

GETTING STARTED GUIDE AND SPECIFICATIONS

SLSC-12001 Chassis

12 Slot Switch Load Signal Conditioning Chassis for 4U SLSC Modules

This document describes how to get started with the National Instruments SLSC-12001 chassis. The document contains chassis specifications, information about installing and mounting hardware, and powering and connecting the chassis.

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Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.



Caution To ensure the specified EMC performance, operate this product only with shielded cables and accessories.



Caution To ensure the specified EMC performance, the length of any cable connected to a trigger port must be no longer than 3 m (10 ft).



Caution To ensure the specified EMC performance, all front and rear slots must be covered. Front filler panels must be used in all slots not containing modules. Rear filler panels must be used in all slots not using Rear Transition Interface (RTI) adapters. These filler panels are available at ni.com.

Unpacking the Chassis

Carefully inspect the shipping container and the chassis for damage. Check for visible damage to the exterior and interior of the chassis. If damage appears to have been caused during shipment, file a claim with the carrier. Retain the packing material for possible inspection and/or reshipping. If the chassis is damaged, do not install it and contact NI.

What You Need to Get Started

To set up and use the SLSC-12001 chassis you need the following items:

- Hardware
 - SLSC-12001 chassis
 - SLSC module(s)
 - Front filler panels if not using modules in all slots
 - Rear filler panels if not using RTIs in all slots
 - Power supply, refer to the *Chassis Power* section
 - Power cable
 - Power input connector
 - Ethernet cable
 - Data Acquisition system (optional)
 - Host System (may be Data Acquisition system)
 - Grounding wire
 - Grounding lug
- Software
 - NI-SLSC driver, downloadable from ni.com
 - Software as needed for your application
- Tools
 - Screwdriver as needed for your application
 - Wire stripper
- Documentation
 - *SLSC-12001 Chassis Getting Started Guide and Specifications*
 - Documents as required for your application

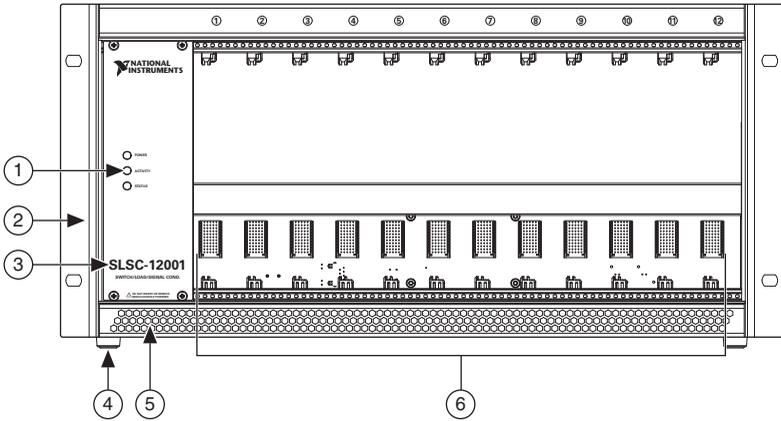
You can download needed documents from ni.com/manuals.

Chassis Overview

The SLSC-12001 chassis is designed for use with any SLSC module designed in accordance with the *SLSC Module Design Specification 1.0*. The SLSC-12001 chassis must be powered by an external power supply as described in the *Chassis Power* section of this document. The chassis allows communication between a host system and the SLSC modules in order to configure them. Additionally a Data Acquisition (DAQ) System, such as PXIe or cRIO, can be connected to SLSC modules through an RTI.

Figure 1 shows the front features of the SLSC-12001 chassis.

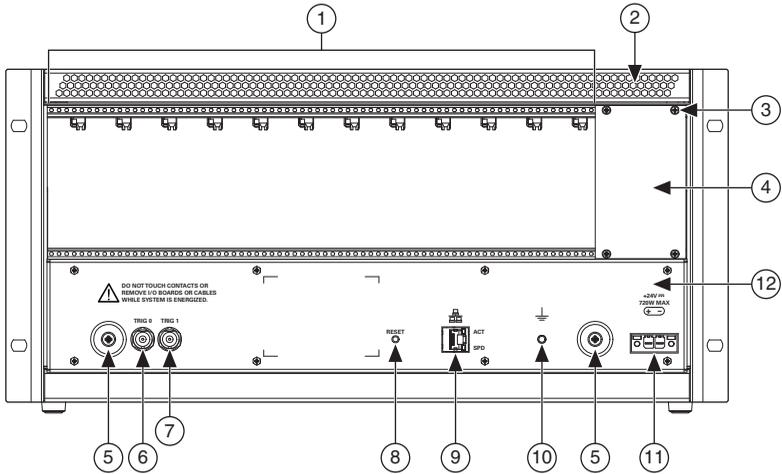
Figure 1. SLSC-12001 Chassis Front View



- | | |
|------------------------------------|------------------------------|
| 1 POWER, STATUS, and ACTIVITY LEDs | 4 Chassis Feet (4) |
| 2 Mounting Bracket (2) | 5 Front Air Intake |
| 3 Chassis Model Name | 6 SLSC Peripheral Slots (12) |

Figure 2 shows the rear features of the SLSC-12001 chassis.

