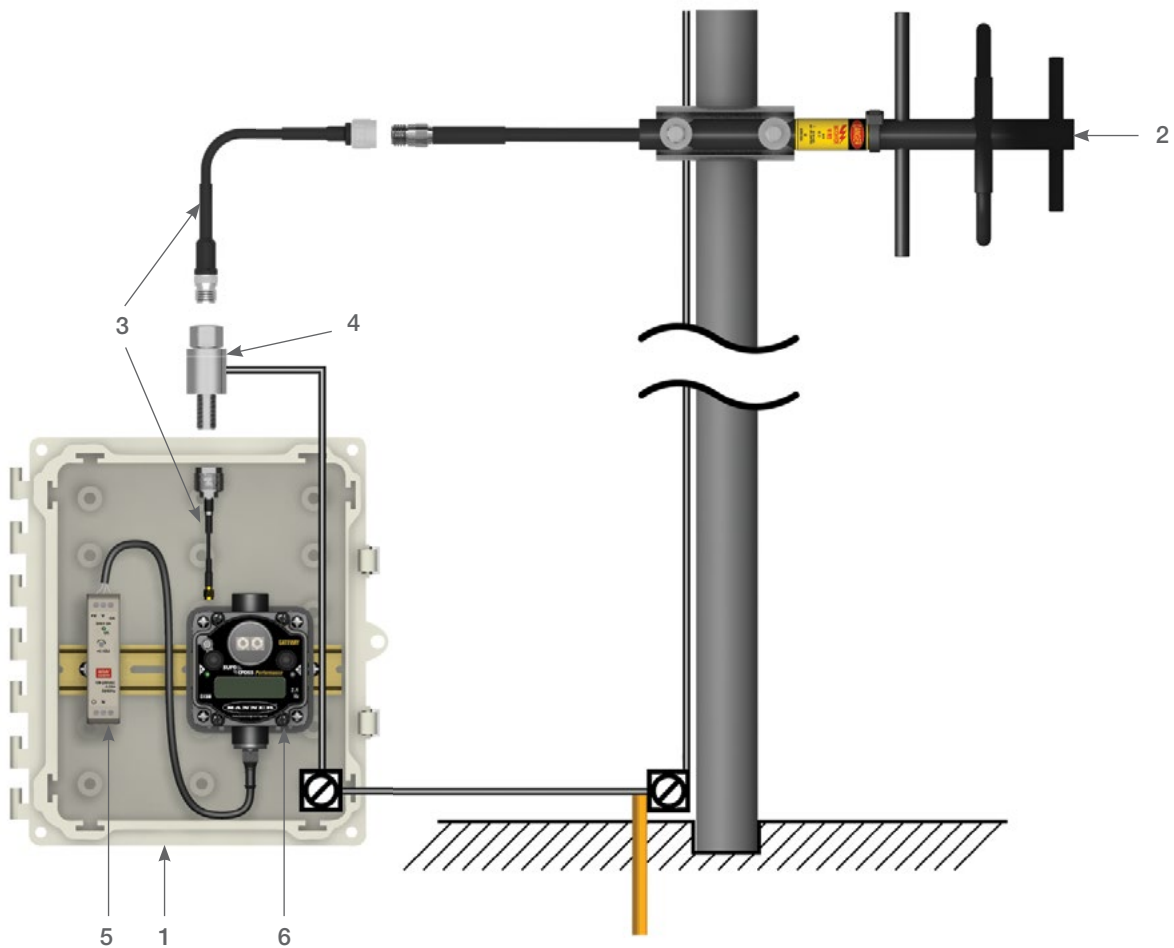


Accessories



NOTE: The Sure Cross® Radio installation shown includes wireless accessories available from Banner. It is for illustration purposes only. Installations may vary.

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6 × 6 in:
Fits a single DX80.

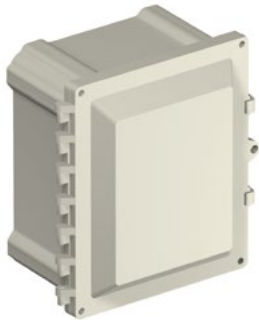


10 × 8 in:
Fits a power supply, surge suppressor, a single DX80, and a few relays. This is a popular size but can get cramped.



12 × 10 in:
This is the recommended size; provides ample room for multiple radios and accessories.

(1) Enclosures



Polycarbonate Enclosures

BWA-AH664	Enclosure, Polycarbonate, with Opaque Cover, 6 × 6 × 4 in
BWA-AH864	Enclosure, Polycarbonate, with Opaque Cover, 8 × 6 × 4 in
BWA-AH1084	Enclosure, Polycarbonate, with Opaque Cover, 10 × 8 × 4 in
BWA-AH12106	Enclosure, Polycarbonate, with Opaque Cover, 12 × 10 × 6 in
BWA-AH14126	Enclosure, Polycarbonate, with Opaque Cover, 14 × 12 × 6 in
BWA-AH16148	Enclosure, Polycarbonate, with Opaque Cover, 16 × 14 × 8 in
BWA-AH181610	Enclosure, Polycarbonate, with Opaque Cover, 18 × 16 × 10 in
BWA-AH664C	Enclosure, Polycarbonate, with Clear Cover, 6 × 6 × 4 in
BWA-AH864C	Enclosure, Polycarbonate, with Clear Cover, 8 × 6 × 4 in
BWA-AH1084C	Enclosure, Polycarbonate, with Clear Cover, 10 × 8 × 4 in
BWA-AH12106C	Enclosure, Polycarbonate, with Clear Cover, 12 × 10 × 6 in
BWA-AH14126C	Enclosure, Polycarbonate, with Clear Cover, 14 × 12 × 6 in
BWA-AH16148C	Enclosure, Polycarbonate, with Clear Cover, 16 × 14 × 8 in
BWA-AH181610C	Enclosure, Polycarbonate, with Clear Cover, 18 × 16 × 10 in

