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1 Product Description

Remote Display and Configuration Tool

- Allows for configuration of remote sensor heads
- Easy to set up and use with a 2-line, 8-character display
- Ability to display live distance measurement
- Ability to save up to 6 unique configurations
- Not required for continuous operation of configured sensor(s)

1.1 Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Output A and B</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSD1QP</td>
<td>Configurable</td>
<td>Integral 150 mm (6 in) PVC cable with 5-pin M12/Euro-style quick disconnect</td>
</tr>
</tbody>
</table>

1.2 Overview

The RSD1 remote display is designed to provide easy sensor configuration and monitoring with the ability to copy settings between sensors.

1.3 Features and Indicators

Three LED indicators on the RSD1 provide ongoing indication of the connected sensor status.

- **Output A LED Indicator**
  - Solid Amber = Output A On
  - Off = Output A Off

- **Power LED Indicator**
  - Solid Green = Normal Operation, Power On

- **Output B LED Indicator**
  - Solid Amber = Output B On
  - Off = Output B Off

1.3.1 Display

The RSD1 display is a 2-line, 8-character LCD. The main screen is the Run mode screen, which shows the real-time measurements of the connected sensor.

1.3.2 RSD1 Buttons

Use the RSD1 buttons Down, Up, Enter, and Escape to view or change RSD1 settings and information and to program a connected sensor.
Down and Up Buttons

Press Down and Up to:

- Navigate the menu systems
- Change programming settings

When navigating the menu systems, the menu items loop.

Press Down and Up to change setting values. Press and hold the buttons to cycle through numeric values. After changing a setting value, the value slowly flashes until the change is saved using the Enter button.

Enter Button

Press Enter to:

- Confirm selection
- Save changes

In the RSD1 Menu, a check mark in the lower right corner of the display indicates that pressing Enter accesses a submenu.

Press Enter to save changes. New values flash rapidly, and the sensor returns to the parent menu.

Escape Button

Press and hold Escape for 4 seconds to:

- Access the RSD1 Menu while in Run mode

Press Escape to:

- Leave the current menu and return to the parent menu

**Important:** Pressing Escape discards any unsaved programming changes.

In the RSD1 Menu, a return arrow in the upper left corner of the display indicates that pressing Escape returns to the parent menu.

Press and hold Escape for 2 seconds to return to Run mode from the RSD1 Menu.
2 Installation

2.1 Mounting Instructions

Mount on a DIN Rail
1. Hook the DIN rail clip on the bottom of the RSD1 over the edge of the DIN rail (1).
2. Push the RSD1 up on the DIN rail (1).
3. Pivot the RSD1 onto the DIN rail, pressing until it snaps into place (2).

Remove from a DIN Rail
1. Push the RSD1 up on the DIN rail (1).
2. Pivot the RSD1 away from the DIN rail and remove it (2).

2.2 Wiring Diagrams

The following wiring diagrams are examples of different RSD1 outputs. Wiring is dependent on the sensor connected to the RSD1.

Dual Discrete

Discrete Analog (Current)

Discrete Analog (Voltage)

Note: When connecting a 5-pin sensors to the RSD1, a double-ended 5-pin to 5-pin cordset is optional. When connecting a 4-pin sensor to the RSD1, a double-ended 4-pin to 5-pin adapter cordset is required.

2.3 Connection Options

When connecting the RSD1 to a sensor or control system, an adapter may be required depending on the sensor. For additional information on how to connect the RSD1, see the information below.

www.bannerengineering.com - Tel: +1 888 373 6767
2.3.1 Connecting the RSD1 to a Sensor

