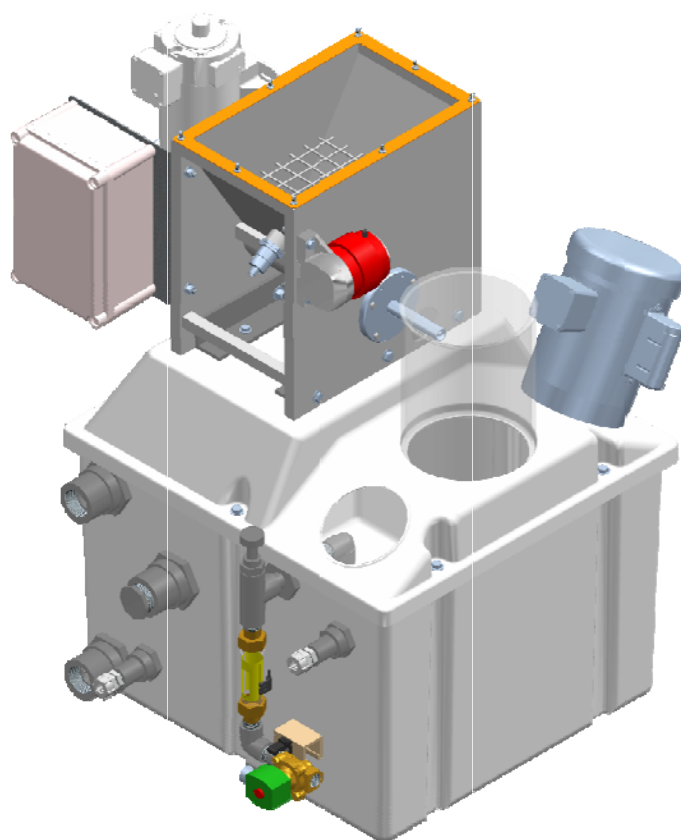


Operating Instructions ProMinent® ProMdry™ Batch Dry Chemical Feed Systems



Please completely read through these operating instructions first! Do not discard! The warranty may be voided due to damage caused by operating errors!

Ver.09_21_2016

ProMinent Fluid Controls, Inc. (USA), 136 Industry Drive, Pittsburgh, PA 15275

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The system is designed to mix batches of dry chemicals and water prior to feeding the mixed solution or slurry to the process. The volumetric feeder is preset to dispense the correct amount of dry chemical into the mix tank, while the water flow is set to allow proper fill time. The system will batch automatically, low tank level will start the system and high tank level will stop the system. The mixed solution or slurry is typically pumped to the process. The ProMdry's mixed output will be referred to as solution or product in this manual.

ADD DRY CHEMICAL

OVERFLOW TO DRAIN

USE THIS PORT IF USING GRAVITY TO FLOW TO THE PROCESS

TO PROCESS

VENTURI (SHOWN) OR CONTINUOUS FLOW PUMP

WATER IN

System Components

Figure 2

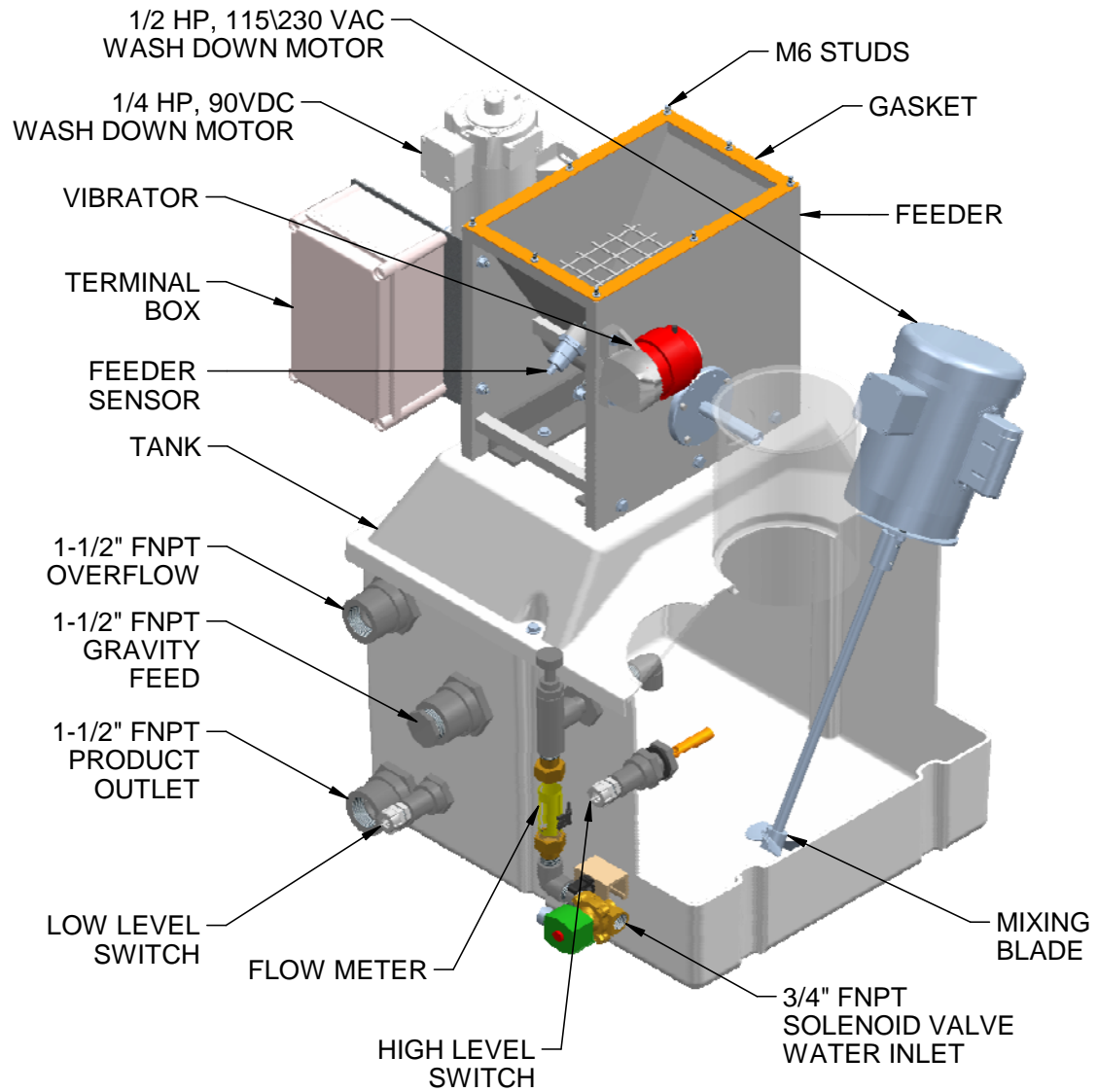
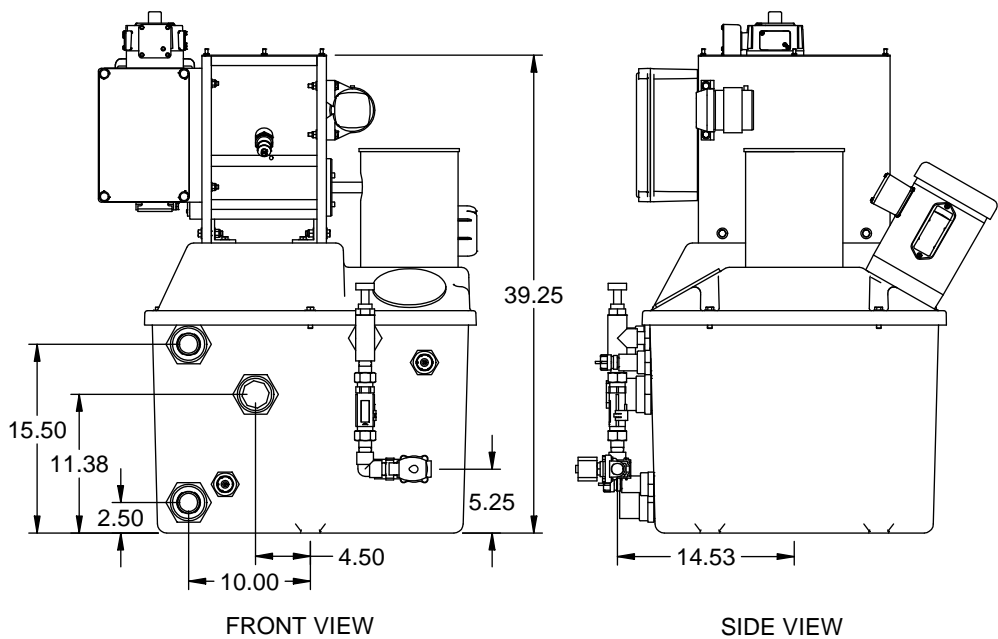
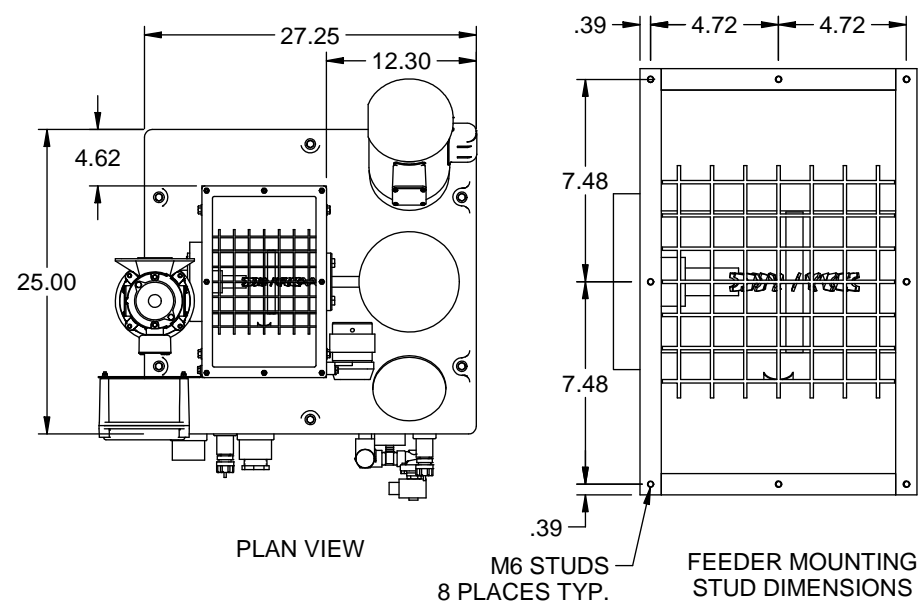


Figure 3



Batch ProMdry Layout without Hopper

Installation

Unpacking

- Inspect the packaging of your ProMdry for any damage in shipment, and report it to the shipping company immediately, as shipping damage is not warranted by ProMinent. Open the shipping container and inspect your ProMdry for damage caused by rough handling, and report any damage immediately to the shipping company.
- Check your goods against the packing list and purchase order to be sure you have received your entire order. If there is anything missing, contact your ProMinent distributor.

Location

- The ProMdry should be placed in a dry location that is protected from the elements and is close to the pump to be used to feed the solution to the process. Be sure there is ample space around the ProMdry for access to maintain and repair the unit during its life.
- Be sure there is ample access to load the dry chemical into the hopper, and there is a drain nearby for routine maintenance and wash down of spilled chemical in the area.

Electrical Installation

IMPORTANT

- ***Observe all local state and national electrical codes when installing your ProMdry.***
- ***The electrical installation of the system should only be performed by qualified electricians.***
- The ProMdry is electrically connected according to the enclosed electrical diagram (see Appendix for drawing). Make sure that the ProMdry is grounded per all applicable electrical codes to prevent electrical shock.

NOTE: *If electrical drawings were provided with your ProMdry, they supersede the drawings in this manual.*

Water Installation

- Any suspended solids or particulates in supply water can clog or damage the solenoid, fill valve or flow meter. Connect only clean incoming water supply to $\frac{3}{4}$ " FNPT solenoid water inlet connector (see Figure 2).
- Installing a pressure regulator directly upstream of the inlet solenoid valve is recommended to avoid over pressure problems or damage, and to produce a more consistent solution mixture. Set pressure regulator between 30-60 psi
- The clean water supply and piping should be selected so that the water pressures do not fall below 30 psig, the operating pressure range is 30-80 psi.

Discharge Connection (Mixed Solution Outlet)

- The 1 $\frac{1}{2}$ " FNPT "PRODUCT OUTLET" fitting should be connected to the inlet of the pump being used to feed the mixed solution to your process. (See Figure 2)
- The unit comes with Drain assembly; see the appendix for different recommended installation arrangements.

Description of System Control

Selector Switch Operation

SYSTEM Selector Switch

ON: The system will operate, if all other selector switches are in the AUTO mode. System will start a batch at low level and stop batch sequence at high level.

REMOTE: The system will operate when a remote switch/contact is closed, if all other selector switches are in the AUTO mode. System will start a batch at low level and stop the batch sequence at high level.

FEEDER SPEED CONTROL

LOCAL: A local Digital potentiometer controls the speed of the dry chemical feeder.

REMOTE: User provided 4-20mA signal to control the speed of the dry chemical feeder.

WATER Selector Switch

ON: The water valve will open and fill the mixing tank. This could be used during startup or troubleshooting for water valve check, pre-filling or flushing the chamber during routine maintenance.

CAUTION: *In this mode the water valve is not interlocked with high level switch. Use caution to avoid overflowing.*

AUTO: The water valve will open automatically when the System starts a batch.

