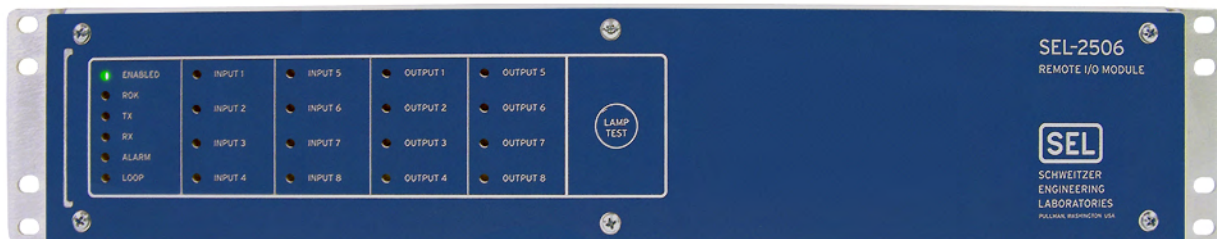




SEL-2506 Remote I/O Module Instruction Manual



Features, Benefits, and Applications

The SEL-2506 is a two rack unit remote I/O module that has eight contact inputs and eight contact outputs. The status of these inputs and outputs is communicated between the SEL-2506 and a host device using **MIRRORED BITS®** Communications over a serial or fiber-optic port. Each contact input controls one of the eight MIRRORED BITS transmit bits, while each of the eight received MIRRORED BITS controls a contact output. Use the transmitted contact input status for control indication of a remote device.

- **Communications Flexibility** helps you simplify and improve existing or new installations.
 - Add simple pilot communications to existing two- or three-terminal line applications.
 - Isolate relay and breaker dc supplies for breaker failure trip distribution schemes.
 - Annunciate the status of remote contacts.
- **Rack Mount** with a compact two rack unit chassis.
- **Self-Testing** increases reliability of auxiliary relay functions.
- **Simple Status Diagnostics** consist of 22 LEDs that indicate contact input, output, channel, and device status.
- **Improve Reliability** through increased scheme security reliability with channel monitoring and alarm output.
- **User Configurable Labels** allow clear indication of system function and status.
- **Fast Operating Speed** is comparable with high-speed teleprotection equipment.
- **Connectorized® Terminal Blocks** offer ease of service.
- **Increased Safety** is provided through fiber-optic isolation when equipped with fiber-optic communications.
- **Two Serial Interface Options:** Fiber optic for superior COM insulation or EIA-232 for convenient connection to a relay.
- **Two Contact Output Options:** Conventional Form C or high-speed contact outputs.

Product Overview

Figure 1 and Figure 2 show the functional overview of the SEL-2506. Figure 3 shows the rear panel of a SEL-2506 with high-speed contact outputs.

The SEL-2506 is an excellent teleprotection device and a simple way of expanding the number of I/O points available in a system of relays. It is superior to hard-wiring relays together through electromechanical or static auxiliary relays, because you can now monitor the performance of the communications channel. In addition, its self-testing ability ensures prompt notification of any device or communications channel problem.

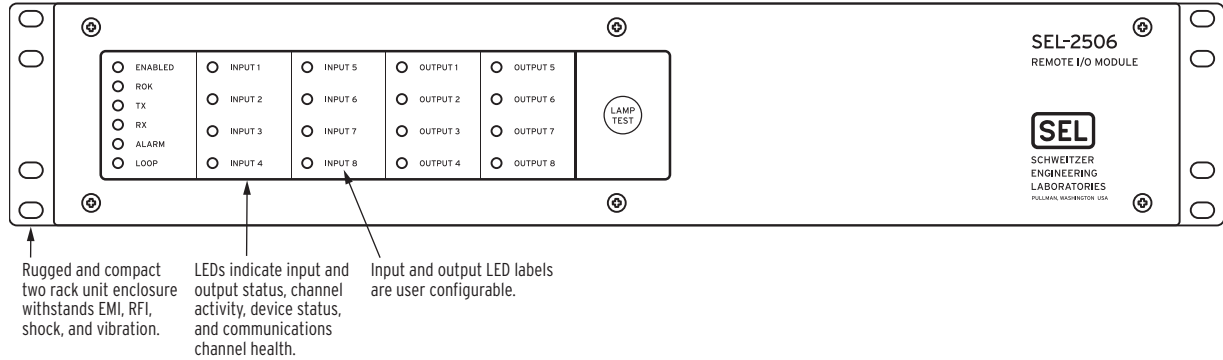


Figure 1 SEL-2506 Front Panel

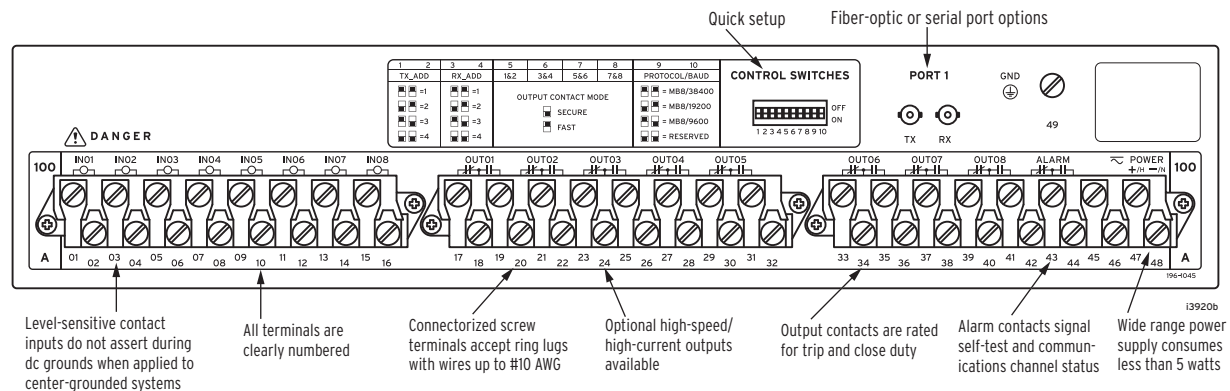


Figure 2 SEL-2506 Standard Contact Output Rear Panel (Shown With Fiber-Optic Port)

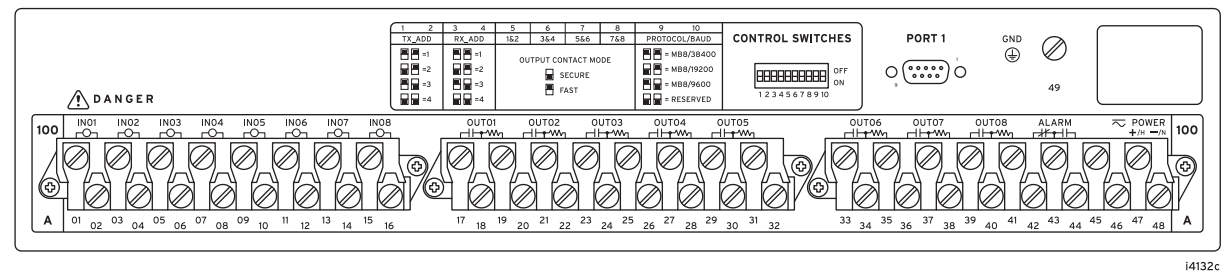


Figure 3 SEL-2506 High-Speed Contact Output Rear Panel (Shown With Serial Port)

