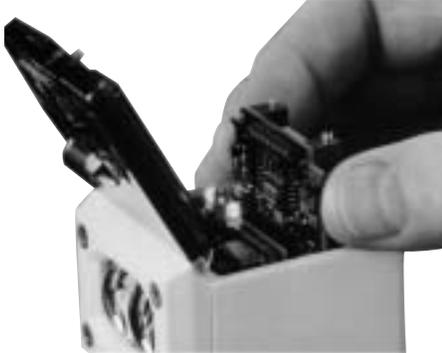


45DN Bus Expansion Cards

For use with Q45X Photoelectric Sensors on DeviceNet™ Bus Networks



Features

- Banner model 45DN plug-in bus cards enable a Banner Q45X Series sensor to establish a logical relationship between the sensor's output and other compatible devices on a DeviceNet™ bus network.
- The following features of the 45DN are programmable via the network with a configuration tool*:

| Feature | Range (default) |
|-----------------|---|
| Network Address | 0-63 (63) |
| Baud Rate | 125K, 250K, 500K (125K) |
| Operate Mode** | Light Operate or Dark Operate (Light Operate) |

All 45DNs support the following connection type:

The *Explicit Message Connection*, which is required to Set and Get sensor Attributes.

The 45DN1 supports the following connection type:

The *Bit Strobe Connection*, which responds to a master's request.

The 45DN2 supports the following connection type:

The *Change of State Connection*, which responds to the slave's change of state.

I/O Response (8-bit word of data):

| | | |
|----------|--------------------|---------------|
| Bit 0: | 0 | Output is OFF |
| | 1 | Output is ON |
| Bit 1: | 0 | Alarm is OFF |
| | 1 | Alarm is ON |
| Bits 2-7 | Not used: always 0 | |

* Configuration may be simplified through use of an Electronic Data Sheet (Banner model EDS 40223)

** The Light/Dark Operate switch in the Q45 sensor must be set to the Light Operate position (the factory setting).



Models

| Model | Part Number | Used with Sensor | Communications | I/O Supported |
|--------|-------------|-----------------------------------|---|----------------------------|
| 45DN1 | 40059 | All Q45XB6 models, except emitter | DeviceNet | Bit Strobe Connection |
| 45DN2 | 49215 | All Q45XB6 models, except emitter | DeviceNet | Change of State Connection |
| 45DNE1 | 40907 | Q45X6EQ emitter | Allows emitter to be powered from DeviceNet bus; does not communicate | |



WARNING . . . Not To Be Used for Personnel Protection

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.

Overview

The 45DN is one of a family of bus expansion cards for Q45X Series sensors which includes models for use on AS-Interface, SDS™, and DeviceNet.

Use of a 45DN bus expansion card turns the Q45X into a “smart” sensor which can be connected to a DeviceNet bus network using a simple “dumb drop” junction box or a “T” connector. Plugging a bus expansion card into a Q45X Series sensor automatically converts the basic sensor outputs to a pair of datacom connections with the proper protocol for use on a DeviceNet bus network. Q45X sensors without bus cards (i. e. “dumb sensors”) may also be added to any bus system, via a “smart drop” junction box. Basic Q45X sensors (without bus expansion cards) interface directly to PLC dc inputs. The block diagram below illustrates how “smart” and “dumb” Q45X Series sensors can be mixed together on the same bus network.

