



SEL-2245-4 AC Metering Module

The SEL-2245-4 provides ac metering inputs for the SEL Axion®. Within an Axion node, install as many as sixteen SEL-2245-4 modules per system in any combination you want.

Front Panel



Figure 1 SEL-2245-4 AC Metering Module

Mechanical Installation

Each SEL-2242 chassis/backplane has four or ten slots, labeled A–J. Slots B–J support the SEL-2245-4 modules.

To install an SEL-2245-4 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.

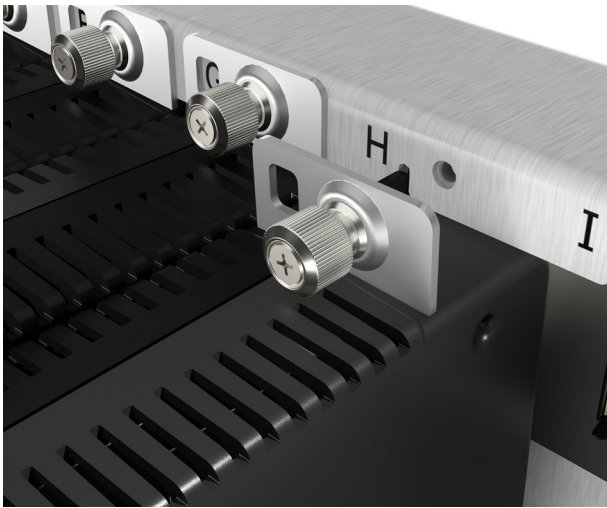


Figure 3 Final Module Alignment

Input Connections

The SEL-2245-4 CT/PT analog inputs include a dot next to the terminal number to indicate the positive convention. Refer to *Specifications* for ac analog input ratings and to *Figure 4* for terminal assignments. You can configure potential transformer (PT) inputs for 5–400 V and current transformer (CT) inputs for 0–22 A. Configure inputs by adding a Fieldbus I/O connection for each module in ACCELERATOR RTAC® SEL-5033 Software. See the EtherCAT® portion in *Section 2: Communications* in the *SEL-5033 Software Instruction Manual* for details.

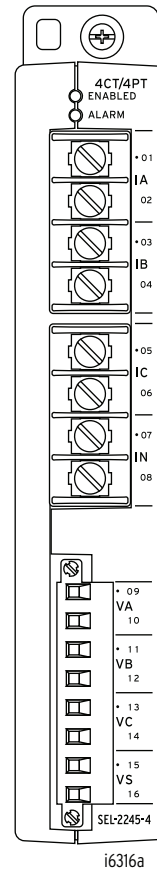


Figure 4 CT/PT Analog Inputs

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.

CAUTION

Use supply wires suitable for 60°C (140°F) above ambient. See product or manual for ratings.

ATTENTION

Utilisez des fils d'alimentation appropriés pour 60°C (140°F) au-dessus ambiante. Voir le produit ou le manuel pour les valeurs nominales.

Specifications

Compliance

Designed and manufactured under an ISO 9001 certified quality management system

UL Listed to U.S. and Canadian safety standards (File E220228; NRAQ, NRAQ7)

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

AC Metering Inputs (SEL-2245-4)

Frequency:	50/60 Hz
Range:	45–65 Hz
Typical Accuracy:	±0.005 Hz above 20 V
Worst-Case Accuracy:	±0.01 Hz above 20 V
Phase Rotation:	ABC, ACB
Input Configuration:	3-Wire Delta, 4-Wire Wye

Update Interval

Fundamental Metering:	200 Hz
RMS Metering:	5 Hz

Current Inputs Phase and Neutral

I_{NOM} :	1 A or 5 A (no settings required)
Measurement Range:	0.050–22 A Continuous 22–100 A Symmetrical for 25 s
Thermal Withstand Limit:	500 A for 1 s
Typical Accuracy:	±0.1% Fundamental @ f_{NOM} and > 0.6 A ±0.1% RMS @ f_{NOM} and > 0.6 A
Worst-Case Accuracy:	±2% ± 0.005 A Fundamental ±1% ± 0.005 A RMS
Angle	
Range:	±180°
Typical Accuracy:	±0.1° Fundamental @ f_{NOM} and > 0.6 A
Worst-Case Accuracy:	±2° @ f_{NOM}
Burden:	< 0.1 VA @ I_{NOM}

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 > 20 V ±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:	I0, I1, I2, V0, V1, V2
Typical Accuracy	
Magnitude:	±0.2% @ f_{NOM}
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 $V > 6.7 V, I > 0.6 A$

Power and Power Factor (Per Phase and Three-Phase)

PA, PB, PC, 3P	
Typical Accuracy:	0.1% @ PF > 0.1
Worst-Case Accuracy:	2%
QA, QB, QC, 3Q	
Typical Accuracy:	0.1% @ PF < 0.9
Worst-Case Accuracy:	2%
SA, SB, SC, 3S	
Typical Accuracy:	0.1%
Worst-Case Accuracy:	2%
PFA, PFB, PFC, 3PF	
Typical Accuracy:	0.1% @ PF > 0.1
Worst-Case Accuracy:	2%

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 (P or M class)
Voltage:	VA, VB, VC, VS
Current:	IA, IB, IC, IN
Positive-Sequence:	V1, I1
Periodic:	Frequency and df/dt
Processing Rate:	120 Hz
Message Rates (60 Hz nominal):	1, 2, 4, 5, 10, 12, 15, 20, 30, 60, and 120* (messages/second)

Message Rates (50 Hz nominal): 1, 2, 5, 10, 25, 50, and 100*
(messages/second)

* Message rates are supported on the SEL-3350, SEL-3555, and SEL-3560.

Triggered Waveform Recording

Sampling Rates: 1, 2, 4, 8, 24 kHz software selectable
Record Duration: 0.1 second increments from 0.5 s to specified maximum for each sample rate.
Maximum Record Duration: 6 s at 24 kHz
18 s at 8 kHz
36 s at 4 kHz
72 s at 2 kHz
144 s at 1 kHz
Record Pretrigger: 0.05 s minimum to a maximum of (record length - 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: IEC 60255-5:2000
IEEE C37.90-2005
Severity Level:
0.5 Joule, 5 kV CT/PT inputs
Dielectric (HiPot): IEC 60255-5:2000
IEEE C37.90-2005
Severity Level:
2500 Vac CT/PT inputs for 1 minute

RFI and Interference Tests

EMC Immunity

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
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
(202 ms filter on RMS voltages and frequencies, 33 ms filter on fundamental frequencies)
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
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 Hz to 150 Hz
Severity Level: Level 4, Segment 4:
30 Vrms open-circuit, 15 kHz-150 kHz

Emissions

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

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This product is covered by the standard SEL 10-year warranty. For warranty details, visit selinc.com or contact your customer service representative.

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