OneReach™
INSTALLATION INSTRUCTIONS

The OneReach System is an integrated data and power cable solution capable of supporting single, or multiple, remote PoE devices beyond the conventional 100 meters from the communications closet. Available OneReach system options can extend PoE to over 1,000 meters. The OneReach System is designed to provide:
1) centralized power control with back-up, and
2) up to 1 Gb/s Ethernet links through a simplified network that is both easy and economical to install.

Berk-Tek®
A NEXANS COMPANY

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OneReach System Installation

Section 1 | Overview

The system consists of three parts: *Power Injection (PI)*, the *OneReach Cable Assembly (OCA)* and the *Remote PoE Port (Remote)*. The variety of available components allows you to build a custom system for your exact needs – each is designed to work together for ease of use and a streamlined installation. If any of the OneReach components or devices supported by OneReach are or will be located outdoors or subject to electrical surges, see page 13 for important grounding information.

A | Power Injection starts from the Power Injection Chassis or the PI Source on single channel systems (described later). The rack mountable chassis, located in a local closet, accommodates the slide-in 4-port Media Modules and injects the power and the data from active networking equipment into a hybrid fiber optic and copper cable. The power supply is compliant with the requirements for Class 2 per NFPA 70-2017 when used as part of the OneReach system.

The 4U chassis with rear terminal blocks has a capacity of 12 single-sized slots and accepts one to three power supplies plus up to six media modules. Each slide-in Media Module supports four Ethernet ports. The 2U chassis accepts the same power supplies and media modules, but with a capacity of six single-sized slots.

Power Injection Chassis

Slide-in Power Supply Modules (PSM) provide 400W of power from each AC input and are equipped with active ventilation. *At least one PSM is required*, with a second or third PSM specified when required for additional power. Each PSM will support twelve PoE, eight PoE+ or four HPoE devices. The maximum number of PSMs in any one chassis shall be three. The screw terminals cannot be used to wire chassis together, nor should other means be used in an attempt to transfer power between chassis.

Power Supply Module

The slide-in **Media Modules** provide various configurations of media conversion for 10/100/1000Mb/s network links to VoIP phones, wireless access points, security cameras, and other devices. Each media conversion channel includes: rear panel MTP® or LC optical ports, front panel RJ45 ports for the copper and indicator LED's for fiber link, and copper link. Blank filler plates are available for unused module positions.

The single channel systems use the 1-Port Source, mentioned earlier, as both the source and media converter *(see Part 2 Installation Instructions; item D)*.
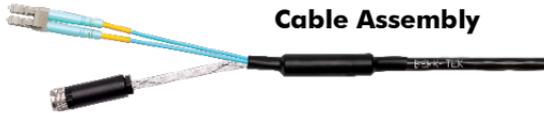
4-Port Media Module

MTP® Connector

OneReach Cable Assembly

**PI Chassis with (1) PSM and (4) 4-Port Media Modules and 6 Blank Filler Plates**

1-Port PI Source

B | OneReach Cable Assemblies (OCA) provide a common pathway for data transmission and Class 2 power supply in a single pull installation. The OCA consists of a Berk-Tek CL3R-OF/PLTC-OF or CL3P-OF/PLTC-OF rated composite copper/fiber cable, within a single jacket, which includes 12 AWG solid conductors coupled with either tight-buffered or loose-tube optical fibers. All cables are indoor/outdoor rated to support routing between telecommunication closets and outdoor locations for IP-cameras, WAPs, emergency call boxes, and other IP-based devices. Since the cable is listed as CL3R-OF/PLTC-OF or CL3P-OF/PLTC-OF, it can be installed in the same pathways as other low voltage cables. Bulk cable is also available for field termination.

Assemblies are built to specific length requirements for each project with pre-terminated fiber connectors and an M8 connector for power on the Remote. Assemblies use OM3 optical fiber and LC (2 fiber, 4 fiber, or 8 fiber) or MTP® (12 fiber) optical connectors to support single and multi-port applications.

