

NEW-FLOW

**ISO 9001
REGISTERED**

NEW-FLOW

Instruction Manual

SHEATH TYPE RESISTANCE SENSOR /
SHEATH TYPE THERMOCOUPLE
RTD & THERMOCOUPLE使用說明書



Explosion proof



IP65

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INSTALLATION

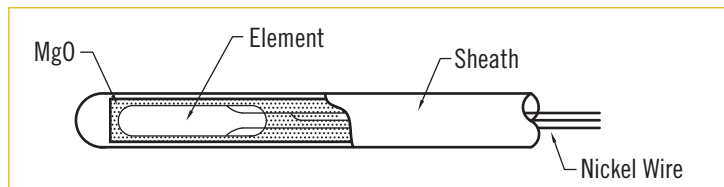
SHEATH TYPE RESISTANCE SENSOR - RTD

摘要 General

New-Flow RTD 為一具有高精確度及可靠性的測量溫度感測器。

New-Flow sheath type resistance sensor is high precision and reliability measuring temperature sensor.

組成零件 Component List



熱電阻感測器尺寸 Thermo Resistance Sensor Size

SINGLE ELEMENT						
	Sheath (unit:mm)			Lead Wire (unit:mm)		Sheath max. length (unit:M)
	O.D	t	Material	Diameter	Material	A
	Ø1.6	0.25	SUS316	Ø0.25	Nickel	100
Ø3.2	0.47	Ø0.51		83		
Ø4.8	0.72	Ø0.76		35		
Ø6.4	0.93	Ø1.00		20		
Ø8.0	1.16	Ø1.30		11.5		
Ø9.0	1.25	Ø1.46		21		
Ø12.75	1.80	Ø1.50		10.5		

DOUBLE ELEMENT						
	Sheath (unit:mm)			Lead Wire (unit:mm)		Sheath max. length (unit:M)
	O.D	t	Material	Diameter	Material	A
	Ø3.2	0.38	SUS316	Ø0.30	Nickel	83
Ø4.8	0.72	Ø0.50		35		
Ø6.4	0.93	Ø0.72		20		
Ø8.0	1.16	Ø0.90		11.5		
Ø9.0	1.25	Ø1.00		21		
Ø12.75	1.80	Ø1.50		10.5		

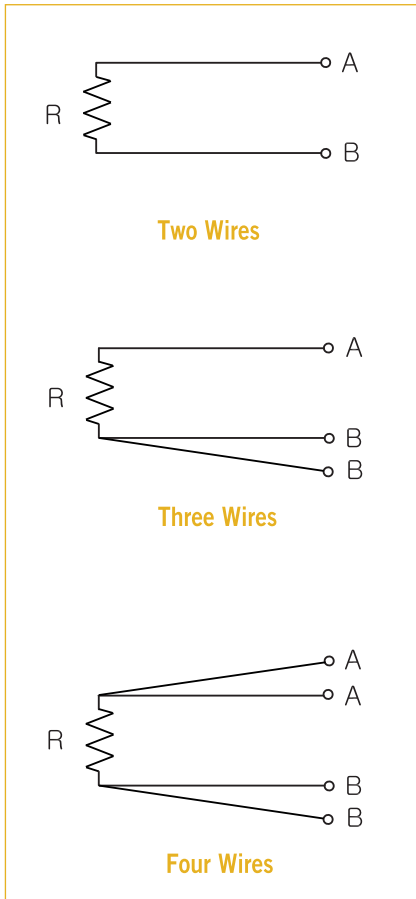
Standard Table For PT100 (R100/R0=1.385)

IEC Pub. 751-1983 JIS C1604-1997			ASTM E1137-1995	
Class	Tolerance (°C)	Measuring Current	Class	Tolerance (°C)
A	$\pm(0.15+0.002 t)$	Under 2mA	A	$\pm(0.13+0.0017 t)$
B	$\pm(0.3+0.005 t)$		B	$\pm(0.25+0.0042 t)$

*1 t l: display temperature (°C) on request range.

