SCMVAS

Voltage Attenuator System

Description

The SCMVAS (**S**ignal **C**onditioning **M**odular **V**oltage **A**ttenuator **S**ystem) is an analog signal conditioning system designed to safely monitor and accurately measure voltage potentials up to 460VAC (1300V peak-to-peak). These high-level voltages are typically found in industrial applications such as induction heaters or electric-motor drive controllers. The system reduces the input signal to a level suitable for interface to data acquisition systems, while at the same time providing various filter characteristics and 1500Vrms isolation (Figure 1).

For each channel of analog input, an attenuator module, SCMVAS-Mnnn, pre-conditions the signal which is then filtered, isolated, and converted to a high-level voltage output using an SCM5B30-07 or SCM5B40-07 module. The SCM5B40-07 module with a 10kHz bandwidth is recommended for common 50/60Hz signals low in harmonics where the user is interested in measuring only AC voltage. The SCM5B30-07 module is used for low frequency AC signals below 4Hz. For signals comprised of harmonics or noncoherent content, the SCM5B33 True RMS Input module is recommended. Use of this module provides a DC output that is directly related to input signal power, or the RMS (Root Mean Square) value, allowing true RMS representation of input signals ranging from pulses to complex nonperiodic waveforms. The attenuator and signal conditioning modules have excellent stability over time and do not require recalibration. Overall system accuracy is ±0.06%.

Input signal connections to the SCMVAS-Mnnn attenuator module are made using a pluggable terminal block for ease of system assembly and reconfiguration. For safety purposes, the terminal block has a cover over the screws and there are no other exposed high-voltage points on the SCMVAS-Mnnn series modules, SCM5B30-07 or SCM5B40-07 module, or the mounting backpanel.

The SCMVAS system has two specially designed backpanels for mounting the attenuator and signal conditioning modules. The SCMVAS-PB8 high density, 8-channel backpanel (Figures 2, 3) can be panel mounted or DIN rail mounted and provides the conditioned output signal on screw terminal blocks. Jumpers are provided on each channel to optionally connect or isolate each module's I/O Common from other channel's I/O Common and/or Power Common. The SCMVAS-PB16 (Figures 4, 5) has 16 channels of analog I/O simultaneously available to high-speed data acquisition (ADC) boards through a 26-conductor ribbon cable. Refer to the SCMPB01 Data Sheet and Application Note AN502 in this catalog for recommended ground connections and host system interfaces. Both the SCMVAS-PB8 and SCMVAS-PB16 backpanels can be mounted on the SCMXRK-002 19-inch metal rack.

▶ Features

- Accepts High Voltage Signals up to 460VAC (1300V Peak-to-Peak)
- 5 or 10 Volt Output for A/D Systems
- 1500Vrms Transformer Isolation
- True 3-Way Isolation
- Up to 160dB CMR
- ±0.06% Accuracy
- Panel or DIN Rail Mounting Options
- Approvals Pending

