



by **ENOVATION** CONTROLS

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**CONTROLS &
INSTRUMENTATION**

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2" and 2.5" Swichgage® and Murphygage® Instruments

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9104	Direct Mount Pressure Switch Model PSB	15

4.5" Swichgage® and Murphygage® Instruments

96001	Pressure Gage and Swichgage® Instruments OPL Series 4-1/2 in. (114 mm) Diameter Dial	17
00029	Pressure Swichgage® 45APE Series Instrument	23
96107	Lead Line Pressure Swichgage® Instrument Model PT167EX 4-1/2 in. (114 mm) Diameter Dial	25

Pressure Transmitters

1211009	Pressure Transmitters PXT-K Series	27
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20, 25, A20 and A25 Series Vacuum Switchgag® Instrument 2 and 2-1/2 in. (51 and 64 mm) Dial



25 Series



20 Series

Features

- Combination Indicating Gage and Limit Switch
- Critical Vacuum Limit Switches Are Visible and Adjustable (Most Models)
- Switch Can Activate Alarms and/or Shutdown Equipment
- Monitor Engine Load

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

The 20 Series (2 inch/51 mm dial) and the 25 Series (2-1/2 inch/64 mm dial) Switchgag instruments are diaphragm-actuated, vacuum-indicating gages, with built-in electrical switches. These switches are used for tripping alarms and/or shutdown devices.

The 20 and 25 series gage mechanism is enclosed in a steel case coated to resist corrosion (except for a small weep hole in the bottom of the case).

The A20 and A25 series gage has a polycarbonate case and is sealed from the environment. All gages 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 a self-cleaning motion to ensure electrical continuity.

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

A pulsation dampener (PD2160) is included with each Switchgag to help eliminate pointer flutter. When monitoring intake manifold vacuum, the PD2160 is mounted in the manifold. The PD2160 has a 1/8-27 NPT connection.

A vacuum tubing kit (V5179) is available for all models to help reduce pulsations. The kit includes 48 inches (1.2 m) of copper tubing and two compression fittings. Specify tubing kit V5179.

Applications

Commonly used to measure loading of spark ignition engines through intake manifold vacuum. Also can serve as overspeed protection from sudden loss of load on these engines. Use anywhere the vacuum source is compatible with port materials.

Specifications

Dial: White on black, dual scale; U.S.A. standard scale is Inches of Hg/kPa.

Case (mounting clamp included):

20 and 25 Series: Plated steel.

A20 and A25 Series: Polycarbonate/glass filled.

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

Lens: Polycarbonate, high-impact.

Process Connection: 1/8-27 NPTM brass.

Sensing Element: Beryllium copper diaphragm.

Gage Accuracy: ±2% of scale in operating range (mid 1/3 of scale).

Unit Dimensions

20 and A20 Series: 3 x 3 x 3 in. (76 x 76 x 76 mm).

25 and A25 Series: 4-3/4 x 4-3/4 x 2-3/4 in. (121 x 121 x 70 mm).

Adjustable Limit Contacts:

2-SPST contacts; pilot-duty only, 2 A @ 30 VAC/DC. Contacts are gold flashed silver.

Limit Contact Adjustment: by a 1/16 in. hex wrench.

Limit Contact Wire Leads (20 and 25 Series):

18 AWG (1.0 mm²) x 12 in. (305 mm).

Limit Contact Terminals: A20 Series number 4 screw terminals; A25 Series number 6 screw terminals.

Unit Weight

20 Series: 8 oz. (0.23 kg).

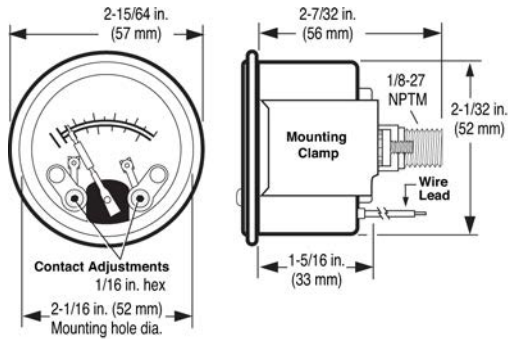
25 Series: 11 oz. (0.31 kg).

A20 Series: 6 oz. (0.17 kg).

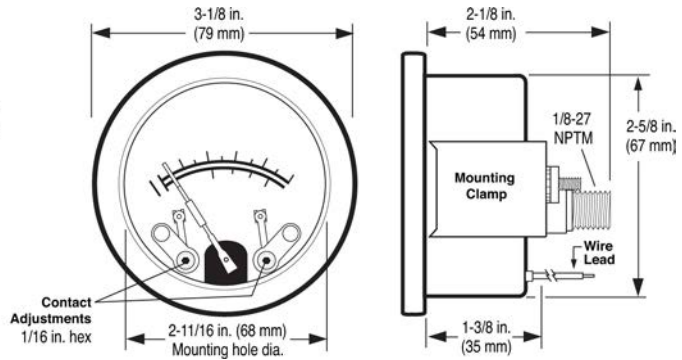
A25 Series: 10 oz. (0.28 kg).

Dimensions

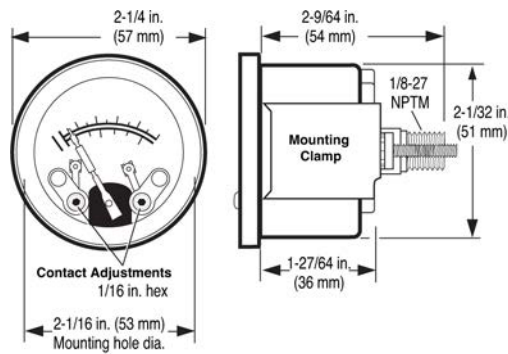
20 Series Models



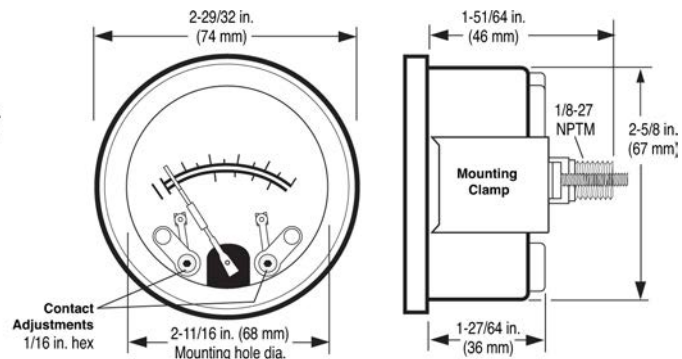
25 Series Models



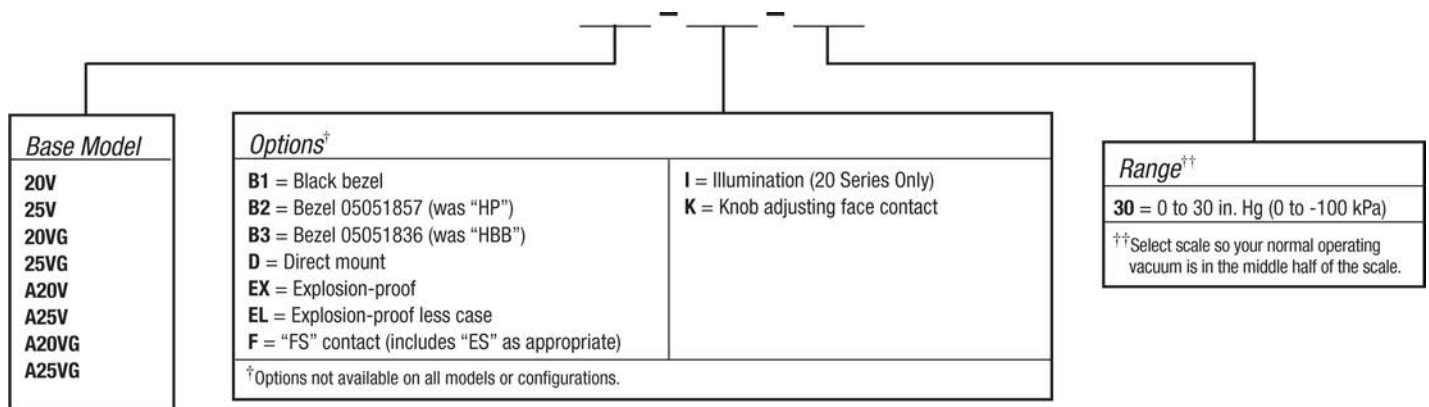
A20 Series Models



A25 Series Models



How to Order



Differential Pressure Gage for Filter Restriction

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



Features

- 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

¹ Products covered by this bulletin comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility except as noted.

The 20DP and A20DP Series (2 inch/51 mm dial) and the 25DP and A25DP Series (2-1/2 inch/64 mm dial) Swichgage instruments 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 instrument 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.

Snap-Switch Rating (“DPE” models): SPDT, 3 A @ 30 VDC inductive; 4 A @ 125 VAC inductive.

Base Models

20DP, 25DP, A20DP and A25DP Swichgage instrument

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

20DPE, 25DPE, A20DPE and A25DPE Swichgage instrument

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

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).

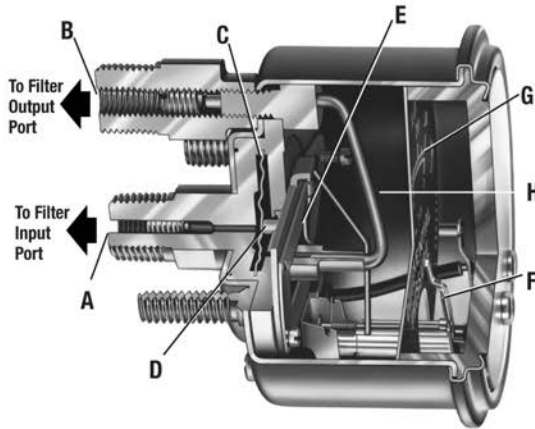
Limit Contact Terminals: A20DP Series number #4 screw terminals. A25DP Series number 6 terminals.

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).

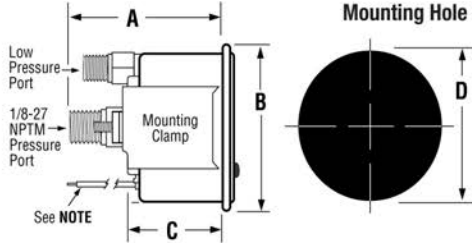
Features an internal snap-acting SPDT switch, instead of the single pole/pointer contacts. When the switch closes on rising pressure, it becomes set, as pressure falls the switch resets. 20DPG, 25DPG, A20DPG and A25DPG Murphygage instrument gage without contact(s).

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 contaminant's 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
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)

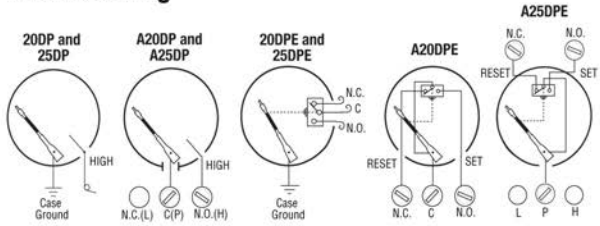
NOTE: 20 and 25 Series have 18 AWG (1.0 mm²) wire. A20 Series has #4 screw terminals and A25 Series has #6 terminals. Dimensions are in inches and (millimeters).

Ranges and Factory Settings

Ranges* Available	Max. Static Pressure	Max. Differential Pressure	Contact Setting
0-15 (0-103) [0-1.0]	50 (345) [3.4]	30 (207) [2.0]	10 (69) [0.8]
0-30 (0-207) [0-2.0]	150 (1.0) [10]	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.

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 ^{††}
20DP 25DP	15 = 0-15
A20DP A25DP	30 = 0-30
20DPE 25DPE	50 = 0-50
A20DPE A25DPE	75 = 0-75
20DPG 25DPG	100 = 0-100
A20DPG A25DPG	

^{††}Select scale so your normal operating pressure is in the middle half of the scale.

Options[‡]

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

[‡]Options not available on all models or configurations.

20 and 25 Series Pressure Switchgag® Instrument 2 and 2-1/2 in. (51 and 64 mm) Dial



Features

- Combination Indicating Gage and Limit Switch
- Critical Pressure Limit Switch Is Visible and Adjustable (Most Models)
- Switch Can Activate Alarms and/or Shutdown Equipment
- Exceeds SAE Standards

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The 20 Series (2 inch/51 mm dial) and the 25 Series (2-1/2 inch/64 mm dial) Switchgag® models are diaphragm-actuated, pressure-indicating gages, with built-in electrical switches. These switches are used 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].

The gage mechanism is enclosed in a steel case coated to resist corrosion. A polycarbonate, break-resistant lens and a polished, stainless steel bezel help protect this rugged, built-to-last instrument. 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 models 20P and 25P, 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 are grounded through the Switchgag® case and have self-cleaning motion to ensure electrical continuity.

Models 20PE and 25PE have internal snap-acting SPDT switches.

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

Applications

The Switchgag® was specifically designed to protect engines/equipment in Oil Field, Marine, Irrigation, Construction and Trucking applications to monitor Engine Lube 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; others available (see How to Order).

Case: Plated steel; mounting clamp included (except for direct mount models).

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

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%
400psi (28 Bar)	±3%	±3%	±5%

Base Models

20P and 25P Series Switchgag®

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

20PE and 25PE Switchgag®

20PE (was 20EO) and 25PE (was 25EO). 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.

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

Adjustable Limit Contact (20P and 25P): SPST contact; pilot-duty only, 2 A @ 30 VAC/DC; Normally Close (NC) when the low limit is met. Normally Open (NO) 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.

Limit Contact Wire Leads: 18 AWG (1.0 mm²) x 12 in. (305 mm).

Snap-Switch Rating (20PE and 25PE): SPDT, 3 A @ 30 VDC inductive; 4 A @ 125 VAC inductive.

Snap-Switch Wire Leads: 20 AWG (0.75 mm²) x 12 in. (305 mm).

Unit Weight: 20 Series: 8 oz. (0.23 kg).

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

Unit Dimensions: 20 Series: 3 x 3 x 3 in. (76 x 76 x 76 mm).
25 Series Models: 4-3/4 x 4-3/4 x 2-3/4 in. (121 x 121 x 70 mm).

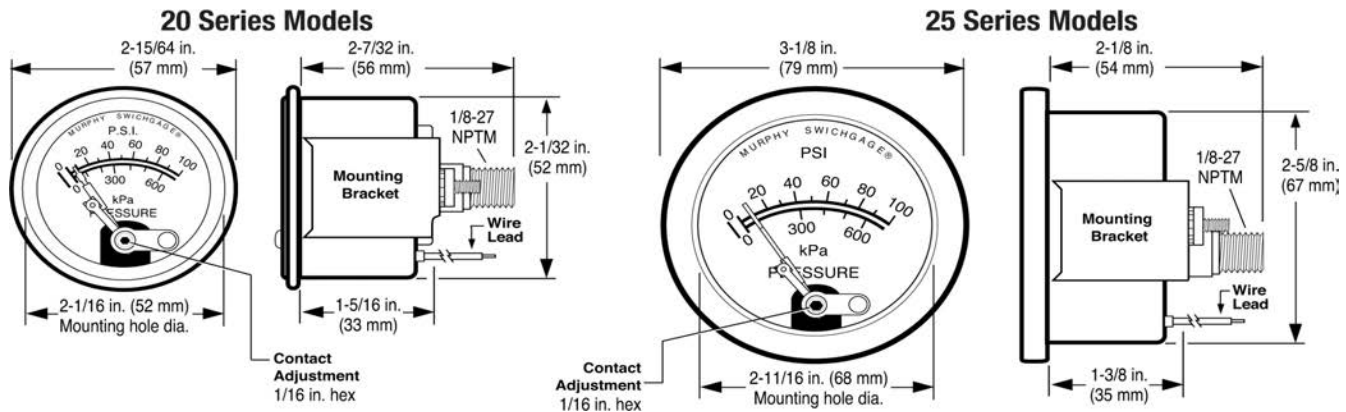
20PABS and 25PABS Switchgag®

Same as 20P and 25P with internal SPDT snapswitch for pre-alarm. 20P7 and 25P7 Lockout Switchgag® Same as 20P and 25P Series. They also include a front, semi-automatic lockout for startup override. This built-in device holds the pointer away from the contact on startup. When pressure exceeds the set point, the lockout is automatically disengaged (see page 3 for details).

20PG and 25PG MURPHYGAGE®

Gage without contact(s).

Dimensions



Pressure Ranges and Factory Settings

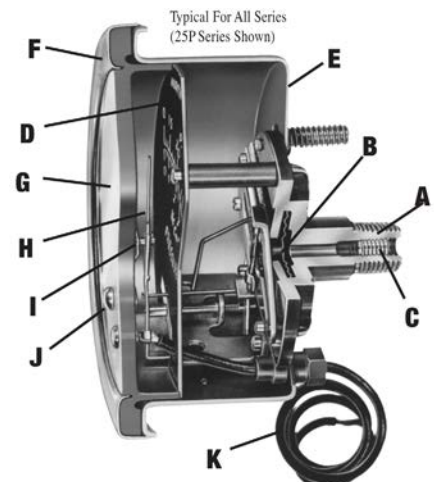
NOTES

- 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 20PE and 25PE; 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			20PABS and 25PABS Settings					
psi	(kPa)	[bar]		psi	(kPa)	[bar]	psi	(kPa)	[bar]	Low			Alarm		
0-15	(103)	[1.0]	2 x scale	3	(21)	[0.2]	12	(83)	[0.8]	3	(21)	[0.2]	6	(41)	[0.3]
0-30	(207)	[2.0]	2 x scale	7	(48)	[0.4]	24	(165)	[1.6]	7	(48)	[0.4]	10	(69)	[0.6]
0-50	(345)	[3.5]	2 x scale	10	(69)	[0.8]	40	(276)	[2.8]	10	(69)	[0.8]	13	(90)	[1.0]
0-75	(517)	[5.0]	2 x scale	15	(103)	[1.0]	60	(414)	[4.0]	15	(103)	[1.0]	18	(124)	[1.5]
0-100	(690)	[7.0]	2 x scale	20	(138)	[1.5]	80	(552)	[5.5]	20	(138)	[1.0]	23	(159)	[1.5]
0-150	(1.0 MPa)	[10]	2 x scale	30	(207)	[2.0]	120	(827)	[8.0]	30	(207)	[1.5]	33	(228)	[2.0]
0-200	(1.4 MPa)	[14]	2 x scale	50	(345)	[3.0]	150	(1 MPa)	[10]	50	(345)	[3.0]	53	(365)	[4.0]
0-300	(2.1 MPa)	[20]	1-2/3 x scale	75	(517)	[5.0]	225	(1.6MPa)	[15]	75	(517)	[5.0]	78	(538)	[5.0]
0-400	(2.8 MPa)	[28]	1-1/4 x scale	150	(1.0 MPa)	[7.0]	300	(2.1MPa)	[20]	75	(517)	[5.0]	150	(1MPa)	[10]

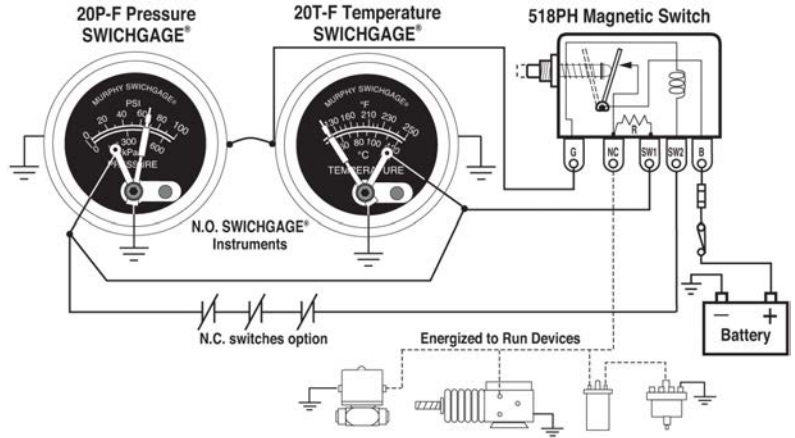
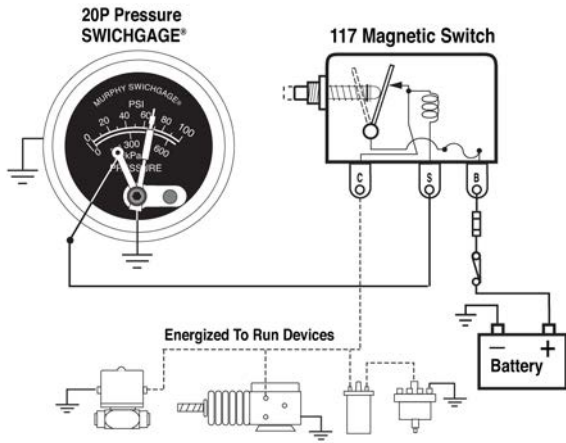
Features

- Process Connection and Port:** Machined from brass bar stock. Together with the diaphragm forms the diaphragm chamber.
- Diaphragm:** Beryllium copper; material is 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 (psi & kPa) standard; others available on request (see How to Order on page 4).
- Case:** Steel with zinc and iridite; mounting clamp included (except for direct mount models).
- Bezel:** Polished stainless steel standard, black bezel also available.
- Lens:** Made of polycarbonate glass, high-impact treated.
- Pointer:** Tempered nickel silver for continuity and corrosion resistance. It is mounted on a machined brass post.
- 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.
- Wire Leads:** 12 in. (305 mm) long, 18 AWG (1.0 mm²) for face-adjustable contacts. 20 AWG (0.75 mm²) for Snap-switches models.



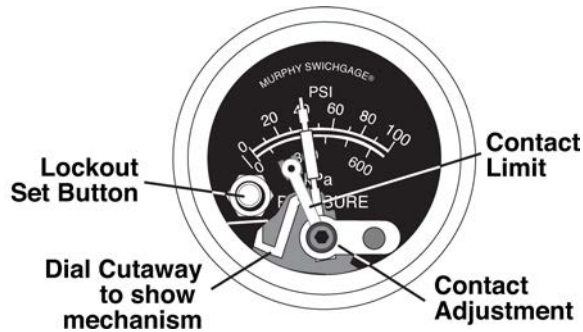
Magnetic Switch

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



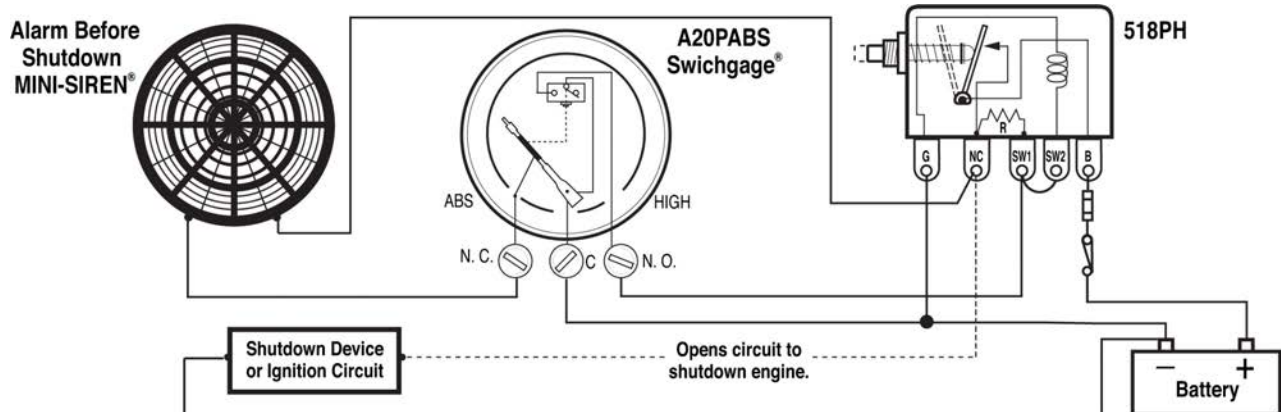
Start-Up Lockout

The Swichgag® low limit contact can be by-passed on start-up by pushing this optional lockout button. It holds the pointer away from the shutdown contact while the engine starts. The lockout will disengage automatically on rising pressure.



Pre-Alarm Using 20/25PABS

The 20PABS and 25PABS features a standard limit contact for low pressure equipment shutdown. It also has an internal SPDT snap-switch to signal an alarm before shutting down. When the low side of 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 preset 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.



How to Order

To order, use the diagram below. List options in ascending alphabetical order (A-Z). Example: 20P-IP1-100.

<i>Base Model</i>	
20P	25P
20PE	25PE
20PABS	25PABS
20P7	25P7
20PG	25PG

<i>Options[†]</i>
B1 = Black bezel
B2 = Bezel 05051857 (was "HP")
B3 = Bezel 05051836 (was "HBB")
D = Direct mount
F = "FS" contact (includes "ES" as appropriate)
HL = High and low contacts
I = Illumination (see Illumination Options, below right)
IP1 = Light pipe illumination, 12 VDC (see Illumination Options, below right)
IP2 = Light pipe illumination, 24 VDC (see Illumination Options, below right)
K = Knob adjusting face contact
OS = Oil sealed (Silicone Oil)
[†] Options not available on all models or configurations.

<i>Range^{††}</i>		
Dual scale (psi/kPa)		Single scale (bar)
	psi	kPa/MPa
15	= 0-15	0-103
30	= 0-30	0-207
50	= 0-50	0-345
75	= 0-75	0-517
100	= 0-100	0-689
150	= 0-150	0-1.03
200	= 0-200	0-1.38
300	= 0-300	0-2.07
400	= 0-400	0-2.76
		1B = 0-1 bar
		2B = 0-2 bar
		3.5B = 0-3.5 bar
		5B = 0-5 bar
		7B = 0-7 bar
		10B = 0-10 bar
		14B = 0-14 bar
		20B = 0-20 bar
		28B = 0-28 bar
^{††} 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.		

<i>Illumination Options</i>		
	IP1 / IP2	I
20 Series	x	x[†]
25 Series	N/A	N/A
[†] Can be used with standard Clamp Lite Assembly (12 V= 05702176; 24 V= 05702177).		

A20 and A25 Series Pressure Switchgauge® Instrument



Features

- 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

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

The A20 Series (2 inch/51 mm dial) and the A25 Series (2-1/2 inch/64 mm dial) Switchgauge instruments 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). Ranges of 30 psi and lower have a small weep hole in the bottom of the case. 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 snapacting SPDT switches for three wire control; can be wired to make or to break a circuit.

Gage-only models, without switches (Murphygage instrument) 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%
400psi (28 Bar)	±3%	±3%	±5%

Base Models

A20P and A25P Series Switchgauge

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

A20PE and A25PE Switchgauge

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.



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

Adjustable Limit Contact (A20P and A25P): SPST contact; pilot-duty only, 2A@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).

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

A20PABS and A25PABS Switchgauge instrument

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

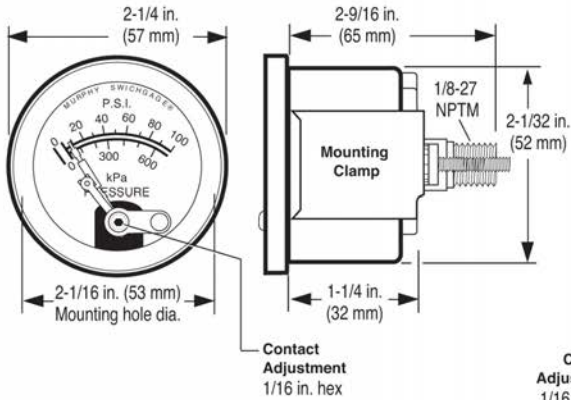
A20PG and A25PG Murphygage instrument

Gage without contact(s).

Dimensions

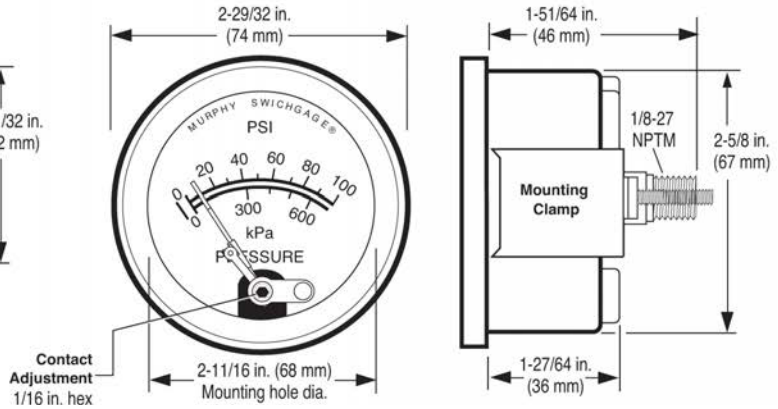
A20 Series Models

A20 Series Models



A25 Series Models

A25 Series Models



Pressure Ranges and Factory Settings

NOTES

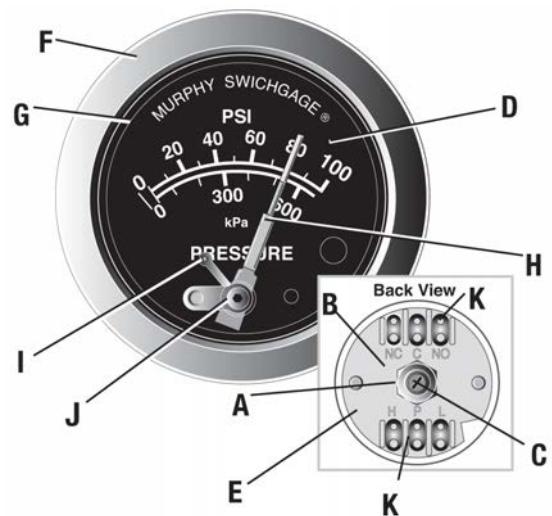
- Values in () are mathematical conversions from psi to kPa/MPa—they do not reflect actual second scale range. U.S.A. standard scale is psi/kPa; U.K. standard scale is psi/bar—exact set-point shown. Consult factory for other scales.

- 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 (1.0 MPa)	15	(103)	[1.0]	60	(414)	[4.0]	15	(103)	[1.0]	18	(124)	[1.5]
0-100	(690)	[7.0]	200 psi (1.4 MPa)	20	(138)	[1.5]	80	(552)	[5.5]	20	(138)	[1.0]	23	(159)	[1.5]
0-150	(1.0 MPa)	[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)	[10.0]	300	(2.1MPa)	[20]	75	(517)	[5.0]	150	(1MPa)	[10]

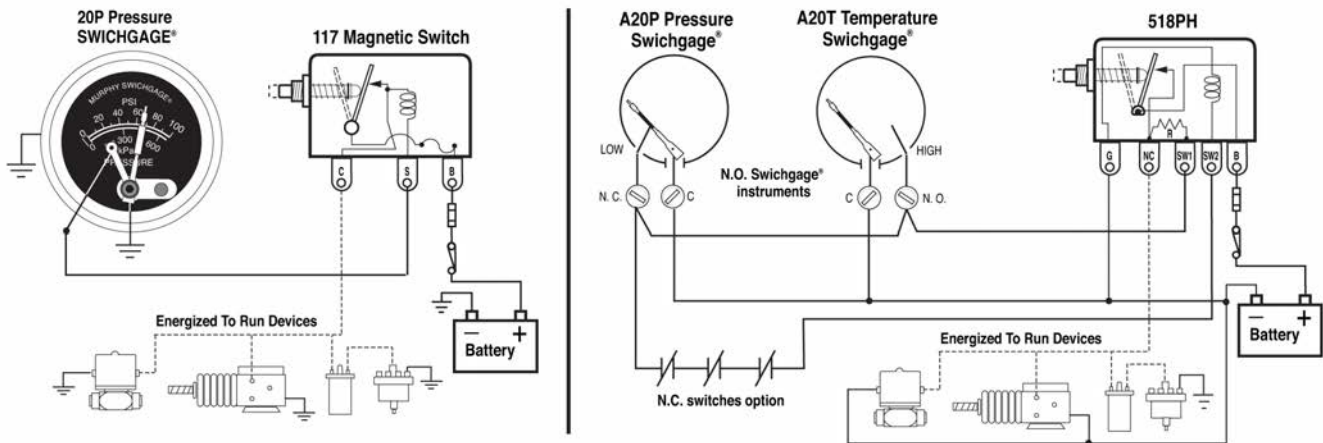
Features

- 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.



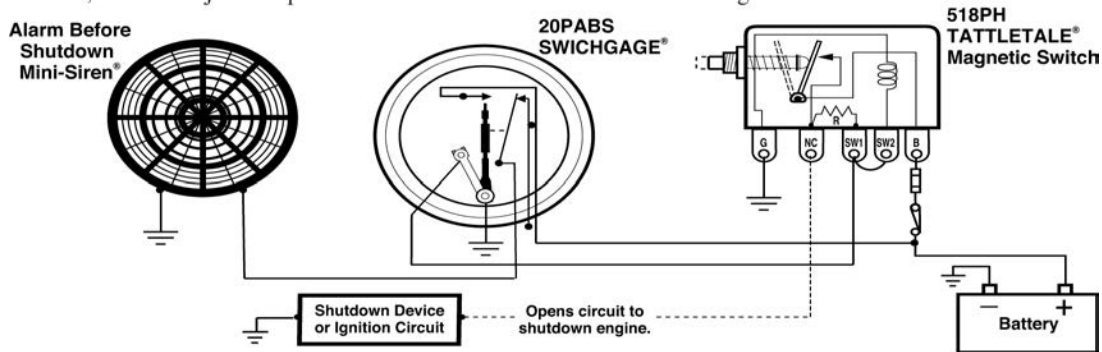
Magnetic Switch

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



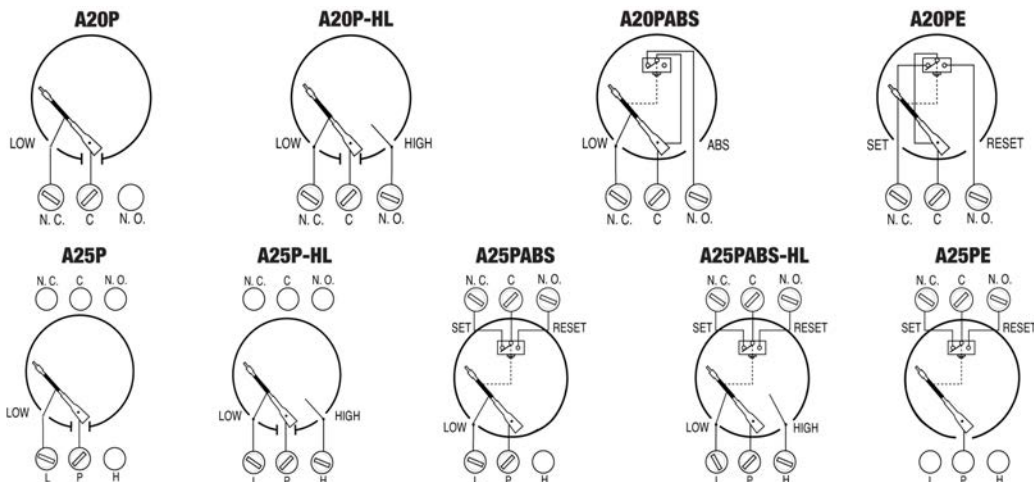
Pre-Alarm Using A20/A25PABS

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 preset 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.



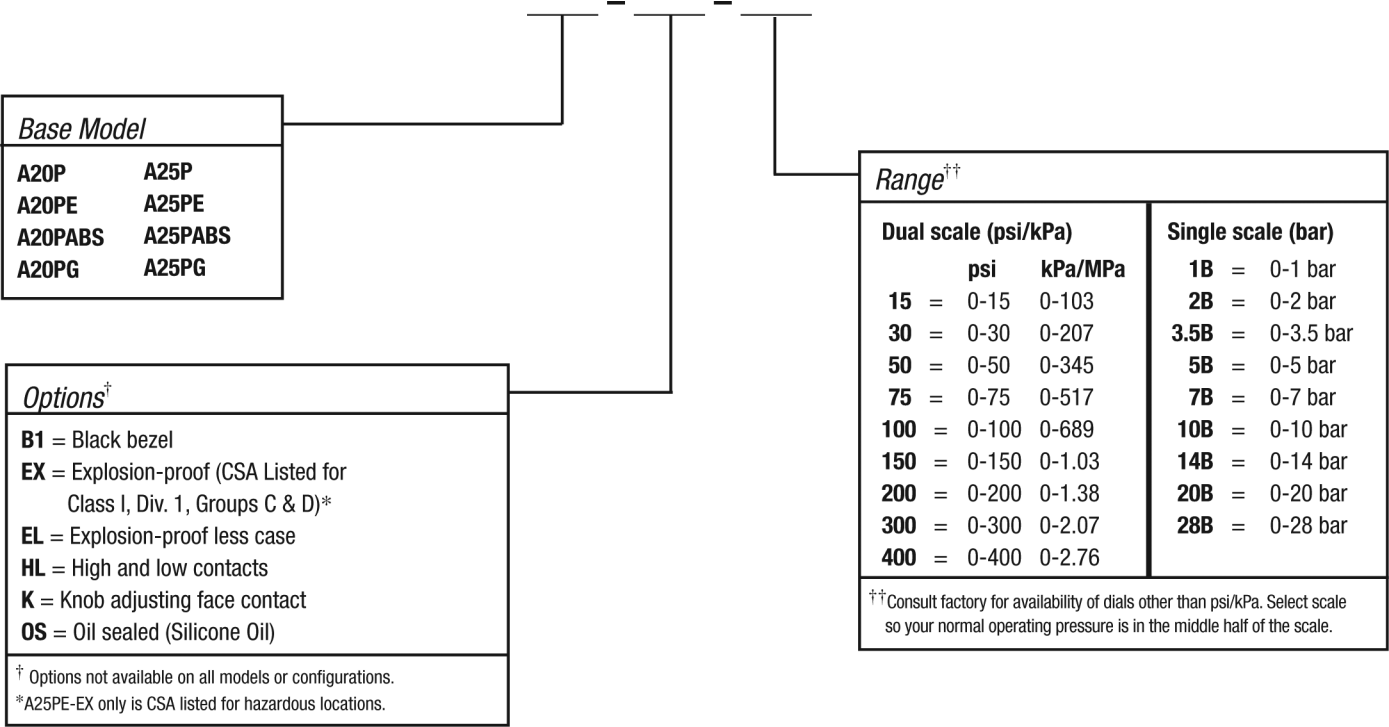
Typical Internal Wiring Diagrams

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

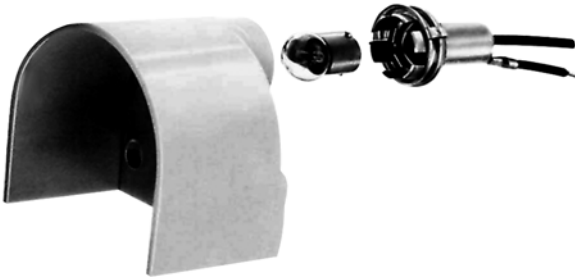
To order, use the diagram below. List options in ascending alphabetical order (A-Z). Example: **A20P-K-100**.



Illumination – Order Separately

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

A25 Series: N/A.



Murphygage® Pressure, Vacuum and Temperature Instruments - B-Series



Features

- 2 in. (51 mm) Dial Gages
- Heavy-duty Rated
- Environmentally Sealed²
- Pressure Models Up to 400 psi (2.76 MPa) [27.6 bar]
- Temperature Models Up to 440°F (220°C)

- 1 Products covered by this bulletin comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility except as noted.
- 2 All pressure gages, above 30 psi (200 kPa) [20.0 bar] and all temperature gages, are environmentally sealed and filled with inert gas. This seal protects the mechanism and eliminates "clouding" of the lens from moisture condensation.

The B-Series Murphygage® instrument is a high quality, diaphragm-actuated indicating gage. Built by Murphy with the same heavy-duty design as the standard 20 series and 25 series Switchgage® instrument, the B-gage is more compact and is the optimum instrument for gage-only applications. It has a high impact polycarbonate lens, sturdy steel case, and a polished, low-profile stainless steel bezel. Accuracy and protection from moderate over-pressure/over-temperature are assured by a unique, unitized diaphragm chamber, superior quality materials, and the design of the gage movement.

Pressure Murphygage® instrument

Pressure changes at the diaphragm convert to accurate mechanical movements that are indicated on an easy to read analog dial. A pulsation dampener in the pressure port helps eliminate pointer flutter; it can be removed for cleaning to maintain the gage's response and accuracy.

Vacuum Murphygage® instrument

Available in 0 to 20 or 0 to 30 in. Hg. (0 to -68 or 0 to -102 kPa) vacuum.

Temperature Murphygage® instrument

As temperature rises, the fluid in the sensing bulb vaporizes to apply pressure on the diaphragm; the movement translates this vapor pressure to a calibrated reading of temperature on the dial. The standard capillary is copper with a PVC armor. Optional armor covering is galvanized steel or 316 stainless steel (specify). Optional bulb types, adaptor nuts and thermowells are available.

Applications

Industrial engines and equipment in Oil Field, Marine, Irrigation, Construction and Trucking industries. Monitoring Engine Coolant, Crankcase Oil, Transmission Oil.

Specifications

Dial: White on black; U.S.A. standard scale is dual scale; others available (see How to Order).

Gage Accuracy:

Pressure/Vacuum (% of Full Scale):

RANGE	LOWER 1/4	MIDDLE 1/2	UPPER 1/4
≤300 psi (24 Bar)	±3%	±2%	±3%
400 psi (28 Bar)	±3%	±3%	±5%

Temperature: See chart on reverse side.

Temperature Range:

Pressure/Vacuum:

Ambient: -40°F (-40°C) thru 150°F (66°C).
Process: -40°F (-40°C) thru 250°F (121°C).

Temperature: See chart on reverse side.

Maximum Panel Thickness: 1/4 in. (6 mm).

Port: Brass.

Case: Plated steel; mounting clamp included (except for direct mount models).

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

Pointer: White (black dial); black (white dial).

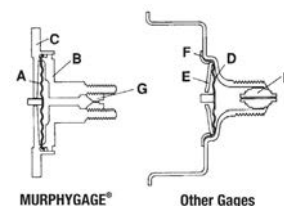
Lens: Polycarbonate, high-impact.

Sensing Element: Beryllium copper diaphragm.

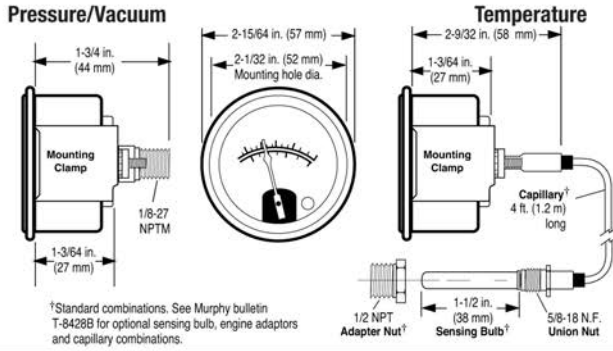
Comparison of a Murphygage® instrument to Most Other Gages

The basic difference between the Murphygage® instrument and most other gages is the internal design. The Murphygage® instrument does not rely on the gage case to serve as part of the sensing chamber. The diaphragm (A) which must expand and contract consistently with changing pressures and temperatures, is held firmly in place by the back plate (B) and the mounting plate (C). In most other gages the diaphragm (D) and an expansion retarding plate (E) are soldered directly into the case port and held in place by a locator ring (F). Should the case receive any damage in this area the diaphragm operation could be affected. However, in the Murphygage® instrument, the diaphragm is protected and securely locked in position.

Another feature of the Murphygage® instrument is the removable pulsation dampener (pressure instruments only) (G) which provides for periodic cleaning when being used with liquids which might cause clogging. Other gages are usually equipped with a non-removable dampener (H).



Standard Dimensions



Temperature Accuracy/Range Chart

Celsius measurements are shown in parenthesis.

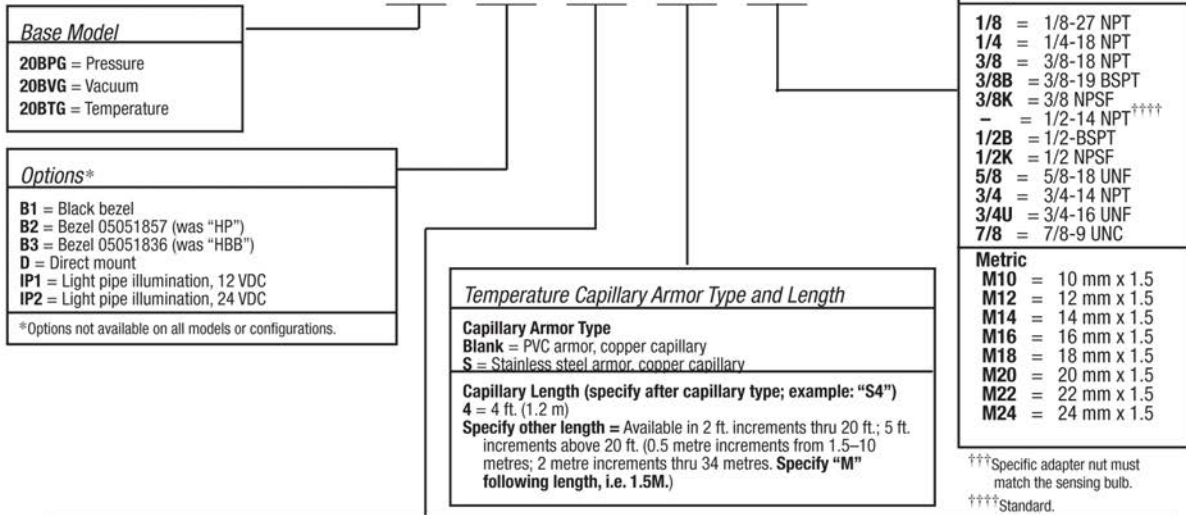
RANGE	Lower 1/3 Scale	Middle 1/3	Upper 1/3
32-120 (0-49)	± 12° (± 6)	± 5° (± 2.4°)	± 6° (± 3°)
32-160 (0-71)	± 20° (± 10°)	± 8° (± 4.4°)	± 7° (± 4°)
130-220 (54-104)	± 6°F (± 3°)	± 3° (± 1.6°)	± 4° (± 2°)
130-250 (54-121)	± 9° (± 5°)	± 5° (± 2.4°)	± 4° (± 2°)
140-300 (60-149)	± 10° (± 5.2°)	± 6° (± 3°)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

MAXIMUM PROCESS TEMPERATURE

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

How to Order

To order, use the diagram below. **NOTE:** List options in ascending alphabetical order (A-Z). Example: 20BTG-IP1-250-4



Range ^{††}					
Pressure (20BPG) Dual scale (psi/kPa)		Pressure (20BPG) Single scale (bar)	Vacuum (20BVG) Dual scale (in. Hg/kPa)		Temperature (20BTG) Dual scale (°F/°C)
15	0-15	0-103	18	0-1 bar	120 = 32-120 0-49
30	0-30	0-207	28	0-2 bar	160 = 32-160 0-71
50	0-50	0-345	3.5B	0-3.5 bar	220 = 130-220 54-104
75	0-75	0-517	5B	0-5 bar	250 = 130-250 60-121
100	0-100	0-689	7B	0-7 bar	300 = 140-300 60-149
150	0-150	0-1.03	10B	0-10 bar	320 = 160-320 71-160
200	0-200	0-1.38	14B	0-14 bar	350 = 180-350 71-160
300	0-300	0-2.07	20B	0-20 bar	440 = 300-440 149-227
400	0-400	0-2.76	28B	0-28 bar	
					Temperature (20BTG) Single scale (°C)
					70C = 0-70°C
					100C = 45-100°C
					120C = 50-120°C
					140C = 60-140°C
					160C = 70-160°C

^{††}Consult factory for availability of dials other than psi/kPa or °F/°C. Select scale so your normal operating value is in the middle half of the scale.

Direct Mount Pressure Switch Model PSB



Features

- Limit Switch for Critical Pressure
- Operate Alarms or Shutdown Equipment
- SPDT Snap-Acting Switch
- Fits Most Engine Applications

¹ Products covered by this bulletin comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility except as noted.

The PSB switch is a direct mount switch for critical pressure points. It has one limit contact that can be used to activate an alarm, actuate indicator lights or shutdown equipment.

The construction of this instrument is the same as our time-proven Swichgage® instrument. A precision machined brass mounting plate and port captures a high quality stamped beryllium copper diaphragm. The single-pole, double-throw (SPDT) snap-switch is operated directly from the diaphragm for quick acting and positive switching. Trip point is factory preset according to your specifications.

Housing is weather sealed to prevent entry of moisture, dust, etc. A glass-filled nylon terminal block with quick screw terminal connections gives the PSB switch a real advantage in industrial engine applications. The PSB is ideal when reading is not desired, but pressure is critical to operational efficiency. Intended for use in general purpose nonclassified areas.

Applications

- Engine Lubrication
- Water pumps
- Compressors
- Oil field systems
- Irrigation systems
- Construction Equipment
- Light-duty Mobile Equipment
- Marine engines
- Generators

Features

- Fits all engine applications
- SPDT snap-switch
- Activates indicator lights, alarms, or shut down equipment
- Time-proven Swichgage® construction
- Easy wiring terminal block
- Steel housing specially coated to resist corrosion
- Factory preset to your specifications

Specifications

Housing: Plated steel.

Pressure Connection: 1/8-27 NPT, Brass.

Diaphragm: Formed beryllium copper (heat treated).

Pulsation Dampener: Brass (it is removable for cleaning).

Terminal Block: Three #4-40 screws.

Accuracy: Trip point: $\pm 3\%$ of full scale.

Switch reset differential: $\pm 7\%$ of full scale.

Repeatability: $\pm 1\%$ of full scale.

Contact Rating: SPDT 3 A @ 30 VDC inductive.

Maximum Pressure: See Trip Point Chart on reverse side.

Temperature Range:

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

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

Factory Trip Point Setting: See Trip Point Chart (on back).

Pressure Range: Specify from 0-400 psi (0- 2.76 MPa) [0- 27.58 bar]. See Trip Point Chart on reverse side.

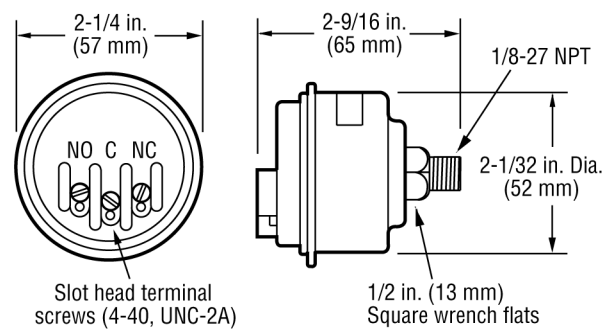
Contact: Operates on rising or falling pressure (specify).

Shipping Weight: 8 oz. (0.25 kgs).

Shipping Dimensions: 3 x 2-3/4 x 2-3/4 in. (76 x 70 x 70 mm).

■ NOTE: No customer replacement parts.

Dimensions



Trip Point Chart

Ranges available psi (kPa/MPa) [bar]	Factory setting psi (kPa) [bar] Falling	Maximum pressure psi (kPa) [bar]
0-15 (0-103) [0-1.03]	3 (21) [.21]	30 (207) [2.07]
0-30 (0-207) [0-2.07]	7 (48) [.48]	60 (414) [4.14]
0-50 (0-345) [0-3.45]	10 (69) [.69]	100 (0-689) [0-6.89]
0-75 (0-517) [0-5.17]	15 (103) [1.03]	150 (0-1.03) [0-10.34]
0-100 (0-689) [0-6.89]	20 (138) [1.38]	200 (0-1.38) [0-13.79]
0-150 (0-1.03) [0-10.34]	30 (207) [2.07]	300 (0-2.07) [0-20.70]
0-200 (0-1.38) [0-13.79]	50 (345) [3.45]	400 (0-2.76) [0-27.60]
0-300 (0-2.07) [0-20.70]	75 (517) [5.17]	500 (3.45) [34.50]
0-400 (0-2.76) [0-27.60]	150 (1.03) [10.34]	500 (3.45) [34.50]

How to Order

PSB - - -

Pressure Range
Specify maximum value
from chart above.

Switch Trip Point[†]
F = Factory set to trip on falling. Specify "F" and the set point value.
Example: PSB-100-**F20**.
R = Factory set to trip on rising. Specify "R" and the set point value.
For units of measure other than psi, specify the set point value followed by unit of measure as follows:
B = Bar
K = kPa/MPa
M = kg/cm2
Example: PSB-7**B-2B**
[†]Switch set point value will be stated on label.

Pressure Gage and Swichgage® Instruments OPL Series 4-1/2 in. (114 mm) Diameter Dial



Features

- Combination Indicating Gage and Critical Pressure Limit Switches
- High and Low Pressure Limit Contacts Are Visible and Adjustable
- Panel and Surface Mount Versions
- Indicating-Only Murphygage® Available
- Latching Control Relay Versions Available

1 Selected configurations are third party listed. Consult factory for details.

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

† Options not available on all models or configurations.

The OPL-series pressure Swichgage instruments are combination pressure indicating gages with adjustable low and high limit switches. Limit switches can be wired directly to electric pilot circuits to operate alarms, shutdown or start/stop of engines and electric motors.

Surface mount or panel mount enclosure is available for most versions. All versions feature a 4-1/2 in. (114 mm) dial for easy viewing. Adjustable limit switches are accessible from front of the Swichgage instrument. Limit contacts have self-cleaning motion to enhance electrical continuity.

Other versions available (see page 2):

- Gage-only without contacts (Murphygage instrument)
- Swichgage instrument with built-in latching relay for start-stop operations.

Specifications

Case: Die cast aluminum; weatherproof.

Contacts: See Electrical page 3, for contact ratings.

Dial: 4-1/2 in. (114 mm) white on black, dual scaled psi / kPa. Other dial configurations available. Consult factory.

Gage Accuracy: ±2% for the **first** and **last** quarters of the scale, the **middle** half is ±1%.

Geared Movement: 302 and 304 stainless steel.

Lens: Optically clear polycarbonate.

Pointer: High visibility with a pointer calibration hub.

Process Connection: Available in 1/4 NPT and 1/2 NPT. See **Table B**, page 5.

Sensing Element: Select from bronze or 316 stainless steel bourdon tube. See **Table B**, page 5 for bourdon tube/socket combinations.



Product Selection Information

WARNING: Selection of the proper gage/Swichgage instrument should include consideration for the service application, the medium being measured, electrical ratings, hazardous area requirements and general operating conditions. Improper selection and/or application may be detrimental to the gage/Swichgage instrument, could cause failure in the operating system and possibly personal injury or property damage. If in doubt consult our sales/engineering staff.

Base Models



OPLC

OPLC, OPLCE and OPLG

The **OPLC** is a surface mount, indicating, pressure gage and switch. Adjustable high and low limit, ungrounded contacts are used to operate alarm, shutdown or start-stop circuits. Pointer closure against either of the adjustable contacts completes the pilot-duty circuit. An SPST toggle switch is provided to override the low limit contact for equipment startup. Suitable for engines or electric motors with appropriate Murphy magnetic switch or transformer relay assembly.

The **OPLCE** features a panel mount square case. It has all the features of the OPLC except the low limit contact lockout.

The **OPLG** is an indicating-only pressure Murphygage instrument. Same as the OPLC except without switch (limit) contacts.



OPLFC

OPLFC and OPLFG

The **OPLFC** is a panel mounting version of the OPLC. It has all of the features of the OPLC except the low limit contact lockout. The lockout must be done externally through the control circuit or with the optional "SA" lockout. The OPLFC is typically used in control panels such as for compressors, pumps, etc. This version can be environmentally sealed with either the "ES" or "OS" options. Contact lead termination is by pigtail wires.

The **OPLFG** is an indicating-only pressure Murphygage instrument. Same as the OPLFC except without switch (limit) contacts



OPLBP

OPLBP and OPLBPE

The **OPLBP** is a specialized version of the OPL series designed for start-stop operation of engines and electric motors. The pilot-duty limit switches are connected to an internal latching control relay for ON/OFF automation. Available for various voltages.

The **OPLBPE** is the same as the OPLBP except has a panel mount square case.



¹ Products covered by this bulletin comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility except as noted.

² Selected configurations are third party listed. Consult factory for details.

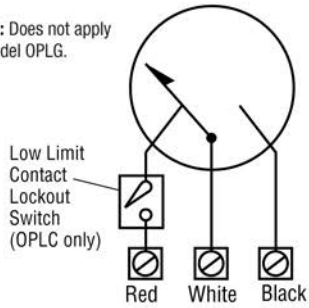
[†] Options not available on all models or configurations.

Electrical

Dimensions

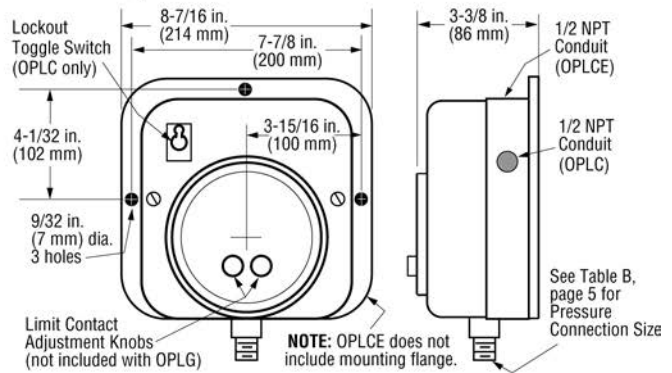
OPLC and OPLCE

NOTE: Does not apply to model OPLG.



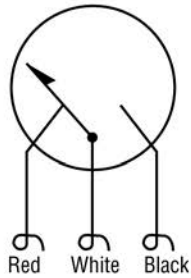
Contact Rating: 1 SPDT; Center off; 2 A, 30 VDC, 1 A, 125 VAC pilot duty

OPLC, OPLCE and OPLG



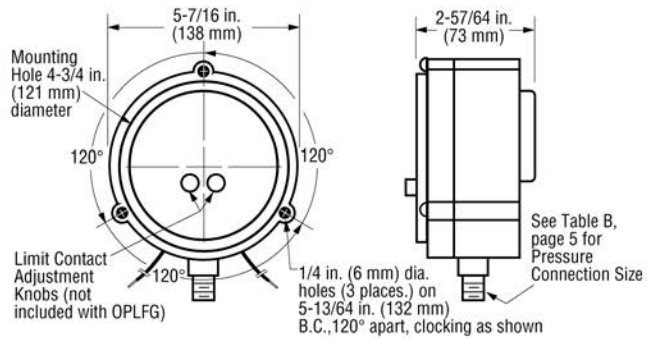
OPLFC

NOTE: Does not apply to model OPLFG.

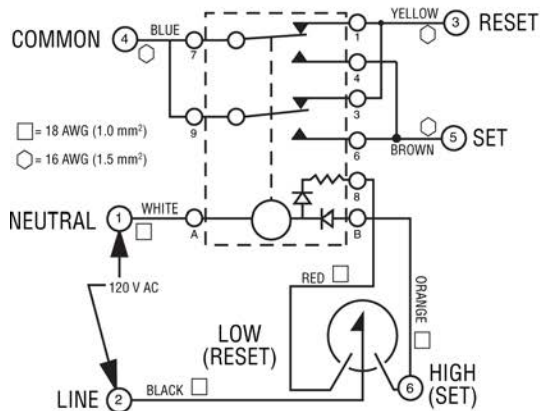


Contact Rating: 1 SPDT; Center off; 2 A, 30 VDC, 1 A, 125 VAC pilot duty

OPLFC and OPLFG

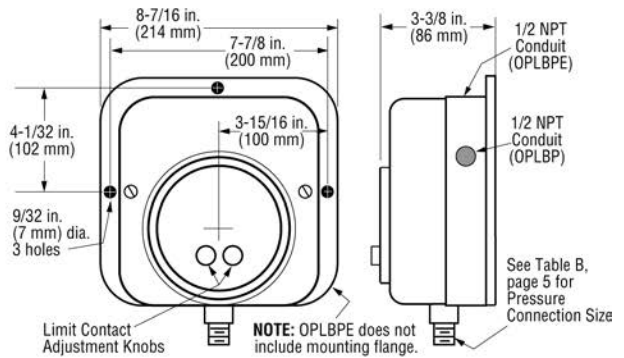


OPLBP and OPLBPE



Contact Rating: SPDT dry relay contacts; 10 A, 125 VAC.

OPLBP and OPLBPE



Options and Accessories

P4 and P6 Options

The **P4 (was PT147)** option provides a remote seal mechanism to protect the Swichgauge instrument sensing element from line pressures of highly viscous and mildly corrosive fluids. Ranges 100 thru 5,000 psi (689 kPa thru 34.5 MPa) [6.9 thru 344.7 bar]. A sealed stainless steel capillary tube, with stainless steel armor, transmits the pressure from the diaphragm seal to the Swichgauge instrument. Standard capillary length is 5 ft. (1.5 m). Optional lengths to 50 ft. (15 m) in 5 ft. (1.5 m) increments are available. Oil well lead lines and pumps with highly viscous liquids are typical applications. If required, customer should provide a pulsation dampener.

The **P6 (was PT167)** option is a diaphragm sealed to a 2 NPT housing which attaches directly to the pressure gage connection. The gage sensing element and the diaphragm chamber are filled with a silicone fluid so that pressure against the diaphragm causes the gage to respond. The diaphragm housing is plated machined steel. Typical application is for oil well lead lines. Ranges 100 thru 1,000 psi (689 kPa thru 6.8 MPa) [6.89 thru 68.9 bar]. The P4 and P6 can be ordered as optional features to the Swichgauge or indicating-only Murphygage instrument. See *How to Order*.

NOTE:

P4 option not available for scales below 100 psi.

P6 option available for scales 100 psi thru 1,000 psi only.



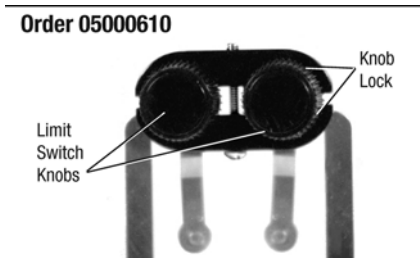
OPLFC-A-600-OS-P6



OPLFC-A-1000-OS-P4L

Tamperproof Contact Accessory

Order 05000610



Pulsation Dampener

- Eliminate pointer contact flutter on pressure Swichgauge and Murphygage instruments which are subject to pulsating pressure from reciprocating pumps or compressors.
- Allow close high-low contact settings for more accurate pressure indication and equipment control.
- Decrease wear on internal geared movement and increase the life of your instrument by eliminating excessive strain and unnecessary pointer movement.
- Available in brass, carbon steel and stainless steel.
- **Must be ordered separately.**



How to Order

Selecting a Model:

1. Select a Base Part Number from **Table A**
2. Select Bourdon Tube and Socket code from **Table B**
3. Select "BP" Relay Voltage code (applies to "BP" models only) from **Table C**
4. Select Range code from **Table D**⁽¹⁾
5. Select Options from **Table E**⁽²⁾

OPLBP - S - 2 - 1000 -

⁽¹⁾ For metric only dials specify scale and unit of measure; example: kPa or bar.

⁽²⁾ List options in alphabetical order (A to Z) followed by numeric in ascending order. Place a dash (-) between each option. See example above.

Table A: Base Models

OPLC	Switchgag, surface mount, with low limit lockout switch
OPLCE	Switchgag, panel mount square case
OPLFC	Switchgag, panel mount
OPLBP*	Switchgag, surface mount, with latching control relay
OPLBPE*	Switchgag, panel mount square case, with latching control relay
OPLG	Murphygag, surface mount
OPLFG	Murphygag, panel mount

* This version not covered by the CE mark.

Table C: "BP" Relay Voltage

Code	Voltage
Blank ⁽³⁾	120 VAC
2	12 VDC
4	24 VDC

NOTE: Relay Voltage applies to "BP" models only.

⁽³⁾ No code is required for 120 VAC voltage.

Table B: Bourdon Tube and Socket

Code	Process Connection	Tube Type	Range Selection Limits psi (MPa) [bar]	Bourdon Tube and Tip Material (all joints TIG welded except "A")	Socket Material
A ⁽⁴⁾	1/4 NPT	Drawn C-Tube	Thru 1,000 psi (6.89 MPa) [68.95 bar]	Grade A Phosphor Bronze Tube (Brass Tip, Silver Brazed)	Brass
S ⁽⁵⁾ ⁽⁶⁾	1/4 NPT	Drawn C-Tube	Thru 1,000 psi (6.89 MPa) [68.9 bar]	316 Stainless Steel	316 Stainless Steel
	1/2 NPT	Drawn Helical	1,500/10,000 psi (10.3/68.9 MPa) [103.42/700 bar]		

⁽⁴⁾Standard thru 1,000 psi (6.89 MPa) [68.95 bar].

⁽⁵⁾Standard 1,500 psi (10.3 MPa) [103.42 bar] thru 10,000 psi (68.9 MPa) [700 bar].

⁽⁶⁾Optional all ranges.

Table D: Ranges

Code	Vacuum/psi	kPa/MPa	bar	Dials All dials are dual scaled psi and kPa/MPa. Single scale dials and custom dials available. Additional charges may apply. Gages All 4-1/2 inch (114 mm) Switchgauge instruments are available for Class I, Division 1, Groups C & D hazardous applications. Division 2 locations can also be covered by our Non-Incendive or Intrinsically Safe systems. See the full catalog or contact any Murphy representative for complete details.
30HV60H	30" Hg/Vac-60" Hg/Press.	-101 kPa-203 kPa	-1.01-2.03	
30V	30" vac-0 psi	-101 kPa-0 kPa	-1.01-0	
30V15	30" vac-15 psi	-101 kPa-103 kPa	-1.01-1.03	
30V30	30" vac-30 psi	-101 kPa-207 kPa	-1.01-2.07	
30V100	30" vac-100 psi	-101 kPa-689 kPa	-1.01-6.89	
30V200	30" vac-200 psi	-101 kPa-1.38 MPa	-1.01-13.79	
30V300	30" vac-300 psi	-101 kPa-2.07 MPa	-1.01-20.68	
15	0-15 psi	0-103 kPa	0-1.03	
30	0-30 psi	0-207 kPa	0-2.06	
60	0-60 psi	0-414 kPa	0-4.13	
100	0-100 psi	0-689 kPa	0-6.89	
160	0-160 psi	0-1.10 MPa	0-11	
200	0-200 psi	0-1.38 MPa	0-14	
300	0-300 psi	0-2.07 MPa	0-20	
400	0-400 psi	0-2.76 MPa	0-28	
600	0-600 psi	0-4.14 MPa	0-40	
1000	0-1000 psi	0-6.89 MPa	0-70	
1500	0-1500 psi	0-10.34 MPa	0-100	
2000	0-2000 psi	0-13.79 MPa	0-140	
3000	0-3000 psi	0-20.68 MPa	0-200	
5000	0-5000 psi	0-34.48 MPa	0-350	
10000	0-10,000 psi	0-68.95 MPa	0-700	

Table E: Options[†]

Option	Description	Option	Description
BC	Back connected bourdon tube	P6	(PT167) PT167 pressure transmitter, direct mounting
ES	Environmentally sealed	TA	(TCA) Tickler contact
EX	Explosion-proof: SWITCHGAGE® enclosed within explosion proof case; Class I, Div. 1, Groups C & D		
EL	(EXLC) Explosion-proof less case		
LC	Less case		
OS	Oil sealed case		
P4L	(PT147) Pressure transmitter with 5 ft. (1.5 m) capillary* (Pulsation dampener no longer supplied.) * For capillary greater than 5 ft., specify in 5 ft increments following designator; example: P4L15		

[†]Options not available on all models or configurations.

Shipping Information**

Shipping Weights:

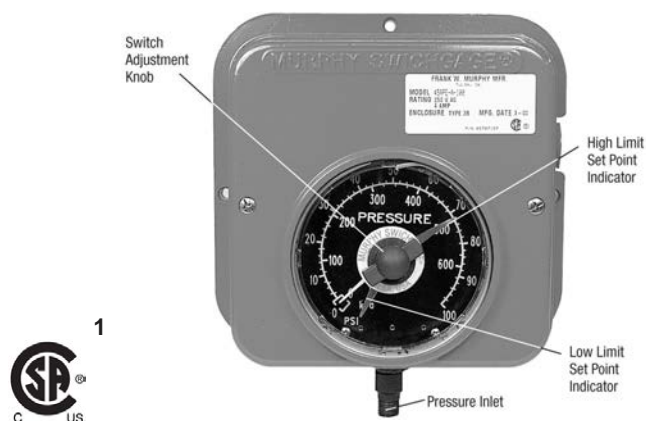
OPLC: 5 lbs 9 oz (2.5 kg)
 OPLG: 5 lbs 6 oz (2.4 kg)
 OPLFC and OPLCE: 3 lbs 4 oz (1.5 kg)
 OPLFG: 3 lbs 4 oz (1.5 kg)
 OPLBP and OPLBPE: 5 lbs 11 oz (2.6 kg)

Shipping Dimensions:

OPLC, OPLG and OPLFG:
 9-1/2 x 9-1/4 x 5-3/4 in. (241 x 235 x 146 mm)
 OPLFC and OPLCE:
 9-1/4 x 8-1/4 x 5-1/2 in. (235 x 210 x 140 mm)
 OPLBP and OPLBPE:
 9-1/4 x 8-1/4 x 5-1/2 in. (235 x 210 x 140 mm)

** Some options could alter shipping weights and dimensions. Consult factory.

Pressure Switchgauge® 45APE Series Instrument



Features

- Combination Indicating Gage with Independent Low and High Snap-Acting Switches
- Field-Adjustable and Highly Visible Low and High Pressure Trip Point Indicators
- Dual-Sector Geared Movement Allows for Full-Scale Indication and Set Point Control
- Panel and Surface Mount Versions Available
- Latching Control Relay Versions Available

1 Listed for non-hazardous locations Pending for hazardous location.

The 45APE Series Switchgauge instrument is a mechanical gage for pressure indication. It includes 2 adjustable SPDT switches. These snap-acting switches can be used for start and stop, to trip alarms and to shut down equipment. Ranges are available from 30"vac (-100 kPa) [-1 bar] thru 10,000 psi (138 MPa) [1379 bar], see back page.

Basic Operation

The 45APE Series utilizes a bourdon tube sensing unit with a stainless steel dual-sector geared movement. Each of the sectors drive separate pointers when pressure is applied to the bourdon tube. The indicating pointer (visible pointer) shows actual pressure reading, including below and beyond the low and high trip points. The low and high trip points are adjustable independently on the gage front lens. The switch operator pointer (behind the dial) is calibrated to follow the indicating pointer. The low and high trip point indicators "arrest" the switch operator pointer, and as pressure decreases or increases, through "the principal of lost motion" the respective snapswitch is tripped.

Basic Models

45APE Series Switchgauge instrument
Surface mount (square case) version.

45APEF Series Switchgauge instrument
Panel mount (round case) version.

45APEBP Latching Control Relay Series

These models have a latching control relay for automatic ON/OFF control. They are designed to start and stop electric motor driven equipment.

45APEE and 45APEBPE

These models (square case) have the same features as the 45APE/45APEBP, but suitable for panel mounting.

Applications

The 45APE Series models are widely used in applications requiring pressure indication and Form "C" low and high pressure switches.

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 - 10,000 psi; back connection optional.

Sensing Element: Bronze or 316 stainless steel bourdon tube.

Gage Accuracy: Indicating pointer within switch points with hysteresis of <1%; $\pm 2\%$ for first and last quarters of scale; middle half of scale is $\pm 1\%$.

Indicating pointer above or below trip point:

Range	Accuracy (+/-) above & below trip point only
< 100 (except 15 psi)	10
15	15
100-300	4
400-1000	2
1500-2000	12
3000-5000	8

Reading based on testing performed with switch point at mid scale which represents worst case. Switch accuracy $\pm 1.5\%$.

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

Switch Reset Deadband: Approximately 10% FS.

Snap-Acting Switches: 2-SPDT; 2 A @ 250 VAC.

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 mm²) x 9 in. (229 mm) long.

Wire Connections (-ES, -OS): 1/2 NPTM conduit and wire leads, 24 AWG (0.22 mm²) x 30 in. (762 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.

CSA Certified Models: 45APE Series models with pressure range thru 5000 psig (34.4 MPa) [344 bar] are CSA approved for Non-Hazardous locations, except options BC, ES, LC and OS. Explosion-proof "EX" models with pressure range thru 5000 psig (34.4 MPa) [344 bar] are CSA approved for Hazardous locations Class I, Groups, C & D. 45APEBP and 45APEBPE models are not CSA certified.

How to Order

Specify model number. **NOTE:** No designator is required for **Standard** configurations. List options in alphabetical order (A to Z). Place a dash (–) between each option. See example below.

Base Model
45APE 45APEE
45APEF 45APEBPE*
45APEBP*
* Not covered by CSA.

Voltage (BP models only, feature NOT covered by CSA)
Blank= 120 VAC
2 = 12 VDC
4 = 24 VDC

Bourdon Tube/Socket
A = Bronze/Brass std. <=1,000 psi
S = 316 Stainless Steel/ 316 Stainless Steel

Options (NOTE: Not all options available for every model.)
BC = Back Connected Bourdon Tube
ES = Environmentally Sealed (45APEF models only)
EX = Explosion-proof (approved for hazardous areas Class I, Groups C & D to <= 5000 psig)
EL = (EXLC) Explosion-Proof Less Case
LC = Less Case
OS = Oil Sealed (45APEF models only)
P4L = (PT147) PT147 pressure transmitter w/5 ft. capillary⁽¹⁾
(Pulsation dampener no longer provided)
P6 = (PT167) PT167 Pressure transmitter direct mount⁽²⁾
(1) For capillary greater than 5 ft., specify in 5 ft. increment following designator, example: P4L15 (option P4 with 15 ft. capillary).
(2) Available for ranges ≥100-1000 psi only.
NOTE: for detail on P4L, P6 options see FWMurphy sales bulletin OPL-96001B in section 05 of your catalog.

45APEBP – 4 – S – 100 – EX

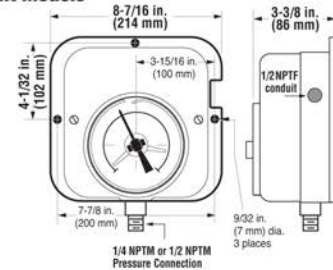
45APE Series Typical Wiring Diagram

Contact Ratings: 2-SPDT snap-switches; 2 A @ 250 VAC
NOTE: Diagram shows the pointer in the rest (shelf) position.

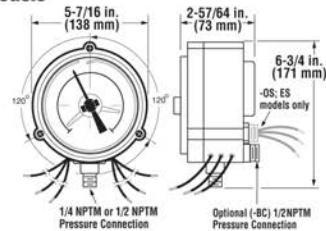
Range

Code	Vacuum/psi	kPa/MPa	bar
30HV60H	30" Hg/Vac - 60" Hg/Press.	-101 kPa-203 kPa	-1.01-2.03
30V	30" vac - 0 psi	-101 kPa - 0 kPa	-1.01 - 0
30V15	30" vac - 15 psi	-101 kPa - 103 kPa	-1.01 - 1.03
30V30	30" vac - 30 ps	-101 kPa - 207 kPa	-1.01 - 2.07
30V100	30" vac - 100 psi	-101 kPa - 689 kPa	-1.01 - 6.89
30V200	30" vac - 200 psi	-101 kPa - 1.38 MPa	-1.01 - 13.79
30V300	30" vac - 300 psi	-101 kPa - 2.03 MPa	-1.01 - 20.68
15	15 psi	0 - 103 kPa	0 - 1.03
30	0 - 30 psi	0 - 207 kPa	0 - 2.06
60	0 - 60 psi	0 - 414 kPa	0 - 4.13
100	0 - 100 psi	0 - 689 kPa	0 - 6.89
160	0 - 160 psi	0 - 1.10 MPa	0 - 11.03
200	0 - 200 psi	0 - 1.38 MPa	0 - 13.78
300	0 - 300 psi	0 - 2.07 MPa	0 - 20.68
400	0 - 400 psi	0 - 2.76 MPa	0 - 27.57
600	0 - 600 psi	0 - 4.14 MPa	0 - 41.36
1000	0 - 1000 psi	0 - 6.89 MPa	0 - 68.95
1500	0 - 1500 psi	0 - 10.34 MPa	0 - 103.42
2000	0 - 2000 psi	0 - 13.79 MPa	0 - 137.89
3000	0 - 3000 psi	0 - 20.68 MPa	0 - 206.84
5000	0 - 5000 psi	0 - 34.48 MPa	0 - 344.73
10000	0 - 10,000 psi	0 - 68.95 MPa	0 - 689.47

Surface Mount Models



Panel Mount Models



Lead Line Pressure Swichgauge® Instrument Model PT167EX 4-1/2 in. (114 mm) Diameter Dial



Features

- Designed to Monitor Line Pressures of Highly Viscous and Mildly Corrosive Fluids
- Combination Indicating Gage and Critical Pressure Switch
- High and Low Pressure Limit Contacts Are Visible and Adjustable
- Explosion-Proof Enclosure

- 1 The PT167EX is CSA listed for ranges 100 to 5000 psi (689 kPa to 34.5 MPa) [6.89 to 344.74 bar].
2 Products covered by this bulletin comply with EMC Council directive 89/336/EEC regarding electromagnetic compatibility as noted.

The Murphy PT167EX is a pressure Swichgauge instrument connected to a threaded pressure diaphragm housing. The Swichgauge instrument is enclosed in an explosion-proof case and is CSA rated for Class I, Division 1, Groups C and D.

A Swichgauge instrument is a pressure indicating gage with adjustable low and high pressure limit switches. When the gage pointer touches the low or high limit switches, an electrical circuit is completed which can operate alarms and/or shut down equipment.

The 2 NPT, sealed-diaphragm housing is attached directly to the Swichgauge connection. The diaphragm housing is filled with a silicone fluid so that pressure against the diaphragm causes the Swichgauge instrument to respond. The housing seals the Swichgauge sensing element from the medium being measured.

Applications

Applications include highly viscous liquids such as crude oil on lead line applications. Other applications have included asphalt, sludge, abrasive materials, etc.

Specifications

Case: Explosion-proof, sand cast aluminum. Lens is removable. CSA Listed for Class I, Division 1, Groups C and D.*

Contact Rating: 1 A, 125 V AC.

Dial: 4-1/2 in. (114 mm) white on black, dual scaled psi /kPa. Other dial configurations available. Consult factory.

Ranges: See How to Order on reverse side.

Gage Accuracy: ±3% full scale.

Dimensions

Process Connection: 2 NPT.

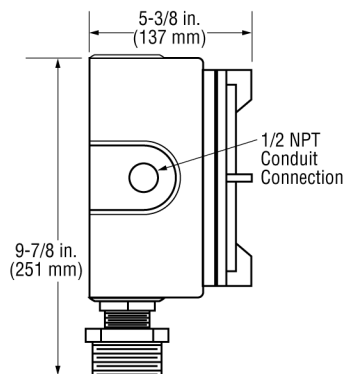
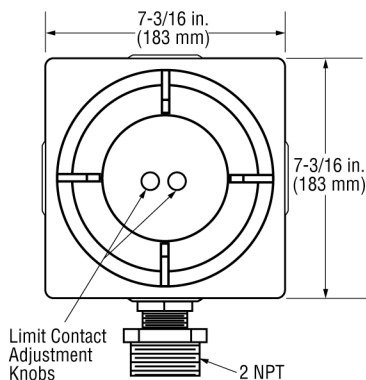
Maximum Pressure: 30% overpressure.

Diaphragm Housing: Plated steel, Ni-Span®; silicon filled.

Diaphragm Fluid: Silicone 200.

Shipping Weight: 16.5 lb (7.5 kg).

Shipping Dimensions: 12 x 12 x 9 in. (305 x 305 x 229 mm).



How to Order

To order, specify pressure range, bourdon tube and options. Example: **PT167EX-A-200-T1**.



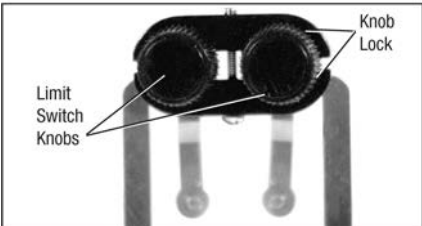
Bourdon Tube Socket-Material/Size			
Specify	Tube/Socket Material	Tube Type	Range Selection Limits psi (MPa) [bar]
A	Grade A Phosphor Bronze (Tube) Brass (Socket)	C-Tube	Thru 1,000 psi (6.89 MPa) [68.95 bar]
S	316 Stainless Steel (Tube and Socket)	C-Tube	Thru 1,000 psi (6.89 MPa) [68.95 bar]

Ranges			
Specify	vacuum/psi	kPa/MPa	bar
100	0 - 100 psi	0 - 689 kPa	0 - 6.89
160	0 - 160 psi	0 - 1.10 MPa	0 - 11.03
200	0 - 200 psi	0 - 1.38 MPa	0 - 13.78
300	0 - 300 psi	0 - 2.07 MPa	0 - 20.68
400	0 - 400 psi	0 - 2.76 MPa	0 - 27.57
600	0 - 600 psi	0 - 4.14 MPa	0 - 41.36
1000	0 - 1000 psi	0 - 6.89 MPa	0 - 68.95

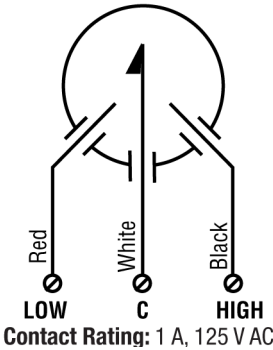
If specifying range in bar, kPa/MPa or kg/cm², specify appropriate designator after value.
Example: 20**B** = 20 bar.
B = Bar
K = kPa/MPa
M = kg/cm²

Tamperproof Contact Accessory

Order 05000610

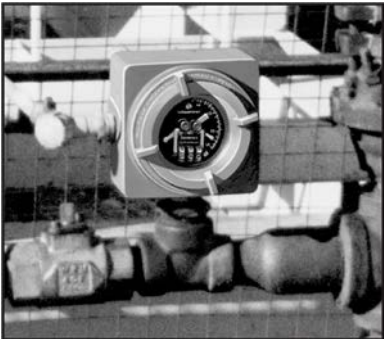


Internal Wiring



Typical Installation

The photo at right shows the PT167EX installed in a lead line. For optimum effectiveness, the PT167EX should be installed ahead of all other devices or valves; by positioning it immediately adjacent to the well outlet, the Swichgage instrument monitors the entire lead line, sensing any blockage whether sludge build-up in the line or an accidental closed valve. The pressure trans-mitter threads into a 2 NPT tee on the lead line.



PXT-K Series Pressure Transmitters



Features

- 4-20 mA Output Signal
- Piezoresistive Pressure Transmitter
- Corrosion Resistant Construction
- High Stability

The **PXT-K Series** pressure transmitters are state-of-the-art instruments providing 4-20 mA output. Each Piezoresistive Pressure Transmitter contains a transducer comprised of a piezoresistive silicon chip mounted on a glass-metal feed-through header welded into a stainless steel housing and filled with silicone oil; the very thin laser-welded stainless steel isolation-diaphragm completes the front side. Media pressure is transferred from the stainless steel isolation-diaphragm, via the oil inside the cell, to the silicon measuring chip. This construction, combined with the advanced internal signal conditioning circuitry, results in a rugged instrument with extremely small temperature error and class-leading EMI/RFI resistance.

The enclosure and all wetted parts are made of 316L stainless steel to meet NACE MR01-75.

Applications: **PXT-K Series** Pressure Transmitters can be used in applications such as Compressors, Engines, Process Control, Liquid Level and Pumps.

Specifications

Operating Pressure Range: See the part number matrix on the reverse side.

Operating Temperature: -40 to 180°F (-40 to 82°C).

Compensated Temperature Range: -20 to 160°F (-29 to 71°C).

Physical Characteristics:

Process Connection: 1/4 NPT female with 7/8" Hex Nut.

Electrical Connection (PXT-K-XXX): 1/2" NPT Male
Conduit connection with 60" long cable, vented

Enclosure: NEMA 4/IP65 or better

Body: 316L Stainless Steel. Meets NACE MR01-75.

Wetted Parts: 316L stainless steel

Environmental Effect (Humidity): No effect for 0-95%, Non-condensing

Mounting: Transmitter can be installed in any axis. Transmitter position has negligible effect on performance as long as it is perpendicular to the flow being monitored.

Shock Resistance: 1000g per IEC 60068-2-6 (Mechanical Shock)

Vibration Resistance: 20G per IEC 60068-2-6 (Vibration under resonance)

Wiring Protection: Protected against reverse polarity and short circuit, 48 VDC Maximum

Supply Voltage: 8 - 30 VDC (Typically 24 VDC)

Transmitter Output: 4-20mA, two wire configurations with load characteristics

Insulation: Greater than 10MΩ @ 300 VDC

Electromagnetic Compatibility (EMC): Standards; EN 61000-6-2:2005, EN 61000-6-3:2007, EN 61326-2-3:2006

Voltage Surge/Spike Protection: Protection against a 600 Volt spike per IEC 60-2

Shipping Weight: 6.5 ounces

Applicable Standards:

NACE MR0175 Compliant with the requirements

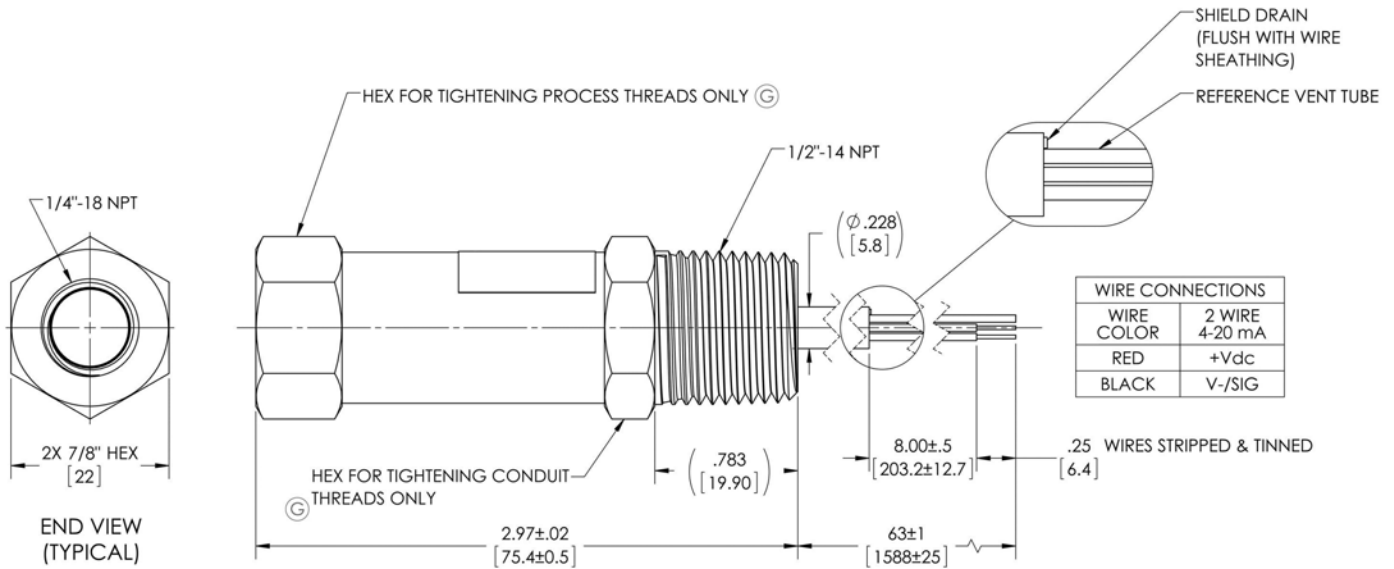
CSA (c/us): Class I / II / III, Div 1, Groups A-F T4
Class I / II / III, Div 2, Groups A-D,F,G T4

ATEX: IBExU 10 ATEX 1124 X

II 1G Ex ia IIC T6-T4

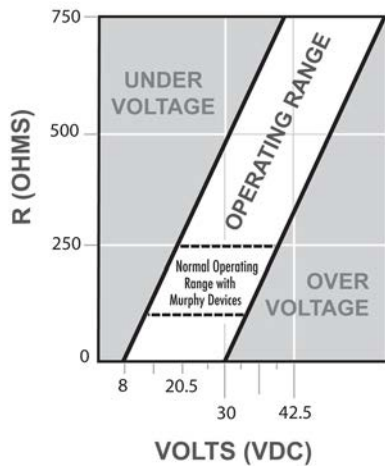
II 3G Ex nA IIC T6

Product Dimensions - PXT-K



Operating Range

Supply voltage for the PXT-K must be within range of 8-30 VDC. The graph below shows the minimum supply voltage (VDC) required for a given load resistance (R).



LOOP RESISTANCE GRAPH

How to Order

PXT-K Series Model Number Matrix

Example: PXT-K-600
Murphy two wire Pressure Transmitter with Flying Lead Connection, 0-600psig range, 4-20 mA_{dc} output. If no digit follows the pressure range, it is automatically a 4-20 mA_{dc} output signal.

MODEL NUMBER:

PXT -						OUTPUT SIGNAL
						4-20 mA _{dc} BLANK
K	PXT (Flying Lead)					30V30WC (-30" H ₂ O to +30" H ₂ O)
KM	PXM (M12 x 1 Connector)					30V30 (-30" Hg to +30 psig)
KD	PXD (DIN 43650 Connector)					30V100 (-30" Hg to +100 psig)
						15 (psig)
						60
						100
						200
						300
						400
						600
						1000
						2000
						3000
						5000
						6000
						10000

Range Clarification:

30V30WC: -30 WC to +30WC

30V30: -30"HG to +30PSI

30V100: -30"HG to +100PSI

All other ranges listed are in PSI

PXT and PXT-K Series Pressure Transmitter Cabling Identification

The PXT Series Pressure Transmitters have been changed. Previous pressure transmitters in this series were identified as **PXT Pressure Transmitters**. The newest version is the **PXT-K Series Pressure Transmitters**. Identification of electrical cable color is NOT interchangeable between the two series of pressure transmitters.

This document contains information to assist you in identifying the pressure transmitter unit you have and the correct electrical cable colors to avoid wiring mistakes.

PXT SERIES		PXT-K SERIES	
 <p>Indentations on the hex coupling for controlled locking.</p> <p>Product has a step-down between the transmitter body and hex coupling.</p>		 <p>No step-down between the body and the hex coupling.</p> <p>No indentations on the hex coupling.</p>	
Cable Color	Connection	Cable Color	Connection
RED	POWER	RED	POWER
BLUE	SIGNAL	BLUE	N/A
BLACK	CASE GROUND	BLACK	SIGNAL
ORANGE, YELLOW, WHITE	N/A	ORANGE, YELLOW, WHITE	N/A
Installation Instructions	00-02-0475	Installation Manual	00-02-0840
Installation Diagram	05-08-0754	Installation Diagram	05-08-0763

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SECTION 10 TEMPERATURE

2" and 2.5" Swichgage® and Murphygage® Instruments

95026	A20 and A25 Series Temperature Swichgage® Instrument	31
94031	20 and 25 Series Temperature Swichgage® Instrument 2 and 2-1/2 in. (51 and 64 mm) Dial	35
9137	Direct Mount Temperature Switch – Model TSB	39

Accessories for 2" and 2.5" Gages

8428	Sensing Bulb/Scale/Capillary Length Combinations for 20, 25, A20 and A25 Series Temperature Swichgage® and Murphygage® Instruments	41
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Pyrometers

9011	Exhaust Pyrometers - Models 10705146 and 10705147	43
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SDB Series Temperature Swichgage® Instruments

7543	Direct-Mount Temperature Swichgage® Instrument SDB Series	45
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4.5" Swichgage® and Murphygage® Instruments

94117	4.5 in. (114 mm) Dial Temperature Swichgage® SPL and 45TE Series	49
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Digital Temperature Swichgage® Instrument

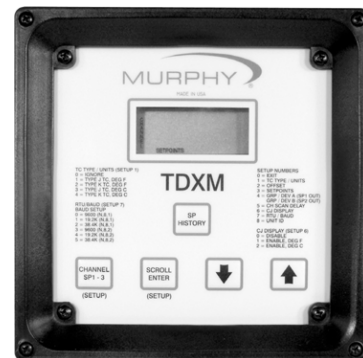
8911	Dual Temperature Swichgage® Model Series MDTM89	53
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Temperature Scanners

9106	Temperature Scanner/Pyrometer Swichgage® – Model TDX6	55
00064	Temperature Scanner/Pyrometer – TDXM Model	57

Temperature Sensors

96084	Thermocouple, RTD, and RTD Transmitter Assemblies with Thermowell – TC, RTD, and RTDT Series	59
0610107	Thermocouple, 1/4" Diameter Stainless Steel Tube Type	61
0910430	Air Temperature Sensor – Model 12	63



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A20 and A25 Series - Temperature Switchgag[®] Instrument



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

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

The A20 Series (2 inch/51 mm dial) and the A25 Series (2-1/2 inch/64 mm dial) Switchgag 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 Switchgag instruments include: engines and equipment in Oil Field, Marine, Irrigation, Construction and Trucking industries. Monitoring Engine Coolant temperature, Crankcase Oil, Transmission Oil.

Base Models

Coolant or Oil Temperature

A20T and A25T Series Switchgag

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

A20TL and A25TL Switchgag

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

A20TE and A25TE Switchgag

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 Switchgag – Same as 20 and 25T with internal SPDT snapswitch for pre-alarm.

Cylinder Head Temperature

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

Gage-Only Models

A20TG and A25TG MURPHYGAGE[®] – Gage without contact(s).

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). * 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.

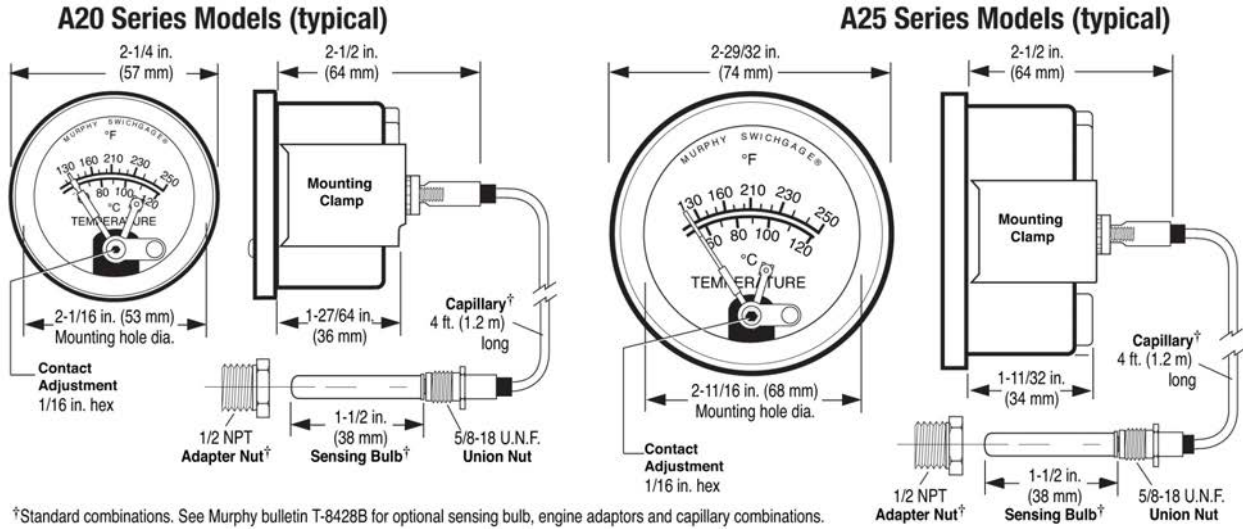
Wiring: A20TE: Number 4 screw terminals; A25TE: Number 6 screw terminals.

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).

* For optional capillary lengths, engine adapters, sensing bulbs and range combinations, visit <http://www.fwmurphy.com>.

Dimensions



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)	°F (°C)	°C only	Low	High	Alarm†		Shutdown	
		°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	66
130 – 220 (54 – 104)	45 – 100	260 (127)	210 (99)	85	160 (71)	210 (99)	200 (93)	80	210 (99)	85	85
130 – 250 (54 – 121)	50 – 120	310 (154)	210 (99)	97	160 (71)	210 (99)	200 (93)	95	210 (99)	100	100
140 – 300 (60 – 149)	60 – 140	340 (173)	275 (135)	130	200 (93)	275 (135)	265 (129)	125	275 (135)	130	130
160 – 320 (71 – 160)	70 – 160	370 (192)	300 (149)	150	200 (93)	300 (149)	290 (143)	145	300 (149)	150	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)

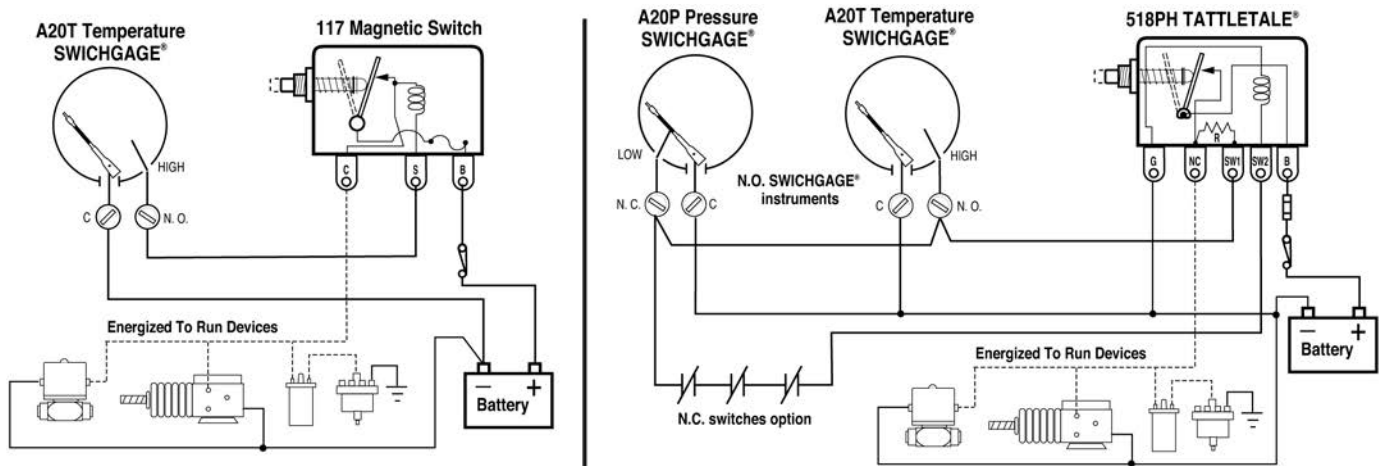
Maximum Temperature

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

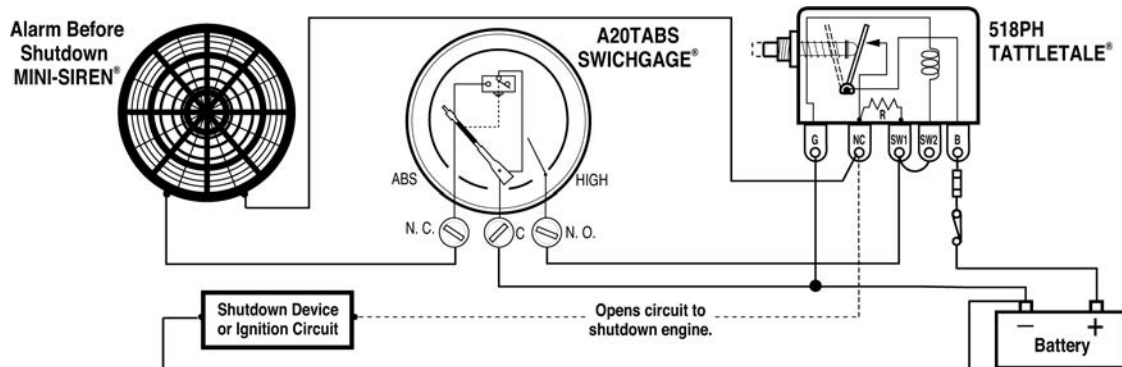
Magnetic Switch

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



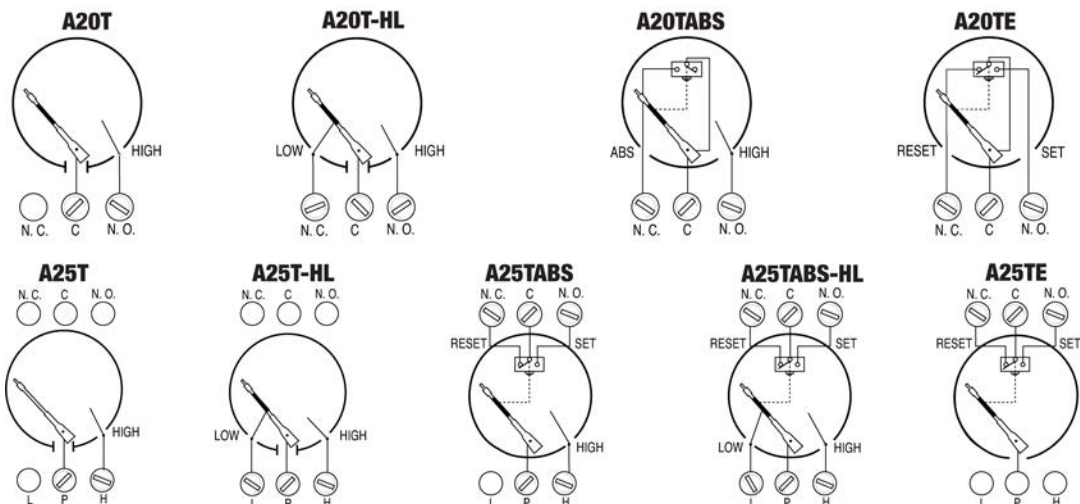
Pre-Alarm using A20/A25TABS

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.



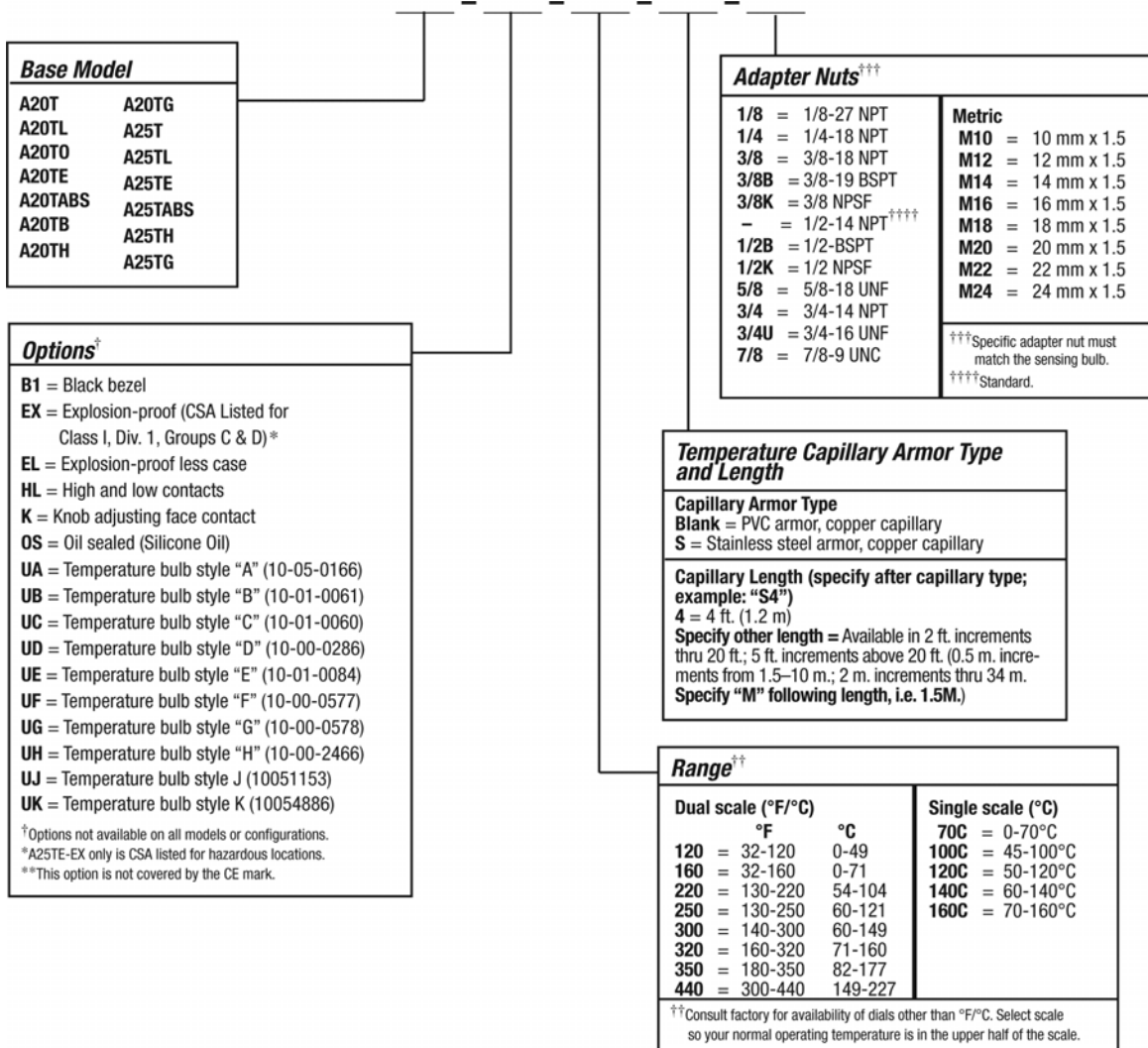
Typical Internal Wiring Diagrams

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**.



Illumination – Order Separately

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

A25 Series: N/A.



20 and 25 Series Temperature Switchgag[®] Instrument 2 and 2-1/2 in. (51 and 64 mm) Dial



Features

- Combination Indicating Gage and Limit Switch
- Critical/High Temperature Limit Switch Is Visible and Adjustable (Most Models)
- Switch Can Activate Alarms and/or Shut Down Equipment
- Contact Grounds Through Case

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

The 20 Series (2 inch/51 mm dial) and the 25 Series (2-1/2 inch/64 mm dial) Switchgag 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).

The gage mechanism is enclosed in a steel case coated to resist corrosion. A polycarbonate, break resistant lens and a polished, stainless steel bezel help protect this rugged, built-to-last instrument.

These vapor 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 the diaphragm mechanism. The diaphragm translates this vapor pressure into a mechanical gage reading.

For series 20T and 25T, 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 grounded through the Switchgag case. They have self-cleaning motion to enhance electrical continuity.

Models 20TE and 25TE have internal snap-acting SPDT switches.

Gage-only models, without contacts (Murphygag[®] instrument) are also available.

Applications

Industrial engines and equipment in Oil Field, Marine, Irrigation, Construction and Trucking industries. Monitoring Engine Coolant, Crank-case Oil, Transmission Oil.

Specifications

Dial: White on black; U.S.A. standard scale is dual scale °F/°C; others available (see How to Order).

Case: Plated steel; mounting clamp included (except for direct mounting models).

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

Pointer: Tempered nickel silver.

Lens: Polycarbonate, high-impact.

Sensing Element: Beryllium copper diaphragm.

Capillary: PVC armored copper; 4 ft. (1.2 m). 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 (20T and 25T): SPST contact; pilot duty only, 2 A @ 30 VAC/ VDC; Ground path through encasement. Normally Closed (NC) when the high limit is met. Normally Open (NO) 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.

Limit Contact Wire Leads: 18 AWG (1.0 mm²) x 12 in. (305 mm).

Snap-Switch Rating (20TE and 25TE):

SPDT, 3 A @ 30 VDC inductive; 4 A @ 125 VAC inductive. Snap-Switch Wire Leads: 20 AWG (0.75 mm²) x 12 in. (305 mm).

Unit Weight: 20 Series: 12.7 oz. (0.39 kg).

25 Series Models: 13.8 oz. (0.43 kg).

Unit Dimensions: 20 Series: 4-3/4 x 4-3/4 x 2-3/4 in. (121 x 121 x 70 mm). 25 Series Models: 4-3/4 x 4-3/4 x 3 in. (121 x 121 x 76 mm).

*For optional capillary lengths, engine adaptors, sensing bulbs and range combinations, visit <http://www.fwmurphy.com>.

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Base Models

Coolant or Oil Temperature

20T and 25T Series Swichgag

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

20TL and 25TL Swichgag instrument

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

20TO Swichgag instrument

Same as 20T with a special dial for Oil Temperature.

20TE and 25TE Swichgag instrument

20TE (was 20ESR) and 25TE (was 25ESR).

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.

20TABS and 25TABS Swichgag instrument

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

Cylinder Head Temperature

20TH and 25TH Swichgag instrument

20TH (was 20TL8133) and 25TH (was 25TL8133). For use on Air Cooled engines.

Direct Mount Models

20TD Swichgag instrument

Same as 20T. Available ranges: 220°F (104°C) or 250°F (121°C). Includes 1/4 x 4 in. (6 x 102 mm) sensing bulb.

20SD Swichgag instrument

Same as 20T. Available ranges: 220°F (104°C) or 250°F (121°C). Includes 11/32 x 1-1/2 in. (9 x 38 mm) sensing bulb.

Gage-Only Models

20TG and 25TG Murphygag

Gages without contact(s).

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 20TE and 25TE; 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		Single Scale				Low	High	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 (172)	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 20T, 25T, 20TE and 25TE 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)

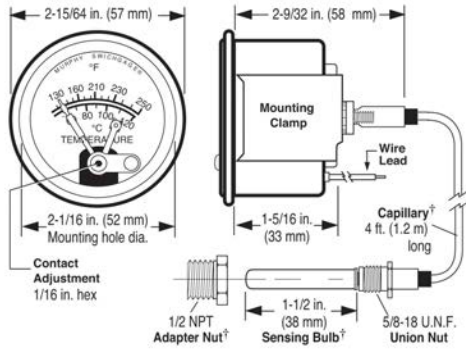
Maximum Temperature

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

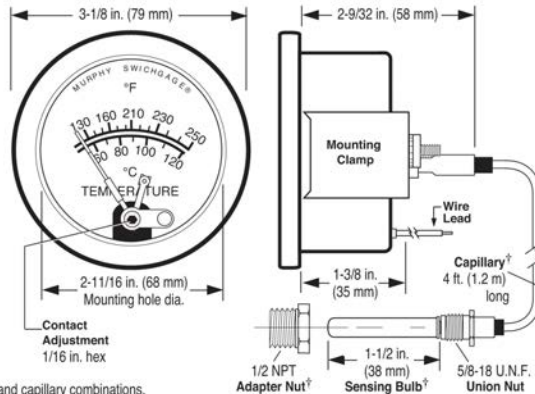
RANGE	MAXIMUM PROCESS TEMPERATURE
≤250° (120°)	120% OF FULL SCALE
300° (140°)	350° (198°)
≥320° (160°)	120% OF FULL SCALE

Dimensions

20 Series Models (typical)



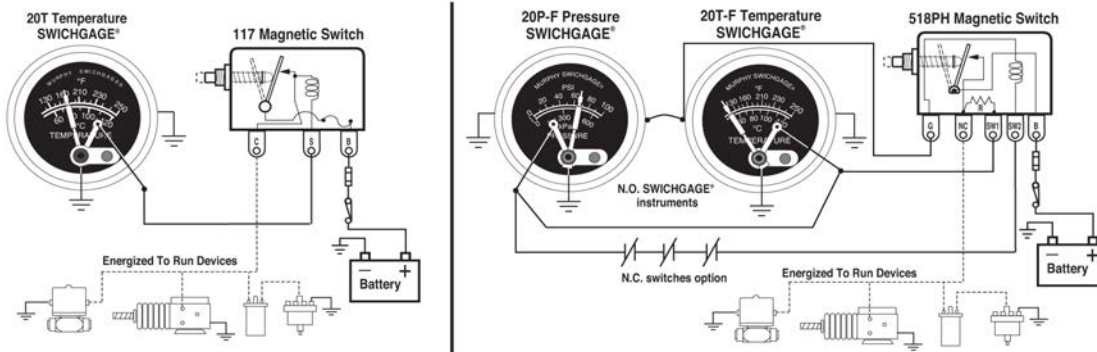
25 Series Models (typical)



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

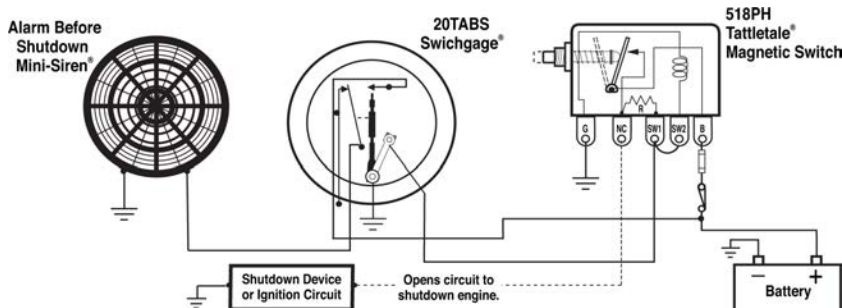
Magnetic Switch

INDUCTIVE AND HIGH CURRENT LOADS REQUIRE THE USE OF A MAGNETIC SWITCH. The Switchgag contacts are for light-duty electrical switching to operate alarms or control devices. Murphy manufactures the Magnetic Switch for protection of the light-duty Switchgag 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 20/25TABS

The 20TABS and 25TABS feature a standard limit contact for high temperature equipment shutdown. It also has an internal SPDT snap-switch to signal an alarm before shutting down. When the low side of 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.

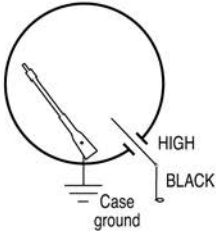


Typical Internal Wiring Diagrams

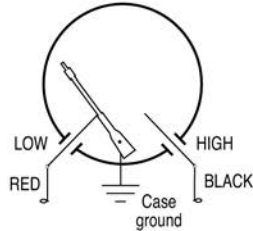
Pointer shown in the shelf position. Pointer type contact rating: pilot duty 2 A @ 30 VAC/VDC.

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

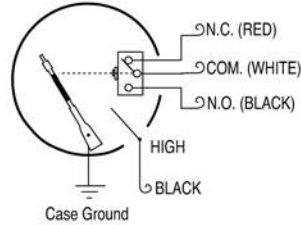
Pointer Type Contact



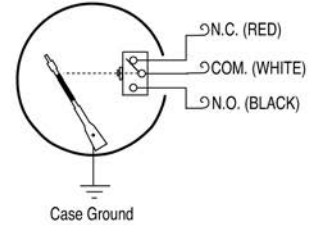
"HL" Hi-Lo Option



ABS Models



TE Models



How to Order

To order, use the diagram below. List options in ascending alphabetical order (A-Z). Example: **20T-IP1-250-4**.

Base Model

20T	20TH	25TL
20TL	20TD	25TE
20TO	20SD	25TABS
20TE	20TG	25TH
20TABS	25T	25TG
20TB		

Options[†]

A = AGF (Argon filled)
 B1 = Black bezel
 B2 = Bezel 05051857 (was "HP")
 B3 = Bezel 05051836 (was "HBB")
 EX = EX proof (explosion proofed)
 EL = EX less case (explosion proofed less case)
 F = "FS" contact (includes "ES" as appropriate)
 HL = High and low contacts
 I = Illumination (for options, see chart below)
 IP1 = Light pipe illumination, 12 VDC
 IP2 = Light pipe illumination, 24 VDC
 K = Knob adjusting face contact
 OS = Oil sealed (Silicone Oil)
 UA = Temperature bulb style A (10050166)*
 UB = Temperature bulb style B (10010061)*
 UC = Temperature bulb style C (10010060)*
 UD = Temperature bulb style D (10000286)*
 UE = Temperature bulb style E (10010084)*
 UF = Temperature bulb style F (10000577)*
 UG = Temperature bulb style G (10000578)*
 UH = Temperature bulb style H (10002466)*
 UK = Temperature bulb style K (10054886)*

[†] Options not available on all models or configurations.
^{*} Specify optional bulb **ONLY** when not included as standard for temperature **Base Model**, scale/range or capillary length.

Illumination Options

	IP1 / IP2	I
20 Series	x	x ¹
25 Series	N/A	N/A

¹Can be used with standard Clamp Lite Assembly (12 V= 05702176; 24 V= 05702177).

Adapter Nuts^{†††}

1/8 = 1/8-27 NPT	Metric
1/4 = 1/4-18 NPT	M10 = 10 mm x 1.5
3/8 = 3/8-18 NPT	M12 = 12 mm x 1.5
3/8B = 3/8-19 BSPT	M14 = 14 mm x 1.5
3/8K = 3/8 NPSF	M16 = 16 mm x 1.5
- = 1/2-14 NPT ^{††††}	M18 = 18 mm x 1.5
1/2B = 1/2-BSPT	M20 = 20 mm x 1.5
1/2K = 1/2 NPSF	M22 = 22 mm x 1.5
5/8 = 5/8-18 UNF	M24 = 24 mm x 1.5
3/4 = 3/4-14 NPT	
3/4U = 3/4-16 UNF	
7/8 = 7/8-9 UNC	

^{†††}Specific adapter nut must match the sensing bulb.
^{††††}Standard.

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 metres increments from 1.5–10 metres; 2 metre increments thru 34 metres. Specify "M" following length, i.e. 1.5M.)

Range^{††}

Dual scale (°F/°C)	Single scale (°C)
°F °C	
120 = 32-120 0-49	70C = 0-70°C
160 = 32-160 0-71	100C = 45-100°C
220 = 130-220 54-104	120C = 50-120°C
250 = 130-250 60-121	140C = 60-140°C
300 = 140-300 60-149	160C = 70-160°C
320 = 160-320 71-160	
350 = 180-350 82-177	
440 = 300-440 149-227	

^{††}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.

Direct Mount Temperature Switch – Model TSB



Features

- Limit Switch for Critical Temperature
- Activates Indicator Lights, Alarms or Shutdown Equipment
- SPDT Snap-Acting Switch
- Fits Most Engine Applications
- Time-Proven Switchgage® Construction
- Easy Wiring Terminal Block
- Steel Housing Specially Coated to Resist Corrosion
- Trip Point is Factory Preset to Your Specifications

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

The TSB switch is a direct mount switch for temperature sensing. It has one limit contact that can be used to activate an alarm, actuate indicator lights or shut down equipment.

The construction of this instrument is the same as our time-proven Switchgage®. A precision machined brass mounting plate and port captures a high quality stamped beryllium copper diaphragm. The single-pole, double-throw (SPDT) snap switch is operated directly from the diaphragm, for quick acting and positive switching. Trip point is factory preset according to your specifications.

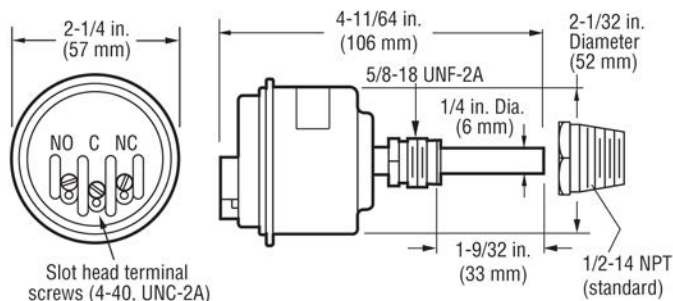
Housing is weather sealed to prevent entry of moisture, dust, etc. A glass-filled nylon terminal block with quick-screw terminal connections gives the TSB switch a real advantage in industrial engine applications. The TSB is ideal when reading is not desired, but temperature is critical to operational efficiency.

Intended for use in general purpose nonclassified areas.

Applications

- Engine Coolant
- Irrigation Systems
- Compressors
- Oil Field Systems
- Engine Lubrication
- Construction equipment
- Mobile Equipment
- Marine Engines
- Generators
- Electric Motors

Dimensions



Specifications

Housing: Plated steel.

Connections: Popular NPT and metric (specify).

Diaphragm: Formed beryllium copper (heat treated).

Sensing Bulb: Copper.

Terminal Block: Three # 4-40 screws.

Accuracy	Switch Trip Point Range 150–295°F (66–146°C)
Trip Point	±3°F (1.7°C)
Switch Reset Differential	± 15°F (9°C)
Repeatability	±3°F (1.7°C)

Contact Rating: SPDT 3 A @ 30 VDC inductive.

Maximum Temperature: 325°F (163°C).

Factory Trip Point Setting: 210°F (99°C) Rising. Other trip point setting must be specified at time of order (see How to Order on reverse side).

Contact: Operates on rising or falling temperature. Specify operating specification for rising or falling temperature when ordering.

Shipping Weight: 10 oz (0.31 kg).

Shipping Dimensions: 4-3/4 x 4-3/4 x 2-5/8 in. (121 x 121 x 67 mm).

NOTE: No customer replacement parts.

How to Order

To order the TSB model use the diagram below.

TSB – R230 – 3/8

Standard Switch Trip Point
Specify trip point value. Example: TSB-R200

Standard Switch Trip Point Values (rising)*	Accuracy
R165 = 165°F (74°C)	
R180 = 180°F (82°C)	165– 210°F ±5°F (±2.7°C)
R200 = 200°F (93°C)	Water/glycol 10% used for setpoint
R205 = 205°F (96°C)	
R210 = 210°F (99°C)	
R220 = 220°F (104°C)	
R225 = 225°F (107°C)	215– 230°F ±7°F (±3.8°C)
R230 = 230°F (110°C)	240– 250°F ±10°F (±6.5°C)
R240 = 240°F (116°C)	Heat transfer fluid used for setpoint (276 viscosity @ 100°F)
R250 = 250°F (121°C)	

* Non standard trip points require a minimum quantity order.
Trip point must be in 5°F increments between 165– 250°F (74–121°C).

Switch Reset Differential	±15°F (±8.3°C)
Switch Repeatability	±3°F (1.7°C)

Connection Size

Blank = 1/2-14 NPT**	10-05-0131**
1/4 = 1/4-18 NPT	10-05-0167
3/8 = 3/8-18 NPT	10-05-0069
5/8 = 5/8-18 UNF	10-05-0068
3/4 = 3/4-14 NPT	10-05-0105
7/8 = 7/8-9 UNC	10-05-0093
3/8B = 3/8-19 BSPT	10-05-0284
1/2B = 1/2 BSPT	10-05-0330
M14 = 14 mm x 1.5 †	10-05-0104 †
M16 = 16 mm x 1.5 †	10-05-0514 †
M18 = 18 mm x 1.5 †	10-05-0399 †
M20 = 20 mm x 1.5 †	10-05-0670 †
M22 = 22 mm x 1.5 †	10-05-0606 †
M24 = 24 mm x 1.5 †	10-05-0907 †

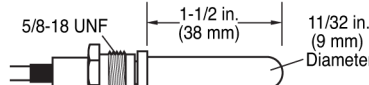
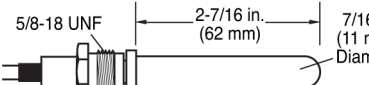
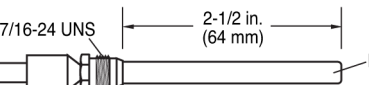
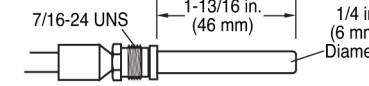
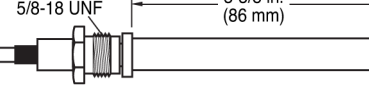

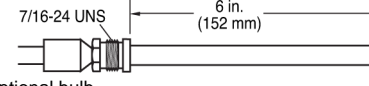
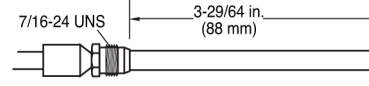
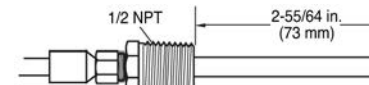
** Standard connection.
† Includes copper seal.

Sensing Bulb/Scale/Capillary Length Combinations for 20, 25, A20 and A25 Series Temperature Switchgag® and Murphygag® Instruments

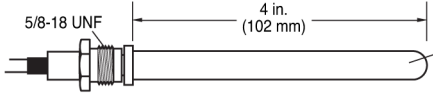
APPLICATION NOTE: Murphy vapor pressure actuated temperature Switchgag and Murphygag instruments indicate the temperature as measured at the sensing bulb. If the sensing bulb is not fully immersed in the medium being measured, an inaccurate reading will occur. This is particularly important when applying bulb types “C”, “F” and “H” since the attaching nut can be positioned at various depths along the length of the sensing bulb. For best results be sure that the sensing bulb is fully immersed. For further important details see appropriate installation sheet for Murphy temperature devices or contact a Murphy representative.

NOTE:

- Bulb Type A, B, E & K are provided as standard on T & TE series based on scale and capillary length.
- Bulb Type D is provided as standard on TL & TH series based on scale and capillary length.
- Bulb Type J is provided as standard on TJD series.
- Any bulb used where it is standard, based on model, scale and capillary length, must not be specified in the Model Number. Any bulb used where it is not standard must be specified in the Model Number.

Bulb Type	Bulb Dimensions	Adaptor Nut Group	Thermowell Group	Capillary Tube Length	Temperature Ranges	
					°F	°C
A	 Standard bulb 20BTG, 20/25T, A20/25T 10050166	1	I	2-30 feet (0.61-9.14 meters)	130-220, 130-250, 140-300, 160-320, 180-350, 300-440	54-104, 54-121, 60-149, 71-160, 82-177, 149-227
				2-7 feet (0.61-2.13 meters)	32-120, 32-160	0-49, 0-71
B	 Standard bulb 20BTG, 20/25T, A20/25T 10010061	2	II	31-80 feet (9.45-24.39 meters)	130-220, 130-250, 140-300, 160-320, 180-350, 300-440	54-104, 54-121, 60-149, 71-160, 82-177, 149-227
				8-23 feet (2.43-7.01 meters)	32-120, 32-160	0-49, 0-71
C*	 Optional bulb 10010060	3	—	2-25 feet (0.61-7.62 meters)	130-220, 130-250, 140-300, 160-320, 180-350	54-104, 54-121, 60-149, 71-160, 82-177
				2-4 feet (0.61-1.21 meters)	300-440	149-227
D†	 Standard bulb 20/25TL, A20/25TL, 20/25TH, A20/25TH 10000286	4	IV	2-16 feet (0.61-4.88 meters)	130-220, 130-250, 140-300, 160-320, 180-350	54-104, 54-121, 60-149, 71-160, 82-177
				2-4 feet (0.61-1.21 meters)	300-440	149-227
E	 Standard bulb 20BTG, 20/25T, A20/25T 10010084	2	III	24-35 feet (7.32-10.67 meters)	32-120, 32-160	0-49, 0-71
				81-110 feet (24.69-33.53 meters)	30-220, 130-250, 140-300, 160-320, 180-350, 300-440	54-104, 54-121, 60-149, 71-160, 82-177, 149-227
F	 Optional bulb 10000577	3	—	16-25 feet (4.88-7.62 meters)	130-220, 130-250, 140-300, 160-320	54-104, 54-121, 60-149, 71-160
G	 Optional bulb 10000578	4	—	17-25 feet (5.18-7.62 meters)	30-220, 130-250, 140-300, 160-320	54-104, 54-121, 60-149, 71-160
H	 Optional bulb 10002466	3	IV	2-25 feet (0.61-7.62 meters)	130-220, 130-250, 140-300, 160-320, 180-350	54-104, 54-121, 60-149, 71-160, 82-177
				2-4 feet (0.61-1.21 meters)	300-440	149-227
J	 Standard bulb 20/25TJD, A20/25TJD 10051153	3 and Part No. 85030447	—	2-12 feet (0.61-3.66 meters)	130-250	54-121

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Bulb Type	Bulb Dimensions	Adaptor Nut Group	Thermowell Group	Capillary Tube Length	Temperature Ranges	
					°F	°C
K	 <p>Standard bulb 20/25T, A20/25T</p> <p>10004886</p>	2	—	36-50 feet (10.97-15.24 meters)	32-120 32-160	0-49 0-71

* Standard bulb for bearing temperature models (example 20TB).

† Standard bulb for aircooled engine models (example 20TH) and Ford worldwide engines (example 20TL).

Consult factory for non-listed options and combinations.

Optional Adaptor Group			
PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
Group 1		Group 2	
10050167	1/4-18 NPT	10050103	3/8-18 NPT
10050069	3/8-18 NPT	10050107	1/2-14 NPT
10050284	3/8-19 BSPT	10050827	3/4-14 NPT
10050131	1/2-14 NPT	10050695	7/8-9 UNF
10050330	1/2-14 BSPT	10002447	22 mm x 1.5
10050068	5/8-18 UNF	Group 3	
10050105	3/4-14 NPT	10010052	1/8-27 NPT
10050093	7/8-9 UNC	10010051	10 mm x 1.5
10002442	14 mm x 1.5	10005235	10 mm x 1.0
10002444	16 mm x 1.5	Group 4	
10002443	18 mm x 1.5	10050912	1/8-27 NPT
10002446	20 mm x 1.5	10002450	10 mm x 1.5
10002445	22 mm x 1.5	10002451	12 mm x 1.5
10002449	24 mm x 1.5		

Optional Thermowells	
PART NO.	DESCRIPTION
Group I	
10010009	1/2-14 NPT, Carbon Steel, Nickel Plate
10050128	1/2-14 NPT, 304 Stainless Steel
10050899	1/2-14 NPT, Carbon Steel, Nickel Plate
10000425	7/8-9 UNC, Carbon Steel, Nickel Plate
Group II	
10050169	1/2-14 NPT, 304 Stainless Steel
Group III	
10050900	1/2-14 NPT, Carbon Steel, Nickel Plate
10050901	1/2-14 NPT, 304 Stainless Steel

Exhaust Pyrometers Models 10705146 and 10705147



10705146



10705147

Features

- Single or Dual Port Reading
- 2% Accuracy
- Sealed Construction
- Temperature Compensation
- Easy to Read Scales

The Single 10705147 (00000956) and Dual 10705146 (00000819) Port Pyrometers monitor exhaust temperatures in all types of engines. The Dual Port Pyrometer can monitor each bank of a V-type engine, allowing you to compare readings at all times. Both pyrometers feature an easy-to-read illuminated dial with scales in both Fahrenheit and Celsius. They require no outside power (except for dial lighting). Spring loaded jewels and alloy pivots increase durability. Murphy offers pyrometer accessories such as thermocouples and wire lead assembly.

Application

Excessive exhaust temperature is a major damaging factor to all engines. The best way to monitor this temperature is with the use of a pyrometer. Excessive exhaust temperature is caused by an upset fuel/air ratio or more fuel in the engine than there is air to support it. This condition can occur as a result of over throttling, a dirty air cleaner, different fuels, a malfunctioning fuel system, change of altitude, an out of tune engine and many other causes. But whatever the cause, a pyrometer indicates this condition before serious damage occurs. Suitable for stationary or mobile engines, power units, agricultural and construction equipment, as well as marine and trucking.

Features

- Large sweep scales for maximum legibility
- Internal illumination for night use
- Accuracy: 2% full scale
- Sealed housing
- Ambient temperature compensation
- Calibrated permanently at 2/3 scale
- Flush type mounting on any plane

Benefits of Using a Pyrometer

- Longer engine life
- Better fuel economy
- Less lubrication oil dilution
- Lubrication oil stays clean much longer
- Exhaust emissions drop to a minimum
- Malfunctions indicated before excessive damage occurs

Specifications

Dial Scale

Single: 300 to 1300°F (150 to 700°C)*

Dual: 300 to 1200°F (150 to 649°C)*

Dial Sweep (both models): 100°.

Accuracy: Full scale 2%.

Illumination

Internal 12 or 24 VDC.

Bezel: Polished stainless steel.†

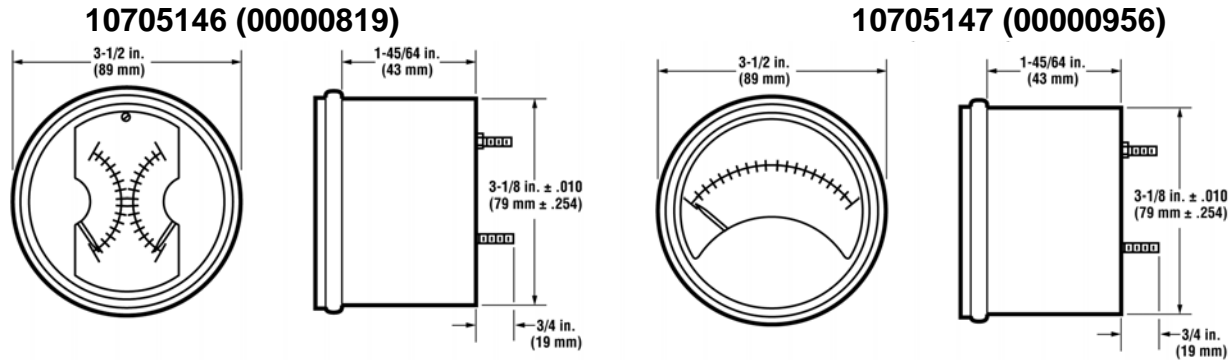
Case: PVC.

Pointer(s): Fire Orange.

* Celsius only dials available.

† Black bezel available. Special order.

Dimensions



How to Order

Specify part number. Example: **10705146 (00000819)**

Pyrometer
10705146 = Dual
10705147 = Single.

Accessories (order separately)

00000817 14 ft. (4.27 m) Wire Lead Assembly.

00000818 Thermocouple, grounded, Type K, 3/8 NPT*

00003488 Thermocouple, ungrounded, Type K, 1/4 NPT*

*1/8 NPT, 1/4 NPT and 1/2 NPT adaptors available.

Accessories

Thermocouples 00000818 and 00003488 can mount in the engine manifold or in 2 to 3-1/2 in. (51 to 89 mm) diameter exhaust ports. In turbo-charged engines, a thermocouple mounts between the engine and the turbo. Thermocouple 00000818 is a grounded, type K (Chromel Alumel). Thermocouple 00003488 is ungrounded type K (Chromel Alumel).

Thermocouple Specifications

Element "K": type (NiCr/Ni) solid wire

Hot Junction: fusion welded..

Protecting Tube: inconel for no carbon absorption, end closed by heliarc melt down.

Wire Insulation: Q-glass with stainless steel overbraid.

