM and make sure you understand everything.

WARNINGS & SAFETY INSTRUCTIONS

Hayward cannot anticipate all of the situations a user may encounter while installing and using the **Compact II** actuators. The user must know and follow all applicable industry specifications on the safe installation and use of these actuators. Misapplication of the product may result in injuries or property damage. Refer to Hayward **Compact II** catalogue for additional product safety information or contact Compact.

1. Make sure the actuator is isolated from air supply or electrical ancillaries before attempting to do any maintenance.
2. Before removing the actuator from a valve always make sure the line has been depressurized and drained. Cycle the valve a few times to relieve any pressure that could be trapped in the body cavity.
3. Utmost caution must be taken when handling the actuator. Only qualified personal are who are trained for maintenance work and have read the instructions are to assemble or disassemble the actuator.
4. Before operating an actuator which is connected to a valve in the pipeline, make sure you know the valve function.
5. Use only Compact II components and spare parts supplied in the Repair Kits.
6. Do not attempt to remove the actuator pistons by use of air pressure when the covers have been removed.
7. Do not leave any grip key or shaft connection attached to the actuator, or try to manually operate the actuator while it is still connected to the air pressure.
8. Use the actuator within the pressure and temperature limits indicated on the nameplate or as given in our catalogue and IOM.
9. The operator must follow and observe any national or local safety law and regulation imposed by his system

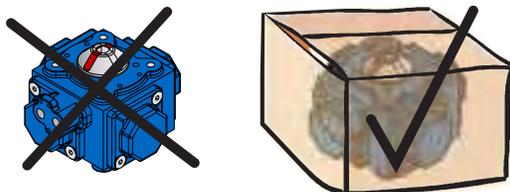


CE

HAYWARD INDUSTRIAL PRODUCTS INC.
ONE HAYWARD INDUSTRIAL DRIVE
CLEMMONS, NC 27012-5100
PHONE 336-712-9900
WWW.HAYWARDINDUSTRIAL.COM

STORAGE

The Compact actuator has been packaged to provide protection during shipment, however, it can be damaged in transport. Prior to storage, inspect the actuator for shipping damage. Keep the actuators in their original packing box during storage. It is recommended to keep the actuators in a clean and dry environment until ready for use. The actuator has two air ports, which should be plugged during storage to prevent liquids or other materials from entering the actuator during storage. If the actuators are to be stored for a long period of time before installation, it is recommended to stroke them periodically to prevent setting of the seals. Store the actuators indoors to protect them from humidity and dust.



OPERATING CONDITIONS

Lubricants

The actuators come lubricated from the factory and under normal operating conditions do not require re-lubrication. In the event of actuator maintenance it is recommended to use the following lubricants:

For NBR O-rings use EP1.

The lubricant is suitable for use from -20°C (-4°F) to +80°C (+176°F).

For Viton O-rings use Molykote 111 or OKS 1110.

The lubricants are suitable for use from -40°C (-40°F) to +140°C (+284°F).

For EPDM O-rings use **only** Silicone grease (i.e. Molykote 111 or OKS 110).

The lubricants are suitable for use from -40°C (-40°F) to +140°C (+284°F).

Explosive Environment

The Compact II can be installed in any appropriate potentially explosive hazardous area as listed on the identification nameplate on the actuator. The Compact II is certified to **category II** according to the ATEX Directive 94/9/EC (Equipment intended for use in Potentially Explosive Atmospheres).

For applications requiring category I protection please consult with Compact representative .

Air Supply

Use clean dry air. Other inert gases may be used such as nitrogen, argon and natural gas. Thin hydraulic oil can also be used. Do not use water as supply media.

Oxygen or hydrogen must NOT BE USED.

The operating medium is to be filtered to 30 micron particle size or less. Always consult with a representative of Compact for suitability and recommended practice.

Piping connected to the actuator or accessories should be fitted according to recommended instrumentation piping practice.

Prior to connection make sure all lines have no loops and are free of water, oil or other contaminants that may be trapped in

the pipes. Pipes must be flushed with air to clean the passages. Where sealants are been used for threaded connections, care must be taken to avoid excess material been forced into the actuator ports.

Supply Pressure

The supply pressure for the Compact II actuators are as follows:

Double-acting: 2-8 barg (30-120 psig).

Spring-return: 3-8 barg (40-120 psig).

Spring-return actuators can also operate with air pressure of 2 barg (30 psig) by using the appropriate spring configuration as shown in the Compact catalogue. When sizing an actuator to available air supply, make sure you have adequate power in the actuator to allow the valve to complete its operation and leave enough power for safety margin.

Temperature

The standard temperature limits for the Compact II actuators are -20°C (-4°F) to +80°C (+176°F). For temperatures below or above these figures special preparation and materials are required such as grease, O-rings, pinion bearings and pads.

The Compact II **maximum** working temperature is 130°C (266°F) when used with Viton O-rings and HT grease.

The Compact II **minimum** working temperature is -40°C (-40°F) when used with EPDM O-rings and LT grease.

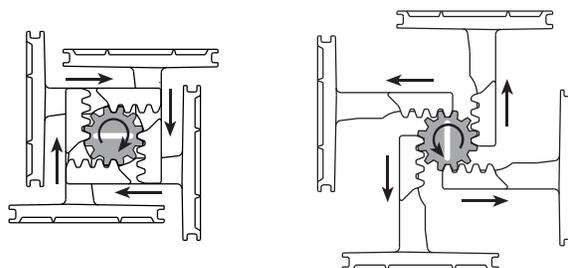
For temperatures below -40°C (-40°F) please consult with Compact.

When used in sub-zero temperatures it is essential to use an air dryer for the supply to avoid any moisture.

Always consult with a representative of Compact II for suitability and recommended practice.

PRINCIPLE OF OPERATION

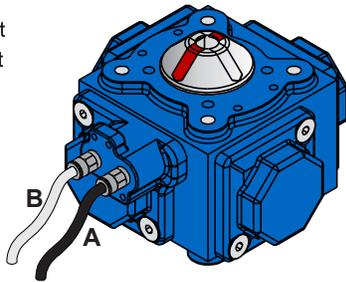
The Compact II actuator is a pneumatic quarter-turn Rack & Pinion actuator. Air pressure applied to the piston surface area generates thrust which transforms linear motion to rotary motion of the pinion. The Compact II has four pistons centrally located around one pinion. This means that the actuator can generate twice the torque of dual piston actuators, is lightweight, occupies minimum space and has minimal air consumption.



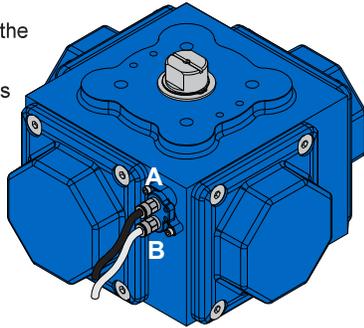
AIR CONNECTIONS

The actuator air connections are marked **A** and **B**.
 Port B connects to a chain of holes to all the four pistons. The air passes into the Namur cover (or insert) and through holes which are connected to the two neighbouring pistons. Each piston receives the air flow from two directions which ensures a quick response.

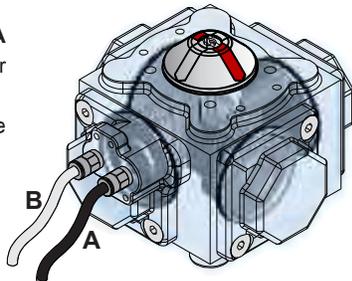
In sizes C15 to C45 port **A** is to the right and port **B** to the left.



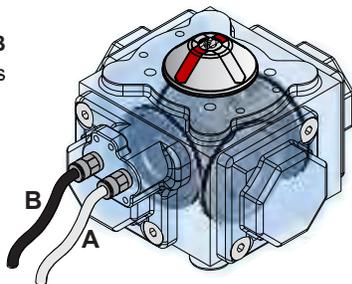
In sizes C60 and C75 the air connections are vertical where port **A** is above port **B**.



Pressure entering port **A** into the center chamber pushes the pistons outward and rotates the pinion **CCW**

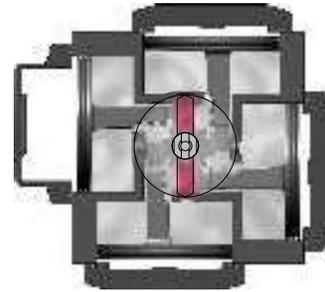


Pressure entering port **B** into the outer chambers pushes the pistons inward and rotates the pinion **CCW**



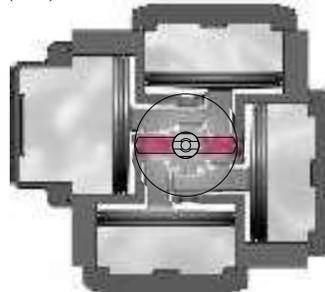
Double Acting (DA)

Pressure entering Port A to open:
 Center chamber pressurized. Pistons move outward and the pinion rotates counter clockwise (CCW).



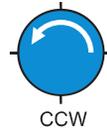
Pressure entering Port B to close:

Outside chambers pressurized. Pistons move inward and the pinion rotates clockwise (CW).



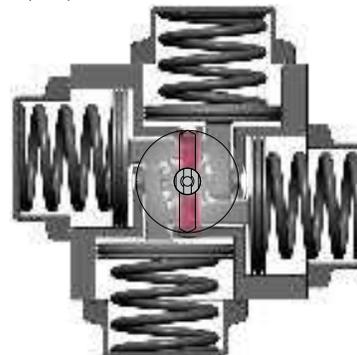
Spring Return (SR)

Pressure entering Port A to open:
 Center chamber pressurized. Pistons move outward and the pinion rotates counter clockwise (CCW).
 Springs are compressed.



Pressure exiting Port A to close:

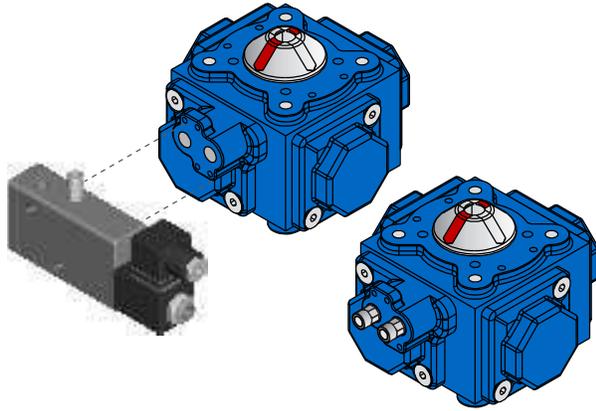
Air released from center chamber. Springs drive pistons inward. Pinion rotates clockwise (CW).



NAMUR Solenoid Mounting

Air supply connection is done by mounting a solenoid directly onto the Namur cover which has a mounting pad conforming to the Namur standards. (Only Solenoids made to the NAMUR standard can be mounted in this way.)

The Compact II actuator can also be piped with solid or flexible tubing from remote solenoid valves.

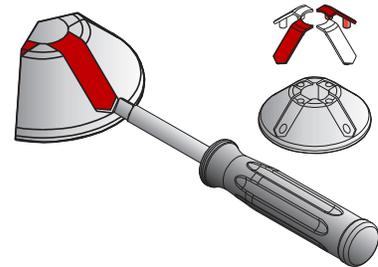


INDICATOR & PUCK

All actuators are assembled with a highly visible indicator or puck. The indicator and puck have interchangeable "snap-on" flow direction arrows for identification of valve position.



The arrows provide any type of pattern according to the valve ports. Use a screw driver or sharp object at the arrow head to push it out.



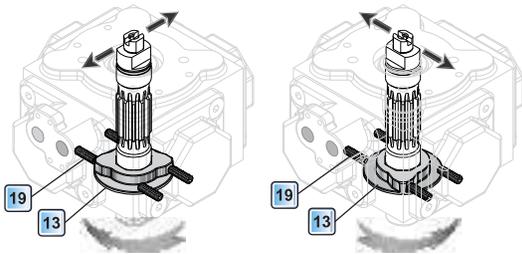
ISO 5211 or DIN 3337

The actuator bottom flange is in accordance with ISO 5211 (or DIN 3337) international standard and incorporates a star shaped female drive for flexibility to fit various valve output shafts. The valve can be attached by a bracket or mounted directly onto the actuator, using one of the various ISO hole patterns.

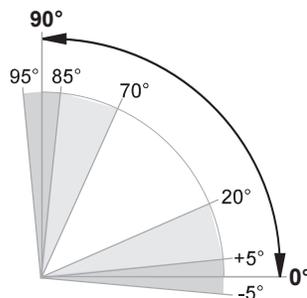
TRAVEL ADJUSTMENT

The actuator comes factory adjusted to produce 90° rotation. The rotation is restricted by the stop (13) and four adjustment screws (19) which provide fine tuning or a limiting stroke.

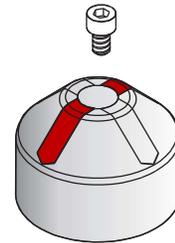
The screws are threaded into the actuator body and are diametrically opposed to create simultaneous and equal forces on opposite sides of the stop to eliminate off-center forces.



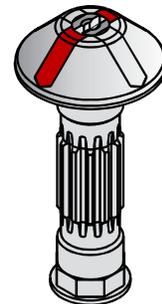
The standard stop screws allow adjustment of +/-5° in the travel limits. Other Intermediate positions can be achieved with a longer set of stop screws which will enable travel from 0° to 20° and from 90° to 70° rotation.



The puck has three position signaling inserts screws to allow signaling of any position. The puck is screwed to the pinion Namur thread.

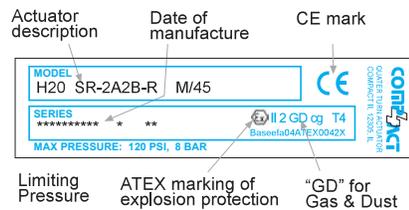


The indicator snaps to the pinion with its Namur interface projecting above it and enabling any ancillary to connect to the pinion.



IDENTIFICATION

Compact II actuators are supplied with a nameplate which is located on the side of the body. The information includes actuator size, model, type, spring set, threads, indicator, additional options, date of manufacture, protection rating, pressure limits and company logo.



1 DISASSEMBLY

General

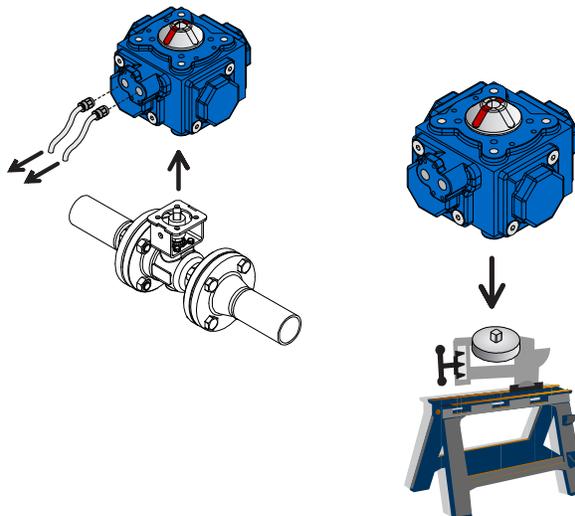
Before performing any disassembly operations make sure you read all the warnings and safety instructions in this leaflet.

Do not attempt to disassemble the actuator while it is still connected to the valve or to any ancillary.

Verify that the actuator is not pressurized. Check that the air ports are vented and spring return actuators are in the fail close position.

Work in a clean area, free of dust, debris, grease, corrosives and moisture. For security and comfort do the repairs on a table with a vice and available air supply. Clamp an adaptor to the vice and place the actuator drive on it.

Use only Metric hex head wrenches and make sure they are not blunt on the edges.



2 Disassembly of Double Acting Covers

2.1 Before disassembly, mark the covers (8, 8A, 9) with the body. This is recommended to identify each cover to its original position when you re-assemble the actuator.

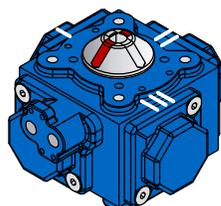
2.2 Remove the cover screws (10). If in the initial rotation the screws are jammed, hit them lightly on the head with a flat pin to make them loose.

2.3 Remove the covers making sure not to damage the O-ring seals (7, 7A, 10).

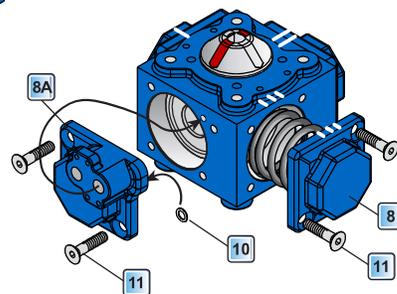
When removing the Namur cover (8A) make sure the O-ring connecting to the inner chamber is secure in its slot.

To convert to SR actuator, go to Section 6 for assembly.

Mark the covers



Namur cover facing air hole



3 Disassembly of Spring Return Covers

Caution: Springs in the actuator are under tension.

3.1 Before disassembly, mark each of the covers (8,8A,9) with the body. This is recommended to identify each cover to its original position when you re-assemble the actuator.

3.2 Remove the cover screws in sequence by turning each opposing screw two rotations at a time. When removing the Namur cover (8A) make sure the O-ring connecting to the inner chamber is secure in its slot. Before the screws leave the threads the springs become free of tension.

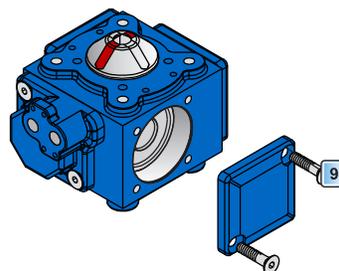
If in the initial rotation the screws are jammed, hit them lightly on the head with a flat pin to make them loose. When there are 4 screws in the cover (sizes C60, C75), work on two opposing screws first and then on the second set as described before.

3.3 Remove the covers making sure not to damage the cover seals.

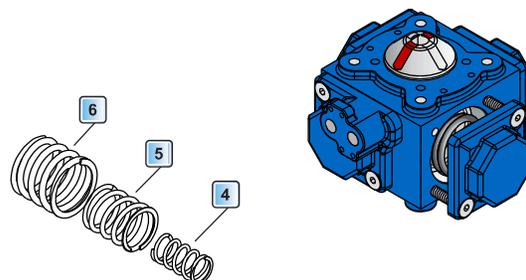
3.4 Remove the springs (4,5,6) from the cylinder and lay them together in their covers for the assembly stage.

3.5 Follow the same routine on all four cylinders. To replace the spring configuration or to convert to DA actuator, go to Section 6 for assembly.

DA covers Removal



SR covers Removal

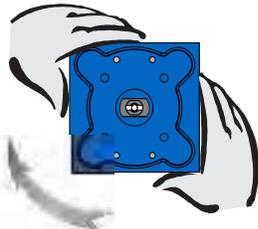


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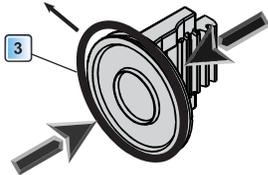
Pistons Disassembly

4.1 Looking at the actuator as shown to the left, withdraw the left of each pair of stroke adjustment screws (19) approximately 6-10 mm outward. This will enable the stop to rotate beyond its 90° limit so the pistons can come out. It may require a little force to release the adjustment screws as they are assembled with a thin layer of Loctite® 221.

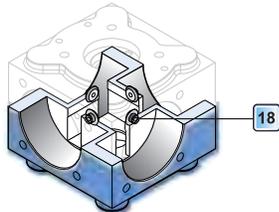
4.2 Grip the actuator body with both hands and rotate it in the CW direction to eject the 4 pistons out of their cylinders. The 4 pistons will eject out of the actuator body as demonstrated to the right.



4.3 Remove the piston O-rings (3) by pressing them slightly from both sides of the piston, creating a loop and pull them out of their groove. Do not use a sharp object to pry them out.



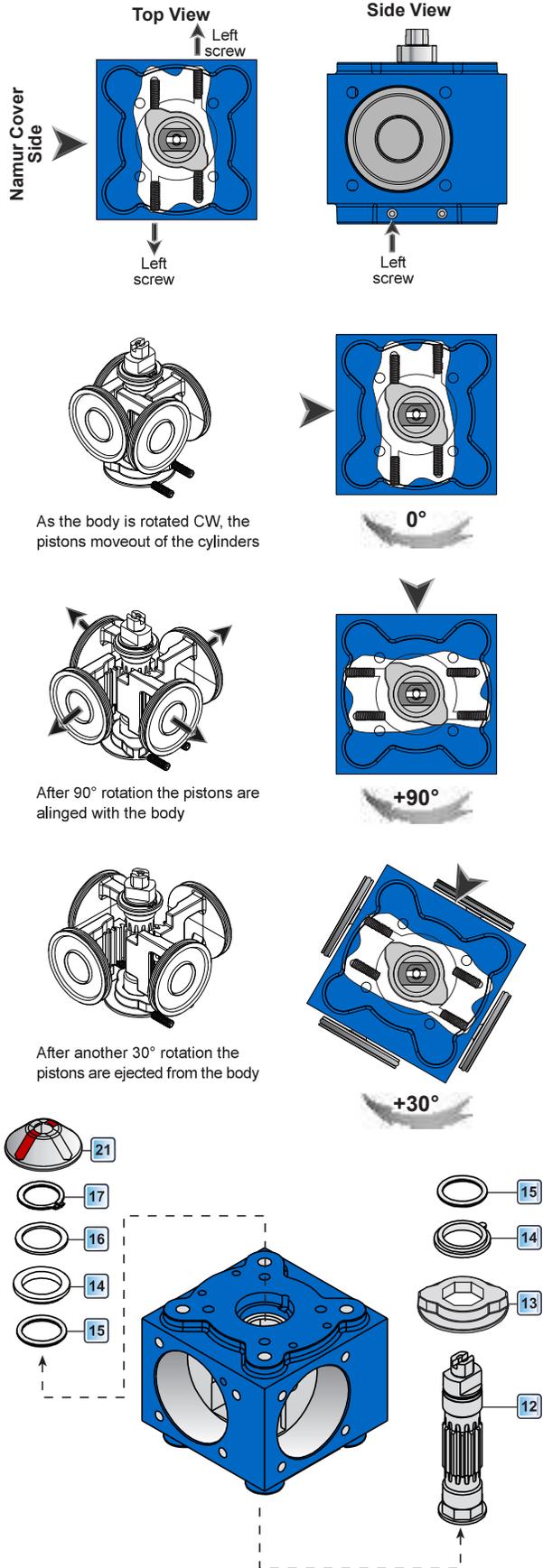
4.4 Push the four pads (18) in towards the pinion with a tool and remove them from body.
Note: Usually it is not required to remove the pads.



5

Pinion Disassembly
For C45 to C75 go to section 7.0

- 5.1 Remove the indicator (21). Use a two screwdrivers to pry it off the pinion. Do not apply force on the indicator.
- 5.2 Remove the circlip (17).
- 5.3 Push the pinion (12) down and remove it from the body.
- 5.4 The stop plate (13), bottom bearing (14) and pinion O-ring (15) will drop out with the pinion. There is no need to separate the stop from the pinion. Make sure the stop and pinion stay together in the same orientation they came out.
- 5.4 Remove the disc bearing (16), upper bearing (14) and O-ring (15) from the body.



6

ASSEMBLY

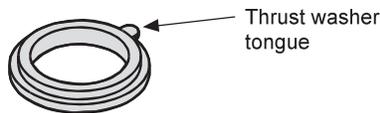
General

Before performing assembly, clean the grease in the cylinders and all the actuator parts. Check the cylinder for any scratches. The surface should be smooth and without any damage, debris, rust or other contaminants. Apply grease to all the parts prior to assembly.

- 6.1 If you have removed the pads, push them back into their holes as shown in section 4.4.
- 6.2 If the stop (13) has been removed from the pinion (12), insert it back making sure the orientation of the two stop protrusions are at 45° to the Namur slot as shown in the drawing to the right. Use the two grooves which are cast on the stop bottom plane to identify the stop orientation.
- 6.3 Fit the thrust washer (14) and pinion O-ring (15) to the pinion (12) and stop (13).

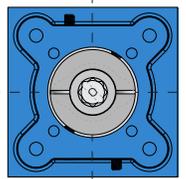
For C45 to C75 go to section 8.0

- 6.4 Insert the pinion assembly into the body. Make sure that the thrust washer tongue engages to the opposing groove in the body.



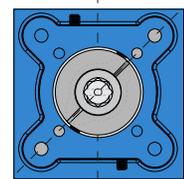
- 6.5 When inserting the pinion to the body, bring the grooves of the stop perpendicular to the adjustment screws to ensure correct angle of rotation. Rotate the pinion CCW until the protrusion flats hit the adjustment screws and the grooves line up with the threaded holes as shown below.

Step 1
Grooves perpendicular to adjustment screws



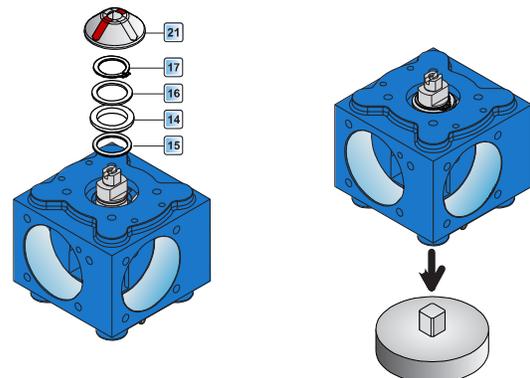
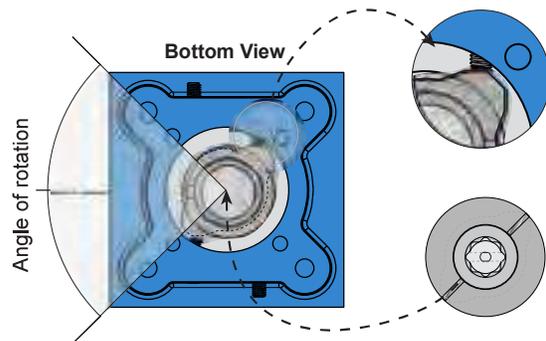
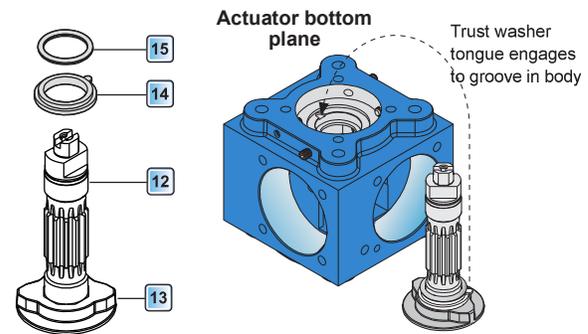
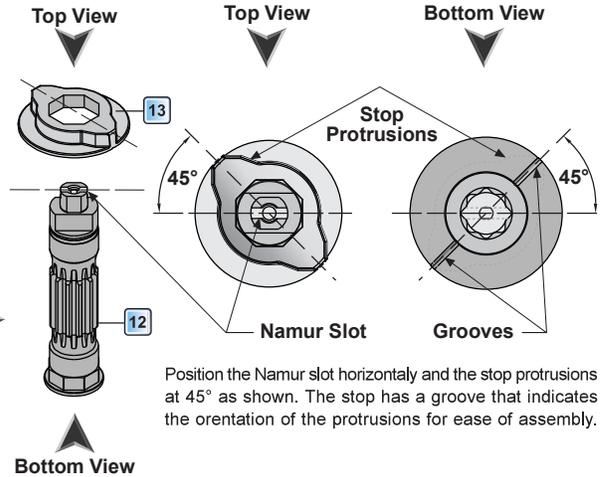
Bottom View

Step 2
Grooves aligned to adjustment screws



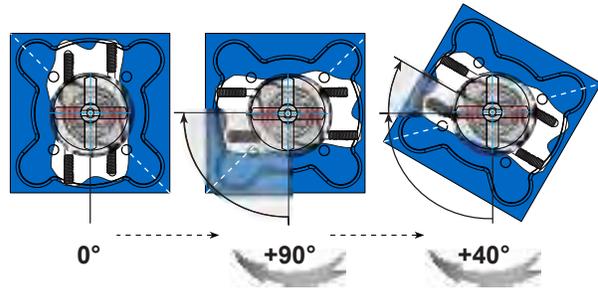
Bottom View

- 6.6 Fit the pinion O-ring (15), thrust washer (14) and disc bearing (16) to the pinion. Make sure that the thrust washer tongue engages to the opposing groove in the body.
- 6.7 Always use a new circlip (17). Insert it on the pinion. If the pinion does not protrude high enough, make sure that the bottom thrust bearing tongue has properly engaged into the body groove and the stop is recessed in the body. Clip the indicator (21) back on the pinion.
- 6.8 Place the assembled body with the pinion on the rig with the adaptor for inserting the pistons back in the

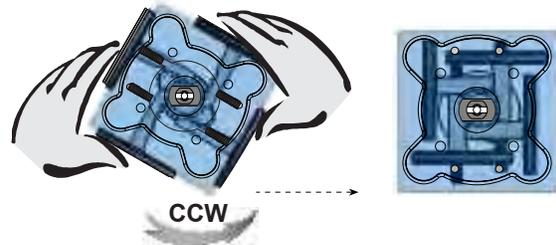


cylinders.

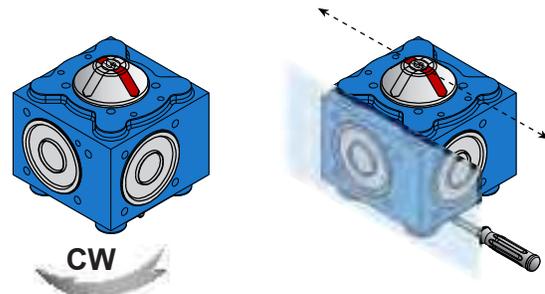
- 6.9 Looking from the top of the actuator, rotate the body 90° CW and another 40° to bring it to the position for inserting the pistons.
- 6.10 Fit the O-rings on the pistons.
- 6.11 Apply grease in the body cylinders, to the pistons groove and rack and to the piston O-rings.
- 6.12 Insert the four pistons in the cylinders, keeping the orientation of the racks so the teeth engage with the pinion teeth.



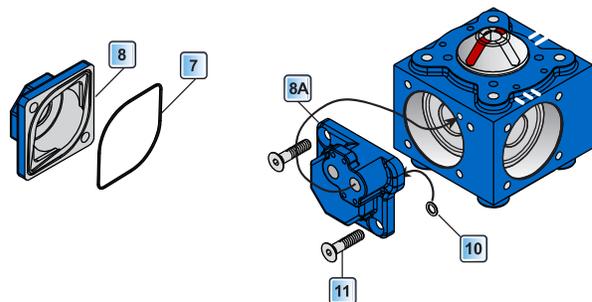
- 6.13 Holding all 4 pistons with both hands as shown, rotate the body CCW until it stops against the adjustment screws and all 4 pistons are pulled inside. Make sure all the 4 pistons have reached the same position in the cylinder.



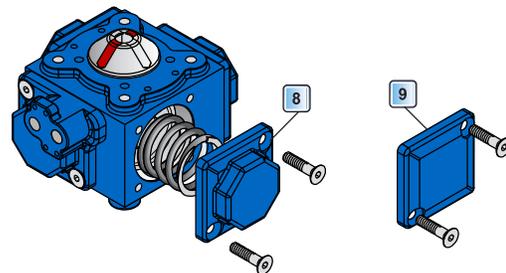
- 6.14 Rotate the body back 90° CW to the open position so the pistons are now almost flush with the actuator body. Apply a drop of Loctite® 221 to the two adjustment screws that were pulled away and screw them back until they both touch the stop. Adjust them until you visually see that the pinion flats are parallel with the body plane.



- 6.15 Rotate the body back and forth to get the pistons running smoothly in the cylinders.
- 6.16 Bring the pistons in to the close position and once again apply grease in the cylinders behind the pistons.
- 6.17 Apply grease to all the spring sets.
- 6.18 Push the cover O-rings (7) in the groove of the covers (8, 9). If needed, replace them with a new set. Notice that the Namur cover (8A) has an additional small O-ring (10) that should be in place.



- 6.19 Lubricate the cover screws (11).
- 6.20 Assemble the Namur cover first (8A). If this is a SR actuator, place the spring set in the cover and then screw the spring cover (8).
- 6.21 Always tighten the screws in sequence.
- 6.22 Assemble the DA covers (9). Make sure the covers are put back according to your marking during disassembly.

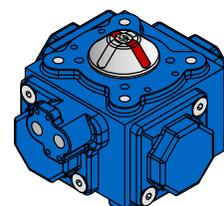


- 6.23 Assemble the SR covers with the spring set. The screws are long enough to engage to the thread before the springs start to compress. Tighten the screws in sequence and only two turns at a time.

- 6.24 Finally torque the screws to the set figures in the table below.

Actuator Screws Torque Figures

Actuator Size	Screw	NM	Lb-ft	Lb-in
C15 - C20	M5	3.5	2.5	30
C25 - C30	M8	9.0	6.5	80
C35	M10	18.0	13.0	160
C45 - C75	M12/M16	40.0	30.0	360



7

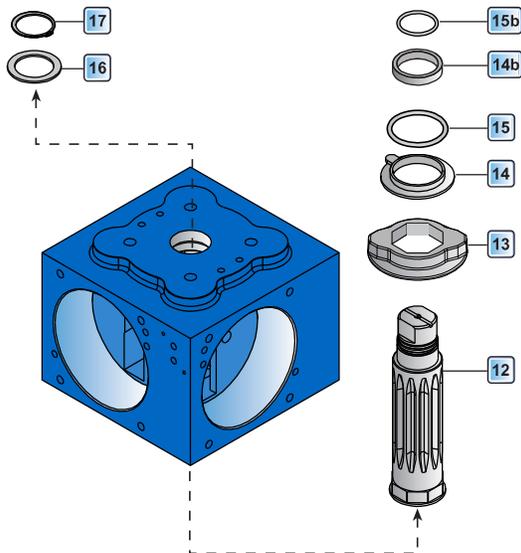
Sizes C45-C75

Sizes C45, C60 and C75 have a slightly different pinion assembly than the smaller sizes. The top bearing, O-ring disc bearing and circlip are smaller in diameter than the bottom items. The top bearing and O-ring are assembled from the bottom and not the top as with the smaller sizes. The instruction below highlights the assembly differences.

Pinion Disassembly

- 7.1 Remove the circlip (17) and the disc bearing (16).
- 7.2 Push the pinion (12) down very carefully and remove it from the body.
- 7.3 The top bearing (14b) is inserted in the body and the top O-ring (15b) is fitted to the pinion. They should both come out with the pinion from the bottom.
- 7.4 The stop plate (13), bottom bearing (14) and bottom O-ring (15) will drop out with the pinion. There is no need to separate the stop from the pinion. Make sure the stop and pinion stay together in the same orientation they came out. The C75 has an integral stop and will not separate.

Return to section 6.0



8

Pinion Assembly

- 8.1 Assemble the stop (13), bottom bearing (14) and O-ring (15) as described in section 6.2.
- 8.2 Assemble the top bearing (14b) on the pinion (12) shoulder.
- 8.2 Fit the top O-ring (15b) on the pinion in its groove. Apply grease.
- 8.3 Insert the pinion assembly into the body. Make sure that the thrust washer tongue engages to the opposing groove in the body. Be careful not to harm the top O-ring.
- 8.4 When inserting the pinion to the body, bring the grooves of the stop perpendicular to the adjustment screws to ensure correct angle of rotation. Rotate the pinion CCW until the protrusion flats hit the adjustment screws

and the grooves line up with the threaded holes as shown below. See illustrations in section 6.3.

- 8.5 Fit the disc bearing (16) to the pinion.
- 8.6 Always use a new circlip (17). Insert it on the pinion. If the pinion does not protrude high enough, make sure that the bottom thrust bearing tongue has properly engaged into the body groove and the stop is recessed in the body.
- 8.7 Place the assembled body with the pinion on the rig with the adaptor for inserting the pistons back in the cylinders.

Return to section 6.9

ACTUATOR TESTING

After completion of actuator assembly it is required to follow these testing procedures to ensure the actuator has been assembled correct and to minimize the risk of personal.

Pneumatic Leak Test

The pneumatic test checks there is no leakage across the pistons or to environment. Use commercial leak testing solution to check leakage to atmosphere. It is acceptable to allow a small amount of leakage to atmosphere. A bubble which breaks every 10 seconds is considered acceptable.

The leak testing pressure will be 80 psig (5.5 barg). Use a calibrated pressure regulator to apply pressure to the actuator.

WARNING: Do not exceed the maximum operating pressure rating listed on the nameplate.

Cycle the actuator at least 5 times to allow the seals to find their position before commencing with the leak test.

Piston leakage

Any leakage across the piston is not acceptable.

- 1.0 Apply the pressure to port A and leave port B open.
- 2.0 Apply a leak testing soap solution to port B and check for leakage.
- 3.0 For DA actuators repeat this applying pressure to port B and check port A for leakage.
- 4.0 If leakage is observed, disassemble the actuator again and check the seals, surface finish and cleanliness of the internal parts to find the cause of leakage. After doing the repair work, the leakage test must be performed again.

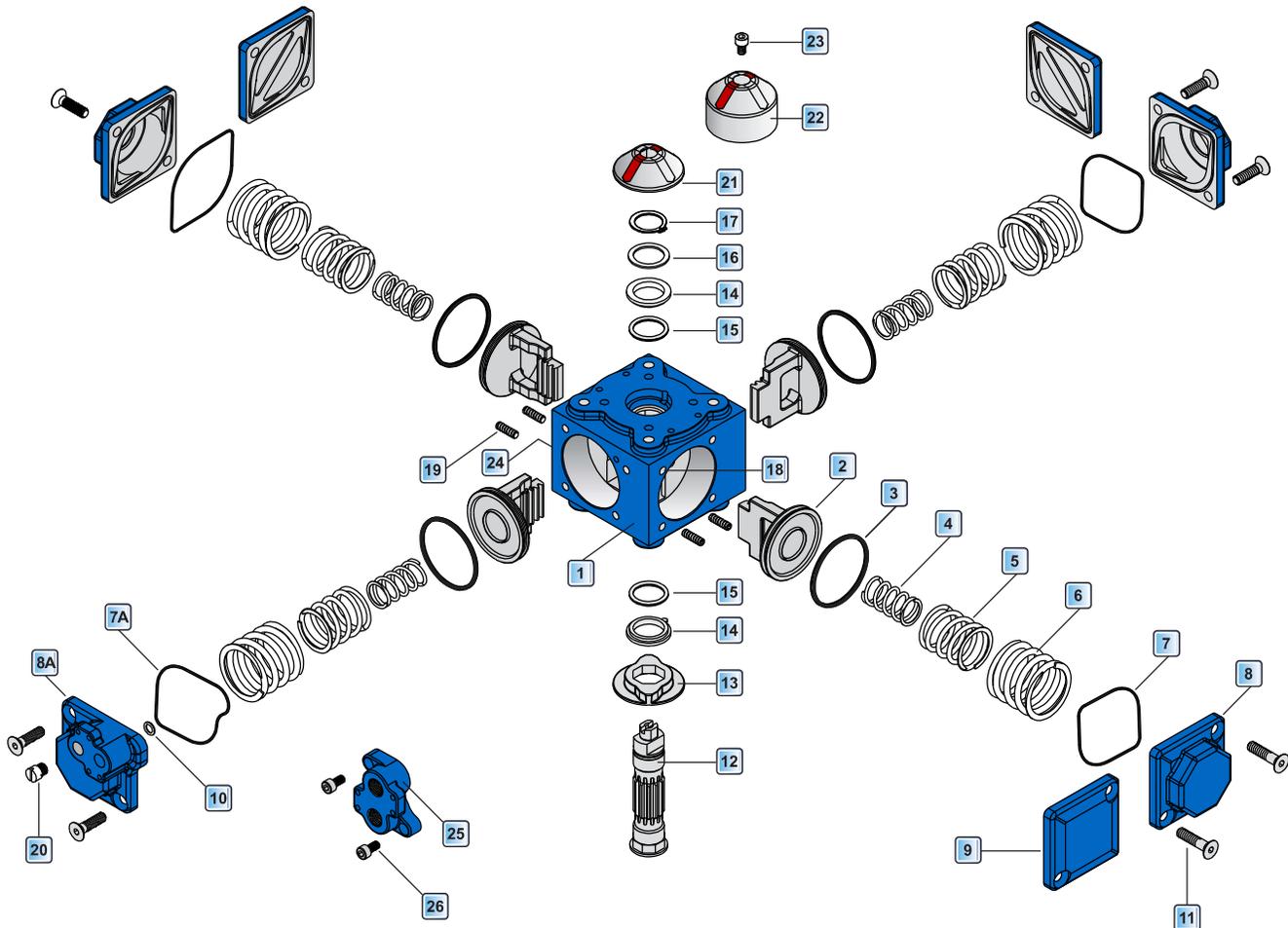
External leakage

For SR actuators apply the pressure to port A and leave port B open.

For DA actuators apply the pressure to port A and B. After applying pressure, wait a few seconds to let the pistons stabilize and then check for leakage. Apply the leak testing solution to the pinion output. For DA actuators apply the leak testing solution to the covers.

Loctite is a registered trademark of Loctite Corp.

PARTS LIST



Description	Qty	Material
1 Body	1	AL 356-T6
2 Piston	4	AL 356/380
3 Piston O-Ring	4	Buna N, Viton, EPDM
4 Inner Spring	4	Spring steel, Painted
5 Middle Spring	4	Spring steel, Painted
6 Outer Spring	4	Spring steel, Painted
7 Cover O-Ring	3	Buna N, Viton, EPDM
7a Namur Cover O-Ring	1	Buna N, Viton, EPDM
8 Spring Return Cover	3	AL 356/380
8a Namur Cover	1	AL 356/380
9 Double Acting Cover	3	AL 356/380
10 Air Supply O-Ring	1	Buna N, Viton, EPDM
11 Cover Screw	8-16	ST, ST.
12 Pinion	1	Steel E.N.Coated

Description	Qty	Material
13 Stop	1	ST.ST 316
14 Thrust Washer	2	Delrin, NRG, UHMWPE
15 Pinion O-Ring	2	Buna N, Viton, EPDM
16 Disc Bearing	1	ST.ST / Delrin
17 Circlip	1	ST.ST
18 Pad	4	Delrin, NRG, UHMWPE
19 Stroke Adjustment Screw	4	ST, ST.
20 Exhaust Plug (Silencer)	1	Delrin, (Brass)
21 Indicator	1	Plastic (ABS), Red & White
22 Puck	1	Plastic (ABS), Red & White
23 Indicator Screw	1	ST.ST
24 Tag (not shown)	4	ST.ST
25 Namur insert	1	AL 380
26 Insert screw	2	ST.ST

Pressure Switch

Barksdale

Installation And Maintenance Instructions

Pressure Switches

Series 96200, 96201, 96210, **96211**

Vacuum Switches

Series 96220, 96221

Description

These switches are miniature size pressure/vacuum switches having factory set or field-adjustable set-points, fixed deadbands (differentials), and have piston or diaphragm piston sensors. The switches are designed to provide long life and maintain excellent set-point accuracy despite environmental conditions. Materials wetted by the process fluid include pressure connections of brass or stainless steel and internal elastomers of Buna-N and Teflon as standard.

Caution: Do not use these switches for hazardous or corrosive service, and do not use for oxygen service without proper degreasing and proper preparation. Check nameplates on switch for maximum proof (overpressure) pressure or vacuum limits.

Installation

Caution: This switch should be installed by a trained service person. A media filter should be in the system to protect the switch.

Mounting: Switch may be mounted in any position.

Piping: Support adequate piping and mount the pressure switch to avoid excessive shock or vibration. To minimize the effect of vibration on switch, mount perpendicular to vibration. Apply pipe compound sparingly to male pipe threads only. Avoid pipe strain on switch by properly supporting and aligning piping.

Tamper Resistant Option: Field-adjustable models with a "T" prefix have two set screws to lock-in the set-point adjustment sleeve. Use a 5/64 allen wrench. Overtightening will result in switch damage.

Set-point adjustment for field-adjustable models

For pressure switch (96201 and **96211**) models):

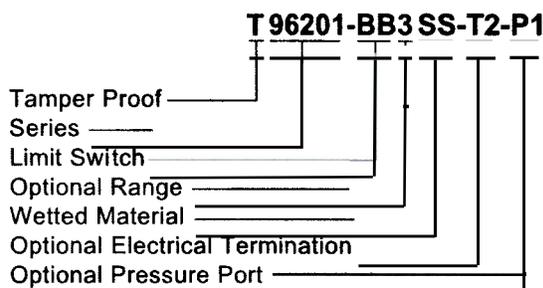
- After connecting switch, turn adjustment sleeve clockwise to increase the set-point and counter-clockwise to decrease the set-point. The switch can be set either on "increasing pressure" mode or "decreasing pressure" mode.
- For exact pressure setting, cycle pressure switch and make fine adjustments with sleeve.

~~For vacuum switch (96221 model):~~

- ~~After connecting switch, turn adjustment sleeve counter-clockwise to increase the set-point and clockwise to decrease the set-point. The switch can be set either on "increasing vacuum" mode or "decreasing vacuum" mode.~~
- ~~For exact vacuum setting, cycle vacuum switch and make fine adjustments with sleeve.~~

Pressure/Vacuum Switches

Switch Number Coding (Example Only)



Wiring

Wiring must comply with local and national electric codes.

Caution: Electrical rating must be within range stated on the switch nameplate. Failure to stay within the rating of the switch may result in damage to, or premature failure of, the electrical contacts.

Standard switch rating: 5 amps, 250 VAC/28 VDC
SPDT

Standard free leads color code:

Pressure switch	Vacuum switch
purple = COMMON	purple = COMMON
red = NO	red = NC
blue = NC	blue = NO

Optional termination:

- T1: 1/4" male quick connect terminals. C, NO, NC markings are on the switch.
- T2: DIN 43650 type. Use 5 to 8 mm O.D. cable size. After the cable hook-up, tighten the gland squeeze nut to ensure firm environmental seal.

Pressure switch	Vacuum switch
position 1 = C	position 1 = C
position 2 = NC	position 2 = NO
position 3 = NO	position 3 = NC
position 4 = NOT USED	position 4 = NOT USED

-T4: 1/2" NPT male conduit connection with free leads.

-T5: 1/2" NPT female conduit connection with free leads.

Connect applicable conduit to the switch (plastic conduit is recommended). Generally, handtight is adequate for a conduit enclosure. **Caution:** use conduit hex only when tightening. Do not exceed 80 lb in tightening or bending torque. Failure to follow this instruction may result in switch damage.

Testing of the switch

Testing of the switch may be done before or after final installation. If bench tested, the switch should be re-tested when installed in the final application. Be sure switch can be tested without affecting other equipment. Check nameplates for electrical rating and circuitry (normally closed or normally open) of switch. Cycle switch a few times to check operation.

Troubleshooting

Warning: Disconnect electrical power supply to switch before removal or inspection.

Important: The switch is not field-repairable. In case of damage, replace entire switch.

Causes of improper operation:

1. Incorrect electrical connection: check leads to switch. Be sure they are properly connected. See "Wiring" section for circuitry color code.
2. Faulty control circuit: check electrical power supply to switch. Check for loose or blown fuses, open-circuited or grounded wires, loose connections at switch.
3. Incorrect pressure: check pressure in system. Pressure/vacuum must be within range specified on nameplate.
4. External leakage: replace pressure/vacuum switch.
5. Excessive vibration or surges: check for pressure fluctuations in system. Check switch mounting and be sure there is no excessive vibration.

If the operation of the pressure/vacuum switch cannot be corrected by the above means, consult factory or authorized factory representative.

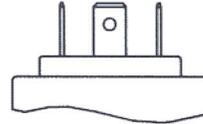
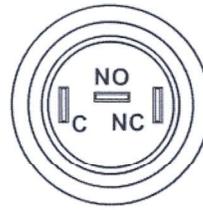
For service or ordering information

Consult factory or authorized factory representative. Specify full catalog number (with any optional modifications) and factory set-point.

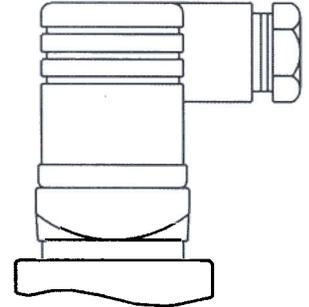
Warranty

All products of the company are sold and all services are offered subject to the company's standard conditions of sale.

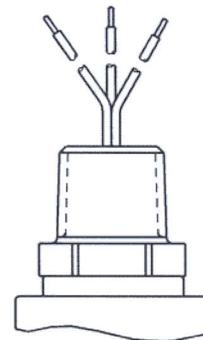
OPTIONAL ELECTRICAL TERMINATIONS



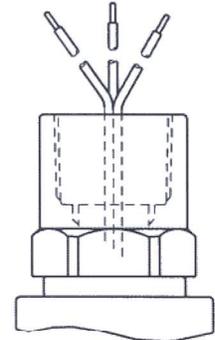
-T1 SUFFIX



-T2 SUFFIX

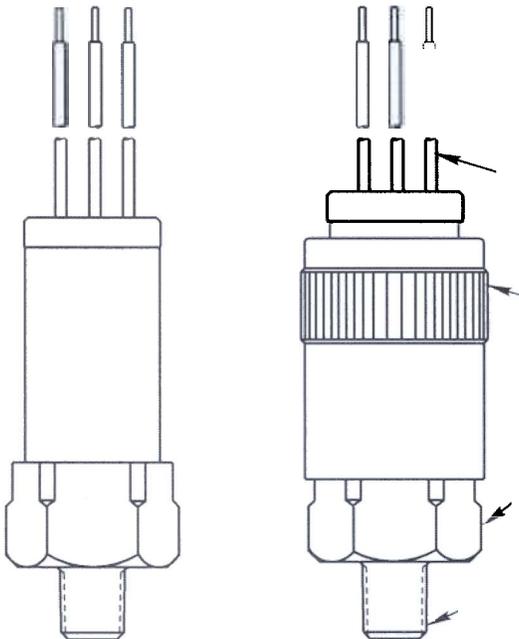


-T4 SUFFIX



-T5 SUFFIX

STANDARD MODELS

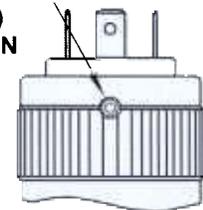


FACTORY SET MODEL
96200, 96210,
96220 SERIES

FIELD-ADJUSTABLE MODEL
96201, 96211,
96221 SERIES

OTHER OPTIONS

SET SCREW
(5/64 ALLEN WRENCH)
DO NOT OVERTIGHTEN



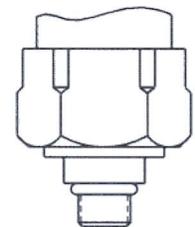
PREFIX "T"
TAMPER RESISTANT
ADJUSTMENT SLEEVE

FREE LEADS
STANDARD

SET-POINT
ADJUSTMENT
SLEEVE

1 1/4 HEX
(APPLY WRENCH
HERE ONLY)

PRESSURE
PORT
1/4 NPT
MALE



-P1 SUFFIX
7/16-20UNF MALE
PRESSURE PORT
WITH O-RING

Butterfly Valve

**HAYWARD FLOW CONTROL
BYV SERIES BUTTERFLY VALVE
INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS**



PLEASE READ THE FOLLOWING INFORMATION PRIOR TO INSTALLING AND USING HAYWARD BYV SERIES BUTTERFLY VALVES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PRODUCT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY, OR EVEN DEATH.

1. Hayward Flow Control (Hayward), a division of Hayward Industries, guarantees its products against defective material and workmanship only. Hayward assumes no responsibility for property damage or personal injury resulting from improper installation, misapplication, or abuse of any product.
2. Hayward assumes no responsibility for property damage or personal injury resulting from chemical incompatibility between its products and the process fluids to which they are exposed. Determining whether a particular PVC, CPVC, or PP product is suitable for an application is the responsibility of the user. Chemical compatibility charts provided in Hayward literature are based on ambient temperatures of 70°F and are for reference only.
3. Hayward products are designed for use with non-compressible liquids.

WARNING

Hayward PVC and CPVC products should NEVER be used or tested with compressible fluids such as compressed air or nitrogen. Use of PVC and CPVC products in compressible fluid applications may result in product damage, property damage, personal injury, or even death.

WARNING

The Series BYV Butterfly Valve is intended for use in liquid service only. Do not attempt to use this valve for controlling air or gases. Use of this product in air or gas service may result in product damage, property damage, personal injury, or even death.

4. The maximum recommended fluid velocity through any Hayward product is eight feet per second (8 ft/s). Higher fluid velocity can result in damage due to the water hammer effect.
5. Piping systems must be designed and supported to prevent excess mechanical loading on Hayward products due to system misalignment, weight, shock, vibration, and the effects of thermal expansion and contraction.
6. The effect of temperature on plastic piping systems must be considered when the systems are initially designed. The pressure rating of plastic systems must be reduced with increasing temperature. Maximum operating pressure is dependent upon material selection as well as operating temperature. Before installing any Hayward product, consult Hayward product literature for pressure vs. temperature curves to determine any operating pressure or temperature limitations.
7. PVC and CPVC plastic products become brittle below 40°F. Use caution in their installation and operation below this temperature.

WARNING

Hayward PVC and CPVC products should not be used in services with operating temperature below 34°F.

8. Due to differential thermal expansion rates between metal and plastic, transmittal of pipe vibration and pipe loading forces, **DIRECT INSTALLATION OF PLASTIC VALVES INTO METAL PIPING SYSTEMS IS NOT RECOMMENDED.** Wherever installation of plastic valves into metal piping systems is necessary, it is recommended that at least 10 pipe diameters in length of plastic pipe be installed upstream and downstream of the plastic valve to compensate for the factors mentioned above.
9. Published operating requirements are based on testing of new valves using clean water at 70°F. Valve performance is affected by many factors including fluid chemistry, viscosity, specific gravity, flow rate, and temperature. These should be considered when sizing Hayward products.
10. Systems should always be depressurized and drained prior to installing or maintaining any Hayward product.

WARNING

Failure to depressurize and drain system prior to installing or maintaining valve may result in product damage, property damage, personal injury, or even death.

11. Always follow your site and or company procedures for any safety training and or site specific precautions or warnings in addition to those in this document.

1. INSTALLATION:

1.1. Transporting the Valve:

Valve should be stored inside factory packaging until product is ready to be installed. Packaged valve should be stored indoors, at room temperature, and out of direct sunlight. Avoid storing packaged valve in location where packaging may become wet. Valve should be moved as close to installation site as possible prior to removing from packaging. Do not cut through tape on box any more than necessary to avoid cutting the liner sealing face of the valve. After removing valve from carton, care must be taken not to damage valve or to allow debris to enter valve.

WARNING

System must be depressurized and drained prior to installing valve or performing maintenance. Failure to depressurize and drain system prior to installing or maintaining valve may result in product damage, property damage, personal injury, or even death.

CAUTION

Do not install valve directly to pump outlet. Allow a length of at least 5 pipe diameters between pump outlet and valve.

Do not install valve directly after a reducer / expansion fitting. Install at least 5 pipe diameters from an expansion or reducing fitting.

Pipe must be supported upstream and downstream of the valve. Sound piping system design principles should be applied when installing this valve.

Do not install valve directly into a metal system (see pg. 2). Wherever installation of plastic valves into metal piping systems is necessary, it is recommended that at least 10 pipe diameters in length of plastic pipe be installed upstream and downstream of the plastic valve.

When lifting valve do not lift by the handle of lever operated valves or the hand wheel on gear operated valves. When lifting the valve do not damage the disc or the liner, protect the face of the liner.

1.2. Installing the Valve into a System:

NOTE

Hayward BYV Series butterfly valves are bi-directional. There are no direction arrows or specific orientation requirements for proper operation.

- 1.2.1. Remove valve from packaging.
- 1.2.2. Verify that product is defect free and meets specifications.
- 1.2.3. BYV butterfly valves should be installed between flanges matching the bolt pattern of the valve; ANSI B16.5 class 150 flanges or DIN standard PN10.
 - 1.2.3.1. The use of additional gaskets is not necessary and not recommended.
 - 1.2.3.2. Suggested bolt lengths are listed in table 1. Mating flange thickness may vary by manufacturer, style of flange, and flange materials.
 - 1.2.3.3. The BYV butterfly valve is bi-directional in flow and shut off/sealing in any body configuration, and with or without body bolt hole threaded lugs.
 - 1.2.3.4. In dead end service it is recommended the valve is installed between one pipe flange and a downstream companion or blind flange, or ring flange.
- 1.2.4. ID of pipe must clear disc when valve is operated.
 - 1.2.4.1. Hayward butterfly valves are designed for use with all pipe flanges that have bores equal to or larger than Schedule 80 pipe as listed in table 1. If the bore is smaller than listed the inside of the pipe flange must be chamfered at a 45° angle to a diameter listed. Sharp edges and burrs must be removed.
- 1.2.5. Flanges must be aligned and square to valve.
 - 1.2.5.1. When installed between two existing flanges, the flanges should be separated to provide clearance on the face to face of the valve. This will prevent the valve sealing surfaces from distortion during installation.
 - 1.2.5.2. Pipe flange faces should be clean and free of debris including old gasket material.
 - 1.2.5.3. A light coating of a lubricant applied to the flange sealing surface may aid in installation. Make sure lubricant is compatible with valve materials of construction before applying.
- 1.2.6. Install valve between flanges.
 - 1.2.6.1. Valves should be opened to approximately 15° when installed.
 - 1.2.6.2. Do not open disc beyond face of valve to prevent damage to the edge of the disc by the mating flange during installation.
 - 1.2.6.3. The stem can be in any desired position (i.e. upright, sideways, etc.), provided the flange bolt holes align with the valve bolt holes. Typically a vertical location for the stem is preferred.
 - 1.2.6.4. Center the outside diameter of the valve to the outside diameter of the flanges.
- 1.2.7. Installations in systems with vertical pipe orientation:
 - 1.2.7.1. Follow guidelines as above.
- 1.2.8. Install bolting.
 - 1.2.8.1. Metal washers are recommended between nut/bolt head and the pipe flange.
 - 1.2.8.2. For wafer style valves, insert stud through holes in flanges and valve, install washers and nuts.
 - 1.2.8.3. For lugged valves, insert cap screws or bolts, both with washers, through flanges into threaded lugs in the body.

- 1.2.8.4. Install bolting loosely by hand.
- 1.2.8.5. With a torque wrench, uniformly tighten nut to approximately 8 ft*lb (10.8 N*m) in an alternating sequence as shown in figure 1. Continue alternating tightening until the recommended flange bolt torque, in table 1, is achieved. Note: The proper tightening sequence is also molded into the valve body.
- 1.2.9. Install throttle plate and handle.
 - 1.2.9.1. On lever operated valves the throttle plate is shipped installed into the top adapter flange of the valve. If it has become loose during shipping re-fit into the mounting flange of the body of the valve. The throttle plate can fit two ways. One way results in the handle on one side of the valve, alternatively it can be removed from the body mounting flange and rotated 180° opposite of the first way thus placing the handle on the opposite side of the valve. To install the handle on the opposite side of the valve, you may need to operate the valve, without the throttle plate, past the closed position then reinstall the throttle plate.
 - 1.2.9.2. Note: The handle will only fit completely into the throttle plate in one orientation. The valve is shipped partially open. If the desired position of the handle is on the opposite side of the pipe, remove the throttle plate, rotate it 180°, and refit into the mounting plate. The handle will now position on the opposite side of the pipe. Fit handle onto the stem of the valve.
 - 1.2.9.3. Once the handle is installed on the stem and over the throttle plate, install the provided washer, lock washer, and socket head cap screw into the handle, threading the screw into the top of the valve stem. Tighten to 15 ft*lb.
 - 1.2.9.4. Squeeze the grip of the valve completely and operate the valve 3-4 times to verify it moves from at least full open to full close and intermediate stops are working.
- 1.2.10. Install handle bezel.
 - 1.2.10.1. Align the tab cutout on the underside of handle bezel with the tab inside the handle.
 - 1.2.10.2. Using a flat object, gently press fit the handle bezel into the handle until it is flush with the first step in the mating pocket of the handle.
- 1.2.11. Additional Notes:
 - 1.2.11.1. Normal pipe hanger spacing is recommended.
 - 1.2.11.2. Do not allow valve to support the weight of the pipe.
 - 1.2.11.3. If the valve was provided with a gear box from the factory, the gear box stops will already be set by the factory during assembly.
 - 1.2.11.4. When using pneumatic or electric actuators, additional support directly to the actuator is recommended. When large actuation is used, its' weight needs to be supported independent of the support given by the mounting flange of the valve.
- 1.3. Valve with gear box:
 - 1.3.1. Follow steps above thorough 1.2.8 above.
 - 1.3.2. Install hand wheel on shaft of gear box using pin.
- 1.4. Valve with actuator:
 - 1.4.1. Follow steps above through 1.2.8 above.
 - 1.4.2. If the valve was provided with an actuator from the factory, the actuator stops will already be set by the factory during assembly.
 - 1.4.3. Support weight of actuator as necessary.
 - 1.4.4. Refer to IOM provided with actuator for wiring and operating instructions.

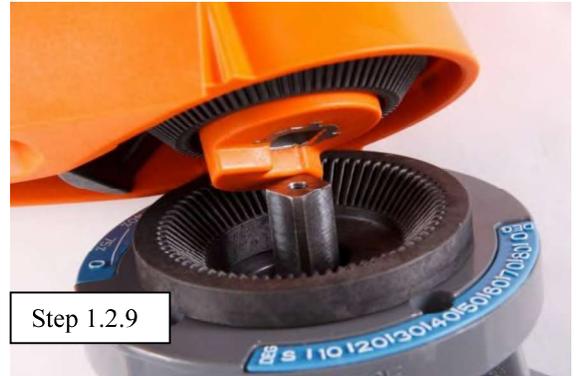
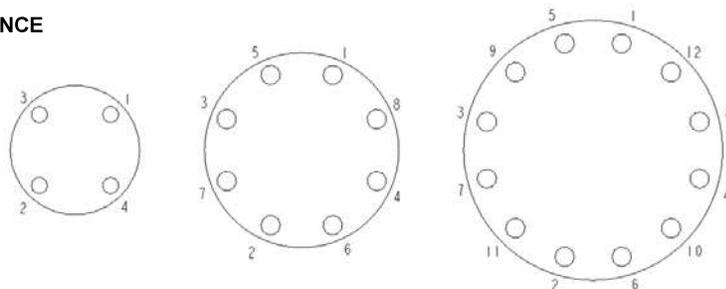


Table 1: RECOMMENDED FLANGE BOLT TORQUE FOR BUTTERFLY VALVES; ANSI B16.5 Bolt Patterns

Size Nominal	Minimum Pipe / Flange Bore at Valve Face(in.)	Nominal Valve Face to Face (in.) (ANSI B16.10)	Stud Length Wafer ¹ (in)	Stud Diameter (In.) - Thread	Flat Face Type Flange Torque ft * lb.	Van-Stone Type Flange Torque ft * lb.
2"	1.40	1.69	5.5	5/8-11 UNC	15-25	10-20
2-1/2"	1.94	1.81	5.75	5/8-11 UNC	15-25	10-20
3"	2.97	1.81	6.0	5/8-11 UNC	20-25	10-20
4"	3.85	2.06	6.5	5/8-11 UNC	20-25	10-20
6"	5.84	2.19	7.25	3/4-10 UNC	30-40	10-20
8"	7.72	2.38	7.5	3/4-10 UNC	30-40	20-30
10"	9.64	2.69	8.0	7/8- 9 UNC	50-60	40-50
12"	11.34	3.06	8.5	7/8- 9 UNC	50-60	40-50

¹ Stud Length may vary because of type and brand of flange used

Figure 1: FLANGE BOLT TORQUE SEQUENCE



2.0 STARTUP AND OPERATION:

WARNING

Hayward PVC and CPVC products should NEVER be used or tested with compressible fluids such as compressed air or nitrogen. Use of PVC and CPVC products in compressible fluid applications may result in product damage, property damage, personal injury, or even death.

WARNING

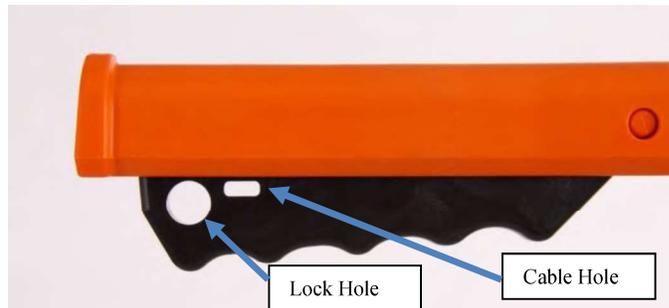
The Series BYV Butterfly Valve is intended for use in liquid service only. Do not attempt to use this valve for controlling air or gases. Use of this product in air or gas service may result in product damage, property damage, personal injury, or even death.

WARNING

Hayward PVC and CPVC products should not be used in services with operating temperature below 34°F.

- 2.1 Slowly purge air from system and pressurize and test as required.
- 2.2 Look for leaks around valve and check for proper valve operation. If any leaks are present, or valve does not perform properly, refer to troubleshooting guide. Depressurize and drain system prior to performing any maintenance.
- 2.3 BYV-Series butterfly valves are designed to seal bi-directionally.
- 2.4 Periodically check valve for leaks or external damage.
- 2.5 Periodically check flange bolts for correct torque. (NOTE: Retightening of nuts may be necessary after initial system start-up.)
- 2.6 Operation of valve to intermediate positions**
 - 2.6.1 Wrap fingers and hand around grip end of handle. (Palm is on the top side of the handle, fingers are on the grip)
 - 2.6.2 While firmly holding the handle, squeeze end of handle so the grip moves into the handle. This will disengage the handle mechanism from the throttle plate.
 - 2.6.3 Rotate the handle to the desired valve position while aligning the indicator on the side of the handle to the indication on the body bezel. The valve can be set at 5° increments from 0° to 90°. Slowly release the grip while maintaining the handle position.
- 2.7 Operation of valve to full closed**
 - 2.7.1 Wrap fingers and hand around grip end of handle. (Palm is on the top side of the handle, fingers are on the grip)
 - 2.7.2 While firmly holding the handle, squeeze end of handle so the grip moves into the handle. This will disengage the handle mechanism from the throttle plate.
 - 2.7.3 Rotate the handle clockwise to close.
 - 2.7.3.1 Resistance will be felt while approaching closed as the disc engages the liner of the valve. Closed is indicated by the letter S (Shut) on the body bezel. Once the indicator on the handle is centered on the S, then release the grip.
- 2.8 Operation of valve to full open**
 - 2.8.1 Wrap fingers and hand around grip end of handle. (Palm is on the top side of the handle, fingers are on the grip)
 - 2.8.2 While firmly holding the handle; squeeze end of handle so the grip moves into the handle. This will disengage the handle mechanism from the throttle plate.
 - 2.8.3 Rotate the handle counter clockwise to open.
 - 2.8.3.1 Resistance will be felt if the valve was fully closed while the disc disengages the liner of the valve. Open is indicated by the letter O (Open) on the body bezel. Once the indicator on the handle is centered on the O, then release the grip.
- 2.9 Body Bezel Indicators:**
 - 2.9.1 The body bezels in figure 2 indicate position of the valve.
 - 2.9.1.1 One of the body bezels indicates the position of the disc in degrees.
 - 2.9.1.2 The other body bezel indicates the position of the disc related to the % of Cv for the full open valve.
- 2.10 Locking Lever Operated Valve:**
 - 2.10.1 There is a hole in the grip near the underside of the end of the handle.
 - 2.10.2 A Master Lock Number 5 can be used to lock the handle to prohibit squeezing of the grip, and operation of the handle.

**Figure 2:
Padlock**



- 2.10.3 Once lock is installed, verify that squeezing the handle and grip does not disengage the handle mechanism and the valve cannot be operated.
- 2.10.4 Alternatively or in addition to the lock, a cable lock can be used through the rectangular slot. A 0.160" (4 mm) cable is the correct size.
- 2.10.5 An option exists for 2" – 8" valves to inhibit operation with a cap that replaces the handle. See your Hayward distributor, sales person, or representative for further details.
- 2.11 Periodic Operation**
 - 2.11.1 Where possible, for valves that are installed in locations where they are not operated frequently, it is recommended that valves are operated according to a routine maintenance schedule at least once every six months.

3.0 MAINTENANCE:

WARNING

System must be depressurized and drained prior to installing valve or performing maintenance. Failure to depressurize and drain system prior to installing or maintaining valve may result in product damage, property damage, personal injury, or even death.

3.1 Replacing Valve Disc and or Liner and Seals:

- 3.1.1 Please read above sections to be familiar with the valve.
- 3.1.2 Reference section 6 of this document for identification of parts.
- 3.1.3 Remove valve from line.
- 3.1.4 Removal of operator/actuator or, handle assembly and throttle plate:

WARNING

Make sure operator has no stored energy and is in its' fail position if applicable. For valves supplied with electric actuators, follow lock out/tag out procedures and remove all power from device before performing maintenance.

- 3.1.4.1 To remove handle assembly:
 - 3.1.4.1.1 Remove handle bezel.
 - 3.1.4.1.2 Remove socket head cap screw that attaches the handle assembly to the stem.
 - 3.1.4.1.3 Slide the handle upward (away from the valve) and off of the stem.
 - 3.1.4.1.4 Remove the throttle plate. Its' fit may be snug, gently pry it from the body.
- 3.1.4.2 To remove gearbox:
 - 3.1.4.2.1 Prepare to support weight of gear box. Once bolting is removed using the next steps, it may freely slide from the stem.
 - 3.1.4.2.2 Loosen the bolts (or nuts) on the underside of the body mounting flange.
 - 3.1.4.2.3 Continue to loosen until disengaged from the threads in the gearbox.
 - 3.1.4.2.4 Slide the gear box off of the stem. 2" – 8" may have one or more adapter sleeves between the gearbox and the stem. 10" and 12" may have one or more adapter sleeves between the gearbox and stem and a key to engage the stem to the sleeve.
- 3.1.4.3 To remove actuator:
 - 3.1.4.3.1 Prepare to support weight of the actuator. Once bolting is removed using the next steps, it will freely slide from the stem.
 - 3.1.4.3.2 Loosen the bolts (or nuts) on the underside of the body mounting flange.
 - 3.1.4.3.3 Continue to loosen until disengaged from the threads in the actuator.
 - 3.1.4.3.4 Slide the actuator off of the stem. There may be an adapter plate and or an adapter sleeve between the valve and the actuator. Remove these from the valve as well.

CAUTION

The edges of the square drive may be sharp or become sharp from usage. Avoid cutting hands.

- 3.1.5 Remove the weather seal. This can be accomplished by sliding a thin screw driver between the stem and the weather seal. Gently pull upward to slide the weather seal up the stem and away from valve.
- 3.1.6 Remove the gland using an extra deep socket. The gland has a right hand thread.

Gland Removal				
Valve Size	2"-3"; DN50-DN80	4"; DN100	6"-8"; DN150-DN200	10"-12"; DN250-DN300
Gland Hex Size	13/16"	1"	1-1/8"	1-3/4"

- 3.1.7 Remove the stem by pulling it from the valve. The stem will bring the upper bearing with it as it comes out of the valve.
- 3.1.8 Remove the upper bearing from the stem. Note condition of o-rings on the upper bearing. Replace if worn. Hayward highly recommends replacing o-rings any time the valve is maintained.
- 3.1.9 Gently push at the top of the face of the disc along the stem center line. The disc will move out of the liner and tilt around the seal retainer. The seal retainer will likely still be in the bottom of the disc when the disc is removed.
- 3.1.10 Remove the seal retainer from the disc. If the seal retainer is in the disc counter bore, use the stem to remove the seal retainer by inserting it in the "top" of the disc and push seal retainer out of the disc. Inspect the seal retainer o-rings. Replace if worn. Hayward highly recommends replacing o-rings any time the valve is maintained.
- 3.1.11 Apply a light coat of Krytox® grease to the counter bore in the bottom of the disc (bore opposite the one with the Hayward H on the outside of the disc).
- 3.1.12 Orientate the seal retainer with the o-rings installed so the end with the **radius** on the inside diameter will enter the disc first. Apply Krytox® to the lower counter bore in the disc. Push the seal retainer into the disc until it is flush with the bottom of the disc.
- 3.1.13 Before inserting the new disc in the liner, inspect the liner for tears, excessive wear, material erosion, and noticeable swell. If any of these exist, it is recommended the liner be replaced.



3.1.14 The liner has a definite orientation in the body. It is not symmetric from the top to the bottom. It is symmetric from face to face.

3.1.14.1 Notice the stem holes through the liner. One has a counter bore and one does not.

3.1.14.2 The end (top end) with the counter bore matches a lip in the inside diameter of the body at the top of the valve.

3.1.14.3 Fold one side of the liner mid way between the top and bottom holes so that it forms a C shape.

3.1.14.4 Starting on the top end on the liner fit the counter bore in the liner onto the lip inside the body. Center it on the lip.

3.1.14.5 As you work circumferentially away from the lip, and on the unfolded side, using hand force, press the liner into the inside of the body. A lip along the inside of the body corresponds to a groove in the center of the liner between the faces.

3.1.14.6 Check to see that the hole in the bottom of the liner is aligned with the boss around the hole in the interior lower portion of the body.

3.1.14.7 Unfold the liner while fitting it to the lip along the inside of the body.

3.1.14.8 Verify the hole in the top and bottom of the liner is aligned to the corresponding features in the body.



Top of Liner
with Counter
Bore
(3.1.14.1)



Bottom of
Liner with
Straight Bore
(3.1.14.1)



Steps 3.1.14.5 to 3.1.14.8



Step 3.1.15.1

3.1.15 Now resume replacing the disc.

3.1.15.1 Apply a light coating of Krytox® grease to one side of the face of the liner in the areas near the stem bores.

3.1.15.2 Align the top and bottom of disc with the top and bottom of liner. The Hayward H is nearest the top of the valve. (The seal retainer inside the disc is nearest the bottom of the liner.) Begin to work the disc into the liner; align the disc mid-way between open and closed.

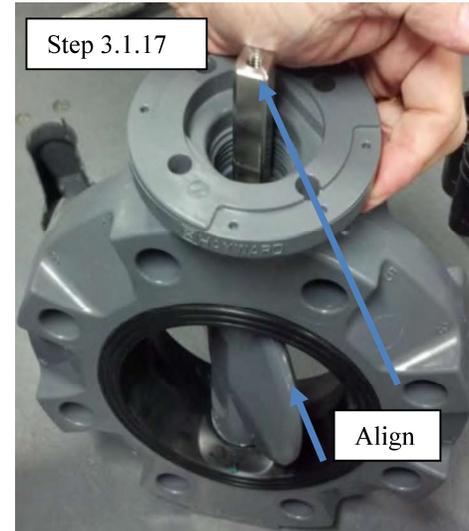
3.1.15.3 Work small amounts at the top and then the bottom until the disc is inserted into the liner. The top and bottom of the disc must be reasonably aligned with the top and bottom of the body.

3.1.15.4 The hex bore in the disc for the stem will be visible through the top of the valve.

3.1.16 If still in place, remove the upper bearing from the stem.

- 3.1.17 Note: There is a line scribed on the end of the stem. **Important:** This line must align in the same direction with the edge of the disc.
- 3.1.18 Insert the stem through the body into the upper portion of the disc.
- 3.1.18.1 The stem can be moved from side to side to help the hex of the stem go into the disc.
- 3.1.18.2 Verify the lower portion of the disc is still centered on the lower section of the liner.
- 3.1.18.3 Gently push or lightly tap the stem until it is bottomed into the body.
- 3.1.19 Insert upper bearing.
- 3.1.19.1 Apply a coat of Krytox® grease to the outside diameter of the end of the bearing containing the o-rings.
- 3.1.19.2 Align the square shape on the upper bearing to the square shape on the stem. Insert the upper bearing, with the o-rings in their grooves, over the stem and into the stem bore of the body.
- 3.1.19.3 Gently press the upper bearing into the body of the valve until it is near the bottom of the thread for the gland.
- 3.1.20 Insert gland.
- 3.1.20.1 Place the gland over the stem with the hex side away from the valve.
- 3.1.20.2 Start the thread by hand.
- 3.1.20.3 Tighten only until snug using an extra deep socket; approximately 2 ft* lbs.
- 3.1.21 Apply a light coat of Krytox® to the outside diameter of the weather seal. Align square shape on weather seal to square shape on stem and replace weather seal.
- 3.1.22 Replace throttle plate and handle or worm gear or actuation package
- 3.1.23 Check operation of the valve from full closed to full open. Check intermediate stop positions to ensure throttle plate and handle properly engage.

Note: The 10" (DN250) and 12" (DN300) valves have a stem that is round with a keyway on the end shown in Step 3.1.17. Similar to the 8" (DN200) and smaller, the keyway and scribe line will align with the disc. Non-standard stems are sometimes used for direct mount to an actuator. The end configurations of these are specific to the valve and actuator package. Basic disassembly and re-assembly will follow the standard valve. Insure that the reassembled valve stem alignment matches the original orientation.



4.0 TROUBLESHOOTING:

Problem	Cause	Solution
Leak between flange and valve body.	Damaged face on liner.	Replace liner or valve.
	Damaged face on flange.	Loosen flange bolts, align flange and valve, and re-install bolts. Be certain pipe is evenly supported upstream and downstream of valve.
	Over / under / unequally tightened flange bolts.	Loosen all flange bolts. Re-torque flange bolts in alternating sequence. See Table 1 for flange bolt torques.
	Liner face and flange face incorrectly paired	Verify seal area on liner overlaps seal areas on flange. If flange has a face o-ring, verify it is concentric and within the inside and outside diameter of the liner face.
Leak through valve.	Disc is not fully closed.	Check that handle location indicator is on "S" for shut; handle is positioned perpendicular to the pipe run. Check that stop is properly set on gear or other actuating device; adjust stops if required. Remove handle or actuator to verify scribe line on top of stem is indicating fully closed – line is perpendicular to the pipe run.
	Damaged seal surface on disc.	Replace disc or valve.
	Damaged seal surface on liner.	Replace liner or valve.
	Excessive line pressure.	Verify line pressure has not exceeded maximum working pressure of the valve at operating temperature. Replace valve.
Valve difficult to operate.	Over / unequally torque flange bolts.	Loosen all flange bolts. Re-torque flange bolts in alternating sequence. See Table 1 for flange bolt torques.
	Flange or pipeline misaligned to valve; disc striking mating flange inside diameter	Loosen flange bolts, align flange and valve, and re-install bolts. Be certain pipe is evenly supported upstream and downstream of valve.
	Liner is swollen.	Check compatibility of fluid in the valve with the liner. Call Hayward with fluid, temperature, and existing liner material for liner recommendations. Replace valve.
	Line not properly supported, transferring weight of system to valve, or crushing valve between flanges.	Add pipe support before and after, or adjacent to valve.
	Actuator is not properly supported, transferring weight and stress to valve.	Loosen body mounting flange bolts. Add supports to system so that actuator is independently supported. Retighten body mounting flange bolts.
Damaged disc or liner.	Excessive flow rate.	Maximum line velocities of 8 ft/sec. recommended for plastic piping systems. Resize system or valve.
	Water Hammer	Maximum line velocities of 8 ft/sec. recommended for plastic piping systems. Resize system or valve. Reduce line velocity. Reduce speed of operation (i.e. closure) of valve.
	Detrimental solids in process media.	Install a strainer upstream of valve to prevent damage to valve.
	Cavitation in line.	Maximum line velocities of to 8 ft/sec. exceeded. Valve should be installed at least 5 pipe diameters from the nearest pump or fitting. Resize system or valve.
	Process conditions.	Check chemical compatibility of disc material with fluids in valve.
		Check that valve was not in service or operated at temperatures below recommended.
	Throttling position at low % opening	Verify arrow on valve body is in line with system flow. Correct valve orientation.
Limit time in position at reduced flow rate. Resize system or valve.		
Leakage through top of valve at mounting flange near gland.	Failed liner and failed liner o-rings	Replace liner and o-rings. Inspect stem and replace if warranted.
	Line not properly supported, transferring weight of system to valve, or crushing valve between flanges.	Add pipe support before and after, or adjacent to valve.
	Actuator is not properly supported, transferring weight and stress to valve.	Loosen body mounting flange bolts. Add supports to system so that actuator is independently supported. Retighten body mounting flange bolts.
Valve does not open or close fully or will not stop at intermediate positions.	Debris in handle. Damaged throttle plate or lever	Remove handle and remove any debris from the handle mechanism. Replace handle if damaged. Replace throttle plate if damaged.

5.0 PRODUCT SPECIFICATIONS:

Maximum Pressure: 150 psi @ 70°F (see Chart 1 for operating pressures at elevated temperatures)

Operating Temperature:

Material	Minimum Operating Temperature	Maximum Operating Temperature
PVC	34°F (1.1°C)	140°F (60.0°C)
CPVC	34°F (1.1°C)	180°F (82.2°C)
GFPP	20°F (-6.6°C)	240°F (115°C)

Maximum System Flow Velocity: 8 ft/s for thermoplastic piping systems

Flow Capacity, Cv:

Size	Cv Values at disc position					
	15°	30°	45°	60°	75°	Full Open
2"	0.2	15	37	65	88	92
2-1/2"	1.1	24	45	80	145	165
3"	3.1	28	36	83	182	250
4"	20	58	84	183	390	470
6"	30	105	200	458	1000	1510
8"	125	203	375	770	1650	2820
10"	123	289	644	1396	3003	4723
12"	154	435	1011	2189	4586	6400

WARNING
 The maximum recommended fluid velocity through any plastic piping system is eight feet per second (8 ft/s). Higher fluid velocity can create excess water hammer effect, resulting in property damage, personal injury, or even death.

CAUTION
 Published operating requirements are based on testing of new valves using clean water at 70°F. Valve performance is affected by many factors including fluid chemistry, viscosity, specific gravity, flow rate, and temperature. These should be considered when sizing systems using Hayward products.

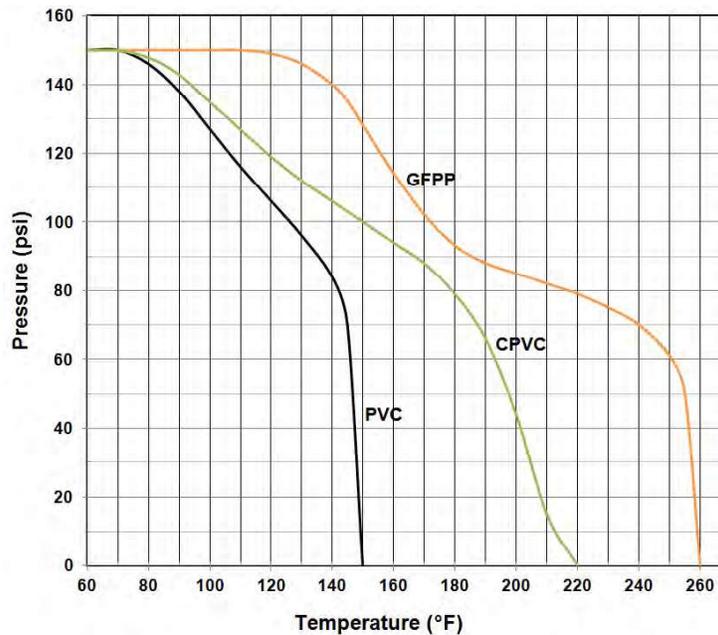
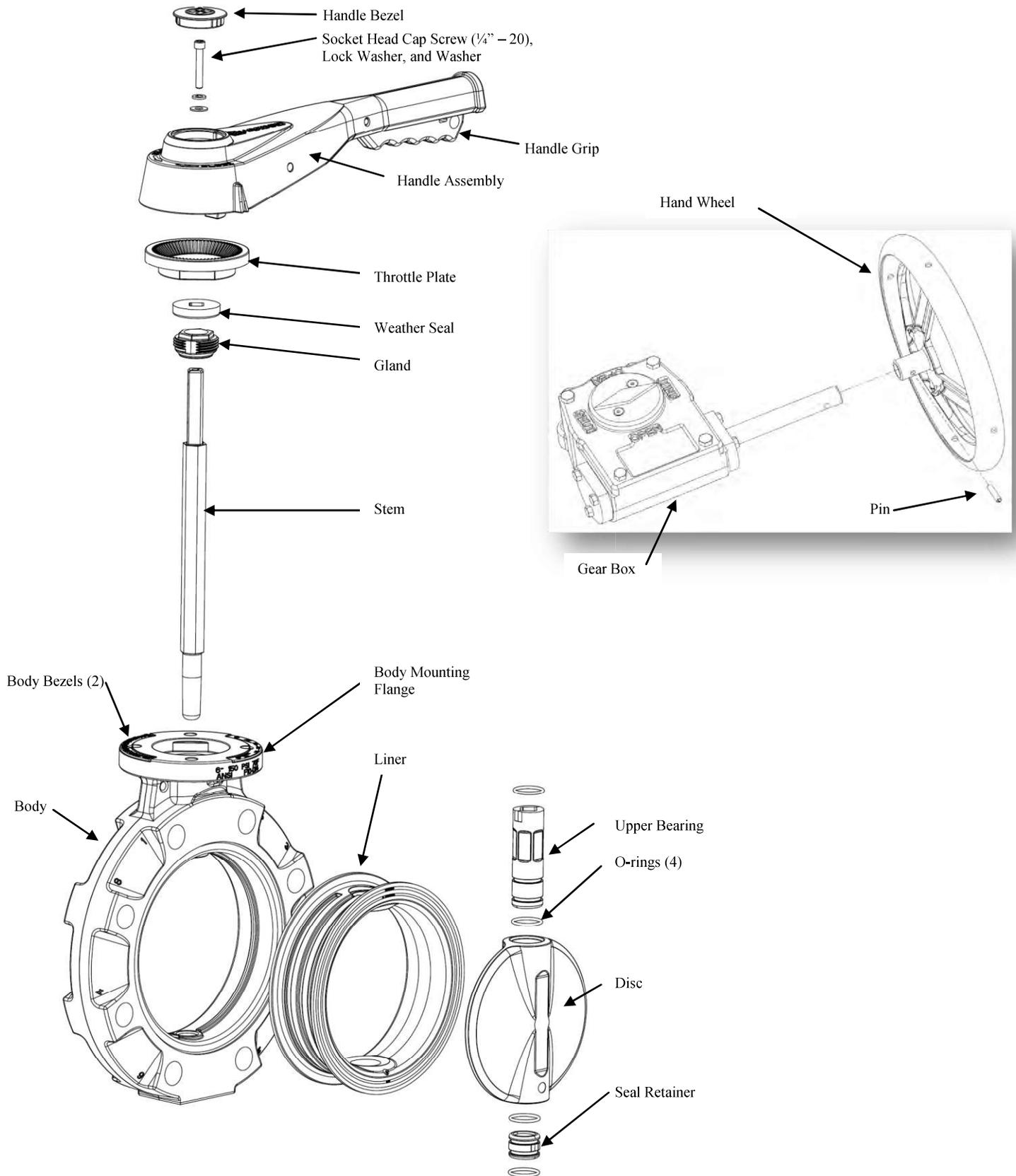


Chart 1: Operating pressures at elevated temperatures

6.0 PARTS LIST:

Fig. 3: Exploded view of BYV Series Butterfly Valve





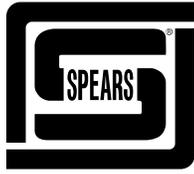
7.0 WARRANTY TERMS AND CONDITIONS:

TWO YEAR WARRANTY: All products manufactured by Hayward are warranted against defects in material or workmanship for a period of two years from date of shipment. Our sole obligation under this warranty is to repair or replace, at our option, any product or any part or parts thereof found to be defective. **HAYWARD MAKES NO OTHER REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** The warranty set forth above is the only warranty applicable to Hayward products and in no event shall Hayward be liable for any delay, work stoppage, cartage, shipping, loss of use of equipment, loss of time, inconvenience, loss of profits of any direct or indirect incidental resulting from or attributable to a breach of warranty. **The remedies under this warranty shall be the only remedies available. OUR MAXIMUM LIABILITY SHALL NOT IN ANY EVENT EXCEED THE CONTRACT PRICE FOR THE PRODUCT.**

Notes:

Krytox® is a trademark of E.I. du Pont de Nemours and Company

Ball Valve



Proper Use & Installation Of Valve and Fitting Union Connections

TECH-2-No.109

TECHNOLOGY UPDATE

Union connections provide a removable joint that allows assembly and disassembly for temporary connections or installation of piping, valves and other equipment that may need to be removed from a system for servicing or replacement. While simple in operation, understanding a few details will further assure satisfactory performance of plastic union connections.

Union Function Basics

Sealing Mechanism - An internal O-ring is the sealing mechanism for a union connection. This seals in two ways. On initial installation, the O-ring must be compressed enough to effect a seal between the mating surfaces of the Body and End Connector components. This is accomplished by tightening the Union Nut. Secondly, as pressure increases, the O-ring moves with the fluid using the pressure to create a tighter seal, blocking fluid medium from escaping between the mating components. This seal remains effective as long as there is sufficient compression on the O-ring and will be compromised only when an operational situation causes loss of compression.

Tightening – Tightening is only required to sufficiently compress the O-ring. Many suitable union connections can be made with hand tightening of the Union Nut and an additional 1/4-turn of the nut with a strap wrench. However, care should be taken to avoid over tightening! Additional stress imposed can potentially damage components. The necessity for additional tightening is generally an indication of other problems within the system or union connection itself.

Typical Connection Problems

System Misalignment - Failure to adequately seal a union connection is frequently attributable to misalignment in system components, where the nut is used to forcibly draw together the End Connector and Body Components. Misalignment may not allow even compression of the O-ring and results in loss of sealing. Additional tightening applies undue stress to the threaded components that can potentially lead to fracturing.

Dirt & Debris – An often-overlooked problem, the simple presence of sand, dirt and debris on the O-ring or mating surface can easily prevent proper sealing. Such can also cause difficulty in tightening the nut if threads are clogged.

Damage to O-ring or Mating Surfaces – Much like the effect of debris, damage to the O-ring or union components can prevent sealing by either not allowing proper compression or creating a leak-path under the O-ring seal.

Lubricant Use - Certain lubricants are stress-cracking agents that can induce premature failure of components, especially the nut, under normal tightening stress loads. A properly installed union connection should not require lubrication to assemble. The perceived necessity of a lubricant is also indicative of other problems.

Significant Temperature Variations – Significant changes in either fluid or ambient temperatures, including sun exposure, can result in stretching of thermoplastic nuts. This “relaxing” in turn reduces O-ring compression that can require additional tightening after initial installation.

Essential Installation Instructions

Preparation Checks

- Check that pipe ends are properly prepared for solvent cement or threaded installation of End Connectors.
- Check that system has adequate free movement for final assembly of Union Connection without misalignment or need to “draw together” any gaps.
- Check that valves and system have adequate support.

Install End Connectors

- Always remove Union Nut & End Connectors from valve for installation.
- Slide Union Nut onto pipe BEFORE installing End Connector.
- Spears® uses a retained (press-fit) O-ring on the End Connector. Check that the O-ring is in place and pressed evenly into the groove without bumps or ripples.
- Solvent cement or thread End Connector to pipe as applicable. Allow to cure prior to further assembly or valve installation.

Install Union Connection

- Make sure that the face of the End Connector is squarely aligned with the face of the body and flush against the O-ring. **DO NOT USE UNION NUTS TO DRAW TOGETHER ANY GAPS OR TO CORRECT SYSTEM MISALIGNMENT.**
- Support assembly and thread Union Nut onto Body.
- Tighten Nut **HAND TIGHT ONLY.**
- **DO NOT** use metal pipe wrenches.

Adjustments After Pressure Tests

- If any leaks are detected during system pressure test, disconnect Union and check for noted problems; then reinstall. If problem persists, tighten Union Nut *no more than* an additional 1/16-turn. Use **ONLY** strap wrenches. Apply a reference mark to the nut and body as an index to avoid over tightening. Tightening must not exceed the following maximum torque values:

Maximum Union Nut Torque (in.-lbs)

Union Size (in.)	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6
Torque (in.-lbs.)	58	83	95	122	170	190	269	560	583	912

WARNINGS:

- **DO NOT USE LUBRICANTS OR THREAD SEALANTS ON UNION NUTS.**
- **DO NOT USE UNION NUTS TO DRAW TOGETHER ANY GAPS OR TO CORRECT SYSTEM MISALIGNMENT.**
- **DO NOT SUPPORT EQUIPMENT OR SYSTEM COMPONENTS FROM A UNION CONNECTION.**
- **DO NOT USE ANY METAL WRENCHES. USE ONLY STRAP WRENCHES.**

Not For Use With Compressed Air or Gas

Progressive Products From Spears® Innovation & Technology

SPEARS® MANUFACTURING COMPANY

15853 Olden St., Sylmar, CA 91342

(818) 364-1611 • Visit our Web site: www.spearsmfg.com



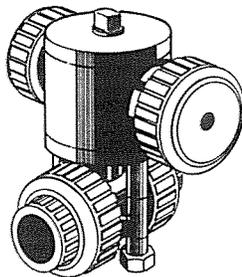
Air Actuated Ball Valve

ASSEMBLY, INSTALLATION & OPERATING INSTRUCTIONS FOR TRUE-BLUE™ AIR ACTUATORS

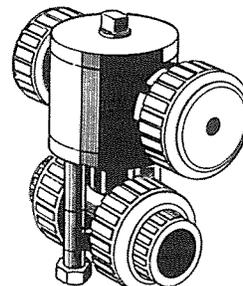
A. Parallel Mounting of Air Actuator to Ball Valve

Note: "Parallel" (in line with valve) mounting is recommended; however, where space limitations dictate, the actuator may be "Perpendicular" mounted (across the valve). See perpendicular-mounting section B.

1. Close the ball valve and hand tighten the union nuts. Remove the handle.
2. Install the handle at the top of the actuator and rotate the handle (if necessary) so that the recess on the bottom of the actuator is aligned with the ball valve shaft.
3. Position the actuator over the ball valve so that the ball valve shaft slides into the recess.
4. Slide the two spacers between the base of the actuator and the ball valve mounting lugs and then insert the mounting bolts through the lugs and spacers. Thread the mounting bolts snugly into the base of the actuator. It is recommended to use a couple of drops of Loctite® thread sealant on the threads to avoid loosening due to vibration or continued cycling.
5. The position of the handle will always indicate the position of the ball valve. If the handle is parallel with the piping, the valve is open. If the handle is perpendicular to the piping, the valve is closed.



Perpendicular Mounting



Parallel Mounting

B. Perpendicular-Mounting

Note: If space limitations prevent the preferred "Parallel" mounting method, the actuator can be mounted perpendicular to the valve. When the actuator is to be perpendicular-mounted, the base of the actuator must be rotated.

1. Remove the 4 assembly screws which hold the base to the actuator body.
2. Rotate the base 1/4 turn (90°).
3. Make sure the gasket is properly aligned to accept the screws, then replace the 4 assembly screws.
4. The actuator is now ready for mounting to the ball valve as in steps 1-4 in section A above except that it is aligned perpendicular.

PLAST--MATIC
VALVES, INC.

1384 Pompton Ave., Cedar Grove, NJ 07009-1095
Phone: (973) 256-3000 • Fax: (973) 256-4745

5. When the actuator is perpendicular-mounted, all labeling concerning the position of the valve will be backwards. (If the labeling indicates the valve is open, it is actually closed). Please also note that the direction of rotation of the handle will be backwards.

C. Installing a Spring Return Kit

1. For parallel-mounted normally closed valves:
 - a. Remove the union nut and air cap from the left side of the actuator. Make sure the ball valve is in the closed position.
 - b. Unscrew the adjusting cap from the spring housing and slide the union nut over the spring housing.
 - c. Thread the union nut with the spring housing back onto the actuator.
 - d. Insert spring into the spring housing and screw the spring adjusting cap into the housing until it cannot go any farther.
2. For parallel-mounted normally open valves:
 - a. Remove the union nut and air cap from the right side of the actuator. Make sure the ball valve is in the open position. b., c., and d. are the same as above.
3. For perpendicular-mounted normally closed valves:
 - a. Remove the union nut and air cap from the right side of the actuator. Make sure the ball is in closed position. b., c., and d. are the same as above.
4. For perpendicular-mounted normally open valves:
 - a. Remove the union nut and air cap from the left side of the actuator. Make sure the ball is in open position. b., c., and d. are the same as above.

D. Installation of Actuator & Ball Valve Assembly into Piping System

1. Flow Direction: Due to the Trunnion design, these valves are capable of handling flow and pressure in either direction.
2. Threaded connections: Use Teflon[®] tape or a suitable pipe sealant on the threaded connections. Use a strap wrench to tighten only 1/4 turn more than hand tight. Do not use metal pipe wrenches.
3. Socket connections: (PVC and CPVC only). Pipe ends must be cut off square and deburred. Clean pipe and valve end connector socket with proper cleaning solvent. After cleaning, apply solvent cement with a brush to both the pipe and socket. Immediately insert pipe into socket rotating the socket about 1/2 turn during insertion. **CAUTION:** It is best to do this with socket end connector disassembled from valve to avoid getting solvent cement inside the valve. If you are not familiar with solvent cementing, contact your Plast-O-Matic distributor for further information.
4. To maximize cycle-life of ball valve, turn the union nuts onto the ball valve hand tight only. Approximately 1,000 cycles later tighten again by hand or with a strap wrench and the valve will never again need adjusting or tightening.
5. Supporting the ball valve & actuator assembly:
Tapped holes (1/4-20 for ABV 1.2 & 1.6, 3/8-16 for ABV 2.5) have been provided on the bottom of the two mounting nuts. These tapped holes insure quick, easy mounting to a bracket or support.

6. Disassembly of downstream piping: The Trunnion design of this valve enables you to disassemble the downstream piping from the valve by unscrewing the valve's downstream union without leakage from the upstream pressure. The valve must be in the closed position before doing this. Use extreme caution with dangerous fluids.
7. Valve removal from piping: The True Union design enables you to simply unscrew the two valve union nuts and slide the valve body away from the piping. Pressure or liquid head must be removed from both sides of valve before doing this. Use extreme caution with dangerous fluids.

E. Connecting Actuator to Compressed Air System (or water pressure system)

1. Plast-O-Matic Air Actuators require a solenoid valve to control the air pressure that powers the actuator. The solenoid valve must be a 3-way or a 4-way depending on the mode of operation of the actuator. Actuators using air pressure for both opening and closing require a 4-way solenoid valve. Actuators using air pressure in combination with a spring require a 3-way solenoid valve. These solenoid valves may be purchased from Plast-O-Matic.

3-Way Solenoid Valve	4-Way Solenoid Valve
Gen. Purpose #8320B13	#8345E1
Exp. Proof #8320B14	#8345E11

To insure maximum actuator life, compressed air should be filtered & lubricated. No solvents or vapors should be in the air supply. Refer to the label on the actuator body for recommended operating pressures.

2. Water Actuation - In situations where air pressure is not available water pressure can be used so long as the pressure available is sufficient to operate the actuator. A brass solenoid valve (3-way or 4-way) will handle air or water. If the water is not clean, a filter should be used.

F. Manual Override Operation

~~1. Air by Air Actuators~~

~~In order to override an air by air actuators, the air supply pressure must be shut off with no residual pressure in the actuator. The override shaft on top of the actuator can then be turned in the direction indicated on the label (remember that for perpendicular mounted actuators, the directions and positions on the labeling are backwards).~~

2. Air by Spring Actuators

In order to override an air by spring actuator, the air supply pressure must first be shut off with no residual pressure in the actuator, and then the spring adjusting cap must be removed to relieve the spring force. The override shaft on top of the actuator can then be turned in the direction indicated on the label (remember that for perpendicular-mounted actuators, the directions and positions on the labeling are backwards).

