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**FWMURPHY
CONTROL SYSTEMS AND SERVICES**

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FWMurphy would like to take this opportunity to thank you for purchasing your new Murphymatic® Control System. This system was designed and built by qualified engineers, and technicians, with your control requirements in mind. We use the best materials and equipment in fabricating your controls systems.

We continually strive to provide defect-free products and services on time. This dedication allows us to maintain ISO 9001 registration.

Whatever your instrumentation and automation control application needs, *FWMurphy* provides quality products and services. We are available to define your requirements, provide design solutions and customer support.

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Limited Warranty

MURPHY SWICHGAGE® and MURPHYMATIC® CONTROL SYSTEMS

This Murphy supplied product is warranted to be of good quality materials and workmanship. This limited warranty is for a period of ONE year. Any unit suspected of a quality flaw, verified by Murphy, will be either repaired or replaced, at our option, when returned to our factory, transportation charges paid. If a customer is requesting on-site service assistance for a MURPHYMATIC® control system, we will engage the proper resources to repair, adjust or replace the MURPHYMATIC® control system in accordance with our Service Philosophy and Limited Warranty. We are not responsible for damage caused by improper installation, neglect or abuse and are limited under warranty to repairing or replacing the item only and are not liable for equipment on which this product is installed.

Murphy SWICHGAGE® control instruments, MURPHYMATIC® control systems, or their parts, and supplied product shall be of kind and quality described in the

specifications as supplied and no other warranty except of title shall be implied. All other warranties, express or implied, including but not limited to warranties of merchantability or fitness for a particular purpose, are explicitly disclaimed. The liability of the company shall not in any case exceed the cost of correcting defects in the supplied product; and upon the expiration of above mentioned one year, all such liability shall terminate. The company shall not in any event be liable for indirect or consequential damages.

You have purchased dependable instrumentation and with normal care, it will provide long and faithful service, and enhance the preventive maintenance program on your valuable equipment. Any claim for shortage or damage of this shipment must be accompanied by this Packing Slip within 15 days of receipt or invoice date, whichever is later.



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In order to consistently bring you the highest quality, full featured products, we reserve the right to change our specifications and designs at any time.

Printed in U.S.A.

This Murphy supplied control device is warranted to be of good quality materials and workmanship. Murphy warrants this quality for a period of ONE FULL YEAR. (Parts and systems are code dated.) This is only a time limit extension of the standard warranty; all other statements in the Murphy Limited Warranty remain in effect.

As with any monitoring and/or control system, the purchase, installation and use of SWICHGAGE® control instruments and other Murphy Systems is NOT AN INSURANCE POLICY. It is, however, the simplest means of adding inexpensive, reliable protection—protection that is as sound as the instruments, installation, and follow-up preventive maintenance program that is applied to these instruments and to the equipment they help protect. SWICHGAGE® control instruments, properly installed and maintained, are important and effective tools in any preventive maintenance program.

All "work machines" have life signs such as pressures, temperatures, levels, and overspeed conditions. Each of these vital signs can be monitored by a SWICHGAGE® capable of accurate indication and reliable limit switching. Teamed with Murphy electrical and SELECTRONIC® components, SWICHGAGE® control instruments can constantly monitor pressures, levels, temperatures, vibration, and overspeed conditions and activate alarm and/or shutdown when preset limits are reached. As these vital signs are constantly monitored, the SWICHGAGE® control instruments and their related components must be periodically inspected,

both visually and physically. Look for frozen pointers, bad contacts, kinked or broken pressure tubing or capillaries. Check floats on Level SWICHGAGE® control instruments visually and, if possible, mechanically. Test electric circuits and move limit contacts into the operating range to see that the proper sequence of events occurs when the contacts meet.

If a SWICHGAGE®, TATTLETALE® or other component fails the visual, physical, or electrical check, then repair or replace the unit or its parts as necessary to bring it back to proper operation. When a question exists on warranty, the questionable part should be returned to the factory or affiliate company for warranty inspection. If within the warranty period the unit is found to operate improperly and it appears to be related to material quality or workmanship, Murphy will repair or replace the product. (See Warranty above.)

Murphy SWICHGAGE® control instruments, MURPHYMATIC® panels and SELECTRONIC® systems are not a substitute for, but can be important tools in, a routine preventive maintenance program. Since 1939 we have been building our worldwide reputation as the source for simple, reliable monitoring and protection, featuring simplicity of maintenance. Please refer any questions regarding tests, repair or replacement parts to the factory, your nearest affiliate company, or your authorized servicing dealer.



FW MURPHY
CONTROL & INSTRUMENTATION SOLUTIONS

DC POWER CONNECTION SOURCE

FWMurphy recommends that the power source (+ and -) connection points of any panel containing any solid state device (i.e. EMS 447, 547, C267, ASM or AS series controllers, etc.) be made directly to the terminals of the battery (+ and -). This will allow the battery to act as a filter and absorb any voltage spikes or noise generated by the alternator or other devices located on the equipment being controlled by the solid-state device. The preferred method is to tie the negative battery terminal to proper earth ground, (i.e. earth ground rod) and tie any needed frame/chassis grounds to that same point as well. Connection of power and DC common at any other point will cause increased noise susceptibility in the system. Depending on the actual configuration of the end application, this can cause various control problems, such as erratic operation, inaccurate sender/transducer readings, remote communication problems, etc.

INDUCTIVE LOADS

FWMurphy recommends that **any** inductive load tied to a solid-state output (relays, solenoids, incandescent lamps, etc.) have a reverse biased diode across the coil to snub the inductive kickback. This prevents the field collapse of the coil from damaging the solid-state output devices and keeps the DC power "clean" from spikes.

WELDING PRECAUTION

FWMurphy recommends that **no** welding take place directly on the equipment or on the equipment that is physically connected to equipment where solid state electronics are used. If welding **must** be performed on this equipment, FWMurphy recommends that the following precautions are taken to reduce the chance of the solid state electronics being permanently damaged, or damaged enough to fail at some later time. FWMurphy will not warrant any device that has been subjected to damage caused by welding.

Open the control panel and any associated sub-panels or swing panels. Disconnect power and ground connections; and all ribbon and other cable types leading to or from any solid state device (i.e. EMS 447, 547, C267, etc.). Note: Most cables should have a keyed connector for ease of reconnection, or have removable terminal blocks. Even if this is an outdoor field repair, wires should be removed from screw terminals where necessary to prevent any possibility of damage.

Attach the welders' ground clamp as close as possible to the area where the welding will occur and use the lowest feasible setting of the welding machine output. These precautions will lessen the chance that a high electrical potential will pass through or across the control panel and/or its components.

IN ORDER TO GET THE MOST RELIABLE OPERATION OUT OF A MURPHY CONTROL SYSTEM, HERE ARE A FEW WIRING TIPS.
REVISED 30 NOVEMBER, 1997

ALWAYS CONNECT POWER TO A DC CRANKING BATTERY POWERED SYSTEM DIRECTLY FROM THE CRANKING BATTERY FOR BOTH POSITIVE AND GROUND CONNECTIONS. ANY OTHER CONNECTION POINT RATHER THAN DIRECTLY FROM THE BATTERY COULD RESULT IN PROBLEMS. THERE IS A GREATER VOLTAGE DROP SEEN AT OTHER CONNECTIONS POINTS WHEN THE ENGINE IS CRANKED, THAN AT THE BATTERY.

ALWAYS INSTALL DIODES, SUCH AS 1N4005 DIODES ACROSS INDUCTIVE LOADS LIKE SOLENOID COILS AS CLOSE AS POSSIBLE TO THE COIL. THE BANDED END OF THE DIODE SHOULD BE TOWARDS THE POSITIVE SIDE OF THE COIL, OR INDUCTIVE LOAD.

ALWAYS USE SHIELDED WIRE FOR MAGNETIC PICK-UP, AND ANALOG WIRING. GROUND THE DRAIN WIRE (SHIELD) AT THE PANEL, ONLY.

PLEASE TRY TO INSURE THE FOLLOWING SEPARATION OF WIRING BY USING MULTIPLE RUNS OF CONDUIT. HERE ARE THE LEVELS OF SEPARATION FROM NOISIEST TO THE WEAKEST VICTIM. SOME OF THIS SEPARATION IS REQUIRED BY CODES AND RECOMMENDED PRACTICES. IN ANY CASE, THIS IS EXPLAINED WITH THE IDEA THAT AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE.

1. IGNITION WIRING, THE "G" LEAD, AND CD IGNITION FUEL VALVE WIRING
2. AC WIRING
3. DC POWER WIRING (MAGNETIC PICK-UP CAN BE RUN WITH THIS, BUT IT MUST BE IN SHIELDED CABLE).
4. ANALOG SIGNALS, LIKE 4-20 MILLIAMPS AND SENDER SIGNALS. (MAGNETIC PICK-UP WIRING CAN BE RUN WITH THIS, BUT IT MUST BE IN SHIELDED CABLE).
5. THERMOCOUPLE WIRING (MUST USE SHIELDED THERMOCOUPLE GRADE EXTENSION WIRE FOR THE PROPER TYPE (TYPICALLY J & K))
6. SENSOR WIRES THAT ARE EITHER "NON-INCENDIVE" FOR CLASS I, DIVISION 2, OR "INTRINSICALLY SAFE" FOR CLASS I, DIVISION 1

GENERAL WIRING PRECAUTIONS

There are several precautions you can take on initial installation to reduce chances of failure over time. Many of these steps may take a few extra minutes to do at the time of installation; however, they can also save many headaches in the future. We strongly recommend that you follow these precautionary steps.

1. **Suppression Diodes**

Place suppression diodes across all inductive loads. These loads typically include pilot relays, solenoid valves, starter solenoids, etc. This helps increase contact life and eliminate a source of electrical interference.

2. **Wire power leads directly to battery Post.**

When hooking your power supply to your Test- Off - Auto switch (AUTOMATIC MODE) or OFF-ON switch (MANUAL MODE), run you're wiring directly to the battery post. This helps minimize noise generated from battery chargers and alternators.

3. **Pilot excessive loads.**

Many of the outputs on the EMS Controller are rated for low current, control type loads. Do not run high current loads directly to the unit.

4. **Use stranded wire for hookup.**

Solid wire transmits vibration and is more likely to crystallize and break when it is subjected to movement.

5. **Separate AC and DC wiring.**

Never run AC and DC handling wiring together. AC signals may get coupled into the control circuits leading to erratic operation.

6. **Wire standby battery charger directly to battery.**

Standby chargers must be wired directly to the battery. Failing to do this may result in erratic operation due to electronic "noise" coupled into the microprocessor.

7. **Special precautions for spark ignition engines.**

Magnetos and ignition coils produce high voltage and cause high frequency interference. The EMS Controller is designed to filter out much of this interference; however, precautions must be taken to protect the unit. Sender and shutdown wiring must be routed away from the magneto and spark coil wiring. Resistor spark plugs and spark plug wires reduce electrical interference and may also be required in especially "noisy" environments.

8. **Use shielded cable on magnetic pickup.**

Shielded cable is recommended for connecting the magnetic pickup to the EMS Controller. This helps prevent signal loss and the possible coupling of electrical interference into the relatively sensitive speed sensing circuit. The shield should only be grounded on one end.

Remember, proper care during installation will help your EMS Controller live a long and trouble-free operating life. If for any reason you have questions during installation, feel free to give us a call.

Installation Instructions for Level Maintainers

Model Series LM300

LM-92164N
Revised 08-02
Section 15
(00-02-0176)



Read the following instructions before installing. A visual inspection of this product for damage during shipping is recommended before mounting. These installation instructions are intended for all LM300 series models.

GENERAL INFORMATION

WARNING

BEFORE BEGINNING INSTALLATION OF THIS 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.

LM300: Level Maintainer only (no switches).

LM301: Low switch contacts for low level shutdown or alarm. Four wires, SPDT.

LM302: Two switches for low and high level shutdown or alarm. Four wires, DPST, wired N.O. in normal operating ranges.

LM303: Two switches for low and high level shutdown or alarm. Four wires, DPST, wired N.C. in normal operating ranges.

LM304: Two switches. Alarm before shutdown on low level and shutdown on low-low level. Four wires, DPST, wired N.O. in normal operating ranges.

LM305: Two switches. Alarm before shutdown on low level and shutdown on low-low level. Four wires, DPST, wired N.C. in normal operating ranges.

Specifications

Case/Cover: Die cast aluminum.

Switch Housing: Aluminum.

Approval Rating: LM301 thru LM305 : CSA certified^{††} for non hazardous locations. Enclosure Type 4 certified.

LM301-EX thru LM305-EX: CSA certified^{††} for Class I, Groups C and D: Class II, Groups F and G hazardous locations. Enclosure Type 4 certified.

Float: Rigid polyurethane foam. Polyurethane coated.

Maximum Ambient Temperature: 250°F (121°C)

Oil Inlet Connection: Top entry 1/2-14 NPT with built-in filter screen (removable for cleaning).

Inlet Orifices: 1/4 in. (6 mm) standard. 1/8 in. (3 mm) available.

Wire (switch models): 18 AWG x 13 in. (1.0 mm² x 330 mm).

Maximum Inlet Pressure (MIP):

Max. Differential: 2 in. (51 mm) between running and stationary oil level. 30 psi (207 kPa) [2.07 bar].

with 1/8 in. (3 mm) orifice.

15 ft. oil (4.6 m oil)

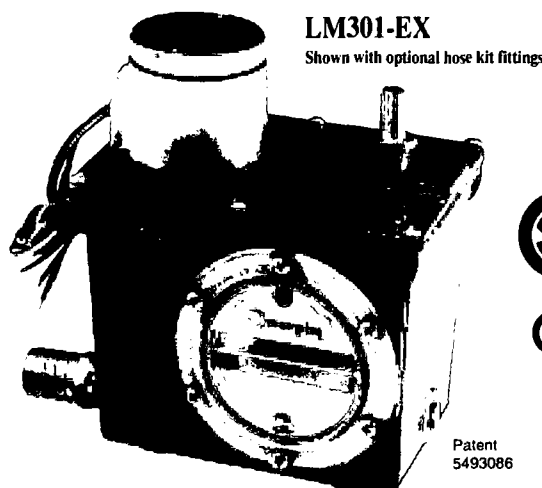
with 1/4 in. (6 mm) orifice.

Maximum Case Pressure (MCP): 15 psi (103 kPa) [1.03 bar].

Orifice Seal[†]: Buna-N Thumb-ValveTM

Switch Contact: Silver, SPDT snap acting, 10A @ 125, 250VAC; 10A @ 30VDC.

(1 only for low level; 2 only for high & low; or 2 only for low with alarm before shutdown)



LM301-EX

Shown with optional hose kit fittings



Patent
5493086

Outlet Connection: 3/4-14 NPT left side, right side, and bottom.

Crankcase Balance Vent Fitting: 1/2-14 NPT.

Mounting: Accepts Murphy pipe mounting or universal mounting brackets.

Lens: Clear "Frog Eye" non-staining, high impact, high temperature nylon; UV and heat stabilized.

Dial: High visibility white background with green and white "index" lines for normal level indication.

Test Knob: Rotate to test switch operation. Turn clockwise for low level test and turn counterclockwise for high level test.

Flow Rate Test: Using SAE 30 @ 32°F (0°C).

Orifice Diameter	Pressure	Flow Rates
1/4 in.* (6 mm)	4 ft. oil - 15 ft. oil (1.2 m oil - 4.6 m oil)	4.7 GPH - 31.0 GPH (17.8 LPH - 117.3 LPH)
1/8 in. (3 mm)	10 psig - 30 psig (68.9 kPa - 207 kPa) [.69 - 2.07 bar]	16.9 GPH - 32.1 GPH (63.7 LPH - 121.5 LPH)

*Standard

NOTE: Friction losses due to piping NOT considered.

Optional Hose Kit: 15000355

Quantity	Description
1	1/2 in. (13 mm) I.D. x 3 ft. (914 mm) long hose
1	1 in. (25 mm) I.D. x 3 ft. (914 mm) long hose
2	1/2 in. (13 mm) worm gear clamp
2	1 in. (25 mm) worm gear clamp
2	1/2 NPT x 1/2 in. (13 mm) barbed fitting
2	3/4 NPT x 1 in. (25 mm) barbed fitting

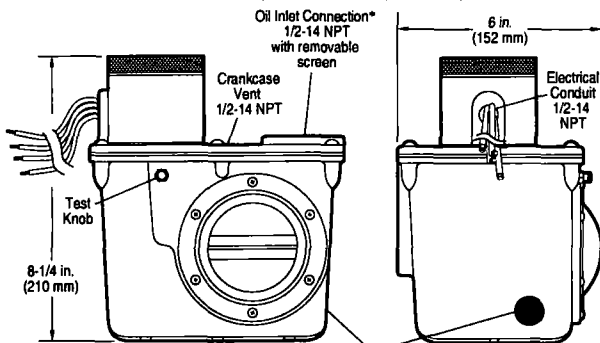
^{††}CSA certified with switch contacts rated at 10 A @ 250 VAC (standard).

** Products covered by this bulletin comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility except as noted.

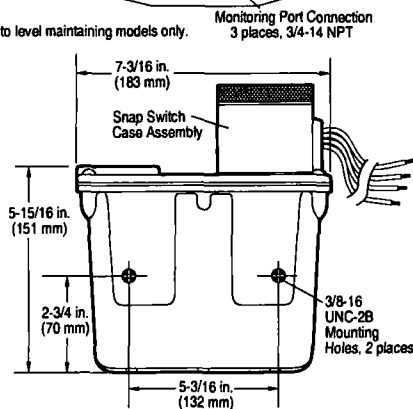
DIMENSIONS

LM300 Series Enclosures

The dimensions below are for the optional -EX model enclosure. The standard model enclosure dimensions are the same except the height and width which are: 7 in. (178 mm) H, 7-7/8 in. (200 mm) W.



*Applies to level maintaining models only.

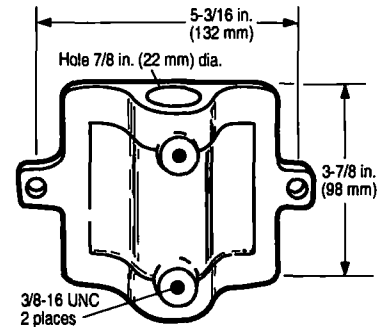


Mounting Brackets with Hardware

15000371 pipe bracket

Additional Hardware Supplied

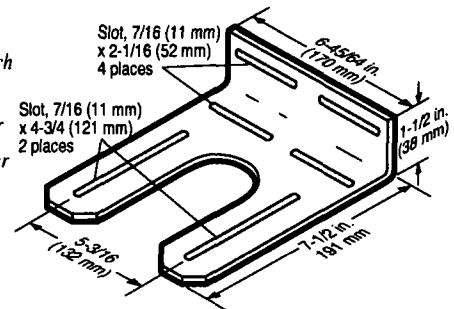
- (4) 3/8-16 UNC x 1 inch (25 mm) screws
- (4) 3/8-16 nut
- (4) 3/8 I.D. lock washer
- (2) 3/8 I.D. flat washer



15000370 universal bracket

Additional Hardware Supplied

- (2) 3/8-16 UNC x 1 inch (25 mm) screws
- (4) 3/8 I.D. flat washer
- (2) 3/8 I.D. lock washer
- (2) 3/8-16 nut



TYPICAL INSTALLATION

Mounting (all LM300 Series models)

NOTE: Mount the LM300 series level maintainers as close as possible to the crankcase. Also, excessive vibration can cause overflow. Be sure mounting brackets are supported.

The following instructions are based on the usage of the pipe and universal mounting brackets shown above.

Pipe Bracket Mounting

1. Mount a nominal 1/2 inch (21 mm) diameter pipe to the deck of the engine.
2. Install the pipe bracket to the LM300 using two 3/8-16 UNC x 1 inch bolts supplied. See Figure 1A.
3. Slip the LM300 onto the pipe and install the two adjustment bolts. Each adjustment bolt consists of a 3/8-16 UNC x 1 inch bolt and two nuts. See Figure 1B. **DO NOT** tighten the adjustment screws too tightly because you will have to adjust the LM300 later in the installation process.

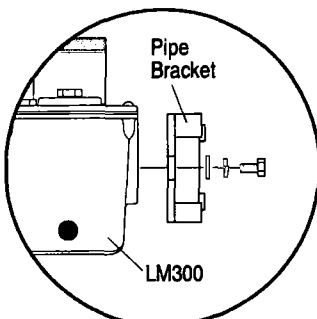


Figure 1A

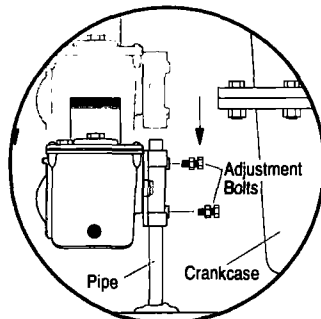


Figure 1B

Mounting with Universal Bracket

The universal bracket has two mounting methods: deck mounting and pan mounting.

Deck Mounting

1. Install the universal bracket to the deck as shown in Figure 2A with two flat washers and two 3/8 inch (10 mm) diameter bolts (not supplied).

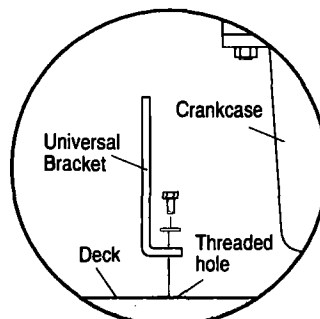


Figure 2A

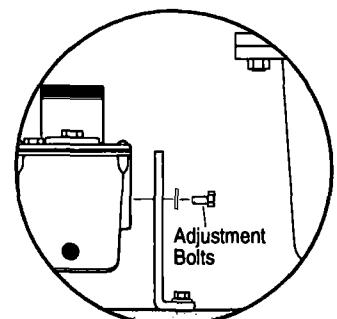


Figure 2B

2. Mount the LM300 to the universal bracket using two 3/8-16 UNC x 1 inch (25 mm) bolts supplied (Figure 2B). **DO NOT** tighten the adjustment screws too tightly. You will have to adjust the LM300 later in the installation process.

Crankcase (Oil Pan) Mounting

1. Install the universal bracket to the crankcase using the existing crankcase bolts (Figure 3A). Crankcase bolt diameter must be no larger than 7/16 inch (11 mm).

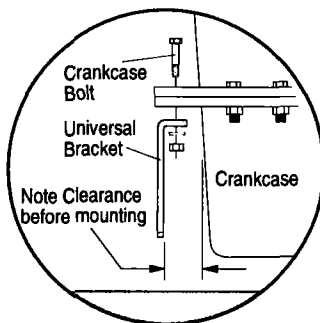


Figure 3A

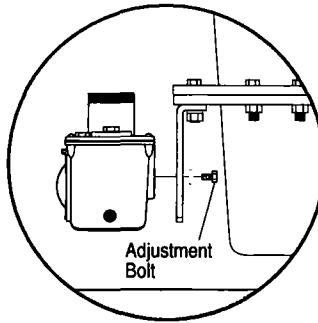


Figure 3B

NOTE: Check clearance between crankcase and mounting bracket before installing the mounting bracket. If space between the crankcase and mounting bracket does not allow installation and access to the adjustment bolts advance to Step 3.

2. Mount the LM300 to the universal bracket using two 3/8-16 UNC x 1 inch bolts supplied. **DO NOT** tighten the adjustment bolts too tight. You will have to adjust the LM300 later in the installation process.
3. If space between the crankcase and mounting bracket is narrow, install the universal mounting bracket to the LM300 before installing to the crankcase oil pan.

Connecting Fittings and Hoses

The following instructions are for all LM300 series level maintainers. All steps that reference oil inlet or oil supply tank **DO NOT** apply to non-level-maintaining models. Also, these instructions are based on the Murphy optional hose kit described on page 1. If you did not order the optional hose kit, gather the hoses, clamps and fittings as specified in the optional hose kit.

1. Install the LM300 fittings in their proper locations. **NOTE:** Apply a sealant such as teflon, to all threaded connections.
2. Attach the 1 inch (25 mm) diameter, flexible monitoring hose to the crankcase and the monitoring port on the LM300. See Figure 4. **CAUTION:** The hose must slope slightly downward from the LM300 and **MUST NOT** have any droop or low spots.

NOTE: If the drain plug on the crankcase is used for the connection, we recommend installation of a tee to allow draining of the crankcase for service.

3. Install the 1/2 inch (13 mm) I.D. x 3 ft. (914 mm) hose to the vent connection on the LM300 to the vent connection on the crankcase. See Figure 4. **The vent connection on the crankcase must be well above the regulated oil level.** All hoses must be clear of obstructions.

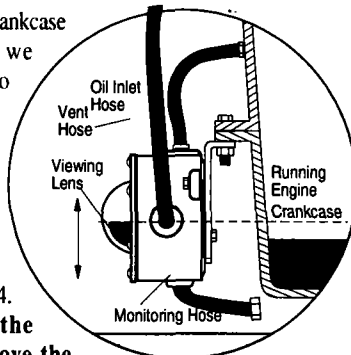


Figure 4

BEFORE CONTINUING, VERIFY THAT ALL HOSE CLAMPS ARE TIGHT.

4. Fill the crankcase to the proper oil levels. With the engine running and warm, loosen the mounting bracket adjustment bolts and adjust the LM300 so that the oil level in the sight gauge is aligned with the white "index line" on the dial (Figure 4). Tighten the adjustment bolts securely.

Connecting the LM300 to an Oil Supply Tank (level maintaining models only)

1. Remove the caplug from the oil inlet connection. Be sure the filter, inside the connection, is clear of debris. Install the oil inlet connection.
2. Connect a 1/2 inch I.D. (13 mm) or larger hose to oil inlet fitting on the LM300 and to the shutoff valve on the oil supply tank. See Figure 5. The hose must maintain a downward slope and not have low spots or droops. Maximum head pressure rating using standard 1/4 in. (6 mm) orifice is 15 ft. (4.6 meters). See Flow Rate test on page 1 for additional orifice pressure ratings.
3. Before filling the supply tank with oil, be sure the tank is clean and dry and the shutoff valve is closed. Also, be sure all hoses and clamps are tight. Fill the tank with **CLEAN** oil.

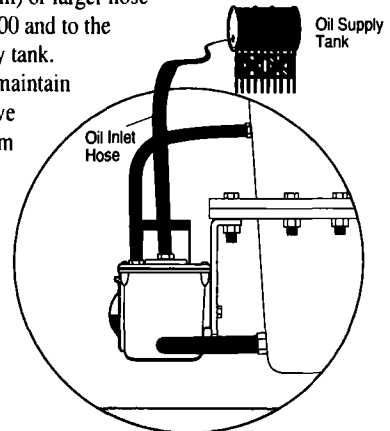


Figure 5



WARNING: Overfill condition can be caused by excessive inlet pressure, (maximum inlet pressure depends on orifice), and/or improper "vent to crankcase" installation. See Flow Rate Test on page 1 for maximum pressure.

4. After oil supply tank is full, open the shutoff valve.

Next, make the proper electrical connections for the application. See contact ratings on page 1 and schematics on page 4.

Switch Test (switch models only)

To test the shutdown and/or alarm functions perform the following:

1. Unscrew protective boot from test knob. **IMPORTANT:** Always replace boot after testing.
2. Turn the test knob 1/4 turn to the right (clockwise), for low test indication (Figure 6).
3. Turn the knob 1/4 turn to the left (counterclockwise), for high test indication. **DO NOT FORCE THE TEST KNOB TO TURN.**

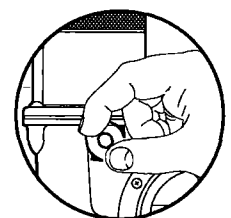


Figure 6

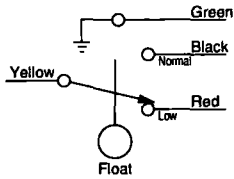
NOTE: After the engine shuts down, you will notice that the oil in the sight gauge glass will rise above normal running level, possibly showing an overfill condition. This is a result of "drain-back" to the engine crankcase and it is normal. Therefore, on models LM302 and LM303 it may be necessary to wire the high level shutdowns into a class "B" or "C" (bypass until first time safe) lockout, so as to allow a permissive start. After the engine is re-started the level will pull down to the normal running level and the shutdown features will be active. A modulating valve (Thumb-Valve™) in the level maintaining models will allow oil usage to be made-up continuously during operation.

SWITCH WIRING DIAGRAMS

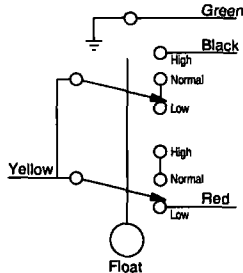


WARNING: DISCONNECT ALL ELECTRICAL POWER BEFORE CONNECTING ANY WIRES.

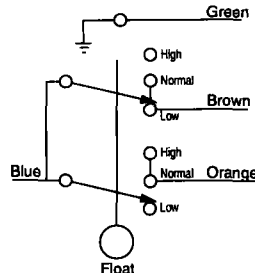
LM301 SPDT



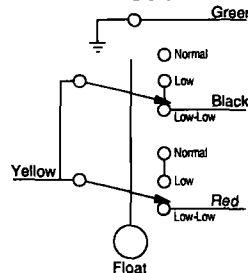
LM302 High/Low N.O. DPST



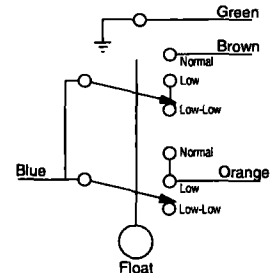
LM303 High/Low N.C. DPST



LM304 Alarm before shutdown N.O. DPST



LM305 Alarm before shutdown N.C. DPST



OPERATING RANGES OF SWITCHES

This section applies only to models that have built-in switches. The illustrations below and to the right show the dials and their operating ranges of the switches. If levels are within the designated zones the switch(es) will activate. **Notice** that a switch is capable of activating approximately 3/8 in. (10 mm) from the top of the high zone and 3/8 in. (10 mm) from the bottom of the low zone. The dial in **Figure 9** shows that if level continues to drop into the low-low zone, a shutdown will occur.

NOTE: Color zones on dial face show approximate normal operating zones. Actual conditions may vary depending upon operating characteristics of the engine. Placement of the LM300 according to the above instructions will compensate for these conditions.

