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# FWMURPHY LIMITED WARRANTY

Murphy supplied products are warranted to be of good quality materials and workmanship. As with any monitoring or control system, the purchase, installation and use of Murphy control instruments and other Murphy systems is NOT AN INSURANCE POLICY. 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.

## LIMITED WARRANTY

**Murphy Manufactured Products.** Murphy warrants all Murphy manufactured products that it determines to be defective in materials and/or workmanship, under normal use, for a period of **TWO** years, unless otherwise stated.

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MURPHY SHALL HAVE NO LIABILITY FOR, AND EXPRESSLY DISCLAIMS ANY WARRANTY OR AFFIRMATION OF FACT, EXPRESS OR IMPLIED, OTHER THAN AS SET FORTH IN THIS WARRANTY STATEMENT, INCLUDING, WITHOUT LIMITATION (1) THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE; (2) ANY WARRANTY OR AFFIRMATION OF FACT RELATED TO MISUSE, IMPROPER SELECTION, RECOMMENDATION, OR MISAPPLICATION OF ANY PRODUCT; AND (3) ANY WARRANTY OR AFFIRMATION OF FACT THAT THE CATALOGS, LITERATURE AND WEBSITES IT PROVIDES ACCURATELY ILLUSTRATE AND DESCRIBE PRODUCTS.



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## MURPHYMATIC® Control Systems

If a customer is requesting on-site warranty review or service assistance for a MURPHYMATIC® control system, we will engage the proper resources to evaluate the request and to repair, adjust or replace the MURPHYMATIC® control system, or component(s), in accordance with our Service Philosophy and Limited Warranty.

## PRODUCT RETURN

Before returning any product customer believes is defective, customer must provide to Murphy details of the warranty claim situation, a complete description of the product, details from the Model Number label attached to each product, including Model Number, part number, and date code, and obtain from Murphy a Warranty/Return Authorization Number (W&R Number).

Any Claim for shortage or damage to shipment must be accompanied by the Packing Slip within 15 days of receipt or invoice date, whichever is later. Damages in shipment are the responsibility of the carrier and customer must make claim directly with the carrier.

## LIMITATION OF LIABILITY

ANY LIABILITY FOR CONSEQUENTIAL, INCIDENTAL, SPECIAL EXEMPLARY OR PUNITIVE DAMAGES IS EXPRESSLY DISCLAIMED. MURPHY'S LIABILITY IN ALL EVENTS SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCT THAT GIVES RISE TO ANY LIABILITY. MURPHY'S REPAIR, REPLACEMENT, OR PAYMENT OF SUCH AMOUNT SHALL BE THE FINAL AND EXCLUSIVE REMEDY IN THE EXHAUSTION OR UNAVAILABILITY OF ANY OTHER REMEDY SPECIFIED HEREIN AND SHALL NOT BE CONSTRUED OR ALLEGED BY CUSTOMER TO HAVE FAILED OF ITS ESSENTIAL PURPOSE. THE LIABILITY OF THE COMPANY SHALL CEASE WITH THE EXPIRATION OF THE WARRANTY PERIOD MENTIONED ABOVE.



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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.

#### **Notice:**

The information in this guide is subject to change without notice. *FWMurphy* shall not be liable for technical or editorial errors or omission contained herein, nor for incidental or consequential damages resulting from the furnishing, performance of these materials. This manual contains information on the components and operation of those components supplied as part of the control systems. Photocopies may be made without the consent of *FWMurphy*. Murphymatic®, Selectronic® and Tattletale® are registered for *FWMurphy* with the U.S. Patent and Trademark Office.



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## **Welding Precautions:**

FWMurphy recommends that **no** welding takes 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 devices (i.e. TTDJ, 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 welder's 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.

## **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. DC Power Connection Source**

FWMurphy recommends that the power source (+ and -) connection points of any panel containing any solid state device (i.e. TTDJ, EMS, C267, 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



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configuration of the end application, this can cause various control problems, such as erratic operation, inaccurate sender/transducer readings, remote communication problems, etc.

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

## 2. Inductive Loads

FWMurphy recommends that any inductive load tied to a solid-state output (relays, solenoids, incandescent lamps, etc.) has 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.

## 3. Shielded Cable

Shielded cable is recommended for connecting the magnetic pickup and analog inputs/outputs to the control panel. This helps prevent signal loss and the possible coupling of electrical interference into the circuits. The drain wire (shielded) should only be grounded at one end.

## 4. Wiring Separation

Please try to ensure the following separation of wiring by using multiple runs of conduits. Here are the levels of separation from noisiest to the weakest victim. Some of this separation is required by codes and recommended practices.

- I. Ignition wiring, the "G" lead, and CD ignition fuel valve wiring;
- II. AC wiring;
- III. DC power wiring (magnetic pick-up can be run with this, but it must be in shielded cable);
- IV. Analog signals, like 4-20 mA and sender signals (magnetic pick-up can be run with this, but it must be in shielded cable);
- V. Thermocouple wiring (must use shielded thermocouple grade extension wire for the proper type, typically J or K);
- VI. Sensor wires that are either "nonincendive" for Class I, Div. 2, or "intrinsically safe" for Class I, Div. 1.



## TERMS AND CONDITIONS OF SALE

### **PRICES:**

Prices are stated in U.S. Dollars at User Net (list) less applicable discount or Net if so stated. Verbal quotes are subject to confirmation by a written quotation from authorized personnel of FWMurphy. Verbal quotations expire, unless an order is accepted the same day they are made. Written quotations automatically expire in thirty (30) days unless otherwise stated in writing. They can be terminated by written notice within that period.

Price changes apply to all orders received after the effective date, and will be billed at the latest price. Blanket orders with scheduled releases will be billed at the new price on the effective date.

### **TAXES:**

All prices, published or quoted do not include applicable local, state, or federal taxes. Applicable taxes must be paid by the Purchaser.

### **MINIMUM BILLING:**

All orders are subject to a net minimum billing.

### **ORDERS:**

All orders must be bona fide commitments showing stipulated quantities, complete item descriptions, and required dates if applicable. We reserve the right to make design changes or improvements without notice.

### **PENALTIES AND DELAYS:**

No penalty clause of any kind will be effective unless approved in writing by an authorized officer of FWMurphy. The company will not be liable for any delay or damage caused by circumstances beyond FWMurphy's reasonable control, including fire, strike, acts of the Purchaser, insurrection, acts of God, transportation failures, or inability to obtain labor, materials or manufacturing facilities.

### **ACCEPTANCE:**

No order is binding upon the company until accepted by an authorized official of FWMurphy.

### **CANCELLATION AND ALTERATION:**

Any order or contract may be cancelled or altered by the Purchaser only upon payment of reasonable charges based upon expenses already incurred and commitments made by FWMurphy for the benefit of the Purchaser.

### **DAMAGE AND LOSS:**

Murphy products are packed in specially designed cartons to protect them from shipping damage. Responsibility for delivery lies in the carrier upon our delivery to him and upon his acceptance of the merchandise.

All shipments should be inspected upon receipt at destination for damage, either visible or concealed. Claims for loss or damage should be filed with the carrier immediately. FWMurphy will assist insofar as is practical

in securing satisfactory adjustment of claims. However, all claims for loss and damage must be made by the Purchaser to the carrier.

### **SHORTAGES:**

Shortages in shipment must be reported within fifteen (15) days of material receipt or of invoice date and must be accompanied by the packing list. We reserve the right to backorder any item unless you request that shipment be made in full, in which case we will schedule the complete shipment at the earliest date possible.

### **TERMS OF PAYMENT and RESERVATION OF TITLE:**

Terms are net thirty (30) days from date of invoice with approved credit. FWMurphy reserves the right to require full or partial payment in advance of shipment where the financial condition of the Purchaser does not justify continuance of production or shipment on the terms of payment specified. Orders from Purchasers with unapproved credit ratings may be shipped C.O.D. with reservation of title in FWMurphy until purchase price shall be paid in full.

Export terms will be quoted.

All prices are F.O.B. our plant, Tulsa, OK or Rosenberg, TX.

### **RETURN OF EQUIPMENT:**

Material may be returned for credit only upon prior approval of receiving officer. Accepted items require a Return Authorization Number, must be returned all charges paid, and be sufficiently packed to prevent damage during shipment. Items must be new and unused, and must have been purchased in the past six (6) months. You must cite your purchase order number and our invoice or order number. Items must be returned through the same channels as purchased. A fifteen (15) percent minimum charge will be made against all returns to cover cost of testing, restocking and accounting. Credit will apply to future purchases and is not refundable.

### **REPAIRS:**

Repair services are available for selected products. Customers will be advised of applicable evaluation fees and estimated repair charges prior to the return.

Items returned for repair require a Return Authorization Number and must be returned all charges paid.

Repairs beyond the new product warranty carry a 90-day repair warranty.

Possession of a Murphy Catalog and/or price list does not imply the right to purchase as an authorized Murphy dealer.



# TTDJ Series Fully-Configurable Fault Annunciator Installation and Operations Manual

TTDJ-99062N  
Revised 01-02  
Section 50  
(00-02-0412)



Please read the following information before installing. This installation information is intended for all TTDJ Series models. A visual inspection of this product before installation for any damage during shipping is recommended.

## 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.



US Patent 6,144,116  
(model TTDJ-IGN-T only)

CSA Certified for Use in Class I, Div. 2,  
Groups C and D Hazardous Areas.

## Description

The TTDJ is a solid-state fault annunciator and shutdown control system, with hour meter, designed to protect engines, compressors and their associated equipment. Four TTDJ modules are available:

**TTDJ-DC** : Powered by 12 or 24 VDC systems without tachometer and overspeed sensing. Includes RS485 serial port.

**TTDJ-DC-T** : Powered by 12 or 24 VDC systems with internal tachometer and overspeed sensing. Includes RS485 serial port.

**TTDJ-IGN** : Powered by negative ground CD ignition systems without tachometer and overspeed sensing. Without RS485 port.

**TTDJ-IGN-T** : Powered by negative ground CD ignition systems with internal tachometer/overspeed sensing. Without RS485 port.

All TTDJ models will accept 32 sensor inputs from normally open and/or normally closed sensors. Each of the first 16 inputs can be configured for Shutdown or Alarm Before Shutdown\*, and can be locked out by one of the Two Start-Run timers (B1:0-5 min.; B2:0-9:59 min.), or configured as Class C. The annunciator provides for both closing of a fuel valve, and grounding of an ignition after a time delay. The TTDJ has built-in Elapsed Time Meter. Run Hours and Tachometer Settings are stored in non-volatile memory, as well as the last 4 shutdowns and one alarm (alarm only stored if active at the time of shutdown). The TTDJ liquid crystal display annunciates any fault from the sensor inputs, displays engine speed and elapsed time.

Other features for all TTDJ models are: built-in Test Mode to test the sensor circuits without shutting down, on-board backup battery to retain the fault display after shutdown (IGN models only), and a history of the last 4 shutdowns with their associated Run Hours, also stored in non-volatile memory.

TTDJ-DC and TTDJ-DC-T models feature an RS485 serial communications port (MODBUS RTU slave) to interface with micro-controllers, PC's, PLC's and controllers.

## Module/ Head

The module is the brain of the control system. It contains the microcomputer, the Liquid Crystal Display (LCD), the membrane keys for configuring the sensors inputs, the Sensor Inputs Terminal Blocks and the Power Inputs and Control Output Terminal Block. The TTDJ-DC module also includes an RS485 serial communications port (MODBUS RTU slave).

\*Alarm Before Shutdown is a function that causes annunciation and the alarm output, but will not cause a shutdown.

## Liquid Crystal Display

The Liquid Crystal Display sequentially provides shutdown/alarm condition, run hours, rpm, and timer information. A shutdown or alarm condition is indicated by the appropriate sensor number in the first two leftmost digits. Hours display uses all the digits. RPM display is shown in the rightmost digits with a Run Indicator in the first digit. The Timer display shows the timer number in the first digit and the time in the last three digits.

## Timers

Active Timers are indicated by the timer number in the first digit of the display, and the remaining time in the last three digits. Timer 1= Class "B1", Timer 2= Class "B2", Timer 3= Test, Timer 4= Ignition Ground Delay.

## Power and Control Inputs/Outputs

The TTDJ power and control inputs and outputs are connected to the Power Inputs terminal block on the back of the TTDJ.

In the TTDJ-IGN and TTDJ-IGN-T the FV+ output is a non-switched output that supplies stored energy from an internal capacitor. -FV and ALARM outputs are non reversible switched outputs (switched OFF for normal operation, switched ON for alarm and shutdown). When a shutdown fault is detected, the -FV and ALARM turn ON and after a time delay, the IGN input switches to ground.

On the TTDJ-DC and TTDJ-DC-T the IGN, FV, and ALARM outputs are programmed to switch ON for normal operation.

## Sensor Inputs and Terminals

Up to 32 dry contact sensor inputs or Murphy device transistor outputs can be connected to the back of the TTDJ via a terminal block (32 pair, screw type, each with a jumper). Sensor inputs 1 to 16 are configurable as Class "A", Class "B1", Class "B2" or Class "C" functions, Shutdown or Alarm Before Shutdown\*. The Class "B" timers allow sensor inputs to be locked out at start-up. Sensor inputs configured for Alarm Only will cause the Alarm Output to turn on when tripped, and the sensor number will be annunciated while the unit continues to run. TTDJ sensor inputs 17-28 are dedicated as Class "A" Shutdown only. Sensor input 29 can be configured as a Class "A", or Class "ESD" input. Sensor input 32 is dedicated as Class "ESD". Sensor inputs 30 & 31 can have special functions or be Class "A". Any tripped sensor is detected within 1 second after faulted.

## Emergency Shutdown

Sensor input number 32 is dedicated to Emergency Shutdown. The Emergency Shutdown sensor input overrides the Test timer. Additionally, sensor input 29 can be configured as a Class "A" or Class "ESD" input.

## Remote Reset (optional, Setup 5 = 1 or 3)

When the Remote Reset feature is selected, point 30 with a closed contact resets the TTDJ in the same manner as when using the Reset key. The closed contacts to operate the Remote Reset feature should be kept closed only momentarily for approximately 1 second to cause a remote reset.

## Remote Lockout (optional, Setup 5 = 2 or 3)

The Remote Lockout inhibits the Class B1 and Class B2 Lockout timers. These Lockouts are ignored when a closed switch is seen at Input 31. An open switch at Input 31 allows the Lockouts to function normally. When the Remote Lockout is active it resets Class "C", "B1" and "B2" Lockout timers. This is intended to be used with automatic starting systems. With a contact closure on terminals 31 with the unit not running, the display will alternate between either RPM (-T models) and the Class "B1" timer, or the display will flash (non-T models). The TTDJ should be put into remote lockout immediately before stopping the engine. The contact closure should be opened once the engine is running. At that time the "B1" and "B2" timers will be allowed to count down.

## Reset Key

The Reset key resets All faults and initiates the Class "B" timers.

## Overspeed (-T models only)

These models feature an internal tachometer with Overspeed Shutdown (50). This shutdown bypasses the Ignition Ground Delay. It is not locked out by the Test Timer.

## Underspeed Annunciation (-T models only)

TTDJ-IGN-T models display (51) when an underspeed condition occurs. It is not locked out by the Test Timer.

## Loss of Ignition Annunciation (non -T models)

The TTDJ-IGN models will display (51) when ignition input is lost. It is not locked out by the Test Timer.

## Run/Stop Key (Manual Stop)

The Manual Run/Stop key is used for system shutdown from the panel. When pressed, the unit will shutdown the system without turning on the Alarm Output (on -DC models the Alarm Output is turned off on Manual Stop). Manual Stop (Shutdown 52) is not locked out by the Test Timer.

## Low Backup Battery Voltage (-IGN models)

The TTDJ-IGN models have an internal backup battery. When the "Lowbatt" display appears (this message will alternate with other displays) the battery needs to be replaced, see page 3 for details.

## Timer "O" Key

This key zeros the current displayed timer: Class "B1", "B2", Ignition Ground Timer, or Test Timer. If the TTDJ is in the Test mode, it exits Test.

## Test Key

Initiates the Test Timer with 5 minutes. Test mode is indicated by the "3" in the first digit of the display. Faulted inputs are displayed as in normal operation, but the system is not shutdown and the Alarm Output is not turned on. Press "Reset" to reset the fault and press the Timer "O" to exit. The following shutdowns override Test: Emergency Shutdown (32), Overspeed (50), Manual Stop (52), Underspeed (51), and Loss of Ignition (51). If Class "C" functions are used, they will need to be bypassed to test other sensors. When exiting "Test" with Class "C" functions, press "Reset" and "Timer 0" simultaneously.

## Shutdown History

The TTDJ models store the last 4 shutdown codes and any alarm present

at shutdown, as well as the elapsed time reading at which they occurred. For instance, if the unit is shutdown from sensor input 1, the display will show "01 SD1" to indicate the last shutdown. Shutdown #1 was sensor input #1. Press the "Up" key for "Shutdown 2", "3", "4", and for any present "Alarm". To view the elapsed time reading at which any of the shutdowns occurred, press "Push To Read Hours" key while viewing that shutdown.

## Class "B" Lockout Timer

Allows the system to become fully operational without shutting down by start-up related conditions. Class "B1" and Class "B2" Sensor inputs are locked out until their corresponding timer expires. Class "B1" Timer is selectable from 0:00-5:00 minutes, and Class "B2" Timer from 0:00-9:59 minutes.

## Class "C" Functions

There is a practical limit of sensor inputs defined as Class "C" Shutdown and/or Class "C" alarm of 8 points. The Class "C" function operation is that the sensor will be initially faulted on Start-up. If the sensor never clears there will not be any annunciation and alarm or shutdown. If the sensor clears for a full 2 seconds, then it is armed to alarm or shutdown. Pressing the Reset key will allow a Class "C" alarm function to go back to the Start-up state where it can remain faulted without annunciation and alarm. An example of a Class "C" function is Low Discharge pressure.

## Ignition Ground Delay

This delay is selectable from 0-20 seconds. To select the delay use SETUP.4, see User Set Up Menus and To Enter User Set Up on page 5.

## Hourmeter

The TTDJ internal hourmeter keeps track of Run Hours. To display Run Hours for 5 seconds, press the Push to Read key. Run Hours are stored in non-volatile memory, maintaining hours in the absence of power.

## RS485 Serial Port (TTDJ-DC / TTDJ-DC-T)

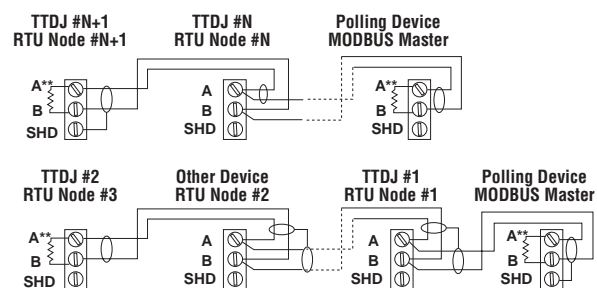
The RS485 serial port (MODBUS RTU slave) on the back of the module is provided for communicating with micro-controllers, PC's, PLC's and SCADA systems (see RS485 Typical Connections, below). It is recommended that a termination resistor\*\* (customer supplied) be used on the first and last device connected in a daisy-chain configuration.

The communication parameters are 9600 baud, no parity, 8 bits with 1 stop bit (9600,N,8,1), half-duplex. The shield terminal on the TTDJ terminal block should only be used if the drain wire on the shielded cable is not connected to ground anywhere else. Each device must have a unique RTU node number. A retry delay of 0.3 second may be helpful (set up for 3 retries).

## Modbus Integer Holding Registers

40001= RPM  
40002= ETM (elapsed Time Meter 0-65535 Hrs.)  
40003= Class B1 (in seconds)  
40004= Shutdown Numbers (0=OK) (1-32, 50-52 =SD shutdown)  
40005= Output Status (Bit 0= IGN, Bit 1= FV, Bit 2= ALR)  
40006= Inputs 1-16 (Bit 0 = TB1..., Bit 15= TB16) (True 1= Inactive)  
40007= Inputs 17-32 (Bit 0= TB17..., Bit 15= TB32) (True 1= Inactive)  
*If 40006 and 40007 both contain "FF" there are no active shutdowns.*

## RS485 typical connections



\*\*Terminating resistor is 120 ohms. Install Terminating resistor at the master and the last slave. Use only Belden 9841 or 3105A cable or cabling with a characteristic impedance of 120 ohms.



## SPECIFICATIONS

### Power Input (Operating Voltages):

**TTDJ-DC; TTDJ-DC-T Models:** 10- 32VDC, 500 mW max.

**TTDJ-IGN; TTDJ-IGN-T Models:** 90-350 VDC negative ground CD ignition; approx. 650µA @ 100VDC.

**Sensor Inputs:** 32 N.O. or N.C. passive switches.

**Inputs 1-16:** Configurable as Class "A", "B1", "B2", or "C" Shutdown or Alarm Before Shutdown\*.

**Inputs 17-28:** Dedicated Class "A" shutdowns.

**Inputs 29:** Configurable as Class "A" or Class "ESD".

**Input 30:** Selectable Remote Reset or Class "A".

**Input 31:** Remote Lockout or Class "A"; inhibits the Class "B1 & B2" Lockout Timers.

**Input 32:** Class "ESD" Overrides Test Timer, typically used for emergency shutdown.

**Outputs:** 0.5 A @ 350 VDC.

**Outputs Selection:** Ground ignition immediately or trip fuel valve and ground ignition after time delay.

**Communications:** RS485 Serial Port, Modbus RTU slave (TTDJ-DC models).

\*Alarm Before Shutdown is a function that causes annunciation and the alarm output, but will not cause a shutdown.

**Operating Temperature:** -40 to 185°F (-40 to 85°C).

**Storage Temperature:** -40 to 185°F (-40 to 85°C).

**Sensor Scan Rate:** Within 1 second.

**B1 Start/Run Timer:** Adjustable, 0 - 5 minutes.

**B2 Start/Run Timer:** Adjustable, 0 - 9:59 minutes.

**Pulses per Revolution Range for Tach. Calibration:**  
32-360 (TTDJ-DC-T); 1 - 16 (TTDJ-IGN-T).

**Overspeed Set point:** 0 - 9999 rpm.

**Underspeed Set point:** 0 - 5000 rpm.

**Magnetic Pickup:** 5 - 120 Vrms, 0-10 kHz.

**On-Board Backup Power 00005125 (-IGN Versions only):**

6 VDC, 1300 mAh, Duracell® DL223A or Sanyo® CR-P2 Lithium battery.

**Tachometer Accuracy:** ±0.5% of the display reading or ±1 RPM whichever is greater.

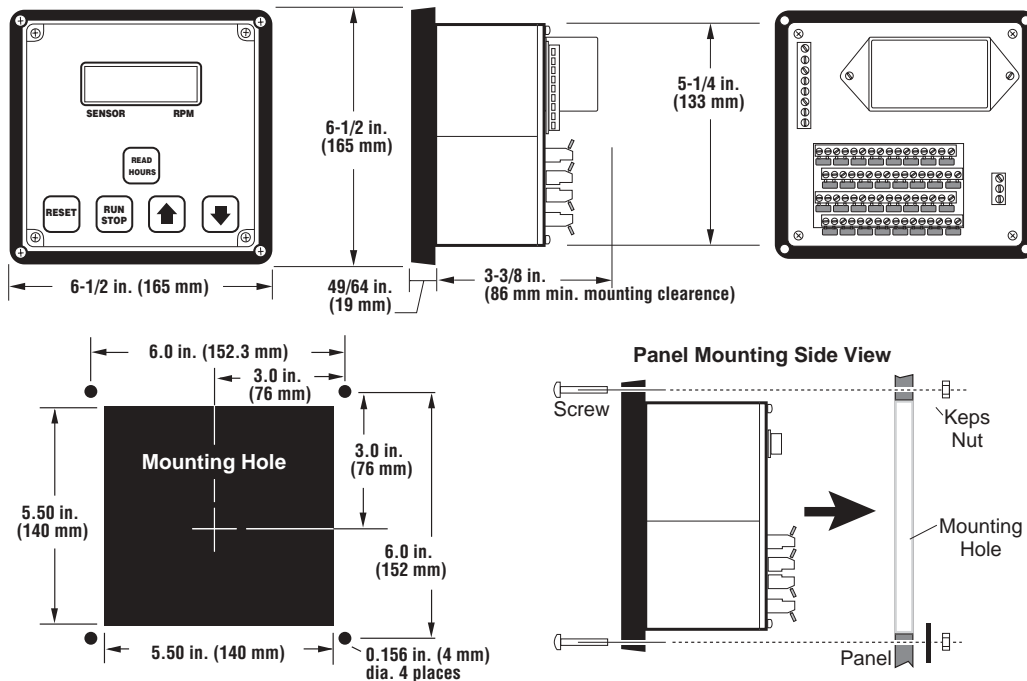
**Hourmeter Range:** 0 to 65535 hrs.

