FOXCOM

Complete RF-2-Fiber Solutions

4003 / 4005 System Outdoor Unit
Interfacility Link
Installation and User's Guide

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Foxcom Inc.
Princeton Forrestal Village
136 Main Street Suite 300
Princeton, NJ 08540
USA

Tel: 609-514-1800
Toll free: 1-866-ONEPATH
Fax: 609-514-1881

Foxcom Ltd.
Beck Science Center
8 Hartom Street, Har Hotzvim
P.O.Box 45092
Jerusalem 91450
Israel

Tel: +972-2-589-9888
Fax: +972-2-589-9898

Website: www.foxcom.com
e-mail: sales@foxcom.com

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Warranty and Repair Policy

Foxcom performs testing and inspection to verify the quality and reliability of our products. Foxcom uses every reasonable precaution to ensure that each unit meets specifications before shipment. Customers are asked to advise their incoming inspection, assembly, and test personnel as to the precautions required in handling and testing our products. Many of these precautions are to be found in this manual.

The products are covered by the following warranties:

General Warranty

Foxcom warrants to the original purchaser all standard products sold by Foxcom to be free of defects in material and workmanship for 24 months from date of shipment from Foxcom. During the warranty period, Foxcom will repair or replace any product that Foxcom proves to be defective. This warranty does not apply to any product which has been subject to alteration, abuse, improper installation or application, accident, electrical or environmental over-stress, negligence in use, storage, transportation or handling.

Specific Product Warranty Instructions

All Foxcom products are warranted against defects in workmanship, materials and construction, and to no further extent. Any claim for repair or replacement of units found to be defective on incoming inspection by a customer must be made within 30 days of receipt of shipment, or within 30 days of discovery of a defect within the warranty period.

This warranty is the only warranty made by Foxcom and is in lieu of all other warranties, expressed or implied. Foxcom sales agents or representatives are not authorized to make commitments on warranty returns.

Returns

In the event that it is necessary to return any product against above warranty, the following procedure shall be followed:

1. Return authorization is to be received from Foxcom prior to returning any unit. Advise Foxcom of the model, serial number, and discrepancy. The unit may then be forwarded to Foxcom, transportation prepaid. Devices returned collect or without authorization may not be accepted.
2. Prior to repair, Foxcom will advise the customer of our test results and any charges for repairing customer-caused problems or out-of-warranty conditions etc.
3. Repaired products are warranted for the balance of the original warranty period, or at least 90 days from date of shipment.

Limitations of Liabilities

Foxcom's liability on any claim, of any kind, including negligence for any loss or damage arising from, connected with, or resulting from the purchase order, contract, quotation, or from the performance or breach thereof, or from the design, manufacture, sale, delivery, installation, inspection, operation or use of any equipment covered by or furnished under this contact, shall in no case exceed the purchase price of the device which gives rise to the claim.

EXCEPT AS EXPRESSLY PROVIDED HEREIN, FOXCOM MAKES NO WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO ANY GOODS, PARTS AND SERVICES PROVIDED IN CONNECTION WITH THIS AGREEMENT INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. FOXCOM SHALL NOT BE LIABLE FOR ANY OTHER DAMAGE INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH FURNISHING OF GOODS, PARTS AND SERVICE HEREUNDER, OR THE PERFORMANCE, USE OF, OR INABILITY TO USE THE GOODS, PARTS AND SERVICE.

The Company's exclusive warranty and the remedy provided for breach thereof shall not apply to:

1. Any Product used or operated other than pursuant to the Company's written instructions,
2. Damage or deficiencies resulting from accident, alteration, modification, mis-use, tampering, negligence, improper maintenance, installation or abuse,
3. Use of any Product other than at the Installation Site,
4. Use of any Product that is defective or damaged due to misuse, accident, or neglect, or due to external electrical stress, lightning or other acts of nature,
5. Use of any Product by a person who is not any authorized employee of the Customer, or
6. Used other than as explicitly authorized in writing by the Company.

Reporting Defects

The units were inspected before shipment and found to be free of mechanical and electrical defects.

Examine the units for any damage which may have been caused in transit. If damage is discovered, file a claim with the freight carrier immediately. Notify Foxcom as soon as possible.

Note Keep all packing material until you have completed the inspection.

Precautions

Personal Safety

OPTICAL RADIATION

Applying power to the transmitter unit will create a laser energy source operating in Class I as defined by IEC 825-1. Use either an infrared viewer, optical power meter or fluorescent screen for optical output verification.

AC POWER HAZARD

The rackmount power supply line is EMI filtered. The chassis is connected to earth ground in compliance with safety requirements. Always use the 3-prong AC plug with earth ground to avoid possibility of electrical shock hazard to personnel.

GROUNDING

See **Figure 2 4003 ODU Connectors** on page 3 for the location of the ODU's main grounding point. Do not attempt to install the ODU before grounding the unit at this point.

The unit should be installed according to NEC/CEC.

Equipment Safety

To avoid damaging your product, please observe the following:

1. The transmitter input and receiver output are DC coupled and can withstand the bias from a satellite receiver. Do not exceed 25V DC bias.

2. The input of the outdoor unit transmitter (L-Band uplink) and may have an optional built-in bias for inserting DC power up the coax to the LNB. Make certain any equipment or test equipment connected to the transmitter input can withstand this bias.
3. Do not allow any dirt or foreign material to get into the optical connector bulk-heads. This may cause damage to the polished optical connector end faces.
4. The optical fiber jumper cable bend radius is 3 cm. Smaller radii can cause excessive optical loss and/or fiber breakage.
5. If multiple transmitters are installed in the chassis allow sufficient room for adequate ventilation; otherwise the units may overheat causing possible safety hazard or equipment damage.
6. Make sure the unit is grounded!
7. When several units are installed on one 7180M chassis, ensure that the total units' current (including any LNB bias) does not exceed 6A.

1 Introduction to the 4003 / 4005 ODU System Interfacility Link

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The Sat-Light™ 4003/4005 Series Outdoor Unit is a outdoor enclosure providing IP64 protection for Foxcom Sat-Light Interfacility Links. The ODU, a compact mounted unit, allows the integration of any combination of four Sat-Light components. For example four transmitters, four receivers, a combination of both, can be installed. Units from different links canbe installed in the same ODU. In addition, serial data transceivers or 10 MHz reference signal links can be installed along with the links.

Optional: For redundant links a Model 2040 1:1 switch can also be included. The switch utilizes internal switching logic which can be configured to detect loss of optical and/or RF signal, registering a fault.

