

# Temperature Temperature

## Mechanical

### ► Temperature switch



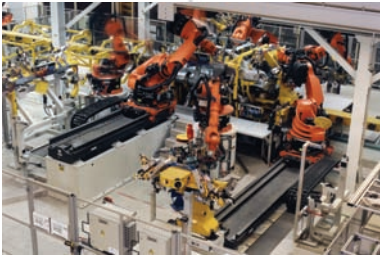
**Barksdale**  
CONTROL PRODUCTS

**CRANE** Barksdale, Inc./Barksdale GmbH  
A Subsidiary of Crane Co.

# Barksdale – Comprehensive process control

Our product range covers the complete field of mechanical and electronic pressure, temperature, level and flow monitoring and control for liquid and gaseous media. The high standard and functional reliability of our products provide the ideal prerequisites for challenging measuring tasks even under extreme operating conditions. Our motto is „Control every move“ and in this sense we develop intelligent solutions for today's market in the fields of hydraulic systems, utility vehicles and industrial equipment focussing on:

- ▶ Mobile and stationary hydraulic systems
- ▶ Pneumatic shock absorbing systems for trailers, trucks and busses
- ▶ Shipbuilding technology
- ▶ Petroleum and natural gas production



## Pressure

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Electronic Pressure Transducers  
Electronic pressure switches  
Mechanical Pressure Switches



## Level

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Level switches  
Continuous tank level indicating systems TLI  
Level probes  
Bypass level indicating systems



## Flow

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Flow switches  
Flow sensors



## Temperature

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Electronic temperature switches  
Electronic temperature sensors  
Mechanical temperature switches



## Valves

---

Shutoff valves  
Directional control valves  
Air suspension valves



# Temperature

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Subject to technical changes.

## Construction

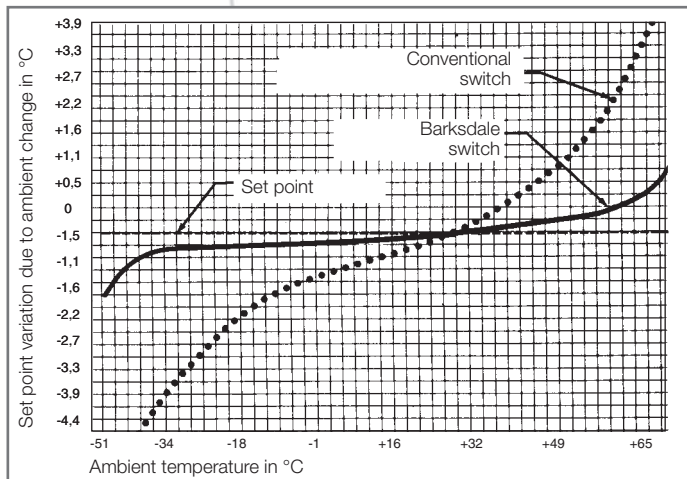
### Temperature switch with remote sensor

### Local mount type

For Pmax, pressure refer to Accessories, p. 18 table 1.4 Pressure - temperature rating

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## Ambient temperature compensation and switching accuracy

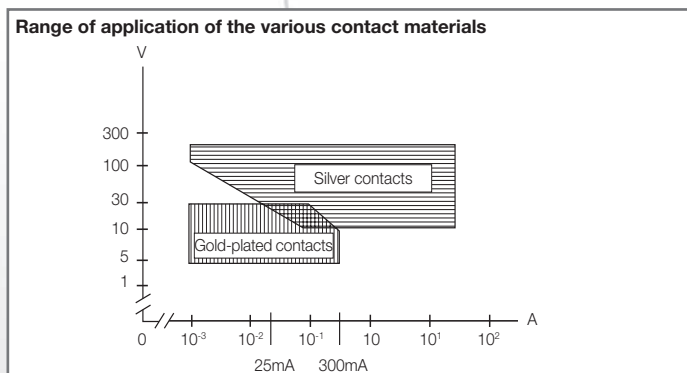


The accuracy of liquid-filled temperature switches depends largely on the ambient temperature. Barksdale temperature switches incorporate a compensating device to cancel out the adverse effects of ambient temperature fluctuation. Within the mid 60% of the adjustable range (between 20% and 80% of the scale area) the influence of the ambient temperature is limited to  $\pm 0.5\%$  ( $\pm 2\%$  at minimum or maximum adjustable set point).

### Example:

In conventional switches an ambient temperature fluctuation between  $-50\text{ }^{\circ}\text{C}$  and  $+75\text{ }^{\circ}\text{C}$  produces a swing of 10 degrees or more - in Barksdale switches extreme fluctuation of ambient temperatures may result in a 2 to 3 degrees swing.

## Contact Materials



Barksdale temperature switches have silver contact micro switches. On request we also supply micro switches with gold-plated contacts. Gold-plated contacts are almost exclusively used on micro switches that are only exposed to low electrical loads.

The product of current and voltage should not exceed 0.12 VA. Recommended values: current should range at  $< 400\text{ mA}$  and voltage at  $< 30\text{ V}$ . If operated on alternating current the above values are peak values.

Subject to technical changes.

# Temperature

## Mechanical temperature switches

## Overview

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Model	MT1H	T2H	T1X / T2X
Micro switch	H, M, GH, GM, S, G (RD)	H, M, GH, GM, S, RD	H, M, GH, GM, S
Available with manual reset	yes	yes, but only with high circuit S2	no
Set points	1	2	1 or 2
Adjustment ranges	-45 °C...+66 °C to +160 °C... +316 °C	-45 °C...+66 °C to +160 °C... +316 °C	-45 °C...+66 °C to +160 °C... +316 °C
Temperature sensor material	304 stainless steel	304 stainless steel	304 stainless steel
Temperature sensor type	Capillary, 1.8 m long (3.6 and 7.5 m)	Capillary, 1.8 m long (3.6 and 7.5 m)	Capillary, 1.8 m long (3.6 and 7.5 m)
Housing material	Anodized die-cast aluminium	Anodized die-cast aluminium	Painted die-cast aluminium
Protection class	IP65, NEMA 4 / 13	IP65, NEMA 4 / 13	IP65, NEMA 4 / 7 / 9

Subject to technical changes.



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Model	L1X	ML1H	L2H
Micro switch	H, M, GH, GM, S	H, M, GH, GM, S, G (RD)	H, M, GH, GM, S, RD
Available with manual reset	no	yes	yes, but only with high circuit S2
Set points	1	1	2
Adjustment ranges	-45 °C...+24 °C to +66 °C...+232 °C	-45 °C...+24 °C to +66 °C...+232 °C	-45 °C...+24 °C to +66 °C...+232 °C
Temperature sensor material	Brass/copper, version S: stainless steel	Brass/copper, version S: stainless steel	Brass/copper, version S: stainless steel
Temperature sensor type	Sensor, local mount type	Sensor, local mount type	Sensor, local mount type
Housing material	Painted die-cast aluminium	Anodized die-cast aluminium	Anodized die-cast aluminium
Protection class	IP65, NEMA 4 / 7 / 9	IP65, NEMA 4 / 13	IP65, NEMA 4 / 13

Subject to technical changes.

# Temperature

## Mechanical temperature switches

## Overview

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<b>Modell</b>	<b>T9692X</b>		
<b>Micro switch</b>	EE, GH		
<b>Available with manual reset</b>	no		
<b>Set points</b>	1 bzw. 2		
<b>Adjustment ranges</b>	-23 °C...+43 °C to +82 °C...+165 °C		
<b>Temperature sensor material</b>	Stainless steel		
<b>Temperature sensor type</b>	Capillary, 1.8 m long (3.6 and 7.5 m) or sensor, local mount type		
<b>Housing material</b>	Stainless steel		
<b>Protection class</b>	IP65, NEMA 4X, 7 & 9		

Subject to technical changes.

