SEL-2245-22 Analog Input Extended Range Module

The SEL-2245-22 provides extended range dc analog inputs or ac voltage inputs for the SEL Axion®. Within an Axion system, install as many as sixteen SEL-2245-22 modules in any combination you want.

Front Panel

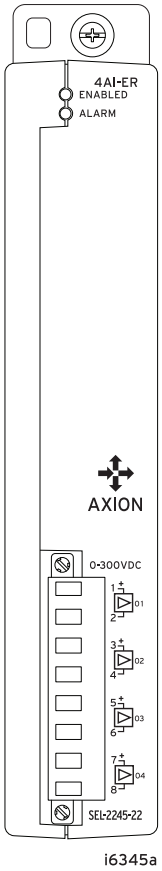

Figure 1 SEL-2245-22 Analog Input Extended Range Module

Mechanical Installation

Each SEL-2242 chassis/backplane has four or ten slots, labeled **A**–**J**. Slots **B**–**J** support the SEL-2245-22 modules.

Figure 2 Notch for Module Alignment

To install an SEL-2245-22 module, tip the top of the module away from the chassis, align the notch on the bottom of the module (shown in *Figure 2*) with the slot you want on the chassis, and place the module on the bottom lip of the chassis as *Figure 3* illustrates. The module is aligned properly when it rests entirely on the lip of the chassis.

Figure 3 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 4*). Finally, press the module firmly into the chassis and tighten the chassis retaining screw.

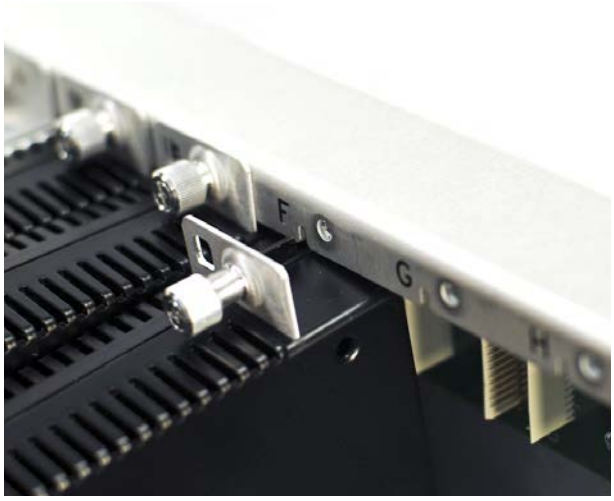

Figure 4 Final Module Alignment

Input Connections

The SEL-2245-22 analog inputs include a plus sign to indicate the positive convention. Refer to *Specifications* for analog input ratings and to *Figure 1* for terminal assignments. Input range is 0–300 Vdc. 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

General

Operating Temperature Range:

–40° to +85°C (–40° to +185°F)
Note: Not applicable to UL applications.

Operating Environment

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

Type Test Acceptance Criteria

Level B: Allows temporary degradation or loss of performance during transient events that are self-recovering.

DC Transducer (Analog) Inputs (SEL-2245-22) (DC Mode)

Input Impedance:	> 7 MΩ
Input Range (Maximum):	0–300 V
Sampling Rate:	24 ksps

Anti-Alias Filter

Corner Frequency:	5 kHz
Rolloff:	20 dB 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

Group Delay (Pre-Filter):	5.3 ms
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)

AC Voltage Inputs (SEL-2245-22) (AC Mode)

Voltage Inputs

V_{NOM}:	300 V
Measurement Range:	5–400 L-N, 9–693 L-L Vac Fundamental/RMS 5–300 L-N, 9–520 L-L Vac Fundamental/RMS (UL)
Maximum:	600 L-N, 1039 L-L Vac Fundamental/RMS for 10 s
Typical Accuracy:	±0.1% Fundamental@ f_{NOM} and > 20V ±0.1% RMS@ f_{NOM}
Worst Case Accuracy:	±2% Fundamental@ f_{NOM} ±1% RMS ±0.05 V

Angle

Range:	±180°
Typical Accuracy:	±0.1° @ f_{NOM} and > 20 V
Worst Case Accuracy:	±2° @ f_{NOM}
Burden:	< 0.1 VA

Sequence Components

Values:	V0, V1, V2
Typical Accuracy	
Magnitude:	±0.2% @ f_{NOM} and V > 6.7 V, I > 0.6 A
Angle:	±0.2% @ f_{NOM} and V > 6.7 V, I > 0.6 A
Worst Case Accuracy	
Magnitude:	±3% @ f_{NOM} and V > 6.7 V, I > 0.6 A
Angle:	±0.2% @ f_{NOM} and V > 6.7 V, I > 0.6 A

Synchrophasor

Conformance:	IEEE C37.118.1-2011 as amended by IEEE C37.118.1a-2014 IEEE C37.118.2-2011
Accuracy:	Level 1 as specified by IEEE C37.118
Measurements:	Software selectable
Voltage:	VA, VB, VC, VS
Positive-Sequence:	V1
Periodic:	Frequency and df/dt
Processing Rate:	120 Hz

AC and DC Inputs (SEL-2245-22)

Common Mode Range

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

Isolation

2500 Vrms between separate inputs
2500 Vrms all inputs to chassis

Accuracy at 25°C

ADC:	16 bit
Inputs:	0.25% of full-scale typical 3% of full scale worst case

Accuracy Variation With Temperature

Inputs:	±0.015% per °C of full scale

Triggered Waveform Recording

Sampling Rate:	1, 2, 4, 8, 24 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 1 Vibration Response, Severity: Class 1
Shock Resistance:	IEC 60255-21-2:1988 Bump Test, Severity: Class 1 Shock Withstand, Severity: Class 1 Shock Response, Severity: Class 1
Seismic:	IEC 60255-21-3:1993 Quake Response, Severity: Class 2
Cold:	IEC 60068-2-1:2007 –40°C, 16 hours
Dry Heat:	IEC 60068-2-2:2007 +85°C, 16 hours
Damp Heat, Cyclic:	IEC 60068-2-30:2005 25°C to 55°C, 6 cycles, 95% relative humidity

Dielectric Strength and Impulse Tests

Impulse:	IIEC 60255-5:2000 IEEE C37.90-2005 Severity Level: 0.5 Joule, 5 kV
Dielectric (HiPot):	IEC 60255-5:2000 IEEE C37.90-2005 Severity Level: 2500 Vac channel to chassis for 1 minute

RFI and Interference Tests

EMC Immunity

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
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
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:	IEC 60255-22-1:2007 Severity Level: 2.5 kV common-mode 1.0 kV differential-mode IEEE C37.90.1-2002 Severity Level: 2.5 kV Oscillatory 4.0 kV Fast Transient
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
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

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