INSTALLATION

接線方式 Wiring Method



2導線式 Two-Conductor Type

因阻抗值須加算導線阻抗，雖然導線阻抗值非常小，但有必要於開始就知道導線之阻抗值。相較之下，R為高阻抗之場合以外不太被使用之型式。

Since a conductor resistance is added to the resistance value, it is necessary to reduce the conductor resistance in advance. This type is not usually used, except for a high resistance RTD's.

3導線式 Three-Conductor Type

一般最常被採用的型式。此種型式各導線之材質、線徑、長度與線阻抗要相等，且全長之溫度分佈必須要等溫。因導線3線之差異對於精度有不良之影響，在長距離傳輸時必須要注意。

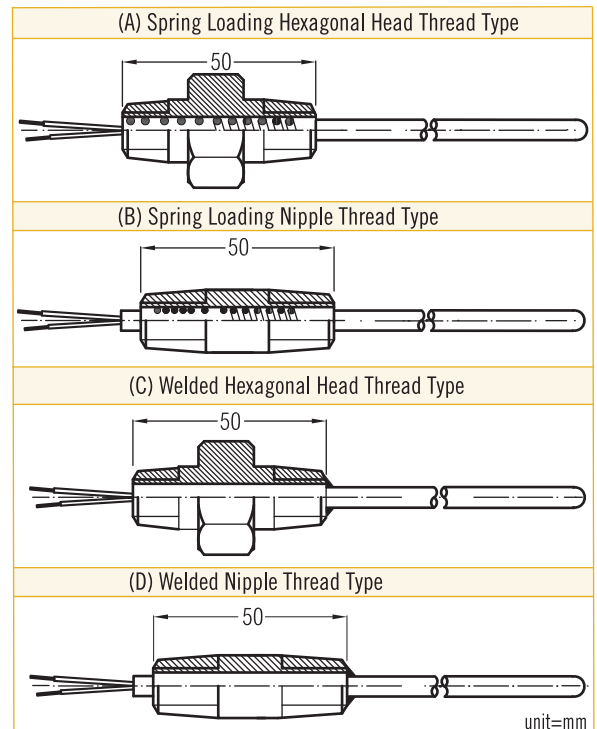
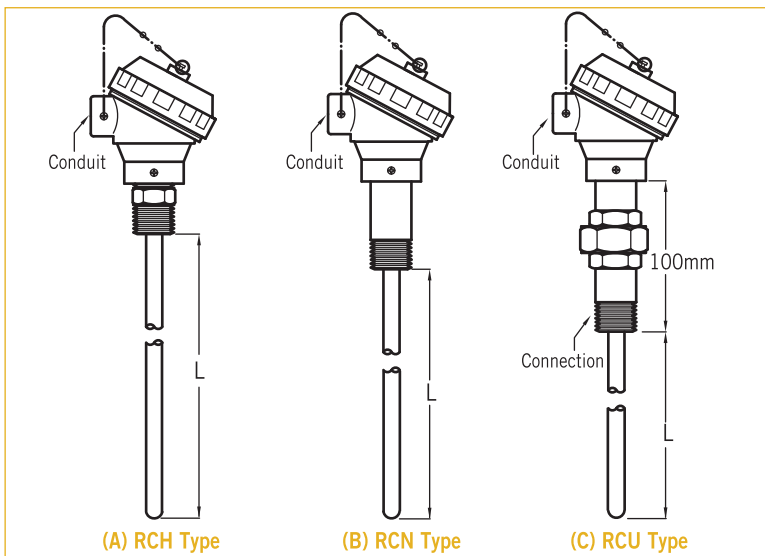
Use to eliminate the effect of conductor resistance, care should be taken for long-distance transmission because a variation of resistance of conductors has an effect on accuracy. This type of connection is most widely used in industrial applications.

4導線式 Four-Conductor Type

導線阻抗並不會對精度造成很大之影響，被使用在高精度計測時。一般量測時給與固定電流，再依電位差測定阻抗值。

This type of connection is used for high-accuracy measurement and standards because it is not affected by conductor resistance. Generally, a constant current is applied and the resistance value is measured by a potential difference.