Swing Panel Kits

BWA-AH66SPK	Swing Panel Kit, 6 × 6 in, Includes Mounts, Screws, and Panel
BWA-AH86SPK	Swing Panel Kit, 8 × 6 in, Includes Mounts, Screws, and Panel
BWA-AH108SPK	Swing Panel Kit, 8 × 10 in, Includes Mounts, Screws, and Panel
BWA-AH1210SPK	Swing Panel Kit, 12 × 10 in, Includes Mounts, Screws, and Panel
BWA-AH1412SPK	Swing Panel Kit, 14 × 12 in, Includes Mounts, Screws, and Panel
BWA-AH1614SPK	Swing Panel Kit, 16 × 14 in, Includes Mounts, Screws, and Panel
BWA-AH1816SPK	Swing Panel Kit, 18 × 16 in, Includes Mounts, Screws, and Panel

Back Panel Kits

BWA-BP66A	Back Panel, aluminum, 6 × 6 in
BWA-BP86A	Back Panel, aluminum, 8 × 6 in
BWA-BP108A	Back Panel, aluminum, 8 × 10 in
BWA-BP1210A	Back Panel, aluminum, 12 × 10 in
BWA-BP1412A	Back Panel, aluminum, 14 × 12 in
BWA-BP1614A	Back Panel, aluminum, 16 × 14 in
BWA-BP1816A	Back Panel, aluminum, 18 × 16 in

(1) Enclosures, continued

DIN Rail Kits (with self-threading screws)

BWA-AH6DR	Din Rail Kit 6 in (Includes 2 Tribolar Screws and DIN Rail)
BWA-AH8DR	Din Rail Kit 8 in (Includes 2 Tribolar Screws and DIN Rail)
BWA-AH10DR	Din Rail Kit 10 in (Includes 2 Tribolar Screws and DIN Rail)
BWA-AH12DR	Din Rail Kit 12 in (Includes 2 Tribolar Screws and DIN Rail)
BWA-AH14DR	Din Rail Kit 14 in (Includes 2 Tribolar Screws and DIN Rail)
BWA-AH16DR	Din Rail Kit 16 in (Includes 2 Tribolar Screws and DIN Rail)
BWA-AH18DR	Din Rail Kit 18 in (Includes 2 Tribolar Screws and DIN Rail)

Enclosure Accessories

BWA-AHAK	Accessory Kit, Includes all screws, inserts, and mounting feet (Replacement Only)
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Fiberglass Enclosures

BWA-EF1086	Enclosure Fiberglass Hinged 10 × 8 × 6 in
BWA-EF866	Enclosure Fiberglass Hinged 8 × 6 × 6 in
BWA-PANEL108	Panel, 10 × 8 in
BWA-PANEL86	Panel, 8 × 6 in

(2) Antennas

Select your antenna based on your specific application needs. There are three basic antenna solutions:

- Use the supplied rubber duck antenna inside the enclosure. DX80 products come with a 2 dBi rubber duck antenna. Often simply attaching the supplied antenna to the radio provides enough radio range to meet your needs.
- Mount a dome antenna to the enclosure. The -D antennas can be mounted directly on the enclosure.
- Use an N-type pole-mounted antenna, with surge suppressor. The -A and -AS antennas can be mounted remotely from the enclosure and require the BWC-LFNBMN-DC surge suppressor.



Omni-Directional Antennas with RP-SMA Male Connections

BWA-902-C	900 MHz	2 dBi, Rubber swivel (ships with 900 MHz radios)
BWA-905-C		5 dBi, Rubber swivel
BWA-202-C		2 dBi, Rubber swivel, 3 1/4 in (ships with 2.4 GHz radios)
BWA-205-C	2.4 GHz	5 dBi, Rubber swivel, 6 1/2 in
BWA-207-C		7 dBi, Rubber swivel, 9 1/4 in
BWA-902-RA	900 MHz	2 dBi, Rubber fixed right-angle
BWA-902-RA2	900 MHz	2 dBi 1/2 wave, Rubber fixed right-angle, 160 mm tall
BWA-201-001	2.4 GHz	1 dBi, Rubber, 1 in tall

(2) Antennas, continued



Omni-Directional Dome Antennas

BWA-902-D	900 MHz	2 dBi, 18 inch cable	RP-SMA Box Mount
BWA-202-D	2.4 GHz	2 dBi, 18 inch cable	RP-SMA Box Mount

Other



BWA-205-M	2.4 GHz	5 dBi, Magnetic whip antenna, 12 ft cable	RP-SMA Male
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Omni-Directional Fiberglass Antennas with N-Type Female Connections

BWA-906-A	900 MHz	2 dBi, Rubber swivel (ships with 900 MHz radios)	
BWA-208-A	2.4 GHz	8.5 dBi, Fiberglass, 24 in	
BWA-206-A		6 dBi, Fiberglass, 16 in (shown)	
BWA-906-AS	900 MHz	6 dBi, Fiberglass, 1/4 Wave, 23.6 in (1.3 inch diameter)	
BWA-908-AS		8 dBi, Fiberglass, 3/4 Wave, 63 in (1.5 inch diameter)	



Directional (Yagi) Antennas with N-Type Female Connection

BWA-9Y6-A	900 MHz	6.5 dBd, 6.8 x 13 inches Outdoor
BWA-9Y10-A	900 MHz	10 dBd, 6.8 x 24 inches Outdoor

Cellular (CDMA multi band)

BWA-CDMA-002	RP-SMA male connection	2 dBi, 6.3 in blade style
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(3) Antenna Cables



