Datasheet

Sure Cross® R70SR Serial Data Radios are compact, industrial, low-power wireless communications devices used to extend the range of serial communications networks. The Serial Data Radios are available in two frequencies, 900 MHz and 2.4GHz, and are fitted with M12 quick disconnect connectors for fast deployment.

- RS-485 serial communication
- Star or tree network topology configuration
- DIP switches select operational modes
- Frequency Hopping Spread Spectrum (FHSS) technology ensures reliable data delivery
- Self-healing, auto-routing radio frequency network with multiple hops to extend the network's range

For additional information, updated documentation, and a list of accessories, refer to Banner Engineering's website, www.bannerengineering.com.

R70SR Models

Models	Frequency	Transmit Power
R70SR9MQ	900 MHz ISM Band	1 Watt
R70SR2MQ	2.4 GHz ISM Band	65 mW (100 mW EIRP)

Quick Start Guide

Setting Up Your Data Radio Network

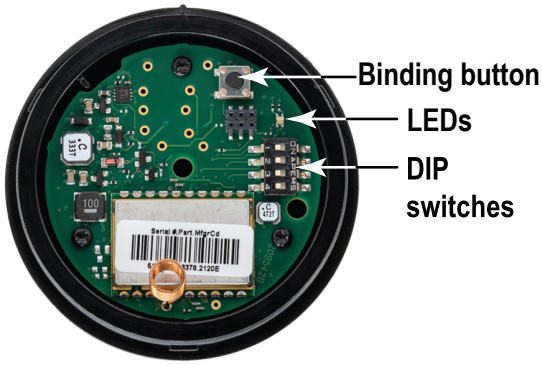
To set up and install your wireless Data Radio network, follow these steps:

1. Before installing your data radios, verify that your serial devices work. Connect your serial devices using a serial cable.
2. Configure the DIP switches of all devices.
3. Apply power to all devices.
4. Form the wireless network by binding the repeater and peripheral radios to the controller/primary radio.
5. Observe the LED behavior to verify the devices are communicating with each other.
6. Install your wireless sensor network components. For more details about installing your radios, refer to the Sure Cross Installation Guide (p/n 151514) downloadable from the Wireless Reference Library at www.bannerengineering.com.

Configuration Instructions

Buttons and LEDs

Binding button, LEDs, and DIP switches



Configure the DIP Switches

Before changing DIP switch positions, disconnect the power[1]. Any changes made to the DIP switches are not recognized until after power is cycled to the device. For parameters not set using the DIP switches, use the configuration software to make configuration changes. For parameters set using the DIP switches, the DIP switch positions override any changes made using the configuration software.

Open the Cover

If the cover is in the locked position, the arrow on the cover is above the notch on the base. Follow these steps to unlock and remove the cover.

1. Rotate the cover counterclockwise so that the notches are aligned together.
2. Pull the top cover off.

DIP Switch Settings for the R70SR

Device Settings	DIP Switches			
	1	2	3	4
Serial baud rate (19200); No parity (software default setting)	OFF			
Serial baud rate 9600; No parity	ON			
Routed mode (master to slave; repeater/slave to master) (default setting)		OFF		
Broadcast mode		ON		
Set this radio to be a slave radio (default setting) (900 MHz or 2.4 GHz models)			OFF	OFF
Set this radio to be a master radio • 900 MHz models: Set to 1 W (30 dBm) transmit power • 2.4 GHz models: Transmit power remains at 65 mW			OFF	ON
Set this radio to be a repeater radio (900 MHz or 2.4 GHz models)			ON	OFF
Set this radio to be a master radio • 900 MHz models: Set to 250 mW (24 dBm) transmit power • 2.4 GHz models: Transmit power remains at 65 mW			ON	ON

Baud Rate and Parity— Use the Baud Rate and Parity setting DIP switches to configure the radio's serial port. These settings must match the device wired to the radio's serial port. A faster baud rate setting may improve system response time. Changing the baud rate does NOT change the radio transmission rate. The Software default also provides the ability to set custom baud rate and timing parameter settings via AT commands. For more information, see the technical note Changing the Baud Rate and Parity on an R70SR Serial Data Radio (p/n b_51173725).

