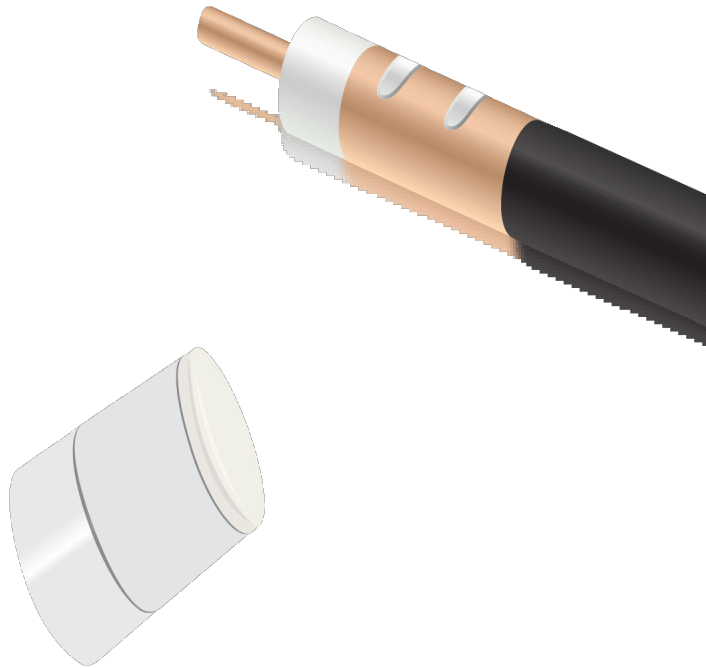




INSTALLATION GUIDE

Radiating Cable

ProSoft Technology®



RCL/RCH

March 10, 2020

Important Information

Your Feedback Please

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March 10, 2020

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For professional users in the European Union

If you wish to discard electrical and electronic equipment (EEE), please contact your dealer or supplier for further information.



Warning – Cancer and Reproductive Harm – www.P65Warnings.ca.gov

Installation Instructions:

THIS EQUIPMENT IS AN OPEN-TYPE DEVICE AND IS MEANT TO BE INSTALLED IN AN ENCLOSURE SUITABLE FOR THE ENVIRONMENT SUCH THAT THE EQUIPMENT IS ONLY ACCESSIBLE WITH THE USE OF A TOOL.

SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D HAZARDOUS LOCATIONS, OR NONHAZARDOUS LOCATIONS ONLY.

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

WARNING – EXPLOSION HAZARD – SUBSTITUTION OF ANY COMPONENT MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

Agency Approvals and Certifications

Please visit our website: www.prosoft-technology.com

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1 Installation

In a wireless system, electromagnetic waves, or radio frequencies, are transmitted and received by radios. In environments where the transmission or reception of these radio signals cannot effectively reach the antennas of the receiving radios due to obstructions, wireless communications may drop or experience faults. A busy manufacturing plant is an example of an industrial environment where there may be obstructions reflecting and blocking RF frequency signals.

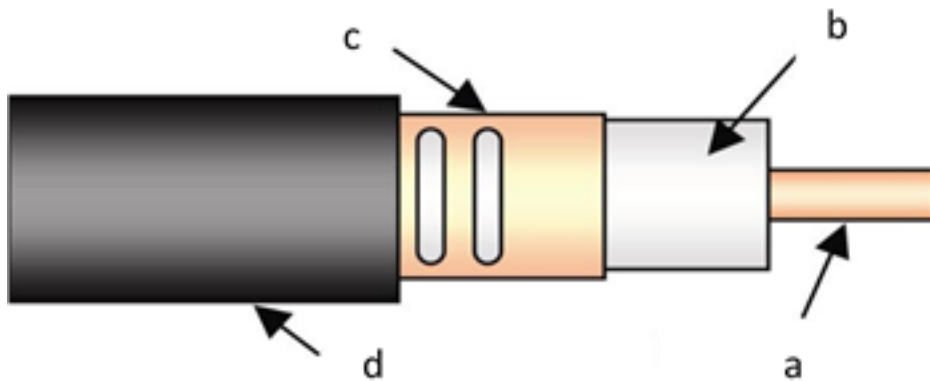
In environments like this, a radiating cable may be used to achieve line of sight. Radiating cable provides a reliable wireless connection for many types of applications that have Ethernet devices moving along a fixed track including:

- Electrified monorail systems (EMS)
- Skillet Conveyors
- Cranes
- Rotating machinery
- Automated Storage Retrieval Systems
- And others

2 Cable Construction

It's a good idea to understand how radiating cables are constructed. The following illustration shows how the cable is assembled.

