

# TURCK

## DC Self-Contained Temperature Controls



### TC01-G1/2 A4P-2AP8X-H1140 TC01-G1/2 A4P-LIAP8X-H1140

- Indication of relative temperature via three-digit, seven-segment display
- Two independent switching points or single switch point with current analog output
- Hysteresis or window function
- On- and off-delay
- MIN/MAX memory function

The self-contained temperature-monitoring device has two independently adjustable switching points or single switch point with separate analog output. These can be used for limit-value monitoring or window functions. The operating range is between  $-40^{\circ}$  and  $+120^{\circ}\text{C}$  when used in liquid or paste-like media.

The outputs can be programmed for either N.C. or N.O. operation. The switch on- and off-delays suppress output indications caused by short-term fluctuations in temperature.

The device features a volatile, resettable MIN/MAX memory. It is programmed via push buttons located on the front cover. Switching points and parameter settings can be called up and displayed while the unit is operating.

The device should be mounted in a standard tee or weld socket. The housing is rotatable for optimal viewing of the display.

### Operating Modes

If an over-range of a certain temperature is to be monitored, select the **hysteresis-function**. In this mode, a limit value must be set. If the temperature exceeds this value, the output either activates or de-activates, depending on the selected output function.

A hysteresis value is assigned to the limit value, which determines the differential between the switch-on or switch-off value. It is also possible to delay the switch-on and switch-off times.

If the **window-function** is selected as the operating mode, the switching output activates when the adjusted limit temperature is reached (beginning of window range) and de-activates when the end value (defined by the window width value) is reached. The switch-on and switch-off delay may also be used in this operating mode.

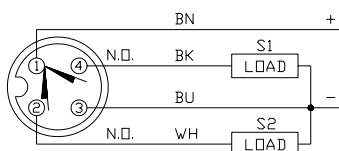
## Discrete and Analog Temperature Controls, DC Self-Contained, Programmable TC01-G1/2 A4P-2AP8X-H1140 TC01-G1/2 A4P-LIAP8X-H1140

<b>Type</b>	TC01-G1/2A4P-2AP8X-H1140	TC01-G1/2A4P-LIAP8X-H1140
ID number	M6877001	M6877002
<b>Output</b>	(2) PNP transistors, short-circuit and reverse-polarity protected, programmable N.C. or N.O.	(1) PNP transistor, short-circuit and reverse-polarity protected, programmable N.C. or N.O. And One 4-20 mA Analog output
Voltage drop at I <sub>max</sub>	≤2.5 V	≤2.5 V
<b>Operating Voltage</b>	21.6 - 26.4 VDC (incl. ripple)	
Current consumption	≤ 70 mA	
<b>Temperature Range</b>	-20° to +60°C (-4° to +140°F)	
Medium temperature range	-40° to +120°C (-40° to +248°F)	
<b>Adjustment Time</b> (water, 10% - 90%)	typ. 10 s	
<b>Measuring Range</b>	-40° to +120°C (-40° to +248°F)	
Tolerance range	±2.5°C (0° to 80°C: ±1°C)	
Switch point accuracy	±3% of full scale	
Display resolution	1°C (-9.9° to +99.9°C: 0.1°C)	
<b>Programmable Ranges</b>	-39° to +120°C (-38° to +248°F), 0.5°C/step	
Hysteresis range	0.5° to +99.5°C (32.9° to +211.1°F), 0.5°C/step (0.9°F/step)	
Window range	0.5° to +99.5°C (32.9° to +211.1°F), 0.5°C/step (0.9°F/step)	
Switch-on and switch-off delay time	0 to 50 s (0.5 s/step)	
<b>LED indications/ display</b>	3-digit 7-segment display	
- at limit value S1/S2	yellow (2x)	
- display resolution (3-digit)	0.1°C	
<b>Connection</b>	4-wire <i>euromast</i> <sup>®</sup> quick disconnects, RK 4.4T-* or WK4.4T-* (See page 65), * = length in meters	
<b>Materials</b>		
Housing	PBT	
Sensor	316TI stainless steel (1.4571)	
Type of protection (IEN 529/ DIN 40050-9)	IP 65	
Pressure resistance	1450 psi (100 bar)	

