

# TL70 Wireless MultiHop Modular Tower Light



## Datasheet



The Sure Cross® TL70 Wireless MultiHop Modular Tower Light combines the best of Banner's popular Tower Light family with its reliable, field-proven, Sure Cross wireless MultiHop architecture.

- Available in 900 MHz and 2.4 GHz ISM Bands
- Up to six colors, or five colors plus audible, in one device
- Rugged, water-resistant IP65 housing with UV-stabilized material
- Bright, uniform indicator segments appear gray when off to eliminate false indication from ambient light
- Two-way communication - light segments can be controlled with the input wires or the master radio



**Important:** Please download the complete TL70 Wireless MultiHop Modular Tower Light technical documentation, available in multiple languages, from [www.bannerengineering.com](http://www.bannerengineering.com) for details on the proper use, applications, Warnings, and installation instructions of this device.



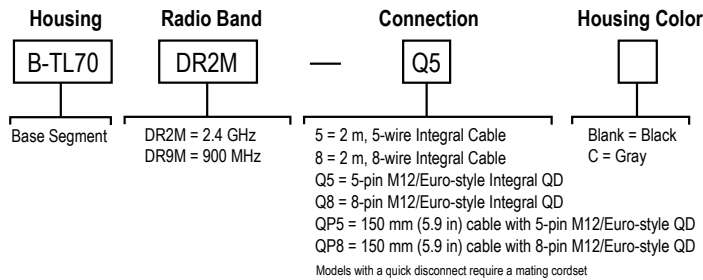
**Important:** Por favor descargue desde [www.bannerengineering.com](http://www.bannerengineering.com) toda la documentación técnica de los TL70 Wireless MultiHop Modular Tower Light, disponibles en múltiples idiomas, para detalles del uso adecuado, aplicaciones, advertencias, y las instrucciones de instalación de estos dispositivos.



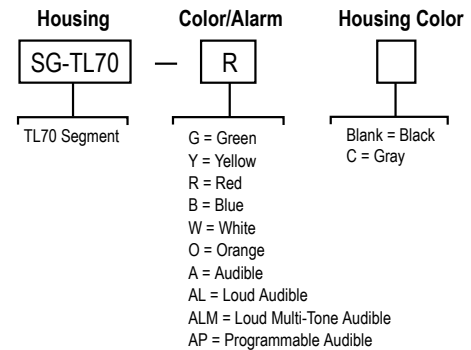
**Important:** Veuillez télécharger la documentation technique complète des TL70 Wireless MultiHop Modular Tower Light sur notre site [www.bannerengineering.com](http://www.bannerengineering.com) pour les détails sur leur utilisation correcte, les applications, les notes de sécurité et les instructions de montage.

## Models

### TL70 Base



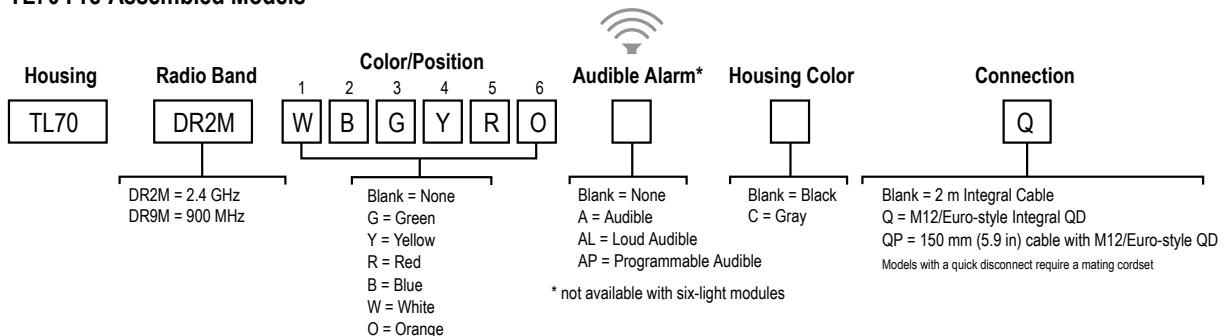
### TL70 Segments



Select the 5-pin base for tower light configurations of up to three modules. Select the 8-pin base for tower light configurations of up to six modules, or when the event counter will be enabled.

- Example base model number: B-TL70DR2M-Q5
- Example light segment model number: SG-TL70-G
- Example audible segment model number: SG-TL70-A

### TL70 Pre-Assembled Models

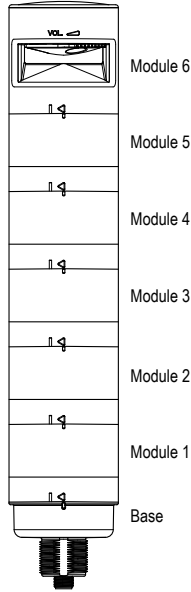


- Example pre-assembled model number: TL70DR2MGYRAQ

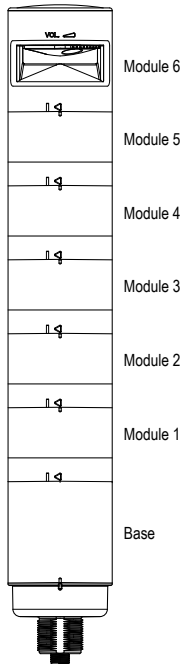
## Configuring the Modules



Turn on the appropriate DIP switch to set the order of the components, counting up from the tower light's base.



