

MC-WR/WRK Thermocouple



As the sensor for temperature measuring and controlling, thermocouple is usually connected with display meter or other transmitters to measure temperature of liquid, vapor, gas and solid surface ranging from -40°C to 1800°C . Thermocouple is based on physical phenomenon that two conductor of different materials is connected to form return circuit. When temperature on both end is different, it results in thermoelectric potential in return circuit. Thermocouple in practical applications is usually composed with temperature sensing element, mounting & fixing device and junction box.

MC-WR/WRK-X Thermocouple is subjects to IEC international standard graduating number, including the thermocouple of PtRh30-PtRh6, PtRh10-Pt, PtRh13-Pt, NiCr-NiSi, NiCr-CuNi, Cu-CuNi, Fe-CuNi, etc.

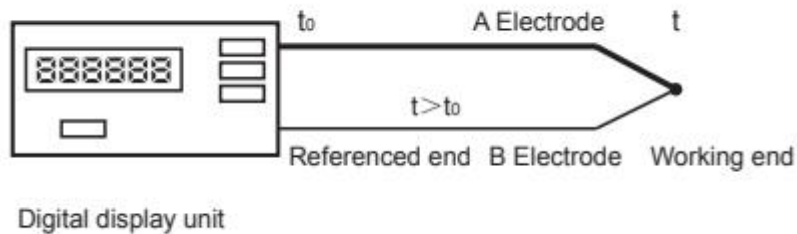


Type of thermocouple	Graduating	Measurement range	Allowed deviation $\Delta t^{\circ}\text{C}$
PtRh30- PtRh6	B	0~1800	$\pm 1.5^{\circ}$ or $\pm 0.25\%t$
PtRh10- Pt	S	0~1600	$\pm 1.5^{\circ}$ or $\pm 0.25\%t$
PtRh13- Pt	R	0~1600	$\pm 1.5^{\circ}$ or $\pm 0.75\%t$
NiCr – NiSi	K	0~1300	$\pm 2.5^{\circ}$ or $\pm 0.75\%t$
NiCr – CuNi	E	0~800	$\pm 2.5^{\circ}$ or $\pm 0.75\%t$
Cu - CuNi	T	0~350	$\pm 1^{\circ}$ or $\pm 0.75\%t$
Fe - CuNi	J	0~750	$\pm 2.5^{\circ}$ or $\pm 0.75\%t$

MC-WR/WRK thermocouple can be made by assembly structure or sheathed structure. In comparison with assembly type, the sheathed is with small diameter, easy to bend, perfect vibration endurance, suitable for the place where assembly type is not suitable.

Principle

Two ends of conductor with different compositions form loop, direct measurement end is called measurement end, and joint terminal is called reference end. When there is temperature difference between measurement end and reference end, thermal current will be generated between loops. Thermal voltage of the thermocouple will be increased with the temperature rise at measuring end. The thermal voltage value is only related with thermocouple conductor material and temperature difference at both ends. A thermocouple mainly consists of joint box, protection tube, insulated sleeve, joint terminal, and thermal polar along with various fixtures.



Nominal pressure of thermocouple

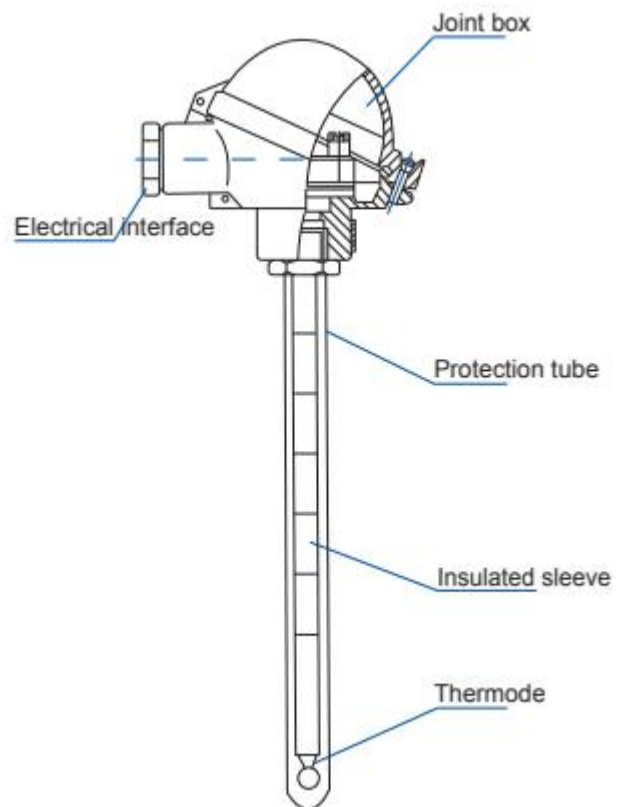
In general, it indicates the static external pressure undertaken by protection tube at room temperature, without break occurred. In fact, allowed working pressure is not only related with protection material, diameter, wall thickness, also with structure, installation method, probing depth, and flow and type of measured media.

