









## ELECTRONIC TEMPERATURE SWITCHES

For measuring and monitoring the temperature of the medium, HYDAC offers a wide variety of electronic temperature switches with an integrated or separate temperature probe.

ETS 3200 Pressure-resistant for inline installation
ETS 3200 Pressure-resistant for inline installation, IO-Link
ETS 3200 for tank installation
ETS 3200 for tank installation, IO-Link
ETS 3800 for separate temperature probe
ETS 3800 for separate temperature probe, IO-Link
ETS 320 Pressure-resistant for inline installation
ETS 380 for separate temperature probe
ETS 1700 for separate temperature probe
TFP 100 (separate temperature probe)

Other electronic temperature switches for special applications can be found in the sections "Sensors for Potentially Explosive Atmospheres" and "OEM Products for Large Volume Production"

Electronic Temperature Switches	 ETS 3200	 ETS 3800	 ETS 320	 ETS 380	 ETS 1700	 HTS 8000
Accuracy (max. error)	2°F	2°F	2°F	2°F	2°F	3%
Pressure resistant to 8700 psi	✓		✓			
Integrated probe	✓		✓			✓
Separate probe		✓		✓	✓	
Number of switching outputs	2	2	2	2	4	2
Analog output	✓	✓	✓	✓	✓	
Digital display	✓	✓	✓	✓	✓	
Programmable	✓	✓	✓	✓	✓	
In-Tank	✓					
Factory-set (not field-adjustable)						✓
VDMA Menu Navigation	✓	✓				
Available as individual unit	✓	✓	✓	✓	✓	
OEM product for large volume production						✓
IO Link Interface	✓	✓				
UL Approval	✓	✓				

**Note:**  
Not all feature combinations are possible. For precise information, please consult the relevant data sheet.



## Electronic Temperature Switch ETS 3200 Pressure Resistant for Inline Mounting

### Description:

The ETS 3200 is a compact electronic temperature switch with a 4-digit display.

Pressure resistant to 8700 psi, this model has an integrated 18 mm temperature probe and can be screwed directly inline or into a hydraulic block.

Different output models with one or two switching outputs, optionally with an additional analog output signal, offer a variety of application possibilities. The switching points and the associated hysteresis can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- 2 switching outputs, up to 1.2 A load per output
- Optional analog output signal selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit display
- Optimum alignment - display can be rotated in two planes (axes)
- Switching / switch-back points and many useful additional functions can be set using the keypad
- Display of temperature and unit of measurement in °C or °F

### Technical data:

Input data	
Measuring range	-13...212°F (-25...100°C)
Probe length	18 mm (0.72")
Pressure resistance	8700 psi
Mechanical connection	G1/2 A DIN 3852
Torque value	33ft-lb (45 Nm)
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Accuracy (display, analog output)	≤ ± 2.0°F (+/- 1.0°C)
Temperature drift (environment)	≤ ± 0.0085% FS/°F max. zero point ≤ ± 0.0085% FS/°F max. range
Analog output (optional)	
Signal	selectable: 4 .. 20 mA ohmic resist. max. 500 Ω 0 .. 10 V ohmic resistance min. 1 kΩ corresponds in each case to -13...212°F
Switch outputs	
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50</sub> : 3 s t <sub>90</sub> : 9 s
Environmental conditions	
Ambient temperature range	-13...+176°F (-13...+140°F acc. to UL spec.)
Storage temperature range	-40...+176°F
Fluid temperature range <sup>1)</sup>	-40...+212°F/-13...+212°F
CE mark	EN 61000-6-1 / 2 / 3 / 4
eURus-mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analog output 18 .. 35 V DC with analog output for use acc. to UL spec. - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analog output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 135 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> -13 °F with FPM seal, -40 °F on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All the settings available on the ETS 3200 are combined in 2 easy-to-navigate menus. To prevent unauthorized adjustment of the instrument, a programming lock can be set.

## Setting ranges of the switching points and switch-back hysteresis:

Switching point function

Unit	Switching point	Hysteresis	Increment*
°C	-23.0 .. 100.0	1.0 .. 123.5	0.5
°F	-9 .. 212	2 .. 222	1

Window function

Unit	Lower switch value	Upper switch value	Increment*
°C	-23.0 .. 97.5	-22.0 .. 98.5	0.5
°F	-9 .. 208	-7 .. 209	1

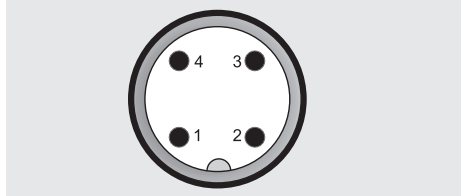
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

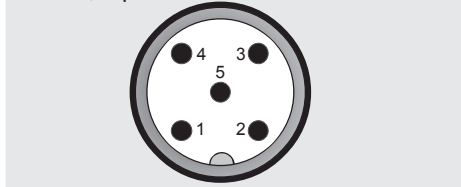
## Pin connections:

M12x1, 4 pole



Pin	ETS 3226-2	ETS 3226-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analog
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ETS 3228-5
1	+U <sub>B</sub>
2	Analog
3	0 V
4	SP 1
5	SP 2

## Model code:

ETS 3 2 2 X - X - 018 - 400

### Mechanical connection

2 = G1/2 A DIN 3852 (male)

### Electrical connection

6 = Male M12x1, 4 pole

only possible on output models "2" and "3"

8 = Male M12x1, 5 pole

only possible on output model "5"

### Output

2 = 2 switching outputs

only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analog output

only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analog output

only in conjunction with electrical connection type "8"

### Probe length in mm

018

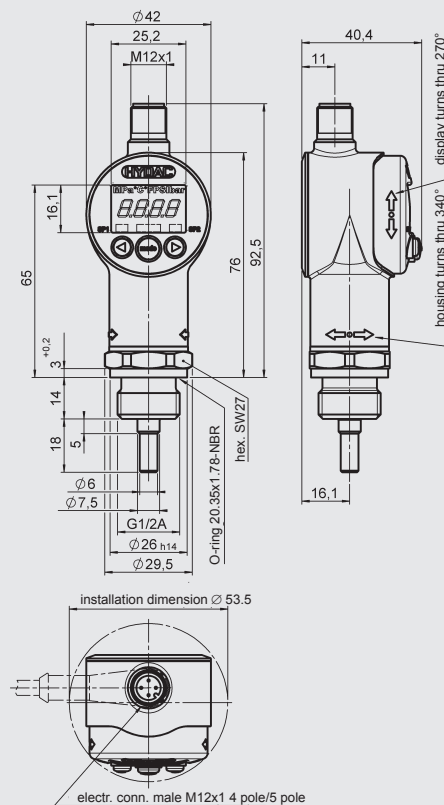
### Modification number

400 = Standard in °F

## Accessories:

Appropriate accessories, such as electrical connectors, splash guards, etc. can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## HYDAC ELECTRONICS

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## Electronic Temperature Switch ETS 3200 – Pressure-Resistant for Inline Installation with IO-Link Interface



### Description:

The ETS 3200 with IO-Link communication interface is a compact, electronic temperature switch with 4-digit display. Pressure-resistant up to 8700 psi with an integrated 18 mm temperature probe, this model can be mounted directly inline or on the hydraulic block.

