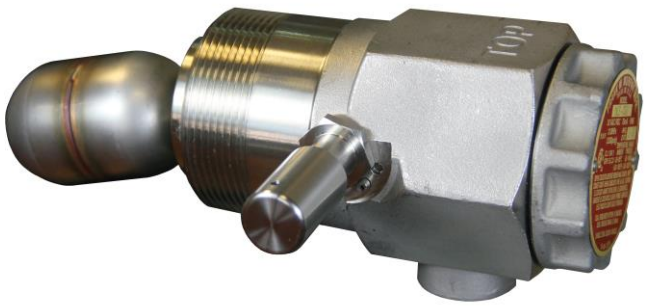
FW MURPHY™
PRODUCTION CONTROLS



MLS Series

Liquid Level Switches

Installation and Operations Manual

00-02-0730
2019-01-15
Section 15

Warranty - A limited warranty on materials and workmanship is given with this FW Murphy product. A copy of the warranty may be viewed or printed by going to http://www.fwmurphy.com/warranty

CAUTION: MLS Series parts are not interchangeable with other FW Murphy liquid level products. Damage caused by using incorrect parts is not covered by our Limited Warranty.

Please read the following information before installing. A visual inspection for damage during shipping is recommended before mounting.

BEFORE BEGINNING INSTALLATION OF THIS FW MURPHY PRODUCT:

- Disconnect all electrical power to the machine.
- Make sure the machine cannot operate during installation.
- Follow all safety warnings of the machine manufacturer.
- Read and follow all installation instructions.
- OBSERVE all pressure and electrical ratings and requirements for the devices and the operating environment.
- BE SURE all pressure HAS BEEN REMOVED from the vessel before opening any pressure connections.
- Please contact FW Murphy Production Controls immediately if you have any questions.

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Product Information

MLS Series Liquid Level Switches with 2 inch NPT and 1-1/2 inch NPT mounting are float activated to operate an electrical SPDT reed switch for alarm or shutdown of an engine or electric motor. The MLS Series connects directly into the scrubber wall and can be used with an FW Murphy weld collar or FW Murphy external float chamber.

Features

- Clean magnet design virtually eliminates iron filing accumulation onto the magnet
- Seal-free construction
- Designed for harsh gas compressor scrubber applications
- Optional push button to test functions
- CF8 (304) cast stainless steel body and 304 stainless steel float
- MLS Series rated for 2000 psi (13.8 MPa) [138 bar] working pressure
- Electric model only available
- Improved design provides better dependability with reduced number of moving parts
- All models screw directly into the scrubber or can be mounted via external float chamber
- CSA C/US Class l, Div. 1, Grp. B, C & D locations
- Canadian Registration Number: MLS-020, MLS-015: 0F12013.2 C (all provinces and territories) CSA approved

MLS Series Models and Accessories

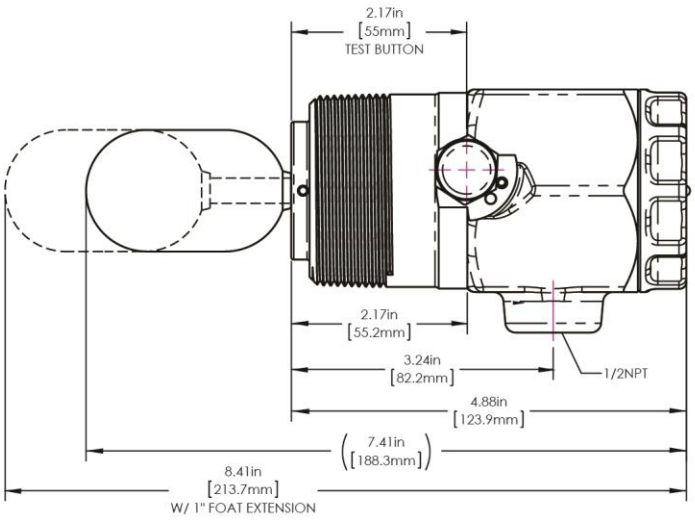
This manual covers the models and accessories listed below.

