



MINI-ARRAY™ Heated Enclosure

For outdoor measuring light screen systems



Features

- Heavy-duty stainless steel or extruded aluminum housing protects emitter or receiver in an outdoor environment
- Thermostatically controlled resistance wires keep glass window free of condensation, snow or ice for effective sensor operation in cold weather environments
- Humidistat also controls heated window to keep glass clear, even on damp or foggy days
- Choose from stainless steel or aluminum housings, in 3 sizes
- Compatible with 4', 5', and 6' MINI-ARRAY sensors
- Space-saving, vertical design requires only 8" x 8" footprint
- An excellent solution for outdoor applications such as toll booths

Overview

The Series BMHE Heated Enclosure is designed to offer weather protection for a MINI-ARRAY emitter or receiver in an outdoor application such as a toll booth.

The Enclosure has a laminated safety glass window with a series of resistance wires. The resistance wires connect through two thermostats to a power source to heat the glass as necessary to prevent condensation, ice or snow from inhibiting the beams. When humidity inside the enclosure rises, a humidistat prompts the heater to warm the window, to prevent condensation.

The Series BMHE MINI-ARRAY Heated Enclosure is designed to accommodate MINI-ARRAY emitters and receivers 4', 5', or 6' long, with enough extra space at top and bottom to ensure accurate mounting.

Models

Model Number	Description			Overall Enclosure Height (H)**	Clear Window Height (C)**
	Material	Finish*	Array Length		
BMHE4A/BMHL4G	Aluminum Enclosure	Painted	4'	1.7 m (66.5")	1.5 m (59")
BMHE5A/BMHL5G	Aluminum Enclosure	Painted	5'	2.0 m (78.5")	1.8 m (71")
BMHE6A/BMHL6G	Aluminum Enclosure	Painted	6'	2.2 m (86.5")	2.0 m (79")
BMHE4SS/BMHL4GSS	Stainless Steel Enclosure	Painted	4'	1.7 m (67.5")	1.5 m (60")
BMHE5SS/BMHL5GSS	Stainless Steel Enclosure	Painted	5'	2.0 m (79.5")	1.8 m (72")
BMHE6SS/BMHL6GSS	Stainless Steel Enclosure	Painted	6'	2.2 m (87.5")	2.0 m (80")
BMHE4SSN/BMHL4GSSN	Stainless Steel Enclosure	Non-painted	4'	1.7 m (67.5")	1.5 m (60")
BMHE5SSN/BMHL5GSSN	Stainless Steel Enclosure	Non-painted	5'	2.0 m (79.5")	1.8 m (72")
BMHE6SSN/BMHL6GSSN	Stainless Steel Enclosure	Non-painted	6'	2.2 m (87.5")	2.0 m (80")

* Standard color is Federal Safety Yellow (Federal Standard color# 23538). Consult Factory for other colors.

** Refer to Figure 1.

MINI-ARRAY™ Heated Enclosure

MINI-ARRAY Heated Enclosure Specifications

Heater Power Requirement	BMHE4 Models: 4 amps @ 24V ac BMHE5 Models: 4 amps @ 28V ac BMHE6 Models: 4 amps @ 36V ac (See power supplies available, page 7)
Control Thermostat	Encapsulated disc-type Closing Temperature: 4°C (39°F) Open Temperature: 29°C (84°F)
Back-up Thermostat	Encapsulated disc-type Closing Temperature: 32°C (90°F) Open Temperature: 49°C (120°F)
Humidistat	Mechanical switch activated by hygroscopic nylon film Humidity Range: 20% to 80% relative humidity
Status Indicator	Front-mounted red LED indicates when heater element is ON
Temperature Range	-20° to +70°C (-4° to +158°F)
Construction	Housing: 6063 T6 aluminum, extruded; or 304 stainless steel, formed Window: Laminated safety glass with embedded resistance wires
Environmental Rating	NEMA 3R (IEC IP54)
Connections	<p>Sensors: MINI-ARRAY emitters and receivers have 5-pin Mini-style connectors; use Banner 5-wire cables (see page 7) or user-supplied 5-wire shielded cable with optional field-wireable connector (see page 7); see sensor data sheet for further details. For other sensor models, see individual sensor data sheet for connection specifications.</p> <p>Heater: (Cable not supplied) Requires 2-wire 14 gauge stranded cable, with ground wire. Loop resistance < 0.75 ohms (up to 45 m/150' of 14 gauge cable) Connectors accept up to 14 gauge stranded wire.</p> <p>Humidistat: Blade connectors on the humidistat housing connect to the wire receptacles on the heated window wiring harness.</p>