Figure 2. SLSC-12001 Chassis Rear View

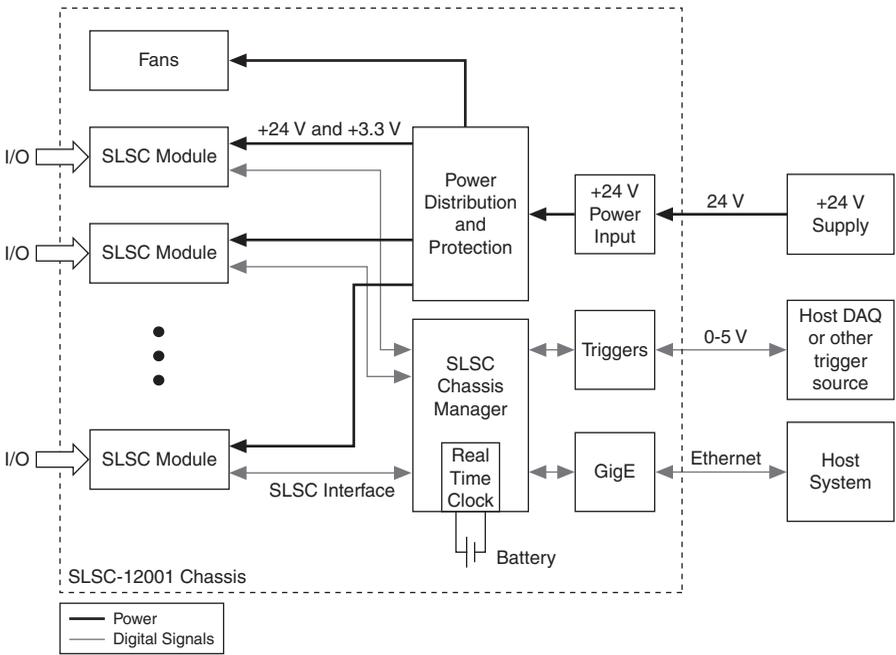


- | | |
|---------------------------------|-------------------------|
| 1 SLSC Peripheral Rear I/O Area | 7 Trigger 1 |
| 2 Rear Air Exhaust | 8 Button |
| 3 Upper Rear Panel Screws (4) | 9 Ethernet Port |
| 4 Upper Rear Panel | 10 Chassis Ground Screw |
| 5 Bumpers (2) | 11 DC Voltage Input |
| 6 Trigger 0 | 12 Backplane Panel |

SLSC-12001 Chassis Block Diagram

Figure 3 shows the SLSC-12001 chassis block diagram.

Figure 3. SLSC-12001 Chassis Block Diagram



The chassis power comes from an external +24 V supply and is distributed to each SLSC module through an internal power bus. The +24 V bus has input overvoltage, reverse voltage, and short circuit protection at each SLSC module output. The chassis does not have a power switch, therefore power is energized as soon as the external power supply is connected to the chassis and powered.

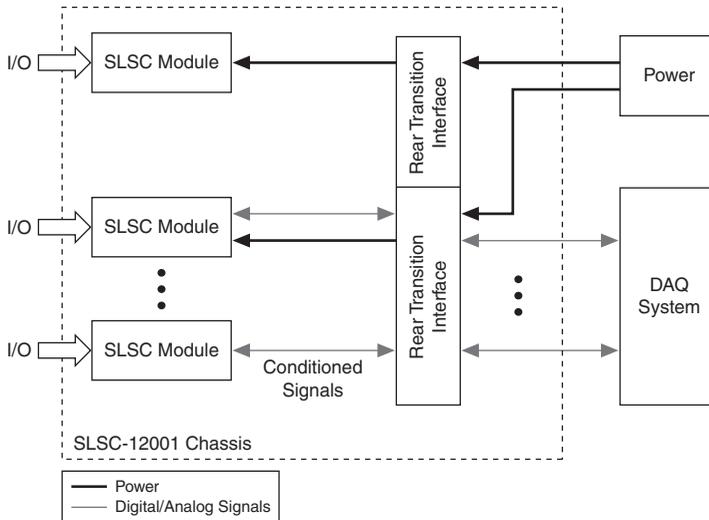
The SLSC-12001 chassis communicates with each module through the SLSC interface and manages the Ethernet connectivity with a host computer.

The SLSC-12001 chassis also has built-in diagnosis functions, such as battery and fan monitoring, that is accessible through the NI-SLSC driver. The chassis will shut down the 24 V rail supplied to the module unless all 5 fans are powered.

SLSC-12001 Chassis Rear Transition Interface

An optional secondary backplane, RTI, may be used with the SLSC-12001 chassis to route conditioned I/O signals directly to the DAQ system. The RTI can be used to distribute additional power to one or more modules as shown in Figure 4.

Figure 4. Rear Transition Interface



RTIs must be implemented as follows:

1. All slots must have the SLSC Peripheral Rear I/O Area covered by either an RTI or rear filler panel to meet EMC and airflow requirements.
2. RTI implementation is flexible and can be used as follows:
 - An RTI can be a single slot width therefore resulting in 12 RTIs.
 - An RTI can be a single PCB 12 slots wide taking into account all slots.
 - An RTI can cover any number of slots from 1 to 12.

Installing the Chassis

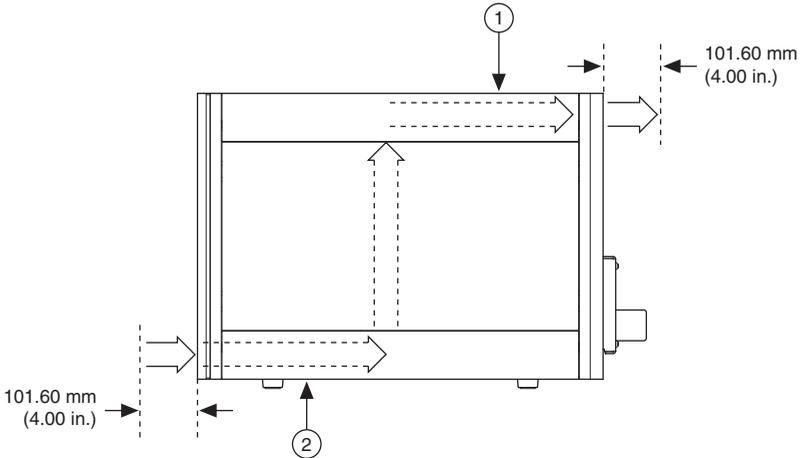
The SLSC-12001 chassis is designed to operate in an instrument rack with cooling clearances to allow for proper airflow circulation.



Caution The SLSC-12001 chassis must be installed in a rack or similar enclosure that ensures the rear of the chassis is not accessible (per IEC 61010-1) during normal use. Access to the RTIs must require a tool. The front of the chassis may remain accessible. Additionally, the rack or enclosure must meet the enclosure requirements of IEC 61010-1 for containing the potential spread of fire from the RTIs.

The SLSC-12001 chassis cooling inlet air vents are located on the front lower side of the chassis and the outlet air vents are on the back upper side of the chassis. Position the air inlet to pull air from outside the instrument rack. For best performance the air vents must allow easy air circulation without wiring or panels blocking the vents. Refer to Figure 5 for airflow and clearance information.

