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If a power cable is included with this product, it must be used exclusively for this product.

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Chapter 1  Introduction to Environmental Sensor Packages

Raritan has three types of environmental sensor packages: DPX, DPX2 and DX series.

DPX series described in this guide refers to DPX sensor packages instead of DPX PDUs unless otherwise specified.

Note that NOT all Raritan products support all types of Raritan environmental sensor packages. For specific sensor support information, see your Raritan product's online help, such as EMX or PX2 online help.

*Note: Online help is accessible from your Raritan product's application or the Support page (http://www.raritan.com/support/) on Raritan's website.*

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Chapter 1: Introduction to Environmental Sensor Packages

Sensor Overview

An environmental sensor package may have more than one sensor or actuator function. For details, see:

- **Available DPX Sensor Packages** (on page 5)
- **Available DPX2 Sensor Packages** (on page 20)
- **Available DX Sensor Packages** (on page 26)

A sensor is used to detect the environmental condition, such as temperature, humidity, and water presence. An actuator is used to control a system or mechanism, such as turning on or off a device.

Depending on your Raritan product’s firmware, the maximum number of sensors or actuators supported by your Raritan product, such as EMX and PX2, differs. See **Supported Maximum Number of Sensors and Actuators** (on page 40).

The maximum cabling length for all sensor packages connected to a Raritan product's sensor port should not exceed 98 feet (30 meters). See **Supported Maximum Sensor Distance** (on page 39).

*Exception: DX-PD2C5 supports a maximum cabling length of 29 feet (9 meters) instead of 98 feet (30 meters).*

**Warning:** For proper operation, wait for 15~30 seconds between each connection operation or each disconnection operation of environmental sensor packages.

Sensor Comparison
### Chapter 1: Introduction to Environmental Sensor Packages

<table>
<thead>
<tr>
<th>Sensor family</th>
<th>Connection interface</th>
<th>Support for sensor daisy chain</th>
<th>Chain position availability*</th>
<th>Support for a Raritan sensor hub</th>
<th>Automatic sensor firmware update</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPX</td>
<td>RJ-12</td>
<td>**</td>
<td></td>
<td>☑</td>
<td></td>
</tr>
<tr>
<td>DPX2</td>
<td>RJ-12</td>
<td>☑     ***</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>DX</td>
<td>RJ-45</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
</tbody>
</table>

* A sensor's position in a sensor daisy chain is included in the chain position availability information. This information can be retrieved through the Raritan product where the sensor is connected, such as PX2 or EMX.

** Most DPX sensor packages do NOT support daisy chaining except for DPX-T1DP1.

*** DPX2 sensors can be daisy chained via one DPX2 sensor cable, but you cannot daisy chain multiple DPX2 sensor cables.
Chapter 2  DPX Series

DPX is the first generation of Raritan environmental sensor packages. Most DPX packages come with a factory-installed sensor cable with an RJ-12 connector.

DPX supports the use of a Raritan sensor hub to increase the number of connected DPX sensors.

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# Available DPX Sensor Packages

<table>
<thead>
<tr>
<th>Sensor packages</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPX-T1</td>
<td>1 temperature sensor. See <em>DPX Temperature and Humidity Sensors</em> (on page 6).</td>
</tr>
<tr>
<td>DPX-T1H1</td>
<td>1 temperature sensor and 1 humidity sensor. See <em>DPX Temperature and Humidity Sensors</em> (on page 6).</td>
</tr>
<tr>
<td>DPX-T3H1</td>
<td>3 temperature sensors and 1 humidity sensor. See <em>DPX Temperature and Humidity Sensors</em> (on page 6).</td>
</tr>
<tr>
<td>DPX-AF1</td>
<td>1 air flow sensor. See <em>Air Flow Sensors</em> (on page 6).</td>
</tr>
<tr>
<td>DPX-T1DP1</td>
<td>1 temperature sensor and 1 differential air pressure sensor. See <em>Differential Air Pressure Sensors</em> (on page 7).</td>
</tr>
<tr>
<td>DPX-CC2-TR</td>
<td>Two-channel contact closure sensors. See <em>Contact Closure Sensors</em> (on page 9).</td>
</tr>
<tr>
<td>DPX-WSF</td>
<td>1 floor-mounted water sensor. See <em>Floor-mounted Water Sensor</em> (on page 17).</td>
</tr>
<tr>
<td>DPX-WSC series</td>
<td>1 cable water sensor. See <em>Cable Water Sensor</em> (on page 18).</td>
</tr>
</tbody>
</table>

For detailed information on sensor names, see *Sensor Naming Conventions* (on page 44).
DPX Temperature and Humidity Sensors

Raritan provides three types of DPX temperature and humidity sensor packages: DPX-T1, DPX-T1H1 and DPX-T3H1.

A DPX-T3H1 package contains one DPX-T1H1 and two DPX-T1 sensors. As shown in the following diagram, all sensors have been connected to the sensor cable, when shipping out of the factory, in a manner that you cannot remove or replace any individual sensor.

Air Flow Sensors

If a DPX air flow sensor (DPX-AF1) is connected, make sure that sensor faces the source of the wind (such as a fan) in the appropriate orientation as indicated by the arrow on that sensor.