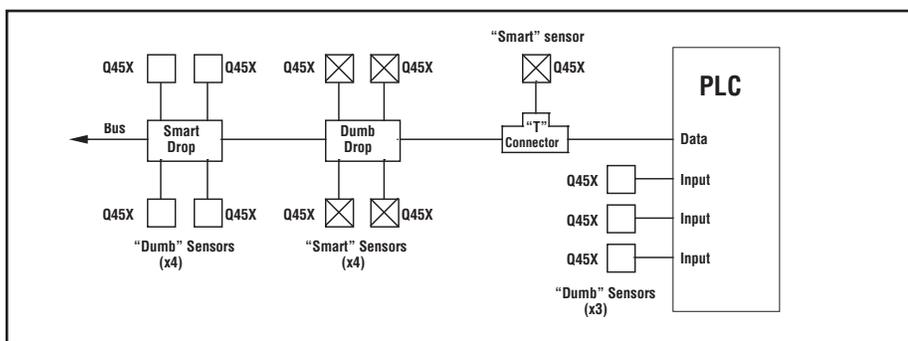


Figure 1. The same model Q45X “smart” and “dumb” sensors may be mixed on the same bus system

Installation and Removal

Modules are installed through the top of the sensor, as follows:

- 1) Remove power from the sensor.
- 2) Loosen the top cover hold-down screw and raise the cover. The cover is hinged at the front.
- 3) Using a small screwdriver inserted into one of the slots at the rear of the inside black cover, lift up and remove the black inside cover (Figure 2A).
- 4) Insert the card in the expansion slot so that the connector receptacles on the card align with the connector pins inside the sensor. Slide the card down into the slot until the connectors are fully engaged (Figure 2B).
- 5) Replace the original black inside cover with the one supplied with the 45DN card.
- 6) Make sure that the Light/Dark Operate switch in the Q45X sensor is set to the Light Operate position.

Modules are removed through the top of the sensor, as follows:

- 1) Follow steps 1 through 3 of the installation procedure, above.
- 2) Insert a small, flat bladed screwdriver or similar tool into the lift slot on the edge of the expansion card (Figure 2C). Gently pry up to disconnect the card, and then lift it out.
- 3) Replace the black inside cover.

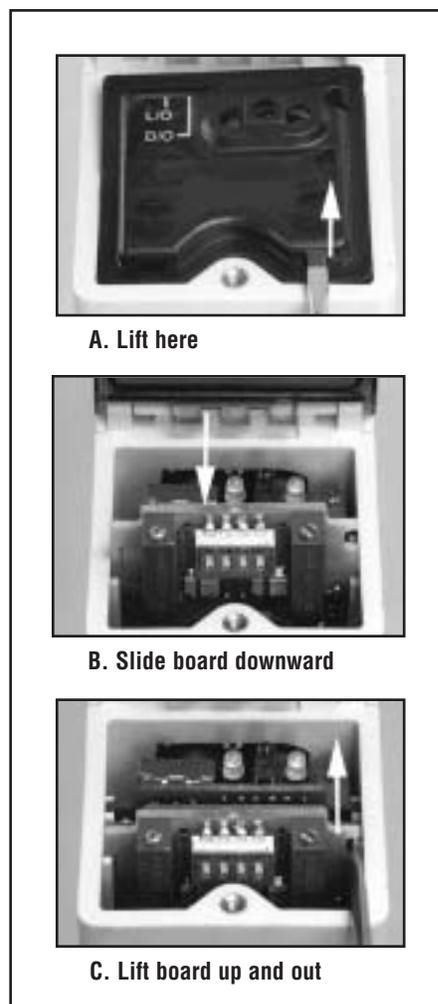


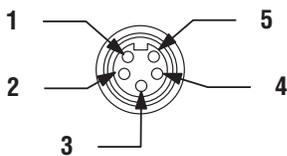
Figure 2. Installation and removal of Bus Expansion Cards