Adaptors:

- 3/8 NPT (00003578) standard
- 1/8 NPT (00003577)
- 1/4 NPT (00003450)



- 1/2 NPT (00003579)



Wire Lead Assembly 00000817 is a 14 ft. (4.27 m) extension with mating plug connections for the 00000818 and 00003488 thermocouples. The wire is PVC covered, non-shielded, 18 AWG (1.0 mm²), with heat shrinkable sleeve provided for insulating terminals after installation. Extension up to 100 ft. (30.48 m) can be made with 18 AWG (1.0 mm²) or larger copper wire at the gage head.

Direct-Mount Temperature Switchgauge® Instrument SDB Series



Features

- Easy to Read Dial
- Bi-Metallic Sensor
- Two Ranges:
100 to 500°F (40 to 260°C)
200 to 1000°F (100 to 500°C)
- Dials Scaled in Degrees
Fahrenheit/Celsius
- CSA Listed Explosion-Proof Model Available

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

The SDB Series are direct-mounting temperature Switchgauge devices. They provide an accurate direct-reading gauge with an adjustable limit switch to activate alarms and/or shutdown. A knob on front of the Switchgauge instrument allows you to adjust the limit switch trip point. Pointer movement is actuated by a bi-metallic sensing element.

Models SDB500, SDB501 and SDB500EX have a temperature range of 100 to 500°F (40 to 260°C). SDB500EX enclosure is explosion-proof and CSA listed for Class I, Group C and D hazardous locations.

The SDB1000 has a temperature range of 200 to 1000°F (100 to 500°C).

Basic Operation

SDB500, SDB501 and SDB1000: When the indicating pointer on the SDB touches the adjustable contact, a one-wire-to-ground circuit is completed to shut down the equipment and/or actuate audible or visual alarms. Proper relays or Tattletale® annunciators (magnetic switches) must be incorporated into the system.

SDB500EX: When the temperature rises to the preset trip point, the pointer engages an internal SPDT snap-switch to close/open circuits.

Applications

The most common use of the SDB Series is to monitor gas compressor temperatures. Engine exhaust temperature can also be monitored to indicate overloading or lean fuel mixtures; or use the SDB to help coordinate loads on twin-engine installations.

Specifications

Temperature Ranges:

SDB500, SDB500EX, and SDB501:
100 to 500°F (40 to 260°C).
SDB1000: 200 to 1000°F (100 to 500°C).

Sensing Bulb Material and Size: 304 stainless steel;
1/2 in. dia. x 4 in. (13 x 102 mm) insertion depth.

Maximum Bulb Pressure:

285 psi (1.97 MPa) [19.7 bar] at 625°F (329°C).
NOTE: use of a thermowell is recommended.

Process Connection: 1/2 NPTF. 3/4 NPT adapter available.

Sensing Element: High torque bi-metal element in heliarc welded stainless steel bulb.

Contact Rating:

SDB500, SDB501 and SDB1000: 2 A @ 30 VAC
SDB500EX: 2 A @ 120 VAC

Limit Contact Adjustment: By knob through full range.

Maximum Unit Temperature:

SDB500, SDB500EX, SDB501: 625°F (329°C).
SDB1000: 1250°F (677°C).

Case Material: SDB501: Die-cast aluminum.

SDB500, SDB1000, SDB500EX: Sand-cast aluminum.

Switchgauge Accuracy: ± 3% of full scale.

NOTE: All models are calibrated for use with a thermowell.
Specify when a thermowell is **NOT** to be used,
(see How to Order on back page).

Wire: 18 AWG (1.0 mm2). See Dimensions for lengths, reverse side.

Dial: Black print on stainless steel. Dials are scaled in degrees Fahrenheit and Celsius.

Shipping Weight:

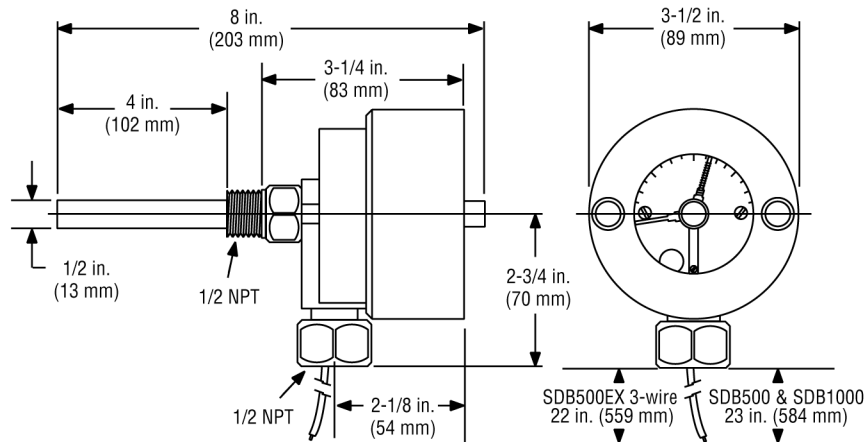
SDB501: 1 lb. 4 oz. (0.57 kg).
SDB500 and SDB1000: 2 lb. (1.0 kg).
SDB500EX: 2 lb. 5 oz. (1.05 kg).

Shipping Dimensions:

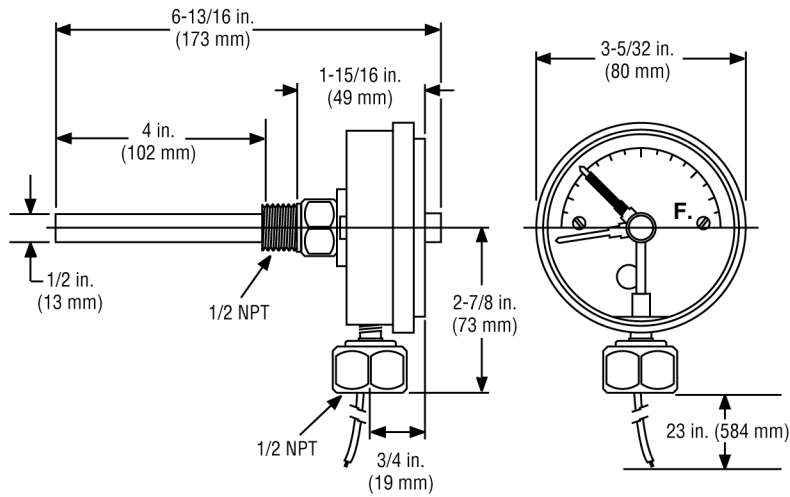
SDB501: 8-1/4 x 4-1/4 x 4-1/2 in. (210 x 108 x 114 mm).
SDB500 and SDB1000: 8-1/4 x 4-1/4 x 4-1/2 in. (210 x 108 x 114 mm).
SDB500EX: 9 x 5-1/2 x 6 in. (229 x 140 x 152 mm).

Dimensions

SDB500, SDB500EX, and SDB1000

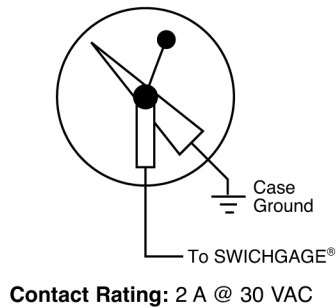


SDB501

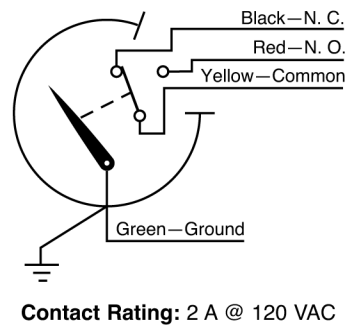


Wiring Diagrams

SDB500, SDB501, and SDB1000

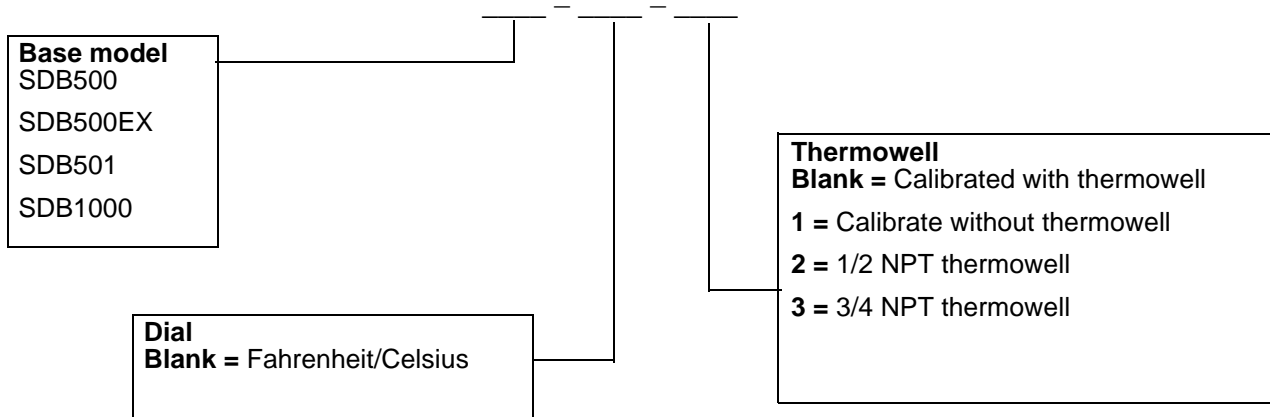


SDB500EX



How to Order

To order the SDB use the model number diagram below. Model number example: **SDB500EX-3**.



Optional Thermowells

Murphy offers thermowells (separable sockets) to facilitate maintenance of a temperature Switchgauge instrument and to protect the temperature sensing bulb from extreme amounts of system pressure. For system pressures exceeding 285 psi (1.97 MPa) [19.7 bar] at 625°F (329°C) an optional thermowell is recommended for use with the SDB series. The thermowell protects the SDB bulb from system pressures up to 3000 psi (20.68 MPa) [206.8 bar] at 300°F (149°C). Two thermowell options are available: 1/2 NPT and 3/4 NPT. Thermowells can be ordered with the SDB Series Switchgauge instrument or ordered separately. See “How to Order” above.

To order thermowell separately:

Specify part number **10050025** for 1/2 NPT.

Specify part number **10050311** for 3/4 NPT.

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4.5 in. (114 mm) Dial Temperature Switchgag® SPL and 45TE Series



Features

- Combination Indicating Gage and Critical Temperature Limit Switches
- High and Low Temperature Limit Contacts Are Visible and Adjustable
- SPDT Snap-Acting Models
- Panel and Wall Mount Versions
- Latching Control Relay Versions Available

* Selected configurations are third party listed. Call Murphy for details.

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

The 4-1/2 in. (114 mm) dial size Switchgag® is a mechanical gage for temperature indication. It includes adjustable, electrical contacts that can be used for start and stop, to trip alarms and to shut down equipment.

Ranges are available from 15° to 250°F (9° to 121°C) thru 260° to 450°F (127° to 232°C).

Basic Operation

This vapor actuated gage features a sealed capillary tube and sensing bulb. When subjected to heat, the liquid in the sensing bulb expands to vapor creating pressure against a bourdon tube mechanism. The bourdon tube translates this vapor pressure into a mechanical gage reading.

For models SPLC and SPLFC, the gage pointer acts as a pressure indicator and as one switch pole which completes a circuit when it touches the adjustable limit contacts. Contacts have self-cleaning motion to ensure electrical continuity. A toggle switch is provided on SPLC models to override the low contact for equipment start-up.

Models 45TE and 45TEF have internal snap-acting SPDT switches.

Applications

Typical applications include:

- Gas Compressors
- Engine Coolant Temperature
- Process Temperature
- Heaters and Coolers
- Water Pump Temperature

Specifications

Dial: White on black, dual scale, °F and °C standard, 4-1/2 in. (114 mm) diameter.

Case: Die cast aluminum, surface or panel mount.

Capillary: PVC armored copper tube, 5 ft. long (1.5 m.) standard—see options next page.

Sensing Bulb: Copper bulb: 1/2 in. (13 mm) OD; Length: 7 in. (178 mm).

Minimum bulb insertion— see corresponding chart, on page 2.

Pressure Rating: 600 psi (4.1 MPa) [41 bar]. Connection: 1/2 NPT compression fitting.

Overrange: Do not exceed 10% above full range.

Limit Contacts (SPLC and SPLFC): 1-SPDT, Center off; pilot-duty; 2 A @ 30 V; 1 A @ 125 VAC. Contacts are gold plated silver.

Snap-Acting Switches (45TE and 45TEF): 2-SPDT; 2 A @ 250 VAC.

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

Wire Connections: Surface mount models: 1/2 NPT conduit and terminal block.

Panel mount models: Wire leads, 18 AWG (1.0 mm²) x 9 in. (229 mm) long. "OS" models: 1/2 NPT conduit and wire leads, 18 AWG (1.0 mm²) x 9 in. (229 mm) long.

Item Weight: 8 lb. (3.6 kg) approximately. Explosion-proof models: 22 lb. (10 kg) approx.

Item Dimensions: 16 x 11 x 5-1/2 in. (406 x 279 x 140 mm).

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

Basic Models

SPLC Series Switchgag®

Surface mount version of the Switchgag®. For these models the gage pointer makes with two adjustable contacts to complete a pilot duty circuit.

SPLFC Series Switchgag®

Panel-mounting (round case) version of the SPLC.

SPLBP Latching Control Relay Switchgag®

This version of the SPLC Series is designed to start and to stop electric motor driven equipment. The pilot duty contacts of the SPLBP are connected to a latching control relay for automatic ON/ OFF control, either directly or through a motor starter.

45TE Series Snap-Acting Switchgag®

Surface mount version of the Switchgag®. These models offer internal snap-acting SPDT switches, instead of the single pole contacts.

45TEF Series Switchgag®

This is the panel mounting (round case) version of the 45TE series.

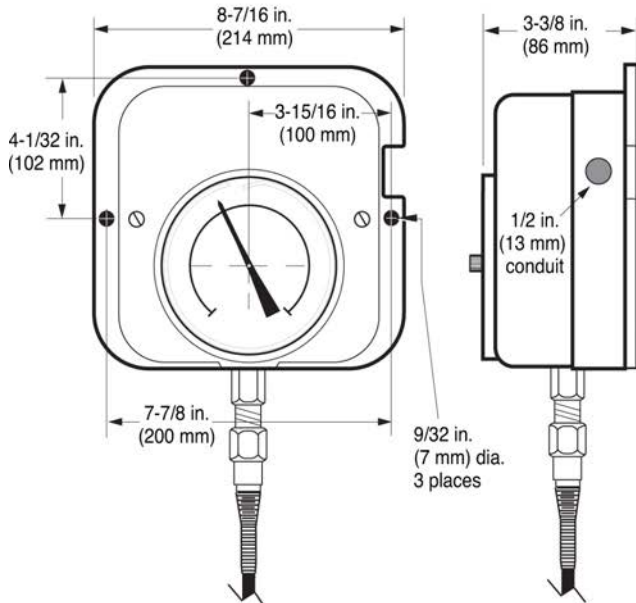
45TEBP Snap-Acting and Latching Control Relay Switchgag®

Same as 45TE—includes an internal latching control relay for automatic ON/OFF control either directly or through a motor starter.

Murphy offers square case configurations altered to fit round panel openings, see "Dimensions", next page.

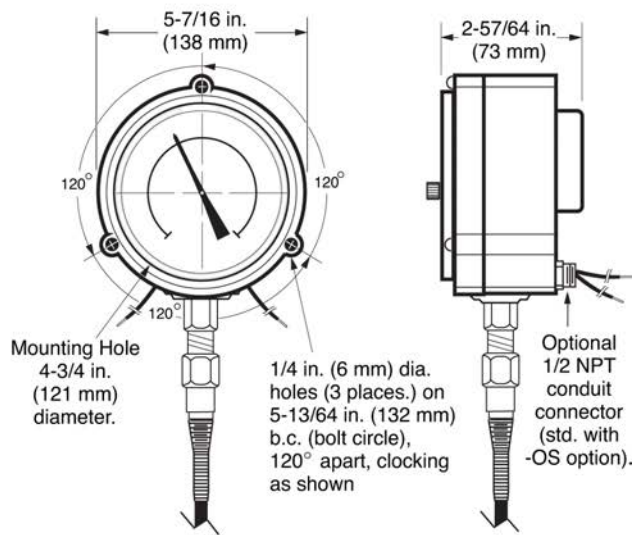
Dimensions

Surface Mount Models

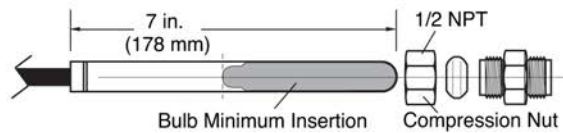


* SPLCE, SPLBPE, 45TEE and 45TEBPE versions feature square case, but altered to fit standard round panel mounting—not pictured.

Panel Mount Models



Sensing Bulb

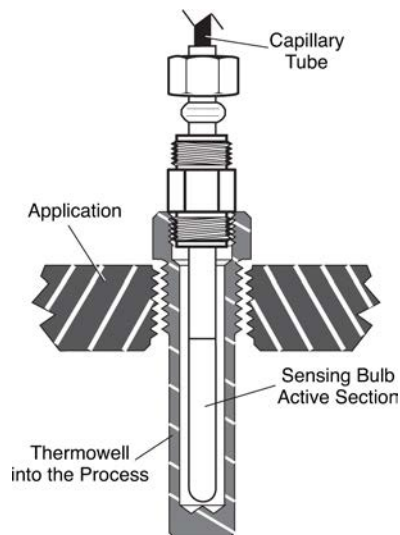


Ranges and Accuracy — Sensing Bulb Insertion

Temperature Ranges Available (dual scale dials)		Accuracy (SPL and 45 Series Models)			Minimum Sensing Bulb Insertion into Process
Fahrenheit	Celsius	First 1/3	Middle 1/3	Upper 1/3	
15° to 250°F	9° to 121°C	±8°F/±4°C	±2°F/±1°C	±2°F/±1°C	5 in. (127 mm)
130° to 350°F	54° to 177°C	±8°F/±4°C	±2°F/±1°C	±3°F/±1.5°C	2-1/2 in. (64 mm)
260° to 450°F	127° to 232°C	±8°F/±4°C	±2°F/±1°C	±3°F/±1.5°C	2-1/2 in. (64 mm)

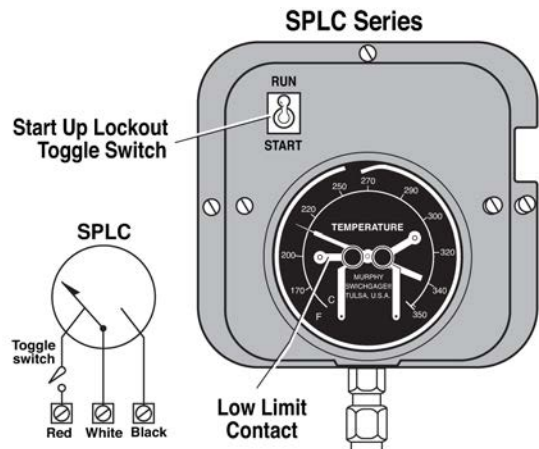
Using a Thermowell

Installing a thermowell is recommended for high pressure applications or corrosive environments. It also allows sensing bulbs to be changed or adjusted without opening the connection to process. Murphy offers thermowells for a variety of applications.



Start-Up Lockout

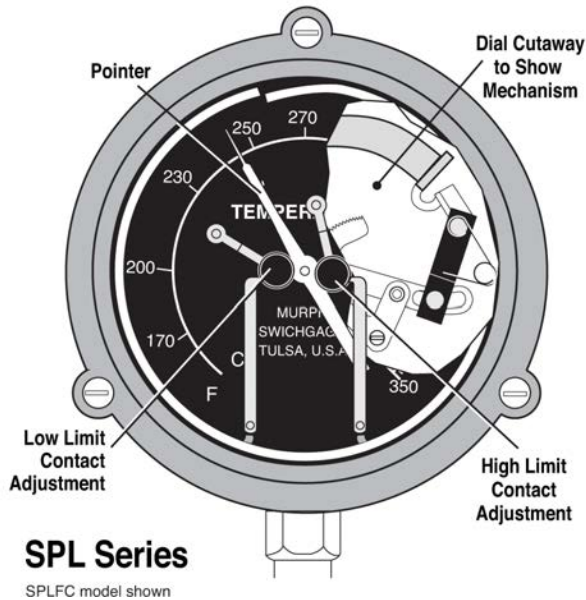
The SPLC Switchgag® low limit contact can be bypassed for equipment start up. A toggle switch is provided for this purpose. The toggle switch must be manually reset when temperature rises above the low limit.



How the SPL Works

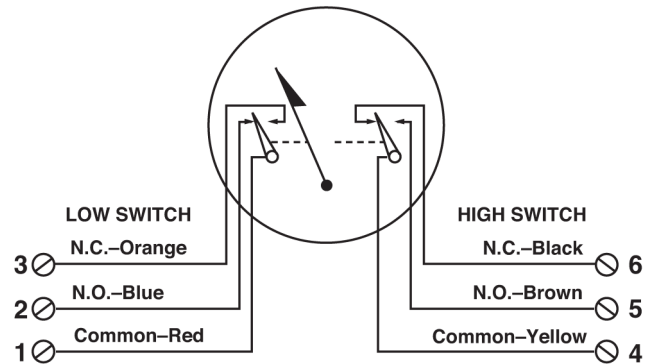
SPLC and SPLFC Switchgag® temperature indicator gages include 2 pilot duty, pointer-type limit contacts (one for high and one for low) that can be used for alarm and/or shutdown. The SPLC and SPLFC models will complete a circuit when the gage pointer and either limit contact meet. This provides an electrical signal to alert the operator of critical temperature conditions or, when required, to shut-down the equipment. Both limit contacts (high and low) are field adjustable by simply turning the fingertip type knob to the desired point on the scale dial.

The graphic below shows details of a typical SPLFC Switchgag® model.



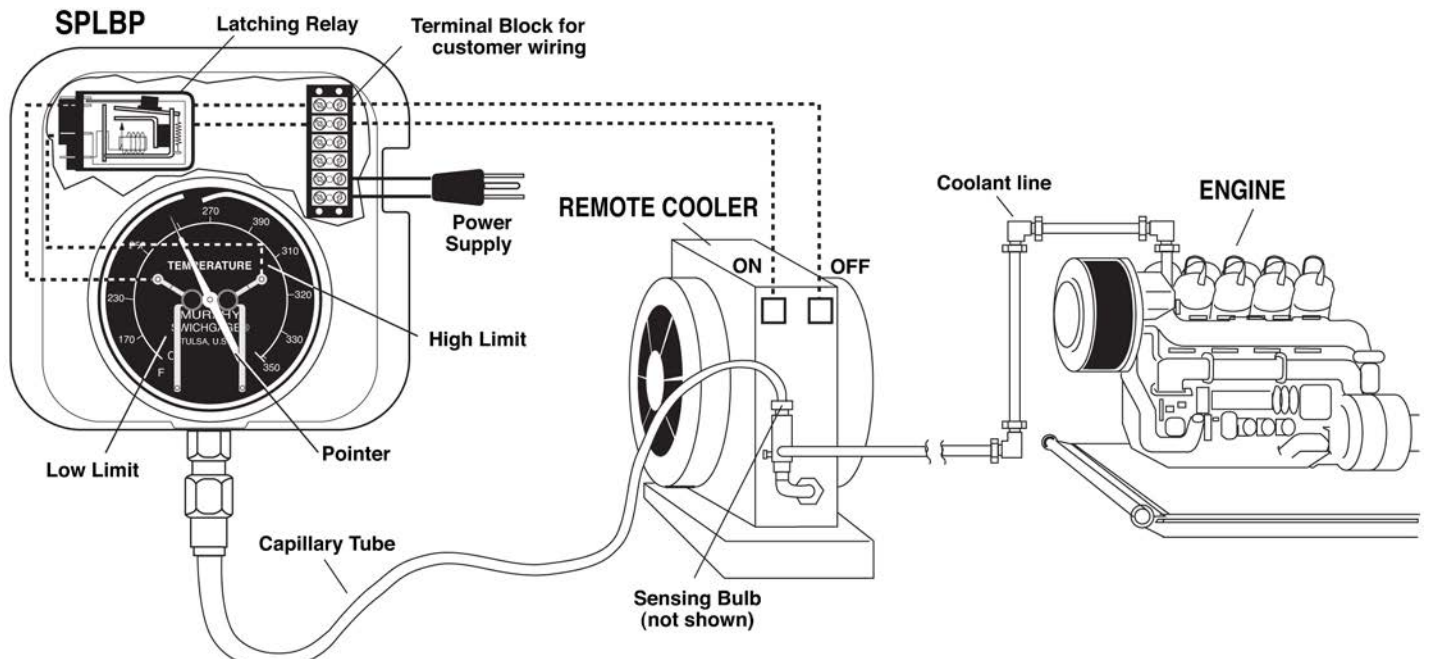
How the 45TE Works

The 45TE series Switchgag® incorporates 2 SPDT snap-switches instead of the pointer-type contacts of the SPL. Unlike the SPL that completes an electrical circuit as soon as the pointer touches the contact, the 45TE trip point indicators will stop the pointer movement slightly before the switches operate. As temperature continues to increase (reaching high set point) or to decrease (reaching low set point), the electrical circuit is then made. It provides the ability to set the trip point exactly with the indicator needle—no guessing or equipment calibration is needed as on blind switches. The 45TE trip points (high and low) can be easily set using its stacked knob adjustment. See the schematic below for details.



(BP) Latch Relay Contact Models

Primarily designed to maintain a specific temperature range by turning ON or OFF heaters or coolers having 125 VAC circuitry, the SPLBP and 45TEBP Switchgag® models are applicable to a variety of situations where temperatures are variable and controlling factors. As the pointer touches a preset high or low limit contact/snap-switch, the magnetic latching relay sets or resets to latch a heater or cooler ON or OFF. The relay unlatches, (resets) when the opposite contact operates. Pictured below is a typical application. **For applications with higher voltages, a Murphy TR assembly can be used in conjunction with any 4-1/2 in. (114 mm) dial Switchgag®.**



How to Order

Specify model number. NOTE: No designator is required for **Standard** configurations.
Also, list options in alphabetical order (A to Z). Place a dash (–) between each option. See example below.

SPLBP – 4 – 350 G 10 – EX

Base Model

SPLC	45TE
SPLCE	45TEE
SPLFC	45TEF
SPLBP*	45TEBP*
SPLBPE*	45TEBPE*

* This version not covered by CE mark.

Latching Control Relay Voltage (applies to “BP” models only)

Blank = 120 VAC
2 = 12 VDC
4 = 24 VDC

Range

250 = 15 to 250°F
350 = 130 to 350°F
450 = 260 to 450°F

Armor / Capillary / Bulb

P = PVC / Copper / Copper
S = Stainless steel / Stainless steel / Stainless steel

Capillary Length

Specify in feet:	Specify in metres:
05 = 5 feet	1.5M = 1-1/2 metres
10 = 10 feet	2M = 2 metres
Etc.	Etc.

5 ft. increments available to 30 ft., thereafter 10 ft. increments only. Some ranges are not available over 50 ft.

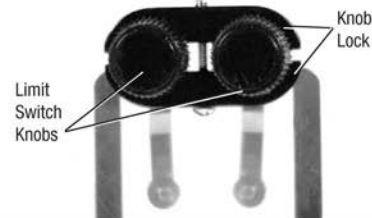
Options

NOTE: Verify option availability. Not all options can be provided for every model.

BC = Capillary tubing exits from back of case
ES = Environmentally sealed for isolation from the elements
EX = Explosion-proof; SWICHGAGE® enclosed within explosion proof case; Class I, Division 1, Groups C & D
EL = (EXLC) Explosion-proof less case; internal gage mechanism only—without case
LC = Less case; SWICHGAGE® mechanism and hardware connections—without case
OS = Liquid filled case for resistance against corrosion, environment, vibration and electrical arc
TA = (TCA) Tickler contact; includes 1 auxiliary contact (tickler) and 2 limit contacts (all-face-adjustable-SPL series)

Tamperproof Contact Accessory

Order 05000610



Dual Temperature Switchgauge® Model Series MDTM89



Features

- Monitor Inputs From Two Thermocouples
- Adjustable Switch Trip Point For Each Input
- FET or SCR Output
- Power From CD Ignition or 120 VAC or 12/24 VDC
- Types “J” or “K” Ungrounded Thermocouples
- Digital Readings in Fahrenheit or Celsius

* When used with approved ignition or 12-24 VDC. Contact Murphy for details.

† Approved for CD ignition, 80–250 VDC.

Murphy's model MDTM89 is an electronic, dual-temperature monitor. It monitors two thermocouples, displays the temperature of the thermocouple selected, and has adjustable trip points for each input. A toggle switch provides for selection of the thermocouple to be displayed and/or the temperature trip point to be checked/adjusted. If either trip point is reached, the associated output “turns on” and can be used as a control signal, or to initiate alarms and/or shutdown.

A “Push to Read” button, located below the selector switch, allows the operator to check the trip point and to see its value as adjustments are made. Two potentiometers, one on each side of the thermocouple selector switch, are provided for field-adjustment of the trip points.

There are four basic models. Two of the models are powered by capacitor discharge ignition, and have either an FET or an SCR output. One model operates from 12 or 24 VDC and has an FET output. One model operates from 120 VAC by use of an isolation module and has an FET output. Standard display is in degrees Fahrenheit; degrees Celsius is optional.

Applications

Applications include the following:

- Compressor suction/discharge temperature
- Engine/compressor jacket water temperature
- Engine exhaust temperature
- Compressor cylinder temperature
- After cooler temperature
- Bearing temperature

Thermocouple Type

Either “J” or “K” type **UNGROUND**ED THERMOCOUPLE is accepted. Specify type in part number for each MDTM89 unit (see How to Order information on back page).

Order thermocouples as a separate item.

Automatic Cold Junction Reference

Cold junction reference point compensation is an integral feature of the monitor. The compensator circuit monitors case temperature and automatically compensates for changes in ambient temperatures. Compensation will allow maximum of 2 degrees change in the temperature reading from 32 to 122°F (0 to 50°C).

Open Thermocouple Input

An open thermocouple input forces the monitor into upscale overrange. The monitor indicates an overrange by displaying the numeral 1 (one) in the left most digit of the display. An overrange will turn on the high trip point output.

Trip Point Operation

Monitored trip points are independent of the thermocouple selector switch. Both set points are always active.

When the thermocouple temperature reaches the trip point temperature, the MDTM89 is triggered. After approximately 0.5 seconds the trip point output “turns on”.

Trip points are set by depressing the “Push to Read” push button while rotating a trip point potentiometer until the desired trip point temperature is displayed.

Continuous & Trip Point Display

The selector switch is used to select the thermocouple or trip point temperature to be displayed. The selected temperature is continuously displayed during normal operation. Depressing the “Push to Read” push button displays the trip point temperature of the selected thermocouple.

Specifications

Power Requirements (Operating Voltages):

MDTM89-A: 100 to 350[†] VDC, CD ignition, negative ground (FET outputs).

MDTM89-E: 100 to 350^{*}, CD ignition, negative ground (FET outputs).

MDTM89-B: 100 to 350^{*} VDC, CD ignition, negative or positive ground (SCR outputs).

MDTM89-C: 12 to 24[†] VDC, negative ground, 15 milliwatts (FET outputs).

MDTM89-D: 120 VAC (MDTM89-C with 120 V isolation module #IT-1) (FET outputs.) Model NOT approved by CSA or Factory Mutual.

Power Consumption: CD ignition: 350 µa @ 100V; 120 VAC: 0.6 watts; 24 VDC: 0.5 watts.

Outputs: Model B: output turns on above trip point; output turns off when power is switched off; two (2) isolated SCR outputs, 0.5 amp @ 250 VDC.
Models A, C and D: output turns on above trip point; output turns off below trip point; two (2) isolated FET outputs, 0.5 amp @ 250 VDC.
Model E: output one turns on above trip point, output turns off below trip point; output 2 turns on below trip point, output turns off above trip point: two (2) isolated FET outputs, 0.5 amp @ 250 VDC.

* Approved for CD ignition, 80–250 VDC.

† When used with approved ignitions or 12-24 VDC. Contact Murphy for details.

Ambient Cold Junction Compensation Range: 32 to 122°F (1°C from 0 to 50°C).

Operating Temperature: -4 to 158°F (-20 to 70°C).

Storage Temperature: -40 to 300°F (-40 to 150°C).

Case: Die cast aluminum.

Reset Differential: FET models: Decreases 3 Degrees (°F or °C).
SCR model: turn input power off to reset.

Measurement Range: Monitor Range 0-1999°F or °C (specify "F" or "C" in part number).

Accuracy: With J-type thermocouple: from 150-1200°F (66-649°C) ±1.5% of reading. With K-type thermocouple: from 400-2000°F (204-1076°C) ±1.5% of reading. At calibration temperature.

Laboratory Approvals: CSA† and Factory Mutual* approved for Class I, Division 2, Group D, hazardous locations).

Thermocouple Lead Length: 150 ohm lead resistance affects monitor accuracy less than 1°.

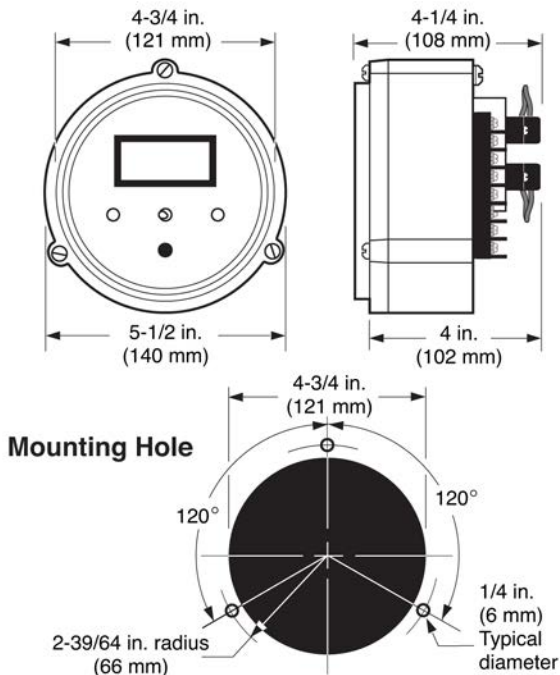
Trip Point Accuracy: ±3°F (±2°C) of reading.

Trip Point Adjustment Range: 0-1999 Degrees.

Shipping Weight: 48 ozs (1.4 kg).

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

Dimensions



How to Order

MDTM89- F - A - K

Calibration
F: Fahrenheit
C: Celsius

Type of **ungrounded** thermocouple to be used; "J" or "K".

Powered by and type output:

A: CD ignition, 100–350 VDC, output by FET (Field Effect Transistor, 0.5 A @ 250 VDC maximum).

E: CD ignition, 100–350 VDC, output by FET (Field Effect Transistor, 0.5 A @ 250 VDC maximum).

B: CD ignition, 100–350 VDC, output by SCR (Silicon Controller Rectifier, 0.5 A @ 250 VDC maximum).

C: 12 to 24 VDC, 15 mw, output by FET

D: 120 VAC, output by FET (same as "C" with a 120 VAC–24 VDC power supply [#IT-1])

MDTM89 Interface Capabilities

Model	Power Source	Rating
LCDT	CD Ign., 120 VAC, 12/24 VDC	CL.I, Div.1, Gr.D, Haz. areas*
S1501	120 VAC or 12/24 VDC	CL.I, Div.1, Gr.D, Haz. areas*
TTD	CD Ign., 12/24 VDC	CL.I, Div.2, Gr.D, Haz. areas**
TATTLETALE®	CD Ign., 120 VAC, 12/24 VDC	Non-Hazardous areas

PLC s, various non-Murphy annunciators—contact factory.

* An isolation barrier is needed between the MDTM89 and an Annunciator rated for Class I, Division 1, Group D, Hazardous Areas.

** When used with approved ignition. Contact Murphy for details.

Temperature Scanner/Pyrometer Switchgag[®] – Model TDX6



Model TDX6



Features

- Scans 6 Channels
- Rated for Class I, Division 2, Group D Hazardous Areas
- Start-up Time Delay
- Easy to Read Digital Display
- Accepts Type "J" or "K" Thermocouples Grounded[†] or Ungrounded
- Field Adjustable Trip Points
- LCD Display in Either °F or °C (Specify)
- One Thermocouple May Be Selected for Continuous Display
- CD Ignition, 24 VDC, or 120 VAC Powered
- No Special Training or Programming Required
- Scans All 6 Sensors in 30 Seconds



* When used with approved ignition. Contact Murphy for details.

† When used with power requirements described below.

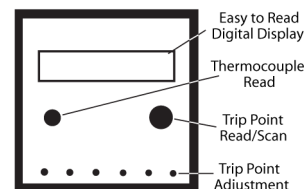
‡ Using grounded thermocouples introduces the risk of odd currents or voltages being imposed on the thermocouple signal which can affect the accuracy of the reading. This is an inherent problem of grounded thermocouples, the reason why we prefer ungrounded thermocouples.

Description

The TDX6 is an advanced design 6-point temperature scanner and pyrometer. It continually scans up to six thermocouples and sequentially displays the thermocouple number and its reading. Each sensor input has a field settable trip point for alarm, shutdown or control. A read/scan selector allows the operator to set and view each trip point. With the selector in the scan mode, a "thermocouple read" push button provides a means to manually toggle through the six channels and to lock in on a specific channel. Normal scanning will resume approximately three seconds after releasing the push button. All trip points are continually armed and active during the scanning process.

Type "J" or "K", grounded[‡] or ungrounded thermocouples are accommodated. Other types are available upon request.

The TDX6 can interface with other Murphy SELECTRONIC[®] TATTLETALE[®] annunciators and Micro-controllers. It is rated for Class I, Division 2, Group D, hazardous areas* and is available for operation from CD ignition, 120 VAC, or 24 VDC.



Applications

- Gas Compressor Suction/Discharge Temp.
- Engine/Compressor Jacket Water Temperature
- Process Temperatures
- Generators
- Pumps
- Engine Exhaust Temperature

Specifications

Power Requirements (Operating Voltages): 120 VAC or 80-250 VDC, CD ignition or 24 VDC.

Outputs:

Models TDX6-A and TDX6-C: Six (6) isolated Silicon Controlled Rectifier (S.C.R.) outputs; 0.5 A @ 250 VDC; switches on (applies ground) above trip point and switches off (removes ground) when power is switched off.

Models TDX6-B and TDX6-D: Six (6) isolated Field-Effect Transistor (F.E.T.) outputs; 0.1 A @ 250 VDC; switches on (applies ground) above trip point and switches off (removes ground) below trip point.

Operating Temperature: -4 to 158°F (-20 to 70°C).

Storage Temperature: -40 to 300°F (-40 to 150°C).

Case: ABS 1/4 DIN (90 x 90 mm).

Scanning Speed: Complete scan in 30 seconds.

Reset Differential: F.E.T. models: Decreases 3 Degrees (°F or °C). S.C.R. models: Turn input power off to reset.

Display Update Time: Updates temperature every 0.3 seconds.

Start-up Time Delay: Unit is locked out for 10 seconds after ignition voltage is sensed.

Ambient Cold Junction Compensation Range: 2°F from 32°F to 122°F (1°C from 0°C to 50°C).

Measurement Range: Monitor Range 0-1999°F or °C (specify °F or °C in part number).

Accuracy:

With J-type thermocouple: from 50-150°F (10-66°C) +3°F(+2°C), from 150-1200°F (66-649°C) ±1.0% of reading.

With K-type thermocouple: from 400-2000°F (204-1076°C) ±1.0% of reading.

Trip Point Accuracy: ±3°F (±2°C) of reading.

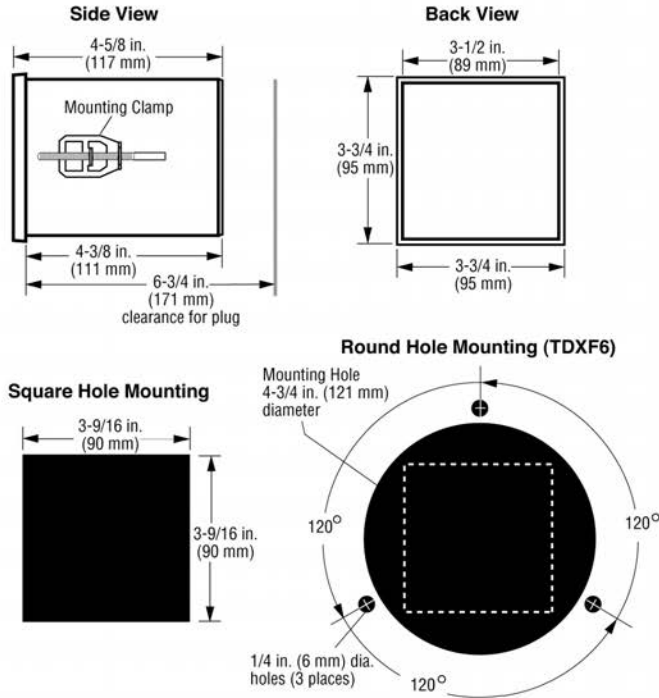
Trip Point Adjustment Range: 0-1999 Degrees.

Open Thermocouple Input: A number 1 appears in the display to the right of the channel number and the trip point operates.

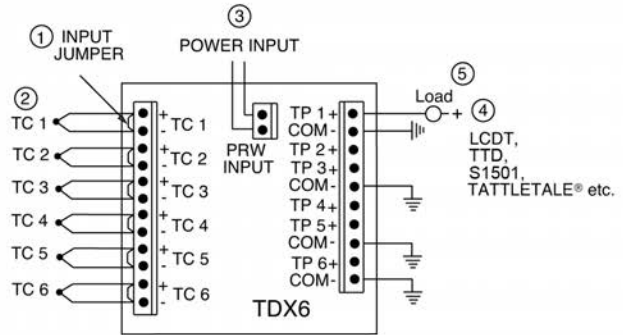
Shipping Weight: 2 lb. (0.91 kg).

Shipping Dimensions: 5-1/2 x 9 x 6 in. (140 x 229 x 152 mm).

Dimensions



Typical Wiring Diagram



NOTES:

- ① Remove input jumper when the thermocouple is connected to input.
- ② Thermocouple Input
- ③ Power input 120 VAC, 80-250 VDC, CD ignition or 24 VDC, positive or negative ground.
- ④ Interfaced components must meet area classification requirements.
- ⑤ When using the TDX6 with inductive loads, we recommend installing a suppression diode across all coils.

TDX6 Interface Capabilities

Model	Power Source	Rating
LCDT	CD Ign., 120 VAC, 12/24 VDC	Cl.I, Div.1, Gr.D, Haz. areas*
S1501	120 VAC or 12/24 VDC	Cl.I, Div.1, Gr.D, Haz. areas*
TTD	CD Ignition (neg. grnd), 12/24 VDC	Cl.I, Div.2, Gr.D, Haz. areas†
TATTLETALE®	CD Ign., 120 VAC, 12/24 VDC	Non-Hazardous areas

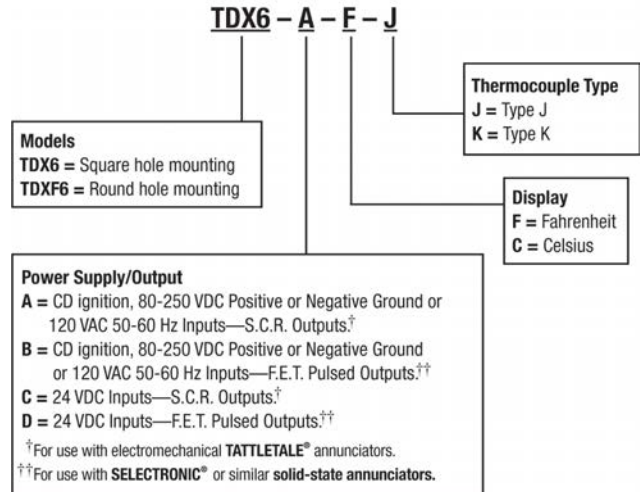
* Note: An isolation barrier is needed between the TDX6 and an Annunciator rated for Class I, Division 1, Group D, Hazardous Areas.

† Note: When used with approved ignition. Contact Murphy for details.

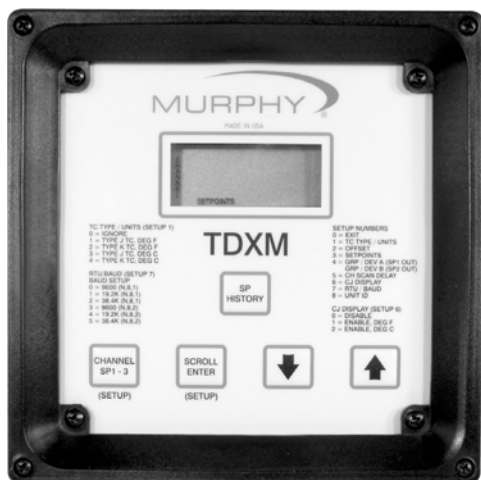
PLC's, various non-Murphy annunciators—contact factory.

How to Order

To order the TDX6 use the part number designation diagram below.



Temperature Scanner/Pyrometer – TDXM Model



Features

- Scans Up To 24 Channels
- Three (3) Adjustable Trip Points Per Channel
- Accepts Any Combination of “J” or “K” Type Grounded or Ungrounded Thermocouples
- 2 Separate Groups with Deviation Trip Functions Selectable
- Powered By 10 to 32 VDC Systems
- RS485 Serial Communications Port
- Uses MConfig™ Configuration and Monitoring Software
- CSA Certified for Use in Class I, Division 2, Groups “B, C & D” Hazardous Locations

The TDXM now gives you a unique configurable temperature scanner/pyrometer with a built-in power supply. A new design features a 7-character, 7-segment Liquid Crystal Display window with 1/2 inch (13 mm), easy-to-read characters. Also located on the faceplate are membrane keys for easy configuring.

Highly reliable and versatile, the TDXM accepts up to 24 type “J” or “K” grounded or ungrounded* thermocouples. Each channel has three (3) adjustable setpoints SP1, SP2 and SP3. The SP1, SP2 and SP3 Setpoints correspond to the SP1, SP2 and SP3 outputs. Additionally it has the selectable feature to monitor and alarm or shutdown on deviation from an average for up to two groups of temperatures (GRP/DEV; deviation from average). One group could be exhaust temperatures and another group could be bearing temperatures.

The TDXM is capable of communicating with controllers, PLC's, computers or SCADA (Supervisory Control & Data Acquisition) systems by a built-in RS485 serial communications port.

The TDXM-DC is available for 10 - 32 VDC systems.

User Interface (Faceplate)

The User Interface includes a numeric LCD display and a 5-button membrane keypad for readout and channel configuration. Thermocouple types can be selected and setpoints entered through a series of setup menus, see “Setup Menus” section.

Thermocouple Types

Each of the 24 channels on the TDXM can be configured as either “J” or “K” type thermocouples and temperature units can be selected as °F or °C readout for each channel. Unused channels can be set to “Ignore” and will not be seen in the display and will not cause fault trips.

Control Options

Each TDXM model features three outputs: 2 Field Effect Transistor (FET) outputs and 1 Form-C Relay output. Each channel has 3 setpoints, one for each of the outputs. This allows for greater system flexibility by grouping sets of channels through one output.

Setpoint History

The TDXM stores the last setpoint trip for each output in non-volatile memory. For instance, if SP1 of channel 1 was the last SP1 tripped, the LCD display will read: SP1 1 when the Setpoint History is accessed for SP1.

Sensor Inputs and Terminals

The TDXM accepts up to 24, either “J” or “K” type grounded or ungrounded* thermocouples using 24 pairs of screw type connections. Each pair has a jumper from the factory. Any tripped setpoint is detected within 2 seconds after the set point is exceeded.

RS485 Serial Port

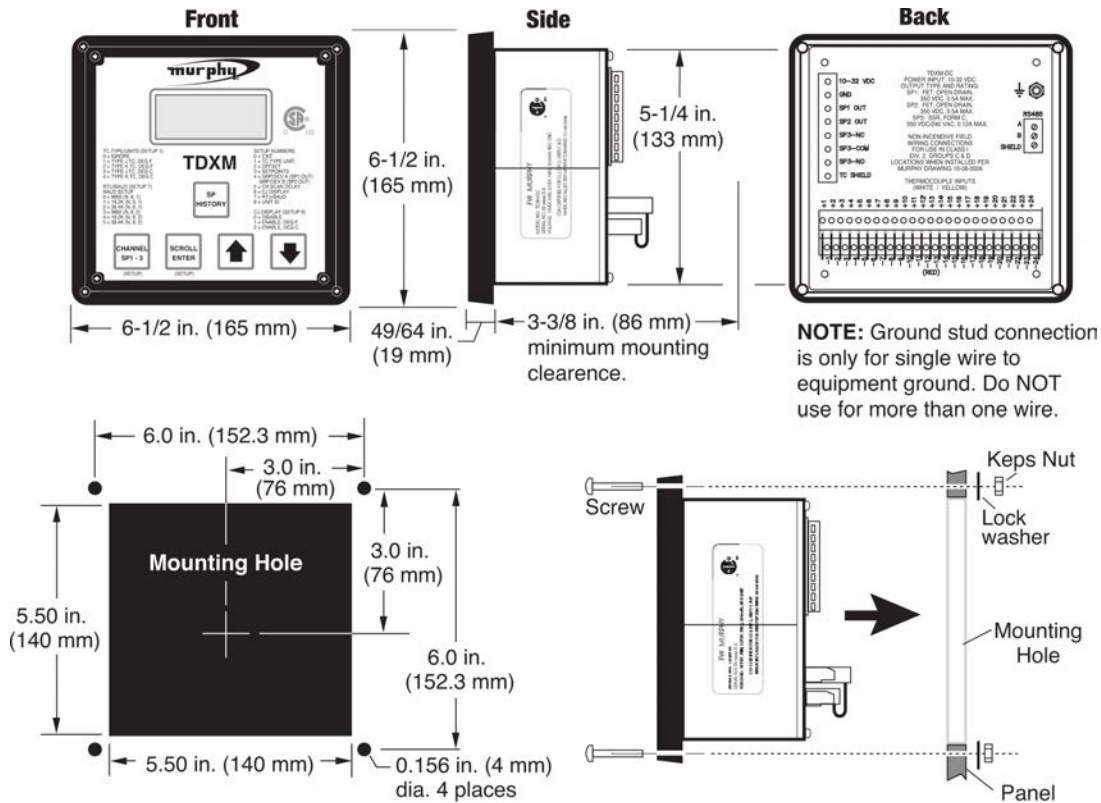
The RS485 serial port (MODBUS®† RTU slave) on the back of the module is provided for communicating with micro-controllers, PC's, PLC's and SCADA systems (see “Typical Wiring Diagrams”). It is recommended that a termination resistor (customer supplied) be used when the TDXM is the last device connected in a daisy-chain configuration. The Baud rate, number of stop bits, and slave node number can be set using the keypad. Communication is half-duplex. Modbus® RTU function codes 3 and 6 are supported.

* We recommend the use of ungrounded thermocouples. Errors in readings with grounded thermocouples can be the result of differences in grounding between different devices.

† MODBUS® is a registered trademark of AEG Schneider Automation Inc.

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TDXM Module Dimensions



For Outdoor Use, the TDXM should be mounted in a weatherproof enclosure

Specifications

Power Input (Operating Voltages): 10- 32VDC, 750 mW max.

Sensor Inputs: Up to 24 type "J" or "K" grounded or ungrounded[†] thermocouples.

Outputs: Two (2) Outputs 0.5 A, 350 VDC, FET-sink to ground to trip. One (1) Form "C" Solid State Relay Output 0.125 A, 350 VDC/240 VAC.

NOTE: The form "C" relay output is de-energized for a trip condition. The NC terminal is closed and the NO terminal is open for trip.

Communications: RS485 Serial Port, MODBUS® RTU slave.

[†] We recommend the use of ungrounded thermocouples. Errors in readings with grounded thermocouples can be the result of differences in grounding between different devices

How to Order Your TDXM

Specify the following part number

Head/Module

TDXM-DC: 24-channel model, 10-32 VDC powered.

TDXM-DC W/SP3 Latch: Same as TDXM-DC but with SP3 latch feature.

Operating, Storage, and Display Temperature: -40 to 85°C (-40 to 185°F).

Sensor Scan Rate: Scans all channels in 2 seconds.

Range: Type K: 0 - 1999°F (0 - 1093°C); Type J: 0 - 1538°F (0 - 837°C).

Display Type: Custom 7-segment, 7-character, backlit type with temperature units indication and setpoint trip indication.

Accuracy: Cold junction: Better than ±0.5°C (1.0°F). Type "J" or "K": ±1°C (2°F); 38 - 1093°C (100 - 1999°F).

Cold Junction Compensation: -40 to 85°C (-40 to 185°F).

Open Thermocouple Detection: Drives channel reading high.

Shipping Weight (all Models): 3 lb. (1.36 kg) approximately.

Shipping Dimensions (all Models): 5-1/2 x 9 x 9-1/2 in. (140 x 229 x 241 mm) approximately.

Configuration Software

MConfig: TDXM configuration software available.

Replacement Parts

Plug, kit, TDXM: Terminal Plug replacement kit-P/N 10-00-7848.

Thermocouple, RTD, and RTD Transmitter Assemblies With Thermowell – TC, RTD, and RTDT Series



Features

- 304 Stainless Steel Thermowell Protection
- Compatible with Digital Switchage®
- Types “J” or “K” Ungrounded Thermocouples
- 100 Ohm, 3-Wire RTD Assemblies
- 4-20 mA DC Output RTD Transmitters

Description

Enovation Controls, LLC. offers a variety of highly reliable thermocouple and RTD (Resistance Temperature Detector) assemblies and 4-20 mA DC output RTD transmitters.

Their innovative features include a 304 stainless steel thermowell that provides protection to the spring loaded element.

The cast aluminum connecting head meets NEMA 4 requirements and includes an RTD transmitter or a thermocouple/ RTD terminal block mounted on ceramic Steatite and rated NEC Class 2.

The complete assemblies are offered in 2-1/2, 4-1/2, or 7-1/2 in. (63, 114, or 191 mm) thermowell insertion lengths.

Loop Resistance Graph

Supply voltage for RTDT must be within 13-40 VDC. The figure on right shows the minimum supply voltage (VDC) required for a given load resistance (RL).

Thermocouple Assemblies with Thermowell

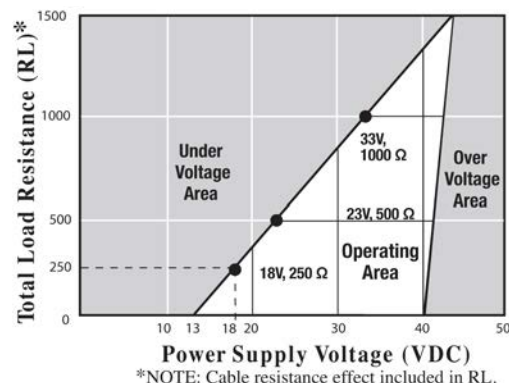
Available in types J or K, the thermocouple assemblies have ungrounded elements in a 304 stainless steel spring loaded sheath. For product compatibility see back page (replacement parts and thermocouple extension wire are available).

RTD Assemblies with Thermowell

Resistance temperature detector (RTD) assemblies are available with a 100 ohm platinum element, 3- wire leads, and spring loaded 316L stainless steel element sheath.

RTD Transmitter Assemblies with Thermowell

RTDT assemblies transmit process variable temperatures. Available as part of the temperature sensor assemblies or as a separate units, the RTDT's accept 2 or 3 wire, 100 ohm RTD's. The RTD transmitters are loop powered, they feature linearized 4-20 mA DC outputs and have reversed polarity protection.



Applications

Enovation Control's temperature sensing assemblies fit in a variety of industrial processes and applications. Their ruggedness and characteristics make these assemblies a popular and price-competitive choice.

Specifications

Thermowell: 304 stainless steel; 7000 psi (48.2 MPa) [482 bar] max. @ 70°F.

Connecting Head: Cast Aluminum; 400°F (204°C) maximum operating temperature.

Thermocouple: Ungrounded, Magnesium Oxide (MgO) insulated 96% purity; element sheath of 304 stainless steel.

Type “J” operating temp.: 900°F (482°C) max.

Type “K” operating temp.: 1800°F (982°C) max.

RTD: 100 ohm @ 0°C Platinum element; 3-wire; 400 °F maximum; 0.00385 temperature coefficient; 316L stainless steel element sheath.

RTD Transmitter: 100 ohms Platinum RTD; 400 °F maximum; Ranges: 0 to 400°F and -60 to 140°F. Linearized 4-20 mA DC output. Loop powered typically 24 VDC, when using the Loop Resistance Graph, 13-40 VDC. For use with 100 ohms Platinum RTD elements, 0.00385 temperature coefficient.

Thermocouple Accuracy (J/K): 0.5%.

RTD Accuracy: ±0.12%.

RTD Transmitter Accuracy: ±0.1%.

Terminal block: Ceramic Steatite; thermocouples have: 4 terminals; RTD's: 6 terminals. 28 to 14 AWG wire size, (8-32 SS screws).

Shipping Weights (listed by insertion length):

2-1/2 in. (63 mm) model: 2 lb. (0.907 kg).

4-1/2 in. (114 mm) model: 2 lb. 8oz. (1.24 kg).

7-1/2 in. (191 mm) model: 3 lb. 6oz. (1.67 kg).

Shipping Dimensions (listed by insertion length):

2-1/2 and 4-1/2 in (63 and 114 mm) models: 12 x 7 x 5-1/2 in. (305 x 178 x 140 mm).

7-1/2 in. (191 mm) models: 16 x 11 x 5-1/2 in. (406 x 280 x 144 mm).

Optional Thermocouple Extension Wire: (Sold separately—see How to Order section)

Individual Conductor Insulation: Extruded PFA.

Duplex Conductor Insulation: Twisted; Extruded PFA Overall.

Temperature Rating: Continuous -450 to 500°F (-267 to 260°C).

Abrasion Resistance: Good.

Moisture Resistance: Excellent.

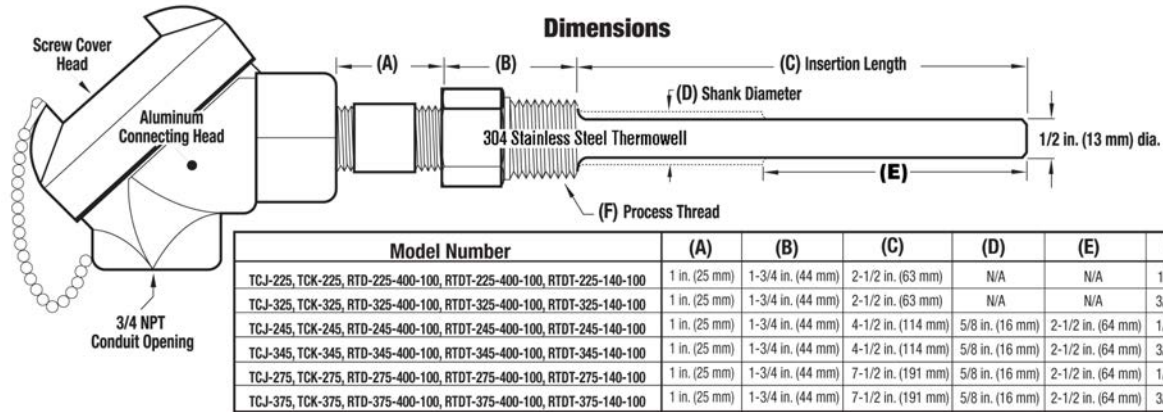
Shielding: Metallic Shield.

Gauge: 20 AWG (0.5 mm²).

Ohms per Double Foot Type “J”: 0.357

Ohms per Double Foot Type “K”: 0.586

Dimensions



How to Order

To order just specify the model number needed (see chart below). Order replacement parts and thermocouple extension wire separately.

Model Number	P. Thread	Insertion Length	Sensing Element Type	Transmitter Range
Thermocouple Assemblies (thermowell included)				
TCJ-225	1/2 NPT	2-1/2 in. (63 mm)	J Type Ungrounded Thermocouple	
TCK-225	1/2 NPT	2-1/2 in. (63 mm)	K Type Ungrounded Thermocouple	
TCJ-325	3/4 NPT	2-1/2 in. (63 mm)	J Type Ungrounded Thermocouple	
TCK-325	3/4 NPT	2-1/2 in. (63 mm)	K Type Ungrounded Thermocouple	
TCJ-245	1/2 NPT	4-1/2 in. (114 mm)	J Type Ungrounded Thermocouple	
TCK-245	1/2 NPT	4-1/2 in. (114 mm)	K Type Ungrounded Thermocouple	
TCJ-345	3/4 NPT	4-1/2 in. (114 mm)	J Type Ungrounded Thermocouple	
TCK-345	3/4 NPT	4-1/2 in. (114 mm)	K Type Ungrounded Thermocouple	
TCJ-275	1/2 NPT	7-1/2 in. (191 mm)	J Type Ungrounded Thermocouple	
TCK-275	1/2 NPT	7-1/2 in. (191 mm)	K Type Ungrounded Thermocouple	
TCJ-375	3/4 NPT	7-1/2 in. (191 mm)	J Type Ungrounded Thermocouple	
TCK-375	3/4 NPT	7-1/2 in. (191 mm)	K Type Ungrounded Thermocouple	
RTD Assemblies (thermowell included)				
RTD-225-400-100	1/2 NPT	2-1/2 in. (63 mm)	100 ohm Pt RTD 400°F maximum	
RTD-325-400-100	3/4 NPT	2-1/2 in. (63 mm)	100 ohm Pt RTD 400°F maximum	
RTD-245-400-100	1/2 NPT	4-1/2 in. (114 mm)	100 ohm Pt RTD 400°F maximum	
RTD-345-400-100	3/4 NPT	4-1/2 in. (114 mm)	100 ohm Pt RTD 400°F maximum	
RTD-275-400-100	1/2 NPT	7-1/2 in. (191 mm)	100 ohm Pt RTD 400°F maximum	
RTD-375-400-100	3/4 NPT	7-1/2 in. (191 mm)	100 ohm Pt RTD 400°F maximum	
RTD Transmitter Assemblies (thermowell included)				
RTDT-225-400-100	1/2 NPT	2-1/2 in. (63 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-225-140-100	1/2 NPT	2-1/2 in. (63 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)
RTDT-325-400-100	3/4 NPT	2-1/2 in. (63 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-325-140-100	3/4 NPT	2-1/2 in. (63 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)
RTDT-245-400-100	1/2 NPT	4-1/2 in. (114 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-245-140-100	1/2 NPT	4-1/2 in. (114 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)
RTDT-345-400-100	3/4 NPT	4-1/2 in. (114 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-345-140-100	3/4 NPT	4-1/2 in. (114 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)
RTDT-275-400-100	1/2 NPT	7-1/2 in. (191 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-275-140-100	1/2 NPT	7-1/2 in. (191 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)
RTDT-375-400-100	3/4 NPT	7-1/2 in. (191 mm)	100 ohm Pt 4-20 mA RTD Transmitter	0-400°F (-17.8 to 204°C)
RTDT-375-140-100	3/4 NPT	7-1/2 in. (191 mm)	100 ohm Pt 4-20 mA RTD Transmitter	-60 to 140°F (-51.1 to 60°C)

Replacement Parts (order separately)

TCHA = Cast aluminum head with terminal blocks for thermocouples
TCJE-25 = Type J element only for 2-1/2 in. wells*
TCKE-25 = Type K element only for 2-1/2 in. wells*
TCJE-45 = Type J element only for 4-1/2 in. wells*
TCKE-45 = Type K element only for 4-1/2 in. wells*
TCJE-75 = Type J element only for 7-1/2 in. wells*
TCKE-75 = Type K element only for 7-1/2 in. wells*
PTW-225 = 1/2 NPT x 2-1/2 in. thermowell
PTW-325 = 3/4 NPT x 2-1/2 in. thermowell
PTW-245 = 1/2 NPT x 4-1/2 in. thermowell
PTW-345 = 3/4 NPT x 4-1/2 in. thermowell
PTW-275 = 1/2 NPT x 7-1/2 in. thermowell
PTW-375 = 3/4 NPT x 7-1/2 in. thermowell
RTDE-25 = 100 Ω Pt RTD element only for 2-1/2 in. wells*
RTDE-45 = 100 Ω Pt RTD element only for 4-1/2 in. wells*
RTDE-75 = 100 Ω Pt RTD element only for 7-1/2 in. wells*
RTDTX-400-100 = 100 Ω Pt RTD Transmitter only (0 to 400°F)*
RTDTX-140-100 = 100 Ω Pt RTD Transmitter only (-60 to 140°F)*

Thermocouple Extension Wire

00-00-3271 = Type J 100 ft roll.
00-00-3272 = Type K 100 ft roll.

* All elements are spring loaded

Product Compatibility

Model	Power Source	Temperature Sensor
MDTM89	CD Ign. 12/24 VDC, 120 VAC	J/K ungrounded thermocouples
TDX6	CD Ign. 12/24 VDC, 120 VAC	J/K grounded/ungrounded tc.
TD35	8-35 VDC	J/K grounded/ungrounded tc.
MDM45	10-30 VDC @ 3.6 watts max.	4-20 mA RTD transmitter
TDXM	12/24 VDC	J/K grounded/ungrounded tc.

Thermocouple, 1/4" Diameter Stainless Steel Tube Type

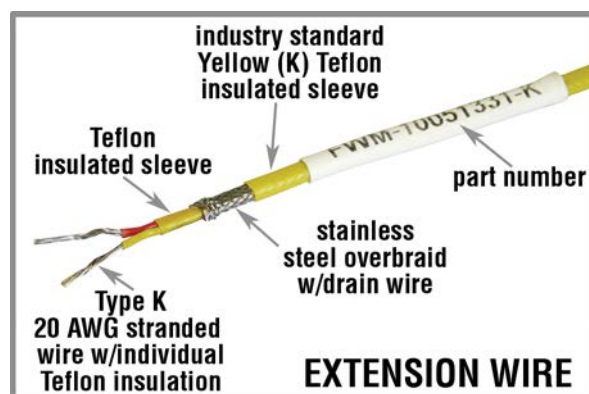


Features

- 1/4" Diameter 316 Stainless Steel Tubing Sheath
- Type K, 6" and 10" Probes
- Can be Used With 2", 4.5" and 7.5" Insertion Thermowells
- Can be Bent Anywhere Along its Length to a 90° Angle
- Tip Sensitive to Minimize Temperature Influence From Surrounding Environment

Due to the increase in controller and telemetry applications, this thermocouple product line has been added to the line up of Murphy temperature monitoring end devices. They are designed to fit as many applications as possible with the fewest possible parts and the fewest possible installation caused faults.

Most of the thermocouple failures occur in how the thermocouples extension wire is installed and connected. This new line incorporates Type K, 20 AWG stranded extension wire encased in a rugged cable to meet demanding environments. The extension wire lengths are available in 5', 15', 30', 50', and 100' lengths. This will enable a run from the point of measurement to the nearest conduit entry or to be installed in a cable tray. The industry standard yellow Teflon allows easy identification of K type thermocouple wires so they can be separated from high voltage wires following good installation practices.



Thermowells are available in 2", 4-1/2", or 7-1/2" lengths for insertion depth and have a 1/2" NPT process connection. They are supplied with a standard stainless steel compression fitting for securing the thermocouple in the thermowell at the appropriate depth. In low pressure applications the thermocouple can be inserted directly into the process through a standard 1/4" SS tubing compression fitting.

Product Description

The thermocouples are encased in a ¼" diameter 316 stainless steel tubing sheath with stainless steel Bell Spring for strain relief. The initial offerings are K type thermocouples with 6" and 10" long ¼" diameter probes. The thermocouples are shipped straight, but can be bent with standard tubing benders anywhere along its length to a 90° angle to minimize clearance required and help prevent damage due to personnel working on the unit. The thermocouple is tip sensitive to minimize ambient temperature influence and should be inserted between 25% and 75% of the piping inside diameter or enough to minimize any skin temperature affect on the tip of the probe when installed in vessels.

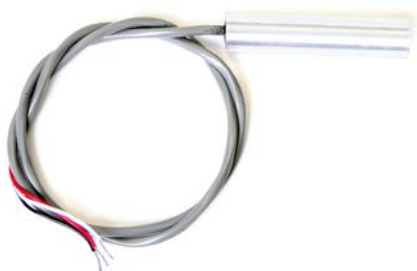
Additional features

- Stainless steel transition sealing gland with a stainless steel Bell Spring for strain relief.
- Standard bore through stainless steel compression fitting for securing the thermocouple in the thermowell at the appropriate depth.
- Can be inserted directly into a low-pressure application process through a standard ¼" SS bore through tubing compression fitting.
- Enables a run from the point of measurement to the nearest conduit entry, junction box, or all the way to the panel housing the readout and monitoring instrument. Can also be installed in a cable tray.
- The thermowell assembly comes with a stainless steel bore through compression fitting and ferrel saving installation time and money.

How to Order

Item Number	Product Name	Description
10051331	Thermocouple, Type K, 1/4Dia. Tube x 6"L	w/5' Thermocouple Extension Wire
10051325	Thermocouple, Type K, 1/4Dia. Tube x 6"L	w/15' Thermocouple Extension Wire
10051326	Thermocouple, Type K, 1/4Dia. Tube x 6"L	w/30' Thermocouple Extension Wire
10051327	Thermocouple, Type K, 1/4Dia. Tube x 6"L	w/50' Thermocouple Extension Wire
10051328	Thermocouple, Type K, 1/4Dia. Tube x 6"L	w/100' Thermocouple Extension Wire
10051332	Thermocouple, Type K, 1/4Dia. Tube x 10"L	w/5' Thermocouple Extension Wire
10051323	Thermocouple, Type K, 1/4Dia. Tube x 10"L	w/15' Thermocouple Extension Wire
10051317	Thermocouple, Type K, 1/4Dia. Tube x 10"L	w/30' Thermocouple Extension Wire
10051322	Thermocouple, Type K, 1/4Dia. Tube x 10"L	w/50' Thermocouple Extension Wire
10051321	Thermocouple, Type K, 1/4Dia. Tube x 10"L	w/100' Thermocouple Extension Wire
10707436	Thermowell, ½"NPT, ¼" T, 2.0"L	Assembly 304SS
10707437	Thermowell, ½"NPT, ¼" T, 4.5"L	Assembly 304SS
10707438	Thermowell, ½"NPT, ¼" T, 7.5"L	Assembly 304SS

Air Temperature Sensor - Model 12



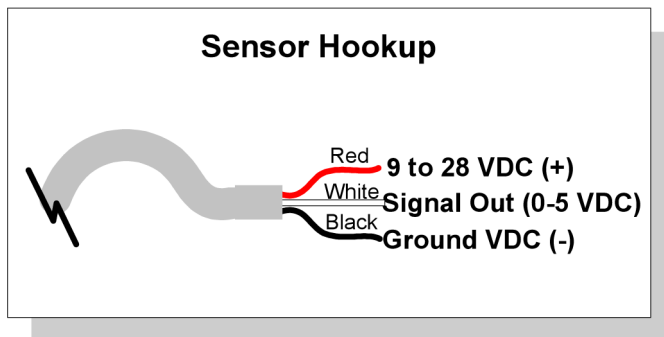
Features

Applications for the Probe Include the Following:

- Monitor Ambient Temperature and Signal Wind Machines to Start.
- Monitor and Maintain Cargo Temperatures.

The Model 12 Air Temperature Sensor is intended for use in applications that monitor slowly changing temperature. The unit gives approximately .5 °F (.25 °C) resolution when used with an 8-bit analog input.

Temperature Sensing Range		
VDC Out	°C	°f
0.00	-18	0
0.25	-14.5	5.8
0.50	-11.4	11.5
0.75	-8.2	17.3
1.00	-5	23.0
1.25	-1.8	28.8
1.50	1.4	34.5
1.75	4.6	40.3
2.00	7.8	46.0
2.25	11	51.8
2.50	14.2	57.5
2.75	17.4	63.3
3.00	20.6	69.0
3.25	23.8	74.8
3.50	27	80.5
3.75	30.2	86.3
4.00	33.3	92.0
4.25	36.6	97.8



Specifications

Temperature Capability

Useful Operating Temperature Range: 0°F to 115°F (-18°C to 46°C)

Component Temperature Range: -85°F to 300°F (-65°C to 150°C)

Accuracy: 2% of full scale with software offset correction.

Voltage

Power Input Voltage: 9 to 28 VDC

Current Draw: 1mA

Cable: 2 foot length, 22 AWG, stranded

Clamp: 1/2" ID, provided (P/N 00-03-0392)

How to Order

Air Temperature sensor - Model 12 - P/N 10-70-7483

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SECTION 15 FLUID LEVEL

Level Switch System - Bilge	
95107	Bilge Level Switch System BLSK1 Series 65
Level Switches - Tank Level	
94124	Hydrostatic Head Level Switches DF Series 67
Level Swichgage® Instruments - Coolant	
00072	Level Swichgage® Instrument For Engine Liquids – L150/EL150K1 Series 71
Level Maintainers	
1010627	Lube Level Maintainer – Model LM500/LM500-TF 73
92149	Level Maintainer – LM300 Series 77
96121	Oil Level Regulators for Lubricators – LR500 Series 79
7225	Maintain Lube Level – Model LR857 81
Level Swichgage® Instruments - Oil	
0710176	Float Actuated Oil Level Swichgage® Instrument for Small Engines and Pumps 83
Level Swichgage® Instruments - Lube	
6572	Lube Level Swichgage® Instrument – L129 Series 85
Level Switches - Crankcase	
7229	Crankcase Level Switch – L971 Series 87
Level Switches - Scrubber	
1010629	Liquid Level Switches – MLS Series 89
0600009	LS200 Series Liquid Level Switches 91
Level Valves - Scrubber	
01069	Dump Valves – DVU Series 95
Level Swichgage® Instruments - Tank Level	
94122	4-1/2 in. (114 mm) Dial Level Swichgage® Instrument – OPLH / OPLHACS Series 97



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Bilge Level Switch System BLSK1 Series



Features

- Operates Bilge Pumps or Alarms
- Uses Proven "Air Cell" Actuated System
- Remote Switch and Moving Parts Kept Unaffected by Corrosion
- Aluminum Body and Cover
- Includes 3 Assemblies:
 - (1) BLS1 Bilge Level Switch
 - (2) MACT1 Tube Kit (Sensor Line and Fittings)
 - (3) MAC1 "Air Cell" (Volume Cell)

The BLSK1 Bilge Level Switch System gives you all items and fittings necessary to install in your bilge. Or, you can have only the parts you want and you provide brackets, tubing and mounting hardware.

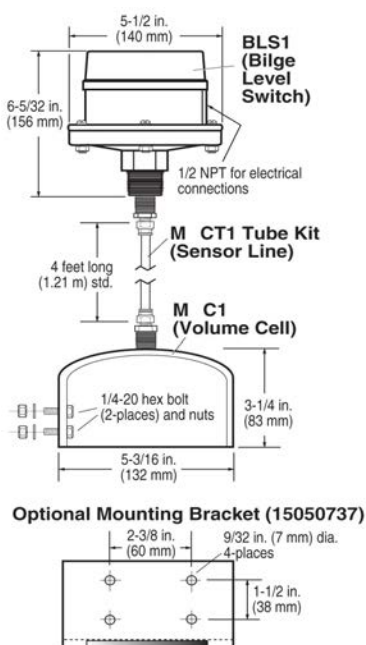
Using the proven "Air Cell" actuating system, all moving parts and switching are remote from bilge liquids and are thus not affected by corrosion, rust, etc. All wetted parts are of non-corrosive materials.

As bilge level rises a column of air is captured in the MAC1 Air Volume Cell. The rising bilge level compresses the column of air creating pressure against the large diaphragm in the BLS1 Bilge Level Switch and the switch trips. Switch set point is adjustable.

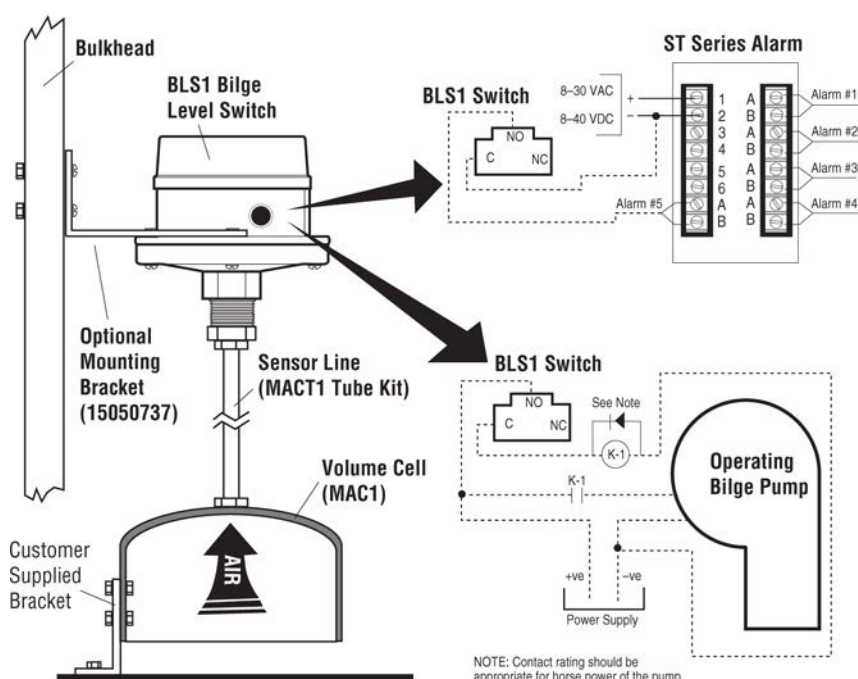
The switch resets as the bilge is pumped out. Air cell recharges itself during normal operation.

The BLS1 is constructed of materials not affected by marine atmospheres; Aluminum or Bronze body and cover, Buna-N diaphragm.

Dimensions



Typical Installation and Wiring



Specifications

BLS1 Bilge Level Switch Snap-Switch SPDT (standard)

- 5 A @ 125, 250, or 480 VAC
- 1/2 A @ 125 VDC, 1/4 A @ 250 VDC

NOTE: A pilot relay may be used for higher contact ratings (see Typical Wiring Diagram).

Case/Lid: Aluminum (std).

Bottom Plate: Glass-filled Nylon.

Process Connection: 1/4 NPTF.

Max. Pressure: 25 psi (172 kPa) [1.72 bar].

Conduit Connection (electrical): 1/2 NPT.

BLS1 Weight: 3 lb. (1.4 kg).

BLS1 Dimensions: 6-1/4 x 6-1/4 x 6-1/4 in. (159 x 159 x 159 mm).

15050737 Optional mounting bracket

16 ga., 304 stainless steel (see Dimensions).

MACT1 Tube Kit (fittings included)

4 ft. (1.21 m) flexible non-corrosive tubing, 1/4 in. (6 mm) dia. (cut to fit).

MACT1 Weight: 0.5 lb. (0.23 kg).

MACT1 Dimensions: 6 x 6 x 6 in. (152 x 152 x 152 mm).

MAC1 Air Cell (Volume Cell)

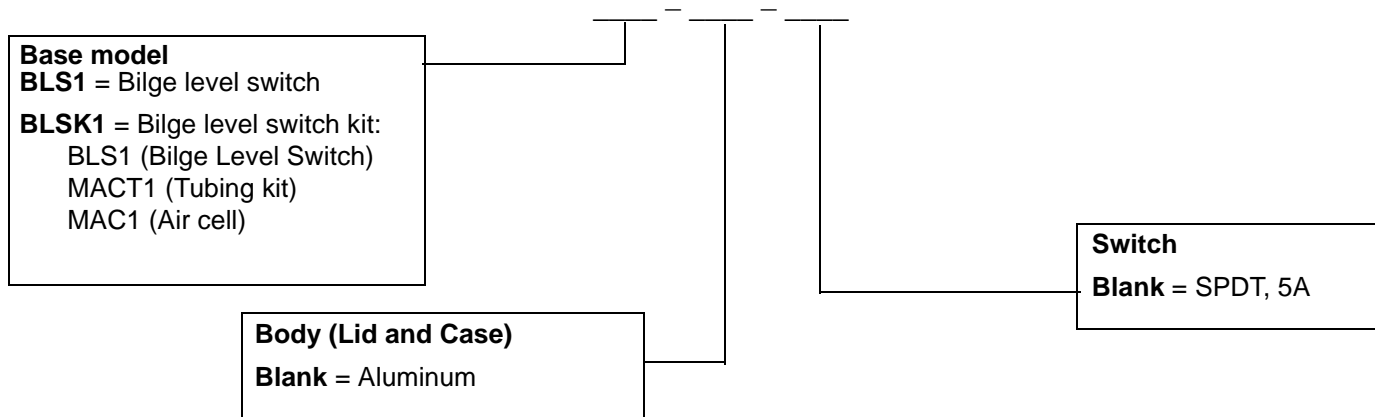
- Made of non-corrosive materials
- (2) 1/4-20 stainless steel hex bolts and nuts.

MAC1 Weight: 2 lb. (1 kg).

MAC1 Dimensions: 6 x 6 x 6 in. (152 x 152 x 152 mm).

How to Order

To order use the model number designation diagram below.



Accessories and Replacement Parts (order separately)

15050737: BLS1 mounting bracket.

15010205: 5 A snap-switch and movement assembly.

15000123: Diaphragm assembly.

15050823: Piston.

15050824: Knob for limit adjustment.

Hydrostatic Head Level Switches DF Series



Applications

- Salt Water Disposal Systems
- Cooling Towers
- Crude Oil Tanks
- Waterflood Systems
- Diesel Day Tanks
- Sumps

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

The DF series are diaphragm operated "hydrostatic head pressure" level switches. A pressure sensitive diaphragm operates a snap-switch that can be wired directly to electric pilot circuits to control pumps at predetermined levels. Typical application is to start and stop electric driven pump(s) to maintain tank levels. It is also applicable to engine driven pumps.

The nitrile sensing diaphragm is impervious to most liquids and is sensitive enough to control levels with 1/4 in. (6 mm) repeatability. See model descriptions for limits of switch trip point adjustability. Materials include aluminum body, glass-filled nylon bottom plate and a special alloy leaf snapswitch as standard.

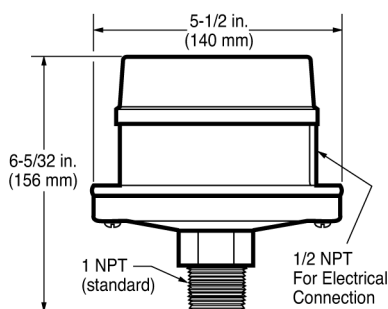
This simple level switch is highly reliable and can be worked into almost any new or existing system without major modification or special tools.

DF755 and **DF757** are suitable for atmospheric tanks in a non-hazardous area. The SPDT snap-switch for the DF755 is preset for a 4 in. (102 mm) differential in liquid level. The DF757 trip point is adjustable over a 108 in. (2743 mm) differential.

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

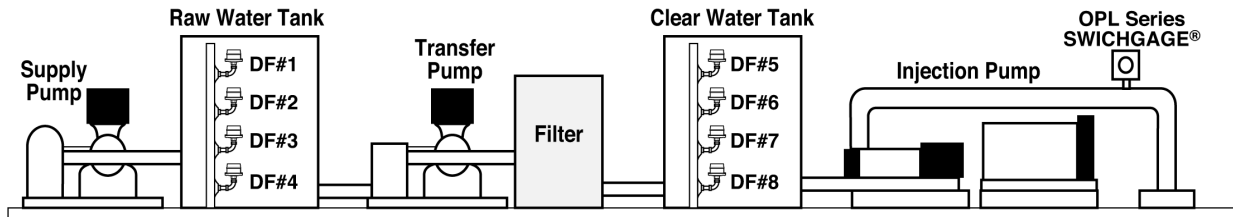
Dimensions

DF755 and DF757



Applications

- Water Flood Systems
- Crude Oil Tanks
- Salt Water Disposal Systems
- Diesel Day Tanks
- Sumps
- Cooling Towers



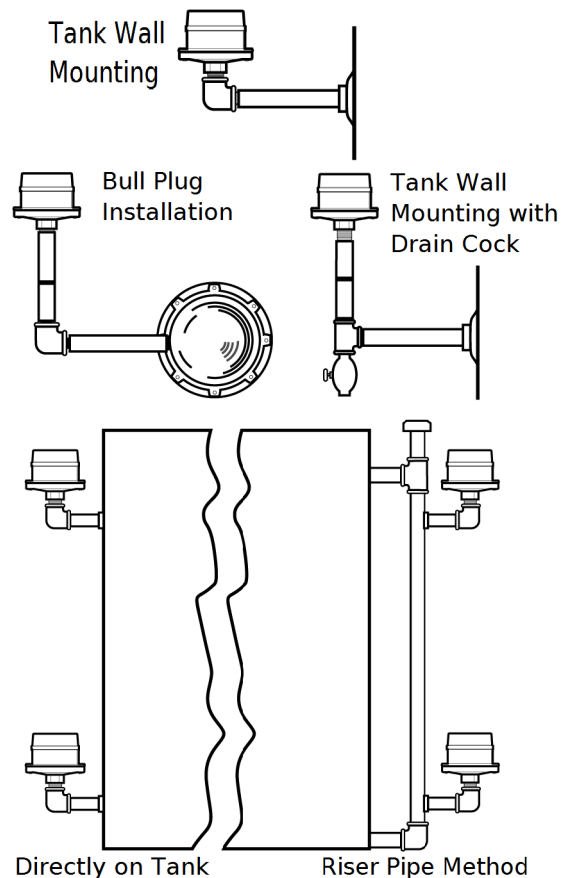
Typical Water Flood Control System

The diagram above displays eight DF Series switches installed on a Raw Water tank and a Clear Water tank. When raw water rises to predetermined level, **DF#1** stops the supply pump. As tank level falls below the predetermined level, **DF#2** starts the supply pump. If the tank level continues to fall, **DF#3** initiates shutdown of the supply pump. **DF#4** stops transfer pump before raw water tank is completely pumped out.

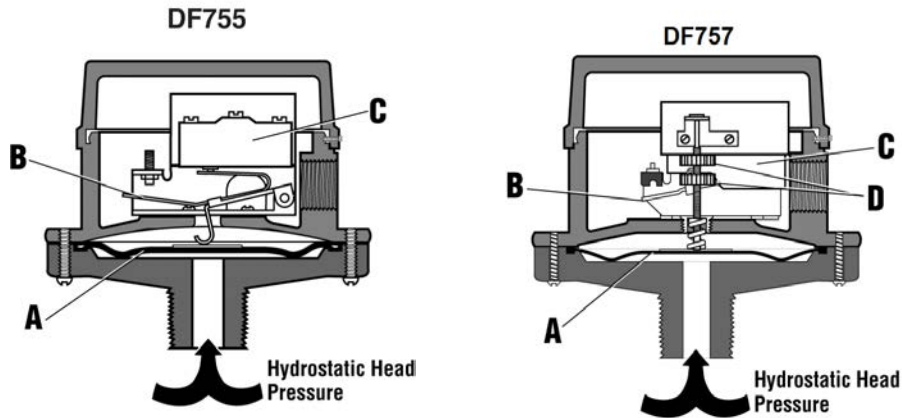
When clear water reaches the predetermined level, **DF#5** stops the transfer pump. As tank level falls to predetermined low level, **DF#6** starts the transfer pump. If the tank level continues to fall due to the failure of the filters section, **DF#7** initiates shutdown of the transfer pump. (DF755 located at this level will also operate backwash equipment). **DF#8** stops injection pump before tank pumps completely out.

An OPL Series Pressure SWICHGAGE® stops injection pump when pressure reaches predetermined high or low pressure.

Typical Tank Mounting Methods (DF755)



Basic Operation



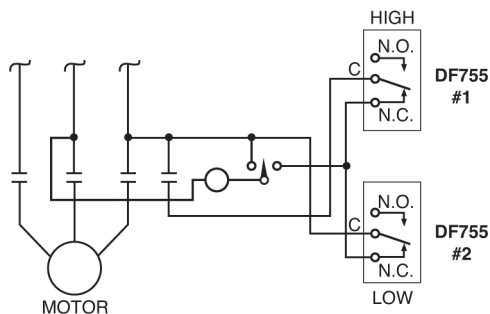
As the liquid level rises, hydrostatic head pressure is applied to the diaphragm **A**. The diaphragm is forced upward forcing the actuator arm **B** to activate the snap-switch **C**.

Model DF755 is factory set and operates at approximately 2 in. (51 mm) and 6 in. (152 mm) above the level at which the diaphragm is mounted. The trip point(s) for Model DF757 are adjustable between 2 in. (51 mm) and 110 in. (2794 mm) for high and low (make/break) operation by knobs, **D**.

Typical Wiring

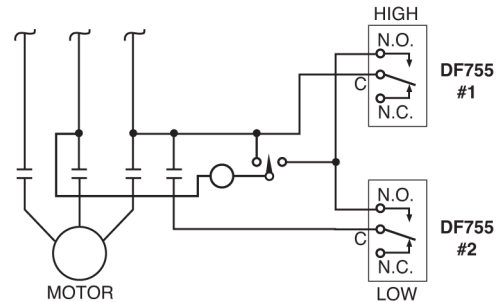
Starts at Low Level, Stops at High

Start motor when predetermined low level is reached and stop when high level is reached. Keeps tank level within selected limits. Motor starter equipped with H.O.A.



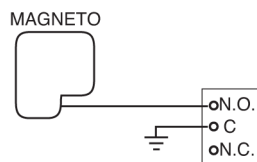
Starts at High Level, Stops at Low

Start motor when predetermined high level is reached and stop when low level is reached. Motor starter equipped with H.O.A.



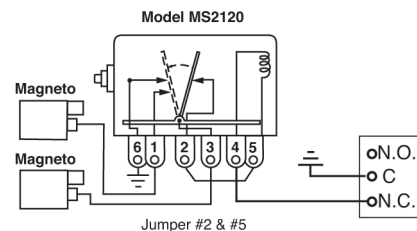
Single Magneto Shutdown

Shut down single ignition engine when fluid reaches low level. Simple wiring of magneto to N.O. switch terminal will shut down engine at predetermined high level, shown below.



Dual Magneto Shutdown

Shut down dual magneto engines using Murphy MS2120 Magnetic Switch. Diagram below shows hookup for low level shutdown. Simple wiring changes and mounting locations are necessary for high level shutdowns.



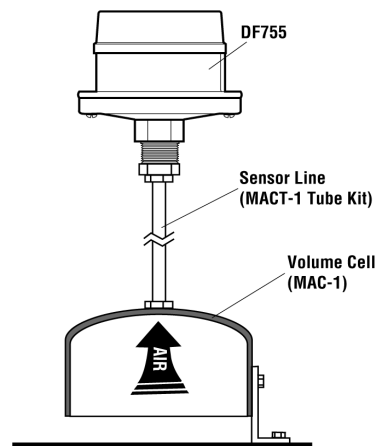
Accessories

Murphy offers the **MAC-1 Volume Air Cell** that can be attached to the DF755 to monitor water levels on a sump. Activates alarms or start a pump directly. The MAC-1 Volume Air Cell is non-corrosive and provides 1/4-20 stainless steel mounting studs.

The **MACT-1 Tubing Kit** provides 4 ft. (1.2 m) flexible, non-corrosive 1/4 in. (6 mm) tubing (cut to fit). The kit includes necessary fittings to attach tubing.

Volume Cell Operation

As liquid rises around the volume cell, it compresses air inside the cell and forces it up in the sensor line. As air pressure increases due to the water level continuing to rise, sufficient pressure will be applied to activate the internal snap-switch, which in turn starts the pump. As the liquid level is pumped down, pressure decreases and the above procedure is reversed. The pump is stopped and held in a standby condition. An air purge may be required in the sensor line. Consult factory.



Specifications

Snap-switch Ratings

SPDT (standard—all models)

- 5 A @ 125, 250, or 480 VAC
- 1/2 A @ 125 VDC, 1/4 A @ 250 VDC

DPDT (optional)

- 10 A @ 28 VDC
- 10 A @ 120, 230 VAC

Case/Lid: Aluminum (standard)

Bottom Plate: Glass-filled Nylon

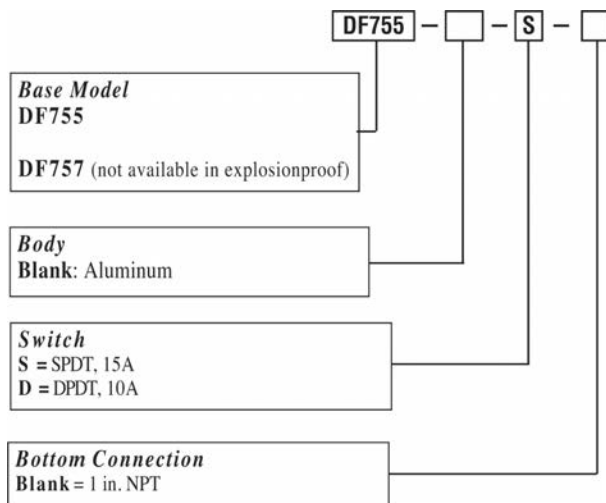
Process Connection: 1 NPT (standard)

Maximum Pressure Rating: 25 psi (172 kPa [1.72 Bar])

Conduit Connection (electrical): 1/2 NPT

How to Order

To order the DF series, use the model number designation diagram below.



Accessories

The accessories below are sold separately and are available from Murphy.

Specify

MAC-1: air volume cell

MACT-1: air volume cell tube kit

Shipping Weights

DF755: 3 lb. (1.4 kg)

DF757: 3 lb. (1.4 kg)

Shipping Dimensions

DF755, DF757, 6-1/4 x 6-1/4 x 6-1/4 in. (159 x 159 x 159 mm)

Service Parts: DF Series

15000123 Diaphragm Repair Kit

Service Parts: DF755 Series

15000121 Snap-switch, and insulator assembly

15000122 Snap-switch, insulator and movement assembly

15000313 Movement and bracket assembly

Service Parts: DF757 Series

15000174 Snap-switch and bracket assembly

Level Swichgauge® Instrument For Engine Liquids L150/ EL150K1 Series



Features

- Monitors Level of Coolant, Lube Oil, Diesel Fuel And Hydraulic Fluid.
- Indicating Gauge
- Low Limit Switch
- Float Operated
- Explosion-Proof Model Is Available

* EL150EX Models are CSA Listed for Class I, Division 1, Group C & D Hazardous Locations

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

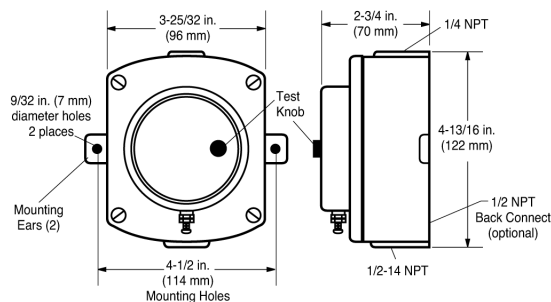
The L150 Series Level Swichgauge instrument is a combination liquid level gauge and low limit switch; each unit includes (1) a chamber with pivotal float, (2) an indicating dial with pointer, and (3) a low level contact. When properly installed and maintained, the float operates the pointer which, in turn, both indicates level during normal operation, and closes a switching circuit if the level falls to the low-limit set point.

Applications

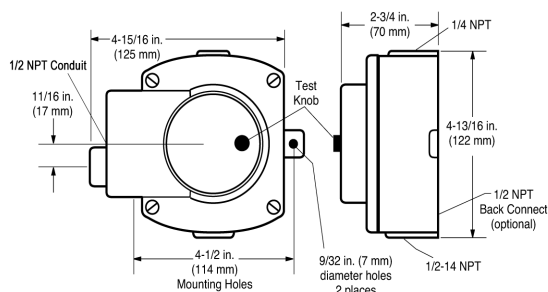
The primary use of the L150/EL150K1 is for engine cooling systems, surge or expansion tanks, condenser radiator or vapor phase systems, pressurized or atmospheric systems. The Level Swichgauge instrument can also be used to monitor lube oil, hydraulic fluid or diesel fuel reservoirs and activates alarms and/or shut-down at a predetermined minimum level. These instruments are built for low pressure systems with a maximum of 25 psi (172 kPa) [1.72 bar].

Dimensions

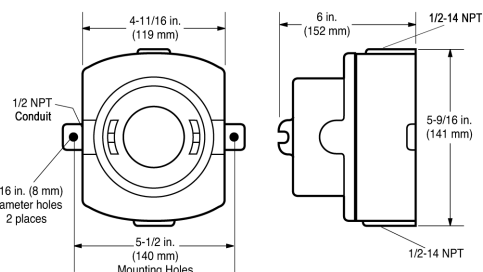
L150



EL150K1



EL150EX

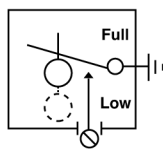


Standard Electrical Diagrams

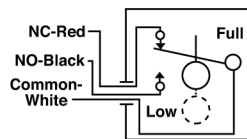


WARNING: This typical wiring diagram is shown for clarity only. It is not intended for use as installation instructions.

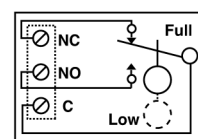
L150



EL150K1



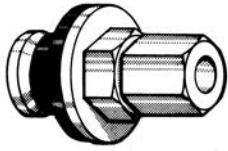
EL150EX



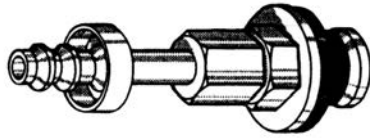
Radiator Fittings

Murphy PS, PS Barbed and PS-D fittings allow the installation of the L150/EL150K1 to the radiator when a fitting is not available.

- **15-00-0107 (PS):** thin wall, 1/4 in. (6 mm) tube fitting.
- **15-01-0167 (PS-Barbed):** thin wall, 1/4 in. (6 mm) tubing or hose.
- **15-01-0202 (PS-D):** for diesel or oil, thick wall (to 1/4 in. [6 mm]), accepts 1/2 in. (13 mm) I.D. hose or 1/4 in. (6 mm) O.D. tubing.



15-00-0107 (PS)



15-01-0167 (PS Barbed)

Repair Kits

L150

- 15-00-0138 All parts except case and body
- 15-00-0101 Case/body assembly

EL150K1

- 15-00-0139 All parts except case and body
- 15-00-0101 Case/body assembly
- 15-00-0100 Lens/switch assembly

EL150EX

- 15-00-0110 Cover and float assembly
- 15-00-0108 Lid assembly
- 15-00-0109 Switch/terminal assembly

Accessories

Specify	Description
15-00-0107	Radiator fitting (PS)
15-01-0202	Radiator fitting (PS-D)
15-01-0167	Radiator fitting (PS Barbed)
15-70-0854	Visor Kit, EL150K1 (knob guard)

Specifications

L150 Specifications

Case: Die cast aluminum, poly-urethane coated; approximate dimensions; 4-1/2 x 4-3/4 x 2-3/4 in. (114 x 121 x 70 mm).

Mounting Holes: (2) 9/32 in. (7 mm) diameter at 4-1/2 in. (114 mm) on center.

Float: Brass.

Lens: Polycarbonate.

O-rings: Saturated Nitrile, are suitable for coolant or hydrocarbons. Maximum temperature 250°F (121°C).

Gasket: Nitrile.

Vent Tube: 1/4 x 5 in. (6 x 127 mm) copper cane with 1/4 NPT x 1/4 in. (6 mm) tube fitting.

Contact Rating: 2 A @ 30 VAC/DC.

Wire: (1) 16 AWG x 26 in. (1.5 mm² x 660 mm) with terminals.

Shipping Weight: 29 oz. (0.82 kg.).

Shipping Dimensions: 5-1/4 x 5-1/4 x 5-1/2 in. (133 x 133 x 140 mm).

EL150K1 Specifications

Case: Die cast aluminum, poly-urethane coated; approximate dimensions; 5 x 4-3/4 x 2-3/4 in. (127 x 121 x 70 mm).

Enclosure Rating: IP35

Mounting Holes: (2) 9/32 in. (7 mm) diameter at 4-1/2 in. (114 mm) on center.

Float: Brass.

Lens: Polycarbonate.

O-rings: Saturated Nitrile, are suitable for coolant or hydrocarbons. Maximum temperature 250°F (121°C).

Gasket: Nitrile.

Vent Tube: 1/4 x 5 in. (6 x 127 mm) copper cane with 1/4 NPT x 1/4 in. (6 mm) tube fitting.

Snap-Switch: SPDT rated 10 A @ 125 VAC; 0.5 A @ 125 VDC; 10 A 30 VDC.

Wire: (3) 18 AWG x 14 in. (1 mm² x 356 mm).

Shipping Weight: 42 oz. (1.2 kg.).

Shipping Dimensions: 5-1/4 x 5-1/4 x 5-1/2 in. (133 x 133 x 140 mm).

EL150EX Specifications

Case: Sand cast aluminum, painted; approximate dimensions; 6-1/2 x 5-3/4 x 5-1/4 in. (165 x 146 x 133 mm).

Mounting Holes: (2) 5/16 in. (8 mm) diameter at 5-1/2 in. (140 mm) on center.

Float: 304 Stainless steel.

Lens: Tempered glass.

O-rings: Saturated Nitrile, are suitable for coolant or hydrocarbons. Maximum temperature 250°F (121°C).

Gasket: Nitrile.

Vent Tube: 1/4 x 5 in. (6 x 127 mm) copper cane with 1/4 NPT x 1/4 in. (6 mm) tube fitting and 1/2 NPT to 1/4 NPT reducer fitting.

Snap-Switch: SPDT rated 10 A @ 125 VAC; 0.5 A @ 125 VDC; 10 A 30 VDC.

Wire: Wired to terminal block.

Laboratory Approvals: CSA Listed for Hazardous Locations Class I, Division 1, Groups C & D.

Shipping Weight: 5 lbs. (2.26 kg.).

Shipping Dimensions: 6-1/2 x 6-3/4 x 6-3/8 in. (165 x 171 x 162 mm).

Lube Level Maintainer – Model LM500/LM500-TF



Features

- **Test Feature (TF)** Allows Test of Float and Switch
- **Direct Mount (DM)** Capable
- Eliminates Under/Overfill Due to “Human Error”
- See Oil Level and Condition Without Shutting Down
- Simple Installation
- Automatically Maintains Lube Level
- Low level, 3-Wire, Snap-Action Switch
- Positive Sealing Thumb-Valve™

Not intended for use with fuel

The Murphy LM500-TF Oil Level Maintainer includes a test feature that confirms both the float and switch are operating correctly with a single press of the test button. The LM500 series maintains the crankcase oil level of an engine, pump or compressor. Adjusted to the correct running-oil-level, it will replenish oil as it is used. The low-level switch will alarm and/or shutdown the equipment if supply oil is lost and the equipment continues to use oil.

Application

The LM500 maintains oil level on any size engine. It also supports installations that require a 3-wire, snap-action switch. Refer to LM500 Series Flow Rate Chart for application data.

Test Feature

The form C (3-wire) contact allows a controller/annunciator to be wired as a closed-loop system, resulting in a reliable fault-sensitive circuit.

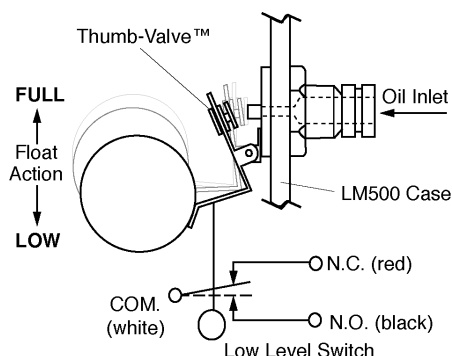
How the LM500 Maintains Levels

As crankcase oil level drops, the LM500 float also drops and opens the Thumb-Valve™. This allows oil to flow from the supply tank, through the LM500, and into the crankcase. When proper level is achieved in the crankcase, the LM500 float rises, causing the Thumb-Valve™ to close off further oil flow.

The simple and unique Thumb-Valve™ is non-clogging and provides a positive, leak-free seal.

Thumb-Valve Operation

If the clean oil supply is depleted and oil level continues to fall, the low level switch will operate an alarm or equipment shutdown.



Specifications

Crankcase Balance Vent Connection: 1/2 NPTF (top).

Inlet Connection: 1/2 NPTF removable screen (side).

Outlet Connection:

2 x 3/4 NPTF (side)

1 x 3/4 NPTF (bottom)

Thumb-Valve™ Material: Viton.

Snap-switch: SPDT rating 10 A, 125 VAC; 0.5 A, 125 VDC; 10 A, 30 VDC.

Wire leads: 18 AWG x 14 in. ± 2 in. (355 mm) length.

Conduit Connection: 1/2 inch conduit (female, top).

Case: Die cast aluminum

Lens: Clear “Frog Eye” non-staining, high impact, high temperature polycarbonate; UV and heat stabilized.

Dial: High visibility white background with solid green band for normal level indication.

Maximum Inlet Pressure: 9.50 psi/25 ft. oil (head pressure).

Maximum Case Pressure: 15 psi (103 kPa).

Maximum Differential: 2 in. (51 mm) between running and stopped.

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

Float: 304 Stainless Steel

Flow Rates: Refer to LM500 Series Flow Rates chart for application data.

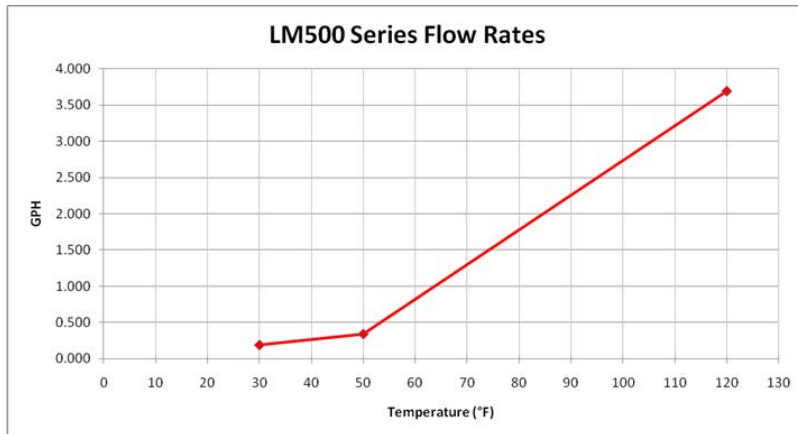
Dimensions: Overall 6-9/16 inch tall x 6-3/16 inch deep x 3-1/2 deep. For exact dimensions, refer to document “00-02-0729 LM500 Installation Instructions”.

LM500/LM500-TF Shipping Dimensions: 9.5 x 7.5 x 11 in. (241.3 x 190 x 279.4 mm).

LM500/LM500-TF Shipping Weight: 3 lbs. 13.44 oz (1.74 kg)

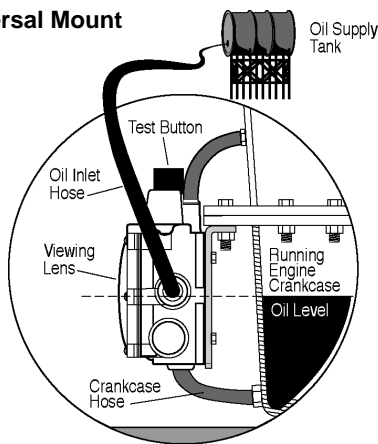
LM500 Series Flow Rates

LM500 Series Flow Rates are based on SAE 40 motor oil @ 2 ft. head pressure. Friction losses due to piping are not considered.

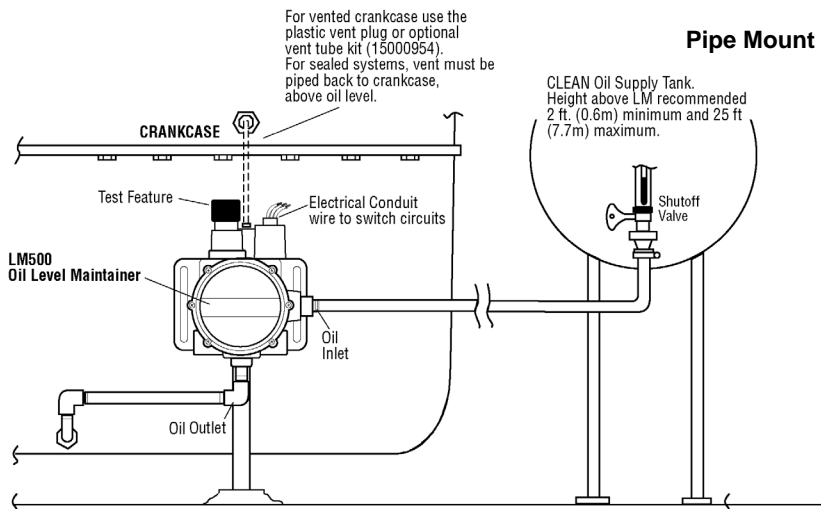


Typical Installations

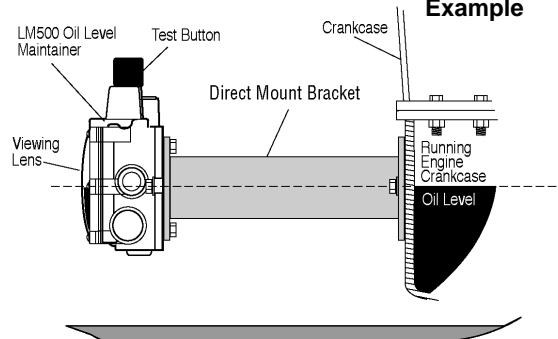
Universal Mount



Pipe Mount

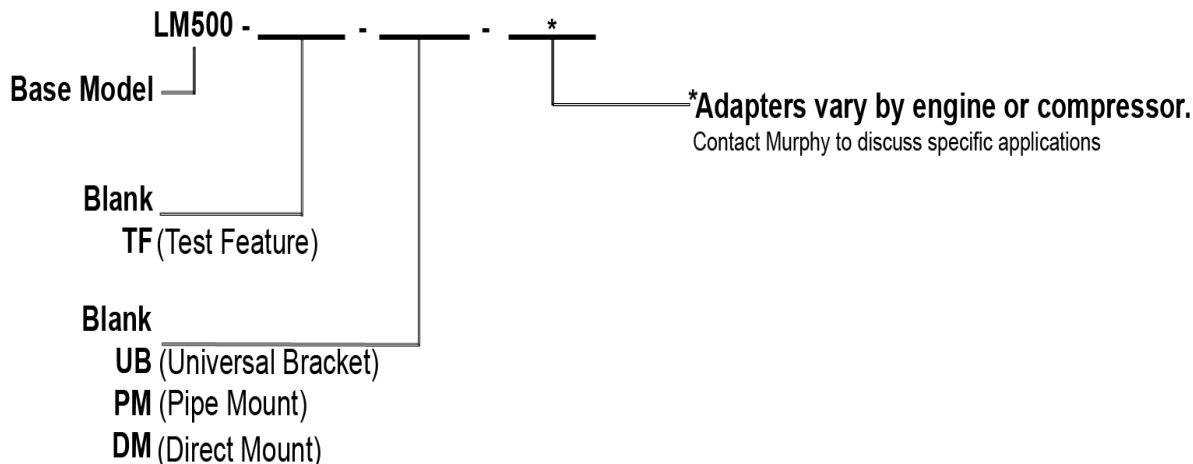


Direct Mount Example



How to Order

To order the LM500 use the model number designation diagram below. (Example for Pipe Mount: **LM500-TF-PM**)



Mounting Brackets with Hardware

In addition to the direct mounting option, Murphy offers two mounting brackets for the LM500. The Pipe Bracket Kit fits a 7/8 in. (22 mm) diameter pipe (see typical installation below). The Universal Flange Kit allows various mounting methods. For exact dimensions, visit <http://www.fwmurphy.com>.

Accessories (Specify part number)

Description	Part Number
Vent Fittings Kit	15000954
Hose Kit	15000355
1/2 NPT x 1/2 in. Hose Barbed Fitting	89080801
3/4 NPT x 1 in. Hose Barbed Fitting	89081001
Pipe Bracket Kit	15000518
Universal Flange Kit	15000519
Bubble Lens Kit	15000532

Vent Fitting Kit: 15000954

- One Tubing vent
- One 1/4 x 1/2 NPT Connector

Hose Kit: 15000355

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

Fittings Kit: 15000943

- One Tubing vent
- One Hose Barb, 1/2 NPT to 1/2 Hose
- One Hose Barb, 1" ID HOSE x 3/4 NPT
- One Connector, 1/4 x 1/2 NPT

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Level Maintainer – LM300 Series



Features

- Maintains Proper Lube Level
- Shutdown on Low Level, or High and Low Level
- Low Level Alarm Before Shutdown
- Manual Float Switch Test
- High Visibility “Frog Eye” Lens
- Optional Pipe or Universal Mounting Brackets
- Optional Inlet Orifices for Low to High Pressure Applications
- Explosion-Proof Models Available

* Products covered by this bulletin comply with Directive: 2004/108/EC (European Electromagnetic Compatibility). European Harmonised standard: EN 61000-6-3:2007 (Emissions). EN 61000-6-1:2005 (Immunity)

The LM300 Series Level Maintainer automatically adds oil to the crankcase as needed to keep the lube level normal. Most models have built-in switches that will alarm and/or shutdown the equipment if the makeup supply is depleted and engine oil level falls or if overfill conditions exist. LM300 series explosion-proof models are CSA certified† for Class I, Division 1 Hazardous areas.

Applications

- Engines
- Compressors
- Pumps
- Coolers

Base Models‡

LM300: Level Maintainer only (no switches).

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

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

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

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

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

Specifications

Case/Cover: Die cast aluminum.

Switch Housing: Aluminum.

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

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

Float: Rigid polyurethane foam. Polyurethane coated.

Max. Ambient Temperature: 250°F (121°C)

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

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

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

Max. Inlet Pressure (MIP): 30 psi (207 kPa) [2.07 bar]. with 1/8 in. (3 mm) orifice.
15 ft oil (4.6 m oil) with 1/4 in. (6 mm) orifice.

Max. Differential: 2 in. (51 mm) between running and stationary oil level.

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

Orifice Seal†: Buna-N Thumb-Valve™

Switch Contact: Silver, SPDT snap acting, rated at 10 A @ 125, 250 VAC; 10 A @ 30 VDC. (1 only for low level; 2 only for high and low; or 2 only for low level with alarm before shutdown)

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

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

* Standard

NOTE: Friction losses due to piping NOT considered.

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

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

Mounting: Accepts Murphy pipe mounting bracket or universal mounting bracket.

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

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

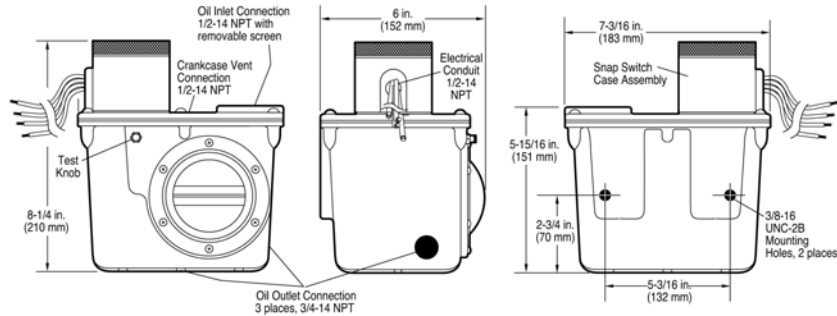
Test Knob: Rotate to test switch operation. Turn clockwise for low level test and turn counterclockwise for high level test.

† CSA certified with switch contacts rated at 10 A at 250 V AC (standard).

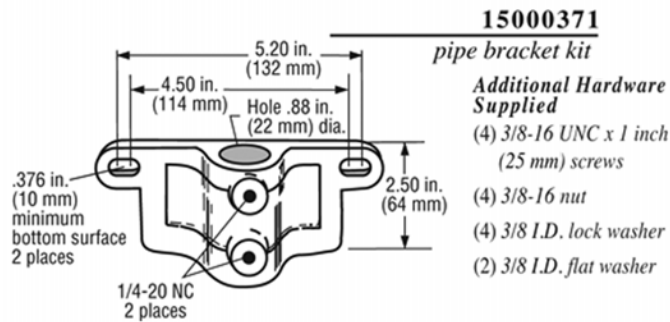
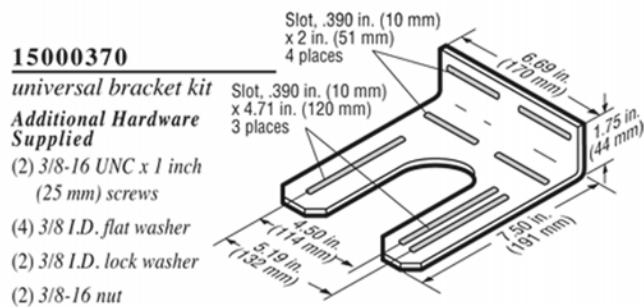
‡ Specify “EX” for explosion-proof enclosure. All models **except LM300** are available in an explosion-proof enclosure.

Dimensions

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

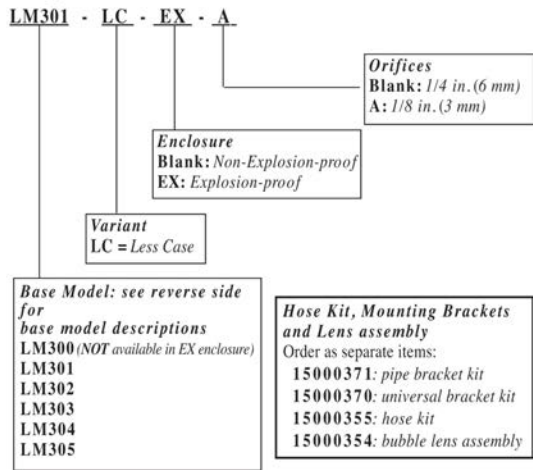


Mounting Brackets with Hardware



How to Order

Build a complete model number using the following chart. See example. See reverse page for standard and optional specifications.



Shipping Information

- Shipping Weights:**
- LM300 Series non-“EX” models: 6 lbs. 6 ozs. (2.89 kg)
 - LM300 Series “EX” models: 6 lbs. 12 ozs. (3.06 kg)
- Shipping Dimensions (all LM300 Series models):**
- 10-5/8 x 8-7/8 x 6-3/4 in. (270 x 225 x 171 mm)

Optional Hose Kit: 15000355

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

Oil Level Regulators for Lubricators – LR500 Series

Model LR579

Regulates Lincoln Lubricators



Features

- Unique Anti-Clog Thumb-Valve™
- Regulate Oil Flow From Reservoir to Keep Lubricator Full
- Eliminates Manual Oil Check and Refill Time
- Low-level Shutdown Switch
- Reduce Engine and Pump Repairs Caused By Low Lube Level

The LR500 Series Level Regulators automatically add oil to a lubricator to maintain the factory recommended level. This function eliminates the work time necessary for manual checks and refills.

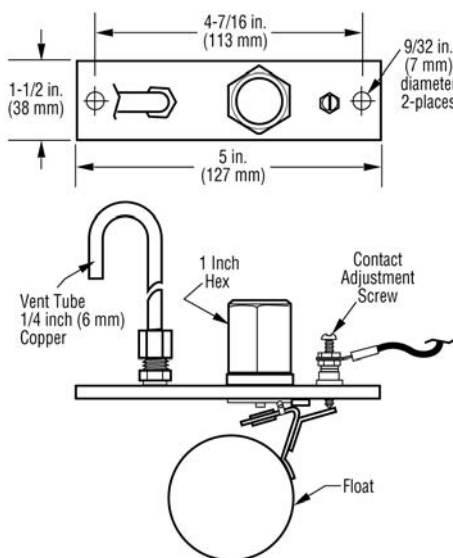
Each model has a low-level shutdown switch to protect equipment when oil supply is lost. If the lubricator oil level drops below the minimum operations level, the low-level switch will operate an alarm and/or shutdown the equipment.

Model **LR579** is for Lincoln lubricators. It features an adjustable low-level shutdown contact.

LR589 is for Lincoln lubricators, and the **LR589NC** is the normally closed wired version of the LR589.

Dimensions

LR579



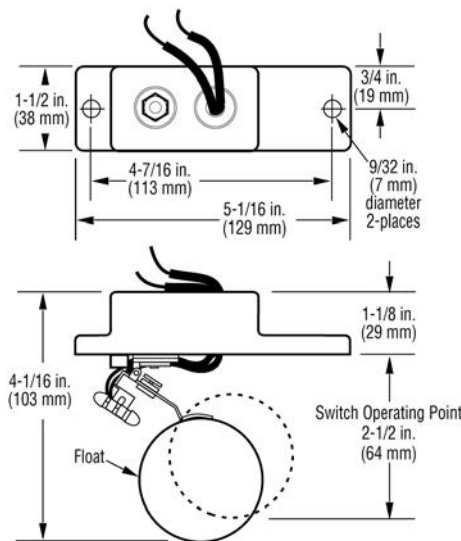
Shipping Weight: 13 oz. (368 g).

Shipping Dimensions: 4-3/4 x 4-3/4 x 3-1/4 in.
(121 x 121 x 83 mm).

Shipping Weight: 12 oz. (340 g).

Shipping Dimensions: 4-3/4 x 4-3/4 x 2-3/4 in.
(121 x 121 x 70 mm)

LR589 / LR589NC



Installation



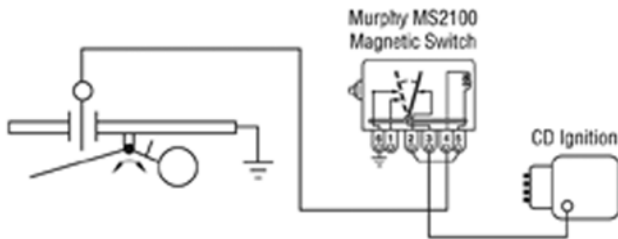
WARNING

Before beginning installation of this Murphy product:

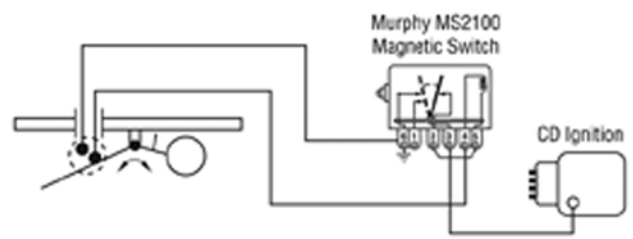
- ✓ Disconnect ALL electrical power to the machine.
- ✓ Make sure the machine CANNOT operate during installation.
- ✓ Follow all safety warnings of the machine manufacturer.
- ✓ Read and follow all installation instructions.

1. Remove the cover on a vacant cell of the lubricator (**DO NOT** install in bays next to crank arm).
2. Bolt the level regulator in place, using the bolts that held the cover.
3. Connect the flex hose from the oil reservoir to the oil inlet at the level regulator. Oil reservoir must be at least two feet (0.61 meters) above the level regulator.
4. Wire switch for alarm and/or shutdown. One switch can be used to shut-down all equipment supplied by a common oil reservoir.

Typical Wiring for LR579



Typical Wiring for LR589



How to Order

Specify model when ordering.

LR579

LR589

LR589NC

Maintain Lube Level – Model LR857



Features

- Eliminates Under/OverFill Due to “Human Error”
- Simple Installation
- Automatically Maintains Lube Level
- Low Level Switch
- Models to Fit Varied Applications
- Positive Sealing Thumb-Valve™

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

Murphy LR857 Lube Level Regulator maintains the crankcase oil level of an engine, pump or compressor. Adjusted to the correct running-oil-level, the LR857 will replenish oil as it is used. An integral, low-level switch will alarm and/or shutdown the equipment if supply oil is lost and the equipment continues to use oil.

Application

The LR857 maintains oil level on any size engine, but is recommended for small to medium volume applications and installations that require a 3-wire, snap-action switch.

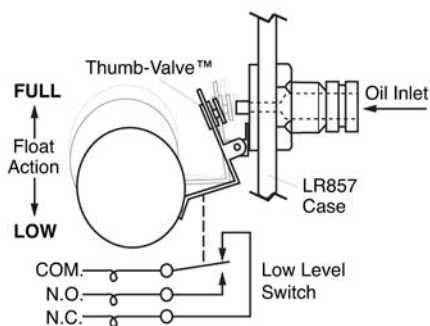
How the LR857 Maintains Levels

As crankcase oil level drops, the LR857 float also drops and opens the Thumb-Valve™. This allows oil to flow from the supply tank, through the LR857, and into the crankcase. When proper level is attained in the crankcase, the LR857 float rises, causing the Thumb-Valve to close off further oil flow.

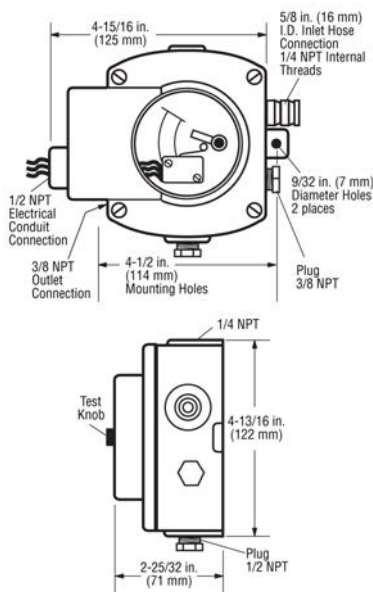
The simple and unique Thumb-Valve is non-clogging and provides a positive, leak-free seal. Flow rate through the 1/8 inch (3 mm) orifice is significant to allow crankcase refill through the LR857.

Thumb-Valve Operation

As the equipment uses oil, the float falls, providing immediate level compensation. At FULL position, the float holds the valve closed. If the clean oil supply is depleted and oil level continues to fall, the low level switch will operate an alarm or equipment shutdown.



Dimensions



Mounting Brackets with Hardware

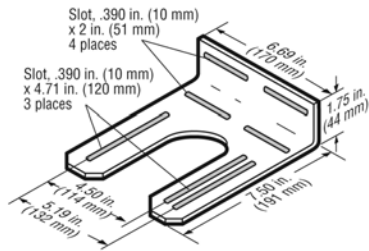
Murphy offers two mounting brackets for the LR857. The 15000238 Pipe Bracket Kit fits a 7/8 in. (22 mm) diameter pipe (see typical installation below). The 15010224 universal Flange Kit allows various mounting methods.

15010224

Universal Flange Kit

Additional Hardware Supplied

- (2) 1/4-20 x 1-1/4 inch (32 mm) bolts
- (4) 1/4 dia. flat washer
- (2) 1/4-20 hex nuts
- (2) 5/16-18 x 1-1/4 inch (32 mm) bolts
- (4) 5/16 dia. flat washer
- (2) 5/16-18 hex nuts

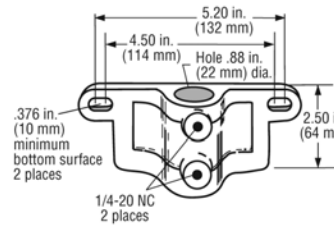


15000238

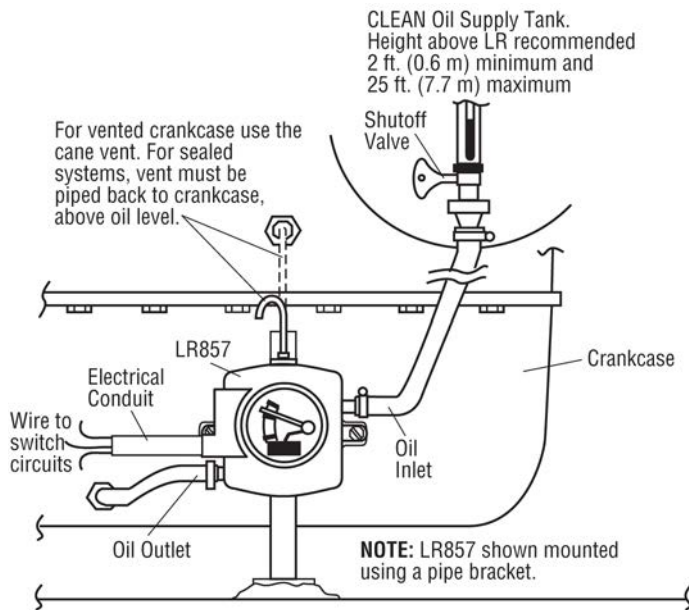
Pipe Bracket Kit

Additional Hardware Supplied

- (2) 1/4-20 x 7/8 inch (22 mm) screws
- (2) 1/4-20 x 1 inch (25 mm) screws
- (4) 1/4-20 hex nuts
- (4) 1/4 inch (6 mm) dia. split washer



LR857 Typical Installation



Specifications

Inlet Connection: 5/8 in. (16 mm) I.D. hose

Outlet Connection: 3/8 NPT

Snap-switch: SPDT rating 10 A @ 125 VAC; 0.5 A @ 125 VDC; 10 A @ 30 VDC.

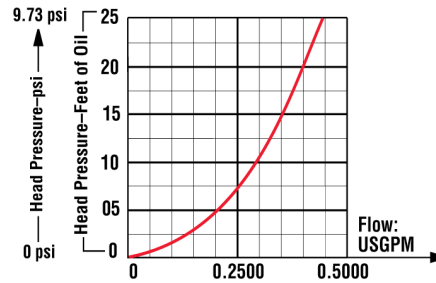
Conduit Connection: 1/2 NPT

Case: Die cast aluminum

Lens: Polycarbonate

Float: Brass

Flow Rates (see chart below): Oil with 0.9 specific gravity @ 70°F (21°C)



Fittings Kit: 15000420

The 15000420 kit is sold separately. It includes the following items.

Quantity	Description
1	1/4 in. (6 mm) O.D copper cane tube (vent connection)
1	1/4 in. (6 mm) tube x 1/4 male pipe fitting
1	1/2 in. (13 mm) I.D. hose fitting (outlet connection)

How to Order

Specify model **LR857**

Accessories (Specify part number)

Description	Part Number
Fittings Kit	15000420
Pipe Bracket Kit	15000238
Universal Flange Kit	15010224

Replacement Parts (Specify part number)

Inlet Valve Assembly	15000159
Glass and Switch Ass'y	15000100

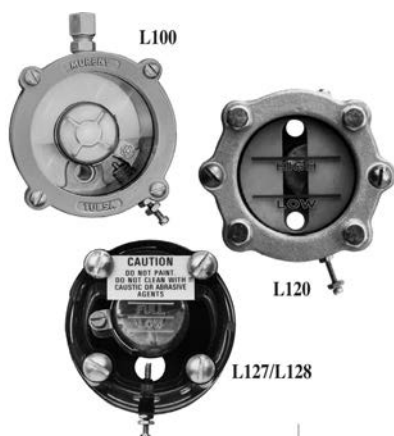
Lid Assembly 15000161

Float Assembly (Brass-std) 15000941

LR857 Shipping Dimensions: 9 x 5-1/2 x 6 in. (229 x 140 x 152 mm).

LR857 Shipping Weight: 3 lbs. 6 oz. (1.5 kg).

Float Actuated Oil Level Switchgag[®] Instrument For Small Engines and Pumps



Features

- See Oil Level and Condition Without Shutting Down
- Shutdown or Alarm on Low Lube Level
- Adjustable Limit Switch for Alarm and/or Shutdown
- Save on Reduced Downtime and Repair Costs
- Simple Installation

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

These float actuated Oil Level Switchgag instruments are a combination oil level sight gage and adjustable, low and/or high limit switch. The limit switches are normally open during operation— yet close if the level drops (or rises) to where the float contacts the limit screw. The contact completes a circuit to ground a magneto or trip a Murphy magnetic switch. The magnetic switch can be used to activate alarms and/or shutdown. Models are also available without limit switches.

Application

The level instruments described above can be used on a variety of crankcases, pump gearcases, or oil reservoirs—primarily on small engines and pumps. The following list displays the model and its typical application:

L100[†]: Small engines and pumps with non-vented crankcase.

L100W[†]: Small engines and pumps with vented crankcase.

L120: Machined surface on crankcase such as Witte, National-Oilwell/Garland.

L127: Machined surface on crankcase, specifically, Fairbanks-Morse ZC Series and Bell Engines.

L128: Machined surface on crankcase, specifically, Arrow and Continental Emsco/Climax.

Specifications

Maximum Pressure Rating (all models): 30 psi (207 kPa) [2.07 bar]

L100 and L100W

Case: Die cast aluminum

Float: Brass

Rating: 2 A @ 30 VAC/DC

Vent Fitting: 1/4 in. (6 mm) tube x 1/8 NPT

Inlet Fitting: Hex Nipple 1/4 NPT

Hardware (shipped loose)

L100:

- Copper Tubing: 1/4 x 48 in. dia. (6 mm x 1.2 m)
- Reducer Bushing: 1/2 NPT x 1/4 NPT
- Close Nipple: 1/2 NPT
- Tee: 1/2 NPT, black pipe
- Wire: 16 AWG x 24 in. (1.5 mm2x 610 mm)

L100W:

- Vent Tube: 1/4 x 3-3/8 in. (6 x 86 mm)
- Reducer Bushing: 3/4 NPT x 1/4 NPT
- Close Nipple: 3/4 NPT
- Tee: 3/4 NPT, black pipe
- Wire: 16 AWG x 24 in. (1.5 mm2x 610 mm)

L120

Case: Cast Aluminum

Float: Brass

Rating: 2 A @ 30 VAC/DC

Mounting Bolts: 1/4-20 UNC-2A (4 req'd)

L127 and L128

Case: TROGAMID[®] Nylon

Float: Brass

Rating: 2 A @ 30 VAC/DC

Wire: 16 AWG x 48 in. (1.5 mm2 x 1.2 m)

Mounting Bolts:

- L127: 1/4-20 NC x 2 in. (4 required)
- L128: 3/8-16 NC x 3/4 in. (2 require d)

Shipping Weight:

- **L100:** 2 lbs. (0.91 kg)
- **L100W:** 2 lbs. (0.91 kg)
- **L120:** 1 lb 8 oz (0.68 kg)
- **L127:** 8 oz (0.23 kg)
- **L128:** 10 oz (0.36 kg)

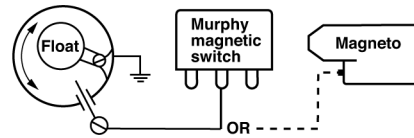
Shipping Dimensions

- **L100:** 5-1/4 x 5-1/4 x 5-1/2 in. (133 x 133 x 140 mm)
- **L100W:** 4-3/4 x 4-3/4 x 3-1/4 in. (121 x 121 x 83 mm)
- **L120:** 4-3/4 x 4-3/4 x 3-1/4 in. (121 x 121 x 83 mm)
- **L127 and L128:** 4-3/4 x 4-3/4 x 3-1/4 in. (121 x 121 x 83 mm)

[†] Models available with high and low options. See How to Order on reverse side

Typical Wiring Diagram

Below is a typical wiring diagram for a level Switchgauge instrument. A Switchgauge instrument can be connected to a Murphy magnetic switch or magneto. Switch Contact Rating is 2 A @ 30 VAC/DC resistive.