- a. Inner conductor
- b. Dielectric
- c. Slotted Outer Conductor
- d. Cable Jacket



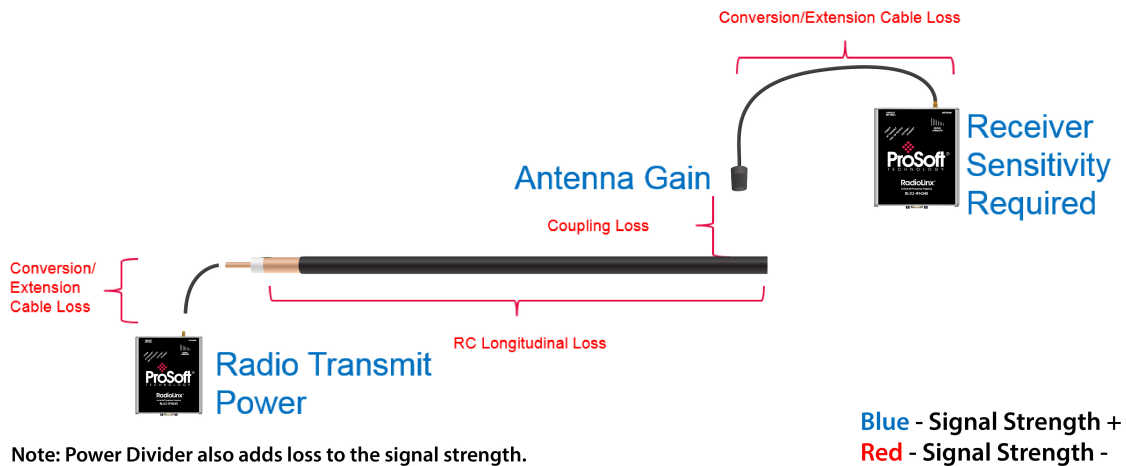
3 Signal Losses with Radiating Cables

As with all antennas, the transmission of radio frequencies with a radiating cable is subject to loss. The two types of signal loss that need to be considered in a radiating cable application are known as longitudinal loss and coupling loss.

- Coupling Loss
- Longitudinal Loss

3.1 Coupling Loss

Delete this text and replace it with your own content.



3.2 Longitudinal Loss

Longitudinal loss is the measure of attenuation of the signal propagation across the length of the radiating cable. Attenuation of the radio frequencies increases with the length of the cable.

4 Radiating Cable Application Components

Click each item for information:

- [Radios](#)
- [Conversion Cables](#)
- [Extension Cables](#)
- [Connectors](#)
- [Radiating Cables](#)
- [Resistors](#)
- [Splitters](#)
- [IP67 Cables](#)
- [Preparation Tool](#)
- [Cable Hanger](#)

4.1 Radios



RLX2-IHNF-W

802.11 abgn Weatherproof IP67 Fast Industrial Hotspot



RLX2-IHNF-WC

802.11 abgn Weatherproof IP67 Fast Industrial Hotspot, Conduit



RLX2-IHNF

802.11 abgn Fast Industrial Hotspot, IP20

4.2 Conversion Cables

- C40Mxx-yy-zz LMR195® 400 Cables



4.3 Extension Cables

C40Mxx-yy-zzz LMR® (N-Plug to N-Plug).

- C40M40-40-xxx (N-plug to N-plug)



4.4 RC Connectors

RCX-CON-50-US

- N-Type Radiating Cable Connector, Female.



