RESISTANCE THERMOMETERS

DEFINITION

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. Standards are used for up to 500 ° C, and special types are used for requests up to 500-850 °. Maximum operating temperatures given in the catalogue are for air environment without harmful gases. In environments with intense harmful effects, the service life of resistance thermometers will be shortened depending on to the effects of harmful gases.

Resistance thermometers are used for surface measurements and low and high pressure processes in environments such as

RESISTANCE THERMOMETER SELECTION

For long-lasting, accurate and reliable operation of resistance thermometers, its element, protective sheath and mounting type should be selected. For the right check the general information section on Resistance Thermometers.

Resistance thermometer element gives resistance values in accordance with Pt-100, Pt-1000 and Ni-1000 DIN Standard 43760 or IEC 751 Standard. Pt-100 and Ni-1000 elements have 100 ohm resistance values at 0 ° C.

Resistance thermometers are manufactured with an inset. Inset is a second protector placed inside the outer protective sheath. Resistance thermometer element is placed inside the inset outer sheath and then filled with metal oxide powder. The inset is then placed inside the outer sheath of the resistance thermometer. The biggest advantage of resistance thermometers with inset is that only inset is changed without stopping the process. In addition, by providing only the inset of a resistance thermometer whose other parts such as outer protector and head are intact, more economical material is obtained.

PROTECTIVE SHEATHS

Resistance thermometer protective covers should be selected in accordance with the process conditions. Usually;
1.4301 (AISI304 Quality Stainless),
1.4571 (AISI316 Quality Stainless) pipes are used. 1.4571 (AISI316) stainless pipe is used as the inset material. It can also be produced in pipes required by other standards.

RESISTANCE THERMOMETER STANDARD : DIN 43760 and IEC 751

HEAD STANDARD : A, B and C in DIN 43729 standard type head

PROTECTIVE SHEATH STANDARD : Metal in DIN and AISI standards

CONNECTION HEAD

The inset is attached to the aluminum cast head, to which the resistance thermometer protective sheath are attached, with spring compression and two screws. By installing with spring compression, problems caused by vibration are minimized. In addition, the problems that may arise due to the expansion are eliminated and a better heat conduction is provided. Generally, Type B aluminium casting heads are used in resistance thermometers. Type C head can also be used on demand. The heads comply with the DIN43729 standard.

CONNECTION and MOUNTING STYLE

Resistance thermometers specified in this catalogue are generally thought to be connected to the process with raccord or flange. Copper conductive cables are used between the resistance thermometer head and the device. The connection cable of resistance thermometers up to 10 meters is connected with two wires, three wires from 10 meters to 150 meters and four wires after 150 meters. The fluid velocity of the process in which the resistance thermometer is immersed is a factor affecting the measurement accuracy. Resistance thermometers should generally be placed perpendicular to the flow direction. In order for resistance thermometers to measure the ambient temperature accurately, it should be immersed in the environment at least 6, maximum 15 times of the outer diameter.

STANDARD and SPECIAL TYPES

Standard types specified in the catalogue and frequently used in the market can be ordered by selecting them in accordance with the coding system. In addition to the standard types specified in the catalog, special type resistance thermometers are also produced according to the characteristics of the process.

<u>In order to order a special type resistance thermometer;</u>

1- If there is a resistance thermometer used before, a sample should be given.
2- If the special resistance thermometer has been purchased from ORDEL before, the order number or the technical drawing number must be given.
3- Technical drawing indicating the diameter, length and shape of the resistance thermometer, if any, should be given.
4- If a new resistance thermometer is purchased, the process should be described clearly.
5- Continuous and maximum operating temperatures should be specified.
6- If known, report chemical wear factors along with flow and pressure information of the process.

SPARE PARTS and REPAIR

All parts of resistance thermometers can be ordered according to the types specified in the catalogue. Resistance thermometers can be repaired. It would be very economical to change only the element of a resistance thermometer whose main parts such as the inset, outer protective head and terminal are intact and only the Pt-100 element is defective. In addition, replacing only the inset when the inset is the only defective part in the resistance thermometer is much more economical than buying a complete new one.