To affix this sensor to an object or place, just screw it up using the sensor’s two screw holes.
Differential Air Pressure Sensors

The DPX differential air pressure sensor (DPX-T1DP1) detects not only the differential air pressure but also the temperature because it has a built-in temperature sensor.

This sensor is designed to receive the inputs of two pressure levels. Differential air pressure is measured by reading the difference of the two inputs.

If multiple differential air pressure sensors are needed, you can cascade them.

<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>'In' port (RJ-12)</td>
<td>Connect to a Raritan product, such as PX2 or EMX. If cascading multiple air pressure sensors, connect this port to the 'Out' port of another sensor.</td>
</tr>
<tr>
<td>2</td>
<td>'Out' port (RJ-12)</td>
<td>Use this port for cascading air pressure sensors.</td>
</tr>
<tr>
<td>3</td>
<td>'Lo' pressure nozzle</td>
<td>Receive low air pressure inputs.</td>
</tr>
<tr>
<td>4</td>
<td>'Hi' pressure nozzle</td>
<td>Receive high air pressure inputs.</td>
</tr>
</tbody>
</table>
Connecting Tubes

Two tubes are shipped with the sensor. Connect the tubes to the sensor to receive two air pressure inputs. If necessary, cut the tubes so that the tube length meets your needs.

▶ To install tubes:

1. Connect the tubes to both pressure nozzles of the sensor.

2. Place each tube’s grommet in an appropriate location where you want to detect differential air pressure levels.
   - Place the "Lo" tube’s grommet in a low air pressure position.
   - Place the "Hi" tube’s grommet in a high air pressure position.

Cascading Air Pressure Sensors

You can increase the number of differential air pressure sensors by cascading them. Do NOT cascade air pressure sensors more than the maximum number of sensors supported by your Raritan product. The supported maximum number varies based on the firmware version. See Supported Maximum Number of Sensors and Actuators (on page 40).

▶ To cascade multiple sensors:

1. Use a Raritan-provided phone cable to connect an air pressure sensor to a Raritan product like PX2 or EMX.
   - Plug one end of the cable into the sensor’s "In" port.
   - Plug the other end into a Raritan product's sensor port.
   
   An RJ-12 to RJ-45 adapter is required if your Raritan product uses an RJ-45 SENSOR port.
Chapter 2: DPX Series

2. Use another Raritan-provided phone cable to connect the first air pressure sensor to an additional one.
   a. Plug one end of the cable into the "Out" port of the first sensor.
   b. Plug the other end into the 'In' port of the additional sensor.

3. Repeat the above step if intending to cascade more air pressure sensors.

Contact Closure Sensors

Raritan's contact closure sensor (DPX-CC2-TR) can detect the open-and-closed status of connected detectors/switches.

This sensor has two channels for connecting two discrete (on/off) detectors/switches. Four termination points are available: the two to the right are associated with one channel (as indicated by the sensor's LED number), and the two to the left are associated with the other.

<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Two LEDs for indicating two channels' status.</td>
</tr>
<tr>
<td>②</td>
<td>Four termination points for connecting two discrete detectors/switches.</td>
</tr>
</tbody>
</table>
Supported detector/switch types:

At a minimum, a discrete detector/switch is required in order for DPX-CC2-TR to work properly. The types of discrete detectors/switches that can be connected to DPX-CC2-TR include those for:

- Door open/closed detection
- Door lock detection
- Floor water detection
- Smoke detection
- Vibration detection

Raritan does NOT produce most of the above detectors/switches except floor water sensors. When using third-party probes, you must test them with DPX-CC2-TR to ensure they work properly.

Important: Integration and testing for third-party detectors/switches is the sole responsibility of the customer. Raritan cannot assume any liability as a result of improper termination or failure (incidental or consequential) of third-party detectors/switches that customers provide and install. Failure to follow installation and configuration instructions can result in false alarms or no alarms. Raritan makes no statement or claim that all third-party detectors/switches will work with DPX-CC2-TR.

Connection scheme:

A DPX-CC2-TR can connect two contact closure detectors/switches.

For details on connecting a detector/switch, see Connecting Detectors/Switches to New DPX-CC2-TR (on page 11) or Connecting Detectors/Switches to Old DPX-CC2-TR (on page 13).
Old and New Contact Closure Sensors

Since the end of 2012 Raritan provided a new contact closure sensor. Old and new contact closure sensors are functionally identical with the following exceptions.

- The old sensor type uses buttons to secure or loosen the connection of detectors/switches while the new type uses screws.
- The new sensor type's terminals can be separated from the sensor but the old type's terminals are fixed.
- The new sensor type supports Raritan's water sensors (DPX-WSC and DPX-WSF) but the old type does NOT.

Both old and new contact closure sensors share the same part number: **DPX-CC2-TR**.

The latest firmware for your Raritan product will continuously support the old DPX-CC2-TR.

- For instructions on new contact closure sensors, see [Connecting Detectors/Switches to New DPX-CC2-TR](on page 11).
- For instructions on old contact closure sensors, see [Connecting Detectors/Switches to Old DPX-CC2-TR](on page 13).

Connecting Detectors/Switches to New DPX-CC2-TR

The new DPX-CC2-TR comprises two parts: sensor box and terminal module. The terminal module is removable so it is more convenient to connect/disconnect discrete detectors/switches.