4.5 Radiating Cable

RCHB-xxxM

- 5GHz-Bulk Radiating Cable

RCLB-xxxM

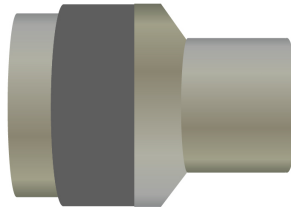
- 2.4GHz-Bulk Radiating Cable



4.6 RC Resistor

RLX-LFTR-40

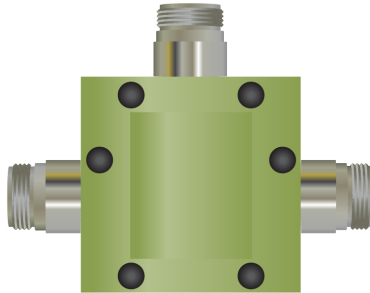
- 50 Ohm Terminating Resistor - N-Plug



4.7 Splitter

PD50-2

2-Way Power Divider



4.8 IP67 Cables

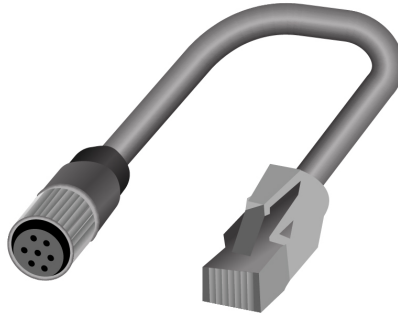
CULPWR-M12-XXX

- 4-pin A Code M12 to Un-terminated leads, Power Cable



CULRJ45-M12-XXX

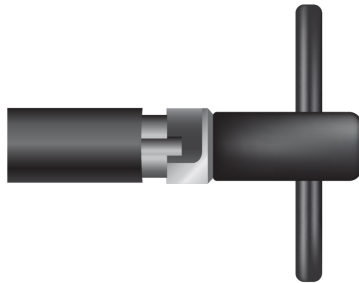
- 8-pin A Code M12 to RJ45 Network Cable



4.9 Radiating Cable Preparation Tool

RCX-CPTOOL-US

- Radiating Cable Preparation Tool



4.10 Radiated Cable Hangers

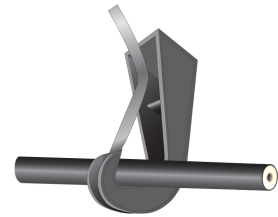
RCX-CLIC-KIT-US Hanger Kit with Round Spacer



RCX-XLIC-K85-US Hanger Kit with Rectangular Spacer

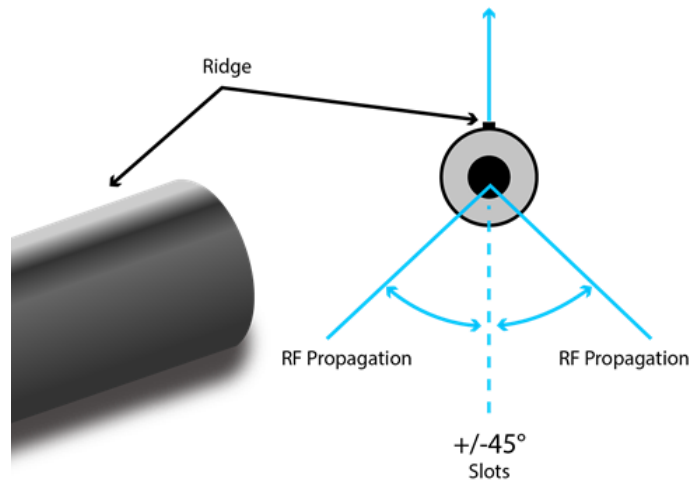


RCX-HNG-US Hanger Hardware - Hook Hanger with tightening strap (100 Pack)



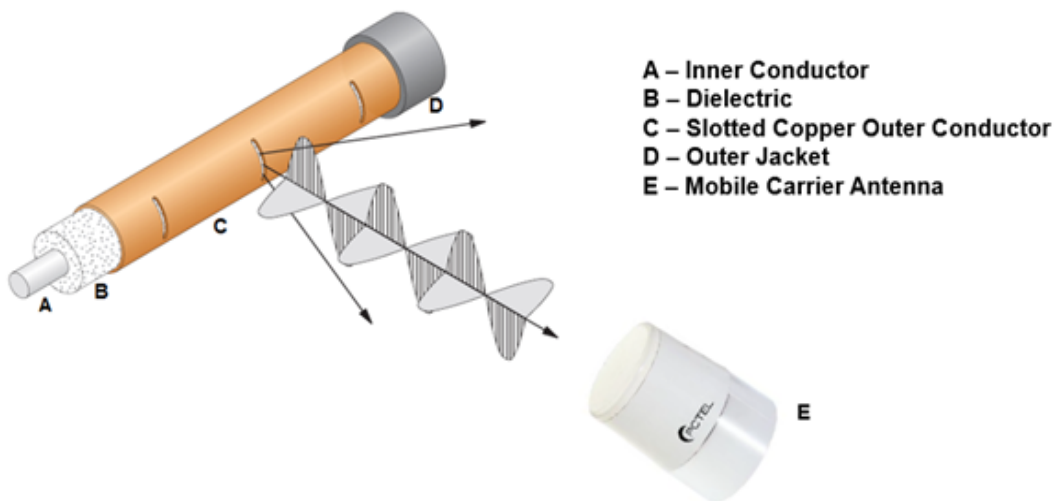
5 Alignment

The openings in the slotted outer conductor determine the wavelength, or frequency, to be radiated from the cable. These slots must be oriented toward the area requiring coverage. The slots are located 180° from the ridge on the outer jacket.



