

# SCM7B21/30/31

## Isolated Analog Voltage Input Modules



### Description

Each SCM7B21/30/31 voltage input module accepts one channel of analog voltage input which is filtered, isolated, amplified, 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.

After the initial field-side filtering, the 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.

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

- Accepts Millivolt and Voltage Level Signals
- Provides High-Level Voltage Outputs
- 1500Vrms Transformer Isolation
- Accuracy,  $\pm 0.03\%$  of Span Typical,  $\pm 0.1\%$  Max
- ANSI/IEEE C37.90.1 Transient Protection
- Input Protected to 120Vrms Continuous
- Noise, 500 $\mu$ Vp-p (5MHz), 250 $\mu$ Vrms (100kHz)
- Up to 160dB CMRR
- 85dB NMR at 60Hz, 80dB at 50Hz
- Easy DIN Rail Mounting
- CSA C/US Certified
- CE and ATEX Compliant

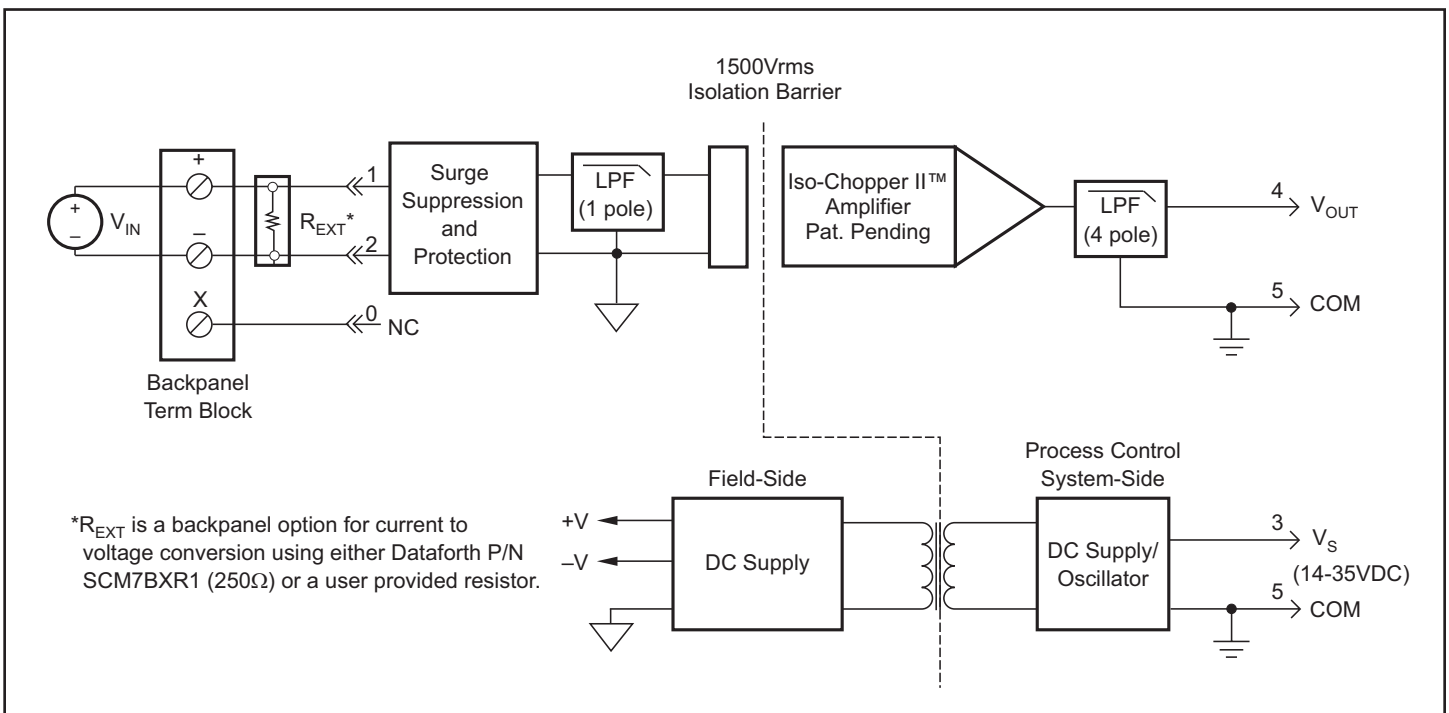


Figure 1: SCM7B21/30/31 Block Diagram

**Specifications** Typical\* at 25°C and +24VDC

Module	SCM7B21	SCM7B30	SCM7B31
<b>Input</b>			
Signal Range	±10V	±10mV to ±1V	±1V to ±50V
Bias Current	±0.1nA	±0.5nA	±0.05nA
Resistance			
Normal	2MΩ min	50MΩ	500kΩ min
Power Off	2MΩ min	30kΩ min	500kΩ min
Overload	2MΩ min	30kΩ min	500kΩ min
<b>Protection</b>			
Continuous	120Vrms max	120Vrms max	120Vrms max
Transient	ANSI/IEEC C37.90.1	ANSI/IEEC C37.90.1	ANSI/IEEC C37.90.1
<b>Output</b>			
Signal Range <sup>(1)</sup>	±10V	†	†
Effective Available Power <sup>(1)</sup>	10mW	40mW	40mW
Resistance	<1Ω	<1Ω	<1Ω
Protection	Continuous Short to Ground	Continuous Short to Ground	Continuous Short to Ground
Voltage/Current Limit	±12V, ±14mA	±12V, ±14mA	±12V, ±14mA
<b>CMV (Input-to-Output)</b>			
Continuous	1500Vrms	1500Vrms	1500Vrms
Transient	ANSI/IEEC C37.90.1	ANSI/IEEC C37.90.1	ANSI/IEEC C37.90.1
CMRR (50 or 60Hz)	100dB	160dB	120dB
<b>Accuracy<sup>(2)</sup></b>	±0.03% Span typical, ±0.1% Span max	±0.03% Span typical, ±0.1% Span max	±0.03% Span typical, ±0.1% Span max
<b>Linearity<sup>(3)</sup></b>	±0.01% Span typical, ±0.02% Span max	±0.01% Span typical, ±0.02% Span max	±0.01% Span typical, ±0.02% Span max
<b>Stability (-40°C to +85°C)</b>			
Gain	±55ppm/°C	±35ppm/°C	±55ppm/°C
Input Offset	N/A <sup>(4)</sup>	±0.5μV/°C	±5μV/°C
Zero Suppression	N/A	±0.005%(V <sub>z</sub> ) <sup>(5)</sup> /°C	±0.005%(V <sub>z</sub> ) <sup>(5)</sup> /°C
Output Offset	±0.001% Span/°C	±0.002% Span/°C	±0.002% Span/°C