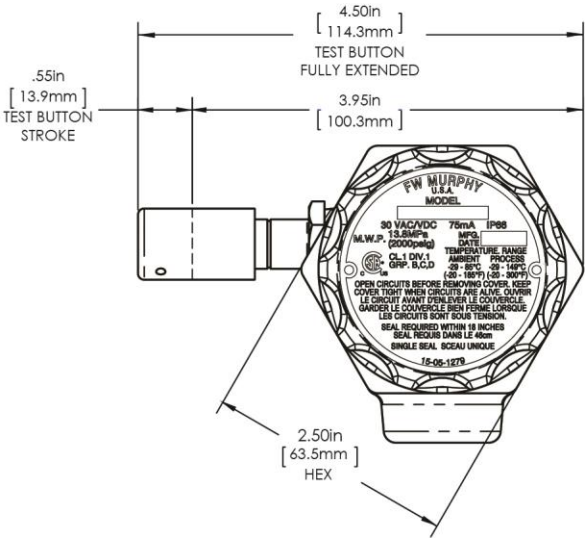
Part Number	Description	Notes
15700840	MLS-015	1-1/2 in. NPT
15700905	MLS-015-TF , with Test Function	1-1/2 in. NPT
15700839	MLS-020	2 in. NPT
15700904	MLS-020-TF, with Test Function	2 in. NPT
15700799	External Float Chamber	Operating Pressure: 2000 psi (13.8 MPa) [138 bar] Operating Temperature: 400° F (204° C)
15050375	Weld Collar	
15000892	1-inch Float Extension Kit	

MLS Diagram

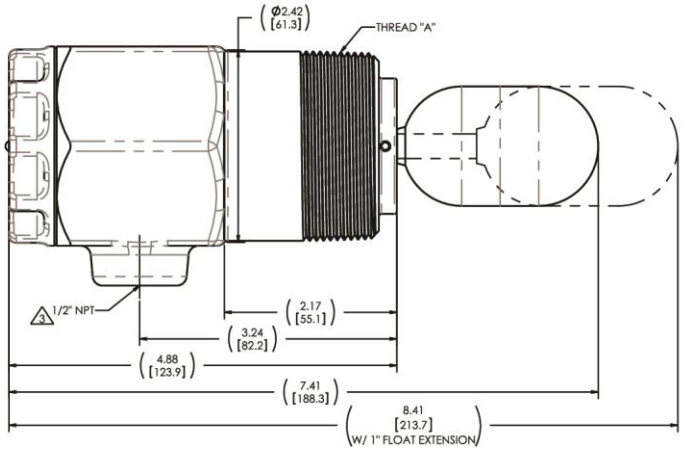
All models of the MLS Series install the same and share dimensions other than Test Button.

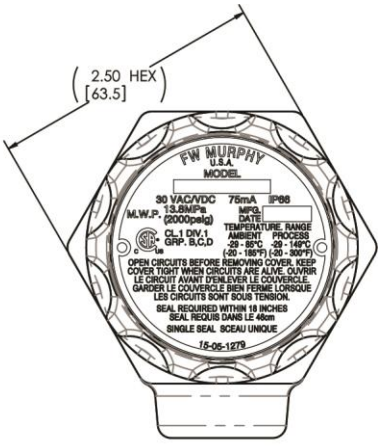
MLS (TF) Models





MLS



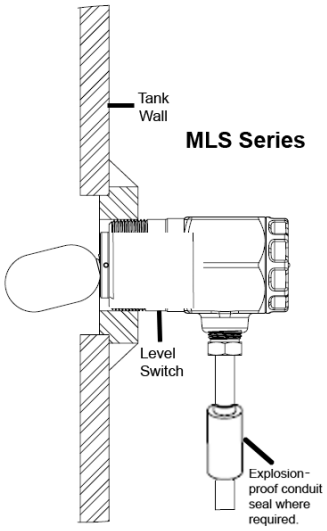


NOTE: Refer to Table 2 for clearances.

Pressure Vessel Installation

Direct Installation into the Wall of the Pressure Vessel

CAUTION: Determine that the float travel is not obstructed by the coupling in the vessel wall, internal baffles, etc.
Refer to tables 1 and 2 for application data.
INSTALLATION SHOULD BE ACCOMPLISHED BY QUALIFIED PERSONNEL ONLY.



