ZPA NOVÁ PAKA

Thermoelectric temperature sensor without protective armature (jacketed thermocouples)(Ex ia)
PRODUCT MANUAL
Type 312

APPLICATION

- For such temperature measurements, which require
  - Short temperature response time (fast response of the sensor to a change of the measured temperature);
  - Small dimensions and flexibility of the sensor (possibility of shaping the thermocouple)
  - High mechanical resistance to pressure, strokes and vibrations;
  - Resistance to fast temperature changes;
  - High insulation resistance at normal ambient temperature and high temperatures;
  - Good general resistance to corrosion, resistance to corrosion live;
  - Higher stability of output signal in comparison with wire thermocouples;
  - Other specific properties of jacketed thermocouples
- With material of thermocouple jacket INCONEL 600 for the environment, which requires great resistance to oxidation, resistance in clear air to 1150°C, it is not recommended for CO_2 and sulphur gases over 550°C and sodium over 750°C;
- With material of thermocouple jacket 1.4541 for the environment, which requires good resistance to corrosion between crystals even after welding, good resistance to heavy oil products, steam and exhaust gases, good resistance to oxidation, maximum temperature of application 800°C;
- For explosive conditions in areas Zone 2, Zone 1 and Zone 0 pursuant to EN 60079-10 in case of connection to the Ex ia circuit
- For the environment, where mechanical resistance is required pursuant to EN 60068-2-6 (class AH2) and seismic capability of the electrical equipment of the safety system of the nuclear power stations pursuant to IEC 980 (MVZ level SL-2).

The areas of application may be e.g. nuclear energy, steam boilers, pressurized water reactors, airplane engines, processing of plastic materials, paper production and food production industries.

The sensors in EX ia design are rated products pursuant to the Directive 2014/30/EU of the European Parliament and the Council and EU Declaration of Conformity **EU-312000** is issued for them.

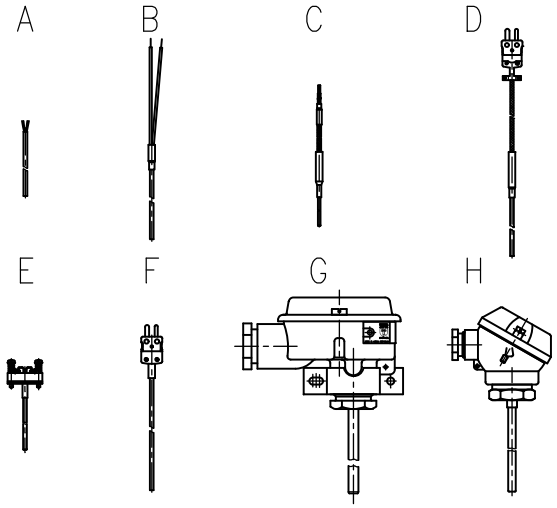
DESCRIPTION

Jacketed thermocouples are manufactured in a wide range of designs, type "J" or "K", with external diameter 1-1.5-2-3-4.5-6 mm, in simple or double design with insulated or grounded measuring end. According to the requirement of the customer, the length of the thermocouple can be from 100 mm to several meters; even several dozens of meters on the basis of an agreement.

According to the requirement of the customer, the cold end of the thermocouple can be with loose outlets of branches of the thermocouple (to approx. 25 mm), with transient piece and loose outlets (approx. 150 mm) or in design with flange and ceramic terminal board for the installation to the head of type B pursuant to DIN 43 729; one of the designs is also the termination of the thermocouple with this head.

The cold end of the thermocouple can be terminated with a flat connector of type A or B pursuant to EN 50212 in colour design pursuant to the type of the thermocouple or with a transient piece and weld-on compensation wiring for that particular type of thermocouple, that in design with insulation from glass fibres and external jacketing of a steel wire for increasing mechanical resistance, with internal and external Teflon insulation or with internal and external silicone insulation. This compensation wiring can be also terminated with the above mentioned flat connector.

To measure temperature, a defined change of the thermoelectric voltage of the thermocouple in dependence on the change of temperature of the measured environment is used.



TECHNICAL DATA

The sensor is designed pursuant to EN 61140 as an electrical equipment of protection class III for the application in networks with category of overvoltage in installation II and pollution grade 2 pursuant to EN 61010-1; the follow-up (evaluation) device shall comply with Article 6.3 of the said standard.

Measuring range:
For thermocouples of type "J" :-200 to 800°C
For thermocouples of type "K" : 0 to 1150°C
Maximum range of basic temperature line for thermocouples pursuant to EN 60584-1 depends on thermocouple Ø, maximum long-term temperature decreases with thermocouple Ø.

Electric strength pursuant to EN 61010-1 Article 6.8.4:
500 V eff for thermocouples Ø ≥ 2 mm
100 V eff for thermocouples Ø ≤ 1.5 mm

Electric insulation resistance pursuant to EN 61515:
min. 1000 MΩ/m, at ambient temperature 20 ±15 °C and max. 80 % relative humidity

Intrinsically safe pursuant to EN IEC 60079-0 and EN 60079-11:
Ex II 1 G Ex ia IIC T5/T6 Ga
(Meaning of designation - see figure 4)
P_i = 500 mW T6 (-60°C≤ Ta ≤ 68°C)

Intrinsically safe circuit parameters:
only for thermocouple "K" and "J", with measuring insert Ø6

U_i = 60 V	U_o = 100 mV
I_i = 100 mA	I_o = 50 mA
P_i = 500 mW	P_o = 25mW
C_i = 850 pF/m	
L_i = 16 μH/m	

WARNING

The device must be installed in a housing that meets the degree of protection against intrusion of at least IP 20.
The casing of the measuring insert is not separated from the inner intrinsically safe circuit according to the standard EN 60079-11. This information must be taken into account during installation.

Coverage pursuant to EN 60529:
- IP 65 applies to design with head
- IP 60 for other designs

Operation position:
discretionary, the outlet of the design with head shall not be situated upwards

Type of operation: continuous
Sensor weight: pursuant to design and length

Applied materials:

Jacket of the thermocouple	INCONEL 600 **or** 1.4541 (only for thermocouple "**J**")
Compensation wiring	insulation from glass fibres, external jacketing from galvanized steel wire, in design with internal and external Teflon insulation or with internal and external silicone insulation
Transient piece	aluminium
Connector	high-temperature polymer
Head	made of aluminium alloy, chromated and painted with aluminium paint
Head clamps of the terminal board	brass with Ni surface (for designs 312 E, 312 G and 312 H)

OPERATION CONDITIONS

The environment is defined by a group of parameters and their severity grades IE 36 pursuant to EN 60721-3-3 and the following operation conditions.

