TL70 Wireless Modular Tower Light

Datasheet

SureCross Wireless TL70 Tower Lights combine the best of Banner's popular Tower Light family with its reliable, field proven, SureCross wireless architecture.

- Available in 900 MHz and 2.4 GHz ISM Bands
- Up to 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 Gateway
- Input wires can be configured as auxiliary inputs from other devices

TL70 Base

Housing	Radio Band		Connection		Housing Color
B-TL70	DXN2	—	Q5		
Base Segment	DXN2 - Node 2.4 GHz DXN9 - Node 900 MHz		**5** = 2 m, 5-wire Integral Cable **8** = 2 m, 8-wire Integral Cable **Q5** = 5-pin M12/Euro-style Integral QD **Q8** = 8-pin M12/Euro-style Integral QD **QP5** = Pigtail with 5-pin M12/Euro-style QD **QP8** = Pigtail with 8-pin M12/Euro-style QD QD models require mating cordset		**Blank** = Black **C** = Gray

TL70 Segments

Housing		Color/Alarm	Housing Color
SG-TL70	—	R	
TL70 Segment		**G** = Green **Y** = Yellow **R** = Red **B** = Blue **W** = White **A** = Audible	**Blank** = Black **C** = Gray

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.

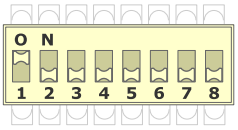
- Example base model number: B-TL70DXN2-Q5
- Example light segment model number: SG-TL70-G
- Example audible segment model number: SG-TL70-A

TL70 Pre-Assembled Models

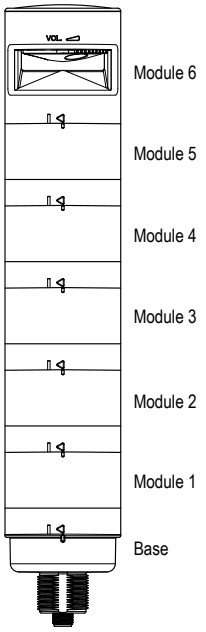
Housing	Radio Band	Color/Position 1	2	3	4	5	Audible Alarm	Housing Color	Connection
TL70	DXN2	W	B	G	Y	R			Q
	DXN2 - Node 2.4 GHz DXN9 - Node 900 MHz	Blank = None G = Green Y = Yellow R = Red B = Blue W = White					Blank = None A = Audible	Blank = Black C = Gray	Blank = 2 m Integral Cable Q = M12/Euro-style Integral QD QP = Pigtail with M12/Euro-style QD QD models require mating cordset

- Example pre-assembled model number: TL70DXN2GYRAQ

Configuring the Modules



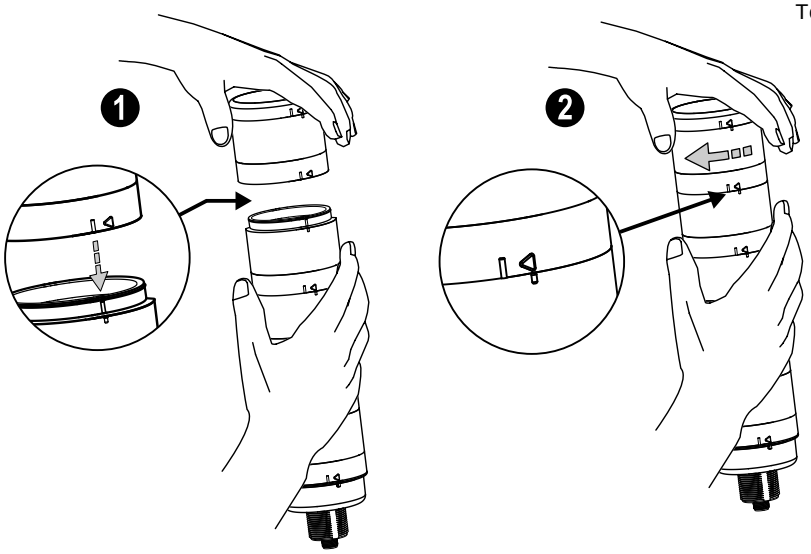
Turn on the appropriate DIP switch to set the order of the components, counting up from the tower light's base.