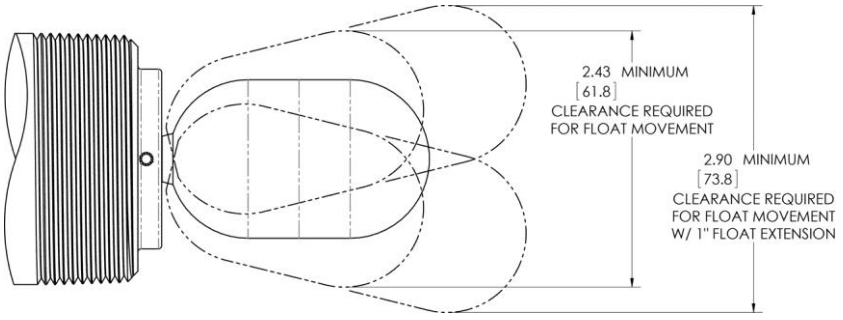
1. Make certain the float is tightly screwed onto the counter-balance.
2. Before installing the level switch, use of a pipe thread sealant is recommended. Screw the unit directly into the threaded connection in the wall of the pressure vessel.
3. Verify that the electrical connection is positioned at the bottom.

   NOTE: The word TOP is cast into the top of the body.

4. Make the electrical wiring connections according to appropriate wiring diagrams for the alarm or shutdown system to be used. The electrical connection is ½ inch-14 NPT.
5. Ensure all electrical connections are insulated and the cover is fully installed before reconnecting electrical power.
6. Verify all pressure connections are tight before pressurizing the system.

Float Clearance Reference Tables

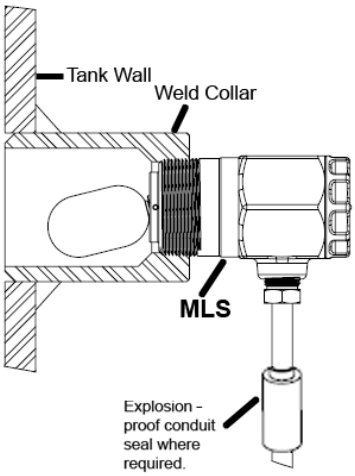
Pipe Data - Table 2				
Nom. Size (inches)	**O.D. (inches)**	**Schedule Number**	**Wall Thickness (inches)**	**Inside Diameter (inches)**
2.5	2.875	40STD	0.203	2.469
3	3.5	40STD	0.216	3.068
3	3.5	80XS	0.3	2.9
4	4.5	40STD	0.237	4.026
4	4.5	80XS	0.337	3.826



Installation with a Weld Collar

1. The weld collar, P/N 15050375, must be welded into the wall of the pressure vessel according to code standards and good welding practices.
2. Follow above instructions for installation directly into the wall of the pressure vessel.

> **NOTE:** Weld collar 15050375 is not recommended with a 1-inch float extension.



Installation Using FW Murphy External Float Chamber

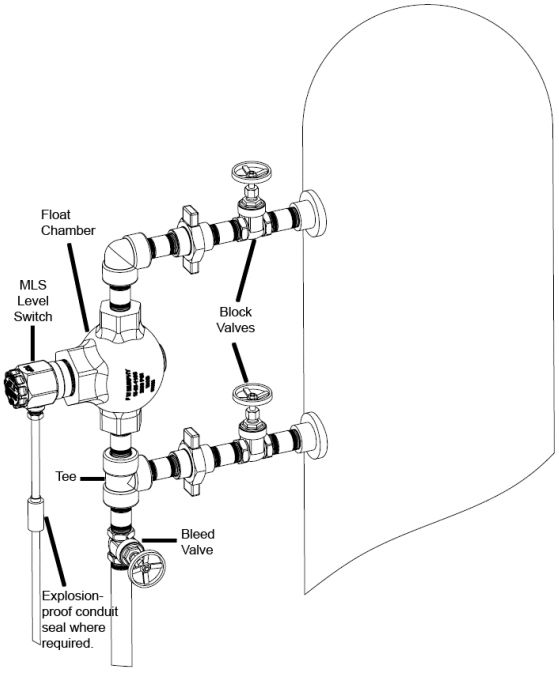
1. Install the FW Murphy float chamber 15051098 or 15700799 on the outside wall of the pressure vessel using 1" NPT piping. Position the 2-inch NPT threaded connection at the height where you want the level switch to operate. The 2-inch NPT threaded connection must be positioned away from the tank wall.

> **NOTE:** If using Float Chamber 15051098, best practices recommend a surface mount installation.

2. A tee and bleed valve are typically installed at the bottom of the lower 1-inch pipe riser to allow draining of the float chamber for servicing or replacement.

