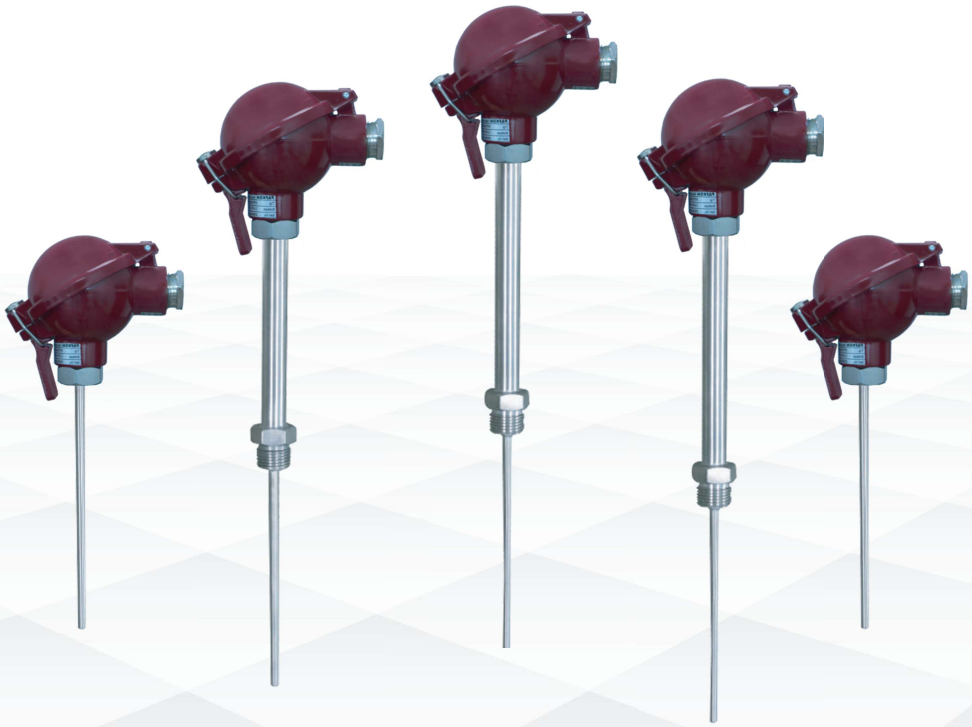
PAFKON

Ölçüm ve Kontrol Sistemleri Müh. A.Ş.

Temperature Measurement Products



CE ISO 9001 Ex

Product Data Sheet

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PAFKON PFT Temperature Sensors

- Comprehensive temperature measurement for customer requirements
- All RTD and Thermocouple types are available for various applications for different industries
- Wide process connection options
- Optional Class A accuracy for RTD and special tolerance thermocouples for critical temperature measurements
- EN IEC 60079-0:2018 , EN IEC 60079-11:2012 certified temperature measurement for hazardous applications

PAFKON Resistance Thermometers

Resistance thermometers are widely used in various processes from -200 °C to + 850 °C.
They provide more accurate values than thermocouples, especially at low temperatures.
Standard types are used for up to 500 °C, and for higher temperatures, special types are used.

Resistance thermometers are manufactured with an inset and put into a protection sheath.
RTD element is placed into the inset and then filled with metal oxide powder.
The best feature of the resistance temperature with inset is to replace by new one without stopping the process.

RESISTANCE THERMOMETER SELECTION :

To ensure the reliability and accuracy of the resistance thermometers,
it is important to select the correct element and protection sheath.
For the correct selection, please use the PAFKON RTD Selection Chart.

PROTECTION SHEATHS :

Resistance thermometer protection sheaths should be selected in accordance with the process conditions.
Usually; 1.4301 (AISI304 SS), 1.4571 (AISI316 SS) pipes are used.
1.4571 (AISI316) stainless steel pipe is used as the standard inset material.

HEAD :

Protection sheath is engaged to the aluminium head and inset is fixed to the head with screws and springs.
Springs are used to minimize the effect of the vibration and to eliminate
the problems caused by the metal expansion related to temperature raise.

Generally, Type B aluminium cast head is used for resistance thermometers.
If requested, Type C hausing can also be used. Heads, comply with the DIN43729 standard.

CONNECTION AND MOUNTING :

The resistance thermometers specified in this data sheet are generally thought to be threaded, welded and flange mounted to the process. Copper cables are used between the housing and the resistance thermometer.
If the resistance thermometer is immersed to the pipe, the velocity of the fluid inside the pipe is one of the factors that effect the accuracy of the measurement. The resistance thermometers should placed perpendicular to the flow direction.

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TRANSMITTERS AND OUTPUTS :

You can order the resistance thermometers with or without transmitters. If analog output is necessary, resistance thermometers should be ordered with transmitters. PR electronics head mount temperature transmitters are used as a vendor in PAFKON temperature trasmitters. HART 5 or HART 7 options are also available.

TRANSMITTER TYPES :

TYPE	5331A / D	5332A / D	5333A / D	5335A / D	5337A / D	5437A / D
INPUT: RTD, TC **OUTPUT:** mA	2-wire programmable transmitter	2-wire programmable RTD transmitter	2-wire programmable transmitter	2-wire transmitter with HART 5 protocol	2-wire transmitter with HART 7 protocol	2-wire HART 7 temperature transmitter
INPUT:						
RTD, measurement range / min. span	-200...+850°C / 25°C	-200...+850°C / 25°C	-200...+850°C / 25°C	-200...+850°C / 10°C	-200...+850°C / 10°C	-200...+850°C / 10°C
Sensor connection, wires	2 - 3 - 4		2 - 3	2 - 3 - 4	2 - 3 - 4	2 - 3 - 4
TC types	BEJKLNRSTUW3W5Lr			BEJKLNRSTUW3W5	BEJKLNRSTUW3W5	BEJKLNRSTUW3W5Lr
Max. offset	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	
Cold junction compensation	Internal / external			Internal / external	Internal / external	Internal / external
OUTPUT: mA, signal range / min. span	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA
TECHNICAL SPECIFICATIONS:						
Ambient temperature	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-50...+85°C
Supply voltage, DC	7.2...35 VDC	7.2...35 VDC	8...35 VDC	8...35 VDC	8...35 VDC	7.5...48 VDC
Max. required power	0.8 W	0.8 W	0.8 W	0.8 W	0.8 W	< 850 mW
Isolation voltage, test / operation	1500 VAC / 50 V			1500 VAC / 50 V	1500 VAC / 50 V	2.5 kVAC / 55 VAC
Response time	1...60 s	1...60 s	0.33...60 s	1...60 s	1...60 s	
Signal dynamics, input / output	20 bit / 16 bit	20 bit / 16 bit	19 bit / 16 bit	22 bit / 16 bit	22 bit / 16 bit	70 ms
Accuracy	≤ ±0.05% of span	≤ ±0.05% of span	≤ ±0.1% of span	≤ ±0.05% of span	≤ ±0.05% of span	≤ ±0.05% of span
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.005% of span / °C	< ±0.005% of span / °C	< ±0.005% of span / °C
NAMUR	NE21, NE43	NE43	NE43	NE21, NE43, NE89	NE21, NE43, NE89	NE 21/43/44/89/95/107/130
Channels	1	1	1	1	1	1 or 2*
Programming	5909	5909	5909	5909 / HART5	5909 / HART 7 / HART 5	5909 / HART 7 / HART 5
APPLICATION GUIDE:						
Dual input (4 terminals)				✓	✓	
True dual input (7 terminals)						✓
Custom sensor linearization	✓	✓	✓	✓	✓	✓
mA output	✓	✓	✓	✓	✓	✓
Loop-powered	✓	✓	✓	✓	✓	✓
Galvanically isolated	✓			✓	✓	✓
HART protocol				✓	✓	✓
Process signal calibration	✓	✓	✓	✓	✓	✓

* For ATEX applications PR 5331D, 5332D, 5333D, 5335D, 5337D and 5437D head mount temperature transmitters should be used with I.S. barriers and we recommend PR 9106B HART transparent repeater as I.S. barrier

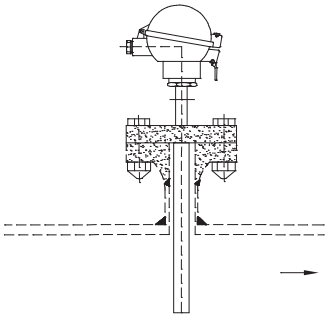
PAFKON Resistance Thermometers

Installations Instructions

Recommended Installation Length

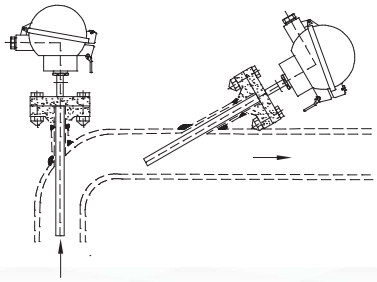
The usual way of ensuring that thermal measurements are accurate is to comply with the minimum insertion depth of the temperature sensor. Ideally, the sensor on a thermometer should be located in the center of the pipe to avoid heat dissipation errors.