# Mechanical temperature switches

**Type MT1H**

with capillary

## Features

- Single switch with remote sensor
- Explosion proof housing
- Terminal clip and set point adjustment in °C and °F under tamper protected cover
- Protection class: IP65, NEMA 4 / 13
- Optional:
  - Disconnection with manual reset, G (RD)-micro switch
  - Adjustable hysteresis (dead band), S-micro switch
- Approvals: Ex ia, UL, CSA

## Adjustment ranges

-45 °C...+66 °C to +160 °C...+316 °C

## Applications

Temperature monitoring in machine and machine tool industry, shipbuilding, railcars, power plants, antifreeze, heating systems, compressor monitoring



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## Technical Data

<b>Housing material:</b>	Die-cast aluminium, anodized
<b>Temperature sensor material:</b>	304 stainless steel (1.4301)
<b>Temperature sensor type:</b>	Capillary, 1.8 m long (6 foot) (optional 3.6 m and 7,5 m) (12 foot and 25 foot), armoured  If not equipped with thermowell the sensor may only be used up to 21 bar max.
<b>Electrical values:</b>	All models are equipped with SPDT contacts
<b>Micro switch type:</b>	H, M, GH, GM, G (RD), S
<b>Electrical connection:</b>	1/2" NPT female, internal screw terminal, cable gland in PA, for cable size 6...12 mm is included
<b>Protection class:</b>	IP65, NEMA 4 / 13

<b>Set point adjustment:</b>	Turn adjustment knob clockwise to increase the actuation point
<b>Standards:</b>	The equipment is in conformity with the following harmonised European standards:  EN 60014 1977 + A1 to A4 and EN 500120 1977 + A1
<b>Intrinsic safety:</b>	The switches are also suitable for intrinsically safe applications. Add "Exi" in case of ordering. The following max. values are valid when using these switches: U <sub>max</sub> =28 V I <sub>max</sub> =50 mA
<b>Approvals:</b>	Ex ia, UL, CSA
<b>Weight:</b>	1.0 kg approx.

## Adjustment ranges

Code adjustment range	Sensor temperature limits (°C)	Adjustment range (°C)	Hysteresis (°C)* for micro switch			
			H, GH	M, GM	S	G (RD)
						2.8...manual
<b>154</b>	-73 ... +93	-45...+66	0.5... 1.1	1.1...2.2	2.2... 8.3	
<b>251</b>	-73 ... +149	+10...+121	0.5... 1.1	1.1...2.2	2.2... 8.3	
<b>351</b>	-73 ... +205	+66...+177	0.5... 1.1	1.1...2.2	2.2... 8.3	
<b>601</b>	-18 ... +343	+149...+227	1.1...2.2	2.2... 3.3	3.9... 13.9	
<b>603</b>	-18 ... +343	+160..+316	1.1...2.2	2.2... 3.3	3.9... 13.9	

\* Dependent on medium

Specifications are subject to changes without notice.

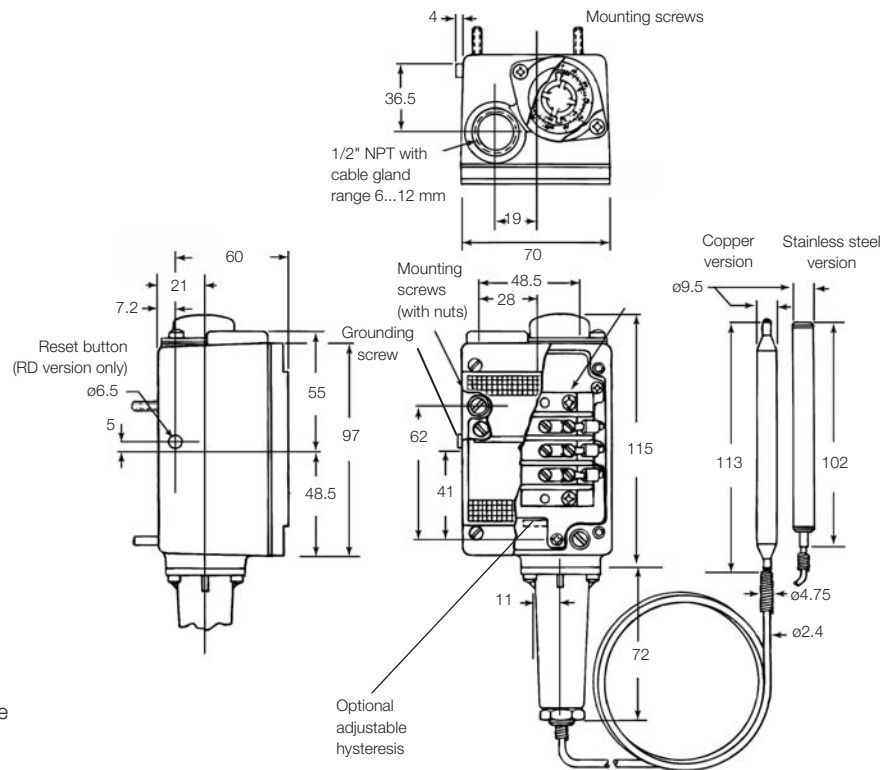
# Temperature

## Mechanical temperature switches

## Type MT1H

### Dimensions (in mm / inch)

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#### Contacts: color code and function

- C = Common = purple
- NC = Normally Closed Contact = blue
- NO = Normally Open Contact = red

### Electrical ratings

Micro switch	Special features	Volt AC 50/60 Hz	Ind. load A	Res. load A	Volt DC	Ind. load A	Res. load A	Comments
<b>H</b>	Micro switch with silver contacts	125	10	10	6	0.50	0.5	Small hysteresis; High AC / low DC loads
		250	10	10	to 28			
		480	3	3				
<b>M</b>	Micro switch with silver contacts	125	10	10	12	5.00	15.0	Medium hysteresis; High AC and DC loads
		250	10	10	24	1.00	2.0	
		480	3	3	250	0.25	0.4	
<b>GH</b>	Micro switch with gold contacts for low voltage and low current	125	1	1	24	1.00	1.0	Small hysteresis
<b>GM</b>		30	0.1	0.1	30	0.10	0.1	Medium hysteresis
<b>S</b>	Micro switch with silver contacts	480	15	15	125	0.05	0.4	Adjustable hysteresis
<b>G (RD)</b>	Micro switch with silver contacts	480	10	10	125	0.4	0.75	Manual reset

Hermetically sealed micro switch (HMT1H) on request

### Sensor lengths / Options

Sensor lengths		Options	
<b>S-A</b>	1.8 m, armoured, SS (6 foot)	<b>RD</b>	Manual reset
<b>S-12-A</b>	3.6 m, armoured, SS (12 foot)	<b>EXI</b>	for intrinsically safe application, Ex ia
<b>S-25-A</b>	7.5 m, armoured, SS (25 foot)		

### Ordering

#### Example for order number

Type	Micro switch	Code	Adjustment range	Sensor length	Options
<b>MT1H</b>	<b>H</b>	<b>251</b>	<b>S-A</b>	<b>EXI</b>	

#### Your order number

<b>MT1H</b>			
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Specifications are subject to changes without notice.

# Mechanical temperature switches

**Type T2H**

with capillary

## Features

- Dual switch with remote sensor and explosion proof housing
- Terminal clip integrated, set point adjustment in °C and °F under tamper protected cover
- Protection class: IP65, NEMA 4 / 13
- For use as two position controller
- Optional for high circuit S2:
  - Disconnection with manual reset, RD-micro switch
  - Adjustable hysteresis (dead band), S-micro switch
- The low circuit S1 can also be used for max. or min. monitoring or for sensor monitoring
- Approvals: Ex ia, UL, CSA

## Adjustment ranges

-45 °C...+66 °C to +160 °C...+316 °C

## Applications

Temperature monitoring and control in industry, shipbuilding, railcars



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## Technical Data

<b>Housing material:</b>	Die-cast aluminium, anodized
<b>Temperature sensor material:</b>	304 stainless steel (1.4301)
<b>Temperature sensor type:</b>	Capillary, 1.8 m long (6 foot) (optional 3.6 m and 7.5 m) (12 and 25 foot), armoured  If not equipped with thermowell the sensor may only be used up to 21 bar max.
<b>Electrical values:</b>	All models are equipped with SPDT contacts
<b>Micro switch type:</b>	H, M, GH, GM, S, RD
<b>Electrical connection:</b>	3/4" NPT female, internal screw terminal, cable gland in PA in PA, for cable size 6...12 mm is included
<b>Protection class:</b>	IP65, NEMA 4 / 13

<b>Set point adjustment:</b>	Turn adjustment knob clockwise to increase the actuation point
<b>Standards:</b>	The equipment is in conformity with the following harmonised European standards:  EN 60014 1977 + A1 to A4 and EN 500120 1977 + A1
<b>Intrinsic safety:</b>	The switches are also suitable for intrinsically safe applications. Add "Exi" in case of ordering. The following max. values are valid when using these switches: U <sub>max</sub> = 28 V I <sub>max</sub> = 50 mA
<b>Approvals:</b>	Ex ia, UL, CSA
<b>Weight:</b>	1.5 kg approx.

## Adjustment ranges

Code adjustment range	Sensor temperature limits (°C)	Adjustment range (°C)	Hysteresis (°C)* for micro switch			
			H, GH	M, GM	S	RD
						2.8...manual
<b>154</b>	-73 ... +93	-45...+66	0.5... 1.1	1.1...2.2	2.2... 8.3	
<b>251</b>	-73 ... +149	+10...+121	0.5... 1.1	1.1...2.2	2.2... 8.3	
<b>351</b>	-73 ... +205	+66...+177	0.5... 1.1	1.1...2.2	2.2... 8.3	
<b>601</b>	-18 ... +343	+149...+227	1.1...2.2	2.2...3.3	3.9... 13.9	
<b>603</b>	-18 ... +343	+160..+316	1.1...2.2	2.2...3.3	3.9... 13.9	

\* Dependent on medium

Specifications are subject to changes without notice.