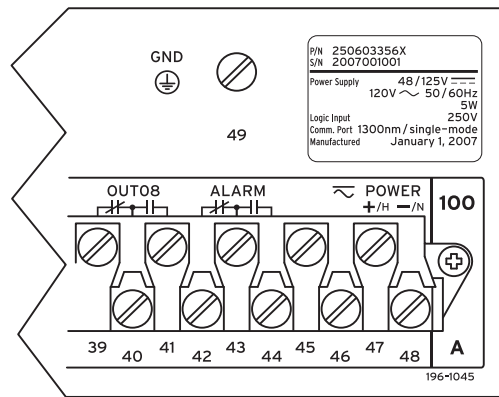


Figure 4 Serial Label

MIRRORED BITS Applications

The following application suggestions and examples represent only a few possible uses for the SEL-2506.

- Add communications-assisted tripping to existing relays.
- Add event annunciation to pilot trip schemes.
- Isolated remote-tripping via fiber-optic links.
- Cross-trigger event reports.
- Perform auxiliary relay functions while adding self-testing capabilities.

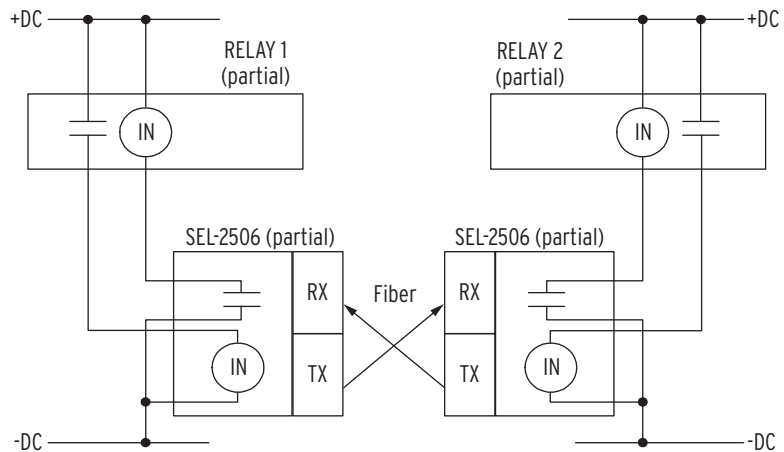


Figure 5 Channel Interface I/O for Relays Without MIRRORED BITS Protocol

- Create bus protection using existing protection relays for simple buses.
- Include an SEL-2100 for bus protection of larger buses.
- Add direct transfer trip to existing cogeneration interconnections.

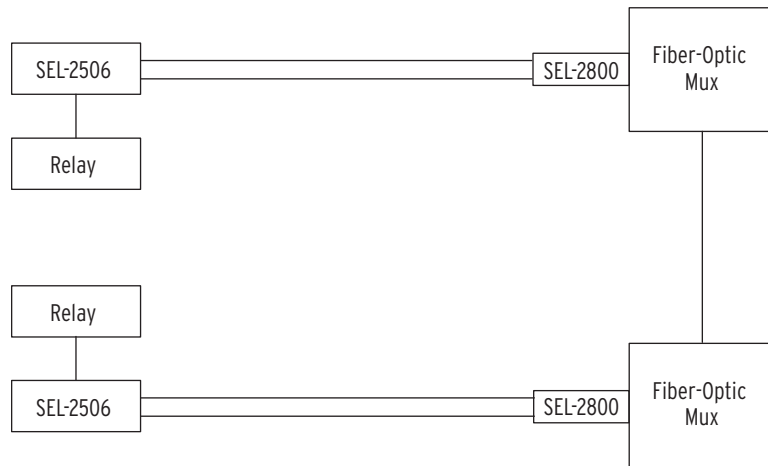


Figure 6 Provide Communications-Assisted Tripping Over Existing Digital Communications Networks

- Provide low-cost teleprotection over digital multiplexers.
- Provide a migration path from electromechanical relays to MIRRORED BITS relays.

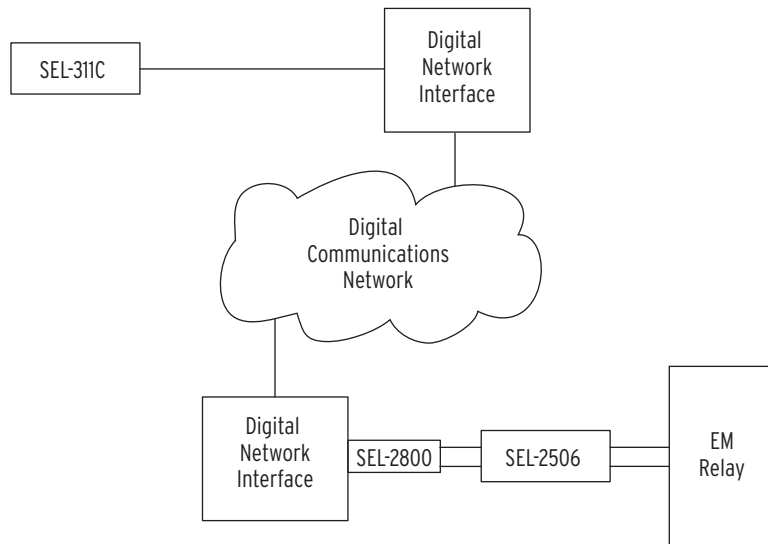


Figure 7 Interface Relays With MIRRORED BITS to Relays Without MIRRORED BITS

- Eliminate hard-wiring from control room to breaker or motor-operated disconnect switch.
- Reduce dc ground exposure.
- Add trip/close path continuity monitoring.
- Expand I/O capability of relays with MIRRORED BITS communications protocol.

