



## Q45XDN

"Intelligent" Photoelectric Sensors for use on DeviceNet™ Bus Networks



**DeviceNet™**

### Features

- Easy "smart sensor" interfacing to DeviceNet bus networks
- Integral Euro-style (M12) quick-disconnect connector for DeviceNet compatible cable
- Impressive optical performance in opposed, diffuse, retroreflective, convergent or fiber optic sensing modes
- Highly visible Power and Received Signal Strength indicator LEDs
- Tough mechanical design

### Description

Q45XDN Series sensors are designed specifically for use on DeviceNet-bus networks. These are "smart" sensors which can be wired to a DeviceNet bus using a "dumb" tee.

Q45XDN1 models support the *Bit Strobe Connection*, which responds to a master's request. Q45XDN2 models support the *Change of State Connection*, which responds to a slave's change of state. All models support the *Explicit Message Connection*, which is required to *Set* and *Get* sensor *Attributes*.

Q45XDN Series sensors feature two highly-visible sensor status indicator LEDs for power and received signal strength. The Signal indicator incorporates Banner's patented<sup>†</sup> Alignment Indicating Device (AID™) circuitry which pulses the indicator at a rate which is proportional to the received light signal strength. A slow flash rate alerts personnel to a marginal signal due to sensor misalignment or dirt on the lenses.

Q45XDN Series photoelectric sensors have impressive optical performance (see excess gain curves on pp. 2 - 4). All models boast o-ring sealing which exceeds the NEMA 6P (IP67) rating. They are extremely rugged, with PBT polyester housings and molded acrylic lenses. They are equipped with a 12 mm Euro-style quick-disconnect connector which accepts DeviceNet-compatible cable (see Hookup Information).

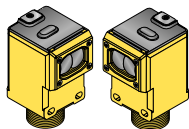
<sup>†</sup>U.S. Patent #4356393



#### **WARNING . . . Not To Be Used for Personnel Protection**

**Never use this product as a sensing device for personnel protection. Doing so could lead to serious injury or death.**

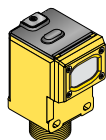
This product does NOT include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products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



Infrared, 880 nm

## Opposed-Mode Emitter (E) and Receiver (R) Models

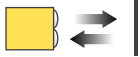
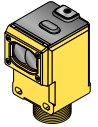
Models	Focus	Cable	Supply Voltage	I/O Support	Excess Gain	Beam Pattern Effective Beam: 13 mm
Q45XDN1EQ6	60 m (200')	5-pin Euro QD	11-25V dc	Emitter Only		
Q45XDN1RQ6				Bit Strobe		
Q45XDN2RQ6				Change of State		



Visible Red, 680 nm

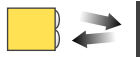
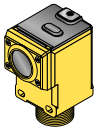
## Retroreflective Mode Models

Models	Focus	Cable	Supply Voltage	I/O Support	Excess Gain	Beam Pattern
<b>Non-Polarized</b>						
Q45XDN1LVQ6	80 mm to 9 m (3" to 30')	5-pin Euro QD	11-25V dc	Bit Strobe		
Q45XDN2LVQ6				Change of State		
<b>Polarized</b>						
Q45XDN1LPQ6	150 mm to 6 m (6" to 20')	5-pin Euro QD	11-25V dc	Bit Strobe		
Q45XDN2LPQ6				Change of State		



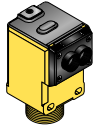
Infrared, 880 nm

Diffuse Mode Models						
Models	Focus	Cable	Supply Voltage	I/O Support	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
<b>Short-Range Diffuse</b>						
Q45XDN1DQ6	450 mm (18")	5-pin Euro QD	11-25V dc	Bit Strobe		
Q45XDN2DQ6				Change of State		
<b>Long-Range Diffuse</b>						
Q45XDN1DLQ6	1.8 m (6')	5-pin Euro QD	11-25V dc	Bit Strobe		
Q45XDN2DLQ6				Change of State		



