KOBOLD

Operating Instructions

for

Electronic Temperature Sensor

Model: TDA

TDA

1. Contents

2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:
• Electronic Temperature Sensor, model: TDA

4. Regulated Use

Any use of the Electronic Temperature Sensor, model: TDA which exceeds the manufacturer's specifications may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage. The application specifications include the installation, start-up and service requirements specified by the manufacturer.

5. Operating Principle

The KOBOLD Model TDA temperature sensor is used for economical measuring and monitoring of temperature. It can be used for any application in which temperatures must be monitored with great accuracy.

The sensor element is a semiconductor that outputs a digital signal to the electronic analyser in 0,5°C steps. The measured values are shown on a 3-place LED display. The analogue output can be adjusted as required with the measuring range.

6. Mechanical Connection

Before installation:
- Make sure the maximum operating pressure and maximum service temperature for this instrument are not exceeded.

Installation:
- This device is installed in a matching sleeve. Use sealing tape (i.e. Teflon tape) or a flat gasket to seal the threaded connections.
- The mounting position should be selected so that the sensor tip is always immersed in the liquid being monitored, thus ensuring optimal heat exchange between the liquid and the temperature sensor.
- Note that deposits that build up on the senor tip or dirty liquids can have an insulating effect and cause invalid measurements.
- Whenever possible, after the mechanical installation is complete, the joint at the threaded connector and the supply piping should be checked to ensure that it is tight and does not leak.

7. Electrical Connection

Caution! Be sure that the supply voltage of your system is the same as that specified on the device nameplate.

- Make sure that the electrical supply lines are de-energized.
- Make the connection using a PVC cable or the M 12x1 connector socket, as shown in the accompanying diagram.
- Appropriate connectors with different cable lengths are optionally available.

Important! The instrument electronics may be damaged if the connectors are assigned incorrectly.

7.1. Connector pin assignment TDA-...L3M

weiß / white
braun / brown
schwarz / black
blau / blue

Option: Socket with cable

Plug

TDA
nicht belegt / n.c.
+Vs /+ Supply
0V / Ground
Ausgang / Output
0V / Ground
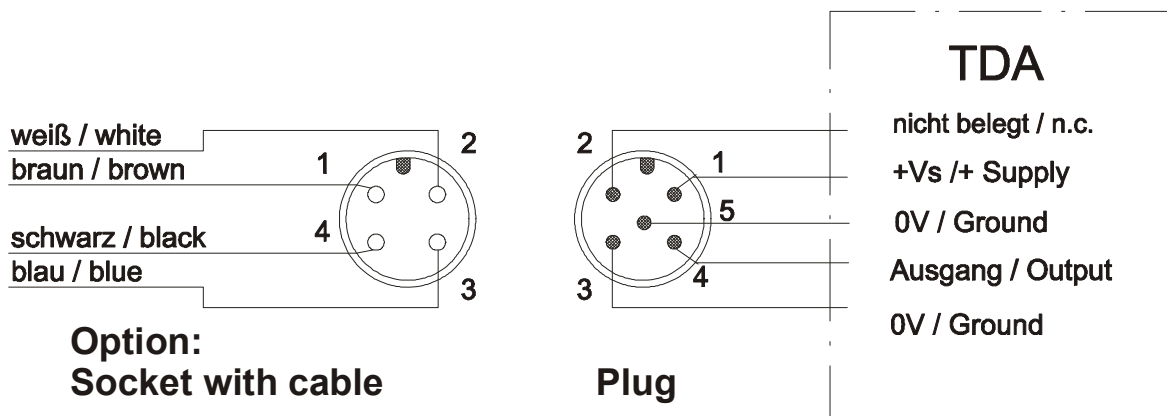
Connection example