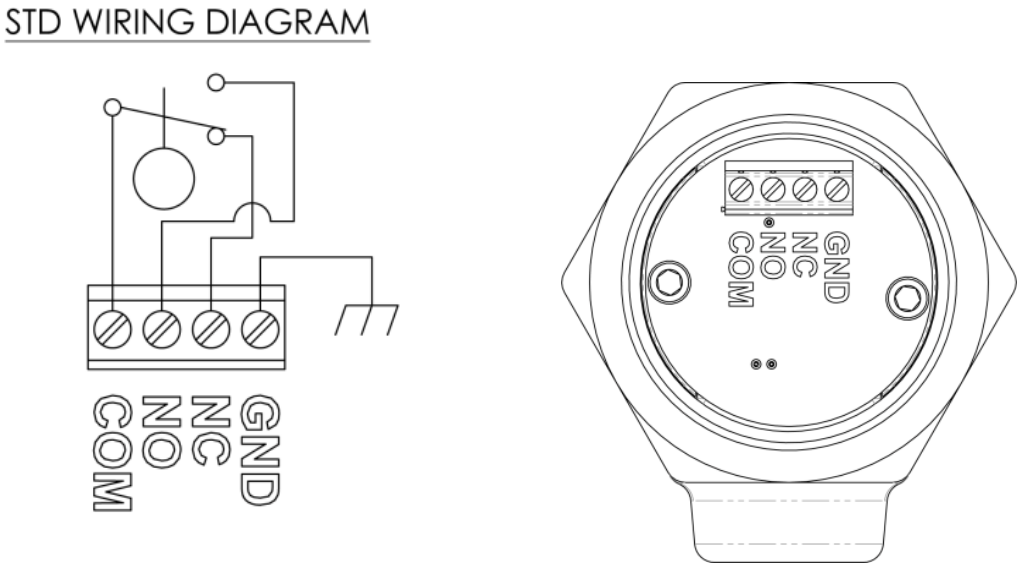
> **NOTE**: A typical installation with blocking and bleed valves is shown at right.

3. Install the MLS-020 in the 2-inch NPT connection of the float chamber. BE SURE float travel is not restricted and that the float is tight onto the counter-balance.
4. To complete the installation and wiring, follow the instructions for mounting directly into wall of the vessel and for wiring.



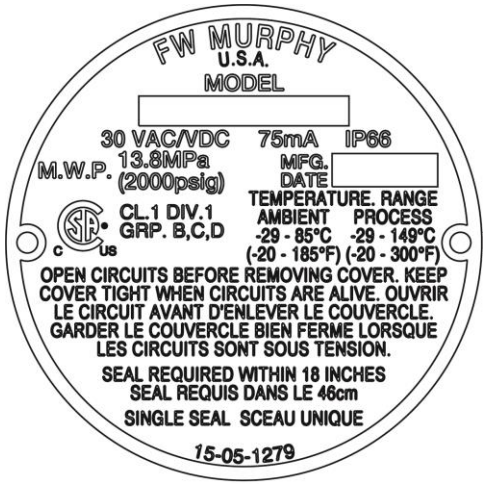
Electrical Wiring

Under Back Cover



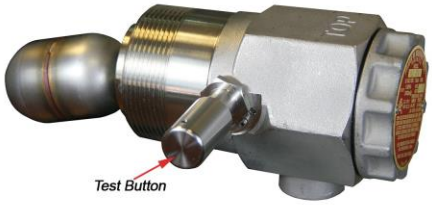
Switch Rating: 30VDC/VAC @ 75 mA

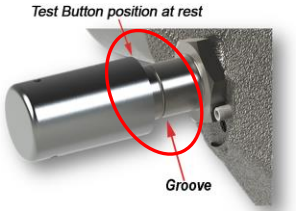
Back Cover



Testing the MLS at Routine Preventive Maintenance

Test Button – MLS TF Model Only





Considerations

The tank level can affect the test results. If the tank level is above the float, the float will already be in the up position, and the test button won't have anything to move. If the float is partially floating, you might not be able to hear the float drop.