Medium	Installation lengt
Fluids	8 to 10 x Ø thermowell tip
Gases	10 to 15 x Ø thermowell tip



Insufficient nominal diameter

In the case of pipelines with very small nominal diameters, insertion inside an elbow pipe is recommended. The temperature sensor is set in opposition to the flow direction of the medium. Inserting the temperature sensor with an adapter at an angle of < 45° against the flow direction can also distort measurement results.



Accuracy classes of measurement resistors in accordance with IEC 60751

Both thin film resistors and wire wound resistors in accordance with IEC 60751 can be used across the entire range of application. Subsequently, only the accuracy class of the temperature range used can remain valid.

Thin film resistor (TF), built-in

Class B	Δt = ± (0.30 + 0.0050 x [t])	-50 to 400 °C (-58 to 752 °F)
Class A	Δt = ± (0.15 + 0.0020 x [t])	-30 to 300 °C (-22 to 572 °F)

Wire wound resistor (WW), built-in

Class B	Δt = ± (0.30 + 0.0050 x [t])	= 196 to 600 °C (= 320.8 to 1112 °F)
Class A	Δt = ± (0.15 + 0.0020 x [t])	= 100 to 450 °C (= 148 to 842 °F)

Vibration Resistance

The use of a mineral insulated cable and special installed measuring elements ensure very high vibration resistance of all measuring insets of the Pafkon temperature sensors. The acceleration values of 30 m/sec2 (3 g), defined for already increased requirements in accordance with the standard IEC 60751, are exceeded by all measuring inset types for Pafkon temperature sensors. The optimally suitable combination of measuring range, diameter, accuracy, and vibration resistance can be taken from the following tables.

	Meas.range	Vibration resistance
Class B	-50 to 400 °C (-58 to 752 °F)	100 m/sec² (10g) at 10 to 500 Hz
Class A	-30 to 300 °C (-22 to 572 °F)	
Class AA	0 to 100 °C (32 to 212 °F)	

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PAFKON Thermocouples

Pafkon thermocouple is a temperature sensor consisting of two dissimilar metal wires joined at one end, which generates a voltage proportional to temperature. It is widely used in industrial, scientific, and commercial applications due to its wide temperature range, durability, and fast response time.

THERMOCOUPLE SELECTION :

To ensure the reliability and accuracy of thermocouple, it is important to select the correct type.

For the correct selection, please use following PAFKON RTD Selection Chart.

Type	Material(Positive/Negative)	Temp Range(°C)	Class 1 Tolerance	Class 2 Tolerance	Typical Temperature Range
K	Chromel / Alumel	-200 to +1260	±1.5°C or ±0.004 ×	t	
J	Iron / Constantan	-40 to +750	±1.5°C or ±0.004 ×	t	
T	Copper / Constantan	-200 to +350	±0.5°C or ±0.004 ×	t	
E	Chromel / Constantan	-200 to +900	±1.5°C or ±0.004 ×	t	
N	Nicrosil / Nisil	-200 to +1300	±1.5°C or ±0.004 ×	t	
R	Pt 13% Rh / Pt	0 to +1600	±1.5°C or ±0.005 ×	t	(above 200°C)
S	Pt 10% Rh / Pt	0 to +1600	±1.5°C or ±0.005 ×	t	(above 200°C)
B	Pt 30% Rh / Pt 6% Rh	0 to +1800	Not specified for Class 1	±1.5°C or ±0.0075 ×	t

- |t| is the **absolute value of temperature** in °C.
- The "whichever is greater" rule applies when both °C and percentage tolerances are given.
- Class 1 thermocouples require **special selection or calibration** to meet tighter tolerances.

HEAD :

Protection sheath is engaged to the aluminium head and inset is fixed to the head with screws and springs. Springs are used to minimize the effect of the vibration and to eliminate the problems caused by the metal expansion related to temperature raise.

Generally, Type B aluminium cast head is used for thermocouples If requested, Type C hausing can also be used. Heads, comply with the DIN43729 standard.

CONNECTION AND MOUNTING :

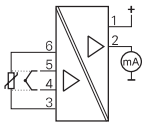
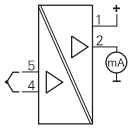
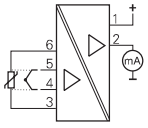
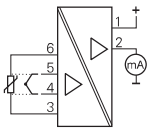
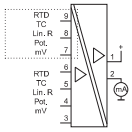
The thermocouples specified in this data sheet are generally thought to be threaded, welded and flange mounted to the process. thermocouple cables are used between the housing and the thermocouple.

If the thermocouple is immersed to the pipe, the velocity of the fluid inside the pipe is one of the factors that effect the accuracy of the measurement. The thermocouple should placed perpendicular to the flow direction.

TRANSMITTERS AND OUTPUTS :

You can order the resistance thermometers with or without transmitters. If analog output is necessary, resistance thermometers should be ordered with transmitters. PR electronics head mount temperature transmitters are used as a vendor in PAFKON temperature trasmitters. HART 5 or HART 7 options are also available.

TRANSMITTER TYPES :

TYPE	5331A / D	5334A / D	5335A / D	5337A / D	5437A / D
INPUT: RTD, TC **OUTPUT:** mA	2-wire programmable transmitter 	2-wire programmable transmitter 	2-wire transmitter with HART 5 protocol 	2-wire transmitter with HART 7 protocol 	2-wire HART 7 temperature transmitter 
INPUT:					
RTD, measurement range / min. span	-200...+850°C / 25°C		-200...+850°C / 10°C	-200...+850°C / 10°C	-200...+850°C / 10°C
Sensor connection, wires	2 - 3 - 4		2 - 3 - 4	2 - 3 - 4	2 - 3 - 4
TC types	BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5Lr	BEJKLNRSTUW3W5	BEJKLNRSTUW3W5	BEJKLNRSTUW3W5Lr
Max. offset	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	50% of selec. max. value	
Cold junction compensation	Internal / external	Internal	Internal / external	Internal / external	Internal / external
OUTPUT: mA, signal range / min. span	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA	3.5...23 mA / 16 mA
TECHNICAL SPECIFICATIONS:					
Ambient temperature	-40...+85°C	-40...+85°C	-40...+85°C	-40...+85°C	-50...+85°C
Supply voltage, DC	7.2...35 VDC	7.2...35 VDC	8...35 VDC	8...35 VDC	7.5...48 VDC
Max. required power	0.8 W	0.8 W	0.8 W	0.8 W	< 850 mW
Isolation voltage, test / operation	1500 VAC / 50 V	1500 VAC / 50 V	1500 VAC / 50 V	1500 VAC / 50 V	2.5 kVAC / 55 VAC
Response time	1...60 s	1...60 s	1...60 s	1...60 s	
Signal dynamics, input / output	20 bit / 16 bit	18 bit / 16 bit	22 bit / 16 bit	22 bit / 16 bit	70 ms
Accuracy	≤ ±0.05% of span	≤ ±0.05% of span	≤ ±0.05% of span	≤ ±0.05% of span	≤ ±0.05% of span
Temperature coefficient	< ±0.01% of span / °C	< ±0.01% of span / °C	< ±0.005% of span / °C	< ±0.005% of span / °C	< ±0.005% of span / °C
NAMUR	NE21, NE43	NE21 , NE43	NE21, NE43, NE89	NE21, NE43, NE89	NE 21/43/44/89/95/107/130
Channels	1	1		1	1 or 2*
Programming	5909	5909	5909 / HART5	5909 / HART 7 / HART 5	5909 / HART 7 / HART 5
APPLICATION GUIDE:					
Dual input (4 terminals)			✓	✓	
True dual input (7 terminals)					✓
Custom sensor linearization	✓	✓	✓	✓	✓
mA output	✓	✓	✓	✓	✓
Loop-powered	✓	✓	✓	✓	✓
Galvanically isolated	✓	✓	✓	✓	✓
HART protocol			✓	✓	✓
Process signal calibration	✓	✓	✓	✓	✓

* For ATEX applications PR 5331D, 5334D, 5335D, 5337D and 5437D head mount temperature transmitters should be used with I.S. barriers and we recommend PR 9106B HART transparent repeater as I.S. barrier

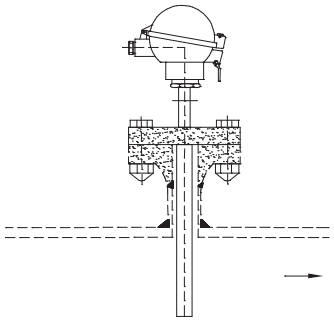
PAFKON Thermocouples

Installations Instructions

Medium	Installation lengt
Fluids	8 to 10 x Ø thermowell tip
Gases	10 to 15 x Ø thermowell tip

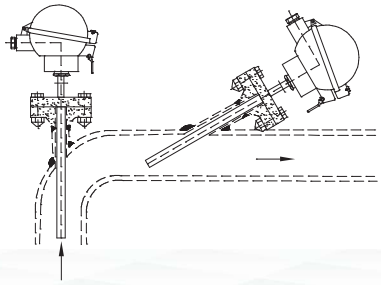
Recommended Installation Length

The usual way of ensuring that thermal measurements are accurate is to comply with the minimum insertion depth of the temperature sensor.Ideally, the sensor on a thermometer should be located in the center of the pipe to avoid heat dissipation errors.