<table>
<thead>
<tr>
<th>Sensor Connector</th>
<th>Connection Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Pin (5-Wire)</td>
<td>When connecting the RSD1 to a sensor with a 5-pin connector, a double-ended 5-pin cordset can be used to extend the distance between the RSD1 and the sensor.</td>
</tr>
<tr>
<td></td>
<td>• See MQDEC3-5xxSS</td>
</tr>
<tr>
<td>4-Pin (4-Wire)</td>
<td>When connecting the RSD1 to a sensor with a 4-pin connector where the white wire is used for communication, an adapter is required to connect RSD1 pin 5 to pin 2 of the sensor.</td>
</tr>
<tr>
<td></td>
<td>• See MQDC-45xxSS</td>
</tr>
<tr>
<td></td>
<td>When connecting the RSD1 to a sensor with a 4-pin connector where the black wire is used for communication, an adapter is required to connect RSD1 pin 5 to pin 4 of the sensor.</td>
</tr>
<tr>
<td></td>
<td>• See MQDC-4B5G0xSS</td>
</tr>
<tr>
<td></td>
<td>When connecting the RSD1 to a sensor with a 4-pin connector, a double-ended cordset can be used in addition to the adapter to extend the distance between the RSD1 and the sensor.</td>
</tr>
<tr>
<td></td>
<td>• See MQDEC3-5xxSS</td>
</tr>
</tbody>
</table>

2.3.2 Connecting the RSD1 to a Control System

When connecting the RSD1 to a control system, there are many combinations of double-ended and flying leads that can be used to fit your application needs. See sensor specific literature for additional cordset options.

Note: A 5-pin to 4-pin converter cable (MQDEC-54xxSS) may be required when connecting to an I/O block if pin-2 on the sensor is configured for remote input.
3 Programming a Sensor with the RSD1

When connected to a sensor and in Run Mode, the RSD1 mirrors the connected sensor’s display. Program a sensor using the buttons on the RSD1.

For sensor programming information, reference the literature specific to the connected sensor.

In addition to programming a connected sensor, the RSD1 buttons can be disabled to prevent unauthorized or accidental programming changes.

Note that the buttons on the RSD1 are slightly different than the buttons on some sensors. See the following table for the corresponding buttons.

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Up</th>
<th>Down</th>
<th>Enter</th>
<th>Escape</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSD1</td>
<td><img src="button-up.png" alt="Up" /></td>
<td><img src="button-down.png" alt="Down" /></td>
<td><img src="button-enter.png" alt="Enter" /></td>
<td><img src="button-escape.png" alt="Escape" /></td>
</tr>
<tr>
<td>Q4X</td>
<td><img src="button-up.png" alt="Up" /></td>
<td><img src="button-down.png" alt="Down" /></td>
<td><img src="button-select.png" alt="Select" /></td>
<td>n/a</td>
</tr>
<tr>
<td>Q5X</td>
<td><img src="button-select.png" alt="Select" /></td>
<td><img src="button-exit.png" alt="Exit" /></td>
<td><img src="button-select.png" alt="Select" /></td>
<td>n/a</td>
</tr>
</tbody>
</table>

3.1 RSD1 Menu (MENU)

The RSD1 Menu includes several submenus that provide access to view and change RSD1 settings and to view RSD1 information.

To access the RSD1 Menu, press and hold the **Escape** button > 4 seconds while in Run Mode.
3.2 Sensor Configuration Menu (CONFIG)

There are six sensor configuration slots available to import user configuration data from remote sensors. Once user configuration data is imported, the ability to export the configurations is available.

3.2.1 Import

If the user configuration slot is empty, it is available to import from the remote sensor.

After a successful configuration import, the name of the configuration slot will include an asterisk (*) to show that the configuration slot contains configuration data.
3.2.2 Name

The name of the selected configuration slot can be modified.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edit</td>
<td>The existing configuration name can be edited</td>
</tr>
<tr>
<td>New</td>
<td>A new name can be entered</td>
</tr>
</tbody>
</table>

**Note:** An asterisk (*) precedes the configuration slot name of a configuration that contains configuration data.

3.2.3 Export

If a sensor configuration has been imported, the user configuration data can be exported to a connected remote sensor.

To export user configuration data, navigate to the Export menu using the RSD1 push buttons and press the Enter button. Navigate to Yes and press the Enter button. To confirm configuration export, press the Enter button a second time.

3.2.4 Delete

A configuration slot can be cleared by deleting the user configuration data.

Once user configuration data has been deleted from a configuration slot the asterisk (*) at the beginning of the configuration slot name will be deleted as well to show that the configuration slot no longer contains user configuration data.

3.2.5 Detail

The specific details of the remote sensor that was used to import configuration data will be available to review.

3.3 Input Menu (RSD1 IN)

Use the Input menu to view or change the:
- **Input polarity**
- **Remote input detection settings**

![RSD1 Input Menu Map](image)

**Figure 6. RSD1 Input Menu Map**

3.3.1 Input Active

The Active option sets the remote input polarity.

