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Occupancy Solution Kit: Multiple Count Emitter-Receiver (MCER)

Setup Guide

Kit Contents

Receiver
includes D cell battery and ISM radio

TL70 Wireless Indicator
includes bracket and power supply

Direct Select™ Operator Interface
includes C battery

Not shown above:

DXM Controller

Power Supply

Emitter
includes D cell battery

Tools Needed

Tape measure
Phillips screwdriver
Hand drill

Not Included

1/4"-20 mounting fasteners

How it Works

The Occupancy Solution Kit works by monitoring the number of people into and out of an area. User defined alert levels trigger a red indicator on the Operator Interface and Indicator Light to show that the area occupancy has been exceeded. Occupancy levels reset automatically every night at 2 AM Central Time.

Multiple Count Emitter-Receiver (MCER) Solution Kits are preconfigured to monitor between two and four distinct doors. Each Directional Sensor Pair monitors people entering and exiting a specific area and gives a total count of people inside the monitored door. Individual Operator Interfaces display the number of people in an area and allow for employee adjustments to the occupancy count. Green indicator lights display if additional people are allowed to enter the area. The Indicator Light turns red to indicate when people are required to wait until the occupancy level drops below a user-defined limit. The Multiple Count Emitter-Receiver Solution Kit can be expanded to monitor up to 10 different areas (doors). Contact your local distributor or Banner Engineering's Technical Support team at 1-800-203-5616 for assistance with larger systems.

Total Count Emitter-Receiver (TCER) Solution Kits are available when a user requires single area monitoring.

The **DXM Controller** sets the user-defined occupancy levels. The display shows the current occupancy level and other system metrics.

The Occupancy Limit defines the area's maximum capacity. The Occupancy Warning value defines a warning level below the Occupancy Limit to indicate when the occupancy is close to the area's capacity. Reaching the Occupancy Warning value triggers faster reporting.

Set the Occupancy Warning value below the Occupancy Limit value.

Mount the DXM Controller in a secure location outside of any metal cabinets or enclosures.

The **Direct Select™ Operator Interface** displays the count of people in the monitored area.

The indicator is off when the occupancy level is below the warning limit. The indicator turns yellow when the warning limit has been reached. The indicator turns red when the Occupancy limit has been reached.

Use the ⬆ (up) and ⬇ (down) buttons to manually make corrections to the count by increasing and decreasing the count to reflect the actual occupancy level. The display may take up to two seconds to update the manual adjusts. The ↩ (back) button resets the corresponding system back to 0 occupancy.

The Operator Interface can be mounted near each monitored door or can be mounted or held by an operator to actively monitor the occupancy level. Additional Operator Interfaces can be added for each monitored area (door).

The **Indicator Light** alerts people when entering into the area is allowed (green) and when entering is no longer allowed (red).

An optional yellow segment can be added to display the Occupancy Warning. See the accessories list for the model number.

Mount the Indicator Light indoors when possible and mount so that people entering the monitored area are able to see the occupancy status.

Emitter   Receiver with Radio

The **Emitter-Receiver Directional Sensor Pair** detects whether a person is entering or exiting the monitored area. The sensor pair comes with two components: an emitter and a receiver with an internal radio. The receiver has a radio icon on the cover and base of the sensor.

Mount the sensor pair according to Banner's suggested mounting instructions.

Indicator Light bracket, model LMB30LP (included with kit)

Occupancy monitoring is inherently subject to irregular human movement and the system cannot be guaranteed to detect with 100% accuracy in all cases.

Set Up Your Hardware

1 ## Supply power to all devices

The Occupancy Solution Kit arrives with all necessary power sources needed to get the system operating quickly. This includes lithium batteries for the Directional Sensors and Direct Select™ Operator Interface, and a DC power supply for the DXM Controller and TL70 Wireless Indicator Light.

Supply Power to the DXM Controller

Plug the power supply into the DXM Controller, aligning the keys in the connector, and hand tighten. Plug the power supply into a power outlet using the appropriate regional wall adapter.

