

# DSCA37









## Non-Linearized Thermocouple Input Signal Conditioners

## **Description**

Each DSCA37 non-linearized thermocouple input module provides a single channel of thermocouple input which is filtered, isolated, amplified, and converted to a high-level voltage output (Figure 1). Signal filtering is accomplished with a five-pole filter which provides 85dB of normal-mode rejection at 60Hz and 80dB at 50Hz. An anti-aliasing pole is located on the field side of the isolation barrier, and the other four poles are on the system side. After the initial field-side filtering, the input signal is chopped by a proprietary chopper circuit. Isolation is provided by transformer coupling, again using a proprietary technique to suppress transmission of common mode spikes or surges.

The DSCA37 can interface to eight industry standard thermocouple types: J, K, T, E, R, S, B and N. Each module has cold junction compensation to correct for parasitic thermocouples formed by the thermocouple wire and input screw terminals on the module. Upscale open thermocouple detection is provide by internal circuitry. Downscale indication can be implemented by installing a 47MΩ, ±20% resistor between screw terminals 6 and 8 on the input terminal block.

Module output is either voltage or current. For current output models a dedicated loop supply is provided at terminal 3 (+OUT) with loop return located at terminal 4 (-OUT). The system-side load may be either floating or grounded.

Special input circuits provide protection against accidental connection of power-line voltages up to 240VAC and against transient events as defined by ANSI/IEEE C37.90.1. Protection circuits are also present on the signal output and power input terminals to guard against transient events and power reversal. Power lines are secured to the module using screw terminals which are in pluggable terminal blocks for ease of system assembly and reconfiguration.

The modules have excellent stability over time and do not require recalibration, however, zero and span settings are adjustable up to ±5% to accommodate situations where fine-tuning is desired. The adjustments are made using potentiometers located under the front panel label and are non-interactive for ease of use

## **Features**

- Interfaces to Types J, K, T, E, R, S, B, and N Thermocouples
- Industry Standard Output of 0 to +10V, 0 to 20mA, or 4 to 20mA
- 1500Vrms Transformer Isolation
- ANSI/IEEE C37.90.1 Transient Protection
- Input Protected to 240VAC Continuous
- True 3-Way Isolation
- Wide Range of Supply Voltage
- 160dB CMR
- 85dB NMR at 60Hz, 80dB at 50Hz
- ±0.05% Accuracy
- ±0.01% Linearity
- Easily Mounts on Standard DIN Rail
- · C-UL-US Listed
- CE and ATEX Compliant