TDA-...L3M/Plug M12

+Vs
n.c.
GND
GND
+Vs
Analog Out
0(4)-20mA

TDA
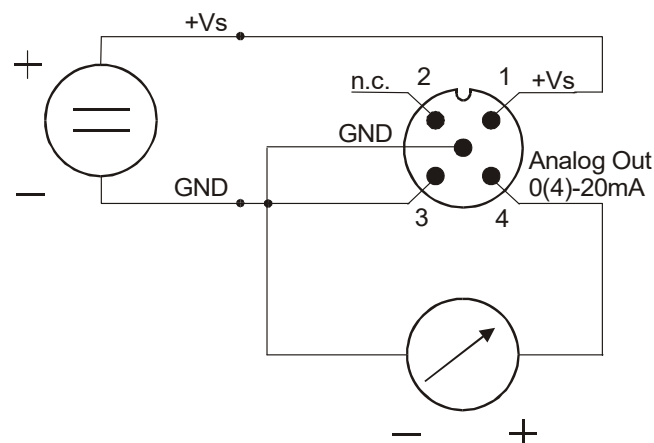
7.2. Connector pin assignment TDA-...P3M, TDA-...N3M

	TDA-...P3M	TDA-...N3M
	PNP-Output	NPN-Output
	+24 V$_{DC}$	+24 V$_{DC}$
	0 V / GND	0 V / GND
	0(4)-20 mA	0(4)-20 mA
	0 V / GND	0 V / GND

weiß / white
braun / brown   1

schwarz / black   4
blau / blue

2

3

Option:
Socket with cable

2

3   4

1

5

Plug
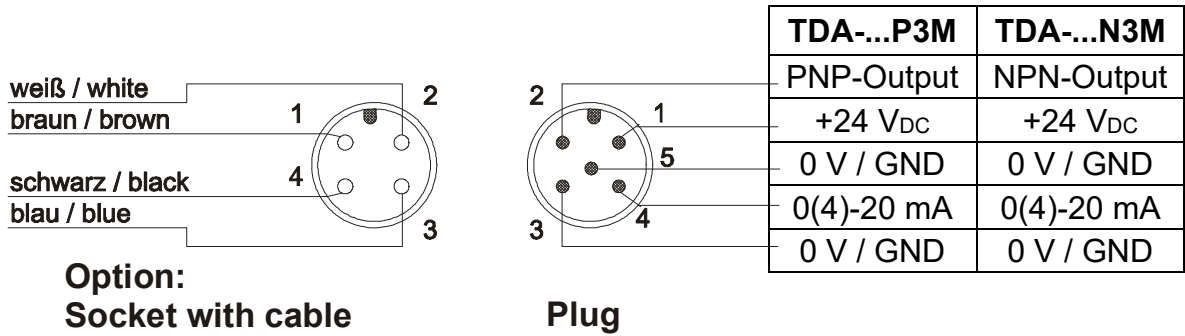
Cable connector assignment

TDA-...P3M
Plug M12

+Vs

Power   +   —

PNP out   2   1   +24 V$_{DC}$

GND   3   5   4   0(4)-20 mA

mA   +   —

GND
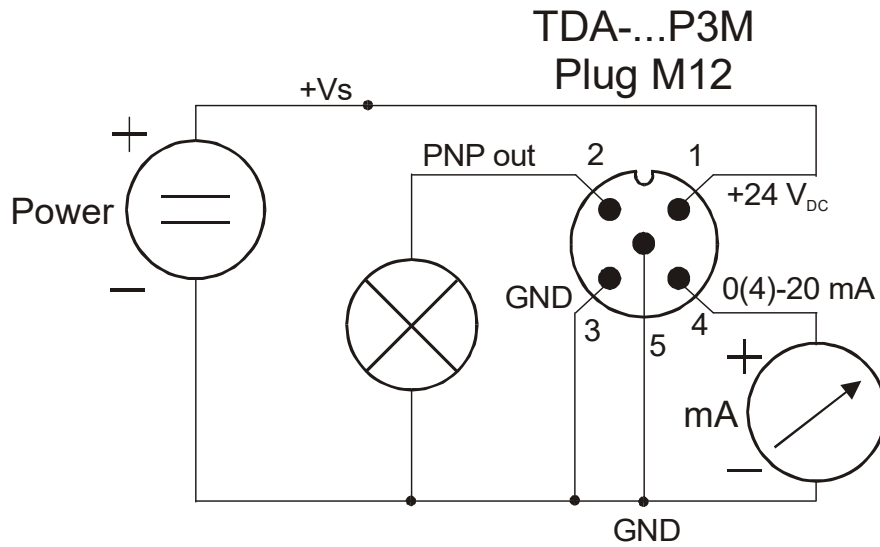
8. Operation

> ☝ Caution! Please note that when used in high temperature applications, the device housing and the operating controls can become very hot.

