Phoenix Digital

OPTICAL COMMUNICATION For SIEMENS/TI TIWAY, PEERLINK, and Remote I/O Networks

Phoenix Digital now provides Fiber Optic TIWAY™, PEERLINK™, and Remote I/O Communications. Optical Communication Modules (OCMs) are available for SIEMENS SIMATIC TI 505 Chassis Installation, or in modular Standalone Enclosures for Panelmount Installation... with integral 120/220 VAC, 24 VDC, or 125 VDC power supplies.

FEATURES

- Fiber Optic Communications. . .
  - Noise Immunity
  - Intrinsically Safe
- Dependable Data Communications. . .
  - On-Line Error Checking
  - Fault Prediction
  - Fault Location
  - Fault Tolerant
  - Redundant Fiber Media
- Plugs Directly Into SIEMENS/TI System Chassis. . .
  - SIMATIC TI 505 Plug-In Module
- Network-Wide Diagnostics. . .
  - Locates Fault and Impending Fault Conditions
- Short or Long Distance. . .
  - 6 Feet (2 Meters) to 6 Miles (10 Kilometers) Apart - Multimode Operation
  - Over 16 Miles (25 Kilometers) Apart - Singlemode Operation
- Selectable Wavelengths. . .
  - 850 nanometers, 1300 nanometers
- Compatible with Both Singlemode and Multimode Fiber, and with Industrial Fiber
- Ruggedized Industrial Fiber Optic Cable. . .
  - Available only from Phoenix Digital

DESCRIPTION

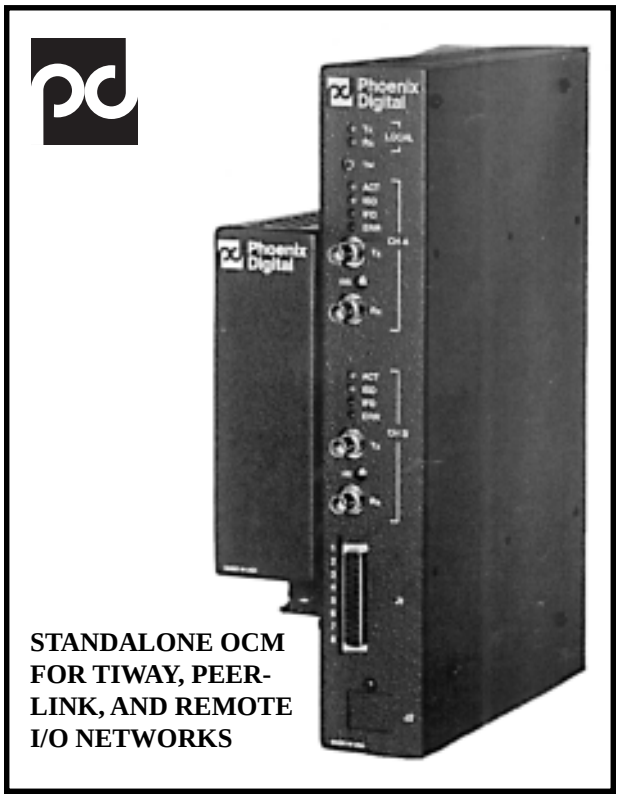
Phoenix Digital's family of Optical Communication Modules for use with SIEMENS/TI TIWAY, PEERLINK, and Remote I/O networks provide the most advanced, comprehensive, fiber optic communication capabilities on the market today. Phoenix Digital's OCMs provide optical communication media, transparent to the communication protocol and configurable for distribution by the user in ring, bus, star, tree, or point-to-point network installations. Fiber optic cable is now the media of preference for harsh industrial network environments due to the inherent benefits of high reliability, electrical noise immunity, and intrinsic safety.

Phoenix Digital's OCMs provide continuous on-line error checking for jitter, pulsewidth distortion, carrier symmetry, and optical signal strength. All of this, together with comprehensive self-test diagnostics, optimizes the overall integrity of SIEMENS/TI TIWAY, PEERLINK, and Remote I/O communication networks at-large, providing Dependable Data Communications.

Optical communication network options include features not found in even the most expensive communication network installations:

- On-line Diagnostic Monitoring
- Self Healing Communication Recovery
- In-line Signal Monitoring
- Locates Fault and Impending Fault Conditions
- Fully Compatible with SIEMENS/TI TIWAY, PEERLINK, and Remote I/O Networks
- Annunciation of Low Signal Level
- Wavelength Selection
- Extended Communication Distances

Phoenix Digital's OCMs may be used together in the same physical network to connect SIEMENS/TI Controllers, I/O Chassis, Host Adapters, Operator Interface Stations, Network Interface Modules, etc. Phoenix Digital makes all of this possible, in the price range of a conventional communication modem, through application of its patented self healing communication switch and advanced optical technologies.



STANDALONE OCM FOR TIWAY, PEERLINK, AND REMOTE I/O NETWORKS

OPERATION

FAULT PREDICTIVE... Phoenix Digital's OCMs provide fault prediction thru diagnostic monitoring and detection of impending communication failures resulting from gradual degradation of the communication link itself. The OCM monitors for impending fault conditions by continuously measuring the actual in-line signal strength (optical power) of the data communications at the receive data inputs on the module. The OCM continuously compares these actual in-line measurements to preset optical power reference thresholds. If the actual in-line data communication signal strength degrades below these power thresholds the OCM will detect and annunciate the impending failure condition via indicators on the front of the module. The OCM also provides hardwired diagnostic outputs (discrete and analog) for detecting and locating impending fault conditions, and for on-line optical power measurement. Thus, communication network status is continuously monitored, and impending failure conditions are located and annunciated before the communication failure actually occurs. OCM diagnostics insure on-line network integrity, and enable maintenance personnel to perform Predictive Maintenance on fiber optic TIWAY, PEERLINK and Remote I/O communication networks at-large!

FAULT MANAGEMENT... Phoenix Digital's OCMs provide fault tolerant, self healing communications through diagnostic monitoring of the communication signal waveforms at each

node on the network, and ultra-high speed detection and isolation of points of communication failure anywhere on the network. OCM modules self heal around communication failures in ring, bus, star, tree, or point-to-point network configurations. OCMs automatically redirect network traffic around points of failure until the failure conditions are corrected, and then automatically restore the communication network to its original traffic patterns. Thus, communication continuity is unconditionally maintained by the OCM module in the event of either node or media failure, enabling maintenance personnel to splice/terminate/replace fiber media, add/delete nodes, etc. on-line, without disrupting network communications! In addition, the OCM provides diagnostic outputs to locate network fault conditions, providing on-line diagnostic monitoring of the communication network at-large. All of this is transparent to the operation TIWAY, PEERLINK, and Remote I/O communication networks.

INTERACTIVE DIAGNOSTICS... Phoenix Digital's OCMs provide advanced, system-level interactive diagnostics. These diagnostics may be used to assist in troubleshooting a wide variety of different types of network problems:

- — Detect and Locate Fault Conditions Throughout the Network
- — Trap-and-Hold, and Locate Intermittent Communication Failures
- — Detect and Locate Impending Fault Conditions Throughout the Network

These advanced diagnostics provide the user with a powerful set of tools, greatly simplifying network start-up and on-line maintenance of TIWAY, PEERLINK, and Remote I/O communication networks.

EXTENDED DISTANCES... Phoenix Digital's OCMs provide optional wavelength selection for extended distance applications. The economical 850 nanometer wavelength may be selected for data communication networks with less than 12,000 feet (3,650 meters) between nodes. The higher performance 1300 nanometer multimode wavelength may be selected for longer distance applications, extending communication distances between nodes to over 6 miles (10 kilometers). The 1300 nanometer singlemode wavelength may be selected for extended distance applications, extending communication distances between TIWAY and Remote I/O nodes to over 16 miles (25 kilometers)! (Consult factory for PEERLINK distance capabilities.)

INSTALLATION

Phoenix Digital's Optical Communication Modules are available in both plug-in and standalone configurations, for TIWAY, PEERLINK, and Remote I/O network applications. Plug-in OCMs install directly into SIEMENS/TI SIMATIC 505 Chassis. Standalone OCMs may be Panelmounted. SIEMENS/TI UHA/NIM (TIWAY/PEERLINK) or CPU/RBC (Remote I/O) modules may be cabled directly to OCMs using Phoenix Digital's OCM Interconnect Cables (see Ordering Information). OCMs may be interconnected on the fiber optic network in an active bus configuration, using either multimode or singlemode fiber optic cable (See Figure on Page 7). Channel A Receive Data inputs and Transmit Data outputs should be interconnected sequentially from OCM to OCM in one direction, and Channel B Receive and Transmit Data inputs and outputs interconnected sequentially in the opposite direction. This configuration may be made fault tolerant by cross-connecting end-to-end Channel A (Ch A Transmit to Ch A Receive) and Channel B (Ch B Transmit to Ch B Receive) on the OCMs on either end of the active bus (See Figure on Page 8). This effectively transforms it into a counter-rotating ring TIWAY, PEERLINK, or Remote I/O network configuration without requiring any further action by the user.