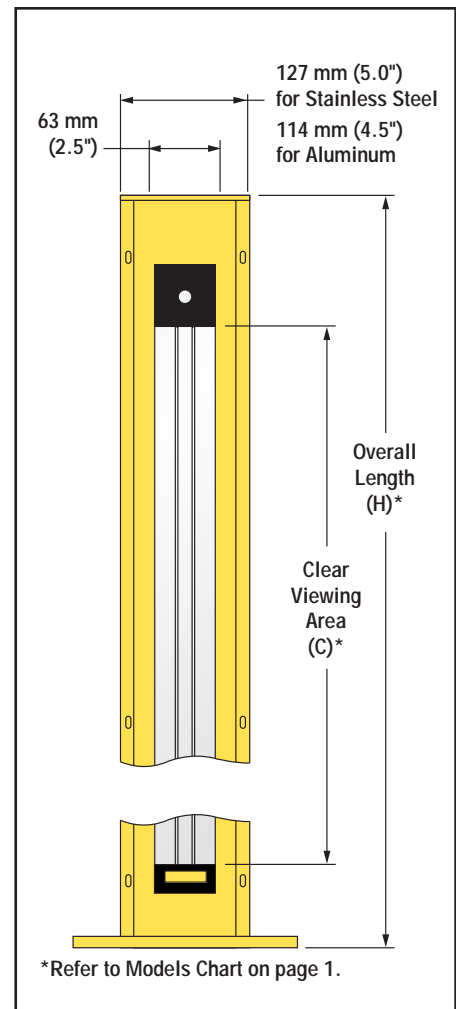


Figure 1. Heated Enclosure dimensions

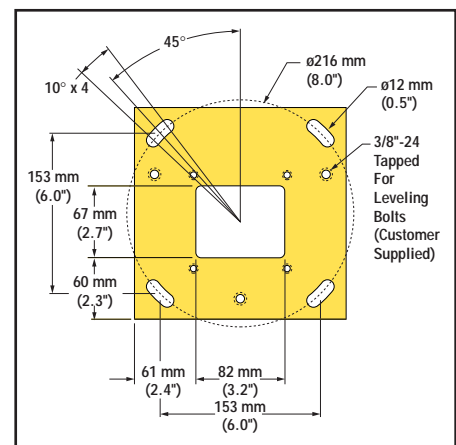


Figure 2. Base plate mounting hole pattern and dimensions

Installation

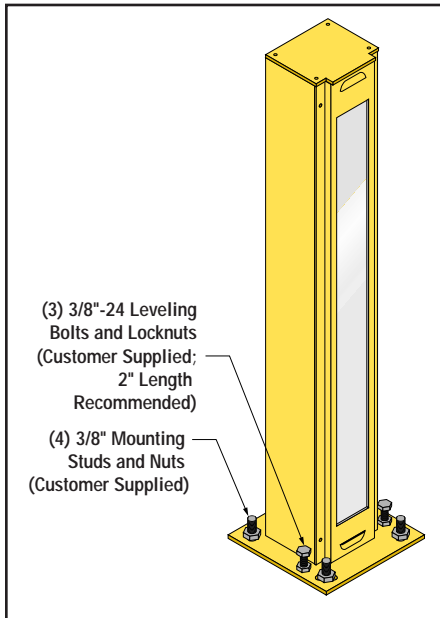


Figure 3. Base mounting and leveling

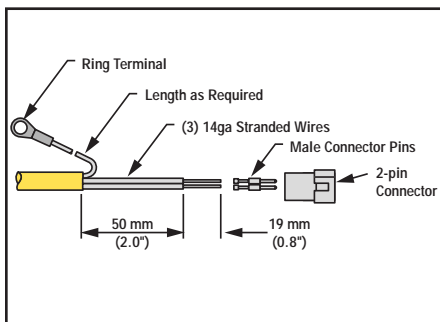


Figure 4. Assembly of Molex connector

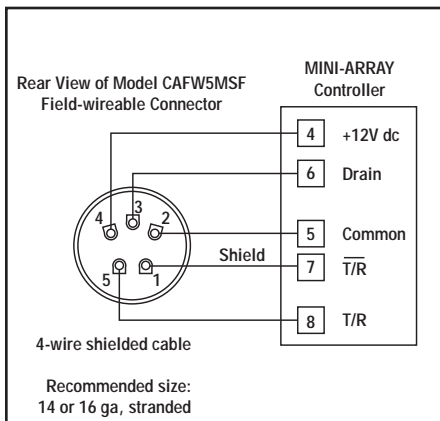


Figure 5. MINI-ARRAY Sensor cable hookup to the field-wireable connector

Assembly

- 1) Prepare a 6" x 6" square mounting pad, using four 3/8" studs (not included).
- 2) Mount the base plate to the housing (Figure 6) with 4 stainless steel flat head screws (1/4" - 20 x 3/4", included).
- 3) Feed the heater cable and the sensor cable through the cutout in the base plate; set the housing/base plate assembly onto the mounting pad.
- 4) Level the housing in one of 2 ways:
 - Using 3 user-supplied 3/8" - 24 x 2" bolts and lock nuts; or
 - Using 4 leveling nuts, threaded onto the four mounting studs, under the base plate. After leveling, secure the housing assembly using four 3/8" nuts on the four mounting studs (Figure 3). Add flat washers and lock washers, as required (not included).

Electrical Connections

Heater Supply Cable

Transformer Power Supplies convert 115V ac to the voltage required by the heated window and humidistat. See Figure 6 and page 7 for more information.

- 1) The heated window is powered at the top of the enclosure. Route the heater supply cable to the top of the enclosure along one side wall. Cut off any excess cable, leaving enough to make the connections. Secure the cable midway along the sidewall, using one of the supplied cable clips.
