SC5000
TWO-WIRE ISOLATED TEMPERATURE TRANSMITTER

OVERVIEW

The SC5000 Silver Series transmitter provides a direct current output proportional to the temperature as measured with a thermocouple or RTD. The user may select between thermocouple types J, K, R, S, T, E or N, or 3850 or 3920 RTDs. RTD input connections are provided for 2, 3 and 4 wire operation. The transmitter compensates for the lead resistance in the 3 wire configuration and provides true measurement of the resistive element without wire lead error in the 4 wire configuration. In addition, the RTD configuration provides an automatic high gain/narrow input span mode for input spans as narrow as 15°C, when the SPAN value (i.e., the FULL SCALE value) is set anywhere between 0°C (32°F) and 150°C (302 °F), inclusive. Input span and zero adjustments provide full rangeability over all the above sensors. Linearization is furnished for all the thermocouple types as well as 3850 and 3920 micro-ohm/ohm/ °C 100 ohm platinum resistive elements; or may be used in the non-linearized mode.

TECHNICAL DESCRIPTION

The SC5000 is designed and manufactured to be intrinsically safe. The case is completely flame retardant consisting of an extruded aluminum shell with a stamped aluminum backplate and injection molded UL94-V0 polyester face.

A microprocessor controls input settings, cold junction temperature compensation, input auto-zero, variable input signal damping, normal/reverse acting output,

and uses look-up tables with dynamic non-linear extrapolation to perform thermocouple linearization to publication NIST Monograph 175. RTD's are linearized to DIN 43760 (a= 0.00385 or 0.00392).

The SC5000 utilizes a microprocessor controlled single slope integrating converter to transform the input voltages from the T/C or RTD, the cold junction sensor, ground and a reference voltage to their time equivalents. The microprocessor then digitally performs linearization, compensation for offsets, compensation for drift, and develops a digital signal with a duty cycle proportional to the corrected input signal amplitude. This signal is coupled through an isolating pulse transformer to the output circuitry which modulates the current at the output terminals (PS + and - terminals).

The transmitter contains adaptive filtering and conditioning to reduce susceptibility to transients and noisy environments. Large sample averaging increases the unit's accuracy and stability while a separate small sample average allows the unit to rapidly track larger changes in temperature.

A watchdog circuit protects the unit against power disturbances by restarting the microprocessor's operation after a specified period of inactivity. The output is fully isolated from the input and ground. The unit is not susceptible to problems caused by ground loops and common mode voltages, and the factory settings, stored in non-volatile memory, are not susceptible to brown-outs or power losses.

LABELS

A label on the top side of the unit, above the output terminals (Figure 1) shows wiring diagrams for thermocouple and RTD connection.

The product model and factory set-up information is on the label directly below the input terminals (Figure 2) . This label contains a space showing calibration information.

FIGURE 1

INPUT SELECTION			WIRING GUIDE	
IND	T/C	RTD α	T/C	① ② ③ ④
0	J	3850μ 2/4W	RTD 2W	① ② ③ ④
1	K	3850μ 3W	RTD 3W	① ② ③ ④
2	R	3920μ 2/4W	RTD 4W	① ② ③ ④
3	S	3920μ 3W		
4	T	NOT USED		
5	E	NOT USED		JUMPER AT TERMINALS
6	N	NOT USED		

FIGURE 2

Lakeland, FL. U.S.A.
WILKERSON INSTRUMENT CO. INC.
800-234-1343
www.wici.com

MODEL	
CAL	
CODE	

CONFIGURATION

The SC5000 is factory configured to the temperature span and sensor as noted on the Model label in the following format:

SC5000, __,__,__,__,__

4/20	4/20 mA Output
20/4	20/4 mA Output

L	Linearized
N	Non-linearized

US	Output goes **Upscale** on open sensor
DS	Output goes **Downscale** on open sensor