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

* Factory default setting

Assembling the Modules

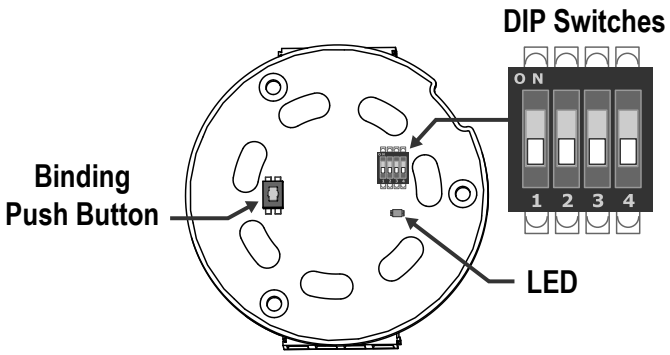


To assemble the modules:

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

Bind the TL70s to the Gateway and Assign the Node Address

Before beginning the binding procedure, apply power to all the devices.



1. Enter binding mode on the Gateway.
   - For board modules, triple-click the button.
   - For housed models, triple-click button 2.

   On the board modules, the green/red LED flashes. On the housed models, both LEDs flash red.
2. Assign the TL70 a Node address using the Gateway's rotary dials. 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 Node 01, set the left dial to 0 and the right dial to 1.

   Valid Node addresses are 01 through 47.
3. Remove any segments to access the circuit board in the base module of the TL70.
4. Enter binding mode on the TL70 by triple-clicking the button.
   The bicolor LED flashes alternately while it searches for a Gateway in binding mode. After the TL70 is bound, the LED is red and green for four seconds (looks amber), then it flashes four times (looks amber). The TL70 automatically exits binding mode, cycles power, and enters Run mode.
5. Reassemble the TL70 segments back onto the base.
6. Repeat steps 2 through 5 for as many TL70 Wireless Modular Tower Lights as are needed for your network.
7. After binding all TL70 Wireless Modular Tower Lights, exit binding mode on the Gateway.
   - For board modules, double-click the button.
   - For housed models, double-click button 2.

LED Behavior for the Nodes

Nodes do not sample inputs until they are communicating with the Gateway. The radios and antennas must be a minimum distance apart to function properly. Recommended minimum distances are:

900 MHz 150 mW radios: 6 feet
900 MHz 1 Watt radios: 15 feet
2.4 GHz 65 mW radios: 1 foot

LED (Bi-color)	Node Status
Flashing green	Radio link okay
Green and red flashing alternately	In Binding mode
Both colors are solid for 4 seconds, then flash 4 times; looks amber	Binding mode is complete
Flashing red, once every 3 seconds	Radio link error
Flashing red, once every second	Device error

DIP Switch Settings

Radio Transmit Power		
DIP Switch 1 Position	900 MHz Models	2.4 GHz Models
OFF *	1 Watt (30 dBm) Operation	Disabled
ON	250 mW (24 dBm) Operation	

The 900 MHz radios can be operated at 1 watt (30 dBm) or 250 mW (24 dBm). While the Performance radios operate in 1 Watt mode, they cannot communicate with the older 150 mW radios. To communicate with the older 150 mW radios, operate this radio in 250 mW mode. 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), making the 2.4 GHz Performance models automatically compatible with older 2.4 GHz models.

DIP Switch 2 Position	900 MHz Models and 2.4 GHz Models
OFF *	Input wires control light segments
ON	Disables wired input control of light segments and converts wires to auxiliary Inputs

* Default configuration

Modes of Operation

Node Controlled. The wireless TL70 Node can be operated similar to a wired model where the individual segments are activated by a PLC or manual switch. In this scenario, the Gateway only monitors the status of the light segments. An example application would be remotely monitoring the status of one or multiple machines from a single Gateway.

Gateway Controlled. In the Gateway-controlled mode, the TL70 Node only requires 10 to 30 V dc power. Input signals sent from the Gateway have full control over the status of all the segments. An example application would be a call-for-parts application with a TL70 Node mounted a fork truck and the Gateway mounted in a work cell or stock room. When part pick-up or delivery in needed, the operator sends a signal to the fork truck driver. A multicolor TL70 could be used when there are multiple pick-up or delivery locations.