Maximum temperature:

- In the place: of the transient piece, including the compensation wiring 180°C
- of the cold end of the thermocouple (according to design) 150°C

Vibrations:

The table specifies maximum recommended values of designs of the thermocouple with loose outlets of branches. In case of a specific application, it is necessary to consider the design of the cold end and the length of the thermocouple.

Jacketed thermocouple	∅ [mm]					
	6	4.5	3	2	1.5	1
Frequency range [Hz]	10 to 500					
Drift amplitude [mm]	0.75	0.5	0.35	0.2	0.075	0.035
Acceleration amplitude [m.s^{-2}]	98.0	68.6	49.0	29.4	9.8	4.9

Note: Specified values apply to firmly installed thermocouple in the whole length for the temperature from +5 to 35°C. The said values decrease in the direction to the limit values of the measuring range.

Intrinsically safe measuring inserts can be used in intrinsically safe circuits of group II electrical equipment.

Relative ambient humidity:
10 to 95 % without condensation, with upper limit of water content 29 g H_2O/kg of dry air

Atmospheric pressure: 70 to 106 kPa

METROLOGICAL DATA

Probe: measuring thermocouple **J** (Fe-CuNi) or **K** (NiCr-NiAl) pursuant to EN 60584-1, tolerance class 2 pursuant to IEC 584-2
single (Ø 1 - 1.5 - 2 - 3 - 4.5 - 6 mm)
or double (Ø 3 - 4.5 - 6 mm),
insulated or grounded measuring end

Calibration depth of immersion: 60mm

Temperature response time pursuant to IEC 751 in whirling water (characteristic value):

Ø 1, ∅ 1.5	$\tau_{0.5}$	0.7 s
	$\tau_{0.9}$	2.2 s
Ø 2, ∅ 3	$\tau_{0.5}$	1.1 s
	$\tau_{0.9}$	3.0 s
Ø 4.5, ∅ 6	$\tau_{0.5}$	1.3 s
	$\tau_{0.9}$	3.4 s

Note: The values apply to thermocouples with insulated measuring end. Temperature response times for grounded measuring end will be even lower.

DESIGNATION

Data on product quality and completeness certificate

- Trade mark of the manufacturer
- Product name
- Time code (Serial number for calibrated design, design with tolerance class 1, Ex ia design)
- Product ordering number

Data on transient piece
(for design 312 B, 312 C and 312 D)

- Trade mark of the manufacturer
- Product ordering number
- Measuring range
- Sensor type / tolerance class
- Time code (Serial number for calibrated design, design with tolerance class 1)
- Coverage

Data on label below terminal board
(for design 312 E)

- Trade mark of the manufacturer
- Measuring range
- Sensor type / tolerance class
- Time code (Serial number for calibrated design, design with tolerance class 1, Ex ia design)
- Product ordering number
- Mark of non-explosiveness (Ex ia design):
  Ⓔx II 1 G Ex ia IIC T5/T6 Ga
  and number of the EU-Type Examination Certificate
- Mark CE 1026

Data on label below terminal board
(for design 312 H and 312 G)

- Trade mark of the manufacturer
- Sensor type / tolerance class / desing of the measuring end
- Time code (Serial number for calibrated design, design with tolerance class 1, Ex ia design)

Data on label on head
(for design 312 H and 312 G)

- Trade mark of the manufacturer
- Measuring range
- Sensor type / tolerance class
- Time code (Serial number for calibrated design, design with tolerance class 1, Ex ia design)
- Coverage
- Mark of non-explosiveness (Ex ia design):
  Ⓔx II 1 G Ex ia IIC T5/T6 Ga
  and number of the EU-Type Examination Certificate
- Mark CE 1026

Type of designation of designs 312 A and 312 F pursuant to the agreement of the customer with the manufacturer.
If case of a requirement of the customer, the jacketed thermocouples can be provided with additional identification data.

DELIVERY

Jacketed thermocouples are delivered in direct or rolled conditions.
In direct conditions, they are delivered, as a default, in the length provided in the following table.
Thermocouples of bigger length (refer to the table) are delivered, as a default, in rolled conditions; in direct conditions after a prior agreement with the manufacturer.

Nominal diameter of the thermocouple [mm]	Delivery of the thermocouple in direct conditions	Delivery of the thermocouple in rolled conditions	Rolled to diameter approx. [mm]
1	L ≤ 1000 mm	L > 1000 mm	Ø 250 to 400
1.5			
2			
3	L ≤ 2000 mm	L > 2000 mm	Ø 350 to 450
4.5			
6			

Unless agreed otherwise with the customer, each delivery includes

- Delivery note
- Sensor pursuant to the purchase order
- Optional screw union ordered separately pursuant to manual for accessories, type 991
- Accompanying technical documentation in Czech:
  - Product quality and completeness certificate, which also serves as the warranty certificate
  - Calibration sheet (for calibrated design)
  - Product manual
  - EU Declaration of Conformity for Ex ia design

If it is established in the purchase contract or agreed otherwise, the following documentation can be also delivered with the product

- Copy of the Inspection Certificate 3.1 for the material of the jacket of the thermocouple with the heat number
- Declaration of Conformity with purchase order 2.1 acc. to EN 10204
- Declaration of Conformity of the supplier pursuant to EN ISO/IEC 17050-1
- Calibration sheet (for uncertified calibrated design)
- Test report about the seismic and the vibration qualification

CERTIFICATION

- Non-explosiveness Ex ia, EU-Type Examination Certificate pursuant to the Directive 2014/34/EU
  FTZÚ 21 ATEX 0007X

RELIABILITY

Reliability indicators in operation conditions and ambient conditions specified herein

- Mean time of operation between failures 96 000 hours (inf. value)
- Expected service life 10 years

CALIBRATION

It is realized pursuant to TPM 3322-94 and in compliance with EN 60584, usually in three temperature points distributed evenly within the operation range of the sensor or in the points according to the requirement of the customer. Calibration sheet with measured data is issued for calibrated sensors.