**Hourmeter Accuracy:** ±15 minutes per year.

## TTDJ MOUNTING DIMENSIONS (All Models)



**WARNING:** PERFORM THE MOUNTING OPERATION WITH POWER SOURCE OFF. THE TTDJ SERIES MODULE WAS DESIGNED TO BE MOUNTED WITHIN A WEATHERPROOF ENCLOSURE. IT IS INTENDED FOR MOUNTING IN A FLAT PANEL. A SQUARE MOUNTING HOLE OF 5-1/2 IN. (140 MM) AND FOUR MOUNTING SCREW HOLES ARE NEEDED. INSERT THE MODULE FROM THE FRONT SIDE OF THE PANEL AND SECURE THE FOUR MOUNTING SCREWS AND NUTS THROUGH THE BEZEL.



## REPLACING THE BATTERY (-IGN Models only)



**WARNING:** THE BACKUP POWER BATTERY IS LOCATED WITHIN THE TTDJ MODULE. THEREFORE, EXTREME CAUTION MUST BE EXERCISED WHEN REPLACING IT. FOR CLASS I, DIVISION 2, HAZARDOUS AREAS INSTALLATIONS, FIRST, SHUTDOWN THE SYSTEM AND MAKE SURE THAT THE HAZARDOUS AREA IS KNOWN TO BE NON-HAZARDOUS BEFORE OPENING THE POWER SUPPLY COVER.

The TTDJ-IGN models include a Backup Power Battery located within the TTDJ module. To gain access to and to replace the battery do the following:

1. Make sure the area is made Non-Hazardous and shut down the System (remove power).
2. Using extreme caution remove the Power Supply Cover Screws (located on the back of the TTDJ module).
3. Gently pull the Power Supply Cover away from the back of the TTDJ to

have access to the old Backup Battery.

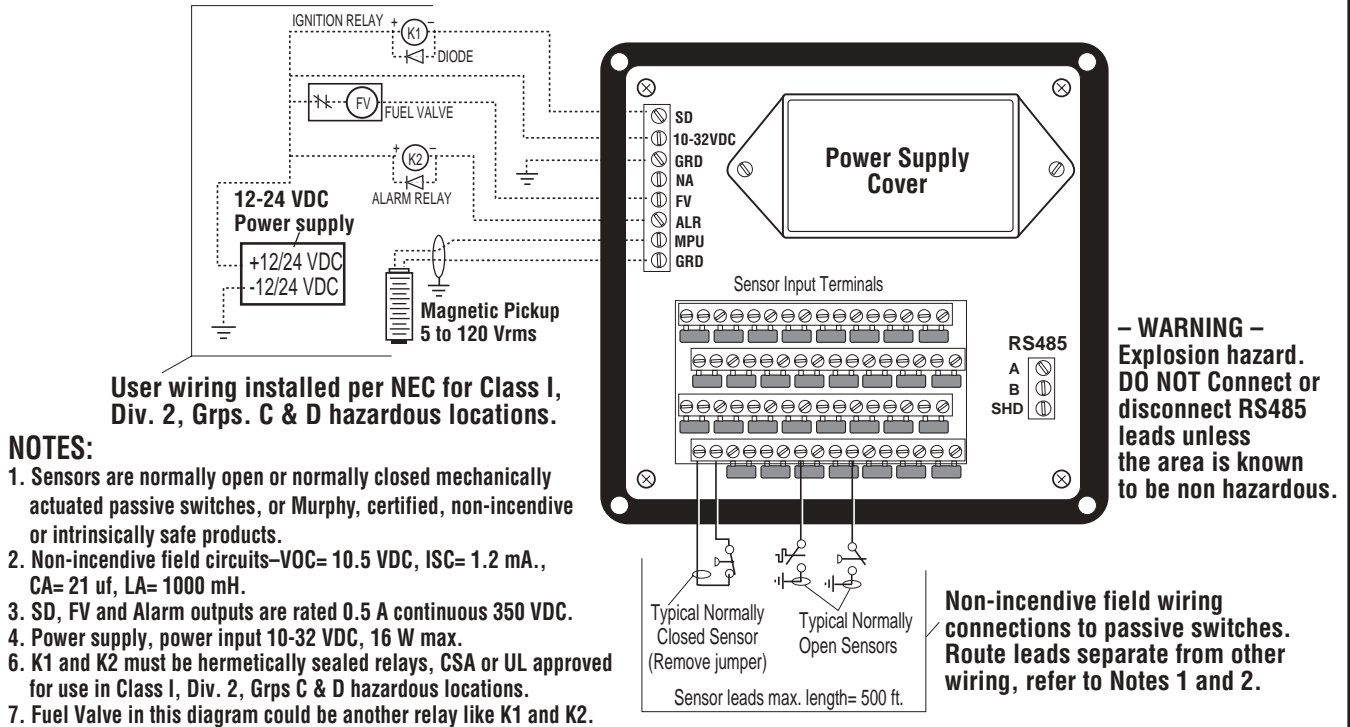
4. Locate the old Backup Battery.
5. Using extreme caution, not to damage any component, replace the battery with a 6 VDC, 1300 mAh, Duracell® DL223A or Sanyo® CR-P2 Lithium battery, available from Murphy (p/n 00005125).
6. Carefully proceed to replace the Power Supply Cover.
7. You are now ready to power up your system and resume operations.

## TYPICAL WIRING DIAGRAMS (All Models)

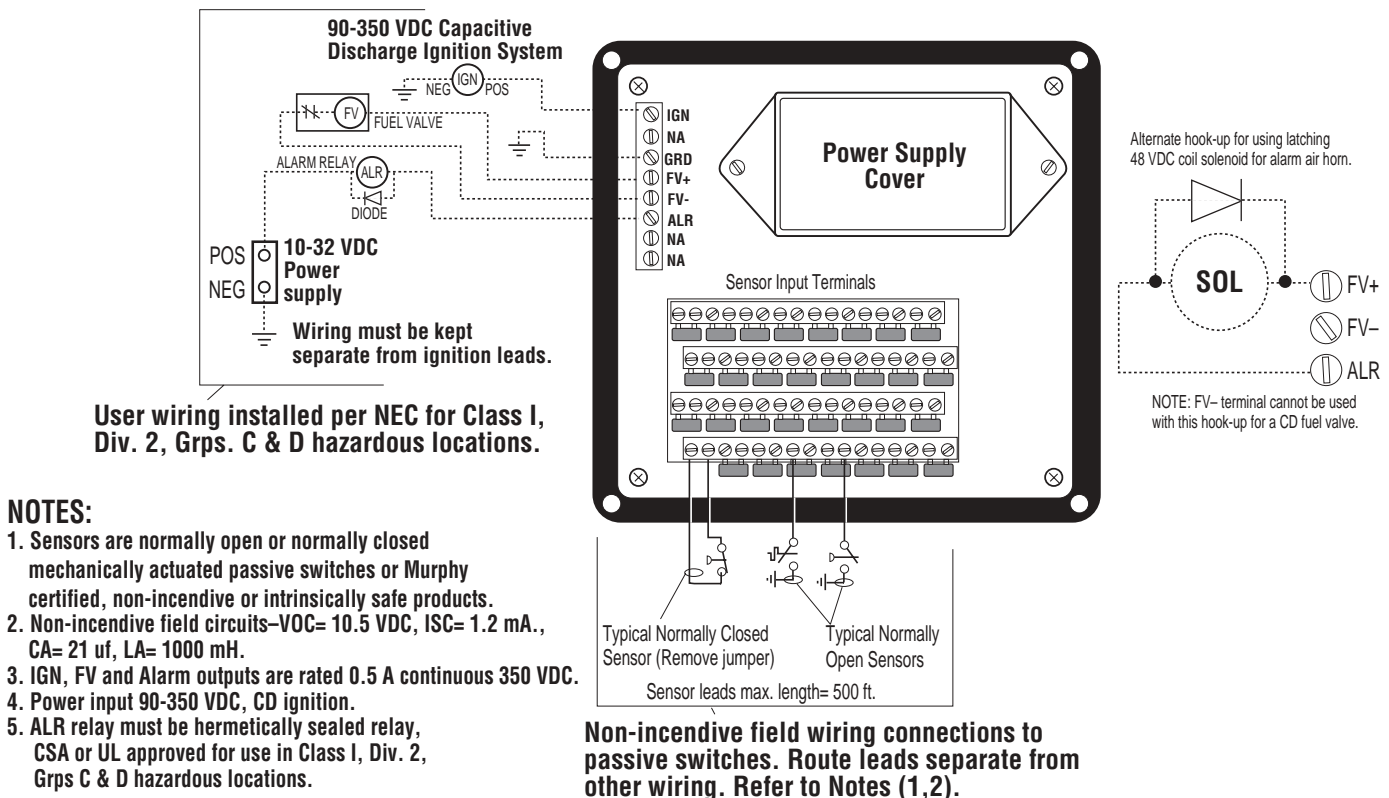


**WARNING:** FOR HAZARDOUS APPLICATION REQUIREMENTS, THE TTDJ COMPLETE SYSTEM MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) CLASS I, DIVISION 2, GROUPS C & D (ARTICLE 504) SPECIFICATIONS AND PER MURPHY DRAWING 50-08-0039. SENSOR INPUT WIRES MUST BE SEPARATED A MINIMUM OF 2 IN. (51 MM) FROM OTHER WIRES.

### TTDJ-DC AND TTDJ-DC-T TYPICAL WIRING



### TTDJ-IGN AND TTDJ-IGN-T TYPICAL WIRING



## TTDJ SENSOR SETUP MAP

## TYPE SETUP

TYPE SETUP

SETUP.3

STOP

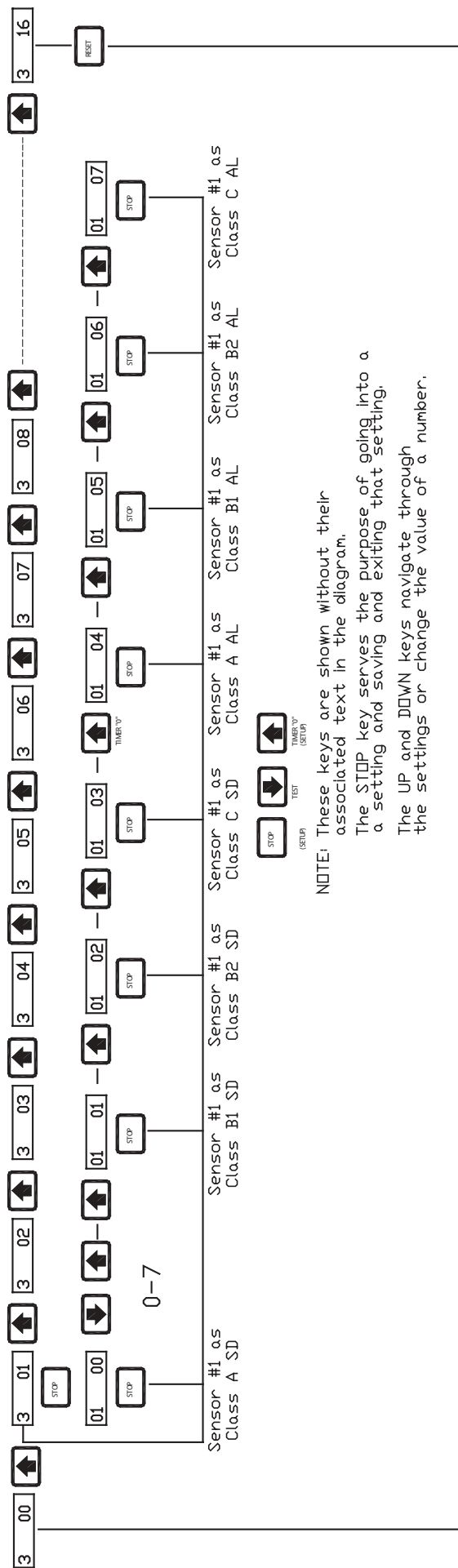
C0dE:00



CDEIXX

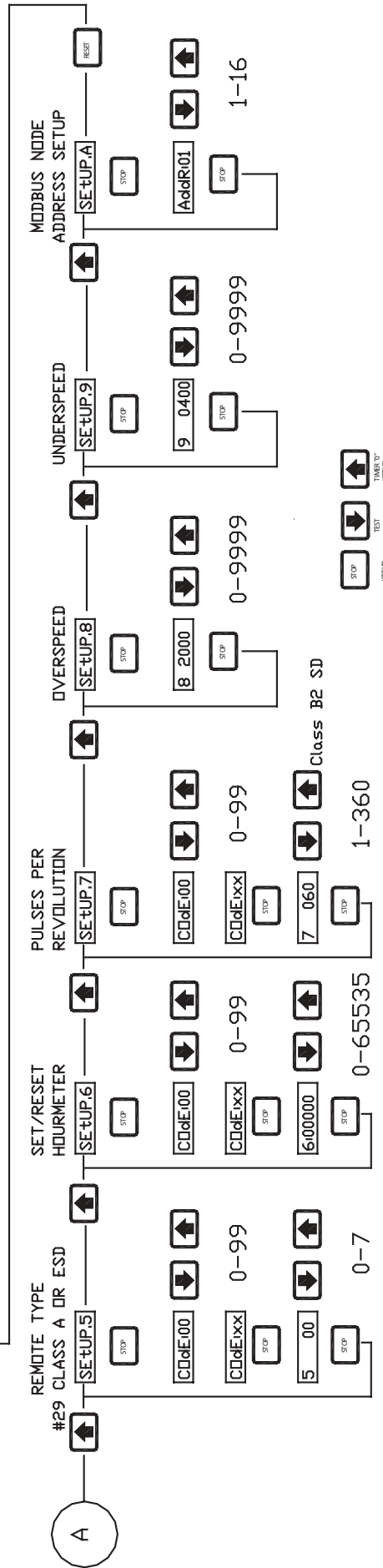
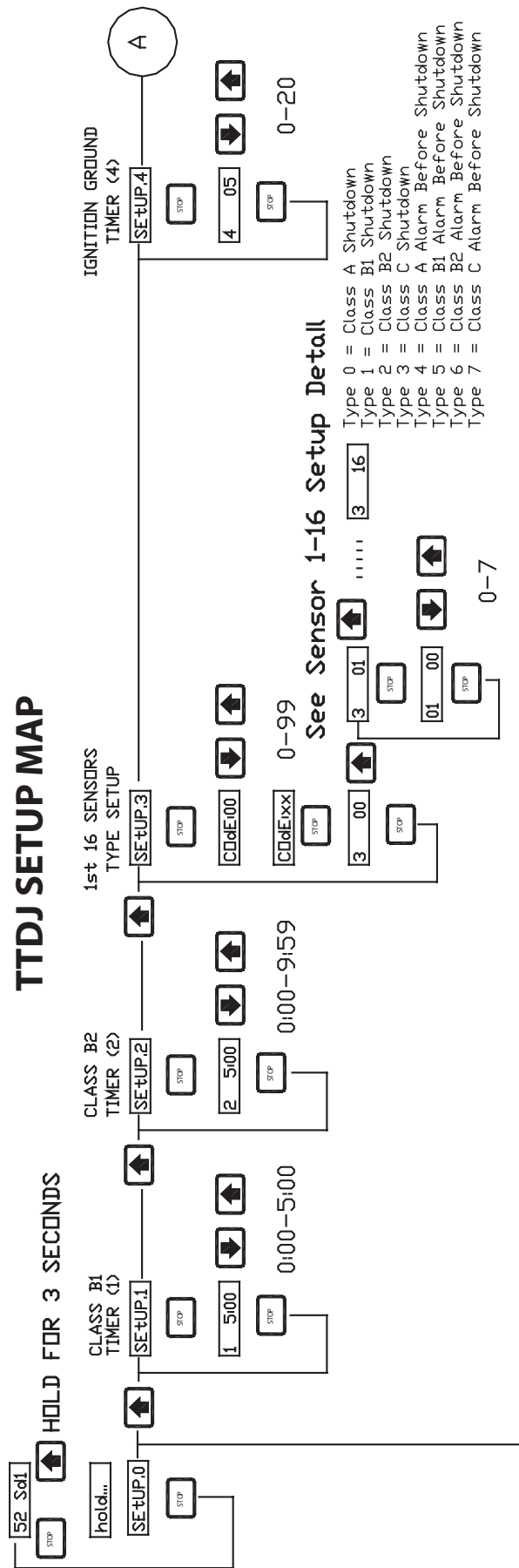
0-99

STOP



**NOTE:** These keys are shown without their associated text in the diagram. The STOP key serves the purpose of going into a setting and saving and exiting that setting. The UP and DOWN keys navigate through the settings or change the value of a number.

# TTDJ SETUP MAP



**NOTE:** These keys are shown without their associated text in the diagram. The STOP key serves the purpose of going into a setting and saving and exiting that setting. The UP and DDWN keys navigate through the settings or change the value of a number.

0 = No Remote Lockout or Reset, #29 Is Class A  
 1 = Remote Reset, No Remote Lockout, #29 Is Class A  
 2 = Remote Lockout, No Remote Reset, #29 Is Class A  
 3 = Remote Reset and Lockout, #29 Is Class A  
 4 = No Remote Reset or Lockout, #29 Is Class ESD  
 5 = Remote Reset, No Remote Lockout, #29 Is Class ESD  
 6 = Remote Lockout, No Remote Reset, #29 Is Class ESD  
 7 = Remote Reset and Lockout, #29 Is Class ESD

## User Set Up Menus

The following are the User Setup Menus for All TTDJ models:

- SETUP.1 **SETUP.1** = Class B1 Timer (0 – 5:00)  
 SETUP.2 **SETUP.2** = Class B2 Timer (0 – 9:59)  
 \*SETUP.3 **SETUP.3** = Sensor 1-16 Type Setup  
 SETUP.4 **SETUP.4** = Ignition Ground Delay (0 – 20 sec.)  
 \*SETUP.5 **SETUP.5** = Remote Setup  
 0= No Remote Lockout or Reset, #29 is Class “A”  
 1= Remote Reset, No Remote Lockout, #29 is Class “A”  
 2= Remote Lockout, No Remote Reset #29 is Class “A”  
 3= Remote Reset, and Lockout, #29 is Class “A”  
 4= No Remote Reset or Lockout, #29 is Class “ESD”  
 5= Remote Reset, No Remote Lockout, #29 is Class “ESD”  
 6= Remote Lockout, No Remote Reset #29 is Class “ESD”  
 7= Remote Reset and Lockout, #29 is Class “ESD”  
 \*SETUP.6 **SETUP.6** = Hours Setup

The User Setup Menus shown below are also available for -T models:

- \*SETUP.7 **SETUP.7** = Pulses per revolution  
 SETUP.8 **SETUP.8** = Overspeed  
 SETUP.9 **SETUP.9** = Underspeed

The User Setup Menu shown below is for ALL -DC models:

- SETUP.A **SETUP.A** = Modbus RTU node number 1-16 (-DC models)

*\*These Set Up Menus are code protected (for all models).*

## To Enter User Set Up Menus (Must be in Manual Stop #52)

To enter the User Setup Menus the TTDJ unit Must be in the Manual Stop (#52) condition. If a shutdown is present other than Manual Stop, press the “Reset” key, then immediately Press and Hold Both the Run/Stop and Up (Timer 0) keys. Now follow these steps:

- Press and hold both the Run/Stop and Up (Timer 0) keys until the LCD reads **hold...** (HOLD).
  - Continue to hold both keys for 3 more seconds approximately. The display reads **SETUP.0** (SETUP.0), you are now in the User Setup Menu.
  - Use the Up key (Timer 0) and Down (Test) keys to select the desired Setup Menu.
  - Press the Run/Stop key to enter the desired Setup Menu.
- NOTE: Some settings are password protected.**
- Use the Up and Down keys to preset the desired parameter. Press Reset to zero the value.
  - When the desired value is entered, press Run/Stop.
  - Repeat Steps 3-6 until all parameters are preset.
  - To exit User Setup, select SETUP.0 and press Run/Stop.

## Code Protection

For Setup Menus that are code protected, the LCD will read “CODE.00” prompting the user to enter a code before allowing setup. Use the Up and Down keys to enter the code. If the code is entered incorrectly, the LCD will read “Error”. After 3 incorrect entries, the Code Setup is exited. Once the correct Code is entered, the Setup Menu is accessed.

## To Calibrate the Tachometer (TTDJ-DC-T and TTDJ-IGN-T models)

The TTDJ measures RPM based on the number of pulses per engine revolution. To calibrate the tachometer first enter the User Set Up Menus, see steps 1-3 from “To Enter User Set Up Menus” above.

Select SETUP.7. Enter the code, then enter your number of pulses per engine revolution (refer to Pulses/Revolution, above right).

## Pulses/Revolution

### TTDJ-IGN-T (Ignition Model)

For this model the number of pulses per revolution is determined by the number of cylinders and cycles of the engine, according to the following table:

Cylinders	Cycles	Pulses	Cylinders	Cycles	Pulses
1	2	1	6	2	6
2	2	2	6	4	3
2	4	1	8	2	8
3	2	3	8	4	4
4	2	4	10	4	5
4	4	2	12	4	6
5	2	5	16	4	8

**NOTE:** Divide the number of cylinders by 2 for split capacitor ignitions.  
 Multiply the number of cylinders by 2 for throw away spark ignitions.

### TTDJ-DC-T (DC Model)

For TTDJ-DC-T models the pulses per revolution can come from a magnetic pickup. The number of pulses per revolution is simply the number of teeth on the flywheel gear (32 to 360).

## Sensor Input Set Up

Sensor inputs 1-16 are configurable. The following types are available:

- Type 0** = Class A, Shutdown  
**Type 1** = Class B1, Shutdown  
**Type 2** = Class B2, Shutdown  
**Type 3** = Class C, Shutdown  
**Type 4** = Class A, Alarm Before Shutdown†  
**Type 5** = Class B1, Alarm Before Shutdown†  
**Type 6** = Class B2, Alarm Before Shutdown†  
**Type 7** = Class C, Alarm Before Shutdown†

To configure a Sensor Input:

- Enter the SETUP.3 menu (enter the code). The Display will read: **3 00** (3 00).
- Use the Up and Down keys to select the input to be configured. For example if you select Input #1 the display reads: **3 01** (3 01).
- Press the Run/Stop key. Assuming you selected Input #1, and that input is currently configured as a Class A, Shutdown, the display will read **01 0** (01 0).
- Use the Up and Down keys to select the desired Sensor Input Type.
- Press the Run/Stop key, the display reads: **3 01** (3 01).
- Repeat Steps 2-5 as necessary.
- To Exit press Reset, the display shows: **3 00** (3 00). Then press the Run/Stop key.

## Elapsed Time Set / Reset

Enter the Elapsed Time Set Up. SETUP.6. First make sure the jumper for Input #30 is installed. To Set the time do the following:

- Enter the SETUP.6 menu (enter the code). The display will read the elapsed time in hours, after the 6 (for example: **6.00001** (6.00001) if the elapsed time is 1 hour).
- Set the desired time using the Up/Down keys. Press Reset to zero the time.
- When the desired time is entered, press the Run/Stop key.
- To exit User Setup, press Reset, the display will show: **SETUP.0** (SETUP 0) and press the Run/Stop key.

**NOTE:** Decimal fractional of the elapsed time is lost when the Elapsed Time Setup is entered, and it can only be set to the nearest hours.

†Alarm Before Shutdown is a function that causes annunciation and the alarm output, but will not cause a shutdown.



## SEQUENCE OF OPERATIONS

### System Start Up

Press the **RESET** key to clear any faulted sensor input and unground/enable ignition for engine operation. Apply starting power to the engine.