PARTS LIST TRUE BLUE™ AIR ACTUATOR

ITEM NUMBER	PART NAME	NO. PER ASSEMBLY
1	COVER BEARING	1
2	UPPER SHAFT O-RING SEAL	1
3	HANDLE (SUPPLIED WITH BALL VALVE)	1
4	COVER	1
5	GASKET	2
6	BODY	2
7	UNION NUT	2
8	AIR CAP O-RING SEAL	2
9	U-CUP SEAL	2
10	AIR CAP	2
11	PISTON	1
12	SHAFT	1
13	LOWER SHAFT O-RING SEAL	1
14	BASE	1
15	ASSEMBLY SCREW	6
16	BASE BEARING	1
17	SPACER	2
18	MOUNTING BOLT	2
19	SPRING-RETURN KIT	OPTIONAL
20	SPRING	1
21	ADJUSTING CAP	1
22	AIR SIDE LIMIT-STOP KIT	OPTIONAL
23	ADJUSTING BOLT	1
24	LOCKING NUT	1
25	THREAD SEAL	1
26	LIMIT-STOP AIR CAP	1
27	AIR CAP O-RING SEAL	1
28	END NUT	1
29	SPRING SIDE LIMIT-STOP KIT	OPTIONAL
30	LIMIT-STOP GUIDE	1
31	LIMIT-STOP ADJUSTING CAP	1
32	END NUT	1
33	ADJUSTING BOLT	1
34	LOCKING NUT	1
35	SEAL KIT (INCLUDES ITEM NO.'S 2, 3, 8, 9, 13)	OPTIONAL
36		

STANDARD ACTUATOR: MODEL ABVA, AIR x AIR OPERATION

OPTIONAL LIMIT-STOP KIT FOR AIR SIDE OF ACTUATOR: 23, 24, 25, 26, 27, 28, 29

OPTIONAL LIMIT-STOP KIT FOR SPRING SIDE OF ACTUATOR: 30, 31, 32, 33, 34, 35

MODEL ABVS, AIR x SPRING REQUIRES OPTIONAL SPRING - RETURN KIT: 19, 20, 21, 22

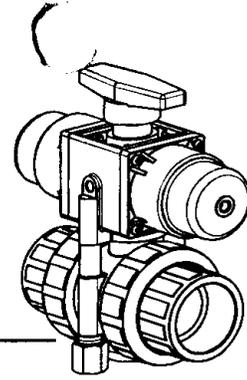
Tolerances: Except as Indicated
 DIMENSIONS: ± 0.005
 FINISH: ± 1/32"

Plant-O-Matic Valves, Inc.
 1284 Pompton Ave., Cedar Grove, N.J. 07109-1005
 Quantity: 1
 As Specified
 Parts List For ABV 1.2.1.6.25

Part Number: 4414

NOTE:
WHEN ORDERING PARTS, SPECIFY PART NAME AND ACTUATOR MODEL NUMBER.

ASSEMBLY, INSTALLATION & OPERATING INSTRUCTIONS FOR TRUE BLUE™ 2.5 AIR ACTUATORS ABRA, **ABRS** & ABMS



A. Mounting of Actuator to Ball Valve MBV125, **MBV150** and MBV200. ABRS

1. Close the ball valve and hand tighten the union nuts. Remove the handle.
2. Install the handle at the top of the actuator and rotate the handle (if necessary) so that the recess on the bottom of the actuator is aligned with the ball valve shaft.
3. Position the actuator over the ball valve so that the ball valve shaft slides into the recess.
4. Slide the two spacers between the base of the actuator and the ball valve mounting lugs and then insert the mounting bolts through the lugs and spacers. Thread the bolts snugly into the base of the actuator. It is recommended to use a couple of drops of Loctite® thread sealant on the threads to avoid loosening due to vibration or continued cycling.
5. The position of the handle will always indicate the position of the ball valve. If the handle is parallel with the piping, the valve is open. If the handle is perpendicular to the piping, the valve is closed.

B. Installation of Actuator & Ball Valve Assembly into Piping System

1. Flow Direction: Due to the Trunion design that supports the ball, these valves are capable of handling flow and pressure in either direction.
2. Threaded Connections: Use Teflon® tape or a suitable pipe sealant on the threaded connections. Use a strap wrench to tighten only ¼ turn more than hand tight. **DO NOT USE METAL PIPE WRENCHES.**
3. Socket Connection: (PVC and CPVC only). Pipe ends must be cut off square and deburred. Clean pipe and valve end connector socket with proper cleaning solvent. After cleaning, apply solvent cement with a brush to both the pipe and socket. Immediately insert pipe into socket rotating the socket about ½ turn during insertion. **CAUTION:** It is best to do this with socket end connector disassembled from valve to avoid getting cement inside the valve. If you are not familiar with solvent cementing, contact your Plast-O-Matic distributor for further information.
4. To maximize cycle life of ball valve, turn the union nuts onto the ball valve hand tight only. Approximately 1,000 cycles later tighten again by hand or with a strap wrench and the valve will never again need adjusting or tightening.
5. Supporting the ball valve and actuator assembly: Tapped holes have been provided on the bottom of the two mounting nuts. These tapped holes ensure quick, easy mounting to a bracket or support.
6. Disassembly of downstream piping: The Trunion design of this valve enables you to disconnect the valve from the downstream piping by unscrewing the valve's downstream union without leakage from the downstream pressure. The valve must be in the closed position before doing this. Use extreme caution with dangerous fluids.
7. Valve removal from piping: There must be no pressure or liquid in the piping on both sides of the valve. When the pipeline is clear, the True Union design enables you to simply unscrew the two valve union nuts and slide the valve body away from the piping. Use extreme caution with dangerous fluids.

C. Connecting to Compressed Air System (or water pressure system)

1. Plast-O-Matic Air Actuators require a solenoid valve to control the air pressure that powers the actuator. ~~A 4-way solenoid valve must be used with the ABRA (Air x Air). A 3-way solenoid valve is used with the ABMS (Air x Spring) or ABMS (Air x Spring with Manual Override).~~ The recommended solenoid valves available from Plast-O-Matic are:

continued...

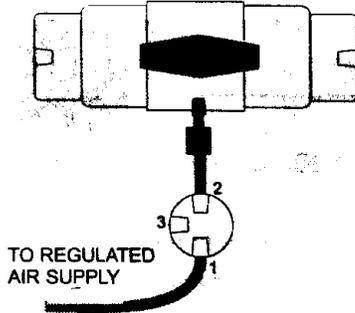
NOV 98

Solenoid Valves
 General Purpose
 Explosion Proof

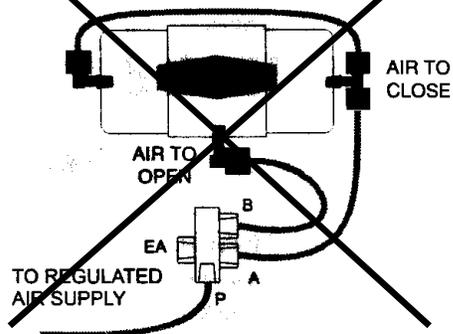
3-Way
 #8320G13
 #EF8320G13

~~**4-Way**
 #8345G1
 #EF8345G1~~

**ABRS/ABMS-2.5 ACTUATOR TYPICAL
 INSTALLATION WITH 3 WAY SOLENOID**



~~**ABRA-2.5 ACTUATOR TYPICAL
 INSTALLATION WITH 4 WAY SOLENOID**~~



RECOMMENDED AIR PRESSURE

	Operating Pressure	Maximum Pressure
ABRA	30 - 50 PSI	80 PSI @ 75°F
ABRS/ABMS	60 - 80 PSI	80 PSI @ 75°F

MAXIMUM AMBIENT TEMPERATURE 120°F/49°C

To ensure maximum actuator life, compressed air should be filtered and lubricated. No solvents or vapors should be in the air supply.

2. Water Actuation: In situations where air pressure is not available, water pressure can be used as long as the pressure available is sufficient to operate the actuator. A brass solenoid valve (3-way or 4-way) will handle air or water. If the water is not clean, a filter should be used.

D. Manual Override Operation

- ~~1. ABRA (Air x Air) Actuator: In order to override an air by air actuator, the actuator must be depressurized. The handle on top of the actuator can then be turned in the direction indicated on the label.~~
2. ABRS (Air x Spring) Actuator: In the event of an emergency, the valve can be opened or closed manually by depressurizing and removing the actuator, then manually turning the valve with the removable handle from the top of the actuator. To manually override the ABRS without removing the actuator, order option ABMS. (see page 4 of instructions)

E. Default Position

1. ABRS or ABMS is shipped in a "normally-closed" position; when air pressure is supplied the valve opens. In the event of power loss the valve is closed by spring force.
2. Converting ABRS to "normally-open": First, remove the top handle from the center shaft (remove screw on ABMS). At the base of the actuator, remove the retaining ring. Push down on the top of the pinion shaft and slide it out of the rack gearing. Rotate the shaft exactly 90° and slide it back into the gearing. Replace the retaining ring and handle. If you use excessive force to remove the pinion, an o-ring may be dislodged; be sure to replace it. Also, the insert in the base of the pinion may separate from the shaft; check that the orientation of the double-D in the insert is the same as the top of the shaft.
- ~~3. The ABRA has no default position. In the event of pressure or power loss, the actuator can be manually opened or closed according to instruction D above.~~

BE SURE TO PLAN A SAFE SHUTDOWN, EMERGENCY STOP AND START-UP PROCEDURE IN THE EVENT OF ELECTRICAL POWER OR PRESSURE LOSS.

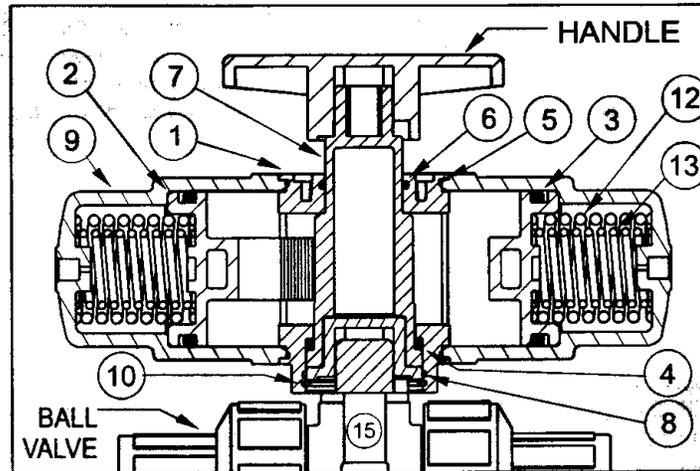
F. MAINTENANCE

True Blue Actuators are maintenance-free, but may require internal lubrication after extended cycle life.

- ~~1. The ABRA (Air x Air) Actuator may be disassembled, and silicone grease applied to gearing and piston seals.~~

2. ABRS and ABMS (Air x Spring) Actuators have pre-loaded springs and may only be disassembled with proper fixtures. Lubrication of the gearing only can be done by removing the pinion. (See instructions in Section E, #2 above.) Apply silicone grease to pinion and gearing inside the housing.

G. SCHEMATIC AND PARTS LIST



PARTS LIST FOR ABRA/ABRS/ABMS***

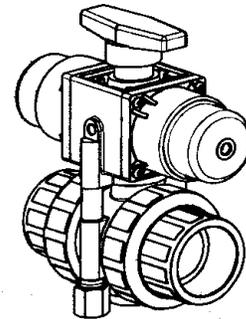
ITEM	QTY	DESCRIPTION	MAT'L
1	1	BODY	GPP
2	2	PISTON-RACK	DELFIN
3	2	O-RING #330	RUBBER
4	1	O-RING #223	RUBBER
5	2	O-RING #039	RUBBER
6	1	O-RING #124	RUBBER
7	1	PINION	DELFIN
8	1	INSERT	GPP
9	2	CYLINDER	GPP
10	1	RETAINING RING	SS
11**	8	SCREW, #10	SS
12	2*	SPRING	SS
13	2*	SPRING	SS
14**	2	SCREW MOUNT	ASSY
15	2	SPACER	VALOX

* ABRS AND ABMS ONLY ** NOT SHOWN

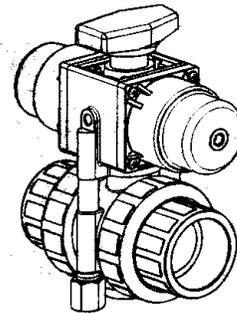
*** SHOWN OPEN AS ABRS (NORMALLY CLOSED)

GPP = GLASS FILLED POLYPROPYLENE (BLUE)

SS = STAINLESS STEEL DELFIN is white material



"Parallel" handle position (above) indicates open valve; "perpendicular" handle (below) indicates closed valve.



ABMS option shown on back page.

PLAST-O-MATIC VALVES, INC.

1384 Pompton Avenue, Cedar Grove NJ 07009 USA
973-256-3000 • FAX: 973-256-4745 • info@plastomatic.com

ABMS OPTION

All Instructions A through G apply to the ABMS option, with the following differences:

A. Mounting of ABMS to Ball Valve MBV125, MBV150 and MBV200.

1. Close the ball valve and hand tighten the union nuts. Remove the ball valve handle. The ABMS is supplied with a handle, so the ball valve handle is no longer needed.
2. Two shipping screws were installed to temporarily hold the flat round mounting plate to the base of the actuator. While holding the plate and manual override coupling (the round, white slotted piece at the base of the actuator) to the body, remove the two shipping screws. If the mounting plate is not held in place, the white slotted coupling may fall off; simply reattach it making sure that the slot is oriented lengthwise in the same direction as the handle.

D. Manual Override Operation ABMS (Air x Spring w/Manual Override) Actuator: In order to override an air by spring actuator with manual override option, the air supply pressure must be shut off with no residual pressure in the actuator. The override handle on top of the actuator must be securely on the shaft. It can then be pressed down to disengage the shaft from the spring-loaded rack and pinion mechanism, then turned. It must only be turned as far as the stop — approximately a quarter-turn. When power or pressure is again available, the actuator must be checked to be certain that the shaft reengages with the spring-loaded rack and pinion: Power the actuator, and verify that the handle can no longer be turned by hand without pressing down on the handle. If it still turns freely, move the handle slowly until the shaft reengages.

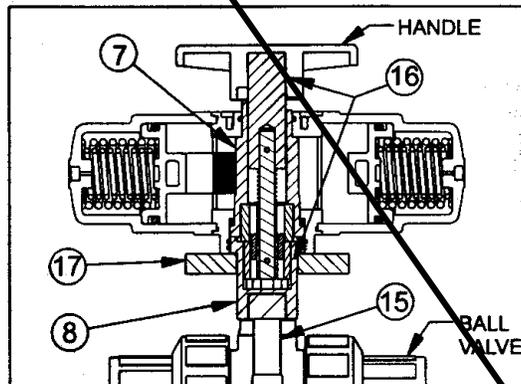
E. Default Position

2. Converting ABMS to "normally-open": First, remove the top handle from the center shaft (remove screw holding handle on). At the base of the actuator, remove the mounting plate, white slotted coupling (has hex cut slot in top) and steel/plastic spring loaded shaft. Push down on the top of the pinion shaft and slide it out of the rack gearing. Rotate the pinion 90° in either direction and slide it back into the gearing. Replace the steel/plastic shaft and remount the handle. The handle should be oriented such that the key on the underside will move down into the notch cut on the pinion when the handle is depressed and the handle is in-line or parallel to the centerline of the cylinders. Replace the hex-cut white slotted coupling. Make sure the slot in the bottom of the coupling is oriented in the same direction as the handle slot on top of the actuator. If you use excessive force to remove the pinion shaft, an O-ring may be dislodged; be sure to replace it.

MODIFIED AND ADDITIONAL PARTS FOR ABMS MANUAL OVERRIDE ACTUATOR

ITEM	QTY	DESCRIPTION	MATERIAL
7	1	M.O. PINION	DELRIN
8	1	M.O. COUPLING	DELRIN
10	0	OMT RET. RING	
14	2	M.O. SCREW MOUNT	ASSY
15	2	M.O. SPACER	VALOX
16	1	M.O. DRIVE ASSY	ASSY
17	1	M.O. MOUNT	PVC

M.O. = Manual Override



PLAST-O-MATIC VALVES, INC.

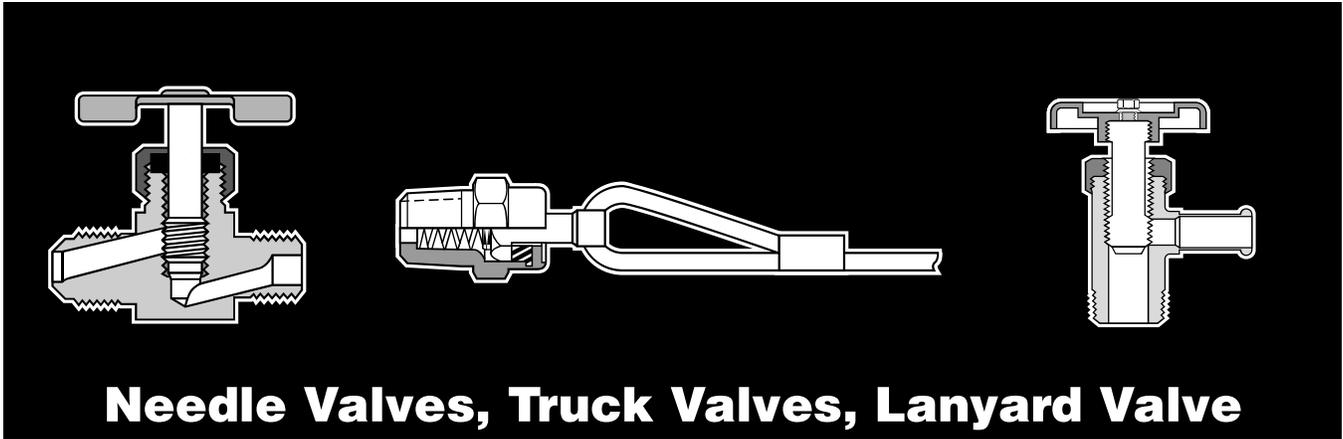
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www.plastomatic.com

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Needle Valve



Advantages

Parker Needle and Truck Valves have metal-to-metal seats, with fine-thread screwdown. This enables positive sealing up to the capacity of the valve.

The Lanyard Valves' compact design is ideally suited for releasing condensate from air tanks. Available with various lengths of cable. Brass construction with specially formulated low temperature seal which remains elastic to temperatures as low as -40°F. It is manufactured for use with low pressure air systems such as air tanks on heavy trucks. Consult division for use with other fluids.

Working Pressure and Temperature

Valves are designed to withstand up to 150 PSI working pressure, unless otherwise noted. See specific part number for temperature range.

Needle Valves Installation Instructions

Series NV valves should always be installed with the pressure against the seat. Refer to drawing to determine correct direction of flow.

Lanyard Valve Operating Instructions

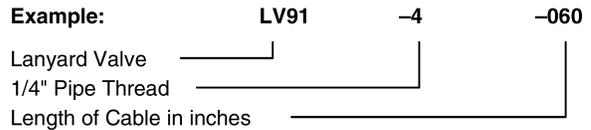
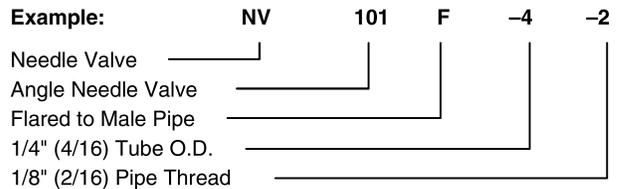
A pulling action exerted on the cable cocks the stem, allowing condensate to pass through the valve. Releasing the cable resets the stem which returns the valve to its closed position.

Order

By part number and name.

Nomenclature

Part numbers are constructed from symbols that identify the style and size of the fitting. The first series of numbers and letters identifies the style and type fitting. The second series of numbers describes the size.



Special Valves

Valve configurations and/or sizes other than those shown in the catalog can be furnished. It is suggested that a print or sketch be submitted with the inquiry.

Pricing

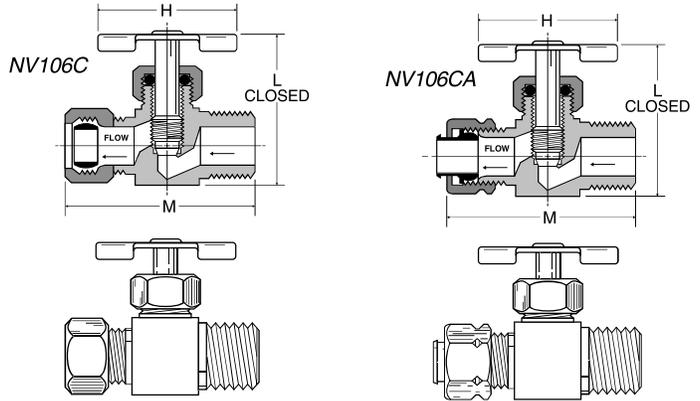
Only items priced in current supplementary price list PL3501 are carried in stock. Price and delivery for non-stock items furnished on request for specified quantity.

K

Needle Valve NV106C-NV106CA

Compression to Male Pipe *Provided with Pin Handle
 Temperature Range: -45° to +250° F

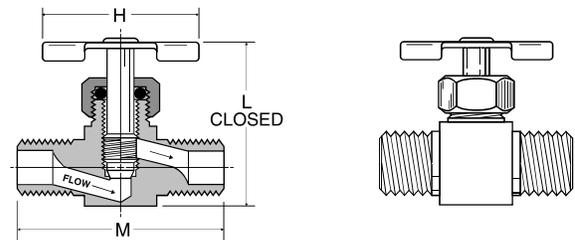
PART NO.	TUBE SIZE	PIPE THREAD	H	L	M
NV106C-4-2*	1/4	1/8	1.50	1.41	1.53
NV106C-4-4*	1/4	1/4	1.50	1.40	1.55
NV106C-5-2*	5/16	1/8	1.50	1.35	1.50
NV106C-6-4	3/8	1/4	1.38	1.56	1.75
NV106CA-4-2	1/4	1/8	1.50	1.41	1.47
NV106CA-4-4*	1/4	1/4	1.50	1.33	1.52
NV106CA-6-4	3/8	1/4	1.38	1.53	1.78



Needle Valve NV107P

Male Pipe to Male Pipe *Provided with Pin Handle
 Temperature Range: -45° to +250° F

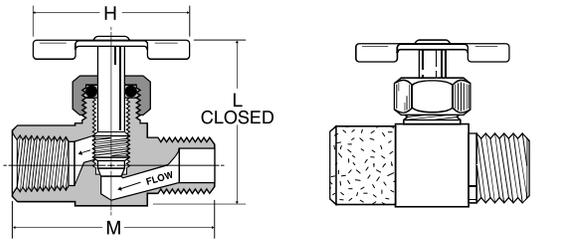
PART NO.	PIPE THREAD	H	L	M
NV107P-2*	1/8	1.50	1.35	1.25
NV107P-4	1/4	1.38	1.54	1.65



Needle Valve NV108P

Female Pipe to Male Pipe *Provided with Pin Handle
 Temperature Range: -45° to +250° F

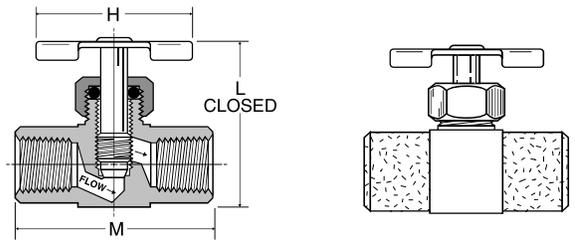
PART NO.	PIPE THREAD	H	L	M
NV108P-2*	1/8	1.50	1.36	1.25
NV108P-4	1/4	1.38	1.56	1.61



Needle Valve NV109P

Female Pipe to Female Pipe *Provided with Pin Handle
 Temperature Range: -45° to +250° F

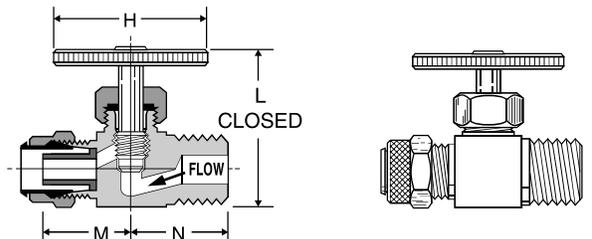
PART NO.	PIPE THREAD	H	L	M
NV109P-2*	1/8	1.50	1.35	1.25
NV109P-4	1/4	1.38	1.53	1.60



Needle Valve NV311P

Poly-Tite to Male Pipe
 Temperature Range: 0° to +150° F

PART NO.	TUBE SIZE	PIPE THREAD	H	L	M	N
NV311P-4-2	1/4	1/8	1.07	1.17	.50	.63
NV311P-4-4	1/4	1/4	1.07	1.18	.50	.72
NV311P-6-4	3/8	1/4	1.07	1.19	.56	.72



Pressure Regulator

[®]
SPEEDAIR®



Regulator

Models: 4ZM05A, 4ZM06A, 4ZM07A, 4ZM08A



PLEASE READ AND SAVE THESE INSTRUCTIONS. READ CAREFULLY BEFORE ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE OR MAINTAIN THE PRODUCT DESCRIBED.

PROTECT YOURSELF AND OTHERS BY OBSERVING ALL SAFETY INFORMATION. FAILURE TO COMPLY WITH INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE! RETAIN INSTRUCTIONS FOR FUTURE REFERENCE.

PLEASE REFER TO BACK COVER FOR INFORMATION REGARDING DAYTON'S WARRANTY AND OTHER IMPORTANT INFORMATION.

Model #: _____

Serial #: _____

Purch. Date: _____

Printed in China
NSC100 / Version 1/ 11/ 15/2015
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BEFORE YOU BEGIN

Unpack

- After unpacking unit, inspect carefully for any damage that may have occurred during transit. Check for loose, missing, or damaged parts. Shipping damage claim must be filed with carrier.

Contents



4ZM05A, 4ZM06A



4ZM07A, 4ZM08A



- See General Safety instructions on page 2.

Getting Started

Safety / Specifications

Installation

Operation

Maintenance

Repair parts



GENERAL SAFETY INFORMATION

Speedaire air pressure regulators features self-relieving and high capacity. These heavy-duty units are designed for commercial/industrial applications, providing high air flow and maintaining the set pressure with minimum pressure drop between the actual air compressor outlet pressure and the set pressure to tools and equipments.

The device may only be operated in the permanent installation in pressured air systems. Improper use or modifications to the device or the use of its components which are not tested and approved by the manufacturer may result in unforeseen damage.

Air line regulators are used in a variety of air systems which may go with air compressor, spray gun, filters, lubricators, hoses, etc. Read and understand all safety instructions, installation instructions and operation instructions before using this unit. Basic safety precautions should always be followed to reduce the risk of personal injury and/or property damage.

General Safety Instructions

1. Read all safety instructions. Failure to do so may cause harm to you and others.
2. Keep children and unauthorized persons away from the device. Ensure that children are not able to play with the device.
3. Do not overload the device. Do not use the device for purposes for which it is not intended.
4. Always make sure that the air line is in good condition.
5. Hose and connection should be inspected to avoid any leakage before use.
6. Residual air in the system needs to be released before service or repair.
7. Ensure that all connections and supply lines are rated for the required pressure and air flows.

CAUTION Polycarbonate bowls are not recommended for use in atmospheres containing chemicals such as acetone, benzene, carbon tetrachloride, gasoline, toluene and/or air compressor systems using synthetic fire-resistant lubricants.



SPECIFICATIONS

Model	Max. Inlet Press.	Max. temp.	Max. Flow	Main Ports	Gauge Ports	Pressure Adjustment Range	Wt. (lbs)
4ZM05A	400 psi	150°F	15 cfm	1.8"	1.8"	5 to 125 psi	0.42
4ZM06A	400 psi	150°F	15 cfm	1.4"	1.8"	5 to 125 psi	0.42
4ZM07A	300 psi	150°F	14 cfm	1.8"	1.8"	5 to 125 psi	0.30
4ZM08A	300 psi	150°F	15 cfm	1.4"	1.8"	5 to 125 psi	0.30

- Air supply must be dry enough to avoid ice formation below +35°F.
- At 150 psi inlet pressure, set pressure of 90 psi, and a 15 psi pressure drop.

DIMENSIONS (inch)

Granger Items No.	Length (in./mm)	Width (in./mm)	Height (in./mm)
4ZM05A	1.48/38	1.50/38	2.86/73
4ZM06A	1.48/38	1.50/38	2.86/73
4ZM07A	1.63/41	1.50/38	2.91/75
4ZM08A	1.63/41	1.50/38	2.91/75

INSTALLATION INSTRUCTIONS

1. Before installation, check whether the connections used match the maximum pressure of the regulator.
2. Shut off air pressure from air system. Install the regulator vertically or at any angle in the air line. Ensure that the regulator is installed with inlet/outlet air flow in the proper direction of arrow on the unit. The regulator should be installed upstream of lubricator(s), and cycling valve(s) in the air line, and should be as close as possible to the device being serviced.
note : Model 4ZM05 and 4ZM06 have the word *IN* stamped next to the air inlet port.
3. Connect pipes to the inlet and outlet ports using pipe thread sealant tape on male threads only. When screwing pipes together, prevent ingress of shavings and sealant to the interior of the unit. Contaminations in the unit may cause it to fail.
4. Make sure that all connections to the regulator are tight and secure.
5. Install a pressure gauge to either of the gauge ports facing the operator. The other gauge port should be plugged or can be used as an additional air outlet for regulated air.



- It is recommended that a Speedaire air line filter should be installed upstream of the regulator.
- The regulator must be installed in such a way that no mechanical force or tension occurs.

OPERATING INSTRUCTIONS (See Figure 2)

- Ensure that the pressure to the air inlet of the regulator from air line does not exceed the maximum pressure specified in the instructions.
- Before applying inlet pressure, pull the knob upwards until you hear the click, turn it counterclockwise to release all force on the regulating spring. Then push the knob downwards until you hear the click.
- Air inlet pressure can be approached by turning the adjustment. Pull the knob upwards until you hear the click, turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. When the desired pressure is obtained, pull the knob downwards until you hear the click to secure the knob.
- The set air pressure can be read on the pressure gauge.
- Always approach the desired pressure gradually, either from a lower pressure to a higher pressure, or from a higher pressure to a lower pressure.

DIAGRAMS

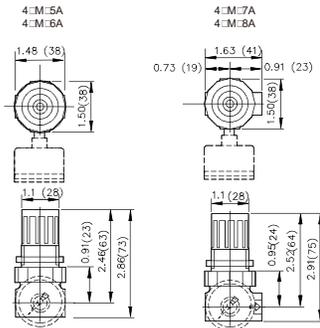


figure 1



MAINTENANCE

Maintenance Steps

- disassembly (See figure 2)**
 - Regulator can be disassembled without removal from air line.
 - Shut OFF inlet pressure. Reduce pressure in inlet and outlet lines to zero.
 - Turn adjustment fully counterclockwise.
 - Disassemble in general accordance with the parts illustrated in Figure 2.
- cleaning(See figure 2)**
 - Clean parts with warm water and soap.
 - Rinse and dry parts. Blow out internal passages in body with clean, dry compressed air.
 - Inspect parts. Replace those found to be damaged.
- assembly (See figure 2)**
 - Lubricate o-rings with a light coat of good quality o-ring grease.
 - Assemble the unit as shown on Figure 2.
 - Diaphragm valve pin must slide freely thru the valve seat after seat is torqued into body.

torque table

Parts Ref. No.	Inch Pounds (N-m)
Bonnet	65 to 75 (7.3 to 8.5)
Valve seat	4 to 6 (0.45 to 0.68)

Getting Started
 Safety / Specifications
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 Repair Parts



REPAIR PARTS ILLUSTRATION FOR 4ZM05A, 4ZM06A, 4ZM07A, 4ZM08A

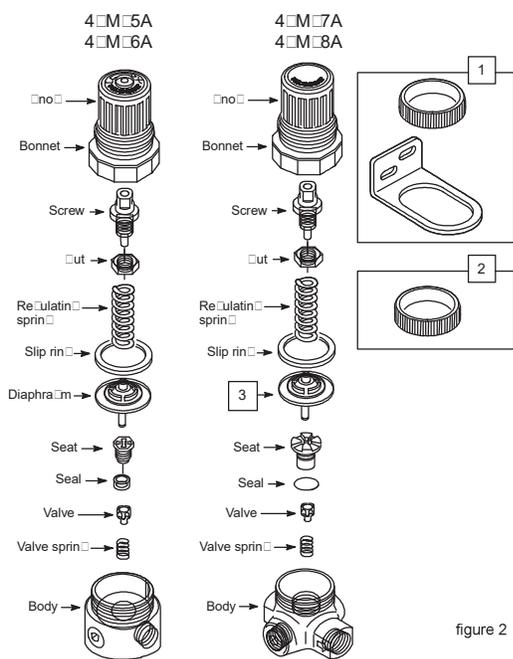


figure 2

For Repair Parts, call 1-800-323-0620
24 hours a day - 365 days a year

Please provide following information:
 -Model number
 -Serial number (if any)
 -Part description and number as shown in parts list



REPAIR PARTS ILLUSTRATION FOR 4ZM05A, 4ZM06A, 4ZM07A, 4ZM08A

Ref. No.	Parts Description	Part No.	Qty.
1	Wall bracket & panel nut	4ZK12A	1
2	Panel nut	4ZK13A	1
3	Diaphragm	114X45	1

Getting Started
 Safety / Specifications
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SPEEDAIRE ONE-YEAR LIMITED WARRANTY

SPEEDAIRE ONE-YEAR LIMITED WARRANTY. All Speedaire® product models covered in this manual are warranted by Dayton Electric Mfg. Co. ("Dayton") to the original user against defects in workmanship or materials under normal use for one year after date of purchase. If the Speedaire Product is part of a set, only the portion that is defective is subject to this warranty. Any product or part which is determined to be defective in material or workmanship and returned to an authorized service location, as Dayton or Dayton's designee designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced with a new or reconditioned product or part of equal utility or a full refund given, at Dayton's or Dayton's designee's option, at no charge. For limited warranty claim procedures, see "Warranty Service" below. This warranty is void if there is evidence of misuse, mis-repair, mis-installation, abuse or alteration. This warranty does not cover normal wear and tear of Speedaire Products or portions of them, or products or portions of them which are consumable in normal use. This limited warranty gives purchasers specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.

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**Dayton Electric Mfg. Co.,
100 Grainger Parkway, Lake Forest, IL 60045 U.S.A.
or call +1-888-361-8649**

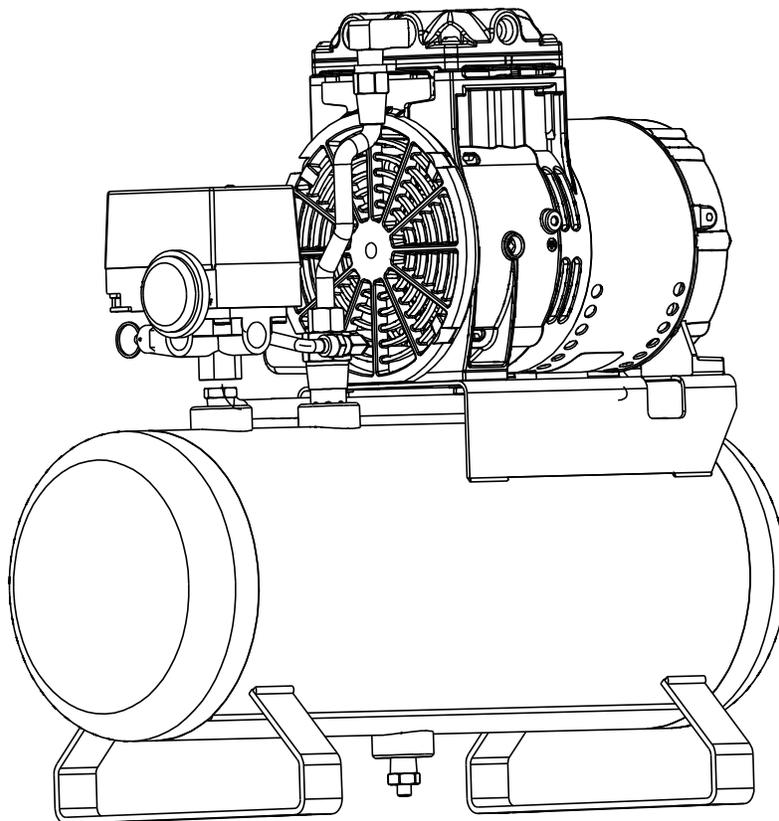
Air Compressor

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A Gardner Denver Product

ULTRA
AIR-PAC®

3524 WASHINGTON AVE., SHEBOYGAN, WI 53081 USA 1-800-558-7721 www.thomasairpac.com

OWNER'S MANUAL and OPERATING INSTRUCTIONS for
Model T-617HDN
Portable, Perma-Lube™ Heavy Duty
WOB•L PISTON AIR COMPRESSOR



⚠ WARNING: Read and understand the information in this owner's manual before operating air compressor.

Part No. 642485 Rev. H 08/08

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GENERAL DESCRIPTION

The Airpac model T-617HDN is an electrically powered air compressor with a thermally protected motor, mounted to a 2 gallon air storage tank. Tank pressure is regulated by a combination of a pressure switch and a safety valve. The pressure switch will turn the compressor on when tank pressure drops below 100 PSIG, and turn the compressor off when tank pressure reaches 122 PSIG. The safety valve prevents tank pressure from exceeding 140 PSIG.

SPECIFICATIONS

Voltage	115V, 60Hz
Fuse Requirements	10A
Safety Valve Setting	140 PSIG (965 KPa)
Air Displacement	1.75 CFM (49.5 LPM)
Air Delivery90 CFM @ 100 PSI (25.48 LPM @ 689.5 KPa)
Amps at Working Pressure	3.9 A
Automatic Control	Starts @ 98 PSIG (675.7 KPa) Stops @ 122 PSIG (841.2 KPa)
Tank Size	2 Gal.
Shipping Weight	32 lbs.
Cord	6 ft. (1.83 M)
Sound Level	60 dB

PSI = Pounds Per Square Inch
KPa = Kilopascals

CFM = Cubic Feet Per Minute
LPM = Liters Per Minute

APPLICATION

Ideal as primary or secondary air source for almost any operation, the Renegade T-617HDN is particularly suitable for shops, garages, and factories where repetitive use demands high reliability. The T-617HDN will operate:

- ◆ 1 Finish Nail Guns

Visit www.thomasairpac.com for more information

SAFETY FIRST



This symbol points out important safety instructions which if not followed could endanger the personal safety and/or property of yourself and others. Read and understand the information in this owner's manual and the engine owners manual before operating.

1. The compressor should be located in a dry, clean, and well ventilated area.
2. Inspect hose, plug, and cord for signs of damage before use. Do not use if a deficiency is found. Contact your nearest service center for replacement parts. Never operate a damaged unit.
- 3. Do not tamper with the safety valve. It has been factory set. Any adjustment of this valve could cause serious injury.**
4. This air compressor needs no lubrication. Applying oil to any part could result in polluted air delivery to the air-handling equipment.
5. Compressed air must never be aimed at anyone because it can cause serious injury. Keep children away. WEAR EYE PROTECTION.
6. All air compressors generate heat even under normal operating conditions. To avoid serious burns, never touch the air compressor during or immediately after operation.
7. When unit is not in use, wrap cord securely and store in dry place. Do not abuse cord or plug.
8. Before servicing, cleaning, or removal of any part, shut off power and relieve pressure from tank.
9. This system produces 125 PSI. To avoid rupture and injury, do not operate this pump with components rated less than 125 PSI working pressure (including but not limited to spray guns, hose and hose connections without pressure regulator).

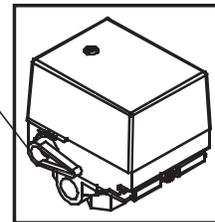
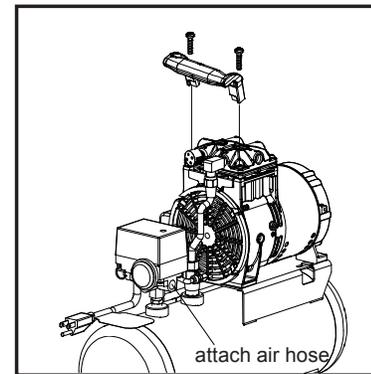
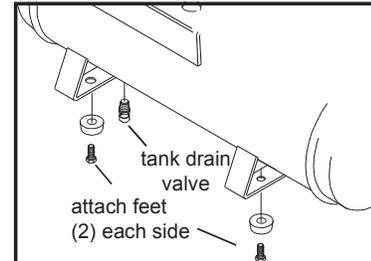
If warranty service or repair is needed contact your nearest authorized service center. If one does not exist in your area, contact the factory. Unauthorized repairs or teardown of the unit will void the factory warranty.

SET-UP

Location of Air Compressor

Operate air compressor in a clean, dry and well ventilated area. The air filter must be kept clear of obstructions which could reduce air flow to the compressor. The air compressor should be located at least 12" away from walls or other obstructions that could interfere with the flow of air.

1. Remove the air compressor from the carton and place it on its side.
2. Install the 4 rubber feet with the screws included in the accessory kit as shown.
3. Close the tank drain valve.
4. Remove 2 head screws and install handle with hardware included in accessory kit.
5. Turn on/auto/off lever on the pressure switch to the "OFF" position.
6. Attach air hose to the compressor manifold.
7. Plug the power cord into a grounded outlet or approved extension cord. (See Grounding Instruction section) Turn the on/auto/off lever on the pressure switch to the "ON" position.



Extension Cords

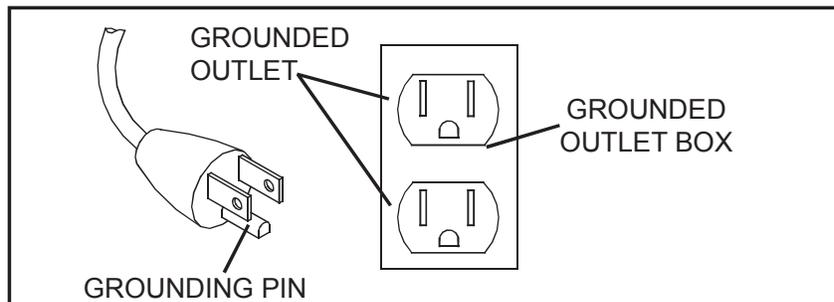
To avoid voltage drop and power loss to motor, use additional hose instead of an extension cord. If an extension cord must be used, use only a 3-wire extension cord equipped with a 3-blade grounding plug and a 3-slot receptacle that will accept the plug on the compressor. Be sure to use an extension cord heavy enough to carry the current your product will draw. An undersized cord will cause a drop in line voltage resulting in loss of power and overheating. Make sure the extension cord is in good condition.

NOTE: Wire size increases as gauge number decreases.

MINIMUM GAUGE FOR EXTENSION CORDS				
CORD LENGTH	25 FEET	50 FEET	100 FEET	150 FEET
GAUGE	12	12	10	8

Grounding Instructions

⚠ DANGER: Improper grounding can result in electrical shock. In the event of a short circuit, grounding reduces the risk of shock by providing an escape wire for the electric current. The air compressor must be grounded. This compressor is for use on a nominal 120 volt circuit and is equipped with a grounding wire and appropriate grounding plug that looks like the plug illustrated. The plug must be used with an outlet that has been installed and grounded in accordance with all local codes and ordinances. Make sure that the compressor is connected to an outlet having the same configuration as the plug. No adapter should be used with this product. Inspect the plug and cord before each use. Do not use compressor if there are signs of damage.

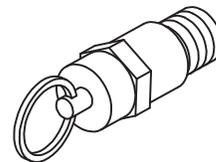


⚠ DANGER: Improper installation of the grounding plug can result in electrical shock. If repair or replacement of the cord or plug is required, do not connect the grounding wire to either flat blade terminal. The wire with the green (with or without yellow stripes) insulation is the grounding wire and must be connected to the grounding pin. Check with a qualified electrician if the grounding instructions are not completely understood, or if unsure unit is properly grounded. Do not modify the plug that has been provided. If it does not fit the available outlet, the correct grounded outlet must be installed by a qualified electrician.

OPERATION

Safety Valve

The safety valve is designed to prevent pressure in the storage tank from exceeding 140 PSIG.



⚠ WARNING: Do not tamper with or attempt to eliminate the safety valve.

Thermal Overload Protector

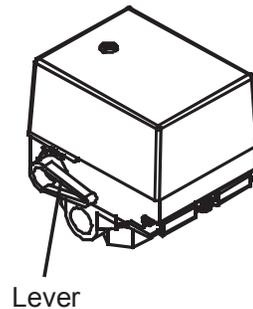
The compressor motor is equipped with a thermal overload protector. If the motor should overheat, the overload protector will shut the motor off. If this occurs, turn the on/off lever to the off position and allow motor to cool for approximately 5 minutes.

NOTE: Tank pressure must be below 100 PSIG for the compressor to start. Restart the compressor by moving on/off lever to the on position. If compressor fails to start, check for blown fuses; the compressor may require more time to cool. If the overload protector shuts down the motor frequently, it could be due to low voltage. Common signs of low voltage are:

1. Motor does not get up to power or speed.
2. Fuses or circuit breaker activate when starting compressor.
3. Lights dim or remain dim when compressor is started.
4. Other motor operated appliances fail to operate properly.
5. Too many motor operated appliances on same circuit.

Pressure Switch

The compressor is operated by an on - auto/off lever on the side of the pressure switch. By turning the lever to the "AUTO" position the compressor will start and stop automatically within the settings of the pressure switch. The pressure switch is factory adjusted to start the compressor when the tank pressure drops below 100 PSIG and to stop when tank pressure reaches 122 PSIG. To stop the compressor, turn the lever clockwise to the "OFF" position. (DO NOT STOP THE COMPRESSOR BY REMOVING THE ELECTRICAL PLUG.) The on/off lever operates a valve which relieves pressure from the compressor. If the lever is left on when the electric power is interrupted, the compressor may have difficulty in starting under this pressure.

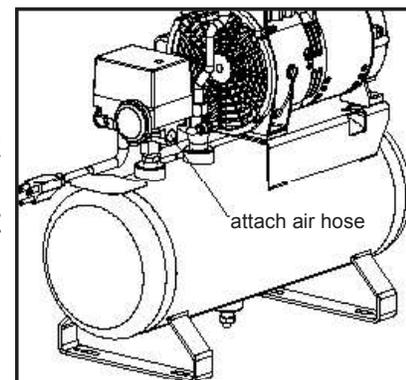


Operating Procedures

1. Make sure on/off lever is in the off position.

⚠ WARNING: Before using air tools or accessories, check manufacturer's maximum pressure rating. Maximum pressure rating must be above 122 PSIG.

2. Attach air hose and accessory to compressor. (Remove orange pull plug first.)
3. Turn on/off lever to the on position and allow tank pressure to build.
4. When the motor stops, it has reached cutout pressure and the unit is ready for use.



NOTE: When using an accessory or air tool, pressure in the storage tank decreases. When it reaches a certain low level (cut-in pressure) the motor will automatically restart and raise the pressure in the storage tank.

5. To shut down compressor, simply move on/off lever to the off position.

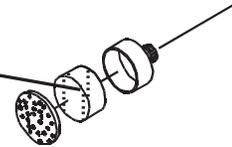
6. Allow compressor to cool.

7. Drain storage tank (see Storage Tank in Maintenance Section).

MAINTENANCE

Air Filter

Inspect air filter before each use. Clean filter with soap and water as necessary. Squeeze excess moisture from filter and allow to dry before re-installing. If filter becomes clogged or damaged, replace it.

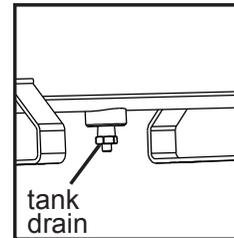


⚠ WARNING: Never clean air filter with a flammable liquid or solvent. Explosive vapors may accumulate in the air tank and cause an explosion, resulting in serious injury or death.

CAUTION: Do not operate air compressor without air filter.

Storage Tank

The storage tank should be drained after each use or after every four hours of operation to prevent condensation build-up and corrosion inside the tanks. To drain tank, slowly and carefully open drain fitting, tip unit upright and allow water to drain out. Always drain tank before storing compressor.



DO NOT over tighten drain valve when closing. The drain valve on this tank seals primarily through the o-ring seal. Over tightening the valve can damage the o-ring and may cause premature failure. To prevent damage, stop closing the valve as soon as air can no longer be heard escaping from the valve, or when finger tight.

NOTE: When draining tank, watch for debris (rust particles). If there appears to be debris in water, contact your dealer for possible tank replacement. The appearance of rust inside the tank will compromise its' ability to hold pressure and can cause bursting.

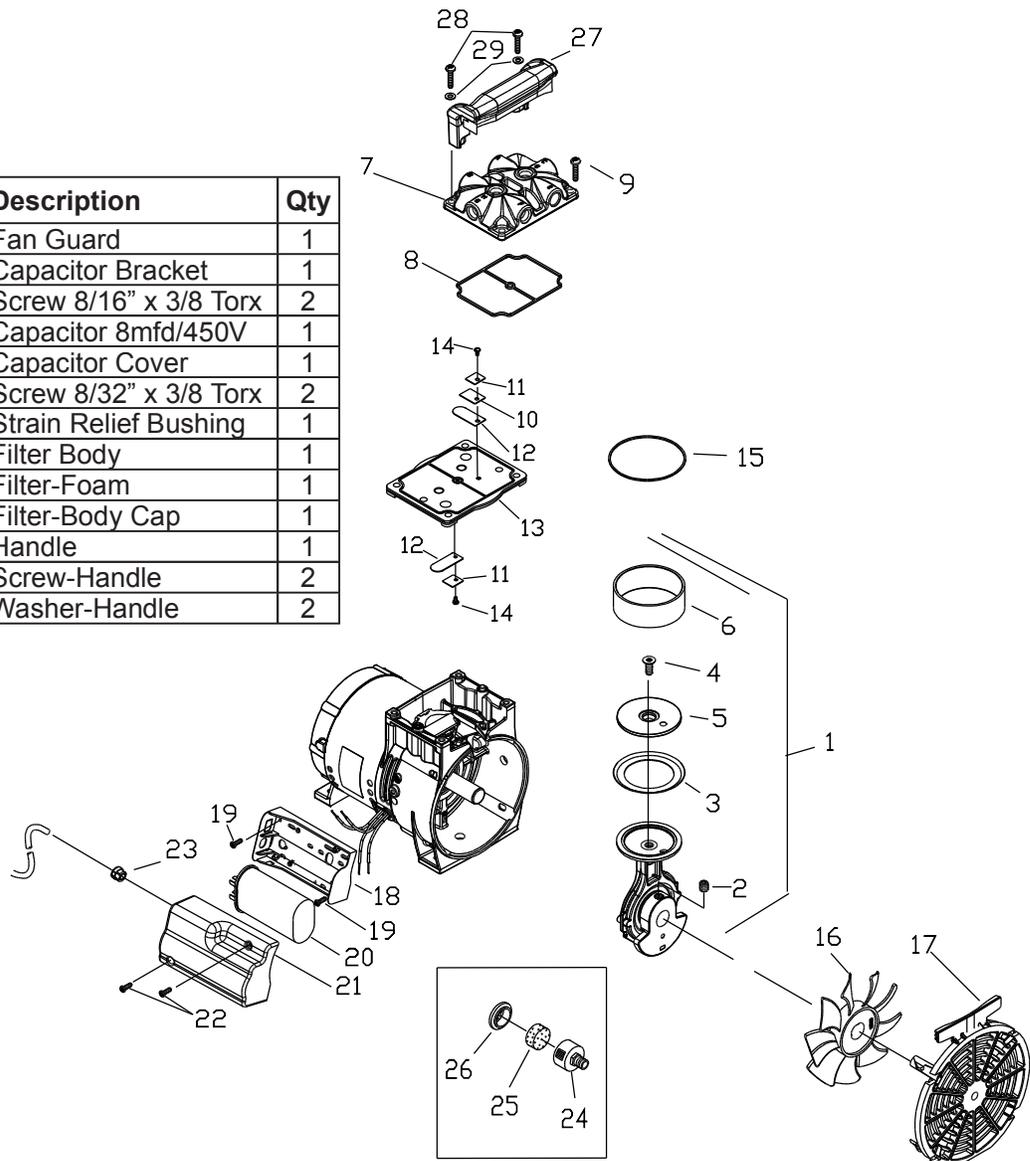
⚠ WARNING: Do not weld on the air tank of this compressor. Welding on the air compressor tank can severely impair tank strength and cause an extremely hazardous condition. Welding on the tank in any manner will void the warranty. If warranty service or repairs are needed contact your nearest authorized servicing dealer. If one does not exist contact the factory. Unauthorized teardown of the unit will void the factory warranty.

EXPLODED VIEW AND PARTS LIST

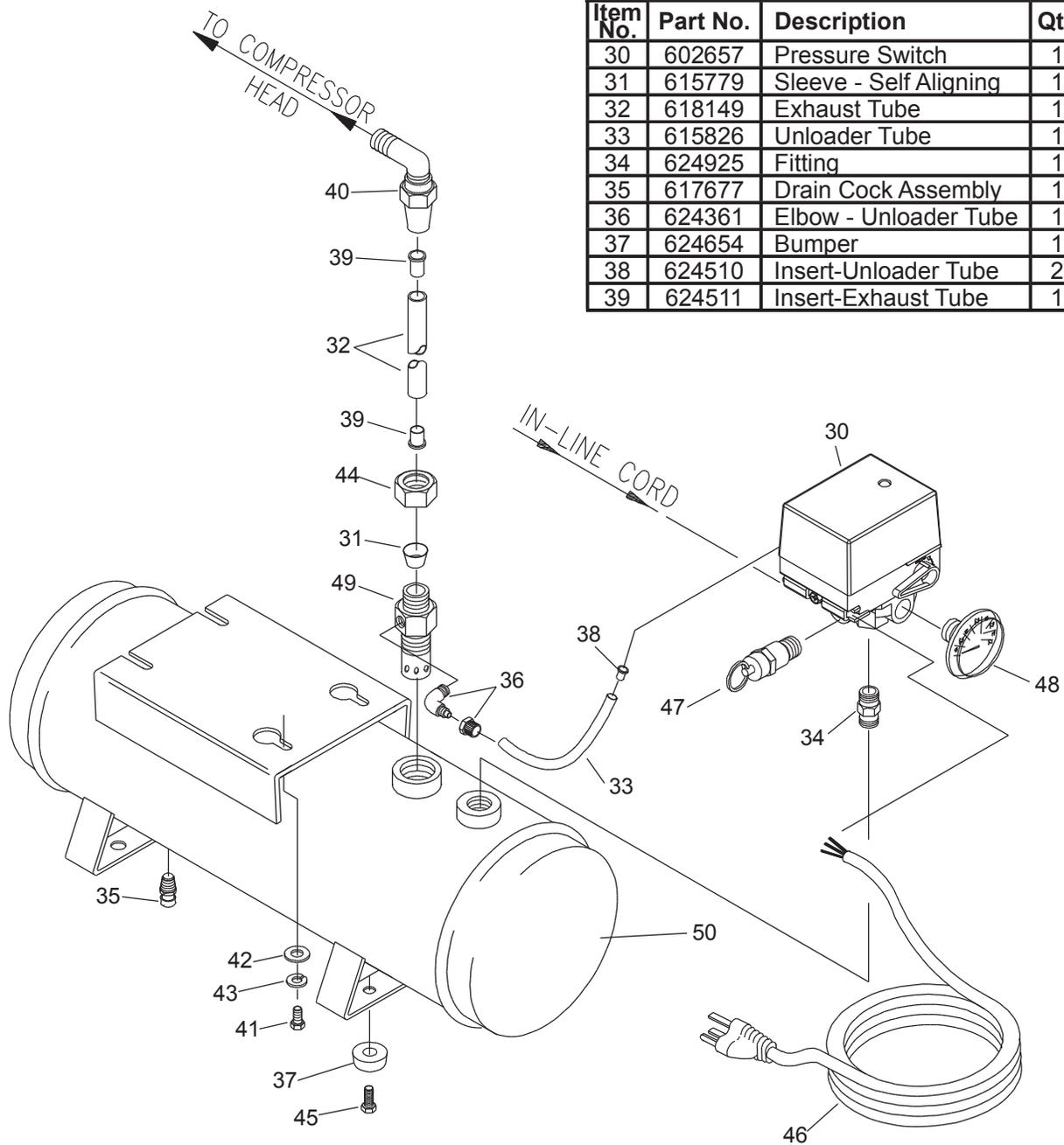
COMPRESSOR PARTS LIST

Item No.	Part No.	Component Part	Description	Qty
1	666459-S		Conn. Rod Ass'y-Service	1
2*		625088	Eccentric Set Screw	1
3*		624396	Piston Cup	1
4		625180	Screw-Cup Retainer	1
5*		626397	Piston Cup Retainer	1
6*		670031	Cylinder Sleeve	1
7	610869-500		Head	1
8*	623143		O-Ring Head Gasket	1
9	625175		Screw-Head	4
10*		621647	Valve Backer	1
11*		617562	Valve Keeper Strip	2
12*		621485	Valve Flapper-Int. & Exh.	2
13		621632-540	Valve Plate	1
14*		625094	Screw-Valve Plate	2
15*	623071		O-ring-Valve Plate	1
16	638281		Fan-Black	1

Item No.	Part No.	Description	Qty
17	647076	Fan Guard	1
18	603178	Capacitor Bracket	1
19	625434	Screw 8/16" x 3/8 Torx	2
20	603025	Capacitor 8mfd/450V	1
21	603167	Capacitor Cover	1
22	625449	Screw 8/32" x 3/8 Torx	2
23	633160	Strain Relief Bushing	1
24	660710	Filter Body	1
25	641034	Filter-Foam	1
26	660767	Filter-Body Cap	1
27	629081	Handle	1
28	625379	Screw-Handle	2
29	626014	Washer-Handle	2



TANK PARTS LIST



Item No.	Part No.	Description	Qty
30	602657	Pressure Switch	1
31	615779	Sleeve - Self Aligning	1
32	618149	Exhaust Tube	1
33	615826	Unloader Tube	1
34	624925	Fitting	1
35	617677	Drain Cock Assembly	1
36	624361	Elbow - Unloader Tube	1
37	624654	Bumper	1
38	624510	Insert-Unloader Tube	2
39	624511	Insert-Exhaust Tube	1

Item No.	Part No.	Description	Qty
40	624517	Connector - Head	1
41	625206	Screw-Cprsr. Mounting	4
42	626563	Washer- Cprsr. Mounting	4
43	626509	Lock Washer-Cprsr. Mtng.	4
44	626766	Nut - Compression	1
45	625406	Screw - Bumper	4
46	633660	Cord	1
47	633957	Safety Valve	1
48	638262	Gauge - Pressure	1
49	638322	Check Valve Assembly	1
50	669470-540	Tank Assembly	1

ELECTRIC COMPRESSOR TROUBLESHOOTING

The following guide has been compiled to assist the consumer in identifying problems that may be encountered with electric compressors. Please inspect for possible causes and contact an authorized service center when necessary.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Motor Won't Start	No Power to Compressor	Check Circuit Breaker or Fuse.
	Switch Lever in "Off" Position	Move Switch Lever to On Position.
	Faulty Start Relay Faulty Start Capacitor	◆ ◆
Compressor Won't Restart	Check Valve Leaks	Inspect Check Valve-Contact Service Center.
	Low Voltage to compressor	Connect Unit to Sufficient Voltage Source.
	Pressure Switch Hanging Up	Inspect Pressure Switch-Contact Service Center.
Low Air Output	Leak At Fitting(s)	Inspect Fittings-If Loose or Damaged Contact Service Center.
	Broken Valve Flapper	◆
	Debris in Valves	◆
	Faulty Head Gasket	◆
	Faulty Valve Plate Gasket Worn Piston Cup	◆ ◆
Compressor Won't Shut Off	Leak At Fitting(s)	Inspect Fittings-If Loose or Damaged Contact Service Center.
	Broken Valve Flapper	◆
	Debris in Valves	◆
	Faulty Head Gasket	◆
	Faulty Valve Plate Gasket	◆
	Worn Piston Cup Relief Valve Leaking	◆ ◆
Water in Air Lines or Tools	Tank Not Drained Regularly	Drain Air from Tank(s) through Drain Valves. Ensure Air Lines are Free of Moisture.
Low Pressure to Tools	Damaged Gauge on Regulator	Inspect Gauge-Contact Service Center.
	Regulator Not Adjusted Properly	Adjust Regulator to Required Pressure.
	Faulty Regulator	Inspect Regulator-Contact Service Center.

ATTENTION: The automatic pressure switch prevents this unit from running if the tank pressure exceeds 100PSI. If the compressor will not start, drain the pressure from the tank.

◆ These procedures require special fixtures, tools or assembly techniques available only through a Service Center. For service, contact the dealer from whom you purchased the compressor. To order parts, visit our website, www.thomasairpac.com, or call our Customer Service Center at **1-800-848-7735**.

Limited Warranty

The Gardner Denver Thomas, Inc. Compressor is warranted to you, the original purchaser, for a period of one year from date of original purchase to be free from defects in material and workmanship. If during the specified warranty period you believe the purchased product or any part thereof has such a defect, you must return the product or part during such period, with proof of purchase and at your cost, to the nearest authorized service center (consult the list of service centers enclosed with the product) for repair, or replacement of the defective part. If you do not know the location of the nearest service center, contact Gardner Denver Thomas, Inc. at the address below for instructions. If the product or part is found to have been defective in material or workmanship, it will be repaired or replaced (as deemed necessary by the repair center), free of charge, and returned to the purchaser at the purchaser's cost. If the repair work must be done at the Gardner Denver Thomas, Inc. factory, transportation costs of the product or part, to and from the factory, must be paid by the purchaser.

The warranty shall not apply to any compressor, which in Thomas' judgement has been subject to misuse, negligence or accident, or which has been operated from an inadequate power supply. All wearing and consumable parts are excluded under the terms of this warranty. This warranty shall not apply to compressors that require oil for operation, which have been operated with oil levels below that specified by Gardner Denver Thomas, Inc.

THE MANUFACTURER LIMITS THE DURATION OF THE IMPLIED WARRANTY OF MERCHANTABILITY TO THE LIMITED WARRANTY PERIOD SET FORTH ABOVE, AND OTHERWISE DISCLAIMS ALL IMPLIED WARRANTIES WITH RESPECT TO THE PRODUCT AND IT'S PARTS INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Thomas' total liability for any and all claims, damages, losses and injuries arising out of or relating to any breach of warranty shall not exceed the purchase price of the product. IN NO EVENT WHETHER IN CONTRACT, OR TORT, OR OTHERWISE SHALL THOMAS BE LIABLE FOR LIQUIDATED, INDIRECT, EXEMPLARY, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, EXPENSES OR COSTS, INCLUDING BUT NOT LIMITED TO: (1) LOSS OF PROFITS, BUSINESS, OR GOODWILL; (2) LOSS OF USE OF EQUIPMENT OR FACILITIES; OR (3) LOSS RESULTING FROM UNUSABLE MACHINERY OR FACILITY DOWNTIME, HOWSOEVER CAUSED AND EVEN IF THE POTENTIAL FOR SUCH DAMAGES WAS DISCLOSED AND/OR KNOWN.

The remedy provided in this Limited Warranty for defective product is purchaser's sole and exclusive remedy, subject to your state law. Further, this Warranty gives you specific legal rights, and you may also have other rights, which may vary, from state to state.

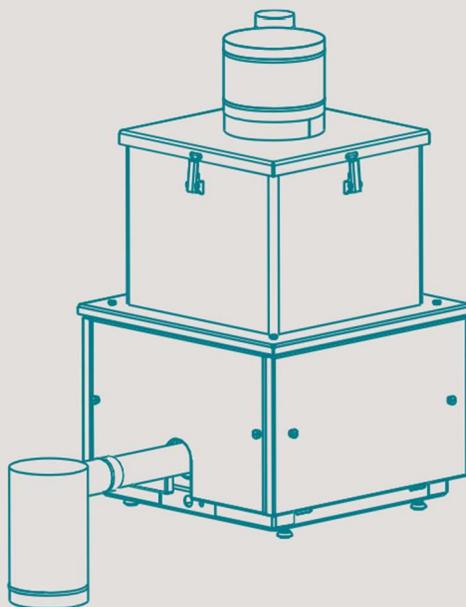
If you believe warranty service is needed, contact your nearest authorized service center. If one does not exist in your area, please contact the manufacturer:



Thomas Products Division of
Gardner Denver Thomas, Inc.
C/O Customer Service
3524 Washington Avenue
Sheboygan, Wisconsin 53081
Phone: (800) 558-7721
Fax: (920) 451-6307
www.thomasairpac.com

AccuRate Feeder

Series Feeder 300, 600 and 900 Instruction Manual



PASS - Service you can rely on
Fast, comprehensive, anywhere in the world

Quality and reliability are the cornerstones of our company's philosophy. That is why we consider a comprehensive service concept simply par for the course, from strict quality control, installation and commissioning through to seamless support across the entire product life cycle.

With over 30 service stations and over 180 service specialists, you can count on us to be there whenever – and wherever – you need us.

It doesn't matter where you are, our specialists are there to advise and assist with the best in worldwide, personal, comprehensive service.

During office hours, service specialists from all divisions are on hand to analyze problems and failures. Look at **www.schenckprocess.com** for your nearest Schenck Process Location.

Customized to meet your requirements, our comprehensive Process Advanced Service System provides you with the best service.

Are you looking for individual, perfect-fit service solutions?

Then our, the modular service system PASS is the ticket. It covers the entire service spectrum, from simple inspections through to full service. Interested?

Then find out more about the individual components at

www.schenckprocess.com/en/service.

Service:

In House Support (Monday through Friday from at least 8 o'clock to 5 p.m. CST)

Service specialists are available for technical assistance to answer your questions or assist you in trouble shooting.

Heavy Industry

Phone: +1 800-558-0184

Fax: +1 262-473-2489

Light Industry

Phone: +1 800-558-0184

Fax: +1 262-473-2489

Spare Parts and Components

Phone: +1 800-558-0184

FAX: +1 262-473-2489

MKTG@ACCURATEFEEDERS.com

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Subject to change without prior notice.

Note: The Original Instruction Manual is English

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Series Feeder

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1 Safety Information

1.1 Using the Feeder for the Intended Purpose

When commissioning your feeder for the material specified in your order, follow the information given in this instruction manual and refer to the technical data supplied in the system documentation binder.

Your feeder has been configured to process the material specified in your order. If processing alternate materials is desired, reconfiguration of your system may be necessary.

HINT



Approval necessary prior to changes to the feeder.

Any change to the basic construction of the feeder should not be performed without the approval of Schenck AccuRate. This warning also applies to the installation and set up of safety devices and any welding work on component

parts of the feeder.

Your feeder is not intended to be serviced, cleaned, or accessed on a frequent (more than once per shift) basis. If your process requires frequent interaction, the feeder has to be modified to meet the requirements outlined in the machinery directive 2006/42/EC.

Spare parts must meet the technical specifications indicated by Schenck AccuRate. To ensure that this requirement is met, only genuine Schenck AccuRate spare parts should be used.

If your feeder is a component of a larger system or process, always determine safety considerations before commissioning from the perspective of upstream and downstream equipment.

WARNING

Danger of being pulled in and caught in the rotating discharge element.

This could result in body parts being crushed or cut. – The feeder is intended to be operated with the material discharge attached to downstream equipment, cutting off access to the material discharge element.



1. The end-user is responsible for ensuring that it is not possible to access the material discharge element while in operation.
⇒ Protective measures must be installed to prevent access to the material discharge.

DANGER

Areas having an explosive atmosphere.

The use of the feeder in explosion area applications could result in serious injuries and equipment damage.

– The feeder is not intended to operate in areas having explosion risks, unless your feeder is specifically rated for this type of hazard.

1. The end-user is responsible to ensure the feeder is not used in areas having explosion risks, unless your feeder is specifically rated for this type of hazard.

WARNING

Do not exceed permissible internal pressure range.

If the permissible internal pressure range is exceeded, flying parts could cause serious bodily injury and feeder damage.

– Upstream and downstream flow passage pressures (relative to ambient) may not exceed 95 mbar nor be less than -5 mbar.

1. Pressure relief devices should be installed where this potential is unavoidable.

Do not use feeder to feed hazardous biological or microbiological substances.

This could result in serious injury or death.

– This feeder is not intended to feed hazardous biological or microbiological substance (e.g., bacteria, viruses).

1. Flow passage junctions are not hermetically sealed.

CAUTION

Operating feeder outside permissible ambient operating temperature range.

If the feeder is operated outside the permissible ambient temperature range, feeder surfaces could become hot and contact with the feeder could cause burns. The ambient operating temperature range for the feeder is -10°C to 40°C.

NOTICE

This feeder is not intended for use in residential applications.

1.2 Notes on the Design

The feeder configurations shown and described in this manual are simply examples of typical applications. The dimensioned drawings and planning documentation supplied apply for the application specified in the order, as do any order-specific supplementary documents.

1.3 Signal Words

1.3.1 Signal Words for Safety Notes

Potential dangers will always exist when working with technical devices. Dangers will arise if the machine was incorrectly installed or commissioned or operated by untrained personnel. The following signal words indicate dangers that may arise when handling this machine.

This signal word indicates a danger that can immediately cause the most severe injuries up to and including death.

Follow all instructions to prevent this from occurring.

WARNING

This signal word indicates a danger that can cause serious injuries up to and including death.

Follow all instructions to prevent this from occurring.

CAUTION

This signal word indicates a danger that can cause slight or medium injuries.

Follow all instructions to prevent this from occurring.

1.3.2 Signal Words for Application Notes

The following signal words are for reference notes on material damages and on the optimal use of the machine.

NOTICE

Signal word used to identify situations in which material or environmental damage could occur.

Follow all instructions to prevent this from occurring.

HINT

Signal word used to identify information on using the product at an optimal level of efficiency.

1.4 Component or Stand-Alone Use

1.4.1 Component Use

If the feeder is interlinked with other devices or processes in the plant, responsible personnel must make additional information available to the operators of the feeder that will augment this instruction manual and ease overall system operation and use.

1.4.2 Stand-Alone Use

Inlet

Danger of being pulled in and caught in moving paddles and rotating discharge element.

This can result in body parts being crushed, cut and other serious injuries. When feeder is running, avoid contact with moving paddles and rotating discharge element inside feed hopper.

Outlet

Danger of becoming entangled in the discharge element at the material discharge point.

This can result in body parts being crushed, cut and other serious injuries. When feeder is running, never place hands and fingers near the helix at the outlet of the feeder.

1.5 Feeding Bulk Solids Hazardous to Health

Any contact with harmful bulk solids could pose a health hazard.

The following may escape if service work is done incorrectly or due to aging or wear and tear of seals:

- bulk solids,
- gases escaping from bulk solids, and
- media that displace oxygen (such as inert gases) in quantities that could be hazardous to health.

There is constant risk to operating personnel if the feeder is operated when open.

If the feeder is operated under these conditions, the operating company must ensure appropriate measures are taken (e.g. extraction, installing detecting devices) to avoid health hazards to operating personnel or damage to the environment.

Please consult Schenck AccuRate for the appropriate actions depending on your order.

1.6 Damaged / Defective Seals or Components

WARNING

Worn or damaged seals and/or mating components can cause bulk solid leakage to the feeder ambient.

Poisoning, irritation of the skin or eyes and other health hazards can result from contact with bulk materials harmful to health.

– Immediately replace the defective seals and/or components under consideration

of the safety regulations applying to the material in question.

1. Refer to the figure below for seal inspection points.

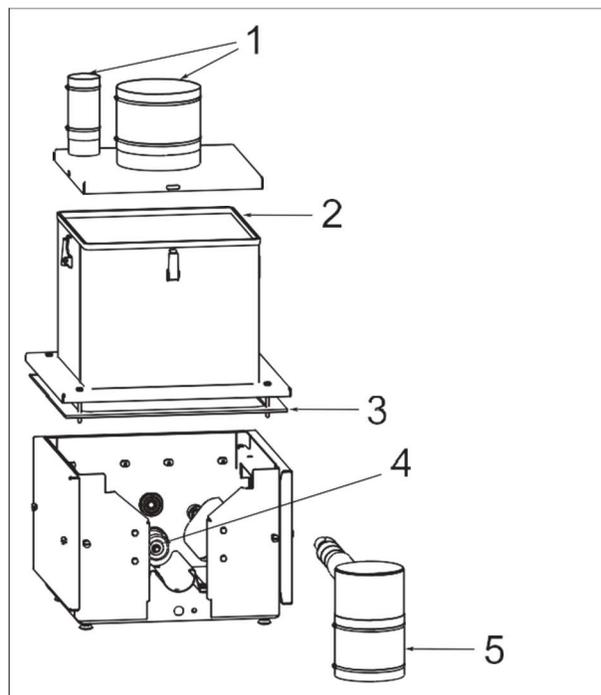


Fig. 1: Seal Inspection Points

- 1 Extension cover inlet and vent connector
- 2 Extension hopper cover gasket
- 3 Extension hopper gasket
- 4 Quill seal(s)
- 5 Nozzle discharge connection

1.7 Work on Electrical Equipment

1.7.1 Five Safety Rules of Electrical Engineering

These five safety rules must be followed in the order shown before commencing work on electrical systems. Once the work is finished, they are applied in reverse order.

Electrical shock from live components.

Danger of life from electrical shocks.

– Take all possible precautions to ensure safety before commencing work on live components. Observe, among other things, the following:

1. Disconnect the components.
2. Secure them against inadvertent restart.
3. Ensure that the components have been de-energized.
4. Above 1 KV: Earth the cables and bypass them.
5. Cover or shield adjacent, live components.

1.7.2 Damaged / Defective Electrical Components

Electrified damaged or defective components.

There is a danger of life from an electric shock.

– Always have qualified personnel ensure that the components are neither damaged nor defective.

1. Damaged or defective electrical components must immediately be replaced or, if possible, repaired by qualified personnel.

1.7.3 ARC Flash

ARC Flash

Contact with electrical components in electrical enclosures could result in an electrical explosion resulting in severe injury or death.

– When power is applied, electrical enclosures should be closed and locked.

1. If door to electrical enclosure is open, appropriate personal protective equipment (PPE) is required in accordance with local electrical codes.

1.8 Personnel Qualifications

Specialized personnel are personnel who have received accredited professional training in the specific area of work.

Example:

Personnel designated to work on electrical machine components must have accredited professional training as an 'electrician'.

Furthermore, the machine operator has to qualify the specialized personnel for local working conditions.

Qualified operating personnel are persons that the machine operator has trained and qualified so that they can carry out everyday machine operation work without causing danger to themselves or third parties.

Only trained and authorized specialized personnel may perform the work described in this manual.

The specialized personnel should be familiar with the safe operation of cranes and fork lift trucks.

Only specialized personnel may work on connected weighing systems.

Furthermore, the specialized personnel should be familiar with and observe locally applicable regulations regarding safety and accident prevention.

1.8.1 Qualifications of the Operating Personnel

Only qualified and authorized operating personnel may operate the feeder following the instructions in this manual.

The operating personnel should be familiar with and observe in-plant regulations regarding safety and accident prevention.

1.9 Safety Instructions for the Operating Company

The supervisors of staff working with or on the machine should familiarize themselves and comply with the safety instructions and any aspects of machine operation relevant to safety. They must ensure that the personnel have read and understood the safety instructions. The supervisor of the operating and specialized personnel must check that the safety instructions are being adhered to.

The supervisor must consider whether hazards could arise if the machine is operated as an interlinked component of an overall system. If this is the case, the supervisor should draw up additional safety instructions.

In order to exclude hazards as much as possible, the operator may also need to draw up a set of in-plant instructions and have the affected personnel confirm receipt of it. The operator must define the areas of responsibility for those working with the machine so that the personnel have clearly defined responsibilities with regard to the safe operation of the machine.

1.10 Safe Operating Environment for the Feeder

Danger of electrical shock.

Disconnect and lock out all power to the feeder. Never unlock and restore power to the feeder before all equipment guards have been closed and any safety items are restored.

1.11 Service and Maintenance

Maintenance and repair work on the feeder not described in this manual may only be done by the specialized personnel of Schenck AccuRate or its authorized representatives.

NOTICE

When doing welding work, please place the minus pole directly on the welding point to protect the electrical components of your feeder from damage.

Welding should only be performed on supporting components or components that have an impact on operational safety with the approval of Schenck AccuRate.

1.12 Basic Occupational Safety on Your Feeder

Comprehensive occupational safety can only be guaranteed when the feeder is used as intended and all necessary safety precautions have been taken. The following safety fundamentals must be followed in order to comply with occupational health and safety regulations and to properly operate the machine:

- material infeed should not overflow the feeder.
- only authorized personnel may enter the inlet area to perform work described in this manual during feeder operation.
- the feeder should never be climbed on.

WARNING

Moving parts on and in the feeder.

Crushing, cutting and other bodily injuries may occur if you come into contact with moving feeder parts.

1. Switch off the power supply and discharge all energy stores before performing maintenance, service or cleaning work on the machine.
2. Secure the machine against inadvertent restart.
3. Restart the machine only when all protective equipment has been put back into place and have been shown to function properly.

1.12.1 Intended State of Feeder

Comprehensive occupational safety can only be guaranteed when the feeder is completely closed and when used as intended. Upstream and downstream connections are order specific. If your equipment order does not meet local safety rules, contact Schenck AccuRate for assistance. Refer to figure 2.

The following are recommended safe practices:

- material in-feed (1) connection to upstream plant components is securely fastened and in good working condition (in case of auto refill)
- ventilation opening (14) connection to upstream ventilating systems or dust filter is securely fastened and in good working condition (in case of auto refill)
- upper end of the downturn (7) is properly sealed
- flexible connector or PVC elbow at discharge element (8) is securely fastened
- if the feeder is located outdoors, follow all local electrical codes to provide suitable grounding to protect against lightning strike
- grounding strap is attached to the front of the feeder frame (9) connecting the other end to a suitable earth ground per local electrical code to provide protection against electrical malfunctions
- side panels (10) are securely fastened to feeder frame
- chain guard (11) is securely fastened
- snap closures (13) on cover are securely fastened
- extension hopper is securely fastened to the feeder frame via c-clamps or direct bolt-down method (12)

WARNING

Rotating discharge element and moving paddles and chain.

There is risk of crushing, cutting and other bodily injuries if you come into contact with moving components.

– When the feeder is running, never remove the cover (2) of the extension hopper (3), the flexible connections and or PVC elbow (1, 8, 14), downturn seal (7), or the side panels (10).

1. Always leave the feeder closed until all moving parts have come to rest and all types of power supply have been turned off.

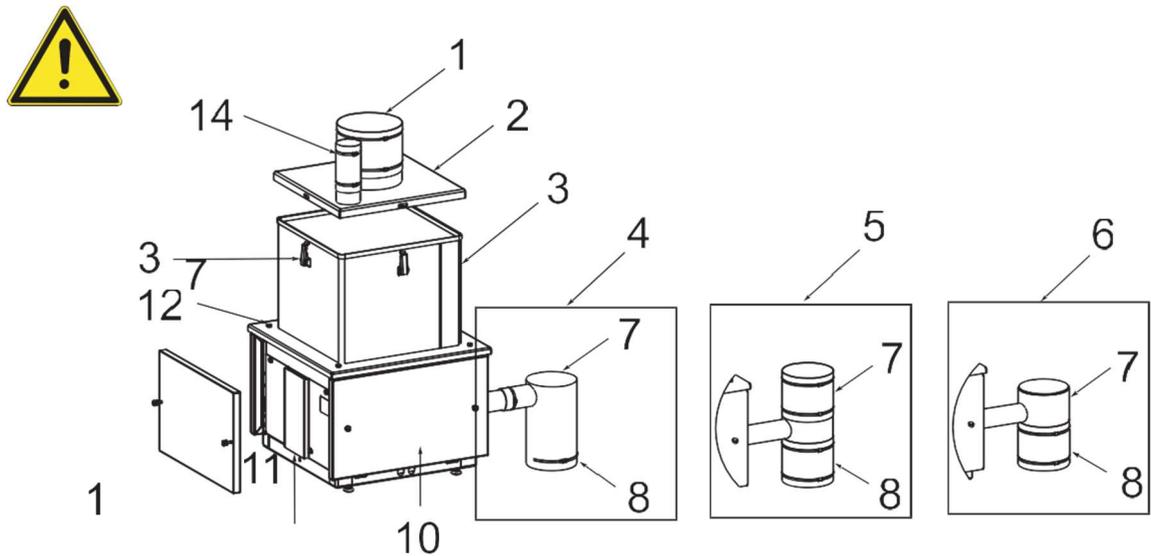
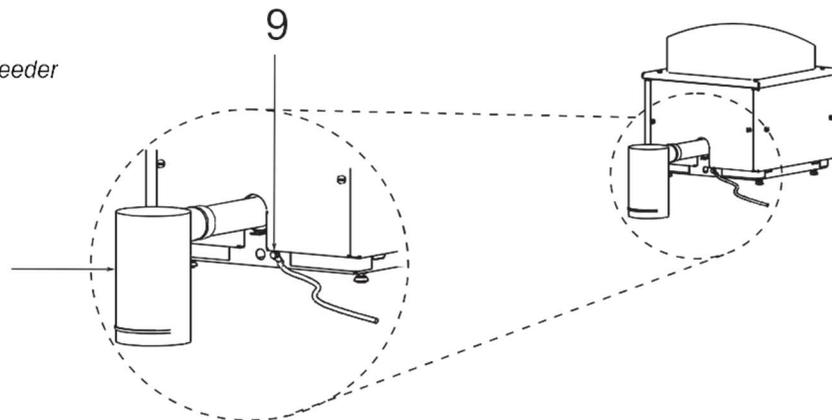


Fig. 2: Intended State of Feeder



1	Material in-feed	2	Cover
3	Extension hopper	4	Flexible PVC downturn clamped at discharge opening
5	Through pipe sealed at upper (vent) and lower (discharge) openings	6	Rigid downturn with permanent cover, sealed at discharge opening
7	Upper end of downturn	8	Flexible connector or PVC elbow at downturn
9	Feeder grounding strap location	10	Side panels
11	Chain guard	12	Extension hopper bolt
13	Snap closures	14	Ventilation opening

Securing the Hopper Cover

The extension hopper or feed hopper cover of your feeder is fastened with snap closures or a v-band clamp. This enables you to assemble/disassemble these components quickly and easily.

WARNING

Electrified feeder cover.

Danger of life from electrical shock.

– The feeder cover might become electrically charged.

1. This is the reason why you should always make sure that the snap closures are sealed in operation.
2. The potential equalization for the extension hopper and cover cannot be guaranteed if snap closures are not sealed in operation.
3. The snap closures are set at the factory to guarantee sufficient pretension when sealing.
4. If the cover should happen to have been removed, ensure that it has been replaced onto the extension hopper and that the snap closures have been refastened before commissioning the feeder.



1.13 Maximum Surface Temperature

Depending upon the specific design, this feeder can feed bulk solids from temperatures above ambient temperatures.

Bulk solids should not exceed 81°C [180°F]. Bulk solid temperatures exceeding 70°C [158°F] could cause burns when coming into contact with the extension hopper or discharge tube.

WARNING**Hot surfaces and connecting elements on the feeder.**

This could result in burns from the hot surfaces.

The feeder's surfaces and fasteners may be hot.

– All of the following safety precautions must be observed.

1. The operator should install protective equipment to prevent these injuries and keep it in good condition.
2. This protective equipment must not be circumvented.
3. All necessary personal protective equipment should be worn such as gloves or goggles.
4. The feeder should be allowed to cool off to normal ambient temperature before doing work on the feeder such as inspection or service.

DANGER**Danger of becoming wound-up and caught in the discharge element at the material discharge point.**

Crushing and shearing injuries could result if body parts become caught between the turns of the discharge element (helix) and the wall of the discharge pipe (nozzle).

– Avoid contact with the material discharge point while feeder is running.

1. The feeder must be shut down, de-energized and secured against inadvertent restarts before work is performed on the material discharge point.



Fig. 3: Hazard at Front Material Discharge

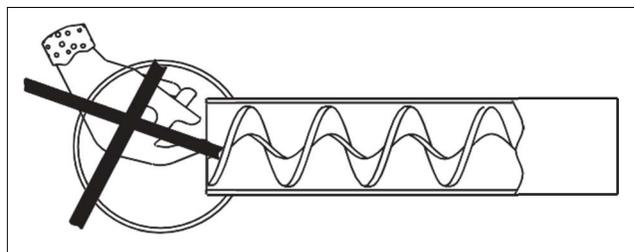


Fig. 4: Hazard at Lateral Discharge

1.14.1 Helix Rotation

Incorrect helix rotation may result in the creation of a draw-in and wind-up hazard at the point of material discharge.

It may also result in no material being fed and damage to the feeder.

– When establishing the electrical connections per the order specific connection drawing of the feeder, make sure the helix rotation is correct.

1. Always do a visual check of helix screw rotation.
Change motor polarity if necessary.

1.15 Material Intake Point as a Hazard

Rotating parts inside the feed hopper.

There is risk of cutting and crushing or of other bodily injuries if you come into contact with moving components.

– Do not reach inside feed hopper when feeder is operating.

1. Ensure the feeder is turned off and all sources of power to the feeder have been cut before removing the protective grid.

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2 Brief Description

This manual documents installation, operation and maintenance of the Series Feeder. A motor controller is used to adjust and control feedrate.

The Series Feeder is designed for the metering of a wide variety of bulk materials with a high degree of accuracy. The flexible hopper is agitated on the exterior by two alternating paddles. This action massages the material down into the metering screw, eliminating bridging to ensure consistent flow of materials. The helix flights are filled uniformly, resulting in volumetric accuracy.

The Series Feeder is available as a volumetric or gravimetric feeder. See the figure below.

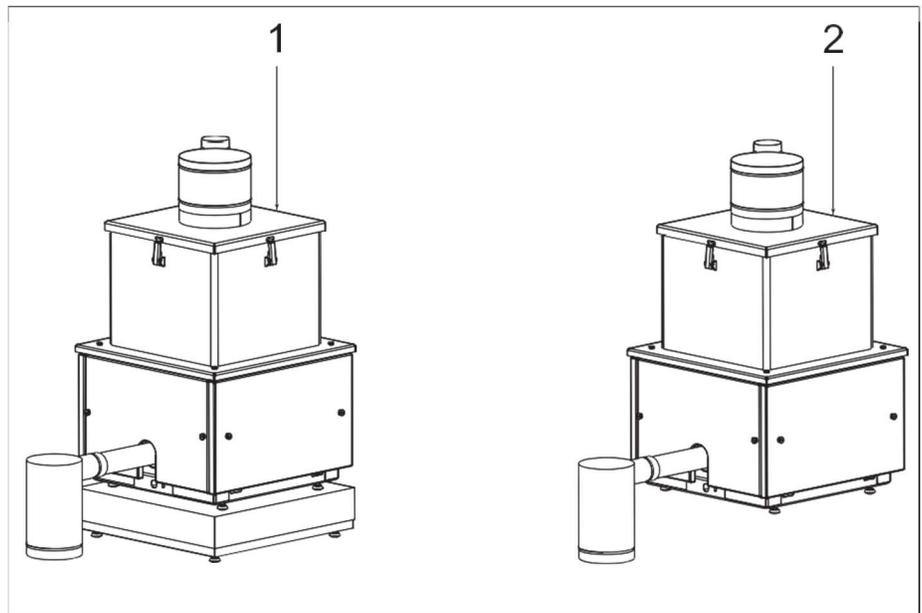


Fig. 5: Gravimetric and Volumetric Feeders

1	Gravimetric feeder	2	Volumetric feeder
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2.1 Feeder Components

The following figure shows the Series Feeder in an exploded-view format and indicates essential building blocks of the feeder.

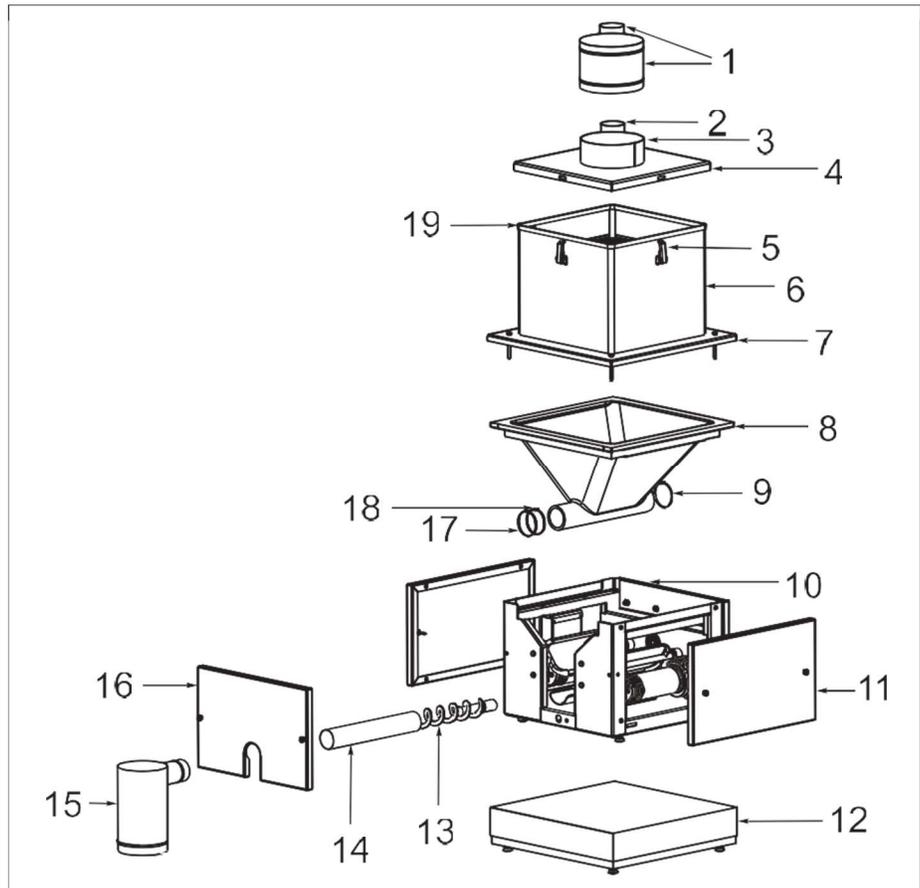


Fig. 6: Exploded View of Feeder

1	Flexible connectors	2	Ventilation opening
3	Material in-feed	4	Cover
5	Snap closure	6	Extension hopper
7	Extension hopper gasket	8	Feed hopper
9	Rear hose clamp	10	Feeder frame
11	Side panel	12	Scale (gravimetric version)
13	Helix	14	Nozzle
15	Nozzle discharge downturn	16	Front panel
17	Outside hose clamp	18	Inside hose clamp
19	Extension hopper cover gasket		

3 Mechanical Installation

3.1 Overview

Refer to your mechanical installation drawings and associated information.

Carefully select a stable, level site for your feeder that is fully accessible to service and material handling activities. When these preparations are successfully performed, the functionality of the feeder system is improved and accuracy and reliability are enhanced.

The objective of mechanical installation is to ensure:

- A stable, level surface on which to mount the feeder and controls.
- Appropriate connections for proper material flow to and from the feeder for disturbance-free operation.
- Proper grounding of all electrical devices for safety and trouble-free operation.
- Appropriate feed hopper venting so that “pressure differentials” are not present at the nozzle discharge and material leakage does not occur.

3.2 Storage

NOTICE

Equipment supplied by Schenck AccuRate is, as a matter of principle, intended for immediate installation or erection.

However, if between the times of delivery to site and the time of installation and/or erection intermediate storage becomes necessary, the customer must notify Schenck AccuRate, and unless Schenck AccuRate determines otherwise, the customer must adhere to the following instructions.

- Store on a plane surface and in upright position.
- Store equipment so as to be protected from rain, dew, condensate, other kinds of moisture, and corrosion-promoting atmosphere. Permissible storage temperature is $-5...+45\text{ }^{\circ}\text{C}$. Avoid greater changes. Maximum permissible relative humidity is 70% at all temperatures. An indoor, controlled environment is recommended to avoid fluctuations in temperature and/or humidity which could result in condensation.
- Ensure sufficient protection from infestation by insects or rodents, taking due account of local conditions.
- Protect equipment from ionizing radiation (x-rays, radio activity, etc.) as well as microwave radiation and magnetic fields. The same limit values apply as for the protection of personnel.
- Storage time does not extend warranty period granted by Schenck AccuRate.
- Rubber Items (e.g., flexible hoppers, gaskets, seals, belts)
 1. Release tension (if applicable)
 2. Treat rubber belts with suitable protectant
 3. Store in cool, dry (<35% relative humidity) place, protected from direct light
 4. Protect rubber items from ozone effects



3.3 Unpacking Instructions



⚠ OTIC ⚠

Handle ⚠ i ⚠ in ⚠ container and feeder ⚠ it ⚠ care ⚠

Carefully remove the shipping container to expose the feeder assembly. If the feeder is attached to the shipping pallet, retain on the pallet and move to the installation site prior to removing the pallet.

Carefully inspect the feeder for any damage during transit. If damage to the feeder is discovered, contact your carrier immediately and file a claim for damages. The feeder assembly is shipped complete and in good condition when it leaves our factory.

Some feeder components may be shipped disassembled from the feeder (e.g. leveling foot assemblies, handle with mounting screws, instruction manual, and helix and nozzle). If you have not received all of these items, contact Schenck AccuRate.

3.4 Safe Handling and Transit



DANGER

Any contact with harmful bulk solids could pose a health hazard.

To ensure no material escapes into the air while moving the feeder, always empty the feeder prior to moving.

Use a forklift or overhead crane to lift and move feeder at all times. The feeder should be transported on or attached to a shipping pallet whenever possible. See figure below.

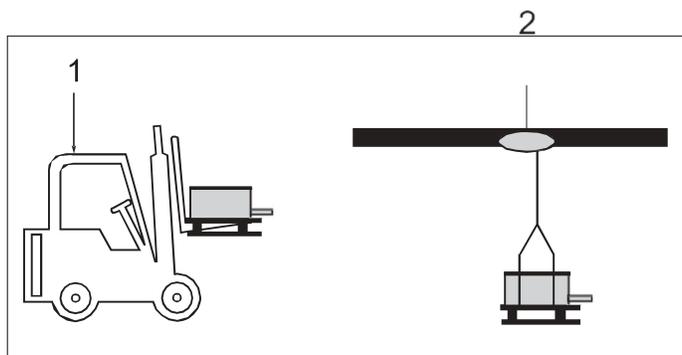


Fig. 7: Transit with Pallet

1	Transit using a fork lift	2	Transit using an overhead lift
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When a pallet is not available, it is necessary to partially disassemble the feeder to properly attach the lifting straps or chains. To transport the feeder without a pallet, the feed hopper must be removed. Refer to page [→ 55] and see the figure below.

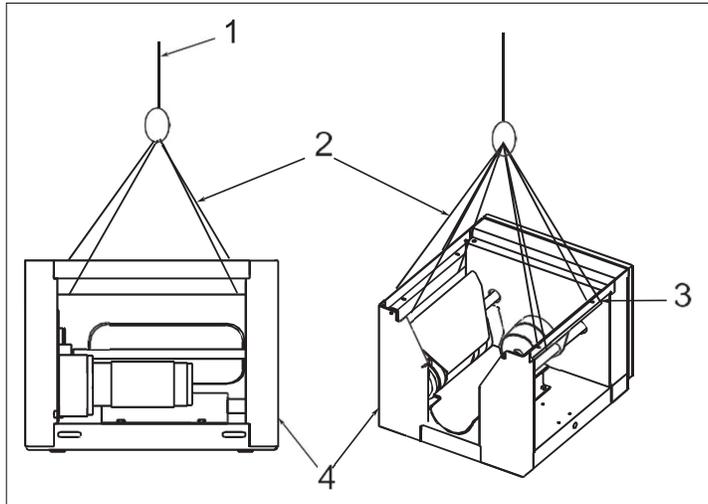


Fig. 8: Transit without Pallet

1	Chain or straps to hoist	2	Transport straps or chains
3	Transport strap location (through top of feeder frame with hopper removed)	4	Feeder with hopper removed

When moving the feeder, it is important to be aware of the mass of the unit and the location of the center of mass. Refer to the figure and table below for mass and center of mass information.

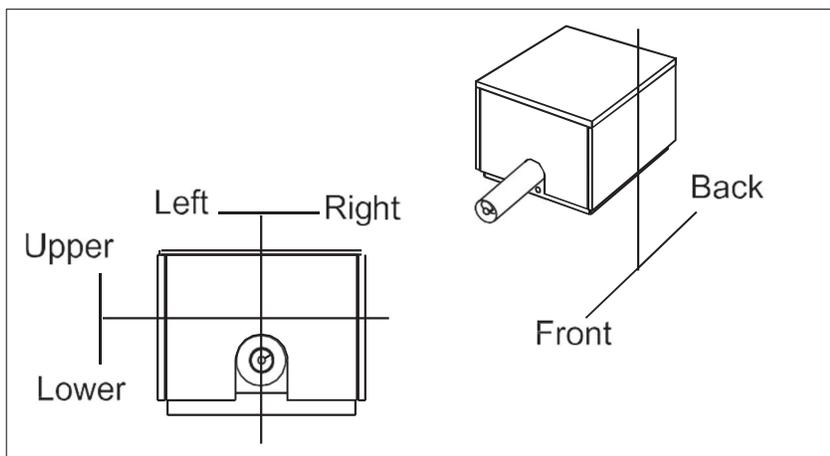


Fig. 9: Center of Gravity

Feeder Model	Feeder Weight	Feeder Center of Gravity
302M	31 Kg	Lower, Left, Back
304M	34 Kg	Lower, Center, Back
308M	81 Kg	Lower, Left, Back
310M	81 Kg	Lower, Left, Back
312M	81 Kg	Lower, Center, Back
310M/04	34 Kg	Lower, Center, Back
312M/04	34 Kg	Lower, Center, Back
602M	65 Kg	Lower, Left, Back
603M	125 Kg	Lower, Left, Back
604M	77 Kg	Lower, Center, Back
605M	117 Kg	Lower, Center, Back
610M	64 Kg	Lower, Left, Back
611M	111 Kg	Lower, Left, Back
612M	66 Kg	Lower, Left, Back
613M	65 Kg	Lower, Left, Back
610M/04	77 Kg	Lower, Center, Back
612M/04	77 Kg	Lower, Center, Back
902M	225 Kg	Lower, Right, Back
904M	252 Kg	Lower, Left, Back
910M	225 Kg	Lower, Right, Back
912M	229 Kg	Lower, Right, Back
910M/04M	252 Kg	Lower, Left, Back
912M/04M	252 Kg	Lower, Left, Back

3.5 Preparing Site

Refer to your mechanical drawings for feeder dimensions and relevant installation instructions.

The mounting structure (table, stand, frame) for the feeder system should be solid, level and as disturbance-free (from external vibration –see page [→ 23], ambient conditions, winds or fans and other machinery in close proximity) as reasonably possible.



HINT

At low feedrates, wind movement can cause significant scale disturbances. Provide proper protection from the wind to ensure accurate scale results.

Any support platform that is provided for the mounting structure (floor, balcony, mezzanine) should also be solid and level to provide a sturdy base for operations. It is strongly recommended that a carpenter's bubble level be employed prior to selecting a potential placement site to determine if it is level. If the base is not level, appropriate actions should be taken to compensate with the platform on which the feeder will be placed.

Adequate space should be provided to allow access to the entire feeder for servicing. Refer to the section on Access Points in this manual.



HINT

Strain on cables can cause significant scale disturbances.

Ensure cables to the weighed section do not come into contact with other cables, structures, components, etc.

3.6 Leveling and Anchoring the Feeder/Scale

The support structure for the feeder must be rigid, flat, and have a surface area equal to, or larger than the feeder base. Four adjustable feet are supplied with each feeder and should be threaded into the corners of the feeder base. Refer to page [→ 25] for assembly instructions. The feeder and scale should then be leveled into their permanent position.



DANGER

The feeder could be pushed, slid or gradually moved via vibration from its intended position.

Depending on the relative location of the feeder, this could result in the feeder falling and seriously harming plant personnel.

– Install the feeder so that it is not liable to fall from its mounting position.