Supply Power to the Emitter-Receiver Directional Sensor Pair and Mount to the Bracket

The Directional Sensor Pair comes with two components: an emitter and a receiver with an internal radio.

1. Unscrew the four corner screws with a Phillips screwdriver on the Receiver and remove the cover.

The Receiver has an internal radio with a radio icon on the base and front cover.

Radio icon

2. Insert the 3.6V lithium D cell battery. Verify the battery's positive and negative terminals align to the positive and negative terminals as marked.

Caution: there is risk of damage if the batteries are installed incorrectly.

Status LED

3. If the radio board Status LED does not automatically begin flashing, turn on the radio by pressing and holding the button until it begins flashing.

Verify the toggle switch on the bottom of the sensor is in the "ON" position.

Toggle switch   Radio button

4. Place the cover back on the Receiver and hand tighten the four corner screws. Do not over-tighten.

5. Mount the supplied bracket to the Receiver. Place the L bracket between the washer and the jam nut. Thread the jam nut onto the base of the Receiver. Hand-tighten the jam nut.

Repeat this process for the Emitter.

Supply Power to the Direct Select™ Operator Interface

Status LED

1. Unscrew the four corner screws with a Phillips screwdriver and open the Operator Interface.

2. Insert the 3.6 V lithium battery. Verify the battery's positive and negative terminals align to the positive and negative terminals as marked.

Caution: There is risk of damage if the batteries are installed incorrectly.

3. If the Status LED does not automatically begin flashing, turn on the Operator Interface by pressing and holding ⤺ and ✔ together for five seconds or until the Status LED starts flashing red.

4. Reassemble the Node and tighten the four corner screws. Do not over-tighten.

Supply Power to the TL70 Wireless Indicator Light and Mount to the Bracket

1. Position the Indicator Light on the bracket so that the icons are facing the desired orientation.

Secure with the supplied lock nut. Hand tighten only.

2. Connect the power supply to the Indicator Light, aligning the keys in the connector. Hand tighten.

3. Connect the power supply into a power outlet using the appropriate regional wall adapter.

Mount the System Components

2

Mounting hardware is not included with the Occupancy Solution Kit. Banner recommends using ¼-20 mounting bolts, self tapping screws, magnetic mounts, or hardware that is compatible with the mounting surface.

Do not mount any radios inside metal enclosures. Metal around the radios can reduce wireless signal strength.

Mount the DXM Controller in a secure location, outside of any metal cabinets or enclosures.

The DXM Controller has four mounting holes. Use ¼-20 mounting bolts or self tapping screws to secure the controller to a rigid surface.

Mount the Indicator Light indoors when possible and mount so that people entering the monitored area are able to see the occupancy status.

Mount the indicator light using the supplied bracket and ¼-20 mounting bolts, self tapping screws, or optional magnetic mounts listed at the end of this document.

The Multiple Count Solution Kit comes with a single Operator Interface. It is configured to monitor the count for door 1. Mount the Operator Interface near door 1 in a central supervisory location, or the Operator Interface can be held by an employee to actively monitor the occupancy level. Additional Operator Interfaces can be added to the system to monitor and make adjustments to individual doors.

Mount the Operator Interface to a rigid surface using the mounting holes and ¼-20 bolts, self tapping screws, or optional magnetic mounts listed at the end of this document.

How you mount your sensor varies based on the application requirements. User-provided custom mounting fixtures may be required in cases where the supplied brackets are not compatible with the installation location. Contact your local distributor or Banner Engineering's Technical Support team at 1-800-203-5616 for more options or refer to the Troubleshooting section (pg 9).

Banner recommends the sensors be mounted indoors when possible. The arrows on the face of the Emitter-Receiver Sensor Pair must point towards the inside of the building/monitored area. Mount the sensors using two 1/4"-20 mounting bolts, self tapping screws, or the optional magnetic brackets. Use the side arrows on the Emitter and Receiver to mount the sensor in the correct orientation.