Below are the resistance values for the new DPX-CC2-TR to open and close a connected detector/switch reliably.

- Open: Greater than 320K ohm
- Closed: Less than 200K ohm

**To make connections when the terminal module is attached:**

1. Strip the insulation around 12 mm from the end of each wire of discrete detectors/switches.
2. Fully insert each wire of both detectors/switches into each termination point.
   - Plug both wires of a detector/switch into the two termination points to the left.
• Plug both wires of the other detector/switch into the two termination points to the right.

3. Use an appropriate screw driver to tighten the screws above each termination point until the connected wires are securely fastened.

► To make connections after the terminal module is separated:
You can also connect a detector/switch when the terminal module is separated from the sensor box.
1. Loosen the screws at two sides of the terminal module.
Chapter 2: DPX Series

Note: The two screws are not removable so just loosen them.

2. Separate the terminal module from the sensor box.

3. After connecting detectors/switches to the terminal module, plug the terminal module back into the sensor box, and then tighten the screws at two sides of the terminal module.

Connecting Detectors/Switches to Old DPX-CC2-TR

The old DPX-CC2-TR has four spring-loaded termination points and four little buttons to control the spring of each termination point.

► To connect third-party or Raritan’s discrete detectors/switches:

1. Strip the insulation around 12 mm from the end of each wire of discrete detectors/switches.
2. Press and hold down the tiny rectangular buttons above the termination points on DPX-CC2-TR.

3. Fully insert each wire of both detectors/switches into each termination point.
   - Plug both wires of a detector/switch into the two termination points to the left.
   - Plug both wires of the other detector/switch into the two termination points to the right.

4. Release the tiny rectangular buttons after inserting the wires properly.

5. Verify that these wires are firmly fastened.

Configuring a Contact Closure Sensor

Before using DPX-CC2-TR to detect contact closure status, water, smoke or vibration, you must determine the normal state by adjusting its dip switch. The dip switch controls the LED state on DPX-CC2-TR, and is associated with a channel.

**To adjust the dip switch setting:**

1. Place the detectors/switches connected to DPX-CC2-TR to the position where you want to detect a specific environmental situation.

2. Uncover the dip switch on DPX-CC2-TR.
   - **New** DPX-CC2-TR
Chapter 2: DPX Series

- Old DPX-CC2-TR

3. To set the Normal state for channel 1, locate the dip switch labeled 1.

4. Use a pointed tip such as a pen to set the slide switch to the position labeled N.O or N.C.
   - N.O (Normally Open): The open status of the connected detector/switch is considered normal.
   - N.C (Normally Closed): The closed status of the connected detector/switch is considered normal.

For Raritan’s water sensors, the Normal state must be Normally Open, which indicates there is no water detected. Set the dip switch to Normally Open and verify that the LED of the channel where the Raritan’s water sensor is connected remains OFF.

- New DPX-CC2-TR

5. To set the Normal state for channel 2, repeat Step 4 for adjusting the other dip switch’s setting.

6. Install back the dip switch cover.
Note: The dip switch setting must be properly configured, or the sensor's LED may be incorrectly lit in the Normal state.

Contact Closure Sensor LEDs

DPX-CC2-TR has two LEDs for showing states of two connected detectors/switches.

The LED is lit when the associated detector/switch is in the "alarmed" state. See Configuring a Contact Closure Sensor (on page 14) for how to set the Normal state.

The meaning of a lit LED varies depending on the Normal state settings.

- **When the Normal state is set to Normally Closed (N.C):**

<table>
<thead>
<tr>
<th>LED</th>
<th>Sensor state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Closed</td>
</tr>
<tr>
<td>Lit</td>
<td>Open</td>
</tr>
</tbody>
</table>

- **When the Normal state is set to Normally Open (N.O):**

<table>
<thead>
<tr>
<th>LED</th>
<th>Sensor state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Open</td>
</tr>
<tr>
<td>Lit</td>
<td>Closed</td>
</tr>
</tbody>
</table>

For Raritan's water sensors, the Normal state must be set to Normally Open (N.O). The following is the correct LED behavior based on proper dip switch settings.

<table>
<thead>
<tr>
<th>LED</th>
<th>Sensor state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No water detected</td>
</tr>
<tr>
<td>Lit</td>
<td>Water detected</td>
</tr>
</tbody>
</table>
Floor Water Sensors

Raritan has two types of floor water sensors that work in conjunction with Raritan’s new contact closure sensor (DPX-CC2-TR). One is the floor-mounted water sensor (DPX-WSF), and the other is the cable water sensor (DPX-WSC series).

Note that only the NEW contact closure sensors support these water sensors.

Note: If you order a Raritan water sensor with the part number containing the suffix -KIT, you get the new contact closure sensor that supports it.

Floor-mounted Water Sensor

The floor-mounted water sensor has a flat bottom so it can stand on the ground. The water detector’s dimension is 63.5 mm x 13.25 mm x 13.2 mm (W x L x D).

Use one of the following methods to affix this detector to the ground:

- Screw the detector to the ground with your own screws. To avoid breaking the detector’s enclosure, do not over tighten the screws.
- Put something weighing around 100 to 250 grams (0.22 to 0.55 pounds) into the empty bag shipped with this water sensor. Then use cable ties to wrap the bag right above the detector. Make sure the detector is not tilted so that its bottom evenly contacts the ground.