The device has a switching output and additional output that can be configured as switching or analog (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterization and cyclical transmission of process and service data is therefore possible.

The temperature switch series ETS 3200 with communication interface IO-Link according to specification V1.1 was specially designed to connect sensors in automation systems.

Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO-Link interface
- 1 PNP transistor switching output
- Additional signal output can be configured as PNP transistor switching output or analog output
- 4-digit display
- Display can be rotated in two axes for optimal alignment

### Technical data:

Input data	
Measuring range	-13...212°F (-25...100°C)
Sensor length	18 mm (0.72")
Pressure resistance	8700 psi
Hydraulic connection	G1/2 A DIN 3852
Torque value	33ft-lb (45 Nm)
Parts in contact with medium	Mech. connection: Stainless steel Seal: FPM
Output data	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analog output
Accuracy (display, analog output)	≤ ± 2.0°F (+/- 1.0°C)
Temperature drift (environment)	≤ ± 0.0085% FS/°F max. zero point ≤ ± 0.0085% FS/°F max. range
Analog output	
Signal	selectable: 4 .. 20 mA load resist. ≤ 500 Ω 0 .. 10 V load resist. min. 1 kΩ corresp. in each case to -13...212°F
Switch outputs	
Type	PNP transistor switching output
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50</sub> : 3 s t <sub>90</sub> : 9 s
Parameterisation	
	Via IO-Link interface, with HYDAC programming device HPG 3000 or push-buttons on the ETS 3200
Environmental conditions	
Ambient temperature range	-13...+176°F
Storage temperature range	-40...+176°F
Fluid temperature range <sup>1)</sup>	-40...+212°F/-13...+212°F
CE mark	EN 61000-6-1 / -2 / -3 / -4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC (without analog output) 18 .. 35 V DC (with analog output)
Current consumption	≤ 0.535 A with active switching outputs ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analog output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight (complete unit including probe)	~ 135 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> -13 °F with FPM seal, -40 °F on request

## Setting options:

All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

## Setting ranges for the switch outputs:

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
-25 .. +100 °C	-23.8 °C	100.0 °C
-13 .. +212 °F	-11 °F	212 °F

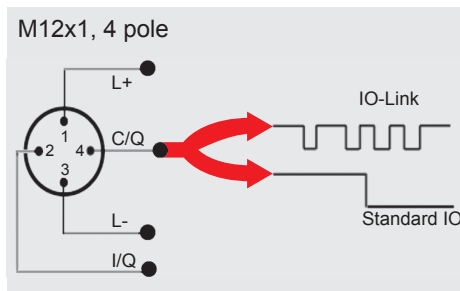
Measuring range	Min. difference betw. RP and SP & FL and FH	Increment*
-25 .. +100 °C	1.2 °C	0.2 °C
-13 .. +212 °F	2 °F	1 °F

\* All ranges given in the table are adjustable by the increments shown.  
 SP = switch point  
 RP = switch-back point  
 FL = temperature window lower value  
 FH = temperature window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display off)

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analog output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

ETS 3 2 2 6 - F31 - 018 - 400

**Type**  
 2 = With integrated temperature sensor

**Mechanical connection**  
 2 = G1/2 A DIN 3852, (male)

**Electrical connection**  
 6 = Male M12x1, 4 pole (connector not supplied)

**Output**  
 F31 = IO Link interface

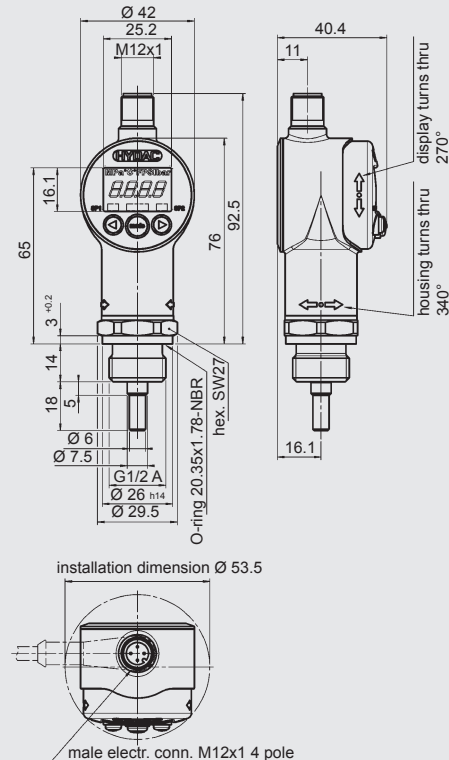
**Probe length in mm**  
 018

**Modification number**  
 400 = Standard in °F

## Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Temperature Switch ETS 3200 for Tank Installation

### Description:

The ETS 3200 is a compact electronic temperature switch with digital display.

With its integrated temperature probe, the ETS 3200 is particularly suitable for direct tank installation and is available in various lengths.

Different output models with one or two switching outputs, optionally with an additional analog output signal, offer a variety of application possibilities.

The switching points and the associated hysteresis can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- 2 switching outputs, up to 1.2 A load per output
- Optional analog output signal selectable (4 .. 20 mA, 0 .. 10 V)
- 4-digit display
- Optimum alignment - display can be rotated in two planes (axes)
- Switching / switch-back points and many useful additional functions can be set using the keypad.
- Display of temperature and unit of measurement in °C or °F

### Technical data:

Input data	
Measuring range	-13...212°F (-25...100°C)
Probe lengths	100; 250; 350 mm (3.94; 9.84; 13.78")
Pressure resistance	725 psi
Mechanical connection	G1/2 A DIN 3852
Torque value	33ft-lb (45 Nm)
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Accuracy (display, analog output)	≤ ± 2.0°F (+/- 1.0°C)
Temperature drift (environment)	≤ ± 0.0085% FS/°F max. zero point ≤ ± 0.0085% FS/°F max. range
Analog output (optional)	
Signal	selectable: 4 .. 20 mA ohmic resist. max. 500 Ω 0 .. 10 V ohmic resistance min. 1 kΩ corresponds in each case to -13...212°F
Switch outputs	
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50</sub> : 8 s t <sub>90</sub> : 15 s
Environmental conditions	
Ambient temperature range	-13...+176 °F (-13...+140 °F acc. to UL spec.)
Storage temperature range	-40...+176 °F
Fluid temperature range <sup>1)</sup>	-40...+212 °F / -13...+212 °F
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analog output 18 .. 35 V DC with analog output for use acc. to UL spec. - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analog output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 150 g (probe length 100 mm) ~ 185 g (probe length 250 mm) ~ 210 g (probe length 350 mm)

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> -13 °F with FPM seal, -40 °F on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All the settings available on the ETS 3200 are combined in 2 easy-to-navigate menus. To prevent unauthorized adjustment of the instrument, a programming lock can be set.