RTD型號及感溫棒型式 Resistance Sensor Model & Type



SHEATH TYPE THERMOCOUPLE

摘要 General

New-Flow Thermocouple 為一具有高精確度及可靠性的測量溫度感測器。

New-Flow sheath type thermocouple is high precision and reliability measuring temperature sensor.

熱電偶構造 Thermocouple Construction

熱電偶的動作原理也就是所謂的“西貝克效應”。假使導線兩端有溫度差，將會造成電流流動。電流的多寡取決於選擇的材質。

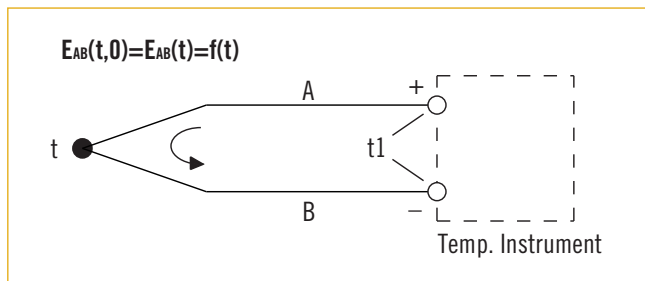
將兩種不同的金屬材質連接在一起並加熱此端，導線另兩端的參考溫度將會產生電差。若要測量溫接點溫度，導線另兩端參考溫度不能得知，需將導線延伸到可知的溫度點，作為參考點（一般為冷接點）。

此參考點的溫度是可知的係數，將參考點（冷接點）和溫接點溫度相加即是所測的實際溫度。

The effect responsible for the action of thermocouple is the “Seebeck Effect”. If a temperature difference exists along a wire, this will causes a displacement of electrical charge. The amount of the charge displacement depends on the electrical characteristics of the chosen material. If two wires of different materials are joined at one point and then a voltage difference will be generated between the open ends of the two wires. In order to be able to measure the temperature at the junction, the temperature at the open end must be known. If the temperature of the open end is not known, then it must be extended (by a compensating cable) into the zone of known temperature (reference junction, usually referred to as the “Cold Junction”). The temperature of the reference junction must be known and constant. The exact temperature is equal joined junction temperature plus cold junction temperature.

熱電偶測溫原理 Principle

如下圖，選用兩種不同的金屬或合金絲 A,B，稱為熱電極，焊接的一端稱為測量端，連線顯示儀表的兩頭稱為參比端。當測量端和參比端溫度不同時，就會產生熱電勢 $E_{AB}(t,t_1)$ 。當 $t=0^{\circ}\text{C}$ 時則有：



熱電偶種類及元件表 Element Material

Symbol	Positive Polarity (+)	Negative Polarity (-)
N	Alloy: nickel, chromium and silicone	Alloy: nickel and silicone
K	Alloy: nickel and chromium	Alloy: nickel
E	Alloy: nickel and chromium	Alloy: copper and nickel
J	Iron	Alloy: copper and nickel
T	Copper	Alloy: copper and nickel