FEEDER Selector Switch:

ON: The dry chemical feeder will start instantly; this mode will be used during startup/commissioning for dry feeder calibration, or other testing of the feeder.

CAUTION: Dry feeder won't turn off in the ON mode! The user will need to select OFF or AUTO mode, to return to normal operation.

AUTO: The dry chemical feeder will start automatically when the System turns on and will operate as long as the water flow switch detects flow.

MIXER Selector Switch

ON: The Mixer motor will start instantly. This could be used to manually mix the solution or verify the operation and direction of the mixer motor during startup.

CAUTION: Mixer won't turn off automatically! The user will need to turn the switch to the OFF position manually, or to AUTO for normal operation.

AUTO: The Mixer motor will start automatically when the system starts a batch. It will turn off at the end of the batching cycle, once the mixing timer times out. The Mixer motor will start when high level is achieved, and will continue to mix for the preset time.

VIBRATOR Selector Switch (optional)

ON: Vibrator will run instantly and it is used to keep the dry chemical, especially powders from sticking to the sides of the hopper. Do not operate vibrator for extended periods without the feeder operating. This will compact the material and increase the chance of material bridging.

CAUTION: Vibrator won't turn off in ON mode! The user will need to select the OFF mode manually, or switch VIBRATOR to AUTO mode for normal operation

AUTO: Vibrator is interlocked with feeder and a cycling timer will turn the vibrator ON and OFF based on programmed times.

HOPPER LOW Indicator (Optional)

The ProMdry can be equipped with a proximity switch to activate an indicator light to alert for low chemical in hopper.

Note: this is for information only, and will not affect the operation of the system.

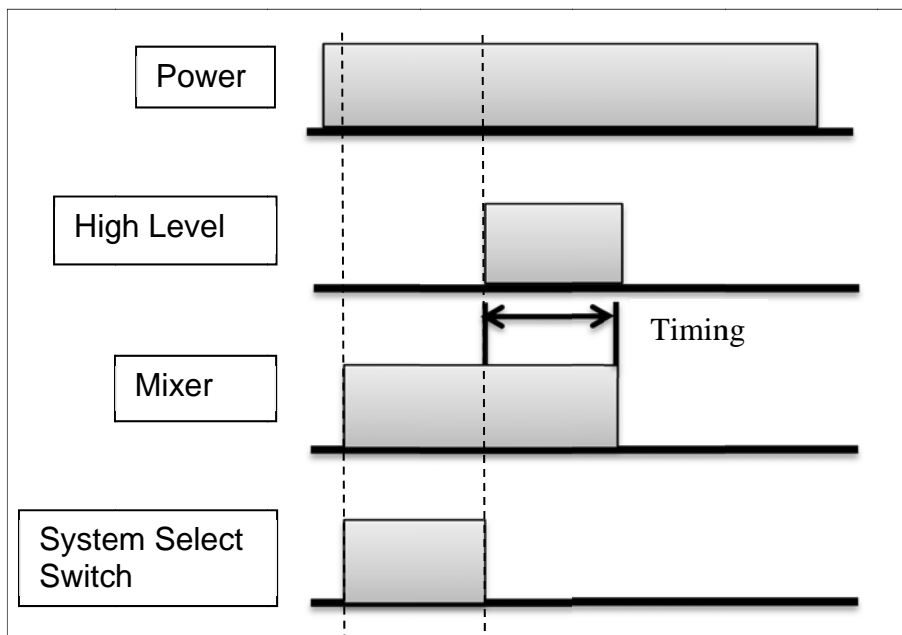
ALARM

The unit will go into alarm whenever it detects low water flow while batching.

The alarm can be reset by pressing "ALARM RESET" push button to acknowledge the alarm after the cause has been corrected. If the low flow is not corrected the alarm will recur.

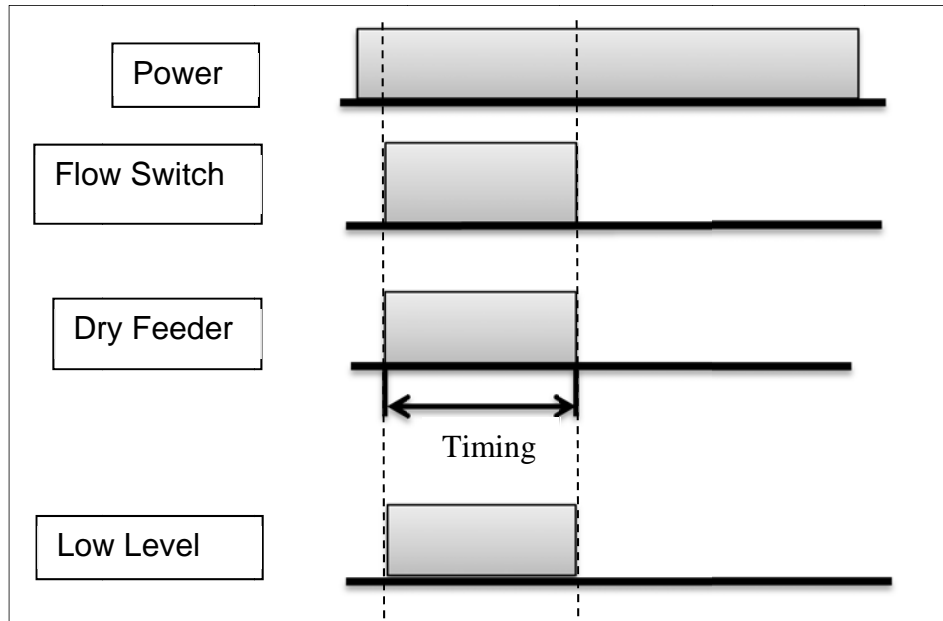
MIXER TIMER (Digital)

Timer is set to “Signal OFF delay”. Tank mixer will start at low level when the system starts and operate the entire time the tank is filling. At high level, the mixer motor will remain on, the mixer timer will start, and the mixer will continue to run for the preset time to continue mixing the solution.



Feeder TIMER (Digital)

Timer is set to “Cumulative”. The feeder will start automatically when the System starts at low level. The feeder will operate for the preset time. This allows precise control of the batch concentration by controlling the feeder speed and the feed time. The feeder is interlocked with the water flow switch, and it will operate only while the flow switch detects minimum flow.



Volumetric Dry Feeder Calibration

This dry feeder dispenses material based on volume. Calibrating the feeder allows a calibration curve to be generated based on actual weight of the chemical being dispensed. This will communicate more accurate and meaningful information. A timed sample will be taken at four feeder speeds and weighed. These weights will be used to generate a graph to be used for making future adjustments to the feed rate.

Calibration is to be performed during the initial start-up or if the feed chemical is changed.

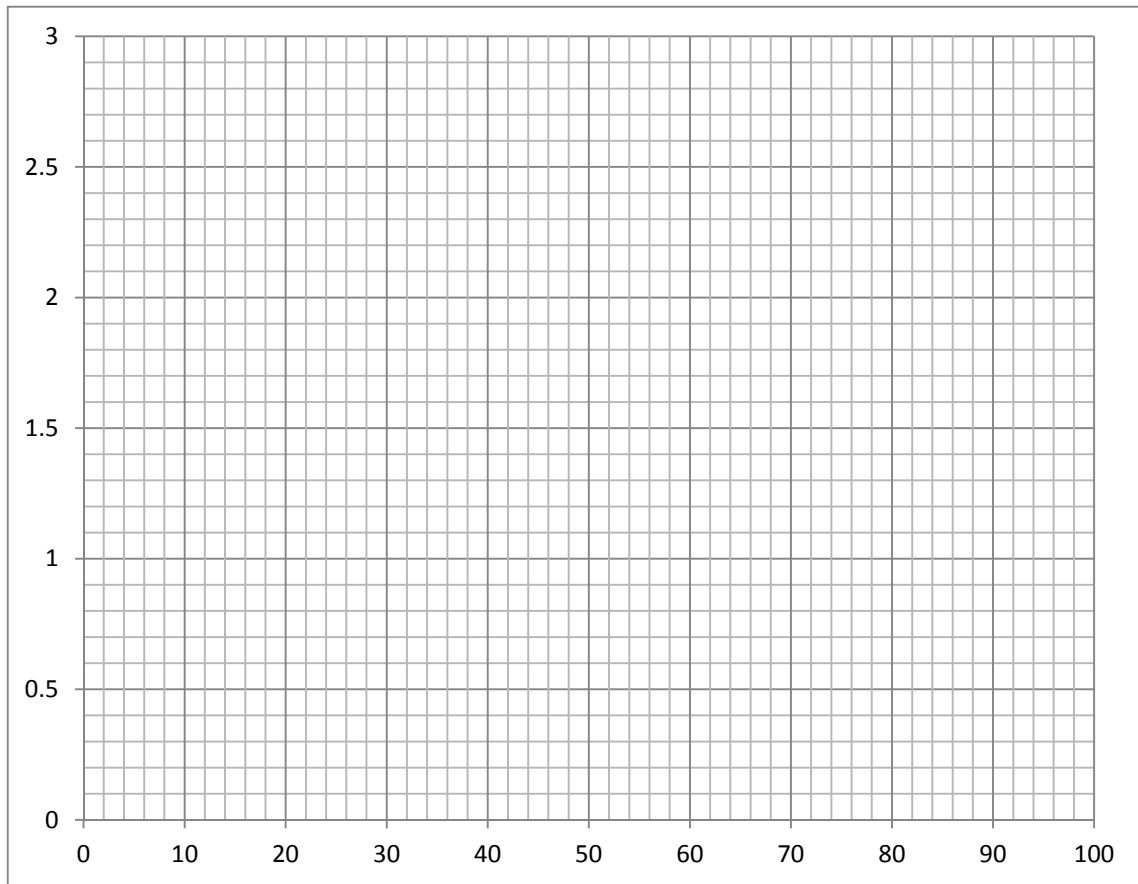
The following procedure is recommended:

CAUTION!

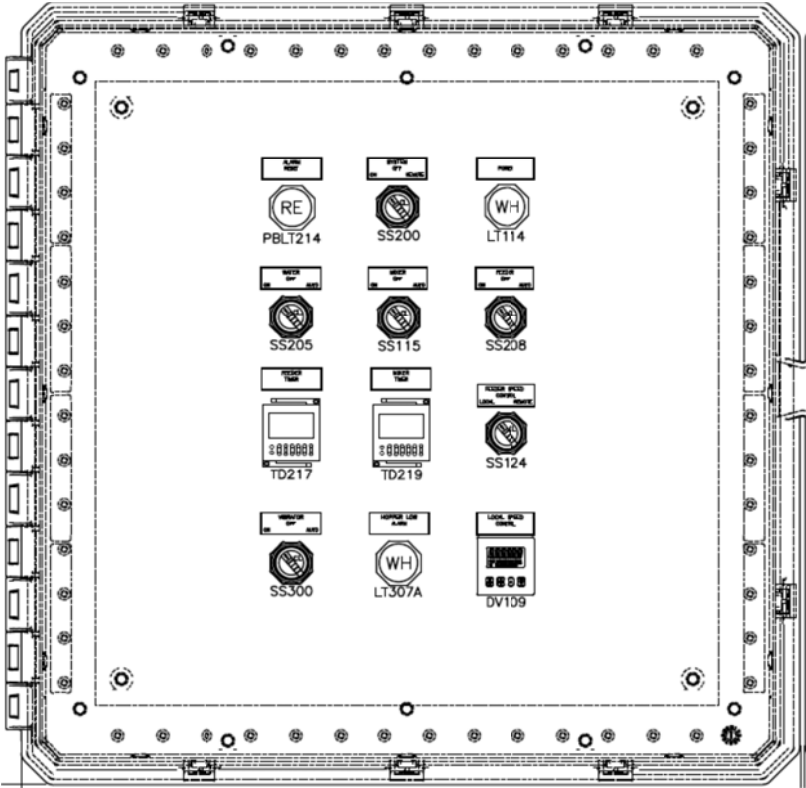
Any chemical spilled on the floor may cause a safety hazard and should be cleaned up immediately.

- 1- Identify a properly sized container to catch the timed sample. Tare out the containers weight on the scale prior to taking samples.
- 2- Place the container underneath the feeder screw discharge. You will need to remove the clear chamber from the feeder discharge.
- 3- Verify the dry feeder has proper level of dry material.
- 4- Operate feeder for about 10 seconds or until steady discharge appears before beginning calibration. This will insure the feed screw and discharge pipe are full when beginning.
- 5- Empty and replace the sample container.
- 6- Set the local speed to 25%
- 7- Note the time to the second, Set the Feeder speed control to "Local" and Feeder selector switch to "ON"
- 8- After 1 minute set the Feeder selector switch to "OFF"
- 9- Record the net weight of the dry product delivered during this period and enter it onto the graph
- 10- Repeat the procedure for 50%, 75% and 100% Feeder speed
- 11- Draw a line through the four points and then any feed rate setting can be determined by utilizing the graph on the following page.