TYPE DETERMINATION FOR ORDER

The order is made according to the code created with standard codes and additions to the standard code. It is coded according to the features determined by drawing number and 6 digits.

Special Types:

It is expressed with additional information added to the end of the 6th digit. All products, except the standard product, are called "Special types". Special types are coded with "OS" production number.

CREATING A SAMPLE ORDER

OR02-B1H06-10 Ü EF

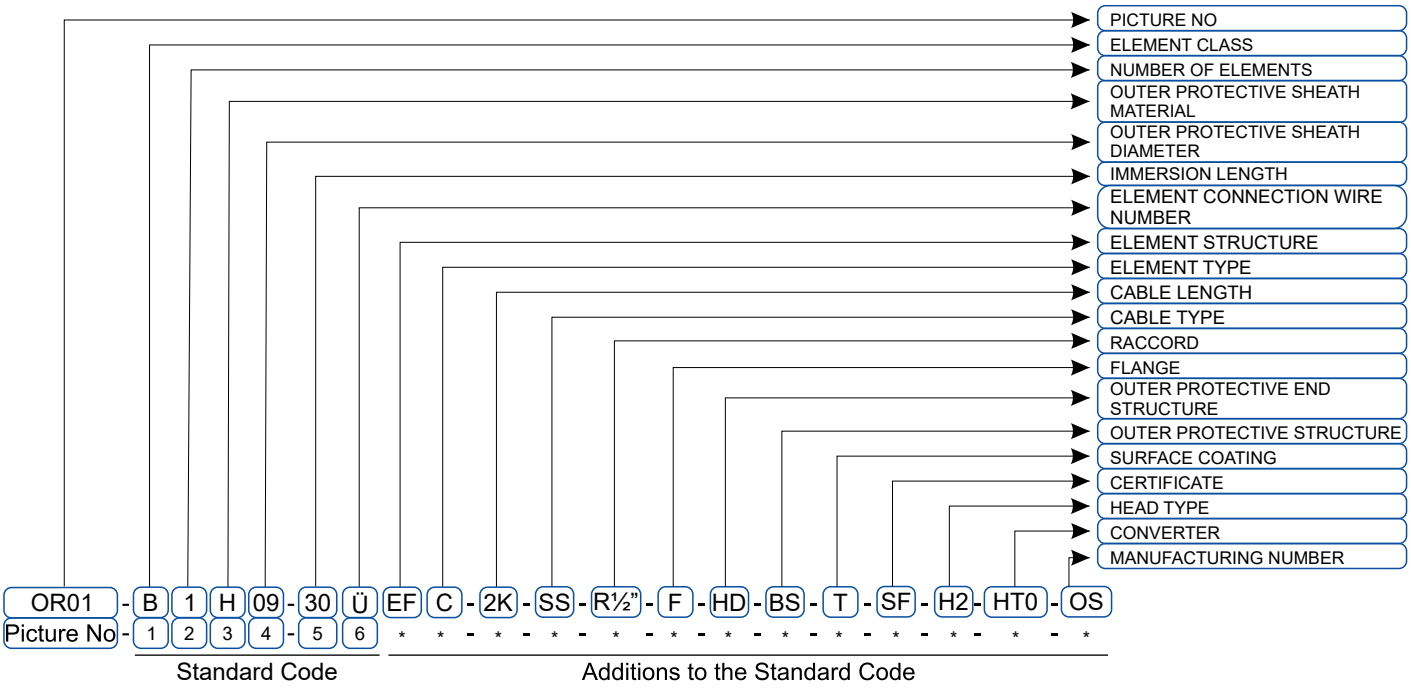
* The picture conforms to OR02
* In B Class feature
* Single Element
* Outer protector 1,4571
* Protective diameter 6mm
* Immersion length 100mm
* Three wire connection
* Film elements

CREATING A SAMPLE SPECIAL TYPE

OR-OS-001-XXXX-000

Note: Special code will be given by Ordel.