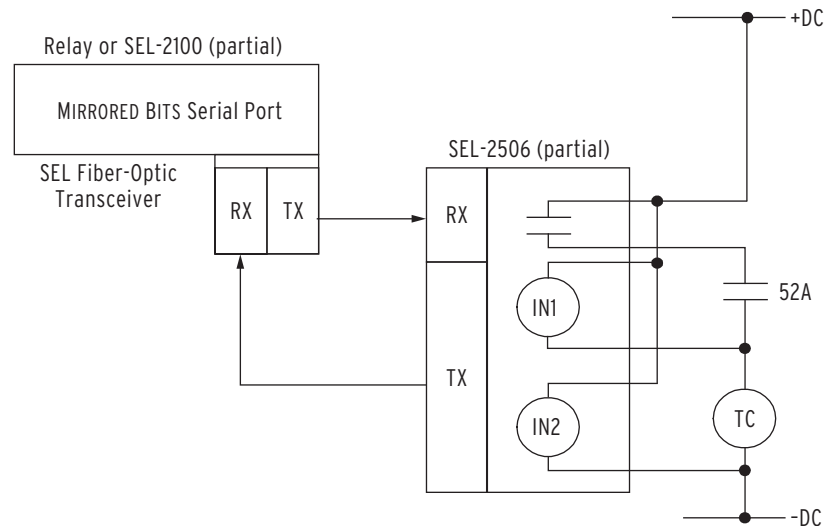


Figure 8 Reduce Wiring From Control House to Outdoor Cabinets

Example Distribution Bus Protection: Radial Feeders

Figure 9 shows an SEL-2506 application using existing distribution relays and an SEL-2100 Logic Processor to provide bus and line protection for the radial system. When the overcurrent elements of the transformer low-side relay pick-up and the overcurrent elements in the feeder relays do not, the detected fault must be located on the bus. Using relay overcurrent element status transmitted by the SEL-2506 modules, the SEL-2100 uses SELOGIC® control equations to issue a bus trip via a MIRRORED BITS message to the protective relays through the SEL-2506 modules. Unlike conventional schemes, there is no switch-board wiring between relays. Eliminating this wiring reduces dc ground exposure, and replacing this wiring with SEL-2506 remote I/O modules adds self-testing and automatic communications path checking.

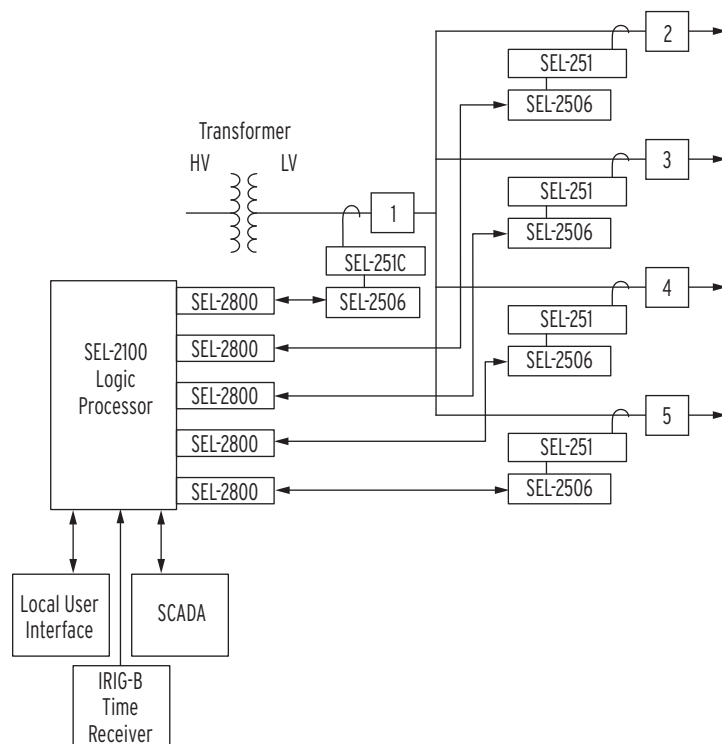


Figure 9 Distribution Bus Protection Application Example

Functional Description

MIRRORED BITS Decoder/Encoder and I/O Control

Figure 10 shows the functional block diagram of the SEL-2506. There is a MIRRORED BITS decoder associated with the receive (RX) port and an encoder for the transmit (TX) port. The decoder receives MIRRORED BITS messages, checks that the receive address matches that set by switches 3–4, checks for data message errors, and then decodes each message. If a Receive MIRRORED BITS (RMB) is a logical one for the number of message frames set by switches 5–8, the SEL-2506 asserts the corresponding output contact.

If an RMB is a logical 0 for the number of message frames set by switches 5–8, the SEL-2506 deasserts the corresponding output contact. If the communications channel is faulty or power is removed from the device, the contact outputs are deasserted.

The decoder also monitors the received data and channel integrity. Detected errors include: data errors, resynchronization, data over- and under-run, parity, and framing errors. When it detects an error, the SEL-2506 turns off the ROK LED and de-energizes the ALARM relay (closing the alarm contact) after a 100 ms delay. If the SEL-2506 detects two errors in a row, it begins resynchronizing with the remote device. Once the remote device receives this resynch message, it also deasserts its ROK message to indicate a problem with the communications path.

The encoder converts the eight contact inputs into the MIRRORED BITS protocol and outputs this data to the transmit fiber-optic or serial port.

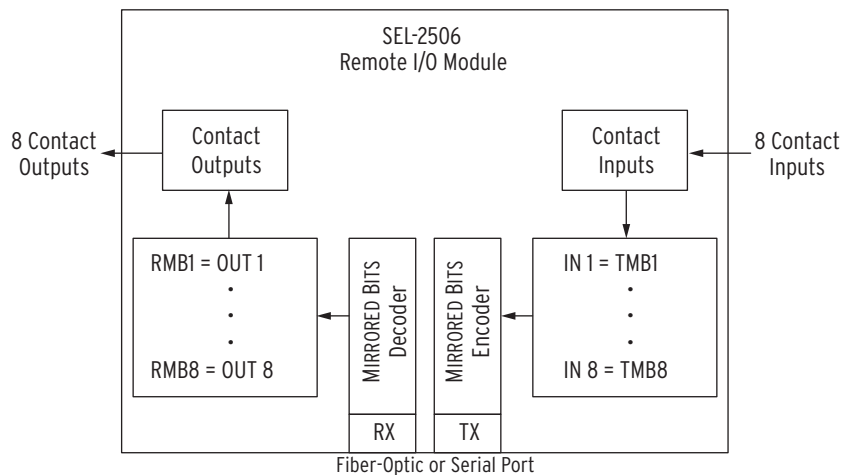


Figure 10 SEL-2506 Functional Block Diagram

Safety Information

Dangers, Warnings, and Cautions

This manual uses three kinds of hazard statements, defined as follows:

DANGER

Indicates an imminently hazardous situation that, if not avoided, **will** result in death or serious injury.

⚠ WARNING








Indicates a potentially hazardous situation that, if not avoided, **could** result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation that, if not avoided, **may** result in minor or moderate injury or equipment damage.

Safety Symbols

The following symbols are often marked on SEL products.

	⚠ CAUTION Refer to accompanying documents.	⚠ ATTENTION Se reporter à la documentation.
	Earth (ground)	Terre
	Protective earth (ground)	Terre de protection
	Direct current	Courant continu
	Alternating current	Courant alternatif
	Both direct and alternating current	Courant continu et alternatif
	Instruction manual	Manuel d'instructions

Safety Marks

The following statements apply to this device.