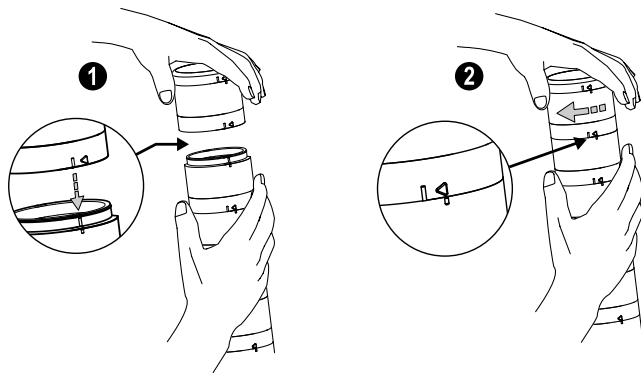
Assembly Options		DIP Switches							
		1	2	3	4	5	6	7	8
Light and Standard Audible Components	Module 1	ON							
	Module 2		ON						
	Module 3			ON					
	Module 4				ON				
	Module 5					ON			
	Module 6						ON		
Light Module Flash Rate	3 Hz							ON	OFF
	1.5 Hz							ON	ON
	Solid On*							OFF	OFF
Standard Audible Module Settings	Pulse 1.5 Hz							ON	OFF
	Chirp Alarm							ON	ON
	Siren Alarm							OFF	ON
	Continuous Alarm*							OFF	OFF



Assembly Options		DIP Switches									
		1	2	3	4	5	6	7	8	9	10
Loud Audible Module Settings	Pulse 1.5 Hz							ON	OFF		
	Chirp Alarm							ON	ON		
	Siren Alarm							OFF	ON		
	Continuous Alarm*							OFF	OFF		
	Low Intensity									OFF	OFF
	Med. Intensity									ON	OFF
	Med./Loud Intensity									OFF	ON
	Loud Intensity									ON	ON

\* Factory default setting

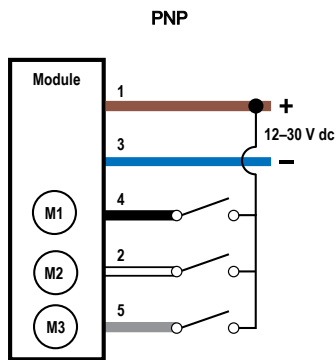
## Assembling the Modules



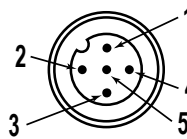
To assemble the modules:

1. Align the notches on each module and press together.
2. Rotate the top module clockwise to lock into place (notches shown in the locked position).

## Wiring Diagrams

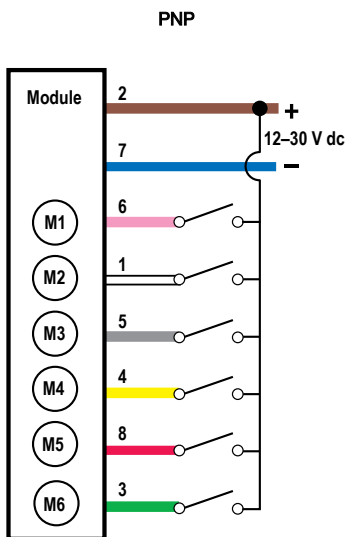


**Euro-style Male Pinouts**

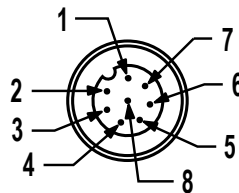


**Key**

- 1 = brown
- 2 = white
- 3 = blue
- 4 = black
- 5 = gray
- M1 = Module 1
- M2 = Module 2
- M3 = Module 3



**Euro-style Male Pinouts**



**Key**

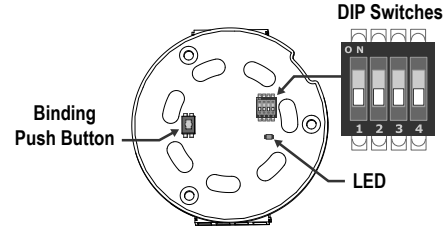
- 1 = white
- 2 = brown
- 3 = green
- 4 = yellow
- 5 = gray
- 6 = pink
- 7 = blue
- 8 = red
- M1 = Module 1
- M2 = Module 2
- M3 = Module 3
- M4 = Module 4
- M5 = Module 5
- M6 = Module 6

Input wires M1 through M6 can be used to either control the light segments or can be configured as external PNP Inputs. Refer to the DIP switch settings for configuration instructions.

## Configuring the Radio Module

## Set the Radio Module DIP Switches

Before applying power to the device, set the radio module's DIP switches. Default configurations are noted with (\*).