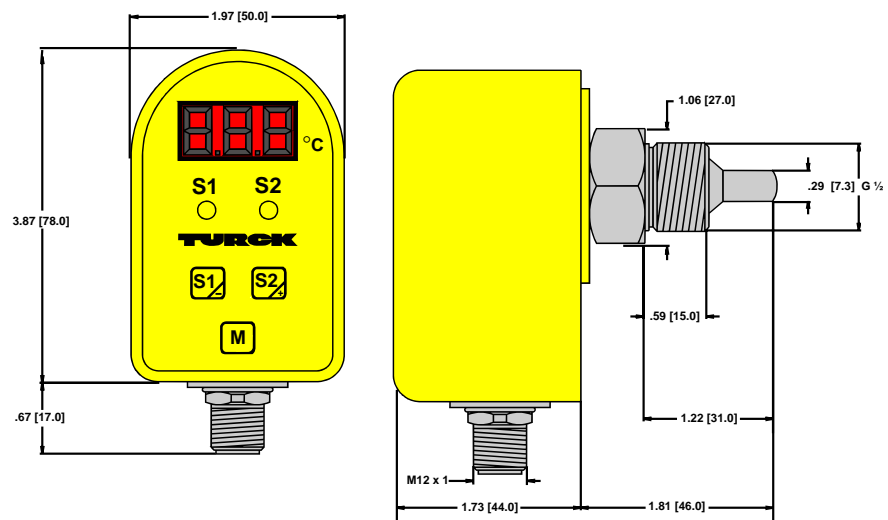
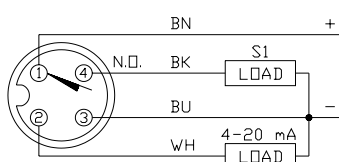
**Note:** G threading refers to British parallel pipe (BSPP) threading.

### Wiring Diagrams

#### 2AP8X

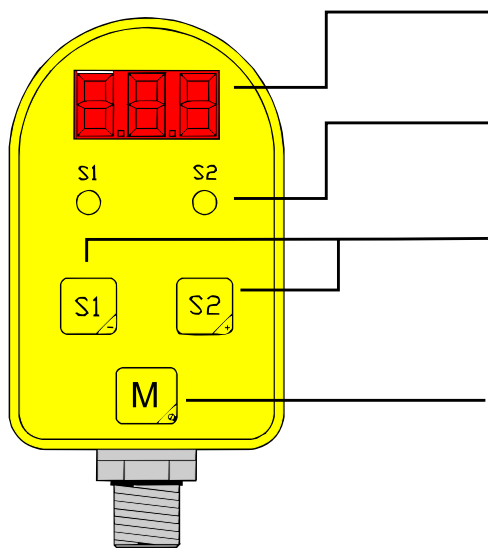


#### LIAP8X



## Operating and Display Elements

### Operating and display elements for call-up of programmed parameters



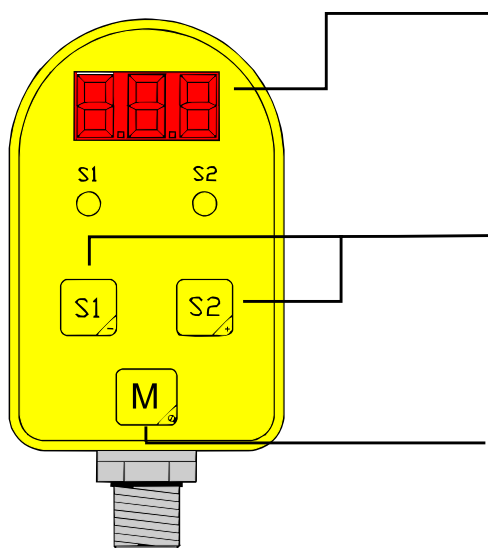
**7-segment display**, 3 digits.  
Indicates relative temperature.