Antenna Cables: RP-SMA to RP-SMA

BWC-1MRSFRSB0.2	RG58, RP-SMA Male to RP-SMA Female Bulkhead, 0.2 m
BWC-1MRSFRSB1	RG58, RP-SMA Male to RP-SMA Female Bulkhead, 1 m
BWC-1MRSFRSB2	RG58, RP-SMA Male to RP-SMA Female Bulkhead, 2 m
BWC-1MRSFRSB4	RG58, RP-SMA Male to RP-SMA Female Bulkhead, 4 m
BWC-2MRSFRS3	LMR200, RP-SMA Male to RP-SMA Female, 3 m
BWC-2MRSFRS6	LMR200, RP-SMA Male to RP-SMA Female, 6 m
BWC-2MRSFRS9	LMR200, RP-SMA Male to RP-SMA Female, 9 m
BWC-2MRSFRS12	LMR200, RP-SMA Male to RP-SMA Female, 12 m



Antenna Cables: RP-SMA to N-Type

BWC-1MRSMN05	LMR100 RP-SMA to N-Type Male, 0.5 m
BWC-1MRSMN2	LMR100 RP-SMA to N-Type Male, 2 m



Antenna Cables: N-Type

BWC-4MNFN3	LMR400 N-Type Male to N-Type Female, 3 m
BWC-4MNFN6	LMR400 N-Type Male to N-Type Female, 6 m
BWC-4MNFN15	LMR400 N-Type Male to N-Type Female, 15 m
BWC-4MNFN30	LMR400 N-Type Male to N-Type Female, 30 m

(4) Surge Suppressors



BWC-LFNBMN-DC	Surge Suppressor, bulkhead, N-Type Female, N-Type Male, dc Blocking
BWC-LMRSFRPB	Surge Suppressor, bulkhead, RPSMA to RP-SMA

(5) Power Supplies

DC Power Supplies



PSW-24-1

DC Power Supply, 100-240 V ac 50/60 Hz input, 24 V dc 1 A output, UL Listed Class 2

PSD-24-4

DC Power Supply, 90-264 V ac 50/60 Hz input, 24 V dc output, US-style wall plug input, 4-pin M12/Euro-style output; 2 m (6 ft) cable, UL Listed Class 2

PSDINP-24-06

DC Power Supply, 0.63 Amps, 24 V dc, with DIN Rail Mount, Class I Division 2 (Groups A, B, C, D) Rated

PSDINP-24-13

DC Power Supply, 1.3 Amps, 24 V dc, with DIN Rail Mount, Class I Division 2 (Groups A, B, C, D) Rated

PSDINP-24-25

DC Power Supply, 2.5 Amps, 24 V dc, with DIN Rail Mount, Class I Division 2 (Groups A, B, C, D) Rated

FlexPower Supplies and Replacement Batteries



DX81-LITH

Battery Supply Module with mounting hardware

DX81H

Battery Supply Module with mounting hardware, for DX99 polycarbonate housing

DX81P6

Battery Supply Module, six "D" cells, with mounting hardware

Solar Panels



BWA-SOLAR PANEL 3W

Solar Panel, 12 V, 3 W, Multicrystalline, 188 × 195 × 15, Wall/ Pole clamp style mounting bracket included

BWA-SOLAR PANEL 5W

Solar Panel, 12 V, 5 W, Multicrystalline, 270 × 222 × 17, Wall/ Pole clamp style mounting bracket included

BWA-SOLAR PANEL 20W

Solar Panel, 12 V, 20 W, Multicrystalline, 573 × 357 × 30, "L" mounting bracket included

BWA-SOLAR CNTRL-12V

Solar Controller, 6 A Load Current 12 V System Voltage, recommended for 20 watts or less solar panel AND Sealed Lead Acid Battery (SLA)

(5) Power Supplies, continued



Replacement Batteries

BWA-BATT-001	Lithium "D" cell, single, for DX81-LITH and DX81H Battery Supply Module
BWA-BATT-006	Lithium "AA" cell, single, for Wireless Q45 Sensors for DX81x models



Relays

IB6RP	Interface Relay Box, 18 to 26 V dc inputs, isolated relay outputs (not shown)
BWA-RELAY-12V	Relay, Blade Style with Base, 12 V
BWA-RELAY-24V	Relay, Blade Style with Base, 24 V
BWA-RH1B-UDC12V	Relay, Blade Style, No Base, 12 V (replacement part)
BWA-RH1B-UDC24V	Relay, Blade Style, No Base, 24 V (replacement part)
BWA-SH1B-05	Relay Base Only (replacement part)

(6) Brackets and Mounting Options

Mounting Kit

BWA-HW-001	<ul style="list-style-type: none"> Screw, M5-0.8 x 25 mm, SS (4) Screw, M5-0.8 x 16 mm, SS (4) Hex nut, M5-0.8 mm, SS (4) Bolt, #8-32 x 3/4-in, SS (4)
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Brackets



SMBDX80DIN	<ul style="list-style-type: none"> Black reinforced thermoplastic bracket for mounting on a 35 mm DIN rail
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BWA-HW-034	<ul style="list-style-type: none"> DIN rail clip, black plastic Used with the M-HBx MultiHop and -PBx Performance board modules
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SMBAMS18RA	<ul style="list-style-type: none"> Right-angle SMBAMS series bracket with 18 mm hole Articulation slots for 90+° rotation 12-ga. (2.6 mm) cold-rolled steel
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Hole center spacing: A = 26.0, A to B = 13.0
Hole size: A = 26.8 x 7.0, B = ø 6.5, C = ø 19.0

<p>BWA-BK-001</p>	<ul style="list-style-type: none"> • Use to mount vibration sensor models QM42VT1 and QM42VT2 • Includes magnetic mounting bracket SMB42FLM12 and 2 mounting screws
<p>BWA-BK-004</p>	<ul style="list-style-type: none"> • Mounts both the K50U Ultrasonic sensor and a Wireless Q45U Node or DX80 Node
<p>BWA-BK-005</p>	<ul style="list-style-type: none"> • Mounts both the K50U Ultrasonic sensor and a Wireless Q45U Node
<p>BWA-BK-008</p>	<ul style="list-style-type: none"> • QM42 Center-mount magnetic bracket for round objects
<p>BWA-HW-057</p>	<ul style="list-style-type: none"> • 3M™ Thermally Conductive Adhesive Transfer Tape 8820 • Provides a heat-transfer path between heat-generating components and heat sinks or other cooling devices • 3 pieces per pack • Tape is 20 mils (0.50 mm) thick; liner is 1.5-2 mil (37.5-50 µm) thick • Thermally conductive ceramic filler • Dual liner using silicone-treated polyester: easy-release PET



Hole center spacing: 35.1
Hole size: 25.4 x 5.3

- DIN-35-70 = 70 mm
- DIN-35-105 = 105 mm
- DIN-35-140 = 140 mm
- 35 mm DIN Rail

Ethernet Cables

Use a crossover cable to connect the GatewayPro or DX83 Ethernet Bridge to a host system without using an Ethernet switchbox or hub. When using a switchbox or hub, use a straight cable.

