

DIS474 THERMOCOUPLE INPUT PROCESS INDICATOR



DESCRIPTION

The DIS474 provides a 3 ½ digit red LED display of temperature as measured by a thermocouple input. The unit includes filtering and conditioning to reduce susceptibility to transients and noisy operations. The digital display utilizes an auto-zero dual-slope integrating A/D converter for accuracy and stability.

A unique analog thermocouple circuit with digital linearity compensation provides the optimum combination of resolution and thermocouple linearization. Linearization is better than $\pm 1^\circ\text{C}$ from -200°C (-328°F) to the thermocouple's upper limit on all ranges. $0.1^\circ\text{C}/0.1^\circ\text{F}$ resolution is available for thermocouple types J, K, T, E and N (-199.9 to $+199.9^\circ\text{C}/^\circ\text{F}$). A temperature sensing I.C. potted inside the input connector provides optimum cold-junction compensation.

All DIS instruments are gasketed and, when properly installed, are NEMA-4X waterproof and corrosion resistant. ZERO and SPAN controls are accessible by removing a gasketed front access panel.

A plug-in range card, accessible without opening the case, permits user-recalibration for all thermocouple types and ranges. $^\circ\text{C}$ or $^\circ\text{F}$ is selected using switches accessible from the rear. A rear-panel jumper selects upscale or downscale burnout indication.

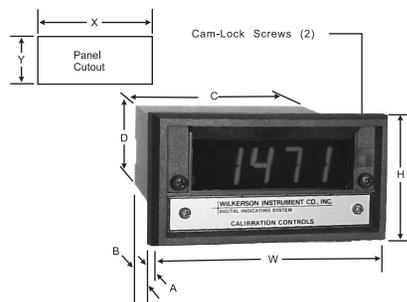
A complete set of engineering unit labels is sent with each DIS. Terminations are made to a screw terminal connector on the rear of the case.

INSTALLATION

DIS Series instruments are designed to be mounted from the front of a panel through a standard horizontal 1/8 DIN cutout. Two mounting cams secure the DIS to the front panel. Figure 1 shows the case and panel cutout dimensions.

To install the DIS in the cutout, turn the two cam-lock screws (on the front panel - see Figure 1) counterclockwise until the cams move far enough toward the rear to clear the panel thickness. Insert the case through the panel cutout and turn the cam-lock screws clockwise until both are tight.

Figure 1. DIS Case and Panel Cutout Dimensions



Dimension	Inches	Millimeters
H	2.25	57.1
W	4.15	105.4
A	0.46	11.7
B	4.02	102.1
C	3.57	89.6
D	1.65	41.9
X	3.62	92.0
Y	1.77	45.0

CONTROLS

ZERO and SPAN adjustments are located behind the front panel. To gain access, simply loosen the two screws and remove the gasketed CALIBRATION CONTROLS panel. $^\circ\text{C}/^\circ\text{F}$ indication is selected using DIP switches at the rear of the instrument. Upscale/downscale burnout indication is selected using a plug-in jumper at the rear of the instrument. Thermocouple type and wide/narrow range selection is changed by replacing a plug-in card, also at the rear of the instrument.

CALIBRATION

All DIS Series instruments are precisely calibrated at the factory to the range printed on the label. To recalibrate or change ranges, proceed as follows

$^\circ\text{C}/^\circ\text{F}$ Switches

Set the two rear-panel DIP switches UP for $^\circ\text{F}$, DOWN for $^\circ\text{C}$. No recalibration required.

Upscale/Downscale Burnout Indication

To change upscale/ downscale burnout indication unplug the rear-panel range card to reach the jumper. Install the jumper in its left position for downscale indication, right for upscale. The jumper may be removed altogether if minimum input bias current is preferred, but burnout indication will be unpredictable. Reinstall the range card. No recalibration is required.

Input Connection

Range changes and display recalibration require precise calibration inputs.