Device Settings	DIP Switches			
	1	2	3	4
Transmit power 900 MHz radios: 1.00 Watt (30 dBm) 2.4 GHz radios: 0.065 Watts (18 dBm) and 60 ms frame	OFF *			
Transmit power 900 MHz radios: 0.25 Watts (24 dBm) 2.4 GHz radios: 0.065 Watts (18 dBm) and 40 ms frame	ON			
Input wires control light segments		OFF *		
Disables wired input control of light segments and converts wires to auxiliary Inputs		ON		
MultiHop radio setting: Slave			OFF *	
MultiHop radio setting: Repeater			ON	
Reserved				OFF *

### Transmit Power Levels/Frame Size

The 900 MHz data radios can be operated at 1 watt (30 dBm) or 0.250 watt (24 dBm). For most models, the default transmit power is 1 watt.

For 2.4 GHz radios, the transmit power is fixed at 0.065 watt (18 dBm) and DIP switch 5 is used to set the frame timing. The default position (OFF) sets the frame timing to 60 milliseconds. To increase throughput, set the frame timing to 40 milliseconds. Note that increasing the throughput decreases the battery life.

*Prior to date code 15341 and radio firmware version 3.6, the frame timing was 40 ms (OFF) or 20 ms (ON).*

### MultiHop Radio Overview

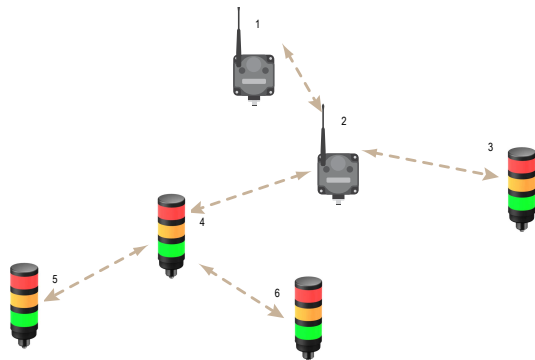
MultiHop networks are made up of one master radio and many repeater and slave radios.

The MultiHop networks are self-forming and self-healing networks constructed around a parent-child communication relationship. A MultiHop Radio is either a master radio, a repeater radio, or a slave radio.

- The master radio controls the overall wireless network.
- The repeater radios extend the range of the wireless network.
- The slave radios are the end point of the wireless network.

At the root of the wireless network is the master radio. All repeater or slave radios within range of the master radio connect as children of the master radio, which serves as their parent. After repeater radios synchronize to the master radio, additional radios within range of the repeater can join the network. The radios that synchronize to the repeater radio form the same parent/child relationship the repeater has with the master radio: the repeater is the parent and the new radios are children of the repeater. The network formation continues to build the hierarchical structure until all MultiHop radios connect to a parent radio. A MultiHop radio can only have one designated parent radio. If a radio loses synchronization to the wireless network it may reconnect to the network through a different parent radio.

For the simple example network shown below, the following relationships exist:



- Radio 1 is the master radio and is parent to radio 2 (repeater).
- Radio 2 (repeater) is child to radio 1 (master), but is parent to radios 3 (slave) and 4 (repeater).
- Radio 4 (repeater) is child to radio 2 (repeater), but is parent to radios 5 and 6 (both slaves).

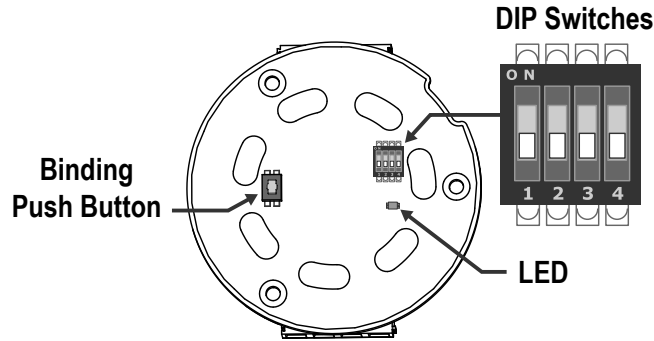
On the LCD of each device, the parent device address (PADR) and local device address (DADR) are shown.

**MultiHop Master Radio.** Within a network of MultiHop data radios, there is only one master radio. The master radio controls the overall timing of the network and is always the parent device for other MultiHop radios. The host system connects to this master radio.

**MultiHop Repeater Radio.** When a MultiHop radio is set to repeater mode, it acts as both a parent and a child. The repeater receives data packets from its parent, then re-transmits the data packet to the children within the repeater's network. The incoming packet of information is re-transmitted on both the radio link and the local serial link.

**MultiHop Slave Radio.** The slave radio is the end device of the MultiHop radio network. A radio in slave mode does not re-transmit the data packet on the radio link, only on the local serial (wired) bus.

## Bind the TL70 Wireless MultiHop Modular Tower Light to Form Networks



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

Before using the TL70 devices, you must bind them to the MultiHop master radio and assign a device ID using the master's rotary dials. There are no physical switches or dials on the TL70 radio. To bind and address an TL70, follow these steps.

### On the MultiHop Master Radio

1. Apply power to the master radio.
2. Triple click button 2 to enter binding mode. For the two LED/button models, both LEDs flash red and the LCD shows \*BINDNG and \*MASTER. For single LED/button models, the LED flashes alternatively red and green.
3. Using the rotary dials, select the Device ID to assign to the TL70. Use the left rotary dial for the left digit and the right rotary dial for the right digit. For example, to assign your TL70 to Device ID 10, set the left dial to 1 and the right dial to 0.