OneReach Cable Assembly
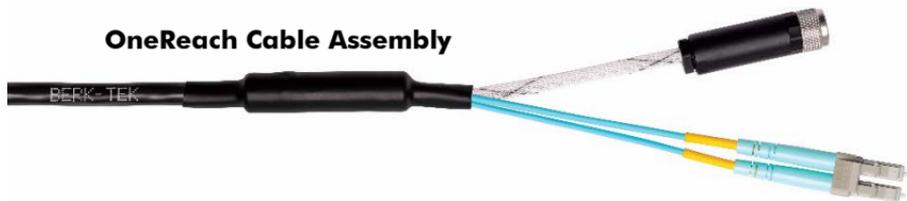
4-Port Remote   **2-Port Remote**   **1-Port Remote**

C | Remote PoE Ports (Remotes) are available in 1-port, 2-port, and 4-port versions. Remotes are available to support PoE, PoE+, and HPoE devices with speeds up to 1 Gb/s. IP-based devices with appropriate power requirements may be connected to remote PoE ports with standard RJ45 terminated patch cords.

Section 2 | Installation Instructions

Assembly Length
Prior to ordering, use a metered pull tape in the conduit system to ensure that assemblies are the correct length. Once the length of the conduit is determined, add 1% for measurement error, plus the additional length needed to reach appropriate rack(s) and create desired service loops. For example, if the metered tape result shows 500 ft.:

Example Length Calculation

Tape Results	500 ft.
1% for measurement error	+5 ft.
Extension past conduit	+10 ft.
Service Loops	+15 ft.
--	
Total assembly length	530 ft.

A | Cable Installation

1 | Ensure that the conduit system size is large enough to accommodate the cable.

    a. OneReach Cable Assemblies follow the same fill-ratio standards as all other low-voltage cable installations, as defined by NFPA 70, the National Electrical Code (NEC).

    b. The NEC defines the maximum amount of space that the installed cables should occupy in a given size conduit. A single cable is allowed to occupy up to 53% of the cross-sectional area (CSA) inside of a conduit. Two cables can occupy 31%. A 40% maximum fill ratio is mandated for three or more cables.

    c. If you do not have ready access to a fill-ratio calculator, the CSA can be manually calculated by squaring the outside diameter of the cable (inside diameter of the conduit for conduit CSA), and then multiplying the total by 0.7854. Note: The number 0.7854 is arrived at by dividing π by four ($3.1416 \div 4 = 0.7854$).

    d. Add the total of the cable CSA's together.

    e. Divide the total cable CSA by the conduit CSA.

    Note: The cable's pulling eye will need to fit into the conduit. Please see the OCA's product spec drawing for the pulling eye outer diameter (OD). For example, if the pulling eye has a 0.8 inch OD, then a Trade Size 1" conduit will be needed.

2 | Stage pre-terminated cable at the remote location.

    a. The pulling eye will be attached to the top end of the reel.

    b. The cable must be placed on an axle that will allow the cable to easily unwind during the pulling operation.

    c. The cable should pull off the top of the reel.

3 | *Use pulling eye to pull cable from the remote location enclosure through the conduit to the closet.*

    a. The use of a preinstalled pulling rope will facilitate this step.

    b. Bend limiting devices (pulleys) **must** be used in areas where there may be a sharp bend.