When mounting the Directional Sensor Pair using the supplied brackets:

1. Mount the Emitter bracket to a rigid surface.
2. Mount the Receiver bracket at the same height as the Emitter bracket. Follow the bracket assembly instructions on page 4 to re-assemble the Sensors to the bracket.
3. Align the Receiver by rotating the housing until it is perpendicular to the Emitter. Two yellow alignment LEDs should begin to flash on the Receiver when it is aligned.

When mounting the Directional Sensor Pair using the sensor housing mounting holes:

1. Mount the Emitter against a flat surface using the two mounting holes.
2. Place the Receiver across from the Emitter and position it at the same height as the Emitter. Move the Receiver horizontally until the two yellow Alignment LEDs begin to flash.
3. Secure the Receiver after it has been aligned to the Emitter.

Yellow alignment LED

Mounting Recommendations

- Mount the Directional Sensor Pair so that the sensor's top is at a minimum height of 1.25 m (50 in) to avoid the potential for miscounts. Mounting the sensor at a height below 1.25 m (50 in) may result in double counts by detecting arm or leg motion. The Directional Sensor Pair may need to be mounted higher than 1.25 m (50 in) to avoid counting arm motion or people carrying or pushing objects.
- Mount the Emitter and Receiver less than 30 ft from each other for optimal performance.

Example Mounting Options

For all installation images, **R** refers to the Receiver and **E** refers to the Emitter.

Sliding Doors

For occupancy monitoring in areas with sliding doors, Banner recommends mounting the devices on the inside of the door as close as possible to the door.

Avoid mounting the sensors in areas where people will stand and may block the sensors.

This mounting option uses the supplied L bracket.
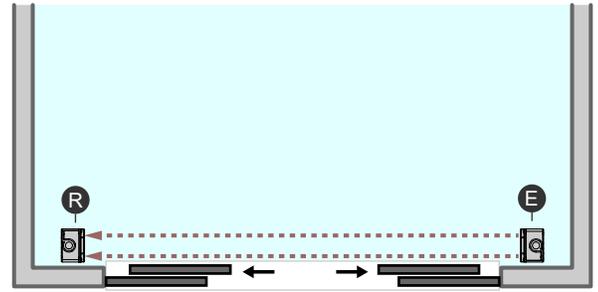
Outward Opening Doors

For occupancy monitoring in areas with outward opening doors, Banner recommends mounting the devices on the inside of the door as close as possible to the door.

The supplied L brackets can be mounted on the walls next to the door. If the door enters into a hallway/corridor, the sensors can be mounted directly to the walls without using the brackets.

Avoid mounting the sensors in areas where people will stand and block the sensors.
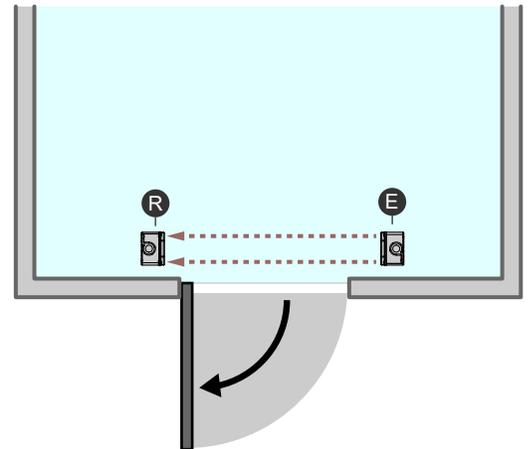
Inward Opening Doors

For occupancy monitoring in areas with inward opening doors, Banner recommends mounting the devices on the inside of the door and far enough from the door that the door does not block the sensor pair when opening.

The supplied bracket allows for sensor rotation for an angled mounting. The sensors should be mounted to the supplied bracket on a fixed wall surface.

