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**NI-9921**

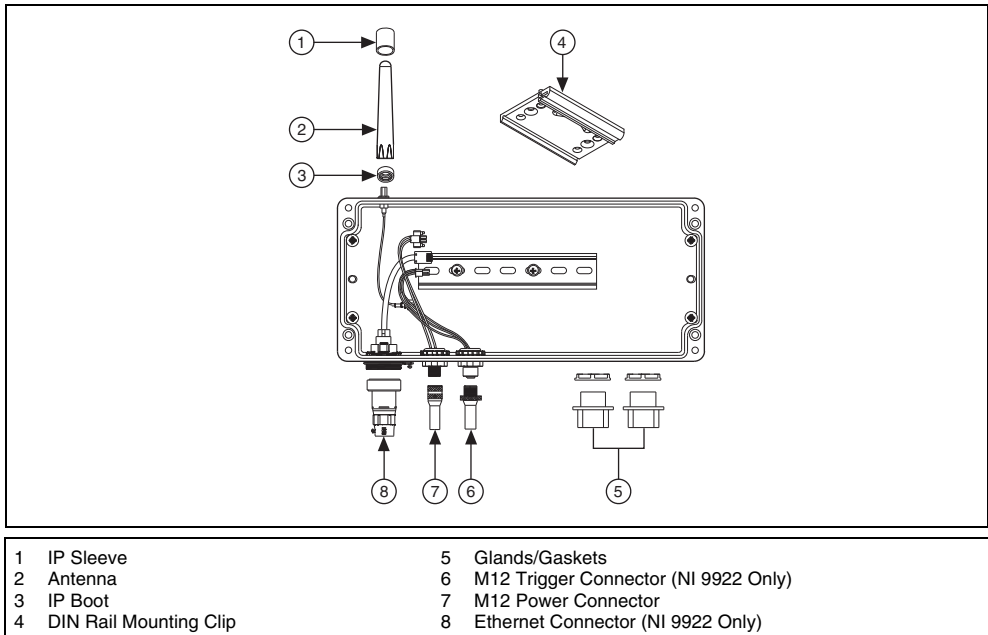
# INSTALLATION GUIDE

## NI 9921/9922 Outdoor IP Enclosure

### For NI WLS-9000 Series Devices

This guide describes how to install and use the National Instruments 9921 and National Instruments 9922 outdoor IP enclosures. The NI 9921/9922 outdoor IP enclosures are accessories that provide NI WLS-9000 Series devices with a minimum ingress protection (IP) rating of IP54 against dust or water in harsh outdoor or industrial environments.

Figure 1 shows the NI 9921/9922 outdoor IP enclosure components.



**Figure 1.** NI 9921/9922 Outdoor IP Enclosure Components



**Note** You need a #1 and #2 Phillips and a #1 flat screwdriver to install the NI 9921/9922.

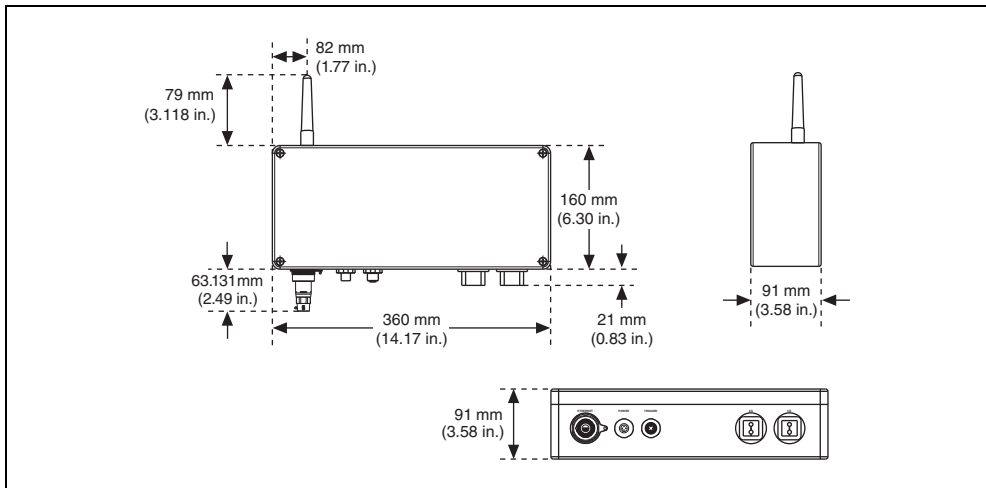
For more information about IP ratings, refer to the [Understanding IP Ratings](#) section. For the NI WLS-9000 Series device specifications, refer to the [NI WLS/ENET-9163 User Guide and Specifications](#) available at [ni.com/manuals](http://ni.com/manuals).

