

# 4-1/2 in. (114 mm) Dial Size Hall Effect SWICHGAGE®



## 45HE Series

- Proven Hall Effect Switch Technology for Pressure, Temperature and Level Applications
- Easy-to-Adjust Alarm or Shutdown Set Points
- Normally Open or Normally Closed Systems
- Superior Switching Accuracy and Flexibility
- Ideal for DC Powered Solid State Controllers
- Tough Die Casted Aluminum Housing
- Explosion-Proof Case Available

### Description

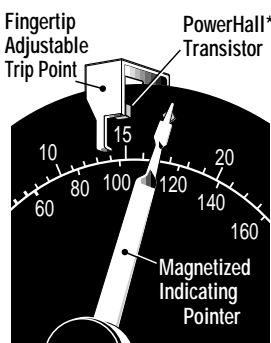
The 45HE Series SWICHGAGE® is a monitoring and alarm/shutdown device for industrial requirements. It combines state-of-the-art Hall effect switching and analog indication for Pressure, Temperature or Level applications depending on the model used.

The 45HE is ideal for use with DC powered solid state controllers because it operates with Normally Open or Normally Closed Systems from 4.5 to 28 VDC. 120 VAC On-Off control available in Latching Control Relay (BP) models.

Most 45HE models are available in surface mount or panel mount case designs. Dials are dual scale, single scale, and custom dials are also available.

### Basic Operation

Based on our proven OPL, SPL and OPLH Series SWICHGAGE® models, the 45HE Series includes two magnetic-field-actuated PowerHall\* transistors. When the magnetized indicating pointer meets one of the Hall effect devices, the corresponding alarm or shutdown transistor output signal becomes active. The 45HE trip points are fingertip adjustable.



### Applications

The 45HE Series SWICHGAGE® models accurately and reliably measure, indicate and control pressure, temperature and level in applications such as gas compressor control panels, pumping applications, industrial process applications.

45HE models are available for specific applications such as monitoring oil well lead lines, storage tank levels, automatic ON/OFF pump control, etc.

### Features

#### PLC and Solid State Compatible

The Normally Open and Normally Closed versions of the 45HE Series are suitable for Murphy (and others) solid state TATTLETALE® annunciators and logic controllers, PLC's and micro-processor-based controllers.

#### Low Switch Start-Up Override

A standard toggle switch is provided (N.O. and N.C. surface mounted models) to override the low switch during equipment start-up.

#### Latching Control Relay (BP Model)

The 45HEBP Series includes a latching control relay for automatic ON/OFF control, either directly or through a motor starter.

#### Freeze-proof Sensing (FP Model)

A freeze-proof sensing device is available for the 45LHE Series level SWICHGAGE®. The freeze-proof device inserts directly into the tank wall. The 45LHEFP sensor is stainless steel with a Buna-N rolling diaphragm.

### Optional Features

#### Remote Transmitter Option (-P4)

This factory-sealed, remote pressure transmitter protects the 45PHE sensing element from line pressures of highly viscous and mildly corrosive fluids. A 5 foot (1.5 m) stainless steel capillary tube transmits pressure from the diaphragm seal to the unit. A 1 NPTM plated steel pulsation dampener is included to help prevent damaging pulsation.

#### Direct Transmitter Option (-P6)

The -P6 option is the direct mounted version of the -P4 (remote transmitter option). This factory-sealed mechanism consists of a 2 NPTM plated steel diaphragm housing (304 stainless steel diaphragm housing is optional), which attaches directly to the 45PHE pressure SWICHGAGE®.

#### Explosion-proof Option (-EX)

Most 45HE Series SWICHGAGE® devices are available with an explosion-proof case for hazardous applications.

### Warranty

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

\* Allegro MicroSystems, Inc., registered trademark.