Avoid mounting the sensors in areas where people will stand and block the sensors.
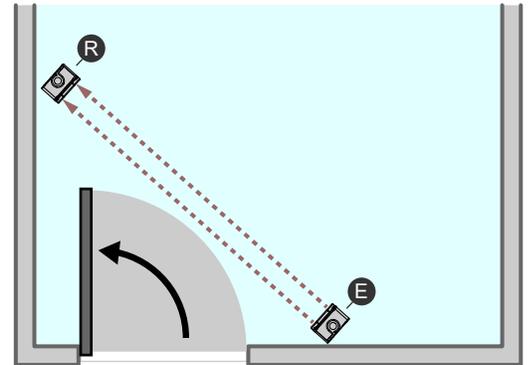
L-type Doors

For occupancy monitoring in areas with an L-type door configuration, Banner recommends mounting the devices on the inside of the door so that the door does not block the sensors when it is opened.

Two mounting options are shown. Both mounting options are valid for this type of installation and use the mounting holes on the sensor's housing.

Avoid mounting the sensors in areas where people will stand and block the sensors.
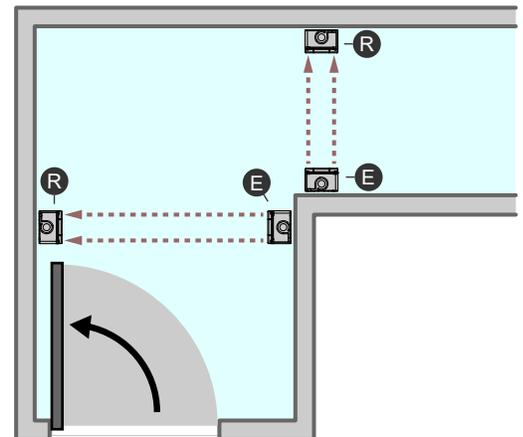
Disclaimer: Do not place in an area where the sensor pairs may be continually blocked by people or objects.

Define Your Alert Levels

Set Up the Warning and Alarm Settings Using the DXM Controller

This Occupancy Solution Kit is designed to provide visual indication of capacity levels for monitored areas. The Door Occupancy Limit indicates that the area has exceeded the capacity of people that may enter.

The red indicator light alerts people attempting to enter that they need to wait until people have left the area before they can enter (green light). The Door Occupancy Warning setting is user-defined and indicates when the occupancy level is getting close to the Door Occupancy Limit. The Door Occupancy Warning displays as a yellow flashing LED on the Operator interface and enables change of state reporting, which updates the count after every person enters instead of once a minute (the default update rate).

Use the Controller's LCD, button keys, and menu system to configure the warnings and alarms.

On the DXM Controller, use the arrow keys to select the **Registers** menu and press **ENTER**.

Highlight **Door 1 Occupancy Limit** and press **ENTER**.

Enter your desired **Door 1 Occupancy Limit**.

1. Using the up and down arrow buttons, select the first digit for the limit and press **ENTER** to set the first digit.
2. Use the up and down arrows to set the second digit (if applicable) and press **ENTER**.
3. Repeat if you are adding a third digit.
4. Press **ENTER** once more to highlight **SEND** and press **ENTER** to confirm.

The screen should now display the entered **Door 1 Occupancy Limit**.

Enter your desired **Door 1 Warning**.

1. Using the up and down arrow buttons, select the first digit for the warning and press **ENTER** to set the first digit.
2. Use the up and down arrows to set the second digit (if applicable) and press **ENTER**.
3. Repeat if you are adding a third digit.
4. Press **ENTER** once more to highlight **SEND** and press **ENTER** to confirm. Note: The **Door 1 Warning** level must be set below the **Door 1 Occupancy Limit**.

The screen should now display the entered **Door 1 Warning**.

Repeat these steps for each additional door. By default, the **Fast Sample** setting is set to 1. This allows for change of state reporting. Change the **Fast Sample** setting to 0 to disable change of state reporting and increase the battery life.

