SEL-2245-2 Analog Input Module

The SEL-2245-2 provides dc analog inputs for the SEL Axion®. Within an Axion system, install as many as sixteen SEL-2245-2 modules in any combination you want.

Front Panel

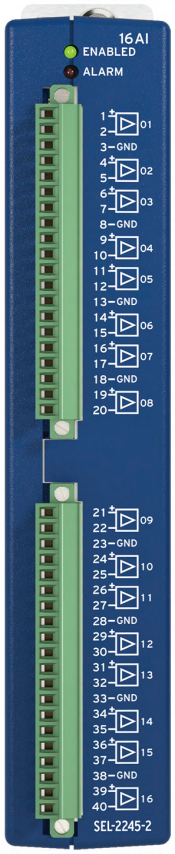

Figure 1 SEL-2245-2 DC Analog Input Module

Mechanical Installation

Each SEL-2242 chassis/backplane has four or ten slots, labeled A–J. Slots B–J support the SEL-2245-2 modules.

To install an SEL-2245-2 module, tip the top of the module away from the chassis, align the notch on the bottom of the module with the slot you want on the chassis, and place the module on the bottom lip of the chassis as *Figure 2* illustrates. The module is aligned properly when it rests entirely on the lip of the chassis.

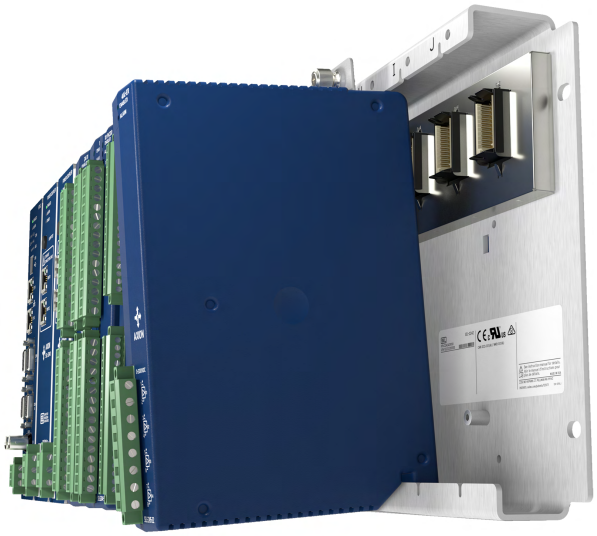

Figure 2 Proper Module Placement

Next, carefully rotate the module into the chassis, making sure that the alignment tab fits into the corresponding slot at the top of the chassis (refer to *Figure 3*). Finally, press the module firmly into the chassis and tighten the chassis retaining screw.

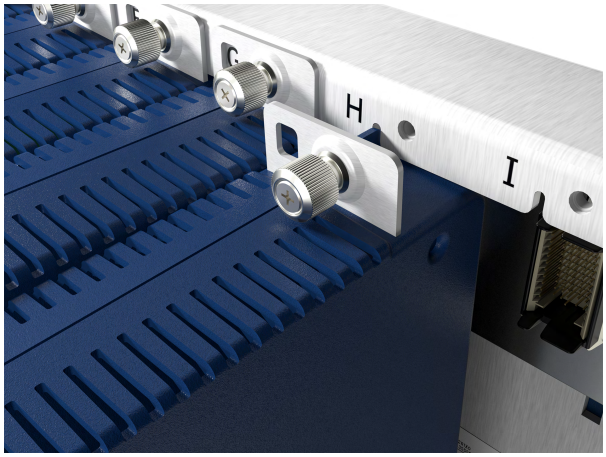

Figure 3 Final Module Alignment

Input Connections

The SEL-2245-2 dc analog inputs include a plus sign to indicate the positive convention. Refer to *Specifications* on page 2 for analog input ratings and to *Figure 1* for terminal assignments. You can configure inputs to measure ±20 mA, ±2 mA, or ±10 V signals. Configure inputs by adding a Fieldbus I/O connection for each module in ACSELERATOR RTAC® SEL-5033 Software. See the EtherCAT® portion in *Section 2: Communications* in the SEL-5033 software manual for details.

