The SEL-2245-411 provides standard current and low-voltage (LEA) monitoring inputs for the SEL-2240 Axion®. Within an Axion node, install as many as 16 SEL-2245-411 modules per system in any combination.

Front Panel

Mechanical Installation

Each SEL-2242 chassis/backplane has four or ten slots, labeled A-J. Slots B–J support the SEL-2245-411 modules.

To install an SEL-2245-411 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.
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 3 Proper Module Placement

Figure 4 Final Module Alignment

Input Connections

The SEL-2245-411 4 CT/4 LEA 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 5 for terminal assignments. You can configure low-voltage or low-energy analog (LEA) inputs for 0–30 V and current transformer (CT) inputs for 0–22 A.

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 Instruction Manual for details.

Figure 5 4CT/4LEA 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

## General

**Operating Temperature Range:**

-40° to +85°C (~-40° to +185°F)

**Operating Environment**

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

## AC Metering Inputs

**Frequency:** 50/60 Hz

**Range:** 45–65 Hz

**Typical Accuracy:** ±0.005 Hz above 500 mV

**Worst-Case Accuracy:** ±0.01 Hz above 500 mV

**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

**INOM:** 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% @ f NOM and > 0.6 A Fundamental
- ±1% ± 0.005 A RMS

**Angle**

- Range: ±180°

**Typical Accuracy:** ±0.1° @ f NOM and > 50 mV

**Worst-Case Accuracy:** ±2° @ f NOM

**Burden:** < 0.1 VA

## Voltage Inputs

**V NOM:** 1.5 V

**Measurement Range:**

- 30 Vac peak
- 0.05–22 Vac RMS

**Maximum:** 300 VL-N for 10 s (surge)

**Typical Accuracy:**

- ±0.1% @ f NOM and > 50 mV RMS
- ±0.1% @ f NOM and > 50 mV Fundamental

**Worst-Case Accuracy:** ±3% ± 1 mV @ f NOM Fundamental/RMS

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

- **PA, PB, PC, 3P**
  - **Typical Accuracy:** 0.1% @ PF ≥ 0.5
  - **Worst-Case Accuracy:** 2%

- **QA, QB, QC, 3Q**
  - **Typical Accuracy:** 0.1% @ PF ≤ 0.98
  - **Worst-Case Accuracy:** 2%

- **SA, SB, SC, 3S**
  - **Typical Accuracy:** 0.1%
  - **Worst-Case Accuracy:** 2%

## 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 Test, 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:** 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:**
- IEEE 60255-5-2000
- IEEE C37.90-2005
  - Severity Level: 0.5 Joule, 5 kV CT/PT inputs

**Dielectric (HiPot):**
- IEEE 60255-5-2000
- IEEE C37.90-2005
  - Severity Level: 2500 Vac CT/PT inputs for 1 minute

### RFI and Interference Tests

**EMC Immunity**

**Electrostatic Discharge Immunity:**
- IEEE C37.90-3-2001
- IEC 60255-22:2-2008
- IEC 60100-4-2:2008
  - Severity Level: 8 kV contact discharge
  - 15 kV air discharge

**Radiated RF Immunity:**
- IEEE C37.90-2-2004
  - Severity Level: 35 V/m
- IEC 60100-4-3:2008
- 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:**
- IEEE 60255-22-6:2001
- IEC 60100-4-6:2008
  - Severity Level: 10 Vrms

**Surge Immunity:**
- IEC 60100-4-5:2005
  - 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; cable length ≤2 m)

**Fast Transient, Burst Immunity:**
- IEEE 60255-22-4:2008
- IEEE 60100-4-4:2011
  - Severity Level: Class A: 4 kV, 5 kHz; 2 kV, 5 kHz on communications ports
    - (cable length ≤2 m)

**Magnetic Field Immunity:**
- IEC 60100-4-10:2001
  - Severity Level: 100 A/m for 3 seconds, 100 A/m for 1 minute
- IEC 60100-4-9:2001
  - Severity Level: 1000 A/m
- IEC 60100-4-10:2001
  - Severity Level: 100 A/m

**Surge Withstand Capability Immunity:**
- IEEE 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 (cable length ≤2 m)

**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 (cable length ≤2 m)

**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
    - (cable length ≤2 m)

**Emissions**

**Radiated and Conducted Emissions:**
- IEEE 60255-25:2000
  - Severity Level: Class A