4 | *Gently remove the pre-terminated cable end from the reel and its protective sock.*

Pulling Eye
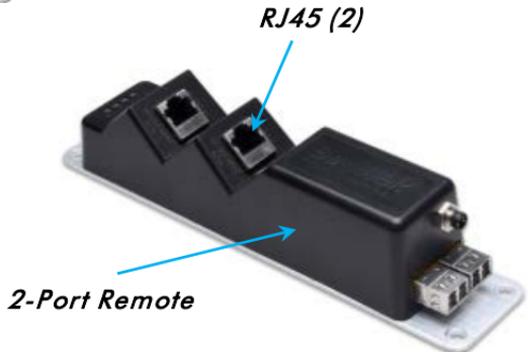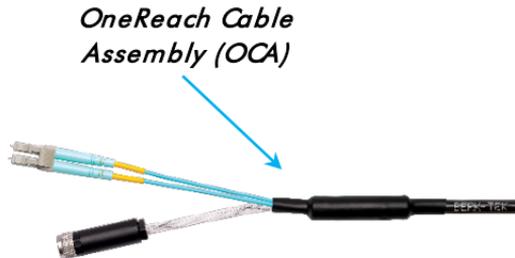
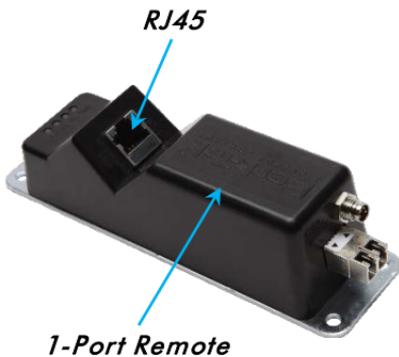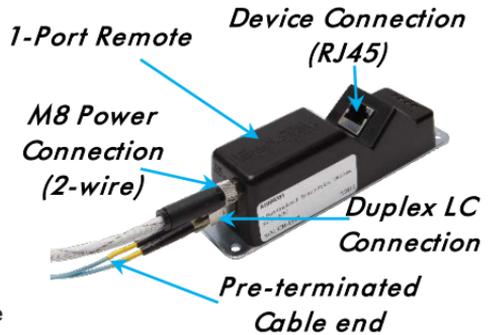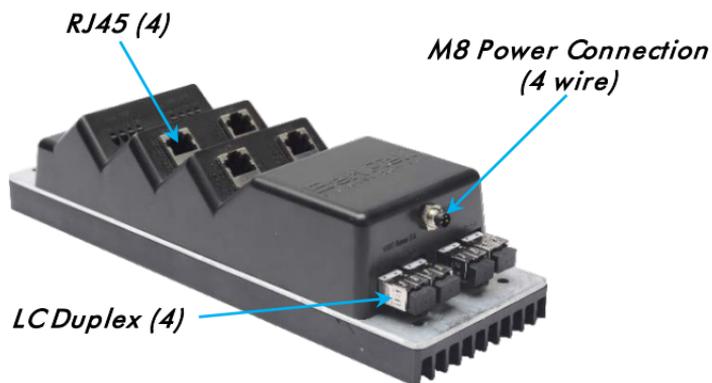*Pull grip with Pulling Eye Loop on end (first to come off)*

1-Port Remote

B | Remote Location Installation of the 1-Port, 2-Port, or 4-Port Remote

1 | An appropriately rated NEMA box is required in any location where the Remote may come into contact with rain, other liquids, or be subjected to condensation. Leave about 1 meter (3 ft.) of the pre-terminated end of the cable inside the NEMA box and pull the opposite end through to the closet. The cable should be routed in a circle around inside edge of box, while maintaining the minimum bend radius.

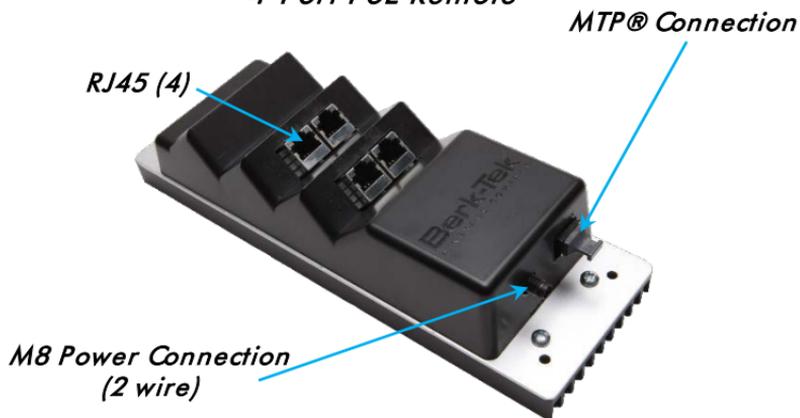2 | Mount the Remote towards the top of the back plate of the NEMA box with four appropriate #8 screws.