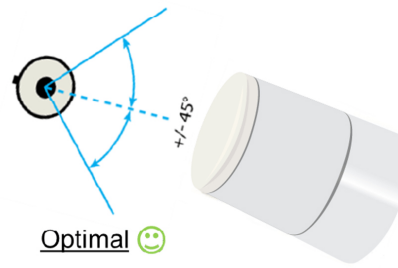
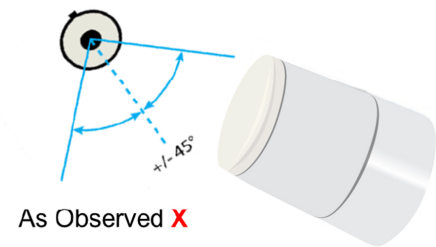
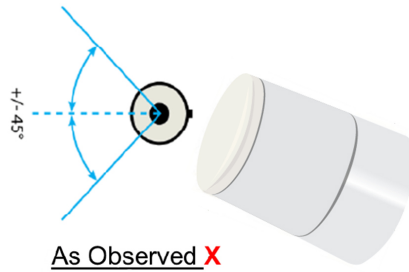
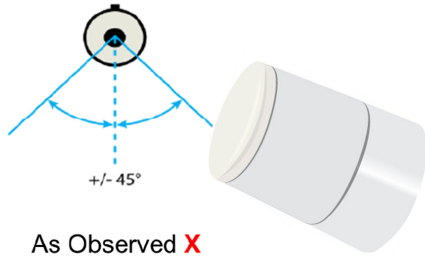
To ensure optimal wireless communication, the receiving antenna should be aligned with the slots of the radiating cable. The distance between the radiating cable and the receiving antenna is recommended to be approximately:

- 5 GHz: 1.25 - 10 cm
- 2.4 GHz: 4 - 7



5.1 Receiving Antenna Alignment Examples

RELATION TO ANTENNA



6 Bending Radius

While laying the cable in the application, make sure the cable is not bent tighter than the minimum bending radius of 20cm to avoid damage. Do not kink the radiating cable.



>20cm

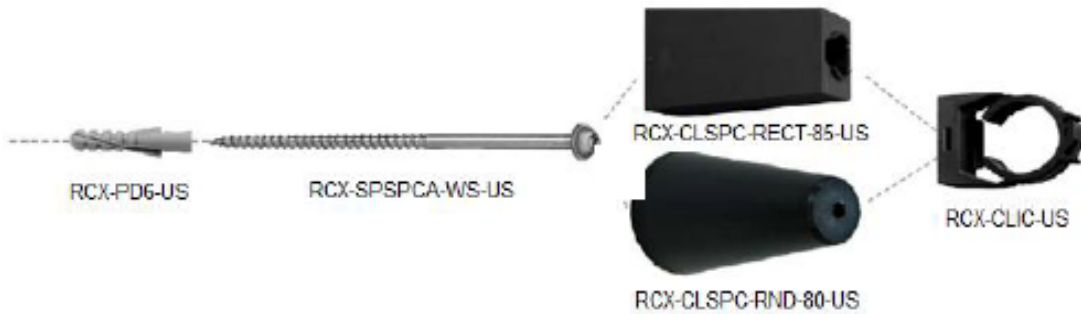
7 Fixing Hangers

Radiating cable is mounted with clip hangers or clic clamps. The maximum gap between hanger-s/clamps should not exceed 1 meter. The securing clips should be plastic and should not cover the openings in the slotted outer conductor. The cable should not be mounted in a way where movement in the application will cause stress on the cable (shifting ground, etc).

