



TEMPERATURE SWITCH & TRANSDUCER



주식회사 플루마

Fluma Co., Ltd.

HYDRAULIC, PNEUMATIC AND ELECTRIC TECHNOLOGY

Temperature

Electronic Dual Temperature Switch

BTS3000

Features

- ▶ Measuring range: -22° to +284°F (-30° to +140°C)
- ▶ One or two switch points
- ▶ Analog output 4 - 20 mA
- ▶ Display & electronic connection: rotatable by 320°
- ▶ Simple navigation menu
- ▶ Superior EMI protection
- ▶ 0.50% accuracy
- ▶ IO-Link communication interface
- ▶ Enclosure Rating: Type 4X (IP65) / Type 6 (IP67)

Applications

- ▶ Machine tool industry
- ▶ Hydraulic & pneumatic systems
- ▶ Injection molding machines
- ▶ Cooling monitoring / circuits
- ▶ Lubrication systems
- ▶ Construction machinery
- ▶ Automobile industry



General Specifications*

Sensor element:	PT100 Class A DIN/IEC 60751	
Materials:	304 Stainless steel	
Wetted parts:	304 Stainless steel / PBT, PA6.6 GF30	
Enclosure:	304 Stainless steel / PBT, PA6.6 GF30	
Seals:	FKM fluoroelastomer (standard) EPDM (optional)	
Operating elements:	3 easy-response push-buttons	
Enclosure rating:	Type 4X (IP65) / Type 6 (IP67)	
Protection class:	III	
Electrical connection:	Plug M12 x 1, 4-pin / 5-pin / 8-pin	
Process connection:	1/4" NPT Male, 1/2" NPT Male, 7/16-20 UNF (SAE-4) Male, G1/4" Male	
Dimensions Enclosure:	1.6 Ø x 4.4 inches (without plug connector and sensor)	
Weight:	Approx. 0.4 lb (200 g)	
Measuring ranges:	-22°F to +284°F (-30°C to +140°C)	
Max. pressure:	2,900 psi (200 bar)	
A/D-Converter:	12 bit (4,096 steps per measure span)	
Resolution:	12 bit (4,096 steps per measure span)	
Scanning rate:	1000/s	
Time Constant:	Approx. 40 s	
Accuracy:	< ±0.5 % f. s. at +25 °C	
Repeatability:	±0.1% f. s.	
Temperature range:	14°F to 140°F (-10°C to +60°C)	
Electronics:	-22°F to 176°F (-30°C to +80°C)	
Storage:	-22°F to 176°F (-30°C to +80°C)	
Power supply:	15 to 28 V DC, reversed polarity protected (SELV, PELV) Class 2	
Digital display:	4-digit 14-segment LED red display, digit height .35 inches (9 mm)	
Display rate:	20/s	
Error display:	LED RED and alphanumeric display	
Power consumption:	Approx. 50 mA (without load) Approx. 80 mA (Output Code 6)	
Relay output (option 6):	Relay 1 NC Relay 2 NO Load: max. 1A, max. 60V, max. 30VA	
Analog output:	Current output:	4-20 mA
	Scanning rate:	2 ms
	Adjustment range:	25% to 100% f. s.
Transistor switching outputs:		
Switching function:	Normally open / normally closed, standard /window mode and diagnosis function adjustable	
Switching output:	PNP / (NPN field-selectable on IO-Link units)	
Adjustment range for switching point and hysteresis:	0% to 125% f. s.	
Switching frequency:	Max. 100 Hz	
Load:	Max. 500mA, short-circuit-proof IO-Link: Max. 250mA	
Delay:	0.0 s to 50.0 s adjustable	
Status display(s):	LED(s) red	
IO-Link Communication Interface:		
Transmission type:	COM2 (38.4 kBaud)	
IO-Link revision:	1.1	
SDCI standard:	IEC 61131-9	
Profiles:	Smart Sensor, Process Data Variable, Device Identification, Device Diagnosis	
SIO modules:	Yes	
Required master port type:	A	
SIO output:	1 analog / 2 binary (switch points) [see product configurator]	
Min. process cycle time [ms]:	2.5	
Device ID:	0x011...	
Approvals:	cULus*** - E302981	
EMI	EN 61000-4-2 ESD	4 kV CD / 8 kV AD
	EN 61000-4-3 HF radiated	10 V/m
	EN 61000-4-4 Burst	2 kV
	EN 61000-4-5-Surge	1/2 kV
	EN 61000-4-6 HF conducted	10 V
	Shock resistance**	DIN EN 60028-2-27
Vibration resistance**	DIN EN 60028-2-26	20 g (10 to 2000 Hz)

