

# 20 and 25 Series Temperature Swichgage® 2 and 2 1/2 in. (51 and 64 mm) Dial

The 20 Series (2 inch/51 mm dial) and the 25 Series (2-1/2 inch/64 mm dial) Swichgage models are diaphragm-actuated, temperature-indicating gages with built-in electrical switches for tripping alarms and/or shut-down devices.

Ranges are available from 32°-120°F (0°-45°C) through 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 Swichgage case. They have a self-cleaning motion to enhance electrical continuity.

Models 20TE and 25TE have internal snap-acting SPDT switches. Gage-only models without contacts (MurphyGage® instrument) are also available.

These instruments are used on industrial engines and equipment in oil field, marine, irrigation, construction and trucking industries and for monitoring engine coolant, crankcase oil and transmission oil.



20T Series shown



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

2 Model 25TE is CSA listed for non-hazardous areas. Model 25TE-EX is CSA listed for Class I, Division 1, Groups C & D hazardous areas.

## Base Models

### Coolant or Oil Temperature 20T and 25T Series Swichgage

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

#### 20TL and 25TL Swichgage instrument

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

#### 20TE and 25TE Swichgage instrument internal snap-switch

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 Swichgage instrument

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

### Cylinder Head Temperature

#### 20TH and 25TH Swichgage instrument

20TH (was 20TL8133) and 25TH (was 25TL8133). For use on air-cooled engines.

#### Direct Mount Models

##### 20TD Swichgage 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 Swichgage 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 MurphyGage

Gages without contact(s).

# 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 direct mount models)

**Bezel:** Polished stainless steel, standard; others 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 Temperature Accuracy Chart

**Maximum Temperature:**

See Temperature Ranges and Factory Settings Table

**Maximum Ambient Temperature:**

-40°F (-40°C) through 150°F (66°C)

**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 through 100% of the scale

**Limit Contact Wire Leads:** 18 AWG (1.0 mm) 2 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 [www.murphybynovationcontrols.com](http://www.murphybynovationcontrols.com).

## 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. Only certain models are adjustable.
- 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.

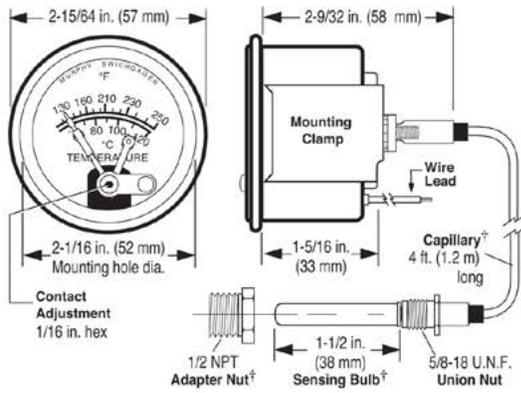
+ SPDT snap-switch is the alarm switch.

## Temperature Accuracy Chart

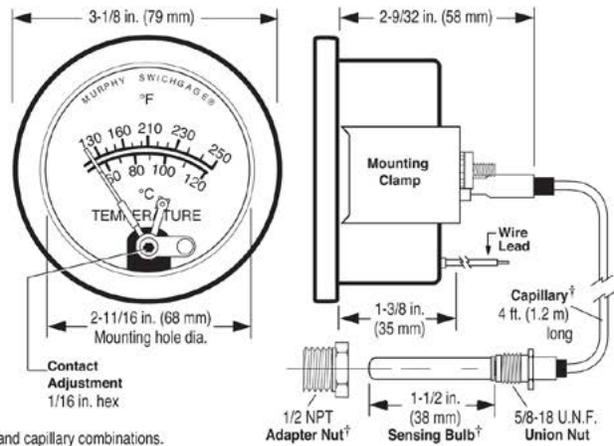
Temperature Range	Lower 1/3 of Scale	Middle 1/3 of Scale	Upper 1/3 of Scale
32 to 120°F (0 to 49°C)	± 12°F (± 6°C)	± 5°F (± 2.4°C)	± 6°F (± 3°C)
32 to 160°F (0 to 71°C)	± 20°F (± 10°C)	± 8°F (± 4.4°C)	± 7°F (± 4°C)
130 to 220°F (54 to 104°C)	± 6°F (± 3°C)	± 3°F (± 1.6°C)	± 4°F (± 2°C)
130 to 250°F (54 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)