Routed Mode—Use routed messaging when using a point-to-point or point-to-point-with-repeater topology. Routing is more robust and faster than broadcast messaging. In Routed mode, the radios will route serial data packets only to a single device. In general, this mode is for faster communications. If the Slave/Repeaters are in Routed mode, they will only route serial data packets to the Master and will only listen for serial data packets coming from the Master. If the Master radio is in Routed mode, it will only route serial data packets to the first Slave radio that comes into the network. The Master Radio should only be in Routed mode if used in a Point to Point Network.

Broadcast Mode—Broadcast mode allows for more flexible radio layouts and is used in the star and MultiHop tree topologies. These topologies are much more flexible but they are slower. When using broadcast mode, a small percentage of data packets will not be reach their destination. Broadcast mode requires the application layer to automatically retry packets that time out. In networks with multiple slaves, the master radio must use broadcast mode, but the slaves can be set to use routing mode to route their data packets back to the master radio. In Broadcast Mode, the radios will route serial data packets to all devices in the network. In general, this mode will have slower communication speeds but will allow for much more system flexibility. If the Slave/Repeaters are in Broadcast mode, they will route serial data packets to all other devices and will listen to serial data packets coming from all devices. If the Master radio is in Broadcast mode, it will route serial data packets to all Slave/Repeaters and listen to serial data packets coming from all devices.

Transmit Power Levels—The 900 MHz radios transmit at 1 Watt (30 dBm) or 250 mW (24 dBm). The 250 mW mode reduces the radio's range, which can help avoid cross talk in areas with multiple systems. For 2.4 GHz models, this DIP switch is disabled. The transmit power for 2.4 GHz is fixed at about 65 mW EIRP (18 dBm).

Star Topology—To configure your radios as a star topology, set one radio to be the master in broadcast mode (DIP switch 2 ON). Set all the other radios to be slaves, also in broadcast mode.

Network Topologies in MultiHop Mode

Cable Replacement Configuration for Point-to-Point Networks--In this simple cable replacement application, the radio system knows all data originating at one end must be transmitted to the other end. This allows the radio system to automatically correct for transmission problems and it also provides the greatest throughput. This is the fastest configuration.

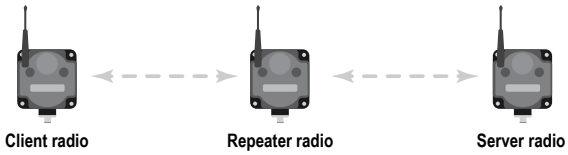
[1] For devices powered by batteries integrated into the housing, triple-click button 2, then double-click button 2 to reset the device without removing the battery.

Simple cable replacement configuration for a point-to-point network

Device Settings	DIP Switches			
	1	2	3	4
Client configuration	On	Off	Off	On
Server configuration	On	Off	Off	Off

Cable Replacement Configuration for with Repeaters--In this simple cable replacement application with a repeater radio, the radio system still knows all data originating at one end must be transmitted to the other end. In this application, no serial devices are connected to the repeater(s). The system still corrects for transmission problems, but it takes time to repeat the message. The network delay is double that of a system with no repeater.

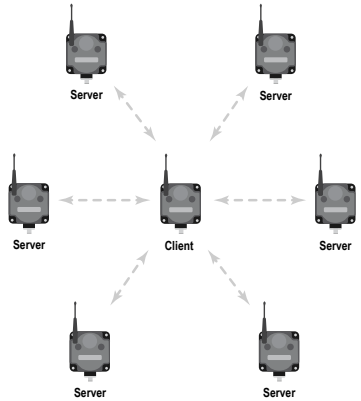
Simple cable replacement configuration for a point-to-point network with a repeater



Device Settings	DIP Switches			
	1	2	3	4
Client configuration	On	Off	Off	On
Repeater configuration	On	Off	On	Off
Server configuration	On	Off	Off	Off

MultiHop Mode (Star Network)--In this more complex star topology, the client radio at the center of the network can communicate with many server radios. A common example would be a PLC at the center communicating with many remote I/O systems. The star topology is slower than a point-to-point network but faster than a tree network.