When configured with transmitters in a downlink application both satellite polarities can be accommodated. In an uplink configuration an ODU mounted near the antenna, holding several receivers, can feed a standalone up-converter, block up converter, or transceiver. The 4003/4005 series ODU can also be configured as a transceiver for VSAT applications.

Most product options offer manual gain control (MGC). MGC ensures maintenance of a unity gain on the fiber optic link under the user defined design requirements. The ODU contains an internal power supply sufficient for any combination of transmitters and receivers chosen. Prime power to the ODU is via a weather tight connector from a AC or DC power supply. A LED indicator showing operational status is provided on the ODU. Internal LNB power selection and monitoring and alarms are available. The molded cast housing provides protection of the internal components from the ambient weather conditions.

1.1 System Components

The 4003 / 4005 ODU can integrate:

RF cards:

7210DT/R, 7830T/R, 7830DT/R, 7870T/R, 7290T/R, 7320T/R, 7410T/R, 7225T/R, 7225HT/R, 7490T/R, 7310T/R, 7310DT/R

Data Cards

7050-1, 7050-2,7050-3

Accessories

2040, 2100

Passive accessories

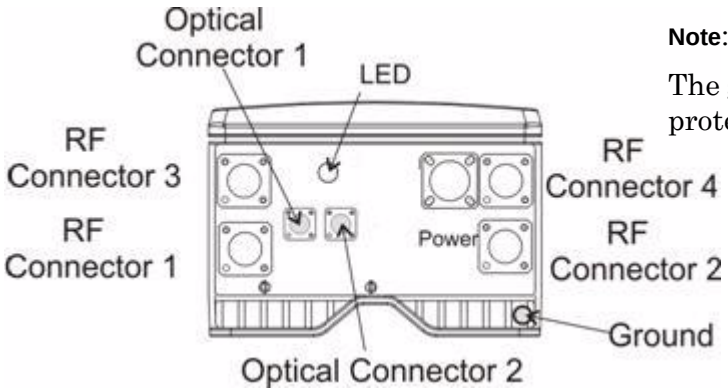
22012, 21012, 23012, 24012

The 4003 / 4005 ODU can be ordered with the following options:

-2PS (two power supply), -WDM (internal WDM), -XD1310(1310 DFB upgrade), -XD1550(1550nm DFB upgrade), F13LNB-X(fix 13V LNB to card X), F18LNB-X(fix 18V LNB to card X), -OR(optical and RF monitoring for 2040), -Cream (4004 cream color upgrade), -Olive(4003/4005 Olive color upgrade)

1.2 Product Drawings

Figure 1 4003 / 4005 ODU Unit[1]



Note:

The grounding point is earth protective.

Figure 2 4003 ODU Connectors

Figure 3 Protective Earth Grounding Point

1. With F-connectors

Figure 4 Installation Groove and ID Plate

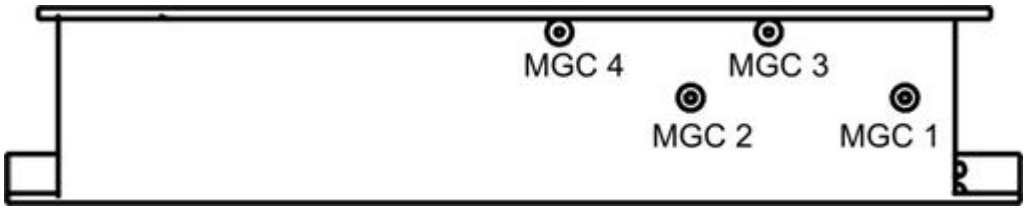


Figure 5 ODU MGC Potentiometers

Note *Not all SatLight modules feature MGC. If the ODU is equipped with a transmitter which does not feature MGC, the corresponding potentiometer will not function.*