## Setting ranges of the switching points and switch-back hystereses:

Switching point function

Unit	Switching point	Hysteresis	Increment*
°C	-23.0 .. 100.0	1.0 .. 123.5	0.5
°F	-9 .. 212	2 .. 222	1

Window function

Unit	Lower switch value	Upper switch value	Increment*
°C	-23.0 .. 97.5	-22.0 .. 98.5	0.5
°F	-9 .. 208	-7 .. 209	1

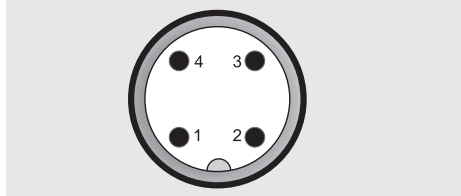
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

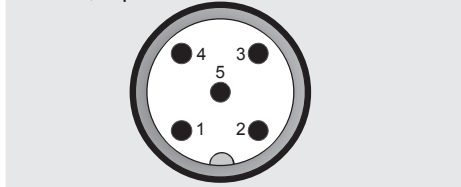
## Pin connections:

M12x1, 4 pole



Pin	ETS 3226-2	ETS 3226-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analog
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ETS 3228-5
1	+U <sub>B</sub>
2	Analog
3	0 V
4	SP 1
5	SP 2

## Model code:

ETS 3 2 2 X - X - XXX - 400

### Mechanical connection

2 = G1/2 A DIN 3852 (male)

### Electrical connection

6 = Male M12x1, 4 pole

only possible on output models "2" and "3"

8 = Male M12x1, 5 pole

only possible on output model "5"

### Output

2 = 2 switching outputs

only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analog output

only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analog output

only in conjunction with electrical connection type "8"

### Probe length in mm

100; 250; 350

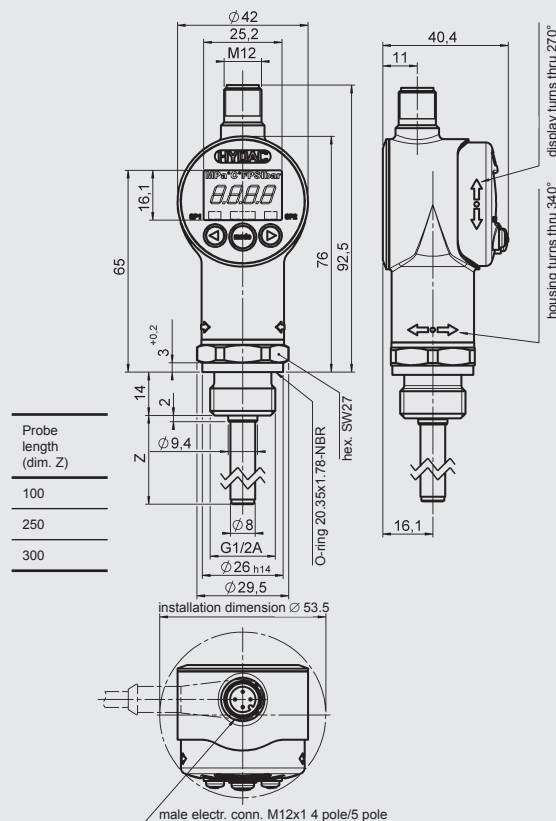
### Modification number

400 = Standard for °F

## Accessories:

Appropriate accessories, such as electrical connectors, protective sleeves for tank mounting, splash guards, etc. can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Electronic Temperature Switch ETS 3200 for Tank Installation with IO-Link Interface



### Description:

The ETS 3200 with IO-Link communication interface is a compact, electronic temperature switch with 4-digit display.

With its integrated temperature probe, the ETS 3200 is particularly suitable for direct tank installation and is available in various lengths.

The instrument has a switching output and additional output that can be configured as switching or analog (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterization and cyclical transmission of process and service data is therefore possible.

The temperature switch series ETS 3200 with communication interface IO-Link according to specification V1.1 was specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO-Link interface
- 1 PNP transistor switching output
- Additional signal output, can be configured as PNP transistor switching output or analog output
- 4-digit display
- Display can be rotated in two axes for optimum alignment

### Technical data:

Input data	
Measuring range	-13...+212 °F (-25...100 °C)
Probe length	100; 250; 350 mm (3.94; 9.84; 13.78")
Pressure resistance	725 psi
Hydraulic connection	G1/2 A DIN 3852
Torque value	33ft-lb (45 Nm)
Parts in contact with medium	Mech. connection: Stainless steel Seal: FPM
Output data	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analog output
Accuracy (display, analog output)	≤ ± 2.0 °F (+/- 1.0 °C)
Temperature drift (environment)	≤ ± 0.0085% FS/°F max. zero point ≤ ± 0.0085% FS/°F max. range
Analog output	
Signal	selectable: 4 .. 20 mA load ≤ 500 Ω 0 .. 10 V ohmic resist. min. 1 kΩ corresp. in each case to -13 .. +212 °F
Switch outputs	
Type	PNP transistor switching output
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50</sub> : 8 s t <sub>90</sub> : 15 s
Parameterisation	
	<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the ETS 3200</b>
Environmental conditions	
Ambient temperature range	-13...+176 °F
Storage temperature range	-40...+176 °F
Fluid temperature range <sup>1)</sup>	-40...+212 °F / -13...+212 °F
CE mark	EN 61000-6-1 / -2 / -3 / -4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC (without analog output) 18 .. 35 V DC (with analog output)
Current consumption	≤ 0.535 A with active switching outputs ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analog output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight (complete unit including probe)	~ 150 g (probe length 100 mm) ~ 185 g (probe length 250 mm) ~ 210 g (probe length 350 mm)

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> -13 °F with FPM seal, -40 °F on request

## Setting options:

All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

## Setting ranges for the switch outputs:

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
-25 .. +100 °C	-23.8 °C	100.0 °C
-13 .. +212 °F	-11 °F	212 °F

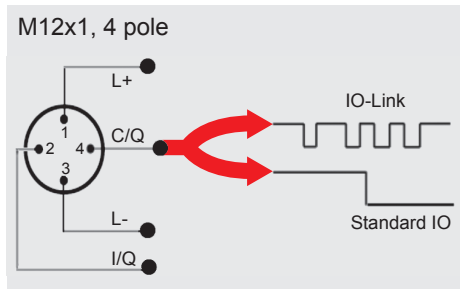
Measuring range	Min. difference betw. RP and SP & FL and FH	Increment*
-25 .. +100 °C	1.2 °C	0.2 °C
-13 .. +212 °F	2 °F	1 °F

\* All ranges given in the table are adjustable by the increments shown.  
 SP = switch point  
 RP = switch-back point  
 FL = temperature window lower value  
 FH = temperature window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display off)

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analog output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

ETS 3 2 2 6 - F31 - XXX - 400

### Type

2 = With integrated temperature probe

### Mechanical connection

2 = G1/2 A DIN 3852, (male)

### Electrical connection

6 = Male M12x1, 4 pole (connector not supplied)