Insufficient nominal diameter

In the case of pipelines with very small nominal diameters, insertion inside an elbow pipe is recommended. The temperature sensor is set in opposition to the flow direction of the medium. Inserting the temperature sensor with an adapter at an angle of < 45° against the flow direction can also distort measurement results.



Accuracy classes of measurement thermocouples in accordance with IEC 60584

Class I and **Class II** refer to **accuracy classes** for thermocouples, defined by the international standard **IEC 60584-1**.These classes indicate how accurate the thermocouple is expected to be over a specific temperature range.

Thermocouple Accuracy Classes (IEC 60584-1) Basic

Class	Tolerance (± °C or %)	Description
Class 1	± 1.5 °C or ± 0.004 x	t
Class 2	± 2.5 °C or ± 0.0075 x	t

Vibration Resistance

The use of a mineral insulated cable and special installed measuring elements ensure very high vibration resistance of all measuring insets of the Pafkon temperature sensors. The acceleration values of 30 m/sec2 (3 g), defined for already increased requirements in accordance with the standard IEC 60751, are exceeded by all measuring inset types for Pafkon temperature sensors. The optimally suitable combination of measuring range, diameter, accuracy, and vibration resistance can be taken from the following tables.

Type	minimum immersion length	Temperature-sensitive length	Non-flexible length
Vibration-resistant up to 600 m/sec² (60g)	70 mm (2.76 in)	7 mm (0.28 in)	30 mm (1.18 in)

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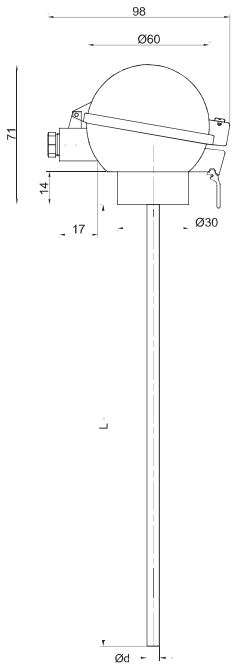
Overview of temperature sensors

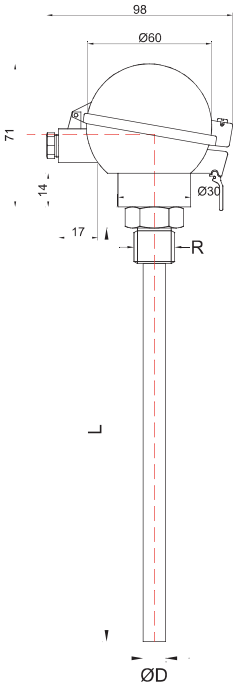
Technical Specification

Type

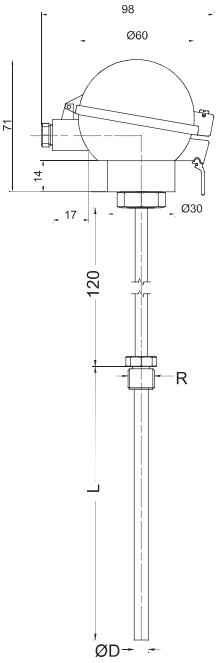
PFT01



PFT02



PFT03



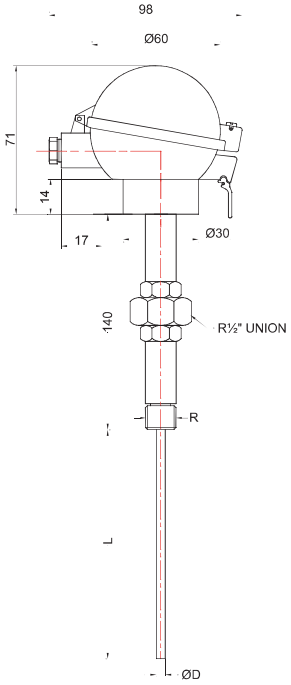
Design	Straight type without a compression fitting.	Straight type without a compression fitting.		Straight type with a compression fitting and extension tube
Process connection	Welded connections, Insertion in an existing thermowell	¼"BSP ¼"NPT M10x1 ½"BSP ½"NPT M12x1 ⅛"BSP ⅛"NPT M10x1,5 ¾"BSP ¾"NPT M20x1,5 1"BSP 1"NPT M27x1,5		¼"BSP ¼"NPT M10x1 ½"BSP ½"NPT M12x1 ⅛"BSP ⅛"NPT M10x1,5 ¾"BSP ¾"NPT M20x1,5 1"BSP 1"NPT M27x1,5
Extention Length	Without	Without		120 mm
Sensors	RTD Pt-50 , Pt-100, Pt-500 ,pt-1000 Ni-100 ,Ni-1000 Thermocouple T,J,K,N,E,S,R,B	RTD Pt-50 , Pt-100, Pt-500 ,pt-1000 Ni-100 ,Ni-1000 Thermocouple T,J,K,N,E,S,R,B		RTD Pt-50 , Pt-100, Pt-500 ,pt-1000 Ni-100 ,Ni-1000 Thermocouple T,J,K,N,E,S,R,B
Sensor Class	RTD Class A ,Ciass B TC Class I ,Class II	RTD Class A ,Ciass B TC Class I ,Class II		RTD Class A ,Ciass B TC Class I ,Class II
Number of Sensors	Single or Double	Single or Double		Single or Double
Insertion Length (L)	50-3000 mm	50-3000 mm		50-3000 mm
Sensor Type	RTD Thin Film ,Ceramic ,Glass	RTD Thin Film ,Ceramic ,Glass		RTD Thin Film ,Ceramic ,Glass
Thermowell Material	1.4301(304) 1.4571 (316 Tl) 1.4541 (321) 1.4841 (310S) 1.4845 (310S)	1.4301(304) 1.4571 (316 Tl) 1.4541 (321) 1.4841 (310S) 1.4845 (310S)		1.4301(304) 1.4571 (316 Tl) 1.4541 (321) 1.4841 (310S) 1.4845 (310S)
Thermowell Insertion Length	50-3000 mm	50-3000 mm		50-3000 mm
Thermowell Bore Diameter	6-9-10-12-14-15 mm	6-9-10-12-14-15 mm		6-9-10-12-14-15 mm
Head	Type B	Type B		Type B
Transmitter	Check Transmitter List	Check Transmitter List		Check Transmitter List