Figure 5. SLSC-12001 Chassis Airflow



1 Airflow Out

2 Airflow In

In order to operate the chassis at the maximum allowable ambient temperature and maximum power as specified in the *Environmental* section, you must mount the chassis horizontally in the rack and allow for airflow at the intake and exhaust as shown in Figure 5. Filler panels, which are available at ni.com, must be inserted in any empty front module slots and in any empty rear RTI slots.

Installing Rear Transition Interfaces



Caution Do not touch or remove the I/O boards or cables while the system is energized. I/O boards may have exposed hazardous live voltages. Access must be prevented in normal operation



Note Refer to RTI manufacturer documentation for product-specific installation instructions.

NI recommends installing all RTIs prior to the initial module installation. Complete the following steps to install RTIs:

1. Power off the main DC power source or disconnect it from the chassis before installing any RTI.
2. Ensure that the chassis is powered off. The POWER LED should be off. If it is not off, do not proceed until the POWER LED is off.
3. Loosen the screws of the upper rear panel. Refer to Figure 2 for the upper rear panel screws locations.
4. Position the RTI at the desired slot and insert the securing screws, but do not fully tighten them.
5. Insert a corresponding module in the same slot providing additional resistance at the rear of the RTI for the module to fully mate to the RTI.
6. Repeat steps 4 and 5 for all required RTIs.
7. Tighten the screws for all RTIs and the upper rear panel. This ensures proper alignment for future connections between modules and these RTIs.

Installing SLSC Modules



Caution The SLSC-12001 chassis and the SLSC modules do not support hot plug-in. The entire chassis must be powered down when a module is installed.

Complete the following steps to install an SLSC module in the chassis while referring to Figure 6:



Caution Power off the main DC power source or disconnect it from the chassis before installing the module. To completely remove power, you must disconnect all power cables.

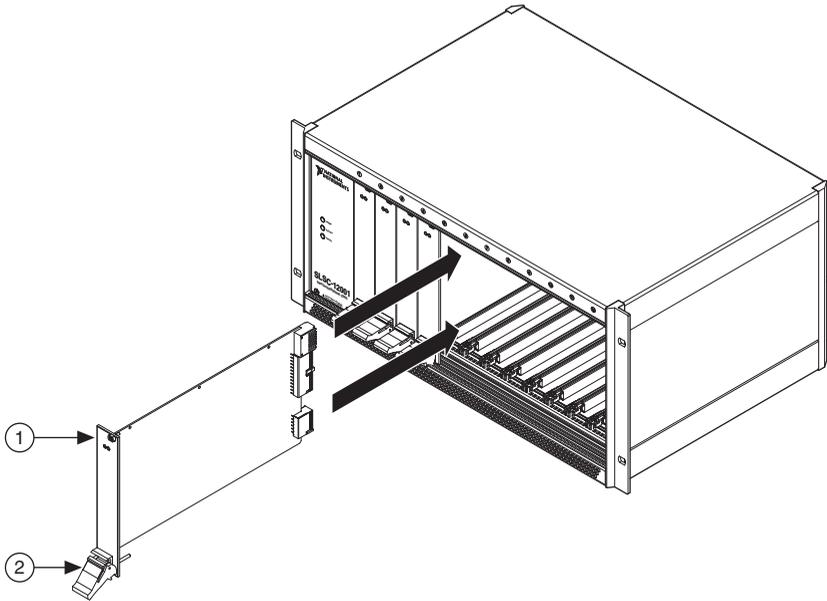


Note Refer to module and RTI documentation to ensure electrical compatibility for rear I/O connections.

1. Ensure that the chassis is powered off. The POWER LED should be off. If it is not off, do not proceed until the POWER LED is off.

2. Ensure that any alternate power source(s) connected the RTI(s) or modules are powered off.
3. Inspect the slot pins on the chassis backplane for any bending or damage prior to installing a module.
4. Install a module into a chassis slot by first placing the module PCB into the front of the PCB guides at the top and bottom.
5. Slide the module into the chassis until you begin to feel resistance then push up the injector/ejector handle to fully seat the module into the chassis frame.
6. Secure the module front panel to the chassis using the module front-panel mounting screws.

Figure 6. SLSC-12001 Module Installation



1 Module

2 Injector/Ejector Handle

Removing SLSC Modules



Caution The SLSC-12001 chassis and the SLSC modules do not support hot plug-in. The entire chassis must be powered down when a module is removed.

Complete the following steps to remove an SLSC module from the chassis:

1. Power off the main DC power source or disconnect it from the chassis before removing the module.
2. Ensure that the chassis is powered off. The POWER LED should be off. If it is not off, do not proceed until the POWER LED is off.
3. Ensure that any alternate power source(s) connected the RTI(s) are powered off.

4. Unsecure the module front panel from the chassis by loosening the module front-panel mounting screws.
5. Push down on the injector/ejector handle to pull the module away from the backplane connector(s).
6. Slide the module to the front of the chassis, making sure the module remains in the guide rails as you slide it out of the chassis.

Connecting the Chassis

Safety Guidelines



Caution Before undertaking any troubleshooting, maintenance, or exploratory procedure; carefully read the following cautionary notices.

- **Chassis Grounding**—The SLSC chassis grounding screw may be connected to facility ground. Refer to the [Grounding the Chassis](#) section for instructions on connecting a grounding conductor.
 - **Live Circuits**—Operating personnel and service personnel must not remove protective covers when operating or servicing the chassis. Adjustments and service to internal components must be undertaken by qualified service technicians. During service of this product, disconnect the external power supply from the SLSC chassis.
 - **Explosive Atmosphere**—Do not operate the chassis in conditions where flammable gases are present. Under such conditions, this equipment is unsafe and may ignite the gases or gas fumes.
 - **Part Replacement**—Only service this equipment with parts that are exact replacements, both electrically and mechanically. Contact NI for replacement part information. Installation of parts with those that are not direct replacements can cause harm to personnel operating the chassis. Furthermore, damage or fire may occur if replacement parts are unsuitable.
 - **Modification**—Do not modify any part of the chassis from its original condition. Unsuitable modifications can result in safety hazards.

Grounding the Chassis

Connect the grounding electrode system of the facility to the chassis using the chassis grounding screw located on the back of the SLSC-12001 chassis. Refer to Figure 2 for the location of the chassis ground screw. Use an AWG 8 wire with a lug as appropriate for your application.

