FLOMEC®

QSB & QSI Electronic Module for Remote Applications

Installation Instructions

These installation instructions cover the installation of the following electronic modules for remote applications:

- QSB pulse output, with or without a display

- QSI1, QSI2, QSI3 versions of communications electronics, with or without a display

The basic mechanical installation is the same for all electronic modules. The wiring connections and wiring diagrams differ depending on the electronic module being installed.

MODULE CONTENTS

Check the contents of your module using the list below as reference.

- (1) Completely assembled QSB or QSI module (with or without a display)
- (1) Instruction sheet
- (2) Butt-splice connectors

- (1) Q09 Owner's manual (if module includes Q09 display)
- (1) Set of (4) Strain reliefs

Additional items included with ***Display Ready*** module only:

- (1) Display seal
- (4) #4-20 x 7/8 in. tapping screws
- (1) 10 pin male connector

Dimensions are shown in inches and [mm]

4.91
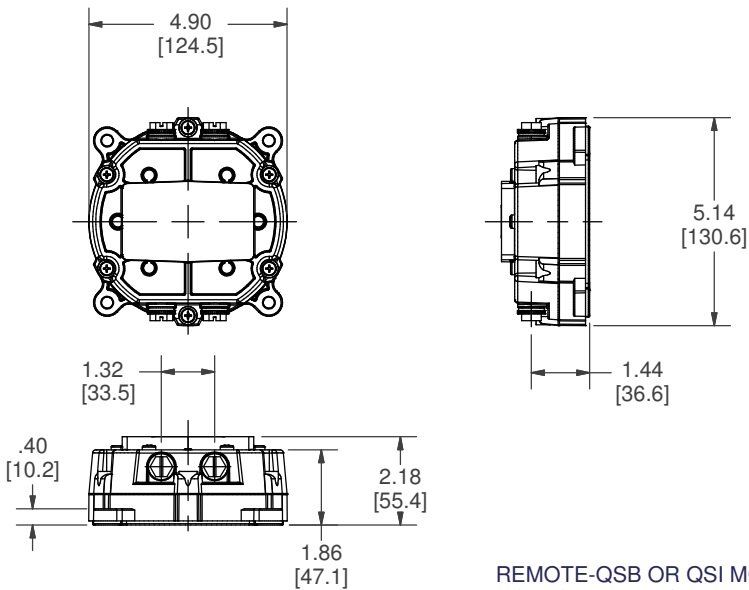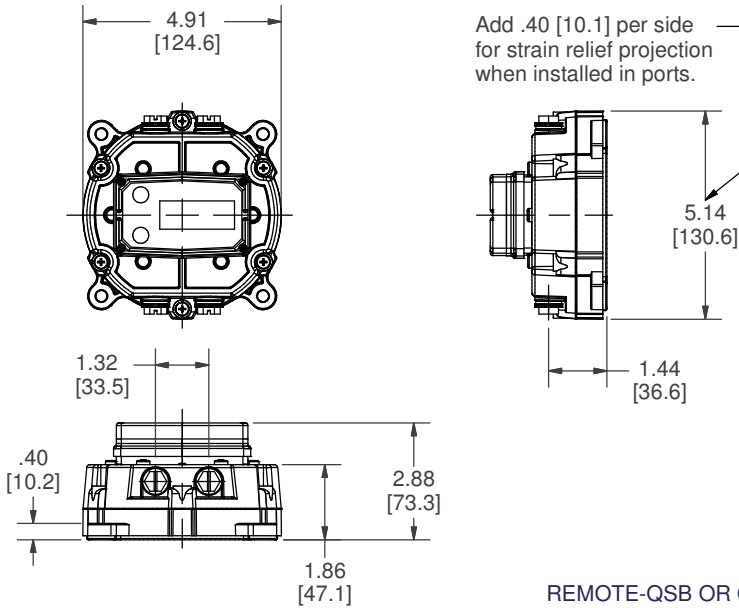[124.6]

Add .40 [10.1] per side
for strain relief projection
when installed in ports.