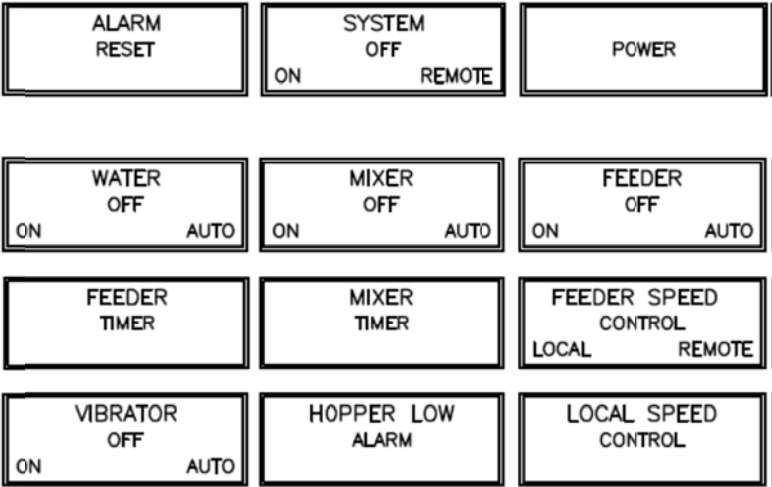
Volumetric Dry Feeder Calibration



Panel Layout



General Controls Layout



Control Label Markings Expanded View

Commissioning/Start Up/Operation

The ProMdry chemical feed system is designed to make batches of mixed solution to be fed to the process. The system will start at low tank level, opening the water valve to fill the tank while dispensing and mixing the preset amount of dry chemical into solution. At high tank level, the water and dry feeder will turn off leaving the mixer operating for the preset period to completely mix the batch. System will restart and repeat this sequence when the tank reaches low level. The water flow switch must detect flow before the dry feeder will start.



DANGER! *Risk of crushing anything in the area of the feed auger!
Never remove the protective safety screen or reach into the unprotected dry feeder during operation of the system.*

NOTE: The tank solution level must be lower than low level switch to start the system in AUTO mode.

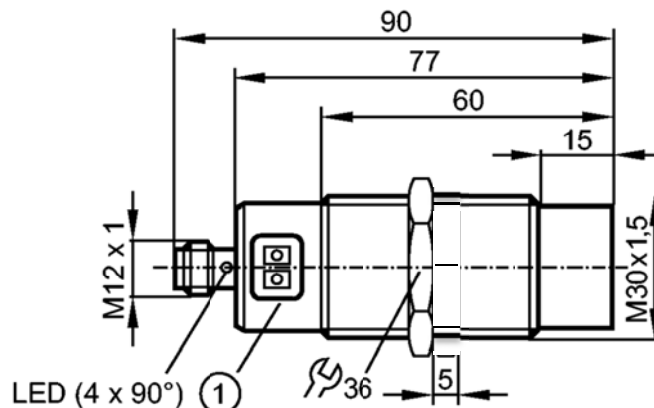
- **Batching test, before loading dry chemical:**
- Ensure system has clean inlet water and solution discharge connected.
- Ensure that correct power is supplied to the ProMdry (see electrical drawing).
- Turn on main breaker located inside control panel (see electrical drawing).
- Close and latch the control cabinet door.
- Place all switches in the OFF position.
- Open any installed service valves in the water supply line.
- Ensure that the water pressure is adjusted to 30-60 psi.
- Open the flow control valve located above the flow meter to its maximum open position.
- Place the Water, Feeder, Mixer, and Vibrator switches to AUTO. All component switches should be in AUTO position.
- Place Feeder Speed to LOCAL (then again in REMOTE if you will be using a 4-20mA feeder speed signal)
- Set the feeder speed to ZERO.
- Place the SYSTEM selector switch to ON.

- The system should start filling the tank; adjust the flow control valve to the desired water fill rate. The faster the tank fills decreases the available feed time. Be sure to note the fill time and adjust the feed time if needed.
- Adjust the flow switch on the flow meter to detect flow at the desired minimum flow rate.
- At high level, the water and dry chemical feeder will turn off.
- After full, adjust the feed rate, feed time, and mix time to the desired settings.
- Turn SYSTEM switch to the OFF position
- Drain the tank until the solution tank level is below low level, so when SYSTEM is turned back on, the ProMdry will restart and make a batch of solution.

Setting of the optional Hopper level sensor

The response threshold of the capacitive level sensor is adapted to the different dry chemicals being mixed.

- First, fill the volumetric feeder with dry chemical until the level sensor is completely covered.
- Then, turn the adjusting screw of the level sensor to the right, which will result in moving the sensor toward you until the LED turns on.
- Carefully turn the adjusting screw to the left which will move the sensor away until the LED turns off.
- Turn the adjusting screw to the right by an additional 1 full turns, the LED must still be off.
- Check the switching function during operation after setting these limits. The dry chemical sensor LED must be OFF with dry chemical in Hopper and ON without dry chemical near the sensor.



- **Prepare To Make the First Batch:**
- Ensure there is dry chemical in the hopper
- If not already calibrated, perform calibration of the dry feeder output (see **Volumetric Dry Feeder Calibration** above).

Operation

- Set WATER, MIXER, FEEDER, and VIBRATOR (optional) selector switches to Auto
- Set the Mix Timer to the desired time.
- Set the Feed Timer to the desired time. **NOTE:** *This time must be shorter than the time it takes the tank to fill.* Decrease water flow rate if more feed time is needed, as this will increase the time it takes to fill the tank.
- Start the dry feeder by turning the SYSTEM switch to the ON position, or by closing a remote contact when the SYSTEM switch is in the REMOTE position.
- Solution tank must be at low level to start.

- **Feeder speed REMOTE**

Increase or decrease the dry chemical feed rate by changing the external 4-20 mA signal to a higher or lower value (4-20 mA = 0 – 100% feeder speed).

Change the amount of dilution water correspondingly.

- **Feeder speed LOCAL**

Increase or decrease the dry chemical feed rate by adjusting the digital LOCAL SPEED potentiometer on the control cabinet to a higher or lower value (0 – 100% feeder speed). Change the amount of dilution water correspondingly.

- Stop the SYSTEM by turning the SYSTEM switch to OFF position, or by opening the remote contact in REMOTE position.

Local/Remote Settings Table:

Local (%)	Remote (mA)	TGD 18.13 (Cuft/min)	TGD 30.13 (Cuft/min)	TGD 38.13 (Cuft/min)
0	4.0	0	0	0
25	8.0	0.24	0.36	0.72
50	12.0	0.47	0.73	1.44
75	16.0	0.71	1.09	2.15
100	20.0	0.95	1.45	2.87

Maintenance

Volumetric Feeder

- The drive of the dry feeder should be maintenance-free because the gears are equipped with life-time lubrication.
- Cleaning of the dry chemical feeder is normally not necessary. If it becomes necessary, contact your authorized ProMinent distributor for assistance.

Cleaning the Mixer Tank

**WARNING!**

Chemicals and residue may be hazardous.

Use OSHA recommended Personal Protective Equipment to avoid injury.

1. Adjust the LOCAL SPEED CONTROL using Digital potentiometer on the control cabinet to 00.0
2. Turn the WATER switch to the ON position to open the solenoid valve, and let the dilution water rinse the inside of the chamber.
3. If emptying the chamber is necessary, open the drain valve located in the discharge plumbing (not shown in drawings) and allow water to flush through.

Specifications:

Technical Data

Power	120V, 60Hz, 20 Amp
Water	3/4" FNPT, 50 psi, 100°F Max
Discharge	1-1/2" FNPT
Overflow	1-1/2" FNPT
Volumetric Feeder TGD 18.13	0.95 cuft/hr Max, PE and 304SS
Volumetric Feeder TGD 30.13	1.45 cuft/hr Max, PE and 304SS
Volumetric Feeder TGD 38.13	2.87 cuft/hr Max, PE and 304SS
Extension hopper	1 cu ft PE
Bag loading hopper	___cu ft SS
Tank Mixer.....	½ hp, 1725 RPM
Solution Tank	FRP, 35 gallons
Shipping Weight	71 Lbs

Dry Feeder Motor data

Armature Voltage:	90 V
Base Speed:	1,750 rpm
Enclosure:	TENV
Frame:	56C
Gear reduction:	1 : 13.5
Insulation class:	F
Frame Material:	Steel
Output Power:	0.25 hp
Brand:	Baldor-Reliance
Agency Approvals:	CE, CSA, UR
Ambient Temperature:	40 °C
Armature Current:	2.5 A
Armature Inertia:	7.804lb-ft ²
Base Indicator:	Rigid
Bearing Grease Type:	POLYREX EM (-20F +300F)
Drip Cover:	No Drip Cover

