Modbus Plus Ruggedized Tap

990 NAD 230 10

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

Safety Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

CAUTION

CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

Introduction

To Our Customer

This device must be installed as specified in a network layout plan or similar diagram, showing the device's mounting location and cable connections. Improper installation can cause problems with the network operation. If you do not have a diagram showing the mounting location and cabling information, you should obtain one from your network administrator before proceeding with the installation.

NOTE: Ensure that **either** the port protector plug **or** the programming cable is securely installed at **all** times.

Tools You Will Need

You will need these tools:

- wire cutter to cut the cables and a wire stripper or knife to remove the cable outer jacket
- wire crimper to connect a lug to the shield drain wires of the drop cable
- socket for removing and reinstalling the 5/16" hex nut at the drain wire grounding post
- Phillips #2 or flat screwdriver with 1/4" (6 mm) blade for removing the tap's cover
- flat screwdriver with 1/8" (3 mm) blade for connecting wires at the screw terminals

Dimensions and Clearances

Figure 1 shows the tap's outer dimensions. When you plan the tap's location on a panel, be sure to allow sufficient clearances at the sides of the tap for installing your network cables.

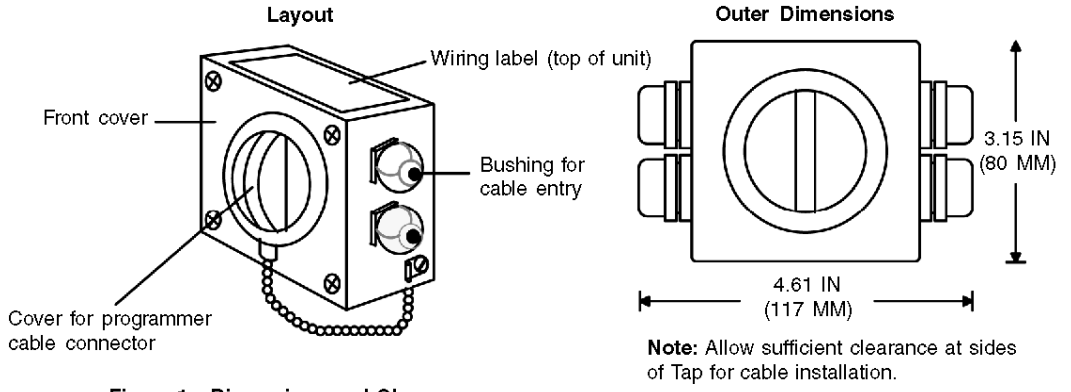


Figure 1 Dimensions and Clearances

Mounting the Tap on a Panel

Mounting from the Front of the Panel

Refer to Figure 2 for the tap's dimensions for front mounting. Drill two holes in the panel surface at the planned location for mounting the tap, using the dimensions shown in Figure 2. Loosen the tap's four corner screws, and open the front cover. The cover is retained by a chain and internal wiring (do not disconnect the cover or wiring). This will expose the two mounting holes inside the tap case.

The tap body has two internal holes of 3/16 in (5 mm) diameter, with a mounting depth of 11/16 in (18 mm). Mount the tap to the panel.

Mounting from the Rear of the Panel

Refer to Figure 2 for the tap's dimensions for rear mounting. Drill two holes in the panel surface at the planned location for mounting the tap, using the dimensions shown in Figure 2. It is not necessary to remove the tap's cover for rear mounting.

The tap has two rear surface holes tapped for M3 metric screws. The maximum allowable depth into the tap body is 3/8 in (10 mm). Mount the tap to the panel.

