KOS104TC

Low Cost Thermocouple Transmitter

kos104TCmanualb220600.doc 30727054 22/06/00

WARRANTY

The instruments are warranted against defective materials and workmanship for a period of three years from date of delivery.

If a product appears to have a defect or fails during the normal use within the warranty period, please contact the distributor from which you purchased the product.

This warranty does not apply to defects resulting from action of the buyer such as mishandling or improper interfacing.

The liability under this warranty shall extend only to the repair of the instrument. No responsability is assumed by the manufacturer for any damage which may result from its use.

KOSMOS SERIES

1.0 DESCRIPTION

This device is a low cost thermocouple two wire 4-20mA temperature transmitter. The transmitter is available in a number of standard sensor types and ranges, but if required the user may re-range the transmitter over most popular thermocouple temperature ranges. Automatic thermocouple cold junction compensation is required. The output is directly referenced to the mV input, allowing linearisation to be carried out by the loop monitoring instrumentation, if required. The device is housed inside a plastic enclosure, suitable for head mounting into any DIN style enclosure. Screw terminals are provided for wire connections. The enclosure provides access to the range setting links and trim potentiometers.

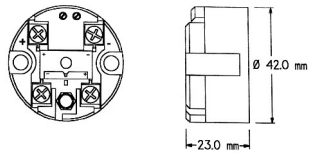
2.0 SPECIFICATION @ 20ºC

Input	Isolated junction un-grounded thermocouple			
Thermocouple type	K	T	J	
Span Min.	75	75	75	ºC
Span Max.	1000	400	760	ºC
Offset Range	-120	-150	±130	ºC
Accuracy (less CJ)	±0.1% FS	(0/100ºC range)		
Overall Stabillity	400ppm/ºC	(0/100ºC range)		
Input impedance	> 1MΩ			
Lead Resistance	Typ 0.01ºC/Ω per type K 0/100ºC			
Burn out	Up Scale Standard			
	Down Scale by link change.			
Cold junction	Automatic 0 to 70ºC			
	Accuracy 0.2ºC@20ºC, tracking ±0.05ºC/ºC			
Output type	4-20mA (directly proportional to mV input)			
	Over range > 25mA under range < 3.5mA			
Supply voltage	10-30V DC reverse conection protected			
Loop Sensitivity	10μA/V			
Temperature Stability	Zero drift typical 0.02%/ºC			
	Span typical 0.005%/ºC			
Loop ripple	< 40μA/V (measured at 1V ripple 100Hz)			
Loop resistance	(V Supply-10) /0.021			
Response time	2mS to reach 70% of final value			
Ambient temperature	0 to 70ºC operation, -40 to 85ºC storage			
Ambient Humidity	0 to 95% RH non condensing			
Connections	Recommended cable size 2.5mm^2			
EMC	EN50081-1			
	EN50082-1			

3.0 MECHANICAL

The transmitter is mounted using two 5.5mm diameter holes, on standard 33mm fixing centres.This transmitter has been specifically designed to be mounted inside a DIN standard probe head enclosure, which should provide adequate protection from moisture, corrosive atmosphere etc. All cable entries should be sealed using the correct size cable gland. Care must be taken when locating the transmitter to ensure the ambient temperature will remain inside the specified range of 0 to 70ºC, for best operation keep the ambient within the range 10/30 deg C.

The diagrams show the mechanical layout and a typical application of the transmitter mounted inside a probe head enclosure, with sensor wires entering through the centre hole.



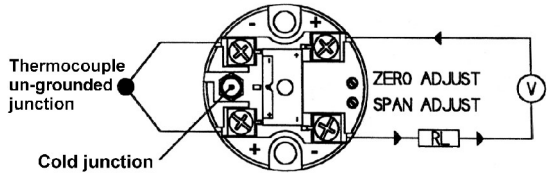
3.2 ELECTRICAL

Connections to the transmitter are made to the screw terminals provided on the top face. No special wires are required for the output connections, but screened twisted pair cables are recomended for long runs. A hole is provided through the centre of the transmitter to allow sensor wires,(entering direct from the probe assembly via a base entry), to be threaded through the transmitter body, direct to the input screw terminals. The screw terminals have been designed to allow all conection wires to enter from an inner or outer direction.

The transmitter is protected against reverse connection by means of a series diode, therefore incorrect connection of the output wires will result in near zero current flow in the loop. Incorrect connection of the sensor wires will result in the transmitter saturating at either is low or upper limits, depending on the setting of the burnout links.

The diagram shows the method of connection to provide a 4-20mA current loop output. The TC sensor shown would normally take the form of a probe assembly with a two wire output. The output loop shows a 24V DC power supply, used to provide loop excitation, the transmitter, and a load all connected in series. The load symbol represents other equipment in the loop, normally indicators, controllers, loggers etc. Sometimes these instruments come with the 24V supply built in as standard, this simplifies wiring and reduces cost. Care must be taken when designing the 4-20mA circuit to ensure that the total burden of the loop, that is the total voltage requierements of all the equipment in the loop added together, does not exceed the power supply voltage. If a number of instruments are conected in the loop, ensure that only one instrument is tied to ground. Grounding the loop at two points will result in shorting out part of the loop and therefore the instruments in taht part of the loop will not operate.