The NI 9921/9922 kit includes the following items:

- NI 9921/9922
- One Ethernet field termination connector kit<sup>1</sup>
- One Ethernet end cap<sup>1</sup>
- One M12 trigger male field termination connector kit<sup>1</sup>
- One M12 trigger end cap<sup>1</sup>
- One M12 power female field termination connector kit
- One M12 power end cap
- M25 gland clamps
- Two glands, split
- Two glands, blanking plugs
- Four 4–20 Plastite® screws (included in DIN rail kit)
- 2.4 GHz antenna
- One IP Boot
- One IP Sleeve
- DIN rail mounting clip
- Two small zip ties

## Dimensions

Figure 2 shows the NI 9921/9922 dimensions.



**Figure 2.** NI 9921/9922 Dimensions

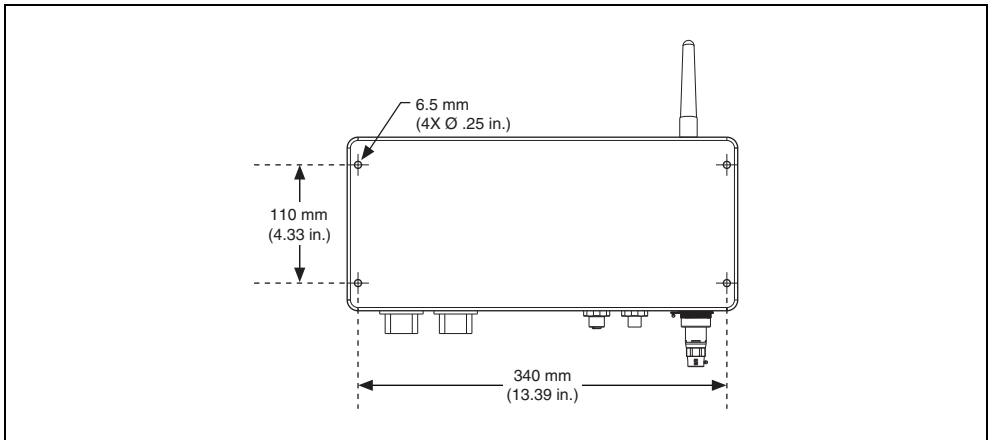
<sup>1</sup> Not included with the NI 9921.

## Mounting the NI 9921/9922

Figure 3 shows the NI 9921/9922 mounting hole dimensions. NI recommends mounting the NI 9921/9922 before installing the NI WLS-9000 Series device and attaching the internal and external cables.



**Tip** Attach the cover after mounting the NI 9921/9922 and installing the NI WLS-9000 Series device.



**Figure 3.** NI 9921/9922 Mounting Hole Dimensions and Locations

## Setting Up and Installing the NI 9921/9922

Complete the following steps to set up and install the NI 9921/9922:

### Step 1: Unpack and Inspect the Kit Contents

Remove the device from the package and inspect the device and kit contents. Contact NI if the device appears damaged. Do *not* install a damaged device or use kit contents that appear damaged.

