SEL-2244 Digital I/O Module

The SEL-2244 provides contact input and outputs for the SEL Axion®. Within an Axion node, install any combination of SEL-2244 modules you want.

Front Panel

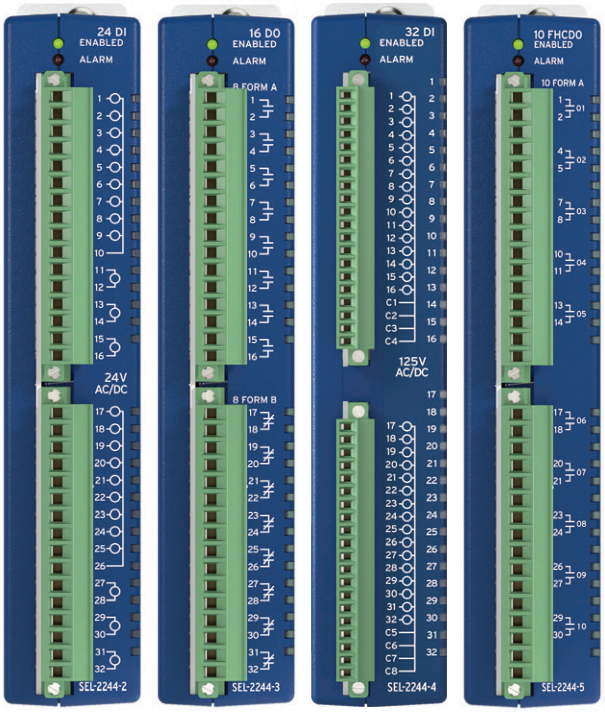


Figure 1 SEL-2244 Digital Input and Output Modules

Mechanical Installation

Each SEL-2242 chassis/backplane has ten slots, labeled **A** through **J**. Slots **B**–**J** support the SEL-2244 Digital Input and Digital Output modules.

To install an SEL-2244 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

Connections

Inputs

The SEL-2244-2 24 Digital Input (DI) module optoisolated inputs are not polarity dependent. The SEL-2244-4 32 DI module inputs support positive and negative polarities relative to the common return terminal, but inputs on the same bank need to be configured to have the same polarity for dc signals and be in phase for ac signals. Refer to the *Specifications on page 2* for optoisolated input ratings and *Figure 1* for terminal assignments. On all SEL-2244-2 24 DI voltage options, and the 110 V and 125 V options of the SEL-2244-4 32 DI, you can configure inputs to respond to ac or dc control signals. The 24 V and 48 V options of the SEL-2244-4 32 DI only support dc control signals. Configure contact inputs by adding a Fieldbus I/O connection for each module in ACSELERATOR RTAC® SEL-5033 Software. See the EtherCAT® portion of *Section 2: Communications* in the ACSELERATOR RTAC *SEL-5033 Instruction Manual* for details.

NOTE: Ensure that when you are applying ac power to inputs with common returns that ac neutral is connected to the common terminal.

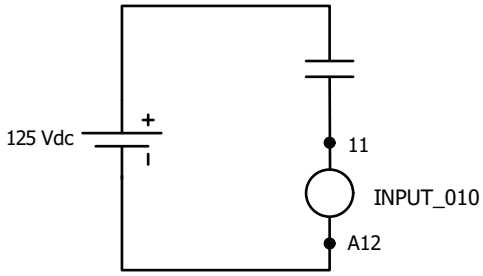


Figure 4 Digital Inputs

Outputs

Refer to the *Specifications on page 2* for output contact ratings and *Figure 1* for terminal assignments. Depending on which module type you ordered, the module will have all Form A, all Form B, or some of each contact type. Standard and fast high-current outputs are wired the same. The fast high-current outputs are not polarity sensitive. Configure contact outputs by adding a Fieldbus I/O connection for each module in ACSELERATOR RTAC. See the EtherCAT portion of *Section 2: Communications* in the *ACSELERATOR* RTAC *SEL-5033 Instruction Manual* for details.

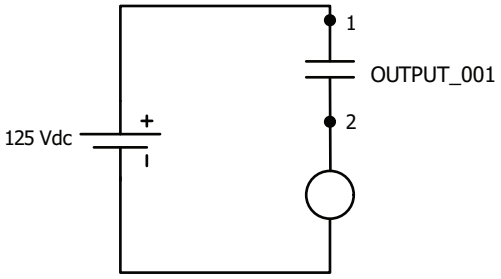


Figure 5 Digital Outputs

LED Indicators

Each input and output is associated with a red LED on the right edge of the module. The LED will be illuminated when you assert the point or depress the lamp test button.