RESISTANCE THERMOMETER CODING



9

PICTURE NO	OR01, OR02, OR03, OR04, OR05, OR06, OR07, OR08, OR09, OR10, OR11, OR12, OR14, OR15, OR16, OR20, OR30, OR40, OR50, OR60	Manufacturing methods of resistance thermometers are determined with different drawing numbers.
ELEMENT CLASS	(B) = B Class , (A) = A Class	In section (1), the class of the desired resistance thermometer element is written.
NUMBER OF ELEMENTS	(1) Single Element , (2) Double Element	In section (2), the number of elements is written.

OUTER PROTECTIVE SHEATH MATERIAL

STANDARD SHEATS	ORDEL CODE	STANDARD SHEATS	ORDEL CODE
1.4301 (304)	E	1.4749,1.4762,446	M
1.4401 (316)	F	1.4841,1.4845,310S	L
1.4404 (316L)	B	Inconel-600	N
1.4541 (321)	J	KER 610	P
1.4571 (316TI)	H	KER 799	A
Yellow (Brass)	U	TEFLON	T

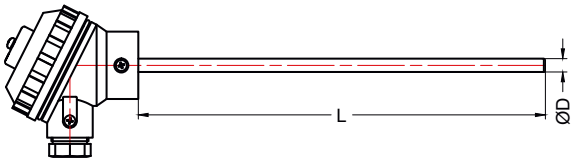
In section (3), he letter corresponding to the protective sheath material selected according to the process conditions is written.
Note: For the right protective sheath selection, please review the outer protective sheath section in the thermocouple general information section and the table of resistance to liquids of metal pipes.

OUTER PROTECTIVE SHEATH DIAMETER (mm)	02	09	16	24	In section (4), numbers corresponding to the protective sheath diameters selected according to the process conditions are written. (two digits)
	03	10	17	26	
	04	12	18	28	
	05	14	20	30	
	06	15	22	32	
	08	Note: These dimensions are in "mm".			
IMMERSION LENGTH	5	30	71	180	In section (5), the number corresponding to the immersion length selected in accordance with the process is written. In order for resistance thermometers to make accurate measurements, the protective sheath diameter must be immersed in the process at least 6 and a maximum of 15 times of the outer diameter.
	10	35	100	200	
	15	40	120	250	
	18	50	140	300	
	20	60	160	380	
	25	Note: These dimensions are in "mm".			
ELEMENT WIRE CONNECTION	Ü (3 Wires) D (4 Wires) Note: No code is added when two wire connection is requested.				In section (6), the element wire number is written. This digit is very important in terms of the distance between the resistance thermometer and the device. Cable distance should be two wires up to 9 m, three wires for 10 m and above, four wires for 150 m and above.
ELEMENT STRUCTURE	EF - Film Element ES - Ceramic Element EG - Glass Element				The letters expressing whether the element has film element or ceramic element are written. Film element works between -70 .... + 500 ° C, Ceramic element at -200 .... + 600 ° C range. **Note:** Please call our company for higher temperature elements.
ELEMENT TYPE	Pt-50 (A) Pt-500 (B) Pt-1000 (C)		Ni-100 (N) Ni-1000 (E) Glass Element (G)		In this section, If an element other than Pt-100 is desired, the desired element type is expressed with letters.
CABLE LENGTH	0,5K 50cm 1K 1m 1,5K 1,5m 2K 2m		2,5K 2,5m 3K 3m 4K 4m 5K 5m		In this section, the desired cable length is expressed in numbers and letters.
CABLE TYPE	PP - PVC + PVC				In this section, the cable insulation types selected depending on the ambient conditions and temperature of the cable to be used in the resistance thermometer are named with letters.
	SS - Silicone + Silicone				
	CC - Glass fiber + Glass fiber				
	TT - Teflon + Teflon				
	CCB - Glass fiber + Glass fiber + Shielding				
	TS - Teflon + Silicone				
	TCB - Teflon + Glass fiber + Shielding				
	TBS - Teflon + Shielding + Silicone				
	TBT - Teflon + Shield + Teflon				
	SCBS - Silicone + Glass fiber + Shielding + Silicone				
RACCORD	R¼"	R¼"NPT	RM10x1		In this section, If raccord is requested, the character related to the raccord measure is encoded in the additions section to the standard code. Standard raccords are specified in this section. Specify the size of the raccord you want to produce in all standards.
	R½"	R½"NPT	RM12x1		
	R⅛"	R⅛"NPT	RM10x1,5		
	R¾"	R¾"NPT	RM20x1,5		
	R1"	R1"NPT	RM27x1,5		
	Note: The standard raccord sizes mentioned above are fixed type raccords.When these raccords are requested as adjustable raccords (moving), the raccords are coded as "RA". For example RA½ "Adjusted Record				
FLANGE	Casting Flange F Note: Production is made in all flange sizes. It will be sufficient to specify the flange size.				If the process connection is requested with a flange, "F" is written on the flange digit. Our standard flange sizes are available in the reserves section.
OUTER PROTECTIVE END STRUCTURE	HS Air Slotted HD Air Perforated İ Needle End Y Surface Probe				If the end assembly is requested differently, it is defined by the codes specified in the standards.
OUTER PROTECTIVE STRUCTURE	BS Fulled Material BSY Half Full Material				External protectors are made of pipe or filled material. No addition to the type code is made for tubular protectors.