3 | Remove fiber dust caps and clean connector end faces with a fiber optic microfiber dry cleaner .

1-Port Remote

Device Connection (RJ45)

M8 Power Connection (2-wire)

Duplex LC Connection

Pre-terminated Cable end

4 | Connect the pre-terminated LC duplex connectors, or MTP® connector, and the M8 connector to the Remote. Ensure the cable loops easily around the box and that there are no tight bends in the fibers (minimum bend radius is about 10 cm).

5 | Connect the remote active device to the Remote with a RJ45 terminated patch cord (also through a cable grip if required).

RJ45

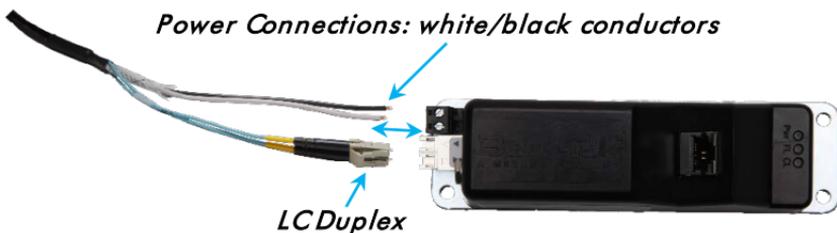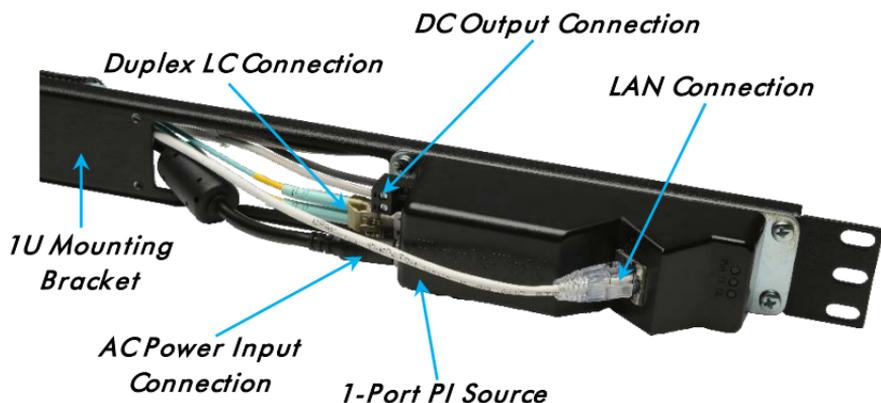**OneReach Cable Assembly (OCA)**

1-Port Remote

RJ45 (2)

2-Port Remote

4-Port PoE+ Remote

RJ45 (4)

M8 Power Connection
(4 wire)

LC Duplex (4)

4-Port PoE Remote

MTP® Connection

RJ45 (4)

M8 Power Connection
(2 wire)

C | Hook-up for the 1-Port PI Source

1 | Route hybrid cable to location where the PI Source is to be mounted.

2 | Mount the PI Source using four appropriate #8 screws to the 1U mounting bracket.

3 | With no power applied to the PI source, attach conductors to the appropriate terminal one at a time and tighten each terminal screw of the dual terminal block.

4 | Connect the terminated LC duplex connectors to the PI Source.

5 | Make the network connection to RJ45 connector.

6 | Remove fiber dust caps and clean connector end faces with a fiber optic cleaner. Plug in duplex LC connector.