### Engine Speed (-T models only)

The first thing displayed on versions with Tachometer is the engine speed. While there is time remaining in either of the Class "B" timers, the display will alternate between engine speed and the Class "B" timers (4 seconds each). Once the Class "B1" timer expires, while there is time remaining in the Class "B2" timer, the display will alternate between the engine speed and the Class "B2" timer (4 seconds each). Once both Class "B" timers expire, the engine speed is displayed continuously.

### Class "B1" Timer

While there is time remaining in the Class "B1" timer, the display will alternate between engine speed and the Class "B1" time remaining for example: "1 0.30" (4 seconds each). All sensor inputs configured as Class "B1" are locked out at this point. For non -T models the "B1" display will be steady. To zero this timer, press **TIMER "0"**.

### Class "B2" Timer

Once the Class "B1" timer expires while there is time remaining in the Class "B2" timer, the display will alternate between engine speed and the Class "B2" time remaining for example: "2 0.30" (4 seconds each). All sensor inputs configured as Class "B2" are locked out at this point. For non -T models the "B2" display will be steady. To zero this timer press the **TIMER "0"** key, after the Class "B2" timer has expired.

### Elapsed Time

To display the run hours, press the "**Display Hours**" key. The current Run hours will be displayed for 5 seconds. **NOTE:** On all non tachometer models (non -T) the **RUN HOURS** are displayed after the Class "B" Timers expire, instead of **ENGINE SPEED**. The decimal point flashes to indicate the unit is running.

### Alarm Only Condition

If any one of the sensor inputs configured as an **ALARM-ONLY** is faulted, the Alarm Output will turn ON, and the sensor number will be displayed in the first two digits. Press the **RESET** key after the sensor input has cleared, to clear the display and to turn OFF the Alarm output.

### Overspeed (-T models only)

If the engine speed exceeds the Overspeed Set point the engine will shutdown, bypassing the Ignition Ground Delay. The TTDJ-T models will display "50". Overspeed overrides the Test mode.

### Underspeed (-T models only)

If after the Class "B1" Timer expires the engine speed falls below the Underspeed Setpoint, the engine will shutdown. The TTDJ will annunciate/display "51". Underspeed overrides the Test mode.

### Manual Stop

To manually shutdown the engine, press the **STOP/RUN** key. The TTDJ will shutdown the system and the display will indicate "52". Manual Stop overrides the Test mode.

### Ignition Ground Delay

Upon reaching a shutdown condition, the unit will trip the fuel valve, and, after the delay expires, ground the ignition. This delay is bypassed on **Overspeed (50)**, **Emergency Shutdown (32)**, and sensor input #29 if configured as Class "ESD".

### Loss of Ignition

TTDJ-IGN models annunciate/display "51" when ignition input is lost. The energy stored in the FV+ circuit will trip the fuel valve.

### Resetting Shutdown Fault

After the shutdown condition is cleared on the equipment, press **RESET** key.

### Test Timer

The Test Timer is used to verify that sensors are wired properly and working correctly. To perform a sensor test while running do the following:

1. Press the **TEST** key and verify that the Test Timer is shown with 5 minutes: (3 5.00).
2. Trip the first sensor to be tested and verify that the sensor number and class type appear on the display (see displays below). The display will alternate between the Sensor Number and the Test timer.
3. Clear the sensor then press the **RESET** key. Verify that the sensor number is cleared from the display.
4. Repeat Steps 2 and 3 for each sensor.
5. To exit, press the **TIMER "0"** key or allow the Test Timer to expire.

**NOTE:** Any of the following conditions will override the Test Timer: **Emergency Shutdown (32)**, **Overspeed Shutdown (50)**, **Underspeed Shutdown -T models (51)**, **Loss of Ignition (51) non-T models**, **Manual Stop (52)**, and sensor input #29, if configured as a Class "ESD".

### Test Mode Display

In Test, when a sensor is tripped, the sensor number and the Class type are displayed, for example if sensor #1 (01) a Class "B1" shutdown is tripped in the Test the LCD reads "01 t1". The following are the Test Mode Displays:

	(t0): Class "A" Shutdown
	(t1): Class "B1" Shutdown
	(t2): Class "B2" Shutdown
	(t3): Class "C" Shutdown
	(t4): Class "A" Alarm
	(t5): Class "B1" Alarm
	(t6): Class "B2" Alarm
	(t7): Class "C" Alarm

### 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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# **CONFIDENTIAL**

## **SECURITY ACCESS CODE INFORMATION**



MURPHY has made efforts to ensure the reliability of the TTDJ Series Digital Fault Annunciator. Please note that the TTDJ's "User Set Up Menus" are critical operating parameters. These numbers contain information that only qualified personnel should be allowed to access.

Items set improperly within these parameters can cause serious damage to the TTDJ Series Digital Fault Annunciator and to your equipment.

Access to the "User Set Up Menus" is password protected.

Please keep this access code away from unauthorized personnel.

The access code is designated as follows:

**User Set Up Menus code = 35**

Read all TTDJ Series installation and operation instructions before attempting to edit the User Set Up Menus, and make sure that the device is correctly installed.

Please contact Murphy if you have any questions.



# Installation for 4-1/2 in. (114 mm) dial Pressure MURPHYGAGE® and SWICHGAGE®

**Model Series: OPLC, OPLG, OPLBP, 45APE, 45APEBP and 45 Series**

**Options: -OS, -ES, -P4 and -P6**

Please read the following instructions before installing. A visual inspection is recommended before mounting. General Information and these installation instructions are intended for all 4-1/2 in. (114 mm) dial pressure 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.



**OPLC and OPLFC** SWICHGAGE® instruments have high and low limit contacts to monitor, alarm or shut down. The OPLC has a flanged case. A method to override the low limit contact for start-up is provided on most models. See Operation Test section—page 3.  
OPLFC can be direct or panel mounted (see page 2).

**OPLG and OPLFG** MURPHYGAGE® instruments are indication-only pressure gages. Same as OPLC and OPLFC models except without switch (limit) contacts.

**45 Series** includes a magnetic switch to stop an engine or electric motor each time the gage contact operates. A lockout push button overrides low contact for startup. Other variations available.

**45APE and 45APEF Series** are versions of the OPLC Series featuring 2 snap-acting SPDT switches instead of the pointer type contacts. These units do not include low contact lockout.

**OPLBP and 45APEBP** are versions of the OPLC and 45APE featuring pilot duty limit switches connected to an internal latching control relay for “on/off” control directly or through a motor starter.

## Specifications

**Dial:** White on black, dual scale, psi and kPa standard, 4-1/2 in. (114 mm) diameter.

**Case:** Die cast aluminum, surface or panel mount.

**Overrange:** Do not exceed 10% FS above full range.

**Process Connection:** 1/4 NPTM thru 1000 psi;  
1/2 NPTM 1500 - 20,000 psi; back connection optional.

**Sensing Element:** Bronze or 316 stainless steel bourdon tube.

### Gage Accuracy:

Indicating pointer within switch points with hysteresis of <1%:

±2% for first and last quarters of scale; middle half of scale is ±1%.

Indicating pointer below low or above high set points (45APE Series only):

±4% for first and last quarters of scale; middle half of scale is ±3%.

For ranges <60 psi add ±1%.

**Pressure Relief Disc:** Back of case (except EX models).

**Switch Reset Deadband:** Approximately 10% FS.

**Snap-Acting Switches:** See wiring information (page 4).

**Dry Relay Contact (“BP” Models):** 10 A @ 28 VDC or 10 A @ 120 VAC.

**Wire Connections (Surface Mount):** 1/2 NPTF conduit/ terminal block.

**Wire Connections (Panel Mount):** Wire leads, 18 AWG (1.0 mm<sup>2</sup>) x 9 in. (229 mm) long.

**Wire Connections (-ES, -OS, -CC):** 1/2 NPTM conduit and wire leads,  
24 AWG (0.22 mm<sup>2</sup>) x 33 in. (838 mm) long.

**Item Weight:** 5 lbs 6 oz (2.4 kg) approximately.

Explosion-proof models: 21 lb. (9.5 kg) approx.

**Item Dimensions:** 10 x 9 x 6 in. (254 x 229 x 152 mm) approximately.

Explosion-proof models: 12 x 12 x 9 in. (305 x 305 x 229 mm) approximately.



### Precautions:

Do NOT exceed rated pressure range. Do not use teflon tape on connection threads. Do not block the inlet orifice. For direct mount into the process, a vertical or ninety degree mounting is recommended.

Use wrench on shank to tighten or loosen connection. Do not twist case when installing, this will damage internal components and will void the warranty. **Do not overtighten.**

Use shock mounts as necessary to prevent excessive vibration.

If liquid in the system freezes, it will expand and will damage the tube.

For 45APE Series – Low setpoint should be limited to the lower 1/2 scale and upper setpoint should be limited to the upper 1/2 scale.

## Warranty

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

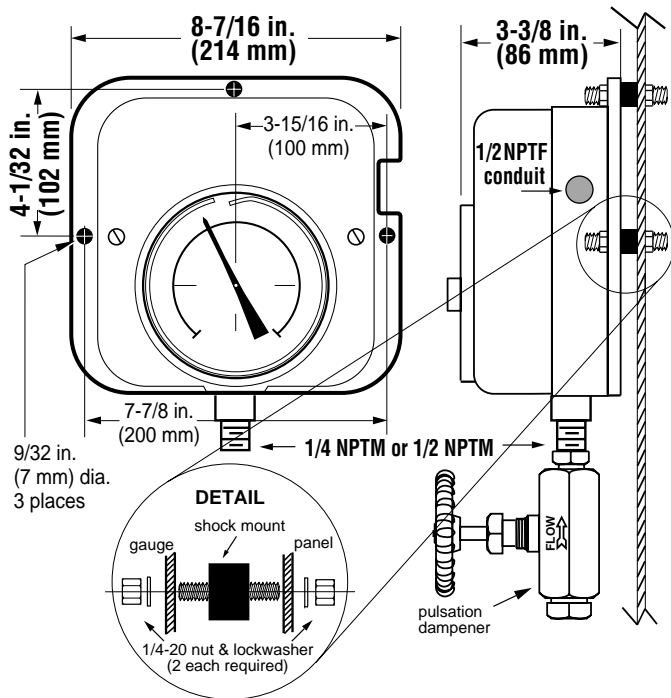
\*Selected configurations are third party listed. Consult factory for details.

\*\*Products covered by this bulletin comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility except as noted. Does not cover “BP” models.

## CASE MOUNTING

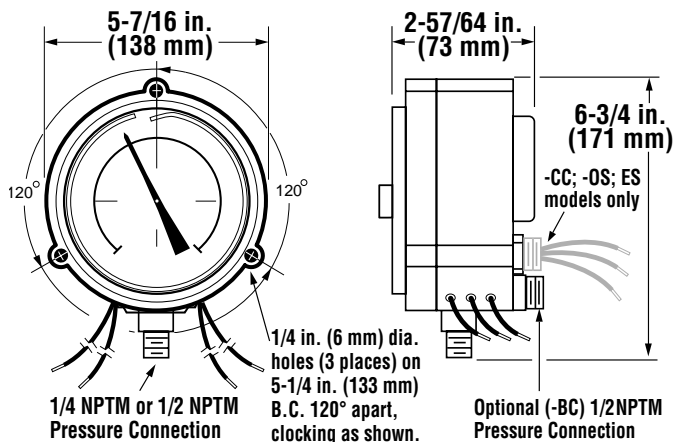
### OPL Series Wall Mount

Flanged case design intended for wall mount, it can also be direct mounted. Shown with shock mounts and pulsation dampener.

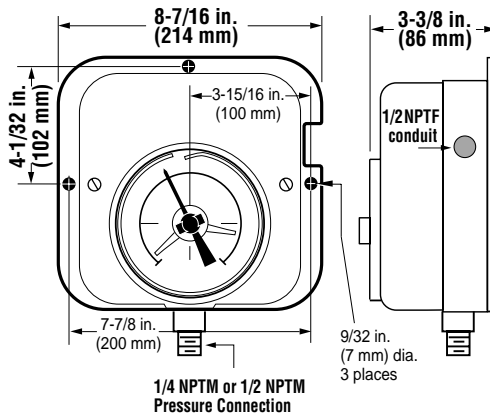


### OPL Series Flush Mount

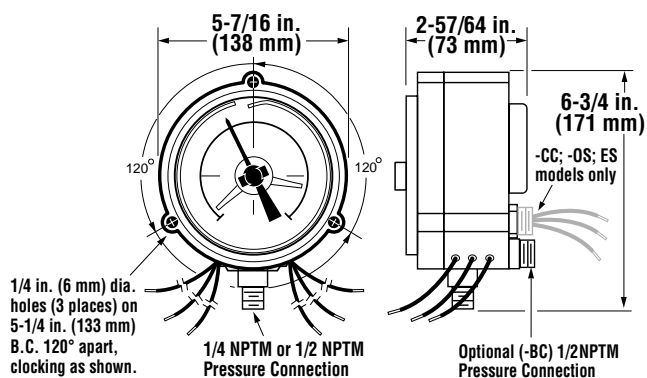
Round case design to be mounted in a panel from 1/32 in. (1 mm) to 1/8 in. (3 mm) thick. It can also be direct mounted. Shown with pulsation dampener.



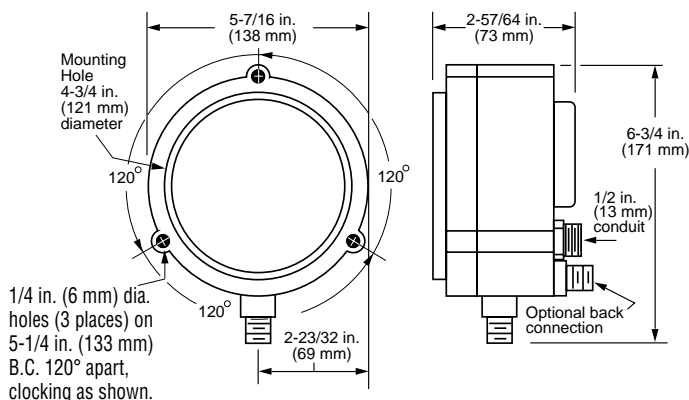
### 45APE Series Wall Mount



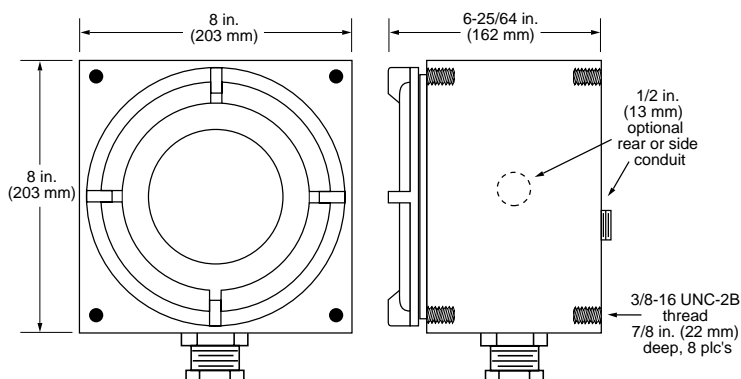
### 45APE Series Flush Mount



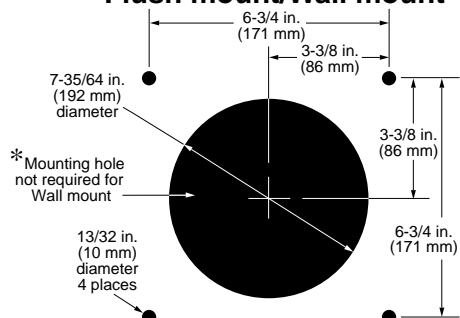
### Options "OS" and "ES" (flush mount case)



### Explosion-proof Case Mount Explosion-proof case can be mounted from face or rear.



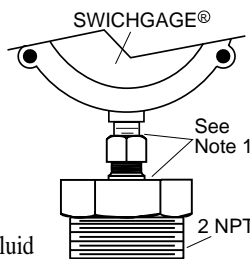
### Flush mount/Wall mount\*



## OPTIONS

**OS and ES** (oil sealed and environment sealed case) options for corrosive environment, feature a panel mount case design or screw directly into the process. See Case Mounting (p-2).

**Pulsation Dampener** Helps controls pressure instruments subject to pulsation. The PD8187 is NOT intended as a “shutoff” valve. See Case Mounting (p-2).



**P6** is a sealed mechanism with a typical application for oil well lead lines. Its 2 NPT housing and diaphragm seal filled with silicon fluid attaches directly into a 2 NPT tee on the lead line. Tighten only the 2-5/8 in. (67 mm) hex fitting.

**CAUTION: Do not tamper with or break sealed connections.**

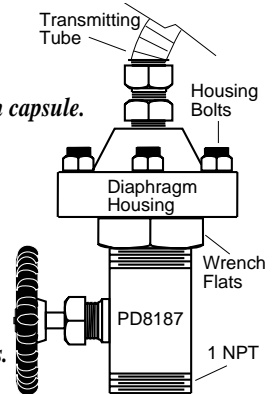
**P4** is a remote seal mechanism with stainless steel armored capillary to protect the SWICHGAGE® from highly viscous and/or corrosive fluids.

1. Use thread sealant to install the PD8187 pulsation dampener into source pressure connection.
2. Loosen the eight housing bolts until the bottom housing is free to turn.

**CAUTION: Do Not unscrew the green diaphragm capsule.**

3. Tighten the bottom housing to the 1 NPT on the pulsation dampener.
4. Tighten the eight housing bolts to 25±3 foot lbs. by staggering the tightening for even clamping.
5. Route capillary away from heat source such as exhaust manifold. Excess capillary should be carefully coiled and secured to avoid damage.

**CAUTION: Do Not cut capillary or make sharp bends.**



## ADJUSTMENTS

### OPL/45 Series Limit Contact Adjustments

Facing the dial, left side knob is the “Low limit” contact and the “High limit” contact is located to the right. To set the limit contacts simply turn the fingertip type knob to the desired point on the scale.

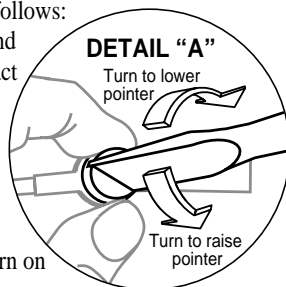
### 45APE Series Trip Point Adjustments

The 45APE Series features a stacked limit indicator adjustments knob. The bottom half knob adjusts the “Low” limit indicator, the top half is to adjust the “High” limit indicator. To set the limit contacts simply turn the fingertip type knob to the desired point on the scale.

### OPL and 45 Series Indicating Pointer Adjustments

To reset to zero or to a known value do as follows:

1. Turn off power. Remove the snap ring and very carefully remove the lens and contact assembly (or open hinged cover).
2. Hold the pointer hub with thumb and forefinger then turn screw to desired point. See **DETAIL “A”**.
3. Replace lens and contact assembly and snap ring (or close hinged cover), and turn on the power.

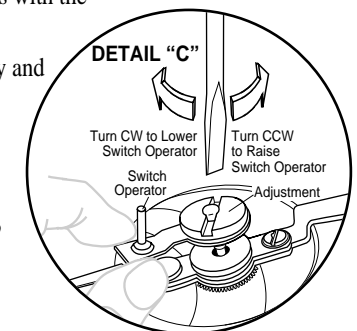
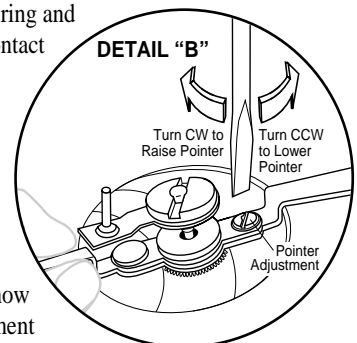


### 45APE Series Pointer Adjustments

To reset to zero or to a known value proceed as follows:

1. Turn off the power. Remove the snap ring and very carefully remove the lens and contact assembly (or open hinged cover).
2. Hold the pointer hub with thumb and forefinger, then turn the Pointer Adjustment screw to the desired point. See **DETAIL “B”**.
3. If the Switch Operator needs adjustment, hold the Switch Operator Hub with thumb and forefingers as show on **DETAIL “C”**; and turn the adjustment screw until the Switch Operator aligns with the indicating pointer.
4. Replace the lens and contact assembly and the snap ring (or close hinged cover). Turn the power back on.

**NOTE: Span adjustments and recalibration must be performed by authorized mechanic or return the unit to FWMurphy. See addresses on p-4.**



## OPERATION TEST INSTRUCTIONS

### OPLC, OPLFC and OPLBP

1. Perform operation test after the unit is installed and wired appropriately. (See the typical wiring diagram, on page 4.)
2. When pressure is applied to the instrument, the pointer will travel in a clockwise direction. Adjust the limit contacts to the desired settings.
3. To start, place the toggle switch in the “start” position or otherwise override low contact.
4. After the indication pointer rises above the low limit contact, return the toggle switch or override device to the “run” position.
5. To test the limit contacts, turn the limit contact to be tested until it touches the pointer. That will trip the control circuit.
6. Reset the shutdown or alarm circuit device and repeat above sequence for each contact/trip point.

### 45 Series

1. Repeat steps 1 and 2. (See OPLC operation test instructions.)
2. Press the semi-automatic pushbutton located on the low contact knob.
3. Reset the magnetic switch pushbutton.
4. After the indication pointer rises above the low limit contact, the lockout - pushbutton automatically disengages and the low limit is armed.
5. Repeat steps 5 and 6. (See OPLC operation test instructions.)

### 45APE, 45APEF and 45APEBP

1. Repeat steps 1 and 2. (See OPLC operation test instructions.)
2. To test the switches, turn the limit indicator until it touches the pointer, then continue to rotate until the snap switch operates\*.
3. Reset the shutdown or alarm circuit device.

\* The trip point indicator will stop the pointer movement slightly before the snap switch operates. As pressure continues to increase or decrease, the trip point setting is reached.



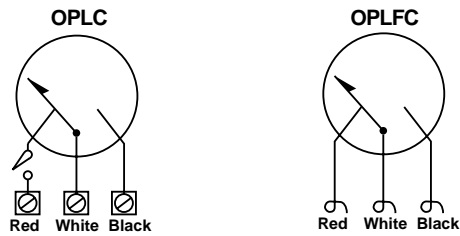
## TYPICAL ELECTRICAL DIAGRAMS



**WARNING:** PERFORM THE WIRING OPERATION WITH THE POWER SOURCE "OFF". MAKE SURE THE VOLTAGE AND CURRENT REQUIREMENTS ARE WITHIN THE SWITCHGAGE® RATINGS. BEFORE WIRING DETERMINE VOLTAGE AND POLARITY FOR THE APPLICATION. USE THE APPROPRIATE WIRE SIZE. ALL CONNECTIONS SHOULD BE MADE USING A SPADE (FORKED) OR RING TERMINALS. FOR PIGTAIL CONNECTIONS USE WIRE NUTS. CONDUIT IS RECOMMENDED TO PROTECT WIRES FROM DAMAGE.

### OPLC and OPLFC

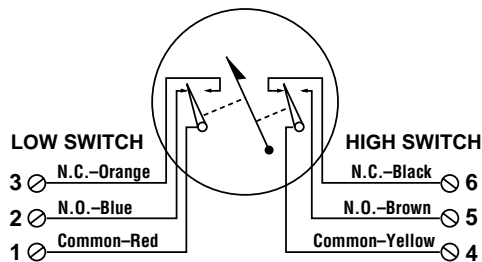
**Contact Rating:** 1 SPDT, Center Off; 2 A, 30 VDC, 1 A, 125 VAC pilot duty.



**NOTE:** Diagrams above show the pointer in the at rest (shelf) position.

### 45APE and 45APEF

**Contact Rating:** 2-SPDT snap-switches (one for high and low pressure), 4 A inductive, 250 VAC each switch. **NOTE:** Diagram below shows the pointer in the at rest (shelf) position. Low setpoint should be limited to the lower 1/2 scale and upper setpoint should be limited to the upper 1/2 scale.