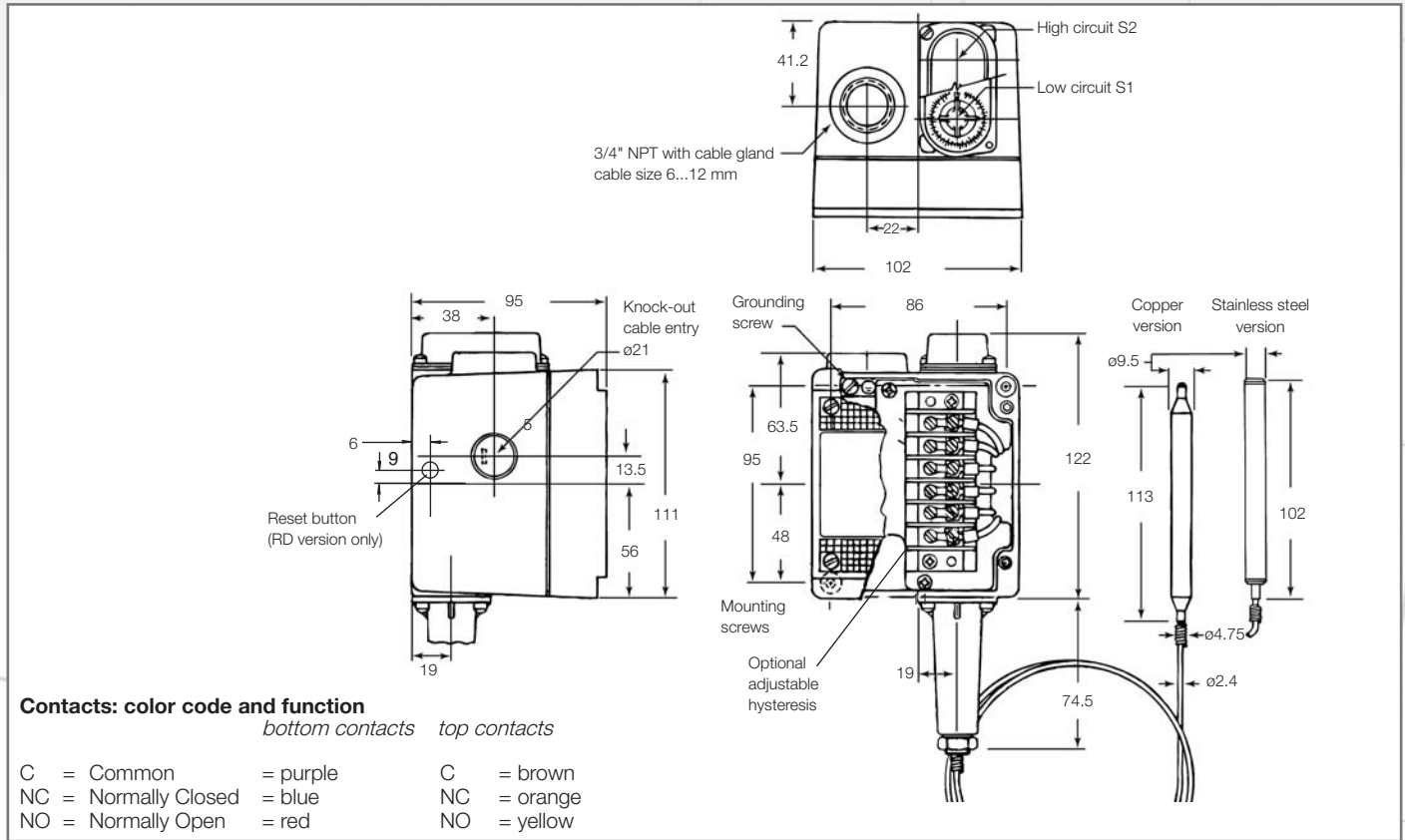
# Temperature

## Mechanical temperature switches

## Type T2H

### Dimensions (in mm / inch)

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#### Contacts: color code and function

bottom contacts top contacts

C = Common	= purple	C = brown
NC = Normally Closed	= blue	NC = orange
NO = Normally Open	= red	NO = yellow

### Electrical ratings

Micro switch	Special features	Volt AC 50/60 Hz	Ind. load A	Res. load A	Volt DC	Ind. load A	Res. load A	Comments
<b>H</b>	Micro switch with silver contacts	125	10	10	6	0.50	0.5	Small hysteresis; High AC / low DC loads
		250	10	10	to			
		480	3	3	28			
<b>M</b>	Micro switch with silver contacts	125	10	10	12	5.00	15.0	Medium hysteresis; High AC and DC loads
		250	10	10	24	1.00	2.0	
		480	3	3	250	0.25	0.4	
<b>GH</b>	Micro switch with gold contacts for low voltage and low current	125	1	1	24	1.00	1.0	Small hysteresis
<b>GM</b>		30	0.1	0.1	30	0.10	0.1	Medium hysteresis
<b>S</b>	Micro switch with silver contacts	480	15	15	125	0.05	0.4	Adjustable hysteresis
<b>RD *</b>	Micro switch with silver contacts	480	10	10	125	0.4	0.75	Manual reset (S2 only)

\* Please note: enter "RD" in "Option" and the micro switch for S1 (H, M, GH or GM) in "Micro switch" when placing your order.  
Hermetically sealed micro switch (HT2H) on request

### Sensor lengths / Options

Sensor lengths		Options	
<b>S-A</b>	1.8 m, armoured, SS (6 foot)	<b>RD</b>	Manual reset (S2 only)
<b>S-12-A</b>	3.6 m, armoured, SS (12 foot)	<b>EXI</b>	for intrinsically safe application, Ex ia
<b>S-25-A</b>	7.5 m, armoured, SS (25 foot)		

### Ordering

#### Example for order number

Type	Micro switch	Code	Adjustment range	Sensor length	Options
<b>T2H</b>	<b>M</b>		<b>251</b>	<b>S-A</b>	<b>EXI</b>

#### Your order number

<b>T2H</b>				
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Specifications are subject to changes without notice.

# Mechanical temperature switches

**Type ML1H**

## Local mount type

### Features

- Local mount type single switch
- Explosion proof housing
- Terminal clip and set point adjustment in °C and °F under tamper protected cover
- Protection class: IP65, NEMA 4 / 13
- Optional:
  - Disconnection with manual reset, G (RD)-micro switch
  - Adjustable hysteresis (switch-back difference), S-micro switch
- Thermowell in stainless steel and brass 3/4" NPT male thread
- Option thermowell:
 

W	=	Brass
WS	=	Stainless steel SS316Ti, 1.4571
- Approvals: Ex ia, UL, CSA

### Adjustment ranges

-45 °C...+24 °C to +66 °C...+232 °C

### Applications

Temperature monitoring in machine and machine tool industry, shipbuilding, power plants, antifreeze, heating systems, compressor monitoring

### Technical Data

<b>Housing material:</b>	Die-cast aluminium, anodized
<b>Process connection:</b>	Standard 1/2" NPT male, option W/WS 3/4" NPT male
<b>Temperature sensor material:</b>	Standard: brass / copper, version S: stainless steel (SS304 / 1.4301) for pressure values refer to table in chap. Accessories
<b>Electrical values:</b>	All models are equipped with SPDT contacts
<b>Micro switch type:</b>	H, M, GH, GM, S, G (RD)
<b>Electrical connection:</b>	1/2" NPT female, internal screw terminal, cable gland in PA, for cable size 6...12 mm is included
<b>Protection class:</b>	IP65, NEMA 4 / 13

<b>Set point adjustment:</b>	Turn adjustment knob clockwise to increase the actuation point
<b>Standards:</b>	The equipment is in conformity with the following harmonised European standards:  EN 60014 1977 + A1 to A4 and EN 500120 1977 + A1
<b>Intrinsic safety:</b>	The switches are also suitable for intrinsically safe applications. Add "Exi" in case of ordering. The following max. values are valid when using these switches: U <sub>max</sub> = 28 V I <sub>max</sub> = 50 mA
<b>Approvals:</b>	Ex ia, UL, CSA
<b>Weight:</b>	1.0 kg approx.