SURFACE COATING	T Teflon Coating TH Teflon Hose ST Stellite Coating		External protectors can be coated as required by the process conditions. If there is a coating, it is defined as specified.
CERTIFICATE	SF		If resistance thermometers are requested with an accredited certificate it must be defined with "SF".
HEAD	H1 - Sgs type head	H7 - Stainless head	Our production for resistance thermometers is type B head. When other heads are requested, please specify which head. **Note:** See Thermocouple spares section for other heads.
	H2 - C type head	H8 - B type head	
	H3 - BUZ-H head	H9 - A type head	
	H4 - Windowed BUZ-H head	H10 - A type Bakelite head	
	H5 - Plastic head	H11 - C type Bakelite head	
	H6 - Pvc head	Ex-Proff head (Certified)	
CONVERTER	HTO - Ordel converter		Resistance Thermometers may have a head converter, whether made by Ordel or another brand in resistance thermometers. It can be defined according to the desired features in the order.
	HT1 - Ordel insulated converter		
	HT - Cable output to connect to the converter		
	HTH - Hart protocol converter		
	HTE - Ex-Proof converter		

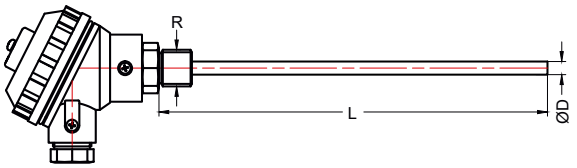
RESISTANCE THERMOMETERS

OR01 resistance thermometer is straight type without raccord. B type head is used in standard production. Diameters of 9mm and above are inset type. It contains OR05. Inset type can be made in diameters less than 9mm upon request.



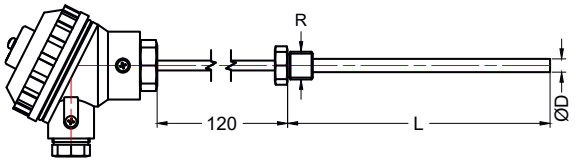
OR01

OR02 resistance thermometer is raccord type. Standard is ½ "raccord. Diameters of 9mm and above are inset type. It contains OR05. Inset production can be made in diameters below 9mm if desired.



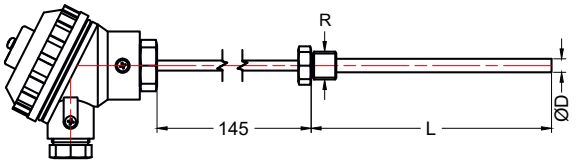
OR02

There is 120mm distance between **OR03** Raccord type and head-raccord. ½ "standard raccord. It is inset type. It contains OR05.



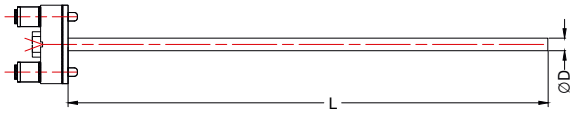
OR03

There is 145mm distance between **OR04** raccord type and head-raccord. ½ "standard raccord. If a distance of more than 145mm between head and raccord is requested, it should be specified. It is inset type. It contains OR05.