### On the MultiHop TL70 Radio

1. Click the button on TL70 three times to place the TL70 into binding mode. After entering binding mode, the TL70 LEDs blink slowly, alternating between red and green. After the TL70 receives a valid binding code from the MultiHop Master Radio, the red and green LEDs are both illuminated continuously, resulting in a slightly orange light. The red and green LEDs simultaneously flash four times to indicate that the TL70 accepts the binding code. The TL70 enters RUN mode.
2. After binding a TL70 to the MultiHop Master Radio and assigning it a unique Device ID, write the Device ID on the TL70's label.
3. Repeat this sequence (TL70 steps 1 and 2) for as many TL70s as you need to bind. If two TL70s are accidentally assigned the same Device ID, rerun the binding procedure on one of the TL70s to reassign the ID. The binding sequence may be run on a TL70 as many times as necessary.

### On the MultiHop Master Radio

1. To exit binding mode, double click button 2 on the MultiHop master radio. The master radio reboots and enters RUN mode.

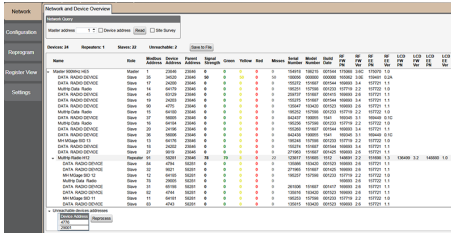
### Slave and Repeater TL70 Wireless MultiHop LED Behavior

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

Process Steps	Response	LED
1	Apply power to the radio	Solid red and green (orange) for 8 seconds
2	The slave/repeater searches for a parent device.	Flashes red
3	A parent device is detected. The slave/repeater searches for other parent radios within range.	Solid red
4	The slave/repeater selects a suitable parent.	Solid red and green (orange)
5	The slave/repeater attempts to synchronize to the selected parent.	Solid red
6	The slave/repeater enters RUN mode.	Solid green, then flashes green
7	The slave/repeater is synchronized to the parent.	Flashes green
	Serial data packets begin transmitting between the slave/repeater and its parent radio.	Flashes red and green (orange)

## MultiHop Configuration Software

Use Banner's MultiHop Configuration Software to view your MultiHop radio network and configure the radio and its I/O.



The software connects to a MultiHop master radio using one of four methods.

- Serial; using a USB to RS-485 (for RS-485 radios) or a USB to RS-232 (for RS-232 radios) converter cable.
- Modbus TCP; using an Ethernet connection to an Ethernet radio master.
- Serial DXM; using a USB cable to a DXM Controller to access a MultiHop master radio.
- TCP DXM: using an Ethernet connection to a DXM Controller to access a MultiHop master radio.

For MultiHop DX80DR\* models, Banner recommends using BWA-UCT-900, an RS-485 to USB adapter cable with a wall plug that can power your 1 Watt MultiHop radio while you configure it. The adapter cable is not required when connecting to a DXM Controller.

Download the most recent software revision from the Wireless Reference Library on Banner Engineering's website: [www.bannerengineering.com](http://www.bannerengineering.com).