Overview of temperature sensors

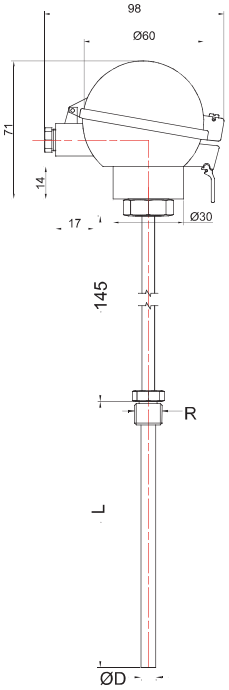
Technical Specification

Type

PFT04



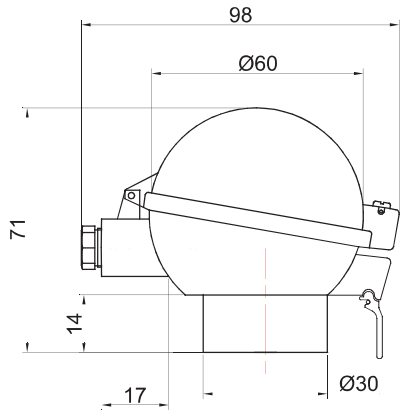
PFT20



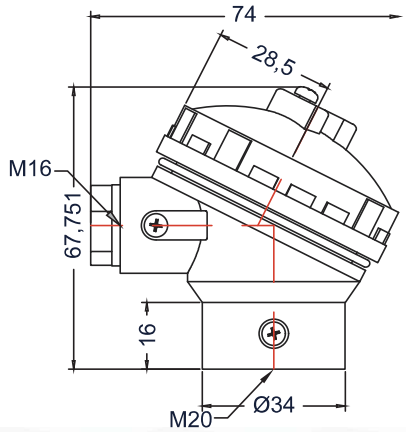
Design	Straight type with a compression fitting and extension tube	Straight type with a compression fitting and extension tube
Process connection	Welded connections, Insertion in an existing thermowell	¼"BSP ¼"NPT M10x1 ½"BSP ½"NPT M12x1 ⅛"BSP ⅛"NPT M10x1,5 ¾"BSP ¾"NPT M20x1,5 1"BSP 1"NPT M27x1,5
Extention Length	145 mm	140 mm
Sensors	RTD Pt-50 , Pt-100, Pt-500 ,pt-1000 Ni-100 ,Ni-1000 Thermocouple T,J,K,N,E,S,R,B	RTD Pt-50 , Pt-100, Pt-500 ,pt-1000 Ni-100 ,Ni-1000 Thermocouple T,J,K,N,E,S,R,B
Sensor Class	RTD Class A ,Ciass B TC Class I ,Class II	RTD Class A ,Ciass B TC Class I ,Class II
Number of Sensors	Single or Double	Single or Double
Insertion Length (L)	50-3000 mm	50-3000 mm
Sensor Type	RTD Thin Film ,Ceramic ,Glass	RTD Thin Film ,Ceramic ,Glass
Thermowell Material	1.4301(304) 1.4571 (316 TI) 1.4541 (321) 1.4841 (310S) 1.4845 (310S)	1.4301(304) 1.4571 (316 TI) 1.4541 (321) 1.4841 (310S) 1.4845 (310S)
Thermowell Insertion Length	50-3000 mm	50-3000 mm
Thermowell Bore Diameter	6-9-10-12-14-15 mm	6-9-10-12-14-15 mm
Head	Type B	Type B
Transmitter	Check Transmitter Lİst	Check Transmitter List

Overview of head types

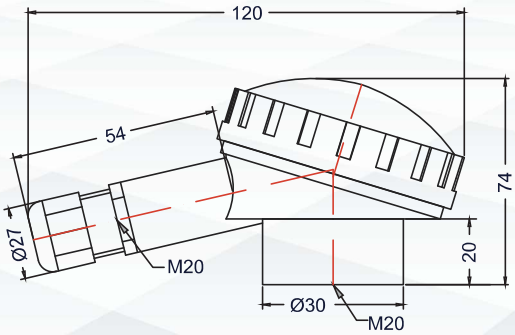
B type housing



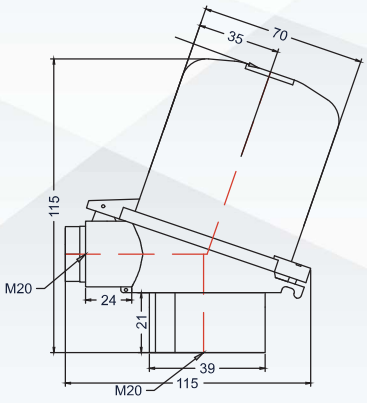
C type housing



PVC type housing



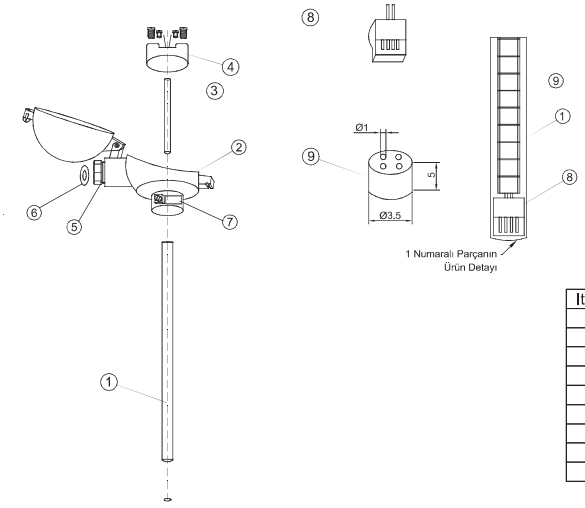
Buzz type housing with window for display



Overview of temperature sensors

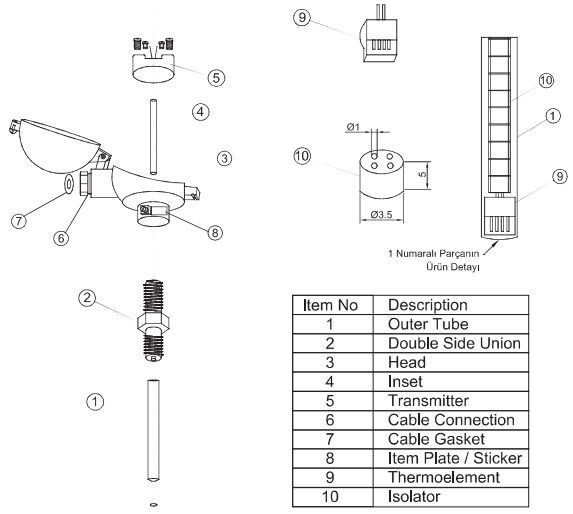
Drawing / Part List

Type **PFT01**



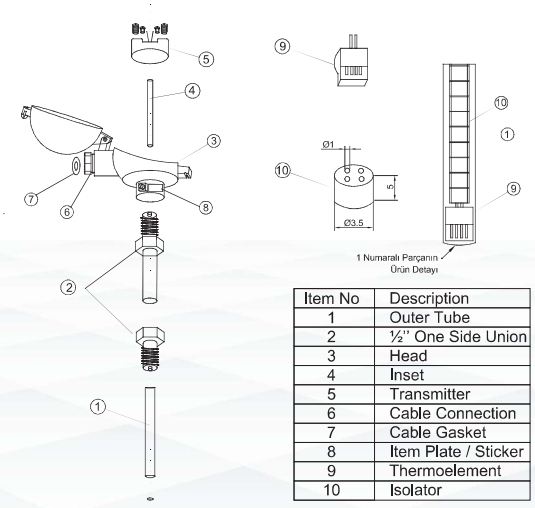
Item No	Description
1	Outer Tube
2	Head
3	Inset
4	Transmitter
5	Cable Connection
6	Cable Gasket
7	Item Plate / Sticker
8	Thermoelement
9	Isolator

PFT02



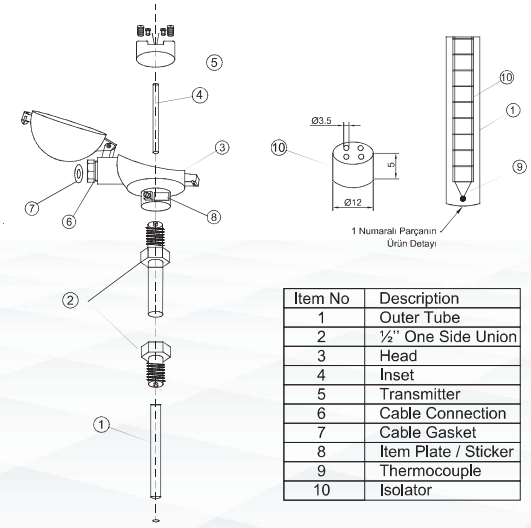
Item No	Description
1	Outer Tube
2	Double Side Union
3	Head
4	Inset
5	Transmitter
6	Cable Connection
7	Cable Gasket
8	Item Plate / Sticker
9	Thermoelement
10	Isolator

PFT03



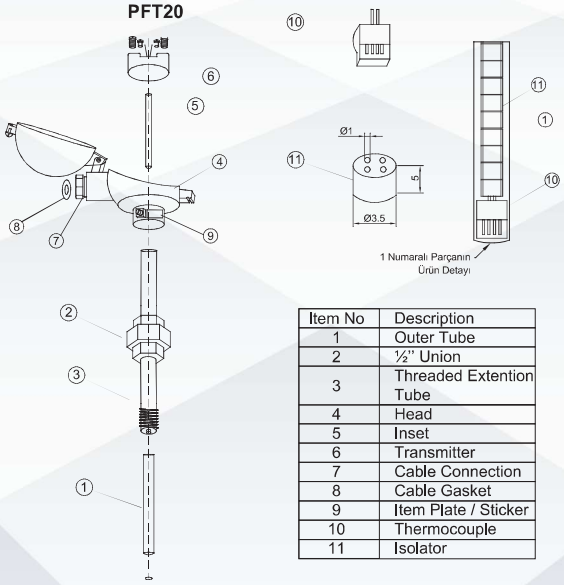
Item No	Description
1	Outer Tube
2	½'' One Side Union
3	Head
4	Inset
5	Transmitter
6	Cable Connection
7	Cable Gasket
8	Item Plate / Sticker
9	Thermoelement
10	Isolator