5.14
[130.6]

1.44
[36.6]

1.32
[33.5]

.40
[10.2]

2.88
[73.3]

1.86
[47.1]

REMOTE-QSB OR QSI MODULE
WITH DISPLAY

4.90
[124.5]

5.14
[130.6]

1.44
[36.6]

1.32
[33.5]

.40
[10.2]

2.18
[55.4]

1.86
[47.1]

Figure 1

REMOTE-QSB OR QSI MODULE
NO DISPLAY / DISPLAY READY

3

The QSB and QSI modules are available with or without a display. The QSI modules are also available as a "display ready" version with no display installed, but ready for the customer to install his own GPI display.

QSB:

The QSB module is equipped with pulse-out electronics. Pulse out electronics is the default standard regardless of type of module or style of cover plate. This manual contains information and meter wiring diagrams for the QSB pulse-out electronics.

QSI:

The QSI communications module is a multiple capability electronics package and has three versions (QSI1, QSI2 or QSI3) available; each with its own mix of capabilities to better serve the customer (See Versions below).

- QSI1 is equipped with: Bluetooth®, **coil/digital pulse input, pulse output (flow or energy & scalable), RS485 (Modbus® RTU), temperature inputs, BTU calculator.

- QSI2 is equipped with: Bluetooth, **coil/digital pulse input, pulse output (flow or energy & scalable), data logger, temperature inputs, BTU calculator.

- QSI3 is equipped with: Bluetooth, **coil/digital pulse input, pulse output (flow scalable), data logger, 4-20mA output.

This manual contains information and meter wiring diagrams for the three different QSI electronics modules.

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IMPORTANT NOTICE

QSB and QSI module electronics are very sensitive to electric noise if operated within 6 inches of some electric motors, relays, transformers or other sources of electronic noise.

If the QSB or QSI electronics are used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

GENERAL INFORMATION

QSB and QSI electronics are available factory installed on designated meters, or as modules that will adapt the electronics to other GPI meters.

The QSB and QSI electronics converts the voltage (or pulses) from the meter into usable information to support the various capabilities of the modules. The modules also supply the display (when installed) with the information and power it needs to function as designed.

The QSB and QSI module electronics are powered by customer- supplied external power.

SAFETY

This product is not approved for use in hazardous locations.

- Be sure O-rings and seals are kept in good repair.

- When applying power, adhere to specifications in this manual.

- Disconnect external power before attaching or detaching input or output wires.

NOTE: *For* **Display Ready** *QSI Modules Only.*

For *the "Display Ready" QSI module, follow these initial instructions first to install your customer provided display to the cover plate in the kit. Then follow the Installation Instructions to install this customer assembled unit to the meter.*

1. Make sure the QSI module is disconnected from power source.

2. Remove batteries from your display, they will no longer be needed.

3. Remove the pickup coil from the back center of your display by cutting the two wires that attach it to the display. Cut the wires as close to the display as possible to ensure the cut ends do not touch the PC board inside the QSI module. Discard the removed coil.

4. Using a small regular screwdriver, remove the clear sealant from the 10 pin female connector holes on the backside of your display.

5. Insert the "long legs" of the 10 pin male connector that came with the kit into the 10 pin female connector on the QSI circuit board (see Figure 2).

6. Install the formed display seal into the seal gland on the backside of the display.

7. **CAREFULLY** mount the display onto the cover plate ensuring the legs of the male 10 pin connector are inserted into ALL 10 pin female connector holes of the display (see Figure 3).

8. Secure the display to the cover plate using the four #4-20 x 7/8 in. tapping screws. Torque to 80-96 oz-in (0.56-0.67 Nm).
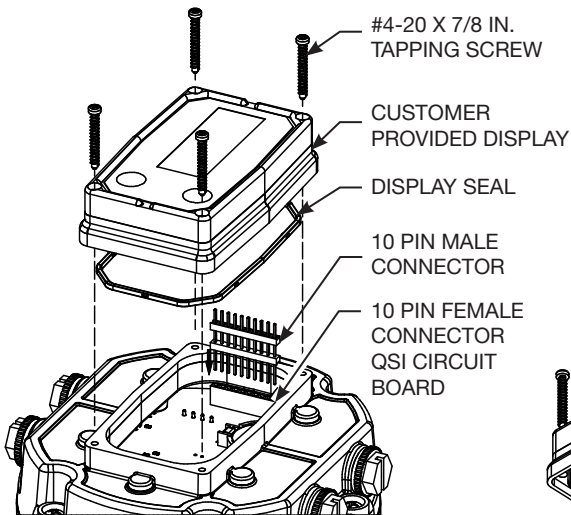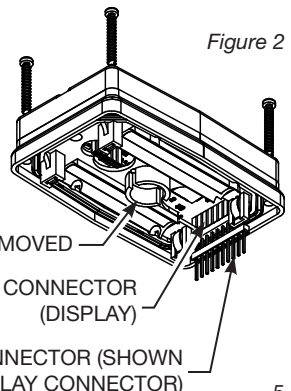