BWA-E2M	Ethernet cable, RSCD RJ45 440, 2 m
BWA-E8M	Ethernet cable, RSCD RJ45 440, 8 m
BWA-EX2M	Ethernet cable, crossover, RSCD RJ45CR 440, 2 m



Adaptor Cables

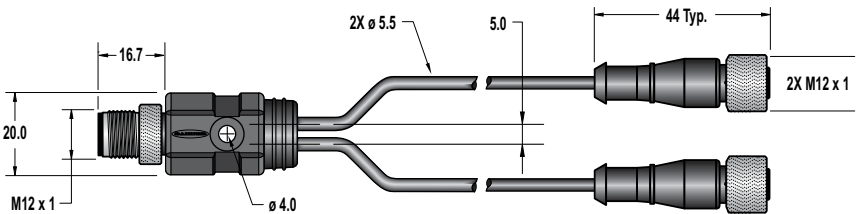
BWA-HW-006	Adapter cable, USB to RS-485, for use with the User Configuration Tool software (UCT)
BWA-UCT-900 (shown)	Adapter cable with power, USB to RS-485, for use with the User Configuration Tool software (UCT), supplies power to 1 Watt radios
BWA-USB1WIRE-01	PC USB to 1-wire Serial Interface converter. Use with the Sensor Configuration Tool software to communicate directly with 1-wire Serial Interface sensors

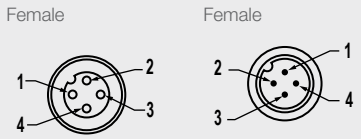
Splitter Cables

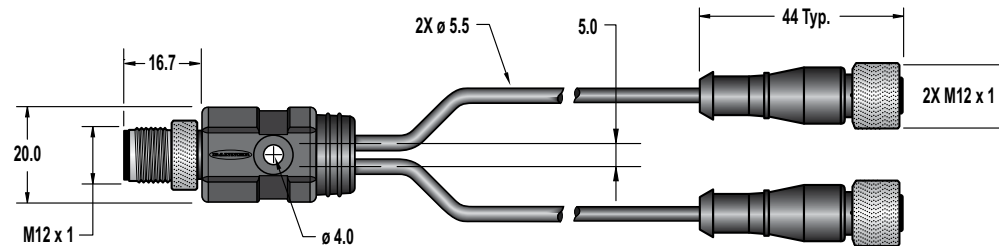
Use **CSRB-M1250M125.47M125.73** to split power between two *FlexPower*® or solar powered devices. DO NOT use this cable to connect a *FlexPower* devices to a 10 to 30 V dc powered device.

Use **CSRB-M1253.28M1253.28M1253.28** to connect one *FlexPower* device (data radio, FlexPowered Gateway, etc) to two power sources, such as the *FlexPower* Solar Supply and DX81P6 Battery Pack.

Model	Length	Style	Pinout
CSRB-M1250M125.47M125.73	Trunk: 0 m (male) Branches: 0.14 m and 0.22 m (female)	Straight	<div>Male<div></div><div>Female<div></div></div><div>1 = Brown 2 = White 3 = Blue 4 = Black 5 = Green/Yellow</div></div>
CSRB-M1253.28M1253.28M1253.28	Trunk: 1 m (female) Branches: 1 m (male)		



Model	Branches	Trunk	Pinout
CSB-M1240M1240	No branch	No trunk	 <p>1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray</p>
CSB-M1240M1241	2 x 0.30 m (1 ft)	No trunk	
CSB-M1241M1241	2 x 0.30 m (1 ft)	0.30 m (1 ft)	
CSB-M1248M1241		2.50 m (8 ft)	
CSB-M12415M1241		4.57 m (15 ft)	
CSB-M21425M1241		7.60 m (25 ft)	
CSB-UMT425M1241		7.60 m (25 ft) Unterminated	

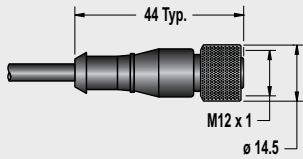
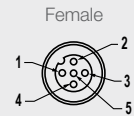
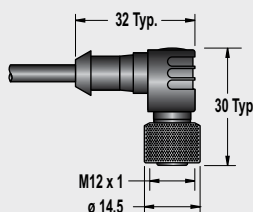


Cordsets

Euro-Style — Single-Ended

Right-angle cordsets are not compatible with the DX70 devices. When facing the Node or Gateway toward you and the quick-disconnect connection is facing down, the right-angle cables exit to the right.

When using the *FlexPower*® Node with integrated battery, use a double-ended cordset. When using a *FlexPower* Node with external power supply, use a single-ended cordset. If using the communication lines, the cable length cannot exceed 3 meters (10 ft).