LED Indicators

The LEDs labeled **ENABLED** and **ALARM** are related to EtherCAT network operation. The green **ENABLED** LED illuminates when the module is operating normally on the network. The **ALARM** LED illuminates during network initialization or when there is a problem with the network. Refer to *Section 3: Testing and Troubleshooting* in the *SEL-2240 Instruction Manual* for more information.

Specifications

Compliance

Designed and manufactured under an ISO 9001 certified quality management system

UL Listed to U.S. and Canadian safety standards (File NRAQ, NRAQ7 per UL508, and C22.2 No. 14)

CE Mark

UKCA Mark

Product Standards

IEC 60255-26:2013 - Relays and Protection Equipment: EMC
IEC 60255-27:2014 - Relays and Protection Equipment: Safety
IEC 60825-2:2004 +A1:2007 +A2:2010 for fiber-optic communications
IEC 61850-3:2013 - Comm Systems for Power Utility Automation

General

Operating and Storage Temperature Range

–40° to +85°C (–40° to +185°F)
Units should be stored and transported in their original packaging.

Note: Operating temperature evaluated for UL ambient 0° to 40°C.

Operating Environment

Pollution Degree:	2
Overvoltage Category:	II
Insulation Class:	1
Relative Humidity:	5–95%, noncondensing
Maximum Altitude:	2000 m
Vibration, Earth Tremors:	Class 1

DC Transducer (Analog) Inputs (SEL-2245-2)

Input Impedance

Current Mode:	200 Ω for ±20 mA 5000 Ω for ±2 mA
Voltage Mode:	10 MΩ

Input Range (Maximum):

±20 mA
(transducers: 4–20 mA or 0–20 mA typical)
±2 mA
(transducers: 0–1 mA or 0–2 mA typical)
±10 V
(transducers: 0–5 V or 0–10 V typical)

Sampling Rate:

1 ksps

Anti-Alias Filter

Corner Frequency:	330 Hz
Rolloff:	20 dBV per decade

Digital Filter

Corner Frequency:	Filter A: 16 Hz Filter B: 10 Hz Filter C: 0.2 Hz
50 Hz Rejection:	Filter A: > 30 dB Filter B: > 50 dB Filter C: > 70 dB
60 Hz Rejection:	Filter A: > 60 dB Filter B: > 70 dB Filter C: > 70 dB

Step Response

No Filter:	3 ms (10–90% response)
Filter A:	23 ms (10–90% response)
Filter B:	35 ms (10–90% response)
Filter C:	700 ms (10–90% response)

Common Mode Range

±35 Vdc between inputs
±250 Vdc all inputs to chassis

Isolation

500 Vac between separate inputs
2000 Vac all inputs to chassis

Accuracy at 25°C

ADC:	16 bit
Voltage Inputs (±10 V):	0.25% of full scale typical 0.05% with field calibration 2% of full-scale maximum
High Current Inputs (±20 mA):	0.5% of full scale typical 0.1% with field calibration 2% of full-scale maximum
Low Current Inputs (±2 mA):	0.5% of full scale typical 0.1% with field calibration 4% of full-scale maximum

Accuracy Variation With Temperature

Inputs:	±0.015% per °C of full scale (±20 mA, ±2 mA, or ±10 V)
ADC:	±0.004% per °C

Triggered Waveform Recording

Sampling Rate:	1 kHz
Record Duration:	0.1 second increments from 0.5 s to 144 s
Record Pretrigger	0.05 s minimum to a maximum of (record length minus 0.05) s
Waveform File Format:	COMTRADE (IEEE C37.111-1999 compliant)