1.3 Typical System Architectures

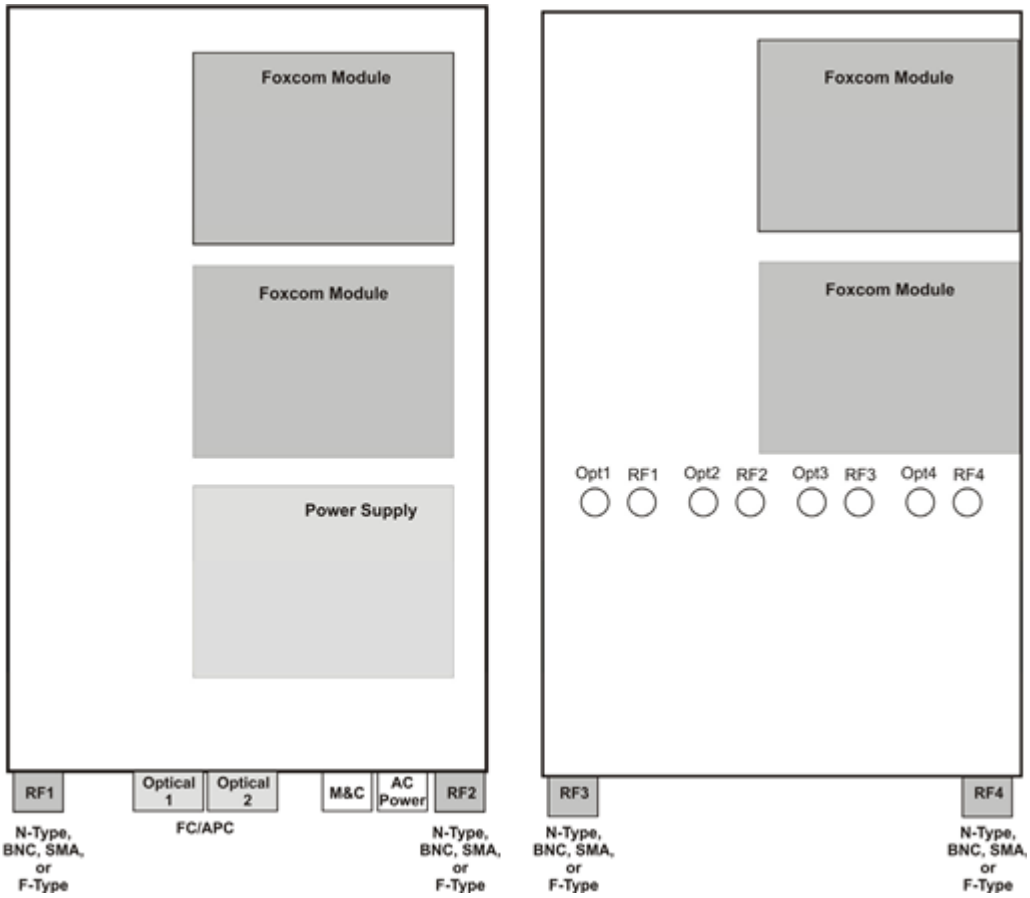
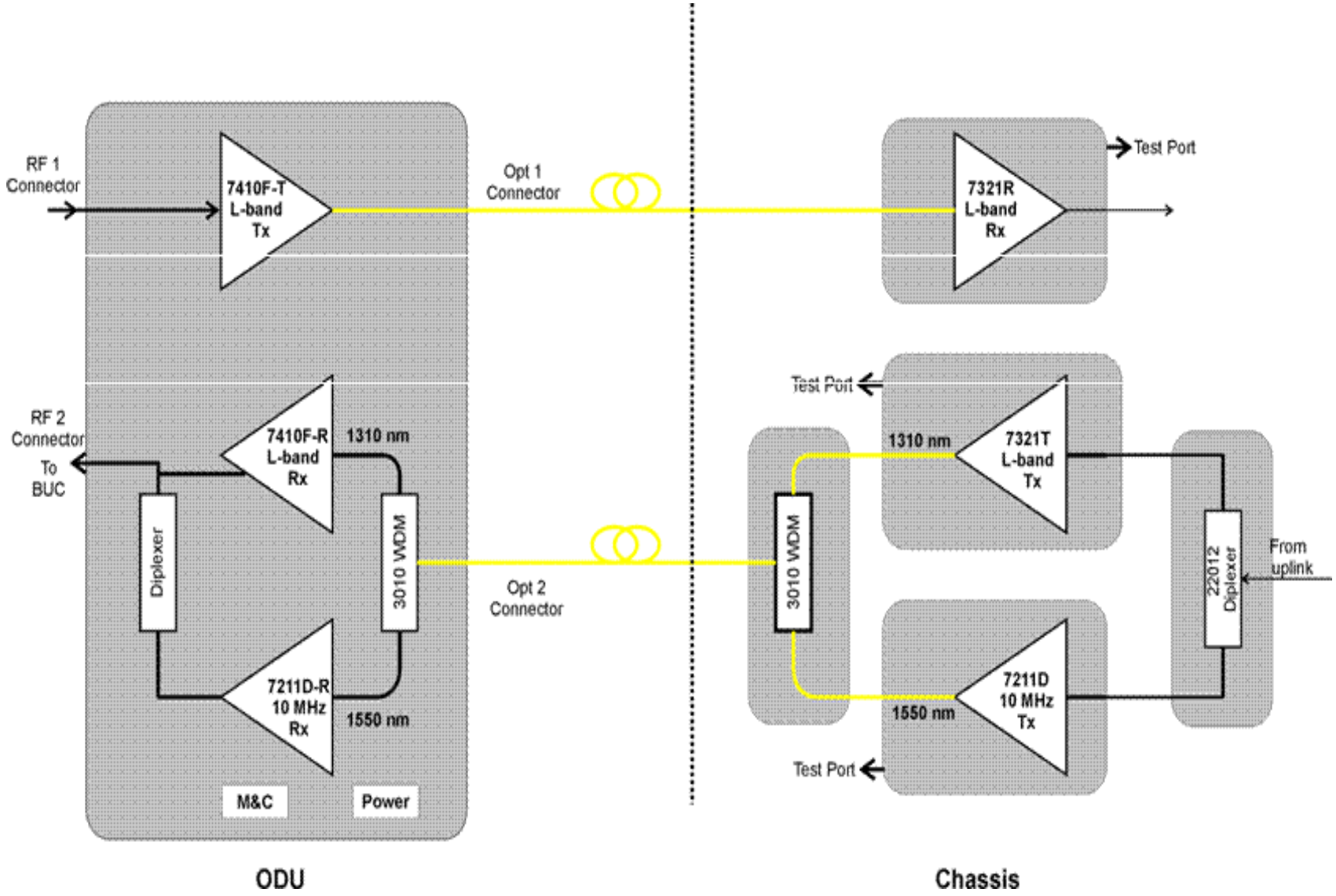


Figure 6 4003 / 4005 ODU Base Unit and Cover


RF 1
Connector
7410F-T
L-band
Tx
Opt 1
Connector
7321R
L-band
Rx
Test Port
RF 2
Connector
To
BUC
7410F-R
L-band
Rx
1310 nm
Diplexer
3010 WDM
7211D-R
10 MHz
Rx
1550 nm
M&C
Power
Opt 2
Connector
Test Port
1310 nm
7321T
L-band
Tx
3010 WDM
22012
Diplexer
From
uplink
7211D
10 MHz
Tx
1550 nm
Test Port
ODU
Chassis

The 4005 ODU does not require the use of the 3010 WDM module.

On the upper panel of the ODU unit are eight LEDs. **Table 1** describes the LEDs.

LED Name	LED Function
Opt 1	Indicates that module 1 laser or phot diode is functioning
RF1	Indicates that module 1 RF path is functioning
Opt 2	Indicates that module 2 laser or phot diode is functioning
RF2	Indicates that module 2 RF path is functioning
Opt 3	Indicates that module 3 laser or phot diode is functioning
RF3	Indicates that module 3 RF path is functioning
Opt 4	Indicates that module 4 laser or phot diode is functioning
RF1 4	Indicates that module 4 RF path is functioning

Table 1 LED Indicators

Note *The ODU can hold up to four units. If less than four cards are installed, then the corresponding LEDs will be plugged.*

1.4 Product and Module Identification

The 40003/4005 series ODU can hold up to four units, transmitter and/or receivers, and/or Ethernet links. Within the ODU each module is placed in a standardized order and is connected to a predetermined RF connector, optical connector, and MGC potentiometer.