Connect the temperature sensor as shown in the previous wiring diagram and then connect it to a power source of the specified voltage.

8.1. Button function

In the normal mode (measuring mode)

▼ : Press 3 secs ➡ **Set-up mode**

In the set-up mode

▼ : Next Step

◆ : Change Value

Any time

3 sec ▼

or do not press
a button for 20 sec

↓

Standard mode
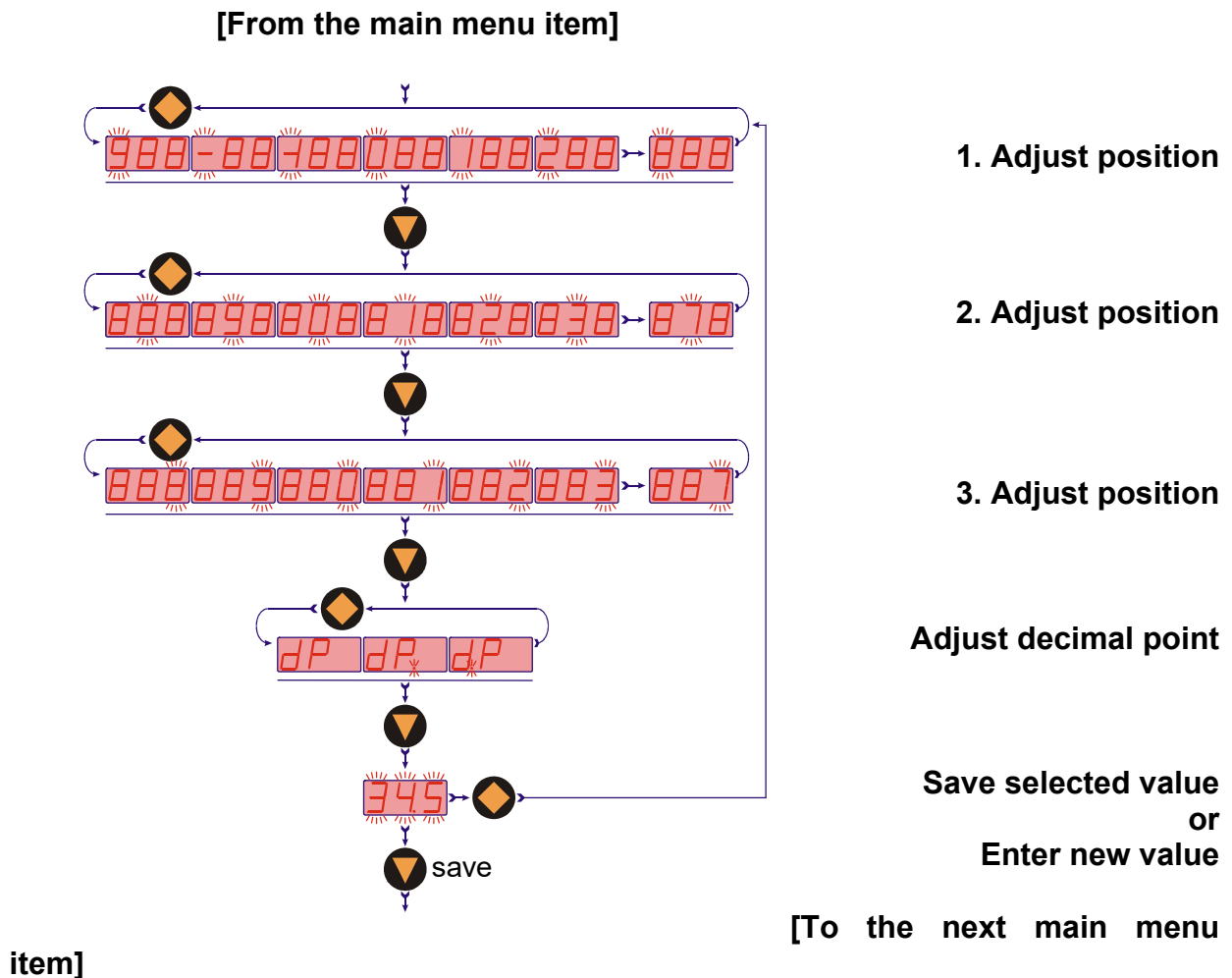
TDA

9. Settings

The following values can be changed at the temperature transmitter:

	Scale Range	Factory Setting
Start current (**S-C**)	0...FS	0
End current (**E-C**)	0...FS	FS
Start current selection (**SCS**)	0 / 4	4
Change code (**CCo**,)	000...999	000

9.1. Value setting

From the main menu item (for example: start current, **"S-C"**), press the "◆" button to set the value. The flow chart below illustrates the universal routine for changing individual parameters.

[From the main menu item]

1. Adjust position

2. Adjust position

3. Adjust position

Adjust decimal point

Save selected value
or
Enter new value

[To the next main menu item]

10. Set-up Mode

10.1.   TDA-...L3M, TDA-...L3P, TDA-...L3S

3 sec

Codeinput
Code=
`Cod`

Setting parameter

Startcurrent
`S-C`
7sec

Setting parameter

End current
`E-C`
7sec

Setting parameter

Startcurrent Selection
`SCS`
7sec

0-20 mA
`0--`

4-20 mA
`4--`

`0--`

Save

Code change
`CCo`

Setting paramter

TDA

10.2.   TDA-...P3M, TDA-...N3M

3 sec ▼

Code input   `Cod` ◆ → setting parameter

Switch pt.   `SPo` ◆ → setting parameter
▼

Hysteresis   `HYS` ◆ → setting parameter
▼

Duo-Point   `duo` ◆ → setting parameter
▼

On-Delay   `dSE` ◆ → setting parameter
▼

Off-Delay   `drE` ◆ → setting parameter
▼

Contact type   `Con` ◆ → `no`   ▼ → `no`
  N/C contact
  N/O contact   `nc`   ◆   ◆   ▼ Save
▼

Start current   `5-C` → ◆ 7sec → setting parameter

Endcurrent   `E-C` → ◆ 7sec → setting parameter

Start current Choice   `SCS` → ◆ 7sec → `0--` (0-20 mA) / `4--` (4-20 mA) → ◆ → ▼ → `0--` → ▼ Save

Change code   `CCo` → ◆ → setting parameter

TDA

11. Main Menu Items

11.1. Current output

The current output is selected as follows:

"**S-C**"   Start current indicated value < > 0(4) mA
"**E-C**"   End current   indicated value < > 20 mA
"**SCS**"   Start current selection (0-20 mA or 4-20 mA).

The indicated value at which 0(4) mA flows is entered in menu item "S-C". The indicated value at which 20 mA flows is entered in menu item "E-C".

11.2. Switching point

The switching point is entered in the menu item "**SPo**". A setting value between -199 and 999 can be selected. This value can also include a decimal point. The decimal point can be set at two points (e.g. 10.0 or 1.00). If the measuring value is the set switch point, the temperature switch is activated and is signalised by a lighted LED.
If the hysteresis is zero and the window point is inactive, the temperature switch will be reacted if the temperature is below the switch point.

11.3. Hysteresis

After setting the switching point, the hysteresis can be entered as a negative value in the "**HYS**" menu. The standard hysteresis value is zero. In operation condition this can lead to ambiguous switching behaviour if the reading fluctuates around the switching point or window point. This can be prevented by increasing the hysteresis. The hysteresis relates to the switching point and the window point (switching point minus hysteresis; window point plus hysteresis).
Example: Switching point 100 °C; Hysteresis: -2.5 °C
          The temperature switch switches when 100 °C is exceeded and switches back when the reading drops below 97.5 °C.

11.4. Window point (duo-point)

Along with the switching point, the "**duo**" (duo-point) has to be defined, known as the window point. This must be higher than the switching point. By using the window point and the switching point it is possible to monitor the measurement value in a certain range. The switching point limits the measurement range to smaller values and the window point to larger values.