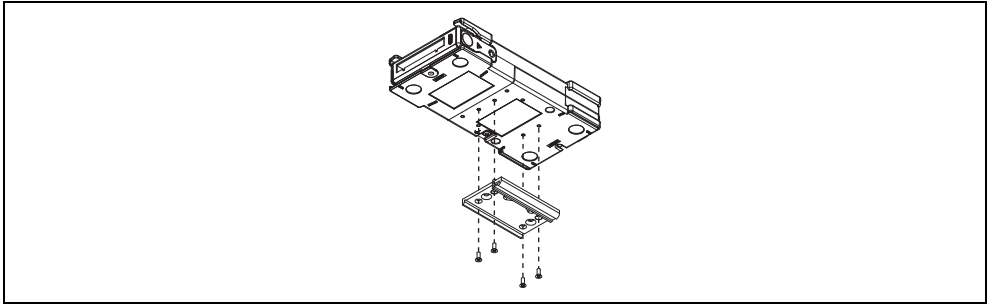
### Step 2: Unscrew and Detach the Cover

The cover of the NI 9921/9922 is equipped with captive screws. Use a #2 Phillips screwdriver to remove the cover as shown in Figure 11.

### Step 3: Install the NI WLS-9000 Series Device

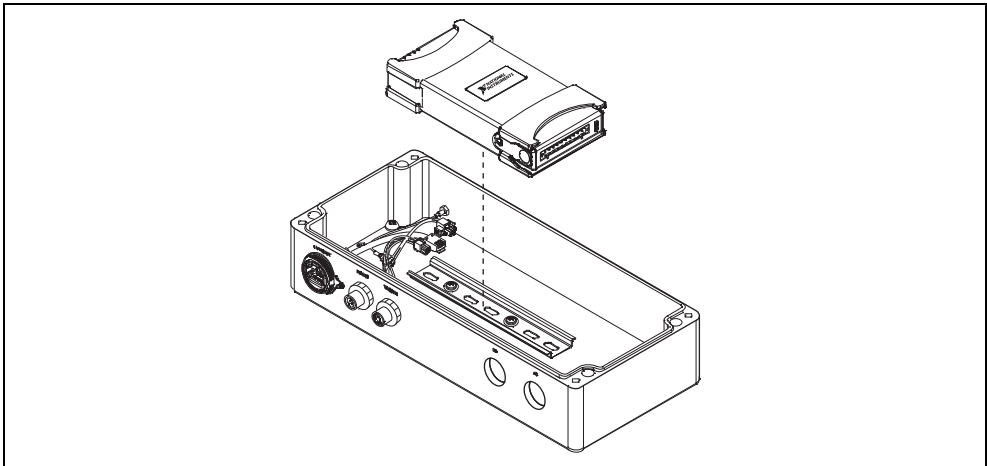
Complete the following steps to install the NI WLS-9000 Series device into the NI 9921/9922:

1. Use the #1 Phillips screwdriver and the four 4–20 Plastite® screws to attach the DIN rail clip to the NI WLS-9000 Series device, as shown in Figure 4.

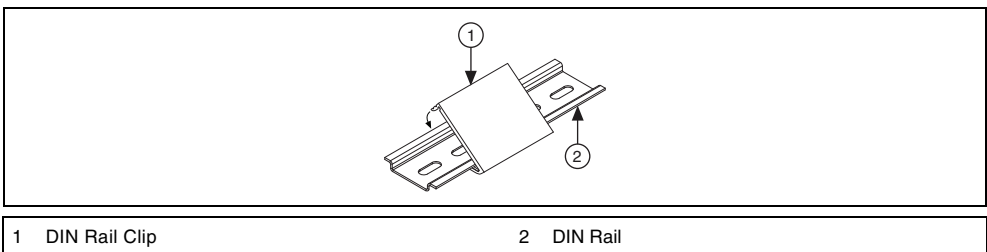


**Figure 4.** Attaching DIN Rail Clip to NI WLS-9000 Series Device

2. Snap the NI WLS-9000 Series device onto the DIN rail of the NI 9921/9922 outdoor IP enclosure, as shown in Figure 5 and Figure 6.