# Specifications

**Case:** Die casted aluminum,

**Dial:** 4-1/2 in. (114 mm), white on black background.

**Sensing Element:** Bronze bourdon tube standard; 316 stainless steel or monel are optional. 45LHEA and 45LHE Level models up to 20 ft. (6.09 m) brass bellows is standard; stainless steel bellows is optional (see page 4).

**Geared Movement:** 302 and 304 stainless steel.

**Lens:** Clear Polycarbonate, UV stabilized, fog and scratch resistant.

**SWICHGAGE® Sensor:** PowerHall; outputs negative signal (sinking transistor output) rated: 300 mA continuous.

**SWICHGAGE® Set Points:** 2-fingertip adjustable, visible on face-dial.

**SWICHGAGE® Electrical Connection:**

Surface Mount Case: Terminal block; 1/2 NPTF conduit connection.

Panel Mount Case: Wire leads, 18 AWG x 8 in. (1.0 mm<sup>2</sup> x 203 mm); 1/2 NPTM conduit connection.

Optional Conduit Connection: 24 AWG x 8 in. (0.22 mm<sup>2</sup> x 203 mm); 1/2 NPTM conduit connection.

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

**Storage Temperature:** -77 to 185°F (-60 to 85°C).

**Power Input:** 4.5 to 28 VDC; 120 VAC/24VDC for Latching Control Relay (BP) models with built-in transformer/rectifier.

**Overrange:** Do not exceed 30% above full range (all models).

**Pressure Models Sensing Connection:** Bottom connection 1/4 NPTM thru 1000 psi (6.89 MPa) [68.9 bar], or 1/2 NPTM 1500 psi (10.3 MPa) [103 bar] thru 20,000 psi (137 MPa) [1378 bar], back connection optional.

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

## Temperature Models Sensing Connections:

Capillary: 5 feet (1.5 m) PVC armored copper tube, standard.

(Other options available see "How to Order" section, page 4).

Sensing Bulb: Copper, 1/2 in. (13 mm) O.D. x 7 in. (178 mm) length; 600 psi (4.14 MPa) [41.37 bar] pressure rating, for higher pressure ratings the use of thermowell is recommended.

Sensing Bulb Connection: 1/2 NPTM.

## Temperature Models Accuracy

Temperature Range	Lower 1/4	Middle 1/2	Upper 1/4
-60 to 60°F (-51 to 16°C)	± 2°F (± 1°C)	± 2°F (± 1°C)	± 2°F (± 1°C)
-40 to 136°F (-40 to 58°C)	± 4°F (± 2°C)	± 2°F (± 1°C)	± 2°F (± 1°C)
15 to 250°F (9 to 121°C)	± 8°F (± 4°C)	± 2°F (± 1°C)	± 2°F (± 1°C)
130 to 350°F (60 to 180°C)	± 8°F (± 4°C)	± 2°F (± 1°C)	± 3°F (± 1.5°C)
260 to 450°F (127 to 232°C)	± 8°F (± 4°C)	± 2°F (± 1°C)	± 3°F (± 1.5°C)

## Level Models Sensing Connections:

**45LHE, 45LHEF:** Bottom connection 1/4 NPTM.

**Bellows Mov. Models (up to 20 ft. [6 m] range):** Bottom connection 1/4 NPTF.

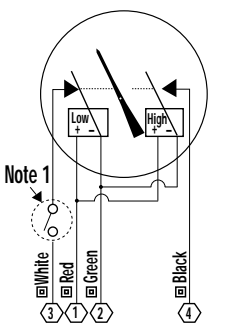
**45LHEFP:** 2 NPTM back connection.

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

# Internal Wiring

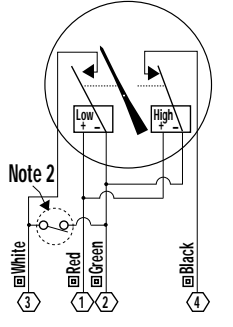
**Important information:** When using the 45HE SWICHGAGE® with inductive loads, we recommend installing a suppression diode across all coil(s).