Module 1	Module 2	Module 3	Module 4
RF connector 1	RF connector 2	RF connector 3	RF connector 4
Optical connector 1	Optical connector 2	Optical connector 3	Optical connector 4
MGC 1	MGC 2	MGC 3	MGC 4

Table 2 Modules and Connectors: four cards in ODU

Module 1	Module 2	Module 3	Module 4
RF connector 1	RF connector 2	RF connector 3	not used
Optical connector 1	Optical connector 2	Optical connector 3	not used
MGC 1	MGC 2	MGC 3	not used

Table 3 Modules and Connectors: three cards in ODU

Module 1	Module 2	Module 3	Module 4
RF connector 1	RF connector 2	not used	not used
Optical connector 1	Optical connector 2	not used	not used
MGC 1	MGC 2	not used	not used

Table 4 Modules and Connectors: two cards in ODU

Module 1	Module 2	Module 3	Module 4
RF connector 1	not used	not used	not used
Optical connector 1	not used	not used	not used
MGC 1	not used	not used	not used

Table 5 Modules and Connectors: one card in ODU - The 4003 requires a WDM in order to support 4 TX/RX cards.

2 Installation

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2.4.2.2 Hanging the Unit on a Wall 10
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2.5.1 Cable Assembly 12
2.5.2 Installing the Fiber Optic Cable in the Protective Cover 13
2.5.3 Monitoring Cable (Optional) 15

Observe all warnings and cautions mentioned at the beginning of this manual (see **Important Information** on page iii**.**

). If after set-up you experience problems, see **Chapter 4: Troubleshooting** on page 23.

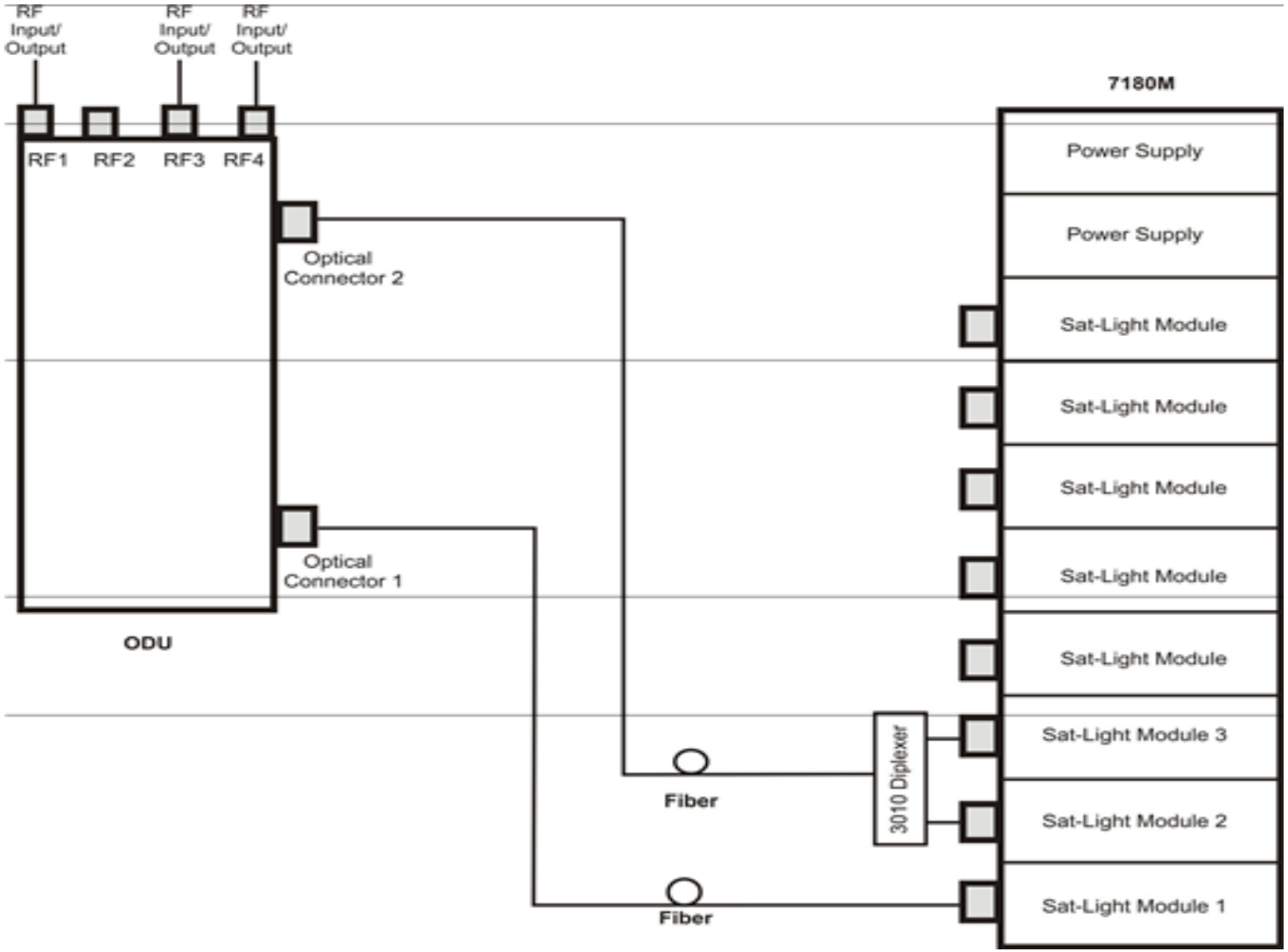


Figure 7 4003 Setup Example [for illustrative purposes only]

1. All chassis connectors are on the rear panel.

2.1 Setting up the Indoor Unit

See the module specific *Installation and User's Guide* regarding the instructions on how to set up the indoor units and their specifications.

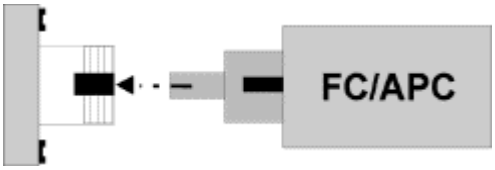
2.2 Connecting the Fiber Optic Cables

Before connecting the cable

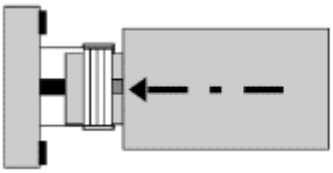
- The fiber cable must be either fusion spliced or connected via FC/APC connectors
- Wipe the connector with a lint-free cotton cloth.
- Note the polarity key of the optical connector before inserting

To connect the fiber optic cable

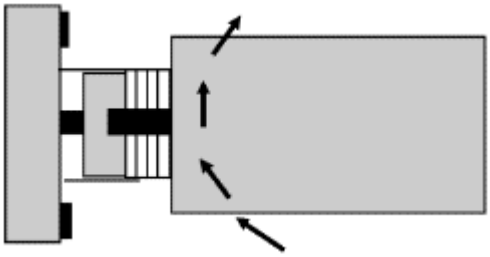
1. Line up the polarity key



2. Insert the connector



3. Tighten the connector



2.3 Aligning for Unity Gain

All internal adjustments have been set up at the factory; the only user adjustments are input and output RF signal levels accessible from the side panel and described in the following sections. **If possible, adjust the Manual Gain Control before installing the units in the field.**

Note Setting for Unity Gain is the preferred method.