Dimensions

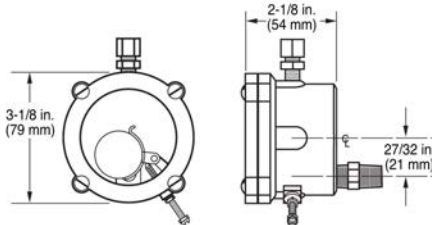
L100 and L100W

Shipping Dimensions:

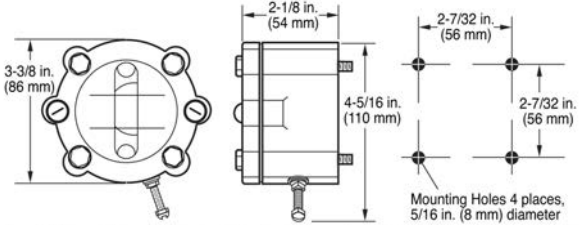
- L100: 5-1/4 x 5-1/4 x 5-1/2 in. (133 x 133 x 140 mm)
- L100W: 4-3/4 x 4-3/4 x 3-1/4 in. (121 x 121 x 83 mm)

Shipping Weight:

- L100: 2 lbs. (0.91 kg)
- L100W: 2 lbs. (0.91 kg)

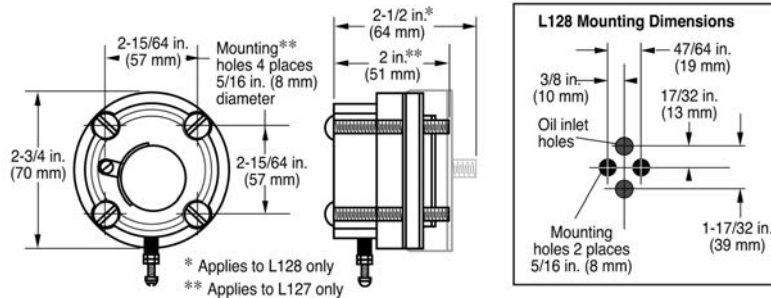


L120



Shipping Weight: 1 lb 8 oz (0.68 kg) Shipping Dimensions: 4-3/4 x 4-3/4 x 3-1/4 in. (121 x 121 x 83 mm)

L127 and L128



Shipping Weight:

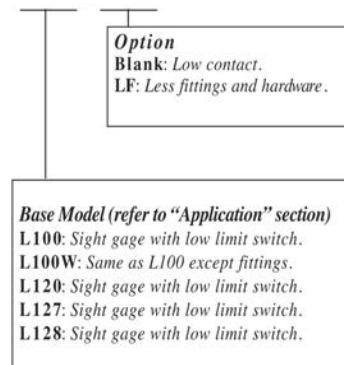
- L127: 8 oz (0.23 kg)
- L128: 10 oz (0.36 kg)

Shipping Dimensions (L127 and L128):

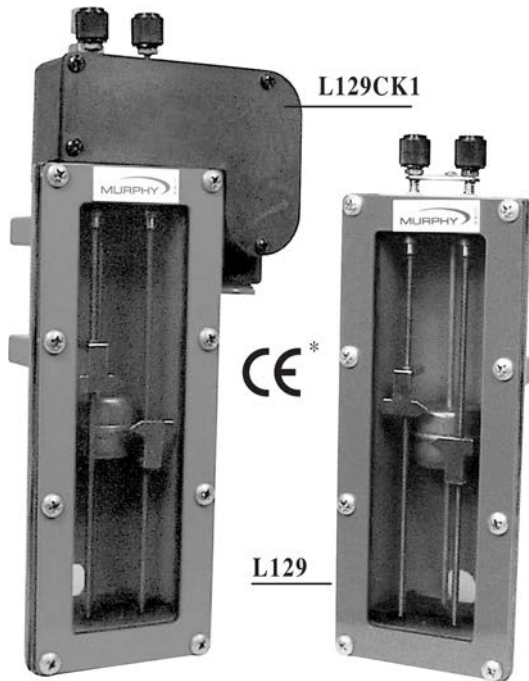
4-3/4 x 4-3/4 x 3-1/4 in. (121 x 121 x 83 mm)

How to Order

Specify base model designator and options in sequence shown. Example: L100-HL



Lube Level Swichgag[®] Instrument – L129 Series



Features

- Check Lube Level Without Shutting Down
- Use On Engines, Pumps, And Compressors
- Combination Indicating Gage with Low and High Limit Switch
- Float Operated

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

The L129 Series Lube Level Swichgag instrument is a combination lube level indicating gage and adjustable low and high limit switches. It provides protection against low oil level or high level caused by overfill or fuel or water seepage into the crankcase.

A 6-3/4 inch (171 mm) deep sight gauge allows you to check the condition and level of your oil without shutting down the equipment.

Fingertip adjustable limit contacts, thru 4-7/8 inch (122 mm) range, makes it simple to set high and low limit contacts. If the float touches the high or low limit contact, a normally open circuit will be completed which can activate alarms and/or shutdown the equipment.

There are two models in the L129 Series: L129 and L129CK1. The L129 model is designed for grounded, low voltage electrical systems. It features a one-wire-to-ground electrical circuit. The L129CK1 was designed for applications requiring a three-wire, above ground electrical circuit. It features ungrounded contacts and a conduit hub to protect electrical wiring.

Options are available for both models.

A flow restrictor plug is available that restricts oil flow from the crankcase to the L129 Series switch and vice versa. It is typically used on applications where the engine is not stationary such as marine and mobile equipment.

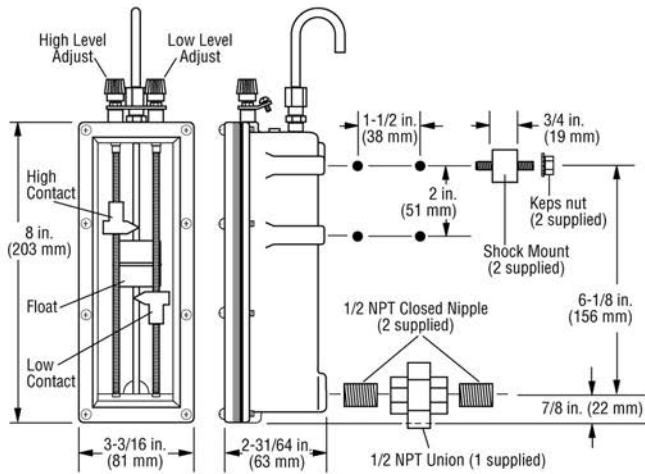
The L129 Series Lube Level SWICHGAGE[®], when properly installed and maintained, can monitor and protect your engines and pumps from improper lubrication level, which can result in extensive damage.

Applications

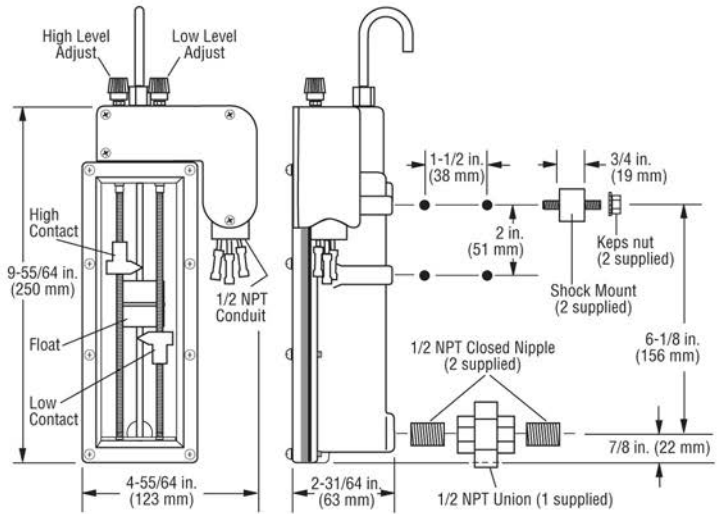
The L129 Series is recommended for engines and pumps with larger crankcase capacity. Although designed primarily for stationary engines, the L129 Series is often used in mobile applications such as marine, rail, and some large off-highway trucks.

Dimensions

L129

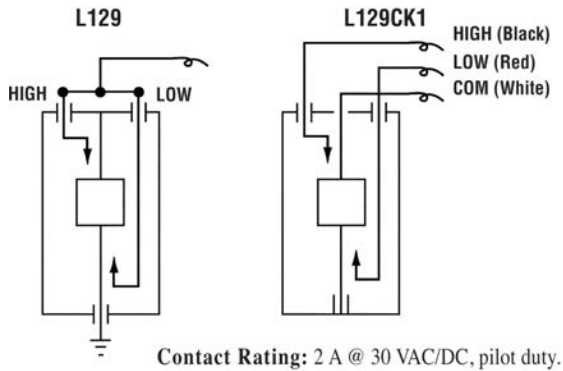


L129CK1



Wiring Diagrams

These diagrams are shown with the float in the “full” position.



Contact Rating: 2 A @ 30 VAC/DC, pilot duty.

Specifications

Case: Die Cast Aluminum.

Lens: Tempered Glass.

Maximum Working Pressure: 10 psi (68.9 kPa).

Process Connection: 1/2 NPT.

Float Material: Brass.

Contact Rating: 2 A @ 30 VAC/DC, pilot duty.

Repair Kits

Specify part number.

L129

- 15000888** Full Repair Kit (less castings and glass ass'y) for date code T2 and later.
- 15000480** Bezel, Glass and Gasket Set for date code W7 and later
- 15000485** Glass and Gasket Set for all date codes
- 15050241** Restrictor plug for all date codes

L129CK1

- 15000480** Bezel, Glass and Gasket Set for date code W7 and later
- 15000485** Glass and Gasket Set for all date codes
- 15050241** Restrictor plug for all date codes

Shipping Weight:

L129: 3 lb. (1.4 kg).

L129CK1: 3 lb. 9 oz. (1.6 kg).

Shipping Dimensions (both models):

12 x 4-1/2 x 4-3/4 in. (305 x 114 x 121 mm).

Crankcase Level Switch – L971 Series



Features

- Durable Low Level Switch
- Replaces Non-Explosion-proof Switch on Ingersoll-Rand Compressors
- Adaptable to Other Compressors
- Installs with Minimal Downtime
- Two Year Limited Warranty

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

The Murphy L971 Series Level Switch detects low oil level in a compressor's crankcase. As oil level in the crankcase depletes, the float on the L971 switch falls, and if reaches the predetermined limit, will trip the internal snap-switch which in turn will initiate a shutdown and/or alarm. The L971 may also be used to detect rising fluid levels in stuffing box containment vessel.

The L971 is designed for Ingersoll-Rand Type 30, Type 40 and ESH compressors, yet can be adapted to fit other compressors that have an inspection plate extending below normal operating oil level.

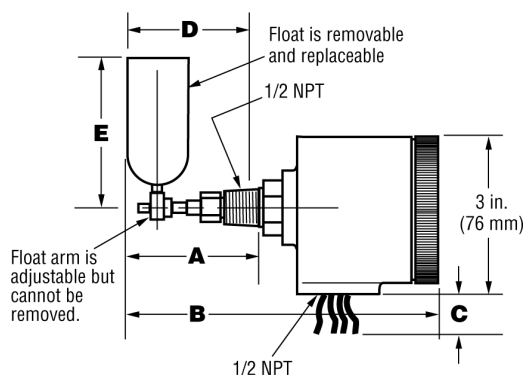
The L971 has a 1/2 NPT process connection and features an explosion-proof enclosure, durable SPDT snap-switch and rigid polyurethane foam float. A 304 stainless steel float is available on certain configurations (see Specifications).

Dimensions

Dimensions in inches* (see drawing right)

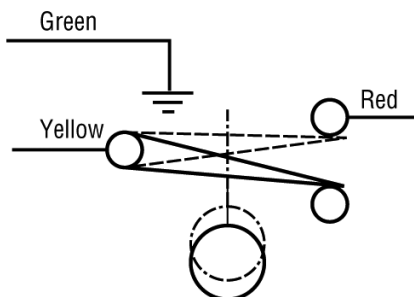
Models	A	B	C	D	E
L971	2-5/8 (67)	5-7/8 (149)	30 (762)	2-1/2 (64)	2-27/32 (72)
L971-A	2-5/8 (67)	5-7/8 (149)	30 (762)	2-1/2 (64)	2-27/32 (72)
L971-B	4-13/16 (122)	8-1/16 (205)	30 (762)	4-5/8 (117)	2-27/32 (72)
L971-C	2-13/16 (71)	6-1/16 (154)	30 (762)	2-7/8 (73)	3-1/8 (79)
L971-D	3-7/8 (98)	7-1/8 (181)	30 (762)	3-3/4 (95)	2-27/32 (72)
L971-E	4-13/16 (122)	8-1/16 (205)	30 (762)	5-1/8 (130)	2-27/32 (72)
L971-F	2-5/8 (67)	5-7/8 (149)	40 (1016)	2-1/2 (64)	2-27/32 (72)
L971-G	2-5/8 (67)	5-7/8 (149)	40 (1016)	2-1/2 (64)	2-27/32 (72)

* Millimeter dimensions are shown in parenthesis ().

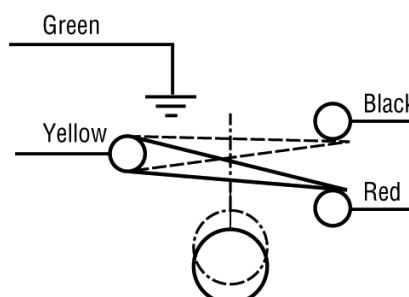


Wiring Diagrams†

Model L971-A



All Other Models



Specifications

Operating Temperature Range: -15 to 275°F (-26 to 135°C).

Maximum Working Pressure: 30 psi (206 kPa) [2.06 bar].

Switch Rating: 4 A @ 250 VAC.

† Shown in "shelf" position with no force acting upon float.

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Material

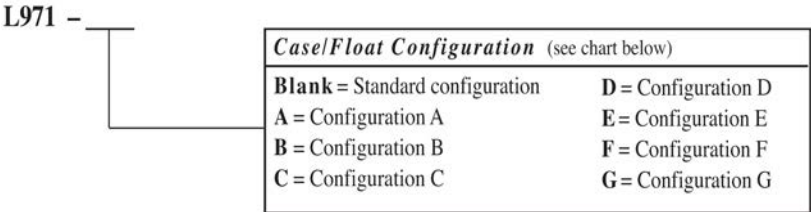
Case: Aluminum (explosion-proof).
Mounting Adaptor: Brass.
Floats: Rigid polyurethane. 304 stainless steel available on L971-C only.
Other Wetted Parts: 303, 304, and 316 stainless steel.
O-Ring Seals: Viton and Buna.

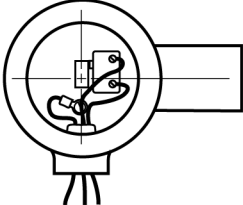
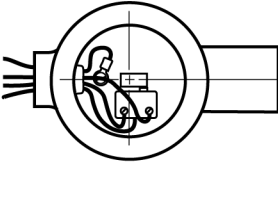
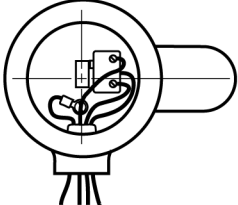
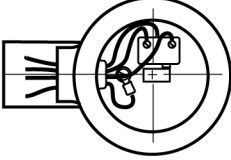
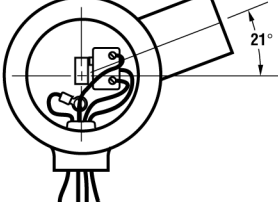
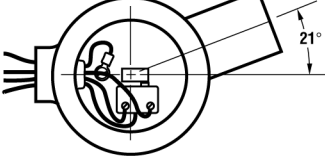
Process Connection: 1/2 NPT.

Enclosure Rating: UL and CSA listed for Class I, Groups C & D; Class II, Groups F & G, Hazardous Locations.
Conduit Connection: 1/2 NPT.
Wire: 18 AWG (0.75 mm²).
Shipping Weight: 1 lb. 10 oz. (0.7 kg).
Shipping Dimensions: 8-1/4 x 4-1/4 x 4-1/2 in. (210 x 108 x 114 mm).

How to Order

To order the L971 Series Level Switch to fit your application, use the diagram below. Example model number: **L971-C**



Model	L971-A	L971 and L971-B	L971-C
Case/Float Configuration (front view, less cover and gasket)	TOP 	TOP 	TOP 
Model	L971-D and L971-E	L971-F	L971-G
Case/Float Configuration (front view, less cover and gasket)	TOP 	TOP 	TOP 

NOTE: Switches shown tripped on falling level.

MLS Series - Liquid Level Switches

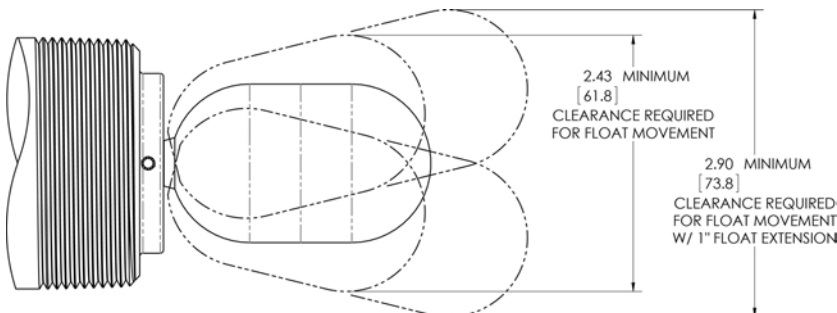
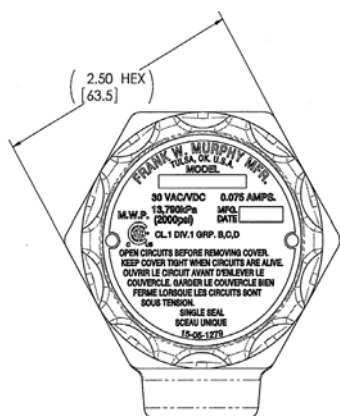
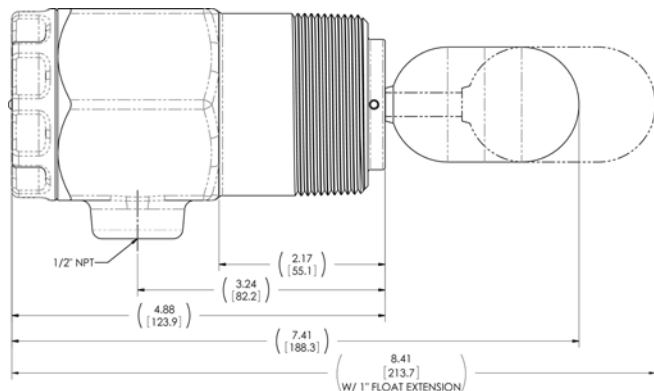


Features

- **Clean Magnet Design** Virtually Eliminates Iron Filing Accumulation Onto the Magnet
- **Seal-Free Construction**
- ANSI/ISA 12.27.01 Compliant (Single Seal)
- Operates in 0.50 Specific Gravity or Heavier Fluids
- Designed for Harsh Gas Compressor Scrubber Applications
- 304 Cast Equivalent SS Body and 304 SS Float
- Rated for 2000 psi (13.8 MPa) [138 bar] Working Pressure
- Trip on Rising and Falling Without Need to Rotate Body
- Electric Model Only Available
- All Models Screw Directly Into the Scrubber or Can be Mounted Via a Murphy External Float Chamber
- CSA C/US Class I, Div. 1, Grp. B, C & D Locations
- NACE MR0175 Compliant
- Canadian Registered (CRN, see below)

MLS Series Liquid Level Switches are float activated to operate an electrical SPDT reed switch for annunciation/pilot signal for indication of high level to an annunciator, controller or PLC. The MLS connects directly into the gas scrubber wall and can be used with a Murphy weld collar or Murphy external float chamber. The MLS Series is available in both 1 1/2 and 2"NPT models.

Product Dimensions



Specifications

Process Connection: 2" NPT (MLS-020); 1-1/2" NPT (MLS-015)

Fluid Density (SG):

- 0.50 MIN (no extension)
0.65 MIN (1 inch extension)

Pressure Rating: 2000 psig (13.8 MPa) [138 bar]

Materials:

- Body: ASTM A351 CF8 (304 SS)
Cover: ASTM A351 CF8 (304 SS)

Other Wetted Parts: 304 or 316 SS

Meets NACE MR0175 for direct exposure to H₂S

Process Temperature: -20 to 300°F (-29 to 149°C).

Electrical: 30VAC/VDC 75mA Form C SPDT

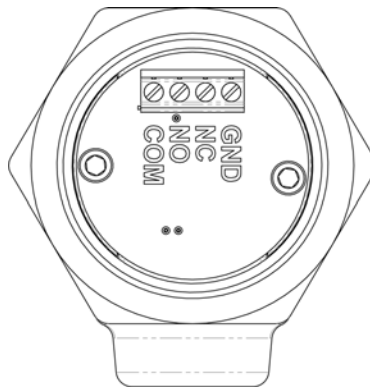
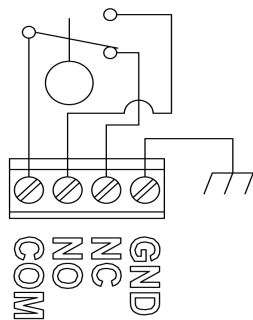
Conductor cross section AWG/kcmil min.: 26

Conductor cross section AWG/kcmil max.: 16

Canadian Registration Number: MLS-020, 0F01476.2
MLS-015, 0F12013.2

Electrical Wiring Diagram

STD WIRING DIAGRAM



Accessories

Refer to MLS Installation and Operations manual for additional information.

External Float Chamber 15700799

Operating Pressure: 2000psi (13.8MPa)[138 bar]

Operating Temperature: 400°F (204°C)

Shipping Weight: 18lbs (8.2kg)

1-inch Float Extension Kit 15000892

Weld Collar 15050375

Operating Pressure: 2000psi (13.8MPa)[138 bar]

Operating Temperature: 400°F (204°C)

Shipping Weight: 6lbs (2.7kg)

Approximate Shipping Weights and Dimensions (all models)

Weight: MLS-020, 5.5 lbs. (2.49 kg) MLS-015, 5 lbs (2.27 kg)

Dimensions: 14 x 5 x 3.5 in (356 x 127 x 89 mm)

How to Order

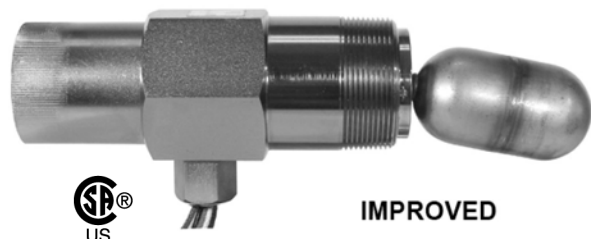
To order the MLS Series Level Switch, please use the product number below:

MLS-020 (2" NPT)

MLS-015 (1-1/2" NPT)

LS200 Series Liquid Level Switches

Electric Switch



LS200 Liquid Level Switches with 2" NPT mounting are float activated to operate an electrical SPDT snap switch (optional DPDT on some models) for alarm or shutdown of an engine or electric motor. The LS200 connects directly into the vessel wall and can be used with a Murphy weld collar (P/N 15050375) or Murphy external float chamber (P/N 15700799).

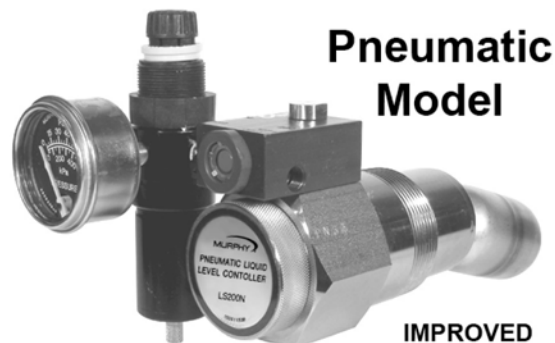
LS200NDVOR is a float-activated, pneumatic-vent level device used to operate dump valves or similar devices.

The LS200NDVOR provides a 2" NPT mounting with a pneumatic output for interfacing with pneumatic devices such as our Murphy pneumatic dump valve or with other pneumatic instrumentation.

LS200NDVO is the Dump Valve Operator (DVO) without the pressure regulator for those applications where the system provides a filter regulator for "instrument quality" air or gas as the control medium.

LS200N is the pneumatic level switch without the DVO and filter regulator.

NOTE: Pneumatic media devices require clean, dry, instrument quality air or gas. This unit is supplied with a pressure regulator, filter and Murphy 20BPG pressure gage for improved system life and trouble-free operation.



Features

- Designed for harsh gas compressor scrubber applications
- 304 stainless steel float operates in 0.55 specific gravity and heavier fluids (see Table 1)
- LS200 series rated for 2000 psi (13.8 MPa) [138 bar] working pressure
- Electric and pneumatic models available
- More robust design
- All models screw directly into the vessel or can be mounted via external float chamber
- Nickel plated body to provide enhanced corrosion protection
- Listed for Class I, Div. 1, Grp. C & D locations
- Canadian Registration Number OF1476.2
- Stainless Steel models are available for corrosive atmospheres.
- Trip on rising liquid level only

NOTE: The Murphy Series 1200 Liquid Level Switches have been replaced with the improved, more robust design of the Murphy LS200 Series Liquid Level Switches. The MSLS (Scrubber Level System) replaces the LS200 high-level shutdown switch with the MLS-020 magnetic level switch.

Accessories

Refer to LS200 Installation and Operations manual for additional information.

External Float Chamber 15700799

Operating Pressure: 2000psi (13.8MPa)[138 bar]

Operating Temperature: 400°F (204°C)

Weld Collar 15050375

Operating Pressure: 2000psi (13.8MPa)[138 bar]

Operating Temperature: 400°F (204°C)

Shipping Weight: 6 lb. (2.7kg)

Float Shaft Extension, 1", 15000478 (LS200 Series only)

Float Shaft Extension, 6", 15000503 (LS200 Series only)

Table 1 LS200 Minimum Allowable Specific Gravity			
Model	Float Extension length (inch)	Pressure (psi)	Specific Gravity
LS200	0	2000	0.55
	1		0.7
LS200NDVO	0	2000	0.63
	1		0.73

***Note:** The min. allowable SG will decrease with a decrease in operating pressure

Product Dimensions

LS200

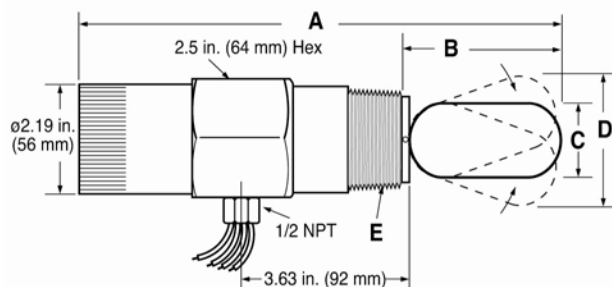


Table 2 LS200	
A	10.16 in. (258 mm)
B	3.44 in. (87 mm)
C	1.75 in. (44 mm)
D	2.80 in. (71 mm)
E	2 NPT

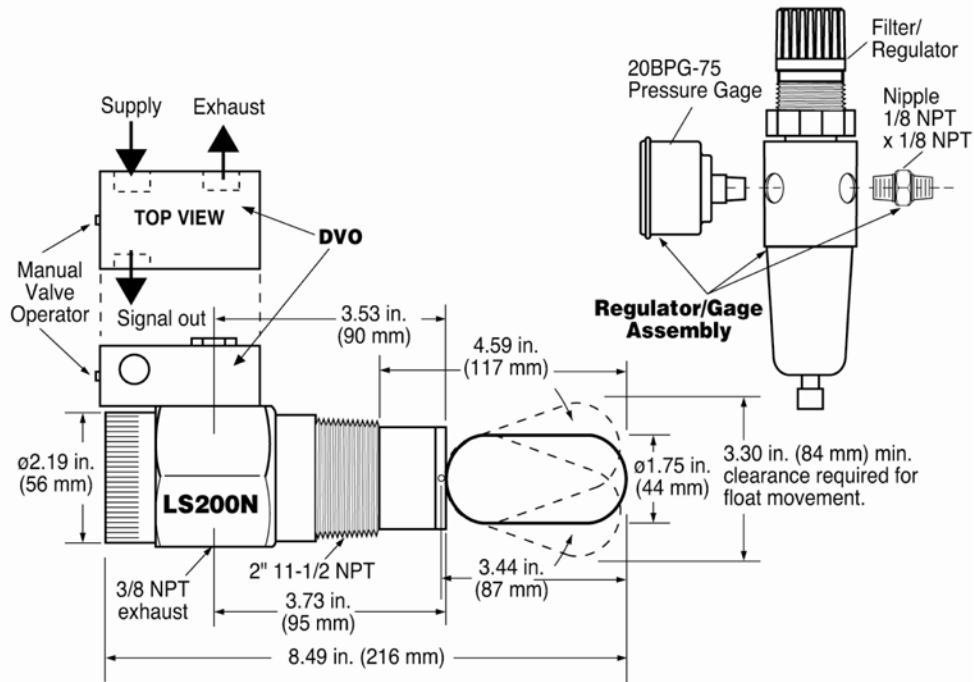
Application Data

Table 3 Pipe Data				
Nom. Size (inches)	O.D. (inches)	Schedule Number	Wall Thickness (inches)	Inside Diameter (inches)
3	3.5	40ST	0.216	3.068
3	3.5	80XS	0.3	2.9
4	4.5	40ST	0.237	4.026
4	4.5	80XS	0.337	3.826

Table 4 Minimum Clearance				
Product Name	Insertion Depth (inches)		Vertical Clearance (inches)	
	Std.	w/ 1" Extension	Std.	w/ 1" Extension
LS 200	4.6	5.6	2.8	3.15
LS 200N	5.43	6.4	3.3	3.9
L 1200	4.65	5.7	3.9	4.55
L 1200N	5.6	6.7	5.3	6.9
L 1100	4.4	5.4	3.4	4.05

Models L 1200, L 1200N, and L 1100 are discontinued and remain in the table for reference purposes only.

LS200N, LS200NDVO and LS200NDVOR with Dump Valve Operator, Pressure Regulator & Gage



CAUTION: LS200 Series parts are not interchangeable with the L1200 Series.

Specifications

All Models

Body: Nickel plated steel; optional 316 stainless steel (meets NACE standard MR-01-75 for direct exposure to H₂S service)

Float: 304 stainless steel (see Table 1 for application data)

Pressure rating: 2000 psig (13.8 MPa) [138 bar] (LS200 models only)

O-ring: Viton

LS200

Process connection: 2" NPT

Temperature rating: -20 to 300°F (-29 to 149°C)

Electrical: SPDT std. (see "Electrical" section for configuration/rating).

Wiring: 18 AWG x 36 in. (1.0 mm² x 916 mm)

LS200NDVOR

Process connection: 2" NPT

DVO valve: 3 way N.C. w/manual operator, all connections 1/8" NPT (minimum 30 psig required)

Filter/pressure regulator set:

Regulator: 0 to 75 psig (0 to 517 kPa) [0 to 5.17 bar] range

Maximum input pressure: 300 psig (2.07 MPa) [20.7 bar]

LS200NDVO

Process connection: 2" NPT

DVO valve: 3 way N.C. w/manual operator; all connections 1/8" NPT

LS200 N

Process connection: 2" NPT

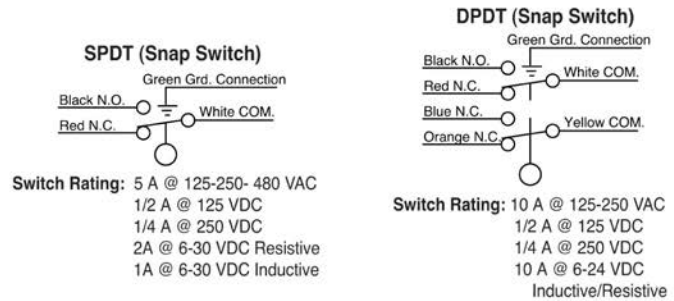
Vent valve: 2 way N.C. w/ 1/16in. (2mm) orifice and Viton seat; Inlet: 1/8" NPT; outlet 3/8" NPT

Approximate Shipping Weights and Dimensions

All models: 6 lb. 10 oz. (3 kg);

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

Electrical



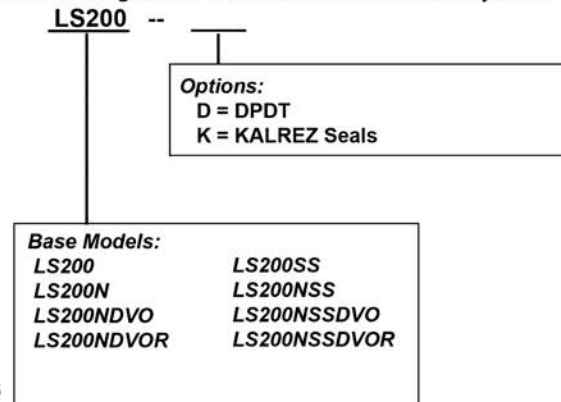
How to Order your Level Switch

Build a complete model number using the diagram below.

NOTE: Refer to 00-02-0671 for replacement parts.

See SLS literature to build complete system for Scrubber Level Control. (04005)

Canadian Registration Number OF1476.2 issued by ABSA



Dump Valves DVU Series



Features

- For Separators/Scrubbers to 2000 psi (13.8 MPa) [138 bar] Working Pressure
- Hex Union Allows Plug and Seat Replacement Without Piping Removal
- Operates on 30–70 psi (2.07–4.83 kPa) [2.07–4.83 bar] Control Pressure
- Compatible With Murphy Level Controls
- Soft Seat Valve
- Manual Valve Operator

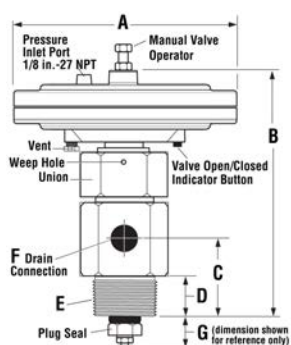
The DVU Series are pneumatically controlled dump valves. The valves open and close automatically by pneumatic control from a Murphy level controller and dump valve operator. Diaphragm actuated, the DVU series dump valves operate at 30–70 psi (2.07–4.83 kPa) [2.07–4.83 bar] and up to 2000 psi (13.8 MPa)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

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

Application

Designed for gas compressor scrubbers, the DVU Series can be used to dump any liquids compatible with its materials of construction.

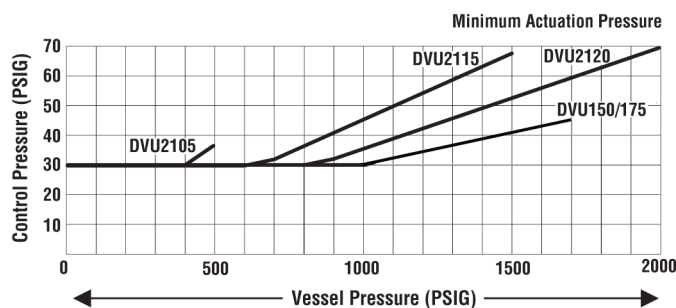
Dimensions



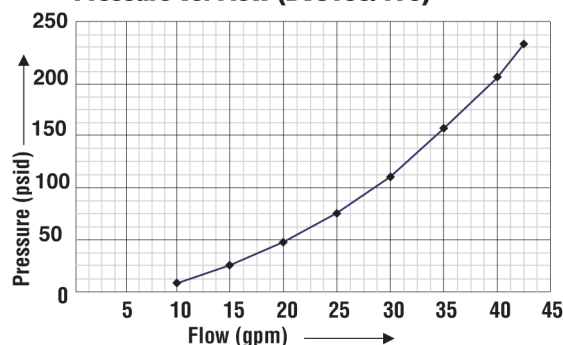
Model	DVU2120	DVU2115	DVU2105	DVU175	DVU150
A	7.50 (191)	7.50 (191)	7.50 (191)	7.50 (191)	7.50 (191)
B	8.0 (203)	8.0 (203)	8.0 (203)	6.75 (171)	6.75 (171)
C	2.75 (70)	2.75 (70)	2.75 (70)	2.0 (51)	2.0 (51)
D	1.0 (25)	1.0 (25)	1.0 (25)	1.0 (25)	1.0 (25)
E	2-11.5 NPT	2-11.5 NPT	2-11.5 NPT	1-11.5 NPT	1-11.5 NPT
F	1-11.5 NPT	1-11.5 NPT	1-11.5 NPT	3/4"-14 NPT	1/2"-14 NPT
G	1.03 (26)	1.03 (26)	1.03 (26)	0.73 (19)	0.73 (19)

NOTE: Dimensions are in inches and (millimeters).

Control Pressure vs. Working Pressure



Pressure vs. Flow (DVU150/175)



Specifications

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

Valve Operating Pressure: See chart (bottom pg 1).

Maximum Working Pressure:

DVU150/175 (STD & SS): 1800 psi (12.4 MPa) [124 bar].

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

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

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

Shipping Weights

DVU150 and DVU175: 9 lbs. (4 kg.).

DVU150SS and DVU175SS: 9 lbs. (4 kg.).

DVU2105, DVU2115, DVU2120: 14 lbs. (6.4 kg.).

Shipping Dimensions

8 x 8 x 12 in. (203 x 203 x 305 mm.).

Service Parts

Part No.	Description
DVU2120	
55-00-0237	Seal Kit
55-00-0236	Diaphragm Kit
DVU2115	
55-00-0241	Seal Kit
55-00-0236	Diaphragm Kit
DVU2105	
55-00-0245	Seal Kit
55-00-0236	Diaphragm Kit
DVU150/175	
55-00-0230	Seal Kit
55-00-0231	Diaphragm Kit
55-00-0255	Bulk Seal Kit (10 each)

Part No.	Description
DVU150SS/175SS	
55-00-0262	Seal Kit
55-00-0231	Diaphragm Kit
55-00-0263	Bulk Seal Kit (10 each)

Typical Seal Kit includes: Stem/Stem Nut Assy, Seat, Quad Ring, Polypack Seal, Crush Seal Washer, Plug/Seal Assy, O-Ring (x2), Flat Washer, Nylock Nut.

Typical Bulk Seal Kit includes: 10 each of Crush Seal Washer, Plug/Seal Assy, O-Ring.

Typical Diaphragm Repair Kit includes: Diaphragm, Flat Washer (upper), Nylock Nut, Diaphragm Plate, Quad Ring, O-Ring, Polypack Seal, Sealing Washer.

Scrubber Level Systems (SLS)

(Includes LS200, LS200NDVOR and DVU valve)

SLS2120: Includes DVU2120 valve

SLS2115: Includes DVU2115 valve

SLS2105: Includes DVU2105 valve

SLS175: Includes DVU175 valve

SLS150: Includes DVU150 valve

-LR: Less Regulator option

(Includes MLS-020, LS200NDVOR and DVU valve)

MSLS2120: Includes DVU2120 valve

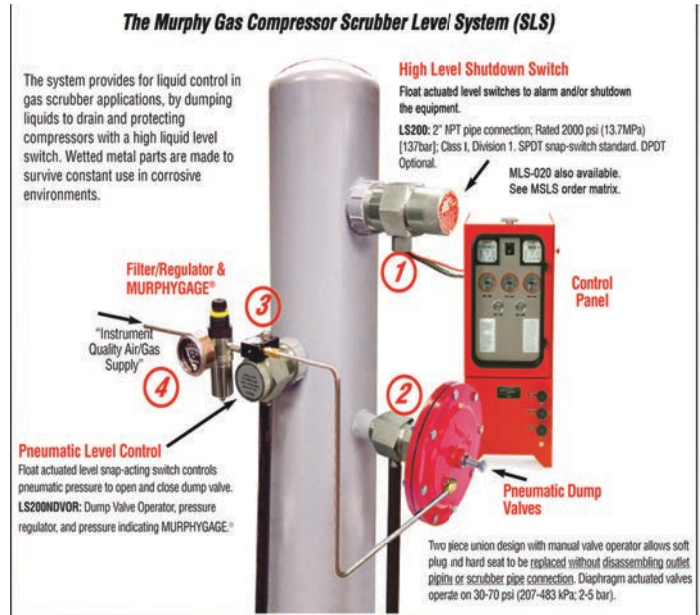
MSLS175: Includes DVU175 valve

MSLS150: Includes DVU150 valve

-LR: Less Regulator option

How to Order *Specify model number:*

Model	Inlet	Outlet	Trim Size	Working Max. Press.
DVU2120	2 NPT	1 NPT	0.436 in. (11 mm)	2000 psi.
DVU2115	2 NPT	1 NPT	0.576 in. (15 mm)	1500 psi.
DVU2105	2 NPT	1 NPT	0.859 in. (22 mm)	500 psi.
DVU175	1 NPT	3/4 NPT	0.359 in. (9 mm)	1800 psi.
DVU175SS	1 NPT	3/4 NPT	0.359 in. (9 mm)	1800 psi.
DVU150	1 NPT	1/2 NPT	0.359 in. (9 mm)	1800 psi.
DVU150SS	1 NPT	1/2 NPT	0.359 in. (9 mm)	1800 psi.



4-1/2 in. (114 mm) Dial Level Swichgage® Instrument OPLH / OPLHACS Series



Features

- Combination Level Indicating Gage and Critical Level Limit Switch
- High and Low Level Limit Contacts Are Visible and Adjustable
- Designed to Start and Stop Pumps to Maintain Specific Levels
- Indication only Murphygage® instrument Available
- Latching Control Relay Versions Available



Selected configurations are third party listed. Consult FWMurphy for details.

The OPLHC/OPLHACS Series Level Swichgage instruments are combination level indicating gages with adjustable low and high limit switches. Limit switches can be wired directly to electric pilot circuits to operate alarms, shutdown or start/stop pumps to maintain predetermined levels.

Surface mount or panel mount enclosure is available for both model series. All models feature a 4-1/2 in. (114 mm) dial for easy viewing. Adjustable limit switches are accessible from front of the Swichgage instrument.

Specialized models are available for specific applications involving engines or electric motors.

OPLHC/OPLHACS

Series Swichgage instruments include 2-adjustable, pilot duty, pointer type contacts. Contacts have self-cleaning motion to enhance electrical continuity. Models are available with a rugged bourdon-tube or 316 stainless steel bellows sensing element for greater accuracy and sensitivity in lower ranges. A “freeze-proof” sensor of 316 stainless steel with Buna-N rolling diaphragm, is available.

OPLHBP/OPLHABPS

Internal latching control relays are available to provide ON/OFF automation for electric motor applications.

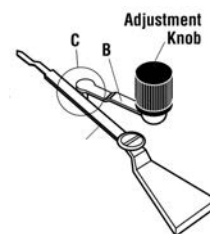
OPLHC and OPLHACS series are available in indication only Murphygage models (OPLHAGS). See Page 2 to determine the model for your application.

Applications

- Saltwater Disposal Systems
- Diesel Day Tanks
- Waterflood Systems
- Oil Storage Tanks

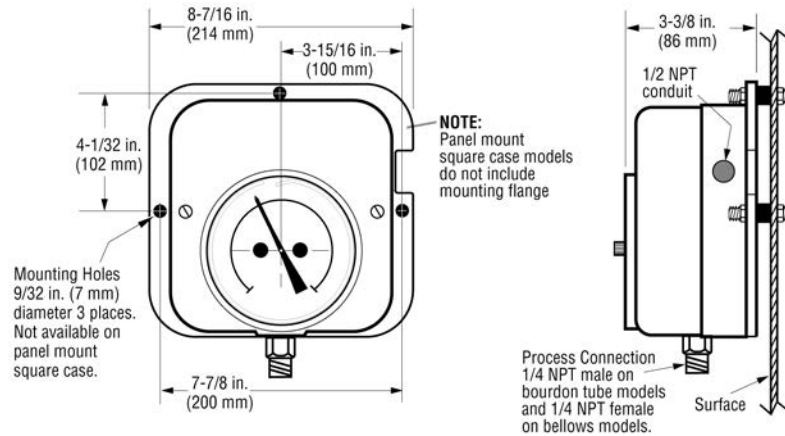
Basic Operation

The OPLHC/OPLHACS series operate from static head pressure. Pressure is transmitted to the process connection of the Swichgage instrument. From here the pressure flexes the bourdon tube or operates the 316 stainless steel bellows (depending on which model you have). The bourdon tube/bellows operates the stainless steel rotary geared movement which in turn operates the indicating pointer on the face of the dial. When the pointer **(A)** closes with the limit contact **(B)**, a control circuit **(C)** is completed and signals an alarm and/or shut down or starts/stops a pump.

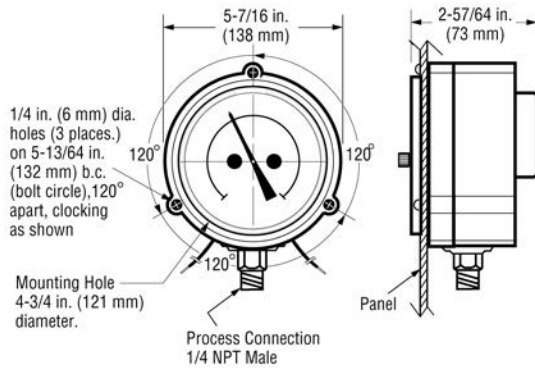


Dimensions

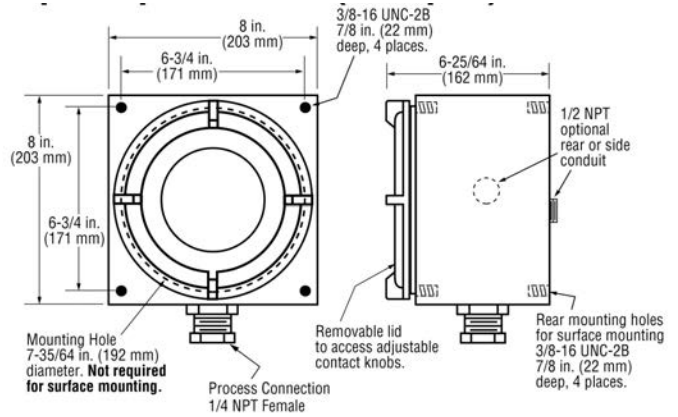
Surface / Panel Mount Enclosure (Square Case)



Panel Mount Enclosure (Round Case)

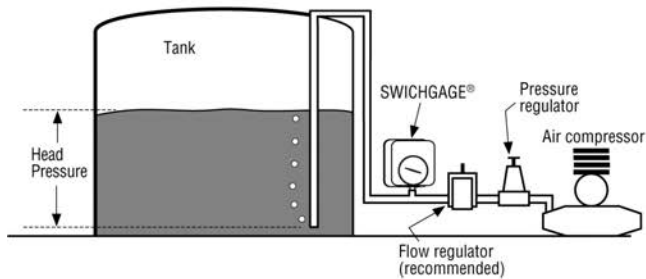


Explosion-proof Enclosure ("EX" Option)

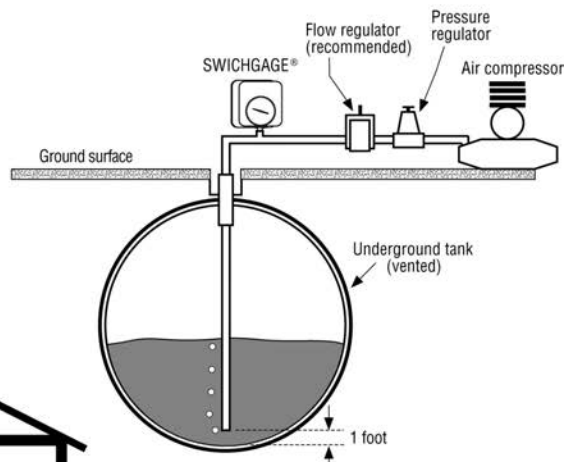


Typical Applications

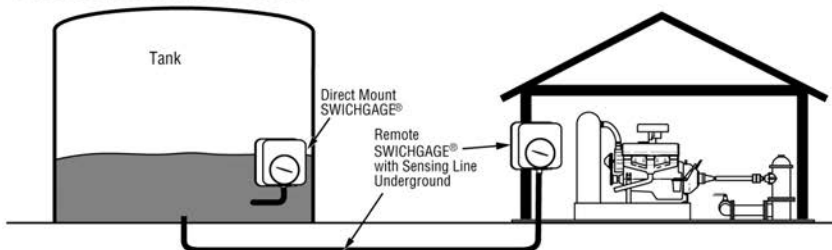
Above Ground Tank



Below Ground Tank



Direct and Remote Tank



Specifications

Specifications	OPLH / OPLHA Series													
	OPLHC	OPLHFC	OPLHCE	OPLHACS	OPLHACFP	OPLHACES	OPLHBP	OPLHABPS	OPLHBPE	OPLHABPES	OPLHG	OPLHFG	OPLHAGS	OPLHAGES
Enclosure Type (die cast aluminum)														
• Surface mount, square case	•			•			•	•			•	•		
• Panel mount, round case		•									•		•	•
• Panel mount, square case			•		•			•	•			•		
Limit Switch Ratings														
• Pointer Contacts: SPDT center off; 2 A, 30 VDC, 1 A, 125 VAC.	•	•	•	•	•	•	•	•	•	•			•	
Latching Control Relay														
• SPDT, 10 A @ 120 VAC (standard)							•	•	•	•				
• DPDT, 12 VDC (Optional)							•	•	•	•				
• DPDT, 24 VAC (Optional)							•	•	•	•				
• DPDT, 24 VDC (Optional)							•	•	•	•				
Sensing Element														
• Bourdon Tube, Bronze/Brass (standard)	•	•	•				•		•		•	•		
• Bellows, 316 Stainless Steel (standard)				•		•		•	•			•	•	•
• Freeze-proof Sensor, 316 St. Steel w/Buna-N diaphragm					•									
Process Connections														
• 1/4 NPT Male	•	•	•				•		•		•	•		
• 1/4 NPT Female				•		•		•	•			•	•	•
• 2 NPT Male					•									
Geared Movement: 300 series stainless steel.	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Accuracy (standard calibration is for water)														
• ±2% first/last quarters of scale, 1% middle half scale. ⁽¹⁾⁽³⁾	•	•	•	•		•	•	•	•	•	•	•	•	•
OPTIONS AVAILABLE (specify when ordering)														
• Environment sealed for isolation from the elements (ES). ⁽²⁾		•									•		•	•
• Explosion-proof case; Class I, Div. 2, Groups C & D (EX)	•			•			•	•						
• Explosion-proof less case; internal gage mechanism without case (EL)	•			•			•	•						
• Less case; internal gage mechanism without case (LC)	•	•	•	•		•	•	•	•	•	•	•	•	•
• Tickler contact (TA)				•	•	•							•	
RANGES AVAILABLE (specify when ordering)														
• 0-5 ft. (0-1.5 m) dual scale dial				•		•		•	•			•	•	•
• 0-10 ft. (0-3 m) dual scale dial				•		•		•	•			•	•	•
• 0-20 ft. (0-6 m) dual scale dial	•	•	•	•	•	•	•	•	•	•	•	•	•	•
• 0-30 ft. (0-9 m) dual scale dial	•	•	•	•	•	•	•	•	•	•	•	•	•	•
• 0-60 ft. (0-18 m) dual scale dial	•	•	•		•		•		•	•				
• 0-120 ft. single scale dial	•	•	•				•		•		•	•		
• 0-3.6 metres single scale dial				•		•		•	•			•	•	•
• 0-4 metres single scale dial				•		•			•			•	•	•
• 0-6 metres single scale dial				•	•	•		•	•			•	•	•
• 0-9 metres single scale dial	•	•	•	•	•	•	•	•	•	•	•	•	•	•

(1) Bourdon tube (OPLHC) models in the 20 ft. (6m) range have an accuracy of 3% full scale.

(2) ES option available for the 20 ft. (6 m) range models and above.

(3) OPLHAC (Bellows) models, 0-5' 3% FS, 0-10' 2% FS.

NOTES:

- Options may not be available in combination. Consult factory.
- Over range is not to exceed 10% FS above full range.
- Calibration is for water. Specify for other liquids.
- Add **TOTAL** height of liquid above the pressure connection to determine correct range (dial scale). For elevated tanks subtract the tank elevation from gage reading to determine actual tank level.

Shipping Dimensions

Item Dimensions: 16 x 11 x 5-1/2 in. (406 x 279 x 140 mm).

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

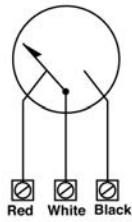
Shipping Weights

Item Weight: 8 lb. (3.6 kg) approximately.

Explosion-proof models: 22 lb. (10 kg) approximately.

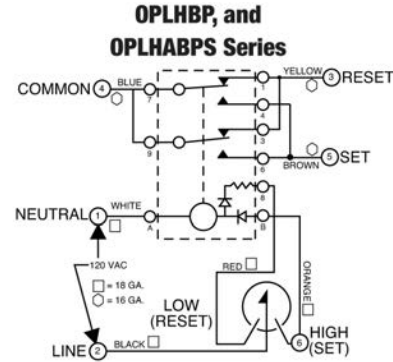
Internal Wiring

OPLHC, OPLHACS, and OPLHAFP Series



Contact Ratings: SPDT center off;
2 A, 30 VDC, 1 A, 125 VAC pilot duty.

OPLHCE, OPLHFC, OPLHACES and OPLHAFCS Series



Contact Ratings: SPDT dry relay con-
tacts, 10 A, 125 VAC.

How to Order

Specify model number. NOTE: No designator is required for Standard configurations. Also, list options in alphabetical order (A to Z). Place a dash (–) between each option. See example below.

OPLHBP – – 2 – 30 – TA

Base Part Numbers

OPLHG	OPLHFC
OPLHGE	OPLHCE
OPLHC	OPLHABPGS
OPLHBP	OPLHBPE
OPLHAGS	OPLHAGES
OPLHACS	OPLHACES
OPLHABPS	
OPLHAFCS	
OPLHAFGS	
OPLHFG	

Options (see Specifications on page 2 for availability)

ES = Environmentally sealed
EX = Explosion-proof
EL = (EXLC) Explosion-proof less case
LC = Less case
TA = (TCA) Tickler contact

Range/Scale (specify in feet)*

	Bellows	Tube
0 5 = 0-5 ft.	X	
1 0 = 0-10 ft.	X	
2 0 = 0-20 ft.	X	X
3 0 = 0-30 ft.	X	X
6 0 = 0-60 ft.		X
1 2 0 = 0-120 ft.		X

*Standard calibration is for water-specify for other.

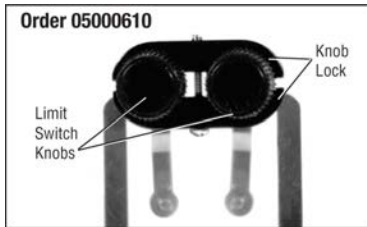
Bourdon Tube/Bellows

OPLHC Standard=Bronze/Brass
OPLHACS Standard=316 Stainless Steel

Latching Control Relay Voltage (applies to "BP" models only)

Blank = 120 VAC
2 = 12 VDC
4 = 24 VDC

Tamperproof Contact Accessory



SECTION 20 VIBRATION, TIME AND SPEED

Tachometers - Analog

97026	Tachometers and Tach/Hourmeters – AT and ATH Series	101
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Tachometers - Digital

9004	Selectronic® Digital Tachometer – MT90 Model	103
96115	Digital Tachometer and Hourmeter With Adjustable Overspeed Set Point – Model MTH6	105
97050	Digital Tachometer and Hourmeter with Adjustable Overspeed Trip Point – SHD30 and SHD30-45 Models	107

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97118	Electronic Speed Switches – HD9063 Series, OS77D Series and SS300 Series	109
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Hourmeters – Electromechanical

97030	Hourmeters – TM Series	113
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96095	Time Switches Models 5T, 15T, 12T and 24T 12 or 24 Hour and 5 or 15 Minute	115
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Vibration Switches

1210981	Electronic Vibration Switch (EVS-2)	117
96013	Shock and Vibration Switch – VS2 Series	119
94092	Shock and Vibration Control Switch – VS94 Model	123



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Tachometers and Tach/Hourmeters – AT and ATH Series



Features

- 4000 RPM – 0 to 100,000 hours
- Sensing from Magnetic Sensor, Battery Charging Alternator or Ignition Signal
- High Visibility Analog Readout
- Air Core Movement
- Easy Calibration through Dip Switches
- Through Dial Lighting
- Powered by 11-28 VDC Battery Available

* Products covered by this bulletin comply with European Council electromagnetic compatibility directive 2004/108/EC, except as noted.

The AT Series tachometers are rugged, transistorized instruments with solid-state circuitry for indication of engine RPM. They are equipped with a bracket for mounting into a standard 3- 3/8 in. (86 mm) dash mounting hole. A full 270° sweep of the pointer gives an accurate indication on a large easy-to-read scale and the dial can be illuminated for night reading. The ATH Series models are also equipped with hourmeter to record the elapsed running time of an engine.

Models available for Alternator, Magnetic Sensor or Ignition signal. These instruments are designed to function from pulses generated by an alternator with 4, 8, 12, 14, or 16 poles on the rotor (3 - 40 PPR). The pulses can also be obtained from the ring gear of an engine by means of an **electromagnetic sensor** (magnetic pickup). Murphy's magnetic sensor driven models are designed to function with flywheels having anywhere from 50 to 304 teeth. **Ignition signal** model available for 2 - 10 cylinder, 4 cycle spark-ignited engines. All models are for negative ground, positive ground or isolated electrical systems and are protected against reverse polarity hookup.

All models are powered by a 11-28 VDC battery and are reverse polarity protected.

Series Models

ATS Series Magnetic Sensor Signal Tach

50-304 flywheel teeth* 11-28 VDC, 3333 Hz to 20.27 kHz @ 4000 RPM

ATHS Series Magnetic Sensor Signal Tachometer/Hourmeter

50-304 flywheel teeth* 11-28 VDC, 3333 Hz to 20.27 kHz @ 4000 RPM

* To determine pulses per engine revolution, work the formulas on the back page and use the pulses per revolution number to determine if the tachometer can be used for your application.

ATA Series Alternator Signal Tachometer

3-40 pulses*/engine revolution 12 VDC, 200 Hz to 2667 Hz @ 4000 RPM

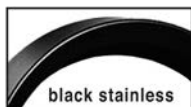
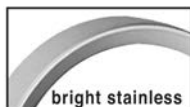
ATHA Series Alternator Signal Tachometer/Hourmeter

3-40 pulses*/engine revolution 12 VDC, 200 Hz to 2667 Hz @ 4000 RPM

ATHI Series Ignition Signal Tachometer/Hourmeter

2 - 10 cylinder, 4 cycle engines, 66.7 Hz to 333.3 Hz @ 4000 RPM

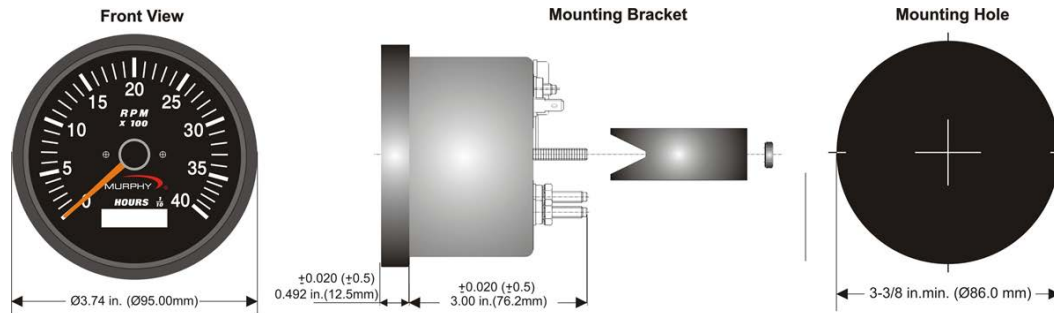
Bezel Styles



Applications

These tachometers are specially designed for use on truck, marine, industrial, or stationary engines.

Dimensions



Specifications

Magnetic Sensor Driven Models

Power Input: 11-28VDC (70mA – 120mA except lamp load)

Backlight: 3.4W T-10 wedge base bulb

RPM Input Signal Voltage: 1.5Vrms minimum

Accuracy: Tachometer: +2% full scale
Hourmeter: +0.01% hours, +1 count

Temperature Range: -40°C to +82°C (no permanent damage shall occur)

Dial (Face Plate): 270° sweep with white numerals (over black background)

Bezel: 304 stainless steel for bright and IS 513 E.E.E. CRCA steel for black

Scale: 0-4000RPM

Case Material: Plastic

Hourmeter Range: 99999.9 hours in 0.1 increments.

Alternator Driven and Ignition Driven Models

Power Input: 11-28VDC (70mA-120mA except lamp load)

Backlight: 3.4W T-10 wedge base bulb

RPM Input Signal Voltage: V low: 0.5V max, V high: 8.0V min.

Accuracy: Tachometer: +2% full scale
Hourmeter: +0.01% hours, +1 count

Temperature Range: -40°C to +82°C (no permanent damage shall occur)

Dial (Face Plate): 270° sweep with white numerals (over black background)

Bezel: 304 stainless steel for bright and IS 513 E.E.E. CRCA steel for black

Scale: 0-4000RPM

Case Material: Plastic

Hourmeter Range: 99999.9 hours in 0.1 increments.

How to Order

Order the Tachometer or Tachometer/Hourmeter by model number.

Magnetic Sensor Tachometer 4000 RPM; 50 - 304 flywheel teeth 11-28 VDC

Model #	Designation
ATS-40	Bright Stainless Steel Bezel
ATS-40-A	Black Stainless Steel Bezel
ATS-40-B	SAE Bright Stainless Steel Bezel
ATS-40-C	SAE Black Stainless Steel Bezel

Magnetic Sensor Tach/Hourmeter 4000 RPM; 50-304 flywheel teeth 11-28 VDC

ATHS-40	Bright Stainless Steel Bezel
ATHS-40-A	Black Stainless Steel Bezel
ATHS-40-B	SAE Bright Stainless Steel Bezel
ATHS-40-C	SAE Black Stainless Steel Bezel

Alternator Signal Tachometer 4000 RPM; 3 - 40 pulses/rev 11-28 VDC

ATA-40	Bright Stainless Steel Bezel
ATA-40-A	Black Stainless Steel Bezel
ATA-40-B	SAE Bright Stainless Steel Bezel

Alternator Signal Tach/Hourmeter 4000 RPM; 3 - 40 pulses/rev 11-28 VDC

ATHA-40	Bright Stainless Steel Bezel
ATHA-40-A	Black Stainless Steel Bezel
ATHA-40-B	SAE Bright Stainless Steel Bezel
ATHA-40-C	SAE Black Stainless Steel Bezel

Ignition Signal Tach/Hourmeter 4000 RPM; 1-5 pulses/engine rev

ATHI-40-A	Black Stainless Steel Bezel
-----------	-----------------------------

Selectronic® Digital Tachometer – MT90 Model



Features

- ± 1 RPM Accuracy
- Easy Calibration
- Clear-Read LCD Display
- Back Light for Night Viewing (Battery Powered models)
- Input Source Can Be a Magnetic Pickup or Engine Alternator
- Power Supplied by Magnetic Pickup or 12, 24, or 32 VDC Battery System

The Murphy Selectronic MT90 digital tachometer offers high accuracy and dependability resulting from use of a quartz crystal time based and digital, solid-state electronics.

Tachometer power is supplied by either a Murphy magnetic pickup, mounted at the flywheel ring-gear of an engine, or by a 12, 24 or 32 volt DC battery system.

RPM data is supplied by either a Murphy magnetic pickup or by the alternator in your battery charging circuit. The MT90 tachometer also has back-lighting for easy readings in low lit areas; this lighting requires a battery power source.

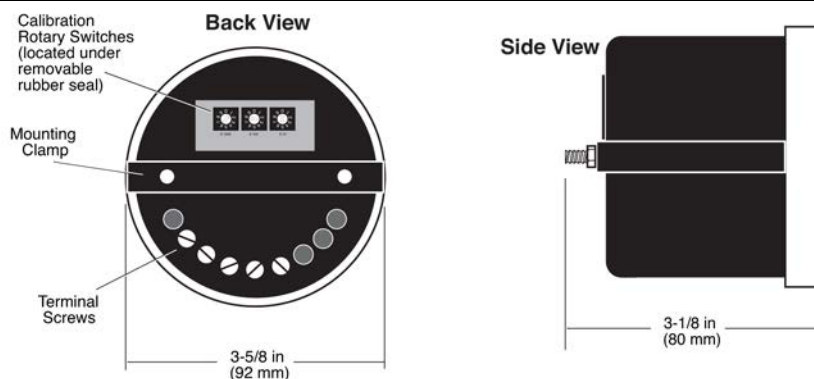
RPM Calibration

The MT90 is calibrated to engine RPM by setting a series of calibration rotary switches on the back of the tachometer. The proper switch sequence for the engine is determined by (1) the number of ring gear teeth for the magnetic pickup, or (2) by the ratio of alternator to engine pulley diameter, and the number of poles of the alternator.

Applications

Typical applications include: Generators, Compressors, Industrial Engines, Oil Field Equipment, Marine Vessels, Vehicles, Farm Equipment, and Construction Equipment.

Dimensions



Magnetic Pickups

MP3298



Pickup Models	Total Length	Threaded Length	Thread Size
MP3298*	3 in. (76 mm)	3 in. (76 mm)	5/8-18 UNF
MP7906†	3 in. (76 mm)	3 in. (76 mm)	3/4-16 UNF
MP7905‡	4-1/2 in. (114 mm)	4-1/2 in. (114 mm)	3/4-16 UNF

* Replaces 20-01-0080 and MP100. Lead wire hookup (12 in. [305 mm]).

† Replaces 20-01-0081. Lead wire hookup (12 in. [305 mm]).

‡ Replaces 20-01-0082. Lead wire hookup (12 in. [305 mm]).

Specifications

Signal Input Voltage: 4 to 35 Vrms from a magnetic pickup or alternator.*

Pulses per Revolution: 3 to 999.

Power Requirements:

- Pickup Power: 4-35Vrms*.
- Battery Power: 8-40 VDC (12, 24, 32 volt).

Current:

- Tach back-light Off, 4mA @ 40 VDC.
- Tach back-light On, 25 mA @ 40 VDC.

* See "Special Note" for Magnetic Pickup Powered MT90 applications

Case: 1018 polycarbonate/polyester blend.

Lens: Polycarbonate.

Bezel: #430 Stainless Steel.

Display: LCD, 4-digit, seven segment.

Operating Temperature: -4 to 158°F (-20 to 70°C).

Storage Temperature: -13 to 185°F (-25 to 85°C).

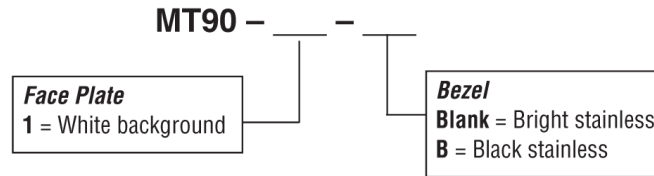
Mounting Hole: 3-7/16in. (87 mm).

Shipping Weight: 14 oz. (0.4 kg).

Shipping Dimensions: 5-1/2 x 5-1/2 x 5-1/2in. (140 x 140 x 140 mm)

How to Order

To order a MT90 for your application, use the diagram below.



To order a magnetic pickup, specify model number. Example: **MP3298**

Digital Tachometer and Hourmeter With Adjustable Overspeed Set Point – Model MTH6



Features

- Tachometer and Hourmeter With Overspeed Shutdown or Alarm Switch
- 3-1/2 Inches (89 mm) Diameter Dial
- Reads RPM Data from a Magnetic Pickup or Battery Charging Alternator
- Powered by 8 to 40 VDC
- Large 5-Digit LCD Display
- Maintains Hours Count When Power Is Lost
- Front Panel Programming
- Hours Can Be Reset to Zero

This microprocessor-based digital tachometer and hourmeter with a built-in overspeed switch is highly accurate and dependable. It measures speed and running hours and can give an alarm or shut down the engine on overspeed.

The MTH6 case is polycarbonate, and its dial measures 3-1/2 in. (89 mm) in diameter.

RPM data for the tachometer and overspeed switch is supplied by a magnetic pickup or battery charging alternator. The magnetic pickup is installed into the flywheel housing of an internal combustion engine. The starter ring gear acts upon the magnetic pickup to generate a voltage pulse each time a gear tooth passes the end of the sensor.

Applications

- Industrial Engines
- Generators
- Compressors
- Oil Field Equipment
- Marine Engines
- Vehicles
- Farm Equipment
- Construction Equipment

Basic Operation

During normal operation, the MTH6 displays RPM. Its five-digit, liquid crystal display is updated every second. When the MTH6 is displaying hours and a speed signal is present, the far left digit and decimal point will flash indicating the hourmeter is operating.

The overspeed set point and running hours can be viewed by manipulating three membrane switches located on the MTH6 front panel.

When the overspeed set point is met an LED, also located on the front panel, lights.

Specifications

Power Requirements: 8-40 VDC (12, 24 or 32 VDC systems).

Maximum Current:

- 12 VDC: 0.011 A, backlight Off;
0.025 A, backlight On.
- 24 VDC: 0.008 A, backlight Off;
0.015 A, backlight On.
- 32 VDC: 0.007 A, backlight Off;
0.010 A, backlight On.

Operating Temperature: -4° to 158°F (-20° to 70°C).

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

Case: 1018 Polycarbonate/Polyester blend.

Mounting Hole Dim.: 3-3/8 in. (86 mm) Dia.

Speed Input: 4.5 Vrms minimum.

Overspeed Switch Rating: 2 A, 50 VDC.

Overspeed Range: 0 to 9000 RPM.

Pulses per Revolution: 4 to 255.

Tachometer Range: 0 to 65,535 RPM.

Tachometer Accuracy: ±1% of the display reading or -2 RPM whichever is greater.

Input Frequency Range: 25 Hz to 20 kHz.

Hourmeter Range: 0 to 99999 hrs.

Hourmeter Resolution: ±0.1 Hour up to 9999.9; ±1 hour 10,000 and up.

Reset Hourmeter: Apply temporary ground to terminal #5 to reset hours to zero.

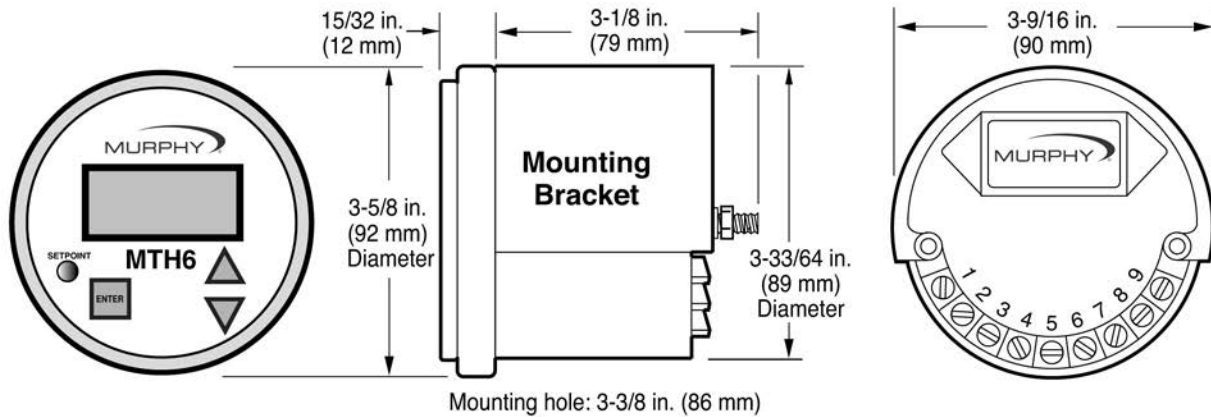
Shipping Weight: 14 oz. (435 g).

Shipping Dimensions: 5-1/2 x 5-1/2 x 5-1/2 in. (140 x 140 x 140 mm).

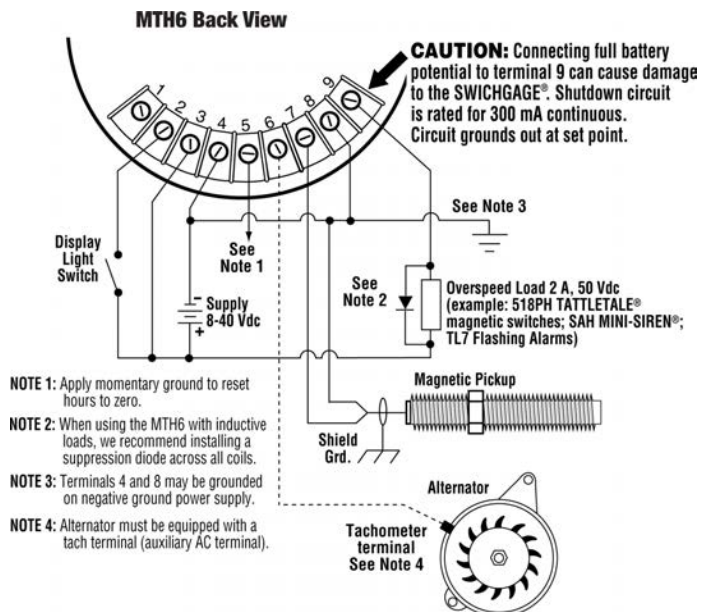
Easy-Calibration

The MTH6 calibration is simple. The operator enters the number of pulses per engine revolution and the overspeed set point value using the membrane-switches located on the front of the MTH6.

Dimensions



Typical Wiring Diagram



How to Order

Order by model designation.

MTH6 - - -

Face Plate:

1 = White Background

Bezel:

Blank = Bright Stainless

A = Black Stainless

Digital Tachometer and Hourmeter with Adjustable Overspeed Trip Point – SHD30 and SHD30-45 Models



Features

- Normally Open and Normally Closed Overspeed Alarm or Shutdown Switch (Standard)
- RPM Data and Power Supplied by Magnetic Pickup or Capacitor Discharge (CD) Ignition
- Accurate to $\pm 0.5\%$ of Display Reading
- Hours Can Be Preset and Reset to Zero
- Approved for Class I, Division 2, Groups C & D Hazardous Areas

* When installed per Murphy Drawing 20-08-0258

The SHD30 and SHD30-45 are microprocessor based tachometers with hourmeter and an overspeed trip point. The trip point can be connected as either a form "c" relay output or as a normally open SCR output for alarm or shutdown on overspeed.

The SHD30 features a panel-mounting design, plastic enclosure that is 5-1/16 (129 mm) long and 4-1/4 in. (108 mm) high.

The SHD30-45 has the same enclosure, but it also has a backplate with studs to mount like a SHD-45, OPLFC.

The SHD30 models power and RPM data are supplied by either a magnetic pickup or a capacitor discharge (CD) ignition. The hourmeter is adjustable to a preset time and resettable to zero. Should power be lost, on-board batteries maintain the run hours display and allow for resetting the overspeed relay output.

Basic Operation

When a tach signal is present the SHD30 models display rpm. When a tach signal is not present, the display is blank unless the Read Hours membrane key, on the faceplate is pressed and held.

The five-digit, liquid crystal display is updated every second. The run hours, overspeed set point and current pulses per engine revolution can be displayed by manipulating the membrane switches. Run hours can be displayed even after power is lost. The run hours display can be configured to alternate with the RPM display.

Applications

- Gas Compressors
- Oil Field Equipment
- Industrial Engines
- Generators

Easy-to-Calibrate

The SHD30 models calibration is done by entering the number of pulses per engine revolution using the Pulses per Revolution and Overspeed Setpoint membrane keys, on the faceplate. The number of pulses is determined by the number of cylinders, cycles and ignition features. It is also determined by the number of ring gear teeth of the engine's flywheel on a magnetic pickup system.

Presetting and resetting running hours is done from the back and front of the SHD30 models.

Specifications

Power input:

CD ignition: 90 to 350 VDC.
150 μ A typical @ 90 VDC;
300 μ A @ 350 VDC.

Magnetic Pickup:

5 to 120 Vrms.
325 μ A typical @ 5 Vrms, 100 Hz;
450 μ A typical @ 5 Vrms, 1 kHz;
1 mA typical @ 5 Vrms, 5 kHz;
2 mA typical @ 5 Vrms, 10 kHz;
15 mW max. @ 5 Vrms, 10 kHz;
2.8 W max. @ 120 Vrms, 10 kHz.

Backup Batteries: 2 replaceable, long life Lithium batteries, Panasonic CR2032 or equivalent, 3 V, 220 mAh power. Shelf life expectancy 10 years.

Operating Temperature: -4° to 158°F (-20° to 70°C).

Storage Temperature: -40° to 300°F (-40° to 150°C).

Case Material: Plastic.

Ignition Frequency Range: 3 to 666 Hz.

Magnetic Pickup Frequency Range: 1 to 10 kHz.

Overspeed Output:

Connected to S.C.R. (Silicon Controlled Rectifier) terminals:
0.5 A, 350 VDC continuous.

Connected to Form "C" Relay terminals:
Relay Contact, 0.5 A, 30 VDC, 125 VAC resistive.

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

Hourmeter Range: 0 to 65535 hrs.

Hourmeter Accuracy: ± 15 minutes per year.

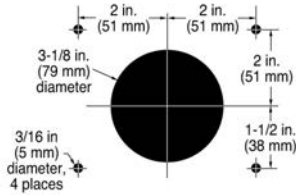
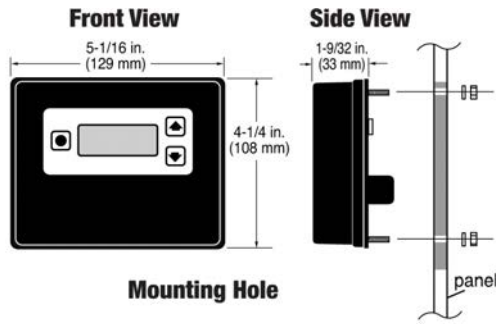
Laboratory Approvals: CSA (Canadian Standards Association) approved for Class I, Division 2, Groups C & D hazardous areas.

Shipping Weight: 1 lb (0.5 kg).

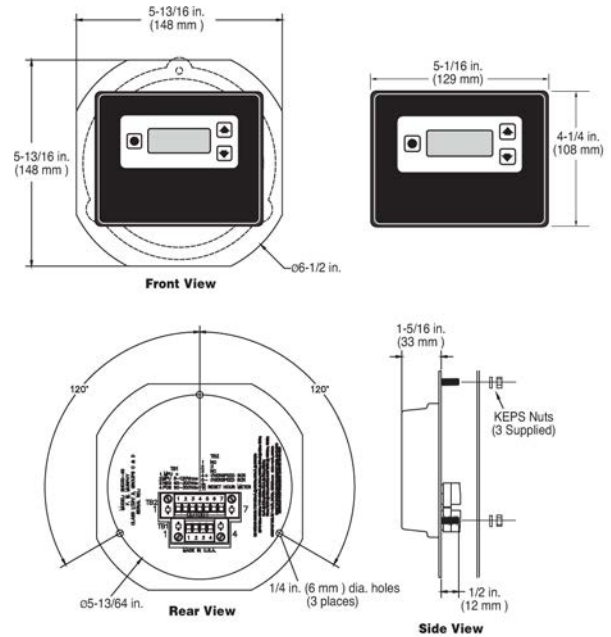
Shipping Dimensions: 9-1/4 x 8-1/4 x 5-1/4 in. (235 x 210 x 133 mm).

Dimensions

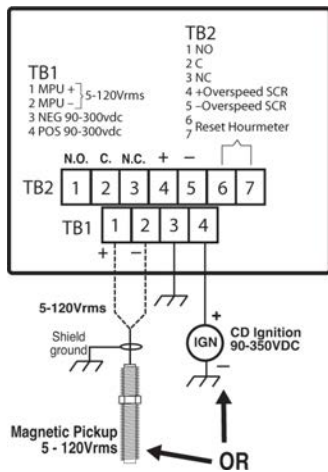
SHD-30



SHD-30-45



Typical Wiring Diagram



WARNING: In hazardous areas the overspeed relay contact is certified for use ONLY with Murphy non-incendive or intrinsically safe products. In non-hazardous areas overspeed relay contact may be used to switch electromechanical Tattle-tale® or Magnetic Switches that do not exceed the relay contact rating: 1 A, 30 VDC; 0.3 A, 110 VDC; 0.5 A, 125 VAC. However, the preferred output to switch electromechanical Tattle-tale® or Magnetic Switches is the N.O. SCR.

Refer to 00-02-0288-IOM for more details.

How to Order

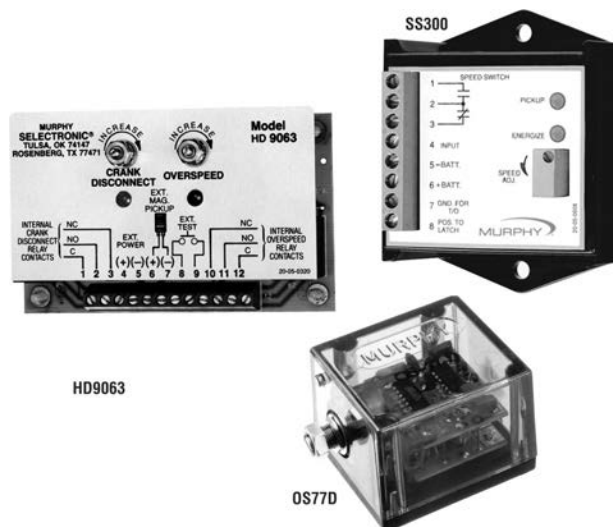
Specify model number:

SHD30 = Tach/hourmeter w/overspeed

SHD30-45 = Tach/hourmeter w/overspeed to mount like SHD45 or OPLFC

00-00-9389 = Panasonic CR2032 or equivalent backup battery (2 required)

Electronic Speed Switches HD9063 Series, OS77D Series and SS300 Series



Features

- Models for Overspeed, Crank Termination, or Crank Termination and Overspeed
- Solid State Construction
- Compact Design
- Field Adjustable Set Points
- High Noise Immunity

Murphy Electronic Speed Switches are available in various configurations to cover a wide variety of applications. These compact devices receive their input signal from various sources depending upon the particular speed switch model and application. They are available in single or dual switch point models and the switch point(s) are field adjustable.

Models are available in self-contained enclosures and as PC-board design for inclusion in your control cabinet. All Murphy speed switches are designed to operate in harsh environments and have high electrical noise immunity.

Series Models Available

SS300 Series: Single set point speed switch with SPDT relay dry contact output.

OS77D Series: Single set point speed sensing module, with a transistor output.

HD9063 Series: Dual set point speed switch in a pc board configuration and relay outputs.

Applications

Murphy speed switches applications include operating alarms, equipment shutdown and modulating control devices. They are ideal for disconnecting starter cranking on auto start systems or overspeed switching:

- Generators
- Compressors
- Industrial Engines
- Pumps
- Vehicles
- Farm Equipment

Select a Speed Switch

In selecting the best Speed Switch for your application, the following factors should be considered:

- **Number of Switch Points.**
How many switch points are needed to perform the speed switching function you require?
- **Available Signal Sources.**
The signal source must provide a minimum frequency and a minimum, but less than maximum, voltage as required by the selected speed switch.
- **What Is the Frequency Output of the Signal Source?**
The following signal sources can be used with most Murphy Electronic Speed Switches.

Note: they may additionally provide the signal and/or power source for some Murphy Tachometer/TACHSWICH™ instruments.

Magnetic Sensor: The sensor is usually mounted through the flywheel housing so that the sensor tip is in close proximity to the ring gear teeth. Output voltage is dependent upon the amount of the gap between the sensor tip and the gear tooth.

$$\text{Set Point Frequency in Hz} = \frac{\text{No. Gear Teeth} \times \text{RPM Set Point}}{60}$$

Alternator Output: Most industrial engine alternators have an "auxiliary" or "tachometer" tap. This tap can provide the signal source for speed switches and tachometers.

$$\text{Set Point Frequency in Hz} = \frac{\text{Pulley Ratio} \times \text{No. of Alternator Poles} \times \text{RPM Set Point}}{120}$$

Ignition Output: This battery ignition signal is commonly used on gasoline and natural gas fueled type engines. The tap is usually located either on the distributor or on the ignition coil. The ignition can be breaker point type or all electronic.

For 2-cycle

$$\text{Set Point Frequency in Hz} = \frac{\text{No. of Cylinders} \times \text{RPM Set Point}}{60}$$

For 4-cycle

$$\text{Set Point Frequency in Hz} = \frac{\text{RPM} \times \text{No. of Cylinders}}{\frac{2}{60}}$$

Signal Generators: Add-on signal generators produce a voltage and frequency output. Match this output to the requirements of the speed switch selected.

SS300 Series

The SS300 Series are single set point speed switches with SPDT relay dry contact output. The trip point is set by a potentiometer. An LED indicates when the signal source is present. A second LED turns on when the trip point is reached. See Table 1 for available models and requirements. An optional time delay is on board to delay operation of the relay for 2-6 seconds after the set point has been reached.

The SS300 Series speed switch is intended for installation within a weatherproof enclosure to protect it from rain, dust, etc.

Application

Overspeed shutdown. Shuts down the engine if RPM exceeds the pre-set limit.

Speed sensitive pull-in/drop-out. Engage or disengage PTO's, 4-wheel drives, other switch points, etc. according to speed of engine being monitored.

Engine and transmission alarms/shutdowns. Oil pressure in some engines and transmissions varies widely between running and idle speeds. The SS300 Series can select between two pressure switch set points according to speed of the engine or transmission and thus give maximum protection to the equipment while at operating RPM and eliminate nuisance alarms when at idle.

Adjustable differential model. The ("AD") can be adjusted to change the speed range over which the pull-in and drop-out differential of the relay will operate. A typical application is to insure that engine speed is above a minimum RPM before applying a load but allows a drop in speed of several hundred RPM without disconnecting the load

Table 1: Models Available and Input Signal

Model Number	Distributor Ignition	Magnetic Pickup	Alternator	Voltage	
				12	24
SS300 (std. model)		x		x	x
SS300-LF (low frequency)	x		x	x	x
SS300-AD (adjustable differential)		x		x	x
SS300-AD-LF (low frq. & Adjst. diff.)	x		x	x	x

Specifications

Power Requirements:

- 12 VDC (9-16 VDC).
- 24 VDC (18-30 VDC).

Frequency Signal:

Voltage (all models):

- Minimum Input Voltage Signal: 4.5 Vrms.
- Maximum Input Voltage Signal: 50 Vrms.

Maximum Current	12V	24V
Pull In	46 mA	46 mA
Pickup only	10.5 mA	16 mA

Frequency Range in Hz	Model Number
25-2000	SS300-LF; SS300-AD-LF
625-9000	SS300-AD; SS300

Reset Differential Magnetic Pickup Signal Models:

- "Standard" Models: 2 Hz Differential.
- "AD" Models (Adjustable Differential): 650-8900 Hz Adjustable

Reset Differential Alternator Models:

- "LF" Models (Low Frequency): 2 Hz Differential
- "AD-LF" Models (Adjustable Differential Low Frequency): 50-1900 Hz Adjustable.

Output: Relay contact, SPDT, resistive load, 6 A, 30 VDC.

Time Delay: When terminal 7 is grounded, the relay operation is delayed for 2-6 seconds after rpm set point is reached.

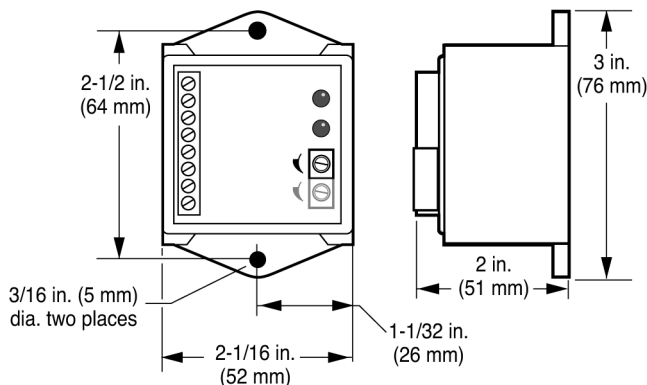
Adjustment: 20—turn potentiometer(s).

Temperature Range: -4° to 185°F (-20° to 85°C).

Relative Humidity: 0 to 95% Non-condensing.

Case: Black, ABS plastic.

Dimensions



How to Order

To order, specify the model number and voltage (see Table 1, above).

Example: SS300-LF-12

Shipping Weight (all models): 0.24 lb. (108 g).

Shipping Dimensions (all models): 8 x 4 x 4-1/2 in. (203 x 102 x 114 mm).

HD9063 Series

The HD9063 Series is a unitized two set point speed switch with SPDT relay outputs. HD9063 is a PC-board configuration with standoffs for mounting in a control panel or cabinet.

The HD9063 provides crank disconnect and overspeed functions. Trip points can be field adjusted on all models. LED's next to the set point potentiometers indicate that the trip point has been reached and the relay(s) have operated. An overspeed test circuit is built-in; it will actuate the output relay at a point 10% below actual overspeed set point.

Application

Crank disconnect/overspeed model is typically used to disconnect the starter on automatic start engine applications and to shutdown the engine if an overspeed situation occurs. Re-engagement of the starter is inhibited until RPM returns virtually to zero. Typical applications include: standby generator sets; pumps and compressors.

Specifications

Power Supply: Voltage: 8-30 VDC.
Maximum Current: 150 mA.

Frequency Signal: (Voltage, Magnetic Pickup Signal Models):

- Minimum: 0.35 Vrms.
- Maximum: 60 Vrms.

Maximum Current, Magnetic Pickup Signal Models: 4.8 μ A.

Adjustment Range, Magnetic Pickup Signal Models:

- HD9063 Model
- Crank Disconnect: 250-6,000 Hz.

- Overspeed: 1,100-10,000 Hz.

Reset Differential, Magnetic Pickup Signal Models

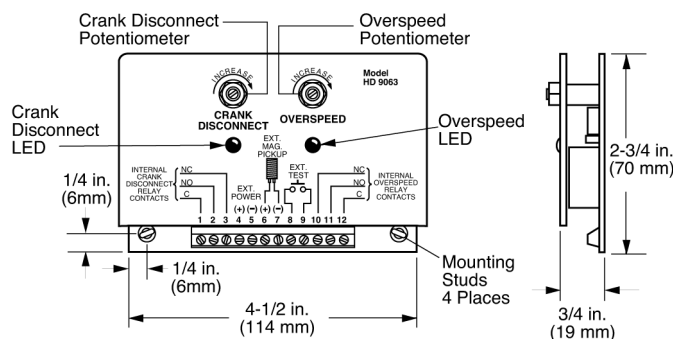
- HD9063 Model
- Crank Disconnect: Dropout 160 Hz \pm 5%.
- Overspeed: 200 Hz Differential.

Output: Relay Contact, SPDT, Resistive Load: (2) 5 A 30 VDC.

Adjustment: (2) 270°-turn potentiometer.

Temperature Range: 14 to 158°F (-10 to 70°C).

Mounting Dimensions/Wiring



How to Order

Specify model numbers below:

HD9063: Two set points; PC board mounting; crank disconnect and overspeed.

Shipping Weight (all models): 2 lbs. (0.90 Kg).

Shipping Dimensions (all models): 10 x 9 x 6 in. (254 x 229 x 152 mm).

OS77D Series

The OS77D Series single set point speed switch is a compact all-electronic speed sensing module. It can be panel mounted via its trip set point potentiometer. It is field adjustable and gives a transistor output when tripped. Relay models available.

Models are available with Normally Open or Normally Closed circuit and with or without re-crank feature which inhibits starter re-engagement until the engine speed is near zero RPM.

Application

Overspeed shutdown. Activates engine shutdown circuit on engine overspeed.

Operate PTO's or drive circuits. Engage or disengage engine PTO, 4-wheel drives, or other control circuits according to RPM monitored.

Disconnect engine cranking when engine starts.



Specifications

Power Supply: Voltage: 7-28 VDC.
Maximum Current: 100 mA.

Frequency Signal:

Voltage, Magnetic Pickup Signal Models

- Minimum: 1.2 Vrms
- Maximum: 30 Vrms

Voltage, Distributor Ignition Models

- Minimum: 6 Vrms
- Maximum: 30 Vrms

Maximum Current, Magnetic Pickup Signal Models: 0.12 mA

Maximum Current, Distributor Ignition Models: 0.12 mA

Adjustment Range, Magnetic Pickup Signal Models: 1000-10,000 Hz

Adjustment Range, Distributor Ignition Models: 40-400 Hz

Reset Differential, Magnetic Pickup Signal Models

- Non-recrank model: 10 Hz Differential
- Recrank model: dropout 54 Hz

Reset Differential, Distributor Ignition Models

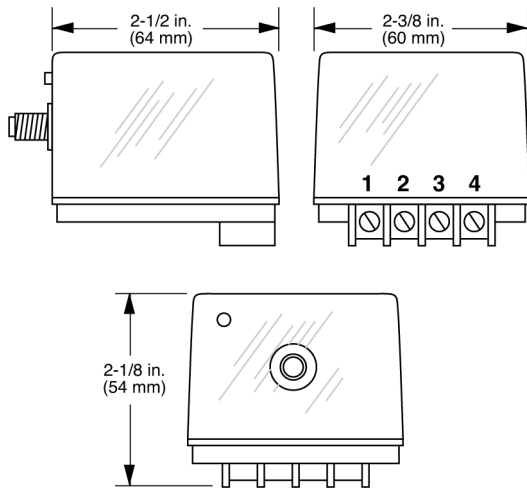
- Non-recrank model: 10 Hz Differential
- Recrank model: Dropout 2.4 Hz

Output: Transistor Sink to Ground Resistive Load: 2 A, 28 VDC

Adjustment: 270°-turn potentiometer

Temperature Range: -13° to 185°F (-25° to 85°C)

Dimensions



How to Order

Specify model numbers below:

OS77D-900NTO: Normally Open; 1000—10,000 Hz, magnetic sensor input.

OS77I-040NTO: Normally Open; 40—400 Hz, distributor ignition input.

OS77D-900NTC: Normally Closed; 1000—10,000 Hz, magnetic sensor input.

OS77D-900RTC: Normally Closed; 1000—10,000 Hz, max. with recrank feature.

■ NOTE: See "Specifications" for individual model specifications.

Shipping Weight (all models): 1 lb. (0.45 Kg)

Shipping Dimensions (all models): 8 x 4 x 4-1/2 in. (203 x 102 x 114 mm)

Hourmeters – TM Series



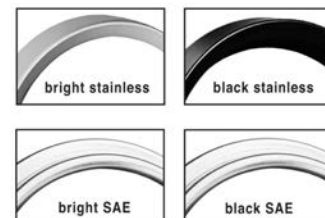
Features

- 2 in. (51 mm) Diameter Dial
- Tamperproof and Environmentally Sealed
- Mechanical Counter—No Battery Needed to Maintain Elapsed Time
- Reversed Polarity Protected
- Quartz-Crystal Time Base for Accurate Long-Term Timekeeping
- Powered by 12 to 24 VDC

* Products covered by this bulletin conform with comply with European Council electromagnetic compatibility directive 89/336/EEC, except as noted. The CE mark does not apply to the TM612 and TM624 models.

The TM Series hourmeters record the operating time of vehicles or powered equipment. They are electromechanical and have a quartz base time counter that insures accuracy (better than $\pm 0.02\%$ over the entire range). They can record up to 99,999.9 hours (9,999.9 for TM612/624) and include an automatic recycle to zero hours feature. The TM Series models have a shock-proof and tamperproof, totally sealed case made of an engineered plastic. These small, light weight time meters are rugged and durable. They are the answer to applications requiring a low DC power, reliable hourmeter.

The TM612/624 model includes a 3-hole mounting shock ring for extreme-shock protection.



Basic Models

6-Digits Hourmeters

Model	Bezel Type
TM4592	Bright Stainless Steel Bezel
TM4593	Black Stainless Steel Bezel

TM4594	SAE Bright Stainless Steel Bezel
TM4595	SAE Stainless Steel Black Bezel
5-Digits Hourmeter with Shock Ring Mounting	
TM612/624	3-Hole Mount, Black Bezel

Applications

These hourmeters can be used on any engine where operating time needs to be recorded. All it requires is a DC power source (refer to Specifications, below).

Outstanding Features

- Solid-State Electronic Drive Circuit
- Quartz-Crystal for Accurate Timing
- Quiet Operation—Permanently Lubricated
- High-Impact, Tamperproof Plastic Case
- Sealed Against Moisture and Dirt
- Indicates Operating Time in Hours and Tenths
- No Battery Back Up Required
- Made in the U.S.A.

Specifications

Power Input: 12 to 24 VDC

Power Consumption: Less than 0.03 W @ 12 VDC; 0.4 W @ 24 VDC.

Accuracy: $\pm 0.02\%$ over entire range.

Temperature Range: -40°F to 185°F (-40°C to +85°C).

Dial (Face Plate): White numerals (over black background).

Time Scale:

TM4592-95 models: 6-digits 99,999.9 hours;

TM612/624 models: 5-digits 9,999.9 hours.

Automatic recycle to zero.

Vibration Resistance: Withstands 10 to 75 Hz @ 1 to 8 G's.

Case Material: Plastic.

Bezel: Stainless Steel.

Terminations: 1/4 in. (6 mm) male blade terminals.

TM4592/4595 Shipping Weight: 5 ozs. (140 g).

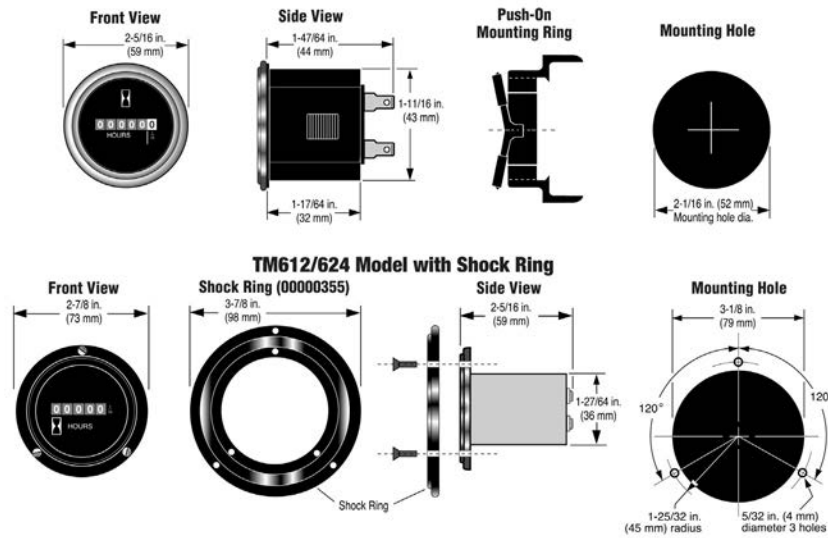
Shipping Dimensions: 3-1/8 x 3 x 3 in. (79 x 76 x 76 mm) approximately.

TM612/624 Shipping Weight: 8 ozs. (230 g).

TM612/624 Shipping Dimensions: 5 x 5 x 3-1/4 in. (127 x 127 x 83 mm) approximately.

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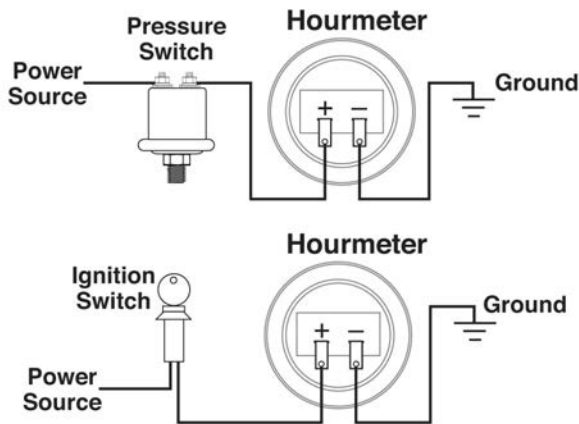
Dimensions



Typical Wiring Diagrams



WARNING: Turn the power source OFF before wiring.



How to Order

Example: **TM4592**

Model Designation

Model	Description
TM4592	6-digits w/Bright Stainless Steel Bezel
TM4593	6-digits w/Black Stainless Steel Bezel
TM4594	6-digits w/SAE Bright Stainless Steel Bezel
TM4595	6-digits w/SAE Stainless Steel Black Bezel
TM612/624	5-digits w/Shock Ring Mount Black Bezel
00000355	Shock Ring only for TM612/624

Time Switches

Models 5T, 15T, 12T and 24T 12 or 24 Hour and 5 or 15 Minute



Features

- Two Versions Available:
 1. Hour Switch for Setting Run Time and Shutdown of Equipment
 2. Minute Switch for a Short Interruption of SWITCHGAGE® Circuits on Test or Start-up
- Spring Wound, No Electric Power Required
- Precision Movement Can Be Set to Zero at Any Time
- Built-in Stop Prevents Overwinding

Murphy Time Switches can automatically start or stop engines or electrical motors after a predetermined time. These time switches can be wired for a open or closed circuit when time expires. They require no electrical current to operate and have an SPDT contact arrangement. These switches feature a precision movement that gives years of reliable service. A built-in stop prevents overwinding.

The **12T** (12 hour) and **24T** (24 hour) time switches are enclosed in a NEMA 4 weatherproof enclosure. A hinged, gasketed cover and 1/2 NPT conduit connection allow for a dust tight installation. The enclosure includes a clasp and eye for padlock to prevent unauthorized operation. Instructions for popular engine applications are secured inside of the lid.

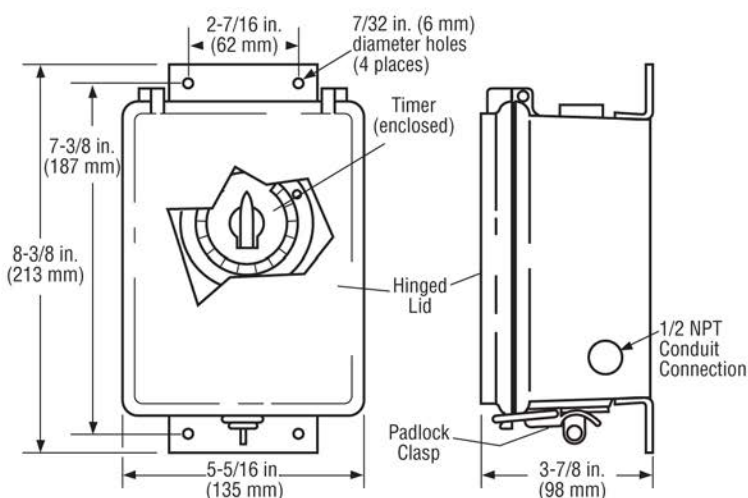
The **5T** (5 minute) and **15T** (15 minute) timers mount directly in control panels for short range timing with manual reset. These switches are perfect for disconnecting shutdown circuits while equipment is being started.

Applications

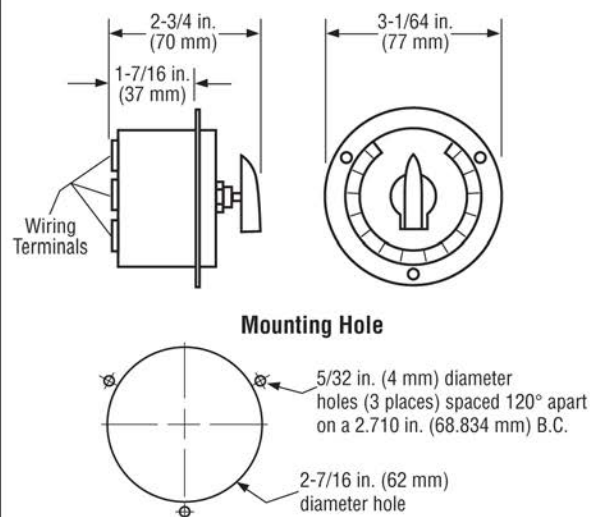
Murphy Time Switches are designed for use in the oil field, irrigation systems or anywhere equipment must operate or be controlled for a predetermined time. Mounted on a post or in a panel away from vibration and shock, these time switches give accurate, long term service.

Dimensions

12T and 24T 5TWP and 15TWP



5T and 15T



Typical Wiring Diagrams

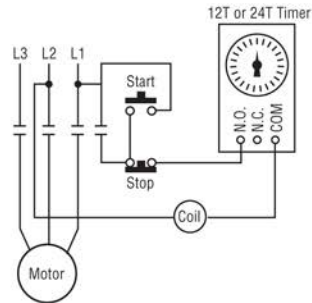


WARNING

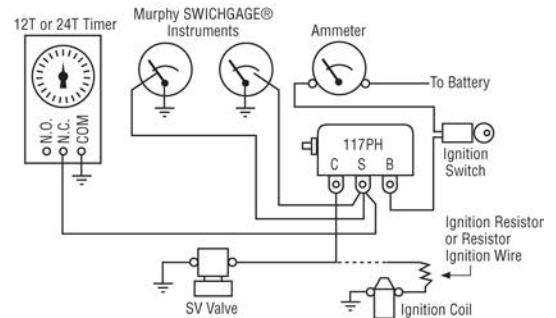
Before beginning installation of this Murphy product:

- ✓ 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.

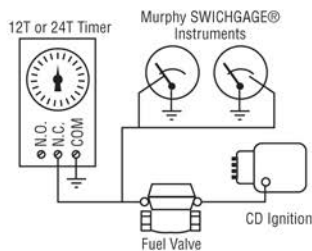
Electric Motor



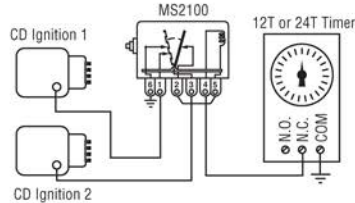
Diesel Engine



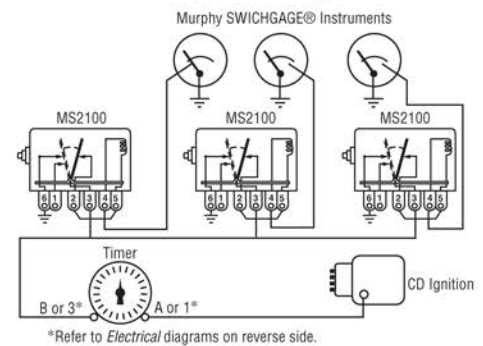
Fuel Valve and CD Ignition



Dual CD Ignition



SWICHGAGE® Circuit Disconnect (5T and 15T)



Specifications

Range:

- 12T: 0-12 hours in 15 minute intervals.
- 24T: 0-24 hours in 30 minute intervals.
- 5T: 0-5 minutes.
- 15T: 0-15 minutes.

Operating Temperature Range: 0°C to 85°C (32°F to 185°F).

Contact (all models): SPDT, rated 5 A @ 480 VAC; 10 A @ 250 VAC; 15 A @ 48 VDC.

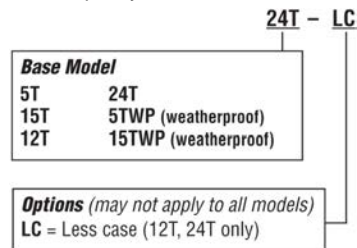
Shipping Weight: 12T, 24T: 4 lbs. 12 oz. (2.15 kg). 5T and 15T: 6 oz. (11.66 g).

Shipping Dimensions: 12T, 24T: 9-1/4 x 8-1/4 x 5-1/2 in. (235 x 210 x 140 mm).

5T and 15T: 3 x 2-3/4 x 2-3/4 in. (76 x 70 x 70 mm).

How to Order

To order time switches, specify as follows:



Electronic Vibration Switch (EVS-2)



Features

- Vibration (0 to 3.0 ips peak)
- Suitable for Universal use - with mounting at any angle
- Aluminum Housing
- 4 to 20 mA Analog Vibration Signal
- RAW Signal 100 mV/g
- Two Relays
- Rugged Design

1 Products covered by this bulletin comply with 2004/108/EC (European electromagnetic compatibility) except as noted.

The **Electronic Vibration Switch (EVS-2)** protects against equipment failure by monitoring velocity-based vibration levels and providing an early warning or shutdown when abnormal vibration is detected.

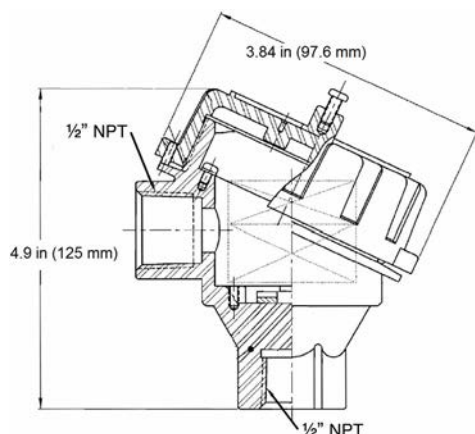
The EVS-2 can be connected to Murphy's TTD™ Annunciator, Centurion™ or Centurion *PLUS*™ controllers for increased functionality. It complements Murphy's VS2™ shock and excessive vibration/pulsation switch designed to detect abnormal shock or pulsation due to equipment failure and to shutdown other equipment in a system to prevent further damage.

The EVS-2 offers two adjustable level detectors with definable response delay for either Warning or Shutdown alarms. Measuring ranges and response times of the level detectors are set by DIP switch. The assigned relay powers a warning or shutdown alarm.

The EVS-2 can be used on any equipment where abnormal vibration could lead to equipment damage, including:

- Cooling Fans
- Engines
- Pumps
- Compressors
- Gear Boxes
- Motors
- Generator Sets
- Imbalance and misalignments
- Defective sleeve bearings
- Broken tie-down bolts
- Defective ball or roller bearings
- Gear mesh
- Blade-pass frequencies
- Detonation or broken parts

The EVS-2 can monitor and alert the operator of abnormal vibration caused by a variety of factors, including:



Terminal Connections

1	+24 V DC
2	0 V DC
3	Relay K1 NC
4	Relay K1 COM
5	Relay K1 NO
6	Relay K2 NC
7	Relay K2 COM
8	Relay K2 NO
9	Analog Output 4 – 20 mA
10	RAW-Signal – 100 mV/g

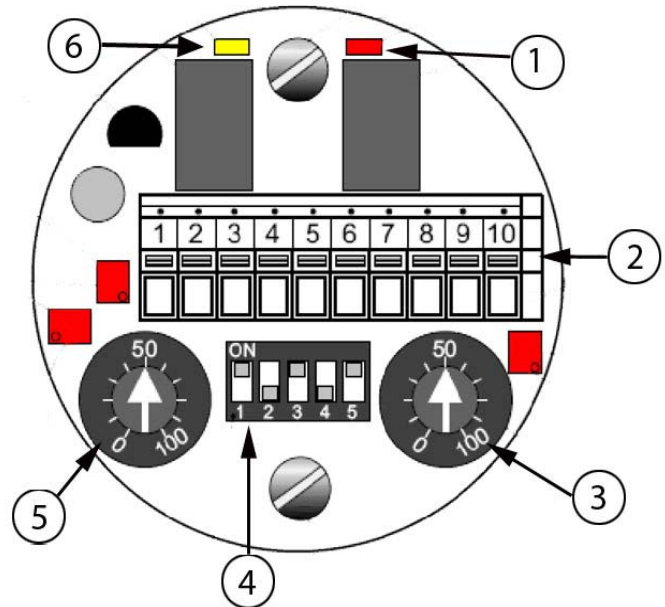
Specifications

PERFORMANCE	
Vibration Range (Adjust jumper S1)	0.75, 1.5 or 3.0 IPS Peak
Frequency Range	5 to 1000 Hz
Analog Output (R _{load})	4-20 mA ≤ 500Ω
RAW Signal (R _{load})	100 mV/g (offset +5VDC) ≤ 20 kΩ
ENVIRONMENT	
Operating Temperature	-22°F to + 185°F (-30°C to + 85°C)
Storage Temperature	-40°F to + 185°F (-40°C to + 85°C)
Enclosure Classification	IP68
Cable Connection	½ NPT, IP66, IRA 06 ATEX 1188 X SIRA 07 ATEX 4327 X
ELECTRICAL	
Sensor Type	Accelerometer
Power Required	20 to 30 VDC
Current Draw	< 40mA
Electrical Connectors	Spring Terminals
APPROVALS	
CSA (c/us)	Class I, Div. 1, Grp A, B, C, D (T5) Class II, Div. 1, Grp E, F, G (T5) Class III, (T5)
ATEX	Ex d IIC T6 IP68, Ex tD A21 T100°C IP68

RELAY	
Switch Contact Capacity	30 VDC/1A, 150 VAC/0.46 A
Relay Function	Non-latching
Threshold Set Point	10 to 100% of Alarm Set Point
Normally Energized (NE)	Fail Safe
Time Delay (Adjust DIP switch S1 and S5)	1 or 5 seconds
PHYSICAL	
Housing Material	Aluminum / Epoxy Paint (Red)
Weight	1.5 Lbs (0.7 Kg)
Size (H x W)	4.9 in. x 3.9 in. (125 x 100 mm)
Mounting Threads	½" NPT Female, ½" NPT Male/Male SS
INDICATORS	
Alarm (LED)	Yellow
Shutdown (LED)	Red

Mechanical Diagram

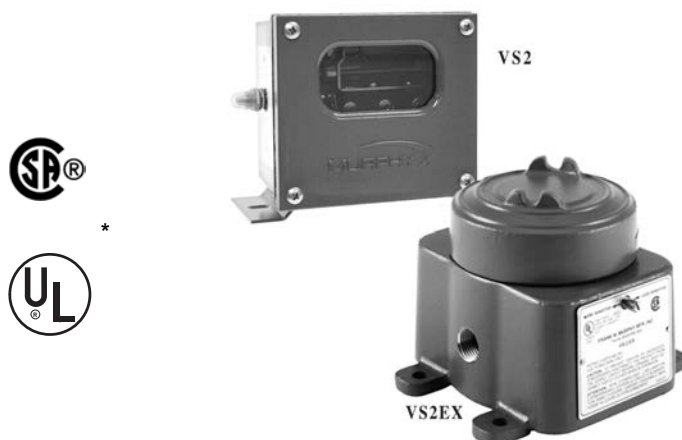
1	Red Channel 2 LED (K2)
2	Spring Terminal 16-24 AWG.
3	Channel 2 (K2) Vibration Set Point Potentiometer (Pot)
4	DIP switches for vibration ranges and time delays
5	Channel 1 (K) Vibration Set point Potentiometer (Pot)
6	Yellow Channel 1 (K1) LED



How to Order

A single model provides all the features and benefits described in the bulletin. Order EVS-2 (PN: 20-70-0242).

Shock and Vibration Switch – VS2 Series



Features

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

* Selected Configurations are Third Party Listed

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

Applications

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

Specifications

VS2 and VS2C

Case: Environmental Protection: Ingress protected to IP54 (when mounted on a horizontal surface with drain holes down). Suitable for non-hazardous areas.

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

Contacts: SPDT-double make leaf contacts, 3A @ 240 VAC; 10A @ 120 VAC; 10A @ 32 VDC

Shipping Weight:

VS2: 2 lb 8 oz. (1.1 kg)

VS2C: 7 lb (3.2 kg)

Shipping Dimensions:

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

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

VS2EX

Case: Base mount, explosion-proof aluminum alloy housing; meets IP54 specifications; Class I, Division 1, Groups C & D; UL and CSA listed

Certification: CSA, UL

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

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

Basic Operation

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

Remote Reset Option (VS2EXR and VS2EXRB)

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

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

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

VS2EXR

Case: Same as VS2EX

Certification: CSA, UL

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

Remote Reset: 115 VAC or 24 VDC (specify)

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

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

VS2EXRB

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

Certification: No third party certification

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

Remote Reset: 115 VAC or 24 VDC (specify)

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

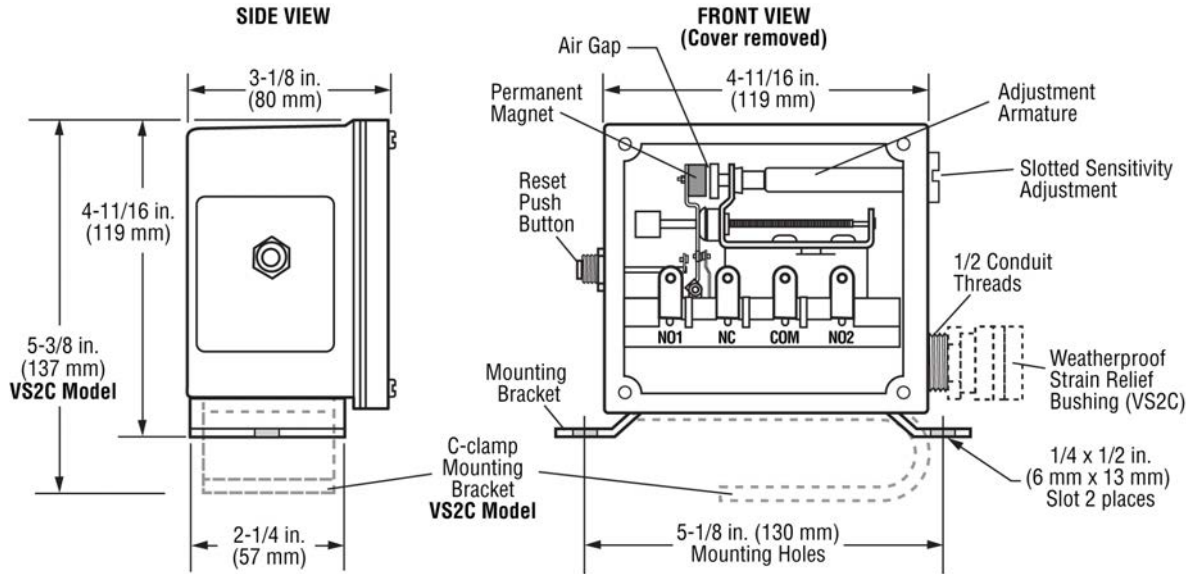
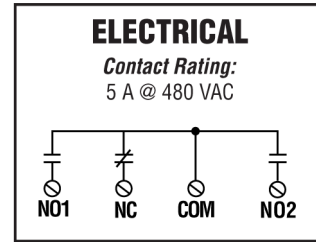
Shipping Dimensions: 12 x 12 x 10 in. (305 x 305 x 254 mm)

Dimensions

Environmental Protection: Ingress protected to IP54 (when mounted on a horizontal surface with drain holes down).

VS2 and VS2C

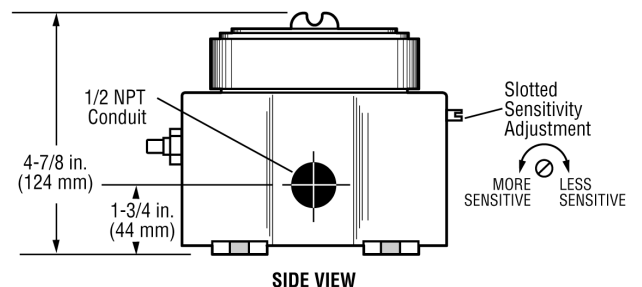
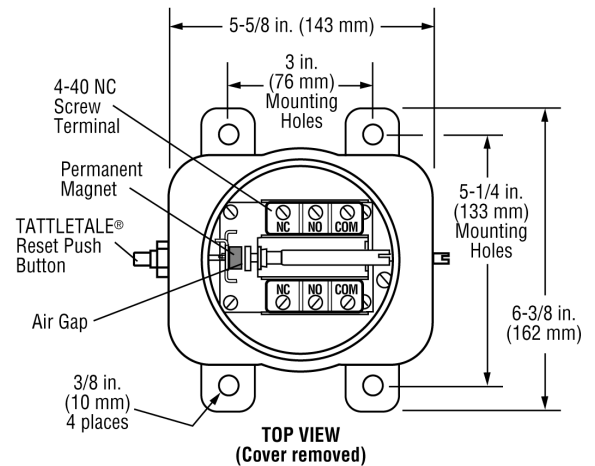
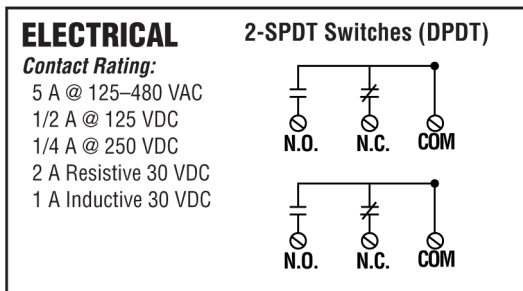
The VS2 and VS2C are designed for use in non-hazardous locations. They have leaf type SPDT, double make contacts that can be used for shutdown and/or alarm. They have a slotted sensitivity adjustment located on the side of the case (see drawing below).



VS2EX

- IP54 Specifications
- Snap-switch Contacts
- TATTLETALE® Reset Button

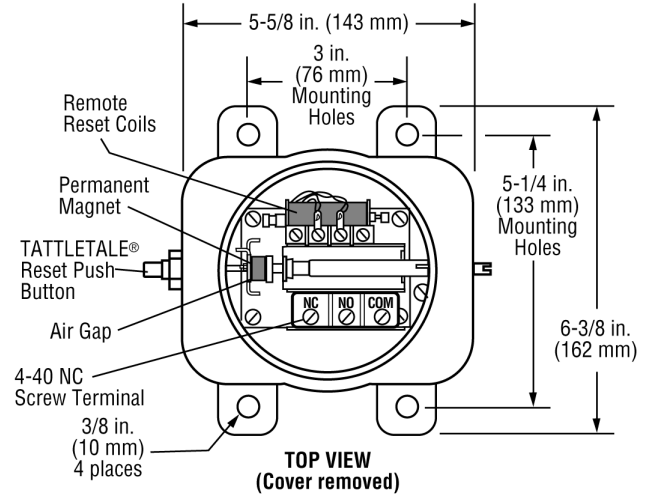
Model VS2EX is housed in an explosion-proof enclosure with threaded cover. This enclosure is CSA and UL listed for Class I, Division 1, Groups C & D hazardous locations. In place of the leaf type contacts, 2-SPDT snap-switches are used in this model. Sensitivity is externally adjustable and, when tripped, the VS2EX gives a TATTLETALE® indication on the reset button. It is constructed to meet IP54 specifications.



VS2EXR

- Remote Reset Feature
- IP54 Specifications
- Snap-switch Contacts
- TATTLETALE® Reset Button

Model VS2EXR features an electric remote reset feature in addition to the TATTLETALE® reset button. The VS2EXR uses only one SPDT snap-switch and is CSA and UL listed for Class I, Division 1, Groups C & D hazardous locations. It is constructed to meet IP54 specifications.



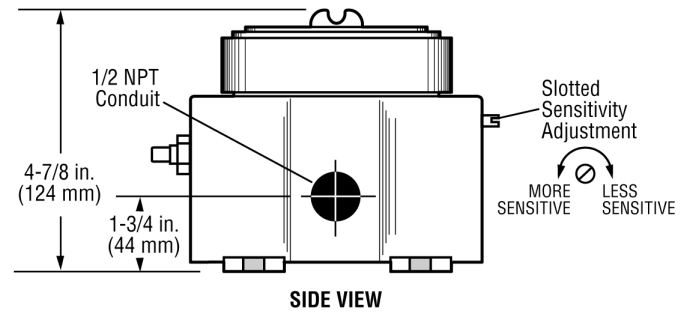
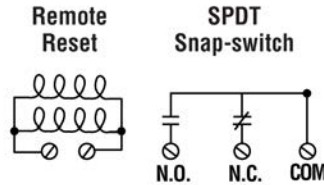
ELECTRICAL

Contact Rating:

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

Remote Reset Rating:

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



VS2EXRB

- For Group B Locations
- Snap-switch Contacts
- DPDT Feature Optional

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

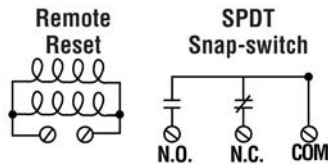
ELECTRICAL

Contact Rating:

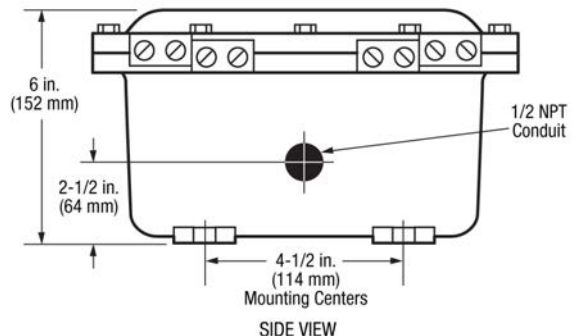
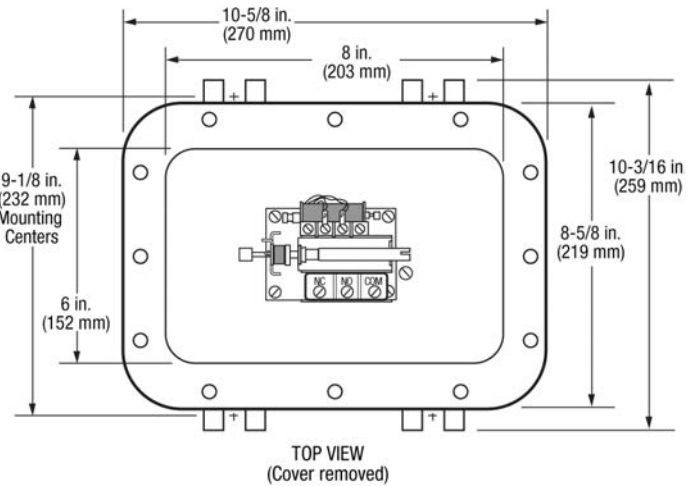
5 A @ 125-480 VAC
1/2 A @ 125 VDC
1/4 A @ 250 VDC
2 A Resistive 30 VDC
1 A Inductive 30 VDC

Remote Reset Rating:

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



Option SPDT
Snap-switch (DPDT)



Service Parts

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

PART NO. DESCRIPTION

VS2 and VS2C

20-00-0030 Movement assembly
20-00-0031 Glass and gasket assembly
20-00-0032 Reset push button assembly
20-05-0021 Mounting clamp (VS2C)
20-00-0261 Cable clamp assembly (1 each) (VS2C)
20-05-0465 2-Conductor electrical cable, 45 feet (13.7 meters) (VS2C)
20-00-0137 5 clamps and 45 feet (13.7 meters) of cable (VS2C)

VS2EX

20-01-0091 Movement assembly
20-05-0087 Cover
00-00-0309 Cover gasket
20-01-0090 Snap-switch and insulator kit (1 switch per kit)

prior to September 1, 1995.*

20-00-0288 Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.*

20-00-0289 C-clamp conversion mounting kit

VS2EXR

20-00-0262 Movement assembly
20-05-0087 Cover
00-00-0309 Cover gasket
20-01-0090 Snap-switch and insulator kit (1 switch per kit)

prior to September 1, 1995.*

20-00-0288 Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.*

20-00-0049 Reset solenoid assembly (115 VAC)
20-00-0234 Reset solenoid assembly (24 VDC)
20-00-0289 C-clamp conversion mounting kit

VS2EXRB

20-01-0090 Snap-switch and insulator kit (1 switch per kit)

prior to September 1, 1995.*

20-00-0288 Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.*

20-00-0057 Inside snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D

prior to September 1, 1995.*

20-00-0058 Outside snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D

prior to September 1, 1995.*

20-00-0287 Inside snap-switch and insulator kit (1 switch per kit) for model

VS2EXRB-D manufactured on September 1, 1995 or later.*

20-00-0290 Outside snap-switch and insulator kit (1 switch per kit) for model

VS2EXRB-D manufactured on September 1, 1995 or later.*

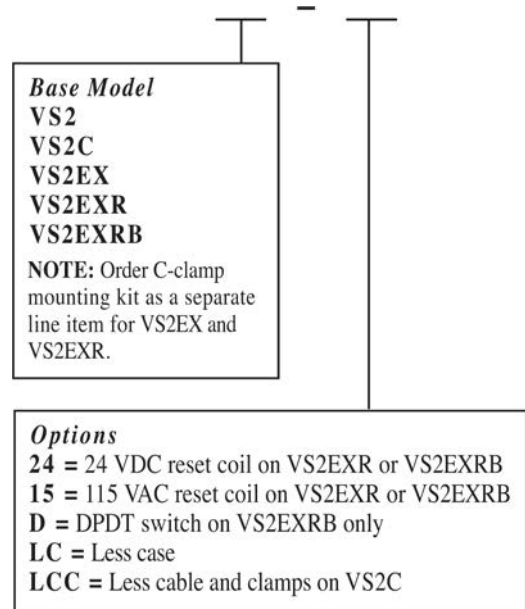
20-05-0077 Adjustment shaft
20-00-0262 Movement assembly
20-00-0049 Reset solenoid assembly (115 VAC)
20-00-0234 Reset solenoid assembly (24 VDC)

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

How to Order

To order your VS2 Series model use the diagram below.

Part number example: **VS2EXR-24**



Shock and Vibration Control Switch – VS94 Model



Features

- NEMA 4X/IP66 Enclosure (CSA Types 4 & 12)
- Protects Your Equipment from Excessive Shock or Vibration
- Fine Adjustment to Precisely Select the Degree of Sensitivity
- Reset from a Remote Location (Optional)
- Time Delay to Override Trip Operation at Start-up (Optional)
- Space Heater to Prevent Moisture Condensation Inside the Unit (Optional)

VS94 Series is an electro-mechanical device designed to protect equipment from damaging shock or vibration. This sensitive mechanism can detect excessive shock or vibration and shutdown the equipment before further damage occurs. A set of contacts is held in a latched position through a magnetic latch mechanism. As the level of shock or vibration increases an inertia mass exerts force against the latch arm and forces it away from the magnetic latch causing the latch arm to separate and to operate the contacts. Sensitivity is obtained by adjusting the amount of air gap between the magnet and latch arm plate.

The VS94 Series is housed in a NEMA 4/4X glass filled polyester enclosure and has a base mount. It is for applications in non-hazardous locations. VS94 models are rated up to 480 VAC. (See the How to Order section on back page for models and options available.)

Applications

Applications for the VS94 include all stationary types of machinery or equipment where excessive shock/vibration can be damaging or poses a threat to normal operations such as in:

- Cooling fans
- Engines
- Pump jacks
- Compressors
- Pumps
- Rotating and Reciprocating Machinery

Features

- Electromechanical Design
- Detects Shock or Vibration in Three Planes of Motion
- NEMA 4/4X (CSA types 4 and 12) Weather-proof Enclosure
- Reliable Magnetic Latch Feature
- Micro Fine, Easy-to-Adjust Sensitivity Adjustment
- Manual Reset (Standard)
- Remote Reset (Optional)
- Adjustable Start-up Time Delay (Optional)
- Space Heater Circuit to Prevent Housing Moisture Condensation (Optional)
- Two (2) versatile SPDT snap-switches rated up to 480 VAC.

Options

Remote Reset

This option of the VS94 includes a built-in electric solenoid which allows reset of tripped unit from a remote location. Available for 115 VAC or 24 VDC.

Time Delay

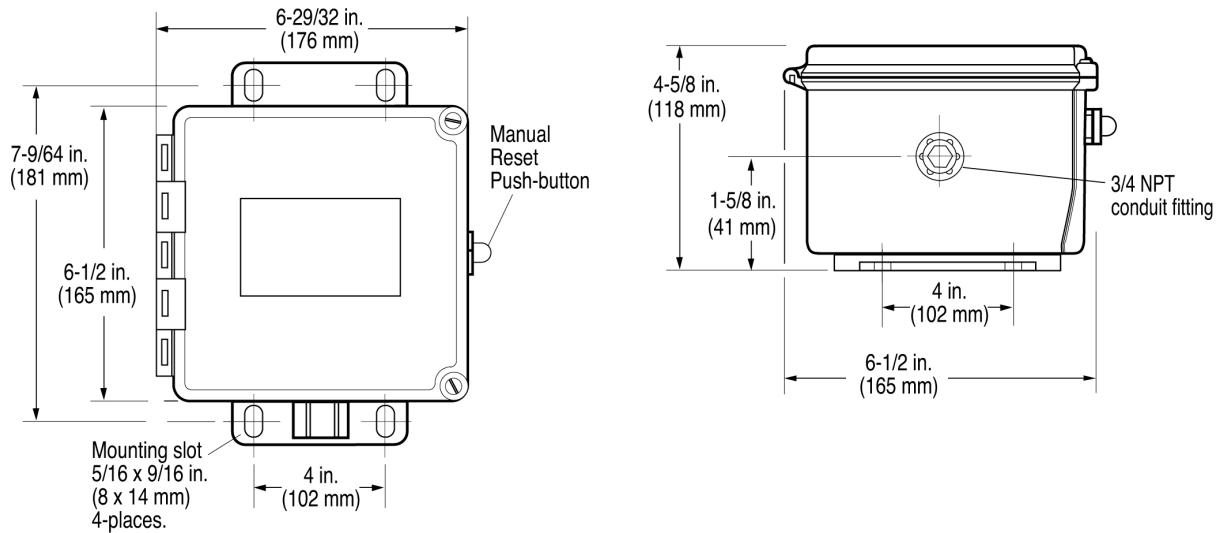
Overrides trip operation on start-up. The time delay option is field-adjustable from 5 seconds up to 6-1/2 minutes with an easy-to-adjust 20-turn potentiometer. Available for 115 VAC or 24 VDC.

Space Heater

This optional circuit prevents moisture condensation inside the VS94 housing.

Dimensions

VS94 Series Models



Specifications

Case: Polyester fiberglass reinforced; NEMA type 4X; IP66; CSA types 4 and 12.

Conduit Fitting: 3/4 NPT conduit fitting connection.

Normal Operating Ambient Temperature: 0 to 140°F (-18 to 60°C).