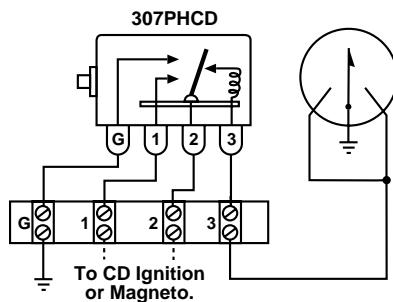
### 45 Series with 307PHCD

**Contact Rating:** 12/32 VDC coil, 10 A, 32 VDC battery ignition contacts; Magneto ignition coil, 10 A magneto ignitions contacts; CD ignition coil, 10 A CD ignition contacts; 120 VAC coil, 10 A, 120 VAC contacts.

**NOTE:** Diagram below shows the pointer in the operating position.

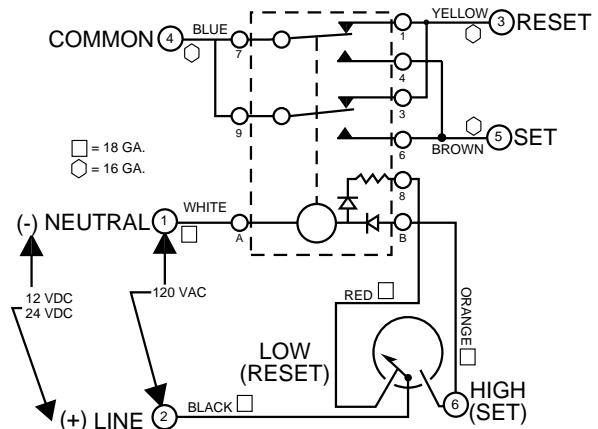
#### IMPORTANT:

Use with 110/120 VAC requires isolated ground SWITCHGAGE® instruments.



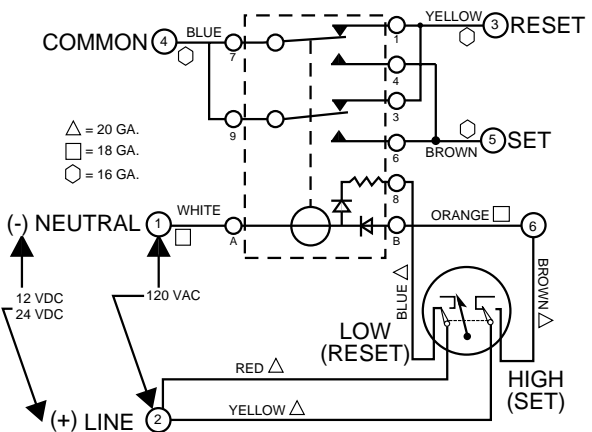
### OPLBP

**Contact Rating:** SPDT dry relay contacts; 10 A, 125 VAC. **NOTE:** Diagram below shows the pointer in the at rest (shelf) position.



### 45APEBP

**Contact Rating:** SPDT dry relay contacts; 10 A, 125 VAC. **NOTE:** Diagram below shows the pointer in the at rest (shelf) position.



### Transformer Relay Assemblies

For higher voltages, Murphy TR Assemblies can be used in conjunction with any SWITCHGAGE®.



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# Installation Instructions for Pressure and Vacuum 2 and 2-1/2 in. (51 and 64 mm) Dial MURPHYGAGE® and SWICHGAGE® Instruments. 20, 25, A20, A25 Series

P-95033N  
Revised 02-02  
Section 05  
(00-02-0162)



Please read the following instructions before installing. A visual inspection of this product for damage during shipping is recommended.

## 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 2 and 2-1/2 in. (51 and 64 mm) dial size MURPHYGAGE® and SWICHGAGE® instruments are diaphragm-actuated, pressure or vacuum gages with a 1/8-27 NPTM pressure port connection (2 pressure ports for differential pressure models).

Models with face-adjustable contact(s) are rated for 2 A @ 30 V (pilot duty). If the gage case is steel (20P, 25P, 20DP, 25DP etc.) the ground path for the contact circuit is through the case. Therefore, the case must be installed in the ground plane of the electrical power supply.

If the case is polycarbonate (A20P, A20DP, A25P, A25DP etc.) the ground path is isolated and is made through the "C" or "P" terminals on the back of the gage case ("C" for A20 models; "P" for A25 models).

Models 20PE, 25PE, A20PE, A25PE etc. have a snap-acting switch instead of the face adjustable pointer type contact. Electrical rating is 3 A @ 30 VDC, 4 A @ 125 VAC. Reset differential for the switch is approximately 10% of the scale.

**NOTE:** Select a scale so your normal operating pressure is in the upper middle of the scale.



**CAUTION:** Certain dangers to human safety and to equipment may occur if some equipment is stopped without pre-warning. It is recommended that monitored functions be limited to alarm-only or to alarm before shutdown.

### Alarm Before Shutdown Models

The 20PABS, A20PABS, 25PABS and A25PABS feature a front limit contact for equipment shut-down and an internal SPDT snap switch for Alarm Before Shut-Down. When the low side (preset point) of the snap switch trips, the N.C. terminal completes a circuit to activate an alarm. A continued decrease in pressure will complete the shutdown circuit. An increase in pressure of approximately 10% of scale is necessary before the snap-switch (alarm) will RESET and open the circuit.

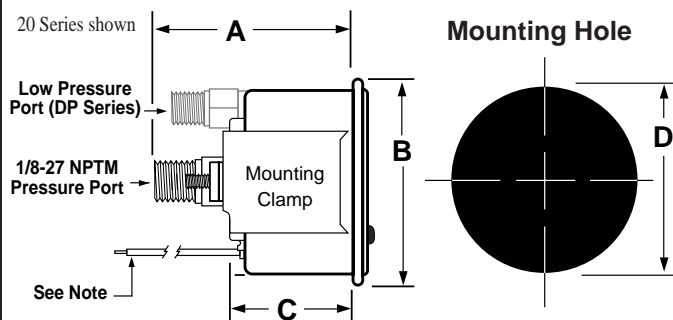
**NOTE:** Face contact shut-down limit setting and snap switch low point are factory-set; specify when ordering if setting is other than standard.

### Typical TATTLETALE® Magnetic Switch

Murphy manufactures several, patented Magnetic Switches for protection of the pilot duty SWICHGAGE® contacts and to ensure positive shut-down of equipment. There are Magnetic Switches for CD ignition, Magneto, Battery systems and electric motor driven equipment. TATTLETALE® annunciators show the cause of shut-down. The first one to trip will lockout all other TATTLETALE® annunciators. Be sure the type of Magnetic Switch/TATTLETALE® matches the power source used to trip it.

**NOTE:** At equipment start-up (for models not having a built-in time delay) the reset button must be held in until normal operation occurs, or an external time delay may be used. Instructions are packed with each Magnetic Switch/TATTLETALE®.

## Typical Mounting Dimensions



	20 Series	A20 Series	25 Series	A25 Series
<b>A</b>	2-7/32 (56)	2-9/16 (65)	2-1/8 (54)	1-51/64 (46)
<b>B</b>	2-15/64 (57)	2-1/4 (57)	3-1/8 (79)	2-29/32 (74)
<b>C</b>	1-5/16 (33)	1-1/4 (32)	1-3/8 (35)	1-27/64 (36)
<b>D</b>	2-1/16 (53)	2-1/16 (53)	2-11/16 (68)	2-11/16 (68)

**NOTES:** 20/25 Series: 18 AWG pigtails. A20/A25 series: #4/#6 screws. The dimensions above are in inches and (millimeters).

## Panel Mounting

All models can be installed in a panel from 0.032 to 0.250 in. (1 to 6 mm) thick. Remove the mounting bracket and insert the gage from the front side of the panel. Replace bracket and secure it. Do **NOT** overtighten. (See Figure 2).

## Connecting the Pressure Port

1. Pressure tubing is generally not provided. Use of good quality flexible pressure tubing/hose and fittings is strongly suggested. Use at least 3/16 in. (5 mm) I.D. tubing. If using copper or rigid tubing, install at least 12 in. (305 mm) flexible hose from the gage to the rigid tubing. This prevents damaging vibration from reaching the gage. For most models a pulsation orifice, within the pressure port, is provided and it is removable for cleaning (Figure 2).

2. Connect tubing to the 1/8-27 NPTM port. Use of non-hardening thread sealing compound is recommended although thread is "dry seal".

**IMPORTANT:** Make sure NOT to foul pressure orifices with sealant. NEVER exceed maximum pressure rating for the gage range; see chart on p-2.

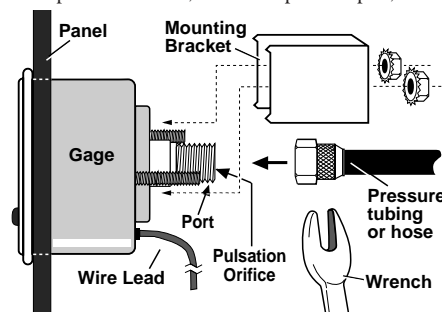


Figure 2

**IMPORTANT:** SWICHGAGE® instruments, Magnetic Switches and shut-down or alarm devices, properly used, are effective tools in any preventive maintenance program. For optimum performance, check these tools periodically: look for frozen pointers, kinked/worn tubing, broken wiring or loose connections; operate the contacts and watch for expected results. Replace damaged/worn parts; clean/repair as necessary. Check for correct/complete wiring, unbroken insulation and no accidental grounds. DO NOT run shut-down wires with ignition wiring. Check all tubing and connections for leaks. Mount Magnetic Switches and valves upright, to prevent moisture collection.



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

## Pressure Ranges and Factory Settings

Ranges Available		Maximum Pressure	Std. Settings*		Hi Settings**		20/25PABS Settings				Start-up Lockout Settings					
psi	Bar		psi	Bar	psi	Bar	Low		Alarm†		Contact		Lockout		Release (max.)	
0-15 (103)	1.0	30 psi (21 MPa)	3 (21)	0.2	12 (83)	0.8	3 (21)	0.2	6 (41)	0.3	3 (21)	0.2	4 (28)	0.3	6 (41)	0.4
0-30 (207)	2.0	60 psi (21 MPa)	7 (48)	0.4	24 (165)	1.6	7 (48)	0.4	10 (69)	0.6	4 (28)	0.4	7 (48)	0.5	10 (69)	0.7
0-50 (345)	3.5	100 psi (21 MPa)	10 (69)	0.8	40 (276)	2.8	10 (69)	0.8	13 (90)	1.0	10 (69)	0.5	13 (90)	1.0	20 (138)	1.4
0-75 (517)	5.0	150 psi (21 MPa)	15 (103)	1.0	60 (414)	4.0	15 (103)	1.0	18 (124)	1.5	10 (69)	0.7	15 (103)	1.0	23 (159)	1.6
0-100 (690)	7.0	200 psi (21 MPa)	20 (138)	1.5	80 (552)	5.5	20 (138)	1.0	23 (159)	1.5	20 (138)	1.0	25 (173)	2.0	35 (241)	2.4
0-150 (1.0 MPa)	10	300 psi (3.4 MPa)	30 (207)	2.0	120 (827)	8.0	30 (207)	1.5	33 (228)	2.0	20 (138)	1.5	30 (207)	2.0	45 (310)	3.1
0-200 (1.4 MPa)	14	400 psi (3.4 MPa)	50 (345)	3.0	150 (1 MPa)	10	50 (345)	3.0	53 (365)	4.0	40 (276)	3.0	50 (345)	3.5	70 (482)	4.8
0-300 (2.1 MPa)	20	500 psi (3.4 MPa)	75 (517)	5.0	225 (1.6 MPa)	15	75 (517)	5.0	78 (538)	5.0	50 (345)	3.5	75 (517)	5.0	105 (724)	7.2
0-400 (2.8 MPa)	28	500 psi (3.4 MPa)	150 (1 MPa)	7.0	300 (2.1 MPa)	20	75 (517)	5.0	150 (1 MPa)	10	100 (690)	6.0	—	7.0	150 (1 MPa)	10

Values in ( ) are mathematical conversions from psi to kPa/MPa—they do not reflect second scale range. U.S.A. standard scale is psi/kPa; U.K. standard scale is psi/bar. Consult factory for other scales.

\* Standard setting for 20P/25P and 20PE/25PE models.

\*\* Low settings for Hi/Lo option same as standard settings. Hi/Lo option available for 20P/25P models only.

† SPDT Snap-switch is the alarm switch.

## Connecting Vacuum Models

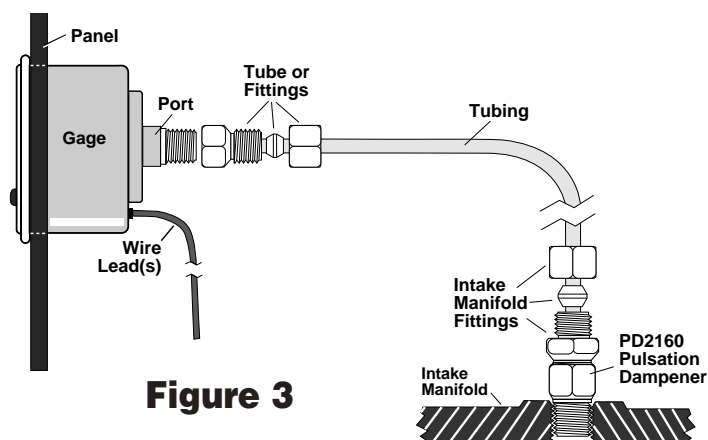
The vacuum SWICHGAGE®/MURPHYGAGE® measures intake manifold vacuum and gives an indication of the load applied to the engine.

1. Mount the gage in a suitable location so that the face is visible and easily accessible.



**CAUTION:** Make SURE NOT TO FOUL the pressure orifices with pipe dope or dirt or the SWICHGAGE® instrument will not operate.

2. Connect suitable tubing to the 1/8-27 NPT port of the gage and to an open port in the intake manifold. Mounting kit V5179 is suggested and includes tubing and necessary fittings. The manifold fitting is 1/4 NPT. **Figure 3** shows a typical mounting using V5179 kit. A Murphy PD2160 is also recommended.
3. Be sure connections are tight—gage will not operate properly if line leaks.



**Figure 3**

## Connecting Differential Pressure Models

Differential pressure models are typically applied to indicate restriction in oil/fuel filters. The “High” pressure port (center mounted) is piped to the Inlet side of the filter. The “Low” pressure port (top center mounted) is piped to the Outlet side of the filter.



**CAUTION:** Make SURE NOT TO FOUL the pressure orifices with pipe dope or dirt or the SWICHGAGE® instrument will not operate.

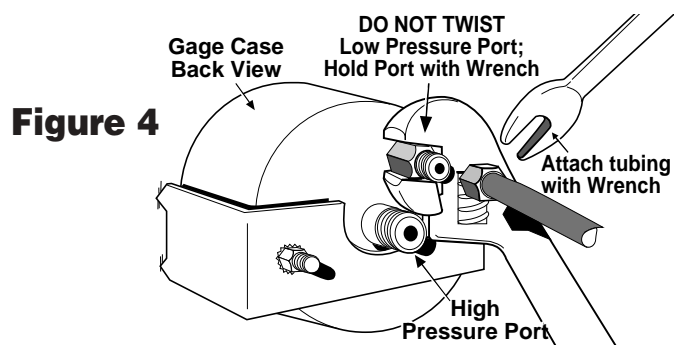
1. To connect the high pressure tubing use at least 3/16 in. (5 mm) I.D. flexible pressure tubing/hose and fittings. If using copper or rigid tubing, install at least 12 in. (305 mm) flexible hose from the gage to the rigid tubing (to prevent damaging vibration to the gage, see **Figure 2**).

2. You **MUST** use a second wrench on the **Low Pressure** port when tightening tube fittings. (**Figure 4**). Notice that a wrench is used for holding the low pressure port while a second wrench will tighten the pressure tubing/hose fitting onto the port.



**WARNING:** Failure to use a second wrench on the low pressure port when tightening tube fittings may result in damage to the internal pressure tubing. Do NOT overtighten connection to port.

**IMPORTANT:** NEVER exceed maximum static pressure or differential pressure ratings for your gage range; stated in chart below.



**Figure 4**

Ranges* Available	Max. Static Pressure	Max. Differential Pressure	Contact Setting
0-15 (0-103) [0-1.0]	200 (1.4) [14]	30 (207) [2.0]	10 (69) [0.8]
0-30 (0-207) [0-2.0]	300 (2.1) [20]	60 (414) [4.0]	20 (138) [1.0]
0-50 (0-345) [0-3.5]	300 (2.1) [20]	100 (690) [7.0]	30 (207) [2.0]
0-75 (0-517) [0-5.0]	300 (2.1) [20]	150 (1.0) [10]	50 (345) [3.5]
0-100 (0-690) [0-7.0]	300 (2.1) [20]	200 (1.4) [14]	60 (414) [4.0]

\*Values are shown in psi, (kPa/MPa) and [bar]. Values in kPa/MPa and bar are mathematical conversions from psi—they do not reflect actual second scale range.

## Setting the SWICHGAGE® contacts



**IMPORTANT:** If the SWICHGAGE® has a lockout push button on the face, a contact setting higher than the factory setting will make the lockout device inoperative.

For 20PE, 25PE, 25DPE, A20PE, A25PE and A25DPE models the switch trip point CANNOT be set at either the lowest or the highest extremes of the scale. Trip point MUST allow for the switch reset differential. For adjustable switch versions, the switch point is adjustable ONLY over the lower half of the scale.

1. All contacts are set using a 1/16 in. hex wrench (Figure 5).
2. Some models such as A20PE, A25PE, etc. may not have field adjustment. Consult the factory if in doubt. For adjustable models, 1/4 turn clockwise lowers switch operating point approximately 7% of scale.
3. Observe the "normal operating" pressure or vacuum readings. Set the contact slightly below minimum reading observed or slightly above minimum pressure recommended by equipment manufacturer. For differential pressure models set the contact slightly below the desired maximum differential pressure.

## Testing the Contacts

1. With equipment running; use a 1/16 in. hex wrench to rotate contact until it touches the pointer. **Do NOT force contact against the gage pointer.** Equipment should shut down and/or alarm should operate. *Reset the contact* (See Figure 5).
2. **VERY IMPORTANT** Each time you start the machine, observe that the SWICHGAGE® is indicating pressure or vacuum. Visual inspection and regular testing should be normal procedure to ensure proper operation and to achieve maximum results from your SWICHGAGE®.

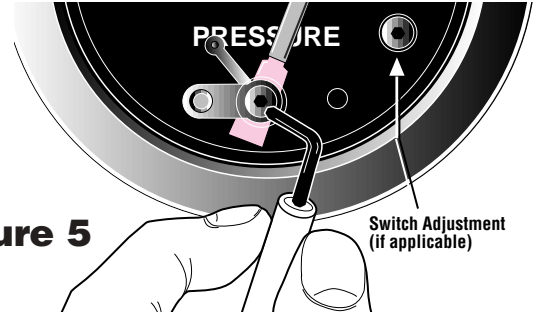


Figure 5

## Wiring Installation



**WARNING:** DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING THE WIRING INSTALLATION. FOR BATTERY IGNITION SYSTEMS, DISCONNECT THE BATTERY GROUND STRAP. FACE ADJUSTED POINT-ER TYPE CONTACTS ARE PILOT DUTY. DO NOT EXCEED CONTACT RATINGS ON ANY SWICHGAGE® MODEL.

20 and 25 Series models wire leads are 18 AWG or 20 AWG, 12 in. (305 mm) long. A20 and A25 Series models have number 4 or number 6 screw terminals.

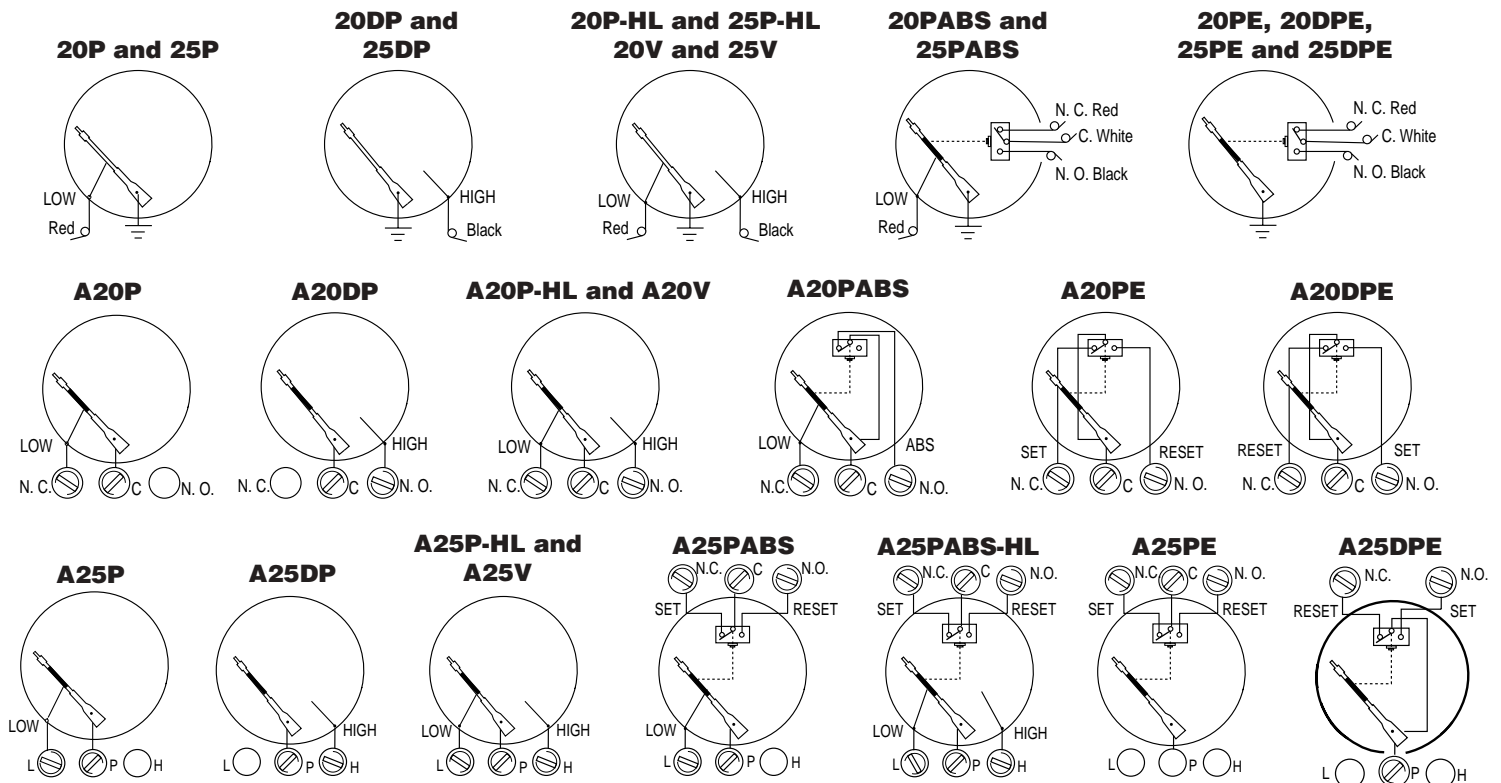
When installing the SWICHGAGE® on a ungrounded panel, you MUST provide a ground wire from the SWICHGAGE® to a common ground. Install ONLY in a 12 or 24 V system. Warning lights or audible signal MUST be of the same voltage as the battery. Current draw should NEVER exceed SWICHGAGE® contact ratings.

**CAUTION:** Ordinary incandescent lights are damaging to SWICHGAGE® contacts. We recommend using our direct connected alarms TL-7 flashing lamp and/or SAH MINI-SIREN®.

The pictorial below shows typical wirings for each base model. Look for specific typical wiring diagram with your base model number and wire accordingly.

The pointer is shown in the **Shelf Position**. Face adjusted pointer type contacts are rated pilot duty 2 A @ 30 VAC/DC. Snap-switch contacts are rated 3 A @ 30 VDC; 4 A @ 125 VAC.

**CAUTION:** On some models pointer contact and ABS switch share the same "Common". Voltage source MUST be the same. Maximum voltage is 30 V. Consult factory for applications with 120 VAC systems.