The final step in installing the ODU is re-adjusting the Receiver Gain Control for unity gain.

See the module specific *Installation and User's Guide* regarding instructions on how to set the link for unity gain.

2.4 Setting up the Outdoor Unit

To set up the ODU:

1. Install the unit on a wall or a pole
2. Connect the inout/output power cable.

Observe all warning and cautions in the section **Important Information** on page iii.

Warning When installing the unit the grounding cable must be connected before the power supply is applied. If for any reason you must disconnect the grounding, first shut down the power supply. After the unit is shut down, verify that the grounding cable was removed.

2.4.1 Before you Start

Check that the following items are included in the ODU package:

- ODU unit
- Cable components:
  Monitoring and Control: Connector (male) & Backshell
  AC Power: Power Cable (6.5 ft long)
- M&C Connector Cover (1)
- Brackets (2) & 4 bolts
- Screwdriver

In addition you will need:

- Drill[1]
- Drill bits (5/16")
- Screws (user provided)
- Drill sheet (provided)
- Wall plugs (user provided)
- Screw and nuts[3] (user provided)
- Crimpier
- Heat blower

1. Drill, drill bits, drill sheet, crimpier are only needed if the ODU will be installed on a wall.

2.4.2 Hanging the Unit

2.4.2.1 Hanging the Unit on a Pole

1. The ODU can be installed on a pole. The installation pole can be at maximum of 45°. The pole diameter must be between 1. 2" to 1.9" (30 - 50 mm).
2. Place the first bracket on the outer side of the pole. Using two screws screw the bracket to top of the ODU.
3. Place the second bracket on the outer side of the pole. Using two screws, screw the bracket to bottom of the ODU.
4. Using one screw, secure each bracket to the pole.

Note Screw length depends on the width of the pole.

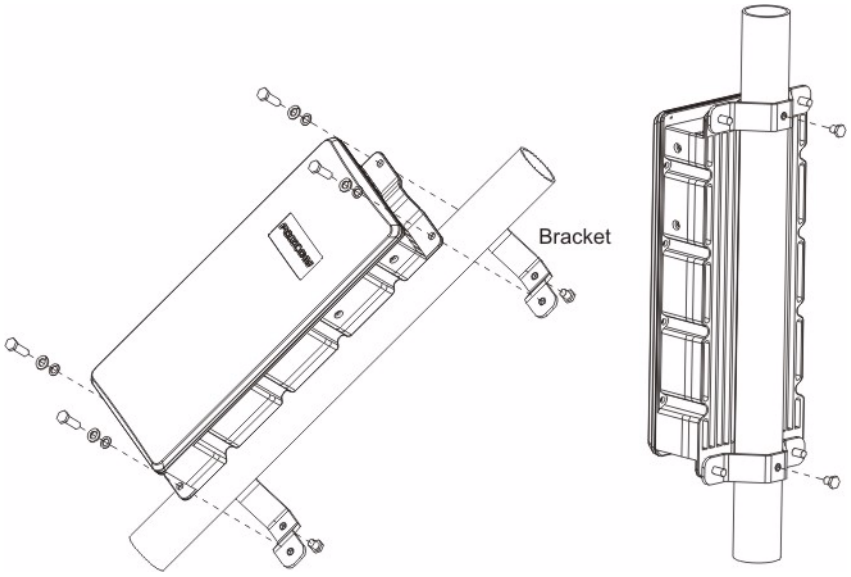


Figure 8 Attaching the ODU to an Installation Pole

2.4.2.2 Hanging the Unit on a Wall

Caution *The ODU is heavy! Make sure that the wall can support its weight (5 kg.) Suitable bolts must be used. Foxcom recommends that the ODU be installed on concrete walls.*

1. Using the drill sheet provided drill four holes (5/16") through the markings indicated on the paper.
2. Using the drilled holes as a guide, place the ODU on the wall.
3. Using four screws, secure the ODU to the wall.

2.5 Connecting the Input/Output/Power Cables

WARNING UNIT MUST BE GROUNDED BEFORE APPLYING POWER!

To ground the unit:

1. Assemble the ground assembly as shown in **Figure 9 Ground Assembly**.

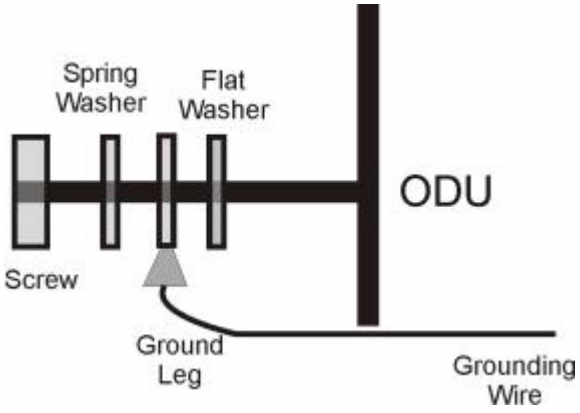


Figure 9 Ground Assembly

2. Follow the NEC regulations regarding grounding and powering.
   When connecting the cables to the ODU unit:
   - the RF, M&C, optical, and power cables must be assembled and weather-proofed.
   - the optical cable must be covered with weather-proofing covering.

   In addition the monitoring cables can be set up (optional).

3. Attach the power cable to the power connector. Attach the connector **so that the red line on the connector body is covered.**

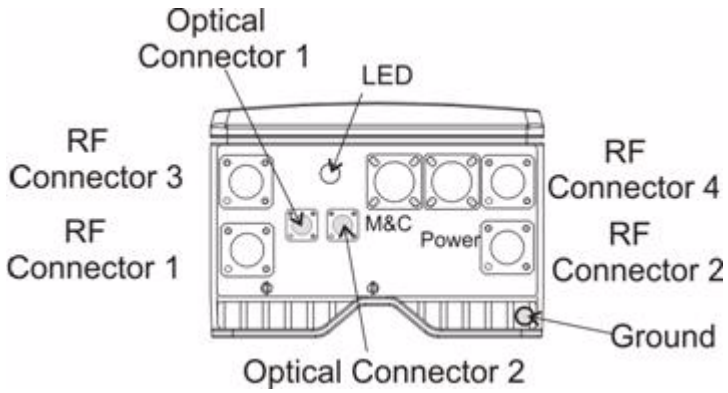


Figure 10 4003 ODU Connectors

2.5.1 Cable Assembly

1. Ground the unit.
2. Wipe off any dirt from the RF and power cables.
3. Assemble the cable components (see **Figure 11 Cable Components [1]**).