7 | Connect either the barrel (or M8) connector from the AC power supply to the PI Source.

8 | Plug the power supply into the AC outlet.

9 | Ensure that the PI Media Source "Pwr" LED Indicator is illuminated.

Power Connections: white/black conductors

LC Duplex

Duplex LC Connection

DC Output Connection

LAN Connection

1U Mounting Bracket

AC Power Input Connection

1-Port PI Source

D | Closet Installation for the 4-Port PI Media Module

1 | Route cable in the closet to the rear of the Power Injection Chassis, accounting for proper bend radius. For pre-terminated assemblies, route excess cable in slack management at the side or rear of the rack.

2 | Terminating the bare end of pigtail assemblies only.
    a.   Cut cable to appropriate length so there is an extra six feet of cable available. Note that some surge protectors require additional distance between the cable end and the chassis/Remote. This may require more cable length to be prepared.

    b.   Strip back the cable jacket at least one foot and terminate the fibers with appropriate connectors.

    c.   With the copper conductors approximately the same length as the fibers, strip about ¼ inch of insulation from copper conductors. Keep any excess copper conductor, as it may be needed for use with a surge protector.

3 | Shut off the power to the chassis using the rear switches of all power supplies in the chassis.

4 | Match the copper conductor to the color identification on the terminal block. Insert the stripped conductors one at a time, and tighten each terminal screw.

Note: Be sure the chassis has all power supplies shut off before hooking up a cable and that the wire colors match the terminal block identification.

a. Each screw down terminal has at least a B and W position. Each conductor pair uses a single terminal block. The table below provides the conductor termination guide; conductor pairs are shown by row in the below table.

B Terminal	W Terminal
Black	White
Blue	Yellow
Brown	Orange
Purple	Pink

b. Some terminals have a R position; this position is for use with older 4-Port remotes and their associated OCA, and would have a red conductor terminated to that terminal.

5 | Remove fiber dust caps and clean connector end faces with a fiber optic microfiber dry cleaner. Plug the LC or MTP® connectors into the appropriate connectors on the rear of the Media Modules.

6 | Connect the desired network equipment to the RJ45 ports on the front of the Media Modules to communicate with the remote end devices.

7 | Plug in and turn on all power supplies in the Power Injection Chassis.

8 | Ensure that all the Power Supply "ON" indicators are illuminated.

Equipment Connections (e.g. Ethernet switch, server, NVR)

Slide-in Media Module

Power Supply

9 | Ensure the Remote "Pwr" Indicator is illuminated.

10 | Blue "FL" LED's on the slide-in Media Module indicate that the fiber port is linked between the two locations.
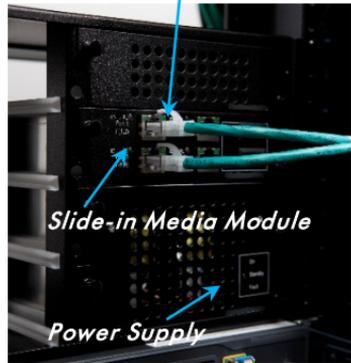
E | Grounding

