

# 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 ( $\alpha = 0.00385$ ) or 120Ω Nickel ( $\alpha = 0.00672$ ) 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.

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 canceling 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") 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

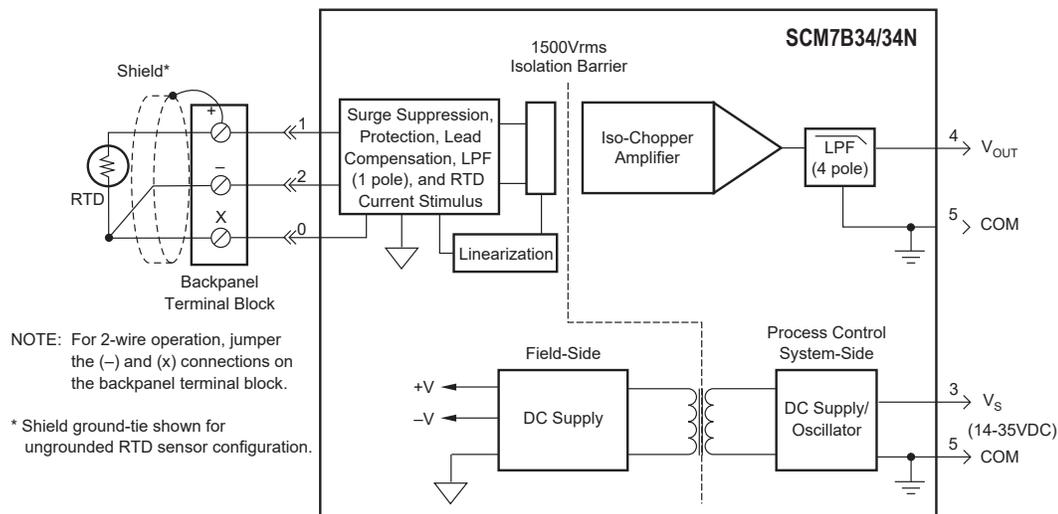
- Interfaces to 100Ω Platinum or 120Ω Nickel RTDs
- Provides 250μA RTD Excitation Current
- Linearizes RTD Signal Response
- Provides High-level Voltage-outputs
- 1500Vrms Transformer Isolation
- Accuracy, ±0.05% to ±0.15% of Span (typ)
- Nonconformity, ±0.025% to ±0.07% of Span (typ)
- ANSI/IEEE C37.90.1 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
- Manufactured per RoHS III Directive 2015/863

### BENEFITS

- Breaks Ground Loops
- Protects User Equipment from Lightning and Heavy Equipment Power-line Voltage
- Small Form-factor for High-density Applications
- Reduces EMC Concerns
- Reduces Electrical Noise in Measured Signals
- Signal Filtering in Noisy Environments

### APPLICATIONS

- Analog Signal Conditioning
- Industrial Process Control
- Test and Measurement
- System and Signal Monitoring
- Temperature Measurement
- Torque Measurement
- Civil Engineering
- Geotechnical Monitoring



SCM7B34/34N Block Diagram - [For Module Dimensions and Pinouts. See Page 2-26](#)

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

Module	SCM7B34	SCM7B34N
Input Signal Range	100Ω Pt RTD See Ordering Information	120Ω Ni RTD See Ordering Information
Protection Continuous Transient	120Vrms (max) ANSI/IEEE C37.90.1	120Vrms (max) ANSI/IEEE C37.90.1
Sensor Excitation Current <sup>(1)</sup> Lead Resistance Effect	≈250μA ±0.02°C/Ω (max)	≈250μA ±0.02°C/Ω (max)
Output Signal Range <sup>(2)</sup> Effective Available Power <sup>(2)</sup> Resistance Protection Voltage/Current Limit	† 40mW <1Ω Continuous Short-to-Ground ±12V, ±14mA	† 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	1500Vrms ANSI/IEEE C37.90.1 160dB
Accuracy <sup>(3)</sup> Nonconformity <sup>(4)</sup> Stability (-40°C to +85°C) Gain Input Offset Zero Suppression Output Offset	See Ordering Information See Ordering Information ±60ppm/°C ±1μV/°C ±0.002%(R <sub>z</sub> /R <sub>SPAN</sub> ) <sup>(5)</sup> /°C ±0.002% Span/°C	See Ordering Information See Ordering Information ±60ppm/°C ±1μV/°C ±0.002%(R <sub>z</sub> /R <sub>SPAN</sub> ) <sup>(5)</sup> /°C ±0.002% Span/°C
Noise Peak at 5MHz B/W RMS at 10Hz to 100kHz B/W Peak at 0.1Hz to 10Hz B/W	500μV 250μV 1μV RTI <sup>(6)</sup>	500μV 250μV 1μV RTI <sup>(6)</sup>
Open Input Response ‘+’ Lead ‘-’ Lead ‘x’ Lead	Upscale Non-deterministic Downscale	Upscale Non-deterministic Downscale
Open Input Detection Time	<5s	<5s
Frequency and Time Response Bandwidth, -3dB NMR (50/60Hz) Step Response, 90% Span	3Hz 80/85dB 250ms	3Hz 80/85dB 250ms
Supply Voltage Current <sup>(2)</sup> Sensitivity	14 - 35VDC 12mA ±0.0001%/V <sub>S</sub>	14 - 35VDC 12mA ±0.0001%/V <sub>S</sub>
Mechanical Dimensions (h)x(w)x(d)	2.13" x 1.705" x 0.605" (54.1mm x 43.3mm x 15.4mm)	2.13" x 1.705" x 0.605" (54.1mm x 43.3mm x 15.4mm)
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	-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

**Ordering Information**

Model†	Input Range	Accuracy <sup>(2)</sup> (typ)	Accuracy <sup>(2)</sup> (max)	Nonconformity <sup>(3)</sup> (typ)	Nonconformity <sup>(3)</sup> (max)
<b>100Ω Pt **</b>					
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)
<b>120Ω Ni **</b>					
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
+1V 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	0.00385	DIN 43760	JIS C 1604-1989	IEC 751
120Ω Ni	0.00672			

**NOTES:**

- \*Contact factory or your local Dataforth sales office for maximum values.
- (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<sub>E</sub> 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<sub>z</sub> is the value of the RTD resistance at the lowest measurement point. R<sub>SPAN</sub> is the change in resistance over the measurement span.
- (6) RTI = Referenced to Input.