# Dimensions

20 Series Models (typical)



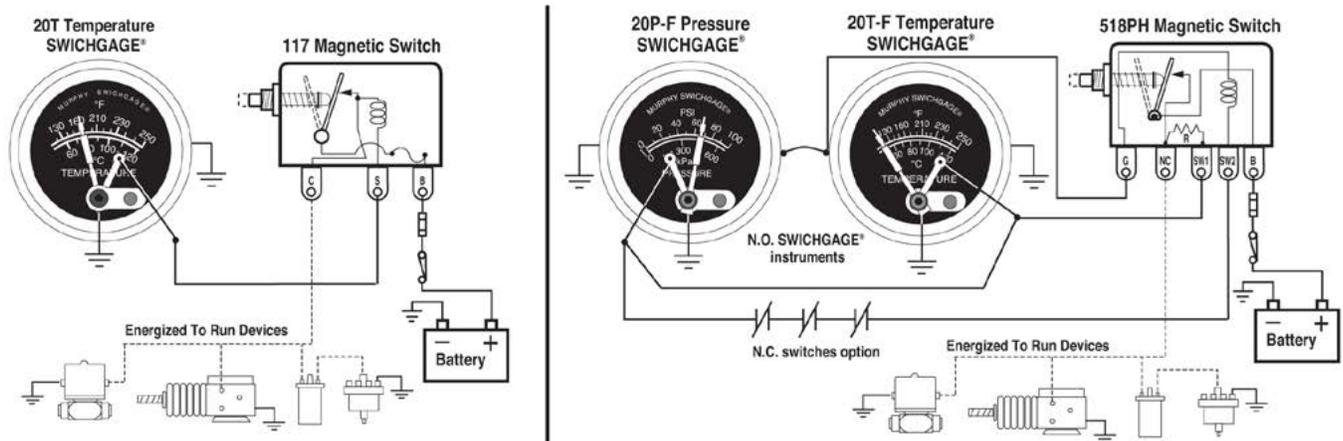
25 Series Models (typical)



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

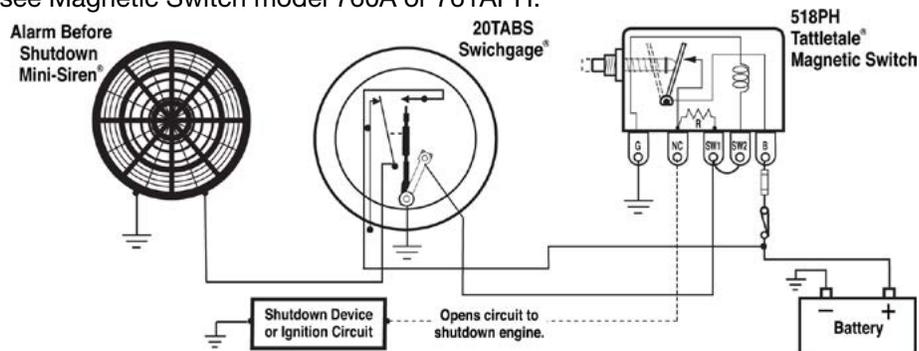
# Magnetic Switch

INDUCTIVE AND HIGH CURRENT LOADS REQUIRE THE USE OF A MAGNETIC SWITCH. The Swichgage contacts are for light-duty electrical switching to operate alarms or control devices. Enovation Controls manufactures the Magnetic Switch for protection of the light-duty Swichgage limit contacts. Tattletale® Magnetic Switches show the cause of shutdown for applications that include: capacitor discharge or magneto ignitions, battery systems and electric motor driven equipment. Typical wiring diagrams are shown below.



# Pre-Alarm using 20/25TABS

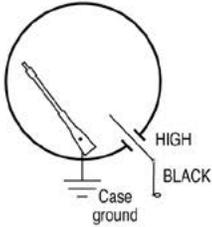
The 20TABS and 25TABS feature a standard limit contact for high temperature equipment shutdown and an internal SPDT snap-switch to signal an alarm before shutting down. When the low side of the snap-switch trips (preset point), on rising temperature, the switch completes a circuit to activate an alarm. 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 for settings. For alternative alarm before shutdown, see Magnetic Switch model 760A or 761APH.



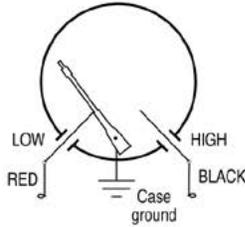
# Typical Internal Wiring Diagrams

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.