- 2) Strip the heater supply cable insulation as shown in Figure 4. Install the ring terminal on the ground wire. Install the male connector pins on the 2 power wires, using Molex crimping tool model HTR01031E, or equivalent.
- 3) Push the power wires into the 2 male connector pins, and crimp. Insert the pins into the Molex 2-pin connector (see Figure 4). Attach the ring terminal to the hole at the upper back of the enclosure, using the supplied #10 hardware.

Humidistat Supply Cable

- 1) Insert 6 spring nuts into the rear slots in the back of the enclosure, 3 on each side. (Two nuts will be for attaching the humidistat bracket, and 4 will be for attaching the sensor brackets, at top and bottom.) Mount the humidistat/bracket assembly to the upper back of the enclosure.
- 2) Push the 2 wires with blade terminals into place on the humidistat wiring harness; push firmly until they "click" into place. (Connect either wire to either terminal; polarity is not important.)

Sensor Cable

- 1) Route the sensor cable terminal to the top of the enclosure, leaving enough to bend it at the top and plug it into the sensor. If you are supplying non-Banner cables and using the field-wireable connector, see Step 2.
- 2) To install the field-wireable connector, follow the wiring connections as shown in Figure 5. Be sure to allow enough space at the top of the Heated Enclosure when mounting the sensors, to accommodate this connector's additional length (as compared with the standard Banner QD cable). See page 7 for more information about the field-wireable connector.