> **If the window point (duo-point) is less than or equal to the switching point, an error report (Er4) will be indicated on the display. The value is deleted and its function is invalid (in the case that the window point and switching point out of adjustment).**

The value is set in the same way as the switching point.
The window point is needed for process, monitoring of a certain temperature range.

Example: Switching point: 50 °C; window point: 70 °C; hysteresis: -2 °C
The temperature contact switches when 50 °C is exceeded.
If the temperature remains between 48 °C (50-2) and 72 °C (70+2), the contact will remain in active switching condition (LED on). If it exceeds 72 °C or drops below 48 °C , the contact will de-energise.
.

11.5.   Switching behaviour

The following diagram clarifies the switching behaviour of the temperature switch. The contact closes (contact type: no) when it drops below the switching point or the window point. It only opens again if the window point plus hysteresis is exceeded or if it drops below the switching point minus hysteresis. An **LED** indicates the switching condition of the switching point.
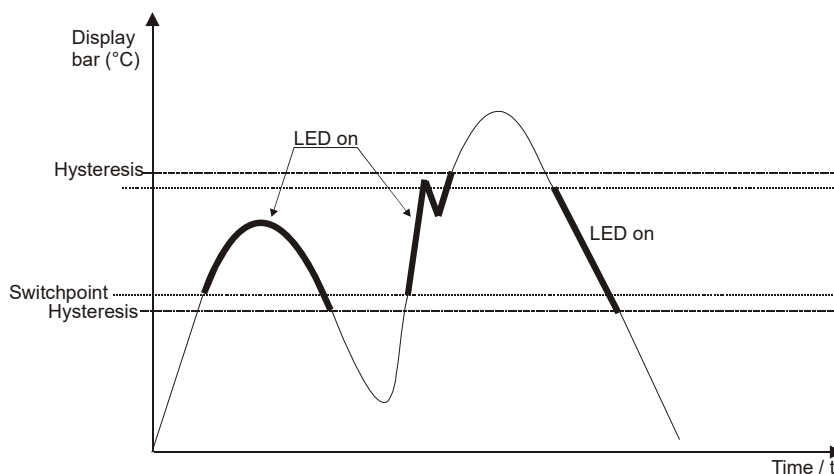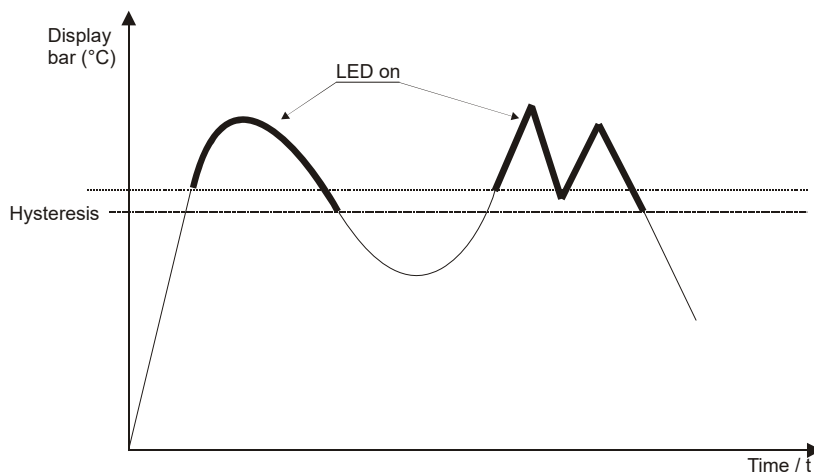
11.6. Transient response

Using the menu items **"dSE"** and **"drE"** it is possible to set the delay set and the delay reset.

The delay set causes delayed switching of the output if the switching threshold is exceeded.

The delay reset causes a delayed resetting of the output if it drops below the switching threshold – hysteresis.

The setting range for both parameters is 0.0 ... 99.5 seconds. The step rate is 0.5 seconds.

With these two functions it is also possible to suppress temporary disturbances.

11.7. Contact type

The transistor switching output can be set in the **"Con"** menu. The switching function changes from

<div align="center">

no - NO

to

nc - N/C and back.