<table>
<thead>
<tr>
<th>Number</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water detector.</td>
</tr>
</tbody>
</table>
### Chapter 2: DPX Series

#### Number | Item
--- | ---
2 | Wires to connect to the contact closure sensor. You need a minimum of 30 cm wires to prevent the contact closure sensor from being damaged by floor water (if any). Below are the wire length limitations:
- Minimum: 30 cm (11.8 inches)
- Maximum: 150 cm (59 inches)

---

#### Cable Water Sensor

The cable water sensor is in the shape of a cable so it can be flexibly placed, twisted or wrapped around a location where water may drip, such as a ceiling tile, water pipe or the floor.

Raritan provides two types of cable water sensors. The only difference is their cable length.
- DPX-WSC-35: 3.5 meters (11.5 feet).
- DPX-WSC-70: 7 meters (23 feet).

---

#### Number | Item
--- | ---
1 | Cable-shaped water detector.
<table>
<thead>
<tr>
<th>Number</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Wires to connect to the contact closure sensor.</td>
</tr>
<tr>
<td></td>
<td>You need a minimum of 30 cm wires to prevent the contact closure sensor from being damaged by floor water (if any). Below are the wire length limitations:</td>
</tr>
<tr>
<td></td>
<td>- Minimum: 30 cm (11.8 inches)</td>
</tr>
<tr>
<td></td>
<td>- Maximum: 150 cm (59 inches)</td>
</tr>
</tbody>
</table>
Chapter 3  DPX2 Series

DPX2 sensors are physically similar to DPX sensors. Below are their differences:

- DPX2 does not have a factory-installed sensor cable so you must manually connect sensors to a DPX2 sensor cable.
- DPX2 has an LED to show the sensor status.
- DPX2 provides the chain position information.
- Individual DPX2 sensors can be replaced without the need to reconnect the DPX2 sensor cable.
- DPX2 does NOT support the use of a Raritan sensor hub.

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DPX2 Temperature and Humidity Sensors ............................................. 21
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Available DPX2 Sensor Packages

<table>
<thead>
<tr>
<th>Sensor packages</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPX2-T1</td>
<td>1 temperature sensor. See <em>DPX2 Temperature and Humidity Sensors</em> (on page 21).</td>
</tr>
<tr>
<td>DPX2-T1H1</td>
<td>1 temperature sensor and 1 humidity sensor. See <em>DPX2 Temperature and Humidity Sensors</em> (on page 21).</td>
</tr>
<tr>
<td>DPX2-T2H1</td>
<td>2 temperature sensors and 1 humidity sensor. See <em>DPX2 Temperature and Humidity Sensors</em> (on page 21).</td>
</tr>
<tr>
<td>DPX2-T3H1</td>
<td>3 temperature sensors and 1 humidity sensor. See <em>DPX2 Temperature and Humidity Sensors</em> (on page 21).</td>
</tr>
</tbody>
</table>

For detailed information on sensor names, see *Sensor Naming Conventions* (on page 44).
DPX2 Temperature and Humidity Sensors

There are four types of DPX2 temperature and humidity sensor packages: DPX2-T1, DPX2-T1H1, DPX2-T2H1, and DPX2-T3H1.

A DPX2-T2H1 package contains one DPX2-T1H1 and one DPX2-T1 sensor.

A DPX2-T3H1 package contains one DPX2-T1H1 and two DPX2-T1 sensors.

Each DPX2 package is shipped with a DPX2 sensor cable for sensor connection.

The following is a DPX2 sensor's diagram.

<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Head connector</td>
<td>Connect to the DPX2 sensor cable.</td>
</tr>
<tr>
<td>2</td>
<td>LED</td>
<td>Indicate the sensor status.</td>
</tr>
</tbody>
</table>

**DPX2 LED States**

The DPX2 sensor indicates an alert by making its LED flash on and off. The LED also flashes when the sensor is upgrading its firmware.

**DPX2-T1**

<table>
<thead>
<tr>
<th>LED states</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Temperature is in the normal state.</td>
</tr>
<tr>
<td>Flashing (1 flash and 1 off)</td>
<td>Temperature enters either alarmed state: warning or critical.</td>
</tr>
<tr>
<td>High-speed flashing</td>
<td>Sensor firmware is being updated. See Sensor Firmware Update (on page 43).</td>
</tr>
</tbody>
</table>
## DPX2-T1H1

<table>
<thead>
<tr>
<th>LED states</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>Both temperature and humidity are in the normal state.</td>
</tr>
<tr>
<td>Flashing 1 flash and 1 off</td>
<td>Temperature enters an alarmed state: warning or critical. Temperature is in the normal state. Humidity is in the normal state.</td>
</tr>
<tr>
<td>Flashing 2 flashes and 1 off</td>
<td>Temperature is in the normal state. Humidity enters an alarmed state: warning or critical.</td>
</tr>
<tr>
<td>Flashing 3 flashes and 1 off</td>
<td>Both temperature and humidity enter an alarmed state: warning or critical.</td>
</tr>
<tr>
<td>High-speed flashing</td>
<td>Sensor firmware is being updated.</td>
</tr>
</tbody>
</table>

### Connection and Disconnection

Before connecting a DPX2 sensor to a Raritan product like PX2 or EMX, you must connect it to a DPX2 sensor cable first.