NOTE: The connector pins accept up to 14 gauge stranded wire; 16 gauge stranded wire is recommended for the sensor cable wires.

MINI-ARRAY™ Heated Enclosure

Banner-supplied Stainless-steel Hardware (in 4-section Packet):*					
Item	Use	Description	Packet No.	Quantity	
				SS Enclosure	Alum. Enclosure
A	Mount base plate to enclosure	1/4-20 x .75" Phillips flat head screw	3	4	4
B	Mount sensor and humidistat brackets	10-32 x .50" socket head cap screw	3	6	6
		Split ring lock washer, #10	3	6	6
		Flat washer, #10	3	6	6
		10-32 spring nut*	4	6	6
C	Grounding screw	Phillips pan head machine screw	4	1	1
		ITLW washer, #10	4	1	1
D	Mount window assembly to enclosure	8-32 x .38" Phillips pan head machine screw	4	16	–
		8-32 x .50" Phillips pan head machine screw	1	–	12
		Lock washer, ITLW, #8	1	16	12
E	Mount cover plate to enclosure	8-32 x .38" Phillips pan head machine screw	2	4	4
		Split ring lock washer, #8	2	4	4
		Flat washer, #8	2	4	4

* All fasteners are stainless steel, except for zinc-plated steel spring nuts.

Additional Hardware Included with Heated Enclosure:					
Item	Use	Description	Quantity		
			SS Enclosure	Alum. Enclosure	
F	Connect power to heater cable	Male connector pins	2	2	
		2-pin connector	1	1	
G	Fasten power cable	Cable holder clip (3/4 x 3/4)	2	2	
H	Ground power cable	Ring terminal	1	1	
J	Mount sensors	Sensor brackets (packed with heated enclosure)	2	2	
		Humidistat/bracket assembly	1	1	
User-Supplied Hardware:					
K	Mount and level base	3/8" - 24 leveling bolts (2" recommended)	3	3	
		3/8" - 24 lock nuts	3	3	
		3/8" Mounting studs	4	4	
		3/8" Mounting nuts	4	4	