PFT04

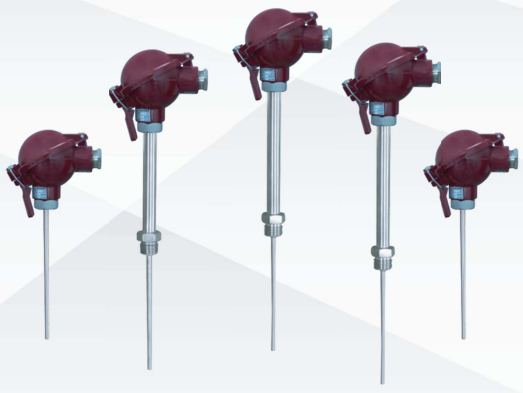


Item No	Description
1	Outer Tube
2	½'' One Side Union
3	Head
4	Inset
5	Transmitter
6	Cable Connection
7	Cable Gasket
8	Item Plate / Sticker
9	Thermocouple
10	Isolator

PFT20



Item No	Description
1	Outer Tube
2	½'' Union
3	Threaded Extention Tube
4	Head
5	Inset
6	Transmitter
7	Cable Connection
8	Cable Gasket
9	Item Plate / Sticker
10	Thermocouple
11	Isolator



Overview of Thermowells

GUIDE TO CHOOSE A THERMOWELL

THERMOWELL FUNCTIONS

Thermowells are used to protect the bulbs from the effect of corrosion and the process medium flow, deu to the high speed at which the process medium flows, and to enable the temperature transmitter interchanged, recalibrated and replaced without disturbing the process.

MATERIALS

The choice of materials is generally based upon considerations of resistance to corrosion and the temperature limits of the process medium.In addition to the standard materials like stainless steel, thermowells can be also produced by Inconel 600 ,Inconel 800 ,Incoloy 825 ,Hastelloy C-4. For special corrosion-resistance requirements, some thermowells may also be coated in PTFE.

PROCESS CONNECTIONS

The threads on thermowell connectors conform to the ASME B1.20.1 standards for NPT threads, and to DIN 3852 form A for Gas threads (UNI 338-BSP). Flanged thermowells have special threaded connectors which are welded to flanges that conform to the ANSI B16.5 or DIN-UNI standards. In these thermowells, the mechanical strength is assured by the threaded connection between the flange and thermowell,while the weld merely acts as a seal.

IMMERSION DEPTH "U"

For optimal measurement accuracy of the temperature sensing element is essential that the sensitive portion of the element be located entirely within the immersion depth.
Therefore, when selecting a thermowell it is essential to know the exact length of the sensitive portion of the temperature instrument.
On PAFKON thermo elements ,the sensitive portions vary depending on the measuring range. Refer to thermowell dimension.

THERMOWELL BORE

Different installations require a variety of different thermo elements for the measurement of temperature. The use of standard bore diameters facilitates interchangeability of the temperature sensors.

PROCESS FLUID SPEED

When a thermowell is inserted into a process at a specific fluid speed it creates a turbulent wake (Von Karman Trail), which will have a particular frequency determined by the diameter of the thermowell and the speed of the process fluid.
It is important for the thermowell dimensions to be chosen so that the frequency of the Karman wake is less than the resonant frequency of the thermowell. If these frequencies should coincide, the result ing vibrations will cause the destruction of the thermowell.

PRESSURE TEMPERATURE RELATION

The maximum permitted working pressure varies as a function of thermowell wall thickness and temperature.

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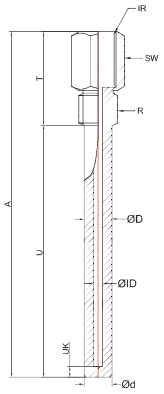
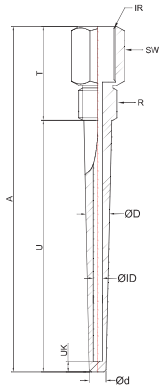
Overview of thermowells

Screw-in Thermowell

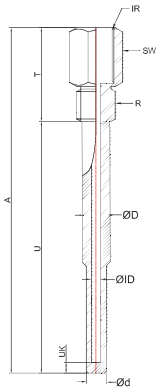
TW11



TW12



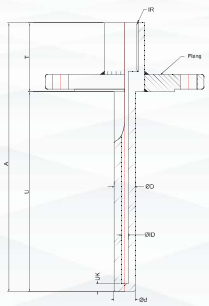
TW13



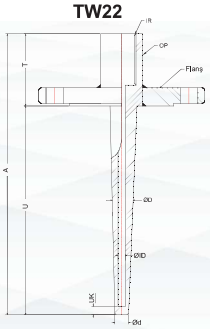
Type	Straight Shank	Conical	Stepped
Material	ASTM A304 (1.4301) / ASTM A316 Ti (1.4571) / ASTM A316 L (1.4404) / ASTM A310 (1.4845) / ASTM A321 (1.4541) ASTM A105 (Carbon St) / DIN 1.4749(AISI 446) / DIN 1.4828(AISI 309) / DIN 1.4841(AISI 314) / DIN 1.7335 (Molbden) INCONEL-600 (DIN 2.4816) / INCONEL-800 (DIN 1.4876) / INCOLOY-825 (DIN 2.4858) / HASTELLOY-C4 (DIN 2.4610) BRASS / PTFE		
Sensor	Thermocouple / RTD		
ØID	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm
Ød	15 / 18 / 20 / 26 mm	16 / 19 / 22 / 30 mm	9 / 12 / 14 / 16 mm
UK	5 / 6,35 mm	5 / 6,35 mm	5 / 6,35 mm
Insertion Length (U)	Manufactured upon customer request		
Extention Length (T)	Manufactured upon customer request		
Total Length (A)	Manufactured upon customer request		
Sensor Connection	½"NPT / ¾"NPT / 1"NPT		
Process Connection	½"NPT / ¾"NPT / 1"NPT		

Flanged Thermowell

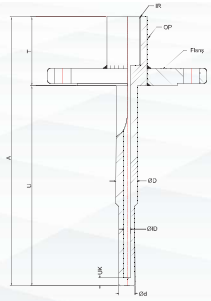
TW21



TW22



TW23



Type	Straight Shank	Conical	Stepped
Material	ASTM A304 (1.4301) / ASTM A316 Ti (1.4571) / ASTM A316 L (1.4404) / ASTM A310 (1.4845) / ASTM A321 (1.4541) ASTM A105 (Carbon St) / DIN 1.4749(AISI 446) / DIN 1.4828(AISI 309) / DIN 1.4841(AISI 314) / DIN 1.7335 (Molbden) INCONEL-600 (DIN 2.4816) / INCONEL-800 (DIN 1.4876) / INCOLOY-825 (DIN 2.4858) / HASTELLOY-C4 (DIN 2.4610) BRASS / PTFE		
Sensor	Thermocouple / RTD		
ØID	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm
Ød	15 / 18 / 20 / 26 mm	16 / 19 / 22 / 30 mm	9 / 12 / 14 / 16 mm
UK	5 / 6,35 mm	5 / 6,35 mm	5 / 6,35 mm
OP	31 / 38 mm	31 / 38 mm	31 / 38 mm
Insertion Length (U)	Manufactured upon customer request		
Extention Length (T)	Manufactured upon customer request		
Total Length (A)	Manufactured upon customer request		
Sensor Connection	½"NPT / ¾"NPT / 1"NPT		
Process Connection	DIN FORM ; DN10 / DN15 / DN20 / DN25 / DN40 / DN50 / DN65 / DN80 / DN100 ANSI FORM: ½'' / 1'' / 1- ¼'' / 1- ½'' / 2'' / 2- ½'' / 3'' / 4''		
Flange Type	WN (Weld Neck) / FF (Flat Face) / SN (Slip On) / TD (Threaded) / SW (Socked Welded) / RTJ (Ring Type Join)		
Pressure Rating	DIN FORM: PN10 / PN16 / PN25 / PN63 / PN100 / PN160 / PN250 ANSI FORM: 150lb / 300lb / 600lb / 900lb / 1500lb		