Minimum probing depth of thermocouple

Shall be 8~10 times of the outer diameter of protection tube (except for special products).

Thermocouple insulated resistance (normal temperature)

Trial voltage of insulated resistance at normal temperature shall be DC 500V±50V, condition to measure insulated resistance at normal temperature is 15~



35°C, relative humidity is 45% ~ 75%, atmosphere pressure is 86 ~ 106 KPa.

a. For the thermocouple more than 1m, the product of insulated resistance at normal temperature and its length is 100Mohms.m.

That is, $R_r X L \geq 100 M\Omega \cdot ML > 1m$

Where, R_r – insulated resistance at normal temperature for thermocouple($M\Omega$); L – length of thermocouple (m).

b. For the thermocouple equal to or lower than 1m, the insulated resistance at normal temperature shall be less than 100 $M\Omega$.

Upper limit of insulated resistance for thermocouple shall be no less than the specifications in following table:

Upper limit temperature °C	Trial temperature °C	Resistance value $M\Omega$
$100 \leq t_m < 300$	$t = t_m$	10
$300 \leq t_m < 500$	$t = t_m$	2
$500 \leq t_m < 850$	$t = t_m$	0.5
$850 \leq t_m < 1000$	$t = t_m$	0.08
$1000 \leq t_m < 1300$	$t = t_m$	0.02
$t_m > 1300$	$t = 1300$	0.02

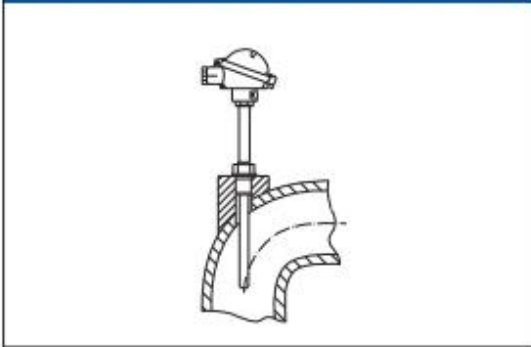
Model Selection

MC-WR/WRK	Thermocouple	
-	Type of thermocouple	B: PtRh30- PtRh6 S: PtRh10- Pt R: PtRh13- Pt K: NiCr – NiSi E: NiCr – CuNi T: Cu - CuNi J: Fe - CuNi
-	(Temperature range)	e.g. (0-1000°C) or (0-1800°F) etc.
-	Dual or not	None: Single thermocouple output D: Dual thermocouple output
-	Case type	W: Water-proof type Ex: Ex-proof type HS: Hersman connection O: Outlet type X: Wire lead out S: Customer specified
-	Material of wet parts	-SS: SS wet parts -CR: Ceramic probe -O: specified For SS (stainless steel) , please specified 304SS or 316SS.
-	Signal output	None: thermocouple