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

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

Space Heater (optional):

Option	Operating Current
H15	.023 A @ 115 VAC
H24	.12 A @ 24 VDC

Remote Reset (optional):

Option	Operating Current
R15	.17 A @ 115 VAC
R24	.36 A @ 24 VDC

Time Delay (optional):

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

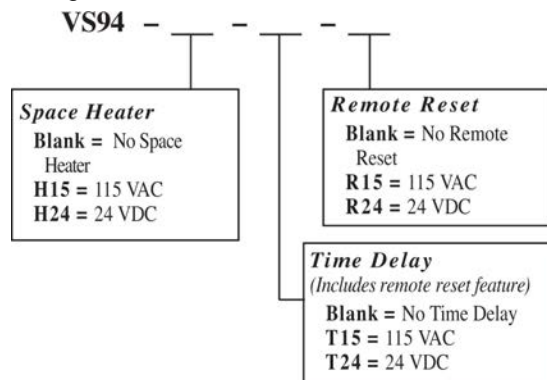
Time Delay/Remote Reset: Adjustable 20-turn potentiometer from 5 seconds to 6-1/2 minutes (15 seconds per turn approximately).

Shipping Weight: 4.35 lb. (2 kg.)

Shipping Dimensions: 9 x 8 x 4-11/16 in. (229 x 203 x 119 mm)

How to Order

To order your VS94 model use the diagram below.



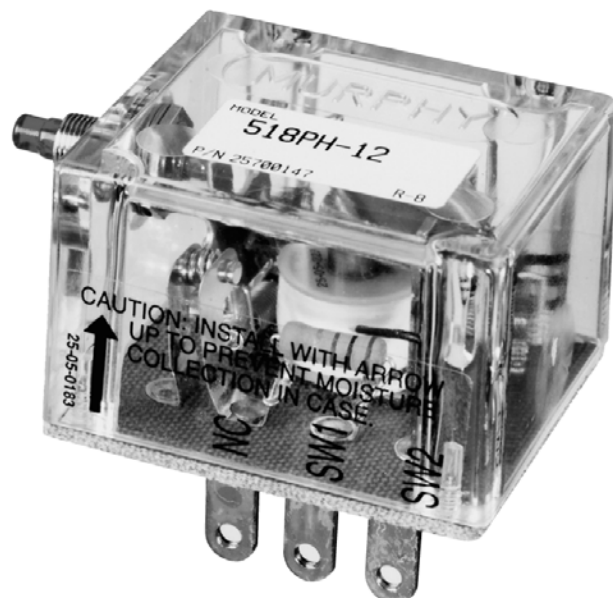
SECTION 25 MAGNETIC SWITCHES AND ANNUNCIATORS

Remote Alarm/Annunciators

95046 SELECTRONIC® TATTLETALE® Remote Alarm Annunciators ST Series 125

Magnetic Switches

78793 TATTLETALE® Annunciators and Magnetic Switches 131



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SELECTRONIC® TATTLETALE® Remote Alarm Annunciators ST Series



Features

- Provide Audible and Visual Alarm
- Simple and Inexpensive
- Wide Range of Applications
- Gen-Set Models Meet NFPA-99 and NFPA-110 Requirements

The ST Series SELECTRONIC® TATTLETALE® annunciators are a simple and inexpensive answer to your remote alarm annunciator needs. Basic models **ST5AS** and **ST10AS** are general purpose alarms suitable for a variety of applications. Model **ST8** gives first out annunciation of fault. Model **STA16** is designed for generator set applications and can be configured to meet NFPA requirements for standby generators.

These compact TATTLETALE® annunciators tell you by a flashing LED which variable malfunctioned. Many feature a pulsating MINI-SIREN® to audibly alert you to the malfunction. The audible alarm is silenced by depressing the Alarm Silence push button, but the visual signal remains in operation until the fault is corrected and the contacts are cleared.

A test push button allows you to test all alarm LEDs. Because LEDs are solid state, cold light, electronic devices, they don't burn out as incandescent light bulbs do.

Basic models accept 8-32 VAC or 8-40 VDC input voltage. Others are available for either 12 VDC or 24 VDC input.

Preprinted peel and stick nameplates for common faults are supplied with each unit. Most of the SELECTRONIC® TATTLETALE® annunciators accept either normally open (N.O.) or normally closed (N.C.) contacts. You can mix N.O. and N.C. contacts on the same unit.

Two mounting styles are offered; a recessed panel mounting flange and a freestanding gimbal mounting. (Model STA16 is available only in flange mount).

All models except STA16 have a time delay available to lockout the audible alarm on startup. These unique alarm panels have wide ranging applications and can be grouped in many configurations. Ask any Murphy sales/engineer for assistance.

Basic Operation

When an alarm sensor trips, the LED flashes and, if equipped, the MINI-SIREN® sounds. At the same time an output circuit is activated which allows you to connect an external relay to operate a general alarm, operate a shutdown device, etc.

Applications

- Marine
- Agriculture
- Generator Sets
- Construction
- Oil Field

BASIC: ST5AS, ST10AS and ST5DAS Series

Murphy Basic ST-SERIES SELECTRONIC® TATTLETALE® annunciators are used wherever a remote alarm and annunciation is required. Typical applications are in marine pilot houses to alert the crew of problems developing in engine, gear, bilge, auxiliary power plants, etc. Repeater panels can be added for additional locations such as flybridge, on deck, galley or engineer's quarters. Each repeater panel can be acknowledged individually or alternate wiring allows for one master control to silence all repeater panels.

Other applications include power plant control rooms or building maintenance, for remote drilling rigs, construction sites, agricultural and construction equipment.

When a fault occurs, the contact operation causes the appropriate LED to flash and the audible MINI-SIREN® to pulse. At the same time an output signal is generated which allows an external relay to be wired to operate a general alarm such as a bell or horn. Depressing the Alarm Silent button silences the local audible alarm and disconnects the output for the remote alarm. The flashing LED remains in operation until the fault is corrected and the contacts reset. Alarm Silence/Test button allows you to test all LEDs.

Preprinted peel and stick nameplates for common faults are supplied with each unit.

5-Points

- **ST5ASF** (flange mount) and **ST5ASG** (gimbal mount)
- Provides 5 alarm points and output for remote alarm relay.
- Accepts N.O. and/or N.C. contacts.
- Use individually or gang for multiple applications.
- Input voltage 8-32 VAC or 8-40 VDC.



10-Points

- **ST10ASF** (flange mount) and **ST10ASG** (gimbal mount)
- Provides 10 alarm points and output for remote alarm relay.
- Accepts N.O. and/or N.C. contacts.
- Use individually or gang for multiple applications.
- Input voltage 8-32 VAC or 8-40 VDC.



Dual 5-Points

ST5DASF (flange mount) and **ST5DASG** (gimbal mount)

- Provides two separate sets of 5 alarm points in one package. Each set of 5 points is powered separately from the other, but they share the same negative of the power source.
- Primary application is on twin engine boats. Since each set of alarm points is powered separately, if only one engine is running there is no alarm on the engine not running.
- Accepts N.O. and/or N.C. contacts.
- Input voltage 8-32 VAC or 8-40 VDC.



FIRST OUT FAULTS: ST8 Series

First out fault TATTLETALE[®] tells you which monitored variable malfunctioned first. The fault is annunciated and locked in until reset by the operator. Applications include process monitoring such as compressors, pumps, generators, etc. Preprinted peel and stick nameplates for common faults are supplied with each unit.

8 First Out

- **ST8F** (flange mount) and **ST8G** (gimbal mount)
- Provides 8-point first out cause of shutdown TATTLETALE[®]. A flashing LED indicates the cause of shutdown identified by the nameplate.
- Accepts N.O. and/or N.C. contacts.
- Includes SPDT dry contact output rated 2 A @ 28 VDC.
- Selectable sensor lockout for delay on startup.
- Input voltage 8-32 VAC or 8-40 VDC.



GENERATORS: STA16 Series

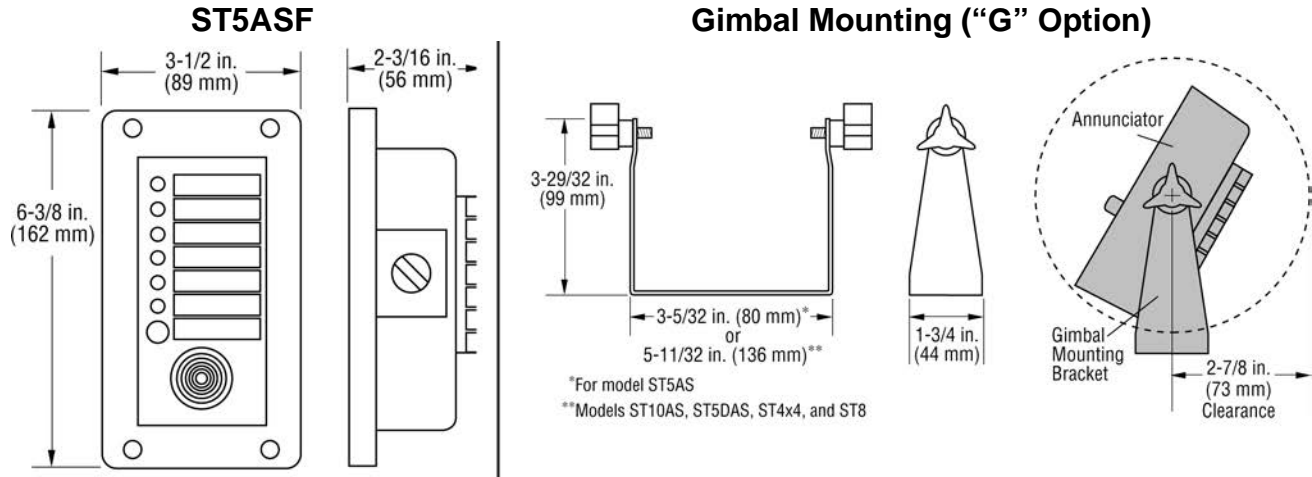
The STA16 is a multi-functional visual and audible 16-point alarm typically applied as a remote alarm. Its picture frame bezel allows for flush mounting into a control panel or customer supplied wall mounted pull box. Preprinted peel and stick nameplates for all common engine and generator functions allow for generic applications or for NFPA-110 REQUIREMENTS.

16-Points

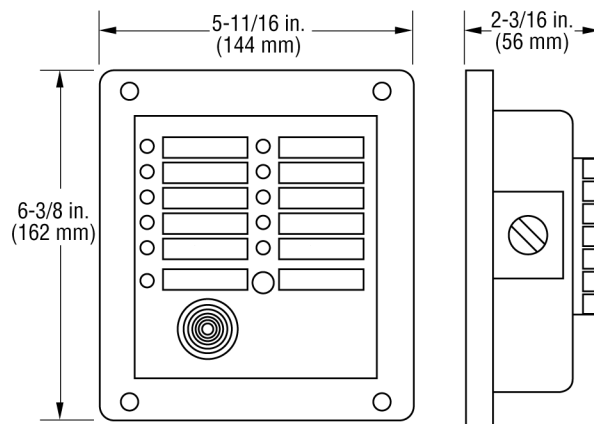
- **STA16** is a 16-point annunciator for generator sets.
- Provides 16 points of visual and audible alarms including built-in sensing for low battery voltage and battery charger malfunction.
- Accepts N.O. switch inputs
- Negative switch input.



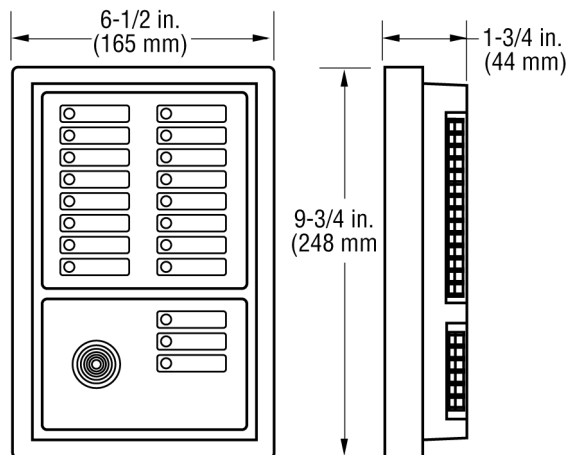
DIMENSIONS



ST8F and ST10ASF



STA16



SPECIFICATIONS

Specifications	Models				
	ST5AS	ST10AS	ST5DAS	ST8	STA16
Number of Alarm Points					
• 5 Visual	•				
• 10 Visual		•	•		
• 8 First Out Visual				•	
• 16 Visual					•
Audible Alarm					
• 1 local; common to all inputs	•	•	•		•
• 1 local; common to all inputs except battery charger malfunction and generator operating	•	•	•		•
Alarm Silence: Silences audible only	•	•	•		•
Test Push Button: Tests all LED's	•	•	•		•
Alarm Output: Customer supplied relay same voltage as input; coil not to exceed 500 mA.	•	•	•		•
Input Voltage					
• 8-32 VAC / 8-40VDC	•	•	•	•	
• 12 or 24 VDC (specify)					•
Startup Time Delay: Customer selectable: 25-35 seconds	•	•	•	•	
Sensor Input					
• Accepts N.O. positive or negative					•
• Accepts N.O. and/or N.C.	•	•	•	•	
Mounting Options					
• Less Mounting kit	•	•	•	•	
• Flange Mounting kit	•	•	•	•	
• Gimbal Mounting kit	•	•	•	•	
First Out Shutdown: Amber-No; Red-Yes				•	
Shutdown Relay Output: SPDT dry contacts; 2 A @ 28 VDC				•	
Alarm Reset: Repair fault; contacts open					
Shutdown Reset: Repair fault; contacts open; push reset button; remove power				•	
Battery Charger Malfunction: Built-in sensing; visual alarm only					•
Shipping Weights					
• 1.25 lbs (567 g)	•				
• 1.50 lbs (680 g)		•	•	•	
• 2 lbs (907 g)					•
Shipping Dimensions					
• 6-1/4 x 6-1/4 x 6-1/4 in. (159 x 159 x 159 mm)	•	•	•	•	
• 12 x 7-1/2 x 5-1/2 in. (305 x 191 x 140 mm)					•

ACCESSORIES and OPTIONS

TDST3-5 and TDST8-10

TDST3-5 and TD8-10 single point time delays inhibit sensor input to ST Series annunciators for 3-5 or 8-10 seconds. Compensates for momentary contact operation due to vessel movement, etc.

GIMBAL and FLANGE Mounting Kits

These kits are available for change-over mounting and as service parts. They fit all "LM" (less mounting) configurations.

25700007 Gimbal mount kit fits ST5ASLM. **25020138**

25700008 Flange mount kit fits ST5ASLM. **25020139**

25700034 Gimbal mount kit fits ST10ASLM, ST5DASLM and ST8LM. **25020141**

25700371 Flange mount fits ST10ASLM, ST5DASLM and ST8LM. **25020142**

FLANGE Mount



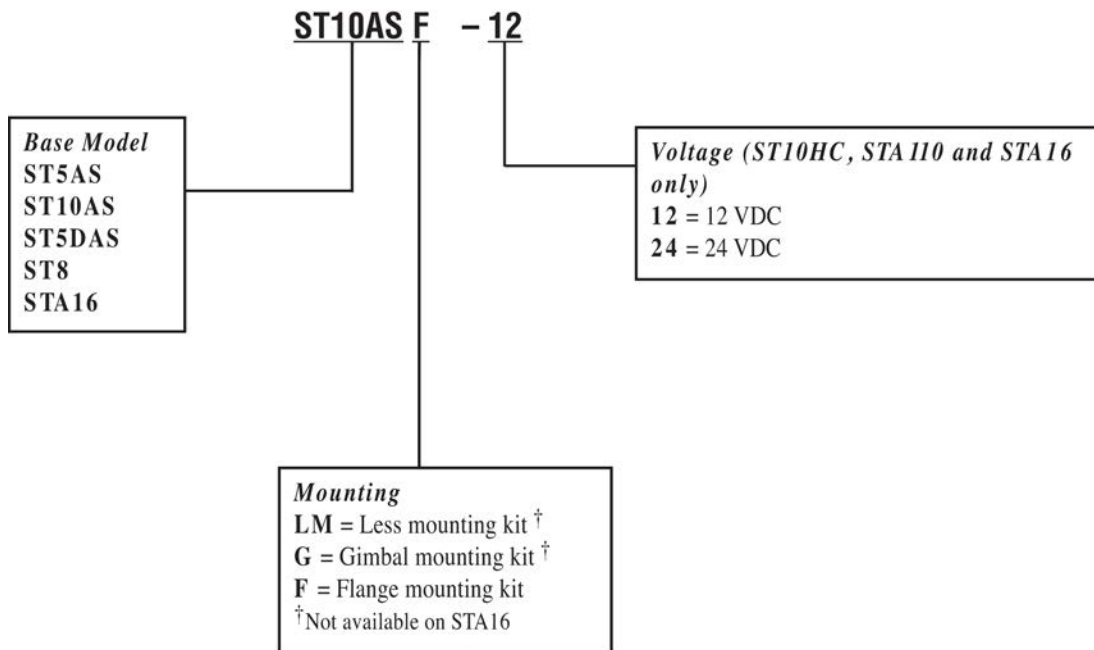
GIMBAL Mount



HOW TO ORDER

SELECTRONIC® TATTLETALE® Annunciator

Specify model number using diagram below.



Accessories and Options

Specify part number.

Part Number	Description
-------------	-------------

TDST3-5	3–5 second time delay
TDST8-10	8–10 second time delay
25700007	Gimbal mount kit; fits ST5ASLM.
25700008	Flange mount kit; fits ST5ASLM.
25700034	Gimbal mount kit; fits ST10ASLM, ST5DASLM, and ST8LM
25700371	Flange mount fits; ST10ASLM, ST5DASLM, and ST8LM.

TATTLETALE® Annunciators and Magnetic Switches



Features

- Nerve Centers for Murphy SWICHGAGE® Instruments and Automation Systems
- Available for Use with Engines or Electric Motors
- Electrical Load Carrying Devices for Alarm or Shutdown Device

Tattletale annunciators and magnetic switches are the nerve centers that translate Switchgauge contact operations into decisions and operate the alarm or shutdown device. They are the electrical load carrying devices for the alarm or shutdown device. Tattletale annunciators indicate which monitored function failed leading to the alarm or shutdown whereas magnetic switches do not. Magnetic switches operate basically as a latching relay.

Application

Magnetic switches and Tattletale annunciators are available for use with engines or electric motors. Various circuits, time delays and contact configurations are available to match the power source and mode of operation required for alarm only, alarm before shutdown or shutdown only.

For distributor ignition engines, the magnetic switch opens the distributor coil circuit to cause shutdown. For magneto or CD ignitions the magnetic switch grounds the ignition output. Some models can also trip fuel valves instead of or in addition to grounding the ignition. Diesel engines are shut down by either closing off the fuel or air supply. Magnetic switches and Tattletale annunciators can make or break circuits for these engines.

For electric motor application, various magnetic switches are available to operate the motor starter, holding coil directly or in conjunction with appropriate Murphy Transformer-Relay assembly.

Features

Magnetic switches and Tattletale annunciators described in this bulletin are electrically tripped relay type devices. Models are available to operate from battery power, 120 VAC, conventional magnetos and capacitor discharge type ignitions. Energized to run models allow CLOSED LOOP circuitry. Others draw momentary power to trip. Configurations are available for contact make or contact break to cause shutdown. Some models have both make and break contacts.

All models have a weather resistant case with screw terminals for ease of customer hookup. Manually reset models have a face mounted reset push button which also serves as a fault indicator in the Tattletale version. In this application, one or more Tattletale/magnetic switches are used to advise operating personnel which monitored function caused shutdown. Only the Tattletale connected to that function sensor trips causing the reset push button to pop out.

Electrically reset models perform the same functions as the manually reset models and are reset by cycling the power supply off and then on.

Time delay models use reliable solid state time circuits to lockout operated switch contacts for start-up and/or to allow operation of alarms before shutdown occurs. Specific models allow application of power to a shutdown circuit and automatic disconnect of power after a given time delay.

Specifications	117	117PH	MS2100	MS2110	MS2111	MS2120	518PH	518APH	518E	520APH	521PH	760A†	761APH	822PH	M4264-1	R129A
Coil Voltage																
12 volt							•	•	•	•	•	•				•
24 volt							•	•	•	•	•	•				•
12/24 volt*	•	•		•	•									•		
120 VAC			•													
Magneto ignition					•										•	
CD ignition			•												•	
Coil (see Note 6 below)	2	2	6	2	4	1	7	7	7	8	7	5	2	3		5
Contacts (see Note 2 below)																
NCH	•	•	A	A	A		•	•	•	•	•	•	•	•		
NOH			A	A	A		•	•	•	•	•	•	•	•		
NCG						B									B	B
NOG						B				•					B	B
Latch Type																
Energize to trip	•	•	•	•	•	•					•	•	•	•		•
Energize to latch							•	•	•	•						
Reset Type																
Manual indicating		•	•	•	•	•	•	•	•	•		•	•	•		
Manual non-indicating	•															
Electric non-indicating											•					•
Time Delay																
Before shutdown									•		•	•				
Start only											•	•				
After shutdown																

* Multi-voltage AC or DC systems. See circuit descriptions below and on next page.

A: Dry contacts normally wired in hot circuit.

B: Dry contacts normally wired in ground circuit.

† Does not latch after shutdown signal clears, automatically resets.

NOTES

The chart above indicates features/configurations available for each model.

1. **Coil Voltage**-Coils are specific voltage rated or multiple voltage rated.

2. **Contacts**-This is the control circuit output. In the latched position the NCH contact has a "hot" output; in the tripped position the NOH contact has a "hot" output. In the latched position, the NCG has a "grounded" output; in the tripped position, the NOG has a "grounded" output.

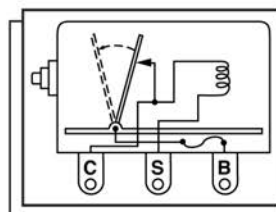
3. **Latch Type**-Refers to whether the magnetic coil is momentarily energized to trip or requires continuous power in the operating mode and de-energizes to trip.

4. **Reset Type**-Refers to manual or electric reset; manual indicating type is a TATTLETALE®.

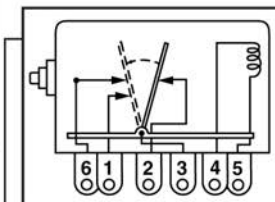
5. **Time Delay**-Indicates operation of the time delay.

6. **Coil Resistances** in OHMS, or coil and resistor

1.) 0.5 2.)18 3.)30 4.)72 5.)90/190 for 12/24 6.)288 7.)339/678 for 12/24 8.)339/618 for 12/24



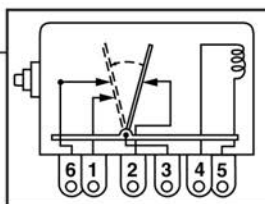
117/117PH Use to shutdown 12V thru 32V distributor ignition or diesel engines. Breaks circuit when tripped. Opens distributor coil circuit or power circuit to diesel run device. Automatically disconnects from battery after trip. Contacts 10 amps 32 VDC. 14 amp fuse.



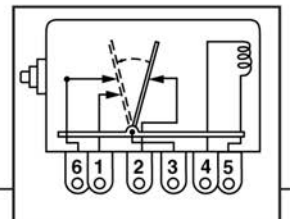
MS2110 Multi purpose TATTLETALE® with dry contacts that can be used to make two circuits and break another when tripped. Operates from 12 or 24 VDC or 24 VAC. The operating coil is intermittent duty and must be disconnected by an external circuit when tripped. The MS2110 is a replacement for

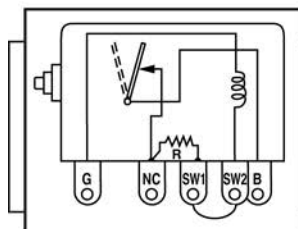
221PH, 169PH, 274 and 274PH.

MS2100 Multi purpose TATTLETALE® with dry contacts that can be used to make two circuits and break another when tripped. Operates from 120 VAC or Capacitor Discharge Ignition. The operating coil is intermittent duty and must be disconnected by an external circuit when tripped. The MS2100 is a replacement for 100PH, 307CD, 307PHCD and 224CD.

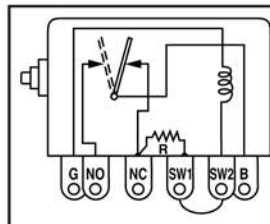


MS2120 Multi purpose TATTLETALE® with dry contacts that can be used to make two circuits and break another when tripped. Operates from Magneto Ignition. The operating coil is intermittent duty and must be disconnected by an external circuit when tripped. The MS2120 is a replacement for 307, 307PH and 224.





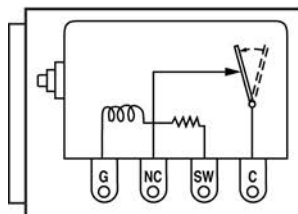
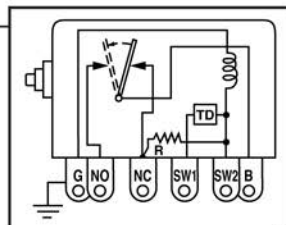
518PH Allows for SWICHGAGE® and/or N.C. contacts to be wired "Closed Loop" (in series). Any contact open or SWICHGAGE® contact close in the circuit shunt trips the 518PH. Specify 12 or 24 VDC. Contacts 10 amps 24V. 14 amp fuse.



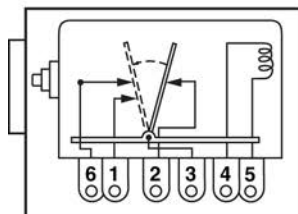
518APH Allows for SWICHGAGE® and/or N.C. contacts to be wired "Closed Loop" (in series). Any contact open or SWICHGAGE® contact close in the circuit shunt trips the 518APH. Specify 12 or 24 VDC. Contacts 10 amps 24V. 14 amp fuse.

518E Same as 518APH but recommended for high vibration application where nuisance shutdowns typically occur due to higher than normal vibrations (ie. wood chippers) 12 Volt only.

520APH Same as 518APH except with 30 second time delay before trip on one SWICHGAGE® contact input but immediate trip on the second SWICHGAGE® contact input. Typical use is for immediate stop of engine from oil pressure or coolant temperature, but delayed shutdown from alignment switches on center pivot irrigation system. Specify 12 or 24 VDC and length of time delay. Time delays are available from 5 to 120 seconds. Contacts 10 amps 24 V. 14 amp fuse.



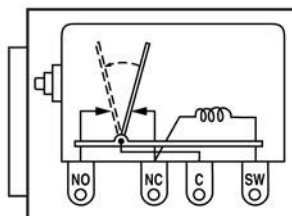
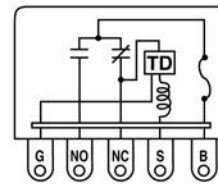
521PH Use with N.C. SWICHGAGE® or switches to ground magneto or CD ignition when tripped. Trip coil energized to run, de-energized to shutdown when N.C. contacts open. Specify 12 or 24 VDC. Contacts 10 amps 24 V.



MS2111 Replaces 221PH w/72 ohm coil. Used with NICS-78 non-incendive control system. Service part only.

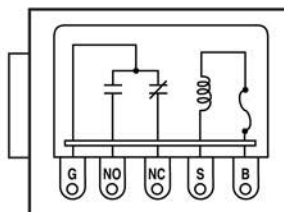
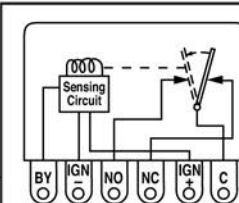
760A/760AF/761APH Use for distributor ignition or diesel. Time delay lockout of SWICHGAGE® contacts on start-up only; customer wired for delayed or immediate trip on shutdown. Breaks and makes circuits when tripped. 760A resets automatically when the shutdown signal is removed or power is removed. 761APH has manual reset. 760AF is 760A with inline fuse. Must specify 12 or 24 VDC, and length of time delay. Optional time delays: 15, 30 (standard) or 60 seconds. Contacts 10 amps 24 V. 14 amp fuse. Models 760A and 761APH carry the CE mark.

NOTE : The 760A cannot be adequately protected by a circuit breaker in a dead short condition with a battery as the power source. The circuit breaker will take a finite amount of time to react, during which time the circuit board of the 760A will be damaged beyond repair. Fuses are the optimal method for protecting the 760A.

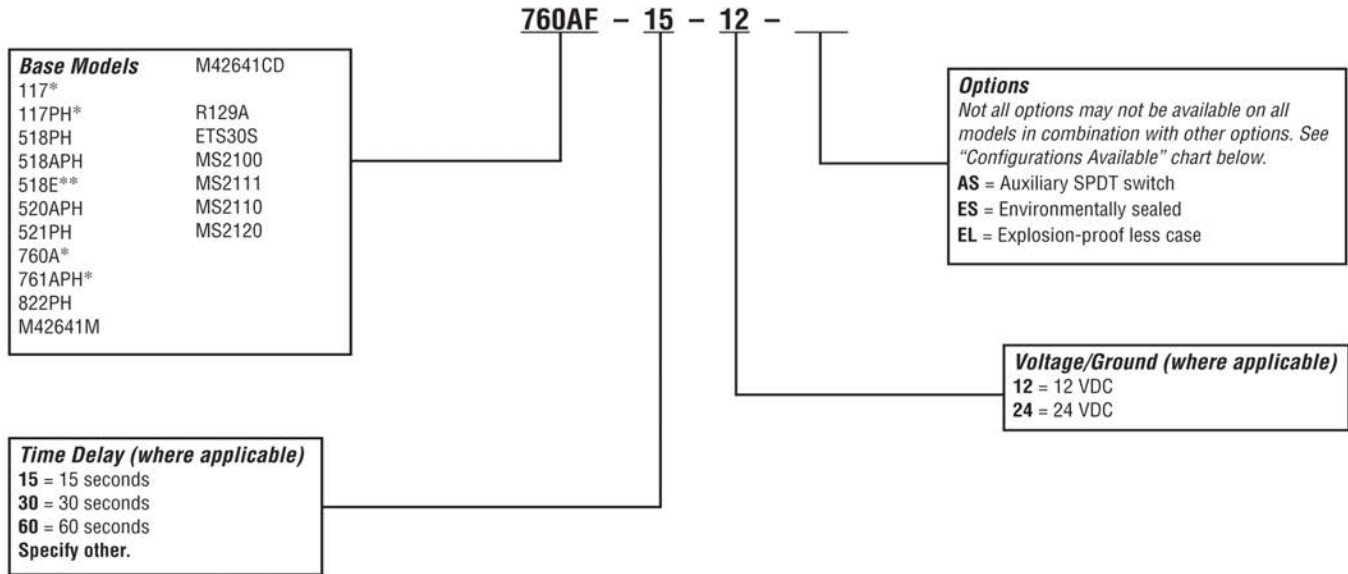


822PH Used in Murphy TR-assemblies as master disconnect. 24 VAC coil energizes when SWICHGAGE® contact closes to ground; breaks and makes circuit when tripped. Manual reset.

M4264 Series Detects loss of magneto/CD ignition output and transfers contacts for customer use. Contacts 10 amps; 48 VAC/VDC. **M42641CD** transfers SPDT dry contacts when tripped.



R129A A SPDT relay with 10 amp dry contacts. Specify 12 or 24 VDC. Contacts 10 amps 24 VDC. 14 amp fuse.



*Add the letter "F" to the base model to indicate an inline fuse instead of a base mounted fuse. Example: 760AF, 761APHF, 117F.

**12 Volt negative ground version only.

Configurations Available

	117	MS2110	MS2110	MS2120	MS2111	517/517A	518/518A/518F	520A	521	760A	760AF	761A	822	M4264-1
Non-PH	1,2									1	1			1
PH	1,2	1,2	1,2	1,2	1	1	1	1				1	1	
PH-ES	1	1	1	1	1	1								

1= Offered
2= Auxiliary snap-switch

Model Number	Hold up (Time Delay)	Minimum Charge Time
ETS10S	10-12 seconds	7 seconds
ETS30S	30-35 seconds	20 seconds

NOTE:

- Hold up time is directly related to the capacitor charge time.
- Caution must be taken by the user to assure minimum charge time is met for proper operation of timer.

Accessories

Order accessories as a separate item. Specify part number when ordering.

25050016 Weathercap.

25050547 Clear flexible dust boot for push button.

30050323 Single unit mounting panel.

65010026 In-line fuse holder with 14 amp fuse.

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.

SECTION 30 ENGINE PANELS

Engine Panel Accessories

8904	Selectronic® Flasher Alarm Light and Mini-siren – TL7 and SAH Series	135
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Engine Panels - Mechanical and/or Electric

03063	Swichgage® Shutdown Panels for Irrigation Engines and Pumps – 75160 Series	137
94032	Swichgage® Shutdown Panels for Mobile Equipment of All Kinds – WAI Series	139
8198	Swichgage® Kits for Engines – WD100 Series	143
03061	Swichgage® Shutdown Panels with Open Back for Diesel Engines – WD300 Series	145
04001	Electric Gage Shutdown Panels for DEUTZ 1011/2011, 912/913 and 914 – WDU Series Panels	147
03062	Swichgage® Shutdown Panels for High Plains and Other Irrigation Engines – WHB Series	153
94100	Shutdown Panel Kits for Deutz and Other Engines	155
97077	Swichgage® Diagnostic Panel Kits for Cummins B and C-Series Engines – W0162 and W0163	157
8426	Swichgage® Shutdown Panel Kit – W0168 and W0241	161
92226	Swichgage® Shutdown Panel Kit – Model W0270	163
94098	Swichgage® Panel Assembly – Model WDU-0277	165

MurphyLink® PowerView™ Panels

1211014	MurphyLink® Series ML25 Panels	167
1211015	MurphyLink® Series ML50 Panels	169
1211016	MurphyLink® Series ML100 Panels	171
1211017	MurphyLink® Series ML150 Panels	173
1211018	MurphyLink® Series ML300 Panels	175
1211030	MurphyLink® Series Industrial Harnesses	177

Marine Engine Panels

1211179	Marine Engine Panel Series MLP and MRP Series Panels	179
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Selectronic® Flasher Alarm Light and Mini-siren TL7 and SAH Series



Features

- High Visibility Flashing Red Alarm Light or Audible Alarm
- 12 VDC or 24 VDC
- Panel Mount
- All Electronic Description

The Model TL7 is a panel mounted flashing alarm light and audible alarm driver. The TL7 helps protect the Murphy Switchgag contacts from the very high inrush current of the lamp. It is available in 12 or 24 VDC for negative ground systems. The SAH Mini-siren provides an audible alarm when fault conditions are detected by a Switchgag instrument. It can be panel mounted and operates on 6–28 VDC.

Application

The TL7 Flasher/Light is used as a warning device on various types of industrial and mobile equipment. The Mini-siren will give an audible warning when the TL7 operates, or it can be wired directly to the Switchgag contacts for audible only alarm.

Features: TL7

- Red polycarbonate lens
- 12 VDC or 24 VDC negative ground (specify voltage)
- Tin plated male push-on type terminals
- SAH terminal designed to drive piezo electric audible alarm rated 20 mA @ 28 VDC such as Murphy SAH Series Mini-siren

Specifications: TL7

Power Requirements:

- Voltage: 12 or 24 VDC, negative ground (specify voltage).
- Current:
 - Sensor switch < 60 mA
 - 12 VDC, 360 mA with lamp on
 - 24 VDC, 200 mA with lamp on
 - 12 or 24VDC, 5 mA standby, lamp off

Outputs (see replacement lamps):

Lamp output: 120 mA @ 14.4 VDC
SAH terminal: 20 mA @ 28 VDC resistive

Enclosure: Red polycarbonate lens with aluminum retaining nut.

Temperature Range: -40°F to 165°F (-40°C to 74°C).

Terminal Connections: Four tin plated 1/32 x 1/4 inch (0.8 x 6 mm) male push-on type terminal.

Mounting Hole: 1-1/8 in. (29 mm) diameter.

Maximum Panel Thickness: 1/4 in. (6 mm).

Specifications: SAH

Type: PIEZO electric transducer.

Operating Voltage: 6–8 VDC.

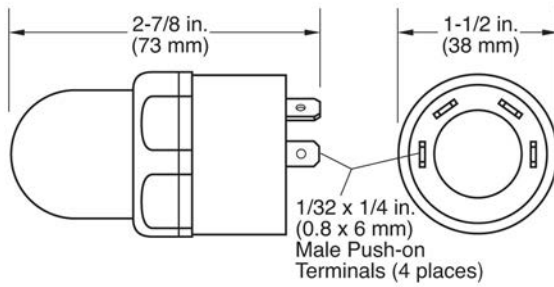
Output Level: at 28 VDC 1 meter, 90± 5 dB.

Current Drain: at 28 VDC, 20 mA MAX.

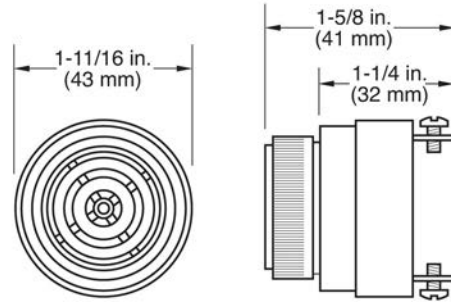
Mounting Hole: 1-1/8 in. (29 mm) diameter.

Maximum Panel Thickness: 1/8 in. (3 mm).

Dimensions



Mounting Hole: 1-1/8 in. (29 mm) diameter
Maximum Panel Thickness: 1/4 in. (6 mm)



Mounting Hole: 1-1/8 in. (29 mm) diameter
Maximum Panel Thickness: 1/8 in. (3 mm)

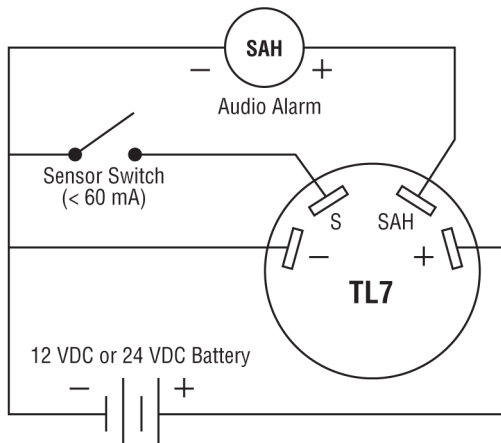
Typical Wiring Diagram



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.

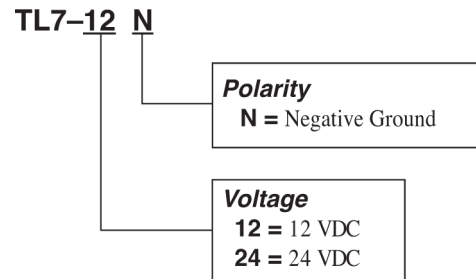
Below is a typical circuit diagram for the TL7 Flasher/Light and SAH Mini-siren. When the switch closes the lamp will flash and the optional Mini-siren will pulse at the same frequency.



NOTE: typical wiring with negative ground. Although designed to be used with Murphy Switchgage, the TL7 can be used with any dry contact type switch.

How to Order

When ordering a TL7, voltage and polarity must be specified (see the diagram below):



Swichgag[®] Shutdown Panels for Irrigation Engines and Pumps – 75160 Series



Features

- Ideal for Irrigation Engines
- Includes Loss of Pump Discharge Pressure and High Coolant Temperature Swichgag Instruments
- Model With Solenoid Fuel Shutoff Valve

The 75160 series:

This Swichgag panel is specifically configured for irrigation engines and includes loss of pump discharge pressure Swichgag instrument. The panel is enclosed on top, bottom, and both ends. Mounting flanges extend on top and bottom. The back of the panel is open. Access holes are in the bottom.

75160: includes low oil pressure, high coolant temperature, low pump pressure Swichgag instruments, Magnetic Switch, and emergency stop button.

75160D: includes SV-series solenoid diesel fuel valve (specify voltage). For diesel engines without shut-down solenoid in the injection pump, add a Murphy SV Series solenoid fuel shut-off valve or RP2300 Series rack pull solenoid.

Panel Kits Include:

- Low Lube Oil Pressure Swichgag instrument
- High Coolant/ Temperature Swichgag instrument
- 518PH Magnetic Switch.
- SV Series Solenoid Fuel Shutoff Valve.
- PB128S Emergency stop push button.

Specifications

Low Lube Oil Pressure Swichgag instrument:

- 0-100 psi (0-689 kPa) [0-6.89 bar]
- 1/8 NPT process connection

Low Pump Pressure Swichgag instrument:

- 0-150 psi (1.03 MPa) [10.34 bar]
- 1/8 NPT process connection

High Coolant Swichgag instrument:

- 130-250°F (54-121°C)
- 48 in. (1.2 m) capillary
- 1/2 NPT process connection

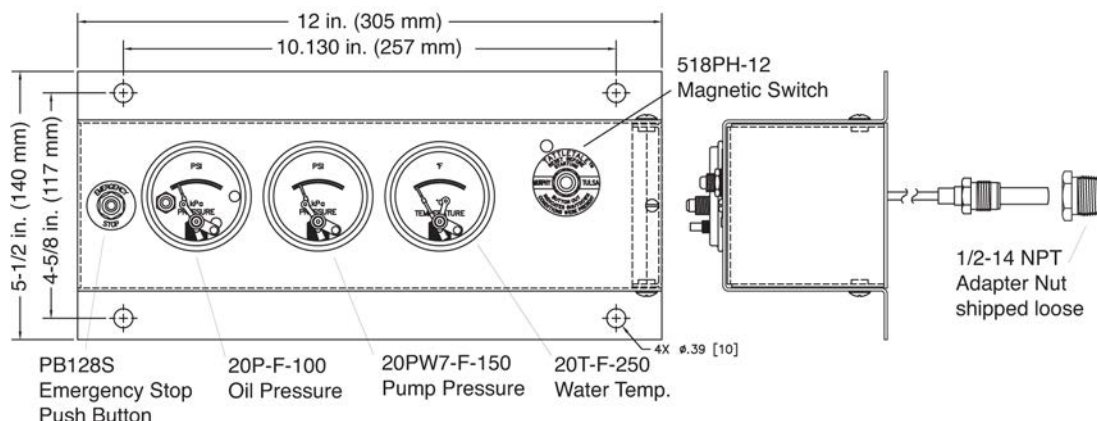
518PH Magnetic Switch: 12 or 24 volt (specify)

SV Series Solenoid Fuel Shutoff Valve: 12 or 24 volt (specify)

Shipping Weight: 8 lbs. 8 ozs. (3.9 kgs.)

Shipping Dimensions: 15.5 x 16 x 10.5 in. (394 x 406 x 267 mm).

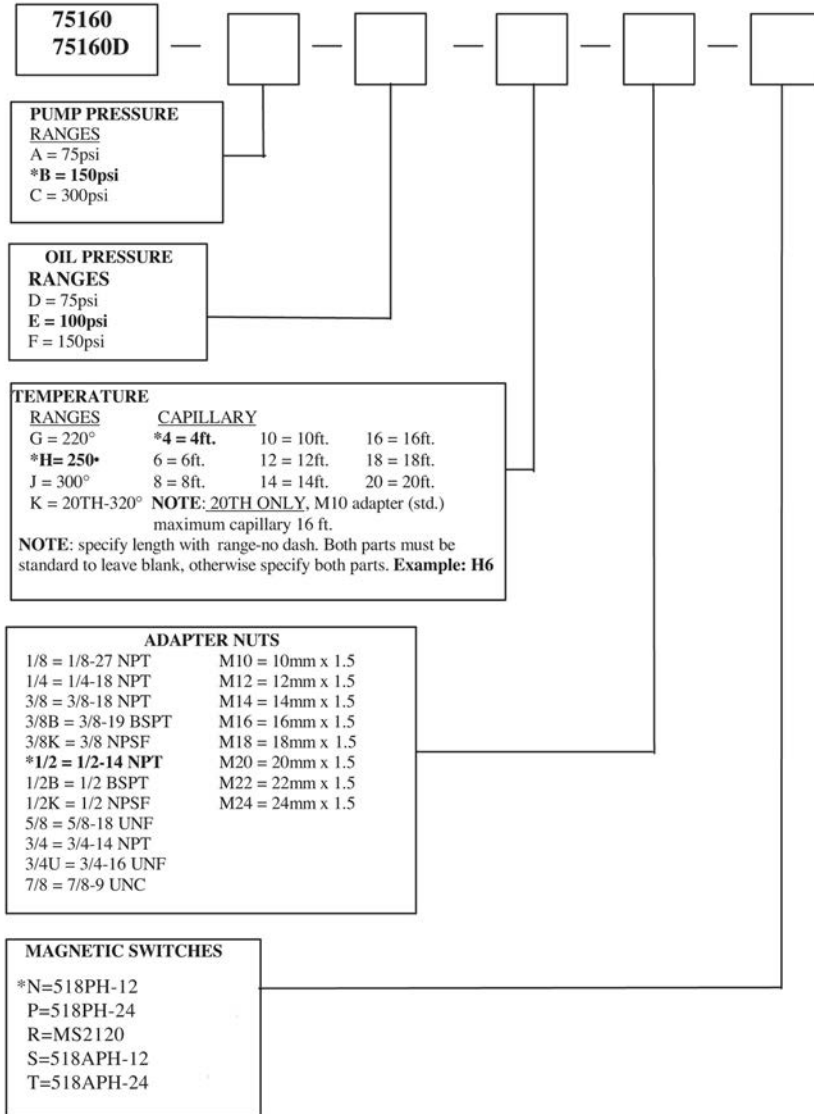
Dimensions (all Models)



How to Order

NOTES:

1. * = Standard Component or Range and is not required for ordering, see section notes if section has two parts to specify.
2. If requirements are outside of the matrix, order panel with free formed text and use the '3050xxxx' product number of the base model.



Swichgage® Shutdown Panels for Mobile Equipment of All Kinds – WAI Series



Features

- Get the Same Original Equipment Specified by Major OEM's
- Swichgage Instruments Include Built-in Light Pipe Illumination
- Prewired and Ready to Install
- Alarm Only Model Saves Money on Applications Not Requiring Shutdown
- Available for 12 or 24 Volts

WAI Series Murphy panels offer engine protection for on and off road mobile equipment.

You get accurate engine readings and time-delayed automatic shutdowns. Flashing light and mini-siren signal a warning before the shutdown. Alarm-only panels (without shutdown capabilities) are also available.

WAI panels are easy to install and function test without the need for expensive auxiliary equipment. Each is a cost competitive and effective system for engine protection.

The WAI Series Panels are complete diagnostic, engine-protection systems. Any vehicle or engine can be monitored and in case of potentially damaging conditions an alarm will operate before the engine is shut down. WAI Panels feature direct-reading, mechanical Swichgage instruments (gauge and limit switch in one) and Selectronic relays and alarms. Swichgage instruments are internally lighted for night illumination.

Models Available

WAI-2: Completely enclosed and with convenient under-dash mounting provides Swichgage instruments for low oil pressure and high coolant temperature; visual and audible alarms before automatic shutdown. Includes a 270° pivoting, mounting bracket.

WAI-3: Same as WAI-2 panel with a 3rd Swichgage instrument for block coolant pressure (0-15 psi).

WAI-4: Same as WAI-2 panel with a 3rd Swichgage instrument for transmission temperature (140-300°F).

WAI-7: Open style panel same as WAI-2.

WAI-8: Open style panel provides Swichgage instruments for low oil pressure, coolant pressure and high coolant temperature; visual and audible alarms before automatic shutdown.

WAI-9: Open style panel same as WAI-8 with transmission temperature Swichgage instrument instead of coolant pressure.

WAI-271: Open style panel similar to WAI-7 but for alarm-only.

Application

Trucks, buses, fork lifts, loaders, earth-movers—any engine powered mobile unit, such as delivery vans, farm and construction equipment, street sweepers.

WAI-2

- Enclosed Panel
- Oil Pressure Switchgauge instrument
- Coolant Temperature* Switchgauge instrument
- Mini-siren
- FL3/TL2 flasher and light
- 760AF Magnetic Switch with 30 second time delay for alarm before shutdown; 12 VDC, (optional 24 V)



WAI-3 / WAI-4

- Enclosed Panels
- Oil Pressure Switchgauge instrument
- Coolant Temperature* Switchgauge instrument
- Block Coolant Pressure* Switchgauge instrument (WAI-3 only 0-15psi)
- Transmission Temp.* Switchgauge instrument (WAI-4 only 140-300°F)
- Mini-siren
- FL3/TL2 flasher and light
- 760AF Magnetic Switch with 30 second time delay for alarm before shutdown; 12 VDC, (optional 24 V)



WAI-7

- Open Style Panel
- Oil Pressure Switchgauge instrument
- Coolant Temperature* Switchgauge instrument
- Mini-siren
- TL7, Flasher Alarm Light
- 760AF Magnetic Switch with 30 second time delay for alarm before shutdown; 12 VDC, (optional 24 V)



WAI-8 / WAI-9

- Open Style Panel
- Oil Pressure Switchgauge instrument
- Coolant Pressure* Switchgauge instrument (WAI-8 only 0-15psi)
- Transmission Temp.* Switchgauge instrument (WAI-9 only 140-300°F)
- Coolant Temperature* Switchgauge instrument
- Mini-siren
- TL7, Flasher Alarm Light
- 760AF Magnetic Switch with 30 second time delay for alarm before shutdown; 12 VDC, (optional 24 V)



* Temperature capillary length is standard 6 ft. (1.8 m). Specify longer lengths.

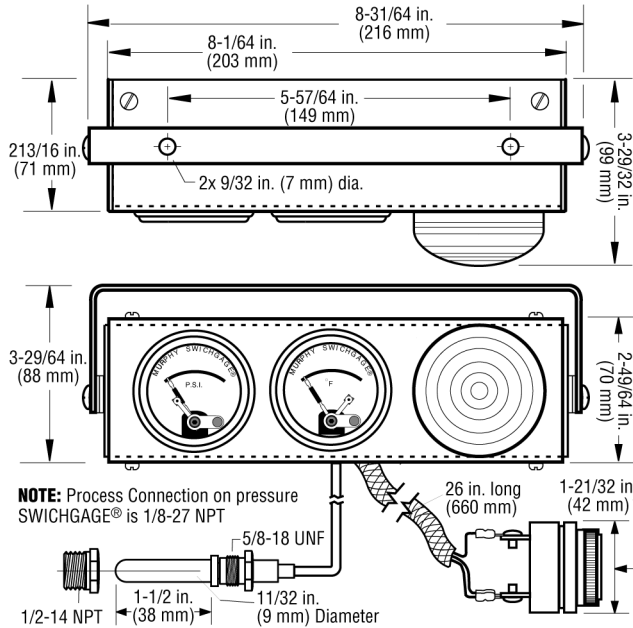
WAI-271

- Alarm-Only, Open Style Panel
- Oil Pressure Switchgauge instrument
- Coolant Temperature* Switchgauge instrument
- Mini-siren
- TL7, Flasher Alarm Light
- Available for 12 VDC or 24 VDC

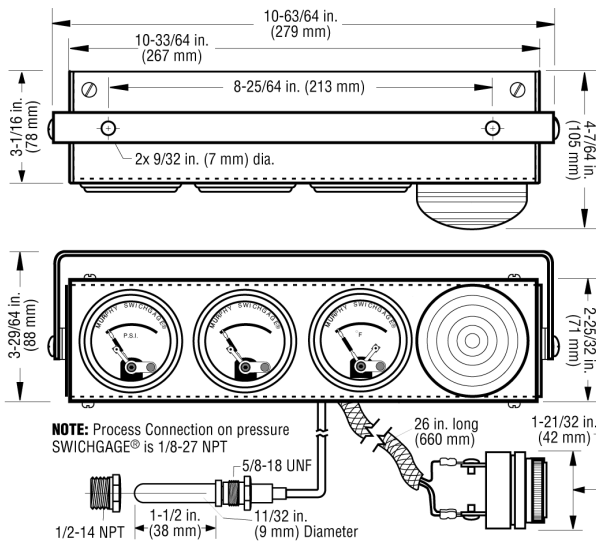
Typical Dimensions



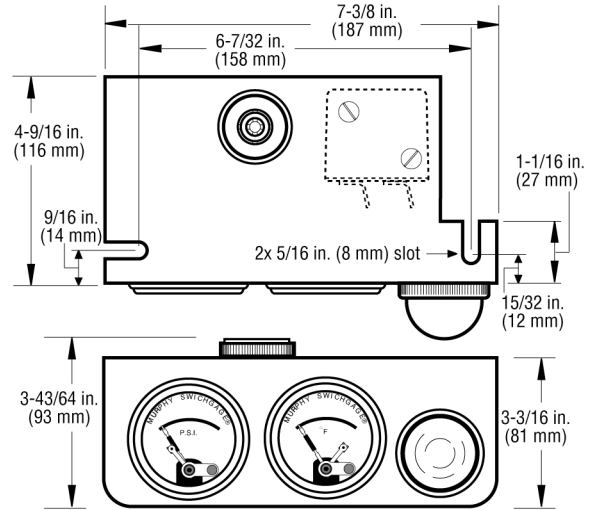
WAI-2



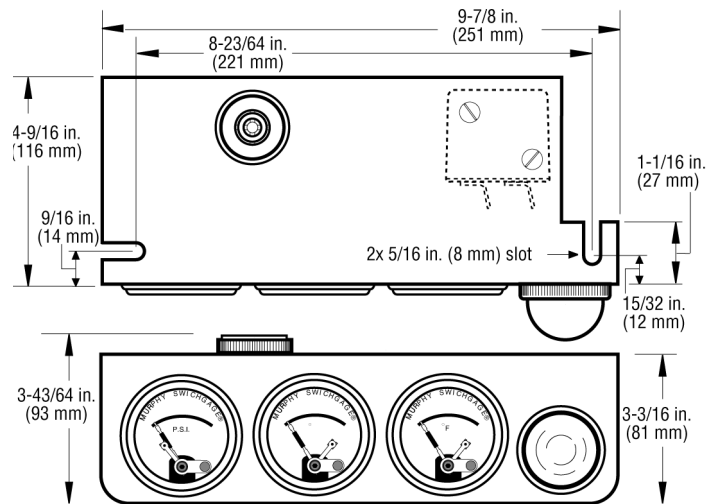
WAI-3 / WAI-4



WAI-7



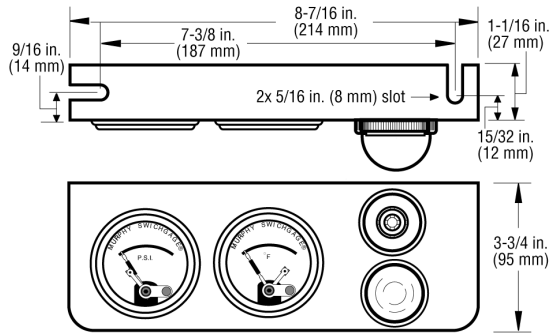
WAI-8 / WAI-9



* Temperature capillary length is standard 6 ft. (1.8 m). Specify longer lengths.

Typical Dimensions—(continued)

WAI-271



How to Order

Order by using the model number (also see the quick reference guide below):

WAI-2

WAI-3

WAI-4

WAI-7

WAI-8

WAI-9

WAI-271

STANDARD PANEL ASSEMBLIES AND KITS ~ QUICK REFERENCE GUIDE

Options like 24 VDC, special capillary length, delay time, etc. can be specified.

	WAI2	WAI3	WAI4	WAI7	WAI8	WAI9
Enclosed, easy-mount panel	✓	✓	✓			
Open, easy-mount panel				✓	✓	✓
201P-1-75 Engine oil pressure SWICHGAGE®	✓	✓	✓	✓	✓	✓
202T-1-220 Engine coolant temperature SWICHGAGE® (6 ft. [1.83 m] capillary)	✓	✓	✓	✓	✓	✓
202P-1-15 Engine coolant pressure SWICHGAGE®		✓			✓	
203T-1-300 Transmission temperature SWICHGAGE® (6 ft. [1.83 m]) warning-only			✓			✓
760AF SELECTRONIC® relay (30 second time delay, 12V)	✓	✓	✓	✓	✓	✓
TL7 SELECTRONIC® flashing alarm (12V, negative ground)				✓	✓	✓
TL2 and FL3 alarm light	✓	✓	✓			
SAH MINI-SIREN®	✓	✓	✓	✓	✓	✓
Diode 65010098, isolates transmission temperature for warning-only			✓			✓

Swichgag[®] Kits for Engines – WD100 Series



**WD185
Engine Kit**

Features

- Universal Mounting Panel
- Guard Against Low Oil Pressure or High Running Temperature
- For Farm or Construction Equipment

The WD100 Series Swichgag kits provide engine monitoring that shuts down farm, construction, or other engine powered equipment, when dangerous pressures or temperatures occur. The control center for each of these kits is the compact and adjustable, Universal Mounting Panel. This panel holds two Swichgag(s) and a Tattletale[®] magnetic switch, and shut down device where appropriate.

Specifications

- Murphy Swichgag products are two-instruments-in-one: (1) an accurate indicating gauge with (2) a built-in, adjustable, limit switch.
- 518PH Tattletale magnetic switch is designed to shut down engines; operates as a circuit breaker to interrupt the ignition circuit to a distributor or to close a solenoid fuel valve on diesels.
- Temperature capillary tubes are 6 ft. (1.8 m) standard, but can be ordered in any length.
- Standard Swichgag ranges*:
Pressure: 0-100 psi (0-689 kPa) [0-6.89 bar]
Temperature: 130-250°F (54-121°C)

* Other ranges are available on request.

WD100 Series Kits

Depending upon the kit selected, the following components are supplied:

- C. Universal Mounting Panel which consists of:
- 20P, oil pressure Swichgag instrument
 - 20T, temperature Swichgag instrument with 6 ft. (1.8 m) capillary, or 20TH, temperature Swichgag instrument for WD175 kit.
 - 518PH Tattletale magnetic switch
- D. Bracket mounting bolts, washers and nuts.
- E. CKV2336, fuel reverse flow/check valve.
- F. PRV50, fuel pressure relief valve
- G. SV-Series, fuel shut-off solenoid valve (1/4 NPT X 1/4 NPT) Specify 12VDC or 24VDC.

Kit Combinations

These kits are available for virtually any engine application, any engine type, or can be custom ordered to meet a specific use.

Kit WD100 includes: A, and B

Suitable for use on distributor ignition engines or on diesels having a shutdown solenoid in the fuel pump.

Shipping Weight: 4.75 lbs (2.2 kg)

Shipping Dimensions: 9-3/4 in. x 9-1/4 in. x 5-3/4 in. (248 mm x 235 mm x 146 mm)

Kit WD150 includes: A, B, C, and E

Suitable for most liquid cooled diesel engines.

Shipping Weight: 6.15 lbs (2.8 kgs.)

Shipping Dimensions: 9-3/4 in. x 9-1/4 in. x 5-3/4 in. (248 mm x 235 mm x 146 mm)

Kit WD175 includes: A, B, C, and E

Suitable for air cooled diesel engines; 10 mm 1.5 adaptor and special head temperature bulb. Includes SV-Series fuel valve.

Shipping Weight: 6.15 lbs (2.8 kgs.)

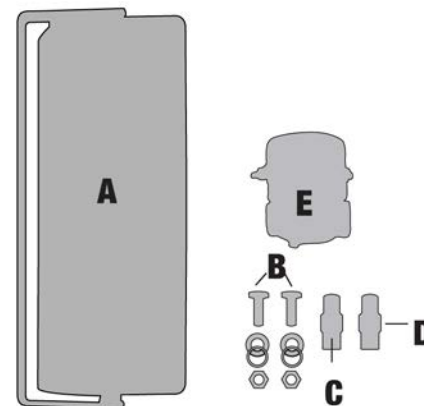
Shipping Dimensions: 9-3/4 in. x 9-1/4 in. x 5-3/4 in. (248 mm x 235 mm x 146 mm)

Kit WD185 includes: A, B, C, D, and E

Suitable for engines with gear driven transfer pump. (SV-Series is not required on engines with built-in shutdown in the injector pump.)

Shipping Weight: 6.20 lbs (2.8 kgs.)

Shipping Dimensions: 9-3/4 in. x 9-1/4 in. x 5-3/4 in. (248 mm x 235 mm x 146 mm)

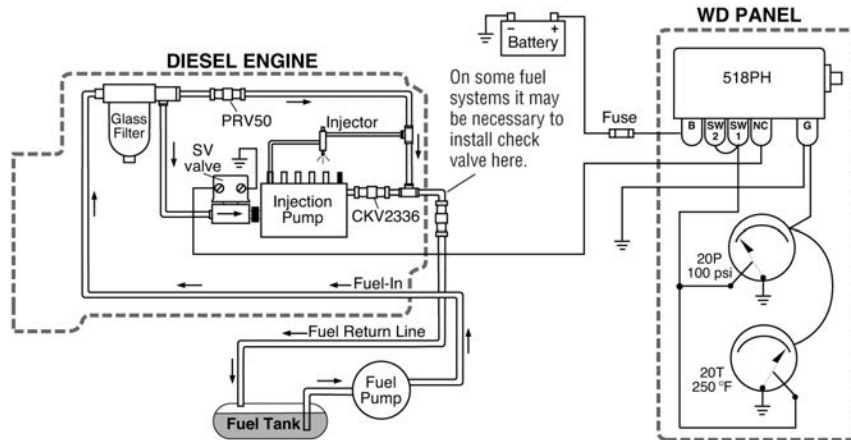


—Especially designed for adaptation to a

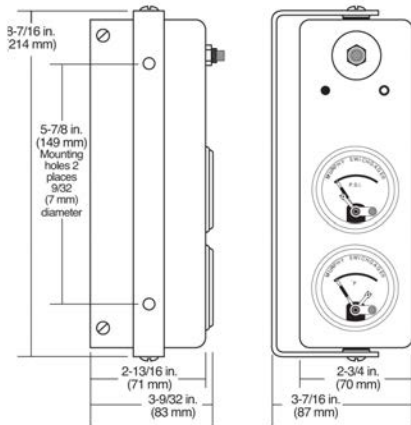
Typical Wiring to Diesel Engine

Special Notes:

- Murphy Pressure Relief Valve; model PRV50 is factory set to start opening at 25 psi (172 kPa) [1.72 bar]. This is done to protect the fuel filter canister from bursting due to high pressure.
- Install the Murphy Check Relief Valve, model CKV2336, **as close as possible to the injection pump**. When the CKV2336 is installed properly it should prevent the injection pump from siphoning fuel thus not allowing continued operation after the SV valve closes.
- Install the SV-Series fuel valve as close as possible to the injection pump inlet port.
- **All fittings must be air tight.**

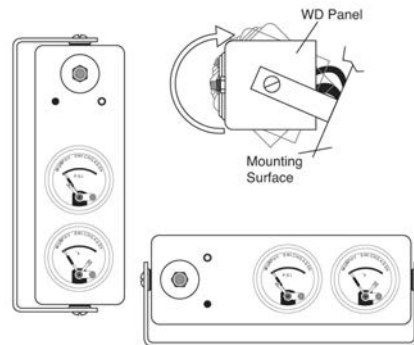


Dimensions



Rotating/Tilting Panel

It is the ability of this panel to mount in many different positions (Switch-gage instruments can be rotated, the panel tilted) that allows for instrument visibility without a difficult installation or interference with other engine equipment.



How to Order

To determine the kit that will suit your application, refer to the Kit Combinations on the reverse side. When you have decided on a kit, the model number and voltage must be specified when ordering. Example: **WD100, 12 Volt**

Approximate Shipping Weights and Dimensions for each kit are specified on the reverse side of this bulletin, under **Kit Combinations**. Order oil line assembly separately.

Swichgage® Shutdown Panels with Open Back for Diesel Engines – WD300 Series



Features

- Universal Design Ideal for Diesel Engines Without Fuel Solenoid Built Into the Injection Pump
- Swichgage Instruments for Low Oil Pressure, High Coolant Temperature
- Includes Fuel Solenoid Shutdown Valve

WD300 Series

The universally applicable WD300 Series panels are the ideal control solution for a wide variety of diesel engines without shutdown solenoid in the injection pump.

The standard WD300 Series panel includes basic engine protection for low oil pressure and high coolant temperature. It also includes Murphy's SV Series solenoid fuel shut-off valve, (see bulletin SV-99026B).

WD300LV Models

For engines that have the fuel shut-off solenoid built into the injection pump. This model also applicable to battery ignition engines.

Panel Kits Include:

- Low Lube Oil Pressure Swichgage instrument.
- High Coolant/ Temperature Swichgage instrument.
- 117PH Magnetic Switch.
- SV Series Solenoid Fuel Shutoff Valve.
- PB128S Emergency Stop Push Button.

Specifications

Low Lube Oil Pressure SWICHGAGE®:

- 0-100 psi (0-689 kPa) [0-6.89 bar]
- 1/8 NPT process connection

High Coolant SWICHGAGE®:

- 130-250°F (54-121°C)
- 48 in. (1.2 m) capillary

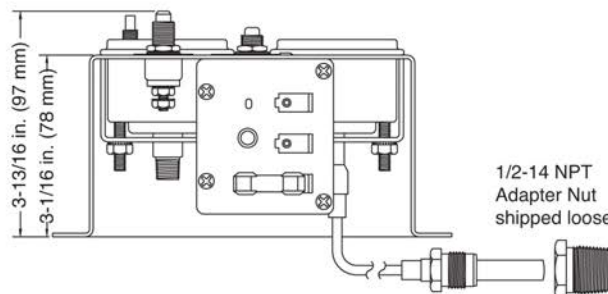
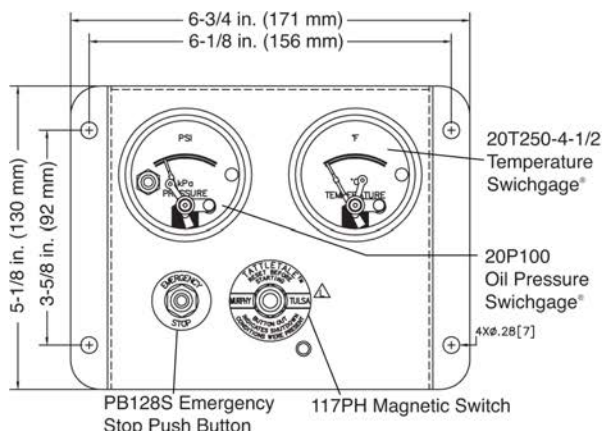
- 1/2 NPT process connection

117PH Magnetic Switch SV Series Solenoid Fuel Shutoff Valve: 12 or 24 volt (specify)

Shipping Weight: 8 lbs. 8 ozs. (3.9 kgs.)

Shipping Dimensions: 8.5 x 5.25 x 5.5 in. (216 x 133 x 140 mm).

Dimensions (all Models)



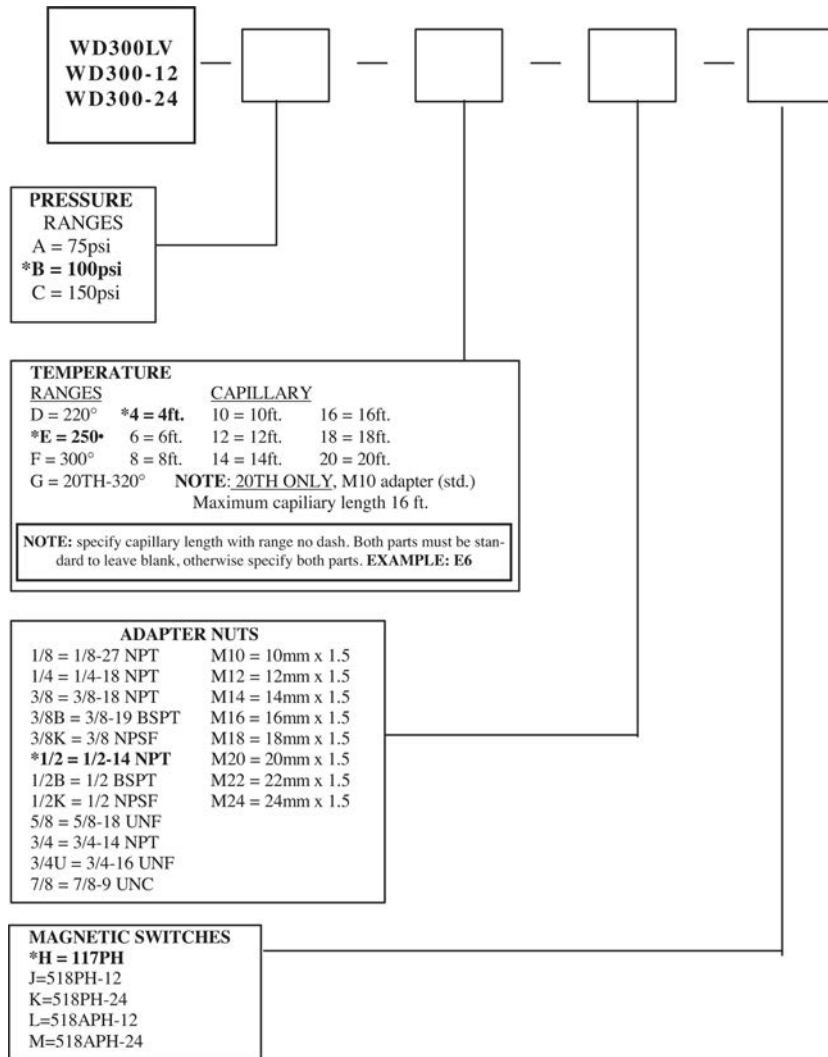
How to order

Notes:

* = Standard Component or Range and is not required for ordering, see section notes if section has two parts to specify.

- **WD300LV**: Does not include a SV Fuel Valve.
- **WD300**: Includes an SV Fuel Valve, (WD300-12 = 12 volt valve and WD300-24 = 24 volt valve)

If requirements are outside of the matrix, order panel with free formed text and use the '3050xxxx' product number of the base model.



Electric Gage Shutdown Panels for DEUTZ 1011/2011, 912/913 and 914 – WDU Series Panels



Features

- Environmentally Sealed Electric Gages with LED Illumination Provide Accurate Readouts
- Reliable Shutdown Protection On Low Oil Pressure and High Engine Temperature
- Includes “Plug and Go” Package for Quick and Easy Installation to 1011/2011, 912/913 and 914 DEUTZ Engines
- Recessed Front Panel Design Houses Components and Utilizes a Hinged Front Cover for Easy Access to Internal Components
- Features Engine Preheat Circuit

Deutz engines that come factory equipped with electric-switched oil pressure and temperature senders can now be outfitted with a standard line of electric gage “Plug and Go” panels that take the work and time out of the installation process. Two bolts mount the panel to the engine’s bell housing and the included wiring allows for fast “Plug and Go” assembly. Simply remove two screws and the front hinged panel drops down allowing access to all the internal components. These panels are offered in three versions to accommodate all wiring and mounting requirements for DEUTZ 1011/2011, 912/913 & 914 Engines.

The panels are designed to compliment Deutz engines supplied with pre-installed factory-set “electric switched senders.” Protection against low oil pressure and high engine temperature is achieved with the Murphy 760A Time Delayed Magnetic Switch. A panel mounted 10 amp fuse protects the sensitive instrumentation from any over-current situation and stops the engine if blown. The Deutz pre-installed “electric switched senders” supply all shut-down signals directly to the Murphy 760A providing reliable and proven engine protection in harsh environments.

Critical engine information is provided with Murphy’s environmentally sealed; LED illuminated EG Series electric gages. Known for their reliable performance and constructed of corrosion resistive materials, these rugged gages exceed SAE J1810 standards for use in tough off-road and industrial power unit applications. A unique spin-on gage clamp keeps the gages tight even in high vibration applications. Murphy’s alternator driven ATHA 4000 RPM tachometer provides accurate display of engine speed with its back-lit dial, while the digital hour meter records the elapsed engine run time. The heavy duty key switch constructed of corrosion resistant materials and heavy gauge wiring exceed the current requirements of the starter and engine pre-heat circuit. A red lamp mounted on the front panel indicates when the pre-heat circuit is active.

All components are assembled into a robust black powder-coated enclosure with text indicating key position. The “Plug and Go” external wire harness connects to the rear of the panel and has all the engine side connections pre-wired. The panel mounting bracket comes pre-assembled to the enclosure with three vibration isolators, making installation fast and simple.

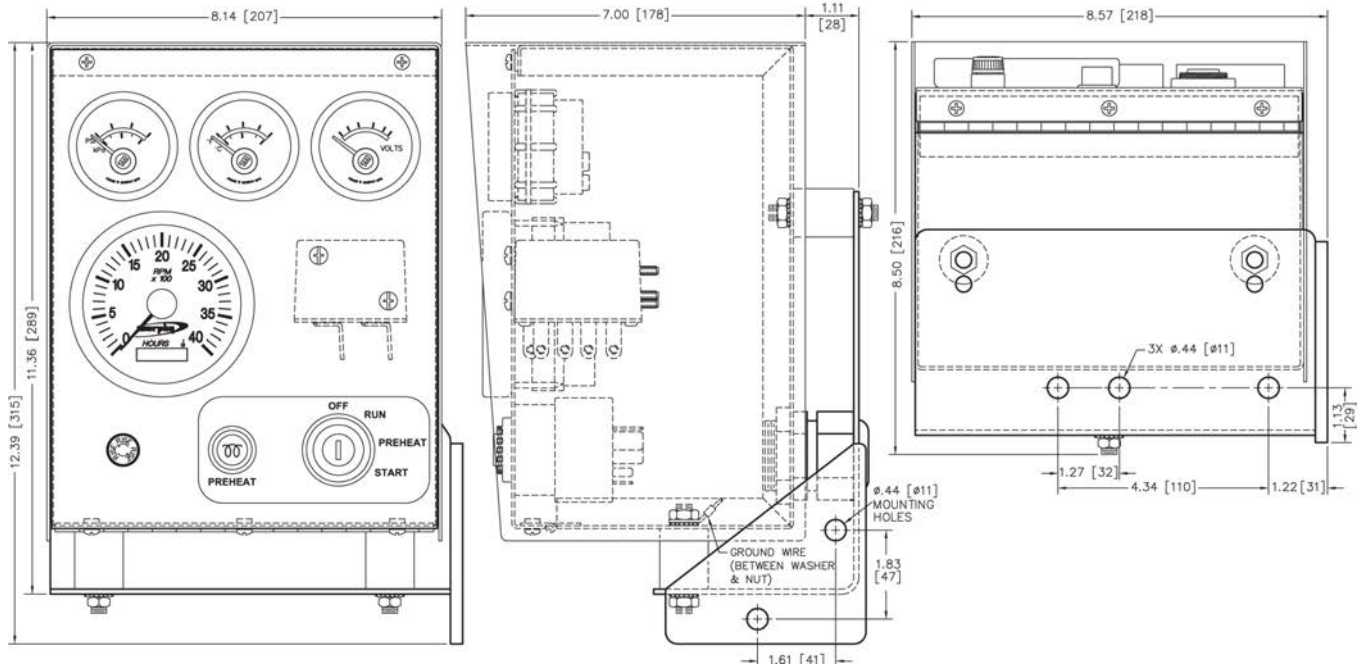
Features

- Oil Pressure Gage: 0-80 PSI (0-500 kPa)
- Engine Temperature Gage: 140-300 °F (60-150 °C)
- Volt Meter (8-18 VDC)
- Tachometer/Hourmeter (0-4000 RPM)
- Key Switch (Heavy Duty)
- Engine Preheat with Red Indicator Lamp
- Murphy 760A Safety Shutdown (Automatic Time Delayed for Start-up)
- Panel Mount Fuse
- Recessed and Protected Front Panel
- Durable Powder Coat Finished Enclosure and Mounting Bracket

Labor Saving Installation Features

- Pre-wired External Harness (Includes all connectors and terminals)
- Mating connectors match Deutz Engine wiring for fast “Plug and Go” connection
- Pre-assembled: Enclosure, Rubber Isolation Mounts and Mounting Bracket
- Simple Bolt-on/Plug-in Installation

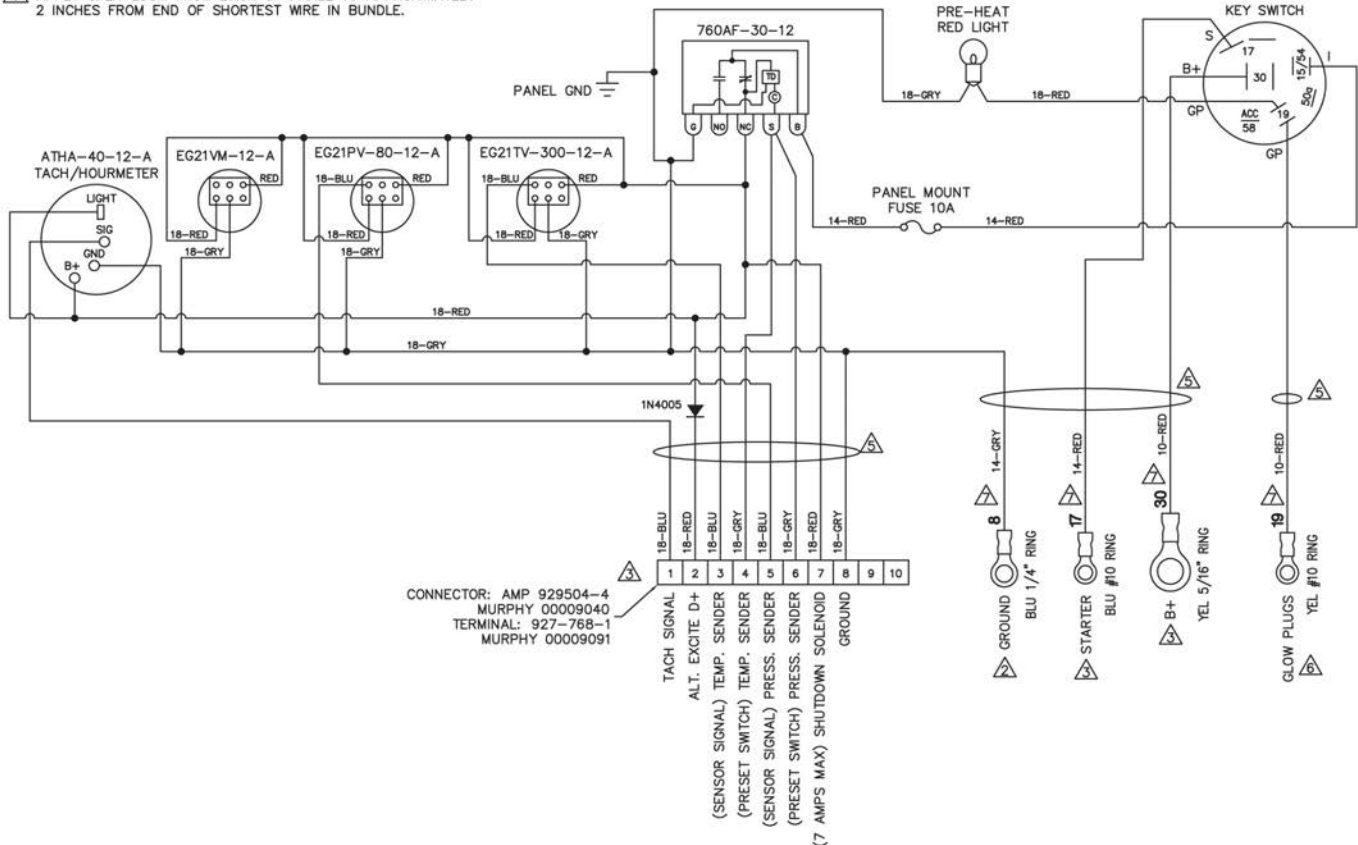
WDU0814 Dimensions Includes Enclosure, Mounting Bracket and Shock Mounts



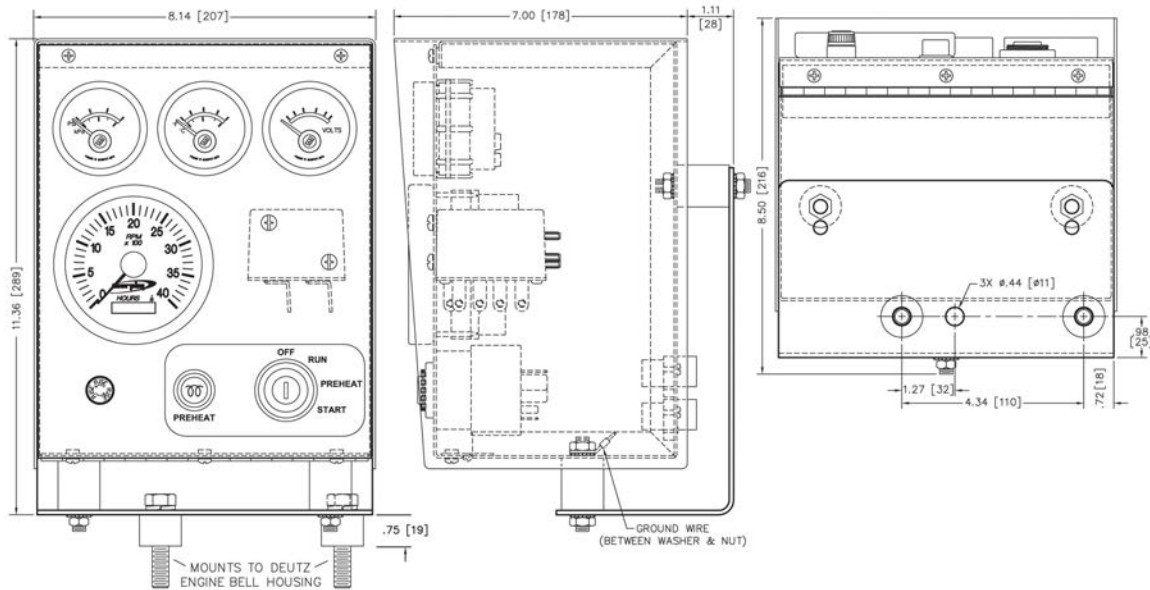
Wiring

NOTES:

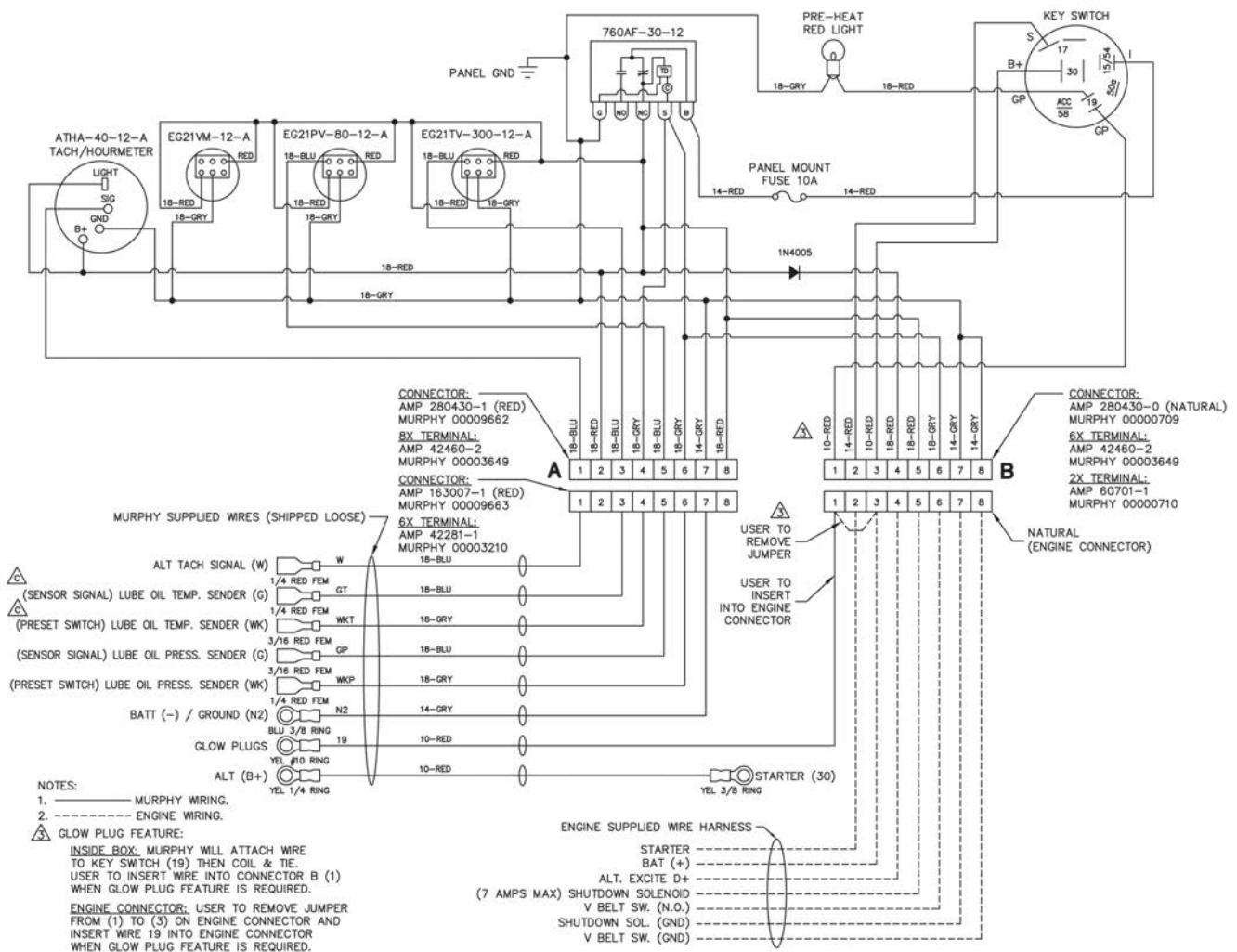
1. ——— MURPHY HOOK-UP BOTH ENDS.
 - WIRE TO CUST GND TO EXTEND 36 INCHES FROM BACK OF PANEL.
 - WIRE TO CONN, STARTER, B+ TO EXTEND 42 INCHES FROM BACK OF PANEL.
 4. TOLERANCE = $\pm 2^\circ$
 - APPLY SPLIT LOOM FROM BACK OF PANEL TO APPROXIMATELY 2 INCHES FROM END OF SHORTEST WIRE IN BUNDLE.
- WIRE TO GLOW PLUGS TO EXTEND 40 INCHES FROM BACK OF PANEL.
- MARK OR TAG WIRES FOR CUSTOMER HOOKUP WITH NUMBERS OR LETTERS SHOWN.



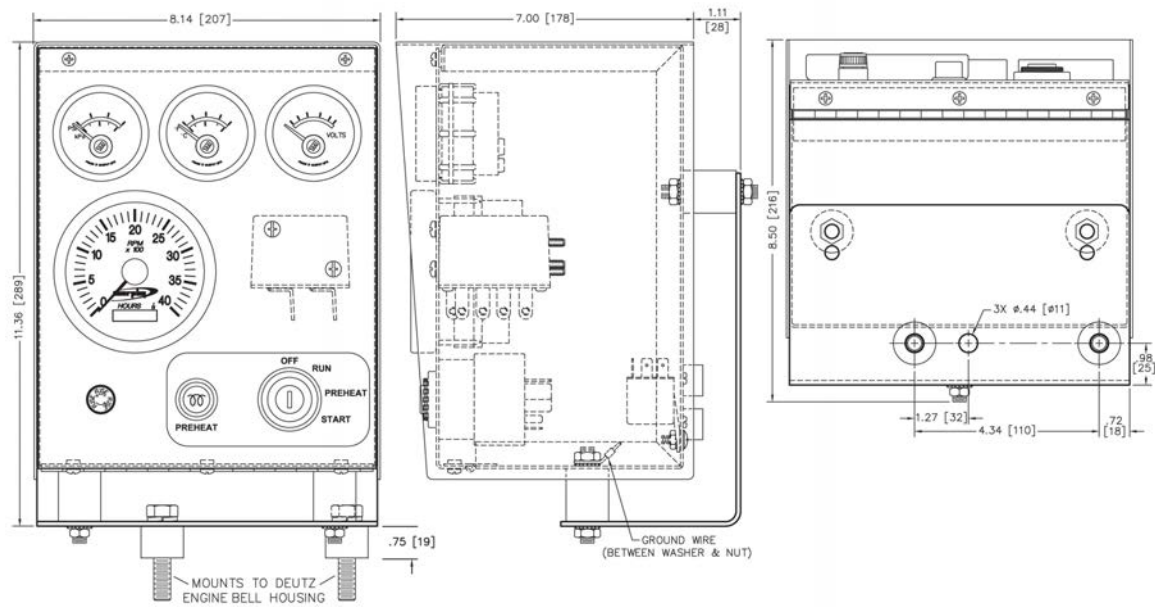
WDU0815 Dimensions



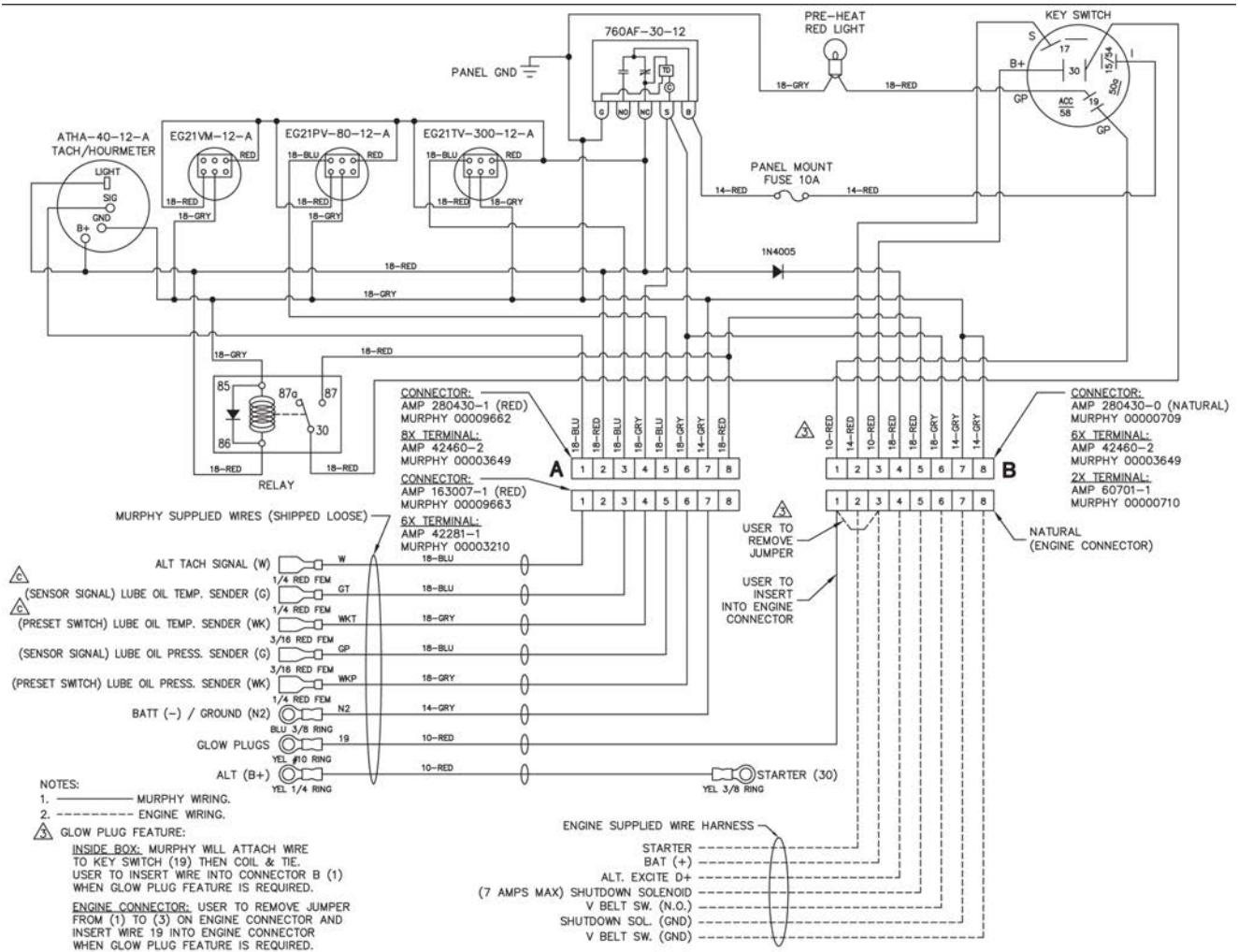
Wiring



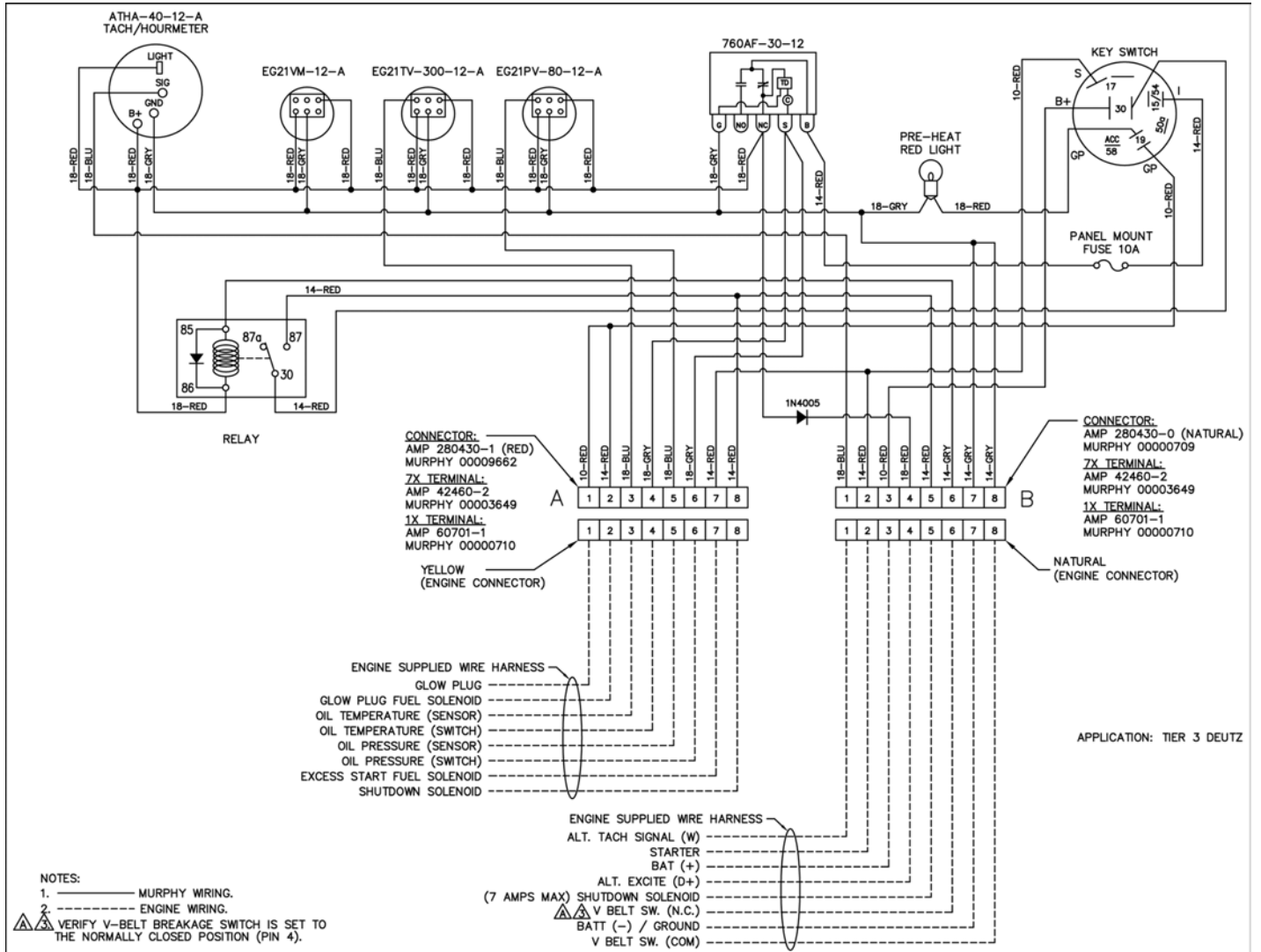
WDU0816 Dimensions



Wiring



WDU0865 Wiring for Deutz 914 Tier 3 Engine Wiring



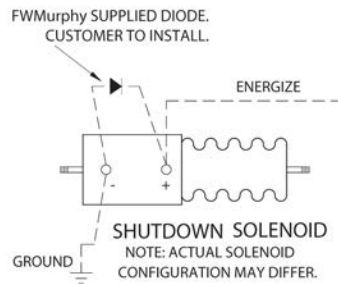
Specifications:

Voltage: 12 VDC.

Shipping Weight: 16 lb. (7.3 kg).

Shipping Dimensions: 14 x 15-3/4 x 9-1/2in. (356 x 400 x 242 mm).

WARNING: FLYBACK DIODE REQUIRED ACROSS ALL INDUCTIVE LOADS TO REDUCE THE POTENTIAL OF VOLTAGE SPIKES DAMAGING SOLID STATE COMPONENTS.



How to Order (Order your WDU panel using the model number)

WDU0814 Panel Number 30-70-0814 used on DEUTZ 1011/2011 Engine

- Includes Attached Wire Harness Pigtail with engine connector, battery (+), starter, pre-heat and ground wires.
- Mounting bracket has an additional plate to accommodate specific engine mount location

WDU0815 Panel Number 30-70-0815 used on DEUTZ 912/913 Engine

- Includes Loose External Wire Harness that plugs into back of panel, starter and pre-heat wires.
- Deutz supplied engine harness also plugs into back of panel

WDU0816 Panel Number 30-70-0816 used on DEUTZ 914 Engine

- Includes a relay housed internal to the panel for the fuel solenoid
- Includes Loose External Wire Harness that plugs into back of panel, starter and pre-heat wires.
- Deutz supplied engine harness also plugs into back of panel

WDU865 Panel Number 30-70-0865 used on Deutz 914 TIER 3 engines.

- Includes a relay housed internal to the panel for the fuel solenoid
- Includes Loose External Wire Harness that plugs into back of panel, starter and pre-heat wires.
- Deutz supplied engine harness also plugs into back of panel

Swichgage® Shutdown Panels for High Plains and Other Irrigation Engines – WHB Series



Features

- Ideal for High Plains Irrigation Engines
- Mounts Directly to Engine Flywheel Housing
- Swichgage Instruments for Low Oil Pressure, High Coolant Temperature and Ammeter
- Provision for Additional Instruments

The **WHB Series** open type panels are the industry standard for High Plains irrigation engines. These panels bolt directly to the engine flywheel housing. They include Swichgage protection for low engine oil pressure and high coolant or high oil temperature, and have provision to add an additional Swichgage instruments, such as pump discharge pressure, voltage regulator, throttle cable, and start button or switch.

For diesel engines without shut-down solenoid in the injection pump, add a Murphy SV Series solenoid fuel shut-off valve or RP2300 series rack puller solenoid (for details visit <http://www.fwmurphy.com>).

Swichgage products are two-instruments-in one: (1) an accurate indicating gage with (2) a built-in, adjustable limit switch.

Panel Kits Include:

- Low Lube Oil Pressure Swichgage instrument
- High Coolant/ Temperature Swichgage instrument
- 117PH Magnetic Switch.
- PB128S Emergency Stop Push Button.
- Ammeter 60-0-60.
- Provisions for additional Swichgage controls, such as irrigation pump pressure or engine oil temperature.

Specifications

Low Lube Oil Pressure Swichgage instrument:

- 0-100 psi (0-689 kPa) [0-6.89 bar]
- 1/8 NPT process connection

High Coolant/Oil Temperature Swichgage instrument:

- 130-250°F (54-121°C)
- 48 in. (1.2 m) capillary
- 1/2 NPT process connection

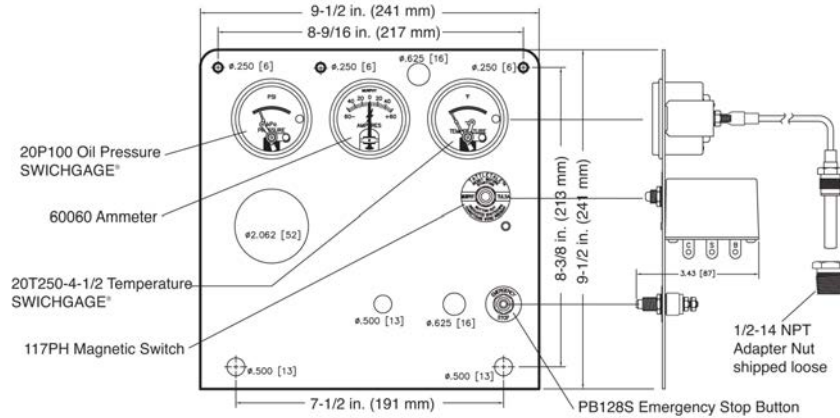
117PH

Ammeter: 60-0-60

Shipping Weight: 8 lbs. 8 ozs. (3.9 kgs.)

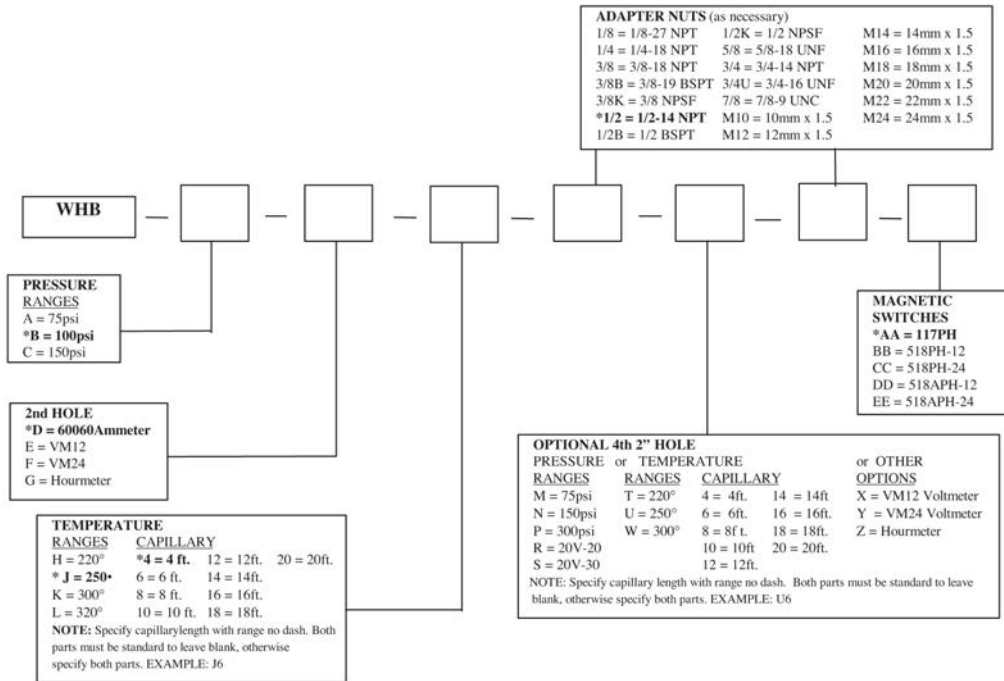
Shipping Dimensions: 9.5 x 9 x 5 in. (241 x 229 x 127 mm)

Dimensions



NOTE: This is an standard schematic. if non-standard components are specified, this schematic my not exactly reflect your panel.

How to Order



NOTES:

- * = Standard Component or Range and is not required for ordering, see section notes if section has two parts to specify.
- If requirements are outside of the matrix, order panel with free formed text and use the '3050xxxx' product number of the base model.

Shutdown Panel Kits for Deutz and Other Engines - W0156 and W0169 Series



Features

- Protection Against Dangerously Low Oil Pressure or High Temperature
- Closed-loop Circuitry Ensures Proper Operation at All Times
- Weatherproof and Shock-Mounted
- Complete Kit Ready for Easy Installation
- Fits Deutz FL912 and FL913 Series and Other Engines Description

The W0156 and W0169 panel kits were developed specifically for air-cooled and liquid-cooled engines where a weather proof engine panel is required. Both kits features Swichgag[®] protection for low engine oil pressure and high cylinder head or high oil temperature. Shock-mounted panel bolts directly to the flywheel housing or bracket of your design.

These kits were originally designed for Deutz FL912 and FL913 series engines, but can be used on a variety of engines. Internal wiring mates with standard Deutz circuit.

Panel kits include:

- Low Lube Oil Pressure Swichgag instrument
- Cylinder Head/Oil Temperature Swichgag instrument
- 518PH Magnetic Switch.
- Alternator failure light.

- Ignition key switch.
- Provisions for additional Swichgag instruments such as irrigation pump pressure or voltmeter/ammeter etc.
- Provisions for tachometer.

Swichgag products are two instruments in one: (1) an accurate indicating gage with (2) a built-in, adjustable limit switch.

A 518PH Magnetic Switch provides a Closed-loop circuit to ensure proper operation at all times. The 518PH allows the system to be sensitive to open circuits, broken wires, false grounds, corrosion, loss of power and other factors which could otherwise prevent the protective controls from operating.

The mounting panel is enclosed. Panel Kits are prewired and ready to install and are available for 12 or 24 VDC systems.*

Specifications

Low Lube Pressure Swichgag:

- 0-100 psi (0-689 kPa) [0-6.89 bar].
- 1/8 NPT process connection.

Temperature Swichgag:

- Cylinder Head Temperature (W0156): 160-320°F (71-160°C), M10 x 1.5 process connection.

- Oil Temperature (W0169): 130-250°F (54-121°C), 1/2NPT process connection (see Murphy General Catalog for optional sizes).
- 48 in. (1.2 m) capillary.

518PH Magnetic Switch: 12 or 24 volt (specify).

Shipping Weight: 14lb. (6.4 kgs.).

Shipping Dimensions: 14-7/8 x 14-7/8 x 6-3/4 in. (378 x 378 x 171 mm).

How to Order

Specify part number.

W0156: For air-cooled engines.

W0169: For liquid-cooled engines.

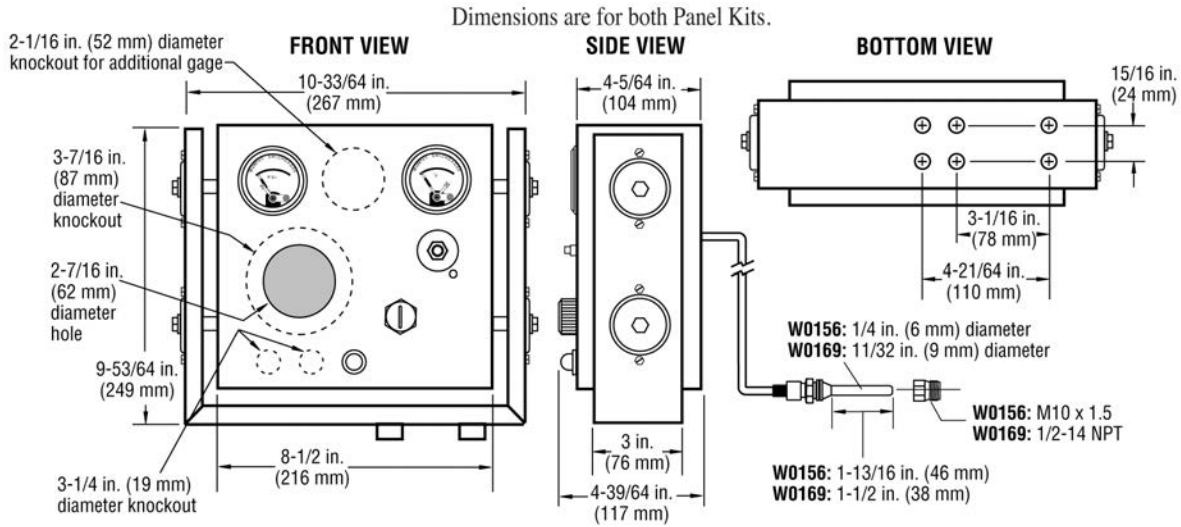
■ *NOTE: 12 volt kit is standard. If you require 24 volt kit-specify when ordering.



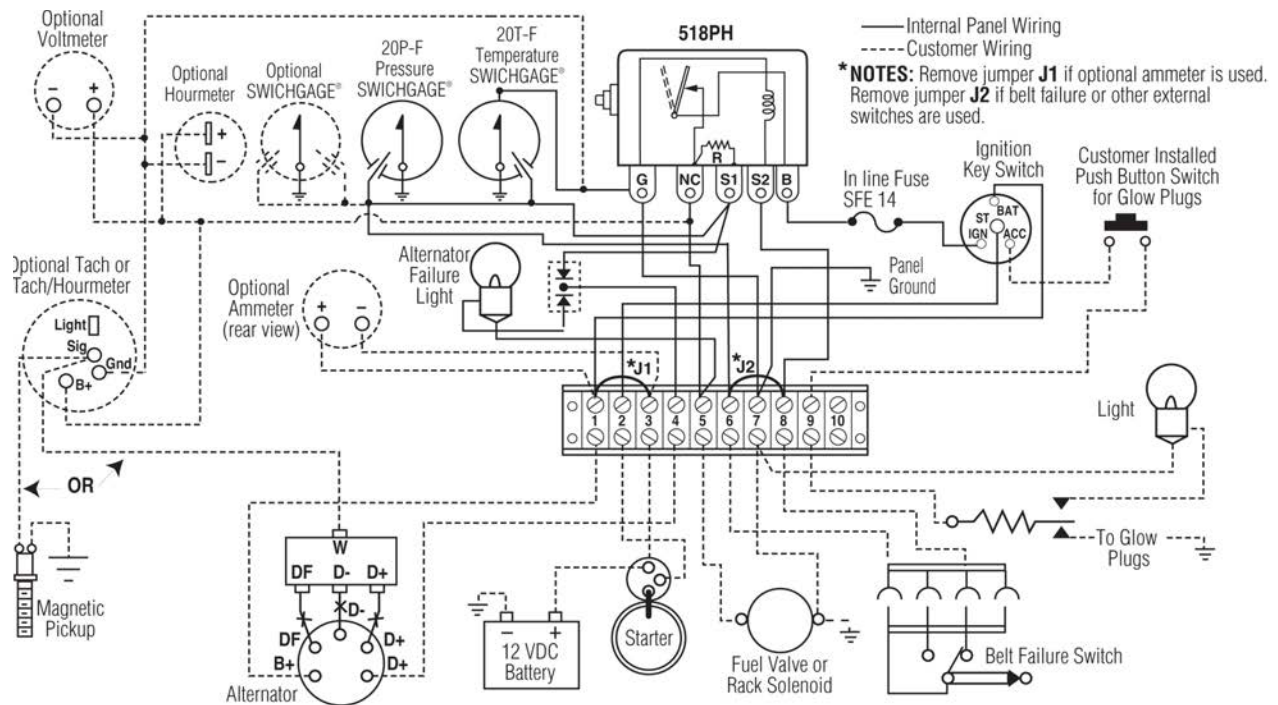
CAUTION: Certain danger to human and to equipment such as applied in a mobile or marine application may occur if some equipment is stopped without pre-warning. It is therefore, recommended that monitored functions be limited to alarm only or to alarm before shutdown in such applications.

Dimensions

Dimensions are for both Panel Kits.



Typical Wiring Diagram for Deutz



Swichgag[®] Diagnostic Panel Kits For Cummins B and C-Series Engines W0162 and W0163



Features

- Includes Swichgag Instruments for Critical Engine Protection
- Complete and Ready to Install
- Provision for Throttle Cable
- Fits B and C-Series Open or Closed Power Units

Designed specifically for Cummins B and C-Series engines, these kits are complete with all components ready for installation. The kit will mount directly to Cummins supplied mounting bracket part no. EG-9907 (4B/T/TA3.9-P) or EG-9904 (6B/T/TA5.9-P). See p-2. These kits include our exclusive SWICHGAGE[®]s for basic engine protection. A Closed-loop protective circuit is provided by Murphy 518PH magnetic switch to ensure proper operation at all times.

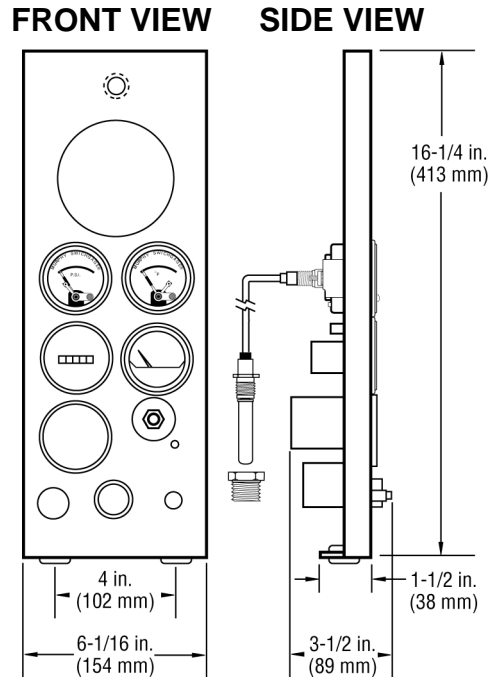
Features

- Unitized kit with all components
- Shock mounted panel fully assembled
- Closed-loop circuit
- Provision for additional Swichgag instruments, such as irrigation pump pressure
- Provision for tachometer and throttle cable
- Complete wiring harness allows easy installation

Kit Includes

- Oil pressure Swichgag instruments
- Coolant temperature Swichgag instruments
- Voltmeter
- Hourmeter
- Emergency stop push button
- Key or push button start (specify)
- Face mounted fuse
- Starter auxiliary solenoid kit (complete)
- Necessary bolts, nuts, etc. for complete kit mounting

Dimensions (Dimensions below are for both kits)



INSTALLATION INSTRUCTIONS



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.

Open Power Unit

1. Remove battery ground and secure to prevent unintentional contact.
2. Attach oil line to pressure Switchage. Use sealant tape or pipe dope.



CAUTION: Do not allow sealant to plug pressure Switchage orifice.

3. Feed wire harness through bottom 2 in. (51 mm) dia. hole in bracket EG-9907/EG-9904.
4. Feed oil line through upper 2 in (51 mm) dia. hole in bracket EG-9907/EG-9904.
5. Install panel onto mounting bracket and secure.
6. Install oil line into engine oil galley. Use sealant tape or pipe dope.
7. Install temperature sensing bulb into water jacket.



CAUTION: Be sure capillary tube is routed away from exhaust manifold.

8. Connect wire 7A to hot terminal of fuel solenoid.
9. Connect wire 8A to engine block (ground).

10. Mount starter solenoid (auxiliary magnetic switch) to bracket 30050670 and mount assembly to engine below starter.
11. Connect wire 11B to starter terminal "S"
12. Connect wires 6A, 9B, and 10B to starter terminal "Batt"
13. Connect wire 10A to either of the large terminals on starter solenoid (auxiliary magnetic switch). Connect wire 11A to other large starter solenoid terminal.
14. Connect wire 5A to either of the small terminals on the starter solenoid. Connect wire 13A to the other small terminal.
15. Connect plug (wires 1A, 4A, and 12A) to alternator.
16. Connect wire 9A and 12B to battery terminal on alternator.
17. Be sure all connections are tight and reconnect battery ground cable.
18. Service engine according to manufacturer's instructions.
19. To start engine, depress and hold red reset button on panel face (518PH magnetic switch) while cranking. Observe that oil pressure has been established and release reset button. If reset button pops out the engine will stop. Refer to the 518PH installation operation instructions.

Closed Power Unit

1. Remove battery ground and secure to prevent unintentional contact.
2. Enlarge panel cutout on engine enclosure to fit hole pattern on panel face and expose full panel face.

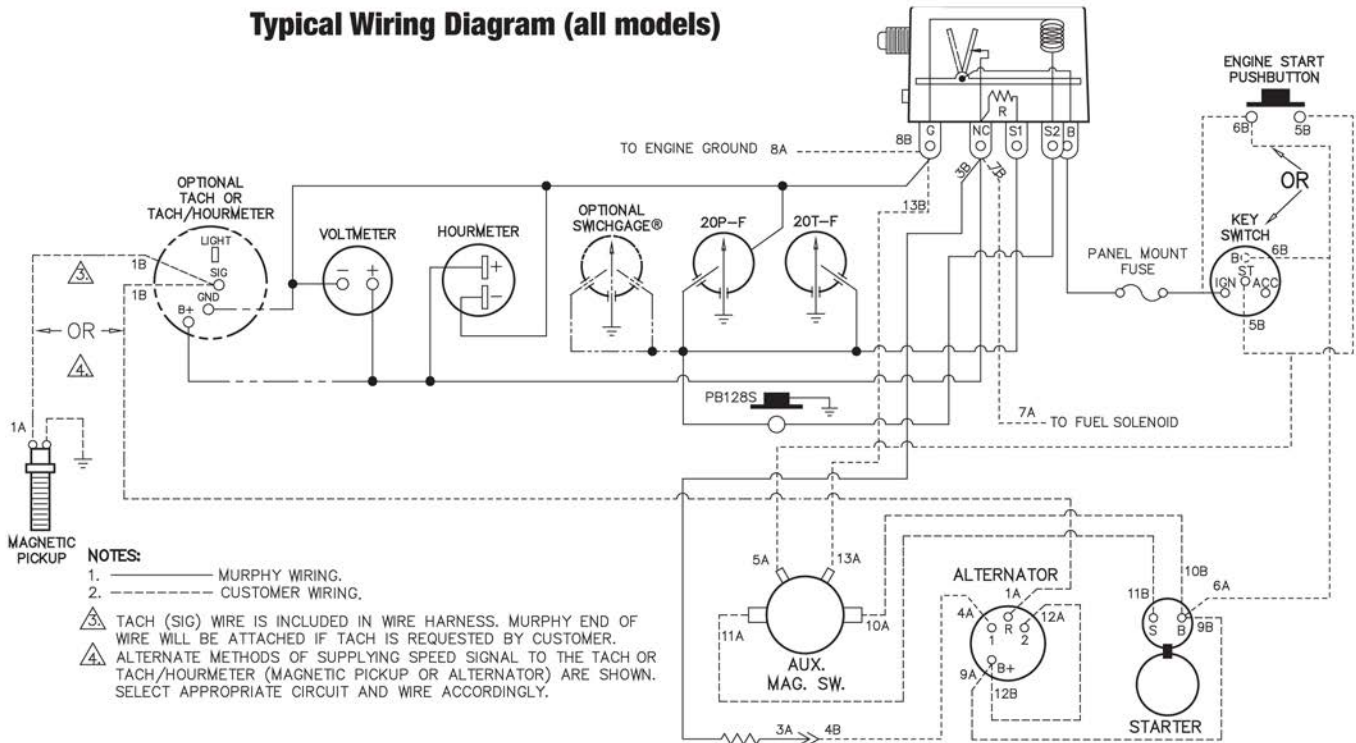


CAUTION: Do not allow sealant to plug pressure Switchgage orifice.

4. Attach Switchgagge panel assembly to rear side of cutout.
5. Follow steps 7 through 19 for open power units.

Typical Wiring Diagram (all models)

Typical Wiring Diagram (all models)



How to Order: Order by model number.

W0162: Includes an ignition key start

W0163: Includes push button start.

(Optional) DHK: Deluxe oil pressure line assembly

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Swichgag[®] Shutdown Panel Kit – W0168 and W0241



W0168

Features

- Protection Against Dangerously Low Oil Pressure or High Temperature
- Closed-loop Circuitry Ensures Proper Operation at All Times
- Operates on 12 or 24 VDC Systems*
- Complete Kit Ready for Easy Installation
- Universal Mounting Panel Description

The W0168 and W0241 panel kits are universal-fit instrument panels for most industrial engines. They include Swichgag protection for low engine oil pressure and high coolant or high oil temperature. These Panel Kits are similar—the W0168 has a start/stop key switch and the W0241 has a start push button.

Panel kits include:

- Low Lube Oil Pressure Swichgag instrument.
- High Coolant/Oil Temperature Swichgag.
- 518PH Magnetic Switch.
- Emergency stop push button.
- Ignition key switch for start/stop (W0168).
- Push button for start (W0241).
- Ammeter 60-0-60.
- Provisions for additional Swichgag controls, such as irrigation pump pressure or engine oil temperature.
- Provisions for tachometer and throttle cable.

Swichgag product is two-instruments-in one: (1) an accurate indicating gage with (2) a built-in, adjustable limit switch.

A 518PH Magnetic Switch provides a Closed-loop circuit to ensure proper operation at all times. The 518PH allows the system to be sensitive to open circuits, broken wires, false grounds, corrosion, loss of power and other factors which could otherwise prevent the protective controls from operating.

The universal mounting panel is enclosed on all 4 sides with open back. An optional back cover (model no. 30050800) is available for both kits. Panel Kits are prewired and ready to install and are available for 12 or 24 VDC systems.*

Specifications

Low Lube Oil Pressure Swichgag Instrument:

- 0-100 psi (0-689 kPa) [0-6.89 bar]
- 1/8 NPT process connection

High Coolant/Oil Temperature Swichgag Instrument:

- 130-250°F (54-121°C)
- 48 in. (1.2 m) capillary
- 1/2 NPT process connection

518PH Magnetic Switch:

12 or 24 volt (specify)

Ammeter: 60-0-60

Shipping Weight: 8 lbs. 8 ozs. (3.9 kgs.)

Shipping Dimensions:

16 x 11 x 5-1/2 in. (406 x 279 x 140 mm)

How to Order

To order a Shutdown Panel Kit for your application, specify model number.

W0168

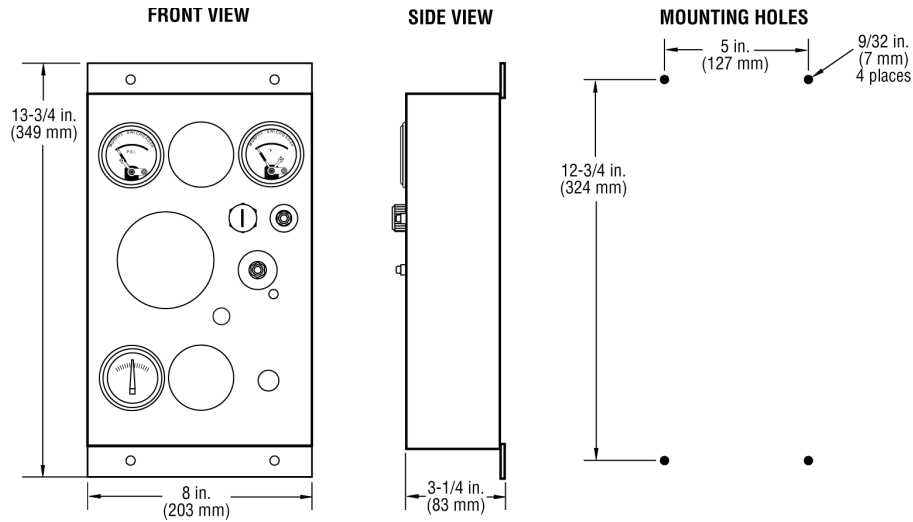
W0168B (back cover)

W0241

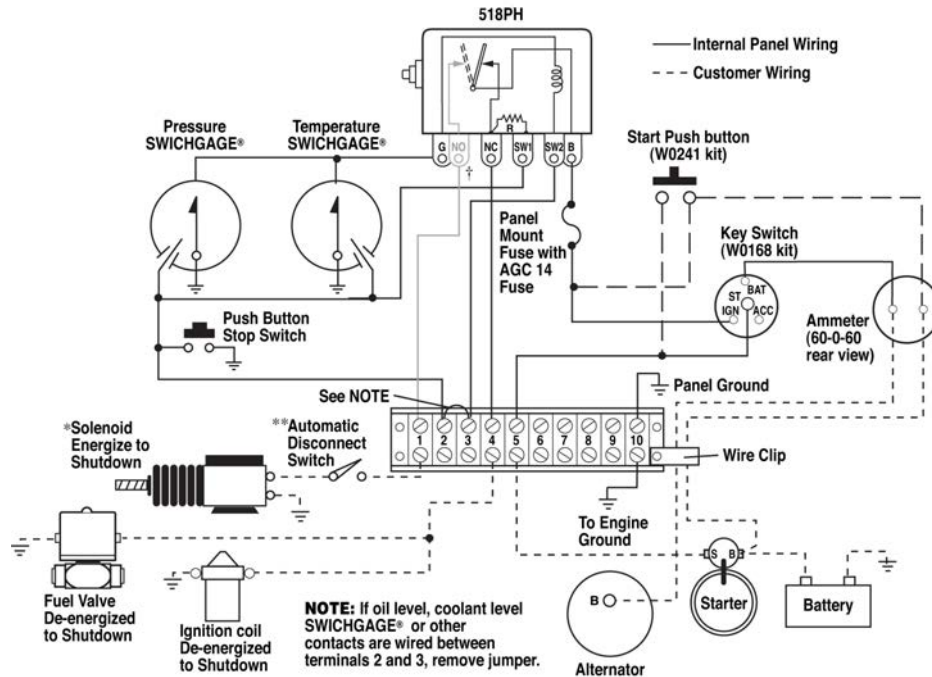
* NOTE: 12 volt kit is standard. If you require 24 volt kit—specify when ordering.

Dimensions

Dimensions below are for both Panel Kits.



Typical Wiring Diagram



*Key Switch must remain in "ON" position.

**Such as N.O. fuel pressure switch part number 00-00-0421.

† Normally Open terminal available on model 518APH.

Swichgage® Shutdown Panel Kit Model W0270



Features

- Fits Caterpillar, Perkins and Detroit Diesel 4 and 6 Cylinder Engines
- Complete Kit Ready for Easy Installation
- Includes Wiring Harness
- Mount Either Side of Engine, or On Top
- Enclosed and Shock-Mounted
- Easily Expandable

The W0270 is a compact, low profile Swichgage shutdown panel kit. It is designed to fit the following power units:

- Caterpillar 3054 and 3056
- Perkins 1004 and 1006
- Detroit Diesel 1000 Series.

A universal shock-mounted bracket allows mounting on either side of the engine, or on top, for your power unit configurations. The kit is ready for quick, easy installation with provision for installing customer supplied ignition/start key switch. All wiring is included in the panel.

This panel kit is ideal for all types of power unit applications—irrigation pumps, grain dryers, compressors, generators, etc.

Standard Features

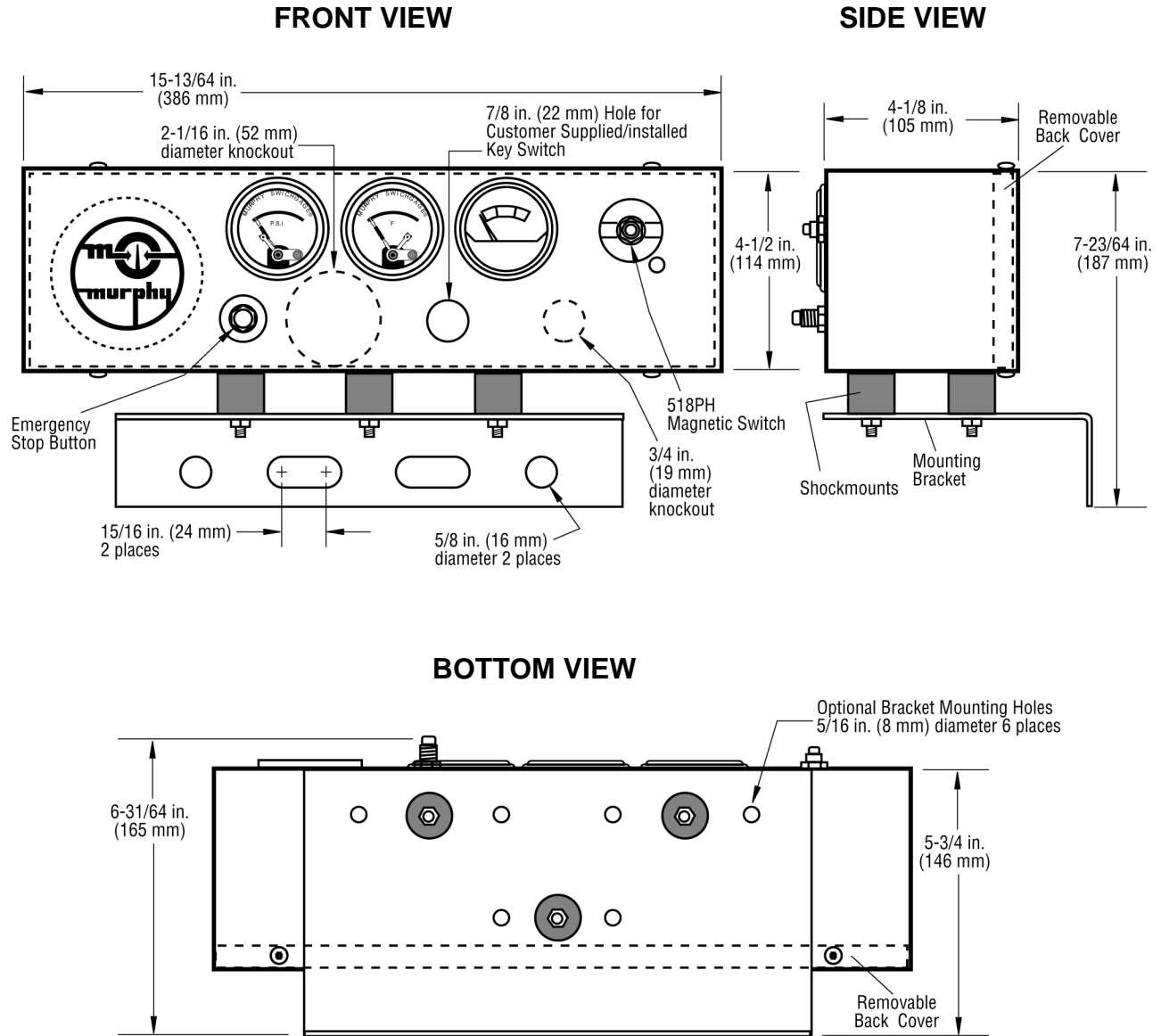
- Engine oil pressure monitoring Swichgage instrument (20P-F)
- Coolant temperature monitoring Swichgage instrument (20T-F)
- Voltmeter (VM12/VM24)
- Closed-loop 518PH Magnetic Switch
- Emergency stop button (PB128S)
- Provision for throttle cable
- Provision for customer supplied key switch (loom is prewired—mount and plug-in)
- Provision for optional tachometer or hourmeter (loom is prewired)
- Provision for one additional Swichgage instrument such as irrigation pump discharge pressure monitoring
- All items prewired including tachometer or hourmeter
- Complete external wiring harness including wiring for pre-heat and shutdown solenoid

How to Order

Specify model number and voltage when ordering.

Order oil line assembly separately.

Dimensions



Swichgag[®] Panel Assembly for DEUTZ 413, 511, 912, and 913 Series – WDU-0277



Features

- OEM Replacement Panel
- Complete Kit
- Weatherproof
- Full Features

Description

The WDU-0277 Swichgag instrument panel is suitable for all open frame DEUTZ 413, 511, 912 and 913 series engines. This OEM panel is ideal for all power unit applications such as pumps, generators and compressors.

Swichgag instruments are provided for engine oil pressure and cylinder head temperature. Also included is a complete array of components for easy installation.

The panel mounts onto existing pads on the flywheel housing and can face to either side of the engine. Shockmounts in the mounting bracket provide protection from shock and normal vibration for the panel and its components.

Specifications

- Weatherproof panel with hinged and gasketed rear access door.
- Suspension shock mounted bracket
- Low Lube Oil pressure Swichgag with 2 ft. (0.61 m) oil pressure line and banjo fitting.
- High Cylinder Head temperature Swichgag with 4 ft. (1.2 m) capillary tubing.
- Magnetic Switch/relay for automatic shutdown
- Ammeter
- Hourmeter
- Off-Ign-Heat-Start Key switch
- Alarm lights for Alternator Failure and Preheat
- Fuel return check valve (not shown)
- Plug-in wire connector to match Deutz wire harness (not shown)
- Provision for 3 additional Swichgag or Murphygag[®] instruments.

How to Order

To order the WDU-0277, specify model and voltage. Example: **WDU-0277-12**

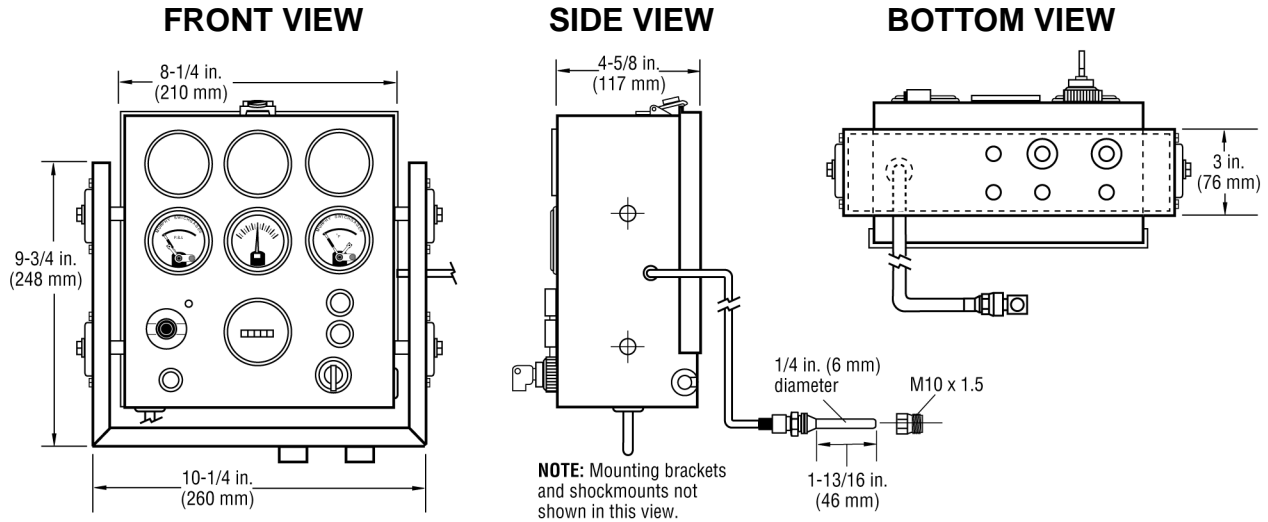
WDU – 0277 –

Voltage

12 = 12 VDC

24 = 24 VDC

Dimensions



CAUTION: "OIL FILLED INSTRUMENTS CONTAIN SILICON OIL" Exposure may be hazardous under certain circumstances. "DO NOT CUT CAPILLARY" It contains chemicals or solvents which may be hazardous under certain circumstances. "Keep out of Eyes, Mouth and Do Not expose to Skin" Keep out of reach of children. Flush thoroughly with water and seek medical attention. If swallowed, call physician immediately. MSDS Sheets are available by calling: 918/627-3550.



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.