If any connected sensor is broken, you can replace it with a new one without disconnecting the DPX2 sensor cable from the Raritan product.

### Connecting a DPX2 Sensor Cable

Raritan has three types of DPX2 sensor cables. The difference is the number of available head connectors on the cable: one to three head connectors.

DPX2 sensor cables cannot be daisy chained.

The following diagram illustrates a DPX2 sensor cable with three head connectors.
Chapter 3: DPX2 Series

<table>
<thead>
<tr>
<th>Number</th>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RJ-12 connector</td>
<td>Connect to a Raritan product, such as PX2 or EMX.</td>
</tr>
<tr>
<td>2</td>
<td>Head connectors</td>
<td>Connect DPX2 sensors.</td>
</tr>
</tbody>
</table>

Sensor connection guidelines:
- Always connect DPX2 sensors to the sensor cable in sequence.

Below indicates the head connector sequence on a sensor cable with three head connectors.

- If the number of sensors that you will connect is less than the number of available head connectors on the cable, always connect them to the first one or first two head connectors. Otherwise, some or all connected sensors do not work.

Scenario A: Only one sensor is connected.
**Scenario B: Only two sensors are connected.**

![Diagram of RJ-12 connectors](image)

**Disconnecting a DPX2 Sensor**

You can remove any individual DPX2 sensor from the sensor cable as needed.

**To disconnect a DPX2 sensor:**

1. Press the latch of the cable connector so that the other side of the latch slightly goes up.

2. Pull the sensor away.

3. Connect any DPX2 sensor back to this free head connector, or move all subsequent DPX2 sensors that follow it on the same sensor cable to prior head connectors.

**Warning:** The final step is required, or all subsequent DPX2 sensors no longer work properly. For example, after removing the sensor from the 2nd head connector, you must either add a DPX2 sensor back to the 2nd head connector, or disconnect the sensor from the 3rd head connector and re-connect it to the 2nd head connector.
A DX sensor package consists of terminals, sensors and three ports - one RJ-12 and two RJ-45 ports.

Different DX sensor packages have a different number of terminals. Every pair of terminals is a channel for connecting a sensor or actuator.

Sensor cables are not shipped with DX. A standard network cable is needed to:

- Connect a DX sensor to a Raritan product with an RJ-45 SENSOR port, such as PX3.

  Note: For a Raritan product with an RJ-12 SENSOR port, such as EMX and PX2, use an RJ-12 to RJ-45 adapter cable instead which is shipped with the DX package.

- Daisy chain DX sensors packages.

  Warning: Do NOT use a crossover cable to connect DX.

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# Available DX Sensor Packages

This table lists all DX sensor packages which are available at the time of writing.

<table>
<thead>
<tr>
<th>Sensor packages</th>
<th>Description</th>
</tr>
</thead>
</table>
| DX-D2C6         | 7 pairs of terminals:  
|                 | Two for connecting dry contact signal actuators (DC) and five for contact closure sensors (CC).  
|                 | 1 hall effect sensor.  
|                 | \textit{Note: The hall effect sensor is reserved for future use and currently shall NOT be used.}  
|                 | See \textit{DX-D2C6} (on page 26). |
| DX-PD2C5        | 7 pairs of terminals:  
|                 | Two for powered dry contact signal actuators and five for contact closure sensors.  
|                 | See \textit{DX-PD2C5} (on page 29). |
| DX-PIR          | 1 occupancy sensor, 1 tamper sensor, and 1 pair of terminals for contact closure sensors.  
|                 | See \textit{DX-PIR} (on page 31). |

For detailed information on sensor names, see \textit{Sensor Naming Conventions} (on page 44).

---

## DX-D2C6

DX-D2C6 has seven channels for both contact closure sensors and dry contact signal actuators. The label attached to DX-D2C6 helps you identify different channels.

\textit{Warning: DX-D2C6 does NOT support Raritan’s water sensors.}

**DX-D2C6 Label:**

<table>
<thead>
<tr>
<th>CC2</th>
<th>CC3</th>
<th>DC1</th>
<th>CC4</th>
<th>CC5</th>
<th>DC2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CC1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>
- CC represents a contact closure sensor channel. There are five CC channels: CC1 through CC5.
- DC represents a dry contact signal actuator channel. There are two DC channels: DC1 and DC2.

**DX-D2C6 hall effect sensor (reserved):**
The DX-D2C6 contains a built-in hall effect sensor, which can detect whether a door is open or closed. The hall effect sensor is reserved for future use and currently shall NOT be used. After connecting DX-D2C6 to a Raritan product like PX2, this built-in sensor will be detected and show up in that product's web interface and SNMP MIB, which is normal.