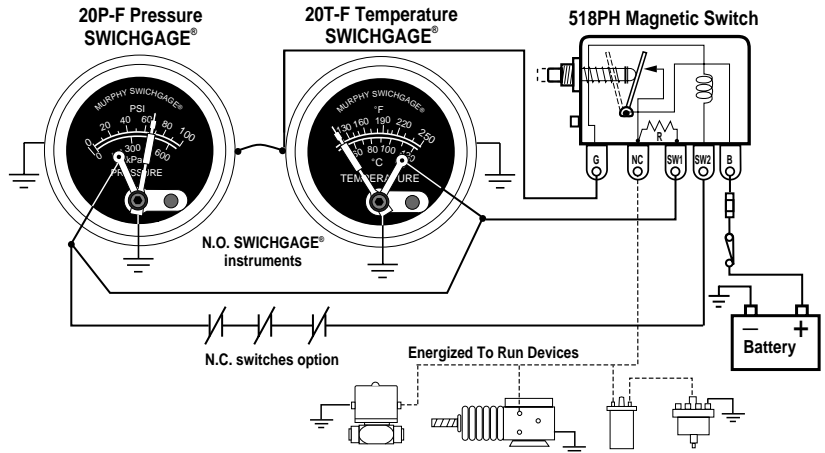
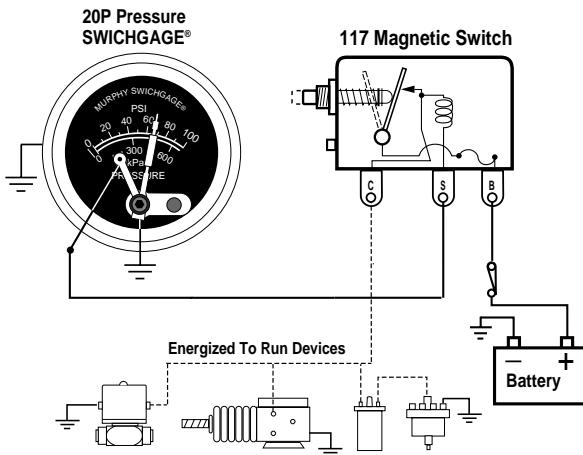
# Installing The Magnetic Switch



**WARNING: DISCONNECT THE BATTERY OR POWER SOURCE BEFORE BEGINNING THE INSTALLATION. SEE SPECIFIC WIRING INSTRUCTIONS PACKED WITH EACH MAGNETIC SWITCH / TATTLETALE®.**

1. Mount with electrical lugs down. Drill mounting holes in panel.
2. Clean away burrs and filings. Position the Magnetic Switch in the panel, making sure the pilot stud is in place.
3. Add decal, then washer, then nut and tighten.

*NOTE: Murphy components are easily wired and maintained. Use good quality wire and terminals. The type of Magnetic Switch differs for various applications. See typical wirings below. Wiring and instructions are packed with each Magnetic Switch.*



## Troubleshooting

**DO THIS FIRST:** Look for broken wiring, frozen pointer, dirty contacts (will not make), burnt pointer or contact. Verify that all wiring is intact and connections are tight. Verify that SWICHGAGE® has not been damaged (hit or dropped). Verify that there is pressure/vacuum supplied to the gage. Verify that the SWICHGAGE® is operative (it reads). Verify that the alarm or shutdown device is fully operable; and check other components such as spark plugs, ignition, fuel pump and filter, etc. Reset Magnetic Switch and verify that it stays latched.

SYMPTOM	CAUSE	TEST/REMEDY
Engine will not start.	<ol style="list-style-type: none"> <li>1. Short or Open circuit, be sure the Magnetic Switch latches and puts out power to the run device or removes ground (ignition). Check for power/ground at run device.</li> <li>2. Control circuit overloaded by accessories (blown fuse in Magnetic Switch).</li> <li>3. False ground in control circuit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reset Magnetic Switch and make sure it stays latched. Refer to installation instructions for 518PH Magnetic Switch (provided with unit).</li> <li>2. Find blown fuse and replace (use 14 A fuse). Reroute the accessories.</li> <li>3. Repair.</li> </ol>
False shutdown.	<ol style="list-style-type: none"> <li>1. SWICHGAGE® circuit has intermittent open or short.</li> <li>2. Vibration causes the Magnetic Switch to trip.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check all wiring and repair/replace as necessary.</li> <li>2. Repair and relocate the switch as needed.</li> </ol>
SWICHGAGE® closes but does not trip the magnetic switch or kill the engine.	<ol style="list-style-type: none"> <li>1. Incomplete shutdown circuit.</li> <li>2. Dirty SWICHGAGE® contacts.</li> <li>3. Ignition not providing power to primary terminal post.</li> <li>4. SWICHGAGE® case may not be grounded.</li> <li>5. Incorrect Magnetic Switch for type of power.</li> </ol>	<ol style="list-style-type: none"> <li>1. Locate open circuit and repair.</li> <li>2. Clean and check that contacts make.</li> <li>3. Repair ignition.</li> <li>4. Ground case.</li> <li>5. Replace with correct Magnetic Switch.</li> </ol>
Magnetic Switch tripped but engine is still running.	<ol style="list-style-type: none"> <li>1. Open circuit between the Magnetic Switch and the shutdown device.</li> <li>2. Lost ground to kill the engine.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check wiring from Magnetic Switch to shutdown device, repair or replace.</li> <li>2. Check all wiring and connections and repair.</li> </ol>
Pointer will not operate properly. Inaccurate reading.	<ol style="list-style-type: none"> <li>1. Frozen pointer</li> <li>2. Loose pointer spring (caused by hitting or dropping gage).</li> <li>3. Plugged pressure orifice.</li> </ol>	<ol style="list-style-type: none"> <li>1. Return for repair or replacement.</li> <li>2. Return for repair or replacement.</li> <li>3. Remove and clean.</li> </ol>
Pointer/contact burned-in two.	Without exception this condition is caused by incorrect wiring or short circuit.	Recheck wiring; replace SWICHGAGE® or return for repair.

## 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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# Instructions for Installation and Maintenance

## For all 2 in. (51 mm) and 2-1/2 in. (64 mm) Dial Temperature MURPHYGAGE® and SWICHGAGE®

T-8446N  
Revised 10-00  
Section 10  
(00-02-0168)



Please read the following information before installing. A visual inspection of this product for damage during shipping is recommended before mounting. General information and these installation instructions are intended for all 20T, 25T, A20T, and A25T 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.

### Description

Murphy 2 in. (51 mm) and 2-1/2 in. (64 mm) MURPHYGAGE® and SWICHGAGE® instruments have a remote sensing bulb connected to the gauge head by a sealed capillary system. **DO NOT CUT THIS CAPILLARY OR BEND AT A SHARP ANGLE.** The sensing bulb and capillary are filled with a liquid. When heat is applied to the sensing bulb the liquid turns to vapor which exerts pressure against the diaphragm movement of the gauge. This movement is read on the dial face as temperature.

Models having face adjustable contact(s) are rated for 2 A @ 30 V (pilot duty). If the case is steel (models 20T, 20SD, 25T, etc.), the ground path for the contact circuit is through the case. Therefore, the case must be installed in the ground plane of the electrical power supply.

If the case is polycarbonate (models A20T, A25T), the ground path is isolated and is made through the "C" or "P" terminal on the back of the case.

Models 20TE, A20TE, 25TE and A25TE have a snap-acting switch instead of the face adjusted pointer type contact. Electrical rating is 3 A @ 30 VDC, 4 A @ 125 VAC. Reset differential for the switch is approximately 10% of the scale below the trip point. Trip point is factory set and must be special ordered for field adjustable.

### SWICHGAGE® models with Alarm Before Shut-down

The 20TABS, A20TABS, 25TABS and A25TABS feature a front limit contact for high temperature equipment shut-down and an internal SPDT snap switch for Alarm Before Shut-Down (see Wiring Diagram, page 3). When the high side (preset high temperature point) of the snap switch trips, the N.O. terminal completes a circuit to activate an alarm. A continued increase in temperature will complete the shutdown circuit. A decrease in temperature of approximately 10% of scale is necessary before the snap-switch (alarm) will RESET and open the circuit.

**NOTE:** The front contact shut-down limit setting (adjustable) and snap switch high point are preset at the factory; if settings other than standard are necessary, then specify when ordering.



### Typical TATTLETALE® Magnetic Switch

Murphy manufactures several, patented Magnetic Switches for protection of the light duty SWICHGAGE® contacts and to ensure positive shut-down of equipment. There are Magnetic Switches for Capacitor Discharge ignition, Magneto, or Battery systems, and models for electric motor driven equipment. TATTLETALE® annunciators are indicators that show the cause of shut-down. TATTLETALE® annunciators are used in conjunction with several different SWICHGAGE® instruments. The first one to trip will lockout all other TATTLETALE® annunciators. Be sure the type of Magnetic Switch matches the power source used to trip it.

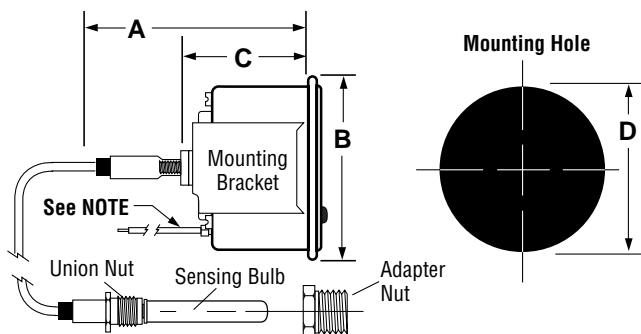
**NOTE:** At equipment start-up, the Magnetic Switch reset button must be held in until normal operation occurs, or an external time delay may be used. See examples of typical wiring and instructions packed with each Magnetic Switch.



**CAUTION:** Certain dangers to human safety and to equipment may occur if some equipment is stopped without pre-warning. It is recommended that monitored functions be limited to alarm-only or to alarm before shutdown.

**IMPORTANT:** SWICHGAGE® instruments, Magnetic Switches and shut-down or alarm devices, properly used, are effective tools in any preventive maintenance program. For optimum performance, check these tools periodically: look for frozen pointers, kinked/worn tubing, broken wiring or loose connections; operate the contacts and watch for expected results. Replace damaged/worn parts; clean/repair as necessary. Check for correct/complete wiring, unbroken insulation and no accidental grounds. **DO NOT run shut-down wires with ignition wiring.** Check all tubing and connections for leaks. Mount Magnetic Switches and valves upright, to prevent moisture collection.

### MOUNTING DIMENSIONS



**NOTE:** 20 and 25 Series have 18 AWG pigtails. A20 series has #4 screws. A25 series has #6 screws.

### For All 20, 25, A20, and A25 Series Temperature MURPHYGAGE® and SWICHGAGE® instruments

	20 Series	A20 Series	25 Series	A25 Series
A	2-7/32 (56)	2-9/64 (54)	2-1/8 (54)	1-51/64 (46)
B	2-15/64 (57)	2-1/4 (57)	3-1/8 (79)	2-29/32 (74)
C	1-5/16 (33)	1-27/64 (36)	1-3/8 (35)	1-27/64 (36)
D	2-1/16 (53)	2-1/16 (53)	2-11/16 (68)	2-11/16 (68)

**NOTE:** The dimensions above are in inches and (millimeters).

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

## INSTALLATION



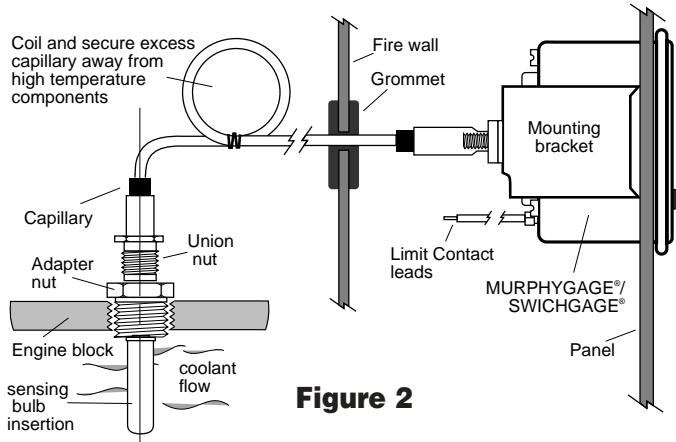
**WARNING: DISCONNECT THE BATTERY OR POWER SOURCE BEFORE BEGINNING THE INSTALLATION. DO NOT OPEN RADIATOR CAP OR FITTINGS ON A HOT ENGINE. DANGEROUS BURNS CAN OCCUR.**

### Panel Mounting

The 20, 25, A20 and A25 series models can be installed in a panel from 0.032 in. (1 mm) to 0.250 in. (6 mm) thick. See Mounting Dimensions, page 1. Remove the mounting bracket completely and insert the MURPHYGAGE®/SWICHGAGE® from the front side of the panel. Replace the bracket and secure it in place. **IMPORTANT: Do NOT overtighten the mounting bracket. Shockmount the panel as necessary.**

### LIQUID COOLED ENGINES:

1. Drain engine coolant to a level below the temperature sensing connection/plug. This connection is on the engine side of the thermostat generally near thermostat housing. *Consult your engine manual.*
2. Remove adapter nut from temperature sensing bulb and union nut.
3. Apply a non-hardening thread sealant to the adapter nut and screw securely into the water jacket opening in the engine.
4. Route the temperature capillary **AWAY** from hot surfaces such as exhaust manifolds.
5. Place the sensing bulb into the adapter nut and observe that the sensing bulb does not "bottom" in the water jacket nor are there other obstructions in the water jacket opening. Secure sensing bulb into the adapter nut with the 5/8-18 union nut. *See Figure 2.*



**Figure 2**



**CAUTION:** Do **NOT** cut or bend the temperature capillary at a sharp angle. Excess capillary must be carefully coiled and secured. The temperature sensing bulb must be immersed directly into the water jacket flow to sense coolant temperature. Do **NOT** install into a tee or other fitting. Use only Murphy adapter nuts.

6. Coil excess temperature capillary into a 2 in. (51 mm) diameter minimum coil. Tie the coil to prevent excessive movement.
7. Allow the engine to warm up and the thermostat to open. Slightly loosen the 5/8-18 union nut on the temperature sensing bulb to allow trapped air to escape from the cooling system. Retighten the nut.



**WARNING:** Perform this operation using appropriate protection. Trapped air and coolant may cause burns.

### AIR COOLED ENGINES:

Temperature for air cooled engine can be measured in the cylinder head or in the lubricating oil. Oil temperature will give a more uniform reading than cylinder head since the oil circulates throughout the engine. Refer to specific instructions supplied, if any, for your specific application.

1. *Oil Temperature*
  - a. The SWICHGAGE® sensing probe must be fully immersed in the oil pan, oil filter housing, oil cooler, etc. depending on engine model and configuration.
  - b. Observe all precautions for liquid cooled engines.
2. *Cylinder Head Temperature*
  - a. Generally the cylinder head must already have a hole drilled and tapped for insertion of the temperature sensing probe.
  - b. If a hole is not provided in the cylinder head and no provision is made to drill and tap one, it may be possible to install an external bolt on heat sink such as the Murphy HS7.
  - c. Coat the temperature sensing probe with a high temperature grease. A mixture of silicone and graphite flakes is recommended although grease alone can be used.



**CAUTION:** Do **NOT** apply too much grease. If grease is pushed out of the hole when temperature probe is inserted, remove some grease.

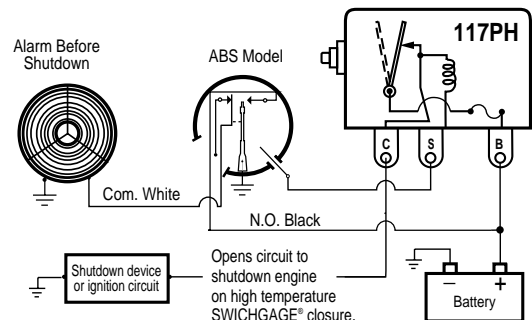
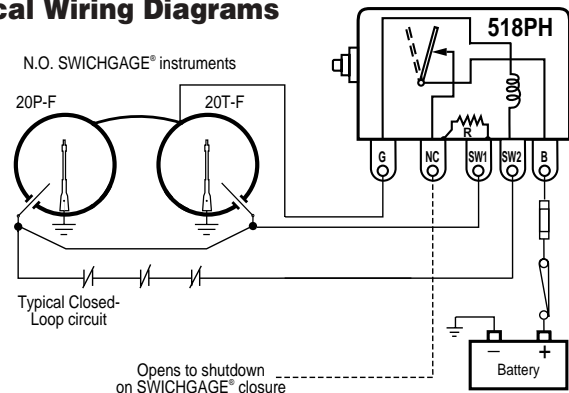
- d. Observe all precautions for liquid cooled engines.

### Connecting the TATTLETALE®/Magnetic Switch

1. Mount with electrical lugs down. If necessary, drill the case and pilot-stud holes (template provided).
2. Clean away burrs and filings. Position the Magnetic Switch in the panel, making sure the pilot stud is in place.
3. Add decal, then washer, then nut and tighten.

**NOTE:** Murphy components are easily wired and maintained. Use good quality wire and terminals. The type of Magnetic Switch differs for various applications. See examples of typical wiring (below). Wiring and instructions are packed with each Magnetic Switch.

### Typical Wiring Diagrams



**IMPORTANT INFORMATION:** Do **NOT** clean MURPHYGAGE®, SWICHGAGE® and Magnetic Switch with steam or high pressure washes. Many solvents and cleaners can haze and permanently damage the clear, polycarbonate. Clean your devices with: mild soap and water, mineral spirits, methyl/isopropyl/isobutyl alcohols, or 1 & 3 denatured alcohols.

**WARNING:** Do not clean the MURPHYGAGE®/SWICHGAGE® - Magnetic Switch when equipment is running or very hot.

## Setting the SWICHGAGE® contacts



**IMPORTANT:** For 20TE, 25TE, A20TE and A25TE models the switch trip point **CANNOT** be set at either the lowest or the highest extremes of the scale. Trip point **MUST** allow for the switch reset differential. For adjustable switch versions, the switch point is adjustable **ONLY** over the upper half of the scale.

1. All contacts are set using a 1/16 in. hex wrench (Figure 3).
2. Some models such as A20TE, A25TE, etc. may not have field adjustment. Consult the factory if in doubt.
3. Observe the "normal operating" temperature readings. Set the contact slightly **above** maximum reading observed or slightly **below** maximum temperature recommended by equipment manufacturer.

## Testing the Contacts

1. With equipment running; use a 1/16 in. hex wrench to rotate contact until it touches the pointer. **Do NOT force contact against the gage pointer.** Equipment should shut down and/or alarm should operate. Reset the contact (Figure 3).
2. **VERY IMPORTANT** Each time you start the machine, observe that the SWICHGAGE® is indicating temperature. Visual inspection and regular testing should be normal procedure to ensure proper operation and to achieve maximum results from your SWICHGAGE®.

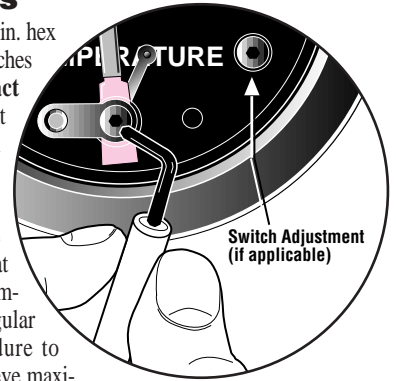


Figure 3

## TYPICAL WIRING DIAGRAMS



**WARNING:** DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING THE WIRING INSTALLATION

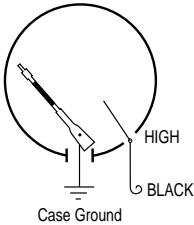
### 20 and 25 Series models

These diagrams are shown with the pointer in the at rest (shelf) position.

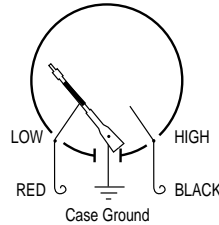
Pointer contact rating: pilot duty 2 A @ 30 VAC/DC.

Snap-switch rating: 3 A @ 30 VDC, 4 A @ 125 VAC.

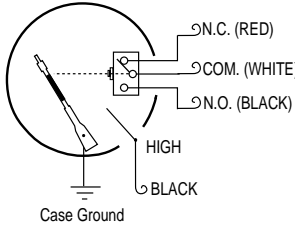
#### 20T and 25T



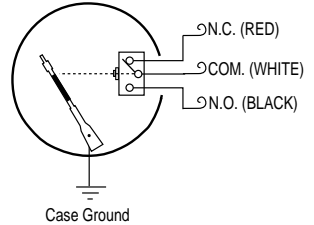
#### 20T-HL and 25T-HL



#### 20TABS and 25TABS



#### 20TE and 25TE



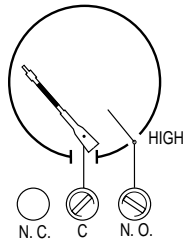
### A20 Series models

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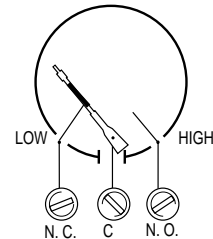
Pointer contact rating: pilot duty 2 A @ 30 VAC/DC.

Snap-switch rating: 3 A @ 30 VDC, 4 A @ 125 VAC.

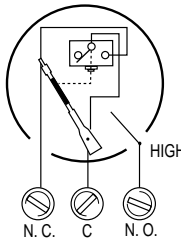
#### A20T



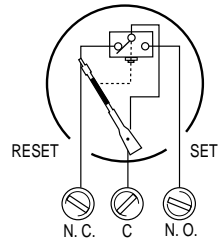
#### A20T-HL



#### A20TABS\*



#### A20TE



\* **CAUTION** Pointer contact and ABS switch share the same "Common". Voltage source **MUST** be the same. Maximum voltage is 30 V. Consult factory for 120 VAC applications.

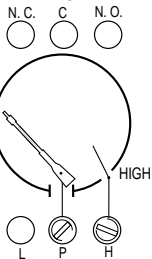
### A25 Series models

These diagrams are shown with the pointer in the at rest (shelf) position.

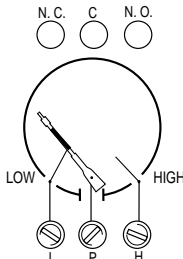
Pointer contact rating: pilot duty 2 A @ 30 VAC/DC.

Snap-switch rating: 3 A @ 30 VDC, 4 A @ 125 VAC.

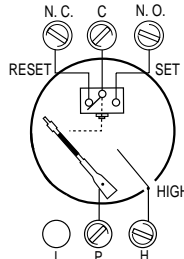
#### A25T



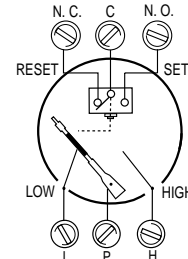
#### A25T-HL



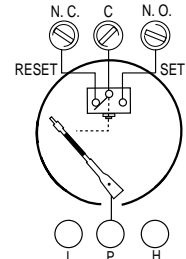
#### A25TABS



#### A25TABS-HL



#### A25TE



## TROUBLESHOOTING TIPS

### DO THIS FIRST:

- Verify that the SWICHGAGE® has not been damaged (hit or dropped).
- Check for kinked or broken/worn capillary tubing.
- Verify that the sensing bulb is immersed in coolant flow.
- Look for broken wiring, frozen pointer, dirty contacts (will not make).
- Verify that there is coolant or water flowing inside the engine.
- Reset Magnetic Switch and verify that it stays latched.

The following information will assist in the correction of most problems which you may encounter with the unit. If any problems persist after you have made these checks, consult your nearest Murphy facility.