## 45PHE, 45THE and 45LHE Series



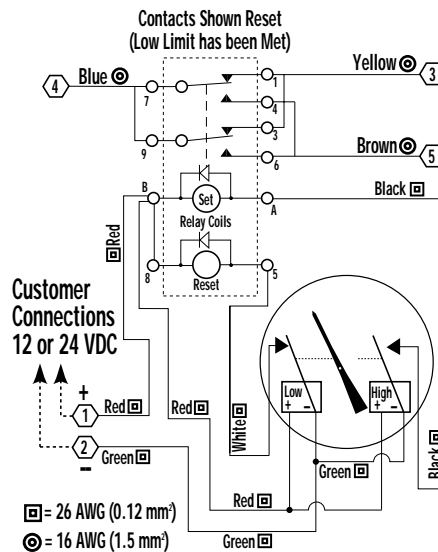
□ = 26 AWG (0.12 mm<sup>2</sup>)  
 Red= Positive Power Input  
 Green= Negative Power Input  
 White= Low Transistor Sinking Output  
 Black= High Transistor Sinking Output

## 45PHENC, 45THENC and 45LHENC Series



□ = 26 AWG (0.12 mm<sup>2</sup>)  
 Red= Positive Power Input  
 Green= Negative Power Input  
 White= Low Transistor Sinking Output  
 Black= High Transistor Sinking Output

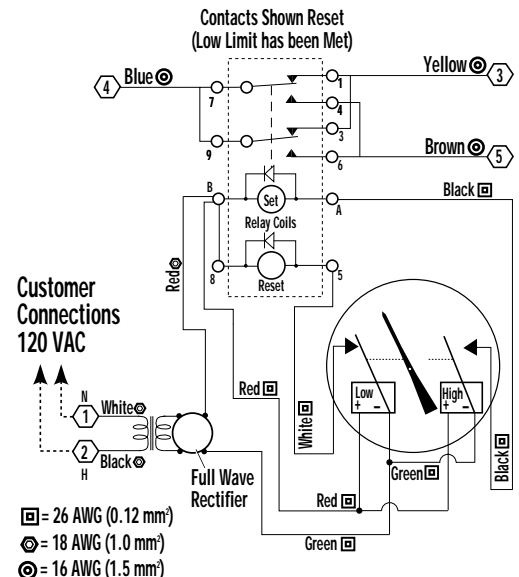
## 45PHEBP, 45THEBP and 45LHEBP Series (12/24 VDC)



Customer Connections  
 12 or 24 VDC

□ = 26 AWG (0.12 mm<sup>2</sup>)  
 ⊙ = 16 AWG (1.5 mm<sup>2</sup>)

## 45PHEBP, 45THEBP and 45LHEBP Series (120 VAC)



Customer Connections  
 120 VAC

□ = 26 AWG (0.12 mm<sup>2</sup>)  
 ⊙ = 18 AWG (1.0 mm<sup>2</sup>)  
 ⊙ = 16 AWG (1.5 mm<sup>2</sup>)

Latching Relay Contact Ratings: SPDT Dry Relay Contacts, 10 A @ 120 VAC

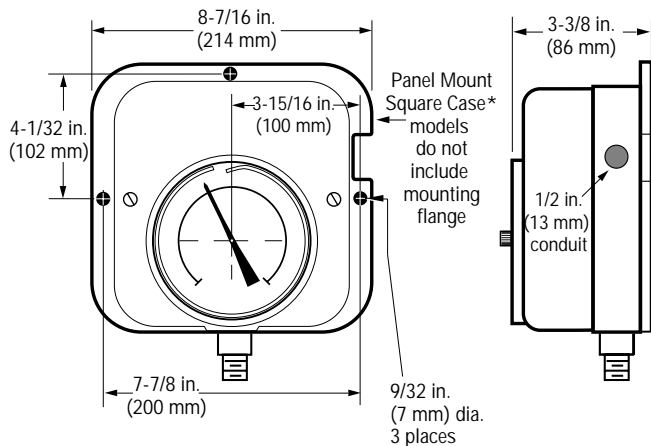
Hall Effect Sensors Ratings: 300 mA continuous