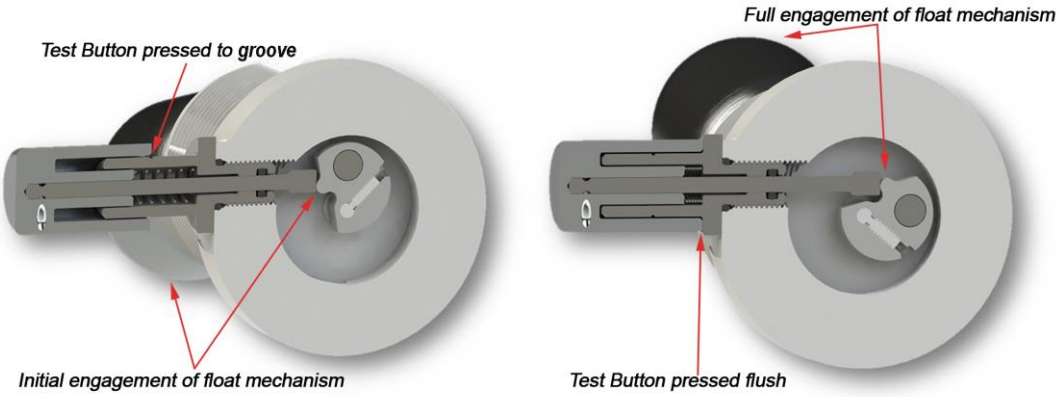
> **NOTE:** With a higher tank pressure, the Test Button will be noticeably harder to push.

Test

IMPORTANT: The panel should be in Test Mode if it is operating to avoid unintentional shutdowns during test.

This procedure tests for float function; the complete mechanism including the magnetic activation of the reed switch; and the wiring from the switch to the control panel.

1. If operating at time of testing, put the panel in Test Mode to avoid an unintentional shutdown.
2. Push the Test Button in while listening for the float to hit the top of the body.
3. Release the Test Button while listening for the float to hit the bottom of the body.
    a. When you hear the float hitting the body as you press and release the button, the float is attached and working properly.



    b. If the float is gone, the counter balance will rotate to the faulted or high level position causing the switch to trip. The MLS unit will have to be removed and repaired or replaced.
    c. As the test button is being pressed, the motion should be fairly smooth and consistent through the entire travel of the button and return. If it is not, there is a problem with the float mechanism, and the MLS unit will have to be removed and repaired or replaced.

Testing MLS Switch Manually – MLS Models

We suggest using the FW Murphy magnetized screwdriver approach to test the micro-reed switch and float position.

CAUTION: Be sure to follow hazardous area electrical procedures.

The Principle of Test Method

The reed switch in the MLS is operated by an applied magnetic field. The magnetic field is designed so that the switch will be actuated at a location further from the terminal under normal working conditions. When the float is missing, the counter balance will drop, raising the end where the float should be because of the weight of the counter balance. The movement of the counter balance will bring the magnetic field to a lower position through the mechanism. Using this approach can easily test the float status and operation of the switch.

Considerations

- Be careful not to damage or short wires connected to the MLS either at the switch or the annunciator or controller connection point (control panel).
- Check terminal connections and wiring before replacing the cover of the MLS for proper operation.

Test Preparation

1. Check the sight glass to make sure any liquid level is below the MLS. (If the float is already raised by liquid, the test procedure may suggest the float is missing and that the counter balance has forced the assembly into the high liquid level state.)
2. Make sure the area is non-hazardous, getting a hot work permit, for instance. This only needs to be done if the circuit connected to the MLS is not intrinsically safe or non-incendive.
3. Disconnect the wiring once it is de-energized to use a meter to perform the test, or use the test function of the annunciator or controller to verify switch operation.

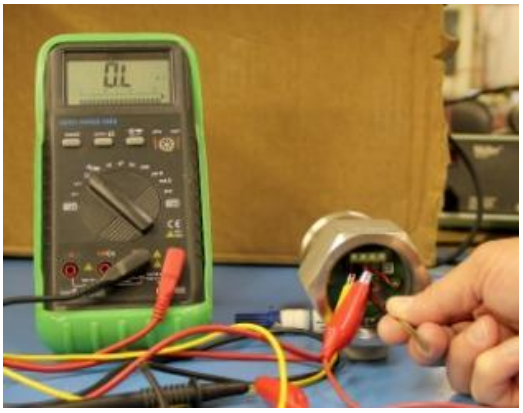
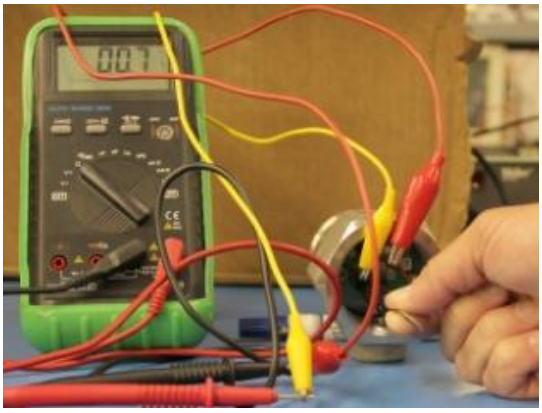
> **NOTE:** Manual testing is always used with the standard FW Murphy MLS Series Liquid Level Switches and can be used on any MLS model.