SYMPTOM	CAUSE	TEST/REMEDY
Engine will not start.	<ol style="list-style-type: none"> <li>1. Short or Open circuit, be sure that the Magnetic Switch latches and either puts out power to run device or removes ground (magneto or CD ignition). Check for power or ground at run device.</li> <li>2. Control circuit overloaded by accessories (blown fuse in Magnetic Switch).</li> <li>3. False ground in control circuit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reset Magnetic Switch and make sure it stays latched. For 518PH check battery voltage and place a jumper between SW1 and SW2. If switch latches, check SWICHGAGE® wiring circuit and repair. If switch does not latch, repair or replace Magnetic Switch.</li> <li>2. Find the cause of the blown fuse and replace it (use a 14 A fuse). Reroute the accessories.</li> <li>3. Repair.</li> </ol>
False shutdown.	<ol style="list-style-type: none"> <li>1. SWICHGAGE® circuit has intermittent open or short.</li> <li>2. Vibration causes the Magnetic Switch to trip.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check all wiring and replace as necessary.</li> <li>2. Repair and relocate the switch as needed.</li> </ol>
SWICHGAGE® closes but does not trip the magnetic switch or kill the engine.	<ol style="list-style-type: none"> <li>1. Incomplete shutdown circuit.</li> <li>2. Dirty SWICHGAGE® contacts.</li> <li>3. Magneto not providing power to primary terminal post.</li> <li>4. SWICHGAGE® case may not be grounded.</li> <li>5. Incorrect Magnetic Switch for type of power.</li> </ol>	<ol style="list-style-type: none"> <li>1. Locate open circuit and repair.</li> <li>2. Clean and check that contacts make.</li> <li>3. Repair magneto.</li> <li>4. Ground case.</li> <li>5. Replace with correct Magnetic Switch.</li> </ol>
TATTLETALE® tripped but engine is still running (magneto or CD ignition)	<ol style="list-style-type: none"> <li>1. Open circuit between the TATTLETALE® and the shutdown device.</li> <li>2. Lost ground to kill the engine.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check wiring from TATTLETALE® to shutdown device, repair or replace.</li> <li>2. Check all wiring and connections and repair.</li> </ol>
Pointer will not operate properly. Inaccurate reading.	<ol style="list-style-type: none"> <li>1. Frozen pointer</li> <li>2. Loose pointer spring (caused by hitting or dropping gauge).</li> <li>3. Bulb not inserted to full length or low coolant level.</li> <li>4. Kinked/crimped/broken capillary.</li> </ol>	<ol style="list-style-type: none"> <li>1. Return for repair or replace.</li> <li>2. Return for repair or replace.</li> <li>3. Correct.</li> <li>4. Correct</li> </ol>
Pointer or contact burned-in-two.	<ol style="list-style-type: none"> <li>1. Without exception this condition is caused by incorrect wiring or a short circuit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to wiring diagram and recheck wiring; replace SWICHGAGE® or return for repair. Observe voltage and current ratings.</li> </ol>

### 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.



# A20 and A25 Series Pressure SWICHGAGE®



## 2 and 2-1/2 in. (51 and 64 mm) Dial

- Corrosion Resistant Polycarbonate Case
- Indicating Gage and Limit Switch
- Switch Can Activate Alarms and/or Shut Down Equipment
- Critical Pressure Limit Switch Is Visible and Adjustable (Most Models)
- Contact(s) Isolated From Ground

## Description

The A20 Series (2 inch/51 mm dial) and the A25 Series (2-1/2 inch/64 mm dial) SWICHGAGE® models are diaphragm-actuated, pressure-indicating gages, with built-in electrical switches for tripping alarms and/or shutdown devices.

Ranges are available from 0-15 psi (103 kPa) [1.0 bar] thru 0-400 psi (2.8 MPa) [28 bar].

All models of these rugged, built-to-last instruments are face sealed from the environment by the unique combination of a polycarbonate case and lens, a polished stainless steel bezel and O-ring seals. Ranges above 30 psi (207 kPa) [2 bar] are totally sealed from the external environment (except PE Series).

Accuracy and protection from moderate overpressure is assured by a unique, unitized diaphragm chamber. A built-in pulsation dampener helps eliminate pointer flutter and is removable for cleaning.

For series A20P and A25P, the gage pointer acts as a pressure indicator and as one switch pole which completes a circuit when it touches the adjustable limit contact. Contacts have self-cleaning motion to ensure electrical continuity.

Models A20PE and A25PE have internal snap-acting SPDT switches for three wire control; can be wired to make or to break a circuit.

Gage-only models, without switches (MURPHY-GAGE®) are also available.

## Applications

A20/A25 Series applications include: engines/equipment in Oil Field, Marine, Irrigation, Construction and Trucking Engines for Lube Oil Pressure, Water Pump Pressure, Hydraulic Pressure, Air Pressure, etc.

## Specifications

**Dial:** White on black, dual scale; U.S.A. standard scale is psi/kPa; U.K. standard scale is psi/bar (see How to Order).

**Case:** Polycarbonate/glass filled, corrosion-resistant; steel mounting clamp included.

**Bezel:** Polished stainless steel, standard; others are available (see How to Order).

**Pointer:** Tempered nickel silver; Red tip.

**Lens:** Polycarbonate, high-impact.

**Oil:** Silicon Oil.

**Temperature Range:**

Ambient: -40°F (-40°C) thru 150°F (66°C).

Process: -40°F (-40°C) thru 250°F (121°C).

**Process Connection:** 1/8-27 NPTM brass.

**Sensing Element:** Beryllium copper diaphragm.

**Gage Accuracy (% of Full Scale):**

RANGE	LOWER 1/4	MIDDLE 1/2	UPPER 1/4
≤300 psi (20 Bar)	±3%	±2%	±3%
400 psi (28 Bar)	±3%	±3%	±5%

**Maximum Pressure:** See Pressure Ranges and Factory Settings table on page 2.

**Adjustable Limit Contact (A20P and A25P):**

SPST contact; pilot-duty only, 2 A @ 30 VAC/DC;

Closed when the low limit is met. Open when pointer is in normal operating range.

Contacts are gold flashed silver.

Limit Contact Adjustment: by a 1/16 in. hex wrench thru 100% of the scale.

Wiring: A20P: Number 4 screw terminals;

A25P: Number 6 screw terminals.

**Snap-Switch Rating (A20PE and A25PE):**

SPDT, 3 A @ 30 VDC inductive; 4 A @ 125 VAC inductive.

Wiring: A20PE: Number 4 screw terminals;  
A25PE: Number 6 screw terminals.

**Unit Weight:** A20 Series: 8 oz. (0.23 kg).

A25 Series Models: 11 oz. (0.31 kg).

**Unit Dimensions:** A20 Series: 3 x 3 x 3 in. (76 x 76 x 76 mm). A25 Series Models: 4-3/4 x 4-3/4 x 2-3/4 in. (121 x 121 x 70 mm).

## Base Models

**A20P and A25P Series SWICHGAGE®**

The gage pointer makes with an adjustable contact to complete a pilot-duty circuit.

**A20PE and A25PE SWICHGAGE®**

A20PE (was A20EO) and A25PE (was A25PEO).

Features internal snap-acting SPDT switches, instead of the single pole/pointer contacts. When the switch closes on falling pressure, it becomes Set, as pressure rises the switch Resets (refer to wiring diagram on page 3).

Model A25PE is CSA listed for

non-hazardous areas.

Model A25PE-EX is CSA listed for Class I, Division 1, Groups C and D hazardous areas.

**A20PABS and A25PABS SWICHGAGE®**

Sames as A20P and A25P with internal SPDT snap-switch for pre-alarm.

**A20PG and A25PG MURPHYGAGE®**

Gage without contact(s).

## Warranty

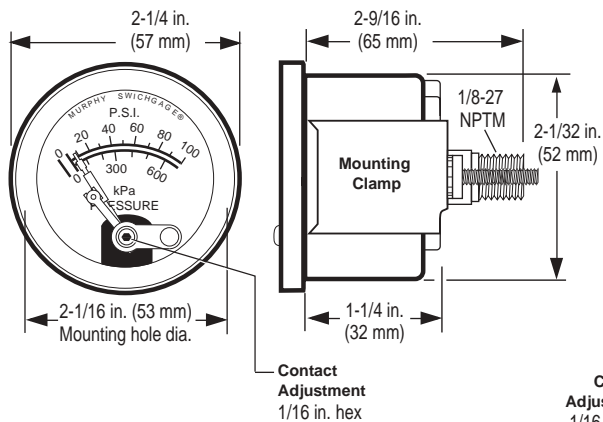
A two-year limited warranty on materials and workmanship is given with this Murphy product. Details are available on request and are packed with each unit.

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

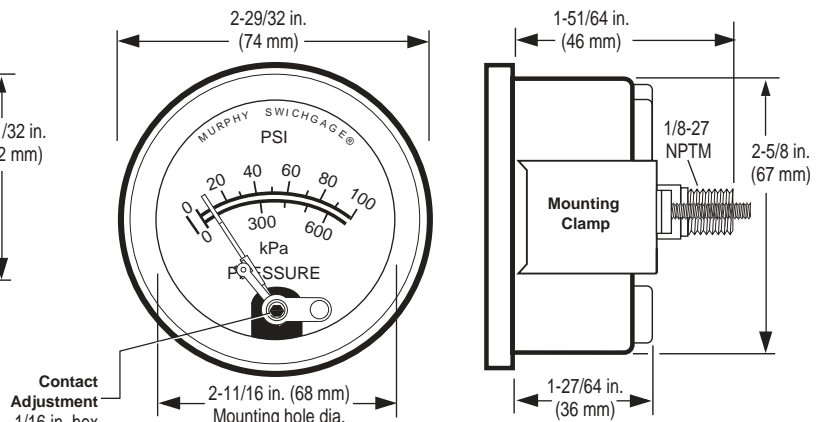


## Dimensions

### A20 Series Models



### A25 Series Models



## Pressure Ranges and Factory Settings

### NOTES

- Values in ( ) are mathematical conversions from psi to kPa/MPa—they do not reflect actual second scale range. U.S.A. standard scale is psi/kPa; U.K. standard scale is psi/bar—exact set-point shown. Consult factory for other scales.
- For models A20PE and A25PE; the switch trip point cannot be set at either the low or high extreme of the scale. The trip point must allow for the reset differential.
- For adjustable switch models, the trip point is adjustable **only** over the lower half of the scale.

Ranges Available			Maximum Pressure	Standard Settings			High Settings*			A20PABS and A25PABS Settings					
psi	(kPa)	[bar]		psi	(kPa)	[bar]	psi	(kPa)	[bar]	Low			Alarm†		
0-15	(103)	[1.0]	30 psi (207)	3	(21)	[0.2]	12	(83)	[0.8]	3	(21)	[0.2]	6	(41)	[0.3]
0-30	(207)	[2.0]	60 psi (413)	7	(48)	[0.4]	24	(165)	[1.6]	7	(48)	[0.4]	10	(69)	[0.6]
0-50	(345)	[3.5]	100 psi (690)	10	(69)	[0.8]	40	(276)	[2.8]	10	(69)	[0.8]	13	(90)	[1.0]
0-75	(517)	[5.0]	150 psi (1.0MPa)	15	(103)	[1.0]	60	(414)	[4.0]	15	(103)	[1.0]	18	(124)	[1.5]
0-100	(690)	[7.0]	200 psi (1.4MPa)	20	(138)	[1.5]	80	(552)	[5.5]	20	(138)	[1.0]	23	(159)	[1.5]
0-150	(1.0MPa)	[10]	300 psi (2.1 MPa)	30	(207)	[2.0]	120	(827)	[8.0]	30	(207)	[1.5]	33	(228)	[2.0]
0-200	(1.4 MPa)	[14]	400 psi (2.8 MPa)	50	(345)	[3.0]	150	(1 MPa)	[10]	50	(345)	[3.0]	53	(365)	[4.0]
0-300	(2.1 MPa)	[20]	500 psi (3.4 MPa)	75	(517)	[5.0]	225	(1.6MPa)	[15]	75	(517)	[5.0]	78	(538)	[5.0]
0-400	(2.8 MPa)	[28]	500 psi (3.4 MPa)	150	(1.0 MPa)	[7.0]	300	(2.1MPa)	[20]	75	(517)	[5.0]	150	(1MPa)	[10]

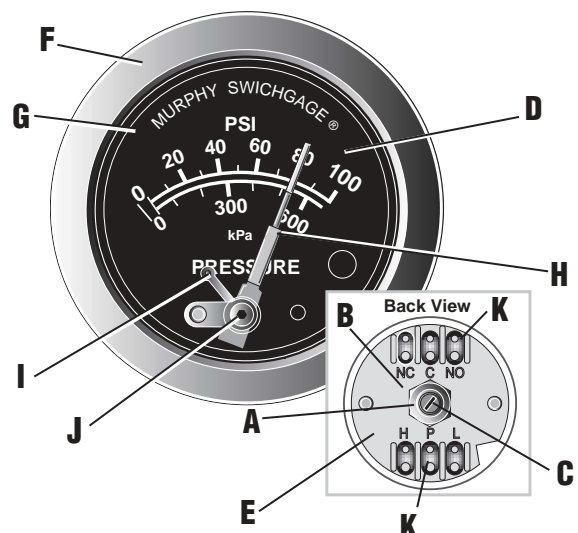
\*\*Low settings for Hi/Lo option same as standard settings. Hi/Lo option available for A20P and A25P models only.

†SPDT Snap-switch is the alarm switch.

## Features

- Process Connection and Port:** Machined from brass bar stock. Together with the diaphragm forms the diaphragm chamber.
- Diaphragm (not shown):** Beryllium copper die formed and heat treated to very close physical and metallurgical specifications.
- Pulsation Dampener:** Designed to minimize undesirable pointer chatter. It is removable for cleaning.
- Dial:** White letters on a black background, dual scale; others available on request—see How to Order.
- Case:** Polycarbonate/glass filled, corrosion resistant; mounting clamp included.
- Bezel:** Polished stainless steel standard, black bezel also available.
- Lens:** Made of high-impact resistant treated polycarbonate.
- Pointer:** Tempered nickel silver for continuity and corrosion resistance—mounted on a machined brass post. Red tip.
- Limit Contact:** SPST contact; N.C. when low limit is met. N.O. when pointer operates above limit.
- Limit Contact Adjustment:** by 1/16 in. hex type wrench thru 100% of the scale. Easy adjustment knob available.
- Electrical Connections:** Number 4 screw terminals for A20 Series; and number 6 screw terminals for A25 Series models.

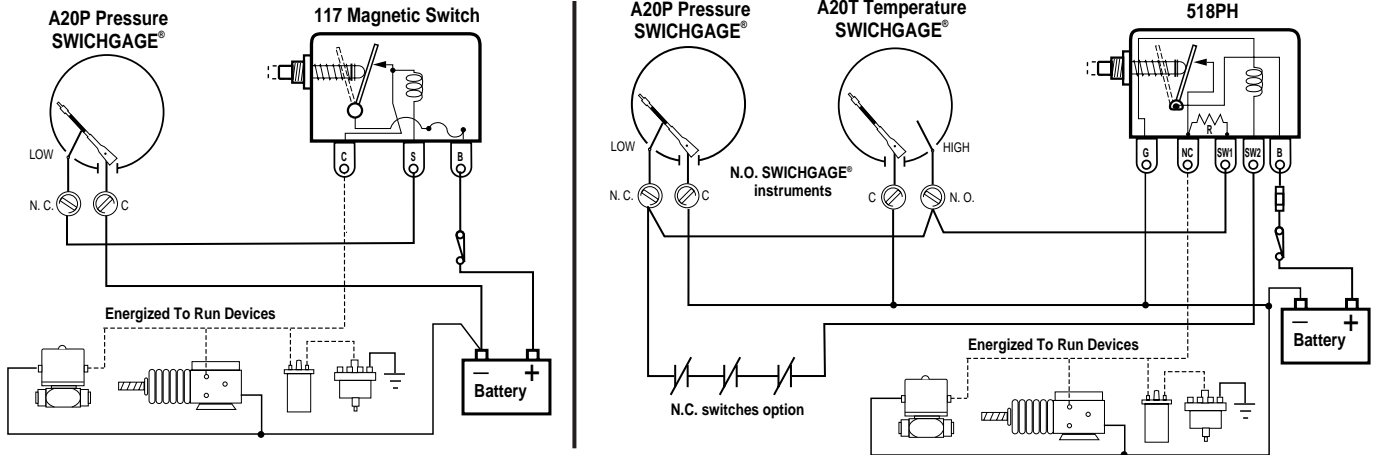
Typical For All Series (A25P Series Shown)



## Magnetic Switch

**INDUCTIVE AND HIGH CURRENT LOADS REQUIRE THE USE OF A MAGNETIC SWITCH.** The SWICHGAGE® contacts are for light-duty electrical switching to operate alarms or control devices. Murphy manufactures the Magnetic Switch for protection of the pilot-duty SWICHGAGE® limit contacts.

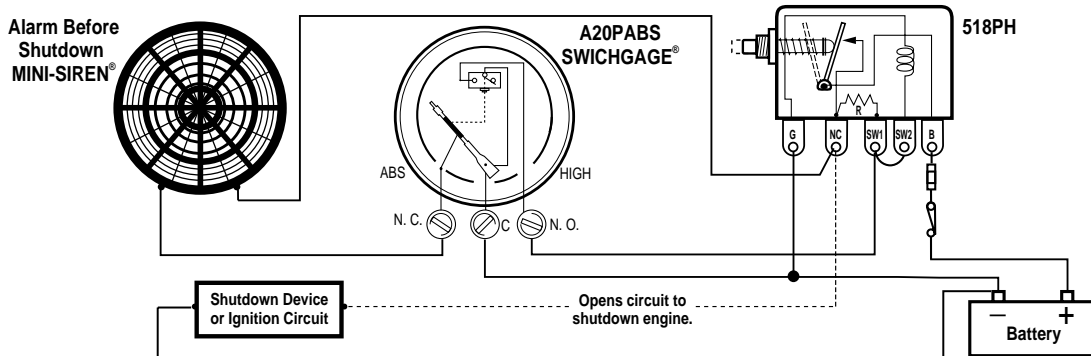
TATTLETALE® Magnetic Switches show the cause of shutdown for applications that include: capacitor discharge or magneto ignitions, battery systems and electric motor driven equipment. Typical wiring diagrams are shown below.



## Pre-Alarm Using A20/A25PABS

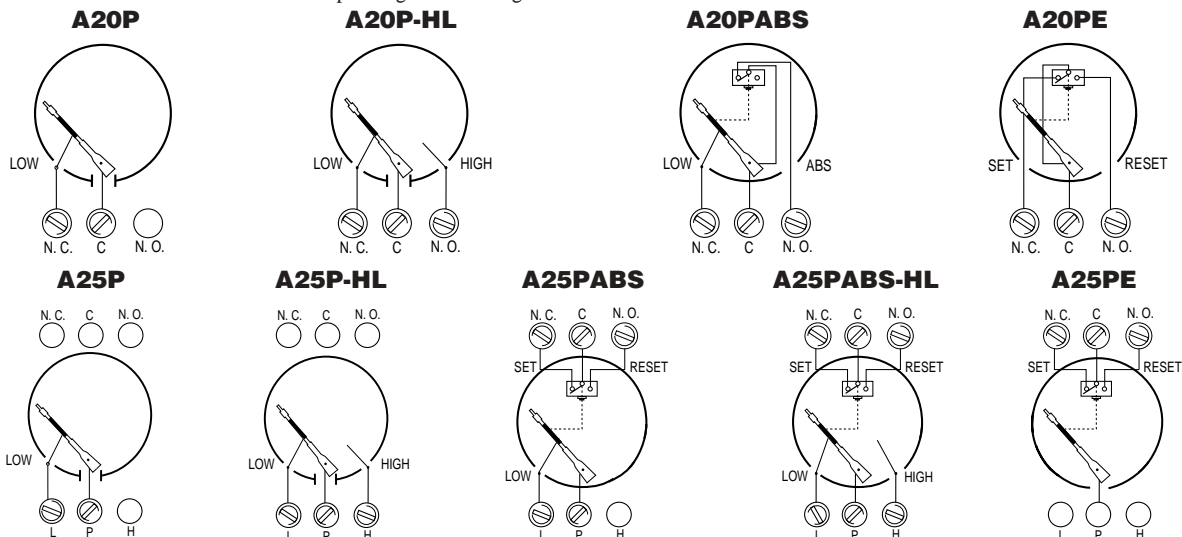
The A20PABS and A25PABS features a standard limit contact for equipment shutdown on low pressure. It also has an internal SPDT snap-switch to signal an alarm before shutting down. When the snap-switch trips (preset point), on falling pressure, the switch completes a circuit to activate an alarm. If the pressure continues to fall, the face-adjustable pointer contact will make and the shutdown circuit

will be completed (see the typical diagram below for reference). The front contact shutdown limit setting (which is adjustable) and the snap-switch are pre-set at the factory. Refer to "Pressure Ranges and Factory Settings" table on opposite page for settings. For alternative alarm before shutdown, see Magnetic Switch model 760A or 761APH.



## Typical Internal Wiring Diagrams

Pointer shown in the shelf position. Pointer type contact rating: pilot-duty 2 A @ 30 VAC/VDC resistive. Snap-acting switch rating: 3 A @ 30 VDC inductive, 4 A @ 125 VAC inductive.



## How to Order

To order, use the diagram below. List options in ascending alphabetical order (A-Z). Example: **A20P-K-100**.

Base Model		Range <sup>††</sup>	
A20P	A25P	<b>Dual scale (psi/kPa)</b>	<b>Single scale (bar)</b>
A20PE	A25PE	<i>psi</i> <i>kPa/MPa</i>	<b>1B</b> = 0-1 bar
A20PABS	A25PABS	<b>15</b> = 0-15    0-103	<b>2B</b> = 0-2 bar
A20PG	A25PG	<b>30</b> = 0-30    0-207	<b>3.5B</b> = 0-3.5 bar
		<b>50</b> = 0-50    0-345	<b>5B</b> = 0-5 bar
		<b>75</b> = 0-75    0-517	<b>7B</b> = 0-7 bar
		<b>100</b> = 0-100    0-689	<b>10B</b> = 0-10 bar
		<b>150</b> = 0-150    0-1.03	<b>14B</b> = 0-14 bar
		<b>200</b> = 0-200    0-1.38	<b>20B</b> = 0-20 bar
		<b>300</b> = 0-300    0-2.07	<b>28B</b> = 0-28 bar
		<b>400</b> = 0-400    0-2.76	

Options <sup>†</sup>
<b>B1</b> = Black bezel
<b>EX</b> = Explosion-proof (CSA Listed for Class I, Div. 1, Groups C & D)*
<b>EL</b> = Explosion-proof less case
<b>HL</b> = High and low contacts
<b>K</b> = Knob adjusting face contact
<b>OS</b> = Oil sealed (Silicone Oil)

† Options not available on all models or configurations.  
 \*A25PE-EX only is CSA listed for hazardous locations.

††Consult factory for availability of dials other than psi/kPa. Select scale so your normal operating pressure is in the middle half of the scale.

### Illumination – Order Separately

**A20 Series:** Clamp Lite Assembly; 12 V= 05702176; 24 V= 05702177

**A25 Series:** N/A.



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# A20 and A25 Series Temperature SWICHGAGE®



## 2 and 2-1/2 in. (51 and 64 mm) Dial

- Corrosion Resistant Polycarbonate Case
- Indicating Gage and Limit Switch
- Switch Can Activate Alarms and/or Shut Down Equipment
- Critical/High Temperature Limit Switch Is Visible and Adjustable (Most Models)
- Contact(s) Isolated From Ground

### Description

The A20 Series (2 inch/51 mm dial) and the A25 Series (2-1/2 inch/64 mm dial) SWICHGAGE® models are diaphragm-actuated, temperature-indicating gages, with built-in electrical switches for tripping alarms and/or shutdown devices.

Ranges are available from 32-120°F (0-45°C) thru 300-440°F (160-220°C).

All models of these rugged, built-to-last instruments are fully sealed from the environment by the unique combination of a polycarbonate case and lens, a polished stainless steel bezel, and O-ring seals.

These vapor/pressure actuated gages feature a sealed capillary tube and a sensing bulb. When subjected to heat, the liquid in the sensing bulb changes to vapor creating pressure against a diaphragm mechanism. The diaphragm translates this vapor pressure into a mechanical gage reading.

For series A20T and A25T, the gage pointer acts as a temperature indicator and as one switch pole which completes a circuit when it touches the adjustable limit contact. Contact(s) are isolated from ground. They have self-cleaning motion to enhance electrical continuity.

Models A20TE and A25TE have internal snap-acting SPDT switches.

Gage-only models, without contacts (MURPHYGAGE®) are also available.

### Applications

Applications for A20 and A25 Series temperature SWICHGAGE® instruments include: engines and equipment in Oil Field, Marine, Irrigation, Construction and Trucking industries. Monitoring Engine Coolant temperature, Crankcase Oil, Transmission Oil.