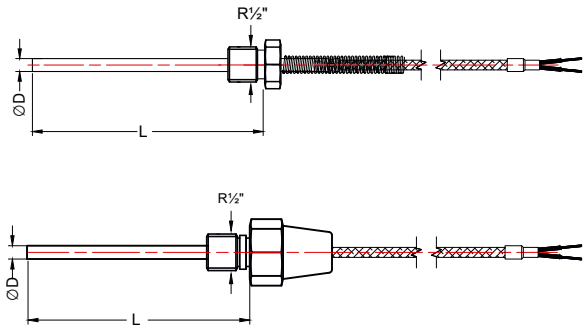
OR04

OR05 is inset type. Resistance thermometers are generally used with inset. RT element is placed in a stainless sheath. It is filled with metal oxide powders. Inset is a second protector placed inside the outer shield.OR01, OR02, OR03, OR04 and OR20 have OR05. While coding OR05, the immersion length is written in "mm".



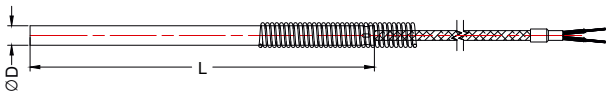
OR05

OR06 type resistance thermometer is a simple resistance thermometer with raccord and fixed cable. ½ ”standard raccord. Other raccord sizes can be produced. Since it is fixed cable, the cable length must be specified in the order. Raccord temperature should not exceed 100 ° C. It is produced in two different types as OR06 and OR06-A (Conical Raccord).



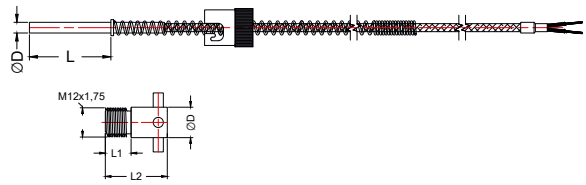
OR06

OR07 type resistance thermometer has a simple flat type structure with fixed cable. Cable length must be specified in the order. There is a pipe at the end of the cable. This pipe can be given in "L" length in different diameters. In standard production, OR07 cable outlet is springy.



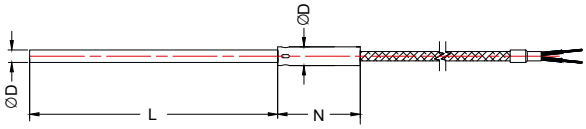
OR07

OR08 type resistance thermometer is bayonet type with fixed cable. The tip of the resistance thermometer is clamped into metal blocks or heating processes with a spring and fixed with raccord. In standard production, the pin raccord is M12x1.5 threaded. L length is 30mm. It is manufactured in different lengths. Since it has a fixed cable, the cable length must be specified in the order. The cable type should be selected according to the ambient conditions in which the cable will be found.



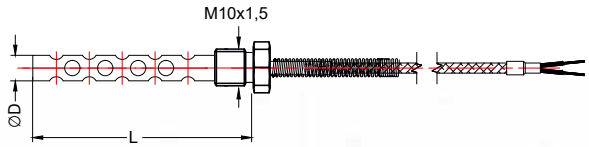
OR08

OR09 is fixed wired type. It is used for portable purposes. It is produced in desired lengths up to 9mm diameter in stainless steel protected pipes. Especially in laboratory applications, metal or glass containers can be used in many different areas by immersing them in erlanmayer. Cable connection point should not exceed 100 ° C.



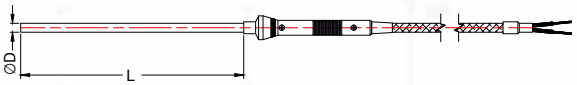
OR09

OR10 Miniature type resistance thermometer is used to measure air temperatures precisely. There is air-hole pipe protecting the element. Process connection is threaded M12x1.5. It is also produced with glass elements. Glass element is more sensitive than standard element. However, it is expensive compared to the standard element.