### Output

F31 = IO Link interface

### Probe length in mm

100; 250; 350

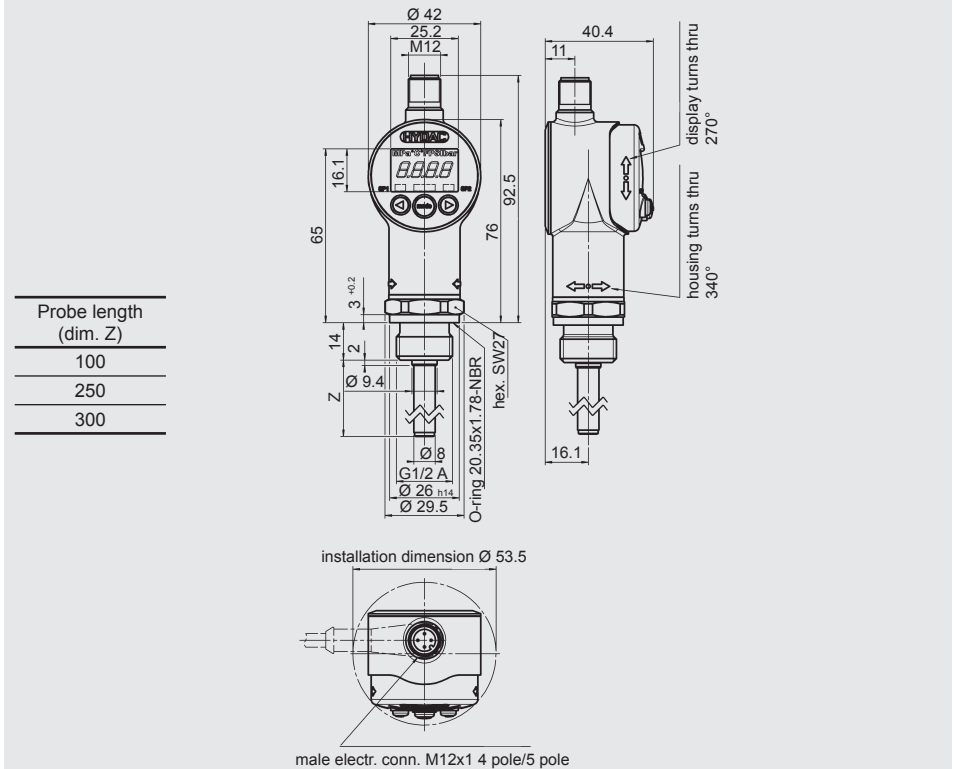
### Modification number

400 = Standard in °F

## Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

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For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Temperature Switch ETS 3800 for Separate Temperature Probe

### Description:

The ETS 3800 is a compact electronic temperature switch with a 4-digit display.

The version for a separate temperature probe has a measuring range of -22..+302 °F and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation.

It is also possible, however, to evaluate commonly-available PT 100 temperature probes.

Different output versions with one or two switching outputs, and with the possible option of an additional analog output signal, offer a variety of application possibilities.

The switching points and the associated hysteresis can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- 2 switching outputs, up to 1.2 A load per output
- Optional analog output signal selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - display can be rotated in two planes (axes)
- Switching / switch-back points and many useful additional functions can be set using keypad
- Display of temperature and unit of measurement in °C or °F

### Technical data:

Input data	
Measuring range <sup>1)</sup>	-22..302°F (-30..150°C)
Connection, separate temperature probe	Female cable connection M12x1, 4 pole
Output data	
Accuracy (display, analog output)	± 2.0 °F (+ PT100 error)
Temperature drift (environment)	≤ ± 0.0085% FS/°F max. zero point ≤ ± 0.0085% FS/°F max. range
Analog output (optional)	
Signal	selectable: 4 .. 20 mA      load resist. max. 500 Ω 0 .. 10 V      load resistance min. 1 kΩ corresponds in each case to -22..+302°F
Switch outputs	
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
Environmental conditions	
Ambient temperature range	-13..+176°F (-13..+140°F acc. to UL spec.)
Storage temperature range	-40..+176°F
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analog output 18 .. 35 V DC with analog output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
for use acc. to UL spec.	
Current consumption	max. 2.455 A total max. 35 mA with inactive switch outputs max. 55 mA with inactive switch outputs and analog output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 87 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Depending on the temperature range of the connected temperature sensor, the indication range of the ETS 3800 may be reduced.

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All the settings available on the ETS 3800 are combined in 2 easy-to-navigate menus. To prevent unauthorized adjustment of the instrument, a programming lock can be set.

## Setting ranges of the switching points and switch-back hysteresis:

Switching point function

Unit	Switching point	Hysteresis	Increment*
°C	-27.0 .. 150.0	1.0 .. 178.0	0.5
°F	-17 .. 302	2 .. 320	1

Window function

Unit	Lower switch value	Upper switch value	Increment*
°C	-27.0 .. 146.5	-25.5 .. 148.0	0.5
°F	-17 .. 296	-14 .. 298	1

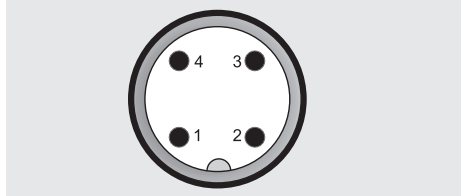
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

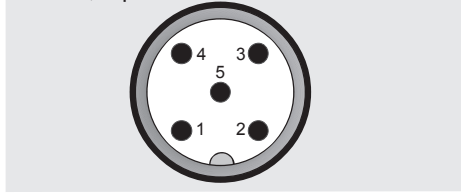
## Pin connections:

M12x1, 4 pole



Pin	ETS 3866-2	ETS 3866-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analog
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ETS 3868-5
1	+U <sub>B</sub>
2	Analog
3	0 V
4	SP 1
5	SP 2

## Model code:

ETS 3 8 6 X - X - 000 - 400

### Mechanical connection

6 = Female cable connection M12x1, 4 pole

### Electrical connection

6 = Male M12x1, 4 pole

only possible on output models "2" and "3"

8 = Male M12x1, 5 pole

only possible on output model "5"

### Output

2 = 2 switching outputs

only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analog output

only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analog output

only in conjunction with electrical connection type "8"

### Probe length in mm

000 = Separate temperature probe

### Modification number

400 = Standard in °F

### Accessories:

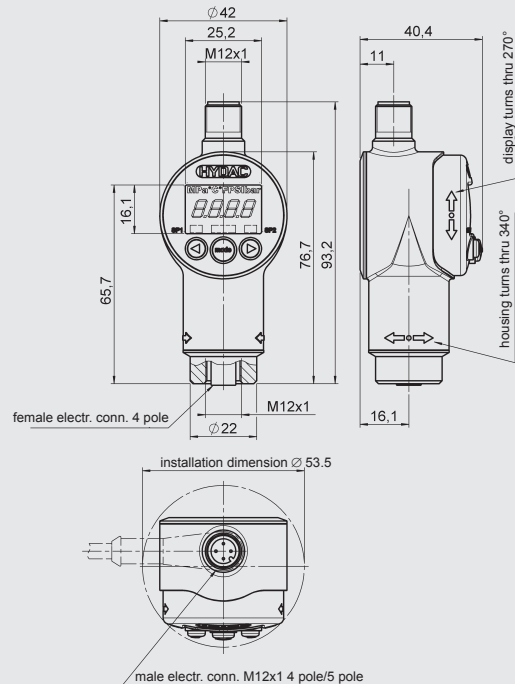
A male cable connector M12x1, 4 pole, to connect the separate temperature probe and a 3 m sensor cable, LIYCY 4 x 0.25 mm<sup>2</sup> are supplied with the instrument. Other accessories, such as electrical connectors, splash guards, clamps for wall-mounting, etc. can be found in the Accessories brochure.