Navigate: MENU > INPUT > Active
### 3.3.2 Input Type

The Type option sets the input type.

**Navigate:** Menu > Input > Type

**Default:** Sensor

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disable</td>
<td>All remote inputs are ignored</td>
</tr>
<tr>
<td>Sensor</td>
<td>Remote input settings are passed directly to the remote sensor. For sensor remote input programming information, reference the literature specific to the connected sensor.</td>
</tr>
<tr>
<td>RSD1</td>
<td>Remote input is used to control the export function on the RSD1 and to load new configurations to the attached sensor. For more information, see Remote Input (p. 13).</td>
</tr>
</tbody>
</table>

### 3.3.3 Input Switch

The Switch option sets external remote input pulse acceptance.

**Navigate:** MENU > INPUT > Switch

**Default:** No

<table>
<thead>
<tr>
<th>Switch Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Allows external remote input pulses to select remote input type. For more information, see Remote Input (p. 13).</td>
</tr>
<tr>
<td>No</td>
<td>Does not allow external remote input pulses to modify remote input selection type.</td>
</tr>
</tbody>
</table>
3.4 Display Menu (DISPLAY)

Use the Display menu to view or change the:
- RSD1 display orientation
- RSD1 sleep mode settings

![Display Menu Map]

3.4.1 View

The View option sets the display orientation of the RSD1. For applications where the display must be mounted so that it is not right-reading, invert the display for readability. The Down and Up buttons do not change when the display is inverted.

Navigate: MENU > DISPLAY > View

Default: Normal

![RSD1 Normal Display Orientation](image)

![RSD1 Inverted Display Orientation](image)

3.4.2 Sleep

The Sleep option sets when the display is put to sleep. Four timing options are available: 1, 5, 15, or 60 minutes. Sleep mode is disabled by default. Sleep occurs in Run mode and any menu. To wake the sensor and return to the last viewed mode or menu, press any button.

RSD1 sleep settings are independent of the sleep settings of a connected sensor.

Navigate: MENU > DISPLAY > Sleep

Default: Disabled

<table>
<thead>
<tr>
<th>Sleep Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disable</td>
<td>The display will not go to sleep</td>
</tr>
<tr>
<td>1min</td>
<td>Turn off the display after 1 minute</td>
</tr>
<tr>
<td>5min</td>
<td>Turn off the display after 5 minutes</td>
</tr>
<tr>
<td>15min</td>
<td>Turn off the display after 15 minutes</td>
</tr>
<tr>
<td>60min</td>
<td>Turn off the display after 60 minutes</td>
</tr>
</tbody>
</table>
3.5 Lock, Unlock, and OpLock Menu (LOCK)

The RSD1 can be locked to prevent unauthorized or accidental programming changes.

A lock symbol displays in the upper left corner of the RSD1 display to indicate when the RSD1 is set to Lock or OpLock. When locked, the menus are available to view settings, but the values cannot be changed. To lock the RSD1 while still allowing for the export of user configuration data, use the OpLock feature.

Unlock the RSD1 to allow programming changes.

Note: The Lock and OpLock functions only prevent changes to the RSD1. Changes can still be made to an attached sensor. For sensor lock options, reference the literature specific to the connected sensor.

Navigate: MENU > LOCK
Default: Unlocked

3.5.1 Unlock
The RSD1 display can be unlocked to allow programming changes.

3.5.2 Lock
The RSD1 display can be locked to prevent unauthorized or accidental programming changes.

3.5.3 OpLock
The RSD1 display can be locked while still allowing for the export of user configuration data using the OpLock feature.

3.6 Information Menu (INFO)
Use the Information menu to view the model, part number (P/N), serial number (S/N), and firmware version (Version) information. Select one of these options to view specific information for the connected sensor. This information is read-only.

Navigate: MENU > INFO

3.6.1 Diags

Diagnostic display options are available for system diagnostics and may be requested by a Banner Engineering Applications Engineer.

3.7 Reset Menu (RESET)

Use the Reset menu to restore the RSD1 to the factory default settings.

Navigate: MENU > RESET.