</div>

NO switch means: the transistor is switched through if the switching point is exceeded.
N/C contact means: The output transistor is cut off when the switching point is exceeded.

11.8. Change code

Change code **"CCo"** protects the device against unauthorised changing of the set parameters. If the code set is different from 000, then the operator must enter the set code before selecting the set-up mode.

12. Maintenance

This device is maintenance-free when properly installed. However, deposits from dirty liquids can lead to invalid measured values.

13. Technical Information

Housing cover:	Stainless steel 1.4305
Housing:	Stainless steel 1.4404
Connections, compact version:	
	G 1/2 or G 3/4 external thread stainless steel 1.4404
	Option: 1/2 NPT or 3/4 NPT
Connection, separately mounted version:	
Sensor:	100 mm, 6 mm
Cable:	2.5 m PTFE with M 12x1 plug connector
Housing:	M 25x1 with jam nut
Principle of measurement:	semiconductor
Display:	3-position LED, digit-height: 7mm
Resolution:	0.5 °C to 100 °C
	1 °C above 100 °C
Max. temperature of measured medium:	-20...+120 °C (compact version)
	50...+125 °C (separately mounted version)
Max. ambient temp.:	-20 to +50 °C
Max. pressure:	80 bar
Power supply:	24 V_{DC} $\pm$ 20%
Power consumption:	40 mA (TDA-...L3M) approx. 70 mA (TDA...P3M, TDA-...N3M) without switching current output
Electrical connection:	Plug M12x1 or PVC cable t_{max}: 90 °C)
Switching output:	Semiconductor; PNP or NPN (factory set), max. 300 mA, short-circuit proof
Contact function:	N/O N/C, window, adjustable
Switch. point adjustment:	via 2 keys adjustable
Switching display:	programmable
Switching state display:	1 (2) LED
Hysteresis:	via 2 keys adjustable
ON/OFF-switching delay:	0,5...99,5 (separately adjustable)
Measuring cycle:	0.5 s, $t_{(50/90)}$ = ca. 13/30 s
Accuracy (sensor):	$\pm$0.5 °C (between -10 ... +85 °C) $\pm$2 °C (between -50...-10 °C and + 85 ...125 °C)
Protection type:	IP 65

TDA

14. Ordering Codes

Example: TDA-15H2 R4 0 L 3M

Display	Measur. range	Connection	Model	Sensor length	Output	Electr. connection
3-position LED display	-20...+120 °C	G 1/2	TDA-15H2 R4	**0** = short **1** = 100 mm **2** = 200 mm**	**L** = 0 (4) - 20 mA **P** = 0 (4) - 20 mA, PNP - switch output **N** = 0 (4) - 20 mA, NPN - switch output	**3M** = M12x1 plug connector
		G 3/4	TDA-15H2 R5			
		1/2 NPT	TDA-15H2 N4			
		3/4 NPT	TDA-15H2 N5			
	-50...+125 °C	separately mounted version, smooth sensor	TDA-15H3 D6	**1** = 100 mm		

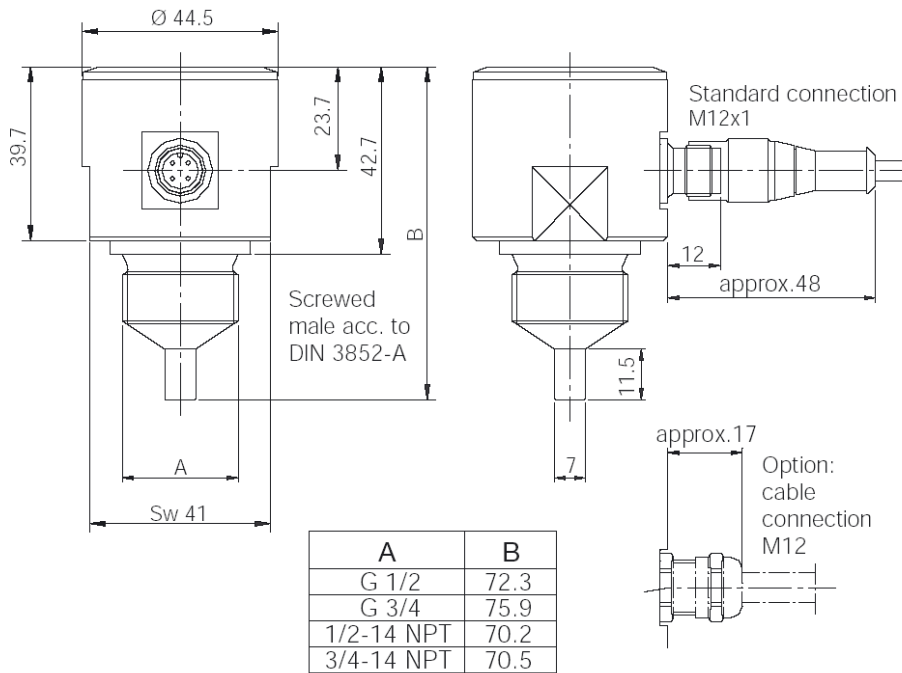* Please specify cable length when ordering! **Maximum length for NPT screw thread is 184 mm instead of 200 m.