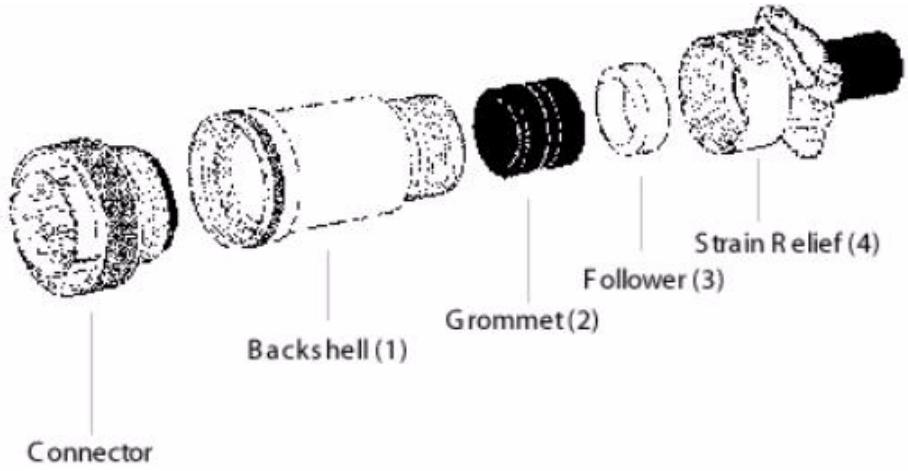


Figure 11 Cable Components [1]

4. Each cable must be protected by a shrinkable cable sleeve. Slide the cable sleeve over the connector and place the sleeve up against the ODU unit.

Note If the cables will be repeatedly connected/unconnected then do not shrink the sleeves.

5. Heat the sleeve, beginning with the connector end. When the sleeve has shrunk around the connector, stop heating for 30 seconds.
6. Continue heating until the cable sleeve is firmly and uniformly shrunk on both the cable and connector.
7. Connect the fiber optic cables.

2.5.2 Installing the 4003 Fiber Optic Cable in the Protective Cover

Before connecting the cable

1. The fiber cable must be either fusion spliced or connected via FC/APC connectors
2. Wipe the connector with a lint-free cotton cloth.
3. Note the polarity key of the optical connector before inserting

To connect the fiber optic cable

1. Remove the washer from the bottom half of the protective cover.

Figure 12 Protective Cover

2. Thread the cables through the cover

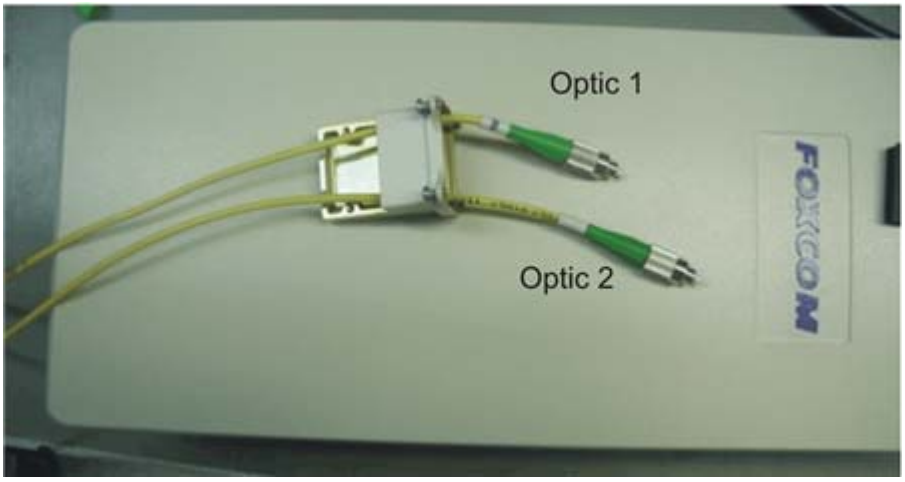
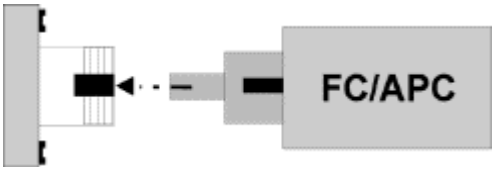
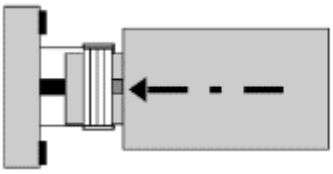


Figure 13 Threading the Cables

3. Line up the polarity key



4. Insert the connector



5. Tighten the connector

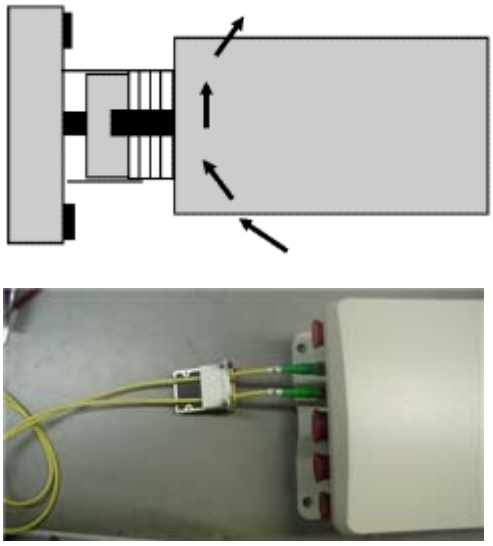


Figure 14 Placing the Cover

6. Close the unit. Place the cover against the 4003 ODU and screw the cover into the ODU.

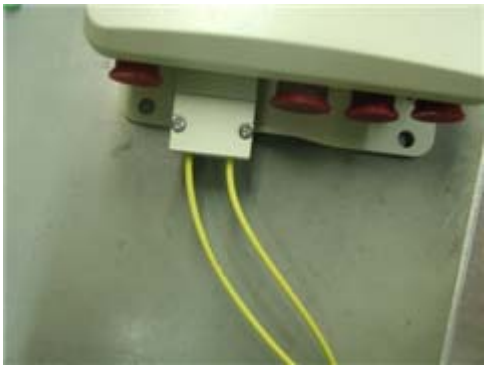


Figure 15 Closed cover attached to the 4003 ODU

Caution *The washer must be put in place or the fiber optic connectors will not be weatherproof.*

2.5.3 Monitoring Cable (Optional)

1. Thread the monitoring cable(s) through the cable assembly.
2. Place the cable in the appropriate pin in the M&C Connector.