SPECIFICATIONS

Fiber Optic Cable Type	: Multimode or Singlemode
Mating Connector	: ST or SMA
Transmit Launch Power	: -15 dbm (Typical, Multimode), -18 dbm (Singlemode)
Receive Sensitivity	: -32 dbm
Power Supply	
Plug-In Modules	: +5 VDC (1.5 Amps), -5 VDC (200 Ma)
Standalone, Panelmount Modules	: 120/220 VAC, 24 VDC, 125 VDC.... 15 Watts
Environmental	
Operating Temperature	: 0˚ to 60˚ C (32˚ to 140˚ F)
Storage Temperature	: -40˚ to 85˚ C (-40˚ to 185˚ F)
Relative Humidity	: 0 to 95% RH, noncondensing
Dimensions	
SIMATIC TI 505 Plug-In Modules	: Single Slot, SIMATIC TI 505 Module
Standalone, Panelmount Modules	: 10.38" H x 3.50" W x 7.00" D (26.36cm H x 8.90cm W x 17.78cm D)

ORDERING INFORMATION

Model Number(1)	**Description**
OCM-TWY-85	SIMATIC TI 505 TIWAY OCM (12,000 feet/3,650 meters between nodes)
OCM-TWY-13	SIMATIC TI 505 TIWAY OCM (32,000 feet/10 kilometers between nodes)
OCM-PER-85	SIMATIC TI 505 PEERLINK OCM (850 nm wavelength)
OCM-PER-13	SIMATIC TI 505 PEERLINK OCM (1300 nm wavelength)
OCM-TRI-85	SIMATIC TI 505 Remote I/O OCM (12,000 feet/3,650 meters between nodes)
OCM-TRI-13	SIMATIC TI 505 Remote I/O OCM (32,000 feet/10 kilometers between nodes)
OCM-CBL-TP	TIWAY/PEERLINK Cable (For Direct Connection to SIEMENS/TI TIWAY or PEERLINK UHA/NIM Modules.)
OCM-CBL-RI	Remote I/O Cable (For Direct Connection to SIEMENS/TI CPU or RBC.)

(1) Add suffix "-P" for Standalone, Panelmount Module Enclosure.
Add suffix "-D" for Diagnostic Outputs.
Add suffix "-ST" for ST Fiber Optic Connector Style.
Add suffix "-SMA" for SMA Fiber Optic Connector Style. (Available with 850 Nanometer Wavelength Only.)
Add suffix "-24V" for 24 VDC Operation.
Add suffix "-125V" for 125 VDC Operation.
Add suffix "-ACV" for 120/220 VAC Operation.
Add suffix "-SM" for Singlemode Operation. (Available with 1300 Nanometer Wavelength and ST Connector Options Only.)
Add suffix "-D" to OCM-CBL cables for Diagnostic Outputs.
Add suffix "-10" to OCM-CBL cables for 10 foot/3 meter length.

Consult factory for additional information on fiber optic modules for other SIEMENS/TI networks (**ETHERNET, MODBUS**... among others); 19" Rackmount/Panelmount Modems and VME Plug-In Modules; Industrial Fiber Optic Cable (indoor, outdoor, aerial, burial, etc.); termination and splice tool kits; fiber optic video (CCTV) and telephone communications; fiber optic modules, multiplexers, network servers, and communication controllers for MODBUS communication networks; and on-site installation support, training, and network commissioning services.

TIWAY and PEERLINK are registered trademarks of SIEMENS/TI.

INDUSTRIAL FIBER OPTIC CABLE

Phoenix Digital provides fiber optic cable specifically designed for rugged industrial applications. Phoenix Digital's Industrial Fiber Optic Cable provides a full range of superior optical performance, rugged packaging and protection, and the physical integrity the industrial user wants and needs for ease of installation and handling.

FEATURES

- INDUSTRIAL PACKAGING OPTIONS. . .
  Rugged Industrial Construction - Life Expectancy Exceeds 20 Years
  Double Jacketing, High Tensile Strength
  Extended Temperature and Humidity Range
  Oil, Chemical, Moisture, Abrasion, and UV Sunlight Resistant
  Riser Rated (OFNR) and CSA FT-4, Passes Stringent UL 1666 Flame Test
  Plenum Rated (OFNP) and CSA FT-6, Passes Stringent UL 910 Flame Test

- WIDE VARIETY OF INSTALLATION OPTIONS. . .
  Gel Filled Loose Tube Construction for both Indoor and Outdoor Installation
  Self Supporting, All Dielectric Cable for Aerial Installation
  Direct Burial, Armored Cable for Underground Installation
  Low Smoke, Zero Halogen Cable for Premise Installation
  Ultra Strong, Non-Armored Cable for Deep Mine Applications

- SUPERIOR OPTICAL PERFORMANCE. . .
  Multiple Fibers per Cable (2 to 36 Fibers)
  9/125, 50/125, 62.5/125, and 200/230 Micron Sizes
  Multiple Wavelengths - Multimode and Singlemode Capability

- FULLY COMPATIBLE WITH PHOENIX DIGITAL'S COMPLETE LINE OF INDUSTRIAL OPTICAL COMMUNICATION MODULES.

- WHEN PHOENIX DIGITAL PROVIDES BOTH THE FIBER OPTIC MODULES AND THE FIBER OPTIC CABLE IT WARRANTS NETWORK PHYSICAL LAYER COMPATIBILITY!

Phoenix Digital

7650 East Evans Rd., Bldg A
Scottsdale, AZ 85260
(480) 483-7393 Phone
(480) 483-7391 Fax
email: phxdigital@aol.com
internet: http://www.phoenixdigitalcorp.com

OPTICAL PERFORMANCE

FIBER OPTIC CABLE MODEL # FOC-EXP, FOC-SSA, FOC-DBA, FOC-LSZHB, AND FOC-USNA

Fiber Type (Core/Cladding size...microns)	Mode Type	Max. Attenuation (db/km)		Min. Bandwidth (MHz-km)		Numerical Aperture
		850 nm	1300 nm	850 nm	1300 nm	
9/125	Singlemode	N/A	.4	N/A	N/A	N/A
50/125	Multimode	3.00	1.00	800	800	0.200
62.5/125	Multimode	3.75	1.50	160	500	0.275
200/230	Multimode	7.0	N/A	15	N/A	0.370

FIBER OPTIC CABLE MODEL # FOC-RRB AND FOC-PRB

Fiber Type (Core/Cladding size...microns)	Mode Type	Max Attenuation (db/km)		Min Bandwidth (MHz-km)		Numerical Aperture
		850 nm	1300 nm	850 nm	1300 nm	
9/125	Singlemode	N/A	.7	N/A	N/A	N/A
50/125	Multimode	3.50	1.50	800	800	0.200
62.5/125	Multimode	3.75	1.50	160	500	0.275
200/230	Multimode	12.0	N/A	15	N/A	0.370

FIBER OPTIC CABLE ORDERING INFORMATION(1)

Model # FOC-XXX-YY-ZZZ

Type of Fiber
009 = 9/125 Micron
050 = 50/125 Micron
062 = 62.5/125 Micron
200 = 200/230 Micron

Number of Fibers in Cable
02(2) = 2 Fibers
04 = 4 Fibers
06 = 6 Fibers
08 = 8 Fibers
10 = 10 Fibers
12 = 12 Fibers
24 = 24 Fibers
36 = 36 Fibers

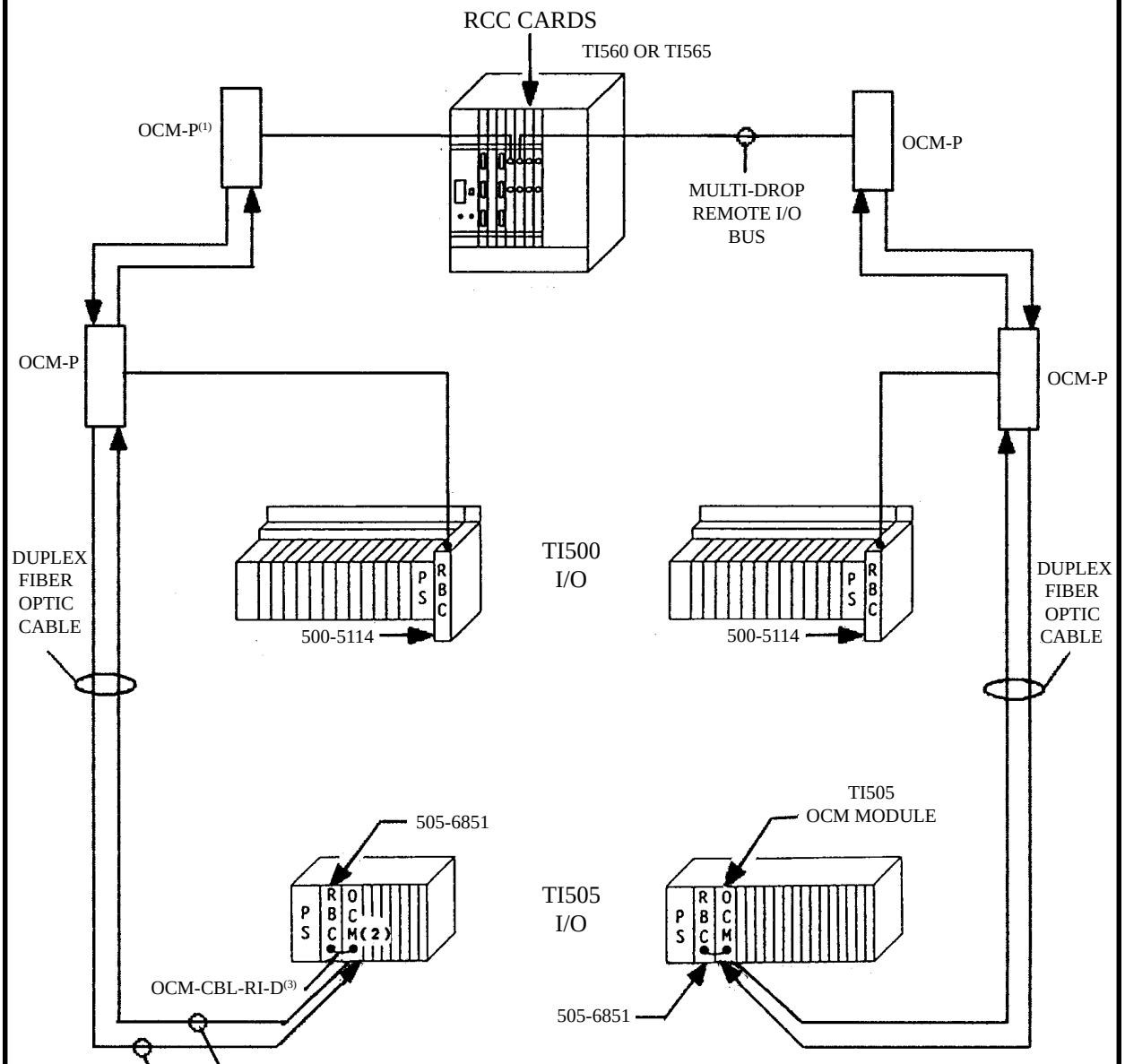
Type of Cable (Installation)
EXP = Extended Performance Industrial Construction
SSA = Self Supporting Aerial, All Dielectric Construction
DBA = Direct Burial, Armored Construction
LSZHB = Low Smoke, Zero Halogen Construction
USNA = Ultra Strong, Non-Armored Construction
RRB = Riser Rated Breakout Construction
PRB = Plenum Rated Breakout Construction