Additional system information is available on the DXM Controller's display.

The installation and configuration of your Solution Kit is complete.

Troubleshooting

Problem	Possible Causes / Solutions
Directional Counts are not changing	Sensors may not be properly aligned. Verify the Receivers and Emitters are aligned and verify the yellow alignment LEDs on the Receivers are flashing. If they are not flashing yellow, check if there are obstructions between the Sensors and realign them. Batteries may need to be replaced
Directional Count is opposite of expectation	Directional Sensor Pair may be installed in the incorrect location. Verify the emitter and receiver are installed in the correct orientation. The arrows on the covers should be pointing toward the inside of the monitored area.
Sensors are double counting	Sensors may not be mounted too low. Adjust the sensor height to avoid shopping carts, arm motion, or leg motion that may trigger double counts
Sensors missing directional counts or over counting	People may be entering side-by-side, causing the sensors to view a single count instead of two people. People stopping in the middle of the beam path may block others coming through and being counted. If someone walks into the beam path without going through completely, stops, then turns around, the person may not have been counted properly. Recommend instructing people to walk through in a single file pattern and not to stop in front of the sensor's beam path.
Counts reset unexpectedly	Pushing the back arrow on the Operator Interface clears all the counts, similar to the daily reset. To avoid resetting the count, instruct your operators to not press the back arrow.
All counts reset overnight	The DXM Controller is programmed to reset all counts at 2 AM Central (observing DST). Contact your local distributor or Banner Engineering's technical support team at 1-800-203-5616 for assistance on changing the reset schedule.
Operator Interface no longer displays the counts	After the DXM Controller is rebooted, a delay of 5 minutes may occur before counts are displayed. The Operator Interface may not be communicating with the DXM Controller. Check the status LED above the ✅ (check mark) button. If the status LED flashes red, change the positioning of the DXM Controller or Operator Interface so that they are closer to each other (they should have a minimum separation distance of 15 feet). The status LED should flash green when the Operator Interface is communicating to the DXM Controller. If the status LED does not begin to flash green, contact your local distributor or Banner Engineering's technical support team at 1-800-203-5616.
Sensor's red LED is flashing	Sensors are not communicating with the DXM Controller. Change the positioning of the DXM Controller to improve radio signal. The status LEDs should flash green when the Sensors are communicating to the DXM Controller. If the status LEDs do not begin to flash green, contact your local distributor or Banner Engineering's technical support team at 1-800-203-5616.
Wireless TL70 Indicator Light is not lighting up	After the DXM Controller reboots or cycles power, a delay of up to five minutes may occur before the indicators turn on. The TL70 Wireless Indicator Light may not be communicating with the DXM Controller. Remove the light module above the base by rotating the base counterclockwise and pulling it off of the segments, the lines on the notches should align. Verify the internal status LED is flashing green. If the LED is flashing red, change the positioning of the DXM Controller or TL70 Wireless Indicator Light so they are closer to each other to improve communication. The status LED should flash green when the Indicator Light is communicating to the DXM Controller. If the status LEDs do not begin to flash green, contact your local distributor or Banner Engineering's technical support team at 1-800-203-5616.

Optional: Cloud Connectivity

Banner Engineering's Occupancy Solution Kit offers a fast and easy way to gain access to the data and history of the occupancy at your facility. The following section will show you how to configure your DXM Controller over Ethernet and quickly create your solution on the Banner CDS platform. See your data on a default dashboard and create your own visual tools and reporting.

1

Connect the devices using the supplied cables

1. Plug the threaded end of the Ethernet cable to the DXM Controller. Aligning the pins and connect the quick disconnect connector. Hand-tighten only.
2. Connect the RJ45 connector to a local area network device, such as a Wi-Fi router or network modem.

Network Configuration

The Occupancy Solution Kit can be connected to a network using either Static IP or Dynamic IP (DHCP). By default, the Occupancy Solution Kit is configured to use DHCP. Use DHCP when connecting directly to a modem or router. Use a Static IP address if directed to by your IT department.