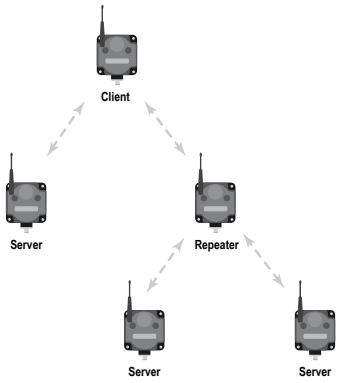
MultiHop mode star network



Device Settings	DIP Switches			
	1	2	3	4
Client configuration	On	Off	Off	On
Server configuration	On	Off	Off	Off

MultiHop Mode with a Tree Network Configuration—A tree network using MultiHop radios is the most powerful wireless system possible; many repeaters and server can be combined to cover vast areas and get around hills or buildings. In the other networks, the wireless "hops" are minimized. In this system, you can "hop" as much as you need to. In MultiHop mode, there may be some speed tradeoffs, but it is still significantly faster and more reliable than a Tree Topology in Serial Mode.

MultiHop mode with a tree network

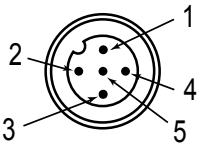


Device Settings	DIP Switches			
	1	2	3	4
Client configuration	On	Off	Off	On
Repeater configuration	On	Off	On	Off
Server configuration	On	Off	Off	Off

Packet Routing in MultiHop Data Radio Mode—In MultiHop Data Radio mode, the client radio first discovers all connected Modbus server in the network, then uses the Modbus ID contained in the incoming Modbus message to wirelessly route the packet only to the radio attached to the target Modbus server. The packet is then passed via the radio's serial interface to the Modbus device where it is processed. This is entirely transparent to the user. Direct packet-by-packet routing offers an advantage over broadcast addressing with MultiHop paths because each hop in the path can be retried independently in the event of a packet error. This results in significantly more reliable packet delivery over MultiHop paths. Modbus IDs 01 through 10 are reserved for server directly connected to the host (local I/O). As such, polling messages addressed to these devices are not relayed over the wireless link. Use Modbus IDs 11 through 60 for remote Modbus server — devices serially connected to an R70 Server or Repeater — allowing a maximum of 50 attached devices.

Apply Power

The R70SR Serial Data Radio is fitted with a 5-pin M12 connector for fast installations. Use straight splitter cordsets to connect multiple devices and power to the R70SR Serial Radio. For a list of splitter and cordset options, see "Accessories for the R70SR Data Radio " on page 7.

5-pin M12 Male Connector	Pin	Wire Color	Wiring Description
	1	Brown (bn)	10 to 30 V DC
	2	White (wh)	RS-485 / D1 / B / +
	3	Blue (bu)	DC common (GND)
	4	Black (bk)	RS-485 / D0 / A / -
	5	Gray (gy)	No connection

Bind the R70SR Serial Data Radio to Form a Network

To create your network, bind the R70SR to the designated server radio.

Verify your radio DIP Switches and connected device Modbus IDs are set according to "Configuration Instructions" on page 1.

Binding the serial data radios ensures all radios within a network communicate only with the other radios within the same network. The serial data primary radio automatically generates a unique binding code when it enters binding mode. This code is transmitted to all radios within range that are also in binding mode. After a repeater/server is bound, the repeater/server radio accepts data only from the client radio to which it is bound. The binding code defines the network, and all radios within a network must use the same binding code.

1. Apply power to all radios and place the R70SR radio at least two meters away from the client radio.
2. Remove the cover. See "Open the Cover" on page 2.
3. On the client radio: Triple-click the binding button to put the client radio into binding mode.
   Both LEDs flash red.

4. On the R70SR: Triple-click the binding button to put the R70SR into binding mode.
   The radio enters binding mode and searches for any client radio in binding mode. While searching for the client radio, the two red LEDs flash alternately. When the radio finds the client radio and is bound, both red LEDs are solid for four seconds, then both red LEDs flash simultaneously four times.
5. Re-install the R70SR's cover.
6. Repeat steps 3 through 5 for as many radios as are needed for your network.
7. On the client radio: After all radios are bound, double-click the binding button to exit binding mode on the client.
   The network begins to form after the client data radio exits binding mode.
8. On the client radio: Re-install the cover to protect the button and radio board.

Child (Server) Radios Synchronize to the Parent (Client) Radios
The synchronization process enables a Sure Cross radio to join a wireless network formed by a client radio. A simple point-to-point network with one client radio and one server radio synchronizes quickly after power up; larger MultiHop networks may take a few minutes to synchronize. First, all radios within range of the client data radio wirelessly synchronize to the client radio. These radios may be server or repeater radios.