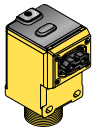
Visible Red, 680 nm

Convergent Mode Models						
Models	Focus	Cable	Supply Voltage	I/O Message	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
Q45XDN1CVQ6	38 mm (1.5 in)	5-pin Euro QD	11-25V dc	Bit Strobe		
Q45XDN2CVQ6				Change of State		
Q45XDN1CV4Q6	100 mm (4 in)	5-pin Euro QD	11-25V dc	Bit Strobe		
Q45XDN2CV4Q6				Change of State		



Infrared, 880 nm

Glass Fiber Optic Models						
Models	Focus	Cable	Supply Voltage	I/O Message	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
Q45XDN1FQ6	Range varies by sensing mode and fiber optics used	5-pin Euro QD	11-25V dc	Bit Strobe		
Q45XDN2FQ6				Change of State		



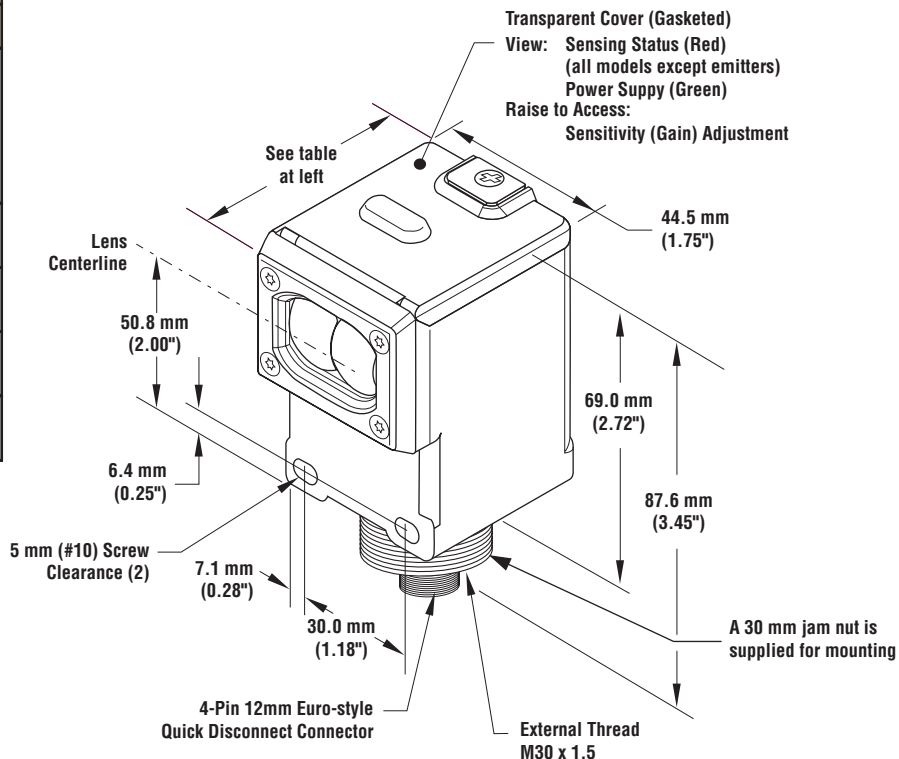
Visible Red, 660 nm

Plastic Fiber Optic Models						
Models	Focus	Cable	Supply Voltage	I/O Message	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
Q45XDN1FPQ6	Range varies by sensing mode and fiber optics used	5-pin Euro QD	11-25V dc	Bit Strobe		
Q45XDN2FPQ6				Change of State		