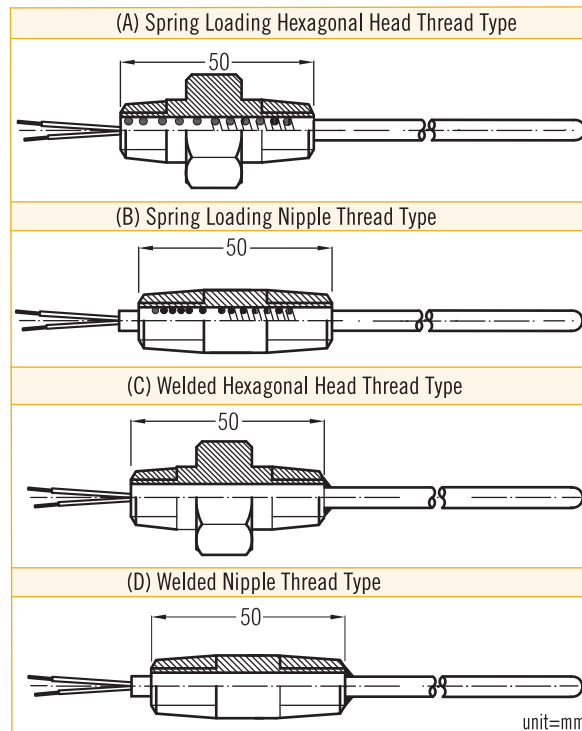
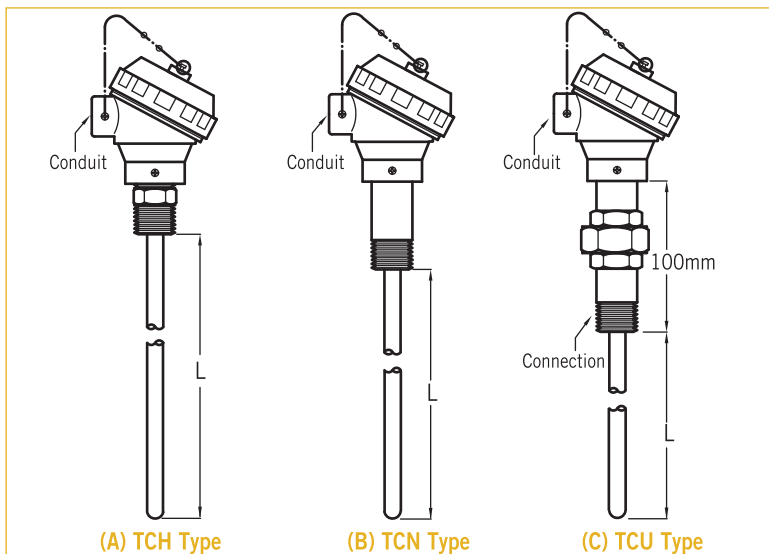
感測器規格 Thermocouple Sensor Size

SINGLE ELEMENT	Sheath (mm)		Wire dia. (mm)	Maximum Temperature Range (in air) Limited (unit: °C)					Maximum Length Available (unit: M)	
	O.D	t		N	K	E	J	T		
	∅1.0	0.17	∅0.17	900 ⁽³⁾	650 ⁽¹⁾	650 ⁽¹⁾	450 ⁽¹⁾	300 ⁽¹⁾	400	
	∅1.6	0.27	∅0.27	1200 ⁽³⁾	650 ⁽¹⁾	650 ⁽¹⁾	450 ⁽¹⁾	300 ⁽¹⁾	180	
	∅3.2	0.47	∅0.51	1260 ⁽³⁾	750 ⁽¹⁾	750 ⁽¹⁾	650 ⁽¹⁾	350 ⁽¹⁾	130	
	∅4.8	0.72	∅0.76	1260 ⁽³⁾	800 ⁽¹⁾	800 ⁽¹⁾	750 ⁽¹⁾	350 ⁽¹⁾	140	
	∅6.4	0.93	∅1.0	1260 ⁽³⁾	1000 ⁽³⁾	900 ⁽²⁾	800 ⁽¹⁾	750 ⁽¹⁾	350 ⁽¹⁾	80
	∅8.0	1.16	∅1.3	—	1050 ⁽³⁾	1000 ⁽²⁾	900 ⁽¹⁾	800 ⁽¹⁾	750 ⁽¹⁾	350 ⁽¹⁾
DOUBLE ELEMENT	∅3.2	0.47	∅0.51	—	750 ⁽¹⁾	750 ⁽¹⁾	650 ⁽¹⁾	350 ⁽¹⁾	130	
	∅4.8	0.72	∅0.76	—	800 ⁽¹⁾	800 ⁽¹⁾	750 ⁽¹⁾	350 ⁽¹⁾	140	
	∅6.4	0.93	∅1.0	—	1000 ⁽³⁾	900 ⁽²⁾	800 ⁽¹⁾	750 ⁽¹⁾	350 ⁽¹⁾	80
	∅8.0	1.16	∅1.3	—	1050 ⁽³⁾	1000 ⁽²⁾	900 ⁽¹⁾	800 ⁽¹⁾	750 ⁽¹⁾	350 ⁽¹⁾