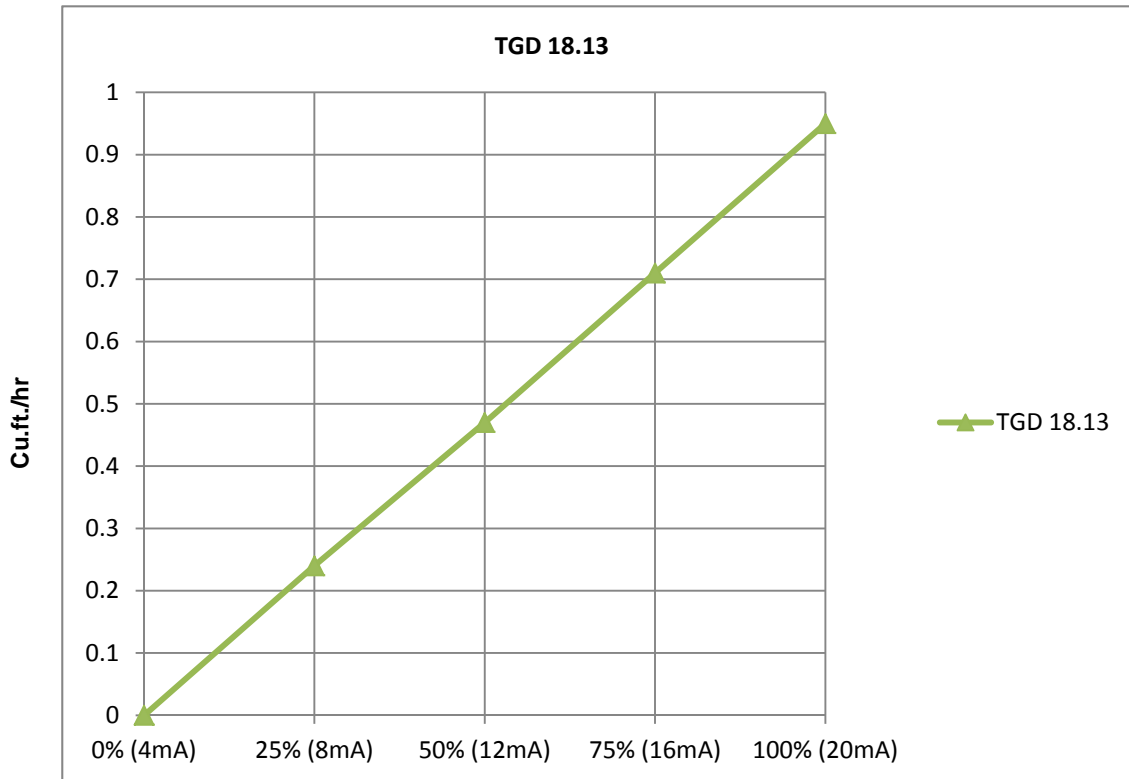


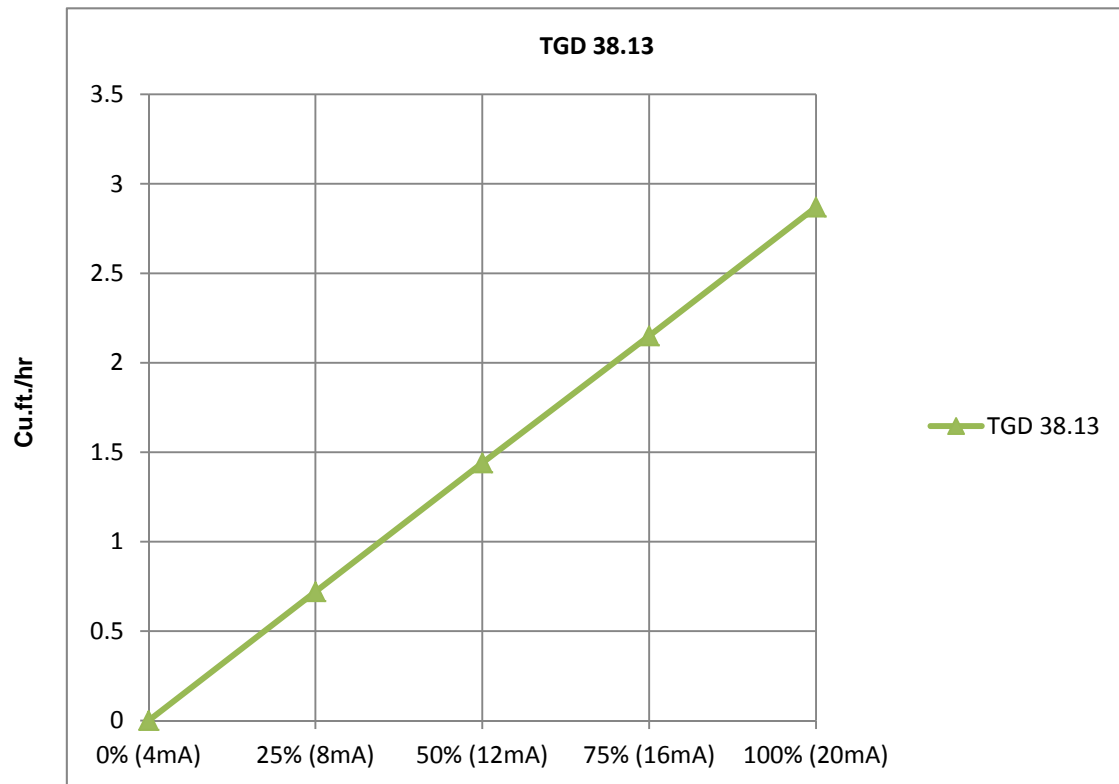
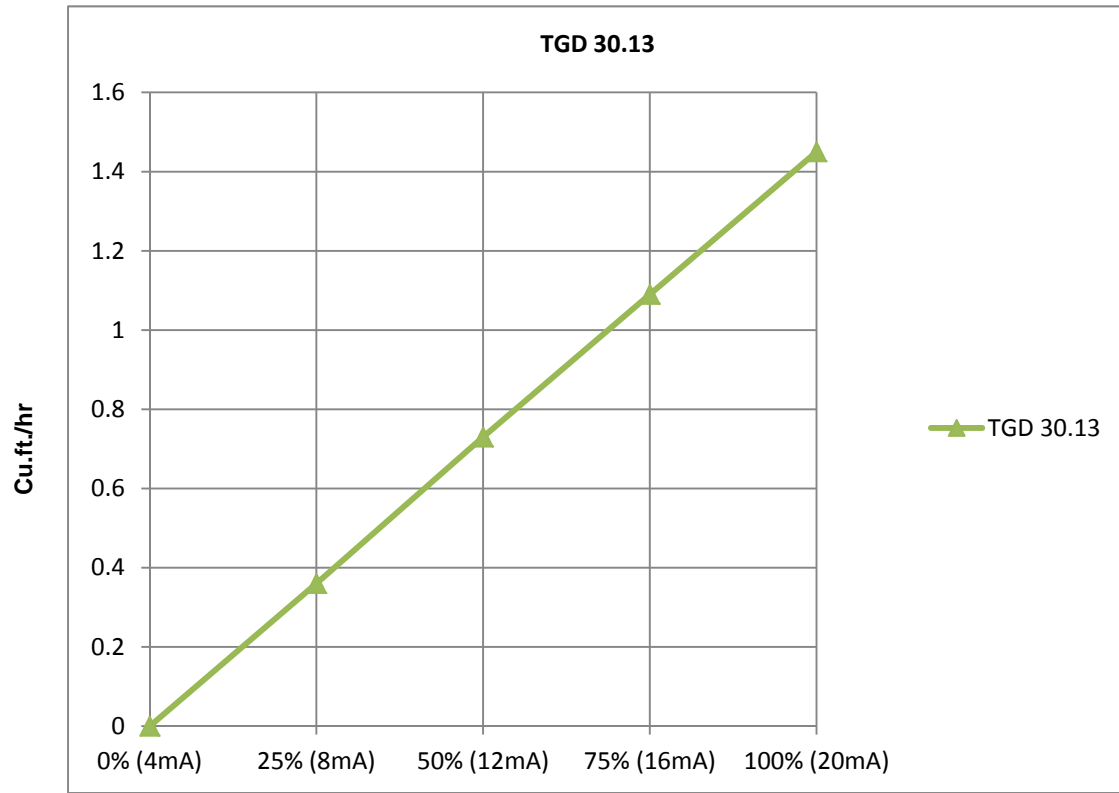
WARNING!

**Characterizes a possibly hazardous situation.
If not avoided, your life may be in danger or serious
injuries may result.**

Dry Feeder Performance Curves

Model TGD 18.13 (Cu ft/hr)	Model TGD 30.13 (Cu ft/hr)	Model TGD 38.13 (Cu ft/hr)
0.95	1.45	2.87





Spare Part List

ProMdry System Components

Description	Part #
Flow Meter, 1-16 GPM	1051735
FLOW SWITCH	1051736
Feeder\Hopper Gasket	1059329
Level Switch	1051734

Dry feeder TGD 18.13 RC

Description	Part #
Feeder screw pipe, size 18, complete	791741
Cyl. screw DIN 912 M 6x25 A2	468021
Push-on lid on TGD RC	1020860
Protective screen, cold galvanized	741177
Capacitive proximity switch, M30x1.5	1059141
Bulker wheel, size 18, complete, RC	1020866
Axle SW 7x150 RC 1.4305	1021032
Screw with core, size 18, complete, 1.4301 RC	1020863
Cyl. screw DIN 912 M 5x20 A2	1006258
Washer DIN 125 A 5.3 A2	1003393
Drive shaft d35x55 TGD RC	1020862
Setscrew DIN 913 M 5x8 A2	1008088
Cyl. screw DIN 912 M 6x25 A2	468021
Cyl. screw DIN 912 M 6x20 A2	791791
Intermediate plate TGD RC	1020854
Cyl. screw DIN 912 M 6x30 A2	791792
screw feeder unit TGD 18.13 NEMA flange	1059113

Spare Parts List

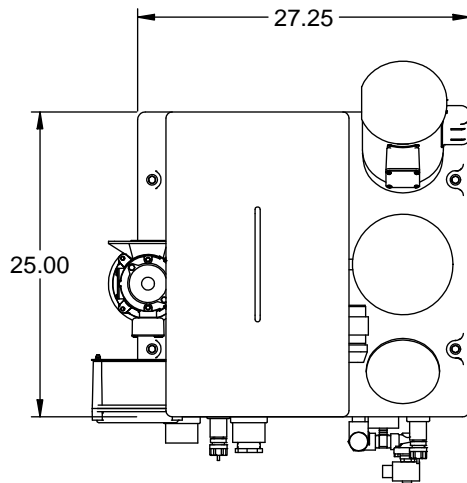
Dry feeder TGD 30.13 RC

Description	Part #
Feeder screw pipe, size 30, complete	791742
Cyl. screw DIN 912 M 6x25 A2	468021
Push-on lid on TGD RC	1020860
Protective screen, cold galvanized	741177
Capacitive proximity switch, M30x1.5	1059141
Bulker wheel, size 30, complete, RC	1021061
Axle SW 7x150 RC 1.4305	1021032
Screw with core, size 30, complete, 1.4301 RC	1021058
Cyl. screw DIN 912 M 5x20 A2	1006258
Washer DIN 125 A 5.3 A2	1003393
Drive shaft d35x55 TGD RC	1020862
Setscrew DIN 913 M 5x8 A2	1008088
Cyl. screw DIN 912 M 6x25 A2	468021
Cyl. screw DIN 912 M 6x20 A2	791791
Intermediate plate TGD RC	1020854
Cyl. screw DIN 912 M 6x30 A2	791792
screw feeder unit TGD 30.13 NEMA flange	1059114

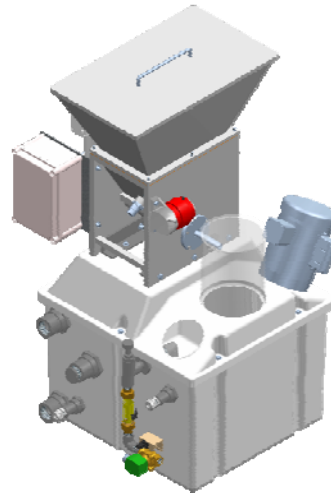
Dry feeder TGD 38.13 RC

Description	Part #
Feeder screw pipe, size 38, complete	791743
Cyl. screw DIN 912 M 6x25 A2	468021
Push-on lid on TGD RC	1020860
Protective screen, cold galvanized	741177
Capacitive proximity switch, M30x1.5	1059141
Bulker wheel, size 38, complete, RC	1021062
Axle SW 7x150 RC 1.4305	1021032
Screw with core, size 38, complete, 1.4301 RC	1021059
Cyl. screw DIN 912 M 5x20 A2	1006258
Washer DIN 125 A 5.3 A2	1003393
Drive shaft d35x55 TGD RC	1020862
Setscrew DIN 913 M 5x8 A2	1008088
Cyl. screw DIN 912 M 6x25 A2	468021
Cyl. screw DIN 912 M 6x20 A2	791791
Intermediate plate TGD RC	1020854
Cyl. screw DIN 912 M 6x30 A2	791792
screw feeder unit TGD 38.13 NEMA flange	1059115