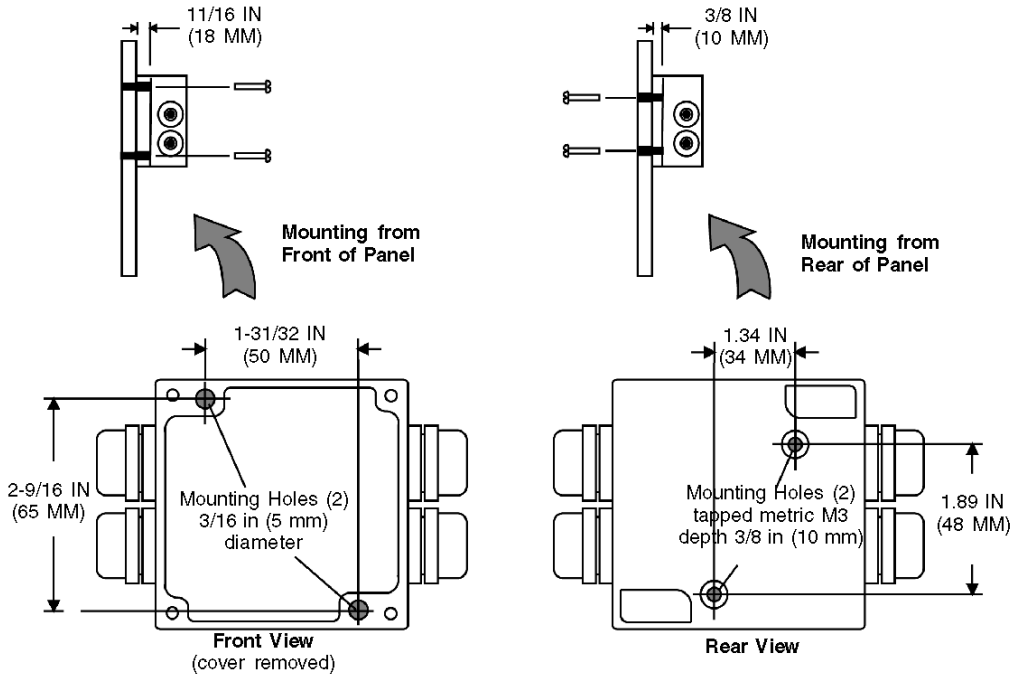


Figure 2 Mounting Methods

Identifying Trunk Cables at the Tap Site

Identifying the Inline Sites and End Sites

Before you connect the network trunk cable to your tap, you must know the kind of network site at which your tap is located. There are two kinds of network sites: *inline sites* and *end sites*.

End sites are always located at the two extreme ends of a cable section. Every other site is an inline site.

Figure 3 shows a typical network. Note the positions of end sites and inline sites.

Inline Site Connections (Two Trunk Cables): Note the inline sites in Figure 3. The tap at each inline site will have two trunk cables connected.

End Site Connections (One Trunk Cable plus Terminator): Note the end sites in Figure 3. The tap at each end site will have one trunk cable connected. A terminator (Schneider Automation part 990 NAD 230 11) *must* be installed into each tap at an end site. It *must not* be installed into taps at inline sites. In Figure 3, the taps marked **T** must have the terminator installed.

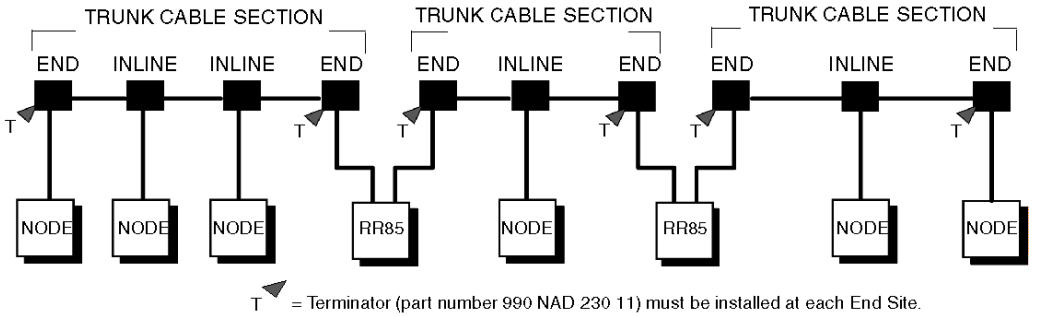


Figure 3 Identifying End Sites and Inline Sites

Identifying Trunk Cables at the Tap Site

Refer to Figure 3. Inline sites will have two trunk cables routed to the tap -- one cable from the previous tap, and one cable to the next tap. The two cables are not interchangeable. They must be connected to different terminals inside the tap.

Your network may have a single-cable layout (as shown in Figure 3), or it may have dual (redundant) cables.

Single-Cable Layouts: Inline sites have *one* tap. There will be two trunk cables routed to each inline site. There will be one trunk cable routed to each end site.

Dual-Cable Layouts: Each site will be have *two* taps. There will be four trunk cables routed to each inline site (two per tap). There will be two trunk cables routed to each end site (one per tap).

Labeling of Cables: Make sure that every cable routed to the tap site is labeled so you can identify it. If you do not have a network plan showing the cable routing to your tap or if your cables are not properly labeled, you should not continue with the installation until you obtain this information.