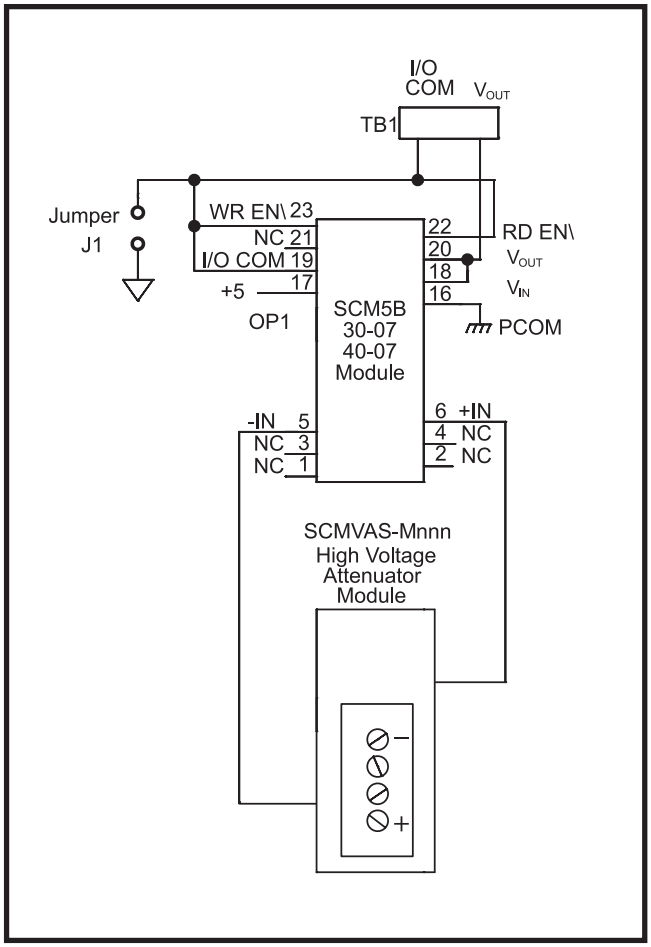

Figure 1: SCMVAS Schematic

SCM5B30/40-07

Isolated Analog Voltage Input Modules

Specifications

Typical at T_A=+25°C and +5V power

Module	SCM5B30-07	SCM5B40-07
Input Range	–1.0V to +1.0V	*
Input Bias Current	±0.5nA	*
Input Resistance		
Normal	50MΩ	*
Power Off	40kΩ	*
Overload	40kΩ	*
Input Protection		
Continuous	240Vrms max	*
Transient	ANSI/IEEE C37.90.1	*
CMV, Input to Output		
Continuous	1500Vrms max	*
Transient	ANSI/IEEE C37.90.1	*
CMR (50 or 60Hz)	160dB	100dB
NMR	95dB at 50Hz, 90dB at 60Hz	120dB per Decade above 10kHz
Accuracy(1)	±0.03% Span	*
Linearity	±0.005% Span	±0.01% Span
Stability		
Input Offset	±20mV/°C	*
Output Offset	±20mV/°C	*
Gain	±25ppm/°C	*
Noise		
Input, DC to 10Hz	2µVrms	*
Output, 100kHz	200µVrms	2mVp-p
Bandwidth, -3dB	4Hz	10kHz
Response Time	0.2s	35µs
(to 90% final value)		
Output Range	–5V to +5V (–10V to +10V, D model versions)	*
Output Resistance	50Ω	*
Output Protection	Continuous short to ground	*
Output Selection Time	6.0µS at C_{load} = 0 to 2000pF	*
(to ±1mV of Vout)		
Output Current Limit	±8mA	*
Output Enable Control		
Max Logic "0"	+0.8V	*
Min Logic "1"	+2.4V	*
Max Logic "1"	+36V	*
Input Current "0,1"	0.5µA	*
Power Supply Voltage	+5VDC ±5%	*
Power Supply Current	30mA	*
Power Supply Sensitivity	±200µV/% RTI(2)	*
Mechanical Dimensions	2.28"x 2.26"x 0.60" (58mm x 57mm x 15mm)	*
Environmental		
Operating Temp. Range	–40°C to +85°C	*
ATEX Group II, Cat. 3	–20°C to +40°C	*
Storage Temp. Range	–40°C to +85°C	*
Relative Humidity	0 to 95% noncondensing	*
Emissions EN61000-6-4	ISM, Group 1	*
Radiated, Conducted	Class A	*
Immunity EN61000-6-2	ISM, Group 1	*
RF	Performance A ±0.5% Span Error	*
ESD,EFT	Performance B	*

Ordering Information

Model(3)	Description
SCM5B30-07	V Isolation Module, ±5V Output, 4Hz Bandwidth
SCM5B40-07	V Isolation Module, ±5V Output, 10kHz Bandwidth
SCM5B30-07D	V Isolation Module, ±10V Output, 4Hz Bandwidth
SCM5B40-07D	V Isolation Module, ±10V Output, 10kHz Bandwidth
SCM5B33-02	True RMS Module, 0 to 5VDC Output
SCM5B33-02B	True RMS Module, 0 to 1mADC Output
SCM5B33-02C	True RMS Module, 4 to 20mADC Output
SCM5B33-02D	True RMS Module, 0 to 10VDC Output
SCM5B33-02E	True RMS Module, 0 to 20mADC Output

NOTES:
(1) Includes linearity, hysteresis and repeatability.
(2) RTI = Referenced To Input.
(3) SCM5B33 modules allow connection of input signals up to 300Vrms without SCMVAS attenuator modules. Consult SCM5B33 datasheet for details.