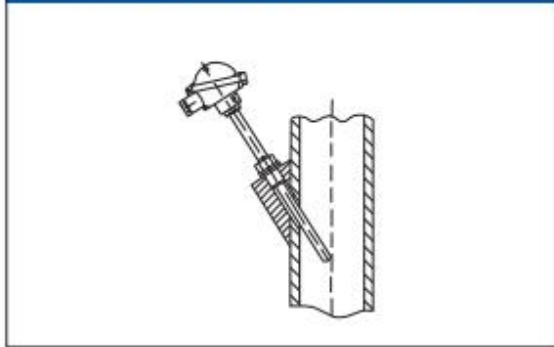
		S1: signal output 4-20mA S2: signal output 0-5V S3: signal output 0-10V S4: signal output RTD S5: signal output thermocouple S0: customer specified
-A	Installment type	1: fixed thread 2: slide adjustable thread 3: rotatable adjustable thread 4: flange 5: clamp 6: none thread or flange 0: customer specified
	Thermo well	None: without TW: with thermo well
-	Size of installment	e.g. for A1, -1/2BSP or -M20*1.5 etc.; for A3, -2" or 3" etc.
-	(Diameter of Probe)	E.g. -6 (6mm), or -1/4". etc.
-	(Length of Probe)	E.g. -200 (200mm), or -8". etc.

Installation

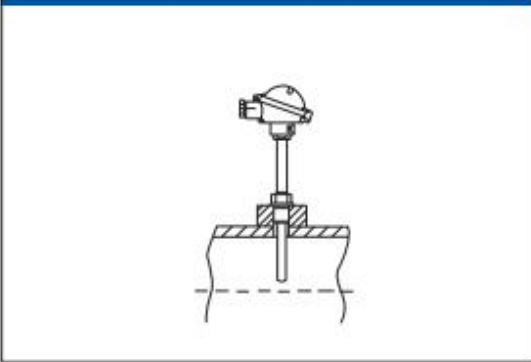
Installation method above bending tube



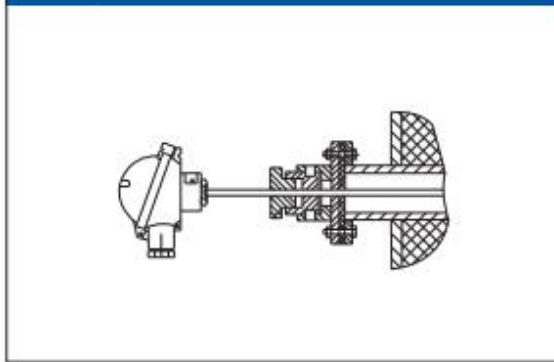
Installation method along tilt tube axis



Installation method along vertical tube axis



Sealing installation method in flue of boiler



MC-WR/WRK-Ex ex-proof type:



MC-WR/WRK-X wire lead out:



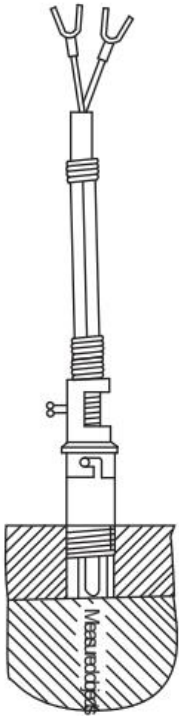
MC-WR/WRK-TW (with thermowell):



Thermowell:



MC-WR/WRK-09 Spring Pressing Fixed Thermocouple



MC-WR/WRK-09 Spring Pressing Fixed Thermocouple tightly presses the end of thermocouple and measured objects via spring, to increase the reliability and accuracy. It can be used with display instrument. Thermocouple with flexible extension conduit, which can be freely bended, with short heat response time, applicable to plastic extrusion machine, light fabric, and food industry etc. Installation method of MC-WR/WRK-09 thermocouple shown as the figure, installed on the measured objects, firstly tighten the connection bolt on the measured objects, then press the thermocouple on the measured objects, tighten the clamp screw, finally fasten the locked clamp.

Graduating	Temperature range °C	Response time t0.5(s)	Material of probe
E	0~400	<5	SS 1Cr18Ni9Ti

Total	Probe l2 (mm)	Connection bolt
1000	30	35or70
1500	30	
2000	30	
2500	30	
3000	30	
3500	30	
4000	30	
1000	60	
1500	60	
2000	60	
2500	60	
3000	60	
3500	60	
4000	60	