Modbus Registers

I/O	Modbus Holding Register		I/O Type	I/O Range		Holding Register Representation		Module #
	Gateway	Any Node		Min.	Max.	Min. (Dec.)	Max. (Dec.)	
1	1	1 + (Node# × 16)	Discrete IN 1	0	1	0	1	M1
2	2	2 + (Node# × 16)	Discrete IN 2	0	1	0	1	M2
3	3	3 + (Node# × 16)	Discrete IN 3	0	1	0	1	M3
4	4	4 + (Node# × 16)	Discrete IN 4	0	1	0	1	M4
5	5	5 + (Node# × 16)	Discrete IN 5	0	1	0	1	M5
6	6	6 + (Node# × 16)	Discrete IN 6	0	1	0	1	M6
7	7	7 + (Node# × 16)	Reserved					
8	8	8 + (Node# × 16)	Device Message					
9	9	9 + (Node# × 16)	Discrete OUT 9	0	1	0	1	M1
10	10	10 + (Node# × 16)	Discrete OUT 10	0	1	0	1	M2
11	11	11 + (Node# × 16)	Discrete OUT 11	0	1	0	1	M3
12	12	12 + (Node# × 16)	Discrete OUT 12	0	1	0	1	M4
13	13	13 + (Node# × 16)	Discrete OUT 13	0	1	0	1	M5
14	14	14 + (Node# × 16)	Discrete OUT 14	0	1	0	1	M6
15	15	15 + (Node# × 16)	Control Message					
16	16	16 + (Node# × 16)	Reserved					

Specifications

Tower Light

Supply Voltage and Current
12 to 30 V dc (Outside the USA: 12 to 24 V dc, ± 10%) [1]
Indicators - Maximum current per LED color:

Blue, Green, White: 420 mA at 12 V dc; 145 mA at 30 V dc
Red, Yellow: 285 mA at 12 V dc; 120 mA at 30 V dc
Audible: 30 mA at 12 to 30 V dc

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.)

Supply Protection Circuitry
Protected against transient voltages

Indicator Response Time
Off Response: 150 µs (maximum) at 12 to 30 V dc
On Response: 180 ms (maximum) at 12 V dc; 50 ms (maximum) at 30 V dc

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

Segment Lumens

Color	Typical Wavelength or Color Temp	Typical Intensity (lm)
Green	525 nm	92
Red	625 nm	40
Yellow	590 nm	22
Blue	470 nm	32
White	5000 K	125

Audible Adjustment
Rotate the cover until the desired volume is reached
Change in sound intensity from fully open to fully closed is 8 dB

Construction
Bases, segments, covers: polycarbonate

Indicators
1 to 5 colors depending on model: Green, Red, Yellow, Blue, and White
Flash rates: 1.5 Hz ±10% and 3 Hz ±10%
LEDs are independently selected

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

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

Vibration and Mechanical Shock
Vibration 10 to 55 Hz 0.5 mm p-p amplitude per IEC60068-2-6
Shock 15G 11 ms duration, half sine wave per IEC60068-2-27

Certifications
Pending

Radio

Radio Range[2]
900 MHz, 1 Watt: Up to 9.6 km (6 miles)
2.4 GHz, 65 mW: Up to 3.2 km (2 miles)

Minimum Separation Distance
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

900 MHz Compliance (1 Watt)
FCC ID UE3RM1809: This device complies with FCC Part 15, Subpart C, 15.247
IC: 7044A-RM1809

2.4 GHz Compliance
FCC ID UE300DX80-2400 - This device complies with FCC Part 15, Subpart C, 15.247
ETSI/EN: In accordance with EN 300 328: V1.7.1 (2006-05)
IC: 7044A-DX8024

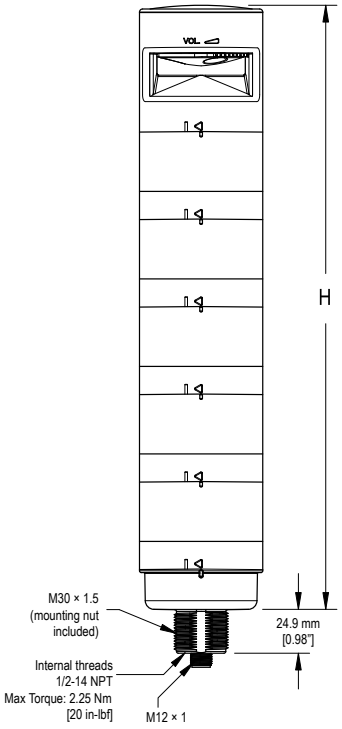
Radiated Immunity HF
10 V/m (EN 61000-4-3)