General Safety Marks

For use in Pollution Degree 2 environment.	Pour l'utilisation dans un environnement de Degré de Pollution 2.
Ambient air temperature shall not exceed 40°C (104°F).	La température de l'air ambiant ne doit pas dépasser 40°C (104°F).
Terminal Ratings Tightening Torque Terminal Blocks: 1.0–2.0 Nm (9–18 in-lb)	Spécifications des bornes Couple de serrage Borniers : 1,0–2,0 Nm (9–18 livres-pouce)

Other Safety Marks (Sheet 1 of 2)

⚠ DANGER Contact with instrument terminals can cause electrical shock that can result in injury or death.	⚠ DANGER Tout contact avec les bornes de l'appareil peut causer un choc électrique pouvant entraîner des blessures ou la mort.
⚠ DANGER Contact with this circuitry may cause electrical shock that can result in injury or death.	⚠ DANGER Tout contact avec ce circuit peut être la cause d'un choc électrique pouvant entraîner des blessures ou la mort.
⚠ WARNING Use of this equipment in a manner other than specified in this manual can impair operator safety safeguards provided by this equipment.	⚠ AVERTISSEMENT L'utilisation de cet appareil suivant des procédures différentes de celles indiquées dans ce manuel peut désarmer les dispositifs de protection d'opérateur normalement actifs sur cet équipement.
⚠ WARNING Have only qualified personnel service this equipment. If you are not qualified to service this equipment, you can injure yourself or others, or cause equipment damage.	⚠ AVERTISSEMENT Seules des personnes qualifiées peuvent travailler sur cet appareil. Si vous n'êtes pas qualifiés pour ce travail, vous pourriez vous blesser avec d'autres personnes ou endommager l'équipement.

Other Safety Marks (Sheet 2 of 2)

<p>⚠ WARNING Do not look into the fiber ports/connectors.</p>	<p>⚠ AVERTISSEMENT Ne pas regarder vers les ports ou connecteurs de fibres optiques.</p>
<p>⚠ WARNING Do not look into the end of an optical cable connected to an optical output.</p>	<p>⚠ AVERTISSEMENT Ne pas regarder vers l'extrémité d'un câble optique raccordé à une sortie optique.</p>
<p>⚠ WARNING During installation, maintenance, or testing of the optical ports, use only test equipment qualified for Class 1 laser products.</p>	<p>⚠ AVERTISSEMENT Durant l'installation, la maintenance ou le test des ports optiques, utilisez exclusivement des équipements de test homologués comme produits de type laser de Classe 1.</p>
<p>⚠ CAUTION Equipment components are sensitive to electrostatic discharge (ESD). Undetectable permanent damage can result if you do not use proper ESD procedures. Ground yourself, your work surface, and this equipment before removing any cover from this equipment. If your facility is not equipped to work with these components, contact SEL about returning this device and related SEL equipment for service.</p>	<p>⚠ ATTENTION Les composants de cet équipement sont sensibles aux décharges électrostatiques (DES). Des dommages permanents non-décelables peuvent résulter de l'absence de précautions contre les DES. Raccordez-vous correctement à la terre, ainsi que la surface de travail et l'appareil avant d'en retirer un panneau. Si vous n'êtes pas équipés pour travailler avec ce type de composants, contacter SEL afin de retourner l'appareil pour un service en usine.</p>
<p>⚠ CAUTION Class 1 LASER Product. This product uses visible or invisible LASERS based on model option. Looking into optical connections, fiber ends, or bulkhead connections can result in hazardous radiation exposure.</p>	<p>⚠ ATTENTION Produit LASER de Classe 1. Ce produit utilise des LASERS visibles ou invisibles dépendant des options du modèle. Regarder vers les connecteurs optiques, les extrémités des fibres ou les connecteurs de cloison peut entraîner une exposition à des rayonnements dangereux.</p>
<p>⚠ CAUTION Removal of enclosure panels exposes circuitry which may cause electrical shock which can result in injury or death.</p>	<p>⚠ ATTENTION Le retrait des panneaux du boîtier expose le circuit qui peut causer des chocs électriques pouvant entraîner des blessures ou la mort</p>
<p>⚠ CAUTION Use of controls or adjustments, or performance of procedures other than those specified herein, may result in hazardous radiation exposure.</p>	<p>⚠ ATTENTION L'utilisation de commandes ou de réglages, ou l'application de tests de fonctionnement différents de ceux décrits ci-après peuvent entraîner l'exposition à des radiations dangereuses.</p>

Installation and Maintenance

⚠ CAUTION
Do not connect power to the SEL-2506 until you have completed initial connection procedures.

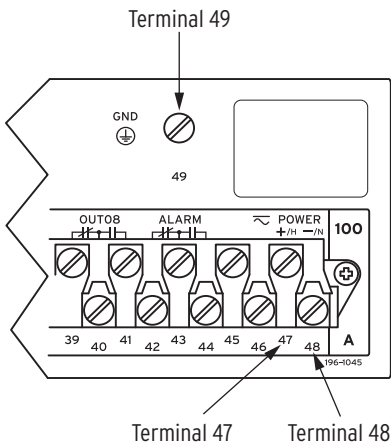


Figure 11 SEL-2506 Rear-Panel Power and Ground Connections

You can order the SEL-2506 with one of two power supply voltage ranges listed in *Specifications on page 18*. The serial number label on the back of the device lists the power supply voltage equipped.

Power Connections

DANGER

Contact with instrument terminals can cause electrical shock that can result in injury or death.

Use 16 AWG (1.5 mm²) wire (or heavier) to connect to the **POWER** terminals. When you use a dc power source, you must connect the source with the proper polarity, as indicated by the + (Terminal 47) and - (Terminal 48) symbols on the power terminals. Upon connecting power, you will see the **ENABLED LED** illuminate.

Connection to external power must comply with IEC 947-1 and IEC 947-3. Place an external switch, circuit breaker, or overcurrent device in the **POWER** leads for the SEL-2506; this device must interrupt both the hot (H) and neutral (N) power leads.

The maximum current rating for the power disconnect circuit breaker or overcurrent device must be 20 A. Be sure to locate this device within 3.0 m (9.8 ft) of the relay. Operational power is internally fused. This fuse is not user replaceable. Should failure occur return the unit to the factory for repair.

Rear-Panel Symbols

There are important safety symbols on the rear of the SEL-2506.

Observe proper safety precautions when you connect the SEL-2506 at terminals marked by these symbols. In particular, the danger symbol located on the rear panel corresponds to the following: **Contact with instrument terminals can cause electrical shock that can result in injury or death.** Be careful to limit access to these terminals.



Figure 12 Rear-Panel Safety Symbols

Fast Hybrid Control Output Option

Figure 13 shows connections for Fast Hybrid (fast high-current-interrupting) control output when equipped.

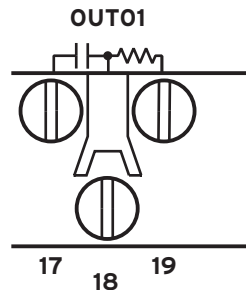


Figure 13 Fast Hybrid Control Output Connection

NOTE: You can use ac or dc circuits with Fast Hybrid (fast high-current-interrupting) outputs.

Fast Hybrid control output uses three terminal positions. The third terminal of the Fast Hybrid control output is connected to resistors used to mitigate transient inrush current conditions. Connecting the third terminal is optional based on your particular application.