1. In volumetric applications, one may use the threaded holes (after removing the leveling feet) to secure the feeder to the mounting surface with appropriate fasteners.
2. In gravimetric applications, fixing the feeder to the scale could impair maintenance, cleaning, and/or scale performance. Therefore, if the feeder is liable to fall from the scale and harm someone, a suitable barrier preventing such motion is strongly recommended.

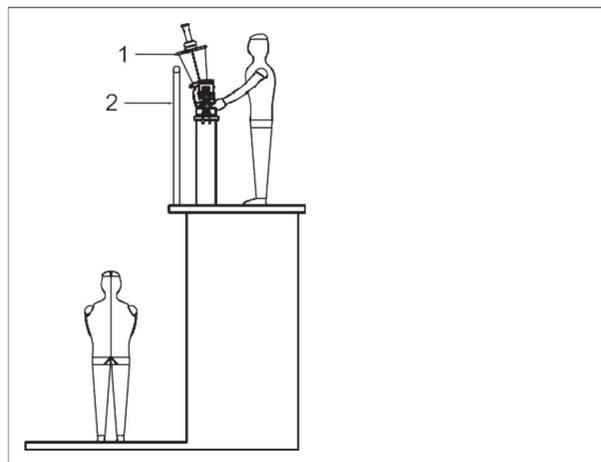


Fig. 10: Instability Hazard

1	Feeder	2	Suitable barrier
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3.7 Access Points



CAUTION

Frequent, constant or awkward motions can result in ergonomic injuries. It is the responsibility of the end-user to position the feeder and associated control HMI (if applicable) to be ergonomically safe.

Provide sufficient access areas for operation and maintenance. See the figure below.

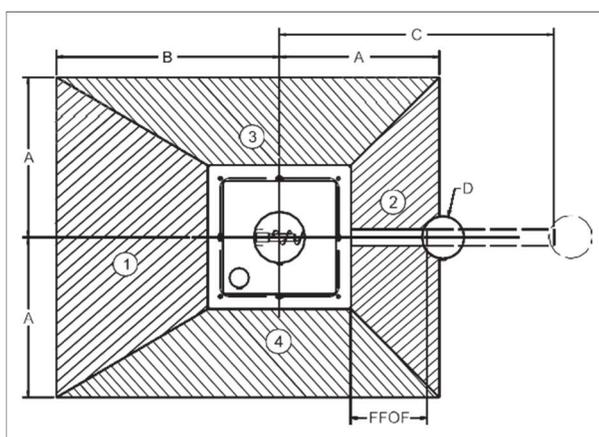


Fig. 11: Access Points

1	Feeder service zone (Rear)	2	Feeder process zone (Front)
3	Feeder service zone (Side)	4	Feeder service zone (Side)

1 Feeder Service Zone (Rear)

This service zone provides access to:

- the rear panel
- the chain guard
- the drive components (chain, sprockets)
- agitation link and lever assemblies
- the gearmotor (or reducer) mounting fasteners
- hopper inlet and vent flex connectors
- 3 (of 4) extension hopper cover clamps

2 Feeder Process Zone (Front)

- the nozzle downturn flex connector (or flexible downturn)
- the front panel
- the nozzle
- the helix
- 3 (of 4) extension hopper cover clamps

3 & 4 Feeder Service Zones (Sides)

- the side panels
- the gearmotor (or motor + reducer)
- the hose clamp sealing the flex hopper spout to the quill

The exemplary clearance dimensions shown in the table below for the drawing above are minimum dimensions. The dimensions given in your documentation binder are always applicable.

Series Feeder Model	Dim A [mm]	Dim B [mm]	Dim „C [mm] (Clearance for nozzle/helix removal)
300	620	800	(2 x FFOF) + 320
600	720	900	(2 x FFOF) + 480
900	820	1000	(2 x FFOF) + 600

NOTES:

Dimensions given are minimum values. Additional space will make servicing the feeder more convenient.

FFOF = Distance from “Front Face of Feeder” to the end of the nozzle (or helix). This dimension is order specific, and is obtained from the last three digits of the helix or nozzle part number (e.g., HX6A-2.251100001-012 has an “FFOF” dimension of 12 inches [305mm]).

If the nozzle has an integrated downturn, it will be necessary to add “D” to “C”.

3.8 Acceleration Amplitude and Displacement



NOTICE

Vibrations caused by ambient conditions.

Vibrations can have negative effects.

They can cause mismeasurements in gravimetric feeders.

– The limit values listed below must be maintained for acceleration and displacement (feeder movement) depending on the frequency of the vibrations caused by the feeder surroundings

1. If you are not able to reduce these vibrations, please ask Schenck AccuRate for suitable measures that you can implement to do so.

The following rules apply to vibrations on the scale floor area at the frequency f:

The figures below (for acceleration amplitude and displacement) show the limiting curves for the acceleration amplitude a and the displacement x , separating the acceptable amplitude ranges from the unacceptable ones.

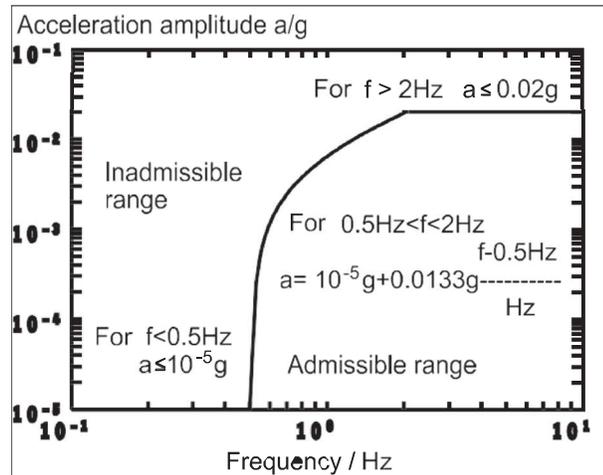


Fig. 12: Acceptable Acceleration Amplitude

a = acceleration amplitude in [m/s²]
 f = frequency in [Hz]
 g = gravitational acceleration = 9.81 m/s²

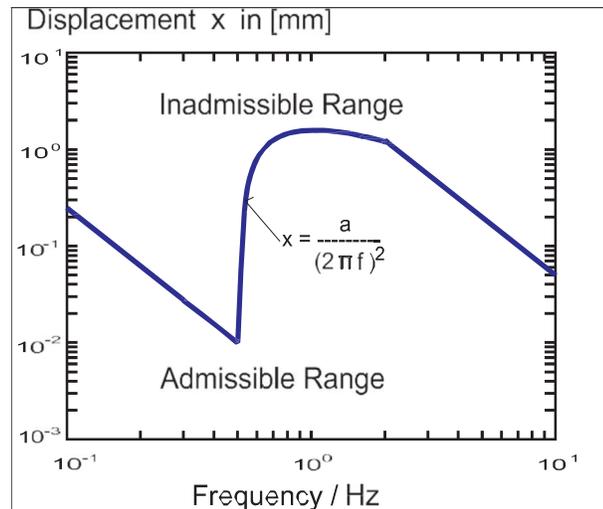


Fig. 13: Displacement as a Function of Frequency

These figures show clearly that:

- it may be necessary to introduce a support for the gravimetric feeder that is decoupled from the vibrations.
- this support has to be very rigid.

This is the reason why developing vibrations should generally be combated with attenuation and reinforcements.

3.9 Assembling Leveling Feet

It is important that the feeder be level. Four leveling feet have been included with your feeder to ensure the feeder is level.

Follow the steps below to assemble the leveling feet. Refer to the drawings below.

1. Locate the four threaded holes in the bottom corners of the feeder frame.
2. Turn the lock nut on the leveling foot until it stops in a position as close to the black rubber pad as possible.
3. Next, thread these leveling feet assemblies clockwise into the threaded holes in the bottom corners of the feeder frame.
4. Turn these feet assemblies until desired height for the feeder is achieved.
5. Place a level on the feeder.
6. Adjust feet until feeder is level and tighten the lock nuts against the feeder base.

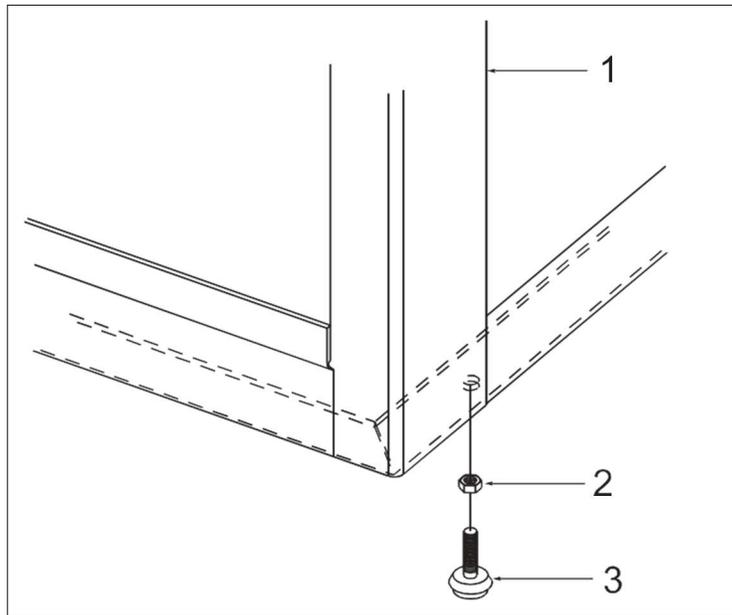


Fig. 14: Foot Assembly Installation

1	Feeder frame	2	Lock nut
3	Foot		

3.10 Attaching Extension Hopper

In some applications, a hopper extension or other upstream equipment may be attached to the top of the feeder. To attach the equipment, a slight modification is necessary.



NOTICE

Drilling the hopper in locations other than the specified drill mark locations voids all warranties.

Only drill holes in the hopper in the drill mark locations shown in the figures below.

1. Remove the hopper and locate the four marks, or dimples in the bottom of the hopper. (The steps for hopper removal can be found on page [→ 55].) See the figures below for the location of the marks.
2. Drill four holes of the required size in the hopper at the drill marks.
3. When the drilled hopper is installed, the holes line up with tapped holes in the frame. See the figures below.
4. Extension hopper or other upstream equipment may now be attached to the feeder using four bolts.

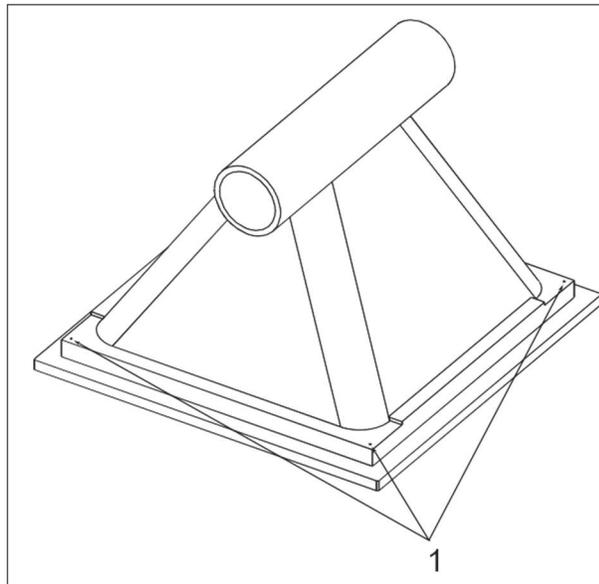


Fig. 15: Drill Mark Location

1	Location of drill marks (drill here)
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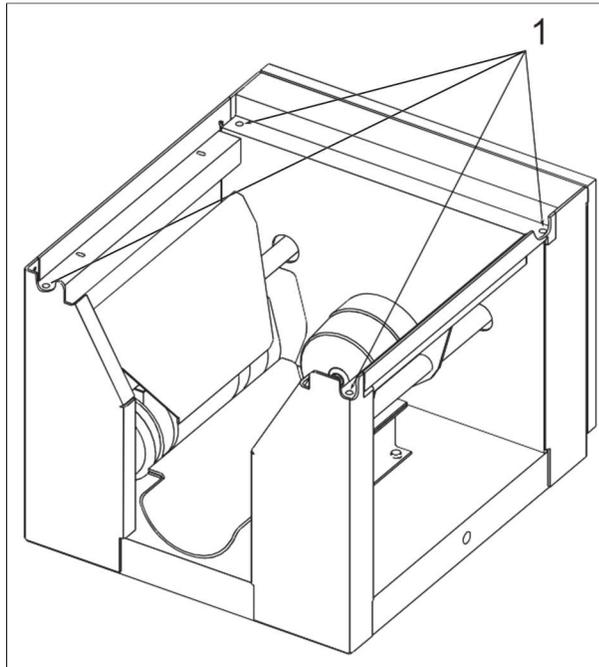


Fig. 16: Drilled Holes in Frame

1	Drilled and tapped holes in frame
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DANGER

Weight of feeder is not meant to be carried by these four bolts.

Insufficient support could cause the feeder to fall and cause bodily injury as well as damage to the feeder.

– The feeder is not designed to be supported in this location.

1. Refer to page [→ 18] for safe handling and transit of the feeder.

3.11 Material Infeed and Discharge Considerations

Material infeed and discharge connections to and from the feeder may dramatically impact feeder system output and accuracy. These connections must be carefully thought out and correctly installed to ensure optimal performance of your system. Since gravimetric systems are very sensitive to disturbances and vibration, and since these problems can impact feeding accuracy, special measures may be necessary to neutralize or eliminate them.

If your site experiences disturbance or vibration problems and feeding accuracy is not met, contact your Schenck AccuRate representative for assistance.

3.11.1 Volumetric Applications

Without Scale

Infeed and discharge considerations for volumetric applications center primarily around dust control and containment. Depending on design, the hopper cover may have two openings:

- The opening in the cover center is for material infeed; the opening offset from the center allows air to escape during refill (e.g. venting).

For volumetric systems, an appropriate method of connecting inlet opening to material source is acceptable as long as it is attached in a manner that will not result in material flow issues. For dust control, the vent should be connected to either a dust containment system or an adequate filtering system.



Whether or not dust containment is an issue, the opening (diameter) of the receiving vessel should be a minimum of 25% larger than the feeder discharge nozzle to provide for an air escape path. If flexible connectors are not present, this will provide for an air escape path.

HINT

The impact of unequalized pressure could cause inconsistent feed rates which would negatively impact system accuracy.

If dust containment is a consideration when connecting the feeder to other system components, flexible connectors must be provided on material infeed and helix discharge openings. Care must be taken to ensure that pressure build-up (unequalized pressure) from material discharge caused by displaced air in the downstream receiving vessel is not an issue.

3.11.2 Gravimetric Applications

With Scale

Material infeed and discharge concepts for gravimetric applications are more complex and focus primarily on neutralizing or averting adverse effects (e.g. vibrations).

NOTICE



Adverse effects that have an impact on the feeder and weighing module normally also have a negative impact on the accuracy of the feed system (feeding mechanism + control electronics).

You must observe the details given in this manual concerning disturbances such as vibrations and accelerations (refer to [page \[→ 27 \]](#)). Follow these

Gravimetric factors from linking the feeder to upstream and downstream plant components for material feed and discharge are normally neutralized using flexible links. Use flexible connections approved or supplied by Schenck AccuRate (refer to page [→ 29]).

Gravimetric factors from uncompensated pressure in the feeder can falsify feeder results because air or some other medium could directly build up pressure over the scale's area and act as a force on the weighing modules.

If it is not possible to avoid uncompensated pressure with the basic feeder construction, we recommend the following:

- Using the feeder with ventilation
- Using pressure compensation

This may be necessary both with the material feed (the feeder's cover) and the feeder's material discharge point.

3.12 Flexible Connections

3.12.1 Alignment of Flexible Connections

DANGER



Moving parts on the material infeed and material discharge.

Upper body parts may be at risk of becoming crushed or otherwise injured.

- The flexible connections constituting the seamless transition to upstream and downstream component parts should always be undamaged and tightly connected to the component parts.
- Flexible connections are protective equipment elements that physically separate workers from hazards. The feeder should not be operated without flexible connections used as intended.

1. Always ensure that the flexible connections are undamaged and are mounted as intended.

Please remember the following when using the flexible connections on the material infeed and material discharge:

- If using a bellows type flexible connector, the alignment offset (A) between the tubes connected by flexible connections should be smaller than or equal to 2 mm (0.078 inches). If using a stretchable sleeve-type connector, a greater misalignment (6mm [.25 in]) is permitted.
- The distance (B) between the two tubes has to meet the specifications on the order drawing found in your documentation binder.

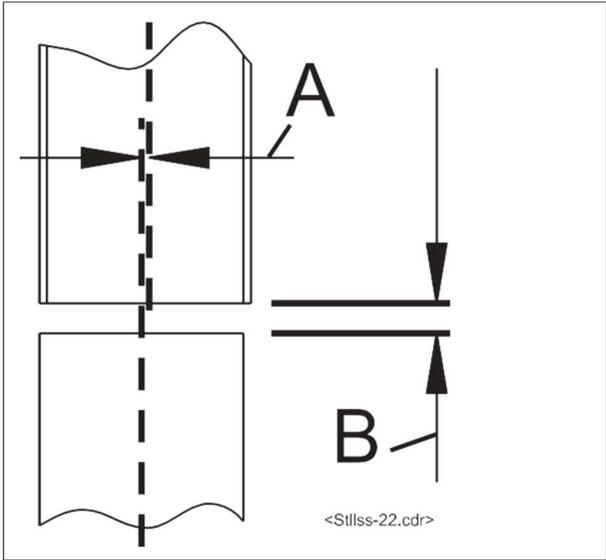


Fig. 17: Alignment of Flexible Connectors

4 Electrical Installation

Refer to your electrical drawings, electrical schematics, and lay-out drawings for additional information.

4.1 Connecting Electrical Equipment

Electrical wiring is performed in the electrical enclosure.

For specific information concerning connection of power to your feeder system, refer to your electrical drawings.



NOTICE

Motor wiring polarity.

If the motor is incorrectly wired, the helix will rotate in the wrong direction may become unscrewed. If this happens, disconnect power to the feeder and reconnect the helix. (Refer to [page \[→ 55\]](#).) Check drawing schematics and re-wire as needed so helix rotates counter-clockwise as viewed from the discharge end.

4.2 Basic Electrical Information

WARNING

Upstream and downstream equipment (if present) may not shut down when the feeder E-stop command is activated.

The feeder may overflow; upstream equipment may be over loaded due to blockage. Downstream equipment may cease to operate properly outside the specified limits of material in-flow. If flow blockages result in flex connector failure, the operator could be exposed to hot and/or hazardous material resulting in burns or other bodily injury.

– If the simultaneous shut-down of the feeder with upstream and downstream equipment is critical to maintain safe operating or process control, tie together E-stop circuitry of all relevant machines.

1. Follow all local codes when connecting E-stop circuitry to upstream and downstream equipment.



NOTICE**Improper grounding.**

Improper grounding can result in damage to feeder and alter feeding accuracy.
– Sound earth grounding techniques should be employed to ensure safety and functionality.



1. All power supplies terminated in the electrical enclosure/electrical junction box must originate from a common ground bus.
2. The ground cables to the feeder and separate control enclosure(s) must originate from a common ground bus.
3. Ground cables must be equal to (in gauge) or larger than the corresponding current-carrying conductors.
4. Attach all control cable shields according to instructions in the appropriate system manual.

NOTICE**Quality of power.**

Quality of power can affect system safety and functionality.

– Consider the quality of power entering the system to ensure system safety and functionality.



1. UPS (uninterruptible power source) is recommended for power systems that experience frequent interruptions and/or periodic voltage fluctuations.
2. A lightning arrester is recommended for power systems that experience frequent voltage surges due to lightning or large inductive loads.
3. A line reactor is recommended for power systems that experience frequent voltage spikes.

**HINT**

Depending on your feeder control system, additional control manual(s) may be provided.

4.3 Grounding the Feeder

**DANGER****Inadequate grounding of equipment.**

Inadequately grounded equipment could cause severe injury or death in the case of electrical malfunctions or lightning strike.

– Ensure adequate grounding of equipment.

1. Follow local electrical codes.

Some systems produce excessive static that may cause problems in feeding material properly. The following is the recommended procedure for properly grounding the components of the system.

1. Measure the following distances and cut sections of #10 wire with ring lugs accordingly. From a stud (or suitable grounding terminal) on the hopper extension to an attachment point on the main frame of the feeder (see item 8 in the figure below). From one side panel mounting screw on the scale to the attachment point on the feeder frame (see item 6 in the figure below). From the nozzle to a stud (or suitable ground clamp) on the feeder frame (see item 4 in the figure below).
2. Attach one end of a wire from a stud (or suitable grounding terminal) on the hopper extension to a stud (or suitable ground clamp) on the main frame of the feeder.
3. Attach a wire from one side panel mounting screw on the scale to a stud (or suitable ground clamp) on the main frame of the feeder (use the same feeder stud in step two).
4. Attach a ground wire from the True earth (see item 6 in the figure below) to the same mounting screw used in step three. (Grounding must be attached to True earth in accordance with National Electrical Code Specifications.)
5. Attach a ground wire from the nozzle to a stud (or suitable ground clamp) on the feeder frame.



HINT

The same point on the feeder frame can be used to attach all three ground wires.

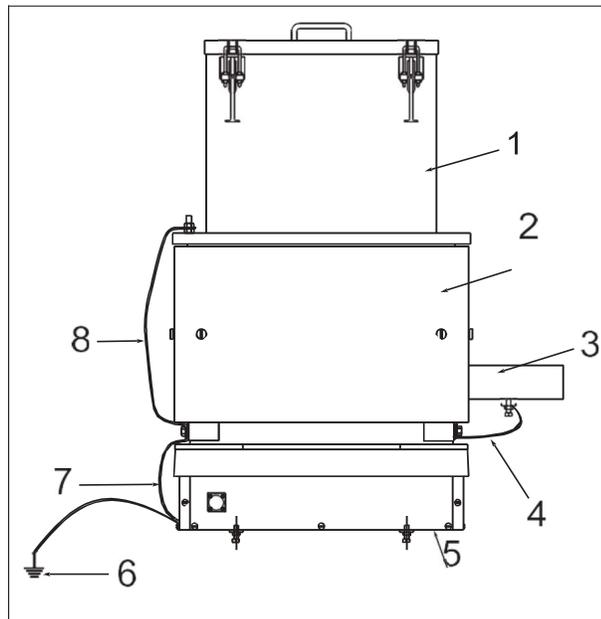


Fig. 18: Grounding

1	Hopper extension	2	Feeder
3	Nozzle	4	Nozzle/feeder ground strap
5	Scale	6	True earth
7	Feeder/scale ground strap	8	Feeder/hopper ground strap

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5 Commissioning

5.1 Overview

Refer to system set-up drawings and electrical schematics for your feeder and associated controls.

Commissioning is the act of fine tuning and running a system properly once set-up and installation activities have been completed. Systems may be self-commissioned (i.e., the customer performs the activity) or commissioning may be performed by a competent third party such as Schenck AccuRate. These instructions will help you achieve timely, accurate system commissioning and operation for greater control and system functionality.

You can find the specific steps for assembling the mechanical and electrical equipment in the prior chapters of this manual.

Calibration information can be found in this chapter.

In the other chapters of this manual, you can find data on operating and servicing the feeder as well as troubleshooting and typical feeder data. Always read the data sheets for the order on the technical data to be found in your documentation binder.

5.2 Commissioning Procedures

- Applying power to the system.
- Ensuring that the motor controller is working properly.
- Initial starting procedures.
- Ensuring that the entire infeed/discharge system (feed hopper, helix t-coupling, helix, nozzle and downturn) is working properly.
- Securing appropriate infeed and discharge connections that are adequate for your requirements and do not introduce undesired disturbances into the system.
- Calibrating the system and ensuring output accuracy prior to operation.

5.3 Applying Power to the System

Refer to the Electrical Installation Chapter in this manual for details on applying power to the feeder system. Refer to this section prior to and during commissioning activities to ensure that all safety and customer requirements have been satisfied.

5.4 Initial Starting Procedures

5.4.1 Correct Helix Rotation

Before placing dry material into the hopper, run the feeder for a short period of time to become familiar with its operation. While the feeder is running, check the helix rotation. The helix should be rotating counter-clockwise when viewed from the discharge end of the feeder. If the helix is not rotating counter-clockwise, the motor has been wired incorrectly. Refer to your electrical drawings and schematics.



DANGER

Incorrect helix rotation may result in the creation of a draw-in and wind-up hazard at the point of material discharge.

It may also result in no material being fed and damage to the feeder.

– When establishing the electrical connections per the order specific connection drawing of the feeder, make sure the helix rotation is correct.

1. Always do a visual check of helix rotation.
⇒ Change motor polarity if necessary.

5.4.2 Chain Tension Adjustment

After running the feeder for the first eight hours, check the chain tension. The chain may stretch slightly in the first 8 hours of use and may need additional adjustment. See page [→ 67] for chain adjustment instructions.

5.5 Upstream/Downstream Devices Operation

The upstream/downstream devices are at the heart of the feeder system. When this system works properly, system accuracy and operability are enhanced. Before proceeding, ensure that all upstream/downstream devices have been installed and are operating properly.

5.6 Motor Control Operation

A key to proper functioning of the feeder system is accurate motor controller functioning.

Performance information, specifications and related data concerning your motor controller can be found in your Control Manual.



WARNING

There can be hazards on moving parts, such as the discharge element and agitation, if the feeder is suddenly and unintentionally operated.

Moving components can suddenly move and crush parts of your body or cause other injuries to them.

– The drive control for the feed rate should be off or set to zero speed.

1. Please read the documentation for your control.

5.7 Filling the Hopper by Hand

The hopper (feed or extension) may require hand filling during commissioning for calibration, first-run or a variety of other functional tasks.

WARNING

Moving parts such as the discharge element present dangers during filling.

Parts of your body could be crushed or injured if you touch moving parts.

– Always read the instructions on the feeder's intended use, see page [→ 1].

1. The feeder should be put into a safe state.
2. Never reach into the feed hopper when feeder is running.



To fill the hopper by hand:

1. Disconnect power to the feeder and secure it from inadvertent restart.
2. Ensure that the feed and/or extension hopper, the helix and nozzle have been installed properly.
3. Place an appropriately-sized container at the process end of the feeder beneath the nozzle outlet or downturn to catch the output.
4. Attain a safe position relative to the hopper and hand-feed (via bucket, scoop, etc.) enough material into the hopper to ensure complete covering of the helix flights and filling of the lower portion of the hopper. Replace the hopper cover if a protective grid is not present.
5. Reconnect the power and turn the drive motor on and observe evacuation of the hopper via the helix. Make adjustments to feedrate or modify other parameters as appropriate.
6. Observe feed level in hopper closely during system operation. If it appears that feed material will run out prior to the end of the test or operation at hand, refill hopper from receiving container or with fresh material.

5.8 Integration with Upstream/Downstream Devices

When installed in a total system environment, it is extremely important that careful consideration be given to the feeder and its place in the overall system. Integration of the feeder with upstream and downstream processes and devices is key to proper functioning of the entire system.

Key integration considerations include:

- Appropriate connections to and from the feeder for upstream and downstream devices.
- Appropriate discharge vessel diameter at the outlet of the feeder.
- Adequate in-feed and venting for any dust collection or containment system that may be employed.
- Use of disturbance-controlled connections and Schenck AccuRate supplied or approved flexible connectors.

5.9 Operator Interface and Commissioning

The feeder is operated with its control electronics or operating elements.

Please review your specific application for operating your feeder and read the documentation in the system documentation binder for your feeder.

Operator interface information, including motor control data and additional control parameters, can be found in:

- **Volumetric Control Manual**
- **Gravimetric Control Manual**

5.10 Volumetric Calibration of the Material Flow

Your feeder was calibrated at the factory for operation as a volumetric feeder to guarantee linear material discharge across the entire range of drive speeds.

However, it is difficult to guarantee the behavior of the bulk solids actually used just by the factory calibrating the drive speed because

- the density of the bulk solids may fluctuate, and
- the level of the discharge element is not known exactly.

This is the reason why your feeder should be calibrated volumetrically applying the bulk solids actually used locally.



HINT

Also read the information that you can find in your system documentation binder on drive control for correct calibration.

The idea behind calibration is to determine the parameters needed for calculating the drive speed (potentiometer setting if set locally) for any given feed rate.

The method of calibration described here is suitable for most bulk solids. Differing calibration methods may be necessary if large deviations occur or if there are any unusual conditions. If this is the case, contact Schenck AccuRate for assistance.

5.11 Volumetric Calibration Procedure

A **correct feedrate** is determined by:

- Helix speed
- Material bulk density
- Size and type of helix employed.

Equipment required for this procedure:

- A large container to catch the test material
- An accurate scale to weigh the container and material
- An accurate timing device (i.e., stopwatch).

Calibration Procedure

1. Run the feeder empty for 5 to 10 minutes to establish stable operation.
2. Place the empty, large container on the scale and record the weight.
3. Fill the feed hopper with the material to be processed (see page [→ 37]).
4. Turn the feeder ON and run until the discharge nozzle is full of process material; then shut the feeder OFF.
5. Set the feed rate potentiometer at 75% of maximum speed. See the Volumetric Control Manual for information setting the potentiometer speed.
6. Collect and weigh 3 separate catch samples by running the feeder for one-minute intervals and weighing the samples after each interval. Record the data on the Calibration Calculation table, page [→ 42] (see also examples on page [→ 44]).



HINT

Shorter test intervals may be used if the catch container will not hold one-minute interval samples.

If a shorter test interval is used, the measured weight must be equalized to the appropriate unit of time (weight/min or weight/hr). For example, a 30-second sample weight is multiplied by 2 to compare to one-minute samples.

Longer test intervals to attain a measurable sample may be required if the feedrate is very low. If a longer test interval is used, the measured weight must be equalized to the appropriate unit of time (weight/min or weight/hr). For example, a 3-minute sample weight will be divided by 3 to compare to one-minute samples.

7. Set the potentiometer at 50% of maximum speed.
8. Repeat step 6. Continue using 25% and 10% potentiometer settings and enter the values in the Calibration Calculation table, page [→ 42].



HINT

Additional catch samples at other potentiometer settings may be required for some difficult to feed materials. Repeat step 6 as required with other potentiometer settings.



HINT

Make sure that all samples are adjusted to use the same unit of time (weight/min or weight/hr).

9. Calculate the Average Sample Weight by adding the three catch samples together and dividing by three.

10. Calculate the Average Net Weight by subtracting the sample container weight from the Average Sample Weight.

11. Plot the Average Net Weight for the various potentiometer settings on the calibration graph, page [→ 42]. To determine the Vertical Axis Scale Increment for the vertical axis (Net Weight), multiply the Net Weight value at the 50% potentiometer setting by 0.2. Multiply the Vertical Axis Scale Increment by 1 and enter this in position (a) on the graph. Multiply the Vertical Axis Scale Increment by 2 and enter into position (b) and so on through position (j); see page [→ 45] for an example.

12. Connect the Average Net Weight points to determine the feedrate curve for this specific material in this feeder. This curve provides an estimated potentiometer setting for a selected feedrate.



HINT

The plotted curve of the Average Net Weight for the various motor speed settings (potentiometer setting) may not be a straight line.

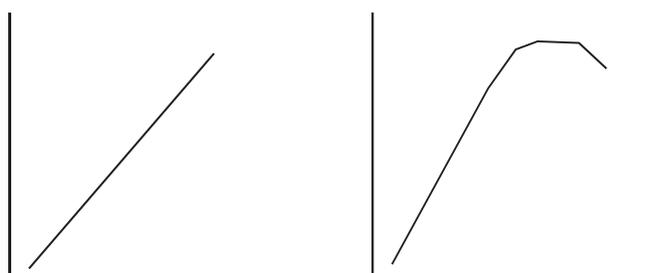


Fig. 19: Typical Plotted Feedrate Curves

1	Weight per unit time	2	Potentiometer setting (motor speed setting)
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5.11.1 Determining and Calculating the Feed Rate

Once the volumetric calibration process has been completed, you can find the drive speed (potentiometer setting) required to achieve a given feed rate.



HINT

Any feed rate can have two drive speed settings if the feed rate curve shown is not a straight line. Always use the lower setting.

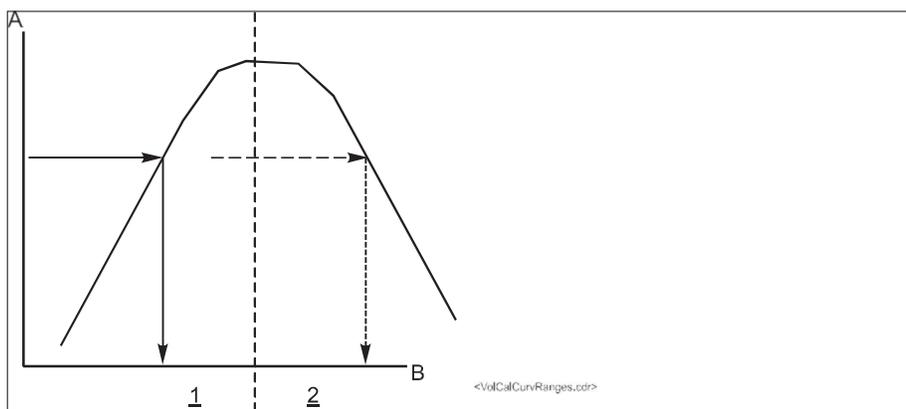


Fig. 20: Feed Rate Curve Ranges

1	Range to be applied	2	Range not to be applied
A	Net weight value (feed rate)	B	Potentiometer settings

1. Read one weight per unit of time (weight/minute) from the vertical axis that corresponds to the desired feed rate.
2. Move along a straight horizontal line to the right until you intersect the feed rate curve shown.
3. Then move downward on a straight line to intersect the horizontal axis and read the drive speed setting (potentiometer setting) for each feed rate.
4. Let the drive run at the speed setting read from the calibration curve to check the drive setting (potentiometer setting). Take several samples and calculate the feed rate (refer to page [→ 41]). It may be necessary to make small adjustments to the drive speed to achieve the desired feed rate.
5. Repeat item 4 as often as necessary.



HINT

Material characteristics can change over time. We therefore recommend that you inspect the calibration calculations at regular intervals.

Potentiometer setting	Actual sample weight	Mean sample weight	Sample container weight	Mean net weight
75%				
50%				
				1)
25%				
10%				

Tab. 1: Volumetric Calibration

Scale increment (vertical axis) = mean net weight at 50% potentiometer - setting 1) x 0.2

Scale increment (vertical axis) = _____ 1) x 0.2 = _____

Scale increment (vertical axis) in position:

(a)	=	1	x	Scale increment (vertical axis)	=	_____
(b)	=	2	x	Scale increment (vertical axis)	=	_____
(c)	=	3	x	Scale increment (vertical axis)	=	_____
(d)	=	4	x	Scale increment (vertical axis)	=	_____
(e)	=	5	x	Scale increment (vertical axis)	=	_____
(f)	=	6	x	Scale increment (vertical axis)	=	_____
(g)	=	7	x	Scale increment (vertical axis)	=	_____
(h)	=	8	x	Scale increment (vertical axis)	=	_____
(i)	=	9	x	Scale increment (vertical axis)	=	_____
(j)	=	10	x	Scale increment (vertical axis)	=	_____

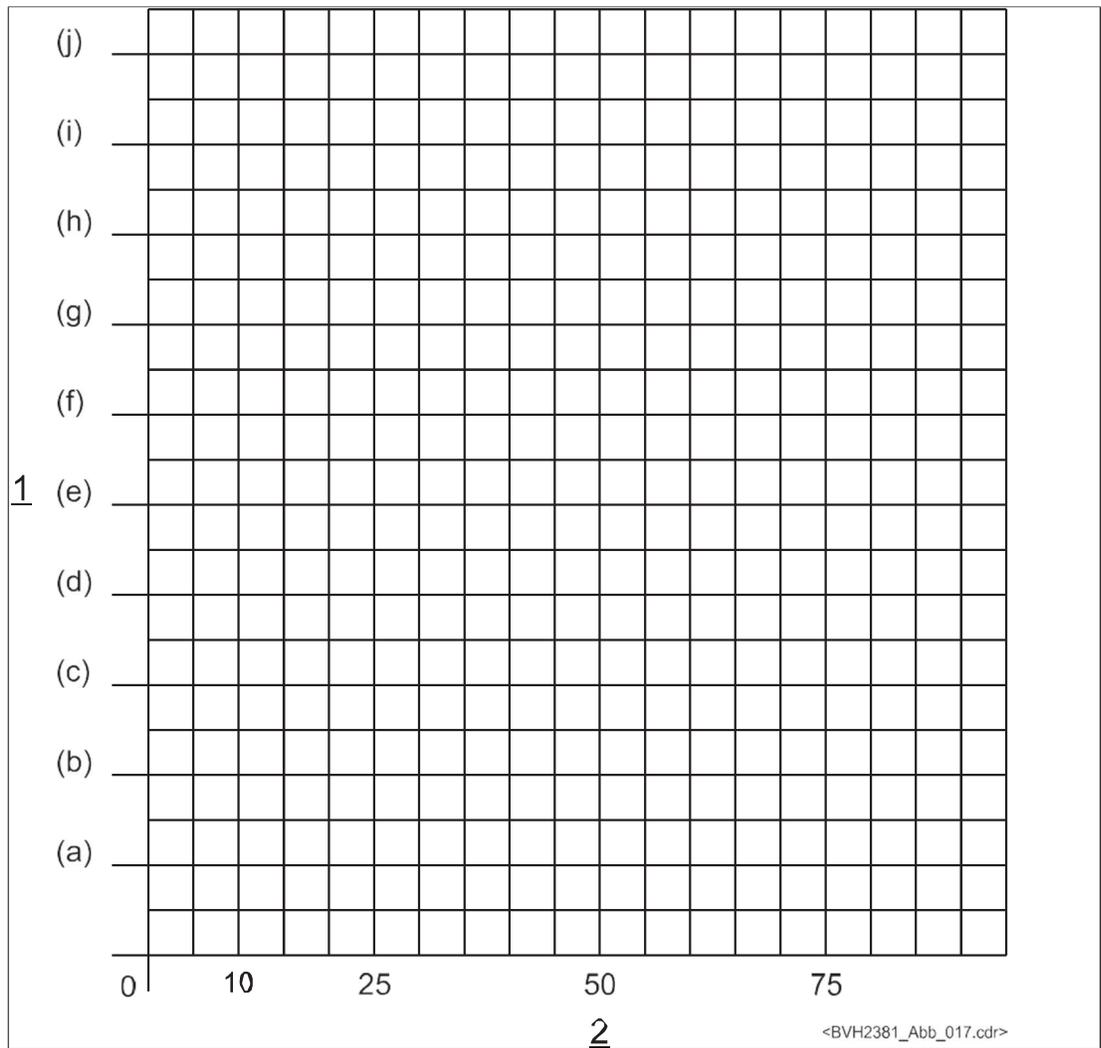


Fig. 21: Grid - Volumetric Calibration Graph

1	Mean net weight in _____ per _____ (weight / unit of time)
2	Potentiometer settings (%)

5.11.2 Volumetric Calibration - Example

Potentiometer setting	Actual sample weight	Mean sample weight	Sample container weight	Mean net weight
75%	204			
	208			
	212	208	3	205
50%	180			
	175			
	179	178	3	175.1
25%	85			
	87			
	83	85	3	82
10%	35			
	33			
	33	34	3	31

Tab. 2 : Volumetric Calibration - Sample Table

Scale increment (vertical axis) = mean net weight at 50% potentiometer - setting 1) x 0.2

Scale increment (vertical axis) = 175.1) x 0.2 = 35

- (a) = 1 x Scale increment (vertical axis) = 35
- (b) = 2 x Scale increment (vertical axis) = 70
- (c) = 3 x Scale increment (vertical axis) = 105
- (d) = 4 x Scale increment (vertical axis) = 140
- (e) = 5 x Scale increment (vertical axis) = 175
- (f) = 6 x Scale increment (vertical axis) = 210
- (g) = 7 x Scale increment (vertical axis) = 245
- (h) = 8 x Scale increment (vertical axis) = 280
- (i) = 9 x Scale increment (vertical axis) = 315
- (j) = 10 x Scale increment (vertical axis) = 350

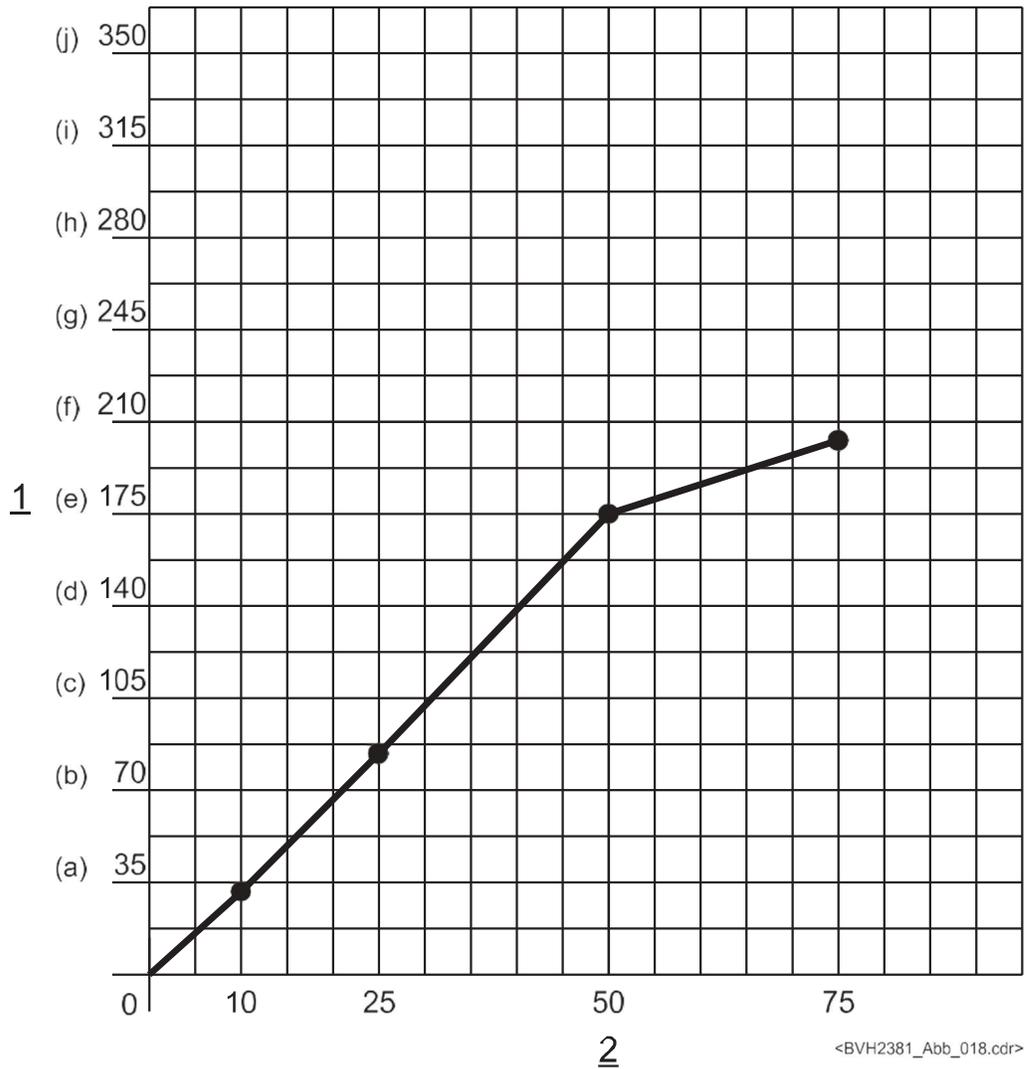


Fig. 22: Example - Volumetric Calibration Graph

1	Mean net weight in ____ kg ____ per ____ h ____ (weight / unit of time)
2	Potentiometer settings (%)

5.12 Gravimetric Calibration of Material Flow

Gravimetric calibration of your feeder system is dependent on the type of gravimetric system controller being employed. If the controller has been provided by Schenck AccuRate, calibration information will be found in the Gravimetric Control Manual. If the system controller has not been provided by Schenck AccuRate, consult alternate supplier information manual(s).

**HINT**

Calibration test weight should be placed on top of the feeder cover.

5.12.1 Electrical Connections

**HINT**

Feeder power cables should not be crossed or touching another object. Also allow for a generous loop for proper scale function.

5.13 System Commissioning Checklist

The system commissioning checklist:

- Is a handy reference to ensure that all system components are installed properly and working according to requirements.
- Prompts you to check all connections to upstream/downstream devices to ensure that they are appropriate for requirements.

System Commissioning Checklist

Before system operation, verify that:

- An appropriate system site has been chosen and properly prepared (level and free of outside vibrations).
- An adequate support structure has been provided for feeder system placement.
- The support structure for the feeder, controls and peripheral devices has a surface area equal to, or greater than, the total area required for equipment placement and servicing.
- System site location provides easy access for all service, maintenance and cleaning activities for the feeder and adequate operator activity room.

- All system components have been carefully unpacked, identified, verified to be in good physical condition, checked off the packing list or customer order sheet, and placed in a secure location, convenient for installation activities.
- Responsible personnel, familiar with system design parameters, inter-connection requirements and all safety considerations are closely involved with installation, commissioning and operation activities.
- Responsible personnel have familiarized themselves with all system manuals and technical documentation, all locally approved safety procedures and requirements and any site or customer- specific issues prior to system installation and operation.

- Responsible personnel supervise the physical installation of the system. Only qualified and properly-trained personnel perform electrical connection hook-ups and any other tasks that require advanced knowledge or skills to properly install the system.
- All component parts of the system are properly installed, appropriately connected and set up per overall system requirements and engineering drawings.
- All connections to and from the feeder are appropriate for the requirements of the system.
- The feeder is level and true to the ground.
- Electrical grounding and quality of power considerations have been adequately addressed to ensure safe and accurate operation of the feeder system.
- All mechanical connections to upstream/downstream devices and processes are secure and stable.
- All mechanical/electrical connections to system components are secure, stable and appropriate per the engineering drawings and customer requirements.
- Any outstanding issues that have arisen during installation, commissioning or operation have been identified and resolved.

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6 Operation



CAUTION

Operating errors and incorrect machine handling.

Incorrect handling can result in injury.

- Only personnel that have been trained to operate the machine may perform such work.
- Furthermore, the personnel must also be familiar with the locally applicable safety and accident prevention regulations.
 1. The personnel must receive training in the correct handling of the machine at regular intervals.

The feeder can be controlled and operated either manually or automatically.

Before using the system, determine which mode of operation is desired and reference either:

- Volumetric Control Manual using the system motor controls.
- Gravimetric Control Manual using the system motor controls.



NOTICE

Vibrations and excessive speed of the discharge aids (agitations).

These can falsify the weighing results and increase wear.

- This is the reason why it is very important to keep the speed of the discharge aids as low as possible in the feeding process.
- Also check the speed if there are irregularities in the feed rate.
 1. Maintain the agitation frequency at a minimum level which still meets the feeding performance criteria.

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7 Maintenance

7.1 Inspection



DANGER

Rotating parts at the discharge element and the agitating of the feed hopper.

There is risk of cutting and other bodily injuries if you come into contact with moving components.

– Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.

– Ensure that the feeder is protected from inadvertent restart.

1. Switch off the feeder.
2. Wait until all energy stores are discharged.
3. Cut the power to the feeder from all sources.

Your feeder has been designed and constructed of the highest quality, long-life materials and components. Due to this extended-use design, long-term, maintenance-reduced operation will result.

If abnormal wear on any of these components is observed or irregular performance during operation is noted, servicing and/or maintenance should be performed.

7.2 Preventative Maintenance

A preventive maintenance schedule is strongly recommended to maintain your feeder at peak functionality.

The life of the individual components highly depends on the operating conditions ruling at a particular time, regular maintenance cycles cannot be indicated.

The following table outlines the maintenance schedule that you should follow to keep your feeder in a safe and proper working order. The numbers in the table represent different tasks. Complete descriptions of the tasks can be found in the Maintenance chapter of this manual.

Number	Task
1	Adjust
2	Lubricate (see page [→ 80])
3	Inspect for wear or other signs of malfunction
4	Replace

Item	Daily	Weekly	Monthly	3 Months	6 Months	Annually
Chain			1,2,3			
Sprockets			1,3			
Gear Motor (brushes on DC motors)			3			
Helix				3		
Nozzle				1,3		
Hopper				3		
Hopper Extension Dust Sock		3			4	
Drive Shaft				3		
Seals (see page [→ 5])			3		4	
Quill			3			
Bearings & Bushings			3			
Nuts & Bolts			1,3			
Keyways				3		
Eccentric Shaft				3		
Feeder Mounting Bolts			3			

7.3 Removing Panels



DANGER

Moving feeder parts.

There is risk of crushing, cutting and other bodily injuries if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
- Ensure that the feeder is protected from inadvertent restart.

1. Switch off the feeder.
2. Wait until all energy stores are discharged.
3. Cut the power to the feeder from all sources.



HINT

Remove cable from touchpad when removing side panel with touchpad potentiometer.

Panels must be removed for most maintenance. Follow the steps below to remove panels.

1. Loosen screws and remove panel. See the figure below.

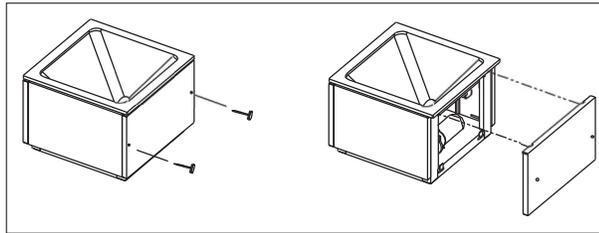


Fig. 23: Panel Removal

7.4 Replacing Helix and Nozzle

DANGER

Moving feeder parts.

There is risk of cutting, crushing and other bodily injuries if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
- Ensure that the feeder is protected from inadvertent restart.
 1. Switch off the feeder.
 2. Wait until all energy stores are discharged.
 3. Cut the power to the feeder from all sources.



HINT

When helix size changes, the nozzle must also change.

Follow the steps below to replace the helix and nozzle. Refer to the figure below.

1. Empty feed hopper.
2. Remove front panel.
3. Disconnect flex connector(s) at nozzle discharge.
4. Loosen front inside and outside hose clamps.
5. Remove nozzle.

6. Remove helix by turning it counter-clockwise when looking at it from the nozzle side.

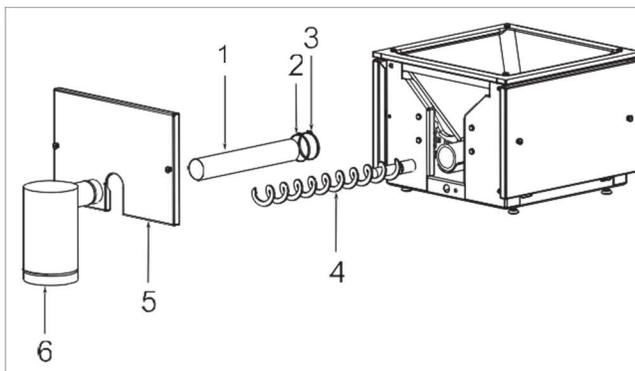


Fig. 24: Helix and Nozzle Removal

1	Nozzle	2	Outside hose clamp
3	Inside hose clamp	4	Helix
5	Front panel	6	Flexible connector at nozzle discharge

Follow the steps below to install the helix and nozzle.

1. Position new helix on drive shaft and turn it clockwise.
2. Install nozzle, making sure it is square with the feeder and making it flush with the end of the helix. The helix should not extend past the end of the nozzle. Refer to the figures below.
3. Install and secure inside hose clamp. The inside hose clamp must be around the nozzle and hopper to seal this area, but not under the metal saddle.
4. Install and secure outside hose clamp. The outside hose clamp must go over the nozzle, making sure it is also secured under the metal saddle and tightened.

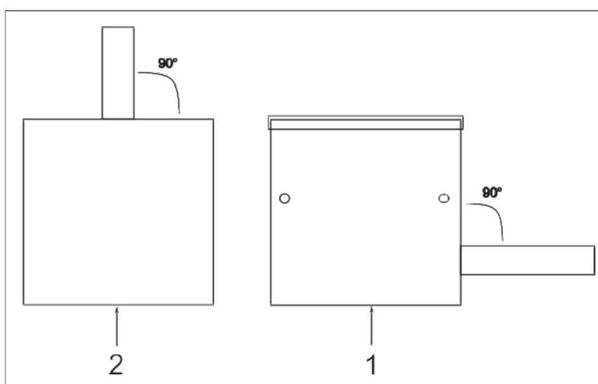


Fig. 25: Nozzle Installation

1	Top view of feeder	2	Side view of feeder
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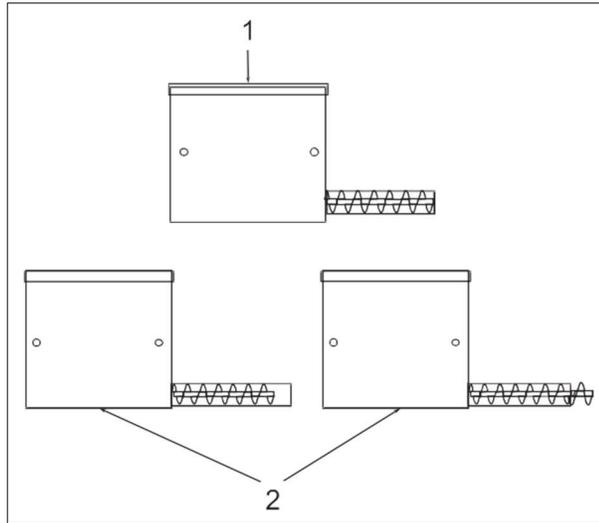


Fig. 26: Helix Installation

1	Correct helix/nozzle arrangement	2	Incorrect helix/nozzle arrangement
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7.5 Removing Hopper



DANGER

Moving feeder parts.

There is risk of cutting, crushing and other bodily injuries if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
- Ensure that the feeder is protected from inadvertent restart.

1. Switch off the feeder.
2. Wait until all energy stores are discharged.
3. Cut the power to the feeder from all sources.

Follow the steps below to remove the hopper. Refer to the figure below.

1. Empty material from hopper.
2. Remove front and side panels.
3. Loosen front inside and outside hose clamps.
4. Remove helix and nozzle (refer to page [→ 53]).
5. Remove the four bolts located under the left and right side of frame lip.
6. Loosen rear hose clamp and lift hopper from frame.

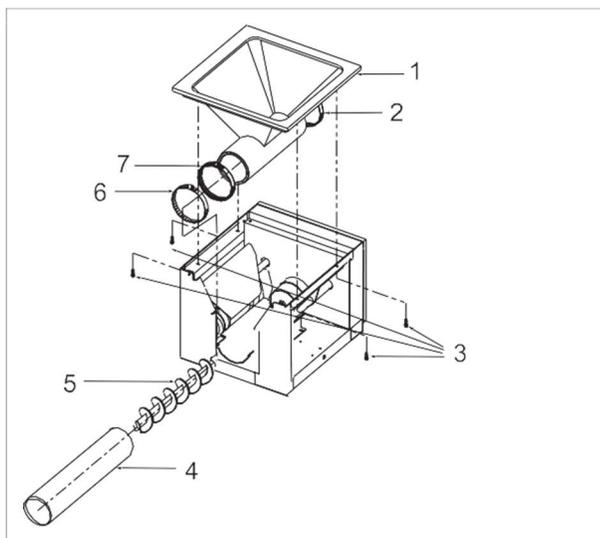


Fig. 27: Hopper Removal

1	Hopper	2	Rear hose clamp
3	Hopper bolts (4)	4	Nozzle
5	Helix	6	Outside hose clamp
7	Inside hose clamp		

To install, reverse procedure.



NOTICE

Incorrect hopper installation could result in material leakage and/or poor feeding results.

Make sure the rear hose clamp is over hopper spout. The inner portion of the hopper should be flush with bevel of quill. See the figure below.

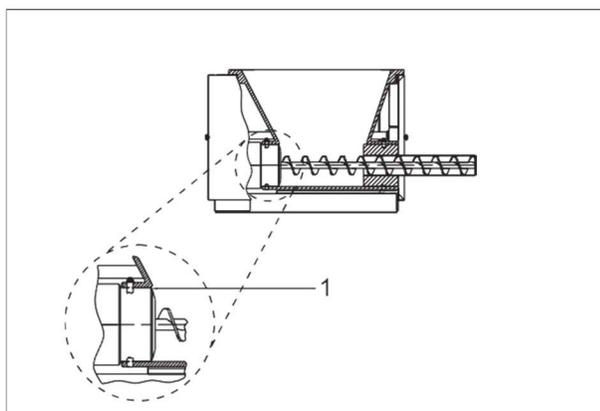


Fig. 28: Quill Alignment

1	Bevel on quill is flush with hopper
---	-------------------------------------

7.6 Removing Chain Guard



DANGER

Moving feeder parts.

There is risk of crushing, cutting and other bodily injuries if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
- Ensure that the feeder is protected from inadvertent restart.

1. Switch off the feeder.
2. Wait until all energy stores are discharged.
3. Cut the power to the feeder from all sources.

The chain guard must be removed to perform maintenance to the chain, sprockets, link assembly, agitation paddles, and gear motor.

Follow the steps below to remove the chain guard.

1. Remove rear panel. Refer to page [→ 52].
2. Loosen screws and remove chain guard. See figure below.

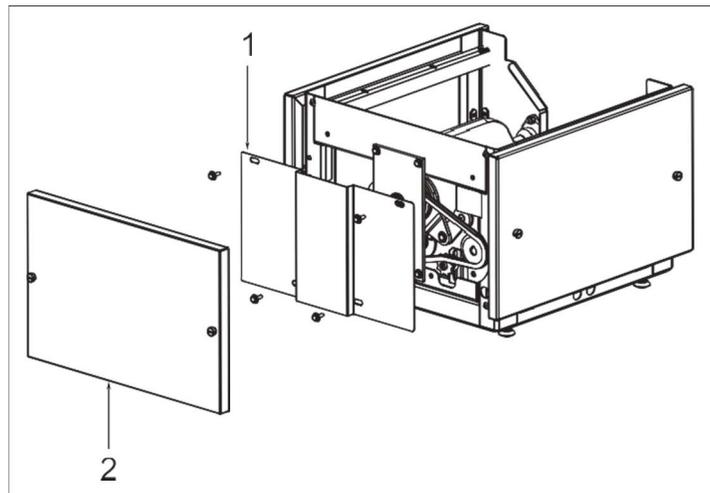


Fig. 29: Chain Guard Removal

1	Chain guard	2	Rear panel
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7.7 Removing Bearing Support Plate



DANGER

Moving feeder parts.

There is risk of crushing, cutting and other bodily injuries if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
- Ensure that the feeder is protected from inadvertent restart.

1. Switch off the feeder.
2. Wait until all energy stores are discharged.
3. Cut the power to the feeder from all sources.

The bearing support plate must also be removed to perform maintenance to the chain, sprockets, link assembly, agitation paddles, and gear motor.

Follow the steps below to remove the bearing support plate.

1. Remove the rear panel. Refer to page [→ 52].
2. Remove the chain guard. Refer to page [→ 57].
3. Loosen screws and remove bearing support plate. See the figure below.

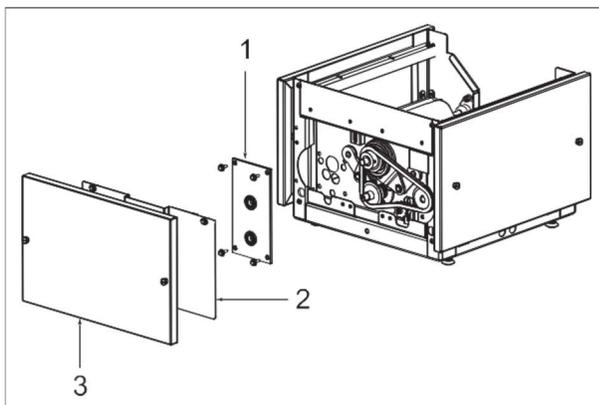


Fig. 30: Bearing Support Plate Removal

1	Bearing support plate	2	Chain guard
3	Rear panel		

7.8 Replacing Sprockets and Chains

Occasionally, sprockets and chains need to be replaced due to wear or when changing the gear ratio.

DANGER

Moving feeder parts.

There is risk of cutting, crushing and other bodily injuries if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
- Ensure that the feeder is protected from inadvertent restart.



1. Switch off the feeder.
2. Wait until all energy stores are discharged.
3. Cut the power to the feeder from all sources.

WARNING

Worn sprockets are very sharp.

Contact with worn sprockets can cause cutting or other bodily injuries.

- Use extreme caution when removing sprockets.



1. Use protective gloves to prevent injury.

7.8.1 Chain Removal

DANGER

Master link clip could become flying projectile.

The clip may cause severe injury if it were to hit the eyes.

- Use extreme caution when removing master link clip.



1. Always wear eye protection to prevent injury.

Follow the steps below for chain removal. Refer to the figures below.

1. Disconnect power.
2. Remove rear panel. Refer to page [→ 52].
3. Remove chain guard. Refer to page [→ 57].
4. Remove bearing support plate if necessary. Refer to page [→ 58].
5. Loosen idler shoulder bolt.
6. Locate master link in chain. This link is identified by a clip which holds it in place. The clip may be removed by placing a pliers over the open end of the clip and link pin. Apply pressure to clip to release it from the chain.

- The chain will now pull apart easily. Apply a small amount of oil to the master link area if the chain is corroded or hard to remove.

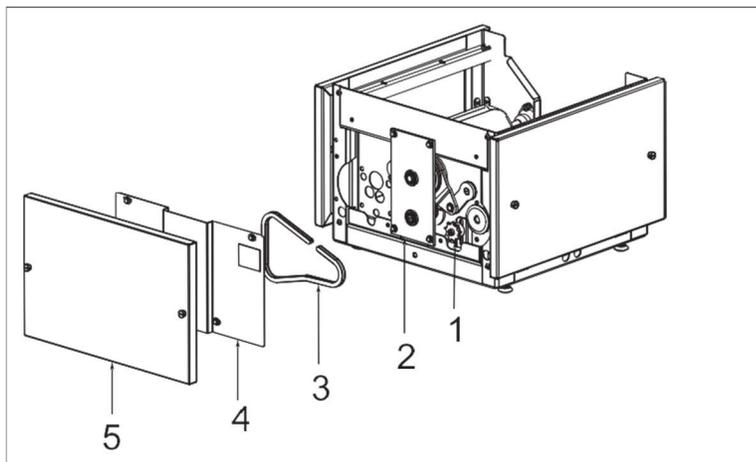


Fig. 31: Chain Removal

1	Idler and shoulder bolt	2	Bearing support plate
3	Chain	4	Chain guard
5	Rear panel		

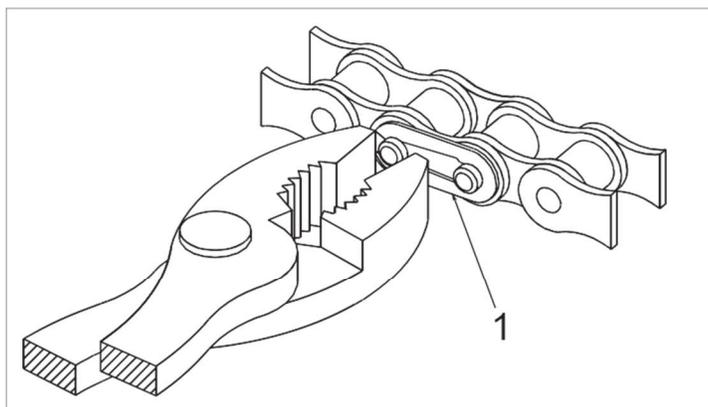


Fig. 32: Removing Master Link Clip

1	Master link clip
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To install chain, refer to page [→ 67].

7.8.2 Sprocket Removal

When sprockets become worn or damaged, they must be replaced.



HINT

Note the location and orientation of sprockets to their shafts. They must be returned to the same position. See the figures below

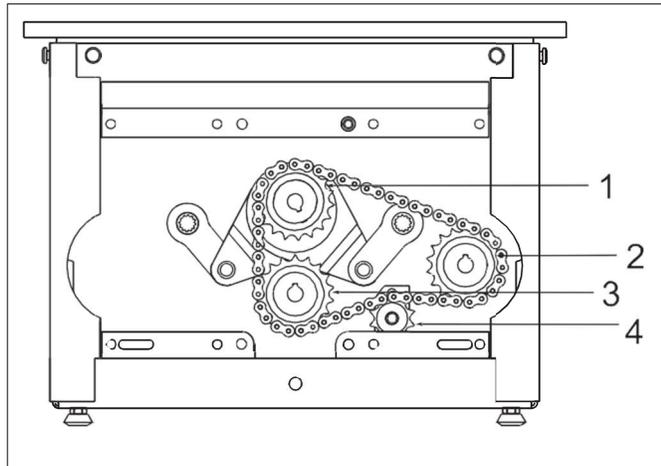


Fig. 33: 300 & 600 Single Drive Sprocket Configuration

1	Link assembly	2	Gear motor sprocket
3	Helix sprocket	4	Idler sprocket

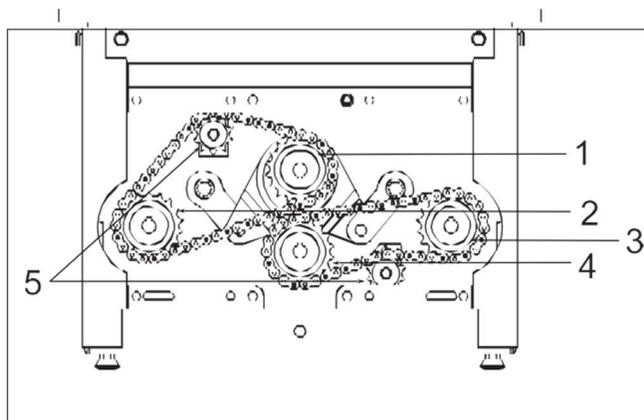


Fig. 34: 300 & 600 Dual Drive Sprocket Configuration

1	Link assembly	2	Agitation motor sprocket
3	Helix motor sprocket	4	Helix sprocket
5	Idler sprockets		

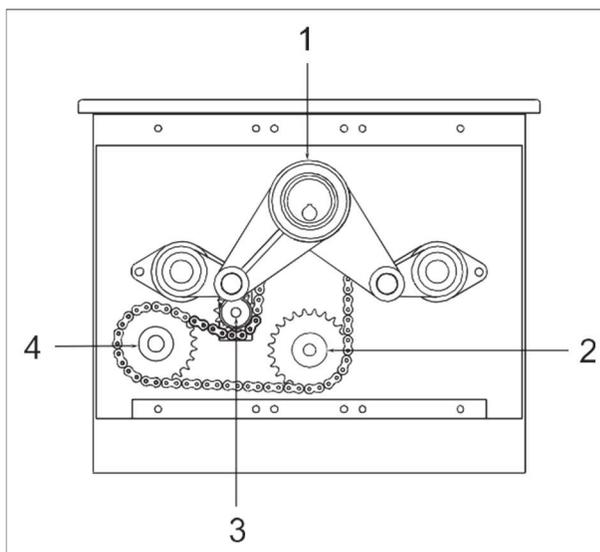


Fig. 35: 900 Sprocket Configuration Single Drive

1	Link assembly	2	Helix sprocket
3	Idler sprocket	4	Motor sprocket

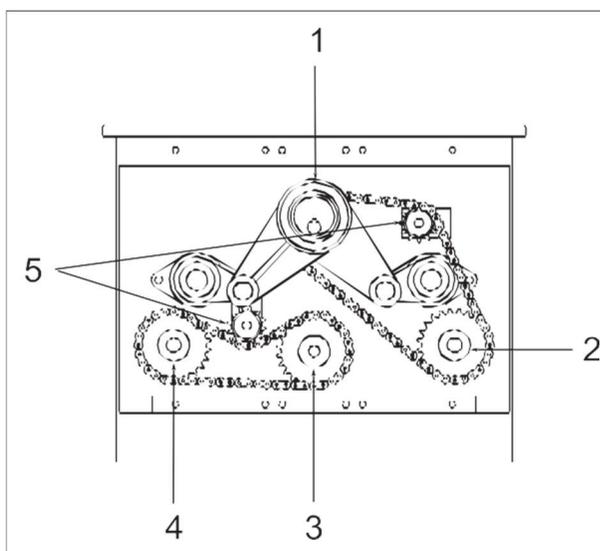


Fig. 36: 900 Sprocket Configuration Dual Drive

1	Link assembly	2	Agitation motor sprocket
3	Helix sprocket	4	Helix motor sprocket
5	Idler sprockets		



CAUTION

Improper sprocket alignment will cause irreparable damage to sprockets and chain.

Always use a straight edge (such as a metal ruler) to align the sprockets when installing. See the figure below.

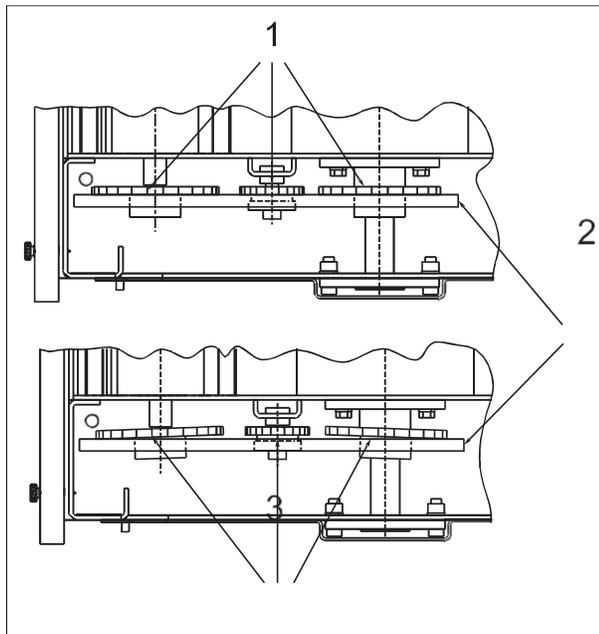


Fig. 37: Sprocket Alignment

1	Correctly aligned sprockets (no gaps between sprocket and straight edge)	2	Straight edge
3	Incorrectly aligned sprockets (gaps between sprocket and straight edge)		

7.8.2.1 Gear Motor Sprocket

Follow the steps below to remove gear motor sprocket. Refer to the figure below.

1. Remove rear panel (see page [→ 52]).
2. Remove chain guard (see page [→ 57]).
3. Remove bearing support plate (see page [→ 58]).
4. Remove chain (see page [→ 59]).
5. Loosen the set screw.

6. Apply small amount of oil to shaft.
7. Pull sprocket from gear motor shaft. (Gear motor shaft key may be loose and could fall out. Take care not to lose the key.)

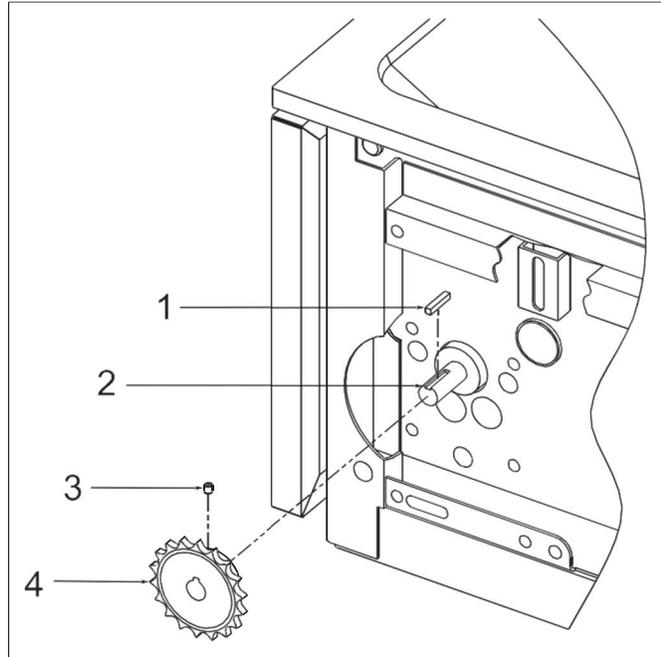


Fig. 38: Gear Motor Sprocket Assembly

1	Gear motor shaft key	2	Gear motor shaft
3	Set screw	4	Gear motor sprocket

To reinstall, follow the steps below.

1. Make sure key is in shaft keyway.
2. Align sprocket with key and slide it onto the shaft.
3. Tighten set screw over key.
4. Install chain (see page [→ 67]).
5. Install bearing support plate if necessary (see page [→ 58]).
6. Install chain guard (see page [→ 57]).
7. Install rear panel (see page [→ 52]).



HINT

When reinstalling, do not tighten idler sprocket completely. The idler sprocket must be loose to adjust chain tension.

7.8.2.2 Idler Sprocket

Follow the steps below to remove the idler sprocket. Refer to the figure below.

1. Remove rear panel (see page [→ 52]).
2. Remove chain guard (see page [→ 57]).
3. Remove chain (see page [→ 59]).
4. Loosen the shoulder bolt.
5. Remove shoulder bolt. This will release the idler sprocket, spacer, and threaded insert.



HINT

When replacing the idler sprocket, the threaded insert may need to be held in place with a flat screwdriver.

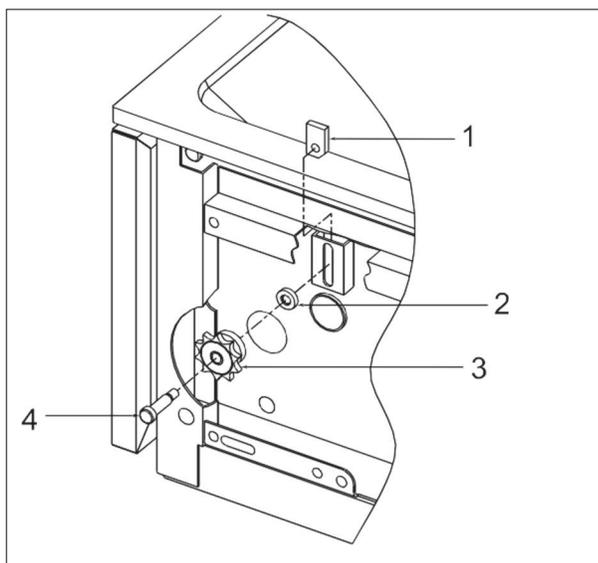


Fig. 39: Idler Sprocket Assembly

1	Threaded insert	2	Spacer
3	Idler sprocket	4	Shoulder bolt

To install, reverse procedure. Ensure sprockets are aligned properly (see page [→ 63]).



HINT

When reinstalling, do not tighten idler sprocket completely. Idler sprocket must be loose to adjust chain tension.

7.8.2.3 Link and Helix Sprocket

Follow the steps below to replace the link or helix sprocket. Refer to the figure below.

1. Remove rear panel (see page [→ 52]), chain guard (see page [→ 57]), bearing support plate (see page [→ 58]), and chain (see page [→ 67]).
2. Loosen the set screw and remove sprocket from shaft.
3. Inspect shaft and key for signs of wear. Replace the key and/or shaft if any looseness is noticed.
4. Inspect the set screw and key for each sprocket. Replace it if there are any signs of damage.
5. Align sprocket key slot with shaft key and install sprocket.
6. Align sprockets, using straight edge.
7. Tighten set screws.
8. Install chain (see page [→ 67]), bearing support plate (see page [→ 58]), chain guard (see page [→ 57]), and rear panel (see page [→ 52]).

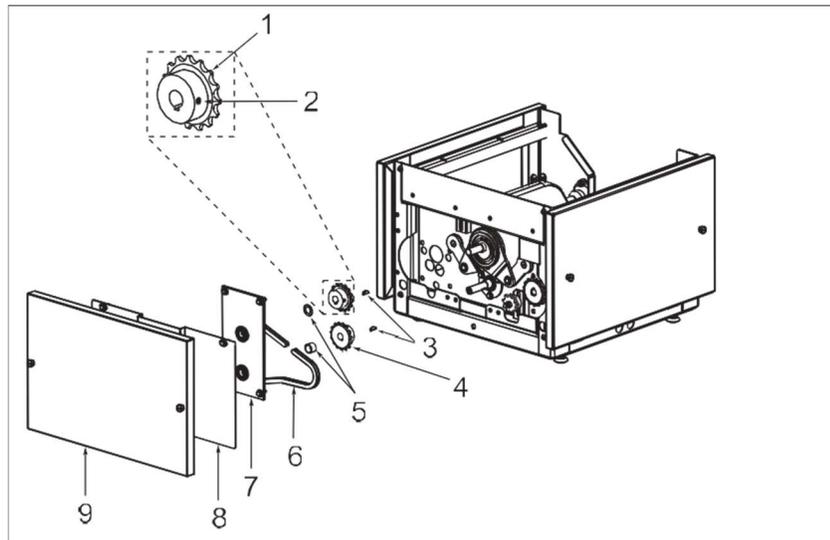


Fig. 40: Link and Helix Sprocket Removal

1	Link sprocket	2	Key
3	Set screws	4	Helix sprocket
5	Spacers (number of spacers varies per feeder model)	6	Chain
7	Bearing support plate	8	Chain guard
9	Rear panel		



HINT

When reinstalling, do not tighten idler sprocket completely. Idler sprocket must be loose to adjust chain tension.

7.8.3 Chain Installation / Adjustment

Follow the steps below to install chain or make adjustments to the chain.

1. Inspect chain for wear and/or damage. Replace chain as necessary.
2. Thread chain over proper sprockets.
3. Replace the master link and clip, leaving slack in chain
4. Install bearing support plate if removed (see page [→ 58]).
5. Adjust chain tension by moving idler sprocket. The chain should deflect about .25 inches (6.35mm) at the points shown in the figures below.
6. Tighten idler sprocket.
7. Install chain guard (see page [→ 57]), and rear panel (see page [→ 52]).



HINT

Chain may need to have a few links removed to obtain proper length.



HINT

Paint master link clip a bright color prior to installing it. This will help to locate it in the future. Always use a new clip when re-assembling chain.



CAUTION

Make sure clip is completely seated on master link pins.

If clip comes off, chain may come apart, possibly causing damage to machine and loss of product caused by machine malfunction.

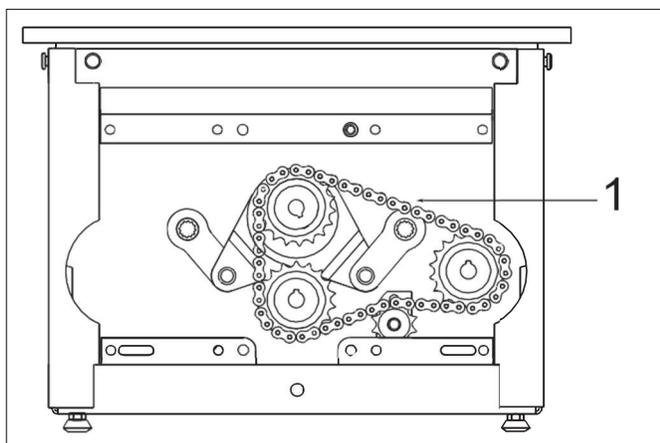


Fig. 41: 300 & 600 Chain Deflection Single Drive

1	Check the chain deflection here
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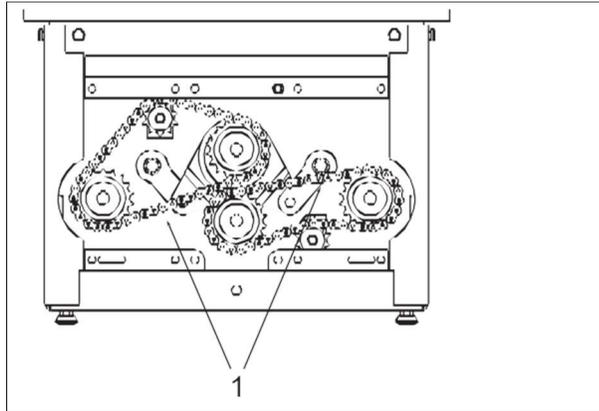


Fig. 42: 300 & 600 Chain Deflection Dual Drive

1	Check chain deflection here
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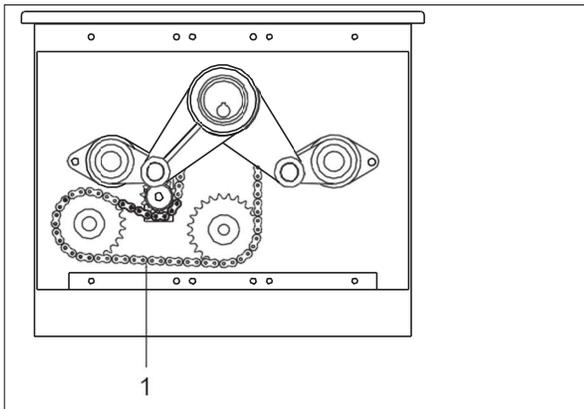


Fig. 43: 900 Chain Deflection Single Drive

1	Check chain deflection here
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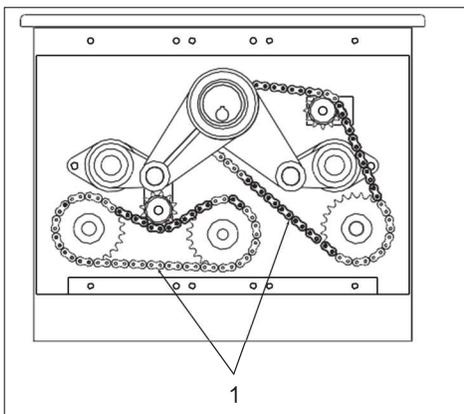


Fig. 44: 900 Chain Deflection Dual Drive

1	Check chain deflection here
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7.9 Removing Link Assembly



DANGER

Moving feeder parts.

There is risk of crushing, cutting or other bodily injuries if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
- Ensure that the feeder is protected from inadvertent restart.
 1. Switch off the feeder.
 2. Wait until all energy stores are discharged.
 3. Cut the power to the feeder from all sources.

Located at the rear of the feeder is the link assembly which activates the agitation paddles. The link assembly must be disassembled for most maintenance to drive systems or when installing a different eccentric.



HINT

During disassembly, be sure to not change the location of spacers on the link assembly shaft. When reassembling the link assembly, the spacers must be placed in the same location or the drive chain will not be properly aligned.

To disassemble or remove the link assembly, follow the steps below. Refer to the figure below.

1. Remove rear panel (see page [→ 52]).
2. Remove chain guard (see page [→ 57]).
3. Remove bearing support plate (see page [→ 58]).
4. Remove chain (see page [→ 59]).
5. Remove the two retaining clips that hold the link assembly to paddle shaft levers.
6. Remove link sprocket as described on page [→ 66] (300/600 feeders only).
7. Pull link assembly with shaft attached off paddle shaft levers (300/600 feeders only). The 900 feeder link assembly shaft will usually remain fixed in the feeder frame, but can be removed by prying behind the link assembly sprocket.

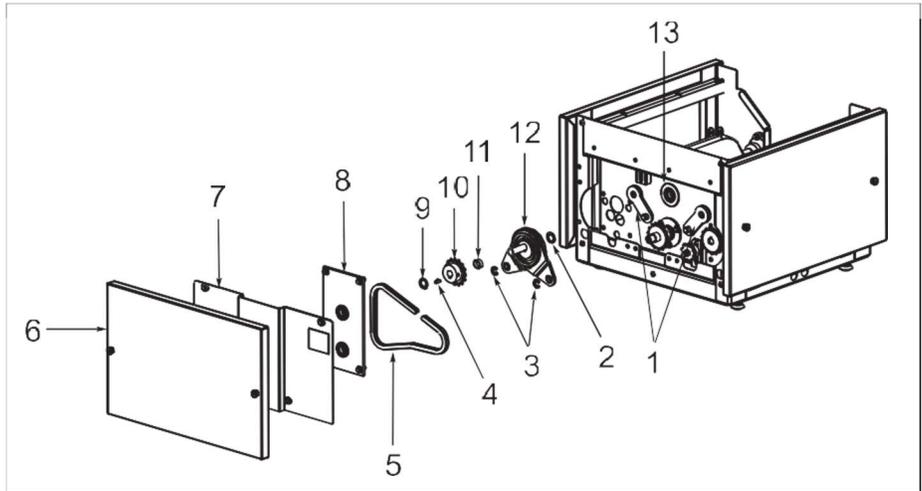


Fig. 45: 300 & 600 Link Assembly Removal

1	Paddle shaft levers	2	Spacer
3	Link/lever retaining clips	4	Key
5	Chain	6	Rear panel
7	Chain guard	8	Bearing support plate
9	Spacer	10	Link sprocket with set screw
11	Spacer	12	Link assembly
13	Ball bearing		

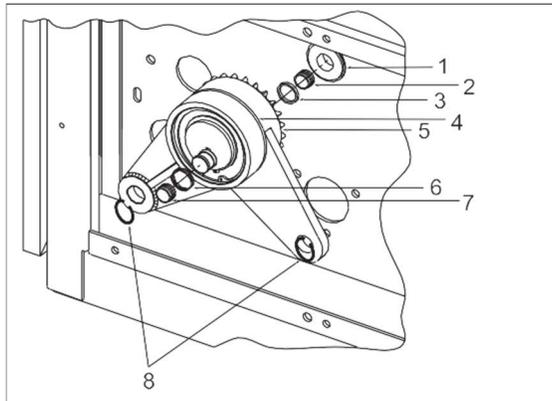


Fig. 46: 900 Link Assembly Removal

1	Ball bearing	2	Tolerance ring
3	Spacer	4	Link assembly
5	Link assembly sprocket	6	Spacer
7	Tolerance ring	8	Retaining clips

To install the link assembly, follow the steps below.

1. Inspect ball bearings in feeder frame and bearing support plate. If any play is evident in the inner race, replace the bearings.
2. Install new tolerance rings on shaft (900 feeder only, see figure above).
3. Reassemble link assembly by placing link assembly sprocket, relevant spacers, and slide link assembly with shaft attached through bearing.
4. Align holes in link assembly to slide over pins on paddle shaft levers and install new retaining clips.
5. Install link sprocket as described on page [→ 66] (300/600 feeders only).
6. Reinstall chain, leaving slack in the chain.
7. Install bearing support plate (see page [→ 58]).
8. Adjust chain tension as described on page [→ 59].
9. Install chain guard (see page [→ 57]) and rear panel (see page [→ 52]).

7.10 Replacing Eccentrics

Changing eccentrics may increase or decrease agitation of the vinyl hopper.

DANGER

Moving feeder parts.

There is risk of crushing, cutting and other bodily injury if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
 - Ensure that the feeder is protected from inadvertent restart.
1. Switch off the feeder.
 2. Wait until all energy stores are discharged.
 3. Cut the power to the feeder from all sources.



HINT

Changing the eccentric in a 300 or 600 feeder requires an arbor press. Changing the eccentric in a 900 feeder requires special tools (e.g., bearing separator, 2-jaw style external jaw puller-potentially with modified jaws, or a combination thereof). As an option, the link assembly with (new) eccentric installed may be purchased from Schenck AccuRate. For more information about types of eccentrics available, contact Schenck AccuRate.



7.10.1 300 and 600 Eccentric Replacement

Follow the steps below to change the eccentrics for the 300 and 600 feeders. Refer to the figure below.

1. Remove rear panel (see page [→ 52]), chain guard (see page [→ 57]), bearing support plate (see page [→ 58]), chain (see page [→ 59]), and link sprocket (see page [→ 66]).
2. Remove the link assembly (see page [→ 69]).
3. Remove the eccentric retaining clip.
4. Press eccentric, including shaft, from link assembly.
5. Loosen set screw in eccentric and remove eccentric shaft from eccentric. Note the position of the eccentric relative to the shaft for reinstalling.
6. Install eccentric shaft in new eccentric and tighten set screw.

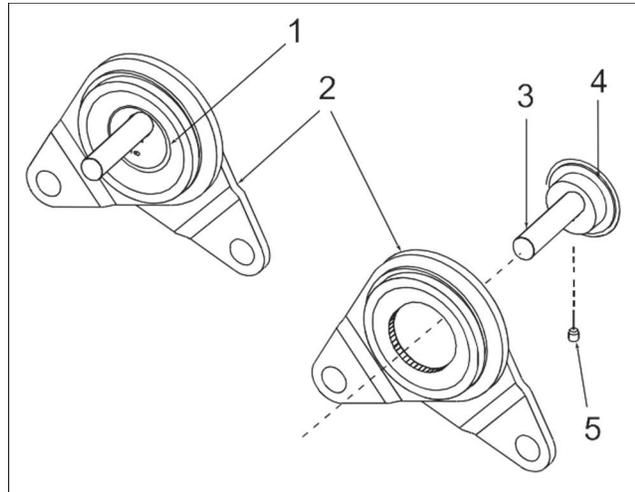


Fig. 47: 300 & 600 Eccentric Replacement

1	Eccentric retaining clip	2	Link assembly
3	Eccentric shaft	4	Eccentric
5	Set screw		

To install, reverse procedure.

7.10.2 900 Eccentric Replacement

Follow the steps below to change the eccentrics for the 900 feeder. Refer to the figures below.

1. Remove rear panel (see page [→ 52]), chain guard (see page [→ 57]), bearing support plate (see page [→ 58]), and chain (see page [→ 59]).
2. Remove the link assembly (see page [→ 69]). The shaft (with sprocket) will usually stay fixed in the feeder frame.
3. Remove the two retaining clips that secure the eccentric to levers. See the figure below.
4. At this point, one of the levers must be pulled from the assembly as indicated in the figure below. This should be done using appropriate tools (see note on page [→ 71]).

5. The eccentric may then be pressed through the remaining lever with an arbor press.
6. Install new eccentric in one lever using the arbor press and install snap ring.

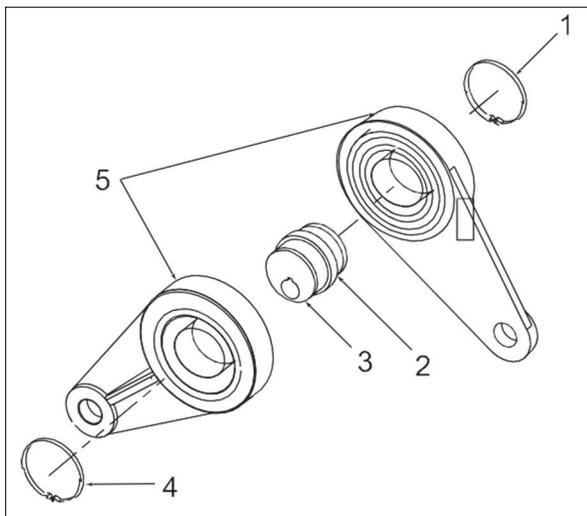


Fig. 48: 900 Eccentric Installation

1	Retaining clip	2	Eccentric shoulder
3	Eccentric	4	Retaining clip
5	Levers		



CAUTION

A shoulder on the eccentric does not allow the eccentric to be pressed through both levers.

The levers must be separated as indicated in the figure below.

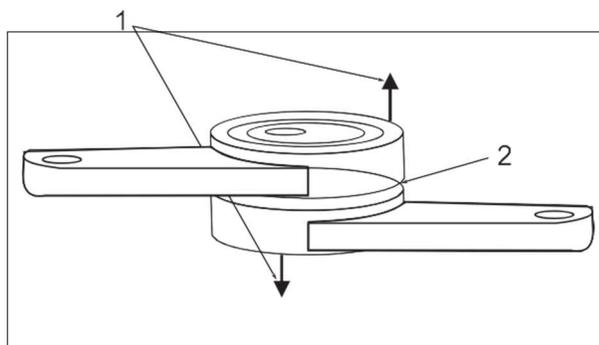


Fig. 49: Lever Separation for 900 Feeder

1	Direction of separation	2	Point of separation
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To install, reverse procedure.

7.11 Removing Agitation Paddles



DANGER

Moving feeder parts.

There is risk of crushing, cutting and other bodily injuries if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
 - Ensure that the feeder is protected from inadvertent restart.
- 1. Switch off the feeder.
- 2. Wait until all energy stores are discharged.
- 3. Cut the power to the feeder from all sources.

7.11.1 300 and 600 Agitation Paddle Removal

Follow the steps below to remove agitation paddles on the 300 and 600 feeders. Refer to the figures below.

1. Remove material from feed hopper.
2. Remove front, rear and side panels (see page [→ 52]).
3. Remove helix and nozzle. See page [→ 53].
4. Remove hopper. See page [→ 55].
5. Remove chain guard (see page [→ 57]) and bearing support plate (see page [→ 58]).
6. Remove chain (see page [→ 59]).
7. Remove link sprocket and assembly (see page [→ 69] and page [→ 66]).
8. Mark orientation of paddle ends to lever assemblies. Right and left paddles are not the same. Each paddle has an “R” or an “L” on the back. This refers to the right or left as you face the feeder from the nozzle side.
9. Remove lever assemblies by removing e-clips on inside of feeder frame.
10. Slide paddle toward rear bearing until shaft clears front bearing and remove paddle assembly.
11. Remove second paddle in the same fashion.

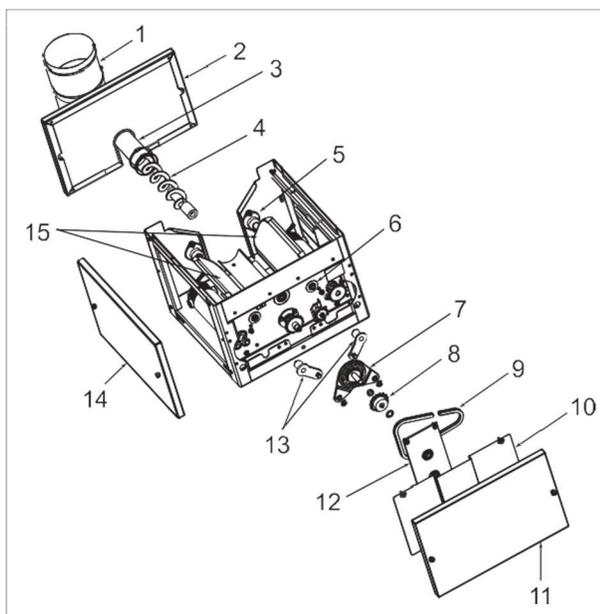


Fig. 50: 300 and 600 Agitation Paddles Disassembly

1	Flexible connector at nozzle discharge	2	Front panel
3	Nozzle	4	Helix
5	Front bearing (2)	6	Back bearing (2)
7	Link assembly	8	Link sprocket
9	Chain	10	Chain guard
11	Rear panel	12	Bearing support plate
13	Lever assemblies	14	Side panel (2)
15	Agitation paddle assemblies		

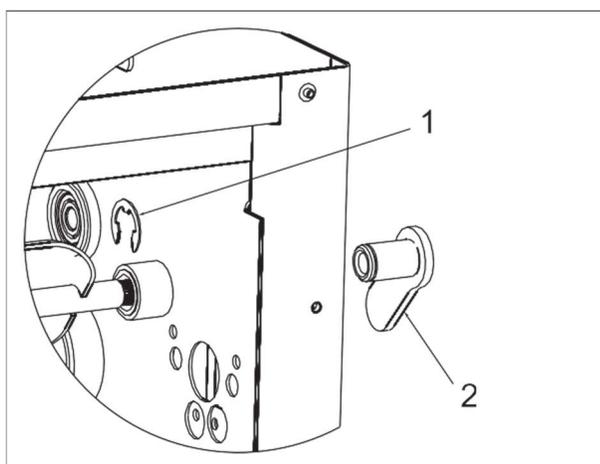


Fig. 51: 300 and 600 Lever Assembly Removal

1	E-clip	2	Lever assembly
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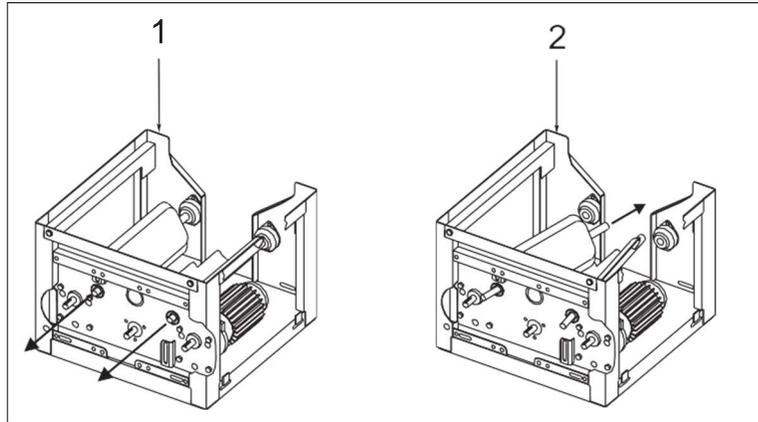


Fig. 52: 300 and 600 Agitation Paddle Removal

1	Slide paddles toward rear of feeder	2	Once paddles clear front bearing, slide toward the front
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To install agitation paddles for 300 and 600 feeders, follow the steps below.

1. Slide proper paddle through opening of rear bearing. Position front of paddle shaft in front bearing. Position second paddle in similar fashion.
2. Install lever assemblies on the paddle shaft ends. Make sure marks on levers align with those on shafts.
3. Install link assembly and sprocket (see page [→ 69] and page [→ 66]).
4. Install chain, leaving slack in the chain (see page [→ 67]).
5. Install bearing support plate (see page [→ 58]).
6. Adjust chain tension (see page [→ 67]).
7. Install chain guard (see page [→ 57]).
8. Install hopper (see page [→ 55]).
9. Install helix and nozzle (see page [→ 53]).
10. Install front, side, and rear panels (see page [→ 52]).



CAUTION

Paddles must be properly aligned or damage may result.

If paddles are not aligned properly, they may hit motors causing damage to paddles and/or motors.

7.11.2 900 Agitation Paddle Removal

Follow the steps below to remove agitation paddles on the 900 feeder. Refer to the figure below.

1. Remove material from feed hopper.
2. Remove front, rear and side panels (see page [→ 52]).
3. Remove helix and nozzle (see page [→ 53]).
4. Remove hopper (see page [→ 55]).

5. Remove chain guard (see page [→ 57]) and bearing support plate (see page [→ 58]).
6. Loosen the locking bearing nut on the rear of the paddle shaft and remove the locking bearing.
7. Slide the paddle toward the rear of the feeder until the front of the shaft clears the front bearing. The paddle can now be lifted out. See the figure below.



HINT

The paddles are different on the right and left sides.

Note which paddle came off each side, so that it can be replaced in the proper location.

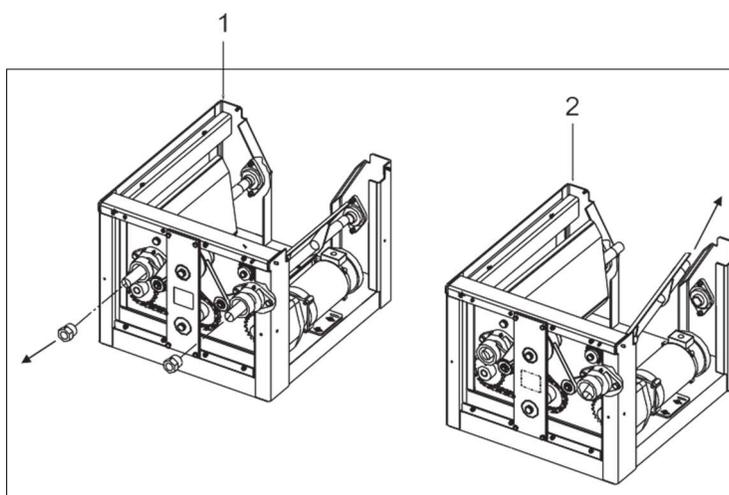


Fig. 53: 900 Agitation Paddle Removal

<p>1 Remove the locking bearings and slide the paddles to the rear.</p>	<p>2 Once paddles clear front bearings, lift the front of paddles and slide them forward.</p>
---	---

To install the agitation paddles for the 900, follow the steps below.

1. Slide the proper paddle through the rear bearing and the lever until the front of the paddle shaft clears the front bearing.
2. Slide the front of the shaft into the front bearing. Do not tighten the bearing set screws.
3. Slide the locking bearing on the paddle shaft and into the lever.
4. Line up the alignment mark on the end of the paddle shaft with the holes on the lever. See the figure below.
5. Tighten the locking bearing nut to 175 ft-lbs.
6. Install bearing support plate (see page [→ 58]) and chain guard (see page [→ 57]).
7. Install hopper (see page [→ 55]).
8. Install helix and nozzle (see page [→ 53]).
9. Install front, rear, and side panels (see page [→ 52]).