**Note 1:** Start/Run Switch; Open for Start, Closed for Run (surface mount models only).

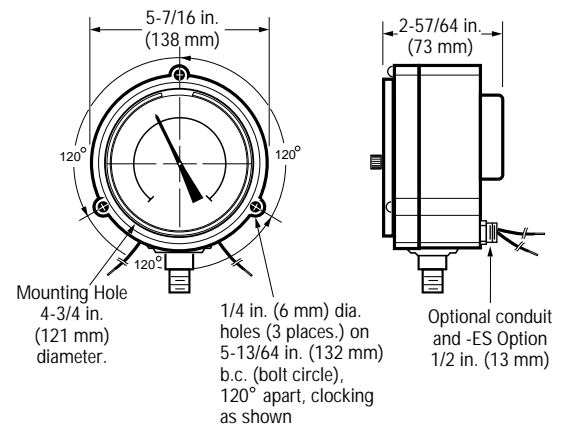
**Note 2:** Start/Run Switch; Closed for Start, Open for Run (surface mount models only).

# Dimensions

## Surface Mount 45PHE and 45LHE Series

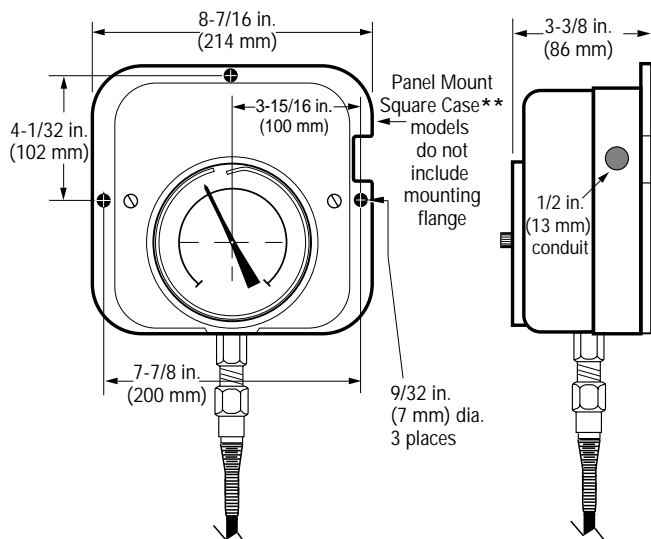


## Panel Mount 45PHEF and 45LHEF Series

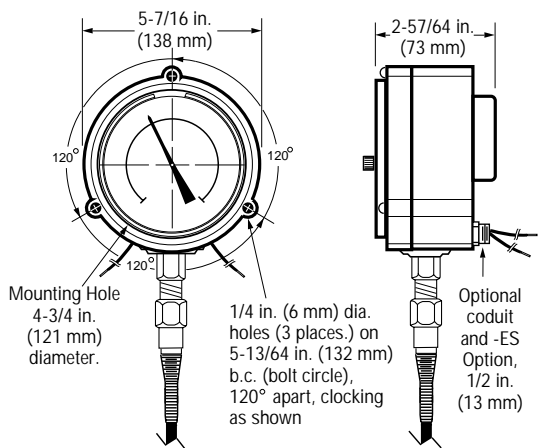


\* 45PHEE, 45LHEE, 45PHENCE, 45LHENCE, 45PHEBPE and 45LHEBPE models feature square case, but altered to fit standard round panel mounting—not pictured.