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### Adjustment ranges

Code adjustment range	Sensor temperature limits (°C)	Adjustment range (°C)	Hysteresis (°C)* for micro switch			
			H, GH	M, GM	S	G (RD)
						2.8...manual
201	-73 ... +121	-45...+24	0.5... 1.6	0.5... 1.6	3.3... 11.2	
202	-73 ... +121	-9...+60	0.5... 1.6	0.5... 1.6	3.3... 11.2	
203	-73 ... +121	+24...+93	0.5... 1.6	0.5... 1.6	3.3... 11.2	
204	-73 ... +121	-45...+93	0.5... 1.6	0.5... 1.6	3.3... 11.2	
351	-73 ... +205	+38...+107	0.5... 1.6	0.5... 1.6	3.3... 11.2	
354	-73 ... +205	+38...+177	0.5... 1.6	0.5... 1.6	3.3... 11.2	
454	-18 ... +260	+66...+232	1.6... 3.3	1.6... 3.3	5.5... 16.8	

\* Dependent on medium

Specifications are subject to changes without notice.

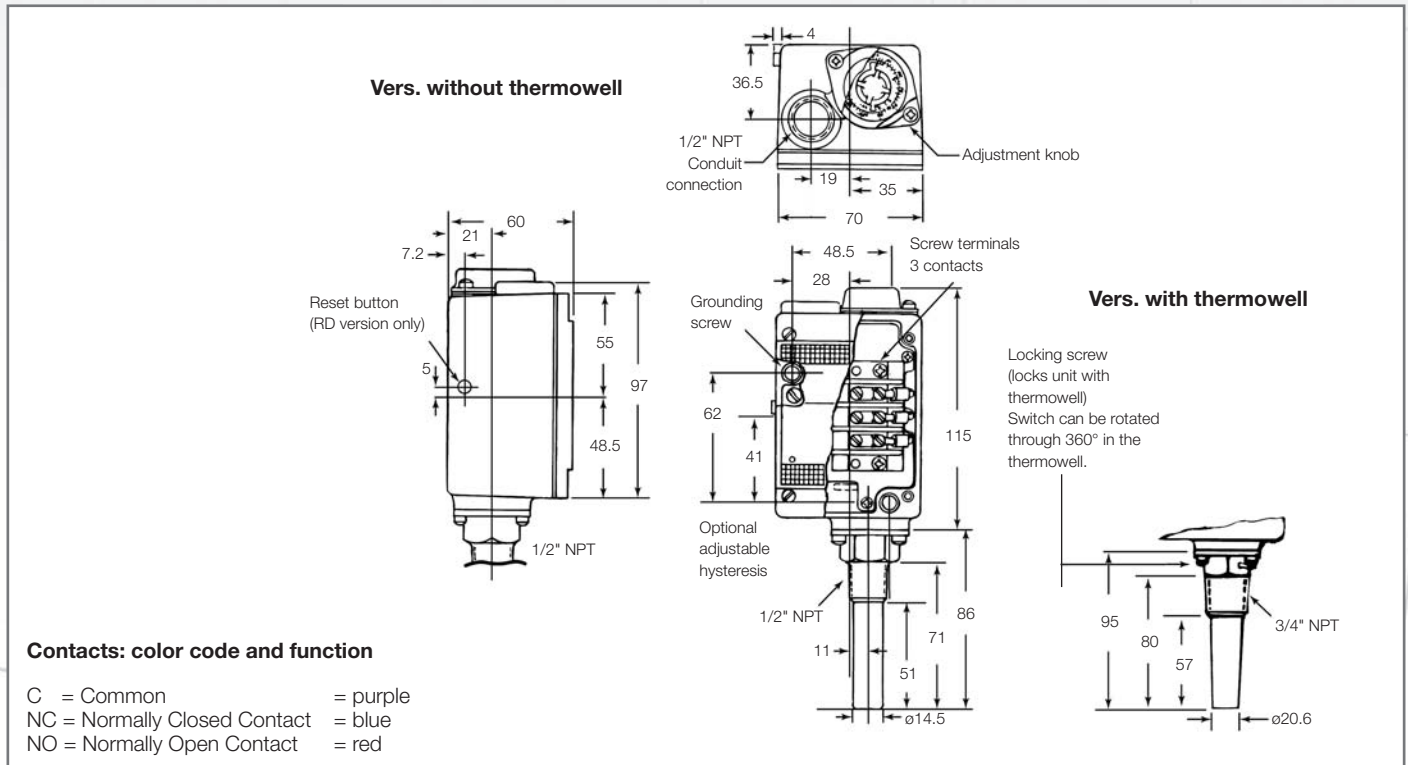
# Temperature

## Mechanical temperature switches

## Type ML1H

### Dimensions (in mm / inch)

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### Electrical ratings

Micro switch	Special features	Volt AC 50/60 Hz	Ind. load A	Res. load A	Volt DC	Ind. load A	Res. load A	Comments
<b>H</b>	Micro switch with silver contacts	125 250 480	10 10 3	10 10 3	6 to 28	0.50	0.5	Small hysteresis; High AC / low DC loads
<b>M</b>	Micro switch with silver contacts	125 250 480	10 10 3	10 10 3	12 24 250	5.00 1.00 0.25	15.0 2.0 0.4	Medium hysteresis; High AC and DC loads
<b>GH</b>	Micro switch with gold contacts for low voltage and low current	125	1	1	24	1.00	1.0	Small hysteresis
<b>GM</b>	Micro switch with gold contacts for low voltage and low current	30	0.1	0.1	30	0.10	0.1	Medium hysteresis
<b>S</b>	Micro switch with silver contacts	480	15	15	125	0.05	0.4	Adjustable hysteresis
<b>G</b>	Micro switch with silver contacts	480	10	10	125	0.4	0.75	Manual reset (RD)

Hermetically sealed micro switch (HML1H) on request

### Sensor material / Options

Sensor material		Options 1		Options 2	
---	Brass/copper	<b>W</b>	Thermowell of brass	<b>RD</b>	Manual reset
<b>S</b>	Stainless steel	<b>WS</b>	Thermowell of SS (1.4571, SS316 Ti)	<b>EXI</b>	for intrinsically safe application, Ex ia

### Ordering

#### Example for order number

Type	Micro switch	Code	Sensor material *	Option 1	Option 2
ML1H	GH	202	S	WS	Exi

\* : Brass/copper, option: S = Stainless steel

#### Your order number

ML1H					
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Specifications are subject to changes without notice.

## Local mount type

### Features

- Local mount type dual switch with explosion proof housing
- Terminal clip integrated, set point adjustment in C and °F under tamper protected cover
- Protection class: IP65, NEMA 4 / 13
- For use as two-position controller optionally with one micro switch with adjustable hysteresis for temperature control
- The second contact can also be used for max. or min. monitoring or for sensor monitoring
- Optional for high circuit S2:
  - Disconnection with manual reset, RD-micro switch
  - Adjustable hysteresis (deadband), S-micro switch
- Option thermowell:
  - W = Brass
  - WS = Stainless steel SS316Ti, 1.4571
- Approvals: Ex ia, UL, CSA

### Adjustment ranges

-45 °C...+24 °C to +66 °C...+232 °C

### Applications

Temperature monitoring and control in industry, shipbuilding, railcars

### Technical Data

<b>Housing material:</b>	Die-cast aluminium, anodized
<b>Process connection:</b>	Standard 1/2" NPT male, option W/WS 3/4" NPT male
<b>Temperature sensor material:</b>	Standard: brass / copper, version S: stainless steel (SS304 / 1.4301) for pressure values refer to table in chap. Accessories
<b>Electrical values:</b>	All models are equipped with SPDT contacts
<b>Micro switch type:</b>	H, M, GH, GM, S, RD
<b>Electrical connection:</b>	1/2" NPT female, internal screw terminal, cable gland in PA, for cable size 6...12 mm is included
<b>Protection class:</b>	IP65, NEMA 4 / 13

<b>Set point adjustment:</b>	Turn adjustment knob clockwise to increase the actuation point
<b>Standards:</b>	The equipment is in conformity with the following harmonised European standards:  EN 60014 1977 + A1 to A4 and EN 500120 1977 + A1
<b>Intrinsic safety:</b>	The switches are also suitable for intrinsically safe applications. Add "Exi" in case of ordering. The following max. values are valid when using these switches: U <sub>max</sub> = 28 V I <sub>max</sub> = 50 mA
<b>Approvals:</b>	Ex ia, UL, CSA
<b>Weight:</b>	1.5 kg approx.