### Specifications

**Dial:** White on black; U.S.A. standard scale is dual scale °F/°C; others available.

**Case:** Glass filled/Polycarbonate, corrosion-resistant; steel mounting clamp included.

**Bezel:** Polished stainless steel, standard; others are available.

**Pointer:** Tempered nickel silver; red tip.

**Lens:** Polycarbonate, high-impact.

**Sensing Element:** Beryllium copper diaphragm.

**Capillary:** PVC armored copper; 4 ft. (1.2 m)\*  
Galvanized and stainless steel armor optional.

**Sensing Bulb:** Copper\*.

**Gage Accuracy:** See accuracy chart, on page 2.

**Maximum Temperature:** See Temperature Ranges and Factory Settings table on page 2.

**Adjustable Limit Contact (A20T and A25T):**  
SPST contact; pilot-duty only, 2 A @ 30 VAC/VDC; isolated from case ground. Normally Closed when the high limit is met. Normally Open when pointer is in normal operating range. Contacts are gold flashed silver.

Limit Contact Adjustment: by a 1/16 in. hex wrench thru 100% of the scale.

Wiring: A20T: Number 4 screw terminals;  
A25T: Number 6 screw terminals.

**Snap-Switch Rating (A20TE and A25TE):**  
SPDT, 3 A @ 30 VDC inductive; 4 A @ 125 VAC inductive.

Wiring: A20TE: Number 4 screw terminals;  
A25TE: Number 6 screw terminals.

**Unit Weight:** A20 Series: 11.9 oz. (0.370 kg).  
A25 Series Models: 13.3 oz. (0.413 kg).

**Unit Dimensions:** A20 Series: 4-3/4 x 4-3/4 x 3 in. (121 x 121 x 76 mm). A25 Series Models: 4-3/4 x 4-3/4 x 2-3/4 in. (121 x 121 x 70 mm).

### Base Models

#### Coolant or Oil Temperature

##### A20T and A25T Series SWICHGAGE®

For these models the gage pointer makes with an adjustable contact to complete a pilot-duty circuit.

#### A20TL and A25TL SWICHGAGE®

For use on Ford Worldwide engines. Supplied with special sensing bulb.

#### A20TE and A25TE SWICHGAGE®

A20TE (was A20ESR) and A25TE (was A25ESR). Models with internal SPDT snap-switches, instead of the single pole/pointer contact(s). When the switch closes on rising temperature, it becomes Set. As temperature decreases the switch Resets.

Model A25TE is CSA listed for non-hazardous areas. Model A25TE-EX is CSA listed for Class I, Division 1, Groups C & D hazardous areas.



#### A20TABS and A25TABS SWICHGAGE®

Same as 20 and 25T with internal SPDT snap-switch for pre-alarm.

### Cylinder Head Temperature

#### A20TH and A25TH SWICHGAGE®

A20TH (was A20TL8133) and A25TH (was A25TL8133). For use on Air Cooled engines.

### Gage-Only Models

#### A20TG and A25TG MURPHYGAGE®

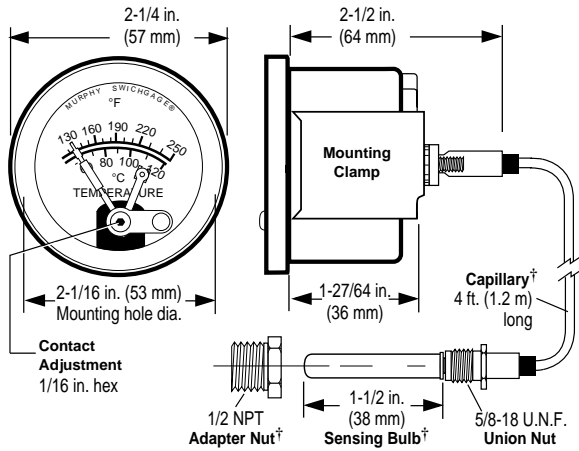
Gage without contact(s).

\* For optional capillary lengths, engine adapters, sensing bulbs and range combinations, see Murphy bulletin T-8428B.

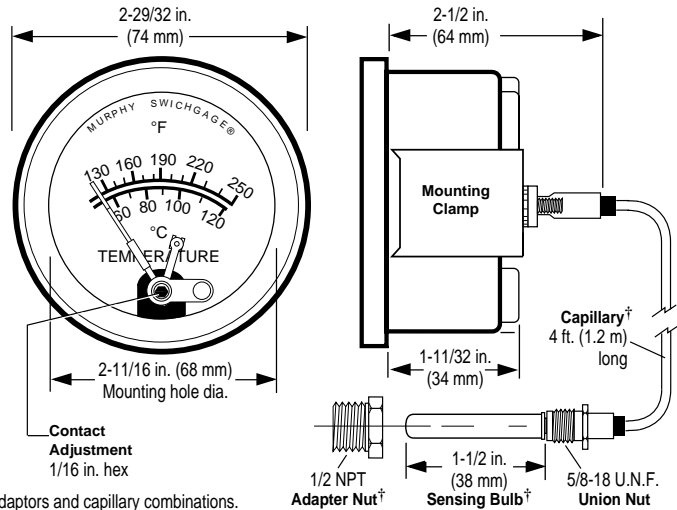
\*\* Products covered by this bulletin comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility except as noted.

## Dimensions

### A20 Series Models (typical)



### A25 Series Models (typical)



†Standard combinations. See Murphy bulletin T-8428B for optional sensing bulb, engine adaptors and capillary combinations.

## Temperature Ranges and Factory Settings

### NOTES

- Values in ( ) are mathematical conversions from °F to °C—they do not reflect actual second scale range. U.S.A. standard scale is °F/°C.
- For models A20TE and A25TE; the switch trip point cannot be set at either the low or high extreme of the scale. The trip point must allow for the reset differential.
- For adjustable switch models, the trip point is adjustable **only** over the upper half of the scale.

Ranges Available		Max. Temp.	Std. Settings*		Hi/Lo Settings		20TABS and 25TABS Settings			
Dual Scale Dial °Fahrenheit (°Celsius)	Single Scale °Celsius only		°F (°C)	°C only	Low °F (°C)	High °F (°C)	Alarm**		Shutdown	
°Fahrenheit (°Celsius)	°Celsius only	°F (°C)	°F (°C)	°C only	°F (°C)	°F (°C)	°F (°C)	°C only	°F (°C)	°C only
32 – 120 (0 – 49)	—	185 (85)	110 (43)	—	32 (0)	110 (43)	100 (38)	—	110 (43)	—
32 – 160 (0 – 71)	0 – 70	215 (102)	150 (66)	66	32 (0)	150 (66)	140 (60)	60	150 (66)	66
130 – 220 (54 – 104)	45 – 100	260 (127)	210 (99)	85	160 (71)	210 (99)	200 (93)	80	210 (99)	85
130 – 250 (54 – 121)	50 – 120	310 (154)	210 (99)	97	160 (71)	210 (99)	200 (93)	95	210 (99)	100
140 – 300 (60 – 149)	60 – 140	340 (173)	275 (135)	130	200 (93)	275 (135)	265 (129)	125	275 (135)	130
160 – 320 (71 – 160)	70 – 160	370 (192)	300 (149)	150	200 (93)	300 (149)	290 (143)	145	300 (149)	150
180 – 350 (82 – 177)	—	400 (209)	330 (166)	—	240 (116)	330 (166)	320 (160)	—	330 (166)	—
300 – 440 (149 – 227)	—	500 (260)	400 (204)	—	300 (149)	400 (204)	390 (199)	—	400 (204)	—

\* Standard setting for A20T, A25T, A20TE and A25TE models.

\*\* SPDT snap-switch is the alarm switch.

## Temperature Accuracy Chart

Temperature Range	Lower 1/3 of Scale	Middle 1/3 of Scale	Upper 1/3 of Scale
32 to 120°F (0 to 49°C)	± 12°F (± 6°C)	± 5°F (± 2.4°C)	± 6°F (± 3°C)
32 to 160°F (0 to 71°C)	± 20°F (± 10°C)	± 8°F (± 4.4°C)	± 7°F (± 4°C)
130 to 220°F (54 to 104°C)	± 6°F (± 3°C)	± 3°F (± 1.6°C)	± 4°F (± 2°C)
130 to 250°F (54 to 121°C)	± 9°F (± 5°C)	± 5°F (± 2.4°C)	± 4°F (± 2°C)
140 to 300°F (60 to 149°C)	± 10°F (± 5.2°C)	± 6°F (± 3°C)	± 5°F (± 2.4°C)
160 to 320°F (71 to 160°C)	± 10°F (± 5.2°C)	± 5°F (± 2.4°C)	± 5°F (± 2.4°C)
180 to 350°F (82 to 177°C)	± 12°F (± 6°C)	± 5°F (± 2.4°C)	± 5°F (± 2.4°C)
300 to 440°F (149 to 227°C)	± 9°F (± 5°C)	± 5°F (± 2.4°C)	± 4°F (± 2°C)

## Maximum Temperature

MAXIMUM AMBIENT TEMPERATURE: -40° (-40°) thru 150° (66°)

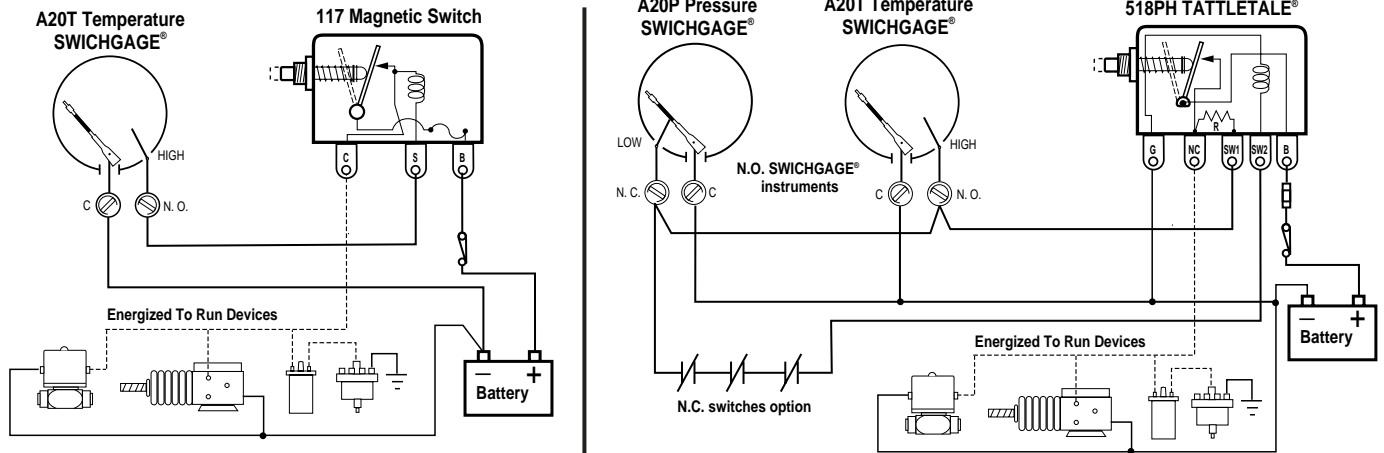
RANGE	MAXIMUM PROCESS TEMPERATURE
≤250° (120°)	120% OF FULL SCALE
300° (140°)	350° (198°)
≥320° (160°)	120% OF FULL SCALE



## Magnetic Switch

**INDUCTIVE AND HIGH CURRENT LOADS REQUIRE THE USE OF A MAGNETIC SWITCH.** The SWICHGAGE® contacts are for light-duty electrical switching to operate alarms or control devices. Murphy manufactures the Magnetic Switch for protection of the pilot-duty SWICHGAGE® limit contacts.

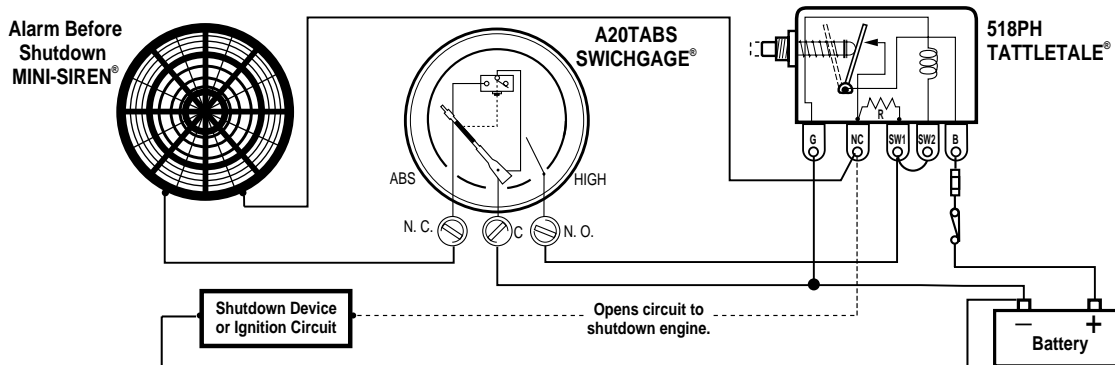
TATTLETALE® Magnetic Switches show the cause of shutdown for applications that include: capacitor discharge or magneto ignitions, battery systems and electric motor driven equipment. Typical wiring diagrams are shown below.



## Pre-Alarm Using A20/A25TABS

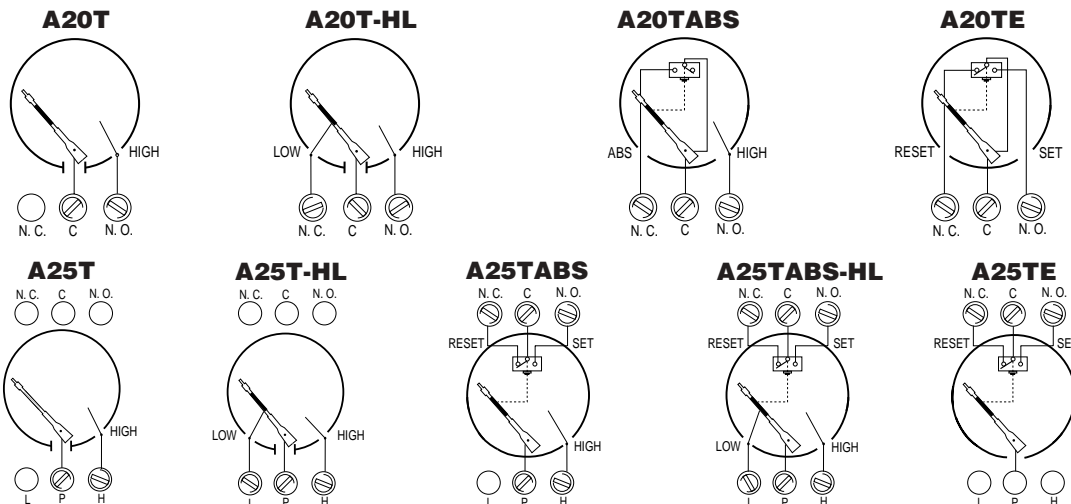
The A20TABS and A25TABS features a standard limit contact for equipment shutdown on high temperature. It also has an internal SPDT snap-switch to signal an alarm before shutting down. When the snap-switch trips (preset point), on rising temperature, the switch completes a circuit to activate an alarm. If the temperature continues to increase, the face-adjustable pointer contact will make and

the shutdown circuit will be completed (see the typical diagram below for reference). The front contact shutdown limit setting (which is adjustable) and the snap-switch are preset at the factory. Refer to "Temperature Ranges and Factory Settings" table on opposite page for settings. For alternative alarm before shutdown, see Magnetic Switch model 760A or 761APH.



## Typical Internal Wiring Diagrams

Pointer shown in the shelf position. Pointer type contact rating: pilot-duty 2 A @ 30 VAC/VDC resistive. Snap-acting switch rating: 3 A @ 30 VDC inductive. 4 A @ 125 VAC inductive.



## How to Order

To order, use the diagram below. List options in ascending alphabetical order (A-Z). Example: **A20T-B1-250-4**.

### Base Model

A20T	A20TG
A20TL	A25T
A20TO	A25TL
A20TE	A25TE
A20TABS	A25TABS
A20TB	A25TH
A20TH	A25TG

### Options<sup>†</sup>

**B1** = Black bezel  
**EX** = Explosion-proof (CSA Listed for Class I, Div. 1, Groups C & D) \*  
**EL** = Explosion-proof less case  
**HL** = High and low contacts  
**K** = Knob adjusting face contact  
**OS** = Oil sealed (Silicone Oil)  
**UA** = Temperature bulb style "A" (10-05-0166)  
**UB** = Temperature bulb style "B" (10-01-0061)  
**UC** = Temperature bulb style "C" (10-01-0060)  
**UD** = Temperature bulb style "D" (10-00-0286)  
**UE** = Temperature bulb style "E" (10-01-0084)  
**UF** = Temperature bulb style "F" (10-00-0577)  
**UG** = Temperature bulb style "G" (10-00-0578)  
**UH** = Temperature bulb style "H" (10-00-2466)  
**UJ** = Temperature bulb style J (10051153)  
**UK** = Temperature bulb style K (10054886)

<sup>†</sup>Options not available on all models or configurations.

\*A25TE-EX only is CSA listed for hazardous locations.

\*\*This option is not covered by the CE mark.

### Temperature Capillary Armor Type and Length

#### Capillary Armor Type

**Blank** = PVC armor, copper capillary

**S** = Stainless steel armor, copper capillary

#### Capillary Length (specify after capillary type; example: "S4")

**4** = 4 ft. (1.2 m)

**Specify other length** = Available in 2 ft. increments thru 20 ft.; 5 ft. increments above 20 ft. (0.5 m. increments from 1.5–10 m.; 2 m. increments thru 34 m. **Specify "M" following length, i.e. 1.5M.**)

### Range<sup>††</sup>

#### Dual scale (°F/°C)

	°F	°C
<b>120</b>	= 32-120	0-49
<b>160</b>	= 32-160	0-71
<b>220</b>	= 130-220	54-104
<b>250</b>	= 130-250	60-121
<b>300</b>	= 140-300	60-149
<b>320</b>	= 160-320	71-160
<b>350</b>	= 180-350	82-177
<b>440</b>	= 300-440	149-227

#### Single scale (°C)

<b>70C</b>	= 0-70°C
<b>100C</b>	= 45-100°C
<b>120C</b>	= 50-120°C
<b>140C</b>	= 60-140°C
<b>160C</b>	= 70-160°C

<sup>††</sup>Consult factory for availability of dials other than °F/°C. Select scale so your normal operating temperature is in the upper half of the scale.

### Illumination – Order Separately

**A20 Series:** Clamp Lite Assembly; 12 V= 05702176; 24 V= 05702177

**A25 Series:** N/A.



### 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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# Differential Pressure for Filter Restriction

**20DP, 25DP, A20DP and A25DP Series**
**2 and 2-1/2 in. (51 and 64 mm) Dial**


20DP-50

- Monitors Engine Oil and Fuel Filters
- Actuates Alarm or Shutdown System When Filter Becomes Clogged
- Combination Indicating Gage and Limit Switch
- Actuates Filter Backwash
- Signals Coolant Loss or Aeration On Engine Water Pump

## Description

The 20DP and A20DP Series (2 inch/51 mm dial) and the 25DP and A25DP Series (2-1/2 inch/64 mm dial) SWICHGAGE® models are diaphragm-actuated, differential pressure-indicating gages, with a built-in electrical switch. This switch is used for tripping alarms and/or shutting down equipment. These gages are intended to monitor and indicate oil, fuel or water filter restriction and can reduce the risk of dangerously high pressure which may rupture the filter, resulting in contaminants entering the system.

The 20DP and 25DP series mechanism is enclosed in a steel case coated to resist corrosion. The A20DP and A25DP series have a polycarbonate case and are sealed from the environment. All feature a polycarbonate, break-resistant lens and a polished, stainless steel bezel to help protect these rugged, built-to-last instruments.

The gage pointer acts as a pressure indicator and as one switch pole which completes a circuit when it touches the adjustable limit contact. Contacts have self-cleaning motion to ensure electrical continuity.

## Features

- **CONSTANT VISUAL INDICATION** of the condition of your filter is shown on the dial.
- **TWO INSTRUMENTS IN ONE** – an accurate indicating gage and adjustable p.s.i.d. limit switch. Reduces inventory and installation time.
- **ADJUSTABLE CONTACT** lets you set the monitoring range of the gage. The contact is tamperproof and can be set only with a 1/16 Allen-head wrench.
- **DURABILITY** – All gages are made of durable materials allowing them to withstand rugged applications.

- **EARLY FILTER CHANGES** cost you money and increase the risk of contaminants entering the system. A Murphy filter restriction SWICHGAGE® will let you know when to change the filter and maintain peak efficiency.

## Specifications

**Dial:** White on black, dual scale; U.S.A. standard scale is psi/kPa. Other scales available—inquire.

**Case:** 20DP and 25DP Series: *plated steel.*

A20DP and A25DP Series: *polycarbonate.*

**Bezel:** Polished stainless steel, standard; others are available (see How to Order).

**Lens:** Polycarbonate, high-impact.

**Temperature Range:**

Ambient: -40°F (-40°C) thru 150°F (66°C).

Process: -40°F (-40°C) thru 250°F (121°C).

**Process Connection:** 1/8-27 NPTM brass.

**Sensing Element:** Beryllium copper diaphragm.

**Gage Accuracy:** ±3% maximum across scale.

**Adjustable Limit Contact:** SPST contact; pilot-duty only, 2 A @ 30 VAC/DC; closed when the low limit is met, open when pointer is in normal operating range. Contacts are gold flashed silver.

Limit Contact Adjustment: *by 1/16 in. hex wrench thru 100% of scale.*

Limit Contact Wire Leads (20DP and 25DP Series): *18 AWG (1.0 mm²) x 12 in. (305 mm).*

Limit Contact Terminals: *A20DP Series number #4 screw terminals. A25DP Series number 6 terminals.*

**Snap-Switch Rating (“DPE” models):**

SPDT, 3 A @ 30 VDC inductive; 4 A @ 125 VAC inductive.

**Unit Weight:**

20DP and A20DP Series: *9 oz. (0.25 kg);*

25DP and A25DP Series: *11 oz. (0.29 kg).*

**Unit Dimensions:**

20DP and A20DP Series: *3 x 2-3/4 x 2-3/4 in. (76 x 70 x 70 mm).*

25DP and A25DP Series: *4-3/4 x 4-3/4 x 2-3/4 in. (121 x 121 x 70 mm).*

## Base Models

**20DP, 25DP, A20DP and A25DP SWICHGAGE®**

The gage pointer makes with an adjustable contact to complete a pilot-duty circuit.

**20DPE, 25DPE, A20DPE and A25DPE SWICHGAGE®**

**20DPE (was 20DPEO), 25DPE (was 25DPEO), A20DPE (was A20DPEO) and A25DPE (was A25DPEO).**

Features an internal snap-acting SPDT switch, instead of the single pole/pointer contacts. When the switch closes on rising pressure, it becomes Set, as pressure falls the switch Resets.

**20DPG, 25DPG, A20DPG and A25DPG MURPHYGAGE®**

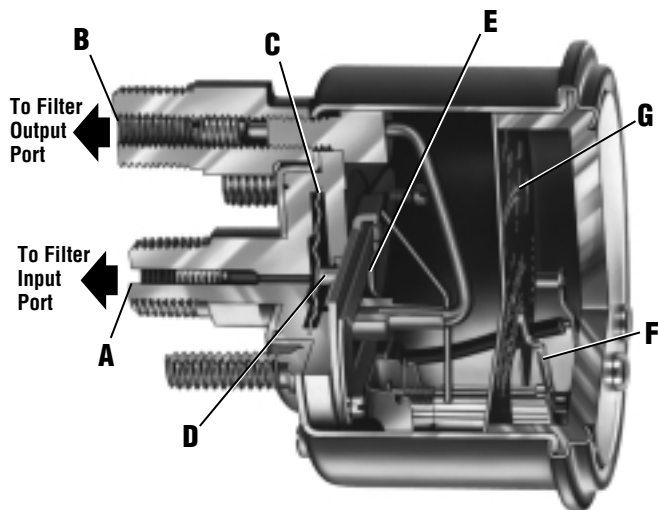
Gage without contact(s).

