

Electronic temperature switch with display Model TSD-30

WIKA data sheet TE 67.03

Applications

- Machine tools
- Hydraulic power packs
- Coolant and lubrication systems
- Machine building

Special features

- Available with single or dual NPN or PNP solid state user-programmable switches
- High visibility, rugged 14-segment red LED display electronically rotates 180° for top-down or horizontal installation
- Independent rotation between the M12x1 electrical connection and the display to optimize installation position
- User-friendly, intuitive 3-key operation
- Versions with 4-20 mA or 0-10V analog output available
- Programming menu meets VDMA Standards for user friendly navigation

Description

Award-winning in design and functionality

The successful design and the excellent functionality of the WIKA switch family were already confirmed by winning the "iF product design award 2009" for the pressure switch model PSD-30.

The robust 14 segment LED display has been designed using 0.35 in (9 mm) high characters and with a slight incline in order to make reading the temperature as easy as possible from a distance.

The 3-key operation makes simple, intuitive menu navigation possible. The menu navigation is designed in accordance with the latest VDMA standard. The VDMA standard for fluid sensors (24574-2, part 2 temperature switches) has the aim of considerably simplifying the use of temperature switches by standardising menu navigation and display.

The control keys have been designed as large as possible and are arranged ergonomically to ensure fast and easy adjustments. Operation without any additional assistance is made easier through the tactile feedback.



Electronic temperature switch with display
Model TSD-30

Customised installation

The installation of the model TSD-30 temperature switch can be flexibly adapted to the individual mounting situation. Due to the almost unlimited rotation of the display and case by more than 300°, the display can be adjusted independently of the electrical connection. The display can thus always be aligned to face the operator, and the M12 x 1 connection positioned to suit the desired cable routing.

High quality

During development of the WIKA switch family a high value was placed on a robust design and the selection of appropriate materials suited for machine-building applications. For this reason the case and the threaded connection of the electrical connector are made from stainless steel. Overwinding or tearing off the connector is therefore virtually impossible.

IO-Link

With the optional output signal in accordance with the IO-Link communication standard, the TSD-30 allows a fast integration into modern automation systems. IO-Link offers an even faster installation, parameterisation and higher functionality of the model TSD-30.

Measuring ranges

Selectable versions		
Temperature	°C	°F
Standard	-20 ... +80	-4 ... +176
Option 1) 2)	-20 ... +120	-4 ... +248

1) Only for process connections with compression fitting.

2) Installation instructions under "Operating conditions" must be observed.

Display

14-segment LED, red, 4-digit, 0.35 in (9 mm) character size

Display can be turned electronically by 180°

Update: 200 ms

Output signal

Selectable versions	Switching output		Analogue signal
	SP1	SP2	
Option 1	PNP	-	4 ... 20 mA (3-wire)
Option 2	PNP	-	DC 0 ... 10 V (3-wire)
Option 3	PNP	PNP	-
Option 4	PNP	PNP	4 ... 20 mA (3-wire)
Option 5	PNP	PNP	DC 0 ... 10 V (3-wire)

Optionally also available with an NPN instead of an PNP switching output.

IO-Link, revision 1.1 (option)

IO-Link is optionally available for all output signals.

With the IO-Link option, switching output SP1 is always PNP

Switching thresholds

Switch point 1 and switch point 2 are individually adjustable

Switching functions

Normally open, normally closed, window, hysteresis

Freely adjustable

Switching voltage

Power supply - 1 V

Switching current

- without IO-Link: max. 250 mA
- with IO-Link: SP1 max. 100 mA
SP2 max. 250 mA

Adjustment accuracy

≤ 0.5 % of span

Temperature offset adjustment

±3 % of span

Scaling

Zero point: 0 ... 25 % of span

Full scale: 75 ... 100 % of span

Load

Analog signal 4 ... 20 mA: ≤ 0.5 kΩ

Analog signal DC 0 ... 10 V: > 10 kΩ

Service life

100 million switching cycles

Voltage supply

Power supply U_s

DC 15 ... 35 V

Current consumption

Switching outputs with

- Analog signal 4 ... 20 mA: 70 mA
- Analog signal DC 0 ... 10 V: 45 mA
- without analog signal: 45 mA

IO-Link option causes a deviating current consumption

Total current consumption

- without IO-Link: max. 600 mA including switching current
- with IO-Link: max. 450 mA including switching current

Accuracy specifications

Analog signal

≤ ±0.5 % of span + temperature sensor error

Switching output

≤ ±0.8 % of span + temperature sensor error

Display

≤ ±(0.8 % of span + temperature sensor error) ±1 digit

Temperature sensor

For °C: ±(0.15 K + 0.002 | t |) per EN 60751

For °F: ± [1.8*(0.15 + 0.002 (t - 32) / 1.8)]

| t | is the numerical value of the temperature without consideration of the sign.