MurphyLink® Series ML25 Panels



Features

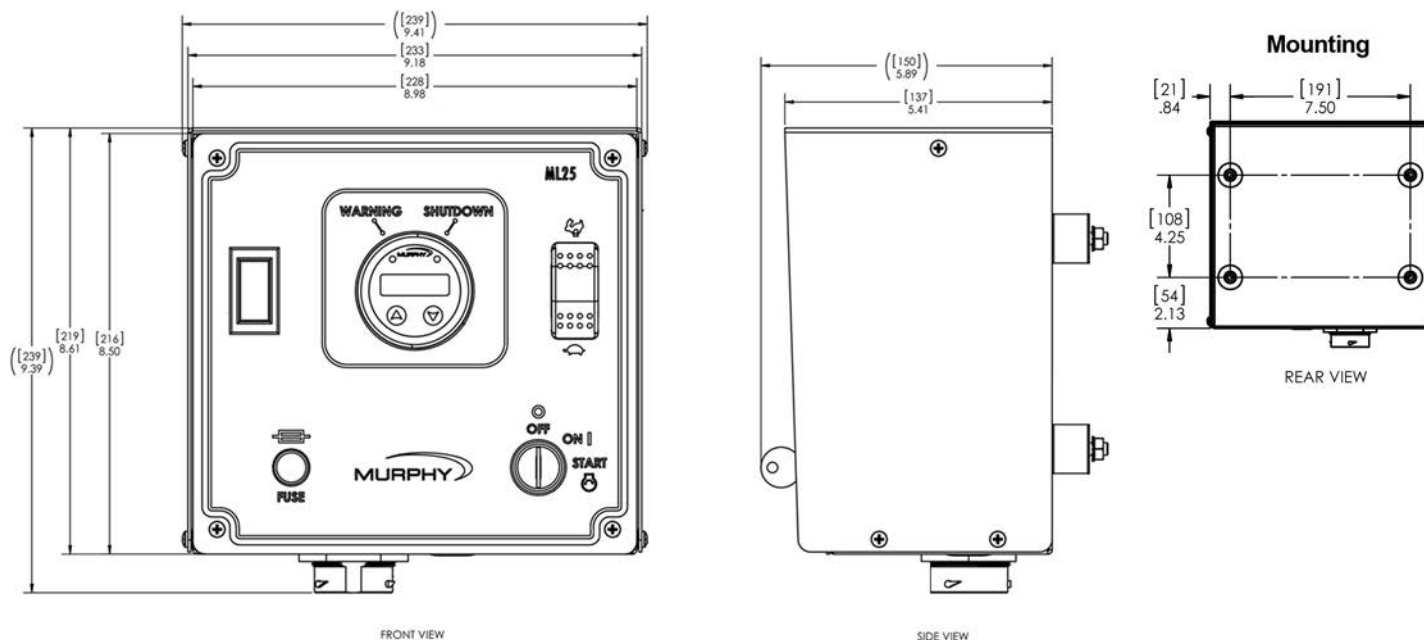
- Tier 4/Stage IIIB/IV Compliant/Ready
- Compact J1939-Compliant Device for Electronically Controlled Engines
- Displays up to 20 Standard J1939 Parameters
- Active and Stored Diagnostic Trouble Codes
- Provides Enhanced Visual Alarm Indication Using Bright ALARM and SHUTDOWN LEDs

The MurphyLink® Series ML25 Panels feature the PowerView™ PV25, an engine and diagnostic display in an economical and compact package. This J1939-compliant device provides electronic engine parameter data, is simple to install, and matches the PowerView line of rugged displays. The PV25 can be powered by 12 or 24 volt systems.

The PV25 is equipped with two push buttons to quickly access a convenient menu. In addition, a back-lit graphic display and two LED's indicate Active-fault Alarm or Shutdown status.

Active and Stored Fault messages display the SPN (Suspect Parameter Number), FMI (Failure Mode Indicator) and the OC (Occurrence Count) using the SAE J1939 protocol.

Product and Mounting Dimensions



Specifications

Operating Voltage:	12/24 VDC (6.5-32VDC Minimum and Maximum Voltage)
Operating Current:	850mA MAX
Mounting:	4-.75" Rubber Isolated Shockmounts
Starting Method:	KeySwitch
Stopping Method:	KeySwitch
Display:	PowerView Model 25
Indication Lamps:	One red, One Amber via PV25 Display
Enclosure Material:	Powder Coated Cold Rolled Steel
Wiring Interface:	1-Deutsch HDP 21pin Connector
Throttle Method:	Rocker Switch (Digital Inputs to ECU)
Tier 4 Regeneration:	CAN Enabled (via PV25) or Rocker Switch (via Digital Input to ECU)
Operational Temperature:	-40° to +70°C (-40° to +158°F)
Storage Temperature:	-55° to +85°C (-67° to +185°F)
Box Dimensions:	15.4 X 13.4 X 8.5
Shipping Weight:	9.5 lbs

How to Order

<i>Description</i>	<i>Throttle</i>	<i>Volt</i>	<i>Panel</i>	<i>Model Number</i>	<i>Part #</i>
PV25 Flat Only	PTO Ramp	12/24	Flat	ML25-FP	32700190
PV25 Enclosed			Enclosed	ML25	32700191
PV25 Flat Only w/ T4 switch	PTO Ramp T4 Rocker	12/24	Flat	ML25-T4-FP	32700192
PV25 Enclosed w/ T4 switch			Enclosed	ML25-T4	32700193

MurphyLink® Series ML50 Panels



Features

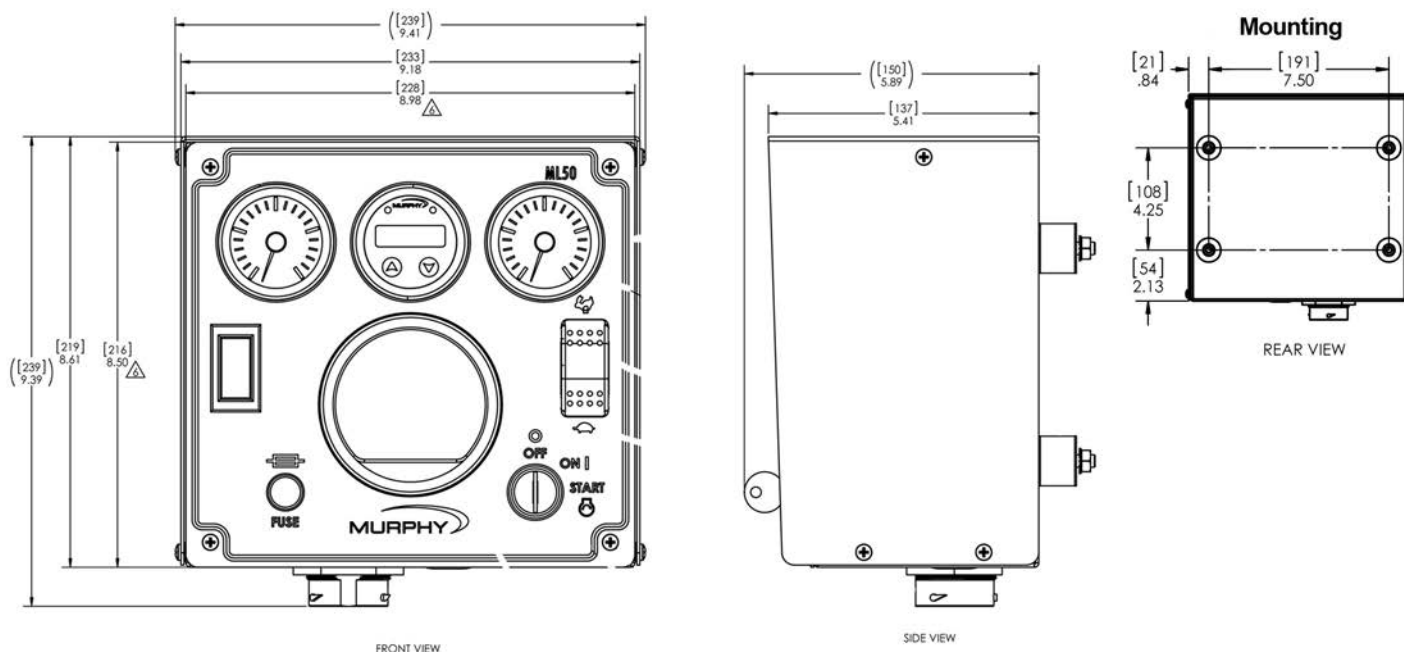
- Tier 4/Stage IIIB/IV Compliant/Ready
- Compact J1939-Compliant Device for Electronically Controlled Engines
- Displays up to 20 Standard J1939 Para-Meters
- Active and Stored Diagnostic Trouble Codes
- Analog Gages
- Provides Enhanced Visual Alarm Indication Using Bright ALARM and SHUTDOWN LEDs

The MurphyLink® Series ML50 Panels feature PVCAN gages and the PowerView™ PV25, an engine and diagnostic display in an economical and compact package. This J1939-compliant device provides electronic engine parameter data, is simple to install, and matches the PowerView line of rugged displays. The PV25 can be powered by 12 or 24 volt systems.

The PV25 is equipped with two push buttons to quickly access a convenient menu. In addition, a back-lit graphic display and two LED's indicate Active-fault Alarm or Shutdown status.

Active and Stored Fault messages display the SPN (Suspect Parameter Number), FMI (Failure Mode Indicator) and the OC (Occurrence Count) using the SAE J1939 protocol.

Product and Mounting Dimensions



Specifications

Operating Voltage:	12/24 VDC (6.5-32VDC Minimum and Maximum Voltage)
Operating Current:	1.2A MAX
Mounting:	4-.75" Rubber Isolated Shockmounts
Starting Method:	KeySwitch
Stopping Method:	KeySwitch
Display:	PowerView Model 25
Indication Gauges	1) Engine Temperature 2) Engine Oil Pressure 3) Engine Speed (Analog Tachometer)
Indication Lamps:	One red, One Amber via PV25 Display
Enclosure Material:	Powder Coated Cold Rolled Steel
Wiring Interface:	1-Deutsch HDP 21pin Connector
Throttle Method:	Rocker Switch (Digital Inputs to ECU)
Tier 4 Regeneration:	CAN Enabled (via PV25) or Rocker Switch (via Digital Input to ECU)
Operational Temperature:	-40° to +70°C (-40° to +158°F)
Storage Temperature:	-55° to +85°C (-67° to +185°F)
Box Dimensions:	15.4 X 13.4 X 8.5
Shipping Weight:	10.5 lbs

How to Order

<i>Description</i>	<i>Throttle</i>	<i>Volt</i>	<i>Panel</i>	<i>Model Number</i>	<i>Part #</i>
PV25 w/ gages Flat Only	PTO Ramp	12/24	Flat	ML50-FP	32700212
PV25 w/ gages Enclosed			Enclosed	ML50	32700213
PV25 w/ gages Flat Only w/ T4 switch	PTO Ramp T4 Rocker	12/24	Flat	ML50-T4-FP	32700214
PV25 w/ gages Enclosed w/ T4 switch			Enclosed	ML50-T4	32700215

MurphyLink® Series ML100 Panels



Features

- Tier 4/Stage IIIB/IV Compliant/Ready
- Standard Panel Designed for Modern Electronic Engines and Equipment Applications Using SAE J1939 Controller Area Network (CAN)
- PowerView™ Model 101 Displays Over 50 Standard SAE J1939 Parameters Broadcast by Major Engine and Transmission Manufacturer's ECU's
- Display Active Faults and ECU-Stored Faults With Text Description on Most Common Faults for Diagnosing Equipment Malfunctions
- Standard Harnesses Available for Most Major Engine Manufacturers ECU's
- Enclosed Design or Flat Panel Option

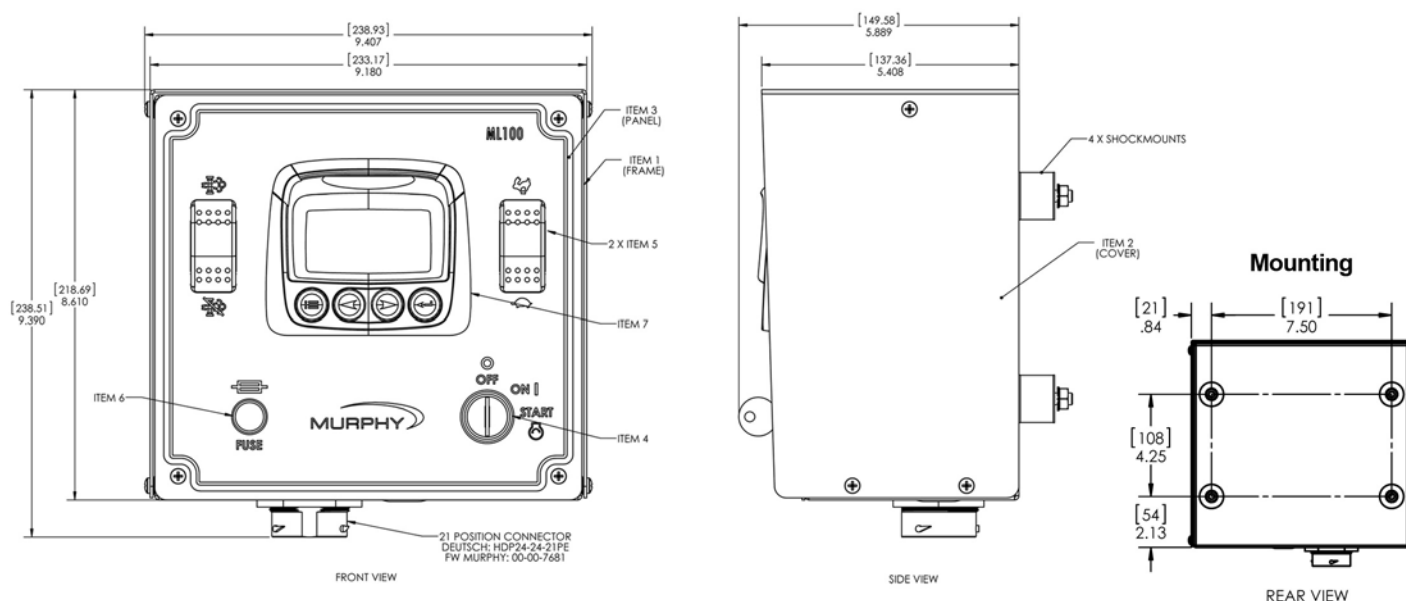
The MurphyLink® Series ML100 Panel features the PV101-C display, which was developed to meet the needs for instrumentation and control on electronically controlled engines communicating using the SAE J1939 Controller Area Network (CAN).

This basic panel contains a key switch, increment/decrement throttle and the PowerView. This standard panel can be ordered with or without an enclosure, since all of the components are assembled to a stand-alone flat panel. Optional mounting kits are offered for the enclosure, which provide packagers and operators numerous mounting solutions to meet multiple applications. Panel designs are offered to meet the needs of specific engine models. In addition, FW Murphy offers standard wiring harnesses for quick Plug and Go operation that interface with all the 2nd Generation MurphyLink PowerView panels.

The PV101 Display is a multifunction tool that enables equipment operators to view many different engine or transmission parameters and service codes. The PowerView includes a graphical backlit LCD screen. It has excellent contrast and viewing from all angles. The display can show either a single parameter or a quadrant display for viewing four parameters simultaneously. Diagnostic capabilities include fault codes with text translation for the most common fault conditions.

The PowerView has four buttons using touch-sensitive technology, which eliminates the concern for push button wear and failure. In addition operators can navigate the display with ease. Enhanced alarm indication uses ultra bright alarm and shutdown LED's (amber and red). The PowerView has a wide operating temperature range of -40 to +85°C (-40 to 185°F), display viewing -29 to +85°C (-20 to 185°F), and environmental sealing to +/- 5 PSI.

Product and Mounting Dimensions



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Specifications

Operating Voltage:	12/24 VDC (6.5-32VDC Minimum and Maximum Voltage)
Operating Current:	1A MAX
Mounting:	4-.75" Rubber Isolated Shockmounts
Starting Method:	KeySwitch
Stopping Method:	KeySwitch
Display:	PowerView Model 101-C
Indication Lamps:	One red, One Amber via PV101-C Display
Enclosure Material:	Powder Coated Cold Rolled Steel
Wiring Interface:	1-Deutsch HDP 21pin Connector
Throttle Method:	Rocker Switch (Digital Inputs to ECU) TSC1 CAN Throttling (via PV101)
Tier 4 Regeneration:	CAN Enabled (via PV101) or Rocker Switch (via Digital Input to ECU)
Operational Temperature:	-40° to +70°C (-40° to +185°F)
Viewable Temperature:	-29° to +85°C (-20° to +185°F)
Storage Temperature:	-40° to +85°C (-40° to +185°F)
Box Dimensions:	15.4 X 13.4 X 8.5
Shipping Weight:	9.5 lbs

How to Order

<i>Description</i>	<i>Throttle</i>	<i>Volt</i>	<i>Panel</i>	<i>Model Number</i>	<i>Part #</i>
PV101 Flat only	PTO Ramp	12/24	Flat	ML100-FP	32700198
PV101 Enclosed			Enclosed	ML100	32700199
PV101 Flat only w/ T4 switch	PTO Ramp T4 Rocker	12/24	Flat	ML100-T4-FP	32700200
PV101 Enclosed w/ T4 switch			Enclosed	ML100-T4	32700201

MurphyLink® Series ML150 Panels



Features

- Standard Panel Designed for Modern Electronic Engines and Equipment Applications Using SAE J1939 Controller Area Network (CAN)
- PowerView™ Model 101 Displays Over 30 Standard SAE J1939 Parameters Broadcast by Major Engine and Transmission Manufacturer's ECU's
- Display Active Faults and ECU-Stored Faults With Text Description On Most Common Faults for Diagnosing Equipment Malfunctions
- Standard Harnesses Available for Most Major Engine Manufacturers ECU's
- Enclosed Design or Flat Panel Option

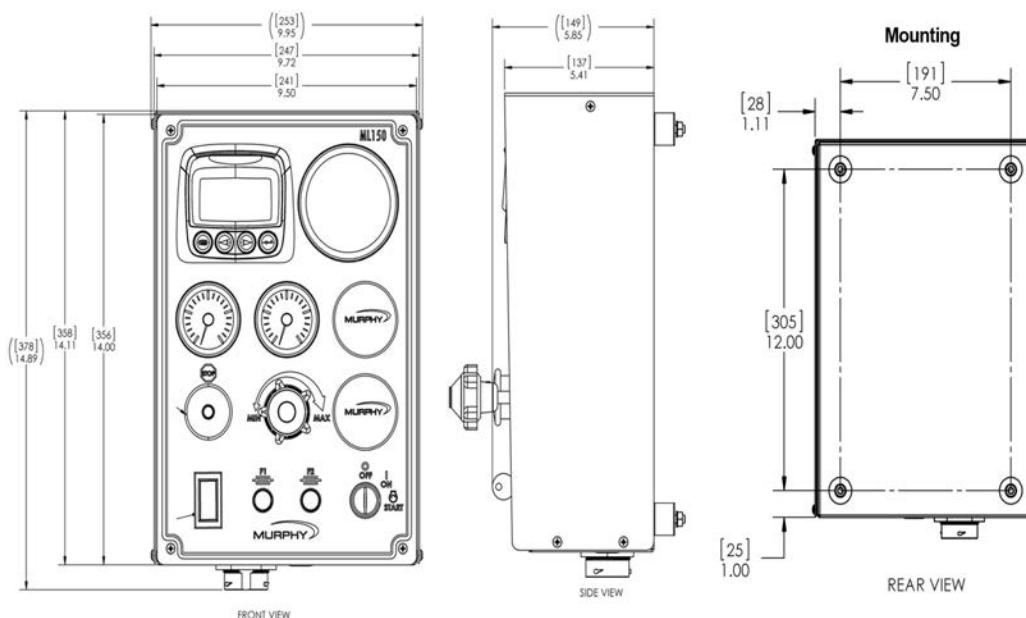
The MurphyLink® Series ML150 Panels include the PowerView PV101-C display and the M-Link™ PowerView Analog gages. They are part of the J1939 MurphyLink Family developed to meet the needs for instrumentation and control on electronically controlled engines communicating using the SAE J1939 Controller Area Network (CAN).

The PV101 display is a multifunction tool that enables equipment operators to view many different engine or transmission parameters and service codes. The panels provide a window into modern electronic engines. The PowerView includes a graphical backlit LCD screen. It has excellent contrast and viewing from all angles. The display can show either a single parameter or a quadrant display for viewing four parameters simultaneously. Diagnostic capabilities include fault codes with text translation for the most common fault conditions.

Other components in the panels are microprocessor-based M-Link PowerView Analog Gages for displaying critical engine data broadcast by an electronic engine: engine RPM, oil pressure, and coolant temperature.

The ML150 Series panels are available in an enclosure or stand-alone flat panel option that can be dropped into a dash or console. This standard panel can be ordered with or without an enclosure. Optional mounting kits are offered for the enclosure, which provide packagers and operators numerous mounting solutions to meet multiple applications.

Product and Mounting Dimensions



Specifications

Operating Voltage:	12/24 VDC (8-32VDC Minimum and Maximum Voltage)
Operating Current:	1.4A MAX
Mounting:	4-.75" Rubber Isolated Shockmounts
Starting Method:	KeySwitch
Stopping Method:	KeySwitch
Display:	PowerView Model PV101-C
Indication Lamps:	One red, One Amber via PV101-C Display
Enclosure Material:	Powder Coated Cold Rolled Steel
Wiring Interface:	1-Deutsch HDP 21pin Connector
Throttle Method:	Rocker Switch (Digital Inputs to ECU) or Hand Throttle (PWM or 0-5V) TSC1 CAN Throttling (via PV101)
Tier 4 Regeneration:	CAN Enabled (via PV101) or Rocker Switch (via Digital Input to ECU)
Operational Temperature:	-40° to +85°C (-40° to +185°F)
Viewable Temperature	-29° to +85°C (-20° to +185°F)
Storage Temperature:	-40° to +85°C (-40° to +185°F)
Box Dimensions:	21.5 X 13.5 X 8.5
Shipping Weight:	16.0 lbs

How to Order

<i>Description</i>	<i>Throttle</i>	<i>Volt</i>	<i>Panel</i>	<i>Model Number</i>	<i>Part #</i>
PV101 Flat only	PTO Ramp	12/24	Flat	ML150-FP	32700202
PV101 Enclosed			Enclosed	ML150	32700203
PV101 Flat only w/ T4 switch	PTO Ramp T4 Rocker		Flat	ML150-T4-FP	32700204
PV101 Enclosed w/ T4 switch			Enclosed	ML150-T4	32700205
PV101 Flat only Stop Button, Morse 5V	PWM Morse & E-Stop		Flat	ML150-ES-MT5V-FP	32700216
PV101 Enclosed Stop Button, Morse 5V			Enclosed	ML150-ES-MT5V	32700217
PV101 Flat only Stop Button, Morse 5V w/ T4 switch	PWM Morse & E-Stop		Flat	ML150-T4-ES-MT5V-FP	32700206
PV101 Enclosed Stop Button, Morse 5V w/ T4 switch			Enclosed	ML150-T4-ES-MT5V	32700207
PV101 Flat only Stop Button, Morse PWM	0-5V Morse & E-Stop		Flat	ML150-ES-MTPWM-FP	32700218
PV101 Enclosed Stop Button, Morse PWM			Enclosed	ML150-ES-MTPWM	32700219
PV101 Flat only Stop Button, Morse PWM w/ T4 switch	0-5V Morse & E-Stop		Flat	ML150-T4-ES-MTPWM-FP	32700208
PV101 Enclosed Stop Button, Morse PWM w/ T4 switch			Enclosed	ML150-T4-ES-MTPWM	32700209

MurphyLink® Series ML300 Panels



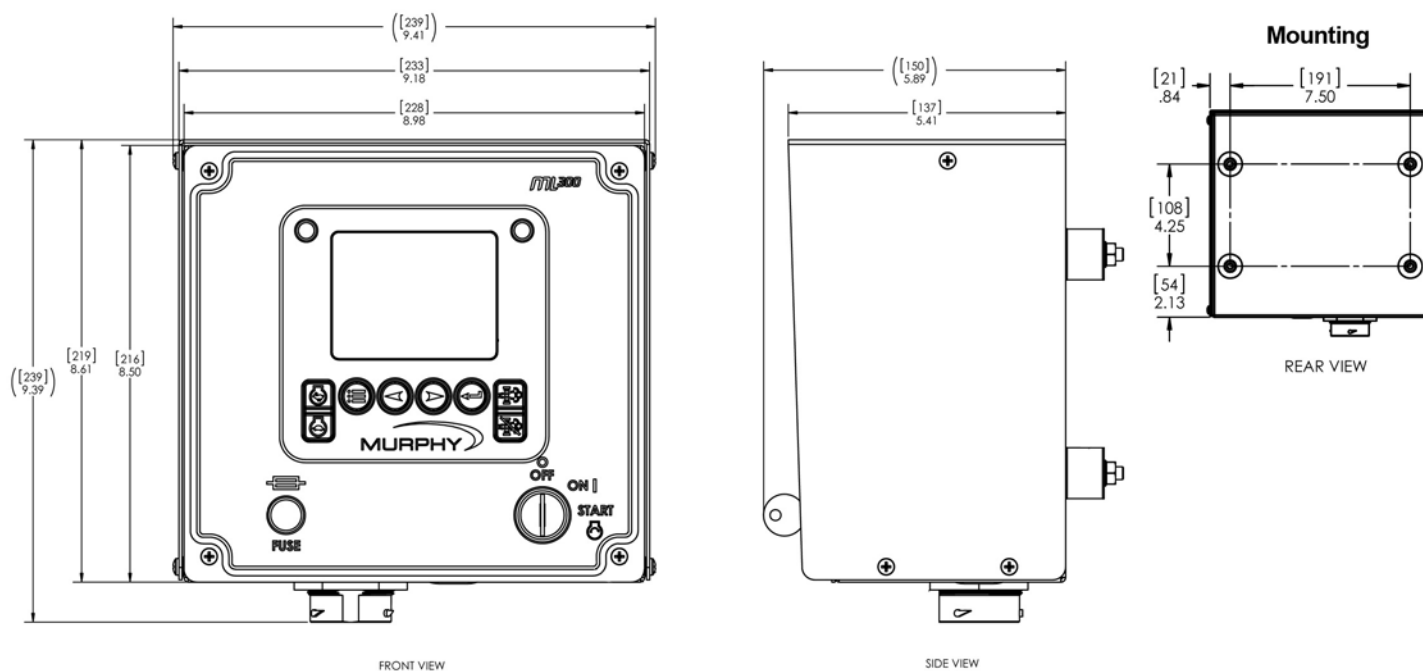
Features

- Tier 4/Euro Stage IV ready
- Superior Display Visibility Even in Bright Sunlight
- Back-Mounted Display for Seamless Panel Integration
- Integrated CAN Communication Using SAE J1939
- Rugged Enclosure Using Industry Standard Deutsch Connectors
- Circuit Protection and Diagnostics

The MurphyLink® Series ML300 Panels include the new PowerView™ PV300, a robust, multifunction control panel that provides advanced monitoring of electronic engines designed to meet Tier 4/Euro Stage IV emissions requirements. The model PV300-P monitors multiple engine and machine parameters on an easy-to-read 3.8-inch (97 mm) QVGA monochrome LCD.

The panel is capable of handling sophisticated engine diagnostics as well as basic engine alarm/shutdown with integrated throttle control. The PV300 provides monitoring of Tier 4/Euro Stage 4 compliant electronic engines, monitors multiple J1939 parameters, and provides basic engine alarm/shutdown with integrated throttle control. Throttling communicates through TSC1 on the J1939 CAN network. The regeneration commands for inhibit and forced-regeneration communicate through J1939 CAN protocol.

Product and Mounting Dimensions



Specifications

Operating Voltage:	12/24 VDC (9-32VDC Minimum and Maximum Voltage)
Operating Current:	1.2A MAX
Mounting:	4 - .75" Rubber Isolated Shockmounts
Starting Method:	KeySwitch
Stopping Method:	KeySwitch
Display:	PowerView Model 300
Indication Lamps:	One red, One Amber via PV300 Display
Enclosure Material:	Powder Coated Cold Rolled Steel
Wiring Interface:	1-Deutsch HDP 21pin Connector
Throttle Method:	TSC1 CAN Throttling (via PV300 Tactile Rocker) - Increment/Decrement - Idle/Run - Idle, Run 1, Run 2
Tier 4 Regeneration:	CAN Enabled (via PV300 Tactile Rocker)
Operational Temperature:	-40° to +85°C (-40° to +185°F)
Storage Temperature:	-40° to +85°C (-40° to +185°F)
Box Dimensions:	15.4 X 13.4 X 8.5
Shipping Weight:	10.0 lbs

How to Order

<i>Description</i>	<i>Volt</i>	<i>Panel</i>	<i>Model Number</i>	<i>Part #</i>
PV300	12/24	Enclosed	ML300	32700210

Murphy Industrial Harnesses



Features

- Connect any MurphyLink® Panel to Major Engine Manufacturers' Engines
- Customizable Per Specific Customer Application and Requirement
- Standard 21-Pin Deutsch Connector Interface
- Manufactured in the USA
- Built to Strict Quality Standards for Long Term Reliability

MurphyLink ML Panels are universal to all engines. The adaptation to the engines will be through the MIH Harness, which is built to the specifications of each Engine Manufacturer and Customer. When requesting the MIH Harness, specific information will be obtained so that the correct harness may be built for your engine.

How to Order

Gather the following information prior to ordering:

	(1)	(2)	(3)	(4)	(5)	(6)
MIH=	CA	70P	IT4	12	C18	A4E4

1 Engine Companies	2 Number of Pins in Harness	3 Emissions Tier	4 Length of Harness	5 Engine Model	6 ECU Model
Caterpillar/Perkins - CA	40 Pin - 40P	Gas - GS	6 ft - 06	CAT	Acert
Cummins - CU	50 Pin - 50P	Tier 2 - T2	12 ft - 12	3128E	DDEC IV
Detroit Diesel - DD	64 Pin - 64P	Tier 3 - T3		Series 50	CM550
Duetz - DZ	70 Pin - 70P	Tier 4 - T4		Series 60	CM850
Iveco - IV	80 Pin - 80P	Tier 5 - T5		QSB59	CM2150
Mercedes - MB				QSB83	ADEM II
Ford - FO				etc...	ADEM IV
Liebherr - LI					etc...
JCB - JC					
Volvo - VO					
Scania - SC					

Contact Murphy Industrial Panel Division for more information at 918.317.4100, or IPDSales@FWMurphy.com

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Marine Local and Remote Engine Panel Series



Features

- Designed Specifically for Commercial Marine, Mechanical Engine Applications
- Full and Broad Compliment of Features and Functionality
- High Quality Construction and Components Designed to Withstand the Rigors of Marine Life
- Local and Remote Panel Options

Maximize the monitoring and alarm capabilities for your mechanical engine with FW Murphy's panel solutions designed specifically for commercial marine applications. The 100 Series and 300 Series provide the durability, reliability and functionality essential for your engine, and offer a broad range of features from which to choose.

MLP 100

Indication Gages:

- Water Temperature (Engine Coolant Temperature)
- Oil Pressure (Engine Oil Pressure)
- Voltage (Voltmeter)
- Engine Speed (Analog Tachometer/ Digital Hour Meter)

Inputs:

- Battery (+)
- Battery (-)
- Magnetic Pickup
- Engine Oil Pressure
- Engine Temperature

Outputs:

- Engine Crank
- Engine Stop Signal

Mounting:

Shock Mounts

Panel Material: Polycarbonate

Style: Enclosed

Voltage: 12V or 24V

Max Current Draw: 13Amps

Starting Method: Key Switch

Stopping Method: Key Switch or

Engine Stop Button

Wiring Interface: 1-Duetsch HDP

21 pin & 1 Duetsch HDP 31 pin Connectors

Remote/ Local Switch: Toggle Switch for Switching Between

Local and Remote Modes of Operation



MRP 100

Indication Lamps:

- 5-First Out Fault Indication Lamps Utilizing Murphy's ST5 Annunciator
- 1-Power On Lamp Utilizing Murphy's ST5 Annunciator

Indication Gages: Engine Speed (Analog Tachometer/ Digital Hour Meter)

Inputs:

- Battery (+)
- Battery (-)
- Magnetic Pickup
- Remote Stop Signal Line In
- Warning Oil Pressure
- Warning Coolant Temperature

Outputs:

- Remote Start
- Remote Stop Signal

Mounting: Countersunk Screw Holes (size 6 to 8 screws)

Panel Material: Polycarbonate

Style: Flat Panel

Voltage: 12V or 24V

Max Current Draw: 13Amps

Starting Method: Key Switch

Stopping Method: Key Switch or Engine Stop Button

Wiring Interface: 1-Terminal Block 16 Position



MLP 300

Indication Lamps:

- System Power Green Incandescent Lamp
- Water Temperature High Red Incandescent Lamp
- Overspeed Red Incandescent Lamp
- Oil Pressure Low Red Incandescent Lamp
- Warning Red Incandescent Lamp

Indication Gages:

- Water Temperature (Engine Coolant Temperature)
- Oil Pressure (Engine Oil Pressure)
- Voltage (Voltmeter)
- Engine Speed (Analog Tachometer/ Digital Hour Meter)
- Gear Oil Pressure
- Exhaust (Pyrometer)
- Crankcase Pressure (Water Column Pressure)

Inputs:

- Battery (+)
- Battery (-)
- Magnetic Pickup
- Engine Temperature

Outputs:

- Engine Crank
- Engine Stop Signal

Mounting: Shock Mounts

Panel Material: Polycarbonate

Style: Enclosed

Voltage: 12V or 24V

Max Current Draw: 13Amps

Starting Method: Key Switch

Stopping Method: Engine Stop Push Button

Wiring Interface: 1-Duetsch HDP 21 pin & 1 Duetsch HDP 31 pin Connectors

Remote/ Local Switch: Toggle Switch for Switching Between Local and Remote Modes of Operation



MRP 300

Indication Lamps:

- 10-First Out Fault Indication Lamps Utilizing Murphy's ST10 Annunciator
- 1-Power On Lamp Utilizing Murphy's ST10 Annunciator
- 1-Engine Warning Red Incandescent Lamp

Indication Gages:

- Water Temperature (Engine Coolant Temperature)
- Oil Pressure (Engine Oil Pressure)
- Engine Speed (Digital Tachometer)
- Gear Oil Pressure + D14

Inputs:

- Battery (+)
- Battery (-)
- Magnetic Pickup
- Remote Stop Signal Line In
- Warning Oil Pressure
- Warning Coolant Temperature
- Warning Gear Oil Pressure
- Warning Crankcase Pressure
- Warning Overspeed

- Engine Oil Pressure
- Engine Coolant Temperature
- Gear Oil Pressure

Outputs:

- Remote Start
- Remote Stop Signal

Mounting: Countersunk Screw Holes (size 6 to 8 screws)

Panel Material: Polycarbonate

Style: Flat Panel

Voltage: 12V or 24V

Max Current Draw: 13Amps

Starting Method: Key Switch

Stopping Method: Engine Stop Push Button

Dimmer: Local Dimmer knob (Adjustment to Gage Backlights)

Wiring Interface: 1- Terminal Block 16 Position



How To Order

Product	Model	Voltage	Part Number
Marine Local Panel	MLP100	12V	30090496
Marine Remote Panel	MRP100	12V/24V	30090497
Marine Local Panel	MLP300	12V	30090489
Marine Remote Panel	MRP300	12V	30090488
Marine Local Panel	MLP100-24V	24V	30090510
Marine Remote Panel	MRP300-24V	24V	30090512
Marine Local Panel	MLP300-24V	24V	30090511

Contact FW Murphy for harness information and ordering.

SECTION 40 ENGINE AND MOTOR CONTROLS

Engine and Generator Controls

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01035	Electric Motor Driven Clutch Operator for Engine Automation Systems – Model CO3	231
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Keystart 9620 Series - Engine and Generator Controls



Features

- Operator controlled start/stop
- Keyswitch operation
- Automatic fault shutdowns and alarm output
- Timed preheat output
- Overspeed shutdown, driven from magnetic pickup or generator AC

Keystart 9620 and 9621 control modules provide manual start/stop and automatic fault protection for generators, pumps and other engine-driven applications.

Operator control is by a 4 position keyswitch, with the key removable only in the Stop/Reset (O) position. Outputs allow control of engine fuel (energised to run), starter motor and preheat. The Keystart also has an alarm output for remote or audible warning of faults.

Indication of engine status and faults is by six LEDs and icons. Four switch inputs (closing to negative on fault) enable automatic shutdown on engine low oil pressure, high coolant temperature and auxiliary faults. Model 9621 has a fully adjustable engine overspeed shutdown feature, configurable for either generator AC or magnetic pickup speed signals. Charge alternator excitation and a charge fail warning LED are fitted as standard.

Electrical connection is by quick-connect, spring-clamp terminal blocks. A universal 7 to 30VDC power supply permits operation with 12 or 24VDC engine batteries, with engine crank-dip voltage protection fitted as standard.

Keystarts are front-of-panel mounted through a standard square cut-out, and secured at the rear with quick-fit clips. Epoxy-resin case encapsulation gives superior vibration/shock resistance and environmental protection.

Specifications

Power supply

Operating voltage, steady state: 7 to 30 VDC
Operating voltage, brown out / cranking: 5 VDC minimum
Current consumption: < 100mA

Inputs

Fault switch inputs: close to negative DC during fault
Generator AC input (model 9621 only):
70 – 270 VAC rms, <50 to >60 Hz nominal
Magnetic pickup input (model 9621 only):
3.5 – 21 VAC rms, <2000 to >6500 Hz nominal

Outputs (all ratings non-reactive)

Run (fuel): positive DC, NO relay contacts, 10A max @ 24VDC
Start (crank): positive DC, keyswitch contacts, 10A max @ 24VDC
Alarm: negative DC (open collector transistor), 300mA max
Speed calibration: to suit 0 – 1mA, 75 Ohm meter,
output = 0.75mA at rated engine speed

Adjustable settings

Preheat timer: 0 or 10 secs (links J1 and J4), default = 0 secs
Fault override timer: 2 to 20 secs (VR1), default = 10 secs
Overspeed trip level (model 9621 only): 100 to 130% (VR3) of nominal calibrated speed, default = 110% (of 50 or 60 Hz)


Physical

Case material: polycarbonate / polyester
Overall dimensions (w x h x d): 96 x 96x 95mm / 3.8 x 3.8 x 3.7 in.
Panel cut-out size: DIN 92 x 92mm / 3.6 x 3.6 in.
Weight: approx 300g / 0.7 lb
Operating temperature: –35 to +55 °C / –31 to +131 °F

Front view and operation

LED indication:-

- run (fuel) on - green
- preheat on - amber
- low oil pressure fault shutdown - red
- high engine temperature fault shutdown - red
- overspeed/aux 2 fault shutdown - red
- charge fail warning - red
- aux 1 fault shutdown - red



4 position keyswitch:

- Off/Reset.** Removes power, stops the engine and resets any latched shutdown fault.
- Run.** Activates the Run output and (if enabled) the timed Preheat output. Once the engine is fully running, and after the 'override' time, Keystart immediately shuts down the engine on detection of a fault.
- Start/crank.** Maintains the Run output, and activates the Start (crank) output. Shutdown fault inputs are disabled and the fault override timer is reset. This position spring-returns to I (Run) on release.
- Auxiliary.** Keyswitch auxiliary output, positive DC.

How to order

Model:

KEY9620 Without overspeed protection

KEY9621 With overspeed protection, selectable AC generator or magnetic pickup sensing *

Keyswitch type:

K2 Type 2, rubberised

KEY9620

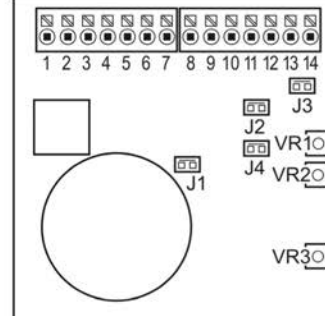
K2

* factory default setting is for AC generator sensing, calibrated to either 50 or 60 Hz nominal. Non-standard (NS) settings/options are available to order.

Accessories/spares

Stock code	Description
41.70.0157	Spare mounting clips (pack of 4)
65.70.0256	Spare keyswitch (K2 type), includes key
00.00.3235	Spare key (K2 type)

Rear view, connection & settings



Connection:-

- 1 run (fuel) output: +DC, 10A
- 2 preheat output: +DC, 10A
- 3 start (crank) output: +DC, 10A
- 4 + DC power supply
- 5 charge fail (W/L) input
- 6 oil pressure fault input
- 7 aux. 1 fault input
- 8 engine temp fault input
- 9 aux. 2 fault input
- 10 alarm output: -DC, 250mA
- 11 speed calibration output
- 12 - DC power supply

Speed input, model 9621 only:

links J2 and J3 ON:

13 L Generator AC, 50/60Hz

14 N 70-270 VAC, 50/60Hz

links J2 and J3 OFF:

13 + magnetic pickup,

14 - 3.5-21 VAC, 2000-6500Hz

Configuration:-

Use a 3 mm/0.1 in. flat head screwdriver for potentiometers VR1-VR3

All models:-

J1 & J4: preheat output timing

- J1 ON: no preheat
- J1 OFF, J4 OFF: preheat 10 secs fixed, unaffected by crank
- J1 OFF, J4 ON: preheat 10 second max, cancelled by crank

VR1: Fault override, 2 - 20 secs, clockwise to increase.

Model 9621 only:-

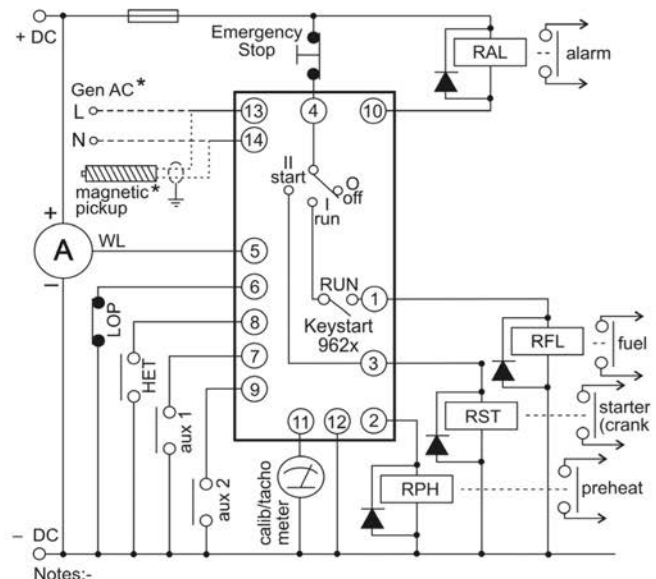
J2 & J3: speed sensing source (pins 13 and 14):-

- both links ON for generator AC, 50/60Hz
- both links OFF for magnetic pickup, 2000 - 6500 Hz.

VR2: Speed calibration. Set J2 and J3 correctly, run engine to nominal speed, adjust VR2 to give (pin 11) calibration output of 0.75mA

VR3: Overspeed, 100 - 130% of VR2 setting, clockwise to increase

Typical connection



Notes:-

* Overspeed models 9621 only. Select generator AC or magnetic pickup speed sensing using links J2 & J3 (see rear view diagram). Factory default setting is for generator AC sensing.

CANstart™ 9630 Series Engine and Generator Controls



Features

- Keyswitch start/stop operation
- SAE J1939 CANbus compatible
- Drives electric panel gauges: oil pressure, engine temp, tachometer
- Display of ECU transmitted faults
- Adjustable overspeed shutdown
- Auxiliary fault shutdown inputs

CANstart™ 9631 and 9632 modules provide operator start/stop control, panel gauge driving, fault indication and auxiliary shutdown protection for ECU-controlled, CANbus SAE J1939 compatible engines. These compact controllers can be used with generators, pumps and other engine-driven applications.

Operator control is through a 4 position keyswitch. The key is common to all CANstarts and is removable only in the Stop/Reset (O) position. Six LEDs and icons indicate engine/ECU status and faults. Two of these LEDs, with associated inputs, provide for auxiliary fault shutdown and charge alternator fail/excitation.

CANstart™ has two protected (positive DC) FET outputs for the control of ECU 'engine run' and starter motor. Three additional outputs drive analogue panel gauges (Murphy, VDO or Datcon), based on ECU-transmitted data for engine speed, oil pressure and coolant temperature.

All units include adjustable engine overspeed protection: model 9631 provides automatic overspeed shutdown for variable speed applications; model 9632 is configured for fixed-speed 1500/1800 RPM genset use.

DIP switches at the rear allow setup of control and gauge output options. Electrical connection is by spring-clamp terminals, including a universal 8 to 32 VDC power supply for operation with 12 or 24 VDC engine batteries. Engine cranking supply brown-out protection is fitted as standard.

CANstart™ is front-of-panel mounted through a standard square cut-out, and secured at the rear with quick-fit clips. Epoxy-resin case encapsulation gives superior vibration/shock resistance and environmental protection

Specifications

Power supply

Operating voltage, steady state: 8 to 32 VDC
Operating voltage, brown out / cranking: 5 VDC minimum
Current consumption: < 100mA

Inputs

CANbus:
SAE J1939 protocol, switchable 120 Ohm terminating resistor
Auxiliary shutdown (x2): close to negative DC during fault

Outputs (all ratings non-reactive)

Run (ECU), start (crank):
positive DC (protected FET), 6A max @ 32 VDC
Alarm:
negative DC (open collector transistor), 250mA max @ 32 VDC
Oil pressure gauge:
suitable for Murphy, VDO 5 or 10 Bar, Datcon 7 or 10 Bar

Outputs (cont.)

Engine temperature gauge: suitable for Murphy, VDO or Datcon
Tachometer: for use with charge alternator driven tachometers

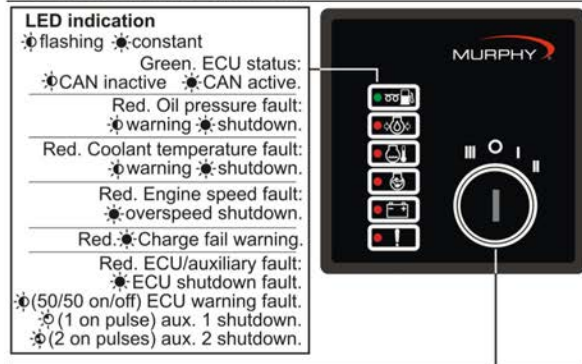
Adjustable settings

Model 9631 (variable speed engines)
Overspeed level: 1250 – 2800 RPM (50 RPM increments), or 'off'
Model 9632 (fixed speed engines/gensets)
Nominal speed: 1500 or 1800 RPM
Overspeed level: 1 – 15% of nominal speed (1% increments), or 'off'

Physical

Electromagnetic compatibility: 2004/108/EC
Case material: polycarbonate / polyester
Overall dimensions (w x h x d): 96 x 96 x 131mm / 3.8 x 3.8 x 5.2 in.
Panel cut-out size: DIN 92 x 92mm / 3.6 x 3.6 in.
Weight: approx 240g / 0.6 lb
Operating temperature: –20 to +75 °C / –4 to +167 °F

Front view and operation



How to order

CST9631 K2

Model:

CST9631 For variable speed engines, overspeed setting range 1250-2800 RPM *

CST9632 For fixed speed engines/gensets, overspeed setting range 100-115% of 1500/1800 RPM *

Keyswitch type:

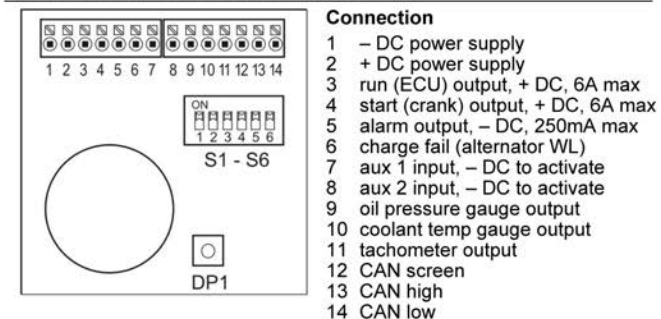
K2 Type 2, rubberised

* Default overspeed settings are:-
 CST9631: 1250 RPM
 CST9632: 110% of 1500 or 1800 RPM (please specify).
 Non-standard (NS) settings/options are available to order.

Accessories

Stock code	Description
41.70.0157	Spare mounting clips (pack of 4)
65.70.0256	Spare keyswitch (K2 type), includes key
00.00.3235	Spare key (K2 type)
Various	EG/EGS series Electric Gage & Swichgage®
Various	ATA/ATHA series tachometers & tachourmeters

Rear view, connection & settings



S1 – S5 DIP switch settings

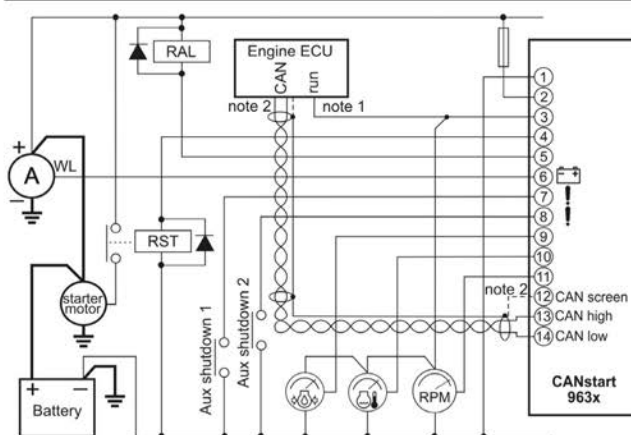
Note: switch S6 reserved for future use.

switch position	on (up)	off (down)	options (* default settings)
S1	▲	▼	Murphy temp. and pressure gauges *
S2	▲	▼	Datcon temp. and 0 – 7 bar pressure gauges
S3	▲	▼	Datcon temp. and 0 – 10 bar pressure
S4	▲	▼	VDO temp. and 0 – 5 bar pressure gauges
S5	▲	▼	VDO temp. and 0 – 10 bar pressure gauges
	▲	▼	CAN 120 Ohm terminating resistor in circuit *
	▲	▼	CAN 120 Ohm terminating resistor removed
	▲	▼	Sets speed nominal or range for DP1 below: see installation instructions for full details.

DP1 digital potentiometer setting (with S5 above)

Overspeed shutdown set point: see installation instructions for details.

Typical connection



Notes:-

- Wiring shown for ECU with close to positive to run input. An additional interposing fuse or relay may be required between pin 3 and ECU: check engine documentation for ECU 'run' input requirements.
- ECU CANbus screen is typically earthed/grounded at one end only. Check engine & ECU documentation for details

MURPHYMATIC® Engine Micro-Controller A91 Series



Features

- Microprocessor Based Automatic Controller
- Field Programmable Trip Points
- Five LED Signal Indicators
- Startup Lockout Timer
- Interfaces With Other Existing Murphy Products
- NEMA 3R "Weatherproof" Enclosure Description

A completely unattended startup/shutdown and run controller for engine driven equipment. This user friendly, compact, state-of-the-art microprocessor based controller, covers all basic start stop operations plus other features only found on more sophisticated and expensive controllers.

The A91 is designed to operate from a 12 or 24 volt battery, and requires a magnetic sensor (pickup) for speed detection. It includes features, such as crank and rest cycles, time delay lockouts, sensing circuit for crank disconnect and over-speed, time delays before start and stop. Warmup and cool down are connected only on the WC model. Four LED's indicate shutdown for: low lube oil, high temperature, over crank and over- speed, and are reset by turning the power off. A fifth LED for engine running indicates when crank disconnect occurs.

The micro-controller is available in several configurations and is factory programmed. Certain parameters can be field adjusted without altering the basic control program. Custom programming of the microchip is available to OEM's and quantity orders.

The A91 is housed in a NEMA 3R enclosure with a hinged and gasketed dead front door. This weatherproof enclosure includes two 1/2 in. conduit holes, [7/8 in. (22 mm) diameter] in the bottom for input and output wiring.

All of the electrical components are installed on a "box" shaped, hinged front sub panel assembly. This working assembly can be purchased and installed in the user's choice of enclosures.

Applications

A variety of applications can be covered with the micro-controller such as:

- Air/Gas Compressors
- Standby Generator Sets
- Fire/Pipeline/Emergency Flood Pumps
- Booster/Transfer Pumps
- Municipal Fresh/Waste Water Treatment
- Sewage Lift Stations

Models Available

A91: For less than 5 amp current draw up to 24 VDC electric run output*

A91-S: For 10 amp current draw up to 240 VDC electric run output*

* Run output is the voltage and current required for an ignition system, fuel valve, or solenoid actuator that allows the engine to run.

A91-WC: Same as A91—with a warmup/cooldown relay.

A91-S-WC: Same as A91-S—with a warmup/cooldown relay.

Any Model -LC: Less weatherproof enclosure.

Features

The A91 Series combines the advantages of solid state microprocessor control logic with the dependability of Murphy's experience in Engine Automation Systems. This engine controller eliminates the need for most electromechanical logic and control relays, while providing built-in design features:

- Applicable to All Types of Engines
- Built-in Speed Sensing Circuit with:
 - Adjustable Crank Disconnect RPM
 - Adjustable Over speed RPM
- Three-position Selector Switch allows for "Automatic" "Off" or "Test" mode.
- Engine Running LED indicator
- Four First-Out Shutdown LED indicators for:
 - Low Lube Oil
 - High Temperature
 - Overcrank
 - Overspeed
- Quality 16 point Terminal Block
- Either start from remote contact close to start, open to stop, or N.O. contacts close to start, close to stop.
- Relays are plug-in type with LED indicator for fast service and maintenance.

Optional Features

- S:** Includes a relay to isolate magneto and capacitor discharge ignition systems.
- WC:** Includes a relay for loading and unloading driven equipment for engine warmup and cooldown.

Specifications

Power Input: 12 or 24 VDC nominal (specify).

Standby Power Consumption: <50mA.

Magnetic Pickup Input: Requires 2 V rms minimum.

Sensor Input Polarity: Negative (-).

Outputs: Five (5) open collector transistor 500 mA sink.

Two (2) relay, 5 Amp maximum at 12 or 24 VDC (sourcing).

Reverse Polarity Protection: 200 volt peak reverse voltage.

On-board Memory: 8k PROM (programmable, read only memory); data retention 10 years.

Operating Temperature Range: -20 to 140°F (-25 to 60°C).

Operating Humidity Range: 0-95% Non-Condensing

User Trip point Adjustments: Five (5) on-board potentiometers (320° turn).

Test-Off-Automatic Toggle Switch: Three position switch for:

- Test: Starts engine in automatic mode and runs until switched "off" or emergency shutdown occurs.
- Off: Disconnects all power to control circuits, Stop/disables engine from starting and resets shutdown indicators.

- Auto: Automatic start/stop sequencing is initiated by external switches and signals.

Cycle Crank Timer: 5 crank attempts 7 seconds each; 4 rest periods 15 seconds each, before overcrank.

Overspeed Trip Point Setting: From 2500-9000 Hz.

Crank Disconnect Speed Setting: From 400-2500 Hz.

Shutdown Time Delay: 15 seconds after engine start; locks out low lube oil and high temperature.

Engine Run LED: Turns "on" when crank disconnect occurs.

Shutdown Output: Removes DC output or operates dry relay contacts for engine shutdown (depending on model used).

Start/Stop: SPDT momentary; or SPST maintained switches.

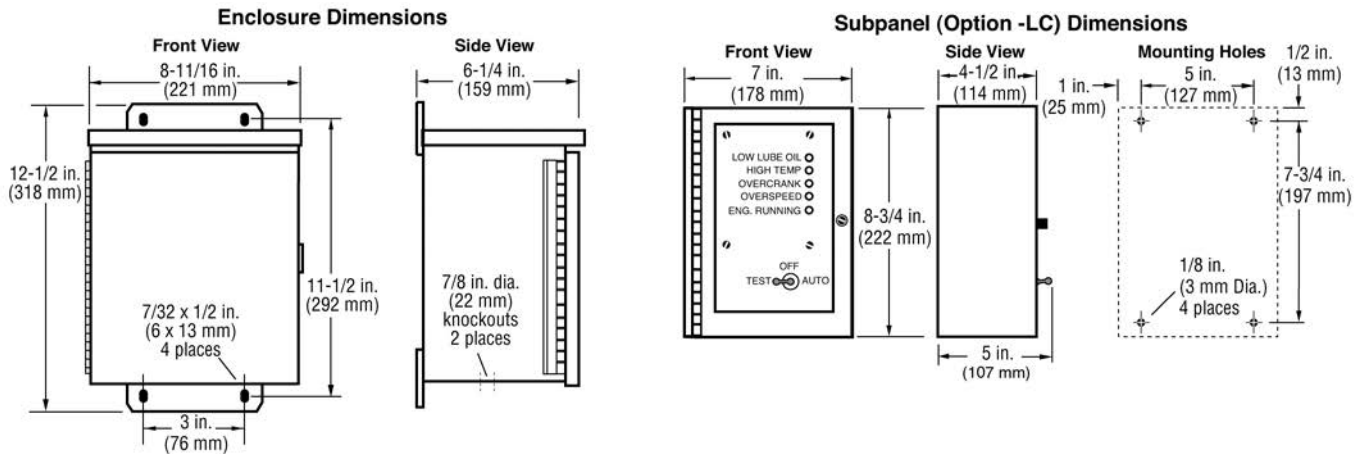
Warmup Time Delay: Field adjustable from 0-300 seconds to load the engine after warmup (model -WC only).

Cooldown Time Delay: Field adjustable from 0-300 seconds (model -WC only).

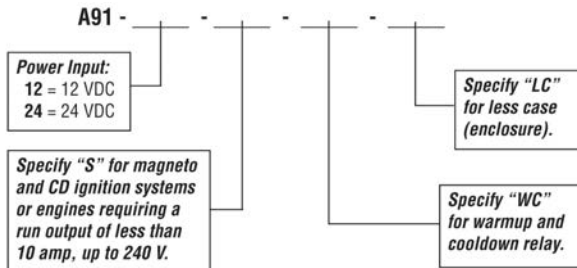
Enclosure: Weatherproof NEMA 3R.

Enclosure Coating: Red enamel.

Dimensions



How to Order



NOTE: Run output is 5 amp @ 12 or 24 VDC. Run output is the voltage required for an ignition system, fuel valve, or solenoid actuator that allows the engine to run.

Accessories

MP3298: Magnetic pickup.

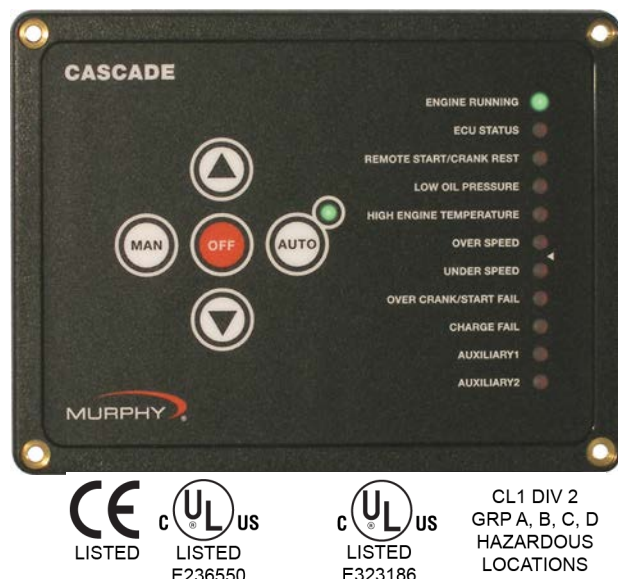
00002062: 12 V auxiliary starter solenoid.

00002063: 24 V auxiliary starter solenoid.

AT67207: Throttle controller.

CO3: Clutch actuator.

Auto-Start/Stop Controller — Cascade



Features

- Durable Encapsulated Protection Against Dirt, Water, and Dust – Rated NEMA4 and IP65
- Operates During Low Battery Blackouts
- Compatible with Electronic and Mechanical Engines – ECU, MPU, AC Frequency
- J1939 Ready – Works Directly with MurphyLink J1939 PowerView Gages

The Cascade controller offers automatic start and stop control with easy configuration for a broad number of applications.

This auto-start controller is designed to fit any engine-driven application requiring a simple and robust automatic start and stop sequence. Pumps, Compressors, Grinders, Power Units and Generators are just few of the industrial applications for the controller.

The Cascade controller is fully compatible with all major engine types. Whether you are running mechanical or J1939 engines, the controller will work with your application.

Here are some of the unique features of the Cascade that only Murphy can offer at our competitive price.

- **Durability:** Encapsulated to protect it against dirt, water and dust, along with a compression gasket to fully seal it to the panel. Cascade is rated NEMA4 and IP65.
- **Low Battery Blackouts:** Operates in total blackout for a minimum of two seconds.
- **Compatibility:** Accept MPU, AC Frequency and ECU speed signals and can operate with standard and J1939 engines.
- **Inputs and Outputs:** The Cascade Inputs and Outputs are ruggedly protected and fault tolerant.
- **J1939 Ready:** Works directly with Murphy's J1939-ready PowerView gages, just plug and go, no sender is required.
- **CD101 Cascade Configuration Tool:** Allows quick setup and loading of parameters into a Murphy standard Cascade via a PC software tool.

Specifications

Power input: 9-35VDC continuous - operates during total blackout for 2 seconds minimum.

Power consumption: Sleep Mode (Manual): 1mA typical; Sleep Mode (Automatic): 4mA typical. Running Mode (Manual): 20mA typical; Running Mode (Automatic): 24mA typical.

Operating/Storage temperature: -40 to 85°C; (-40 to 185°F).

Humidity: 0-100%, non-condensing.

Housing: UV stabilized black polycarbonate and epoxy encapsulation. Weather tight and includes sealing gasket to keep moisture and debris out of enclosure. Properly mounted controller will maintain NEMA4 / IP65 rating of enclosure.

Vibration: Rated to 6G.

Impact: Rated to 10G.

Inputs: Dedicated digital inputs for low oil pressure, high engine temperature, remote start, DC charge fail/Alternator fail. Two aux inputs are configurable for multiple functions.

Outputs: 7 – 4 auxiliary, configurable (1A DC protected). 3 dedicated outputs for Crank, Fuel/ECU, Alternator excitation.

Crank attempts: 3, 5, 10, Continuous.

Crank Rest: 5-60 seconds, adjustable.

Shutdown lockout time delay: 5, 10, 15, 20, 25, 30 seconds.

Crank disconnect speed setting: Field settable 0-9999 RPM (16-60Hz AC freq input).

Overspeed/underspeed trip point setting: ±5 to 50% of nominal.

Speed sensing inputs: Magnetic pickup (5-120VAC RMS / 0-10 kHz) & AC frequency (30-600VAC RMS / 16-80 Hz).

CANbus interface: Directly reads engine speed, & engine status data* from SAE-J1939 enabled engines.

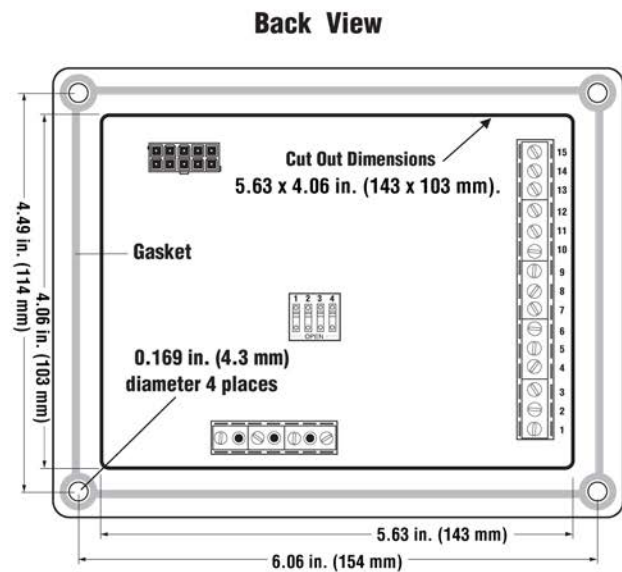
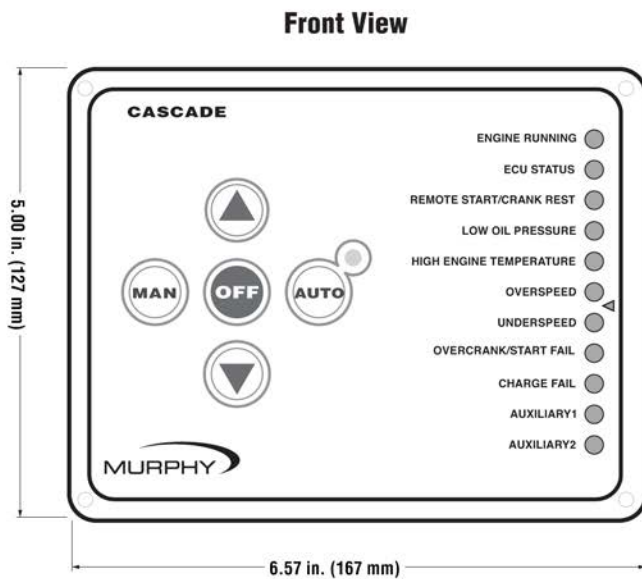
MODbus interface: In J1939 applications drives PVA series analog gages.

*Engine status data limited to low oil pressure, high engine temperature, "Wait to start" status, Warning & Fault lamp information, and communication error.

Cascade Auto-Start Controller Dimensions

Front View

Back View



How to Order

To Order specify: CD101 P/N 40700259

Shipping Weight: 1 lb. (453 g) approximately.

Shipping Dimensions: 5.1 x 6.7 x 1.6 inch (130 x 170 x 41 mm) approx.

Accessories

CD101 Cascade Configuration Kit P/N:40090045

Automatic Engine Controller - Model AEC101



Features

- Automatic Engine Controller with Built-in SWICHGAGE® Instruments and Hourmeter
- Quick and Easy to Install
- Advanced, Rugged, Reliable Cascade Design
- Very Low Competitive Cost
- Operates on 12 or 24 Volt Systems
- First-out Indication

The AEC101 Automatic Engine Controller provides you with simple-yet sophisticated, engine automation. It features basic automatic start/stop capabilities plus other features found on more sophisticated and expensive controllers-all in an easy to install panel.

The AEC101 operates from 12 or 24 volt systems. It includes crank and rest cycles, sensing circuits for crank disconnect and overspeed, overcrank, and re-crank on false starts. The top LED for engine running indicates when crank disconnect occurs. Up to six first-out indicating LEDs for shutdown. Four of the six shutdown LEDs are dedicated for low oil pressure, high engine temperature, overspeed, and underspeed. Two remaining LEDs can be setup for first-out shutdown indication through auxiliary input 1 and 2.

The built in oil pressure and water temperature SWICHGAGE® instruments provide visual indication and can be set to initiate shutdown on critical pressure and temperature.

The electromechanical quartz based hourmeter can record up to 9,999.9 hours. It is housed in a shockproof case and built to be rugged and durable for a long life.

The Cascade controller allows manual or automatic selection of the operation sequence.

The AEC101 has additional features as listed below:

- Adjustable Overspeed circuit
- Adjustable Overcrank circuit
- Adjustable Shutdown Lockout Delay
- Engine Running Indication LED
- Re-Cranks Engine on False Starts
- Advanced Microprocessor Technology
- Convenient Hat Bracket design for simple engine mounting
- Built-in Hourmeter
- Oil Pressure SWICHGAGE®
- Temperature SWICHGAGE®

How to Order

Specify AEC101.

Sequence of Operation

The following sequence is pre-programmed into the AEC101.

Operation Sequence with Panel in Auto:

When the AEC101 receives an automatic start signal the engine will begin to crank and the Shutdown Lockout time delay will begin. The Shutdown Lockout Delay does two functions. It allows the AEC101 to disregard signals from the low oil pressure and high temperature SWITCHGAGE® at engine start-up. Also, if the engine false starts, the recrank will be delayed to allow the engine to stop moving before engaging the starter. If the engine fails to start after the set number of crank and rest attempts, the AEC101 will indicate an Overcrank LED. The engine will be locked out from any further start attempts.

NOTE: All shutdown conditions can be reset by pressing the OFF button followed by pressing the Auto button to initiate auto sequence.

Once Crank Disconnect speed is reached the Engine Running LED will turn on steady. The engine will also run at full governed speed while in operation. If the speed exceeds the Overspeed setpoint, the AEC101 will initiate an engine shutdown and the Overspeed LED will turn on. The engine will be locked out from any further start attempts.

If a low oil pressure or high temperature conditions occurs while the engine is running, the AEC101 will shutdown the engine and the appropriate LED will turn on. The engine will be locked out from any further start attempts.

NOTE: The Shutdown Lockout Delay must have expired to get a shutdown on low oil pressure or high engine temperature.

Operation Sequence with Panel in Manual:

When the manual button on the Cascade Controller is pressed, an automatic start signal is simulated. Therefore, the controller will operate the same as it does in AUTO. However, it will continue to run as long as there are no signals from monitored conditions or until the OFF or AUTO buttons are pushed. Keep in mind, it will still shutdown the engine if a monitored condition occurs such as low oil pressure, high engine temperature, or loss of speed signal.

Specifications

Operating Voltage: 9-35VDC continuous – operates during total blackout for 2 seconds minimum.

Environmental

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

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

Humidity: 0-100%, non condensing

Inputs

- Dedicated digital inputs for low oil pressure, high engine temperature, remote call to run, DC charge fail/Alternator fail. Two auxiliary inputs are configurable for multiple functions.

Outputs

- 7 Outputs
 - 4 configurable auxiliary sinking outputs (1A DC protected)
 - 3 dedicated outputs for Crank, Fuel, Alternator Excitation

Crank Attempts: 3, 5, 10, Continuous

Crank Rest: 5-60 seconds, Adjustable

Shutdown lockout time delay: 5, 10, 15, 20, 25, 30 sec.

Speed Sensing Input:

Magnetic Pickup (5-120VAC RMS / 0-10 kHz)

AC frequency (30-600 VAC RMS / 16-80 Hz)

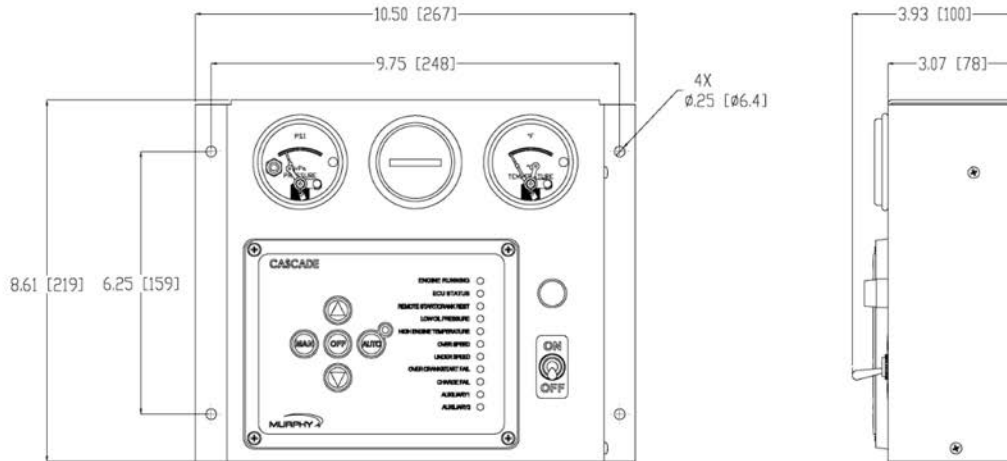
Crank disconnect speed setting: Field settable 0-9999 RPM (16-60 Hz AC freq input)

Housing: Powdercoated 14 Gauge Cold Rolled Steel

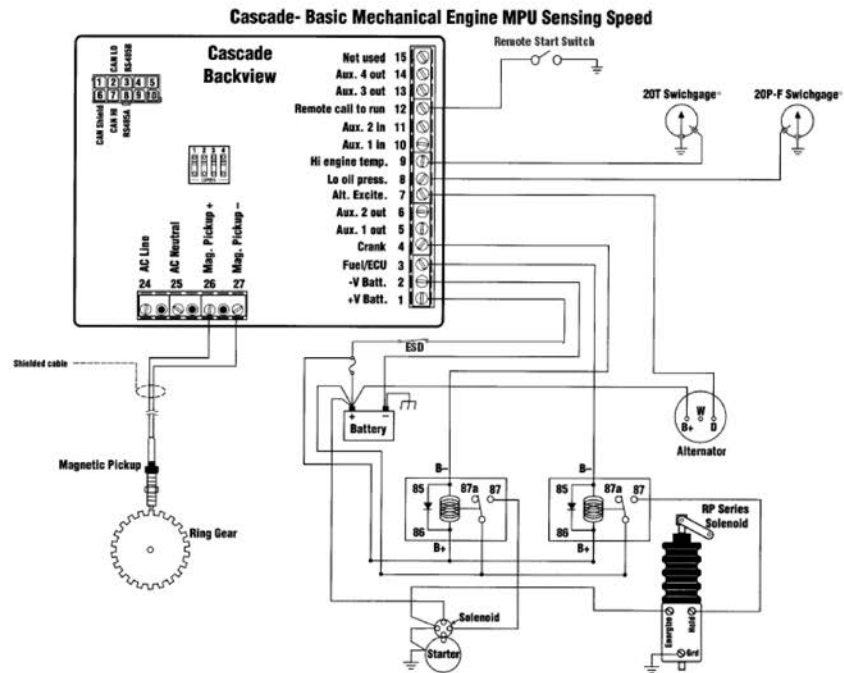
Shipping Weights: 7 Lb. (3175 g.) approximately.

Shipping Dimensions: 12 x 12 x 5.5 in. (305 x 305 x 140 mm) approx.

Product Dimensions



Typical Wiring Diagram



NOTE: This diagram represents typical wiring scenario, and is not the schematic to the panel.

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EMS PRO LITE Engine Monitoring System Controller



Features

- Supports Mechanical and J1939 Electronic Engines
- Automatic Start/Stop
- Backlit Graphical Display
- Shutdown History File
- First-out Shutdown and/or Alarm Indicating LEDs
- Field Adjustable Parameters
- Supports TSC1 Throttle Messaging
- Wide Operating Temperature Range
- IP65 Rated
- Internet-ready utilizing MODBUS®* RTU with Auxiliary Equipment

* MODBUS is a registered trademark of its respective owner and not affiliated with FW Murphy.

The EMS PRO LITE is a customizable pump-controller designed specifically with dewatering and irrigation applications in mind. This versatile unit supports both Mechanical and J1939 Electronic engines, thus eliminating the need to stock multiple controllers. A step ahead, the EMS PRO LITE is Tier 4 & Stage IIIB/IV ready. This includes displaying the current Urea level % on the LCD.

The operator interface is a responsive 8-button membrane keypad and backlit graphical display mounted directly to the front of a rugged NEMA 4 enclosure.

A microprocessor-based controller, the EMS PRO LITE operating parameters are field-adjustable without the need for a computer. However, the EMS PRO LITE can be modified for use with a remote modem or in a SCADA system with MODBus® RTU protocols on either an RS232 or RS485 port.

EMS PRO LITE offers Auto Start/Stop with 2-Float, Transducer settings (pressure and level), or Clock start/stop using the internal real time clock. Throttle to Level, Pressure, or maximum RPM (desired RPM) is offered. The robust EMS PRO LITE is engineered for 12 VDC systems (8 VDC minimum to 14.4 VDC maximum) and a wide operating temperature.

Communications

The EMS PRO LITE has RS485, RS232 and J1939 CAN communication ports. The standard unit uses RS485 or RS232 for Modbus RTU. At the same time, the CAN port allows J1939 communication with the engine ECU to display engine parameters and control the throttle via TSC1, if supported by the engine.

How to Order

Part #	Description
40700305	EMS PRO LITE

Accessories

40000521	21-pin and 9-pin, 10 ft (3.048m) Whip Harness Kit for Mechanical Engines
40000522	9-pin, 10 ft (3.048m) Whip Harness for I/O
40000523	9-pin Connector Kit for I/O with terminals
40000524	21-pin and 9-pin Connector Kit with terminals
40000526	21-pin, 10' (3.048m) Whip Harness for Mechanical Engines
40000531	21-pin Connector Kit with terminals for engine connector

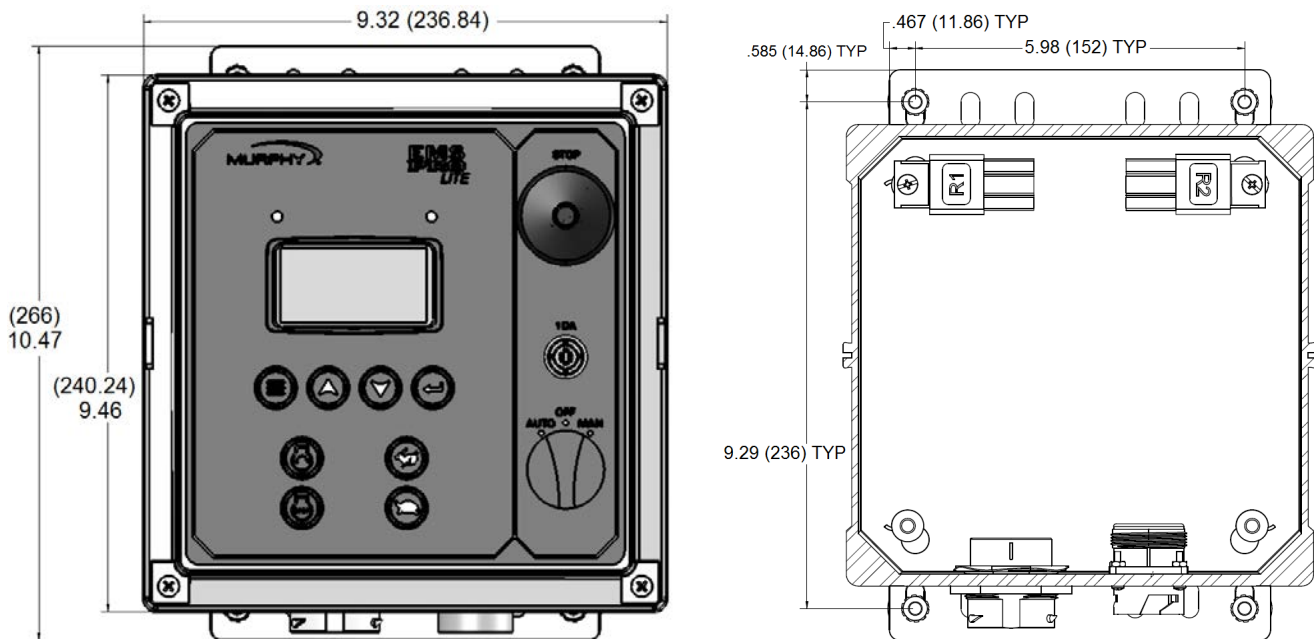
Murphy Industrial Harness: Please contact *Industrial Panel Sales* for application-specific MIH harnesses for electronic engines

Specifications

Operating Voltage: 8 VDC Minimum to 14.4 VDC Maximum **Operating Temperature:** -40° to 80°C (-40° to 176°F)
Relative Humidity: 95%RH @ 60°F (140°C) **Storage Temperature:** -40° to 80°C (-40° to 176°F)
Enclosure: Polycarbonate NEMA 4 (UL/cUL listed) **Environmental Sealing:** IP65
Shipping Weight: 7 lb. (3.2 hg)
Shipping Dimensions: 12" x 12" x 10" (304.8 x 304.8 x 254 mm)

Analog Inputs: 6 Analog Inputs designed via program; sender/ground digital 4-20mA, 0-5 VDC
Digital Inputs: 4 Digital Inputs High/Low (2 inputs dedicated for auto and manual states of key switch)
Frequency: 1 optically isolated input for speed reference, magnetic pick-up, (2VAC-50VAC RMS, 30-10kHz)
Fuel Sender Input: 33 Ohm full, 240 Ohm empty. This input can also be configured for an external auxiliary shutdown
Analog Output: 4-20mA or 0.4 to 4.2VDC (used for 0.4 – 4.2V throttling)
Digital Outputs: 6 Digital Outputs; 3 FET B+ (rated at 1A), 3 Open Collector sink-to-ground 100 mA (one of these is used to pilot a relay)
Communications: RS485, RS232, CAN J1939, CAN 2.0B ports

Product Dimensions



EMS PRO - Engine Monitoring System Controller



Shown with optional clear door.



*Approved by CSA for Non-hazardous locations (Group Safety Publication IEC 61010-1)

Features

- Supports Mechanical and J1939 Electronic Engines
- Automatic Start/Stop
- Backlit Graphical Display
- Shutdown History File
- First-Out Shutdowns and/or Alarm Indicating LEDs
- Field Adjustable Parameters
- Supports TSC1 Throttle Messaging
- Wide Operating Temperature Range
- IP66 Rated
- Internet Ready Utilizing Modbus® RTU with Auxiliary Equipment
- Real Time Clock in 24 Hour Format
- NEMA 4X Enclosure with Optional Clear Door

The EMS PRO is a flexible all-in-one customizable unit that meets the needs of engine-driven pumping equipment applications. The EMS PRO is a dedicated microprocessor-based, single engine controller. It offers field-adjustable operating parameters that can be changed without the need for a computer. It is also able to support both mechanical and J1939 electronic engines.

The EMS PRO has selectable auto start/stop features with several throttling options. The auto start/stop options (Single Contact, Floats, Momentary, Transducer and Clock) are available at the touch of a button. The Transducer start/stop option includes three settings; pressure, level and temperature. In addition, there are many performance-enhancing features, all of which are available through an operator interface that is easy to learn and use. The EMS PRO is ideal for use with a remote modem or in a SCADA system offering Modbus RTU protocol on either the RS232 or RS485 port.

The EMS PRO has the ability to withstand a wide ambient temperature range and comes standard in a NEMA 4X rated enclosure secured by four rubber shock mounts. Inside is a backlit graphical display visible day or night and under all kinds of conditions.

Communications

The EMS PRO has RS485, RS232 and J1939 CAN communication ports. The standard unit uses RS485 or RS232 for Modbus RTU. At the same time, the CAN port allows J1939 communication with the engine ECU to display engine parameters and control the throttle via TSC1 if supported by the engine.

How to Order

P/N 40-70-0301 EMS PRO

P/N 40-70-0302 EMS PRO with Optional Clear Door

NOTE: Care should be taken when selecting the optional clear door when used in applications involving direct sunlight exposure. Direct sunlight can cause premature component failure by allowing the sealed enclosure temperature to exceed the rated 80°C/175°F.

Accessories

The EMS PRO has (2) Deutsch HDP connectors, 21 pin and 31 pin, for easy field wiring.

Harness Options:

- P/N 40-00-0479 EMS PRO 21-pin & 31-pin Connector Kit
- P/N 40-00-0480 EMS PRO 10' 21-pin & 31-pin Harness Kit
- P/N 40-00-0481 EMS PRO 10' 31-pin I/O Harness
- MEH Adapter Harness: Please contact Industrial Panel Sales for application specific adapter harness.
- MEH Harness: Please contact Industrial Panel Sales for application specific MEH harness.

Specifications

Operating Voltage (12 and 24 systems):

- 8 VDC minimum to 32 VDC maximum

Environmental

Operating Temperature: -40° to 80°C (-40° to 176°F)

NOTE: Care should be taken when selecting the option clear door when used in applications involving sunlight exposure. Direct sunlight can cause premature component failure by allowing the sealed enclosure temperature to exceed the rated 80°C/175°F.

Storage Temperature: -40° to 80°C (-40° to 176°F)

Environmental Sealing: IP66

NOTE: Meets IP66 when the door is closed **AND** latched.

Relative Humidity: 95%RH @ 60°C

Standby Current:

- (@ 12VDC) 220mA
- (@ 24VDC) 255mA

CAN Bus: SAE J1939 compliant

Enclosure: Polycarbonate NEMA 4X (UL Certified)

Product Dimensions

Inputs:

Analog Inputs: (12) designated via program; sender/ground digital, 4 -20mA, 0-5 VDC.

Digital Inputs: (8) high/low

Frequency: 1 optically-isolated input for speed reference, magnetic pick-up. (2VAC-50VAC RMS)

Fuel Sender Input: 33 Ohm full, 240 Ohm empty

Outputs:

Digital Outputs: (3) FET B+ (rated at 1A)

Relays: 1 SPDT and 8 SPST 5 Amp pilot relays (maximum relay ground current limited to 23 amps).

User Interface: (8) button membrane switch

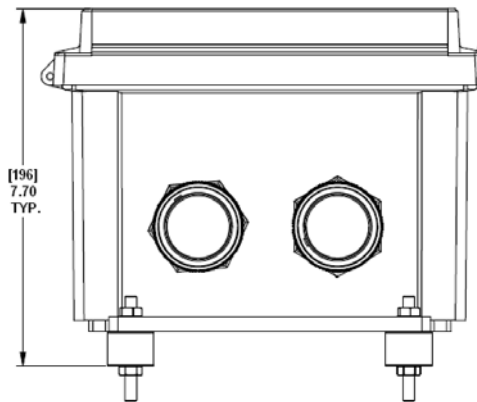
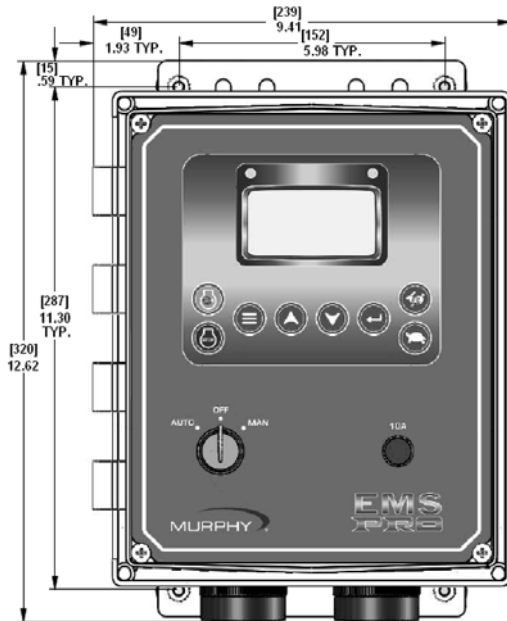
Connectors: 21pin and 31pin Deutsch HDP20 Series

Mounting: 4 isolated .75 inch rubber shock mounts

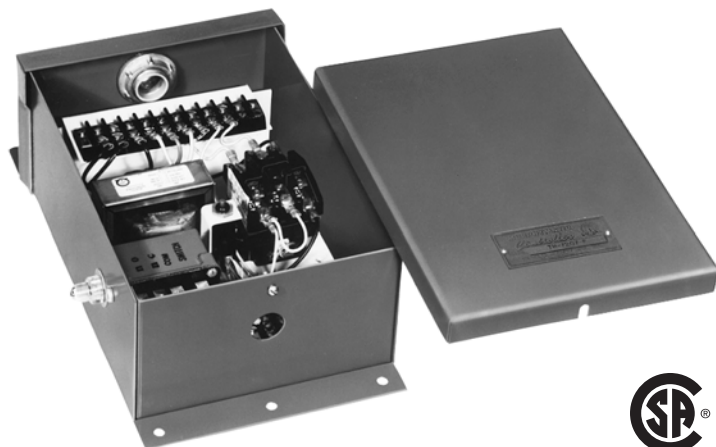
Shipping Weight: 11 Lb. (5 kg.)

Shipping Dimensions (all models):

- 15 x 15 x 11 in. (381 x 381 x 279.4 mm)



Transformer Relay Assemblies TR Series by MURPHYMATIC®



Features

- Electric Motor Controllers
- Use in Conjunction with Murphy Switchgag[®] for:
- Electric Motor Start and Stop
- Emergency Shutdown and Time Delay
- Low Voltage Control of Magnetic Motor Starters Utilizing a Low 24 Volt Pilot Circuit

The Murphy TR Series, Transformer Relay Assemblies are electric motor controllers. Models are available for emergency shutdown, start and stop only, start and stop with emergency shutdown, and combinations of the above models with time delay.

All TR Series internal control circuits are completely prewired and relays are plug in type to facilitate field servicing.

NEMA 1 enclosure is standard on all TR Series models. NEMA 3 weatherproof enclosure, and "LC" Less Case versions are optional.

Murphy SWICHGAGE[®] instruments for pressure, temperature, level etc., can be used with the TR's for semiautomatic or totally unattended operation and control of your electric motor powered equipment.

Controls up to 480 Volts

A set of normally open, dry relay contacts controlled by a 24 VAC relay coil, controls the magnetic motor starter holding coil up to 480 volts. The high voltage contacts are completely isolated from the low voltage control to help reduce electrical hazards.

Features

- Heavy-duty transformer with multiple primary taps for easy connection to most any available AC power sources.
- 24 VAC low Voltage secondary control circuit with terminals for remote auxiliary switches.
- Plug-in relays have three SPDT silver cadmium oxide contacts providing long life reliability.
- Power relay has extra heavy silver cadmium oxide contacts rated 10 amp, 480 VAC.
- When TR is used with a Murphy Analog SWICHGAGER, it allows for visual reading of operating conditions, and provides an adjustable differential between high and low settings throughout the SWICHGAGER dial range.

Applications

The TR Series transformer relay assemblies are ideal for controlling a variety of electric motor driven applications. They are recommended for use on salt water disposal systems, waterflood systems, and many others. A Model TR-1762 used in conjunction with a model OPLHC Tank Level Controller, and an OPLC Series discharge pressure can completely automate a salt water disposal pump.

Specifications

Transformer: Primary (power supply) with triple taps for 120/240/480 VAC. 50/60 Hz.
Secondary (control supply) 24 VAC.

Power Rating: 25 VA.

Terminal Blocks: High Voltage rated at 30 A, 600 V.
Low Voltage rated at 20 A, 300 V.

Control Relays: Plug-in, 120 V, 10 A contact rating.

Contacts:

Power (holding): 10 A, 480 VAC, SPST.
Control (auxiliary): 480 VAC, 690 VA pilot duty.

Conduit: Top: 3/4 in. hub; Bottom 1/2 in. hole.

Approximated Shipping Dimensions:

NEMA 1; NEMA 3; and "LC" Less Case: 15 x 15 x 7 in. (381 x 381 x 178 mm).

Approximated Shipping Weight:

NEMA 1: 18 lb. (8.16 kg.).
NEMA 3: 22 lb. (10 kg.).
"LC" Less Case: 14 lb. (6.35 kg.).

TR Assemblies

Models and Functions

TR7207 — Used for emergency shutdown of electric motors driven equipment which are manually started.

TATTLETALE® indicates shutdown and locks out power until the malfunction is corrected and the TATTLETALE® is reset. A momentary power failure during shutdown will not void the lockout feature. For use with standard, normally open, one-wire to ground Murphy SWITCHGAGE® instruments.

TR7208 — Same as TR7207 except used with normally closed, ungrounded SWITCHGAGE® instruments which open for shutdown.

TR9193 — Same as TR7207 with adjustable time delay, which locks out shutdown functions for up to 10 minutes, to allow pressures and temperatures to reach normal range after start-up.

TR1760 — Used with electric motors or driven equipment which is started and stopped from a remote, normally open SWITCHGAGE®.

TR1761 — Includes the same features as the TR1760 plus provisions for

operating remote panel lights or audible alarms. Also includes emergency shutdown and lockout from a remote, normally open, one wire to ground SWITCHGAGE®.

TR1762 — Same as TR1761 with adjustable time delay lockout of shutdown functions, for up to 10 minutes, during start-up.

NOTE: TR1760, TR1761, and TR1762 comply with National Electrical code 1975, Article 430-73.

Some models have been discontinued and replaced by other models:

Discontinued	Replacement
TR-5171	TR1760
TR-7159	TR1761
TR-9195	TR1762

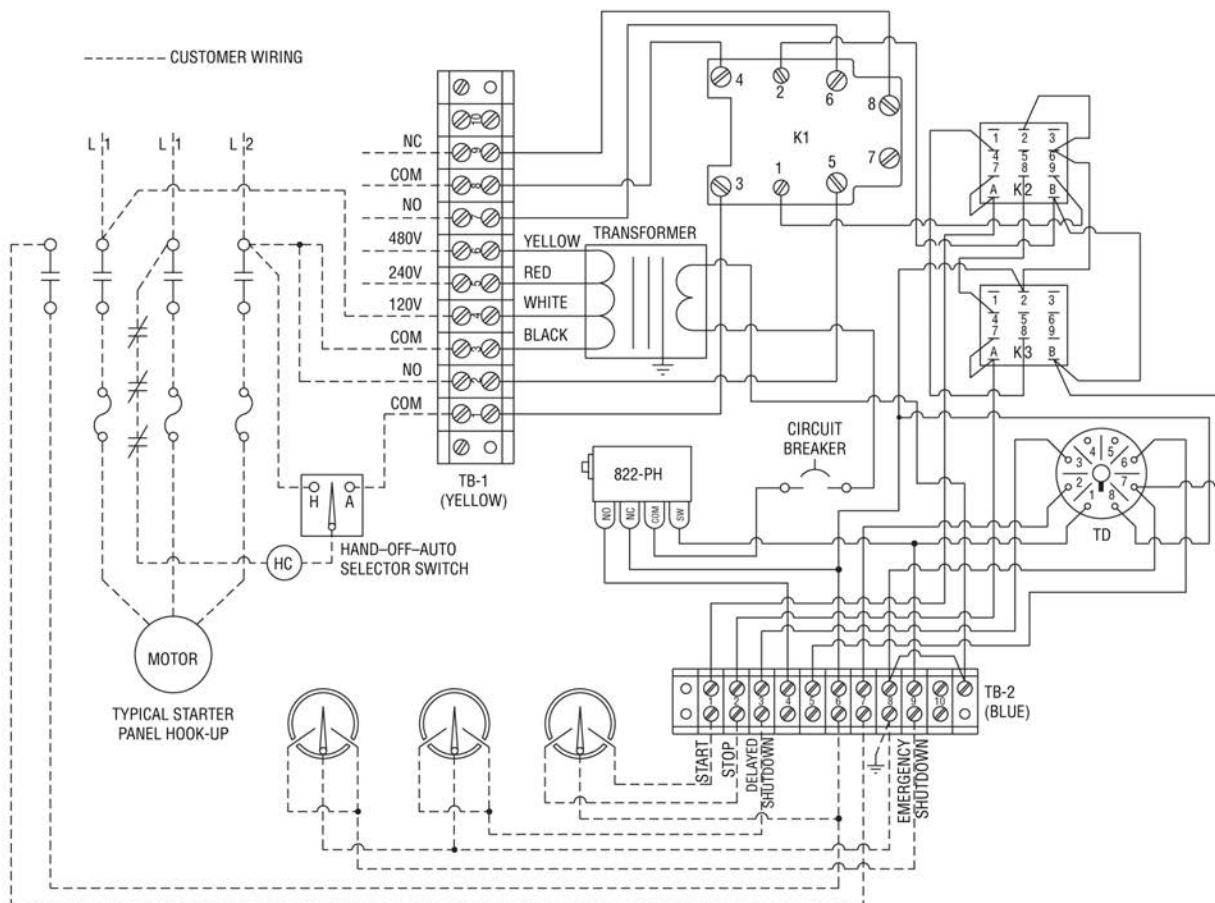
To Order TR Assemblies Use The Appropriate Model Number



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.

TR1762

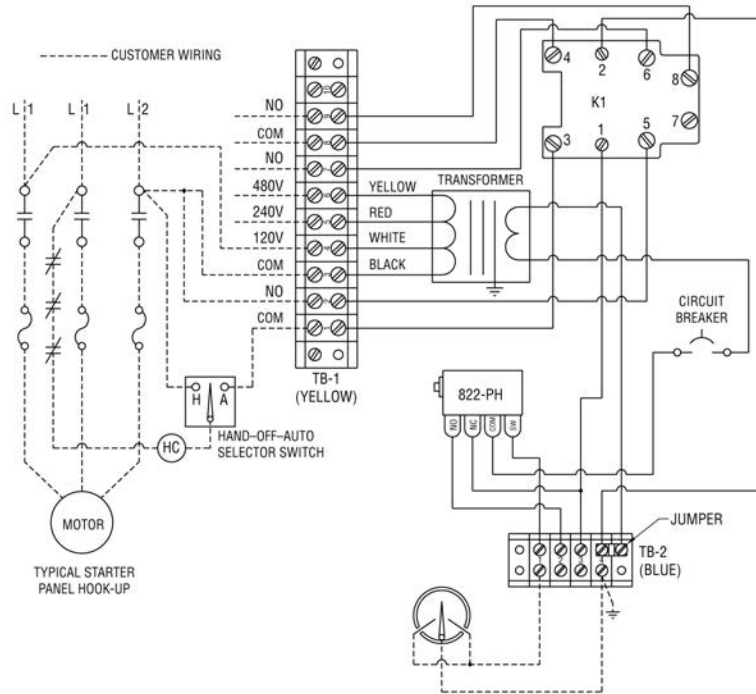




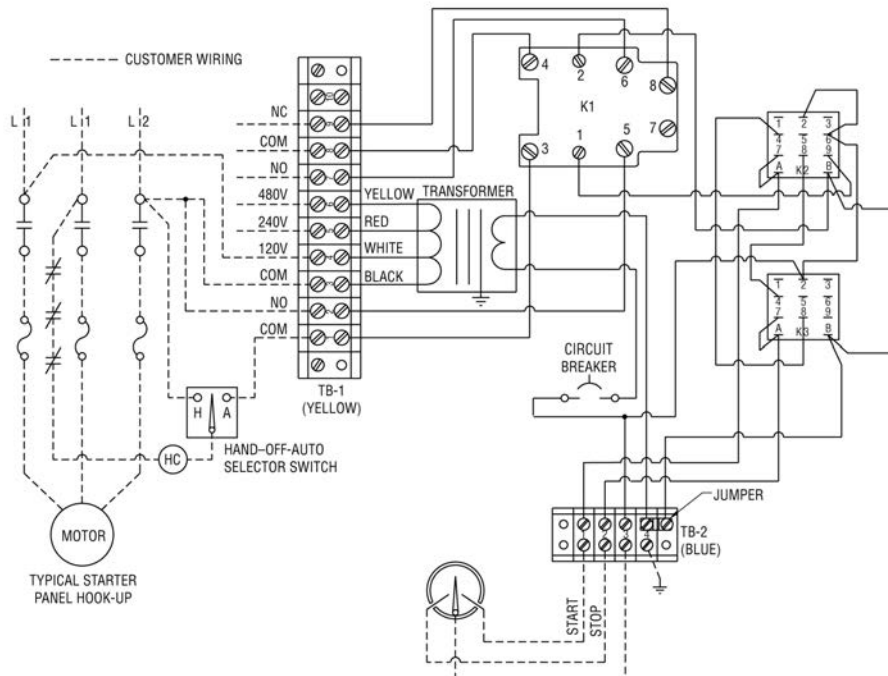
WARNING Before beginning installation of this Murphy product:

- ✓ Disconnect ALL electrical power to the machine.
- ✓ Make sure the machine CANNOT operate during installation.
- ✓ Follow all safety warnings of the machine manufacturer.

TR7207



TR1760

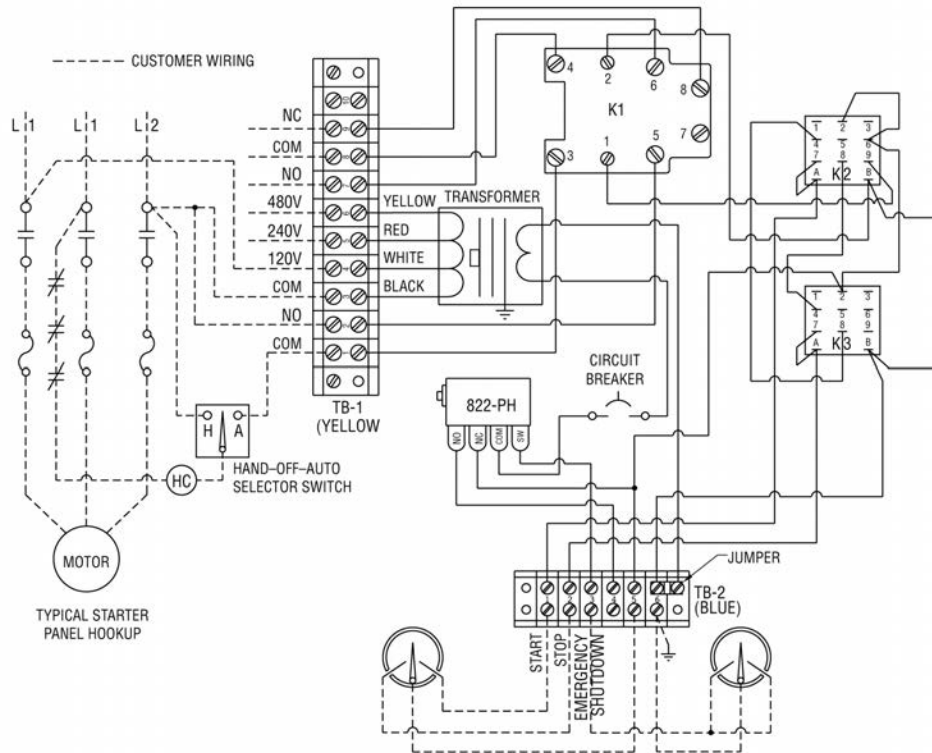




WARNING Before beginning installation of this Murphy product:

- ✓ Disconnect ALL electrical power to the machine.
- ✓ Make sure the machine CANNOT operate during installation.
- ✓ Follow all safety warnings of the machine manufacturer.

TR1761



IntelliSpark™ Ignition Controller System



Features

- Crankshaft-referenced 16-bit microprocessor based system
- Patented Smart Coil technology
- Automatic energy control
- Five timing reference options including camless operation
- Two field-adjustable timing schedules
- Optimized engine combustion and performance
- True primary and secondary diagnostics

The IntelliSpark™ 32/16/8 series ignition systems are capacitive discharge, low-tension type designs. The system is capable of generating precise spark timing that improves fuel economy, load balance and ignition stability. The controller design incorporates a state-of-the-art, 16-bit, microcontroller. This technology provides users with a highly flexible solution to meet their ignition needs.

The user can choose from one of five methods of crankshaft sensing for a 4-stroke engine and two methods for a 2-stroke engine.

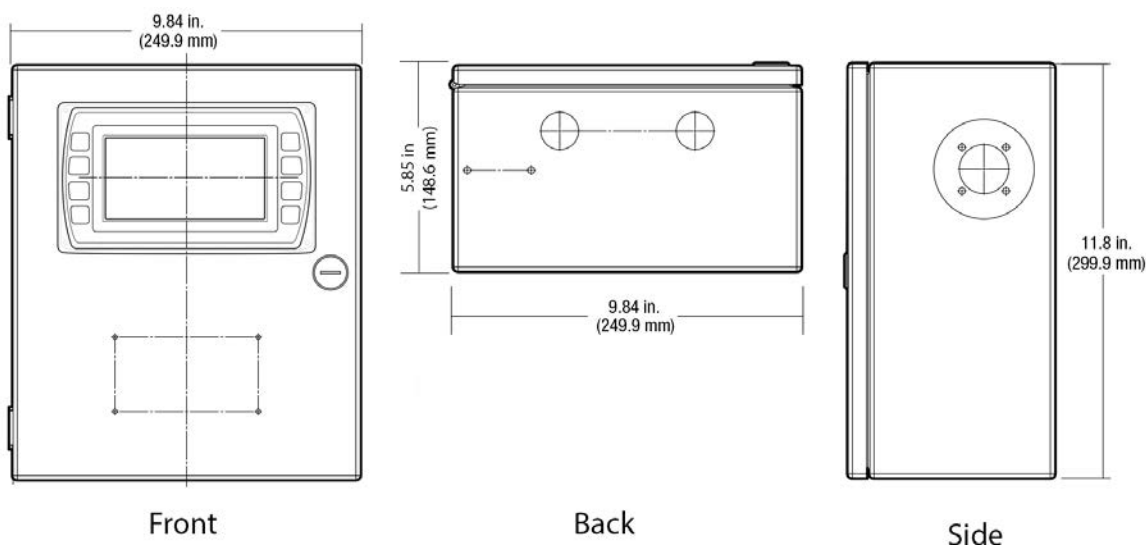
The Murphy ignition coils used with this controller are “smart coils” with a sense lead connection for spark plug demand voltage measurements allowing the system to:

- Measure demand on each cylinder’s plug for diagnostic purposes.
- Automatically control the energy delivered to the smart coils to optimize spark plug life.
- Use the measured demand in the unique “camless” crank method to determine the compression stroke, eliminating the need for a camshaft sensor.

Several smart coil designs are available to accommodate specific ignition requirements including, remote mount coils and plug-mounted (integral) coils, non-hazardous or CSA C1, D2 rated versions.

This system also includes the Murphy PV-450 full color screen display for control functions, monitoring, programming, and diagnostic testing. The 8 button display includes comprehensive built-in help files and wiring information for the coil harness and a data base of common engines for ease of configuration.

Product Dimensions



Specifications

Power Requirements:

IS-16/8: 10-30 VDC (12/24 VDC nominal) 3.0 Amps max

IS-32: 10-30 VDC, 6.0 Amps max

Note: The input current is dependent on firing rate

Temperature Operating Range: -4° to +158° F (-20° to +70° C)

CSA Certified for Class I, Div 2, Groups B, C, D

IS-8: Fires 8 outputs

IS-16: Fires 16 outputs

IS-32: Fires 32 outputs, 2 outputs can fire simultaneously

Energy Storage:

IS-32/16/8: 180 mJ max, per tank capacitor

Output Electrical Specifications:

IS-8: Single tank capacitor

IS-16: Dual, alternately fired tank capacitors

IS-32: Quad, alternately fired pairs of tank capacitors

Ignition Outputs are High-side firing referenced to the "T" pin on the output harness

Note: These outputs are not ground referenced unless the "T" lead is grounded. Recommend careful adherence to installation instructions.

Maximum Output Current Pulse Rating: 40 Amps

Note: Current pulse amplitude is dependent on the coils in use and the tank capacitor voltage.

IT-230 Series coils: 7 Amp pulse @ 230Volts

IT-150 Series coils: 35 Amps @ 150 Volts

IT-250 series coils: 20 Amps @ 250 Volts

4/20 mA Inputs:

4/20mA A: This input retards timing (if programmed) when schedule A is active.

4/20mA B: This input retards the timing (if programmed) when schedule B is active.

Communications:

IS-8/16: An auxiliary comm port is available, RS-485 interface, Modbus protocol

Note: This port has a user programmable slave ID, runs at 9600 baud or 19.2K.

All parameters available can be modified in parallel using the main front panel display.

How To Order

IntelliSpark Ignition Module	
Part Number	Description
72700030	IS-8,Ignition Module, 8 Outputs, Without Display
727000252	IS-8D,Ignition Module, 8 Outputs, With Display
72700028	IS-16,Ignition Module, 16 Outputs, Without Display
72700253	IS-16D,Ignition Module, 16 Outputs, With Display
72700199	IS-32,Ignition Module, 32 Outputs, Without Display
72700254	IS-32D,Ignition Module, 32 Outputs, With Display

Remote Display Unit	
Part Number	Description
727000249	Display Module, PV450NV-03-CSA-IS
78001106	Cable, Remote Power 50 ft., PVW-450-PWR-50 ft.
78001107	Cable, Remote Communication 50 ft., PVW-450-RS485-50 ft.

NOTE: Use one display module and cable for each ignition module.

Please contact your local Murphy Sales Representative for a complete IntelliSpark Ignition System and Murphy products from Enovation Controls.

A local distributor can be found at www.fwmurphy.com/wheretobuy/us-sales-distributors.

Ignition Control Systems

MPI 601 Series CD Ignition

- The **MPI 601 Series** is a self-powered CD ignition system which can be installed on any large flywheel, spark-ignited engine. With electronics engine-mounted in close proximity to the flywheel, the unit is powered by magnetic charging circuitry.



Features:

- Reliable capacitor discharge circuitry
- High-output, self-powered electromagnetic system
- 30,000 volt output at low rpm
- Crankshaft-referenced timing
- Dual trigger timing
- One-cylinder applications
- Control circuitry is sealed module
- Self-powered, no external power required
- Two year warranty

Benefits:

- Inexpensive, proven design
- No moving parts to wear out
- More timing accuracy with flywheel mounting
- Compatible with most large flywheel spark-ignited engines
- Provides power for ignition-powered panels

FWMurphy Control & Instrumentation Solutions

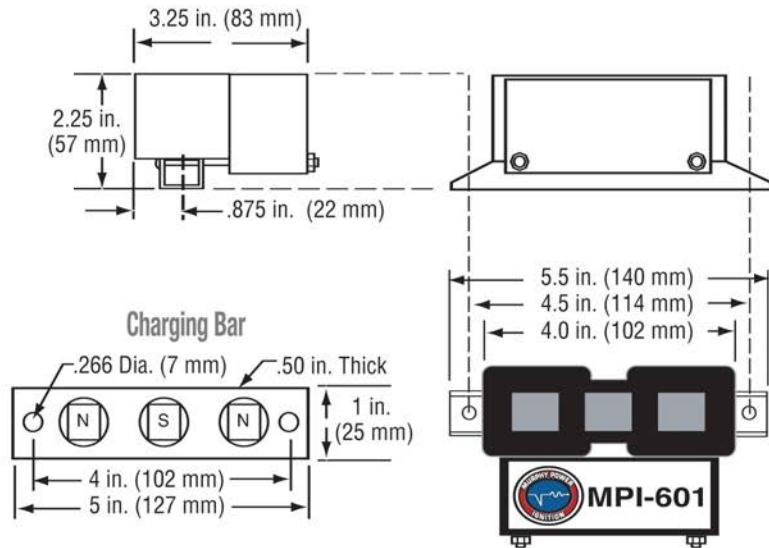
► MPI 601 Series CD Ignition

Maximize Power To Run Smoother.

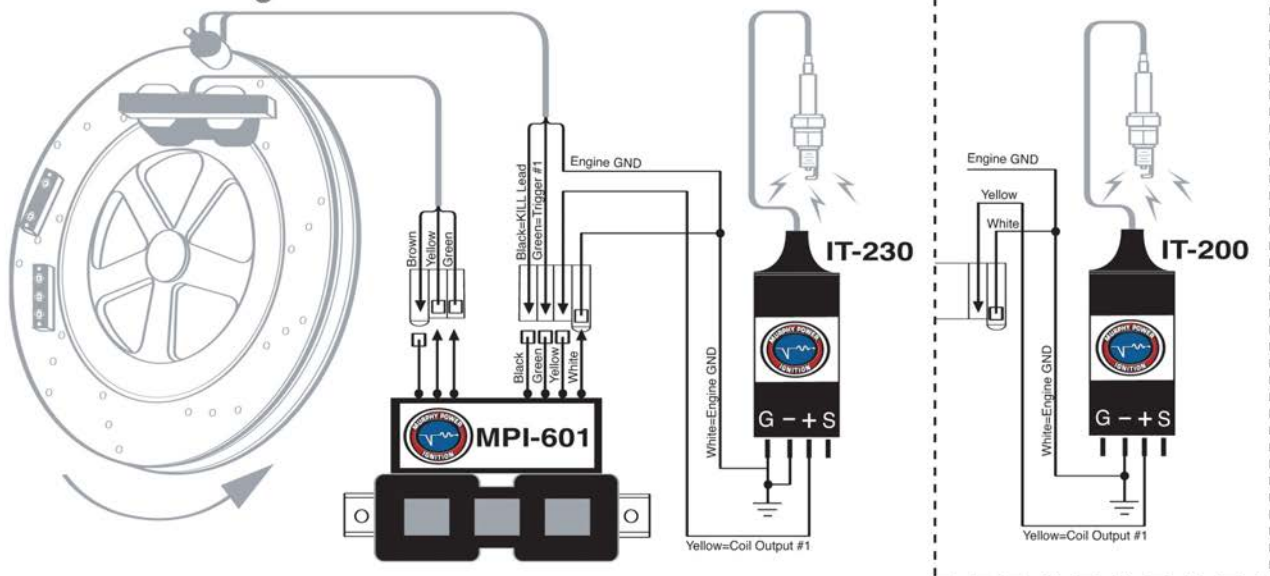
Installation

1. A trigger magnet bar is fastened to the flywheel with the run magnet (deeper recessed) at the timing angle chosen for normal running.
2. A trigger coil is installed to sense the magnets and trigger ignition circuitry.
3. The ignition unit is installed on brackets (consult factory for details) in close proximity to the flywheel, at 30 degrees more advanced than the position of the trigger magnet bar. Detailed instructions are provided with each unit.

MPI 601 Dimensions



Connection Diagram



To order: Specify engine type and bracket



Detonation Sensing Interface System - Model DSI

For G3500 Series Caterpillar Engine

The **Murphy Detonation Sensing Interface System** utilizes a pair of highly sensitive accelerometers to detect detonation. In the event of detonation the DSI signals the **Murphy IntelliSpark™ System**, via 4/20 mA control signal, which responds by immediately retarding the timing thus eliminating the potentially harmful effects of continuous detonation.



Features:

- Utilizes advanced piezoelectric accelerometer sensors to provide real-time analog signal
- Signal is proportional in amplitude to the levels of vibration detected
- Sensors respond over wide range of frequencies up to 10 KHz
- Retards timing to reduce vibration intensity or eliminate it entirely
- Sensor range – 0 – 500 g's
- Detect any source of vibration

Benefits:

- Easy to use Controller interface
- Detects detonation tendencies at low levels before they reach greater intensity and cause engine damage
- Flexible controls, useful information for operators
- Wide bandwidth allows detection of most mechanical vibration sources including detonation
- Complete installation kits, wiring guidelines and sensor kits provided

FWMurphy Control & Instrumentation Solutions

► Detonation Sensing Interface System

Maximize Power To Run Smoother.

Specifications:

Power Requirements: 18-30 VDC 300mA max.

Controller Operating Temp range: -20C to 70C

Sensor Operating Temp Range: -40C to 120C

Sensor Frequency Range: 20-5000 Hz

Sensor Sensitivity: 10mV/g 500g F.S.

Control Inputs:

The 1/REV signal must be provided. Two interfaces are available for customer convenience.

Option 1. MPI_ISO_1/REV-MPI_ISO_RTN: This input connects back to the IntelliSpark Isolated_ 1/REV output pair.

Option 2. 1/REV_In: This interface is designed to be used directly by a mag pick sensor. It can be wired in parallel to the MPI 1/REV mag pick up. It can also be connected in parallel to a Hall-Effect sensor if in use.

Control Output: Vanalog_Out: This is a 1-5 volt open-circuit output level that when terminated externally by 250 ohm becomes a 4-20 mA current signal. Note: The Murphy IntelliSpark Ignition system already has an internal 250 ohm resistor across this input.

Shutdown Output: This is an Open-Drain type interface.

Maximum current when activated: 1.0 amps.

Maximum externally applied voltage when de-activated: 100V.

Panel Controls and Indicators:

1. Power On Switch. Applies 24 VDC to the electronics and sensors.

The knock sensor cable should never be removed or installed with power on.

Power On Indicator provides verification that power is applied.

2. Sensor 1(2) Low Level lights: These indicators will come on when the engine is running over 400 rpm and the sensor output is below minimum level. Its an indication that the sensor is not sensing vibration levels during normal running operations. This may be due to the sensor becoming loose or the cable is removed or the engine is running at idle or unloaded when very low levels of vibration are generated.

3. SHUTDOWN: This indicator will come on if the system detects three heavy detonation present for three successive revolutions. The Shutdown output will activate and it can be tied into a panel or directly to the Murphy IntelliSpark ignition to kill ignition.

4. SHUTDOWN RESET: After a shutdown occurs this push-button clears the shutdown indicator and de-activates the shutdown output for subsequent start-up.

5. Internal indicators

1. Flashing amber led indicates firmware is operating normally

Applications:

– Any Caterpillar 3500 series engine.

Ignition Control Systems – Ignition Coils

The ignition coil is one of the most critical components of any ignition system. When properly matched to the ignition controller's output, the ignition coil ensures optimum performance and reliability.

Murphy Smart Coils are patented, and are used with IntelliSpark Control Technology to provide real time diagnostics and prognostics. Also offered are coils for direct replacement of Altronic coils. All Murphy coils are manufactured with the highest quality of construction for long life durability.

A variety of coils are offered to meet specific application requirements as listed below.

Ignition Coils

IT-250FM

72700240

Smart Coil™

Flange Mount Coil

CSA Approved - Cl. 1, Gr. D, Div. 2

Duration: 400-500 uS @ 10 kV



IT-250

72700237

Smart Coil™

Open Coil, Non-Hazardous

Duration: 400-500 uS @ 10 kV



IT-230FM

72700231

Smart Coil™

Flange Mount Coil

CSA Approved - Cl. 1, Gr. D, Div. 2

Duration: 500-700 uS @ 10 kV



IT-230

72700230

Smart Coil™

Open Coil, Non-Hazardous

Duration: 500-700 uS @ 10 kV



ITX-230RM

72700232

Smart Coil™

Remote Mount Coil

CSA Approved - Cl. 1, Gr. D, Div. 2

Duration: 500-700 uS @ 10 kV



ITX-150-6; -12

6" Length 72700233

12" Length 72700234

Smart Coil™

Integral Coil

CSA Approved - Cl. 1, Gr. D, Div. 2

Duration: 200-300uS @ 10 kV



ITX-250-12

72700245

Smart Coil™

Integral Coil

CSA Approved - Cl. 1, Gr. D, Div. 2

Duration: 400-500 uS @ 10 kV



ITX-250RM

72700246

Smart Coil™

Integral Coil

CSA Approved - Cl. 1, Gr. D, Div. 2

Duration: 400-500 uS @ 10 kV





Murphy Ignition Coils Direct Replacement to *Altronic® Coils



ITX-200RM
72700241
Remote Mount Coil
(replacement to *Altronic 501061-S)
CSA Approved - Cl. 1, Gr. D, Div. 2
Duration: Standard



ITX-170-6; -10; -12
6" length 72700242 (replacement to *Altronic 591011A)
10" length 72700243 (replacement to *Altronic 591011B)
12" length 72700244 (replacement to *Altronic 591011C)
CSA Approved - Cl. 1, Gr. D, Div. 2
Duration: Standard



IT-200FM
72700238
Flanged Coil
(replacement to *Altronic 591018)
CSA Approved - Cl. 1, Gr. D, Div. 2
Duration: Standard



IT-200 Blue
72700235
Unshielded Epoxy Coil
(replacement to *Altronic 501061)
Duration: Standard



IT-200LFM
72700239
Flanged Coil
(replacement to *Altronic 591012)
CSA Approved - Cl. 1, Gr. D, Div. 2
Duration: Long



IT-200L Red
72700236
Unshielded Epoxy Coil
(replacement to *Altronic 591010)
Duration: Long

*Altronic® is registered trademark of ALTRONIC, INC.

Power Supply Murphy Brushless Alternators

- ▶ **Murphy Ignition Systems** are optimized with power supplies utilizing Murphy high-quality brushless alternators. Designed for long-lasting durability with no moving electrical components. Ideal for all industrial applications, certified for hazardous duty locations and field proven.



Shown with optional bracket



Certified for hazardous locations
Class 1, Division 2, Groups C, D, T6

Features:

- No brushes, no brush springs
- One moving part, no moving electrical parts
- One-piece bearing housing, 4.5" or 9.5" brackets available
- Permanent bearing alignment
- Oversize lubrication reservoir
- Glass Filled TFE Fluorocarbon Seal (Teflon)
- Air-cooled 7.3" diameter advanced design

Benefits:

- Strong, compact reliable power
- Exceptional bearing life
- Simple inspection and maintenance procedures
- 24-VDC, rated to 80 amp, 5,000 rpm
CSA approval rated to 60 amp, 3,600 rpm
- Bi-directional rotation

FWMurphy Control & Instrumentation Solutions

► Brushless Alternators

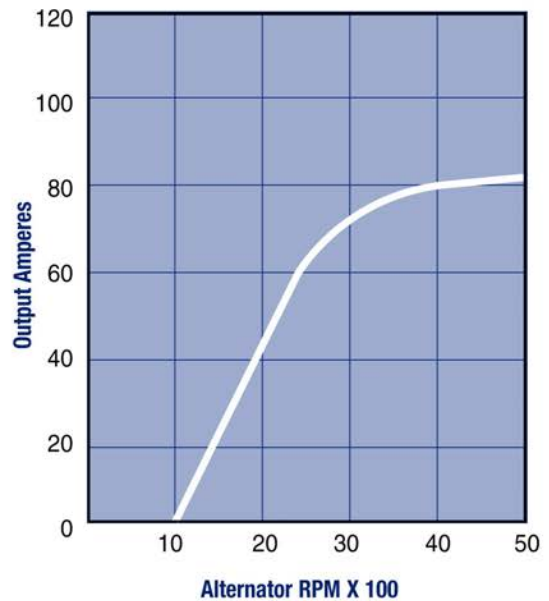
Maximize Power To Run Smoother.

Part number: 72700161; Model number: 102499-HZ24; 7.3" Diameter, Air-cooled, Belt or Direct Driven, 24 Volt

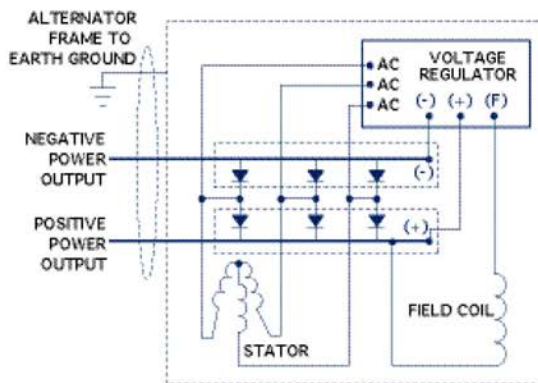
Specifications

Rated Amperes	80
RPM @ Rated Amperes	5000
Preset Volt Range	25.5-30
Full Load Voltage @ 28.0 Preset	27.5
Field Amperes	4.5 Typical
Rotation	Bi-Directional
Shaft Diameter (Pulley)	7/8 inch nominal
Voltage Regulator	Integral - Adjustable - Self Exciting
Wiring Connections	B+, B-, Ground
Rectifier Diode Construction	Individually Replaceable
Rectifier, Rated Capacity	225 Amperes

*CSA International Certification 60 Amperes @ 3600 RPM



Wiring Diagram

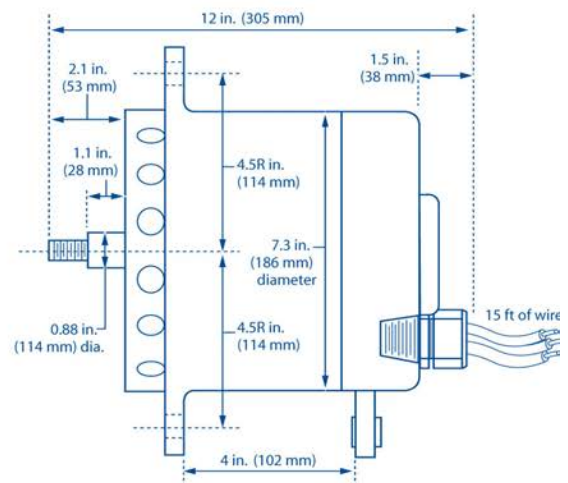


WIRE COLOR CODES

AC	WHITE
POS	RED
NEG	BLK
FLD	BLUE
CHASSIS GROUND	GREEN

For 7.3 inch diameter, single ended, 80 amp alternator to self-excited voltage regulator, all voltages. For use in Class I, Division 2, Hazardous Areas.

Dimensions



AFR-1R - Rich-Burn Air/Fuel Ratio Control System



Features

- Simplest air/fuel ratio controller on the market
- Easy on-screen interface for convenient setup and operation
- One setpoint target
- Operator help key on display
- Comprehensive fault diagnostics
- Minimal operator training required
- Fast and easy installation

The AFR-1R is the Simplest, Rich-Burn Air/Fuel Controller Available

Striking the right air/fuel ratio to support your catalytic converter shouldn't be that hard. And it's not – if you choose the right equipment.

Compliance Controls' AFR-1R air/fuel ratio controller is exactly the right choice. It's pure simplicity at every step – from installation to operation.

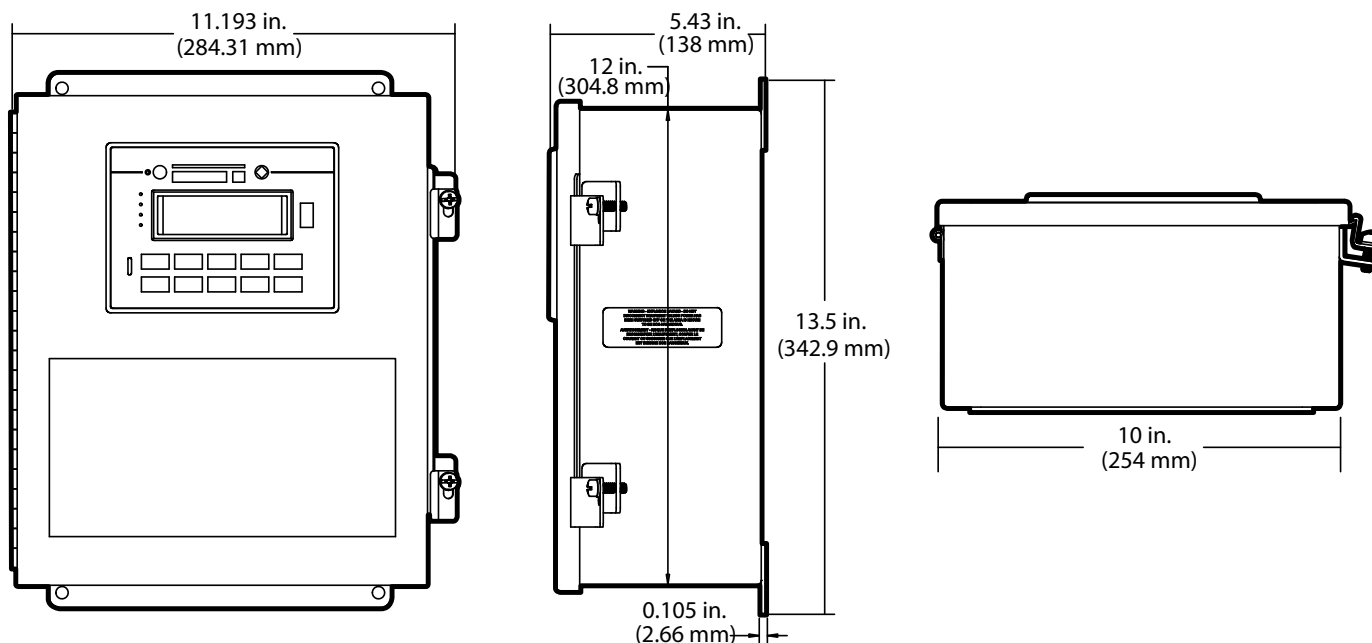
Non-intrusive installation – The AFR-1R operates on an auxiliary fuel line, which can be easily isolated for maintenance, analysis or troubleshooting.

High Speed full authority “butterfly” control valves are available.

Single setpoint, No fine-tuning or tweaking needed.

Streamlined navigation – single-button access to the main functions.

Dimensions



Technical Features

- Designed for low horsepower gas fueled, carbureted rich-burn industrial engines.
- Microprocessor-based controller with a single setpoint
- Setpoint and operation done entirely through the 4 Line x 20 character display, enclosure or remote mounted.
- Post catalyst, oxygen sensor input for real time adaption to changing catalyst performance (post catalyst sensor is optional).
- Pre and Post catalyst thermocouple input for catalyst over temperature protection (ungrounded Type K thermocouples, optional).
- Pre and Post catalyst differential temperature displayed.
- Separate alarm and shutdown dry-contact relays for flexibility in setup and operation.
- Proportional solenoid control valves used for quick response time.
- Heated exhaust gas oxygen sensors for optimum AFR control.
- NEMA 12 enclosure, 10" W x 13" H x 5" D.
- 24 VDC standard with optional 12 VDC configuration.
- CD ignition input for engine speed reference with optional magnetic pickup input.
- Upgradeable to command multi-setpoint targets and accept additional end devices

How to Order

AFR Model Number Strategy

AFR-WD-R-1R-10-TK4B-LC													
HARDWARE			Application			End Devices							
AFR-WD-R			1	R	1	0	TK4B	LC					
1	Model	2	# of Target Setpoints	3	Control Type	4	# of Banks	5	Post Cat Sensor	6	Type of Valve	7	Kit Type
AFR-ND-R	AFR, No Display, HEGO Controller	1	Qty. 1	R	RICH BURN	1	Single	0	None	TK2		Blank	Standard Kit w/Enclosure
AFR-WD-R	AFR, With Display, HEGO Cotroller	9	Qty. 9			2	Dual	1	Yes	TK4B		LC	"Less Case", No Enclosure,
AFR-ND-L	AFR, No Display, Wideband Controllre	64	Qty. 64			- OR IF LEAN BURN -				TK6B			for Panel Mount
AFR-WD-L	AFR, With Display, Widband Controller			L	LEAN BURN	1	1 Fuel Ctrl Valve	1	1 UEGO Sensor	TK10		RD	Remote Mount Display
						2	2 Fuel Ctrl Valve	2	2 UEGO Sensor	TK11B			
										FA25			
										FA50			

AFR-9R - Rich-Burn Air/Fuel Ratio Control System



Features

- Simplest multi-set point (9) air/fuel ratio controller on the market
- Easy on-screen interface for convenient setup and operation
- Nine air/fuel setpoints matched to specific engine load conditions
- Operator help key on display
- Designed for applications with varying engine loads
- Ongoing compliance in high-variable environments

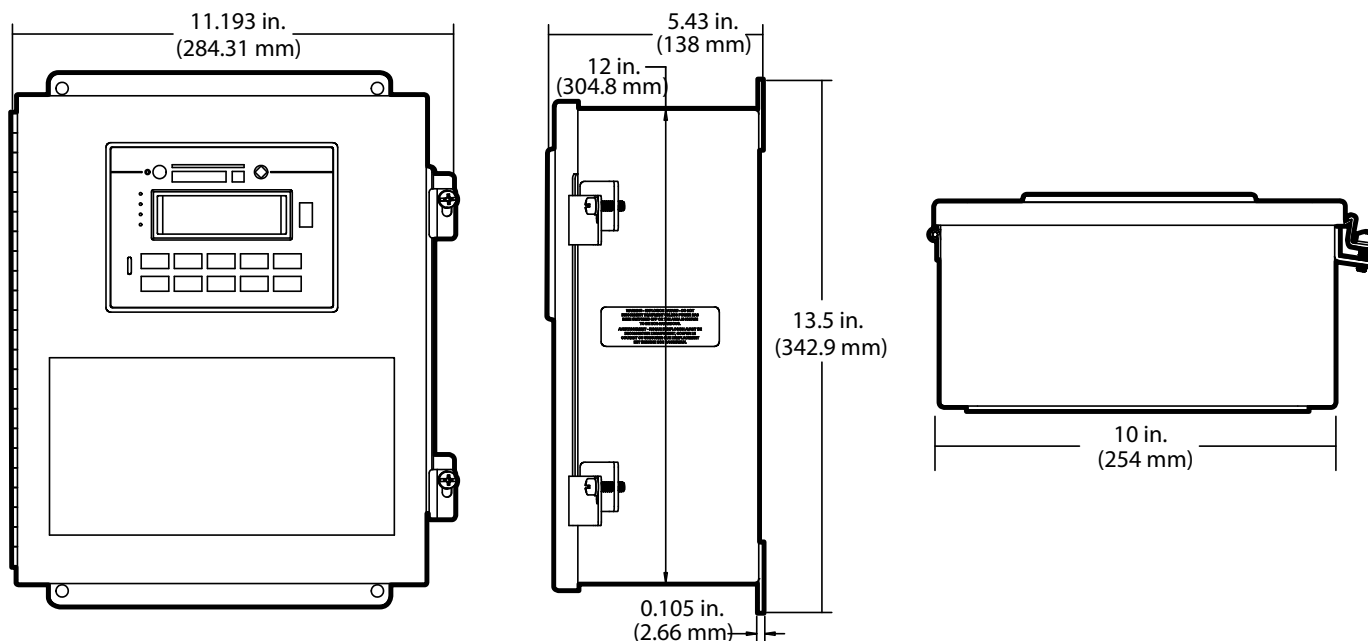
The AFR-9R air/fuel ratio controller is exactly the right choice. It is pure simplicity at every step – from installation to operation.

The AFR-9R offers the same simplicity as the AFR-1R model such as non-intrusive installation and stream-lined menu-driven navigation, but with more setpoints, for even tighter control.

The AFR-9R features nine setpoint targets based on a combination of three RPM settings and three manifold pressure settings. As your engine's load conditions change, the AFR-9R continues to make sure it is in the best possible operating range for optimum catalyst performance.

If your site is facing tightening regulations, changes in ambient temperature, big load swings or gas quality/ pressure changes, the AFR-9R is the right choice. It is simple air/fuel ratio controller with more flexibility.

Dimensions



AFR-WD-R-1R-10-TK4B-LC													
HARDWARE		Application		End Devices									
AFR-WD-R		1		R		1		0		TK4B		LC	
1	Model	2	# of Target Setpoints	3	Control Type	4	# of Banks	5	Post Cat Sensor	6	Type of Valve	7	Kit Type
AFR-ND-R	AFR, No Display, HEGO Controller	1	Qty. 1	R	RICH BURN	1	Single	0	None	TK2		Blank	Standard Kit w/Enclosure
AFR-WD-R	AFR, With Display, HEGO Controller	9	Qty. 9			2	Dual	1	Yes	TK4B		LC	"Less Case", No Enclosure, for Panel Mount
AFR-ND-L	AFR, No Display, Wideband Controller	64	Qty. 64			- OR IF LEAN BURN -				TK6B			
AFR-WD-L	AFR, With Display, Wideband Controller			L	LEAN BURN	1	1 Fuel Ctrl Valve	1	1 UEGO Sensor	TK10		RD	Remote Mount Display
						2	2 Fuel Ctrl Valve	2	2 UEGO Sensor	TK11B			
										FA25			
										FA50			

AFR-64R - Rich-Burn Air/Fuel Ratio Control System



Features

- 64 set point, load tracking, air/fuel ratio controller
- Pre- and post-catalyst engine exhaust Monitoring
- Critical engine and catalyst function Diagnostics
- Continuous health monitoring of the oxygen sensors
- Tracking includes engine load, tailpipe emissions, ambient air temperature, fuel composition and more
- One easy controller for rich-burn Natural Gas Engines

A lot of control in a single package: The AFR-64R air/fuel ratio controller monitors ambient changes, reacts with precision and diagnoses potential problems before they become costly.