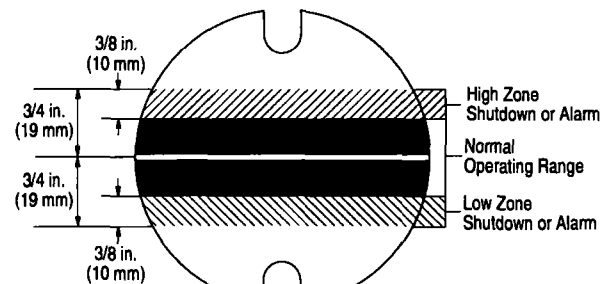


Figure 8: LM302/LM303

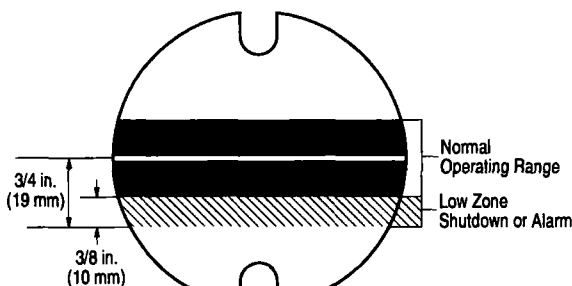


Figure 7: LM301

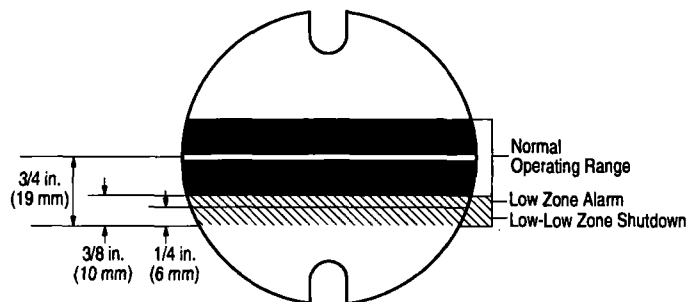


Figure 9: LM304/LM305

Warranty

A two-year limited warranty on materials and workmanship is given with this Murphy product. Details are available on request and are packed with each unit.



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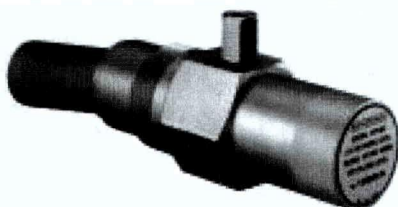
Level Controls for Scrubbers

FWMurphy

Model L1200 Float Operated Electric



Model L1200N Float Operated Pneumatic



Model L1200NDVOR Float Operated Pneumatic with Dump Valve Operator, Pressure Regulator and Gage



Model L1200NDVO Float Operated Pneumatic with Dump Valve Operator



**Products covered by this bulletin comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility except as noted.

L1200 Series

Patents 3970099, 4505288, 4573489

- BUOYGLAS™ Float Operates to 0.5 Specific Gravity
- Stainless Steel Models Meet NACE Requirements and Carry Canadian Registration Numbers
- Models Rated for 2000 psi (13.8 MPa) [138 bar] Vessels
- Models Listed for Class I, Division 1 Locations

L1100 and L1200 Series Level Switches

These float operated level switches are available in electric and pneumatic models. They are primarily designed for high level applications but models are available for low level. Electric models are listed for Class I, Division 1, Groups C & D hazardous locations. Models are available in all stainless steel to NACE standard MR-01-75 for direct exposure to H₂S service. These level switches have screw-in connections for direct installation or an optional external float chamber is available for the L1200 series high pressure versions. The high pressure versions of both L1100 and L1200 series are rated for 2000 psi (13.8 MPa) [138 bar] operating pressure. See the specifications sections of this bulletin for further details.

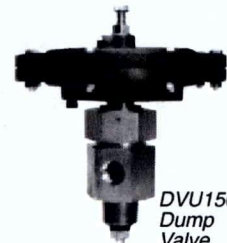
NOTE: All stainless steel versions of L1100, L1200, L1200N, L1200NDVO, and L1200NDVOR series carry Canadian Registration Number OF1476.2.

Application: L1100 and L1200 Series

Designed primarily for gas compressor scrubber level. Low pressure models can be used anywhere level switching of a non-pressurized vessel is required. Electric models are typically used for high level shutdown of the engine or electric motor, while pneumatic models operate vessel dump valves such as Murphy DV-series. Models designed for low level switching have been used for fuel, lube oil, hydraulic oil, etc.

DV Series Dump Valves

The DVU150, DVU175, DVU2105/2115/2120 are pneumatically controlled dump valves. These valves open and close automatically by pneumatic control from an L1200NDVO or similar dump valve operator. Diaphragm actuated, the DV series valves operate at 30-70 psi (207-483 kPa) [2.07-4.83 bar] with up to 2000 psi (13.7 MPa) [137 bar] vessel pressure. A pop up button indicates valve open/closed.



DVU150
Dump
Valve

Primarily engineered for compressor scrubbers, these valves can be applied to any liquids dumping job that is compatible with the valves materials, pressure limit and flow rates.

SLS02 MURPHYMATIC® Scrubber System

A complete MURPHYMATIC® system for automatic level control of condensate in scrubbers, including periodic dumping and high level shutdown, is available as a complete package from Murphy. All wetted metal parts are electroless nickel plated or stainless steel. The SLS02 scrubber system includes:
(Includes L1200, L1200NDVOR, and DVU valve)

SLS02A: Includes DVU150 valve

SLS02C: Includes DVU175 valve

SLS02BA: Includes DVU2105 valve

SLS02BB: Includes DVU2115 valve

SLS02BC: Includes DVU2120 valve

-LR: Less Regulator option



Specifications	L1100	L1111	L1150	L1200	L1250	L1200N	L1200NDVO	L1200NDVOR
Body								
• Standard: Electroless Nickel plated steel	x ^A	x ^A	x ^A	x ^B	x ^B	x ^B	x ^B	x ^B
• Optional: 316 Stainless Steel†	x ^A	x ^A	x ^A	x ^B	x ^B	x ^B	x ^B	x ^B
Pressure Rating								
• 15 psi (103 kPa) [1.03 bar] Polyethylene Float			x		x			
• 1500 psi (10.3 MPa) [103.42 bar] Stainless Float	x	x		x		x	x	x
• 2000 psi (13.8 MPa) [138 bar] BUOYGLAS™ Float	x	x		x		x	x	x
Temperature Rating								
• Standard: -20/175°F (-29/79°C)			x		x			
• Standard: -20/300°F (-29/149°C)	x	x		x		x	x	x
• Optional: -20/400°F (-29/204°C)*	x			x		x	x	x
Specific Gravity								
• Standard: 0.5 with BUOYGLAS™ float	x	x		x		x	x	x
• Optional: 0.65 with 304 Stainless Steel†	x			x		x	x	x
• Standard 0.73 Polyethylene Float			x		x			
Electrical								
• Standard SPDT: 5 A @ 125/480 VAC (see p. 3 for full ratings)	x	x	x	x	x			
• Optional DPDT: 10 A @ 250 VAC (see p. 3 for full ratings)	x	x	x	x	x			
Wire: 18 AWG x 36 in. (1.0 mm ² x 914 mm)	x	x	x	x	x			
O-Rings: Viton	x	x	x	x	x	x	x	x
Valve: Two-way snap-action vent type • 1/8 in. (3 mm) orifice w/Viton "A" seat • 1/8 NPT inlet; 1/4 NPT outlet • 30-70 psi (207-483 kPa) [2.07-4.83 bar] operating pressure						x	x	x
Dump Valve Operator: Operates Murphy DV Series dump valves or similar.							x	x
Pressure Regulator/Filter and Murphy 20BPG: 0-75 psi (0-517 kPa) [0-5.17 bar] pressure gauge. Maximum input 300 psi (2.07 MPa) [20.68 bar].								x
Operation: H=For high level, L=For low level	H	L	H	H	H	H	H	H

^A = 1-1/2 NPT

^B = 2 NPT

† Meets NACE standard MR-01-75 for direct exposure to H₂S service.

* Not available with DPDT snap-switch.

SLS02 Scrubber System

Patent No. 4505288

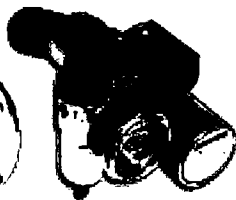
- High Level Shutdown •
- High Level Dump Valve •
- High Level Dump Valve Operator •



High Liquid Level Shutdown Switch (L1200)
Patent No. 3970099



MURPHY NU-MATIC™ Dump Valve (DVU150/175/2105/2115/2120)



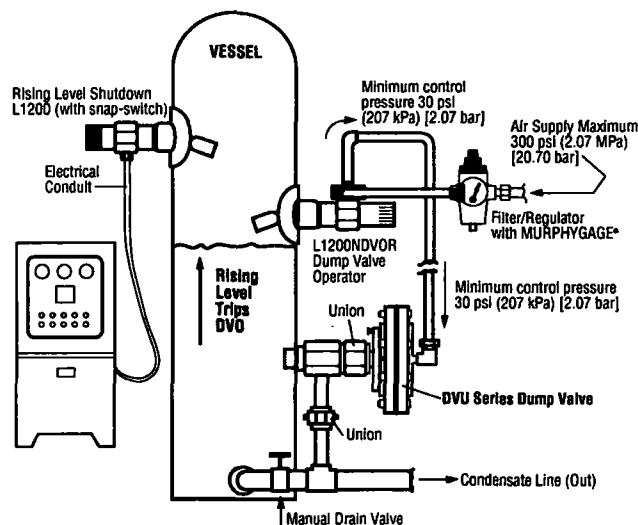
MURPHY NU-MATIC™ Dump Valve Operator (L1200NDVOR)
Patent No. 3970099

SLS02 System Operation

As condensate rises in the scrubber, the float on the L1200NDVOR rises and trips it's pneumatic valve. The valve opens allowing pressure to enter the dump valve pilot chamber. Once the pressure enters the pilot chamber it forces the diaphragm and valve stem forward thus opening the valve seat and releasing condensate through the valve stem and out the drain. As the condensate level drops, the L1200N pneumatic valve closes to shut off the pressure to the dump valve causing it to close.

If for any reason the condensate continues to rise beyond normal dump levels, the L1200 operates the alarm and/or shuts down the equipment.

The MURPHYGAGE® and Filter/Regulator on the L1200NDVOR helps keep the control pressure clean and dry. It also allows operator to adjust pressure to recommended level.



Dimensions

L1100 and L1200

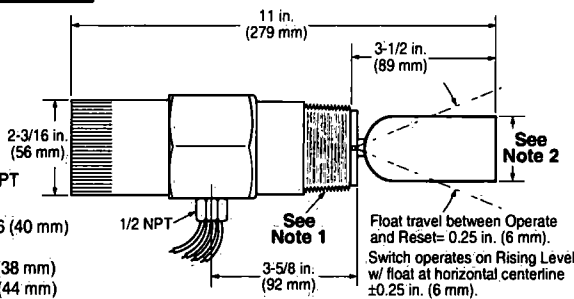
Note 1:

L1100: 1-1/2 NPT
L1200: 2 NPT

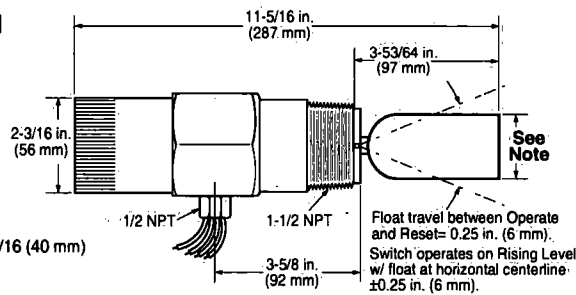
Note 2: 1-9/16 (40 mm)

SF option:

L1100: 1-1/2 (38 mm)
L1200: 1-3/4 (44 mm)

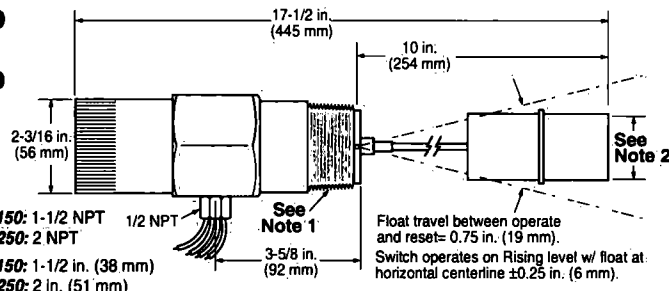


L1111

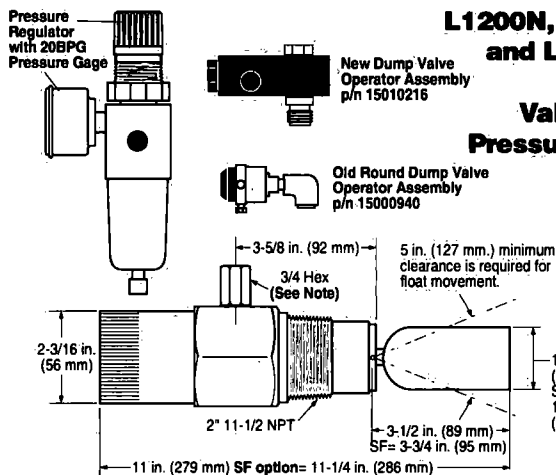


Note: 1-9/16 (40 mm)

L1150 and L1250



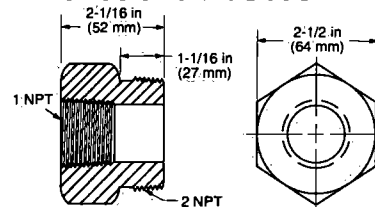
Note 1: L1150: 1-1/2 NPT
L1250: 2 NPT
Note 2: L1150: 1-1/2 in. (38 mm)
L1250: 2 in. (51 mm)



Note: For use only with Old Round Dump Valve Operator Assembly (15000940).

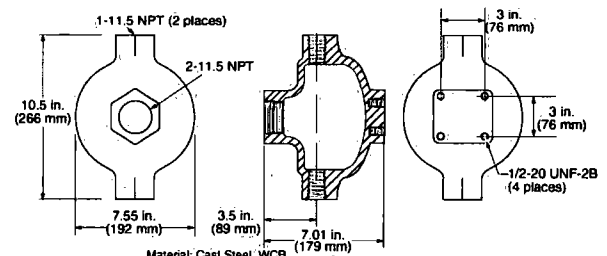
Accessories

Adaptor Bushing 55050617 for DVU150 and DVU175



Material: 2-1/2 Hex bar stock C.R.S.

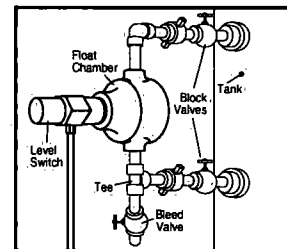
Float Chamber 15051098



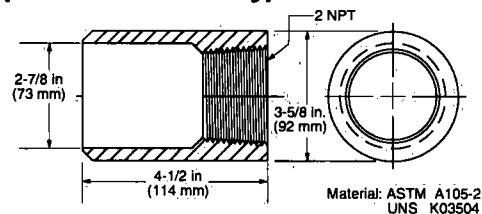
Material: Cast Steel, WCB

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

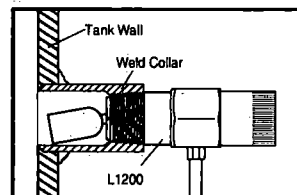
Typical L1200/L1200N Float Chamber Installation



Weld Collar 15050375 (use with L1200 only)



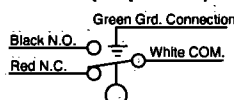
Typical L1200 Weld Collar Installation



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

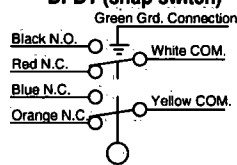
Wiring

SPDT (snap-switch)



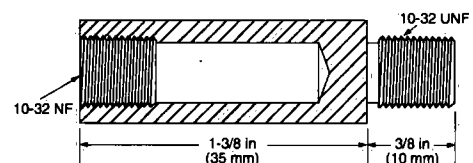
Switch Rating: 5 A @ 125-250-480 VAC
1/2 A @ 125 VDC
1/4 A @ 250 VDC
2A @ 6-30 VDC Resistive
1A @ 6-30 VDC Inductive

DPDT (snap-switch)



Switch Rating: 10 A @ 125-250 VAC
1/2 A @ 125 VDC
1/4 A @ 250 VDC
10 A @ 6-24 VDC Inductive/Resistive

Float Shaft Extension 15000892



Material: AISI 304, UNS-S30400

NOTE: The extension is used with the L1100 and L1200 only. One extension is supplied with each unit. Use of additional extensions is not recommended as they reduce the ability of the unit to operate for the stated specific gravity.

How to Order

L1100 and L1200 Series

Build a complete model number using the diagram below. See example. See Specifications Chart on page 2 for standard and optional features.

Example model number

L1100 -

Options
D = DPDT
K = KALREZ Seals
SF = Stainless Steel Float
400 = 400°F (204°C) Service**

Base Models	
L1100*	L1100SS
L1111	L1111SS
L1150	L1150SS
L1200*	L1200SS*
L1250	L1250SS
L1200N*	L1200NSS*
L1200NDVO*	L1200NSSDVO*
L1200NDVOR*	L1200NSSDVOR*

*Stainless steel models carry Canadian Registration Number OF1476.2.

**Not available with DPDT snap-switch.

Complete SLS02 Systems

Specify

SLS02A: Includes DVU150 valve

SLS02C: Includes DVU175 valve

SLS02BA: Includes DVU2105 valve

SLS02BB: Includes DVU2115 valve

SLS02BC: Includes DVU2120 valve

-LR: Less Regulator option

Accessories (order by part number designation)

15050375: Weld collar

15000892: Float shaft extension

55050617: DVU150/DVU175 adaptor bushing 2 NPT-M to 1 NPT-F

15051098: External Float Chamber

Warranty

A two-year limited warranty on materials and workmanship is given with this Murphy product. Details are available on request and are packed with each unit.

Replacement Parts (order by part number designation)

L1100/L1200

15000893: *BUOYGLAS™ float*

15000894: *Stainless Steel float for L1200*

15000937: *Stainless Steel float for L1100*

15000124: *SPDT snap-switch assembly*

15010213: *L1100 counter balance assembly*

15010214: *L1200 counter balance assembly*

L1200N

15050420: *Cam spring return*

15050421: *Cam*

15000893: *BUOYGLAS™ float*

15000894: *Stainless steel float for L1200N*

15050453: *Valve stem*

15010189: *Counter balance assembly*

L1200NDVO and L1200NDVOR

55050621: *Regulator only*

05706499: *20BPG-D-75 psi (0-517 kPa) [0-5.17 bar]*

15010216: *DVOA assembly (New rectangular style)*

15000940: *DVO assembly (Old round style)*

00003341: *Filter for regulator*

00003340: *Regulator diaphragm kit*

Shipping Weights

L1100: 6 lb. (2.7 kg).

L1111: 5 lb. 11 oz. (2.5 kg).

L1150: 5 lb. 4 oz. (2.3 kg).

L1200: 6 lb. 6 oz. (2.8 kg).

L1250: 6 lb. 6 oz. (2.8 kg).

L1200N: 5 lb. 5 oz. (2.4 kg).

L1200NDVO: 5 lb. 14 oz. (2.6 kg).

L1200NDVOR: 6 lb. 10 oz. (3 kg).

SLS02: 19 lb. 6 oz. (8.7 kg).

Shipping Dimensions

L1100: 14 x 5 x 3-1/2 in. (356 x 127 x 89 mm).

L1111: 14 x 5 x 3-1/2 in. (356 x 127 x 89 mm).

L1150: 14 x 5 x 3-1/2 in. (356 x 127 x 89 mm).

L1200: 14 x 5 x 3-1/2 in. (356 x 127 x 89 mm).

L1250: 14 x 5 x 3-1/2 in. (356 x 127 x 89 mm).

L1200N: 14 x 5 x 3-1/2 in. (356 x 127 x 89 mm).

L1200NDVO: 14 x 5 x 3-1/2 in. (356 x 127 x 89 mm).

L1150NDVOR: 10 x 9-1/2 x 6 in. (254 x 241 x 152 mm).

SLS02: 15 x 15 x 12 in. (381 x 381 x 305 mm).



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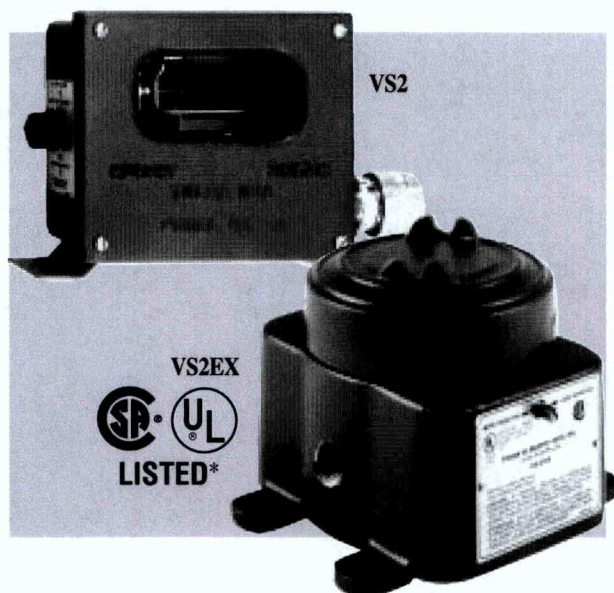
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In order to consistently bring you the highest quality, full featured products, we reserve the right to change our specifications and designs at any time.

Shock and Vibration Switch



VS2 Series

- Designed to Detect Shock/Vibration in 3-Planes of Motion
- Fully Adjustable
- Includes Magnetic Latching Feature
- Manual or Electric Reset

Description

The VS2 Series switches are shock sensitive mechanisms for shutdown of engine or electric motor powered equipment. These switches use a magnetic latch to ensure reliable operation. Explosion-proof "EX" models for hazardous locations are available.

Applications

Ideal for use on engines, pumps, compressors, heat exchangers and pumping units, the VS2 Series can be used anywhere shutdown protection from damaging shock/vibration is desired. Switches are field adjustable to sensitivity required in each application.

Specifications

VS2 and VS2C

Case: Equal to NEMA 3R. Suitable for non-hazardous areas.

VS2: Base mount

VS2C: C-clamp mount, includes 45 ft. (13.7 m) 2-conductor cable, and 5 cable clamps.

Contacts: SPDT-double make leaf contacts, 5A @ 480 VAC.

VS2EX

Case: Base mount, explosion-proof aluminum alloy housing; meets NEMA 7/IP50 specifications; Class I, Division 1, Groups C & D; UL and CSA listed.*

Snap-switches: 2-SPDT snap-switches; 5A @ 480 VAC;* 2A resistive, 1A inductive, up to 30 VDC.

Normal Operating Temperature: -40 to 140°F (-40 to 60°C).

VS2EXR

Case: Same as VS2EX.

Snap-switch: 1-SPDT snap-switch and reset coil; 5A @ 480 VAC;* 2A resistive, 1A inductive, up to 30 VDC.

Remote Reset : 115 VAC or 24 VDC (specify).

VS2EXRB

Case: Explosion-proof aluminum alloy housing; rated Class I, Division 1, Group B hazardous areas.

Snap-switch: 1-SPDT snap-switch with reset coil (option available for 2-SPDT switches); 5A @ 480 VAC; 2A resistive, 1A inductive, up to 30 VDC.

Remote Reset: 115 VAC or 24 VDC (specify).

Basic Operation

Pushing the reset button moves the tripping latch into a magnetically held position. A shock/vibration will move the magnet beyond this holding position, thus freeing the spring loaded tripping latch to transfer the contacts and shutdown the machinery (see dimensional diagrams in the following pages for visual representation of parts).

Remote Reset Option (VS2EXR and VS2EXRB)

The remote reset option includes a built-in electric solenoid which allows reset of tripped unit from a remote location. Available for 115 VAC or 24 VDC.

Warranty

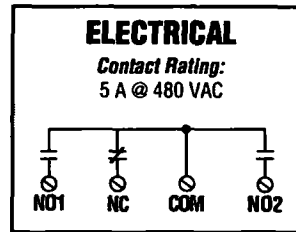
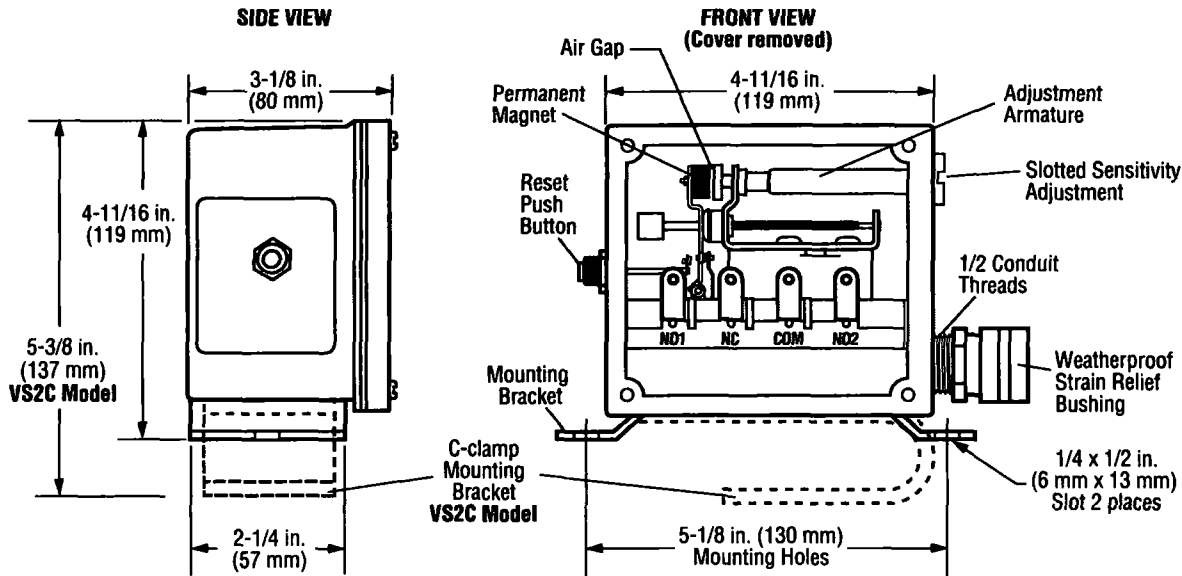
A limited warranty on materials and workmanship is given with this FWMurphy product. A copy of the warranty may be viewed or printed by going to www.fwmurphy.com/warranty.asp.

*CSA and UL listed with 480 VAC rating.



VS2 and VS2C

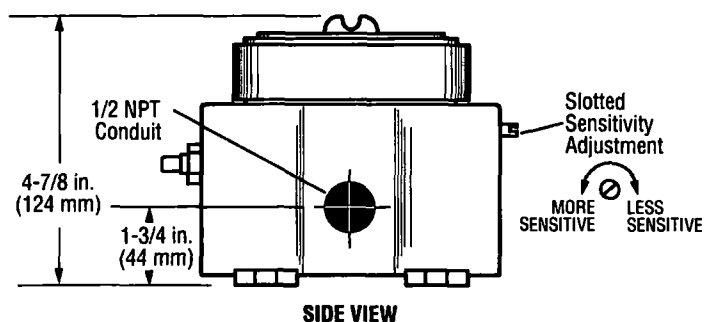
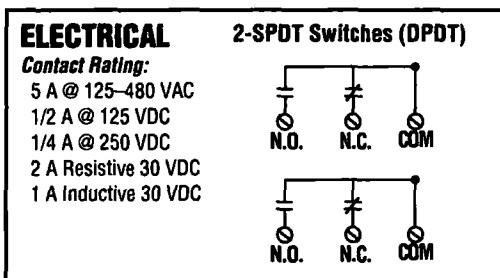
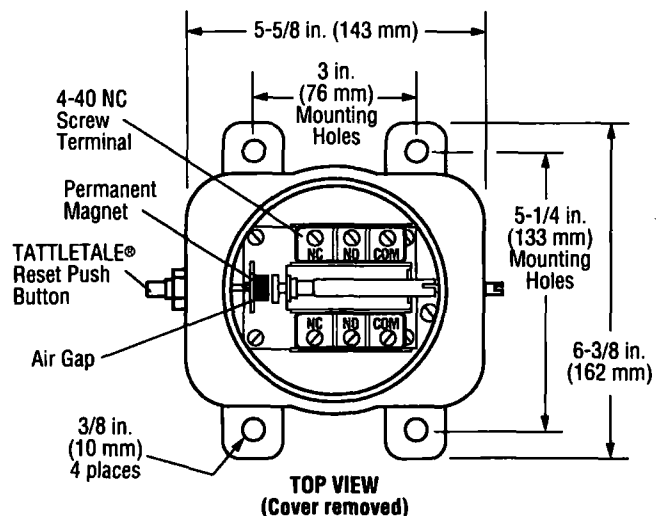
The VS2 and VS2C are designed for use in non-hazardous locations. They have leaf type SPDT, double make contacts that can be used for shutdown and/or alarm. They have a slotted sensitivity adjustment located on the side of the case (see drawing below).



VS2EX

- NEMA 7/IP50 Specifications
- Snap-switch Contacts
- TATTLETALE® Reset Button

Model VS2EX is housed in an explosion-proof enclosure with threaded cover. This enclosure is CSA and UL listed for Class I, Division 1, Groups C & D hazardous locations. In place of the leaf type contacts, 2-SPDT snap-switches are used in this model. Sensitivity is externally adjustable and, when tripped, the VS2EX gives a TATTLETALE® indication on the reset button. It is constructed to meet NEMA 7 specifications.



VS2EXR

- Remote Reset Feature
- NEMA 7 Specifications
- Snap-switch Contacts
- TATTLETALE® Reset Button

Model VS2EXR features an electric remote reset feature in addition to the TATTLETALE® reset button. The VS2EXR uses only one SPDT snap-switch and is CSA and UL listed for Class I, Division 1, Groups C & D hazardous locations. It is constructed to meet NEMA 7 specifications.