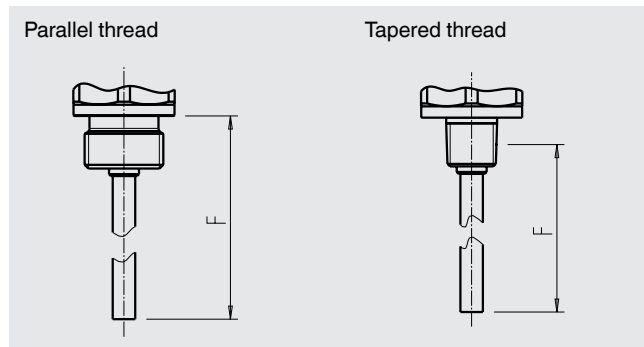
The actually achievable accuracy is significantly determined by the mounting situation (immersion depth, sensor length, operating conditions). This is especially the case for large temperature gradients between the environment and the medium.

Measuring element

Model

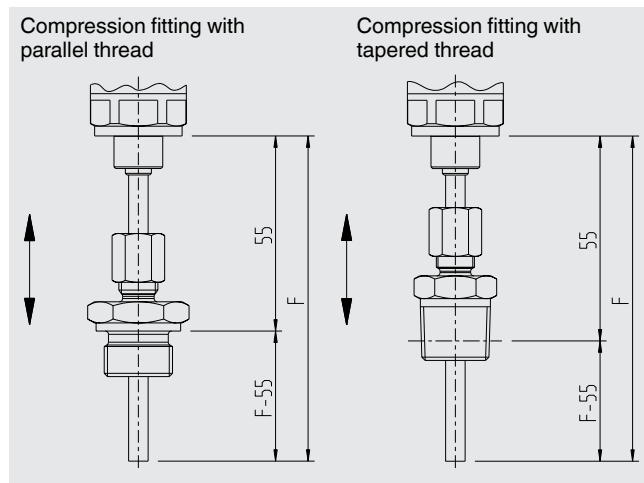
Pt1000, 2-wire, DIN EN 60751 / class A

Sensor length (F)



F		25 ¹⁾	50 ^{1) 2)}	100 ²⁾	150 ²⁾	250 ²⁾	350 ²⁾
mm		25 ¹⁾	50 ^{1) 2)}	100 ²⁾	150 ²⁾	250 ²⁾	350 ²⁾
in		0.98 ¹⁾	1.97 ^{1) 2)}	3.94 ²⁾	5.91 ²⁾	9.84 ²⁾	13.8 ²⁾

1) Not available with compression fitting or measuring range -20 ... +120 °C (-4 ... +248 °F).
2) Not available with G 1/8 A per DIN 3852-E.



F		100 ²⁾	150 ²⁾	250 ²⁾	350 ²⁾
mm		100 ²⁾	150 ²⁾	250 ²⁾	350 ²⁾
in		3,94 ²⁾	5,91 ²⁾	9,84 ²⁾	13,8 ²⁾

2) Not available with G 1/8 A per DIN 3852-E.

Response time

T05 < 5 s (per DIN EN 60751)

T09 < 10 s (per DIN EN 60751)

Maximum operating pressure

2,175 psi (150 bar)

When using a compression fitting:

max. 725 psi at 248 °F (max. 50 bar at 120 °C)

Operating conditions

Permissible temperature ranges

Medium: see measuring ranges

Ambient: -20 ... +80 °C (-4 ... 176 °F as lead)¹⁾

Storage: -20 ... +80 °C (-4 ... 176 °F as lead)

1) The permissible ambient temperature is limited to -20 ... +40 °C (-4 ... +104 °F) at the "-20 ... +120 °C" measuring range.

At high medium or ambient temperatures, ensure by suitable measures that the instrument case temperature does not exceed 176 °F (80 °C) in continuous operation (the temperature is measured at the hexagon of the process connection).

At medium temperatures above 176 °F (80 °C) the thread must not be immersed into the medium.

Humidity

45 ... 75 % r. h.

Vibration resistance

Sensor length F ≤ 5.91 in (150 mm):

6 g (IEC 60068-2-6,)

Sensor length F ≥ 9.84 in (250 mm):

2 g (IEC 60068-2-6,)

Shock resistance

50 g (IEC 60068-2-27, mechanical)

Ingress protection

IP65 and IP67 (per IEC 60529)

The stated ingress protection only applies when plugged in using mating connectors that have the appropriate ingress protection.