Overview of the Wiring Connections

Locate the Wiring Terminals

- Loosen the tap's four corner screws, and open the cover. The cover is retained by a chain and internal wiring (do not disconnect the cover or wiring). This will expose the circuit board and wiring terminals inside the tap.
- Pull the circuit board out from the tap slightly. Locate the four wiring terminals: TB1, TB2, TB3, and TB4.
- Also locate the grounding post XG1 for the drop cable's drain wires.

Figure 4 shows the terminal locations.

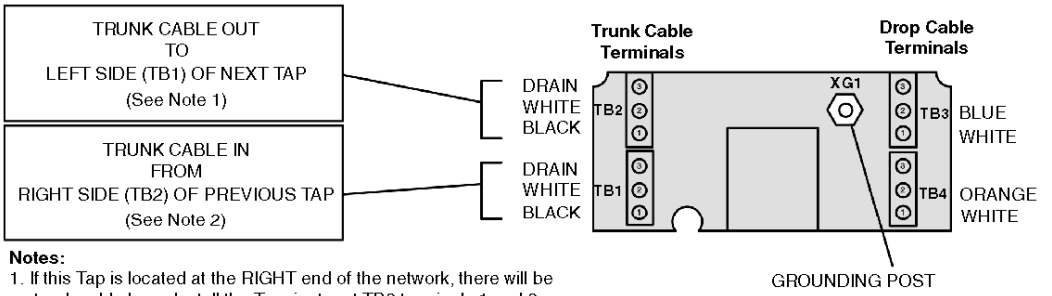


Figure 4 Wiring Terminal Locations

At Inline Sites:

Two trunk cables will be routed to the tap. The taps must be connected in series. The cable from the *right side* of the previous tap must connect to the *left side* of this tap. The cable from the *right side* of this tap must connect to the *left side* of the next tap. There must be no terminator in the tap.

At End Sites:

One trunk cable will be routed to the tap. It may be either from the ***right side*** of the previous tap or to the ***left side*** of the next tap. A terminator must be installed and connected in the tap.

Inserting Cables:

The tap has four bushings for inserting the cables or terminator. Each bushing has a cap, internal moisture seal, and retainer clip. Remove the cap. Insert the item through the cap, then through the moisture shield, and then through the retainer clip.

Figure 5 shows the method of insertion.

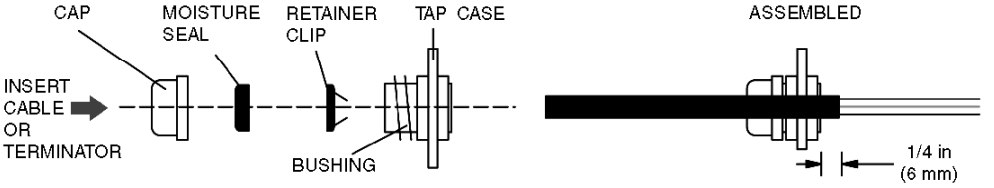
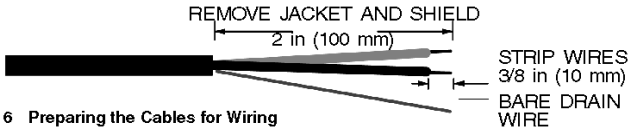


Figure 5 Method of Insertion into Tap Bushings

Connecting the Cables

Connecting the Cables

The following table outlines the steps to connect the cables.

Step	Action
1	**Insert the cables into the bushings.** First, insert all of the cables through their correct bushings into the tap. Also insert the terminator if it will be used at this tap site. Make sure you are using the correct bushing for each item. • Refer to Figure 7 to locate the bushings for the trunk cable and terminator. • Refer to Figure 8 to locate the bushing for the drop cable. Insert the cables through the bushings to a depth of approximately 4 in (100 mm) inside the tap. This will give you enough length for connecting the wires. Do not tighten the caps on the bushings yet.
2	**Prepare the cables for wiring.** Remove the jacket and shield to a length of approximately 2 in (50 mm). The length does not have to be exact. Next, strip each wire and remove its insulation to a length of approximately 3/8 in (10 mm).  **Figure 6 Preparing the Cables for Wiring**