<b>Specifications</b>																								
<b>Supply Voltage and Current</b>	The sensor is powered by the bus network (11 to 25V dc @60 mA)																							
<b>Supply Protection Circuitry</b>	Protected against reverse polarity, transient voltages, and loss of ground. (none of these conditions will harm the sensor or interrupt communication on the network)																							
<b>Response Time</b>	2 milliseconds; Total response time will also include the response time of the network																							
<b>Adjustments</b>	Multi-turn SENSITIVITY control on top of the sensor (beneath a transparent o-ring sealed cover) allows precise sensitivity setting (turn clockwise to increase gain); Internal switch must be in Light Operate (L/O) position, which is the factory setting																							
<b>Indicators</b>	<p><b>On the sensor:</b> Green and Red; visible through the transparent sensor top cover</p> <p><b>Green LED</b> lights for dc power ON</p> <p><b>Red LED</b> is Banner's patented Alignment Indicating Device (AID<sup>™</sup>, 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><b>On the 45DN Bus Card:</b> Green and Red; visible through the transparent sensor top cover</p> <p>A bi-color LED indicates the status of the network.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;"><b>Green</b></td> <td style="width: 30%;">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><b>Red</b></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>	<b>Green</b>	Steady	Sensor on line, connected to master		Flashing	Sensor on line, address + baud rate are ok	<b>Red</b>	Steady	Critical network fault or duplicate node address detected; wrong baud rate		Flashing	Minor or connection time-out fault											
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<b>Sensor Configuration</b>	<p><b>The following features of the Q45XDN Series Sensors are programmable via the network with a configuration tool*:</b></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Feature</th> <th style="text-align: left;">Range</th> </tr> </thead> <tbody> <tr> <td>Network Address</td> <td>0-63 (default = 63)</td> </tr> <tr> <td>Baud Rate</td> <td>125K, 250K, 500K (default = 125K)</td> </tr> <tr> <td>Operate Mode*</td> <td>Light Operate or Dark Operate (default = Light Operate)</td> </tr> </tbody> </table> <p>All Q45XDN models support:</p> <p><b>Explicit Message Connection:</b> Required to <i>Set</i> and <i>Get</i> sensor <i>Attributes</i></p> <p>Q45XDN1 supports the following connection type:</p> <p><b>Bit Strobe Connection:</b> Responds to a master's request.</p> <p>Q45XDN2 supports the following connection type:</p> <p><b>Change of State Connection (COS):</b> Responds to a slave's change of state.</p> <p><b>I/O Response is with the following 8-bit word of data:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Bit 0:</td> <td style="width: 15%;">0</td> <td style="width: 70%;">Output is OFF</td> </tr> <tr> <td></td> <td>1</td> <td>Output is ON</td> </tr> <tr> <td>Bit 1:</td> <td>0</td> <td>Alarm output is OFF</td> </tr> <tr> <td></td> <td>1</td> <td>Alarm output is ON</td> </tr> <tr> <td>Bits 2-7</td> <td colspan="2">Not Used: Always 0</td> </tr> </table> <p>*NOTES: 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).</p>	Feature	Range	Network Address	0-63 (default = 63)	Baud Rate	125K, 250K, 500K (default = 125K)	Operate Mode*	Light Operate or Dark Operate (default = Light Operate)	Bit 0:	0	Output is OFF		1	Output is ON	Bit 1:	0	Alarm output is OFF		1	Alarm output is ON	Bits 2-7	Not Used: Always 0	
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<b>Construction</b>	Molded PBT polyester thermoplastic polyester housing; molded acrylic lenses; stainless steel hardware. O-ring sealed transparent polycarbonate top cover.																							
<b>Environmental Rating</b>	IEC IP67; NEMA 6P																							
<b>Connections</b>	Euro-style DeviceNet <sup>™</sup> -compatible quick-disconnect cables																							
<b>Operating Temperature</b>	-25° to +70°C (-13° to +158°F); Maximum relative humidity 95% (non-condensing)																							

## Dimensions

Overall Sensor Depth	
Suffix	Depth
E (emitter), D (short-range diffuse), DL (long-range diffuse), LV (retroreflective), and R (receiver)	54.6 mm (2.15")
CV and CV4 (convergent)	61.5 mm (2.42")
LP (polarized retroreflective)	56.4 mm (2.30")
F (glass fiber optic)	60.5 mm (2.38")
FP (plastic fiber optic)	59.8 mm (2.35")