Model	Length	Style	Dimensions	Pinout	
MQDC1-501.5	0.50 m (1.5 ft)	Straight		 <p>Female</p> <p>1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray</p>	
MQDC1-506	1.83 m (6 ft)				
MQDC1-515	4.57 m (15 ft)				
MQDC1-530	9.14 m (30 ft)				
MQDC1-506RA	1.83 m (6 ft)	Right-Angle			
MQDC1-515RA	4.57 m (15 ft)				
MQDC1-530RA	9.14 m (30 ft)				

Cordsets, continued

Model	Length	Style	Description
BWA-QD5.5	—	—	Prewired 5-pin Euro connector, 1/2-14 NBSM
BWA-QD8.5	—	—	Prewired, 8-pin Euro connector, 1/2-14 NBSM
BWA-QD12.5	—	—	Prewired 12-pin Euro connector, 1/2-14 NBSM
FIC-M12F4	—	Straight	Euro-Style Field-Wireable Connector 4-pin Female Straight
MQDMC-401	0.5 m	Straight	Cordset, 4-pin Euro-style, single ended, male, longer pigtails for DX80...C models

Euro-Style — Double-Ended

When using the *FlexPower*® Node with integrated battery, use a double-ended cordset. When using a *FlexPower* Node with external power supply, use a single-ended cordset. If using the communication lines, the cable length cannot exceed 3 meters (10 feet).

Model	Length	Style	Dimensions	Pinout
DEE2R-51D	0.31 m (1 ft)	Female Straight/ Male Straight		
DEE2R-53D	0.91 m (3 ft)			
DEE2R-58D	2.44 m (8 ft)			

Other Cordsets

BWA-RIBBON-001	Ribbon cable, 20-pin DBL socket
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BWA-HW-010 Cable, *FlexPower* Current Monitoring

DX85 Modbus RTU Remote I/O Devices



IP67 Housing



IP20 Housing

Model	Description
DX85M6P6	DX85 Modbus RTU Remote I/O, 6 Discrete IN, 6 Discrete OUT
DX85M4P4M2M2	DX85 Modbus RTU Remote I/O, 4 Discrete IN, 4 Discrete OUT, 2 Analog IN, 2 Analog OUT (0 to 20 mA)
DX85M4P8	DX85 Modbus RTU Remote I/O, 4 Discrete IN, 8 Discrete OUT
DX85M8P4	DX85 Modbus RTU Remote I/O, 8 Discrete IN, 4 Discrete OUT
DX85M0P0M4M4	DX85 Modbus RTU Remote I/O, 4 Analog IN, 4 Analog OUT (0 to 20 mA)
DX85M-P7	DX85 Modbus RTU Remote I/O, Up to 12 sinking inputs or up to 12 NMOS sinking outputs (for a total of 12 I/O)
DX85M-P8	DX85 Modbus RTU Remote I/O, Up to 12 sourcing inputs or up to 12 sourcing outputs (for a total of 12 I/O)

NOTE: Add a "C" to the end of any DX85 model to order that I/O mix with an IP20 housing. The IP20 models are Class I, Division 2 certified when installed in a suitable enclosure.

Cable Glands and Plugs

Model	Description
BWA-HP.5-10	Dummy Hole Plugs, 1/2-in NPT, 10 pieces
BWA-HW-031	Vent Plug, 1/2-in NPT, IP67
BWA-HW-059	Vent Plug, Plastic, 1/2-inch NPT, Strain-relief fitting, with o-ring, for 0.2 to 0.35 dia cable
BWA-HW-053	Plug Conduit, Plastic Hex, 1/2-14 NPT, for 1.2 to 2.5 mm dia
BWA-HW-052	Cable Gland Pack: 1/2-inch NPT gland, 1/2-inch NPT multi-cable gland, and 1/2-inch NPT vent plug
BWA-CG.5-10	Cable Glands, 1/2-in NPT, Cordgrip for 3 holes of 2.8 to 5.6 mm diameter, 10 Pack
BWA-CG.5-3X5.6-10	Cable Glands, 1/2-inch NPT, Cordgrip for 3 holes of 2.8 to 5.6 mm diam, 10 Pack
BWA-CG.5-2X2.5-10	Cable Glands, 1/2-in NPT, Cordgrip for 2 holes of 1.2 to 2.5 mm diameter, 10 Pack
BWA-CG.5-6X4.0-10	Cable Glands, 1/2-in NPT, Cordgrip for 6 holes of 2 to 4 mm diameter, 10 Pack
BWA-CG.5-6X3.0-10	Cable Glands, 1/2-in NPT, Cordgrip for 6 holes of 1.5 to 3 mm diameter, 10 Pack

Hardware and Replacement Parts

Model	Description
BWA-HW-002	DX80 Access Hardware Kit: Plastic threaded plugs, PG-7 (4) Nylon gland fittings, PG-7 (4) Hex nuts, PG-7 (4) Plug, 1/2-in NPT Nylon gland fitting, 1/2-in NPT
BWA-HW-003	PTFE Tape, 1/4-in wide, 600-in long
BWA-HW-004	Replacement Seals: O-ring, rotary access cover, PG21 (2) O-ring, body gasket (2) Access cover, rotary dials, clear plastic (2)
BWA-HW-009	Solar assembly hardware pack, includes brackets, bolts, and set screws
BWA-HW-007	Housing Kit, DX80, top and bottom, 10 pieces
BWA-HW-008	Housing Kit, DX81, top and bottom, 10 pieces
BWA-HW-044	Terminal header for the MultiHop Ethernet Data Radio
BWA-HW-011	Terminal Block Headers, IP20, 2 pack
BWA-HW-012	DX99 Antenna Extension Pack: Screw, M4-0.7 x 20, pan head, black steel Flexible Antenna Cable, 12 in, SMA male to SMA female
BWA-HW-032	Access hardware for the E housing, one 1/2-in plug, one 1/2-in gland
BWA-HW-037	Clear plastic retaining ring for DX99 metal housings, 10 pack

Metal Housing Accessories



Model	Description
BWA-HW-016	Antenna Feedthrough, Stainless Steel, 1/2-in NPT
BWA-HW-017	Antenna Feedthrough, Stainless Steel, 3/4-in NPT
BWA-HW-012	DX99 Antenna Extension Pack (M4-0.7 x 20 black steel pan head screw, flexible antenna cable 12-in SMA male to SMA female)
BWA-HW-037	Clear plastic retaining ring for DX99 metal housings (10 pack)
BWA-AXFS0130	AXF™ Explosion-Proof Antenna Coupler



Omnidirectional Dome Antennas

Models	Frequency	Description	Connection
BWA-902-001	900 MHz	2 dBi, 18 inch cable	1/2-in SS NPT Port
BWA-902-002			3/4-in SS NPT Port
BWA-202-001	2.4 GHz		1/2-in SS NPT Port
BWA-202-002			3/4-in SS NPT Port



Additional Devices and Sensors



IP67 Housing



IP20 Housing

DX85 Modbus RTU Remote I/O Devices

These remote I/O devices have a Modbus Interface and are used to expand the I/O of the Gateway or the Modbus host.