SCMVAS-Mnnn

High Voltage Attenuator Modules

Specifications

Typical at T_A=+25°C

Module	SCMVAS-Mnnn
Input Range	±100Vpeak to ±700Vpeak (70VAC to 500VAC)
Input Voltage Maximum	±750Vpeak
Input Resistance	10MΩ
Accuracy	±0.03%
Stability	±50ppm/°C
Output Range	±1V
Output Resistance	<100kΩ
Mechanical Dimensions	1.70"x 1.98"x 0.69" (44mm x 51mm x 18mm)
Environmental	
Operating Temp. Range	–40°C to +85°C
ATEX Group II, Category 3	–20°C to +40°C
Storage Temp. Range	–40°C to +85°C
Relative Humidity	0 to 95% noncondensing

Accessories

Model	Description
SCMVAS-PB8	Backpanel, 8-Channel
SCMVAS-PB8D	Backpanel, 8-Channel, DIN Rail Mount
SCMVAS-PB16	Backpanel, 16-Channel
SCMVAS-PB16D	Backpanel, 16-Channel, DIN Rail Mount

Ordering Information

Model	Description	Input Range with V Isolation Module	Input Range with True RMS Module
SCMVAS-M100	Attenuator Module	±100V Input (70VAC)	±141V Input (100VAC)
SCMVAS-M200	Attenuator Module	±200V Input (141VAC)	±283V Input (200VAC)
SCMVAS-M300	Attenuator Module	±300V Input (212VAC)	±424V Input (300VAC)
SCMVAS-M400	Attenuator Module	±400V Input (282VAC)	±566V Input (400VAC)
SCMVAS-M500	Attenuator Module	±500V Input (353VAC)	±707V Input (500VAC)
SCMVAS-M600	Attenuator Module	±600V Input (424VAC)	Not Available
SCMVAS-M650	Attenuator Module	±650V Input (460VAC)	Not Available
SCMVAS-M700	Attenuator Module	±700V Input (495VAC)	Not Available
SCMVAS-MPT	Attenuator Module, Pass-Thru 1-to-1		