** At probe length over 100mm shock & vibration resistance can be influenced by the application

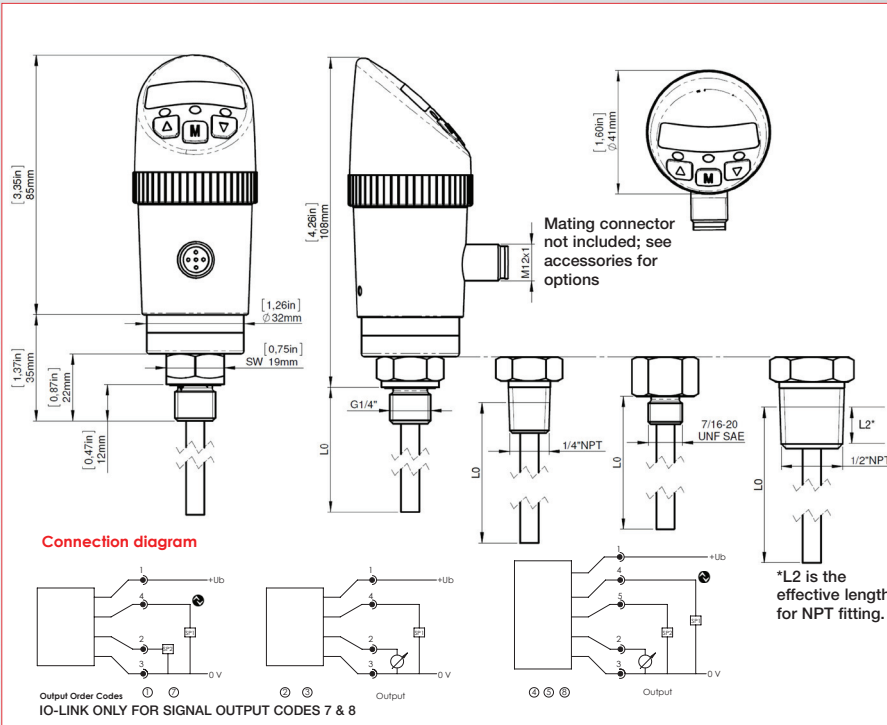
*** 1 - 5 output options only

* See product configurator for additional options.

Electronic Dual Temperature Switch

BTS3000

Technical Drawings



Electrical Connection Chart

Pin	Signal Output Code 1 & 7	Signal Output Code 2 & 3	Signal Output Code 4 & 5 & 8	Signal Output Code 6
1	+Ub	+Ub	+Ub	+Ub
2	SP2	Signal	Signal	SP1a
3	OV	OV	OV	SP1b
4	SP1/IO-Link *	SP1	SP1/IO-Link *	OV
5	-	-	SP2	SP2a
6	-	-	-	SP2b
7	-	-	-	-
8	-	-	-	Housing

* IO-LINK ONLY FOR SIGNAL OUTPUT CODES 7 & 8

Length	1/4" NPT / 1/2" NPT / 7/16-20 UNF (SAE-4)	G1/4"
L0	.7" [17.78 mm]	0.67" [17 mm]
	2" [50.8 mm]	0.98" [25 mm]
	4" [101.6 mm]	1.97" [50 mm]
	6" [152.4 mm]	3.94" [100 mm]
	12" [304.8 mm]	11.80" [300 mm]
		25.59" [650 mm]



Dimensions inches [mm]

Product Configurator

Example **BTS3 8 E V M 2.00Z 1**

Series: **BTS3** Series BTS3000, electronic dual temperature switch

* Highlighted options represent those most frequently used. Select these common options for improved most availability. (5/21)

Output:

1	Dual switch point
2	Single switch point plus 4-20mA (0-10V field selectable)
3	Single switch point plus 0-10V (4-20mA field selectable)
4	Dual switch point plus 4-20mA (0-10V field selectable)
5	Dual switch point plus 0-10V (4-20mA field selectable)
6	Dual switch points (1 x NO SPST / 1 x NC SPST), not UL approved
7	IO-Link / Dual switch point, no UL
8	IO-Link / Dual switch point plus 4-20mA (0-10V field selectable), no UL