CAUTION

The paddles must be properly aligned or damage may result.

If the paddles are not aligned properly, they may hit the motors causing damage to the paddles and/or the motors. If you have any questions with paddle alignment, contact Schenck AccuRate.

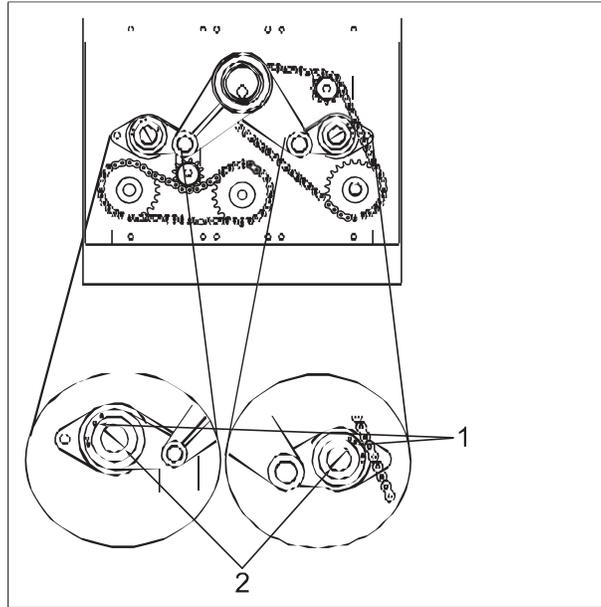


Fig. 54: 900 Paddle Alignment

1	Mark on paddle shaft	2	Hole on lever for 900 feeder
---	----------------------	---	------------------------------

7.12 Replacing Gear Motor

The gear motor brushes are the only motor service parts available for the gear motor. If a problem (other than worn brushes) should arise with a gear motor, it must be replaced. For details on a replacement gear motor, contact Schenck AccuRate.

DANGER

Moving feeder parts.

There is risk of crushing, cutting and other bodily injuries if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
- Ensure that the feeder is protected from inadvertent restart.
 1. Switch off the feeder.
 2. Wait until all energy stores are discharged.
 3. Cut the power to the feeder from all sources.



7.12.1 Gear Motor Removal

Follow the steps below to remove gear motor. Refer to the figure below.

1. Empty feed hopper.
2. Remove front, rear and side panel (next to motor). See page [→ 52].
3. Remove the helix and nozzle (see page [→ 53]).
4. If gear motor mounting bolts are difficult to access, remove the feed hopper (see page [→ 55]).
5. Remove chain guard (see page [→ 57]).
6. To gain access to the chain master link, it may be necessary to remove the bearing support plate (see page [→ 58]).
7. Remove chain (see page [→ 59]).
8. Remove gear motor sprocket from gear motor shaft (see page [→ 63]).
9. Disconnect gear motor power cord from the junction box. The junction box is located on the feeder frame. Remove screws from top of box. Disconnect motor power cable from terminal strip. Slide cable out of junction box.
10. Remove the bolts securing the gear motor to the back of the feeder frame.
11. Slide gear motor forward until shaft clears hole in feeder frame. The paddle next to the gear motor and front paddle bearing may have to be removed if it interferes with the motor removal. Simply remove the mounting bolts (see page [→ 74]).
12. Remove gear motor from frame.

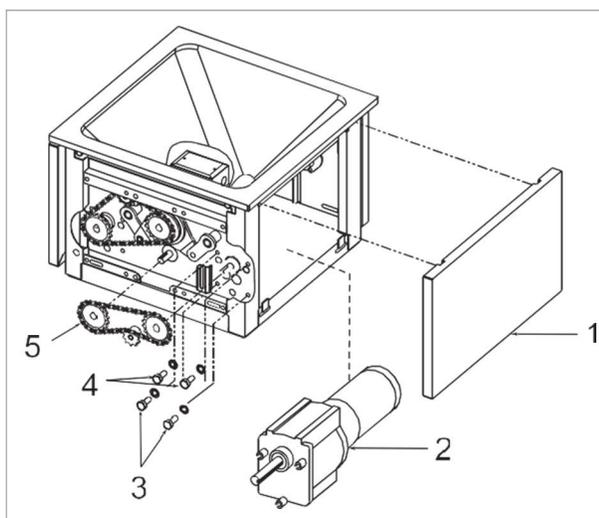


Fig. 55: Gear Motor Removal

1	Side panel	2	Gear motor
3	Lower gear motor mounting bolts	4	Upper gear motor mounting bolts
5	Chain and sprockets		

To install, reverse procedure.

7.12.2 Gear Motor Brush Replacement

The gear motor brushes may need to be replaced due to normal wear. (DC motors only.) Follow the steps below to replace the gear motor brush. Refer to the figure below.

1. Empty material from hopper.
2. Remove hopper to gain access to gear motor (see page [→ 55]).
3. Remove cap and plug with a large screwdriver.
4. Remove and replace brush.

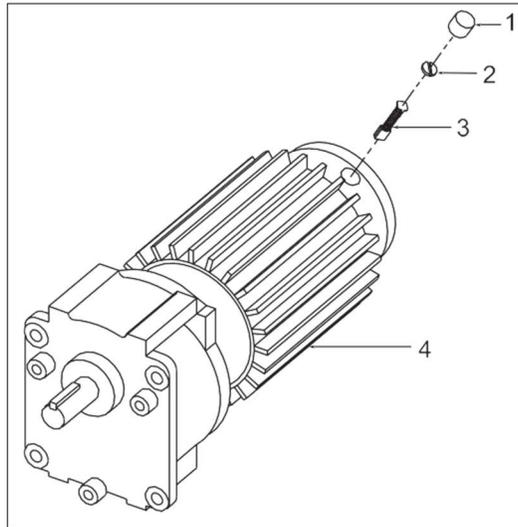


Fig. 56: Gear Motor Brushes

1	Cap	2	Plug
3	Gear motor brush	4	Gear motor

To install, reverse procedure.

7.13 Lubrication



DANGER

Moving feeder parts.

There is risk of cutting, crushing and other bodily injuries if you come into contact with moving components.

- Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.
- Ensure that the feeder is protected from inadvertent restart.

1. Switch off the feeder.
2. Wait until all energy stores are discharged.
3. Cut the power to the feeder from all sources.

Lubrication is important in keeping your feeder running smoothly. Refer to page [→ 51] for lubrication schedule.

Follow the steps below to lubricate chain.

1. Remove rear panel (see page [→ 52]) and chain guard (see page [→ 57]).
2. Lightly oil entire chain.
3. Install chain guard and rear panel.

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8 Cleaning and Sanitizing



DANGER

Electrical shock from live components.

There is danger to life from electrical shock.

– The use of water and/or cleaning solutions increases the risk of electrical shock.

1. All electrical contact must be securely disconnected before cleaning.

If your feeder is used in a food or dairy application, it must be cleaned and sanitized regularly. Frequency of cleaning and sanitizing depends on product and local laws and regulations.



HINT

Contact your local health inspector for specific laws and regulations for you area and process.

A typical cleaning and sanitizing procedure is usually done in the following order.

1. Rinsing – Remove any product residual.
2. Cleaning – Use a detergent solution to clean all surfaces of the feeder.
3. Sanitizing – Use a sanitizing solution to sanitize feeder.

8.1 Rinsing

Rinsing is performed to remove any product residual. Use water to completely remove any product that may have built up in the hopper, or exterior of the unit. The entire feeder can be sprayed with water from any direction with a low pressure system (less than 10 psi). Water temperature should not exceed 180°F (82°C).



HINT

Dry as required.

8.2 Cleaning

To clean your feeder, remove helix, nozzle, and hopper as described in the Maintenance chapter.

- The hopper, helix and nozzle must be cleaned with only mild soap and water. Limited use of mineral spirits is approved.
- If your feeder is a 312, 314, 612, 614, 912 or 914 model, the seals must be removed from the quill and cleaned. If seals show signs of wear, replace them. See the figure below.
- Wipe down remainder of the feeder with cleaning solution.



HINT

When the cleaning procedure is completed, a second rinse must be performed to remove all detergent solution.

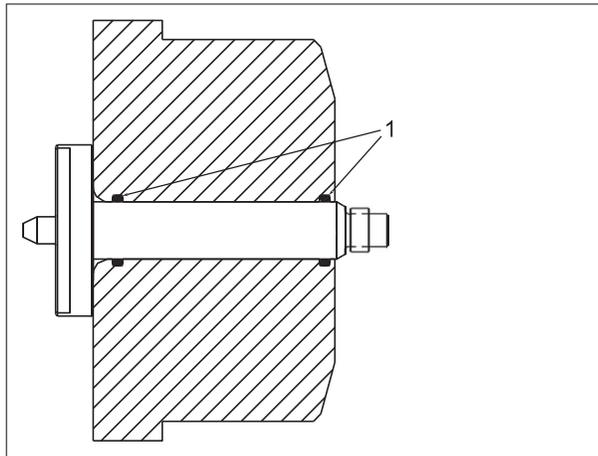


Fig. 57: Quill and Drive Shaft Seals

1	Seals (312, 314, 612, 614, 912 & 914 standard models only)
---	--

8.3 Sanitizing

While unit is disassembled, sanitize all parts using an approved sanitizing solution. Contact your local health authority for information on suitable sanitizing agents.



NOTICE

Sanitizing agents may be corrosive to feeder components.

Sanitizing agents may be corrosive to hopper and/or seals. Select a sanitizing agent that is compatible with these materials. Limit exposure of these items to reduce effect agents may have.

9 Troubleshooting

This is a guide to check problems that might arise under normal operation. Consult this manual for instructions regarding the action to be taken.

DANGER

Moving feeder parts.

There is risk of crushing, cutting or other bodily injuries if you come into contact with moving components.



– Ensure that all sources of power to the feeder have been cut before performing work of any kind on the feeder.

– Ensure that the feeder is protected from inadvertent restart.

1. Switch off the feeder.
2. Wait until all energy stores are discharged.
3. Cut the power to the feeder from all sources.

Problem	Cause	Solution
Feeder doesn't run	Blown fuse – AC line	Replace the fuse
	Poor wiring connections of amphenols or terminal block	Tighten connections & re-solder leads if necessary.
	Incorrect wiring	Check schematic & rewire if necessary.
	Improper analog input	Correct source signal.
Feeder runs, but not correctly	Runs backwards	Switch motor armature leads at the terminal block or motor
	Motor surges	AC line voltage varies – install line conditioner.
		DC output voltage too high, 10% adjust max trimpot. (Contact Schenck AccuRate for assistance.)
Motor brushes are bad – replace.		
Feeder stalls	Flow restrictions	Remove restrictions from nozzle adapter.
	Helix and nozzle not flush at the discharge end	Reposition the helix and the nozzle until they are flush.
	Foreign objects lodged in helix	Turn off power and remove the foreign objects then restart the feeder.

Problem	Cause	Solution
	Pellets jammed in helix	Increase the nozzle diameter or decrease the helix diameter to provide more clearance and eliminate the pinch point. (Contact Schenck AccuRate for assistance.)
	Product buildup inside the nozzle	Review helix and nozzle combination for your application, change if needed. (Contact Schenck AccuRate for assistance.)

10 Data

10.1 Technical Data

Sound Pressure:

The continuous sound pressure levels are lower or equal then 70dB(A).

10.2 Conversion Table

METRIC	US UNITS	US UNITS	METRIC
Weight (basic unit is gram-g)			
1 gram	.03527 oz	1 oz	28.4 g
1 kg	2.205 lbs	1 lb	.454 kg
1 kg	35.3 ozs	1 oz	.028 kg
1 Metric Ton	2204.6 lbs		
Length (basic unit is meter-m)			
1 m	3.281 ft	1 ft	.305 m
1 m	1.094 yds	1 yard	.914 m
1 cm	.393 ins	1 inch	2.54 cm
1 mm	.039 ins	1 inch	25.4 mm
Capacity (basic unit is liter-l)			
1 l	61.023 cu ins	1.057 quarts	1 liter
1 l	.03531 cu ft	1 cu ft	28.321
Force/Stress (basic unit is pascal = 1 Newton (N)/square meter)			
1 N	.225 lbs	1 lb	4.448 N
1 Nm	8.85 lb ins	1 lb in	.113 Nm
1 Nm	.738 lb ft	1 lb ft	1.355 Nm



HINT

Multiply cubic feet x 28.32 to calculate liters. Multiply liters x 0.03531 to calculate cubic feet.

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weighing

feeding

screening

automation

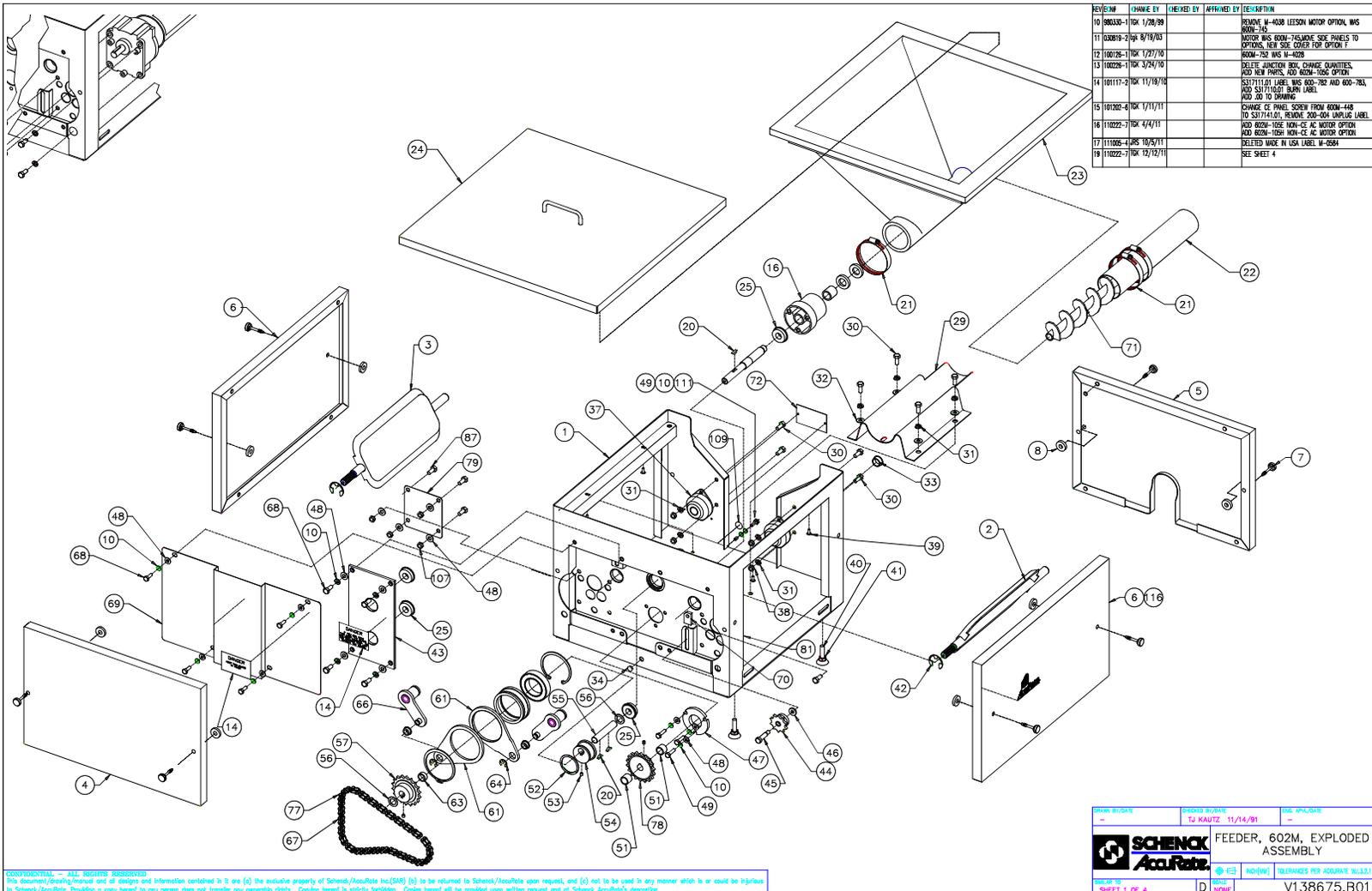


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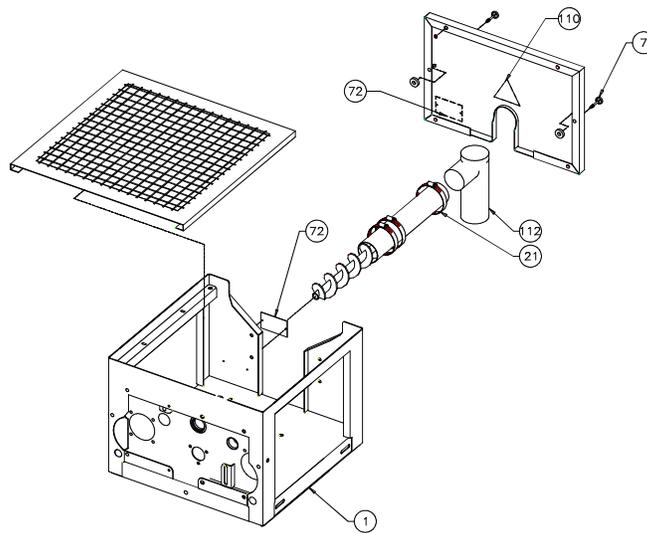


REV/ENR	CHANGE BY	HECKED BY	APPROVED BY	DESCRIPTION
10	080330-1	TK	1/28/09	REMOVE M-4038 LEISSON MOTOR OPTION, WAS BORN-745
11	030919-2	TK	8/18/03	MOTOR WAS BORN-745, MOVE SIDE PANELS TO OPTIONS, NEW SIDE COVER FOR OPTION F
12	100126-1	TK	1/27/10	BORN-742 WAS M-4038
13	100226-1	TK	3/24/10	DELETE JUNCTION BOX, CHANGE QUANTITIES, ADD NEW PARTS, ADD BORN-1000 OPTION
14	101117-2	TK	11/18/10	SS1711.01 LABEL WAS BORN-702 AND BORN-703, ADD SS1711.01 LABEL
15	101202-4	TK	1/11/11	CHANGE CE PANEL SCREW FROM BORN-448 TO SS17141.01, REMOVE 200-004 W/PLUG LABEL
16	110222-7	TK	4/4/11	ADD BORN-1000 NON-AC MOTOR OPTION, ADD BORN-1000 NON-AC MOTOR OPTION
17	111005-4	AS	10/5/11	DELETED MADE IN USA LABEL, W-0584
19	110222-7	TK	12/12/11	SEE SHEET 4

DESIGN BY/DATE	ORDER BY/DATE	REV. BY/DATE
-	TK/MATZ 11/14/01	-
SCHENCK AccuRate		
FEEDER, 602M, EXPLODED ASSEMBLY		
SCALE TO	NO. OF SHEETS	TOLERANCES PER ACCURATE M.I.S.I.
SHEET 1 OF 4	D NONE	V138675.B01

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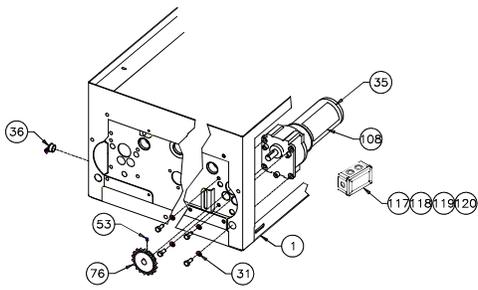
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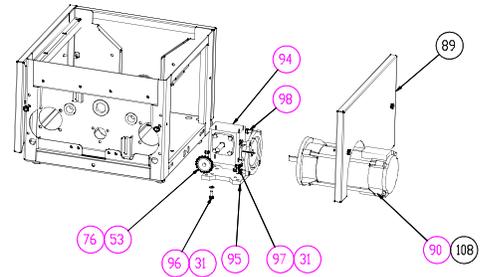
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	<small>NO DIMENSIONS PER ACCURATE 61121</small>
<small>DELIVER TO</small> SHEET 2 OF 4	<small>SCALE</small> NONE
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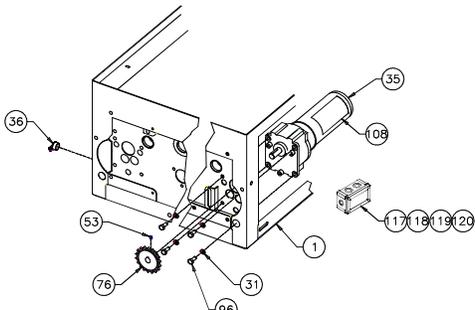
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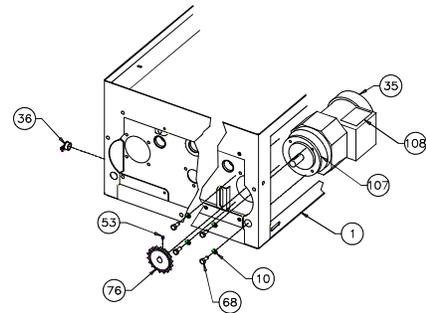
OPTION A



OPTION G



OPTION D



OPTION E
OPTION F
OPTION H

PART NUMBER	PART NUMBER	MOTOR OPTION
602M-105A	V138675.B01	.25HP 90VDC
602M-105D	V138677.B01	.25HP 90VDC (CE)
602M-105E	V523603.B01	1/2HP 230VAC/3/50
602M-105F	V138678.B01	1/2HP 230VAC/3/50 (CE)
602M-105G	V138679.B01	RIGHT ANGLE DRIVE
602M-105H	V523604.B01	1/2HP 230VAC/3/60

DESIGN BY/DATE	DESIGNED BY/DATE	DATE APPROVED
-	TU KAUTZ 11/14/91	-
		FEEDER, 602M, EXPLODED ASSEMBLY
DRAWN BY	SCALE	TOLERANCES PER ACCURATE 9.1.11
SHEET 3 OF 4	D NONE	V138675.B01

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ITEM	QTY	PART #	DESCRIPTION
GENERAL PARTS, 602-105-M[V138680.B01]			
2	1	602-268	V138658.B01 AGITATOR, LEFT SIDE
3	1	602-267	V138657.B01 AGITATOR, RIGHT SIDE
4	1	600-770	V138462.B01 PANEL, FEEDER, REAR
5	1	600-771	V138464.B01 PANEL, FEEDER, FRONT
8	8	M-3128	V154539.B01 WASHER, .61 OD, RETAINER, BLACK NYLON
9	1	M-1090	V154168.B01 .25 LOCKWASHER, INTERNAL TOOTH
11	1		
13	1		
15	1		
16	1		QUILL, PER SALES ORDER
17	1		
18	1		
19	1		
20	3	M-1505	V154285.B01 KEY, HIPRO, SAE 1035
22	1		ADAPTER, NOZZLE
23	1		HOPPER, PER SALES ORDER
24	1	602M-054	V138635.B01 COVER ASSEMBLY
25	4	M-1501	V154281.B01 BEARING, BALL, 1.375 OD X .625 ID
26	1		
27	1		
28	1		
29	1	600-527	V138401.B01 SADDLE
30	8	M-3245	V154604.B01 SCREW, HEX HEAD, M8X1.25 X 20 LG, SST
32	4	M-1118	V154177.B01 WASHER, FLAT .312 SS
33	5	M-2046	V154471.B01 PLUG, HOLE, .675
34	1	M-3141	V154548.B01 PLUG, HOLE, .6438
36	1	M-2002	V154457.B01 CONNECTOR, ROMEX, .50 PIPE THREAD
37	2	M-1737	V154346.B01 BEARING, BRONZE, .75 ID, TRIANGLE
38	4	M-3198	V154581.B01 NUT, HEX, M8X1.25, SST
39	6	M-3186	V154573.B01 SCREW,TRUSS HEAD, M5X0.8 X 16 LG, SST
40	4	M-3210	V154587.B01 LEVELING GLIDE, M10X1.5 X 35 LG
41	4	M-3199	V154582.B01 NUT, HEX, M10X1.5, SST
42	2	M-1508	V154287.B01 RING, RETAINING, EXTERNAL, SHAFT #1.00
43	1	600-760	V138456.B01 SUPPORT, OUTER BEARING
44	1	602M-037	V138670.B01 IDLER SPROCKET ASSEMBLY
45	1	M-3204	V154583.B01 BOLT, SHOULDER, 10mm X 25 LG
46	1	M-3148	V154532.B01 SHAFT, MACHINED
47	1	600-946	V138527.B01 RING, BEARING
48	15	M-1089	V154167.B01 WASHER, FLAT,.25 SST
49	1		
50	1		
51	1	600-045	V138300.B01 SPACER
52	1	M-1502	V154282.B01 RING,RETAINING,EXTERNAL, #1.750 SHAFT
53	4	M-3190	V154575.B01 SCREW,SET, M6X1 X 6 LG, CUP POINT
54	1		ECCENTRIC
55	1	600-038	V138933.B01 SHAFT, ECCENTRIC
56	2	600-784	V138475.B01 BUSHING, MACHINERY
57	1		SPROCKET, ECCENTRIC SHAFT, .625 BORE
58	1		
59	1		
60	1		
61	1	602-016	V138619.B01 LINK ASSEMBLY
62	1		
63	1	600-044	V138299.B01 SPACER
64	2	M-2001	V154456.B01 RING,RETAINING,EXTERNAL, #1.500 SHAFT
65	1		
66	2	602-004	V138612.B01 LEVER ASSEMBLY
67	2.25	M-2016	V154465.B01 CHAIN, ROLLER, #41
68	1		
69	1	600-779	V138473.B01 COVER CHAIN
70	1	600M-052	V138539.B01 CLAMP, IDLER
71	1		HELIX
73	1		
74	1		
75	1		
77	1	M-2010	V154462.B01 CONNECTING LINK, 41GH
78	1		SPROCKET, HELIX
81	1	S305311.01	V164068.B01 STRAIN RELIEF,UNIVERSAL,CABLE BUSHING
87	4	M-3193	V154577.B01 SCREW,HEX HEAD, M6X1 X 12 LG,SST
106	1		
107	5	M-3189	V154574.B01 NUT, HEX, M6 X 1, SST
109	1	200-005	V137852.B01 DECAL, GROUND STUD...
111	1	M-3786	V154829.B01 THREADED INSERT, A-X SERIES, GRIP, M6X1

ITEM	QTY	PART #	DESCRIPTION
OPTIONS			
1	1	1	602M-615 V138717.B01 FRAME WELDMENT, DUAL DRIVE
1	1	1	602M-605 V138711.B01 FRAME WELDMENT, EXP PROOF
6	2	1	1 600-773 V138467.B01 PANEL, FEEDER, SIDE
7	8	8	8 600M-448 V138548.B01 THUMB SCREW, M6X1, (NO UNURL)
8	8	8	8 S317141.01 V170839.B01 THUMB SCREW, PANEL, SOCKET HEAD CAP, M6X1 X 30MM LG,SS
10	4	4	16 8 4 16 M-1090 V154168.B01 .25 LOCKWASHER, INTERNAL TOOTH
14	2	2	2 2 200-001 V137843.B01 DECAL, SPROCKET HAZARD
19	2	2	2 200-002 V137850.B01 DECAL, SPROCKET HAZARD, PICTURE ONLY
21	3	4	3 3 3 M-1003 V154148.B01 CLAMP, HOSE
31	12	8	8 16 8 M-1158 V154182.B01 WASHER, LOCK .3125 SS
35	1	1	1 1 1 M-0431 V153962.B01 GEARMOTOR, .25 HP, 60 RPM, 90V
1	1	1	1 600M-752 V138576.B01 GEARMOTOR,60RPM,.25HP,90VDC,INLINE,CSA
1	1	1	1 600M-462 V138593.B01 GEAR REDUCER, RIGHT ANGLE, 60 RPM
1	1	1	1 S317284.01 V170935.B01 GEARMOTOR,SEW,230-400,3/50VAC,0 DEG,MOD
68	8	8	12 8 12 M-3191 V154576.B01 SCREW, HEX HD M6 X 20 DIN 933 SS
72	1	1	1 1 M-0807 V154086.B01 PLATE, SERIAL NUMBER
76	1	1	1 1 600-765 V138459.B01 MOTOR SPROCKET, .625 BORE
1	1	1	1 1 1 600-707 V138429.B01 MOTOR SPROCKET, 20mm BORE
1	1	1	1 1 1 600M-739 V138568.B01 COVER PLATE, SEW MOTOR
80	1	1	1 1 600M-265 V138547.B01 SCREEN, HOPPER
89	1	1	1 1 600-775 V138470.B01 PANEL, LEFT SIDE, RIGHT ANGLE DRIVE
90	1	1	1 1 M-1691 V154333.B01 1/2HP EXP MOTOR
1	1	1	1 1 M-1116 V154175.B01 1/4HP EXP MOTOR
1	1	1	1 1 S303515.03 V163127.B03 MOTOR, .50HP, 90VDC, 56C FACE
94	1	1	1 1 600-462 V138593.B01 GEAR REDUCER, RIGHT ANGLE, 60 RPM
1	1	1	1 1 600-528 V138463.B01 GEAR REDUCER, RIGHT ANGLE, 120 RPM
95	1	1	1 1 M-1813 V154387.B01 BASE, RIGHT ANGLE REDUCER, GRAY
96	1	1	1 1 M-1179 V154189.B01 SCREW, HEX HEAD, .312-18 X .75 LG, SST
97	1	1	1 1 M-3216 V154592.B01 SCREW, HEX HD, M8X1.25X25 LG, SST
98	1	1	1 1 M-1157 V154181.B01 WASHER, LOCK, .375, SS
107	5	4	9 5 4 M-3189 V154574.B01 NUT, HEX M6 X 1 DIN 934 BN628 SS
108	1	1	1 1 600-768 V138460.B01 DECAL, DANGER UNPLUG MOTOR
1	1	1	1 1 S317110.01 V170812.B01 LABEL, BURN HAZARD/HOT SURFACE
110	1	1	1 1 S317111.01 V170813.B01 LABEL, CUTTING OF FINGERS OR HAND/AUGER
112	1	1	1 1 500-850 V138187.B0X DUST ELBOW, W/INL
1	1	1	1 1 500-851 V138189.B0X DUST ELBOW, W/INL, OFFSET
116	1	1	1 1 S313679.01 V168599.B01 PANEL,SIDE,CUTOUT, HELIX SIDE
117	1	1	1 1 S302081.01 V162524.B01 JUNCTION BOX
1	1	1	1 1 S316717.01 V170532.B01 JUNCTION BOX ASSEMBLY
118	2	2	2 2 S307645.01 V165122.B01 STRAIN RELIEF,DOME,M20, BLK, W/O-RING
119	2	2	2 2 S308630.01 V165692.B01 STRAIN RELIEF NUT,M20, BLK
120	2	2	2 2 S305313.01 V164069.B01 SCREW, CHEESE HD, M4X0.7X16MM,SST
121	1	1	1 1 S300039 V161379.B01 CTRL,PWM,N4X,115V,60Hz,SD,90VDC,UL
			S300040 V161380.B01 BOM,CTRL,90VDC,PWM,SD,115V,N-4,UL
			S300041 V161381.B01 CTRL,PWM,N4X,230V,60Hz,SD,90VDC,UL
			S300042 V161382.B01 CTRL,PWM,N4,230V,60Hz,SD,90VDC,UL
			S300043 V161383.B01 CTRL,PWM,N4X,115V,60Hz,AUTO,SD,90VDC,UL
			S300044 V161384.B01 CTRL,PWM,N4,115V,60Hz,AUTO,SD,90VDC,UL
			S300045 V161385.B01 CTRL,PWM,N4X,230V,60Hz,AUTO,SD,90VDC,UL
			S300046 V161386.B01 CTRL,PWM,N4,230V,60Hz,AUTO,SD,90VDC,UL
			S300158 V161478.B01 CTRL,SCR,N4X,220V,50/60Hz,SD,AL,90VDC
			S300159 V161479.B01 CTRL,SCR,N4X,220V,50/60Hz,AUTO,SD,AL,90V
			S300254 V161549.B01 SCR1 CTRL,N4X,110V,50/60Hz,SD,AL,90V
			S300255 V161550.B01 SCR1CTRL,N4X,110V,50/60Hz,AUTO,SD,AL,BOM
			S314162.01 V168932.B01 CONTROL,N1,INT,TPP,110,SD,90DC,BOM
			S314162.01 V168933.B01 CONTROL,N1,REM,TPP,110,SD,90DC,BOM
			S314162.01 V168939.B01 CONTROL,N1,REM,TPP,110,SD,90DC,BOM
			S314167.01 V168940.B01 CONTROL,N1,REM,TPP,220,SD,90DC,BOM
			S314169.01 V168942.B01 CONTROL,N1,REM,TPP,AUTO,110,SD,90DC,BOM
			S314170.01 V168943.B01 CONTROL,N1,REM,TPP,AUTO,220,SD,90DC,L/O
			S317072.01 V170775.B01 CONTROL,SCR1,IP65,230V,SD,90,CE
			S317071.01 V170774.B01 CONTROL,SCR1,IP65,230V,SD,90,CE
			S317084.01 V170787.B01 CONTROL,SER-RX-S2-40-VT-RJ-CE,BOM
			S314084.02 V170787.002 CONTROL,SER-R4-S2-40-VT-RJ-CE,BOM
			S314085.01 V170788.B01 CONTROL,SER-RX-D4-40-VT-RJ-CE,BOM
			S314085.02 V170788.002 CONTROL,SER-R4-D4-40-VT-RJ-CE,BOM

REV	DATE	BY	CHKD	APP'D	DESCRIPTION
19	11/02/21				A. DELETE 16X M-3131 BRIPPERS B. DELETE 2X M-1302 SPS LOADS C. DELETE QUIL 600M-049 D. DELETE 600-010 HOPPER E. QTY 5 PLUG WAS QTY 1 F. M-3186 SCREW WAS M-3211 G. REPLACE LHM PARTS WITH 400-016 H. QTY 235 CHAIN WAS QTY 4 I. ADD 1X S30531.01 RELIEF J. DELETE M-402B MOTOR OPTION K. QTY 5 WAS QTY 0 L. ADD 1X 600-768 DECAL M. QTY 2 WAS QTY 1 N. ADD CONTROLS O. ADD HOPPER/ECCENTRIC CONTROLS TO NOTE 5 P. DELETE NOTE 8 Q. DELETE NOTE 9 R. ADD NOTE 10 S. ADD NOTE 10 T. DELETE M-1344 BEARING U. DELETE 800-001 SHAFT V. DELETE M-3194 BEARING W. ADD S30531.03 MOTOR X. DELETE 8X M-3137 BEARERS Y. DELETE 4X M-3041 SCREWS Z. DELETE M-3018 SADDLE

- NOTE:
- ON ALL L.I.W. FEEDERS (4) VIBRATION ISOLATOR PADS (P/N 2000-006) V137839.B01 WILL REPLACE THE LEVELING GLIDES.
 - USE SILICONE TO PLUG UNUSED HOLES IN BASE.
 - REQUIRED IF ANY FRONT DISCHARGE NOZZLES ARE INCLUDED IN ORDER.
 - REQUIRED IF ANY SIDE DISCHARGE NOZZLES ARE INCLUDED IN ORDER.
 - THE FOLLOWING ARE ITEMS THAT ARE DETERMINED BY THE ORDER FOR PART SELECTION:
 - MOTOR, PER DRIVE REQUIREMENTS
 - SPROCKET COMBINATION
 - HELIX
 - NOZZLE ADAPTOR
 - DUST ELBOW
 - HOPPER
 - HOPPER
 - ECCENTRIC
 - CONTROLS
 - FOR QTY OF CHAIN (ITEM 67) THE UNIT OF MEASURE IS LENGTH IN FEET.
 - THIS MOTOR CANNOT BE USED FOR CE APPLICATIONS.
 - CONTROLS NOT SHOWN

DATE	ORDER BY DATE	DATE
11/14/21	11/14/21	

SCHENCK FEEDER, 602M, EXPLODED
AccuRate ASSEMBLY

RELAY TO SHEET 4 OF 4

SIZE NONE

BUSINESS PER ACCURATE K133

V138675.B01

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Hopper Level Switch



Roto-Bin-Dicator®
Single & Double Switch Models
Installation & Operation Manual

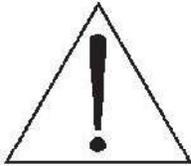


Roto-Bin-Dicator® Single & Double Switch Models Installation & Operation Manual

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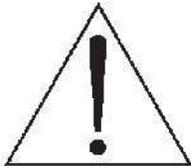
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SAFETY SYMBOLS



WARNING:

IDENTIFIES CONDITIONS OR PROCEDURES, WHICH IF NOT FOLLOWED, COULD RESULT IN SERIOUS INJURY. RISK OF ELECTRICAL SHOCK.



CAUTION:

IDENTIFIES CONDITIONS OR PROCEDURES, WHICH IF NOT FOLLOWED, COULD RESULT IN SERIOUS DAMAGE OR FAILURE OF THE EQUIPMENT.

Roto-Bin-Dicator®

Single & Double Switch Models

I. HANDLING AND STORAGE

SAVE THESE INSTRUCTIONS

INSPECTION AND HANDLING

Do not dispose of the carton or packing materials.

Each package should be inspected upon receipt for damage that may have occurred due to mishandling during shipping. If the unit is received damaged, notify the carrier or the factory for instructions. Failure to do so may void your warranty. If you have any problems or questions, consult the manufacturer Customer Support at 800-778-9242.

DISPOSAL AND RECYCLING

This product can be recycled by specialized companies and must not be disposed of in a municipal collection site. If you do not have the means to dispose of properly, please contact the manufacturer for return and disposal instructions or options.

STORAGE

If the Roto-Bin-Dicator® is not scheduled for immediate installation following delivery, the following steps should be observed:

1. Following inspection, repackage the unit into its original packaging.
2. Select a clean dry site, free of vibration, shock and impact hazards.
3. If storage will be extended longer than 30 days, the unit must be stored at temperatures between 32° and 158°F (0° and 70°C) in non-condensing atmosphere with humidity less than 85%.



CAUTION: DO NOT STORE A NON-POWERED UNIT OUTDOORS FOR A PROLONGED PERIOD.

II. GENERAL SAFETY

AUTHORIZED PERSONNEL

All instructions described in the document must be performed by authorized and qualified service personnel only. Before installing the unit, please read these instructions and familiarize yourself with the requirements and functions of the device. The required personal protective equipment must always be worn when servicing this device.

USE

The device is solely intended for use as described in this manual. Reliable operation is ensured only if the instrument is used according to the specifications described in this document. For safety and warranty reasons, use of accessory equipment not recommended by the manufacturer or modification of this device is explicitly forbidden. All servicing of this equipment must be performed by qualified service personnel only. This device should be mounted in locations where it will not be subject to tampering by unauthorized personnel.

MISUSE

Improper use or installation of this device may cause the following:

- Personal injury or harm
- Application specific hazards such as vessel overfill
- Damage to the device or system

If any questions or problems arise during installation of this equipment, please contact the manufacturer Customer Support at 800-778-9242.

III. PRODUCT DESCRIPTION

Operation centers around the low torque, slow speed synchronous motor. The motor either turns the paddle in the absence of the bulk material, or turns itself to actuate the micro switch when paddle rotation is stopped by the bulk material. Constant power to the stalled motor keeps the switch actuated until the paddle is again free to turn.

TECHNICAL SPECIFICATIONS

FUNCTIONAL	
Operating Power	120 VAC, 240 VAC; 50/60 Hz, 24 VDC
Motor Rating	5 watts max, 1 rpm
Fail-Safe Circuitry	Low level fail safe
Operating Temp	-40° F to 185° F (-40° C to 85° C)
PHYSICAL	
Drive Shaft Assembly	Precision machined shaft with two shielded ball bearings
Shaft Seal	Teflon®/Viton® Lipseal rated 1/2 micron @ 30 psi (2.1 kg/cm ²) @ 400° F (204° C)
Housing and Cover	Dust-tight and weatherproof (NEMA 4X) polyester coated aluminum casting
Mounting Plate	8" outside diameter with 1 1/4" NPT pipe threaded coupling; standard polyester coated mild steel; optional 304 SS
Rigid Shaft and Paddle	Metal parts of all designs are 304 SS
Flex Shaft	Available in neoprene, 155°F (68° C) or silicone, 400° F (204° C) coatings
Shipping Weight	Aluminum housing 10 lbs (4.5 kg) SS housing 16 lbs (7.3 kg)
Pollution Degree	2
Installation Category	II
Altitude	6,562 ft (2000 m)

APPROVALS & RATINGS

UL: General Purpose and Explosion-proof in Hazardous Class 1, Groups C & D, and Class II, Groups E, F & G

CSA: General Purpose and Explosion-proof in Hazardous Class 1, Groups C & D, and Class II, Groups E, F & G

ATEX: Gas and Dust

CE

IV. MECHANICAL INSTALLATION



WARNING: For explosion-proof units in hazardous locations, a seal fitting must be located within 18" of the control. In order to preserve the explosion-proof integrity of the casting, care must be exercised when removing and replacing the cover so no damage is done to the flanges.



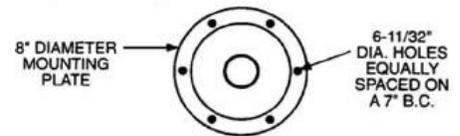
WARNING: For products marked as Type 4 or 4X, use Type 4 or 4X hub fitting.

MOUNTING LOCATION

There must be a free flow of material both to and away from the paddle and shaft. Keep the paddle and shaft out of the direct flow of material. Protective baffles or offset mounting may be required.

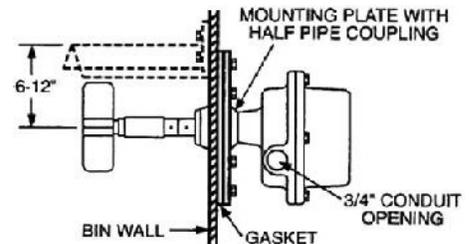
MOUNTING SURFACE PREPARATION

1. On a 7" bolt circle, drill and tap or drill 6 equally spaced holes in the bin wall for 1/4" bolts or cap screws. Bolt heads should be tack welded to the bin inner wall.
2. Cut a 5" diameter hole to pass paddle.
3. If required, fabricate and weld or bolt a protective baffle to the inner wall.



MOUNTING ON SIDE OF BIN

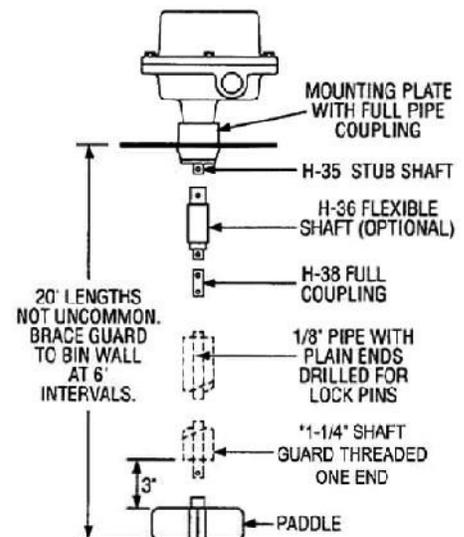
1. Conduit opening must be down or to the left.
2. Assemble gasket between the mounting plate and the bin wall.
3. Use a pair of rubber and steel washers beneath the attaching hardware.



MOUNTING ON TOP OF BIN

1. Cut shaft extension pipe to the required length and drill a 1/8" hole through the pipe 7/16" from each end.
2. Assemble the shaft extension to the H-38 coupling and pin it securely.
3. Cut the pipe guard 5" shorter than the overall extended shaft and paddle length. Thread one end 1 1/4" NPT.
4. Assemble the guard over the extension and screw securely into the mounting plate.
5. Assemble the paddle to the shaft extension and pin it securely.

Note: The shaft extension must be free to turn inside of the shaft guard pipe. Drive all lock pins in flush to lock securely. *Shaft lengths 12" and longer require a shaft guard.



V. ELECTRICAL INSTALLATION



WARNING: REMOVE POWER FROM THE UNIT BEFORE INSTALLING, REMOVING, OR MAKING ADJUSTMENTS.



WARNING: For explosion-proof units in hazardous locations, a seal fitting must be located within 18" of the control. In order to preserve the explosion-proof integrity of the casting, care must be exercised when removing and replacing the cover so no damage is done to the flanges.



WARNING: For products marked as Type 4 or 4X, use Type 4 or 4X hub fitting.

GENERAL SAFETY

When using electrical equipment, you should always follow basic safety precautions, including the following:

- The installation and wiring of this product must comply with all national, federal, state, municipal, and local codes that apply.
- Properly ground the enclosure to an adequate earth ground.
- Do not modify any factory wiring. Connections should only be made to the terminals described in this section.
- All connections must use conductors with an insulation rating of 300V minimum, rated for 221°F (105° C), a minimum flammability rating of VW-1, and be of appropriate gauge for the voltage and current required (see specifications).
- Do not allow moisture to enter the electronics enclosure. Conduit should slope downward from the housing. Install drip loops and seal conduit with silicone rubber product.

DISCONNECT REQUIREMENTS FOR PERMANENTLY INSTALLED EQUIPMENT

A dedicated disconnecting device (circuit breaker) must be provided for the proper installation of the unit. If independent circuits are used for power input and outputs, individual disconnects are required. Disconnects must meet the following requirements:

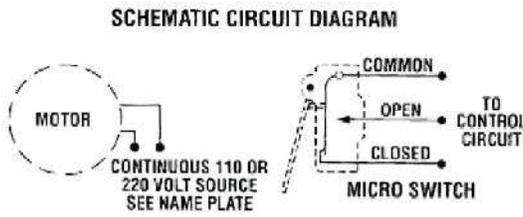
- Located in close proximity to the device
- Easily accessible to the operator
- Appropriately marked as the disconnect for the device and associated circuit
- Sized appropriately to the requirements of the protected circuit (See specifications)

PROTECTIVE EARTH GROUND

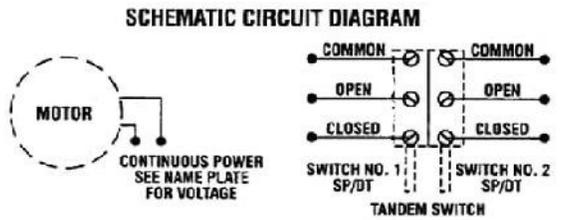
To eliminate shock hazards in the unlikely event of an internal insulation breakdown, the unit is provided with a “protective earth” () lead which must be connected to earth ground. In addition, the input power ground lead must be connected to the “protective earth” () terminal provided. Wire sizes must be selected such that it can safely carry the sum total of all circuits’ maximum amperage.

1. Connect the power source for the motor to the terminal block. Continuous power is essential. The motor may be stalled indefinitely without damage.
2. Make wiring connections to the control micro switch using a separate circuit from that of the motor.
3. Apply power to the motor circuit, checking the freeness of operation and actuation of the micro switch.
4. Fasten the housing cover securely to prevent damage from dust or moisture.

WIRING FOR SINGLE SWITCH
24 V/110 V/220 V UNITS

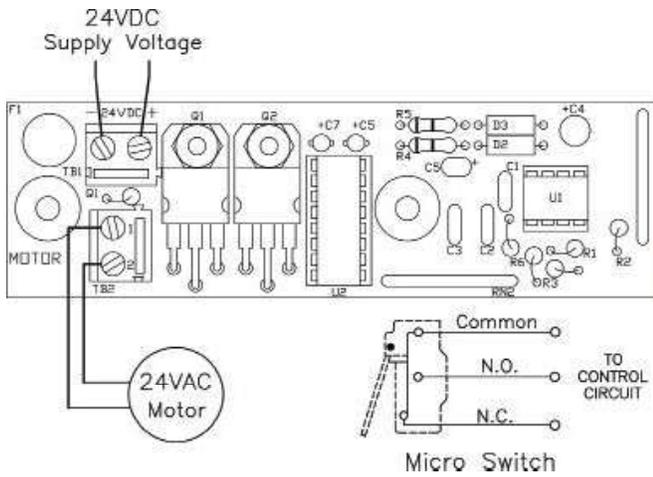


WIRING FOR DOUBLE SWITCH



WARNING: Do not power motor through a microswitch.

WIRING FOR 24 VDC UNITS



VI. MAINTENANCE

PREVENTATIVE MAINTENANCE

No scheduled preventative maintenance is required for the Roto-Bin-Dicator® units when properly applied and installed correctly. There is no cleaning required for the unit before or during installation.

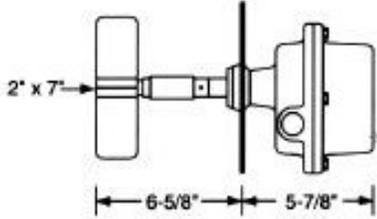
REPLACEMENT PARTS

Model	Part Number	Description	Qty
RD-H 24 VDC Single Switch	LAR110940	Lower Frame Assembly; Aluminum includes shaft seal, clutch and drive shaft, bearings and stub shaft	1
	LAR130270	MicroSwitch, Single Pole, Double Throw, 1 HP 125 VAC, 2 HP 250 VAC, 20 AMP 125, 250, or 480 VAC, 1/2 AMP 125 VDC, 1/2 AMP 250 VDC	1
	LAR121960	Cover, Aluminum	1
	LAR110081	Switch Bracket Assembly	1
	LAR111024	Motor Replacement Kit, 24 VAC	1
	LAR130290	Motor Replacement Kit, 24 VAC, 4 W	1
	LAR111193	Printed Circuit Board Assembly	1
	LAR111025	Switch Assembly	1
	LUA030240	Cover Screw	6
R-H, RB-H, RX-H, RXB-H Single Switch	LAR110940	Lower Frame Assembly; Aluminum includes shaft seal, clutch and drive shaft, bearings and stub shaft	1
	LAR121960	Cover, Aluminum	1
	LAR120050	Switch Bracket	1
	LAR110070	Motor Replacement Kit, 110 VAC	1
	LAR110100	Motor Replacement Kit, 220 VAC	1
	LAR111025	Switch Assembly	1
	LAR130300	Terminal Block	1
	LAR131220	Cover Gasket (not furnished on explosion-proof units)	1
	LUA030240	Cover Screw	6
RXD-H 24 VDC Single Switch	LAR111002	Frame Assembly, Aluminum includes shaft seal, clutch and drive shaft, bearings and stub shaft, XP	1
	LAR130270	MicroSwitch, Single Pole, Double Throw, 1 HP 125 VAC, 2 HP 250 VAC, 20 AMP 125, 250, or 480 VAC, 1/2 AMP 125 VDC, 1/2 AMP 250 VDC	1
	LAR121950	Aluminum Cover, XP	1
	LAR110081	Switch Assembly	1
	LAR111024	Motor Replacement Kit, 24 VAC	1
	LUA030240	Cover Screw	6
BX-H 110 VAC, BX-B 220 VAC, BX-H 24 VAC Single Switch CE & ATEX Approval	LAR111002	Frame Assembly; Aluminum includes shaft seal, clutch and drive shaft, bearings and stub shaft, XP	1
	LAR130270	MicroSwitch, Single Pole, Double Throw, 1 HP 125 VAC, 2 HP 250 VAC, 20 AMP 125, 250, or 480 VAC, 1/2 AMP 125 VDC, 1/2 AMP 250 VDC	1
	LAR111075	Aluminum Cover	1
	LAR110080	Switch Assembly	1
	LAR110070	Motor Replacement Kit, 110 VAC	1
	LAR110100	Motor Replacement Kit, 220 VAC	1
	LAR111024	Motor Replacement Kit, 24 VAC	1
	LAR130300	Terminal Block	1
	LUA031890	Cover Screw	6

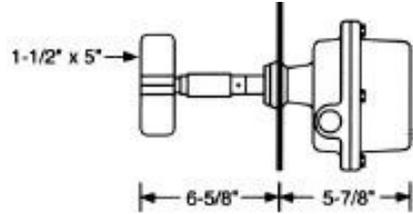
RA-H, RC-H, RXA-H, RXC-H Double Switch	LAR110940	Lower Frame Assembly; Aluminum includes shaft seal, clutch and drive shaft, bearings and stub shaft- General Purpose	1
	LAR121960	Cover, Aluminum - General Purpose	1
	LAR111002	Housing Assembly; Aluminum, clutch/drive shaft, bearings, shaft seal and stub shaft; cover included - XP	1
	LAR120050	Switch Bracket	1
	LAR110070	Motor Replacement Kit, 110VAC	1
	LAR110100	Motor Replacement Kit, 220VAC	1
	LAR111026	Switch Assembly	1
	LAR130300	Terminal Block	1
	LAR131220	Cover Gasket (not furnished on Explosionproof units)	1
LUA030240	Cover Screw	6	
BXA-H 110 VAC, BXC-B 220 VAC, BX-H 24 VAC Double Switch CE & ATEX Approval	LAR111002	Frame Assembly; Aluminum includes shaft seal, clutch and drive shaft, bearings and stub shaft, XP	1
	LAR130270	MicroSwitch, Single Pole, Double Throw, 1HP 125 VAC, 2 HP 250 VAC, 20 AMP 125, 250, or 480 VAC, 1/2 AMP 125 VDC, 1/2 AMP 250 VDC	1
	LAR111075	Aluminum Cover	1
	LAR110090	Switch Assembly	1
	LAR110070	Motor Replacement Kit, 110 VAC	1
	LAR110100	Motor Replacement Kit, 220 VAC	1
	LAR111024	Motor Replacement Kit, 24 VAC	1
	LAR130300	Terminal Block	1
	LUA031890	Cover Screw	6
BXA-H 24VDC Double Switch CE & ATEX Approval	LAR111002	Frame Assembly; Aluminum includes shaft seal, clutch and drive shaft, bearings and stub shaft, XP	1
	LAR130270	MicroSwitch, Single Pole, Double Throw, 1 HP 125 VAC, 2 HP 250 VAC, 20 AMP 125, 250, or 480 VAC, 1/2 AMP 125 VDC, 1/2 AMP 250 VDC	1
	LAR111075	Aluminum Cover	1
	LAR110091	Switch Assembly	1
	LAR111024	Motor Replacement Kit, 24 VAC	1
	LUA031890	Cover Screw	6
RE-H 24 VDC Double Switch	LAR110940	Lower Frame Assembly; Aluminum includes shaft seal, clutch and drive shaft, bearings and stub shaft	1
	LAR130270	MicroSwitch, Single Pole, Double Throw, 1 HP 125 VAC, 2 HP 250 VAC, 20 AMP 125, 250, or 480 VAC, 1/2 AMP 125 VDC, 1/2 AMP 250 VDC	1
	LAR121960	Cover, Aluminum	1
	LAR110091	Switch Assembly	1
	LAR111024	Motor Replacement Kit, 24 VAC	1
	LUA030240	Cover Screw	6
RXE-H 24 VDC Double Switch	LAR111002	Frame Assembly, Aluminum includes shaft seal, clutch and drive shaft, bearings and stub shaft, XP	1
	LAR130270	MicroSwitch, Single Pole, Double Throw, 1 HP 125 VAC, 2 HP 250 VAC, 20 AMP 125, 250, or 480 VAC, 1/2 AMP 125 VDC, 1/2 AMP 250 VDC	1
	LAR121950	Aluminum Cover, XP	1
	LAR110091	Switch Assembly	1
	LAR111024	Motor Replacement Kit, 24 VAC	1
	LUA030240	Cover Screw	6

VII. DIMENSIONAL DRAWINGS

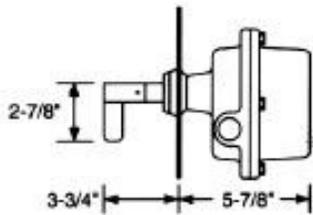
Type 1. Large 4-vane paddle, molded neoprene flexible shaft



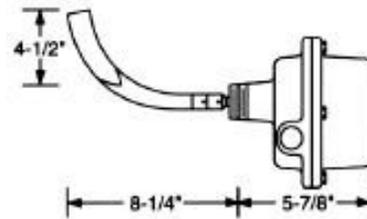
Type 2. 4-Vane paddle, molded neoprene flexible shaft



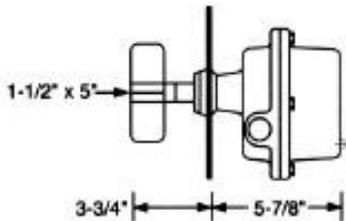
Type 3. Single vane paddle



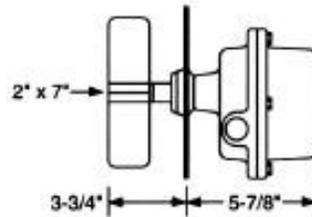
Type 3i. Single vane paddle, insert through 1 1/4" mounting coupling



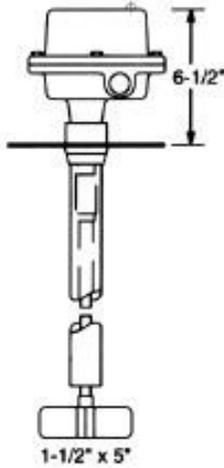
Type 4. Standard 4-vane paddle



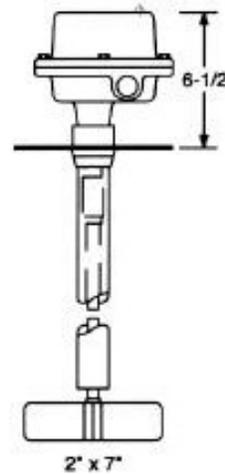
Type 5. Large 4-vane paddle



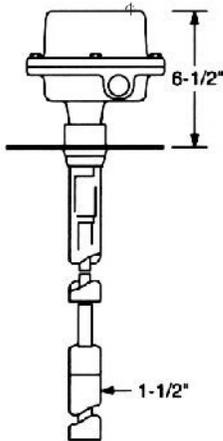
Type 6. 4-Vane paddle with shaft coupling for shaft extension



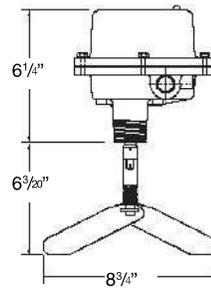
Type 7. Large 4-vane paddle with shaft coupling for shaft extension



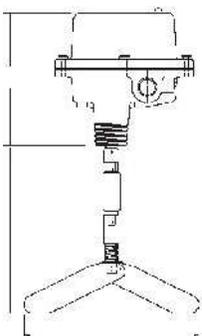
Type 8. Neoprene or SS multiplex paddle with shaft coupling for shaft extension



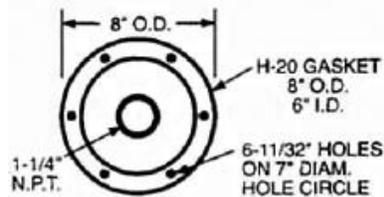
Type 9. Collapsible 2-vane SS paddle



Type 10. Collapsible 2-vane SS paddle with flexible shaft



Mounting Plate





150 Venture Boulevard
Spartanburg, SC 29306
Tel: (800) 778-9242
Fax: (864) 574-8063
sales@bindicator.com
www.bindicator.com

venture
MEASUREMENT

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LAR180212 Rev C

Baldor Motor

BALDOR • RELIANCE

**Integral Horsepower
AC Induction Motors
ODP, WPI, WPII Enclosure
TEFC Enclosure
Explosion Proof**

Installation & Operating Manual

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Section 1

General Information

Overview This manual contains general procedures that apply to Baldor Motor products. Be sure to read and understand the Safety Notice statements in this manual. For your protection, do not install, operate or attempt to perform maintenance procedures until you understand the Warning and Caution statements. A Warning statement indicates a possible unsafe condition that can cause harm to personnel. A Caution statement indicates a condition that can cause damage to equipment.

Important: **This instruction manual is not intended to include a comprehensive listing of all details for all procedures required for installation, operation and maintenance. This manual describes general guidelines that apply to most of the motor products shipped by Baldor. If you have a question about a procedure or are uncertain about any detail, Do Not Proceed. Please contact your Baldor distributor for more information or clarification.**

Before you install, operate or perform maintenance, become familiar with the following:

- NEMA Publication MG-2, Safety Standard for Construction and guide for Selection, Installation and Use of Electric Motors and Generators.
- The National Electrical Code
- Local codes and Practices

Limited Warranty

1. Most Baldor products are warranted for 18 months from the date of shipment to Baldor's customer from Baldor's district warehouse or, if applicable, from Baldor's factory. Baldor Standard-E® standard efficient motors are warranted for 24 months. Standard-E is limited to three phase, general purpose, 1-200 HP ratings that fall under the Energy Policy Act (EPAAct). Baldor Super-E® premium efficient motors are warranted for 36 months. Baldor IEEEE841 motors are warranted for 60 months. All warranty claims must be submitted to a Baldor Service Center prior to the expiration of the warranty period.
2. Baldor will, at its option repair or replace a motor which fails due to defects in material or workmanship during the warranty period if:
 - a. the purchaser presents the defective motor at or ships it prepaid to, the Baldor plant in Fort Smith, Arkansas or one of the Baldor Authorized Service Centers and
 - b. the purchaser gives written notification concerning the motor and the claimed defect including the date purchased, the task performed by the Baldor motor and the problem encountered.
3. Baldor will not pay the cost of removal of any electric motor from any equipment, the cost of delivery to Fort Smith, Arkansas or a Baldor Authorized Service Center, or the cost of any incidental or consequential damages resulting from the claimed defects. (Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.) Any implied warranty given by laws shall be limited to the duration of the warranty period hereunder. (Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.)
4. Baldor Authorized Service Centers, when convinced to their satisfaction that a Baldor motor developed defects in material or workmanship within the warranty period, are authorized to proceed with the required repairs to fulfill Baldor's warranty when the cost of such repairs to be paid by Baldor does not exceed Baldor's warranty repair allowance. Baldor will not pay overtime premium repair charges without prior written authorization.
5. The cost of warranty repairs made by centers other than Baldor Authorized Service Centers **WILL NOT** be paid unless first authorized in writing by Baldor.
6. Claims by a purchaser that a motor is defective even when a failure results within one hour after being placed into service are not always justified. Therefore, Baldor Authorized Service Centers must determine from the condition of the motor as delivered to the center whether or not the motor is defective. If in the opinion of a Baldor Authorized Service Center, a motor did not fail as a result of defects in material or workmanship, the center is to proceed with repairs only if the purchaser agrees to pay for such repairs. If the decision is in dispute, the purchaser should still pay for the repairs and submit the paid invoice and the Authorized Service Center's signed service report to Baldor for further consideration.
7. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Safety Notice:

This equipment contains high voltage! Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt installation, operation and maintenance of electrical equipment.

Be sure that you are completely familiar with NEMA publication MG-2, safety standards for construction and guide for selection, installation and use of electric motors and generators, the National Electrical Code and local codes and practices. Unsafe installation or use can cause conditions that lead to serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.

WARNING: Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.

WARNING: Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that all grounding instructions have been followed. Electrical shock can cause serious or fatal injury. National Electrical Code and Local codes must be carefully followed.

WARNING: Avoid extended exposure to machinery with high noise levels. Be sure to wear ear protective devices to reduce harmful effects to your hearing.

WARNING: This equipment may be connected to other machinery that has rotating parts or parts that are driven by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt to install operate or maintain this equipment.

WARNING: Do not by-pass or disable protective devices or safety guards. Safety features are designed to prevent damage to personnel or equipment. These devices can only provide protection if they remain operative.

WARNING: Avoid the use of automatic reset devices if the automatic restarting of equipment can be hazardous to personnel or equipment.

WARNING: Be sure the load is properly coupled to the motor shaft before applying power. The shaft key must be fully captive by the load device. Improper coupling can cause harm to personnel or equipment if the load decouples from the shaft during operation.

WARNING: Use proper care and procedures that are safe during handling, lifting, installing, operating and maintaining operations. Improper methods may cause muscle strain or other harm.

WARNING: Before performing any motor maintenance procedure, be sure that the equipment connected to the motor shaft cannot cause shaft rotation. If the load can cause shaft rotation, disconnect the load from the motor shaft before maintenance is performed. Unexpected mechanical rotation of the motor parts can cause injury or motor damage.

WARNING: Disconnect all electrical power from the motor windings and accessory devices before disassembly of the motor. Electrical shock can cause serious or fatal injury.

WARNING: Do not use non UL/CSA listed explosion proof motors in the presence of flammable or combustible vapors or dust. These motors are not designed for atmospheric conditions that require explosion proof operation.

Safety Notice Continued

WARNING: Motors that are to be used in flammable and/or explosive atmospheres must display the UL label on the nameplate along with CSA listed logo.

Specific service conditions for these motors are defined in NFPA 70 (NEC) Article 500.

WARNING: UL Listed motors must only be serviced by UL Approved Authorized Baldor Service Centers if these motors are to be returned to a hazardous and/or explosive atmosphere.

Caution: To prevent premature equipment failure or damage, only qualified maintenance personnel should perform maintenance.

Caution: Do not over-lubricate motor as this may cause premature bearing failure.

Caution: Do not lift the motor and its driven load by the motor lifting hardware. The motor lifting hardware is adequate for lifting only the motor. Disconnect the load from the motor shaft before moving the motor.

Caution: If eye bolts are used for lifting a motor, be sure they are securely tightened. The lifting direction should not exceed a 20° angle from the shank of the eye bolt or lifting lug. Excessive lifting angles can cause damage.

Caution: To prevent equipment damage, be sure that the electrical service is not capable of delivering more than the maximum motor rated amps listed on the rating plate.

Caution: If a HI POT test (High Potential Insulation test) must be performed, follow the precautions and procedure in NEMA MG1 and MG2 standards to avoid equipment damage.

If you have any questions or are uncertain about any statement or procedure, or if you require additional information please contact your Baldor distributor or an Authorized Baldor Service Center.

Receiving

Each Baldor Electric Motor is thoroughly tested at the factory and carefully packaged for shipment. When you receive your motor, there are several things you should do immediately.

1. Observe the condition of the shipping container and report any damage immediately to the commercial carrier that delivered your motor.
2. Verify that the part number of the motor you received is the same as the part number listed on your purchase order.

Storage

If the motor is not put into service immediately, the motor must be stored in a clean, dry and warm location. Several precautionary steps must be performed to avoid motor damage during storage.

1. Use a "Megger" periodically to ensure that the integrity of the winding insulation has been maintained. Record the Megger readings. Immediately investigate any significant drop in insulation resistance.
2. Do not lubricate bearings during storage. Motor bearings are packed with grease at the factory. Excessive grease can damage insulation quality.
3. Rotate motor shaft at least 10 turns every two months during storage (more frequently if possible). This will prevent bearing damage due to storage.
4. If the storage location is damp or humid, the motor windings must be protected from moisture. This can be done by applying power to the motors' space heater (if available) while the motor is in storage.

Unpacking

Each Baldor motor is packaged for ease of handling and to prevent entry of contaminants.

1. To avoid condensation inside the motor, do not unpack until the motor has reached room temperature. (Room temperature is the temperature of the room in which it will be installed). The packing provides insulation from temperature changes during transportation.
2. When the motor has reached room temperature, remove all protective wrapping material from the motor.

Handling

The motor should be lifted using the lifting lugs or eye bolts provided.

1. Use the lugs or eye bolts provided to lift the motor. Never attempt to lift the motor and additional equipment connected to the motor by this method. The lugs or eye bolts provided are designed to lift only the motor. Never lift the motor by the motor shaft or the hood of a WP11 motor.
2. When lifting a WP11 (Weather Proof Type 2) motor, do not lift the motor by inserting lifting lugs into holes on top of the cooling hood. These lugs are to be used for hood removal only. A spreader bar should be used to lift the motor by the cast lifting lugs located on the motor frame.
3. If the motor must be mounted to a plate with the driven equipment such as pump, compressor etc., it may not be possible to lift the motor alone. For this case, the assembly should be lifted by a sling around the mounting base. The entire assembly can be lifted as an assembly for installation. Do not lift using the motor lugs or eye bolts provided.

If the load is unbalanced (as with couplings or additional attachments) additional slings or other means must be used to prevent tipping. In any event, the load must be secure before lifting.

Section 2 Installation & Operation

Overview

Installation should conform to the National Electrical Code as well as local codes and practices. When other devices are coupled to the motor shaft, be sure to install protective devices to prevent future accidents. Some protective devices include, coupling, belt guard, chain guard, shaft covers etc. These protect against accidental contact with moving parts. Machinery that is accessible to personnel should provide further protection in the form of guard rails, screening, warning signs etc.

Location

It is important that motors be installed in locations that are compatible with motor enclosure and ambient conditions. Improper selection of the motor enclosure and ambient conditions can lead to reduced operating life of the motor.

Proper ventilation for the motor must be provided. Obstructed airflow can lead to reduction of motor life.

1. **Open Drip-Proof/WPI** motors are intended for use indoors where atmosphere is relatively clean, dry, well ventilated and non-corrosive.
2. **Totally Enclosed and WPII** motors may be installed where dirt, moisture or dust are present and in outdoor locations.

Severe Duty, IEEE 841 and Washdown Duty enclosed motors are designed for installations with high corrosion or excessive moisture conditions. These motors should not be placed into an environment where there is the presence of flammable or combustible vapors, dust or any combustible material, unless specifically designed for this type of service.

Mounting

The motor must be securely installed to a rigid foundation or mounting surface to minimize vibration and maintain alignment between the motor and shaft load. Failure to provide a proper mounting surface may cause vibration, misalignment and bearing damage.

Foundation caps and sole plates are designed to act as spacers for the equipment they support. If these devices are used, be sure that they are evenly supported by the foundation or mounting surface.

After installation is complete and accurate alignment of the motor and load is accomplished, the base should be grouted to the foundation to maintain this alignment.

The standard motor base is designed for horizontal or vertical mounting. Adjustable or sliding rails are designed for horizontal mounting only. Consult your Baldor distributor or authorized Baldor Service Center for further information.

Alignment

Accurate alignment of the motor with the driven equipment is extremely important.

→ 1. **Direct Coupling**

For direct drive, use flexible couplings if possible. Consult the drive or equipment manufacturer for more information. Mechanical vibration and roughness during operation may indicate poor alignment. Use dial indicators to check alignment. The space between coupling hubs should be maintained as recommended by the coupling manufacturer.

2. **End-Play Adjustment**

The axial position of the motor frame with respect to its load is also extremely important. The motor bearings are not designed for excessive external axial thrust loads. Improper adjustment will cause failure.

3. **Pulley Ratio**

The pulley ratio should not exceed 8:1.

4. **Belt Drive**

Align sheaves carefully to minimize belt wear and axial bearing loads (see End-Play Adjustment). Belt tension should be sufficient to prevent belt slippage at rated speed and load. However, belt slippage may occur during starting.

Caution: Do not over tension belts.

5. Sleeve bearing motors are only suitable for coupled loads.

Doweling & Bolting

After proper alignment is verified, dowel pins should be inserted through the motor feet into the foundation. This will maintain the correct motor position should motor removal be required. (Baldor motors are designed for doweling.)

1. Drill dowel holes in diagonally opposite motor feet in the locations provided.
2. Drill corresponding holes in the foundation.
3. Ream all holes.
4. Install proper fitting dowels.
5. Mounting bolts must be carefully tightened to prevent changes in alignment. Use a flat washer and lock washer under each nut or bolt head to hold the motor feet secure. Flanged nuts or bolts may be used as an alternative to washers.

Power Connection

Conduit Box

Motor and control wiring, overload protection, disconnects, accessories and grounding should conform to the National Electrical Code and local codes and practices.

For ease of making connections, an oversize conduit box is provided. The box can be rotated 360° in 90° increments. Auxiliary conduit boxes are provided on some motors for accessories such as space heaters, RTD's etc.

AC Power

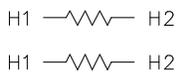
Connect the motor leads as shown on the connection diagram located on the name plate or inside the cover on the conduit box. Be sure the following guidelines are met:

1. AC power is within $\pm 10\%$ of rated voltage with rated frequency. (See motor name plate for ratings).
OR
2. AC power is within $\pm 5\%$ of rated frequency with rated voltage.
OR
3. A combined variation in voltage and frequency of $\pm 10\%$ (sum of absolute values) of rated values, provided the frequency variation does not exceed $\pm 5\%$ of rated frequency.

Performance within these voltage and frequency variations are shown in Figure 2-2.

Figure 2-1 Accessory Connections

HEATERS



One heater is installed in each end of motor.
Leads for each heater are labeled H1 & H2.
(Like numbers should be tied together).

THERMISTERS



Three thermistors are installed in windings and tied in series.
Leads are labeled T1 & T2.

WINDING RTDS



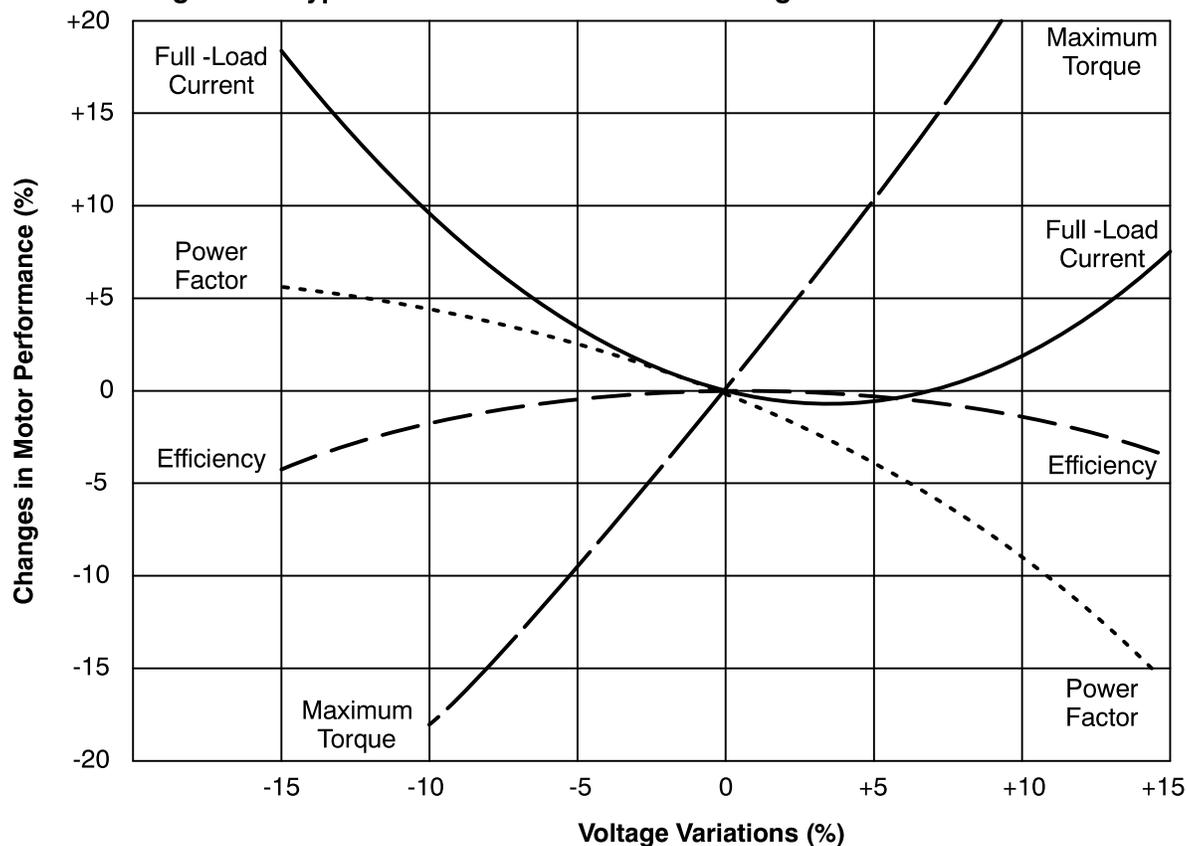
Winding RTDs are installed in windings (2) per phase.
Each set of leads is labeled W1, W2, W3, W4, W5, & W6.

BEARING RTD



- * One bearing RTD is installed in Drive endplate (PUEP), leads are labeled RTDDE.
- * One bearing RTD is installed in Opposite Drive endplate (FREPE), leads are labeled RTDODE.
- * Note RTD may have 2-Red/1-White leads; or 2-White/1-Red Lead.

Figure 2-2 Typical Motor Performance VS Voltage Variations



First Time Start Up

Be sure that all power to motor and accessories is off. Be sure the motor shaft is disconnected from the load and will not cause mechanical rotation of the motor shaft.

1. Make sure that the mechanical installation is secure. All bolts and nuts are tightened etc.
2. If motor has been in storage or idle for some time, check winding insulation integrity with a Megger.
3. Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity.
4. Be sure all shipping materials and braces (if used) are removed from motor shaft.
5. Manually rotate the motor shaft to ensure that it rotates freely.
6. Replace all panels and covers that were removed during installation.
7. Momentarily apply power and check the direction of rotation of the motor shaft.
8. If motor rotation is wrong, be sure power is off and change the motor lead connections. Verify rotation direction before you continue.
9. Start the motor and ensure operation is smooth without excessive vibration or noise. If so, run the motor for 1 hour with no load connected.
10. After 1 hour of operation, disconnect power and connect the load to the motor shaft. Verify all coupling guards and protective devices are installed. Ensure motor is properly ventilated.

Coupled Start Up

This procedure assumes a coupled start up. Also, that the first time start up procedure was successful.

1. Check the coupling and ensure that all guards and protective devices are installed.
2. Check that the coupling is properly aligned and not binding.
3. The first coupled start up should be with no load. Apply power and verify that the load is not transmitting excessive vibration back to the motor through the coupling or the foundation. Vibration should be at an acceptable level.
4. Run for approximately 1 hour with the driven equipment in an unloaded condition.

The equipment can now be loaded and operated within specified limits. Do not exceed the name plate ratings for amperes for steady continuous loads.

Jogging and Repeated Starts Repeated starts and/or jogs of induction motors generally reduce the life of the motor winding insulation. A much greater amount of heat is produced by each acceleration or jog than by the same motor under full load. If it is necessary to repeatedly start or jog the motor, it is advisable to check the application with your local Baldor distributor or Baldor Service Center.

Heating - Duty rating and maximum ambient temperature are stated on the motor name plate. Do not exceed these values. If there is any question regarding safe operation, contact your local Baldor distributor or Baldor Service Center.

Section 3 Maintenance & Troubleshooting

WARNING: UL Listed motors must only be serviced by UL Approved Authorized Baldor Service Centers if these motors are to be returned to a hazardous and/or explosive atmosphere.

General Inspection

Inspect the motor at regular intervals, approximately every 500 hours of operation or every 3 months, whichever occurs first. Keep the motor clean and the ventilation openings clear. The following steps should be performed at each inspection:

WARNING: Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.

1. Check that the motor is clean. Check that the interior and exterior of the motor is free of dirt, oil, grease, water, etc. Oily vapor, paper pulp, textile lint, etc. can accumulate and block motor ventilation. If the motor is not properly ventilated, overheating can occur and cause early motor failure.
2. Use a "Megger" periodically to ensure that the integrity of the winding insulation has been maintained. Record the Megger readings. Immediately investigate any significant drop in insulation resistance.
3. Check all electrical connectors to be sure that they are tight.

Relubrication & Bearings

Bearing grease will lose its lubricating ability over time, not suddenly. The lubricating ability of a grease (over time) depends primarily on the type of grease, the size of the bearing, the speed at which the bearing operates and the severity of the operating conditions. Good results can be obtained if the following recommendations are used in your maintenance program.

Type of Grease

A high grade ball or roller bearing grease should be used. Recommended grease for standard service conditions is Polyrex EM (Exxon Mobil).

Equivalent and compatible greases include:

Texaco Polystar, Rykon Premium #2, Pennzoil Pen 2 Lube and Chevron SRI.

Relubrication Intervals

Recommended relubrication intervals are shown in Table 3-1. It is important to realize that the recommended intervals of Table 3-1 are based on average use.

Refer to additional information contained in Tables 3-2, 3-3 and 3-4.

Table 3-1 Relubrication Intervals *

NEMA / (IEC) Frame Size	Rated Speed - RPM					
	10000	6000	3600	1800	1200	900
Up to 210 incl. (132)	**	2700 Hrs.	5500 Hrs.	12000 Hrs.	18000 Hrs.	22000 Hrs.
Over 210 to 280 incl. (180)		**	3600 Hrs.	9500 Hrs.	15000 Hrs.	18000 Hrs.
Over 280 to 360 incl. (225)		**	* 2200 Hrs.	7400 Hrs.	12000 Hrs.	15000 Hrs.
Over 360 to 5800 incl. (300)		**	*2200 Hrs.	3500 Hrs.	7400 Hrs.	10500 Hrs.

* Relubrication intervals are for ball bearings.

For vertically mounted motors and roller bearings, divide the relubrication interval by 2.

** For motors operating at speeds greater than 3600 RPM, contact Baldor for relubrication recommendations.

Table 3-2 Service Conditions

Severity of Service	Hours per day of Operation	Ambient Temperature Maximum	Atmospheric Contamination
Standard	8	40° C	Clean, Little Corrosion
Severe	16 Plus	50° C	Moderate dirt, Corrosion
Extreme	16 Plus	>50° C* or Class H Insulation	Severe dirt, Abrasive dust, Corrosion, Heavy Shock or Vibration
Low Temperature		<-29° C **	

* Special high temperature grease is recommended (Dow Corning DC44). Note that Dow Corning DC44 grease does not mix with other grease types. Thoroughly clean bearing & cavity before adding grease.

** Special low temperature grease is recommended (Aeroshell 7).

Table 3-3 Relubrication Interval Multiplier

Severity of Service	Multiplier
Standard	1.0
Severe	0.5
Extreme	0.1
Low Temperature	1.0

Some motor designs use different bearings on each motor end. This is normally indicated on the motor nameplate. In this case, the larger bearing is installed on the motor Drive endplate. For best relubrication results, only use the appropriate amount of grease for each bearing size (not the same for both).

Table 3-4 Bearings Sizes and Types

Frame Size NEMA (IEC)	Bearing Description (These are the "Large" bearings (Shaft End) in each frame size)			
	Bearing	Weight of Grease to add * oz (Grams)	Volume of grease to be added	
			in ³	teaspoon
56 to 140 (90)	6203	0.08 (2.4)	0.15	0.5
140 (90)	6205	0.15 (3.9)	0.2	0.8
180 (100-112)	6206	0.19 (5.0)	0.3	1.0
210 (132)	6307	0.30 (8.4)	0.6	2.0
250 (160)	6309	0.47 (12.5)	0.7	2.5
280 (180)	6311	0.61 (17)	1.2	3.9
320 (200)	6312	0.76 (20.1)	1.2	4.0
360 (225)	6313	0.81 (23)	1.5	5.2
400 (250)	6316	1.25 (33)	2.0	6.6
440 (280)	6319	2.12 (60)	4.1	13.4
5000 to 5800 (315-450)	6328	4.70 (130)	9.2	30.0
5000 to 5800 (315-450)	NU328	4.70 (130)	9.2	30.0
360 to 449 (225-280)	NU319	2.12 (60)	4.1	13.4
AC Induction Servo				
76 Frame 180 (112)	6207	0.22 (6.1)	0.44	1.4
77 Frame 210 (132)	6210	0.32 (9.0)	0.64	2.1
80 Frame 250(160)	6213	0.49 (14.0)	0.99	3.3

* Weight in grams = .005 DB of grease to be added

Note: Not all bearing sizes are listed. For intermediate bearing sizes, use the grease volume for the next larger size bearing.

Caution: To avoid damage to motor bearings, grease must be kept free of dirt. For an extremely dirty environment, contact your Baldor distributor or an authorized Baldor Service Center for additional information.

Relubrication Procedure Be sure that the grease you are adding to the motor is compatible with the grease already in the motor. Consult your Baldor distributor or an authorized service center if a grease other than the recommended type is to be used.

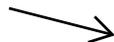
Caution: Do not over-lubricate motor as this may cause premature bearing failure.

With Grease Outlet Plug

1. With the motor stopped, clean all grease fittings with a clean cloth.
2. Remove grease outlet plug.

Caution: Over-lubricating can cause excessive bearing temperatures, premature lubrication breakdown and bearing failure.

3. Add the recommended amount of grease.
4. Operate the motor for 15 minutes with grease plug removed. This allows excess grease to purge.
5. Re-install grease outlet plug.



Without Grease Provisions

Note: Only a Baldor authorized and UL or CSA certified service center can disassemble a UL/CSA listed explosion proof motor to maintain it's UL/CSA listing.

1. Disassemble the motor.
2. Add recommended amount of grease to bearing and bearing cavity. (Bearing should be about 1/3 full of grease and outboard bearing cavity should be about 1/2 full of grease.)
3. Assemble the motor.

Sample Relubrication Determination

Assume - NEMA 286T (IEC 180), 1750 RPM motor driving an exhaust fan in an ambient temperature of 43° C and the atmosphere is moderately corrosive.

1. Table 3-1 list 9500 hours for standard conditions.
2. Table 3-2 classifies severity of service as "Severe".
3. Table 3-4 shows that 1.2 in³ or 3.9 teaspoon of grease is to be added.

Note: Smaller bearings in size category may require reduced amounts of grease.

Table 3-5 Troubleshooting Chart

Symptom	Possible Causes	Possible Solutions
Motor will not start	Usually caused by line trouble, such as, single phasing at the starter.	Check source of power. Check overloads, fuses, controls, etc.
Excessive humming	High Voltage.	Check input line connections.
	Eccentric air gap.	Have motor serviced at local Baldor service center.
Motor Over Heating	Overload. Compare actual amps (measured) with nameplate rating.	Locate and remove source of excessive friction in motor or load. Reduce load or replace with motor of greater capacity.
	Single Phasing.	Check current at all phases (should be approximately equal) to isolate and correct the problem.
	Improper ventilation.	Check external cooling fan to be sure air is moving properly across cooling fins. Excessive dirt build-up on motor. Clean motor.
	Unbalanced voltage.	Check voltage at all phases (should be approximately equal) to isolate and correct the problem.
	Rotor rubbing on stator.	Check air gap clearance and bearings.
		Tighten "Thru Bolts".
	Over voltage or under voltage.	Check input voltage at each phase to motor.
	Open stator winding.	Check stator resistance at all three phases for balance.
	Grounded winding.	Perform dielectric test and repair as required.
	Improper connections.	Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity. Refer to motor lead connection diagram.
Bearing Over Heating	Misalignment.	Check and align motor and driven equipment.
	Excessive belt tension.	Reduce belt tension to proper point for load.
	Excessive end thrust.	Reduce the end thrust from driven machine.
	Excessive grease in bearing.	Remove grease until cavity is approximately $\frac{3}{4}$ filled.
	Insufficient grease in bearing.	Add grease until cavity is approximately $\frac{3}{4}$ filled.
	Dirt in bearing.	Clean bearing cavity and bearing. Repack with correct grease until cavity is approximately $\frac{3}{4}$ filled.
Vibration	Misalignment.	Check and align motor and driven equipment.
	Rubbing between rotating parts and stationary parts.	Isolate and eliminate cause of rubbing.
	Rotor out of balance.	Have rotor balance checked and repaired at your Baldor Service Center.
	Resonance.	Tune system or contact your Baldor Service Center for assistance.
Noise	Foreign material in air gap or ventilation openings.	Remove rotor and foreign material. Reinstall rotor. Check insulation integrity. Clean ventilation openings.
Growling or whining	Bad bearing.	Replace bearing. Clean all grease from cavity and new bearing. Repack with correct grease until cavity is approximately $\frac{3}{4}$ filled.

Suggested bearing and winding RTD setting guidelines

Most large frame AC Baldor motors with a 1.15 service factor are designed to operate below a Class B (80°C) temperature rise at rated load and are built with a Class H winding insulation system. Based on this low temperature rise, RTD (Resistance Temperature Detectors) settings for Class B rise should be used as a starting point. Some motors with 1.0 service factor have Class F temperature rise.

The following tables show the suggested alarm and trip settings for RTDs. Proper bearing and winding RTD alarm and trip settings should be selected based on these tables unless otherwise specified for specific applications.

If the driven load is found to operate well below the initial temperature settings under normal conditions, the alarm and trip settings may be reduced so that an abnormal machine load will be identified.

The temperature limits are based on the installation of the winding RTDs imbedded in the winding as specified by NEMA. Bearing RTDs should be installed so they are in contact with the outer race on ball or roller bearings or in direct contact with the sleeve bearing shell.

Winding RTDs - Temperature Limit In °C (40°C Maximum Ambient)

Motor Load	Class B Temp Rise ≤ 80°C (Typical Design)		Class F Temp Rise ≤ 105°C		Class H Temp Rise ≤ 125°C	
	Alarm	Trip	Alarm	Trip	Alarm	Trip
≤ Rated Load	130	140	155	165	175	185
Rated Load to 1.15 S.F.	140	150	160	165	180	185

- Note:
- Winding RTDs are factory production installed, not from Mod-Express.
 - When Class H temperatures are used, consider bearing temperatures and relubrication requirements.

Bearing RTDs - Temperature Limit In °C (40°C Maximum Ambient)

Bearing Type Oil or Grease	Anti-Friction		Sleeve	
	Alarm	Trip	Alarm	Trip
Standard*	95	100	85	95
High Temperature**	110	115	105	110

- Note: * Bearing temperature limits are for standard design motors operating at Class B temperature rise.
** High temperature lubricants include some special synthetic oils and greases.

Greases that may be substituted that are compatible with Polyrex EM (but considered as "standard" lubricants) include the following:

- Texaco Polystar
- Mobilith SHC-100
- Darmex 707
- Rykon Premium #2
- Pennzoil Pennzlube EM-2
- Darmex 711
- Chevron SRI #2
- Chevron Black Pearl
- Petro-Canada Peenless LLG

See the motor nameplate for replacement grease or oil recommendation.
Contact Baldor application engineering for special lubricants or further clarifications.

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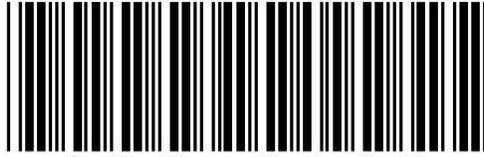
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www.baldor.com



AC Induction Motor Performance Data
Record # 8198

Winding: 35WG3997	Type: 3520M	Enclosure: TENV
-------------------	-------------	-----------------

SPEC # 35H828-399761

Nameplate Data				General Characteristics at 460 V, 60 Hz:	
Rated Output (HP)	1			Full Load Torque	1.5 LB-FT
Volts	208-230/460			Start Configuration	DOL
Full Load Amps	3-2.8/1.4			Break Down Torque	5 LB-FT
R.P.M.	3450			Pull-Up Torque	3.5 LB-FT
Hz	60	Phase	3	Locked-rotor Torque	4.1 LB-FT
NEMA Design Code	B	KVA Code	H	Starting Current	9 Amps
Service Factor	1			No-load Current	0.5 Amps
NEMA Nom. Eff.	80	P.F.	88	Line-line Res. @ 25°C.	15.6 Ohms
Rating - Duty	40C AMB-CONT			Temp. Rise @ Rated Load	75°C
S.F. Amps				Temp. Rise @ S.F. Load	

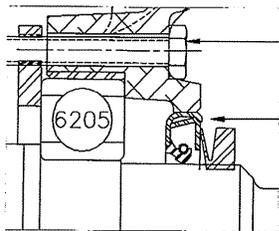
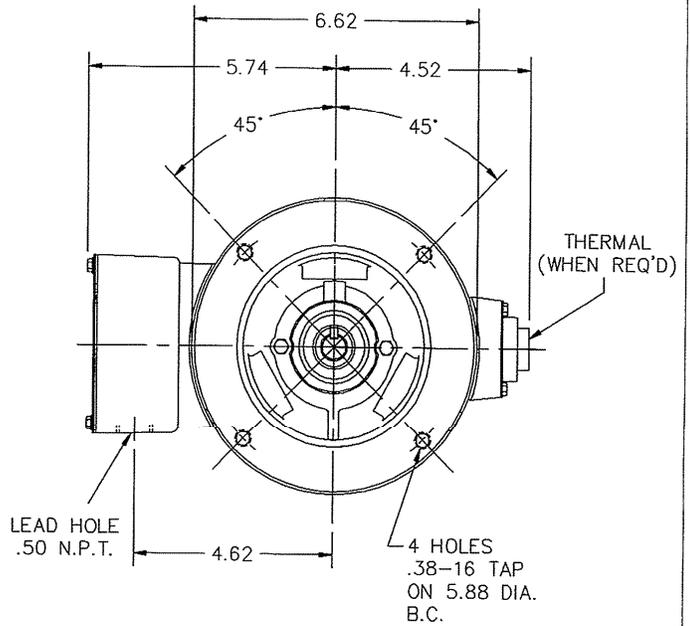
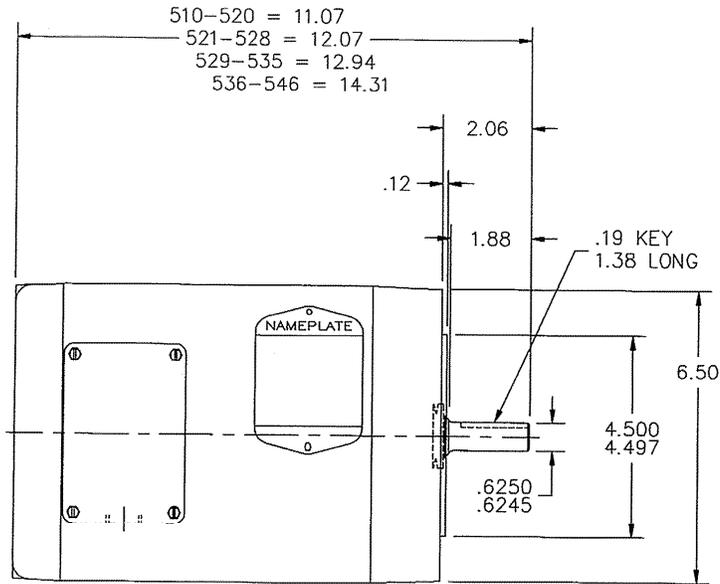
Load Characteristics at 460 Volts, 60 Hz

% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor	62	78	86	90	92	92	
Efficiency	57.5	70.7	75.6	77.4	77.6	77.6	
Speed	3548	3511	3470	3427	3378	3324	
Line Amperes	0.7	0.9	1.1	1.4	1.7	2	

Baldor Electric Company Fort Smith, Arkansas

SPEC # 3514828-399761

35LYH828



COAT ENTIRE SCREW
 HEAD W/RED SEALER
 BEFORE INSTALLING

APPLY COAT OF
 RED SEALER TO
 HOUSING BEFORE
 PRESSING SEAL IN

PULLEY END DETAIL

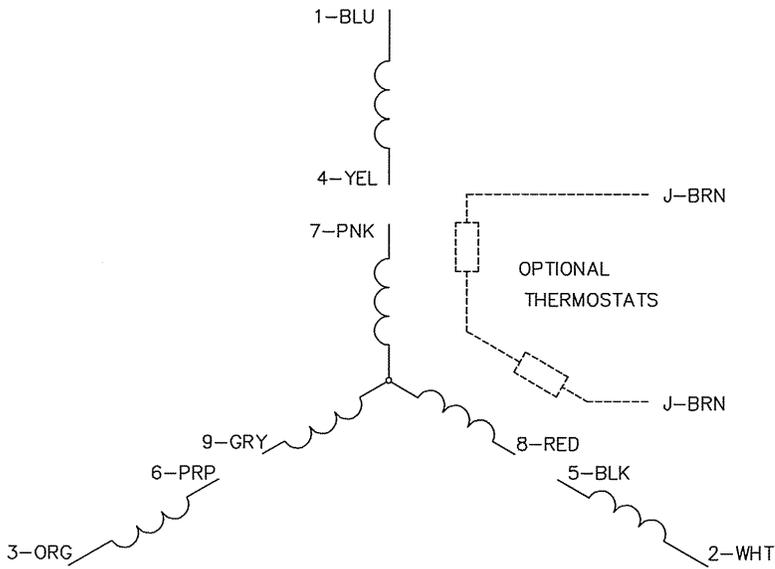
CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT MOTOR PERFORMANCE IS SUITABLE IN THE APPLICATION.

REV. DESC: 35SH1854 WAS 35SH1163			
REV. LTR: U	BY: EAO	REVISED: 11: 35: 11 02/21/2001	TDR: 227757
8Z8H475C		FILE: AAA00012513	REF: 35LYH828
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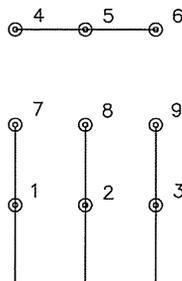
BALDOR ELECTRIC Co.

STD 56C TENV VERT 35M - HOSE DOWN (SP 9)

35LYH828

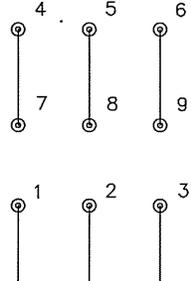


LOW VOLTAGE (2Y)



LINE

HIGH VOLTAGE (1Y)



LINE

NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

REV. DESC: REVISE TO SHOW OPTIONAL COLORS			
REV. LTR: E	BY: JLP	REVISED: 01/19/99 10:15	TDR: 0171435
S00000		FILE: AAA00005140	MDL: -
		MTL: -	

BALDOR ELECTRIC Co.

3PH, DV, 9 LEADS

Tank Mixer, Gear Box



BALDOR ELECTRIC COMPANY

P. O. BOX 2400 • FORT SMITH, ARKANSAS 72902-2400 U.S.A. • (479) 646-4711 • FAX (479) 648-5792

REDUCER INSTALLATION, MAINTENANCE AND LUBRICATION

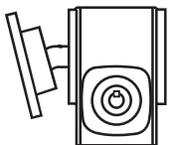
Baldor reducers achieve maximum performance and life when installed properly. Please follow these instructions carefully.

INSTALLATION

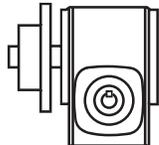
Baldor reducers filled with Kluber Klubersynth UH1-6-460 synthetic lubricant are ready for immediate use. These reducers are completely sealed and require no breather vents. The design and synthetic lubrication allow efficient operation to reduce operating temperature and minimize internal pressure build up. The reducer has been filled with the correct amount of oil for all approved mounting positions. Do not add or remove any oil during installation or after the break-in period.

Mount the reducer on a flat surface, to assure proper bolt tension and prevent damage to the mounting base. When direct coupling the reducer to the driven machine, carefully align the reducer output shaft to the input shaft of the driven machine. These shafts must be connected with a flexible coupling.

Power transmission components, such as sprockets, gears, or sheaves, mounted on the reducer shafts produce overhung loads. Mount these components as close as possible to the reducer with the hub facing outward. This mounting minimizes the load on the reducer shaft and bearings for increased life. Carefully align these components with their counterparts on the driven machine.



INCORRECT



CORRECT

MAINTENANCE

Baldor reducers require no periodic maintenance. Visual inspection (for oil leakage and general operating condition) and a simple cleaning to remove dirt build up is recommended.

Accumulation of material on the reducer can lead to overheating and reduced life.

LUBRICATION

Klubersynth UH1-6-460 is suitable for USDA Class H1 environments. This synthetic lubrication does not require periodic changing. The lubrication should only be replaced when maintenance is performed that requires disassembly. Use only Klubersynth UH1-6-460. This lubrication is suitable for a wide temperature range (-13° to 320° F). However, refer to “**Operating Environment**” section for the ambient operating temperature for Baldor speed reducers.

MOUNTING POSITIONS

Because Baldor speed reducers do not require a breather vent, they are suitable for mounting in a wide variety of mounting positions without modification.

Avoiding those positions where the high-speed (input) oil seal is immersed in oil, will provide greater security against high-speed (input) seal wear. For maximum seal life, the reducer should be mounted with the high-speed (input) shaft as high as possible above the low-speed (output) shaft. Since the high-speed (input) oil seal experiences more revolutions than the output, it will also experience more heat and more wear. When the speed reducer is mounted in a manner where the high-speed (input) seal is below the oil level, and the seal is nearing the end of its useful life, the steady head of oil on the seal will result in a leak. If the reducer is mounted with the high-speed (input) seal above the oil level it may not leak even when the seal has reached the end of its useful life.