Short transient inrush current can flow at the closing of an external switch in series with open Fast Hybrid contacts. This transient will not energize the circuits in typical relay-coil control applications (trip coils and close coils), and standard auxiliary relays will not pick up. However, an extremely sensitive digital input or light-duty, high-speed auxiliary relay can pick up for this condition. This false pick-up transient occurs when the capacitance of the Fast Hybrid output circuitry charges (creating a momentary short circuit that a fast, sensitive device sees as a contact closure). A third terminal (19 in

Figure 14) provides an internal path for precharging the Fast Hybrid output circuit capacitance when the circuit is open.

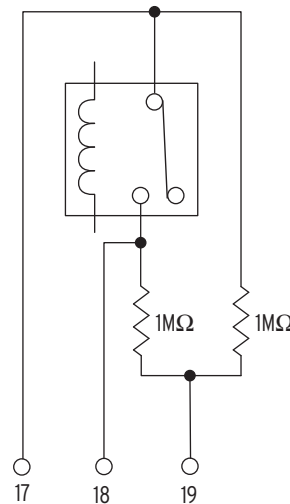


Figure 14 Fast Hybrid Control Output Typical Terminals

Figure 15 shows some possible connections for this third terminal that will eliminate the false pick-up transients when closing an external switch. In general, you must connect the third terminal to the dc rail (positive or negative) that is on the same side as the open external switch condition. If an open switch exists on either side of the output contact, then you can accommodate only one condition.

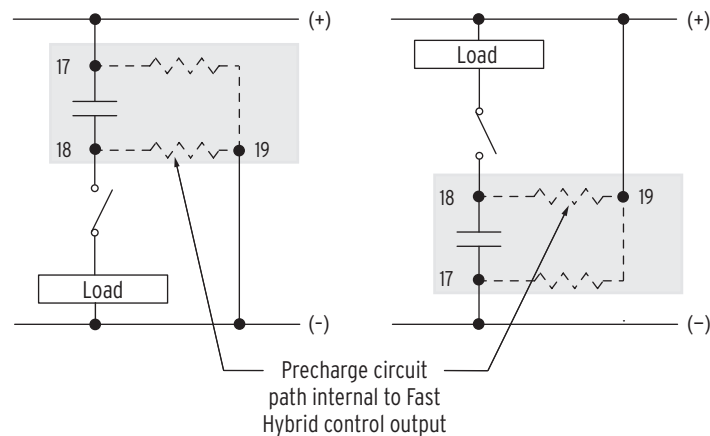


Figure 15 Precharging Internal Capacitance of Fast Hybrid Output Contacts

Screw Terminal Connectors

Terminate connections to the SEL-2506 screw terminal connectors with ring-type crimp lugs. Use a #8 ring lug with a maximum width of 9.1 mm (0.360 in.). The screws in the rear-panel screw terminal connectors are #8-32 binding head, slotted, nickel-plated brass screws. Tightening torque for the terminal connector screws is 1.0 Nm to 2.0 Nm (9 in-lb to 18 in-lb).

Grounding

Connect the grounding terminal (49) labeled **GND** on the rear panel to a rack frame ground or main station ground for proper safety and performance. Use 12 AWG (4 mm²) or heavier wire less than 2 m (6.6 ft) in length for this connection. The ground connection should be made before the power connections.

Cleaning

Use care when cleaning the SEL-2506. Use a mild soap or detergent solution and a damp cloth to clean the chassis. Be careful cleaning the front and rear

panels because a permanent plastic sheet covers each panel; do not use abrasive materials, polishing compounds, or harsh chemical solvents (such as xylene or acetone) on any surface.

Fiber-Optic Port

The SEL-2506 uses a fiber-optic transmitter unless ordered with the EAI-232 option. See *Specifications* for details about use of a 91560 attenuator on some shorter fiber links. When working with this device, observe the following safety precautions:

- Do not look into the fiber (laser) ports/connectors.
- Do not look into the end of an optical cable connected to an optical output.
- Do not perform any procedures or adjustments that this instruction manual does not describe.
- Do not use controls or adjustments, or perform procedures other than those specified in this instruction manual; these actions might result in hazardous radiation exposure.
- Incorporated components, such as transceivers and laser emitters, are not user serviceable. Return units to SEL for repair or replacement.

EIA-232 Option

The EIA-232 port is a female 9-pin connector with the pin numbering shown in *Figure 16*. The pin functions are listed in *Table 1*.

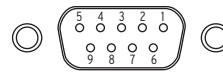


Figure 16 EIA-232 Connector Pin Numbers

Table 1 EIA-232 Pin Assignments

Pin	Signal Name	Description
1	5 Vdc	SEL transceiver power (when Jumper J1 is installed on the communications card)
2	RXD	Receive data
3	TXD	Transmit data
4	N/C	None
5	GND	Signal ground
6	N/C	None
7	N/C	None
8	N/C	None
9	N/C	None

Configuring the SEL-2506

The SEL-2506 uses a ten-position control (DIP) switch to set the TX and RX addresses, to determine the number of received correct consecutive messages for output contact control, and to program the data rate of the MIRRORING BITS communications (see *Table 3*). The contact consecutive messages feature is intended to increase the system security for applications requiring higher security, such as direct transfer tripping.

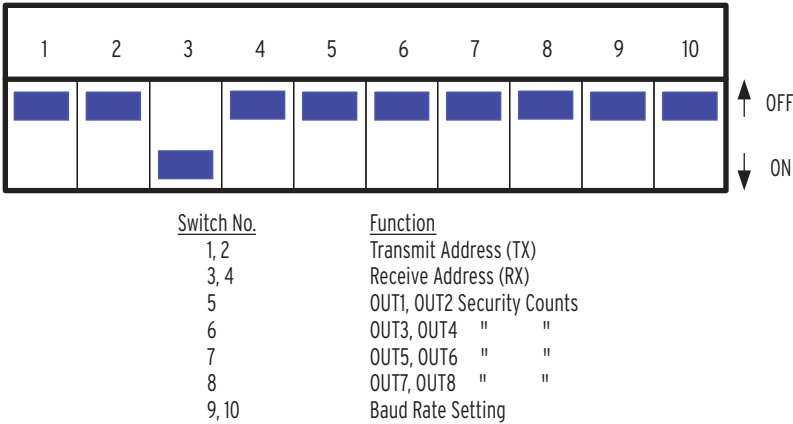


Figure 17 SEL-2506 Control Switch Position Identifications

Setting the
Transmit and
Receive Addresses

You must set the TX address of each local SEL-2506 to match the receive address of the remote device. Further, the TX and RX addresses of each device should not be set to the same number. The SEL-2506 detects a loopback condition when it receives its own transmit address in the MIRRORING BITS message. When the SEL-2506 detects loopback, it illuminates the LOOP LED and extinguishes the ROK LED. The SEL-2506 disables the contact outputs to prevent acting on its own message during loopback (i.e., output contacts go to their de-energized state). Table 2 lists the address settings.

Table 2 Transmit and Receive Address Settings

Switch 4	Switch 3	RX Address	Switch 2	Switch 1	TX Address
OFF	OFF	1	OFF	OFF	1
OFF	ON	2	OFF	ON	2
ON	OFF	3	ON	OFF	3
ON	ON	4	ON	ON	4

Setting Security
Counts for Received
Data

Table 3 lists the data security count setting possibilities. When the data security switch is set to OFF, the contact output follows its associated RMB logical status. When the data security switch is set to ON, two consecutive RMB messages of the same logical state are required to assert/deassert the associated contact output. Note that each setting switch controls an adjacent pair of contact outputs.