## Surface Mount 45THE Series

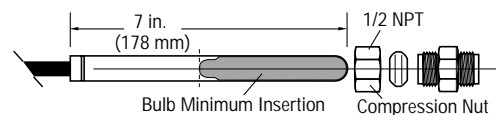


## Panel Mount 45THEF Series

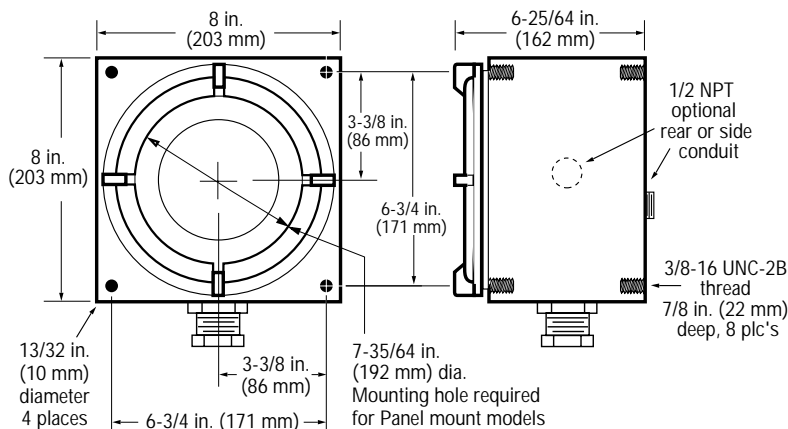


\*\* 45THEE, 45THENCE and 45THEBPE versions feature square case, but altered to fit standard round panel mounting—not pictured.

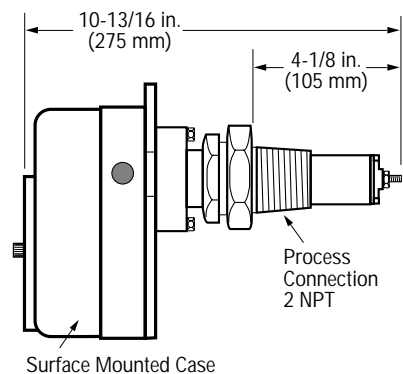
## Temperature Sensing Bulb



## Explosion-proof -EX Option



## 45LHEFP Freeze-proof



# How to Order

Specify model number. List options in alphabetical order (A to Z). Place a dash (-) between each option. See example below.

## 45PHE - R - 2 - 30 - CC

### Base Models for Pressure

45PHE (surface mount)	45PHENC (surface)
45PHEF (panel mount)	45PHEFNC (panel)
45PHEE (panel)†	45PHENCE (panel)†
45PHEBP (surface)	45PHEBPE (panel)†

### Base Models for Temperature

45THE (surface mount)	45THENC (surface)
45THEF (panel mount)	45THEFNC (panel)
45THEE (panel)†	45THENCE (panel)†
45THEBP (surface)	45THEBPE (panel)†

### Base Models for Level

45LHE (surface mount)	45LHENC (surface)
45LHEF (panel mount)	45LHEFNC (panel)
45LHEE (panel)†	45LHENCE (panel)†
45LHEBP (surface)	45LHEBPE (panel)†
	45LHEFP (freeze-proof)

### Bourdon Tube/Bellows

- A = Bronze bourdon tube with brass socket—up to 1000 psi.  
= Brass bellows (level models 20 ft./6.09 m. and below only).
- R = 316 Stainless steel bourdon tube with carbon steel socket.
- S = 316 Stainless steel bourdon tube and socket.  
= 316 Stainless steel bellows movement.
- P = "K" Monel bourdon tube with monel 400 socket  
(Special order. Check delivery and price.)
- A1 = 1/2 NPT—up to 1000 psi.
- R1 = 1/2 NPT—up to 1000 psi.
- S1 = 1/2 NPT—up to 1000 psi.
- P1 = 1/2 NPT—up to 1000 psi.

### Latching Control Relay Voltage (for "BP" models only)

- Standard\* (Do not specify) = 120 VAC systems.
- 2 = 12 VDC systems.
- 3 = 24 VAC systems.
- 4 = 24 VDC systems.