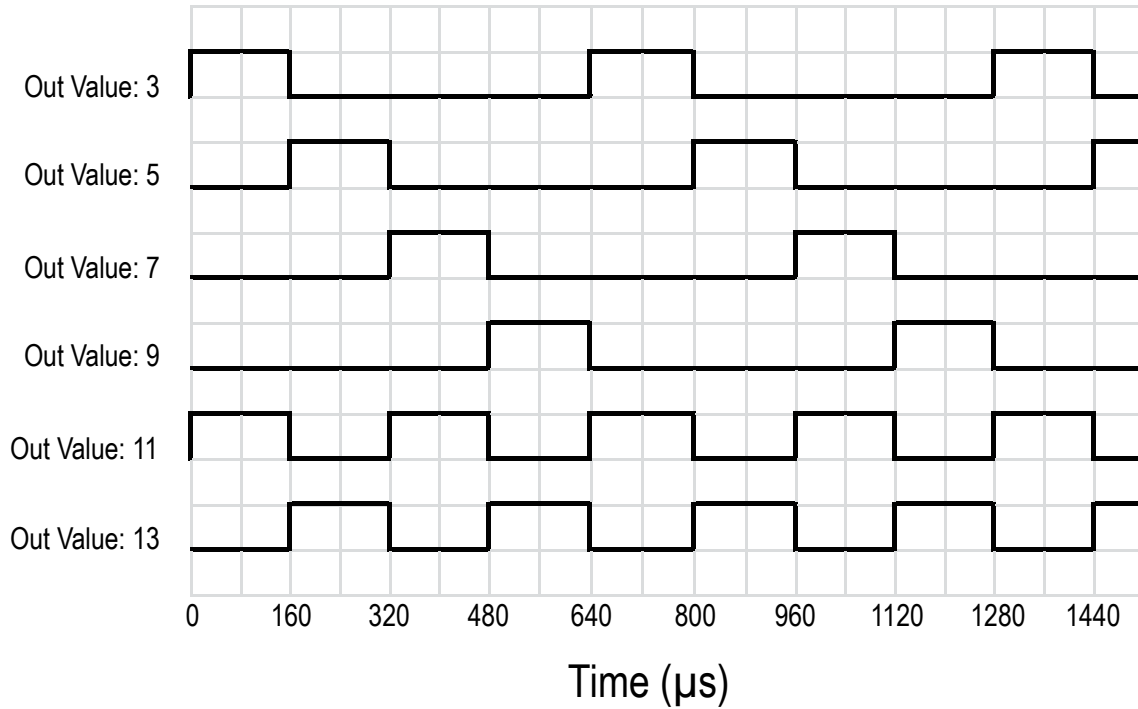
## Modbus Registers

Modbus Holding Register (4xxxx)	I/O Type	I/O Range		Holding Register Representation (Dec.)		Module #
		Min.	Max.	Min.	Max.	
1	Discrete IN 1	0	1	0	1	M1
2	Discrete IN 2	0	1	0	1	M2
3	Discrete IN 3	0	1	0	1	M3
4	Discrete IN 4	0	1	0	1	M4
5	Discrete IN 5	0	1	0	1	M5
6	Discrete IN 6	0	1	0	1	M6
501	Light OUT 1	0	65535	0	65535	M1
502	Light OUT 2	0	65535	0	65535	M2
503	Light OUT 3	0	65535	0	65535	M3
504	Light OUT 4	0	65535	0	65535	M4
505	Light OUT 5	0	65535	0	65535	M5
506	Light OUT 6	0	65535	0	65535	M6

## Flash Pattern

Write specific values to the light OUT registers to control the light's behavior.

Light OUT Register Value	Light Operation
1	On
3	Flashing at 1.5 Hz
5	Delay of 160 $\mu$ s, then flashing at 1.5 Hz
7	Delay of 320 $\mu$ s, then flashing at 1.5 Hz
9	Delay of 480 $\mu$ s, then flashing at 1.5 Hz
11	Flashing at 3 Hz
13	Delay of 160 $\mu$ s, then flashing at 3 Hz



Example -- Lights Racing Up the Stack

To program all four lights to come on at a different time to appear to race up the light stack, write a 3 to M1, 5 to M2, 7 to M3, and a 9 to M4.

## Specifications

### Tower Light Specifications

#### Supply Voltage and Current

12 V DC to 30 V DC (Outside the USA: 12 V DC to 24 V DC, ± 10%)<sup>¶</sup>  
 900 MHz Consumption: Maximum current draw is < 40 mA and typical current draw is < 30 mA at 24 V DC. (2.4 GHz consumption is less.)

Indicator Color or Audible Model	Maximum Current (mA)	
	at 12 V dc	at 30 V dc
Blue, Green, White	420	150
Red, Yellow, Orange	285	120
Standard Audible	30	30
Loud Audible (Intensity 1)	18	14
Loud Audible (Intensity 2)	40	28
Loud Audible (Intensity 3)	160	70
Loud Audible (Intensity 4)	350	110

#### Supply Protection Circuitry

Protected against transient voltages

#### Indicators

1 to 6 colors depending on model (Green, Red, Yellow, Blue, White, and Orange)  
 LEDs are independently selected  
**Flash Rates:** 1.5 Hz ±10% and 3 Hz ±10%

#### Indicator Response Time

**Off Response:** 150 µs (maximum) at 12 V DC to 30 V DC  
**On Response:** 180 ms (maximum) at 12 V DC; 50 ms (maximum) at 30 V DC

#### Audible Alarm

**Standard Audible:** 2.6 KHz ± 250 Hz oscillation frequency; maximum intensity (typical) 92 dB at 1 m (3.3 ft)  
**Loud Audible:** 2.6 KHz ± 250 Hz oscillation frequency; maximum intensity (typical) at 1 m (3.3 ft)

DIP Switches		Max Intensity (Loud Audible)
9	10	
ON	ON	Intensity 4: 101 dB
OFF	ON	Intensity 3: 99 dB
ON	OFF	Intensity 2: 92 dB
OFF	OFF	Intensity 1: 85 dB

#### Construction

**Bases, Segments, Covers:** polycarbonate

#### Audible Adjustment

**Standard Audible Adjustment:** Rotate the cover until the desired volume is reached  
**Loud Audible Electronic Adjustment:** Select the desired volume using DIP switches 9 and 10

#### Typical Reduction in Sound Intensity with Audible Adjustment (maximum to minimum):

- **Standard Audible:** 8 dB
- **Loud Audible:** 16 dB

#### Connections

5-pin M12/Euro-style quick disconnect, 8-pin M12/Euro-style quick disconnect, 150 mm (5.9 in) PVC cable with an M12/Euro-style quick disconnect, or 2 m (6.5 ft) unterminated cable, depending on model

#### Vibration and Mechanical Shock

Vibration: 10 Hz to 55 Hz, 0.5 mm peak-to-peak amplitude per IEC 60068-2-6  
 Shock: 15G 11 ms duration, half sine wave per IEC 60068-2-27