MLS Model (standard)

MLS TF Model (Optional)

Test Switch

1. Remove the cover of the MLS.
2. Place the FW Murphy magnetized screwdriver under the terminal block in the middle.
3. Adjust the position of the screwdriver down to the bottom of the circuit board until the switch changes state (see figure #1).
    a. When the meter, annunciator or controller indicates a change in the state of the switch, it is confirmed that the switch is operating normally.

1. Figure #1 Switch operates normally

Test Float

4. Place the FW Murphy magnetized screwdriver close to the terminals labeled NO and COM (see figure #2).
    a. If the meter, annunciator or controller does not indicate a change in state of the switch, the float is attached to the unit and is in the down position.
    b. If the meter, annunciator or controller indicates a change in state of the switch, the float is missing.

1. Figure #2 Float is Missing

Replacement Parts

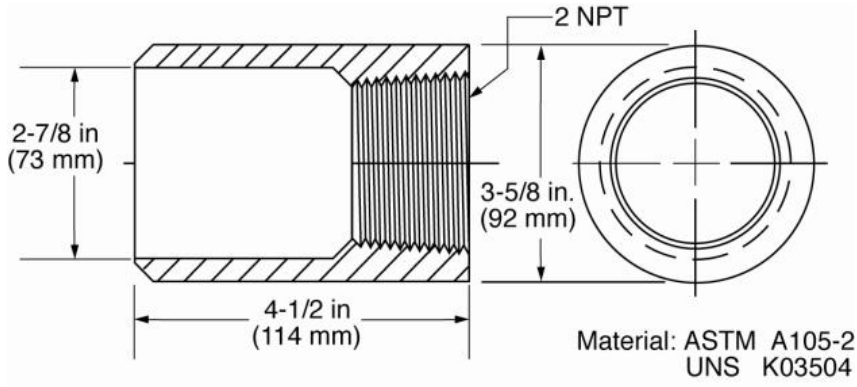
Order by part number designation.

15000531: MLS Float

Stainless Steel Float, MLS Series (not interchangeable with any other FW Murphy Level Switch Float)