### Pressure/Vacuum Range/Scale

30V	30" vac - 0 psi	-101 kPa - 0 kPa
30V15	30" vac - 15 psi	-101 kPa - 103 kPa
30V30	30" vac - 30 psi	-101 kPa - 207 kPa
30V100	30" vac - 100 psi	-101 kPa - 689 kPa
30V200	30" vac - 200 psi	-101 kPa - 1.38 MPa
30V300	30" vac - 300 psi	-101 kPa - 2.07 MPa
15	0 - 15 psi	0 - 103 kPa
30	0 - 30 psi	0 - 207 kPa
60	0 - 60 psi	0 - 414 kPa
100	0 - 100 psi	0 - 689 kPa
160	0 - 160 psi	0 - 1.10 MPa
200	0 - 200 psi	0 - 1.38 MPa
300	0 - 300 psi	0 - 2.07 MPa
400	0 - 400 psi	0 - 2.76 MPa
600	0 - 600 psi	0 - 4.14 MPa
1000	0 - 1000 psi	0 - 6.89 MPa
1500	0 - 1500 psi	0 - 10.34 MPa
2000	0 - 2000 psi	0 - 13.79 MPa
3000	0 - 3000 psi	0 - 20.68 MPa
5000	0 - 5000 psi	0 - 34.48 MPa
10000	0 - 10,000 psi	0 - 68.95 MPa
20000	0 - 20,000 psi	0 - 137.90 MPa

### Options

- BC = Back connected bourdon tube
- CC = Conduit connection
- ES = Environmentally sealed
- EX = Explosion-proof
- EL = Explosion-proof less case
- LC = Less case
- P4 = Pressure transmitter with 5 ft. (1.52 m)
- P4L = Less pulsation dampener
- P6 = Pressure transmitter direct mount
- P6S = Pressure transmitter direct mount, 304 st. st. housing
- RO = Restricting orifice
- SH = Stainless steel external hardware
- T3 = Tamperproof bezel/lens
- TS = Over/under range stop
- VR = Vapor recovery compensator

### Temperature (Specify one from each column)

#### Temperature Range

- 60 = -60 - 60°F (15.6°C)
- 136 = 40 - 136°F (57.8°C)
- 250 = 15 - 250°F (121°C)
- 350 = 130 - 350°F (177°C)
- 450 = 260 - 450°F (232°C)

#### Capillary Type

- P = PVC Armor/Copper Capillary
- G = Galvanized/Copper Capillary
- S = Stainless St./St. St. Capillary
- T = Stainless St./Copper Capillary

#### Capillary Length

- |                        |                          |
|------------------------|--------------------------|
| <i>Specify in feet</i> | <i>Specify in meters</i> |
| 05 = 5 ft. (1.5 m)     | 1.5M = 1.5 m             |
| 10 = 10 ft. (3 m)      | 2M = 2 m                 |
| 15 = 15 ft. (4.5 m)    | 2.5M = 2.5 m             |
|                        | etc.                     |

### Level Range/Scale

<i>Specify in feet</i>	<i>Specify in meters</i>
5** = 0 - 5 ft. (0-1.5 m) Dual scale	4M = 0 - 4 m Single scale
10** = 0 - 10 ft. (0-3 m) Dual scale	3.5M = 0 - 3.5 m Single scale
20** = 0 - 20 ft. (0-6 m) Dual scale	6M = 0 - 6 m Single scale
30 = 0 - 30 ft. (0-9 m) Dual scale	90 = 0 - 9 m Single scale
60 = 0 - 60 ft. (0-18 m) Dual scale	
120 = 0 - 120 ft. Single scale	

**NOTES:** Standard calibration is for water—specify if other. To determine correct range, add **TOTAL** height of liquid above the pressure connection. For elevated tanks subtract tank elevation from gage reading to determine **ACTUAL** tank level.

\*\*Bellows actuated level models instead of bourdon tube.

\* Includes transformer/rectifier 120VAC/24VAC.  
† Features square case, but for panel mounting.

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



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