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### Adjustment ranges

Code adjustment range	Sensor temperature limits (°C)	Adjustment range (°C)	Hysteresis (°C)* for micro switch			
			H, GH	M, GM	S	RD
						2.8...manual
201	-73 ... +121	-45...+24	0.5... 1.6	1.6... 3.3	3.3... 11.2	
202	-73 ... +121	-9...+60	0.5... 1.6	1.6... 3.3	3.3... 11.2	
203	-73 ... +121	+24...+93	0.5... 1.6	1.6... 3.3	3.3... 11.2	
204	-73 ... +121	-45...+93	0.5... 1.6	1.6... 3.3	3.3... 11.2	
351	-73 ... +205	+38...+107	0.5... 1.6	1.6... 3.3	3.3... 11.2	
354	-73 ... +205	+38...+177	0.5... 1.6	1.6... 3.3	3.3... 11.2	
454	-18 ... +260	+66...+232	1.6... 3.3	3.3... 5.0	5.5... 16.8	

\* Dependent on medium

Specifications are subject to changes without notice.

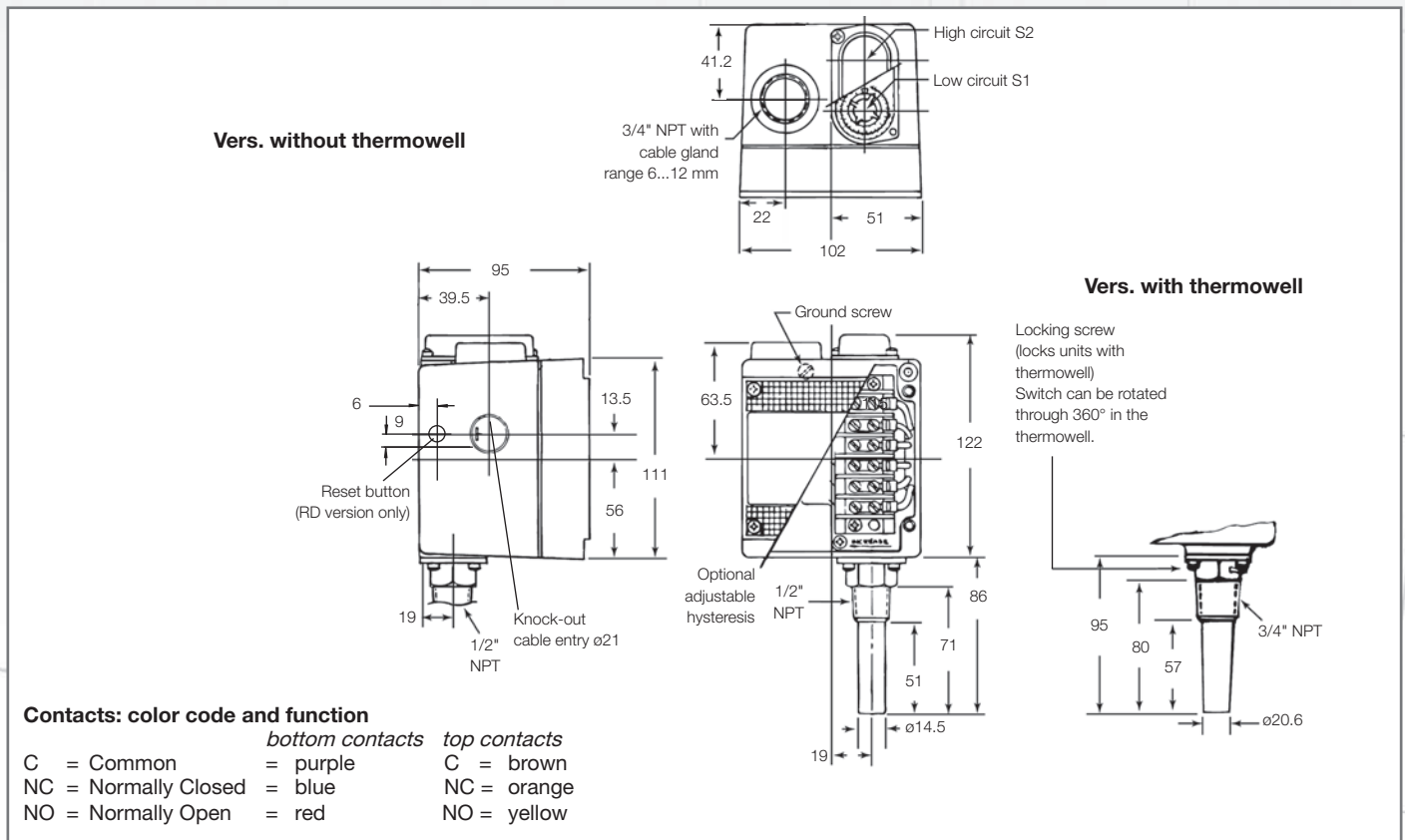
# Temperature

## Mechanical temperature switches

Type **L2H**

### Dimensions (in mm / inch)

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### Electrical ratings

Micro switch	Special features	Volt AC 50/60 Hz	Ind. load A	Res. load A	Volt DC	Ind. load A	Res. load A	Comments
<b>H</b>	Micro switch with silver contacts	125 250 480	10 10 3	10 10 3	6 to 28	0.50	0.5	Small hysteresis; High AC / low DC loads
<b>M</b>	Micro switch with silver contacts	125 250 480	10 10 3	10 10 3	12 24 250	5.00 1.00 0.25	15.0 2.0 0.4	Medium hysteresis; High AC and DC loads
<b>GH</b>	Micro switch with gold contacts for low voltage and low current	125 30	1 0.1	1 0.1	24 30	1.00 0,10	1.0 0.1	Small hysteresis Medium hysteresis
<b>S</b>	Micro switch with silver contacts	480	15	15	125	0.05	0.4	Adjustable hysteresis
<b>RD *</b>	Micro switch with silver contacts	480	10	10	125	0.4	0.75	Manual reset (S2 only)

\* Please note: enter "RD" in "Option" and the 2nd micro switch (H, M, GH or GM) in "Micro switch" when placing your order.  
Hermetically sealed micro switch (HL2H) on request

### Sensor material / Options

Sensor material		Options 1		Options 2	
---	Brass/copper	<b>W</b>	Thermowell of brass	<b>RD</b>	Manual reset (S2 only)
<b>S</b>	Stainless steel	<b>WS</b>	Thermowell of SS (1.4571, SS316 Ti)	<b>EXI</b>	for intrinsically safe application, Ex ia

### Ordering

#### Example for order number

Type	Micro switch	Code Adjustment range	Sensor material *	Option 1	Option 2
<b>L2H</b>	<b>H</b>	<b>202</b>	<b>S</b>	<b>WS</b>	<b>EXI</b>

#### Your order number

<b>L2H</b>					
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\* : brass/copper, option: S = Stainless steel

Specifications are subject to changes without notice.

# Mechanical temperature switches

## Type T1X/T2X

with capillary for hazardous areas

### Features

- Single switch T1X and dual switch T2X with remote sensor
- Explosion proof housing
- Terminal clip integrated, set point adjustment in C and °F under tamper protected cover
- Protection class: IP65, NEMA 4 / 7 / 9
- Optional:
  - for T1X: adjustable hysteresis (switch-back difference), S-micro switch
- Special version for trace heating systems with ratings up to 32 A / 220 V (22/32A / 380 V AC) on request
- Approvals: Ex d, Ex ia, UL, CSA

### Adjustment ranges

-45 °C...+66 °C to +160 °C...+316 °C

### Applications

Temperature monitoring and control in chemical industry and oil industry, offshore



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### Technical Data

<b>Housing material:</b>	Die-cast aluminium, painted
<b>Temperature sensor material:</b>	304 stainless steel (1.4301)
<b>Temperature sensor type:</b>	Capillary, 1.8 m long (6 foot) (optional 3.6 m and 7.5 m) (12 and 25 foot), armoured  If not equipped with thermowell the sensor may only be used up to 21 bar max.
<b>Electrical values:</b>	All models are equipped with SPDT contacts.
<b>Micro switch type:</b>	H, M, GH, GM, S
<b>Electrical connection:</b>	From the terminal block through a 1/2" NPT conduit connection (T1X) resp. a 3/4" NPT conduit connection (T2X) outside.
<b>Protection class:</b>	IP65, NEMA 4 / 7 / 9

<b>Set point adjustment:</b>	Turn adjustment knob clockwise to increase the actuation point
<b>Standards:</b>	The equipment is in conformity with the following harmonised European standards:  EN 60014 1977 + A1 to A4 and EN 500120 1977 + A1
<b>Intrinsic safety:</b>	The switches are also suitable for inherent safety applications. Add "Exi" in case of ordering. The following max. values are valid when using these switches: U <sub>max</sub> = 28 V I <sub>max</sub> = 50 mA
<b>Approvals:</b>	Ex d, Ex ia, UL, CSA
<b>Weight:</b>	T1X: approx. 2.1 kg; T2X: approx. 2.9 kg

### Adjustment ranges

Code adjustment range	Sensor temperature limits (°C)	Adjustment range (°C)	Hysteresis (°C)* for micro switch		
			H, GH	M, GM	S
154	-73 ... +93	-45...+66	0.5... 1.1	1.1...2.2	2.2... 8.3
251	-73 ... +149	+10...+121	0,5... 1.1	1.1...2.2	2.2... 8.3
351	-73 ... +205	+66...+177	0.5... 1.1	1.1...2.2	2.2... 8.3
601	-18 ... +343	+149...+227	1.1...2.2	2.2...3.3	1.6...2.7
603	-18 ... +343	+160..+316	1.1...2.2	2.2...3.3	1.6...2.7

\* Dependent on medium

Specifications are subject to changes without notice.