#4-20 X 7/8 IN. TAPPING SCREW

CUSTOMER PROVIDED DISPLAY

DISPLAY SEAL

10 PIN MALE CONNECTOR

10 PIN FEMALE CONNECTOR QSI CIRCUIT BOARD

Figure 2

Figure 3

COIL & BATTERIES REMOVED

10 PIN FEMALE CONNECTOR (DISPLAY)

10 PIN MALE CONNECTOR (SHOWN SEATED IN DISPLAY CONNECTOR)

5

NOTE: *For* **ALL** *kit part numbers.*

1. Make sure the QSB or QSI module and meter are disconnected from power source.

2. Select the mounting location and mount the remote module using the (4) mounting ears on the base. The holes in the ears will accommodate a 1/4 in. diameter bolt or screw. The remote can be mounted in any orientation.

3. Remove the (6) #8-16 x 3/4 in. screws attaching the module cover plate to the base and separate. Do not damage the seal between the two components (see Figure 4).

4. To route external power and/or electronic cables to the QSB or QSI PC board screw connectors, prepare the cover plate by removing the plug and sealing washer from each port that you intend to use. Replace the removed plugs with a strain relief with O-ring. The strain relief will accommodate cable sizes of 0.11 in. (2.8 mm) through 0.26 in. (6.6 mm) diameter. Leave the factory installed plugs in any unused ports.

5. (Make sure the power is disconnected from external cables before beginning this step): Route external cables through the strain relief(s), and then tighten the dome nut securely around the cable to provide an environmental seal.

6. Connect cable wires to the QSB or QSI PC board screw connectors (or) to the Coil A and Coil B non-polarized wires (if using an unpowered pick-up coil on your device) (see Figure 6, 8, 10, or 12 depending on your module version).

NOTE: *The Coil A and Coil B wire ends are sealed with insulating tape. Do not remove the tape unless connecting to these two wires.*

If your installation will be using the "pulse input" screw connectors on the PC board, and definitely have no need of the Coil A and Coil B wires for "unpowered coil" inputs, the (2) wires may be snipped off as close to the PC board as possible.

Doing that will render the "unpowered coil" inputs to Coil A and Coil B circuits unusable.

If using an "unpowered coil" as inputs, remove the tape from wire ends and connect either of the sensor wires to either of the Coil A and Coil B wires from the PC board using the enclosed butt-splice connectors (see Figure 4). Crimp connector to splice wires together and release insulation gel. Repeat with the remaining sensor and PC board wire

7. Mount the cover plate on the base making sure the seal is seated properly between them. Replace the (6) previously removed screws to secure the cover plate to the base. Tighten screws.