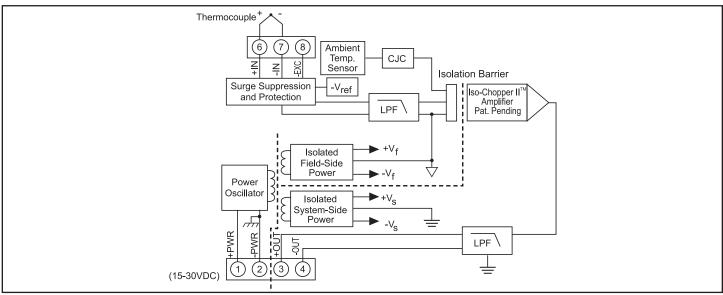


Figure 1: DSCA37 Blok Diagram



## **Specifications** Typical\* at T<sub>A</sub> = +25°C and +24VDC supply voltage

Operation Typical at IA	20 0 and 21120 dappiy voltago
Module	DSCA37
Input Range Input Bias Current	Standard Thermocouple Temperature Limits as per NIST Monograph 175, ITS-90 –30nA
Input Resistance Normal Power Off Overload	50MΩ 65kΩ 65kΩ
Input Protection Continuous Transient Cold Junction Compensation	240Vrms max ANSI/IEEE C37.90.1
Accuracy, +5°C to +45°C Accuracy, -40°C to +80°C	±0.5°C ±1.25°C
Output Range Load Resistance (I <sub>OUT</sub> ) Current Limit Output Protection	See Ordering Information $600\Omega$ max $8\text{mA}(\text{V}_{\text{OUT}}),30\text{mA}(\text{I}_{\text{OUT}})$
Short to Ground Transient CMV, Input to Output, Input to Power	Continuous ANSI/IEEE C37.90.1
Continuous Transient CMV, Output to Power	1500Vrms max ANSI/IEEE C37.90.1
Continuous CMR (50Hz or 60Hz)	50VDC max 160dB
Accuracy Linearity Adjustability Stability	See Ordering Information ±0.01% Span ±5% Zero and Span
Input Offset Output Offset Gain Output Noise, 100kHz Bandwidth	$\pm 0.5 \mu V/^{\circ} C$ $\pm 6 ppm/^{\circ} C (V_{OUT}), \pm 20 ppm/^{\circ} C (I_{OUT})$ $\pm 35 ppm/^{\circ} C$ $250 \mu Vrms (V_{OUT}), 1 \mu Arms (I_{OUT})$
Bandwidth, –3dB NMR Response Time, 90% Span	3Hz 85dB at 60Hz, 80dB at 50Hz 165ms
Open Input Response Open Input Detection Time	Upscale § s
Power Supply Voltage Current Sensitivity Protection	15 to 30VDC 25mA (V <sub>OUT</sub> ), 55mA (I <sub>OUT</sub> ) ±0.0001% %
Reverse Polarity Transient	Continuous ANSI/IEEE C37.90.1
Mechanical Dimensions (h)(w)(d)	2.95" x 0.89" x 4.13" (75mm x 22.5mm x 105mm)
Mounting	DIN EN 50022 -35x7.5 or -35x15 rail
Environmental Operating Temperature Range Storage Temperature Range Relative Humidity Emissions EN61000-6-4 Radiated, Conducted Immunity EN61000-6-2 RF	-40°C to +80°C -40°C to +80°C 0 to 95% Noncondensing ISM, Group 1 Class A ISM, Group 1 Performance A ±0.5% Span Error
ESD, EFT	Performance B

#### NOTES:

## **Ordering Information**

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Model	TC Type <sup>‡</sup>	Input Range	Output Range <sup>†</sup>		ıracy¹		
DSCA37J-01	J	-100°C to +760°C (-148°F to +1400°F)	2, 3, 4	±0.05%	±0.43°C		
DSCA37K-02	K	-100°C to +1350°C ( -148°F to +2462°F)	2, 3, 4	±0.05%	±0.73°C		
DSCA37T-03	T	-100°C to +400°C (-148°F to +752°F)	2, 3, 4	±0.05%	±0.25°C		
DSCA37E-04	Е	0°C to +900°C (+32°F to +1652°F)	2, 3, 4	±0.05%	±0.45°C		
DSCA37R-05	R	0°C to +1750°C (+32°F to +3182°F)	2, 3, 4	±0.05%	±0.88°C		
DSCA37S-06	S	0°C to +1750°C (+32°F to +3182°F)	2, 3, 4	±0.05%	±0.88°C		
DSCA37B-07	В	0°C to +1800°C (+32°F to +3272°F)	2, 3, 4	±0.05%	±0.90°C		
DSCA37N-08	N	-100°C to +1300°C (-148°F to +2372°F)	2, 3, 4	±0.05%	±0.70°C		

## †Output Ranges Available

Output Range	Part No. Suffix	Example
1. –10V to +10V	NONE	NA
2. 0V to +10V	NONE	DSCA37J-01
3. 4 to 20mA	C	DSCA37J-01C
4. 0 to 20mA	E	DSCA37J-01E

## <sup>‡</sup>Thermocouple Alloy Combinations

Standards: DIN IEC 584, ANSI MC96-1-82, JIS C 1602-1981

Туре	Material
J	Iron vs. Copper-Nickel
K	Nickel-Chromium vs. Nickel-Aluminum
T	Copper vs. Copper-Nickel
Е	Nickel-Chromium vs. Copper-Nickel
R	Platinum-13% Rhodium vs. Platinum
S	Platinum-10% Rhodium vs. Platinum
В	Platinum-30% Rhodium vs. Platinum-6% Rhodium
N	Nickel-14.2% Chromium-1.4% Silicon vs. Nickel-4.4%
	Silicon- 0.1% Magnesium

#### Installation Notes:

- 1.) This Equipment is Suitable for Use in Class I, Division 2, Groups A, B,C, D, or Non-Hazardous Locations Only.
- 2.) WARNING Explosion Hazard Substitution of Components May Impair Suitability for Class I, Division 2.
- 3.) WARNING Explosion Hazard Do Not Disconnect Equipment Unless Power Has Been Switched Off or The Area is Known to be Non-Hazardous.
- 4.) The Power to These Devices Shall Be Limited By an Over-Current Protection Device, UL Certified Fuse (JDYX/JDYX2) Rated 6A Max.

<sup>\*</sup>Contact factory or your local Dataforth sales office for maximum values.

<sup>(1)</sup> Includes conformity, hysteresis, repeatability, and CJC error.