OPERATING ENVIRONMENT

Baldor Reducers are designed to operate in ambient temperatures of -10°F to 100°F. The oil sump temperature of the reducer must not exceed 200°F. Consult the factory for applications requiring ambient operating temperature outside this range.

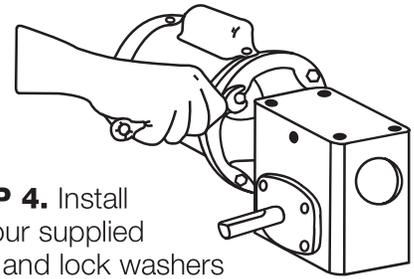
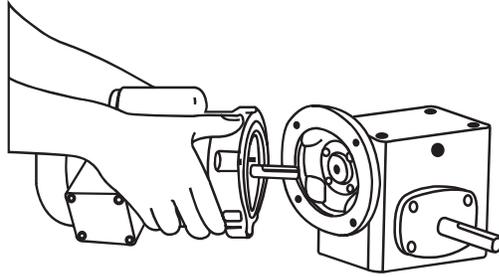
The input horsepower rating shown on the nameplate of each Baldor speed reducer is the continuous mechanical rating of 1.0 service factor at 1750 RPM. Before placing the reducer into service, confirm that its horsepower rating is consistent with the motor horsepower and desired service factor. Service factor and speed reducer ratings can be found in your Baldor Gear Product brochure, BR1600.

"C" FLANGE - HOLLOW BORE WORM STYLE:

STEP 1. Position key in reducer worm bore.

STEP 2. Apply anti-seize compound to the motor shaft.

STEP 3. Line up the key with the key slot and slip the motor shaft in the reducer worm bore.



STEP 4. Install the four supplied bolts and lock washers and tighten bolts evenly for a solid fit between motor and "C" flange.

EXTENDED "C" FLANGE WITH FLEXIBLE COUPLING STYLE:

STEP 1. Mount one coupling half on motor shaft so that the coupling half and end of key are flush with end of motor shaft. (See Drawing A).

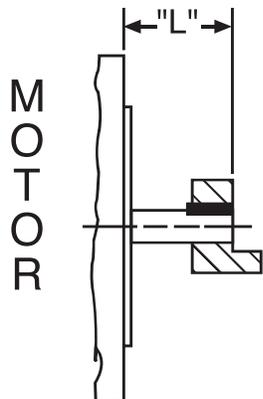
STEP 2. Tighten coupling setscrews. (Thread locking compound is recommended on all coupling setscrews.)

STEP 3. Measure the distance from inner face of coupling to motor mounting surface. (See Drawing A "L").

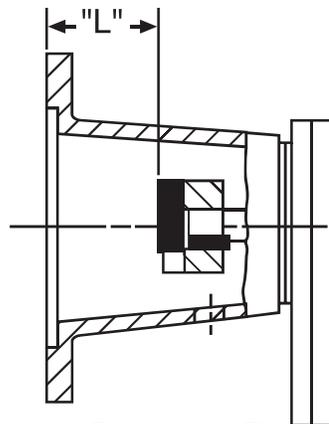
STEP 4. Mount other coupling half on the reducer input shaft so the coupling end measures the same distance "L" to the mounting surface of the "C" flange. (See Drawing B "L")

STEP 5. Tighten setscrews.

Follow the lubrication directions.



Drawing A



Drawing B

Float Switch

Warrick®

Series M Mechanical Tilt Float Switch

Installation and Operation Bulletin

Specifications

Cord	16 gauge, 2 or 3 conductor SJOW, Oil Resistant CPE
Contact Rating	13 amp @ 120/240 VAC, 1/2hp
Contact Design	SPST, Normally Open or Normally Closed, Common with N.O. & N.C. (Form C)
Temperature Rating	32°F (0°C) to 194°F (90°C) Dry and 140°F (60°C) Water Resistant
Overall Weight	1.0 lbs. (not including weight)
Tether Method	Tie-wrap nylon, weight: 2.5 lbs.
Approvals	U.L. Recognized, CSA Certified

Installation

Tether Tie-Wrap (Fig 1)

Attach cord, using a tie-wrap, to a stationary structure. This is known as the tether point, it will determine the pumping range. The farther the float is placed from the tether point, the greater the pumping range. The minimum distance that the float should be placed from the tether point is 3 inches.

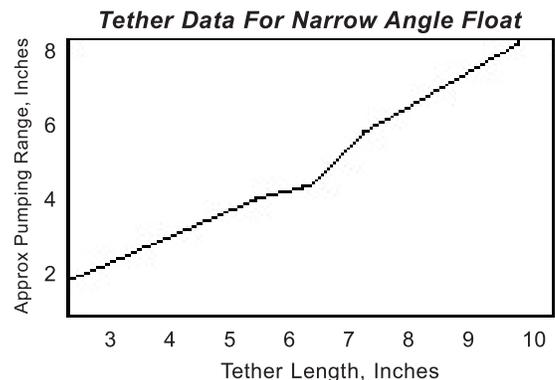
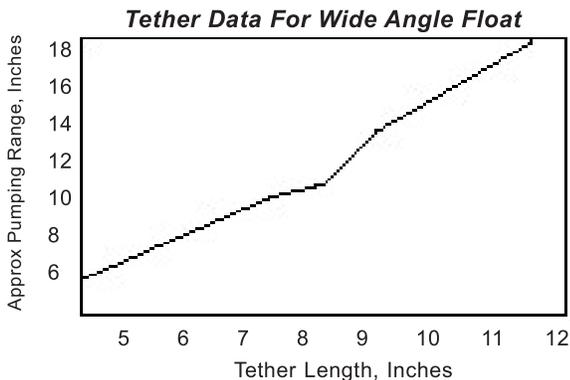
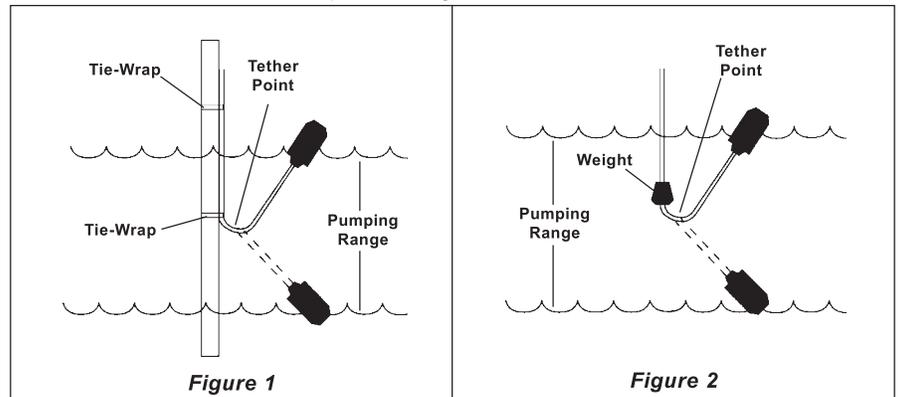
Tether-Weight (Fig 2)

Place tension-brand over the cord before installation. Place the weight at the desired position and secure with the tension-band. This position will determine the pumping range. The farther the float is placed from the tether point, the greater the pumping range. The minimum distance that the float should be placed from the tether point is 3 inches.

Determine tether point using charts below as a reference

Notes:

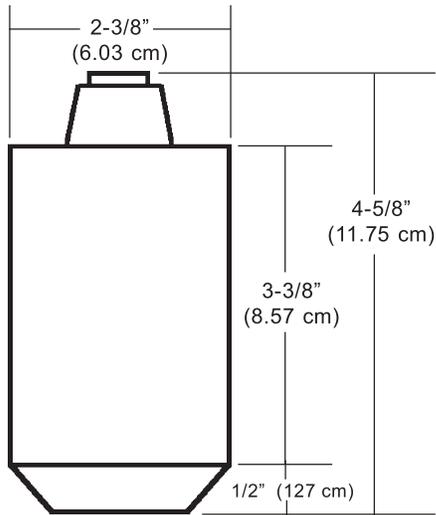
1. To Prevent Motor Burnout - In a pumpdown application make sure the turn-off level is at least 2 inches above the intake of the submersible pump.
2. Securing Tether Points - Make sure levels are correct and that floats are free from any obstructions before securing tether points.



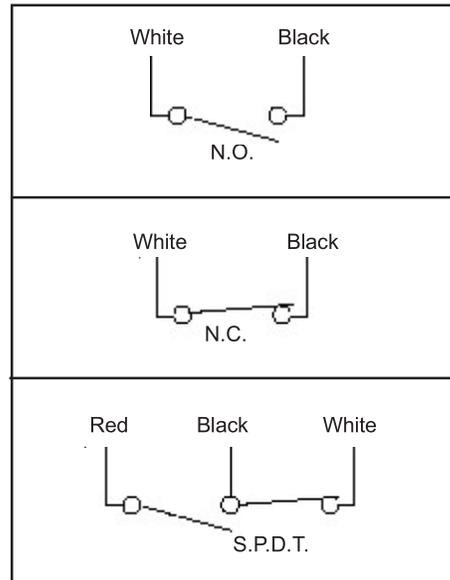
Notes:

1. Narrow angle pumping range is approximately 2 in. to 8 in.
2. Wide angle pumping range is approximately 5 in. to 18 in.

Dimensions



Contact Configurations



Important Points:

- Gems products must be maintained and installed in strict accordance with the National Electrical Code and the applicable Gems Product Instruction Bulletin that covers installation, operation and proper maintenance. Failure to observe this information may result in serious injury or damages.
- For hazardous area applications involving such things as, but not limited to, ignitable mixtures, combustible dust and flammable materials, use an appropriate explosionproof enclosure or intrinsically safe interface device.
- Please adhere to the pressure and temperature limitations shown throughout this catalog for our level and flow sensors. These limitations must not be exceeded. These pressures and temperatures take into consideration possible system surge pressures/temperatures and their frequencies.
- Selection of materials for compatibility with the media is critical to the life and operation of Gems products. Take care in the proper selection of materials of construction, testing is required.
- NSF-approved sensors are made of materials approved for potable water applications according to Standard 61.
- Stainless steel is generally regarded as safe by NSF and FDA.
- Life expectancy of switch contacts varies with application. Contact Gems if life cycle testing is required.
- Ambient temperature changes do affect switch set points, since the gravity of a liquid can vary with temperature.
- Our sensors have been designed to resist shock and vibration. However, shock and vibration should be minimized.
- Filter liquid media containing particulate and/or debris to ensure the proper operation of our products.
- Electrical entries and mounting points in an enclosed tank may require liquid/vapor sealing.
- Our sensors must not be field-repaired.
- Physical damage sustained by product may render it unserviceable.

Return Policy

Returns are accepted on stock items up to 30 days from date of order. You must contact our Returns Department for a Return Authorization (RA) number. Return the goods - freight prepaid - in the original container and include original packing slip. C. O. D. returns are not accepted. Gems reserves the right to apply restocking charges.

Tel: 860-793-4357
Fax: 860-793-4563



Gems Sensors Inc.
One Cowles Road
Plainville, CT 06062-1198
Tel: 860-793-4579
Fax: 860-793-4580

Diverter Valve

(Ship Loose)



Quick-Disconnect Duct and Fittings



Join duct and fittings with quick-release clamps for faster disassembly and cleanout than other duct systems.

304 stainless steel is the most corrosion resistant.

[🔍](#) For technical drawings and 3-D models, click on a part number.

Duct



304 Stainless Steel

Trade Size	ID	Lg.	Gauge	End Construction		Each
8	7 7/8"	59"	22	Rolled	2538K114	\$156.73

[Product Detail](#) [🔍](#)

Quick-Disconnect Duct, 304 Stainless Steel, Trade Size 8

Each

[ADD TO ORDER](#)

In stock

Adjustment Sleeves



Adjustment sleeves extend your duct length. Cut duct, then slide on the sleeve. They include an o-ring for the clamp to grasp.

Adjustment Sleeves

Trade Size	ID	Gauge	Max. Sleeve Extension	End Construction	304 Stainless Steel		Replacement O-Rings	
					Each	Each	Each	Each
8	8"	22	7"	Rolled	2538K124	\$73.45	1761K347	\$5.05

Clamps



304 Stainless Steel

Trade Size		Each
8	2538K134	\$37.27

[Product Detail](#) [🔍](#)

Each

[ADD TO ORDER](#)

In stock

Trade Size 8 304 Stainless Steel Clamp for Quick-Disconnect Duct

90° Elbow Connectors



B

304 Stainless Steel

Trade Size	ID	End Construction	Style	Gauge		Each
8	7 7/8"	Rolled	B	22	2538K144	\$436.73

45° Elbow Connectors



B

304 Stainless Steel

Trade Size	ID	End Construction	Style	Gauge		Each
8	7 7/8"	Rolled	B	22	2538K154	\$267.45

30° Elbow Connectors



B

304 Stainless Steel

Trade Size	ID	End Construction	Style	Gauge		Each
8	7 7/8"	Rolled	B	22	2538K164	\$235.64

Tee Connectors



Tee connectors join or split runs of duct.

304 Stainless Steel

Trade Size	ID	Gauge	End Construction		Each
8	7 7/8"	22	Rolled	2538K754	\$381.45

90° Wye Connectors



Wye connectors join or split runs of duct.

304 Stainless Steel

Trade Size	ID	Gauge	End Construction		Each
8	7 7/8"	22	Rolled	2538K701	\$482.11

45° Wye Connectors



Wye connectors join or split runs of duct.

304 Stainless Steel

Trade Size	ID	Gauge	End Construction	Each
8	7 7/8"	22	Rolled	2538K692 \$362.81

Reducers

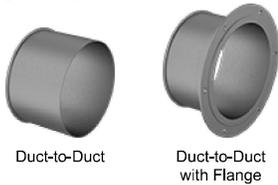


Reducers connect duct with different diameters.

304 Stainless Steel

Trade Size (A)	Trade Size (B)	ID (A)	ID (B)	Gauge	End Construction	Each
8	6	7 7/8"	5 7/8"	22	Rolled	2538K709 \$146.55
10	8	9 7/8"	7 7/8"	22	Rolled	2538K711 169.45
12	8	12"	7 7/8"	22	Rolled	2538K712 202.91

Straight Adapters



Duct-to-Duct

Duct-to-Duct with Flange



Duct-to-Hose

Adapters join quick-disconnect duct to other duct systems. **Duct-to-duct adapters** connect to standard and spiral duct. **Duct-to-duct with flange adapters** provide a secure connection between duct. [Duct flanges](#) are also available. **Duct-to-hose adapters** are slightly undersized. Slide hose over the adapter and hold it in place with a [hose clamp](#) (not included).

304 Stainless Steel

Trade Size	ID	Gauge	End Construction	Each
Duct-to-Duct				
8	7 7/8"	22	Rolled	2538K174 \$90.36

[Product Detail](#)

Trade Size 8 304 Stainless Steel Duct-to-Duct Adapter for Quick-Disconnect Duct

Each

In stock

Duct-to-Duct with Flange				
8	7 7/8"	22	Rolled	2538K184 161.64
Duct-to-Hose				
8	7 7/8"	22	Rolled	2538K194 91.64

Airflow Dampers



Airflow dampers regulate airflow.

304 Stainless Steel

Trade Size	ID	Gauge	End Construction	Blade Material	Each
8	8"	22	Rolled	304 Stainless Steel	2538K674 \$214.00

Blast Gates



Blast gates stop airflow when closed.

304 Stainless Steel

Trade Size	ID	End Construction	Each
8	7 15/16"	Rolled	2538K254 \$225.28

Tee Saddles

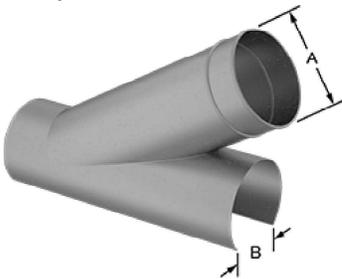


Saddles add a branch to an existing run of duct. Cut a hole in the duct and fit the saddle over the hole.

304 Stainless Steel

Trade Size	(A)	(B)	ID	Gauge	End Construction	Each
6	8	5 7/8"	22	Rolled	2538K232	\$160.00

30° Wye Saddles



Saddles add a branch to an existing run of duct. Cut a hole in the duct and fit the saddle over the hole.

304 Stainless Steel

Trade Size	(A)	(B)	ID	Gauge	End Construction	Each
6	8	5 7/8"	22	Rolled	2538K222	\$160.00

End Caps



304 Stainless Steel

Trade Size	ID	Gauge	End Construction	Each
8	7 7/8"	22	Rolled	2538K683 \$64.46

Standard Duct and Fittings



No need for clamps or connectors—duct and fittings press-fit together. Male ends are crimped or tapered, making them slightly smaller than a female end for simple assembly.

304 stainless steel is more corrosion resistant than steel and aluminum.

For technical drawings and 3-D models, click on a part number.

Duct



Open Duct

Closed Duct

Open duct can be cut with snips prior to installation. The seam snaps together without tools. **Closed duct** is stronger than open duct because it has a seam that is already locked in place.

304 Stainless Steel

Trade Size	Female ID	Male OD	Gauge	End Construction		2 ft.	3 ft.	5 ft.
Open Duct								
8	8"	7 7/8"	26	Crimped	1767K6	—	\$100.13	\$148.56
Closed Duct								
8	8"	7 7/8"	24	Crimped	18005K5	\$65.06	—	120.48

90° Elbow Connectors



Connectors with **welded seams** prevent leaks.

304 Stainless Steel

Trade Size	Female ID	Male OD	Features	End Construction	Gauge	Each	
8	8"	7 7/8"	Welded Seams	Tapered	20	17805K77	\$329.88

45° Elbow Connectors



45° Elbow Connector with Welded Seams

Connectors with **welded seams** prevent leaks.

304 Stainless Steel

Trade Size	Female ID	Male OD	Features	End Construction	Gauge	Each	
8	8"	7 7/8"	Welded Seams	Tapered	20	17805K57	\$262.07

Adjustable-Angle Elbow Connectors, 90° Elbow to Straight



Adjustable-angle elbow connectors can be used at an angle or straight.

304 Stainless Steel

Trade Size	Female ID	Male OD	Gauge	End Construction	Each	
8	8"	7 7/8"	26	Crimped	1767K26	\$75.73

Tee Connectors

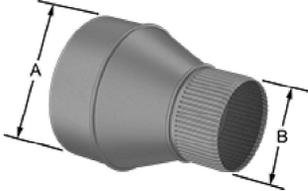


Female x Female x Male

Tee connectors join or split runs of duct.

Trade Size	Female ID	Male OD	Gauge	End Construction	304 Stainless Steel	Each
Female x Female x Male						
8	8"	7 7/8"	26	Crimped	1767K57	\$105.27

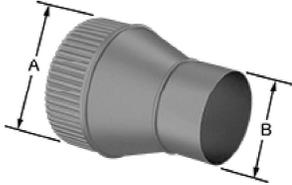
Straight Reducers, Female x Male



Reducers connect duct with different diameters.

Trade Size (A)	Trade Size (B)	Female ID (A)	Male OD (B)	End Construction	Gauge	304 Stainless Steel	Each
8	4	8"	3 7/8"	Crimped	26	1767K83	\$71.60
8	6	8"	5 7/8"	Crimped	26	1767K84	73.42
10	8	10"	7 7/8"	Crimped	26	1767K86	82.95

Straight Reducers, Male x Female



Reducers connect duct with different diameters.

Trade Size (A)	Trade Size (B)	Male OD (A)	Female ID (B)	End Construction	Gauge	304 Stainless Steel	Each
8	6	7 7/8"	6"	Crimped	26	1767K73	\$73.42
10	8	9 7/8"	8"	Crimped	26	1767K75	81.60
12	8	11 7/8"	8"	Crimped	26	1767K76	92.69

Airflow Dampers, Female x Male



Airflow dampers control airflow through duct.

Trade Size	Female ID	Male OD	Gauge	End Construction	Blade Material	304 Stainless Steel	Each
Standard							
8	8"	7 7/8"	26	Crimped	304 Stainless Steel	1767K886	\$149.27

Straight Collars



Male

Collars create branches from a rectangular duct. Cut a hole in the duct and use a collar to attach standard duct.

Trade Size	Male OD	End Construction	Gauge	304 Stainless Steel	Each
Male					
8	7 7/8"	Crimped	26	1767K775	\$53.05

Rain Caps



304 Stainless Steel

304 Stainless Steel

Trade Size	Female ID	End Construction	Gauge		Each
8	8"	Plain	26	1767K36	\$71.78

End Caps



Female

304 Stainless Steel

Trade Size	Female ID	Gauge	End Construction		Each
Female 8	8"	26	Plain	1767K66	\$53.21

Crush-Resistant Spiral Duct and Fittings



A spiral seam makes this duct strong and rigid. Fittings have male ends with a slightly smaller diameter to press-fit into duct. **304 stainless steel** is more corrosion resistant than steel.

[View](#) For technical drawings and 3-D models, click on a part number.

Duct



304 Stainless Steel

Trade Size	Female ID	End Construction	Gauge		2 ft.	5 ft.
8	8"	Plain	24	2561K813	\$49.21	\$109.35

90° Elbow Connectors



304 Stainless Steel

Trade Size	Male OD	Gauge	End Construction		Each
8	7 7/8"	20	Plain	2561K17	\$131.44

45° Elbow Connectors



304 Stainless Steel

Trade Size	Male OD	Gauge	End Construction		Each
8	7 7/8"	20	Plain	2561K22	\$100.20

Straight Connectors



Male

Male straight connectors are required to connect two pieces of duct.

304 Stainless Steel

Trade Size	Male OD	End Construction	Gauge		Each
Male					
8	7 7/8"	Plain	24	2561K35	\$28.85

Straight Reducers



Reducers connect duct with different diameters.

304 Stainless Steel

Trade Size	Male OD	End Construction	Gauge		Each
(A) (B)	(A) (B)				
8 6	7 7/8" 5 7/8"	Plain	20	2561K29	\$81.95
10 8	9 7/8" 7 7/8"	Plain	20	2561K32	\$88.25

End Caps



Male

304 Stainless Steel

Trade Size	Male OD	Gauge	End Construction		Each
Male					
8	7 7/8"	24	Plain	2561K26	\$56.72

Duct Flanges

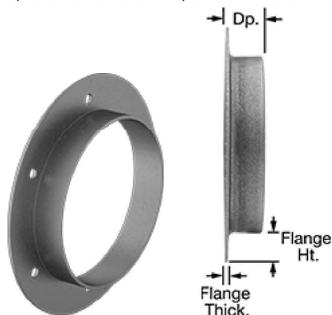
Bolt flanges to equipment to start a run of duct. They can also create secure connections between two duct ends by mounting a flange to each end and then joining the flanges.

Steel, galvanized steel, and 304 stainless steel flanges are also known as angle rings.

304 stainless steel flanges are more corrosion resistant than steel.

For technical drawings and 3-D models, click on a part number.

Steel, Galvanized Steel, and 304 Stainless Steel



Steel, Galvanized Steel, and 304 Stainless Steel

304 Stainless Steel

Trade Size	Female ID	Overall Dp.	Ht.	Thick.	Fasteners Included	Mounting No. of Holes	Hole Dia.	Connection Type		Each
8	8 1/8"	1 1/4"	1 1/4"	1/8"	No	6	3/8"	Press Fit	1734K26	\$40.00

Weld-On Duct Flanges



Weld flanges to equipment to start a run of duct. They can also create secure connections between two duct ends by mounting a flange to each end and then joining the flanges. Also known as **304 stainless steel** flanges are more corrosion resistant than steel.

 For technical drawings and 3-D models, click on a part number.

Trade Size	Female ID	Overall Dp.	Flange		Connection Type	304 Stainless Steel	
			Ht.	Thick.		Part No.	Each
8	8 1/8"	1 1/4"	1 1/4"	1/8"	Press Fit	1734K16	\$40.00

High-Temperature Chimney Vents and Fittings

Built to withstand temperatures up to 1000° F, these vent pipes and fittings are for use with boilers, furnaces, stoves, and other equipment that is fired by gas, oil, wood, or coal.

To join pipes and connectors, twist a male end into a female end and secure with the included locking band.

Pipe



Trade Size	Female ID	Male OD	Gauge	Construction	Insulation Thick.	Specifications Met	304 Stainless Steel	
							18" Lg.	36" Lg.
8	8"	10"	28	Double Wall	1"	UL Listed	1716K17 \$136.19	1716K137 \$256.96

Tee Connectors



Trade Size	Female ID	Male OD	Gauge	Construction	Insulation Thick.	Includes	Specifications Met	304 Stainless Steel	
								Part No.	Each
8	8"	10"	28	Double Wall	1"	Locking Band, Removable Cap	UL Listed	1716K27	\$395.20

Rain Caps



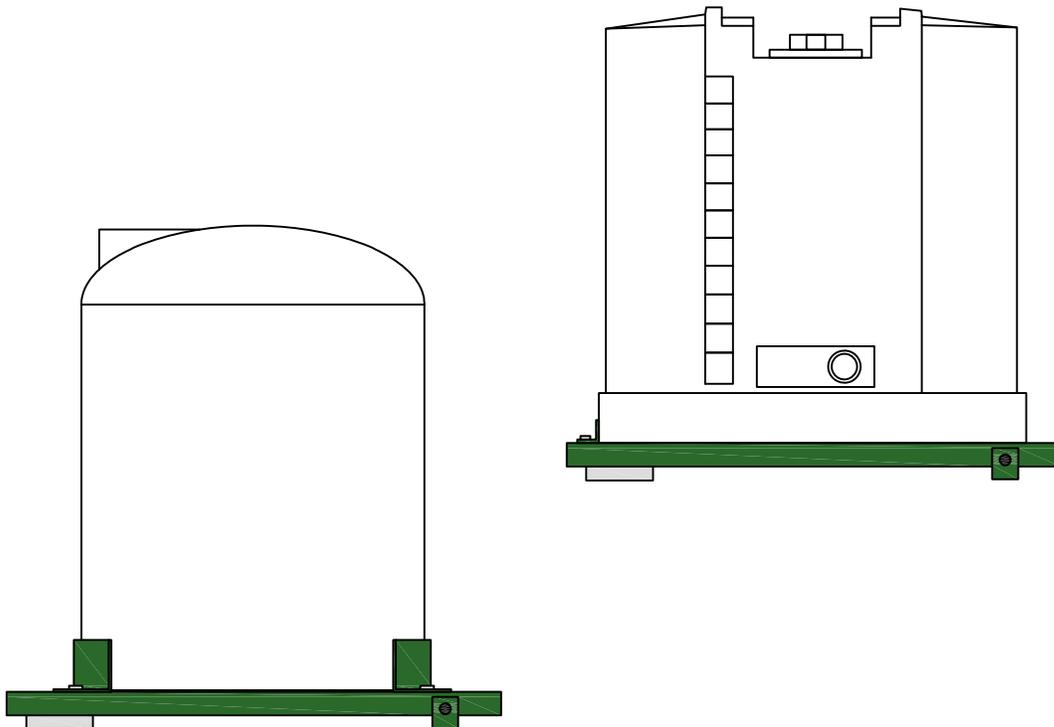
Trade Size	Gauge	Specifications Met	304 Stainless Steel	
			Part No.	Each
8	28	UL Listed	1716K47	\$153.13

Tank Weigh Scale (Ship Loose)

CHEM - SCALE & TOTE SCALE

PLACE MODEL
STICKER HERE

INSTALLATION & OPERATION MANUAL



WARNING!

READ THIS ENTIRE MANUAL BEFORE INSTALLING THIS PRODUCT!

CHEM - SCALE & TOTE SCALE

INSTALLATION & OPERATION MANUAL

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Tank Installation	2
Tote Installation	3
Hazardous Location	4
Warranty	5

INSTALLATION

PLATFORM & LOAD CELL

CAUTION: For proper operation and to avoid possible damage to the scale or injury to yourself, you **MUST** install these items in the following Step-by-Step manner. The scale platform and indicator should be installed within 15 ft of each other unless special load cell cable length has been ordered. Contact factory for distance limitations and additional cable if needed.

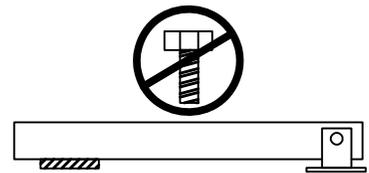
STEP 1: INSTALL LOAD CELL

A. Position platform in location where it is to be installed. **DO NOT ANCHOR PLATFORM YET!**

CHEM-SCALE: Whenever possible, position platform so process piping will connect to the tank over the hinged side of the platform to minimize chance of friction error.

TOTE-SCALE: Position platform so tote will be loaded/unloaded over hinged side of the platform (See Figure 5, page 3).

DO NOT ANCHOR YET !



B. Position the load cell beneath platform as shown (Figure1). Seat the load button in the indent on the underside of platform.

C. Carefully pivot the platform up and off of the load cell so as not to disturb the load cell location. Mark the load cell anchor holes (Figure 2), install anchors and secure load cell to floor.

D. Route the load cell cable to indicator through conduit or in a manner that will prevent damage to the cable and not create a trip and fall hazard to personnel.

Figure 1

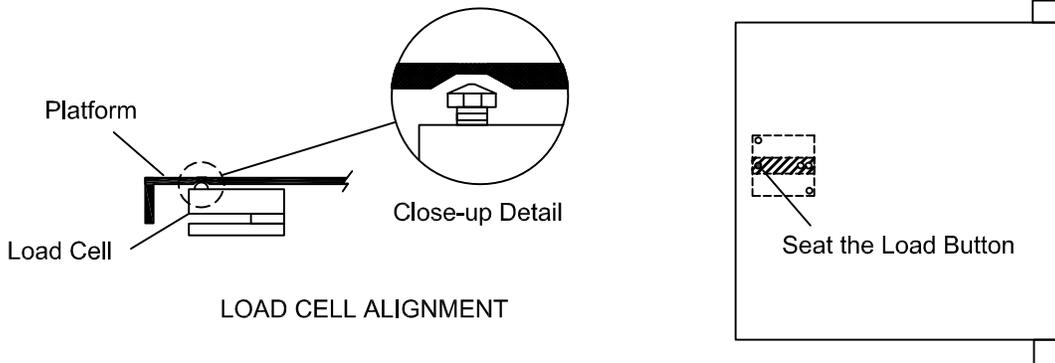
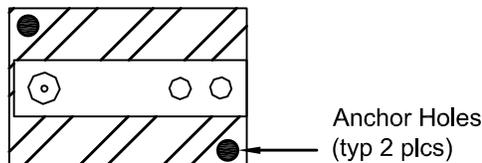


Figure 2



INSTALLATION cont...

STEP 2: INSTALL PLATFORM

- A. Lower the platform onto the load cell. Center the load button in the indent on the underside of platform. Make sure hinge feet lay flat on floor.
- B. Mark hinge anchor holes (Figure 3), install anchors and secure platform to floor.
- C. After anchors installed, verify platform pivots up and down freely on hinges and that load button is still centered in indent on underside of platform. If load button not centered in indent, field calibration of indicator may be required.
- D. For best scale accuracy, level the platform from hinge feet to load cell (front to back) by adjusting load cell load button height. Shims can be placed under hinge feet or load cell base plate if required. Side to side level not critical for scale accuracy.

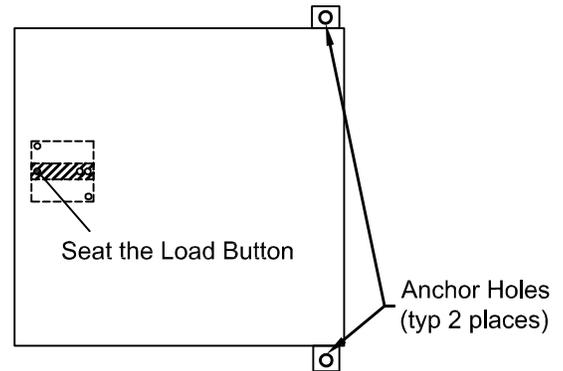


Figure 3

STEP 3: INSTALLING A TANK (for CHEM-SCALE, see STEP 4 for TOTE SCALE)

- A. Center the tank on the platform.

NOTE: TANK MUST BE CENTERED ON PLATFORM FOR ACCURATE WEIGHT MEASUREMENT WHEN USING FACTORY CALIBRATION. IF "X" DISTANCES ARE NOT EQUAL (SEE DWG), FIELD CALIBRATION WILL BE REQUIRED. "Y" DISTANCES ARE NOT REQUIRED TO BE EQUAL.

- B. Place the (4) tank restraint clips into position so they are pressing against the tank. Apply silicone sealant to the bolt threads before installing the bolts. Tighten bolts to secure the tank in place.

NOTE: If using alternate set of clip mounting holes, remove set screws, apply silicone sealant to threads and reinstall in the other set of clip mounting holes.

- C. Process piping should connect to the tank from the hinged side of the platform to reduce friction.

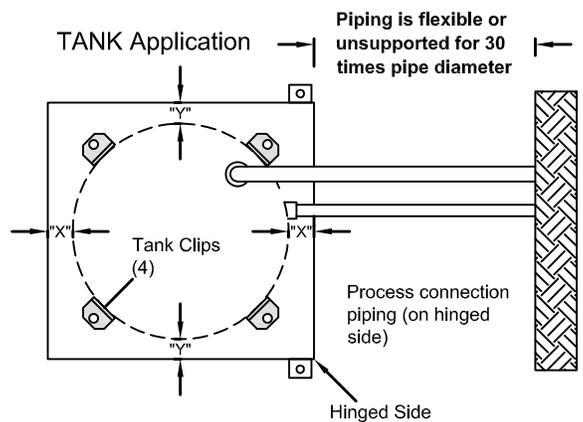


Figure 4

- NOTE: 1) Flexible couplings are HIGHLY recommended to ensure scale accuracy.
- 2) Rigid pipe connections (without flexible couplings) must have a minimum distance from the tank connection to the first pipe support of 30 times the pipe diameter. (ie. 1" pipe requires 30" minimum from the tank connection to the first pipe support. 2" pipe requires 60" etc.)

INSTALLATION cont...

STEP 4: INSTALLING A TOTE (for TOTE SCALE, see STEP 3 for CHEM-SCALE)

A. Center the container on the platform.

NOTE: TANK / TOTE MUST BE CENTERED ON PLATFORM FOR ACCURATE WEIGHT MEASUREMENT WHEN USING FACTORY CALIBRATION. IF "X" DISTANCES ARE NOT EQUAL (FIGURE 5), FIELD CALIBRATION WILL BE REQUIRED. "Y" DISTANCES ARE NOT REQUIRED TO BE EQUAL.

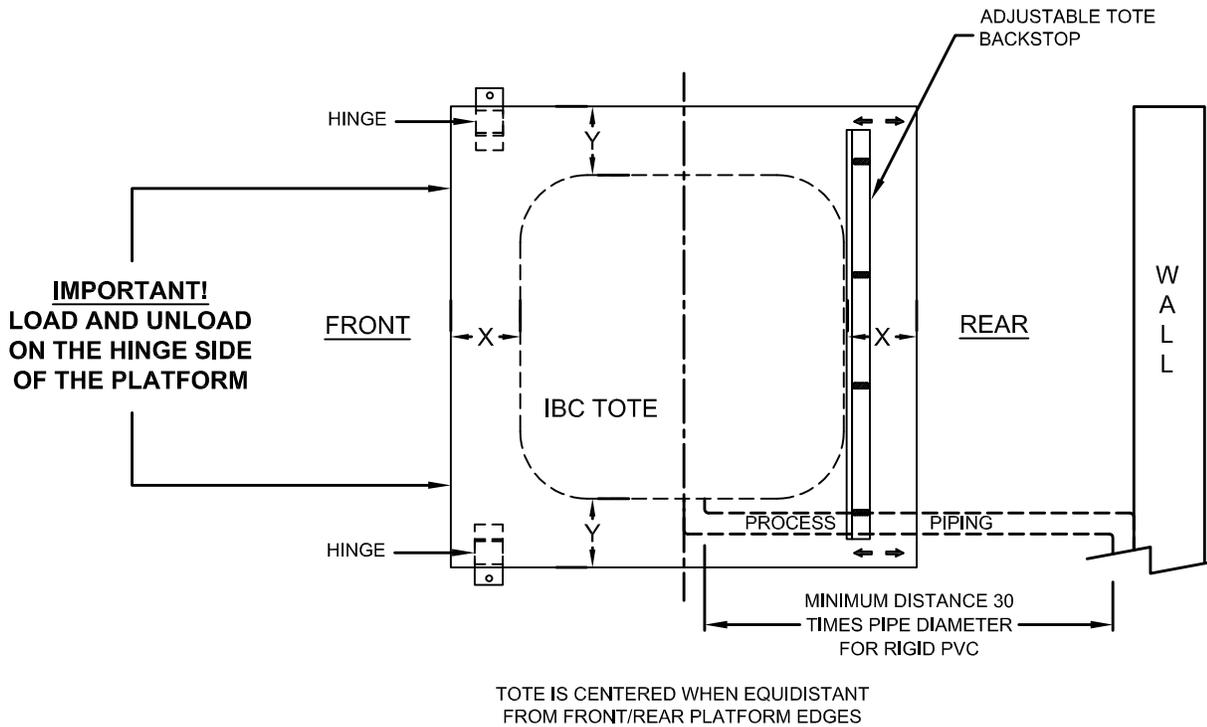


Figure 5

B. Remove backstop bolts and slide backstop firmly against Tank/Tote. Apply silicone sealant to the bolt threads before installing the bolts. Tighten bolts to secure backstop in place.

NOTE: 1) If using alternate set of backstop mounting holes, remove set screw, apply silicone sealant to threads and reinstall in the other set of mounting holes.
2) Adjust backstop only if Tank/Tote size changes.

C. Connect process piping.

NOTE: 1) Flexible couplings are HIGHLY recommended to ensure scale accuracy.

2) Rigid pipe connections (without flexible couplings) must have a minimum distance from the tank connection to the first pipe support of 30 times the pipe diameter. (ie. 1" pipe requires 30" minimum from the tank connection to the first pipe support. 2" pipe requires 60" etc.)

WARNINGS & CAUTIONS

- Refer to local building codes for hazardous location restrictions.
- Anchor platform in level location.
- Anchor platform with building code approved fasteners.

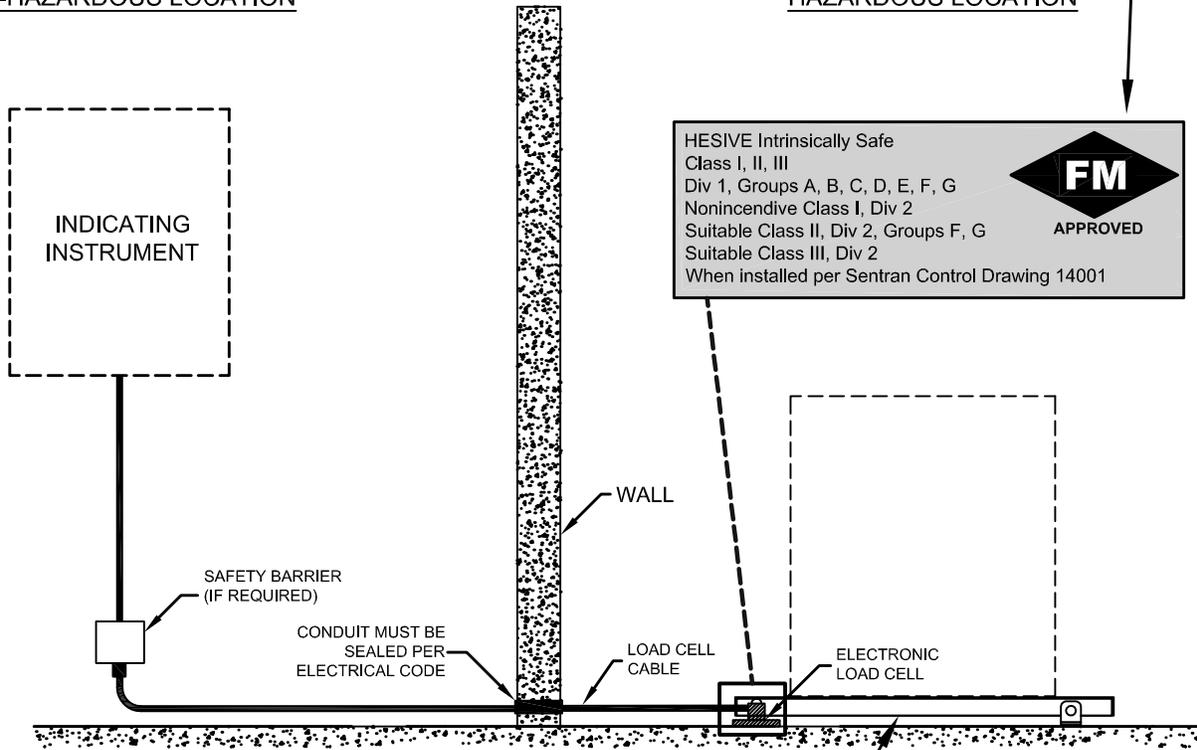
Indicator is not approved for use in hazardous locations. If your installation constitutes an explosive or combustible environment, please consult factory for safety precautions.

For further technical information or for applications engineering assistance, please contact Force Flow at 925-686-6700, 1-800-893-6723, info@forceflow.com.

For hazardous locations, verify electronic load cell(s) furnished with your scale have the following label to meet safety requirements.

NON-HAZARDOUS LOCATION

HAZARDOUS LOCATION



NOTE: EXAMPLE ONLY - Your scale may look different than the unit pictured.

FORCE FLOW

COMMITTED TO CUSTOMER SERVICE & PRODUCT SUPPORT

From the initial writing of a specification through the installation and operation of the equipment, 100% satisfaction is our goal. At Force Flow, we know that a superior customer service and support team is crucial to the success of our company.

PERFORMANCE GUARANTEE

With the purchase of every Force Flow product comes our performance guarantee. If you are unhappy about the performance of one of our products in your chlorination or chemical feed application, you may request a performance guarantee from the selling distributor. Under the performance guarantee, if within 30 days of the original installation you are not completely satisfied with the performance of the Force Flow product, you may return or exchange it for the full purchase price. To qualify, all performance guarantees must be pre-approved by the factory service manager before returning the equipment to the factory.

WARRANTY

Force Flow warrants its hydraulic and electronic scales (including accessories), for a period of Five (5) Years. If a failure occurs within said period, the warranty extends from the date of Force Flow's shipment, and liability is limited to repayment of the purchase price, repair or replacement of the equipment. All warranty work must be returned to the factory or a warehouse designated by Force Flow.



WARRANTY

TECHNICAL & APPLICATION SUPPORT

Force Flow factory engineers have strong technical backgrounds with many years of process weighing experience in both chlorine and chemical feed applications. If you require technical information, application support or help with a custom project, please contact an application engineer on our HELP HOTLINE 1-800-893-6723 USA/Canada or email info@forceflow.com. Also, see our website at www.forceflow.com

SERVICE

Our policy is to get all repairs, warranty work and retrofits completed and shipped within 48 hours of their arrival at the factory. Trained technicians and a large parts inventory make this happen. We understand that there is nothing more frustrating than sending something back to the manufacturer and wondering when you will see it again. 2-Day turnaround on repairs -- that is our policy! For prompt service, call our TOLL FREE HELP HOTLINE at 1-800-893-6723.

**Scale Indicator, Dual Channel
(Ship Loose)**

SOLO G2[®] INDICATOR

INSTALLATION & OPERATION MANUAL



WARNING!

REVIEW THIS ENTIRE MANUAL BEFORE INSTALLING THIS PRODUCT!

SOLO G2[®] INDICATOR

INSTALLATION & OPERATION MANUAL

TABLE OF CONTENTS

<u>DESCRIPTION</u>	<u>PAGE</u>
Single Channel Wiring	1
Dual Channel Wiring	2
Installation Checklist	3
Operation Instructions	4
Specification Sheet	11
Warnings & Cautions	12
Warranty	13
Certifications	14

SOFTWARE VERSION PR413

SINGLE CHANNEL ONLY SOLO G2 INDICATOR INSTALLATION & WIRING

- ▶ ALWAYS SHUT OFF MAIN POWER, BEFORE OPENING FRONT OF CASE !! ALWAYS FOLLOW LOCK OUT TAG OUT PROCEDURES !!
- ▶ INDICATOR IS NOT APPROVED FOR USE IN HAZARDOUS LOCATIONS. IF YOUR INSTALLATION CONSTITUTES AN EXPLOSIVE OR COMBUSTIBLE ENVIRONMENT, CONSULT FACTORY AND SEE PRECAUTIONS ON PAGE 12.
- ▶ LOAD CELL CONNECTORS HAVE SCREW-TYPE TERMINALS TO ASSIST IN CONNECTING WIRES. REMOVE THE CONNECTOR FROM THE BOARD BEFORE ATTACHING WIRES.

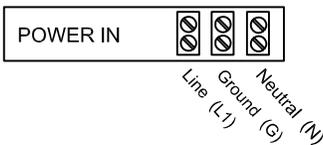


NOTE: Number in black circles refer to corresponding numbers on drawing below.

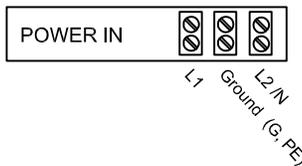
1 POWER HOOK-UP

TURN OFF MAIN POWER BEFORE CONNECTING !! Use a dedicated, surge protected circuit. DO NOT connect any other inductive loads, relays, etc. to this power line ! Resulting power surges can damage the electronics !!! Use far left bottom port and connect per following: (NOTE: Use 1/2" conduit connector).

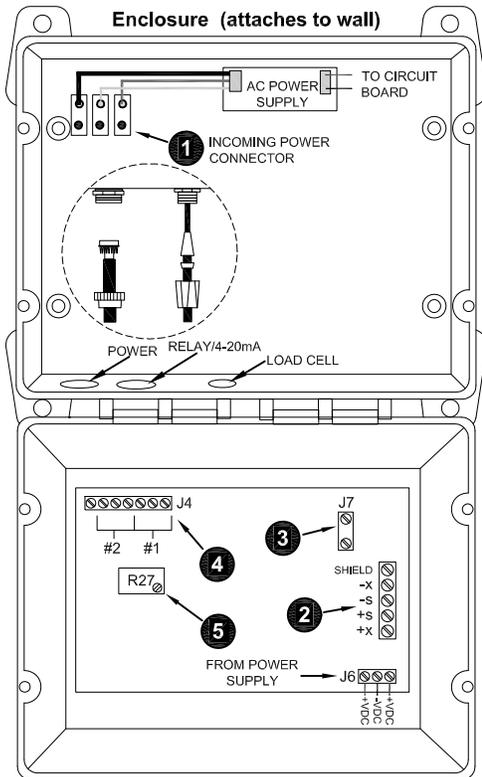
100 VAC-120 VAC



100 VAC-240 VAC (FACTORY OPTION)



12-24 VDC (FACTORY OPTION)

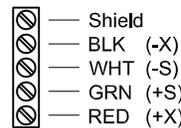


Enclosure cover swings down
NOTE: Single Channel SOLO G2

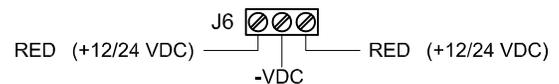
2 LOAD CELL/SENSOR

- ⚠ SHARING CONDUIT
Load cell and sensor cable may share conduit. DO NOT share conduit with any other wires or cables.
- ⚠ TRIMMING/EXTENDING CABLE
Field calibration may be required for best accuracy after trimming excess load cell cable. For additional cable length, contact factory.

SCALE LOAD CELL



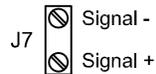
ULTRASONIC



3 4-20mA SIGNAL (J7)

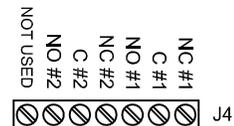
DO NOT USE EXTERNAL LOOP POWER !!
Output is internally powered.
Max loop resistance: 900 Ohms.

DESCRIPTION



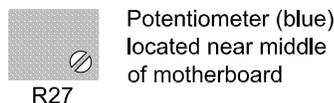
4 SET POINT/ALARM RELAYS (OPTIONAL)

Up to four (4) optional relays are available. FORM C, Dry Contact, 2A @ 30 VDC, 0.5A @ 120 VAC. See page 2 for Relay 3 & 4 location and wiring.



5 DISPLAY VIEW ANGLE ADJUSTMENTS

When indicator cannot be mounted at eye level, adjust display sharpness using the 30-turn, no stop potentiometer R27.



DUAL CHANNEL ONLY SOLO G2 INDICATOR INSTALLATION & WIRING

- ▶ ALWAYS SHUT OFF MAIN POWER, BEFORE OPENING FRONT OF CASE !! ALWAYS FOLLOW LOCK OUT TAG OUT PROCEDURES !!
- ▶ INDICATOR IS NOT APPROVED FOR USE IN HAZARDOUS LOCATIONS. IF YOUR INSTALLATION CONSTITUTES AN EXPLOSIVE OR COMBUSTIBLE ENVIRONMENT, CONSULT FACTORY AND SEE PRECAUTIONS ON PAGE 12.
- ▶ LOAD CELL CONNECTORS HAVE SCREW-TYPE TERMINALS TO ASSIST IN CONNECTING WIRES. REMOVE THE CONNECTOR FROM THE BOARD BEFORE ATTACHING WIRES.

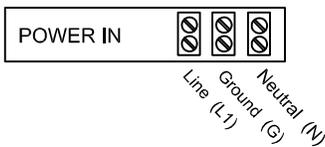


NOTE: Number in black circles refer to corresponding numbers on drawing below.

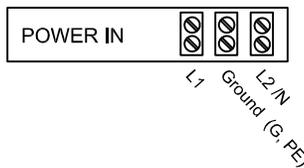
1 POWER HOOK-UP

TURN OFF MAIN POWER BEFORE CONNECTING !! Use a dedicated, surge protected circuit. DO NOT connect any other inductive loads, relays, etc. to this power line ! Resulting power surges can damage the electronics !!! Use far left bottom port and connect per following: (NOTE: Use 1/2" conduit connector).

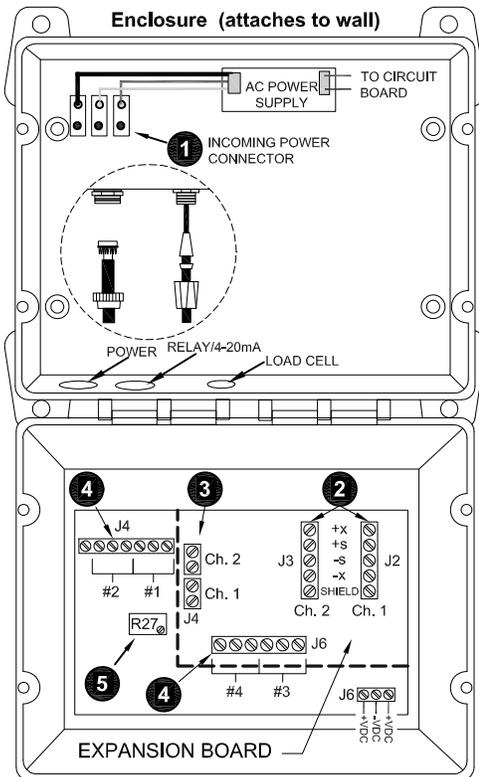
100 VAC-120 VAC



100 VAC-240 VAC (FACTORY OPTION)



12-24 VDC (FACTORY OPTION)



Enclosure cover swings down
NOTE: Dual Channel SOLO G2

2 LOAD CELL/SENSOR



SHARING CONDUIT

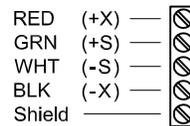
Load cell and sensor cable may share conduit. DO NOT share conduit with any other wires or cables.



TRIMMING/EXTENDING CABLE

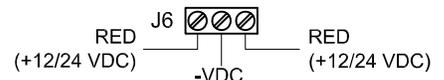
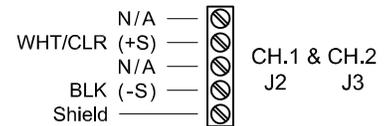
Field calibration may be required for best accuracy after trimming excess load cell cable. For additional cable length, contact factory.

SCALE LOAD CELL



CH.1 & CH.2
J2 J3

ULTRASONIC



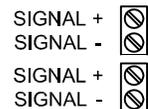
3 4-20mA OUTPUTS

DO NOT USE EXTERNAL LOOP POWER !!

Output is internally powered.

Max loop resistance: 900 Ohms.

J4 ON EXPANSION BOARD



4 SET POINT/ALARM RELAYS (OPTIONAL)

Up to four (4) optional relays are available. FORM C, Dry Contact, 2A @ 30 VDC, 0.5A @ 120 VAC.

RELAYS 1 & 2 (J4) MOTHERBOARD



RELAYS 3 & 4 (J6) EXPANSION BOARD



5 DISPLAY VIEW ANGLE ADJUSTMENTS

When indicator cannot be mounted at eye level, adjust display sharpness using the 30-turn, no stop potentiometer R27.



R27

SOLO G2
2

SOLO G2 INSTALLATION CHECKLIST

CAUTION: STATIC ELECTRICITY PROTECTION

CAUTION should be observed whenever enclosure is open to avoid damage by static electricity. DO NOT touch any of the circuit board, other than the intended contacts noted in these instructions. Carpets, especially, can build up static electricity.

CAUTION: LIGHTNING - SURGE PROTECTION

Be sure that all power coming into the facility is sufficiently protected from transient lightning strikes and power surges. Improper protection may void your warranty.

1. MOUNT INDICATOR

- Mount at eye level if possible.
- DO NOT mount indicator in direct sunlight to avoid long term UV damage to keypad.

2. WIRE INDICATOR - TURN OFF ALL POWER BEFORE WIRING !

- ALWAYS follow standard "LOCK-OUT", "TAG-OUT" procedures.
- Connect dedicated, clean, surge protected power circuit through 1/2" conduit connector.
- Connect load cell cable or sensor cable through 1/4" cord connector. (pre-wired at factory)
- Connect 4-20mA outputs.
- Connect optional relays.
- Power up indicator.
- Adjust display view angle if indicator is not mounted at eye level.

3. SEAL INDICATOR ENCLOSURE TO MAINTAIN 4X RATING !!!

- Tighten all four (4) door screws to maintain NEMA 4X seal on box.
- Check all cord connectors for tight seal.
- Check all 1/2" conduit connectors for tight seal.

4. FORMAT INDICATOR

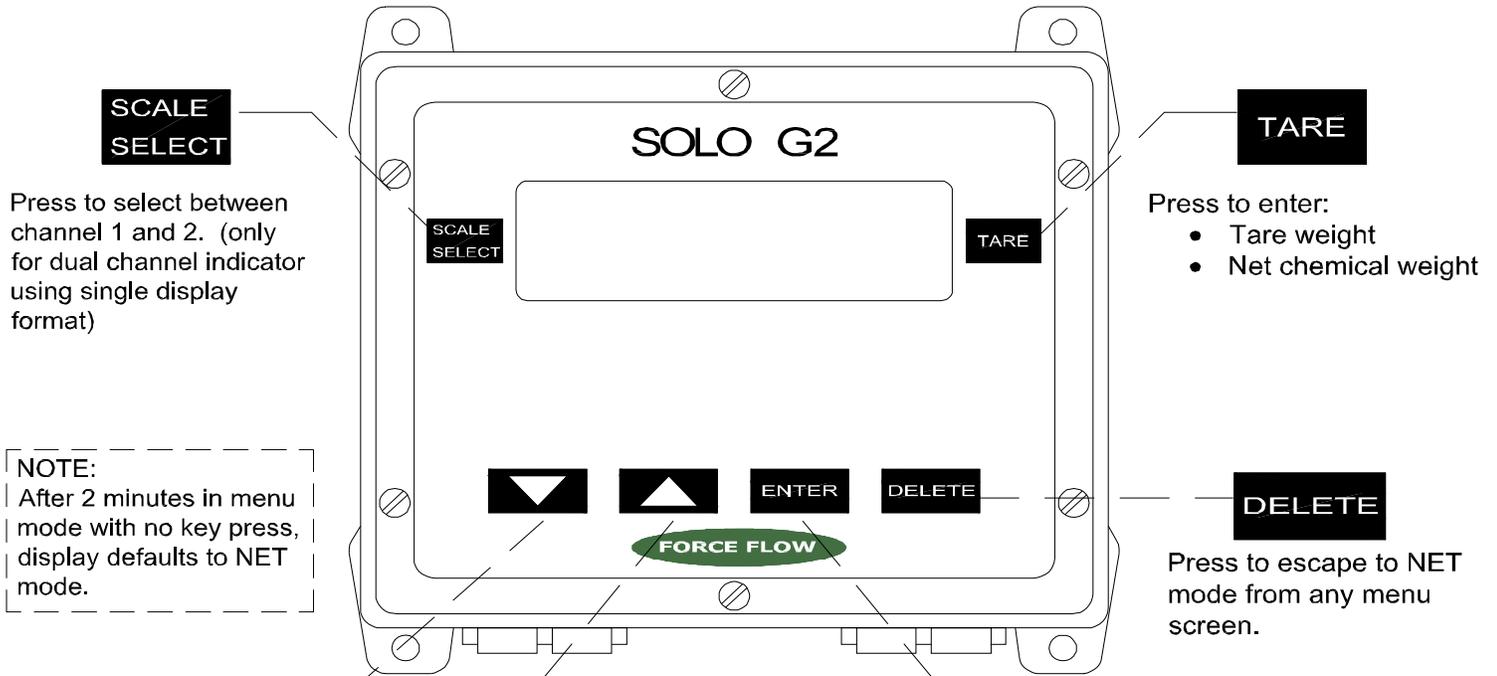
- Check all current settings in USER menus. Make changes as needed for your specific application.

5. SET SCALE ZERO (MENU ITEM 2, "SET ZERO")

6. REVIEW MENU ITEM 8, "DIAGNOSTICS"

- Go to VIEW/SET FACTORS and write the new ZERO COUNTS number in space provided on label located on inside of enclosure door for future reference.

OPERATING INSTRUCTIONS



Use **ARROW** keys to:

- Enter menu
- Move asterisk
- Adjust numerical values

NOTE: While pressing arrow key, momentarily press other arrow key to increase scroll speed. Repeat to increase further.



Press **ENTER** to:

- Access menu item
- Accept changes
- Advance to next screen

TARE

Step 1

SELECT CHANNEL	↓↑
NUMBER	1

Step 2

SELECT MODE	
*NET	TARE

If NET chosen:

Step 3

#1 CHEMICAL	
NET =	200.0

If TARE chosen:

Step 4

#1 CHEMICAL	
TARE =	200.0

Press **TARE** key to set tare weight of tank or net contents.
(Does not apply to ultrasonic systems)

(Step 1 not used on single channel indicator). Use **▼▲** keys to toggle to desired channel.
Press **ENTER** to advance to Step 2.

Use **▼▲** keys to select. **NET** allows you to scroll in the amount of chemical on your scale. **TARE** allows you to scroll in the tare weight of your container.
Press **ENTER** to advance to Step 3 or Step 4.

Use **▼▲** keys to scroll in **NET** amount. (#1 indicates channel selected).
Press **ENTER** to store changes.
(To speed up the scroll, simultaneously tap the other arrow key.)

Use **▼▲** keys to scroll in **TARE** weight. (#1 indicates channel selected).
Press **ENTER** to store changes.
(To speed up the scroll, simultaneously tap the other arrow key.)

SOLO G2 INDICATOR

USER MENU

(Press **▼▲** to enter Menu)

The "USER MENU" has 9 menu items. These are functions that are used during equipment start-up, or if your chemical operation has changed.

Use **▼▲** keys to scroll through the menu items. Press **ENTER** key to access selected menu item. Press **DELETE** key to escape from any place in the menu.

NOTE: After 2 minutes, indicator will "time out" to NET mode if no key is pressed.

DIGITAL DISPLAY:

1 DISPLAY UNITS

ACTION REQUIRED:

This function allows you to select how your chemical will be displayed. Weight (lbs or kgs) or Volume (gallons or liters).

■■■CAL■■■

Step 1

#1 DISPLAY UNITS
***WT VOL**

Use **▼▲** to select WT (lb/kg) or VOL (gal/L) as display units.

If WT is selected at, press **ENTER** to advance to Menu Item 2 "SET ZERO".

If VOL is selected, press **ENTER** to advance to Step 2 below.

■■■LTRA O IC■■■

Step 1

#1 DISPLAY UNITS
***WT VOL**

Use **▼▲** to select WT (lb/kg) or VOL (gal/L) as display units.
Press **ENTER** to advance to Step 1a below.

Step 1a

#1 TANK DIA
INCHES = 64.2

Use **▼▲** to enter inside tank diameter to calibrate sensor to tank.

If WT is selected, press **ENTER** to advance to Step 2 below.

If VOL is selected, press **ENTER** to advance to Menu Item 2, "SET ZERO".

Step 2

#1 SPEC GRAVITY
NUMBER = 1.132

Use **▼▲** to enter specific gravity of chemical.
Press **ENTER** to advance to Menu Item 2, "SET ZERO".

USER MENU Cont...

DIGITAL DISPLAY:

2 SET ZERO

Step 1 **USER MENU** ↓↑ 2
SET ZERO

Step 2 **ARE YOU SURE?**
*NO YES

Step 3 **SELECT CHANNEL** ↓↑
NUMBER = 1

Step 4 **TNK/SCALE EMPTY?**
*NO YES

NOTE: TANK DOES NOT HAVE TO BE EMPTY in order to accurately set zero. If tank is NOT empty, weight of chemical currently in tank (scale) or height of chemical currently in tank (ultrasonic sensor) must be known.

Step 5 **#1 MIN CAL VALUE**
LBS = 0.00

ACTION REQUIRED:

Allows user to "zero" the scale or sensor when scale or tank is empty. If tank is not empty but weight of chemical in tank is known, SET ZERO allows user to adjust display to read this known weight.

Press **ENTER** to advance to Step 2.

If "NO" is selected, press **ENTER** to advance to Menu Item 3 "DISPLAY FORMAT".

If "YES" is selected, press **ENTER** to advance to Step 3.

(NOT FOUND ON SINGLE CHANNEL INDICATOR) Scroll through available channels using **▼▲**. Press **ENTER** to select scale or sensor channel number and advance to Step 4.

Is Tank or Scale empty? Use **▼▲** keys to select YES or NO.

If "YES" is selected press **ENTER** to zero the scale and advance to Menu Item 3 "DISPLAY FORMAT".

If "NO" is selected press **ENTER** to advance to Step 5.

Use **▼▲** keys to scroll to content weight or height.

Then press **ENTER** to store changes and advance to Menu Item 3 "DISPLAY FORMAT".

3 DISPLAY FORMAT

Step 1 **USER MENU** ↓↑ 3
DISPLAY FORMAT

Step 2 **SELECT FORMAT** ↓↑
* SINGL DUAL

Step 3 **AUTO SCAN ?**
* NO YES

Step 4 **ALTERNATING TIME**
SECONDS = 6

Configure how many channels are displayed simultaneously, and whether the auto scan is engaged.

Press **ENTER** key to advance to Step 2.

If the SOLO G2 is set up for only 1 channel, this section is not accessible.

Selecting "single" displays net weight on top line and bar display on bottom. Selecting "dual" displays channel #1 NET on top line and channel #2 NET on the bottom line.

Use **▼▲** keys to to select. Then press **ENTER** :

If Single is selected, advances to Step 3.

If Dual is selected, advances to Menu Item 4 "FILTER BAND".

If AUTO SCAN is activated the SOLO G2 will automatically scan both channels without the operator having to touch any keys.

If "NO" is selected, advances to Menu Item 4 "FILTER BAND".

If "YES" is selected, advances to Step 4.

Use **▼▲** keys to to select. Press **ENTER** to advance.

Allows you to set the scan time period in seconds from one channel to the next.

Use **▼▲** keys to select. Press **ENTER** to store changes and advance to Menu Item 4 "FILTER BAND".

USER MENU Cont...

DIGITAL DISPLAY:

4 FILTER BAND

Step 1

USER MENU ↓↑ 4
FILTER BAND

Step 2

#1 FILTER BAND
WEIGHT = 0.70

ACTION REQUIRED:

Allows you to steady a fluctuating display. This function will only help smooth out fairly rapid fluctuations. Slow, long term fluctuations (over minutes or hours), will likely not be corrected by changing the filter value. Contact factory for assistance in correcting slow, long term display fluctuations.

Press **ENTER** to advance to Step 2.

Increase value to increase filtering. For example, if the display is rapidly jumping +/- 5.0, increase the value to slightly greater than 5.0, such as 6.0, to smooth out displayed reading. As the filter value increases, the display may take longer to reflect sudden weight changes.

Use **▼▲** keys to increase or decrease value. Then press **ENTER** :
If Single channel, advances to Menu Item 5 "MOTION BAND".
If Dual channel, allows adjustment of channel 2.

5 MOTION BAND

Step 1

USER MENU ↓↑ 5
MOTION BAND

Step 2

#2 MOTION BAND
WEIGHT = 0.7

Menu operations such as ZERO and FIELD CALIBRATION require the SOLO G2 in certain steps to store a weight value before moving to the next step. MOTION BAND determines how steady the weight reading is required to be before the SOLO G2 accepts the value and continues on. The greater the value, the greater the fluctuation allowed.

Press **ENTER** to advance to Step 2.

Changing this value alters the required signal stability which could lead to inaccurate field calibration and zero adjustment. Please consult factory before adjusting this value.

USER MENU Cont...

DIGITAL DISPLAY:

ACTION REQUIRED:

6 CONFIG 4-20mA OUT/BARGRAPH

Allows you to set full scale value (20mA) to span output and bar graph. Includes 4-20mA trim function.

Step 1 **USER MENU** ↓↑ 6
CONFIG 4-20/BAR

Press **ENTER** to advance to Step 2.

Step 2 **# OF 4-20 PORTS**
2 ACTIVE

Momentarily displays number of active 4-20mA ports, then automatically advances to Step 3.

Step 3 **C1 FULL SCALE** ↓↑
WEIGHT = XXXX

Use **▼▲** keys to scroll to value you would like 20mA and 100% on bar graph to equal. 4mA is always equal to zero. (Set USER MENU 3, "DISPLAY FORMAT", TO *SINGL to display bar graph).

Example **# 1 NET 150.2 LB**
E■■■■■■■ F

Press **ENTER** to store changes and advance to Step 4.

Step 4 **TRIM OUTPUT NOW?**
***NO YES**

Allows user to trim 4mA & 20mA using a multimeter. Use **▼▲** Keys to select. Then press **ENTER** to advance.

If NO chosen:

If "NO" is selected, you will advance to channel 2, or Menu Item 7 "ALARMS/SETPOINTS".

If YES chosen:

Step 5 **1 TRIM 4 mA**
REF # = 11111

Use **▼▲** keys to change value, then press **ENTER** to advance to Step 6.

Step 6 **1 TRIM 20 mA**
REF # = 11111

Use **▼▲** keys to change value, then press **ENTER** to store changes and advance to channel 2, (repeat Steps 5 & 6 for additional ports), or Menu Item 7 "ALARMS/SETPOINTS".

7 ALARMS/SETPOINTS

This function allows you to choose the value at which you want your optional alarms/set points to trigger.

Step 1 **USER MENU** ↓↑ 7
ALARMS/SETPOINTS

Press **ENTER** to advance to Step 2.

Step 2 **#1 RELAY SCALE**
NUMBER = _____

Use **▼▲** keys to scroll to the scale number of your first set point. Then press **ENTER** to advance to Step 3.

Step 3 **#1 SETPT TYPE**
***LOW HIGH**

Select set point type using **▼▲** keys. Press **ENTER** to store changes and advance to Step 4.

LOW - for descending alarm/set point.
HIGH - for ascending alarm/set point.

Step 4 **#1 SETPT VALUE**
LBS = 125

Use **▼▲** keys to scroll to the value that you wish the relay to trigger. The relay trips when the displayed reading corresponds to this point. Press **ENTER** to store changes and advance to Step 5.

NOTE: Units based on selection in MENU 2, "DISPLAY UNITS".

Step 5 **#1 SETPT DISPLAY**
***NO YES**

Use **▼▲** keys to choose if you want Alarm/Set Points shown on display. Press **ENTER** to return to Step 2 if unit has more than one relay, or to Menu Item 8 "DIAGNOSTICS".

Example **SCALE ALARM**
1HI 2LO

Alternates every few seconds with main NET display.

USER MENU Cont...

DIGITAL DISPLAY:

ACTION REQUIRED:

8 DIAGNOSTICS

This function is used for troubleshooting, and is usually used by a factory trained technician. Contact a Force Flow technician at 800-893-6723 (or 925-686-6700) for assistance.

Step 1 **USER MENU** ↓↑ 8
DIAGNOSTICS

Press **ENTER** to advance to Step 2.
Press **DELETE** to exit to NET screen.
Use **▼▲** keys to scroll to other menu items.

Step 2 **VIEW/SET FACTORS**
***NO YES**

VIEW/SET FACTORS: View or change current zero and span factors. Choose "NO" to advance to Step 7. Choose "YES" to advance to Step 3 (Dual Channel), Step 4 (Single Channel).

Step 3 **SELECT CHANNEL** ↓↑
NUMBER = 1

DUAL CHANNEL ONLY
Use **▼▲** keys to select channel.
Press **ENTER** to advance to Step 4.
Press **DELETE** to advance to Step 7.

Step 4 **#1 ZERO COUNTS**
NUMBER = 23281

ZERO COUNTS is a reference number that corresponds to the current zero location of the channel. After zeroing the channel using MENU 2, SET ZERO, record this new **ZERO COUNTS** number on the label inside the enclosure for future reference. To restore zero, use **▼▲** keys to enter the value you recorded on the label, then press **ENTER** to store.

ADJUST FACTOR?
***NO YES**

If **▼▲** is pressed to adjust **ZERO COUNTS**, warning is displayed. If "YES" is selected and **ENTER** is pressed, **ZERO COUNTS** is displayed again and adjustment can then be made. If "NO" is selected and **ENTER** is pressed, advances to Step 5.

Step 5 **#1 MIN CAL VALUE**
NET = 0.0

MIN CAL VALUE refers to NET amount entered if tank/scale not empty when channel zeroed, or existing amount in tank or on scale when field calibration begun. **DO NOT ADJUST WITHOUT FACTORY ASSISTANCE.**

Step 6 **#1 SPAN FACTOR**
NUMBER = 2.32423

SPAN FACTOR is a reference number that corresponds to the current calibration of the channel. After the channel is calibrated at the factory, the **SPAN FACTOR** is recorded on the label inside the enclosure for future reference. If the channel is re-calibrated in the field, this factor will change. To restore factory calibration, use **▼▲** keys to enter the value recorded on the label, then press **ENTER** to store.

ADJUST FACTOR?
***NO YES**

If **▼▲** is pressed to adjust factor, warning is displayed. If "YES" is selected and **ENTER** is pressed, **SPAN FACTOR** is displayed again and adjustment can then be made. If "NO" is selected and **ENTER** is pressed, advances to Step 7.

Step 7 **RAW A/D READINGS**
***NO YES**

RAW A/D READINGS allows you to view raw A/D counts which can be useful in determining if processor is running. If "YES" is selected and **ENTER** is pressed, advances to Step 8. If "NO" is selected and **ENTER** is pressed, advances to Step 9.

If YES chosen:

Step 8 **3282 5970**

Raw A/D values displayed.
Press **ENTER** or **DELETE** to advance to Step 9.

Channel Layout:

(Ch #1) (Ch #2)

USER MENU Cont...

DIGITAL DISPLAY:

ACTION REQUIRED:

8 DIAGNOSTICS (Cont...)

Step 9

READ BASE UNITS	
*NO	YES

BASE UNITS: View current NET value in units of measure that SOLO G2 uses for background operations. SCALE=WEIGHT (lb or kg), ULTRASONIC=DISTANCE (inches or cm). If "YES" is selected and **ENTER** is pressed, advances to Step 10. If "NO" is selected and **ENTER** is pressed, advances to USER MENU 9, "FIELD CALIBRATION".

Step 10

333 LB	555 IN
---------------	---------------

BASE UNITS displayed. Press **ENTER** or **DELETE** to advance to USER MENU 9, "FIELD CALIBRATION".

Channel Layout:

(Ch #1)	(Ch #2)
---------	---------

9 FIELD CAL

Your indicator has been factory calibrated. This function allows you to field calibrate your indicator by setting the zero and span with known weights or values.

Step 1

USER MENU	↓↑	9
FIELD CAL		

Press **ENTER** to advance to Step 2.

Step 2

DEL FACTORY CAL		↓↑
*NO	YES	

If "NO" is selected, advances to Menu Item 1 "DISPLAY UNITS". If "YES" is selected, advances to Step 3.

Use **▼▲** keys to select. Press **ENTER** to advance.

Step 3

SELECT CHANNEL	↓↑
NUMBER =	1

Use **▼▲** keys to select which Channel to calibrate. Press **ENTER** to advance to Step 4.

Step 4

TANK / SCALE EMPTY?	
*NO	YES

Use **▼▲** to select. If "NO", press **ENTER** to advance to Step 5. If "YES", press **ENTER** to advance to Step 6.

Step 5

#1 MIN CAL VALUE	
LBS =	_____

Use **▼▲** to enter starting value ("0" if tank or scale empty). Press **ENTER** to store value and advance to step 6.

Step 6

#1 APPLY MAXIMUM THEN PRESS ENTER	
--	--

Apply weight or fill with known amount. When finished, press **ENTER** to advance to Step 7.

Step 7

#1 ENTER MAX. VAL	
LBS =	100.0

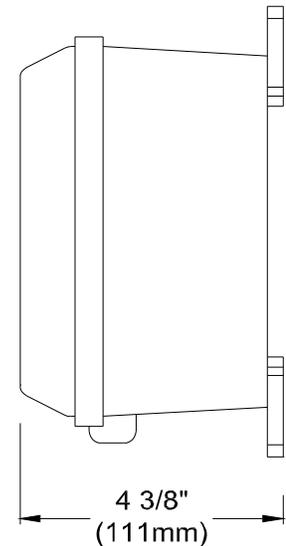
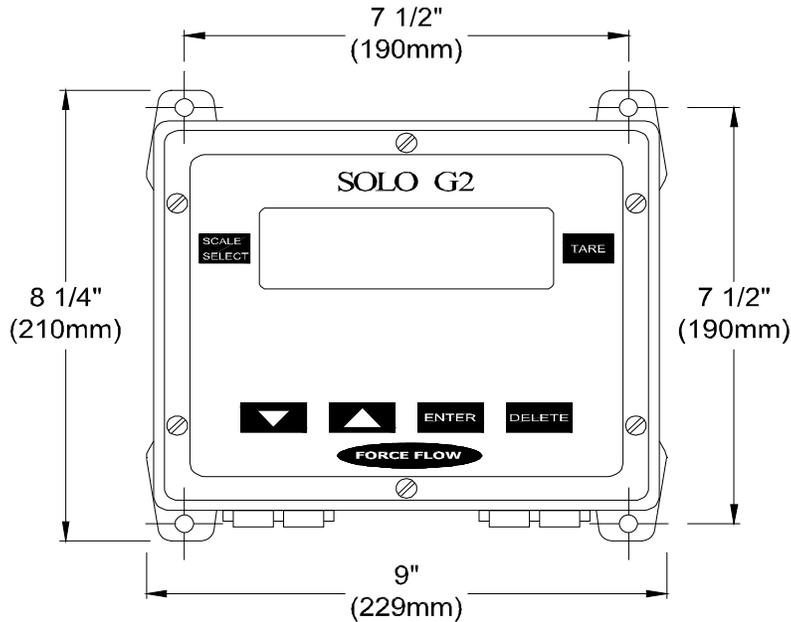
Use **▼▲** to enter amount added in previous step. Press **ENTER** to store value and advance to Step 8.

Step 8

CALIBRATE MORE?	
*NO	YES

Use **▼▲** keys to select. Press **ENTER** to advance. (Select "NO" to exit. Select "YES" to return to Step 3 and calibrate other channel).

SOLO G2 SPECIFICATION SHEET



SPECIFICATIONS for SOLO G2 INDICATOR

Channels: 1 or 2

Input: (1) or (2) 350 ohms Load Cells or 4-20mA signals

Output: 4-20mA (Source Signal)

Increments: 0.1, 0.2, 0.5, 1, 2, 5

Display 2 lines, 16 digits, LCD, 0.4" character

Tare Adjustment: Push button scroll

Operating Temperature: 32-122 degree F, 0-50 degrees C

Power: 110-120 VAC, 50/60 Hz

(220 VAC 50/60 Hz available upon request)

(12-24 VDC operation available upon request-power to be supplied by others)

Connectors: Power and output: 1/2" nylon conduit connectors

Load Cell: 1/2" nylon cord connector

Enclosure: NEMA 4X, UL listed, structural foam molded enclosure

Accuracy: Overall system accuracy 0.1% - 0.25% full scale

MODEL NUMBERS:

SRG2-1 (Single Channel)

SRG2-2 (Dual Channel)

OPTIONS:

LEVEL ALARM / SET POINTS:

The SOLO features four (4) optional adjustable set point relays, that can be used for alarm or control applications. The relays are Form C, Dry Contacts rated at 2A at 30 VDC, 0.5A at 120 VAC.

HAZARDOUS AREA INSTALLATION -WARNINGS & PRECAUTIONS-

- Refer to local building codes for hazardous location restrictions.
- Anchor platform in level location.
- Anchor platform with building code approved fasteners.

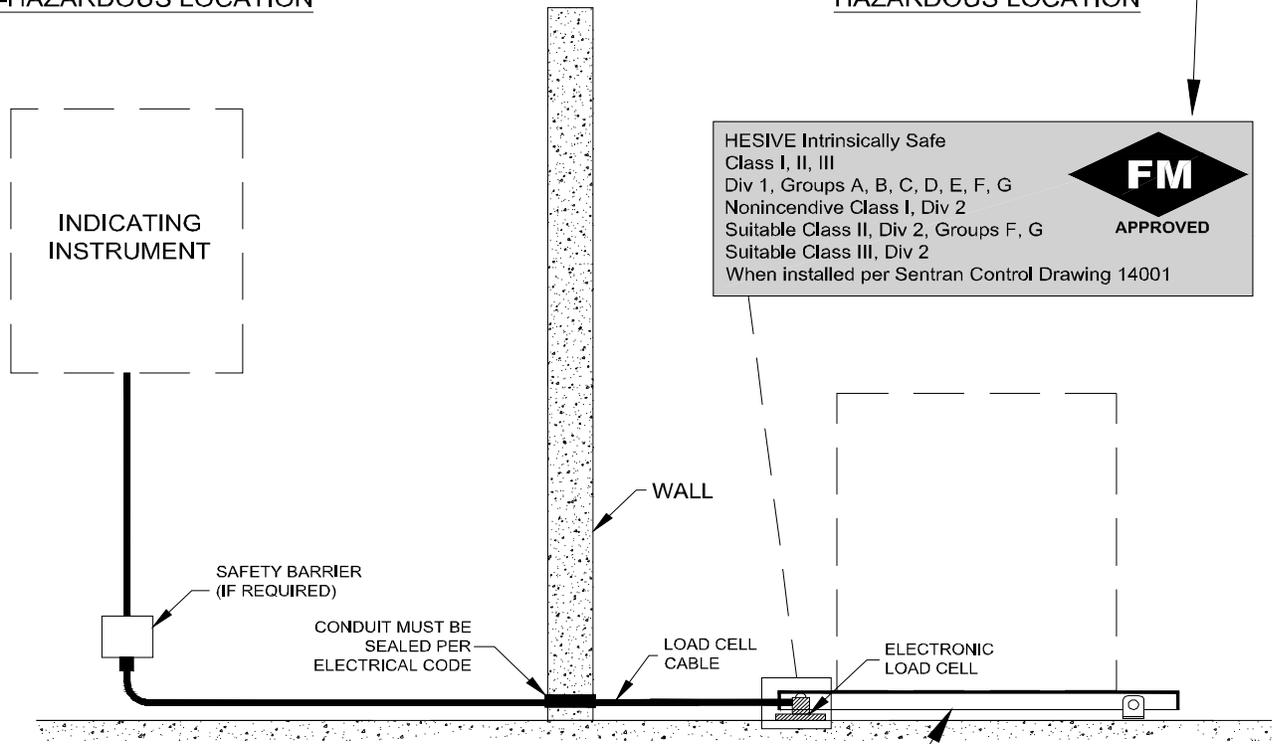
Indicator is not approved for use in hazardous locations. If your installation constitutes an explosive or combustible environment, please consult factory for safety precautions.

For further technical information or for applications engineering assistance, please contact Force Flow at 925-686-6700, 1-800-893-6723, info@forceflow.com.

For hazardous locations, verify electronic load cell(s) furnished with your scale have the following label to meet safety requirements.

NON-HAZARDOUS LOCATION

HAZARDOUS LOCATION



NOTE: EXAMPLE ONLY - Your scale may look different than the unit pictured.



COMMITTED TO CUSTOMER SERVICE PRODUCT SUPPORT

From the initial writing of a specification through the installation and operation of the equipment, 100% satisfaction is our goal. At Force Flow, we know that a superior customer service and support team is crucial to the success of our company.

PERFORMANCE WARRANTY

If the purchase of ever-flow product comes with our performance guarantee, you are automatically covered by the performance guarantee of one of our products in our chlorination or chemical feed application, you may request a performance guarantee from the selling distributor under the performance guarantee, if it is in the date of the original installation you are not completely satisfied with the performance of the ever-flow product, you may return or exchange it for the full purchase price. To qualify, all performance guarantees must be pre-approved by the factory service manager before returning the equipment to the factory.

WARRANTY

Ever-flow warrants all scale, ultrasonic sensor and indicator against defect in material and workmanship under normal use for a period of 5 years. If a defect arises and a valid claim is received within the warranty period, at its option, Ever-flow will either 1) repair the defective equipment at no charge, or 2) exchange the product for a product that is new or re-und under the purchase price of the product. All warranty claims must be returned to factory. Contact factory or Return Merchandise Authorization (RMA).

TECHNICAL APPLICATION SUPPORT

Ever-flow factory engineers have strong technical background with an emphasis on chlorine and chemical feed application experience. If you require technical information, application support or help with a custom project, please contact an application engineer on our HELP HOTLINE 1-800-727-2272 in Canada or email info@forceflow.com. Also, see our website at www.forceflow.com.



SERVICE

Our policy is to get all repair, warranty work and retrofit completed and shipped within our 24-hour arrival at the factory. Trained technicians and a large parts inventory make it possible for us to understand that there is nothing more frustrating than ending up with a back to the manufacturer and wondering when you will see it again. 2-Day turnaround on repair that is our policy. For more service, call our TOLL FREE HELP HOTLINE at 1-800-727-2272.

2000 Tanhill Dr, Concord, CA 95020-0000A

www.forceflow.com info@forceflow.com

1-800-727-2272 fax 925-727-2271



2430 STANWELL DRIVE, CONCORD, CA 94520 USA
Phone (925) 686-6700 Fax (925) 686-6713
info@forceflow.com www.forceflow.com

DECLARATION OF CONFORMITY

APPLICATION OF COUNCIL DIRECTIVE: 89/336/EEC

Standards To Which Conformity Is Declared:

EN50081-1:1992
EN55022 Class B
EN61000-3-2
EN61000-3-3

EN50082-1:1998
EN61000-4-2
EN61000-4-3
ENV50204
EN61000-4-4
EN61000-4-5
EN61000-4-6
EN61000-4-8
EN61000-4-11

Manufacture's Name: Force Flow
Manufacture's Address: 2430 Stanwell Drive
Concord, CA 94520
(925) 686-6700, Fax (925) 686-6713
Equipment Description: Industrial Scale
Equipment Class: Generic-Light Industrial
Product: SOLO G2
Model SRG2

I the undersigned, hereby declare that the equipment specified above, conforms to the Directive(s) and Standard(s).

Place: Concord, California 94520
Full Name: John K. Galloway
Position: VP/ General Manager



DECLARATION OF CONFORMITY

APPLICATION OF COUNCIL DIRECTIVE: 2006/95/EG (formerly 72/23/EEC)

Standards To Which Conformity is Declared:	EN 61010-1:1993
Manufacture's Name:	Force Flow
Manufacture's Address:	2430 Stanwell Drive Concord, CA 94520 (925) 686-6700 Fax (925) 686-6713
Equipment Description:	Industrial Scale
Equipment Class:	Class 1
Product:	SOLO G2
Model Numbers:	Model SRG2

I the undersigned, hereby declare that the equipment specified above, conforms to the Directive(s) and Standard(s).

Place:	Concord, California 94520
Full Name:	John K. Galloway
Position:	VP/ General Manager

Control Panel Components

Harmony ST6

User Manual

EIO0000003527_03
07/2022

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As standards, specifications, and designs change from time to time, information contained in this guide may be subject to change without notice.

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As part of a group of responsible, inclusive companies, we are updating our communications that contain non-inclusive terminology. Until we complete this process, however, our content may still contain standardized industry terms that may be deemed inappropriate by our customers.

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Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in death** or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in death** or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About This Book

Document Scope

This manual describes how to use this product.

Validity Note

This documentation is valid for this product.

The technical characteristics of the devices described in the present document also appear online. To access the information online, go to the Schneider Electric home page.

www.se.com

The characteristics presented in the present document should be the same as those that appear online. In line with our policy of constant improvement we may revise content over time to improve clarity and accuracy. In the event that you see a difference between the document and online information, use the online information as your reference.

Registered Trademarks

Microsoft® and Windows® are registered trademarks of Microsoft Corporation in the United States and/or other countries.

Product names used in this manual may be the registered trademarks owned by the respective proprietors.

Related Documents

You can download the manuals related to this product, such as the software manual, from our website.

www.se.com

Product Related Information

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Remove all power from the device before removing any covers or elements of the system, and prior to installing or removing any accessories, hardware, or cables.
- Unplug the power cable from both this product and the power supply prior to installing or removing the product.
- Always use a properly rated voltage sensing device to confirm power is off where and when indicated.
- Replace and secure all covers or elements of the system before applying power to this product.
- Use only the specified voltage when operating this product. This product is designed to use 24 Vdc. Always check whether your device is DC powered before applying power.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER**POTENTIAL FOR EXPLOSION**

- Do not use this product in hazardous environments.
- Do not connect or disconnect this product unless power has been switched off or the area is known to be non-hazardous.
- Do not attempt to install, operate, modify, maintain, service, or otherwise alter this product except as permitted in this manual.
- Confirm that the USB cable has been attached with the USB cable clamp before using the USB interface.
- Use the USB (micro-B) interface for temporary connection only during maintenance and setup of the device.

Failure to follow these instructions will result in death or serious injury.

Critical alarm indicators and system functions require independent and redundant protection hardware and/or mechanical interlocks.

When you cycle power, wait at least 10 seconds after it has been turned off. If this product is restarted too quickly, it may not operate correctly.

In the event the screen cannot be properly read, for example, if the backlight is not functioning, it may be difficult or impossible to identify a function. Functions that may present a hazard if not immediately executed, such as a fuel shut-off, must be provided independently of this product. The machine's control system design must take into account the possibility of the backlight no longer functioning and the operator being unable to control the machine or making mistakes in the control of the machine.

⚠ WARNING**LOSS OF CONTROL**

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.
- Each implementation of this product must be individually and thoroughly tested for proper operation before being placed into service.
- The machine control system design must take into account the possibility of the backlight no longer functioning and the operator being unable to control the machine, or making errors in the control of the machine.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

▲ WARNING**UNINTENDED EQUIPMENT OPERATION**

- The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter, and apply this product.
- Follow all applicable safety standard, local regulations and directives.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

▲ WARNING**UNINTENDED EQUIPMENT OPERATION**

- Do not use this product as the only means of control for critical system functions such as motor start/stop or power control.
- Do not use this equipment as the only notification device for critical alarms, such as device overheating or overcurrent.
- Use only the software provided with this product. If you use other software, please confirm its operation and safety before use.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The following characteristics are specific to the LCD panel and are considered normal behavior:

- LCD screen may show unevenness in the brightness of certain images or may appear different when seen from outside the specified viewing angle. Extended shadows, or Crosstalk (like extended shadows) may appear on the LCD screen.
- LCD screen may contain black or white colored spots (dead pixels) and the color display may seem to change as time elapses.
- When experiencing vibrations within a certain frequency range and vibration acceleration is above what is acceptable, the LCD screen may partially turn white. Once the vibration condition ends, the whitening of the screen is resolved.
- When the same image is displayed on the screen for a long period, an afterimage may appear when the image is changed.
- The panel brightness may decrease when used for a long time in an environment continuously filled with inert gas. To prevent deterioration of panel brightness, regularly ventilate the panel. For more information, please contact your local distributor.

www.se.com

▲ WARNING**SERIOUS EYE AND SKIN INJURY**

The liquid in the LCD panel contains an irritant:

- Avoid direct skin contact with the liquid.
- Wear gloves when you handle a broken or leaking unit.
- Do not use sharp objects or tools in the vicinity of the LCD panel.
- Handle the LCD panel carefully to prevent puncture, bursting, or cracking of the panel material.
- If the panel is damaged and any liquid comes in contact with your skin, immediately rinse the area with running water for at least 15 minutes. If the liquid gets in your eyes, immediately rinse your eyes with running water for at least 15 minutes and consult a doctor.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTICE

REDUCTION OF SERVICE LIFE OF PANEL

Change the screen image periodically and try not to display the same image for a long period of time.

Failure to follow these instructions can result in equipment damage.

Cybersecurity Best Practices

To help keep your Schneider Electric products secure and protected, we recommend that you implement the cybersecurity best practices. Following the recommendations may help significantly reduce your company's cybersecurity risk. For the recommendations, refer to the following URL:
<https://www.se.com/en/download/document/7EN52-0390/>

Overview

Part Numbers

Part Number List

Series	Model name	Part number
Harmony ST6	HMIST6200	HMIST6200
	HMIST6400	HMIST6400
	HMIST6500	HMIST6500
	HMIST6600	HMIST6600
	HMIST6700	HMIST6700

NOTE: All model numbers may be followed by any letter or number.

Part Number Configuration

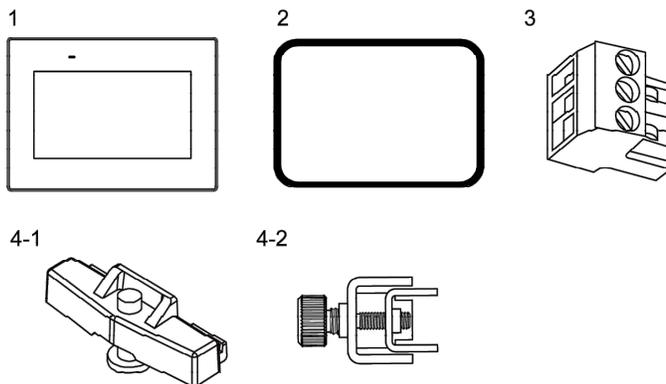
The following describes the configuration of part numbers.

Digit position								
1	2	3	4	5	6	7	8	9
H	M	I	(model)		(series)	(size)	(type)	
			ST		6	2: 4" 4: 7" 5: 10" 6: 12" 7: 15"	00: Standard	

Package Contents

Verify all items listed here are present in your package.
Please your local distributor immediately if you find anything damaged or missing.

⚠ WARNING
<p>UNINTENDED EQUIPMENT OPERATION</p> <p>Do not use damaged products or accessories.</p> <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

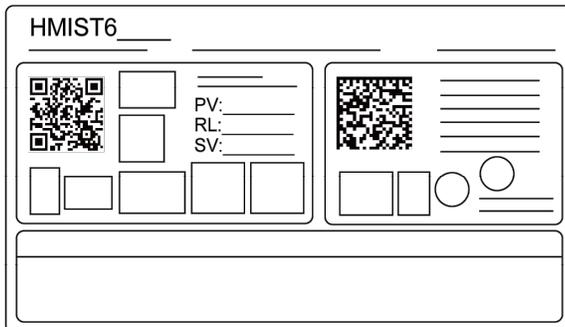


- 1 HMIST6•00 x 1
- 2 Installation gasket (attached to this product) x 1
- 3 DC power supply connector x 1
- 4-1 Installation fasteners for HMIST6200 x 2
- 4-2 Installation fasteners for HMIST64/65/6600 x 4, HMIST6700 x 6
- 5 Quick reference guide x 1

Product Revision and QR Code for Manual

You can identify the product version (PV), revision level (RL), and the software version (SV) from the product label.

You can also check the contents of this manual by using the QR code on the product label. Confirm the location of the QR code below and refer to the manual.



Certifications and Standards

The certifications and standards listed below may include those that are not yet acquired. Please check the product marking and the following URL for the latest acquisition status.

www.se.com

Agency Certifications

- Underwriters Laboratories Inc., UL 61010-2-201 and CSA C22.2 No.61010-2-201, Industrial Control Equipment

Compliance Standards

Europe:

CE

- Directive 2014/30/EU (EMC: EN 61131-2)

Australia, New Zealand:

- RCM

Korea:

- KC

Hazardous Substances

This product is designed to be compliant with the following environmental regulations, even if the product may not fall directly in the scope of the regulation:

- RoHS, Directive 2011/65/EU and 2015/863/EU
- RoHS China, Standard GB/T 26572
- REACH regulation EC 1907/2006

End of Life (WEEE)

The product contains electronic boards. It must be disposed of in specific treatment channels. The product contains cells and/or storage batteries which must be collected and processed separately when they have run out and at the end of product life (Directive 2012/19/EU).

Refer to Maintenance, page 56 when extracting cells and batteries from the product. These batteries do not contain a weight percentage of heavy metals over the threshold notified by European Directive 2006/66/EC.

KC Markings

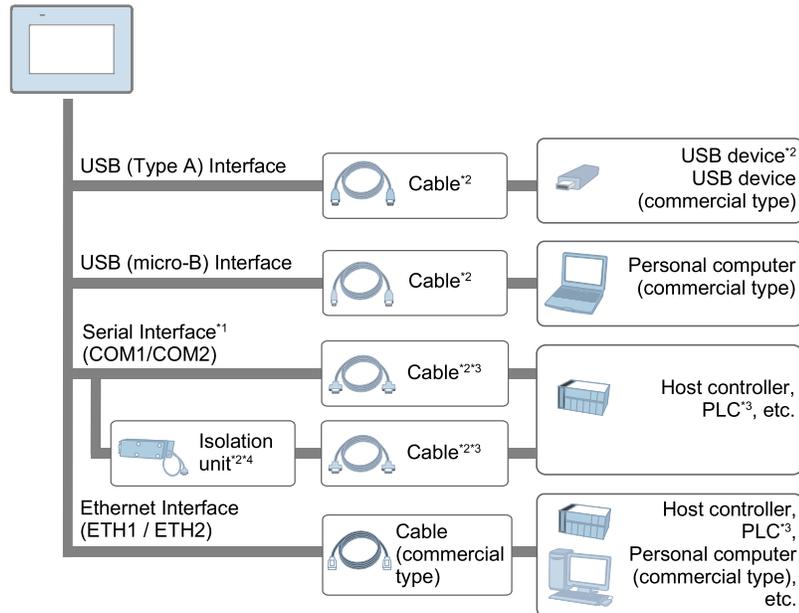
기종별	사용자안내문
A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Device Connectivity

System Design

This section describes the system configuration with this product and peripheral equipment.

NOTE: The number of interfaces, such as serial and Ethernet interfaces, varies depending on the model. Refer to Parts Identification, page 16.



*1 In order to use this as an isolation port, Isolation Unit is required. To use RS-232C isolation unit, set the #9 pin of the COM port to VCC.

*2 Refer to Accessories, page 14.

*3 For information on how to connect controllers and other types of equipment, refer to the corresponding device driver manual of your screen editing software.

*4 HMIST6200 is not supported.

To use this product, transferring project data from the screen editing software is required. For details about transfer, refer to the software manual.

When transferring using the USB (micro-B) interface, connect cables in the following order:

1. Attach the transfer cable to the USB (micro-B) interface of this product.
2. Attach the power cable to this product, then connect the power cable to an external power source.
3. Connect the transfer cable to the computer.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not connect the product to the computer with the USB (micro-B) cable unless the product is powered by the power cable.
- Remove the USB (micro-B) cable before communicating with the host controller and other types of equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Accessories

For host controllers and connection cables, refer to the corresponding device driver manual of your screen editing software.

Product name	Product number	Description
Serial interface		
RJ-45 to D-Sub 25 pin Conversion Cable	XBTZG939	Connects a D-Sub 25-pin cable to this product (RJ-45).
9-pin to 25-pin RS-232C Conversion Cable	XBTZG919	Connects a standard RS-232C cable (D-Sub 25-pin socket) to this product (D-Sub 9-pin plug).
COM Port Conversion Adapter	XBTZGCOM1	Connects optional RS-422 communication items to serial interface (RS-232C).
RS-232C Isolation Unit	XBTZGI232	Connects a host controller to this product and provides isolation (RS-232C and RS-422 are switchable).
RS-485 Isolation Unit	XBTZGI485	Connects a host controller to this product with isolation.
USB (Type A) interface		
USB Front Cable	XBTZGUSB	Extension cable that attaches USB interface to front panel.
USB Clamp Type A (1 port)	HMIZGCLP1	Clamp to prevent disconnection of USB cable (USB Type A, 1 port, 5 clamps/set).
USB (micro-B) interface		
USB Transfer Cable	HMIZG936	Cable for transferring screen data from a PC (USB Type A) to this product (USB micro-B).
USB (micro-B) Front Cable	HMIZSUSBB2	Extension cable that attaches USB interface to front panel.
Others		
Screen Protection Sheet	HMIZD66W	Disposable, dirt-resistant sheet for 12-inch Wide screen (5 sheets/set).
UV Protection Sheet	HMIZUV6W	Sheet to protect the display from dirt and ultraviolet light, for 12-inch Wide screen (1 sheet).
Screen Protection Sheet with UV Protection	HMIZG60W	Disposable, dirt-resistant and ultraviolet protection sheet for 4-inch Wide screen (1 sheet/set).
	HMIZG63W	Disposable, dirt-resistant and ultraviolet protection sheet for 7-inch Wide screen (1 sheet/set).
	HMIZG65W1	Disposable, dirt-resistant and ultraviolet protection sheet for 10-inch Wide screen (1 sheet/set).
	HMIZG67W	Disposable, dirt-resistant and ultraviolet protection sheet for 15-inch Wide screen (1 sheet/set).
Spring Clip	XBTZ3002	Fasteners to attach this product to the mounting surface for HMIST6200.