Step	Action
3	**Connect the trunk cable wires and terminator (refer to figure 7).** The trunk cable contains a white wire, a black wire, and a bare drain wire. Connect the wires as shown in Figure 7. If a terminator is used at this tap site, insert it and connect its wires as shown in Figure 7.
4	**Connect the drop cable signal wires (refer to figure 8).** The drop cable contains two sets of twisted-pair signal wires with separate drain wires. It also has an outer shield drain wire. This is a total of seven wires. Note the wire colors. One set of wires in colored white and orange, with a bare drain wire. The other set is white and blue, with a bare drain wire. Before connecting the wires, make sure you identify the two sets of wires. The two white wires are not interchangeable. When you connect the wires, you must connect each wire to its correct terminal. Connect the wires as shown in Figure 8.
5	**Connect the drop cable drain wires (refer to figure 9).** There are three bare drain wires in the drop cable. Twist the drain wires together, and crimp the grounding lug on them. Connect the lug to the grounding post as shown in Figure 9.
6	**Finish the installation.** After you have connected the wiring, insert the circuit board back into the tap. As you do this, pull each cable back through its bushing until approximately 1/4 in (6 mm) of the cable's outer jacket remains inside the tap. Then tighten each bushing's cap to secure the cable. Dress the wiring neatly, making sure the bare drain wires do not touch any part of the circuit board. Reinstall the tap cover.