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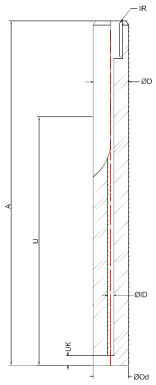
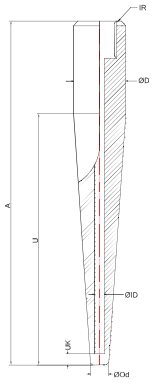
Overview of thermowells

Welded-in Thermowell

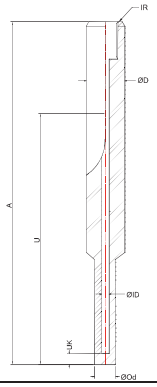
TW31



TW32



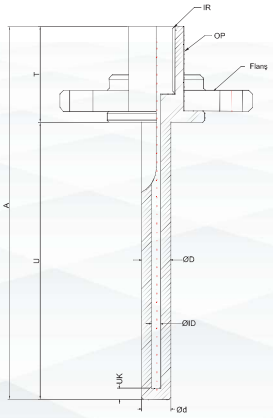
TW33



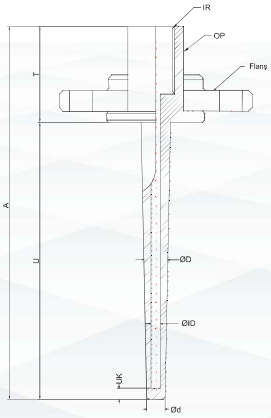
Type	Straight Shank	Conical	Stepped
Material	ASTM A304 (1.4301) / ASTM A316 Ti (1.4571) / ASTM A316 L (1.4404) / ASTM A310 (1.4845) / ASTM A321 (1.4541) ASTM A105 (Carbon St) / DIN 1.4749(AISI 446) / DIN 1.4828(AISI 309) / DIN 1.4841(AISI 314) / DIN 1.7335 (Molbden) INCONEL-600 (DIN 2.4816) / INCONEL-800 (DIN 1.4876) / INCOLOY-825 (DIN 2.4858) / HASTELLOY-C4 (DIN 2.4610) BRASS / PTFE		
Sensor	Thermocouple / RTD		
ØID	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm
Ød	15 / 18 / 20 / 26 mm	16 / 19 / 22 / 30 mm	9 / 12 / 14 / 16 mm
UK	5 / 6,35 mm	5 / 6,35 mm	5 / 6,35 mm
Insertion Length (U)	Manufactured upon customer request		
Extention Length (T)	Manufactured upon customer request		
Total Length (A)	Manufactured upon customer request		
Sensor Connection	½"NPT / ¾"NPT / 1"NPT		
Process Connection	Weld-in		

Vanstone Flanged Thermowell

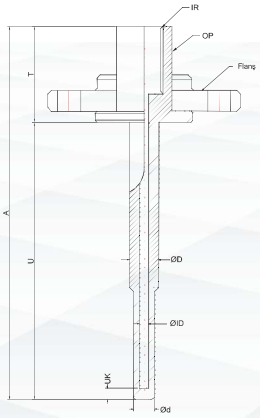
TW41



TW42



TW43



Type	Straight Shank	Conical	Stepped
Material	ASTM A304 (1.4301) / ASTM A316 Ti (1.4571) / ASTM A316 L (1.4404) / ASTM A310 (1.4845) / ASTM A321 (1.4541) ASTM A105 (Carbon St) / DIN 1.4749(AISI 446) / DIN 1.4828(AISI 309) / DIN 1.4841(AISI 314) / DIN 1.7335 (Molbden) INCONEL-600 (DIN 2.4816) / INCONEL-800 (DIN 1.4876) / INCOLOY-825 (DIN 2.4858) / HASTELLOY-C4 (DIN 2.4610) BRASS / PTFE		
Sensor	Thermocouple / RTD		
ØID	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm
Ød	15 / 18 / 20 / 26 mm	16 / 19 / 22 / 30 mm	9 / 12 / 14 / 16 mm
UK	5 / 6,35 mm	5 / 6,35 mm	5 / 6,35 mm
OP	33,4 / 48,3 / 60,3 mm	33,4 / 48,3 / 60,3 mm	33,4 / 48,3 / 60,3 mm
Insertion Length (U)	Manufactured upon customer request		
Extention Length (T)	Manufactured upon customer request		
Total Length (A)	Manufactured upon customer request		
Sensor Connection	½"NPT / ¾"NPT / 1"NPT		
Process Connection	DIN FORM ; DN10 / DN15 / DN20 / DN25 / DN40 / DN50 / DN65 / DN80 / DN100 ANSI FORM: ½" / 1" / 1- ¼" / 1- ½" / 2" / 2- ½" / 3" / 4"		
Pressure Rating	DIN FORM: PN10 / PN16 / PN25 / PN63 / PN100 / PN160 / PN250 ANSI FORM: 150lb / 300lb / 600lb / 900lb / 1500lb		

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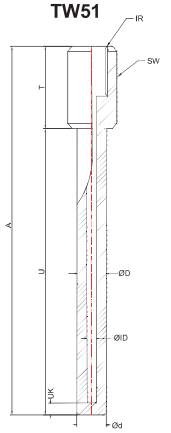
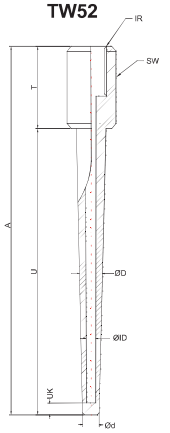
Overview of thermowells

Socket Welded Type Thermowell

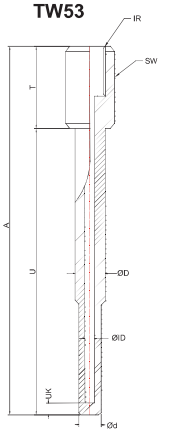
TW51



TW52



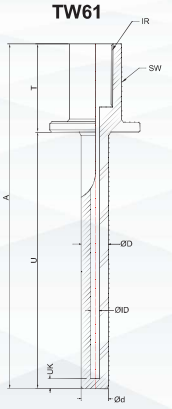
TW53



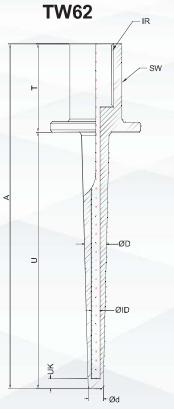
Type	Straight Shank	Conical	Stepped
Material	ASTM A304 (1.4301) ASTM A316 Tİ (1.4571) ASTM A316 L (1.4404) ASTM A310 (1.4845) ASTM A321 (1.4541) ASTM A105 (Carbon St) DIN 1.4749(AISI 446) DIN 1.4828(AISI 309) DIN 1.4841(AISI 314) DIN 1.7335 (Molbden) INCONEL-600 (DIN 2.4816) INCONEL-800 (DIN 1.4876) INCOLOY-825 (DIN 2.4858) HASTELLOY-C4 (DIN 2.4610) BRASS PTFE		
Sensor	Thermocouple / RTD		
ØID	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm
Ød	15 / 18 / 20 / 26 mm	16 / 19 / 22 / 30 mm	9 / 12 / 14 / 16 mm
UK	5 / 6,35 mm	5 / 6,35 mm	5 / 6,35 mm
Insertion Length (U)	Manufactured upon customer request		
Extention Length (T)	Manufactured upon customer request		
Total Length (A)	Manufactured upon customer request		
Sensor Connection	½"NPT / ¾"NPT / 1"NPT		
Process Connection	Weld-in		

Sanitary Type Thermowell

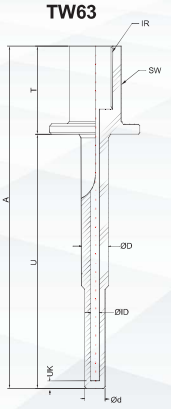
TW61



TW62



TW63



Type	Straight Shank	Conical	Stepped
Material	ASTM A304 (1.4301) ASTM A316 Tİ (1.4571)		
Sensor	Thermocouple / RTD		
ØID	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm	3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 mm
Ød	15 / 18 / 20 / 26 mm	16 / 19 / 22 / 30 mm	9 / 12 / 14 / 16 mm
UK	5 / 6,35 mm	5 / 6,35 mm	5 / 6,35 mm
Insertion Length (U)	Made to order / Manufactured upon customer request		
Extention Length (T)	Made to order / Manufactured upon customer request		
Total Length (A)	Made to order / Manufactured upon customer request		
Sensor Connection	½"NPT / ¾"NPT / 1"NPT		
Process Connection	DIN FORM ; DN6 / DN10 / DN25 / DN40 / DN50 / DN65		