A basic OneReach circuit diagram is provided below for informational purposes. To minimize potential for circulating ground current, the electronics and hybrid power conductors are isolated from the chassis ground, except for transient voltage suppressor (TVS below) protection devices.
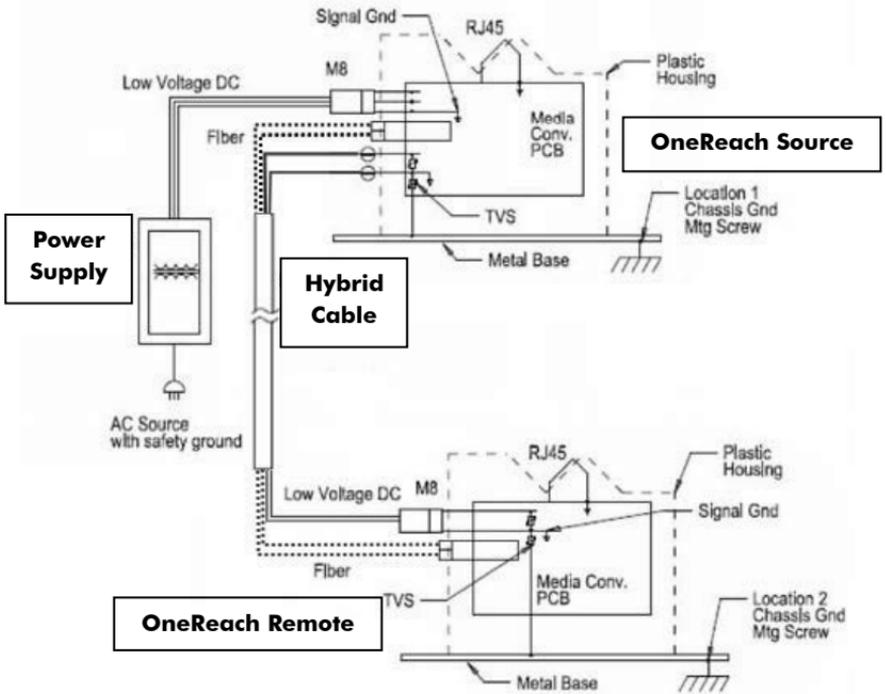
Both the PI source and the remote have internal surge suppression devices, which shunt common mode power surge power that may be induced in the hybrid cable to ground. Transient voltage suppression is part of the circuit, but the base plates must be grounded to facilitate surge voltage protection. Proper installation ensures that the 1.5 kW surge suppression will operate as intended.


The installer must mount the OneReach units such that the base plates are connected to local ground. This is done by using grounding screws (not supplied) to secure the metal base of the PI source or remote to a mounting plate connected to an approved ground.

If the PI source or remote cannot be connected directly to a grounded plate, a ground wire with grounding lug (not supplied) must be used. The ground lug and wire must be installed between the base plate and the ground screw, and tightened securely. The other end of the ground wire is connected to an approved earth ground. Use a copper ground wire, minimum 12AWG (not supplied). Be sure the OneReach system is properly grounded prior to applying power.

F | Surge Protection

For applications where remote devices are outdoors and in danger of possible lightning strikes, 48VDC surge protectors, specifically rated for lightning strike protection, are **strongly** recommended. Berk-Tek likewise **strongly** recommends that in lightning prone applications, a network data line grounded surge suppressor be added on the UTP cables running to the powered device, and a high power grounded surge suppression device be installed at the source end of the hybrid cable. Specific installation guidelines are dependent on the surge protection device selected and the network design.
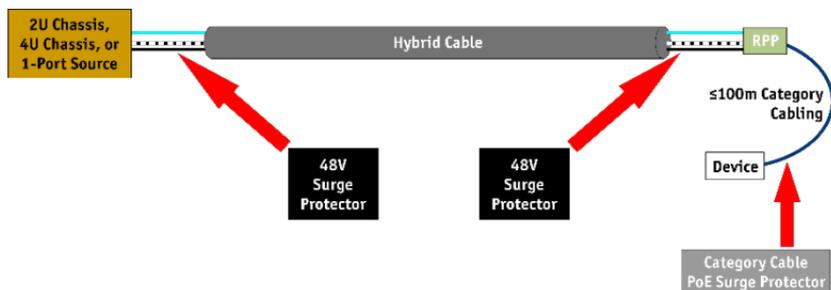
Technical support for the OneReach product line may be reached at 1-800-237-5835 or via email at berktek.support@nexans.com.

Technical Specifications

Standards
Ethernet IEEE Std. 802.3i/u/ab/z, Power Over Ethernet IEEE802.3at

Compliance
Safety: UL 60950-1
Radiation: CFR FCC Part 15 Subpart B