



Preterminated Fiber-Optic Cables and Splice Connector

(Cat. No 1771-PT1, -PT2, -PT3, -PT4, -CPR)

Product Data

Introduction

This data sheet describes:

- the fiber-optic cables available from Allen-Bradley
- how to install the cables in a PLC-2 and PLC-3 system

Cable Description

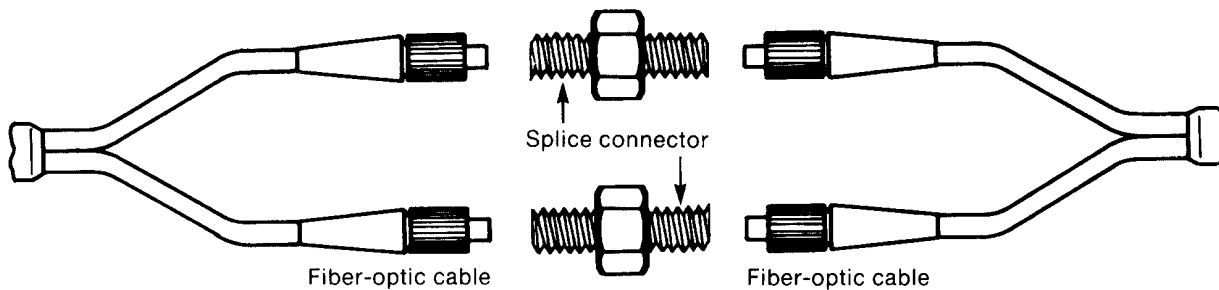
Indoor-rated duplex fiber-optic cables are available from Allen-Bradley in four (4) lengths. You use these preterminated and pretested cables to interconnect 1771-AF fiber-optic converter modules into a complete fiber-optic link. The following table lists these cable assemblies and their catalog numbers:

Cat. No.	Cable Length
1771-PT1	30 Meters (98 Feet)
1771-PT2	75 Meters (246 Feet)
1771-PT3	150 Meters (492 Feet)
1771-PT4	300 Meters (984 Feet)

Splice Connector Description

The Allen-Bradley Splice Connector, (cat. no. 1771-CPR), allows you to connect (**at maximum**) two preterminated fiberoptic cables together. Refer to figure 1. You must use two (2) splice connectors for each duplex fiber-optic cable splice. You can calculate the dB loss of each splice connector by adding the losses of both cable terminations.

Figure 1
Splice Connector



13398

To install the splice connector, simply screw the SMA-style cable connectors into the splice connector until seated. Hold the cable body while tightening the connector. Be sure you do not kink the cable during installation in order to avoid cracking the fiber core.

Important: Exercise special care in calculating the dB loss budget when using splice connectors. These connectors increase the fiber-optic link's dB losses. Refer to the Fiber-Optic Converter Module User's Manual, publication 1771-6.5.36.

Cable Location

You can route fiber cables in the same conduits and wireways that contain conventional wiring. Consult the current edition of the National Electrical Code. Article 770 covers the installation of fiber-optic cables with electrical conductors.

Fiber cables are dielectric. They are non-conductive and are not affected by electromagnetic signals emitted from conventional wire cables. Below are some general physical installation guidelines to follow:

- Do not install the cable where objects may drop and crush it.
- Place **underground-rated** cable in polyethylene or PVC conduit if the installation is underground. Be sure the inside diameter of the pipe is at least four times larger than the outside diameter of the cable.
- Be sure **aerial-rated** cable can support its own weight and any additional weight imposed by wind, ice, or snow. Use a messenger cable if necessary. Follow the manufacturer's hanging guidelines.
- Secure the cable every six feet (minimum) during long vertical runs. The clamp bushings should be constructed of a soft material, such as plastic or rubber.

Cable in Ducts

Observe the following guidelines when you install fiber cable in ventilation ducts:

- Do not place fiber cables in ventilation ducts unless the cables are **plenum-rated**.
- Be sure there are no sharp edges in any ductwork that could cut the cable.
- Be sure that other heavy wire cables in the ducts do not exceed the maximum crush resistance of the fiber.