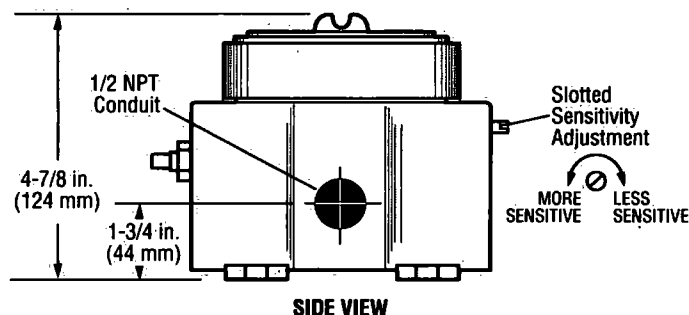
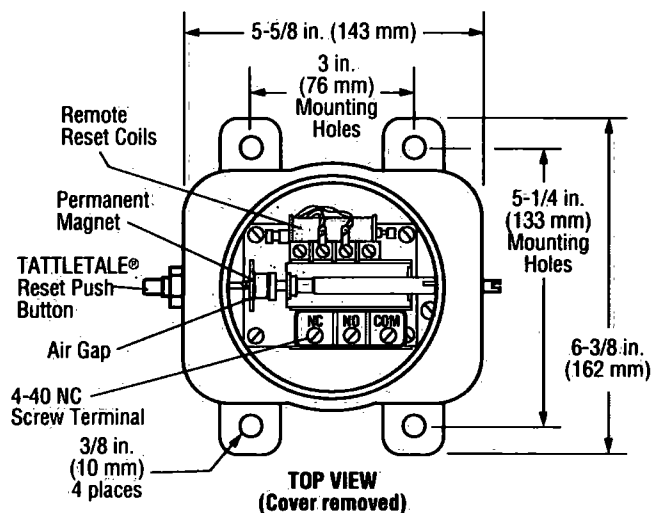
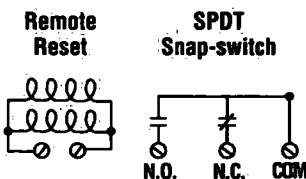
ELECTRICAL

Contact Rating:

5 A @ 125-480 VAC
1/2 A @ 125 VDC
1/4 A @ 250 VDC
2 A Resistive 30 VDC
1 A Inductive 30 VDC

Remote Reset Rating:

115 VAC or 24 VDC (Specify)
350 mA AC/DC



VS2EXRB

- For Group B Locations
- Snap-switch Contacts
- DPDT Feature Optional
- TATTLETALE® Reset Button

Model VS2EXRB is constructed for use in Class I, Division 1, Group B, hazardous locations. It has, as standard, a SPDT snap-switch and an electric remote reset. Option is available for DPDT snap-switch.

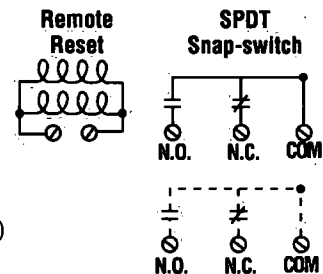
ELECTRICAL

Contact Rating:

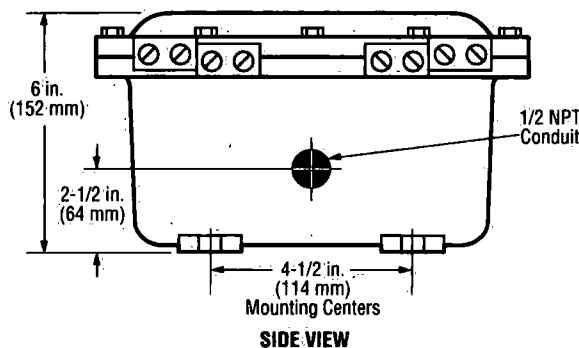
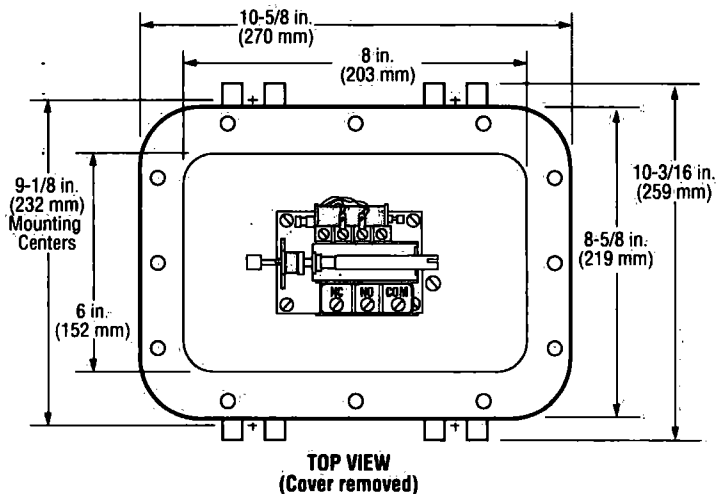
5 A @ 125-480 VAC
1/2 A @ 125 VDC
1/4 A @ 250 VDC
2 A Resistive 30 VDC
1 A Inductive 30 VDC

Remote Reset Rating:

115 VAC or 24 VDC (Specify)
350 mA AC/DC

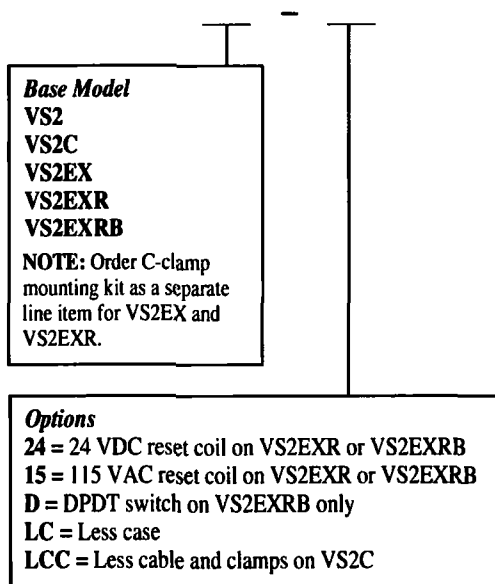


Option SPDT Snap-switch (DPDT)



How to Order

To order your VS2 Series model use the diagram below.
Part number example: **VS2EXR-24**



Shipping Information

VS2 and VS2C

Shipping Weight:

VS2: 2 lb 8 oz. (1.1 kg)

VS2C: 7 lb (3.2 kg)

Shipping Dimensions:

VS2: 8-1/4 x 9-1/4 x 5 in. (210 x 235 x 127 mm)

VS2C: 12 x 7 x 5-1/2 in. (305 x 178 x 140 mm)

VS2EX

Shipping Weight: 4 lb 8 oz. (2 kg)

Shipping Dimensions: 8-1/4 x 9-1/4 x 5 in. (210 x 235 x 127 mm)

VS2EXR

Shipping Weight: 5 lb 8 oz. (2.2 kg)

Shipping Dimensions: 8-1/4 x 9-1/4 x 5 in. (210 x 235 x 127 mm)

VS2EXRB

Shipping Weight: 17 lb 8 oz. (7.9 kg)

Shipping Dimensions: 12 x 12 x 10 in. (305 x 305 x 254 mm)

Service Parts

When ordering service parts, specify both part number and description in listing below.

PART NO. DESCRIPTION

VS2 and VS2C

20-00-0030	Movement assembly
20-00-0031	Glass and gasket assembly
20-00-0032	Reset push button assembly
20-05-0021	Mounting clamp
20-00-0261	Cable clamp assembly (1 each)
20-05-0465	2-Conductor electrical cable, 45 feet (13.7 meters)
20-00-0137	5 clamps and 45 feet (13.7 meters) of cable

VS2EX

20-01-0091	Movement assembly
20-05-0087	Cover
00-00-0309	Cover gasket
20-01-0090	Snap-switch and insulator kit (1 switch per kit) prior to September 1, 1995.*
20-00-0288	Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.*
20-00-0289	C-clamp conversion mounting kit

VS2EXR

20-00-0262	Movement assembly
20-05-0087	Cover
00-00-0309	Cover gasket
20-01-0090	Snap-switch and insulator kit (1 switch per kit) prior to September 1, 1995.*
20-00-0288	Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.*
20-00-0049	Reset solenoid assembly (115 VAC)
20-00-0234	Reset solenoid assembly (24 VDC)
20-00-0289	C-clamp conversion mounting kit

VS2EXRB

20-01-0090	Snap-switch and insulator kit (1 switch per kit) prior to September 1, 1995.*
20-00-0288	Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.*
20-00-0057	Inside snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D prior to September 1, 1995.*
20-00-0058	Outside snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D prior to September 1, 1995.*
20-00-0287	Inside snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D manufactured on September 1, 1995 or later.*
20-00-0290	Outside snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D manufactured on September 1, 1995 or later.*
20-05-0077	Adjustment shaft
20-00-0262	Movement assembly
20-00-0049	Reset solenoid assembly (115 VAC)
20-00-0234	Reset solenoid assembly (24 VDC)

* Models with date 0895 and before use old switch. Dated 0995 after, use straight snap-switch arm, no rollers.



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In order to consistently bring you the highest quality, full featured products, we reserve the right to change our specifications and designs at any time.

Printed in U.S.A.

Shock/Vibration Control Switches Installation Instructions

Models: VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94



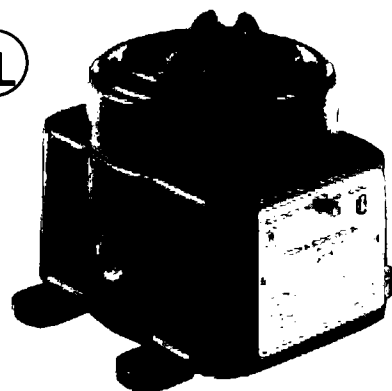
Please read the following instructions before installing. A visual inspection of this product for damage during shipping is recommended before mounting. It is your responsibility to have a qualified person install the unit, and make sure installation conforms with NEC and local codes.

GENERAL INFORMATION

WARNING

BEFORE BEGINNING INSTALLATION OF THIS 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.



Model VS2EX

Description

The Murphy shock and vibration switches are available in a variety of models for applications on machinery or equipment where excessive vibration or shock can damage the equipment or otherwise poses a threat to safe operation. A set of contacts is held in a latched position through a mechanical latch and magnet mechanism. As the level of vibration or shock increases an inertia mass exerts force against the latch arm and forces it away from the magnetic latch causing the latch arm to operate the contacts. Sensitivity is obtained by adjusting the amount of the air gap between the magnet and the latch arm plate. Applications include all types of rotating or reciprocating machinery such as cooling fans, engines, pumps, compressors, pump jacks, etc.

Models

VS2: Base mount; non hazardous locations.

VS2C: C-clamp mount; non hazardous locations.

VS2EX: Explosion-proof; Class I, Div. 1,
Groups C and D*

VS2EXR: Explosion-proof with remote reset.

VS2EXRB: Explosion-proof; Class I, Div. 1, Group B*; with
remote reset.

VS94: Base mount; non hazardous locations, NEMA 4.

Remote Reset Option (VS2EXR, VS2EXRB and VS94 only)

Includes built-in electric solenoid which allows reset of tripped unit from a remote location. Standard on VS2EXR and VS2EXRB. Optional on VS94 (options listed below).

-R15: Remote reset for 115 VAC

-R24: Remote reset for 24 VDC

Time Delay Option (VS94 only)

Overrides trip operation on start-up. For VS94 series models, the delay time is field-adjustable from 5 seconds up to 6-1/2 minutes with a 20-turn potentiometer (15 seconds per turn approximately). Options listed below:

-T15: Time delay for 115 VAC

-T24: Time delay for 24 VDC

Space Heater Options (VS94 only)

This optional space heater board prevents moisture from condensing inside the VS94 Series case. Options listed below:

-H15: Space heater for 115 VAC

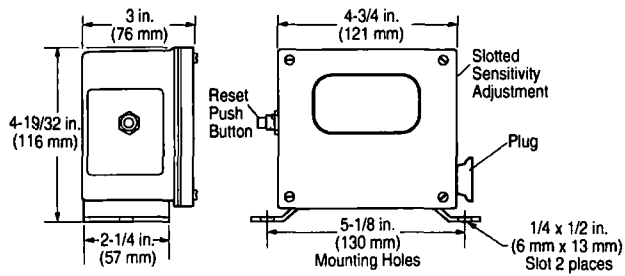
-H24: Space heater for 24 VDC

Warranty

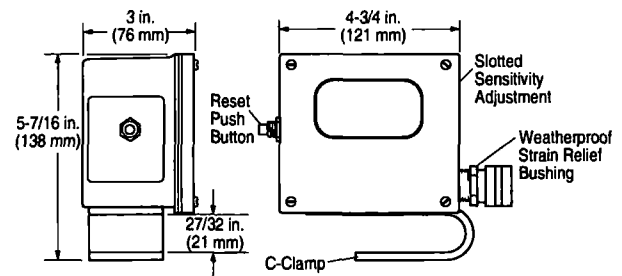
A two-year limited warranty on materials and workmanship is provided with this Murphy product. Details are available on request and are packed with each unit.

DIMENSIONS

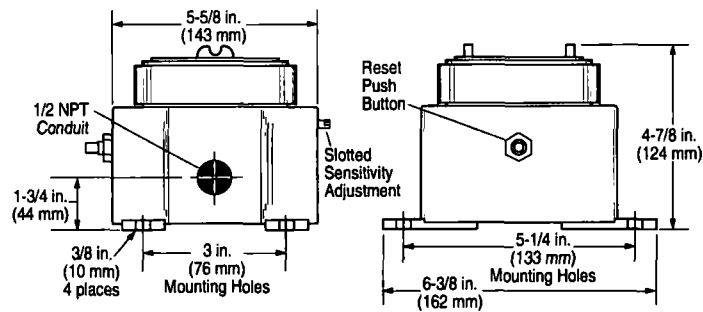
VS2



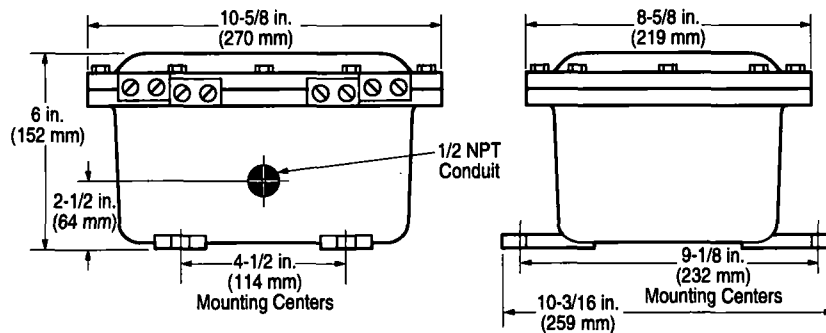
VS2C



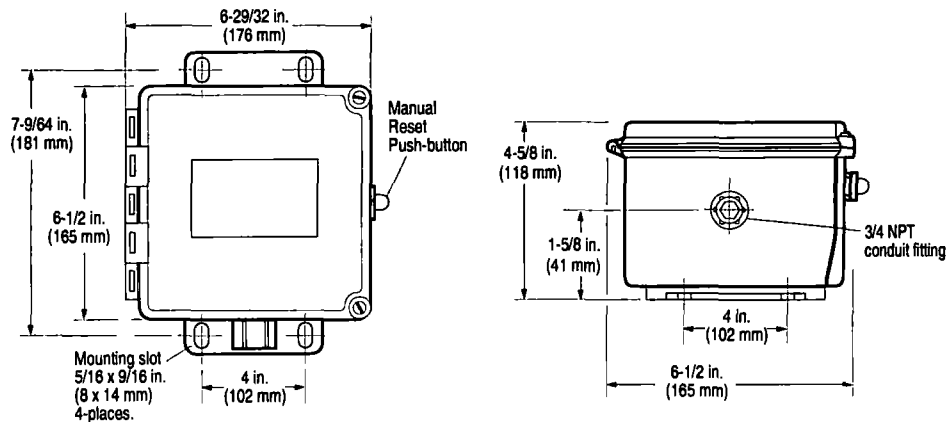
VS2EX and VS2EXR



VS2EXRB



VS94



SPECIFICATIONS

VS2 and VS2C

- **Case:** Weatherproof (equal to NEMA 3R) suitable for non-hazardous areas.
VS2: *Base mount*
VS2C: *C-clamp mount. Includes 45 feet (13.7 meters), 2-conductor 16 AWG, 30 strands/0.25 mm strand dia. (1.5 mm²) cable, and five cable hold down clamps.*
- **Contacts:** SPDT double make leaf contacts, 5A @ 480 VAC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.

VS2EX

- **Case:** Explosion-proof and weatherproof aluminum alloy housing; meets NEMA 7 specifications; Class I, Division 1, Groups C & D; UL and CSA listed*
VS2EX: *base mount.*
- **Snap-switches:** 2-SPDT snap-switches; 5A @ 480 VAC,*
2A resistive, 1A inductive, up to 30 VDC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.

VS2EXR

- **Case:** Same as VS2EX.
- **Snap-switch:** 1-SPDT snap-switch and reset coil; 5A @ 480 VAC,* 2A resistive, 1A inductive, up to 30 VDC.
- **Remote Reset (optional):**

<i>Option</i>	<i>Operating Current</i>
-R15:	350 mA @ 115 VAC
-R24:	350 mA @ 24 VDC
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.

VS2EXRB

- **Case:** Explosion-proof aluminum alloy housing; rated Class I, Division 1, Group B hazardous areas.
- **Snap-switch:** 1-SPDT snap-switch with reset coil (option available for additional SPDT switch); 5A @ 480 VAC; 2A resistive, 1A inductive, up to 30 VDC.

Remote Reset:(optional):

<i>Option</i>	<i>Operating Current</i>
-R15:	350 mA @ 115 VAC
-R24:	350 mA @ 24 VDC

- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.

VS94

- **Case:** Polyester fiberglass reinforced; NEMA type 4 and 4X; IP66; CSA types 4 and 12.
- **Conduit Fitting:** 3/4 NPT conduit fitting connection.
- **Normal Operating Ambient Temperature:**
0 to 140°F (-18 to 60°C).
- **Snap-switches:** 2-SPDT snap acting switches; 5A @ 480 VAC; 2A resistive, 1A inductive, up to 30 VDC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.
- **Heater (optional):**

<i>Option</i>	<i>Operating Current</i>
H15	.023 A @ 115 VAC
H24	.12 A @ 24 VDC

Remote Reset (optional):

<i>Option</i>	<i>Operating Current</i>
R15	.17 A @ 115 VAC
R24	.36 A @ 24 VDC

Time Delay (optional):

<i>Option</i>	<i>Operating Current</i>	<i>Standby Current</i>
T15	.360 A @ 115 VAC	.01 A @ 115 VAC
T24	1.15 A @ 24 VDC	.01 A @ 24 VDC

- **Time Delay/Remote Reset:** Adjustable 20-turn potentiometer from 5 seconds to 6-1/2 minutes (15 seconds per turn approximately).

*CSA and UL listed with 480 VAC rating.

INSTALLATION



WARNING: STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING INSTALLATION.

The VS2 and VS94 series shock switches are sensitive to shock and vibration in all three planes of motion - up/down, front/back and side/side. Front/back is the most sensitive (The reset pushbutton is located on the "front" of the unit). For maximum sensitivity mount the unit so that the front faces into the direction of rotation of the machine. (See Dimensions on page 2 for sensitivity adjustment location).

The VS2 and VS94 Series must be firmly attached/mounted to the machine so that all mounting surfaces are in rigid contact with the mounting surface of the machine. For best results, mount the instrument in-line with the direction of rotating shafts and/or near bearings. In other words, the reset push button should be mounted pointing into the direction of shaft rotation (see page 5). It may be necessary to provide a mounting plate or bracket to attach the VS2 and VS94 Series to the machine. The mounting bracket should be thick enough to prevent induced acceleration/vibration upon the VS2 or VS94 Series. Typically 1/2 in. (13mm) thick plate is sufficient. See illustrations on page 5 for typical mounting locations.



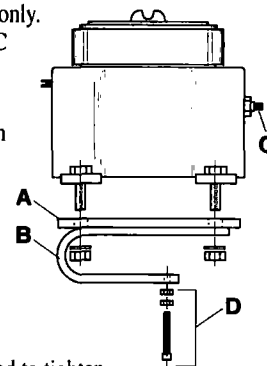
CAUTION: A dust boot is provided on the reset pushbutton for all series to prevent moisture or dust intrusion. The sensitivity adjustment for model VS2EX is not sealed; therefore, mounting

orientation should be on a horizontal plane or with the sensitivity adjustment pointing down. Sensitivity adjustment for model VS2 is covered by a plug. The plug must be in place and tight to prevent moisture or dust intrusion.

C-Clamp Installation (VS2C model only)

A C-Clamp is supplied with the VS2C model only. The C-Clamp is shipped installed on the VS2C but must be installed on the VS2EX and VS2EXR switches.

1. The C-Clamp (B) will already be installed on a 1/4 in. (6 mm) thick steel mounting plate (A). Bolt the VS2 switch to the mounting plate as illustrated — with four 5/16 in. bolts, nuts, and washers.
2. The mounting location should provide convenient access to the TATTLETALE® push button (C).
3. The hardened set screw and nuts (D) are used to tighten the switch to an I-Beam or cross member such as a Sampson post of an oilwell pumpjack.



Continued on next page.

All Models



WARNING: STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING INSTALLATION.

1. Firmly secure the unit to the equipment using the base foot mount or C-Clamp if applicable. See *C-Clamp Installation* page 3.
For oilwell pumpjacks attach the VS2 and VS94 Series to the Sampson post or walking beam. See *Typical Mounting Locations* page 5.
2. Make the necessary electrical connections to the vibration switch. See *Internal Switches*, page 6 for electrical terminal locations and page 7 for typical wiring diagrams. **DO NOT EXCEED VOLTAGE OR CURRENT RATINGS OF THE CONTACTS.** Follow appropriate electrical codes/methods when making electrical connections. Be sure that the run of electrical cable is secured to the machine and is well insulated from electrical shorting. Use of conduit is recommended.

NOTE: If the electrical cable crosses a pivot point such as at the pivot of the walking beam, be sure to allow enough slack in the cable so that no stress is placed on the cable when the beam moves.

If conduit is not used for the entire length of wiring, conduit should be used from the electrical supply box to a height above ground level that prevents damage to the exposed cable from the elements, rodents, etc. or as otherwise required by applicable electrical codes. If conduit is not attached directly to the VS2 and VS94 Series switch, use a strain relief bushing and a weatherproof cap on the exposed end of the conduit. A "drip loop" should be provided in the cable to prevent moisture from draining down the cable into the conduit should the weathercap fail.

Sensitivity Adjustment

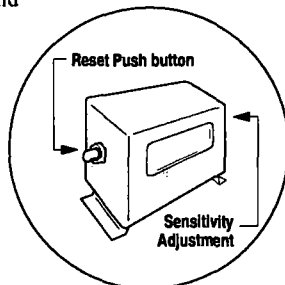


WARNING: REMOVE ALL POWER BEFORE OPENING THE ENCLOSURE. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON PERFORM ADJUSTMENTS, AND MAKE SURE IT CONFORMS WITH NEC AND LOCAL CODES. DO NOT ADJUST SENSITIVITY WHILE THE MACHINE IS RUNNING. STAND CLEAR OF THE MACHINE AT ALL TIMES WHEN IT IS OPERATING.

All models of the VS2 and VS94 Series cover a wide range of sensitivity. Each model is adjusted to the specific piece of machinery on which it is installed. After the switch has been installed in a satisfactory location (see page 5) the sensitivity adjustment will be increased or decreased so that the switch does not trip during start-up or under normal operating conditions. This is typically done as follows:

1. REPLACE ALL COVERS, LIDS, AND ELECTRICAL ENCLOSURES.
2. Press the reset push button to engage the magnetic latch. To be sure the magnetic latch has engaged, observe latch through the window on the VS2 and VS2C (see DETAIL "A"). On the VS2EX, VS94 series the reset button will remain depressed meaning the magnetic latch has engaged.
3. Start the machine.
4. If the instrument trips on start-up,

DETAIL "A"



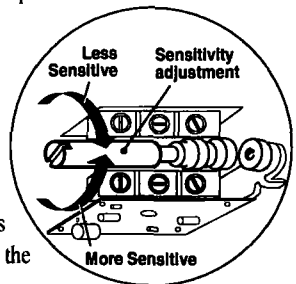
allow the machine to stop. Turn the sensitivity adjustment 1/4 turn clockwise, (adjustment for VS94 and VS2EXRB models is located within the box, see DETAIL "B").



WARNING: MAKE THE AREA NON-HAZARDOUS BEFORE OPENING THE EXPLOSION-PROOF (-EX) ENCLOSURES.

Depress the reset button and restart the machine. Repeat this process until the unit does not trip on start-up.

DETAIL "B"



5. If the instrument does NOT trip on start-up, stop the machine. Turn the sensitivity adjustment 1/4 turn counter-clockwise. Repeat the start-up/stop process until the instrument trips on start-up. Turn the sensitivity adjustment 1/4 turn clockwise (less sensitive). Restart the machine to verify that the instrument will not trip on start-up.

6. Verify that the unit will trip when abnormal shock/vibration exists.

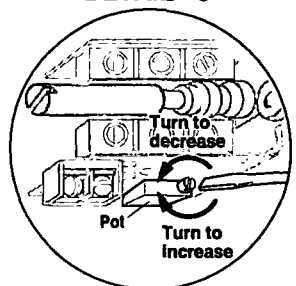
VS94 Time Delay Adjustment



WARNING: REMOVE ALL POWER BEFORE OPENING ACCESS DOOR. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON ADJUST THE UNIT, AND MAKE SURE IT CONFORMS WITH NEC AND LOCAL CODES.

1. Apply power to the time delay circuit. (see page 7 for time delay circuit). The time delay function will be initiated.
2. Time the length of the delay with a watch. Let time delay expire. After it expires, the override circuit will de-energize the solenoid, allowing the latch arm to trip. A clicking noise is heard.
3. TURN THE POWER OFF TO RESET THE TIME DELAY CIRCUIT.

DETAIL "C"



NOTE: Allow 30 seconds bleed-time between turning the power "OFF" and "ON."

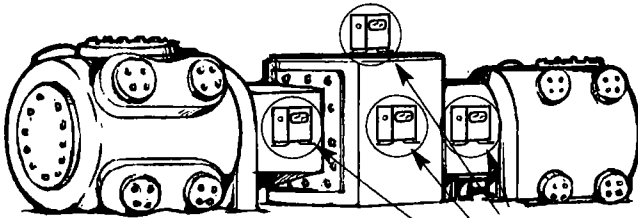
4. Locate the time adjustment pot (DETAIL "C"). The time is factory-set at the lowest setting (5 seconds approximately). To increase time, rotate the 20-turn pot clockwise as needed (15 seconds per turn approximately).
5. Repeat the above steps as necessary to obtain desired time delay.

NOTE: An external time delay can be used with the remote reset feature of the VS2EXR series to provide a remote reset and override of the trip operation on start-up. Time delay must automatically disconnect after

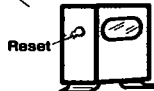
TYPICAL MOUNTING LOCATIONS

NOTE: These are typical mounting locations for best operation. Other mountings are possible. See *Installation* section on page 3.

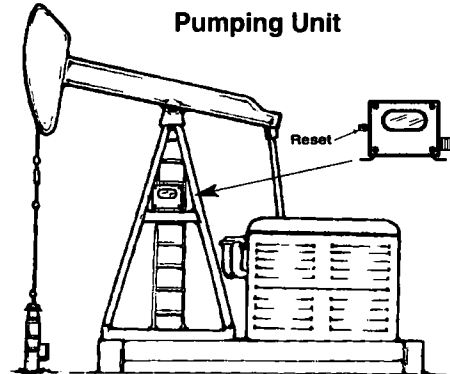
2-Throw Balance-Opposed Compressor



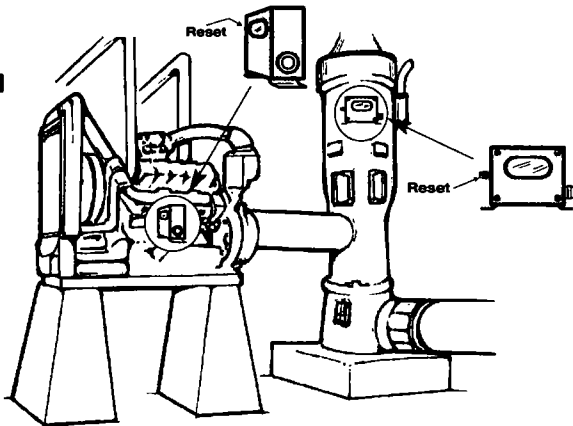
NOTE: If installing on cylinders, 2 vibration/shock switches are recommended- 1 for each cylinder.