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Ordering Information

Pafkon Temperature Sensor

Base Model PFT	PFT	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
Type											
Straight inset type		01									
Threaded straight tube		02									
Threaded with extension ≤ 120 mm		03									
Threaded extension > 120 mm		04									
Extension type optional		20									
Approvals											
Non Hazardous Area			A0								
Atex (Intrinsic Safety ex ia)			A1								
Sensor Bulb Material											
1.4301 (304)				S1							
1.4401 (316)				S2							
1.4404 (316L)				S3							
1.4541 (321)				S4							
1.4571 (316Ti)				S5							
Brass				S6							
1.4749, 1.4762, 446				S7							
1.4841, 1.4845, 310S				S8							
Inconel-600				S9							
KER610				S10							
KER799				S11							
PTFE				S12							
Molybdenum				S13							
Sensor (Bulb)Diameter (mm)											
2 mm (without inset)					02						
3 mm (without inset)					03						
4 mm (without inset)					04						
5 mm (without inset)					05						
6 mm (without inset)					06						
7 mm (without inset)					07						
8 mm (without inset)					08						
9 mm					09						
10 mm					10						
12 mm					12						
15 mm					15						
20 mm					20						
25 mm					25						
30 mm					30						
Customer Specific Diameter					XX						
Sensor Type											
RTD						RT					
Thermocouple						TC					

Ordering Information

Pafkon Temperature Sensor

Base Model PFT	PFT	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
Sensor Wiring											
1xPt100, 2 wire		P1									
1xPt100, 3 wire		P2									
1xPt100, 4 wire		P3									
1xK Type		P4									
1xJ Type		P5									
1xR Type		P6									
1xS Type		P7									
1xT Type		P8									
Customer Specific Request		Z9									
Sensor Accuracy											
Accuracy Class B, IEC 60751			B1								
Accuracy Class A, IEC 60751			B2								
Thermocouple Class 1			B3								
Thermocouple Class 2			B4								
Thermowell Type											
Without Thermowell				D0							
Tubular Thermowell				D1							
Barstock Thermowell				D2							
Thermowell Material											
1.4301 (304)					W1						
1.4401 (316)					W2						
1.4404 (316L)					W3						
1.4541 (321)					W4						
1.4571 (316Ti)					W5						
Brass					W6						
1.4749, 1.4762, 446					W7						
1.4841, 1.4845, 310S					W8						
Inconel-600					W9						
KER610					W10						
KER799					W11						
PTFE					W12						
AISI316Ti with PTFE Covered					W13						
Molybdenum					W14						
A105 Carbon Steel					W15						
Hastelloy C					W16						
Process Immersion Length											
50 mm						U1					
100 mm						U2					
150 mm						U3					
180 mm						U4					
200 mm						U5					
250 mm						U6					
300 mm						U7					
350 mm						U8					
400 mm						U9					
450 mm						U10					
500 mm						U11					
600 mm						U12					
750 mm						U13					
1000 mm						U14					
1200 mm						U15					
1400 mm						U16					
1600 mm						U17					
1800 mm						U18					
2000 mm						U19					
2500 mm						U20					
3000 mm						U21					
3800 mm						U22					
Customer Specific Request						XXX					

Ordering Information

Pafkon Temperature Sensor

Base Model PFT	PFT	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
Extension Tube Length (mm)											
Without Extension		000									
120 mm , standard		120									
Customer Specific Length		XXX									
Sensor Connection Type											
Without			G0								
1/4" BSP			G1								
3/8" BSP			G2								
1/2" BSP			G3								
3/4" BSP			G4								
1" BSP			G5								
1/4" NPT			G6								
3/8" NPT			G7								
1/2" NPT			G8								
3/4" NPT			G9								
1" NPT			G10								
M18x1.5			G11								
M20x1.5			G12								
M24x1.5			G13								
M10x1			G14								
M12x1			G15								
M10x1.5			G16								
M27x1.5			G17								
Nipple - Union 1/2" NPT			G18								
Nipple - Union - Nipple 1/2"NPT			G19								
Nipple - Union 1/2" NPT			G20								
Nipple - Union - Nipple 1/2" NPT			G21								
Nipple - Union 1/2" BSP			G22								
Nipple - Union - Nipple 1/2"BSP			G23								
Nipple - Union 1/2" BSP			G24								
Nipple - Union - Nipple 1/2" BSP			G25								
Thermowell Model											
Without				J00							
TW11				J01							
TW12				J02							
TW13				J03							
TW21				J04							
TW22				J05							
TW23				J06							
TW31				J07							
TW32				J08							
TW33				J09							
TW41				J10							
TW42				J11							
TW43				J12							
TW51				J13							
TW52				J14							
TW53				J15							
TW61				J16							
TW62				J17							
TW63				J18							

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Ordering Information

Pafkon Temperature Sensor

Base Model PFT	PFT	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX

Thermowell Process Connection Type

Without	Y00
Welded	W01
1/4" BSP	TB1
1/2" BSP	TB2
1" BSP	TB3
1/4" NPT	TC1
1/2" NPT	TC2
1" NPT	TC3
Flange DN25 PN10 to PN40, EN 1092-1	F01
Flange DN25 PN63 to PN100, EN 1092-1	F02
Flange DN32 PN16 to PN40, EN 1092-1	F03
Flange DN40 PN10 to PN40, EN 1092-1	F04
Flange DN40 PN63 to PN100, EN 1092-1	F05
Flange DN50 PN6, EN 1092-1	F06
Flange DN50 PN25 to PN40, EN 1092-1	F07
Flange DN50 PN63, EN 1092-1	F08
Flange DN50 PN100, EN 1092-1	F09
Flange DN50 PN16, EM 1092-1	F10
Flange DN100 PN40, EM 1092-1	F11
Flange 1" 150 lbs, ASME B16.5	F12
Flange 1" 300 lbs, ASME B16.5	F13
Flange 1" 600 lbs, ASME B16.5	F14
Flange 1-1/2" 150 lbs, ASME B16.5	F15
Flange 1-1/2" 300 lbs, ASME B16.5	F16
Flange 1-1/2" 600 lbs, ASME B16.5	F17
Flange 1-1/2" 900/1500 lbs, ASME B16.5	F18
Flange 2" 150 lbs, ASME B16.5	F19
Flange 2" 300 lbs, ASME B16.5	F20
Flange 2" 600 lbs, ASME B16.5	F21
Flange 2" 900/1500 lbs, ASME B16.5	F22
Customer Specific Connection Type	XXX

Cable Entry

1/2" BSP Female	C01
1/2" NPT Female	C02
M20 x 1.5	C03
Customer Specific Cable Entry	XXX

Head Type

B Type	H1
Customer Specific Type Head	H2

Ordering Information

Pafkon Temperature Sensor

Base Model PFT	PFT	XX	XX	XX
Transmitter Option				
Ceramic Termimal Block		PR01		
Open connection with wires		PR02		
5331A Transmitter		PR03		
5332A Transmitter		PR04		
5333A Transmitter		PR05		
5334A Transmitter		PR06		
5335A Transmitter		PR07		
5337A Transmitter		PR08		
5437A Transmitter		PR09		
5331D Transmitter		PR10		
5332D Transmitter		PR11		
5333D Transmitter		PR12		
5335D Transmitter		PR13		
5337D Transmitter		PR14		
5437D Transmitter		PR15		
5334B Transmitter		PR16		
Configuration Range				
Standard, 1xPt100 , 3 wire 0-150°C			A00	
Standard, 1xK Type, 0-600°C			A01	
Customer Specific Range			XXX	
Options				
Tag Number (xxxx)				O01
1 specific point sensor calibration				O02
2 specific point sensor calibration				O03
3 specific point sensor calibration				O04
5 specific point sensor calibration				O05
Special Calibration Requirement				XXX

I.S Barrier

For ATEX applications we recommend below I.S. barrier

HART transparent repeater

9106B

- 24 VDC supply via power rail or connectors
- Active and passive mA input
- Active or passive output via the same two terminals
- Splitter function - 1 in and 2 out
- SIL3 Full Assessment and certified acc. to IEC 61508

Application

- 9106B is a 1- or 2-channel isolated 1:1 repeater barrier for intrinsic safety applications.
- The device supplies 2-wire SMART transmitters and can also be used for 2-wire SMART current sources. HART & BRAIN protocols are supported and are transferred bi-directionally.
- 9106B can be mounted in the safe area or in zone 2 / Cl. 1, div. 2 and receive signals from zone 0, 1, 2 and zone 20, 21, 22 including mining / Class I/II/III, Div. 1, Gr. A-G.
- For duplication/migration purposes, the outputs can be sent to two different DCS/PLC/HMI or any monitoring system.
- In safety applications (SIL loops), the 9106BxBx can be used as a splitter with the following output configuration:· When using 9106BxBx in a SIL2 safety function, channel 1 is used for the safety loop. Channel 2 can be used for any non-safety device.· For higher safety purposes (SIL 3), 9106BxBx can be used as a splitter for SIL 3 loops. Channel 1 and 2 are then connected to the same safety PLC, where channel 2 is used as a redundant diagnostic channel. (for more information, consult the FMEDA Report and the Safety Manual).