Wiring Power to the Chassis

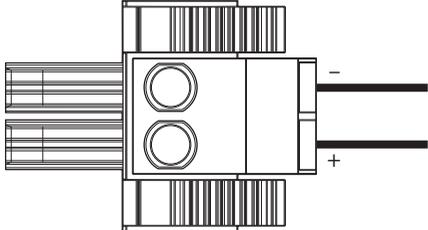
The SLSC-12001 chassis requires a +24 V, DC supply as power for the chassis and installed modules. Refer to the [Chassis Power](#) section for the minimum specifications of the external power supply. For best results ensure that the external power supply is mounted as required by the manufacturer and has enough air circulation for proper cooling.

The SLSC-12001 chassis can draw a significant current from the +24 V power input to support module requirements. Refer to the [Physical Characteristics](#) section for wire gauge sizes permitted by the SLSC-12001 chassis connector when wiring the power. Minimize the cable length between the power supply and SLSC-12001 chassis. Avoid unnecessary intermediate connections on the power lines. If possible, direct wiring between the power supply and chassis is preferred.

Complete the following steps to connect the external power supply:

1. Ensure the +24 V external power supply is powered off.
2. Wire the power supply to the SLSC-12001 chassis power input connector, which is shipped with the SLSC-12001 chassis. Refer to the [Physical Characteristics](#) section for wire gauge information. Refer to Table 1 for signal connection information.

Table 1. Power Input Cable Connector

Connector	Pin	Description
	-	Negative power input
	+	Positive power input

3. Install the power connector on the rear of the SLSC-12001 chassis and secure it with the locking tabs.



Note If a source with remote sensing is used, connect the sensing wires as close as possible to the chassis power input connector.

Powering on the Chassis

The SLSC-12001 chassis does not have an on/off switch since an external power supply provides power to the SLSC-12001 chassis. Connecting an already powered on 24 V supply to the SLSC-12001 is allowed, but higher transient currents may be involved.

When you apply power to the SLSC-12001, the chassis fans start and the POWER LED should turn green immediately. When the POWER LED and the STATUS LED are both green, the chassis is ready for host communication. Refer to the [Understanding LED Indicators](#) section to identify other LED indications.



Note Ensure that SLSC modules are installed in the chassis prior to power-up.



Note If an SLSC module requires auxiliary power supplies, refer to the module datasheet to determine the power-up sequence.



Tip After the SLSC-12001 is powered on, check the voltage at the chassis power connector to ensure that the power line does not drop below the minimum operational voltage range specified in the *Chassis Power* section.

Connecting the Chassis to a Host

Use a shielded Category 5 Ethernet cable to connect the SLSC-12001 using one of the following methods:



Note By default, the SLSC-12001 uses DHCP to acquire an IP address. If the network to which it is connected does not have a DHCP server, the SLSC-12001 assigns itself a link-local IP address. To use a static IP address, you must use DHCP or link-local to access the web-based configuration interface of the SLSC-12001 and then reconfigure it to use a static IP address.

- Connect the SLSC-12001 to the network, typically through a router or switch shared with the host using a standard Ethernet cable.
- Connect the SLSC-12001 to the Ethernet port on the host system using an Ethernet crossover cable.

Connecting to a Measurement System

The SLSC-12001 direct signal connection to a measurement system is optimized to be completed through RTI(s) as required by individual SLSC modules. Use signal cables as required by individual SLSC modules and measurements system to route the signals.

Maintenance

Power off the chassis and any alternate power supplies connected to the modules or RTIs when performing maintenance on the chassis. After maintenance is complete, ensure that the chassis is completely dry and free from contaminants before returning it to service.



Caution Many components within the chassis are susceptible to static discharge damage. Service the chassis only in a static-free environment. Observe standard handling precautions for static-sensitive devices while servicing the chassis. Always wear a grounded wrist strap or equivalent while servicing the chassis.

Cleaning the Chassis

Clean dust from the chassis exterior and interior as needed, based on the operating environment. Periodic cleaning increases reliability.

Use a dry, low-velocity stream of air to clean the interior of the chassis. Use a soft-bristle brush for cleaning around components.

Clean the exterior surfaces of the chassis with a dry lint-free cloth or a soft-bristle brush. If any dirt remains, wipe with a cloth moistened in a mild soap solution. Remove any soap residue by wiping with a cloth moistened with clear water. Do not use abrasive compounds on any part of the chassis.

Cleaning and Replacing the Chassis Intake Filter



Caution Operating the SLSC-12001 without the chassis intake filter installed degrades the cooling performance of the chassis.

Cleaning the Filter

A dirty intake filter dramatically affects the cooling performance of an SLSC-12001 chassis. Clean the intake filter whenever it becomes visibly dirty.

1. For minor dust buildup, you can vacuum the intake filter without removing it from the chassis.
2. For significant dust buildup, NI recommends removing and cleaning the intake filter, or replacing the intake filter.
 - Clean the intake filter by:
 1. Washing it in a mild soap solution.
 2. Rinsing it with water.
 3. Vacuuming or blowing air through it.
 4. Allowing it to dry before reinstalling it in the chassis.
 - You can replace the intake filter with a new one, which is available from ni.com.

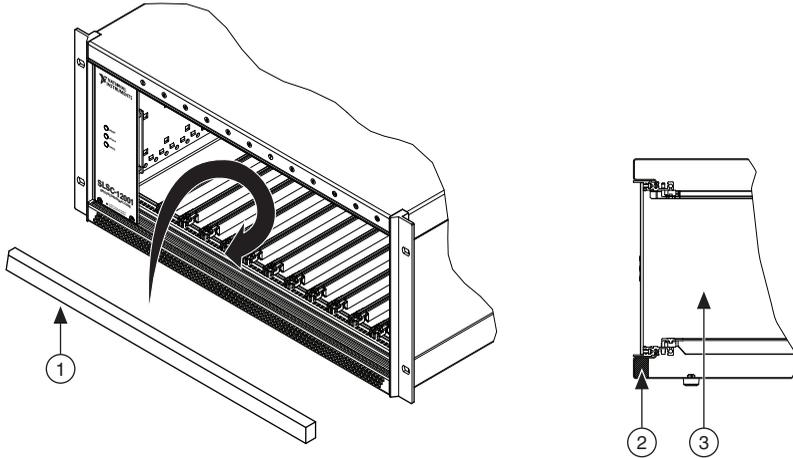
Removing the Filter

1. Remove the four screws from the front panel that contains the chassis LEDs and set them aside.
2. Remove the front panel that contains the chassis LEDs and set it aside.
3. Reach into the bottom front of the chassis and pull out the intake filter.