(1) Consult the factory for other types of cable constructions, types of optical fibers, quantities of bundled fibers, and custom cables.
(2) Specify “02F” for Flat Zipcord Breakout Construction.

Phoenix Digital

7650 East Evans Rd., Bldg A
Scottsdale, AZ 85260
(480) 483-7393 Phone
(480) 483-7391 Fax
email: phxdigital@aol.com
internet: http://www.phoenixdigitalcorp.com

REMOTE I/O:
ACTIVE BUS CONFIGURATIONS



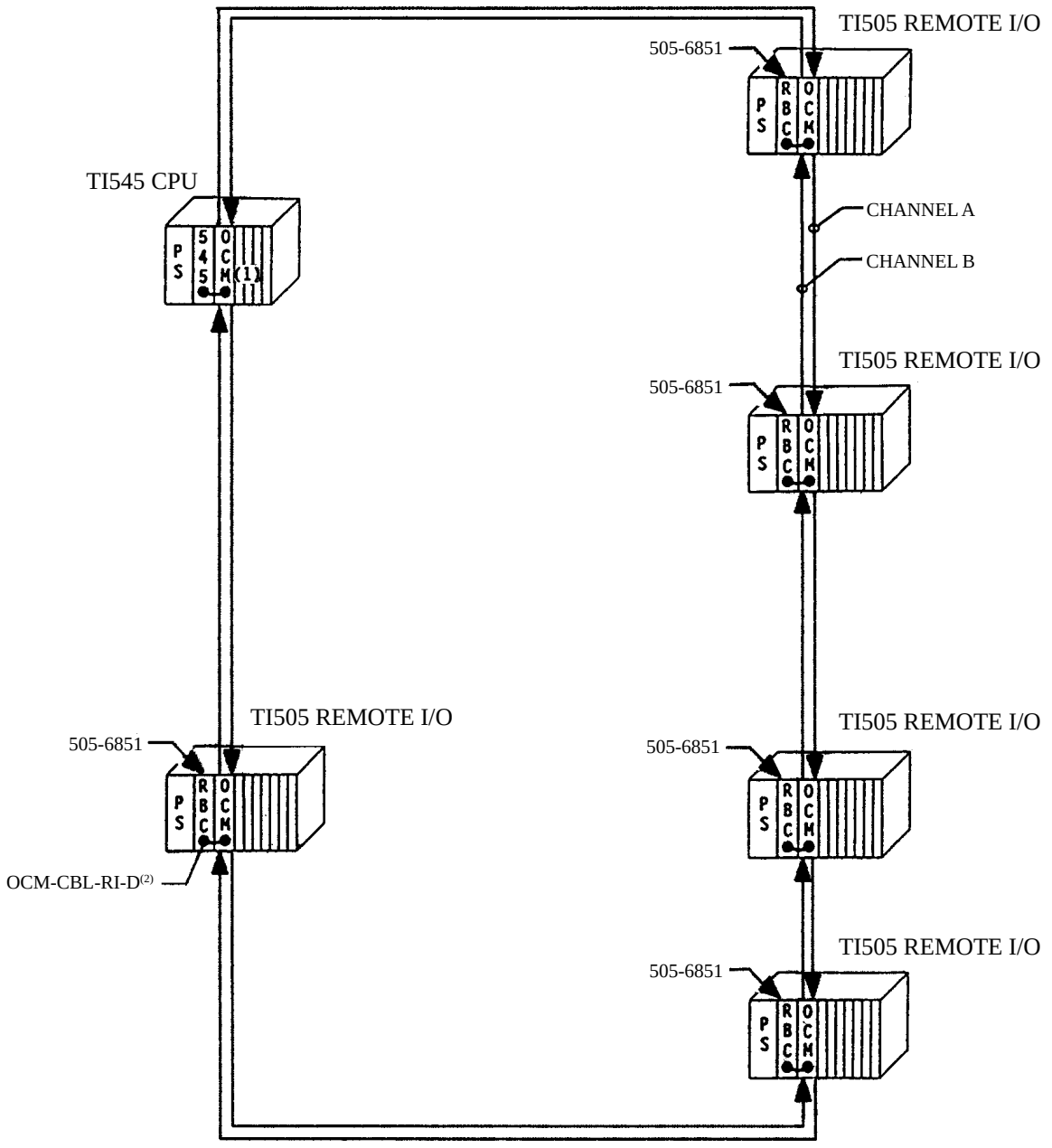
(1) OPTICAL COMMUNICATION MODULE
WITH ENCLOSURE AND POWER SUPPLY
MODEL # OCM-TRI-85-P-D-ST-ACV

(2) OPTICAL COMMUNICATION MODULE
MODEL # OCM-TRI-85-D-ST

(3) OCM INTERCONNECT CABLE
MODEL # OCM-CBL-RI-D

TYPICAL REMOTE I/O OCM INSTALLATION CONFIGURATIONS

REMOTE I/O:
DUAL MEDIA RING CONFIGURATION (FAULT TOLERANT)



(1) OPTICAL COMMUNICATION MODULE
MODEL # OCM-TRI-85-D-ST

(2) OCM INTERCONNECT CABLE
MODEL # OCM-CBL-RI-D

TYPICAL REMOTE I/O OCM INSTALLATION CONFIGURATION

Phoenix Digital

7650 East Evans Rd., Bldg A
Scottsdale, AZ 85260
(480) 483-7393 Phone
(480) 483-7391 Fax
email: phxdigital@aol.com
internet: http://www.phoenixdigitalcorp.com

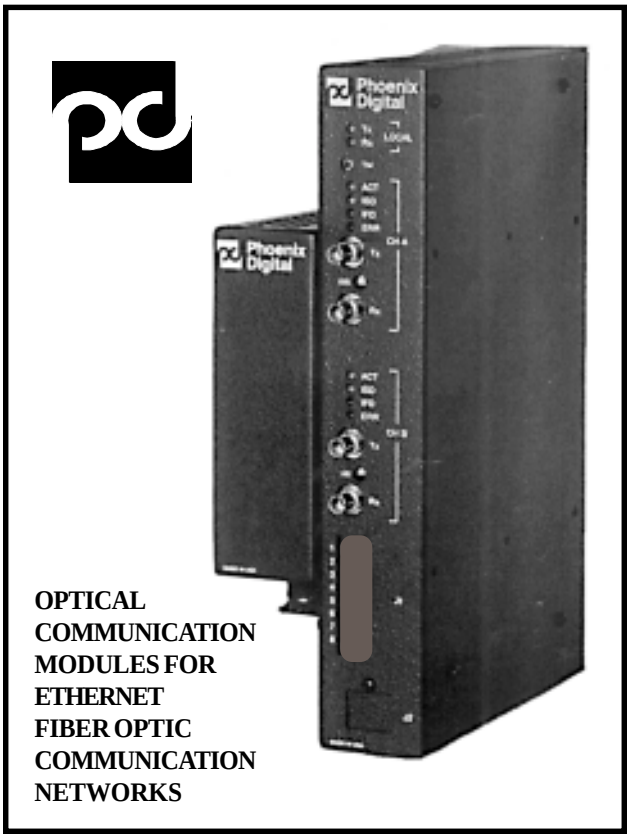
Phoenix Digital

OPTICAL COMMUNICATION For ETHERNET Networks

Phoenix Digital now provides both **Multidrop and Point-to-Point** Fiber Optic Ethernet Communications. Optical Communication Modules (OCMs) are available in modular Standalone Enclosures for Panelmount Installation. . . with integral 120/220 VAC, 24 VDC, or 125 VDC power supplies.