Type Tests

Environmental Tests

Enclosure Protection:	IEC 60529:2001 + CRGD:2003 IP3X excluding the terminal blocks
Vibration Resistance:	IEC 60255-21-1:1988 Vibration Endurance, Severity: Class 2 Vibration Response, Severity: Class 2
Shock Resistance:	IEC 60255-21-2:1988 Bump Withstand, Severity: Class 1 Shock Withstand, Severity: Class 1 Shock Response, Severity: Class 2
Seismic:	IEC 60255-21-3:1993 Quake Response, Severity: Class 2
Cold, Operational and Cold, Storage:	IEC 60068-2-1:2007 –40°C, 16 hours
Dry Heat, Operational and Dry Heat, Storage:	IEC 60068-2-2:2007 +85°C, 16 hours
Damp Heat, Cyclic:	IEC 60068-2-30:2005 25° to 55°C, 6 cycles, 95% relative humidity
Damp Heat, Steady State:	IEC 60068-2-78:2012 93% RH and 55°C for 10 days
Change of Temperature:	IEC 60068-2-14:2009 1 deg. per minute, –40° and +85°C, 5 cycles

Dielectric Strength and Impulse Tests

Impulse:	IIEC 60255-5:2000 IEEE C37.90-2005 Severity Level: 0.5 Joule, 2 kV channel to chassis 0.5 Joule, 500 V channel to channel
Dielectric (HiPot):	IEC 60255-5:2000 IEEE C37.90-2005 Severity Level: 2000 Vac channel to chassis for 1 minute 500 Vac channel to channel for 1 minute

RFI and Interference Tests

EMC Immunity

Low-level analog dc signals were tested with shielded twisted pair for optimum noise rejection.

Slow Damped Oscillatory Waves:	IEC 61000-4-18:2006 + A1:2010 Severity Level: 2.5 kV common mode 1 kV differential mode
Electrostatic Discharge Immunity:	IEEE C37.90.3-2001 IEC 60255-22-2:2008 IEC 61000-4-2:2008 Severity Level: 8 kV contact discharge 15 kV air discharge (Filter A applied) (Command and Control: all 16 input returns connected together) (Measurement: all 16 inputs may be isolated from each other)
Radiated RF Immunity:	IEEE C37.90.2-2004 Severity Level: 35 V/m IEC 61000-4-3:2008 IEC 60255-22-3:2007 Severity Level: 10 V/m
Digital Radio Telephone RF Immunity:	ENV 50204:1995 Severity Level: 10 V/m at 900 MHz and 1.89 GHz
Conducted RF Immunity:	IEC 60255-22-6:2001 IEC 61000-4-6:2008 Severity Level: 10 Vrms
Surge Immunity:	IEC 60255-22-5:2008 IEC 61000-4-5:2005 Severity Level: 1 kV Line to Line, 2 kV Line to Earth (8 ms filter voltage mode, 6 ms filter high-current mode, 4 ms filter low-current mode)
Fast Transient, Burst Immunity:	IEC 60255-22-4:2008 IEC 61000-4-4:2011 Severity Level: Class A: 4 kV, 5 kHz; 2 kV, 5 kHz on communications ports
Magnetic Field Immunity:	IEC 61000-4-8:2009 Severity Level: 1000 A/m for 3 seconds, 100 A/m for 1 minute IEC 61000-4-9:2001 Severity Level: 1000 A/m IEC 61000-4-10:2001 Severity Level: 100 A/m
Surge Withstand Capability Immunity:	IEEE C37.90.1-2002 Severity Level: 2.5 kV Oscillatory 4.0 kV Fast Transient (Filter A applied)
Oscillatory Waves Immunity:	IEC 61000-4-12:2006 Severity Level: Ring Wave: 2 kV common, 1.0 kV differential Oscillatory: 2.5 kV common, 1.0 kV differential (Filter A applied)
Common Mode Disturbance Immunity:	IEC 61000-4-16:2002 Frequency: 0 to 150 Hz Severity Level: Level 4, Segment 4: 30 Vrms open-circuit, 15 to 150 kHz

Emissions

Radiated and Conducted Emissions:	IEC 60255-25:2000 Severity Level: Class A Canada ICES-001 (A) / NMB-001 (A)

Technical Support

We appreciate your interest in SEL products and services. If you have questions or comments, please contact us at:

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