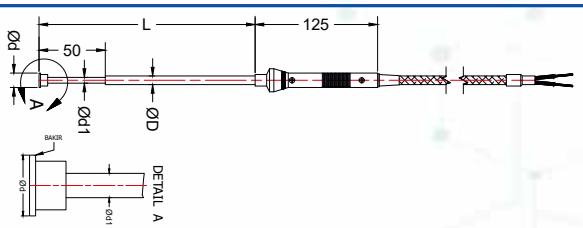
OR10

OR11 is a portable type resistance thermometer with fixed cable. It is produced in desired lengths up to 4,5,6,8 and in special cases 9mm diameter. When choosing the size of the resistance thermometer, care must be taken to ensure that the handle and hand held by hand are long enough not to be affected by the process temperature. In order to get accurate measurements, RT should be immersed in the process at least 6, maximum 15 times the outer diameter. Since it is a fixed cable production, the cable length and cable type must be specified in the order.



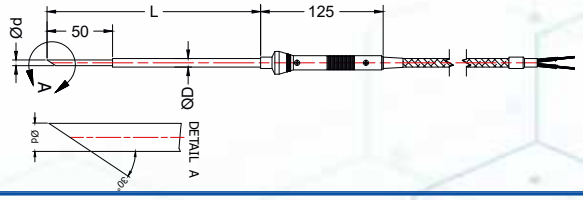
OR11

OR11-Y is a resistance thermometer with fixed cable, which is used to measure flat surfaces. It should be contacted by pressing firmly on the flat surface. It does not give correct results on uneven rough surfaces. If the Surface Type resistance thermometer tip is desired at an angle, it should be encoded as OR11-YA. Since it is a fixed cable production, the cable length and cable type must be specified in the order.



OR11-Y

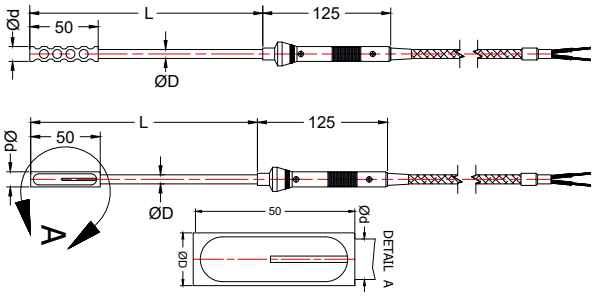
OR11-A is used to measure soft process temperatures. For example, dough, rubber, sponge, meat, etc. are needle-tipped. The measurement is made by pressing strongly on the medium to be measured.



OR11-A

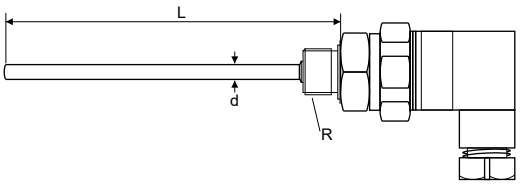
OR11-HD

OR11-HD air perforated RT is used for temperature measurements of clean air environment. There is an air-perforated stainless protector in the 50mm section of the tip. With this structure, the sensor is able to measure precisely. When requested with RT air slot, it is coded as OR11-HS. Since it is a fixed cable production, the cable length and cable type must be specified in the order.



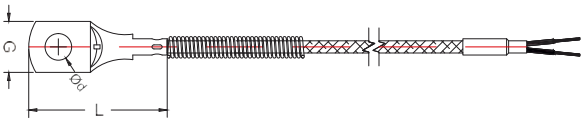
OR12

OR12 type resistance thermometer 43650 is electrical or M12 socket. Standard raccord size is ½". For detailed and different types of choices, please check our OR12 type resistance thermometer catalog in Resistance thermometers section.



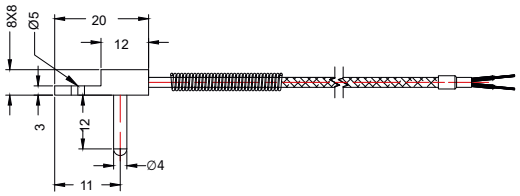
OR13

OR13 is fixed wired type. It is used for flat surface measurements. It is fixed to the surface to be measured with bolts. When ordering, you must specify the "d" diameter. When the cable length and maximum measuring range are specified, the cable type is selected more accurately.