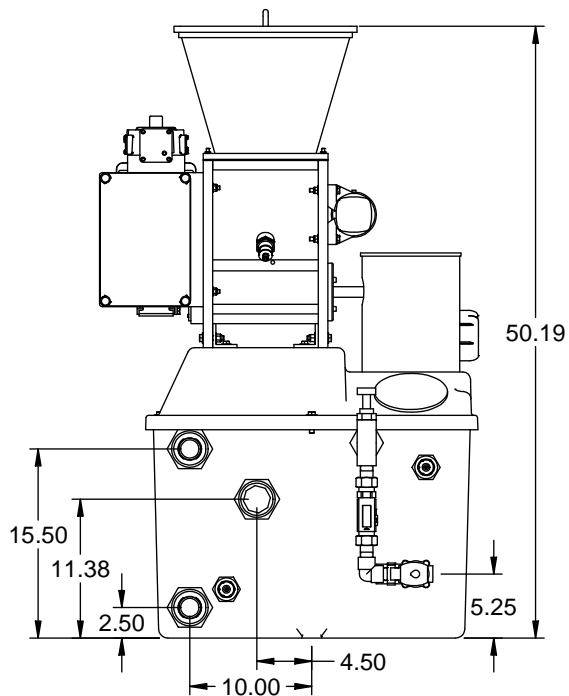
Appendix



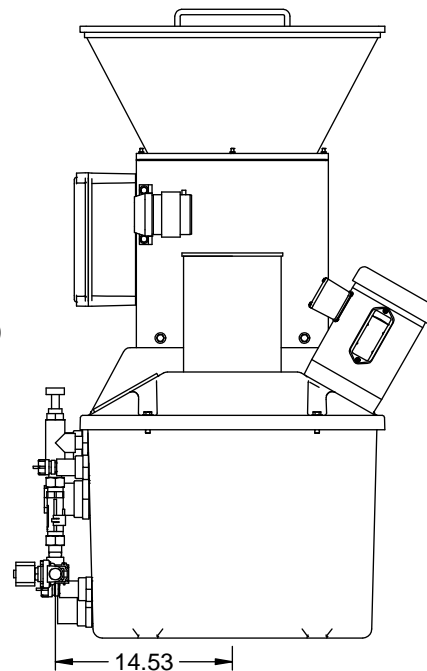
PLAN VIEW



ISOMETRIC VIEW



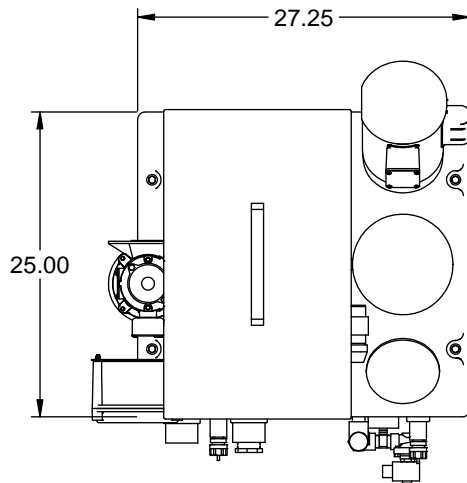
FRONT VIEW



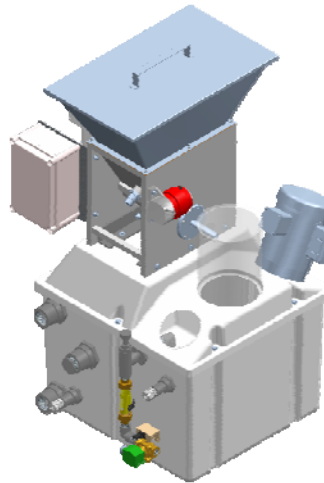
SIDE VIEW

Batch ProMdry Layout with Polypropylene Hopper

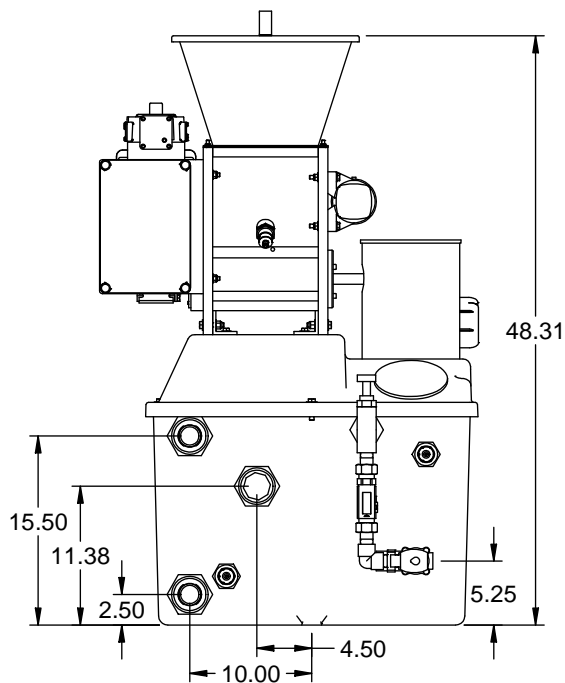
Appendix



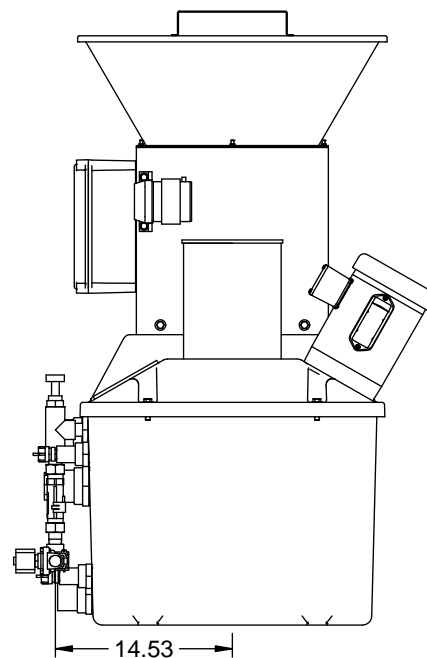
PLAN VIEW



ISOMETRIC VIEW



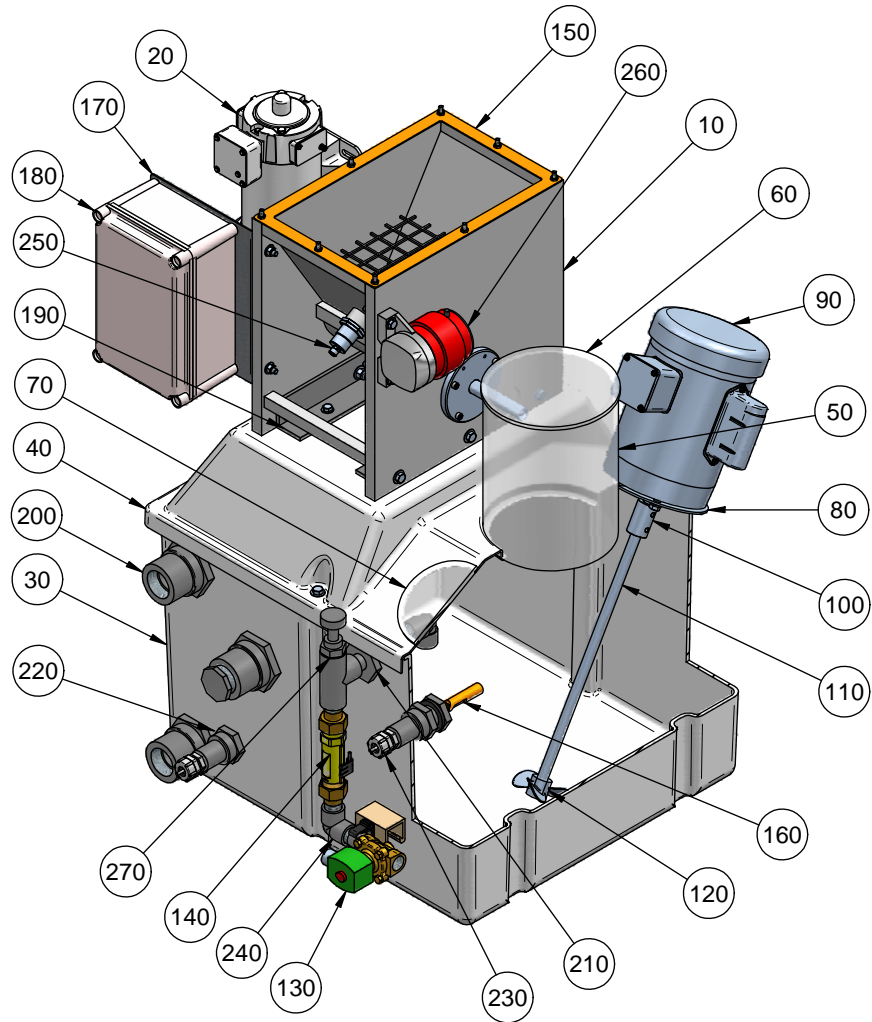
FRONT VIEW



SIDE VIEW

Batch ProMdry Layout with Stainless Steel Hopper

Appendix

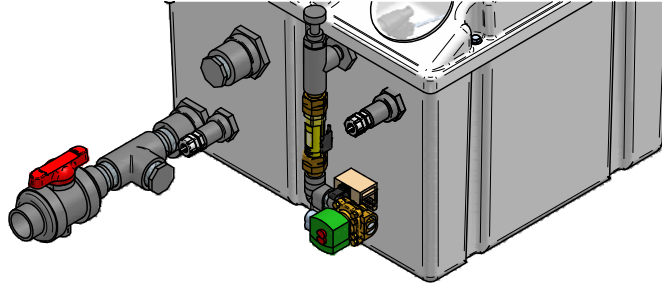


Appendix

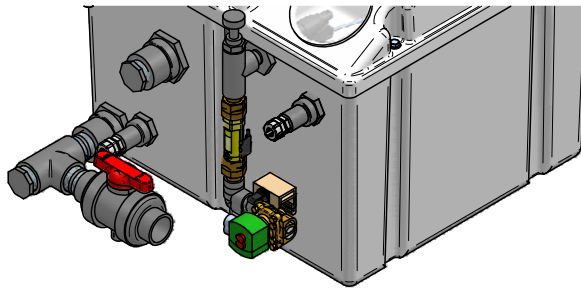
BATCH PROMDRY SYSTEM BILL OF MATERIAL		
ITEM	DESCRIPTION	USA P\N
10	TGD 18.13RC FEEDER	1059113
	TGD 30.13RC FEEDER	1059114
	TGD 38.13RC FEEDER	1059115
20	MOTOR, 1/4 HP, TENV, 90 VDC, 56C	1059145
30	TANK, BOTTOM, PROMDRY	1051719
40	TANK, COVER, PROMDRY	1051718
50	CHAMBER, CLEAR, PROMDRY	1051728
60	COVER, CLEAR CHAMBER, PROMDRY	1051729
70	COVER, LID, PROMDRY	1051730
80	PLATE, MOTOR MOUNTING, 56C, PROMDRY	1058822
90	MOTOR, 1/2 HP, TEFC, 115\230 VAC, 1 PH	7747212
100	COUPLING, SHAFT	1051733
110	SHAFT, 5/8" OD, 18" LONG, 303 SS	1051732
120	BLADE, MIXING	1051731
130	SOLENOID VALVE, 3/4, FNPT, BRASS, NBR, 0-150 PSIG	1051742
140	FLOW METER, 1-16 GPM	1051735
*140	FLOW SWITCH	1051736
150	GASKET, FEEDER\HOPPER	1059329
160	LEVEL SWITCH	1051734
170	BRACKET, TERMINAL BOX MOUNTING	1058821
180	TERMINAL BOX	1059223
190	ANGLE, HOPPER MOUNTING	1051743
200	FITTING, BULKHEAD, 1-1/2", FNPT X SKT, PVC, VITON, SCH 80	7745804
210	FITTING, BULKHEAD, 3/4", FNPT X FNPT, PVC, VITON, SCH 80	7745807
220	FITTING, BULKHEAD, LEVEL SWITCH, PVC, VITON, SCH 80	1060167
230	CORD GRIP	7735040
240	ELBOW-90, 3/4", FT X FT, PVC, SCH 80	7741474
250	SENSOR, CAPACITIVE, FEEDER	1059141
260	VIBRATOR	1051720
270	VALVE, GLOBE, ANGLED, 3/4" FNPT, PVC	1051740