Inserting the Filter

1. Remove modules as needed to place the intake filter in its original location flush against the chassis intake across the entire front length of the chassis.
2. Ensure that the intake filter is oriented as shown in Figure 7.
3. Reinsert the front panel that contains the LEDs.
4. Install the four front panel screws.

Figure 7. Intake Filter Orientation



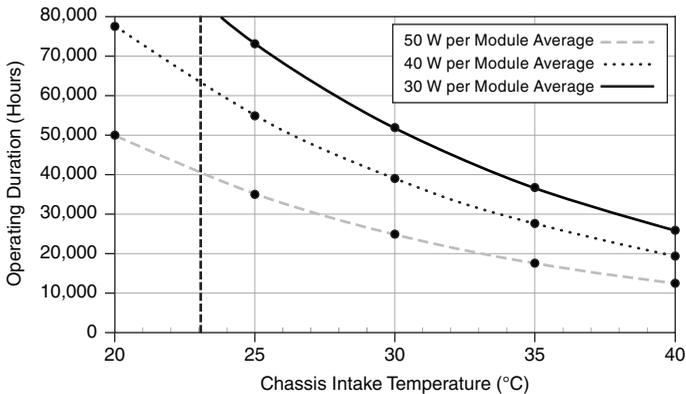
- 1 Filter
- 2 Filter Inserted in Correct Orientation

- 3 Chassis Side Sectioned View

Fan Maintenance

Figure 8 shows estimated fan life based on empirical and manufacturer reliability information. Actual fan operating life may vary based on individual module airflow and heat dissipation characteristics. The information provided in Figure 8 allows you to maximize the performance and operation of the SLSC-12001 chassis by allowing you to manage maintenance schedules.

Figure 8. Projected Fan Lifetime



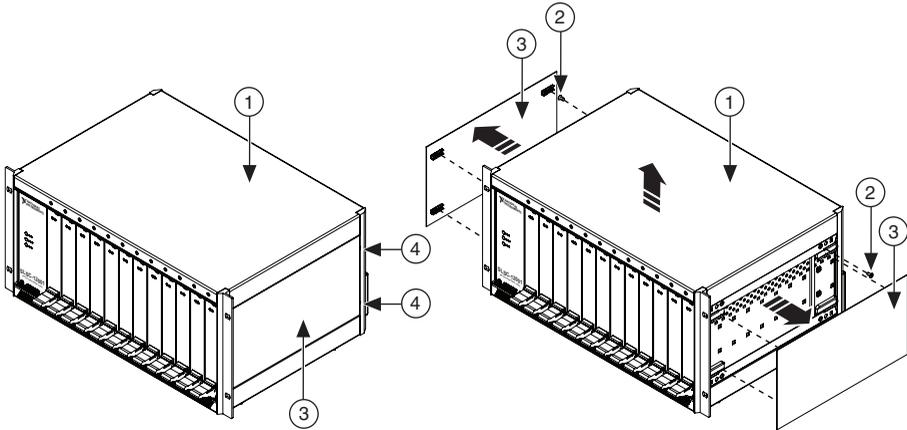
Fan Replacement

National Instruments provides a replacement kit containing five fans and two plastic cable ties. The replacement kit is available at ni.com.

Fan Removal

1. Insert a small flathead screwdriver into the small notches shown in Figure 9 to remove the side panels.

Figure 9. Removing Chassis Panels



- | | |
|---------------------------------|-------------------------------------|
| 1 Top Panel | 3 Side Panel (2) |
| 2 Top Panel Retention Screw (2) | 4 Notches for Screwdriver Insertion |

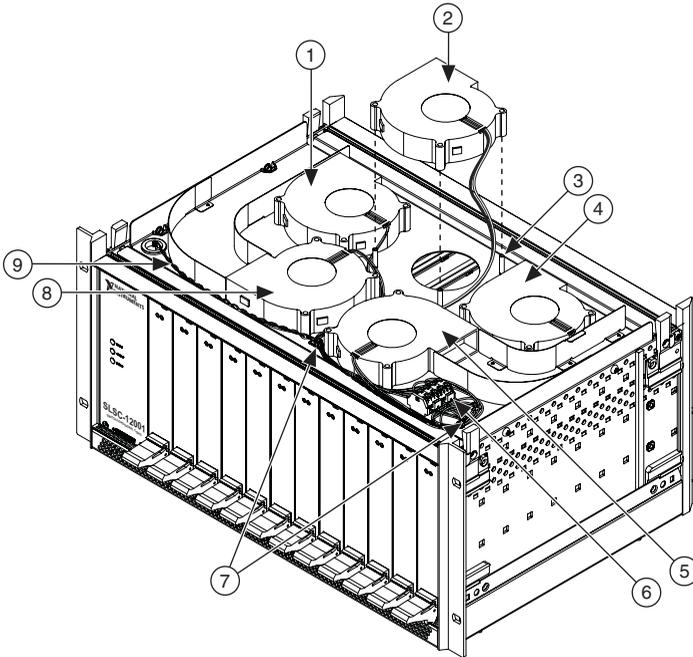
2. Remove the two top panel retention screws using a Phillips screwdriver.



Note Use care when reinstalling the top panel retention screws. These are thread-forming screws and may cause cross-threading damage if inserted incorrectly.