Temperature Range

J, K, R, S, T, E, or N	Thermocouple
3850 or 3920, 2W	2-wire RTD
3850 or 3920, 3W	3-wire RTD
3850 or 3920, 4W	4-wire RTD
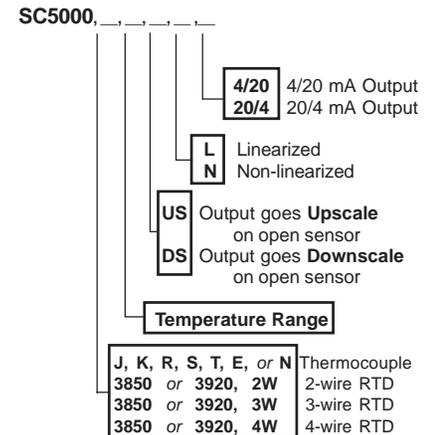
Example: SC5000,J,0/500F,US,L,4/20

NOTE: Model SC5000 will be supplied configured as shown in the example unless otherwise specified.

SETUP WITH A COMPUTER

CAUTION: USER SETUP MUST BE PERFORMED IN A LOCATION CLASSIFIED NON-HAZARDOUS.

The SC5010 can be setup by the user from the on-board membrane keypad and display, or from a computer via Wilkerson Instrument's COMPUTER INTERFACE KIT (CIK005).

The SC5010 is factory set to the specifications on the customer's order. The CIK005 makes it possible for the user to set-up a quantity of transmitters or to review the set-up configurations via a computer.

The CIK005 contains a cable which plugs into an RS232 interface adapter via an RJ11 modular plug. The CIK unit contains active circuitry which conditions the I/O signals between the computer and the transmitter.

The CIK is then plugged into the RS232 serial port of an IBM compatible personal computer. A 9-pin to 25-pin adapter is included, if needed. The other end of the cable has a 4 position modular handset plug which plugs directly into the SC5010.

The configuration utility program is provided on a 3.5" floppy and should be installed on the hard drive. This program is used to interactively configure and monitor the operating parameters of the transmitter. Additionally, set-up files can be generated and stored on disk, which can then be recalled and downloaded to the transmitter as needed. Help files are included in the program to assist the user with the set-up process. Instructions for installing the program are on the disk label.

The configuration program runs on an industry compatible Personal Computer running DOS 3.2 or later with at least 100K of available RAM, a CGA, EGA, VGA or SVGA Graphics Adapter. It requires a dedicated serial port (COM1: or COM2:) set at the following:

Baud Rate: 4800
Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: Xon/Xoff

One additional feature is available to the user when setting up from a computer. When in the 'OFF-LINE/EDIT CONFIG' mode, the cold junction temperature compensation may be deactivated.

SPECIFICATIONS

INPUT

THERMOCOUPLE
Types J, K, R, S, T, E, & N

Spans:
User configurable from 5 mV
minumum to maximum usable range

Linearization:
Maximum linearized range:

J	-210°C	to	+ 760°C
K	-250°C	to	+1372°C
R	-50°C	to	+1768°C
S	-50°C	to	+1768°C
T	-270°C	to	+ 400°C
E	-260°C	to	+1000°C
N	-250°C	to	+1300°C

Reference Junction
Compensation Accuracy:
± 0.25°C

Impedance:

>1 megohm

Span Adjustment:
Continuous from 6.25% to 100%
of T/C range *(5 mV minimum span)*

RTD
100 Ohm Platinum, 0.00385 and
0.00392 alpha, 2, 3, or 4 wire
connection

Maximum usable range:
-200°C to +850°C *(470°C for .00392)*

Minimum Span:
45°C (15 °C in high gain/narrow input
span mode. See OVERVIEW)

Zero Adjustment:
Continuous from 0% to 90% of
sensor range

OUTPUT

Range:
4/20 mAdc

Modes: Normal / Reverse acting
Linear / Non-linear
(User Configured via CIK005)

Burnout Indication:
Thermocouple Only
Upscale / Downscale
(User Configured via CIK005)

Linearity:
±0.25°C of NIST Tables

Test Points:
Monitor Loop Current

Accuracy:
±0.05% of span

Repeatability:
±0.01% of span

Input to output linearity:
±0.01% of span

Response time:
< 1 sec. for 60%
» 6 sec. to 99%

Ripple *(peak to peak)*:
< 0.1% of full scale

Power supply effect:
< 0.001% of span / Volt

Ambient temperature effect:
±0.005% of span / °C

Long term stability:
±0.0005% of span / 6 months

COMMON MODE REJECTION
120 dB, DC to 60 Hz

ISOLATION,
OUTPUT TO INPUT
> 500 megohms

BREAKDOWN,
OUTPUT TO INPUT
> 1000 Volts RMS sine wave

OPERATING TEMPERATURE
-40°C to +80 °C *(-40°F to +176 °F)*

RFI IMMUNITY
Filtering and shielding to reject
RFI interference

POWER
12 VDC to 36 VDC
(current limited to 30 mA max.)