Models	I/O
DX85M6P6	DX85 Modbus RTU Remote I/O, 6 Discrete IN, 6 Discrete OUT
DX85M4P4M2M2	DX85 Modbus RTU Remote I/O, 4 Discrete IN, 4 Discrete OUT, 2 Analog IN, 2 Analog OUT (0 to 20 mA)
DX85M4P8	DX85 Modbus RTU Remote I/O, 4 Discrete IN, 8 Discrete OUT
DX85M8P4	DX85 Modbus RTU Remote I/O, 8 Discrete IN, 4 Discrete OUT
DX85M0P0M4M4	DX85 Modbus RTU Remote I/O, 4 Analog IN, 4 Analog OUT (0 to 20 mA)
DX85M-P7	DX85 Modbus RTU Remote I/O, Up to 12 sinking inputs or up to 12 NMOS sinking outputs (for a total of 12 I/O)
DX85M-P8	DX85 Modbus RTU Remote I/O, Up to 12 sourcing inputs or up to 12 sourcing outputs (for a total of 12 I/O)

NOTE: Add a "C" to the end of any DX85 model to order the I/O mix with an IP20 housing. The IP20 models are Class I, Division 2 certified when installed in a suitable enclosure.

Sensors Optimized for Use with *FlexPower*® Devices

Models	I/O
SM312LPQD-78447	MINI-BEAM®, Low Power, 5 V, polarized retroreflective, 3 m
SM312DQD-78419	MINI-BEAM®, Low Power, 5 V, diffuse, 38 cm
QT50ULBQ6-75390	Ultrasonic, QT50U, 200 mm to 8 m range
QS30WEQ	WORLD-BEAM® Photoelectric Emitter, QS30 (Max Range: 100 ft, 10x excess gain at 50 ft), 1-wire Serial Interface
QS30WRQ	WORLD-BEAM® Photoelectric Receiver, QS30 (Max Range: 100 ft, 10x excess gain at 50 ft), 1-wire Serial Interface





GPS50M GPS Module

Low power consumption, ability to withstand harsh environments, flexible power supply requirements and Modbus RTU communications makes this module ideal for the industrial market.

- Self-contained GPS Module for industrial use.
- Flexible Power Requirements: 5 to 30 V dc with power consumption as low as 100 mW
- Positional error of less than 2.5 meters
- Self-contained for harsh environment; IP69K-rated

GPS50M GPS Module Specifications

Power Requirements	5 to 30 V dc	
Current	Maximum: < 0.5 W Power Save Mode ON Typ. Average: 4 mA at 24 V dc Power Save Mode OFF Tye. Average: 10 mA at 24 V dc	
Indicators	Green flashing: Power ON	Amber flashing: Modbus communication active
Indicators	Green flashing: Power ON	Red flicker: Serial Tx
Operating Temperature	-40 to +85 °C (-40 to +185 °F)	
GPS Features	<ul style="list-style-type: none"> • SIRF Star IV GPS chip • Satellite-based augmentation systems: WAAS, EGNOS, MSAS, GAGAN • High sensitivity navigation engine (PVT) tracks as low as -163 dBm • Update Rate: 1 Hz 	
Communication	<ul style="list-style-type: none"> • Interface: RS-485 Serial • Baud rates: 9.6k, 19.2k (default), or 38.4k • Data format: 8 data bits, no parity (default), 1 stop bit (even or odd parity available) • Do not use termination resistor • Protocol: Modbus RTU 	
Shock and Vibration	<ul style="list-style-type: none"> • IEC 68-2-6 and IEC 68-2-27 • Shock: 30g, 11 millisecond half wave, 18 shocks • Vibration: 0.5 mm p-p, 10 to 60 Hz 	
Accuracy	<ul style="list-style-type: none"> • Positional error of less than 2.5 m (8') with augmentation • Positional error of less than 10 m (33') with no augmentation 	

Other Sensors or Sensor Components

Models	I/O
BWA-THERM-PROBE-001	Temperature sensor with thermistor PS103G2 Operating Temperature Range -20 °C to +105 °C Maximum Power Rating 30 mW Accuracy +/- 0.2%; Plated nickel finish
BWA-S612-30-100	NoShok Series 612 Submersible Level Transmitter, model 612-30-1-1-N-100, 0 to 30 psig, 100' cable
BWA-S612-15-100	NoShok Series 612 Submersible Level Transmitter, model 612-15-1-1-N-100, 0 to 15 psig, 100' cable
BWA-625-5000-1-1-8-25	NoShok Series 625 Intrinsically Safe Pressure Transmitter, model 625-5000-1-1-8-25, 0 to 5000 psig, 1/2-in NPT, 4-20mA, M12 QD
BWA-625-10000-1-1-8-25	NoShok Series 625 Intrinsically Safe Pressure Transmitter, model 625-10000-1-1-8-25, 0 to 10000 psig, 1/2-in NPT, 4-20mA, M12 QD
BWA-P-RKGV 5.33T-1727-2.0	Cable, female M12 4-pin, blue PVC, SS connector, for NoShok Series 625 IS Pressure Transmitter
BWA-ACC-SEN-SDI	Acclima SDI-12 Soil Moisture Transducer

Reference



Data Security

Binding the radios in a network (similar to pairing a phone to a headset, but more secure) locks them to a specific master radio by teaching them the master radio's access code. After the devices are bound, the radios only accept data from that master radio and the master radio only accepts data from the radios that are bound to it.