**LED indications** for switch points S1 and S2.  
The LED illuminates yellow if output S1 or S2 are active.

**Buttons S1/(-) and S2/mA(+)** set switch points S1 and S2/ the analog output. The display will return to the measuring-value monitoring mode in approximately 3 seconds.

**Button M** selects the required parameter.  
After 2 s, the selected value displays for 2 s. Then the display returns to the measuring- value monitoring mode. If the window/hysteresis function is selected, first parameter Fu1/Fu, then Fu2 are displayed. After 2 s, the active function is indicated (window = CO);

### Operating and display elements in the programming mode



**7-segment display** with 3 digits for monitoring of individual menu items, i.e. main and sub-menus and programming values.

**Buttons S1/(-) and S2/mA(+)** switch between sub-menus and set the parameters. S1/(-) decreases the value, S2/mA/(+) increases the value. Programming is initiated by pressing both buttons simultaneously for 3 seconds at which time the display will start flashing. To reset the MIN or MAX memory in programming mode, use either button S1/(-) or S2/mA(+). If power is removed from the sensor, MIN and MAX will automatically be reset.

**Button M** selects the required parameter within the main menu. The parameter can be saved after each step by pressing the button for 3 seconds. At this time the display will stop flashing and the actual measuring value will be indicated.

Note: The analog version S2(+) push button is labeled mA(+).

## TC01-G1/2 A4P-2AP8X-H1140 Parameter Programming and Call-up

**Parameter Setting** (displayed sequentially): Parameters and values are selected via the M and S buttons:

**M:** Use to select parameters in the main menu.

**S1/- and S2/+:** Use to select sub-menu parameters and values.

### Sub-menu (hysteresis/window function)

The display of the sub-menu changes depending on whether the window or hysteresis function modes are selected. Use the S1/- and S2/+ buttons to choose the respective modes.

If the window function **CO** is selected for switching output 1 or 2, the display shows **FR1** or **FR2** a few steps later. The width of the window is determined by the value that was just set.

If the hysteresis function **HYS** is selected for output 1 or 2, **HS1** or **HS2** will be displayed. The adjusted values determine the differential between the switch-on and switch-off value.

**START** (press button S1/- and S2/+ simultaneously for 3 seconds). At this time the menu will begin flashing.

Menu item	Main menu	Sub-menu	Value range
Function 1	<b>FU1</b>		
window function 1		[ <b>CO</b> ]	
hysteresis 1		[ <b>HYS</b> ]	
Function 2	<b>FU2</b>		
window function 2		[ <b>CO</b> ]	
hysteresis 2		[ <b>HYS</b> ]	
Switch point 1	<b>SP1</b>		-39° - +120°C (-39° - +248°F)
Switch point 2	<b>SP2</b>		-39° - +120°C (-39° - +248°F)
Window 1	<b>FR1</b>		0.5° - +99.5°C (-1.0° - +179°F)
hysteresis 1	<b>HS1</b>		0.5° - +99.5°C (-1.0° - +179°F)
Window 2	<b>FR2</b>		0.5° - +99.5°C (-1.0° - +179°F)
hysteresis 2	<b>HS2</b>		0.5° - +99.5°C (-1.0° - +179°F)
Switch-on delay 1	<b>DS1</b>		0 - 50
Switch-on delay 2	<b>DS2</b>		0 - 50
Switch-off delay 1	<b>DR1</b>		0 - 50
Switch-off delay 2	<b>DR2</b>		0 - 50
Switching output 1	<b>OU1</b>		
PNP N.C.		[ <b>NC</b> ]	
PNP N.O.		[ <b>NO</b> ]	
Switching output 2	<b>OU2</b>		
PNP N.C.		[ <b>NC</b> ]	
PNP N.O.		[ <b>NO</b> ]	
MAX value (high)	<b>HI</b>		Reset MAX: [S1/-] / [S2/+]
MIN value (low)	<b>LO</b>		Reset MAX: [S1/-] / [S2/+]
Unit °F / °C	<b>UNI</b>	[ <b>°C</b> ] [ <b>°F</b> ]	