Process Connections:

N ⁹	1/4" NPT male thread
3 ^{1,9}	1/2" NPT male thread (Consult factory)
E	7/16-20 UNF (SAE 4)
G	G1/4" male thread
2	G1/2" male thread (Consult factory)

Electrical Connection:

M³ M12

Sealing:

V ²	FKM fluoroelastomer (standard)
E ²	EPDM (EPR) (optional)
X	No seal (Required for units with NPT thread)
F	FFKM (optional) (Consult factory)

Temperature Ranges:

1	0 to 100°C
2	-30 to 140°C
3	32 to 210°F
4	-22 to 280°F

Sensor Length⁴:

0017M ⁵	17 mm probe
0025M ⁵	25 mm probe
0050M ⁵	50 mm probe
0100M ⁵	100 mm probe
0300M ⁵	300 mm probe
0650M ^{5,6}	650 mm probe
0.70Z ^{1,7}	0.7" probe
2.00Z ^{1,7}	2" probe
4.00Z ^{1,7}	4" probe
6.00Z ^{1,7}	6" probe
12.0Z ^{6,7}	12" probe

Accessories

Order Number	Description
239535-1M-R-S ⁸	4 Pin M12 Female Right Angle Plug Molded Cable, 3.28 Feet (1 Meter), Shielded
239535-1M-S ⁸	4 Pin M12 Female Straight Plug Molded Cable, 3.28 Feet (1 Meter), Shielded
239537	4 Pin M12 Female Straight Connector
239236	4 Pin M12 Female Right Angle Connector
239546-1M-R-S ⁸	5 Pin M12 Female Right Angle Molded Cable, 3.28 Feet (1 Meter), Shielded
239546-1M-S ⁸	5 Pin M12, Female Straight Plug Molded Cable, 3.28 Feet (1 Meter), Shielded
239548-S	5 Pin M12 Female Straight Connector
239548-R	5 Pin M12 Female Right Angle Connector
208779 ¹	2" Probe - Brass Thermowell
208779-SS ¹	2" Probe - 316 Stainless Steel Thermowell
208780 ¹	4" Probe - Brass Thermowell
208780-SS ¹	4" Probe - 316 Stainless Steel Thermowell
208781 ¹	6" Probe - Brass Thermowell
208781-SS ¹	6" Probe - 316 Stainless Steel Thermowell

Note:

1. Thermowell option available for 1/2" NPTF only with 2", 4" and 6" probes only; consult factory for details.
2. Available only for G and UNF thread.
3. Mating connector not included with unit; mating connectors are available and can be ordered as an accessory.
4. Custom probe length available; minimum quantities may apply.
5. Available only for G1/4" or G1/2" thread.
6. At probe length over 11.8" (300 mm), the probe must be kept out of the direct path of the flowing media.
7. Available only for NPT and UNF thread.
8. See Cable Connectors & Accessories for more options.
9. Requires sealing code X

Temperature

Local Mount Temperature Switches

ML1H, L2H

Features

- ▶ Reliable & accurate
- ▶ Local sensing
- ▶ NEMA 4 & IP 65
- ▶ UL, CSA & CE approved
- ▶ Single or dual switching

Applications

- ▶ Oil & gas
- ▶ Mining
- ▶ Tanks and reservoirs
- ▶ Compressors
- ▶ Plastic machinery
- ▶ Factory automation
- ▶ Process equipment
- ▶ Machine tools and industrial equipment



General Specifications*

Accuracy:	±1% of mid-60% of full range. At constant ambient ±0.5% of full scale.
Switch:	Single: 1 SPDT Dual switching: 2 independent SPDT circuits
Electrical Characteristics:	All models incorporate Underwriters' Laboratories, Inc. and CSA listed single pole double throw snap-action switching elements. Switches may be wired normally open or normally closed.
Wetted Parts:	Brass or 304 stainless steel
Electrical Connection:	Single: 3-pin terminal strip Dual: 6-pin terminal strip
Electrical Ratings:	AC value at 75% power factor —10 amps 125, 250 volts AC, 3 amps 480 volts AC. Automatically reset by snap-action of switch.
Enclosure/Housing:	Water-tight and dust-tight indoor and outdoor (NEMA 4) / oil-tight and dust-tight indoor (NEMA 13).
Local Mount:	Immersion length 2-1/16 inches