PACKING

Both the sensors and accessories are delivered in a packing ensuring resistance to the impact of thermal effects and mechanical effects pursuant to controlled packing regulations.

TRANSPORT

The converters may be transported on conditions corresponding to the set of combinations of classes IE 21 pursuant to EN IEC 60721-3-2 (i.e. by airplanes and trucks, in premises that are ventilated and protected against atmospheric conditions).

STORAGE

The sensors may be stored on conditions corresponding to the set of combinations of classes IE 11/1K3 pursuant to EN IEC 60721-3-1 (i.e. in places with continuous temperature control from -5 to 45 °C and with humidity from 5 to 95%, without a special threat of an attack with biological agents, with vibrations of small significance and not situated close to sources of dust and sand).

ORDERING TEMPERATURE SENSORS

The purchase order shall specify

- Name
- Product ordering number
- Ex ia design is ordered using codes JJIX, KJIX, KDUX or JDUX according to table 4
- If screw union as accessories pursuant type 991 is required to delivered to the sensor
- Requirement for other documentation pursuant to Article DELIVERY
- If calibration is required and in what temperature points
- Additional information about the design of the thermocouple (maximum operation temperature and characteristic of measured medium; the required type of the insulation compensation wiring shall be identified as well (glass fibres, Teflon or silicon, without or with external protective wired jacketing), type of connector, another design of cold end)
- Dimensional drawing (scheme) of atypical design
- Number of pieces

PURCHASE ORDER EXAMPLE

Standard design:

Thermoelectric temperature sensor without protective armature, with loose outlets of branches
312A30KJI2200/xxxx/xxxx
50 pcs

Special requirement:

Thermoelectric temperature sensor without protective armature 312 – pursuant to the drawing
6 pcs

ORDERING ACCESSORIES

The purchase order shall specify

- Name
- Product ordering number
- Number of pieces

PURCHASE ORDER EXAMPLE

1 - Screw union with collet for thermocouple ø 3
991 SR 30 K M12
20 pcs

2 - Screw union with threaded rings
991 SR 60 Z G14
20 pcs

TABLE 1 - TOLERANCE OF TERMINAL LENGTH

Length L [mm]	Tolerance
0 to 1000	±1
1001 to 2500	±2
2501 to 5000	±10
5000 to 10000	±0.5% of length L
10001 to 25000	± 1% of length L

TABLE 2 - ADDITIONAL REQUIREMENT FOR DESIGN OF TEMPERATURE SENSORS TYPE 312

SPECIFICATIONS			CODE	
CALIBRATION	**NUMBER OF CALIBRATION POINTS**	**CALIBRATION RANGE**		
Calibration by TPM 3342-94, define calibration points	3	0 to 800 °C	/Q4	
	3	0 to 1100°C	/Q42	
	Other	0 to 1100°C	/Q9	
REQUIREMENT FOR OTHER DOCUMENTATION		**USE**		
Copy of the Inspection Certificate 3.1 acc to EN 10204 for material of protective tube with the heat number				/3.1
Declaration of Conformity with purchase order 2.1 pursuant to EN 10204				/2.1

Specify the code behind ordering number. Define calibration points for codes Q4, Q42 a Q9.

TABLE 3 - DESIGN AND ORDERING TEMPERATURE SENSORS TYPE 312

SPECIFICATION				ORDERING NUMBER											
				312	x	xx	x	x	x					/xxxx	/xxxx
Design	pursuant to figures 2 to 9	2	with loose outlets of branches		A										
		3	with transient piece and loose outlets		B										
		4	with transient piece and compensation wiring		C										
		5	with transient piece, compensation wiring and connector		D										
		6	flange and ceramic terminal board		E										
		7	with connector of type A or B		F										
		8	with head of type B		G										
		9	with head of type MA		H										
	Other - pursuant to the drawing of the customer *)				Z										
Diameter of the thermocouple pursuant to figures 2 to 9			Ø 1 mm			10									
			Ø 1.5 mm			15									
			Ø 2 mm			20									
			Ø 3 mm			30									
			Ø 4.5 mm			45									
			Ø 6 mm			60									
Type of the thermocouple pursuant EN 60584			J [Fe-CuNi]				J								
			K [NiCr-NiAl]				K								
Design			single					J							
			double (Ø 3 – 4.5 – 6 mm)					D							
Measuring end of the thermocouple pursuant to figure 1			grounded						D						
			insulated (default for simple)						I						
			independent (default for double thermocouples)						U						
Material of jacket of the thermocouple			1.4541 (17 248) – default for type „**J**“							1					
			INCONEL 600 (2.4816) – default for type „**K**“ for type “**J**“ only (Ø 2 – 3 - 4.5 – 6 mm)							2					
Tolerance class pursuant to EN 60 584-1			class 2								2				
			class 1								1				
Compensation wiring material insulation (for design C and D)			without compensation wiring									0			
			glass fibre with metal jacketing									G			
			Teflon external and internal **)									T			
			silicone external and internal **)									S			
Type of connector (for design D and F)			without connector										0		
			default (type A)										S		
			miniature (type B) max. ∅ of thermocouple 3mm *)										M		
Length of the thermocouple L [mm] – tolerance pursuant to table 2														/xxxx	
Length of loose ends or compensation wiring L_1 [mm] pursuant to figure 2 to 5															/xxxx

*) Only as a special requirement on the basis of an agreement with the manufacturer

**) Standard for single thermocouple, double thermocouple only as a special requirement on the basis of an agreement with the manufacturer