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

**Indicator Characteristics**

Color	Dominant Wavelength (nm) or Color Temperature (CCT)	Color Coordinates <sup>2</sup>		Lumen Output (Typical at 25 °C)
		x	y	
Green	525 nm	-	-	92
Red	625 nm	-	-	40
Yellow	590 nm	-	-	22
Blue	470 nm	-	-	32
White	5000 K	-	-	125
Orange	-	0.66	0.33	33

**Operating Conditions**

-40 °C to +50 °C (-40 °F to +122 °F)  
95% at +50 °C maximum relative humidity (non-condensing)

**Environmental Rating**

IEC IP65

**Certifications**



(CE approval only applies to 2.4 GHz models)



(NOM approval only applies to 900 MHz models)

**Required Overcurrent Protection**



**WARNING:** Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table. Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply. Supply wiring leads < 24 AWG shall not be spliced. For additional product support, go to [www.bannerengineering.com](http://www.bannerengineering.com).

Supply Wiring (AWG)	Required Overcurrent Protection (Amps)
20	5.0
22	3.0
24	2.0
26	1.0
28	0.8
30	0.5

**MultiHop Radio with Internal Antenna Specifications**

**Radio Range<sup>3</sup>**

900 MHz, 1 Watt (Internal antenna): Up to 3.2 km (2 miles) with line of sight  
2.4 GHz, 65 mW (Internal antenna): Up to 1000 m (3280 ft) with line of sight

**Antenna Minimum Separation Distance**

900 MHz, 150 mW and 250 mW: 2 m (6 ft)  
900 MHz, 1 Watt: 4.57 m (15 ft)  
2.4 GHz, 65 mW: 0.3 m (1 ft)

**Radio Transmit Power**

900 MHz, 1 Watt: 30 dBm (1 W) conducted (up to 36 dBm EIRP)  
2.4 GHz, 65 mW: 18 dBm (65 mW) conducted, less than or equal to 20 dBm (100 mW) EIRP

**Spread Spectrum Technology**

FHSS (Frequency Hopping Spread Spectrum)

**900 MHz Compliance (1 Watt)**

FCC ID UE3RM1809: FCC Part 15, Subpart C, 15.247  
IC: 7044A-RM1809

**2.4 GHz Compliance (MultiHop)**

FCC ID UE300DX80-2400: FCC Part 15, Subpart C, 15.247  
RED Directive 2014/53/EU  
IC: 7044A-DX8024

**Radio Packet Size (MultiHop)**

900 MHz: 175 bytes (85 Modbus registers)  
2.4 GHz: 75 bytes (37 Modbus registers)

**Radiated Immunity HF**

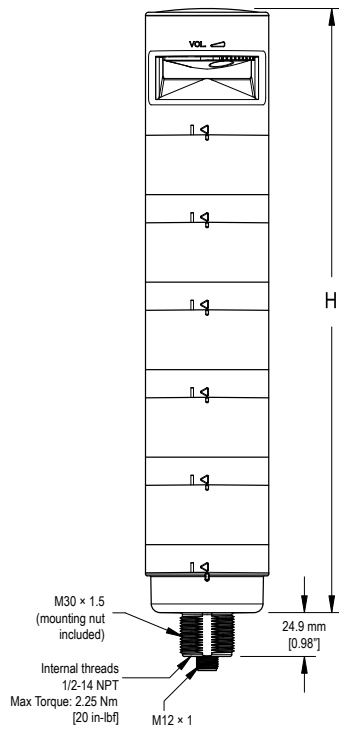
10 V/m (EN 61000-4-3)

<sup>2</sup> Refer to CIE 1931 chromaticity diagram or color chart, to show equivalent color with indicated color coordinates.

<sup>3</sup> Range depends on the environment and decreases significantly without line of sight. Always verify your wireless network's range by performing a Site Survey.



## Dimensions

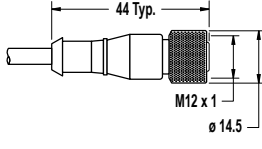
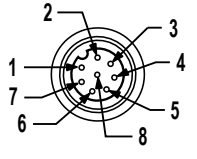
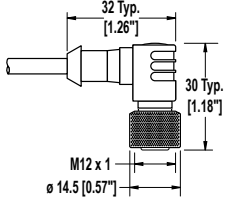


Model	Height (H)
1 light module	87.6 mm (3.45 in)
1 light module, 1 audible module	144.3 mm (5.68 in)
2 light modules	137.3 mm (5.41 in)
2 light modules, 1 audible module	194 mm (7.64 in)
3 light modules	187 mm (7.36 in)
3 light modules, 1 audible module	243.7 mm (9.59 in)
4 light modules	236.7 mm (9.32 in)
4 light modules, 1 audible module	293.4 mm (11.55 in)
5 light modules	286.4 mm (11.28 in)
5 light modules, 1 audible module	343.1 mm (13.5 in)

## Accessories

### Cordsets

5-Pin Threaded M12/Euro-Style Cordsets—Single Ended				
Model	Length	Style	Dimensions	Pinout (Female)
MQDC1-501.5	0.50 m (1.5 ft)	Straight		<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)	Right-Angle		
MQDC1-506RA	1.83 m (6 ft)			
MQDC1-515RA	4.57 m (15 ft)			
MQDC1-530RA	9.14 m (30 ft)			