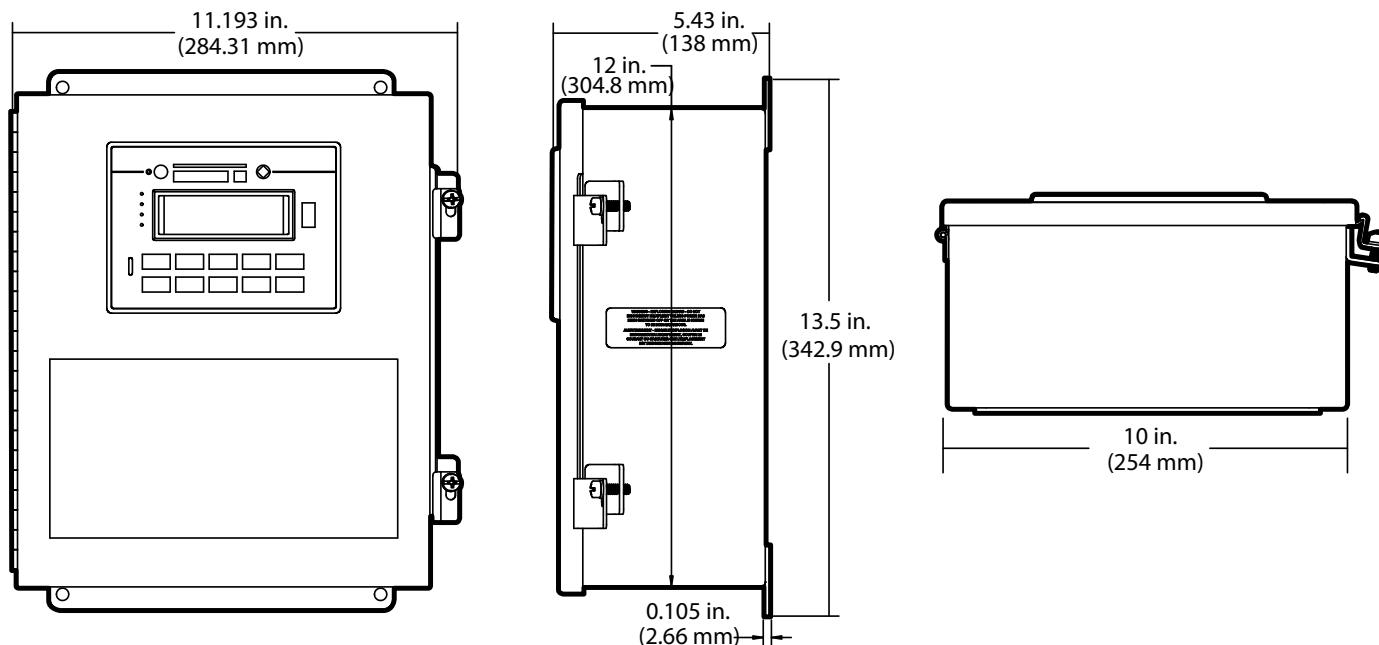
Emissions Compliance: The AFR-64R precisely tracks the air/fuel mix to maintain targeted emissions levels – regardless of variance in load, ambient air temperature or fuel composition.

Flexibility: The AFR-64R controller stores up to 64 load-specific air/fuel set points and automatically tracks engine load changes based on engine RPM and manifold air pressure.

Cost Savings: Pinpoint performance problems as soon as they occur–misfires, detonations and more – to cut the costs of maintenance, downtime, labor and replacement parts.

Whether you need better emissions compliance, engine prognosis/diagnosis and trouble-free equipment life, the AFR-64R helps maximize the efficiency of the engine and its three-way catalytic converter.

Dimensions



Technical Features

- Fast, easy, low-cost installation
- Fits virtually any gas-fueled, carbureted, rich-burn industrial engine – with (or without) a catalytic converter
- Windows®-based platform compatible with most computers
- Software can be installed on laptop, PC, or network
- Comprehensive 38-fault diagnostics, including continuous oxygen sensor health monitoring
- Data plotting for easy, accurate troubleshooting
- Separate alarm and shut-down dry contact relays
- Pre-catalyst closed loop, exhaust oxygen feedback control
- Post-catalyst exhaust oxygen feedback; cascade control for fast, real-time adaptation to changing catalyst performance
- Variable set-point for pre-catalyst and post-catalyst exhaust oxygen control – for real-time response to varying engine loads
- Catalyst temperature monitoring for catalyst over temperature protection
- Drives up to two control banks for operation on “V” type engine configurations
- Multiple valve control options:
 - - Full Authority Valve controls all engine fuel via system-controlled butterfly valve
 - - Trim Fuel Valve adds supplemental fuel to the air intake via system-controlled proportional fuel valve
- Display – Viewable monitor (optional)
- RS-485/MODBUS® communications support for high-speed

How to Order

AFR Model Number Strategy

AFR-WD-R-1R-10-TK4B-LC																	
HARDWARE				Application				End Devices									
AFR-WD-R				1		R		1		0		TK4B		LC			
1				2		3		4		5		6		7			
Model				# of Target Setpoints		Control Type		# of Banks		Post Cat Sensor		Type of Valve		Kit Type			
AFR-ND-R				AFR, No Display, HEGO Controller		1 Qty. 1		R RICH BURN		1 Single		0 None		TK2		Blank Standard Kit w/Enclosure	
AFR-WD-R				AFR, With Display, HEGO Cotroller		9 Qty. 9		2 Dual		1 Yes		TK4B		LC		"Less Case", No Enclosure, for Panel Mount	
AFR-ND-L				AFR, No Display, Wideband Controller		64 Qty. 64		- OR IF LEAN BURN -		TK6B							
AFR-WD-L				AFR, With Display, Widband Controller		L LEAN BURN				1 1 Fuel Ctrl Valve		1 1 UEGO Sensor		TK10		RD Remote Mount Display	
								2 2 Fuel Ctrl Valve		2 2 UEGO Sensor		TK11B					
												FA25					
												FA50					

AFR-64L - Lean-Burn Air/Fuel Ratio Control System



Features

- Easy to install and use
- Troubleshooting and diagnostic capabilities
- Improves engine and emissions control system performance
- Ongoing emissions compliance
- Reduced fuel consumption
- Records up to 8 historic faults at a time
- Reduced lube oil nitration
- Flexible network compatibility; high-speed data transfer
- Longer, more trouble-free equipment life
- Minimal operator training

The AFR-64L air/fuel ratio controller provides state-of-the-art engine control in one simple, easy-to-use product.

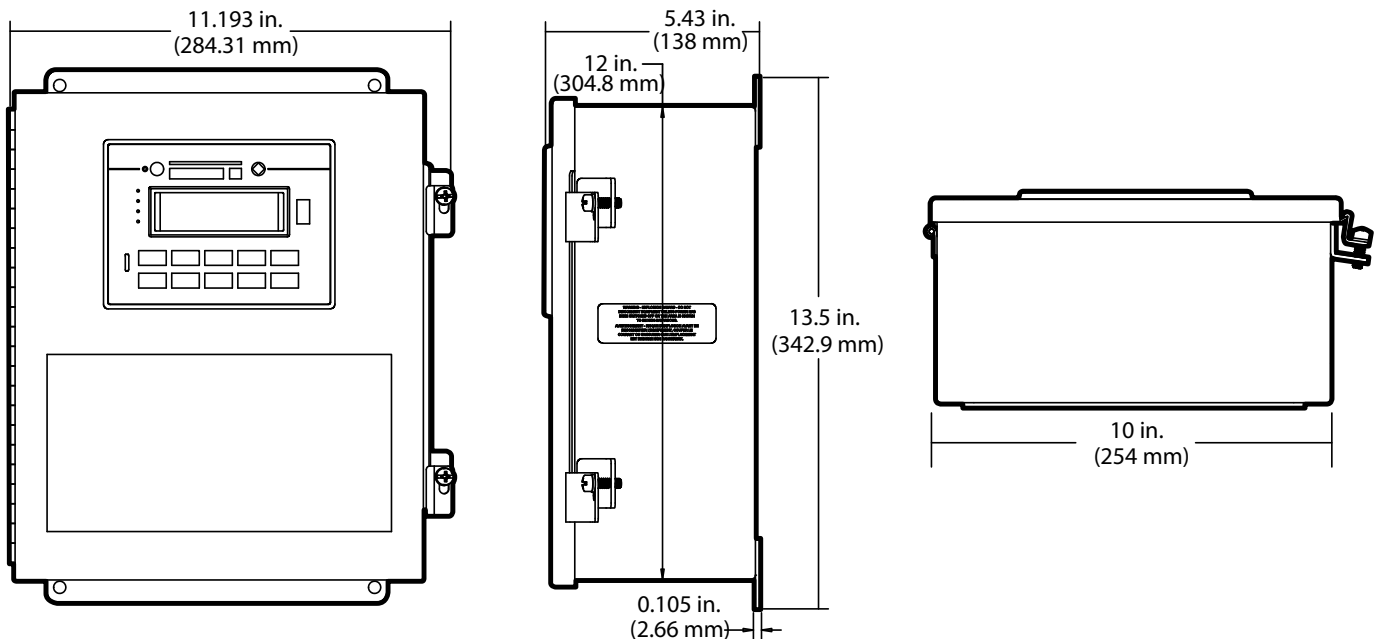
Automatic Operation: No operator intervention needed – the AFR-64L controller automatically tracks multiple factors, including engine load, tailpipe emissions and more, then precisely adjusts the air fuel mix to maximize fuel efficiency, minimize engine emissions, improve engine performance and reduce maintenance costs.

Emissions Compliance: The AFR-64L controller optimizes the lean-burn air/fuel mix to maintain targeted emissions levels over varying engine loads, speeds, fuel quality and ambient conditions.

Cost Savings: Pinpoint performance problems – misfires, detonations and more – as soon as they occur. The AFR-64L controller's advanced troubleshooting and diagnostics cover 76 critical operating parameters, allowing the operator to cut the costs of maintenance, labor, downtime and replacement parts.

Take control over your engine needs – engine diagnostics, emissions control, fully automatic operation – the AFR-64L does it all for you.

Dimensions



AFR-WD-R-1R-10-TK4B-LC													
HARDWARE		Application			End Devices								
AFR-WD-R		1	R		1	0	TK4B		LC				
1	Model	2	# of Target Setpoints	3	Control Type	4	# of Banks	5	Post Cat Sensor	6	Type of Valve	7	Kit Type
AFR-ND-R	AFR, No Display, HEGO Controller	1	Qty. 1	R	RICH BURN	1	Single	0	None	TK2		Blank	Standard Kit w/Enclosure
AFR-WD-R	AFR, With Display, HEGO Controller	9	Qty. 9			2	Dual	1	Yes	TK4B		LC	"Less Case", No Enclosure, for Panel Mount
AFR-ND-L	AFR, No Display, Wideband Controller	64	Qty. 64			- OR IF LEAN BURN -				TK6B			
AFR-WD-L	AFR, With Display, Wideband Controller			L	LEAN BURN	1	1 Fuel Ctrl Valve	1	1 UEGO Sensor	TK10		RD	Remote Mount Display
						2	2 Fuel Ctrl Valve	2	2 UEGO Sensor	TK11B			
										FA25			
										FA50			

AFR-FI - Air/Fuel Ratio Controller for Lean-Burn Fuel Injected Engines



Features

- Improved Engine Performance and Efficiency
- Automated Emissions Compliance
- User-Friendly Display and Keypad Interface
- Price-Competitive
- High-Speed ModBus Communications

The AFR-FI Air/Fuel Ratio Controller is your best value for fuel injected, lean-burn natural gas engines. The microprocessor-based AFR-FI gives better performance through fuel efficiency, automated compliance, and lower maintenance with easy installation, automatic operation, and state-of-the-art technology.

The AFR-FI is a “smart system” that automatically optimizes the lean-burn air/fuel mix to insure top performance and fuel efficiency without the use of traditional pneumatics.

The automated compliance maintains tight control of the lean-burn air/fuel mix with computer speed and precision.

In addition, the AFR-FI delivers optimized engine operation and stays alert with 26 alarms and shutdowns resulting in lower maintenance. Engine monitoring includes fuel flow and fuel pressure, intake manifold temperature, exhaust temperature and air manifold pressure.

Benefits

- Compliance assured
- Eliminates time-consuming, unreliable pneumatic air-fuel control
- Better engine performance
- Less maintenance - lower maintenance cost
- Improved troubleshooting
- Better fuel economy
- Easy installation and setup
- Fully automatic
- Easy integration with other control systems and data collection / analysis systems
- Supports high-speed communications

Technical Features

- D100 MHz, 586-compatible microprocessor: 8 MB of RAM
- User-programmable: Windows-based ladder-logic software (IEC- 61131-3 standard programming languages)
- Daylight-filtered vacuum fluorescent display (4 lines with 20 characters each line)
- 16-key pad: for set-point entry, alarm acknowledgement, start, stop, reset, etc.
- Wall / bracket mount enclosure or free standing
 - Window in door
 - Internal swing panel
 - DIN rail mounted terminal blocks
 - Panduit wireway
- Canadian standard for separation of incandive and non-incandive wiring
- 4RS485 serial ports
- Digital I/O module-reads up to 18 thermocouples or mA sources
- 10 sets of data points (air / fuel map)
- Fuel flow totalization (optional)
- Hour meter
- Shutdown or fault snapshot-provides a complete picture of system conditions at shutdown
- 4 Discrete relay outputs
- Shutdowns
 - GOV-10 shutdown (optional)
 - Low / high fuel flow
 - Low / high fuel pressure
 - Low / high air pressure
 - Air manifold pressure xmitter fail
 - TC break
 - Air manifold temperature
 - Overspeed
- 12 Alarms
- Accommodates wide range of engine configurations
 - V-type engines, inline
 - Waste gate or air damper
 - Other special configurations
- Operating temperature: -40 to +58 C (-40 to +185 F)
- Controller approved for CI. 1, Div. 2, Grps. C & D Areas

How to Order

Please contact your local Murphy Sales Representative for details on how to purchase Murphy AFR Products and Systems from Enovation Controls.

Enovation Controls Sales Representatives and Distributors can be found at

www.fwmurphy.com/wheretobuy/us-sales-distributors

EICS - Engine Integrated Control System



Features

- An OEM approach to an aftermarket application
- Two packages available: performance/efficiency package, optional emissions package (includes catalyst)
- One unit, three integrated functions - CD Ignition, air/fuel control, and electronic governing speed control
- Pre-calibrated and dyno tested for specific engine models
- Advanced electronic air-fuel ratio control
- Lightning fast response to engine speed/load variations and fuel quality changes
- Murphy "Smart" Ignition Coils for expanded engine diagnostics and dynamic spark adjustment
- Graphical color user interface
- Data sharing via Modbus RS485
- Data logging

Optimizing your engine's performance and maintaining emission compliance is easier than ever with Murphy's new Engine Integrated Control System (EICS). It is a complete integration package pre-calibrated specifically for your engine model.

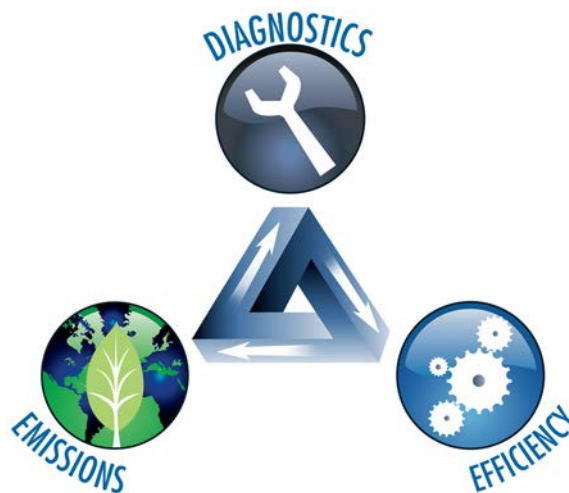
EICS combines key components - ignition system (powered by Murphy's IntelliSpark™ Ignition technology), air/fuel control, speed governing, interface and diagnostics, sensors, harnesses, catalyst and engine control unit (ECU) - in one package, saving you money and man-hours associated with the installation and setup of separate engine components.

The EICS has been pre-configured for your convenience, ensuring your engine will run at optimum performance without the need for manual field adjustments. Its D-EPR valve accommodates wide variations in fuel composition and speed/load ranges, maintaining efficiency with load following technology for even the toughest gas lift applications.

In addition, the EICS eliminates the need for pretest site visits by maintaining emissions - saving you time and money. With EICS you can be certain your site will pass required testing, like Quad J testing, without the need for pretesting to get "dialed in".

Benefits

- Integrated system = simplified installation compared to separate components
- The integrated approach makes more advanced diagnostics possible
- No more setup of generic boxes - EICS is engine specific
- No more "dialing in" - it's pre-calibrated
- Optimization of your engine's performance
- Maintains emissions compliance between testing - no "tweaking" necessary
- Eliminates magneto failures and premature spark plug changes
- Reduces engine failure diagnostic time
- Reduces costs associated with the engine's operation



How to Order

Step 1 - Pick the EICS Engine Kit based upon your engine model

EICS Engine Specific Kits			
Part No.	Engine Model Description	Part No.	Engine Model Description
48700010	EICS Engine Kit G3306TA	48700046	EICS, Shielded Ignition, G3306NA***
48700052	EICS Engine Kit G3306 TAA	48700033	EICS Engine Kit G3306B NA
48700049	EICS, Shielded Ignition, G3306TA***	48700048	EICS, Shielded Ignition, G3306B NA***
48700032	EICS Engine Kit G3306B TA	48700012	EICS Engine Kit G3304NA**
48700045	EICS Engine Kit G3306B TAA	48700047	EICS, Shielded Ignition, G3304NA** ***
48700051	EICS, Shielded Ignition, G3306B TA***	48700037	EICS Engine Kit G3406TA*
48700011	EICS Engine Kit G3306NA	48700035	EICS Engine Kit G3406NA*
48700027	EICS Engine Kit Arrow VRG330	48700055	EICS, Electronic Ignition, G3406TA
48700060	EICS, Shielded Ignition, VRG330***	48700057	EICS, Electronic Ignition, G3406NA
48700043	EICS Engine Kit KTA-19		

*For engine models G3406NA and G3406TA, verify the following before ordering:

(1) If current mixer configuration is located outside the air cleaner use Wedge Intake Kit 48700040.

(2) Verify that your engine has a magneto drive ratio to crank shaft of 1:1. If not, contact your Murphy sales representative.

**For engine models G3304NA, verify that your engine has a magneto drive ratio to crank shaft of 1 1/2:1. If not, contact your Murphy sales representative.

***For Shielded Ignition Retrofit Kits, contact your Murphy sales representative before ordering.

Step 2 - Determine display variant

Every EICS Engine Kit Requires One Display - Choose One Variant Below

P/N 48700017 - In Panel Mount Display Kit, Display + EICS Pigtail + RS485 Pigtail

P/N 48700021 - Remote Mount Display Panel with Switches, in Enclosure

Step 3 - Add optional hardware if desired

Add Optional Emissions Package:

P/N 48700013 - Emissions Kit, Applicable for engines G3304NA, G3306TA, G3306NA, G3406TA, G3406NA, VRG330

P/N 48700050 - Emissions Kit, Applicable for engine KTA-19

To Add Optional Suction/Discharge Pressure Based Speed Control:

Order key below and add a standard Murphy PXT 4-20ma Pressure Sensor to complete

P/N 48700031 - Suction Control/Discharge Control Software Key (requires Murphy PXT sensor)

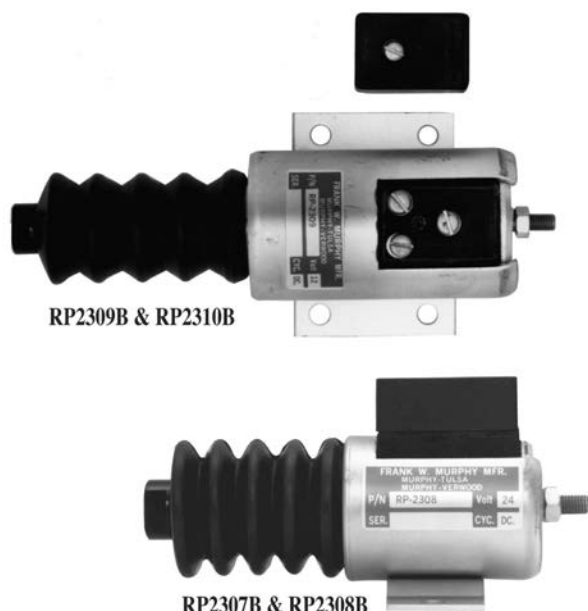
To Add The Generator Control Panel GC-10:

Contact your Murphy sales representative at www.fwmurphy.com/EICS-engines to view a full list of supported engine models, and to let us know which engine models you would like to see mapped next.

Please contact your local Murphy Sales Representative for details on how to purchase Products and Systems from Enovation Controls.

Enovation Controls Sales Representatives and Distributors can be found at www.fwmurphy.com/wheretobuy/us-sales-distributors

Pull/Push DC Solenoids for Diesel Engines – RP Series



Features

- One Solenoid For Pull/Push Operation
- No Internal Switches
- Reduce Coil Burnout
- Boost Reliability
- Reduce Adjustments
- High Force–Small Size
- Can Be Used With Most Engines Start Systems
- SD85 Solenoid Drive Time Delay Available To Greatly Reduce Possibility Of Coil Burnout And Facilitate Low Current Piloted Operation.

Murphy push/pull DC Solenoids provide single unit versatility for engine applications, such as shutdown.

A choice of two models and two voltages is available. All models come complete with return spring and rubber seal boot. See the next page for specifications and options.

Basic Models

Models RP2307B and RP2308B give a full one inch (25 mm) stroke at 11 pounds (49 N) and hold up to 23 pounds (102 N) at full voltage, continuous duty.

They will operate at any stroke less than maximum; refer to the chart shown on page 2.

Models RP2309B and RP2310B can pull 14 pounds (62 N) with a one-and-a-half inch (38 mm) stroke. They hold up to 34 pounds (151 N) at full voltage, continuous duty. See the chart on page 2 for holding force at any stroke less than maximum.

SD85 Solenoid Drive Time Delay

Using the SD85 ensures the energize coil is only powered for 1-2 seconds with each operation. If the plunger does not seat in that time, it is highly unlikely it will seat. The hold coil is energized as long as the signal to the SD85 is active. This insures long life of the RP solenoid.

MODEL & PART NUMBERS: Model No.	DC SOLENOIDS & ACCESSORIES Description	SHIPPING WEIGHT ozs (kg)
RP2307B	12 VDC, 1 in. (25 mm) stroke, 11 lbf (49 N) pull, 23 lbf (102 N) hold	24 ozs (0.7 kg)
RP2308B	24 VDC, 1 in. (25 mm) stroke, 11 lbf (49 N) pull, 23 lbf (102 N) hold	24 ozs (0.7 kg)
RP2309B	12 VDC, 1-1/2 in. (38 mm) stroke, 14 lbf (62 N) pull, 34 lbf (151 N) hold	48 ozs (1.4 kg)
RP2310B	24VDC, 1-1/2 in. (38 mm) stroke, 14 lbf (62 N) pull, 34 lbf (151 N) hold	48 ozs (1.4 kg)
65-01-0108	Clevis yoke assembly	1 ozs (.03 kg)
65-01-0110	Clevis yoke chain assembly	2 ozs (.04 kg)
40-05-0315	Threaded rod (1-1/2 in.)	.05 ozs (.001 kg)
00-00-2457	RPS in-line ball joint	.05 ozs (.001 kg)
00-00-2458	RPS 90° ball joint	1 ozs (.03 kg)

Watts Power/Cold Force in Pounds at 100% Voltage/Inches Stroke

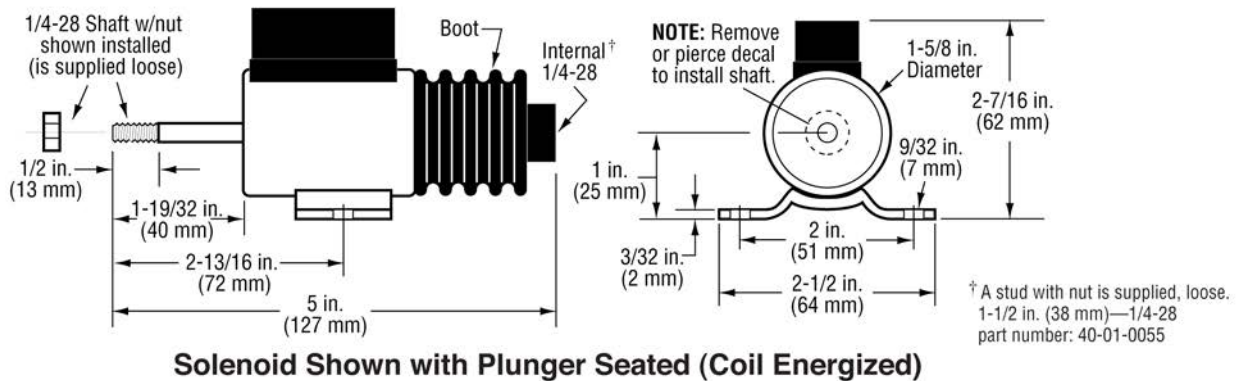
Solenoid Model Number	Maximum Stroke In. (mm)	Power in Watts		Force* in Pounds [Kilograms] at 100% Voltage† Stroke in Inches (Millimeters)							
		Seated	Inrush	Hold Continuous	1/8 (3)	1/4 (6)	1/2 (13)	3/4 (19)	1 (25)	1-1/4 (32)	1-1/2 (38)
RP2307B	1 (25)	18	624	25 [11.34] <13> [5.90]	22 [9.98] <12> [5.44]	21 [9.53] <11> [4.99]	17 [7.71] <10> [4.54]	14 [6.35] <8> [3.63]	10 [4.54] <6> [2.72]	—	—
RP2308B	1 (25)	12	696	27 [12.25] <15> [6.80]	25 [11.34] <14> [6.35]	23 [10.43] <13> [5.90]	19 [8.62] <12> [5.44]	15 [6.80] <9> [4.08]	11 [4.99] <7> [3.18]	—	—
RP2309B	1-1/2 (38)	18	1029	32 [14.52] <19> [8.62]	30 [13.61] <18> [8.16]	27 [12.25] <16> [7.26]	22 [9.98] <14> [6.35]	18 [8.16] <11> [4.99]	13 [5.90] <9> [4.08]	8 [3.63] <6> [2.72]	6 [2.72] <4> [1.81]
RP2310B	1-1/2 (38)	12	960	35 [15.88] <20> [9.07]	34 [15.42] <19> [8.62]	31 [14.06] <17> [7.71]	26 [11.79] <15> [6.80]	22 [9.98] <12> [5.44]	17 [7.71] <9> [4.08]	12 [5.44] <7> [3.18]	7 [3.18] <4> [1.81]

* Forces shown are without return spring. Forces shown < > are with return spring. Forces shown in [] are in kilograms.

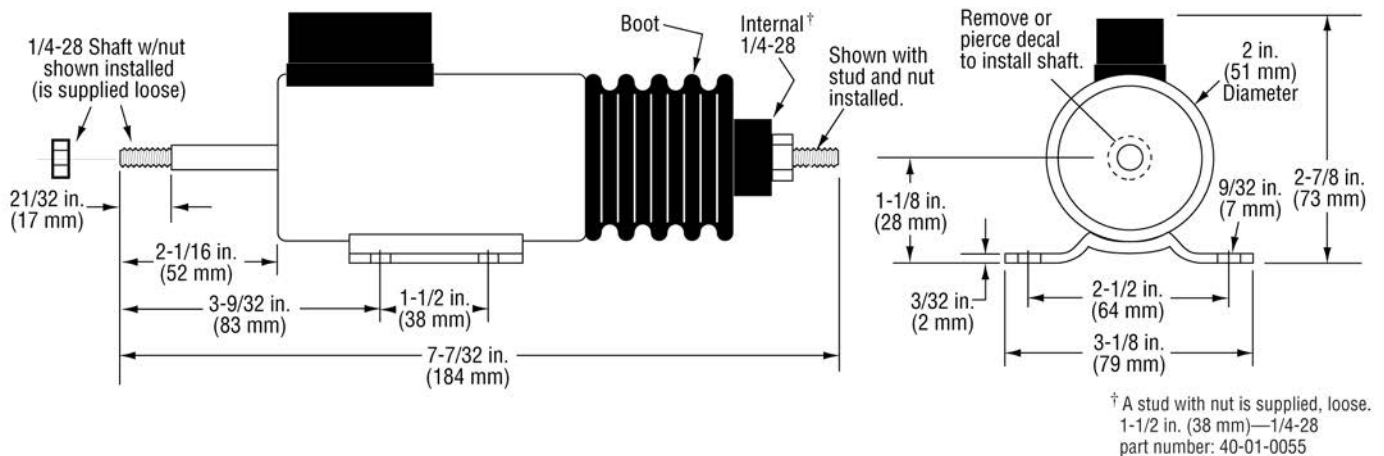
† To determine the operating current, divide the power (watts) indicated in the above table by the applied voltage. Solenoids will operate at any stroke less than maximum.

Solenoid Dimensions

RP2307B and RP2308B



RP2309B and RP2310B



- Note 1.** Typical operating temperature for single 15 second operation of the energize coil is less than: 140°F(60°C) ± 10°F (6°C) for 1 in. (25 mm) Stroke Solenoids (70°F/21°C Rise above ambient) 120°F(49°C) ± 10°F (6°C) 1-1/2 in. (38 mm) Stroke Solenoids (50°F/10°C Rise above ambient) See **CAUTION** statement on next page and note maximum housing temperature is 185°F (85°C).
- Note 2.** The energize-coil should not be activated for more than 15 seconds. Longer energize-coil activation times will damage the solenoid.
- Note 3.** Allow minimum 15 minutes for cooling between activations of energize-coil to avoid damaging the solenoid. (Depends on length of time energize coil is energized.)
- Note 4.** The energize-coil must fully seat the plunger to allow the hold-coil to function properly.

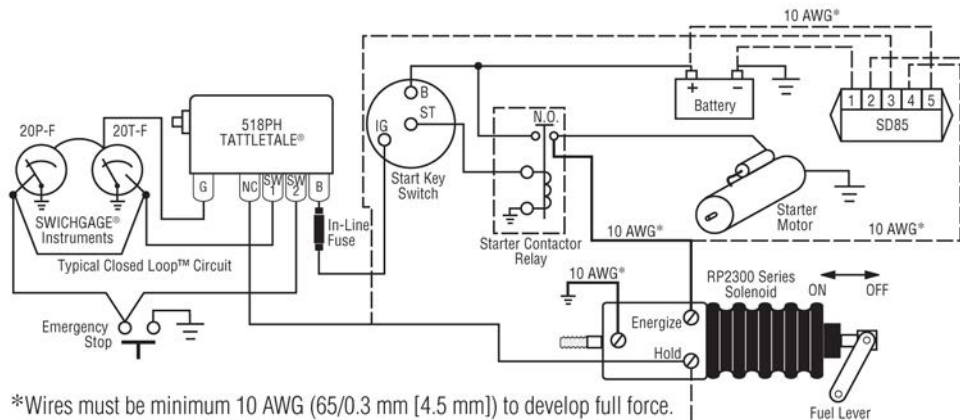
Typical Wiring Diagrams

NOTE: In either application if the starter hangs, on starters with integral solenoids, the energize coil remains energized.

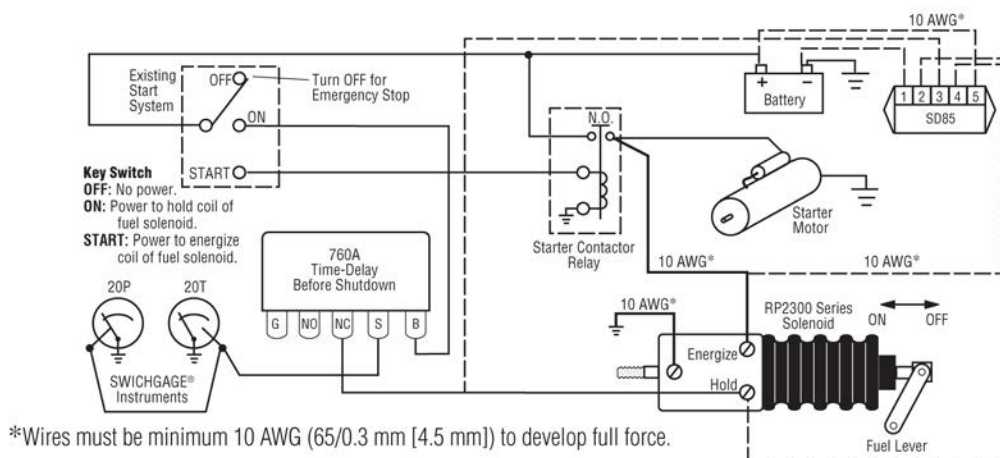


CAUTION: On certain starter solenoids/contactor relays, current can feed back through the energize terminal from the hold coil and provide a parallel path to ground through the device connected to the energize terminal.

Typical time-delayed shutdown using a 518PH magnetic switch (SD85 is optional)



Typical time-delayed shutdown using a 760A magnetic switch (SD85 is optional)



Mechanical Installation

1. Bolt the solenoid securely to the mounting bracket.
2. Connect linkage and check for binding. Plunger should move freely throughout the complete stroke and be allowed to "bottom" at the internal stop of the solenoid.

DO NOT MOUNT WITH BOOT DOWN. DO NOT APPLY ANY GREASE OR LUBRICATION TO PARTS.

IMPORTANT: If the plunger does not seat, it will release prematurely when shifted to the "holding" mode of operation. Readjust linkage to lengthen the plunger stroke. Adjust the yoke in increments of 1/2 turn until plunger will remain in hold position.

Electrical Installation

1. Refer to the diagrams above for typical electric wiring.
2. Use minimum 10 AWG [65/0.3 mm (4.5 mm)] wire size, as noted in the wiring diagrams. A smaller wire will reduce the current available and thus the pulling force. Wire length must be kept to a minimum.

Operation

The solenoid coil is connected to the existing engine starter system or an equivalent circuit. A SD85 is recommended. At starting, both the Energize and Hold-in coils are energized. In the run mode, the Hold-in coil is continuously energized while the Energize coil has to be disconnected, reducing the heating effect and power consumption and avoiding damage to the device.

NOTE: Coils that burn out due to improper electrical hookup, misadjustment or improper operation are not covered by Murphy factory warranty.

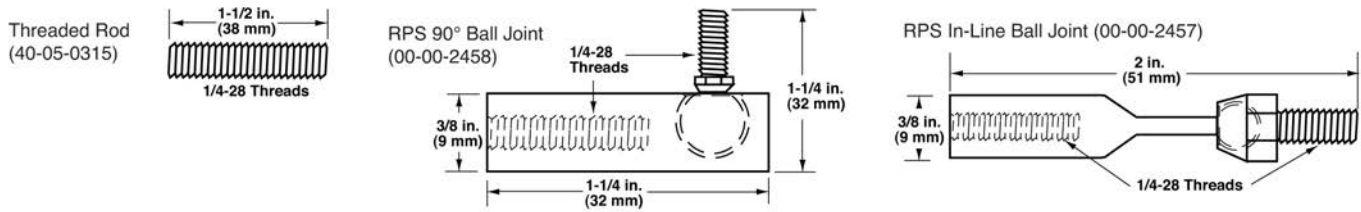


CAUTION: The solenoid housing is hot to the touch. A temperature rise to 185°F (85°C) is permissible.

NOTE: A cool down period of 15 minutes minimum should be allowed between energized pull in cycles.

Accessories

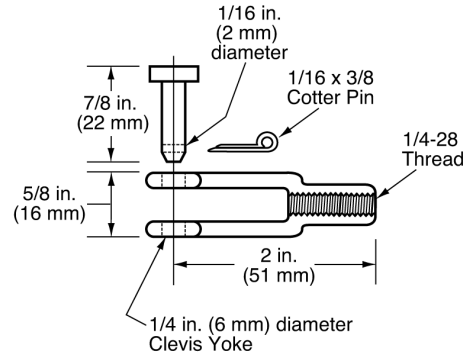
RPS Linkage Parts and Assemblies



Clevis Yoke Bead Chain Assemblies 65-01-0110



Clevis Yoke Assembly 65-01-0108



SD85: Solenoid Drive Time Delay

The SD85 is used when the solenoid is duty cycled for short time periods such as 2-position throttle operation. It also provides enhanced operational control for normal on-off applications. The SD85 activates both coils of the solenoid for a short time then de-energizes the Energize-coil. The Hold-in coil remains energized.



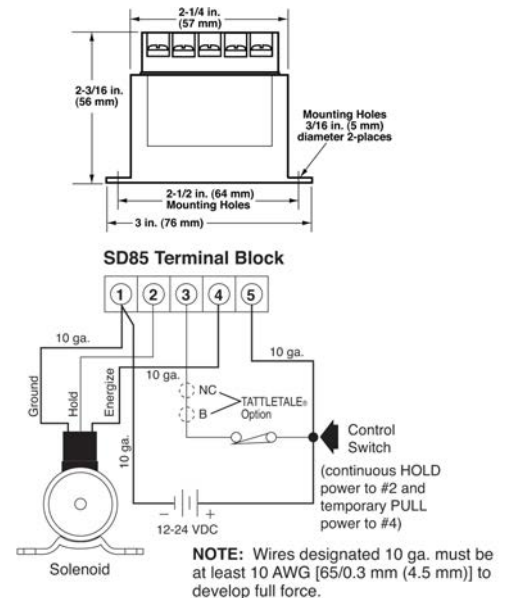
SD85: Specifications

Input Voltage: 8 to 30 VDC

Current Ratings:

- 40 ma standby (quiescent) 8 to 30 VDC
- 75 Amps Pull-in @ 12 VDC
- 1 Amps Hold @ 12 VDC
- 37.5 Amps Pull-in @ 24 VDC
- 0.5 Amps Hold @ 24 VDC
- Terminal #3 2 Amps Maximum
- Terminal #5 112.5 Amps Maximum during Pull-in

NOTE: Wires designated 10 ga. must be at least 10 AWG [65/0.3 mm (4.5 mm)] to develop full force.



Rack Puller for Diesel Engines Model RP75



Features

- Pulls Injection Pump or Air Intake Shutoff Lever
- 30 lbf (133 N) Operating Force
- Models Available for 12 or 24 Volt Systems
- Operates on Signal from SWICHGAGE® Installed on the Engine or Driven Equipment

The RP75 rack puller is a semi-automatic device that provides a pulling force to initiate shutdown of diesel engines and equipment.

The RP75 connects to the injection pump or air intake shut-off lever via a cable (chain optional). A coil spring, within the RP75, is reset manually and is held in place by an electromagnet. When the SWICHGAGE® detects a malfunction, the electromagnetic circuit is interrupted through a Magnetic Switch—releasing the coil spring thus pulling the cable/chain to actuate shutdown. The spring, when fully compressed, exerts a pull of 30 lbf (133 N).

The RP75 is available for 12 or 24 VDC applications and is compatible with all SWICHGAGE® instruments.

Specifications

Operating Force: 30 lbf (133 N) maximum, 10 lbf (44 N) minimum.

Coil Voltage: Specify 12 or 24 VDC.

Coil Resistance: RP75-12: 32.2 ohms. RP75-24: 129.8 ohms.

Length of Travel: 1-7/8 in. (48 mm).

Control Linkage

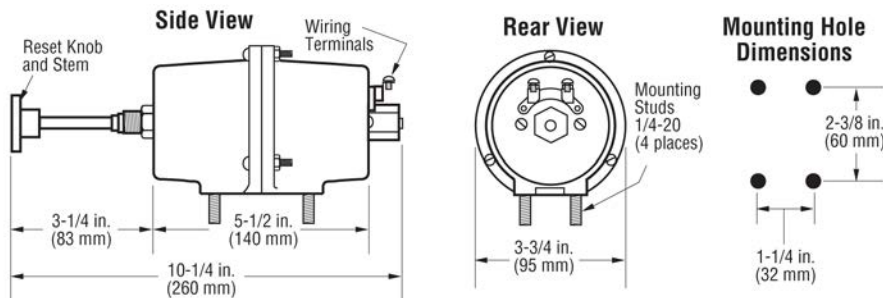
- Cable: 4ft. (1.22 m); Optional 8 ft. (2.43 m) or 12 ft. (3.65 m) available.
- Chain (optional): 30 in. (762 mm).

NOTE: Specify options when ordering.

Shipping Weight: 5 lbs 3 oz. (2.4 kg).

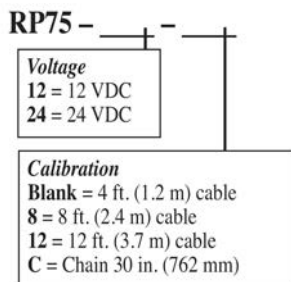
Shipping Dimensions: 9-1/4 x 8-1/4 x 5-1/4 in. (235 x 210 x 133 mm).

Dimensions



How to Order

Specify model number.



Mounting Bracket 40-05-0161 is sold separately. Specify part number when ordering.

Service Parts

Specify part number.

Part Number	Description
40-00-0021	12 VDC core assembly
40-00-0044	Shaft solenoid assembly
40-01-0050	Bushing shaft assembly
40-01-0053	Case repair kit
40-01-0054	Cocking rod, bushing and knob repair kit
40-05-0136	Spring, main actuating
40-05-0149	Spring, cocking rod return
80-04-1030	2 Screws, machined #10-24 x 3/8 pan HD steel CAD II
40-00-0024	24 VDC core assembly

Installation Instructions



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.

Mounting

1. Mount the RP75 using the 40-05-0161 mounting bracket or similar (see **Figure 1**). If installing the RP75 to an engine compartment firewall, go to Step 2.
2. If installing the RP75 to an engine compartment firewall, drill a 3/16 in. (15 mm) diameter hole in the firewall (see **Figure 2**).



WARNING: The firewall must be capable of withstanding the push and pull force of the RP75.

3. Remove the reset knob on the RP75 by loosening the allenhead screw on the knob.
4. Remove the mounting nut and insert the RP75 reset stem through the hole from the back of the firewall.
5. Replace the mounting nut and tighten. Reinstall the reset knob.

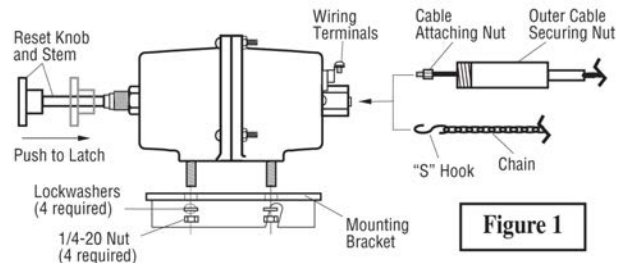


Figure 1

Typical Wiring Diagrams

Wire the RP75 appropriately (see **Figure 3**).

NOTE: RP75 is voltage rated; do not apply 24 VDC to 12 VDC model and vice versa. Also, the 117PH Magnetic Switch is rated for both 12 and 24 VDC circuits but voltage must be specified when ordering the 518PH or 761APH Magnetic Switches.

Installing Cable or Chain

1. To install the control linkage (cable or chain), apply voltage to the RP75. Push in the reset knob. If installing the cable, insert the cable attaching nut into the RP75 and tighten snugly (see **Figure 1**). **DO NOT OVERTIGHTEN** or threads may strip. Attach and tighten outer cable securing nut. If installing the chain, attach the "S" hook to the RP75 (see **Figure 1**).
2. Attach the other end of the cable or chain to the injection pump or air intake shut-off lever so it moves freely without sharp bends and without binding.

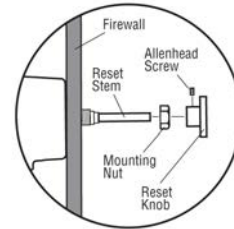


Figure 2

Operation Test

NOTE: Some method must be provided to disconnect (lockout) all normally closed SWICHGAGE® circuits when starting (such as through the appropriate Magnetic Switch).

1. Reset magnetic switch.
2. Push in RP75 reset stem until coil latches the trip mechanism.
3. Start engine and observe that all locked out contacts clear.
4. With engine running, ground SWICHGAGE® contact. The Magnetic Switch will trip thus removing voltage to RP75. The engine should shutdown immediately. If the engine does shutdown, adjust control linkage (cable or chain) to ensure that shutoff lever travels the full length in both directions.



CAUTION: Shut-off lever should not pull hard against the stop in the "off" position.

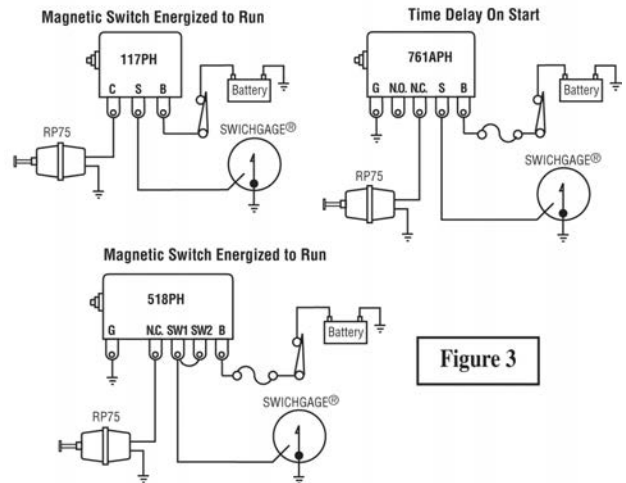
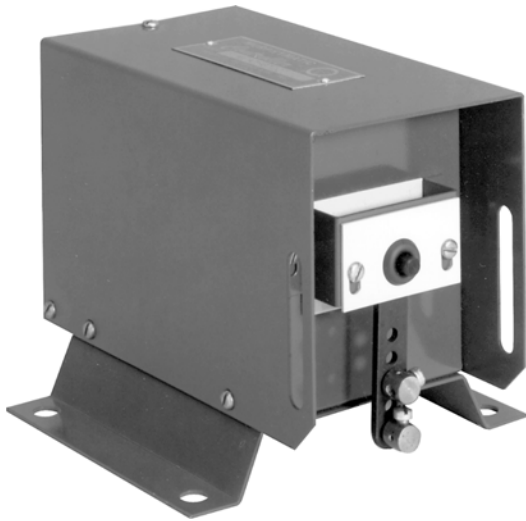


Figure 3

MURPHYMATIC® Engine Throttle Controller Model AT03069



Features

- Automatically Adjusts Engine Speed to Meet Demands of Pressure, Level, Load and Temperature.
- Speed Changes Made Slowly and Smoothly.
- Saves Fuel, Engine Wear, Horsepower and Labor.
- Perfect for Warm-Up and Cool-Down on Automated Systems.
- One Model for Both 12 and 24 VDC Systems.

The AT03069 is a completely reliable heavy duty device developed specifically to automatically control engine speed to meet system demand. Low current, high torque, solid state switching and electronic clutch make it ideal for all automatic and semiautomatic engine systems. Used with the appropriate Murphy SWICHGAGE®, near constant pressure, level and load can be maintained. Check with our engineers for help with other applications where speed control can improve your system.

Applications

Pressure

- City Water Systems.
- Water Flood Injection.
- Sprinkler Lateral Changes.
- Make-up if a "Gang Pump" stops.
- Multiple Hose-reel Irrigation Systems.

Level

- Water or oil storage tanks.
- Waterflood tanks.

Specifications

Voltage: 11-28 VDC negative ground.

Maximum Current: 500 mA (1/2 amp).

Standby Current: Approx. 7 mA.

Increase and Decrease: Inputs float at approx. 8.4 VDC. Grounding inputs causes 8-18 mA of current to flow from either.

Torque: 25 inch pounds.

Sealed limit switches: Factory adjusted, controls maximum travel.

Features

The AT03069 can enhance features of our SELECTRONIC® Micro-Controller units by allowing features such as:

- Warm-up RPM Set point.
- Minimum RPM Set point.
- Maximum RPM Set point.
- Preset Operating RPM Set point.
- Auto Throttling To Match Flows (as needed in flood control applications).
- Maintaining System Pressure (as needed in booster station application).
- Adjustable Rate Of Change In RPM (allowing fine tuning of overall system).

For more information, recommendations and quotations contact our engineering dept.

- Sewer disposal systems.
- Flood control catch basins.

Temperature

- Multi-engine cooling systems.
- Air conditioned chilled water systems.

Engine Load

- Empty or fill reservoirs with a lower horsepower engine—fast when head is high—slow when head is low.

Linkage adjustment on lever arm—5 holes:

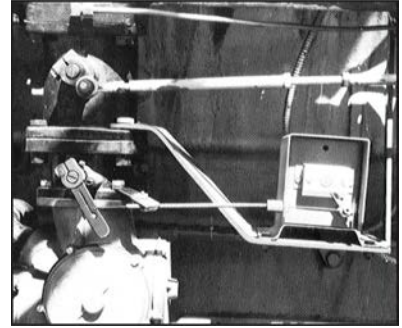
Adjusts travel: 1-3/16 in. (30 mm); 1-11/16 in. (43 mm); 2 in. (51 mm); 2-1/4 in. (57 mm) approximately. Travel Time: 11 to 20 seconds depending on the voltage and force applied.

Dimensions: See reverse side.

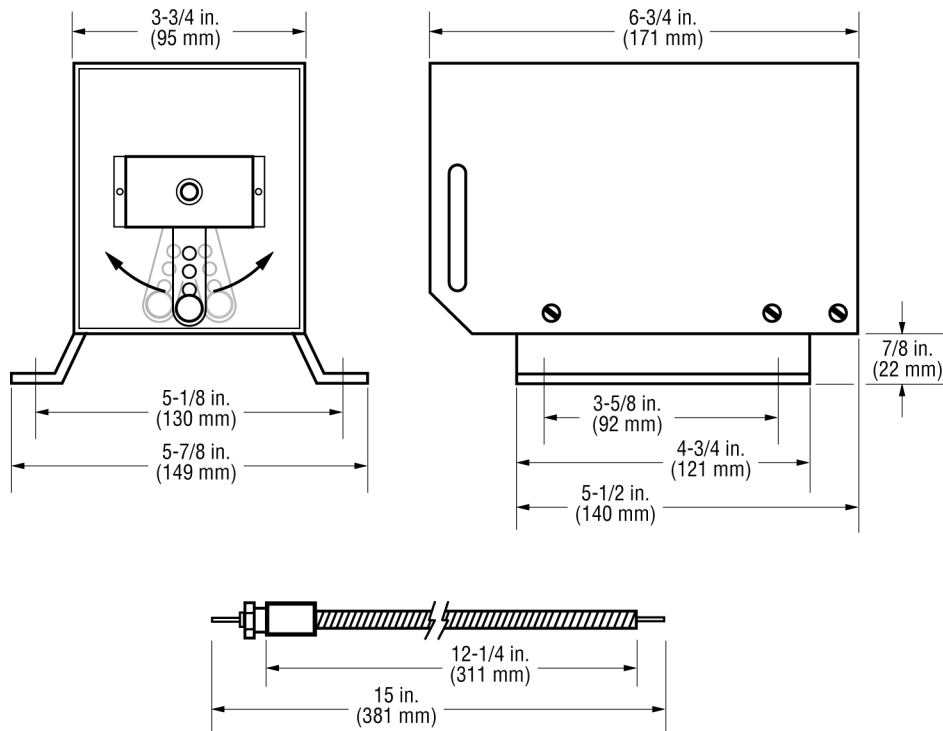
Net Weight: 5 lb. (2.27 kg)

Operation

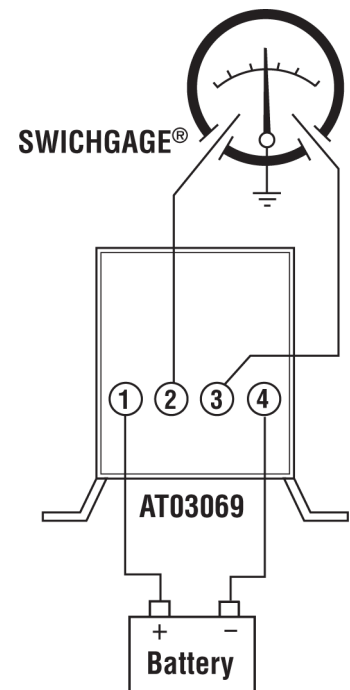
A Murphy SWICHGAGE®* constantly monitors pressure, level, temperature or load. Adjustable high and low contacts on SWICHGAGE® are set slightly above and below desired operating point. When demand changes, pointer touches appropriate high or low contact and signals speed change. AT03069 controller responds only so long as contact is made. The controller stops immediately when contacts separate. Slow, smooth action prevents “hunting” or “surging” on normal applications.



Dimensions



Typical Wiring



How to Order

AT03069

* Mercury tube or snap-action switches are not suitable for this type control. For more information, recommendations and quotations contact our engineering dept.

Electric Motor Driven Clutch Operator for Engine Automation Systems-Model CO3



Features

- Engages and Disengages Clutch
- 250 lb-f (1112N) or 500 lb-f (2224N) Operating Force
- Compatible with MURPHYMATIC® Engine Controllers
- Models Available for 12 or 24 Volt Systems
- Two-Year Limited Warranty
- Adjustable Stroke

The CO3 is an electrically controlled and driven actuator for automatic operation of two position, lever action equipment. Primarily designed to engage and disengage over-center clutches on engines, the CO3 has a wide variety of applications such as opening and closing of pipeline valves, engagement and disengagement of pumps, fixture positioning in automated process control, etc. The positive action screw-type actuator is fully adjustable for length of stroke up to 6 inches (152 mm). The CO3 motor is equipped with an overload clutch that slips if overloaded. In addition, the motor is protected with an automatic reset thermal overload. The CO3 is available for 12 or 24 VDC applications and is compatible with MURPHYMATIC® start-stop engine controllers.

Applications

- Engine Disc Clutches
- Butterfly and Ball Valves
- Brakes
- Two Position Lever-Action Equipment

Specifications

Voltage:

CO3-12: 12 VDC, negative ground.
CO3-24: 24 VDC, negative ground.

Travel (adjustable): 6 in. (152 mm) max.

Case Material: Cast aluminum.

Built-in Circuit Breaker: 20 A.

Operating Force:

CO3-12: 250 lb-f (1112N) max.
CO3-24: 500 lb-f (2224N) max.

Duty Cycle @ 77°F (25°C):

CO3-12: 40% max. @ 125 lb-f (556N) to 25% @ 250 lb-f (1112N).
CO3-24: 100% max. @ 75 lb-f (334N) to 25% @ 500 lb-f (2224N).

Speed:

CO3-12: 1.2 in./sec (3 cm/sec.) @ 0 lb-f to 1.00 in./sec. (1 cm/sec.) @ 250 lb-f (1112N).
CO3-24: 2.4 in./sec (6 cm/sec.) @ 0 lb-f to 1.35 in./sec. (3 cm/sec.) @ 500 lb-f (2224N).

Drive: Self-locking ACME screw.

Current:

CO3-12: 20 amp max.
CO3-24: 14 amp max.

Operating Temperature: -15 to 150°F (-26 to 66°C).

Shipping Weight: 40 lb (18.1 kg).

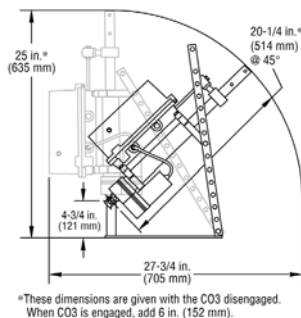
Shipping Dimensions: 25 x 14-1/2 x 12 in. (635 x 368 x 305 mm).

Basic Operation

Refer to **Figure 4** on back page.

When the CO3 receives a signal to engage, the heavy-duty DC motor operates to extend the actuator shaft and yoke a predetermined length. Length of extension is controlled by the adjustable cams in the control housing. When disengaging, the motor reverses and retracts the actuator shaft. At engagement end of the stroke, the actuator backs off from its maximum travel to relieve pressure on the clutch or other device.

Dimensions



How to Order

For 12 VDC applications specify **CO3-12**. For 24 VDC applications specify **CO3-24**.

Installation Instructions



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.

1. Disengage clutch lever on the engine.
2. Remove the clutch lever and reposition it approximately 45 degrees from vertical, towards the rear of the clutch (**Figure 4**).
3. Locate and remove outer roller of the CO3 operating yoke (**Figure 1**).
4. Place the CO3 in direct line with the clutch lever until the inner roller touches the clutch lever at an approximate 90 degree angle (**See Detail in Figure 4**).

NOTE: Reposition clutch lever so it does not bind between rollers when actuator is fully extended and fully retracted.

5. Bolt the CO3 to the stabilizer arm to hold the angle of incidence to the clutch arm (**Figure 4**).
6. Temporarily attach the CO3 mounting plate to the engine skid or base, or mark its location on the skid or base. See **Figure 2** for dimensions.
7. Open control housing cover and locate Cam "A" (**Figure 1**). Loosen the two set screws on Cam "A" and slide the cam all the way to Cam "B".

NOTE: Do not disturb setting of Cam "B". It is factory adjusted for proper operation.

8. Temporarily wire Battery Negative to terminal #5, Positive to terminal #4 of the CO3 (**Figure 3**).
9. Apply a momentary N.O. push button between terminals #1 and #3. When the push button is pressed the CO3 actuator will extend (**Figure 3**).



CAUTION: Be ready to release the push button when the clutch arm is fully engaged. Damage to the clutch or the CO3 can occur if the actuator is allowed to continue to push against the clutch arm.

NOTE: This is best done by energizing the CO3 for short intervals as the clutch arm approaches full engagement. Disconnect battery and remove push button from terminals #1 and #3.

10. Firmly affix the CO3 mounting plate to the engine or skid or pad.
11. Move Cam "A" back toward the front end of the CO3 so that it fully depresses the roller of limit switch SW-2. Retighten both set screws.
12. Reconnect battery and the temporary push button across terminal #1 and #3. The actuator should "back-off" a short distance until clutch lever is between both rollers to insure removal of load from throw out bearings. If minor adjustment is necessary, move SW-2 forward to reduce "back-off" or aft to increase "back-off". Maximum adjustment is 1/2 in. (13 mm). Remove momentary push button.
13. Place a N.O. momentary push button across terminals #2 and #3 (**Figure 3**). Press push button. Actuator should retract and disengage clutch. Actuator will "back-off" and stop when clutch is fully disengaged. **Disconnect battery and remove push button from terminals #2 and #3.**
14. Reconnect battery. The CO3 is now ready for operation. A maintained contact closure across terminals #1 and #3 will engage clutch. A maintained contact closure across terminals #2 and #3 will disengage clutch.

NOTE: Readjust CO3 after any clutch repair.

Figure 1: CO3 Top View

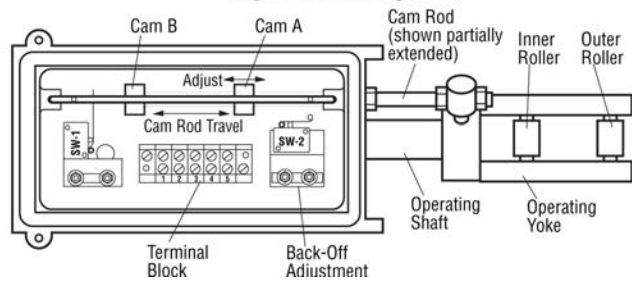


Figure 2: Mounting Plate Dimensions

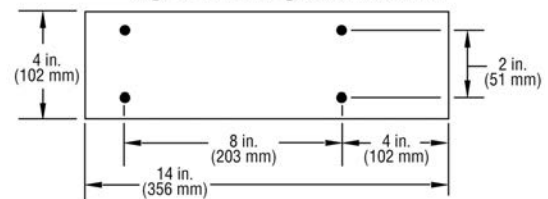


Figure 3: Customer Wiring

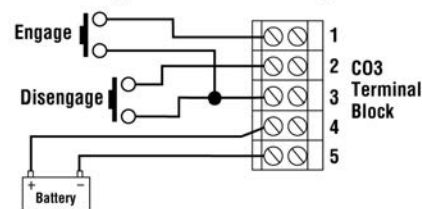
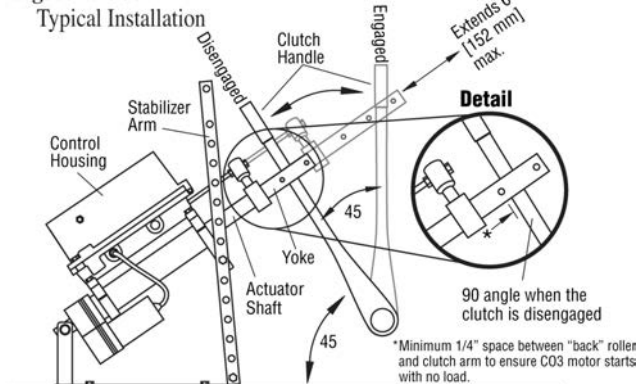


Figure 4: CO3



SECTION 50 COMPRESSOR CONTROLS AND PANELS

Annunciators

8535	LCDT Selectronic® Tattletale® System	233
0910435	TTD™ Series Configurable Fault Annunciator	235
96122	Series 1501 Selectronic® Micro-Controller/Annunciator	239

Controllers

0910434	Centurion™ Configurable Controller – C4 Series	241
0910452	Centurion™ <i>PLUS</i> Full Featured Controller	245

Panels

0910471	TTD™ Annunciator Panel	249
0910472	Centurion™ Control Panel	251
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LCDT Selectronic® Tattletale® System



Features

- Monitor Engine or Motor Driven Pumps and Compressors
- 47 Normally Open (N.O.) or Normally Closed (N.C.) Sensor Inputs
- CSA* and Factory Mutual† Listed
- Rated for Hazardous Locations Specifications

The LCDT Selectronic Tattletale system is a compact fault annunciator with an electronic alarm/shutdown control system. It was designed to protect engine-driven or motor-driven compressors and pumps. The annunciator indicates the sensor, and hence the parameter, that causes an alarm or shutdown. In addition, a means is provided for testing the operation of each sensor without initiating an alarm or shutdown. Employing a liquid crystal display, the LCDT system gives a digital reading of the tripped sensor and the lockout timer countdown.

As the heart of the system, the basic annunciator component has two variations: the Model LCDT-NO, which accommodates normally open sensors, and the Model LCDT-NC, which accommodates normally closed sensors. These units are enclosed in an aluminum box having a brush finish. The LCDT system accommodates 47 sensor inputs, 15 of which may be locked out during start-up by the start/run timer delay.

A separate power supply is provided with the model LCDT instrument. Power may be supplied by CD ignition, a 120 VAC line, or by 12 or 24 VDC battery.

Intended for use with all Switchgauge instruments without "OS" option.

Features

- System alarm or shutdown for up to 47 sensors.
- Timed start-up override for up to 15 sensors.
- Liquid Crystal Display of tripped sensors and the lockout timer countdown.
- Test timer for shutdown override during sensor test.
- Intrinsically safe annunciator unit; Class I, Division 1, Group D Hazardous Locations.
- Explosion-proof power supply.
- A battery maintains the electronics while the engine is not running.
- Optional 3-second time delay allows a fuel valve to close before grounding the ignition.

Specifications

Power: Supplied by CD ignition of an engine, 120 VAC line, or by 12 or 24 VDC battery.

Power Inputs (Operating Voltage):

LCDT-PS-CD (R)-P: 90-250 VDC, CD ignition, positive ground.
LCDT-PS-CD-N: 90-250 VDC CD ignition, negative ground.
LCDT-PS-120/24/12: 120 VAC (6 VA), 24 VDC (1 watt), 12 VDC (0.5 watts).

Sensor Inputs: Accepts up to 47 sensors (NC version only 45) via a ribbon cable. The LCDT system was designed to be used with sensor switches having normally open or normally closed contacts such as Murphy Switchgauge instrument.

NOTE: An approved isolation barrier such as a thermocouple type barrier, must be used between sensor switch and input terminals if sensor outputs come from any energy storing device such as a relay or transistor.

Relay Outputs Ratings:

LCDT-PS-CD (R)-P Contact rating: 4A, 1/20 HP, 125/250 VAC/3A, 30 VDC.

LCDT-PS-120/24/12 Contact Rating: 5A, 28 VDC. 120 VAC (resistive).

FET Outputs: LCDT-PS-CD-N rating (for fuel valve and ignition ground): 0.5A @ 250 V.

Alarm Relay Contact Rating: 4A, 1/20 HP, 125/250 VAC/3A, 30 VDC.

Operating Temperature: Module (head): -40 to 185°F (-40 to 85°C).
Power Supply: 0 to 158°F (-18 to 70°C)

Storage Temperature: -40 to 302°F (-40 to 150°C).

Case: LCDT-NO/NC (module): anodized aluminum.

Power Supply (all models): Explosion-proof aluminum.

Multiplexer Scan Rate: Scans all 47 sensors in 0.7 sec.

Start-Run/Test Timer: Standard 5 minutes, specify other, up to 7 minutes maximum (in 1 minute increments).

Laboratory Approvals: CSA* and Factory Mutual System† Listed for Class I, Division 1, Group D, Hazardous Locations.

Shipping Dimensions:

LCDT-NO/NC module: 8-1/2 x 9-1/2 x 5-1/2 in. (216 x 241 x 140 mm).

LCDT-PS-CD-N and LCDT-PS-CD (R)-P: 4-1/2 x 15-1/2 x 5-1/2 in. (114 x 394 x 140 mm).

LCDT-PS-120/24/12: 11-1/2 x 18-1/4 x 13-1/2 in. (291 x 464 x 343 mm).

LCDT-50CA-36 or 100CA-36: 7-1/4 x 12 x 5-1/2 in. (184 x 305 x 140 mm).

Shipping Weights:

LCDT-NO/NC Head: 5 lb. (2.2 kg.).

LCDT-PS-CD (R)-P: 9 lb. (4.08 kg.).

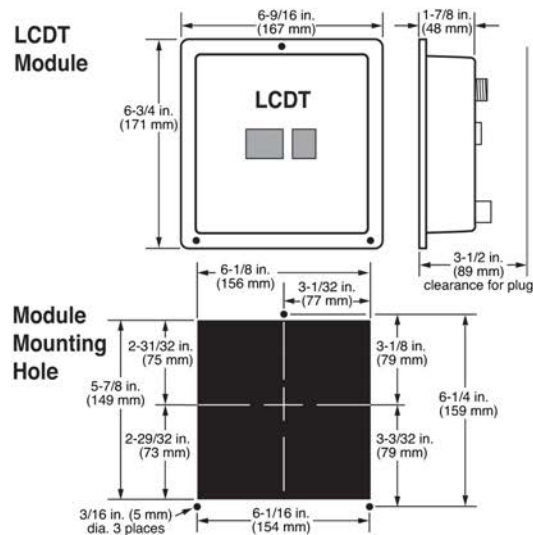
LCDT-PS-120/24/12: 21 lb. (9.5 kg.).

LCDT-50CA-36 or 100CA-36: 3 lb. (1.3 kg.).

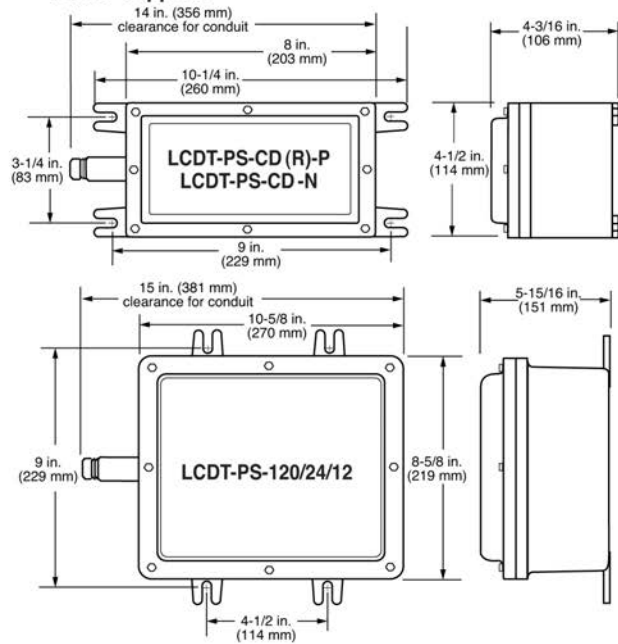
*When used with approved ignition A. Contact Murphy for details.

†When installed per Murphy drawings HC-9450-A (50-08-0021) or HC-9450-AA (50-08-0019).

Dimensions



Power Supplies



LCDT System

The basic LCDT system consists of **(1)** the LCDT module, **(2)** the terminal strip and cable assembly, and **(3)** the power supply.

LCDT Module—described on front page.

Terminal Strip and Cable Assembly

The plug-in type Terminal Strip has 50 screw-type connections for normally open sensors and 100 connections for normally closed sensors. The terminal strip can be connected to the LCDT module with the 36 in. (914 mm) long flat ribbon cable.

Power Supply

You have a choice of input power supplies: LCDT-PS-CD(R)-P and LCDT-PS-CD-N for CD ignition or LCDT-PS-120/24/12 for 120 VAC or 12 or 24 VDC. Each power supply includes control Inputs/Outputs and an intrinsically safe barrier. They were designed for Class I, Divisions 1 and 2, Group D Hazardous Locations. FM and CSA listed.

How to Order

To order complete LCDT system, specify **each** component as follows:

3. **LCDT Module:** Specify LCDT-
-NO: For normally open applications
-NC: For normally closed applications
4. **Terminal Strip and Cable Assembly:** Specify LCDT-
-50CA-36: Normally open
-100CA-36: Normally closed
5. **Power Supply:** Specify LCDT-
-PS-CD(R)-P: CD ignition positive ground
-PS-CD-N: CD one or two ignitions negative ground
-PS-120/24/12: Voltage: 120 AC, 12/24 DC

TTD™ Series Configurable Fault Annunciator



Features

- Fully-Configurable Fault Annunciator
- Alarm and Shutdown Control System for Engine-Driven Pumps and Compressors
- Monitors 48, User-Configurable, Sensor Inputs From N.O. and/or N.C. Censors
- User Selectable Templates Provide Ease of Retrofit by Selecting Configuration of Existing Annunciators via Display Keypad or Download From Computer With Windows Based MConfig® Installed.
- Intuitive Icons Display Status and Operating Mode for Ease of User Operation.
- Serial Communications Port with Selectable Baud Rates up to 38,400
- Universal Power Supplies Powered by 12/24VDC or CD Ignition (Neg. Ground).
- CSA Class I, Division 2, Groups B, C, and D.
- Optional Tachometer Function with Overspeed and Underspeed Protection Using CD Ignition or Magnetic Pickup Input.
- Optional Prelube and Postlube Functionality.
- Optional lubricator No-Flow Detection for up to 4 Proximity Switches.
- One Display Head is Common to all Configurations Allowing Fewer Spare Parts Required to be Maintained in the Field.
- Internal Monitoring of DC Supply, CD Ignition, and Internal Battery Voltage

The TTD product is a solid-state fault annunciator and shutdown control system designed to protect engines, pumps, compressors and their associated equipment. The TTD model will accept 48 sensor inputs from normally open and/or normally closed sensors. Each of the 48 inputs can be configured for "Shutdown" or "Alarm Only". Any input can be locked out by one of the two Start-Run timers, or configured as Class C, ESD or Ignore. The annunciator provides for both closing of a fuel valve and grounding of an ignition after a time delay.

Incorporated in the TTD non-volatile memory:

- Run Hours/Elapsed Time Meter
- Last 10 Shutdowns with associated run hours
- Last 4 Alarms with associated run hours
- Selectable Modbus RTU slave RS232/RS485 serial communications
- Selectable baud rates

Optional Features:

- Pre/Post lube timed functionality (hours roll over at 99,999)
- Tachometer w/ Overspeed and Underspeed setpoints and running hours.
- Lubricator No-Flow detection for up to 4 proximity switches.

The TTD Annunciator Has Two Separate Components:

Display Head

The Display Head displays operational and configuration data. Configuration parameters are entered via keypad or downloaded from MConfig software. The Display Head will accept digital inputs directly on the back of the unit. Power is provided to the Display Head via a direct Phoenix connector or a cable connecting to a remote mounted power supply. The Display Head contains the microprocessor, the Liquid Crystal Display (LCD), the membrane keys for configuring the sensors inputs and the sensor input terminal blocks.

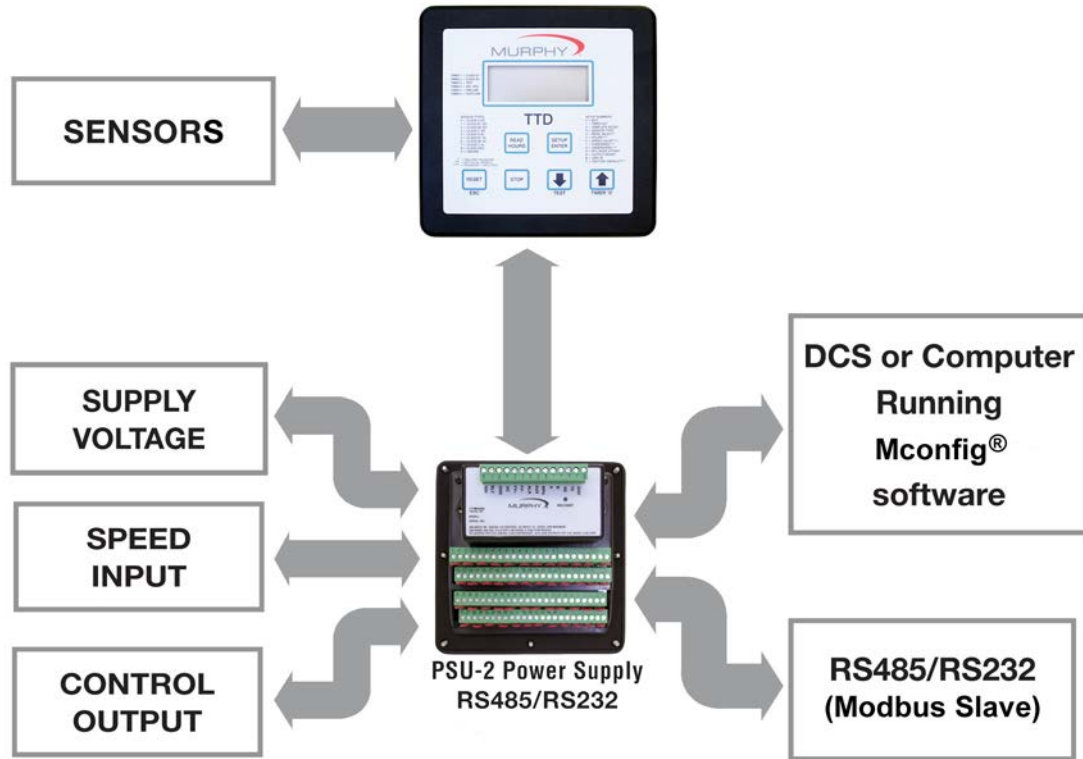
The TTD liquid crystal display annunciates any fault from the sensor inputs, displays engine speed, and run hours/elapsed time meter. Other features for the TTD are: built-in "Test Mode" function to test the sensor circuits without causing a fault shutdown, Pre-lubrication and Post-lubrication timers, and on-board backup battery to retain the fault display after shutdown on ignition powered units.

Power Supply

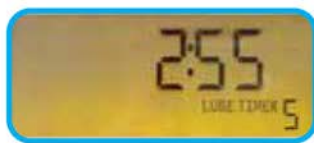
The Power Input and Control Output Terminals are mounted on the Plug-in Power Supply (PSU-2) or other Modbus RTU Master devices. Power Supplies also include an RS485/RS232 serial communication port (MODBUS RTU slave) to interface with micro-controllers, PC's, PLC's, and/or communication and control systems. The serial communication provides read and write register capability and selectable baud rate up to 38,400.

All Power Supply models are reverse polarity protected and can be powered by 10-32vdc or 90- 400vdc negative ground CD ignition. The TTD annunciator is fully operable with the internal battery; the external DC power enables communications support (Modbus slave) and turns on the display backlight.

TTD System



TTD-H Display Head



Normal Operation Display
(yellow background*)



Shutdown/Warning Display
(red background*)

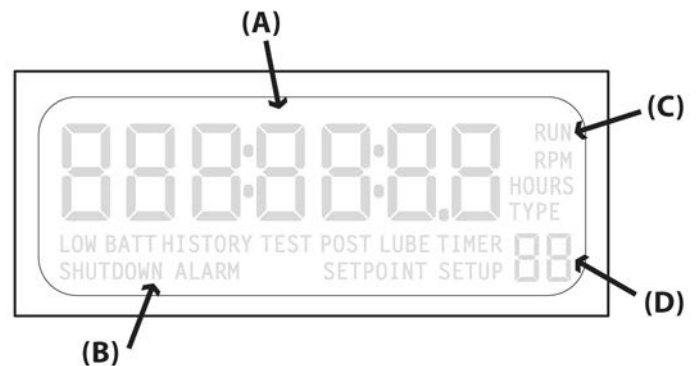


Back View w/PSU-2

TTD Intuitive Display Icons ►

The TTD system features a static LCD display (A) with backlight (external DC is required). The applicable icon and number (B, C and D) will be displayed to clarify the display readings or alert the operator to an operating condition.

* When powered by DC source.



Specifications

Power Requirements:

PSU-2: 10-32VDC, 10W (max); 90-400VDC CD Ignition, 750uA @ 100VDC (max)

On-Board Backup Power: Lithium battery, 6 VDC, 1300 mAh.

Digital Inputs: 48 (a.k.a. Channels)

Sensor Types: Discrete Input, N.O./N.C., intrinsically safe (with use of PSU-1) or non-incendive (with use of PSU-2)

Magnetic Pickup Input:

One Magnetic Pickup Sensor Input: 3.6 - 120 VAC, 2-10 kHz.

Outputs:

IGN: 0.4A @ 400VDC* for 5 seconds
0.15A @ 400VDC(*) cont. duty

RLY: 0.5A @ 48VDC cont. duty

FV-: 0.5A @ 400VDC(*) cont. duty

ALR: 0.5A @ 48VDC cont. duty

AUX: 0.5A @ 48VDC cont. duty

Operator Interface:

Display Type: LCD, Static, 80 segment, custom text with LED Backlight

Display Viewable Area: ~ 2.79 x 1 in. (71.04mm x 25.4mm)

Display Contrast: Automatic

Display Backlight: Yellow (Normal Operation); Red (Shutdown) (Backlight will only be available when unit is powered by DC or AC.)

Voltage Level Monitor: Monitor and display voltage level of DC Supply, CD Ignition, and internal battery.

Keypad: 6 switches: Ridge Embossed, Metal Dome, Tactile 14 Oz. Trip Force

Enclosure Cutout: 5.50 x 5.50 inches (133 mm).

Operating Temperature: -40 to +85 degrees C

Viewable Temperature: -40 to +85 degrees C

Storage Temperature: -40 to +85 degrees C

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

Resetable Hourmeter Range: 0 to 99999 hrs.

Non-Resetable Hourmeter Range: 0 to 99999 hrs.

* CSA approved for 250VDC maximum

Hourmeter Accuracy: ±1 hour per year.

Communication Ports: 1

A single bi-color (GREEN/RED) LED is provided to give visual indication of active transmit and receive traffic. Only one connection will be active at any time.

Interface: Factory configured for RS485; field-selectable for 3-wire RS232 or RS485.

Baud/Stop Bit Selections: 9600, 19.2K, 38.4K[†]; N,8,1; N,8,2

Protocol: Modbus RTU

Connection: There are 2 screw terminal connectors for RS485. There are 2 screw terminal connectors for RS232. There is 1 screw terminal common for both ports labeled as GND.

Third Party Approvals:

TTD-H, PSU-2: CSA Class I, Division 2, Groups B, C, and D.

TTD-H: IEC 60529 - IP66 (NEMA 4 & 4X equivalent)

Intuitive Display Icons:

Display status and assist in setup and operation. The appropriate icon will turn on to indicate unit status or navigation through the setup features.

RUN – Run mode

RPM – Screen Value

HOURS – Screen Value

TYPE – Channel Type Configuration

LOW BATT – Low Battery Warning (displayed when condition exists)

HISTORY – Shutdown History

TEST – Test Mode

LUBE – Pre-lubrication Timer

POSTLUBE – Post-lubrication Timer

SHUTDOWN – Stop Mode

ALARM – Alarm(s) Warning (displayed when condition exists)

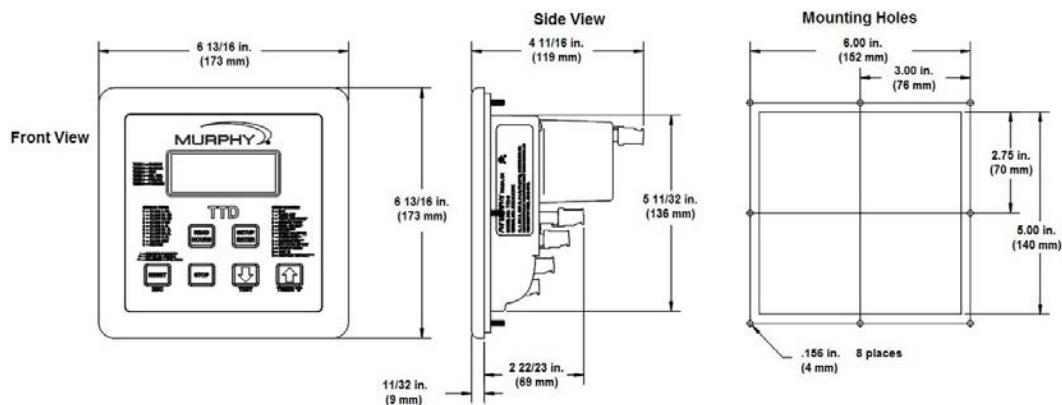
SETPOINT – Edit Set-point Value

SETUP – Setup Menu(s)

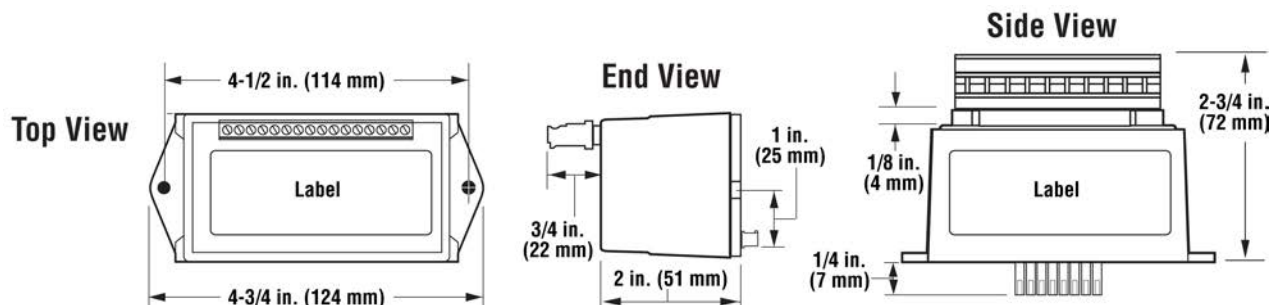
[†] 38.4K baud will not be available when IGN input is selected as the source for RPM calculations. When MPU is selected, this feature is available for selection.

Dimensions

Display Head



Power Supply (PSU-2)

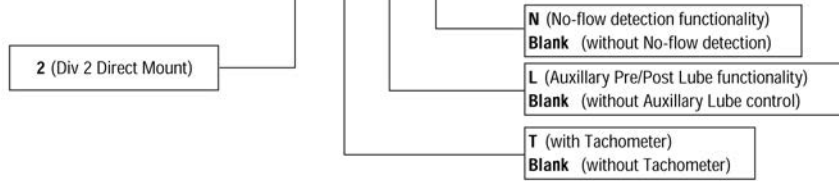


How to Order

Order a standard TTD-H display and your choice of power supply features to complete the TTD annunciator order.

Base Model: **PSU-2 - X - X - X**

Specify model number (see chart below). List your power supply options by placing a dash (-) between each option.



MODEL NUMBER (X indicates components and features included in Model)	PSU-2 (Class 1 Grps. B.C. & D, Div 2 Power Supply, Direct Mounted)	Tachometer w/ Overspeed functionality	Auxiliary Pre/Post Lube functionality	No-flow detection functionality
PSU-2	X			
PSU-2-T	X	X		
PSU-2-L-N	X		X	X
PSU-2-T-L-N	X	X	X	X

TTD Replacement Parts and Assemblies

TTD-H	(50700597)	Display head
PSU-2	(50700596)	Div 2 Power Supply
PSU-2-T	(50700594)	Div 2 Power Supply w/ Tach
PSU-2-L-N	(50700944)	Div 2 Power Supply w/ Pre/Post Lube and No-Flow
PSU-2-T-L-N	(50700942)	Div 2 Power Supply w/ Tach, Pre/Post Lube, and No-Flow
Backup Battery	(00005125)	Lithium battery, 6VDC, 1300mAh
Choke	(50000774)	Ignition Choke Filter
TTD-H Plug Kit	(00009741)	Printed Replacement Terminal Plugs for TTD-H Sensor Inputs
PSU-2 Plug	(00009768)	Printed Replacement Plug for PSU-2 Power Connector

Series 1501 Selectronic® Micro-Controller/Annunciator



NRTL/C

Features

- Alarm/Shutdown for 32 or 64 N.O. or N.C. Sensors
- Operating Sequence Selection
- Field Adjustable Sensor Nomenclature
- Selectable Sensor Lockouts Class A, B, C or P
- Built-In Tachometer/Overspeed Function
- RS232 or RS485 Modbus RTU Communications
- Two Start/Run Timers and Elapsed Time Meter
- CSA Certified or NRTL Approved for Use in Class I, Div. 1 Grps. C & D Hazardous Locations

The Series 1501 instrument is a microprocessor- based alarm, shutdown and control system with tachometer/hourmeter function. It annunciates in alphanumeric characters the protective device that has signaled an alarm or caused equipment shutdown. Information is called up and adjustments are made on a six-button keypad on the face of the unit. Configurations such as: Alarm or Shutdown Nomenclature, Preset Timers, and Tachometer Calibration can be made in the field.

Murphy's Series 1501 system has seven SPDT relays. On the standard model, the relays are assigned to the following functions: Lube, Crank, Ignition/Motor, Fuel Valve, Load, Alarm, Shutdown.

The complete Series 1501 system consists of a head (monitor), sensor input terminal strip (two needed for 64 sensor models), 36 inch (914 mm) flat ribbon cable(s) for connecting the terminal block to the head/monitor, and a Class I, Div. 1, explosion-proof power supply.

The Series 1501 system is powered from 120 VAC or 12 or 24 VDC. The head/monitor is rated intrinsically safe and includes a communication port: RS232 or RS485 (Modbus RTU slave). This port allows for remote control functions such as Start/Stop, Load/Unload, etc., and for access to Series 1501 registers.

Applications

The Series 1501 system can be configured to monitor applications such as: Air and Gas Compressors, Natural Gas Refueling, and other Industrial Operations. For a list of applications and our cataloged programs contact a Murphy sales representative. Custom programming available at additional charge.

Features

- 32 or 64 sensor inputs (N.O. or N.C.) for alarm or shutdown.
- Easy operation/adjustments Six-button keypad.
- RS232 or RS485 Modbus RTU communications.
- Automatic Engine Control.
- Two Start-Run Timers.
- Seven Control Relay Outputs.
- Pre/Postlube Time Delay.
- Automatic Compressor Loading.

Specifications

Power Consumption: 120 VAC (7.5 VA); 12 VDC (3.5 watts); 24 VDC (3.5 watts).

Sensor Inputs: 32 to 64 N.O. and/or N.C. inputs such as Murphy Switchage® instruments. Field selectable as a Class A, B1, B2, C, P or ESD for shutdown, alarm, or control function.

Outputs: 7-SPDT relay outputs, 5 A, 1/16 HP, 125/250 VAC/ 1 A, 30 VDC.

NOTE: For hazardous areas an approved isolation barrier must be used between sensor switch and input terminals if the sensor output comes from any energy storing device such as a relay or transistor.

Adjustable Time Delays: (standard Series 1501)

- Prelube
- Rest
- Process Delay
- Permissive
- Run Delay
- Idle/Cooldown
- Purge
- Postlube
- Fuel Delay
- Crank
- Load Delay
- Test
- Class B1 Sensor Lockout
- Class B2 Sensor Lockout
- Before Ignition Ground or Electric Motor Stop (for up to 59 seconds)

Sensor Inputs Terminal Block: Rail mount DIN type; 32 terminals, screw type.

Opto-Isolated Tach/Run Input: Magnetic pickup, 4.5 to 120 Vrms, 0-10 kHz. CD ignition, positive or negative ground, 100 to 300 VDC, 3-666 Hz. 12 to 125 VDC or 120 Vrms, 50/60 Hz may be used for run signals.

Operating Temperatures: 32 to 122°F (0 to 50°C).

Storage Temperatures: -4 to 158°F (-20 to 70°C).

Case: ABS plastic, 1/4 DIN (90 x 90 mm).

Interface Output: Factory configured for RS232; field-selectable for RS485 (specify for factory configured RS485).

Alphanumeric Display: 2 lines, each line with 16 characters (32 characters total).

Power Supply Enclosure: Explosion-proof, Class I, Division 1. Intrinsically safe barrier built into the power supply, 120 VAC with 7 form "C" relay outputs for the following functions (with standard S1501):

- Lube
- Load
- Crank
- Ignition/Motor
- Fuel Valve
- Shutdown
- Alarm

How to Order

To order the Series 1501 system specify the model number for each individual component and accessory:

Specify:	To Order:
S1501H-32-2	Head with RS232 port for 32 sensors.
S1501H-64-2	Head with RS232 port for 64 sensors.
S1501H-32-4	Head with RS485 port for 32 sensors.
S1501H-64-4	Head with RS485 port for 64 sensors.
S1501CH-32-2	Head w/custom* program, RS232 port, 32 sensors.
S1501CH-64-2	Head w/custom* program, RS232 port, 64 sensors.
S1501CH-32-4	Head w/custom* program, RS485 port, 32 sensors.
S1501CH-64-4	Head w/custom* program, RS485 port, 64 sensors.
S1501CC48	Communications Cable Assembly, 48 in. (1.2 m) long.
S1500TB32	Terminal Block only†
S1500CA36	Ribbon Cable Assembly†
S1501PS-120	120 VAC, 12 or 24 VDC Power Supply.

Accessories:

S1501PCA72	Power and Control Cable Assembly, 72 in. (1.8 m) long.
S1501PS-120-E	Power Supply with 90° Conduit Elbow fitting.
S1501PS-120-LC	Power Supply Less Case.

Approximate Shipping Weights

Complete **Series 1501** System: 28 lb. (12.7 kg).

S1501H-32-2; S1501H-64-2; S1501H-32-4; S1501H-64-4;
S1501CH-32-2; S1501CH-64-2; S1501CH-32-4; S1501CH-64-4:
 2 lb. (0.907 kg).

S1500TB32: 2 lb. (0.907 kg).

S1500CA36; S1501CC48; S1501PCA72: 2 lb. (0.907 kg).

S1501PS-120-LC: 3 lb. (1.36 kg).

S1501PS-120 and S1501PS-120-E: 22 lb. (9.98 kg).

Approximate Shipping Dimensions

Complete **Series 1501** System: 20 x 14 x 12-1/2 in. (508 x 356 x 318 mm).

S1501H-32-2; S1501H-64-2; S1501H-32-4; S1501H-64-4;
S1501CH-32-2; S1501CH-64-2; S1501CH-32-4; S1501CH-64-4: 6 x 6 x
 6 in. (152 x 152 x 152 mm).

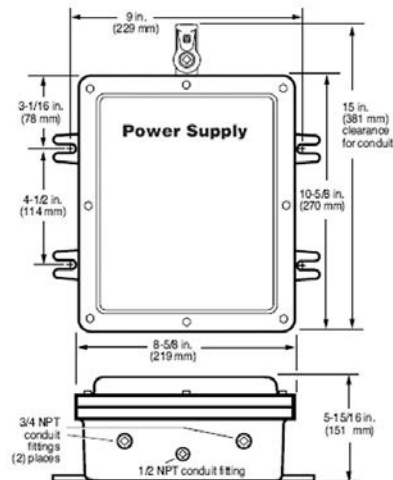
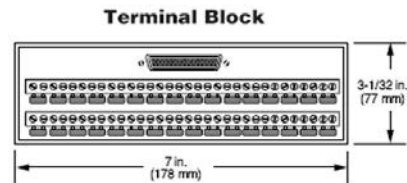
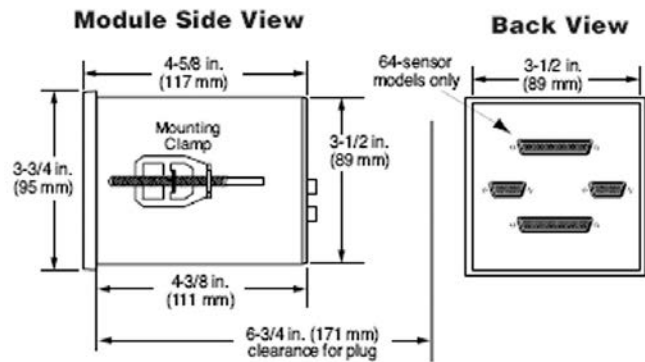
S1500TB32: 12 x 7 x 4 in. (305 x 178 x 102 mm).

S1500CA36; S1501CC48; S1501PCA72: 6 x 6 x 6 in. (152 x 152 x
 152 mm).

S1501PS-120-LC: 12 x 7 x 4 in. (305 x 178 x 102 mm).

S1501PS-120 and S1501PS-120-E: 17 x 10 x 9-3/4 in. (431 x 254 x
 248 mm).

Dimensions



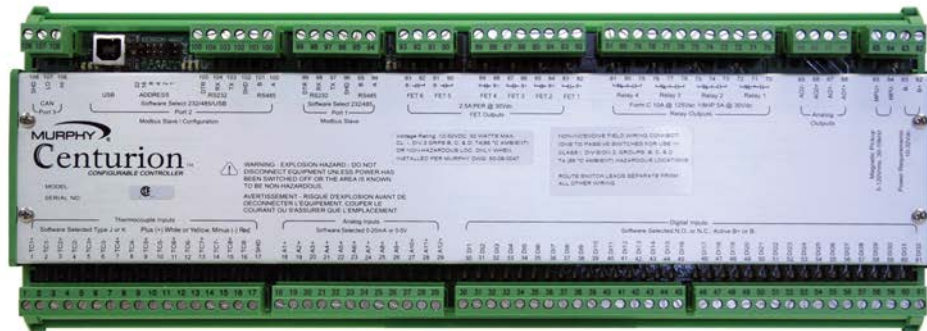
* Specify program number or contact Murphy for available programs listings.

† Two required for 64 sensor models.

Centurion™ Configurable Controller – C4 Series



Display Module (Head)



Main I/O Module



The C4 Series Centurion Configurable Controller is a control and monitoring system. Primarily designed for engine/electric motor driven compressors, the Centurion is well suited for many control applications using standard configurations to save money and reduce training. Additionally, Murphy can custom design a control package to meet exact specifications for a variety of applications.

The Centurion continuously monitors input signals and set points and commands outputs to maintain proper operation. When an out-of-limits event occurs, the controller will stop, shutdown, or control equipment to change conditions. The Auto-Start capabilities of the Centurion allows for start/stop based on parameters such as pressure setpoints or by digital signals.

The Centurion provides real-time data via communication ports to a connected display and/or supervisory system. This advanced system offers multiple options for remote communications and operation including HMI's, PLC's, PC's, and SCADA systems. The industry standard *Modbus® RTU protocol means greater support for a wide variety of communication equipment including radio and satellite communications systems.

Features

- Fully-configurable control and monitoring system. Applications include reciprocating / screw compressors and pump systems
- System is expandable to meet most 3-stage compressor applications.
- User configurable with Windows®-based software. Allows the operator to point-and-click to implement standard processes. All I/O points can be custom-configured.
- No programming experience required.
- Local and remote communications, Modbus® RTU via RS485/232.
- USB 1.1 support for laptops without a serial port.
- Upload / Download capabilities for configurations and setpoints.
- Approved Certification for Class I, Division 2, Groups B, C, & D areas
- Shutdown History List (Last 20 events)
- Event History List (Last 32 events)
- Active Alarm List
- 10 Maintenance Timers
- Run Hourmeter
- Support for No-flow Totalization
- Number of starts per hour (Electric Motor)
- 6 PID Loops w/ Override (up to 3 each)
- Configuration Templates provided for simple user configuration.
- Configurations stored in non-volatile flash memory.
- Setpoints stored in non-volatile eeprom memory.

Basic Components

The Centurion consists of a Display Module, a Main I/O Module, and optional Expansion I/O Module. No special cables are required. The Centurion is designed for use within a weatherproof enclosure only.

- Display Module (Head):** C4-3: LCD Graphic Display.
- Main I/O Module:** C4-1-A: 32 DI, 10 DO, 12 AI, 8 TC, 2 AO, 1 MPU.
- Expansion Module:** MX4: 18 TC (Type J or K). MX5-A: 6 DO, 8 AI, 4 AO, 1 MPU.

DI= Digital Input; DO= Digital Output; AI= Analog Input; AO= Analog Output;
TC= Thermocouple Input; MPU= Magnetic Pick Up Input.
RTD= Resistive Temperature Device

C4 Series General Specifications

Power Input: 10 -32 VDC

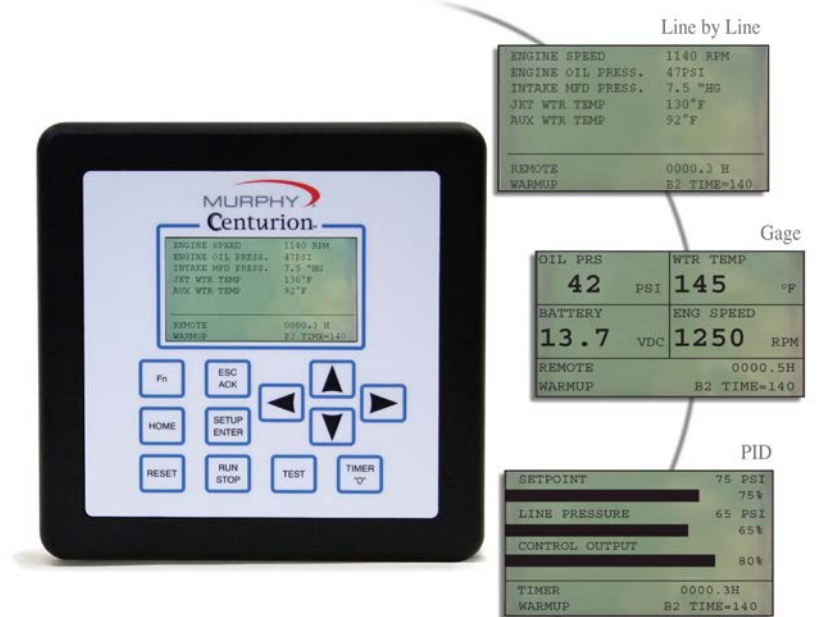
Operating Temp.: -40 to 85°C (-40 to 185°F)

Configuration: PC-based Centurion Configuration Software.

* Modbus is a registered trademark of its respective owner and is not affiliated with FW Murphy.

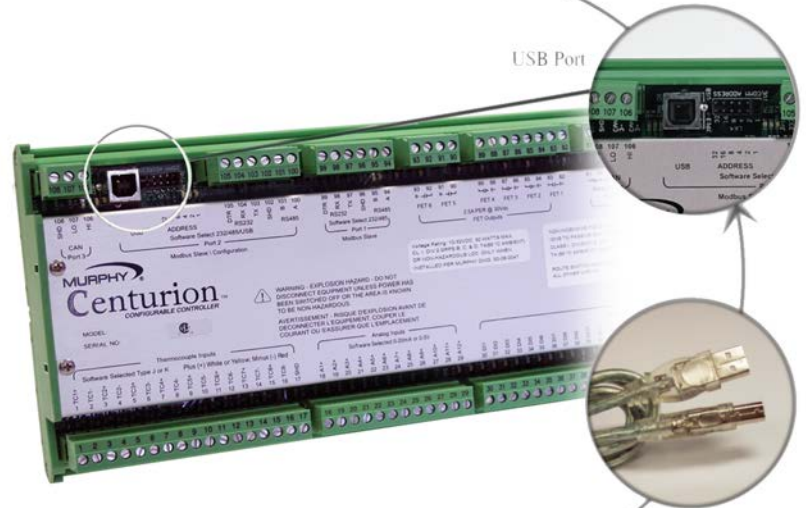
C4-3 Display Module with Graphical LCD

- Operating temperature: -40 to +85°C (185°F).
- 128x64 pixels, LCD Display with Green Backlight.
- 12-key keypad for user interface for set point entry, alarm acknowledgement, start, stop, reset, etc.
- 2 Serial Ports - Software Configurable
 - Port 1 - Modbus Master RS232 or RS485
 - Port 2 - Modbus Slave RS232, RS485, or USB (future)
- Customizable Process Screens (up to 9)
 - Line by Line
 - Gauge
 - Control Loop
 - Generic Register



C4-1-A Main I/O Module

- All I/O options individually software selectable. No jumpers required.
- 32 Optically-isolated DC Digital Inputs: NO or NC, (active high/active low), non-incendive.
 - LED indicators.
 - Approved for use with general purpose switches in hazardous areas.
- 12 Analog Inputs: 0-24mA or 0-5VDC , 10 bit hardware.
- 8 Thermocouples
 - Open Thermocouple
 - Cold Junction Compensation.
- 1 Magnetic Pickup Input/AC Run Signal: 30 to 10kHz, 4.5VAC rms min, 120VAC rms max.
- 10 Digital Outputs:
 - LED indicators
 - Four (4) relay outputs, form C, dry contacts.
 - Four (4) FET outputs (source).
 - Two (2) FET outputs (sink).
- 2 Analog Outputs
 - 4-20mA, 16 bit hardware.
- 3 Communication Ports:
 - Port 1 (SERIAL):
 - Interface: RS232 or RS485.
 - Protocol: Modbus RTU (Slave)
 - Port 2 (SERIAL):
 - Interface: RS232 or RS485.
 - Protocol: Modbus RTU (Slave), Proprietary (Configuration Transfer)



Port 2 (USB): Interface: USB 1.1 Compliant Port emulating RS232 communications via PC driver.

- Protocol/Services: Modbus RTU (Slave), Proprietary (Configuration Transfer)
- Connection: USB Type B connector
- Automatic selection of USB when a signal is detected on the USB Type B connector.

Port 3: Interface: CANBUS

- Protocol/Services: Proprietary communications for Expansion I/O Module support.

Expansion I/O Modules

MX4 Expansion I/O Module

- All I/O options individually software selectable. No Jumpers required.
- 18 Thermocouple Inputs: Type J or K, 12 bit hardware.
 - Open Thermocouple Detection: Drives channel reading high (max of scale).
 - Cold Junction Compensation.
- 1 Magnetic Pickup Input: 4.5VAC – 120 VAC, 30 – 10kHz.



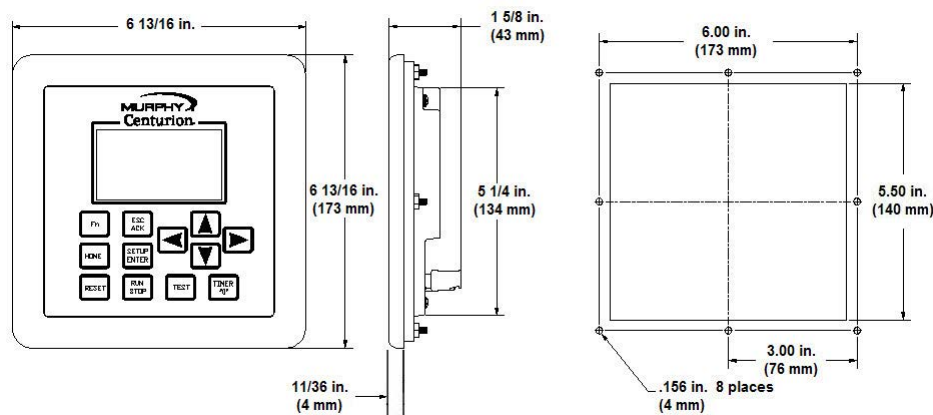
MX5-A Expansion I/O Module

- 8 Analog Inputs: 0-24mA, or 0-5VDC, 10 bit hardware.
- 6 Digital Outputs: Open Collector Transistor, 150mA (sink)
- 4 Analog Outputs: 4-20mA, 16 bit hardware.
- 1 Magnetic Pickup Input: 4.5VAC – 120 VAC, 30 – 10kHz.

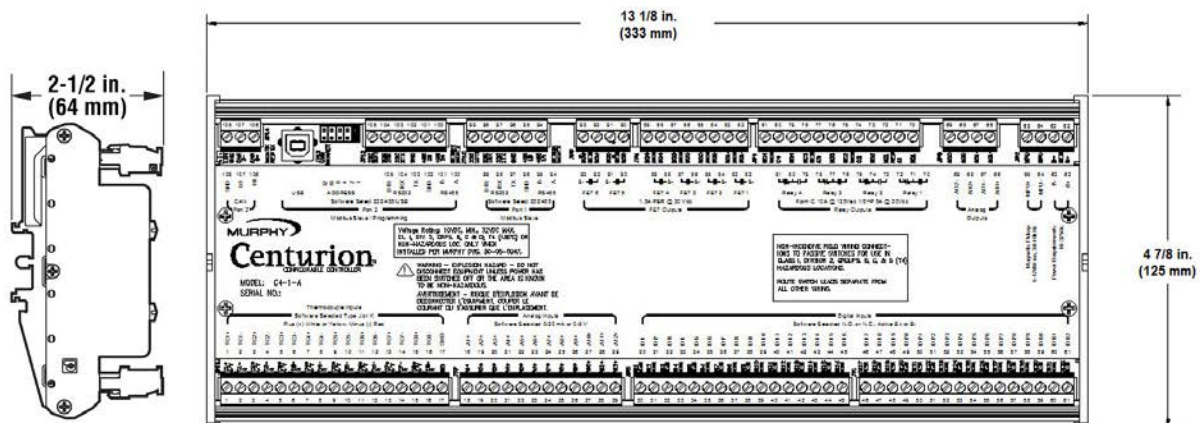


Dimensions

C4-3



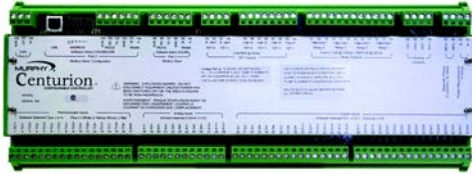
C4-1-A



How To Order

Selecting a Centurion Configurable Controller C4 Series Model:

1. Specify **C4-1-A** Main I/O Module



2. Specify one (optional) Expansion I/O Module

**MX4
or
MX5-A**



3. Specify one (optional) **C4-3** Display Module



The minimum system requirements:
C4-1-A Main I/O Module
Display capable of Modbus communications
The Murphy **C4-3** Display Module is a highly integrated HMI for use with the Centurion system and is recommended for most customers.
Some systems may require additional I/O which is available on the MX4 or MX5-A Expansion I/O Modules..

Accessories

Configuration Software

MurphyNET Configuration Suite - Centurion configuration tool for modifying sequence of operation, set points, timers, faults, and [†]displays for Centurion. Includes file transfer utilities for configuration and firmware upgrades.

Replacement Parts and Accessories

C4-1-A Plug Kit	(00000504)	Printed Replacement Terminal Plugs for Centurion (C4-1-A) Main I/O Module
C4-3 Plug Kit	(00000543)	Printed Replacement Terminal Plugs for Centurion (C4-3) Display Module
Choke	(50000774)	Ignition Noise (Choke) Filter
MX4 Plug Kit	(00030867)	Printed Replacement Terminal Plugs for MX4 Expansion I/O Module
MX5 Plug Kit	(00030868)	Printed Replacement Terminal Plugs for MX5 Expansion I/O Module
Centurion Configuration Tool	(50702313)	Configuration tool for user application setup

[†] Display configuration and other settings for display are only for use with the C4-3 Display Module.

Centurion™ PLUS Full Featured Controller



The Centurion PLUS Controller is a custom programmable control and monitoring system. Primarily designed for engine driven compressors, the Centurion PLUS is well suited for many control applications, such as CNG control, Fire Pump Control, and many industrial control applications. Additionally, Murphy can custom design a control package to meet exact specifications for a variety of other applications.

The Centurion PLUS continuously monitors input signals and set points and commands outputs to maintain proper operation. When an out-of-limits event occurs, the controller will stop, shutdown, or control equipment to change conditions. The Auto-Start capabilities of the Centurion PLUS allow for start/stop based on parameters, such as pressure set points or by digital signals. The Centurion PLUS allows for customer valve logic sequencing, purge cycle control, and many other logic applications. The Centurion PLUS can also provide complex calculation abilities, such as rod load and temperature deviation.

The Centurion PLUS provides real-time data via communications ports to a connected display and/or supervisory system. This advanced system offers multiple options for remote communications and operation including HMI's, PLC's, PC's, and SCADA systems. The industry standard Modbus® RTU protocol means greater support for a wide variety of communication equipment, including radio and satellite communications systems. Other communication options include Modbus® TCP/IP, web page hosting, and data logging captured in standard CSV files uploadable through USB port.

Features

- Custom programmed to meet exact application requirements
- Communications via 2 RS485/RS232 ports
- USB 1.1 support for laptops without a serial port
- Upload/download capabilities for setpoint edits
- Shutdown and alarm history, maintenance timers
- Complex valve logic and sequencing support
- PID Loops w/ overrides (multiple control loop possibilities)
- Expand I/O up to three (3) expansion modules, any combination
- Firmware stored in non-volatile flash memory
- Setpoints stored in non-volatile eeprom memory
- Approved Certification for Class 1, Division 2, Groups B, C, & D areas
- Expanded calculation abilities
 - Rod load equations
 - Lookup table support
 - Temperature channel deviation
- Expanded communication abilities
 - Modem dial in/dial out using terminal interfaces, Modbus® RTU protocols
 - Remote monitoring and control via ethernet (several protocols supported including but not limited to Modbus® TCP, TCP/IP Internet Web server)
 - Event driven email, SMS text messaging possible
 - Protocol conversion (many industry protocols supported)
 - Web page hosting
- Data logging
 - Using common compact flash card memory, 1 GB of storage
 - Trends data as well as capture of readings at time of fault
 - Security file logs all setpoint changes
 - Importable to CSV files
 - Multi-language support

Basic Components

The Centurion PLUS consists of a Display Module, a Main I/O Module, and optional Expansion I/O Modules. No special cables are required. The Centurion PLUS is designed for use within a weatherproof enclosure only.

Display Module (Head): Full color VGA 6" Touchscreen (Optional 10" available)

Main I/O Module: CPC4-1-A: 32 DI, 10 DO, 12 AI, 8 TC, 2 AO, 1 MPU

Expansion Modules:

MX4: 18 TC (Type J or K), 1 MPU

MX5: 24 DI, 8 DO, 10 AI, 1 MPU

MX5-A: Same I/O as MX5, additional 4 analog outputs

MX5-D: Same I/O as MX5, additional 8 digital outputs

DI= Digital Input; DO= Digital Output; AI= Analog Input; AO= Analog Output;
TC= Thermocouple Input; MPU= Magnetic Pick Up Input

* Modbus is a registered trademark of its respective owner and is not affiliated with FW Murphy.

General Specifications

Power Input: 10 -32 VDC

Operating Temp. (CPC4-1): -40 to 85°C (-40 to 185°F)

Operating Temp. (Touchscreen): 0 to 50°C (32 to 122°F)

Application Firmware: Programming Proprietary C Language - PC-based upload/download setpoint editor

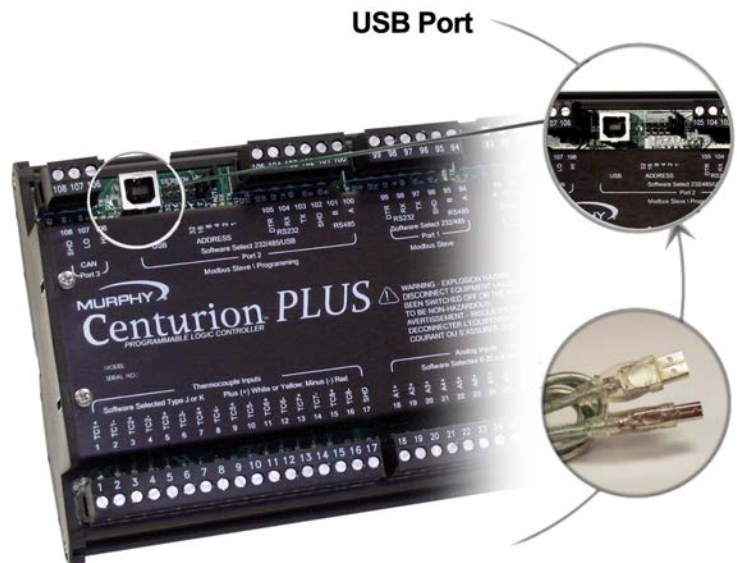
Full-Color VGA Touchscreen

- Full-Color VGA Touchscreen (Resistive Analog)
- 6" Standard offering, 10" upgrade
- Data logging - 1 GB memory card
- Data Log transfer "on the fly"
- Communications
 - Serial RS232 - 2
 - Serial RS485 - 1
 - USB 1.1 - 1
 - Ethernet (several protocols supported including, but not limited to Modbus TCP, TCP/IP Internet Web server)
- 5-Button keypad for on screen menus (6")
- 8-Button keypad for on-screen menus (10")
- Standard Screen offerings
- Front panel Power LED
- 24 VDC Powered



CPC4-1-A Main I/O Module

- All I/O options individually software selectable. No jumpers required
- 32 Optically-isolated DC Digital Inputs: NO or NC, (active high/active low), non-incendive
 - LED indicators
 - Approved for use with general purpose switches in hazardous areas
- 12 Analog Inputs: 4-20mA or 0-5V, 10 bit hardware
- 8 Thermocouples: Type J or K, 12 bit hardware
 - Open Thermocouple Detection: Drives channel reading high (max of scale)
 - Cold Junction Compensation
- 1 Magnetic Pickup Input/AC Run Signal: 30 to 10kHz, 5VAC rms min, 120VAC rms max
- 10 Digital Outputs:
 - LED indicators
 - Four (4) relay outputs, form C, dry contacts
 - Four (4) FET outputs (source)
 - Two (2) FET outputs (sink)
- 2 Analog Outputs
 - 4-20mA, 16 bit hardware
- 3 Communication Ports:
 - Port 1: Interface: RS232 or RS485
 - Protocol: Modbus RTU (Slave)
 - Port 2 (SERIAL):
 - Interface: RS232 or RS485
 - Protocol: Modbus RTU (Master or Slave), Proprietary (Firmware Transfer)



Port 2 (USB): Interface: USB 1.1 Compliant Port emulating RS232 communications via PC driver

- Protocol/Services: Modbus RTU (Slave), Proprietary (Firmware Transfer) Proprietary (Setpoint upload/download)
- Connection: USB Type B connector
- Automatic selection of USB when a signal is detected on the USB Type B connector

Port 3: Interface: CAN

- Protocol/Services: Proprietary communications for Expansion I/O Module support

Expansion I/O Modules

MX4 Expansion I/O Module

- All I/O options individually software selectable. No jumpers required
- 18 thermocouple inputs: Type J or K, 12 bit hardware
 - Open Thermocouple Detection: Drives channel reading high (max of scale)
 - Cold Junction Compensation
- 1 Magnetic Pickup Input: 4.5VAC–120VAC, 30–10kHz

MX5 Expansion I/O Module

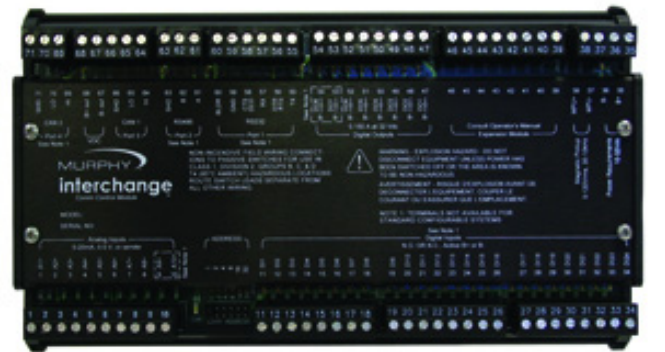
- 24 Digital Inputs: Optically-isolated DC Digital Inputs, (active high/active low), non-incendive
- 10 Analog Inputs: 4–20mA or 0–5VDC, 10 bit hardware
- 8 Digital Outputs: Open Collector Transistor. 150mA (sink)
- 1 Magnetic Pickup Input: 4.5VAC–120VAC, 30–10kHz

MX5-A Expansion I/O Module—Analog Output Option

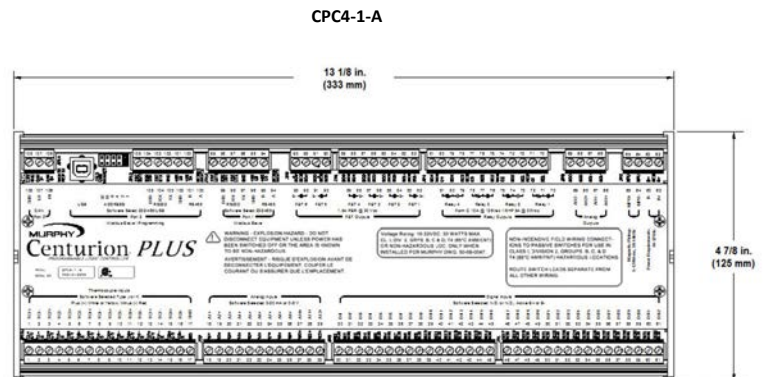
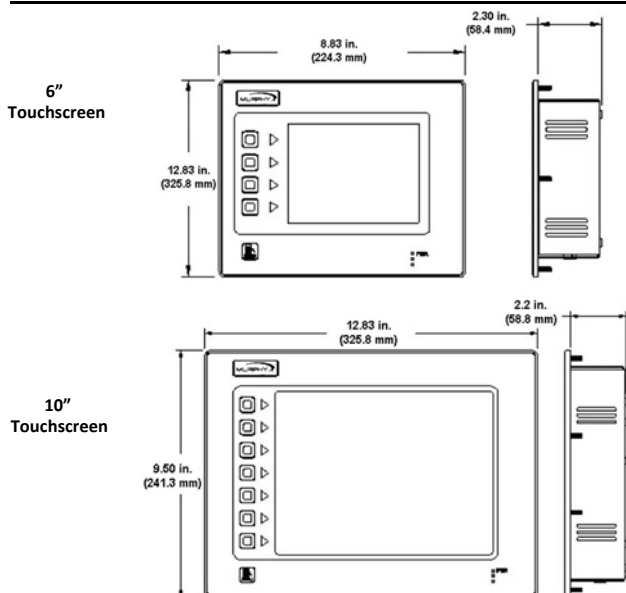
- 24 Digital Inputs: Optically-isolated DC Digital Inputs, (active high/active low) non-incendive
- 10 Analog Inputs: 4–20mA or 0–5VDC, 10 bit hardware
- 8 Digital Outputs: Open Collector Transistor. 150mA (sink)
- 4 Analog Outputs: 4–20mA, 16 bit hardware
- 1 Magnetic Pickup Input: 4.5VAC–120VAC, 30–10kHz

MX5-D Expansion I/O Module—Analog Output Option

- 24 Digital Inputs: Optically-isolated DC Digital Inputs, (active high/active low) non-incendive
- 10 Analog Inputs: 4–20mA or 0–5VDC, 10 bit hardware
- 16 Digital Outputs: Open Collector Transistor. 150mA (sink)
- 1 Magnetic Pickup Input: 4.5VAC–120VAC, 30–10kHz



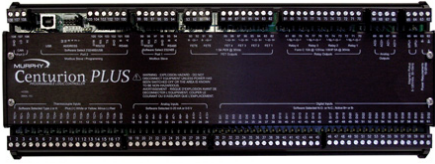
Dimensions



How To Order

Selecting a Centurion *PLUS* Controller Model:

1. Specify **CPC4-1-A** Main I/O Module



2. Specify any combination up to three (3) (optional) Expansion I/O Modules

**MX4
MX5
MX5-A
&/or
MX5-D**



3. Specify one 6-inch or 10-inch (upgrade) VGA Color Touchscreen



The minimum system requirements:
CPC4-1-A Main I/O Module
Full-color VGA Touchscreen (for operation control and interface with Main I/O Module)

Some systems may require the use of our **Interchange™ Comm Control Module, MX-Series Expansion I/O**. Chose up to three (3) of any combination.

Replacement Parts and Accessories

CPC4-1-A Plug Kit (00030866)	Printed Replacement Terminal Plugs for Centurion <i>PLUS</i> (CPC4-1-A) Main I/O Module
Choke (50000774)	Ignition Noise (Choke) Filter
MX4 Plug Kit (00030867)	Printed Replacement Terminal Plugs for MX4 Expansion I/O Module
MX5 Plug Kit (00030868)	Printed Replacement Terminal Plugs for MX5 Expansion I/O Module

TTD™ Annunciator Panel

► TTD Annunciator Panel

The TTD is a fully-configurable fault annunciator and shutdown control system designed to protect engines, compressors and their associated equipment.



TTD-H, PSU-2 Approved for hazardous locations
Class 1, Division 2, Groups B, C, and D.



► Features:

- Easy to operate
- Simple interface
- One display head is common to all configurations requiring fewer spare parts
- Optional tachometer using CD ignition or MPU input
- Optional pre-lube & post-lube functionality
- Optional no-flow detection
- Monitors 48 user-configurable sensor

Specifications:

Power Requirements:

PSU-2: 10-32VDC, 10W (max); 90-400VDC CD Ignition, 750uA @ 100VDC (max)

On-Board Backup Power: Lithium battery, 6 VDC, 1300 mAh.

Digital Inputs: 48 (a.k.a. Channels)

Sensor Types: Discrete Input, N.O./N.C., intrinsically safe or non incendive

Magnetic Pickup Input: 3.6 - 120 VAC, 2-10 kHz.

Outputs:

RLY: 0.4A @ 400VDC(*) for 5 seconds

0.15A @ 400VDC(*) cont. duty

FV- : 0.5A @ 400VDC(*) cont. duty

ALR: 0.5A @ 48VDC

AUX: 0.5A @ 48VDC

Operator Interface:

Display Type: LCD, Static, 80 segment, custom text with LED Backlight

Display Viewable Area: ~ 2.79 x 1 in. (71.04mm x 25.4mm)

Display Contrast: Automatic

Display Backlight: Yellow (Normal Operation); Red (Shutdown) (Backlight will only be available when unit is powered by DC. This feature is not available on PSU-1.)

Voltage Level Monitor: Monitor and display voltage level of DC Supply, CD Ignition, and internal battery.

Keypad: 6 switches: Ridge Embossed, Metal Dome, Tactile 14 Oz. Trip Force

Enclosure Cutout: 5.25 x 5.25 inches (133 mm).

Operating Temperature: -40 to +85 degrees C

Viewable Temperature: -40 to +85 degrees C

Storage Temperature: -40 to +85 degrees C

Tachometer Accuracy: $\pm 0.5\%$ of the display reading or ± 1 RPM, whichever is greater.

Resetable Hourmeter Range: 0 to 65535 hrs.

Non-Resetable Hourmeter Range: 0 to 65535 hrs.

Hourmeter Accuracy: ± 1 hour per year.

Communication Ports: 1

A single bi-color (GREEN/RED) LED is provided to give visual indication of active transmit and receive traffic. Only one connection will be active at any time.

Interface: Factory configured for RS232; field-selectable for RS232 or RS485.

Baud/Configuration: 9600, 19.2K, 38.4K(**);N,8,1;N,8,2

Protocol: Modbus (Slave)

Connection: There are 2 screw terminal connectors for RS485.

There are 2 screw terminal connectors for RS232.

There is 1 screw terminal common for both ports labeled as GND.

Third Party Approvals:

TTD-H, PSU-2: CSA Class I, Division 2, Groups B, C, and D.

Intuitive Display Icons:

Display status and assist in setup and operation resulting in greater ease of operation and interface. The appropriate icon will turn on to indicate unit status or navigation through the setup features.

RUN - Run mode

RPM - Screen Value

HOURS - Screen Value

TYPE - Channel Type Configuration

LOW BATT - Low Battery Warning (displayed when condition exists)

HISTORY - Shutdown History

TEST - Test Mode

LUBE - Pre-lubrication Timer

POSTLUBE - Post-lubrication Timer

SHUTDOWN - Stop Mode

ALARM - Alarm(s) Warning (displayed when condition exists)

SETPOINT - Edit Set-point Value

SETUP - Setup Menu(s)

(*) CSA approved for 250VDC maximum.

(**) 38.4K Baud will not be available when IGN input is selected as the source for RPM calculations. When MPU is selected, this feature is available for selection.

Centurion™ Control Panel



The Centurion Configurable Controller (C4) is a hybrid of annunciator and compressor controller.

The C4 combines the monitoring and shutdown features of an annunciator, with auto-start and basic engine controls that help prevent shutdowns.



Features

- PC Configurable / USB Compatible
- No programming experience required

C4 Series General Specifications

- **Display Module (Head):** C4-3: LCD Graphic Display.
- **Main I/O Module:** C4-1-A: 32 DI, 10 DO, 12 AI, 8 TC, 2 AO, 1 MPU.
- **Power Input:** 10 -32 VDC
- **Operating Temp.:** -40 to 85°C (-40 to 185°F)
- **Configuration:** PC-based Centurion Configuration Software.

C4-3 Display Module with Graphical LCD

- Operating temperature: -40 to +85°C (185°F).
- 128x64 pixels, LCD Display with Green Backlight.
- 12-key keypad for user interface for set point entry, alarm acknowledgement, start, stop, reset, etc.
- 2 Serial Ports - Software Configurable
 - Port 1 - Modbus Master RS232 or RS485
 - Port 2 - Modbus Slave RS232, RS485, or USB (future)
- Customizable Process Screens (up to 9)
 - Line by Line
 - Gauge
 - Control Loop
 - Generic Register

C4-1-A Main I/O Module

- All I/O options individually software selectable. No jumpers required.
- 32 Optically-isolated DC Digital Inputs: NO or NC, (active high/active low), non-incendive.
 - LED indicators.
 - Approved for use with general purpose switches in hazardous areas.
- 12 Analog Inputs: 0-24mA or 0-5VDC , 10 bit hardware.
- 8 Thermocouple
 - Open Thermocouple
 - Cold Junction Compensation.
 - 4-20mA, 16 bit hardware.
- 3 Communication Ports:
 - Port 1 (SERIAL):
 - Interface: RS232 or RS485.
 - Protocol: Modbus RTU (Slave)
 - Port 2 (SERIAL):
 - Interface: RS232 or RS485.
 - Protocol: Modbus RTU (Slave), Proprietary (Configuration Transfer)
 - Port 2 (USB): Interface: USB 1.1 Compliant Port emulating RS232 communications via PC driver.
 - Protocol/Services: Modbus RTU (Slave), Proprietary (Configuration Transfer)
 - Connection: USB Type B connector
 - Automatic selection of USB when a signal is detected on the USB Type B connector.
 - Port 3: Interface: CANBUS
 - Protocol/Services: Proprietary communications for Expansion I/O Module support.
- 1 Magnetic Pickup Input/AC Run Signal: 30 to 10kHz, 4.5VAC rms min, 120VAC rms max.
- 10 Digital Outputs:
 - LED indicators
 - Four (4) relay outputs, form C, dry contacts.
 - Four (4) FET outputs (source).
 - Two (2) FET outputs (sink).
- 2 Analog Outputs

Centurion™ *PLUS* Control Panel

- ▶ **The Centurion *PLUS* Control Panel** is the latest evolution in Murphy's controller technology. This full-featured controller provides the stability of legacy technology combined with the latest HMI Touchscreen for greater expandability and user interface.

▶ Features:

- Custom application programming
- Full time data logging
- Expandable communication capabilities

Centurion *PLUS* controller



General Specifications

Power Input: 10 -32 VDC

Operating Temp. (CPC4-1): -40 to 85°C (-40 to 185°F)

Operating Temp. (Touchscreen): 0 to 50°C (32 to 122°F)

Full-Color VGA Touchscreen

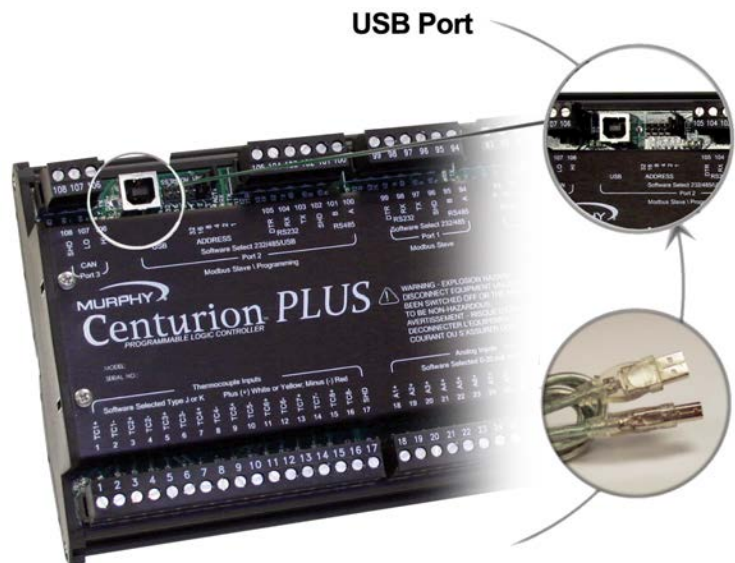
- Full-Color VGA Touchscreen (Resistive Analog)
- 6" Standard offering, 10" upgrade
- Data logging - 1 GB memory card
- Data Log transfer "on the fly"
- Communications
 - Serial RS232 - 2
 - Serial RS485 - 1
 - USB 1.1 - 1
 - Ethernet (several protocols supported including, but not limited to Modbus TCP, TCP/IP Internet Web server)
- 5-Button keypad for on screen menus (6")
- 8-Button keypad for on-screen menus (10")
- Standard Screen offerings
- Front panel Power LED
- 24 VDC Powered

Application Firmware: Programming Proprietary C Language - PC-based upload/download setpoint editor



CPC4-1-A Main I/O Module

- All I/O options individually software selectable. No jumpers required.
- 32 Optically-isolated DC Digital Inputs: NO or NC, (active high/active low), non-incendive.
 - LED indicators.
 - Approved for use with general purpose switches in hazardous areas.
- 12 Analog Inputs: 4-20mA or 0-5V, 10 bit hardware.
- 8 Thermocouples: Type J or K, 12 bit hardware.
 - Open Thermocouple Detection: Drives channel reading high (max of scale).
 - Cold Junction Compensation.
- 1 Magnetic Pickup Input/AC Run Signal: 30 to 10kHz, 5VAC rms min, 120VAC rms max.
- 10 Digital Outputs:
 - LED indicators
 - Four (4) relay outputs, form C, dry contacts.
 - Four (4) FET outputs (source).
 - Two (2) FET outputs (sink).
- 2 Analog Outputs
 - 4-20mA, 16 bit hardware.
- 3 Communication Ports:
 - Port 1: Interface: RS232 or RS485.
 - Protocol: Modbus RTU (Slave)
 - Port 2 (SERIAL):
 - Interface: RS232 or RS485.
 - Protocol: Modbus RTU (Master or Slave), Proprietary (Firmware Transfer)



Port 2 (USB): Interface: USB 1.1 Compliant Port emulating RS232 communications via PC driver.

- Protocol/Services: Modbus RTU (Slave), Proprietary (Firmware Transfer) Proprietary (Setpoint upload/down)
- Connection: USB Type B connector
- Automatic selection of USB when a signal is detected on the USB Type B connector.

Port 3: Interface: CAN

- Protocol/Services: Proprietary communications for Expansion I/O Module support.

Expansion I/O Modules

MX4 Expansion I/O Module

- All I/O options individually software selectable. No Jumpers required.
- 18 Thermocouple Inputs: Type J or K, 12 bit hardware.
 - Open Thermocouple Detection: Drives channel reading high (max of scale).
 - Cold Junction Compensation.
- 1 Magnetic Pickup Input: 4.5VAC – 120 VAC, 30 – 10kHz.

MX5 Expansion I/O Module

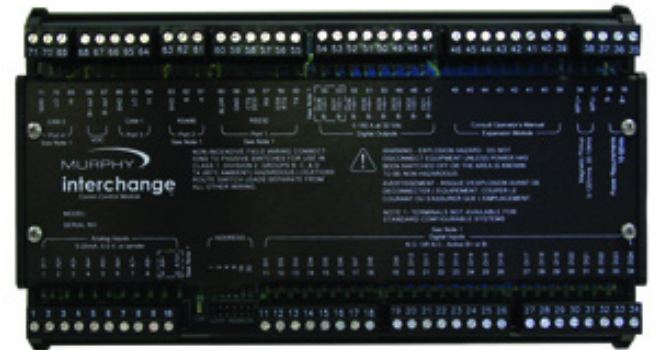
- 24 Digital Inputs: Optically-isolated DC Digital Inputs, (active high/active low), non-incendive
- 10 Analog Inputs: 4-20mA or 0-5VDC, 10 bit hardware.
- 8 Digital Outputs: Open Collector Transistor, 150mA (sink)
- 1 Magnetic Pickup Input: 4.5VAC – 120 VAC, 30 – 10kHz.