TABLE 4 - ORDERING TEMPERATURE SENSORS TYPE 312 IN Ex ia DESIGN

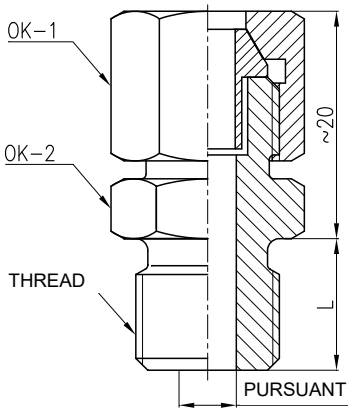
SPECIFICATION			ORDERING NUMBER											
		312	x	xx	x	x	x					/xxxx	/xxxx
Design pursuant to figures 6,8 and 9	flange and ceramic terminal board		E										
	with head of type B		G										
	with head of type MA		H										
Thermocouple Ø 6 mm				60									
Type of the thermocouple pursuant EN 60584	J [Fe-CuNi]				J								
	K [NiCr-NiAl]				K								
Measuring end of the thermocouple pursuant to figure 1	Single thermocouple, insulated end			60	J	J	IX						
					K	J	IX						
	Double thermocouple, independent end			60	J	D	UX						
					K	D	UX						
Material of jacket of the thermocouple	1.4541 (17 248) – default for type „**J**“							1					
	INCONEL 600 (2.4816) – default for type „**K**“ for type “**J**“ only (Ø 2 – 3 - 4.5 – 6 mm)							2					
Tolerance class pursuant to EN 60 584-1	class 2								2				
	class 1								1				
Without compensation wiring										0			
Without connector											0		
Length of the thermocouple L 100 – 3025 [mm]												/xxxx	

TABLE 5 - OVERVIEW OF DESIGNS AND ORDERING OF SCREW UNIONS

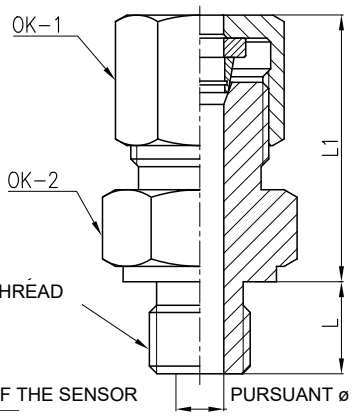
SPECIFICATION		ORDERING NUMBER						
		991	SR	xx	x	xxx	/xxx	/xx
Screw union for temperature sensor without protective tube			SR					
Stem tube of the measuring insert Ø [mm]	3			30				
	4,5 (not for screw union with threaded rings)			45				
	6			60				
Screw union	with collet				K			
	with threaded rings **)				Z			
Fixing thread **Z**	M 8x1 (not for tube of the measuring insert Ø 6)					M08		
	M 12x1,5					M12		
	M 18x1,5					M18		
	M 20x1,5					M20		
	G 1/4					G14		
	G 1/2					G12		
	G 3/8					G38		
	G 3/4					G34		
	1/4-18 NPT					N14		
	1/2-14 NPT					N12		
Thread of the protective hose **Z2** *)							/xxx	

*) Only as special requirement, Thread of the protective hose must be adduce in the order
**) For each screw union with threaded rings is delivered corresponding sealing ring

SCREW UNION WITH COLLET

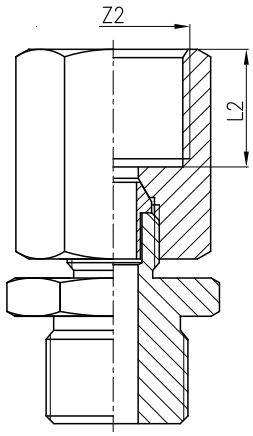


SCREW UNION WITH THREADED RINGS

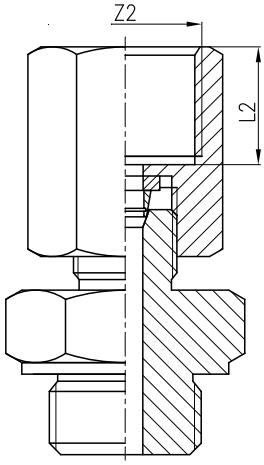


SCREW UNION FOR CONNECTION PROTECTIVE HOSE PIPE

WITH COLLET



WITH THREADED RINGS



SCREW UNION WITH COLLET

THREAD	OK-1	OK-2	L [mm]
M 8x1	OK 14	OK 14	11
M 12x1,5			
M 18x1,5		OK 24	14
M 20x1,5			
G 1/4		OK 14	11
G 1/2		OK 24	14
G3/8		OK 22	11
G 3/4		OK 32	14
1/4-18 NPT		OK 14	
1/2-14 NPT		OK 22	20

*) Thread M 8 x 1 cannot be used for jacketed temperature sensor ø 6

SCREW UNION WITH THREADED RINGS

SENSOR	THREAD	OK-1	OK-2	L [mm]	L1 [mm]
Ø 6 mm	G 1/4	OK 22	OK 22	11	35
	G 3/8				
	G 1/2		OK 27	14	
	G 3/4		OK 36		38
	1/4-18 NPT	OK 14	OK 14		24
	1/2-14 NPT	OK 22	OK 22	20	33
	M 12x1,5	OK 14	19	11	31
	M 18x1,5	OK 22	24	12	35
	M 20x1,5		27	14	
Ø 3 mm	G 1/4	OK 14	OK 22	11	29
	G 3/8				
	G 1/2		OK 27	14	
	G 3/4		OK 36		32
	1/4-18 NPT		OK 14		22
	1/2-14 NPT		OK 22	20	27
	M 8x1*)		OK 14	11	25
	M 12x1,5		OK 19		29
	M 18x1,5		OK 24	12	
	M 20x1,5		OK 27	14	

*) Thread M 8 x 1 cannot be used for jacketed temperature sensor ø 6

INSTALLATION AND CONNECTION

The sensors are installed pursuant to specific conditions for any particular application, e.g. into a collet, by means of various fixtures and tightening stripes, insertion into bores or heat sinks, etc. Jacketed thermocouples can be bent with the radius equalling to five-fold of the external diameter of the jacket.

The operation position of the sensors is discretionary. It is recommended to support the compensation wiring by means of a suitable fixation. The thermocouple is connected to the evaluation devices either directly by the connection of the connecting wiring to the relevant clamps of the device with internal compensation or to clamps of the compensation box (or thermostat of comparison connections) and also by means of connecting wiring to clamps of devices without internal compensation. Jacketed thermocouple with loose outlets of branches or with connector can be installed directly as a part of various evaluation devices.

COMMISSIONING

After the sensor installation and connection of the follow-up (evaluation) device to the supply voltage, the equipment is prepared for operation.

OPERATION AND MAINTENANCE

The sensor does not require and operation and maintenance.

