### WORLD-BEAM® QS18 Universal Voltage Sensors

**Datasheet**

- Easily fits or retrofits almost any mounting configuration
- Exceptional optical performance in a compact right-angle housing
- 20 V ac/dc to 140 V ac/dc or 20 V ac/dc to 270 V ac/dc operation with P-MOSFET or N-MOSFET output, depending on model (see Specifications)
- Bright LED operating status indicators, visible from 360°
- Rugged, sealed housing, protected circuitry, 1200 PSI washdown
- Versatile mounting: front- and base-mount (M18), side-mount, and retrofit brackets

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**WARNING: Not To Be Used For Personnel Protection**

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

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<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing Mode / LED</th>
<th>Sensing Range</th>
<th>Output Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>QS18WE</td>
<td>940 nm Infrared Effective Beam: 10 mm (0.4 in)</td>
<td>20 m (66 ft)</td>
<td>N/A (Emitter)</td>
</tr>
<tr>
<td>QS18ANWR</td>
<td>660 nm Visible Red</td>
<td>3.5 m (12 ft)</td>
<td>N-MOSFET (Sinking)</td>
</tr>
<tr>
<td>QS18RNWR</td>
<td>660 nm Visible Red</td>
<td>6.5 m (21 ft)</td>
<td>N-MOSFET (Sinking)</td>
</tr>
<tr>
<td>QS18APWR</td>
<td>624 nm Visible Red</td>
<td>450 mm (18 in)</td>
<td>N-MOSFET (Sinking)</td>
</tr>
<tr>
<td>QS18RPWR</td>
<td>850 nm Infrared</td>
<td>1 m (39 in)</td>
<td>N-MOSFET (Sinking)</td>
</tr>
</tbody>
</table>

The standard 2 m (6.5 ft) cable models are listed. To order the 9 m (30 ft) cable models, add the suffix "W/30" to the cabled model number. (for example, QS18WE W/30) QD models: To order models with a 150 mm (6 in) pigtail cable with 4-pin AC Micro-style QD, add suffix "Q2" to the model number (for example, QS18WEQ2). A model with a QD connector requires an accessory mating cordset. 600 V cable models: Standard models are supplied with 300 V cable. For 600 V cable, add suffix "C1" to the model number (for example, QS18WEC1).

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1 MOSFET: Metal oxide semiconductor field-effect transistor.
Indicators

1. Green: Power Indicator
2. Amber: Output Indicator
3. Sensitivity (Gain) Potentiometer

Wiring Diagrams

<table>
<thead>
<tr>
<th>Cabled Models</th>
<th>Quick Disconnect (QD) Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Brown</td>
<td>1 = Red/Black</td>
</tr>
<tr>
<td>3 = Blue</td>
<td>2 = Red/White</td>
</tr>
<tr>
<td>4 = Black (no connection for emitters)</td>
<td>3 = Red (no connection for emitters)</td>
</tr>
<tr>
<td></td>
<td>4 = Green (no connection for emitters)</td>
</tr>
</tbody>
</table>

Emitter

1

L1 (DC+)

3

L2 (DC–)

P-MOSFET

1

L1 (DC+)

4

Load

3

L2 (DC–)

N-MOSFET

1

L1 (DC+)

4

Load

3

L2 (DC–)

Emitter

1

L1 (DC+)

2

L2 (DC–)

3

No Connection

4

No Connection

P-MOSFET

1

L1 (DC+)

3

Load

2

L2 (DC–)

4

No Connection

N-MOSFET

1

L1 (DC+)

3

Load

2

L2 (DC–)

4

No Connection
Specifications

Supply Voltage
P-MOSFET Models: 20 to 140 V ac/dc at less than 10 mA, exclusive of load
N-MOSFET Models: 20 to 270 V ac/dc at less than 10 mA, exclusive of load

Supply Protection Circuitry
Protected against reverse polarity and transient voltages

Output Configuration
Single Discrete Output, 100 mA load rating; N-MOSFET or P-MOSFET, depending on model number; Light Operate or Dark Operate, depending on model number

Output Rating
Rating: 100 mA with short circuit protection
Off-state leakage current: less than 400 µA
ON-state saturation voltage: P-MOSFET: 2.75 V; N-MOSFET: 2.5 V

Output Protection Circuitry
Protected against output short-circuit and false pulse on power up.
Delay at power up; outputs do not conduct during this time: 100 ms max. dc, 300 ms max. ac

Required Overcurrent Protection

<table>
<thead>
<tr>
<th>Supply Wiring (AWG)</th>
<th>Required Overcurrent Protection (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>5.0</td>
</tr>
<tr>
<td>22</td>
<td>3.0</td>
</tr>
<tr>
<td>24</td>
<td>2.0</td>
</tr>
<tr>
<td>26</td>
<td>1.0</td>
</tr>
<tr>
<td>28</td>
<td>0.8</td>
</tr>
<tr>
<td>30</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Output Response
Opposed mode: 16.6 ms (1 cycle at 60 Hz)
All other modes: 8.3 ms (1/2 cycle at 60 Hz)

Repeatability
1.5 ms

Indicators
2 LED indicators on sensor top:
Green solid: Power on
Green flashing: Sensor output short circuit
Amber solid: Light sensed
Amber flashing: Marginal excess gain (1 to 1.5x excess gain)

Adjustments
Diffuse, Retroreflective and Polarized Retroreflective models only: 1-turn potentiometer Sensitivity (Gain) adjustment

Construction
ABS housing, PMMA lens, Acetal Gain Adjuster

Connections
2 m (6.5 ft) 3-conductor, 22 AWG PVC cable (300 V ac), or 150 mm (6 in) pigtail PVC cable with 4-pin threaded Micro-style connector; “C1” suffix models: 2 m (6.5 ft) 3-conductor, 22 AWG PVC cable (600 V ac).