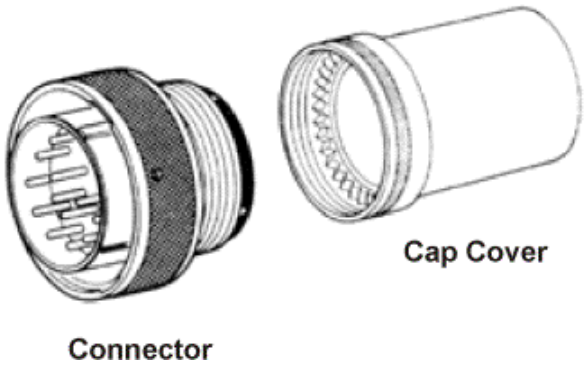


Figure 16 Monitoring Cable Components [2]

3. Gently twist the wiring so that is doubled and can fit into the cover.
4. Place the cover (see **Figure 16 Monitoring Cable Components [2]**) over the wiring and close.

3 Product Technical Description

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3.1 Specifications

3.1.1 4003/4005 ODU Specifications

Enclosure Capacity	4 Units
Enclosure Size	14” H x 6” W x 3.5” D (35.5 x 15.6 x 9.0 cm)
Optical Connector	2 on 4003 4 on 4005
RF Connector[1]	F-type female, 75 Ω adapter, BNC 50 or 75 Ω, SMA, N-type, 75 Ω
Input Power	90 to 260 VAC, 50/60 Hz, 0.5 Amp (max);
Weight	5 Kilograms
Power Consumption	20 Watts
Operating Temp. Range	-30 to +55° C
Storage Temp. Range	-40 to +85° C
Humidity	Humidity 95%, non-condensing
Dust and Water Protection	IP64

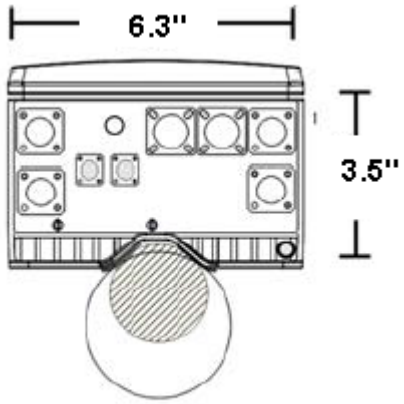
Table 6 4003/4005 General Specifications

1. The specific connector must be specified in the ODU order

Notes

1. Optical fiber plant must be single mode 9/125 and low reflection.
2. See the module specific *Installation and User’s Guides* for each module in the ODU.

3.2 Model Dimensions



Installation: Pole 2" to 3"

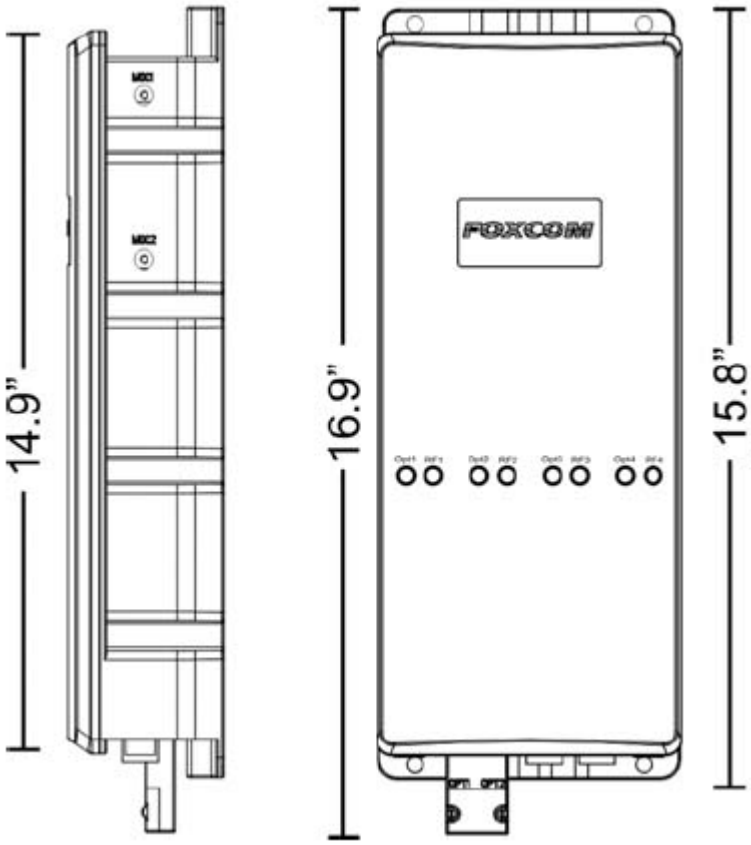


Figure 17 4003/4005 ODUDimensions [not to scale]

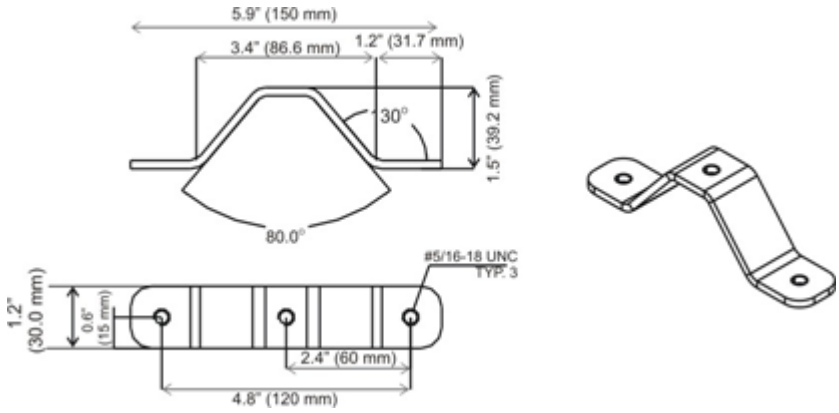


Figure 18 Bracket Dimensions

3.3 ODU M&C Connector Pinouts

Pin #	Function
1	+18V to LNB powering
2	+13V to LNB powering
3	LNB1
4	LNB2
5	RSSI 1 [Module #]
6	RSSI 2 [Module #2]
7	RSSI 3 [Module #3]
8	RSSI 4 [Module #4]
9	Optical Alarm 1 [Module 1]
10	Optical Alarm 2 [Module 2]
11	Optical Alarm 3 [Module 3]
12	Optical Alarm 4 [Module 4]
13	Ground