## Separate temperature probe:

(not supplied with the instrument)

- TFP 104 - 000 with male electr. conn. 4 pole Binder series 714 M18 Part no. 904696 (connector supplied)
- TFP 106 - 000 with male electr. conn. 4 pole M12x1 Part no. 921330 (connector not supplied)
- Tank installation sleeve for TFP 100 Part no. 906170

## Dimensions:



## Note:

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## Electronic Temperature Switch ETS 3800 for Separate Temperature Probe with IO-Link Interface



### Description:

The ETS 3800 with IO-Link communication interface is a compact, electronic temperature switch with 4-digit display. The version for a separate temperature probe has a measuring range of -22..302°F and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation. It is also possible, however, to evaluate commonly-available PT 100 temperature probes. The instrument has one switching output and an additional output that can be configured as either switching or analog (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterization and cyclical transmission of process and service data is therefore possible.

The temperature switch series ETS 3800 with communication interface IO-Link according to specification V1.1 was specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO-Link interface
- 1 PNP transistor switching output
- Additional signal output, can be configured as PNP transistor switching output or analog output
- 4-digit digital display
- Optimum alignment of the display – can be rotated in two axes

### Technical data:

<b>Input data</b>	
Measuring range <sup>1)</sup>	-22..302 °F (-30..150°C)
Connection, separate temperature probe	Female cable connection M12x1, 4 pole
<b>Output data</b>	
Accuracy (display, analog output)	± 2.0 °F ( + PT100 error)
Temperature drift (environment)	≤ ± 0.0085% FS/°F max. zero point ≤ ± 0.0085% FS/°F max. range
<b>Analog output (optional)</b>	
Signal	selectable: 4 .. 20 mA load resist. ≤ 500 Ω 0 .. 10 V load resist. min. 1 kΩ corresp. in each case to -22 .. 302 °F
<b>Switch outputs</b>	
Type	PNP transistor switching output
Switching current	max. 250 mA per output
Switching cycles	> 100 million
<b>Parameterization</b>	
<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the ETS 3800</b>	
<b>Environmental conditions</b>	
Ambient temperature range	-13..+176°F
Storage temperature range	-40..+176°F
CE mark	EN 61000-6-1 / -2 / -3 / -4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
<b>Other data</b>	
Supply voltage	9 .. 35 V DC (without analog output) 18 .. 35 V DC (with analog output)
Current consumption	≤ 0.535 A with active switching outputs ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analog output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight	~ 87 g (excluding connector and probe)

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to the full measuring range

<sup>1)</sup> Depending on the temperature range of the connected temperature sensor, the measurement range of the ETS 3800 may be reduced.

## Setting options:

All terms and symbols used for setting the ETS 3800 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

## Setting ranges for the switch outputs:

Measurement range	Lower limit of RP / FL	Upper limit of SP / FH
-30 .. +150 °C	-28.0 °C	150.0 °C
-22 .. +302 °F	-19 °F	302 °F

Measuring range	Min. difference betw. RP and SP & FL and FH	Increment*
-30 .. +150 °C	2.0 °C	0.5 °C
-22 .. +302 °F	3 °F	1 °F

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

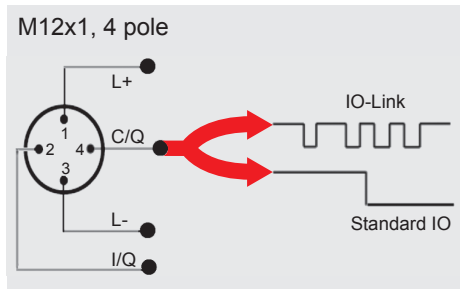
FL = temperature window lower value

FH = temperature window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analog output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## Separate temperature sensor:

(not supplied with instrument)

- TFP 106 - 000 Part No.: 921330 with male electr. conn. 4 pole M12x1 (connector not supplied)
- Tank install. sleeve Part No.: 906170 for TFP 100

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

ETS 3 8 6 6 - F31 - 000 - 400

### Type

8 = For separate temperature probe

### Mechanical connection

6 = Female cable connection M12x1, 4 pole

### Electrical connection

6 = Male M12x1, 4 pole (connector not supplied)

### Output

F31 = IO Link interface

### Sensor length in mm

000 = Separate temperature probe

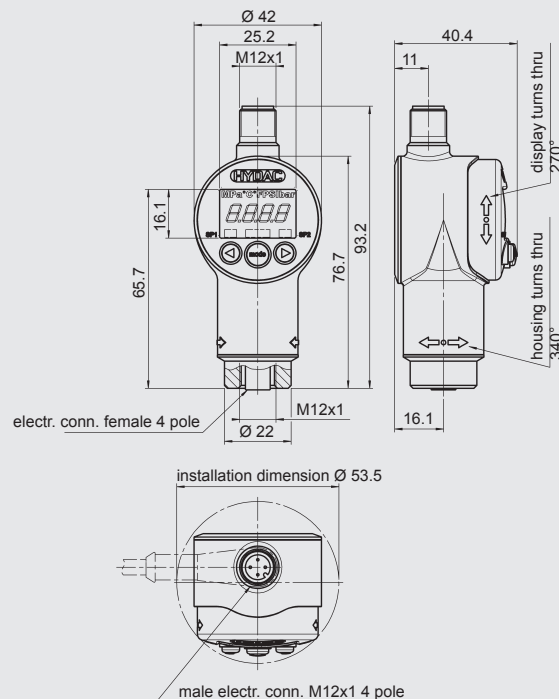
### Modification number

400 = Standard in °F

### Accessories:

A male cable connector M12x1, 4 pole, to connect the separate temperature sensor and a 3 m sensor cable, LIYCY 4 x 0.25 mm<sup>2</sup> are supplied with the instrument. Other accessories, such as electrical connectors, splash guards, clamps for wall-mounting, etc. can be found in the Accessories brochure.

## Dimensions:



## Note:

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## Electronic Temperature Switch ETS 320 Pressure-Resistant for Inline Installation

### Description:

The ETS 320 is a compact electronic temperature switch with a 3-digit display.

Pressure-resistant to 8700 psi with an integrated 18 mm temperature probe, this model can be installed directly inline or on the hydraulic block and has a measuring range of -13..212 °F.

Different output models with one or two switching outputs, and with the possible option of an additional analog output signal of 4 .. 20 mA offer a variety of application opportunities.