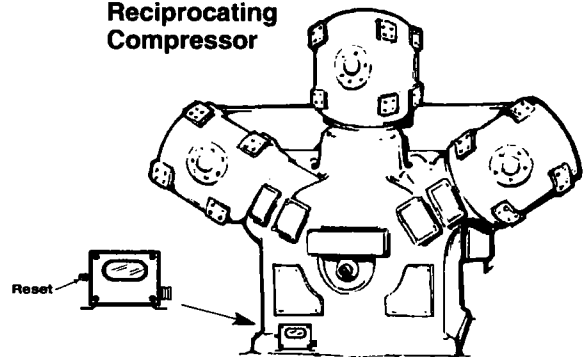
Pumping Unit



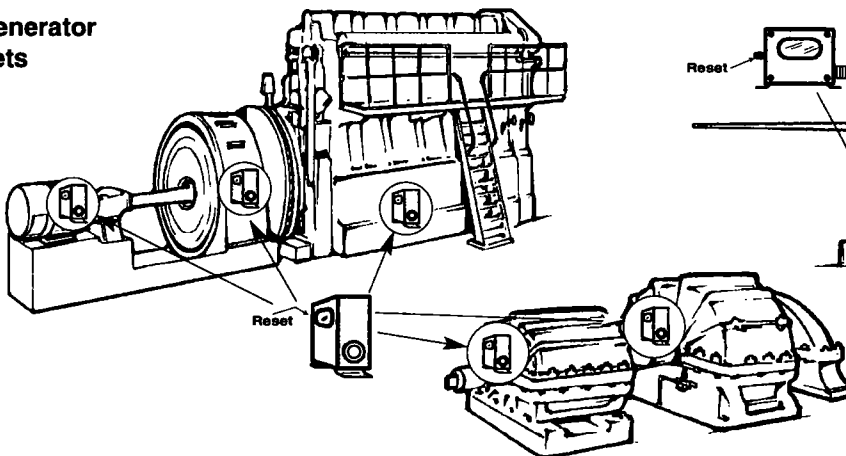
Engine and Vertical Shaft Pump



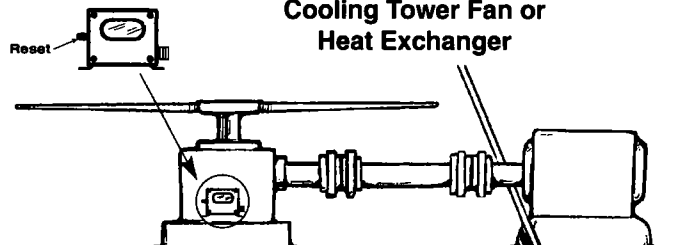
"Y" Type Reciprocating Compressor



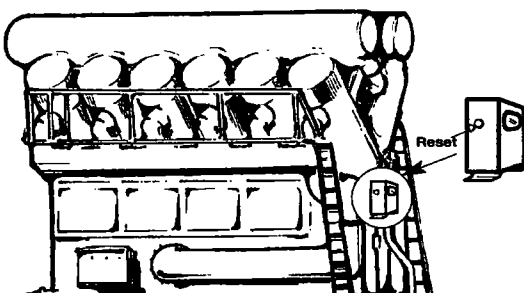
Generator Sets



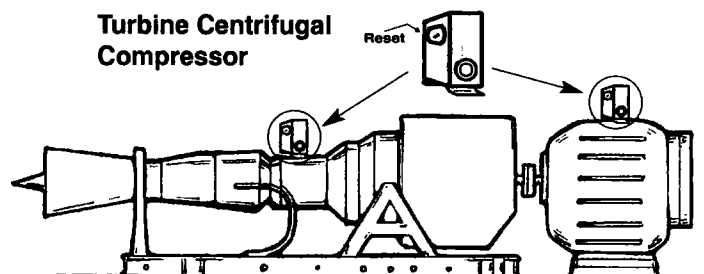
Cooling Tower Fan or Heat Exchanger



Engine Compressor

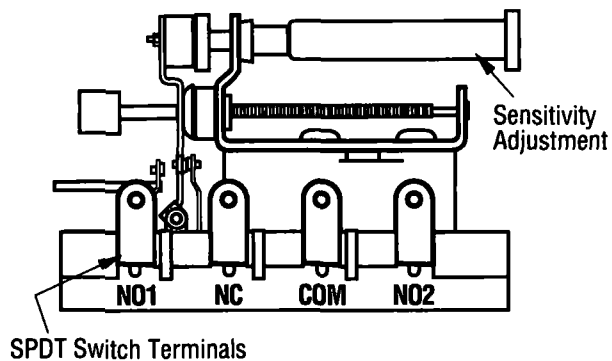


Turbine Centrifugal Compressor

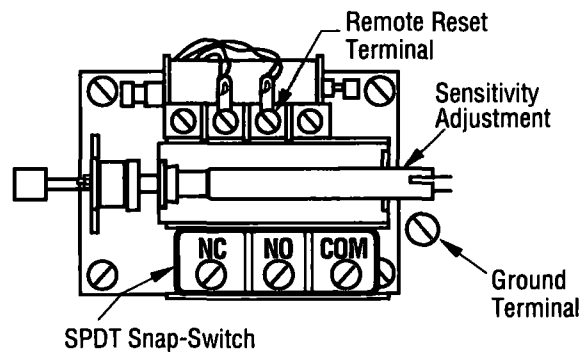


INTERNAL SWITCHES

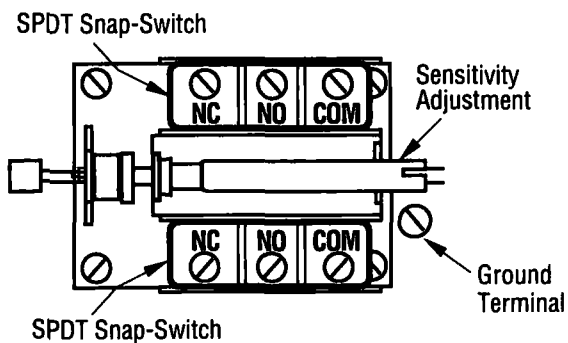
VS2 and VS2C



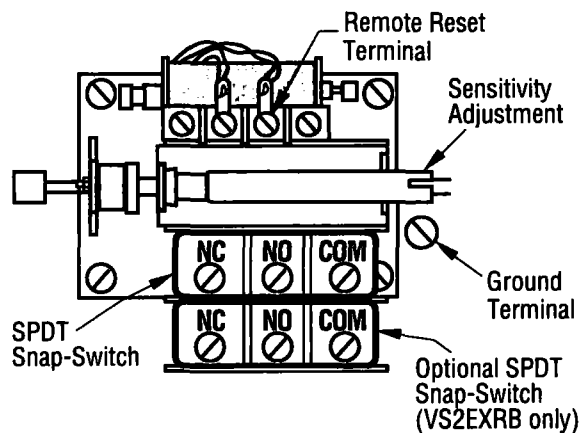
VS2EXR



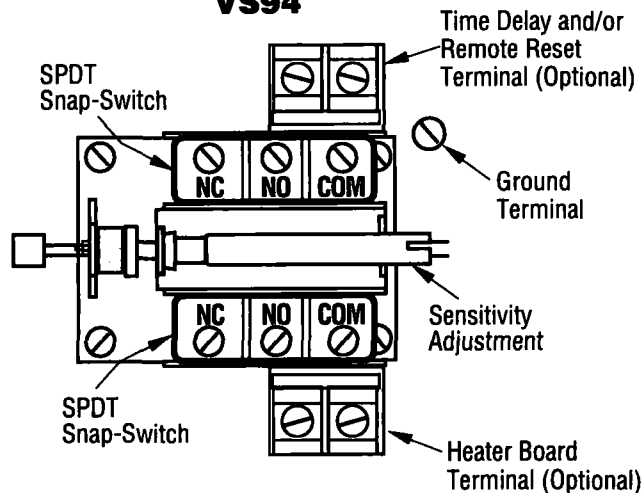
VS2EX



VS2EXB and VS2EXRB



VS94

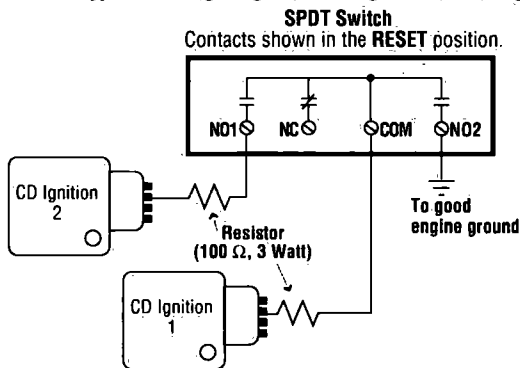


ELECTRICAL

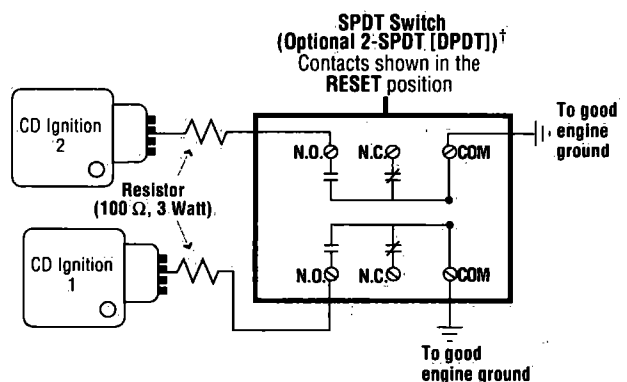


WARNING: REMOVE POWER BEFORE OPENING THE UNIT (ACCESS DOOR). STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING THE WIRING OPERATION. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON INSTALL AND WIRE THE UNIT, AND MAKE SURE IT CONFORMS WITH NEC AND APPLICABLE CODES.

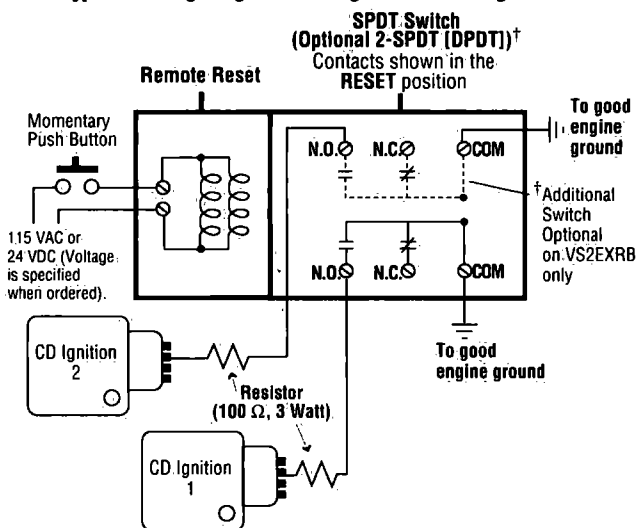
VS2 and VS2C Typical Wiring Diagram for Single or Dual CD Ignition



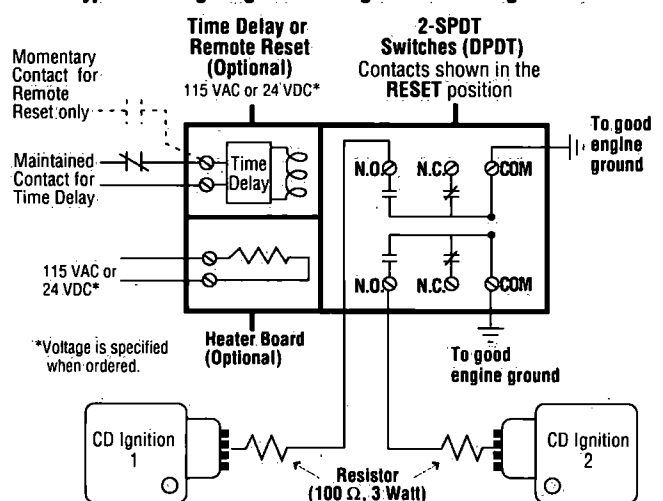
VS2EX Typical Wiring Diagram for Single or Dual CD Ignitions



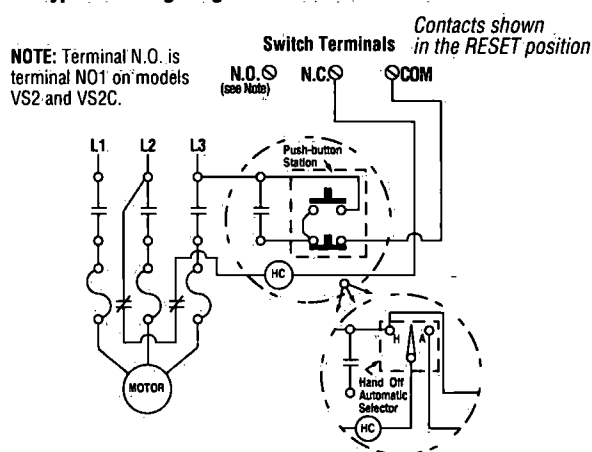
VS2EXR and VS2EXRB Typical Wiring Diagram for Single or Dual CD Ignitions



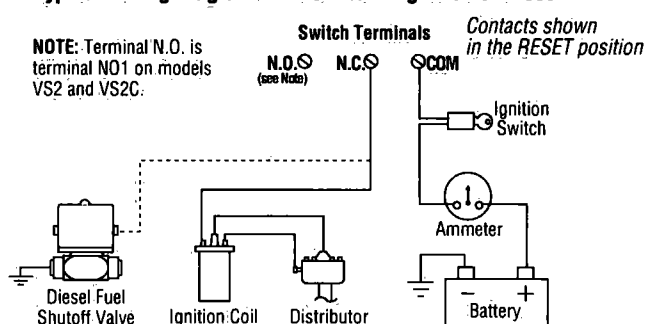
VS94 Typical Wiring Diagram for Single or Dual CD Ignitions



VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94 Typical Wiring Diagram for Electric Motors



VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94 Typical Wiring Diagram for Distributor Ignition or Diesel



SERVICE PARTS

PART NO. DESCRIPTION

VS2

20000030 Movement assembly
20000031 Glass and gasket assembly
20000032 Reset push button assembly

VS2C

20000030 Movement assembly
20000031 Glass and gasket assembly
20000032 Reset push button assembly
20050021 Mounting clamp
20000185 VS2C 5-clamp hardware package assembly.
20050465 2-Conductor electrical cable, 45 feet (13.7 meters)

VS2EX

20010091 Movement assembly
20050087 Cover
00000309 Cover gasket
20010090 Snap-switch and insulator kit (1 switch per kit)
prior to September 1, 1995.*
20000288 **Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000289 C-clamp conversion mounting kit

VS2EXR

20000262 Movement assembly
20050087 Cover
00000309 Cover gasket
20010090 Snap-switch and insulator kit (1 switch per kit)
prior to September 1, 1995.*
20000288 **Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000049 Reset solenoid assembly (115 VAC)
20000234 Reset solenoid assembly (24 VDC)
20000289 C-clamp conversion mounting kit

PART NO. DESCRIPTION

VS2EXRB

20010090 Snap-switch and insulator kit (1 switch per kit)
prior to September 1, 1995.*
20000288 **Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000057 *Inside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D **prior to September 1, 1995.***
20000058 *Outside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D **prior to September 1, 1995.***
20000287 **Inside snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D manufactured on September 1, 1995 or later.***
20000290 **Outside snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D manufactured on September 1, 1995 or later.***
20050077 Adjustment shaft
20000262 Movement assembly
20000049 Reset solenoid assembly (115 VAC)
20000234 Reset solenoid assembly (24 VDC)

VS94 Series

25050506 Dust boot
00000232 Conduit fitting
20010090 Snap-switch and insulator kit (1 switch per assembly)
prior to September 1, 1995.**
20000288 **Snap-switch and insulator kit (1 switch per assembly) for models manufactured on September 1, 1995 or later.*****

* If no date code is found, refer to the old switch. Models with date 0895 and before use old switch. Dated 0995 after, use straight snap-switch arm, no rollers.

** Models dated Q1 thru Q8 (formed snap-switch arm and rollers).

***Models date coded Q9 thru Q12 and R1 thru R12 (straight snap-switch arm, no rollers).

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078792

Installation Instructions for L150, EL150K1, and EL150 EX Level SWICHGAGE®s for Engine Liquids

L-7758N
Revised 06-00
Section 15
(00-02-0171)



Please read the following instructions before installing. A visual inspection for damage during shipping is recommended before mounting. It is your responsibility to have a qualified person install the unit.

GENERAL INFORMATION

WARNING

BEFORE BEGINNING INSTALLATION OF THIS 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.



CAUTION: Certain danger to human and to equipment such as applied in a mobile or marine application may occur if some equipment is stopped without pre-warning. It is therefore, recommended that monitored functions be limited to alarm only or to alarm before shutdown in such applications.

Description

The L150, EL150K1 and EL150EX Level SWICHGAGE® instruments are a combination liquid level gauge and low limit switch. Each unit includes a float chamber, an indicating pointer, a dial, and a low level contact. When properly installed and maintained, the float operates the pointer which, in turn, both indicates level during normal operation, and closes a switching circuit if the level falls to the low-limit set point.

Applications

The primary use of these level SWICHGAGE® instruments is for engine cooling systems, surge or expansion tanks, condenser radiator or vapor phase systems, whether pressurized or atmospheric. These instruments can also be used to monitor lube oil, hydraulic fluid or diesel fuel reservoirs and activate alarms and/or shutdown at a predetermined minimum level.

These instruments are built for low pressure systems.

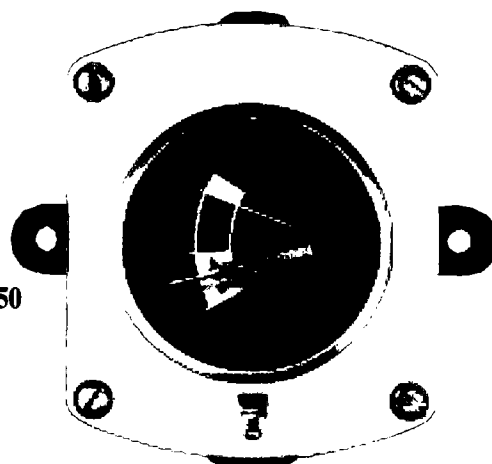
Cold Weather Warning



BEFORE FREEZING WEATHER COMES, CHECK TO BE SURE YOUR L150 OR EL150 SERIES COOLANT LEVEL SWICHGAGE® IS FILLED WITH ANTIFREEZE SOLUTION THE SAME AS YOUR ENGINE BLOCK AND RADIATOR. On many engines, such as condenser radiator systems, the coolant in your level SWICHGAGE® remains static until the level falls to drain point. When 'winterizing' it's a good idea to make certain all water drains from your level SWICHGAGE®, to check against clogged connections, and then BE SURE IT REFILLS WITH ANTIFREEZE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN EQUIPMENT DAMAGE.



L150

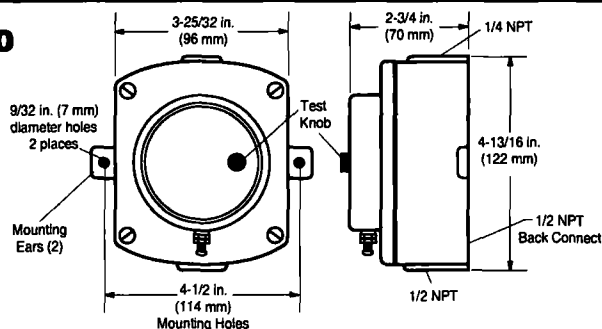


Specifications	L150	EL150K1	EL150EX
Case			
• Die cast aluminum, polyurethane coated	•	•	
• Sand cast aluminum, painted.			•
Float			
• Brass	•	•	
• Stainless Steel (AISI 304)			•
Lens			
• Polycarbonate	•	•	
• Tempered glass			•
O-Rings: Saturated Nitrile, suitable for coolant or hydrocarbons. Maximum temperature 250°F (120°C)	•	•	•
Cover Gasket			
• Neo-cork	•	•	
• Buna			•
Contact Rating			
• Pilot duty 2 A @ 30 VAC/DC resistive SPST	•		
• SPDT rated 10 A @ 125 VAC; 0.5 A @ 125 VDC; 10 A @ 30 VDC		•	•
Vent Tube: 1/4 x 5 in. (6 x 127 mm) with fittings.	•	•	•
Maximum Working Pressure: 25 psi (172 kPa) [1.72 bar]	•	•	•
Electrical Connection			
• (1) 16 AWG x 24 in. (1.5 mm ² x 610 mm) with terminals.	•		
• (3) 18 AWG x 14 in. (1.0 mm ² x 356 mm)		•	
• Terminal Block			•
CSA Listed for Hazardous Location: Class I, Division 1, Groups C & D.			•

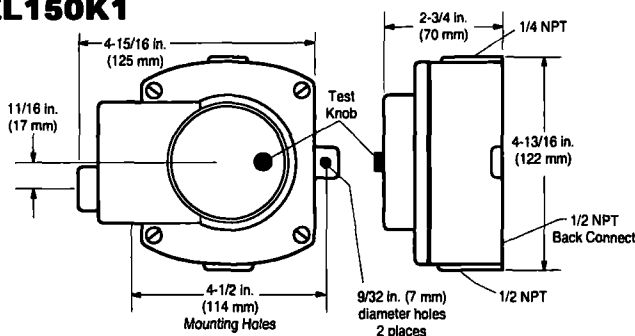
**Products covered by this literature comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility except as noted.

DIMENSIONS

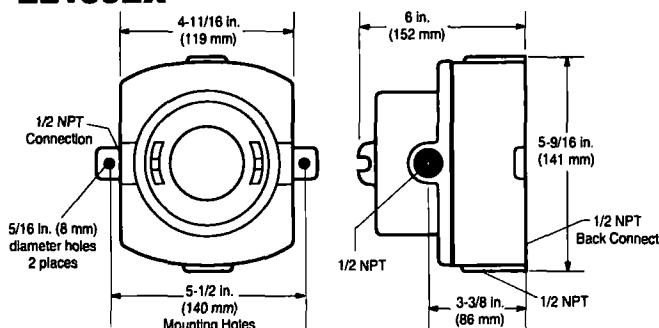
L150



EL150K1



EL150EX



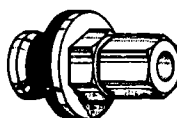
PS FITTINGS INSTALLATION

A Murphy PS fitting is used when there is no threaded fitting in the top tank of the radiator to attach tubing for the L150/EL150 series level SWICHGAGE®.

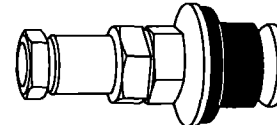
- P/N 15-00-0107 (PS) Accepts 1/4 in. (6 mm) O.D. copper tubing.
- P/N 15-01-0167 (PS Barbed) Barbed fitting accepts 1/4 in. (6 mm) I.D. flexible tubing and hose clamp.
- P/N 15-01-0202 (PS-D) Accepts 1/2 in. (13 mm) I.D. hose; 1/4 in. (6 mm) copper tube.

1. Determine the entry point into the radiator top tank. See *Level SWICHGAGE® Installation* for proper location. Drill 5/8 in. (16 mm) diameter hole in top tank of radiator. Be sure chips do not fall inside the tank. Remove any burrs on the hole wall.
2. Insert the rubber grommet of the PS Blind Hole Fitting. Tighten the jam nut while holding the fitting from turning in the hole. The jam nut will pull the tapered grommet into the hole from the inside of the top tank causing the grommet to expand and seal the hole.
3. Attach the appropriate tubing or hose for the PS Fitting.

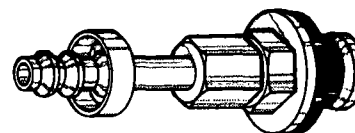
15-00-0107



15-01-0202



15-01-0167



LEVEL SWICHGAGE® INSTALLATION



WARNING: Perform all installations with the power source "OFF". Be sure engine and radiator have cooled and coolant pressure has been relieved. SEVERE BURNS can result. Never remove radiator cap on a hot engine.

IMPORTANT: Operation of the L150/EL150K1 is different for a pressurized cooling system than for an atmospheric (non-pressurized) system. Installation of the L150/EL150K1 is only slightly different for each system. Connection of the top tube connection is the major difference. Differences will be noted in the installation instructions.

Installation Notes

1. All top radiator connections must be away from the return hose turbulence.
2. All bottom radiator connections must be away from the suction hose.
3. The L150/EL150K1 must be attached to a mounting plate on the radiator or other framework.

CAUTION: If the L150/EL150K1 is NOT attached to the radiator, use high temperature quality flexible hose for the top and bottom connections to maintain the shock mounting protection for the radiator.

Pressurized and Atmospheric Systems

1. Drain the cooling system.

2. For a **PRESSURIZED COOLING SYSTEM** (Figure 1) the shutdown point is determined by the entry point A of the tube connection into the top tank. The engine will shutdown when coolant level drops below this connection (see step 4).

If the radiator has a **SHALLOW UPPER TANK**, you can make entry from the top as illustrated in Figure 2. Insert the copper tube until it is slightly above the core. Secure the fitting.

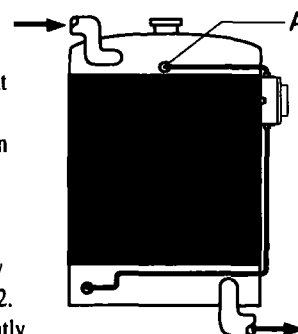
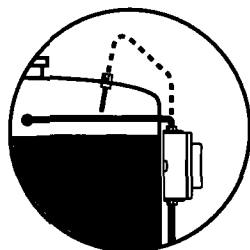


Figure 1: Pressurized System

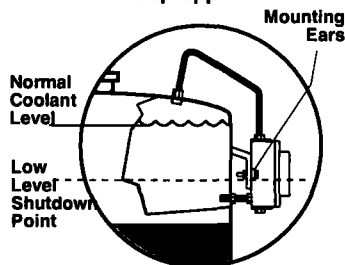
LEVEL SWITCHGAGE® INSTALLATION (continued)

Figure 2:
Shallow Upper Tank



For a **PRESSURIZED** system the tip of the copper tube will be the shutdown level.

Figure 3:
Deep Upper Tank



3. For **ATMOSPHERIC** (non-pressurized) and **PRESSURIZED CROSS FLOW COOLING SYSTEMS** the shutdown point is determined by the mounting position of the L150/EL150K1 relative to the top tank of the radiator (see step 5).

4. For a **PRESSURIZED SYSTEM**, determine the point of entry (tube connection) in the radiator top tank (away from the top hose connection). Many radiators have a pipe nipple provided. If a connection is not provided, you must either weld or solder a fitting or use one of the Murphy PS fittings (see *PS Fittings Installation* page 2). This connection should be as close to the radiator core as possible.

For **MARINE AND MOBILE EQUIPMENT** installations, the top tank connection should be near the vertical centerline of the radiator. This will compensate for changing level due to roll and pitch of the machine during operation.

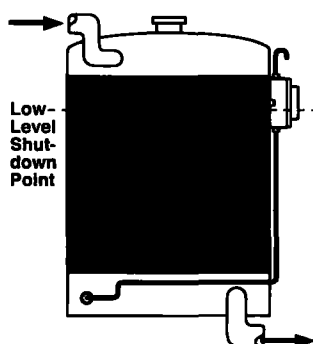
5. For an **ATMOSPHERIC SYSTEM** a tube connection in the top tank may not be required. Determine the lowest desired level of coolant in the top tank. Mount the L150/EL150K1 so that the mounting ears are approximately 1/4 in. (6 mm) above that level (Figure 3). A back mounting option is available for the L150 and EL150K1 for radiators with fabricated steel top tank and/or for use with some condensor cooling systems.

For an **ATMOSPHERIC** system install a 1/4 in. (6 mm) diameter tube in the top fitting of the L150/EL150K1. This tube **MUST** EXTEND ABOVE the top tank. Form the tube into a cane so that the open end of the tube points down but still extends ABOVE the HIGHEST coolant level. The tube can be connected to the top tank if desired. Follow instructions for a **PRESSURIZED SYSTEM**.

6. For most applications, the bottom tube connection is made at the drain cock. Remove the drain cock and install a brass tee. Reinstall the drain cock into the tee. Attach a copper or other suitable tube to the remaining opening of the tee and to the bottom connection of the L150/EL150K1.

If a **drain cock** is not provided, you must attach a fitting or use a Murphy PS fitting the same as for the top tank instructions.

Figure 4: Atmospheric System



7. Wire according to appropriate alarm or shutdown circuits (see *Standard Electrical Diagrams* on page 4).
8. Refill the cooling system according to manufacturer's instructions.
9. Start the engine and allow it to run until the thermostat opens. Increase engine speed to the **FULL** operating speed and observe that the indicating pointer remains at or near the full position. If the pointer drops to the **LOW** position shutdown or alarm will occur due to coolant flow through the L150/EL150K1. If alarm or shutdown occurs, drain the coolant - or clamp off the upper and lower hoses.
- CAUTION: BE SURE SYSTEM PRESSURE IS RELIEVED AND HOT COOLANT CANNOT ESCAPE.** Remove the four (4) mounting screws holding the cover assembly. Invert the float chamber so that the 1/2 NPT connection is on top and the 1/4 NPT connection is on bottom. Reinstall the float and cover assembly in the upright position. Install larger I.D. tubing from the top of the float chamber (1/2 NPT) to the radiator top tank. The smaller 1/4 NPT connection on the bottom will restrict coolant outflow from the L150/EL150K1. Check for unrestricted float movement by rotating the switch test knob.
- Refill the cooling system and repeat step 9.

10. Place a catch basin under the drain cock. Open the drain cock and observe that coolant is leaving the radiator.
- For a **PRESSURIZED** cooling system, shutdown will occur when coolant drops below the entry point of the top tank tube connection. For an **ATMOSPHERIC OR CROSS FLOW PRESSURIZED COOLING SYSTEM**, shutdown will occur when coolant drops approximately 1/4 in. (6 mm) below the level of the case mounting ears. If shutdown does not occur, adjust the L150/EL150K1 mounting as described above.

CAUTION: DO NOT ALLOW ENGINE TO RUN WHEN COOLANT DRAINS BELOW THE UPPER TANK. ENGINE DAMAGE CAN OCCUR.

11. Periodically test switch operation by rotating the test knob on the face of the L150/EL150K1. Rotating the knob forces the pointer mechanism against the contact screw (L150) or the snap switch actuator (EL150K1).

Condensor/Radiator System

1. Mount the L150/EL150K1 so that the horizontal center line of the L150/EL150K1 is approximately 1/4 in. (6 mm) above the minimum coolant level in the engine head.

NOTE: On some engines it is possible to use the back connection option and attach the L150/EL150K1 directly to the engine cylinder. Kits are also available for some engines.

2. Attach a copper tube from the top connection of the L150/EL150K1 to the radiator top tank.
3. Wire and test the system according to above instructions for Pressurized and Atmospheric systems.

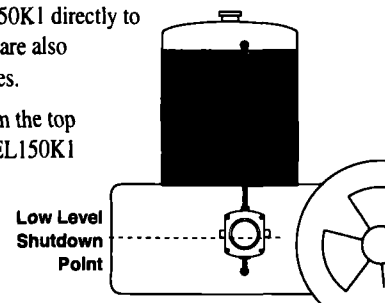


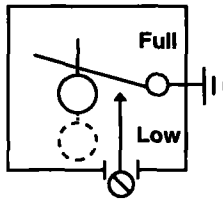
Figure 5:
Condensor/Radiator System

STANDARD ELECTRICAL DIAGRAMS

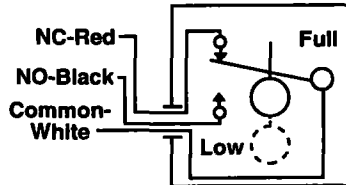


WARNING: PERFORM THE WIRING OPERATION WITH THE POWER SOURCE "OFF".

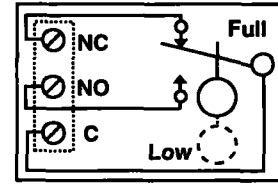
L150



EL150K1



EL150EX



NOTE: All models shown with pointer in full position.

REPAIR KITS

Repair kits are available for the L150, EL150K1 and EL150EX models. When ordering a repair kit specify model repair kit number from chart below:

Model	Components	Repair Kit No.
L150	All parts except case/body	15-00-0138
	Case/body assembly	15-00-0101
EL150K1	All parts except case/body	15-00-0139
	Lens and switch assembly	15-00-0100
	Case/body assembly	15-00-0101
EL150EX	Cover and float assembly	15-00-0110
	Lid assembly	15-00-0108
	Switch/Terminal assembly	15-00-0109

Replacing the Float and Cover Assembly for the L150 and EL150K1



WARNING: Perform the following operation with the power source "OFF". Be sure engine and radiator have cooled and coolant pressure has been relieved. SEVERE BURNS can result. Never remove radiator cap on a hot engine.

1. As applicable, shut off liquid to the SWICHGAGE® or drain the system level below the SWICHGAGE®.
2. Disconnect electrical lead(s), one at a time and tag for reinstallation.
3. Disconnect conduit on EL150K1.

4. Remove the four screws that secure the float and glass assembly to the case.
5. Remove and discard the old float and cover assembly.
6. Remove and discard the old gasket.
7. Install the new gasket.
8. Install the new float and cover assembly and secure it with four screws.
9. Re-connect the conduit on EL150K1.
10. Re-connect the electrical lead(s).
11. As applicable, open valves to the SWICHGAGE® or refill the system to proper level.
12. Check the SWICHGAGE® for proper operation at the full indicating position. (Alarm not operated/engine continues to operate.)
13. Check the SWICHGAGE®, alarm/shutdown circuit, by rotating the test knob toward the low level point of the dial: alarm is operated/engine shuts down.
14. Check for unrestricted float movement by rotating the switch test knob.
15. Replacement of the float and cover assembly is complete.