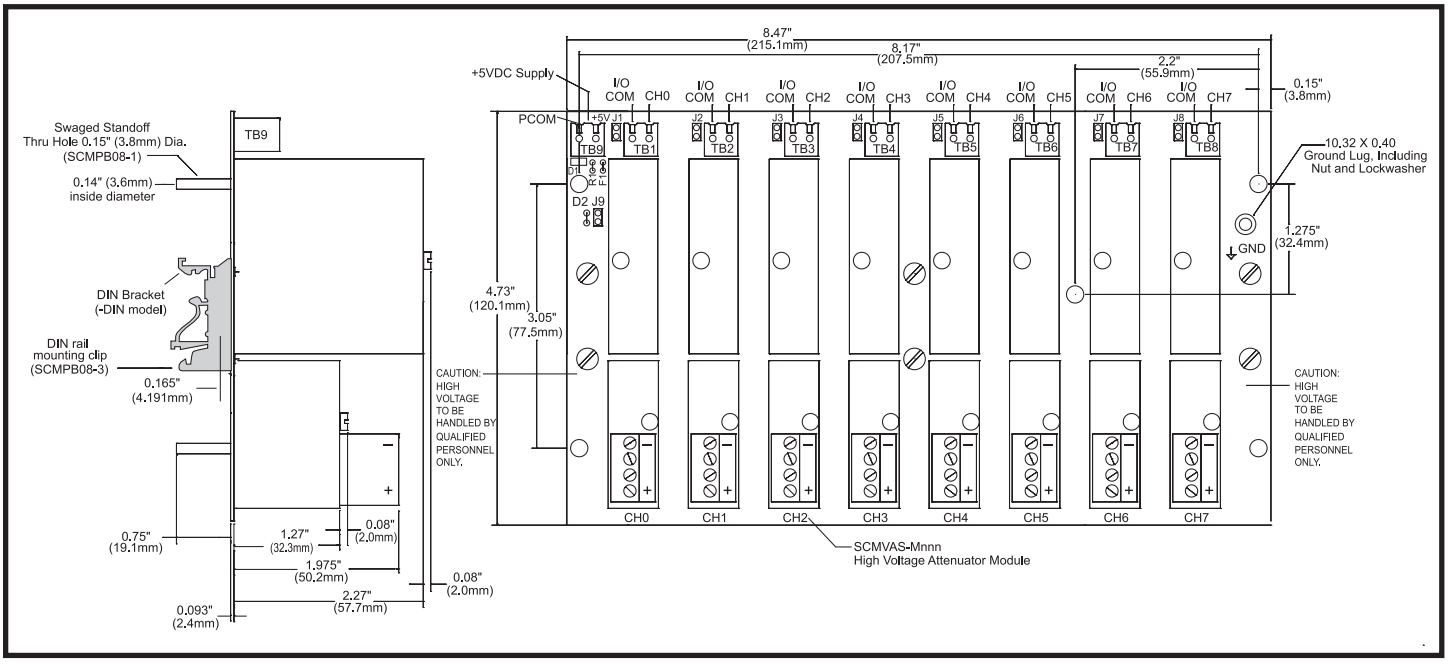

Figure 2: SCMVAS-PB8 Analog I/O Backpanel

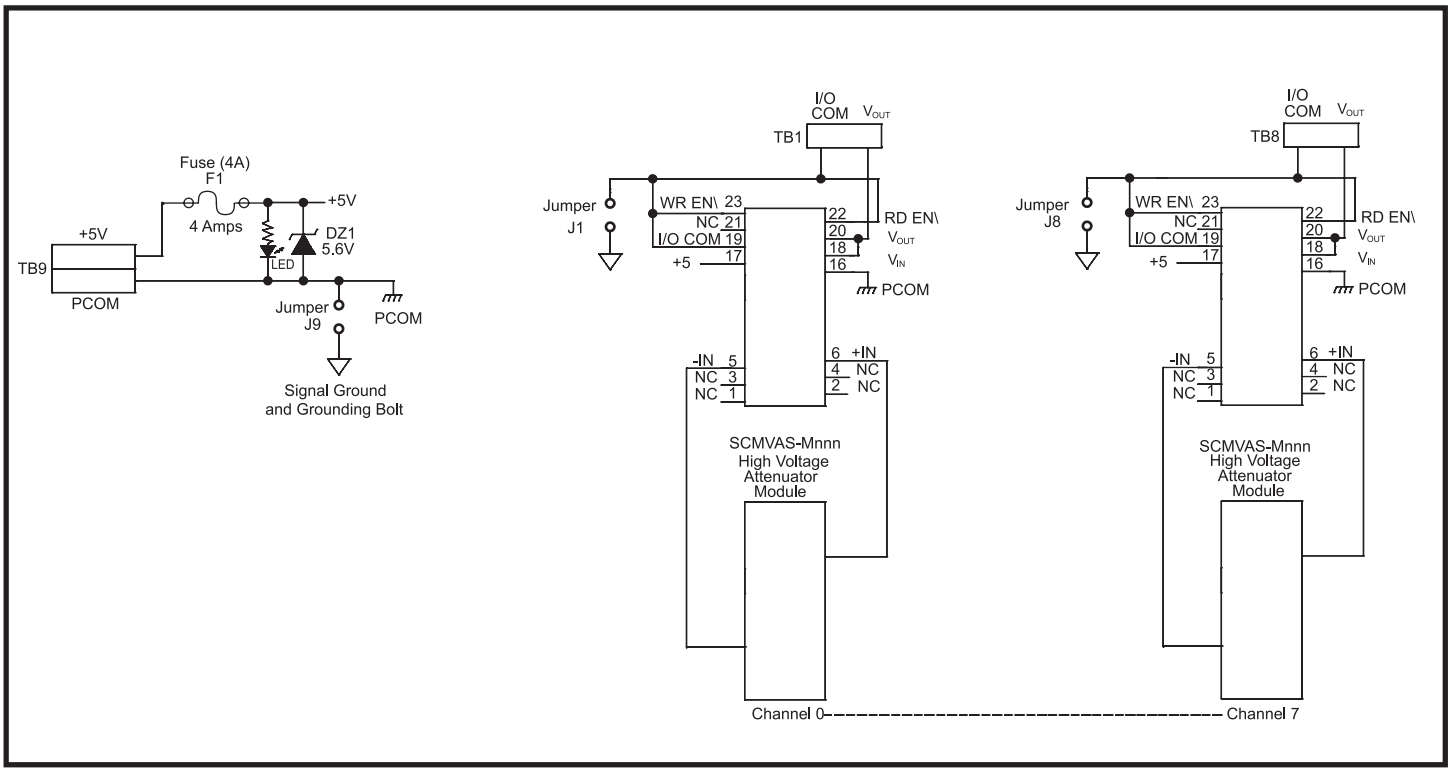