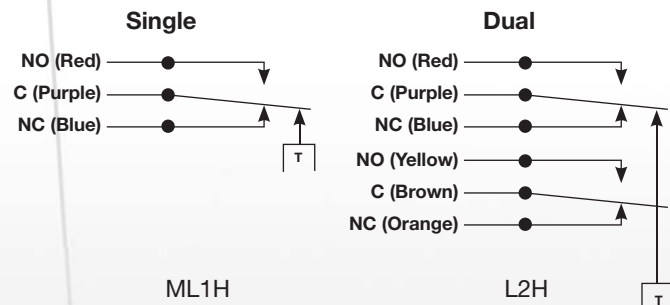
* See Product Configurator for additional options.

Approvals/Listings:	Underwriters' Laboratories, Inc. and Canadian Standard Assoc. are listed under temperature indicating and regulating equipment.
UL:	File No. E56247, Guide No. XAPX
CSA:	File No. LR34555, Guide 400-E-O Class 4813
Temperature Range:	See product configurator.
Adjustment:	Tamper resistant external adjustment. Turn knob clockwise to increase setpoint.
Weight:	Single: approximate 1.5 lbs. Dual: approximate 3.0 lbs.

Wiring Code

Lead	Circuit #1	Circuit #2
Normally Closed	Blue	Orange
Common	Purple	Brown
Normally Open	Red	Yellow