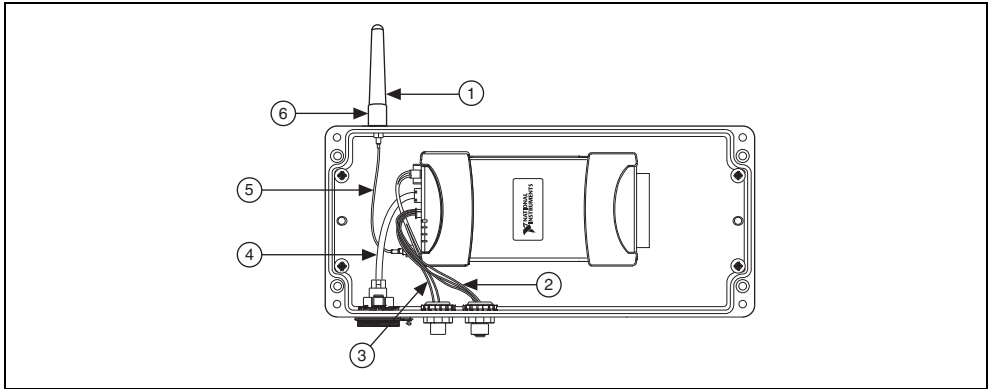
**Figure 5.** Connecting the NI WLS-9000 Series Device to the NI 9921/9922



**Figure 6.** Attaching DIN Rail Clip to the DIN Rail (Shown Without Device)

## Step 4: Connect Internal Cables

The NI 9921/9922 ships with internal cables to connect the NI WLS-9000 Series device to the IP rated connectors that are on the inside of the NI 9921/9922. Refer to Figure 7 while completing the following steps to connect the internal cables to the NI 9921/9922 to the NI WLS-9000 Series device:



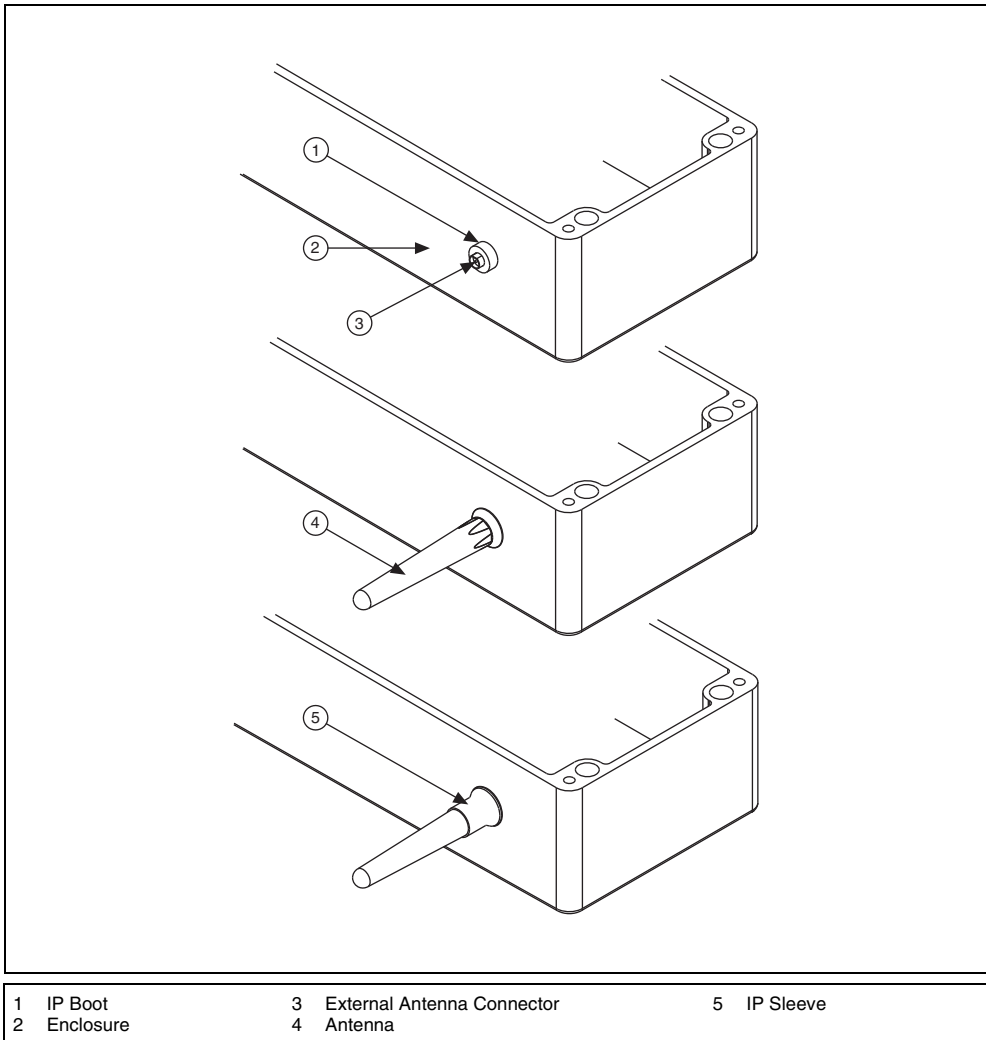
1	Antenna	4	Internal RJ45 Ethernet Cable (NI 9922 Only)
2	Internal Trigger Cable (NI 9922 Only)	5	Internal Antenna Cable
3	Internal Power Cable	6	IP Sleeve