The LEDs labeled **ENABLED** and **ALARM** are related to EtherCAT network operation. The green **ENABLED** LED will illuminate when the module is operating normally on the network. The **ALARM** LED will illuminate 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) (Not applicable to 250 V Input Option)

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 Performance Class 1 - 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

Optoisolated Control Inputs (SEL-2244-2 24 Digital Inputs)

When Used With DC Control Signals:

250 V	ON for 200–275 Vdc	OFF below 150 Vdc
220 V	ON for 176–242 Vdc	OFF below 132 Vdc
125 V	ON for 100–135.5 Vdc	OFF below 75 Vdc
110 V	ON for 88–121 Vdc	OFF below 66 Vdc
48 V	ON for 38.4–52.8 Vdc	OFF below 28.8 Vdc
24 V	ON for 15–30 Vdc	OFF for < 10 Vdc

When Used With AC Control Signals:

250 V	ON for 170.6–300 Vac	OFF below 106 Vac
220 V	ON for 150.3–264 Vac	OFF below 93.2 Vac
125 V	ON for 85–150 Vac	OFF below 53 Vac
110 V	ON for 75.1–132 Vac	OFF below 46.6 Vac
48 V	ON for 32.8–60 Vac	OFF below 20.3 Vac
24 V	ON for 14–27 Vac	OFF for < 5 Vac

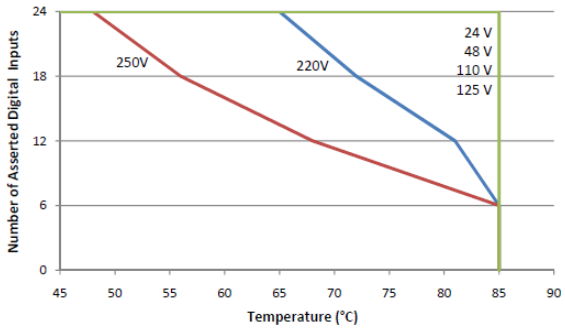
Burden/Current Draw at Nominal DC Voltage: 2–6 mA (Except for 24 V, 8 mA)

Rated Insulation Voltage: 300 Vac

Rated Impulse Withstand Voltage (U_{imp}): 5000 V

Input Thermal Derating

SEL-2244-2 Digital Inputs Derating Curve:



Optoisolated Control Inputs (SEL-2244-4 32 Digital Inputs)

When Used With DC Control Signals:

125 V	ON for 100–135.5 Vdc	OFF below 75 Vdc
110 V	ON for 88–121 Vdc	OFF below 66 Vdc
48 V	ON for 38.4–52.8 Vdc	OFF below 28.8 Vdc
24 V	ON for 15–30 Vdc	OFF for <10 Vdc

When Used With AC Control Signals:

125 V	ON for 85–150 Vac	OFF below 53 Vac
110 V	ON for 75.1–132 Vac	OFF below 46.6 Vac

Burden/Current Draw at Nominal DC Voltage: 2–6 mA (Except for 24 V, 8 mA)

Rated Insulation Voltage: 300 Vac

Rated Impulse Withstand Voltage (U_{imp}): 5000 V

Maximum Voltage Between Inputs That Share a Common Ground: 150 Vpeak

Use default timer values or greater (≥10 ms in DC mode) for EMC compliance.

Control Outputs (SEL-2244-3 Standard Contacts)

Mechanical Durability: 10 M no load operations

DC Output Ratings

Rated Operational Voltage: 250 Vdc

Rated Voltage Range: 19.2–275 Vdc

Rated Insulation Voltage: 300 Vdc

Make: 30 A @ 250 Vdc per IEEE C37.90

Continuous Carry: 6 A @ 70°C; 4 A @ 85°C

Continuous Carry (UL/CSA derating with all outputs asserted): 5 A @ < 60°C; 2.5 A 60 to 70°C

Thermal: 50 A for 1 s

Contact Protection: 350 Vdc, 145 J MOV protection across open contacts

Operating Time (coil energization to contact closure, resistive load): Pickup/Dropout time ≤8 ms typical

Breaking Capacity (10,000 operations) per IEC 60255-0-20:1974:	24 Vdc	0.75 A	L/R = 40 ms
	48 Vdc	0.50 A	L/R = 40 ms
	125 Vdc	0.30 A	L/R = 40 ms
	250 Vdc	0.20 A	L/R = 40 ms
Cyclic Capacity (2.5 cycles/second) per IEC 60255-0-20:1974:	24 Vdc	0.75 A	L/R = 40 ms
	48 Vdc	0.50 A	L/R = 40 ms
	125 Vdc	0.30 A	L/R = 40 ms
	250 Vdc	0.20 A	L/R = 40 ms

AC Output Ratings

Rated Operational Voltage: 240 Vac

Rated Insulation Voltage (excluding EN 61010-1): 300 Vac

Utilization Category: AC-15 (control of electromagnetic loads > 72 VA)