CAUTION: On some high voltage CD Ignition systems, it may be necessary to coat the L150 contact screw head with RTV to prevent "tracking" and false contact operation during wet or high humidity conditions. Use of the EL150K1 is recommended in these cases.

Warning

A two year limited warranty on materials and workmanship is provided with this Murphy product. Details are available on request and are packed with each unit.

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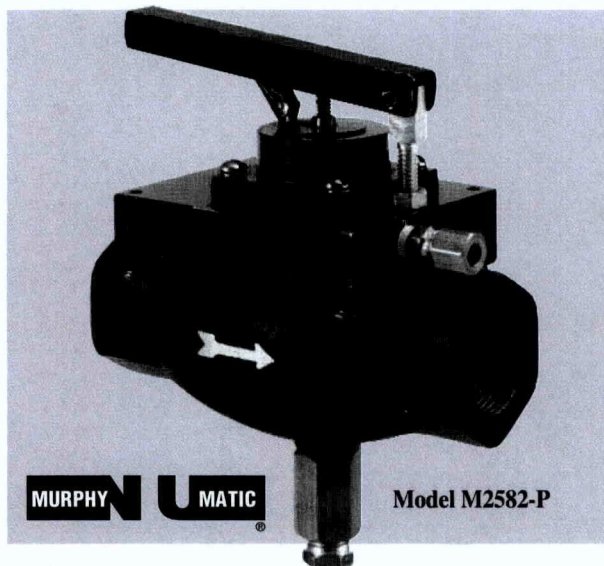
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Pneumatic Valves for Fuel Gas Shutoff

PV-94129B
Revised 04-00
Catalog Section 55
(00-02-0126)



Models M2582-P and M5180-P

- Pneumatically Open and Shut Off Fuel Gas Automatically or Semi-automatically
- Pneumatic Control Pressure Can Be Air, Gas or Oil
- Models for 2 in. or 1 in. (51 mm or 25 mm) Fuel Gas Lines

Description

The M2582-P and M5180-P are pneumatically controlled fuel shut-off valves that open and close automatically or semi-automatically. The pneumatic control pressure can be air, oil or gas. A manual lever aids in opening the valve when control pressure is insufficient. A gas escape vent, when properly vented and maintained, releases trapped gas from the valve after shutoff.

Basic Operation

Automatic: As the control pressure/vacuum increases the valve will open. When the control pressure/vacuum decreases, the valve will close.

Semi-Automatic: If the control pressure/vacuum is too low and the valve does not open automatically, it can be opened manually by lifting the built-in lever arm and setting the latch. The latch resets automatically when control pressure rises enough to release it.

M2582-P is for 1 in. (25 mm) gas lines. It automatically opens at 2 psi (14 kPa) [.14 bar] and fully opens the seat at 3 psi (21 kPa) [.21 bar]. The valve can be manually opened with the lever and latch against inlet pressure of 80 psi (552 kPa) [5.52 bar]. The latch will release after pilot pressure reaches 2.5 psi (17 kPa) [.17 bar].

The M5180-P is for 2 in. (52 mm) gas lines. It automatically opens at 2 psi (14 kPa) [.14

bar] and fully opens the seat at 3 psi (21 kPa) [.21 bar]. The valve can be manually opened with lever and latched against inlet pressure of 100 psi (689 kPa) [6.89 bar]. The latch will release after pilot pressure reaches 2.5 psi (17 kPa) [.17 bar].

Specifications

Valve Body: Sandcast aluminum (alodined for corrosion resistance).
Optional steel body available on M5180-P models only (see *How to Order*).

Valve Seat: Buna-N

Valve Inlet Pressure (Maximum):
M2582-P: 80 psi (552 kPa) [5.52 bar]
M5180-P: 100 psi (689 kPa) [6.89 bar]

Parts Exposed to Gas Line Flow:

- M2582-P:
- Aluminum
 - Buna-N
 - 302, 303, and 17-7 PH stainless steel
- M5180-P:
- Aluminum (Steel optional)
 - Buna-N
 - 302, 303, 304, and 416 stainless steel

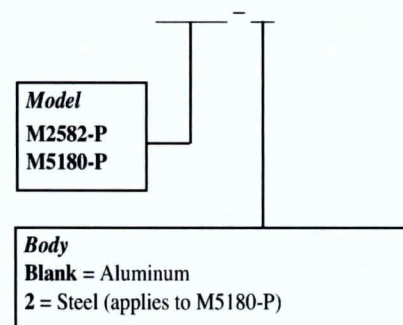
Control Diaphragm: Flexweave polyester fabric and Buna-N elastomer.

Control Pressure (Maximum):

M2582-P: 75 psi (517 kPa) [5.17 bar]
M5180-P: 80 psig (552 kPa) [5.52 bar]

How to Order

To order, use the diagram below.

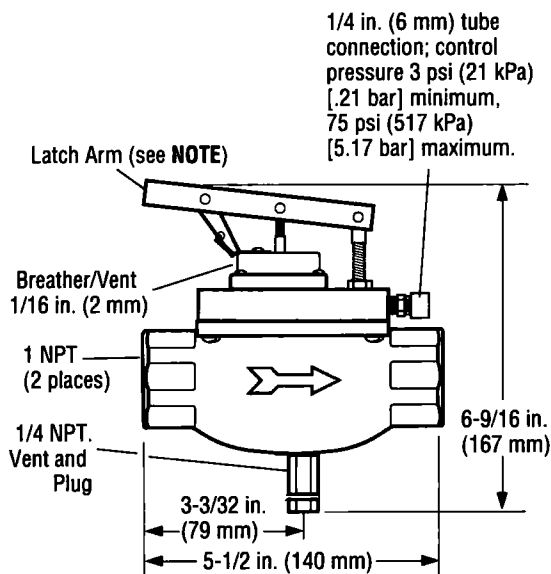


Warranty

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 www.fwmurphy.com/support/warranty.htm

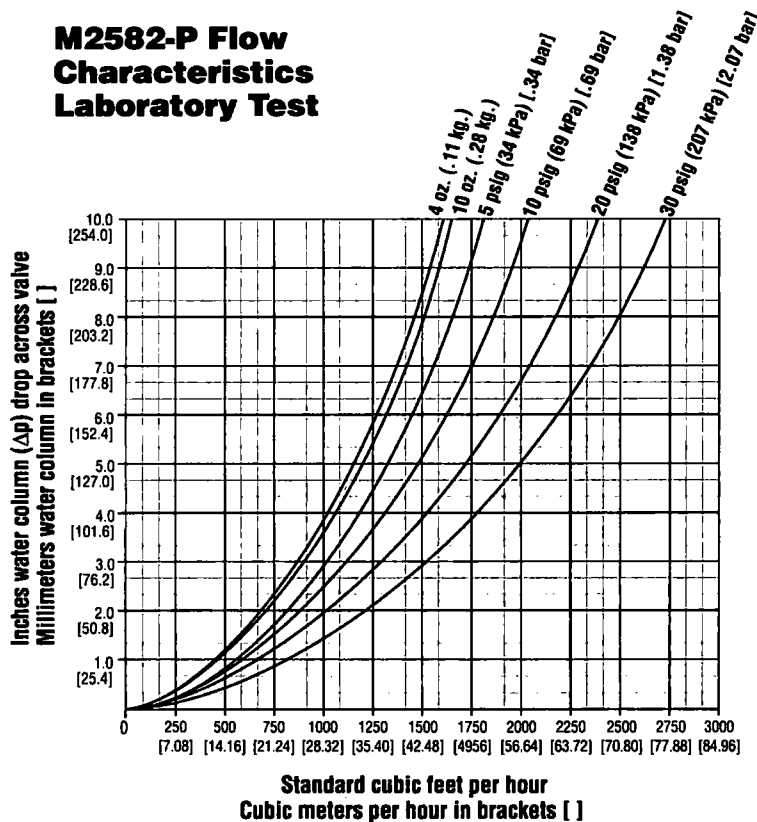


M2582-P Dimensions

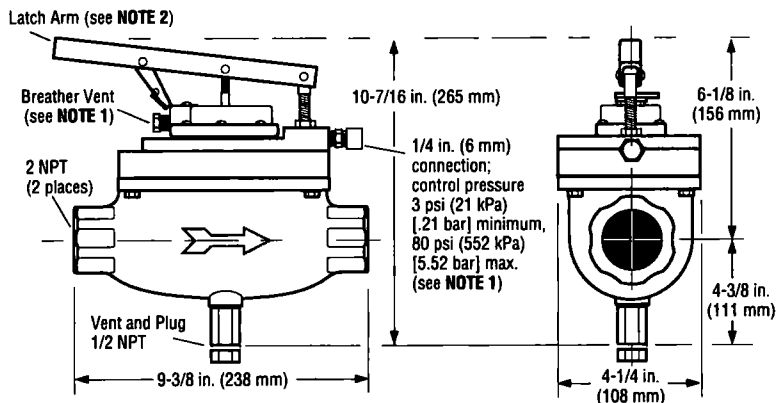


NOTE: Thumb operated opening latch (2.5 psi [17 kPa] [.17 bar] required to release cocking latch)

M2582-P Flow Characteristics Laboratory Test



M5180-P Dimensions



NOTE 1: Control pressure connection fitting and breather vent fitting can be swapped to convert to vacuum control.
NOTE 2: Thumb operated opening latch (2.5 psi [17 kPa] [.17 bar] required to release cocking latch).

Shipping Weights

M2582-P: 5 lbs 10 oz (2.55 kg).

M5180-P: 14 lbs 9 oz (6.61 kg).

With steel body option "2": 25 lbs (11.34 kg).

Shipping Dimensions

M2582-P: 8-1/4 x 8-1/4 x 7-1/2 in.
(210 x 210 x 191 mm).

M5180-P: 12-1/4 x 12-1/4 x 9-3/4 in.
(311 x 311 x 248 mm).

Service Parts

Specify part number when ordering.	M2582P	M5180P
Handle and Latch Kit	55000148	55000154
Stem and Seat Kit	55000147	55000135
Top Works Complete Valve Less Body & Vent	55000150	55000155
Vent Bushing Assembly	55000143	55000132
Diaphragm Assembly	55000184	55000153
Pilot Diaphragm	00007908	55050420

MURPHY

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M2582, M5081, and M5180 Series Electromechanical and Pneumatic, Fuel Gas Shut- off Valves Installation and Operation Instructions

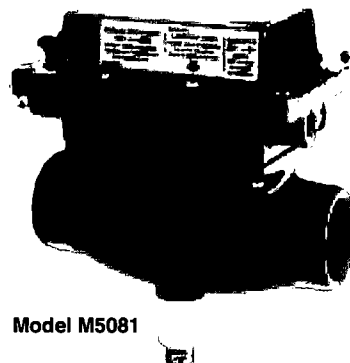
Please read the following instructions before installing. A visual inspection of this product for damage during shipping is recommended before mounting. It is your responsibility to have a qualified person install the unit and make sure installation conforms with NEC and local codes.

GENERAL INFORMATION

WARNING

BEFORE BEGINNING INSTALLATION OF THIS 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.



Model M5081



M2582 and M5081 Series

Tripping Power From Engine Ignition System or Battery (Models available for magneto, CD ignition or 12/24 V battery)

These fuel shut-off valves are semi-automatic devices for shutdown of natural gas fueled engines. The standard valve opens by manual operation of the reset handle. A latch in the upper body of the valve will set and hold the valve open. At this point no electric power is used. The electromagnetic coil is de-energized, the snap-switch(es) is SET.

If a SWITCHGAGE® contact closes, a circuit is completed from power through the snap-switch and coil. Now energized, the electromagnet trips the latch, (latch can be tripped manually), the valve closes, and the snap-switch resets. Power switches from the coil circuit to your choice of an open line, an electrical ground, or an alarm. After tripping, the vent seal opens, and on the M50 models, the open/close indicator (green button) retracts to indicate that the valve is closed.

Valve body is sandcast aluminum. Optional cast steel for M5081 models.

M2582-P and M5180-P

MURPHY-NUMATIC™ Pneumatic Version for Pressure

The M2582-P and M5180 pneumatically controlled valves can operate from pressure, and are designed to open and close automatically or semi-automatically (the supply can be air, oil or gas).

NOTE: If using oil as a pressure source, use a lightweight oil.

These valves will open on rising control pressure and close on decreasing control pressure. M2582-P and M5180-P automatically open at 2 psi (14 kPa) [0.14 bar] and fully open at 3 psi (21 kPa) [0.21 bar].

All models include a built-in lever to aid in opening the valve manually. The M2582-P can be manually opened against inlet pressure of 80 psi (552 kPa) [5.52 bar]. The M5180-P valve can be opened against inlet pressure of 100 psi (689 kPa) [6.89 bar].

Standard models include an escape vent for gas trapped forward in the line after shut-off.

M5081FS

Normally Energized Circuit

The M5081FS is manually opened, electrically latched open and tripped by interrupting the coil power circuit.

Magnetic Switch Adapter

As ignition systems wear from usage, their power output becomes less and less. Ignition may not have the capacity to reliably trip the Fuel Valve. Therefore, the use of a Magnetic Switch Adapter for CD ignition systems is recommended. The Magnetic Switch Adapter is a device that stores energy from the CD ignition to trip the Fuel Valve.

Three models are available:

65700053 (was 65020126): For use with negative ground ignitions up to 240 VDC.

65700054 (was 65020127): For use with positive ground ignitions up to 450 VDC.

65700055 (was 65020155): For use with negative ground ignitions up to 450 VDC.

100 ohm, 2 watt Resistor

For Capacitor Discharge Ignitions that are specified to be grounded when the valve closes, and a Magnetic Switch Adapter is in use. The resistor must be connected in the system to prevent damage to the snap-switches in the fuel shut-off valve (see typical wiring diagrams).

Diode Package

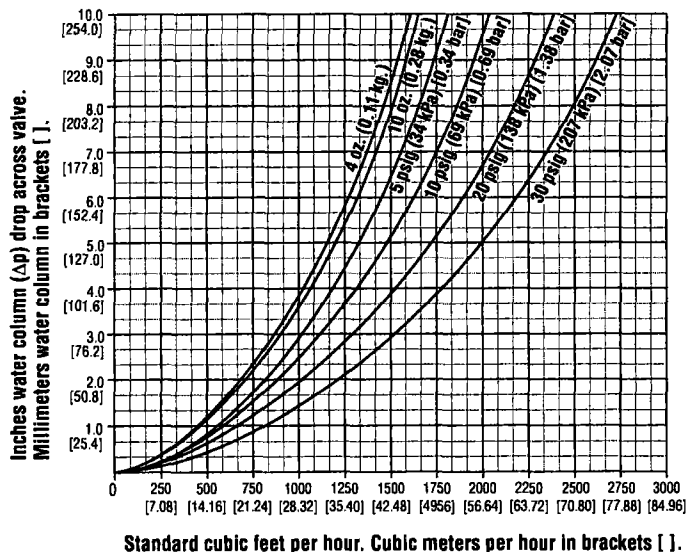
The Murphy diode package (65010065) is designed to allow the fuel shut-off valve to be used with dual Magneto Ignition systems.

NOTE: All aluminum versions of the M5081 Series Fuel Valve carry Canadian Registration Number OC1476.2.

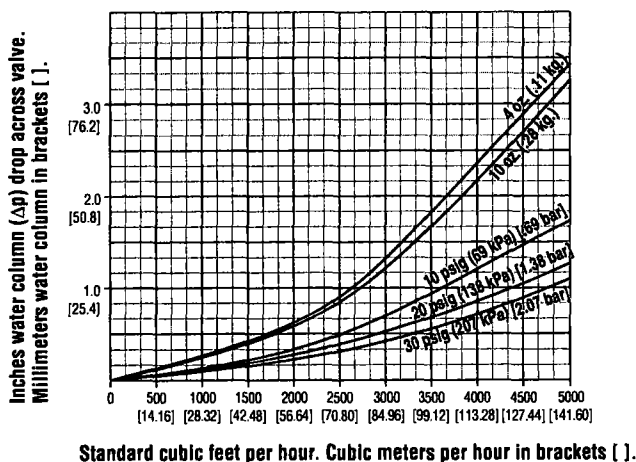
* M5081 model is CSA approved for Class I, Division I, Groups C and D. See Specifications on page 12.

FLOW CHARACTERISTICS

M2582 Series



M5081 and M5180 Series



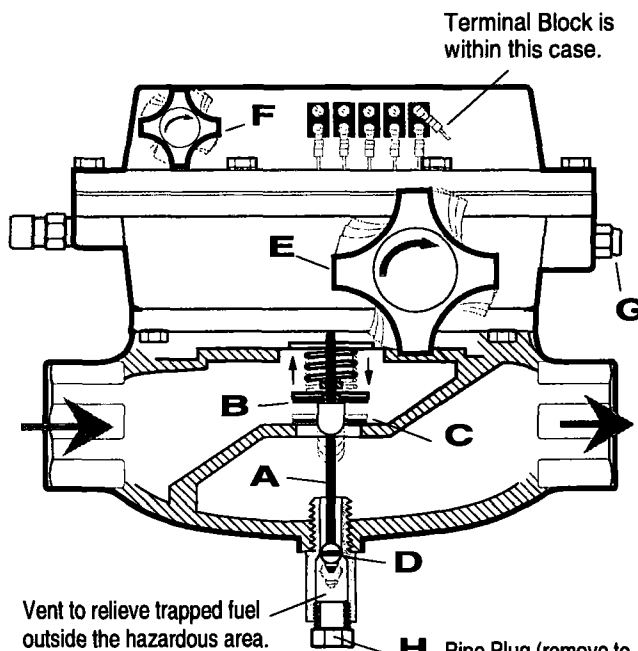
VALVE CUT-OUT

Understanding the Basic Operation of the Fuel Shut-off Valve

The valve below is shown in the run (open) position. Pressure is equalized, seat (B) is open, allowing the fuel to flow. When valve is in the tripped position (closed), seat closes (C).

The vent (D) opens to relieve trapped downstream fuel to vent to a non-hazardous area.

TYPICAL MODEL (M5081) SHOWN



- A. Main Stem
- B. Pressure Disc/seal (in run/open)
- C. Pressure Disc/seal (in trip/closed)
- D. Vent Seal Gland
- E. Reset Knob (latches valve open)
- F. Manual Trip Knob (not available for M5081FS)
- G. Indicator Button (out with valve open)
- H. Pipe Plug

NOTE: If the vent-after-tripping feature is not used, remove O-ring (D), to avoid condensation accumulation that can hamper trip action.

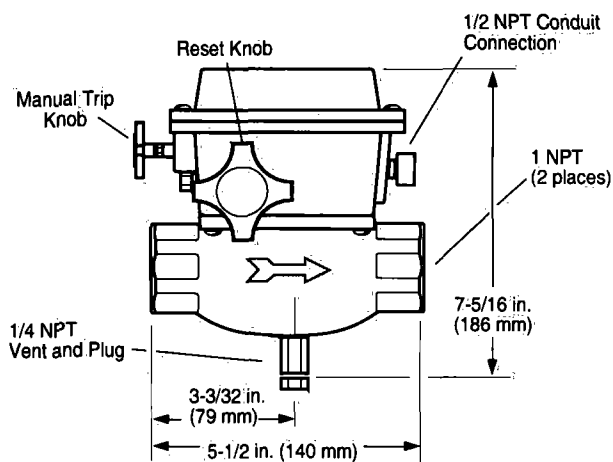
Be sure to replace Pipe Plug (H) and to clean vent periodically.

DIMENSIONS

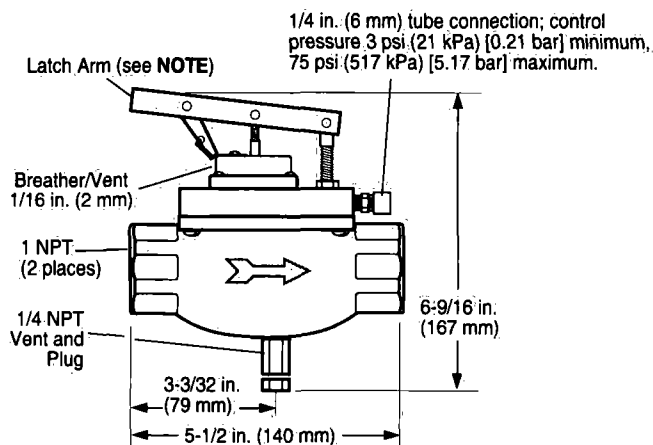


CAUTION: THE ARROW ON THE SIDE OF THE FUEL VALVE **MUST** POINT TO THE CORRECT DIRECTION OF THE FLOW, FROM FUEL SOURCE TO THE ENGINE. APPLY PIPE DOPE **ONLY** TO FUEL PIPE, **NOT** TO THE FUEL VALVE.

M2582

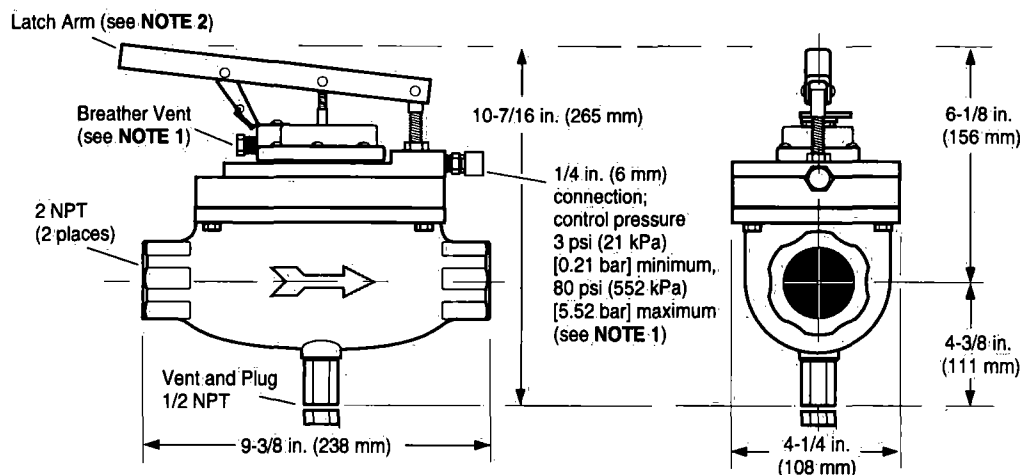


M2582-P



NOTE: Thumb operated opening latch (2.5 psi [17 kPa] [0.17 bar] required to release cocking latch)

M5180-P

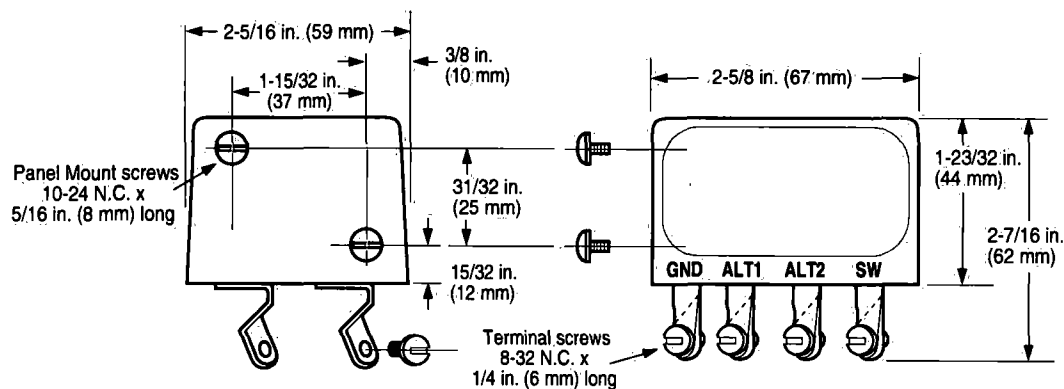


NOTE 1: Control pressure connection fitting and breather vent fitting can be swapped to convert to vacuum control.

NOTE 2: Thumb operated opening latch (2.5 psi [17 kPa] [0.17 bar] required to release cocking latch).

Magnetic Switch Adapters

65700053 (was 65020126); **65700054** (was 65020127); **65700055** (was 65020155)

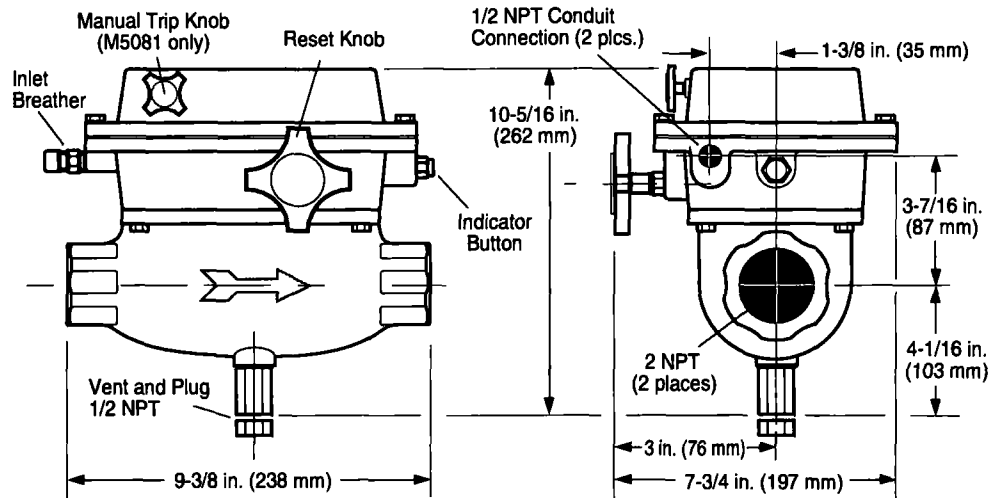


DIMENSIONS *continued*

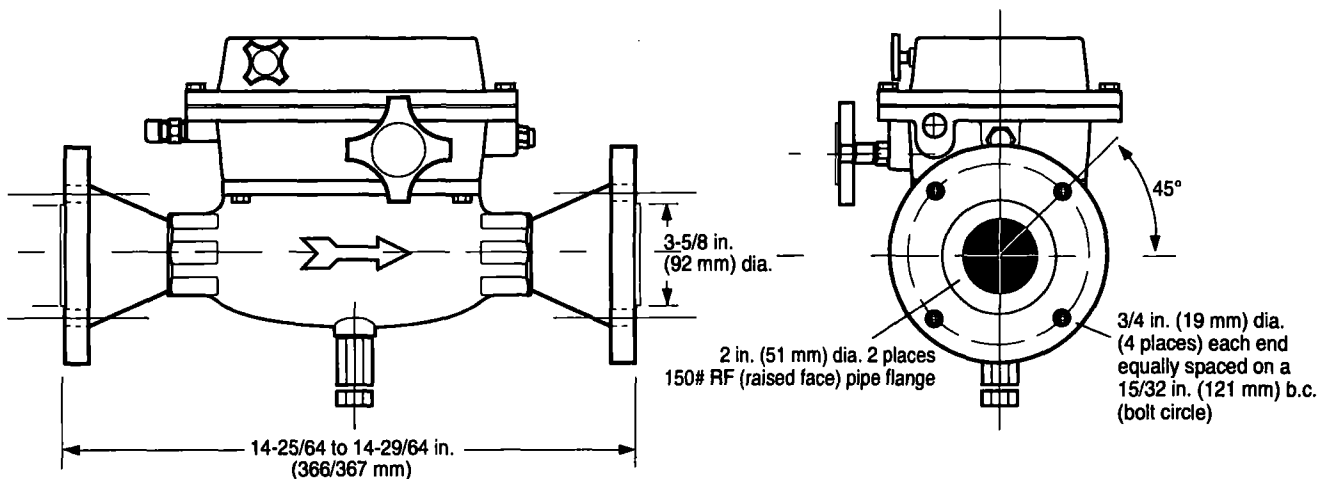


CAUTION: THE ARROW ON THE SIDE OF THE FUEL VALVE **MUST** POINT TO THE CORRECT DIRECTION OF THE FLOW, FROM FUEL SOURCE TO THE ENGINE. APPLY PIPE DOPE **ONLY** TO FUEL PIPE, **NOT** TO THE FUEL VALVE.

M5081 and M5081FS



M5081-3 Steel Flanged Option



INSTALLATION



WARNING: STOP THE ENGINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING INSTALLATION. BEGIN THE INSTALLATION BY SECURING AREA OF ANY HAZARDOUS CONDITIONS. SHUTOFF THE FUEL GAS SUPPLY. FOR HAZARDOUS APPLICATIONS REFER TO NATIONAL ELECTRICAL CODE SPECIFICATIONS.

Connecting the Fuel Shut-off Valve

1. Before connecting the unit, apply pipe dope to plumbing male threads that will be inserted into the valve. Do **not** apply pipe dope to the valve.
2. Make sure that the arrow on the side of the valve indicates the correct direction of the flow.
3. Fuel shut-off valves can be installed in all three planes. However, mounting the valve horizontally (with vent pointing down) is recommended. Do **not** install valve with top down. (Refer to *Figure 1*.)
4. Hold valve in position, (use a tool on valve wrench flats) and tighten plumbing into inlet and outlet ends. (Refer to dimensions on pages 3-4.)



CAUTION: DO NOT TWIST THE VALVE BODY HOUSING.

5. To mount flanged models, follow the appropriate installation codes and ordinances for the application. (For dimensions see page 4.)
6. A vent line (to allow gas trapped forward between fuel valve and the carburetor to escape) should be attached to the vent connection at the bottom of the valve housing. Remove the plug and install the line. (Refer to *Figure 1*.)

Connecting Pneumatic Models M2582-P and M5180-P

1. Repeat the steps above (1 thru 5), and observe the necessary cautions.
2. A lever/arm (handle) and a cocking latch are provided to allow manual opening of the valve. The thumb-operated latch can be locked in place to hold the lever/arm latched. The cocking latch will be released when pilot pressure reaches 2.5 psi (17 kPa) [0.17 bar]. M2582-P and M5180-P automatically open at 2 psi (14 kPa) [0.14 bar], and fully open at 3 psi (21 kPa) [0.21 bar]. See Specifications, page 12 for maximum control pressure.



CAUTION: BE SURE PNEUMATIC SOURCE RELEASES THE MECHANICAL LATCH WHEN RUNNING.

3. If vacuum control is desired, swap the Control Pressure connection fitting and the Breather Vent fitting on your M5180-P model (see *Fig. 2*).