MX5-A Expansion I/O Module (Analog Output option)

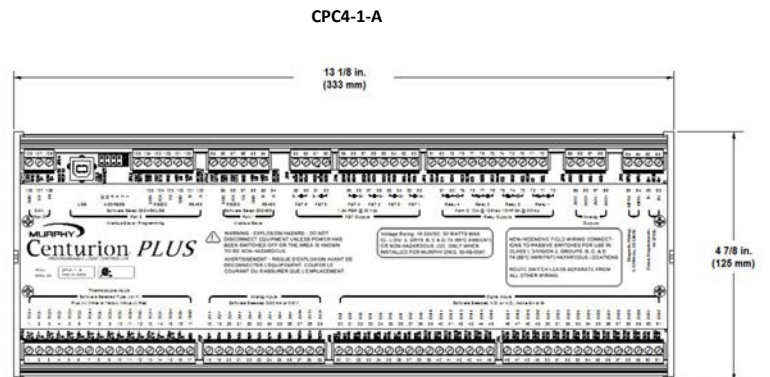
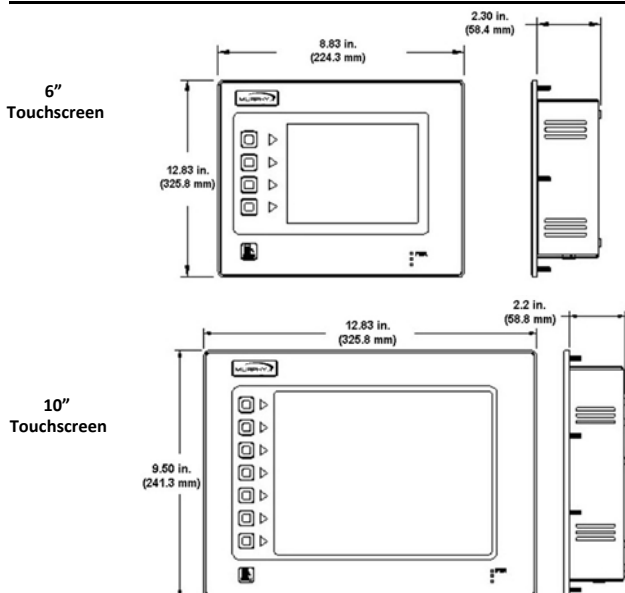
- 24 Digital Inputs: Optically-isolated DC Digital Inputs, (active high/active low), non-incendive
- 10 Analog Inputs: 4-20mA or 0-5VDC, 10 bit hardware.
- 8 Digital Outputs: Open Collector Transistor, 150mA (sink)
- 4 Analog Outputs: 4-20mA, 16 bit hardware.
- 1 Magnetic Pickup Input: 4.5VAC – 120 VAC, 30 – 10kHz.

MX5-D Expansion I/O Module (Digital Output option, 8 additional)

- 24 Digital Inputs: Optically-isolated DC Digital Inputs, (active high/active low), non-incendive
- 10 Analog Inputs: 4-20mA or 0-5VDC, 10 bit hardware.
- 16 Digital Outputs: Open Collector Transistor, 150mA (sink)
- 1 Magnetic Pickup Input: 4.5VAC – 120 VAC, 30 – 10kHz.



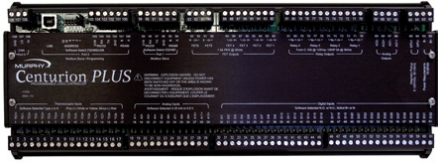
Dimensions



How To Order

Selecting a Centurion *PLUS* Controller Model:

1. Specify **CPC4-1-A** Main I/O Module



2. Specify any combination up to three (3) (optional) Expansion I/O Modules

**MX4
MX5
MX5-A
&/or
MX5-D**



3. Specify one 6-inch or 10-inch (upgrade) VGA Color Touchscreen



The minimum system requirements:

CPC4-1-A Main I/O Module

Full-color VGA Touchscreen (for operation control and interface with Main I/O Module)

Some systems may require the use of our **Interchange™ Comm Control Module, MX-Series Expansion I/O**. Choose up to three (3) of any combination.

Replacement Parts and Accessories

CPC4-1-A Plug Kit	(00030866)	Printed Replacement Terminal Plugs for Centurion <i>PLUS</i> (CPC4-1-A) Main I/O Module
Choke	(50000774)	Ignition Noise (Choke) Filter
MX4 Plug Kit	(00030867)	Printed Replacement Terminal Plugs for MX4 Expansion I/O Module
MX5 Plug Kit	(00030868)	Printed Replacement Terminal Plugs for MX5 Expansion I/O Module

Control Systems & Services

With more than 70 years of history, Murphy's Control Systems & Services division has the experience to provide the correct solution for any control system need. We work with clients to quickly identify critical needs and cost-effective solutions in a wide variety of control systems applications, from basic annunciator shutdown panels to complex PLC-based systems.

CS&S takes any project from conception to completion and beyond, with 24-hour technical support.

Our services include:

- Project Management
- Design and Engineering
- Testing
- Training
- Technical Support
- Programming (PLC and HMI)



Project Management: Dedicated to the Details

Our employees have the proven ability to take your project from concept to design to fabrication and field support. We begin the process with the end in mind, utilizing a consultative approach to get a clear picture of your desired end result.

Design and Engineering: Built Right, Every Time

Consistent design maintains similar look and feel across many different PLC panels. This concept allows production, support staff, customer staff and end-users to be familiar with the controls panels even before they see it for the first time.

Start-Up Assistance: Money Saved, Not Spent

In the Oil & Gas industry, start ups are critical. Having the right personnel on site can save downtime and money by reducing lost production time. Downtime is expensive and can be minimized by having a PLC Service Engineer provide the technical expertise needed for advanced troubleshooting and on-site control philosophy modifications.



Troubleshooting: Extensive Knowledge When & Where You Need It

Equipment malfunctions can happen any time, day or night. So we provide 24-hour technical support to help get your equipment back up and running. Our support team is available by phone to answer your questions and assist with troubleshooting.

Training: Helping Your Team

Our dedicated team of PLC Engineers help your operators feel more comfortable with the systems by spending time with them to go through the PLC as well as basic troubleshooting tips.



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	<i>Check/Relief Valves - Diesel Fuel</i>	
7867	Diesel Fuel Check Valves – CKV/PRV Series	259
	<i>Shutoff Valves</i>	
99026	Diesel-Fuel Shutoff Valves – SV Series	261
94134	Electromechanical Fuel Shutoff Valves – M25 and M50 Series	265
94129	Pneumatic Valves for Fuel Gas Shutoff Models M2582-P and M5180-P	269
	<i>Pulsation Dampener Valves</i>	
95145	Pulsation Dampener – PD8100 Series	271



Model M2582-P

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Diesel Fuel Check Valves



Features

- Problem Solvers for Diesel Engine Shutdown Systems
- Precision Made
- Stainless Steel Spring
- Compact and Simple to Install

Murphy offers two types of diesel fuel line valves: check valves and pressure relief valves.

The CKV series check valves are in-line, one-way valves that prevent fuel from being siphoned back into an injector or injection pump which could delay a shutdown.

There are two types of check valves: CKV2336 and CKV1WPS. The CKV2336 has a 1/4 NPT threaded male connection on each end for connecting to fuel line fittings or hoses. The CKV1WPS check valve is typically mounted in the fuel bypass line of the last fuel injector. The CKV1WPS features a hollow bolt connection and a barbed, 1/8 NPT connection for flex hose or fitting.

The PRV series pressure relief valves, relieve overpressure in a fuel system usually caused by closing of a solenoid fuel valve. The PRV50 and PRV70 have a 1/4 NPT threaded connection on each end for connecting to fuel line fittings or hoses.

Specifications

Materials

	Body	Seal	Spring
CKV2336	Brass	Poppet	SS
CKV1WPS	Brass	SS	SS
PRV50/PRV70	Brass	SS	SS

Note: SS=Stainless steel.

Opening Pressure

CKV2336	4 psi (27)
CKV1WPS	2 psi (14)
PRV50	25 psi (172)
PRV70	70 psi (483)

Note: metric (kPa) equivalents in parenthesis.

Static Pressure (all):

150 psi (1.03 MPa) maximum

Weight:

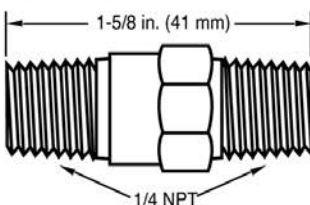
CKV2336: 1.3 oz (40.5 grams)

CKV1WPS: 1.3 oz (40.5 grams)

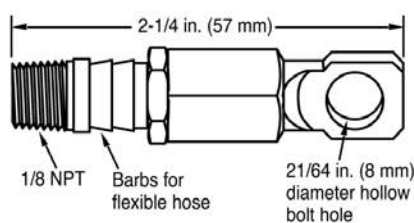
PRV50/PRV70: 1.3 oz (40.5 grams)

Dimensions

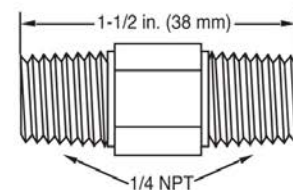
CKV2336



CKV1WPS



PRV50 and PRV70

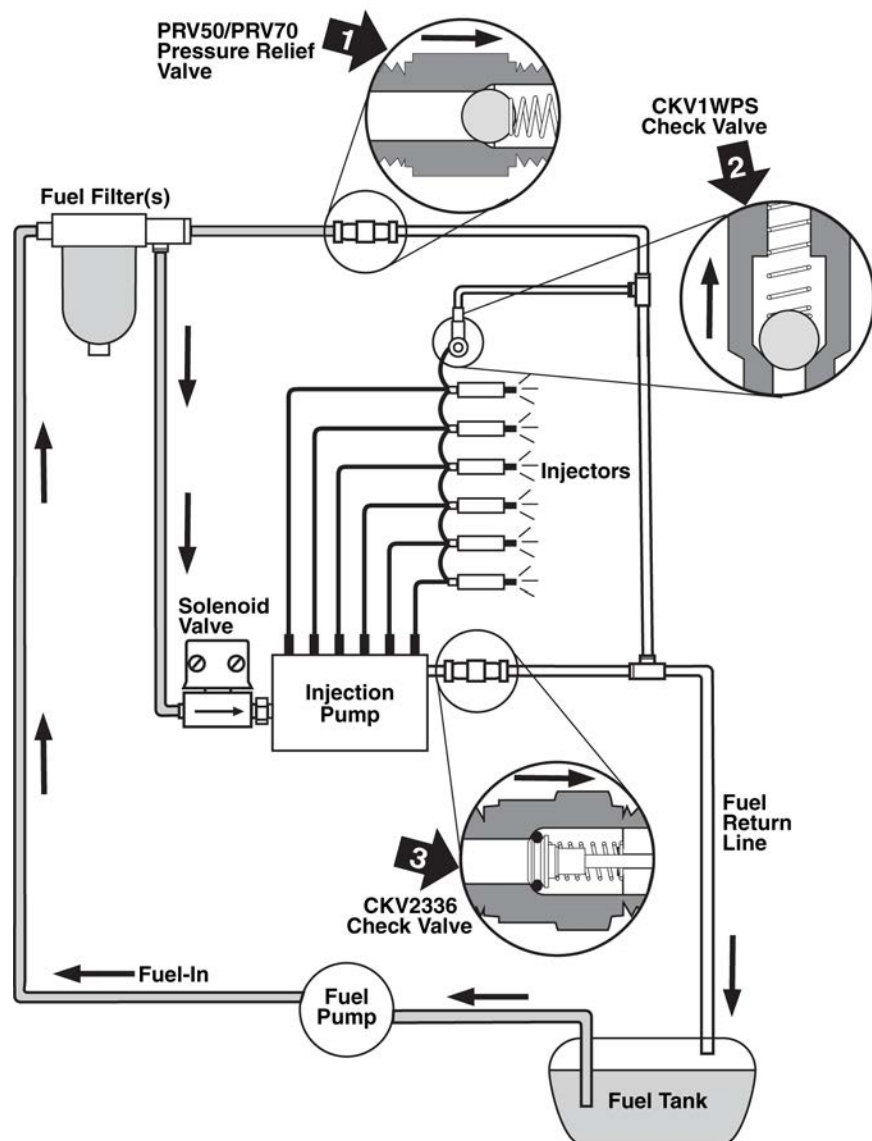


Basic Operation

Murphy Check Valves and Pressure Relief Valves enhance the operation of diesel engine shutdown valves by reducing the time required for complete engine shutdown after the solenoid valve closes. The diagram to the right shows a typical installation using CKV check valves and PRV pressure relief valves. **All valves are shown closed.**

Check Valves close off the fuel return line(s) to prevent fuel or air from re-entering the injection system through the bypass line(s). Models **CKV2336** (3) is an in-line valve. Model **CKV1WPS** (2) has a 21/64 in. (8 mm) banjo fitting that attaches to the return line of the final injector. All check valves allow fuel to flow away from the injectors but close to prevent fuel from flowing in the reverse direction.

The **PRV50** and **PRV70** (1) relieve pressure buildup in the fuel system that can cause fuel filter canisters to burst. When the solenoid valve closes to stop the engine, the fuel transfer pump will continue to produce pressure as the engine slows down to stop. This pressure buildup, if not relieved, can cause fuel filter canisters or gaskets to leak. PRV's are installed in the bypass line from the fuel filter(s) to the fuel return line.



How to Order

Specify model number:

CKV2336
CKV1WPS
PRV50

PRV70

Note: there are no replacement parts.

Diesel-Fuel Shutoff Valves – SV-Series



Features

- Solenoid Operated Fuel Shutoff Valve
- Diesel Engines
- Diesel Driven Pumps and Compressors
- High Pressure Models
- Select from 12 or 24 VDC Models

The SV-series valve is a normally closed valve that opens when current is supplied from the battery through a magnetic switch. Temperature, level, or pressure SWITCHGAGE® instruments installed on the engine and pump or compressor, trip the magnetic switch, breaking the circuit from the battery which closes the valve and stops the engine.

The SV-12 valve operates on 12VDC, has a 1/4 NPT inlet and outlet, and a full 3/16 in. (5 mm) orifice. The 24 VDC (SV-24) is optional. The SV valves open against 30 psi. (207 kPa) [2.07 bar] inlet pressure.

Greater Flow Rate Valve

Special series SV valve is available with a 1/4 in. (6 mm) orifice which opens against maximum pressure of 15 psi (103 kPa) [1.03 bar]. This valve is recommended where greater flow is required, and only static head or low transfer pump pressures are encountered.

High Pressure Valves

SV-HP series valves open against diesel fuel transfer pump pressure up to 60 psi (414 kPa) [4.14 bar]. Models are available for 12 or 24 volt DC systems. The orifice is 1/4 in. (6 mm), using the same inlet/outlet and options as standard SV.

Things You Should Know About SV-Series Valves

The SV-Series fuel shutoff valve is intended for use with diesel engines having externally accessible fuel injection pumps. The volume of fuel required for the engine to operate must be able to pass through the 3/16 in. (5 mm) or 1/4 in. (6 mm) orifice of the valve. You must be able to attach the fuel valve directly onto or in close proximity to the fuel injection pump in order to close off fuel flow to the pump.

SV-series is **NOT** intended for use with engines having "unit" injectors or distributor type injection pumps. Use only with diesel.

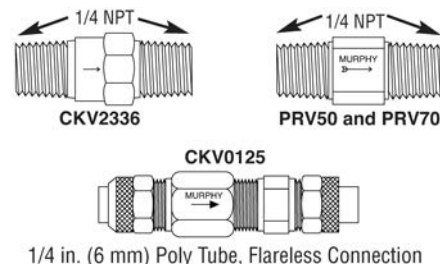
Auxiliary Fuel Valves

Fuel Return Line Check Valve

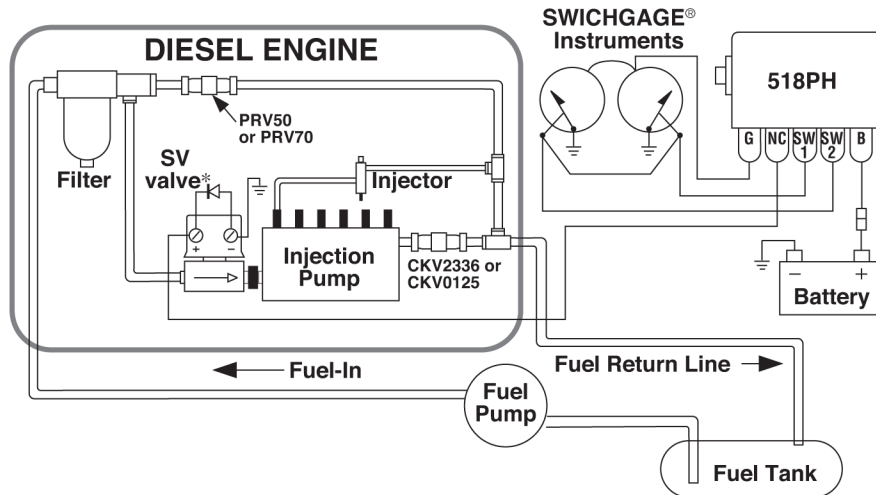
The CKV series is an in-line, one-way valve for the prevention of fuel siphoning from the diesel return line by an injection pump. In engine shutdown systems using a Murphy SV valve, the CKV is necessary to ensure a rapid shut down of the engine by fuel starvation of the injection system. For details see bulletin CKV-7867B.

Fuel Line Pressure Relief Valve

The PRV50 is an in-line, one-way valve for the prevention of overpressure damage to fuel filters and their housings. This pressure relief valve operates in conjunction with a Murphy SV series shutdown valve; after the SV closes, a rapid high pressure build-up caused by the fuel pump can occur. The PRV, mounted in a fuel return line after the filter, will open to relieve pressure buildup.



Typical SV Valve Installation



NOTE: Mount the SV valve as close as possible to the injection pump. If using the SV valve with electronic devices, we recommend installing a suppression diode across the SV valve coil.

Installation and Service Suggestions

1. Make sure the valve is the same voltage as the battery. Under continuous duty, the coil will normally be hot, however, incorrect voltage can cause smoking and burned coils.
2. The valve will not operate if the flow arrow on the side of the valve does not indicate the correct direction of flow.
3. Do not apply pipe dope to female valve threads. Dope inside the valve will foul the seat and prevent proper seal.
4. Install the valve as close as possible to the injection pump.

Troubleshooting the SV-Series Valves

Check Control Circuit: To determine if the electrical system is energizing the solenoid, listen for a metallic click signifying the solenoid is operating. Absence of the click indicates loss of power supply. Check for blown or loose fuses, for an open circuit or a grounded coil, for broken lead wires or open splice connections.

Coil Burnout: Check for open-circuit coil. Replace coil if necessary.

High or Low Voltage: Check voltage across the coil with a voltmeter. Voltage must be in 85% to 110% of nameplate rating.

Incorrect Pressure: Check fuel line pressure. Pressure on the valve must be within the specific range of the SV in use.

Note: If engine continues to run after the valve closes, install a check valve such as CKV2336 in return line.

Fuel Leak Through Valve: Disassemble the valve and clean parts. Replace any parts that are worn or damaged (see other side for repair parts).

Slow Shutdown: Due to the internal fuel capacity of some injection pumps, engine shutdown will not occur until that fuel is used up

Specifications

Electrical Rating: 12 VDC, 10 watts

Orifice: 3/16 in. (5 mm) diameter (optional 1/4 in. [6 mm] diameter). See chart below.

Body Connections: 1/4 NPT inlet/outlet

Maximum Opening Pressure:

3/16 in. (5 mm) orifice: 30 psi (207 kPa) [2.07 bar]
1/4 in. (6 mm) orifice: 15 psi (103 kPa) [1.03 bar]

Shipping Weight: 1 lb. 6 oz. (0.68 kg)

Shipping Dimension: 3 x 2-3/4 Sx 2-3/4 in. (76 x 70 x 70 mm)

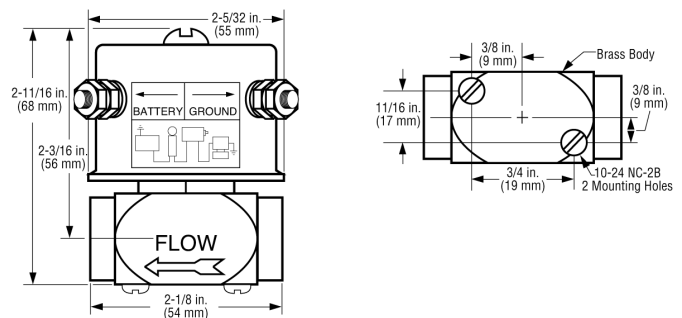
SV-HP (High Pressure model)

Orifice: 1/4 in. (6 mm) diameter. See chart below.

Maximum Opening Pressure: 60 psi (414 kPa) [4.14 bar].

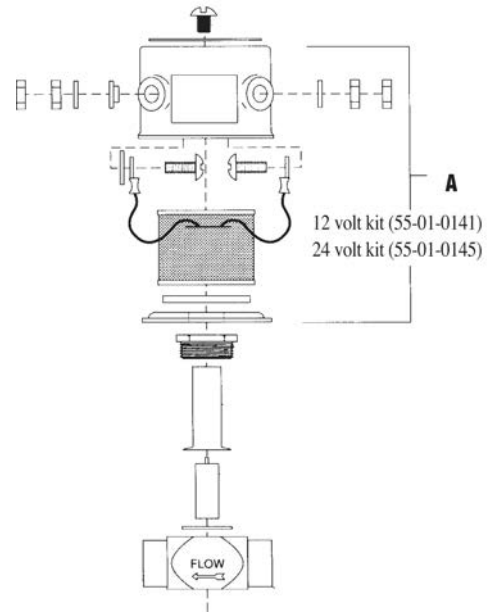
Differential Pressure	3/16 Orifice					1/4 Orifice					
	1	2	5	10	30	1	2	5	10	15	
Gallons per Minute	.48	.68	1.1	1.5	2.2	2.6	.72	1.05	1.65	2.35	2.70
Liters per Minute	2.01	2.85	4.62	6.3	9.24	10.92	3.02	4.41	6.93	9.87	11.34

Dimensions



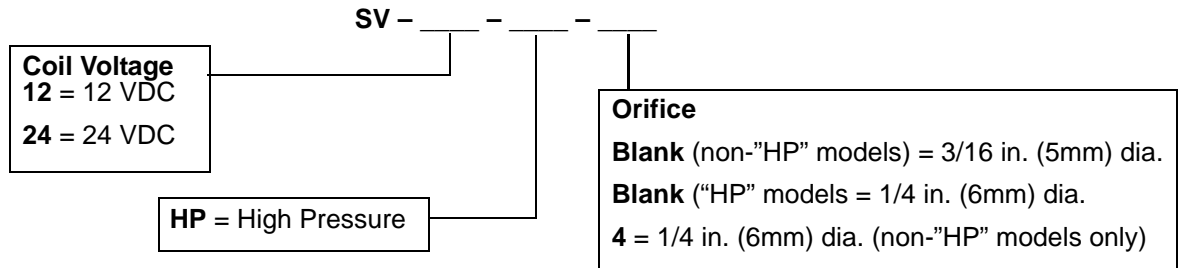
SV Repair Parts

Call-out	Part Description	Part Number
A	Screw	80-04-1412
B	Coil Replacement Kit 12 volt kit	55-01-0141
B	Coil Replacement Kit 24 volt kit	55-01-0145
C	Core Repair Kit (Std mdl's)	55-01-0155
C	Core Repair Kit (HP mdl's)	55-01-0156
D	Valve Body: 3/16 Orifice 1/4 NPT x 1/4 NPT (std.)	55-05-0194
D	Valve Body: 1/4 Orifice 1/4 NPT x 1/4 NPT	55-05-0193



How to Order

See the diagram below, example: **SV-12-HP**



CAUTION: Do NOT use the SV valves with distributor type injection pumps. For use with DIESEL ONLY.

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Electromechanical Fuel Shutoff Valves – M25 and M50 Series



Model M5081



Features

- Instant Response to Shut Off Signal
- Positive Valve Closure
- Vents Gases Trapped After Shutdown
- Explosion-proof Models Available
- Models Available for Magneto, CD Ignition or 12/24 VDC
- Normally Energized Model Available

These fuel shutoff valves are semi-automatic devices for shutdown of natural gas fueled engines. The valve is opened manually and closes when the electromagnet is energized and trips the latch. The valve can be closed manually by turning the valve's disconnect knob. A normally energized model is available that holds the valve open electrically and closes when the coil is de-energized. A vent in the valve body relieves trapped gas when the valve closes. A pop-out indicator button informs you when the valve is open or closed.

The valve's tripping power is provided by an engine ignition system or battery. Models are available for magneto, CD ignition or 12/24 V battery.

The **M2582 is a 1 inch (25 mm) valve** with 1 NPT connections. It has one SPDT snap-switch. The valve body is made of sandcast aluminum. It does not include the open/close indicator button.

M5081 is a 2 inch (51 mm) valve with 2 NPT connections. It has two SPDT snap-switches. The valve body is available in sandcast aluminum or cast steel (optional).

M5081FS is the same as the M5081 but has a normally energized circuit. This circuit allows the valve to be held open electrically and close by interruption of the coil's power circuit. **A manual trip knob is not available on this model.** An optional 2 in. (51 mm) steel flange pipe connection is available for M5081 and M5081FS steel body models (see Dimensions page 3).

Specifications

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

Valve Seat: Buna-N

Maximum Pressure Rating:

- M2582: 80 psig (552 kPa) [5.52 bar]
- M5081: 100 psig (689 kPa) [6.89 bar]
- M5081FS: 100 psig (689 kPa) [6.89 bar]

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

- CD ignition coil resistance: 72 Ω
CD primary voltage: 1.38 to 3.8 A
- M5081FS model: Energized to run (continuous-duty coil) coil resistance:
12 Volt model: 33 Ω (0.36 A)
24 Volt model: 136 Ω (0.17 A)

- Magneto ignition coil resistance: 0.5 Ω
- Magneto primary voltage: 1 to 5 A
- Battery coil resistance: 7 Ω
12 or 24 VDC: 1.2 to 2.4 A

Wiring (See Internal Wiring page 2):

- M2582: Wire leads
- M5081 and M5081FS: Terminal blocks

Snap-switch Rating: 5 A @ 480 VAC

Laboratory Approval: CSA listed for Class I, Groups C and D Hazardous Locations. 5 amps maximum; intermittent duty; models M5081 and M5081-CD engine ignition powered, and model M5081-B, 12 or 24 VAC or VDC; switch contacts rated 5 A @ 480 VAC maximum.

Options and Accessories

Diode Package (65010065)

The Murphy 202 V diode package is designed to allow the fuel shutoff valve to be used with dual Magneto Ignition systems. Sold separately (see How to Order).

Magnetic Switch Adapter

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

Three models are available:

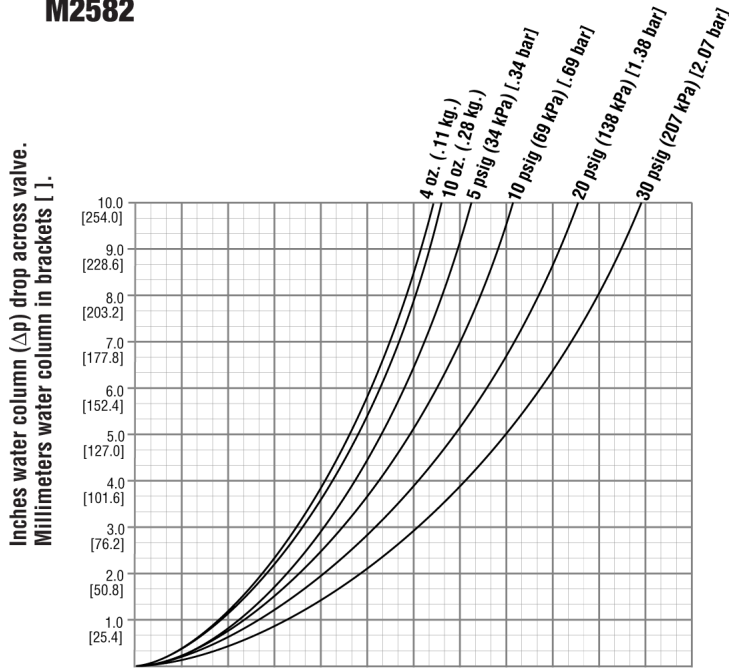
65020126: For Negative Ground CD Ignitions up to 240 VDC

65020127: For Positive Ground CD Ignitions up to 450 VDC

65020155: For Negative Ground CD Ignitions 240 VDC to 450 VDC

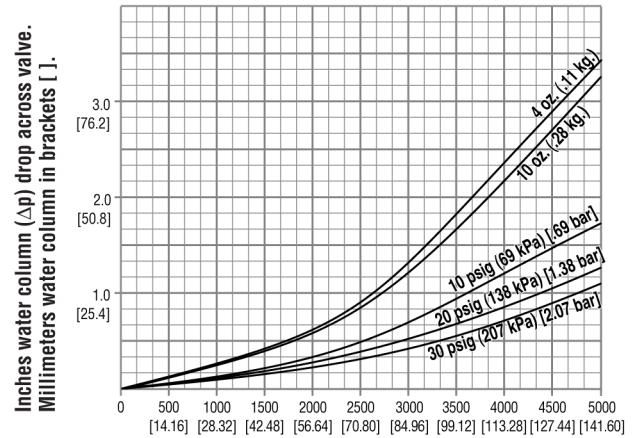
Flow Rates

M2582



Standard cubic feet per hour. Cubic meters per hour in brackets [].

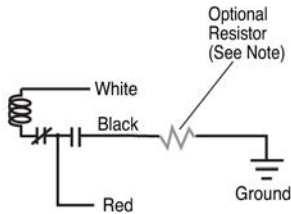
M5081 and M5081FS



Standard cubic feet per hour. Cubic meters per hour in brackets [].

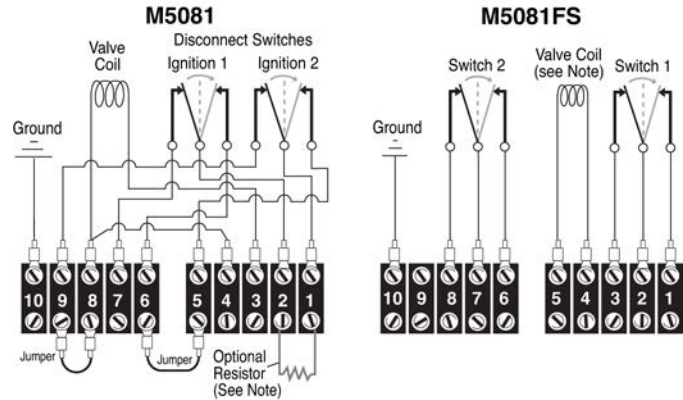
Internal Wiring

M2582



NOTE: For grounding the ignition (CD models only) through the fuel valve's internal snap-switch, a Murphy Magnetic Switch adapter (see page 4) must be used in addition to a 100 ohm, 2 watt resistor (supplied with valve).

M5081 and M5081FS

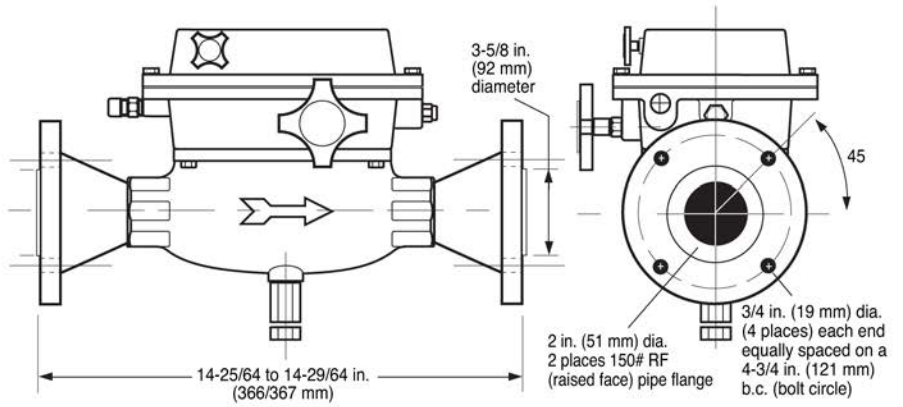
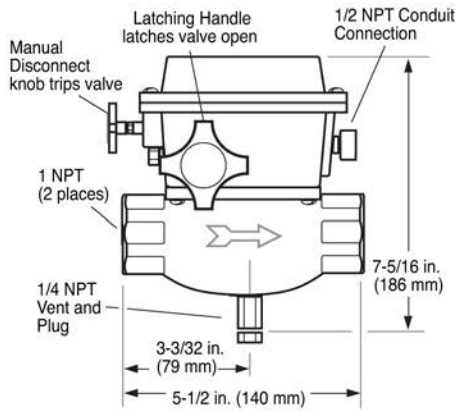


NOTE: For grounding the ignition (CD models only) through the fuel valve's internal snap-switch, a Murphy Magnetic Switch adapter (see page 4) must be used in addition to a 100 ohm, 2 watt resistor (supplied with valve).

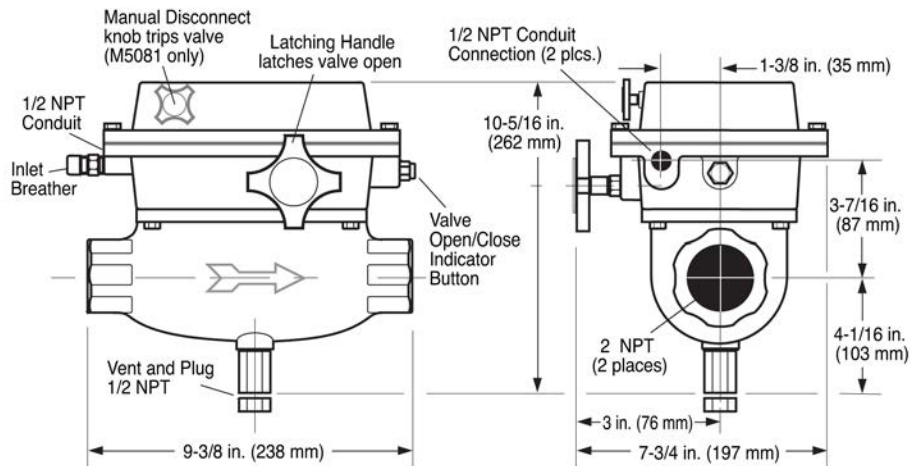
Dimensions

M2582

Steel Flanged Option “3” (available on M5081FS and M5081FS steel body configurations only)

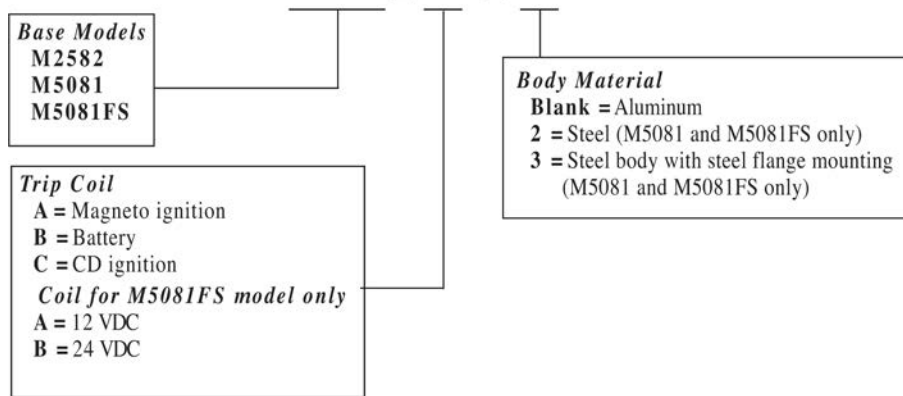


M5081 and M5081FS



How to Order

To order your valve, use the diagram below to specify your model and options. Example: **M5081-A-2**



Accessories

Specify part number when ordering.

Magnetic Switch Adapter

65020126: For Negative Ground CD Ignitions up to 240 VDC

65020127: For Positive Ground CD Ignitions up to 450 VDC

65020155: For Negative Ground CD Ignitions 240 VDC to 450 VDC

Diode Package

65010065: For use with dual Magneto Ignition systems.

Shipping Information

Shipping Weights:

- M2582: 5 lbs 8 oz. (2.49 kg)
- M5081: 14 lbs 8 oz. (6.58 kg)
- M5081-2: 40 lbs (18.14 kg)
- M5081-3: 56 lbs (25.40 kg)
- M5081FS: 14 lbs 8 oz. (6.58 kg)
- M5081FS-2: 40 lbs (18.14 kg)
- M5081FS-3: 56 lbs (25.40 kg)

Shipping Dimensions:

- M2582: 8 x 8 x 7 in. (203 x 203 x 178 mm)
- M5081: 12 x 12 x 9-5/16 in. (305 x 305 x 237 mm)
- M5081-2: 12 x 12 x 9-5/16 in. (305 x 305 x 237 mm)
- M5081-3: 18 x 12 x 13-1/2 in. (457 x 305 x 343 mm)
- M5081FS: 12 x 12 x 9-5/16 in. (305 x 305 x 237 mm)
- M5081FS-2: 12 x 12 x 9-5/16 in. (305 x 305 x 237 mm)
- M5081FS-3: 18 x 12 x 13-1/2 in. (457 x 305 x 343 mm)

Service Parts

Specify part number when ordering.

	M2582	M5081	M5081FS
Coil Assembly			
Battery	55000128	55000126	———
CD Ignition	55000129	55000127	———
Magneto Ignition	55000094	55000080	———
"FS" Coil Assembly			
12 VDC	———	———	55000158
24 VDC	———	———	55000159
Latch Block Assembly			
Latch block assembly	55000095	55000074	———
Latch block switch and coil assembly	55000144	———	———
Latch block switch and mounting bracket assembly	———	55000118	———
Handle and Latch Kit			
Handle and latch kit	———	55000102	55000102
Handle kit	55000096	———	———
Manual Disconnect Assembly	55000097	55000137	———
Snap-switch Assembly	55000098	55000072	55000160
Close/Open Indicator Assembly	———	5500-0138	55000138
Stem and Seat Kit	55000093	55000075	55000135
Top Works Complete Valve Less Body and Vent	55000146	55000131	55000161 (12V) 55000194 (24V)
Vent Bushing Assembly	55000143	55000132	55000132
Diaphragm Assembly	———	———	———
Pilot Diaphragm	———	———	———
Diode Package for Dual Magneto Ignitions	———	65010065	———
Magnetic Switch Adapter for CD Ignitions			
Single/Dual ign. – negative ground up to 240 VDC	65020126	65020126	———
Single/Dual ign. – positive ground up to 450 VDC	65020127	65020127	———
Single/Dual ign. – negative ground up to 450 VDC	65020155	65020155	———

Pneumatic Valves for Fuel Gas Shutoff Models M2582-P and M5180-P



Model M2582-P

Features

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



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

Basic Operation

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

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

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

The **M5180-P** is for 2 in. (52 mm) gas lines. It automatically opens at 2 psi (14 kPa) [.14 bar] and fully opens the seat at 3 psi (21 kPa) [.21 bar]. The valve can be manually opened with lever and latched against inlet pressure of 100 psi (689 kPa) [6.89 bar]. The latch will release after pilot pressure reaches 2.5 psi (17 kPa) [.17 bar].

Specifications

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

Valve Seat: Buna-N

Valve Inlet Pressure (Maximum):

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

Parts Exposed to Gas Line Flow:

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

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

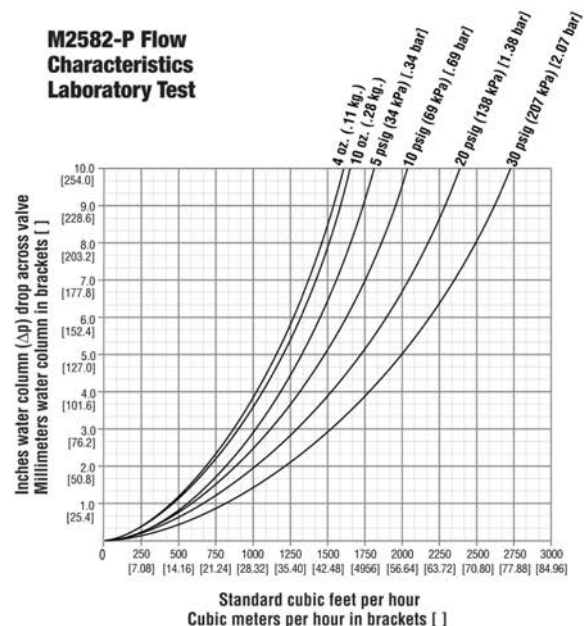
Control Pressure (Maximum):

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

Shipping Weights:

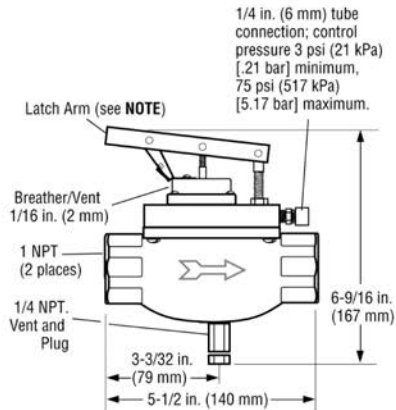
M2582-P: 5 lbs 10 oz (2.55 kg).
M5180-P: 14 lbs 9 oz (6.61 kg).
With steel body option "2": 25 lbs (11.34 kg).

M2582-P Flow Characteristics Laboratory Test

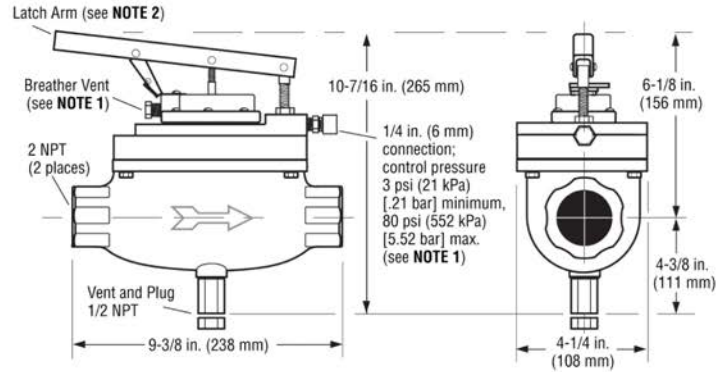


Dimensions

M2582-P



M5180-P



NOTE 1: Thumb operated opening latch (2.5 psi [17 kPa] [.17 bar] required to release cocking latch)

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

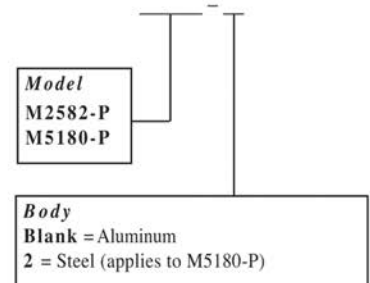
NOTE 3: Control pressure connection fitting and breather vent fitting can be swapped to convert to vacuum control.

Service Parts

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

How to Order

To order, use the diagram below.



Pulsation Dampener – PD8100 Series



Features

- Used On Controllers, Instruments and Recorders to Dampen Pressure Pulsation
- Eliminate Gage Pointer Flutter
- Aids In Providing More Accurate Pressure Indication
- Decreases Wear On Gage's Geared Movement

NOT INTENDED FOR USE AS A SHUTOFF VALVE

The PD8100 Series eliminates pointer flutter on pressure indicating SWICHGAGE® devices which are subject to pulsating pressure from reciprocating pumps or compressors. It also allows a close setting of high and low contact points providing for more accurate pressure indication and control of equipment.

The PD8100 Series decreases wear on geared movements and increases the life of pressure indicating instruments by eliminating excessive gage strain and unnecessary movement.

A necessity which quickly pays for itself by protecting any pressure indicating and control instrument which is subject to pulsation.

PD8100 SERIES NOT FOR USE ON OXYGEN OR LIQUID OXYGEN APPLICATIONS.

Quality built with a large diameter valve stem wheel for ease of adjustment with clearly printed operating instructions. Machined from 1-3/8 in. (35 mm) hex bar stock. A two degree taper on valve and stem assure positive dampening. Available in brass, carbon steel, 303 stainless steel or 316 stainless steel to meet pressure and environmental requirements with either 1/2 NPT or 1/4 NPT inlet connections.

Specifications

See “How to Order” section for available inlet and outlet connections.

PD8183: All wetted parts are Brass. Rated to 3,000 psi (20.68 MPa) [206.80 bar].

PD8184: All wetted parts are Carbon steel. Rated to 5,000 psi (34.47 MPa) [344.70 bar].

PD8185: All wetted parts are 303 stainless steel. Rated to 10,000 psi (68.95 MPa) [689.50 bar].

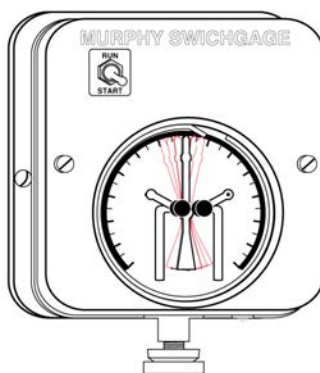
PD8190: All wetted parts are 316 stainless steel. Rated to 10,000 psi (68.95 MPa) [689.50 bar]. Meets NACE standard MR- 01-75 for direct exposure to H₂S.

Operating Temperature: -15 to 400°F (-26 to 204°C)

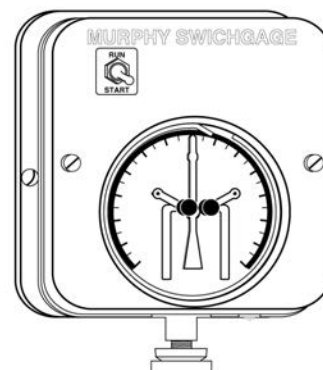
Shipping Weight (all models): 2 lbs.(0.9 kgs.)

Shipping Dimensions (all models): 4-3/4 x 4-3/4 x 3-1/4 in. (121 x 121 x 83 mm)

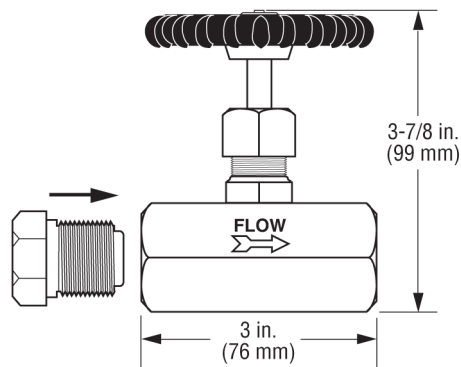
Eliminate pointer flutter like this.



Make SWICHGAGE® instruments and recorders operate like this.

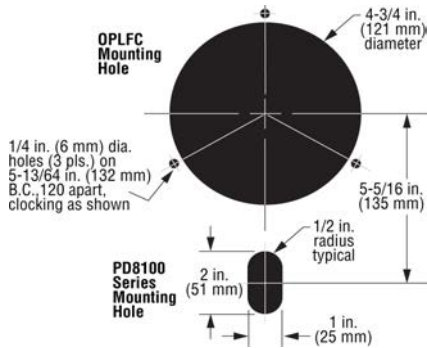


Dimensions



Mounting for the OPLFC Pressure SWITCHGAGE® and PD8100 Series

The PD8100 Series pulsation dampener is mounted directly below the OPLFC



Precautions: Dope or use teflon tape on connection threads. Do not block the inlet orifice.

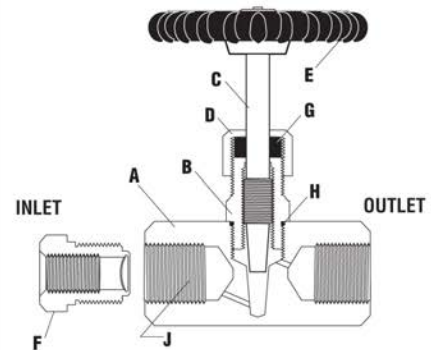
Service Parts

DESCRIPTION (see drawing—right)	PD8183	PD8184	PD8185	PD8190
A. 1/2 NPT inlet x 1/4 NPT outlet*	65-05-0104	65-05-0210	65-05-0204	65-05-1136
1/2 NPT inlet x 1/2 NPT outlet*	65-05-0105	65-05-0212	65-05-0206	65-05-1135
B. Bonnet Fitting	65-05-0099	65-05-0209	65-05-0203	65-05-1139
C. Valve Stem	65-05-0175	65-05-0208	65-05-0202	65-05-1140
D. Packing Nut	65-05-0098	65-05-0211	65-05-0205	65-05-1137
E. Hand Wheel (with 10-32 nut)	55-00-0179	55-00-0179	55-00-0179	55-00-0179
F. Strainer Bushing Assembly†	55-00-0174	55-00-0173	55-00-0175	55-00-0206
G. Molded Packing Gland	00-00-0936	00-00-0936	00-00-0936	00-00-0936
H. 'O' Ring Bonnet Seal	00-00-0302	00-00-0302	00-00-0302	00-00-0302
J. Stainless Steel Mesh Filter**	65-05-0214	65-05-0214	65-05-0214	65-05-0214

†Provided only for units with 1/4 NPT inlet.

*For 1/4 NPT inlet use with strainer bushing assembly.

**Provided in units with 1/2 NPT inlet.



How to Order

PD8185 - 1/4 x 1/4

Base Model
PD8183
PD8184
PD8185
PD8190

Connection Size

1/4 x 1/4 = 1/4 NPT inlet x 1/4 NPT outlet
1/4 x 1/2 = 1/4 NPT inlet x 1/2 NPT outlet
1/2 x 1/2 = 1/2 NPT inlet x 1/2 NPT outlet
1/2 x 1/4 = 1/2 NPT inlet x 1/4 NPT outlet

MURPHYMATIC® Compressor Panel

Shown at right, is a typical MURPHYMATIC® compressor panel featuring three Pulsation Dampeners and Murphy's OPLFC gages.

The PD's are recommended for use on piston pumps and compressors to eliminate pointer contact flutter and gage wear.



SECTION 70 ELECTRIC GAGES

Electric Gages

95090 EG Series – Electric Gage and Swichgage® Instrument 273

Annunciators

0910469 Four-Function TATTLETALE® Annunciator 277



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EG Series – Electric Gage and Switchgage® Instrument



Features

- EG Air Core Movement Design
- Technological Improvements in Lighting, Accuracy in Reading and Wiring Installation
- Environmentally Sealed Design
- Exceeds the Rigid SAE J1810 Standard
- Corrosion-Resistant Materials
- Desirable for Marine and Other Environmentally Sensitive Applications
- Soft, Non-Glare Dial and Pointer Illumination by "Cold Light" LED

The **EGS21 Series Switchgage** instrument has all of the features of the EG21 Series Gage plus an adjustable set point PowerHall Effect switch output for operating alarms or equipment shutdown. The trip point is adjustable over 90% of the scale and has a set point indicator visible from the gage face. Now you can have both, the ease of electric gage installation and the reliable switching of Murphy's famous Switchgage instrument.

Specifications

Power Input: For Gage, Switchgage instrument and Sender: 12 VDC or 24 VDC.

NOTE: EG21 Series gage and EGS21 Series Switchgage instrument **MOVEMENT** and **ILLUMINATION** require 12 VDC to function. For 24 volt systems, voltage converters are built into the electrical wire/connector assembly **and supplied with instrument.**
Specify voltage when ordering.

Case: Polyester (PBT), impact and weather resistant; with convenient screw-on mounting clamp.

Bezel: Polished 316 stainless steel bezel is supplied as standard; Available in black. SAE style optional.

Lens: Clear Polycarbonate and UV stabilized.

Air Core Movement: Silicon dampened pointer.

Dial: Black background and white markings; behind dial lighting (white marking becomes red when illuminated); dual scale with mirror band to reduce parallax reading errors.

Switchgage instrument Sensor: PowerHall Effect; outputs ground signal (sinking output) rated: 300 mA continuous (EGS21 Series only). Pressure, Fuel, Volts set on decreasing scale. Temperature and Amps set on increasing scale.

Output saturation voltage (voltage drop across switch): 1.3-2.3 Volts @ 25°C (May require some conditioning to work with logic inputs)

Switchgage instrument Set Point Indicator: Visible on mirror band (scale); adjustable from the back of the unit (1/16 in. hex type wrench).

Wiring: Plug connector with wire leads, 18 AWG (1.0 mm2) x 8 in. (203 mm) length.

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

Storage Temperature: -77 to 185°F (-60 to 85°C).

Over Voltage (Gage Movement): Withstands a voltage of 200% of nominal system voltage for 5 minutes. (Meets SAE J1810 standards).

Reversed Polarity (Gage Movement): Withstands reversed battery terminal polarity indefinitely within operating temperatures.

Environment and Test: Meets SAE J1810 standards.

Ranges

PRESSURE	80 psi	(552 kPa)	[5.52 bar]
	100 psi	(689 kPa)	[6.89 bar]
	200 psi	(1.38 MPa)	[13.80 bar]
	300 psi	(2.07 MPa)	[20.70 bar]
	400 psi	(2.76 MPa)	[27.60 bar]

TEMPERATURE	250°F	(121°C)
	300°F	(149°C)

FUEL LEVEL	Empty — 1/4 — 1/2 — 3/4 — Full
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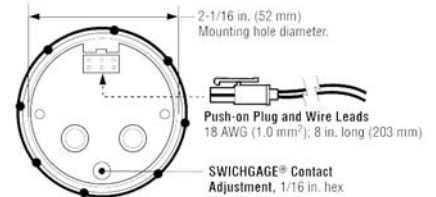
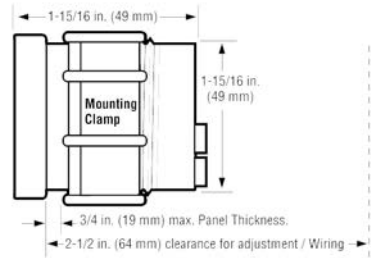
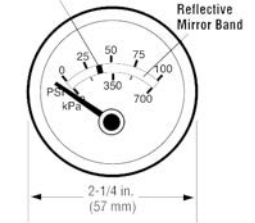
AMMETER	60 — 0 — 60 amps (internal shunt)*
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VOLTMETER	12 VDC: 8 — 18 Volts
	24 VDC: 16 — 36 Volts



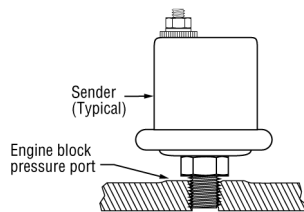
IMPORTANT: EG21 Series gage and EGS21 Series Switchgage Movement and Illumination require 12 VDC to function. For 24 volts systems, voltage converters are built into the electrical wire / connector assembly and supplied with the instrument. Specify voltage when ordering.

SWICHGAGE® Adjustable Contact Indicator



Electric Gage Senders

Pressure



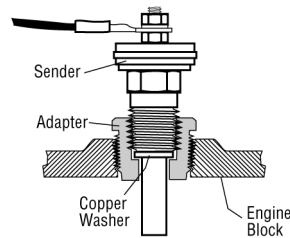
- **ESP:** 1-wire-to-ground sender *
- **ES2P:** 2-wire ungrounded sender *
- **ESDP:** 2-wire ungrounded sender, drives 2 gages *
- **ESPM:** 1-wire-to-ground sender † ‡
- **ES2PM:** 2-wire ungrounded sender † ‡

* Thru 100 psi (689 kPa) [6.89 bar].

† Ranges above 100 psi (689 kPa) [6.89 bar].

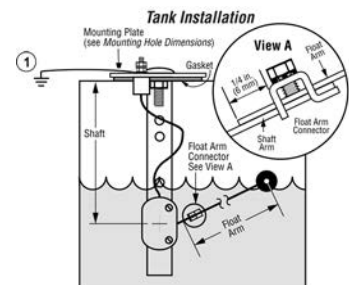
‡ Mounting off-equipment recommended.

Temperature



- **EST:** 1-wire-to-ground sender
- **ES2T:** 2-wire ungrounded sender
- **ESDT:** 2-wire ungrounded sender, drives 2 gages.

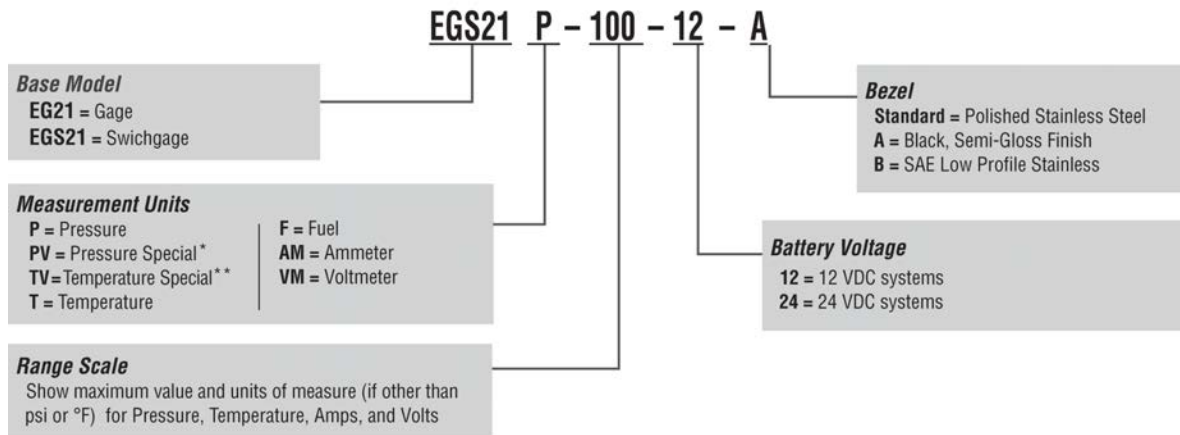
Fuel



- **ESF:** 1-wire-to-ground sender
- **ES2F:** 2-wire ungrounded sender
- **ESDF:** 2-wire ungrounded sender, drives 2 gages.

How to Order

EG Series Gage and Switchgage Instrument

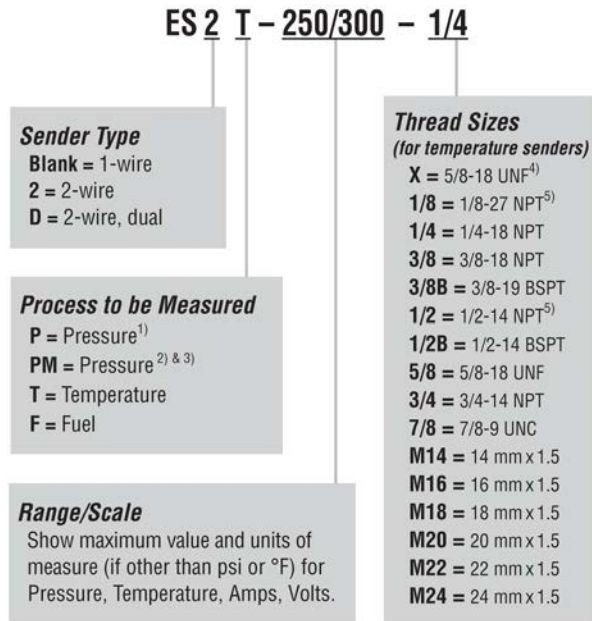


NOTE: EG21 and EGS21 Series are designed for use with 12 volt systems. For 24 volt systems, voltage reducing resistors are included in the wire/connector assembly. No designator required for **Standard** configurations.

*The **EG21PV-80-12 or 24** is designed to read senders with a resistance curve of 9.5 to 182Ω, which are commonly supplied as standard senders on Deutz and VW Engines.

The **EG21TV-300-12 or 24 is designed to read senders with a resistance curve of 240 to 18Ω, which are commonly supplied as standard senders on Deutz and VW Engines.

EG Series Senders



Accessories and Replacement Parts

Off-Equipment Mounting Kit

This kit allows off-equipment mounting of the ESPM, ES2PM and ESDPM pressure senders. Recommended for protection from damaging vibration. Customer supplies hose and fittings. **Specify part number 30-00-0213 when ordering.**

Wire/Connector Assembly

Listed below are replacement part numbers for all wire/connector assemblies.

Voltage converter included for 24 volt. **Specify part number when ordering.**

	12 VDC	24 VDC
EG21P / T / F	05004506	05006166 (05004546) ⁶⁾
EGS21P / T / F	05004507	05006168 (05004548) ⁶⁾
EG21AM	05004505	05006170 (05004550) ⁶⁾
EGS21AM	05004504	05006172 (05004552) ⁸⁾
EG21VM	05004508	05004508
EGS21VM	05004504	05004504

1) Thru 100 psi (689 kPa) [6.89 bar].

2) Ranges above 100 psi (689 kPa) [6.89 bar].

3) Mounting off-equipment recommended.

4) Straight threads, for use with adapter nut.

5) Separate adapter nut not required.

6) For gages with date code R1 (January 1996) or earlier (Q12, Q11, etc.) specify part number shown in parenthesis.

Four-Function Tattletale® Annunciator - EN204 Series



Features

- Designed for Use with Electric Switchgauge Instruments or Normally Open, Close to Negative Contacts
- LED Annunciation for Low Oil Pressure, High Water Temperature, Loss of Battery Voltage, and Low Fuel Level or Glow Plug.
- Output May be Used for Tripping an Electromagnetic Control Switch for Engine Shutdown
- Developed with the Same Leading Edge Technology as our EGS Series Electric Switchgauge.

Electric Switchgauge Instrument

The **EN204 Series Tattletale Annunciator** works with other engine components to clearly indicate critical engine operating conditions. The four bright LEDs on the face of the annunciator indicate the cause of an alarm or shutdown condition.

Two EN204 models are available. Each shows the standard critical engine operating parameters—oil pressure, coolant temperature, and battery voltage. Model EN204-S-12 also includes an indicator for low fuel level. Model EN204-SG-12 substitutes the fuel level indicator with a glow plug indicator for those engines that use a glow plug for easier starting.

The EN204 Annunciators are used in conjunction with Murphy Electric Switchgauge instrument or other normally open switches that close to ground when a fault condition occurs. As an example, in a system with a Murphy EGS21P-100 Oil Pressure Switchgauge instrument, the Switchgauge closes to ground when the oil pressure drops below a pre-determined set point. This will energize the Oil Pressure LED on the EN204 to highlight a low oil pressure failure.

A very important feature of the EN204 is the ability to interface with Murphy 518PH or the 760A Electromagnetic Switches to perform automatic engine shutdown when fault conditions occur. The EN204 can also be used with other Murphy visual and audible alarms (STAS series remote alarm, SAH audible alarm, and the TL7 visual alarm) for remote annunciation and equipment shutdown.

Specifications

Operating Voltage:

12 VDC (10 V min. - 16 V max.).

Current: 0.020 A to 0.025 A per LED.

Output: Sink 0.275 A.

Output Saturation Voltage:

.7-1.1 V @ 25°C.

Case and Screw-on Mounting Clamp:

Polyester (PBT).

Bezel: Bright stainless steel.

Lens: Clear Polycarbonate, UV stabilized.

Dial: Black background and white markings with four (4) Red LED indicators.

Wiring: Plug connector with wire leads, 18 AWG (1.0 mm²) x 8 in. (203 mm) long.

Operating Temperature:

-40 to 185°F (-40 to +85°C).

Storage Temperature:

-76 to 185°F (-60 to 85°C).

Shipping Weight: 0.5 lb. (226 g).

Shipping Dimensions: 8 x 4 x 4-1/2 in. (203 x 102 x 114 mm).

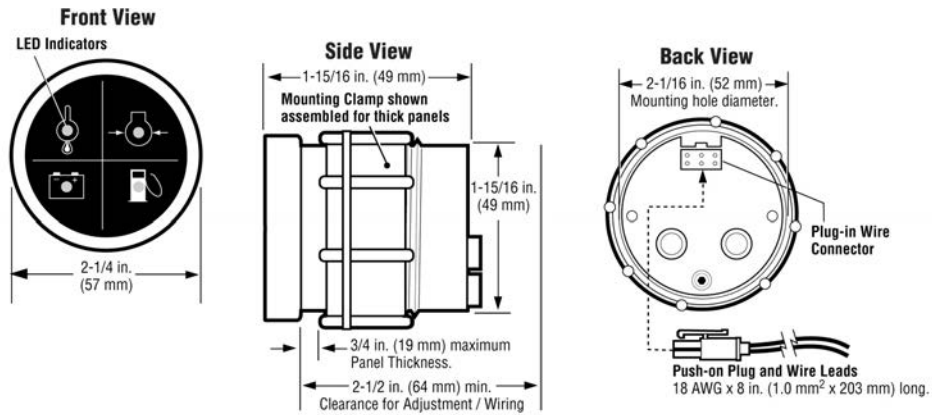
Basic Models

The following two basic models are offered:

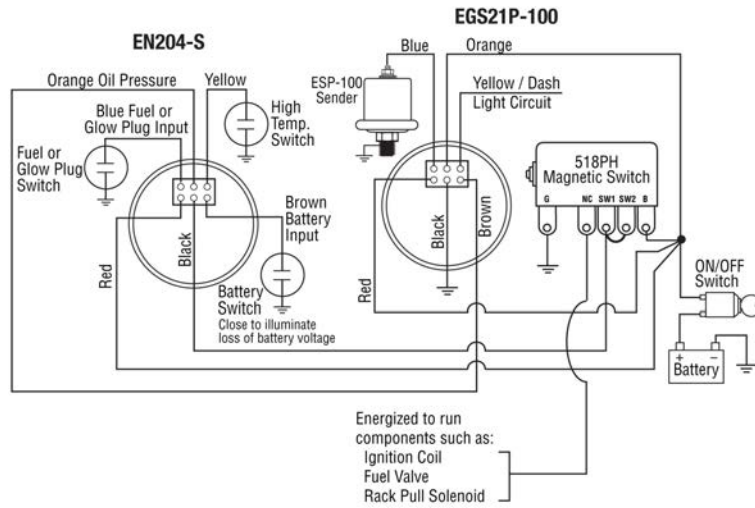
EN204-S-12		EN204-SG-12	
Monitored Functions	Action	Monitored Functions	Action
Oil Pressure	Indicate and Switched	Oil Pressure	Indicate and Switched
Coolant Temperature	Indicate and Switched	Coolant Temperature	Indicate and Switched
Battery Voltage	Indicate	Battery Voltage	Indicate
Fuel Level	Indicate and Switched	Glow Plug Energized	Indicate

The **Switched** functions listed are able to sink a current up to 0.275 amps and may be used to activate the electromechanical control switches or other devices.

Dimensions



EN204-S Typical Wiring Diagram



Note: Use of the **black wire** on the **EN204-S** and the **518PH Magnetic Switch** (as shown in the diagram) is required for engine shutdown.
For LED annunciation only, **black wire** is not used.

How to Order

EN204-S-12 and switch

Four-LED Tattletale annunciator including Fuel Level LED indicator.

EN204-SG-12

Four-LED Tattletale annunciator including Glow Plug LED indicator.

SECTION 75 GEN-SET CONTROLS

Genset Controls

0810288	Keystart 9620 Series – Engine and Generator Controls	279
0810330	CANstart™ 9630 Series – Engine and Generator Controls	281
05195	Auto-Start/Stop Controller – Cascade	283
1211127	EMS-GC10 Genset Controller Unit	285
0910470	Murphy Generator Control Panels (MGC).	287
1311257	Murphy Generator Control Panel Model MGC400	289

Battery Chargers

1010704	Sentinel 150 Series – UL Approved Automatic Battery Chargers.	291
1010705	Sentinel 300P Series – Programmable Switch Mode Battery Chargers	295
1010590	Guardian Battery Chargers	299
1010589	Sentry Battery Chargers	301



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Keystart 9620 Series - Engine and Generator Controls



Features

- Operator controlled start/stop
- Keyswitch operation
- Automatic fault shutdowns and alarm output
- Timed preheat output
- Overspeed shutdown, driven from magnetic pickup or generator AC

Keystart 9620 and 9621 control modules provide manual start/stop and automatic fault protection for generators, pumps and other engine-driven applications.

Operator control is by a 4 position keyswitch, with the key removable only in the Stop/Reset (O) position. Outputs allow control of engine fuel (energised to run), starter motor and preheat. The Keystart also has an alarm output for remote or audible warning of faults.

Indication of engine status and faults is by six LEDs and icons. Four switch inputs (closing to negative on fault) enable automatic shutdown on engine low oil pressure, high coolant temperature and auxiliary faults. Model 9621 has a fully adjustable engine overspeed shutdown feature, configurable for either generator AC or magnetic pickup speed signals. Charge alternator excitation and a charge fail warning LED are fitted as standard.

Electrical connection is by quick-connect, spring-clamp terminal blocks. A universal 7 to 30VDC power supply permits operation with 12 or 24VDC engine batteries, with engine crank-dip voltage protection fitted as standard.

Keystarts are front-of-panel mounted through a standard square cut-out, and secured at the rear with quick-fit clips. Epoxy-resin case encapsulation gives superior vibration/shock resistance and environmental protection.

Specifications

Power supply

Operating voltage, steady state: 7 to 30 VDC
Operating voltage, brown out / cranking: 5 VDC minimum
Current consumption: < 100mA

Inputs

Fault switch inputs: close to negative DC during fault
Generator AC input (model 9621 only):
70 – 270 VAC rms, <50 to >60 Hz nominal
Magnetic pickup input (model 9621 only):
3.5 – 21 VAC rms, <2000 to >6500 Hz nominal

Outputs (all ratings non-reactive)

Run (fuel): positive DC, NO relay contacts, 10A max @ 24VDC
Start (crank): positive DC, keyswitch contacts, 10A max @ 24VDC
Alarm: negative DC (open collector transistor), 300mA max
Speed calibration: to suit 0 – 1mA, 75 Ohm meter,
output = 0.75mA at rated engine speed

Adjustable settings

Preheat timer: 0 or 10 secs (links J1 and J4), default = 0 secs
Fault override timer: 2 to 20 secs (VR1), default = 10 secs
Overspeed trip level (model 9621 only): 100 to 130% (VR3) of nominal calibrated speed, default = 110% (of 50 or 60 Hz)


Physical

Case material: polycarbonate / polyester
Overall dimensions (w x h x d): 96 x 96x 95mm / 3.8 x 3.8 x 3.7 in.
Panel cut-out size: DIN 92 x 92mm / 3.6 x 3.6 in.
Weight: approx 300g / 0.7 lb
Operating temperature: –35 to +55 °C / –31 to +131 °F

Front view and operation

LED indication:-

- run (fuel) on - green
- preheat on - amber
- low oil pressure fault shutdown - red
- high engine temperature fault shutdown - red
- overspeed/aux 2 fault shutdown - red
- charge fail warning - red
- aux 1 fault shutdown - red



4 position keyswitch:

- Off/Reset.** Removes power, stops the engine and resets any latched shutdown fault.
- Run.** Activates the Run output and (if enabled) the timed Preheat output. Once the engine is fully running, and after the 'override' time, Keystart immediately shuts down the engine on detection of a fault.
- Start/crank.** Maintains the Run output, and activates the Start (crank) output. Shutdown fault inputs are disabled and the fault override timer is reset. This position spring-returns to I (Run) on release.
- Auxiliary.** Keyswitch auxiliary output, positive DC.

How to order

Model:

KEY9620 Without overspeed protection

KEY9621 With overspeed protection, selectable AC generator or magnetic pickup sensing *

Keyswitch type:

K2 Type 2, rubberised

KEY9620

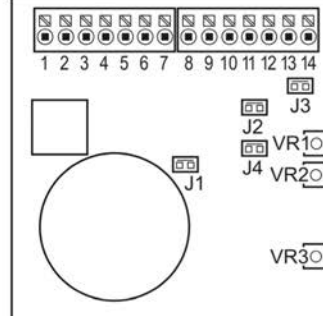
K2

* factory default setting is for AC generator sensing, calibrated to either 50 or 60 Hz nominal. Non-standard (NS) settings/options are available to order.

Accessories/spares

Stock code	Description
41.70.0157	Spare mounting clips (pack of 4)
65.70.0256	Spare keyswitch (K2 type), includes key
00.00.3235	Spare key (K2 type)

Rear view, connection & settings



Connection:-

- 1 run (fuel) output: +DC, 10A
- 2 preheat output: +DC, 10A
- 3 start (crank) output: +DC, 10A
- 4 + DC power supply
- 5 charge fail (VWL)
- 6 oil pressure fault input
- 7 aux. 1 fault input
- 8 engine temp fault input
- 9 aux. 2 fault input
- 10 alarm output: -DC, 250mA
- 11 speed calibration output
- 12 - DC power supply

Speed input, model 9621 only:

links J2 and J3 ON:

13 L Generator AC, 50/60Hz

14 N 70-270 VAC, 50/60Hz

links J2 and J3 OFF:

13 + magnetic pickup,

14 - 3.5-21 VAC, 2000-6500Hz

Configuration:-

Use a 3 mm/0.1 in. flat head screwdriver for potentiometers VR1-VR3

All models:-

J1 & J4: preheat output timing

- J1 ON: no preheat
- J1 OFF, J4 OFF: preheat 10 secs fixed, unaffected by crank
- J1 OFF, J4 ON: preheat 10 second max, cancelled by crank

VR1: Fault override, 2 - 20 secs, clockwise to increase.

Model 9621 only:-

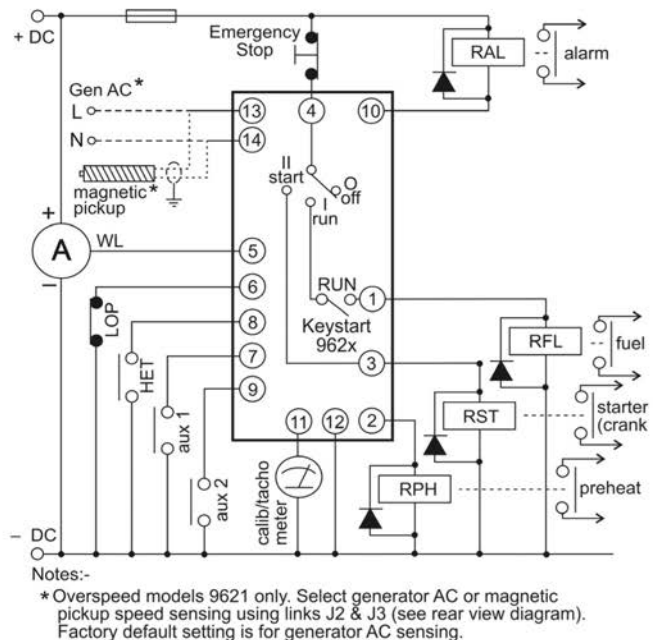
J2 & J3: speed sensing source (pins 13 and 14):-

- both links ON for generator AC, 50/60Hz
- both links OFF for magnetic pickup, 2000 - 6500 Hz.

VR2: Speed calibration. Set J2 and J3 correctly, run engine to nominal speed, adjust VR2 to give (pin 11) calibration output of 0.75mA

VR3: Overspeed, 100 - 130% of VR2 setting, clockwise to increase

Typical connection



CANstart™ 9630 Series Engine and Generator Controls



Features

- Keyswitch start/stop operation
- SAE J1939 CANbus compatible
- Drives electric panel gauges: oil pressure, engine temp, tachometer
- Display of ECU transmitted faults
- Adjustable overspeed shutdown
- Auxiliary fault shutdown inputs

CANstart™ 9631 and 9632 modules provide operator start/stop control, panel gauge driving, fault indication and auxiliary shutdown protection for ECU-controlled, CANbus SAE J1939 compatible engines. These compact controllers can be used with generators, pumps and other engine-driven applications.

Operator control is through a 4 position keyswitch. The key is common to all CANstarts and is removable only in the Stop/Reset (O) position. Six LEDs and icons indicate engine/ECU status and faults. Two of these LEDs, with associated inputs, provide for auxiliary fault shutdown and charge alternator fail/excitation.

CANstart™ has two protected (positive DC) FET outputs for the control of ECU 'engine run' and starter motor. Three additional outputs drive analogue panel gauges (Murphy, VDO or Datcon), based on ECU-transmitted data for engine speed, oil pressure and coolant temperature.

All units include adjustable engine overspeed protection: model 9631 provides automatic overspeed shutdown for variable speed applications; model 9632 is configured for fixed-speed 1500/1800 RPM genset use.

DIP switches at the rear allow setup of control and gauge output options. Electrical connection is by spring-clamp terminals, including a universal 8 to 32 VDC power supply for operation with 12 or 24 VDC engine batteries. Engine cranking supply brown-out protection is fitted as standard.

CANstart™ is front-of-panel mounted through a standard square cut-out, and secured at the rear with quick-fit clips. Epoxy-resin case encapsulation gives superior vibration/shock resistance and environmental protection

Specifications

Power supply

Operating voltage, steady state: 8 to 32 VDC

Operating voltage, brown out / cranking: 5 VDC minimum

Current consumption: < 100mA

Inputs

CANbus:

SAE J1939 protocol, switchable 120 Ohm terminating resistor

Auxiliary shutdown (x2): close to negative DC during fault

Outputs (all ratings non-reactive)

Run (ECU), start (crank):

positive DC (protected FET), 6A max @ 32 VDC

Alarm:

negative DC (open collector transistor), 250mA max @ 32 VDC

Oil pressure gauge:

suitable for Murphy, VDO 5 or 10 Bar, Datcon 7 or 10 Bar

Outputs (cont.)

Engine temperature gauge: suitable for Murphy, VDO or Datcon

Tachometer: for use with charge alternator driven tachometers

Adjustable settings

Model 9631 (variable speed engines)

Overspeed level: 1250 – 2800 RPM (50 RPM increments), or 'off'

Model 9632 (fixed speed engines/gensets)

Nominal speed: 1500 or 1800 RPM

Overspeed level: 1 – 15% of nominal speed (1% increments), or 'off'

Physical

Electromagnetic compatibility: 2004/108/EC

Case material: polycarbonate / polyester

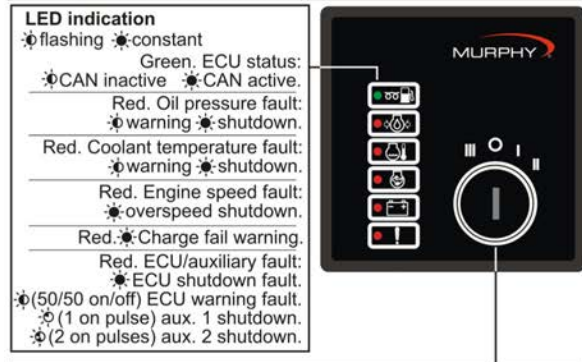
Overall dimensions (w x h x d): 96 x 96 x 131mm / 3.8 x 3.8 x 5.2 in.

Panel cut-out size: DIN 92 x 92mm / 3.6 x 3.6 in.

Weight: approx 240g / 0.6 lb

Operating temperature: –20 to +75 °C / –4 to +167 °F

Front view and operation



How to order

CST9631 K2

Model:

CST9631 For variable speed engines, overspeed setting range 1250-2800 RPM *

CST9632 For fixed speed engines/gensets, overspeed setting range 100-115% of 1500/1800 RPM *

Keyswitch type:

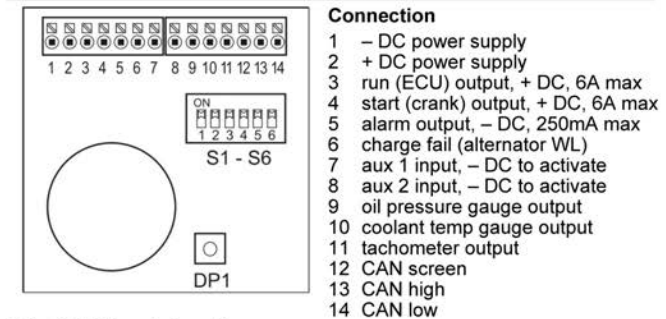
K2 Type 2, rubberised

* Default overspeed settings are:-
 CST9631: 1250 RPM
 CST9632: 110% of 1500 or 1800 RPM (please specify).
 Non-standard (NS) settings/options are available to order.

Accessories

Stock code	Description
41.70.0157	Spare mounting clips (pack of 4)
65.70.0256	Spare keyswitch (K2 type), includes key
00.00.3235	Spare key (K2 type)
Various	EG/EGS series Electric Gage & Switchgage®
Various	ATA/ATHA series tachometers & tachourmeters

Rear view, connection & settings



S1 – S5 DIP switch settings

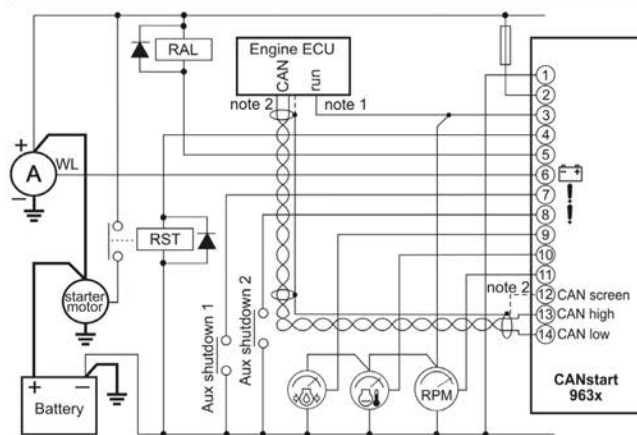
Note: switch S6 reserved for future use.

switch position	on (up)	off (down)	options (* default settings)
S1	▲	▼	Murphy temp. and pressure gauges *
S2	▲	▼	Datcon temp. and 0 – 7 bar pressure gauges
S3	▲	▼	Datcon temp. and 0 – 10 bar pressure
S4	▲	▼	VDO temp. and 0 – 5 bar pressure gauges
S5	▲	▼	VDO temp. and 0 – 10 bar pressure gauges
	▲	▼	CAN 120 Ohm terminating resistor in circuit *
	▲	▼	CAN 120 Ohm terminating resistor removed
	▲	▼	Sets speed nominal or range for DP1 below: see installation instructions for full details.

DP1 digital potentiometer setting (with S5 above)

Overspeed shutdown set point: see installation instructions for details.

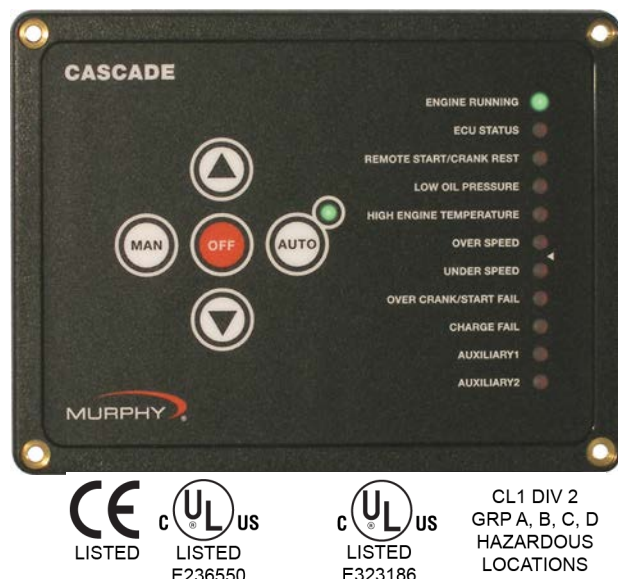
Typical connection



Notes:-

- Wiring shown for ECU with close to positive to run input. An additional interposing fuse or relay may be required between pin 3 and ECU: check engine documentation for ECU 'run' input requirements.
- ECU CANbus screen is typically earthed/grounded at one end only. Check engine & ECU documentation for details

Auto-Start/Stop Controller — Cascade



Features

- Durable Encapsulated Protection Against Dirt, Water, and Dust – Rated NEMA4 and IP65
- Operates During Low Battery Blackouts
- Compatible with Electronic and Mechanical Engines – ECU, MPU, AC Frequency
- J1939 Ready – Works Directly with MurphyLink J1939 PowerView Gages

The Cascade controller offers automatic start and stop control with easy configuration for a broad number of applications.

This auto-start controller is designed to fit any engine-driven application requiring a simple and robust automatic start and stop sequence. Pumps, Compressors, Grinders, Power Units and Generators are just few of the industrial applications for the controller.

The Cascade controller is fully compatible with all major engine types. Whether you are running mechanical or J1939 engines, the controller will work with your application.

Here are some of the unique features of the Cascade that only Murphy can offer at our competitive price.

- **Durability:** Encapsulated to protect it against dirt, water and dust, along with a compression gasket to fully seal it to the panel. Cascade is rated NEMA4 and IP65.
- **Low Battery Blackouts:** Operates in total blackout for a minimum of two seconds.
- **Compatibility:** Accept MPU, AC Frequency and ECU speed signals and can operate with standard and J1939 engines.
- **Inputs and Outputs:** The Cascade Inputs and Outputs are ruggedly protected and fault tolerant.
- **J1939 Ready:** Works directly with Murphy's J1939-ready PowerView gages, just plug and go, no sender is required.
- **CD101 Cascade Configuration Tool:** Allows quick setup and loading of parameters into a Murphy standard Cascade via a PC software tool.

Specifications

Power input: 9-35VDC continuous - operates during total blackout for 2 seconds minimum.

Power consumption: Sleep Mode (Manual): 1mA typical; Sleep Mode (Automatic): 4mA typical. Running Mode (Manual): 20mA typical; Running Mode (Automatic): 24mA typical.

Operating/Storage temperature: -40 to 85°C; (-40 to 185°F).

Humidity: 0-100%, non-condensing.

Housing: UV stabilized black polycarbonate and epoxy encapsulation. Weather tight and includes sealing gasket to keep moisture and debris out of enclosure. Properly mounted controller will maintain NEMA4 / IP65 rating of enclosure.

Vibration: Rated to 6G.

Impact: Rated to 10G.

Inputs: Dedicated digital inputs for low oil pressure, high engine temperature, remote start, DC charge fail/Alternator fail. Two aux inputs are configurable for multiple functions.

Outputs: 7 – 4 auxiliary, configurable (1A DC protected). 3 dedicated outputs for Crank, Fuel/ECU, Alternator excitation.

Crank attempts: 3, 5, 10, Continuous.

Crank Rest: 5-60 seconds, adjustable.

Shutdown lockout time delay: 5, 10, 15, 20, 25, 30 seconds.

Crank disconnect speed setting: Field settable 0-9999 RPM (16-60Hz AC freq input).

Overspeed/underspeed trip point setting: ±5 to 50% of nominal.

Speed sensing inputs: Magnetic pickup (5-120VAC RMS / 0-10 kHz) & AC frequency (30-600VAC RMS / 16-80 Hz).

CANbus interface: Directly reads engine speed, & engine status data* from SAE-J1939 enabled engines.

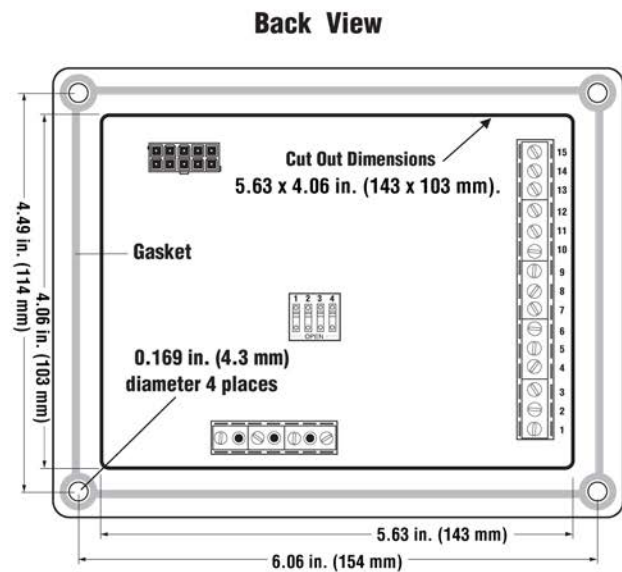
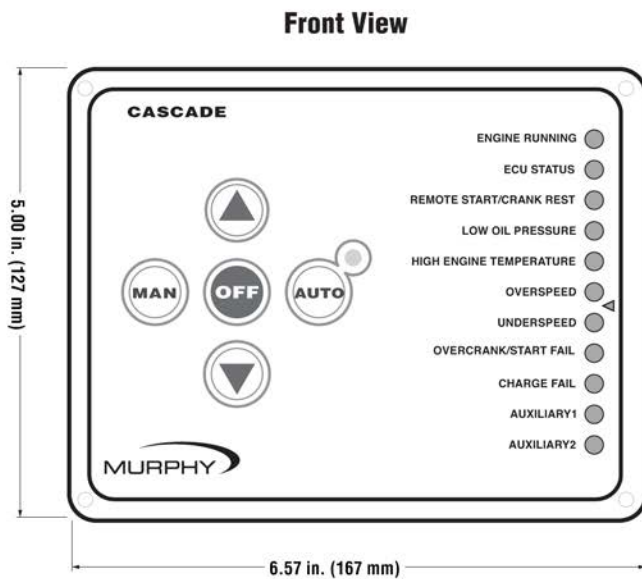
MODbus interface: In J1939 applications drives PVA series analog gages.

*Engine status data limited to low oil pressure, high engine temperature, "Wait to start" status, Warning & Fault lamp information, and communication error.

Cascade Auto-Start Controller Dimensions

Front View

Back View



How to Order

To Order specify: CD101 P/N 40700259

Shipping Weight: 1 lb. (453 g) approximately.

Shipping Dimensions: 5.1 x 6.7 x 1.6 inch (130 x 170 x 41 mm) approx.

Accessories

CD101 Cascade Configuration Kit P/N:40090045

EMS-GC10 Genset Controller Unit



Features

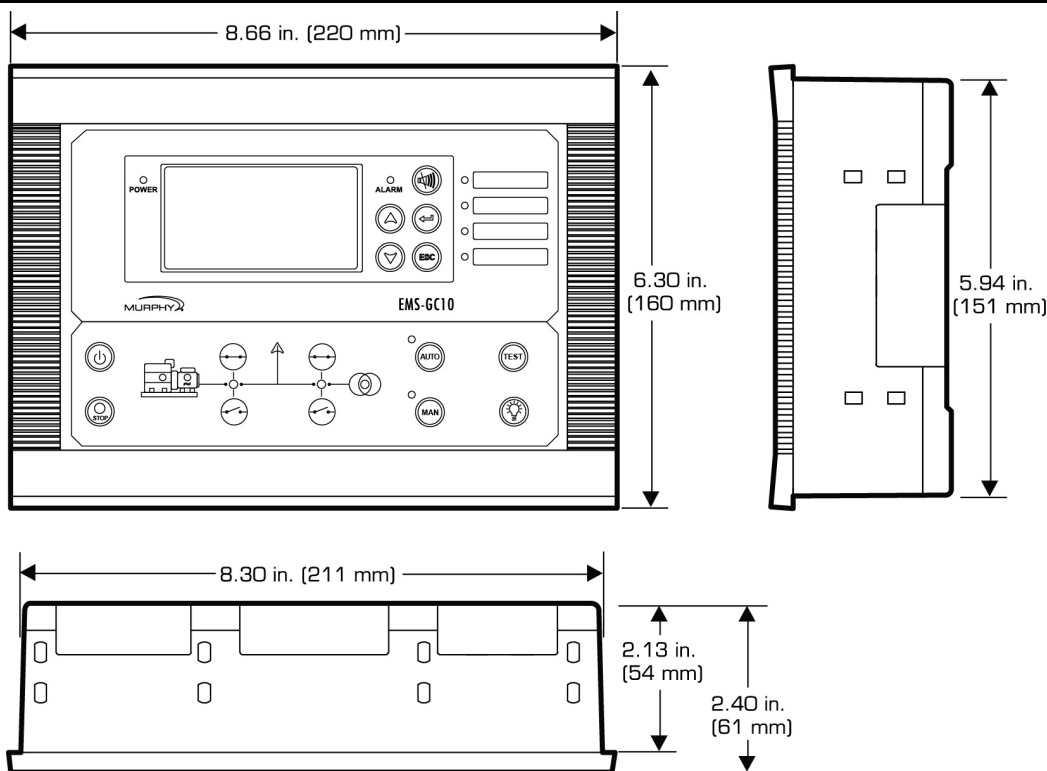
- Controls, Protects, and Monitors Both Engine and Generator
- Compatible with Mechanical and Electronic J1939 Engines
- Supports Automatic Main Failure (AMF) and Generator Breaker Control
- Easy-to-use PC Configuration Tool
- Rugged Design
- Tier 4/ Euro Stage IIIB Ready

The EMS-GC10 Genset Controller provides flexible control and monitoring for industrial genset applications. Typical “generator sets” applications include backup power, power supply for remote locations without a connection to power grid, and mobile power for remote locations. The controller supports programmable logic, up to 40 expressions, and can be configured for specific functions unique to your application. This is accomplished through the M-Logic portion of the Utility Software.

The EMS-GC10 supports Automatic Main Failure (AMF) and generator breaker control.

The EMS-GC10 offers field-adjustable operating parameters that can be changed through the controller or an easy to use PC configuration tool called Utility Software. It is also ideal for use with a remote modem or in a SCADA system offering Modbus RTU protocol on the RS485 port.

Product Dimensions



Specifications

Accuracy: Class 2.0 to EN 60688

Input DC Voltage: 6VDC to 36 VDC

AC Frequency: 30 to 70Hz

Magnetic Pickup Input voltage: 2 to 70V peak, 10 to 10,000Hz

CAN Bus: SAE J1939 Compliant

Analog Inputs: (3) From active transducer: 0(4) to 20 mA, with Resistive-Multi-Inputs (RMI)

Impedance: 50 Ω

Measuring Input Current: 1A or 5A AC from current transformer

Active Digital Input Voltage: (6) Dry Contact inputs (3 VDC Supply with cable supervision)

Resistive Input: Resistor inputs internal 3V supply

Relays: 240 Ω ~ 16mA Impedance:

(3) **Relay:** 30V AC/DC 2A (UL/cUL listed: 30VDC 1A Resistive)

(2) **Relay:** 250VAC/30VDC 2A (UL/cUL listed 30VDC 2A Resistive)

(2) **Relay:** 30V AC/DC 8A (UL-cUL listed: 30VDC 6A Resistive), Status relay/config: 24VDC 1A resistive

Display Interface: 128 x 64 pixel backlight STN, 5 line

Shipping Weight: 0.9 kg (1.9 lbs) Maximum

Shipping Dimensions: 160 x 220 mm (6.30" x 8.66")

CONNECTORS

AC voltage/current inputs: 3.5 mm² (4 AWG) multi-stranded

Other: 1.5 mm² (16 AWG) multi-stranded

ENVIRONMENTAL SPECS:

Generator Operating Voltage: 50 to 480V AC (+20%) phase-phase (UL/C-UL 300VAC maximum)

Operating Temperature: -20°C to 70°C (-4°F to 158°F)

Storage Temperature: -40°C to 70°C (-40°F to 158°F)

Environmental Sealing:

Front: IP65/NEMA type 1 (with gasket)

Terminals: IP20/NEMA type 1
To IEC/EN 60529

Relative Humidity:

97% RH to IEC 60068-2-30, test Db

-20°C to IEC 60068-2-1

+70°C to IEC 60068-2-2

How To Order

Part Number	Description
75700622	EMS-GC10 Controller
75333620	EMS-GC10 PC Configuration Tool (free download from Murphy website)
75000277	EMS-GC10 PC Cable Interface USB-TTL
To order from website go to: http://www.fwmurphy.com/emsgc10	

Murphy Generator Control Panels



Features

- Full Compliment of Options
- High Quality Construction and Components
- Standard Panels Shipped in 2 Weeks or Less
- Competitive Pricing

Our **Murphy Generator Control** line features standard panels for all levels of use, from basic manual start to full-featured auto-start. Each standard panel is designed for maximum flexibility, allowing you to customize the instrumentation to fit your specific application. You get plenty of options, but with the short delivery time of a pre-engineered panel.

MGC50



MANUAL START

- Start method (select one)
 - Key start module with first out annunciation (removes power switch)
 - Key switch & 518 Tattletale
 - Key switch with pre-heat & 518 Tattletale
 - Push button & 518 Tattletale
- Voltmeter
- Hourmeter
- Small enclosure

OPTIONS

- Relay for alarm outputs
- Note:** Minimal options available due to enclosure space constraints, consult IPD for availability

MGC100



AUTO START

- Cascade controller
- Gages for oil pressure and water temperature (mechanical or electric), compatible with Murphy or VDO senders
- AC metering – volts, amps, hertz
- Phase selector switch (3 phase)
- Hourmeter
- Power on-off switch (toggle)

MANUAL START

- Start method (select one)
 - Key start module with first out annunciation (removes power switch)
 - Key switch & 518 Tattletale
 - Key switch w/pre-heat & 518 Tattletale
 - Push button & 518 Tattletale
- Gages for oil pressure and water temperature (mechanical or electric), compatible with Murphy or VDO senders
- AC metering – volts, amps, hertz
- Phase selector switch (3 phase)
- Hourmeter
- Power on-off switch (toggle)

OPTIONS

- DC voltmeter
- Relays for alarm outputs
- NEMA 4 enclosure
- Electric senders – 100 PSI & 250°F 1/2 inch port
- Electric senders – 100 PSI & 320°F M14 port (Deutz engines)
- Quick disconnect and wiring harness
- Energized to stop (auto start only)
- E-stop (mushroom style)
- Phase selector switch (single phase applications)
- Current transformers

MGC150



AUTO START

- Cascade controller
- Quick disconnect (MEH harness required)
- AC metering – volts, amps, hertz
- Phase selector switch (3 phase)
- Hourmeter
- Power on-off switch (toggle)

MANUAL START

- Start method (select one)
 - Key switch & 518 Tattletale
 - Key switch w/pre-heat & 518 Tattletale
 - Push button & 518 Tattletale
- PowerView
- Quick disconnect (MEH harness required)
- AC metering – volts, amps, hertz
- Phase selector switch (3 phase)
- Hourmeter

OPTIONS

- PowerView
- MEH wiring harness
- Relays for alarm outputs
- NEMA 4 enclosure
- E-stop (mushroom style)
- Phase selector switch (single phase applications)
- Current transformers

* Some panels shown with optional equipment installed. All models include fuses, fuse block and wiring.

MGC25



AC METER MODULE

- AC metering
 - Volts
 - Amps
 - Hertz
- Phase selector switch
- Hourmeter
- Compact enclosure – horizontal style
- Optional current transformers

Murphy Generator Control Panel Model MGC400



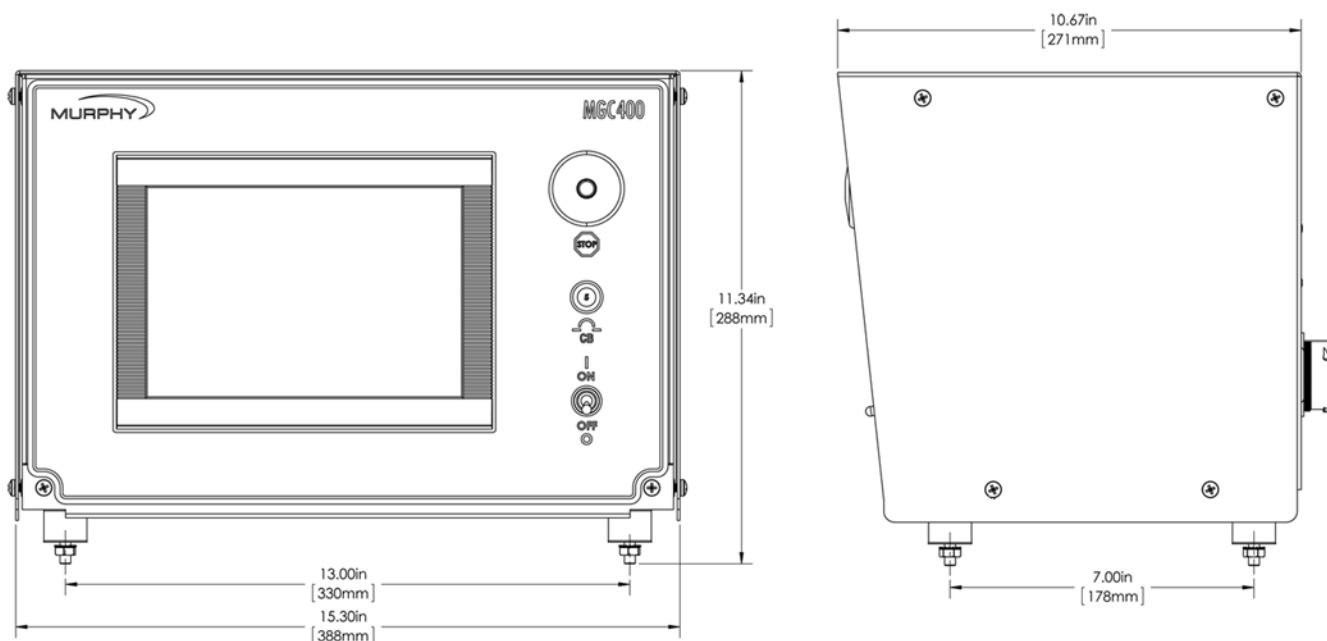
Features

- Rugged and Reliable Panel for Prime Mover, Backup and Standby Power Applications
- Supports Gensets Ranging from 50 kw up to MW sized
- Works with Mechanical and Electronic J1939 Engines
- Controls, Monitors and Protects both the Engine and Generator
- Tier 4/Euro Stage IIIB Ready
- Easy-to-use PC Configuration Tool

The MGC400 is a flexible genset control panel that provides powerful control and monitoring for industrial genset applications. The panel integrates Murphy's robust EMS-GC10 genset controller in a NEMA1 Type 2 enclosure with rubber shock mounts, an ON/OFF switch, circuit breaker, emergency stop, and engine harness connector. The engine harness connector is compatible with Murphy's broad line of MIH harnesses covering a wide range of electronic and mechanical engines. Current transformers are also available through our Industrial Panel Division.

The EMS-GC10 Genset Controller unit delivers field-adjustable operating parameters but may require further configuration using the utility software. The MGC400 panel is a complete generator monitoring, controlling and protection solution with Murphy standard configuration. Custom software configurations for variable engines types and models are also available. The panel is also ideal for use with a remote modem or a SCADA system via Modbus RTU protocol over RS485. Advanced local logic capabilities are provided by a programmable logic tool (M-logic) built into the PC configuration tool of the controller unit. This allows for custom use of the digital I/O and predefining conditions for new functions.

Product Dimensions



Specifications

Technical Specifications

- **3 Phase Generator Monitoring for:** Voltage, Current, Frequency, Power, Reactive Power
- **Generator Protection:**
 - Over/Under Voltage (ANSI Code No. 59/27)
 - Over/Under Frequency (ANSI Code No. 81)
 - Overcurrent (ANSI Code No. 51)
 - Reverse/Overload Power (ANSI Code No. 32)
 - Voltage Unbalanced (ANSI Code No. 60)
- **EMS-GC10 AC Input Voltage:** 50 VAC up to 480 VAC (+20%) phase-to-phase (UL/cUL listed to 300 VAC maximum)
- **Measuring Operating Current:** 1A or 5A AC (from a current transformer)
- **Display:** 128 x 64 pixel backlit STN monochrome LCD, 5 lines; capable for graphics, symbols and text
- **Real Time Clock:** For date and time
- **Enclosure:** Powdercoated Cold Rolled Steel
- **Mounts:** 4 Rubber Isolation Shock Mounts

- **Engine Harness Connector:** 21 pin, Deutsch HDP24-24-21PE

Environmental Specifications

- **Operating DC Voltage:** 6 to 36V continuous
- **Operating Temperature:**
-20°C to 70°C (-4°F to 158°F)
- **Storage Temperature:**
-40°C to 85°C (-40°F to 185°F)
- **Relative Humidity:** 97% RH in accordance with IEC 60068-2-30, test Db
- **Enclosure Sealing:** NEMA1 Type 2

NOTE: The EMS-GC10 has IP65 protection when it is mounted or sealed to the panel using a gasket around the back side of the unit.

Physical Specifications

- **Dimensions:** 15.30 in x 11.34 in x 10.67 in (388.5 mm x 288 mm x 271.1 mm)
- **Weight:** 18 lb. (8.16 kg)

How To Order

Part Number	Description
75700621	MGC400
Additional Information	
To order from website go to: http://www.fwmurphy.com	
Details about Murphy Industrial Harnesses (MIH) solutions can be viewed through this link: http://www.fwmurphy.com/products/panels/mih	
Please contact our Industrial Panels Division for more information about supplying current transformers.	

Sentinel 150 Series - UL Approved* Automatic Battery Chargers




ESNTL150 enclosed

SNTL150 open frame



* UL tested (listed or recognised) to:
UL1236 – Battery chargers for charging engine-starting batteries, and
CSA22.2 No. 107.2 – Battery chargers. See specifications for details.

Features

- Switch mode power supply technology: light and compact, power efficient with low heat dissipation
- High rate, low ripple float charging: 5 or 10A @ 12 VDC, 5A @ 24 VDC
- AutoBoost and temperature compensation
- For stationary engine, genset and standby power applications
-  ^{*} /  ^{*} and  compliant
- NFPA model with alarms for AC failure, charge fail, high battery volts, low battery volts

The Sentinel 150 line provides high performance battery charging for continuous float charge and standby power applications. Switch mode technology provides major advances in power supply and battery charger design, giving a compact and lightweight construction, improved power efficiency and low heat dissipation, wide supply voltage tolerance and low output ripple.

The chargers are configured for fast, accurate charging, to give optimum battery life and reliability. The very smooth output (< 1% ripple) allows charging of sealed or vented batteries – e.g. Nickel Cadmium (NiCd), Lead Acid sealed (VRLA), vented and Planté cells – or use as a stand-alone power supply. Factory calibration is optimized for each specific battery type.

All models features an intelligent, multi-stage charge regime: during charge recovery mode, the Sentinel gives a constant (maximum) current output; as the battery approaches peak charge, the output reverts to float charge mode, maintaining an optimum cell voltage and supplying additional standing load current up to the rated maximum. Output current is always limited to the rated maximum, even during high load (e.g. engine cranking), short-circuit or reverse polarity connection.

AutoBoost

AutoBoost provides a temporary increase in output voltage, equalising the charge between cells and maximising battery life and capacity. AutoBoost is triggered automatically when the battery falls below a preset voltage, or can be initiated manually through a momentary switch input. At the end of the AutoBoost cycle, Sentinel automatically reverts to normal float charge mode, preventing battery over-charge and gassing.

Alarm outputs

Sentinel UL150 models include a self-diagnostic circuit for monitoring charge fail fault conditions (AC supply/fuse failure, DC fuse failure or low/no charge current), with a solid-state relay output for driving a remote alarm or fault annunciator. Enclosed NFPA models have NFPA 110 compliant alarms for AC failure, charge fail, high battery volts and low battery volts.

Temperature compensation

The optimum charge voltage for lead acid and NiCd batteries varies with ambient temperature. Sentinel can be configured to sense battery temperature from a remote sensor and automatically compensate the output charge voltage.

Installation and connection

UL-recognized SNTLUL150 model use an open-frame circuit board and base/heatsink with protective cover, for surface or DIN rail mounting in an existing control panel. UL-listed ESNTLUL150 models use a stainless-steel, wall-mounted case.

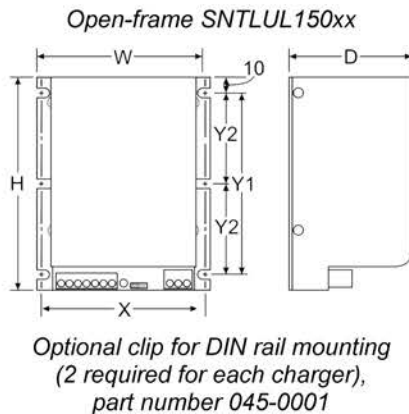
Electrical connection is by screw-terminal blocks. Connection and cable access on ESNTL models is by a hinged front plate and knock-out sections in the enclosure side.

Output calibration

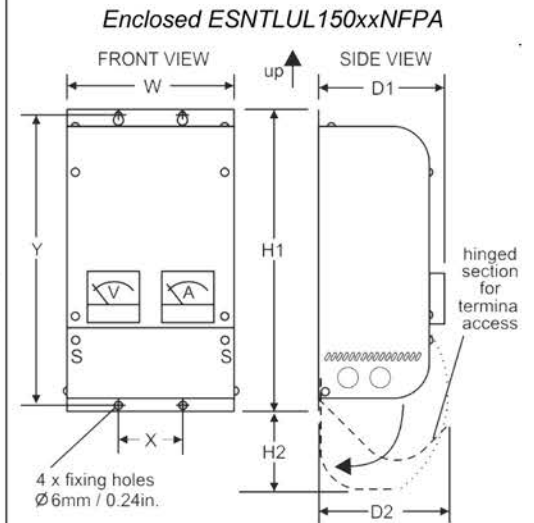
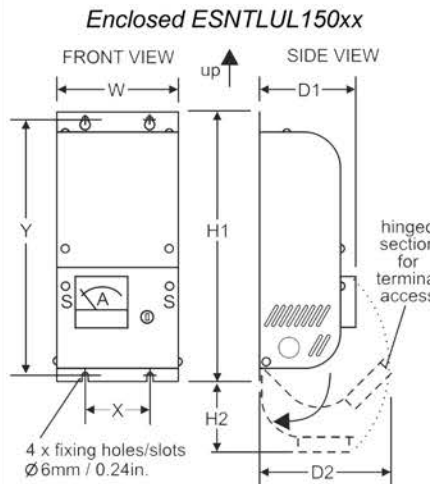
Calibration figures shown are at 20 deg C. If temperature compensation is enabled, and remote SNTL-RTC temperature sensor connected, output voltage automatically varies by 3mV per cell per 1°C deviation from 20°C, within the range -10 to +50°C. Increasing temperatures give decreasing outputs; decreasing temperatures give increasing outputs.

Battery type		float volts (V DC)	boost volts (V DC)
12V	Vented lead acid (6 cells)	13.5	14.1
	Calcium-Calcium (6 cells)	13.8	15.6
	VRLA, AGM (6 cells)	13.5	14.4
	VRLA, Gel (6 cells)	13.5	13.8
	NiCd (10 cells)	14.1	14.5
24V	Vented Lead acid (12 cells)	27.0	28.2
	Calcium-Calcium (12 cells)	27.6	31.2
	VRLA, AGM (12 cells)	27.0	28.8
	VRLA, Gel (12 cells)	27.0	27.6
	NiCd (18 cells)	25.6	26.1
	NiCd (20 cells)	28.2	29.0

Dimensions








SNTL150 models	
Overall:	
W	4.33 in. / 110 mm
H	5.31 in. / 135 mm
D	3.07 in. / 78 mm
Fixing holes:	
X	3.94 in. / 100 mm
Y1	4.53 in. / 115 mm
Y2	2.26 in. / 57.5 mm
Weight:	1.2 lb. / 0.55 kg



ESNTLUL150xx models		ESNTLUL150xxNFPA models
Overall:		
W	4.72 in. / 120 mm	6.50 in. / 165 mm
H1	10.51 in. / 267 mm	11.81 in. / 300 mm
H2	2.76 in. / 70 mm	3.15 in. / 80 mm
D1	3.74 in. / 95 mm	4.92 in. / 125 mm
D2	5.12 in. / 130 mm	
Fixing holes:		
X	2.50 in. / 63.5 mm	
Y	10.04 in. / 255 mm	11.25 in. / 285.5 mm
Weight:		
	2.8 lb. / 1.25 kg	4.4 lb. / 2.0 kg

Dimensions for reference only. Use actual product for mounting template. For safe heat dissipation, mount product in orientation shown, with minimum air-gap clearance of 40mm / 1.5 in. above/below and 25mm / 1.0 in. at each side.

How to order

	Stock code	Model	Description
 	42.70.3600	SNTLUL1501205CDLA	Open-frame (protective cover) Sentinel UL150, 5A/12V vented lead acid output, 110/120/220/240VAC (50Hz/60Hz) input
	42.70.3601	SNTLUL1502405CDLA	Open-frame (protective cover) Sentinel UL150, 5A/24V vented lead acid output, 110/120/220/240VAC (50Hz/60Hz) input
	42.70.3602	SNTLUL1501210CDLA	Open-frame (protective cover) Sentinel UL150, 10A/12V vented lead acid output, 110/120/220/240VAC (50Hz/60Hz) input
 	42.70.3603	ESNTLUL1501205CDLA	Enclosed Sentinel UL150, 5A/12V vented lead acid output, 110/120/220/240VAC (50Hz/60Hz) input
	42.70.3604	ESNTLUL1502405CDLA	Enclosed Sentinel UL150, 5A/24V vented lead acid output, 110/120/220/240VAC (50Hz/60Hz) input
	42.70.3605	ESNTLUL1501210CDLA	Enclosed Sentinel UL150, 10A/12V vented lead acid output, 110/120/220/240VAC (50Hz/60Hz) input
  NFPA110	42.70.3650	ESNTLUL1501210CDLANFPA	Enclosed Sentinel UL150 (NFPA 110 compliant alarm outputs and metering), 10A/12V vented lead acid output, 110/120/220/240VAC (50Hz/60Hz) input
	42.70.3619	SNTL-RTC	Remote temperature sensor with 9.8 feet / 3.0 meter lead assembly, for automatic charge output temperature compensation.

For sealed lead-acid (VRLA, AGM, Gel or Calcium) and NiCd batteries, please consult your Murphy representative.

Sentinel 300P Series - Programmable Switch Mode Battery Chargers



Features

- Microprocessor controlled, programmable battery charger
- High rate, low ripple float charging: 10A @ 12/24 VDC
- AutoBoost and temperature compensation
- Options for RS485/CAN connectivity, backlit display and analog meters
- Panel mount module or wall mounted, stainless steel enclosure
- For stationary engine, genset and standby power applications

-  /  ,  and NFPA 110 compliant

* Tested and approved by UL to:
UL1236 – Battery chargers for charging engine-starting batteries, and
CSA22.2 No. 107.2 – Battery chargers

Sentinel 300P battery chargers provide new levels of DC power control, monitoring and protection for stationary engine starting and standby battery applications.

Advanced Sentinel charging features included as standard:

- **Switch mode charging technology:** high power efficiency and low heat dissipation, plus wide supply voltage tolerance, in a compact and lightweight package.
- **Multistage charging:** float, bulk, absorption and AutoBoost stages ensure no compromise between rapid charge recovery and long term battery capacity and life.
- **Low output ripple:** <1% ripple, beneficial for vented lead acid & NiCd cells, essential for VRLA, and configurable for use as a stand-alone DC power supply.
- **AutoBoost:** triggered automatically on low charge levels, or manually by remote switch, AutoBoost temporarily increases the charge voltage before returning to float mode. Equalizing battery cell charge without overcharge and gassing, AutoBoost maximizes cell capacity and life.
- **Temperature compensation:** ensures batteries are charged at the optimal voltage, which varies significantly with ambient temperature. Sentinel can measure temperature with a battery mounted sensor, and adjusts output voltage to prevent under or over charging.

In addition, the Sentinel 300P includes:

- **Flexible configuration:** microprocessor programmability for automatic or manual configuration of charge output voltages (12 or 24V nominal), cell types/numbers and application – all in one standard model. Programming is by circuit board links or PC-based software configuration and monitoring tool.
- **Inputs & outputs:** for remote charger control, and signalling of charge fail, high/low battery volts and mains fail faults. Standard output functions are NFPA 110 compliant. Non-standard input/output functions available to special order.
- **Display, instrumentation and communication:** options for backlit LCD readout, analogue metering, plus RS485 and CAN 2.0B / SAE J1939 data communication, configuration and control.

The Sentinel 300P is available either as an open-frame, UL-recognized module for mounting in existing control panels, or as a UL-listed, wall-mounted stainless steel enclosure with LCD and analogue metering options.

Electrical connection is by screw terminal blocks. On enclosed models, wiring harness access is by knock-out cable gland holes in the case side.

Output calibration

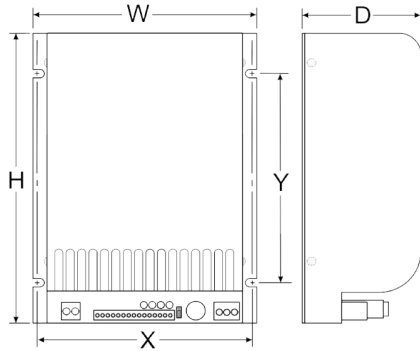
Battery type is selected by circuit board DIP switches or SNTL-PCSUITE configuration software.

Calibration figures at 20 deg C. If temperature compensation is enabled, and remote SNTL-RTC temperature sensor connected, output voltage automatically varies by 3mV per cell per 1°C deviation from 20°C, within the range -10 to +50°C. Increasing temperatures give decreasing outputs; decreasing temperatures give increasing outputs.

Battery type		float volts (V DC)	boost volts (V DC)
12V	Wet (vented) lead acid, 6 cells	13.5	14.1
	Calcium-Calcium, 6 cells	13.8	15.6
	Lead acid Antimony, 6 cells	13.5	14.7
	VRLA, AGM, 6 cells	13.5	14.4
	VRLA, Gel, 6 cells	13.5	13.8
	NiCd, 10 cells	14.1	14.5
24V	Wet (vented) lead acid, 12 cells	27.0	28.2
	Calcium-Calcium, 12 cells	27.6	31.2
	Lead acid Antimony, 12 cells	27.0	29.4
	VRLA, AGM, 12 cells	27.0	28.8
	VRLA, Gel, 12 cells	27.0	27.6
	NiCd, 18 cells	25.6	26.1
	NiCd, 20 cells	28.2	29.0

Dimensions

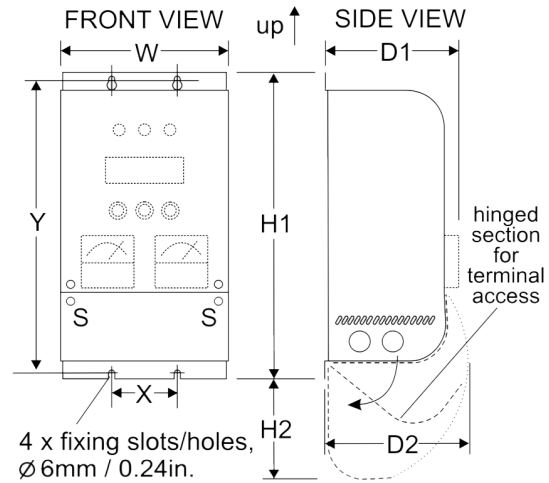
Open-frame SNTL300P



Optional clip for DIN rail mounting
(2 required for each charger),
part number 045-0001

Overall:	
W	6.22 in. / 158 mm
H	8.19 in. / 208 mm
D	3.31 in. / 84 mm
Fixing holes:	
X	5.91 in. / 150 mm
Y	5.91 in. / 150 mm
Weight:	
2.5 lb. / 1.1 kg	

Enclosed ESNTL300P



4 x fixing slots/holes,
ø6mm / 0.24in.

Overall:	
W	6.50 in. / 165 mm
H1	11.81 in. / 300 mm
H2	3.15 in. / 80 mm
D1	4.92 in. / 125 mm
D2	5.12 in. / 130 mm
Fixing holes:	
X	2.50 in. / 63.5 mm
Y	11.25 in. / 285.5 mm
Weight:	
4.4 – 4.6 lb. / 2.0 – 2.1 kg	

Dimensions for reference only. Use actual product for mounting template. For safe heat dissipation, mount product in orientation shown, with minimum air-gap clearance of 1.5 in./40mm above/below and 1.0 in./25mm at each side.

How to order

	Stock code	Model	Description
 	42.70.3850	SNTL300P	Open-frame (protective cover) Sentinel 300P Input supply 110/120/220/240VAC (50Hz/60Hz) Output 10A @ 12/24V
	42.70.3852	SNTL300PC	As above, plus CAN/J1939 communication.
 	42.70.3879	ESNTL300PM	Enclosed Sentinel 300P Input supply 110/120/220/240VAC (50Hz/60Hz) Output 10A @ 12/24V Analog ammeter and voltmeter
 	42.70.3877	ESNTL300PCL	Enclosed Sentinel 300P Input supply 110/120/220/240VAC (50Hz/60Hz) Output 10A @ 12/24V LCD readout, control/program buttons and CAN communications
 	42.70.3875	ESNTL300PCLM	As above, plus analog ammeter and voltmeter.
	42.70.3619	SNTL-RTC	Remote temperature sensor with 9.8 feet / 3.0 meter lead assembly, for automatic charge output temperature compensation.
	42.70.3898	SNTL-PCSUITE	Windows®-based software suite for all (E)SNTL300P models. Request by email with company name, details and valid email address.
	42.70.3899	SNTL-PCCONN	PC connection suite for all (E)SNTL300P models. Includes SNTL-PCSUITE software on CD-ROM, charger RS485 lead (6.5 feet / 2 meter), RS485/USB converter and USB lead (3.2 feet / 1 meter).

Guardian Battery Chargers



Tested and approved by UL to:
UL1236 – Battery chargers for charging engine-starting batteries, and
CSA22.2 No. 107.2 – Battery Charger

Features

- **UL[®] US^{*}** and **CE** compliant
- Heavy duty float charging:
10A @ 12/24 VDC or 20A @ 24 VDC
- Auto boost operation
- Temperature compensation
- NFPA 110 alarm outputs:
charge fail, under volts & over volts
- High quality stainless steel case,
suitable for wall mounting

The Guardian is a highly efficient, high performance battery charger. The output is configured for accurate fast charging, optimum battery life and reliability. High impedance transformer technology gives a low ripple output (<1%) for optimal charging of vented or sealed lead acid or NiCd batteries. The enclosed Guardian range can be used in a wide range of industrial charging applications, including standby engines, pumps and generators.

Each charger consists of a transformer, rectifier and control circuit in a metal wall-mounted enclosure with DC ammeter and voltmeter. The control circuit ensures that the charger maintains the battery voltage at the pre-calibrated float level, while supplying any additional load current up to the specified maximum.

Auto Boost (equalising) operation

Auto boost operation provides a temporary increase in output voltage, equalizing the battery charge between cells and maximizing battery life and capacity. Auto boost is triggered automatically when the battery falls below a preset voltage, and can also be triggered manually by linking two 'boost' terminals, e.g. using a panel switch or push-button. Once the batteries have reached the boost voltage level, Guardian reverts to its normal float charge mode, preventing battery over-charge and gassing.

Temperature compensation

Guardian chargers can be configured (using circuit board links) to give automatic compensation of output voltage with varying temperature, ensuring optimal charging and cell life. Temperature is measured by a circuit board mounted sensor, or RTC option remote sensor complete with 9.5 ft (3m) lead assembly. When temperature compensation is enabled, output voltage decreases as ambient temperature increases at a rate of 1.66mV per °F per cell (3mV per °C per cell) –. see Output Calibration section.

Alarm outputs

The Guardian provides 3 x NFPA110 compliant alarm relay outputs: battery low volts and battery high volts (both with 120 sec delay) and charge fail.

Installation and connection

Wall or surface-mounting is via slots/holes in the stainless steel case. Connection to the wiring harness is by spring clamp terminals, through access holes in the case side. AC supply input and DC charge output are protected with circuit-board mounted fusing. Please see installation and operation instructions for full details.

Specifications

Power supply

Operating voltage: 110 to 120 V AC, $\pm 6\%$

Operating frequency:

50 and/or 60 Hz. model specific - see 'how to order' section

DC Charge Output

Nominal current: 10 or 20 A DC

Nominal voltage: 12 or 24V (see 'calibration' table for float voltages)

Float/boost voltage: see separate 'calibration' table

Voltage ripple: $<1\%$

Alarm outputs

High volts, low volts and charge fail relays:

SPDT dry/volt-free contacts, rated 1A @ 30 V DC, resistive load

Physical

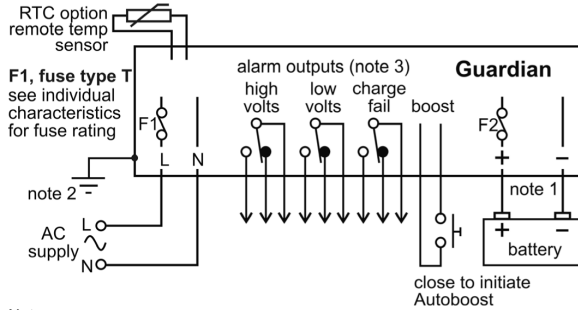
Operating temperature: $+14$ to $+131$ °F / -10 to $+55$ °C

Dimensions: see separate table below

Weight: see separate table below

Electromagnetic compatibility: EN61000-6-4 / EN61000-6-2

Electrical connection



Notes:

- 1) DC charge (battery) output is isolated from the Guardian chassis.
- 2) Chassis must be connected to AC supply ground.
- 3) Alarm relay outputs shown in de-energized (powered down) state.
High (battery) volts relay energizes 120 secs after fault condition.
Low (battery) volts relay de-energizes 120 secs after fault condition.
Charge fail relay de-energizes immediately on fault condition.

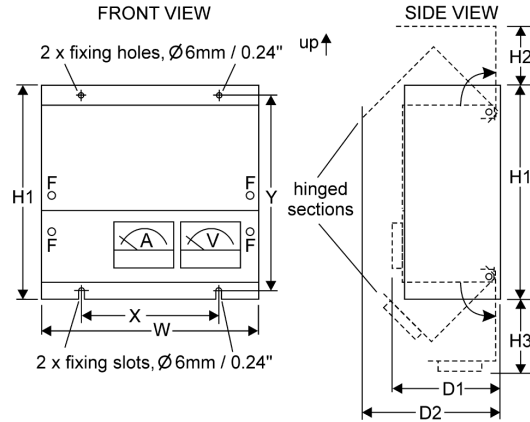
Output calibration

Calibration figures at 68°F / 20°C. Temperature compensation, if enabled, causes output voltage to automatically fall (or rise) with increasing (or decreasing) temperature, at a rate of approx 1.66mV per °F per cell (3mV per °C per cell).

Battery type		float volts (V DC)	boost volts (V DC)
12V	Vented lead acid (6 cells)	13.5	14.1
24V	Vented Lead acid (12 cells)	27.0	28.2

For NiCd and sealed lead acid batteries, please consult your Murphy representative.

Dimensions & weights



	EG150, EG300 series	EG600 series
Overall:-		
W	10.83" / 275 mm	13.19" / 335mm
H1	11.02" / 280mm	12.20" / 310mm
H2	2.95" / 75mm	3.35" / 85mm
H3	3.54" / 90mm	3.94" / 100mm
D1	4.92" / 125mm	5.71" / 145mm
D2	7.48" / 190mm	8.27" / 210mm
Fixing holes:-		
X	6.77" / 172mm	8.78" / 223mm
Y	10.04" / 255mm	11.22" / 285mm
Weight	22.0 lb / 10.0 Kg	38.5 lb / 17.5 Kg

Dimensions for reference only. Use actual product for mounting template.
For safe heat dissipation, mount product in orientation shown, with minimum air-gap clearance of 40mm above/below and 25mm at side.

How to order

Stock code	Model	Description
42.70.1600	EG1501210C5LA	Enclosed Guardian UL, 12V vented lead acid/10A output, 120VAC (50Hz) input
42.70.1601	EG1501210C6LA	Enclosed Guardian UL, 12V vented lead acid/10A output, 120VAC (60Hz) input
42.70.1606	EG3002410C5LA	Enclosed Guardian UL, 24V vented lead acid/10A output, 120VAC (50Hz) input
42.70.1607	EG3002410C6LA	Enclosed Guardian UL, 24V vented lead acid/10A output, 120VAC (60Hz) input
42.70.1610	EG60002420C6LA	Enclosed Guardian UL, 24V vented lead acid/20A output, 120VAC (50/60Hz) input

For NiCd and sealed lead acid batteries, please consult your Murphy representative.

Sentry Battery Chargers



Features

- **UL** ^{us}* and **CE** compliant
- Float charging, 5A @ 12 VDC
- Auto boost operation
- Temperature compensation
- Alarm relay output
- Charge ammeter
- High quality stainless steel case, suitable for wall mounting

* Tested and approved by UL to:

UL1236 – Battery chargers for charging engine-starting batteries, and
CSA22.2 No. 107.2 – Battery chargers

The Sentry UL provides automatic, current limited and thyristor controlled charging of vented lead acid or NiCd batteries. The units may be used in a wide range of industrial charging applications, including standby engines, pumps and generators. The charger is supplied in a wall mounted stainless steel enclosure, complete with DC ammeter indication. Each unit consists of a transformer, rectifier and control circuit. The control circuit ensures that the charger maintains a battery voltage at the pre-calibrated float level, whilst supplying any additional load current up to the specified maximum.

When used as a float charger the unit is designed to give a constant current output while battery voltage is below a 'knee point' (approx. 13V for 12V lead-acid batteries). Above the knee-point, as the battery approaches its float voltage, the Sentry output current ramps down. This multi-stage charge regime gives a fast charge rate, followed by float charge without overcharging.

Auto boost

All Sentry UL units include an Auto boost feature. Auto boost provides a temporary increase in output voltage, equalizing the charge between cells and maximizing battery life and capacity.

Auto boost is triggered automatically when the battery falls below a preset voltage. Auto Boost can also be initiated manually by linking two 'boost' terminals, e.g. using a panel switch or momentary push button. Once the batteries have reached the boost voltage level, the charger reverts to its normal float charge mode, preventing battery over-charge and gassing.

Charge fail alarm output

Sentry UL includes a relay output for remote alarm or signalling of a charge fail condition (no or low output current), e.g. due to AC supply or fuse failure, charger fault or high battery voltage.

Temperature compensation

Sentry UL chargers give automatic compensation of output voltage with varying temperature, ensuring optimal charging and cell life. Temperature is measured by a circuit board mounted sensor, or RTC option remote sensor complete with 9.5 ft (3m) lead assembly. Output voltage decreases as ambient temperature increases at a rate of 1.66mV per °F per cell (3mV per °C per cell) - see Output Calibration section.

Installation and connection

Wall or surface-mounting is by slots/holes in the stainless steel case. Connection to panel wiring is by spring clamp terminals, through access holes in the case side.

The AC supply input is protected with a circuit-board mounted fuse. An electronic polyfuse protects the DC output against reverse polarity and short circuit faults: the polyfuse automatically resets on battery disconnection, allowing correct reconnection without manual fuse replacement.

Specifications

Power supply

Operating voltage: 104 to 127 V AC

Operating frequency: 50/ 60 Hz.

DC Charge Output

Nominal current: 5 A DC

Nominal voltage: 12 V DC

Float/boost voltage: see separate 'output calibration' table

Voltage ripple: <1%

Alarm output

Charge fail relay:

SPDT dry/volt-free contacts, de-energized on fault, rated 1A @ 30 V DC (resistive load)

Physical

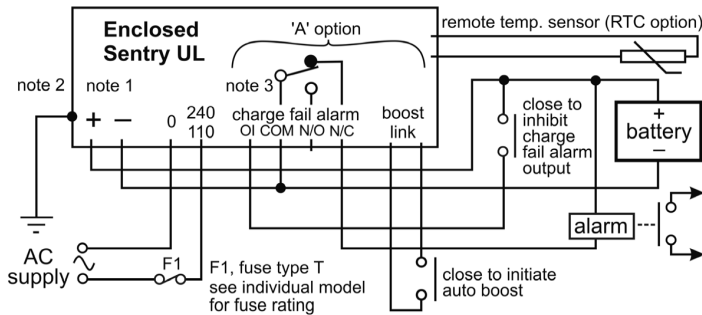
Operating temperature: +14 to +131 °F / -10 to +55°C

Dimensions: see separate diagram/table

Weight: 12.4 lb / 5.6 kg

Electromagnetic compatibility: EN50081-2 / EN50082-2

Electrical connection



Notes:

- 1) DC charge (battery) output is isolated from the Guardian chassis.
- 2) Chassis must be connected to AC supply ground.
- 3) Charge fail alarm relay shown in de-energized (powered down) state.

Output calibration

Calibration figures are at 68°F/20°C. Temperature compensation, if enabled, causes output voltage to automatically fall (or rise) with increasing (or decreasing) temperature, at a rate of approx 1.66mV per °F per cell (3mV per °C per cell).

Battery type		float volts (V DC)	boost volts (V DC)
12V	Vented lead acid (6 cells)	13.5	14.1

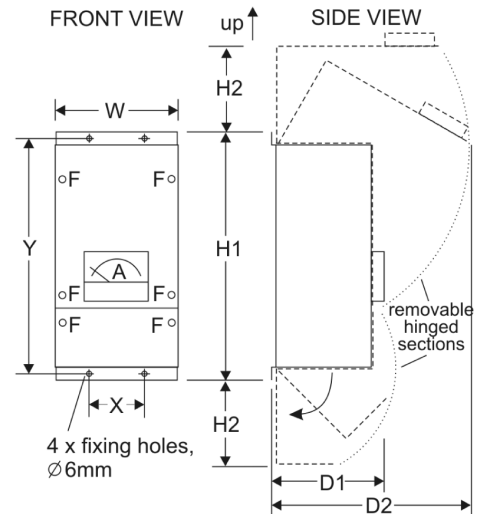
For vented NiCd batteries, please consult your Murphy representative.

How to order

Stock code	Model	Description
42.70.0832	ESUL1001205C5LAA	Enclosed Sentry UL, 12V vented lead acid/5A output, 120VAC (50Hz/60Hz) input

For vented NiCd batteries, please consult your Murphy representative.

Dimensions



Overall:-

W	142mm / 5.59"
H1	268mm / 10.55"
H2	85mm / 3.35"
D1	130mm / 5.12"
D2	222mm / 8.74"

Fixing holes:-

X	64mm / 2.52"
Y	274mm / 10.79"

Approximate dimensions for reference only. Use actual product as a mounting template. For safe heat dissipation, mount product in the orientation shown, with minimum air-gap clearance of 40mm above/below and 25mm at sides.

PowerView™ Displays

1110920	PowerView™ – Model PV25	303
1110823	PowerView™ – Model PV101	305
1311321	PowerView™ – Model PV350	307
1311242	PowerView™ – Model PV380	309
1010638	PowerView™ – Model PV450	311
1211067	PowerView™ – Model PV780	313

HelmView™ Displays

1211117	HelmView™ – Model HV450; Model HVS450	315
1110871	HelmView™ – Model HV750; Model HVS750	317
1211184	HelmView™ – Model HVS780	319

PowerView™ PVA Gages and Accessories

1010612	PowerView™ – CAN Gages	321
02125	PowerView™ – Analog Gages	325
03020	Wiring Harness Accessories for PV101 PowerView™ Module and PVA Analog Gages	329

PowerView™ PVM Gages and Accessories

0710178	PowerView™ – PVM Series Gages	331
0710179	Wiring Harness Accessories for PowerView™ – Model PV101 and PVM Gages	335

PowerView™ Power Supplies

0910389	PVS-5 Power Supply	337
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PowerView™ CAN I/O Modules

0810313	SenderCAN™ – SAE J1939 Input/Output Module	339
0810332	MeCAN™ – Mechanical Engine to J1939 CAN Interface	341
0810308	FuelCAN™ – Fuel Level Sender to J1939 Transmitter	343
0710175	XM500 I/O Module	345
0610067	CANdrive™ – CANbus J1939 to Electric Gage Interface	347



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PowerView™ Model PV25 Engine and Diagnostic Display



Features

- Tier 4/Stage IIIB/IV Compliant/Ready
- Compact J1939-Compliant Device for Electronically Controlled Engines
- Displays Up to 20 Standard J1939 Parameters
- Active and Stored Diagnostic Trouble Codes
- Simple Installation With a Rugged Design
- Provides Enhanced Visual Alarm Indication Using Bright ALARM and SHUTDOWN LEDs

The PowerView 25 is an engine and diagnostic display in an economical and compact package. This J1939-compliant device provides electronic engine parameter data, is simple to install, and matches the PowerView line of rugged displays. The PV25 can be powered by 12 or 24 volt systems.