**DX-D2C6 terminals, dip switches, and LEDs:**
Terminals, dip switches, and LEDs are located in two rows as shown below.

<table>
<thead>
<tr>
<th>Numbers</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CC and DC channels.</td>
</tr>
<tr>
<td></td>
<td><em>Top row:</em></td>
</tr>
<tr>
<td></td>
<td>Four CC channels (CC2 - CC5).</td>
</tr>
<tr>
<td></td>
<td>Two DC channels (DC1 - DC2).</td>
</tr>
<tr>
<td></td>
<td><em>Bottom row:</em></td>
</tr>
<tr>
<td></td>
<td>One CC channel (CC1).</td>
</tr>
<tr>
<td></td>
<td>See <em>Connecting Detectors/Actuators to DX</em> (on page 34) for how to connect CC sensors or DC actuators.</td>
</tr>
<tr>
<td>2</td>
<td>Dip switches for configuring the Normal state of each CC channel. See <em>Adjusting Dip Switches</em> (on page 38).</td>
</tr>
<tr>
<td></td>
<td><em>Top row:</em></td>
</tr>
<tr>
<td></td>
<td>Dip switch 1 controls CC2.</td>
</tr>
<tr>
<td></td>
<td>Dip switch 2 controls CC3.</td>
</tr>
</tbody>
</table>
### Chapter 4: DX Series

<table>
<thead>
<tr>
<th>Numbers</th>
<th>Components</th>
</tr>
</thead>
</table>
|         | Dip switch 3 controls CC4.  
|         | Dip switch 4 controls CC5.  
| • Bottom row:  
|         | Dip switch 1 controls CC1.  
|         | Dip switch 2 controls the built-in hall effect sensor.  
| 3       | CC status LEDs. See *Contact Closure Sensor LED* (on page 16) for details.  
|         | High-speed LED flashing indicates that the DX firmware upgrade is in progress. See *Sensor Firmware Update* (on page 43).  
| • Top row:  
|         | The four LEDs, from left to right, indicate the states of CC2, CC3, CC4 and CC5 respectively.  
| • Bottom row:  
|         | The LED indicates the CC1 state.  |
DX-PD2C5

DX-PD2C5 is physically similar to DX-D2C6 except for the following differences:

- Dry contact signal channels of DX-PD2C5 supply DC 12V power to the connected actuators.
- Dry contact signal channels of DX-PD2C5 only support the connection of EMKA (1150-U5x) doorhandles.
- DX-PD2C5 works with PX3 only.
- Only one DX-PD2C5 is supported per PX3 PDU. Daisy chaining of DX-PD2C5 is NOT supported.
- DX-PD2C5 supports a maximum cabling length of 29 feet (9 meters) instead of 98 feet (30 meters). For details, see Supported Maximum Sensor Distance (on page 39).

Warning 1: If high security is required, it is strongly recommended that DX-PD2C5 shall NOT be used.

Warning 2: DX-PD2C5 does NOT support Raritan’s water sensors.

A label is attached to DX-PD2C5 to help you identify different channels.

► DX-PD2C5 Label:

![DX-PD2C5 Label Diagram]
CC represents a contact closure sensor channel. There are five CC channels: CC1 through CC5.

- PDC represents a dry contact signal actuator channel which is powered. There are two PDC channels: PDC1 and PDC2. Note that each PDC channel has two electrical polarity markings below it: - (negative) and + (positive), which you must follow when connecting an EMKA doorhandle.

**DX-PD2C5 terminals, dip switches, and LEDs:**

Terminals, dip switches, and LEDs are separated into two rows as shown below.

### Numbers | Components
--- | ---
1 | CC and PDC channels.
   - Top row:
     - Four CC channels (CC2 - CC5).
     - Two PDC channels (PDC1 - PDC2).
   - Bottom row:
     - One CC channel (CC1).
   See **Connecting Detectors/Actuators to DX** (on page 34) for how to connect CC sensors or DC actuators.

2 | Dip switches for configuring the Normal state of each CC channel. See **Adjusting Dip Switches** (on page 38).
   - Top row:
     - Dip switch 1 controls CC2.
     - Dip switch 2 controls CC3.
     - Dip switch 3 controls CC4.
     - Dip switch 4 controls CC5.
   - Bottom row:
### DX Series

#### Numbers

<table>
<thead>
<tr>
<th>Components</th>
<th>Dip switch 1 controls CC1.</th>
</tr>
</thead>
</table>

*Note: Dip switch 2 in the bottom row does not control any CC channel and can be ignored.*

<table>
<thead>
<tr>
<th>CC status LEDs. See <a href="#">Contact Closure Sensor LEDs</a> (on page 16) for details.</th>
</tr>
</thead>
</table>

High-speed LED flashing indicates that the DX firmware upgrade is in progress. See [Sensor Firmware Update](#) (on page 43).

- **Top row:**
  - The four LEDs, from left to right, indicate the states of CC2, CC3, CC4 and CC5 respectively.

- **Bottom row:**
  - The LED indicates the CC1 state.

---

### DX-PIR

DX-PIR contains one occupancy sensor (that is, presence detector), one tamper sensor and a pair of terminals for connecting a contact closure (CC) sensor.

*Warning: DX-PIR does NOT support Raritan's water sensors.*

#### Occupancy sensor's detection range:

The occupancy sensor is located on the top of the DX-PIR. It uses the passive infrared technology to detect the motion of a person by sensing the temperature differences between a person and the surroundings.
Below shows the occupancy sensor's detection range and sensing area.

**Side View**
- Maximum range: 5 meters
- Vertical sensing area: 82 degrees (+/- 41 degrees)

**Top View**
- Maximum range: 5 meters
- Horizontal sensing area: 94 degrees (+/- 47 degrees)

*Conditions for the detected target:*
- Temperature difference between the target and the surroundings should exceed 4 degrees Celsius (7.2 degrees Fahrenheit).
- Target's movement speed: 1.0 m/s.
- Target concept is human body (size: 700 x 250 mm).