SPARE PARTS

The sensor design does not require any delivery of spare parts

WARRANTY

The warranty period is 24 months from the receiving of the product by the customer, unless established otherwise in the contract. The rejection of defects shall be enforced in writing at the manufacturer within the warranty period. The rejecting side shall identify the product name, ordering and manufacturing numbers, date of issue and number of the delivery note, clear description of the occurring defect and the subject of the claim. If the rejecting side is invited to send the device for repair, it shall do so in the original package of the manufacturer and/or in another package ensuring safe transport.

The warranty shall not apply to defects caused by unauthorized intervention into the device, its forced mechanical damage or failure to comply with operation conditions of the product and the product manual.

REPAIRS

The sensors shall be repaired by the manufacturer. They shall be sent for repair in the original or equal package without accessories.

DISABLING AND LIQUIDATION

Both the product and its package do not include any parts that could impact the environment.

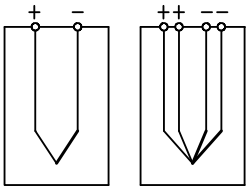
Products that are withdrawn from operation, including their packages, can be disposed of to the sorted or unsorted waste pursuant to the type of waste.

The package of the sensor can by recycled completely.

Metal parts of the products are recycled, non-recyclable plastic materials shall be disposed of in accordance with applicable legislation.

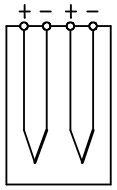
FIGURE 1 - DESIGN OF MEASURING ENDS OF JACKETED THERMOCOUPLES (SCHEMATIC ILLUSTRATION)

INSULATED END - design I (default for simple design)



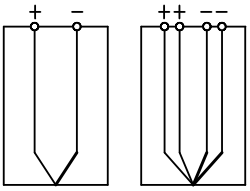
JI DI

INDEPENDENT END - design U (default for double design)



DU

GROUNDED END - design D



JD DD

JI - single thermocouple with insulated measuring end
DI - double thermocouple with insulated measuring end
DU - double thermocouple with independent measuring end
JD - single thermocouple with grounded measuring end
DD - double thermocouple with grounded measuring end
(+) - Fe (thermocouple "J"), NiCr (thermocouple "K") pursuant to EN 60584-1
(-) - CuNi (for thermocouple "J"), NiAl (for thermocouple "K") pursuant to EN 60584-1

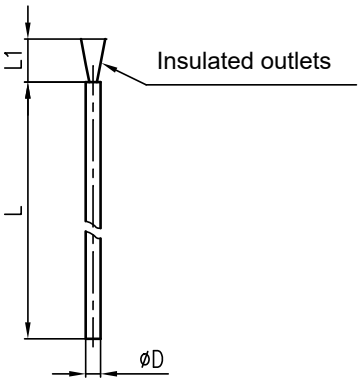
FIGURE 2 - DIMENSIONAL DRAWING - DESIGN A
with loose outlets of branches (standard design)

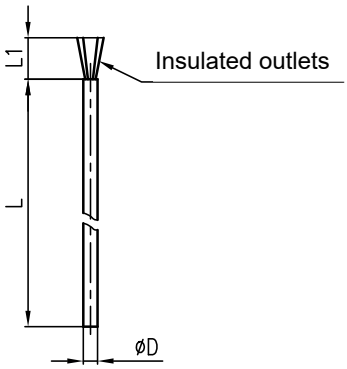
SINGLE THERMOCOUPLE

Ø D [mm]	L_1 [mm]
Ø 1	10
Ø 1.5	15
Ø 2	20
Ø 3	30
Ø 4.5	
Ø 6	

DOUBLE THERMOCOUPLE

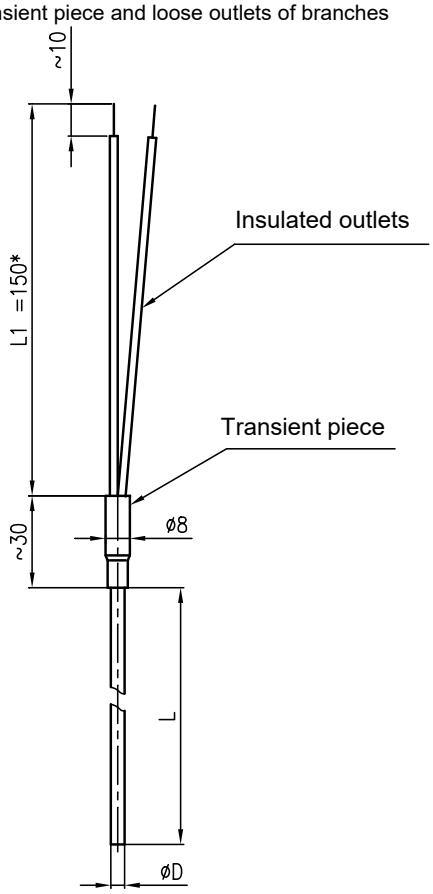
Ø D [mm]	L_1 [mm]
Ø 3	30
Ø 4.5	
Ø 6	





L - length of jacketed thermocouple [mm]
L_1 - length of loose outlets [mm]

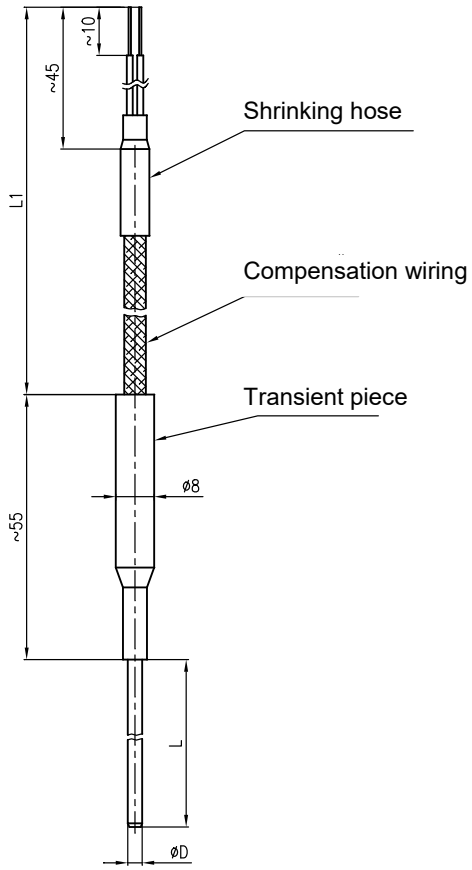
FIGURE 3 DIMENSIONAL DRAWING - DESIGN B
with transient piece and loose outlets of branches