Cable in Conduit

The following guidelines apply when you install fiber cables in conduit:

- Be sure bends in the conduit do not cause the fiber cable to exceed its minimum bend radius.
- Use corner elbow fittings for right-angle bends, such as Crouse-Hinds elbows (type BUB) of the Mogul series or equivalent. These fittings reduce the amount of stress applied to the fiber when pulling cable. Be sure the cable does not kink as you pull it.



CAUTION: Do not pull a fiber cable that contains a splice connector through conduit. The splice connector will separate during installation. Cables that contain a splice connector are intended solely for "lay-in" wire tray installation and repairs.

- Place pull boxes every 200-300 feet to reduce the amount of cable that needs to be pulled at any one time.
- Use pull boxes if the conduit makes several bends which total more than 180°.
- Pull box openings should be at least four times the minimum bend radius of the cable.
- Refer to the current edition of the National Electrical Code for the appropriate article covering cable installation in conduit.

Cable Pulling Guidelines

Pulling fiber cable is similar to pulling conventional copper wire cable. There are two factors, however, which you must consider: fiber-optic tensile strength and minimum bend radius.

Fiber cable has a lower tensile strength than copper wire cable of the same outer diameter (i.e. you cannot exert the same pulling force on a fiber cable as you can on a copper wire cable). Too much fiber cable stretching can cause increased attenuation. You can also cause the fiber-optic connectors to separate from the cable.

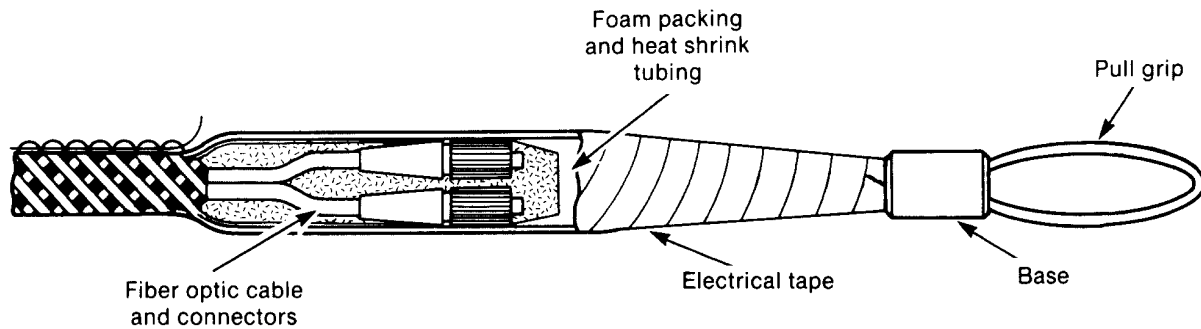


CAUTION: A fiber-optic splice connector is designed to optically connect two fiber-optic cables. The connector cannot withstand the tensile load of a cable “pull in” installation. Do not install a fiber-optic cable that contains a splice the way you would a one-piece cable. Spliced cables are intended solely for “lay-in” installation.

The fiber cable’s minimum bend radius is the smallest radius the cable can accommodate without being damaged. Straining a cable beyond its minimum bend radius may permanently damage it.

To reliably pull a pre-terminated fiber cable, you must attach the cable to a pulling device that protects the fiber-optic connectors. Refer to figure 2. Use the following procedure:

Figure 2
Typical Preterminated Fiber-Optic Cable Pulling Grip



13397

Kellems Fiber-Optic Pulling Grip

Harvey Hubbel Inc.
Kellems Division
Route 1, Lords Hill
Stonington, CT 06278
203-535-1250

1. Place the cable in the braided portion of the pulling device, either a Kellems Fiber-Optic Pull Grip or equivalent. Leave the cable connectors and approximately four to six (4-6) inches of cable extending beyond the braid.
2. Using the attached needle and cord, enclose the cable with the braid by lacing it.
3. Wrap the cable connectors with foam packing material or equivalent. Leave the dust cover caps on the cable connectors.
4. Position a piece of heat-strink tubing over the connectors. Heat the tubing with a hot-air gun.
5. Using electrical tape and beginning at the base, spirally overwrap the pull grip where the fiber cable connectors protrude. Be sure you cover the fiber-optic connectors completely.
6. Lubricate the cable with conventional cable lubricant.
7. Monitor the cable tensile force while pulling the cable.