The switching points and the associated hysteresis can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- Compact temperature switch with integral temperature probe
- 2 transistor switching outputs, up to 1.2 A load per output
- Optional analog output signal 4 .. 20 mA
- 3-digit display
- Switching point or window function
- Switching / switch-back points and many useful additional functions can be set using the keypad

### Technical data:

Input data	
Measuring range	-13 .. 212 °F (-25 .. 100 °C)
Probe length	18 mm (0.71")
Pressure resistance	8700 psi
Mechanical connection	G1/2 A DIN 3852
Torque value	33ft-lb (45 Nm)
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Accuracy (display, analog output)	≤ ± 2.0°F (+/- 1.0°C)
Temperature drift (environment)	≤ ± 0.0085% FS/°F max. zero point ≤ ± 0.0085% FS/°F max. range
Analog output (optional)	
Signal	4 .. 20 mA load resistance max. 400 Ω corresponds to -13..212°F
Switch outputs	
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50</sub> : 3 s t <sub>90</sub> : 9 s
Environmental conditions	
Ambient temperature range	-13..+176 °F
Storage temperature range	-40..+176 °F
Fluid temperature range <sup>1)</sup> (for the probe)	-40..+212 °F / -13..+212 °F
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance to DIN EN 60068-2-29 (1 ms)	≤ 50 g
Protection class to IEC 60529	IP 65
Other data	
Supply voltage	20 .. 32 V DC
Current consumption	approx. 100 mA without switch output
Residual ripple of supply voltage	≤ 5 %
Display	3-digit, LED, 7 segment, red, height of digits 9.2 mm
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup>-13 °F with FPM seal, -40 °F on request

## Setting options:

All the settings available on the ETS 320 are combined in 2 easy-to-navigate menus. To prevent unauthorized adjustment of the instrument, a programming lock can be set.

## Setting ranges of the switching points and switch-back hysteresis:

Switching point function

Unit	Switching point	Hysteresis	Increment*
°C	-22.0 .. 100.0	1.0 .. 178.0	1.0
°F	-10.0 .. 212.0	2.0 .. 320.0	2.0

Window function

Unit	Lower switch value	Upper switch value	Increment*
°C	-23.0 .. 99.0	-22.0 .. 100.0	1.0
°F	-12.0 .. 210.0	-10.0 .. 212.0	2.0

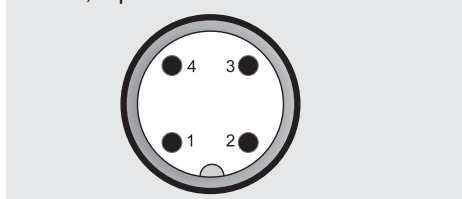
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0 .. 750 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

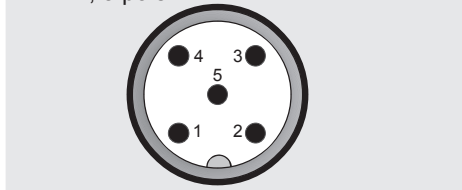
## Pin connections:

M12x1, 4 pole



Pin	ETS 326-2	ETS 326-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analog
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ETS 328-5
1	+U <sub>B</sub>
2	Analog
3	0 V
4	SP 1
5	SP 2

## Model code:

ETS 3 2 X - X - 100 - 400

**Mechanical connection**  
2 = G1/2 A DIN 3852 (male)

**Electrical connection**  
6 = Male M12x1, 4 pole  
only possible on output models "2" and "3"  
8 = Male M12x1, 5 pole  
only possible on output model "5"

**Output**  
2 = 2 switching outputs  
only in conjunction with electrical connection type "6"  
3 = 1 switching output and 1 analog output  
only in conjunction with electrical connection type "6"  
5 = 2 switching outputs and 1 analog output  
only in conjunction with electrical connection type "8"

**Measuring range**  
-25 .. +100 °C (-13 .. +212 °F)

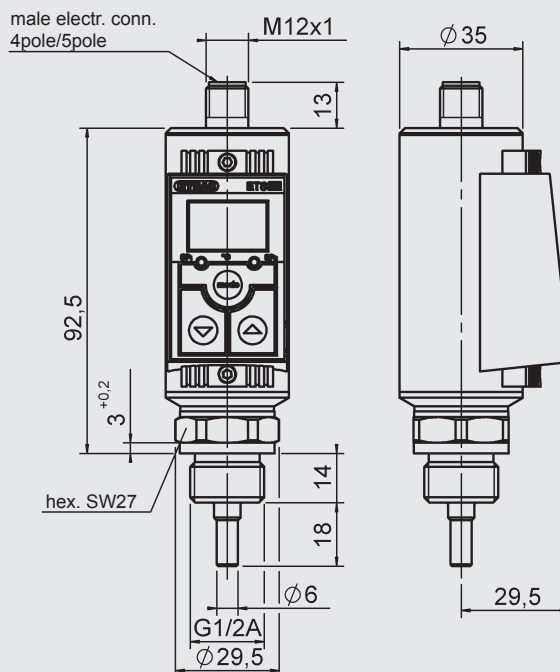
**Modification number**

400 = Standard in °F

## Accessories:

Appropriate accessories, such as electrical connectors, clamps for wall-mounting, etc. can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Electronic Temperature Switch ETS 380 for Separate Temperature Probe

### Description:

The ETS 380 is a compact electronic temperature switch with a 3-digit display.

The version for a separate temperature probe has a measuring range of -22..302 °F and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation.

It is also possible, however, to evaluate commonly available PT 100 temperature probes. Different output models with one or two switching outputs, and with the possible option of an additional analog output signal of 4 .. 20 mA open up a multitude of application opportunities.

The switching points and the associated hysteresis can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- 2 transistor switching outputs, up to 1.2 A load per output
- Optional analog output signal 4 .. 20 mA
- 3-digit display
- Switching point or window function
- Switching / switch-back points and many useful additional functions can be set using the keypad

### Technical data:

<b>Input data</b>	
Measuring range <sup>1)</sup>	-22..302°F (-30..+150°C)
Connection, separate temperature probe	Female cable connection M12x1, 4 pole
<b>Output data</b>	
Accuracy (display, analog output)	≤ ± 2.0°F (+/- 1.0°C)
Temperature drift (environment)	≤ ± 0.0085% FS/°F max. zero point ≤ ± 0.0085% FS/°F max. range
<b>Analog output (optional)</b>	
Signal	4 .. 20 mA ohmic resistance max. 400 Ω corresponds to -30 .. +150 °C
<b>Switch outputs</b>	
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
<b>Environmental conditions</b>	
Ambient temperature range	-13..+176°F
Storage temperature range	-40..+176°F
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance to DIN EN 60068-2-29 (1 ms)	≤ 50 g
Protection class to IEC 60529	IP 65
<b>Other data</b>	
Supply voltage	20 .. 32 V DC
Current consumption	approx. 100 mA without switch output
Residual ripple of supply voltage	≤ 5 %
Display	3-digit, LED, 7 segment, red, height of digits 9.2 mm
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Depending on the temperature range of the connected temperature sensor, the indication range of the ETS 380 may be reduced.

## Setting options:

All the settings available on the ETS 380 are combined in 2 easy-to-navigate menus.

To prevent unauthorized adjustment of the device, a programming lock can be set.