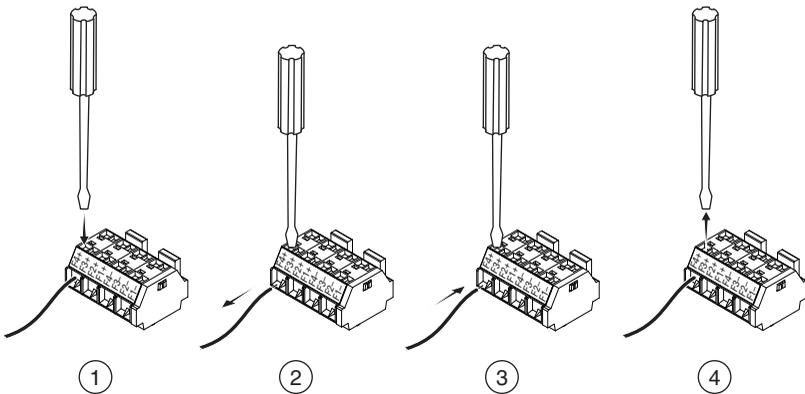
3. Remove the top panel by holding its side edges and lifting it off the chassis.
4. Locate the fan terminal block, by referring to Figure 10.
5. Disconnect the wires associated with the fan(s) that you want to replace. Figure 12 illustrates the fan wire locations.
 - a. Insert a small flathead screwdriver into a spring clamp activation slot to open the corresponding connector terminal as shown in Figure 11.
 - b. Pull the wire out of the connector terminal and remove the screwdriver.
 - c. Repeat step a and b for each fan you replace.
6. Cut the plastic cable ties shown in Figure 10.
7. Lift the fan(s) vertically from the standoffs.

Figure 10. Chassis Fan Components



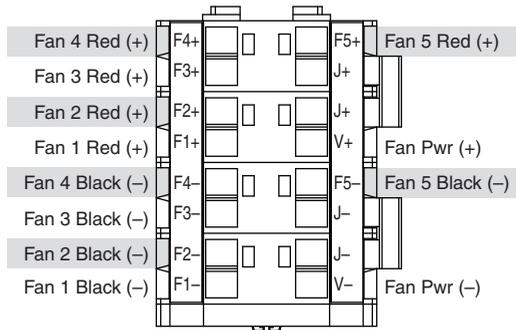
- | | |
|-----------------|--|
| 1 Fan 1 | 6 Fan Terminal Block |
| 2 Fan 2 | 7 Plastic Cable Ties and Cable Tie Anchors |
| 3 Standoff (15) | 8 Fan 4 |
| 4 Fan 3 | 9 Fan Power Cable |
| 5 Fan 5 | |

Figure 11. Fan Terminal Block Wire Removal and Insertion



- | | |
|---|--|
| 1 Step 1 Insert the Screwdriver | 3 Step 3 Replace the Fan Terminal Block Wire |
| 2 Step 2 Remove the Fan Terminal Block Wire | 4 Step 4 Remove the Screwdriver |

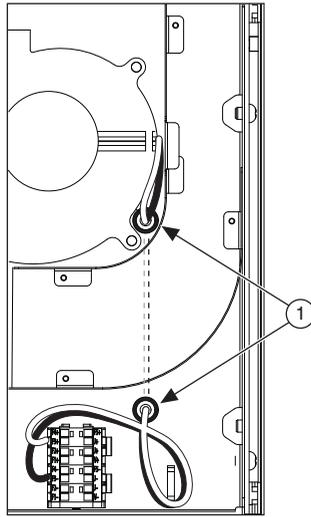
Figure 12. Fan Terminal Block Wiring



Fan Installation

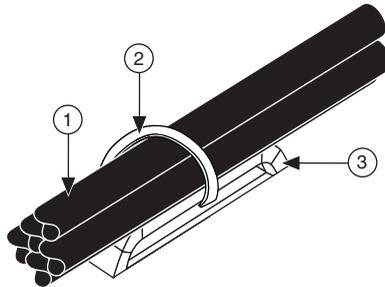
1. Slide the fan(s) down onto the standoffs.
2. Connect the fan wires to the terminal block as shown in Figure 12 using the process shown in Figure 11.
 - a. Insert the screwdriver into the spring clamp activation slot to open the corresponding connector terminal.
 - b. Press the new fan wire into the open connector terminal.
 - c. Remove the screwdriver from the activation slot to clamp the wire into place.
 - d. Repeat step a through c for each fan you install.
3. Route the wires between the fans, not over them. For fan 3 in Figure 10, route the wire beneath the fan tray and back through the two small grommets shown in Figure 13. Pull the wire taut to prevent it from dangling loosely beneath the tray.
4. Coil up the wires and cable as needed to prevent the wires from being pinched when the panel is reattached. Use the chassis sheet metal cable tie anchors shown in Figure 10, and the plastic cable ties from the fan kit to hold the wires and cable tightly in place. Figure 14 illustrates the anchor and cable tie detail.
5. Replace the top panel with the vent holes toward the back.
6. Reinsert the two top panel retention screws using a Phillips screwdriver and tighten the screws to a torque of 1.92 N · m (17 lb · in.).
7. Replace the side panels.

Figure 13. Fan 3 Wiring Detail



1 Small Grommets

Figure 14. Tie Anchor Detail



1 Wires

2 Plastic Cable Tie

3 Cable Tie Anchor

Battery Replacement

The SLSC-12001 contains a lithium cell battery that is required for storing the Real Time Clock information when the chassis is powered off. There is only a slight drain on the battery when power is applied to the SLSC-12001 power connector. The rate at which the battery drains when power is disconnected depends on the ambient storage temperature. The battery is located on the backplane. To replace the battery, complete the following steps while referring to Figure 15:

1. Power off the chassis and any power source(s) connected to module(s) and RTI(s).
2. Remove the chassis power, trigger, and Ethernet cables from the chassis.
3. Remove the washer and nut from around each BNC connector.
4. Remove the eight backplane panel fixing screws.