**Save (exit)** Press button M for 3 seconds

# TURCK

## DC Self-Contained Temperature Controls

### TC01-G1/2 A4P-LIAP8X-H1140 Parameter Programming and Call-up

**Parameter Setting** (displayed sequentially): Parameters and values are selected via the M, S1 and mA buttons:

**M:** Use to select parameters in the main menu.

**S1/- and mA/+:** Use to select sub-menu parameters and values.

#### Sub-menu (hysteresis/window function)

The display of the sub-menu changes depending on whether the window or hysteresis function modes are selected. Use the S1/- and mA/+ buttons to choose the respective modes.

If the window function **CO** is selected, the display shows **FR** a few steps later. The width of the window is determined by the value that was just set.

If the hysteresis function **HYS** is selected, **HS** will be displayed. The adjusted value determines the differential between the switch-on and switch-off values.

**START** (press buttons S1/- and mA/+ simultaneously for 3 seconds). At this time the menu will begin flashing.

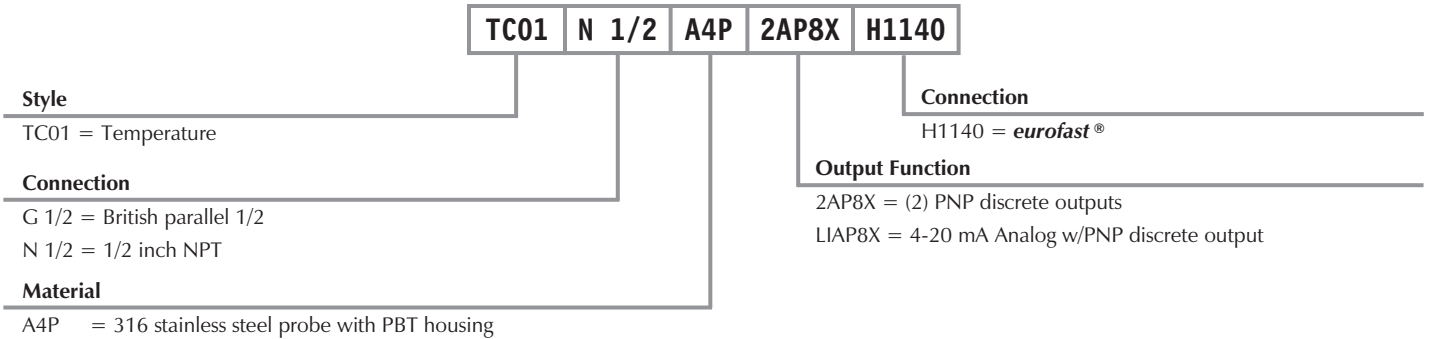
Menu item	Main menu	Sub-menu	Value range
Function	<i>FU</i>		
window function		[ <i>CO</i> ]	
hysteresis		[ <i>HYS</i> ]	
Switch point	<i>SP</i>		-39° - +120°C (-39° - +248°F)
Window	<i>FR</i>		0.5° - +99.5°C (-1.0° - +179°F)
hysteresis	<i>HS</i>		0.5° - +99.5°C (-1.0° - +179°F)
Switch-on delay	<i>DS</i>		0 - 50
Switch-off delay	<i>DR</i>		0 - 50
Switching output	<i>OU</i>		
PNP N.C.		[ <i>NC</i> ]	
PNP N.O.		[ <i>NO</i> ]	
Lower range value 4 mA	<i>R4</i>		-40 - 104 °C (-40° - +219°F)
Upper range value 20 mA	<i>R20</i>		-24 - 120 °C (-24° - +248°F)
MAX value (high)	<i>HI</i>		Reset MAX: [S1/-] / [mA/+]
MIN value (low)	<i>LO</i>		Reset MIN: [S1/-] / [mA/+]
Unit °C / °F	<i>UNI</i>	[ °C ] [ °F ]	

**SAVE / EXIT** Press button M for 3 seconds



**Temperature Part Number Key**

Part Number Keys are to assist in IDENTIFICATION ONLY. Consult factory for catalog items not identified.