FEATURES

- Fiber Optic Communications. . .
  - Noise Immunity
  - Intrinsically Safe
- Dependable Data Communications. . .
  - Fault Tolerant
  - Redundant Fiber Media
  - Fault Prediction
  - Fault Location
  - On-Line Error Checking
- Network-Wide Diagnostics. . .
  - Locates Fault and Impending Fault Conditions
- Supports Ethernet TCP/IP Communications. . .
  - IEEE 802.3 CSMA/CD Networks
- Extended Capacity Fiber Optic Ethernet. . .
  - Connect up to 30 Fiber Optic Modules on a Single Bus or Ring Network
- Mix and Match 10 Base-T, 10 Base-2, 10 Base-5 Media Options. . .
  - Connect via Twisted Pair, Thin-Net, or Thick-Net Coax
- Full Duplex Ethernet for Long Distances
  - Over 16 miles (25 Kilometers) Apart - Singlemode Operation
- Selectable Wavelengths. . .
  - 850 nm, 1300 nm, 1550 nm
- Compatible with Both Singlemode and Multimode Fiber, and with Industrial Fiber



OPTICAL COMMUNICATION MODULES FOR ETHERNET FIBER OPTIC COMMUNICATION NETWORKS

DESCRIPTION

Phoenix Digital's family of Optical Communication Modules for Ethernet networks provide the most advanced, comprehensive, fiber optic communication capabilities on the market today. Phoenix Digital's OCMs provide optical communication media, transparent to the communication protocol and configurable for distribution by the user in ring, bus, star, tree, or point-to-point network installations. Fiber optic cable is now the media of preference for harsh industrial network environments due to the inherent benefits of high reliability, electrical noise immunity, and intrinsic safety.

Phoenix Digital's OCMs provide continuous on-line error checking for jitter, pulsewidth distortion, carrier symmetry, and optical signal strength. All of this, together with comprehensive self-test diagnostics, optimizes the overall integrity of Ethernet communication networks at-large, providing Dependable Data Communications.

Optical communication network options include features not found in even the most expensive communication network installations:

- On-line Diagnostic Monitoring
- Self Healing Communication Recovery
- In-line Signal Monitoring
- Locates Fault and Impending Fault Conditions
- Fully Compatible with Ethernet IEEE 802.3
- Connect up to 30 Fiber Optic Modules on a Single Bus or Ring Network Configuration
- Each Module Provides Integral Hub Functionality... Extra Ports Provided for Programming, Monitoring, Diagnostics
- Ethernet Preamble Regeneration with Signal Retiming and Restoration
- Full Duplex Ethernet Communication
- Annunciation of Low Optical Signal Level
- Wavelength Selection
- Extended Communication Distances

Phoenix Digital's OCMs may be used together in the same physical network to connect Programmable Logic Controllers (PLCs), Distributed Control Systems (DCS), Host Computers, Workstations, Operator Interface Panels, etc. Phoenix Digital makes all of this possible, in the price range of a conventional communication modem, through application of its patented self healing communication switch and advanced optical technologies.

OPERATION

FAULT PREDICTIVE... Phoenix Digital's OCMs provide fault prediction thru diagnostic monitoring and detection of impending communication failures resulting from gradual degradation of the communication link itself. The OCM monitors for impending fault conditions by continuously measuring the actual in-line signal strength (optical power) of the data communications at the receive data inputs on the module. The OCM continuously compares these actual in-line measurements to preset optical power reference thresholds. If the actual in-line data communication signal strength degrades below these power thresholds the OCM will detect and annunciate the impending failure condition via indicators on the front of the module. The OCM also provides hardwired diagnostic outputs (discrete and analog) for detecting and locating impending fault conditions, and for on-line optical power measurement. Thus, communication network status is continuously monitored, and impending failure conditions are annunciated and located before the communication failure actually occurs. This enables maintenance personnel to perform **Predictive Maintenance** on fiber optic Ethernet communication networks at-large!

FAULT MANAGEMENT... Phoenix Digital's OCMs provide fault tolerant, self healing communications through diagnostic monitoring of the communication signal waveforms at each node on the network, and ultra-high speed detection and isolation of points of communication failure anywhere on the network. OCM modules self heal around communication failures in ring, bus, star, tree, or point-to-point network configurations. The OCMs automatically redirect network traffic around points of failure until the failure conditions are corrected, and then automatically restore the communication network to its original traffic patterns. Thus, communication continuity is unconditionally maintained by the OCM module in the event of either node or media failure! In addition, the OCM provides diagnostic outputs to locate network fault

conditions, enabling maintenance personnel to splice/terminate/replace fiber media, add/delete nodes, etc. on-line, without disrupting network communications! All of this is transparent to the operation of Ethernet communication networks.

INTERACTIVE DIAGNOSTICS... Phoenix Digital's OCMs provide advanced, system-level interactive diagnostics. These diagnostics may be used to assist in troubleshooting a wide variety of different types of network problems:

- Detect and Locate Fault Conditions Throughout the Network
- Trap-and-Hold, and Locate Intermittent Communication Failures
- Detect and Locate Impending Fault Conditions Throughout the Network

These advanced diagnostics provide the user with a powerful set of tools, greatly simplifying network start-up and on-line maintenance of Ethernet communication networks.

FIBER MEDIA COMPATIBILITY... Phoenix Digital's OCMs provide optional wavelength selection for universal compatibility with all types of fiber optic cable. Wavelength options include 850 nanometer/multimode, 1300 nanometer/singlemode or multimode, and 1550 nanometer/singlemode or multimode.

The IEEE 802.3 Ethernet communication standard limits the maximum distance (without bridging) on any multidrop Ethernet communication network to 1.9 miles (3 kilometers. . . including fiber and wire) between the two furthest points on the network. Full duplex Ethernet allows communication over longer distances. . . up to 6 miles (10 kilometers) point-to-point between locations using multimode fiber (1300 nanometer operation), and over 16 miles (25 kilometers) using singlemode fiber. However, much longer distances are possible for both half and full duplex Ethernet communication. Consult the factory for more information.

INSTALLATION

Phoenix Digital's Ethernet Optical Communication Modules are available in modular Panelmount, Industrial Enclosures. Ethernet devices may be cabled directly to OCMs using twisted pair wire (10 Base-T), RG-58 Thin-Net coax cable (10 Base-2), or thru the AUI port (Access Unit Interface) to Thick-Net coax cable transceivers (10 Base-5). (Twisted pair interface is provided via an RJ45 connector. Thin-Net interface is provided via a BNC Connector. Thick-Net AUI transceiver interface is provided via a 15-pin D-subminiature connector.)

OCMs may be interconnected on the fiber optic network in an active bus configuration, using either multimode or singlemode fiber optic cable (See Figure on Page 7). Channel A Receive Data inputs and Transmit Data outputs should be interconnected sequentially from OCM to OCM in one direction, and Channel B Receive and Transmit Data inputs and outputs interconnected sequentially in the opposite direction. This configuration may be made fault tolerant by cross-connecting end-to-end Channel A (Ch A Transmit to Ch A Receive) and Channel B (Ch B Transmit to Ch B Receive) on the OCMs on either end of the active bus (See Figure on Page 8). This effectively transforms it into a counter-rotating ring Ethernet network configuration without requiring any other action by the user.

OCMs can also be connected transparently to Ethernet Hubs, Switches, and Routers, to provide Total Enterprise Connectivity... Integrating Multidrop Bus, Ring, Star, and Tree Network Topologies.

Phoenix Digital

7650 E. Evans Rd., Bldg. A
Scottsdale, AZ 85260
(480) 483-7393 Phone
(480) 483-7391 Fax
email: phxdigital@aol.com
internet: http:
//www.phoenixdigitalcorp.com

SPECIFICATIONS

Fiber Optic Cable Type	: Multimode or Singlemode
Mating Connector	: ST or SMA
Transmit Launch Power	: -l5 dbm (Typical, Multimode); -18 dbm (Singlemode)
Receive Sensitivity	: -32 dbm
Power Supply	: 120/220 VAC, 24 VDC, or 125 VDC.... 10 Watts
Environmental	
Operating Temperature	: 0º to 60º C (32º to 140º F)
Storage Temperature	: -40º to 85º C (-40º to 185º F)
Relative Humidity	: 0 to 95% RH, non-condensing
Dimensions	: 10.38" H x 3.50" W x 6.14" D (26.36cm H x 8.90cm W x 15.60cm D)

ORDERING INFORMATION

Model Number(1)	**Description**
OCM-ETH-85-P	OCM For Ethernet Networks (850 nanometer multimode wavelength)
OCM-ETH-13-P	OCM For Ethernet Networks (1300 nanometer multimode wavelength)
OCM-ETH-15-P	OCM For Ethernet Networks (1550 nanometer multimode wavelength)
OCM-CBL-A1-10	10 Base-T PLC to OCM Interconnect Cable (10 ft/3 mtr length)
OCM-AUI-A1	10 Base-T Transceiver

(1) Add suffix "-D" for Real Time Diagnostic Outputs.
Add suffix "-ST" for ST Fiber Optic Connector Style.
Add suffix "-SMA" for SMA Fiber Optic Connector Style. (Available with 850 Nanometer Wavelength Only.)
Add suffix "-24V" for 24 VDC Operation.
Add suffix "-125V" for 125 VDC Operation.
Add suffix "-ACV" for 120/220 VAC Operation.
Add suffix "-A1" for Integral 10 Base-T Transceiver. (Two "-A1" suffixes may be specified for dual, integral 10 Base-T Transceiver Operation.)
Add suffix "-A2" for Integral 10 Base-2 Transceiver.
Add suffix "-EXT" for Networks with 10 or more OCM-ETH modules.
Add suffix "-FD" for Full Duplex, Point-to-Point Ethernet Communication. (Available with 10 Base-T Option Only.)
Add suffix "-SM" for Singlemode Operation. (Available with 1300 and 1550 Nanometer Wavelengths, and ST Connector Options Only.)
Add suffix "-HUB" to cable model number OCM-CBL-A1-10 for direct connection to 10 Base-T Hubs.