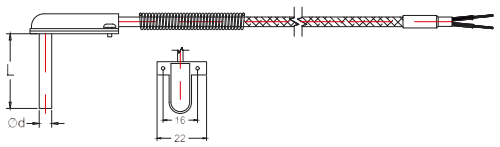
OR14

OR14 is fixed wired. It is mounted on metal and heater blocks in processes that have difficulty in assembly. The resistance thermometer is fixed to the process with a screw. Cable length, diameter and length information should be specified in the order.



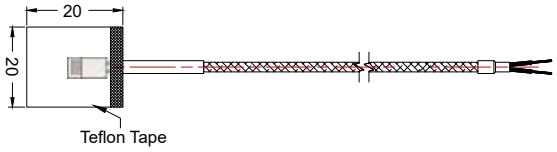
OR15

OR15 is fixed wired. It is an elbow type mounted in metal block housings. It is preferred in processes with assembly difficulties. Cable length, diameter and length information should be specified in the order.



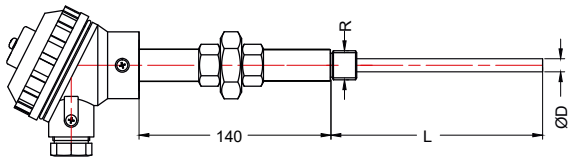
OR16

OR16 is fixed wired. It is the type used by the bonding method on flat surfaces. It is used by mounting an element between the tape. Cable length, diameter and length information should be specified in the order.

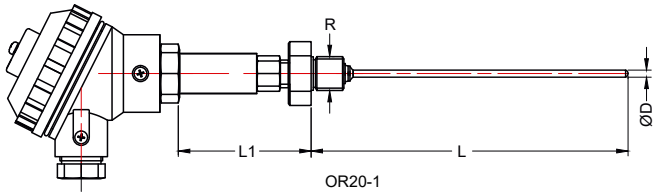


OR20

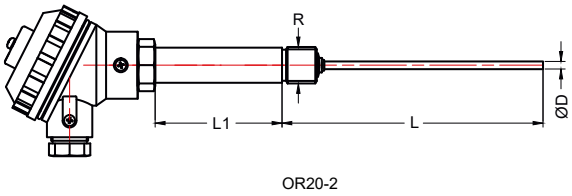
OR20 RTs are used as Nipple, Nipple-Fitting, Nipple-Union-Nipple (Union) connection in their assembly to the thermowell. In standard production, the head and vel connection are ½ "NPT.