L length of jacketed thermocouple [mm]
L_1 length of loose outlets [mm]
* - different length after an agreement with the manufacturer

Ø D [mm]
Ø 1
Ø 1.5
Ø 2
Ø 3
Ø 4.5
Ø 6

FIGURE 4 DIMENSIONAL DRAWING - DESIGN C
with transient piece and compensation wiring

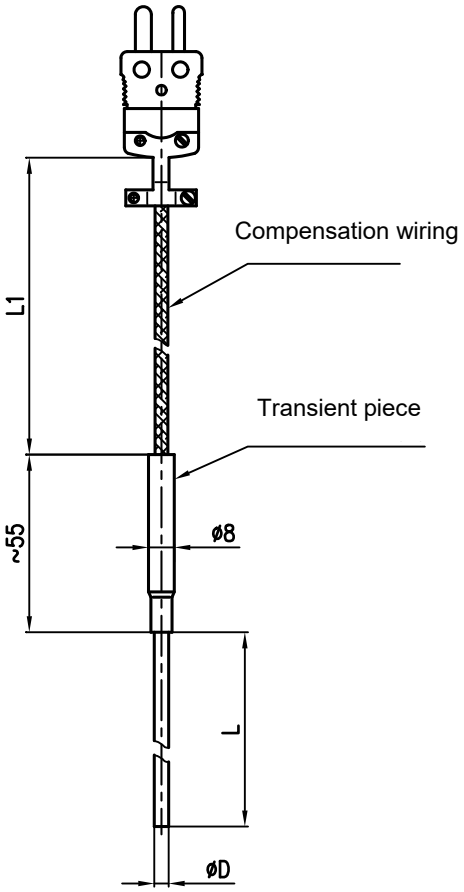


L length of jacketed thermocouple [mm]
L_1 length of loose outlets [mm]

Ø D [mm]
Ø 1
Ø 1.5
Ø 2
Ø 3
Ø 4.5
Ø 6

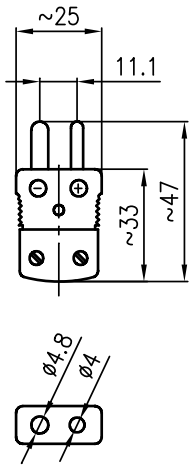
FIGURE 5 DIMENSIONAL DRAWING - DESIGN D

with transient piece, compensation wiring and connector (only as a special request on the basis of an agreement with the manufacturer)

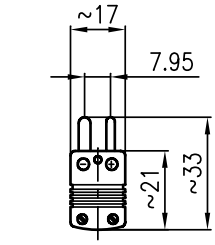


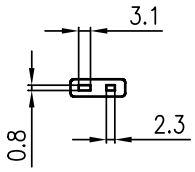
DESIGN OF CONNECTORS pursuant to EN 50212

type A (default unless specified otherwise)



type B





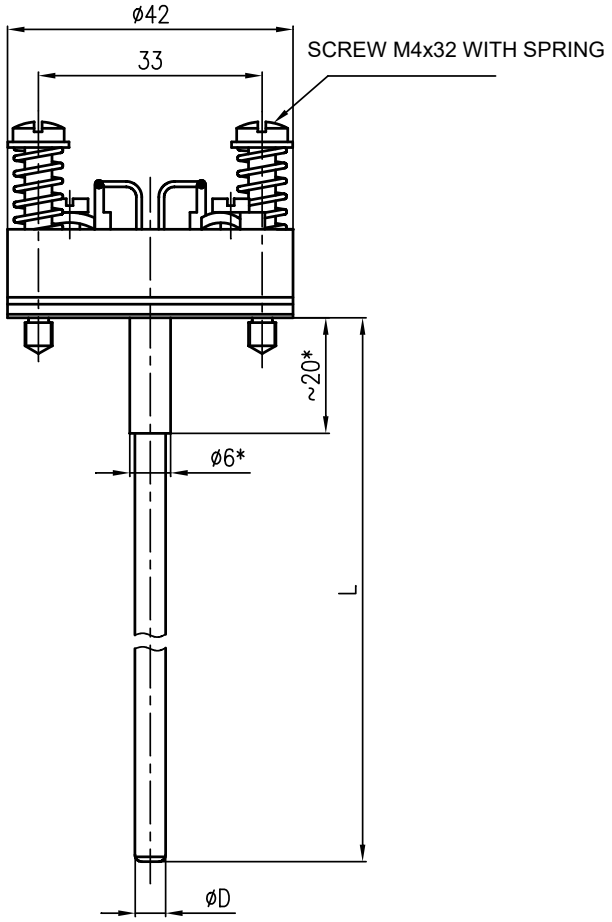
L length of jacketed thermocouple [mm]

L_1 length of loose outlets [mm]

Ø D [mm]	Ø 1
	Ø 1.5
	Ø 2
	Ø 3
	Ø 4.5
	Ø 6

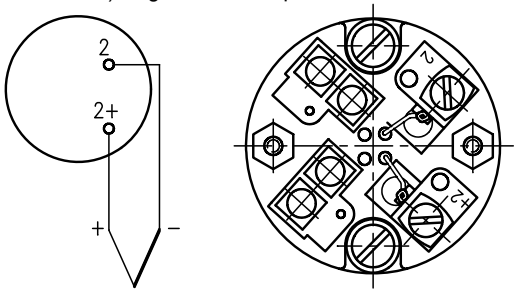
FIGURE 6 DIMENSIONAL DRAWING - DESIGN E

with flange and ceramic terminal board to head of type B pursuant to DIN 43 729 (only as a special request on the basis of an agreement with the manufacturer)

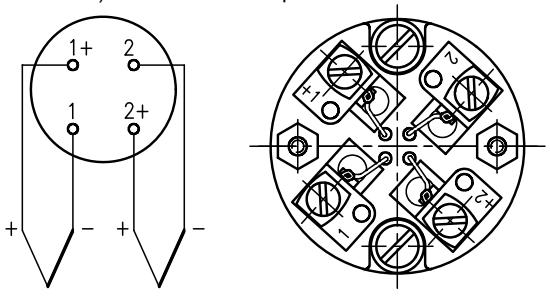


VIEW OF THE TERMINAL BOARD

a) single thermocouple



b) double thermocouple



L length of jacketed thermocouple [mm]