Figure 1
Physical Location and Plumbing (typical)

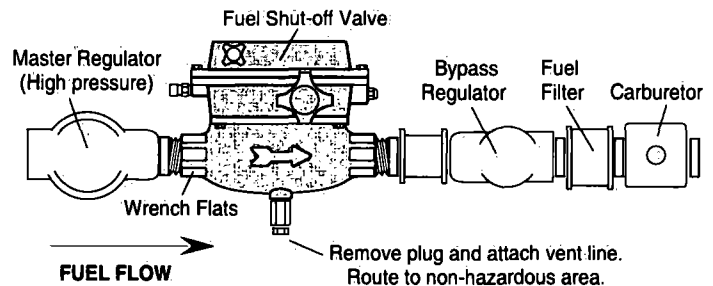
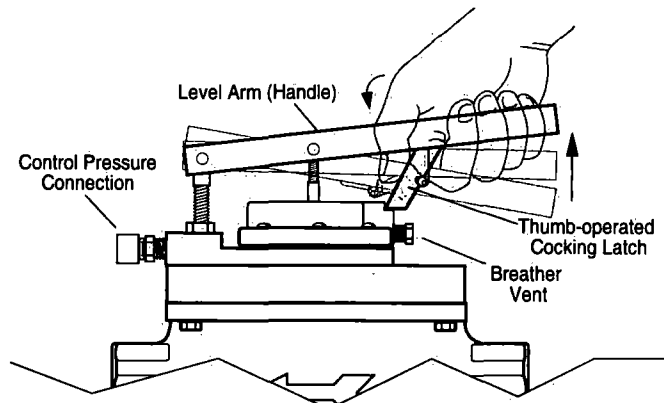


Figure 2
Pull the lever up, and press the latch down into ridge with thumb.



WIRING INFORMATION



WARNING: PERFORM THE WIRING OPERATION WITH THE POWER SOURCE "OFF" AND THE AREA MADE NON-HAZARDOUS. MAKE SURE THE VOLTAGE AND CURRENT REQUIREMENTS ARE WITHIN THE FUEL SHUT-OFF VALVE RATINGS. HARD CONDUIT WITH APPROVED SEALS IS REQUIRED BY THE NEC FOR HAZARDOUS AREA INSTALLATIONS.

M2582 Internal Wiring

Wiring shown in normal mode of operation (seat open). The 20 AWG (0.75 mm²) wire is color coded to the coil:

For CD ignitions: White and Orange

For Magneto ignitions: White and Green

For Battery: White and Blue

Conduit Installation

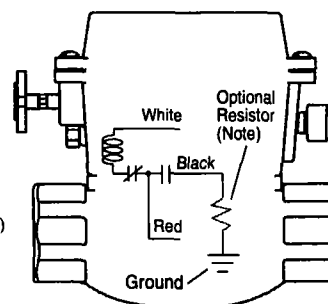
Install a 1/2 NPT conduit from the M2582 conduit connection to the power source. See M2582 Dimensions (page 3) for location.

For wiring the M2582 fuel valve to Solid-State TATTLETALE® annunciators, refer to pages 9, 10, and 11.

Internal Wiring for M2582

NOTE:

For grounding the ignition (CD models only) through the fuel valve snap-switch, use a Magnetic Switch Adapter (see Magnetic Switch Adapter, below) and install a 100 ohm; 2 watt resistor (included on page 11).



M5081 Internal Wiring

Wiring shown in normal mode of operation (seat open). The 18 AWG (1.0 mm²) wire is color coded to the coil:

For CD Ignitions: White and Orange

For Magneto Ignitions: White and Green

For Battery: White and Blue

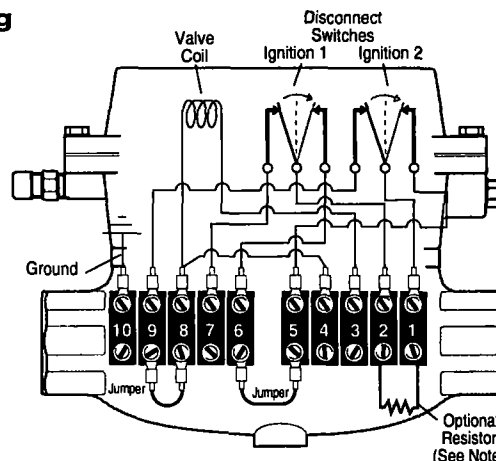
Conduit Installation

Install a 1/2 NPT conduit from the M5081 conduit connection to the power source. Refer to Dimensions (on page 4) for location.

For typical wiring of the M5081 models refer to pages 7 and 8.

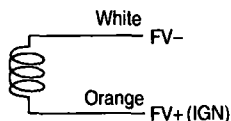
For wiring the M5081 fuel valves to Solid-State TATTLETALE® annunciators, refer to pages 9, 10, and 11.

M5081 Internal Wiring

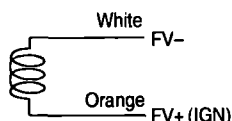


NOTE: For grounding the ignition (CD models only) through the fuel valve snap-switches, use a Magnetic Switch Adapter, see Magnetic Switch Adapter, below and the "TO CLOSE THE FUEL VALVE and GROUND THE IGNITION" attachment, and install a 100 ohm; 2 watt resistor (included with your attachment).

M2582-C-LS Wiring



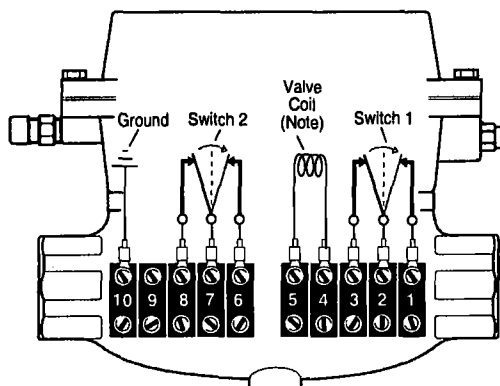
M5081-C-LS Wiring



M5081FS Internal Wiring

For typical Wiring refer to page 8.

For wiring the M5081FS to MARK IV 12/24 refer to page 10.



NOTE: Wiring shown in normal mode of operation (seat open). The 18 AWG (1.0 mm²) wire is red color for both options: 12 VDC and 24 VDC.

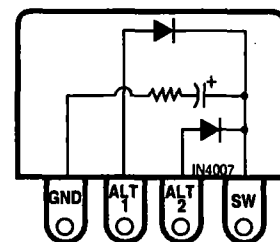
Magnetic Switch Adapters for Use with Capacitor Discharge Ignitions

Connect the Magnetic Switch Adapter between the fuel Valve terminal 1 and the CD Ignition. See wiring diagrams (pages 7 and 11).

65700053 (was 65020126): For use with negative ground ignitions up to 240 VDC.

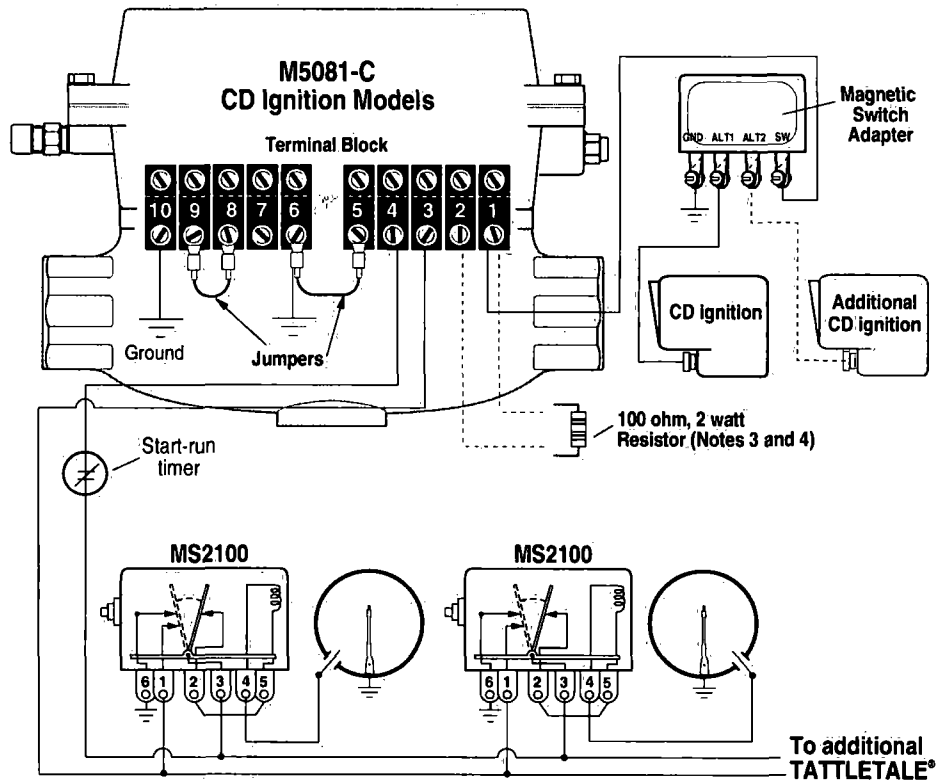
65700054 (was 65020127): For use with positive ground ignitions up to 450 VDC.

65700055 (was 65020155): For use with negative ground ignitions up to 450 VDC.



Negative ground
Magnetic Switch Adapter shown

TYPICAL WIRING for M5081-C (CD IGNITION MODELS)



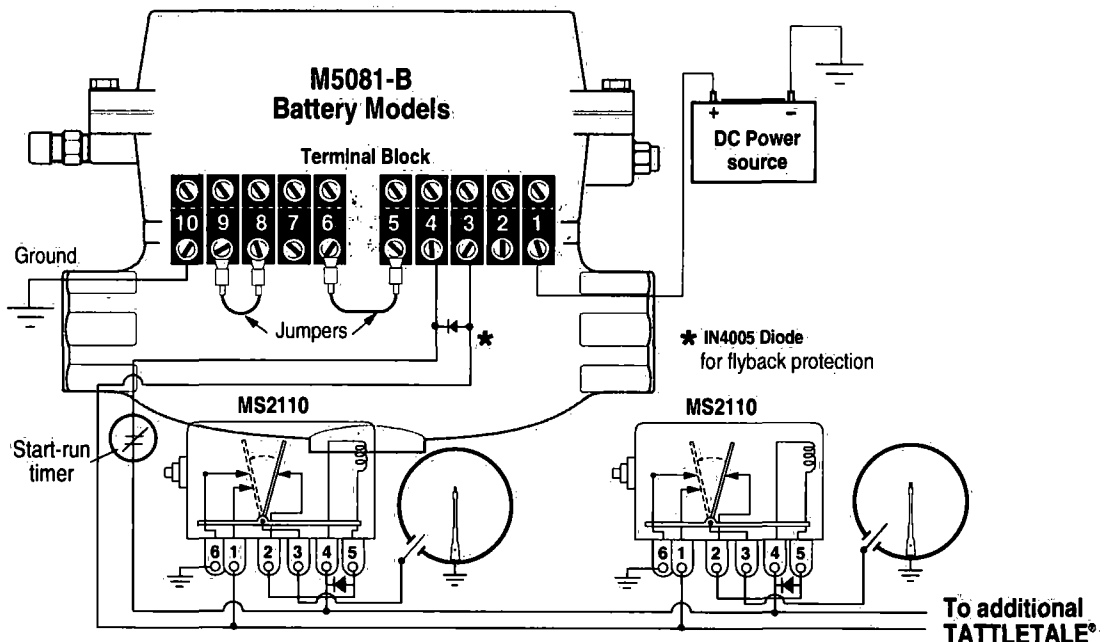
NOTE 1: To CLOSE FUEL VALVE—NOT GROUNDING THE IGNITION (Single CD Ignition Systems) Remove the factory-installed jumper on terminals 6-5. Do NOT ground terminal 6.

NOTE 2: To CLOSE FUEL VALVE—NOT GROUNDING THE IGNITIONS (Dual CD Ignition Systems) Remove the jumper on terminals 6-5. Connect second ignition to Magnetic Switch Adapter terminal ALT2.

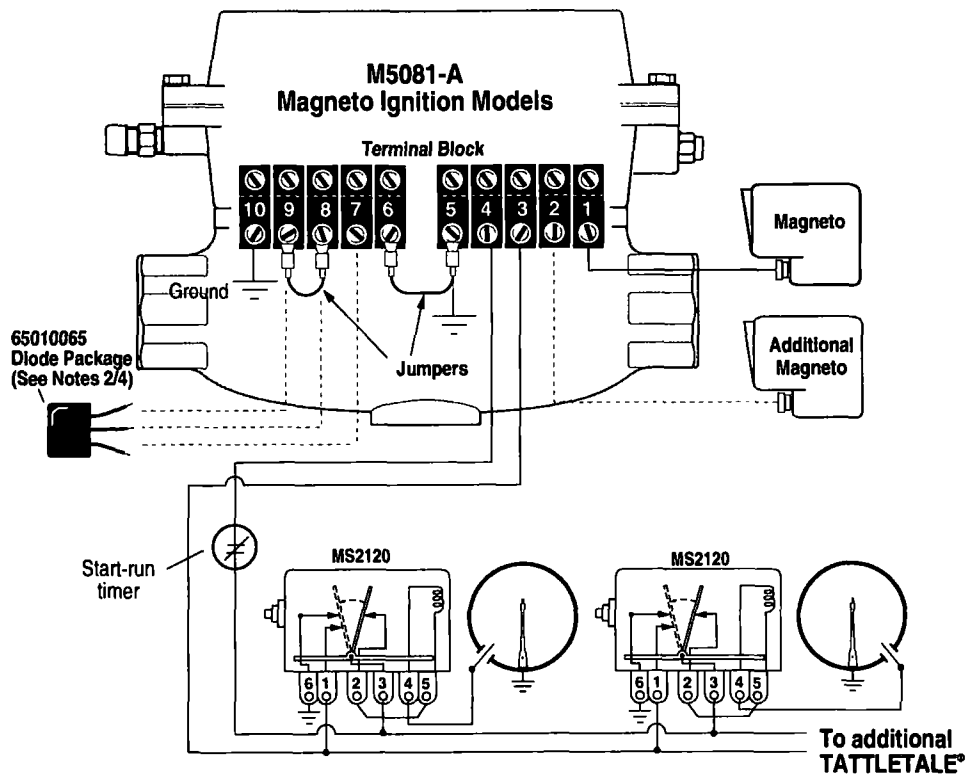
NOTE 3: To CLOSE FUEL VALVE and GROUND THE IGNITION (Single CD Ignition Systems) Remove the jumper on terminals 6-5. Connect a 100 ohm, 2 watt resistor between valve terminals 1-2. Ground terminal 6.

NOTE 4: To CLOSE FUEL VALVE and GROUND THE IGNITION (Dual CD Ignition Systems) Remove the jumper on terminals 6-5. Connect a 100 ohm, 2 watt resistor between valve terminals 1-2. Ground terminal 6. Connect second ignition to Magnetic Switch Adapter terminal ALT2.

TYPICAL WIRING for M5081-B (BATTERY IGNITION MODELS)



TYPICAL WIRING for M5081-A (MAGNETO IGNITION MODELS)



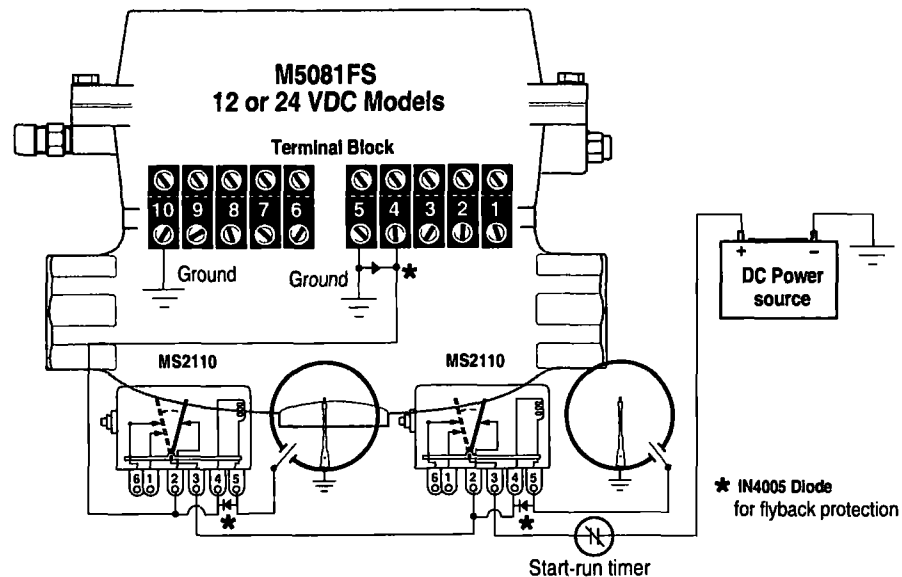
NOTE 1: To CLOSE FUEL VALVE—NOT GROUNDING THE IGNITION (Single Magneto Systems) Remove the factory-installed jumper on terminals 6-5. Do NOT ground terminal 5.

NOTE 2: To CLOSE FUEL VALVE—NOT GROUNDING THE IGNITIONS (Dual Magneto Systems) Remove the factory-installed jumpers on terminals 6-5 and 9-8. Add 65010065 diode package as shown. Do NOT ground terminals.

NOTE 3: To CLOSE FUEL VALVE and GROUND THE IGNITION (Single Magneto Systems) The factory-installed jumpers (6-5 and 9-8) must be in place. Add ground wire to terminal 5.

NOTE 4: To CLOSE FUEL VALVE and GROUND THE IGNITION (Dual Magneto Systems) Remove the jumper on terminals 9-8. Add 65010065 diode package as shown. Add ground wire to terminal 5.

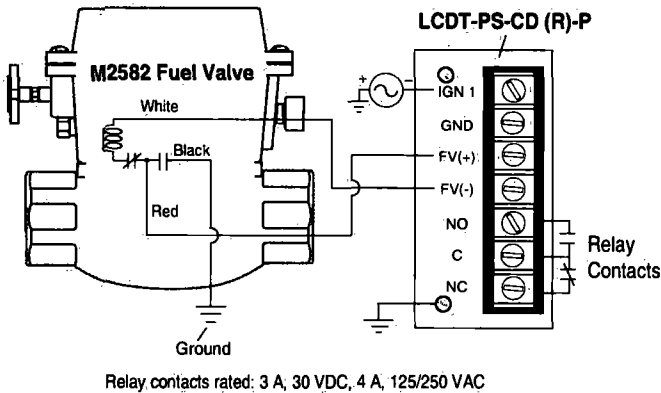
TYPICAL WIRING for M5081FS (NORMALLY ENERGIZED MODELS)



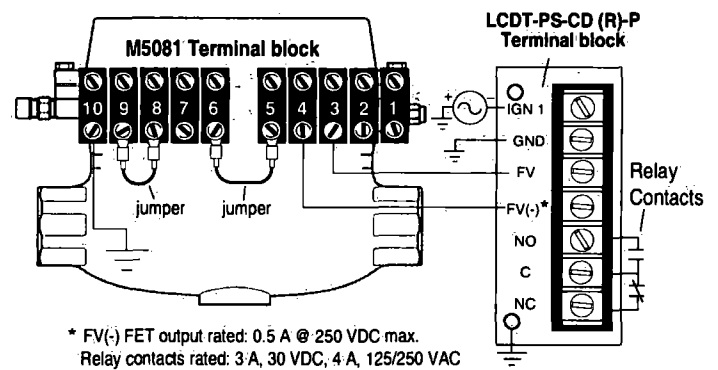
TYPICAL WIRING to SOLID-STATE TATTLETALE® Annunciators



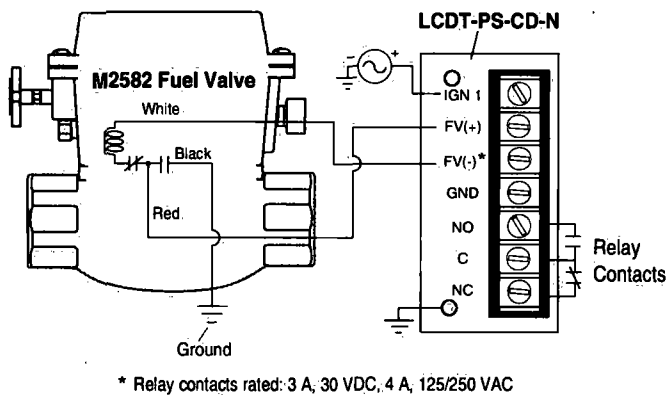
M2582-C to LCDT-PS-CD (R)-P (positive ground)



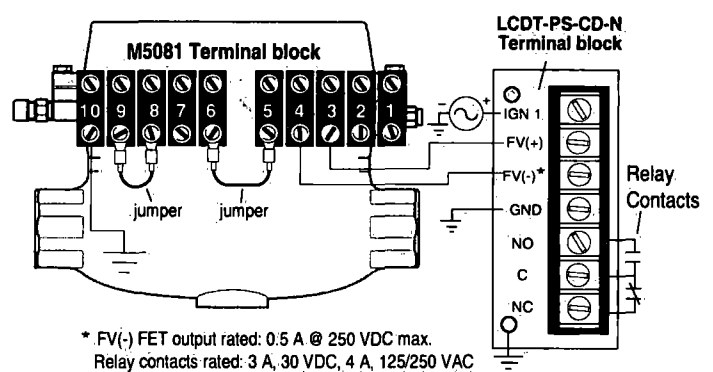
M5081-C to LCDT-PS-CD (R)-P (positive ground)



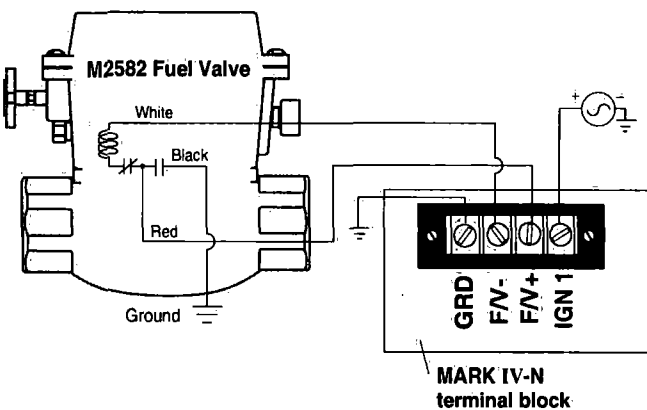
M2582-C to LCDT-PS-CD-N (negative ground)



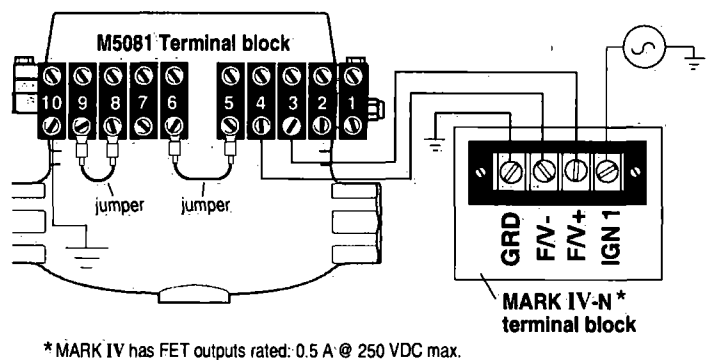
M5081-C to LCDT-PS-CD-N (negative ground)



M2582-C to MARK IV-N (negative ground)



M5081-C to MARK IV-N (negative ground)

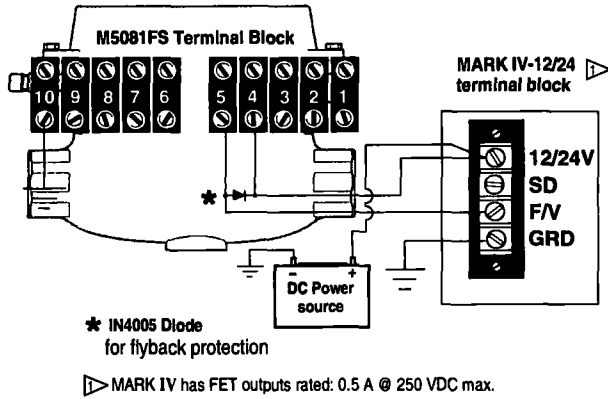


TYPICAL WIRING to SOLID-STATE TATTLETALE® Annunciators

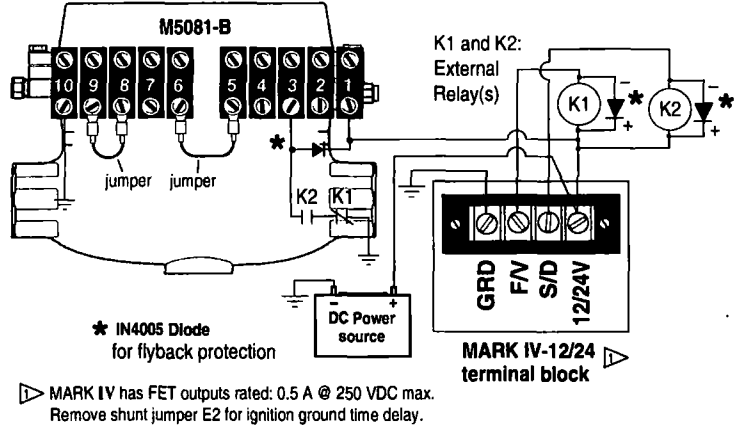


WARNING: PERFORM THE WIRING OPERATION WITH THE POWER SOURCE "OFF" AND THE AREA MADE NON-HAZARDOUS. MAKE SURE THE VOLTAGE AND CURRENT REQUIREMENTS ARE WITHIN THE FUEL SHUT-OFF VALVE RATINGS. HARD CONDUIT WITH APPROVED SEALS IS REQUIRED BY THE NEC FOR HAZARDOUS AREA INSTALLATIONS.

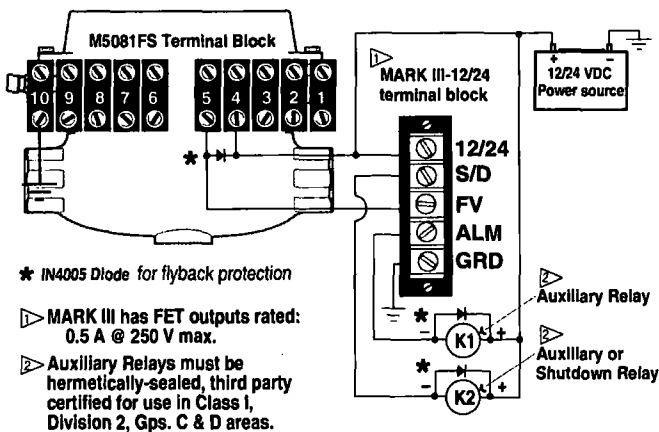
M5081 FS to MARK IV-12/24



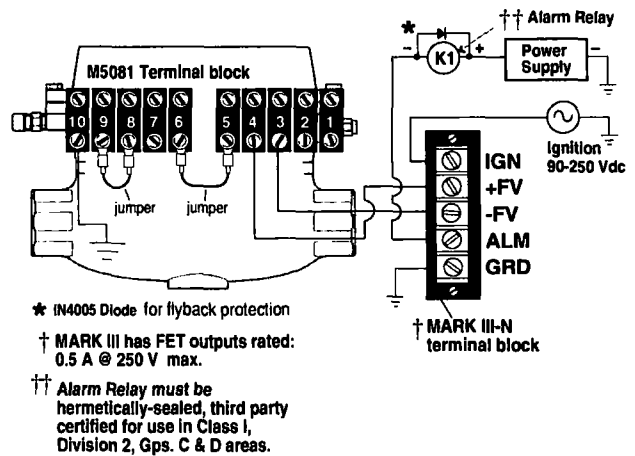
M5081-B to MARK IV-12/24



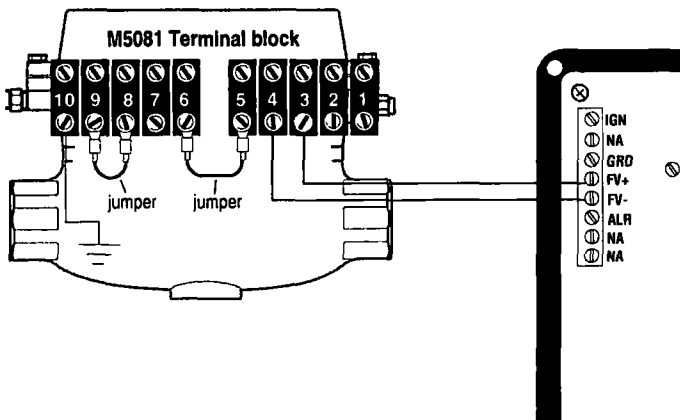
M5081 FS to MARK III-12/24



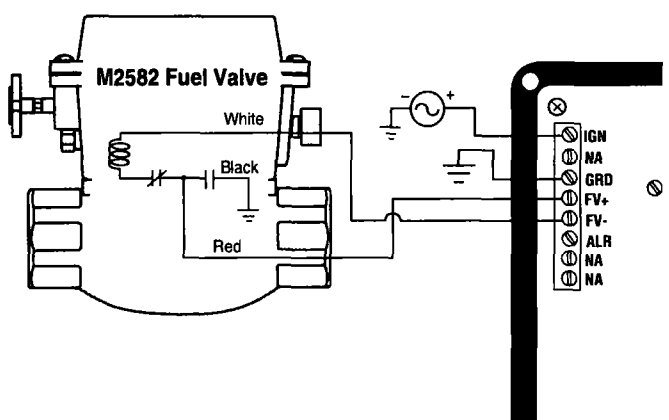
M5081-C to MARK III-N



M5081-C to TTDJ-IGN-(T)



M2582-C to TTDJ-IGN-(T)

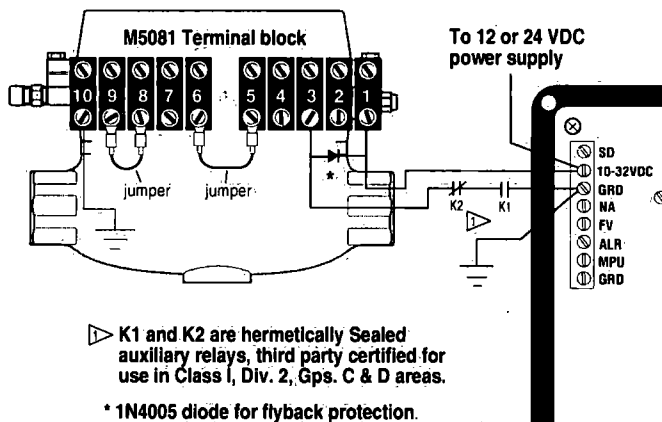


TYPICAL WIRING to SOLID-STATE TATTLETALE® Annunciators *continued*

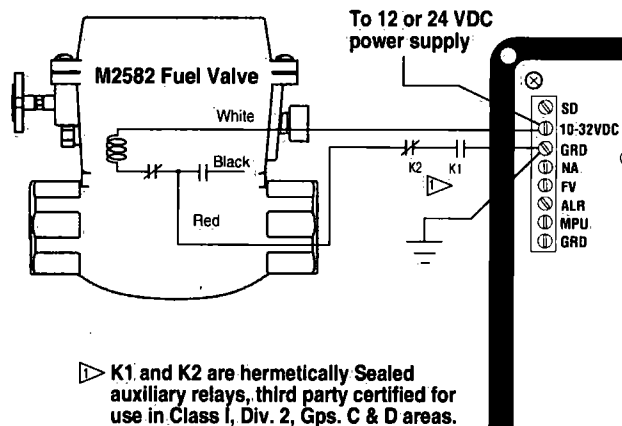


WARNING: PERFORM THE WIRING OPERATION WITH THE POWER SOURCE "OFF" AND THE AREA MADE NON-HAZARDOUS. MAKE SURE THE VOLTAGE AND CURRENT REQUIREMENTS ARE WITHIN THE FUEL SHUT-OFF VALVE RATINGS. HARD CONDUIT WITH APPROVED SEALS IS REQUIRED BY THE NEC FOR HAZARDOUS AREA INSTALLATIONS.