Accessories: Electrical connection

Description	Model
M12x1 plug terminal	**ZUB-KAB-12D500**
M12x1 plug with 2 m cable	**ZUB-KAB-12K002**
M12x1 plug with Quickon-plug	**ZUB-KAB-12Q000**

15. Dimensions

Compact version short

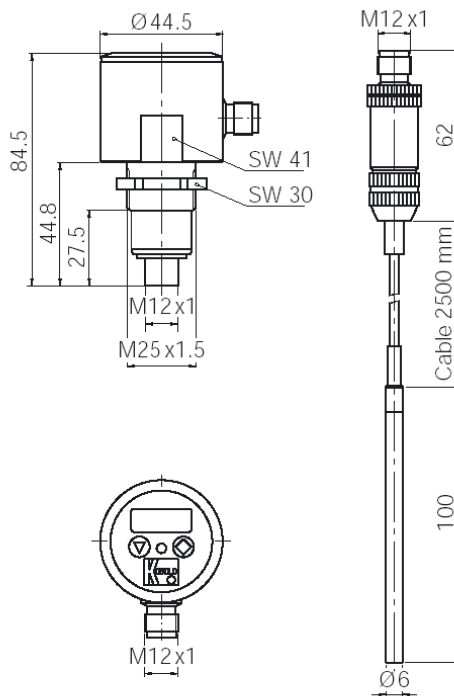| A	B
G 1/2	72.3
G 3/4	75.9
1/2-14 NPT	70.2
3/4-14 NPT	70.5

Compact version long

Separately mounted version

TDA
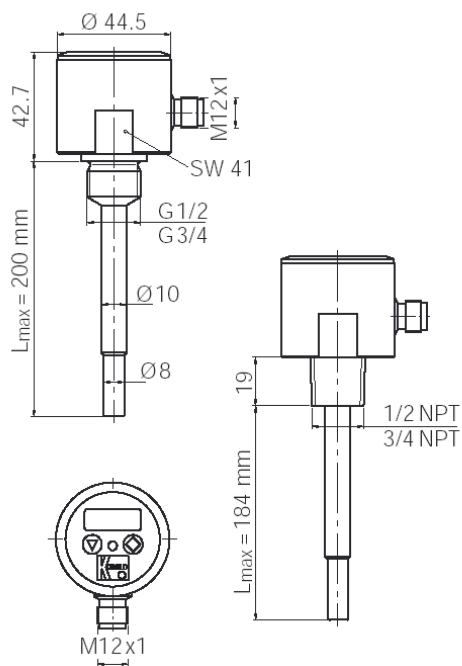
16. EU Declaration of Conformance

We, KOBOLD-Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Electronic temperature sensor, model TDA

to which this declaration relates is in conformity with the standards noted below:

EN 61326-1:2013
Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

EN 61010-1:2011
Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

Also, the following EC guidelines are fulfilled:

2014/30/EU   **EMC Directive**
2011/65/EU   **RoHS** (category 9)

Hofheim, 28. Apr. 16

H. Peters
General Manager

M. Wenzel
Proxy Holder