Mounting position

as required

Reference conditions

Temperature:	59 ... 77 °F (15 ... 25 °C)
Atmospheric pressure:	13.78 ... 15.23 °F (950 ... 1,050 mbar)
Humidity:	45 ... 75 % r. h.
Nominal position:	Process connection lower mount (LM)
Power supply:	DC 24 V
Load:	see "Output signal"

Materials

Wetted parts

Temperature sensor: Stainless steel 316Ti

Non-wetted parts

Case:	Stainless steel 304
Keypad:	TPE-E
Display window:	PC
Display head:	PC + ABS blend

Process connections

Selectable versions	
Standard	Thread
DIN 3852-E (parallel thread)	G 1/8 A
	G 1/4 A
	G 1/2 A
DIN 3852-A (parallel thread)	G 1/4 A with compression fitting
	G 1/2 A with compression fitting
ANSI / ASME B1.20.1 (tapered thread)	1/4 NPT
	1/4 NPT with compression fitting
	1/2 NPT
	1/2 NPT with compression fitting

Other connections on request.
Details on the sensor dimensions see "Dimensions in mm".

Sealings

Selectable versions		
Connection per	Sealing material	
DIN 3852-E (parallel thread)	Standard	NBR
	Option	FPM/FKM
DIN 3852-A (parallel thread)	Standard	Cooper

Electrical connections

Connections


- Circular connector M12 x 1 (4-pin)
- Circular connector M12 x 1 (5-pin) ¹⁾


1) Only for version with two switching outputs and additional analogue signal

Electrical safety

Short-circuit resistance:	S+ / SP1 / SP2 vs. U-
Reverse polarity protection:	U+ vs. U-
Insulation voltage:	DC 500 V
Overvoltage protection:	DC 40 V

Connection diagram

Circular connector M12 x 1 (4-pin)		
	U+	1
	U-	3
	S+	2
	SP1 / C	4
	SP2	2

Circular connector M12 x 1 (5-pin)		
	U+	1
	U-	3
	S+	5
	SP1 / C	4
	SP2	2

Legend:

U+	Positive power supply
U-	Reference potential
SP1	Switching output 1
SP2	Switching output 2
C	Communication with IO-Link
S+	Analog output

CE conformity

EMC directive

2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (industrial application)

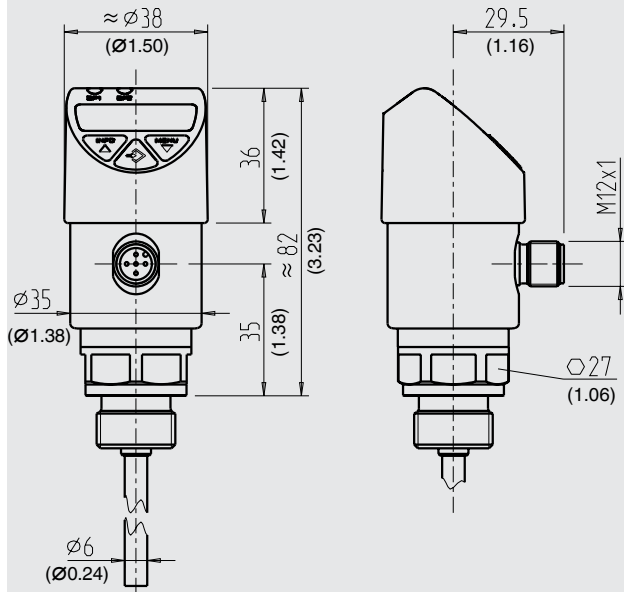
Manufacturer's declaration

RoHS conformity

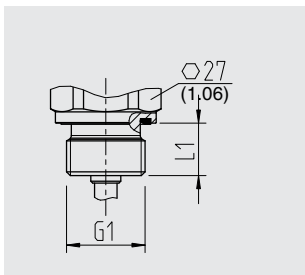
2011/65/EU

Dimensions in mm (inch)

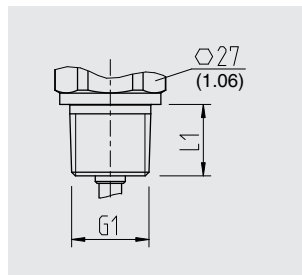
Temperature switch with circular connector M12 x 1
(4- and 5-pin)



Weight: approx. 0.3 kg (10.58 oz)