*Tamper sensor:*
The tamper sensor is located at the bottom of the DX-PIR. This sensor is used to detect whether the DX-PIR is moved away from its original position. In the normal state, the DX-PIR is firmly affixed to an object so this sensor, which is a button on the back of DX-PIR, is pressed down. If someone takes the DX-PIR away, the button springs up so the sensor is in the alarmed state.
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### DX-PIR Terminals, dip switches and LED:

<table>
<thead>
<tr>
<th>Numbers</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>One CC channel comprising a pair of terminals. See <em>Connecting Detectors/Actuators to DX</em> (on page 34) for how to connect a CC sensor.</td>
</tr>
</tbody>
</table>
| 2       | - Dip switch 1 configures the Normal state of the CC channel.  
          - Dip switch 2 controls the built-in occupancy sensor. See *Adjusting Dip Switches* (on page 38). |
| 3       | CC status LED. See *Contact Closure Sensor LEDs* (on page 16) for details.  
          High-speed LED flashing indicates that the DX firmware upgrade is in progress. See *Sensor Firmware Update* (on page 43). |
Making Connections

Connecting Detectors/Actuators to DX

A DX sensor package comprises two parts: a sensor box and the terminal module(s). A terminal module is removable.

*Note:* The following diagrams illustrate a terminal module comprising two termination points only. Your DX terminal module may be larger if it has more terminals.

> **To make connections when the terminal module is attached:**

1. Strip the insulation around 12mm from the end of each wire of a detector or actuator.

2. Fully insert each wire into each termination point of a CC or DC channel on the DX sensor package.

*Important:* If it is a PDC channel with the electrical polarity markings (+ and -), check the DX label to make sure each wire is inserted into the correct termination point with the correct polarity.
3. Use an appropriate screw driver to tighten the screws above each termination point until the connected wires are securely fastened.

To make connections after the terminal module is separated:

1. Loosen the screws at two sides of the terminal module.

*Note: The two screws are not removable so just loosen them.*
2. Separate the terminal module from the sensor box.

3. After connecting detectors/switches to the terminal module, plug the terminal module back into the sensor box, and then tighten the screws at two sides of the terminal module.
Cascading DX Packages

To increase the number of connected DX sensor packages, you can cascade DX using standard network cables. A maximum of 12 DX packages can be daisy chained.

<table>
<thead>
<tr>
<th>Numbers</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RJ-45 ports, each of which is located on either end of a DX sensor package.</td>
</tr>
<tr>
<td>2</td>
<td>RJ-12 port, which is reserved for future use.</td>
</tr>
</tbody>
</table>

To cascade DX packages:

1. Connect a standard network cable to either RJ-45 port of a DX sensor package.

   *Note: For a Raritan product with an RJ-12 SENSOR port, such as EMX and PX2, use an RJ-12 to RJ-45 adapter cable instead which is shipped with the DX package.*

2. If you want to cascade DX packages, get another standard network cable and then:
   
   a. Plug one end of the cable into the remaining RJ-45 port on the prior DX package.
   
   b. Plug the other end into either RJ-45 port on an additional DX package.

Repeat the same steps to cascade more DX packages.
3. Verify that the total number of sensors and actuators connected to these DX packages do not exceed the maximum number of sensors and actuators supported by your Raritan product. The supported maximum number varies based on the firmware version. See **Supported Maximum Number of Sensors and Actuators** (on page 40).

---

**Pre-installed DX Brackets**

To allow users to hang or affix a DX onto an object or position, two brackets have been installed on the rear side of a DX sensor package when shipped out of the factory.

Below is the diagram of a DX sensor package with two brackets installed.

---

**Adjusting Dip Switches**

There are two Normal settings for each CC channel on DX packages.

- **N.O (Normally Open):** The open status of the connected detector/switch is considered normal.
- **N.C (Normally Closed):** The closed status of the connected detector/switch is considered normal.

Each CC channel and the DX-PIR occupancy sensor's Normal setting is configured by turning on or off its corresponding dip switch.

- **To adjust dip switches for CC channels:**
  - **N.O:** Turn ON the dip switch by pressing it down.
  - **N.C:** Turn OFF the dip switch by pressing (or keeping) it up.

- **To adjust the dip switch for DX-PIR occupancy sensor:**
  - Turn it OFF (up) when human absence is considered the normal state.
  - Turn it ON (down) when human presence is considered the normal state.
Appendix A  Supported Maximum Sensor Distance

Every Raritan sensor package supports the total cabling length up to 98 feet (30 m), including DPX, DPX2 and DX series, except for DX-PD2C5.

You can use a Raritan sensor hub to increase the total distance of a DPX sensor. Each sensor port on a Raritan product like EMX supports a maximum of one Raritan sensor hub so DO NOT cascade sensor hubs for distance increase.

For detailed information on DPX’ supported maximum distance, see the online help for your Raritan product, such as EMX or PX2 online help.