Table 3 Data Security Count Settings

Switch	Message 1	Message 2
Switch 5 (OUT1, OUT2)	OFF	ON
Switch 6 (OUT3, OUT4)	OFF	ON
Switch 7 (OUT5, OUT6)	OFF	ON
Switch 8 (OUT7, OUT8)	OFF	ON

For example, when switch 7 is set to ON this requires two consecutive messages to be confirmed before asserting and/or deasserting OUT5 and OUT6, while all other outputs require only one message.

Setting the
Data Rate

Table 4 lists the settings for the three data rate options. For applications using fiber connections between SEL devices, data rate 38400 is recommended. This recommendation is based on operating time. For applications where a multiplexer or other communications device is between the two MIRRORING BITS devices, data rates 19200 or 9600 are recommended. If the channel is

operating intermittently, lowering the data rate will provide more stable performance in most cases.

Table 4 Protocol/Data Rate Settings

Switch 9	Switch 10	
OFF	OFF	MB8 Protocol @ 38400 bps
ON	OFF	MB8 Protocol @ 19200 bps
OFF	ON	MB8 Protocol @ 9600 bps
ON	ON	Reserved

Connecting the SEL-2506 to Other SEL Devices

The SEL-2506 uses the MB8 MIRRORRED BITS protocol, transmits and receives data at the data rate set by switches 9 and 10.

The following examples show how to configure several SEL devices to operate with the SEL-2506. Only the minimum settings required are shown. Consult the appropriate instruction manual to ensure proper settings for your particular MIRRORRED BITS application.

For fiber-optic ports, connect a fiber-optic cable to a compatible transceiver or built-in fiber-optic port on the other device (see *Fiber-Optic and Serial Port Options on page 18*). For the EIA-232 option, connect to the other device using a copper cable within the same cabinet as the SEL-2506.

SEL-2505/SEL-2506

TX_ADD = 1 (Switch 1 and 2 = OFF)
 RX_ADD = 2 (Switch 3 = ON, Switch 4 = OFF)
 PROTO/SPEED = 38400 (Switch 9 = OFF, Switch 10 = OFF)

SEL Relays Except SEL-321 and SEL-400 Series Relays

PROTO = MB8A*
 SPEED = 38400
 RXID = 1 TXID = 2
 * = MB8A or MB8B may be used

SEL-321

PROTO= MB8
 SPEED = 38400
 TX_ID = 2 RX_ID = 1

SEL-2100

PROTO = MB8
 SPEED = 38400
 TXID = 2 RXID = 1

SEL-400 Series Relays

PROTO= MBA*
 SPEED = 38400
 STOPBIT = 2
 TX_ID = 2 RX_ID = 1
 TX MODE = P

* = MBA or MBB may be used

Testing the SEL-2506

Testing an SEL-2506 requires another communicating device. Examples include an SEL-2505, SEL-2506, SEL-2100, or a relay with MIRRORING BITS protocol and the appropriate fiber-optic transceiver or data cable. The following test procedure assumes you are using another SEL-2506 as the remote communicating device. The test procedure for other communicating devices is similar.

Step 1. Check the SEL-2506 dip-switch configuration settings.

Make certain the transmit address matches the receive address of the remote device and that the data rate is identical.

Step 2. Connect the chassis ground terminal of the SEL-2506 to ground (Terminal 49).

Step 3. Connect and apply rated voltage to the power supply inputs of the SEL-2506 (positive to Terminal 47, negative to Terminal 48).

The **ENABLED** LED should illuminate. The b form of the **ALARM** contact should remain closed and the **ALARM** LED illuminates due to no communications.

Step 4. Press the {LAMP TEST} pushbutton.

All LEDs should illuminate. When you release the pushbutton, the LEDs should extinguish.

Step 5. Connect the communications interface between the SEL-2506 modules.

The **ROK**, **TX**, and **RX** LEDs on both devices should illuminate. In addition, the b contacts of the **ALARM** contact should open and the **ALARM** LED should extinguish.

Step 6. Apply rated voltage to IN1 on one device.

The **INPUT1** LED should illuminate on this device. On the other SEL-2506, the OUT1 contact should close and **OUTPUT1** LED should illuminate.

Step 7. Repeat Step 6 for the remaining contacts.

Step 8. To test the loopback feature, connect a single fiber between the **TX** to **RX** on the same device. The **LOOP** LED should illuminate and the **ROK** LED should extinguish. Energize each input. No output contact should assert.

CAUTION

Class 1 LASER Product. This product uses visible or invisible LASERs based on model option. Looking into optical connections, fiber ends, or bulkhead connections can result in hazardous radiation exposure. The LASERs are not user serviceable. Return to the factory for repair or replacement.

Front-Panel Labels

The SEL-2506 features a versatile front panel that you can customize for your needs. Use the slide-in configurable front-panel label to change the identification of target LEDs to match the function indicated.

The blank slide-in label set, shown in *Figure 18*, is included with the SEL-2506.