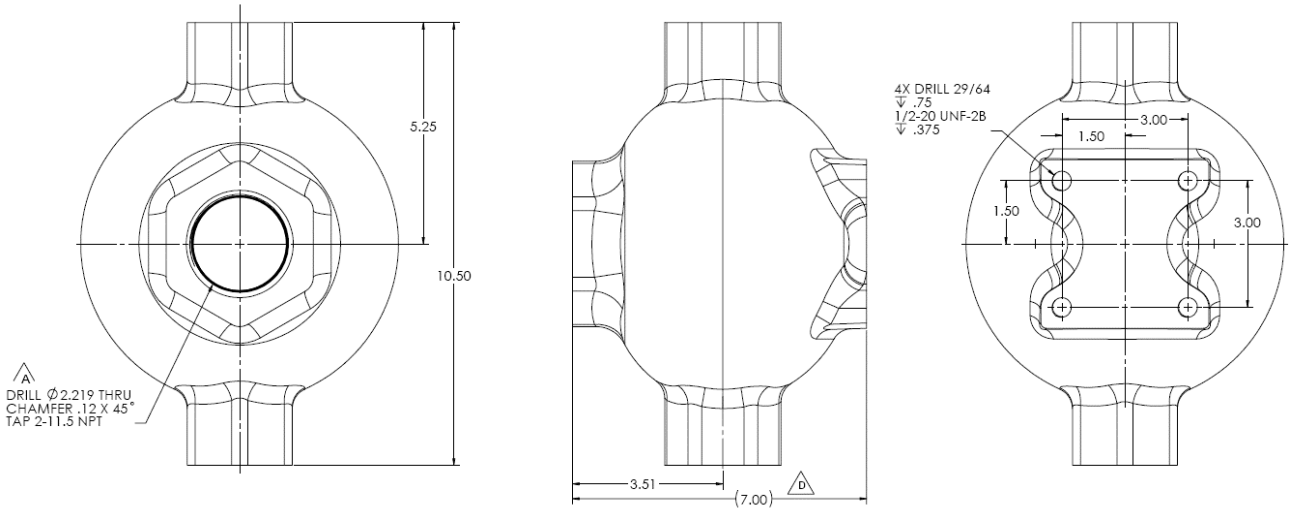
Accessories

15050375: Weld Collar



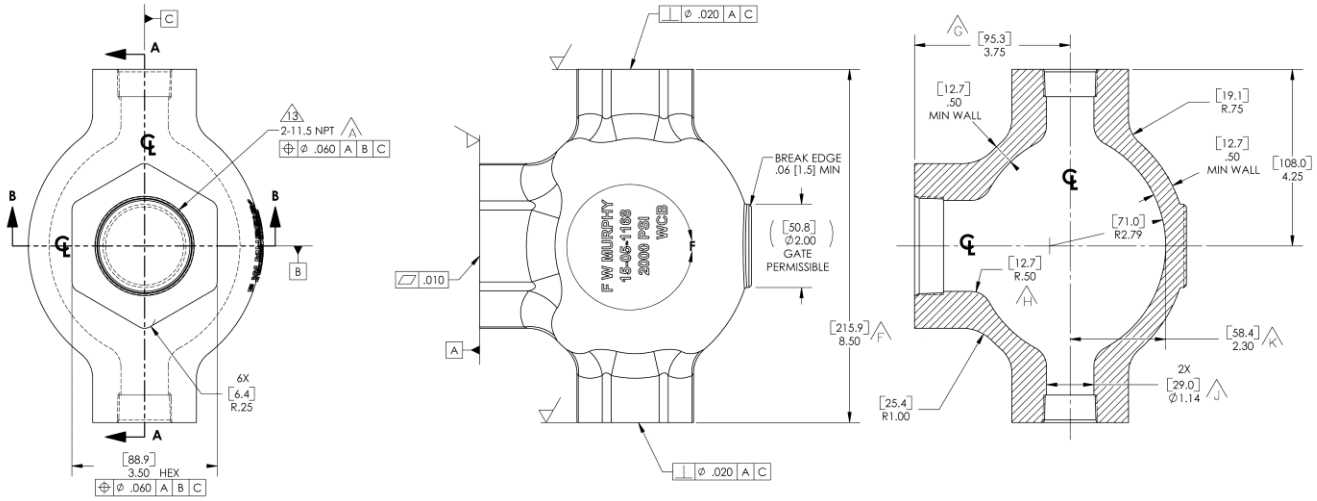
Operating pressure: 2000 psi (13.8 MPa) [138 bar]
Operating temperature: 400° F (204° C)
Not recommended with 1-inch Float Extension

15051098: External Float Chamber



Operating pressure: 2000 psi (13.8 MPa) [138 bar]
Operating temperature: 400° F (204° C)

15700799: Series 100 External Float Chamber



Operating pressure: 2000 psi (13.8 MPa) [138 bar]
Operating temperature: 400° F (204° C)

Specifications

MLS Series

Process connection: 2” NPT (MLS-020)
1-1/2” NPT (MLS-015)
Fluid Density (SG): 0.50 min. (No Extension) 0.65 min (1” Extension)
Pressure Rating: 2000 psig (13.8 MPa) [138 bar]
Materials:
Body: ASTM A351 CF8 (304 SS)
Cover: ASTM A351 CF8 (304 SS)
Other Wetted Parts: 304 or 316 SS
Process Temperature: -20 to 300° F (-29 to 149° C)
Electrical: 30VAC/VDC 75mA Form C SPDT

Approximate Shipping Weights and Dimensions

Weight: MLS-020 models, 5.5 lbs. (2.49 kg); MLS-015 models, 5 lbs. (2.27 kg)
Dimensions: 14 x 5 x 3.5 in. (356 x 127 x 89 mm)

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