*Note: Online help is accessible from your Raritan product’s application or the Support page ([http://www.raritan.com/support/](http://www.raritan.com/support/)) on Raritan’s website.*

▶ Exception - maximum distance for DX-PD2C5:

DX-PD2C5 supports a maximum cabling length of 29 feet (9 meters) instead of 98 feet (30 meters). The maximum distance must follow the following diagram.

- PX3 ➔ 16 feet (5 m) cable ➔ 1 DX-PD2C5 ➔ 13 feet (4 m) cable ➔ EMKA doorhandles
Appendix B  Supported Maximum Number of Sensors and Actuators

The maximum number of sensors and actuators that can be connected to each sensor port of a Raritan product is determined by that product's firmware version.

However, DPX sensor packages are always limited to a maximum of 16 DPX sensors per port due to hardware restrictions regardless of the firmware version.

Below lists different Raritan products and firmware versions that support a different number of sensors and actuators at the time of writing.

Note: For the latest information on the supported maximum number of sensors and actuators, see your Raritan product's online help. Online help is accessible from your Raritan product's application or the Support page (http://www.raritan.com/support/) on Raritan's website.

In the following list, $x$ represents a number.

▸ **A maximum of 16 sensors/actuators supported per port:**
- PX2 series: 2.5.x and earlier
- PX3 series: 2.5.x
- PX3TS series: 2.6.x
- EMX series: 2.5.x and earlier
- BCM series: 2.5.x and earlier
- PXE series: 2.5.x and earlier
- PX, DPC and DPX (PDU) series: 1.5.x and earlier

Note: PX, DPX and DPC PDUs support DPX sensor packages only.

▸ **A maximum of 32 sensors/actuators supported per port:**
- PX2 series: 3.0.0 and later
- PX3 series: 3.0.0 and later
- PX3TS series: 3.0.0 and later
- BCM series: 3.0.0 and later
- PXE series: 3.0.0 and later

▸ **Calculation examples for 16 and 32 sensors/actuators:**

A sensor package may contain more than one sensor/actuator. A sensor or actuator is a function. For example, a DX-D2C6 contains 8 functions because it has 6 sensors and 2 actuators.
Appendix B: Supported Maximum Number of Sensors and Actuators

- When a Raritan product supports 16 sensors or actuators:
  \[ 2 \times 8 = 16 \]
  Therefore, you can connect two DX-D2C6 packages per port.
- When a Raritan product supports 32 sensors or actuators:
  \[ 4 \times 8 = 32 \]
  Therefore, you can connect four DX-D2C6 packages per port.
Appendix C  Sensor Measurement Accuracy

Raritan environmental sensors are with the following factory specifications. Calibration is not required.

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DPX Sensor Accuracy
- Temperature: +/-2 degrees Celsius (+/-3.6 degrees Fahrenheit)
- Humidity: +/-5% (when humidity < 60%) or +/-8% (when humidity > 60%)
- Differential air pressure: +/-1.5%
- Air flow: +/-6.5%

DPX2 Sensor Accuracy
- Temperature: +/-1.0 degree Celsius (+/-1.8 degrees Fahrenheit)
- Humidity: +/-2.0% (when humidity = 10% to 90%)
Appendix D Sensor Firmware Update

DPX2 and DX sensor packages automatically upgrade or downgrade their firmware after being connected to a Raritan product that support these sensor packages, such as PX2 or PX3. This way it ensures that these sensor packages work properly with the connected Raritan product.

Automatic upgrade or downgrade is determined by comparing DPX2 or DX firmware against the environmental sensor firmware stored inside the Raritan product. If downgrade is needed, the sensor firmware is downgraded to a version which is either greater than or equal to the minimum firmware version requested by the connected sensor packages.

Note that a DPX sensor package does NOT support this automatic firmware update feature, and you do NOT need to manually update it.

Tip: Information regarding current sensor firmware version and the sensor’s firmware update time is available in the Device Information dialog. Choose Maintenance > Device Information > Peripheral Devices on your Raritan product like PX2 or PX3.
The model name of a Raritan environmental sensor package consists of sensor family, sensor functions and the total number of the specified function.

[Family] - [Function_1] [Number_1]

- OR -

[Family] - [Function_1] [Number_1] [Function_2] [Number_2]

[Family] is DPX, DPX2 or DX.

[Number_1] and [Number_2] are integer numbers.

[Function_1] and [Function_2] are abbreviations representing diverse functions.

<table>
<thead>
<tr>
<th>Abbreviations</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>Temperature sensors</td>
</tr>
<tr>
<td>H</td>
<td>Relative humidity sensors</td>
</tr>
<tr>
<td>CC or C</td>
<td>Contact closure sensor terminals</td>
</tr>
<tr>
<td>AF</td>
<td>Air flow sensors</td>
</tr>
<tr>
<td>DP</td>
<td>Differential air pressure sensors</td>
</tr>
<tr>
<td>WSC</td>
<td>Cable water sensors</td>
</tr>
<tr>
<td>WSF</td>
<td>Floor-mounted water sensors</td>
</tr>
<tr>
<td>D</td>
<td>Dry contact signal terminals for actuators</td>
</tr>
<tr>
<td>PD</td>
<td>&quot;Powered&quot; dry contact signal terminals</td>
</tr>
<tr>
<td>PIR</td>
<td>Passive infrared occupancy sensor</td>
</tr>
</tbody>
</table>
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