After repeater radios are synchronized to the client radio, any radios that are not in sync with the client but can "hear" the repeater radio will synchronize to the repeater radios. Each repeater “family” that forms a wireless network path creates another layer of synchronization process. When testing the devices before installation, verify the radios are at least two meters apart or the communications may fail.

Client Radio LED Behavior

All bound radios set to operate as client radios follow this LED behavior after powering up.

Process Steps	Response	LED 1	LED 2
1	Apply power to the client radio	-	Solid amber
2	The client radio enters RUN mode.	Flashes green	-
	Data packets begin transmitting between the client and its children radios.	-	Flashes amber
	In binding mode	Flashes red	Flashes red

Server Radio LED Behavior

All bound radios set to server or repeater modes follow this LED behavior after powering up.

Process Steps	Response	LED 1	LED 2
1	Apply power to the radio	-	Solid amber (briefly)
2	The server/repeater searches for a parent device.	Flashes red	-
3	A parent device is detected. The client/repeater searches for other parent radios within range.	Solid red	-
4	The server/repeater selects a suitable parent.	-	Solid amber
5	The server/repeater attempts to synchronize to the selected parent.	-	Solid red
6	The server/repeater is synchronized to the parent.	Flashes green	-
7	The server/repeater enters RUN mode.	Solid green, then flashes green	
	Data packets begin transmitting between the server/repeater and its parent radio.	-	Flashes amber
	In binding mode	Flashes red	Flashes red

Installing Your Sure Cross® Radios

Please refer to one of these instruction manuals to install your wireless network components.

- DX80 Performance Wireless I/O Network Instruction Manual: 132607
- MultiHop Data Radio Instruction Manual: 151317

R70SR Specifications

Radio Range

900 MHz (500 mW): Up to 1.6 km (1 mile) (internal antenna)
2.4 GHz: Up to 1000 m (3280 ft) with line of sight (internal antenna)

Antenna Minimum Separation Distance

900 MHz (500 mW): 4.57 m (15 ft) with the supplied 2 dB antenna
2.4 GHz, 65 mW: 0.3 m (1 ft)

Radio Transmit Power

900 MHz Conducted: 27 dBm (500 mW); EIRP with the supplied 4 dB antenna: 31 dBm (1260 mW)

2.4 GHz Conducted: < 18 dBm (65 mW); EIRP with the supplied 2 dB antenna: < 20 dBm (100 mW)

Spread Spectrum Technology

FHSS (Frequency Hopping Spread Spectrum)

Communication Protocols

Modbus® RTU, Modbus/TCP, EtherNet/IP™

EtherNet/IP™ is a trademark of ODVA, Inc.Modbus® is a registered trademark of Schneider Electric USA, Inc.

Security Protocols

TLS, SSL, HTTPS

900 MHz Compliance

Radio module is indicated by the product label marking

Contains FCC ID: UE3RM7023: FCC Part 15, Subpart C, 15.247

Contains IC: 7044A-RM7023

2.4 GHz Compliance (SX243 Radio Module)

Radio module is indicated by the product label marking

Contains FCC ID: UE3SX243: FCC Part 15, Subpart C, 15.247

Radio Equipment Directive (RED) 2014/53/EU

ETSI/EN: EN 300 328 V2.2.2 (2019-07) [RED HarmStds]

Contains IC: 7044A-SX243

ANATEL: 03737-22-04042

ANATEL
Agência Nacional de Telecomunicações

Radio Data Transfer Rate

900 MHz: 300 kbps

2.4 GHz: 250 kbps

Supply Voltage

10 V DC to 30 V DC (Outside the USA: 12 V DC to 24 V DC, ± 10%)

For European applications, power this device from a Limited Power Source as defined in EN 60950-1.

Average Current for 900 MHz Radios (1500 byte packets at 50 ms intervals)

Client Mode: 0.12 A at 12 V; 0.06 A at 24 V

Server Mode: 0.03 A at 12 V; 0.017 A at 24 V

Average Current for 2.4 GHz Radios (1500 byte packets at 50 ms intervals

Client Mode: 0.035 A at 12 V; 0.02 A at 24 V

Server Mode: 0.022 A at 12 V; 0.014 A at 24 V

Interface

Two bi-color LED indicators

One button (under the small round cover)

Construction

Base: Black polycarbonate

Cover: Translucent gray polycarbonate

Operating Conditions

–40 °C to +85 °C (–40 °F to +185 °F)

95% maximum relative humidity (non-condensing)