Contact Rating Designation: B300 (B = 5 A, 300 = rated insulation voltage)

Contact Protection: 250 Vac, 145 J

Continuous Carry: 3 A @ 120 Vac
1.5 A @ 240 Vac

Conventional Enclosed Thermal Current (I_{the}) Rating: 5 A

Rated Frequency: 50/60 ± 5 Hz

Operating Time (coil energization to contact closure, resistive load): Pickup/Dropout time < 8 ms typical

Electrical Durability Make VA Rating: 3600 VA, cosø = 0.3

Electrical Durability Break VA Rating: 360 VA, cosø = 0.3

Control Outputs (SEL-2244-5 Fast High-Current Contacts)

Mechanical Durability: 10 M no load operations

DC Output Ratings

Rated Operational Voltage: 250 Vdc

Rated Voltage Range: 19.2–275 Vdc

Rated Insulation Voltage: 300 Vdc

Make: 30 A @ 250 Vdc per IEEE C37.90

Continuous Carry: 6 A @ 70°C; 4 A @ 85°C

Continuous Carry (UL/CSA derating with all outputs asserted):	5 A @ < 60°C; 2.5 A 60 to 70°C		
Thermal:	50 A for 1 s		
Contact Protection:	330 Vdc, 145 J MOV protection across open contacts		
Operating Time (coil energization to contact closure, resistive load)			
Pickup time:	≤12 µs at 250 Vdc, 16 µs at 125 Vdc, 65 µs at 19.2 Vdc typical (results with 100 kΩ resistive load)		
Dropout time:	≤8 ms typical		
Inductive Breaking Capacity (100,000 operations) per IEC 60255-0-20:1974:	24 Vdc 48 Vdc 125 Vdc 250 Vdc	10 A 10 A 10 A 10 A	L/R = 40 ms L/R = 40 ms L/R = 40 ms L/R = 20 ms
Cyclic Capacity (4 cycles/second followed by 2 mins idle thermal dissipation) per IEC 60255-0-20:1974:	24 Vdc 48 Vdc 125 Vdc 250 Vdc	10 A 10 A 10 A 10 A	L/R = 40 ms L/R = 40 ms L/R = 40 ms L/R = 20 ms

AC Output Ratings

Rated Operational Voltage:	110/120/220/240 Vac
Voltage Range:	19.2–250 Vac
Rated Insulation Voltage:	250 Vac
Make:	30 A @ 240 Vac
Continuous Carry:	6 A @ 70°C; 4 A @ 85°C
Continuous Carry (UL/CSA derating with all outputs asserted):	5 A @ < 60°C; 2.5 A 60 to 70°C
Thermal:	50 A for 1 s
Contact Protection:	250 Vac, 145 J MOV protection across open contacts
Operating Time (coil energization to contact closure, resistive load):	
Pickup time:	≤12 µs at 250 Vac, 16 µs at 125 Vac, 65 µs at 19.2 Vac typical (results with 100 kΩ resistive load)
Dropout time:	≤8 ms typical

Note: Per IEC 60255-23:1994, using the simplified method of assessment.
Note: Make rating per IEEE C37.90-1989.

Fuse Rating	
Non-Serviceable:	4 A, 450 V, medium time lag M

Type Tests (SEL-2244-2, SEL-2244-3, and SEL-2244-5)

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 except for Form B contacts and SEL-2244-5 (Class 1) 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°C 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 Severity Level: 0.5 Joule, 5 kV IEEE C37.90-2005 Severity Level: 0.5 Joule, 5 kV
Dielectric (HiPot):	IEC 60255-5:2000 Severity Level: 2500 Vac on contact inputs and outputs for 1 minute. IEEE C37.90-2005 Severity Level: 2500 Vac on contact inputs and outputs 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: 4 8 kV contact discharge 15 kV air discharge
Radiated RF Immunity:	IEEE C37.90.2-2004 Severity Level: 35 V/m IEC 61000-4-3:2010 Severity Level: 10 V/m 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 Severity Level: 10 Vrms IEC 61000-4-6:2008 Severity Level: 10 Vrms
Surge Immunity:	IEC 60255-22-5:2008 Severity Level: 1 kV Line to Line, 2 kV Line to Earth 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 Severity Level: Class A: 4 kV, 5 kHz; 2 kV, 5 kHz on communication ports IEC 61000-4-4:2011 Severity Level: 4 kV, 5 kHz
Magnetic Field Immunity:	IEC 61000-4-8:2009 Severity Level: 1000 A/m for 3 seconds, 100 A/m for 1 minute IEC 61000-4-10:2001 Severity Level: 100 A/m
Surge Withstand Capability Immunity:	IEEE C37.90.1-2002 2.5 kV oscillatory, 4 kV fast transient
Oscillatory Waves Immunity:	IEC 61000-4-12:2006 Ring Wave: 2 kV common, 1.0 kV differential Oscillatory: 2.5 kV common, 1.0 kV differential