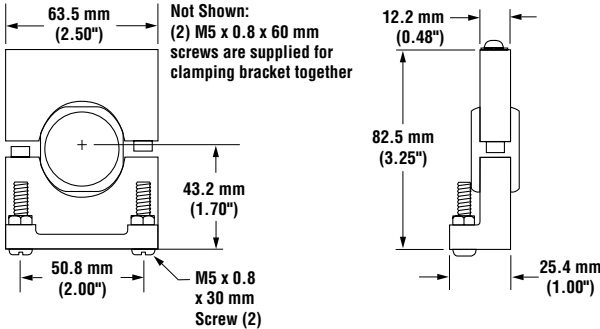

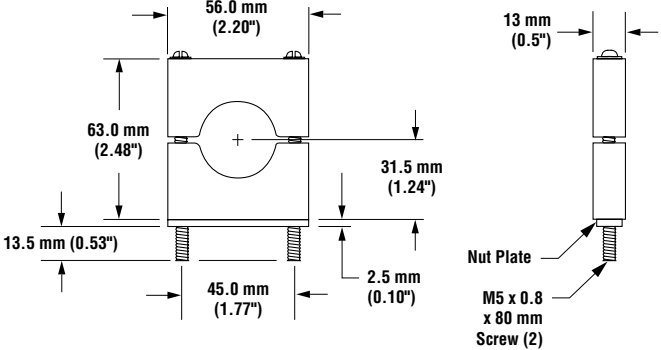

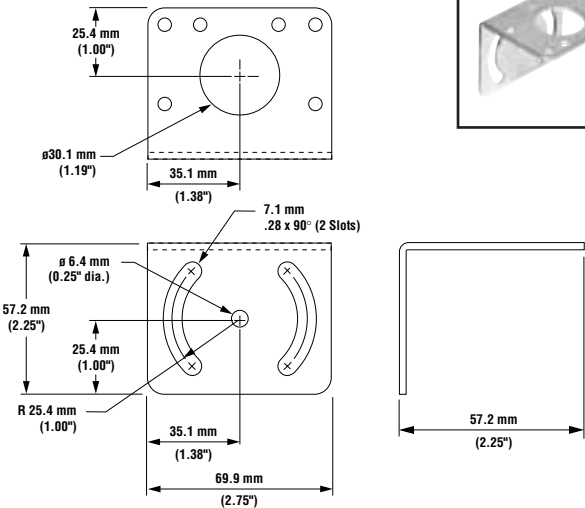


## Hookups

Q45X Male Connector	Pin	Wire Color	Function
<b>Male Pinout</b> 	1		Shield
	2	Red	BUS power (+V)
	3	Black	BUS power (-V)
	4	White	Communications +
	5	Blue	Communications -

The Q45XDN sensor requires DeviceNet-compatible quick-disconnect cable which is available from various manufacturers, such as interlinkBT.

## Mounting Brackets

<p><b>SMB30S</b></p>	<ul style="list-style-type: none"> <li>• 12-gauge, stainless steel, right angle mounting bracket with a curved mounting slot for versatility and orientation</li> <li>• Clearance for M6 (1/4") hardware</li> </ul>	<p><b>SMB30C</b></p>	<ul style="list-style-type: none"> <li>• 30 mm split clamp bracket</li> <li>• Black reinforced thermoplastic polyester</li> <li>• Includes stainless steel mounting hardware</li> </ul>
 		 	
<p><b>SMB30MM</b></p>	<ul style="list-style-type: none"> <li>• 30 mm, 12-gauge, stainless steel bracket with curved mounting slots for versatility and orientation</li> <li>• Clearance for M6 (1/4") hardware</li> </ul>		
 			



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**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.