The proprietary protocol used in Banner's wireless networks provides a high level of data security.

A pseudo-random frequency hopping table is used to provide noise immunity and data security. Each time a message is sent a new frequency is chosen, which makes it almost impossible for any system listening at a given time to hear more than a few messages out of hundreds.

Generic data transfer without context also keeps data secure. Even if a hacker managed to crack the data packet format, all they would see is a set of 16-bit numbers with no reference as to what the numbers mean.



Deterministic System

Determinism is the ability to predict and control network behavior by establishing default states for specific conditions. Banner's deterministic system defines how network endpoints behave during the loss of communications. The network identifies when the communications link is lost and sets relevant outputs to user defined conditions. Once the radio signal is reestablished, the network returns to normal operations.

Example: If a tank level sensor is being used to turn a pump on to refill the tank, the deterministic system will allow you to set the default output state as "OFF" if the wireless signal is lost. With the output set at "OFF", the pump will not be able to over fill the tank in the event of a loss of communications.



Frequency

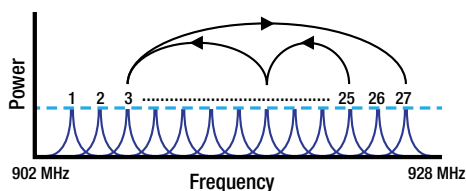
Banner's wireless products operate in the license free ISM band with products that operate at the 900 MHz and 2.4 GHz frequencies.

- 2.4 GHz radios transmit data packets faster and require less power. They are primarily used outside North America.
- 900 MHz radios have a longer range and a better ability to penetrate walls and other obstacles. It is typically used in North America.



Frequency Hopping Spread Spectrum (FHSS)

Frequency Hopping Spread Spectrum is a radio communication technology where the frequency spectrum is divided into channels. Data packets are split up and transmitted on these channels in a random pattern known only to the transmitter and receiver (e.g., Gateway and Node). Because colocated networks follow different random patterns, or hop code tables, multiple networks can operate in close proximity without interfering. If interference is present on one channel, data transmission is blocked. The transmitter and receiver hop to the next channel in the hop table and the transmitter resends the data packet.



Intrinsically Safe

The Sure Cross® DX99 product line is classified as intrinsically safe (IS), not explosion proof, and is certified for a variety of hazardous locations. Intrinsically safe products limit electrical and thermal energy to levels below that required to ignite a flammable or combustible atmospheric mixture in hazardous areas. Each product's datasheet lists the specific certifications for that product.



Network Interference

The Banner wireless system can be installed within any existing 802.11b (Wi-Fi) environment. The low data rates and narrow frequency band of the Banner wireless system make it essentially silent to existing Wi-Fi networks. Additionally, Banner's Gateways and Nodes exchange a binding code that prevents radios outside the network from communicating with it. Finally, they also use multiple frequency hops to eliminate data collisions.



Network Security

The Banner wireless systems use a proprietary protocol and are designed to completely eliminate all Internet Protocol (IP) based security threats. Open protocols, such as Wi-Fi, can route malicious TCP/IP packets that can cause security breaches; however, the Banner wireless systems can not. The Banner protocol only carries sensor data values. It is not possible to gain access to the organization's main network through the Sure Cross wireless system and it is not possible to receive a web page or executable file over the wireless communication layer. Only I/O data is transmitted in the Banner wireless network.

Network Topologies



Point-to-Point

The most basic form of a radio network is called point-to-point. As the name implies, there are only two radios in this network, one Gateway and one Node.



Point-to-Multipoint

Point-to-multipoint is a relatively simple network with one Gateway and a few Nodes. Banner's PM Series is preconfigured to handle up to six Nodes.



Star

This network is formed by connecting multiple Nodes to a single Gateway. The Gateway maintains a communications connection with each Node on a separate communications path. If the communication between one of the Nodes and the gateway fails, the rest of the network remains unaffected.



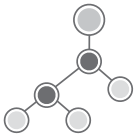
Tree

This network involves several slaves that transmit information to repeaters, which ultimately transmit to the master radio. The use of repeaters can greatly extend the range of the network. This network must have a host controller that controls the master radio.



Network Scalability

Banner's Simple Wire Replacement products come preconfigured to handle up to 6 Nodes (PM8) so that it is easy to set up your network without software. The DX80 Performance Series offers Gateways that support multiple host communication protocols and up to 47 Nodes. Data Radios can handle up to 50 slave radios, and MultiHop Radios can handle up to 100 slave radios.



MultiHop

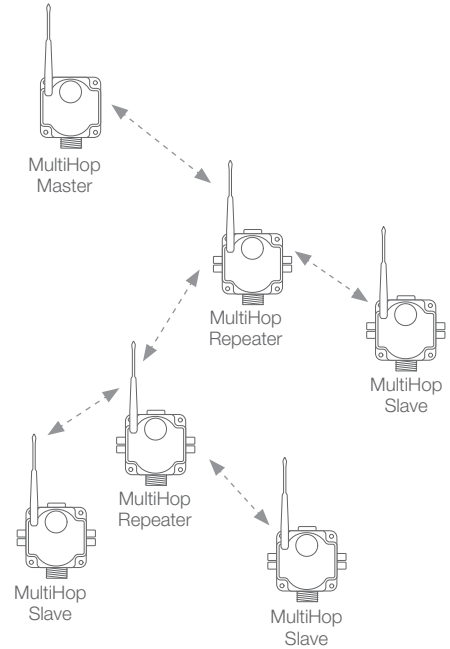
A MultiHop network uses repeaters to extend the range of the network with multiple "hops" to cover longer distances or to circumvent obstacles (trees, buildings, topology, etc.). MultiHop networks are also self-forming (all radios added to the network will automatically connect to the master or a repeater within its range) and self-healing (if a repeater is removed from the network, the radios connected to it can find a new path back to the master radio).