## 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.

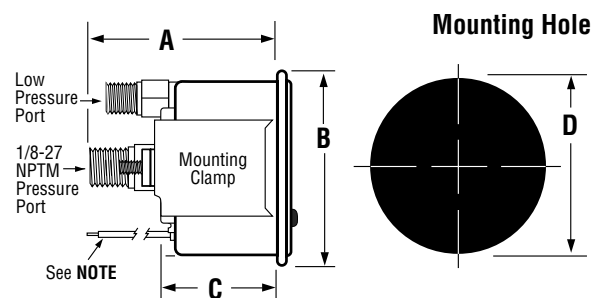
\*\* Products covered by this bulletin comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility except as noted.

## Operating Characteristics



Port **A** connects to the input side of the filter. Pressure pushes diaphragm **C** forward thus pushing the button **D** which turns the crank arm **E** which in turn moves pointer **F** to register the amount of pressure on dial **G**. Port **B** connects to the outlet side of the filter. Pressure is exerted through tube **H** and pushes on the diaphragm thus applying pressure on both sides of the diaphragm. The pointer displays pressure in the amount that the input pressure is greater than the outlet pressure. As the filter is restricted by contaminants and the pressure difference reaches the critical point, the pointer touches the pre-set limit contact and shuts down the system or activates a visual or audible signal to alert the operator.

## Dimensions



	20DP Series	A20DP Series	25DP Series	A25DP Series
<b>A</b>	2-7/32 (56)	2-9/64 (54)	2-1/8 (54)	1-51/64 (46)
<b>B</b>	2-15/64 (57)	2-1/4 (57)	3-1/8 (79)	2-29/32 (74)
<b>C</b>	1-5/16 (33)	1-27/64 (36)	1-3/8 (35)	1-27/64 (36)
<b>D</b>	2-1/16 (53)	2-1/16 (53)	2-11/16 (68)	2-11/16 (68)

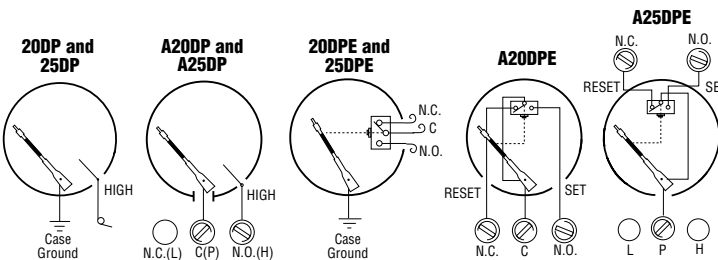
**NOTE:** 20 and 25 Series have 18 AWG (1.0 mm<sup>2</sup>) wire. A20 Series has #4 screw terminals and A25 Series has #6 terminals. Dimensions are in inches and (millimeters).

## Ranges and Factory Settings

Ranges* Available	Max. Static Pressure	Max. Differential Pressure	Contact Setting
<b>0-15</b> (0-103) [0-1.0]	<b>200</b> (1.4) [14]	<b>30</b> (207) [2.0]	<b>10</b> (69) [0.8]
<b>0-30</b> (0-207) [0-2.0]	<b>300</b> (2.1) [20]	<b>60</b> (414) [4.0]	<b>20</b> (138) [1.0]
<b>0-50</b> (0-345) [0-3.5]	<b>300</b> (2.1) [20]	<b>100</b> (690) [7.0]	<b>30</b> (207) [2.0]
<b>0-75</b> (0-517) [0-5.0]	<b>300</b> (2.1) [20]	<b>150</b> (1.0) [10]	<b>50</b> (345) [3.5]
<b>0-100</b> (0-690) [0-7.0]	<b>300</b> (2.1) [20]	<b>200</b> (1.4) [14]	<b>60</b> (414) [4.0]

\*Values are shown in psi, (kPa/MPa) and [bar]. Values in kPa/MPa and bar are mathematical conversions from psi—they do not reflect actual second scale range.

## Internal Wiring



## How to Order

To order, use the diagram below. List options in ascending alphabetical order (A-Z). Example: **20DP-F-30**.

Base Model	Range <sup>††</sup>
20DP	15 = 0-15
A20DP	30 = 0-30
20DPE	50 = 0-50
A20DPE	75 = 0-75
20DPG	100 = 0-100
A20DPG	

<sup>††</sup>Select scale so your normal operating pressure is in the middle half of the scale.

## Options<sup>‡</sup>

**A** = Argon filled case (not available for A25DP, 25DPE, 20DPE Series)  
**B1** = Black bezel  
**B2** = Bezel 05051857 (was "HP")  
**B3** = Bezel 05051836 (was "HBB")  
**EX** = Explosion-proof  
**EL** = Explosion-proof less case

**F** = "FS" contact (includes "ES" as appropriate)  
**K** = Knob adjusting face contact

<sup>‡</sup>Options not available on all models or configurations.



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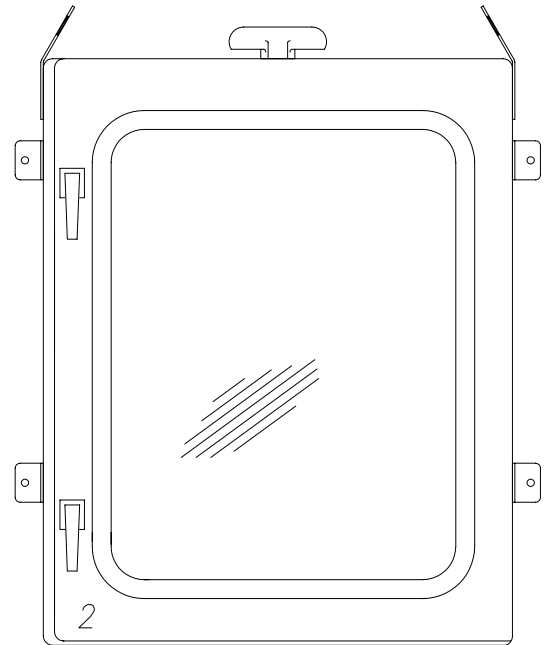
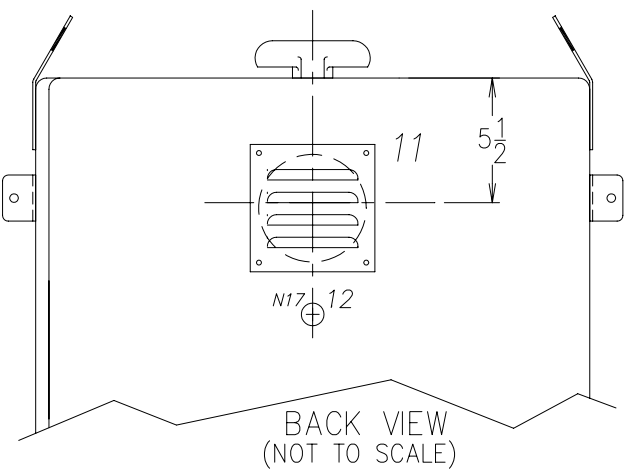
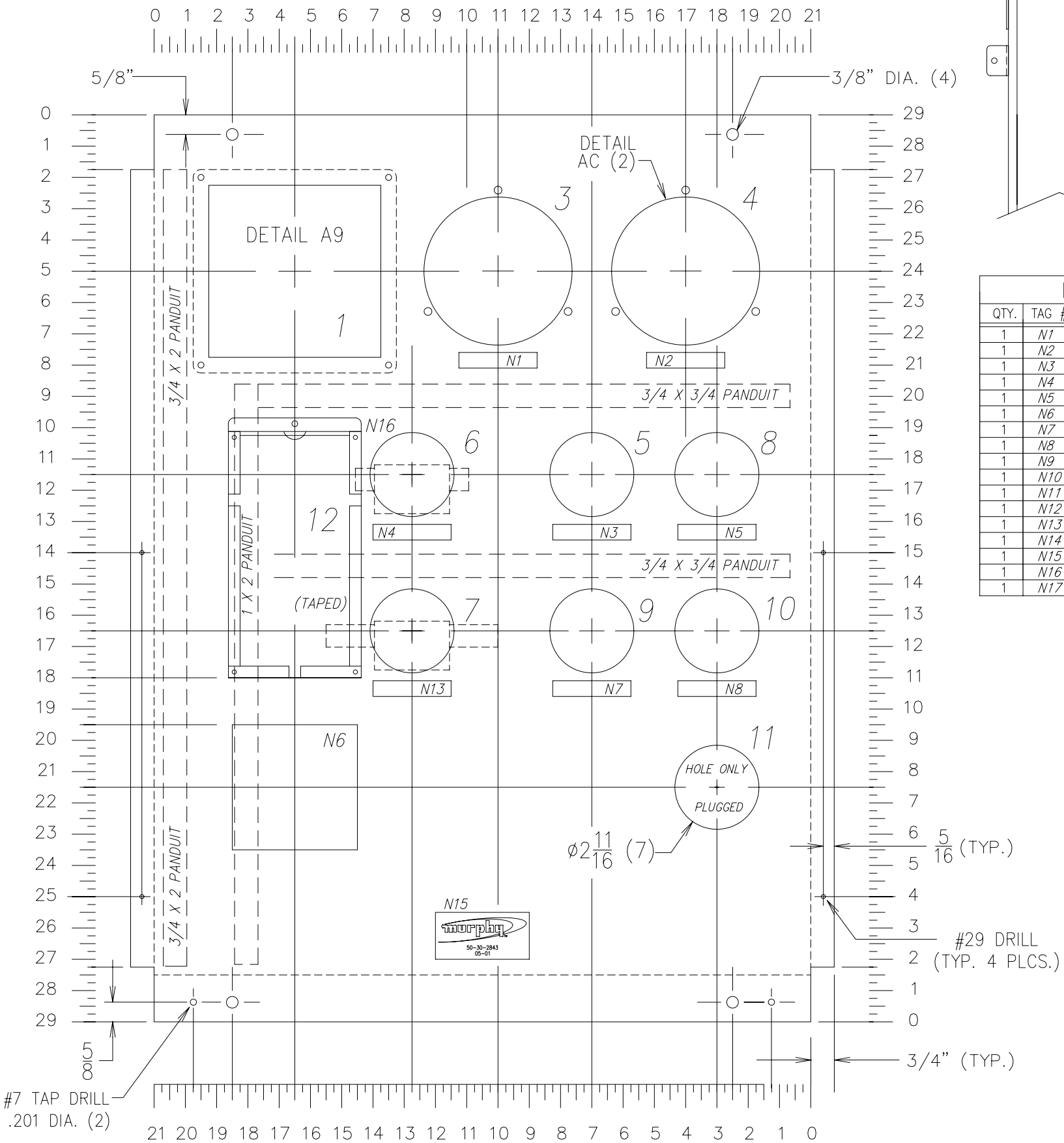
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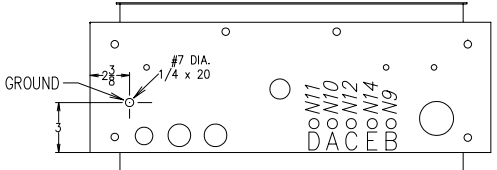
In order to consistently bring you the highest quality, full featured products, we reserve the right to change our specifications and designs at any time.

Printed in U.S.A.

INSIDE PANEL FOR 30" X 24" ENCLOSURE



30" X 24" ENCLOSURE  
FRONT



BACK  
BOTTOM VIEW OF ENCLOSURE  
(NOT TO SCALE)

INDIVIDUAL NAMEPLATE SCHEDULE				
QTY.	TAG #	LETTERS/TAG	DESCRIPTION	PART #
1	N1	W/B	SUCTION>PRESSURE	50225266
1	N2	W/B	DISCHARGE>PRESSURE	50225266
1	N3	W/B	ENGINE OIL>PRESSURE	50225266
1	N4	W/B	LOW COMPRESSOR OIL>DIFFERENTIAL PRESSURE	50225266
1	N5	W/B	ENGINE JACKET>WATER TEMPERATURE	50225266
1	N6	W/B	special annunciator tag, see detail	50225266
1	N7	W/B	COMP DISCHARGE>TEMPERATURE	50225318
1	N8	W/B	COMPRESSOR OIL>TEMPERATURE	50225266
1	N9	W/B	SUCTION>PRESSURE	50225266
1	N10	W/B	DISCHARGE>PRESSURE	50225307
1	N11	W/B	ENGINE OIL>PRESSURE	50225307
1	N12	W/B	COMP OIL>HEADER	50225307
1	N13	W/B	HIGH COMPRESSOR>OIL DIFFERENTIAL PRESSURE	50225266
1	N14	W/B	COMP OIL INJECTION PORT	50225307
1	N15	W/B	serial number tag	50225434
1	N16	RED	COVER, VERTICAL HOLDER	50225541
1	N17	W/R	ESD	50225541

N6 ANNUNCIATOR  
PANEL TAG (TAPED):


F.W. MURPHY ANNUNCIATOR PANEL

Model: 50-30-3503  
Manufacturer: F.W. MURPHY MANUFACTURER  
Annunciation: 5 VDC Non-Incendive  
CD Powered Devices: 150 VDC  
Suitable for Class I, Div. 2 Locations, Grp C & D

CAUTION: Contains non-incendive Circuits  
WARNING: Disconnect power before servicing.  
WARNING: Substitution of parts may impair Classification.

ITEM NUMBERS CORRESPOND TO  
PANEL LEGEND ON DRAWING NO.50-30-3503

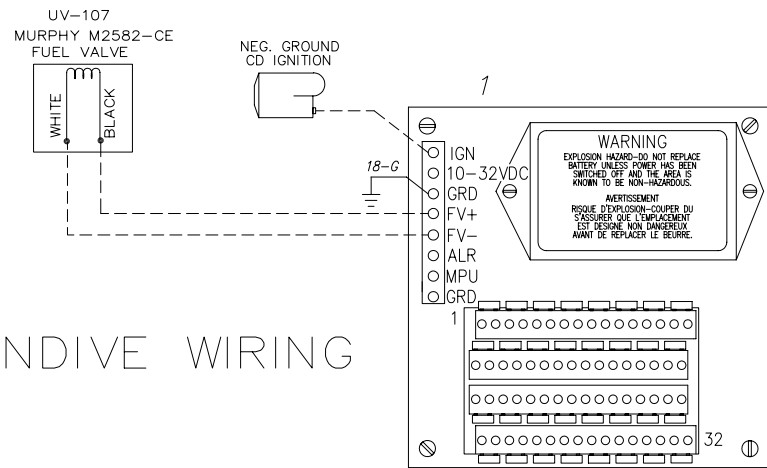
90/135HP FRICK

						DRAWN BY DSR	 CONTROL SYSTEMS & SERVICES – ROSENBERG, TX	
						CHK'D BY		
						APP'D BY		
						DATE 05-10-01		
C	REVISED LAYOUT		MAY 7/02			SCALE NONE	FOR TOROMONT PROCESS	
B	ADD ESD PUSHBUTTON		MAR 20/02					
A	AS BUILT		MAY 18/01					
REV.	DESCRIPTION	ECR #	DATE	CK		SHEET 1 OF 1	PANEL LAYOUT	
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MURPHY MFR. IS NOT RESPONSIBLE FOR COPIES OF THIS DRAWING NOT HAND SIGNED BY OUR ENGINEERS.							DWG. NO. 50-29-3503	REV. C

SUB-PANEL MATERIAL: 16 GA., TYPE 316 STAINLESS STEEL	SUB-PANEL FINISH: PRE-BRUSHED	UNLESS OTHERWISE NOTED DIMENSIONS ARE IN INCHES .xx ±.030 ANGLES ±2° .xxx ±.010 ✓ 125 FRACTIONS ±1/16
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# INCENDIVE WIRING



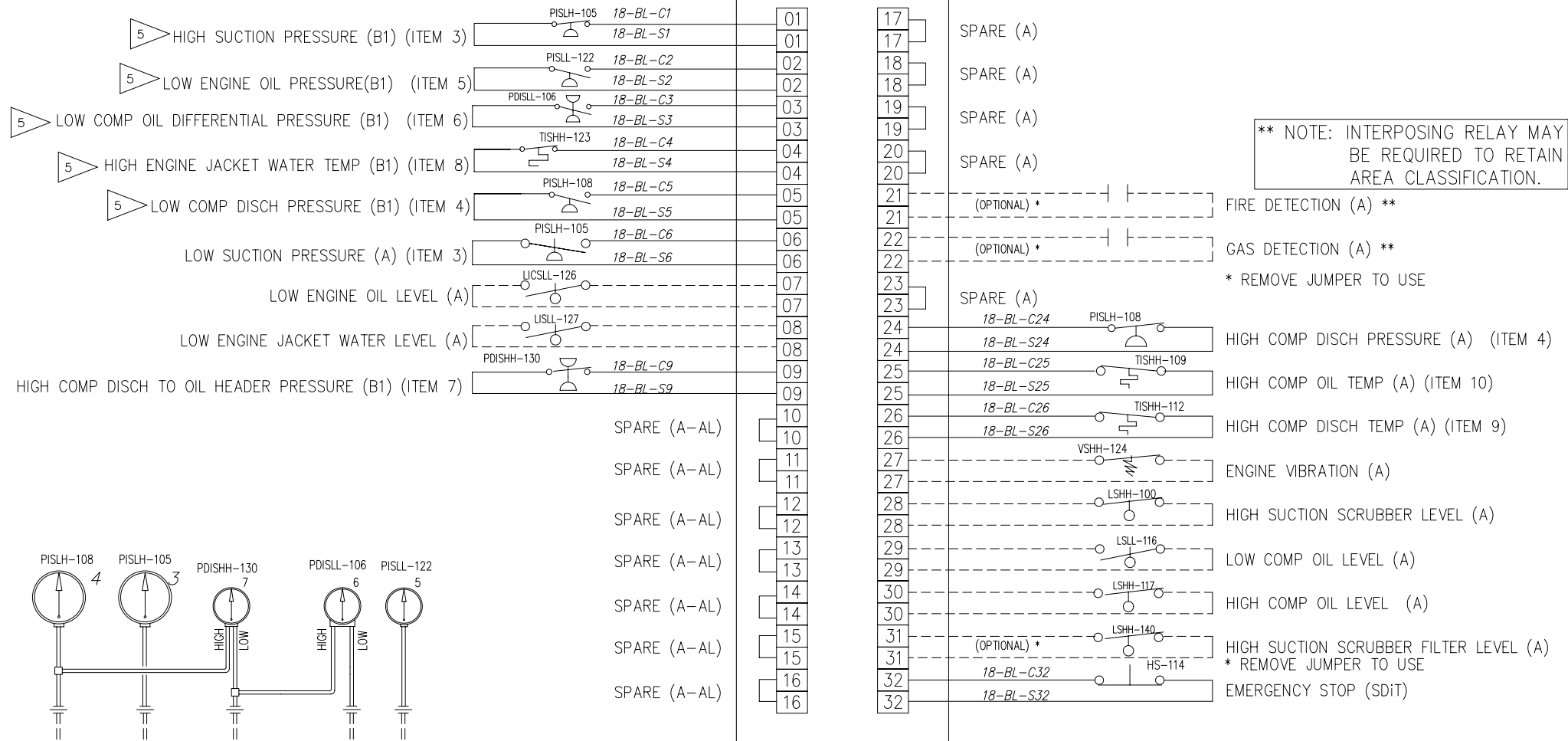
NOTES:

1. FACTORY WIRING: \_\_\_\_\_
  - CUSTOMER WIRING: \_\_\_\_\_
  2. TUBING: STAINLESS STEEL
  - FITTINGS: STEEL
  3. INPUT #29 IS SELECTABLE CLASS "A" OR FOR ESD (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)
  - DISPLAY #52 IS MANUAL STOP (INTERNAL)
  - DISPLAY #51 IS UNDERSPEED (INTERNAL)
  4. EACH OF THE FIRST 16 INPUTS CAN BE CONFIGURED FOR CLASS A, B1, B2 OR C AND FOR SHUTDOWN OR ALARM.
  6. CONFIGURE FOR CLASS C
  7. MAXIMUM LENGTH OF SENSOR LEADS IS 200 FEET.
  8. TTDJ IS DESIGNED FOR USE IN CLASS I, DIV. 2, GROUP C & D HAZARDOUS LOCATIONS.
  9. SENSORS MUST BE MECHANICALLY ACTUATED PASSIVE SWITCHES, NORMALLY OPEN OR CLOSED. REMOVE FACTORY INSTALLED JUMPER FOR NORMALLY CLOSED SWITCHES.
  10. NORMALLY OPEN SENSORS ARE RETURNED TO GROUND POTENTIAL.
  11. ALL WIRING IS 18 AWG, UNLESS OTHERWISE SPECIFIED.
  12. LAST WIRE NUMBER USED IS 18-R-S32
  13. ROUTE SENSOR LEADS SEPARATE FROM ALL OTHER WIRING.

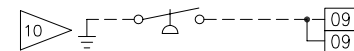
## PANEL LEGEND

ITEM	MFR.	TAG NO.	MODEL NO.	DESCRIPTION	SETPOINT
1.	MURPHY	—	TTDJR-IGN-T	"SELECTRONIC TATTLETALE" (ANNUNCIATOR)	
3.	MURPHY	PISLH-105	45APEF-S-200	SUCTION PRESSURE "SWICHGAGE"	5 PSIG LOW FALLING 90 PSIG HIGH RISING
4.	MURPHY	PISLH-108	45APEF-S-400	DISCHARGE PRESSURE "SWICHGAGE"	10 PSIG LOW FALLING 300 PSIG HIGH RISING
5.	MURPHY	PISLL-122	A25PEF-100	ENGINE OIL PRESSURE "SWICHGAGE"	15 PSIG FALLING
6.	MURPHY	PDISLL-106	25CDPEF-400-SF15	LOW COMPRESSOR OIL DIFFERENTIAL PRESSURE "SWICHGAGE"	15 PSID FALLING
7.	MURPHY	PDISHH-130	25CDPEF50-SR30	HIGH COMP DISCHARGE TO OIL DP PRESS	30 PSID RISING
8.	MURPHY	TISHH-123	A25TEF-250-16-SR210	ENGINE JACKET WATER TEMPERATURE "SWICHGAGE"	210° F RISING
9.	MURPHY	TISHH-112	A25TEF-300-25-SR240	COMPRESSOR DISCHARGE TEMPERATURE "SWICHGAGE"	240° F RISING
10.	MURPHY	TISHH-109	A25TEF-250-16-SR200	COMPRESSOR OIL TEMPERATURE "SWICHGAGE"	200° F RISING
11.	EUROBEX		880-LP2RED	LOUVER	—
12.	TELEMECAN	HS-114	ZB4BS54	ESD PUSHBUTTON c/w ZB4BZ102 CONTACT BLOCK	

## NON-INCENDIVE WIRING




TERMINAL BLOCK LOCATED  
ON BACK OF TTDJ



NOTE: TYPICAL CONNECTION IF  
N.O. SENSOR USED

NOTE: ANY MODIFICATION OF THE PANEL MAY ALTER THE  
THIRD PARTY APPROVAL OF THE UNIT. PLEASE CONTACT  
POWER IGNITION CONTROLS FOR CLARIFICATION.

ADJUSTABLE SETTINGS	
CLASS B1 – TYPICAL 30 sec.	
CLASS B2 – TYPICAL 0 sec.	
IGN. GROUND DELAY – TYPICAL 5 sec.	
UNDERSPEED – TYPICAL 500 rpm	
OVERSPEED – TYPICAL 1900 rpm	

					DRAWN BY BF	 CONTROL SYSTEMS & SERVICES – ROSENBERG, TX	
					CHK'D BY		
E	ADD CH# 31 AS OPTIONAL		MAY 20/03		APP'D BY		
D	ADD ESD AND CHANGE DESCRIPTIONS		MAR 18/02		DATE	02-11-00	FOR TOROMONT PROCESS
C	CHANGE CH 9 TO CLASS B SHUTDOWN		DEC 3/01		SCALE	NONE	
B	ADD OPTIONAL SHUTDOWNS		NOV 12/01				
A	AS BUILT		JUNE 1/01				WIRING DIAGRAM
REV.	DESCRIPTION	ECR #	DATE	CK	SHEET 1 OF 1		
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