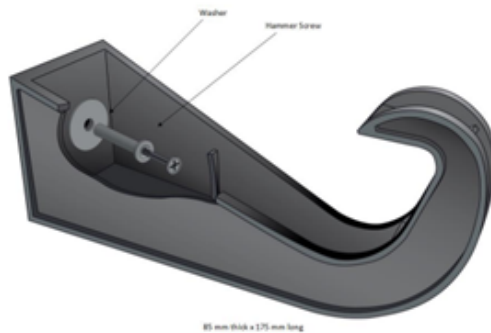
To install a clip hanger:



To install a clic clamp:



To install a hook hanger:





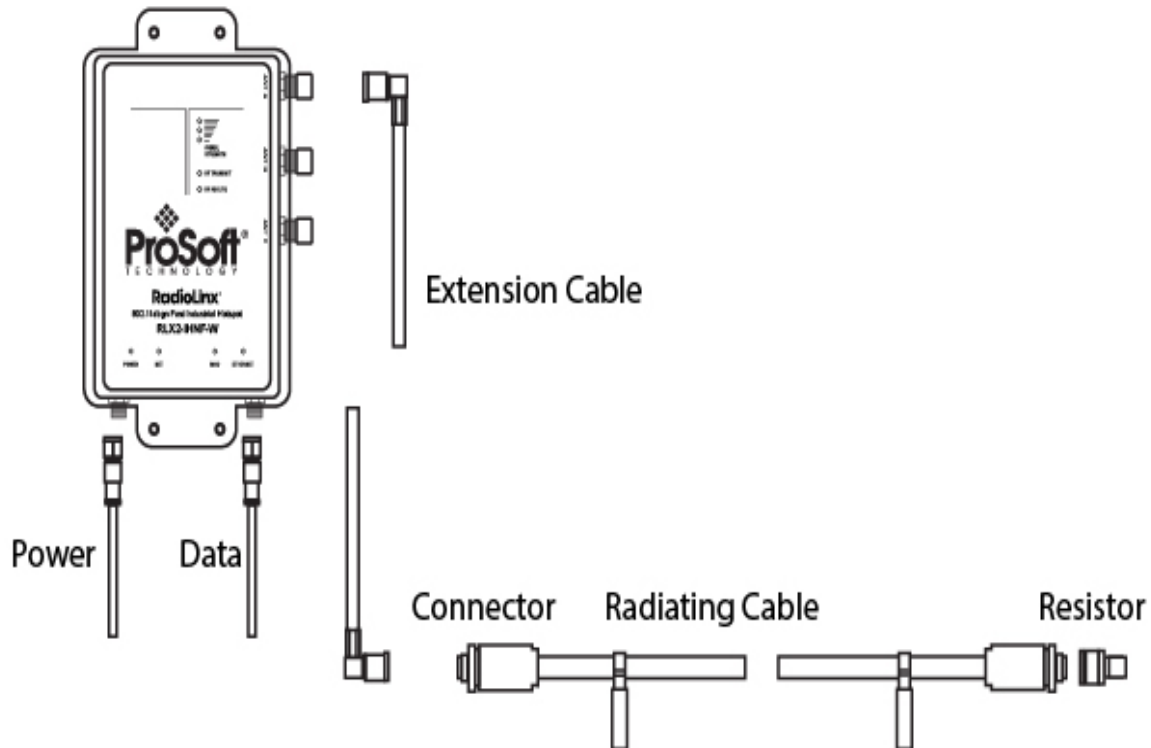
Installation Considerations/Planning:

1. Determine location of master radios, splitters, resistors, etc.
2. Determine the orientation of the receiving antenna. See Alignment section of this manual.
3. Determine the types of hangers/standoffs to be installed.
4. Determine the spacing of the hangers/standoffs. Allow space for cable accessories.
5. Determine when and where to prepare the cable ends for installation of cable connectors. See Radiating Cable Preparation procedure in this manual.
6. Install the hangers/clamps along the application.
7. Start securing the cable at one end of the segment.
8. Continue securing the cable in the hangers, while ensuring the orientation of the cable is correct.
9. Install the accessories and test installation