Connect a calibration input to the INPUT + and - terminals. If a thermocouple simulator is available, use it to provide the calibration input, connecting it to the terminals with the appropriate pair of thermocouple wires. Otherwise, use copper wires to connect a precision DC millivolt source to the input.

When a millivolt source and copper wires are used, it will be necessary to measure and correct for the temperature at the input terminal connections. Using standard tables for your thermocouple, find the millivolt level corresponding to the temperature at the input terminals. Then, at each calibration temperature, subtract this voltage from the voltage given by the thermocouple table. Remember, calibration accuracy will be no better than the accuracy of this temperature measurement.

Range Changes

Thermocouple type and wide/narrow range selection is changed by replacing the plug-in range card at the rear of the instrument. Table 1 lists the input ranges available. Contact Wilkerson Instrument Company, Inc. for replacement range cards.

Plug in the desired range card. (The thermocouple type and range are written on the bottom of the card.) Provide a calibration input source as described under **Input Connection**, above. Turn the rear-panel OS trimpot fully counterclockwise and the GAIN trimpot fully clockwise.

Referring to Table 2, set the input to the value listed under OFFSET CALIBRATION (When using an uncompensated millivolt source and copper wires, remember to subtract the ambient temperature millivolt level from the value shown in Table 2.) The CAL LED on the rear panel should be on.

Turn the OS trimpot clockwise until the LED just begins to turn off.

Raise the input to the GAIN CALIBRATION value in Table 2. The CAL LED should be off. Turn the GAIN trimpot counterclockwise until the LED just begins to light.

Touch up the OS and CAL settings until both are correct. The unit is now properly linearized. Proceed to the **Display Recalibration** section.

Display Recalibration

Provide a calibration input source as described under **Input Connection**, above. If you have changed the input range card, perform the OS and GAIN adjustments described above before recalibrating the display.

For most efficient calibration (minimum back-and-forth between zero and span) the unit is initially zeroed at 0°C , then fine-adjusted at the low end of the range.

Proceed as follows:

Set the two rear-panel DIP switches to $^\circ\text{C}$ (down). Set the input to 0°C (except for type B: $+200^\circ\text{C}$). Adjust the front-panel ZERO adjustment for the proper display reading.

Set the input to the full scale value per Table 1. (Use 199°C for narrow ranges.) Adjust the front-panel SPAN adjustment for the proper display reading.

Repeat until both readings are within a few digits of being correct.

WARRANTY

Now, set the input to the low end value per Table 1. (Use -199°C for narrow ranges.) Adjust the front-panel ZERO for the proper reading.

Set the input to the full scale value per Table 1. (Use +199°C for narrow ranges.) Adjust the front-panel SPAN adjustment for the proper display.

Repeat until both readings are correct.

If you desire to read °F, move the two rear-panel DIP switches to °F (up). Do not recalibrate: the reading will be correct.

The DIS Series of products carry a limited warranty of 5 + 5 years. In the event of a failure due to defective material or workmanship, during the 5 year period, the unit will be repaired or replaced at no charge. For a period of 5 years after the initial 10 year warranty, the unit will be repaired, if possible, for a cost of 10% of the original purchase price.

Relays are not covered by the warranty.

Table 1: Input Ranges

CALIBRATION	THERMOCOUPLE TYPE AND RANGE
B	TypeB, +200 /+1820 °C or +392 / +1999 °F
C	TypeC, -18 /+1999 °C or 0 / +1999 °F
E	TypeE, -200 /+1000 °C or -328 / +1832 °F
E (Narrow)	TypeE, -199.9 /+199.9°C or °F
J	TypeJ, -200 /+1200 °C or -328 / +1999 °F
J (Narrow)	TypeJ, -199.9 /+199.9°C or °F
K	TypeK, -200 /+1372 °C or -328 / +1999 °F
K (Narrow)	TypeK, -199.9 /+199.9°C or °F
N	TypeN, -200 /+1300 °C or -328 / +1999 °F
N (Narrow)	TypeN, -199.9 /+199.9°C or °F
R	TypeR, -50 /+1768 °C or -50 / +1999 °F
S	TypeS, -50 /+1768 °C or -50 / +1999 °F
T	TypeT, -200 /+400 °C or -328 / +752 °F
T (Narrow)	TypeT, -199.9 /+199.9°C or °F