Select Yes to apply the factory defaults; select No to return to the Reset menu without changing any RSD1 settings.

3.8 End Menu (END)

Select the END menu option to return the RSD1 to Run Mode.

3.9 Factory Default Settings

<table>
<thead>
<tr>
<th>Input Settings</th>
<th>RSD1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>Auto</td>
</tr>
<tr>
<td>Type</td>
<td>Sensor</td>
</tr>
<tr>
<td>Switch</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display Settings</th>
<th>RSD1</th>
</tr>
</thead>
<tbody>
<tr>
<td>View</td>
<td>Normal</td>
</tr>
<tr>
<td>Sleep</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lock Settings</th>
<th>RSD1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locked, Unlocked or OpLock</td>
<td>Unlocked</td>
</tr>
</tbody>
</table>

3.10 Remote Input

Use the remote input to program the RSD1 remotely. Activate remote input using the RSD1 buttons to navigate to the RSD1 Input Type menu option.
For Active Low, connect the gray input wire to ground (0 V dc), with a remote switch connected between the wire and ground. To use the Active High function, configure the sensor for Active High using the buttons on the sensor, then connect the gray input wire to V+ (12 V dc to 30 V dc). Pulse the remote input according to the diagram and the instructions provided in this manual.

The length of the individual programming pulses is equal to the value $T$: $0.04 \text{ seconds} \leq T \leq 0.8 \text{ seconds}$.

Exit remote programming modes by holding the remote input low for $> 2$ seconds, or waiting for the automatic 60-second timeout, or by pressing and holding Escape for 2 seconds. The sensor returns to Run mode without saving any new settings.
4 Specifications

Supply Voltage
Use only with suitable Class 2 power supply
12 V dc to 30 V dc:
• Max. load of 330 Ω for analog current (4 mA to 20 mA)
15 V dc to 30 V dc:
• Max. load of 500 Ω for analog current (4 mA to 20 mA)

Power and Current Consumption
Maximum Power Consumption: < 3.6 W (At 30 V dc, 119 mA) with 2 discrete outputs at 50 mA load each
Power Consumption, Normal Run Mode with No Load: < 0.6 W (At 30 V dc, 19 mA)

Supply Protection Circuitry
Protected against reverse polarity and transient overvoltages

Output Configuration
Analog output: 4 to 20 mA or 0 to 10 V, depending on sensor
Discrete output rating: Discrete NPN/PNP, depending on sensor

Output Ratings
Discrete Output: 50 mA maximum (protected against continuous overload and short circuit)
OFF-state leakage current–PNP: < 10 µA at 30 V
OFF-state leakage current–NPN: < 200 µA at 30 V
Output saturation voltage–PNP outputs: < 3 V at 50 mA
Output saturation voltage–NPN outputs: < 2 V at 50 mA
Analog current output: 330 kΩ max. at 24 V; max. load resistance = (Vcc-4.5)/0.02 Ω
Analog voltage output: 2.5 kΩ min. load resistance

Note: 2 ms output delay with white wire

Connection
Integral 150 mm (6 in) PVC cable with 5-pin M12/Euro-style quick disconnect

Construction
Housing: Polycarbonate

Environmental Rating
IEC IP65

Operating Temperature
-10 °C to +50 °C (+14 °F to +122 °F)

Storage Temperature
-40 °C to +70 °C (-40 °F to +158 °F)

Vibration and Mechanical Shock
All models meet MIL-STD-202G, Method 201A requirements. Also meets IEC 60947-5-2. Vibration: 10 Hz to 60 Hz maximum, 0.06 inch (1.52 mm) double amplitude, 10G maximum acceleration per IEC 60947-5-2. MIL-STD-202G, Method 213B, Condition I (100G 6x along X, Y and Z axes, 18 shocks), with device operating. Also meets IEC 947-5-2 requirements: 30G 11 ms duration, half sine wave.

Certifications

4.1 Dimensions

All measurements are listed in millimeters [inches], unless noted otherwise.

M12 X 1 - 6H

M12 X 1 - 6g

38.9 [1.53]

37.4 [1.47]

26.0 [1.10]
Figure 12. RSD1 Full Menu Map
6 Accessories

6.1 Cordsets

The following cordsets can be used to extend the distance between the sensor and RSD1.