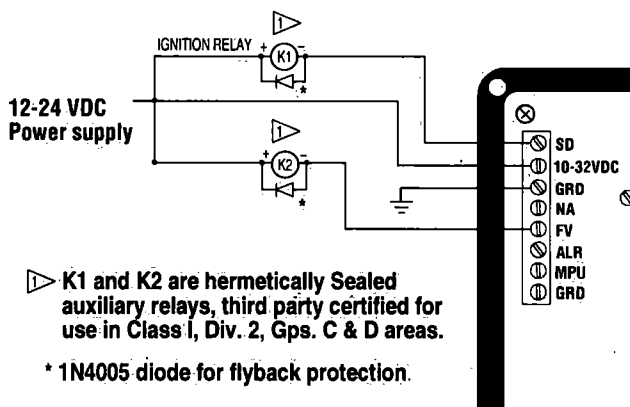
(A) M5081-B to TTDJ-DC-(T)



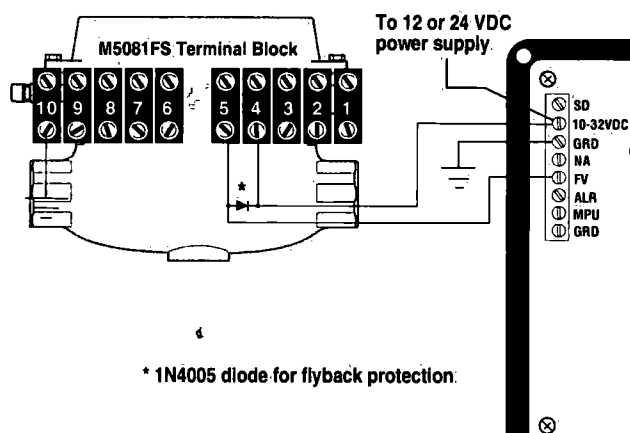
(B) M2582-B to TTDJ-DC-(T)



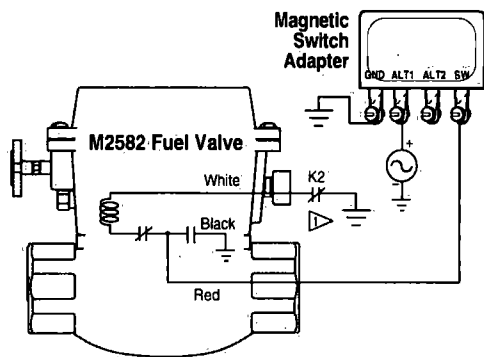
TTDJ-DC-(T) to Relays
Connections Shown for Use with
Diagrams (A), (B), (C), and (D) on this page.



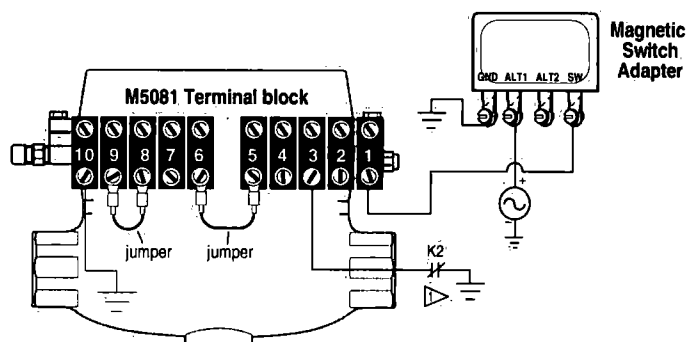
M5081FS to TTDJ-DC-(T)



(C) M2582-C w/Magnetic Switch Adaptor to CD Ignition



(D) M5081-C w/Magnetic Switch Adaptor to CD Ignition



SPECIFICATIONS

Valve Body: Sandcast aluminum, painted red (corrosion resistance);
Optional cast steel available for M5081 and M5081FS models only.

Valve Seat: Buna-N

Maximum Valve Inlet Pressure:

- M2582/M2582-P: 80 psi (552 kPa) [5.52 bar]
- M5081/M5081FS/ M5180-P: 100 psi (689 kPa) [6.89]

Maximum Control Pressure (Pneumatic Models):

- M2582-P: 75 psi (517 kPa) [5.17 bar]
- M5180-P: 80 psi (552 kPa) [5.52 bar]

Snap-switch: M2582: One SPDT, 5 A @ 480 VAC
M5081, and M5081FS: Two SPDT, 5 A @ 480 VAC

Wiring: M2582: Wire leads; M5081, and M5081FS: Terminal blocks

NOTE: All aluminum versions of the M5081 Series Fuel Valve carry Canadian Registration Number OC1476.2.

Coil Rating: Intermittent duty; coil type must match power source;

- CD ignition coil resistance: 72 Ω
CD ignition primary voltage: 1.38 to 3.8 A
- M5081FS: Energized to Run (continuous-duty coil) coil resistance:
12 V model: 33 Ω ;
24 V model: 136 Ω
- Magneto ignition coil resistance: 0.5 Ω
Magneto primary voltage: 1 to 5 A
- Battery coil resistance : 7 Ω
12 or 24 VDC: 1.2 to 2.4 A

Laboratory Approval: CSA listed for Class I, Groups C and D Hazardous Locations. 5 amps maximum; intermittent duty; models M5081 and M5081-CD engine ignition powered, and model M5081-B, 12 or 24 VAC or VDC; switch contacts rated 5 A @ 480 VAC maximum. Maximum pressure 100 psi (689 kPa) [6.89 bar].

SERVICE PARTS	M2582	M5081	M5081FS	M2582-P	M5180-P
Coil Assembly					
Battery	55000128	55000126	-----	-----	-----
CD Ignition	55000129	55000127	-----	-----	-----
Magneto Ignition	55000094	55000080	-----	-----	-----
M5081FS Coil Assembly					
12 VDC	-----	-----	55000158	-----	-----
24 VDC	-----	-----	55000159	-----	-----
Latch Block Assembly					
Latch block assembly	55000095	55000074	-----	-----	-----
Latch block switch and coil assembly	-----	-----	-----	-----	-----
Latch block switch and mounting bracket assembly	-----	55000118	55000196	-----	-----
Handle and Latch Kit					
Handle and latch kit	-----	55000102	55000102	5500148	55000154
Handle kit	55000096	-----	-----	-----	-----
Manual Disconnect Assembly	55000097	55000137	-----	-----	-----
Snap Switch Assembly	55000098	55000072	55000160	-----	-----
Close/Open Indicator Assembly	-----	55000138	55000138	-----	-----
Stem and Seat Kit	55000093	55000075	55000135	55000147	55000135
Top Works Complete Valve Less Body and Vent	55000146	55000131	55000161	55000150	55000155
Vent Bushing Assembly	55000143	55000132	55000132	55000143	55000132
Diaphragm Assembly	-----	-----	-----	55000184	55000153
Pilot Diaphragm	-----	-----	-----	00007908	55050420
Diode Package for Dual Magneto Ignitions	-----	65010065	-----	-----	-----
Magnetic Switch Adapter for CD Ignitions					
Single/Dual ign. - negative ground up to 240 VDC	65700053	65700053	-----	-----	-----
Single/Dual ign. - positive ground up to 450 VDC	65700054	65700054	-----	-----	-----
Single/Dual ign. - negative ground up to 450 VDC	65700055	65700055	-----	-----	-----

Warranty

A two year limited warranty on materials and workmanship is provided with this Murphy product.
Details are available on request and are packed with each unit.



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In order to consistently bring you the highest quality, full featured products, we reserve the right to change our specifications and designs at any time.

Installation and Operation Manual for DVU Series Dump Valves

Models: DVU150, DVU175, DVU2105, DVU2115 and DVU2120

DVU-01070N
Revised 07-02
Section 15
00-02-0483



Please read the following information before installing. A visual inspection of this product for damage during shipping is recommended before mounting. It is your responsibility to have a qualified person install this unit and make sure it conforms to local codes.

GENERAL INFORMATION

WARNING

BEFORE BEGINNING INSTALLATION OF THIS MURPHY PRODUCT

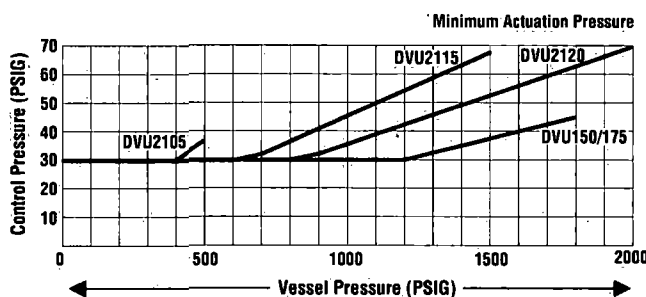
- ✓ Disconnect all electrical power to the machine.
- ✓ Make sure the machine cannot operate during installation.
- ✓ Follow all safety warnings of the machine manufacturer.
- ✓ Read and follow all installation instructions.

Description

The DVU Series models are pneumatically controlled dump valves. The valves open and close automatically by pneumatic control from a Murphy L1200NDVOR or similar level controller and dump valve operator. Diaphragm actuated, the DVU series dump valves operate at 30–70 psi (207–483 kPa) [2.07–4.83 bar] and up to 2000 psi (13.8 MPa) [138 bar] vessel pressure (depending on the model).

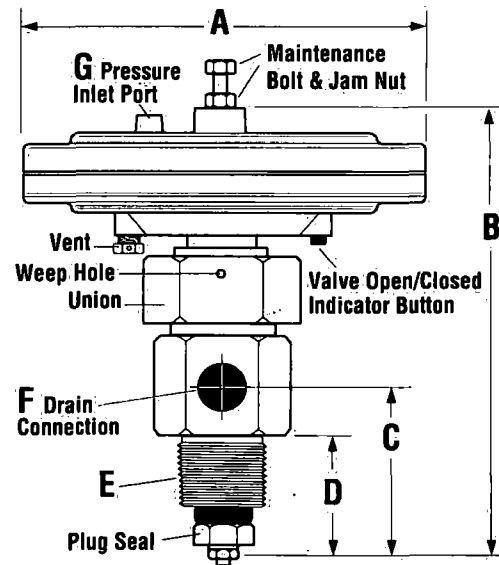
A key benefit of this design is a hex union that provides the ability to replace the seat without removing the valve from piping.

Fig. 1 Control Pressure vs. Vessel Pressure



Model	Inlet	Outlet	Trim Size
DVU150	1 NPT	1/2 NPT	0.359 in. (9 mm)
DVU175	1 NPT	3/4 NPT	0.359 in. (9 mm)
DVU2105	2 NPT	1 NPT	0.859 in. (22 mm)
DVU2115	2 NPT	1 NPT	0.576 in. (15 mm)
DVU2120	2 NPT	1 NPT	0.436 in. (11 mm)

Fig. 2 Dimensions (all models)



	DVU150	DVU175	DVU2105	DVU2115	DVU2120
A	7.5 (191)	7.5 (191)	7.5 (191)	7.5 (191)	7.5 (191)
B	7.86 (200)	7.86 (200)	8.94 (227)	9.00 (229)	9.09 (231)
C	3.04 (77)	3.04 (77)	3.58 (91)	3.64 (92)	3.73 (95)
D	2.04 (52)	2.04 (52)	1.92 (49)	1.98 (50)	2.07 (53)
E	1-11.5 NPT	1-11.5 NPT	2-11.5 NPT	2-11.5 NPT	2-11.5 NPT
F	1/2-14 NPT	3/4-14 NPT	1-11.5 NPT	1-11.5 NPT	1-11.5 NPT
G	1/8-27 NPT	1/8-27 NPT	1/8-27 NPT	1/8-27 NPT	1/8-27 NPT

NOTE: Dimensions are in inches and (millimeters)

Specifications

Operating Temperature: -30 to 250°F (-34.4 to +121°C)

Valve Operating Pressure: Refer to chart, Fig 1.

Maximum Process Pressure:

DVU150 and DVU175: 1800 psi (12.4 MPa) [124 bar].

DVU2105: 500 psi (3.44 MPa) [34 bar].

DVU2115: 1500 psi (10.3 MPa) [103 bar].

DVU2120: 2000 psi (13.8 MPa) [138 bar].

Flow Characteristics: See chart, page 4 (DVU150/175 models only).

Body Material: Electroless Nickel Plated 12L14 Carbon Steel

Internal Wetted Parts: Plug Seal: 90 Durometer Urethane.

Other: 303 stainless steel; Electroless Nickel Plated 12L14 Carbon Steel

Shipping Weights: *DVU150 and DVU175:* 9 lbs. (4 kg.).

Shipping Weights: *DVU2105, DVU2115 and DVU2120:* 14 lbs. (6.4 kg.).

Shipping Dimensions: 7-1/2 x 7-1/2 x 10-3/4 in. (191 x 191 x 274 mm.).

TYPICAL INSTALLATION ON GAS COMPRESSORS

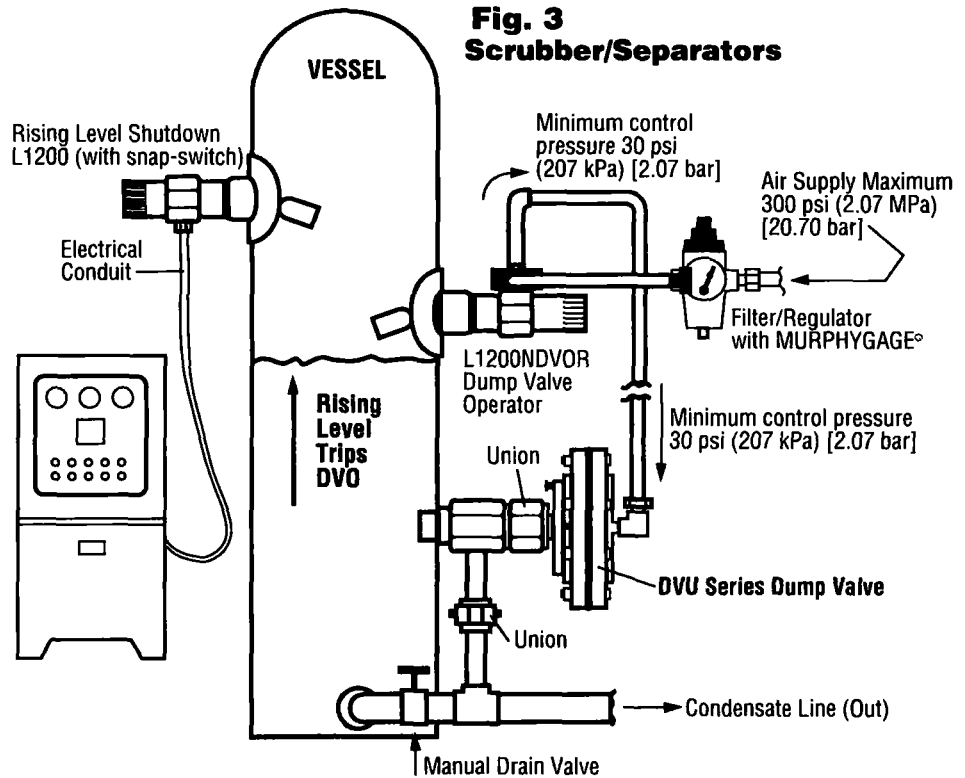
Basic Operation

As condensate rises in the scrubber, the float on the L1200NDVOR rises and trips its pneumatic valve. The valve opens allowing pressure to enter the dump valve pilot chamber. Once the pressure enters the pilot chamber it forces the diaphragm and valve stem forward thus opening the valve seat (valve open/closed indicator button pops out) and releasing condensate through the valve stem and out the drain. As the condensate level drops, the L1200NDVOR pneumatic valve closes to shut off the pressure to the dump valve causing it to close.

If for any reason the condensate continues to rise beyond normal dump levels, model L1200 operates the alarm and/or shuts down the equipment.

The L1200NDVOR Filter/Regulator and the MURPHYGAGE® help keep the control pressure clean and dry. They also allow the operator to adjust pressure to recommended levels.

NOTE: Always use clean, dry, instrument quality gas.



DUMP VALVE INSTALLATION

DVU Series Installation

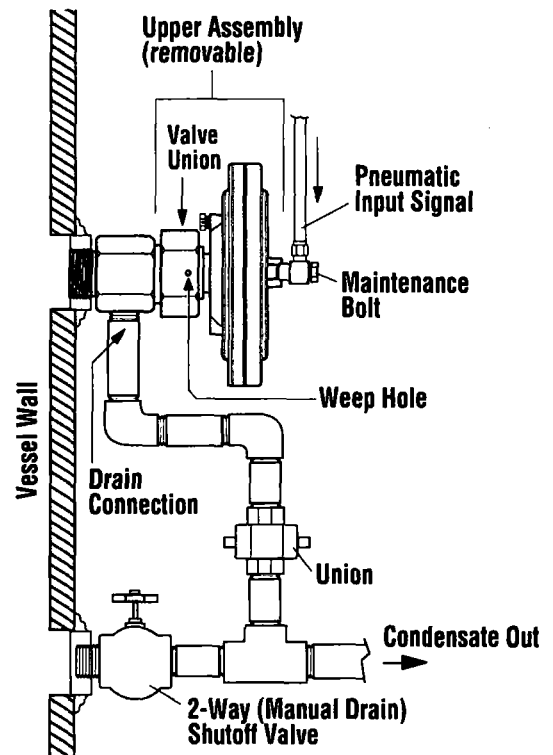


CAUTION: ALWAYS USE "NON-SPARKING TOOLING" WHEN GAS IS KNOWN TO BE PRESENT.

The following describes the "Direct Mounting" method to the tank wall.

1. Install the valve so the drain connection is on the bottom.
Use pipe thread sealant on all the connections.
2. Be sure the unit is screwed tight and does not leak liquid.
3. Install the piping for the pneumatic input signal into the 1/8 NPT threaded connection of the pressure inlet port (on top of the diaphragm housing of the DVU).
6. Install a union between the DVU drain connection and the condensate out line. Use pipe thread sealant on all the connections.

**Fig. 4
Typical
Dump Valve
Installation**



REPAIR PROCEDURE



CAUTION: THE INSTALLATION AND REPAIR PROCEDURES SHOULD ONLY BE PERFORMED BY TRAINED, QUALIFIED, AND EXPERIENCED PERSONNEL. THE TRAINING, QUALIFICATION AND EXPERIENCE REQUIRED IS FOR WORK AROUND PRESSURE VESSELS, NATURAL GAS, POSSIBLY SOUR GAS, OR ANY SUBSTANCE TO BE FOUND IN THE VESSEL. EXTREME CARE MUST BE TAKEN TO INSURE ANY RESIDUAL OR FULL PRESSURE IS RELIEVED FROM ALL PARTS OF THE SYSTEM TO BE SERVICED.

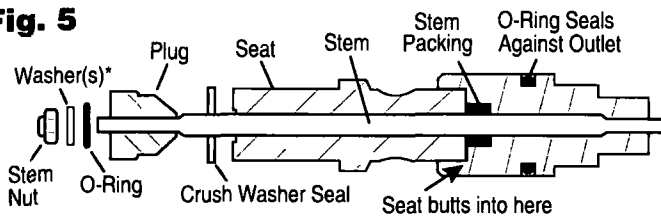
Suggested Tools (Sizes listed are wrench openings. Adjustable crescent wrenches, socket and/or end wrench, pipe wrenches, flat edge screwdriver with 1/4" blade width, can also be used.)

Model	Valve Body	Union Nut	Plug Seal Hex	Stem Nut
DVU150/DVU175	2-1/4"	2-1/4"	3/4"	3/8"
DVU2105	3"	3"	1-1/4"	1/2"
DVU2115	3"	3"	1"	1/2"
DVU2120	3"	3"	7/8"	1/2"

Replacing the Plug and Seat

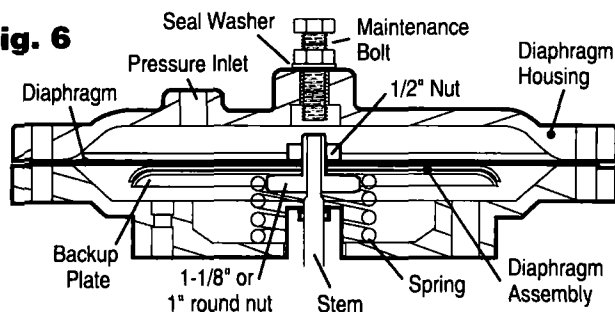
1. Close the pressure block valves (suction & discharge valves) on the inlet and outlet of the skid. Lock them closed if possible.
2. Open the blowdown valve to remove pressure from the unit. Lock the blowdown valve open if possible.
3. After taking all possible precautions to insure there is no pressure in the vessel. (If the condensate line is pressurized, it must also be blocked and locked.) Open the manual drain valve so it bleeds into the vessel so it can also be bled down. Disconnect the pneumatic input signal connection after insuring it also has been de-pressurized.
4. Using a back-up wrench on the valve body, with a quick "breaking" action loosen the union nut on the valve. There is a "weep" hole in the nut. If at any time while loosening and taking off the nut pressure is escaping through the "weep" hole, immediately stop loosening the nut. Retighten the nut and check the preceding procedures to ensure the pressure is bled off the vessel. Never remove the assembly if pressure is coming through the weep hole. See Figure 4 on page 2.
5. With the upper assembly removed from the vessel the plug and/or seat can be replaced. Loosen the 9/16" jam nut on the maintenance bolt on top of the diaphragm cover. Spin the nut up against the head of the bolt. Tighten the bolt to extend the shaft and plug. DO NOT OVERTIGHTEN.

Fig. 5



*Number of washers varies depending on the model from 1 to 3.

Fig. 6



6. Using a back-up wrench on the plug, remove the stem nut on the shaft under the plug. Once the stem nut is broken loose, the 9/16" head maintenance bolt and top assembly will keep the stem from turning. The plug turns freely on the stem once loose. The plug and seat can now be removed. All soft seals should be replaced.

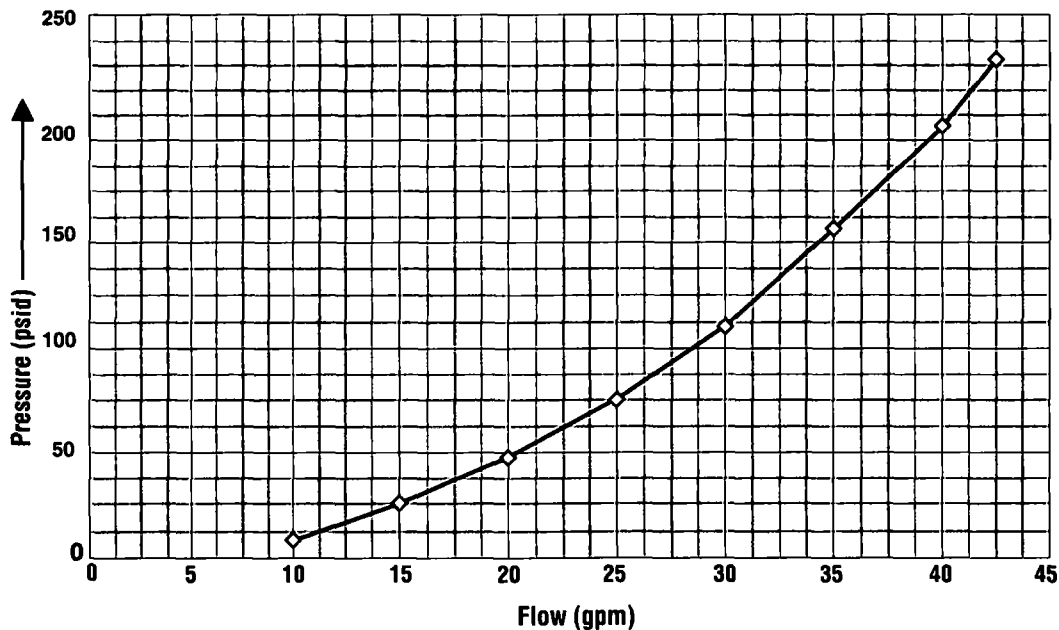
Replacing the Diaphragm

- 6A. If the diaphragm is to be replaced, all preceding steps have to be done. Additionally, do the following:
- 6B. Loosen the 9/16" head maintenance bolt, allowing the diaphragm spring to relax, and the stem to retract. Make alignment marks on the top and bottom halves of the diaphragm assembly for alignment during re-assembly.
- 6C. Remove the 8, 7/16" bolts/nuts holding the diaphragm housing together.
- 6D. Using a straight edge screwdriver, gently separate the 2 halves of the diaphragm housing, and remove the top, or outside portion.
- 6E. Lift the diaphragm and support plates far enough for the 1-1/8" hex or 1" round nut on the bottom of the diaphragm assembly to be accessible to a wrench and not have the spring interfere. If it is desired to replace the packing, pull the stem all the way out. The packing can be easily removed using a small screwdriver to pry the packing out. The new packing can be simply pressed in, making sure the orientation of the packing installed is the same as the orientation of the packing removed. The packing is wider toward the plug end. You will have to use the seat to hold the packing in place when re-inserting the stem.
- 6F. With the 1-1/8" hex or 1" round nut held by a wrench, use a wrench to loosen and remove the 1/2" nut on top of the diaphragm. The diaphragm can now be removed and replaced.
- 6G. With the new diaphragm in place and the 1/2" nut tightened, place the assembly, diaphragm down on a clean, smooth sturdy surface.
- 6H. Have the seat, plug, washers and stem nut handy (if any of these parts are to be replaced, use the old parts for this procedure). Press down evenly and smoothly on the bottom of the diaphragm assembly to cause stem to come up. Place the seat and plug in place. Then push the bottom of the diaphragm assembly down far enough to install the washers and stem nut on the stem. Tighten the stem nut enough to hold against the diaphragm spring.
- 6J. Align the diaphragm holes to the bolt holes (bottom half of the housing). Install the upper diaphragm housing using the alignment marks from step 6B. Install the 8, 7/16" bolts and nuts. Tighten the bolts evenly going from one bolt then 180° around to the next bolt, then either 120° or 240° around to the next bolt and so forth until all 8 bolts are evenly tight.
- 6K. Using the 9/16" head maintenance bolt, tighten, pushing the stem out until the 9/16" bolt stops – DO NOT OVERTIGHTEN.
- 6L. Remove the stem nut holding the plug. (If old parts were used, prepare to install the new parts now.)

7. Install the seat and plug. Place the O-ring on the stem, followed by the washer and stem nut.
8. Tighten the stem nut. Loosen the 9/16" head maintenance bolt by at least one turn past the point where it is no longer in contact with the stem. Tighten the 9/16" jam nut holding the 9/16" head maintenance bolt.
9. Replace the crush washer and the O-ring hidden by the union nut.
NOTE: If pressure or fluid comes out the weep hole of the union nut, either the O-ring under the union nut is leaking, or the packing could be leaking through the internal weep hole above that O-ring.
10. The assembly is ready to be re-installed. Check for relative position of the pneumatic input signal connections before tightening the union nut.

PRESSURE VS. FLOW CHART

Fig. 7 Pressure vs. Flow for DVU150 and DVU175 models only



SERVICE PARTS

Part No. Description

DVU150

55-00-0230 Seal Kit (includes plug)
55-00-0231 Diaphragm Kit

DVU175

55-00-0230 Seal Kit (includes plug)
55-00-0231 Diaphragm Kit

DVU2105

55-00-0245 Seal Kit (includes plug)
55-00-0244 Diaphragm Kit

DVU2115

55-00-0241 Seal Kit (includes plug)
55-00-0240 Diaphragm Kit

DVU2120

55-00-0237 Seal Kit (includes plug)
55-00-0236 Diaphragm Kit

Typical Seal Kit includes: Nut, Washer (1 to 3), "O" Ring, Plug and Seal, Seat, Crush Washer.

Typical Diaphragm Repair Kit includes:

Diaphragm; Diaphragm Washer (upper), Diaphragm Nut, Diaphragm Plate (1 or 2 pcs.), Packing, "O" Ring, Stem, Seal Washer for Maintenance Bolt.

Scrubber Level Systems

(Includes L1200, L1200NDVOR, and DVU valve)

SLS02A: Includes DVU150 valve

SLS02C: Includes DVU175 valve

SLS02BA: Includes DVU2105 valve

SLS02BB: Includes DVU2115 valve

SLS02BC: Includes DVU2120 valve

-LR: Less Regulator option

Warranty

A two year limited warranty on materials and workmanship is provided with this Murphy product. Consumable elastomers are not included. Details are available on request and are packed with each unit.

