SCM7B34/34N

Isolated Linearized 2- or 3-Wire RTD Input Modules

Description

Each SCM7B34/34N RTD input module accepts a single channel of 100Ω Platinum (α = 0.00385) or 120Ω Nickel (α = 0.00672) RTD input and produces an input voltage in response to a low-level current excitation. The input signal is filtered, isolated, amplified, linearized, and converted to a high-level analog voltage for output to the process control system (Figure 1).

These modules incorporate a five-pole filtering approach to maximize both time and frequency response by taking advantage of both Thomson (Bessel) and Butterworth characteristics. One pole of the filter is on the field side of the isolation barrier; four are on the process control system side.

In response to the low-level current excitation signal, the RTD input signal is chopped by a proprietary chopper circuit and transferred across the transformer isolation barrier, suppressing transmission of common mode spikes and surges. The signal is then reconstructed and filtered for process control system output.

Linearization is achieved by creating a non-linear transfer function through the module itself. This non-linear transfer function is configured at the factory and is designed to be equal and opposite to the specific RTD non-linearity. Lead compensation is achieved by matching two current paths thus cancelling the effects of lead resistance.

Modules accept a wide 14 - 35VDC power supply range (+24VDC nominal). Their compact packages (2.13"x1.705"x0.605" max) save space and are ideal for high channel density applications. They are designed for easy DIN rail mounting using any of the "-DIN" backpanels.

Features

- Interfaces to 100Ω Platinum or 120Ω Nickel RTDs
- Provides 250µA RTD Excitation Current
- Linearizes RTD Signal Response
- Provides High-Level Voltage Outputs
- 1500Vrms Transformer Isolation
- Accuracy, ±0.05% to ±0.15% of Span Typical
- Nonconformity, ±0.025% to ±0.07% of Span Typical
- ANSI/IEEE C37.90.1 Transient Protection
- Input Protected to 120Vrms Continuous
- Noise, 500µVp-p (5MHz), 250µVrms (100kHz)
- 160dB CMRR
- 85dB NMR at 60Hz, 80dB at 50Hz
- Easy DIN Rail Mounting
- CSA C/US Certified
- CE and ATEX Compliant