Setting a Static IP Address

To define a specific IP address of your choosing:

1. On the DXM, use the arrows and move to the **System Config** menu. Press **ENTER**.
2. Use the arrow keys to select the **Ethernet** menu. Press **ENTER**.
3. Highlight the **DHCP** selection and press **ENTER**. Set **DHCP** to **OFF**.
4. The system will request a restart, press **ENTER** to confirm.
5. Follow steps 1 and 2 to enter the **Ethernet** menu. Use the arrow keys to select **IP**. Press **ENTER**.
6. Use the up and down arrows to change the IP address. Press **ENTER** to move to the next octet.
7. Press **ENTER** on the final octet to accept the changes.
8. Cycle power to the DXM1200. The changes are saved on the DXM1200 and the new IP address will be used.

Use the same procedures to set the subnet mask (SN) and default gateway (GW) to match your network requirements. Your IT department can provide these settings if needed.

System Config ⟶ Ethernet ⟶

DHCP ⟶	Update DHCP Mode
IP: ⟶	Update IP Address
SN: ⟶	Update SN
GW: ⟶	Update GW Address
Reset ⟶	Resets Ethernet parameters to xml defaults.

After making changes to the Ethernet settings, restart the DXM.

⬆ ⬇ to change the value

ENTER to accept

BACK to return to the previous menu
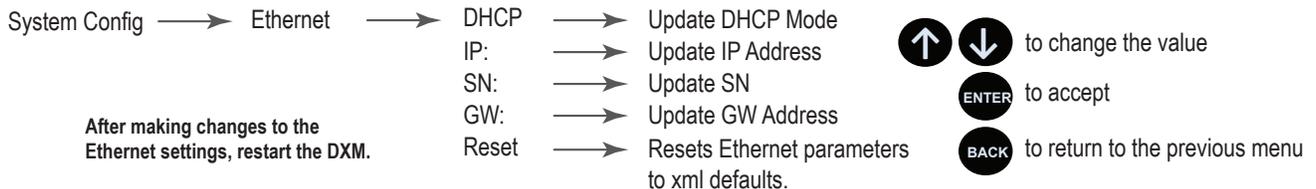
② Banner Cloud Data Service (Banner CDS)

Navigate to bannercds.com.
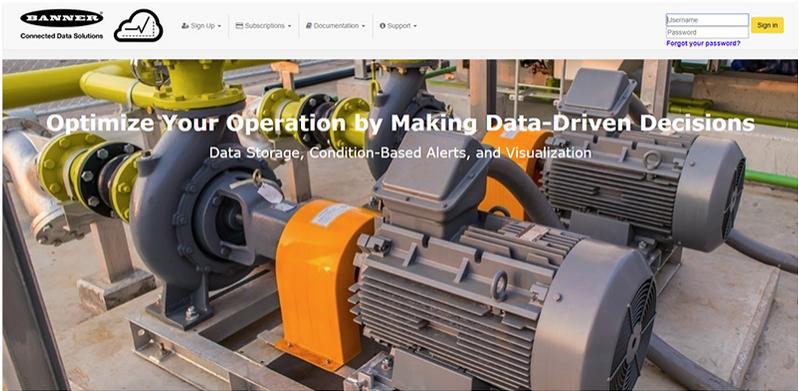
Enter Your Authorization Code

1. Register your account by going to the **Sign Up** menu.
2. Select **Enter Authorization Code.**
3. Enter the requested information. The authorization code is on the Banner Cloud Authorization Code Insert included with the Occupancy Solution Kit.
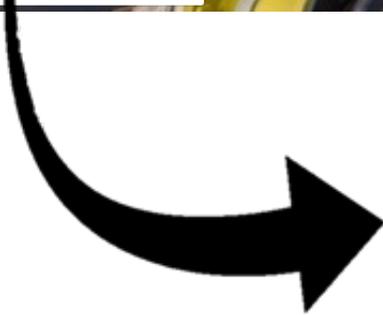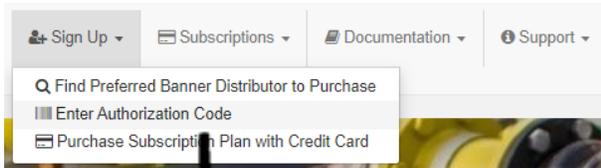
③ Add a New Gateway