8-Pin Threaded M12/Euro-Style Cordsets with Open-Shield				
Model	Length	Style	Dimensions	Pinout (Female)
MQDC2S-806	1.83 m (6 ft)	Straight		 <p>1 = White 2 = Brown 3 = Green 4 = Yellow 5 = Gray 6 = Pink 7 = Blue 8 = Red</p>
MQDC2S-815	4.57 m (15 ft)			
MQDC2S-830	9.14 m (30 ft)			
MQDC2S-850	15.2 m (50 ft)	Right-Angle		
MQDC2S-806RA	1.83 m (6 ft)			
MQDC2S-815RA	4.57 m (15 ft)			
MQDC2S-830RA	9.14 m (30 ft)			
MQDC2S-850RA	15.2 m (50 ft)			

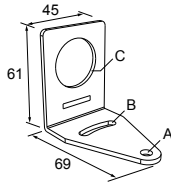
## Mounting Brackets

All measurements are listed in millimeters, unless noted otherwise.

### SMB30A

- Right-angle bracket with curved slot for versatile orientation
- Clearance for M6 (¼ in) hardware
- Mounting hole for 30 mm sensor
- 12-ga. stainless steel

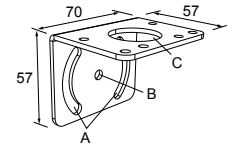
Hole center spacing: A to B=40  
Hole size: A=ø 6.3, B= 27.1 x 6.3, C=ø 30.5



### SMB30MM

- 12-ga. stainless steel bracket with curved mounting slots for versatile orientation
- Clearance for M6 (¼ in) hardware
- Mounting hole for 30 mm sensor

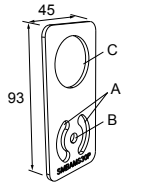
Hole center spacing: A = 51, A to B = 25.4  
Hole size: A = 42.6 x 7, B = ø 6.4, C = ø 30.1



### SMBAMS30P

- Flat SMBAMS series bracket
- 30 mm hole for mounting sensors
- Articulation slots for 90°+ rotation
- 12-ga. 300 series stainless steel

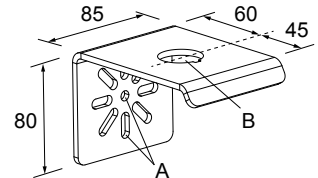
Hole center spacing: A=26.0, A to B=13.0  
Hole size: A=26.8 x 7.0, B=ø 6.5, C=ø 31.0



### SSA-MBK-EEC1

- Single 30 mm hole
- 8 gauge steel, black finish (powder coat)
- Front surface for customer applied labels

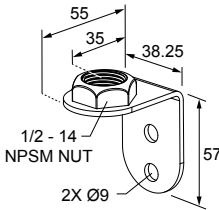
Hole size: A = ø 7 , B = ø 30



### LMBE12RA35

- Direct mounting of stand-off pipe, with common bracket type
- Zinc-plated steel
- 1/2-14 NPSM nut
- Mounting distance from the wall to the center of the 1/2-14 NPSM nut is 35 mm

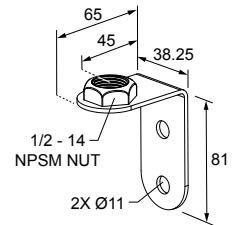
Hole center spacing: 20.0






### LMBE12RA45

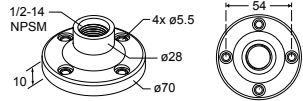
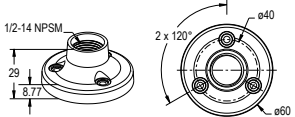
- Direct mounting of stand-off pipe, with common bracket type
- Zinc-plated steel
- 1/2-14 NPSM nut
- Mounting distance from the wall to the center of the 1/2-14 NPSM nut is 45 mm