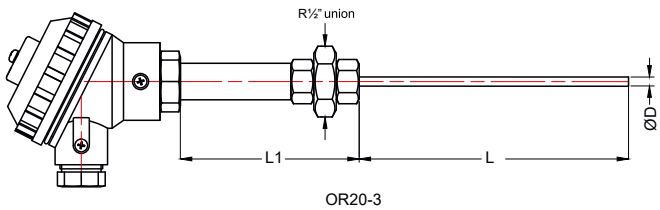
OR20 Types



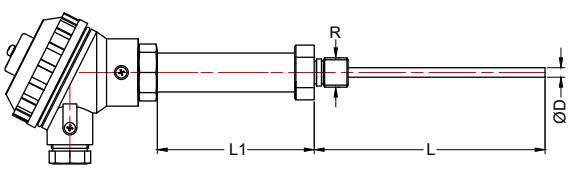
OR20-1



OR20-2

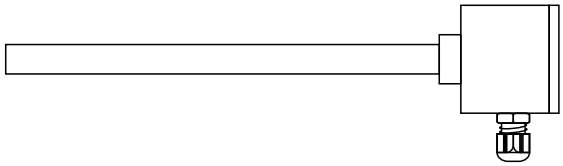


OR20-3



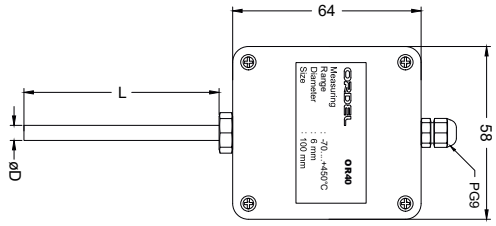
OR20-4

OR30 Aggressive resistance thermometer is processed from PVC, DERLİN or TEFLON filled material. Used in processes of strong acids, organic solvents, petroleum products and mineral oils. It is given in a minimum diameter of 15mm. Please contact ORDEL for your requests for diameter less than 15mm. For detailed and different types of choices, please check the OR30 catalog in the resistance thermometers section.



OR30

OR40 type resistance thermometers are used to measure air temperature in many areas. It is preferred in areas requiring precise measurement of air temperature. It is also produced with air holes. It is encoded as OR40-HD. It is produced as wall mounted in special boxes of 58x117x35mm dimensions. With analog output, the converter can be supplied mounted. For detailed and different types of choices, please check our OR40 catalog in the resistance thermometers section.

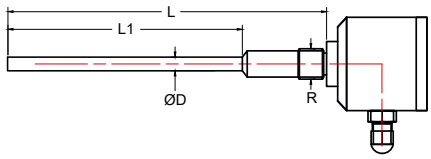


OR40

OR50 is produced as a winding temperature sensor (Slot Type). It is used to measure the temperatures of electric motors and generators. It is mounted on stator windings. For detailed and different types of choices, please check the OR50 catalog in the resistance thermometers section.

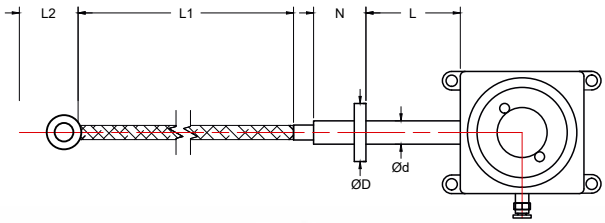
OR50

OR60 type resistance thermometers are widely used in hygienic areas in sectors such as food, medicine. It has AISI316 Stainless steel structure. It can be sterilized easily. Tri-clamp flanged, different sizes can be given with raccord connection. For detailed and different types of choices, please check the OR60 catalog in the resistance thermometers section.



OR60

OR90 type resistance thermometer is a temperature sensor designed to measure tank temperatures. Temperature measurement can be made from more than one point in proportion to the size of the tank. For example (4-14 pcs. Pt-100) AISI316 flexible hoses are used. In standard production, the process connection is flanged. It is also produced with analog output and averaging feature. For detailed, different types and features, please check our OR90 catalog in the resistance thermometers section.



OR90

RESISTANCE THERMOMETER CODING EXAMPLES

PICTURE NO	-	ELEMENT CLASS	NUMBER OF ELEMENTS	OUTER PROTECTIVE SHEATH MATERIAL	OUTER PROTECTIVE SHEATH DIAMETER	-	IMMERSION LENGTH	-	ELEMENT CONNECTION NUMBER OF WIRES	EXCEPTION	EXPLANATION
OR02	-	B	1	H	06	-	25	-	Ü	EF EX	Suitable for **OR02**, B Class Film Pt-100 element, number of elements 1, outer protective diameter 6mm, protective sheath material 1,4571 DIN Stainless (AISI316), immersion length 250mm, ½ "raccord connection, three-wire connection, Ex-Proof head .
OR04	-	A	2	H	08	-	30	-	Ü	ES	Suitable for **OR04**, with A Class Pt-100 ceramic element, number of elements 2, outer protective diameter 8mm, protective sheath material 1.4571 DIN Stainless (AISI316), immersion length 300mm, ½ "raccord connection, distance between head and raccord 145mm, three with wire connection.
OR08	-	B	1	E	05	-	3	-	Ü	EF 5K	Suitable for **OR0**8, B Class Pt-100 film element, number of elements 1, outer protective diameter 5mm, protective sheath material 1.4301 DIN Stainless (AISI304), immersion length 30mm, M12x1.75 bayonet raccord connection, three-wire connection, 5 m wired.