Figure 3: SCMVAS-PB8 Schematic

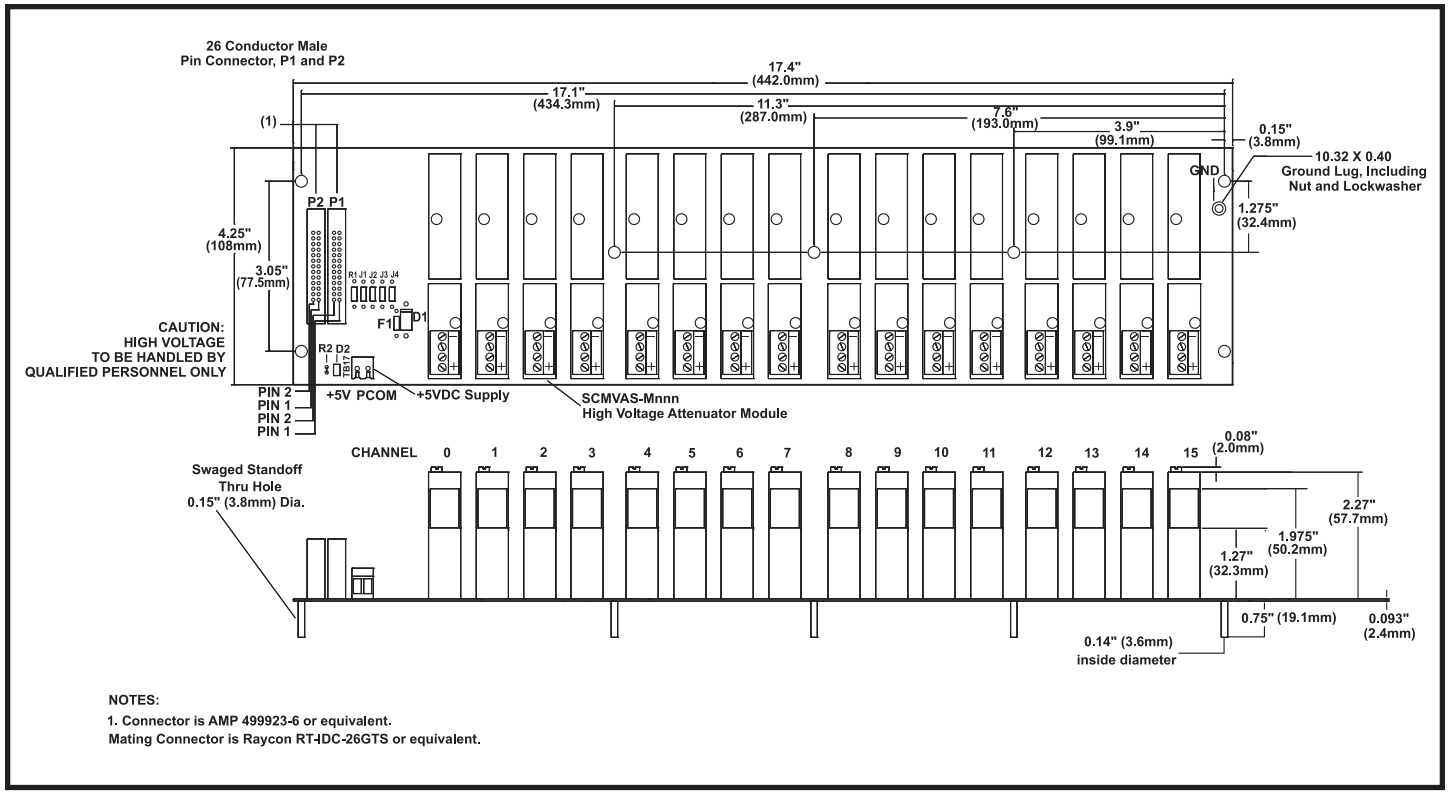