*Material:
 (1) SS316
 (2) SS310
 (3) Inconel 600

INSTALLATION

Thermocouple 型號及感溫棒型式 Resistance Sensor Model & Type



測溫接點種類 Type Of Measuring Junction

種類 Type	形狀 Shape	特性 Feature
Grounded (接地型)		<ol style="list-style-type: none"> 1. This type can withstand 3500 kg/cm² or more. 此型能耐壓 3500 kg/cm² 以上 2. It is not suitable for location with electromagnetic inductino on radio frequency inter-ference. 不適用於電磁波干擾之場所
Ungrounded (非接地型)		<ol style="list-style-type: none"> 1. This type has a slower reponse than the grounded type but is more commonly used since it is not restricted by the object to be measured. 反應速率比接地型慢，但較為廣泛使用，被測物較不受限制 2. The element is covered with an insulator thereby ensuring a long life span. 元件由絕緣體保護，壽命較長
Exposed (露出型)		<ol style="list-style-type: none"> 1. Since the element is exposed reposed reponse time is very fast. 元件是露出型，反應速率非常快 2. This type is suitable for temperature measurement of gases such as automotive exhaust. 非常適用氣體測量，例如：廢氣 3. This type is mechanically weaker than the other. 機械架構比其他類型脆弱

熱電偶各型式特性 *Feature Of Thermocouple*

型式 Type	特性 Feature	優點	缺點
B	<p>Thermocouple which combines a positive wire of a platinum-rhodium alloy containing 70% platinum and 30% rhodium with a negative wire of platinum rhodium containing 94% platinum and 6% rhodium.</p> <p>Type B is more resistant to heat and mechanical stress than type R, and withstands 1800°C Max. Other features are the same as those of type R.</p>	<ol style="list-style-type: none"> 1. 適用 1000°C 以上至 1800°C 之高溫測定。 2. 在常溫環境下熱電動勢非常小，不需補償導線。 3. 耐氧化、耐藥品性良好。 4. 耐熱性與機械強度較 R 型優良。 	<ol style="list-style-type: none"> 1. 在中低溫域之熱電動勢極小，600°C 以下測定溫度不準確。 2. 感度不佳 (熱電動勢值小)。 3. 熱電動勢之直線性不佳。 4. 價格高昂。
R & S	<p>Thermocouple which combines a positive wire of a platinum and rhodium alloy containing 87% platinum and 13% rhodium with a negative wire of pure platinum. This thermocouple is highly accurate, excellent in heat resistance and stability, generally used in oxidizing atmospheres. It is not recommended for use in reducing atmospheres or where metal vapors are present.</p> <p>Thermocouple which combines a positive wire of a platinum rhodium alloy containing 90% platinum and 10% rhodium with a negative wire of pure platinum. Other features are the same as those of type R.</p>	<ol style="list-style-type: none"> 1. 耐熱性、安定性、再現性良好。 2. 耐氧化、耐藥品性良好。 3. 可以做為標準使用。 	<ol style="list-style-type: none"> 1. 感度不佳 (熱電動勢值小)。 2. 在還元性氣體環境較脆弱。(特別是氫、金屬蒸氣) 3. 補償導線誤差大 4. 價何高昂。
N	<p>This is called Nicrosil (positive leg) / Nisil (negative leg) Thermocouple, and its composition and characteristics are very similar to those of type LNK Thermocouple. It is an improved type of type K Thermocouple and has more Si additive, higher heat resistance.</p>	<ol style="list-style-type: none"> 1. 熱電動勢之直線性良好。 2. 1200°C 以下耐氧化性良好。 3. 為 K 型之改良型，受 Green Rot 之影響較小，耐熱較 K 型高。 	<ol style="list-style-type: none"> 1. 不適用於還元性氣體環境。 2. 熱電動勢與貴金熱電偶相比較經時變化較大。
K	<p>Thermocouple which combines a positive wire of an alloy consisting mainly of nickel and chromium with negative wire of an alloy consisting mainly of nickel. This thermocouple widely used in carbon monoxide, sulfurous acid gas or sulfur bearing hydrogen atmospheres.</p>	<ol style="list-style-type: none"> 1. 熱電動勢之直線性良好。 2. 1000°C 以下耐氧化性良好。 3. 在卑金屬熱電偶中安定性屬良好。 	<ol style="list-style-type: none"> 1. 不適用於還元性氣體環境，特別是一氧化碳、二氧化硫、硫化氫等氣體。 2. 熱電動勢與貴金熱電偶相比較經時變化較大。受 Short Range Ordering 之影響會產生誤差。
E	<p>Thermocouple which combines a positive wire of thermocouple K with a negative wire of thermocouple J. This thermocouple has a high thermal emf and is suitable for use in oxidizing atmosphere.</p>	<ol style="list-style-type: none"> 1. 現有熱電偶中感度最佳者。 2. 與 J 熱電偶相比耐熱性良好 3. 兩腳不具磁性 4. 適於氧化性氣體環境 	<ol style="list-style-type: none"> 1. 不適用於還元性氣體環境。 2. 稍具履歷現象
J	<p>Thermocouple which combines a positive wire of iron with thermocouple is resistant in reducing atmospheres and is also resistant to hydrogen and carbon. However it should not be used in atmospheres that will oxidize iron. It is relatively low in cost and often used for medium temperature range applications.</p>	<ol style="list-style-type: none"> 1. 可使用於還元性氣體環境。 2. 熱電動勢較 K 熱電偶大 20% 3. 價格較便宜，適用於中溫區域。 	<ol style="list-style-type: none"> 1. (+) 腳易生銹 2. 再現性不佳
T	<p>Thermocouple which combines a positive wire of copper with a negative wire of an alloy mainly of copper and nickel. High accuracy is obtained at under 300°C, and it is suitable for low temperatures from -200°C to +100°C. It is suitable for use in weak oxidizing and reducing atmospheres.</p>	<ol style="list-style-type: none"> 1. 熱電動勢之直線性良好 2. 低溫之特性良好 3. 再現性良好、高精度。 4. 可使用於還元性氣體環境 	<ol style="list-style-type: none"> 1. 使用溫度限度低 2. (+) 腳之銅氧化 3. 熱傳導誤差大