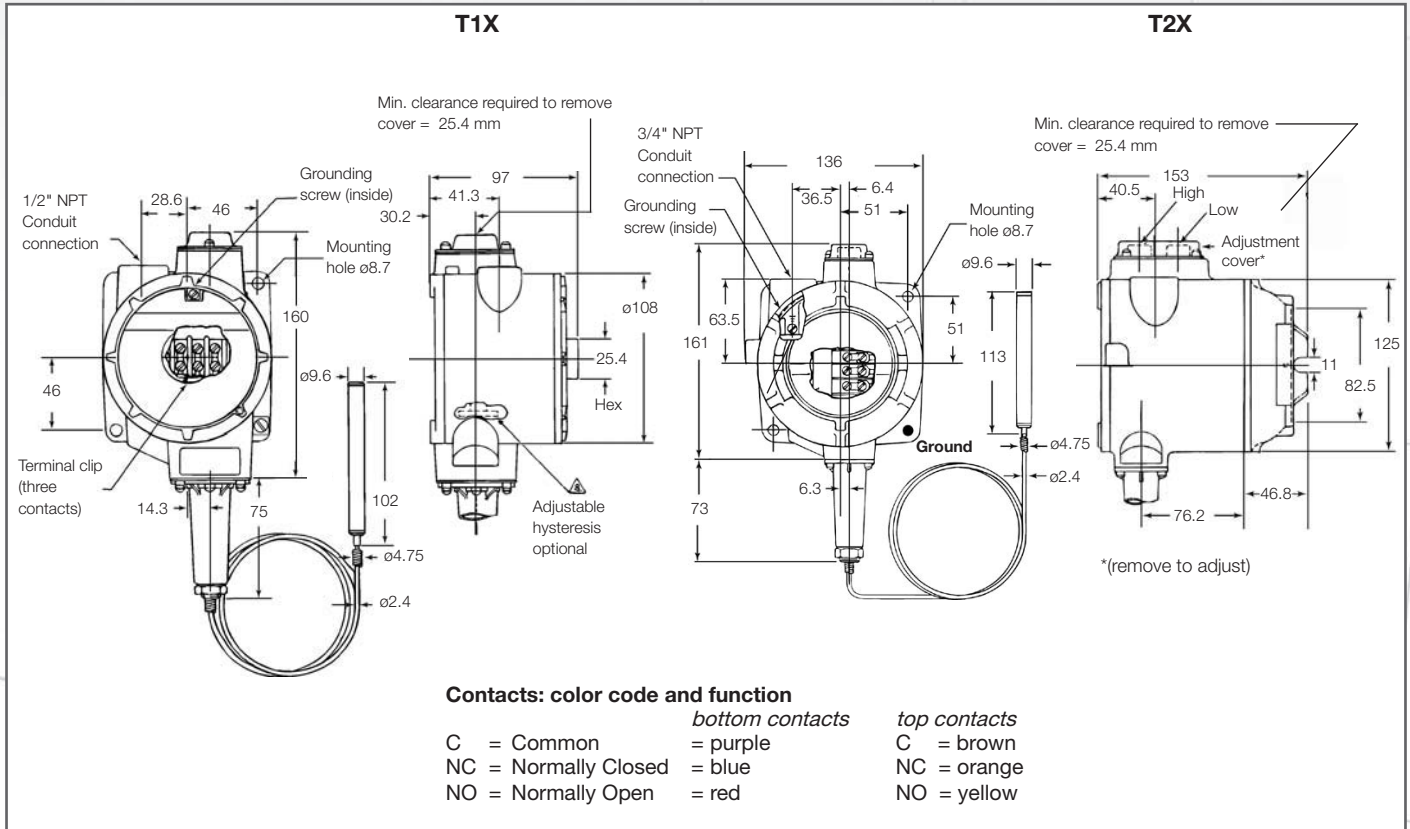
# Temperature

## Mechanical temperature switches

## Type T1X/T2X

### Dimensions (in mm / inch)

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### Electrical ratings

Micro switch	Special features	Volt AC 50/60 Hz	Ind. load A	Res. load A	Volt DC	Ind. load A	Res. load A	Comments
<b>H</b>	Micro switch with silver contacts	125	10	10	6	0.50	0.5	Small hysteresis; High AC / low DC loads
		250	10	10	to			
		480	3	3	28			
<b>M</b>	Micro switch with silver contacts	125	10	10	12	5.00	15.0	Medium hysteresis; High AC and DC loads
		250	10	10	24			
		480	3	3	250			
<b>GH</b>	Micro switch with gold contacts for low voltage and low current	125	1	1	24	1.00	1.0	Small hysteresis
<b>GM</b>	Micro switch with silver contacts	30	0.1	0.1	30	0,10	0.1	Medium hysteresis
<b>S</b>	Micro switch with silver contacts	480	15	15	125	0,05	0.4	Adjustable hysteresis

### Sensor lengths / Options

Sensor lengths		Options	
<b>S-A</b>	1.8 m, armoured, SS (6 foot)	<b>EXI</b>	for intrinsically safe application, Ex ia
<b>S-12-A</b>	3.6 m, armoured, SS (12 foot)	<b>EX</b>	Ex d protection
<b>S-25-A</b>	7.5 m, armoured, SS (25 foot)		

### Ordering

Example for order number

Type	Micro switch	Code Adjustment range	Sensor length	Options
<b>T1X</b>	<b>H</b>	<b>251</b>	<b>S-A</b>	<b>EXI</b>
<b>T2X</b>				

Your order number

<b>T_X</b>			
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Specifications are subject to changes without notice.

# Mechanical temperature switches

**Type L1X**

Local mount type for hazardous areas

## Features

- Local mount type single switch with explosion proof housing
- Terminal clip integrated, set point adjustment in °C and °F under tamper protected cover
- Protection class: IP65, NEMA 4 / 7 / 9
- Optional:
  - Adjustable hysteresis (deadband), S-micro switch
  - Option thermowell: W = Brass  
WS = Stainless steel SS316Ti, 1.4571
- Approvals: Ex d, Ex ia, UL, CSA

## Adjustment ranges

-45 °C...+24 °C to +66 °C...+232 °C

## Applications

Temperature monitoring and control in industry, shipbuilding, railcars



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## Technical Data

<b>Housing material:</b>	Die-cast aluminium, painted
<b>Process connection:</b>	Standard 1/2" NPT male, option W/WS 3/4" NPT male
<b>Temperature sensor material:</b>	Standard: brass / copper, version S: stainless steel (SS304 / 1.4301) for pressure values refer to table in chap. Accessories
<b>Electrical values:</b>	All models are equipped with SPDT contacts
<b>Micro switch type:</b>	H, M, GH, GM, S
<b>Electrical connection:</b>	1/2" NPT female, internal screw terminal, cable gland in PA, for cable size 6...12 mm is included
<b>Protection class:</b>	IP65, NEMA 4 / 7 / 9
<b>Set point adjustment:</b>	Turn adjustment knob clockwise to increase the actuation point

<b>Standards:</b>	The equipment is in conformity with the following harmonised European standards:  EN 60014 1977 + A1 to A4 and EN 500120 1977 + A1
<b>Intrinsically safe:</b>	The switches are also suitable for intrinsically safe applications. Add "Exi" in case of ordering. The following max. values are valid when using these switches: U <sub>max</sub> = 28 V I <sub>max</sub> = 50 mA
<b>Approvals:</b>	Ex d, Ex ia, UL, CSA
<b>Weight:</b>	2.0 kg approx.

## Adjustment ranges

Code adjustment range	Sensor temperature limits (°C)	Adjustment range (°C)	Hysteresis (°C)* for micro switch		
			H, GH	M, GM	S
201	-73 ... +121	-45...+24	0.5...1.6	1.6...3.3	3.3...11.2
202	-73 ... +121	-9...+60	0.5...1.6	1.6...3.3	3.3...11.2
203	-73 ... +121	+24...+93	0.5...1.6	1.6...3.3	3.3...11.2
204	-73 ... +121	-45...+93	0.5...1.6	1.6...3.3	3.3...11.2
351	-73 ... +205	+38...+107	0.5...1.6	1.6...3.3	3.3...11.2
354	-73 ... +205	+38...+177	0.5...1.6	1.6...3.3	3.3...11.2
454	-18 ... +260	+66...+177	1.6...3.3	3.3...5.0	5.5...16.8

\* Dependent on medium

Specifications are subject to changes without notice.