5. Remove the backplane panel.
6. Remove the battery.

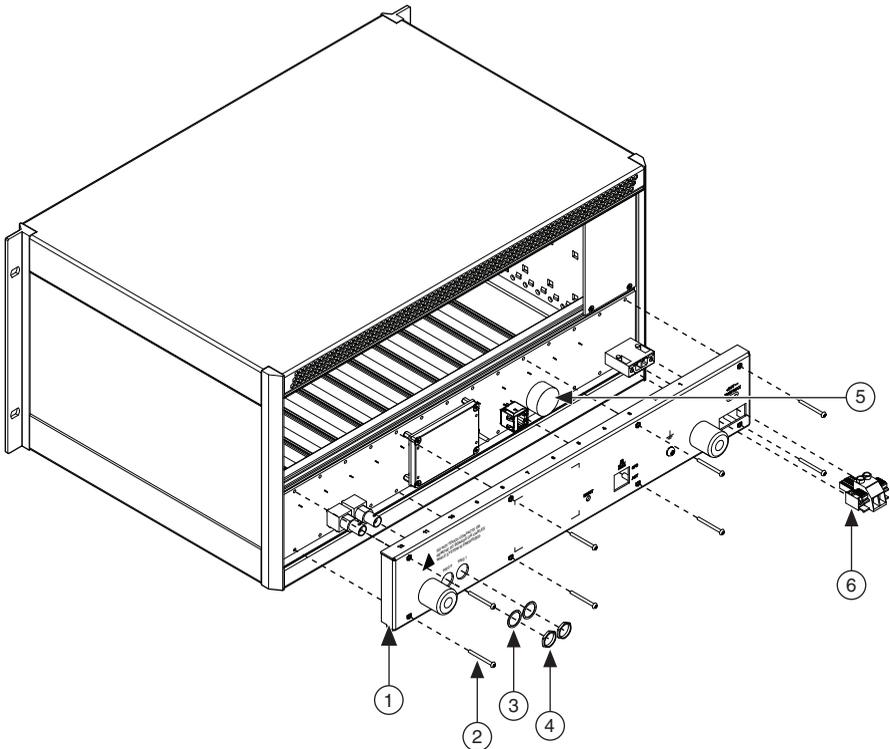


Note Refer to the [Battery Replacement and Disposal](#) section for information about proper disposal of the old battery.

7. Replace the battery with a new Tadiran TL-2450 or an equivalent battery.
8. Replace the backplane panel.
9. Secure the back panel with the eight fixing screws tightened to a torque of $0.56 \text{ N} \cdot \text{m}$ ($5 \text{ lb} \cdot \text{in.}$).
10. Secure each BNC connector with a washer and nut.
11. Replace the chassis power connector.

Once the battery is replaced, the Real Time Clock will reset. Refer to *NI-SLSC Help* for information about setting the clock.

Figure 15. SLSC-12001 Chassis Battery Replacement



- | | |
|---------------------------------------|---------------------------|
| 1 Backplane Panel | 4 BNC Connector Nut (2) |
| 2 Backplane Panel Affixing Screws (8) | 5 Battery |
| 3 BNC Connector Washer (2) | 6 Chassis Power Connector |

Troubleshooting

Understanding LED Indicators

The SLSC-12001 has three LEDs on the front panel. The significance of the LEDs is described in Table 2.

Table 2. Troubleshooting Using LED Indicators

LED Type	LED Indicator	Status
POWER	Off	No power or short circuit on +3.3 V rail causing failure to power on.
	Green	Power is on.
ACTIVITY	Blinking green	Ethernet communication in progress.
	Off	No Ethernet communication.
STATUS	Red	Less than 3 seconds: chassis is starting to boot.
		Reset button is pressed.
		More than 3 seconds after boot start: chassis failed to boot. This could be due to corrupt firmware, incorrect power input, fan failure, or other hardware issues.
	Amber	Chassis is booting.
	Green	Normal operation.

Network Communication Troubleshooting

Multiple problems may result in network communication issues during setup.

Things to try:

- Ensure the chassis is connected to a working 24 VDC power source.
- If the STATUS LED is off, there may be a short circuit. Refer to the [Module Short Circuit Behavior](#) section for more information.
- If the STATUS LED is green, but the ACTIVITY LED is off, try the following:
 - Verify the Ethernet cable is connected properly.
 - If communication is routed through a switch, verify that the switch is powered on and functioning.
 - Verify that your network has a DHCP server or that the chassis is connected to the host system using a crossover cable.
 - Verify that the host computer firewall is disabled.
 - Verify that the host computer is not configured to use a proxy server.

Resetting the Chassis and Modules

The SLSC-12001 chassis has a button, located on the rear of the chassis.

Pressing the reset button results in the following chassis responses:

- **Reset**—When pressed for less than five seconds, the chassis reboots with the current configuration.
- **Factory Reset**—When pressed for five seconds or longer, then released, the chassis reboots into factory default mode, which returns the chassis user configuration to the factory-set defaults listed in Table 3. If the chassis was set to a static IP address, it takes two factory resets to revert to DHCP or Link Local IP address.

Table 3. SLSC-12001 Factory Default Mode Settings

Attribute	Value
Host Name/Chassis Name	SLSC-12001-<8-digit serial number>
Module Name	SLSC-12001-<8-digit serial number>-Mod<slot number>
IP	DHCP or Link Local
Comment	Empty
NI Auth	User name = admin Password = no password required User name = anonymous Password = no password required
Note: If the serial number is less than 8-digits, zeros will be added to the front of the serial number to make it 8 digits long.	

Fan Faults

The NI-SLSC software driver provides the ability to monitor the SLSC-12001 Fan Voltage Sensor to determine whether a fan fault is detected. This feature allows you to determine when a fan should be replaced. If fan faults are not resolved immediately, system performance is impacted. Refer to the *NI-SLSC Driver Help* for more details on monitoring the fans. If the SLSC-12001 detects that all fans have failed, the modules are sent a reset command and the +24 V rail to each slot is turned off to prevent system damage.

Module Short Circuit Behavior

Each SLSC module is powered from the SLSC-12001 through +3.3 V and +24 V rails. If a defective module is present, the SLSC-12001 may fail to start. If one SLSC module has a short circuit condition on the +3.3 V rail, the SLSC-12001 chassis will not start, there will be no Ethernet communication with the chassis, and all front panel LEDs will be off.

If one SLSC module has a short circuit condition on the +24 V rail, the +24 V rail is turned off for all modules once the chassis starts and the POWER LED will be amber. In both cases, power off the chassis and remove the defective module before attempting a restart.

Specifications

The following specifications apply to an SLSC-12001 mounted in a rack with recommended cooling clearances found in the *Installing the Chassis* section and using a power supply that meets the specifications provided in this *Specifications* section. The specifications are valid for the entire temperature range of the chassis unless otherwise specified.

Chassis Power

Nominal input voltage	24 V
Maximum input voltage.....	27.6 V
Minimum input voltage	21 V
Maximum input voltage ripple 20 Hz to 20 MHz	200 mV
Chassis power consumption (no modules)	45 W
Maximum input current	35 A
Maximum power consumption with modules.....	720 W
Maximum power cable length	3 m



Note The external power supply must meet the DC input specifications at the chassis input with a minimum power output of 720 W and must provide suitable overvoltage and overcurrent protection as well as a suitable easily reached disconnect switch or circuit breaker.