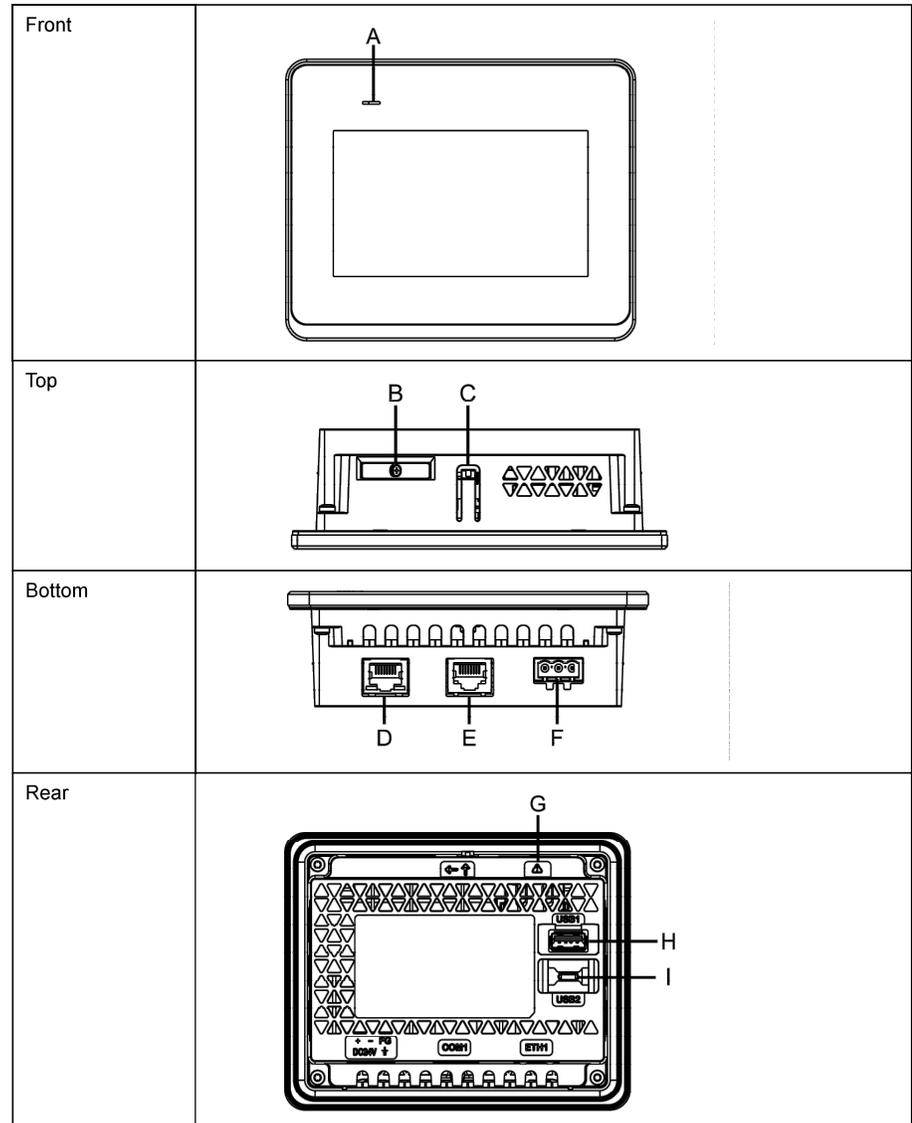
Maintenance Accessories

Product name		
Product number	Supported product	Description
Installation fastener		
HMIZSFIX2	HMIST6200	Installation fastener (2 pieces/set).
HMIZSFIXTF1	HMIST6400, HMIST6500, HMIST6600, HMIST6700	Installation fastener (2 pieces/set).
Installation gasket		
HMIZS51W1	HMIST6200	Provides dust and moisture resistance when this product is installed into a solid panel (1 piece).
HMIZS53W1	HMIST6400	
HMIZS55W1	HMIST6500	
HMIZS56W1	HMIST6600	
HMIZS57W1	HMIST6700	
DC power supply connector		
XBTZGPWS1	All	Connector to connect DC power supply cables.
Battery for data backup		
HMIZSBA1	All	Primary battery for memory and time data backup (1 piece).

Parts Identification and Functions

Parts Identification

Parts Identification (HMIST6200)



A: Status LED

B: Battery slot

C: Hook

D: Ethernet interface (ETH1)

E: Serial interface (RJ-45, RS-232C/485) (COM1)

F: Power plug connector

G: Safety alert symbol*1

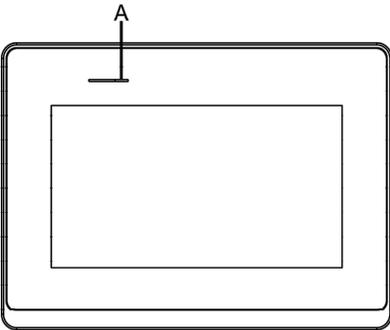
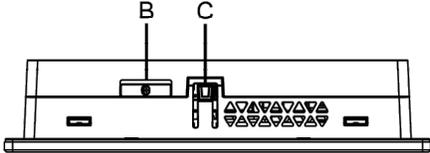
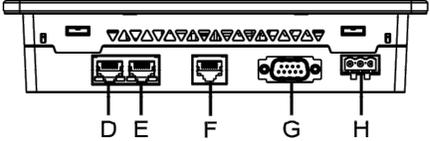
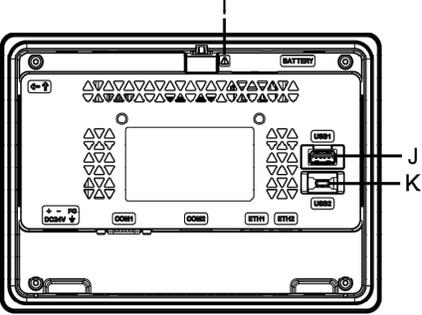
H: USB (Type A) interface

I: USB (micro-B) interface

*1 Identifies the safety messages about the battery in Replacing the Battery, page 58

▲ WARNING
<p>UNINTENDED EQUIPMENT OPERATION</p> <ul style="list-style-type: none"> Do not connect the product to the computer with the USB (micro-B) cable unless the product is powered by the power cable. Remove the USB (micro-B) cable before communicating with the host controller and other types of equipment. <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

Parts Identification (HMIST6400)

Front	
Top	
Bottom	
Rear	

- A: Status LED
- B: Battery slot
- C: Hook
- D: Ethernet interface (ETH2)

E: Ethernet interface (ETH1)

F: Serial interface (RJ-45, RS-485) (COM2)

G: Serial interface (RS-232C) (COM1)

H: Power plug connector

I: Safety alert symbol*1

J: USB (Type A) interface

K: USB (micro-B) interface

*1 Identifies the safety messages about the battery in Replacing the Battery, page 58

⚠ WARNING

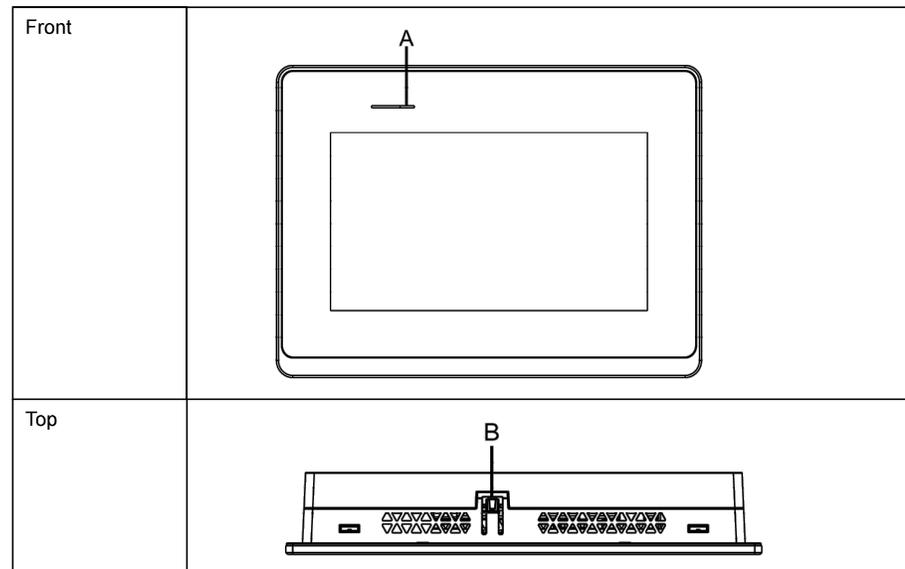
UNINTENDED EQUIPMENT OPERATION

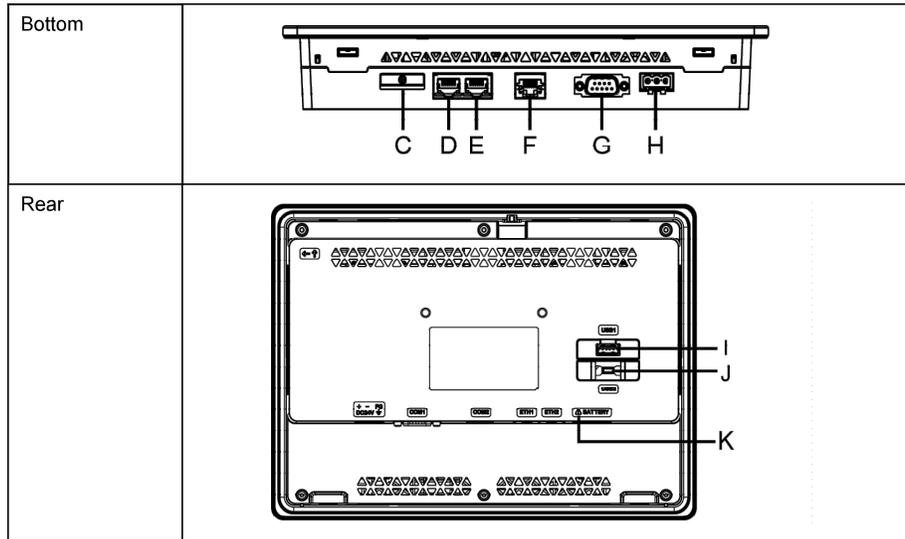
- Do not connect the product to the computer with the USB (micro-B) cable unless the product is powered by the power cable.
- Remove the USB (micro-B) cable before communicating with the host controller and other types of equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Parts Identification (HMIST65/66/6700)

NOTE: The figures below show HMIST6500.





- A: Status LED
- B: Hook
- C: Battery slot
- D: Ethernet interface (ETH2)
- E: Ethernet interface (ETH1)
- F: Serial interface (RJ-45, RS-485) (COM2)
- G: Serial interface (RS-232C) (COM1)
- H: Power plug connector
- I: USB (Type A) interface
- J: USB (micro-B) interface
- K: Safety alert symbol*1

*1 Identifies the safety messages about the battery in Replacing the Battery, page 58

▲ WARNING
<p>UNINTENDED EQUIPMENT OPERATION</p> <ul style="list-style-type: none"> • Do not connect the product to the computer with the USB (micro-B) cable unless the product is powered by the power cable. • Remove the USB (micro-B) cable before communicating with the host controller and other types of equipment. <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

LED Indications

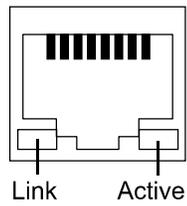
Status LED

After power is turned on, normal status indication by the LED is: red light > flashing orange > green light.

Color	Indicator	HMI operation
Green	ON	In operation
	Flashing once every 5 seconds	Backlight OFF (Standby Mode)
Orange	Flashing	Software starting up
Red	ON	Power is ON.
-	OFF	Power is OFF.

For other LED indications, refer to the manual of your screen editing software.

Ethernet LED



Color	Indicator	Description
Green (Link)	ON	Data transmission is available.
	OFF	No connection or error
Green (Active)	Flashing	Data transmission is occurring.
	OFF	No data transmission

Specifications

General Specifications

Electrical Specifications

Specification		HMIST6200	HMIST6400	HMIST6500
Rated input voltage		24 Vdc		
Input voltage limits		19.2...28.8 Vdc		
Voltage drop (at rated input voltage)		2 ms or less	5 ms or less	10 ms or less
Power consumption	Max	6.9 W	9 W	12.6 W
	When power is not supplied to external devices	3.6 W or less	5.5 W or less	9.6 W or less
	When screen turns off the backlight (standby mode)	2.8 W or less	3.6 W or less	4.6 W or less
	In-rush current	30 A or less		
Noise immunity		Noise voltage: 1,000 Vp-p, Pulse duration: 1 μ s, Rise time: 1 ns (via noise simulator)		
Dielectric strength		1,000 Vac for 1 minute (between power terminal and FG terminal)		
Insulation resistance		500 Vdc, 10 M Ω or more (between power terminal and FG terminal)		

Specification		HMIST6600	HMIST6700
Rated input voltage		24 Vdc	
Input voltage limits		19.2...28.8 Vdc	
Voltage drop (at rated input voltage)		10 ms or less	
Power consumption	Max	18,4 W	18,5 W
	When power is not supplied to external devices	15 W or less	15 W or less
	When screen turns off the backlight (standby mode)	5.9 W or less	5.4 W or less
	In-rush current	30 A or less	
Noise immunity		Noise voltage: 1,000 Vp-p, Pulse duration: 1 μ s, Rise time: 1 ns (via noise simulator)	
Dielectric strength		1,000 Vac for 1 minute (between power terminal and FG terminal)	
Insulation resistance		500 Vdc, 10 M Ω or more (between power terminal and FG terminal)	

Environmental Specifications

Use and store this product in areas that conform to the specified conditions.

NOTE: When using any of the options for this product, check the specifications for special conditions or cautions that may apply to this product.

Physical environment	
Ambient air temperature	0...50 °C (32...122 °F)
Storage temperature	-20...60 °C (-4...140 °F)
Ambient air and storage humidity	10%...90% RH (Non condensing, wet bulb temperature 39 °C [102.2 °F] or less)
Dust	0.1 mg/m ³ (10 ⁻⁷ oz/ft ³) or less (non-conductive levels)
Pollution degree	For use in Pollution Degree 2 environment
Corrosive gases	Free of corrosive gases
Atmospheric pressure (operating altitude)	800...1,114 hPa (2,000 m [6,561 ft] or lower)
Mechanical environment	
Vibration resistance	IEC/EN 61131-2 compliant 5...9 Hz Single amplitude 3.5 mm (0.14 in) 9...150 Hz Fixed acceleration: 9.8 m/s ² X, Y, Z directions for 10 cycles (approximately 100 minutes)
Shock resistance	IEC/EN 61131-2 compliant 147 m/s ² , X, Y, Z directions for 3 times
Electrical environment	
Electrical fast transient/burst immunity	IEC 61000-4-4 2 kV: Power port (display unit) 1 kV: Signal ports
Electrostatic discharge immunity	Contact discharge method: 6 kV Air discharge method: 8 kV (IEC/EN 61000-4-2 Level 3)

⚠ CAUTION

INOPERATIVE EQUIPMENT

- Do not operate or store the product where chemicals evaporate, or where chemicals are present in the air. Chemicals refer to the following: A) Corrosive chemicals: Acids, alkalines, liquids containing salt, B) Flammable chemicals: Organic solvents.
- Do not allow water, liquids, metal, and wiring fragments to enter the panel case.

Failure to follow these instructions can result in injury or equipment damage.

Structural Specifications

	HMIST6200	HMIST6400	HMIST6500
Grounding	Functional grounding: Grounding resistance of 100 Ω or less, 2 mm ² (AWG 14) or thicker wire, or your country's applicable standard.		
Cooling method	Natural air circulation		
Structure*1	IP65F, UL 50/50E, Type 1, Type 4X (indoor use only), Type 13 (on the front panel when properly installed in an enclosure)		
External dimensions (W x H x D)	134.5 x 108.5 x 43 mm (5.3 x 4.27 x 1.69 in)	208 x 153 x 45 mm (8.19 x 6.02 x 1.77 in)	273 x 203 x 47 mm (10.75 x 7.99 x 1.85 in)

	HMIST6200	HMIST6400	HMIST6500
Panel cut dimensions (W x H)	118.5 x 92.5 mm (4.67 x 3.64 in) ^{*2} Panel thickness area: 1.6...5 mm (0.06...0.2 in) ^{*3} When using spring clips: Position 1: 1.5...4 mm (0.06...0.16 in) Position 2: 4...6 mm (0.16...0.24 in)	190 x 135 mm (7.48 x 5.31 in) ^{*2} Panel thickness area: 1.6...5 mm (0.06...0.2 in) ^{*3}	255 x 185 mm (10.04 x 7.28 in) ^{*2} Panel thickness area: 1.6...5 mm (0.06...0.2 in) ^{*3}
Weight	0.4 kg (0.88 lb) or less	0.8 kg (1.76 lb) or less	1.3 kg (2.87 lb) or less

	HMIST6600	HMIST6700
Grounding	Functional grounding: Grounding resistance of 100 Ω or less, 2 mm ² (AWG 14) or thicker wire, or your country's applicable standard.	
Cooling method	Natural air circulation	
Structure ^{*1}	IP65F, UL 50/50E, Type 1, Type 4X (indoor use only), Type 13 (on the front panel when properly installed in an enclosure)	
External dimensions (W x H x D)	313 x 235 x 50 mm (12.32 x 9.25 x 1.97 in)	412 x 268 x 50 mm (16.22 x 10.55 x 1.97 in)
Panel cut dimensions (W x H)	295 x 217 mm (11.61 x 8.54 in) ^{*2} Panel thickness area: 1.6...5 mm (0.06...0.2 in) ^{*3}	394 x 250 mm (15.51 x 9.84 in) ^{*2} Panel thickness area: 1.6...5 mm (0.06...0.2 in) ^{*3}
Weight	1.8 kg (3.97 lb) or less	2.7 kg (5.95 lb) or less

*1 The front face of this product, installed in a solid panel, has been tested using conditions equivalent to the standards shown in the specification. Even though this product's level of resistance is equivalent to these standards, oils that should have no effect on this product can possibly harm this product. This can occur in areas where either vaporized oils are present, or where low viscosity cutting oils are allowed to adhere to this product for long periods of time. If this product's front face protection sheet or cover glass peels off, these conditions can lead to the ingress of oil into this product and separate protection measures are suggested. Also, if non-approved oils are present, they may cause deformation or corrosion of the front panel's cover. Therefore, prior to installing this product, be sure to confirm the type of conditions that will be present in this product's operating environment.

If the installation gasket is used for a long period of time, or if this product and its gasket are removed from the panel, the original level of protection cannot be kept. To maintain the original protection level, be sure to replace the installation gasket regularly.

*2 For dimensional tolerance, everything +1/-0 mm (+0.04/-0 in) and R in angle are below R3 (R0.12 in).

*3 Even if the installation wall thickness is within the recommended range for the Panel Cut Dimensions, depending on the wall's material, size, and installation location of this product and other devices, the installation wall could warp. To prevent warping, the installation surface may need to be strengthened.

NOTICE**EQUIPMENT DAMAGE**

- Ensure this product is not in permanent and direct contact with oils.
- Do not press on the display of this product with excessive force or with a hard object.
- Do not press on the touch panel with a pointed object, such as the tip of a mechanical pencil or a screwdriver.
- Do not expose the device to direct sunlight.

Failure to follow these instructions can result in equipment damage.

NOTICE**STORAGE AND OPERATION OUTSIDE OF SPECIFICATIONS**

- Store the panel in areas where temperatures are within the product's specifications.
- Do not restrict or block this panel's ventilation slots.

Failure to follow these instructions can result in equipment damage.

NOTICE**GASKET AGING**

- Inspect the gasket periodically as required by your operating environment.
- Change the gasket at least once a year, or as soon as scratches or dirt become visible.

Failure to follow these instructions can result in equipment damage.

Functional Specifications

Display Specifications

	HMIST6200	HMIST6400	HMIST6500
Display type	TFT Color LCD		
Display size	4.3"	7"	10.1"
Resolution	480 x 272 pixels	800 x 480 pixels (WVGA)	1,024 x 600 pixels (WSVGA)
Effective display area (W x H)	95.04 x 53.86 mm (3.74 x 2.12 in)	154.08 x 85.92 mm (6.07 x 3.38 in)	222.72 x 125.28 mm (8.77 x 4.93 in)
Display colors	16 million colors For details about display colors, refer to the manual of your screen editing software.		
Backlight	White LED (Not replaceable. Please contact your local distributor.)		
Backlight service life	50,000 hours or more (continuous operation at 25 °C [77 °F] before backlight brightness decreases to 25%)		
Brightness control	16 levels (Adjusted with touch panel or software)		

	HMIST6600	HMIST6700
Display type	TFT Color LCD	
Display size	12.1"	15.6"

	HMIST6600	HMIST6700
Resolution	1,280 x 800 pixels (WXGA)	1,366 x 768 pixels (FWXGA)
Effective display area (W x H)	261.12 x 163.2 mm (10.28 x 6.43 in)	344.23 x 193.54 mm (13.55 x 7.62 in)
Display colors	16 million colors For details about display colors, refer to the manual of your screen editing software.	
Backlight	White LED (Not replaceable. Please contact your local distributor.)	
Backlight service life	50,000 hours or more (continuous operation at 25 °C [77 °F] before backlight brightness decreases to 25%)	
Brightness control	16 levels (Adjusted with touch panel or software)	

Touch Panel

Touch panel type	Resistive film (analog)
Touch points	Single touch
Touch panel resolution	1,024 x 1,024
Touch panel service life	1 million times or more

The touch panel does not support two-point touch (multiple point touch). If you touch multiple points on the touch panel, it will operate as if you touched the center-point of the multiple touches.

For example, if you touch two or more points on the touch panel and at the center of the touches is a switch for a drive system, even though you did not directly touch that switch, it may function as if you did.

⚠ WARNING
<p>UNINTENDED EQUIPMENT OPERATION</p> <p>Do not touch two or more points on the touch panel.</p> <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

Memory

	HMIST6200	HMIST64/65/66/6700
System memory	Flash EPROM 512 MB (operating system, project data, and other data)	Flash EPROM 1 GB (operating system, project data, and other data)
Backup memory	NVRAM 512 KB	

Clock

±65 seconds per month (deviation at room temperature and power is OFF).

Variations in operating conditions and battery life can cause clock deviations from -380 to +90 seconds per month.

For systems where this level of precision is insufficient, the user should monitor and make adjustments when required.

This product uses a primary battery for data backup of the internal clock. If the battery is depleted, the clock data will be lost. To replace the battery, refer to Replacing the Battery, page 58.

Interface Specifications

Specifications of Each Interface

	HMIST6200	HMIST64/65/66/6700
Serial interface COM1		
Asynchronous transmission	RS-232C/485	RS-232C
Data length	7 or 8 bits	
Stop bit	1 or 2 bits	
Parity	None, odd, or even	
Data transmission speed	2,400...115,200 bps, 187,500 bps (MPI)	2,400...115,200 bps
Connector	Modular jack (RJ-45)	D-Sub 9 pin (plug)
Serial interface COM2		
Asynchronous transmission	–	RS-485
Data length	–	7 or 8 bits
Stop bit	–	1 or 2 bits
Parity	–	None, odd, or even
Data transmission speed	–	2,400...115,200 bps, 187,500 bps (MPI)
Connector	–	Modular jack (RJ-45)
USB (Type A) interface		
Connector	USB 2.0 (Type A) x 1	
Power supply voltage	5 Vdc ±5%	
Maximum current supplied	500 mA	
Maximum transmission distance	5 m (16.4 ft)	
USB (micro-B) interface		
Connector	USB 2.0 (micro-B) x 1	
Maximum transmission distance	5 m (16.4 ft)	
Ethernet interface		
Standard	IEEE802.3i/IEEE802.3u, 10BASE-T/100BASE-TX	
Connector	Modular jack (RJ-45) x 1	Modular jack (RJ-45) x 2

NOTE: Use only the SELV (Safety Extra-Low Voltage) circuit to connect the serial, USB and Ethernet interfaces.

Serial Interface

Introduction

The serial interface is not isolated.

NOTE: For information on how to connect controllers and other types of equipment, refer to the corresponding device driver manual of your screen editing software.

On HMIST6200, you can switch the communication method between RS-232C and RS-485 via the software.

The SG (signal ground) and FG (frame ground) terminals are separated inside this product.

⚠️⚠️ DANGER

ELECTRIC SHOCK

- Make a direct connection between the FG (frame ground) terminal and ground.
- Do not connect other devices to ground through the FG (frame ground) terminal of this device.
- Install all cables according to local codes and requirements. If local codes do not require grounding, follow a reliable guide such as the US National Electrical Code, Article 800.

Failure to follow these instructions will result in death or serious injury.

⚠️ CAUTION

LOSS OF COMMUNICATION

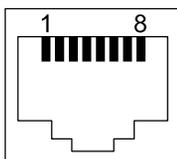
- Do not put excessive stress on the communication ports of all connections.
- Securely attach communication cables to the panel wall or cabinet.
- Use only D-Sub 9 pin cables with a locking tab in good condition.
- Use a RJ45 connector that has a functional locking tab.

Failure to follow these instructions can result in injury or equipment damage.

NOTE: Use within the rated current.

HMIST6200 COM1 (RS-232C/485)

RJ45 connector



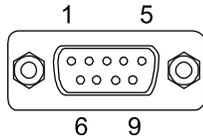
Pin No.	RS-232C/RS-485		
	Signal name	Direction	Meaning
1	RD (RXD)	Input	Receive data (RS-232C)
2	SD (TXD)	Output	Send data (RS-232C)
3	NC	–	No connection
4	D1	Input/Output	Transfer data (RS-485)
5	D0	Input/Output	Transfer data (RS-485)
6	RS (RTS)	Output	Request to send
7	NC	–	No connection

Pin No.	RS-232C/RS-485		
	Signal name	Direction	Meaning
8	SG	–	Signal ground
Shell	FG	–	Frame ground

HMIST64/65/66/6700 COM1 (RS-232C)

D-Sub 9 pin plug connector

Product side:



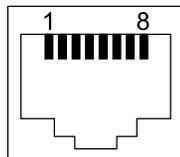
Pin No.	RS-232C		
	Signal name	Direction	Meaning
1	CD	Input	Carrier detect
2	RD (RXD)	Input	Receive data
3	SD (TXD)	Output	Send data
4	ER (DTR)	Output	Data terminal ready
5	SG	–	Signal ground
6	DR (DSR)	Input	Data set ready
7	RS (RTS)	Output	Request to send
8	CS (CTS)	Input	Send possible
9	VCC	Output	+5 Vdc ±5% Output 0.25 A*1
Shell	FG	–	Frame ground

*1 When using RS-232C pin #9, enable VCC with the software.

Recommended jack screw is #4-40 (UNC).

HMIST64/65/66/6700 COM2 (RS-485)

RJ45 connector



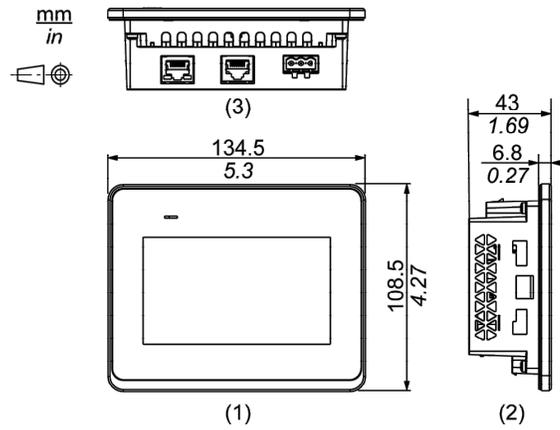
NOTE: When setting up RS-485 communication, the cable diagram for some equipment may require polarization on the terminal side. Change the setting for polarization with your screen editing software.

Pin No.	RS-485		
	Signal name	Direction	Meaning
1	NC	–	No connection
2	NC	–	No connection
3	NC	–	No connection
4	Line A	Input/Output	Transfer data (+)
5	Line B	Input/Output	Transfer data (-)
6	RS (RTS)	Output	Request to send
7	NC	–	No connection
8	SG	–	Signal ground
Shell	FG	–	Frame ground

Dimensions

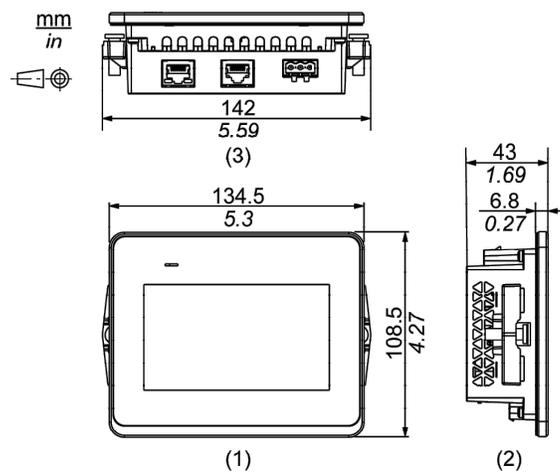
HMIST6200

External Dimensions



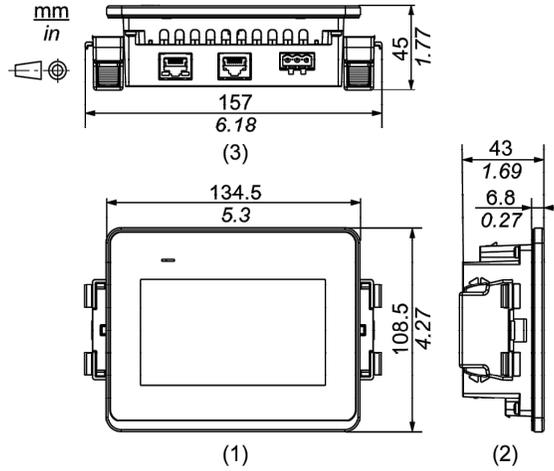
- 1 Front
- 2 Left
- 3 Bottom

Dimensions with Installation Fasteners



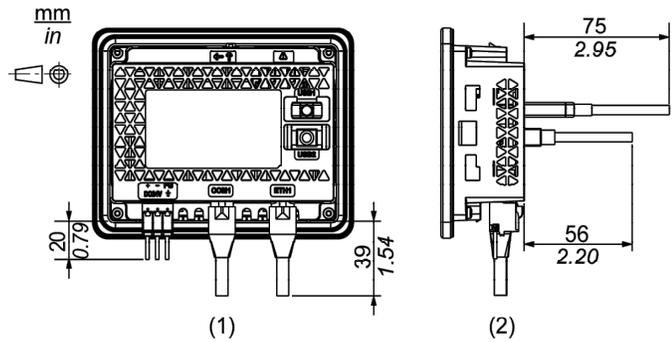
- 1 Front
- 2 Left
- 3 Bottom

Dimensions with Spring Clips



- 1 Front
- 2 Left
- 3 Bottom

Dimensions with Cables

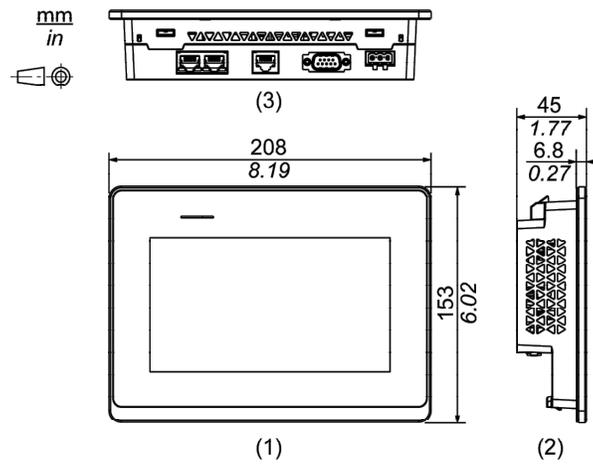


- 1 Rear
- 2 Right

NOTE: All the above values are designed with cable bending in mind. The dimensions given here are representative values depending on the type of connection cable in use. Therefore, these values are intended for reference only.

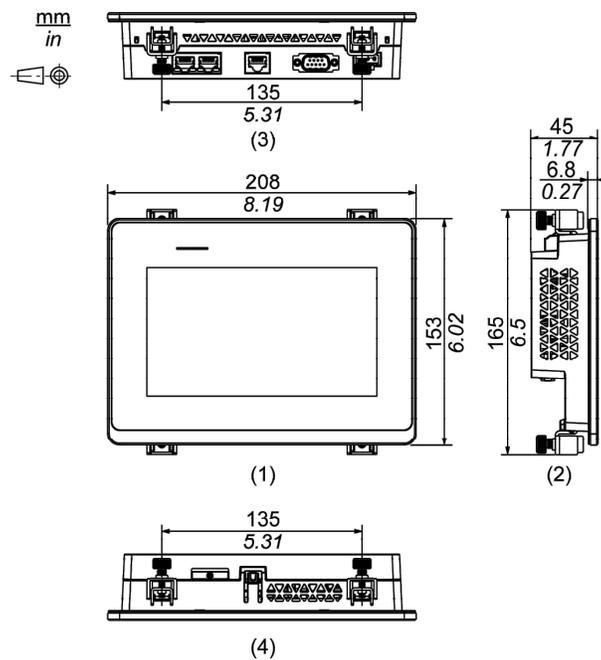
HMIST6400

External Dimensions



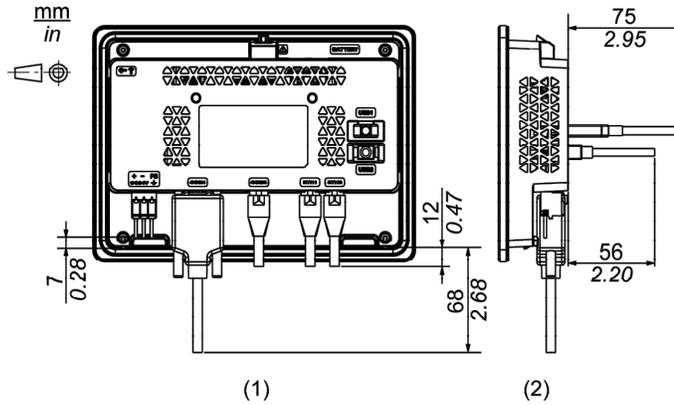
- 1 Front
- 2 Left
- 3 Bottom

Dimensions with Installation Fasteners



- 1 Front
- 2 Left
- 3 Bottom
- 4 Top

Dimensions with Cables



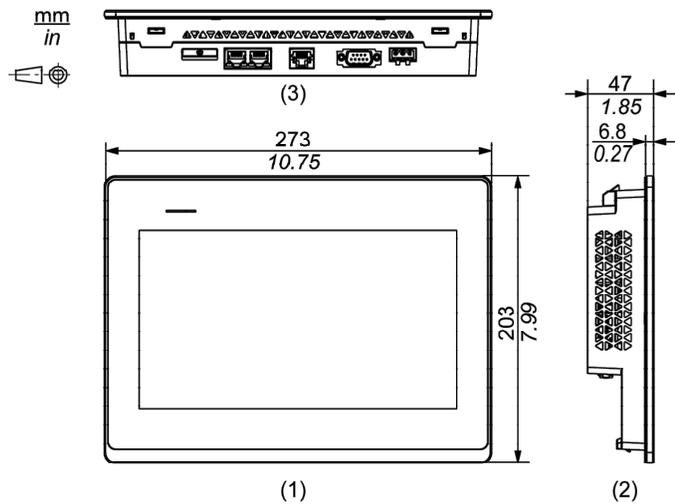
1 Rear

2 Right

NOTE: All the above values are designed with cable bending in mind. The dimensions given here are representative values depending on the type of connection cable in use. Therefore, these values are intended for reference only.

HMIST6500

External Dimensions

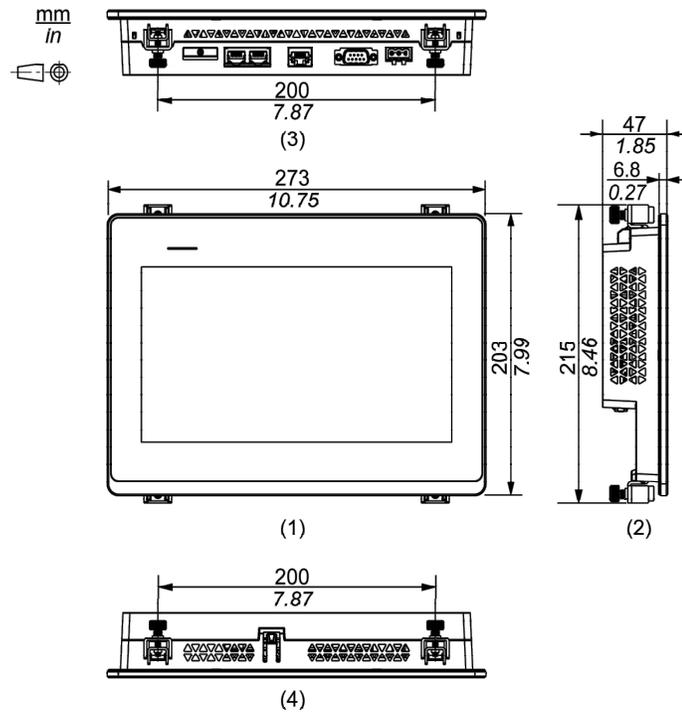


1 Front

2 Left

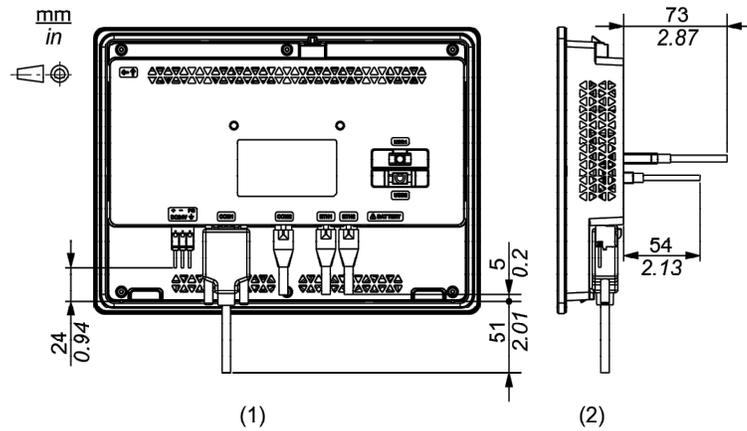
3 Bottom

Dimensions with Installation Fasteners



- 1 Front
- 2 Left
- 3 Bottom
- 4 Top

Dimensions with Cables

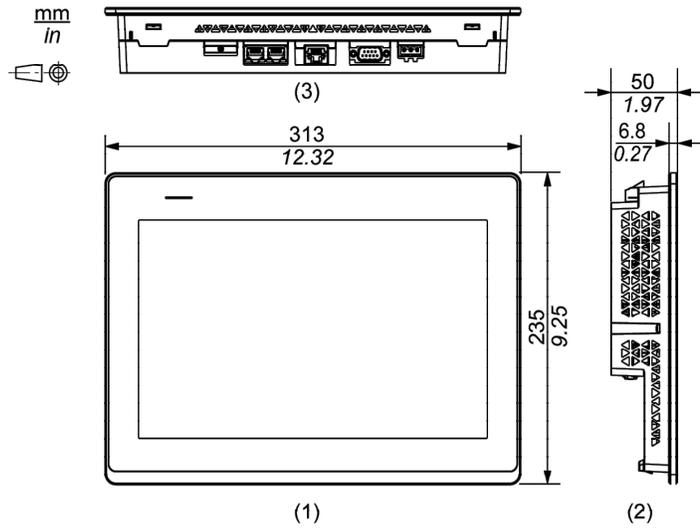


- 1 Rear
- 2 Right

NOTE: All the above values are designed with cable bending in mind. The dimensions given here are representative values depending on the type of connection cable in use. Therefore, these values are intended for reference only.

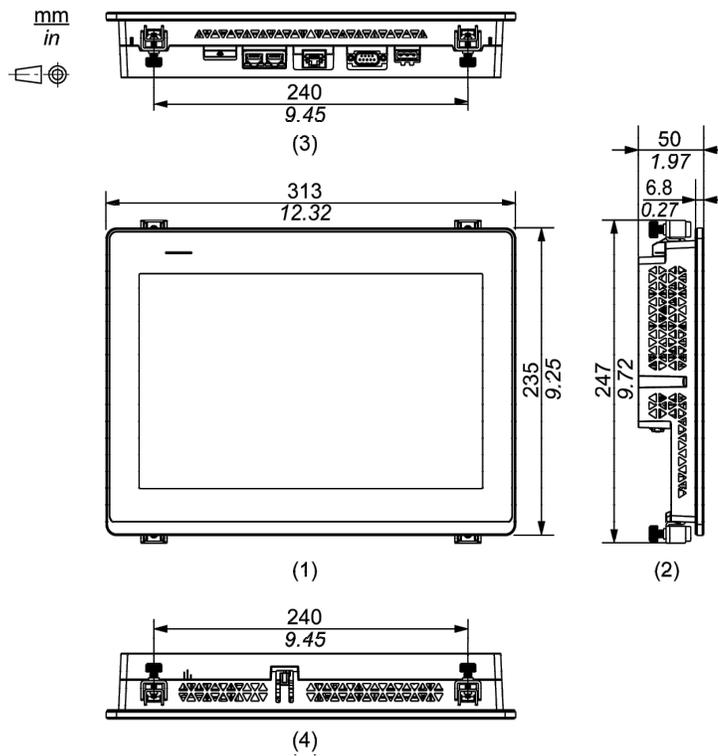
HMIST6600

External Dimensions



- 1 Front
- 2 Left
- 3 Bottom

Dimensions with Installation Fasteners

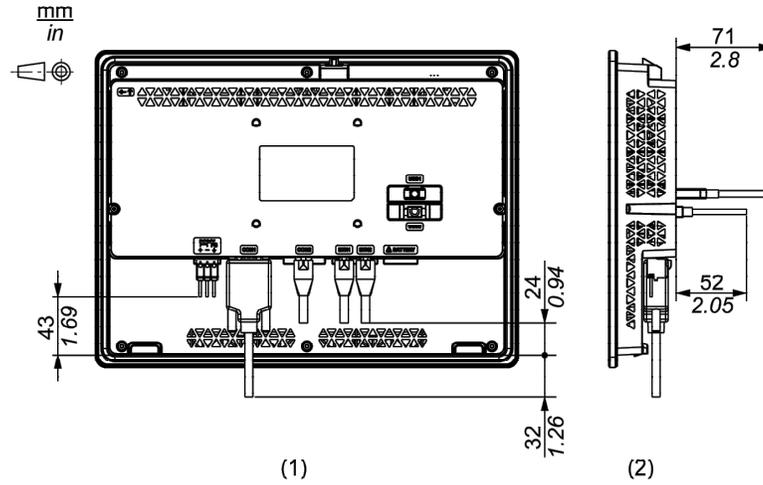


- 1 Front
- 2 Left

3 Bottom

4 Top

Dimensions with Cables



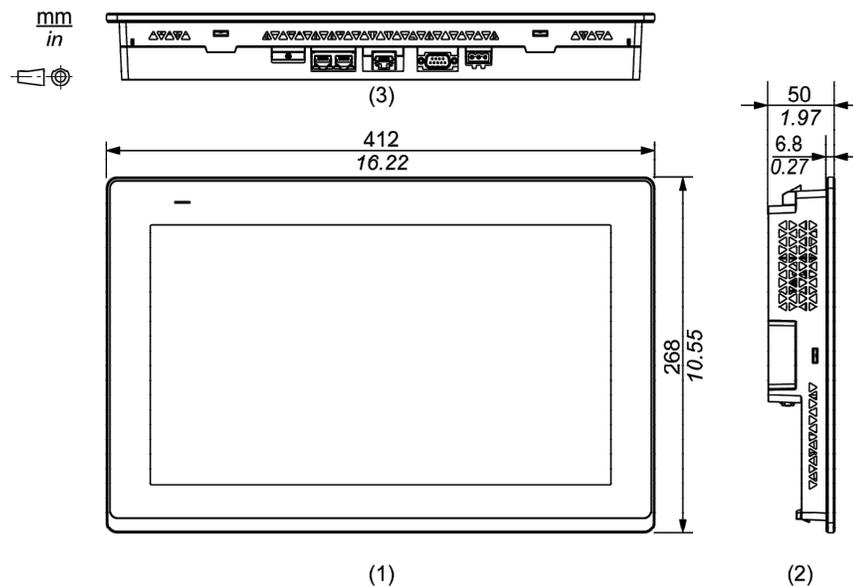
1 Rear

2 Right

NOTE: All the above values are designed with cable bending in mind. The dimensions given here are representative values depending on the type of connection cable in use. Therefore, these values are intended for reference only.

HMIST6700

External Dimensions

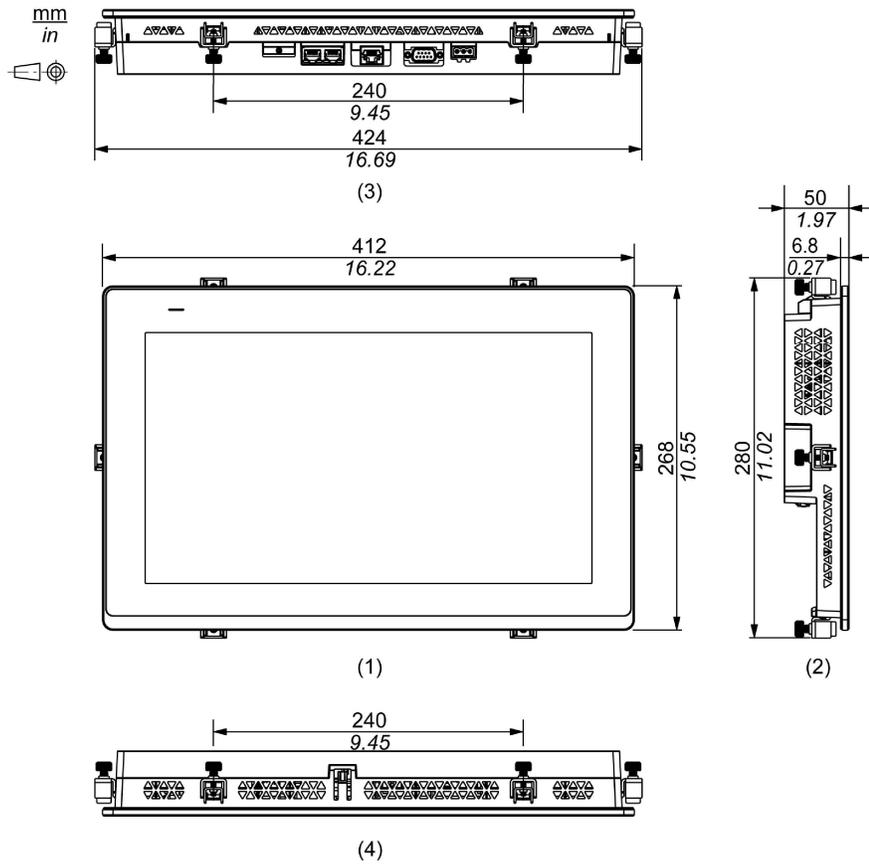


1 Front

2 Left

3 Bottom

Dimensions with Installation Fasteners



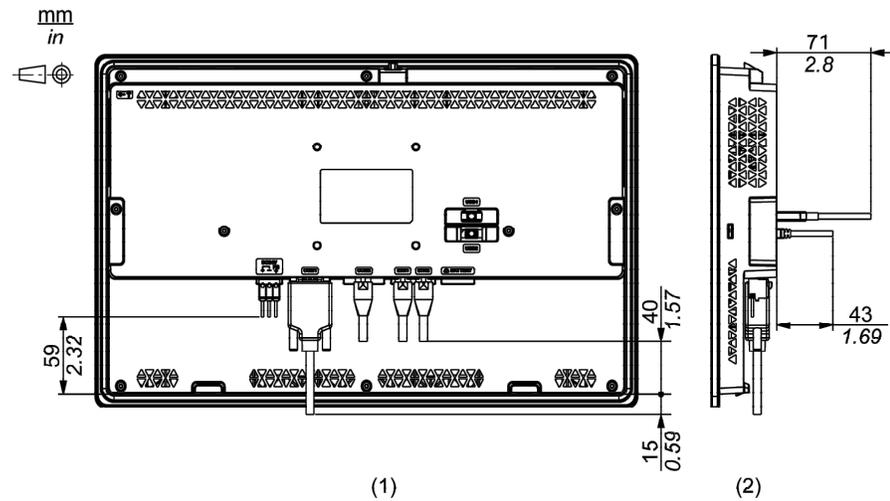
1 Front

2 Left

3 Bottom

4 Top

Dimensions with Cables



1 Rear

2 Right

NOTE: All the above values are designed with cable bending in mind. The dimensions given here are representative values depending on the type of connection cable in use. Therefore, these values are intended for reference only.

Installation and Wiring

Installation

Precautions for Building into an End-use Product

This product is designed for use on flat surfaces of IP65F, UL 50/50E, Type 1, Type 4X (indoor use only) and Type 13 enclosures.

Be aware of the following when building this product into an end-use product:

- The rear face of this product is not approved as an enclosure. When building this product into an end-use product, be sure to use an enclosure that satisfies standards as the end-use product's overall enclosure.
- Install this product in an enclosure with mechanical rigidity.
- This product is not designed for outdoor use. UL certification obtained is for indoor use only.
- Install and operate this product with its front panel facing outward.

NOTE:

- The necessary torque is 0.5 N•m (4.4 lb-in).
- IP65F is not part of the UL certification.

Installation Requirements

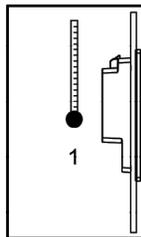
⚠ CAUTION

RISK OF BURNING INJURY

Do not touch the bezel or rear chassis during operation.

Failure to follow these instructions can result in injury or equipment damage.

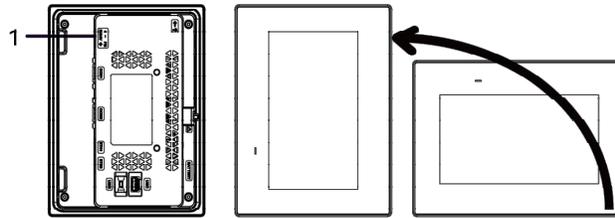
- Check that the installation wall or cabinet surface is flat, in good condition and has no jagged edges. Metal reinforcing strips may be attached to the inside of the wall, near the panel-cut, to increase its rigidity.
- Decide on the thickness of the enclosure wall, based on the level of strength required. Even if the installation wall thickness is within the recommended range for the Panel Cut Dimensions, depending on the wall's material, size, and installation location of this product and other devices, the installation wall could warp. To prevent warping, the installation surface may need to be strengthened.
- Check that the ambient air temperature and the ambient humidity are within their specified ranges in *Environmental Specifications*, page 21. When installing this product in a cabinet or enclosure, the ambient air temperature is the cabinet's or enclosure's internal and external temperature.



1. Internal temperature
2. External temperature

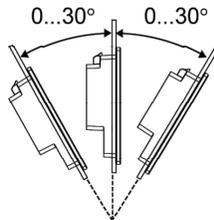
- Be sure that heat from surrounding equipment does not cause this product to exceed its standard operating temperature.
- When mounting this product in portrait orientation, ensure that the right side of this product faces up. In other words, the DC power connector should be at the top.

NOTE: For portrait orientation mounting, make sure your screen editing software supports the function.

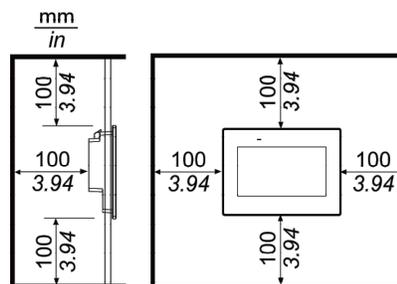


1. Power connector

- When installing this product in a slanted position, the product face should not incline more than 30°.



- For easier maintenance, operation and improved ventilation, install this product at least 100 mm (3.94 in) away from adjacent structures and other equipment as shown in the following illustration:



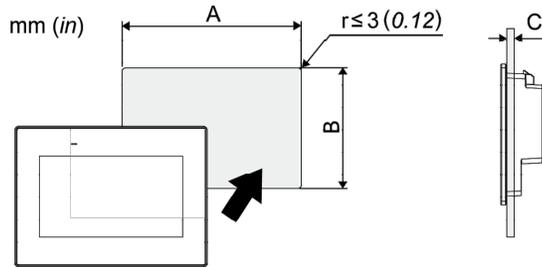
Pressure Differences

When applying and installing this product, it is important that steps are taken to eliminate any pressure difference between the inside and the outside of the enclosure in which this product is mounted. Higher pressure inside the enclosure can cause delamination of the front membrane of the display. Even a small pressure difference inside the enclosure will act on the large area of the membrane and can result in sufficient force to delaminate the membrane and thus cause failure of the touch capability. Pressure differences can often occur in applications where there are multiple fans and ventilators moving air at different rates in different rooms. Please follow these techniques to ensure that this product's function is not impacted by this mis-application:

1. Seal all conduit connections inside of the enclosure, especially those that lead to other rooms that may be at a different pressure.
2. Where applicable, install a small weep hole at the bottom of the enclosure to allow equalization of the internal and external pressure.

Panel Cut Dimensions

Based on the panel cut dimensions, open a mount hole on the panel.



Model name		
A	B	C
HMIST6200		1.6...5 mm (0.06...0.2 in) When installing HMIST6200 with spring clips: Position 1: 1.5...4 mm (0.06...0.16 in) Position 2: 4...6 mm (0.16...0.24 in) NOTE: For the positions, refer to the Installation Procedure (HMIST6200), page 41
118.5 mm (+1/-0 mm) (4.67 in [+0.04/-0 in])	92.5 mm (+1/-0 mm) (3.64 in [+0.04/-0 in])	
HMIST6400		
190 mm (+1/-0 mm) (7.48 in [+0.04/-0 in])	135 mm (+1/-0 mm) (5.31 in [+0.04/-0 in])	
HMIST6500		
255 mm (+1/-0 mm) (10.04 in [+0.04/-0 in])	185 mm (+1/-0 mm) (7.28 in [+0.04/-0 in])	
HMIST6600		
295 mm (+1/-0 mm) (11.61 in [+0.04/-0 in])	217 mm (+1/-0 mm) (8.54 in [+0.04/-0 in])	
HMIST6700		
394 mm (+1/-0 mm) (15.51 in [+0.04/-0 in])	250 mm (+1/-0 mm) (9.84 in [+0.04/-0 in])	

Installation Procedure (HMIST6200)

⚠️⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Remove all power from the device before removing any covers or elements of the system, and prior to installing or removing any accessories, hardware, or cables.
- Unplug the power cable from both this product and the power supply prior to installing or removing the product.
- Always use a properly rated voltage sensing device to confirm power is off where and when indicated.
- Replace and secure all covers or elements of the system before applying power to this product.
- Use only the specified voltage when operating this product. This product is designed to use 24 Vdc. Always check whether your device is DC powered before applying power.

Failure to follow these instructions will result in death or serious injury.

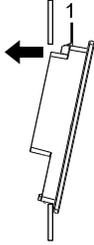
NOTICE

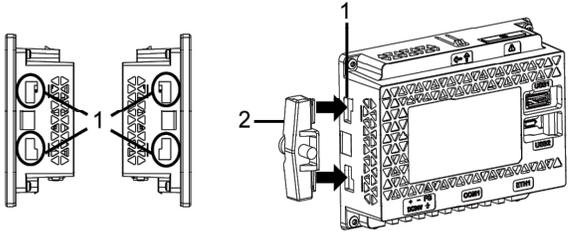
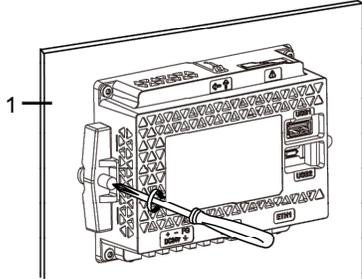
EQUIPMENT DAMAGE

- Always use the installation gasket.
- Keep this product stabilized in the panel-cut while you are installing or removing the screw fasteners.

Failure to follow these instructions can result in equipment damage.

Installing Using Installation Fasteners

Step	Action
1	Place this product on a clean and level surface with the screen facing down.
2	<p>Check that this product's gasket is seated securely into the bezel's groove, which runs around the perimeter of the display panel frame.</p> <p>NOTE: Always use the installation gasket, since it absorbs vibration in addition to repelling water. For the procedure on replacing the installation gasket, refer to Replacing the Installation Gasket, page 57.</p>
3	<p>Based on this product's Panel Cut Dimensions, page 41, open a mount-hole on the panel and attach this product to the panel from the front side.</p> <p>NOTE: This product has a hook at the top to prevent it from falling. Insert the bottom part of the product into the panel opening, and then insert the top part while pushing the hook down.</p> <div style="text-align: center;">  </div> <p>1 Hook</p>

Step	Action
4	<p>Insert the installation fastener hooks into the insertion slots of this product.</p>  <p>1 Insertion slots 2 Installation fastener</p>
5	<p>In a clockwise direction, tighten the installation fastener's screws with a screwdriver.</p> <p>The necessary torque is 0.5 N•m (4.4 lb-in).</p>  <p>1 Installation panel</p>

NOTICE

BROKEN ENCLOSURE

Do not exert more torque than the amount specified.

Failure to follow these instructions can result in equipment damage.

Installing Using Spring Clips

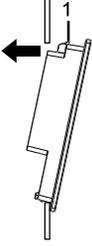
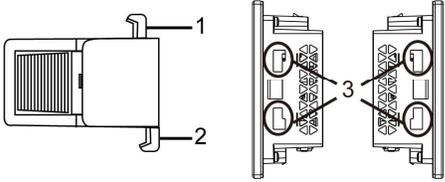
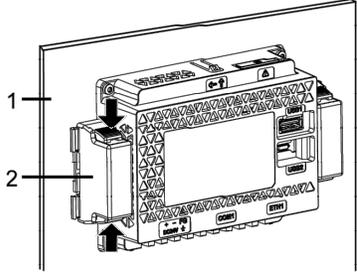
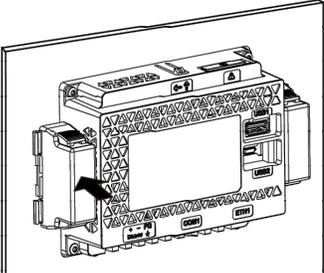
⚠ CAUTION

SPRING LOADED MECHANISM

Do not release the spring clip mechanism near your face.

Failure to follow these instructions can result in injury or equipment damage.

Step	Action
1	Place this product on a clean and level surface with the screen facing down.
2	<p>Check that this product's gasket is seated securely into the bezel's groove, which runs around the perimeter of the display frame.</p> <p>NOTE: Always use the installation gasket, since it absorbs vibration in addition to repelling water. For the procedure on replacing the installation gasket, refer to Replacing the Installation Gasket, page 57.</p>
3	<p>Based on this product's Panel Cut Dimensions, page 41, open a mount hole on the panel and attach this product to the panel from the front side.</p> <p>NOTE: This product has a hook at the top to prevent it from falling. Insert the bottom part of the product into the panel opening, and then insert the top part while pushing the hook down.</p>

Step	Action
	 <p>1 Hook</p>
4	<p>Press the spring clip hooks into the insertion slots on this product. Adjust the spring clips for the panel thickness by turning it over:</p> <ul style="list-style-type: none"> <li>• Position 1 1.5 mm (0.059 in) ≤ panel thickness ≤ 4 mm (0.157 in). <li>• Position 2 4 mm (0.157 in) ≤ panel thickness ≤ 6 mm (0.236 in).  <p>Side of the spring clip</p> <p>1 Hook for position 1</p> <p>2 Hook for position 2</p> <p>3 Insertion slots</p>
5	<p>Lock the spring clips by simultaneously pressing the top and bottom of the clip.</p>  <p>1 Installation panel</p> <p>2 Spring clip</p>
6	<p>To remove the spring clips, unlock the clips by pressing on the back of the clip until you hear a click.</p> 

⚠ CAUTION
<p>RISK OF INJURY</p> <p>Do not drop this product when you remove it from the panel.</p> <ul style="list-style-type: none"> • Hold this product in place after removing the spring clips. • Use both hands. • While pushing on the hook, be careful not to hurt your fingers. <p>Failure to follow these instructions can result in injury or equipment damage.</p>

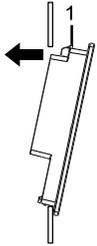
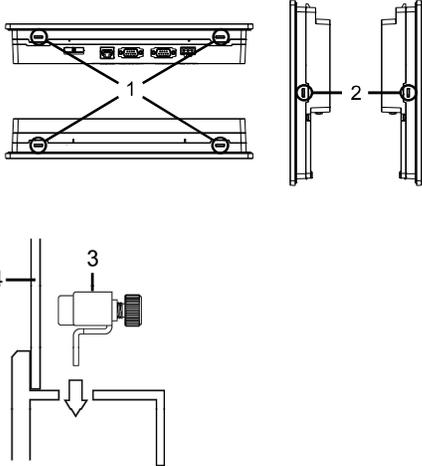
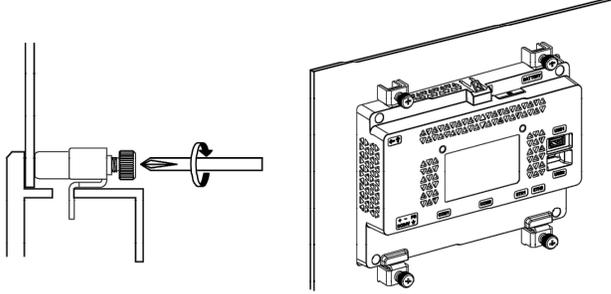
Installation Procedure (HMIST64/65/66/6700)

⚠⚠ DANGER
<p>HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH</p> <ul style="list-style-type: none"> • Remove all power from the device before removing any covers or elements of the system, and prior to installing or removing any accessories, hardware, or cables. • Unplug the power cable from both this product and the power supply prior to installing or removing the product. • Always use a properly rated voltage sensing device to confirm power is off where and when indicated. • Replace and secure all covers or elements of the system before applying power to this product. • Use only the specified voltage when operating this product. This product is designed to use 24 Vdc. Always check whether your device is DC powered before applying power. <p>Failure to follow these instructions will result in death or serious injury.</p>

NOTICE
<p>EQUIPMENT DAMAGE</p> <ul style="list-style-type: none"> • Always use the installation gasket. • Keep this product stabilized in the panel-cut while you are installing or removing the screw fasteners. <p>Failure to follow these instructions can result in equipment damage.</p>

Installing Using Installation Fasteners

Step	Action
1	Place this product on a clean and level surface with the screen facing down.
2	<p>Check that this product's gasket is seated securely into the bezel's groove, which runs around the perimeter of the display panel frame.</p> <p>NOTE: Always use the installation gasket, since it absorbs vibration in addition to repelling water. For the procedure on replacing the installation gasket, refer to Replacing the Installation Gasket, page 57.</p>
3	Based on this product's Panel Cut Dimensions, page 41, open a mount-hole on the panel and attach this product to the panel from the front side.

Step	Action
	<p>NOTE: This product has a hook at the top to prevent it from falling. Insert the bottom part of the product into the panel opening, and then insert the top part while pushing the hook down.</p>  <p>1 Hook</p>
4	<p>Insert the installation fastener hooks into the insertion slots of this product.</p>  <p>1 Insertion slots 2 Insertion slots (HMIST6700 only) 3 Installation fastener 4 Installation panel</p>
5	<p>In a clockwise direction, tighten the installation fastener's screws with a screwdriver. The necessary torque is 0,5 N•m (4,4 lb-in).</p>  <p>NOTE: The installation fasteners can be screwed by hand too.</p>

Removal Procedure

⚠️⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Remove all power from the device before removing any covers or elements of the system, and prior to installing or removing any accessories, hardware, or cables.
- Unplug the power cable from both this product and the power supply prior to installing or removing the product.
- Always use a properly rated voltage sensing device to confirm power is off where and when indicated.

Failure to follow these instructions will result in death or serious injury.

NOTICE

EQUIPMENT DAMAGE

Keep this product stabilized in the panel-cut while you are installing or removing the screw fasteners.

Failure to follow these instructions can result in equipment damage.

Step	Action
1	Loosen the screws of the installation fasteners and remove them.
2	While pushing the hook on the top of this product, slowly remove this product from the panel. 

1 Hook

⚠️ CAUTION

RISK OF INJURY

Do not drop this product when you remove it from the panel.

- Hold this product in place after removing the fasteners.
- Use both hands.
- While pushing on the hook, be careful not to hurt your fingers.

Failure to follow these instructions can result in injury or equipment damage.

NOTICE

EQUIPMENT DAMAGE

To avoid damage, remove this product while pushing the hook or by making sure the lock does not touch the panel.

Failure to follow these instructions can result in equipment damage.

Wiring the Power Supply

Connecting the DC Power Cord

⚡ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Remove all power from the device before removing any covers or elements of the system, and prior to installing or removing any accessories, hardware, or cables.
- Remove power before wiring this product's power terminals.
- Always use a properly rated voltage sensing device to confirm power is off where and when indicated.
- Replace and secure all covers or elements of the system before applying power to this product.
- Use only the specified voltage when operating this product. This product is designed to use 24 Vdc. Always check whether your device is DC powered before applying power.
- Since this product is not equipped with a power switch, be sure to connect a power switch to the power supply.
- Be sure to ground this product's FG terminal.

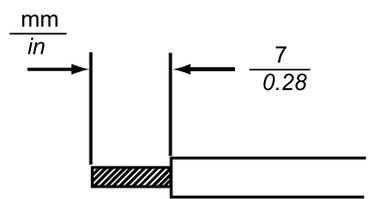
Failure to follow these instructions will result in death or serious injury.

NOTE:

- The SG and FG terminals are separated inside this product.
- When the FG terminal is connected, be sure the wire is grounded. Not grounding this product can result in excessive electromagnetic interference (EMI).

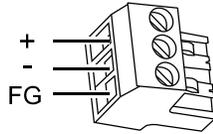
DC Power Cord Preparation

- Make sure the ground wire is either the same or heavier gauge than the power wires.
- Do not use aluminum wires in the power supply's power cord.
- If the ends of the individual wires are not twisted correctly, the wires may create a short circuit.
- The conductor type is solid or stranded wire.
- Use copper wire rated for 75 °C (167 °F) or higher.
- Use the SELV (Safety Extra-Low Voltage) circuit and LIM (Limited Energy) circuit for DC input.

Power cord diameter	0.75...2.5 mm ² (18...13 AWG)*1
Conductor type	Solid or stranded wire
Conductor length	
Recommended driver	Flat-head screwdriver (size 0.6 x 3.5)

*1 For UL compatibility, use AWG 14 or AWG 13.

DC Power Supply Connector Specifications



+	24 Vdc
-	0 Vdc
FG	Functional ground (Connect the FG terminal properly to ground.)

NOTE: Part number: XBTZGPWS1

How to connect the DC Power Cord

Step	Action
1	Confirm the power cord is not connected to the power supply.
2	Check the rated voltage.
3	Remove the DC power supply connector from this product.
4	Strip the membrane of the power cord, and twist the wire ends.
5	<p>Insert each power cord wire into its corresponding hole. Fasten the screws of the DC power supply connector to clamp the wire in place.</p> <p>NOTE:</p> <ul style="list-style-type: none"> The necessary torque is 0.56 N•m (5 lb-in). Do not solder the cable connection.
6	After inserting all three power cord wires, insert the DC power supply connector into the power connector on this product.

Power Supply Precautions

⚡⚠ DANGER

SHORT CIRCUIT, FIRE, OR UNINTENDED EQUIPMENT OPERATION

- Install and fasten this product in an installation panel or cabinet prior to connecting power supply and communication lines.
- Securely attach power cables to an installation panel or cabinet.
- Avoid excessive force on the power cable.

Failure to follow these instructions will result in death or serious injury.

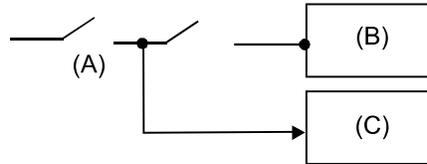
Improving Noise/Surge Resistance

- This product's power cord should not be bundled with or kept close to main circuit lines (high voltage, high current), power lines, or input/output lines, and their various systems should be kept separate. When power lines cannot be wired via a separate system, use shielded cables for input/output lines.
- Make the power cord as short as possible, and twist the wires (twisted pair cabling) all the way from the side of the power supply unit.
- If there is an excess amount of noise on the power supply line, reduce the noise with a noise filter before turning on the power.

- Connect a surge protection device to handle power surges.
- To increase noise resistance, attach a ferrite core to the power cable.

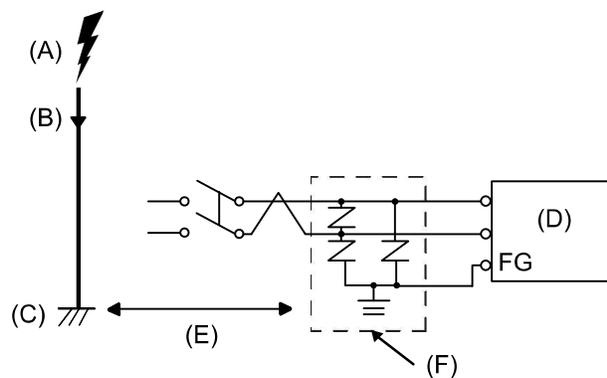
Power Supply Connections

- When supplying power to this product, connect the power as shown below.



- A. Main power
- B. This product
- C. Other unit

- Use the SELV (Safety Extra-Low Voltage) circuit and LIM (Limited Energy) circuit for DC input.
- The following shows a surge protection device connection:



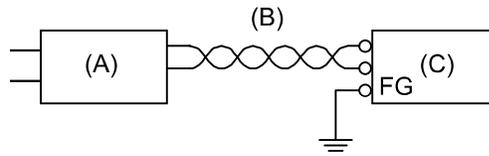
- A. Lightning
- B. Lightning rod
- C. Ground
- D. This product
- E. Provide adequate distance
- F. Surge protection device

- Attach a surge protection device to prevent damage to this product as a result of a lightning induced power surge from a large electromagnetic field generated from a direct lightning strike.

We also strongly recommend to connect the crossover grounding wire of this product to a position close to the ground terminal of the surge protection device.

It is expected that there will be an effect on this product due to fluctuations in grounding potential when there is a large surge flow of electrical energy to the lightning rod ground at the time of a lightning strike. Provide adequate distance between the lightning rod grounding point and the surge protection device grounding point.

- If the voltage variation is outside the prescribed range, connect a regulated power supply.

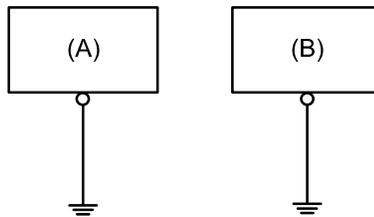


- A. Regulated power supply
- B. Twisted-pair cord
- C. This product

Grounding

Independent Grounding

Always ground the FG (functional ground) terminal. Be sure to separate this product from the FG of other devices as shown below.



- A. This product
- B. Other equipment

Precautions

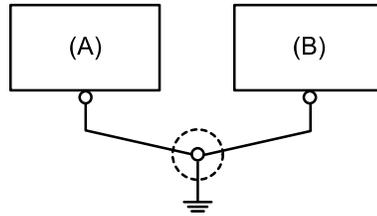
- Check that the grounding resistance is 100 Ω or less.*1
- The FG wire should have a cross sectional area 2 mm² (AWG14) or greater*1. Create the connection point as close as possible to this product, and make the wire as short as possible. When using a long grounding wire, replace the thin wire with a thicker wire, and place it in a duct.
- The SG and FG terminals are separated internally in this product. When connecting the FG and SG, be sure that no ground loop is formed.

*1 Observe local codes and standards.

Common Grounding

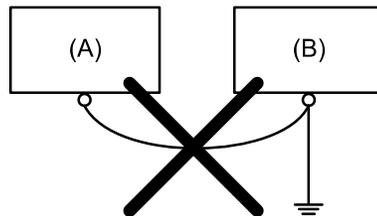
Electromagnetic Interference (EMI) can be created if devices are improperly grounded. EMI can cause loss of communication. If exclusive grounding is not possible, use a common grounding point as shown in the configuration below. Do not use any other configuration for common grounding.

Correct grounding



- A. This product
- B. Other equipment

Incorrect grounding



- A. This product
- B. Other equipment

USB Cable Clamp

USB Clamp Type A (1 port)

Introduction

When using a USB device, attach a USB cable clamp to the USB interface to prevent the USB cable from being disconnected.

⚠ DANGER

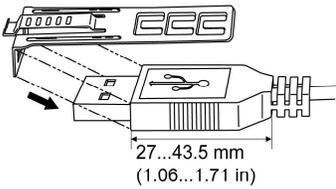
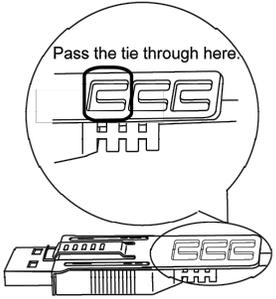
EXPLOSION HAZARD

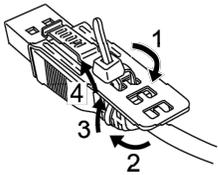
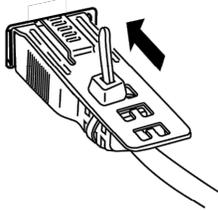
- Do not disconnect equipment while the circuit is live or unless the area is known to be free of ignitable concentrations.
- Remove power before attaching or detaching any connectors to or from this product.
- Ensure that power, communication, and accessory connections do not place excessive stress on the ports. Consider the vibration in the environment when making this determination.
- Securely attach power, communication, and external accessory cables to the panel or cabinet.
- Use only commercially available USB cables.
- Use only non-incendive USB configurations.
- Use the USB (micro-B) interface for temporary connection only during maintenance and setup of the device.
- Do not use this product in hazardous environments.
- Confirm that the USB cable has been attached with the USB cable clamp before using the USB interface.

Failure to follow these instructions will result in death or serious injury.

Attaching USB Clamp Type A (1 port)

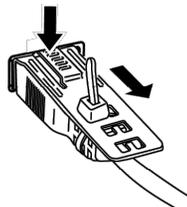
NOTE: Watch your fingers. The edge of the clip is sharp.

Step	Action
1	<p>Mount the clip to the USB mark  connector shell so that it overlaps. The clip matches the 27 to 43.5 mm (1.06 to 1.71 in) length of the USB connector.</p> 
2	<p>Align the clip and the USB cable connector shell. Adjust the position of the holes where the clip is attached. To ensure stability, select the clip-hole position that is closest to the base of the connector shell.</p> 

Step	Action
3	<p>As shown, pass the tie through the clip hole. Next, turn the tie and pass it through the head so that the USB cable can pass through the center of the tie loop. The clip is now attached to the USB cable.</p>  <p>NOTE:</p> <ul style="list-style-type: none"> • Check the direction of the head beforehand. Make sure the USB cable is through the center of the tie loop and that the tie can pass through the head. • You can substitute the tie provided with HMIZGCLP1 (by Schneider Electric), or other commercially available ties with a width of 4.8 mm (0.19 in) and thickness of 1.3 mm (0.05 in).
4	<p>While pressing the grip on the clip, insert the cable from step 3 all the way into the USB host interface. Make sure that the clip tab is secured to the USB cable attached to this product.</p> 

Removing USB Cable Clamp Type A (1 port)

Remove the USB cable while pushing the grip section of the clip.



Isolation Unit

You can install the Isolation Unit to the back of this product or to the installation panel. For details such as settings when using the Isolation Unit (XBTZGI232 or XBTZGI485), refer to the product manual.

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK OR EXPLOSION

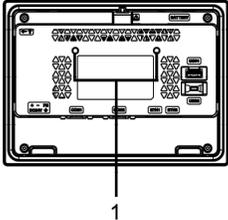
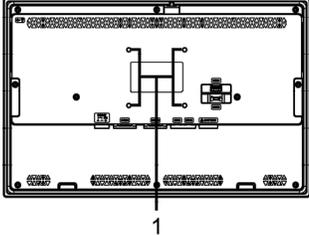
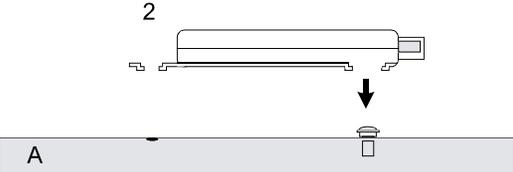
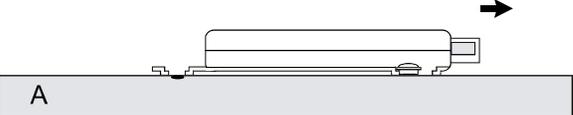
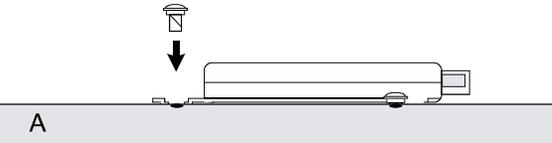
Prior to connecting the Isolation Unit to this product, confirm that this product's power supply is completely turned OFF.

Failure to follow these instructions will result in death or serious injury.

Installation Procedure

NOTE:

- Attach the Isolation Unit to a stable surface. Do not leave the Isolation Unit hanging by its cord.
- Be careful with wire placement. Overlapping cords may cause noise.
- HMIST6200 does not support the Isolation Unit.

Step	Action
1	<p>Check the locations of two screw holes on the rear of this product.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>HMIST64/6500</p>  <p>1</p> </div> <div style="text-align: center;"> <p>HMIST66/6700</p>  <p>1</p> </div> </div> <p>1 Screw hole</p>
2	<p>Install one of the two attachment screws included in the Isolation Unit to this product. Use a torque of 0.5 N•m (4.4 lb-in).</p> <div style="text-align: center;">  <p>1</p> </div> <p>1 Attachment screw A This product</p>
3	<p>Attach the Isolation Unit to this product.</p> <div style="text-align: center;">  <p>2</p> </div> <p>2 Isolation unit A This product</p>
4	<p>Slide the Isolation Unit in the direction of the arrow so the Isolation Unit is hooked by the screw from Step 2.</p> <div style="text-align: center;">  </div> <p>A This product</p>
5	<p>Secure the Isolation Unit in place with another attachment screw. Use a torque of 0.5 N•m (4.4 lb-in).</p> <div style="text-align: center;">  </div> <p>A This product</p>

Maintenance

Regular Cleaning

Cleaning this product

NOTICE

EQUIPMENT DAMAGE

- Power off this product before cleaning it.
- Do not use hard or pointed objects to operate the touch panel.
- Do not use paint thinner, organic solvents, or a strong acid compound to clean the unit.

Failure to follow these instructions can result in equipment damage.

When this product gets dirty, wipe this product with a soft, dry cloth or a soft cloth soaked in only water and wrung tightly.

NOTE: When the product is very dirty, soak the soft cloth in water with a neutral detergent, wring the cloth tightly and wipe the product while avoiding the product label.

Periodic Check Points

Operation Environment

- Is the ambient air temperature within the allowable range? Refer to Environmental Specifications, page 21.
- Is the ambient air humidity within the specified range? Refer to Environmental Specifications, page 21.
- Is the operating atmosphere free of corrosive gasses?

When this product is inside a panel, the ambient environment refers to the interior of the panel.

Electrical Specifications

- Is the input voltage appropriate? Refer to Electrical Specifications, page 21.
- Are all power cords and cables connected properly? Are there any loose cables?
- Are all mounting brackets holding the unit securely?
- Are there scratches or traces of dirt on the installation gasket?

Unit Disposal

When disposing this product, dispose it in a manner appropriate to, and in accordance with, your country's industrial machinery disposal/recycling standards.

Replacing the Installation Gasket

Introduction

The installation gasket provides protection against dust and moisture.

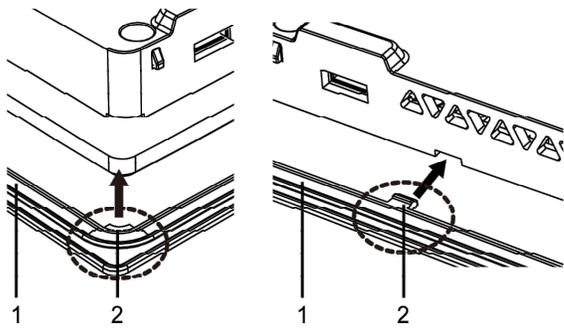
NOTICE

GASKET AGING

- Inspect the gasket periodically as required by your operating environment.
- Change the gasket at least once a year, or as soon as scratches or dirt become visible.

Failure to follow these instructions can result in equipment damage.

Installing the Installation Gasket

Step	Action
1	Place this product on a flat, level surface, with the display face pointing down.
2	Remove the gasket from this product.
3	<p>Attach the new gasket to this product. Insert the protrusions from the four corners of the gasket into the corresponding holes in the corners of this product.</p> <p>Depending on your model, there may be additional protrusions. In the following, refer to the figure on the right and insert the protrusions accordingly.</p> <p>NOTE: When using a tool to insert the gasket, make sure the tool does not catch the rubber gasket and cause a tear.</p>  <p>1 Installation gasket 2 Protruding point</p>

The gasket must be inserted correctly into the groove for moisture resistance of this product.

NOTICE

EQUIPMENT DAMAGE

Be careful not to stretch the gasket unnecessarily.

Failure to follow these instructions can result in equipment damage.

Replacing the Battery

This product uses a primary battery for data backup of the internal clock. If the battery is depleted, the clock data will be lost. Use only the replacement battery for this product (HMIZSBA1).

⚠️⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Follow the procedures step by step to replace the battery correctly and safely.
- Before replacing the battery, turn off this product's power.

Failure to follow these instructions will result in death or serious injury.

⚠️ DANGER

EXPLOSION, FIRE, OR CHEMICAL HAZARD

- Use only the identical replacement battery for this product.
- Do not cause a short circuit.
- Recycle or properly dispose of used batteries.
- Do not recharge, disassemble or heat above 80 °C (176 °F).
- Use your hands or insulated tools to remove or replace the battery.
- Maintain proper polarity when inserting and connecting a new battery.

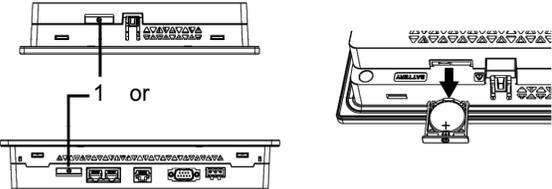
Failure to follow these instructions will result in death or serious injury.

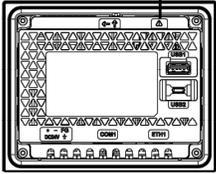
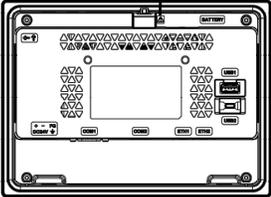
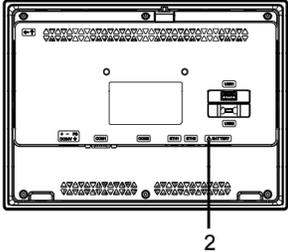
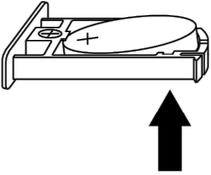
NOTICE

LOSS OF DATA

- Replace the battery regularly every five years after you purchase this product.
- Allow only qualified personnel to change the battery.

Failure to follow these instructions can result in equipment damage.

Step	Action
1	Disconnect the power supply from this product.
2	Touch the housing or ground connection to discharge any electrostatic charge from your body.
3	Place this product on a flat, level surface, with the front side pointing up.
4	Open the battery slot on the top or bottom of this product. 

Step	Action
	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>HMIST6200</p>  </div> <div style="text-align: center;"> <p>HMIST6400</p>  </div> </div> <div style="text-align: center; margin-top: 20px;"> <p>HMIST65/66/6700</p>  </div> <p>1 Battery slot</p> <p>2 Safety alert symbol (see the safety messages stated on the previous page)</p>
5	<p>Remove the spent battery from the tray by touching the battery from the bottom.</p> 
6	<p>Put the new battery on the tray in accordance with the polarity markings in the tray and on the battery.</p>
7	<p>Insert the tray into the battery slot.</p>
8	<p>Reconnect the power supply to this product.</p> <p>NOTE: After reconnecting the power supply, set up the clock again. Refer to your screen editing software manual on how to set up the clock.</p>

Replacing the Backlight

Not replaceable. Please contact your local distributor.

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France

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www.se.com

As standards, specifications, and design change from time to time,
please ask for confirmation of the information given in this publication.

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EIO0000003527_03

Modicon M340 Processors Setup Manual

Original instructions

10/2019

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

WARNING

UNGUARDED EQUIPMENT

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

START-UP AND TEST

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

WARNING

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About the Book



At a Glance

Document Scope

This manual describes the hardware installation of the Modicon M340 PLCs and installation of their main accessories.

This document is also valid for the Modicon M340H PLCs and their accessories.

Validity Note

This documentation is valid for EcoStruxure™ Control Expert 14.1 or later.

You need Modicon M340 firmware 2.4 or later.

The technical characteristics of the devices described in the present document also appear online. To access the information online:

Step	Action
1	Go to the Schneider Electric home page www.schneider-electric.com .
2	In the Search box type the reference of a product or the name of a product range. <ul style="list-style-type: none">• Do not include blank spaces in the reference or product range.• To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the Product Datasheets search results and click on the reference that interests you. If you entered the name of a product range, go to the Product Ranges search results and click on the product range that interests you.
4	If more than one reference appears in the Products search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the datasheet.
6	To save or print a datasheet as a .pdf file, click Download XXX product datasheet .

The characteristics that are presented in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

Related Documents

Title of documentation	Reference number
Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications	EIO0000002726 (English), EIO0000002727 (French), EIO0000002728 (German), EIO0000002730 (Italian), EIO0000002729 (Spanish), EIO0000002731 (Chinese)
Modicon X80 Racks and Power Supplies, Hardware, Reference Manual	EIO0000002626 (English), EIO0000002627 (French), EIO0000002628 (German), EIO0000002630 (Italian), EIO0000002629 (Spanish), EIO0000002631 (Chinese)
EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual	35006144 (English), 35006145 (French), 35006146 (German), 35013361 (Italian), 35006147 (Spanish), 35013362 (Chinese)
EcoStruxure™ Control Expert, Operating Modes	33003101 (English), 33003102 (French), 33003103 (German), 33003104 (Spanish), 33003696 (Italian), 33003697 (Chinese)

You can download these technical publications and other technical information from our website at www.schneider-electric.com/en/download.

Product Related Information

 WARNING
<p>UNINTENDED EQUIPMENT OPERATION</p> <p>The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter, and apply this product.</p> <p>Follow all local and national safety codes and standards.</p> <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

Part I

Modicon M340 PLCs

Subject of this Part

This part provides a general overview of the Modicon M340 PLC configurations and the various sub-assemblies, as well as the networks and field buses used.

What Is in This Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
1	Introduction to Modicon M340 PLC Stations	13
2	General Introduction to PLC Station Components	15
3	General Introduction to PLC Networks	31
4	Operating Standards and Conditions	35

Chapter 1

Introduction to Modicon M340 PLC Stations

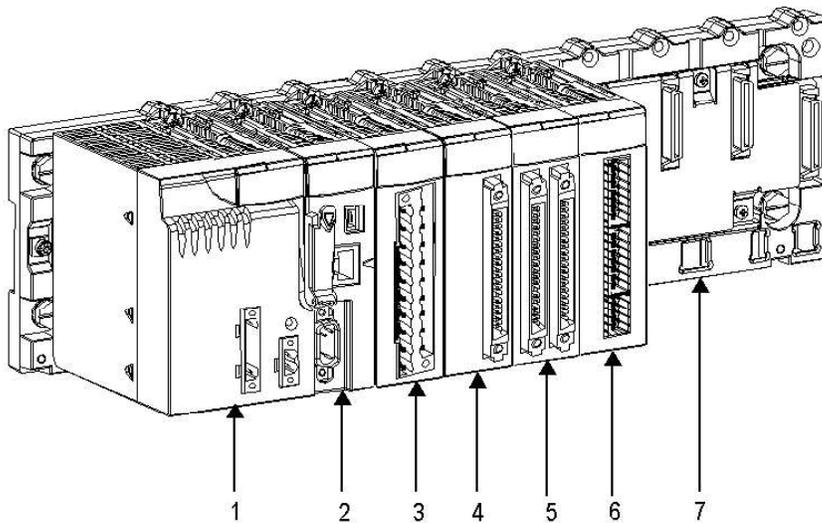
Modicon M340 PLC Station

General

Modicon M340 automated platform processors manage the entire PLC station, which is made up of discrete I/O modules, analog I/O modules, counting modules, discrete I/O modules, analog I/O modules, other expert modules, and communication modules. These are distributed across one or more racks connected on the local bus. Each rack must include a power supply module; the main rack supports the CPU.

Illustration

The following diagram shows a configuration example for the Modicon M340 PLC with one rack:



Number Table

The following table describes the numbered components of the PLC station above.

Number	Description
1	Power supply module
2	Processor
3	20-pin terminal block I/O module
4	40-pin single connector I/O module
5	40-pin 2-connector I/O module
6	Counting module
7	8-slot rack

Chapter 2

General Introduction to PLC Station Components

Subject of this Section

This section provides a general overview of the various components of which a PLC station may consist.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
General Introduction to Processors	16
General Introduction to Racks	17
General Introduction to Power Supply Modules	18
General Introduction to Rack Extender Module	19
General Introduction to Input/Output Modules	20
General Introduction to Counting Modules	23
General Introduction to Communication	25
Grounding of Installed Modules	26
Modicon M340H (Hardened) Processors, Modules and Equipment	28

General Introduction to Processors

General

Each PLC station is equipped with a processor, chosen according to the following characteristics:

- processing power (number of inputs/outputs managed)
- memory capacity
- communication ports

For further information, please refer to *Introduction to BMX P34 xxxx Processors*, [page 39](#).

General Introduction to Racks

General

There are various sizes of racks. The following list presents the quantity of slots available for the CPU and modules for each rack reference:

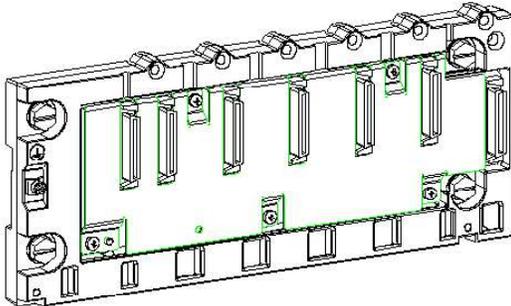
- 4 slots: BMXXBP0400(H) or BMEXBP0400(H)
- 6 slots: BMXXBP0600(H)
- 8 slots: BMXXBP0800(H) or BMEXBP0800(H)
- 12 slots: BMXXBP1200(H) or BMEXBP1200(H)
- racks with redundant power supplies:
 - 6 slots: BMEXBP0602(H)
 - 10 slots: BMEXBP1002(H)

Each rack includes one extra slot that is reserved for the power supply module, and one slot on the right is reserved for the BMXXBE1000 rack extender module.

For further information, refer to the chapter *Modicon X80 Racks Description (see Modicon X80, Racks and Power Supplies, Hardware Reference Manual)*.

Representation of the Racks

The following diagram shows the BMXXPB0400 rack:



General Introduction to Power Supply Modules

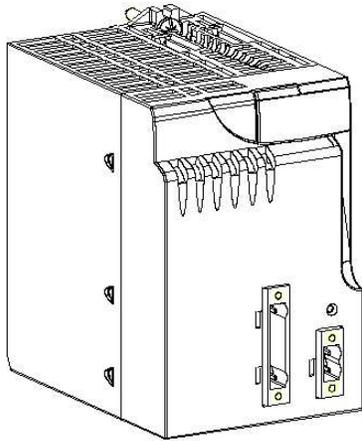
General

Each rack requires one power supply module defined according to the distributed network (alternating or direct current) and the power necessary at rack level.

For further information, refer to the chapter *Modicon X80 Power Supply Modules Description* (see *Modicon X80, Racks and Power Supplies, Hardware Reference Manual*).

Illustration

The following illustration shows a BMXCPS•••• power supply module:



General Introduction to Rack Extender Module

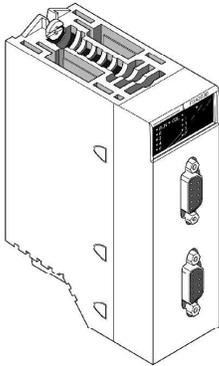
General

This module allows connecting a maximum of 4 chained racks, depending on the CPU, distributed along a maximum length of 30 meters.

For further information, refer to chapter *BMXXBE1000 Rack Extender Module (see Modicon X80, Racks and Power Supplies, Hardware Reference Manual)*.

Illustration

Illustration of the BMXXBE1000 rack extender module:



General Introduction to Input/Output Modules

General

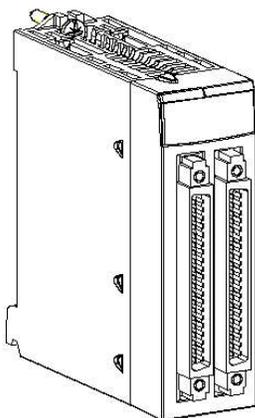
The Modicon M340 range includes discrete and analog input/output modules.

Discrete Input/Output

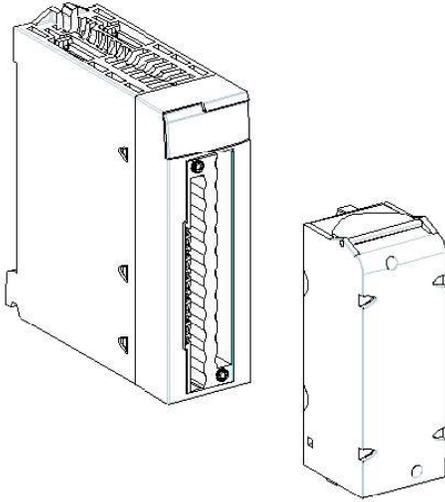
A wide range of discrete input/output modules enables you to select the module best suited to your needs. The characteristics of these modules differ as follows:

Characteristics	Description
Modularity	<ul style="list-style-type: none"> ● 8 channels ● 16 channels ● 32 channels ● 64 channels
Type of Inputs	<ul style="list-style-type: none"> ● Modules with direct current inputs (24 VCC and 48 VCC) ● Modules with alternating current inputs (24 VCA, 48 VCA and 120 VCA)
Type of Outputs	<ul style="list-style-type: none"> ● Modules with relay outputs ● Modules with direct current static outputs (24 VCC / 0.1 A - 0.5 A - 3 A) ● Modules with alternating current static outputs (24 VCC / 240 VAC / 3 A)
Type of Connector	<ul style="list-style-type: none"> ● 20-pin terminal blocks ● 40-pin connectors allowing connection to sensors and pre-actuators by means of the TELEFAST 2 prewiring system

The following illustration shows a discrete input/output modules with 40-pin connectors:



The following illustration shows a discrete input/output module with a 20-pin terminal block:

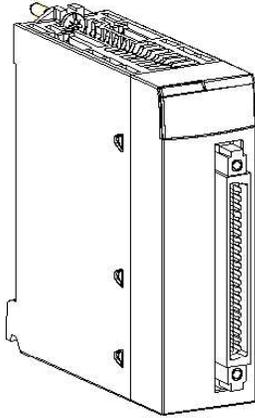


Analog Inputs/Outputs

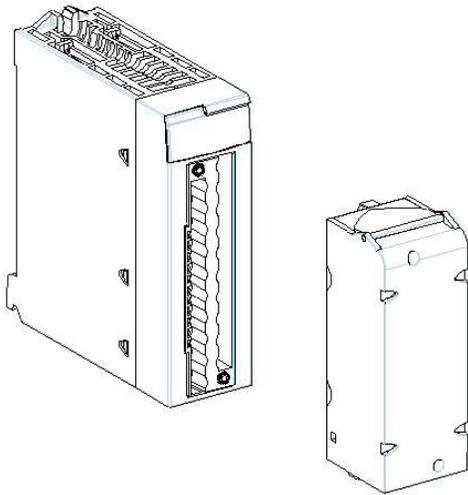
A wide range of analog input/output modules enables you to select the module best suited to your needs. The characteristics of these modules differ as follows:

Characteristics	Description
Modularity	<ul style="list-style-type: none"> ● 2 channels ● 4 channels
Performance and Range of Signals Offered	<ul style="list-style-type: none"> ● Voltage/current ● Thermocouple ● Thermowell
Type of Connector	<ul style="list-style-type: none"> ● 20-pin terminal blocks ● 40-pin connectors allowing connection to sensors and pre-actuators by means of the TELEFAST 2 prewiring system

The following illustration shows an analog input/output module with one 40-pin connector:



The following illustration shows an analog input/output module with 20-pin terminal block:



General Introduction to Counting Modules

General

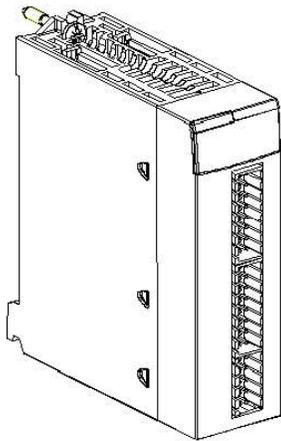
The PLCs in the Modicon M340 range offer counting functions (downcounting, counting, counting/downcounting) by utilizing the application-specific counting modules.

Two counting modules are offered:

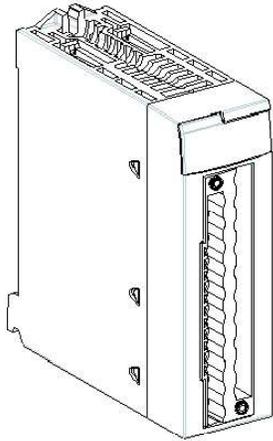
- BMX EHC 0200 module with two counting channels and a maximum acquisition frequency of 60 kHz
- BMX EHC 0800 module with eight counting channels and a maximum acquisition frequency of 10 kHz

Illustration

The following illustration shows a BMX EHC 0200 counting module:



The following illustration shows a BMX EHC 0800 counting module:



General Introduction to Communication

General

PLCs from the Modicon M340 range can be used in different communication modes:

- USB
- Serial
- Ethernet
- CANopen
- AS-Interface

Grounding of Installed Modules

General

The grounding of Modicon M340 modules is crucial to avoid electric shock.

Grounding Processors and Power Supplies

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Ensure ground connection contacts are present and not bent out of shape. If they are, do not use the module and contact your Schneider Electric representative.

Failure to follow these instructions will result in death or serious injury.

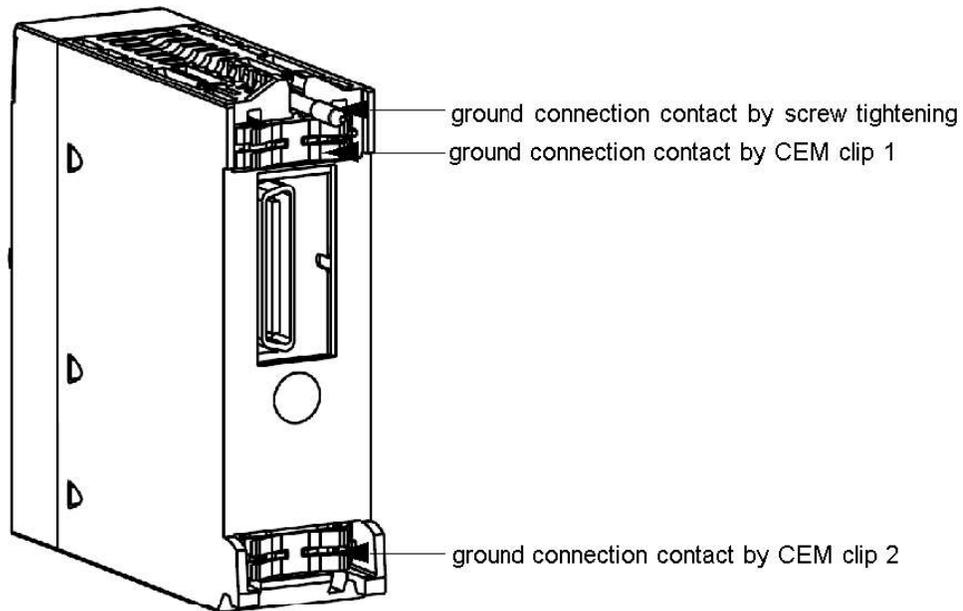
WARNING

UNINTENDED EQUIPMENT OPERATION

Tighten the clamping screws of the modules. A break in the circuit could lead to an unexpected behavior of the system.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

All Modicon M340 modules are equipped with ground connection contacts at the rear for grounding purposes:



These contacts connect the grounding bus of the modules to the grounding bus of the rack.

Modicon M340H (Hardened) Processors, Modules and Equipment

At a Glance

Hardened equipment can operate in extended temperature ranges and harsher environments compared to standard M340 equipment.

NOTE: For more information, refer to chapter *Installation in More Severe Environments* (see *Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications*).