INSTALLATION

金屬保護管特性 *Operating Temp. & Feature Of Metal Protection Tube*

材質 Material	操作溫度 Material Operating Temp.		特性 Feature
	常溫 NOR.	最大溫度 MAX.	
SS304	850 °C	950 °C	耐熱、耐酸鹼。硫磺、還原氣體較弱。 Having high heat resistance, acid resistance, and alkali resistance.
SS316	850 °C	950 °C	雖耐熱、耐酸鹼與SS304相當，在高溫之耐蝕性較佳。 Almost same as SS304 in heat resistance, acid resistance and alkali resistance, but corrosion resistance is higher than SS304 at high temp.
SS316L	850 °C	950 °C	C之含量較 SS316 少，為耐粒界腐蝕性材料。 C amount decreased from SS316. Intergranular corrosion resistant material.
SS310S	1050 °C	1100 °C	Ni-Cr之含有率較高，在高溫抗氧化性強之耐熱鋼。 Having high Ni-Cr content. High heat resistant steel which has high oxidation resistance at high temp.
SUH446 SANDVIK P4	1100 °C	1200 °C	27Cr 鋼，耐熱、耐磨損較強、硫磺氣體下較強。 27Cr steel. Endurable against reducing flame. Having resistance against sulfuric gas.
UMCO 50	1150 °C	1200 °C	鈷合金，耐熱、耐磨損較強、硫磺氣體下也較佳。 Co base alloy. High heat resistant alloy which has abrasion resistance and sulfuric resistance.
KANTHAL AF	1100 °C	1300 °C	高溫下機械強度大。安裝金具之溶接不適。 Having mechanical strength in high temp. Not suitable for welding of metallic fittings.
NCF 600 (INCONEL 600)	1100 °C	1300 °C	不論高溫氧化，還原之氣體中皆為最強。 Having most high resistance in both oxidized and reduced atmosphere at high temp.
TITANIUM	250 °C	500 °C	雖在低溫下耐蝕性非常優秀，但在高溫氧化影響下變脆。 Corrosion resistance at low temp. is fairly good, but oxidized and fragile at high temp.