*The test points are across a silicon
diode and the meter must not drop more
than 250 mV or it will not read accurately.*

INSTALLATION & MOUNTING
MP8500 Mounting Plate is used to mount the transmitter on a flat surface orin a 2 ¾" wide PVC track. Use the mounting plate as a template to locate and drill holes for surface mounting. To screw the mounting plate to the transmitter, remove the appropriate diagonal screws from the back of the unit and reinstall with mounting plate in place against the back of the unit.

DMP8500 Mounting Plate is used to mount the transmitter on a standard 35mm DIN rail. The mounting plate is normally configured to mount the transmitter horizontally, but by rotating the mounting clip 90°, the user may mount the transmitter vertically to obtain higher density mounting on the DIN rail.

CLP5000 is a factory installed retainer clip which holds the transmitter in a 3³/₁₆" I/D housing. For mounting in a 3½" I/D housing, a larger clip, **CLP8500** is also available.

Once mounting is complete, connect the output wires from the power supply and load to the PS + and - terminals. The transmitter is protected against accidental polarity reversal, but will only function with the correct polarity. Next, connect the sensor input wires as shown on the label above the output terminals (Figure 2). The terminal to terminal jumpers must be installed for proper operation.

WARRANTY
The SC5000 Series of products carry a limited permanent warranty. In the event of a failure due to defective material or workmanship, the unit will be repaired or replaced at no charge.

CASE DIMENSIONS INCHES [mm]
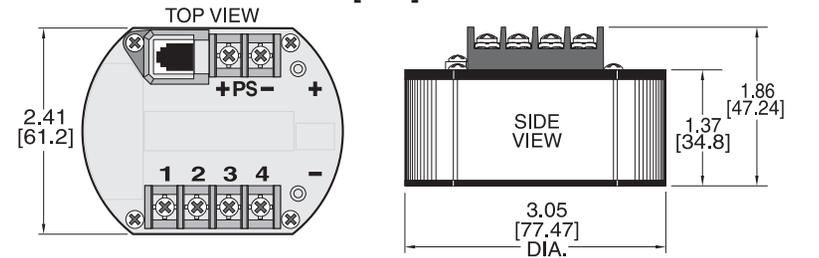
ACCESSORY
EXPLOSION-PROOF ENCLOSURE (XIHFCX2L, XIHFGCX2L)
LISTINGS/APPROVALS
(ADALET XIH SERIES)
CSA certified and FM approved for the following locations:
Class I, Groups B, C, & D
Class II, Groups E, F, & G
NEMA 4 & 7

APPROVALS:
CSA certified
FM approved
STANDARD MATERIALS:
BOX AND COVERS
Copper-free aluminum
O-RING SEALING GASKET
Buna-N-rubber.
GLASS LENS (OPTIONAL)
3/8" thick tempered glass (9.5 mm)
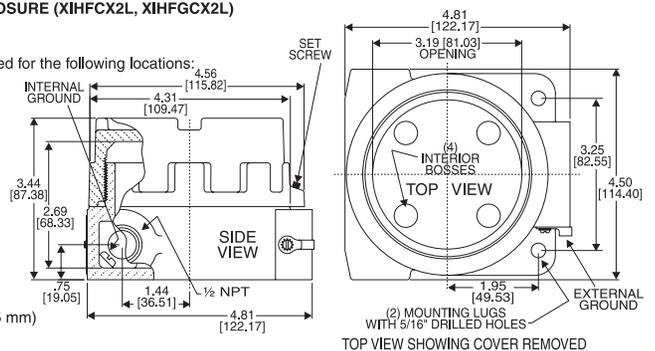
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