8. When the cable enters a pull box at an angle, use at least a 12-inch pulley if the cable is under tension. If the cable is not under tension, use at least a four-inch pulley.
9. As you pull cable from a pull box, coil it in a figure-eight with one-foot loops. This helps prevent the cable from twisting as you continue pulling.

Connecting Cables to the Fiber-Optic Module

To connect the fiber-optic cables to the 1771-AF module, refer to figures 3 and 4. Use the following procedure:

- Remove the dust cover caps from the module's fiber ports. (Do not discard the dust cover caps. They are required for module storage and shipment.)
- Remove the dust covers from the ends of the cable. (Do not discard the cable dust cover caps.)

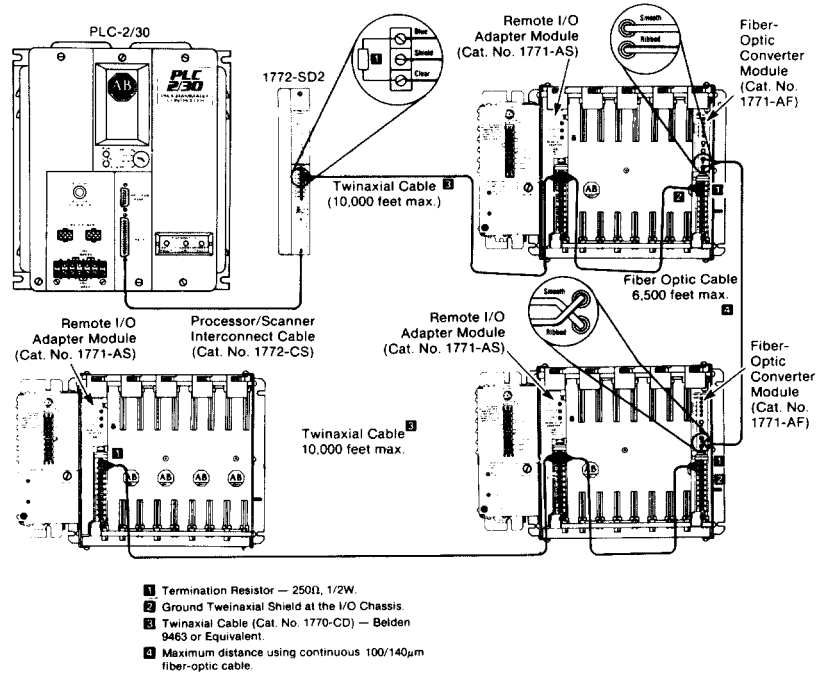
Important: Do not scratch the ends of the cable by touching them or dropping them on hard surfaces. Also, do not use factory compressed air to clean the transmitter/receiver ports. Contaminants in the air can scratch or cloud the ports.

- Attach the cable to the modules by screwing the cable connectors onto the appropriate fiber port. Hold the cable body while tightening the connector. Be sure you do not kink the cable during installation so the fiber core does not crack. Note that during installation you must criss-cross one end of the fiber cable leads as shown in figures 3 and 4.