*not shown in exploded view

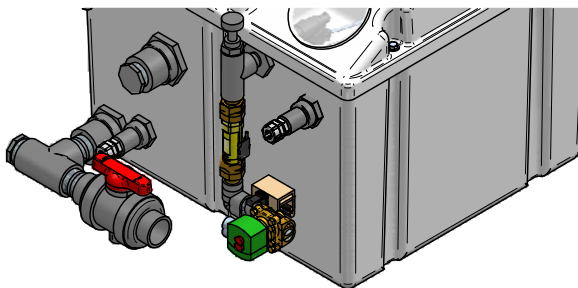
Appendix



DRAIN PLUMBING OPTION 1

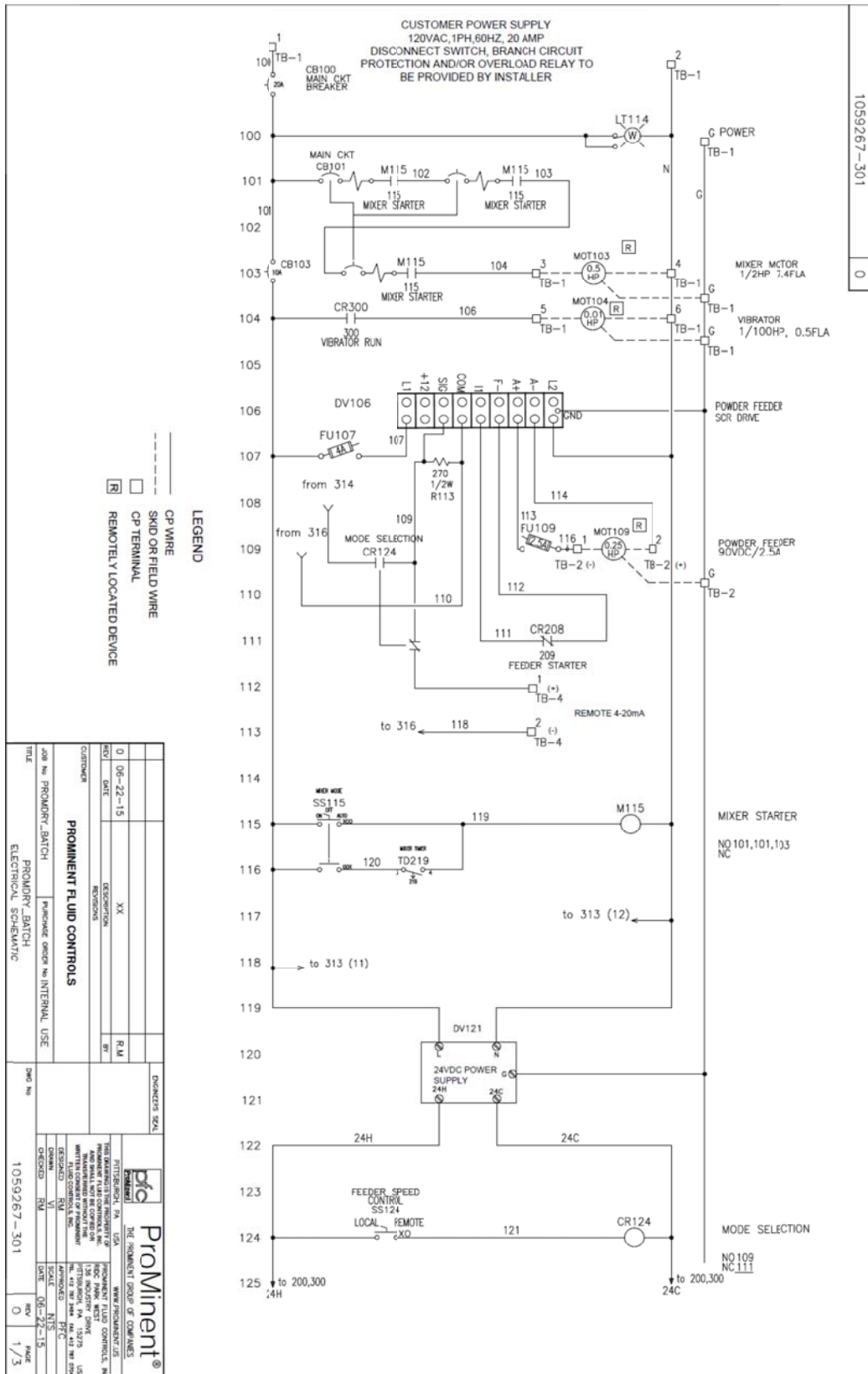


DRAIN PLUMBING OPTION 2

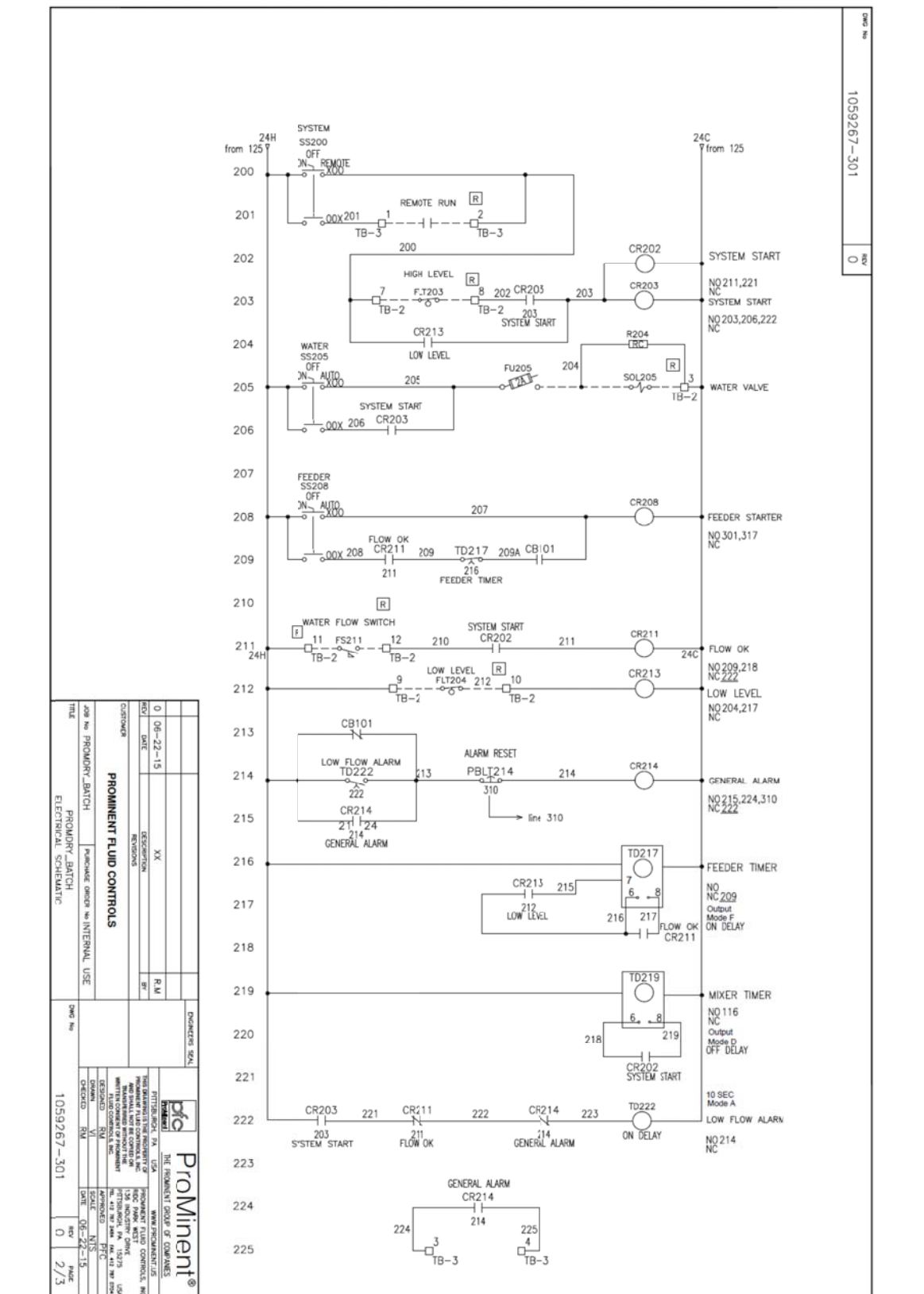


DRAIN PLUMBING OPTION 3

Appendix



Appendix



Appendix



Appendix



Appendix

I&M No. V 5427 R4

Installation & Maintenance Instructions

2-WAY INTERNAL PILOT-OPERATED SOLENOID VALVES
NORMALLY CLOSED OPERATION — GENERAL SERVICE
3/4" NPT

SERIES

8210

8211

NOTICE: See separate solenoid installation and maintenance instructions for information on: Wiring, Solenoid Temperature, Cause of Improper Operation, Coil or Solenoid Replacement.

DESCRIPTION

Series 8210 valves are 2-way normally closed internal pilot-operated solenoid valves designed for general service. Valves are made of rugged forged brass. Series 8210 valves are provided with a general purpose solenoid enclosure. Series EF8210 and 8211 are the same as Series 8210 except they are provided with an explosionproof or explosionproof/watertight solenoid enclosure.

Notice: Brass valves are not certified as lead-free under the Safe Water Drinking Act SWDA 1417 and are not intended for use on drinking water systems. They are intended for control of water in industrial applications. Consult ASCO for valves rated for use in potable water applications.

OPERATION

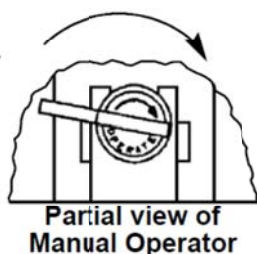
Normally Closed: Valve is closed when solenoid is de-energized; open when energized.

IMPORTANT: Minimum operating pressure differential is 5 psi.

Manual Operator (optional feature)

Manual operator allows manual operation when desired or during an electrical power outage. To engage manual operator (open the valve), turn lever clockwise until it hits a stop. Valve will now be in the same position as when the solenoid is energized. To disengage manual operator (close the valve), turn lever counterclockwise until it hits a stop.

To engage, turn lever clockwise until it hits a stop.



CAUTION: For valve to operate electrically, manual operator lever must be fully rotated counterclockwise.

INSTALLATION

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

Future Service Considerations

Provision should be made for performing seat leakage, external leakage, and operational tests on the valve with a nonhazardous, noncombustible fluid after disassembly and reassembly.

Temperature Limitations

For maximum valve ambient and fluid temperatures, refer to chart below. Check catalog number prefix and watt rating on nameplate.

Watt Rating	Catalog Number Prefix	Solenoid Class	Maximum Ambient Temp.	Maximum Fluid Temp.
6	None or DF	F	122 °F (50 °C)	180 °F (82 °C)
AC	HT	H	140 °F (60 °C)	180 °F (82 °C)
6.1	None, KF, SF or SC	F	125 °F (54 °C)	180 °F (82 °C)
AC	HT, KH, ST or SU	H	140 °F (60 °C)	180 °F (82 °C)
11.2	None or HT	F or H	77 °F (25 °C)	150 °F (65 °C)
DC	None, HT, KF, KH, SC, SF or ST	F or H	104 °F (40 °C)	150 °F (65 °C)
11.6				
DC				

Positioning

This valve is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

Mounting

For Mounting bracket (optional feature) dimensions, refer to Figure 1.

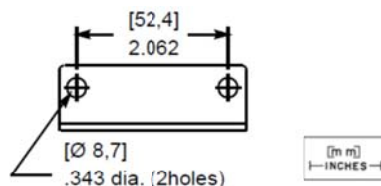


Figure 1. Mounting Bracket Dimensions

Piping

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only. If applied to valve threads, the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

CAUTION: To protect the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600 and 8601 for strainers.

Appendix

MAINTENANCE

⚠ WARNING: To prevent the possibility of death, injury or property damage, turn off electrical power, depressurize valve, and vent fluid to a safe area before servicing the valve

Note: It is not necessary to remove the valve from the pipeline for repairs

Cleaning

All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to open or close. Clean strainer or filter when cleaning the valve.

Preventive Maintenance

- Keep medium flowing through the valve as free from dirt and foreign material as possible.
- Periodic exercise of the valve should be considered if ambient or fluid conditions are such that corrosion, elastomer degradation, fluid contamination build up, or other conditions that could impede solenoid valve shifting are possible. The actual frequency of exercise necessary will depend on specific operating conditions. A successful operating history is the best indication of a proper interval between exercise cycles.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete rebuild kit.

Causes of Improper Operation

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Valve Disassembly

1. Disassemble valve in an orderly fashion using exploded views for identification and placement of parts. Refer to Figure 1 for AC construction; Figure 2 for DC construction.
2. Remove solenoid enclosure. See separate instructions.
- For valves supplied with optional manual operators, see section on *Disassembly of Manual Operator*.
3. Unscrew solenoid base sub-assembly from valve body. Then remove core assembly with core spring and bonnet gasket. For AC construction (Figure 1) core spring is a loose piece.
4. Remove bonnet screws, valve bonnet, diaphragm spring, diaphragm assembly, body gasket, body passage eyelet and body passage gasket.
5. All parts are now accessible for cleaning or replacement. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

- Service Notice -

When installing a new ASCO Rebuild Kit, the parts supplied are new, improved and a direct replacement for the present parts providing all new parts are installed.

CAUTION: To ensure proper valve operation, install all parts supplied in ASCO Rebuild Kit. Do not mix old and new parts.

Valve Reassembly

1. Lubricate body gasket, body passage gasket, bonnet gasket and solenoid base gasket with DOW CORNING® 200 Fluid lubricant or an equivalent high-grade silicone fluid.

2. Install body passage gasket, body passage eyelet, diaphragm assembly, diaphragm spring, valve bonnet and bonnet screws. Hand thread screws as far as possible. Then torque bonnet screws in a crisscross manner to 144 ± 15 in-lbs [$16,3 \pm 1,7$ Nm].
- For valves supplied with optional manual operator, see section on *Reassembly of Manual Operator*.
3. For AC construction (Figure 1), install core spring in core assembly. Wide end of core spring in core first, closed end protrudes from top of core.
4. Install solenoid base gasket, core assembly with core spring and solenoid base sub-assembly in valve body. Torque solenoid base sub-assembly to 175 ± 25 in-lbs [$19,8 \pm 2,8$ Nm].
5. Install solenoid. See separate instructions.

⚠ WARNING: To prevent the possibility of death, serious injury or property damage, check valve for proper operation before returning to service. Also perform internal seat and external leakage tests with a nonhazardous, noncombustible fluid.

6. Restore line pressure and electrical power supply to valve.
7. After maintenance is completed, operate the valve a few times to be sure of proper operation. A *metallic click* indicates the solenoid is operating.

Disassembly of Manual Operator

1. Unscrew solenoid base sub-assembly from manual operator body.
2. Unscrew manual operator body from valve body. Then remove stem retainer from base of manual operator body and stem/spacer sub-assembly.
3. Pull stem/spacer sub-assembly with stem gasket from side of manual operator body. Then remove core assembly with core spring, solenoid base gasket and manual operator bonnet gasket.
4. For further disassembly refer to section on *Valve Disassembly* step 4.

Reassembly of Manual Operator

1. Lubricate stem gasket with DOW CORNING® 111 Compound lubricant or an equivalent high-grade silicone grease.
2. For AC construction (Figure 1), install core spring in core assembly. Wide end of core spring in core first, closed end protrudes from top of core.
3. Holding the manual operator body in a horizontal position, install core assembly with core spring from the bottom end.
4. Insert the stem/spacer sub-assembly with the stem gasket into the side hole of the manual operator body. Rotate the lever of the stem/spacer sub-assembly to the 12 o'clock position.
5. Install stem retainer on base of manual operator body and simultaneously engage it into the slot provided on the stem/spacer sub-assembly.

IMPORTANT: The spacer on the stem/spacer sub-assembly *must be inside of the stem retainer* for AC construction (Figure 1) and *outside of the stem retainer* for DC construction (Figure 2).

6. Install manual operator bonnet gasket and body with preassembled parts into valve body. Torque manual operator body to 175 ± 25 in-lbs [$19,8 \pm 2,8$ Nm].
7. Replace solenoid base gasket and solenoid base sub-assembly. Torque solenoid base sub-assembly to 175 ± 25 in-lbs [$19,8 \pm 2,8$ Nm].
8. For further reassembly, refer to *Valve Reassembly* step 5.