**Figure 7.** Connecting Internal Cables

1. Connect the internal RJ45 Ethernet cable to the NI 9922 and the NI WLS-9000 Series device.
2. Connect the internal antenna cable from the NI 9921/9922 to the NI WLS-9000 Series device.
3. Connect the internal trigger cable from the NI 9922 to the NI WLS-9000 Series device.
4. Connect the internal power cable from the NI 9921/9922 to the NI WLS-9000 Series device.

## Step 5: Install the Antenna

Refer to Figure 8 to install the antenna assembly.



**Figure 8.** Antenna Assembly Installation

On the outside of the enclosure, place the IP boot onto the external antenna connector with the smaller diameter hole out. Screw the antenna onto the external antenna connector until it bottoms out. Slide the IP sleeve down the antenna and over the IP boot until the IP sleeve touches the enclosure.

## Step 6: Attach External Cables

### NI IP Rated Cables

Table 1 lists the optional cable accessories for use with the NI 9921/9922. Go to [ni.com](http://ni.com) for more information about these accessories.

**Table 1.** Optional Cable Accessories

NI Part Number	Description
196648-05	IP rated, 5 meter M12 power cable, pigtail
196649-05	IP rated, 5 meter M12 trigger cable, pigtail
196650-05	IP rated, 5 meter Ethernet cable
196647-01	Cable gland replacements: two solid glands and four assorted two-hole split glands

### Building and Connecting IP Rated Cables

You can order IP rated cables from NI or you can use the field termination connectors that are shipped with the NI 9921/9922 outdoor IP enclosure to make your own cable lengths.



**Caution** Only use the connectors provided with the NI 9921/9922 when building your cables.

The following field termination connectors are included in the NI 9921/9922 kit for creating custom cable connectors:

- One M12 power female field termination connector kit (connects to power)
- One M12 power end cap

The following field termination connectors are also included with the NI 9922:

- One Ethernet field termination connector kit. Refer to documentation included in the Ethernet field termination connector kit for assembly instructions.
- One Ethernet end cap
- One M12 trigger male field termination connector kit (connects to trigger)
- One M12 trigger end cap



**Note** Be sure to route the wires through the plastic and rubber sealing grommets and the backshell before connecting to the screw terminals on the M12 field termination connectors.

### Building an M12 Field Termination Cable

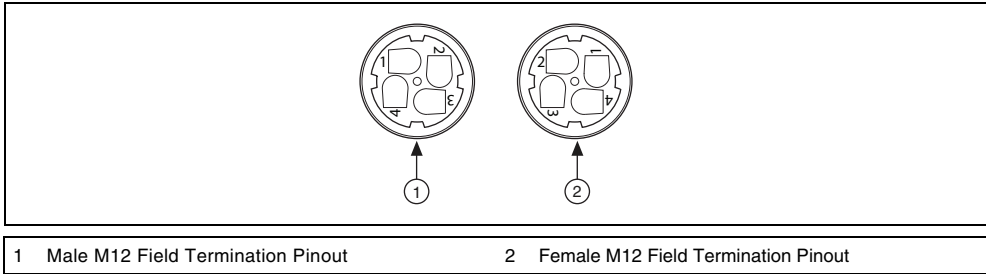
To build an M12 field termination cable with the connector included with the NI 9921/9922, refer to the following sections.