At the root of the MultiHop network is the master radio. All radios within range of the master (whether slave or repeater) connect to it. The master serves as the parent (controls the timing of the network), repeaters and slaves connect as children.

MultiHop Master Radio: Within a MultiHop network, there is only one master radio. It controls the overall timing of the network and is always the parent device. The master radio must be controlled by a host system.

MultiHop Repeater Radio: The repeater acts as a child to the master radio and a parent a slave radio. It retransmits data packets between the master radio and slave radios.

MultiHop Slave Radio: The slave radio is the end device of the network. A radio in slave mode does not retransmit data packets on the radio link.

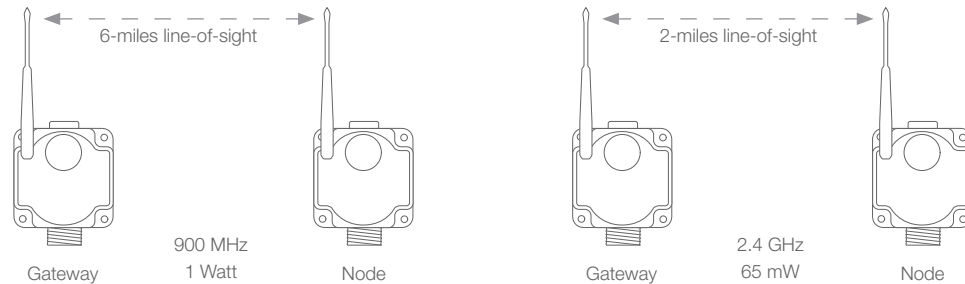


Radio Range

Banner's wireless network is designed for long distance applications. The signal for 900 MHz, 1 Watt radios will travel up to 6 miles and 2.4 GHz, 65 mW radios will travel up to 2 miles line-of-sight.

Line-of-sight is the unobstructed path between radio antennas; however, signals can penetrate walls, floors and other indoor obstructions. Buildings, trees and large metal objects will impact signal strength in outdoor applications.

To verify range, Banner integrates a site survey tool into each Gateway and Node that displays real time signal quality results. Always conduct a site survey prior to installing a wireless network.



TDMA

Time Division Multiple Access (TDMA)

TDMA provides a specific communication time slot for each device in the network, eliminating data collisions. The master radio "requests" data from each node during its time slot, and the node then sends the data. A TDMA architecture also lends itself to efficient power management procedures. When each device knows the time period to receive or send, the radio doesn't have to 'listen' all the time. Power usage can be managed efficiently, allowing radio devices to operate from 3.6 V lithium batteries when necessary.

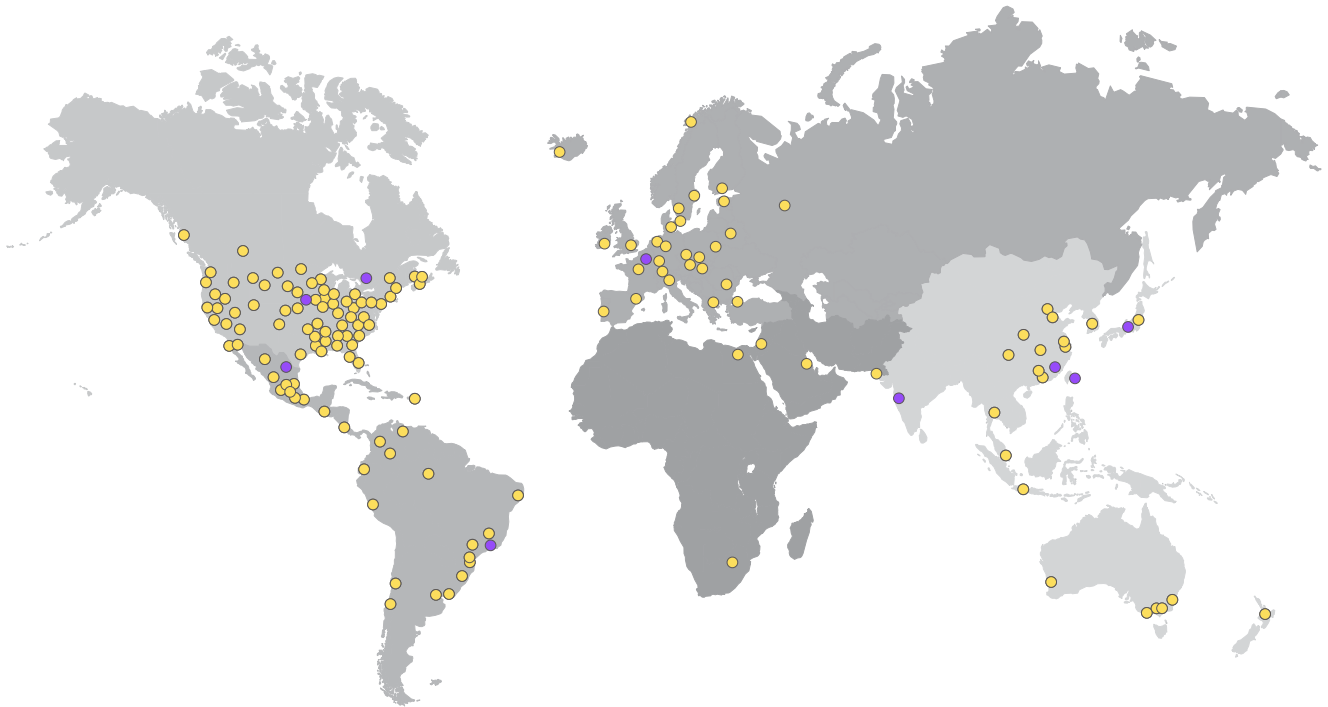


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