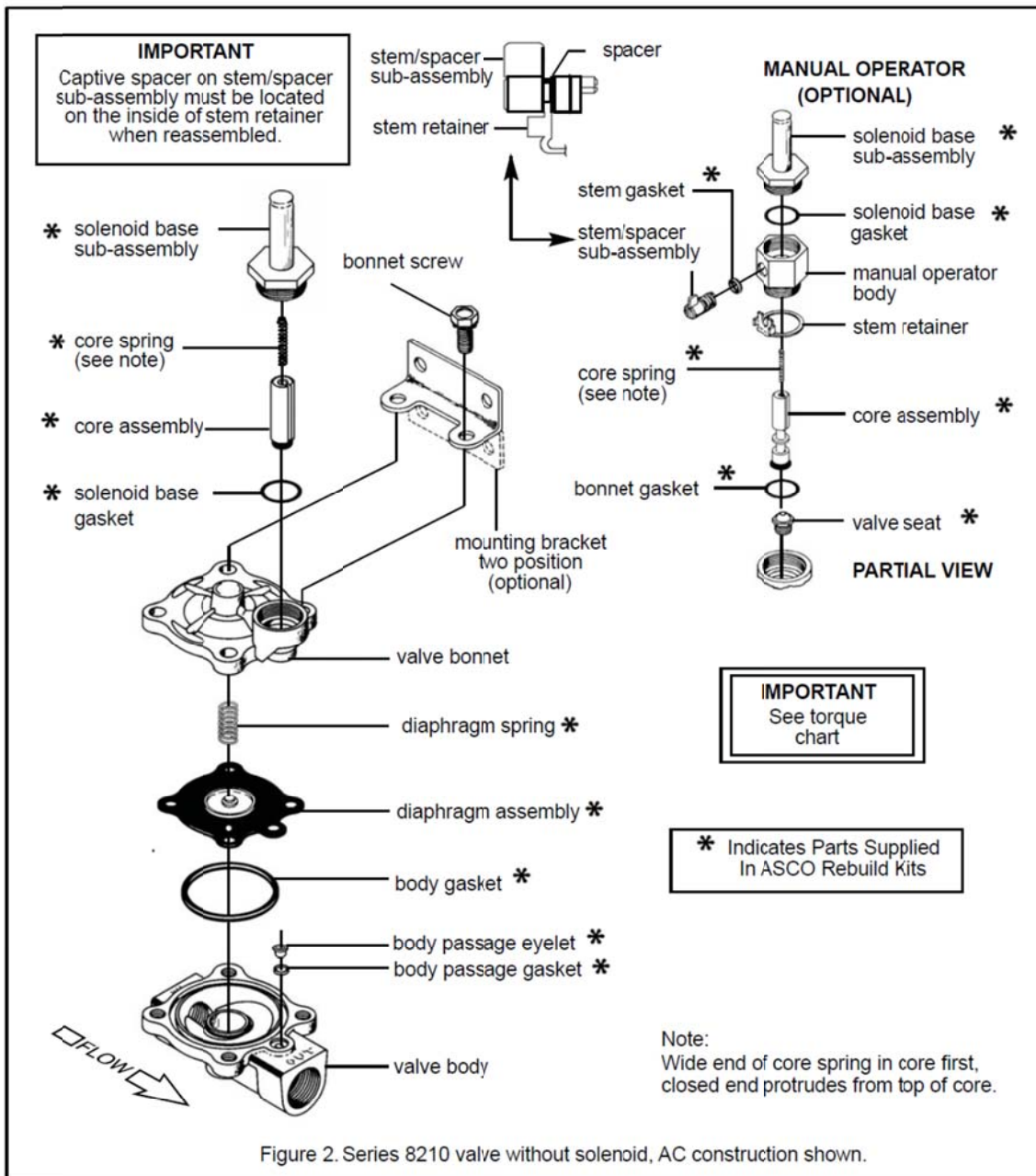
Appendix

Torque Chart

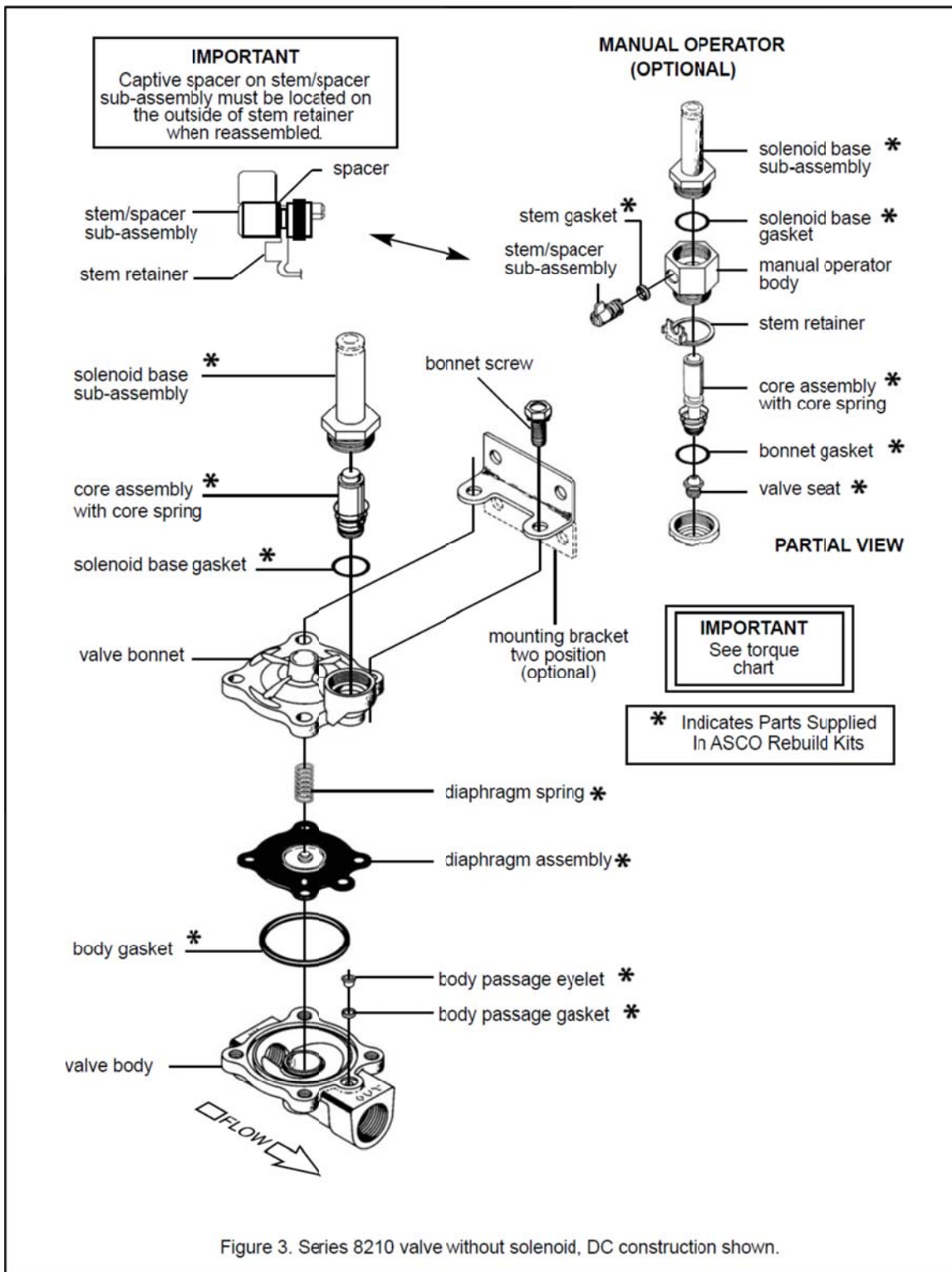
Part Name	Torque Value Inch-Pounds	Torque Value Newton-Meters
Solenoid base sub-assembly	175 ± 25	19,8 ± 2,8
Manual operator body		
Bonnet screw	144 ± 15	16,3 ± 1,7

**ORDERING INFORMATION
FOR ASCO REBUILD KITS**

Parts marked with an asterisk (*) in the exploded view are supplied in Rebuild Kits. When Ordering Rebuild Kits for ASCO valves, order the Rebuild Kit number stamped on the valve nameplate. If the number of the kit is not visible, order by indicating the number of kits required, and the Catalog Number and Serial Number of the valve(s) for which they are intended.



Appendix



Operating instructions

For Plastic Level Switch for Liquids

Model: NKP

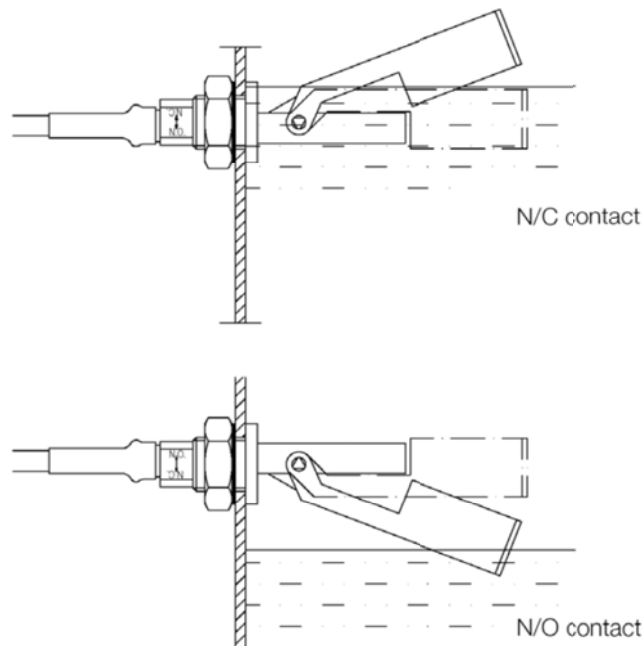
Operating Principle:

The plastic level switch NKP is designed for economical control of liquids in vessels. Many industrial applications can be realized with two different plastic versions each with three different mountings. The switch is remarkable for its maintenance-free design, small dimensions and reed contacts with high switch capacity. The switch is mounted on the side of the vessel. A hinged plastic float with a magnet floats up and down through the liquid level. The encapsulated reed contact is operated by the magnet. The switching function (N/O contact/N/C contact) is determined by the installation position. The switching function is reserved by simply rotating the switch through 180 °C.

Model NKP devices are for use when monitoring liquid levels. The device should only be used with liquids that are compatible with the unit's materials of construction. Level control is often accomplished with at least two level switches - one acting to sense the minimum level and the other for maximum level detection.

Mounting position

The mounting position of the level switch determines the contact operation.



Installation Instructions For EZ-View® Flow Meter and EZ-View® Flow-Alert™ Flow Meter

HEDLAND®
DIVISION OF RACINE FEDERATED INC.

FORM # HLIT 300

8635 Washington Avenue • Racine • Wisconsin 53406-3738 USA
TEL 800-HEDLAND • FAX 800-CHK-FLOW

I. INTRODUCTION

The EZ-View series flow meter is a rugged, low-cost direct reading industrial class flow meter that is simple to install. It can be mounted (installed) in any position from vertical to horizontal without costly flow straighteners or other special plumbing. Constructed of high impact polysulfone plastic, the EZ-View product line offers excellent structural integrity and chemical compatibility with a wide range of industrial chemicals.

EZ-View flow meters provide instantaneous, direct-reading flow rate measurement of liquids in closed piping systems. The transparent polysulfone plastic body allows visual inspection of the fluid condition as well as viewing of the internal flow indicator relative to a calibrated flow scale. See **Figure 1**.

EZ-View meters do not require electrical connections for operation, and provide measurement by creating a predictable differential pressure across a sharp-edged orifice that is located in the piston assembly.

II. OPERATING PRINCIPLE

The EZ-View series flow meter is a piston-type variable area flow meter that uses a sharp-edged annular orifice, formed between an open-centered piston and a tapered metering cone. The piston is held in a "no-flow" position at the base of the cone by a precision retention spring. As flow in the pipe increases, the differential pressure correspondingly increases across the piston orifice, and moves the piston/flow indicator against the spring. The greater the flow rate, the further the piston moves along the tapered metering cone. The flow rate is measured by viewing the red indicator ring, mounted on the piston, relative to a graduated flow scale located on the transparent flow meter body. See **Figure 2**.

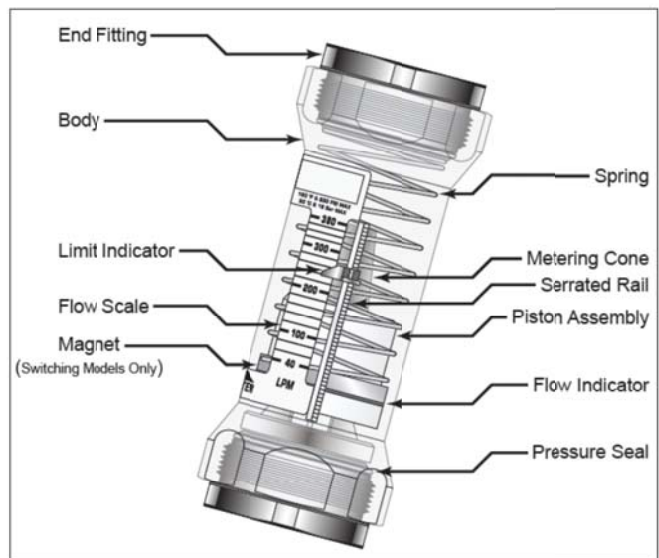


Figure 1. EZ-View Flow Meter

The unique design allows the EZ-View meter to be mounted in any orientation—horizontal, vertical, upside down, etc.—without sacrificing measurement performance. Flow straighteners, located in the inlet and outlet, allow the flow meter to be less sensitive to turbulent flow conditions. Liquid measurements are provided in GPM (Gallons per Minute) and LPM (Liters per Minute).

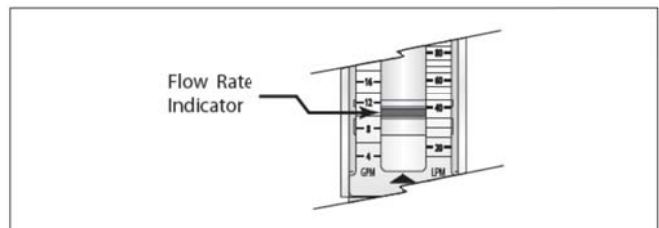


Figure 2. Flow Rate Indicator

Appendix



EZ-View Flow Meter and EZ-View Flow-Alert Flow Meter Installation & Maintenance Instructions

V. FLOW-ALERT SWITCH OPTIONS

NOTE: All Flow-Alert switches are magnetically triggered. It is not possible to add a switch to the basic meter if it was not originally ordered with the switching magnet.

Flow-Alert Latching Limit Switch

The AC and DC powered Flow-Alert modules consist of a relay circuit housed in a sealed plastic enclosure. The modules have a normally open, dry relay contact that can

be used to directly control alarms, warning lights, relays, or interface to a PLC. The relay will be latched on as the magnet inside the flow meter passes by the module, and remain latched on until the magnet passes in the other direction, or power is interrupted. See **Figure 9**. The setpoint is adjustable from 0-100% of full scale. Flow meters can be equipped with one latching limit switch, either AC or DC.

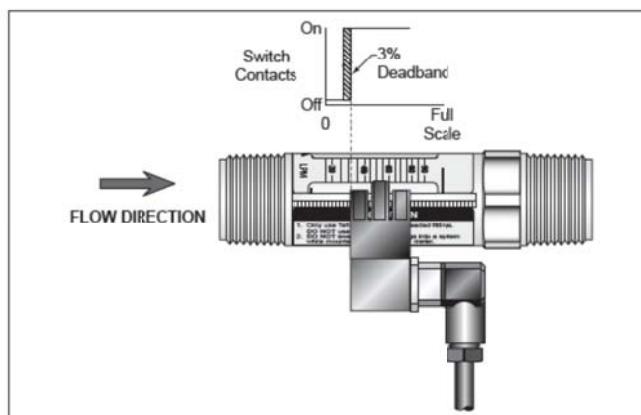


Figure 9. Latching Switches

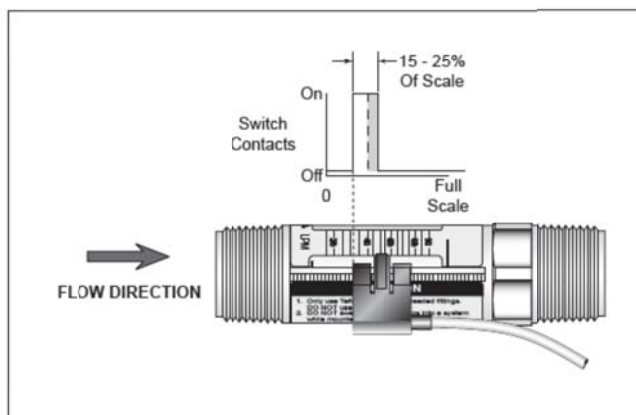


Figure 10. Reed Switches

Flow-Alert Reed Limit Switch

The reed switch Flow-Alert modules are available in three forms: Form A (normally open), Form B (normally closed), and Form C (single-pole, double throw).