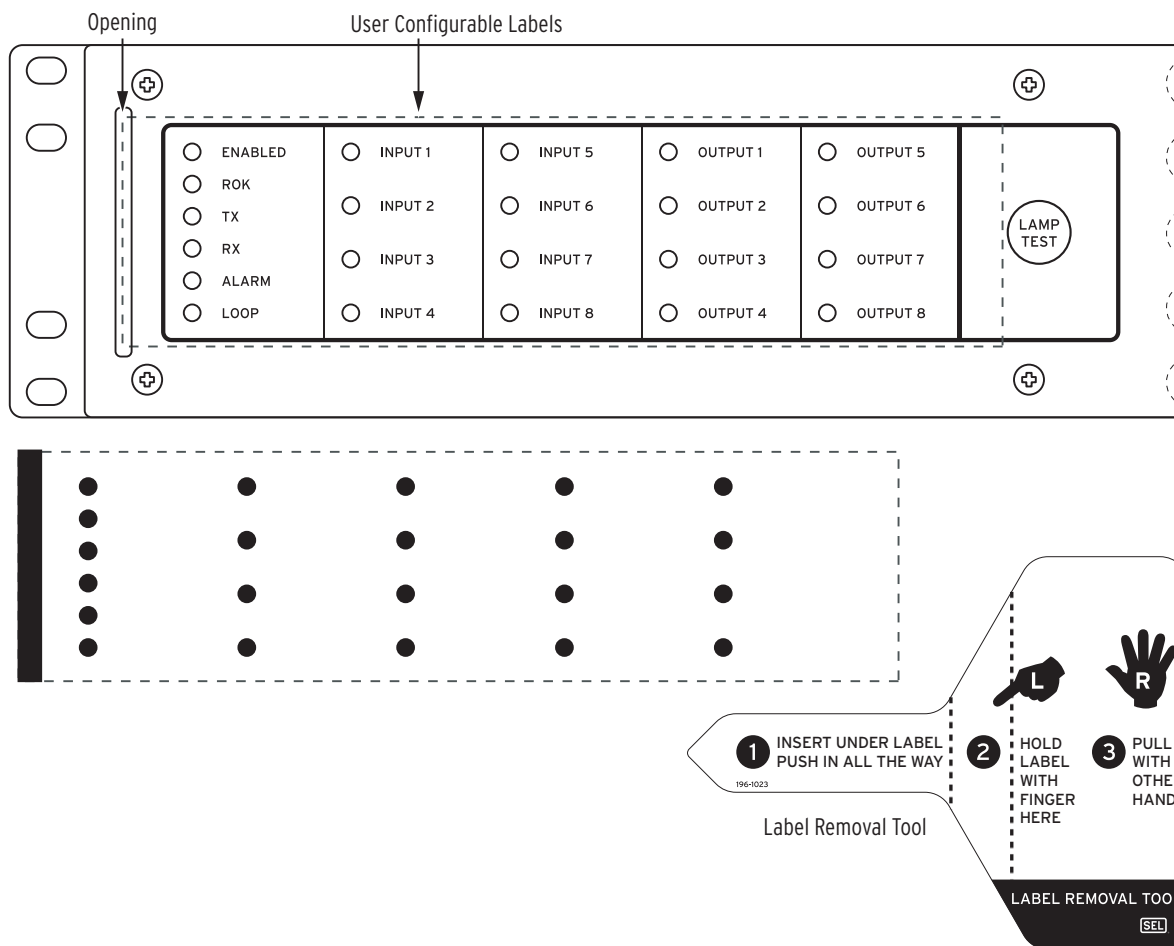


Figure 18 Blank Slide-In Label Set and Label Removal Tool

If you need additional configurable front-panel label supplies, order the labels kit or individual kit components using the part number listed in *Table 5*. Contact your Technical Service Center or the SEL factory to obtain these kits.

Table 5 Configurable Front-Panel Label Kits

Content Descriptions	Quantity	Part Number
SEL-2506 Label Kit	One	9260010
Blank Customer Label Templates on perforated paper for laser printing	Two sets—two labels for each set	196-1048
Blank slide-in label sets for labeling by hand (use only a fine point permanent marker)	One	196-1049
Label Removal Tool	One	196-1023

Removing Configurable Front-Panel Labels

Use the Label Removal Tool (shown in *Figure 18*) and the following procedure to remove slide-in labels from the front-panel pocket.

- Step 1. Push the existing label all the way inside the label pocket.
- Step 2. Slide the tip of the tool under the label at the label pocket opening (see *Figure 18* for opening locations).
- Step 3. Push the exposed edge of the label against the Label Removal Tool while pulling out the combined label and Label Removal Tool to extract the label.

Changing Configurable Front-Panel Labels

NOTE: The default template font is from the Arial family. You can use this font or choose a different font that is available on your computer system.

NOTE: You can adjust the font size to accommodate more text within the cell.

NOTE: Place the perforated stock sheet in the printer tray as indicated by the printer (either face up or face down).

Also, if your printer has duplex capability, be sure to set the printer to print single sided.

There are four options for producing custom labels for the SEL-2506 front panel.

- Use factory-default labels
- Use handwritten labels on factory-default labels
- Use handwritten labels on blank labels
- Use laser-printed labels on perforated paper labels
- Creating laser-printed labels

The purpose of this procedure is to create laser-printed configurable front-panel labels on blank Configurable Label Templates (supplied in the kit). You can find label template files on the SEL website at selinc.com.

Step 1. Open the appropriate Microsoft® Word template.

Step 2. Fill in the fields.

Use the Tab and Arrow keys or your mouse to move from field to field. Field space is limited; only the text that displays on the screen prints on the label.

Save the file often to preserve your work in progress.

Step 3. Test the position of the label text.

- a. Print the template file to plain paper.
- b. Examine the printed sheet for proper alignment. Carefully compare the printed page to the perforated stock sheets.
- c. If the printed sheet is not aligned properly, proceed to *Step 4*.
- d. If the labels appear as desired, proceed to *Step 5*.

Step 4. Make adjustments to margin settings, as necessary, to print in the proper location on the test sheet.

- a. Use the **Page Setup** dialog box to adjust only the top or left margins as needed to correct the alignment.
DO NOT adjust the right or bottom margins.
- b. Do another test print on plain paper.
- c. Examine the label position.
- d. Repeat as necessary until the alignment is correct.

Save the file often to preserve your work in progress.

Step 5. Print the labels on the perforated stock sheets.

If the labels printed incorrectly, repeat this procedure beginning with *Step 3*.

Step 6. Fold and tear the perforated edges of the stock paper to remove the labels from the sheet.

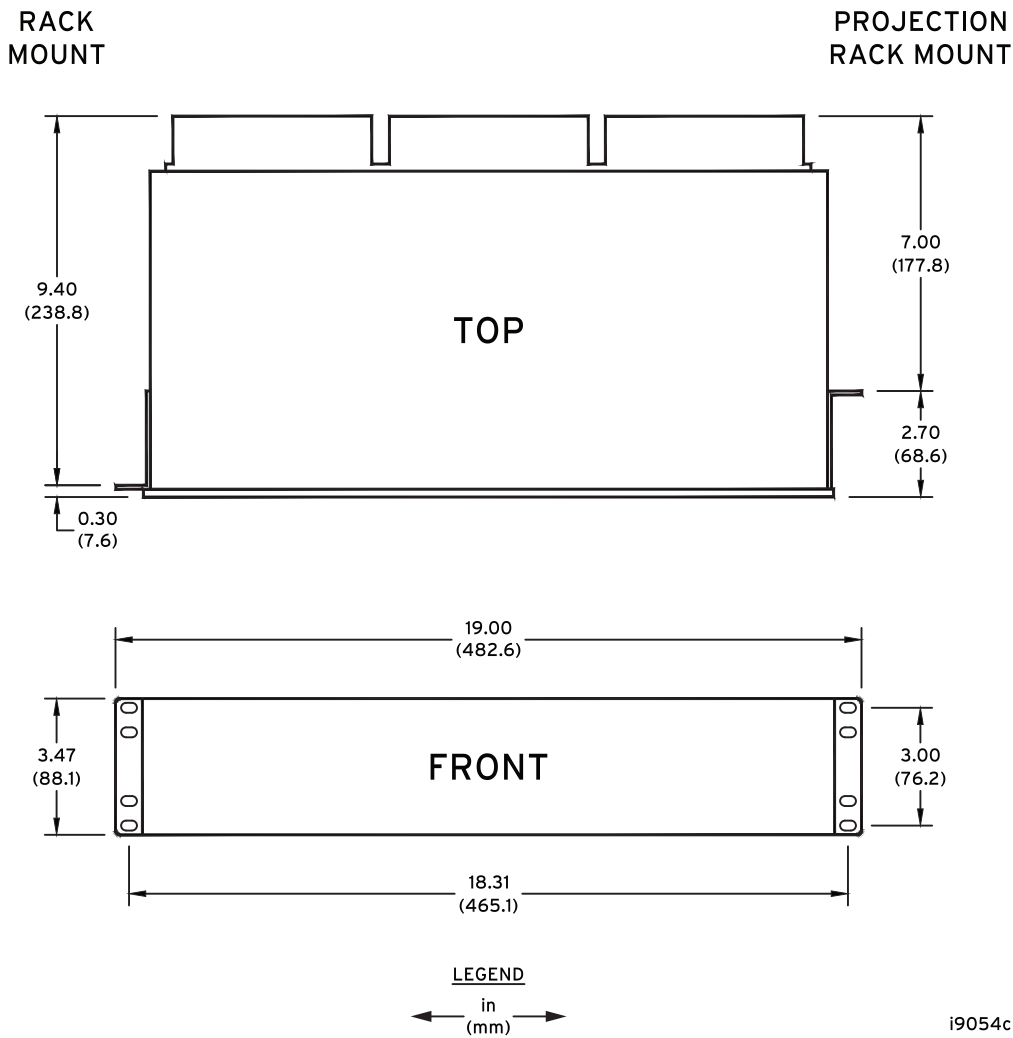
Step 7. Remove the existing labels from the front-panel label pockets with the label removal tool.