## Setting ranges of the switching points and switch-back hysteresis:

Switching point function

Unit	Switching point	Hysteresis	Increment*
°C	-27.0 .. 150.0	1.0 .. 178.0	1.0
°F	-16.0 .. 302.0	2.0 .. 320.0	2.0

Window function

Unit	Lower switch value	Upper switch value	Increment*
°C	-28.0 .. 149.0	-27.0 .. 150.0	1.0
°F	-18.0 .. 300.0	-16.0 .. 302.0	2.0

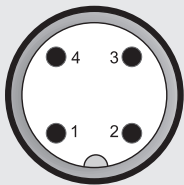
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0 .. 750 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

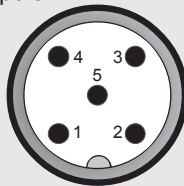
## Pin connections:

M12x1, 4 pole



Pin	ETS 386-2	ETS 386-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analog
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ETS 388-5
1	+U <sub>B</sub>
2	Analog
3	0 V
4	SP 1
5	SP 2

## Model code:

ETS 3 8 X - X - 150 - 400

### Mechanical connection

8 = Electrical connection for separate temperature probe

### Electrical connection

- 6 = Male M12x1, 4 pole  
only possible on output models "2" and "3"
- 8 = Male M12x1, 5 pole  
only possible on output model "5"

### Output

- 2 = 2 switching outputs  
only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analog output  
only in conjunction with electrical connection type "6"
- 5 = 2 switching outputs and 1 analog output  
only in conjunction with electrical connection type "8"

### Measuring range

-30 .. +150 °C (-22 .. +302 °F)

### Modification number

400 = Standard in °F

### Accessories:

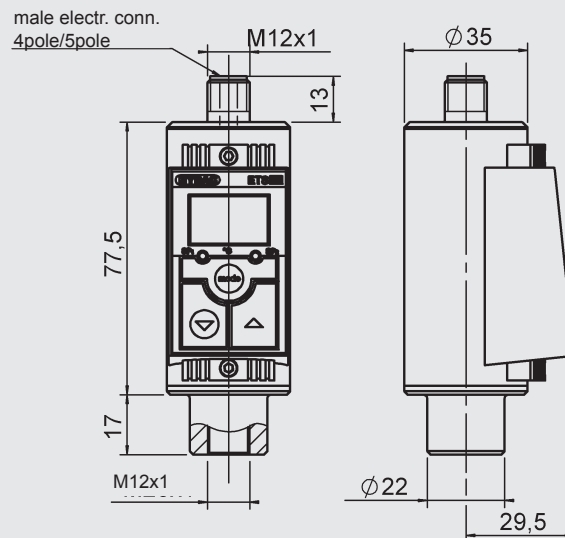
A male cable connection M12x1, 4 pole, to connect the separate temperature probe and a 3 m sensor cable, LIYCY 4 x 0.5 mm<sup>2</sup> are supplied with the instrument. Other accessories, such as electrical connectors, clamps for wall-mounting, etc. can be found in the Accessories brochure.

## Separate temperature probe:

(not supplied with the instrument)

- TFP 104 - 000 with male electr. conn. 4 pole Binder series 714 M18 (connector supplied) Part no. 904696
- TFP 106 - 000 with male electr. conn. 4 pole M12x1 (connector not supplied) Part no. 921330
- Tank installation sleeve for TFP 100 Part no. 906170

## Dimensions:

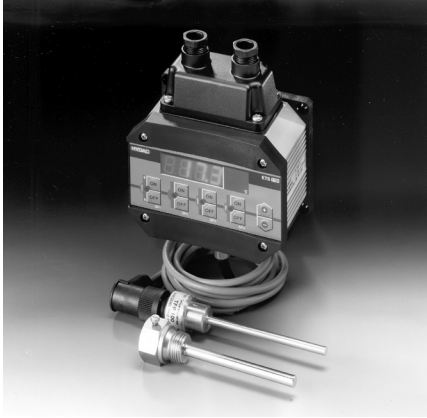


## Note:

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## Electronic Temperature Switch ETS 1700

### Description:

The electronic temperature switch ETS 1700 is used mainly together with the temperature probe TFP 100, which was specially developed for tank mounting.

The 4-digit display can indicate the actual temperature, one of the switching points or the maximum temperature value.

The maximum temperature indicates the highest temperature which has occurred since the unit was switched on or was last reset.

The 4 switching outputs can be used to control heating and cooling processes in hydraulic systems, for example.

Four switching and switch-back points which are independent of each other can be adjusted very simply via the keypad.

An analog output (4 .. 20 mA or 0 .. 10 V) is also available for integration into monitoring systems (e.g. with PLC).

### Special features:

- 4-digit display
- Simple operation due to key programming
- 4 limit relays, switching points and switch back points can be adjusted independently
- Optional analog output signal (4 .. 20 mA or 0 .. 10 V)
- Many useful additional functions
- Optional mounting position (sensor connection on the top/ bottom, keypad and display can be turned through 180°)

### Technical data:

<b>Input data</b>	
Measuring range <sup>1)</sup>	+32..212 °F (0..+100°C)
<b>Output data</b>	
Accuracy (display, analog output)	≤ ± 2.0 °F (+/- 1.0°C)
Repeatability	≤ ± 0.25 % FS
Temperature drift (environment)	≤ ± 0.017% FS/°F max. zero point ≤ ± 0.017% FS/°F max. range
<b>Analog output (optional)</b>	
Signal	selectable: 4 .. 20 mA load resistance max. 400 Ω 0 .. 10 V load resistance min. 2 kΩ corresponds in each case to 32..212°F
<b>Switch outputs</b>	
Type	4 relays with change-over contacts in 2 groups (common supply of each group connected)
Switching voltage	0.1 .. 250 V AC / DC
Switching current	0.009 .. 2 A per output
Switching capacity	400 VA, 50 W (for inductive load, use varistors)
Switching cycles	> 20 million at minimum load > 1 million at maximum load
<b>Environmental conditions</b>	
Ambient temperature range	-13..+140 °F
Storage temperature range	-40..+176 °F
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 5 g
Shock resistance to DIN EN 60068-2-29 (1 ms)	≤ 10 g
Protection class to IEC 60529	IP 65
<b>Other data</b>	
Supply voltage	22 .. 32 V DC
Current consumption	approx. 200 mA
Residual ripple of supply voltage	≤ 10 %
Display	4-digit, LED, 7 segment, red, height of digits 13 mm
Weight	~ 800 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

<sup>1)</sup> Depending on the temperature range of the connected temperature sensor, the indication range of the ETS 1700 may be reduced.

**FS (Full Scale)** = relative to complete measuring range

## Setting options:

The microprocessor integrated into the ETS 1700 enables many useful extra functions in addition to the switching functions, when compared with a normal mechanical temperature switch.

It is possible, for example, to activate switching delay times or to change the relay switching direction.

All settings are made via the keypad.