<b>Noise</b>			
Peak at 5MHz B/W	1mV	500μV	500μV
RMS at 10Hz to 100kHz B/W	250μV	250μV	250μV
Peak at 0.1Hz to 10Hz B/W	1μV RTI <sup>(6)</sup>	1μV RTI <sup>(6)</sup>	1μV RTI <sup>(6)</sup>
<b>Frequency and Time Response</b>			
Bandwidth, -3dB	300Hz	3Hz	3Hz
NMR (50/60Hz)	80dB per Decade above 300Hz	80/85dB	80/85dB
Step Response, 90% Span	1.5ms	165ms	165ms
<b>Supply Voltage</b>	14 to 35VDC	14 to 35VDC	14 to 35VDC
Current <sup>(1)</sup>	16mA	12mA	12mA
Sensitivity	±0.0002%/V <sub>s</sub>	±0.0001%/V <sub>s</sub>	±0.0001%/V <sub>s</sub>
<b>Mechanical Dimensions</b> (h)(w)(d)	2.13" x 1.705" x 0.605" max (54.1mm x 43.3mm x 15.4mm max)	2.13" x 1.705" x 0.605" max (54.1mm x 43.3mm x 15.4mm max)	2.13" x 1.705" x 0.605" max (54.1mm x 43.3mm x 15.4mm max)
<b>Environmental</b>			
Operating Temperature Range	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Storage Temperature Range	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Relative Humidity	0 to 95% Noncondensing	0 to 95% Noncondensing	0 to 95% Noncondensing
Emissions EN61000-6-4	ISM, Group 1	ISM, Group 1	ISM, Group 1
Radiated, Conducted	Class A	Class A	Class A
Immunity EN61000-6-2	ISM, Group 1	ISM, Group 1	ISM, Group 1
RF	Performance A ±0.5% Span Error	Performance A ±0.5% Span Error	Performance A ±0.5% Span Error
ESD, EFT	Performance B	Performance B	Performance B

## NOTES:

\*Contact factory or your local Dataforth sales office for maximum values.

 (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 linearity specifications.

(2) Accuracy includes the effects of repeatability, hysteresis, and linearity.

(3) Linearity is calculated using the best-fit straight line method.

(4) Input offset term included in output offset specification.

 (5)  $V_z$  is the nominal input voltage that results in a 0V output.

(6) RTI = Referenced to Input.

(7) SCM7B21 is available only as ±10V output.

**Ordering Information**

Model	Input Range
SCM7B21 <sup>(7)</sup>	±10V
SCM7B30-01	0 to +10mV
SCM7B30-02	0 to +100mV
SCM7B30-03	0 to +1V
SCM7B30-05	+1 to +5V
SCM7B30-06	±10mV
SCM7B30-07	±100mV
SCM7B30-08	±1V
SCM7B31-01	0 to +10V
SCM7B31-02	±5V
SCM7B31-03	±10V
SCM7B31-04	0 to +5V
SCM7B31-05	0 to +20V
SCM7B31-06	±20V
SCM7B31-07	0 to +50V
SCM7B31-08	±50V

**†Output Ranges Available**

Output Range	Part No. Suffix	Example
+1 to +5V	NONE	SCM7B30-01
0 to +5V	A	SCM7B30-01A
0 to +10V	D	SCM7B30-01D