#### Female M12 Field Termination Cable

On the M12 power female field termination connector, connect the positive lead of the primary power supply to Pin 4 and the negative lead to Pin 3.



The pin number is marked on the inside of the field termination connector, next to the respective terminal, as shown in Figure 9.



**Figure 9.** Male and Female M12 Termination Connector Pinouts

### Male M12 Field Termination Cable

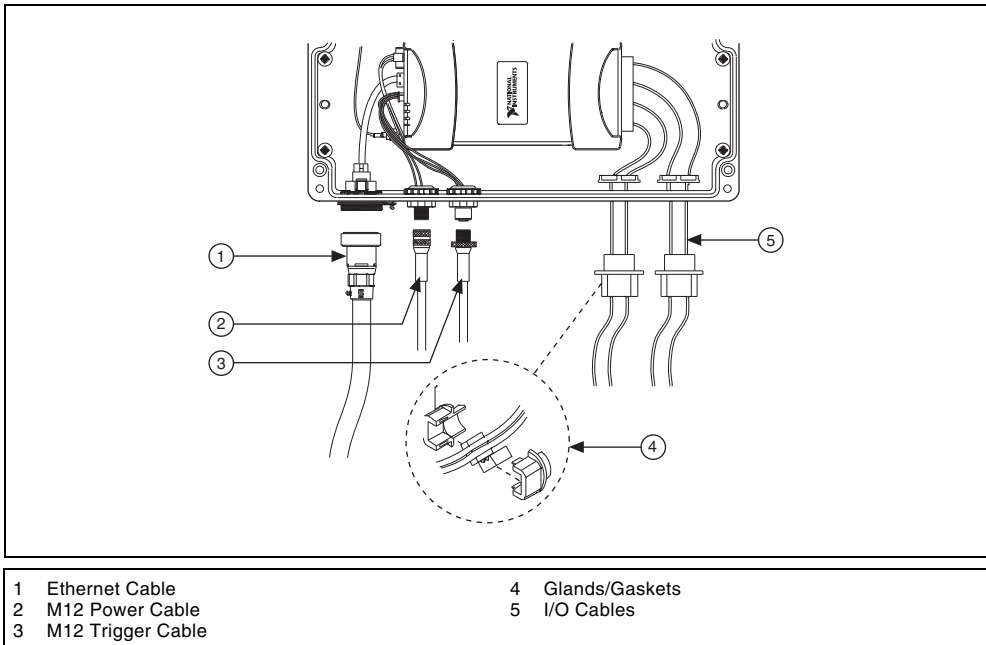
On the M12 Trigger male field termination connector, connect PFI 0 to the Pin 4, PFI 1 to Pin 2, and Ground to Pins 1 and 3.

The pin number is marked on the inside of the field termination connector, next to the respective terminal, as shown in Figure 9.

### Building an IP Rated RJ45 Cable

Refer to the *SCPFE Assembly/Wiring Instructions* document included in the field termination connector kit for instructions about how to build an IP rated Ethernet cable.

Refer to Figure 10 while completing the following steps to attach the external cables:



**Figure 10.** Connecting External Cables/Components

1. Connect external IP rated cables to the external Ethernet connector and the external M12 power and trigger connectors.
2. The two-piece gland system allows prefabricated cables to route I/O out of the NI 9921/9922. When the correct cable gland is selected, it meets a minimum IP rating of IP54. For more information about IP ratings, refer to the [Understanding IP Ratings](#) section. Glands with two holes route two cables at once. Blank glands are also provided, allowing for custom cable configuration.