Spread Spectrum Technology
FHSS (Frequency Hopping Spread Spectrum)

Link Timeout
Gateway: Configurable via User Configuration Tool (UCT) software
Node: Defined by Gateway

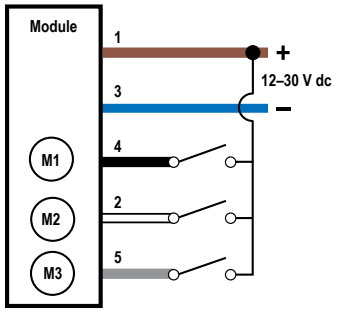
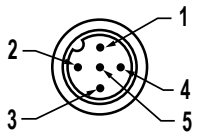
[1] For European applications, power the DX80 from a Limited Power Source as defined in EN 60950-1.
[2] Radio range is with the 2 dB antenna that ships with the product. High-gain antennas are available, but the range depends on the environment and line of sight. To determine the range of your wireless network, perform a Site Survey.

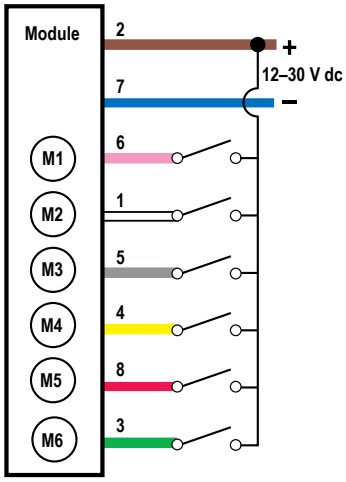
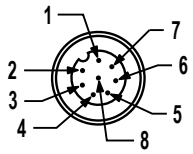
Dimensions



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)

Wiring Diagrams

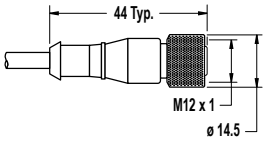
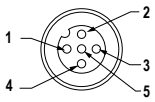
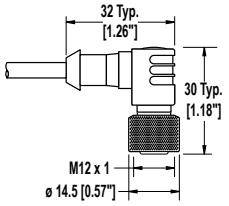
Sourcing (PNP) Input	Euro-style Male Pinouts	Key
		1 = brown 2 = white 3 = blue 4 = black 5 = gray M1 = Module 1 M2 = Module 2 M3 = Module 3

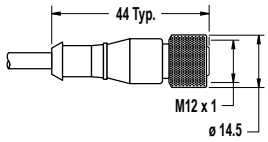
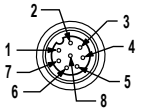
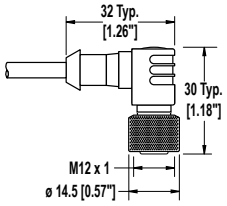
Sourcing (PNP) Input	Euro-style Male Pinouts	Key
		1 = white 2 = brown 3 = green 4 = yellow 5 = gray 6 = pink 7 = blue 8 = red M1 = Module 1 M2 = Module 2 M3 = Module 3 M4 = Module 4 M5 = Module 5 M6 = Module 6

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.

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		 1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray
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)			

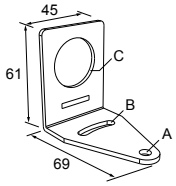
8-Pin Threaded M12/Euro-Style Cordsets with Open-Shield				
Model	Length	Style	Dimensions	Pinout (Female)
MQDC2S-806	1.83 m (6 ft)	Straight		 1 = White 2 = Brown 3 = Green 4 = Yellow 5 = Gray 6 = Pink 7 = Blue 8 = Red
MQDC2S-815	4.57 m (15 ft)			
MQDC2S-830	9.14 m (30 ft)			
MQDC2S-850	15.2 m (50 ft)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

All measurements are listed in millimeters, unless noted otherwise.