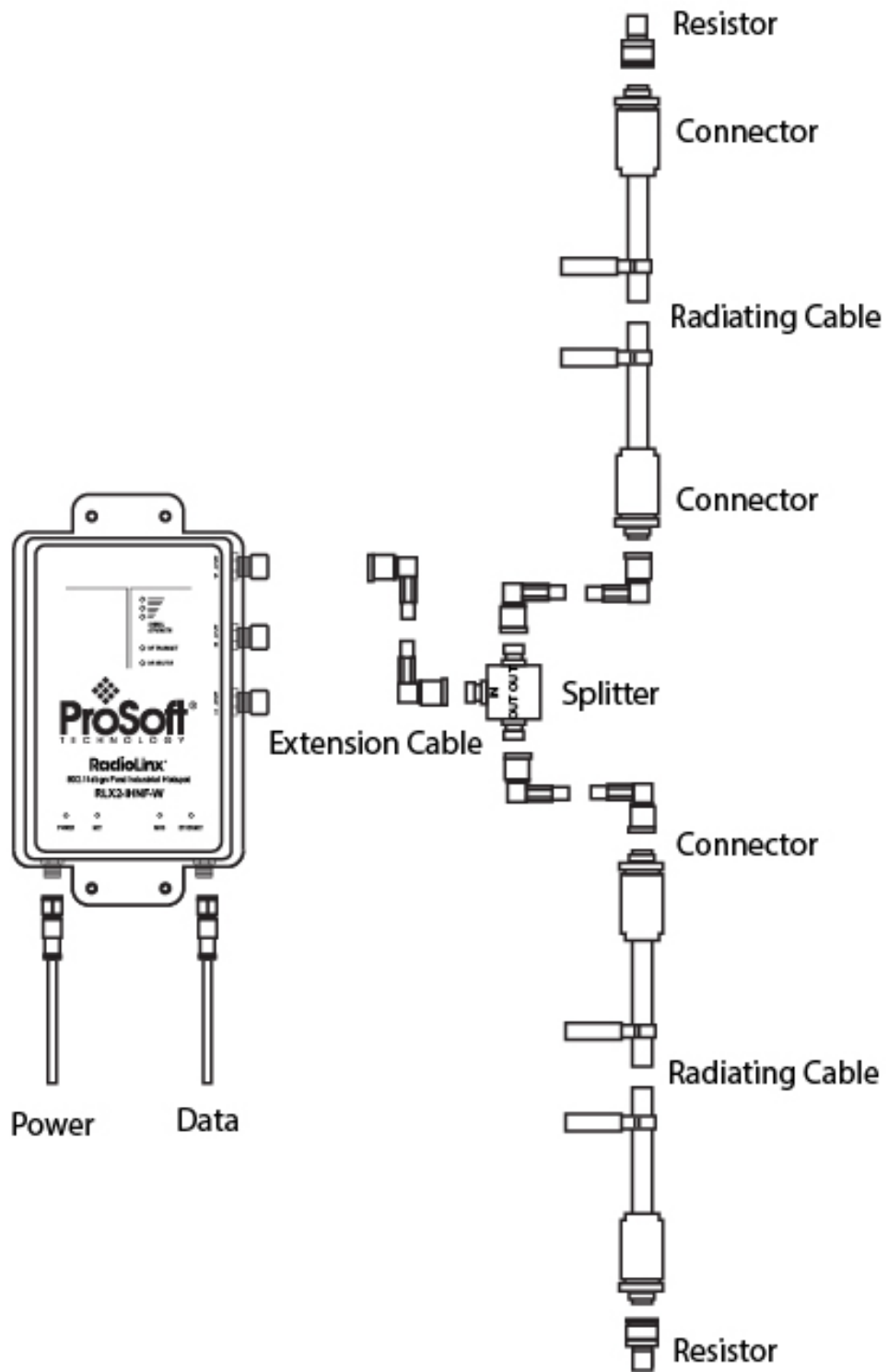
There are multiple installation options for hangers and clamps, depending on your environment. Contact ProSoft Technology for more information.

8 Connecting Cables and Radios

The RLX2-IHNF family of products has been engineered for use with radiating cable. To connect radiating cable, an extension cable is used (C40M60-60-xxx and C40M40-40-xxx). Connect the extension cable to the antenna port A of the radio, then connect the other end to the radiating cable. Signal loss in the extension cable increases with the length, so the cable length should be kept to a minimum.



It is also possible to connect two segments of radiating cable to a radio with the use of a splitter. The splitter splits the power from the radio in half and shares it across the two segments. These segments must be shorter than a segment that is supplied full power from the radio.