Connecting the Trunk Cable Wires and Terminator

Tap Site Figures

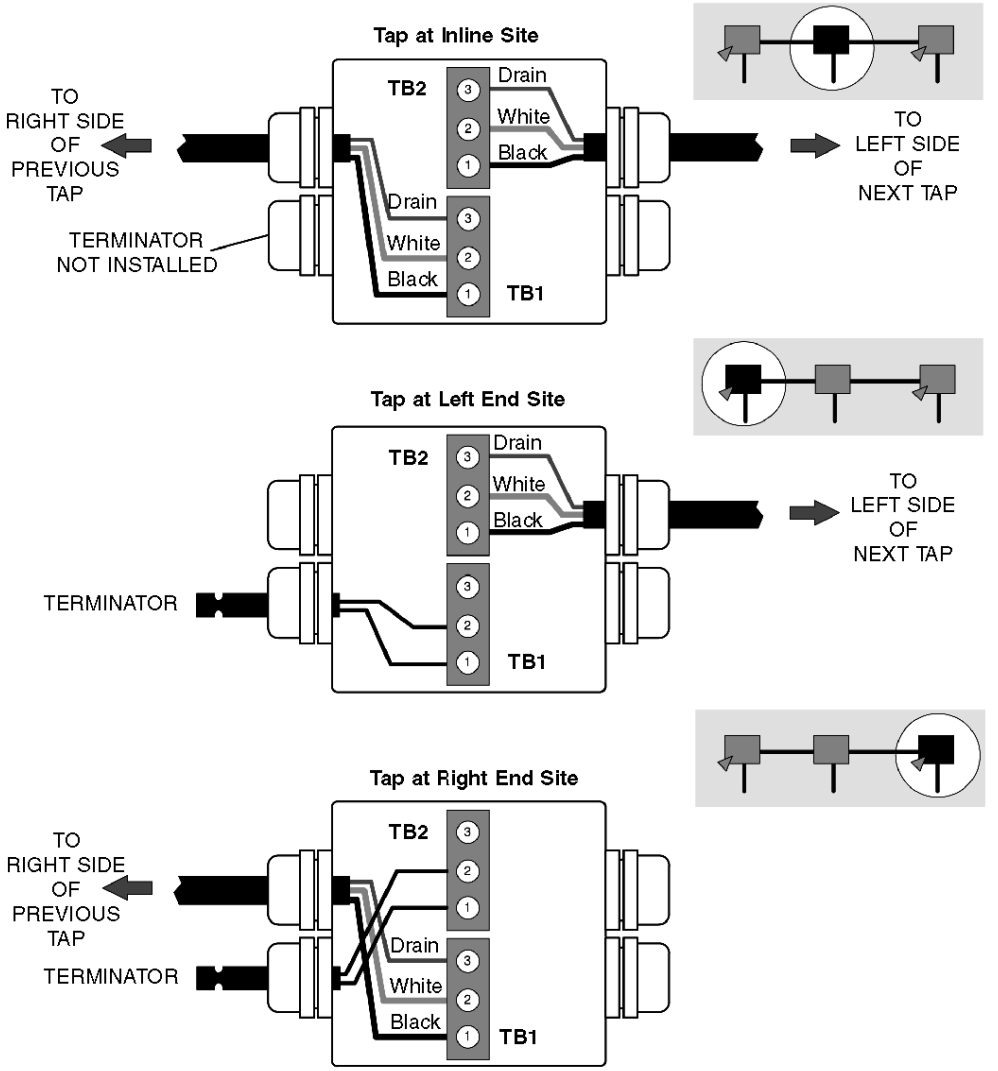


Figure 7 Connecting the Trunk Cable Wires and Terminator

Connecting the Drop Cable Signal Wires

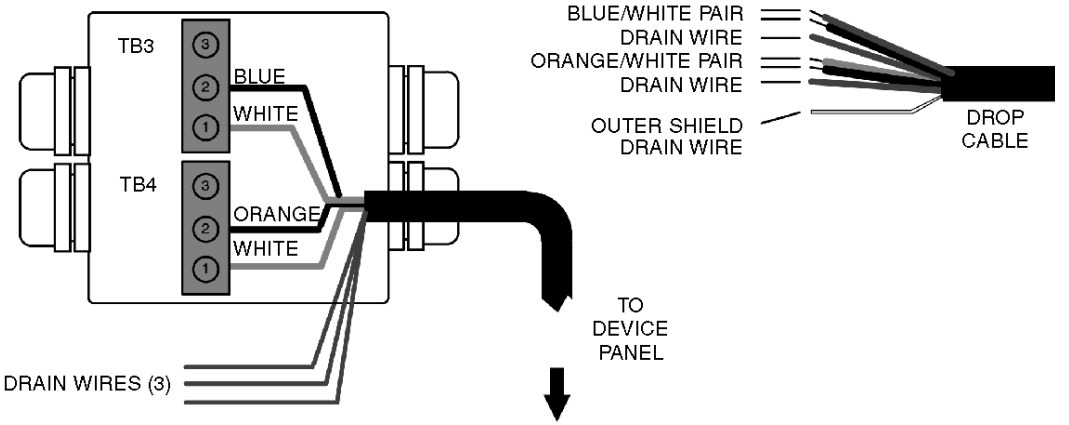


Figure 8 Connecting the Drop Cable Signal Wires

Connecting the Drop Cable Drain Wires

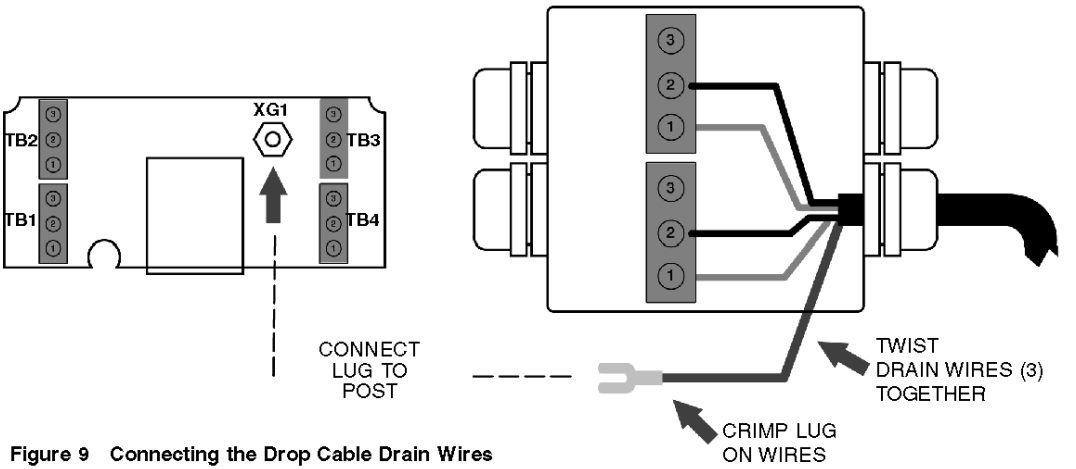


Figure 9 Connecting the Drop Cable Drain Wires

Grounding the Drop Cable at the Device Panel

Overview

Modbus Plus network drop cables require a ground connection to the backplane or panel ground point at the networked device location. The connection is made by means of a metal loop clamp that secures the cable shield to the ground point.