Radiated Immunity: 10 V/m (EN 61000-4-3)

Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

Environmental Ratings

IP65

For installation and waterproofing instructions, go to www.bannerengineering.com and search for the complete instruction manual

Shock and Vibration

All models meet IEC 60068-2-6 and IEC 60068-2-27 testing criteria

Shock: 30G 11 ms duration, half sine wave per IEC 60068-2-27

Vibration: 10 Hz to 55 Hz, 0.5 mm peak-to-peak amplitude per IEC 60068-2-6

Certifications

Banner Engineering BV
Park Lane, Culliganlaan 2F bus 3
1831 Diegem, BELGIUM

Turck Banner LTD Blenheim House
Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN

(CE/UKCA approval only applies to 2.4 GHz models)

CCAK23Y20040T2

警語低功率電波輻射性電機管理辦法第十二條經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大 功率或變更原設計之特性及功能。第十四條低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並 改善至無干擾時方得繼續使用。前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻 射性電機設備之干擾 。

FCC Part 15 Class A for Intentional Radiators

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada Statement for Intentional Radiators

This device contains licence-exempt transmitters(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

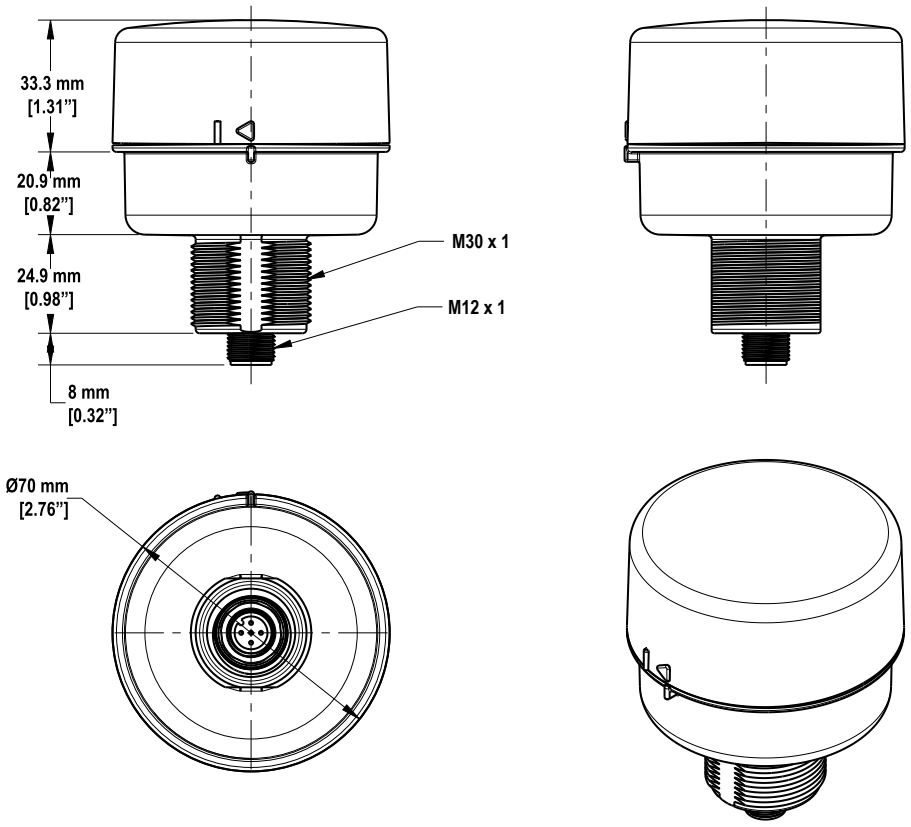
Cet appareil contient des émetteurs/récepteurs exemptés de licence conformes à la norme Innovation, Sciences, et Développement économique Canada. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage.
2. L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

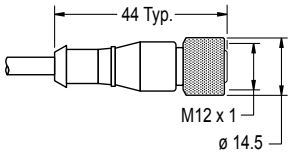
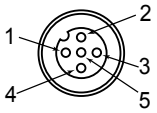
Dimensions for the R70SR

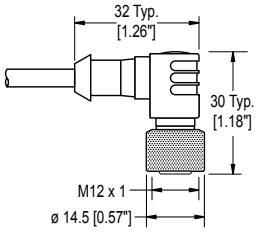
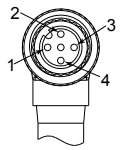
All measurements are listed in millimeters, unless noted otherwise.