Conducted Common Mode Disturbance Immunity:	IEC 61000-4-16:2016 + A1:2010 Frequency: 0 to 150 kHz on digital inputs Severity: 30 Vrms for 60 seconds, 300 Vrms for 1 second

Emissions

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

Type Tests (SEL-2244-4)

Environmental Tests

Enclosure Protection:	IEC 60255-27:2013 IEC 60255-27:2023 IEC 60529:1989 + A1:1999 IEC 60529:1989 + A1:1999 + A2:2013
As Installed (IEC 60529):	Top/Bottom Ventilation Holes: IP3X Elsewhere: IP2X
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 Seismic Response, Severity: Class 2
Cold, Operational and Cold, Storage:	IEC 60068-2-1:2007 –40°C, 16 hours
Dry Heat, Operational and Dry Heat, Cyclic:	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
Damp Heat, Steady State:	IEC 60068-2-78:2001 93% relative humidity and 55°C for 10 days
Change of Temperature:	IEC 60068-2-14:2009 1 deg. per minute, –40°C and +85°C, 5 cycles

Dielectric Strength and Impulse Tests

Impulse:	IEC 60255-27:2013 IEC 61850-3:2013 Severity Level: 0.5 J, 5 kV digital I/O IEEE C37.90:2005 Severity Level: 0.5 J, 5 kV digital I/O
Dielectric (HiPot):	IEC 60255-27:2013 IEC 61850-3:2013 Severity Level: 2.5 kVac on digital I/O IEEE C37.90:2005 Severity Level: 2.5 kVac on digital I/O

RFI and Interference Tests

Slow Damped Oscillatory Waves:	IEC 61000-4-18:2006 + A1:2010 Severity Level: 2.5 kV differential/common mode for digital I/O
Electrostatic Discharge Immunity:	IEC 61000-4-2:2008 IEEE C37.90-3:2001 Severity Level 4 8 kV contact discharge 15 kV air discharge
Radiated RF Immunity:	IEEE C37.80.2:2004 Severity Level: 20 V/m IEC 61000-4-3:2006 + A1:2007 + A2:2010 Severity Level: 10 V/m
Conducted RF Immunity:	IEC 61000-4-6:2014 Severity Level: 10 Vrms
Surge Immunity:	IEC 61000-4-5:2005 IEC 61000-4-5:2014 + A1:2017 Severity Level: 2 kV line-to-line 4 kV line-to-earth
Burden:	IEC 60255-1:2009 IEC 61850-3:2013
Power Frequency Immunity on Binary Inputs:	IEC 61000-4-16:2015 Severity Level: 300 V common mode 150 V differential mode 50/60 Hz
Conducted Common Mode Disturbance:	IEC 61000-4-16:2016 Severity Level: 30 V continuous 300 V for 1 s 50/60 Hz
Fast Transient, Burst Immunity:	IEC 61000-4-4:2012 Severity Level: 4 kV, 5 kHz
Magnetic Field Immunity:	IEC 61000-4-9:2016 Severity Level: 1000 A/m pulsed IEC 61000-4-8:2009 IEC 61000-4-8:1993 Severity Level: 1000 A/m for 2 seconds 100 A/m for 1 minute IEC 61000-4-10:2016 IEC 61000-4-10:1993 + A1:2000 Severity Level: 100 A/m
Surge Withstand Capability Immunity:	IEEE C37.90.1:2012 + ERTA:2013 2.5 kV oscillatory, 4 kV fast transient
Power Frequency Immunity of Binary Inputs:	IEC 61000-4-16:2015 Severity Level: 300 V common mode 150 V differential mode 50/60 Hz
Markings:	IEC 60255-27:2013 IEC 60255-27:2023 IEC 61850-3:2013 IEC 61010-1:2010 + A1:2016 UL 61010-1 Third Edition
Common Mode Disturbance Immunity:	IEC 61000-4-16:2016 Severity Level: 30 V continuous 300 V for 1 s 50/60 Hz
Radiated and Conducted Emissions:	EN 55011:2009 + A1:2010 EN 55022:2010 + AC:2011 EN 55032:2015 + A11:2020 CISPR 11:2009 + A1:2010 CISPR 22:2008 CISPR 32:2015 + A1:2019 CSA CISPR 11:19 ANSI C63.4:2014 + a:2017 KS C 9832:2015 47 CFR Part 15.109 47 CFR Part 15.107 Severity Level: Class 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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