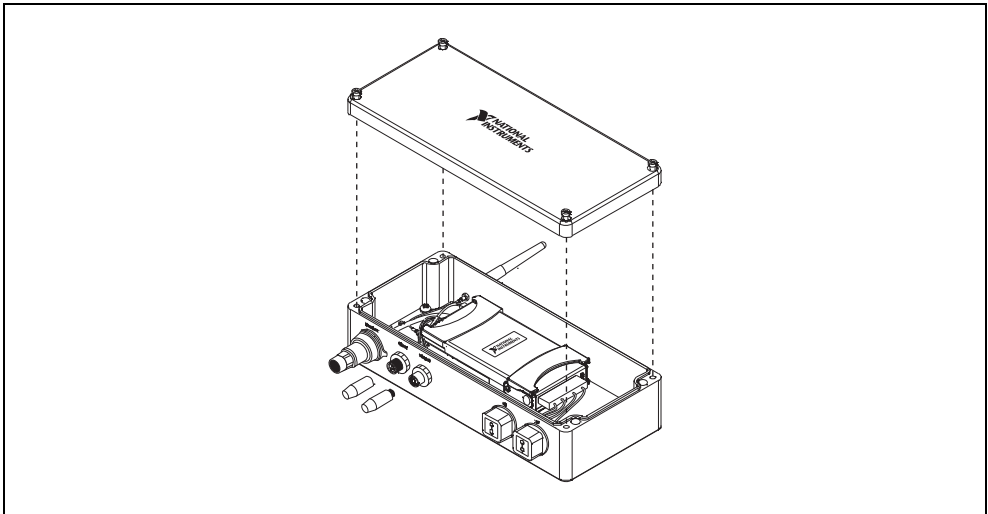
**Note** To ensure that the NI WSL-9000 Series device meets specified requirements, use one of the glands to route ground outside of the NI 9921/9922 outdoor IP enclosure.

To use the two-piece gland system, complete the following steps:

1. Choose the appropriately sized grommet for the cable diameter width. Blank plugs are provided for use with custom cable sizes.
2. Place the grommet around the cable.
3. Press the grommet containing cable into the open cable gland.
4. Press the two halves of the cable gland together until they lock together.
5. Place the provided seal over the thread and place the cable gland into the holes, as shown in Figure 10.
6. Secure the gland with the provided nut.

## Step 7: Attach the Cover

The cover of the NI 9921/9922 is equipped with captive screws. Use a #2 Phillips screwdriver to install the cover as shown in Figure 11.



**Figure 11.** Attaching the NI 9921/9922 Cover

## Understanding IP Ratings

Proper use and installation of an NI WLS-9000 Series device in an NI 9921/9922 outdoor IP enclosure provides a minimum IP rating of IP54 from harsh outdoor and industrial environments. An IP rating of IP54 protects against entry by dust particles and splashing water from all directions.

The two-digit ingress protection (IP) rating is defined by the IEC 60529 standard and specifies the degree to which the enclosures protect against the intrusion of solid particles (represented by the first digit) and water (represented by the second digit).

Table 2 lists the degree of protection.

**Table 2.** IP Ratings

First Number (Protection Against Solid Objects)		Second Number (Protection Against Water)	
0	No protection	0	No protection
1	Protects against objects greater than 50 mm	1	Protects against vertically dripping water
2	Protects against objects greater than 12.5 mm	2	Protects against direct sprays up to 15° from vertical
3	Protects against objects greater than 2.5 mm	3	Protects against direct sprays up to 60° from vertical
4	Protects against objects greater than 1 mm	4	Protects against direct sprays from all angles
5	Dust-protected (no harmful deposit)	5	Protects against low pressure water jets
6	Dust-tight	6	Protects against high pressure water jets
—	—	7	Immersible in water up to 1 m
—	—	8	Immersible in water beyond 1 m

## 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 *NI and the Environment* Web page at [ni.com/environment](http://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](http://ni.com/environment/weee).

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## Where to Go for Support

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The National Instruments Web site is your complete resource for technical support. At [ni.com/support](http://ni.com/support) you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at [ni.com/support](http://ni.com/support) and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

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Czech Republic 420 224 235 774, Denmark 45 45 76 26 00, Finland 358 (0) 9 725 72511,  
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