Figure 4: SCMVAS-PB16 Analog I/O Backpanel

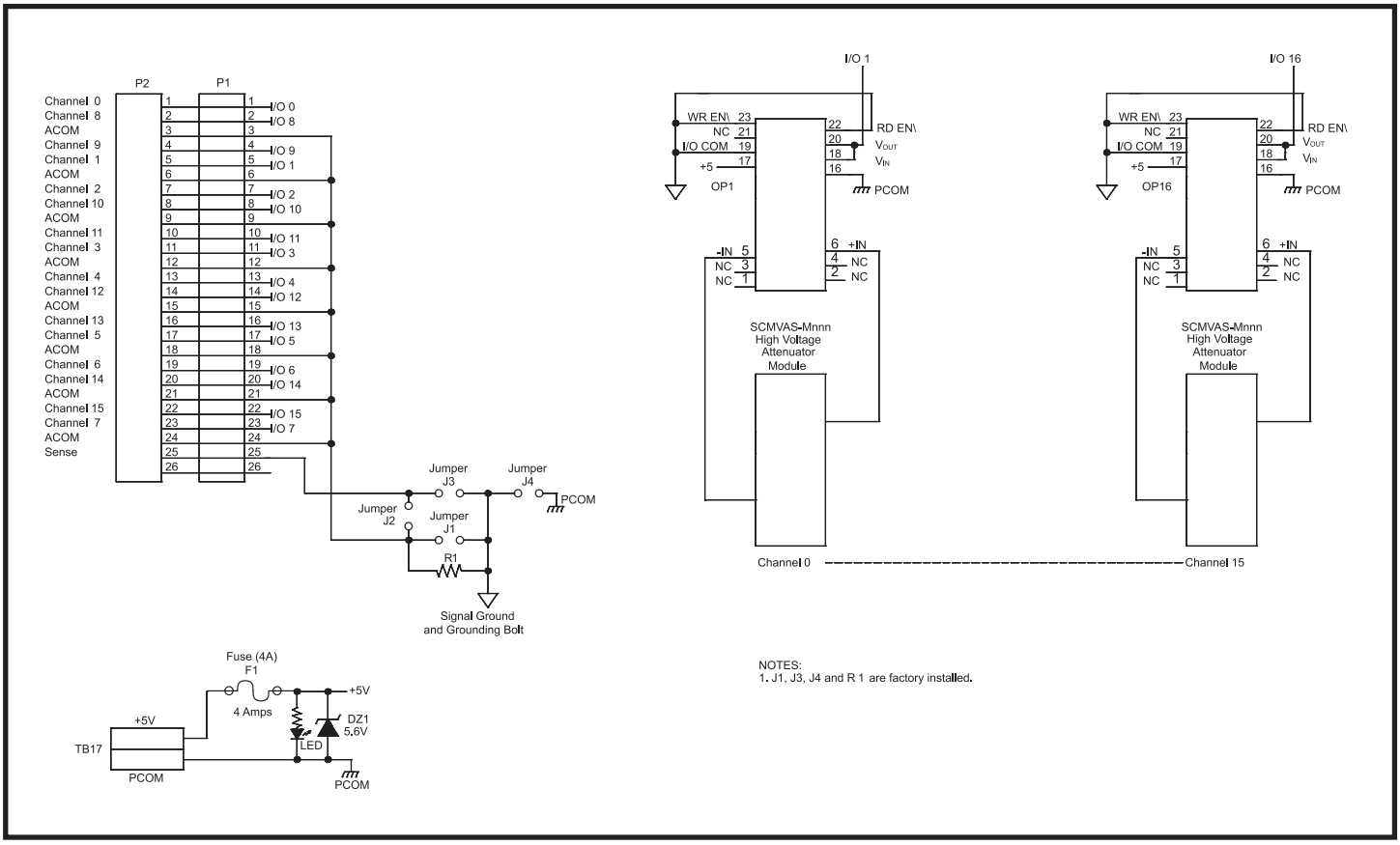

Figure 5: SCMVAS-PB16 Schematic