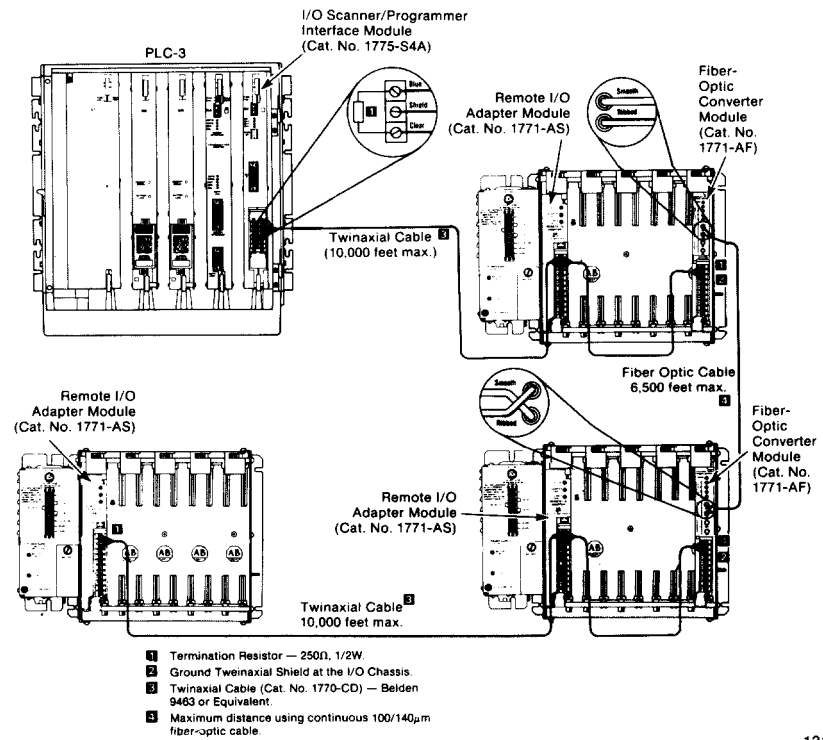
WARNING: Never look into the ends of an active fiber-optic cable or the fiber-optic module transmitters. Harmful optical radiation may be present. Permanent eye damage could result. Use a fiber-optic power meter to determine if a signal is present.

Figure 3
Typical PLC-2 Fiber-Optic Installation



13190

Figure 4
Typical PLC-3 Fiber-Optic Installation

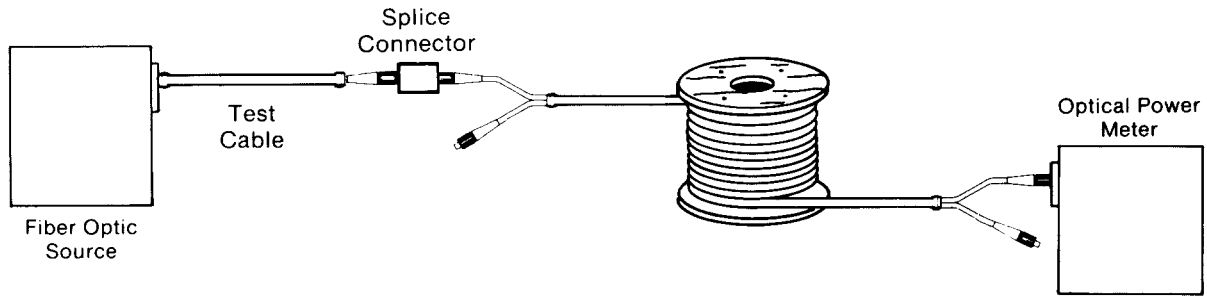


13191

Fiber-Optic Cable Loss Test

This test allows you to measure the amount of optical loss in the cable. To test preterminated cables you will need an optical power source and power meter along with a fiber-optic test cable. (Refer to figure 5.)

Figure 5
Fiber-Optic Cable Loss Test



13396

Use this procedure to test the cable:

1. Attach one end of the test cable to the fiber-optic power source.



WARNING: Never look into the ends of an active fiber-optic cable or the fiber-optic module transmitters. Harmful optical radiation may be present. Permanent eye damage could result. Use a fiber-optic power meter to determine if a signal is present.