Environmental Rating
IEC IP67; NEMA 6; UL Type 1
1200 PSI washdown; NEMA ICS5, Annex F-2002 (PW12)

Operating Conditions
Relative Humidity: 95% at 55 °C (non-condensing)
Temperature: Less than 140 V ac/dc: −25 °C to 70 °C (−13 °F to 158 °F) (N-MOSFET and P-MOSFET models)
140 V ac/dc or greater: −25 °C to 55 °C (−13 °F to 131 °F) (N-MOSFET models only)

Certifications

Dimensions

All measurements are listed in millimeters [inches], unless noted otherwise.
Packing List
Sensor
M18 x 1 jam nut
M3 hardware packet
Datasheet

M3 Hardware Packet Contents
2 – M3 × 0.5 × 20 mm SS Screw
2 – M3 × 0.5 SS Hex Nut
2 – M3 SS Washer

Performance Curves

<table>
<thead>
<tr>
<th>Opposed Mode</th>
<th>Beam Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excess Gain</strong></td>
<td><strong>Beam Pattern</strong></td>
</tr>
<tr>
<td><img src="image-url" alt="Graph" /></td>
<td><img src="image-url" alt="Graph" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Polarized Retroreflective</th>
<th>Beam Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excess Gain</strong></td>
<td><strong>Beam Pattern</strong></td>
</tr>
<tr>
<td><img src="image-url" alt="Graph" /></td>
<td><img src="image-url" alt="Graph" /></td>
</tr>
</tbody>
</table>
### Retroreflective

<table>
<thead>
<tr>
<th>Excess Gain</th>
<th>Beam Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Graph" /></td>
<td><img src="image2.png" alt="Graph" /></td>
</tr>
</tbody>
</table>

### Diffuse (performance based on 90% performance white test card)

<table>
<thead>
<tr>
<th>Excess Gain</th>
<th>Beam Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3.png" alt="Graph" /></td>
<td><img src="image4.png" alt="Graph" /></td>
</tr>
</tbody>
</table>

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**World-Beam® QS18 Universal Voltage Sensors**

P/N 136003 Rev. F  www.bannerengineering.com - Tel: +1-763-544-3164
Accessories

Cordsets

<table>
<thead>
<tr>
<th>Model</th>
<th>Length</th>
<th>Style</th>
<th>Dimensions</th>
<th>Pinout (Female)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQAC-406</td>
<td>1.83 m (6 ft)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQAC-415</td>
<td>4.57 m (15 ft)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQAC-430</td>
<td>9.14 m (30 ft)</td>
<td>Straight</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mounting Brackets

**SMB18A**
- Right-angle mounting bracket with a curved slot for versatile orientation
- 12-ga. stainless steel
- 18 mm sensor mounting hole
- Clearance for M4 (#8) hardware

Hole center spacing: A to B = 24.2
Hole size: A = ø 4.6, B = 17.0 x 4.6, C = ø 18.5

**SMBQS18WRS**
- Retrofit bracket for Universal voltage models; sensor base threads into bracket, bracket bolts to flat surface
- PBT construction
- Clearance for M3 or #6-32 hardware

Other sensor model shown with bracket above. Refer to your current Banner catalog for more mounting bracket options, including: SMB312S, SMB18SF, SMB3018SC, SMB18FA.

Retroreflective Targets

Banner offers a wide selection of high-quality retroreflective targets. See [www.bannerengineering.com](http://www.bannerengineering.com) for complete information.

**NOTE:** Polarized sensors require corner cube type retroreflective targets. Non-polarized sensors may use any retroreflective target.
## Apertures

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Pieces</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Circular</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APQS18-020</td>
<td>0.5 mm dia.</td>
<td>6</td>
</tr>
<tr>
<td>APQS18-040</td>
<td>1.0 mm dia.</td>
<td>6</td>
</tr>
<tr>
<td>APQS18-100</td>
<td>2.5 mm dia.</td>
<td>6</td>
</tr>
<tr>
<td><strong>Horizontal Slot</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APQS18-020H</td>
<td>0.5 × 6.4 mm</td>
<td>6</td>
</tr>
<tr>
<td>APQS18-040H</td>
<td>1.0 × 6.4 mm</td>
<td>6</td>
</tr>
<tr>
<td>APQS18-100H</td>
<td>2.5 × 6.4 mm</td>
<td>6</td>
</tr>
<tr>
<td><strong>Vertical Slot</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APQS18-020V</td>
<td>0.5 × 12.7 mm</td>
<td>6</td>
</tr>
<tr>
<td>APQS18-040V</td>
<td>1.0 × 12.7 mm</td>
<td>6</td>
</tr>
<tr>
<td>APQS18-100V</td>
<td>2.5 × 12.7 mm</td>
<td>6</td>
</tr>
<tr>
<td><strong>Kit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APQS18-DVHX2</td>
<td>2 of each aperture</td>
<td>18</td>
</tr>
</tbody>
</table>

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