Table 2: Inputs for Offset and Gain Calibration

CALIBRATION	OFFSET CALIBRATION		GAIN CALIBRATION	
	mV	°C	mV	°C
B	+0.205 mV	+213 °C	13.734 mV	1813 °C
E	-8.658 mV	-194 °C	75.859 mV	993 °C
E (Narrow)	-8.779 mV	-198.2 °C	13.282 mV	198.2 °C
J	-7.739 mV	-193 °C	69.082 mV	1192 °C
J (Narrow)	-7.852 mV	-198.3 °C	10.662 mV	197.9 °C
K	-5.772 mV	-193 °C	54.519 mV	1362 °C
K (Narrow)	-5.863 mV	-198.2 °C	8.051 mV	197.8 °C
N	-3.889 mV	-190 °C	47.200 mV	1292 °C
N (Narrow)	-3.970 mV	-198. °C	5.851 mV	198.1 °C
R	-0.184 mV	-40 °C	20.983 mV	1758 °C
S	-0.199 mV	-41 °C	18.587 mV	1758 °C
T	-5.551 mV	-197 °C	20.714 mV	397 °C
T (Narrow)	-5.572 mV	-198.1 °C	9.194 mV	198.3 °C

SPECIFICATIONS

INPUT RANGE

Wide

any standard thermocouple type, full temperature range above -200°C (328°F) to +1999°C/°F

Narrow

-199.9 to +199.9°C/°F
types J, K, T, E and N

ACCURACY

Wide

±(0.1% of reading plus 1°C or 2°F)

Narrow

±0.5°C or 0.9°F

BURNOUT INDICATION

jumper selectable

upscale/downscale

COMMON MODE REJECTION

120 dB, DC to 60 Hz

INPUT-TO-LINE

BREAKDOWN VOLTAGE

1500VAC rms

DISPLAY

Digit Size

.56" LED, 3½ digits, ±1999°C/°F
switch selectable

Update

3/sec

OPERATING TEMPERATURE

14°F to 140°F/-10°C to 60°C

TEMPERATURE STABILITY

±0.02% of span/°C max

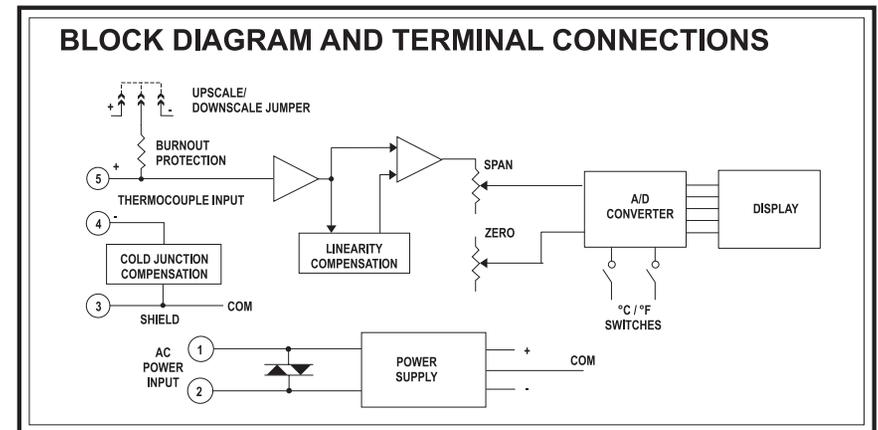
POWER

115VAC ±10%, 50 or 60 Hz (4W max)
230VAC ±10%, 50 or 60 Hz (4W max)

DIS SERIES OPTIONS

The following option is available:

U All circuit boards conformal coated for protection against moisture.



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