Step 8. Insert the newly created labels in the appropriate pockets on the front panel.

To change the labeling again, remove the existing label and repeat the procedure.

Mechanical Diagram

RACK-MOUNT CHASSIS



i9054c

Figure 19 SEL-2506 Dimensions and Drill Diagram

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)

Tightening Torque

I/O and Power
Connectors: 1.0–2.0 Nm (9–18 in-lb)

Serial Ports: 0.6–0.8 Nm (5–7 in-lb)

Terminal Connections

Terminals or stranded copper wire. Ring terminals are recommended. Minimum temperature rating of 90°C (194°F).

Alarm and Output Contacts

Standard Outputs

IEEE C37.90 Tripping Output Performance

Make: 30 A

Carry: 6 A

MOV Protection: 270 Vac rms
360 Vdc continuous

Fast Hybrid (high-speed high current interrupting)

Make: 30 A

Carry: 6 A continuous carry at 70°C
4 A continuous carry at 85°C

1 s Rating: 50 A

MOV Protection
(maximum voltage): 250 Vac/330 Vdc

Pickup Time: ≤10 μs

Dropout Time: ≤8 ms, resistive load

Breaking Capacity (10,000 operations):

48 Vdc	10.0 A	L/R = 40 ms
125 Vdc	10.0 A	L/R = 40 ms
250 Vdc	10.0 A	L/R = 20 ms

Cyclic Capacity (4 cycles/second, followed by 2 minutes idle for thermal dissipation):

48 Vdc	10.0 A	L/R = 40 ms
125 Vdc	10.0 A	L/R = 40 ms
250 Vdc	10.0 A	L/R = 20 ms

Note: Per IEC 60255-23:1994, using the simplified method of assessment.

Note: Make rating per IEEE C37.90-1989.

Optoisolated Inputs

250 Vdc: Pickup 210–300 Vdc
Dropout <150 Vdc

220 Vdc: Pickup 176–264 Vdc
Dropout <132 Vdc

125 Vdc: Pickup 105–150 Vdc
Dropout <75 Vdc

110 Vdc: Pickup 88–132 Vdc
Dropout <66 Vdc

48 Vdc: Pickup 38.4–60 Vdc
Dropout <28.8 Vdc

24 Vdc: Pickup 15–30 Vdc

Note: 24, 48, and 125 Vdc optoisolated inputs draw approximately 4 mA of current; 110 Vdc inputs draw approximately 7 mA of current; and the 220 and 250 Vdc inputs draw approximately 5 mA of current. All current ratings are at nominal input voltages.

Power Supply

125/250 Vdc or 120/240 Vac

Range: 85–350 Vdc or 85–264 Vac
(50 Hz–60 Hz)

Burden: <5 W

48/125 Vdc or 120 Vac

Range: 36–200 Vdc or 85–140 Vac
(50 Hz–60 Hz)

Burden: <5 W

Back-to-Back Operate Time

Data Rate	Standard Outputs Avg. ms.	High-Speed Outputs Avg. ms.
38400	10	4
19200	12	6
9600	18	12

MIRRORED BITS Protocol

MB8 (only)

Port Speed (Data Rate)

38400 bps
19200 bps
9600 bps

Fiber-Optic and Serial Port Options

Ordering Options	1	2	3	4	5
Mode	Multi	Multi	Single	Single	Single
Wavelength (nm)	650	850	1300	1300	1550
Source	LED	LASER	LASER	LED	LASER
Connector type	V-pin	ST	ST	ST	ST
Min TX Pwr. (dBm)	–30	–10	–10	–36	–10
Max TX Pwr. (dBm)	–15	–2	3	–16	3
RX Sens. (dBm)	–39	–49	–50	–50	–50
Sys. Gain (dB)	9	39	40	14	40
91560 Attenuator Required	No	< 2 km	< 16 km	No	< 16 km

Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

Operating Temperature Range

–40° to +85°C (–40° to +185°F)

Note: Not applicable to UL applications.

Humidity

0% to 95% Without Condensation

Altitude

2000 m Maximum

Unit Weight

1.36 kg (3.0 lb)

Dimensions

88.1 mm x 455.1 mm x 223.5 mm
(3.47" H x 18.31" W x 8.80" D)

Contact Input Update Rate

2 ms

Type Tests

Radiated and Conducted Emissions:	IEC 60255-25:2000
Conducted RF Immunity:	IEC 61000-4-6:2008 IEC 60255-22-6:2001
Electrostatic Discharge:	IEC 61000-4-2:2008, Level 4 IEEE C37.90.3:2001 IEC 60255-22-2:2008, Level 4
Fast Transient Burst:	IEC 61000-4-4:1995 IEC 60255-22-4:2002
Radio Frequency Immunity:	IEC 61000-4-3:2010 IEC 60255-22-3:2007
Surge Immunity:	IEC 60255-22-5:2008, Level 0.5, 1.0 kV Line-to-Line 0.5 1.0, 2.0 kV Line-to-Earth IEC 61000-4-5:2005

Surge Withstand:	IEC 60255-22-1:2007 IEEE C37.90.1:2002
Environmental:	IEC 60068-2-1:2007 IEC 60068-2-2:2007
Damp Heat Cycle:	IEC 60068-2-30:2005
Vibration:	IEC 60255-21-1:1988
Endurance:	Class 1
Response:	Class 2
Shock and Bump:	IEC 60255-21-2:1988
Bump:	Class 1
Shock Withstand:	Class 1
Shock Response:	Class 2
Seismic:	IEC 60255-21-3:1993
Quake Response:	Class 2
Dielectric:	IEC 60255-5:2000, IEEE C37.90 2.5 kV rms, 1 min
Impulse:	IEC 60255-5:2000, IEEE C37.90 5 kV 0.5 J

Factory Assistance

We appreciate your interest in SEL products and services. If you have questions or comments, please contact us at:

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