非金屬保護管特性 *Operating Temp. & Feature Of Non-Metal Protection Tube*

材質 Material	操作溫度 Material Operating Temp.		特性 Feature
	常溫 NOR.	最大溫度 MAX.	
Alumina (PT1)	1600 °C	1700 °C	在高溫下氧化，還原性氣體非常安定，在高溫的耐侵蝕性優秀。 1600°C 以上之爐內溫度、溶金屬之測定最適用。 Fairly stabilized and reduced atmosphere. Having a high corrosion resistance at high temp. Suitable for measuring of minimum 1600°C furnace temp. and fusing metal temp.
High Alumina (PT0)	1700 °C	1900 °C	耐熱、耐蝕、電氣絕緣、機械度大。因高硬度耐磨損性優。 Having high heat resistance, corrosion resistance and mechanical strength. Hard material, and high abrasion resistant.
Silicon Carbide	1650 °C	—	耐火度高熱傳導率大。對鋅、鋁、鉛、酸鹼在浸入。對急冷、急熱較強、耐碎裂性優。適合二重保護管之外管。 Having fire resistance and good heat conductivity. Not easily corroded by zinc, aluminum, lead, acid and alkali. Strong against rapid heating and cooling and spalling. Suitable for the use for outer tube of duplex protection tube.

TEMPERATURE TRANSMITTER - NT-IB

微電腦可規劃隔離傳送器安裝及使用說明

簡介



NT-IB 是兩線式大圓安裝隔離型信號傳送器。微電腦設計架構可以容易的使用 NT-IB 免費軟體透過專屬的 USB 規劃線在 PC 上進行規劃輸入信號、範圍、單位...；輸入信號包含：PT100Ω、9 種熱電偶、mV、V (選購時需指定) 及 mA (選購及訂購時需指定)。



特點

1. 電腦可規劃輸入各式溫度訊號及範圍。
2. 規劃時不須連接外部迴路電源。
3. 輸入：
 - 熱電阻 PT100Ω
 - 熱電偶 J, K, T, E, B, R, S, N, C
4. 輸出：
 - 兩線式迴電源，4 to 20mA or 20 to 4 mA 類比輸出
5. 高精度
6. 感測器故障防護：可選擇最高或最低點輸出

規格

輸入：使用者可參考下表進行規劃

熱電偶 (T/C)：標準工業用熱電偶

Type: J, K, T, E, B, R, S, N, C (ITS-90)

PT100Ω: Excitation 180uA,
2 線或 3 線式 (ITS-90 $\alpha=0.00385$)

DC 電壓: -60mV ~ 60mVdc.

量測範圍：可規劃，最大範圍參考下表

量測精度：參考下表。精度測試環境 $24^{\circ}\text{C} \pm 3^{\circ}\text{C}$

取樣時間：200mS.

輸入類型	最大範圍	精度
Thermocouple J	-50 to 1000°C (-58 to 1832°F)	$\pm 1^{\circ}\text{C}$
Thermocouple K	-50 to 1370°C (-58 to 2498°F)	$\pm 1^{\circ}\text{C}$
Thermocouple T	-270 to 400°C (-454 to 752°F)	$\pm 1^{\circ}\text{C}$
Thermocouple E	-50 to 700°C (-58 to 1292°F)	$\pm 1^{\circ}\text{C}$
Thermocouple B	0 to 1750°C (-32 to 3182°F)	$\pm 2^{\circ}\text{C}$ (Note 1.)
Thermocouple R	-50 to 1750°C (-58 to 3182°F)	$\pm 2^{\circ}\text{C}$
Thermocouple S	-50 to 1750°C (-58 to 3182°F)	$\pm 2^{\circ}\text{C}$
Thermocouple N	-50 to 1300°C (-58 to 2372°F)	$\pm 2^{\circ}\text{C}$
Thermocouple C	-50 to 1800°C (-58 to 3272°F)	$\pm 2^{\circ}\text{C}$
PT100	-200 to 600°C (-328 to 1112°F)	$\pm 1^{\circ}\text{C}$
mV	-60mV to 60mV	$\pm 0.01\text{mV}$
Voltage (Note 2.)	-10 to 10 Vdc	$\pm 1\text{mV}$
Current (Note 2.)	0 to 24mA dc	$\pm 10\ \mu\text{A}$

輸出信號：類比信號 4~20mA, 20~4mA

輸出解析度: 0.6 μA

輸出反應時間: <200mS.