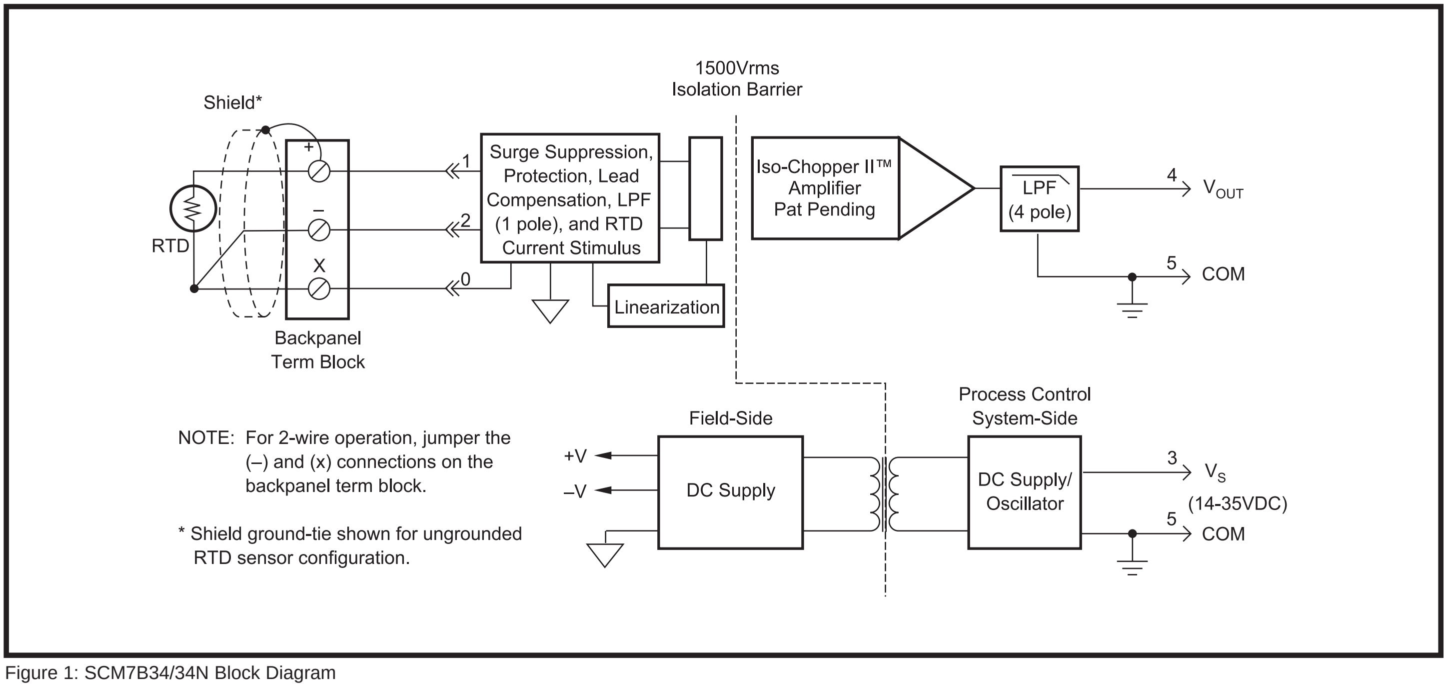

Figure 1: SCM7B34/34N Block Diagram

Specifications

Typical* at 25°C and +24VDC

Module	SCM7B34	SCM7B34N
Input Signal Range Protection Continuous Transient	 100Ω Pt RTD See Ordering Information 120Vrms max ANSI/IEEE C37.90.1	 120Ω Ni RTD * * *
Sensor Excitation Current(1) Lead Resistance Effect	≈250μA ±0.02°C/Ω max	* *
Output Signal Range(2) Effective Available Power(2) Resistance Protection Voltage/Current Limit	 † 40mW <1Ω Continuous Short-to-Ground ±12V, ±14mA	 † * * * *
CMV (Input-to-Output) Continuous Transient CMRR (50 or 60Hz)	 1500Vrms ANSI/IEEE C37.90.1 160dB	 * * *
Accuracy(3) Nonconformity(4) Stability (–40°C to +85°C) Gain Input Offset Zero Suppression Output Offset Noise Peak at 5MHz B/W RMS at 10Hz to 100kHz B/W Peak at 0.1Hz to 10Hz B/W Open Input Response '+' Lead '–' Lead 'x' Lead Open Input Detection Time	See Ordering Information See Ordering Information ±60ppm/°C ±1μV/°C ±0.002%(R_Z/R_{SPAN})(5)/°C ±0.002% Span/°C 500μV 250μV 1μV RTI Upscale Non-deterministic Downscale <5s	* * * * * * * * * * * * *
Frequency and Time Response Bandwidth, –3dB NMR (50/60Hz) Step Response, 90% Span	 3Hz 80/85dB 250ms	 * * *
Supply Voltage Current(2) Sensitivity	14 to 35VDC 12mA ±0.0001%/%V_S	* * *
Mechanical Dimensions (h)(w)(d)	2.13" x 1.705" x 0.605" max 54.1mm x 43.3mm x 15.4mm max	* *
Environmental Operating Temperature Range Storage Temperature Range Relative Humidity Emissions EN61000-6-4 Radiated, Conducted Immunity EN61000-6-2 RF ESD, EFT	 –40°C to +85°C –40°C to +85°C 0 to 95% Noncondensing ISM, Group 1 Class A ISM, Group 1 Performance A ±0.5% Span Error Performance B	 * * * * * * * *

NOTES:
* Contact factory or your local Dataforth sales office for maximum values.
* Specification same as preceding model.
(1) Sensor excitation current is model dependent.
(2) Output Range and Supply Current specifications are based on minimum output load resistance. Minimum output load resistance is calculated by V_{OUT}^2/P_E, where P_E is the output Effective Available Power that guarantees output range, accuracy, and conformity specifications.
(3) Accuracy includes the effects of repeatability, hysteresis, and conformity.
(4) Nonconformity is calculated using the best-fit straight line method.
(5) R_Z is the value of the RTD resistance at the lowest measurement point. R_{SPAN} is the change in resistance over the measurement span.

Ordering Information

Model	Input Range	Accuracy (2)		Nonconformity (3)	
		Typical	Max	Typical	Max
100Ω Pt **					
SCM7B34-01	–100°C to +100°C (–148°F to +212°F)	±0.075% (0.15°C)	±0.15% (0.30°C)	±0.025% (0.05°C)	±0.05% (0.10°C)
SCM7B34-02	0°C to +100°C (+32°F to +212°F)	±0.10% (0.10°C)	±0.2% (0.20°C)	±0.025% (0.025°C)	±0.05% (0.05°C)
SCM7B34-03	0°C to +200°C (+32°F to +392°F)	±0.075% (0.15°C)	±0.15% (0.30°C)	±0.025% (0.05°C)	±0.05% (0.10°C)
SCM7B34-04	0°C to +600°C (+32°F to +1112°F)	±0.05% (0.30°C)	±0.1% (0.60°C)	±0.025% (0.15°C)	±0.05% (0.30°C)
SCM7B34-05	–50°C to +350°C (–58°F to +662°F)	±0.05% (0.20°C)	±0.1% (0.40°C)	±0.025% (0.1°C)	±0.05% (0.20°C)
120Ω Ni **					
SCM7B34N-01	0°C to +300°C (+32°F to +572°F)	±0.15% (0.45°C)	±0.3% (0.90°C)	±0.06% (0.18°C)	±0.12% (0.36°C)
SCM7B34N-02	0°C to +200°C (+32°F to +392°F)	±0.15% (0.30°C)	±0.3% (0.60°C)	±0.07% (0.14°C)	±0.14% (0.28°C)

†Output Ranges Available

Output Range	Part No. Suffix	Example
+1 to +5V	NONE	SCM7B34-01
0 to +5V	A	SCM7B34-01A
0 to +10V	D	SCM7B34-01D

**RTD Standards

Type	Alpha Coefficient	DIN	JIS	IEC
100Ω Pt 120Ω Ni	0.00385 0.00672	DIN 43760	JIS C 1604-1989	IEC 751