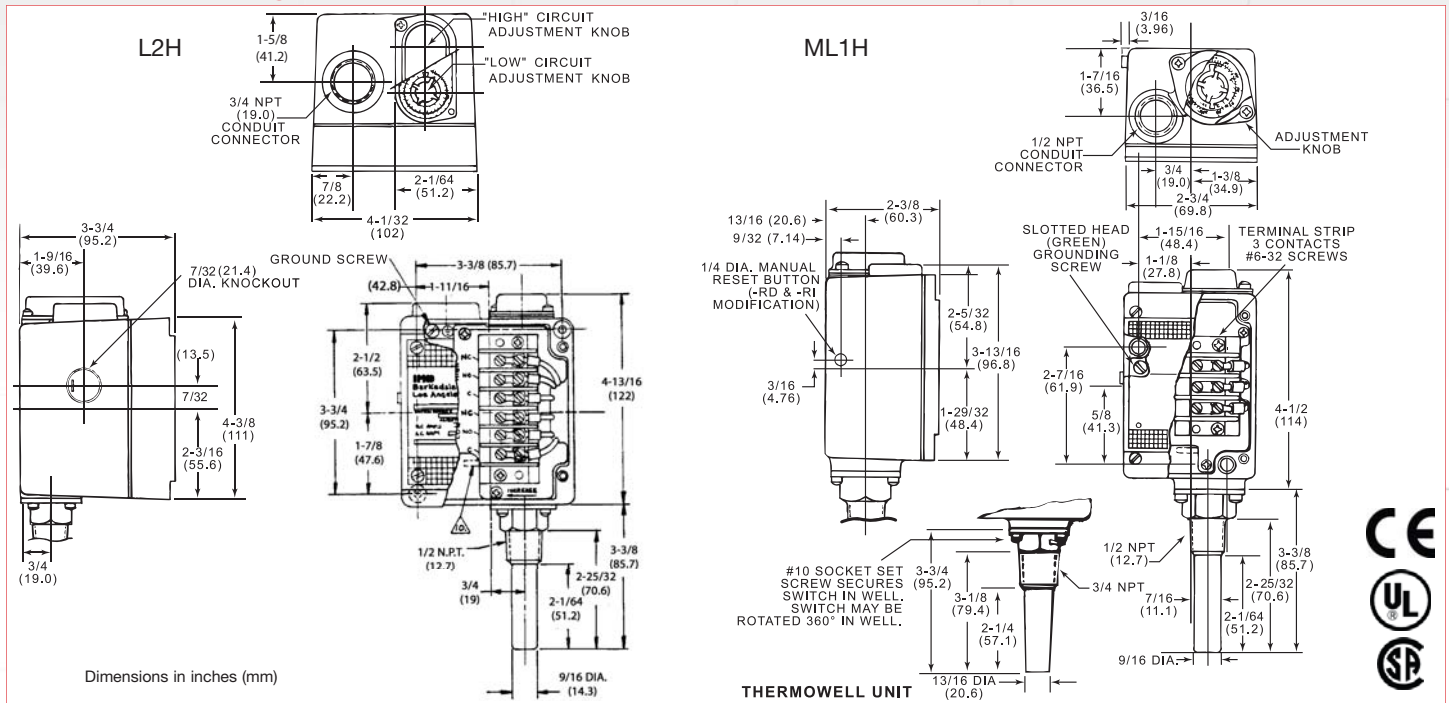
Wiring Diagram



Local Mount Temperature Switches

ML1H, L2H

Technical Drawing



Product Configurator

Example H M L1 H -HH 202 S -WS -FX

H Hermetically sealed limit switch option - Class I, Division II (requires AA, CC, GH or HH limit switch)

Blank Standard

M Single switch models

Blank Dual switch models

L1 Single set point (SPDT)

L2 Dual set point (2 SPDT)

H NEMA 4 & IP65 enclosure

Limit Switch ²

-H	10 amps @ 125/250 VAC; 3 amp @ 480 VAC (standard)
-B	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.05 amps @ 125 VDC; 0.03 amps @ 250 VDC
-G ¹	10 amps @ 125/250/480 VAC; 2 amps @ 600 VAC; 0.4 amps @ 125 VDC; MANUAL RESET
-J	10 amps @ 125/250 VAC; 3 amps @ 480 VAC (with elastomer boot)
-L	15 amps @ 125/250/480 VAC; 0.03 amps @ 125 VDC; 0.02 amps @ 250 VDC
-M	10 amps @ 125/250 VAC; 3 amp @ 480 VAC; 0.5 amps @ 125 VDC; 0.25 amps @ 250 VDC
-S	15 amps @ 125/250/480 VAC; 0.05 amps @ 125 VDC; Adjustable differential ³
-GH	1 amp @ 125VAC; Gold Contacts
-AA	Hermetically sealed; 4 amps @ 125/250 VAC
-CC	Hermetically sealed; 10 amps @ 125/250 VAC
-HH	Hermetically sealed; 5 amps @ 125/250 VAC
-GH	Hermetically sealed; 1 amp @ 125 VAC; gold contacts

Options

- RD Manual reset (use with "G" limit switch) ^{1,4}
- FX NEMA 4X enclosure
- SXXX Factory preset

Thermowell

- W Brass local mount thermowell
- WS 316 stainless steel local mount thermowell

Wetted Material

- Blank Blank if brass
- S 304 stainless steel sensor

Range	Adjustable Range		Media Temperature Limit (Proof)				Differential (Approx.) ²		
	Low	High	Low	High	Low	High	°F	°C	
201	-50°F	+75°F	-45°C	+24°C	-100°F	+250°F	-73°C	+121°C	1° to 3° .5° to 1.6°
202	+15°F	+140°F	-9°C	+60°C	-100°F	+250°F	-73°C	+121°C	1° to 3° .5° to 1.6°
203	+75°F	+200°F	+24°C	+93°C	-100°F	+250°F	-73°C	+121°C	1° to 3° .5° to 1.6°
351	+100°F	+225°F	+38°C	+107°C	-100°F	+400°F	-73°C	+205°C	1° to 3° .5° to 1.6°
204	-50°F	+200°F	-45°C	+93°C	-100°F	+250°F	-73°C	+121°C	1° to 3° .5° to 1.6°
354	+100°F	+350°F	+38°C	+177°C	-100°F	+400°F	-73°C	+205°C	1° to 3° .5° to 1.6°
454	+150°F	+450°F	+66°C	+232°C	0°F	+500°F	-18°C	+260°C	3° to 6° 1.6° to 3.3°

NOTES:
¹ Use G limit switch for single set point models that need this option. When selecting the manual reset option on dual setting switches (L2H), the manual reset limit switch will be on the high circuit. The low circuit limit switch must be specified by the customer.
² Changing limit switch will effect dead band; See sales drawing.
³ When selecting the 'S' adjustable differential limit switch option on a dual setting switch (L2H), a standard 'H' switch will be paired with an 'S' switch. Dual 'S' pricing will apply.
⁴ Not available with hermetically sealed limit switches

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