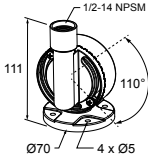
Hole center spacing: 35.0





## Elevated Mount System

Model	Features			Components												
SA-M30 - Black Polycarbonate	<ul style="list-style-type: none"> <li>Streamlined black PC or Gray PC thread cover</li> <li>Covers M30 thread on the light base</li> <li>Mounting hardware included</li> </ul>															
SA-M30C - Gray Polycarbonate																
<table border="1"> <thead> <tr> <th>Polished 304 Stainless Steel</th> <th>Black Anodized Aluminum</th> <th>Clear Anodized Aluminum</th> </tr> </thead> <tbody> <tr> <td>SOP-E12-150SS 150 mm (6 in) long</td> <td>SOP-E12-150A 150 mm (6 in) long</td> <td>SOP-E12-150AC 150 mm (6 in) long</td> </tr> <tr> <td>SOP-E12-300SS 300 mm (12 in) long</td> <td>SOP-E12-300A 300 mm (12 in) long</td> <td>SOP-E12-300AC 300 mm (12 in) long</td> </tr> <tr> <td>SOP-E12-900SS 900 mm (36 in) long</td> <td>SOP-E12-900A 900 mm (36 in) long</td> <td>SOP-E12-900AC 900 mm (36 in) long</td> </tr> </tbody> </table>	Polished 304 Stainless Steel	Black Anodized Aluminum	Clear Anodized Aluminum	SOP-E12-150SS 150 mm (6 in) long	SOP-E12-150A 150 mm (6 in) long	SOP-E12-150AC 150 mm (6 in) long	SOP-E12-300SS 300 mm (12 in) long	SOP-E12-300A 300 mm (12 in) long	SOP-E12-300AC 300 mm (12 in) long	SOP-E12-900SS 900 mm (36 in) long	SOP-E12-900A 900 mm (36 in) long	SOP-E12-900AC 900 mm (36 in) long	<ul style="list-style-type: none"> <li>Elevated-use stand-off pipe (½ in. NPSM/DN15)</li> <li>Polished 304 stainless steel, black anodized aluminum, or clear anodized aluminum surface</li> <li>½ in. NPT thread at both ends</li> <li>Compatible with most industrial environments</li> </ul>			
Polished 304 Stainless Steel	Black Anodized Aluminum	Clear Anodized Aluminum														
SOP-E12-150SS 150 mm (6 in) long	SOP-E12-150A 150 mm (6 in) long	SOP-E12-150AC 150 mm (6 in) long														
SOP-E12-300SS 300 mm (12 in) long	SOP-E12-300A 300 mm (12 in) long	SOP-E12-300AC 300 mm (12 in) long														
SOP-E12-900SS 900 mm (36 in) long	SOP-E12-900A 900 mm (36 in) long	SOP-E12-900AC 900 mm (36 in) long														
SA-E12M30 - Black Acetal	<ul style="list-style-type: none"> <li>Streamlined black acetal or white UHMW mounting base adapter/cover</li> <li>Connects between ½ in. NPSM/DN15 pipe and 30 mm (1-3/16 in) drilled hole</li> <li>Mounting hardware included</li> </ul>															
SA-E12M30C - White UHMW																

Pipe Mounting Flange			
Model	Features	Construction	
SA-F12	<ul style="list-style-type: none"> <li>Elevated-use stand-off pipes (½ in, NPSM/DN15)</li> <li>M5 mounting hardware and nitrile gasket included</li> </ul>	Die-cast zinc base with black paint	
SA-F12-3	<ul style="list-style-type: none"> <li>Elevated-use stand-off pipes (½ in, NPSM/DN15)</li> <li>M4 mounting hardware and nitrile blend gasket included</li> </ul>	Black Polycarbonate	

Foldable Mounting Brackets			
Model	Features	Construction	
SA-FFB12	<ul style="list-style-type: none"> <li>For use with 1/2 inch stand-off pipes</li> <li>Stainless steel hardware</li> </ul>	Black polycarbonate	
SA-FFB12C		Gray polycarbonate	

## LMB Sealed Right-Angle Bracket

Model	Description	Construction	
LMB30RA	<b>Direct-Mount Models:</b> Bracket kit with base, 30 mm adapter, set screw, fasteners, O-rings, and gaskets.	Black polycarbonate	
LMB30RAC		Gray polycarbonate	
LMBE12RA	<b>Pipe-Mount Models:</b> Bracket kit with base, ½-14 pipe adapter, set screw, fasteners, O-rings, and gaskets. For use with stand-off pipe (listed and sold separately).	Black polycarbonate	
LMBE12RAC		Gray polycarbonate	

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For patent information, see [www.bannerengineering.com/patents](http://www.bannerengineering.com/patents).

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Información México: La operación de este equipo está sujeta a las siguientes dos condiciones: 1) es posible que este equipo o dispositivo no cause interferencia perjudicial y 2) este equipo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

Banner es una marca registrada de Banner Engineering Corp. y podrán ser utilizadas de manera indistinta para referirse al fabricante. "Este equipo ha sido diseñado para operar con las antenas tipo Omnidireccional para una ganancia máxima de antena de 6 dBd y Yagi para una ganancia máxima de antena 10 dBd que en seguida se enlistan. También se incluyen aquellas con aprobación ATEX tipo Omnidireccional siempre que no excedan una ganancia máxima de antena de 6dBd. El uso con este equipo de antenas no incluidas en esta lista o que tengan una ganancia mayor que 6 dBd en tipo omnidireccional y 10 dBd en tipo Yagi, quedan prohibidas. La impedancia requerida de la antena es de 50 ohms."

Antenas SMA	Modelo	Antenas Tipo-N	Modelo
Antena, Omni 902-928 MHz, 2 dBd, junta de caucho, RP-SMA Macho	<b>BWA-902-C</b>	Antena, Omni 902-928 MHz, 6 dBd, fibra de vidrio, 1800mm, N Hembra	<b>BWA-906-A</b>
Antena, Omni 902-928 MHz, 5 dBd, junta de caucho, RP-SMA Macho	<b>BWA-905-C</b>	Antena, Yagi, 900 MHz, 10 dBd, N Hembra	<b>BWA-9Y10-A</b>

## Mexican Importer

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