Advanced features

- The PR 45xx detachable display and the green and red front LEDs indicate operation status for each channel.
- Monitoring of error events and cable breakage on input via the individual status relay and/or a collective electronic signal via the power rail.

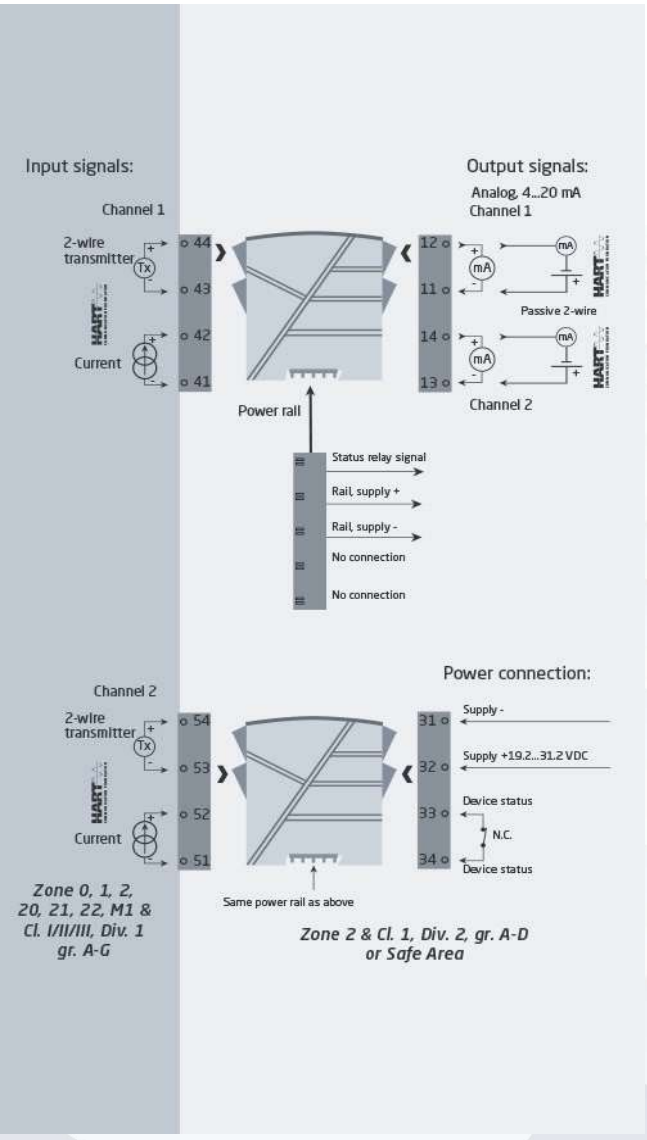
Technical characteristics

- High galvanic isolation of 2.6 kVAC.
- Fast response time <5 ms
- High accuracy better than 0.1%.
- 2-wire transmitter supply >16 V.

Mounting

- The devices can be mounted vertically or horizontally without distance between neighboring units.

Applications



I.S barrier

Order

Type	Associated apparatus	Barrier version	Unit channels	Approvals
9106	Yes : B	Uo = 27.5 V : 1 Uo = 25.3 V : 2	Single : A Double : B	ATEX, IECEx, FM, INMETRO, EAC-Ex : - cULus, ATEX, IECEx, FM, INMETRO, EAC-Ex : -U9

Example: 9106B2B

Environmental Conditions

Operating temperature ..... -20°C to +60°C
Storage temperature ..... -20°C to +85°C
Calibration temperature ..... 20...28°C
Relative humidity ..... < 95% RH (non-cond.)
Protection degree IP20
Installation in ..... Pollution degree 2 & meas. / overvoltage cat. II

Mechanical specifications

Dimensions (HxWxD) ..... 109 x 23.5 x 104 mm
Dimensions (HxWxD) w/ 4501/451x ..... 109 x 23.5 x 116 / 131 mm
Weight approx. ..... 250 g
Weight incl. 4501 / 451x (approx.) ..... 265 g / 280 g
DIN rail type ..... DIN EN 60715/35 mm
Wire size ..... 0.13...2.08 mm^2 AWG 26...14 stranded wire
Screw terminal torque ..... 0.5 Nm
Vibration ..... IEC 60068-2-6
2...13.2 Hz ..... ±1 mm
13.2...100 Hz ..... ±0.7 g

Common specifications

Supply

Supply voltage ..... 19.2...31.2 VDC
Fuse ..... 1.25 A SB / 250 VAC
Max. required power ..... ≤ 1.1 W / ≤ 1.9 W (1 ch. / 2 ch.)
Max. power dissipation, 1 / 2 ch ..... ≤ 0.8 W / ≤ 1.2 W

Isolation voltage

Test /working: Input to any ..... 2.6 kVAC / 300 VAC reinforced isolation
Analog output to supply ..... 2.6 kVAC / 300 VAC reinforced isolation
Status relay to supply ..... 1.5 kVAC / 150 VAC reinforced isolation

Response time

Response time (0...90%, 100...10%) ..... < 5 ms

Programming ..... PR 45xx
Signal dynamics, input ..... Analog signal chain
Signal dynamics, output ..... Analog signal chain
SMART bi-directional communication frequency range ..... 0.5...7.5 kHz
Signal / noise ratio ..... > 60 dB
Accuracy ..... Better than 0.1% of sel. range
mA, absolute accuracy ..... ≤ ±16 µA
mA, temperature coefficient ..... ≤ ±1.6 µA / °C
Effect of supply voltage change on output (nom. 24 VDC) ..... < ±10 µA
EMC immunity influence ..... < ±0.5% of span
Extended EMC immunity: NAMUR NE21, A criterion, burst ..... < ±1% of span

Input specifications

Current input

Measurement range ..... 3.5...23 mA
2-wire transmitter supply 9106B1x (Uo = 27.5 VDC) ..... >16 V / 20 mA
2-wire transmitter supply 9106B2x (Uo = 25.3 VDC) ..... >15 V / 20 mA
Sensor error detection: Loop break 4...20 mA ..... < 1 mA
Input voltage drop, supplied unit ..... < 4 V @ 23 mA
Input voltage drop, non-supplied unit ..... < 6 V @ 23 mA

Output specifications

Current output

Signal range ..... 3.5...23 mA
Load (@ current output) ..... ≤ 600 Ω
Load stability ..... ≤ 0.01% of span / 100 Ω
Current limit ..... ≤ 28 mA

Passive 2-wire mA output

Effect of external 2-wire supply voltage variation ..... < 0.005% of span / V
Max. load resistance [Ω] ..... (Vsupply-3.5)/0.023 A
Max. external 2-wire supply ..... 26 VDC

Status relay

Relay function ..... N.C.
Programmable low setpoint ..... 0...29.9 mA
Programmable high setpoint ..... 0...29.9 mA
Hysteresis for setpoints ..... 0.1 mA
Max. voltage ..... 110 VDC / 125 VAC
Max. current ..... 0.3 ADC / 0.5 AAC
Max. voltage - hazardous installation ..... 32 VDC / 32 VAC
Max. current - hazardous installation ..... 1 ADC / 0.5 AAC

of span ..... = normal measurement range 4...20 mA

Observed authority requirements

EMC 2014/30/EU
LVD 2014/35/EU
RoHS 2011/65/EU
EAC ..... TR-CU 020/2011

Approvals

ATEX 2014/34/EU ..... DEKRA 11ATEX0244 X
IECEx ..... DEK 11.0084X
FM ..... FM16US0465X / FM16CA0213X
INMETRO ..... DEKRA 16.0001 X
cULus ..... 20190709-E233311 (only 9106xxx-U9)
UL ..... UL 61010-1
EAC Ex TR-CU 012/2011 ..... RU C-DK.GB08.V.00410
DNV-GL Marine ..... Stand. f. Certific. No. 2.4
ClassNK TA18527M
SIL ..... SIL 2 / SIL 3 certified & fully assessed acc. to IEC 61508

PAFKON

Ölçüm ve Kontrol Sistemleri Müh. A.Ş.

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