NOTE: The thermocouple used with this transmitter **MUST** be isolated from ground. If grounded thermocouple is used, reading errors will occur.



4.0 RANGES

This transmitter is normally supplied as one of the standard ranges, refer to data sheet. Other ranges can be supplied at time of order but with the aid of suitable equipment, the user can re-range the transmitter. On board links allow the transmitter to be re-ranged to operate over most common industrial and commercial ranges

WARNING- Re-ranging requieres the soldering of small links located on a pcb, housed inside the transmitter. The operator must be experienced in soldering and un-soldering techniques on small PCB, or damage may occur to both PCB and enclosure. If in doubt please state the requiered range at the time of order, to allow the factory to calibrate for you. It is the users responsibility to ensure that no damage occurs due to lack of care during this re-ranging procedure.

Before you start you will need the following equipement:

- TC calibrator with internal cold junction compensation
- DC milliamp meter (digital); accuracy 0.05% on 0 to 20mA range
- Power supply; 24V DC 30mA min.
- T/C Compensating wire, wire for 4-20mA loop, plus trim tool
- Soldering iron with fine tip, solder.Desoldering tool.

1. Decide on the range you requiere and ensure the transmitter is capable of this range. If a range has not been specified at time of order, the transmitter will leave the factory set as type K, 0 to 1000ºC. Obtain access to the internal PCB by flipping out the base cover, using a small screw driver. Remove any pre-solder links from positions A,B,C,D,X,Y,Z, and J.

2. Let TL= offset
   Locate offset TL on table 1 and solder blob indicated links.

3. If TC type is "J" then solder blob link "J"

4. Let TI=Required Temperature @ 4mA
   Let Th=Required Temperature @20mA
   Calculate Transmitter Span
   Ts=Th-TI
   Locate span Ts on table 2 and solder blob links indicated.

5. If down scale burn out is requiered, un-solder link "U" and solder link "D".
   If up/down scale burnout is not important then remove both links U+D

6. Connect T/C calibrator to +/- input terminals. Ensures wires are the correct type and polarity. Connect + signal terminal to + power supply terminal. Connect mA meter in series with the return wire from the - signal terminal to - terminal om power supply. Turn on. Allow a few minutes before calibration to allow the cold junction to stabilise, after the effects of handling the transmitter. Avoid touching the input terminals and wires during calibration as this will cause errors in the cold junction tracking.

7. Set calibrator to temperature TI and adjust "Z" potentiometer for 4.0mA output ±0.01mA.

8. Set calibrator to temperature Th and adjust "S" potentiometer for 20mA output ±0.01mA.

9. Repeat Step 6 and Step 7 until both points are in tolerance.

10. Turn off power and remove wires. Mark transmitter with the new range.

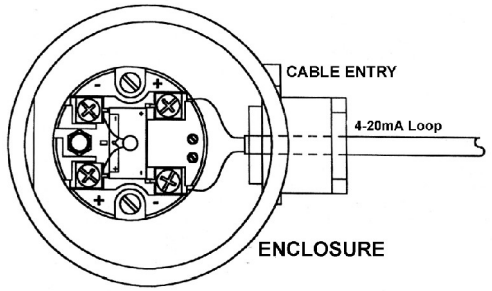
TABLE 1 TL Offset Links group X, Y y Z

Type K	Type T	Type J	Solder links
-120/-99	-150/-105	-130/-96	
-98/-59	-104/-62	-95/-58	X
-58/-23	-61/-24	-57/-23	Y
-22/9	-23/9	-22/9	X, Y
10/40	10/40	10/40	Z
41/72	41/71	41/72	X, Z
73/104	72/99	73/102	Y, Z

TABLE2 Ts Span Links Group A, B, C y D

Type K	Type T	Type J	Solder links
75/148	75/137	75/102	
149/214	138/189	103/170	A
215/280	190/239	171/225	B
281/341	240/284	226/283	A, B
342/401	285/327	284/341	C
402/464	328/371	342/409	A, C
465/527	327/400	410/464	B, C
528/587		465/521	A, B, C
588/646		522/578	D
647/710		579/642	A, D
711/752		643/692	B, D
753/836		693/743	A, B, D
837/899		744/793	C, D
900/966		794/851	A, C, D
967/1035		852/900	A, B, C, D

Note: Max recommended temperature for type J input is 760ºC.



DISEÑOS Y TECNOLOGIA, S.A.
Polígono Industrial Les Guixeres
C/ Xarol 8 C
08915 BADALONA-SPAIN
Tel : +34 - 93 339 47 58
Fax : +34 - 93 490 31 45
E-mail : dtl@ditel.es

www.ditel.es