Consult factory for additional information on fiber optic modules for all major PLC and DCS communication networks; 19" Rackmount/Panelmount Modems and Industrial Fiber Optic Cable (indoor, outdoor, aerial, burial, etc.); Wavelength Division Multiplexers and Optical Couplers; Optical Slip Rings; termination and splice tool kits; fiber optic video (CCTV) and telephone communications; fiber optic modules, multiplexers, network servers, and communication controllers for MODBUS communication networks; and on-site installation support, training, and network commissioning services.

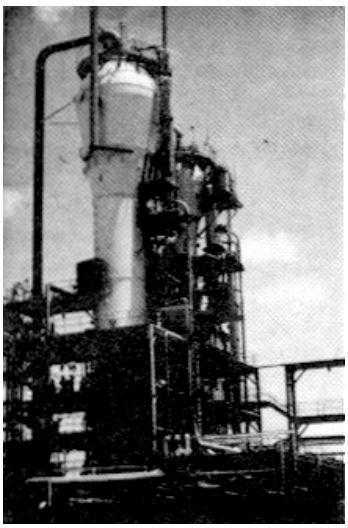
INDUSTRIAL FIBER OPTIC CABLE

Phoenix Digital provides fiber optic cable specifically designed for rugged industrial applications. Phoenix Digital's Industrial Fiber Optic Cable provides a full range of superior optical performance, rugged packaging and protection, and the physical integrity the industrial user wants and needs for ease of installation and handling.

FEATURES

- INDUSTRIAL PACKAGING OPTIONS. . .
  Rugged Industrial Construction - Life Expectancy Exceeds 20 Years
  Double Jacketing, High Tensile Strength
  Extended Temperature and Humidity Range
  Oil, Chemical, Moisture, Abrasion, and UV Sunlight Resistant
  Riser Rated (OFNR) and CSA FT-4, Passes Stringent UL 1666 Flame Test
  Plenum Rated (OFNP) and CSA FT-6, Passes Stringent UL 910 Flame Test

- WIDE VARIETY OF INSTALLATION OPTIONS. . .
  Gel Filled Loose Tube Construction for both Indoor and Outdoor Installation
  Self Supporting, All Dielectric Cable for Aerial Installation
  Direct Burial, Armored Cable for Underground Installation
  Low Smoke, Zero Halogen Cable for Premise Installation
  Ultra Strong, Non-Armored Cable for Deep Mine Applications



- SUPERIOR OPTICAL PERFORMANCE. . .
  Multiple Fibers per Cable (2 to 36 Fibers)
  9/125, 50/125, 62.5/125, and 200/230 Micron Sizes
  Multiple Wavelengths - Multimode and Singlemode Capability

- FULLY COMPATIBLE WITH PHOENIX DIGITAL'S COMPLETE LINE OF INDUSTRIAL OPTICAL COMMUNICATION MODULES.

- WHEN PHOENIX DIGITAL PROVIDES BOTH THE FIBER OPTIC MODULES AND THE FIBER OPTIC CABLE IT WARRANTS NETWORK PHYSICAL LAYER COMPATIBILITY!

Phoenix Digital

7650 East Evans Rd., Bldg. A
Scottsdale, AZ 85260
(480) 483-7393 Phone
(480) 483-7391 Fax
email: phxdigital@aol.com
internet: http://www.phoenixdigitalcorp.com

OPTICAL PERFORMANCE

FIBER OPTIC CABLE MODEL # FOC-EXP, FOC-SSA, FOC-DBA, FOC-LSZHB, AND FOC-USNA

Fiber Type (Core/Cladding size...microns)	Mode Type	Max. Attenuation (db/km)		Min. Bandwidth (MHz-km)		Numerical Aperture
		850 nm	1300 nm	850 nm	1300 nm	
9/125	Singlemode	N/A	.4	N/A	N/A	N/A
50/125	Multimode	3.00	1.00	800	800	0.200
62.5/125	Multimode	3.75	1.50	160	500	0.275
200/230	Multimode	7.0	N/A	15	N/A	0.370

FIBER OPTIC CABLE MODEL # FOC-RRB AND FOC-PRB

Fiber Type (Core/Cladding size...microns)	Mode Type	Max Attenuation (db/km)		Min Bandwidth (MHz-km)		Numerical Aperture
		850 nm	1300 nm	850 nm	1300 nm	
9/125	Singlemode	N/A	.7	N/A	N/A	N/A
50/125	Multimode	3.50	1.50	800	800	0.200
62.5/125	Multimode	3.75	1.50	160	500	0.275
200/230	Multimode	12.0	N/A	15	N/A	0.370

FIBER OPTIC CABLE ORDERING INFORMATION(1)

Model # FOC-XXX-YY-ZZZ

Type of Fiber

009 = 9/125 Micron
050 = 50/125 Micron
062 = 62.5/125 Micron
200 = 200/230 Micron

Number of Fibers in Cable

02(2) = 2 Fibers
04 = 4 Fibers
06 = 6 Fibers
08 = 8 Fibers
10 = 10 Fibers
12 = 12 Fibers
24 = 24 Fibers
36 = 36 Fibers

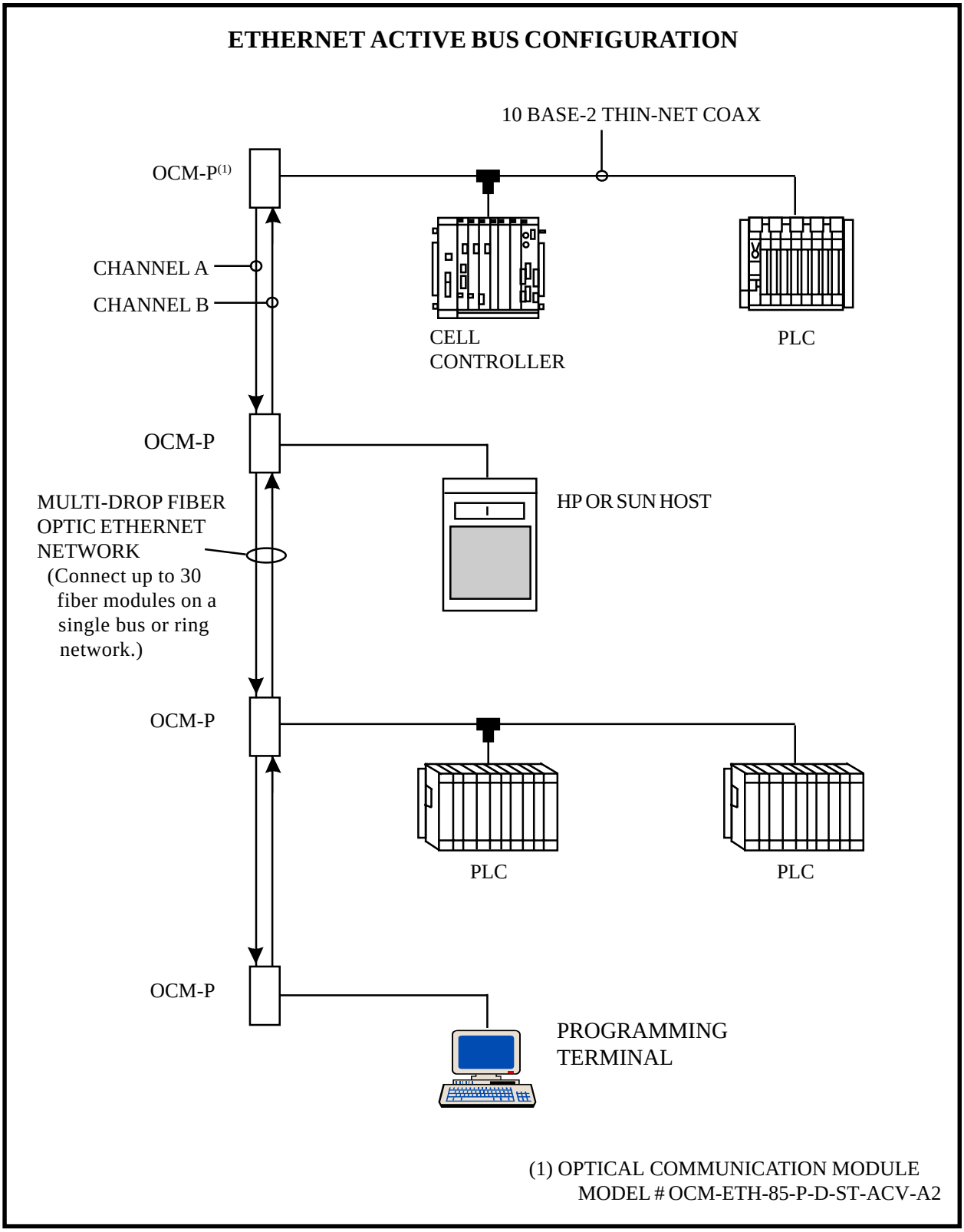
Type of Cable (Installation)

EXP = Extended Performance Industrial Construction
SSA = Self Supporting Aerial, All Dielectric Construction
DBA = Direct Burial, Armored Construction
LSZHB = Low Smoke, Zero Halogen Construction
USNA = Ultra Strong, Non-Armored Construction
RRB = Riser Rated Breakout Construction
PRB = Plenum Rated Breakout Construction

(1) Consult the factory for other types of cable constructions, types of optical fibers, quantities of bundled fibers, and custom cables.
(2) Specify “02F” for Flat Zipcord Breakout Construction.