Table 7 ODU M&C Connector Pinout Functions

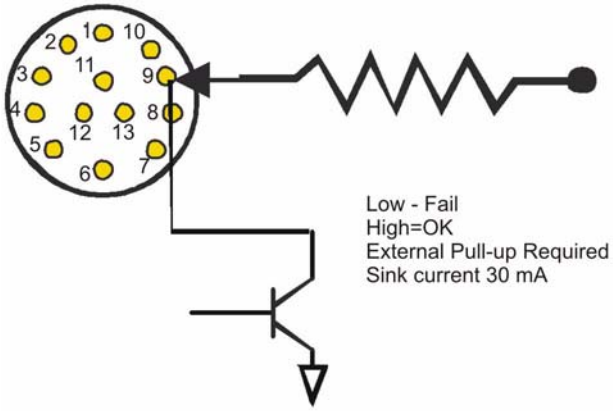


Figure 19 4003/4005 M&C Connector Pins [front view]

Pin	Function
A	110 to 220 VAC ~
B	0 (Neutral)
C	Ground
D	n/a
E	n/a

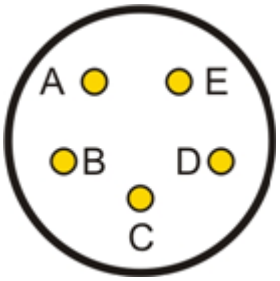


Figure 20 4003/4005 Power Connector Pins [front view]

Appendix 1 Cleaning Fiber Optic Connections

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The unit has an FC/APC angle polished optical connector for very high optical return loss performance. The units are specified into single mode fiber i.e. 9/125 micron core diameter. Full performance is specified only for low return loss optical plant - meaning that the fiber must be fusion spliced and all connections or splices must have a return loss greater than -60 dB. With these guidelines in mind, link lengths beyond 20 kilometers (DFB based products) can be achieved with high performance. Specific performance and/or design assistance is available by request from Foxcom.

If there is low/no signal or noisy signal at a Foxcom module, the connector should be cleaned. Dirt on the inside connector tip can impair the flow of light causing problems in signal transmission. Foxcom modules are sealed but dirt can occasionally enter during installation and alignment.

The input and output optical ports of all Foxcom equipment are known in the fiber optic world as bulkhead ports. Foxcom uses FC/APC connectors.

The following materials are representative of the types of cleaning materials that should be used for cleaning the fiber optic ports and connectors. They are available from several suppliers.

Description	Manufacturer
Kim wipes	Kimberly Clark
Cletop Automatic Connector Cleaner	Cletop
fiber optic Swab	Cletop or FIS
fiber optic Compressed Air	Chemtronics

Table 8 Cleaning materials

Wiping clothes should be made of lint free alcohol free nonabrasive materials. Swabs should have a tightly wrapped tip and be talcum-free. For removing dust from receptacles, a canned compressed gas is recommended. Do not use commercial compressed air because of risk of contamination.

Appendix 1.1 Cleaning Procedures for FC/APC Connectors

Use a Kim Wipe to gently wipe the end face surface of the connector. Alternatively a Cletop automatic connector cleaner can be used.

Figure 21 Wiping the connector with a Kim wiper

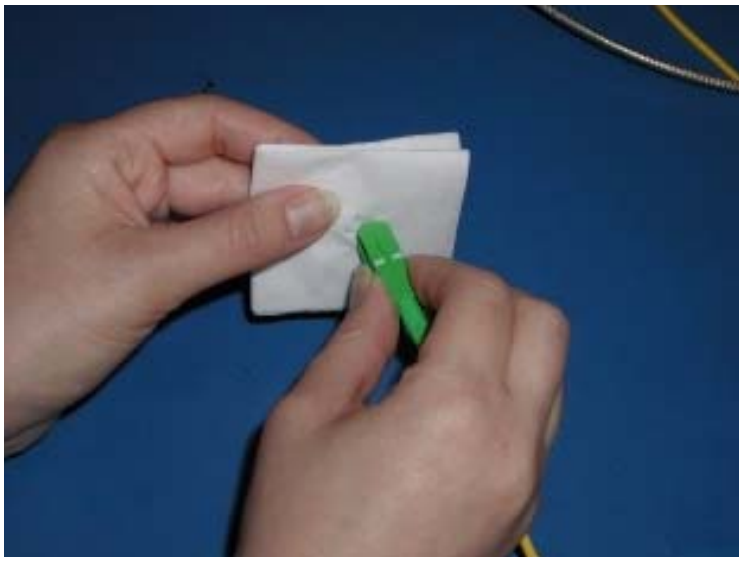

Figure 22 Wiping the connector with a Kim wiper [2]

Appendix 1.2 Cleaning Procedure for FC/APC Bulkhead Ports

Caution *Clean the transmitter and receiver optical ports only when there is evidence of contamination or reduced performance.*

Appendix 1.2.1 Swab Method

Using a clean fiber optic cleaning swab, gently wipe out the optical port. Discard the swab after use.

Figure 23 Cleaning the Optical Port

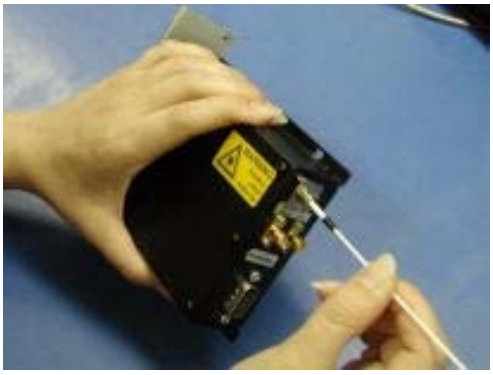

Figure 24 Cleaning the Optical Port [2]

Appendix 1.2.2 Compressed Air Method

Using the extension tube of the compressed air, blow into the port to remove any dust or debris. Do not allow the tube to touch the bottom of the port. Do not use commercial compressed air due to potential oil contamination.

Note To prevent contamination, the optical ports should be connected or covered with a dust cap at all times.

Use dry air or nitrogen only.M