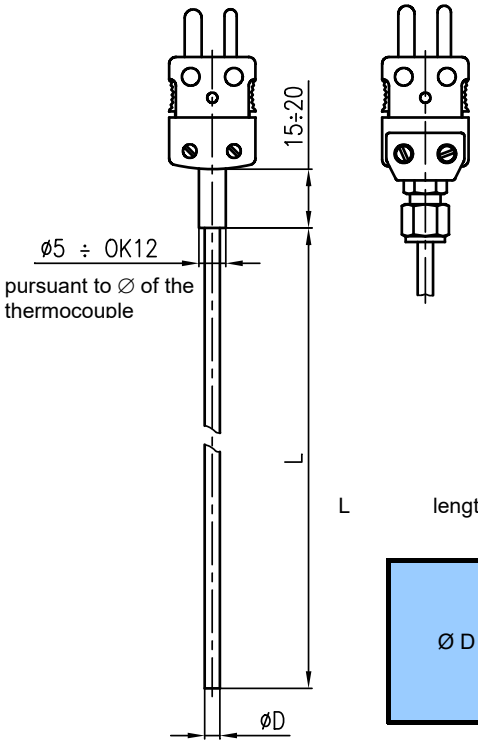
* - only for jacketed thermocouples ∅ 3 and ∅ 4.5

Screw clamps for wires with cross-section 0.2 to 1.0 mm^2

Ø D [mm]	Ø 3
	Ø 4.5
	Ø 6

FIGURE 7 DIMENSIONAL DRAWING - DESIGN F

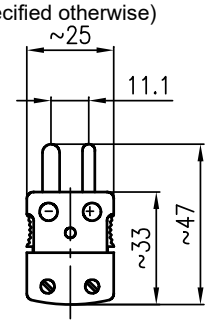
with connector of type A or B pursuant to EN 50212 (only as a special request on the basis of an agreement with the manufacturer)



DESIGN OF CONNECTORS pursuant to EN 50212

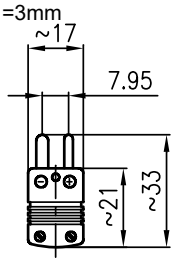
type A

(default unless specified otherwise)



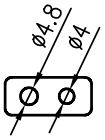
type B

maximum for Ø D =3mm



L length of jacketed thermocouple [mm]

Ø D [mm]	Ø 1
	Ø 1.5
	Ø 2
	Ø 3
	Ø 4.5
	Ø 6



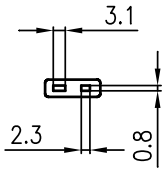
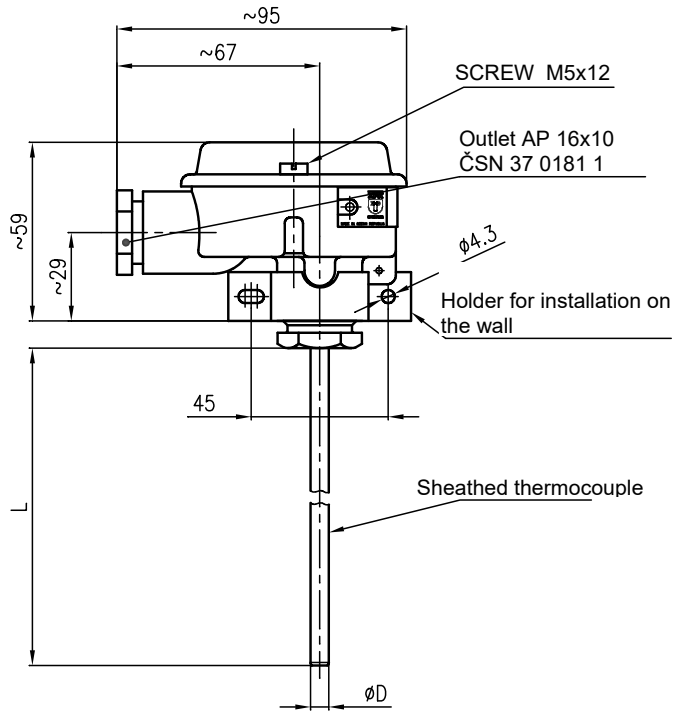


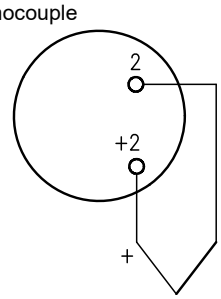
FIGURE 8 DIMENSIONAL DRAWING - DESIGN G WITH HEAD OF TYPE B PURSUANT TO DIN 43 729

(only as a special request on the basis of an agreement with the manufacturer)