Mounting Brackets

SMB30A

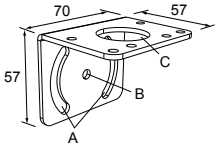
- Right-angle bracket with curved slot for versatile orientation
- Clearance for M6 (¼ in) hardware
- Mounting hole for 30 mm sensor
- 12-ga. stainless steel



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

SMB30MM

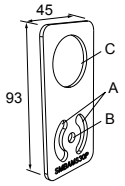
- 12-ga. stainless steel bracket with curved mounting slots for versatile orientation
- Clearance for M6 (¼ in) hardware
- Mounting hole for 30 mm sensor



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

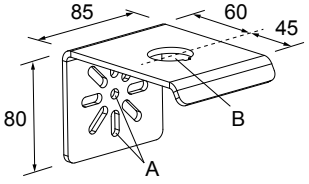
- Flat SMBAMS series bracket
- 30 mm hole for mounting sensors
- Articulation slots for 90°+ rotation
- 12-ga. 300 series stainless steel



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 (zinc-plated)
- Front surface for customer applied labels

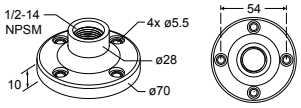


Hole size: A = ø 7 , B = ø 30

All measurements are listed in millimeters, unless noted otherwise.

Elevated Mount System

<table>
<tr><th colspan="3">Model</th><th>Features</th><th>Components</th></tr>
<tr><td colspan="3">SA-M30 - Black Polycarbonate</td><td rowspan="2">• Streamlined black PC or Gray PC thread cover
• Covers M30 thread on the light base
• Mounting hardware included</td><td rowspan="2">  </td></tr>
<tr><td colspan="3">SA-M30C - Gray Polycarbonate</td></tr>
<tr><td>Polished 304 Stainless Steel</td><td>Black Anodized Aluminum</td><td>Clear Anodized Aluminum</td><td rowspan="4">• Elevated-use stand-off pipe (½ in. NPSM/DN15)
• Polished 304 stainless steel, black anodized aluminum, or clear anodized aluminum surface
• ½ in. NPT thread at both ends
• Compatible with most industrial environments</td><td rowspan="4">  </td></tr>
<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>
<tr><td colspan="3">SA-E12M30 - Black Acetal</td><td rowspan="2">• Streamlined black acetal or white UHMW mounting base adapter/cover
• Connects between ½ in. NPSM/DN15 pipe and 30 mm (1-3/16 in) drilled hole
• Mounting hardware included</td><td rowspan="2">  </td></tr>
<tr><td colspan="3">SA-E12M30C - White UHMW</td></tr>
</table>

<table>
<tr><th colspan="4">Pipe Mounting Flange</th></tr>
<tr><th>Model</th><th>Features</th><th>Construction</th><th></th></tr>
<tr><td>SA-F12</td><td>• For use elevated stand-off pipes (½ in, NPSM/DN15)
• M5 mounting hardware and nitrile gasket included</td><td>Die-cast zinc base with black paint</td><td> 
</td></tr>
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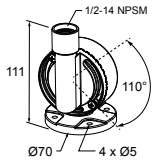
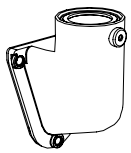
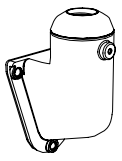
<table>
<tr><th colspan="4">Foldable Mounting Brackets</th></tr>
<tr><th>Model</th><th>Features</th><th>Construction</th><th></th></tr>
<tr><td>SA-FFB12</td><td rowspan="2">• For use with 1/2 inch stand-off pipes
• Stainless steel hardware</td><td>Black polycarbonate</td><td rowspan="2"> 
</td></tr>
<tr><td>SA-FFB12C</td><td>Gray polycarbonate</td></tr>
</table>

LMB Sealed Right-Angle Brackets

<table>
<tr><th>Model</th><th>Description</th><th>Construction</th><th></th></tr>
<tr><td>LMB30RA</td><td rowspan="2">Direct-Mount Models: Bracket kit with base, 30 mm adapter, set screw, fasteners, o-rings, and gaskets</td><td>Black polycarbonate</td><td rowspan="2">  </td></tr>
<tr><td>LMB30RAC</td><td>Gray polycarbonate</td></tr>
<tr><td>LMBE12RA</td><td rowspan="2">Pipe-Mount Models: 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)</td><td>Black polycarbonate</td><td rowspan="2">  </td></tr>
<tr><td>LMBE12RAC</td><td>Gray polycarbonate</td></tr>
</table>

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