負載: Max. (VPower supply - 10V) / 0.020

電源電壓: DC10 to 36V, 內部逆向保護

共模拒斥比: >80dB.

直流電隔離: 3.75 KV. 輸入及輸出間輸入電流必須 $\leq 3.8\text{mA}$

電流限制: $\leq 23\text{mA}$

環境溫度: -40 to 85°C

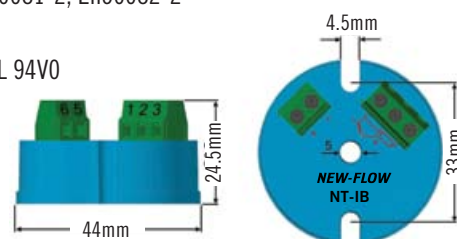
環境溼度: 0 to 90% RH

電磁相容性 (EMC): En50081-2, En50082-2

外觀尺寸: 參考下圖

外殼材質: ABS plastic UL 94V0

重量: 19g



NOTE

1. Type B 的 0~400°C 不在此規範內
2. 內部指撥開關需設定，NT-IB 需訂購時指定

INSTALLATION

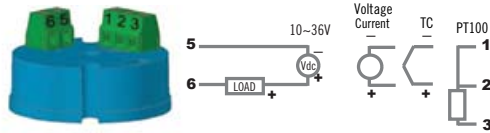
配線圖

配線規範:

鎖螺絲磅數: 4.3lb-in.

線徑: 12~30 AWG.

剝線長度: 7mm



配線注意事項:

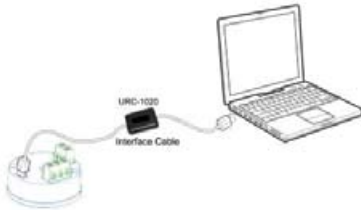
1. 信號線遠離電源及電磁接觸器
2. 此系列產品工作電源不要與電磁接觸器、電動馬達、電感(磁)性裝置等共用電源。
3. 輸入信號為:
TC/RTD/mV: 熱電偶 Type(J, K, T, E, B, R, S, N, C), PT100 和 DC 電壓 -60mV ~ 60mV

操作

所有輸入信號和輸出電流在工廠校正於指定準度之內。也可以透過 *New-Flow* NT-IB 軟體，對輸入和輸出信號進行微調。

規劃

NT-IB 須經由電腦軟體 *New-Flow* NT-IB 及傳輸線即可輕鬆寫入及修改輸入類型。Interface Cable 包含變壓器 USB 接頭寫入修改輸入類型時傳送器不需再另接電源。連接方式如下圖:



右圖為 *New-Flow* NT-IB 軟體規劃之畫面，可規劃參數如下:

1. 輸入信號 Input Signal Type: 不同的輸入在可規劃的範圍內自由選擇規劃。
2. 單位 Unit: 溫度可選擇 (°C or °F); 線性信號 (電壓或電流) 時不影響量測值。
3. 量測範圍 Measuring Range: 在輸入最高及最低範圍內，NT-IB 系列產品將輸入信號轉換為 4~20mA 類比輸出信號。
4. 輸出方向 Output Direction: 可選擇類比輸出 4~20mA or 20~4 mA.
5. 輸入信號斷線 Fault Signal On Sensor Break: 輸入信號斷線時輸出可選擇高於上限 (>20mA) 或低於下限 (<4mA) 兩種輸出模式。
6. 補償修正 Offset Correction: 量測 PV 值補償修正
7. 4~20mA 輸出信號校正 4~20mA Output Signal Calibration: 輸出信號 Zero 及 Span 調整。NT-IB 系列產品需連接電源調整，接線方式請參考上圖。
8. 量測 PV 值 Measuring Value: 從 NT-IB 系列產品持續讀取量測 PV 值。
9. 裝置訊息 Device Information: 顯示裝置型式、軟體版本、序號及連線狀態。