Reed switches are housed in a sealed plastic enclosure for environmental protection. The reed switch modules do not provide a latching function like the AC and DC

powered units. When the magnet inside the flow meter comes within proximity of the module, the reed switch will change state. See **Figure 10**. The setpoint is adjustable from 0-100% of full scale. Two reed switch Flow-Alerts may be installed on a single flow meter but one must be set for activation on increasing flow and the second must be set for activation on decreasing flow.

Switch Specifications

Specifications	AC Latching	DC Latching	Specifications	Reed Switch Form A (NO)	Reed Switch Form B (NC)	Reed Switch Form C (SPDT)
Operating Voltage	115 VAC ± 10%	10-30 VDC		N/A	N/A	N/A
Operating Current	25 mA maximum			N/A	N/A	N/A
Contact Rating	1A @ 30 VDC 0.5A @ 125 VAC Resistive Load		Watts Max Voltage Max Current Max	10 200 1A	5 175 .25A	5 175 25A
Cable	Not Included N/A			3 ft, 24 AWG 2 Conductor PVC Jacket	3 ft, 20 AWG 2 Conductor PVC Jacket	3 ft, 24 AWG 3 Conductor PVC Jacket
Certification	N/A	CE				
Enclosure Rating	NEMA 12 & 13 (IP65)					

Appendix



EZ-View Flow Meter and EZ-View Flow-Alert Flow Meter Installation & Maintenance Instructions

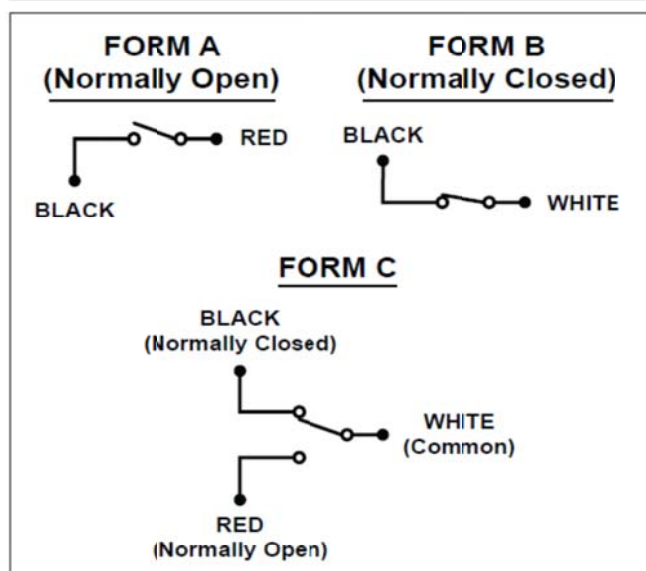


Figure 20. Form A, B & C

Flow-Alert Reed Switch Installation

1. Install the switch on the flow meter by placing the adjustment arm over the serrated rail from the inlet end of the $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1" meters, or the outlet end of the 1- $\frac{1}{2}$ " and 2" meters. Each meter will accept up to two reed switches and the switch(es) for $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1" meters must be installed before the meter is plumbed into the system.
2. Flow-Alert reed switches are available in three configurations: Form A (normally open), Form B (normally closed), and Form C (SPDT). Wire color codes and switch configurations are shown in Figure 20.

Flow-Alert Reed Switch Adjustment

After the flow meter has been installed and the switch wired, the flow rate at which the switch will activate must be adjusted as follows:

1. With the fluid running through the meter, gently move the switch adjustment tab(s) outward until the switch body is free to slide up or down on the serrated rail. See Figure 21.
2. Move the switch into position until the switch activates. See Figure 21.
3. Release the switch adjustment tab(s) to set the switch position.

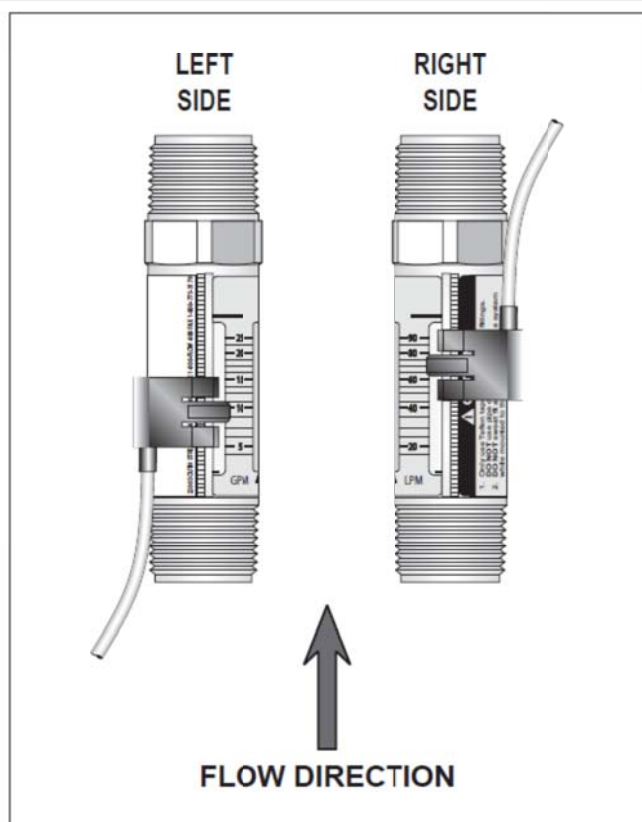


Figure 21. Switch Orientation



WARNING FAIL-SAFE OPERATION

If the flow meter and switch are to be installed in a critical application, be sure the system is fail-safe. The switch should be wired so any switch failure will stop the system. Failure to fail-safe the system may lead to system damage and/or personal injury.

Appendix



EZ-View Flow Meter and EZ-View Flow-Alert Flow Meter Installation & Maintenance Instructions

VI. MAINTENANCE

EZ-View Flow Meters are designed to provide many years of service with little or no maintenance requirements. Periodic cleaning may be required.

- Clean the outside of the flow meter with denatured alcohol or mild detergent and warm water.
- Should the inside of the flow meter become stained, it can be disassembled for cleaning.
- Should the flow meter become jammed with particulate, the meter will require disassembly as described below. The piston assembly should be pushed out from the inlet side to the outlet side. Clean the internal components and reassemble.

Disassembly

NOTE: Models with a 1" body-it is necessary to remove the spring retaining clip (located at the flow meter outlet port).

NOTE: Models with a 2" body can be serviced by removing the two end fittings, then sliding the metering pin out from the inlet, and removing the piston and spring from the outlet.

1. Measure the insertion depth of the retaining ring into the flow meter body with a caliper or other measuring device.
2. Carefully remove the retaining clip with a small, flathead screwdriver.
3. Remove the spring and piston assembly.
4. Clean the inside of the flow meter body and piston assembly with denatured alcohol or mild detergent and water.
5. Reassemble the meter in reverse order of disassembly. Install the retaining ring to the depth measured in step 1. Use a deep socket of approximately 0.9" diameter and hand pressure to install the retaining ring.

VI. APPENDIX

Fluid Correction Standard Flow Scales

Standard liquid flow scales are calibrated in GPM (Gallons per Minute) and LPM (Liters per Minute) at 0.876 specific gravity for petroleum-based fluids, and 1.0 specific gravity for water and water-based fluids.

For field conversion of the standard scale to other fluids, see *Density Effect* below.

Special Flow Scales

Special scales are available for liquids in any measurement unit, and other fluid viscosities and/or specific gravities.

Viscosity Effect (SS/cSt)

The design utilizes a sharp-edged orifice and biasing calibration spring that ensures operating stability and accuracy over the wide viscosity range common to many fluids. Generally, high flow models of each meter size provide good accuracy over a viscosity range of 40 to 500 SUS (4.2 to 108 cSt).

Density Effect (Specific Gravity)

Any fluid density change from stated standards has a proportional effect on meter accuracy. Special scales can be supplied if actual specific gravity decreases accuracy beyond application limits. Corrections for more or less dense fluids can be made to standard scales using the following correction factor:

$$\sqrt{\frac{1.0}{\text{Specific Gravity}}} \quad \text{for water/water-based meters}$$
$$\sqrt{\frac{0.876}{\text{Specific Gravity}}} \quad \text{for petroleum-based meters}$$

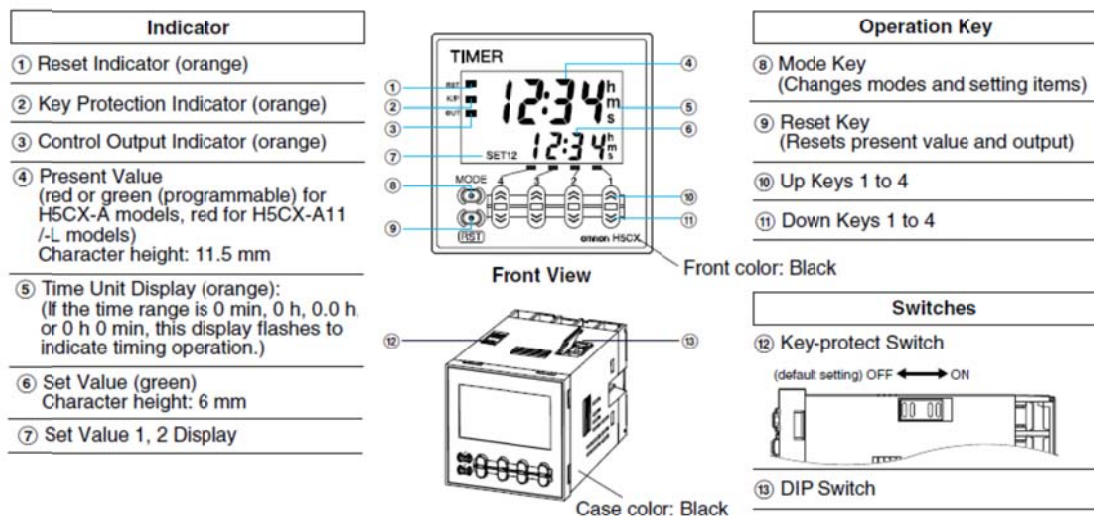
Appendix

H5CX

OMRON

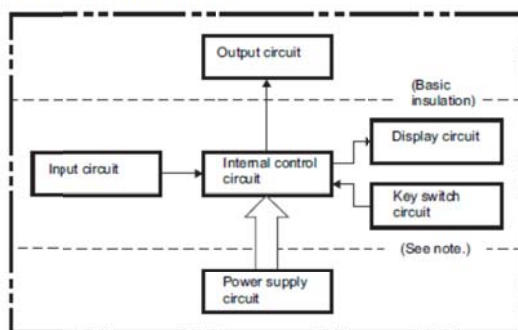
H5CX

Nomenclature



Operation

■ Block Diagram

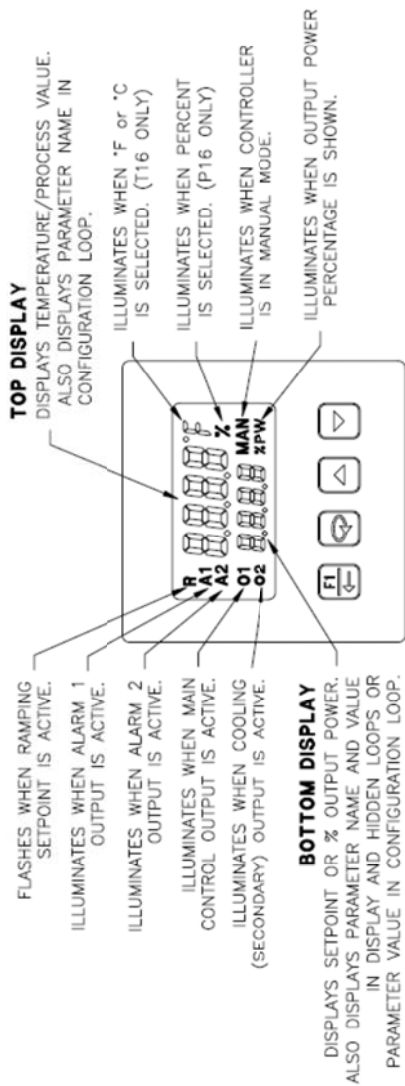


Note: Power circuit is not insulated from the input circuit, except for H5CX-A11/-A11S, which have basic insulation.


■ I/O Functions


Item		Description
Inputs	Start signal	Stops timing in A-2 and A-3 (power ON delay) modes. Start timing in other modes.
	Reset	Resets present value. (In elapsed time mode, the present value returns to 0; in remaining time mode, the present value returns to the set value.) Count inputs are not accepted and control output turns OFF while reset input is ON. Reset indicator is lit while reset input is ON.
	Gate	Inhibits timer operation.
Outputs	Control output (OUT)	Outputs take place according to designated operating mode when timer reaches corresponding set value.

4.0 REVIEWING THE FRONT KEYS AND DISPLAY



FRONT PANEL KEYS

 The F1 key is pressed to exit (or escape) directly to the start of the Display Loop. While in the Display Loop, the F1 key can be pressed to activate its programmed function.

 The Loop key is pressed to advance to the next parameter, to activate a changed selection/value, and when held for three seconds, enter the Hidden Loop.



The Arrow keys are used to scroll through parameter selections/values and in the Configuration Loop they are used to scroll to the appropriate Parameter Module.