To use a splitter:

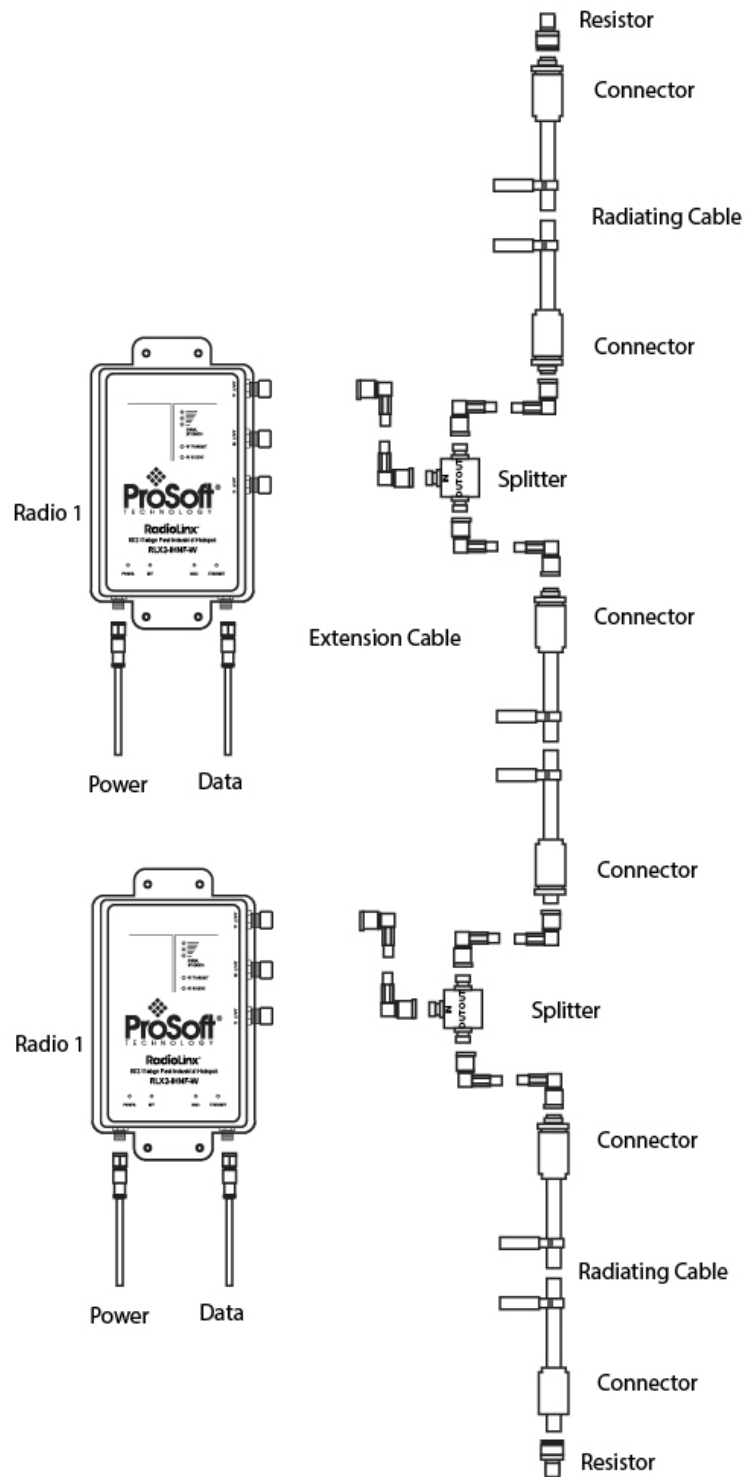
1. Connect the extension cable to the antenna port A of the radio, then connect the other end to the IN port of the splitter.
2. Connect an extension cable to the OUT port of the splitter, and connect the other end to the connector on the radiating cable. Do this for both OUT ports of the splitter.

It is also possible to install a single segment of radiating cable with a radio on each end. This implementation gives better RF overlap which is valuable in roaming applications.

To install a single segment of radiating cable with a radio on each end:

1. Connect the extension cable to the antenna port A of the first radio, then connect the other end to the IN port of the splitter.
2. Connect an extension cable to the OUT port of the splitter and connect the other end to the connector on the radiating cable. Do this for both OUT ports of the splitter
3. Repeat step 1 for the second radio at the end of the radiating cable.

The following example shows how the components are used in this configuration:



9 Radiating Cable Preparation

The cable must be stripped in order to fit a connector to the cable itself.

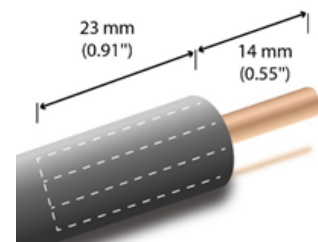
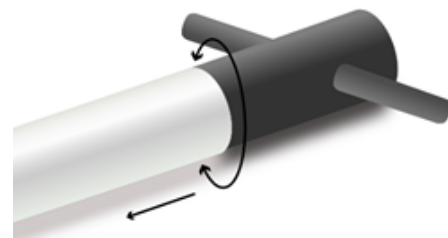
- 1 Cut cable to correct length.