**Temperature General Specifications**

<b>Operating Voltage</b> . . . . .	21.6 - 26.4 VDC (including ripple)
<b>Current Consumption</b> . . . . .	≤70 mA
<b>Voltage Drop at I<sub>max</sub></b> . . . . .	≤2.5 VDC
<b>Temperature Range</b> . . . . .	-20 to +60°C (-4 to +140°F)
<b>Medium Temperature Range</b> . . . . .	-40 to +120°C (-40 to +248°F)
<b>Measuring Range</b> . . . . .	-40 to +120°C (-40 to +248°F)
<b>Tolerance Range</b> . . . . .	±2.5°C (0° to +80°C: ±1°C) ±36.5°F (+32° to +176°F: ±33.8°F)
<b>Switch Point Accuracy</b> . . . . .	±3% of full scale
<b>Display Resolution</b> . . . . .	0.1°C (-9.9° to +99.9°C: 0.1°C) ±36.5°F (+33.8°F +14°F to +210°F: +32°F)
<b>Programmable Ranges</b> . . . . .	-39° to +120°C (-38° to +248°F), 0.5°C/step
<b>Hysteresis Range</b> . . . . .	+0.5° to +99.5°C (+32.9° to +211.1°F), 0.5°C/step (0.9°F/step)
<b>Window Range</b> . . . . .	+0.5° to +99.5°C (+32.9° to +211.1°F), 0.5°C/step (0.9°F/step)
<b>Switch-on and Switch-off Delay Time</b> . . . . .	0 to 50 s (0.5 s/step)
<b>LED Indications/ Display</b> . . . . .	3-digit 7-segment display
<b>at Limit Value S1/S2</b> . . . . .	Yellow (2x)
<b>Display Resolution (3-digit)</b> . . . . .	+0.1°C (+32.1°F)
<b>Protection</b> . . . . .	IP 65



Housing Style	Part Number	ID Number	Output
<p><b>Self-Contained Temperature Controls, PBT Housing</b></p>	TC01-G1/2A4P-2AP8X-H1140	M6877001	Dual PNP N.O./N.C.
	TC01-G1/2A4P-LIAP8X-H1140	M6877002	PNP N.O./N.C. and 4-20 mA
<p><b>Self-Contained Temperature Controls, PBT Housing</b></p>	TC01-N1/2A4P-2AP8X-H1140	M6877005	Dual PNP N.O./N.C.
	TC01-N1/2A4P-LIAP8X-H1140	M6877004	PNP N.O./N.C. and 4-20 mA

**Material**

Housing Probe	PBT 316 Ti Stainless Steel
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Voltage	Pressure Rating (psi)	Switching Current /Analog Load	Operating Temperature (°C)	Temperature Measuring Range (°C)	Process Connection	Mating Cordset	Wiring Diagram #	Wiring Diagrams
21.6-26.4 VDC	1450	200 mA	-20 to +60	-40 to +120	G 1/2	RK 4.4T-*	1	<p><b>Diagram 1</b></p> <p><b>Diagram 2</b></p>
21.6-26.4 VDC	1450	200 mA/<500 Ω	-20 to +60	-40 to +120	G 1/2	RK 4.4T-*	2	
21.6-26.4 VDC	1450	200 mA	-20 to +60	-40 to +120	1/2 NPT	RK 4.4T-*	1	
21.6-26.4 VDC	1450	200 mA/<500 Ω	-20 to +60	-40 to +120	1/2 NPT	RK 4.4T-*	2	

\* Length in meters.