Specifications – Q45X Series Sensors using 45DN Expansion Cards*

| | | | | | | | | | | | | | |
|------------------------------------|--|--|--------|-------------------------------------|--|----------|---|------------|--------|--|--|----------|------------------------------------|
| Supply Voltage and Current | 11 to 25V dc @ 60 mA (combined current for Q45X sensor and 45DN card) | | | | | | | | | | | | |
| Supply Protection Circuitry | Protected against reverse polarity, transient voltages and loss of ground (none of these conditions will harm the sensor or interrupt communication on the network) | | | | | | | | | | | | |
| Response Time | 2 milliseconds; total response time will also include the response time of the network | | | | | | | | | | | | |
| Indicators | <p>On the sensor: Green and Red; visible through the transparent sensor top cover Green LED lights for dc power “ON”</p> <p>Red LED(except emitter model Q45X6EQ) is Banner's patented Alignment Indicating Device (AID™, U.S. patent #4356393) which lights whenever the sensor “sees” a light condition and superimposes a pulse rate which is proportional to the strength of the received light signal (the stronger the signal, the faster the pulse rate)</p> <p>On the 45DN1 and 45DN2 Bus Cards: Green and Red; visible through the transparent sensor top cover A bi-color LED indicates the status of the network.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 10%;">Green</td> <td style="width: 15%;">Steady</td> <td>Sensor on line, connected to master</td> </tr> <tr> <td></td> <td>Flashing</td> <td>Sensor on line - address + baud rate are ok</td> </tr> <tr> <td>Red</td> <td>Steady</td> <td>Critical network fault or duplicate node address detected; wrong baud rate</td> </tr> <tr> <td></td> <td>Flashing</td> <td>Minor or connection time-out fault</td> </tr> </table> | Green | Steady | Sensor on line, connected to master | | Flashing | Sensor on line - address + baud rate are ok | Red | Steady | Critical network fault or duplicate node address detected; wrong baud rate | | Flashing | Minor or connection time-out fault |
| Green | Steady | Sensor on line, connected to master | | | | | | | | | | | |
| | Flashing | Sensor on line - address + baud rate are ok | | | | | | | | | | | |
| Red | Steady | Critical network fault or duplicate node address detected; wrong baud rate | | | | | | | | | | | |
| | Flashing | Minor or connection time-out fault | | | | | | | | | | | |
| Operating Conditions | <p>Temperature: -10° to +70°C (-14° to +158°F)</p> <p>Relative humidity: 95% (non-condensing)</p> | | | | | | | | | | | | |

* See Q45X datasheet P/N 37735 for further information.

Q45X Base, Male Connector



| Pin | Wire Color* | Function |
|-----|-------------|------------------|
| 1 | | Shield |
| 2 | Red | BUS power (-V) |
| 3 | Black | BUS power (-V) |
| 4 | White | Communications + |
| 5 | Blue | Communications - |

*Wire colors in the table above are for DeviceNet-compatible cable only.

Hookup

The Q45X sensor with 45DN expansion card installed requires DeviceNet-compatible quick-disconnect cable, which is available from various manufacturers, such as interlinkBT. See table at left.

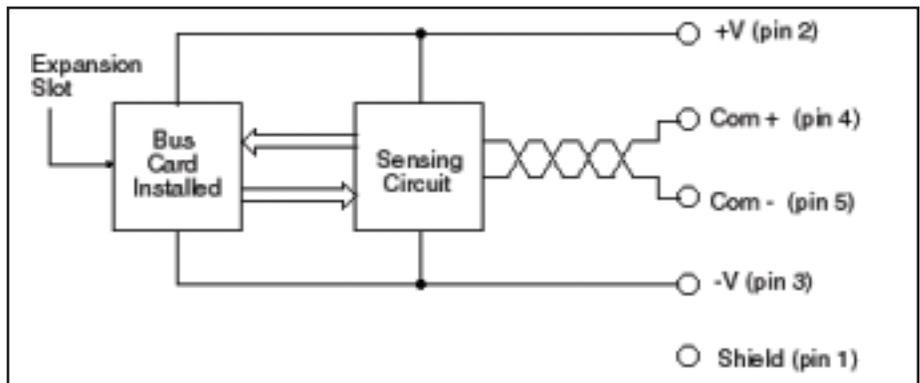


Figure 3. Q45X Bus Configuration (45DN card installed)



WARRANTY: Banner Engineering Corp. warrants its products to be free from defects for one year. Banner Engineering Corp. 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.