Note Depending on populated modules, the startup current could be significantly higher than the steady DC current. The external power supply should sustain the initial startup current without entering the overcurrent protection.

Table 4. DC Output per Slot

Rail	Minimum Volts	Maximum Volts	Maximum Current	Comments
24 V	20.4	26.4	2 A	Across two pins
3.3 V	3.135	3.465	400 mA	—



Note Each slot has short circuit protection.

SLSC-12001 power dissipation

Maximum chassis power dissipation 650 W

Maximum continuous
power dissipation per slot 50 W

Battery

Battery type Tadiran TL-2450

Typical battery life with power applied
to power connector 8 years

Network

Network interface 10BASE-T, 100BASE-T, 1000BASE-T

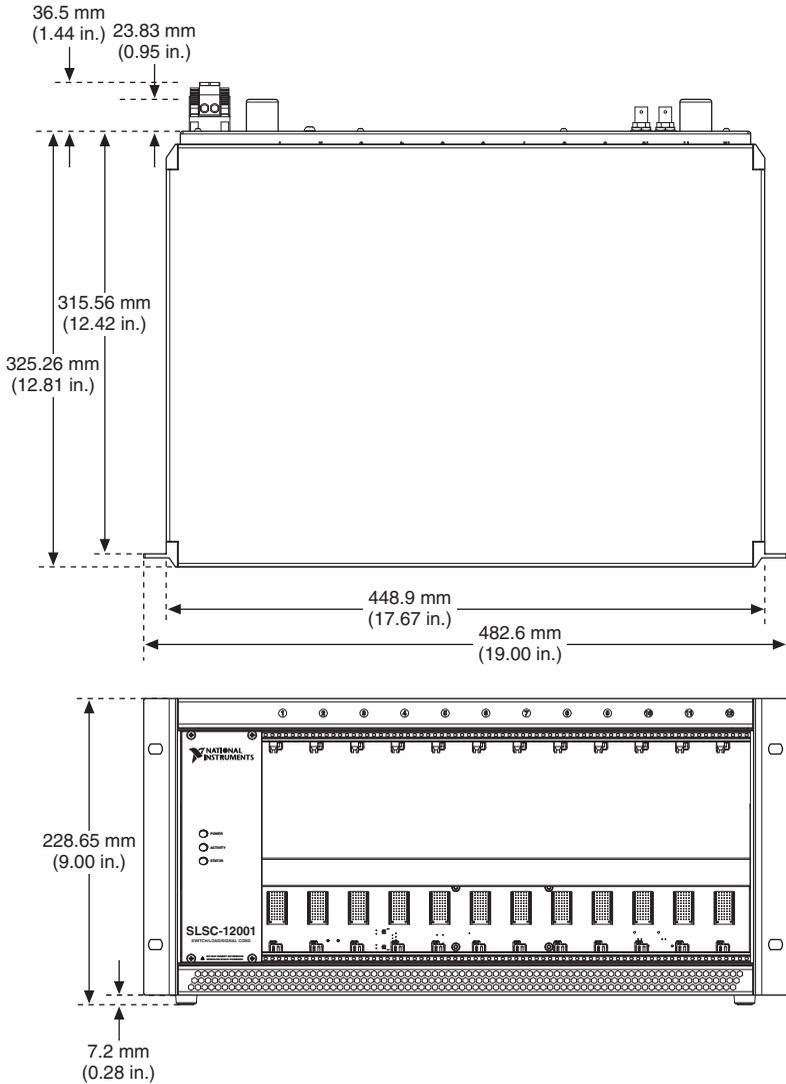
Ethernet compatibility IEEE 802.3

Communication rates 10 Mbps, 100 Mbps, 1,000 Mbps
auto-negotiated

Maximum cabling distance 100 m/segment

Physical Characteristics

Figure 16. SLSC-12001 Dimensions



Power connector screw-terminal
wire gauge..... 8.36 mm² (8 AWG)

Power connector screw-terminal
wire type Copper conductor wire

Power connector screw-terminal wire strip length	10 mm (0.394 in.) of insulation stripped from the end
Power connector screw-terminal screw torque	0.5 N · m (4.4 lb · in.)
Weight (chassis only)	6.2 kg (13.6 lb)

Chassis Cooling

Module cooling system

Slot airflow direction	Bottom of module to top of module
Module cooling intake	Bottom front of chassis
Module cooling exhaust	Top rear of chassis

Environmental

Operating temperature at chassis air intake	0 °C to 40 °C ¹ (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)
Storage temperature range	-40 °C to 85 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)
Relative humidity range, operating	10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.)
Relative humidity range, storage	5% to 95%, noncondensing (Tested in accordance with IEC 60068-2-56.)
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient)
Pollution Degree	2
Indoor use only.	

¹ The chassis internal ambient temperature may reach 85 °C with all slots at the maximum allowed power dissipation.

Shock and Vibration

Operational shock	30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC 60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)
Operating vibration, random	5 Hz to 500 Hz, 0.3 g _{rms} (Tested in accordance with IEC 60068-2-64.)
Non-operating vibration, random	5 Hz to 500 Hz, 2.4 g _{rms} (Tested in accordance with IEC 60068-2-64. Non-operating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Safety

Measurement Category¹ I



Caution Do *not* connect the SLSC-12001 to signals or use for measurements within Measurement Categories II, III or IV.



Caution The protection provided by the SLSC-12001 can be impaired if it is used in a manner not described in this document.

Safety Standards

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1



Note For UL and other safety certifications, refer to the product label or the [Online Product Certification](#) section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions

¹ Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.



Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.



Note For the standards applied to assess the EMC of this product, refer to the [Online Product Certification](#) section.

CE Compliance

This product meets the essential requirements of applicable European Directives as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2011/65/EU; RoHS Directive

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Minimize our Environmental Impact* web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)



EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit ni.com/environment/weee.

Battery Replacement and Disposal



Battery Directive This device contains a long-life coin cell battery. If you need to replace it, use the Return Material Authorization (RMA) process or contact an authorized National Instruments service representative. For more information about compliance with the EU Battery Directive 2006/66/EC about Batteries and Accumulators and Waste Batteries and Accumulators, visit ni.com/environment/batterydirective.

电子信息产品污染控制管理办法（中国 RoHS）



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