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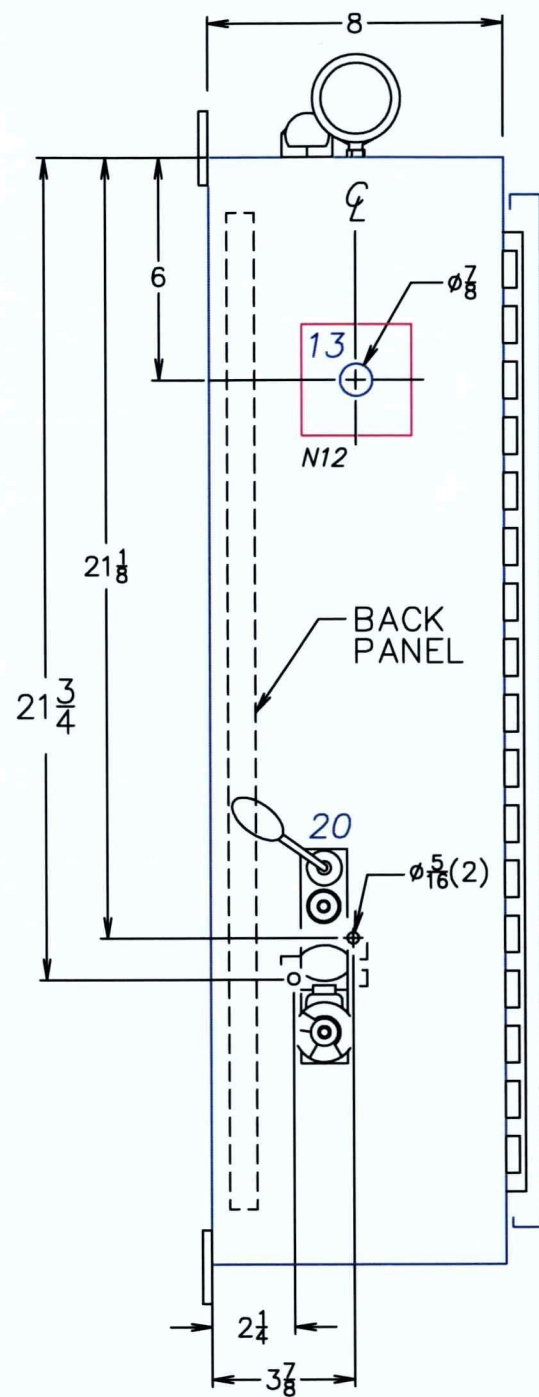
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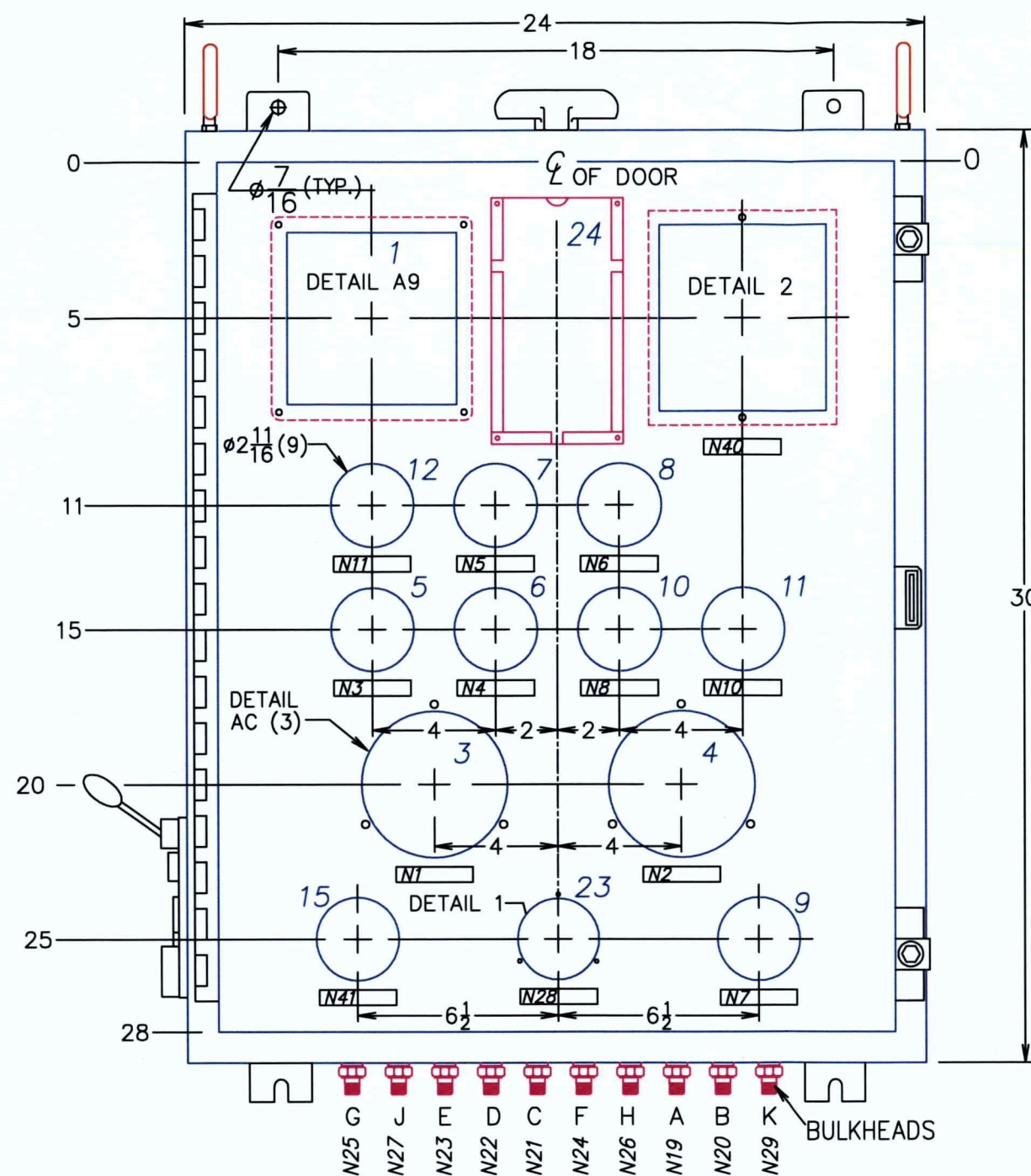


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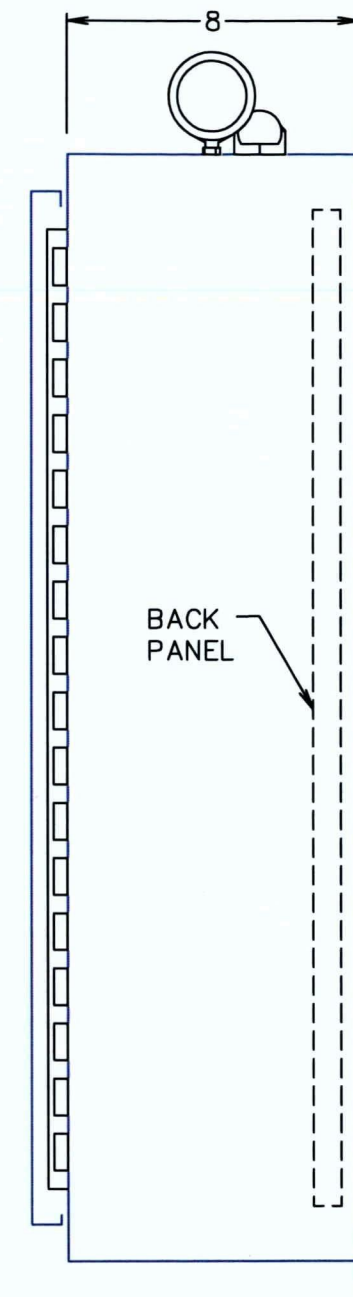
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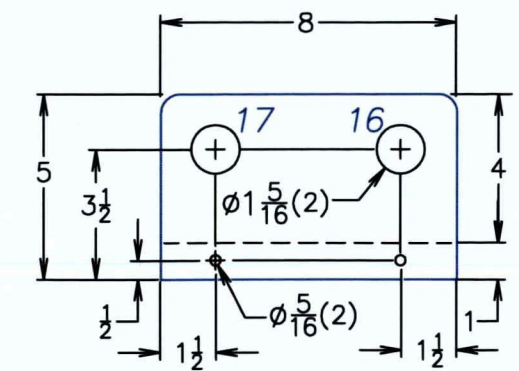
LEFT SIDE VIEW



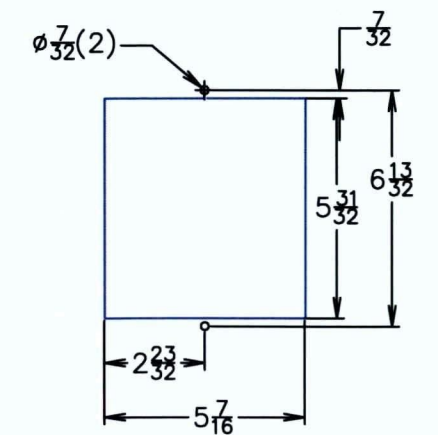
FRONT VIEW



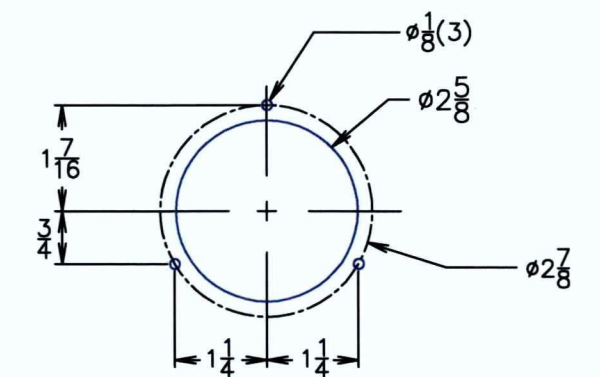
RIGHT SIDE VIEW



PILOT BRACKET




DETAIL 2



DETAIL 1

ENCLOSURE: HOFFMAN A-243008LP(OR EQUAL)
BACKPLATE: HOFFMAN A-30P24(OR EQUAL)

ITEM NUMBERS CORRESPOND TO PANEL LEGEND
ON DRAWING NO. 50-30-3740

						DRAWN BY LINDA	 CONTROL SYSTEMS & SERVICES - ROSENBERG, TX
						CHK'D BY	
						APP'D BY	
D	NO CHANGES THIS SHEET	05-H162	05-18-05			DATE 10-03-02	
C	CHANGED ITEM 2, ADDED DETAIL 2	04-H169	05-11-04			SCALE 3/16	
B	ENGR. CHANGE - MOVED ITEM 2; ADDED BRACKET DETAIL		10-30-02			SHEET 1 OF 2	
A	AS BUILT		10-21-02				
REV.	DESCRIPTION	DCN No.	DATE	CHK'D BY			

FOR		WATERFLOOD SERVICE & SALES	
PANEL LAYOUT			
YOUR NO.	17956-926	OUR NO.	50-30-2668
DWG. NO.	50-29-3740		REV. D

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

MATERIAL	FINISH	UNLESS OTHERWISE NOTED DIMENSIONS ARE IN INCHES .xx ±.030 ANGLES ±2° .xxx ±.010 125 FRACTIONS ±1/16
	PAINT TEXTURED RED	

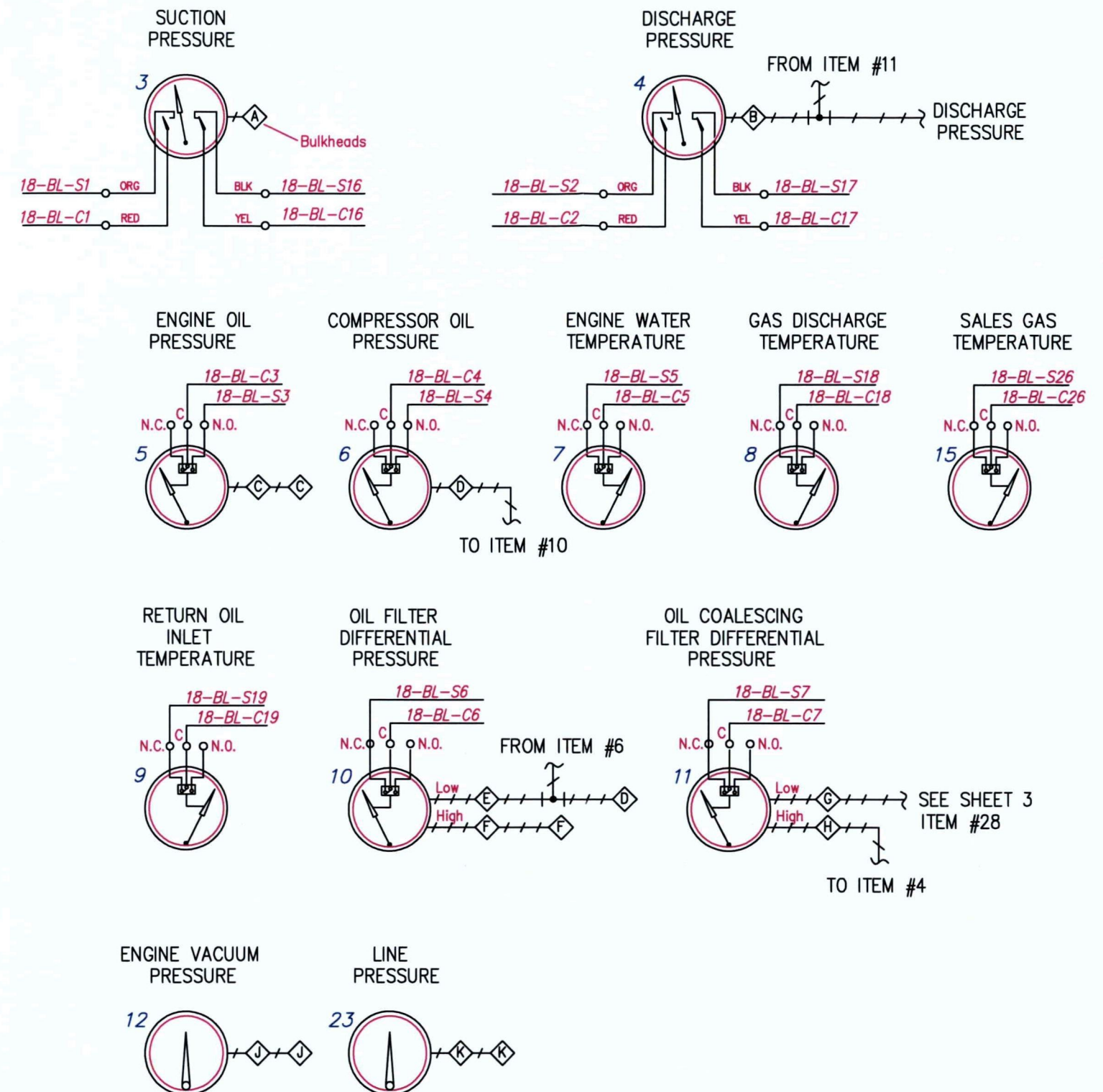
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PANEL LEGEND

ITEM	MFR.	MURPHY PART No.	MODEL NO.	DESCRIPTION
1.	MURPHY	50700112	TTDJ-IGN-T	"SELECTRONIC TATTLETALE" ANNUNCIATOR
2.	UNITED ELECT	00000283	800-4BS-10S-10S	BUILDING AIR TEMPERATURE GAGE
3.	MURPHY	05702713	45APEF-S-60	SUCTION PRESSURE "SWICHGAGE"
4.	MURPHY	05707215	45APEF-S-400	DISCHARGE PRESSURE "SWICHGAGE"
5.	MURPHY	05090122	A25PEF-100-SF15	ENGINE OIL PRESSURE "SWICHGAGE"
6.	MURPHY	05090123	A25PEF-400-SF60	COMPRESSOR OIL PRESSURE "SWICHGAGE"
7.	MURPHY	10701414	A25TEF-250-16-SR210	ENGINE WATER TEMPERATURE "SWICHGAGE"
8.	MURPHY	10090124	A25TEF-300-16-SR220	GAS DISCHARGE TEMPERATURE "SWICHGAGE"
9.	MURPHY	10090123	A25TEF-300-16-SR190	RETURN OIL INLET TEMPERATURE "SWICHGAGE"
10.	MURPHY	05090121	A25DPEF-30-SR15	OIL FILTER DIFFERENTIAL PRESSURE "SWICHGAGE"
11.	MURPHY	05090121	A25DPEF-30-SR15	COALESCING FILTER DIFF. PRESSURE "SWICHGAGE"
12.	MURPHY	05704397	A25VG-30	ENGINE VACUUM "MURPHYGAGE"
13.	TELEMECANIQUE	00007927	ZB4BS54	EMERGENCY SHUTDOWN PUSHBUTTON
14.	TELEMECANIQUE	00007928	ZB4BZ102	CONTACT BLOCK
15.	MURPHY	10090140	A25TEF-160-25-1/2-SR125	SALES GAS TEMPERATURE "SWICHGAGE"
16.	BWB	00009177	"R" PILOT	PRESSURE SENSOR, SET @ 160 psi RISING
17.	BWB	00009176	"R" PILOT	PRESSURE SENSOR, SET @ 155 psi RISING
18.	AMOT	00004852	4229B1C1	PNEUMATIC INDICATOR (2), GREEN/BLACK
19.	SWAGELOK	00009438	SS-6P4T-LD	2 WAY BALL VALVE
20.	VERSA	00006349	VGA-3322-181CC-5116-D048	SOLENOID VALVE
21.	AMOT	00004525	4057DO23H1	VALVE (3)
22.	INGERSOLL	00006295	SMGB-618	PUSHBUTTON
23.	McDANIEL	00004897	KHP-GF	LINE PRESSURE INDICATION GAUGE, 400 psi
24.	MURPHY	50225495	-----	VERTICAL LEGEND HOLDER W/303740.XLS INSERT
25.	VERSA	00005407	BSP-3308-316	PNEUMATIC PILOT VALVE
26.	MURPHY	50225417	-----	ENCLOSURE, ENC-P-H-A302408LP-N3-MR
27.	MURPHY	50225726	-----	STAND, STD-P-30X24X9-CP-REV-MR, MTG HOLES
28.	SWAGELOK	-----	KCPIDRA2A2P1000	REGULATOR, 0-25 PSI
29.	IR	39161002	1N4005	DIODE

NOTES:

- FACTORY WIRING: _____
CUSTOMER WIRING: _____
END USER WIRING: _____
TUBING: _____
 - TUBING: 1/4 x .035 316 STAINLESS STEEL (WELDED)/FLEX
FITTINGS: SWAGELOK STAINLESS STEEL
 - LAST WIRE NUMBER USED: 18-GY-53
 - "18-BL-25" REPRESENTS "AWG-WIRE COLOR-WIRE NUMBER"
 - ROUTE SENSOR LEADS SEPARATE FROM ALL OTHER WIRING.
 - MAXIMUM LENGTH OF SENSOR LEADS IS 500 FEET.
 - CAUTION: DISCONNECT ALL SENSOR LEADS BEFORE WELDING.
 - THIS PANEL IS SUITABLE FOR USE IN CLASS I, DIV. 2, GROUP D HAZARDOUS LOCATIONS.
 - GROUND SYMBOLS WILL BE SHOWN PER THE FOLLOWING:
EARTH/POWER CHASSIS/NON-INCENDIVE DC COM/CLOSE LOOP
- 


- UNLESS OTHERWISE NOTED ALL DEVICES ARE SHOWN IN THE SHELF POSITION.
 - ALL WIRING TO BE 18 GA. UNLESS OTHERWISE NOTED.
 - EACH OF THE FIRST 16 INPUTS CAN BE CONFIGURED FOR CLASS A, B1, B2, OR C AND FOR SHUTDOWN OR ALARM. SPARE SHUTDOWNS WILL BE DEFAULTED TO CLASS "A".
 - INPUT #29 IS SELECTABLE CLASS "A" OR FOR EMERGENCY STOP (OVERRIDES TEST TIMER)
INPUT #30 IS SELECTABLE REMOTE RESET OR CLASS "A"
INPUT #31 IS REMOTE LOCKOUT OR CLASS "A"
(INHIBITS CLASS "B1" & "B2" LOCKOUT TIMERS)
INPUT #32 TYPICALLY USED FOR EMERGENCY STOP (OVERRIDES TEST TIMER)
DISPLAY #50 IS OVERSPEED (INTERNAL, ON "T" MODEL ONLY)
DISPLAY #51 IS UNDERSPEED/LOSS OF IGNITION (ON "T" MODEL ONLY)
DISPLAY #52 IS MANUAL STOP (INTERNAL)
 - SENSOR INPUTS ARE PASSIVE SWITCHES. REMOVE FACTORY INSTALLED JUMPER FOR NORMALLY CLOSED SWITCHES.
 - NORMALLY OPEN SENSORS ARE RETURNED TO GROUND TO ACTIVATE ANNUNCIATOR.
 - FOR ADDITIONAL INFORMATION REFER TO INSTALLATION BULLETIN.



M	NO CHANGES THIS SHEET	05-H383	11-11-05	DRAWN BY	LINDA
L	CHANGED MODEL NUMBER ON ITEM #28	05-H212	06-23-05	CHK'D BY	
K	CHANGED ITEM 28 TO SWAGELOK REGULATOR, 0-25 PSIG	05-H162	5-18-05	APP'D BY	
J	CHANGED ITEMS 3 & 4 TO APEF MODEL "SWICHGAGES"	04-H224	6-14-04	DATE	10-03-02
H	CUSTOMER CHANGE - MODIFIED ITEM 28	04-H215	6-08-04	SCALE	NONE
G	CHANGED ITEM 2 WAS SPLFC-136P10	04-H169	5-11-04	SHEET 1 OF 3	
F	CUSTOMER REQUEST - REVISED ITEM 15	03-H341	9-19-03		
E	REVISED PANEL LEGEND ITEMS 13 & 14	03-H193	5-07-03		
REV.	DESCRIPTION	DCN No.	DATE	CHK'D BY	

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murphy
CONTROL SYSTEMS & SERVICES - ROSENBERG, TX

FOR **WATERFLOOD SERVICE & SALES**

LEGEND & WIRING DIAGRAM

YOUR NO. _____ REF NO. 50-30-2668

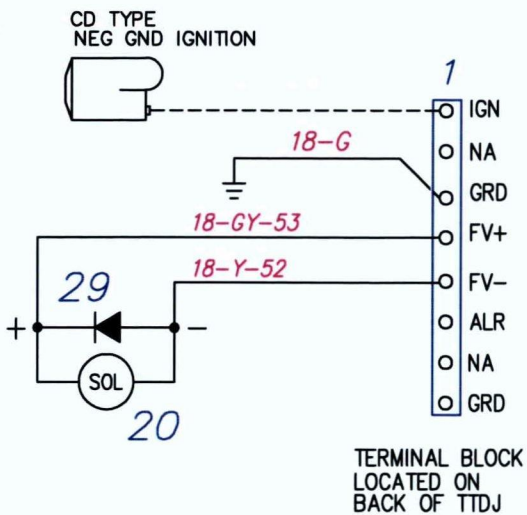
DWG. NO. 50-30-3740 REV. M

INDICATOR READOUTS 303740.x/s

CLASS	DISPLAY	DESCRIPTION			
B1	01	LOW SUCTION PRESSURE	01	18-BL-C1 18-BL-S1 18-BL-C2	3
B1	02	LOW DISCHARGE PRESSURE	02	18-BL-S2 18-BL-C3	4
B1	03	LOW ENGINE OIL PRESSURE	03	18-BL-S3 18-BL-C4	5
B1	04	LOW COMPRESSOR OIL PRESSURE	04	18-BL-S4 18-BL-C5	6
B1	05	ENGINE WATER TEMPERATURE	05	18-BL-S5 18-BL-C6	7
B1	06	OIL FILTER DIFFERENTIAL PRESSURE	06	18-BL-S6 18-BL-C7	10
B1	07	HIGH OIL COALESCING FILTER DIFF PRESSURE	07	18-BL-S7	11
B1	08	LOW COALESCING OIL LEVEL	08		
B1	09	HIGH COALESCING OIL LEVEL	09		
	10	SPARE	10		
	11	SPARE	11		
	12	SPARE	12		
	13	SPARE	13		
	14	SPARE	14		
	15	SPARE	15		
A	16	HIGH SUCTION PRESSURE	16	18-BL-C16 18-BL-S16 18-BL-C17	3
A	17	HIGH DISCHARGE PRESSURE	17	18-BL-S17	4
A	18	HIGH GAS DISCHARGE TEMPERATURE	18	18-BL-C18 18-BL-S18	8
A	19	HIGH RETURN OIL INLET TEMPERATURE	19	18-BL-C19 18-BL-S19	9
A	20	LOW ENGINE COOLANT LEVEL	20		
A	21	LOW ENGINE OIL LEVEL	21		
A	22	ENGINE/COMPRESSOR VIBRATION	22		
A	23	HIGH SCRUBBER LIQUID LEVEL	23		
A	24	SPARE	24		
A	25	LOW BUILDING AIR TEMPERATURE	25	18-BL-25 18-BL-C26 18-BL-S26	2 15
A	26	HIGH SALES GAS TEMPERATURE	26		
A	27	COOLER VIBRATION	27		
A	28	SPARE	28		
A	29	EMERGENCY STOP (OUTSIDE)	29		
A	30	SPARE	30		
A	31	SPARE	31		
A	32	EMERGENCY STOP (INSIDE)	32	18-BL-C32 18-BL-S32	13,14
A	50	ENGINE OVERSPEED (INTERNAL)	1		
B1	51	UNDERSPEED/LOSS OF IGNITION (INTERNAL)			
A	52	MANUAL STOP (INTERNAL)			

1
TERMINAL BLOCK LOCATED ON BACK OF TTDJ

ESD IS DESIGNED FOR ANNUNCIATION OF SHUTDOWN ONLY. ACTUAL SHUTDOWN SHOULD BE ACCOMPLISHED BY CUSTOMER'S SHUTDOWN DEVICE MOUNTED LOCALLY.



M	CUSTOMER REQUESTED CHANGES - REVISED SHUTDOWN LIST	05-H383	11-11-05		DRAWN BY	LINDA
L	NO CHANGES TO THIS SHEET	05-H212	06-23-05		CHK'D BY	
K	NO CHANGES TO THIS SHEET	05-H162	5-18-05		APP'D BY	
J	NO CHANGES TO THIS SHEET	04-H224	6-14-04		DATE	10-03-02
H	NO CHANGES TO THIS SHEET	04-H215	6-08-04		SCALE	NONE
G	NO CHANGES TO THIS SHEET	04-H169	5-11-04			
F	NO CHANGES TO THIS SHEET	03-H341	9-19-03			
E	REVERSED COMMON/SENSOR WIRE NUMBERS	03-H193	5-07-03			
REV.	DESCRIPTION	DCN No.	DATE	CHK'D BY	SHEET 2 OF 3	

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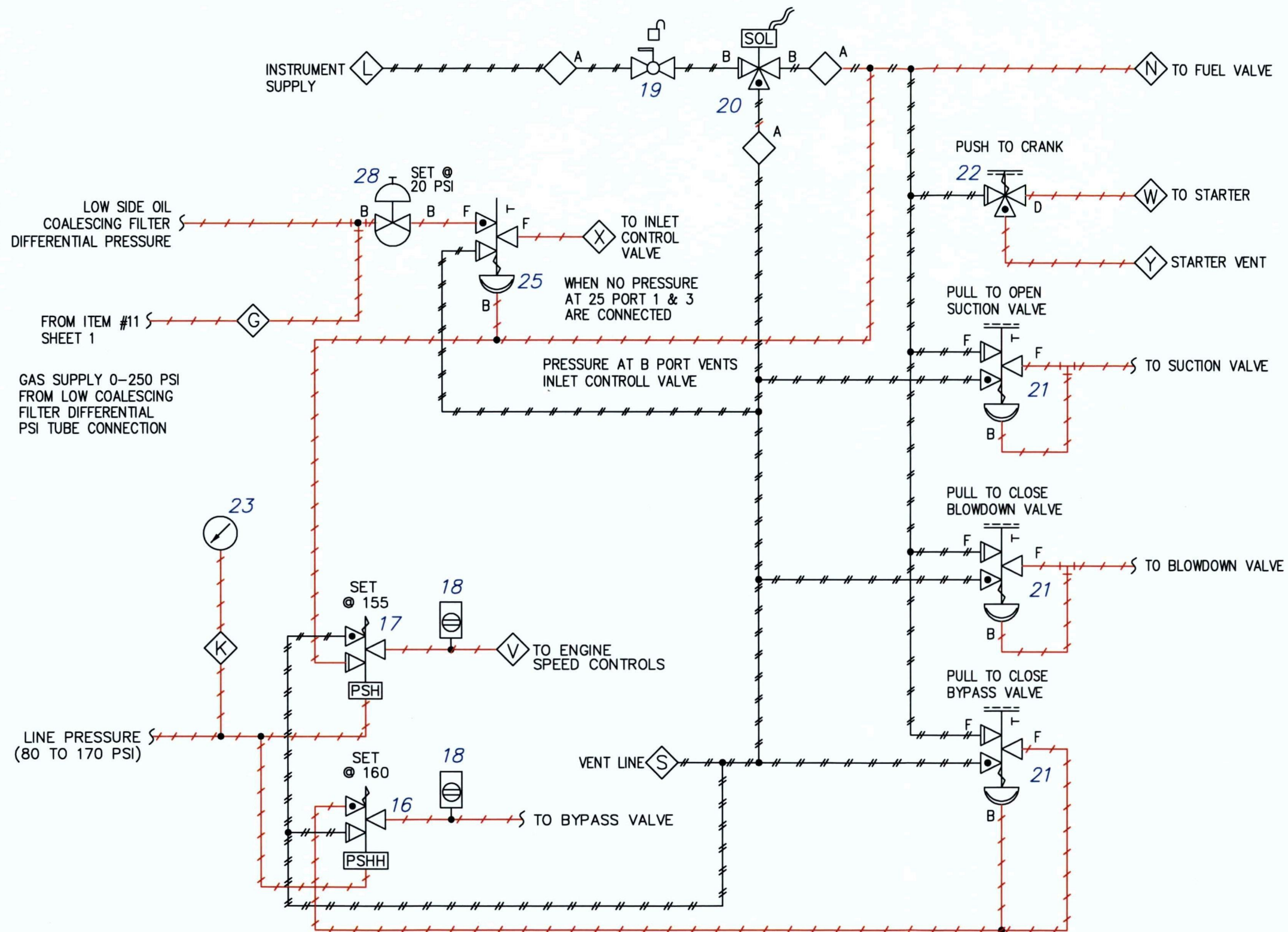
CONTROL SYSTEMS & SERVICES - ROSENBERG, TX

FOR WATERFLOOD SERVICE & SALES


WIRING DIAGRAM

YOUR NO. . REF NO. 50-30-2668

DWG. NO. 50-30-3740 REV. M



TUBING SCHEDULE
 - - - - - 1/4" DIA.
 - - - - - 3/8" DIA.

M	NO CHANGES THIS SHEET	05-H383	11-11-05		DRAWN BY	LINDA	 CONTROL SYSTEMS & SERVICES - ROSENBERG, TX
L	NO CHANGES TO THIS SHEET	05-H212	06-23-05		CHK'D BY		
K	ADDED BULKHEAD "Y" FOR STARTER VENT	05-H182	5-18-05		APP'D BY		
J	NO CHANGES TO THIS SHEET	04-H224	6-14-04		DATE	10-03-02	
H	CUSTOMER CHANGES - MODIFIED ITEM 28	04-H215	6-08-04		SCALE	NONE	
G	NO CHANGES TO THIS SHEET	04-H169	5-11-04				
F	NO CHANGES TO THIS SHEET	03-H341	9-18-03				
E	NO CHANGES TO THIS SHEET	03-H193	5-07-03				
REV.	DESCRIPTION	DCN No.	DATE	CHK'D BY	SHEET 3 OF 3		

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YOUR NO.	REF NO.
DWG. NO.	REV.
50-30-3740	M