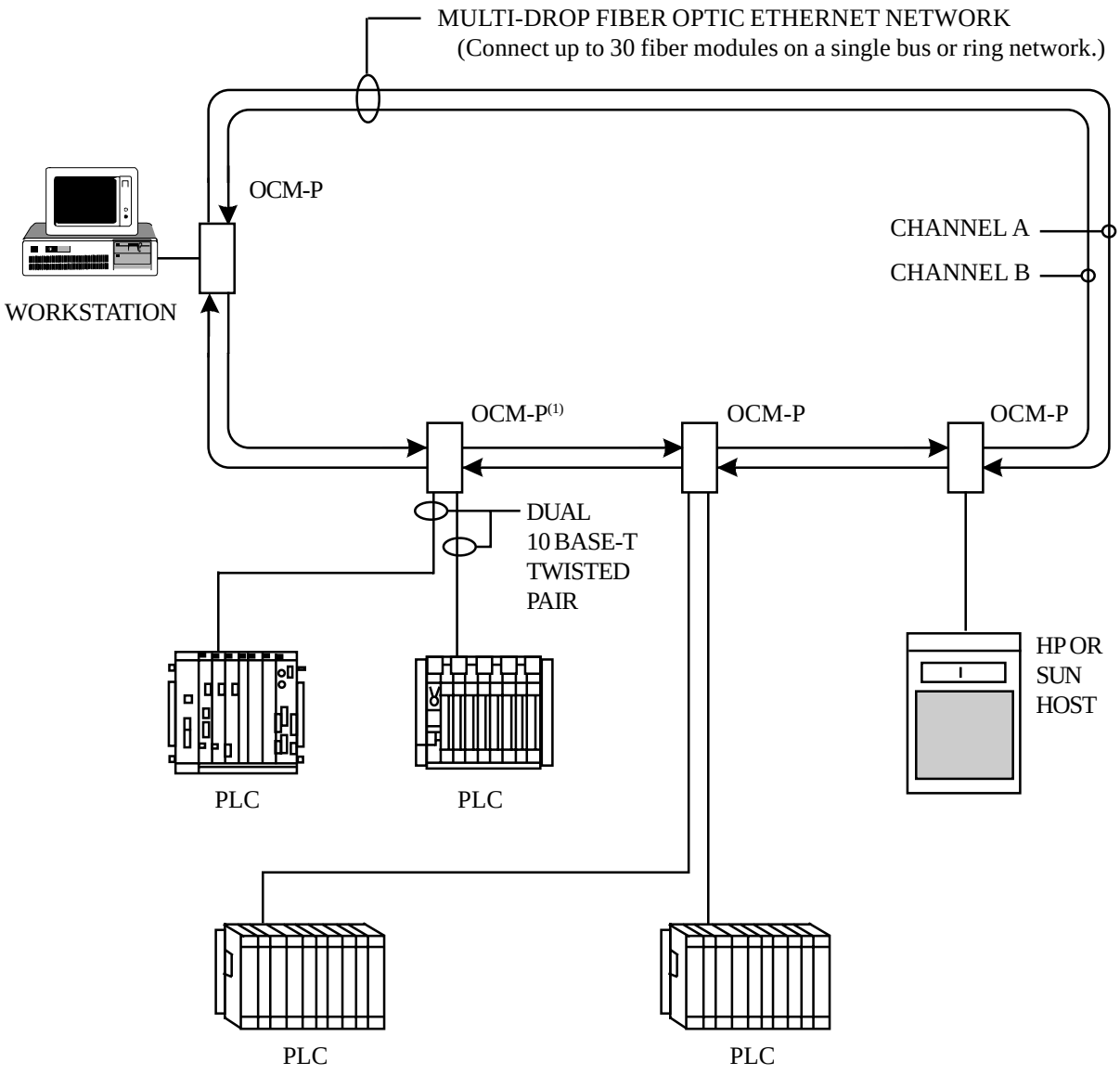
Phoenix Digital

7560 East Evans Rd., Bldg A
Scottsdale, AZ 85260
(480) 483-7393 Phone
(480) 483-7391 Fax
email: phxdigital@aol.com
internet: http://www.phoenixdigitalcorp.com



TYPICAL ETHERNET OCM INSTALLATION CONFIGURATION

ETHERNET DUAL MEDIA RING CONFIGURATION (FAULT TOLERANT)



TYPICAL ETHERNET OCM INSTALLATION CONFIGURATION

Phoenix Digital

7650 East Evans Rd., Bldg. A
Scottsdale, AZ 85260
(480) 483-7393 Phone
(480) 483-7391 Fax
email: phxdigital@aol.com
internet: http://www.phoenixdigitalcorp.com

INDUSTRIAL FIBER OPTIC CABLE

Phoenix Digital

Phoenix Digital provides fiber optic cable specifically designed for rugged industrial applications. Phoenix Digital's Industrial Fiber Optic Cable provides a full range of superior optical performance, rugged packaging and protection, and the physical integrity the industrial user wants and needs for ease of installation and handling.

FEATURES

- INDUSTRIAL PACKAGING OPTIONS...
  - Rugged Industrial Construction - Life Expectancy Exceeds 20 Years
  - Double Jacketing, High Tensile Strength
  - Extended Temperature and Humidity Range
  - Oil, Chemical, Moisture, Abrasion, and UV Sunlight Resistant
  - Low Smoke, Zero Halogen
  - Riser Rated (OFNR) and CSA FT-4, Passes Stringent UL 1666 Flame Test
  - Plenum Rated (OFNP) and CSA FT-6, Passes Stringent UL 910 Flame Test
- WIDE VARIETY OF INSTALLATION OPTIONS...
  - Dry Block With Gel Filled, Loose Tube Construction for both Indoor and Outdoor Installation
  - Self Supporting, All Dielectric Cable for Aerial Installation
  - Direct Burial, Armored Cable for Underground Installation
  - Riser and Plenum Rated Cable for Riser, Premise, and Cable Tray Installation

- SUPERIOR OPTICAL PERFORMANCE...
  - Multiple Fibers per Cable (2 to 36 Fibers)
  - 9/125, 50/125, 62.5/125, and 200/230 Micron sizes
  - Multiple Wavelengths
  - Multimode and Singlemode Capability
- FULLY COMPATIBLE WITH PHOENIX DIGITAL'S COMPLETE LINE OF INDUSTRIAL OPTICAL COMMUNICATION MODEMS FOR...

Rockwell/A-B	Modicon
Siemens/TI	Foxboro
GE Fanuc	Rosemount
Square D	Honeywell
ABB Process Automation	Omron
Kent-Taylor	Plus Many Others

EXTENDED PERFORMANCE FIBER OPTIC CABLE FOR INDUSTRIAL APPLICATIONS

FEATURES... BENEFITS:

- Extended Performance...
  Suitable for Harsh Industrial Environments
- Proprietary, Polyolefin-Based Jacketing Material (No Plasticizers)...
  Corrosion, Moisture, Oil, Flame, Gas, Chemical and UV Resistant
  Meets the Requirements of IEEE-383 Flame Test UL 1581
- Rugged, Industrial Construction...
  Life Expectancy Exceeds 20 Years
- Superior Abrasion and Flexibility to Standard PVC and Polyethylene...
  Ease of Installation and Handling in Both High and Low Temperature Environments
- Gel Filled, Loose Tube Construction...
  Wide Storage and Operating Temperature Range
- Dry Block Technology...
  Simplifies Installation and Reduces Termination Time

INSTALLATION:

Both Indoor and Outdoor Application
Cable Tray... Crush Resistant, Low Friction Jacketing Material
Aerial... With Messenger
Burial... In Conduit

SPECIFICATIONS FOR MODEL # FOC-EXP FIBER OPTIC CABLE:

Mechanical Properties...