### 5-Pin Male Threaded and 5-Pin Female Quick Disconnect M12/Euro-Style Cordset—Double Ended

<table>
<thead>
<tr>
<th>Model</th>
<th>Length &quot;L1&quot;</th>
<th>Style</th>
<th>Pinout</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQDEC3-503SS</td>
<td>0.31 m (1 ft)</td>
<td>Female Straight/Male Straight</td>
<td>Male: 1 = Brown, 2 = White, 3 = Blue, 4 = Black, 5 = Gray</td>
</tr>
<tr>
<td>MQDEC3-506SS</td>
<td>1.83 m (6 ft)</td>
<td></td>
<td>Female: 1 = Brown, 2 = White, 3 = Blue, 4 = Black, 5 = Gray</td>
</tr>
<tr>
<td>MQDEC3-515SS</td>
<td>4.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MQDEC3-530SS</td>
<td>9.20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following cordsets can be used to connect the RSD1 to a 4-pin sensor where the white wire (pin 2) is used for communications (for example, a QSX sensor).

### 4-Pin Female and 5-Pin Male Threaded M12/Euro-Style Cordset—Double Ended

<table>
<thead>
<tr>
<th>Model</th>
<th>Length &quot;L1&quot;</th>
<th>Style</th>
<th>Pinout</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQDC-4501SS</td>
<td>0.31 m (1 ft)</td>
<td>Female Straight/Male Straight</td>
<td>Male: 1 = Brown, 2 = Not Used, 3 = Blue, 4 = Black, 5 = White</td>
</tr>
<tr>
<td>MQDC-4508SS</td>
<td>1.83 m (6 ft)</td>
<td></td>
<td>Female: 1 = Brown, 2 = White, 3 = Blue, 4 = Black, 5 = White</td>
</tr>
</tbody>
</table>

The following cordsets can be used to connect the RSD1 to a control system using the white wire (pin 2) as remote input for Remote TEACH, Laser Off, Laser On.
<table>
<thead>
<tr>
<th>Model</th>
<th>Length &quot;L1&quot;</th>
<th>Style</th>
<th>Pinout</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQDC-5401SS</td>
<td>0.31 m (1 ft)</td>
<td>Female Straight/ Male Straight</td>
<td>Male 1 = Brown 2 = White 3 = Blue 4 = Black</td>
</tr>
<tr>
<td>MQDC-5406SS</td>
<td>1.83 m (6 ft)</td>
<td>Female Straight/ Male Straight</td>
<td>Male 1 = Brown 2 = Not Used 3 = Blue 4 = Black 5 = White</td>
</tr>
</tbody>
</table>

The following cordsets can be used to connect the RSD1 to a 4-pin sensor where the black wire (pin 4) is used for communication (for example, a Q4X sensor).
6.2 Brackets

All measurements are listed in millimeters, unless noted otherwise.

**DIN-35-..**
35 mm DIN Rail

<table>
<thead>
<tr>
<th>Model</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN-35-70</td>
<td>70</td>
</tr>
<tr>
<td>DIN-35-105</td>
<td>105</td>
</tr>
<tr>
<td>DIN-35-140</td>
<td>140</td>
</tr>
</tbody>
</table>

Hole center spacing: 35.1
Hole size: 25.4 x 5.3
7 Troubleshooting

7.1 Errors

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Description</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>NoSensor Found...</td>
<td>No sensor connected</td>
<td>Connect a sensor</td>
</tr>
<tr>
<td>Fail NoSensor</td>
<td>No sensor connected</td>
<td>Connect a sensor</td>
</tr>
<tr>
<td>Fail NotMatch</td>
<td>Sensor version mismatch—the sensor version and part number do not match the configuration being exported</td>
<td>Use a different sensor or select a different export configuration</td>
</tr>
<tr>
<td>Fail TryAgain</td>
<td>Import or export failure</td>
<td>Try the import/export again</td>
</tr>
</tbody>
</table>
8 Product Support

8.1 Contact Us

Banner Engineering Corp. headquarters is located at:

9714 Tenth Avenue North
Minneapolis, MN 55441, USA
Phone: + 1 888 373 6767

For worldwide locations and local representatives, visit www.bannerengineering.com.

8.2 Banner Engineering Corp. Limited Warranty

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