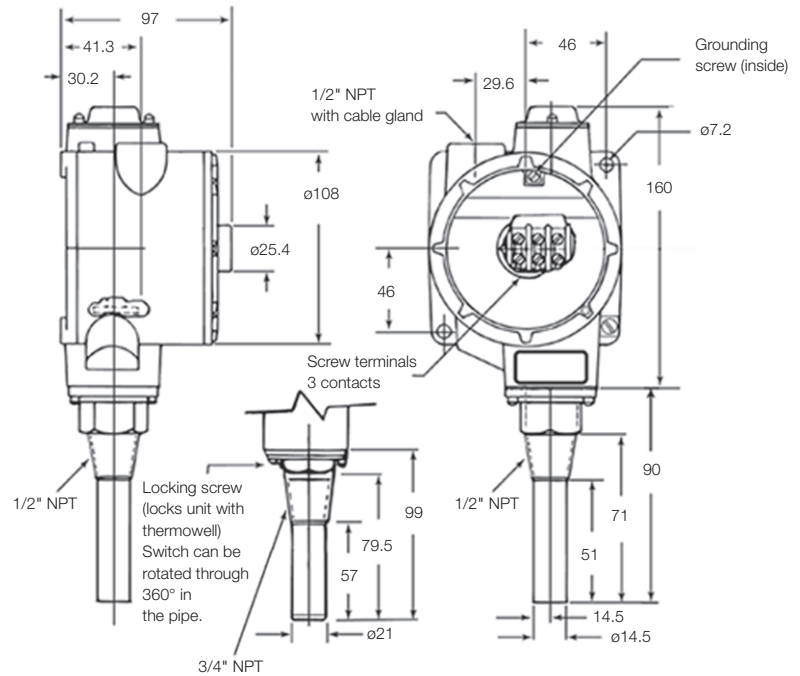
# Temperature

## Mechanical temperature switches

## Type L1X

### Dimensions (in mm / inch)

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#### Contacts: color code and function

- C = Common = purple
- NC = Normally Closed Contact = blue
- NO = Normally Open Contact = red

**Vers. without thermowell    Vers. with thermowell**

### Electrical ratings

Micro switch	Special features	Volt AC 50/60 Hz	Ind. load A	Res. load A	Volt DC	Ind. load A	Res. load A	Comments
<b>H</b>	Micro switch with silver contacts	125 250 480	10 10 3	10 10 3	6 to 28	0.50	0.5	Small hysteresis; High AC / low DC loads
<b>M</b>	Micro switch with silver contacts	125 250 480	10 10 3	10 10 3	12 24 250	5.00 1.00 0.25	15.0 2.0 0.4	Medium hysteresis; High AC and DC loads
<b>GH</b>	Micro switch with gold contacts for low voltage and low current	125	1	1	24	1.00	1.0	Small hysteresis
<b>GM</b>	Micro switch with silver contacts	30	0.1	0.1	30	0.10	0.1	Medium hysteresis
<b>S</b>	Micro switch with silver contacts	480	15	15	125	0.05	0.4	Adjustable hysteresis

Hermetically sealed micro switch (HL1X) on request

### Sensor material / Options

Sensor material		Options 1		Options 2	
---	Brass/copper	<b>W</b>	Thermowell of brass	<b>EXI</b>	For intrinsically safe application, Ex ia
<b>S</b>	Stainless steel	<b>WS</b>	Thermowell of SS (1.4571, SS316 TI)	<b>Ex</b>	Ex d protection

### Ordering

#### Example for order number

Type	Micro switch	Code Adjustment range	Sensor material *	Option 1	Option 2
<b>L1X</b>	<b>H</b>	<b>204</b>	<b>S</b>	<b>WS</b>	<b>EXI</b>

\* : Brass/copper, option: S = Stainless steel

#### Your order number

<b>L1X</b>					
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Specifications are subject to changes without notice.

# Compact explosion proof temperature switch

**Type T9692X**

## Features

- Compact design
- NEMA 4X, 7 & 9
- SPDT and DPDT switch
- ATEX approved
- Class I Div I
- Local mount or capillary type
- Panel mount capability
- 316 stainless steel
- NACE compliant
- Armored capillary

## Adjustment ranges

-23 °C...+43 °C bis 82 °C...+165 °C

## Applications

Offshore,  
Chemical plants & refineries,  
Compressor skids,  
Instrument panels,  
Hazardous location applications

## Technical Data

<b>Repeatability:</b>	±63% of full scale
<b>Typical life:</b>	1 million cycles
<b>Switch type:</b>	SPDT, snap action, Class EE, simulated DPDT (optional) with 2 SPDT
<b>Electrical ratings:</b>	11 A 125/250 VAC 5 A 30 VDC (EE class)
<b>Material:</b> Capillary & armor: Housing: Sensor:	316 stainless steel (1.4401/1.4436) 316 stainless steel (1.4401/1.4436) stainless steel
<b>Electrical connection:</b>	1/2" NPT male conduit connection 18 AWG, 18" (450 mm) free leads
<b>Protection class:</b>	NEMA 4X, 7 & 9
<b>Approvals:</b> ATEX:  UL:  CSA:	CE 0081 LCIE 08 ATEX 6074X $\text{Ex}$ II 2 G Ex d IIC T6, $-40\text{ °C} \leq T_{\text{amb}} \leq 60\text{ °C}$ Listed 366S, Class: I, Groups: A, B, C, D, $-25\text{ °C} \leq T_{\text{amb}} \leq 60\text{ °C}$ Class: I, Groups: B, C, D $-40\text{ °C} \leq T_{\text{amb}} \leq 60\text{ °C}$

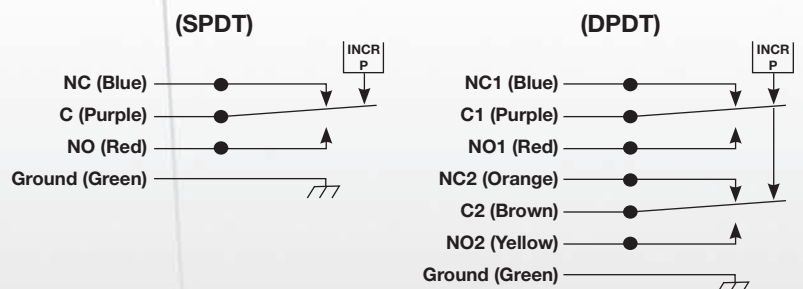
<b>Ambient temperature:</b> CSA & ATEX: UL:	-40 °C to 60 °C (-40 °F to 140 °F) -25 °C to 60 °C (-13 °F to 140 °F)
<b>EMI/RFI (EMC):</b>	EN55011
<b>Vibration resistance:</b>	10g 10-500 Hz, MIL-STD 202 °F
<b>Shock resistance:</b>	50g 11 ms, MIL-S-901C
<b>Set point adjustment:</b>	Adjustment knob can be locked by means of setscrew (hexagon socket SW 1.5). Set point is increased by turning the adjustment knob clockwise.
<b>Weight:</b>	max. 1.4 kg



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## Switching and connection diagram

	Circuit #1	Circuit #2
Normally Closed/NC	Blue	Orange
Common	Purple	Brown
Normally Open/NO	Red	Yellow
Ground	Green	