Fiber Quantity	Outer Diameter inches (mm)	Cable Weight lbs./1,000 ft. (kg/km)	Maximum Tension lbs. (N)		Minimum Bend Radius inches (cm)		Maximum Vertical Rise ft. (M)
			Install.	Operating	Install.	Operating	
2	0.425 (10.8)	65 (97)	600 (2670)	200 (890)	8.5 (21.6)	4.3 (10.8)	2462 (750)
4	0.425 (10.8)	65 (97)	600 (2670)	200 (890)	8.5 (21.6)	4.3 (10.8)	2462 (750)
6	0.425 (10.8)	65 (97)	600 (2670)	200 (890)	8.5 (21.6)	4.3 (10.8)	2462 (750)
8	0.425 (10.8)	65 (97)	600 (2670)	200 (890)	8.5 (21.6)	4.3 (10.8)	2462 (750)
10	0.425 (10.8)	65 (97)	600 (2670)	200 (890)	8.5 (21.6)	4.3 (10.8)	2462 (750)
12	0.425 (10.8)	65 (97)	600 (2670)	200 (890)	8.5 (21.6)	4.3 (10.8)	2462 (750)
24	0.425 (10.8)	65 (97)	600 (2670)	200 (890)	8.5 (21.6)	4.3 (10.8)	2462 (750)
36	0.454 (11.5)	77 (115)	600 (2670)	200 (890)	9.1 (23.1)	4.5 (11.5)	2078 (633)

Environmental Properties...

Storage Temperature = -40º C to +80º C
Operating Temperature = -40º C to +80º C
Relative Humidity = 0 to 100%

SELF SUPPORTING, ALL DIELECTRIC FIBER OPTIC CABLE FOR AERIAL INSTALLATION

FEATURES... BENEFITS:

- Self Supporting Installation...
  Additional Strength Members Eliminate Need to Install or Lash to Messenger Cable Between Poles
- High Density Double Polyethylene Jacket...
  Corrosion, Moisture, Oil, Chemical, and UV Resistant
- All Dielectric Construction...
  Superior Performance When Exposed to Lightning, Electric Fields from Adjacent Power Lines, etc.
- Track Resistant...
  Suitable for Installation in High Voltage Applications up to 25kv/m
- Abrasion Resistant...
  Reduces Ice Build-up in Aerial Installations and Allows Longer Pulls in Wire Duct
- Gel Filled, Loose Tube Construction...
  Wide Installation and Operating Temperature Range

INSTALLATION:

Outdoor Application
Aerial... No Messenger Required
Wire Duct... High Tensile Strength and Low Abrasion for Longer Pulls

SPECIFICATIONS FOR MODEL # FOC-SSA FIBER OPTIC CABLE:

Mechanical Properties...

Fiber Quantity	Outer Diameter inches (mm)	Cable Weight lbs./1,000 ft. (kg/km)	Maximum Tension lbs. (N)		Breaking Strength lbs. (N)	Minimum Bend Radius inches (cm)	
			Install.	Operating		Install.	Operating
2	0.525 (13.34)	100 (150)	1000 (4450)	2000 (8900)	7500 (33,375)	10.6 (26.6)	5.3 (13.3)
4	0.525 (13.34)	100 (150)	1000 (4450)	2000 (8900)	7500 (33,375)	10.6 (26.6)	5.3 (13.3)
6	0.525 (13.34)	100 (150)	1000 (4450)	2000 (8900)	7500 (33,375)	10.6 (26.6)	5.3 (13.3)
8	0.525 (13.34)	100 (150)	1000 (4450)	2000 (8900)	7500 (33,375)	10.6 (26.6)	5.3 (13.3)
10	0.525 (13.34)	100 (150)	1000 (4450)	2000 (8900)	7500 (33,375)	10.6 (26.6)	5.3 (13.3)
12	0.525 (13.34)	100 (150)	1000 (4450)	2000 (8900)	7500 (33,375)	10.6 (26.6)	5.3 (13.3)
24	0.525 (13.34)	100 (150)	1000 (4450)	2000 (8900)	7500 (33,375)	10.6 (26.6)	5.3 (13.3)
36	0.525 (13.34)	100 (150)	1000 (4450)	2000 (8900)	7500 (33,375)	10.6 (26.6)	5.3 (13.3)

Environmental Properties...

Storage Temperature = -40º C to +70º C
Operating Temperature = -40º C to +70º C
Relative Humidity = 0 to 100%

CRUSH RESISTANT, ARMORED FIBER OPTIC CABLE FOR DIRECT BURIAL INSTALLATION

FEATURES... BENEFITS:

- Direct Burial Installation
- Corrugated Steel Armor Bonded to Outer Jacket...
  Provides Additional Crush Strength and Rodent Protection
- MDPE Double Polyethylene Jacket...
  Corrosion, Moisture, Oil, Chemical, and UV Resistant
- Abrasion Resistant...
  Ease of Installation and Handling
- Dry Block With Gel Filled, Loose Tube Construction...
  Wide Installation and Operating Temperature Range

INSTALLATION:

Underground... Direct Burial Conduit
Conduit, Wire Duct, and Aerial Lashing

SPECIFICATIONS FOR MODEL # FOC-DBA FIBER OPTIC CABLE:

Mechanical Properties...

Fiber Quantity	Outer Diameter inches (mm)	Cable Weight lbs./1,000 ft. (kg/km)	Maximum Tension lbs. (N)		Minimum Bend Radius inches (cm)		Maximum Vertical Rise ft. (M)
			Install.	Operating	Install.	Operating	
2	0.650 (16.5)	148 (220)	600 (2670)	200 (890)	13.0 (33.0)	9.8 (24.8)	1080 (330)
4	0.650 (16.5)	148 (220)	600 (2670)	200 (890)	13.0 (33.0)	9.8 (24.8)	1080 (330)
6	0.650 (16.5)	148 (220)	600 (2670)	200 (890)	13.0 (33.0)	9.8 (24.8)	1080 (330)
8	0.650 (16.5)	148 (220)	600 (2670)	200 (890)	13.0 (33.0)	9.8 (24.8)	1080 (330)
10	0.650 (16.5)	148 (220)	600 (2670)	200 (890)	13.0 (33.0)	9.8 (24.8)	1080 (330)
12	0.650 (16.5)	148 (220)	600 (2670)	200 (890)	13.0 (33.0)	9.8 (24.8)	1080 (330)
24	0.650 (16.5)	148 (220)	600 (2670)	200 (890)	13.0 (33.0)	9.8 (24.8)	1080 (330)
36	0.690 (17.5)	160 (238)	600 (2670)	200 (890)	13.8 (35.1)	10.4 (26.3)	1000 (305)

Environmental Properties...

Storage Temperature = -40º C to +70º C
Operating Temperature = -40º C to +70º C
Relative Humidity = 0 to 100%

LOW SMOKE, ZERO HALOGEN FIBER OPTIC CABLE FOR PREMISE AND RAPID TRANSIT INSTALLATIONS

FEATURES... BENEFITS:

- Halex Jacketing (OFN, UL1581)...
  Zero Halogen Content, Low Toxicity, Low Smoke, and Flame Retardent
- Meets Fire Safety Tests IEEE-383, NRS 713, NES 711, ASTM E-622,
  AETA D-2671-74, and IEC 754-1

INSTALLATION:

Both Indoor and Outdoor Application
Premise and Rapid Transit Installation

SPECIFICATIONS FOR MODEL # FOC-LSZHB FIBER OPTIC CABLE:

Mechanical Properties...

Fiber Quantity	Outer Diameter inches (mm)	Cable Weight lbs./1,000 ft. (kg/km)	Maximum Tension lbs. (N)		Minimum Bend Radius inches (cm)		Maximum Vertical Rise ft. (M)
			Install.	Operating	Install.	Operating	
2	0.425 (10.8)	70 (104)	600 (2670)	200 (890)	21.6 (8.5)	10.8 (4.3)	2286 (697)
4	0.425 (10.8)	70 (104)	600 (2670)	200 (890)	21.6 (8.5)	10.8 (4.3)	2286 (697)
6	0.425 (10.8)	70 (104)	600 (2670)	200 (890)	21.6 (8.5)	10.8 (4.3)	2286 (697)
8	0.425 (10.8)	70 (104)	600 (2670)	200 (890)	21.6 (8.5)	10.8 (4.3)	2286 (697)
10	0.425 (10.8)	70 (104)	600 (2670)	200 (890)	21.6 (8.5)	10.8 (4.3)	2286 (697)
12	0.425 (10.8)	70 (104)	600 (2670)	200 (890)	21.6 (8.5)	10.8 (4.3)	2286 (697)
24	0.425 (10.8)	70 (104)	600 (2670)	200 (890)	21.6 (8.5)	10.8 (4.3)	2286 (697)
36	0.454 (11.5)	76 (113)	600 (2670)	200 (890)	23.1 (9.1)	11.5 (4.5)	1975 (602)

Environmental Properties...