“H” Equipment

The follow equipment are available in Hardened versions:

- CPUs:
 - BMX P34 2020H
 - BMX P34 2030 2H
- Power Supplies:
 - BMX CPS 3020H
 - BMX CPS 3500H
 - BMX CPS 4002H
- Backplanes:
 - BMX XBP 0400H
 - BMX XBP 0600H
 - BMX XBP 0800H
 - BMX XBP 1200H
 - BME XBP 0400H
 - BME XBP 0800H
 - BME XBP 1200H
 - BME XBP 0602H
 - BME XBP 1002H
- Backplane Extension:
 - BMX XBE 1000H
- Counting Modules:
 - BMX ECH 0200H
 - BMX ECH 0800H
- Analog Input Modules:
 - BMX ART 0414H
 - BMX ART 0814H
 - BMX AMI 0810H
- Analog Output Modules:
 - BMX AMO 0210H
 - BMX AMO 0410H

- Analog Input/Output Module:
 - BMX AMM 0600H
- TELEFAST Wiring Accessories
 - ABE7 CPA 0410H
 - ABE7 CPA 0412H
- Digital Input modules:
 - BMX DDI 1602H
 - BMX DDI 1603H
- Digital Input/Output modules:
 - BMX DAI 1602H
 - BMX DAI 1603H
 - BMX DAI 1604H
 - BMX DAI 1614H
 - BMX DAI 1615H
 - BMX DDM 16022H
 - BMX DDM 16025H
- Digital Output modules:
 - BMX DAO 1605H
 - BMX DAO 1615H
 - BMX DDO 1602H
 - BMX DDO 1612H
 - BMX DRA 0805H
 - BMX DRA 0815H
 - BMX DRA 1605H
 - BMX DRC 0805H
- Synchronous Serial Interface (SSI) Modules:
 - BMX EAE 0300H

Chapter 3

General Introduction to PLC Networks

Subject of this Section

This section provides a general overview of PLC networks.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
General Introduction to the Modbus Protocol	32
General Introduction to an Ethernet Network	33
General Introduction to the CANopen Field Bus	34

General Introduction to the Modbus Protocol

General

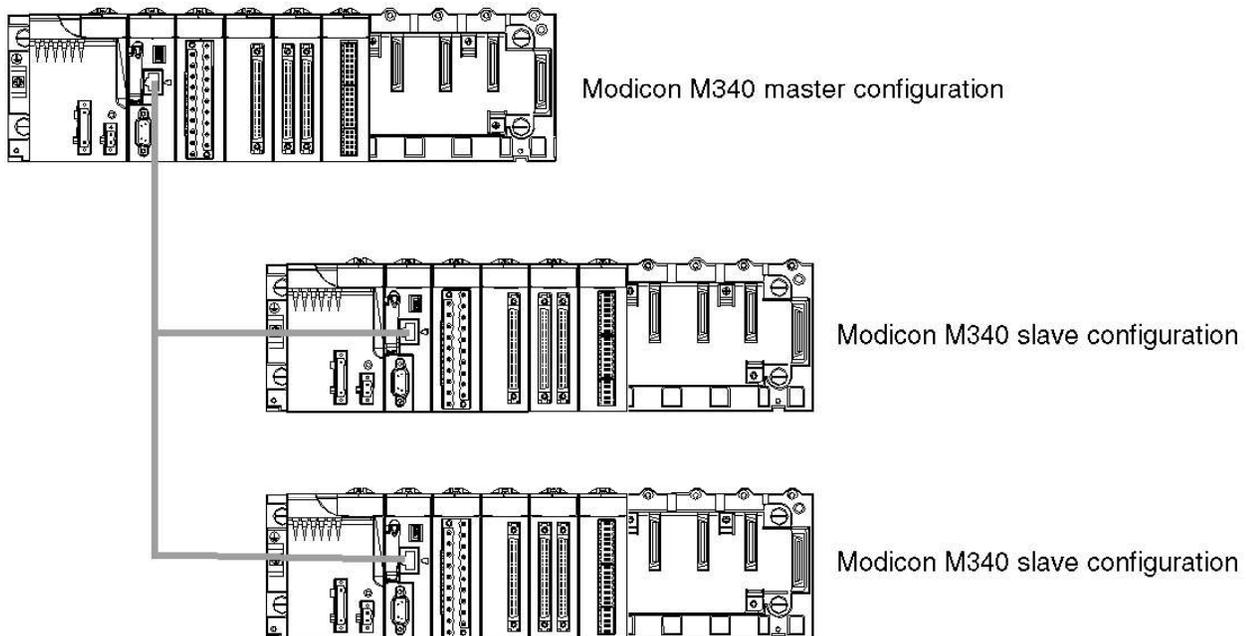
The Modbus protocol creates a hierarchical structure (one master and several slaves).

The master manages all exchanges according to two types of dialog:

- the master exchanges with a slave and awaits the response
- the master exchanges with all slaves without awaiting a response (broadcast queries).

Illustration

The following illustration shows a Modbus network:



General Introduction to an Ethernet Network

General

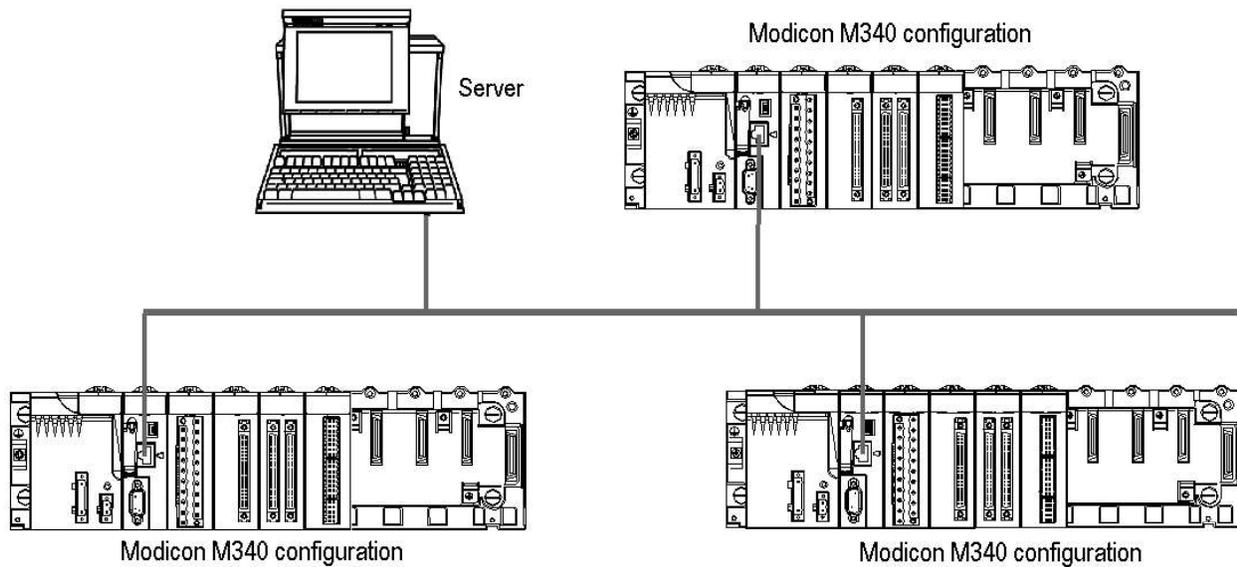
Ethernet communication essentially targets applications of:

- coordination between PLCs
- local or centralized monitoring
- communication with the production management information system
- communication with remote inputs/outputs

Acting as an agent, Ethernet communication also supports management of the network monitoring standard SNMP.

Illustration

The following illustration shows an Ethernet network:



General Introduction to the CANopen Field Bus

General

The CANopen structure consists of:

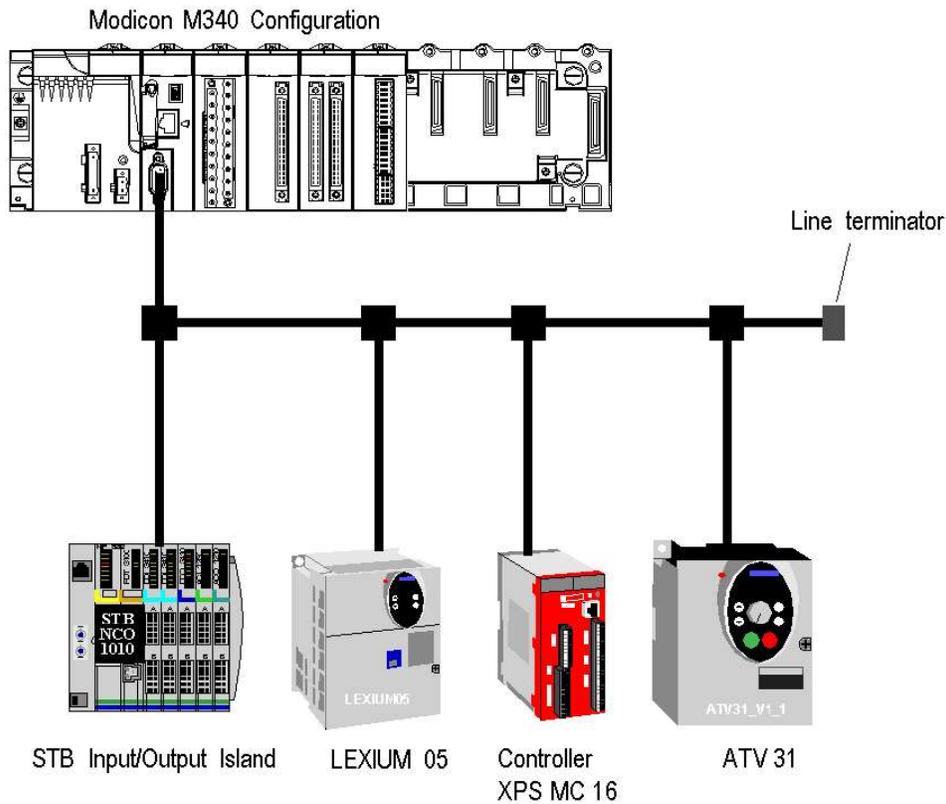
- a bus master
- slave devices, also called nodes

Bus operation is point to point. At any time, each device can send a request on the bus and the affected devices answer.

Bus request priority is calculated by an identifier in each message.

Illustration

The following example illustrates a CANopen field bus architecture:



Chapter 4

Operating Standards and Conditions

Standards and Certifications

Download

Click the link that corresponds to your preferred language to download standards and certifications (PDF format) that apply to the modules in this product line:

Title	Languages
Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications	<ul style="list-style-type: none"><li>● English: EIO0000002726<li>● French: EIO0000002727<li>● German: EIO0000002728<li>● Italian: EIO0000002730<li>● Spanish: EIO0000002729<li>● Chinese: EIO0000002731

Part II

BMX P34 xxxx Processors

Subject of this Part

This part describes the BMX P34 xxxx processors and their installation.

What Is in This Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
5	Introduction to BMX P34 xxxx Processors	39
6	General Characteristics of the BMX P34 xxxx Processors	57
7	Installation of BMX P34 xxxx Processors	73
8	BMX P34 xxxx Processors Diagnostics	85
9	Processor Performance	97

Chapter 5

Introduction to BMX P34 xxxx Processors

Subject of this Section

This section describes the BMX P34 •••• processors.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
General Introduction	40
Physical Description of BMX P34 xxxx Processors	43
USB Link	45
Modbus Link	46
CANopen Link	48
Ethernet Link	50
BMX P34 xxxxx Processors Catalog	53
Real-Time Clock	54

General Introduction

Introduction

A wide range of BMX P34 processors, with increasing performance and capability, are available to respond to various needs.

General

BMX P34 processors can be installed onto Modicon X80 racks.

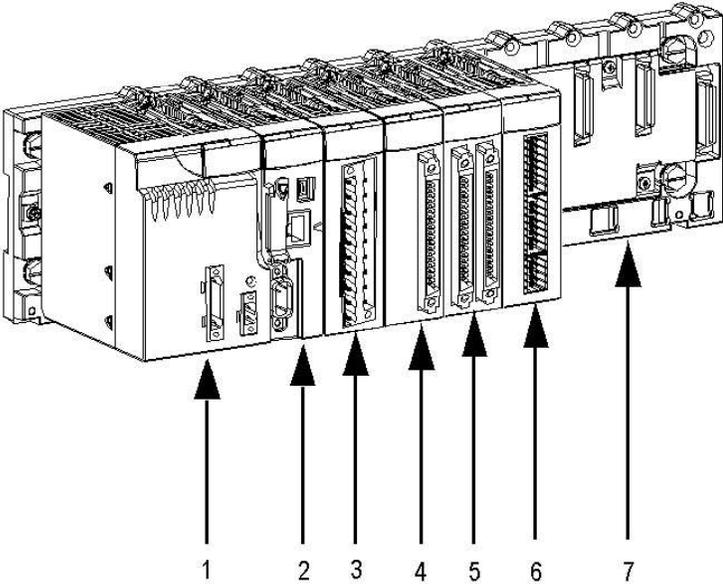
Functions

BMX P34 processors manage the entire PLC station, which includes the following elements:

- discrete input/output modules
- analog input/output modules
- other expert modules
- communication modules.

Illustration

The figure below shows a processor-managed architecture:

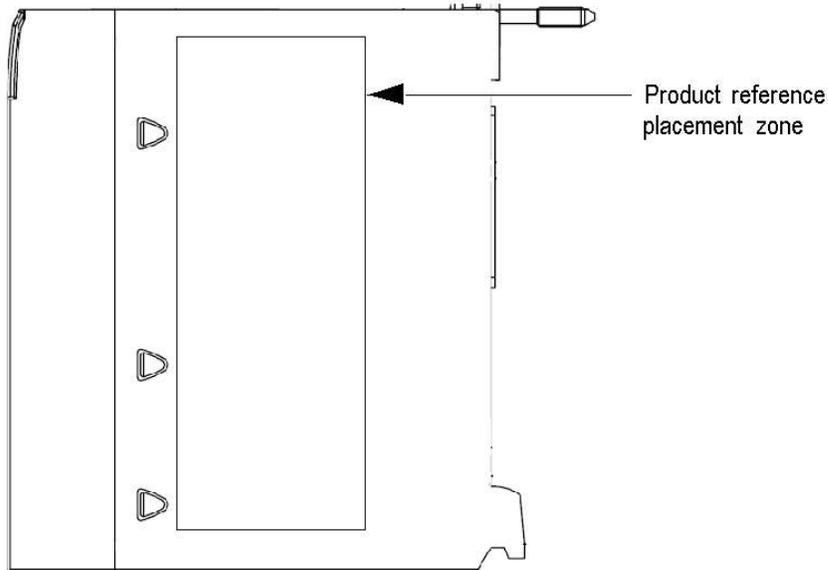


The following table gives the numbered components of the configuration above.

Number	Designation
1	Power supply module
2	Processor
3	20-pin terminal block module
4	40-pin single connector module
5	40-pin twin connector module
6	Counting module
7	Rack

Processor product references

The following diagram shows the location of the product references on the side of the processor:



Main Characteristics of the BMX P34 Processors

The following table shows the main characteristics of the BMX P34 processors.

Processor	Global maximum number of discrete inputs/outputs	Global maximum number of analog inputs/outputs	Maximum memory size	Modbus Connection	Integrated CANopen Master Connection	Integrated Ethernet Connection
BMX P34 1000	512	128	2048 Kb	X	-	-
BMX P34 2000	1024	256	4096 Kb	X	-	-
BMX P34 2010/20102	1024	256	4096 Kb	X	X	-
BMX P34 2020	1024	256	4096 Kb	X	-	X
BMX P34 2030/20302	1024	256	4096 Kb	-	X	X
Key						
X Available						
- Not available						

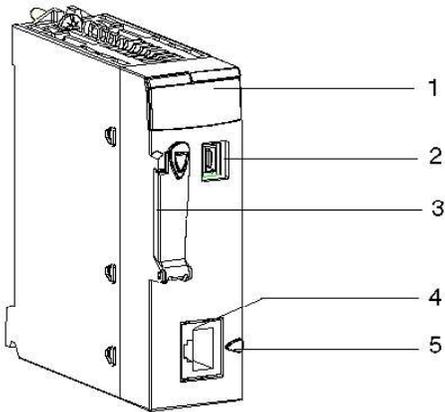
Physical Description of BMX P34 xxxx Processors

General

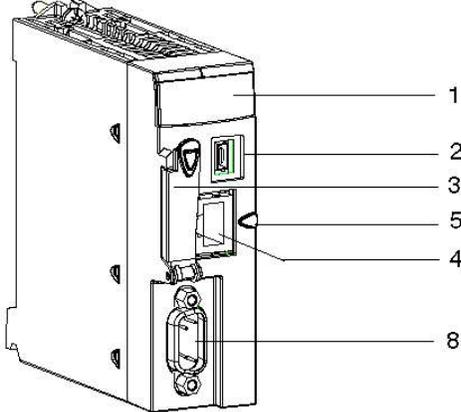
The BMX P34 xxxx processors differ according to the various components they include.

Illustration

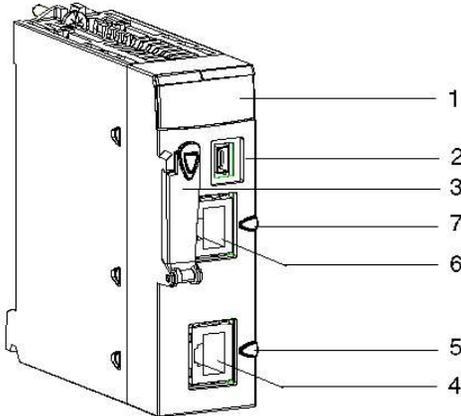
The following diagrams identify the various components of a BMX P34 xxxx processor:



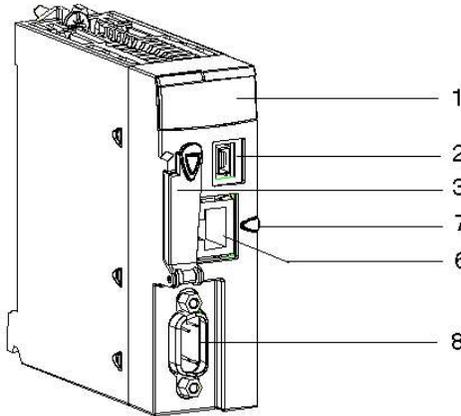
BMX P34 1000/2000 Processors



BMX P34 2010 Processor



BMX P34 2020 Processor



BMX P34 2030 Processor

Description

The following table shows the components of a BMX P34 •••• processor.

Number	Function
1	Display panel
2	USB port
3	Memory card protection port
4	Serial port
5	Serial port identification ring (black)
6	Ethernet port
7	Ethernet port identification ring (green)
8	CANopen port

USB Link

General

All processors have a USB link.

Description

Two connection cables are available to connect a human-machine interface to the processor USB port:

- BMX XCA USB 018, 1.8 m (5.91 ft) in length
- BMX XCA USB 045, 4.5 m (14.76 ft) in length

Both of these cables are fitted with a connector at each end:

- Type A USB: connects to the console
- Type mini B USB: connects to the processor

In fixed assembly with an XBT type console connected to the processor via the USB port, you are advised to connect the USB cable to the shielding connection kit (*see Modicon X80, Racks and Power Supplies, Hardware Reference Manual*).

NOTE: When using the M340, it is strongly recommended to use a USB 2.0 shielded cable following the USB international standard. The cables BMX XCA USB 018 and BMX XCA USB 045 are designed for this type of use and avoid unexpected behavior of the PLC. Those cables are shielded and tested against electrical noises.

Modbus Link

General

The following processors have a built-in communication channel dedicated to serial communication, and support communication via a Modbus link:

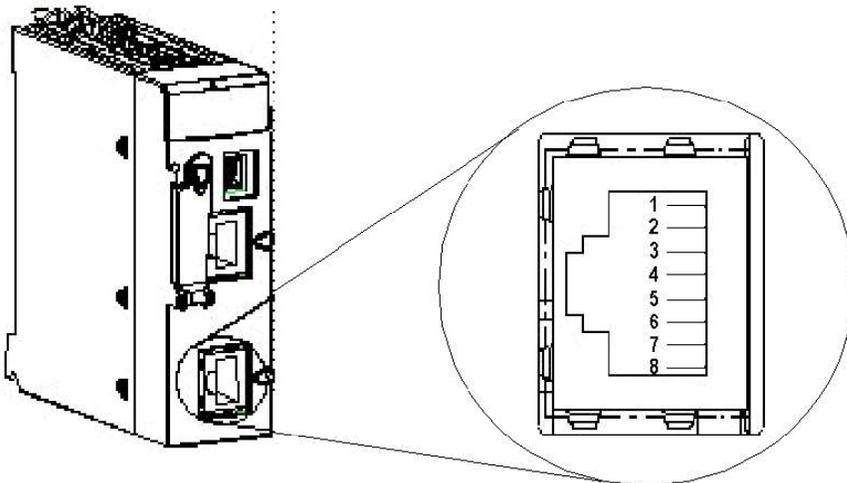
- BMX P34 1000,
- BMX P34 2000,
- BMX P34 2010/20102,
- BMX P34 2020.

Introduction to the Serial Port

The following table describes the characteristics of the serial communication channels:.

Characteristic	Description
Channel number	Channel 0
Protocols supported	<ul style="list-style-type: none">● Modbus protocol (ASCII and RTU)● Character Mode protocol
Connection	RJ45 female connector
Physical link	<ul style="list-style-type: none">● RS 485 non-insulated serial link● RS 232 non-insulated serial link

The following illustration shows the RJ45 serial port:



The following table shows the pin assignment of the serial port for the BMX P34 xxxxx processors:

1	RXD
2	TXD
3	RTS
4	D1
5	D0
6	CTS
7	Power supply
8	Common Shielding

The RJ45 connector has eight pins. The pins used differ according to the physical link used.

The pins used by the RS 232 serial link are as follows:

- Pin 1: RXD signal
- Pin 2: TXD signal
- Pin 3: RTS signal
- Pin 6: CTS signal

The pins used by the RS 485 serial link are as follows:

- Pin 4: D1 signal
- Pin 5: D0 signal

Pins 7 and 8 are dedicated to the power supply of the man-machine interface via the serial link:

- Pin 7: 5 VDC/190 mA network power supply
- Pin 8: common of the network power supply (0 V)

NOTE: The RS 232 4-wire, RS 485 2-wire, and RS 485 2-wire and power supply cables all use the same RJ45 male connector.

CANopen Link

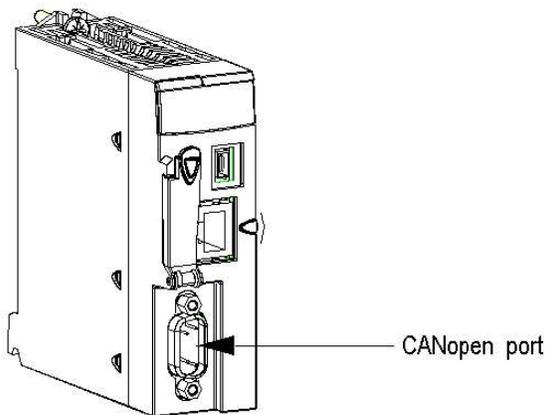
Introduction

The following processors have a built-in communication channel dedicated to CANopen communication, and support communication via CANopen link:

- BMX P34 2010/20102,
- BMX P34 2030/20302.

Introduction to the CANopen Port

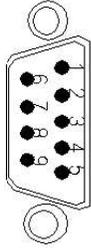
The following illustration shows the position of the BMX P34 2030 processor's CANopen port:



CANopen Connectors

The CANopen port of the processor module is fitted with a SUB-D9 connection.

The following illustration shows the processor CANopen port and the pins labels:



The following table shows the pin assignment of the CANopen link.

Pin	Signal	Description
1	-	Reserved
2	CAN_L	CAN_L bus line (low dominant)
3	CAN_GND	CAN ground
4	-	Reserved
5	Reserved	Optional CAN protection
6	(GND)	Optional ground
7	CAN_H	CAN_H bus line (high dominant)
8	-	Reserved
9	Reserved	Positive external CAN power supply (dedicated to the power supply of optocouplers and transmitters/receivers) Optional

NOTE: CAN_SHLD and CAN_V+ are not installed on the Modicon M340 range processors. These are reserved connections.

Ethernet Link

General

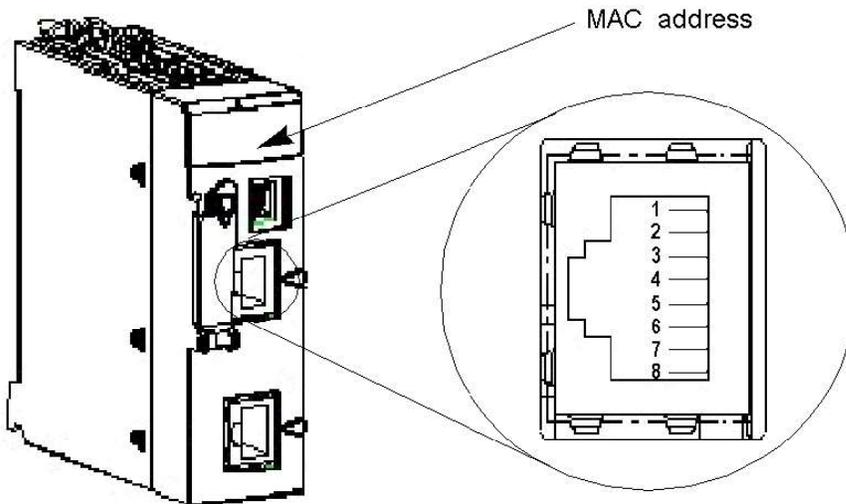
The following processors have a built-in communication channel dedicated to Ethernet communication, with 2 rotary switches which enable easy selection of the IP address processor.

- BMX P34 2020,
- BMX P34 2030/20302.

NOTE: These processors have only one IP address.

Introduction to the Ethernet Port

The following illustration shows the processor of the RJ45 Ethernet port:



The following illustration shows the pin assignment of the Ethernet port:

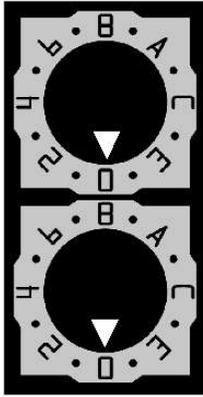
1	TD+
2	TD-
3	RD+
4	Not connected
5	Not connected
6	RD-
7	Not connected
8	Not connected

Introduction to the MAC address

The MAC address is located on the front panel of the processor below the processor display panel.

Introduction to the Rotary Switches

This processor operates as a single node on an Ethernet and possibly other networks. The module must have a unique IP address. The 2 rotary switches on the back of the module provide a simple way to select an IP address:



NOTE: Set the arrow firmly into the desired position. If you do not feel the switch click into place, the value of the switch may be incorrect or undetermined.

Each rotary switch position that you can use to set a valid IP address is marked on the module.

The following information summarizes the valid address settings:

- device name: for a switch-set device name, select a numeric value from 00 to 159. You can use both switches:
 - On the upper switch (TENS digit), the available settings are 0 to 15
 - On the lower switch (ONES digit), the available settings are 0 to 9.

For example, a BMX P34 2020 processor with the switch setting in the above figure is assigned the DHCP device name `BMX_2020_123`.

The selection on the lower switch of any non-numeric parameter (BOOTP, STORED, CLEAR IP, DISABLED) makes the setting on the upper switch inconsequential.

- BOOTP: To get an IP address from a BOOTP server, select either of the two BOOTP positions on the bottom switch.
- STORED: The device uses the application's configured (stored) parameters.
- CLEAR IP: The device uses the default IP parameters.
- DISABLED: The device does not respond to communications.

The functionality of the rotary switch when used in conjunction with the IP Configuration tab (see *Modicon M340 for Ethernet, Communications Modules and Processors, User Manual*) is discussed throughout the IP Address chapter (see *Modicon M340 for Ethernet, Communications Modules and Processors, User Manual*).

Switch Labels

To assist you in setting the rotary switches to their proper positions, a label is affixed to the right side of the module. The switch settings are described in this table:

Upper Switch
0 to 9: Tens value for the device name (0, 10, 20 . . . 90)
10(A) to 15(F): Tens value for the device name (100, 110, 120 . . . 150)
Lower Switch
0 to 9: Ones value for the device name (0, 1, 2 . . . 9)
Bootp: Set the switch to A or B to receive an IP address from a BOOTP server.
Stored: Set the switch to C or D to use the application's configured (stored) parameters.
Clear IP: Set the switch to E to use the default IP parameters.
Disabled: Set the switch to F to disable communications.

BMX P34 xxxx Processors Catalog

Introduction

The choice of BMX P34 xxxx processor is made, primarily, according to its characteristics and possibilities.

BMX P34 xxxx Processors Catalog

The following table describes the important maximum characteristics of the BMX P34 xxxx processors.

Characteristic		BMX P34 1000	BMX P34 2000	BMX P34 2010 /20102	BMX P34 2020	BMX P34 2030 /20302
Maximum Number of channels	Discrete rack inputs/outputs	512	1024	1024	1024	1024
	Analog inputs/outputs	128	256	256	256	256
	Expert channels (counting, PTO, MPS, NOM, etc.)	20	36	36	36	36
Maximum Number of modules	Embedded Serial port	1	1	1	1	-
	Embedded Ethernet port	-	-	-	1	1
	Embedded CANopen port	-	-	1	-	1
	Network communication (TCP/IP)	2	3	3	3	3
	AS-i fieldbus ¹ communication	2	4	4	4	4
Memory size	User application	2048 Kb	4096 Kb	4096 Kb	4096 Kb	4096 Kb
Legend	1 The AS-i field bus requires at least PLC Operating System V2.10.					

Real-Time Clock

Introduction

Each BMX P34 xxxxx processor has a real-time clock which manages:

- The current date and time
- The date and time of the last application shut-down

When power of the processor is turned off, the real-time clock continues counting during four weeks. This duration is guaranteed for a temperature below 45°C (113°F). At a higher temperature this duration is reduced. No maintenance is requested for a real-time clock back up.

Current Date and Time

The processor updates the current date and time in the system words %SW49...%SW53 and %SW70. This data is in BCD (Binary Coded Decimal).

System Word	Most Significant Byte	Least Significant Byte
%SW49	00	Days of the week in the range of values 1 - 7 (1 for Monday and 7 for Sunday)
%SW50	Seconds (0 - 59)	00
%SW51	Hours (0 - 23)	Minutes (0 - 59)
%SW52	Month (1 - 12)	Days of the month (1 - 31)
%SW53	Century (0 - 99)	Year (0 - 99)
%SW70		Week (1 - 52)

Accessing the Date and Time

You can access the date and time as follows:

- through the processor debug screen.
- with the program:
 - Reading system words: %SW49 - %SW53 if the system bit %S50 is at 0,
 - immediate update: writing system words %SW50 to %SW53 if the system bit %S50 is at 1,
 - incremental update: writing the system word %SW59. With this word the date and time can be set field by field from the current value (if the system bit %S59 is at 1), or an overall increment/decrement can be done.

The following table shows the function performed by each bit in the word %SW59.

Bit Range	Function
0	Increments the day of the week
1	Increments the seconds
2	Increments the minutes
3	Increments the hours

Bit Range	Function
4	Increments the days
5	Increments the months
6	Increments the years
7	Increments the centuries
8	Decrements the day of the week
9	Decrements the seconds
10	Decrements the minutes
11	Decrements the hours
12	Decrements the days
13	Decrements the months
14	Decrements the years
15	Decrements the centuries

NOTE: The function is performed when the corresponding bit %S59 is at 1.

NOTE: The processor does not automatically manage Daylight Savings Time.

Date and Time of the Last Application Shutdown

The date and time of the last application shutdown are in BCD in the system words %SW54 - %SW58.

System Word	Most Significant Byte	Least Significant Byte
%SW54	Seconds (0 to 59)	00
%SW55	Hours (0 to 23)	Minutes (0 to 59)
%SW56	Month (1 to 12)	Days of the month (1 to 31)
%SW57	Century (0 to 99)	Year (0 to 99)
%SW58	Day of the week (1 to 7)	Reason for the last application shutdown

The reason for the last application shutdown can be accessed by reading the least significant byte of the system word %SW58 (value in BCD) which can have the following values.

Word value %SW58	Meaning
1	Application switched to STOP mode.
2	Application stopped by watchdog.
4	Power loss or memory card lock operation.
5	Stop on hardware fault.
6	Stop on software fault (HALT instruction, SFC errors, application CRC check fail, undefined system function call, etc). Details on the software fault type are stored in %SW125.

Chapter 6

General Characteristics of the BMX P34 xxxx Processors

Subject of this Section

This section describes the general characteristics of the BMX P34 •••• processors used during installation.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Electrical Characteristics of the BMX P34 xxxxx Processors	58
General Characteristics of the BMX P34 1000 Processor	60
General Characteristics of the BMX P34 2000 Processor	62
General Characteristics of the BMX P34 2010/20102 Processors	64
General Characteristics of the BMX P34 2020 Processor	66
General Characteristics of the BMX P34 2030/20302 Processor	68
Characteristics of the BMX P34 xxxxx Processor Memory	70

Electrical Characteristics of the BMX P34 xxxxx Processors

General

The processors can support certain devices which do not have their own power supply. It is, therefore, necessary to take the power consumption of these devices into account when establishing the overall power consumption breakdown.

Processor Power Consumption

The following table shows the power consumption for all the BMX P34 xxxxx processors with no connected devices.

Processor	Average Consumption
BMX P34 1000	72 mA
BMX P34 2000	72 mA
BMX P34 2010/20102	90 mA
BMX P34 2020	95 mA
BMX P34 2030/20302	135 mA

NOTE: The processor power consumption values are measured at the 24 V_{BAC} output of the power supply module, which is the only power supply output used by the processors.

NOTE: When a device consumes power on the processor serial port connection, its power needs to be added to the power consumed by the processor. The power supplied by the serial port is 5 VCC/190 mA.

NOTICE

IMPROPER POWER SUPPLY

Only use network power-supplied devices tested by Schneider Electric.

Failure to follow these instructions can result in equipment damage.

NOTE: It is possible to use network power-supplied devices not tested by Schneider Electric. However, their operation is not guaranteed. For further information, please contact your Schneider sales office.

Processor Dissipated Power

The following table shows the average dissipated power for all the BMX P34 xxxxx processors with no connected devices.

Processor	Average Dissipated Power
BMX P34 1000	1.7 W
BMX P34 2000	1.7 W
BMX P34 2010/20102	2.2 W
BMX P34 2020	2.3 W
BMX P34 2030/20302	3.2 W

General Characteristics of the BMX P34 1000 Processor

General

The characteristics of the BMX P34 1000 processor are presented below.

Ruggedized Version

The BMX P34 1000H (hardened) equipment is the ruggedized version of the BMX P34 1000 (standard) equipment. It can be used at extended temperatures and in harsh chemical environments.

For more information, refer to chapter *Installation in More Severe Environments* (see *Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications*).

Altitude Operating Conditions

The characteristics apply to the modules BMX P34 1000, and BMX P34 1000H for use at altitude up to 2000 m (6560 ft). When the modules operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see *Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications*).

BMX P34 1000 Processor Characteristics

The following table shows the general characteristics of the BMX P34 1000 processor.

Characteristic		Available	
Operating Temperature		BMX P34 1000	0...+60 °C (+32...+140 °F)
		BMX P34 1000H	-25...+70 °C (-13...+158 °F)
Functions	Maximum number of	Discrete rack inputs/outputs	512
		Analog rack inputs/outputs	128
		Expert channels	20
		Ethernet channels	2
		AS-I Field Bus	2
		Simultaneous communication EF	8
	Maximum number of modules	USB	1
		Embedded Serial Modbus link port	1
		Embedded CANopen master port	-
		Embedded Ethernet port	-
Savable real-time clock		Yes	
Savable Application Data Memory Capacity		128 Kb	
Application Structure	MAST task		1
	FAST task		1
	Event processing		32
Application Code Execution Speed	Internal RAM	100% Boolean	5.4 Kins/ms (1)
		65% Boolean + 35% digital	4.2 Kins/ms (1)
Execution Time	One basic Boolean instruction		0.18 µs (theoretical)
	One basic digital instruction		0.25 µs (theoretical)
	One floating point instruction		1.74 µs (theoretical)

(1) Kins: 1024 instructions (list), theoretical

General Characteristics of the BMX P34 2000 Processor

General

The characteristics of the BMX P34 2000 processor are presented below.

Altitude Operating Conditions

The characteristics apply to the module BMX P34 2000 for use at altitude up to 2000 m (6560 ft). When the module operates above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see *Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications*).

BMX P34 2000 Processor Characteristics

The following table shows the general characteristics of the BMX P34 2000 processor.

Characteristic			Available
Operating Temperature			0...+60 °C (+32...+140 °F)
Functions	Maximum number of	Discrete rack inputs/outputs	1024
		Analog rack inputs/outputs	256
		Counting channels	36
		Ethernet channels	2
		AS-i Field Bus	4
		Simultaneous communication EF	16
	Maximum number of modules	USB	1
		Embedded Serial Modbus link port	1
		Embedded CANopen master port	-
		Embedded Ethernet port	-
Savable real-time clock			Yes
Savable Application Data Memory Capacity			256 Kb
Application Structure	MAST task		1
	FAST task		1
	Event processing		64
Application Code Execution Speed	Internal RAM	100% Boolean	8.1 Kins/ms (1)
		65% Boolean + 35% digital	6.4 Kins/ms (1)
Execution Time	One basic Boolean instruction		0.12 µs
	One basic digital instruction		0.17 µs
	One floating point instruction		1.16 µs

(1) Kins: 1024 instructions (list)

General Characteristics of the BMX P34 2010/20102 Processors

Altitude Operating Conditions

The characteristics apply to the modules BMX P34 2010, and BMX P34 20102 for use at altitude up to 2000 m (6560 ft). When the modules operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see *Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications*).

BMX P34 2010/20102 Processors Characteristics

The following table shows the general characteristics of the BMX P34 2010/20102 processors.

Characteristic			Available
Operating Temperature			0...+60 °C (+32...+140 °F)
Functions	Maximum number of	Discrete rack inputs/outputs	1024
		Analog rack inputs/outputs	256
		Expert channels	36
		Ethernet channels	2
		AS-i field Bus	BMX P34 2010: 0 BMX P34 20102: 4
		Simultaneous communication EF	16
	Maximum number of modules	USB	1
		Embedded Serial Modbus link port	1
		Embedded CANopen master port	1
		Embedded Ethernet port	-
Savable real-time clock			Yes
Savable Application Data Memory Capacity			256 Kb
Application Structure	MAST task		1
	FAST task		1
	Event processing		64
Application Code Execution Speed	Internal RAM	100% Boolean	8.1 Kins/ms (1)
		65% Boolean + 35% digital	6.4 Kins/ms (1)
Execution Time	One basic Boolean instruction		0.12 µs
	One basic digital instruction		0.17 µs
	One floating point instruction		1.16 µs

(1) Kins: 1024 instructions (list)

NOTE: Expert mode function is available for BMX P34 20102 processors.

General Characteristics of the BMX P34 2020 Processor

General

The characteristics of the BMX P34 2020 processor are presented below.

Ruggedized Version

The BMX P34 2020H (hardened) equipment is the ruggedized version of the BMX P34 2020 (standard) equipment. It can be used at extended temperatures and in harsh chemical environments.

For more information, refer to chapter *Installation in More Severe Environments* (see *Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications*).

Altitude Operating Conditions

The characteristics apply to the modules BMX P34 2020, and BMX P34 2020H for use at altitude up to 2000 m (6560 ft). When the modules operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions* (see *Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications*).

BMX P34 2020 Processor Characteristics

The following table shows the general characteristics of the BMX P34 2020 processor.

Characteristic		Available	
Operating Temperature		BMX P34 2020	0...+60 °C (+32...+140 °F)
		BMX P34 2020H	-25...+70 °C (-13...+158 °F)
Functions	Maximum number of	Discrete rack inputs/outputs	1024
		Analog rack inputs/outputs	256
		Expert channels	36
		Ethernet channels	3
		AS-i Field Bus	4
		Simultaneous communication EF	16
	Maximum number of modules	USB	1
		Embedded Serial Modbus link port	1
		Embedded CANopen master port	-
		Embedded Ethernet port	1
Savable real-time clock		Yes	
Savable Application Data Memory Capacity		256 Kb	
Application Structure	MAST task		1
	FAST task		1
	Event processing		64
Application Code Execution Speed	Internal RAM	100% Boolean	8.1 Kins/ms (1)
		65% Boolean + 35% digital	6.4 Kins/ms (1)
Execution Time	One basic Boolean instruction		0.12 µs
	One basic digital instruction		0.17 µs
	One floating point instruction		1.16 µs

(1) Kins: 1024 instructions (list)

General Characteristics of the BMX P34 2030/20302 Processor

Ruggedized Version

The BMX P34 20302H (hardened) equipment is the ruggedized version of the BMX P34 20302 (standard) equipment. It can be used at extended temperatures and in harsh chemical environments.

For more information, refer to chapter *Installation in More Severe Environments (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications)*.

Altitude Operating Conditions

The characteristics apply to the modules BMX P34 2030, BMX P34 20302, and BMX P34 20302H for use at altitude up to 2000 m (6560 ft). When the modules operate above 2000 m (6560 ft), apply additional derating.

For detailed information, refer to chapter *Operating and Storage Conditions (see Modicon M580, M340, and X80 I/O Platforms, Standards and Certifications)*.

BMX P34 2030/20302 Processor Characteristics

The following table shows the general characteristics of the BMX P34 2030/20302 processor.

Characteristic		Available	
Operating Temperature		BMX P34 2030/20302	0...+60 °C (+32...+140 °F)
		BMX P34 20302H	-25...+70 °C (-13...+158 °F)
Functions	Maximum number of	Discrete rack inputs/outputs	1024
		Analog rack inputs/outputs	256
		Expert channels	36
		Ethernet channels	3
		AS-i Field Bus	BMX P34 2030: 0
			BMX P34 20302: 4
	Simultaneous communication EF	16	
	Maximum number of modules	USB	1
		Embedded Serial Modbus link port	-
		Embedded CANopen master port	1
Embedded Ethernet port		1	
Savable real-time clock		Yes	
Savable Application Data Memory Capacity		256 Kb	
Application Structure	MAST task		1
	FAST task		1
	Event processing		64
Application Code Execution Speed	Internal RAM	100% Boolean	8.1 Kins/ms (1)
		65% Boolean + 35% digital	6.4 Kins/ms (1)
Execution Time	One basic Boolean instruction		0.12 µs
	One basic digital instruction		0.17 µs
	One floating point instruction		1.16 µs

(1) Kins: 1024 instructions (list)

NOTE: Expert mode function is available for BMX P34 20302 processors.

Characteristics of the BMX P34 xxxxx Processor Memory

Introduction

The following pages present the main characteristics of the BMX P34 •••• processor memory.

Size of Located Data

The following table shows maximum size of located data according to the type of processor:

Type of Objects	Address	Maximum Size for the BMX P34 1000 Processor	Default Size for the BMX P34 1000 Processor	Maximum Size for the BMX P34 20x0x Processors	Default Size for the BMX P34 20x0x Processors
Internal bits	%Mi	16250	256	32634	512
Input/Output bits	%Ir.m.c %Qr.m.c	(1)	(1)	(1)	(1)
System bits	%Si	128	128	128	128
Internal words	%MWi	32464	512	32464	1024
Constant words	%KWi	32760	128	32760	256
System words	%SWi	168	168	168	168

(1) Depends on the equipment configuration declared (input/output modules).

Size of unlocated Data

Unlocated data is as follows:

- Elementary Data Types (EDT)
- Derived Data Types (DDT)
- DFB and EFB function block data.

Size of Located and Unlocated Data

The total size of located and unlocated data is limited to:

- 128 kilobytes for the BMX P34 1000 processor.
- 256 kilobytes for the BMX P34 20x0x processors

Size of Located Data in Case of State RAM

The following table shows maximum and default size of located data in case of State RAM configuration according to the type of processor.

Type of Objects	Address	BMX P34 1000 V2.40 Processor		BMX P34 2000, 20102, 2020, 20302 Processors (all V2.40)	
		Maximum Size	Default Size	Maximum Size	Default Size
output bits and internal bits	%M (0x)	32765	752	65530	1504
input bits and internal bits	%I (1x)	32765	752	65530	1504
input words and internal words	%IW (3x)	32765	256	65530	512
output words and internal words	%MW (4x)	32765	256	65530	512

NOTE: To use State RAM configuration you need Modicon M340 firmware 2.4 or later.

NOTE: When changing the processor type from a BMX P34 2xxx to a BMX P34 1000, remove the unavailable features (DFBs, EFBs...) in the sections and in the data editor too (Purge Unused FB Instances, Purge Unused Types, Purge Unused Private Data Instance if needed). Otherwise the application can't be built.

Chapter 7

Installation of BMX P34 xxxx Processors

Subject of this Section

This section deals with the installation of BMX P34 •••• processors and memory extension cards.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Fitting of Processors	74
Memory Cards for BMX P34 xxxxx Processors	76

Fitting of Processors

At a Glance

BMX P34 xxxxx processors are powered by the rack bus.

Fitting operations (installation, assembly, and disassembly) are described below.

Installation Precautions

A BMX P34 xxxxx processor is always installed on the rack in slot marked **00**.

Before installing a module, you must take off the protective cap from the module connector located on the rack.

⚠ DANGER

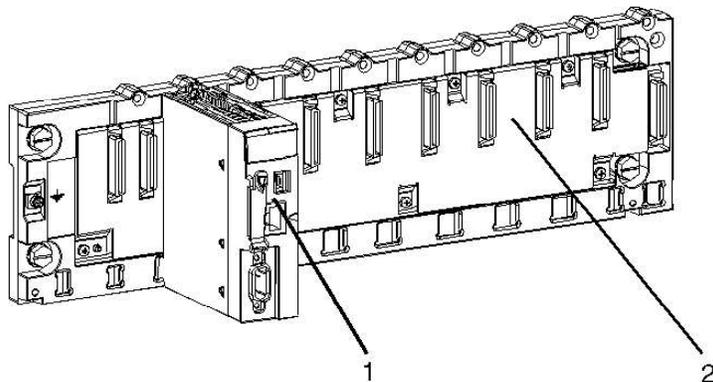
HAZARD OF ELECTRIC SHOCK

Disconnect all power sources before installing the processor.

Failure to follow these instructions will result in death or serious injury.

Installation

The following illustration shows a BMX P34 2010 processor mounted on a BMX XBP 0800 rack:

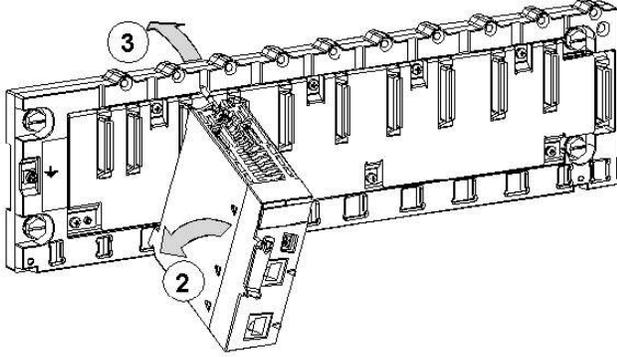
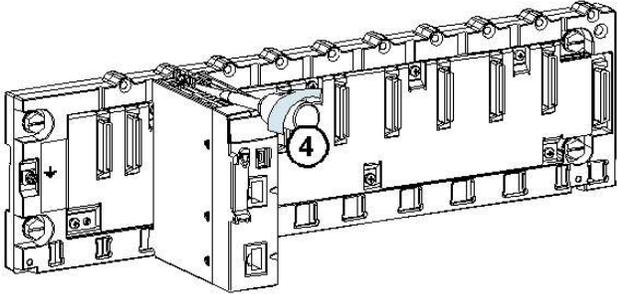


The following table describes the different elements which make up the assembly below.

Number	Description
1	Processor
2	Standard rack

Installing the Processor on the Rack

The following table presents the procedure for installing a processor on a rack.

Step	Action	Illustration
 WARNING		
UNEXPECTED EQUIPMENT OPERATION		
<p>Ensure that the correct memory card is installed before plugging a new processor on the rack. An incorrect card could lead to unexpected system behavior.</p>		
<p>Refer to %SW97 to check the status of the card.</p>		
<p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>		
<p>1</p>	<p>Verify that power is OFF and make sure that the memory card is correct.</p>	<p>The following illustration describes steps 1 and 2:</p>
<p>2</p>	<p>Position the locating pins situated at the rear of the module (on the bottom part) in the corresponding slots in the rack.</p> <p>Note: Before positioning the pins, make sure that you have removed the protective cover.</p>	
<p>3</p>	<p>Swivel the module towards the top of the rack so that the module sits flush with the back of the rack. It is now set in position.</p>	<p>The following illustration describes step 3:</p>
<p>4</p>	<p>Tighten the mounting screw to ensure that the module is held in place on the rack.</p> <p>Tightening torque: 0.4...1.5 N•m (0.30...1.10 lbf-ft).</p>	

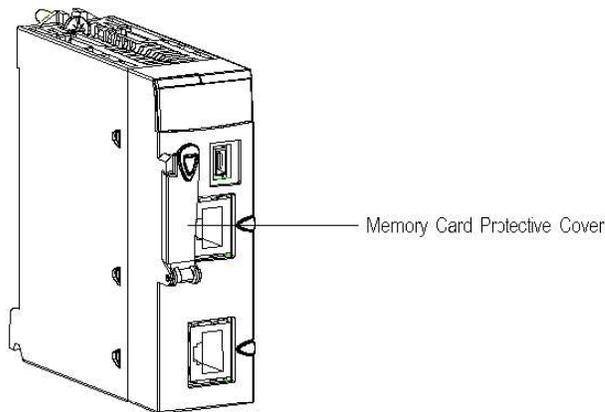
Memory Cards for BMX P34 xxxxx Processors

General

All BMX P34 ••• processors require a memory card.

Memory Card Slot

The following illustration shows the memory card slot on a BMX P34 ••• processor with a protective cover in place:



⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION

Ensure that the protective cover is closed when the processor is running to maintain enclosure environmental ratings.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Memory Card Description

Only Schneider memory cards are compatible with BMX P34 ••• processors.

Schneider memory cards use Flash technology and do not require a battery. These cards can support about 100,000 write/delete cycles (typical).

Three models of memory card are available:

- The BMX RMS 008MP card, used to save application and Web pages.
- The BMX RMS 008MPF card, used to save applications and Web pages as well as to store user files created by the application with the file management function blocks (or files transferred through FTP). The available size for user files in the file system partition is 8 MB (Data Storage area).
- The BMX RMS 128MPF card, used to save applications and Web pages as well as to store user files created by the application with the file management function blocks (or files transferred through FTP). The available size for user files in the file system partition is 128 MB (Data Storage area).

NOTE: The web pages are Schneider Electric pages and cannot be modified.

NOTE: The BMX RMS 008MP card is supplied with each processor, the other ones must be ordered separately.

Memory Card Characteristics

The following table shows the main characteristics of the memory cards.

Memory Card Reference	Application Storage	Data Storage
BMX RMS 008MP	Yes	No
BMX RMS 008MPF	Yes	8 MB
BMX RMS 128MPF	Yes	128 MB

NOTE: The size shown above for the Data Storage area is the maximum recommended size for user files, although file storage is still possible until the global file system partition is full. The risk of going over this recommended maximum is that sufficient free space may not be available for a firmware upgrade, in this case it would be necessary to delete some user files.

The compatibility of the two memory cards is as follows:

- BMX RMS 008MP card compatible with all processors.
- BMX RMS 008MPF and BMX RMS 128MPF cards compatible with the following processors:
 - BMX P34 2000,
 - BMX P34 2010,
 - BMX P34 20102,
 - BMX P34 2020,
 - BMX P34 2030,
 - BMX P34 20302.

NOTE: The memory card is formatted for use with Schneider Electric products. Do not attempt to use or format the card in any other tool. Doing so will prevent program and data transfer usage in a Modicon M340 PLC.

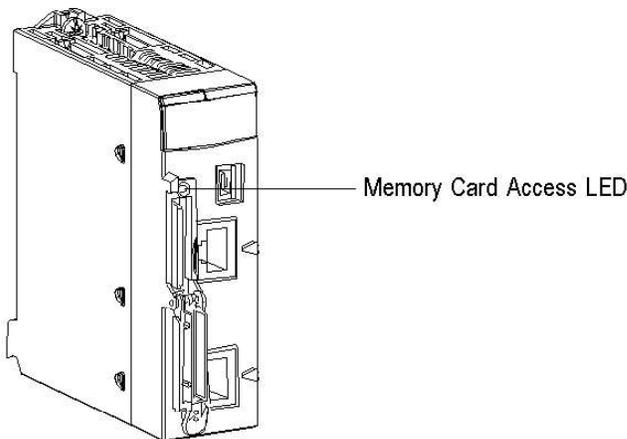
NOTE: For further information about the memory structure of the memory cards, see the Memory Structure of Modicon M340 PLCs (see *EcoStruxure™ Control Expert, Program Languages and Structure, Reference Manual*) page.

NOTE: For further information about Ethernet services provided by memory cards, see the Modicon M340 Memory cards (see *Modicon M340 for Ethernet, Communications Modules and Processors, User Manual*) page in the Ethernet Communication part.

Memory Card Access LED

A memory card access LED is included on all Modicon M340 processors. This LED informs the user of the memory card's status for its removal.

The following illustration shows the physical location of the memory card access LED:



This LED is green and has several different states:

- On: the card is recognized and the processor has access to it,
- Flashing: the LED goes off each time the processor accesses it and comes on again at the end of access,
- Off: the card may be removed as the processor has no access to it.

NOTE: A rising edge on the bit %S65 finishes the current actions, disables access to the card, then switches off the CARDAC LED. As soon as this LED is off, the card can be removed.

NOTE: The memory card access LED is only visible if the cover is open.

NOTE: The red CARDERR LED shows that either the memory card is in error or the memorized application is different from the one processed by the processor. It is located near the top of the processor front panel.

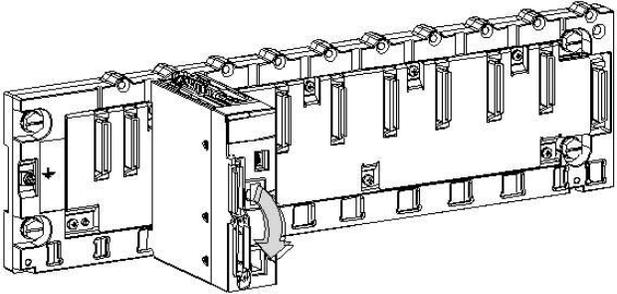
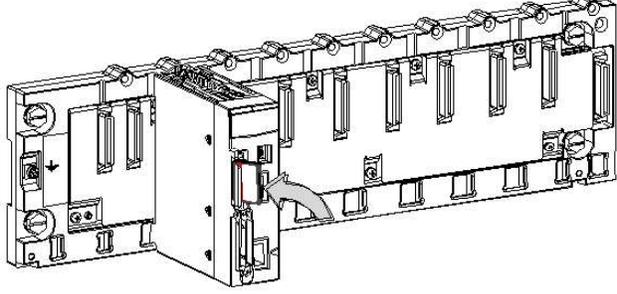
LED States on Power Cycle

The following table presents the different states of the PLC, memory card access LED and CARDERR LED on a power cycle or a PLC reset.

	PLC/memory card behavior	PLC state	Memory card access LED	CARDERR LED
No memory card	-	No configuration	OFF	ON
Memory card not OK	-	No configuration	OFF	ON
Memory card without project	-	No configuration	ON	ON
Memory card with a non-compatible project	-	No configuration	ON	ON
Memory card with a compatible project	Error detected when the restore project from memory card to the PLC RAM	No configuration	Flashing during transfer Finally ON	ON
Memory card with a compatible project	No Error when the restore project from memory card to the PLC RAM		Flashing during transfer Finally ON	ON durring transfer Finally OFF

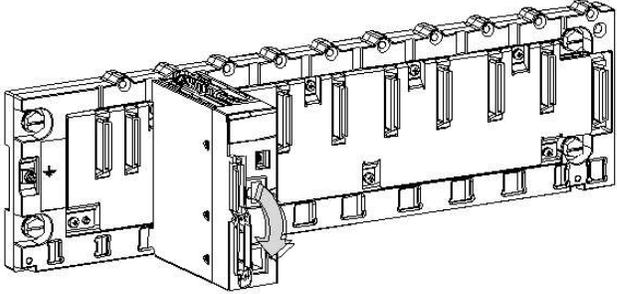
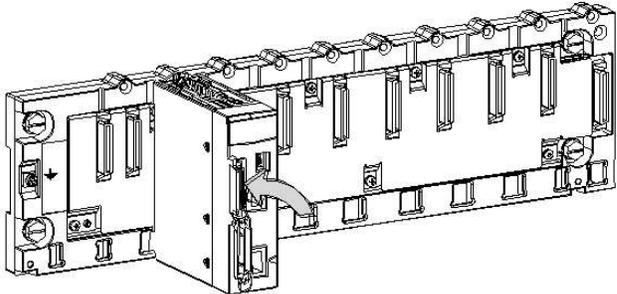
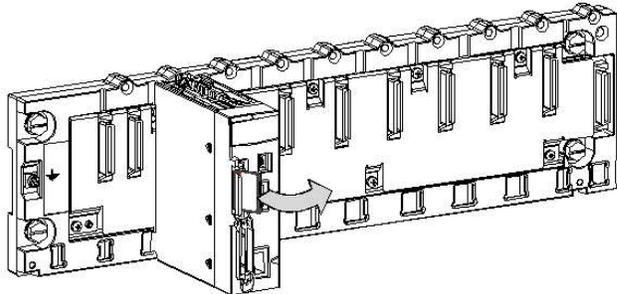
Memory Card Insertion Procedure

The following illustration shows the procedure for inserting a memory card into a BMX P34 ••• processor.

Step	Description	Illustration
 WARNING		
<p>UNEXPECTED EQUIPMENT OPERATION</p>		
<p>Ensure that the correct memory card is installed before plugging a new processor on the rack. An incorrect card could lead to unexpected system behavior.</p>		
<p>Refer to %SW97 to check the status of the card.</p>		
<p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>		
<p>1</p>	<p>Open the processor’s protective cover by pulling the cover towards you.</p>	<p>Opening the cover:</p> 
<p>2</p>	<p>Insert the memory card into its slot by pushing it right in. Result: The card should now be clipped into its slot. Note: Insertion of the memory card does not force an application restore.</p>	<p>Inserting the memory card:</p> 
<p>3</p>	<p>Close the memory card protective cover.</p>	

Memory Card Removal Procedure

Before removing a memory card, a rising edge on bit %S65 has to be generated to ensure the information consistency. When the CARDAC LED is off, then it is possible to extract the card. There is a risk of inconsistency or loss of data if the extraction is done without the management of the bit %S65. The following illustration shows the procedure for removing a memory card from a BMX P34 ••• processor.

Step	Description	Illustration
1	Open the processor's protective cover by pulling the cover towards you.	Opening the cover: 
2	Push the memory card in its slot. Result: The card should unclip from its slot.	Pushing the memory card in its slot: 
3	Remove the card from its slot. Note: The CARDERR LED is on when the memory card is removed from the processor.	Removing the memory card: 
4	Close the protective cover.	

Update an Application

Before removing a memory card, a rising edge on bit %S65 has to be generated to ensure the information consistency. When the CARDAC LED is off, then it is possible to extract the card. There is a risk of inconsistency or loss of data if the extraction is done without the management of the bit %S65. The following table shows the procedure for updating an application in a processor using a master memory card.

Step	Description
1	Put the PLC in STOP.
2	Set bit %S65 to 1 and check that the CARDAC LED is off.
3	Remove the currently used memory card, which includes the old application.
4	Insert the master memory card in the the processor.
5	Press the RESET button on the power supply. Result: the new application is transferd to internal RAM.
6	Remove the master memory card.
7	Insert the memory card with the old application in the the processor.
8	Do a backup command.
9	Put the PLC in RUN mode.

Protect an Application

%SW146-147: those 2 system words contain the unique SD card serial number (32bits). If there is not an SD card or an unrecognized SD card, the 2 system words are set to 0. This information can be used to protect an application against duplication: the application is able to check the value of serial number and can go to halt (or other convenient action) if it is different from the initial one. Thus, this application cannot run on a different SD card.

With Control Expert, the application must be read-protected. To do that, uncheck the Upload information in the Project settings.

NOTE: to enforce the protection, you can encrypt the value of the serial number used in the comparison.

NOTE: the complete SD card identification comprises several parameters including the product serial number (32bits).

Precautions

To keep the memory card in normal working order, the following precautions should be taken:

- Avoid removing the memory card from its slot when the processor is accessing it (green access LED on or flashing).
- Avoid touching the memory card connectors.
- Keep the memory card away from electrostatic and electromagnetic sources as well as heat, sunlight, water, and moisture.
- Avoid impacts to the memory card.
- Before sending a memory card by post, check the postal service's security policy. In some countries the postal service exposes mail to high levels of radiation, as a security measure. These high levels of radiation may erase the contents of the memory card and render it unusable.
- If a card is extracted without generating a rising edge of the bit %S65 and without checking that the CARDAC LED is off, there is a risk of loss of data (file, application).

Chapter 8

BMX P34 xxxx Processors Diagnostics

Subject of this Section

This section deals with BMX P34 •••• processors' diagnostics.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Display	86
Searching for Errors Using the Processor Status LEDs	91
Blocking Errors	92
Non-Blocking Errors	94
Processor or System Errors	96

Display

Introduction

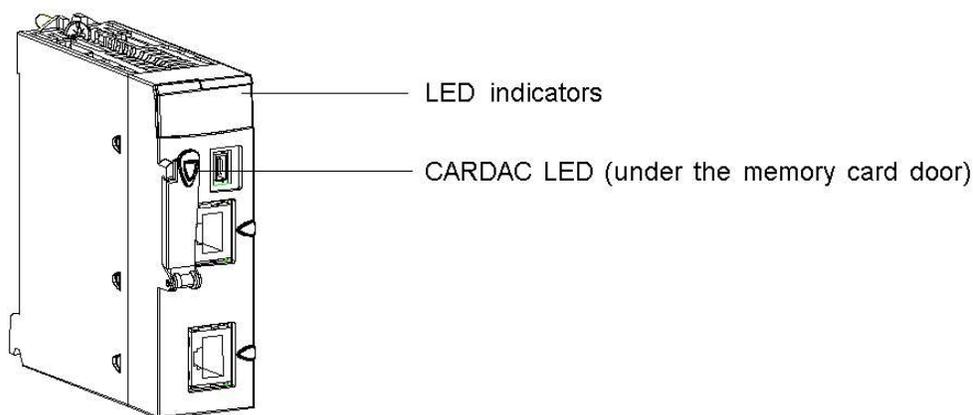
There are several LEDs available on the front panel of each processor, enabling rapid diagnosis of the PLC status.

These LEDs provide information on:

- PLC functioning
- the memory card
- communication with the modules
- serial communication
- communication on the CANopen network
- communication on the Ethernet network

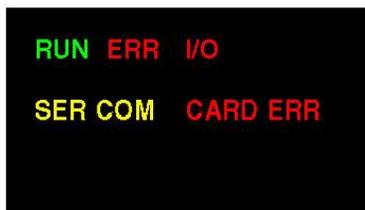
Illustration

The following diagram shows the physical location of the LEDs on the front panel of a BMX P34 •••• processor:



BMX P34 1000/2000 Processors LEDs

The following diagram shows the diagnostic LEDs on the BMX P34 1000/2000 processors:



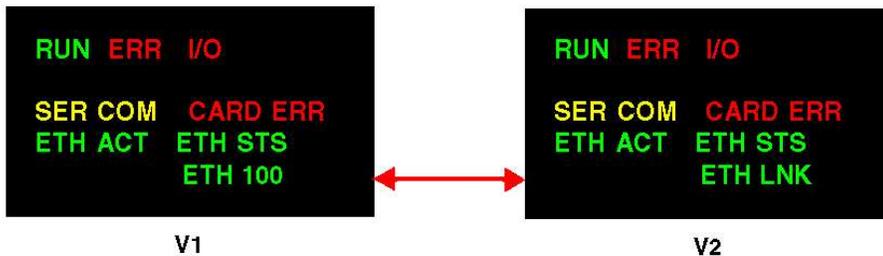
BMX P34 2010 Processor LEDs

The following diagram shows the diagnostic LEDs on the BMX P34 2010 processor:



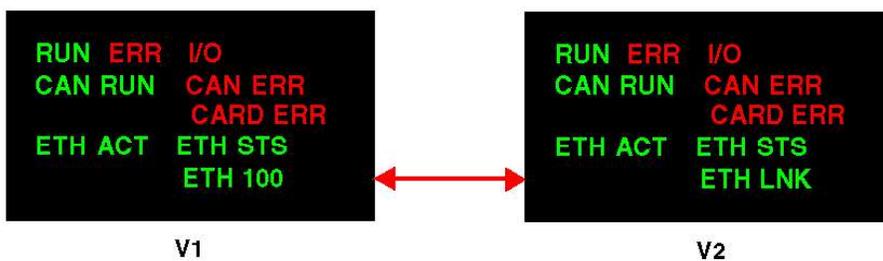
BMX P34 2020 Processor LEDs

The following diagram shows the diagnostic LEDs on the BMX P34 2020 processor. Note that two displays exist, depending on whether you are using V1 or V2 (or greater) of the processor.



BMX P34 2030 Processor LEDs

The following diagram shows the diagnostic LEDs on the BMX P34 2030 processor. Note that two displays exist, depending on whether you are using V1 or V2 (or greater) of the processor.



Memory Card Access LED

There is also a memory card access LED (*see page 78*) on each BMX P34 •••• processor.

Description

The following table describes the meaning of RUN, ERR, I/O, SER COM, CARDERR, CAN RUN, CAN ERR, ETH STS and CARDAC LED on the front panel.

Label	Pattern	Indication
RUN (green): operational state	on	PLC functioning normally, program running
	flashing	PLC in STOP mode or blocked by a software detected error
	off	PLC not configured (absent, invalid, or incompatible application)
ERR (red): detected error	on	Processor or system detected error
	flashing	<ul style="list-style-type: none"> ● PLC not configured (absent, invalid or incompatible application) ● PLC blocked by a software detected error
	off	Normal status (no internal detected errors)
I/O (red): input/output status	on	<ul style="list-style-type: none"> ● Input/output detected error originating from a module or channel ● Configuration detected error
	off	Normal status (no internal detected errors)
SER COM (yellow): serial data status	flashing	Data exchange on the serial connection in progress (receiving or sending)
	off	No data exchange on the serial connection
CARDERR (red): memory card detected error For further information, see project backup management for Modicon M340 PLCs (see <i>EcoStruxure™ Control Expert, Operating Modes</i>)	on	<ul style="list-style-type: none"> ● Memory card absent ● Memory card not recognized ● Memory card content differs from the application saved in the processor
	off	<ul style="list-style-type: none"> ● Memory card recognized ● Memory card content identical to the application saved in the processor
CAN RUN (green): CANopen operations	on	CANopen network operational
	rapid flashing (on for 50 ms, off for 50 ms, repeating)	Automatic detection of data flow or LSS services in progress (alternates with CAN ERR)
	slow flashing (on for 200 ms, off for 200 ms, repeating)	CANopen network pre-operational
	1 flash	CANopen network stopped
	3 flashes	downloading CANopen firmware

Label	Pattern	Indication
CAN ERR (red): CANopen detected errors	on	CANopen bus stopped
	rapid flashing (on for 50 ms, off for 50 ms, repeating)	Automatic detection of data flow or LSS services in progress (alternates with CAN RUN)
	slow flashing (on for 200 ms, off for 200 ms, repeating)	CANopen configuration not valid
	1 flash	At least one of the detected error counters has reached or exceeded the alert level
	2 flashes	A guard event (NMT-slave or NMT-master) or a heartbeat event has taken place
	3 flashes	The SYNC message was not received before the end of the communication cycle period
	off	No CANopen detected error
	off	No communication activity
ETH STS (green): Ethernet communication status	on	Communication OK
	2 flashes	Invalid MAC address
	3 flashes	Ethernet link not connected
	4 flashes	Duplicate IP address
	5 flashes	Waiting for a server IP address
	6 flashes	Secure and safe mode (with default IP address)
	7 flashes	Configuration conflict between rotary switches and internal configuration
CARDAC (green): memory card access Note: This LED is located under the memory card door.	on	Access to the card is enabled
	flashing	Activity on the card; during each access, the card LED is set to OFF, then back to ON
	off	Access to the card is disabled. It is possible to extract the card after the access to the card has been disabled by generating a rising edge on the bit %S65.

The following table describes the meaning of the ETH ACT and ETH 100 LED on the front panel for V1.

Label	Pattern	Indication
ETH ACT (green): Ethernet communication (transmission/reception) activity	on	Ethernet link detected: no communications activity.
	off	No Ethernet link detected.
	flashing	Ethernet link and communications activity detected.
ETH 100 (green): Ethernet transmission speed	on	Ethernet transmission at 100 Mbit/s (Fast Ethernet).
	off	Ethernet transmission at 10 Mbit/s (Ethernet) or no link detected.

The following table describes the meaning of the ETH ACT and ETH LNK LED on the front panel for V2.

Label	Pattern	Indication
ETH ACT (green): Ethernet communication (transmission/reception) activity	on	Communication activity detected.
	off	No communication activity detected.
ETH LNK (green): Ethernet link status	on	Ethernet link detected.
	off	No Ethernet link detected.
	off	No communication activity

NOTE: Rapid flashing is defined as ON for 50 ms and OFF for 50 ms.

NOTE: Slow flashing is defined as ON for 200 ms and OFF for 200 ms.

Searching for Errors Using the Processor Status LEDs

General

The status LEDs located on the processor inform the user of the PLC's operating mode and any possible errors.

The errors detected by the PLC concern:

- circuits which constitute the PLC and/or its modules: internal errors
- the process driven by the PLC or the process wiring: external errors
- functioning of the application executed by the PLC: internal or external errors

Error Detection

Error detection is performed at startup (autotest) or during operation (which is the case for most equipment errors), during exchanges with the modules, or during execution of a program instruction.

Certain "serious" errors require the PLC to be restarted while others are left to the user to decide how to proceed depending on the level of application required.

There are three types of error:

- non-blocking
- blocking
- processor or system

Blocking Errors

General

Blocking errors, caused by the application program, do not cause system errors but prohibit execution of the program. When such an error occurs, the PLC stops immediately and goes into HALT mode (all tasks are stopped on the current instruction). The ERR LED flashes.

Restarting of the Application After a Blocking Error

To end this status it is necessary to init the PLC or to set the %S0 bit to 1.

The application is then in an initial state:

- The data resumes its initial value.
- Tasks are stopped at end of cycle.
- The input image is refreshed.
- Outputs are controlled in fallback position.

The RUN command then allows the application to be restarted.

Blocking Error Diagnosis

Indication of a blocking error is signaled by the ERR and RUN LEDs flashing on the processor front panel.

The system words %SW126 and %SW127 indicate the address of the instruction which caused the blocking error.

The nature of the error is indicated by the system word %SW125.

The following table presents the errors signaled by the values of the system word %SW125.

Hexadecimal Value of %sw125	Corresponding Error
23•••	Execution of a CALL function towards an undefined subroutine
0•••	Execution of an unknown function
2258	Execution of the HALT instruction
9690	Failure of the application CRC check (checksum)
DEB0	Watchdog overrun
DE87	Calculation error on numbers with decimal points
DEF0	Division by 0
DEF1	Character string transfer error
DEF2	Capacity exceeded
DEF3	Index overrun
DEF7	SFC execution error

Hexadecimal Value of %sw125	Corresponding Error
DEFE	SFC steps undefined
81F4	SFC node incorrect
82F4	SFC code inaccessible
83F4	SFC work space inaccessible
84F4	Too many initial SFC steps
85F4	Too many active SFC steps
86F4	SFC sequence code incorrect
87F4	SFC code description incorrect
88F4	SFC reference table incorrect
89F4	SFC internal index calculation error
8AF4	SFC step status not available
8BF4	SFC memory too small after a change due to a download
8CF4	Transition/action section inaccessible
8DF4	SFC work space too small
8EF4	Version of the SFC code older than the interpreter
8FF4	Version of the SFC code more recent than the interpreter
90F4	Poor description of a SFC object: NULL pointer
91F4	Illegal action identifier
92F4	Poor definition of the time for an action identifier
93F4	Macro step cannot be found in the list of active steps for deactivation
94F4	Overflow in the action table
95F4	Overflow in the step activation/deactivation table

Non-Blocking Errors

General

A non-blocking error is caused by an input/output error on the bus or through execution of an instruction. It can be processed by the user program and does not modify the PLC status.

Non-Blocking Errors Linked to Inputs/Outputs

Indication of a non-blocking error linked to the inputs/outputs is signaled by:

- the processor's I/O status LED on
- the modules' I/O status LEDs on
- the error bits and words combined with the channel:
 - bit `%Ir.m.c.ERR` at 1 indicates the channel at error (implicit exchanges)
 - words `%MWr.m.c.2` indicates the channel's type of error (implicit exchanges)
- system bits:
 - `%S10`: input/output error on one of the modules on the rack bus
 - `%S16`: input/output error in the task in progress
 - `%S118`: input/output error on the CANopen bus
 - `%S40 - %S47`: input/output error on address racks 0-7

The following table shows the diagnosis of non-blocking errors from the status LEDs and the system bits.

RUN Status LED	ERR Status LED	I/O Status LED	System Bit	Error
-	-	ON	<code>%S10</code> at 0	Input/Output error: channel power supply error, broken channel, module not compliant with the configuration, inoperative or module power supply error.
-	-	ON	<code>%S16</code> at 0	Input/output error in a task.
-	-	ON	<code>%S118</code> at 0	Input/output error on the CANopen bus (the errors are the same as those of the bit <code>%S10</code>).
-	-	ON	<code>%S40 - %S47</code> at 0	Input/output error in at rack level. (<code>%S40</code> : rack 0 - <code>%S47</code> : rack 7).
Key:				
ON: LED on				
-: Status undetermined				

Non-Blocking Errors Linked to Execution of the Program

Indication of a non-blocking error linked to execution of the program is signaled by one or more system bits %S15, %S18, and %S20 being set to 1. The nature of the error is indicated in the system word %SW125 (always updated).

The following table shows the diagnosis of non-blocking errors linked to the execution of the program.

System Bit	Error
%S15 at 1	Character string manipulation error
%S18 at 1	Capacity overrun, error on a floating point or division by 0
%S20 at 1	Index overrun

NOTE: There are two ways to change non-blocking errors linked to the execution of the program to blocking errors:

- Diagnostic program function, accessible through the Control Expert programming software
- Bit %S78 (HALTIFERROR) when it is set to 1.

The processor's HALT status is determined via the flashing ERR and I/O LEDs. Testing and setting these system bits to 0 is the user's responsibility.

Processor or System Errors

General

Processor or system errors are serious errors related either to the processor (equipment or software) or to the rack bus wiring. The system can no longer operate correctly when these errors occur. They cause the PLC to stop in ERROR status, which requires a cold restart. The next cold restart will be forced in STOP status to prevent the PLC from returning to error.

Diagnosis of Processor and System Errors

The following table presents the diagnosis of processor and system errors.

RUN Status LED	ERR Status LED	I/O Status LED	Hexadecimal Value of the System Word %SW124	Error
-	ON	ON	80	System watchdog error or rack bus wiring error
-	ON	ON	81	Rack bus wiring error
-	ON	ON	90	Unforeseen interruption. System task pile overrun.
Legend:				
ON: On				
-: Undetermined				

Chapter 9

Processor Performance

Subject of this Section

This section presents BMX P34 20•0 processor performance. The BMX P34 20•0 processors have 150% of the BMX P34 1000 performance.

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Execution of Tasks	98
MAST Task Cycle Time: Introduction	102
MAST Task Cycle Time: Program Processing	103
MAST Task Cycle Time: Internal Processing on Input and Output	104
MAST Task Cycle Time Calculation	107
FAST Task Cycle Time	108
Event Response Time	109

Execution of Tasks

General

BMX P34 processors can execute single-task and multi-task applications. Unlike a single-task application, which only executes master tasks, a multi-task application defines the task execution priorities.

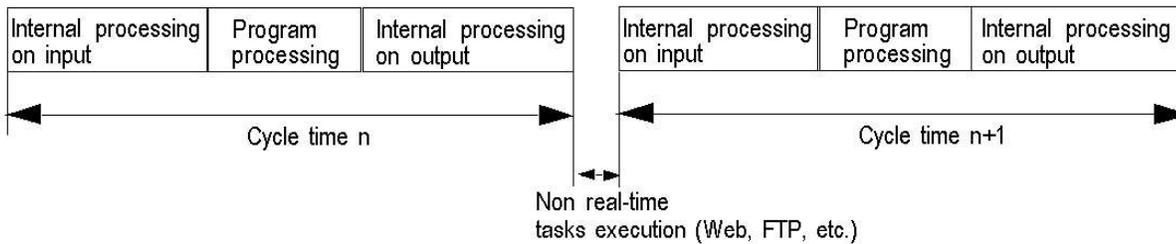
Master Task

The master task represents the application program's main task. You can choose from the following MAST task execution modes:

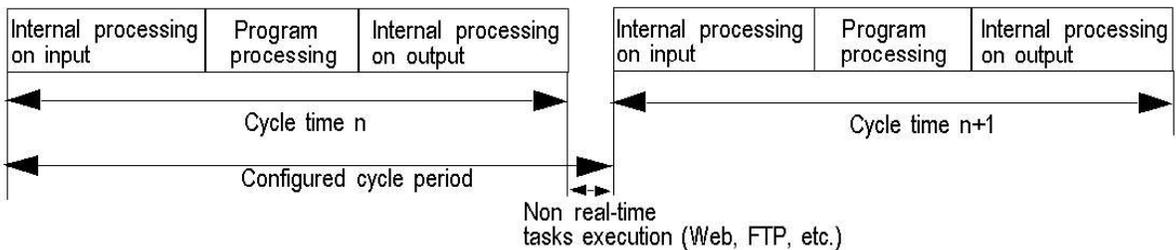
- Cyclical (default setup): execution cycles are performed in sequence, one after the other.
- Periodical: a new cycle is started periodically, according to a user-defined time period (1 - 255 ms).

If the execution time is longer than the period configured by the user, the bit %S19 is set to 1 and a new cycle is launched.

The following illustration shows the cyclical execution of the MAST task:



The following illustration shows the periodical execution of the MAST task:



Both MAST task cycle modes are controlled by a watchdog.

The watchdog is triggered if the MAST task execution time is longer than the maximum period defined in the configuration, and causes a software error. The application then goes into HALT status, and the bit %S11 is set to 1 (the user must reset it to 0).

The watchdog value (%SW11) may be configured between 10 ms and 1,500 ms (default value: 250 ms).

NOTE: Configuring the watchdog to a value that is less than the period is not allowed.

In periodical operating mode, an additional check detects when a period has been exceeded. The PLC will not switch off if the period overrun remains less than the watchdog value.

Bit %S19 signals a period overrun. It is set to 1 by the system when the cycle time becomes longer than the task period. Cyclical execution then replaces periodical execution.

The MAST task can be checked with the following system bits and system words:

System Object	Description
%SW0	MAST task period
%S30	Activation of the master task
%S11	Watchdog default
%S19	Period exceeded
%SW27	Last cycle overhead time (in ms)
%SW28	Longest overhead time (in ms)
%SW29	Shortest overhead time (in ms)
%SW30	Last cycle execution time (in ms)
%SW31	Longest cycle execution time (in ms)
%SW32	Shortest cycle execution time (in ms)

Fast Task

The FAST task is for periodical processing and processing over short durations.

FAST task execution is periodical and must be quick so that no lower priority tasks overrun. The FAST task period can be configured (1 - 255 ms). The FAST task execution principle is the same as for periodical execution of the master task.

The FAST task can be checked with the following system bits and system words:

System Object	Description
%SW1	FAST task period
%S31	Activation of the fast task
%S11	Watchdog default
%S19	Period exceeded
%SW33	Last cycle execution time (in ms)

System Object	Description
%SW34	Longest cycle execution time (in ms)
%SW35	Shortest cycle execution time (in ms)

Event Tasks

With event processing, the application program’s reaction time can be reduced for events originating from:

- input/output modules (EVTi blocks),
- events timers (TIMERi blocks).

Event processing execution is asynchronous. The occurrence of an event reroutes the application program towards the process associated with the input/output channel, or to the event timer that caused the event.

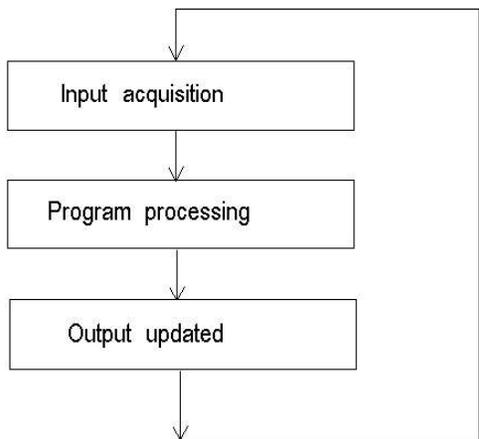
Event tasks can be checked with the following system bits and system words:

System Object	Description
%S38	Activation of events processing
%S39	Saturation of the event signal management stack.
%SW48	Number of IO events and telegram processes executed NOTE: TELEGRAM is available only for PREMIUM (not on Quantum neither M340)

Single Task Execution

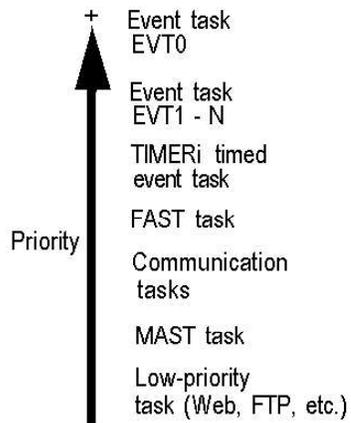
A single-task application program is associated with one task; the MAST task.

The following diagram shows a single-task application’s execution cycle:

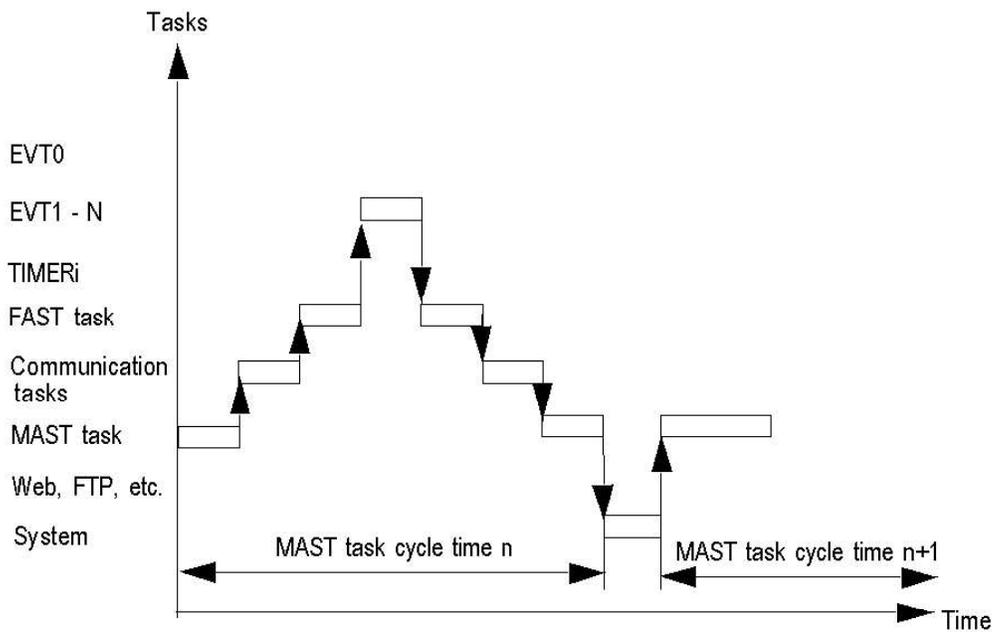


Multi-Task Execution

The following diagram shows the level of priority of the tasks in a multi-task structure:



The following diagram shows the execution of tasks in a multi-task structure:



MAST Task Cycle Time: Introduction

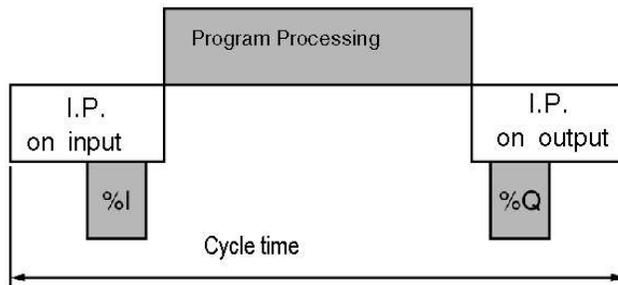
General

The MAST task cycle time is the sum of the following:

- internal processing time on input,
- master task program processing time,
- internal processing time on output.

Illustration

The following diagram defines the MAST task cycle time:



I.P. Internal Processing.

MAST Task Cycle Time: Program Processing

Definition of Program Processing Time

Program processing time is equivalent to the time needed to execute application code.

Application Code Execution Time

The application code execution time is the sum of the times needed for the application program to execute each instruction, at each PLC cycle.

The table below gives the execution time for 1 K of instructions (i.e. 1024 instructions).

Processors	Application Code Execution Time (1)	
	100 % Boolean Program	65 % Boolean + 35 % Digital Program
BMX P34 2000	0.12 milliseconds	0.15 milliseconds
BMX P34 2010		
BMX P34 20102		
BMX P34 2020		
BMX P34 2030		
BMX P34 20302		

(1) All instructions are executed at each PLC cycle.

MAST Task Cycle Time: Internal Processing on Input and Output

General

The internal processing time for inputs and outputs is the sum of the following:

- MAST task system overhead time
- maximum communication system reception time and input management time for implicit inputs/outputs
- maximum communication system transmission time and output management time for implicit inputs/outputs

MAST Task System Overhead Time

For BMX P34 2000/2010/20102/2020/2030/20302 processors, the MAST task system overhead time is 700 µs.

NOTE:

Three system words give information on the MAST task system overhead times:

- %SW27: last cycle overhead time,
- %SW28: longest overhead time,
- %SW29: shortest overhead time.

Implicit Input/Output Management Time

The implicit input management time is the sum of the following:

- Fixed base of 25 µs,
- Sum of the input management times for each module (in the following table, IN).

The implicit output management time is the sum of the following:

- Fixed base of 25 µs (FAST), 73 µs (MAST),
- Sum of the output management times for each module (in the following table, OUT).

The table below shows the input (IN) and output (OUT) management times for each module.

Type of Module	Input Management Time (IN)	Output Management Time (OUT)	Total Management Time (IN+OUT)
BMX DDI 1602, 16 discrete inputs module	60 µs	40 µs	100 µs
BMX DDI 1603, 16 discrete inputs module	60 µs	40 µs	100 µs
BMX DDI 1604, 16 discrete inputs module	60 µs	40 µs	100 µs
BMX DDI 3202 K, 32 discrete inputs module	67 µs	44 µs	111 µs
BMX DDI 6402 K, 64 discrete inputs module	87 µs	63 µs	150 µs
BMX DDO 1602, 16 discrete outputs module	60 µs	45 µs	105 µs
BMX DDO 1612, 16 discrete outputs module	60 µs	45 µs	105 µs
BMX DDO 3202 K, 32 discrete outputs module	67 µs	51 µs	118 µs
BMX DDO 6402 K, 64 discrete outputs module	87 µs	75 µs	162 µs

Type of Module	Input Management Time (IN)	Output Management Time (OUT)	Total Management Time (IN+OUT)
BMX DDM 16022, 8 discrete inputs and 8 discrete outputs module	68 µs	59 µs	127 µs
BMX DDM 3202 K, 16 discrete inputs and 16 discrete outputs module	75 µs	63 µs	138 µs
BMX DDM 16025, 8 discrete inputs and 8 discrete outputs module	68 µs	59 µs	127 µs
BMX DAI 0805, 8 discrete inputs module	60 µs	40 µs	100 µs
BMX DAI 0814, 8 discrete inputs module	TBC	TBC	TBC
BMX DAI 1602, 16 discrete inputs module	60 µs	40 µs	100 µs
BMX DAI 1603, 16 discrete inputs module	60 µs	40 µs	100 µs
BMX DAI 1604, 16 discrete inputs module	60 µs	40 µs	100 µs
BMX DAI 1614, 16 discrete inputs module	TBC	TBC	TBC
BMX DAI 1615, 16 discrete inputs module	TBC	TBC	TBC
BMX DAO 1605, 16 discrete outputs module	60 µs	45 µs	105 µs
BMX DAO 1615, 16 discrete outputs module	TBC	TBC	TBC
BMX AMI 0410 analog module	103 µs	69 µs	172 µs
BMX AMI 0800 analog module	103 µs	69 µs	172 µs
BMX AMI 0810 analog module	103 µs	69 µs	172 µs
BMX AMO 0210 analog module	65 µs	47 µs	112 µs
BMX AMO 0410 analog module	65 µs	47 µs	112 µs
BMX AMO 0802 analog module	110 µs	110 µs	220 µs
BMX AMM 0600 analog module	115 µs	88 µs	203 µs
BMX ART 0414 analog module	103 µs	69 µs	172 µs
BMX ART 0814 analog module	138 µs	104 µs	242 µs
BMX DRA 1605, 16 discrete outputs module	60 µs	45 µs	105 µs
BMX DRA 0804, 8 discrete outputs module	56 µs	43 µs	99 µs
BMX DRA 0805, 8 discrete outputs module	56 µs	43 µs	99 µs
BMX DRA 0815, 8 discrete outputs module	TBC	TBC	TBC
BMX DRC 0805, 8 discrete outputs module	TBC	TBC	TBC
BMX EHC 0200 dual-channel counting module	102 µs	93 µs	195 µs
BMX EHC 0800 eight-channel counting module	228 µs	282 µs	510 µs

Communication System Time

Communication (excluding telegrams) is managed during the MAST task internal processing phases:

- on input for receiving messages
- on output for sending messages

The MAST task cycle time is, therefore, affected by the communication traffic. The communication time spent per cycle varies considerably, based on the following elements:

- traffic generated by the processor: number of communication EFs active simultaneously
- traffic generated by other devices to the processor, or for which the processor ensures the routing function as master

This time is only spent in the cycles where there is a new message to be managed.

NOTE: These times may not all occur in the same cycle. Messages are sent in the same PLC cycle as instruction execution when communication traffic is low. However, responses are never received in the same cycle as instruction execution.

MAST Task Cycle Time Calculation

General

The MAST task cycle time can be calculated before the implementation phase, if the desired PLC configuration is already known. The cycle time may also be determined during the implementation phase, using the system words %SW30 - %SW32.

Calculation Method

The following table shows how to calculate the MAST task cycle time.

Step	Action
1	Calculate the input and output internal processing time by adding the following times: <ul style="list-style-type: none">● MAST task system overhead time (<i>see page 104</i>)● maximum communication system reception time and input management time for implicit inputs/outputs (<i>see page 104</i>)● maximum communication system transmission time and output management time for implicit inputs/outputs (<i>see page 104</i>)
2	Calculate the program processing time (<i>see page 103</i>) according to the number of instructions and the type (Boolean, digital) of program.
3	Add together the program processing time, and the input and output internal processing time.

FAST Task Cycle Time

Definition

The FAST task cycle time is the sum of the following:

- program processing time
- internal processing time on input and output

Definition of Internal Processing Time on Input and Output

The internal processing time on input and output is the sum of the following:

- FAST task system overhead time
- implicit input/output management time on input/output (*see page 104*)

For the BMX P34 20x0x processors, the FAST task system overhead time is 130 μ s.

Event Response Time

General

The response time is the time between an edge on an event input and the corresponding edge on an output positioned by the program in an event task.

Response Time

The following table gives the response time for the BMX P34 20x0x processors with an application program of 100 Boolean instructions and the module.

Processors	Minimum	Typical	Maximum
BMX P34 20x0x	1625 μ s	2575 μ s	3675 μ s



A

agency approvals, *35*

B

BMXP341000, *43*
BMXP342010, *43*
BMXP342020, *43*
BMXP342030, *43*
BMXRMS008MP, *77*
BMXRMS008MPF, *77*
BMXRMS128MPF, *77*
BMXXCAUSB018, *45*
BMXXCAUSB025, *45*

C

CANopen
connectors, *48*
certifications, *35*
compliance, *35*

D

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E

Ethernet
connectors, *50*
event response time, *109*

G

grounding, *26*

I

installing CPUs, *73*

M

memory
CPU modules, *70*
memory cards, *76*
Modbus
connectors, *46*

P

performance, *97*

R

real-time clocks, *54*

S

standards, *35*

W

wiring accessories
BMXXCAUSB018, *45*
BMXXCAUSB025, *45*

Product data sheet

Specifications



distributed analog input Modicon Momentum - 8 Input

170AAI03000

Product availability : Stock - Normally stocked in distribution facility

Main

Range of Product	Modicon Momentum automation platform
Product or Component Type	Analogue input base
Analogue input number	8
Analogue Input Type	Differential
Analogue Input Range	+/- 20 mA 14 bits + sign 250 kOhm 4...20 mA 15 bits + sign 250 kOhm +/- 10 V 14 bits + sign > 0.1 kOhm +/- 5 V 14 bits + sign > 0.1 kOhm 1...5 V 15 bits + sign > 0.1 kOhm

Complementary

Data format	Full 16 bits signed
Absolute accuracy error	+/- 0.13 % full scale 77 °F (25 °C) 1...5 V +/- 0.19 % full scale 140 °F (60 °C) 1...5 V +/- 0.21 % full scale 77 °F (25 °C) +/- 5 V +/- 0.26 % full scale 140 °F (60 °C) +/- 5 V +/- 0.27 % full scale 77 °F (25 °C) +/- 10 V +/- 0.27 % full scale 77 °F (25 °C) 4...20 mA +/- 0.32 % full scale 77 °F (25 °C) +/- 20 mA +/- 0.32 % full scale 140 °F (60 °C) +/- 10 V +/- 0.38 % full scale 140 °F (60 °C) 4...20 mA +/- 0.41 % full scale 140 °F (60 °C) +/- 20 mA
Conversion time	12 ms 8
Isolation between channels	+/- 200 V DC for 1 minute
Isolation between channels and ground	500 V AC for 1 minute
Isolation between channels and bus	500 V AC for 1 minute
Permissible common mode voltage	100 V 47...63 Hz DC between channels to ground 250 V 47...63 Hz AC between channels to ground
Common mode rejection	> 80 dB between channels to ground
External power requirement	< 382 mA DC 20.4...28.8 V DC 24 V DC
Reverse polarity protection	Internal
Marking	CE
Local signalling	for ready 1 LED (green) for channel status 8 LEDs
Electrical connection	2 connectors for removable terminal blocks

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Depth	1.87 in (47.5 mm)
Height	4.92 in (125 mm)
Width	5.57 in (141.5 mm)
Net Weight	0.47 lb(US) (0.215 kg)

Environment

Standards	EN 50081-2 IEC 1131
Product Certifications	FM Class 1 Division 2 CSA UL
Protective treatment	TC
Resistance to electrostatic discharge	4 kV contact IEC 801-2 8 kV on air IEC 801-2
Resistance to electromagnetic fields	9.14 V/m (10 V/m) 80...1000 MHz IEC 801-3
Ambient Air Temperature for Operation	32...140 °F (0...60 °C)
Ambient Air Temperature for Storage	-40...185 °F (-40...85 °C)
Relative Humidity	95 % without condensation
Operating altitude	<= 16404.2 ft (5000 m)

Ordering and shipping details

Category	18206-MOMENTUM PROCESSORS,I/O BASES,CONN.
Discount Schedule	PC31
GTIN	3595861147683
Returnability	Yes
Country of origin	ID

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	2.17 in (5.5 cm)
Package 1 Width	7.09 in (18.0 cm)
Package 1 Length	10.24 in (26.0 cm)
Package 1 Weight	14.04 oz (398.0 g)

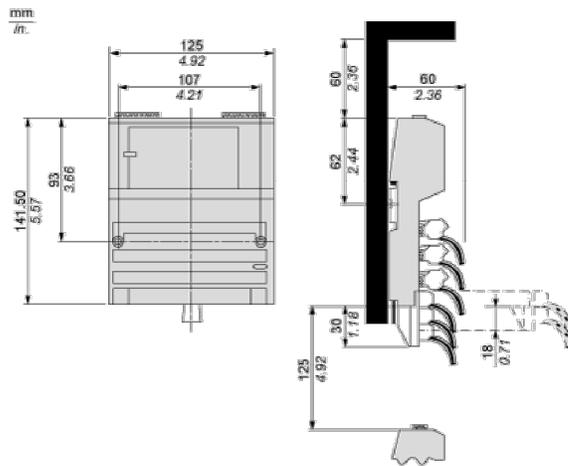
Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Mercury free	Yes
China RoHS Regulation	China RoHS declaration
RoHS exemption information	Yes

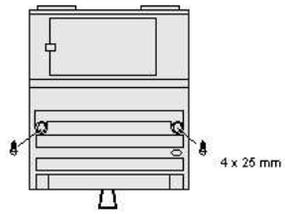
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End of Life Information
WEEE	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins.
Contractual warranty	
Warranty	18 months

Standard Adapter on a Typical Base

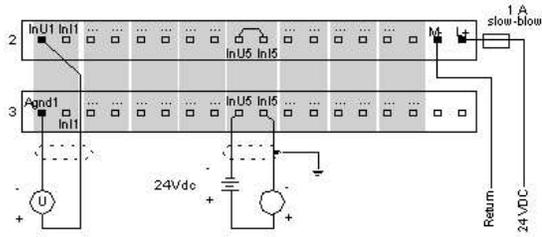
Dimensions



Mounting on a Wall



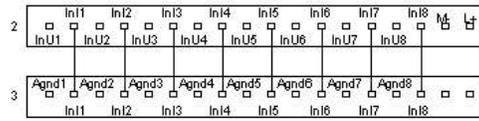
External Wiring Diagram



Examples

- * Channel1, wired for voltage input
- * Channel 5, wired for current input

Internal Pin Connections



Recommended replacement(s)

Product data sheet

Specifications



discrete output module Modicon Momentum - 32 O solid state

170ADO35000

Product availability : Stock - Normally stocked in distribution facility

Main

Range of Product	Modicon Momentum automation platform
Product or Component Type	Discrete output base DC
Group of channels	2 groups of 16 outputs
Discrete output number	32
Discrete output type	Solid state switch
Discrete output voltage	24 V DC
Current per channel	0.5 A
Short-circuit protection	Outputs electronically protected
Protective treatment	TC

Complementary

[Ue] rated operational voltage	24 V DC
Discrete output current	16 A per module 8 A per group
Maximum leakage current	1 mA 24 V DC
Surge current	5 A 1 ms
Maximum voltage drop	<0.5 V 0.5 A at state 1
Output overload protection	Outputs electronically protected
Response time	0.1 ms from state 0 to state 1 0.1 ms from state 1 to state 0
Isolation between channels and bus	500 V AC
Power dissipation	6 W typical 7.5 W maximum
Marking	CE
Local signalling	for channel status 32 LEDs
Current consumption	250 mA 24 V DC
Terminals description PLC n°1	(15)OUT_DIS#15 TB (2)OUT_DIS#2 (8)OUT_DIS#8 (L+)PW_POS (16)OUT_DIS#16 (7)OUT_DIS#7 (M-)PW_NEG (12)OUT_DIS#12

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

(9)OUT_DIS#9
 (11)OUT_DIS#11
 (14)OUT_DIS#14
 (1)OUT_DIS#1
 (5)OUT_DIS#5
 (10)OUT_DIS#10
 (13)OUT_DIS#13
 (3)OUT_DIS#3
 (4)OUT_DIS#4
 (6)OUT_DIS#6

Terminals description PLC n°2	(6)OUT_DIS#22 (4)OUT_DIS#20 (7)OUT_DIS#23 (2L+)PW_POS (3)OUT_DIS#19 TB_1 (8)OUT_DIS#24 (10)OUT_DIS#26 (12)OUT_DIS#28 (2)OUT_DIS#18 (13)OUT_DIS#29 (16)IN_DIS#32 (11)OUT_DIS#27 (14)OUT_DIS#30 (15)OUT_DIS#31 (5)OUT_DIS#21 (9)OUT_DIS#25 (1)OUT_DIS#17 (1L+)PW_POS
--------------------------------------	--

Depth	1.87 in (47.5 mm)
Height	5.57 in (141.5 mm)
Width	4.92 in (125 mm)
Net Weight	0.46 lb(US) (0.21 kg)

Environment

Product Certifications	CSA UL
Resistance to electrostatic discharge	4 kV contact IEC 801-2 8 kV on air IEC 801-2
Resistance to electromagnetic fields	9.14 V/m (10 V/m) 80...1000 MHz IEC 801-3
Ambient Air Temperature for Operation	32...140 °F (0...60 °C)
Ambient Air Temperature for Storage	-40...185 °F (-40...85 °C)
Relative Humidity	95 % without condensation
Operating altitude	<= 16404.2 ft (5000 m)

Ordering and shipping details

Category	18206-MOMENTUM PROCESSORS,I/O BASES,CONN.
Discount Schedule	PC31
GTIN	3595861147676
Returnability	No
Country of origin	ID

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	2.17 in (5.5 cm)
Package 1 Width	7.09 in (18.0 cm)
Package 1 Length	10.24 in (26.0 cm)

Package 1 Weight	14.22 oz (403.0 g)
Unit Type of Package 2	S03
Number of Units in Package 2	10
Package 2 Height	11.81 in (30 cm)
Package 2 Width	11.81 in (30 cm)
Package 2 Length	15.75 in (40 cm)
Package 2 Weight	10.02 lb(US) (4.545 kg)
Unit Type of Package 3	P06
Number of Units in Package 3	80
Package 3 Height	29.53 in (75.0 cm)
Package 3 Width	15.75 in (40.0 cm)
Package 3 Length	31.50 in (80.0 cm)
Package 3 Weight	103.62 lb(US) (47 kg)

Offer Sustainability

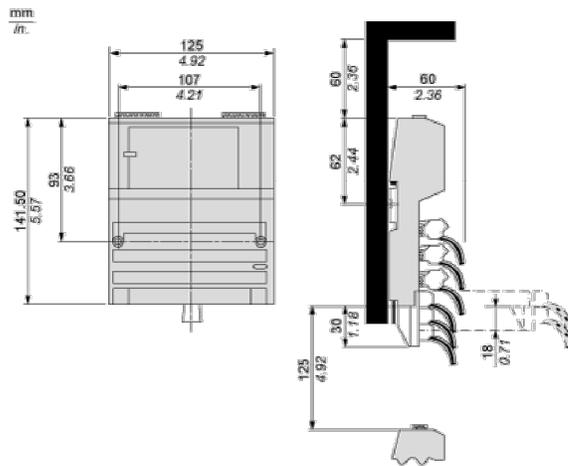
Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Mercury free	Yes
China RoHS Regulation	China RoHS declaration
RoHS exemption information	Yes
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End of Life Information
WEEE	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins.

