SCM7B34/34N

Isolated Linearized 2- Or 3-Wire RTD Input Modules

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 C37.90.1-1989 TRANSIENT PROTECTION
- INPUT PROTECTED TO 120Vrms CONTINUOUS
- NOISE, 500µV PEAK (5MHz), 250µV RMS (100KHz)
- CMRR, UP TO 160dB
- NMR, UP TO 85dB
- EASY DIN RAIL MOUNTING
- CSA CERTIFIED, FM APPROVAL PENDING
- CE COMPLIANT

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.

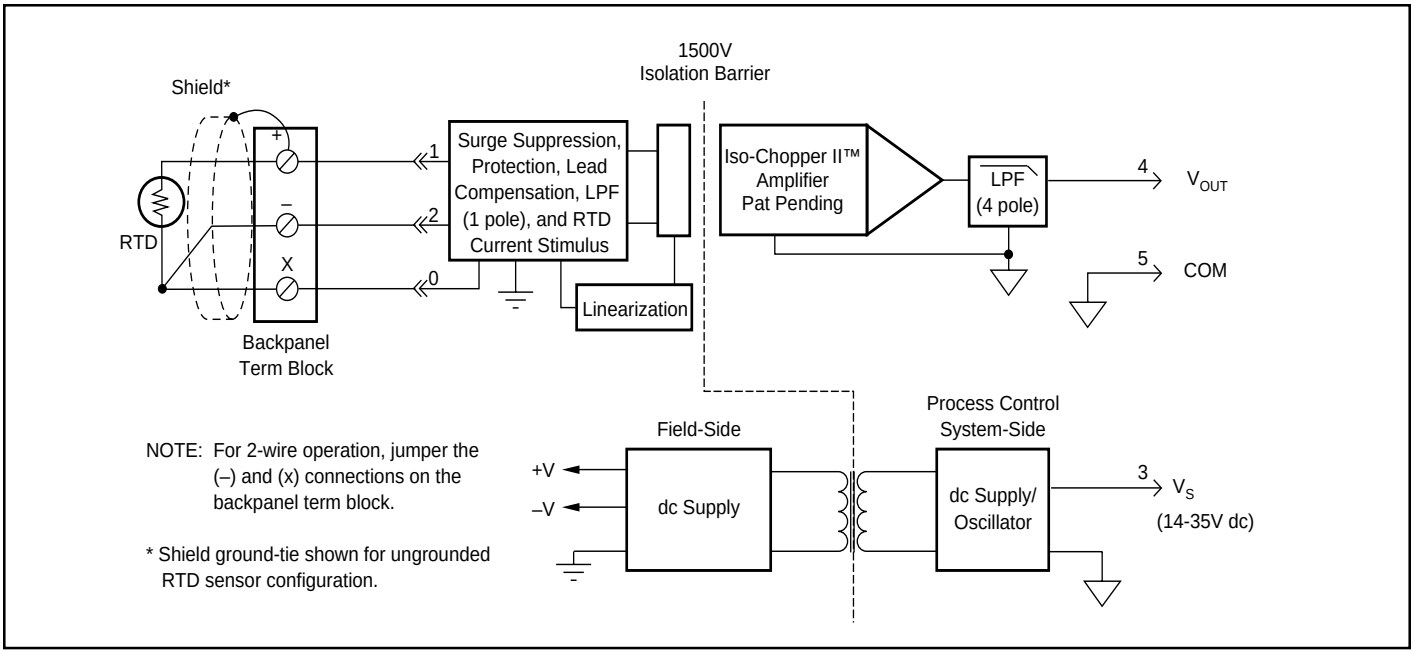

Fig 1: SCM7B34/34N Block Diagram

SPECIFICATIONS Typical at 25°C and +24VDC

Module	SCM7B34	SCM7B34N
Input		
Signal Range	100Ω Pt RTD (See Ordering Information below)	120Ω Ni RTD *
Protection		
Continous	120Vrms max	*
Transient	ANSI/IEEE C37.90.1-1989	*
Output		
Signal Range[1]	◆	◆
Effective Available Power[1]	40mW	*
Resistance	<1Ω	*
Protection	Continuous Short-to-Ground	*
Voltage/Current Limit	±12V, ±14mA	*
CMV (Input-to-Output)		
Continuous	1500Vrms	*
Transient	ANSI/IEEE C37.90.1-1989	*
CMRR (50 or 60Hz)	160dB	*
Accuracy[2]	(See Ordering Information below)	*
Nonconformity[3]	(See Ordering Information below)	*
Stability (-40C to +85°C)		
Gain	±60ppm/°C	*
Input Offset	±1µV/°C	*
Zero Suppression	$\pm 0.002\%(R_Z/R_{SPAN})^4$/°C	*
Output Offset	±0.002% Span/°C	*
Noise		
Peak @ 5MHz B/W	500µV	*
RMS @ 10Hz to 100kHz B/W	250µV	*
Peak @ 0.1Hz to 10Hz B/W	1µV	*
Lead Resistance Effect	±0.02°C/Ω max	*
Sensor Excitation Current[5]	≈250µA	*
Frequency and Time Response		
Bandwidth, -3dB	3Hz	*
NMR (50/60Hz)	80/85dB	*
Step Response, 90% Span	250ms	*
Supply Voltage	14 to 35VDC	*
Current[1]	12mA	*
Sensitivity	$\pm 0.0001\%/\%V_S$	*
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	-40°C to +85°C	*
Storage Temperature Range	-40°C to +85°C	*
Relative Humidity	0 to 90% noncondensing	*
Emmissions	EN50081-1, ISM Group 1, Class A (Radiated, Conducted)	*
Immunity	EN50082-1, ISM Group 1, Class A (ESD, RF, EFT)	*

****RTD STANDARDS**

TYPE	ALPHA COEFFICIENT	DIN	JIS
100Ω Pt	0.00385	DIN 43760	JIS C 1604-1989
120Ω Ni	0.00672		

NOTES

*Specification same as preceding model.

[1] 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.

[2] Accuracy includes the effects of repeatability, hysteresis, and conformity.

[3] Nonconformity is calculated using the best-fit straight line method.

[4] 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.

[5] Sensor excitation current is model dependent.

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 NUMBER MODIFIER	EXAMPLE
+1 to +5V	(none)	SCM7B34-01
0 to +5V	A	SCM7B34-01A
0 to +10V	D	SCM7B34-01D