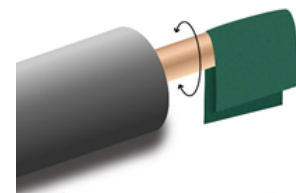
- 2 Smooth edges with a fine sandpaper.



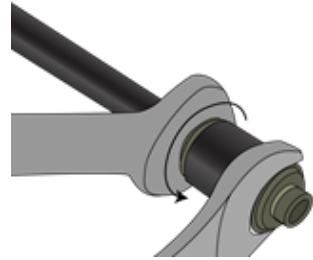
- 3 Use RCX-CPTOOL-US to strip the cable jacket, outer conductor, and dielectric until 14mm of inner conductor is exposed. 23mm of unobstructed cable is required for the mating of the connector.



- 4 Sand the edge of the inner-conductor to a 45° angle.



- 5 Unscrew the connector to separate into two pieces. Position the female end on the radiating cable over the outer jacket, and screw on the male end over the inner conductor to 20-25 Nm.



10 Grounding

RLX2-IHNF

The ground connection of the equipment is made through the DIN clip. The DIN rail shall be properly grounded to the building ground as well as the antenna coaxial screen of the connector.

RLX2-IHNF-W

The equipment shall be properly grounded with the external ground screw connected to building ground as well as the antenna coaxial screen of the connector.

The common or earth side of the circuit is connected to the screen of the coaxial cable and to all accessible parts and circuits.

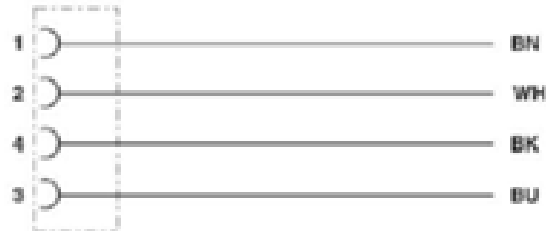


The grounding screw sits between the power connection and the Ethernet connection.

11 Connectors

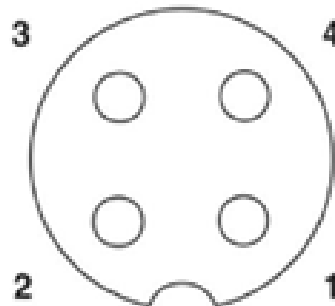
Power

Contact Assignment of the M12 Socket

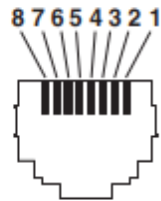


- BK (Black) and BU (Blue) wires are tied together and connect to "+".
- BN (Brown) and WH (White) wires are tied together and connected to "-".

Pin Assignment M12 Socket, 4-pos, A-coded, View Female Side

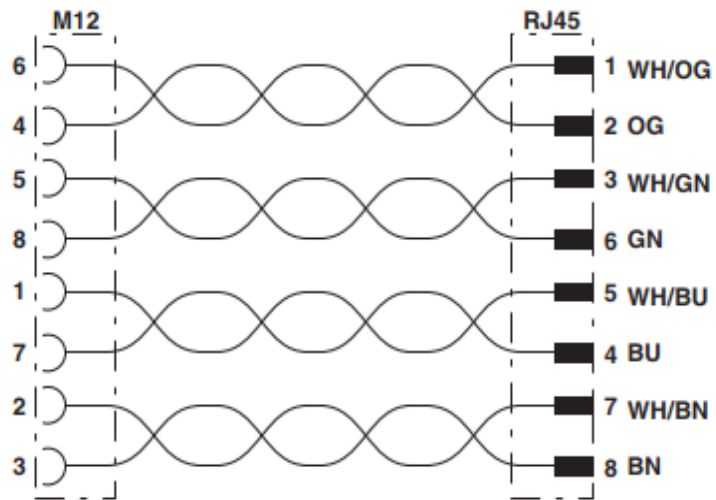


Data

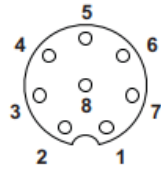


Connector pin assignment plug RJ45

Circuit diagram



Contact assignment of the M12 and RJ45 plug



Pin assignment M12 socket, 8-pos., A-coded, view female side