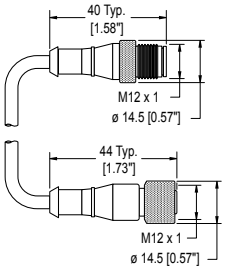
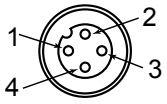
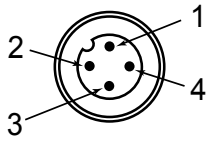
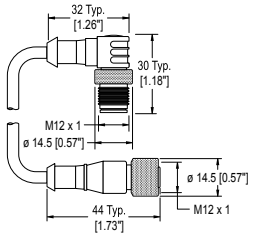
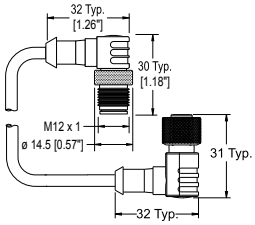
Dimensions for the R70SR

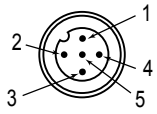
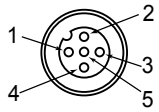
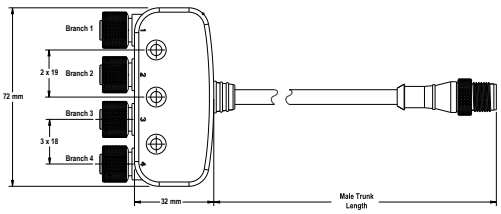


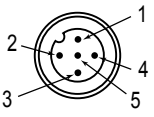
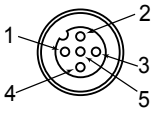
Accessories for the R70SR Data Radio

4-Pin Threaded M12 Cordsets—Single Ended					
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**	
MQDC-403	1 m (3.28 ft)	Straight			1 = Brown 2 = White 3 = Blue 4 = Black 5 = Not used
MQDC-406	2 m (6.56 ft)				
MQDC-410	3 m (9.8 ft)				
MQDC-415	5 m (16.4 ft)				
MQDC-430	9 m (29.5 ft)				
MQDC-450	15 m (49.2 ft)				

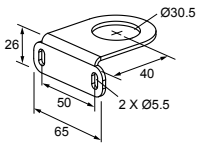
4-Pin Threaded M12 Cordsets—Single Ended					
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**	
MQDC-406RA	2 m (6.56 ft)	Right-Angle			1 = Brown 2 = White 3 = Blue 4 = Black 5 = Not used
MQDC-415RA	5 m (16.4 ft)				
MQDC-430RA	9 m (29.5 ft)				
MQDC-450RA	15 m (49.2 ft)				

4-Pin Threaded M12 Cordsets—Double Ended				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
MQDEC-401SS	0.31 m (1 ft)	Male Straight/Female Straight		Female  Male  1 = Brown 2 = White 3 = Blue 4 = Black
MQDEC-403SS	0.91 m (2.99 ft)			
MQDEC-406SS	1.83 m (6 ft)			
MQDEC-412SS	3.66 m (12 ft)			
MQDEC-420SS	6.10 m (20 ft)			
MQDEC-430SS	9.14 m (30.2 ft)			
MQDEC-450SS	15.2 m (49.9 ft)			
MQDEC-403RS	0.91 m (2.99 ft)	Male Right-Angle/ Female Straight		
MQDEC-406RS	1.83 m (6 ft)			
MQDEC-412RS	3.66 m (12 ft)			
MQDEC-420RS	6.10 m (20 ft)			
MQDEC-430RS	9.14 m (30.2 ft)			
MQDEC-450RS	15.2 m (49.9 ft)			
MQDEC-403RR	0.9 m (2.9 ft)	Male Right-Angle/ Female Right-Angle		
MQDEC-406RR	1.8 m (5.9 ft)			
MQDEC-412RR	3.6 m (11.8 ft)			
MQDEC-420RR	6.1 m (20 ft)			

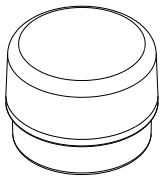
5-Pin Threaded M12 Splitter Cordset with Flat Junction—Double Ended				
Model	**Trunk (Male)**	**Branches (Female)**	**Pinout (Male)**	**Pinout (Female)**
CSB4-M1251M1250	0.3 m (0.98 ft)	Four (no cable)		
			1 = Brown 2 = White 3 = Blue	4 = Black 5 = Gray

