# SEL-2245-3 Analog Output Module

The SEL-2245-3 provides dc analog outputs for the SEL Axion® platform. Within an Axion system, install as many as sixteen SEL-2245-3 modules with as many as three SEL-2245-3 modules per node.

## Front Panel

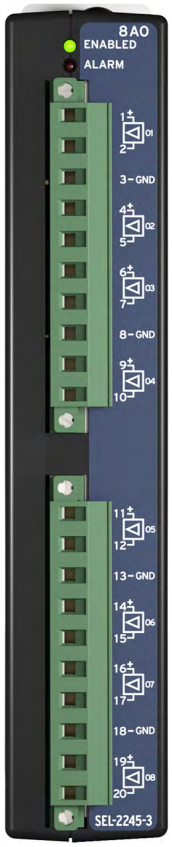


**Figure 1 SEL-2245-3 DC Analog Output Module**

## Mechanical Installation

Each SEL-2242 chassis/backplane has four or ten slots, labeled **A**–**J**. Slots **B**–**J** support the SEL-2245-3 modules.

To install an SEL-2245-3 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**

## Output Connections

The SEL-2245-3 dc analog outputs include a plus sign to indicate the positive convention. Refer to *Specifications* for analog output ratings and to *Figure 1* for terminal assignments. You can configure outputs to drive ±20 mA or ±10 V signals. Configure outputs by adding a Fieldbus I/O connection for each module in ACSELERATOR RTAC® SEL-5033 Software. See the EtherCAT® section in *Section 2: Communications* in the SEL-5033 software manual for details.

**⚠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.

## 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

## 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 Analog Outputs (SEL-2245-3)

### Current Mode

| | |
|---|---|
| Output Range: | –20.48 to +20.48 mA |
| Load Impedance: | 0–750 Ω @ 20 mA, 100 µH |

### Voltage Mode

| | |
|---|---|
| Output Range: | –10.24 to +10.24 volts |
| Load Impedance: | >2000 Ω, 1 µF |

### Step Response:

1 ms (10–90% response typical)

### Isolation

2000 Vdc between outputs or ground

### Accuracy at 25°C

Outputs

| | |
|---|---|
| Current Mode: | ±0.3% of full scale typical<br>±3% of full-scale worst case (during an EMI event over a 1-second period) |
| Voltage Mode: | ±0.2% of full-scale typical<br>±2% of full-scale worst case (during an EMI event over a 1-second period) |

### Accuracy Variation With Temperature

Outputs

±0.01% of full-scale/°K (current or voltage mode)

## Type Tests

### Environmental Tests

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

### Dielectric Strength and Impulse Tests

| | |
|---|---|
| Impulse: | IIEC 60255-5:2000<br>IEEE C37.90-2005<br>Severity Level:<br>0.5 Joule, 3 kV channel to chassis<br>0.5 Joule, 3 kV channel to channel |
| Dielectric (HiPot): | IEC 60255-5:2000<br>IEEE C37.90-2005<br>Severity Level:<br>2000 Vdc channel to chassis for 1 minute<br>2000 Vdc 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<br>Severity Level: 2.5 kV common mode<br>1 kV differential mode |
| Electrostatic Discharge Immunity: | IEEE C37.90.3-2001<br>IEC 60255-22-2:2008<br>IEC 61000-4-2:2008<br>Severity Level: 8 kV contact discharge<br>15 kV air discharge |
| Radiated RF Immunity: | IEEE C37.90.2-2004<br>Severity Level: 35 V/m<br>IEC 61000-4-3:2008<br>IEC 60255-22-3:2007<br>Severity Level: 10 V/m |
| Conducted RF Immunity: | IEC 60255-22-6:2001<br>IEC 61000-4-6:2008<br>Severity Level: 10 Vrms |

| | |
|---|---|
| Surge Immunity: | IEC 60255-22-5:2008<br>IEC 61000-4-5:2005<br>Severity Level: 1 kV Line to Line, 2 kV Line to Earth<br>(The output accuracy will deviate from the specification unless a 1 s delay is implemented on the monitoring device.) |
| Fast Transient, Burst Immunity: | IEC 60255-22-4:2008<br>IEC 61000-4-4:2011<br>Severity Level: Class A: 4 kV, 5 kHz; 2 kV, 5 kHz on communication ports |
| Magnetic Field Immunity: | IEC 61000-4-8:2009<br>Severity Level: 1000 A/m for 3 seconds, 100 A/m for 1 minute<br>IEC 61000-4-9:2001<br>Severity Level: 1000 A/m<br>IEC 61000-4-10:2001<br>Severity Level: 100 A/m |
| Surge Withstand Capability Immunity: | IEEE C37.90.1-2002<br>Severity Level: 2.5 kV Oscillatory 4.0 kV Fast Transient<br>(The output accuracy will deviate from the specification unless a 100 ms delay is implemented on the monitoring device.) |
| Oscillatory Waves Immunity: | IEC 61000-4-12:2006<br>Severity Level: Ring Wave: 2 kV common, 1.0 kV differential<br>Oscillatory: 2.5 kV common, 1.0 kV differential |
| Common Mode Disturbance Immunity: | IEC 61000-4-16:2002<br>Frequency: 0 to 150 Hz<br>Severity Level: Level 4, Segment 4: 30 Vrms open-circuit, 15 to 150 kHz |

Emissions

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



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