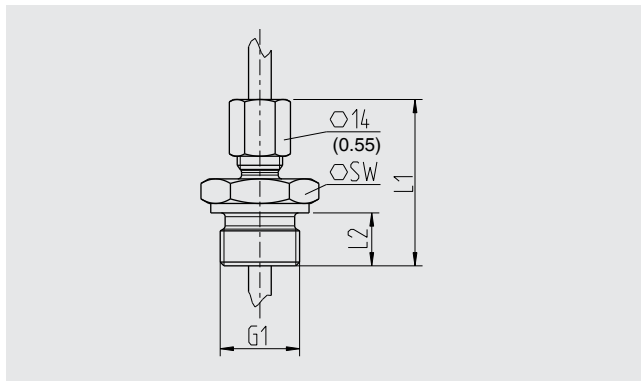


G1	L1
G 1/8 A	13 (0.51)
G 1/4 A	12 (0.47)
G 1/2 A	14 (0.55)

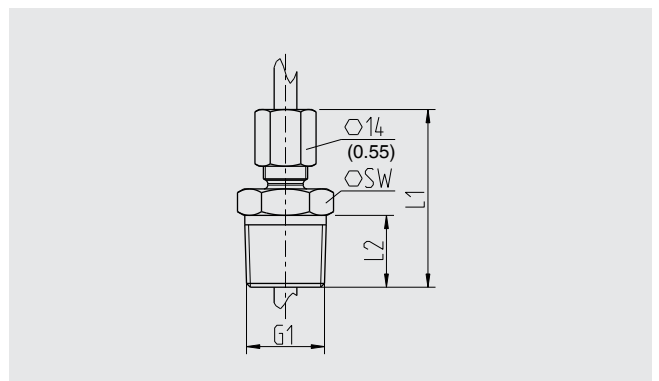


G1	L1
1/4 NPT	13 (0.51)
1/2 NPT	19 (0.75)

Compression fittings




G1	L1	L2	SW
G 1/4 A	40 (1.57)	12 (0.47)	19 (0.75)
G 1/2 A	44 (1.73)	14 (0.55)	27 (1.06)






G1	L1	L2	SW
1/4 NPT	41 (1.61)	15.1 (0.59)	17 (0.67)
1/2 NPT	41 (1.61)	19.7 (0.78)	22 (0.87)

Accessories and spare parts

Compression fittings		
	Description	Order no.
	G ¼ A per DIN 3852-A, stainless steel	11160136
	G ½ A per DIN 3852-A, stainless steel	3221555
	¼ NPT, stainless steel	3232905
	½ NPT, stainless steel	14043934

When using a compression fitting, a limited pressure containment of max. 50 bar at 120 °C (max. 725 psi at 248 °F) medium temperature applies.

Sealings		
	Description	Order no.
	NBR profile sealing G ¼ A DIN 3852-E	1537857
	FPM/FKM profile sealing G ¼ A DIN 3852-E	1576534
	NBR profile sealing G ½ A DIN 3852-E	1039067
	FPM/FKM profile sealing G ½ A DIN 3852-E	1039075

Connectors with moulded cable				
	Description	Temperature range	Cable diameter	Order no.
	Straight version, cut to length, 4-pin, 2 m (6.6 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	4.5 mm (0.18 in)	14086880
	Straight version, cut to length, 4-pin, 5 m (16.4 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	4.5 mm (0.18 in)	14086883
	Straight version, cut to length, 4-pin, 10 m (32.8 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	4.5 mm (0.18 in)	14086884
	Straight version, cut to length, 5-pin, 2 m (6.6 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	5.5 mm (0.22 in)	14086886
	Straight version, cut to length, 5-pin, 5 m (16.4 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	5.5 mm (0.22 in)	14086887
	Straight version, cut to length, 5-pin, 10 m (32.8 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	5.5 mm (0.22 in)	14086888
	Angled version, cut to length, 4-pin, 2 m (6.6 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	4.5 mm (0.18 in)	14086889
	Angled version, cut to length, 4-pin, 5 m (16.4 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	4.5 mm (0.18 in)	14086891
	Angled version, cut to length, 4-pin, 10 m (32.8 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	4.5 mm (0.18 in)	14086892
	Angled version, cut to length, 5-pin, 2 m (6.6 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	5.5 mm (0.22 in)	14086893
	Angled version, cut to length, 5-pin, 5 m (16.4 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	5.5 mm (0.22 in)	14086894
	Angled version, cut to length, 5-pin, 10 m (32.8 ft) PUR cable, UL listed, IP67	-20 ... +80 °C (-4 ... 176 °F)	5.5 mm (0.22 in)	14086896

Ordering information

Model / Measuring range / Output signal / Sensor length / Process connection / Sealing / Accessories and spare parts

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WIKAI Instrument Corporation
1000 Wiegand Boulevard
Lawrenceville, GA 30043-5868
Tel: 888-WIKA-USA • 770-513-8200
Fax: 770-338-5118
E-Mail: info@wika.com
www.wika.com