After launching the CDS webpage, the **Gateways** screen displays. Use the **Gateways** screen to add the DXM Controller to the Cloud application and generate a Dashboard.

1. Click on [+New Gateway] (+New Gateway) in the top-right corner of the **Gateways** screen.
2. Set your **Gateway Name** and enter the **DXM Serial #**. The Serial Number can be found using the DXM Controller's LCD. On the DXM's main menu, scroll to **System Info** and then press **ENTER** twice to view the seven-digit serial number at the bottom of the information list.
3. Enter all seven digits into the **DXM Serial #** entry field on Banner CDS.
4. Verify that **Configuration** is set to **Solutions** and select **Occupancy Multiple Count** for the **Kit Type**. This allows the Banner CDS application to automatically create Dashboard layouts and metrics for the solution. Click [Create] (Create).

The Banner CDS application creates a site for the system and begins searching for a data push from the DXM Controller. The Occupancy Solution Kit is designed to push data once every five minutes to the Cloud.

The DXM Controller could take up to five minutes to complete recognition by the system.

View Dashboard and Set Parameters

After Banner CDS has created the site and detected the DXM Controller, click on [Go to Dashboard] (Go to Dashboard). The [Dashboard] (Dashboard) panel appears and indicates the metrics of the Occupancy Solution Kit.

The data on this dashboard will include a historical indication of the Occupancy of the area and a means of updating the Occupancy Limit and Occupancy Warning parameters.

Optional Accessories

To add additional doors to an occupancy monitoring system, order one of each model listed below (900 MHz or 2.4 GHz).

	Emitter-Receiver Pair	Indicator	Operator Interface	Battery	Battery
900 MHz	DX80N9X2W-DIR	TL70DXN9GRQ-INOUTIKIT	DX80N9DSTS	BWA-BATT-013	BWA-BATT-001
2.4 GHz	DX80N2X2W-DIR-NB	TL70DXN2GRQ-INOUTIKIT	DX80N2DSTS-NB	C Battery	D Batteries

The 900 MHz models are commonly used in the United States. The 2.4 GHz models are required in the EU and many other countries and the **-NB** in the model number indicates it ships without batteries.

Warning Indicator Segment

SG-TL70-Y

- Used with the TL70 Wireless Indicator Light
- Yellow indicator for Warning indication

Additional Mounting Options

LMB30LP

- Used with the TL70 Wireless Indicator Light
- Low profile
- 30 mm mounting hole
- 300 series stainless steel
- No fasteners included

BWA-HW-OSK-001

- Hardware packet used for mounting the Emitter-Receiver Directional Sensor Pair
- Stainless steel L-bracket
- Zinc-plated steel washer
- Delrin locknut

Cellular Modem

SXI-LTE-001

- Used with DXM Controller
- Allows for Cellular Connectivity to the Banner CDS platform

BWA-BK-020 Magnet Mount

- Used with the Direct Select™ Operator Interface or DXM Controller
- Includes two 80-lb pull rare-earth magnet mounts and two #10-32 × 1 inch screw mounts
- Compatible with several other mounting brackets
- 31.75 mm (1.25 inch) diameter
- No fasteners included

Replacement Sensors

Receivers

DX80N9X2W-DIRR

- 900 MHz
- Includes batteries

DX80N2X2W-DIRR-NB

- 2.4 GHz
- No batteries included

Emitters

DX80NxX2W-DIRE

- Includes batteries

DX80NxX2W-DIRE-NB

- No batteries included