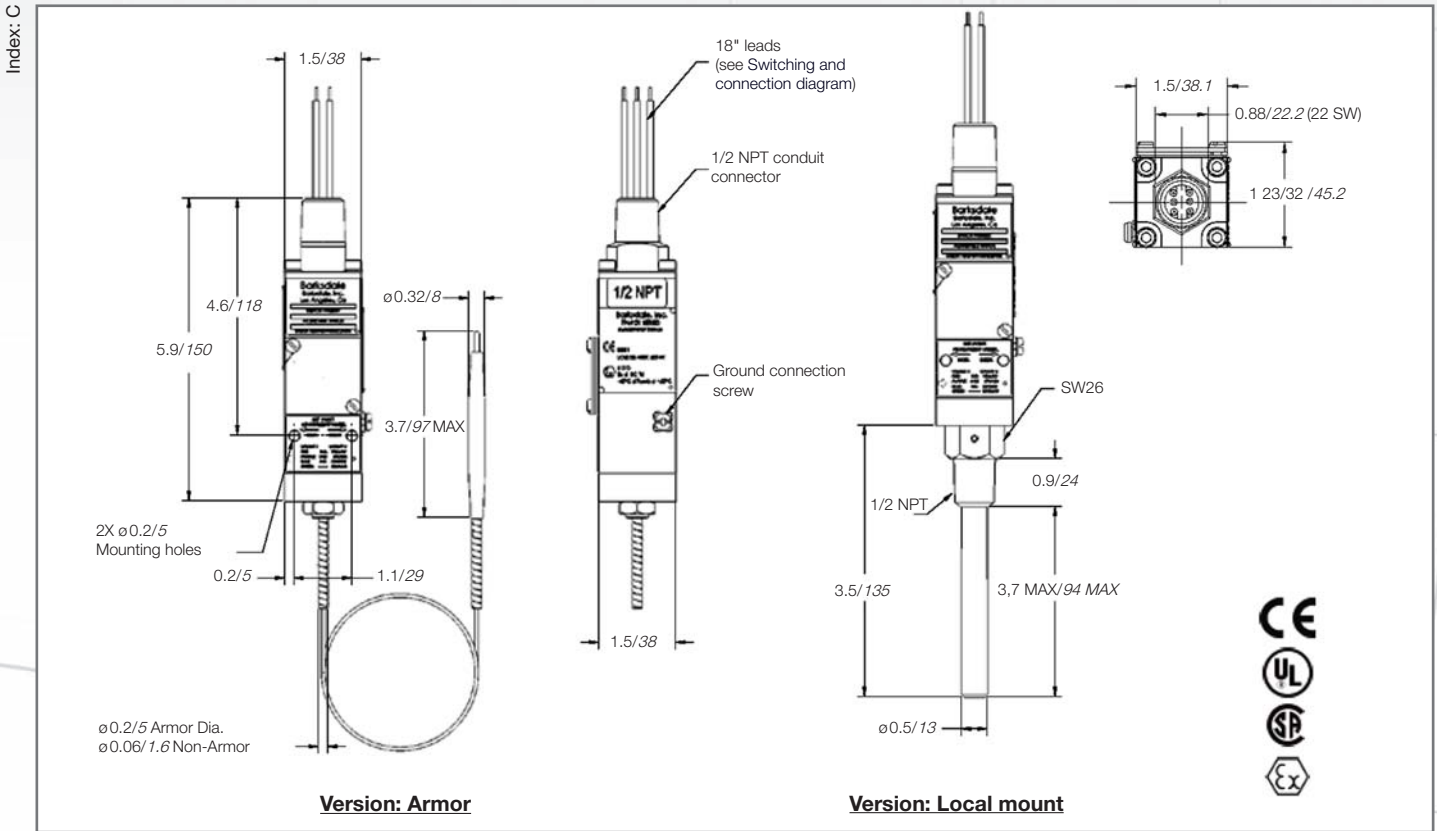
Specifications are subject to changes without notice.

# Temperature

## Compact explosion proof temperature switch

**Type T9692X**

### Dimensions (in mm / inch)



### Product Configurator

Example	T9692X	-1	EE	-1	-072	
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#### Base Configurator

T9692X Temperature switch

#### Switch contact

-1	SPDT
-2	DPDT (simulated with 2 SPDT)

#### Micro switch

EE	Silver contacts 11 A, 125V/250 VAC; 5 A, 30 VDC
GH	Gold contacts 1 A, 125/250 VAC

#### Temperature ranges

	Adjustment range	Approx. deadband <sup>2</sup> Actuation value	Max. temperature range	Proof temperature
-1	-10 °F to 110 °F (-23 °C to 43 °C)	5 °F to 30 °F (2,8 °C to 16,7 °C)	-40 °F to 160 °F (-40 °C to 71 °C)	160 °F (71 °C)
-2	95 °F to 220 °F (35 °C to 104 °C)	5 °F to 30 °F (2,8 °C to 16,7 °C)	40 °F to 270 °F (4 °C to 132 °C)	270 °F (132 °C)
-3	180 °F to 330 °F (82 °C to 165 °C)	5 °F to 30 °F (2,8 °C to 16,7 °C)	70 °F to 380 °F (21 °C to 193 °C)	380 °F (193 °C)

#### Options

---	Standard
-A <sup>1</sup>	Stainless steel, armor
-SXXX	with factory set point adjustment
-WXXX	Extra wire length (XXX=inches)

#### Capillary Length

-072	6 ft (1.8 meters)
-108	9 ft (2.7 meters)
-144	12 ft (3.7 meters)
-001	Local mount

<sup>1</sup> Not available in local mount

<sup>2</sup> Deadband values indicated when used with the "EE" limit switch.

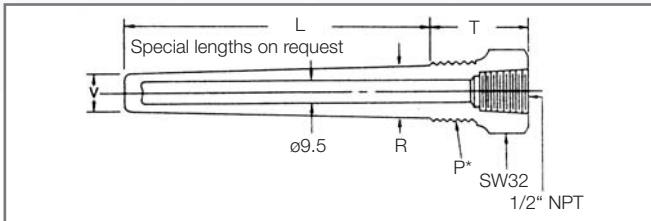
### Accessories

Order No.	Description
926-0811	Ex d - Terminal box incl. terminal (drawing 923-1533 on request)
999-0081	Tamper proof cover

## Thermowell

for remote sensor and capillary models

**Note:** Thermowell for local mount models are treated on the respective data sheet.

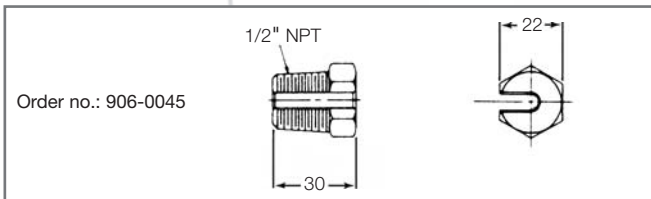


\* Other models available, also R thread

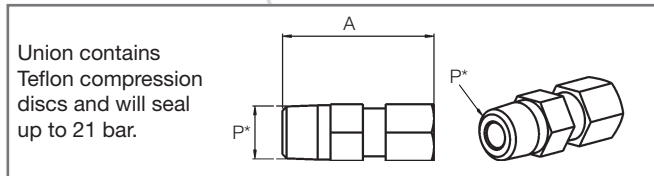
Order No.	P*	R	T	V	
Brass					
906-0044	1/2" NPT	17.5	44.5	16	124
906-0042	3/4" NPT	22.2	44.5	19	124
Stainless steel					
906-0043	1/2" NPT	17.5	47.5	16	114
906-0041	3/4" NPT	22.2	47.5	19	114

## Split nut

Used to hold sensor in thermowell.



## Union connector



Order No.	Material	P* NPT	A
926-0046	Brass	1/2"	57.0
906-0033	Brass	3/4"	63.5
926-0047	Stainless steel	1/2"	57.0
906-0032	Stainless steel	3/4"	63.5

## Heat conducting plate

Order No.	Description
919-0162	Tube 50 g

## Thermowell pressure, temperature and velocity limitations

### Maximum permissible velocity in m/sec

Material	Thermowell length in mm							
	63.5	114	190	267	343	419	495	572
Brass	98 (45)	39 (25)	14	7	4.5	3	2	1.5
Steel	125 (82)	76 (45)	27	14	8.5	5.5	4	3
Stainless steel	147 (106)	83 (63)	30	15	9	6	4.5	3

The values in brackets represent safe values for water flow. All other values are for steam, gas or similar low-density media.

## Pressure - temperature rating (values in bar)

Thermowell	Temperature in °C				
	+22	+94	+210	+320	+430
Brass	350	295	70	*	*
Steel	365	350	335	320	245
Stainless steel	490	435	390	380	365

## Certificates

Order No.	Description
998-9991	Work certificate EN 10204-2.1
998-9992	Work certificate EN 10204-2.2

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Specifications are subject to changes without notice.

# Temperature

Mechanical temperature switches

*Accessories*

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Specifications are subject to changes without notice.

# Experts

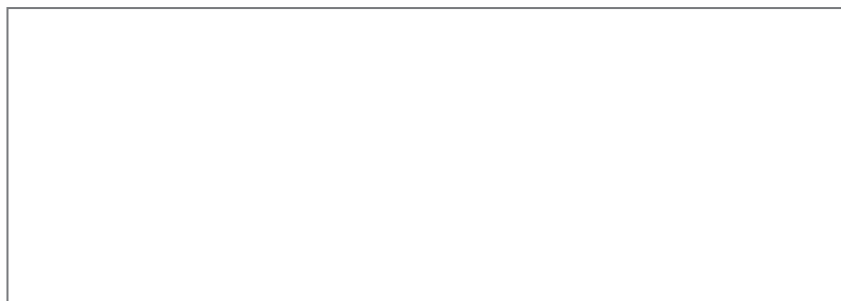
## Specialists for monitoring and control of:

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- ▶ Level
- ▶ Flow

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