MINI-ARRAY™ Heated Enclosure

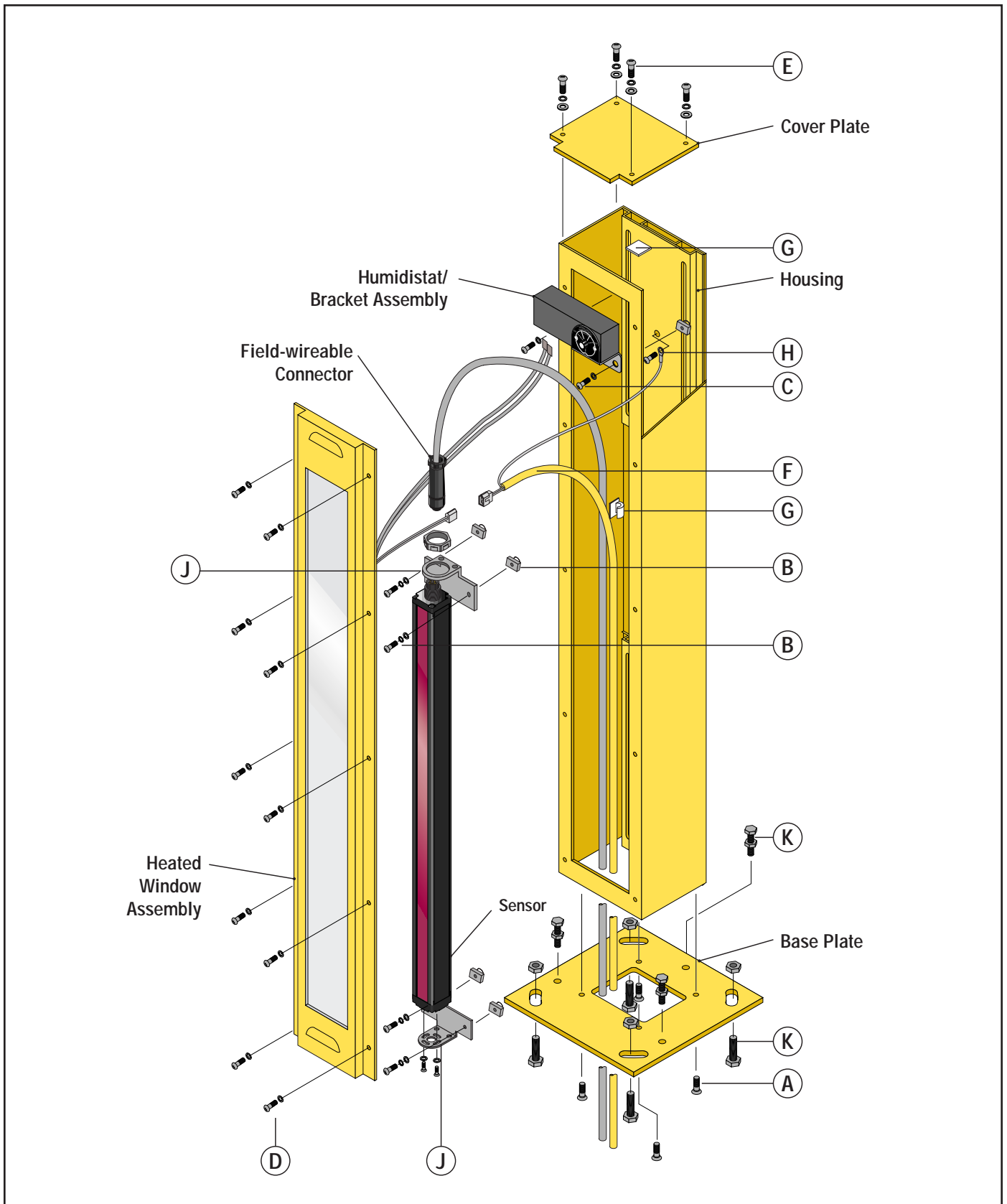


Figure 6. Assembly components

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Sensor Mounting and Alignment

- 1) Assemble the brackets supplied with the Heated Enclosure to each end of the sensor (Figure 6), using 2 hex head screws with integral compression washer per bracket (M4 x 10 – non QD end; M30 Nut and washer – QD end, supplied with sensors). (Although both screws and brackets are supplied with each MINI-ARRAY sensor, use only the brackets packed with the Heated Enclosure.)
- 2) Adjust the location of the spring nuts in the rear slots to align with the holes in the sensor mounting brackets and install the sensor using the supplied #10 hardware. Adjust the height of the sensor to match the height of the opposing sensor; ensure that the sensor lens is oriented parallel to the enclosure window.
- 3) Connect the sensor cable to the sensor's QD connector. See the instructions packed with each sensor for connecting the sensor cable to the array controller. After all sensor wiring is completed, follow the instructions packed with the sensor controller for optimizing alignment. Rotate the enclosure as needed to align the emitter and receiver arrays.

Final Assembly

- 1) Attach the second cable clip to the inside of the cover plate, as shown in Figure 6. Assemble the cover plate to the housing using the supplied #8 hardware. Attach the heater supply cable to the cable clip on the cover plate.
- 2) Connect the heater supply cable to the heated window assembly. Mount the heated window assembly to the enclosure using the supplied #8 hardware.
- 3) Connect the heater power cable to the cable from the Transformer Power Supply (see instructions packed with Power Supply). The red LED at the top of the heated window assembly indicates when the heater element is active.



Operation

Adjusting the Humidistat

The humidistat is adjustable between 20% and 80% relative humidity; the factory setting is 80% relative humidity, the optimal setting for most applications.

To eliminate the humidistat from the window control circuit, turn the knob fully counter-clockwise to the OFF position. To manually close the contacts on the humidistat, turn the knob fully clockwise, to the ON position.