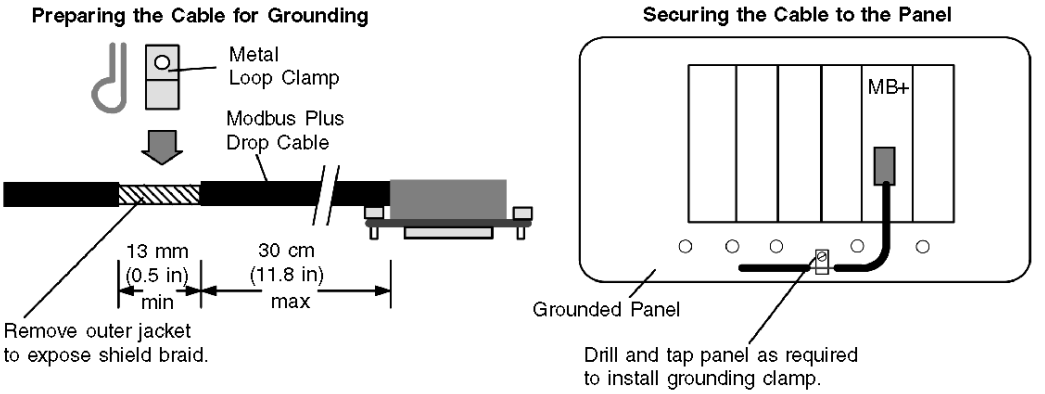


Figure 10 Grounding the Drop Cable at the Device Panel

Preparing the Cable for Grounding

Figure 10 shows how to prepare the drop cable for grounding.

Before stripping the cable's outer jacket, determine the distance from the cable's end connector to the intended ground point on your backplane or panel. This distance will depend on the location of the networked device and the available panel locations for ground points. The maximum allowable distance from the ground point to the cable's end connector is 11.8 in (30 cm).

Remove 0.5 - 1 in (13 - 25 mm) of the cable's outer jacket to expose the shield braid as shown in Figure 10. Install the loop clamp on the shield braid.

Securing the Cable to the Panel

Figure 10 shows how to secure the cable to the panel.

If the panel has a suitable ground point for mounting the cable clamp, install the clamp at that point. Otherwise, drill and tap the panel surface as required to install the clamp. Secure the clamp and cable to the panel.

Connecting a Programming Cable

Overview

A programming device can be connected to the tap to facilitate monitoring and maintenance of the network. The tap has a connector for that purpose, located behind a removable cover on its front panel.

A programming cable is available separately as Schneider Automation part 990 NAA 215 10. It is not included with the tap package.

⚠ CAUTION

NETWORK COMMUNICATION

Before you connect or disconnect any device on an active network, you must be aware of its effect on the communication between your existing devices. The new device's network address must be different from all the other addresses. In addition, the network communication may be disrupted for up to 15 seconds while the network reconfigures itself for the new device. Contact your network administrator to make sure that your application will not be affected.

Failure to follow these instructions can result in injury or equipment damage.

Figure 11 shows how to connect the programming cable. Read the Caution above before making a connection.

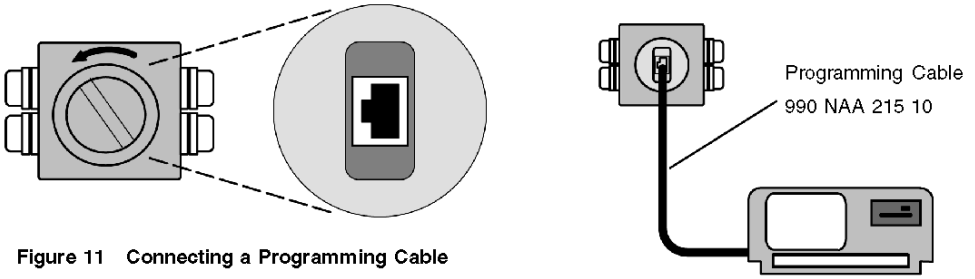


Figure 11 Connecting a Programming Cable

Figure 12 shows the programming cable, 990 NAA 215 10, in more detail.

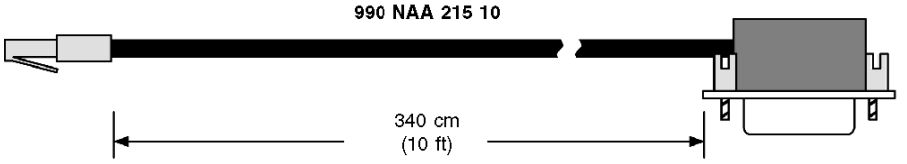


Figure 12 Detail: Programming Cable (990 NAA 215 10)