5-Pin Threaded M12 Splitter Tee				
Model	**Description**		**Pinout (Male)**	**Pinout (Female)**
CSB-M1250M1250-T	Female trunk, 1 female branch, 1 male branch		 1 = Brown 2 = White 3 = Blue	 4 = Black 5 = Green/Yellow

LMB30LP
- Low profile
- 30 mm mounting hole
- 300 series stainless steel



WC-R70 Washdown Cover
- FDA-grade silicone
- Fits R70 data radios
- IP67 and IP69K rated



PSW-24-1
- 24 V DC, 1 A Class 2 UL Listed power supply
- 100 V AC to 240 V AC 50/60 Hz input
- 2 m (6.5 ft) PVC cable with M12 quick disconnect
- Includes Type A (US, Canada, Japan, Puerto Rico, Taiwan), Type C (Germany, France, South Korea, Netherlands, Poland, Spain, Turkey), Type G (United Kingdom, Ireland, Singapore, Vietnam), and Type I (China, Australia, New Zealand) AC detachable input plugs

Warnings

WARNING:
- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

IMPORTANT: Please download the complete Key definition for "{keyrefName}" not found in the DITA map. technical documentation, available in multiple languages, from www.bannerengineering.com for details on the proper use, applications, Warnings, and installation instructions of this device.

IMPORTANT: Por favor descargue desde www.bannerengineering.com toda la documentación técnica de los Key definition for "{keyrefName}" not found in the DITA map., disponibles en múltiples idiomas, para detalles del uso adecuado, aplicaciones, advertencias, y las instrucciones de instalación de estos dispositivos.

IMPORTANT: Veuillez télécharger la documentation technique complète des Key definition for "{keyrefName}" not found in the DITA map. sur notre site www.bannerengineering.com pour les détails sur leur utilisation correcte, les applications, les notes de sécurité et les instructions de montage.

Install and properly ground a qualified surge suppressor when installing a remote antenna system. Remote antenna configurations installed without surge suppressors invalidate the manufacturer's warranty. Keep the ground wire as short as possible and make all ground connections to a single-point ground system to ensure no ground loops are created. No surge suppressor can absorb all lightning strikes; do not touch the Sure Cross® device or any equipment connected to the Sure Cross® device during a thunderstorm.

Exporting Sure Cross® Radios. It is our intent to fully comply with all national and regional regulations regarding radio frequency emissions. **Customers who want to re-export this product to a country other than that to which it was sold must ensure the device is approved in the destination country.** The Sure Cross wireless products were certified for use in these countries using the antenna that ships with the product. When using other antennas, verify you are not exceeding the transmit power levels allowed by local governing agencies. This device has been designed to operate with the antennas listed on Banner Engineering's website and having a maximum gain of 9 dBm. Antennas not included in this list or having a gain greater than 9 dBm are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen such that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communication. Consult with Banner Engineering Corp. if the destination country is not on this list.

IMPORTANT:

- **Never operate a 1 Watt radio without connecting an antenna**
- Operating 1 Watt radios without an antenna connected will damage the radio circuitry.
- To avoid damaging the radio circuitry, never apply power to a Sure Cross® Performance or Sure Cross MultiHop (1 Watt) radio without an antenna connected.

IMPORTANT:

- **Electrostatic discharge (ESD) sensitive device**
- ESD can damage the device. Damage from inappropriate handling is not covered by warranty.
- Use proper handling procedures to prevent ESD damage. Proper handling procedures include leaving devices in their anti-static packaging until ready for use; wearing anti-static wrist straps; and assembling units on a grounded, static-dissipative surface.

Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND WHETHER ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE.

This Warranty is exclusive and limited to repair or, at the discretion of Banner Engineering Corp., replacement. **IN NO EVENT SHALL BANNER ENGINEERING CORP. BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY EXTRA COSTS, EXPENSES, LOSSES, LOSS OF PROFITS, OR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT OR FROM THE USE OR INABILITY TO USE THE PRODUCT, WHETHER ARISING IN CONTRACT OR WARRANTY, STATUTE, TORT, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE.**

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For patent information, see www.bannerengineering.com/patents.

Document title: Sure Cross® R70SR Serial Data Radio (Legacy)
Part number: 224673
Revision: E
Original Instructions

224673