## Setting ranges of the switching points and switch-back hysteresis:

- Switching point relays 1 to 4: 1.5 .. 100 % of the measuring range
- Switching point relays 1 to 4: 1 .. 99 % of the measuring range or alternatively
- Switch-back hysteresis 1 to 4: 1.. 99 % of the measuring range

## Additional functions:

- Switching direction of the relays 1 to 4 (N/C or N/O function)
- Switch-on delay relays 1 to 4 in the range from 0.0 .. 900.0 seconds
- Switch-off delay relays 1 to 4 in the range from 0.0 .. 900.0 seconds
- Switch-back mode (alternatively switch-back point or switch-back hysteresis)
- Display of the actual temperature, a switching point or of the peak value
- Display range individually selectable in °C or °F
- Measurement unit (°C, °F) is displayed
- Analog output (4 .. 20 mA or 0 .. 10 V)
- Programming lock

## Terminal assignment:

### Device connection

Pin	
1	+U <sub>B</sub>
2	0 V
3	Analog output Signal +
4	Analog output Signal - (0 V)
5	Relay 1 N/C
6	Relay 1 N/O
7	Center relay 1 and 2
8	Relay 2 N/C
9	Relay 2 N/O
10	Relay 3 N/C
11	Relay 3 N/O
12	Center relay 3 and 4
13	Relay 4 N/C
14	Relay 4 N/O

### Probe connection

Pin	
1	+U <sub>B</sub>
2	Signal +
3	n.c.
4	Signal -
5	0 V

## Model code:

ETS 1 7 0 X - 100 - 000

### Type of sensor

0 = For PT 100 sensors

### Display

2 = 4-digit display °F

### Measuring range

+32 .. 212 °F (0 .. 100 °C)

### Modification number

000 = Standard

### Accessories:

PG cable glands, mounting bolts, a 5 pole female connector (Binder series 681) for connecting the separate temperature probe and a 3 m sensor cable (LIYCY 4 x 0.25 mm<sup>2</sup>) are supplied with the instrument.

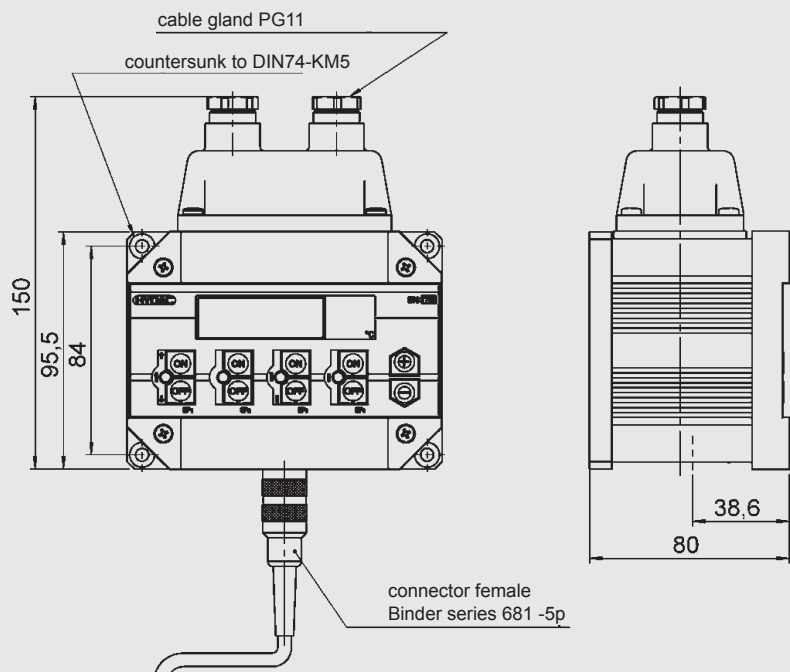
Other accessories, such as vibration mounts etc. can be found in the Accessories brochure.

## Separate temperature probe:

(not supplied with the instrument)

- TFP 104 - 000 with male electr. conn. 4 pole Binder series 714 M18 Part No.: 904696 (female connector supplied)
- TFP 106 - 000 with male electr. conn. 4 pole M12x1 Part No.: 921330 (female connector not supplied)
- Tank installation sleeve for TFP 100 Part. No.: 906170

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Temperature Probe TFP 100

### Description:

The TFP 100 temperature probe was developed primarily for tank installation. The PT 100 precision resistor in 4-conductor design can be connected directly to HYDAC temperature switches ETS 3800, ETS 380 and ETS 1700.

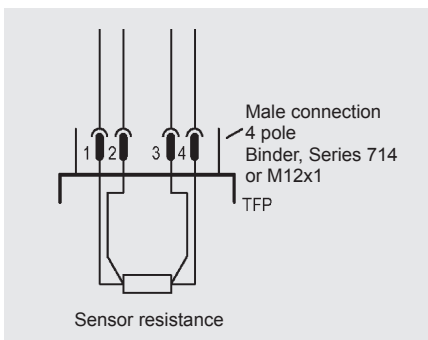
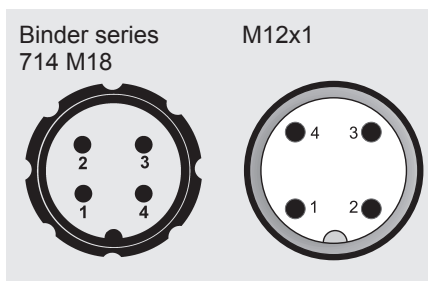
The standardized electrical connection also means that other evaluation or control systems (e.g. PLC) can easily be connected.

For adaptation to different applications and fluids, a nickel-plated brass installation sleeve which is pressure resistant up to 145 psi is available as an accessory.

### Special features:

- Measurement circuit configured as four-conductor circuit
- Simple to install
- For universal application

### Pin connections:



### Technical data:

#### Temperature probe TFP 100

Temperature range	-40 .. +257 °F (-40 .. +125 °C)
Electrical connection	Male Binder series 714 M18, 4 pole Male M12x1, 4 pole
Parts in contact with medium	Brass
CE mark	EN 61000-6-1 / 2 / 3 / 4
Sensor current	0.3 .. 1.0 mA
<b>Tank installation sleeve for TFP 100</b> (Accessory, not supplied)	
Pressure resistance	145 psi
Parts in contact with medium	CuZn39Pb3 (brass), nickel-plated

### Model code:

TFP 10X - 000

Separate temperature probe \_\_\_\_\_

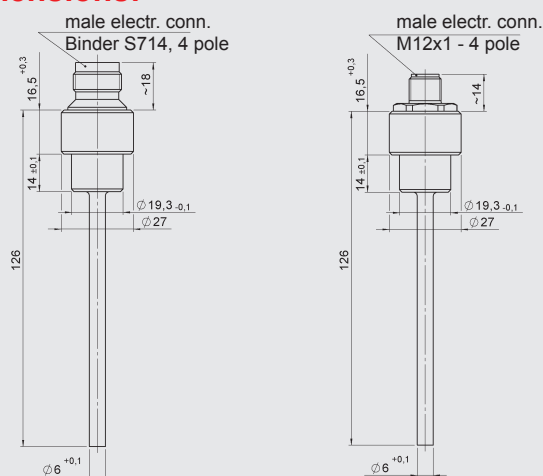
Electrical connection \_\_\_\_\_

- 4 = Male, 4 pole Binder series 714 M18m (connector supplied)
- 6 = Male, 4 pole M12x1 (connector not supplied)

Modification number \_\_\_\_\_

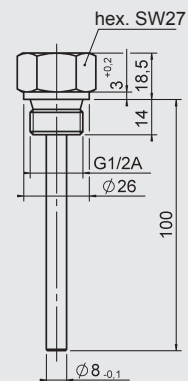
000 = Standard

### Dimensions:



### Tank installation sleeve for TFP100

(to be ordered separately)  
Part No.: 906 170



### Note:

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