Contractual warranty

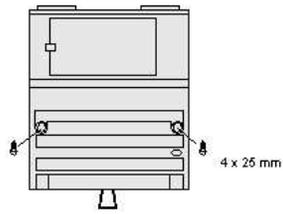
Warranty	18 months
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Standard Adapter on a Typical Base

Dimensions

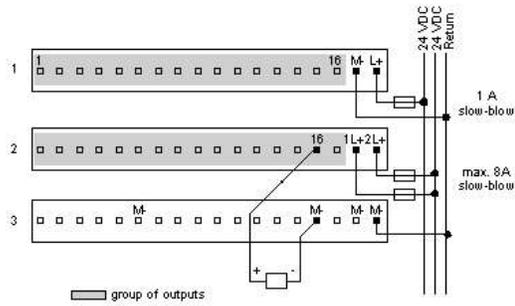


Mounting on a Wall

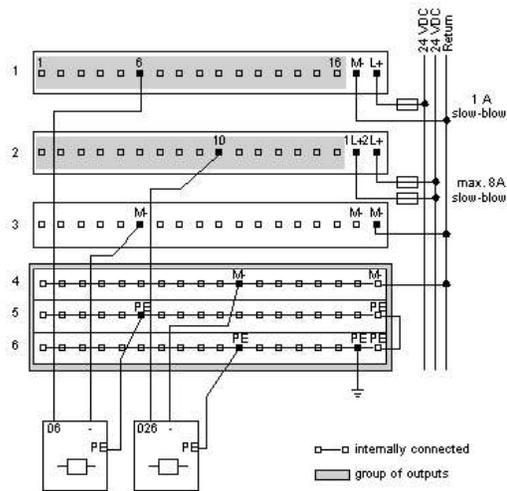


External Wiring Diagrams

2-Wire Actuator

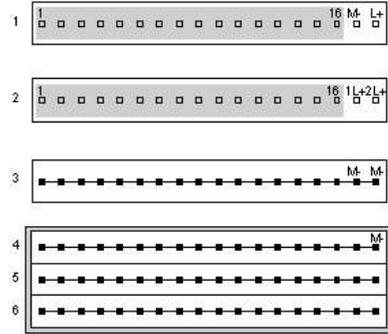


3-Wire Actuators



Internal Pin Connections

Rows 1 through 3 show the internal connections between terminals on the I/O base. Rows 4 through 6 show the internal connections on the optional busbar



Recommended replacement(s)

Product data sheet

Specifications



Unity M1E processor - RS232/485 - Ethernet - USB - I/O bus

171CBU98090

Product availability : Stock - Normally stocked in distribution facility

Main

Range of Product	Modicon Momentum automation platform
Product or Component Type	Processor
Product Compatibility	Modicon STB I/O
Integrated connection type	Ethernet USB port

Complementary

Concept	Transparent Ready class B
Web services	CPU status Ethernet statistics Bandwidth monitoring Home pages Properties
Software Designation	Unity Pro
Communication service	Modbus messaging 125 words, 200 I/O message per second Global Data, 1600 I/O message per second Modbus TCP I/O Scanner and Messaging
Processor name	Spear 320s
Word length	32 bit
Supply voltage limits	4.75...5.25 V
Clock frequency	333 MHz
Topology	Multidrop Modbus Star Modbus TCP
Communication port protocol	Modbus RS485/RS232 - 1 RJ45 19200 bps - 2-wire Modbus TCP ETHERNET - 1 RJ45 10/100 Mbps - twisted shielded pairs cable CAT 5E UTP
Method of access	Client/server Master/slave
Control parameter	CRC-16 for Modbus CRC-32 for Modbus TCP/IP
Addressing	1...247 Modbus Unique IEEE global address Modbus TCP
Fail state	Safe I/O mode
Memory description	Program memory IEC 3584 kB Program memory LL984 3584 kB
Register words	26048
I/O limit processor capacity	2048 inputs/2048 outputs

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

Number of devices	32 Modbus
Exact time for 1 Kinstruction	83 ns
Local signalling	for processor running (RUN) 1 LED (green) for processor or system fault (ERR) 1 LED (red) for I/O module fault (I/O) 1 LED (red) for channel 0 operating (CH0) 1 LED (yellow) for data rate (ETH 100) 1 LED (green) for data rate (ETH LINK) 1 LED (green) for status of Ethernet network (ETH STS) 1 LED (green)
Marking	CE
Current consumption	500 mA 5 V DC
Module format	Standard
Product mounting	35 mm symmetrical DIN rail
Height	2.39 in (60.6 mm)
Width	5.67 in (144 mm)
Depth	2.11 in (53.47 mm)
Net Weight	0.36 lb(US) (0.163 kg)

Environment

Material	Lexan
Dielectric strength	0 V not isolated RS485/RS232 5000 V for 1 minute ETHERNET
Product Certifications	FM C-tick
Standards	UL 508 CSA C22.2 No 142 EN/IEC 61131-2
IP degree of protection	IP20
Shock resistance	15 gn 11 ms sinusoidal vibrations
Resistance to electrostatic discharge	6 kV contact EN/IEC 61131-2 zone B 6 kV contact IACS E10 8 kV on air EN/IEC 61000-4-2
Resistance to electromagnetic fields	13.72 V/m (15 V/m) 80...2700 MHz EN/IEC 61000-4-3
Ambient Air Temperature for Operation	32...140 °F (0...60 °C)
Ambient Air Temperature for Storage	-40...185 °F (-40...85 °C)
Relative humidity	5...96 %
Operating altitude	<= 6561.68 ft (2000 m)

Ordering and shipping details

Category	18206-MOMENTUM PROCESSORS,I/O BASES,CONN.
Discount Schedule	PC31
GTIN	3595864171395
Returnability	Yes
Country of origin	FR

Packing Units

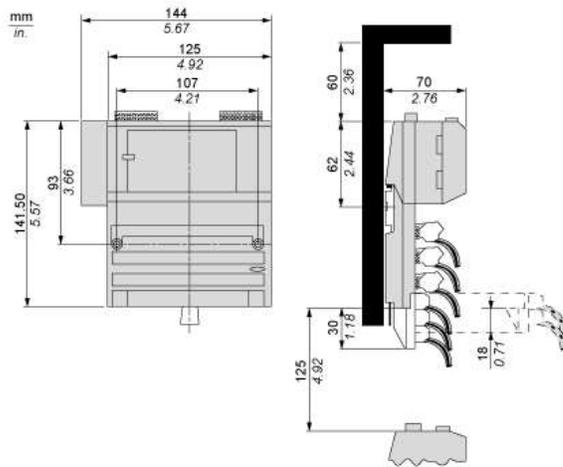
Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	2.95 in (7.500 cm)

Package 1 Width	4.41 in (11.200 cm)
Package 1 Length	8.15 in (20.700 cm)
Package 1 Weight	8.36 oz (237.000 g)
Unit Type of Package 2	S03
Number of Units in Package 2	8
Package 2 Height	11.81 in (30.000 cm)
Package 2 Width	11.81 in (30.000 cm)
Package 2 Length	15.75 in (40.000 cm)
Package 2 Weight	5.26 lb(US) (2.388 kg)

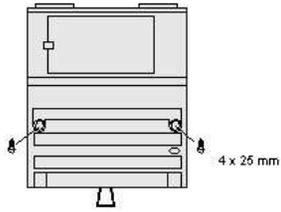
Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Mercury free	Yes
China RoHS Regulation	China RoHS declaration
RoHS exemption information	Yes
Circularity Profile	End of Life Information
WEEE	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins.

Processor and Option Adapter on a Typical Base



Mounting on a Wall



Recommended replacement(s)



Enclosure Alterations

A Pentair Company

Hoffman Enclosures Inc.

2100 Hoffman Way

Anoka, MN 55303-1745

(763) 422-2211

www.hoffmanonline.com

Hoffman cannot assure the safety or effectiveness of any alterations or additions not made by Hoffman Enclosures Inc. However, the following information may be helpful. These instructions do not eliminate the need to consult with equipment manufacturers and to observe all regulatory agency procedures and safe practices to assure the proper electrical and mechanical function of Hoffman products in each particular application.

1. REPAINTING

See "Instructions for Repainting Hoffman Standard Paint Finishes", part number 23155002.

2. MOUNTING INSTRUCTIONS

- a. Wall mounted enclosures have either an internal mounting means or external mounting feet. Proper fasteners must be used in all mounting holes to secure the enclosure to the wall.
- b. Floor mounted enclosures have floor stands (legs) which include mounting plates. Proper fasteners must be used in all mounting holes to securely anchor the enclosure to the floor.

3. DOOR CLOSING ADJUSTMENTS

- a. Single door (wall mounted)
If the surface on which the enclosure is mounted is not flat, the door may not open and close properly. Also, if heavy equipment is mounted on a large door, the door may sag slightly. If the top of the door strikes the lip which extends around the body opening, place metal shims behind the mounting foot which is located at the bottom of the enclosure and closest to the door hinge. Place the shims between the mounting foot and the wall or mounting surface. Be sure all mounting screws are tightened securely.
- b. Two door (floor mounted)
The overlapping doors are factory-fitted to meet evenly at the top and bottom. If the floor under the enclosure is not level, the doors will not close evenly. In this case, place metal shims under the corners of the enclosure. The enclosure should be bolted in place with the doors closed to prevent tipping when installing shims. Shims under the right front corner will raise the right door. Shims under the left front corner will raise the left door. It is important that the doors meet evenly to insure a proper seal against liquids and dust. Be sure all mounting bolts are tightened securely.

4. PANEL INSTALLATION

When the interior panel is being installed, it may be necessary to bend one or more mounting studs slightly to permit the panel to fit in place. Simply position the panel on the studs that line up properly and pry the other studs into position with a suitable screwdriver inserted through the panel holes.

5. REMOVING HINGE PINS FROM CONTINUOUS HINGES

This can be a difficult operation requiring one or more people. This procedure is best accomplished by using a small diameter punch to drive the hinge pin toward the bottom of the enclosure. Lay the wall-mounted and floor-mounted or free-standing enclosure on its back side (see note 7 below). When the hinge pin protrudes about two inches below the bottom hinge barrel, bend the end of the pin 180° so it is shaped like the letter "J". Use an electric or air powered vibrating hammer fitted with a tool which has a hole in the end to fit over the hinge pin, and drive the hinge pin out while opening and closing the door. To install the hinge pin, straighten the pin and drive it in with the vibrating hammer while opening and closing the door. Most hinge pins have one end chamfered, so be sure to start the chamfered end first when installing the pin.

6. PRINT POCKET

The print pocket on the door can be inverted or removed entirely.

7. LIFTING ENCLOSURES BY EYEBOLTS

To lift an enclosure which has eyebolts or mounting feet, be sure to use all the eyebolts and top mounting feet provided. Arrange the chains and cables with spreader bars so you are lifting straight up on the eyebolts or top mounting feet.

ACCESSORIES AND HARDWARE

Hoffman cannot assure the safety or effectiveness of any alterations or additions not made by Hoffman Enclosures Inc.

Lock kits and latch kits are available for field or factory installation on many types of Hoffman enclosures. Lock kits provide key-locking capabilities. Latch kits permit rapid access to enclosure interiors while retaining the oil tight and dust tight features.

Louver plate kits provide ventilation in enclosures where internal heat is a problem.

Floor stand kits for converting wall mounting enclosures to floor mounting are available for field or factory installation on single door NEMA 12 and NEMA 4 enclosures.

Drip shield kits are available for field or factory installation on single door and double door NEMA 12 enclosures.

Electrical interlocks provide a positive internal safety lockout on electrical enclosures while the enclosure contents are energized.

Swing-out panel kits provide a means of mounting gauges, switches, pilot lights and other components near the front of the enclosure.

OTHER HOFFMAN PRODUCTS

- NEMA 1, NEMA 3R, NEMA 4, NEMA 4X, NEMA 9, and NEMA 12 enclosures
- Oil tight JIC boxes and troughs.
- Oil tight wireway and lay-in wireway
- NEMA 1 wireway
- Oil tight pushbutton enclosures
- Cutout boxes, pull boxes, and transformer cabinets
- Non-metallic enclosures
- Stainless steel enclosures and boxes

Safety Lockouts protect personnel and equipment by enabling multiple padlocks to be installed on a de-energized switch.

Touch-up paint is used to repair the finish of enclosures and panels.

Window kits are available for many types of Hoffman enclosures.

Corrosion inhibitors protect interior components of enclosures, wireway, consoles, etc. from corrosion. There are no coatings, oils, or greases to apply.

Hole seals are used to seal extra conduit openings, pushbutton holes, cutouts, etc. against dust, dirt, oil, and water.

Terminal kit assemblies provide an easy method to mount terminal blocks in many types of Hoffman enclosures.

Folding Shelves can be used to support instruments and test equipment.

Pedestals are used to provide floor mounting at a working height for small to medium size enclosures.

- Aluminum enclosures and boxes
- Console cabinets
- Custom-built enclosures of all types
- Instrument and electronic enclosures
- Environmental control products
- EMI/RFI shielded enclosures
- Wiring duct
- Modified Standard Enclosures
- Co-Developed Enclosures

Stainless Steel Type 4X Enclosures

P/N 0240381
Hoffman #A60H3612SS6LP
316SS, 4X



Application

Provides unmatched protection for housing electrical components in highly corrosive environments. This enclosure is used in indoor and outdoor settings that are frequently wet or have constant exposure to water, other liquids, or contaminants.

A wide variety of Type 316L stainless steel enclosures are available for applications requiring the additional protection of Type 316L material.

See Chapter 11, EMC Enclosures, for information on a related EMC-shielded product.

Construction

- 14 gauge Type 304 or Type 316L stainless steel bodies and doors
- Seams continuously welded and ground smooth, no holes or knockouts
- Seamless foam-in-place gasket assures watertight and dust-tight seal
- Rolled lip around three sides of door and all sides of enclosure opening excludes liquids and contaminants
- Stainless steel door clamp assembly assures watertight seal
- Hasp and staple for padlocking
- Door removed by pulling stainless steel continuous hinge pin
- Data pocket is high-impact thermoplastic
- Collar studs provided for mounting optional panels
- Exterior hardware on Type 316L stainless steel enclosures matches enclosure material

Finish

Enclosures are unpainted. Door, sides, top, and bottom have smooth #4 brushed finish.

Industry Standards

UL 508A, 508, File No. E61997: Type 3R, Type 4, Type 4X, and Type 12
NEMA/EEMAC Type 3, Type 3R, Type 4, Type 4X, Type 12, and Type 13
JIC standard EGP-1-1967
CSA File No. LR42186: Type 4, Type 4X, and Type 12
IEC 60529, IP66
Meets Type 3RX requirements

Modification Services Program

You can customize this product to your unique requirements by specifying from these options:

- Enclosure height, width, depth
- Holes and cutouts in body, doors, subpanels
- Tapped holes in subpanels
- Fasteners, mounting channel in enclosure and subpanel
- Mounting (adds and deletes)
- Doors
- Subpanels
- Thermal management (louvers, fans, filters)
- Windows
- Standard accessories
- Drip shield

For details, see Modification Services at hoffmanonline.com.

To order, contact your local Hoffman sales representative.

NOTE: For information about modifications outside the scope of the Modification Services program, contact your Hoffman sales representative.



A Pentair Company

Stainless Steel Type 4X Enclosures

P/N 0240381
Hoffman #A60H3612SS6LP
316SS, 4X

Standard Sizes Stainless Steel Type 4X Enclosures (Cont.)

Catalog Number Type 304	Catalog Number Type 316L	Enclosure Size A x B x C	* Steel Panel Catalog Number	* Stainless Steel Panel Catalog Number	Panel Size D x E	F	Clamps qty	Data Pocket
A36H2408SSLP	A36H2408SS6LP	36.00 x 24.00 x 8.00 (914 x 610 x 203)	A36P24	A36P24SS6	33.00 x 21.00 (838 x 533)	3.00 (76)	5	Large
A36H3008SSLP	A36H3008SS6LP	36.00 x 30.00 x 8.00 (914 x 762 x 203)	A36P30	A36P30SS6	33.00 x 27.00 (838 x 686)	3.00 (76)	7	Large
A42H3608SSLP	A42H3608SS6LP	42.00 x 36.00 x 8.00 (1067 x 914 x 203)	A42P36	A42P36SS6	39.00 x 33.00 (991 x 838)	3.00 (76)	8	Large
A48H3608SSLP	A48H3608SS6LP	48.00 x 36.00 x 8.00 (1219 x 914 x 203)	A48P36	A48P36SS6	45.00 x 33.00 (1143 x 838)	3.00 (76)	8	Large
A20H1610SSLP	A20H1610SS6LP	20.00 x 16.00 x 10.00 (508 x 406 x 254)	A20P16	A20P16SS6	17.00 x 13.00 (432 x 330)	3.00 (76)	4	Small
A24H2010SSLP	A24H2010SS6LP	24.00 x 20.00 x 10.00 (610 x 508 x 254)	A24P20	A24P20SS6	21.00 x 17.00 (533 x 432)	3.00 (76)	5	Small
A30H2410SSLP	A30H2410SS6LP	30.00 x 24.00 x 10.00 (762 x 610 x 254)	A30P24	A30P24SS6	27.00 x 21.00 (686 x 533)	3.00 (76)	5	Large
A36H2410SSLP	A36H2410SS6LP	36.00 x 24.00 x 10.00 (914 x 610 x 254)	A36P24	A36P24SS6	33.00 x 21.00 (838 x 533)	3.00 (76)	5	Large
A36H3010SSLP	A36H3010SS6LP	36.00 x 30.00 x 10.00 (914 x 762 x 254)	A36P30	A36P30SS6	33.00 x 27.00 (838 x 686)	3.00 (76)	7	Large
A42H3010SSLP	A42H3010SS6LP	42.00 x 30.00 x 10.00 (1067 x 762 x 254)	A42P30	A42P30SS6	39.00 x 27.00 (991 x 686)	3.00 (76)	8	Large
A48H3610SSLP	A48H3610SS6LP	48.00 x 36.00 x 10.00 (1219 x 914 x 254)	A48P36	A48P36SS6	45.00 x 33.00 (1143 x 838)	3.00 (76)	8	Large
A24H2412SSLP	A24H2412SS6LP	24.00 x 24.00 x 12.00 (610 x 610 x 305)	A24P24	A24P24SS6	21.00 x 21.00 (533 x 533)	3.00 (76)	5	Small
A30H2412SSLP	A30H2412SS6LP	30.00 x 24.00 x 12.00 (762 x 610 x 305)	A30P24	A30P24SS6	27.00 x 21.00 (686 x 533)	3.00 (76)	5	Large
A36H3012SSLP	A36H3012SS6LP	36.00 x 30.00 x 12.00 (914 x 762 x 305)	A36P30	A36P30SS6	33.00 x 27.00 (838 x 686)	3.00 (76)	7	Large
A36H3612SSLP	A36H3612SS6LP	36.00 x 36.00 x 12.00 (914 x 914 x 305)	A36P36	A36P36SS6	33.00 x 33.00 (838 x 838)	3.00 (76)	7	Large
A48H3612SSLP	A48H3612SS6LP	48.00 x 36.00 x 12.00 (1219 x 914 x 305)	A48P36	A48P36SS6	45.00 x 33.00 (1143 x 838)	3.00 (76)	8	Large
A60H3612SSLP	A60H3612SS6LP	60.00 x 36.00 x 12.00 (1524 x 914 x 305)	A60P36	A60P36SS6	57.00 x 33.00 (1448 x 838)	3.00 (76)	9	Large
A30H2416SSLP	A30H2416SS6LP	30.00 x 24.00 x 16.00 (762 x 610 x 406)	A30P24	A30P24SS6	27.00 x 21.00 (686 x 533)	3.00 (76)	5	Large
A36H3016SSLP	A36H3016SS6LP	36.00 x 30.00 x 16.00 (914 x 762 x 406)	A36P30	A36P30SS6	33.00 x 27.00 (838 x 686)	3.00 (76)	7	Large
A48H3616SSLP	A48H3616SS6LP	48.00 x 36.00 x 16.00 (1219 x 914 x 406)	A48P36	A48P36SS6	45.00 x 33.00 (1143 x 838)	3.00 (76)	8	Large
A60H3616SSLP	A60H3616SS6LP	60.00 x 36.00 x 16.00 (1524 x 914 x 406)	A60P36	A60P36SS6	57.00 x 33.00 (1448 x 838)	3.00 (76)	9	Large



Millimeter dimensions () are for reference only; do not convert metric dimensions to inch.

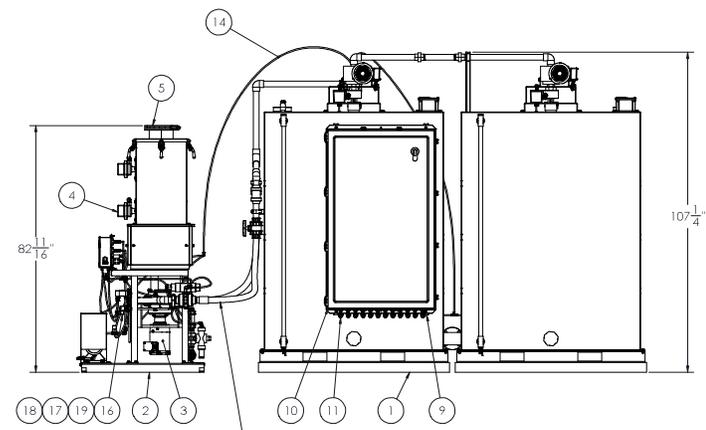
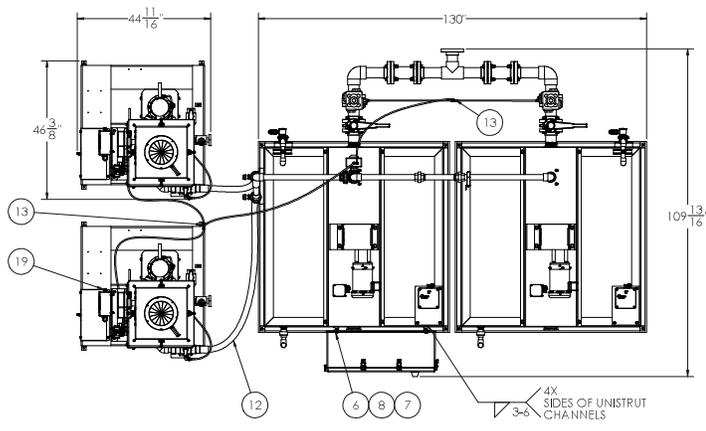
* Panels must be ordered separately. Optional aluminum and composite panels are available for many sizes. See General Accessories.

NOTE: Panels have a formed flange along any side that is longer than 21.00 in. (564mm). Panel A24P20 has a flange on all four sides.

**Mechanical -
Bill of Materials &
Drawings**

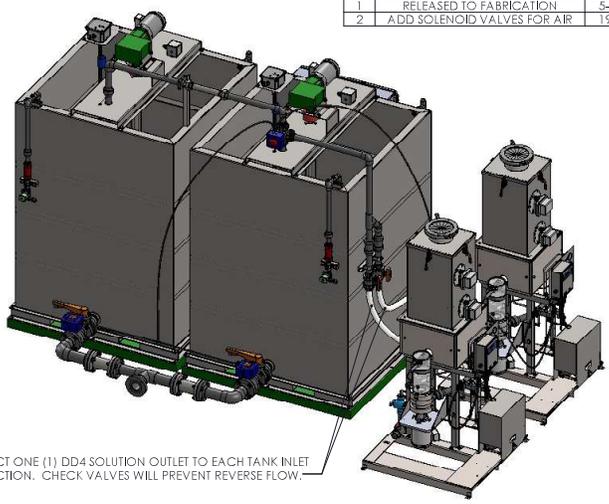
General Arrangements

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16



INTERCONNECT TUBING SHIPPED LOOSE. SHIP LOOSE CHECK VALVES WILL BE PROVIDED FOR SWITCHING BETWEEN TWO DD4 SKIDS.

REVISIONS			
REV.	DESCRIPTION	DATE	BY
1	RELEASED TO FABRICATION	5-OCT-23	EJK
2	ADD SOLENOID VALVES FOR AIR	19-FEB-24	EJK



CONNECT ONE (1) DD4 SOLUTION OUTLET TO EACH TANK INLET CONNECTION. CHECK VALVES WILL PREVENT REVERSE FLOW.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	556386-SA2	TANK ASSEMBLY, DP2000, 1000 GALLON, 460 VAC, WITH SCALES	1
2	3270108	DD4 ASSEMBLY	2
3	5912405	MOTOR ASSEMBLY, DD4, 480V	2
4	556386-SA3	5 CUFT HOPPER ASSEMBLY, WITH HIGH/LOW INDICATORS	2
5	556386-S4	IRIS VALVE, 8" MANUAL OPEN/CLOSE	2
6	1602320	SCREW, CAP, HH, .375-16 UNC-2A X 1.25 LG	4
7	6022331	NUT, HEX, NYLON INSERT, .375-16 UNC-2B	4
8	9742300	WASHER, FLAT, 316SS, 3/8"	8
9	9523005	UNISTRUT CHANNEL, 1.63 SQ, 304SS, 12GA..	11 FT
10	556386-S50	CONTROL PANEL, FRP, DP2000, 60 X 36 X 12, 480V, 3Ph	1
11	2727590	1/2" FLEX CONDUIT CONNECTOR, HUBBELL	16
12	RM9410105	TUBING, PVC, TIGERFLX 1-1/2" ID	25 FT
13	8857201	TEE, SWIVEL, RUN, OD, .375 OD	2
14	27342	TUBING, UV RESIST, 3/8"	40 FT
15	G6017	PARTS GROUP, ELECTRICAL DP	1
16	556386-S12	SOLENOID VALVE, NC, 1/4" NPT, 0-200 PSI, BRASS, NEMA 4	2
17	1048406	ADAPTER, .375 OD TUBE TO .250 NPT MALE, 316SS	4
18	RM9414061	304SS TUBE, RIGID, .38 DIA.	1 FT
19	2728564	CONNECTOR, CORD GRIP, 1/2" MPT	4

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TOLERANCES UNLESS OTHERWISE SPECIFIED:
FRACTION ±1/64 TWO PLACE DECIMAL .010 THREE PLACE DECIMAL .005

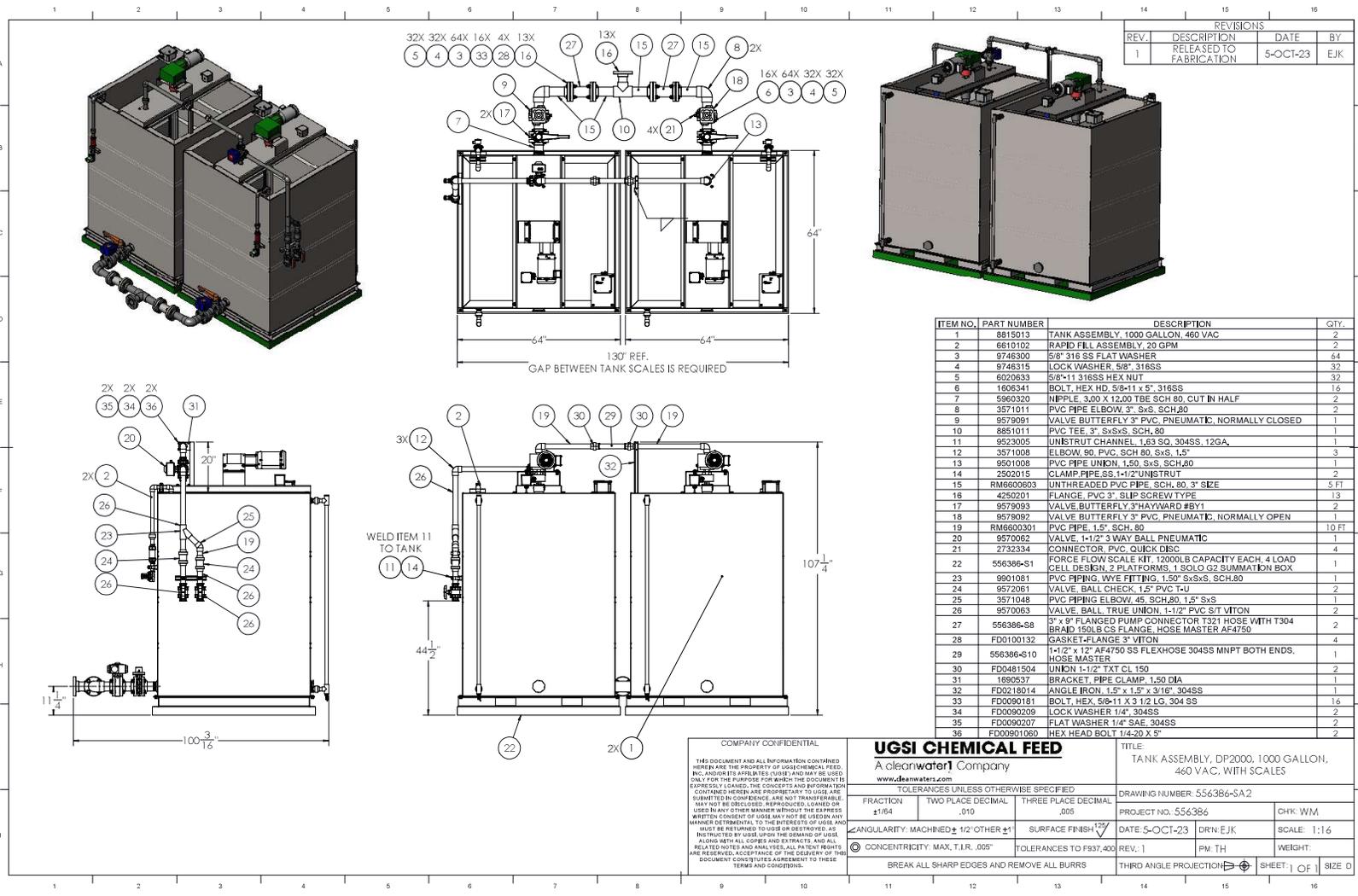
ANGULARITY: MACHINED ± 1/2° OTHER ±1° SURFACE FINISH: 125

CONCENTRICITY: MAX. T.I.R. .005" TOLERANCES TO F937, 400

BREAK ALL SHARP EDGES AND REMOVE ALL BURRS

DUAL DD4's WITH TWO 1000G TANKS
DRAWING NUMBER: 556386-SA1
PROJECT NO. 556386
DATE: 19-FEB-24 DRN: EJK
REV. 2 PM TH
SCALE: 1:16
WEIGHT:
THIRD ANGLE PROJECTION SHEET: 1 OF 1 SIZE D

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16



REVISIONS			
REV.	DESCRIPTION	DATE	BY
1	RELEASED TO FABRICATION	5-OCT-23	EJK

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	8815013	TANK ASSEMBLY, 1000 GALLON, 460 VAC	2
2	6610102	RAPID FILL ASSEMBLY, 20 GPM	2
3	9746300	5/8" 316 SS FLAT WASHER	64
4	9746315	LOCK WASHER, 5/8", 316SS	32
5	6020633	5/8"-11 316SS HEX NUT	32
6	1606341	BOLT, HEX HD, 5/8"-11 x 5" 316SS	16
7	5960320	NIPPLE, 3.00 X 12.00 TBE SCH 80, CUT IN HALF	2
8	3571011	PVC PIPE ELBOW, 3", SxS, SCH 80	2
9	9573091	VALVE, BUTTERFLY 3" PVC, PNEUMATIC, NORMALLY CLOSED	1
10	8851011	PVC TEE, 3", SxSxS, SCH 80	1
11	9523005	UNISTRUT CHANNEL, 1.63 SQ, 304SS, 12GA	1
12	3571008	ELBOW, 90, PVC, SCH 80, SxS, 1.5"	3
13	9501008	PVC PIPE UNION, 1.50, SxS, SCH 80	1
14	2920215	CLAMP PIPE, SS, 1-1/2" UNISTRUT	2
15	RM6600603	UNTHTHREADED PVC PIPE, SCH, 80, 3" SIZE	5 FT
16	4250201	FLANGE, PVC 3", SLIP SCREW TYPE	13
17	9579093	VALVE, BUTTERFLY 3" PVC, PNEUMATIC, NORMALLY OPEN	1
18	9579092	VALVE, BUTTERFLY 3" PVC, PNEUMATIC, NORMALLY OPEN	1
19	RM6600301	PVC PIPE, 1.5", SCH 80	10 FT
20	9570062	VALVE, 1-1/2" 3 WAY BALL PNEUMATIC	1
21	2732334	CONNECTOR, PVC, QUICK DISC	4
22	556366-S1	FORCE FLOW SCALE KIT, 12000LB CAPACITY EACH, 4 LOAD CELL DESIGN, 2 PLATEFORMS, 1 SOLID 22 SUMMATION BOX	1
23	9901081	PVC PIPING, WYE FITTING, 1.50" SxSxS, SCH 80	1
24	9572061	VALVE, BALL CHECK, 1.5" PVC T-J	2
25	3571048	PVC PIPING ELBOW, 45, SCH 80, 1.5" SxS	1
26	9570063	VALVE, BALL TRUE UNION, 1-1/2" PVC S/T, VITON	2
27	556366-S8	3" x 9" FLANGED PUMP CONNECTOR T321 HOSE WITH T304 BRAID 150LB CS FLANGE, HOSE MASTER AF4750	2
28	FD0100132	GASKET-FLANGE 3" VITON	4
29	556366-S10	1-1/2" x 12" AF4750 SS FLEXHOSE 304SS MNPT BOTH ENDS, HOSE MASTER	1
30	FD0481504	UNION 1-1/2" TXT CL 150	2
31	1805037	BRACKET, PIPE CLAMP, 1.50 DIA	1
32	FD0218014	ANGLE IRON, 1.5" x 1.5" x 3/16", 304SS	1
33	FD0090181	BOLT, HEX, 5/8"-11 X 3 1/2 LG, 304 SS	16
34	FD0090209	LOCK WASHER 1/4", 304SS	2
35	FD0090207	FLAT WASHER 1/4" SAE, 304SS	2
36	FD00901060	HEX HEAD BOLT 1/4"-20 X 9"	2

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TOLERANCES UNLESS OTHERWISE SPECIFIED

FRACTION	TWO PLACE DECIMAL	THREE PLACE DECIMAL
±1/64	.010	.005

ANGULARITY: MACHINED ± 1/2° OTHER ±1° SURFACE FINISH: 125

CONCENTRICITY: MAX. T.I.R. .005" TOLERANCES TO F937, 400

BREAK ALL SHARP EDGES AND REMOVE ALL BURRS

TITLE: TANK ASSEMBLY, DP2000, 1000 GALLON, 460 VAC, WITH SCALES

DRAWING NUMBER: 556366-SA2

PROJECT NO. 556366

DATE: 5-OCT-23 DRN: EJK SCALE: 1:1.6

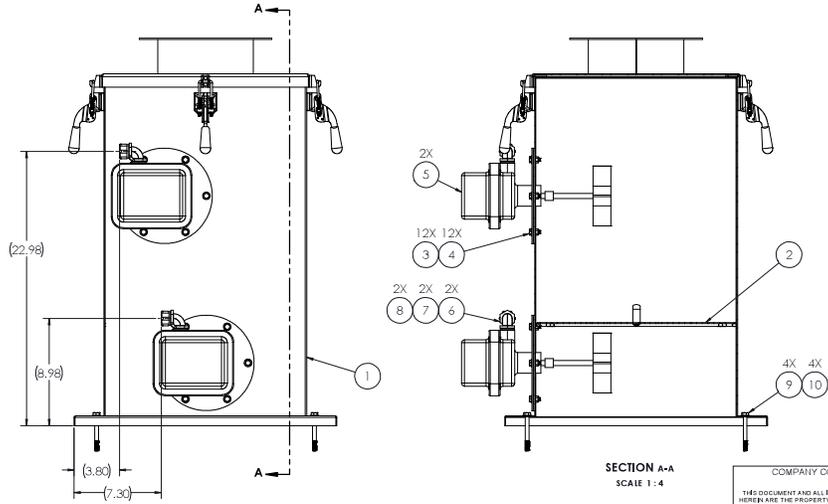
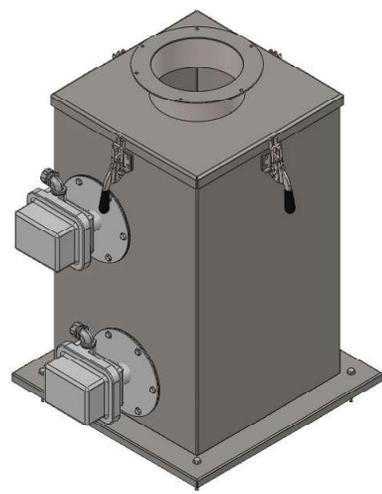
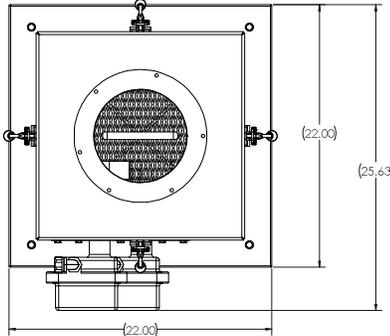
REV. 1 PM TH WEIGHT:

THIRD ANGLE PROJECTION

SHEET: 1 Of 1 SIZE D

5 Cu. Ft. Hopper Assembly

REVISIONS			
REV.	DESCRIPTION	DATE	BY
1	RELEASED TO FABRICATION	5-OCT-23	EJK



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	556386-SA5	5 CUFT HOPPER, WITH HIGH/LOW BINDICATOR HOLES	1
2	7761000	SCREEN ASSEMBLY, HOPPER	1
3	9740300	1/4" SMALL OD FLAT WASHER, 316SS	12
4	1600312	HEX CAP SCREW, 1/4"-20 x 3/4", 316SS	12
5	8725211	SWITCH, BINDICATOR RAH	2
6	3577803	ELBOW, 90 DEG, CONDUIT, .500 MPT	2
7	U22760	SEAL RING, CONDUIT, 1/2"	2
8	1930810	BUSHING, REDUCING, .500 X .750, STEEL, ELECTRICAL	2
9	1601336	SCREW, CAP, HH, .313-18 X 3,00 LG	4
10	9741301	5/16" WASHER, FLAT, 316SS	4

NOTES:
 1. TIGHTEN HARDWARE ITEM NO.'S 3, 4, USING A STAR PATTERN TO EVENLY COMPRESS GASKET (SUPPLIED WITH BINDICATOR ITEM NO. 6).

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TOLERANCES UNLESS OTHERWISE SPECIFIED

FRACTION	TWO PLACE DECIMAL	THREE PLACE DECIMAL
±1/64	.010	.005

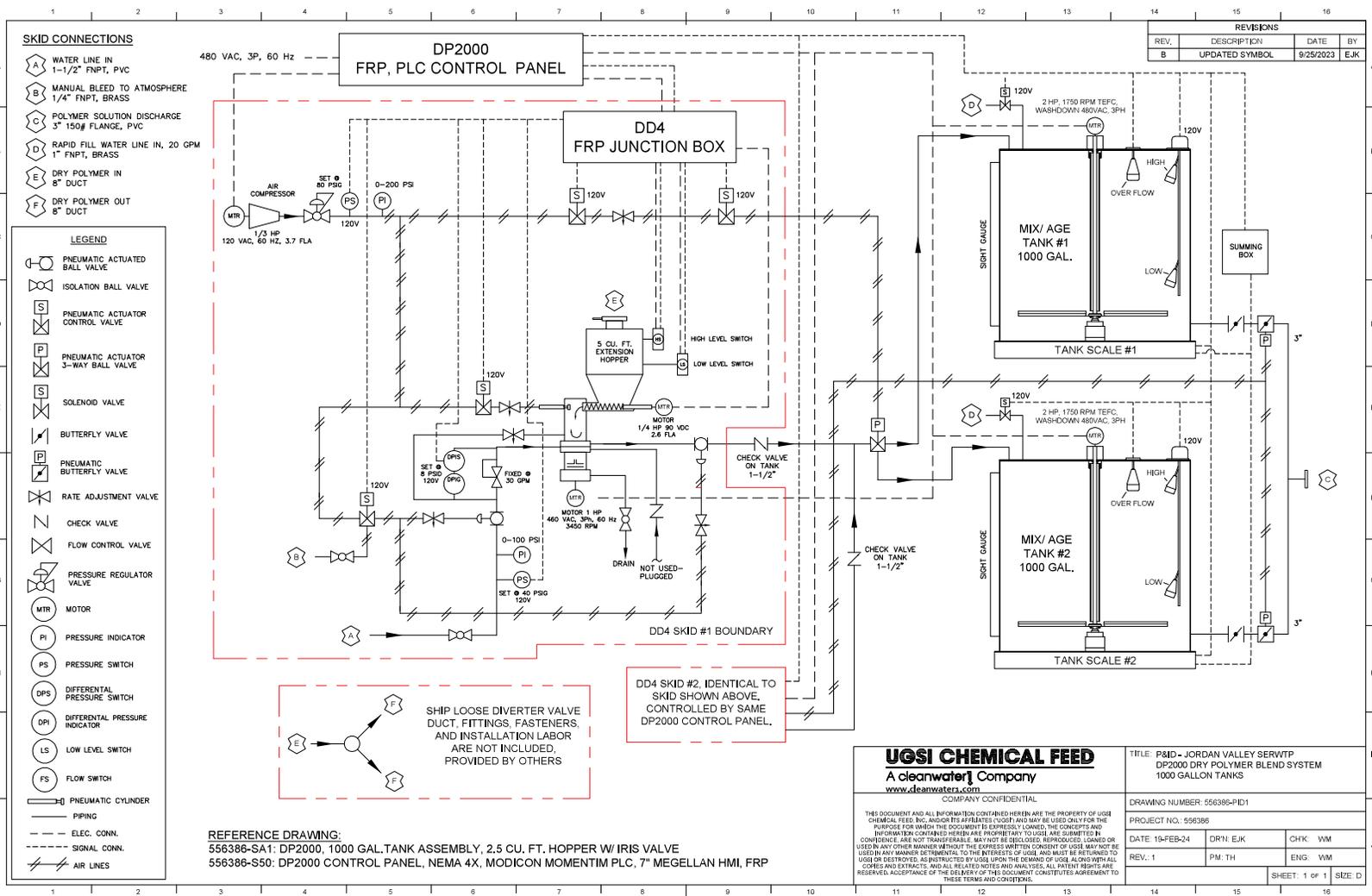
ANGULARITY: MACHINED ± 1/2° OTHER ±1° SURFACE FINISH 125

CONCENTRICITY: MAX. T.I.R. .005" TOLERANCES TO F937, 400

BREAK ALL SHARP EDGES AND REMOVE ALL BURRS

TITLE: 5 CUFT HOPPER ASSEMBLY, WITH HIGH/LOW BINDICATORS
 DRAWING NUMBER: 556386-SA-3
 PROJECT NO. 556386
 DATE: 5-OCT-23 DRN: EJK SCALE: 1:8
 REV.: 1 PM: TH WEIGHT:
 THIRD ANGLE PROJECTION SHEET: 1 OF 1 SIZE D

P& ID



REVISIONS			
REV.	DESCRIPTION	DATE	BY
B	UPDATED SYMBOL	9/25/2023	EJK

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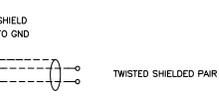
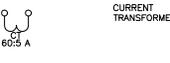
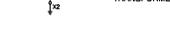
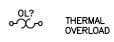
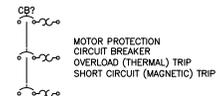
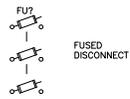
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TITLE: P&ID - JORDAN VALLEY SERWTP DP2000 DRY POLYMER BLEND SYSTEM 1000 GALLON TANKS			
DRAWING NUMBER: 556386-PID1			
PROJECT NO. 556396			
DATE: 18-FEB-24	DRN: EJK	CHK: WM	
REV.: 1	PM: TH	ENG: WM	
SHEET: 1 of 1			SIZE: D

**Electrical -
Bill of Materials
Drawings**

SYMBOL LEGEND



NOTES:

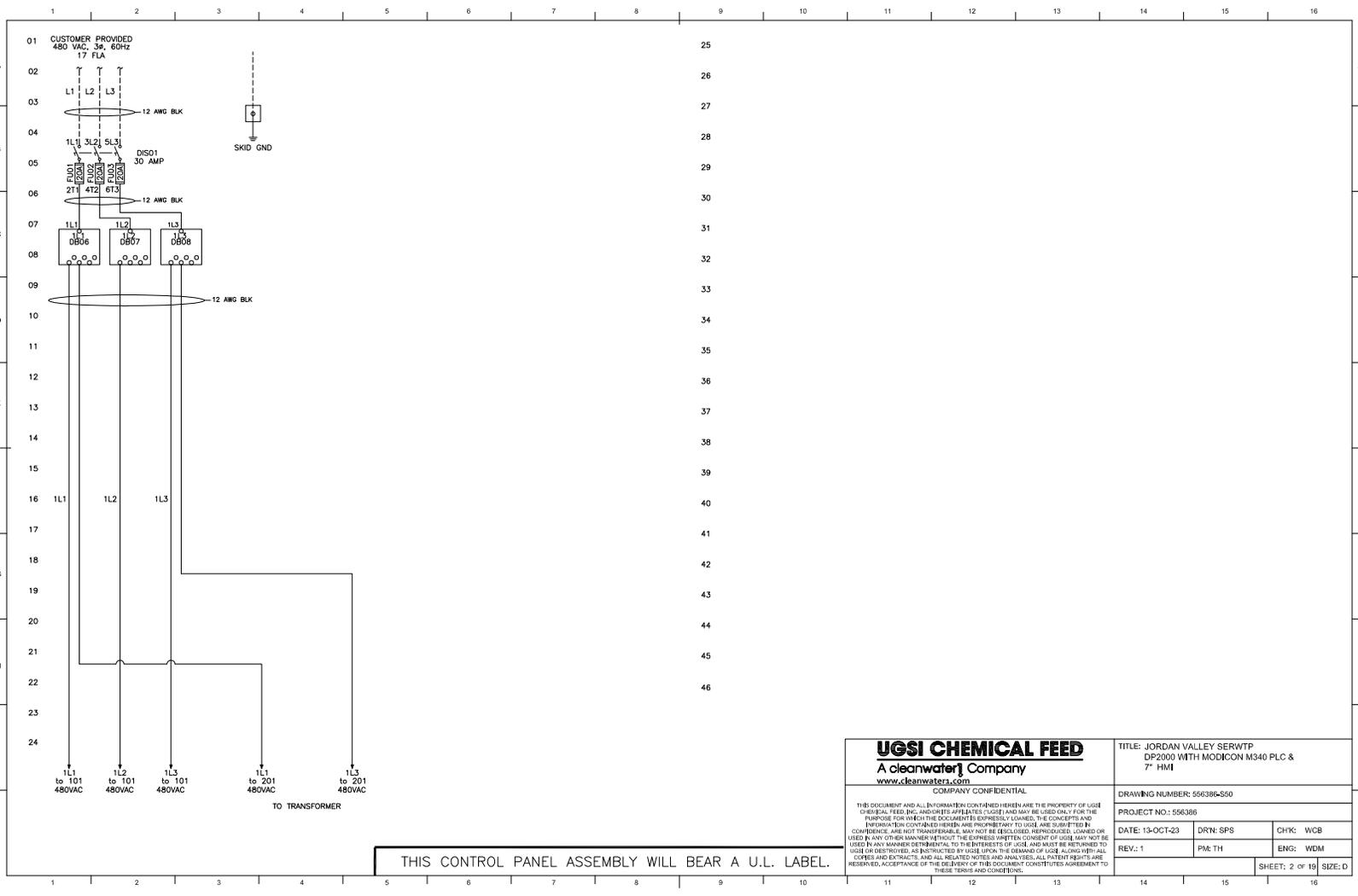
- UGSI INTERCONNECTION TERMINALS.
 - COMPONENT TERMINALS.
 - CUSTOMER CONNECTION TERMINALS.
 - JUNCTION BOX TERMINALS.
- DASHED LINES BETWEEN TERMINALS REPRESENT WIRING TO COMPONENTS NOT MOUNTED IN CONTROL PANEL.
- ALL POWER WIRING TO BE 12 AWG MINIMUM MTW 90°C, 800V UNLESS OTHERWISE NOTED. ALL CONTROL WIRING TO BE 14 MTW 90°C, 600V, UNLESS OTHERWISE NOTED.
- ALL INSTRUMENT WIRE INSULATION TO BE PVC, 90°C, 600V.
- CONDUIT: TYPICAL SKID WIRING TO USE 1/2" NONMETALLIC LIQUID TIGHT CONDUIT AND FITTINGS. MINIMUM RUN LENGTH OF CONDUIT 12". SUPPORT WITHIN 12" OF TERMINATION POINTS. MAX RUN LENGTH 36" (48" IF SUPPORTED/ CLAMPED).
- REFERENCE DRAWINGS:
P&ID: 556386PID1
MECHANICAL: 556386-SA1
- WIRE COLORS TO BE AS SHOWN IN TABLE. ALL NUMBERED AS SHOWN.

WIRE COLOR CODE	
AC POWER	BLACK
AC CONTROL	RED
AC NEUTRAL	WHITE
DC POSITIVE	BLUE
DC NEGATIVE	BLU/WH
DRY CONTACT	ORANGE
GROUND	GREEN
4-20mA +	BLACK
4-20mA -	WHITE

SHEET NUMBER	DRAWING TITLE	BY	REVISION DESCRIPTION	
			DATE	BY
1	Title Page and Legend Sheet	A	B	1
2	480 VAC Power	A	B	1
3	Motor Control	A	B	1
4	-	A	B	1
5	120 VAC Power	A	B	1
6	120 VAC Control Circuit	A	B	1
7	120 VAC Control Circuit	A	B	1
8	24 VDC Power	A	B	1
9	PLC Digital Inputs	A	B	1
10	PLC Digital Outputs	A	B	1
11	PLC Analog Inputs	A	B	1
12	-	A	B	1
13	-	A	B	1
14	Terminal Block Layout	A	B	1
15	Network Connections	A	B	1
16	Mechanical Layout with BOM Numbers	A	B	1
17	Bill of Materials	A	B	1
18	Legend Plates & Fuse Replacement	A	B	1
19	Junction Box for DD4#1 & DD4#2	A	B	1

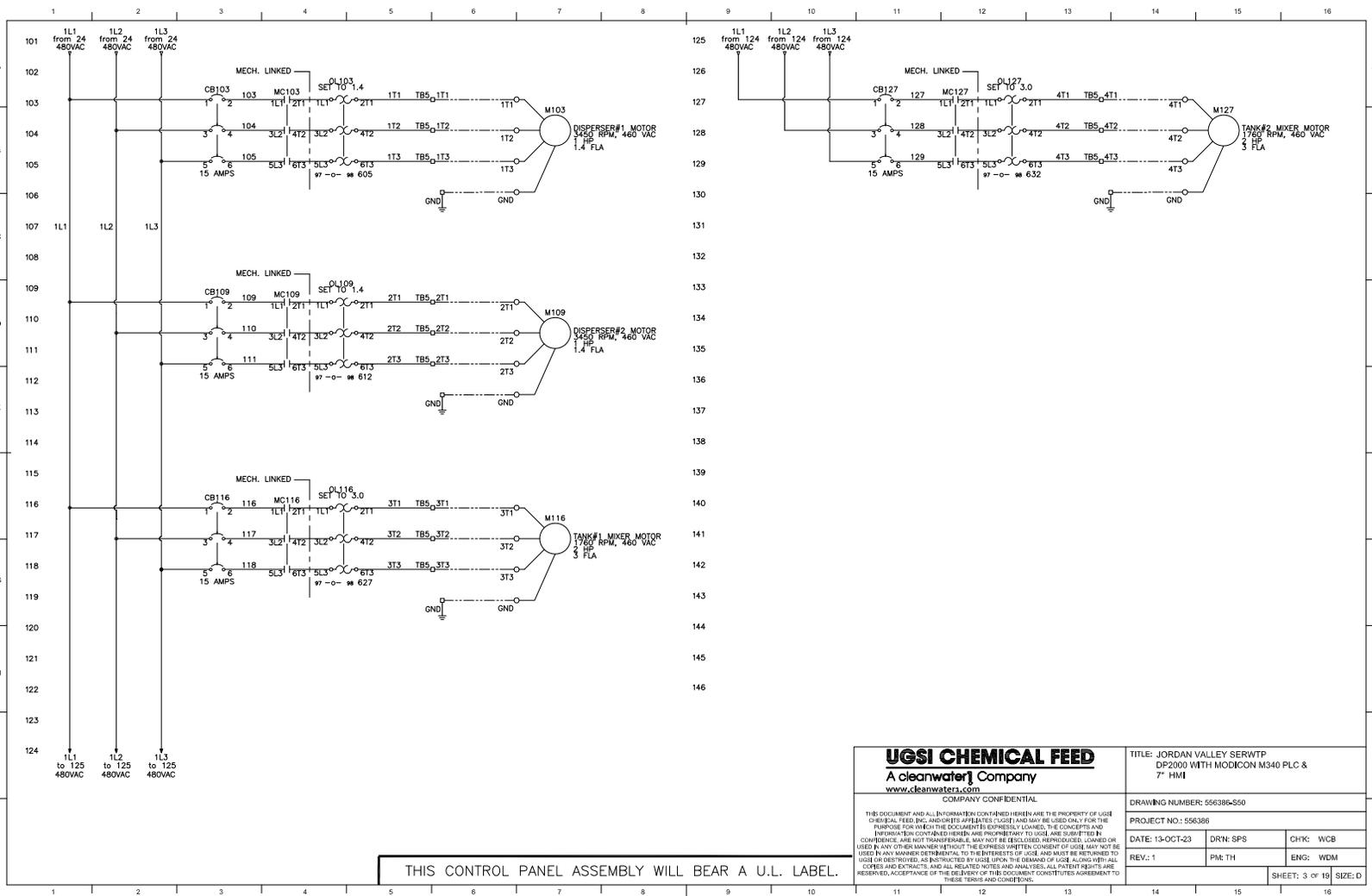
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	<p>DRAWING NUMBER: 556386-550</p> <p>PROJECT NO.: 556386</p> <p>DATE: 13-OCT-23 DRN: SPS CHYK: WCB REV.: 1 PM: TH ENG: WDM</p>

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			<p>SHEET: 2 of 19</p>	<p>SIZE: D</p>



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			<p>SHEET: 3 OF 19</p>
		<p>SIZE: D</p>	

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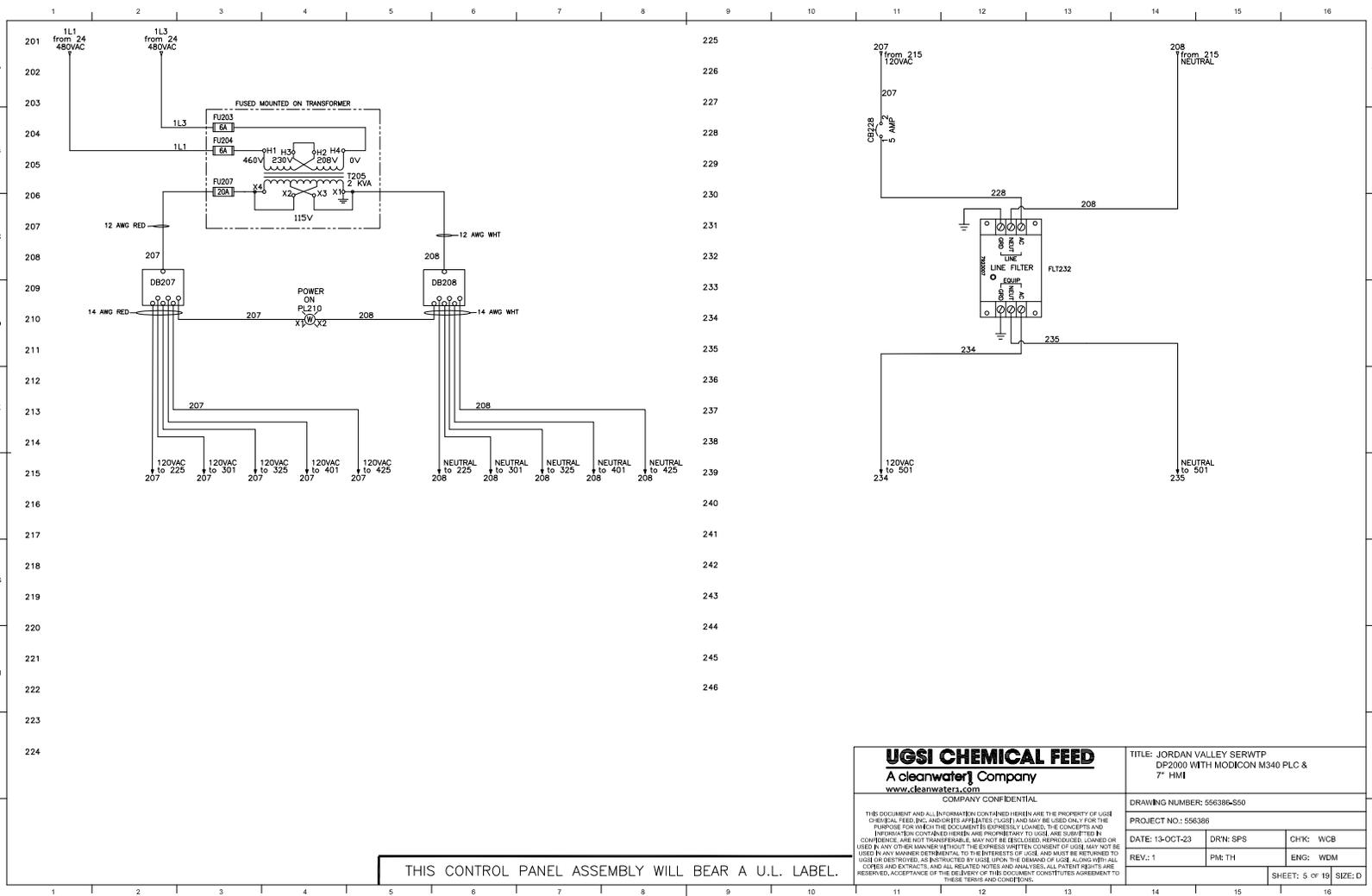
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PROJECT NO.: 556386

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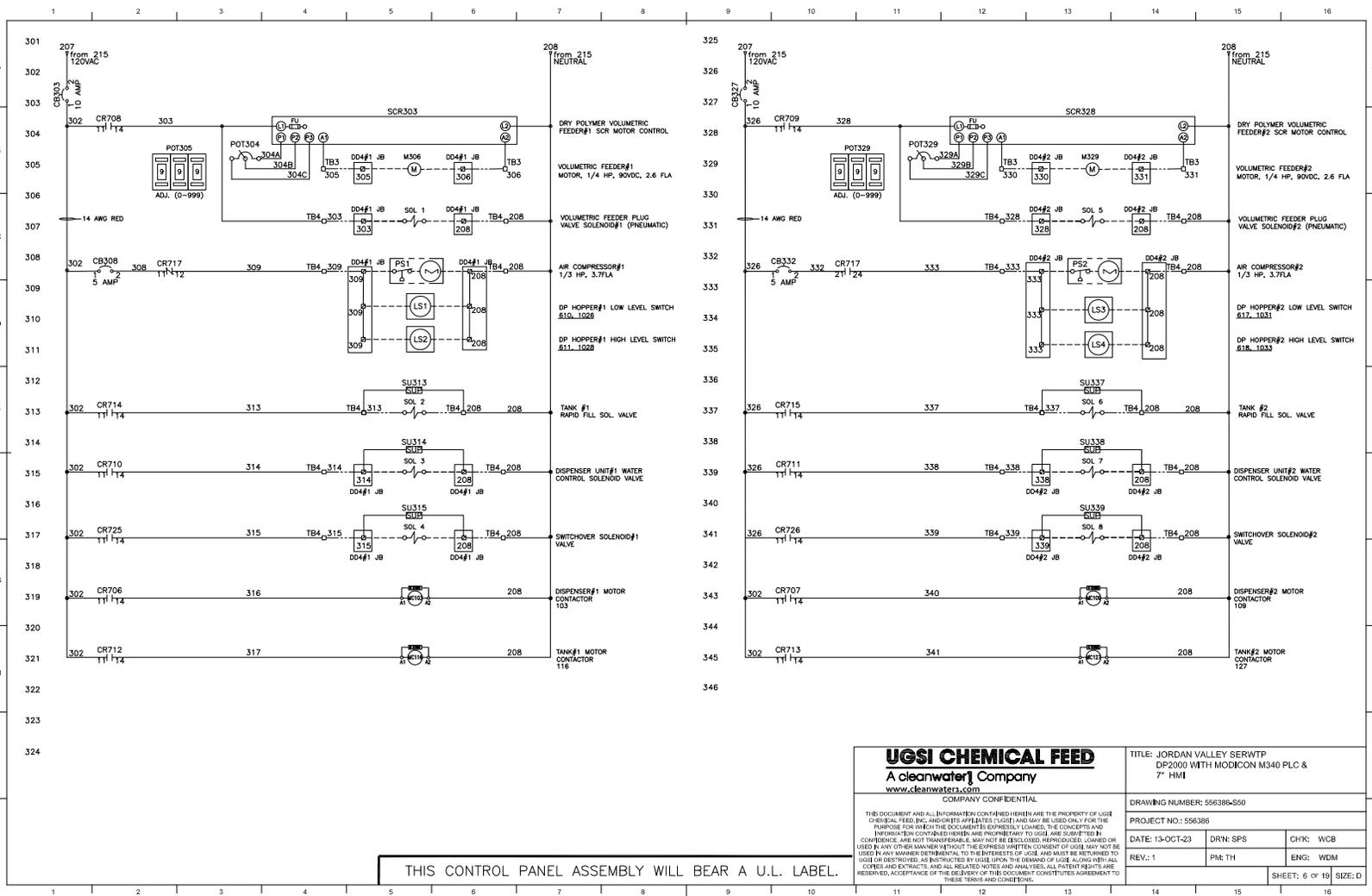
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SHEET: 4 of 19 SIZE: D



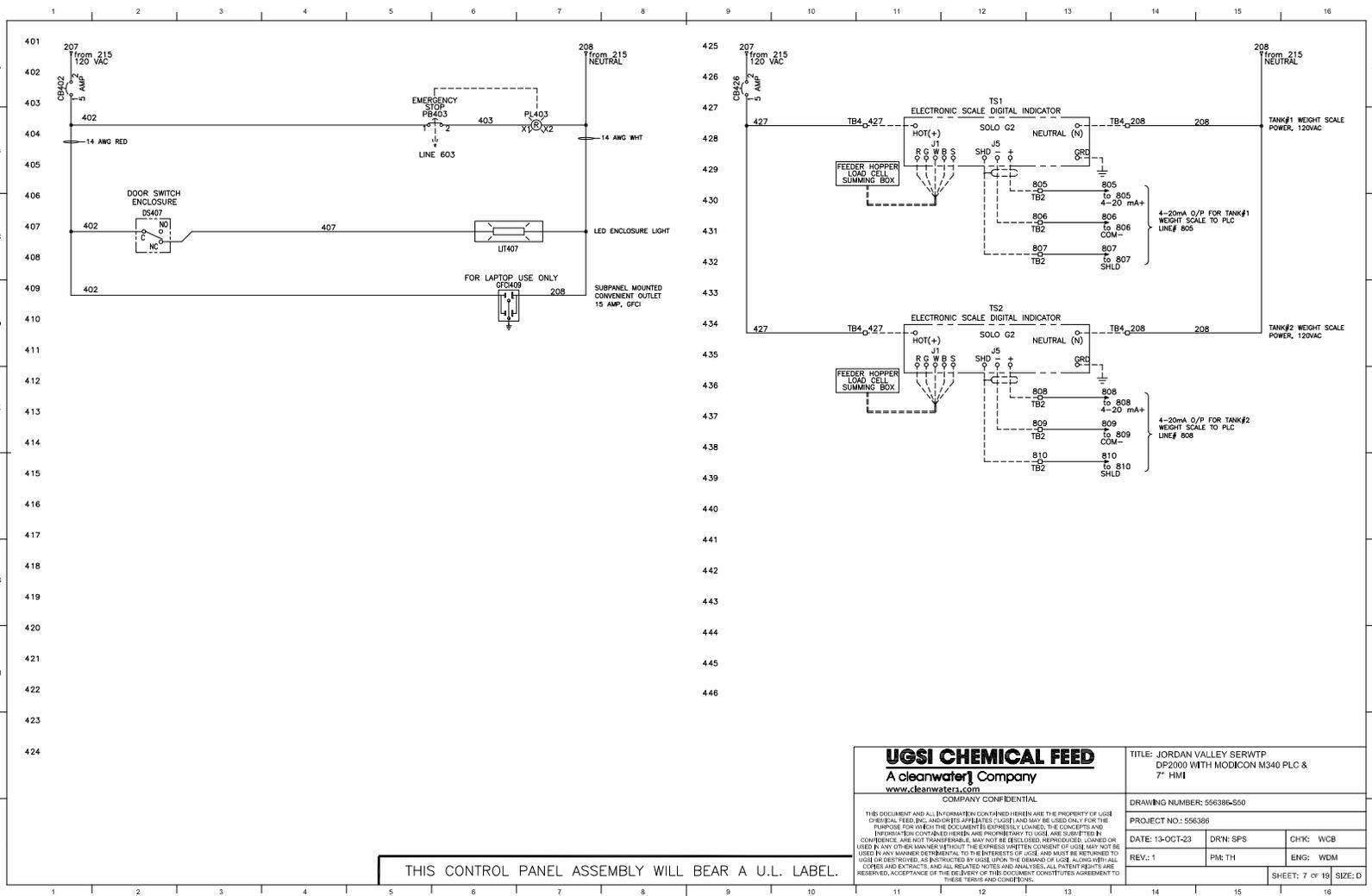
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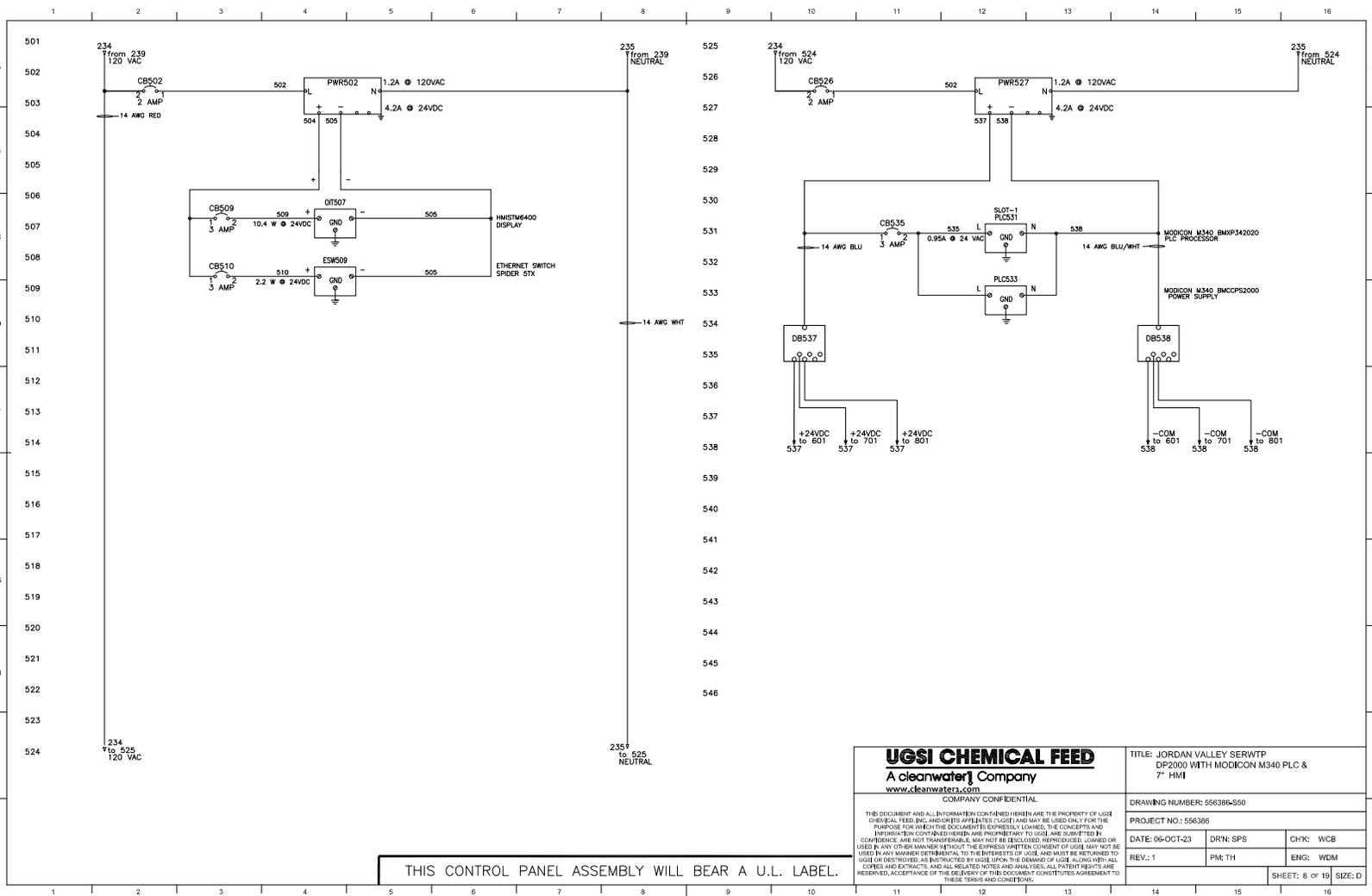
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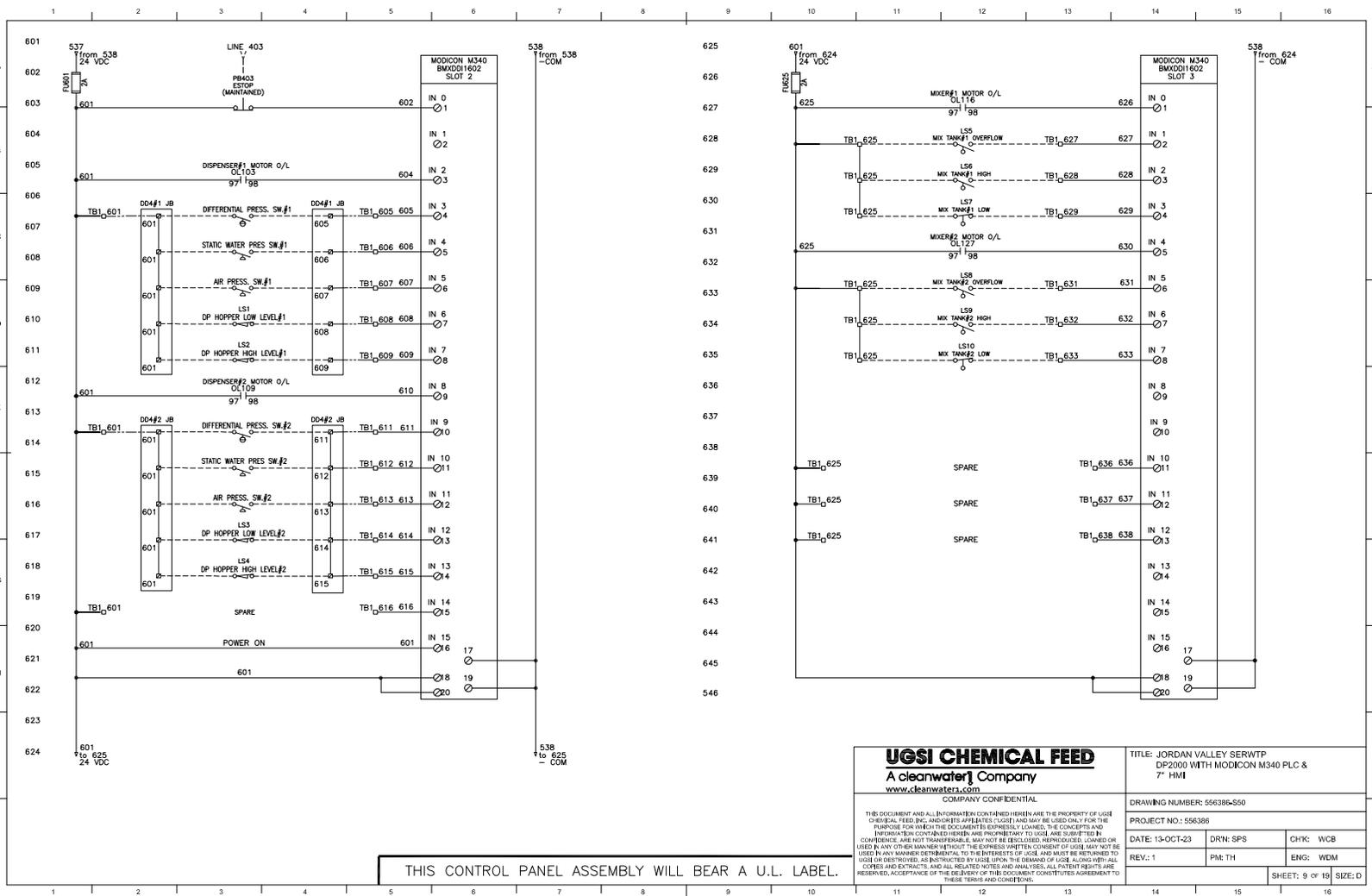
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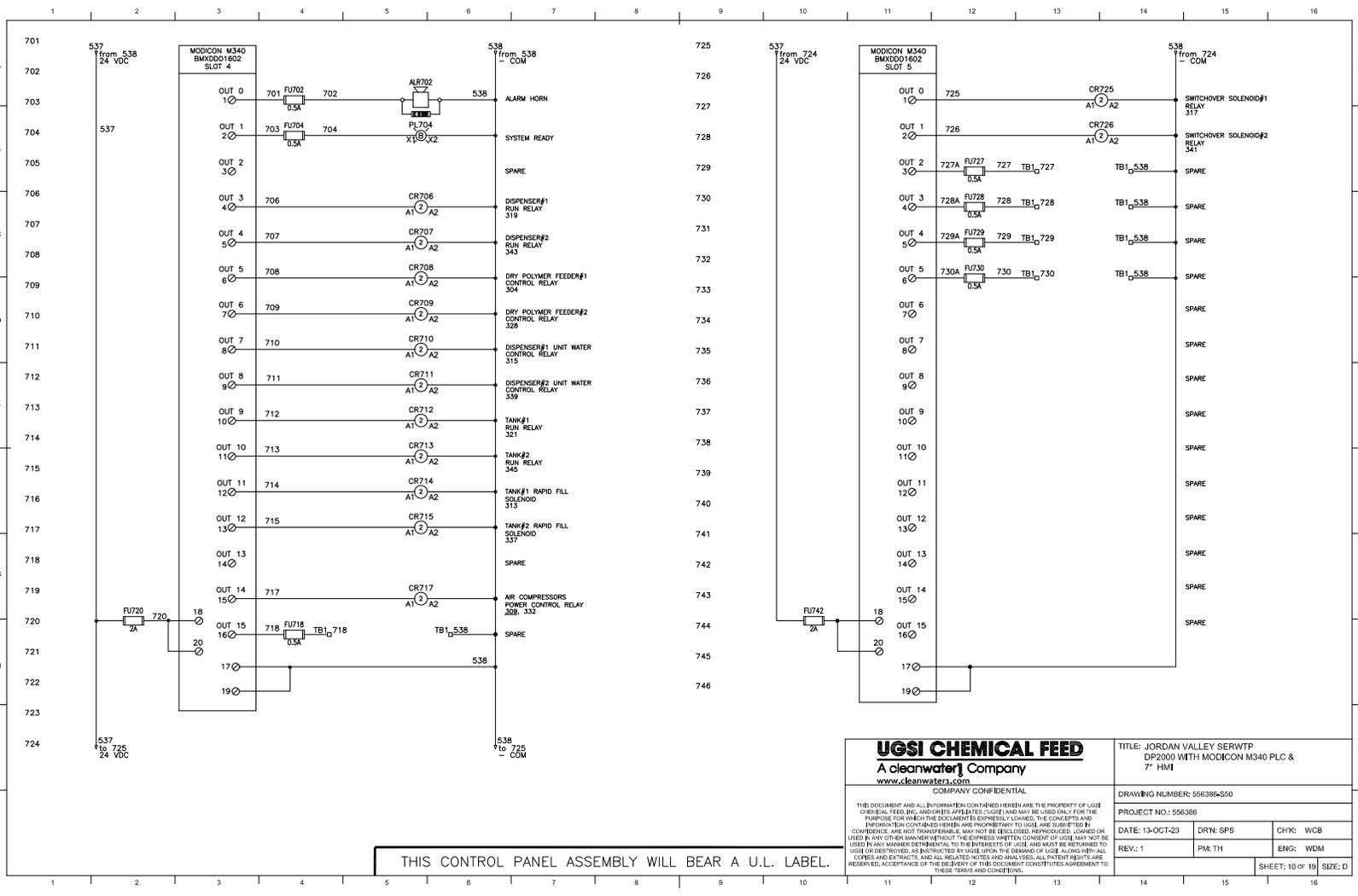
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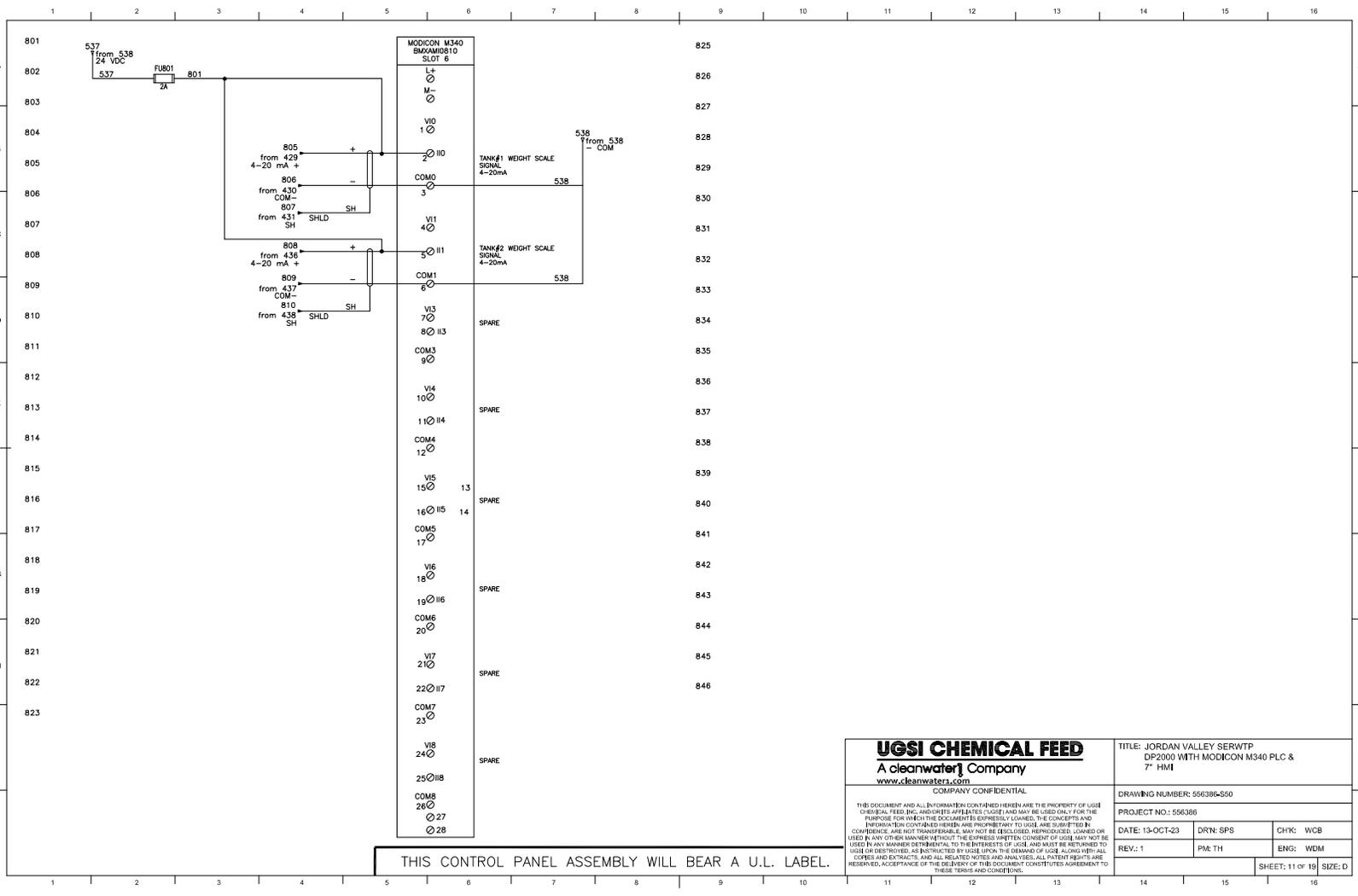


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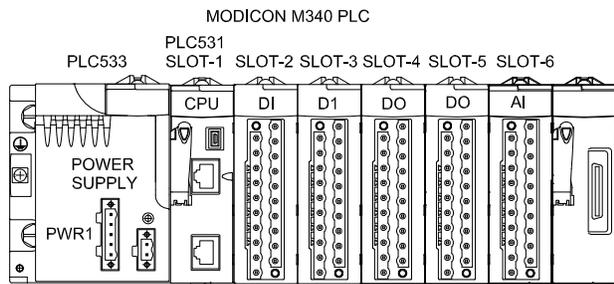
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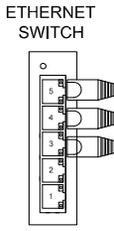
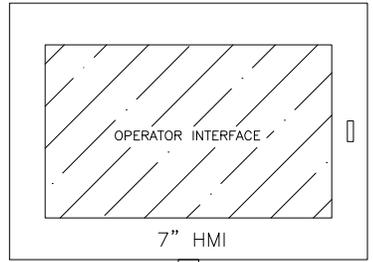
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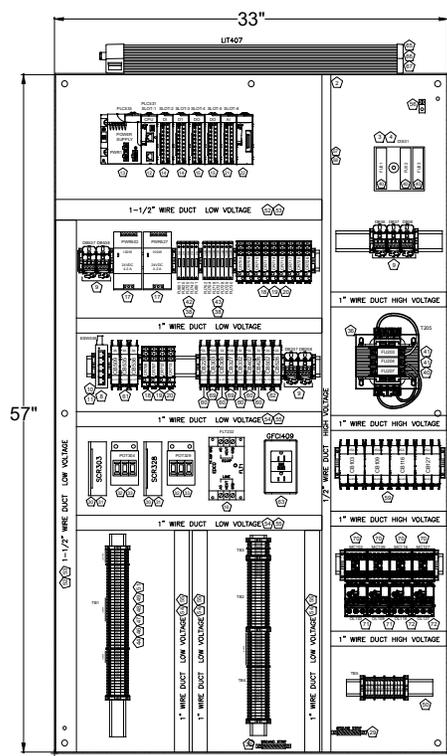
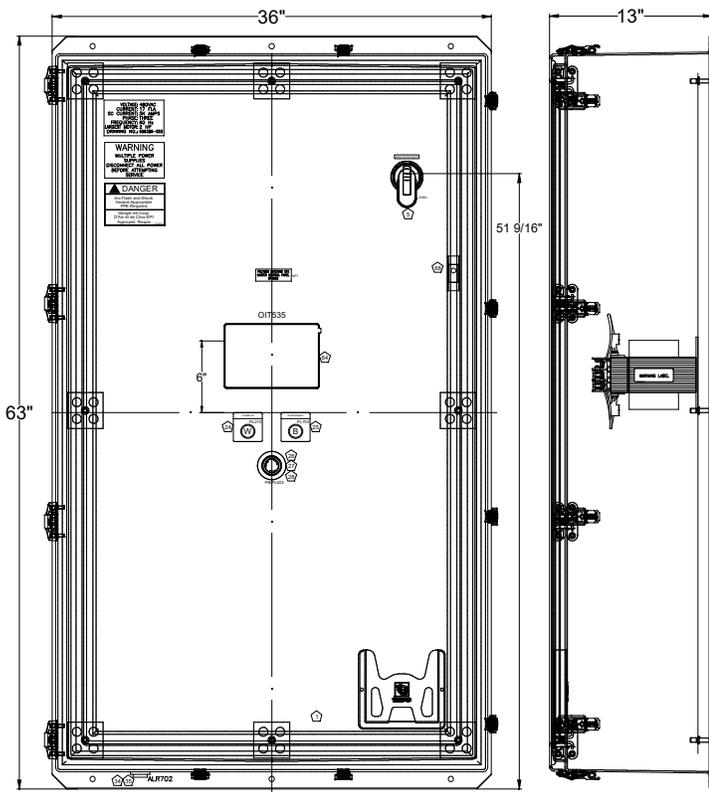
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LOCAL CONTROL PANEL
DD4



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			SHEET: 16 of 19 SIZE: D

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

UGSI Chemical Feed, Inc. Bill of Materials					
No.	Qty.	Description	Manufacturer	Model No.	UGSI P/N:
1	1	Hinge Cover Enclosure Quick-Release Type 4X, 60,25x36,31x12.00, Gray, Fiberglass	Hoffman	A60H3612GQRLP	
2	1	Panel Size: 57.00 x 33.00 In	Hoffman	A60P36	
3	1	Disconnect, Fused 30 AMP	ABB	OS30FACC12	
4	1	Disconnect, Shaft 6mm X 290mm	ABB	OXP6X290	
5	1	Disconnect, Handle	ABB	OHB80L6	
6	-	-	-	-	
7	-	-	-	-	
8	1	5 Port Ethernet Switch	Hirschmann	Spider 5TX	
9	7	Distribution Block	ERICO	569010	
10	1	1 Ft. Ethernet Cable	Panduit	NK5EPC1Y	
11	1	7 Ft. Ethernet Cable	Panduit	NK5EPC7Y	
12	1	PLC Processor - Modicon M340	Schneider	**BMXP342020 (SEE NOTE#1)	5880138
13	1	PLC Power Supply	Schneider	**BMXCPS2000 (SEE NOTE#1)	6922012
14	2	PLC 16-Point, 24VDC, Digital Input Module	Schneider	**BMXDDI1602 (SEE NOTE#1)	5880120
15	2	PLC 16-Point, 24VDC Digital Transistor Output Module	Schneider	**BMXDDO1602 (SEE NOTE#1)	5880121
16	1	Power Filter, 120 VAC	EATON	STCHSP12BT-1RU	
17	2	Power Supply 24VDC 4.2A 100W	SOLA	SDP4-24-100RT	
18	13	Relay, Isolation, 2PDT, 24 VDC, 8A	Allen Bradley	700-HP32Z24	
19	13	Relay, Base, 4Pole, Din Rail	Allen Bradley	700-HN123	
20	13	Relay, Surge Suppressor Module	Allen Bradley	700-ADR	
21	1	PLC 6-Point, Analog Input Module	Schneider	**BMXAMI0610 (SEE NOTE#1)	5880123
22	1	PLC Rack Backplane 6 Slot	Schneider	**BMXXBP0600 (SEE NOTE#1)	556386-S53
23	-	-	-	-	
24	1	White Pilot Light with LED	Allen Bradley	800H-QRH2W	
25	1	Blue Pilot Light with LED	Allen Bradley	800H-QRH2B	
26	1	Illuminate E-Stop Push Button with LED	Allen Bradley	800H-FRXTQH2RA1	
27	1	Emergency Stop Label	Eaton	10250TRP79	
28	1	Emergency Stop Auxiliary Contact Block with (1) NO and (1) NC Contact	Allen Bradley	800T-XA	
29	2	Grounding Bar with Screws	ILSCO	N-174/E-153	
30	2	Silicon Controlled Rectifier	Baldor	BC141	
31	2	Fuse Kit (4Amp) Plug in HP Resistor (.05) 1/4HP	Baldor	BR0050	
32	2	Potentiometer w/ Precision Push Button	Bourns	70153760	
33	2	Mounting Bracket for Potentiometer	UGSI	1692015	
34	1	Enclosure Mounted Alarm Horn, 12-48VDC	Mallory-Sonalert	SC648NDR	
35	1	Type 4X Gasket for Alarm Horn	Mallory-Sonalert	ACC03	
36	1	Control Transformer 2KVA	Square D	9070TF2000D1	
37	-	-	-	-	
38	12	300V Glass Fuse Holder	Phoenix	3004171	
39	-	-	-	-	

****NOTE#1 : THESE PARTS ARE SUPPLIED BY UGSI**

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UGSI Chemical Feed, Inc. Bill of Materials (Continued)					
No.	Qty.	Description	Manufacturer	Model No.	UGSI P/N:
40	4	20Amp 600V Class CC Time Delay Fuse	Mersen	ATQR-20	
41	2	6Amp 600V Class CC Time Delay Fuse	Mersen	ATQR-6	
42	5	2Amp Glass Fuse	Bussman	MDL-2	
43	7	1/2Amp Glass Fuse	Bussman	MDL-1/2	
44	120	Gray Terminal Block	Phoenix	3004362	
45	-	-	-	-	
46	12	Terminal End Barrier	Phoenix	3003020	
47	3	10 Position Fixed Bridge Jumper w/ Screws	Phoenix	0203250	
48	240	Terminal Blank Marking Strip	Phoenix	1051003	
49	28	Terminal End Anchors	Phoenix	0800886	
50	2	DIN RAIL, Angle Mounting Brackets	Phoenix	1201099	
51	2	1 Meter DIN RAIL	Phoenix	0801733	
52	1	1-1/2" x 3" Panduit 6 Ft. Length	Panduit	F1.5X3LG6	
53	1	1-1/2" Panduit Cover	Panduit	C1.5LG6	
54	2	1" x 3" Panduit 6 Ft. Length	Panduit	F1X3LG6	
55	2	1" Panduit Cover	Panduit	C1.1G6	
56	1	#2 CUJAL Aluminum Ground Lug	Burdry	KA2U	
57	1	1/2" x 3" Panduit 6 Ft. Length	Panduit	F0.5X3LG6	
58	1	1/2" Panduit Cover	Panduit	C0.5LG6	
59	4	Circuit Breaker, 480 VAC, 3 Pole, UL489, 15A	Allen Bradley	1489-M3C150	
60	5	Circuit Breaker, 250VAC/VDC, 1 Pole, UL1077, 5A	Allen Bradley	1489-M1C050	
61	3	Circuit Breaker, 250VAC/VDC, 1 Pole, UL1077, 3A	Allen Bradley	1489-M1C030	
62	2	Circuit Breaker, 250VAC/VDC, 1 Pole, UL1077, 2A	Allen Bradley	1489-M1C020	
63	1	GFCI Duplex 115Volt Receptacle	GFI	GFRST15I	
64	1	HMI, Harmony ST6, 7inch wide display, 1COM, 2Ethernet, USB host&device, 24V DC	Schneider/Modicon	**HMISTM6400 (SEE NOTE#1)	556386-S54
65	1	18" Fluorescent Panel Light	Hoffman	CEL550	
66	1	-	-	-	
67	1	Fluorescent Panel Light Power Cable	Hoffman	CELC3001PBUL	
68	1	Fluorescent Panel Light Door Switch	Hoffman	ALFSWD	
69	2	Circuit Breaker, 250VAC/VDC, 1 Pole, UL1077, 10A	Allen Bradley	1489-M1C100	
70	4	Motor Contactor, 480V, 3PH, 120VAC Coil, 9 A	ABB	A9-30-10RT 110-120V	
71	2	Motor Overload, 480V, 3PH, 1.3 - 1.8 A	ABB	TA25DU1.8	
72	2	Motor Overload, 480V, 3PH, 2.8 - 4.0 A	ABB	TA25DU4.0	
73	-	-	-	-	

UGSI CHEMICAL FEED

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TITLE: JORDAN VALLEY SERWTP
DP2000 WITH MODICON M340 PLC &
7" HMI

DRAWING NUMBER: 556386-S50

PROJECT NO.: 556386

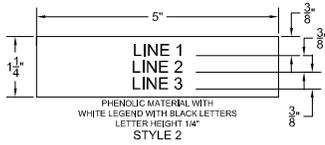
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REV.: 1 PM: TH ENG: WDM

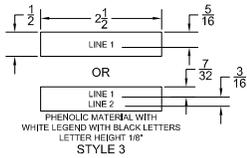
SHEET: 17 OF 19 SIZE: D

MASTER NAMEPLATES			
LOCATION	INSCRIPTION	STYLE	QTY
NP1	POLYMER BATCHING SYS MASTER CONTROL PANEL DP2000	STYLE 2	1

ALL MASTER NAMEPLATES TO BE PHENOLIC MATERIAL WITH WHITE BACKGROUND AND BLACK LETTERING, LETTER HEIGHT 1/4" HIGH



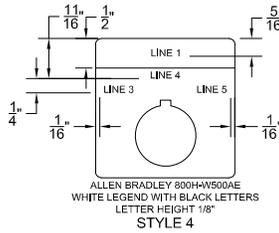
PHENOLIC MATERIAL WITH WHITE LEGEND WITH BLACK LETTERS
LETTER HEIGHT 1/4"
STYLE 2



PHENOLIC MATERIAL WITH WHITE LEGEND WITH BLACK LETTERS
LETTER HEIGHT 1/8"
STYLE 3

LEGEND/NAMEPLATES		
LOCATION	INSCRIPTION	STYLE
	LINE 1 LINE 2 LINE 3 LINE 4 LINE 5	
DIS01	MAIN DISCONNECT	STYLE 3
PL210	POWER ON	STYLE 4
PL704	SYSTEM READY	STYLE 4
PB1/PL403	EMERGENCY STOP	

FUSE REPLACEMENT CHART			
COMP.	AMPS	TYPE	DESCRIPTION
FU01, FU02, FU03	20	CC	Power Input Protection
FU203, FU204	6	CC	Transformer Primary Protection
FU207	20	CC	Transformer Secondary Protection
FU601, FU625, FU720, FU742	2	MDL	PLC 24VDC IO Power Protection
FU702, FU704, FU718, FU727, FU728, FU729, FU730	1/2	MDL	PLC Output Circuit Protection



ALLEN BRADLEY 800H-W500AE
WHITE LEGEND WITH BLACK LETTERS
LETTER HEIGHT 1/8"
STYLE 4

VOLTAGE: 480VAC
CURRENT: 17 FLA
SC CURRENT: 5K AMPS
PHASE: THREE
FREQUENCY: 60 Hz
LARGEST MOTOR: 2 HP
DRAWING NO.: 556386-S50

WARNING
MULTIPLE POWER SUPPLIES
DISCONNECT ALL POWER BEFORE SERVICING

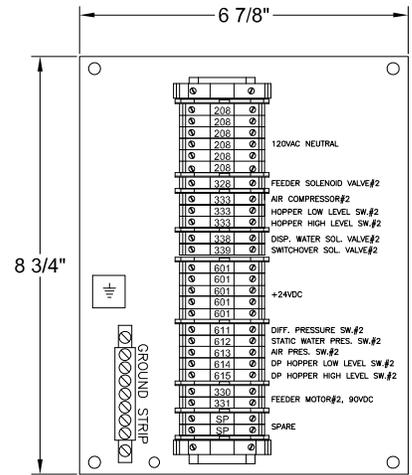
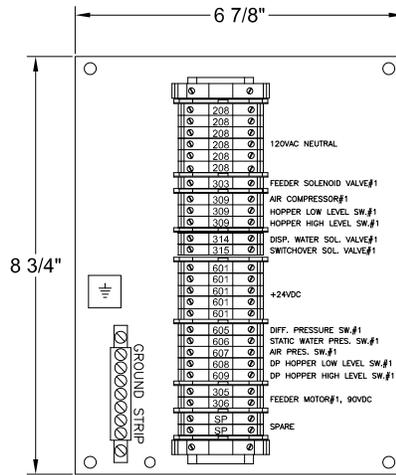
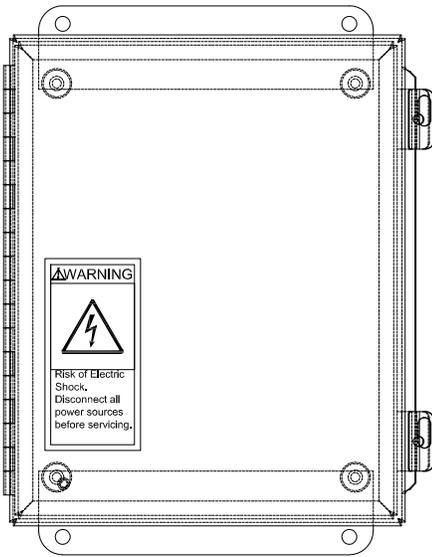
NOTE: NAMEPLATE STYLES 2 & 3 ARE TO BE AFFIXED TO ENCLOSURE USING DOUBLE SIDED TAPE.

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	<p>DRAWING NUMBER: 556386-S50</p> <p>PROJECT NO.: 556386</p>
<p>DATE: 13-OCT-23</p> <p>REV.: 1</p>	<p>DRN: SPS</p> <p>PM: TH</p>
<p>CHK: WCB</p> <p>ENG: WDM</p>	<p>SHEET: 18 OF 19</p> <p>SIZE: D</p>

DD4 #1

DD4 #2



NOTE: STANDARD JUNCTION BOX, MECHANICAL REFERENCE : 556386-SA1

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	<p>DRAWING NUMBER: 556386-550</p>	
<p>DATE: 13-OCT-23</p>	<p>DRN: SPS</p>	<p>CHK: WCB</p>
<p>REV.: 1</p>	<p>PM: TH</p>	<p>ENG: WDM</p>
<p>SHEET: 19 OF 19</p>		<p>SIZE: D</p>

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