Storage Temperature = -40°C to +80°C
Operating Temperature = -40°C to +80°C
Relative Humidity = 0 to 100%

QUALITY CONTROL:

- Post Construction Fiber Testing For Attenuation and Bandwidth
- Optional Sweep Bandwidth Testing
- Quality Assurance Program meets requirements of IOCFR50, Appendix B

ULTRA-STRONG, NON-ARMORED FIBER OPTIC CABLE FOR HIGH CRUSH STRENGTH AND LONG VERTICAL RISE INSTALLATIONS

FEATURES... BENEFITS:

- Stronger than Standard Armored Cables...
  Crush Strength = 1,500 lbs/inch (2,684 N/cm)
- Longer Vertical Rise...
  Ideal for Deep Mine Applications
- Non-Armored Construction...
  Smaller and Lighter than Standard Armored Cables
- Meets Stringent Standards...
  NEC Type OFNR UL1666 Riser Rated and CSA FT-4 and FT-5
  Mine Safety and Health Administration Approved MSHA-SC-P-7K-263066
  Pennsylvania Bureau of Deep Mine Safety Approved ("P" Number)
- Gel Filled, Loose Tube Construction...
  Wide Installation and Operating Temperature Range

INSTALLATION:

Both Indoor and Outdoor Application
Conduit, Wire Duct, and Aerial Lashing

SPECIFICATIONS FOR MODEL # FOC-USNA FIBER OPTIC CABLE:

Mechanical Properties...

Fiber Quantity	Outer Diameter inches (mm)	Cable Weight lbs./1,000 ft. (kg/km)	Maximum Tension lbs. (N)		Minimum Bend Radius inches (cm)		Maximum Vertical Rise ft. (M)
			Install.	Operating	Install.	Operating	
2	0.415 (10.50)	59 (81)	1000 (4450)	333 (1482)	8.3 (21.0)	4.1 (10.5)	3281 (1000)
4	0.415 (10.50)	59 (81)	1000 (4450)	333 (1482)	8.3 (21.0)	4.1 (10.5)	3281 (1000)
6	0.415 (10.50)	59 (81)	1000 (4450)	333 (1482)	8.3 (21.0)	4.1 (10.5)	3281 (1000)
8	0.415 (10.50)	59 (81)	1000 (4450)	333 (1482)	8.3 (21.0)	4.1 (10.5)	3281 (1000)
10	0.415 (10.50)	59 (81)	1000 (4450)	333 (1482)	8.3 (21.0)	4.1 (10.5)	3281 (1000)
12	0.415 (10.50)	59 (81)	1000 (4450)	333 (1482)	8.3 (21.0)	4.1 (10.5)	3281 (1000)
24	0.415 (10.50)	59 (81)	1000 (4450)	333 (1482)	8.3 (21.0)	4.1 (10.5)	3281 (1000)
36	0.415 (10.50)	59 (81)	1000 (4450)	333 (1482)	8.3 (21.0)	4.1 (10.5)	3281 (1000)

Environmental Properties...

Storage Temperature = -40º C to +80º C
Operating Temperature = -40º C to +80º C
Relative Humidity = 0 to 100%

RISER AND PLENUM RATED FIBER OPTIC CABLE

FEATURES... BENEFITS:

- Halex Jacketing (OFNR)...
  Low Smoke, Zero Halogen, Fire Safe
- Optical Fiber Non-Conductive Riser-Rated (OFNR and CSA FT-4)...
  Passes Stringent UL 1666 Flame Test
- Optical Fiber Non-Conductive Plenum-Rated (OFNP and CSA FT-6)...
  Passes Stringent UL 910 Flame Test

INSTALLATION:

OFNR Fiber Optic Cable for Riser and Premise Installation
OFNP Fiber Optic Cable for Plenum, Riser, and Premise Installation
Breakout Installation for Cabling from Wire Closets, Equipment Racks, etc.

SPECS FOR MODEL # FOC-RRB & FOC-PRB FIBER OPTIC CABLE:

OFNR Fiber Optic Cable Mechanical Properties...

Fiber Quantity	Outer Diameter inches (mm)	Cable Weight lbs./1,000 ft. (kg/km)	Maximum Tension lbs. (N)		Minimum Bend Radius inches (cm)		Maximum Vertical Rise ft. (M)
			Install.	Operating	Install.	Operating	
2F(1)	0.12 x 0.24 (3.0 x 6.0)	8 (12)	224 (997)	112 (498)	2.0 (5.0)	1.0 (2.5)	N/A
2	0.286 (7.26)	33 (48)	270 (1201)	112 (498)	5.8 (14.6)	2.9 (7.3)	2715 (830)
4	0.325 (8.25)	40 (60)	400 (1780)	215 (957)	6.6 (16.6)	3.3 (8.3)	4300 (1310)
6	0.380 (9.65)	57 (84)	600 (2670)	250 (1112)	7.6 (19.4)	3.8 (9.7)	3510 (980)
8	0.445 (11.30)	78 (115)	600 (2670)	250 (1112)	9.0 (22.9)	4.5 (11.3)	2565 (780)
10	0.510 (12.95)	105 (157)	600 (2670)	250 (1112)	10.2 (26.0)	5.1 (13.0)	1900 (580)
12	0.565 (14.40)	129 (192)	600 (2670)	250 (1112)	11.4 (28.8)	5.7 (14.4)	1550 (475)
24	0.680 (17.30)	194 (288)	600 (2670)	250 (1112)	13.6 (34.6)	6.8 (17.3)	1030 (315)
36	0.780 (19.80)	212 (315)	600 (2670)	250 (1112)	15.6 (39.6)	7.8 (19.8)	945 (290)

OFNP Fiber Optic Cable Mechanical Properties...

Fiber Quantity	Outer Diameter inches (mm)	Cable Weight lbs./1,000 ft. (kg/km)	Maximum Tension lbs. (N)		Minimum Bend Radius inches (cm)		Maximum Vertical Rise ft. (M)
			Install.	Operating	Install.	Operating	
2F(1)	0.12 x 0.24 (3.0 x 6.0)	8 (12)	224 (997)	112 (498)	2.0 (5.0)	1.0 (2.5)	N/A
2	0.231 (5.86)	24 (35)	270 (1201)	112 (498)	4.6 (11.7)	2.3 (5.9)	3730 (1135)
4	0.272 (5.90)	30 (43)	600 (2670)	250 (1112)	5.4 (13.8)	2.7 (6.9)	2985 (910)
6	0.323 (8.20)	44 (65)	600 (2670)	250 (1112)	6.4 (16.4)	3.2 (8.2)	4545 (1385)
8	0.401 (10.19)	70 (103)	600 (2670)	250 (1112)	8.0 (20.3)	4.0 (10.2)	2855 (870)
10	0.462 (11.73)	93 (138)	600 (2670)	250 (1112)	9.2 (23.4)	4.6 (12.7)	2150 (655)
12	0.523 (13.3)	125 (186)	600 (2670)	250 (1112)	10.5 (26.6)	5.2 (13.3)	2740 (835)
24	0.620 (15.73)	150 (220)	600 (2670)	250 (1112)	12.4 (31.6)	6.2 (15.8)	1350 (410)
36	0.715 (18.15)	185 (280)	600 (2670)	250 (1112)	14.4 (36.4)	7.2 (18.2)	1085 (330)

(1) Flat Zipcord Breakout Construction

Environmental Properties...

Storage Temperature = -40º C to +80º C
Operating Temperature = -20º C to +80º C
Relative Humidity = 5 to 95%

OPTICAL PERFORMANCE:

FIBER OPTIC CABLE MODEL # FOC-EXP, FOC-SSA, FOC-DBA, FOC-LSZHB, AND FOC-USNA

Fiber Type (Core/Cladding size...microns)	Mode Type	Max. Attenuation (db/km)		Min. Bandwidth (MHz-km)		Numerical Aperture
		850 nm	1300 nm	850 nm	1300 nm	
9/125	Singlemode	N/A	.4	N/A	N/A	N/A
50/125	Multimode	3.00	1.00	800	800	0.200
62.5/125	Multimode	3.75	1.50	160	500	0.275
200/230	Multimode	7.0	N/A	15	N/A	0.370

FIBER OPTIC CABLE MODEL # FOC-RRB AND FOC-PRB

Fiber Type (Core/Cladding size...microns)	Mode Type	Max Attenuation (db/km)		Min Bandwidth (MHz-km)		Numerical Aperture
		850 nm	1300 nm	850 nm	1300 nm	
9/125	Singlemode	N/A	.7	N/A	N/A	N/A
50/125	Multimode	3.50	1.50	800	800	0.200
62.5/125	Multimode	3.75	1.50	160	500	0.275
200/230	Multimode	12.0	N/A	15	N/A	0.370

FIBER OPTIC CABLE ORDERING INFORMATION[1]:

Model # FOC-XXX-YY-ZZZ

Type of Fiber
009 = 9/125 Micron
050 = 50/125 Micron
062 = 62.5/125 Micron
200 = 200/230 Micron

Number of Fibers in Cable
02[2] = 2 Fibers 6 = 6 Fibers 10 = 10 Fibers 24 = 24 Fibers
04 = 4 Fibers 8 = 8 Fibers 12 = 12 Fibers 36 = 36 Fibers

Type of Cable (Installation)
EXP = Extended Performance Industrial Construction
SSA = Self Supporting Aerial, All Dielectric Construction
DBA = Direct Burial, Armored Construction
LSZHB = Low Smoke, Zero Halogen Construction
USNA = Ultra Strong, Non-Armored Construction
RRB = Riser Rated Breakout Construction
PRB = Plenum Rated Breakout Construction

Phoenix Digital

7650 E. Evans Rd., Bldg A
Scottsdale, AZ 85260
(480) 483-7393 Phone
(480) 483-7391 Fax
email: phxdigital@aol.com
internet: http://www.phoenixdigitalcorp.com