2. Attach the other end of the test cable to the optical power meter.
3. Adjust the source power until the optical power meter registers 0 dBu.
4. Turn the fiber-optic source off.
5. Disconnect the test cable from the optical power meter.
6. Use a fiber-optic splice connector to connect one end of the preterminated cable to the test cable.
7. Connect the other end of the preterminated cable to the optical power meter.
8. Turn the fiber-optic source on and read the optical power in dBu. This value is the optical loss of the cable.
9. Turn the fiber optic source off.

10. Repeat steps 5 through 8 for the preterminated cable's other fiber.

Both fibers must have low loss connections for proper fiber-optic communication. If the cable loss is higher than expected, the cause may be a break in the cable or a lossy connection.

Related Publications

For additional information on Allen-Bradley's fiber-optic products, refer to the following publications:

- Fiber-Optic Converter Module Product Data Sheet Publication 1771-2.90
- Fiber-Optic Converter Module User's Manual Publication 1771-6.5.36

Specifications

Core Diameter

- 100 μ m

Cladding Diameter

- 140 μ m

Number of Fibers

- 2

Termination Connector Style

- SMA-905 Screw-Type

Strength Member

- Kevlar

Bandwidth @ 850nm

- 100 MHz-Km

Numerical Aperture (NA)

- 0.29

Jacket Material

- PVC

Cable Configuration

- Tight Buffer

Outside Cable Diameter

- 4 x 7 mm (0.157 x 0.275 in)

Weight

- 26.5 Kg/Km (17.7 lbs/1,000 ft)

Installation Tensile Load

- 1000 N (224.8 lbs)

Tensile Load

- 300 N (67.4 lbs)

Minimum Bend Radius (No Load)

- 3 Cm (1.182 in)

Crush Resistance

- 220 N/Cm (250 lbs/ft)

Impact Resistance

- 2.5 N/M (1.845 ft/lbs)

Storage Temperature

- -40 to +80° C
(-40 to + 176° F)

Operating Temperature

- -20 to +70° C
(-4 to + 158° F)

Flex and Twist Resistance (5 cm Radius)

- 2000 Cycles

Attenuation @ 850nm

- 5 dB/Km



ALLEN-BRADLEY
A ROCKWELL INTERNATIONAL COMPANY

As a subsidiary of Rockwell International, one of the world's largest technology companies — Allen-Bradley meets today's challenges of industrial automation with over 85 years of practical plant-floor experience. More than 11,000 employees throughout the world design, manufacture and apply a wide range of control and automation products and supporting services to help our customers continuously improve quality, productivity and time to market. These products and services not only control individual machines but integrate the manufacturing process, while providing access to vital plant floor data that can be used to support decision-making throughout the enterprise.

With offices in major cities worldwide

**WORLD
HEADQUARTERS**

Allen-Bradley
1201 South Second Street
Milwaukee, WI 53204 USA
Tel: (1) 414 382-2000
Telex: 43 11 016
FAX: (1) 414 382-4444

**EUROPE/MIDDLE
EAST/AFRICA
HEADQUARTERS**

Allen-Bradley Europe B.V.
Amsterdamseweg 15
1422 AC Uithoorn
The Netherlands
Tel: (31) 2975/43500
Telex: (844) 18042
FAX: (31) 2975/60222

**ASIA/PACIFIC
HEADQUARTERS**

Allen-Bradley (Hong Kong)
Limited
Room 1006, Block B, Sea
View Estate
28 Watson Road
Hong Kong
Tel: (852) 887-4788
Telex: (780) 64347
FAX: (852) 510-9436

**CANADA
HEADQUARTERS**

Allen-Bradley Canada
Limited
135 Dundas Street
Cambridge, Ontario N1R
5X1
Canada
Tel: (1) 519 623-1810
FAX: (1) 519 623-8930

**LATIN AMERICA
HEADQUARTERS**

Allen-Bradley
1201 South Second Street
Milwaukee, WI 53204 USA
Tel: (1) 414 382-2000
Telex: 43 11 016
FAX: (1) 414 382-2400