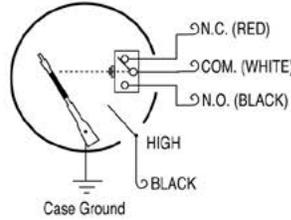
## Pointer Type Contact



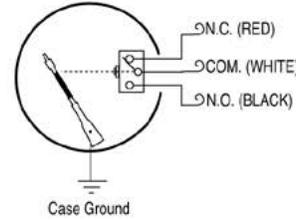
## "HL" Hi-Lo Option



## ABS Models



## TE Models



# How to Order

Options listed below. All configurations may not be available. Call your sales representative or Enovation Controls for more information.

**20T - B1 - 120 - P2M - 3/8**

Base Model
20T
20TL
20TE
20TABS
20TH
20TD
20SD
20TG
25T
25TG

Range	
Dual Scale ° F (° C)	Single Scale ° C
120 = 32-120 (0-49)	70C = 0-70
160 = 32-160 (0-71)	100C = 45-100
220 = 130-220 (54-104)	120C = 50-120
250 = 130-250 (60-121)	140C = 60-140
300 = 140-300 (60-149)	160C = 70-160
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.

Adapter Nuts
Nut Must Match the Sensing Bulb
1/8 = 1/8-27 NPT
1/4 = 1/4-18 NPT
3/8 = 3/8-18 NPT
3/8B = 3/8-19 BSPT
3/8K = 3/8 NPSF
- = 1/2-14 NPT (Standard)
1/2B = 1/2 BSPT
1/2K = 1/2 NPSF
5/8 = 5/8-18 UNF
3/4 = 3/4-14 NPT
3/4U = 3/4-16 UNF
7/8 = 7/8-9 UNC
M10 = 10 mm x 1.5
M12 = 12 mm x 1.5
M14 = 14 mm x 1.5
M16 = 16 mm x 1.5
M18 = 18 mm x 1.5
M20 = 20 mm x 1.5
M22 = 22 mm x 1.5
M24 = 24 mm x 1.5

Options
Options are not available on all models or configurations.
<b>A</b> = AGF (Argon Filled)
<b>B1</b> = Black Bezel
<b>B2</b> = Bezel 05051857 (was HP)
<b>B3</b> = Bezel 05051836 (was HBB)
<b>EX</b> = EX Proof (Explosion Proofed)
<b>EL</b> = EX Less Case (Explosion Proofed Less Case)
<b>F</b> = FS Contact (Includes ES as Appropriate)
<b>HL</b> = High and Low Contacts
<b>I</b> = Illuminations (See Illumination Options)
<b>IP1</b> = Light Pipe Illumination, 12 VDC
<b>IP2</b> = Light Pipe Illumination, 24 VDC
<b>K</b> = Knob Adjusting Face Contact
<b>OS</b> = Oil Sealed (Silicone Oil)
Specify optional bulb <b>ONLY</b> when not included as standard for Temperature Base Model, Scale/Range or Capillary length.
<b>UA</b> = Temperature Bulb Style A (10050166)
<b>UB</b> = Temperature Bulb Style B (10050161)
<b>UC</b> = Temperature Bulb Style C (10010060)
<b>UD</b> = Temperature Bulb Style D (10000286)
<b>UE</b> = Temperature Bulb Style E (10010084)
<b>UF</b> = Temperature Bulb Style F (10000577)
<b>UG</b> = Temperature Bulb Style G (10000578)
<b>UH</b> = Temperature Bulb Style H (10002466)
<b>UK</b> = Temperature Bulb Style K (10054886)

Illumination Options		
	IP1 / IP2	1
20 Series	X	X*
25 Series	N/A	N/A

\* Can be used with Standard Clamp Lite Assembly (12 V = 05702176; 24 V = 05702177)

Temperature Capillary
<b>Capillary Armor Type</b>
<b>P</b> = PVC Armor, Copper Capillary
<b>S</b> = Stainless Steel Armor, Copper Capillary
<b>Capillary Length</b> (specify length after capillary type, example S8)
<b>Feet</b>
4 = 4 ft.
<b>Specify Other Length</b> = 2-foot increments available to 20 ft., thereafter 5 ft. increments only.
<b>Meters</b>
1.5M = 1.5 M.
<b>Specify Other Length</b> = 0.5 meters increments available from 1.5 to 10 meters, thereafter 2 meter increments to 34 meters only. Specify <b>M</b> following length, example S8M.