The following are some of the engine parameters of the PV25 displays. PV25 can display these parameters in standard or metric units.

- | | | | |
|-----------------------|------------------|-----------------------------|------------------------|
| • Engine RPM | • Engine Hours | • Coolant Temperature | • Active Service Codes |
| • Engine Oil Pressure | • System Voltage | • IT4/Stage IIIB Parameters | • Stored Service Codes |

The PV25 is equipped with two push buttons to quickly access a convenient menu. In addition, a back-lit graphic display and two LED's indicate Active-fault Alarm or Shutdown status.

Active and Stored Fault messages display the SPN (Suspect Parameter Number), FMI (Failure Mode Indicator) and the OC (Occurrence Count) using the SAE J1939 protocol.

Bezel Options

Two Bezel styles are available. One is low profile and both are constructed of ABS. Ordering information is on the reverse of this sheet.

AB A-20 Style	BB Low Profile SAE Style
	

Specifications

Operating Voltage: 6 VDC minimum to 36 VDC maximum

Power Supply Operating Current:

460mA max @ 12 VDC

810mA max @ 24 VDC

Reversed Polarity: Withstands reversed battery terminal polarity

Environmental

Operating Temperature: -40 to 70°C (-40° to 158°F)

Storage Temperature: -55 to 85°C (-67° to 185°F)

Sealing: IP68

CAN Bus: SAE J1939 compliant

Connectors

4-pin AMP "Mini-universal Mate-N-Lok Connector"

AMP Plug: P/N 172338-1

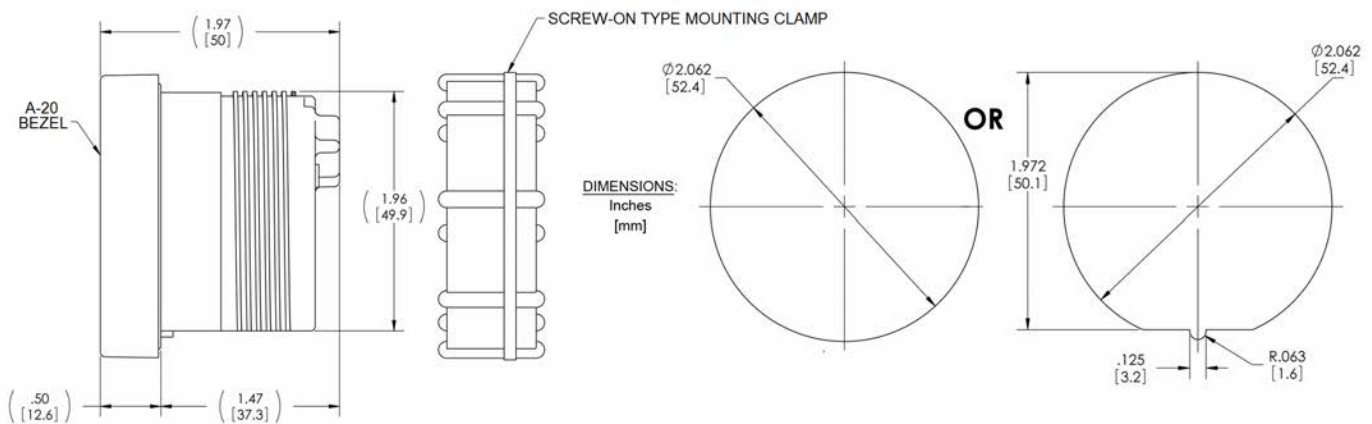
AMP Socket: P/N 171639-1 (4 each, assumes 18 gauge wire. See AMP Plug specification to match socket and wire size.)

Maximum Panel Thickness: 3/8 inch (9.6 mm)

Shipping Weight (all models): 0.2 lb. (0.1 kg)

Shipping Dimensions (all models): 3-7/8 x 2-3/4 x 2-3/4 in. (98.4 x 69.85 x 69.85 mm)

Product Dimensions and Mounting Options



How to Order

PV-25 - A

Bezel Type (flat lens)

AB = A20 (Black)

BB = Low profile SAE (Black)

Accessories

Wiring Harness PVW-PDA-12 PowerView 10 CAN & Power
(P/N 78-00-0613)

Wiring Harness PA-30View 10 Loose Wiring (P/N 78-00-0614)

Terminating Resistor, PVMJR (P/N 78-00-0480)

PowerView™ - Model PV101



Features

- Tier 4I/Euro Stage IV (PV101-C)
- Tier 3/Euro Stage III and earlier (PV101-A)
- For modern electronic engines and equipment applications using SAE J1939 Controller Area Network
- Displays active and ECU-stored faults with text description for diagnosing equipment malfunctions
- Displays over 50 standard SAE J1939 parameters
- Tier 4 emissions compliant
- Software configurable with configuration tool

The **PowerView PV101** display is a multifunction tool that enables equipment operators to view standard engine and transmission parameters as well as active and stored trouble codes. The display can show a single parameter or a four-parameter simultaneous display. Diagnostic capabilities include codes with text description for most common fault conditions. The enhanced alarm indicators have ultra-bright alarm and shutdown LEDs (amber and red). The PV101-C and PV101-A have many features including:

- **Tier 4 Emissions Implementation (PV101-C only)** – Three icons indicating Active Regeneration, Inhibit Regeneration, and Diesel Particulate Filter DPF Restricted. Menu offers Auto DPF Regen and Request DPF Regen.
- **OEM Menu** - A password protected menu offers access to MODBUS Setup, Engine Speed Control ON/OFF, and other critical menu items that require restricted access.
- **TSC1 (Torque Speed Control) (PV101-C only)** – Allows user to set run speed via CAN if supported by engine manufacturer.
- **Additional 4-Up Screen (PV101-C only)** – Allows user to have two 4-Up screens to toggle between. Second user configurable screen is defaulted to show Tier 4 Parameters; DEF Level (Diesel Exhaust Fluid Level), DPF Active Regen Status, Exhaust Filter Outlet Temp, and Exhaust Filter Inlet Temp.
- **Multiple language options** – Russian, Czech, Brazilian Portuguese, Chinese, and Japanese models have been added to the line of existing languages (English, Spanish, French, German, and Italian).
- **Sender Input** – Select between backlight dimmer function or fuel level. Can be calibrated to use non-Murphy fuel senders.
- **Service Reminders** – 5 service reminders allow users to set hours for: Change Engine Oil, Change Air Filters, Change Hydraulic Oil, Service Engine, and Service Machine.
- **Select Source Address** – Select the exact address the PV101 will claim on the Bus.
- **Select CANbus Data Rate** – Allows user to select CANBUS data rate.
- **PV101-C Configuration Tool (PV101-C only)** – PC tool allows users to create, view, edit and download configurations for the PV101.
- **The PV101-C Display Gauges – Compatible with PVA and PVM gages, as well as additional J1939 I/O modules.**

Other components in the MurphyLink system include micro-processor-based PowerView Analog (PVA) Gages for displaying critical engine data broadcast by an electronic engine or transmission's Engine Control Unit (ECU); engine RPM, oil pressure, coolant temperature, and system voltage. A combination audible alarm/relay unit offers warning and shutdown alerts. Up to 32 components may be linked to the PowerView using a simple daisy chain wire connection scheme using RS485. The PowerView and all connected components can be powered by either 12 or 24-volt systems.

Display Parameters

The following are some of the engine and transmission parameters displayed by the PowerView (when applicable, consult engine or transmission manufacturer for SAE J1939 supported parameters). The PowerView can display these parameters in all available languages, as well as in English or Metric units.

- | | | |
|------------------------------------|-----------------------------------|---|
| • Engine RPM | • Oil Pressure | • Transmission Oil Temperature |
| • Engine Hours | • Fuel Economy | • Transmission Gear Position |
| • Fuel Rate | • Throttle Position | • Active Service codes |
| • System Voltage | • Engine Manifold Air Temperature | • Stored Service Codes (when supported) |
| • % Engine Load at the Current RPM | • Current Fuel Consumption | • View Engine Configuration Parameters |
| • Coolant Temperature | • Transmission Oil Pressure | |
| • Catalyst Level | • NMEA 2000 GPS Parameters | |

Specifications

Operating Voltage

- 8 - 32 VDC

Reversed Polarity: Withstands reversed battery terminal polarity indefinitely within operating temperatures.

Environmental

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

Display Viewing Temperature: -29° to +85°C (-20° to +185°F)

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

Environmental Sealing: IP68, ± 5 PSI (± 34kPa)

Power Supply Operating Current

- (@ 14VDC) 52 mA min.: 300 mA max
- (@ 32VDC) 1A max (with LCD heater)

CAN Bus: SAE J1939 compliant

Case: Polycarbonate/polyester

Maximum Panel Thickness: 3/8 inch (9.6 mm)

Auxiliary RS485 Communications Port

- User configurable as Modbus MASTER or Modbus RTU SLAVE
- MASTER ACTIVE (default) drives optional PVA or PVM gages
- SLAVE ACTIVE offers user adjustable communication parameters

Resistive Input: (user selectable as one of the following)

- Backlighting Potentiometer: 1 K Ohm, 1/4 W
- Murphy Fuel Sender: 33 Ohm full, 240 Ohm empty set standard from factory for use with Murphy fuel sender. Programmable for use with non-Murphy fuel senders.

Shipping Weights (all models): 1 Lb. (450 g.)

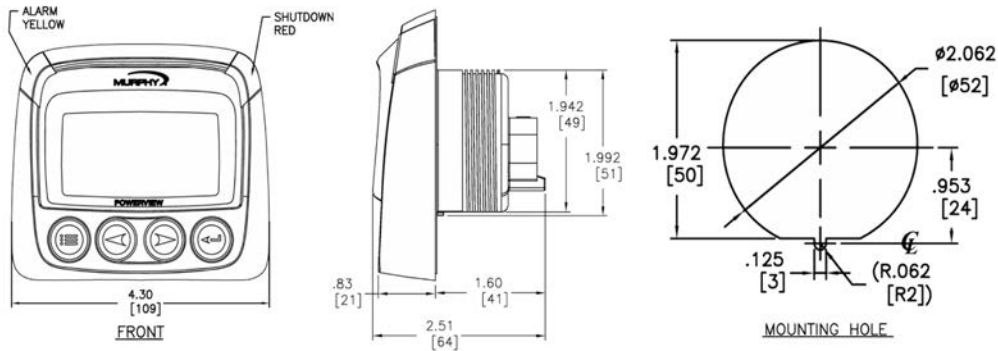
Shipping Dimensions (all models):

5 x 6 x 6 in. (127 x 152 x 152 mm)

Clamp: PBT

Connectors: 6-pin Deutsch DT Series

Product Dimensions



How to Order

Part Number	Model	Description	Languages Available
78700439	PV101-C	Murphy STD	English, Spanish, French, Italian, German
78700497	PV101-C-M01	Murphy STD Russian	English, Russian, French, German, Spanish
78700498	PV101-C-M02	Murphy STD Chinese	English, Chinese
78700499	PV101-C-M03	Murphy STD Japanese	English, Japanese
78700500	PV101-C-M04	Murphy STD Brazilian Portuguese	English, Brazilian Portuguese, French, German, Spanish
78700501	PV101-C-M05	Murphy STD Czech	English, Czech, French, German, Spanish
78700435	PV101-C Configuration Tool Kit	User Configuration Tool	
78700244	PV101-A	Murphy STD	English, Spanish, French, Italian, German
78700396	PV101-A-M01	Murphy STD Russian	English, Russian, French, German, Spanish
78700409	PV101-A-M02	Murphy STD Chinese*	English, Chinese
78700411	PV101-A-M03	Murphy STD Japanese*	English, Japanese

*Added features not available in these language models.

PowerView™ 350 Engine and Diagnostic Display



Features

- For use on mechanical and electronic engines and equipment
- Easy to use configuration software
- Tier 4/Euro Stage IV Ready
- CAN J1939 Communications
- Simple installation with a rugged design
- Setpoint Alarm and Shutdown control
- Multiple Language options available

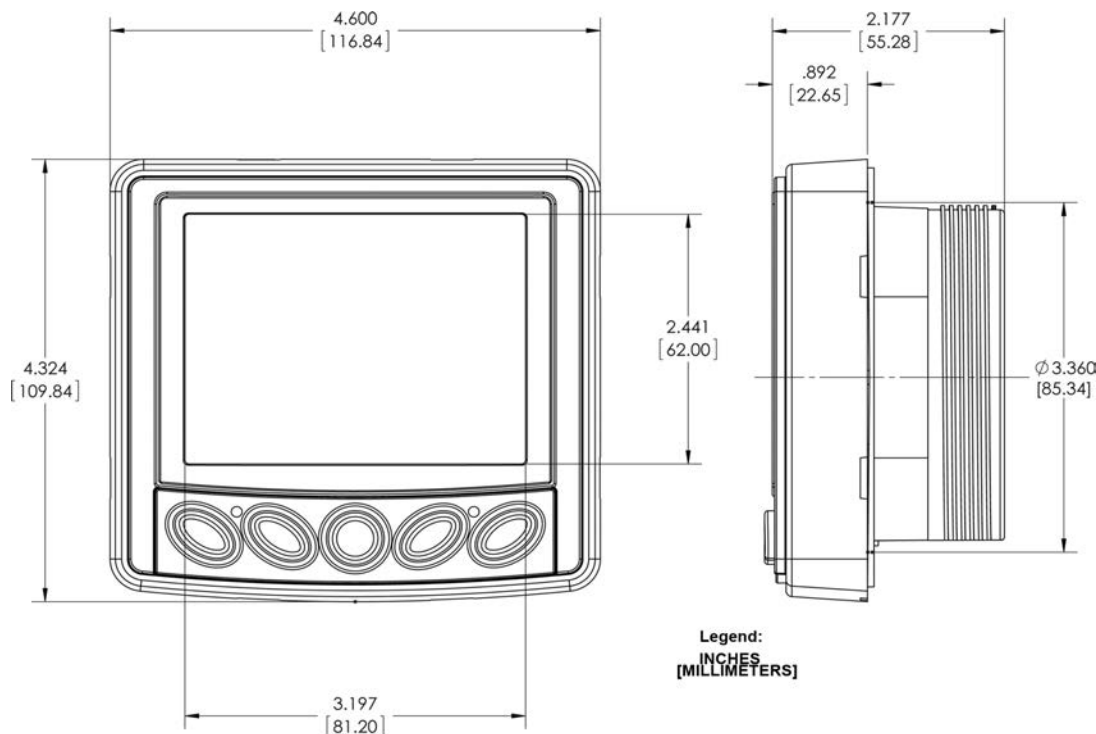
The PowerView 300 Series features robust, multifunction displays for advanced monitoring of multiple electronic engines.

The PV350 display monitors multiple engine and machine parameters on an easy-to-read 3.8-inch (97mm) QVGA monochrome LCD. The display is capable of handling sophisticated engine diagnostics as well as basic engine alarm/shutdown.

Customize the PV350 display using the PowerVision Configuration Studio™, an intuitive tool designed to make customization simple. Using the software tool, users can customize basic graphics, designate screen layout, and define custom parameters.

The PV350 is equipped with five tactile pushbuttons to quickly access a convenient menu. In addition, a back-lit and heat-embossed graphic display and two LED's indicate Active-fault Alarm or Shutdown status.

Product Dimensions



Specifications

Operating Voltage: 6-36 VDC

Vibration and Shock:

7.86g random vbe (5-2,000Hz) and
±50g shock in 3 axis

Reversed Polarity: withstands reversed battery
terminal polarity

Operating Temperature:

-40 to 85°C (-40 to 185°F)

Storage Temperature:

-40 to 85°C (-40 to 185°F)

Communications:

(2) CAN 2.0B; second CAN port is
NMEA 2000 isolated; J1939 and NMEA
2000 Protocol; Proprietary messaging.

EMC/EMI:

2004/108/EC and 2006/95/EC directives
EN61000-6-4:2001 (emission)
EN61000-6-2:2001 (immunity)
EN-501121-3-2 and EN 12895

Connectors: Deutsch DT Series 6 pin
M12 for NMEA 2000 (Micro-C)

Inputs: (1) resistive analog

Outputs: (1) 500 mA; switched low-side

SAE J1113/2, 4, 11, 12, 21, 24, 26 and 41

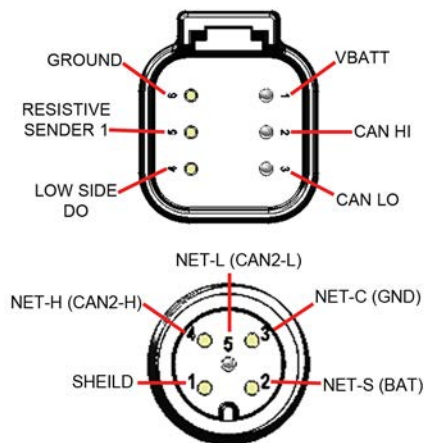
Display: 3.8" (97mm) QVGA (320x240 pixels);
monochrome transfective LCD with white LED
backlight and heater.

Viewing angle: ±50° horizontally; +45° / -60° vertically

Keys: 5 tactile pushbuttons

Alarms: Red and Amber warning LEDs; Capable of
setpoints-triggered output for external piezo
buzzer or shut-down relay.

PV350 Back View



How to Order

Part No.	Description
Display	
78-70-0545	PV350 Display, Murphy Standard
Accessories	
78-09-0100	Programming Kit, PV380-350 with Dongle
Service	
78-05-1077	Seal, PV380-350 Gasket
Software	
78-00-0752	PowerVision Configuration Studio™ CD and License

PowerView™ 380 Engine and Diagnostic Display



Features

- For use on mechanical and electronic engines and equipment
- Easy to use configuration software
- Tier 4/Euro Stage IV Ready
- CAN J1939 Communications
- Simple installation with a rugged design
- Setpoint Alarm and Shutdown control
- Multiple Language options available

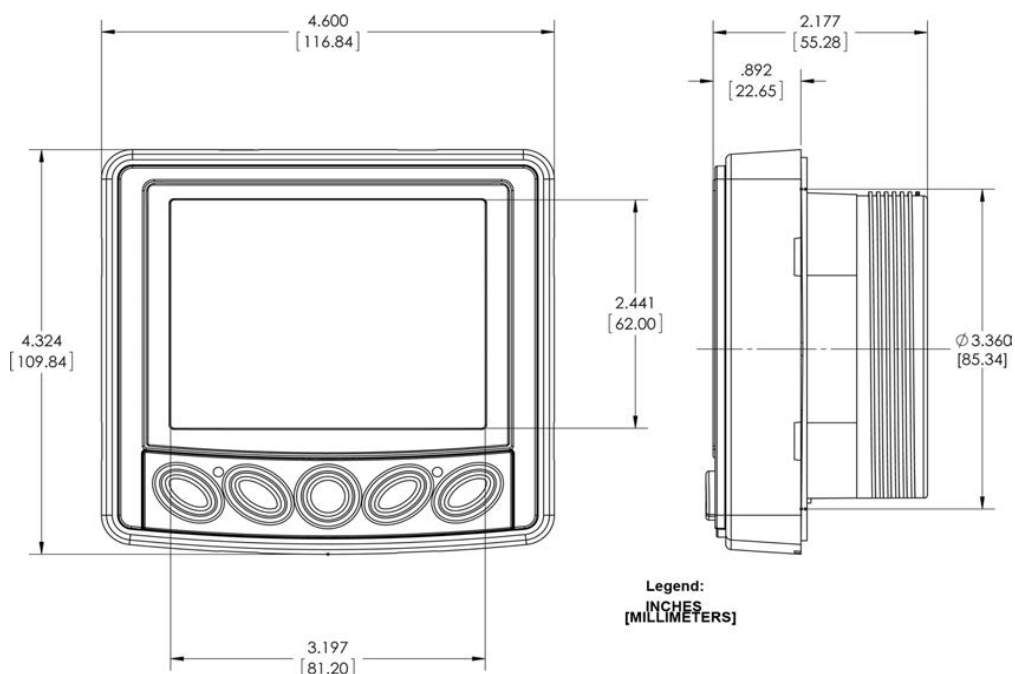
The PowerView 300 Series features robust, multifunction displays for advanced monitoring of multiple electronic engines.

The PV380 display monitors multiple engine and machine parameters on an easy-to-read 3.8-inch (97mm) QVGA monochrome LCD. The display is capable of handling sophisticated engine diagnostics as well as basic engine alarm/shutdown.

Customize the PV380 display using the PowerVision Configuration Studio™, an intuitive tool designed to make customization simple. Using the software tool, users can customize basic graphics, designate screen layout, and define custom parameters.

The PV380 is equipped with five tactile push buttons to quickly access a convenient menu. In addition, a back-lit and heat-graphic display and two LED's indicate Active-fault Alarm or Shutdown status.

Product Dimensions



Specifications

I

Operating Voltage: 6-36 VDC

Vibration and Shock:

7.86g random vbe (5-2,000Hz) and
±50g shock in 3 axis

Reversed Polarity: withstands reversed battery
terminal polarity

Operating Temperature:

-40 to 85°C (-40 to 185°F)

Storage Temperature:

-40 to 85°C (-40 to 185°F)

Communications:

(1) CAN 2.0B; J1939 Protocol;
Proprietary Messaging; (1) RS-485 serial

EMC/EMI:

2004/108/EC and 2006/95/EC directives
EN61000-6-4:2001 (emission)
EN61000-6-2:2001 (immunity)
EN-501121-3-2 and EN 12895

Connectors: Deutsch DT Series 6 and 12 pin

Inputs: (4) resistive analog; (3) analog: 0-5V analog
or digital; (1) frequency 2-10,000Hz,
3.6-120VAC

Outputs: (1) 500 mA; switched low-side
(1) 5V supply (70mA); protected

SAE J1113/2, 4, 11, 12, 21, 24, 26 and 41

Display: 3.8" (97mm) QVGA (320x240 pixels);
monochrome transfective LCD with white LED
backlight and heater.

Viewing angle: ±50° horizontally; +45° / -60° vertically

Keys: 5 tactile pushbuttons

Alarms: Red and Amber warning LEDs: Capable of
setpoints-triggered output for external piezo
buzzer or shut-down relay.

How to Order

Part No.	Description
Display	
78-70-0539	PV380 Display, Murphy Standard
Accessories	
78-09-0100	Programming Kit, PV380-350 with Dongle
Service	
78-05-1077	Seal, PV380-350 Gasket
Software	
78-00-0752	PowerVision Configuration Studio™ CD and License

PowerView™ Model PV450



Features

- Compact CAN-Based Display to Fit Your Application With Freely Configurable Design
- Easy-to-Use PowerVision Configuration Studio™ Software
- Direct Sunlight Viewable
- Rugged Design for Extreme Environments
- Optional - Approved for Class I, Division 2, Groups B, C and D; Temperature Code T4

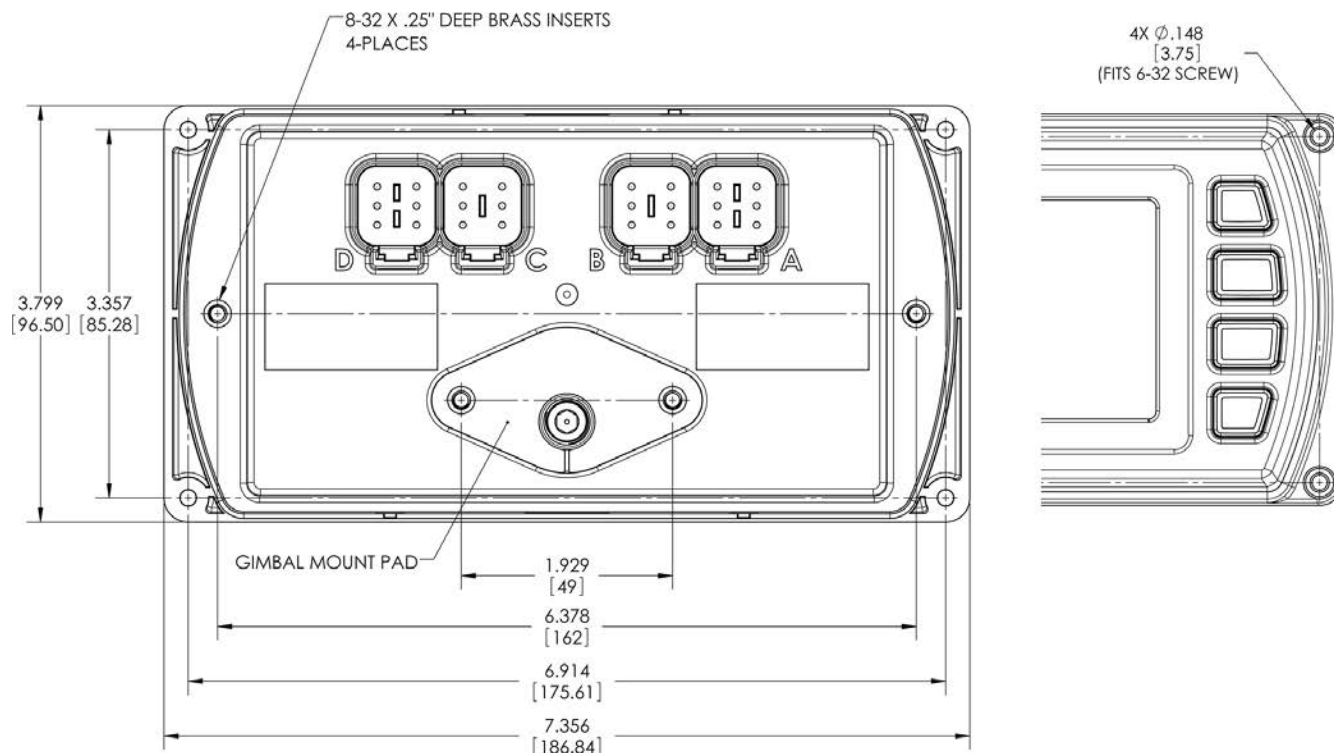
The PowerView 450 display features a freely configurable design, allowing custom software to be quickly developed.

The display is compatible with PowerVision Configuration Studio software, so you can make quick and easy changes to the display.

In addition, the display is highly durable. It features a full-color, robust 4.3" bonded LCD for best in class sunlight readability. The PV450's bonded LCD and rugged design make it a great solution for all types of environments and applications.

See the specifications on the back of this sheet for a complete overview of its technical features.

Dimensions



General Specifications

Technical

Display: Bonded 4.3" color transmissive TFT LCD

Resolution: WQVGA, 480 x 272 pixels, 16-bit color

Aspect Ratio: 16:9

Orientation: Landscape or portrait

Backlighting: LED, 500-650 cd/m² (30,000 hr lifetime)

Microprocessor: Freescale i.MX357 32bit, 532Mhz

QNX Real-Time Operating System

Flash Memory: 256 MB

RAM: 128 Mbytes DDR2 SDRAM

Operating Voltage: 6-32 VDC, protected against reverse polarity and load-dump (CSA, 6-30 VDC)

Power Consumption: 10W max. (CSA, 163 mA max @ 30VDC)

CAN: (2) CAN 2.0B; optional NMEA 2000 isolation, isolation with HVS450

Protocols: J1939, NMEA 2000, CANopen

RS-485: (1) MODBUS Master/Slave

Video input (Optional): (2) NTSC/PAL input channels with one displayed at a time.

Connection: (4) Deutsch DT 6-pin connectors

Keyboard: (8) tactile buttons with white LED backlight

USB 2.0 host, full speed

Output: (1) Open-drain, capable of sinking 500 mA

Input: (1) Resistive, 0-5 V, or 4-20 mA (software configurable) (10-bit resolution)

Clock: Real-time clock with built-in rechargeable Li-ion battery backup (0.033 mWh)

Environmental

Operating Temperature: -40°C to +85°C

Storage Temperature: -40°C to +85°C

Protection: IP 66 and 67, front and back.

Electromagnetic Compatibility:

2004/108/EC

EN 61000-6-4

EN 501121-3-2

EN 61000-6-2 (immunity)

EN 12895

J1113/2, 4, 11, 12, 21, 24, 26 and 41

Vibration: Random vibration, 7.86 Grms (5-2000 Hz), 3 axis

Shock: ± 50G in 3 axis


Specifications applicable to CSA-certified PV450 only

(CSA Certification: Class I Division 2 Groups B, C, & D; T4; IP66)

CAN: (2) CAN 2.0B (transmission rates up to 1Mbps)

Protocols: J1939 and CANopen

Environmental Protection: IP 66 and 67

How to Order		
Part No.	Model	Description
78-70-0436	PV450	PV450
78-70-0538	PV450, J1939,NMEA, with Video	PV450 with Video
78-70-0515	PV450, with Video	PV450 with Video
	Certified PV450 (Class I Division 2 Groups B, C and D; Temperature Code T4; IP66)	
78-70-0543	PV450-01-CSA	PV450 with Video (cCSAus)
78-70-0544	PV450NV-01-CSA	PV450 (cCSAus)
Accessories		
78-00-0831	Visor Kit, PV450	PV450 Visor Kit
78-00-0814	Mounting Plug Kit, PV450	PV450/PV750 Mounting Plug Kit

PowerView™ Model PV780



Features

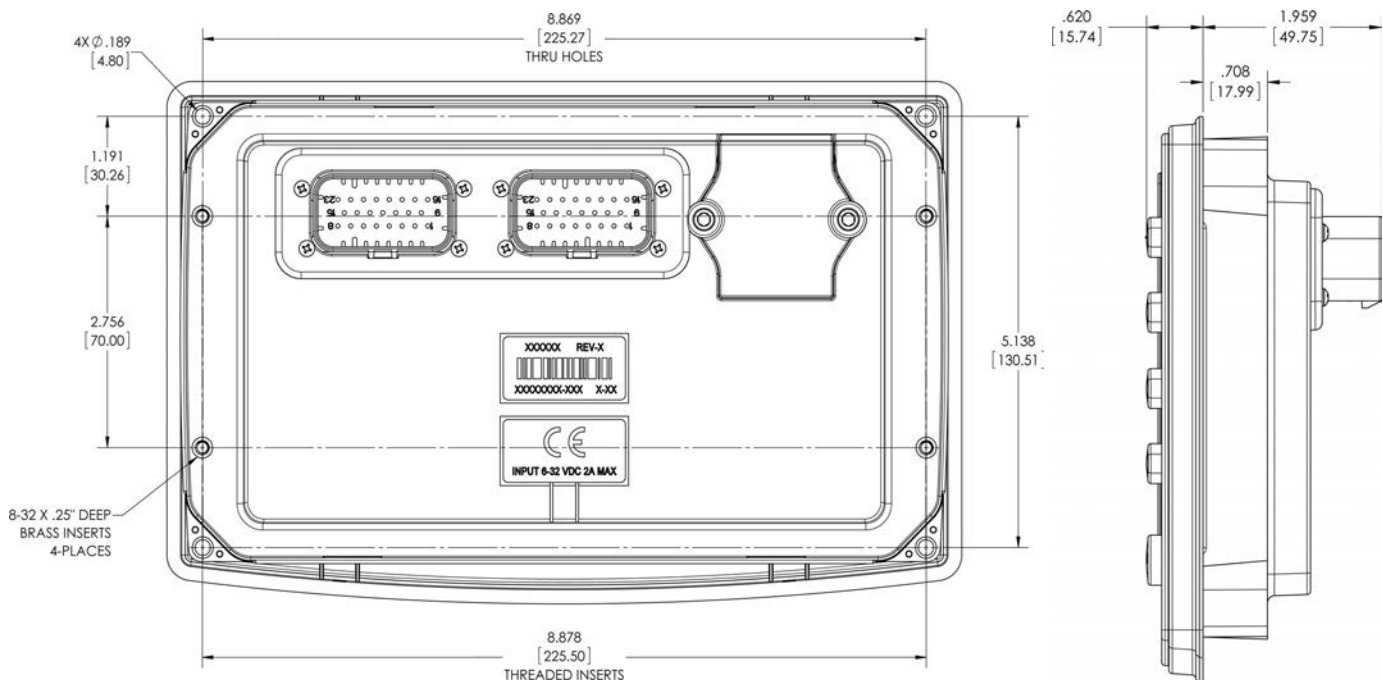
- CAN-Based Display With Rich, Full-Color Graphics
- Compatible With Both Mechanical and Electronic Engines
- Tier 4/Euro Stage IV ready
- Sunlight Readable LCD
- Rugged Design for Extreme Environments
- Multiple Languages
- Easy-to-Use Configuration Software

The PowerView 780 display is a full featured, configurable display that integrated engine, transmission and diagnostic information into an easy to read operator interface. Equipment functionality can be further integrated through the available I/O and controlled via the CANbus.

The PV780 features a full color, 7-inch bonded LCD for brighter, smoother graphics and best in class sunlight readability. The rugged design makes this display a great solution for extreme environments.

The PV780 display is compatible with PowerVision Configuration Studio™ which allows users to edit CAN parameters, add OEM branding and create custom equipment screens for a unique and sophisticated user interface.

Dimensions



Specifications

Technical

Display: 7" (178mm) color transmissive TFT LCD

Resolution: WVGA, 800 x 480 pixels, 16-bit color

Viewing Angle: ±65° horizontal, +55°/-65° vertical

Orientation: Landscape or Portrait

Backlighting: LED, 1000 nit typical brightness 40,000 hr. minimum

Contrast Ratio: 400:1

Refresh Rate: 60 Hz

Microprocessor: Freescale™ i.MX357, 32 bit, 532 MHz, ARM11 core

QNX® Real-time Operating System

Flash Memory: 2 GB total, 1 GB available for data logging

RAM: 128 Mbytes SRAM

Operating Voltage: 6-36 VDC, reverse polarity protected

Video inputs: 3 NTSC/PAL (single channel viewable)

Connectors: 2 AMPSEAL 23 Pin (AMP 770680-1 and AMP 770680-4)

Keyboard: 10 tactile pushbuttons with white LED backlight

Touchscreen: (optional) projected capacitive

USB: (1) USB 2.0 host (OTG, full speed)

Real time clock: with Li-ion rechargeable battery backup

Communications:

- (2) CAN 2.0B; J1939 and CANopen protocols; proprietary messaging
- (1) RS-485 serial (MODBus master/slave)
- (1) USB Host (OTG)

Outputs:

- (1) 500mA switched low-side
- (1) Frequency Out (2Hz - 5 kHz) Vbat rms square wave

Inputs:

- (3) Analog 0-5VDC, 4-20 mA, or resistive, 10-bit resolution
- (5) Discreet Digital 0-5V, Active High
- (1) Frequency In (2Hz - 10 kHz), 5Vpk-pk.min, 120Vpk-pk max

Environmental

Operating Temperature: -40°C to +85°C

Storage Temperature: -40°C to +85°C

Protection: IP66 and 67, front and back.

EMC/EMI:

- 2004/108/EC and 2006/95/EC directives
- EN 61000-6-4:2001 (emission)
- EN 61000-6-2:2001 (immunity)
- EN 501121-3-2 and EN 12895
- J1113/2, 4, 11, 12, 21, 24, 26 and 41

Vibration: Random vibration, 7.86 Grms (5-2000 Hz), 3 axis

Shock: ±50G in 3 axis

Mechanical

Dimensions: 8.37 x 6.0 in. (212.5 x 152.3 mm) landscape

Unit Depth: 3.57 in. (90.8 mm)

Case material: PC/ABS, ISO 3795 (SAE J369, FMVSS 302) rated

Mounting Options: Front Mount, Back Mount, or RAM mount

Certifications:

- CE
- E-mark capable

How to Order

Part Number	Description	Note
78-70-0560	PV780 Display, Murphy Standard Configuration	Displays
78-70-0564	PV780 Touch Display (no configuration; bootloader only)	
78-09-0098	Programming Kit, PV780	Accessories
78-05-1181	Cover, PV780	
78-00-1053	Bracket Kit (screws included)	
78-00-1055	Harness, Grey Connector, USB	
78-00-1056	Harness, Grey Connector, Flying Leads	
78-00-1057	Harness, Black Connector, Flying Leads	
78-00-1017	Harness, Black Connector, Development	
78-00-1018	Harness, Grey Connector, Development	
78-09-0069	Harness, PV750 Conversion, Power/CAN	Service
78-05-1180	Bezel, PV780	

HelmView™ Model HV450; Model HVS450



Features

- A Fully Customizable 4" Color Display Designed Specifically For Commercial Marine Applications.
- Utilized For Modern Electronic Engines and Vessel Monitoring Using SAE J1939 Controller Area Network
- Customizable For Additional Commercial Marine Applications
- Bonded Lcd Screen Viewable In Direct Sunlight
- Rugged Design That Is Simple To Use
- Video Input
- Configuration Software Option Offers Virtually Unlimited Possibilities
- Blackout Mode Option

The **HelmView™ HVS450** is specifically designed to meet the engine monitoring needs of the Commercial Marine industry. Its durable design and easy to use interface offers a complete view of your vessel's engines. Monitor propulsion, auxiliary, transmission, and genset engines all on one display. It is equipped with the ability to switch between Day and Night mode operations and even has a blackout option. There are multiple screens to choose from and the ability to turn screens on/off to meet your specific marine application needs. The HVS450 has the ability to be connected to a video camera for monitoring the engine room or other important areas of the vessel.

This multi-functional display allows you to monitor multiple engines, transmissions, fuel usage, and more using only one device, thus greatly reducing operating costs. It has eight tactile push buttons that can easily be pressed with or without gloves. The HVS450's sunlight viewable, full-color screen makes seeing life-like gauges, alarm warnings, service codes, and video easy to view in virtually any condition. The HVS450 is fully programmed to display Diagnostic Trouble Codes showing critical alarms and text explanations.

The HVS450 display is compatible with the PowerVision Configuration Studio™ so custom software configurations can be quickly developed. With the PowerVision Configuration Studio it is easy to define the user interface screens, monitoring requirements and specifications that are unique to the Commercial Marine industry. The HVS450 paired with the PowerVision Configuration Studio extends custom configuration from only monitoring to equipment control, data logging, and additional alarming. You can even add custom graphics and company branding to the user interface.

Display Parameters

The following are some of the parameters displayed by the HVS450 in English or Metric units (when applicable, consult engine or transmission manufacturer for SAE J1939 supported parameters).

Engine RPM	Transmission Oil Temperature	Instantaneous Fuel Usage
Engine Hours	Transmission Oil Level	Trip Fuel
System Voltage	Tank Levels	Navigational Bearing
% Engine Load at the Current RPM	Course over Ground*	Active Service Codes
Coolant Temperature	Speed over Ground*	Stored Service Codes (when supported)
Oil Pressure	Longitude and Latitude*	Video
	Real Time Display*	

*NMEA GPS Antennae required

HelmView™ Model HV750; Model HVS750



Features

- Abs Type Approved Display For Marine and Offshore Applications on ACC, ACCU and ABCU Classed Vessels (Model HV750 Only)
- Color Display For Modern Electronic Engines and Vessel Monitoring Using SAE J1939 Controller Area Network
- Customizable For Additional Commercial Marine Applications
- Bonded 7-inch LCD Screen Viewable In Direct Sunlight
- Rugged Design That Is Simple To Use
- Video Input
- Configuration Software Option Offers Virtually Unlimited Possibilities
- Blackout Mode Option

The **HelmView HV750** is specifically designed to meet the engine monitoring needs of the Commercial Marine industry. Its durable design and easy to use interface offers a complete view of your vessel's engines. Monitor propulsion, auxiliary, transmission, and genset engines all on one display. It is equipped with the ability to switch between Day and Night mode operations and even has a blackout option. There are multiple screens to choose from and the ability to turn screens on/off to meet your specific marine application needs. The HelmView 750 has the ability to be connected to a video camera for monitoring the engine room or other important areas of the vessel.

This multi-functional display allows you to monitor multiple engines, transmissions, fuel usage, and more using only one device, thus greatly reducing operating costs. It has ten tactile push buttons that can easily be pressed with or without gloves. The HelmView 750's sunlight viewable, full-color screen makes seeing life-like gauges, alarm warnings, service codes, and video easy to view in virtually any condition. The HelmView 750 is fully programmed to display Diagnostic Trouble Codes showing critical alarms and text explanations.

The HelmView 750 display is compatible with the PowerVision Configuration Studio™ so custom software configurations can be quickly developed. With the PowerVision Configuration Studio it is easy to define the user interface screens, monitoring requirements and specifications that are unique to the Commercial Marine industry. The HelmView 750 paired with the PowerVision Configuration Studio extends custom configuration from only monitoring to equipment control, data logging, and additional alarming. You can even add custom graphics and company branding to the user interface.

Display Parameters

The following are some of the parameters displayed by the HelmView 750 in English or Metric units (when applicable, consult engine or transmission manufacturer for SAE J1939 supported parameters).

Engine RPM	Transmission Oil Temperature	Instantaneous Fuel Usage
Engine Hours	Transmission Oil Level	Trip Fuel
System Voltage	Tank Levels	Navigational Bearing
% Engine Load at the Current RPM	Course over Ground*	Active Service Codes
Coolant Temperature	Speed over Ground*	Stored Service Codes (when supported)
Oil Pressure	Longitude and Latitude*	Video
	Real Time Display*	

*NMEA GPS Antennae required

Specifications

Technical

Display: 7" / 178mm color transmissive TFT LCD

Resolution: WGA, 800 x 480 pixels, 16-bit color

Aspect Ratio: 16:9

Orientation: Landscape

Backlighting: LED, 400-500 cd / mC (50,000 h lifetime)

Microprocessor: Freescale iMX.31 32bit, 400Mhz

QNX Operating System

Flash Memory: 2 GB

RAM: 128 Mbytes SDRAM

Operating Voltage: 8-35 VDC, protected against, reverse polarity and load-dump

Power Consumption: 10w full backlight; 22w full backlight with heater (at temperatures below -10 °C)

CAN: 3 CAN ports according to CAN specification 2.0A or 2.0B; one port isolated according to NMEA 2000 (GPS)

RS485: 1 MODBUS Master/Slave port, PVA Gage

Video input: NTSC/PAL

Protocols: J1939, NMEA 2000 (GPS), CANOpen protocol support.

Connection: 5 Deutsch DT 6-pin connectors

Keyboard: 10 tactile buttons

USB 2.0 host (full speed)

Output Digital: (1) capable of syncing 500mA

Inputs: (3) 0-5 VDC analog inputs. (1) input configurable to support measurement frequencies from 2Hz - 10kHz and PWM values from 0-100% duty cycle.

Environmental

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

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

Protection: IP67, front and back.

Emissions: IEC 60945, 95/54/EC

Immunity: SAE J1113, ISO 11452

Vibration: Random vibration, 7.86 G_{rms} (5-2000 Hz), 3 axis

Shock: +/- 50G in 3 axis

Mechanical

Dimensions: 8.37 x 6.0 in. (212.5 x 152.3 mm) landscape

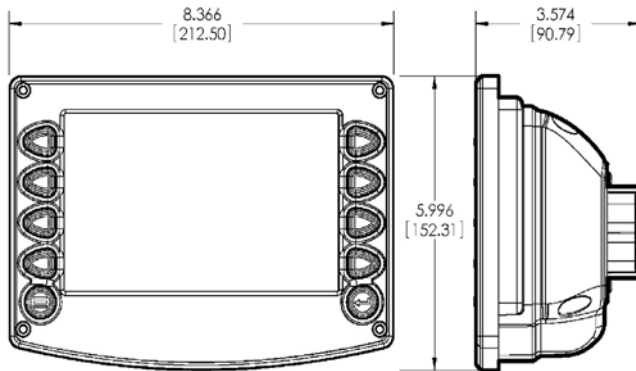
Unit Depth: 3.57 in. (90.8 mm)

Case material: Polycarbonate back case

Mounting: Front or Rear

Optional Gimbal Mount available

Dimensions



Accessories

- PowerVision Configuration Studio (78-00-0752)
- Visor Kit (78-00-0732)
- GPS Kit (78-00-0601)
- Gimbal Mounting Kit (78-00-0697)
- Contact FW Murphy for cable and wiring accessories

Service Parts

- Cover Plate (78-05-0701)
- Bezel (78-05-0720)
- Hardware Mounting Kit (78-00-0638)

How to Order

HelmView™ 750	Model #	Product #
ABS Type Approved	HV750	78-70-0525
Non-ABS	HVS750	78-70-0508

HelmView™ Model HVS780



Features

- Color Display For Modern Electronic Engines and Vessel Monitoring Using SAE J1939 Controller Area Network
- Customizable For Additional Commercial Marine Applications
- Bonded 7-inch LCD Screen Viewable In Direct Sunlight
- Rugged Design That Is Simple To Use
- Video Input
- Configuration Software Option Offers Virtually Unlimited Possibilities
- Multiple Night Viewing “Blackout Mode” Options

The **HelmView HVS780** is a full-featured, configurable display that integrates electronic engine, transmission and vessel information into an easy to read operator interface. Operators can monitor multiple parameters, including single or dual engines, fuel usage, and much more.

The HelmView HVS780 display features a full-color 7-inch bonded LCD screen for rugged environments. It has ten tactile push buttons that can easily be pressed with or without gloves. In addition, it comes pre-loaded with a standard marine software configuration that features custom parameters and interface screens tailored for commercial marine equipment.

Customize the HelmView display with Murphy’s PowerVision Configuration Studio™, a powerful tool that allows you to create custom configurations for unique commercial marine applications - including tug boats, fishing vessels, search and rescue, cargo and more. The HelmView HVS780 paired with the PowerVision Configuration Studio extends custom configuration from only monitoring to equipment control, data logging, and additional alarming. You can even add custom graphics and company branding to the user interface.

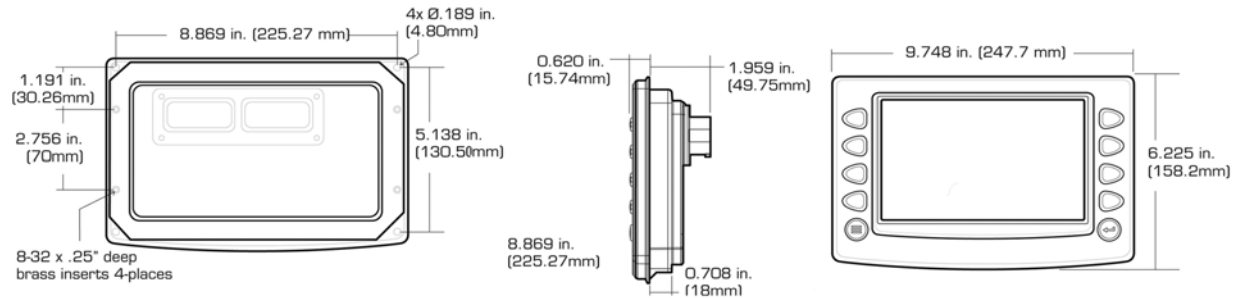
Display Parameters

The following are some of the parameters displayed by the HelmView HVS780 in English or Metric units (when applicable, consult engine or transmission manufacturer for SAE J1939 supported parameters).

Engine RPM	Transmission Oil Temperature	Instantaneous Fuel Usage
Engine Hours	Transmission Oil Level	Trip Fuel
System Voltage	Tank Levels	Navigational Bearing
% Engine Load at the Current RPM	Course over Ground*	Active Service Codes
Coolant Temperature	Speed over Ground*	Stored Service Codes (when supported)
Oil Pressure	Longitude and Latitude*	Video
	Real Time Display*	

*NMEA GPS Antennae required

Dimensions



Specifications

Technical

Display: 7" (178mm) color transmissive TFT LCD

Resolution: WVGA, 800 x 480 pixels, 16-bit color

Viewing Angle: ±65° horizontal, +55°/-65° vertical

Orientation: Landscape

Backlighting: LED, 1000 nit typical brightness 40,000 hr. minimum

Contrast Ratio: 400:1

Refresh Rate: 60 Hz

Microprocessor: Freescale™ i.MX357, 32 bit, 532 MHz, ARM11 core

QNX® Real-time Operating System

Flash Memory: 2 GB total, 1 GB available for data logging

RAM: 128 Mbytes SRAM

Operating Voltage: 6-36 VDC, reverse polarity protected

Video input: 3 NTSC/PAL (single channel viewable)

Communications:

- (2) CAN 2.0B with one isolated (NMEA compliant); J1939 and CANopen® protocols, proprietary messaging.
- (1) RS-485 serial (MODBus master/slave)

Connectors: 2 AMPSEAL 23 Pin (AMP 770680-1 and AMP 770680-4)

Keyboard: 10 tactile pushbuttons with white LED backlight

Touchscreen: (optional) projected capacitive

USB: (1) USB 2.0 host (OTG, full speed)

Real-time clock: with Li-ion rechargeable battery

Shock: ±50G in 3 axis

Output:

- (1) 500mA switched low-side
- (1) Frequency Out (0Hz - 5 kHz), 120Vpk-pk max Vbat rms square wave

Inputs:

- (3) Analog 0-5VDC, 4-20 mA, or resistive, 10-bit resolution
- (5) Discrete Digital 0-5V, Active High
- (1) Frequency In (2Hz - 10 kHz), 5Vpk-pk.min, 120Vpk-pk max

Environmental

Operating Temperature: -40°C to +85°C

Storage Temperature: -40°C to +85°C

Protection: IP66 and 67, front and back.

Emissions: IEC 60945, 95/54/EC

Immunity: SAE J1113

Vibration: Random vibration, 7.86 Grms (5-2000 Hz), 3 axis

Mechanical

Dimensions: 9.75 x 6.23 in. (247.7 x 158.2mm) landscape

Unit Depth: 2.58 in. (65.49 mm)

Case material: PC/ABS, ISO 3795 (SAE J369, FMVSS 302) rated

Mounting Options: Front Mount, Back Mount, or RAM Mount

How to Order

Part Number	Description	Note
78-70-0561	HVS780 Display	Displays
78-00-0752	PowerVision Configuration Studio	Accessories
78-09-1098	Programming Kit	
78-05-1181	Cover	
78-00-1053	Bracket Kit	
78-00-1055	Harness, Grey Connector, USB	
78-00-1056	Harness, Grey Connector, Flying Leads	
78-00-1057	Harness, Black Connector, Flying Leads	
78-00-1017	Harness, Black Connector, Development	
78-00-1018	Harness, Grey Connector, Development	
78-09-0069	Harness, PV750 Power/CAN	Service
78-05-1180	Bezel	

PowerView™ CAN Gages



Features

- For Modern Electronic Engines and Equipment Using SAE J1939 Controller Area Network
- Displays SAE J1939 Parameters Broadcast via CAN
- Cutting Edge, Stepper Motor Technology and Robust Functionality Combined
- Microprocessor Driven for High Accuracy
- Simple Installation and Wiring Design
- No Driving Device Required

The **PowerView CAN Gages (PVCAN)** are a series of intelligent gages designed to display easy-to-read information broadcast over the SAE J1939 communications. These gages are designed to be wired directly to the J1939 CAN bus without the need of another device driving them.

The PVCAN gage include features such as a smooth stepper motor operation for the 270° sweep pointer, an environmentally sealed case with two Deutsch DT style connectors molded into the case, and green LED back lighting. They are available for standard 2-1/6" (52mm) and 3-3/8" (86mm) diameter hole sizes. In addition, their polycarbonate/polyester alloy cases incorporate a "D" shape allowing panel cutouts that eliminate gage rotation during installation.

All PowerView gages can be powered by 12 or 24 VDC systems.

PVCAN Series Models: 2 inch size gages

- PVCAN20-A = Engine Oil Pressure
- PVCAN20-B = Coolant Temperature
- PVCAN20-BA = DEF Level
- PVCAN20-BB = DEF Soot Level
- PVCAN20-C = Voltmeter
- PVCAN20-D = Percent Load at Current RPM
- PVCAN20-E = Transmission Oil Pressure
- PVCAN20-F = Transmission Oil Temperature
- PVCAN20-G = Engine Oil Temperature
- PVCAN20-H = Hydraulic Oil Temperature
- PVCAN20-J = Percent Fuel Level
- PVCAN20-K = Boost Pressure
- PVCAN20-L = Exhaust Gas Temperature
- PVCAN20-M = Intake Manifold Temperature
- PVCAN20-N = Auxiliary Temperature
- PVCAN20-P = Auxiliary Pressure
- PVCAN20-T = Tachometer

PVCAN Series Models: 3.5 inch size gages

- PVCAN35-T = Tachometer
- PVCAN35-S = Speedometer

More gage options may be available. Call F.W. Murphy for more information on specific gages not shown.

Specifications

Power Supply Input Voltage:

12/24V (8-32VDC Minimum and Maximum Voltage)

Power Supply Operating Current:

Typically 70mA

Backlight Maximum Current: 45mA

Input: CAN (SAE J1939)

Operating Temperatures:

-40°F to 185°F (-40°C to 85°C)

Storage Temperatures:

-76°F to 185°F (-60°C to 85°C)

Dial:

White numerals over black background

Gage Accuracy:

Better than ±1% of full scale

Environmentally Sealed Enclosure:

IP68: ±5PSI (±34.4kPa).

Case Material: Polycarbonate/Polyester (PC+PBT)

Clamp Material: Polyester (PBT)

Lens Material: Polycarbonate

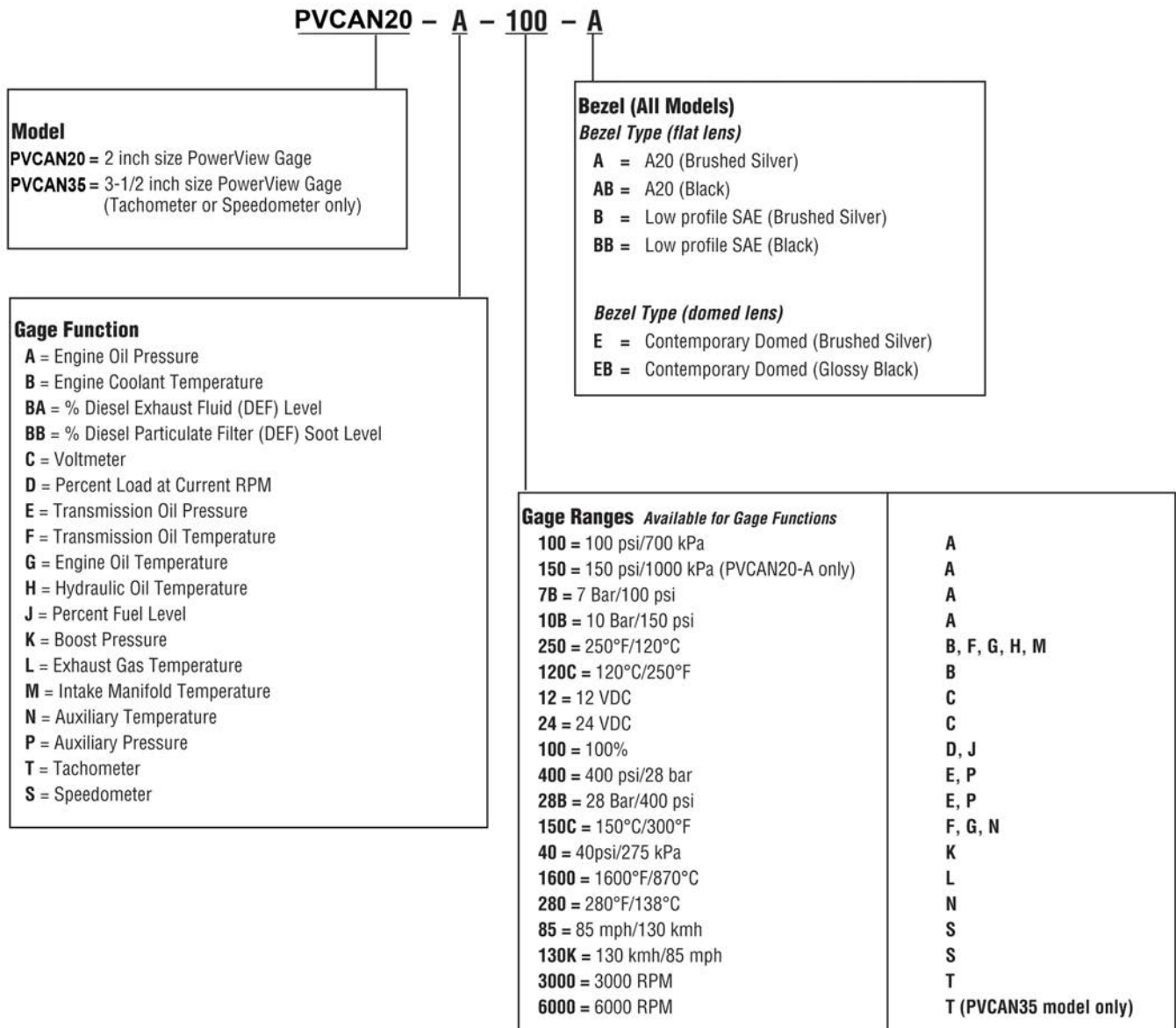
Bezel Material: ABS

Maximum Panel Thickness: 3/8 in. (9.6mm)

Connectors: 6-Pin Deutsch DT06 Series

A-20 Style	Low Profile SAE Style	Contemporary Domed Bezel and Lens Style
PVCAN20 Series - 2 inch Size Gages		
<p>AB Bezel Type</p>  <p>A Bezel Type</p>	<p>BB Bezel Type</p>  <p>B Bezel Type</p>	<p>EB Bezel Type</p>  <p>E Bezel Type</p>
PVCAN35 Series - 3-1/2 inch Size Gages		
<p>AB Bezel Type</p>  <p>A Bezel Type</p>	<p>BB Bezel Type</p>  <p>B Bezel Type</p>	<p>EB Domed Bezel and Lens Type</p>  <p>E Bezel Type</p>

How to Order



Accessories

Part Number	Model	Description
78000761	CANJR	Terminating Resistor
78000745	CANW-J-9	9" Jumper Harness*
78000746	CANW-J-12	12" Jumper Harness*
78000747	CANW-J-24	24" Jumper Harness*
78000748	CANW-J-36	36" Jumper Harness*
78000124	PVW-P-12	12" Power/CAN Harness

* According to recommended SAE J1939 wiring practices, any device on the CAN bus should be noded into the bus with a distance of no more than 1 meter.

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PowerView™ Analog Gages - PVA Series



Features

- For Modern Electronic Engines and Equipment Using SAE J1939 Controller Area Network
- Display SAE J1939 Parameters Broadcast by the Powerview System
- Cutting Edge, Stepper Motor Technology and Robust Functionality Combined
- Microprocessor Driven for High Accuracy
- Simple Installation and Wiring Design

The **PowerView Analog Gages (PVA)** are a series of intelligent gages designed to display easy-to-read information transmitted by the PowerView. The PVA gages communicate with the PowerView via a single RS485 twisted pair MODBUS® RTU serial link. The gages can be daisy-chained using quick-connect harnesses with watertight connectors.

The major feature of the PVA gages is their balance between design and functionality. These modern gages offer a selection of lens and bezel styles and colors.

The PVA gages also include features such as a smooth stepper motor operation for the 270° sweep pointer, an environmentally sealed case with two Deutsch DT style connectors molded into the case, and green LED back lighting. They are available for standard 2-1/6" (52mm) and 3-3/8" (86mm) diameter mounting hole sizes. In addition, their polycarbonate/polyester alloy cases incorporate a "D" shape allowing panel cutouts that eliminate gage rotation during installation.

The PowerView Audible Alarm (PVAA) alerts operators to fault conditions via piezoelectric alarm and relay contacts. It also has a temporary silencer button that silences the audible tone for 2 minutes on warnings and 30 seconds on shutdown conditions. All PowerView gages can be powered by 12 or 24 VDC systems.

Specifications

Power Supply Input: 12/24V (8-32VDC min/max voltage)

Power Supply Operating Current: (@ 14VDC) =

- PVA20, PVA35: 28 mA minimum; 52 mA maximum
- PVAA20: 19 ma minimum; 46 mA maximum

Backlight Maximum Current: 24 mA (Not valid for PVAA20)

Input: RS485 MODBUS® RTU Data

Output: Analog readout

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

Storage Temperature: -76°F to 185°F (-60°C to 85°C)

Dial: White text over black background

Indicating Pointer: Stepper motor Operation with 270 sweep

Gage Accuracy: Better than $\pm 1\%$ of full scale

Environmentally Sealed Enclosure:

- **Sealing:** IP68, ± 5 psi (± 34.4 kPa)
- **Case Materials:** Polycarbonate/Polyester (PC+PBT)
- **Clamp Materials:** Polyester (PBT)
- **Lens Material:** Polycarbonate
- **Bezel Material:** ABS

Maximum Panel Thickness: 3/8 inch (9.6mm)

Connectors: 6-pin Deutsch DT06 Series

The following items apply only to PVAA20









Sound Output Level: 90 dB @ 30cm

Relay Rated Load: 0.5A, 125VAC; 1A, 24VDC

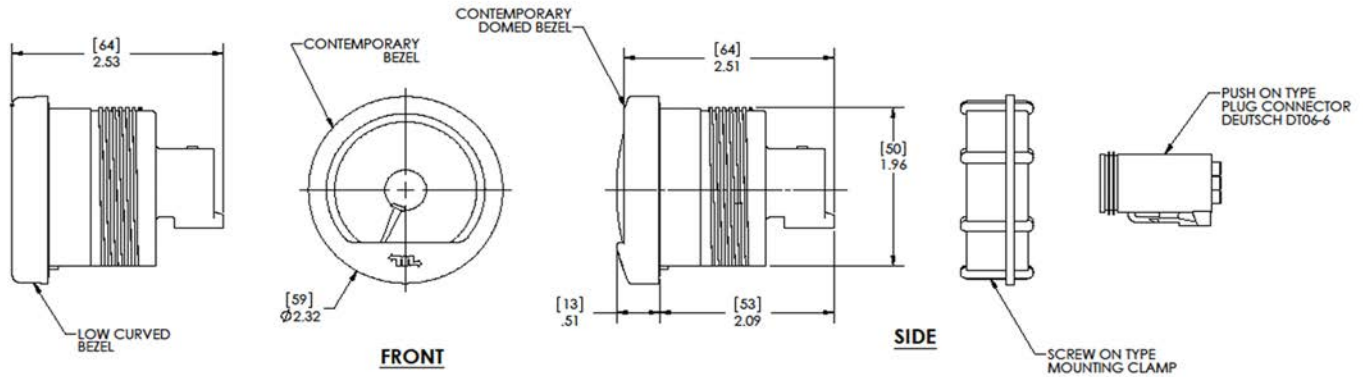
Relay Maximum Switching Capacity: 62.5VA, 30W

External Audible Alarm Output: 28VDC, 30 mA maximum current sink

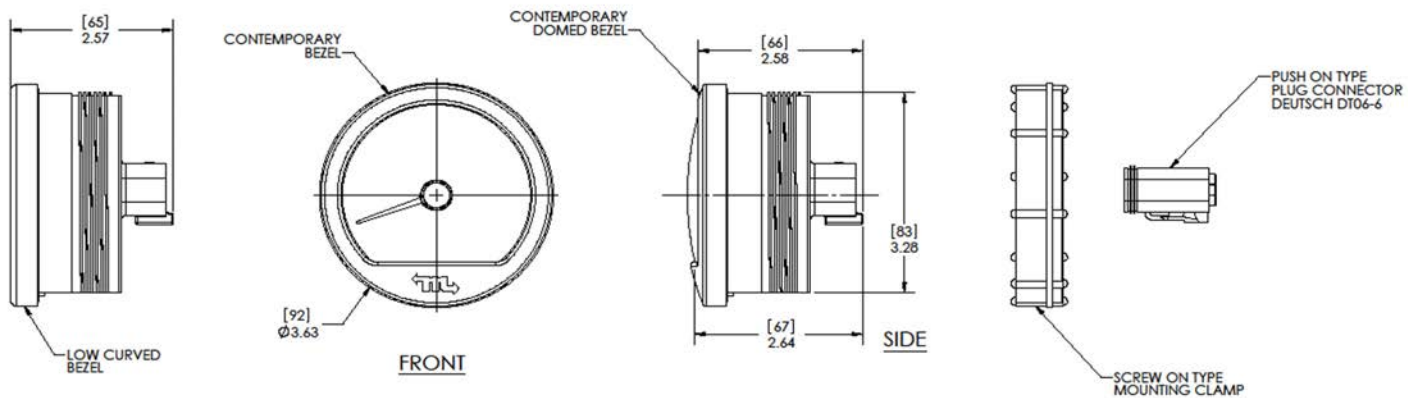
Temporary Silence Button: Charge transfer technology

<p>A-20 Style</p>	<p>Low Profile SAE Style</p>	<p>Contemporary Domed Bezel and Lens Style</p>
<p>PVA20 Series – 2 inch Size Gages</p> <p>AB Bezel Type</p>  <p>A Bezel Type</p>	<p>BB Bezel Type</p>  <p>B Bezel Type</p>	<p>EB Bezel Type</p>  <p>E Bezel Type</p>
<p>PVA35 Series – 3-1/2 inch Size Gages</p> <p>AB Bezel Type</p>  <p>A Bezel Type</p>	<p>BB Bezel Type</p>  <p>B Bezel Type</p>	<p>EB Domed Bezel and Lens Type</p>  <p>E Bezel Type</p>
<p>PVAA20 Model – 2 inch Size Audible Alarm</p> <p>AB Bezel Type</p>  <p>A Bezel Type</p>	<p>BB Bezel Type</p>  <p>B Bezel Type</p>	<p>EB Domed Bezel and Lens Type</p>  <p>E Bezel Type</p>

PVA20/PVAA20 Series - Typical Gage Dimensions



PVA35 Series - Typical Gage Dimensions



PVA20 Series Models - 2 inch size gages

PVA20-A = Engine Oil Pressure

PVA20-B = Coolant Temperature

PVA20-C = Voltmeter

PVA20-D = Percent Load at Current RPM

PVA20-E = Transmission Oil Pressure

PVA20-F = Transmission Oil Temperature

PVA20-G = Engine Oil Temperature

PVA20-H = Hydraulic Oil Temperature

PVA20-J = Percent Fuel Level

PVA20-K = Boost Pressure

PVA20-L = Exhaust Gas Temperature

PVA20-M = Intake Manifold Temperature

PVA20-N = Auxiliary Temperature

PVA20-P = Auxiliary Pressure

PVA20-T = Tachometer

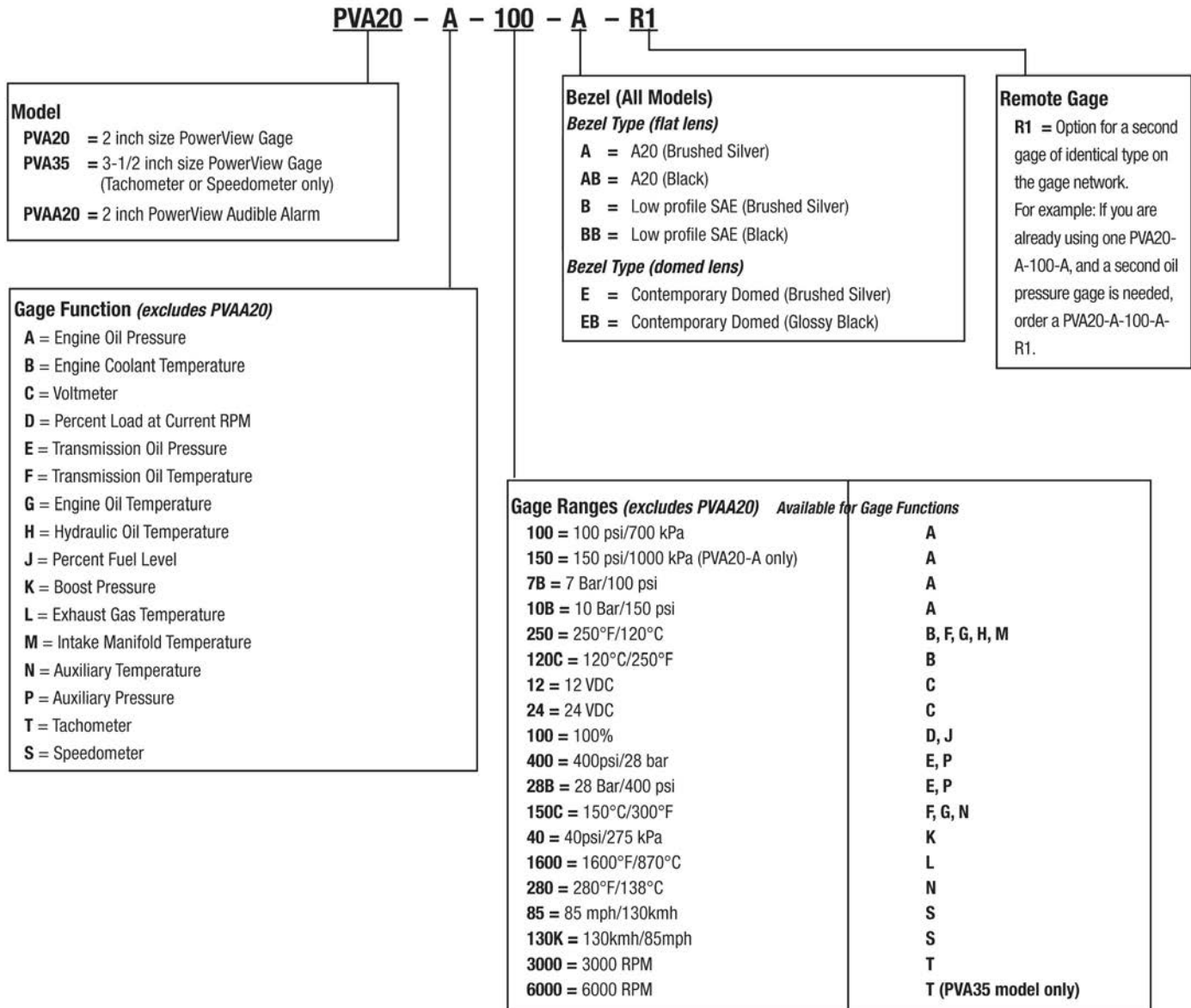
PVAA20 = Audible Alarm

PVA35 Series Models - 3 1/2 inch size gages

PVA35-T = Tachometer

PVA35-S = Speedometer

How to Order



Wiring Harness and Accessories

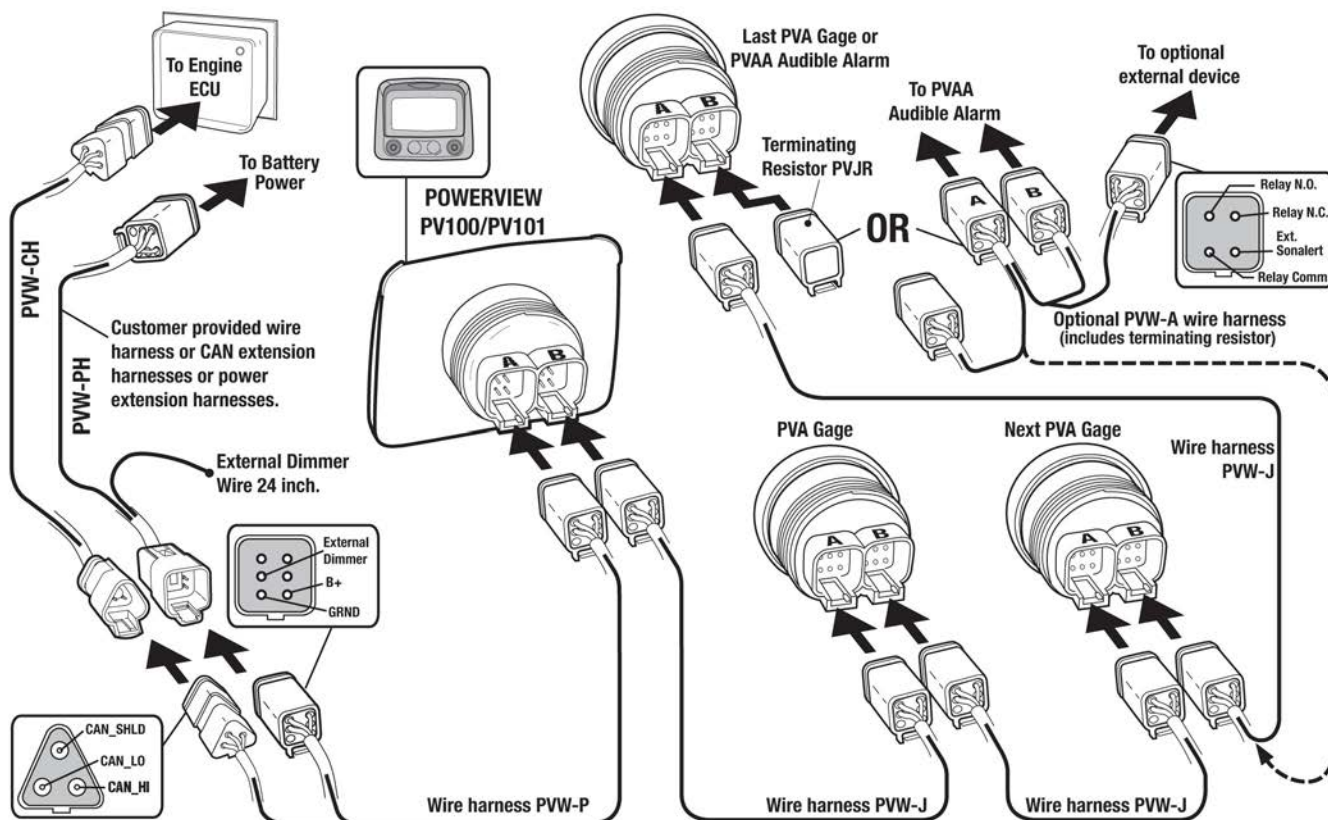
For ordering and connecting wire harnesses, see Bulletin 03020.

Shipping Weight All Models: 1 lb. (450 g)



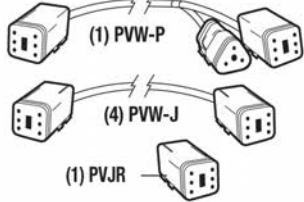
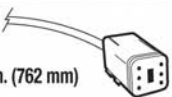

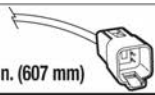

Shipping Dimensions All Models: 6x6x6 inches (153x153x153 mm)

Wiring Harness Accessories for PV101 PowerView Module and PVA Analog Gages

Use the Easy Connect Diagram below to help you locate the wiring harness you need.



Model	Wiring Harness Rendering	Wiring Harness Designation Schematic	Part Number
PVW - P - 12 CAN and Power Harness for PowerView Module	Length: 12 in. (305 mm)	PVW - P - 12 CAN and Power Harness (includes 120Ω CAN resistor)	78000124
Model	Wiring Harness Rendering	Wiring Harness Designation Schematic	Part Number
PVW - J PowerView Jumper Harness		PVW - J - 9 PowerView Jumper Harness Length: - 9 : 9 in. (229 mm) - 12 : 12 in. (305 mm) - 24 : 24 in. (607 mm)	78000121 78000122 78000123
Model	Wiring Harness Rendering	Wiring Harness Designation Schematic	Part Number
PVW-A-12 PowerView Audible Alarm Jumper Harness: Provides alarm relay contacts for external devices.	3 Relay Contacts PVA Gage	PVW - A - 9 Audible Alarm Jumper Harness Length: - 9 : 9 in. (229 mm) - 12 : 12 in. (305 mm) - 24 : 24 in. (607 mm) Includes terminating resistor.	78000153 78000154 78000155
Model	Terminating Resistor Rendering	Resistor Designation	Part Number
PVJR Terminating Resistor		PVJR Use on last PVA Gage in a series – not needed for PV100	78000128

Model	Wiring Harness Rendering	Wiring Harness Designation Schematic	Part Number
PVW-CH PowerView CAN Extension Harness		PVW - CH - 72 PowerView CAN Extension Harness Length: - 72 : 72 in. (1.82 m) - 144 : 144 in. (3.65 m) - 240 : 240 in. (6.10 m) - 360 : 360 in. (9.10 m)	78000157 78000158 78000159 78000160
Model	Wiring Harness Rendering	Wiring Harness Designation Schematic	Part Number
PVW-PH PowerView Battery Power Extension Harness		PVW - PH - 12 PowerView Battery Power Extension Harness Length: - 72 : 72 in. (1.82 m) - 144 : 144 in. (3.65 m) - 240 : 240 in. (6.10 m) - 360 : 360 in. (9.10 m)	78000149 78000150 78000151 78000152
Model	Wiring Kit Rendering	Wiring Harness Designation Schematic	Part Number
PVW-K PowerView Wiring Kit Includes: (1) PVW-P (4) PVW-J (1) PVJR		PVW - K - 12 Kit Length: - 12 : 12 in. (305 mm) - 24 : 24 in. (607 mm)	78000188 78000189
Model	PowerView CAN & Power Loose Wiring	Wiring Harness Designation	Part Number
PVW-PW-30 Length: 30 in. (762 mm)		PVW - PW - 30 PowerView CAN & Power Loose Wiring (Includes 120 ohm CAN resistor)	78000125
Model	PowerView CAN Loose Wiring	Wiring Harness Designation	Part Number
PVW-CC-24 Length: 24 in. (607 mm)		PVW - CC - 24 PowerView CAN Loose Wiring	78000127
Model	PowerView CAN Loose Wiring	Wiring Harness Designation	Part Number
PVW-PC-24 Length: 24 in. (607 mm)		PVW - PC - 24 PowerView Power Loose Wiring	78000126
Model	PowerView CAN Loose Wiring	Wiring Harness Designation	Part Number
PVW-CT		PVW - CT CAN BUS tee Wiring Harness	00009510

PowerView™ PVM Series Gages



Features

- For Modern Electronic Engines and Equipment Using SAE J1939 Controller Area Network
- Display SAE J1939 Parameters Broadcast by the PowerView System
- Cutting Edge, Stepper Motor Technology and Robust Functionality Combined
- Microprocessor Driven For High Accuracy
- Simple Installation and Wiring Design

The **PowerView PVM Series Gages** are intelligent gages designed to display easy-to-read information transmitted by the PowerView. The PVM gages communicate with the PowerView via a single RS485 twisted pair MODBUS® RTU serial link.

The gages can be daisy-chained using quick-connect harnesses.

The major feature of the PVM gages is their balance between design and functionality. These modern gages offer a selection of lens and bezel styles and colors.

The PVM gages also include features such as a smooth stepper motor operation for the 270° sweep pointer, an environmentally sealed case with two Amp Mini Universal Mate-N-Lok connectors molded into the casing, and green LED back lighting. They are available for standard 2-1/6" (52mm) and 3-3/8" (86mm) diameter hole sizes. In addition their plastic cases incorporate a "D" shape allowing panel cutouts that eliminate gage rotation during installation.

PVM20 Series Models

- | | |
|--|---|
| • PVM20-A - Engine Oil Pressure | • PVM20-J - Percent Fuel Level |
| • PVM20-B - Coolant Temperature | • PVM20-K - Boost Pressure |
| • PVM20-C - Voltmeter | • PVM20-L - Exhaust Gas Temperature |
| • PVM20-D - Percent Load at current RPM | • PVM20-M - Intake Manifold Temperature |
| • PVM20-E - Transmission Oil Pressure | • PVM20-N - Auxiliary Temperature |
| • PVM20-F - Transmission Oil Temperature | • PVM20-P - Auxiliary Pressure |
| • PVM20-G - Engine Oil Temperature | • PVM20-T - Tachometer |
| • PVM20-H - Hydraulic Oil Temperature | |

PVM35 Series Models

- PVM35-T - Tachometer
- PVM35-S - Speedometer

Specifications

PV101 Compatibility

- Maximum supported: 5 PVM Gages
- Maximum distance to last gage: 8.5 Meters

Power Supply Input Voltage

- 5V (4.5-5.5 VDC minimum & maximum voltage)

Power Supply Operating Current (@ 5 VDC) =

- PVM20, PVM35: 18 mA minimum; 80 mA maximum

Backlight Maximum Current: 60mA

Input: RS485 MODBUS® RTU data.

Output: Analog Readout.

Environmental

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

Storage Temperature: -67 to 185°F (-55° to 85°C)

Environmental Sealed Enclosure:

- Sealing: IP68, ±5 PSI (± 34.4 kPa)
- Case and Clamp Material: Polyester (PBT)
- Lens Material: Polycarbonate
- Bezel Material: Polyester (PBT)

Dial: White numerals over black background

Return-To-Zero Needle Movement: Not Available for PVM20 models.

Indicating Pointer: Stepper motor operation with 270° sweep

Gage Accuracy: Better than ± 1.0% of scale

Maximum Panel Thickness: 3/8 inch (9.6 mm)

Connectors:

- Amp Mini Universal Mate-N-Lok
- Amp Plug P/N: 172338-1
- Amp Socket P/N: 171639-1

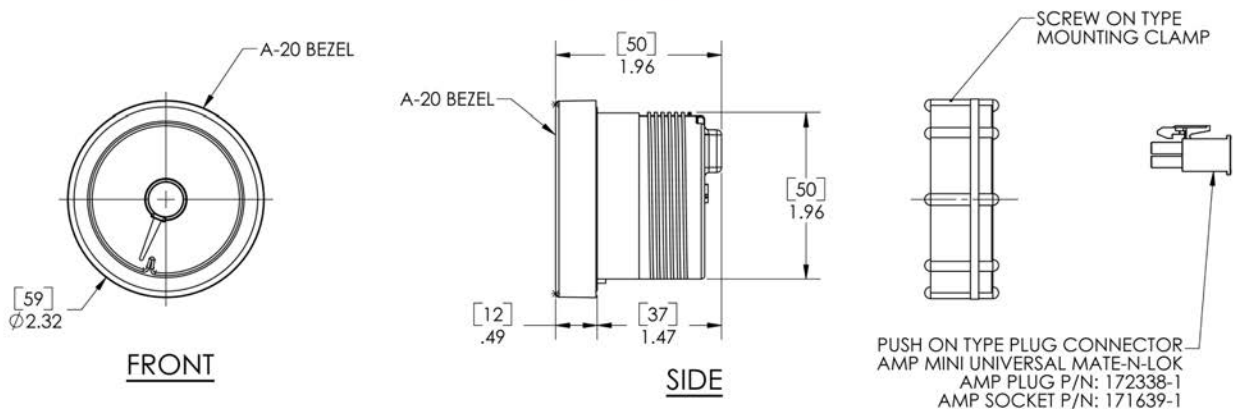
Shipping Weight: 1 Lb. (450 g.)

Shipping Dimensions:

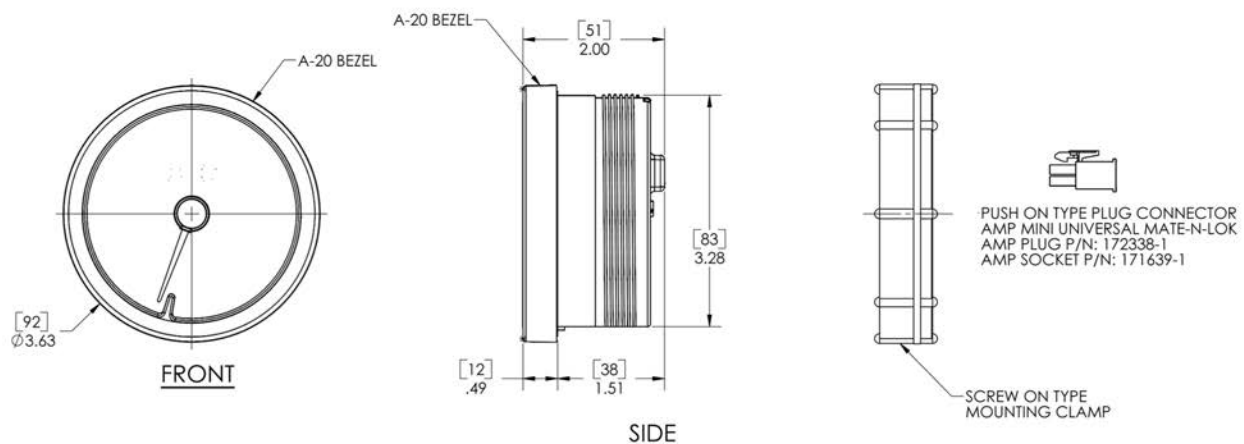
- 6 x 6 x 6 in. (153 x 153 x 153 mm)

Typical Gage Dimensions

PVM20 Series









PVM35 Series









Bezel Styles

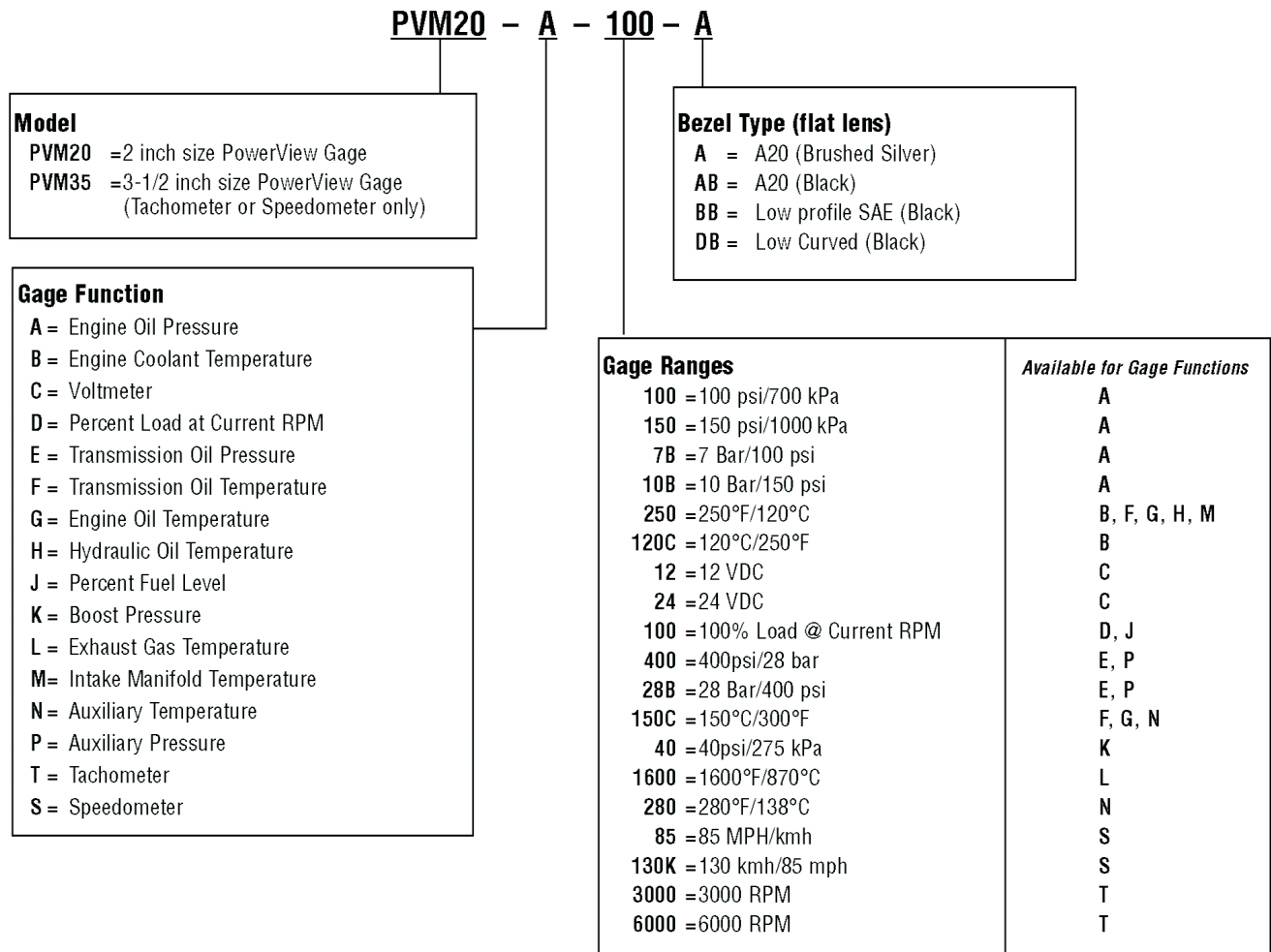
PVM20 Series – 2 inch size gages

AB A-20 Style	A A-20 Style	BB Low Profile SAE Style
 	 	 

PVM35 Series – 3-1/2 inch size gages

AB A-20 Style	A A-20 Style	BB Low Profile SAE Style
 	 	 

How to Order

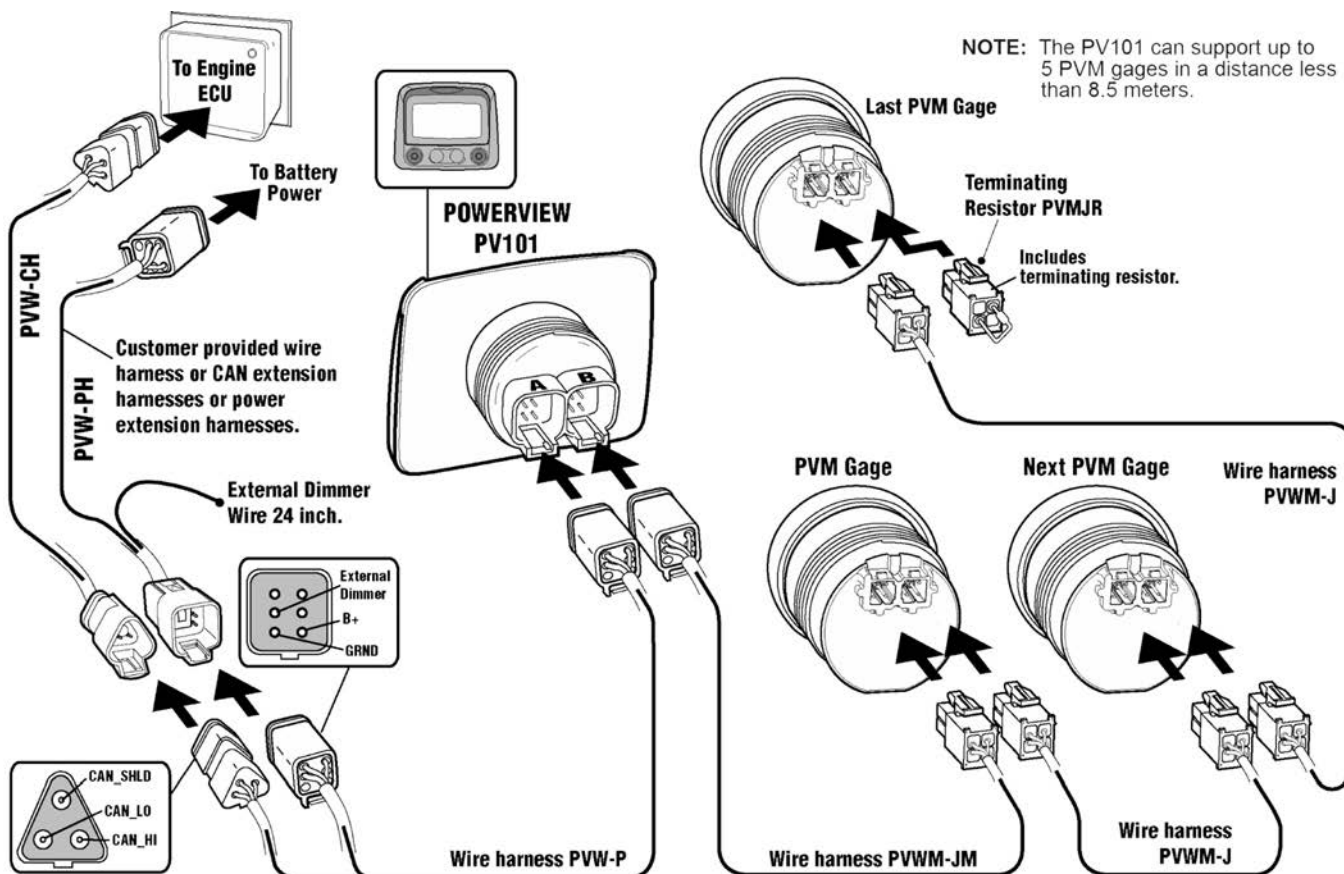


Wiring Harnesses and Accessories




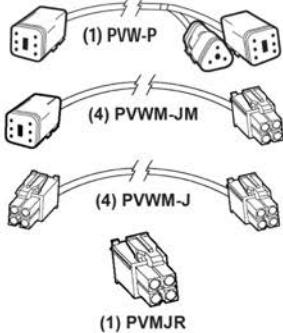
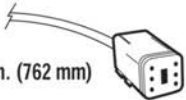
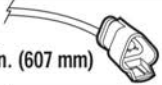
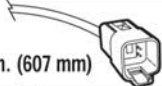

For details see bulletin "0710179 - Wiring Harness Accessories for PVM Gages"

Wiring Harness Accessories for PowerView™ - Model PV101 and PVM Gages

Use the Easy Connect Diagram below to help you locate the wiring harness you need. The charge below the diagram includes the harness schematic to help you with selection of wiring leads length, if applicable.



Model	Wiring harness Rendering	Wiring Harness Designation Schematic	Part Number
PVW-P-12 CAN and Power Harness for PowerView Module	 Length: 12 in. (305 mm)	PVW - P - 12 CAN and Power Harness (includes 120Ω CAN resistor)	78-00-0124
PVWM-J PVM Gage Harness	 Length: 9 in. (229 mm)	PVWM - J - 9 PowerView Jumper Harness Length: - 9 : 9 in. (229 mm) - 12 : 12 in. (305 mm) - 24 : 24 in. (607 mm)	78-00-0479 78-00-0490 78-00-0503
PVWM-JM PowerView Jumper Harness	 Length: 9 in. (229 mm)	PVWM - JM - 9 PowerView Jumper Harness Length: - 9 : 9 in. (229 mm) - 12 : 12 in. (305 mm) - 24 : 24 in. (607 mm)	78-00-0481 78-00-0504 78-00-0505

Model	Wiring Harness Rendering	Wiring Harness Designation Schematic	Part Number
PVW-CH PowerView CAN Extension Harness		PVW - CH- 72 PowerView CAN Extension Harness Length: - 72 : 72 in. (1.82 m) - 144 : 144 in. (3.65 m) - 240 : 240 in. (6.10 m) - 360 : 360 in. (9.10 m)	78-00-0157 78-00-0158 78-00-0159 78-00-0160
PVW-PH PowerView Battery Power Extension Harness		PVW - PH- 12 PowerView Battery Power Extension Harness Length: - 72 : 72 in. (1.82 m) - 144 : 144 in. (3.65 m) - 240 : 240 in. (6.10 m) - 360 : 360 in. (9.10 m)	78-00-0149 78-00-0150 78-00-0151 78-00-0152
Model	Terminating Resistor Rendering	Wiring Harness Designation Schematic	Part Number
PVMJR Terminating Resistor		PVMJR Use on last PVM Gage in a series – not needed for PV101.	78-00-0480
Model	Wiring Kit Rendering	Wiring Harness Designation Schematic	Part Number
PVWM-K PV101-PVM Wiring Kit Includes: (1) PVW-P (4) PVWM-J (?) PVWM-JM (1) PVMJR		PVWM - K- 12 Kit Length: - 12 : 12 in. (305 mm) - 24 : 24 in. (607 mm)	78-00-0511 78-00-0512
Model	PowerView CAN & Power Loose Wiring	Wiring Harness Designation	Part Number
PVW-PW-30	 Length: 30 in. (762 mm)	PVW - PW- 30 PowerView CAN & Power Loose Wiring (Includes 120 ohm CAN resistor)	78-00-0125
Model	PowerView CAN Loose Wiring	Wiring Harness Designation	Part Number
PVW-CC-24	 Length: 24 in. (607 mm)	PVW - CC- 24 PowerView CAN Loose Wiring	78-00-0127
PVW-PC-24	 Length: 24 in. (607 mm)	PVW - PC- 24 PowerView Power Loose Wiring	78-00-0126
PVW-CT		PVW - CT CAN BUS tee Wiring Harness	00-00-9510

PVS-5 Power Supply



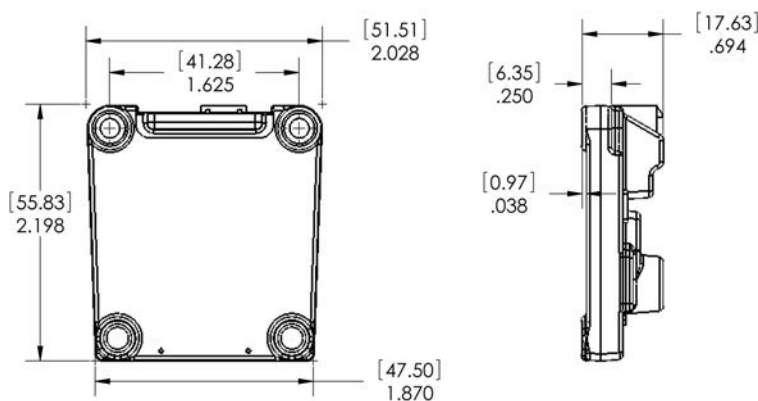
Features

- Provides 5 Volt Power Supply to PVM Gages
- Capable of Supplying Power to a Maximum of 6 PVM Gages
- Enables PVM Gage Compatibility With Existing MurphyLink Products

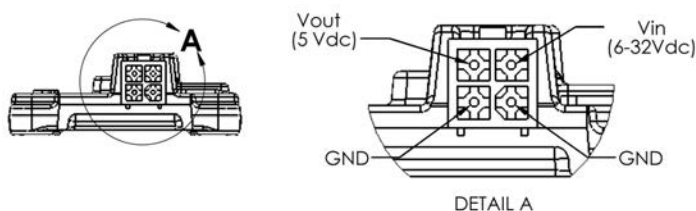
External power is required to make the PVM gage line compatible with existing MurphyLink products, i.e. PV1000, Cascade, iGuard, and eGuard. The PVS-5 power supply device supplies 5 Volts of external power and load dump protection for up to 6 PVM gages. The maximum length of the power and data connection between gages is 0.5 meters (8.5 meters total).

The unit may be installed inside a panel or behind a dash.

Product Dimensions



Wiring Diagram



Mating Connector - Tyco Electronics AMP Mini Universal Mate-N-Lok Plug Housing 4 Position,
AMP P/N 172338-1
Murphy P/N 00-00-6935

Specifications

Input Voltage:

- 6 VDC minimum to 32 VDC maximum
- 12/24 VDC Nominal

Output Voltage: 5 VDC @ 450mA maximum

Reverse Polarity Protection: -36VDC

Overvoltage Protection: +36VDC and above

Overcurrent Protection: 600mA @ 36VDA maximum

Connector: AMP 1-770968-1

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

Storage Temperature: -40°F to 221°F (40°C to +105°C)

Random Vibration: 5-2,000 Hz

Operating Shock: 50G

Certification: CE

Case Material: Polyamide

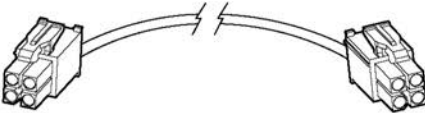
Dimensions: 2"x2"x.75"

Mounting Hole Dimensions: Two #8 screws, 1.625" offset

How to Order

P/N 78-70-0383 - PVS-5 Power Supply

Accessories

Model	Wiring harness Rendering	Wiring Harness Designation Schematic	Part Number
<div>PVWM-J</div> <div>PVM Gage Harness</div>		<div><div><div>PVWM - J - 9</div><div>PowerView Jumper Harness</div></div><div><div>Length:</div><div>- 9 : 9 in. (229 mm) - 12 : 12 in. (305 mm) - 24 : 24 in. (607 mm)</div></div></div>	<div>78-00-0479</div> <div>78-00-0490</div> <div>78-00-0503</div>

SenderCAN™ - SAE J1939 Input/Output Module



Features

- Compatible with SAE J1939 CANbus engines
- Up to 4 sender/switch inputs
- Up to 2 gauge/control outputs
- OEM specifies I/O and CANbus messages
- Compact, sealed epoxy-filled case

SenderCAN™ is a compact, encapsulated input & output module for J1939 CANbus systems. SenderCAN allows the integration of analogue and digital measurement, control and indicating devices into modern CAN and ECU-based engines and systems.

SenderCAN has up to four inputs and two outputs, each of which is factory configured to OEM requirements. Inputs can be set for use with resistive sender or switch signals, which are translated into J1939 CANbus messages with appropriate PGN address, data scaling and transmission rate. Outputs can be configured to drive gauges, lamps, relays or other control devices, based on received J1939 data.

Standard versions are available for use with common senders (for example, the FuelCAN and MeCAN), but SenderCAN is primarily intended for OEM-specified input, output and CANbus requirements. Please note that minimum order quantities or charges apply for custom solutions.

SenderCAN is compact and light enough for inclusion in most wiring harnesses, but can also be surface mounted. The case is fully sealed in epoxy resin for high impact and environmental resistance.

Specifications

Power supply

Operating voltage: 7 to 35 VDC

Current consumption: 25mA (typ.)

Input/Output

Input range: OEM/application specific, -2 to +35 VDC max.

Output: OEM/application specific, 250mA max.

CANbus:

SAE J1939 protocol, optional 120 Ohm terminating resistor

Physical

Case material: high impact ABS, epoxy filled

Dimensions: see diagram

Weight: approx 60 g / 0.13 lb

Operating temperature: -40 to +85 °C / -40 to +185 °F

Environmental sealing: IP65 case, exposed lead ends

Electromagnetic compatibility: 2004/108/EC

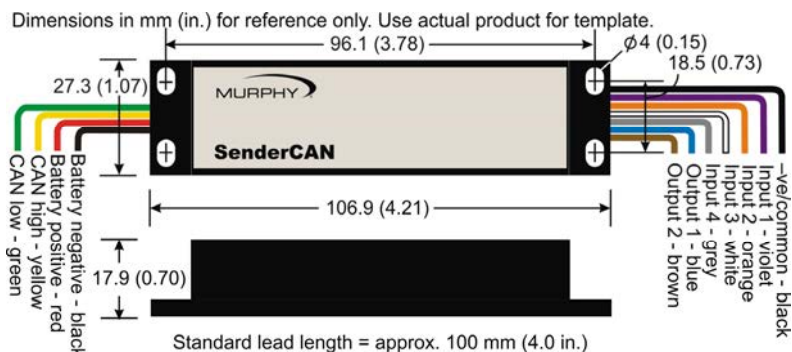
Electrical:

- J1113-11 pulses 1c, 2a, 3a/b and 5a
- EN 61000-4-2 ESD
- EN 61000-4-3 Radiated disturbance
- EN 61000-4-4 Fast transients
- EN 61000-4-5 High energy transients
- EN 61000-4-6 Conducted RF disturbance
- CISPR 16-1-2, 4.3 Conducted emissions
- CISPR 16-2-3 Radiated emissions

How to order

Please contact your Murphy representative to discuss requirements. Also see FuelCAN and MeCAN variants literature.

Connection & Dimensions



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MeCAN™ - Mechanical Engine to J1939 CAN Interface



Features

- Integrates mechanical engines and sensors into J1939 instrument systems
- Inputs for speed sensors, resistive senders and fault switches
- Engine hour tracking

MeCAN™ is a compact, encapsulated interface module that translates resistive sender, fault switch and speed signals into SAE J1939 CANbus data. MeCAN allows quick and simple integration of mechanical engines into modern CANbus systems. Applications include the retrofit of older engine fleets with modern digital instruments, controls and telemetry, and the development of standard control panels for mechanical engines.

MeCAN has three sensor inputs and one output. Two inputs are for oil pressure and coolant temperature sensing, either by fault switches or resistive senders. The third input measures engine speed using a magnetic pickup or charge alternator signal. Input signals are translated into SAE J1939 CANbus messages with assigned PGN address, data scaling and transmission rate. The output can drive an alarm lamp or buzzer or actuate a shut-down relay if the pressure, temperature or speed inputs deviate outside preset fault limits.

A fourth input is connected to a speed calibration potentiometer during setup mode only. DIP switches allow selection of normal/setup mode and two speed input ranges. An LED gives indication of operating mode and CANbus activity.

MeCAN is compact and light enough for inclusion in engine wiring harnesses, but can also be surface mounted. The case is fully sealed in epoxy resin for high impact and environmental resistance. Two standard versions allow use with either fault switches or Murphy ES series resistive senders. Custom solutions are also available for non-standard, volume OEM requirements.

Specifications

Power supply

Operating voltage: 7 to 35 VDC

Current consumption: 25mA (typ.)

Inputs

Maximum operating range: -2 to +35 VDC max.

Oil pressure, coolant temperature (model MEC301-1):

for Murphy ES(2)P and ES(2)T series resistive senders

Oil pressure, coolant temperature (model MEC301-2):

for fault switch, closing to negative DC on fault

Speed (magnetic pickup): opto-isolated, 3 – 30 Vrms, adjustable 10 – 180 pulses per rev

Speed calibration: 0 – 5 kOhm potentiometer (setup only)

Outputs (all ratings non-reactive)

Shutdown: negative Low-side or ground switch, 250mA max.

CANbus: SAE J1939 protocol with 120 Ohm terminating resistor

Physical

Case material: high impact ABS, epoxy filled

Dimensions: see diagram

Weight: approx 60 g / 0.13 lb

Operating temperature: -40°C to +85°C (-40°F to +185°F)

Environmental sealing: IP65 case (with DIP switch protective film intact), exposed lead ends

Electromagnetic compatibility: 2004/108/EC

Electrical:

- J1113-11 pulses 1c, 2a, 3a/b and 5a

- EN 61000-4-2 ESD

- EN 61000-4-3 Radiated disturbance

- EN 61000-4-4 Fast transients

- EN 61000-4-5 High energy transients

- EN 61000-4-6 Conducted RF disturbance

- CISPR 16-1-2, 4.3 Conducted emissions

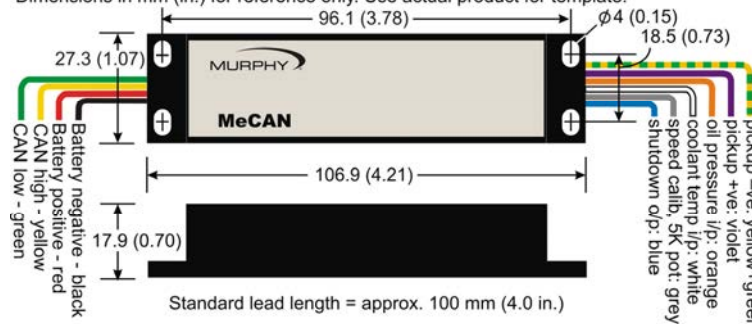
- CISPR 16-2-3 Radiated emissions

Messages Broadcast

PGN	Description
61444	Engine RPM
65263	Oil Pressure
65262	Coolant Temperature
65271	Battery Voltage
65253	Engine Hours

Connection & Dimensions

Dimensions in mm (in.) for reference only. Use actual product for template.



How to Order

Part Number	Description
E2501000	MeCAN, with terminating resistor
E2501200	MeCAN, with terminating resistor; use with pressure & temperature switches (output closes to ground on fault)
E2501300	MeCAN, with terminating resistor; use with Murphy ES(2)P pressure and ES(2)T temperature senders

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FuelCAN™- Fuel Level Sender to J1939 Transmitter



Features

- Converts fuel level sender readings to J1939 CANbus messages
- Compatible with Murphy ES series and other resistive fuel level senders
- Compact, sealed epoxy-filled case

FuelCAN is a compact interface that translates fuel level sender signals into SAE J1939 CANbus messages. The device allows integration of standard senders into modern J1939/CANbus engine instrument and control systems.

FuelCAN modules have three inputs (only one of which is connected at any one time): input 1 is configured for use with Murphy ES series resistive fuel level senders; inputs 2 and 3 can be used with fuel level senders having compatible resistance ranges as shown right.

FuelCAN inputs can also be factory-configured for use with other types of fuel level or resistive senders.

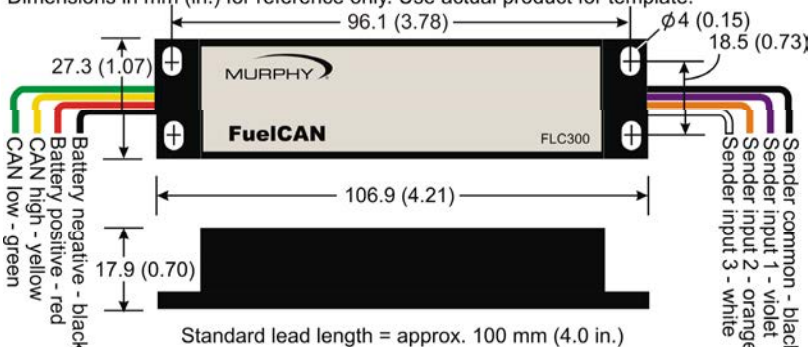
A rear facing LED indicates input/CANbus status.

FuelCAN is compact and light enough to be incorporated into most wiring harnesses, but can also be surface mounted. The polycarbonate case is fully sealed in epoxy resin for high impact and environmental resistance.

	fuel level / approx. resistance, Ohms				
	empty	1/4	1/2	3/4	full
Input 1 (Murphy)	240	147	96	60	33.5
Input 2	240	158	100	58	30
Input 3	10	56	95	138	180

Connection & Dimensions

Dimensions in mm (in.) for reference only. Use actual product for template.



Specifications

Power supply

Operating voltage: 7 to 35 VDC

Current consumption: 25mA (typ.)

Inputs

Maximum operating range: -2 to +35 VDC

Input 1 sender range, Ohms: 240 (empty) to 33.5 (full)

Input 2 sender range, Ohms: 240 (empty) to 30 (full)

Input 3 sender range, Ohms: 10 (empty) to 180 (full)

Outputs

CANbus: SAE J1939 protocol, PGN 65276 (00FEFC₁₆)

- 2 sec update rate

- 120 Ohm terminating resistor optionally fitted

Physical

Case material: high impact ABS, epoxy filled

Dimensions: see diagram left

Weight: approx 60 g / 0.13 lb

Operating temperature: -40°C to -85°C (-40° to -185°F)

Environmental sealing: IP65 case, exposed lead ends

Electromagnetic compatibility: 2004/108/EC

Electrical:

- J1113-11 pulses 1c, 2a, 3a/b and 5a

- EN 61000-4-2 ESD

- EN 61000-4-3 Radiated disturbance

- EN 61000-4-4 Fast transients

- EN 61000-4-5 High energy transients

- EN 61000-4-6 Conducted RF disturbance

- CISPR 16-1-2, 4.3 Conducted emissions

- CISPR 16-2-3 Radiated emissions

How to order

Part Number	Description
E2502000	FuelCAN
E2502100	FuelCAN, with terminating resistor

Please contact your Murphy representative to discuss requirements. Also see SenderCAN and MeCAN variants literature.

Note: Minimum order quantities apply for custom solutions.

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XM500 I/O Module

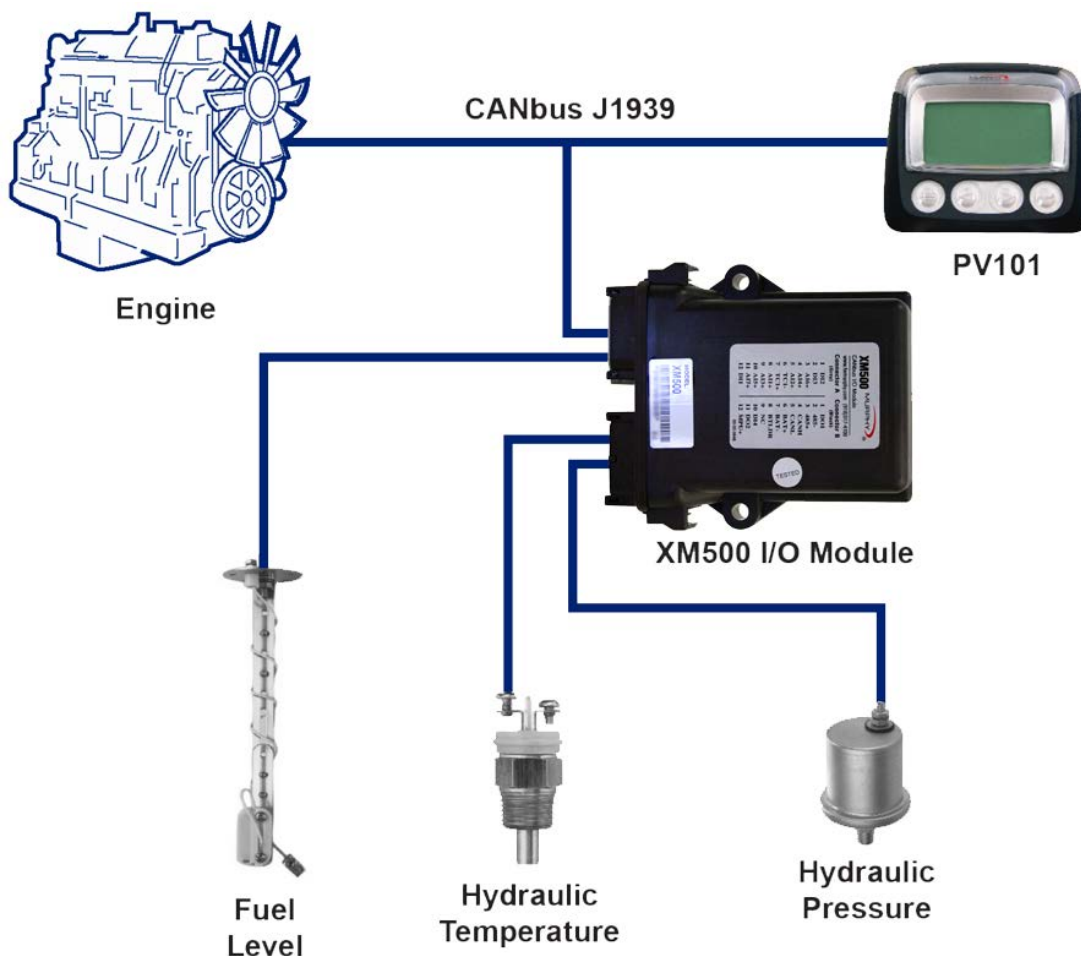


Features

- Adds I/o To J1939 Network
- Works With Standard J1939 Display Modules
- Wide Operating Temperature Range
- Industry Standard Deutsch Enclosure and Connectors
- Custom Programming Available
- Easy-to-Use Configuration Tool Available

The XM500 Module is a configurable Input/Output (I/O) module designed to bring analog and digital inputs and output onto the SAE J1939 Controller Area Network. The XM500 Config Tool provides a user-friendly interface allowing the user to create or change the configuration used on the XM500 module.

Your application may require monitoring of other information which may not be provided by the OEM Engine or Transmission Electronic Control Unit (ECU), such as Fuel Level, Hydraulic Oil Pressure, or a Low Engine Coolant Level switch. The XM500 is ideally suited to bring the additional information you need onto the J1939 CANBus, and can be configured to broadcast fault codes and activate digital outputs per input condition such as Fuel Level Low, Hydraulic Oil Temperature High, etc. Because the XM500 broadcasts information using the J1939 standard protocol, the information can be displayed using standard J1939 display modules, such as the PowerView PV101.



Specifications

Power Input: 8 to 28VDC

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

Digital Inputs: 4 - Ground or battery positive activation

Digital Outputs*: 2 Sinking (500 mA)

**(Outputs are NOT reverse polarity protected. Damage will occur if B+ is connected to the outputs.)*

Damage incurred from improper installation is not covered under the FW Murphy limited warranty policy.)

Thermocouple Input¹: Type K and Type J

Analog Inputs²:

1 - Battery Supply Voltage (dedicated)

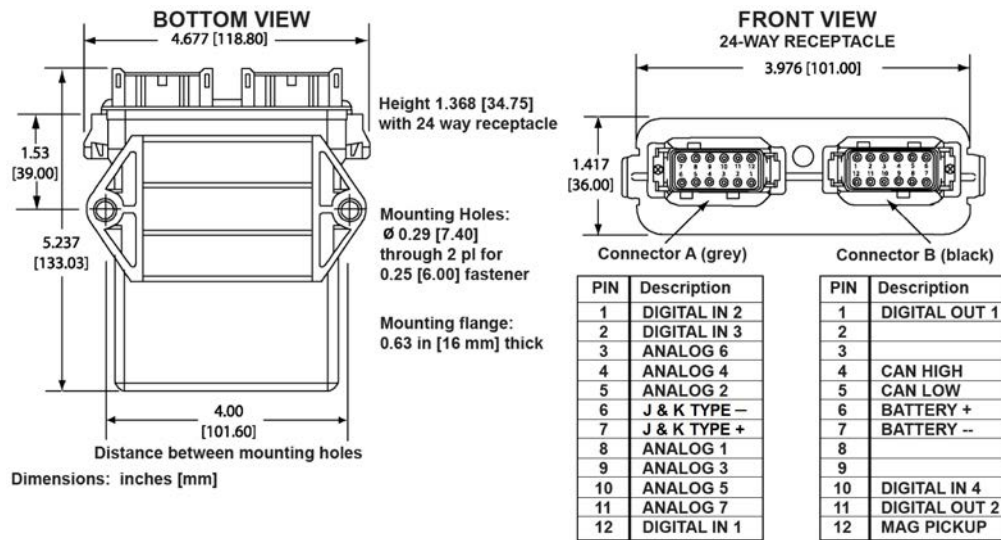
7 - Configurable as 0-5VDC, 4-20mA, resistive senders³ or used as an additional Digital Input

Speed Sensing Input: Magnetic Pick-up (2 to 120VAC RMS from 30 to 10,000 Hz)

¹When the thermocouple input is used, only 5 resistive, 4-20 mA, or 0-5 VDC can be used instead of 7.

²Analog inputs can be exchanged for digital inputs (battery ground activation only), for a total of eleven digital inputs.

³Other resistive senders can be supported. Contact FW Murphy's Industrial Panel Division for programming charges.



How to Order

Part #	Description
78700420	- XM500 Murphy Standard (To determine other configurations, review XM500 Config & Wiring documents at www.fwmurphy.com .)
78700534	- XM500 Configuration Tool

Wiring Harnessing:

30000669	- 6' harness with terminating resistor		30000670	- 12' harness with terminating resistor
30000685	- 6' harness without terminating resistor		30000686	- 12' harness without terminating resistor

CANdrive™ - CANbus J1939 to Electric Gage Interface



Patent applied for GB2424280



Features

- For modern electronic engines and equipment applications using SAE J1939 Controller Area Network
- Drives standard electric gauges
- User-configurable compatibility with Murphy, VDO or Datcon gauges
- Engine fault LED option

As part of the MurphyLink® family, CANdrive offers a cost effective instrument solution for modern electronic engines. CANdrive modules read engine ECU CANbus/J1939 data, drive standard electric panel gauges, and provide LED indication of status and faults.

CANdrive has three dedicated outputs for tachometer, oil pressure and coolant temperature gauges, with DIP switch-selectable compatibility for Murphy, VDO or Datcon gauges. For volume orders, the outputs can be custom-configured for other gauge types, lamps, relays or remote signalling.

CANdrive advantages include:

- the retrofitting of existing electric gauge panels to new, J1939 compatible engines
- the use of standard, economical electric gauges with new J1939 engines
- no need for installation of additional gauge senders, tachometer magnetic pickups and wiring.

CANdrive is packaged in a compact, surface mounted case with epoxy encapsulation for maximum durability and environmental sealing. Electrical connection is via a 12-way automotive type connector. Model CDV100F has a forward facing connector and one power/CAN status LED. Model CDV300R has 8 LEDs for indication of J1939-transmitted engine faults and status. All models include a 6-way DIP switch for flexible configuration.

Specifications

Power supply

Operating voltage,

12V range (switch S5 on/up): 7 to 16 VDC
24V range (switch S5 off/down): 19 to 30 VDC

Current consumption:

CDV100: 25 mA typ.
CDV300: 50 mA typ. (2 LEDs lit)

Inputs

CANbus: SAE J1939 protocol. Input has a 120 Ohm terminating resistor, removable by switch S4.

Outputs (all ratings non-reactive)

Oil pressure gauge, engine temperature gauge:

switch selectable for Murphy, VDO or Datcon gauges:
see Gauge Compatibility section for pressure/temperature verses equivalent sender resistance tables

Tachometer: pulsed DC, 119 Hz $\pm 1\%$ @ 1500 RPM

Physical

Electromagnetic compatibility: 2004/108/EC

Case material: polycarbonate / polyester / epoxy encapsulation

Overall dimensions (w x h x d):

68 x 92 x 22mm / 2.7 x 3.8 x 0.9 in.
(allow 50mm / 2.0 in. depth with connector)

Weight: approx 80g / 0.2 lb

Temperature:

operation: -40 to $+85^{\circ}\text{C}$ / -40 to $+185^{\circ}\text{F}$, 70% RH
storage: -55 to $+105^{\circ}\text{C}$ / -67 to $+221^{\circ}\text{F}$

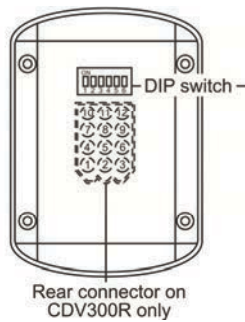
Environmental sealing: IP60

(CDV300R: IP65 from front with optional CDVG gasket)

Vibration: 15g, 10 to 2000 Hz, 3-axis

Shock: 50g, 11 mS, 3-axis

CDV100 Front CDV300R Front Rear View and Configuration



Switch position		Options:				
S1	S2	S3	S4	S5		
▲	▲	▲			Murphy EG(S) temp. & pressure gauges	
▼	▲	▲			Datcon temp. & 0 – 7 bar pressure gauges	
▼	▲	▼			Datcon temp. & 0 – 10 bar pressure gauges	
▲	▼	▲			VDO temp. & 0 – 5 bar pressure gauges	
▲	▼	▼			VDO temp. & 0 – 10 bar pressure gauges	
			▲		CAN 120 Ohm terminating resistor in circuit	
			▼		CAN 120 Ohm terminating resistor removed	
				▲	12V DC power supply	
				▼	24V DC power supply	

Gauge Compatibility

Pressure gauge compatibility table: pressure versus approximate equivalent sender resistance (Ohms)

Pressure	psi	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140
	bar	0	0.7	1.4	2.1	2.8	3.4	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0	9.7
Murphy ES series	240	205	171	143	123	103	88	74	60	47	33					
Datcon 0 – 7 bar	240	195	160	140	115	100	82	68	55	43	35					
Datcon 0 – 10 bar	240	215	190	168	150	135	118	107	97	87	77	67	58	50	42	
VDO 0 – 5 bar	10	38	61	85	110	130	155	180								
VDO 0 – 10 bar	15	30	45	60	70	81	92	103	114	125	136	148	160	170	182	

Temperature gauge compatibility table: temperature versus approximate equivalent sender resistance (Ohms)

Temperature	°C	40	50	60	70	80	90	100	110	120	130	140
	°F	104	122	140	158	176	194	212	230	248	266	284
Murphy ES series	1029	680	460	321	227	164	120	89	74	52	40	
Datcon	360		160		80		50		38			
VDO	282.4	190.0	134.0	95.2	69.1	51.2	38.5	29.4	22.7	18.0	14.5	

Tachometer compatibility: pulsed DC output, 119 Hz \pm 1% at 1500 RPM, e.g. for use with Murphy ATA and ATHA tachometers

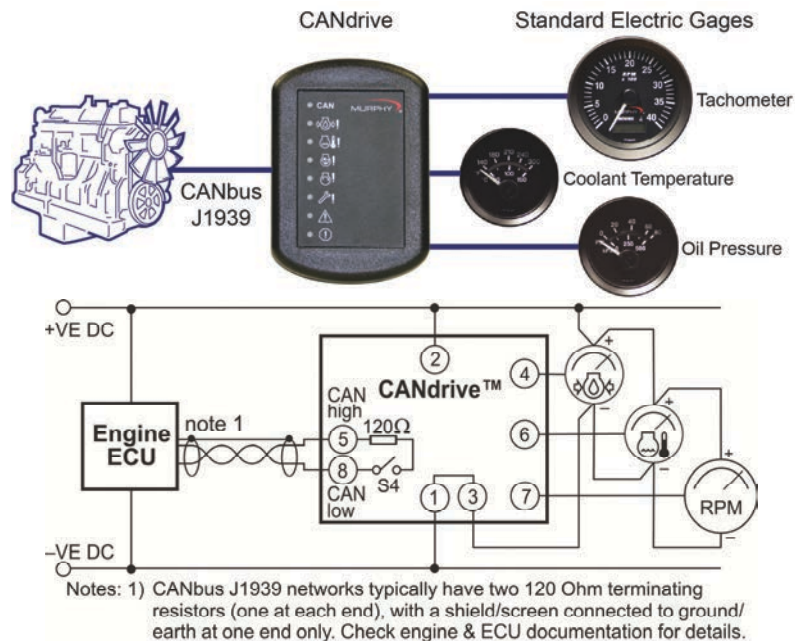
How to Order

Stock Code	Description
79.70.0104	CDV100F, CANdrive™ J1939 to gauge interface, 1 x CAN status LED, connector forward
79.70.0105	CDV300R, CANdrive™ J1939 to gauge interface, 8 x status/fault LEDs, connector rearward
78.00.0437	CDV-PW-30, 8 way wiring harness, length 30 in./760mm
79.70.100	CDVG, optional sealing gasket for CDV300R
78.70.0363	CDV100F plus CDV-PW-30 harness
78.70.0364	CDV300R, CDV-PW-30 and CDVG gasket
79.70.1001	CANdrive connector plug shell
79.70.1002	Connector pins for above (pack of 50)

Further Information

Document	Description
00-02-0618	CANdrive installation and operation
00-02-0251	EG(S)21 series electric gage installation
00-02-0258	AT series tachometer installation

Connection



Numerics

12	33
20 and 25 Series	5
20 and 25 Series Pressure SWITCHGAGE ...	5
20 and 25 Series Temperature Switchgag	5
20, 25, A20 and A25 Series Temperature Switchgag	11
20DP	3
45APE	23
45APE Pressure Switchgag	23
45TE	19
75160 Series	3
9620	1
9630	3

A

A20	1
A20 and A25	1
A20 and A25 Series Pressure Switchgag ...	9
A20 and A25 Series Temperature SWITCHGAGE	1
A20 and A25 Series Vacuum Switchgag ...	1
A20DP and A25DP Series	3
A91	5
AEC101	9
Air Temperature Sensor	33
Analog Gages	23
Annunciator Panel	17
AT and ATH	1
AT03069	49
Automatic Engine Controller	9
Auto-Start/Stop Controller	7, 5

B

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Bilge Level Switch System	1
BLSK1	1
B-Series Murphygag	13

C

C4 Series	9
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Cascade	7, 5
Centurion	9
Centurion™ Control Panel	19
Centurion™ PLUS	13
Centurion™ PLUS Controller Panel	21
Clutch Operator	51
Control Systems & Services	25
Crankcase Level Switch	23

D

DF Series	3
Diagnostic Panel Kits For Cummins B and C-Series Engines	23
Dial Level Switchgag	33
Dial Temperature SWITCHGAGE	19
Diesel Fuel Check Valves	1
Diesel-Fuel Shutoff Valves	3
Differential Pressure for Filter Restriction	3
Digital Tachometer and Hourmeter	5, 7
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Direct-Mount Temperature Switchgag	15
DSI	25
Dual Temperature SWITCHGAGE	23
Dump Valves	31
DVU	31

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Electronic Speed Switches	9
Electronic Vibration Switch	17
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System	31, 33, 35, 37, 41
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F

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H

HD9063	9
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Hydrostatic Head Level Switches	3

I

I/O Module ...	43, 13, 21, 27, 7, 11, 1, 5, 7, 43
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Level Maintainer	13
Level Switchgag	7
Liquid Level Switches	27
LM2000/LM2000S	9, 25
LM300	13
LR500	15
LR857	17
LS200 & L1100	27
Lube Level Maintainer	9, 25
Lube Level Switchgag	21

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M2582-P	11
M310	39
M50	7
M5180-P	11
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MeCAN	39
Micro-Controller/Annunciator	7
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MPI 601 Series	23
MPI Brushless Alternators	29
MPI Detonation Sensing Interface	25
MT90	3
MTH6	5
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Oil Level Regulators	15
Oil Level Switchgag	19
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OPL Pressure Gage and Switchgag	17
OPLH / OPLHACS	33
OS77D	9

P

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PD8100	13
Pneumatic Valves for Fuel Gas Shutoff	11
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Selectronic® Flasher Alarm Light	1
SenderCAN	37
Sensing Bulb/Scale/Capillary	
Length Combinations	11
Sentinel 150 Series	13
Sentinel 300P Series	17
Series 1501	7
SHD30-45	7
Shock and Vibration Control Switch	23
Shock and Vibration Switch	19
Shutdown Panel Kits	21
Shutdown Panels for DEUTZ	13
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Shutdown Panels for Irrigation	
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Solenoids for Diesel Engines	43
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SV-Series	3
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Swichgage® Kits for Engines	9, 41
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Swichgage® Shutdown Panel Kit	27, 29
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T

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TATTLETALE® Annunciators	7
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W0163	23
W0168	27

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TERMS AND CONDITIONS OF SALE

Prices:

Prices are stated in U.S. Dollars at User Net (List Price) less applicable discount, or Net if so stated. Verbal quotes are subject to confirmation by a written quotation from authorized personnel of Enovation Controls. 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 Enovation Controls. The company will not be liable for any delay or damage caused by circumstances beyond Enovation Controls 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 Enovation Controls.

Cancellation and Alterations:

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 Enovation Controls 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. Enovation Controls will assist in so far 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 back order 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. Enovation Controls 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 Enovation Controls 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 authorized Enovation Controls representative. 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 re-stocking charge will be made against all returns of "Standard" (Make-to-Stock) items. A higher re-stocking charge will apply to all "Non-Standard" (Assemble-to-Order) items. "Custom" (Make-to-Order) or special purchase items are not returnable. 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.

Warranty:

All Enovation Controls manufactured products are warranted against defects in materials and workmanship.

The Warranty statement is available upon request or is available on our web site at www.fwmurphy.com. Repairs beyond the new product warranty carry a 90-day repair warranty.

www.fwmurphy.com/warranty

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

ENOVATION CONTROLS LIMITED WARRANTY



Enovation Controls 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

Enovation Controls Manufactured Products. Enovation Controls warrants all Enovation Controls 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.

Non-Enovation Controls Manufactured Products. When Enovation Controls supplies product(s) manufactured by others, the warranty extended to Enovation Controls will be passed through to Enovation Controls customer.

During the warranty period, at its sole option, Enovation Controls will use reasonable efforts to repair or replace any defective product; provided, however, that the customer has returned the defective product to Enovation Controls, shipping costs prepaid. Any repair or replacement, at Enovation Controls' option, shall be the customer's sole and exclusive remedy. We are not responsible for damage caused by improper installation, neglect or abuse and are limited under warranty to repairing or replacing the item only. We are not liable for equipment on which this product is installed.

WARRANTY DISCLAIMER

ENOVATION CONTROLS 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.

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 Enovation Controls 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 Enovation Controls 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. ENOVATION CONTROLS' LIABILITY IN ALL EVENTS SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCT THAT GIVES RISE TO ANY LIABILITY. ENOVATION CONTROLS' 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.

WARRANTY



Important Notice Regarding Product Repairs and Warranty Claims

In order to provide you with the best service possible and to expedite all product repairs and warranty claims, we are changing the processes required to complete the repair or warranty claim. This will require certain actions and information on your part. Partial details follow. For complete details please contact your product Inside Sales Representative.

WR Number:

A Warranty/Repair Return Authorization Number (WR#) will be required prior to all product returns. This number will allow both of us to track the product and to expedite processing of your request. Simply contact our Inside Sales team to request this number. They will ask certain questions that will identify your exact request so that we can fully comply. They will also advise you of certain procedural changes or conditions that may apply to your request, as outlined below.

Complaint/Request Details:

Effective January 1, 2005, Warranty claims require a detailed explanation of the problem or complaint so that we can directly address your concerns. A large percentage of times we are unable to find a problem with the product because we don't know the details of your complaint, and we thus don't know what to look for. We evaluate the product against our specifications, but that may not address your complaint. This explanation will be required for Warranty requests in order to receive the return authorization (WR#). This explanation is also recommended for Repairs but is not required. See below for Repairs.

Evaluation Fee:

Effective January 1, 2005 we established an Evaluation Fee to cover certain costs associated with diagnosing product problems (or suspected problems). When you request the WR#, your product Sales Rep will advise you of this charge, and when it applies. For example, if our evaluation does not support a Warranty Claim, the customer will be asked to pay the fee. However, the fee can be applied to the cost of repair or against the purchase of a new unit. Likewise the fee can be applied to the cost associated with a non-warranty repair. If our evaluation supports the Warranty Claim, the fee will be waived. Also see Repairs below.

Warranty Claim:

- Contact Enovation Controls to receive WR#
- Provide detailed explanation of the problem and why Warranty is claimed. Immediate replacement prior to our evaluation will require that the customer purchase a new unit. If the warranty claim is validated, a credit will be issued against the new unit purchased. A customer purchase order is required prior to replacement.
- Evaluation fee may apply. If applicable, the fee may be applied to repairing the unit or to the purchase of a new unit.

Repairs (Non-Warranty):

- Contact Enovation Controls to receive WR#
- Some products may no longer be accepted for repair or because of their design cannot be repaired. Others are uneconomical to repair. In some cases, repair parts are available for the customer to make the repair. Your product Sales rep will advise details when the WR# is requested.
- (Preferred but not required) Provide detailed explanation of the problem.
- An estimated repair charge is available for those products that can be repaired. When an exact cost is required prior to the actual repair, an Evaluation Fee will apply. The fee may be applied toward the final repair cost. A purchase order is required for either the estimated repair charge or the evaluation fee.
- If the actual cost to repair is greater than 65% of the customer's cost to purchase a new product, we will advise. The customer may then proceed with the repair, purchase a new product, scrap the unit or have it returned as is (at customer's expense). If the unit is scrapped or returned, an evaluation fee will apply.

NOTE: The evaluation fee is \$45 Net (no discount).

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WWW.ECONTROLS.COM

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WWW.FWMURPHY.COM

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* Oil & Gas applications: Field Gas Gathering, Gas Transmission, Gas Power Generation.

**Industrial applications.

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USA-ISO 9001:2008 FM 28221
UK-ISO 9001:2008 FM 29422
CHINA-ISO 9001:2008 FM 52385
Registered Facilities



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