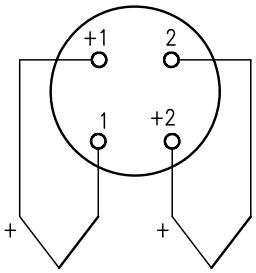


VIEW OF THE TERMINAL BOARD

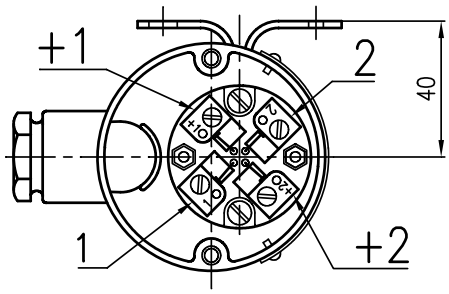
a) single thermocouple



b) double thermocouple



LOCATION OF TERMINAL BOARD IN THE HEAD



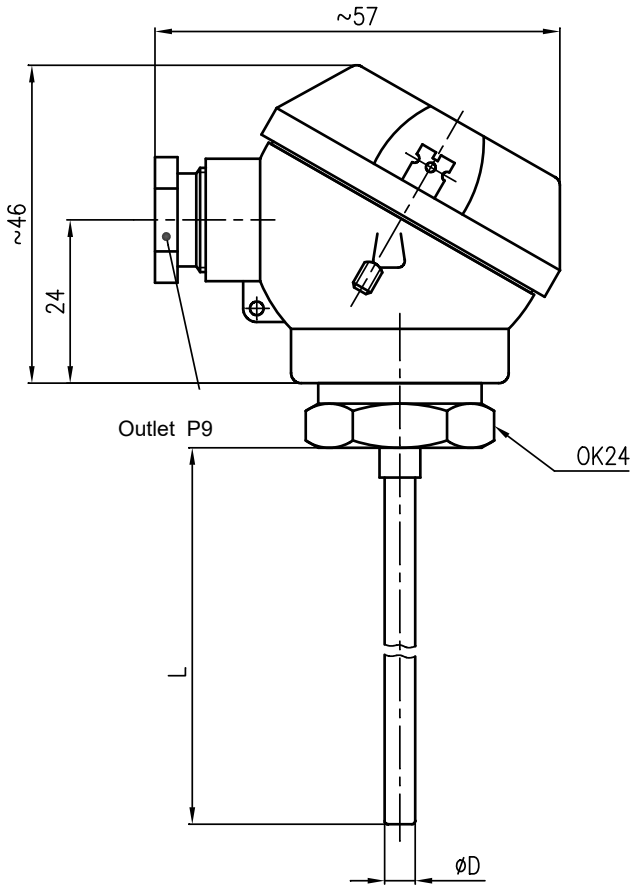
L length of sheathed thermocouple [mm]

Screw clamps for wires with cross-section 0.2 to 1.0mm^2

Ø D [mm]	Ø 3
	Ø 4.5
	Ø 6

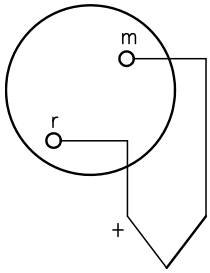
FIGURE 9 DIMENSIONAL DRAWING - DESIGN H WITH SMALL HEAD OF TYPE MA

(only as a special request on the basis of an agreement with the manufacturer)

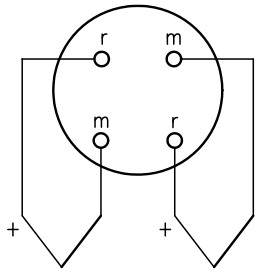


CONNECTION SCHEME

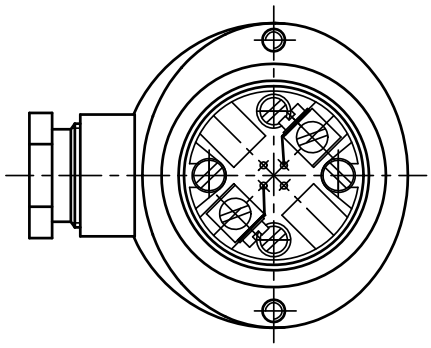
a) single thermocouple



b) double thermocouple



VIEW OF THE TERMINAL BOARD

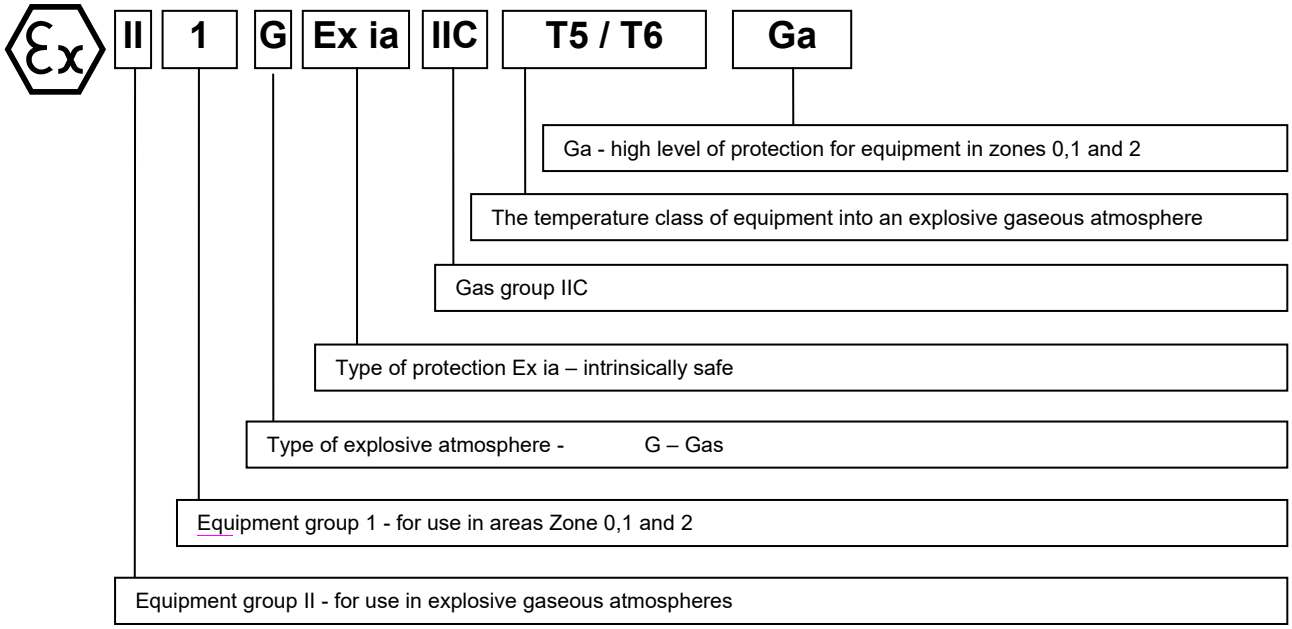


L length of jacketed thermocouple [mm]

Screw clamps for wires with cross-section 0.2 to 1.0mm^2

Ø D [mm]	Ø 3
	Ø 4.5
	Ø 6

FIGURE 10 - INTRINSICALLY SAFE MARKING



April 2021

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ZPA Nová Paka, a.s.
Pražská 470
509 01 Nová Paka

tel.: spojovatel: 493 761 111
e-mail: obchod@zpanp.cz
www.zpanp.cz

bankovní spojení: ČSOB HK
číslo účtu: 271 992 523/300

IČO: 46 50 48 26
DIČ: CZ46504826