For accurate operation, do not attempt to adjust the humidistat below 20% or above 80% relative humidity.

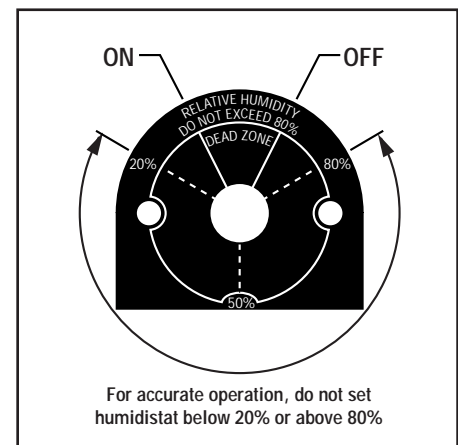



Figure 7. Humidistat control

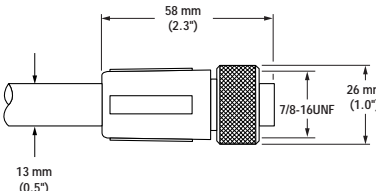
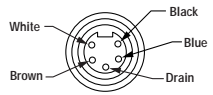
Accessories

Power Supplies

Model	Description	Primary	Secondary
BMHPS4	Power Supply for Two BMHE4 Enclosures	105 to 130V ac	23V ac
BMHPS5	Power Supply for Two BMHE5 Enclosures	105 to 130V ac	27V ac
BMHPS6	Power Supply for Two BMHE6 Enclosures	105 to 130V ac	35V ac

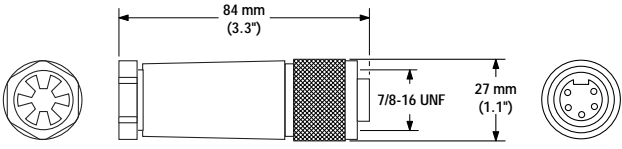


MINI-ARRAY Emitter and Receiver Cables

Model	Length*	Wire	Termination	Dimensions	Pin-out
MAQDC-575C MAQDC-5100C MAQDC-5125C MAQDC-5150C	23 m (75') 30 m (100') 37 m (125') 45 m (150')	16 ga	One end 5-pin Mini-style Female		

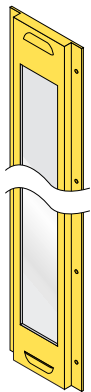
* For cables longer than 150', contact the Factory for assistance.

MINI-ARRAY Field-wireable Connectors for User-Supplied Cables

Model	To Fit Cable Dia.	Termination	Dimensions
CAFW5MSF1 CAFW5MSF3 CAFW5MSF4	6-8 mm 10-12 mm 12-14 mm	5-pin Mini-style Female	

Replacement Heated Windows

Model	Description		
	Material	Finish	Array Length
BMHL4G	Aluminum Window Assembly	Painted (Yellow)	4'
BMHL5G	Aluminum Window Assembly	Painted (Yellow)	5'
BMHL6G	Aluminum Window Assembly	Painted (Yellow)	6'
BMHL4GSS	Stainless Steel Window Assembly	Painted (Yellow)	4'
BMHL5GSS	Stainless Steel Window Assembly	Painted (Yellow)	5'
BMHL6GSS	Stainless Steel Window Assembly	Painted (Yellow)	6'
BMHL4GSSN	Stainless Steel Window Assembly	Non-painted	4'
BMHL5GSSN	Stainless Steel Window Assembly	Non-painted	5'
BMHL6GSSN	Stainless Steel Window Assembly	Non-painted	6'



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WARRANTY: Banner Engineering Corporation warrants its products to be free from defects for one year. Banner Engineering Corporation will repair or replace, free of charge, any product of its manufacture found to be defective at the time it is returned to the factory during the warranty period. This warranty does not cover damage or liability for the improper application of Banner products. This warranty is in lieu of any other warranty either expressed or implied.