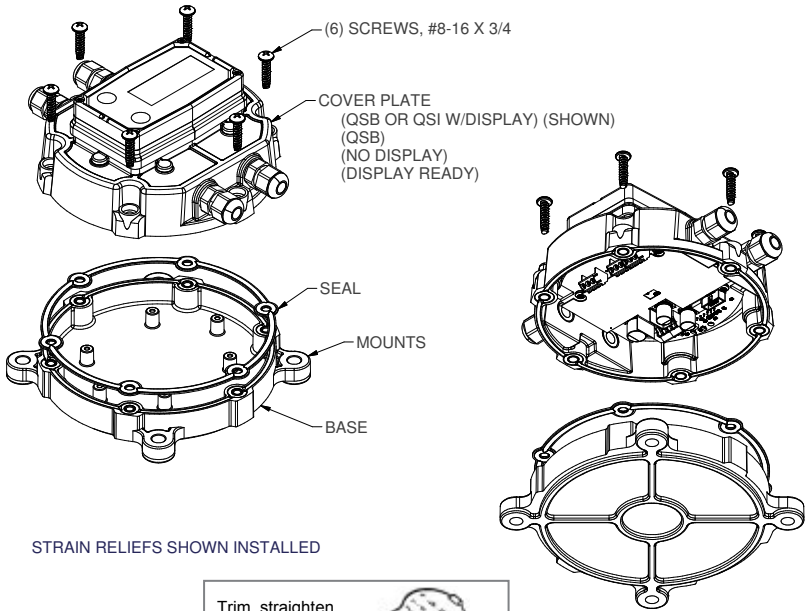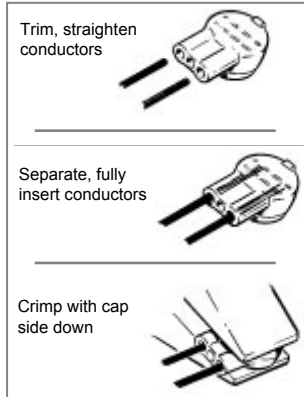8. Connect power to QSB or QSI module and meter.

(6) SCREWS, #8-16 X 3/4

COVER PLATE
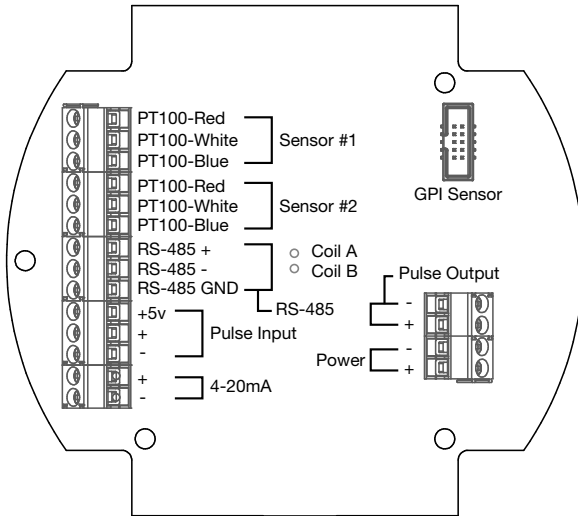(QSB OR QSI W/DISPLAY) (SHOWN)
(QSB)
(NO DISPLAY)
(DISPLAY READY)

SEAL

MOUNTS

BASE

STRAIN RELIEFS SHOWN INSTALLED

Figure 4

Trim, straighten
conductors

Separate, fully
insert conductors

Crimp with cap
side down

TERMINAL CONNECTIONS CHART

Figure 5

TEMP SENSOR	
PT100-Red	Sensor VCC Output
PT100-White	Input High Side
PT100-Blue	Input Return
RS-485 (Galvanically Isolated)	
RS485 (+)	Positive Signal
RS485 (-)	Negative Signal
RS485 GND	Circuit Ground*
PULSE INPUT	
+5V	5 V (dc) output to power external sensor
(+)	Digital Pulse Frequency Input, up to 3kHz
(-)	Digital Pulse Return
4-20mA (Galvanically Isolated)	
(+)	4 to 20mA current loop - current in to transmitter
(-)	4 to 20mA current loop - current out of transmitter*

NOTE: It is not recommended to connect isolated ground connections together or to board common.

Coil A	Low level sine wave input
Coil B	Low level sine wave input
GPI SENSOR	
Ribbon cable connection to GPI custom sensor designs	
PULSE OUTPUT (Galvanically Isolated)	
(-)	Pulse Output return current*
(+)	Pulse Output frequency output. This is a "current sinking open collector" output.***
POWER INPUT	
(-)	12-30 V (ac) or 12-36 V (dc) Input A**
(+)	12-30 V (ac) or 12-36 V (dc) Input B**

**NOTE: Polarity of voltage for AC/ DC is not important. However an earth ground isolated power supply is required to prevent earth ground loop currents and ground fault conditions.

***NOTE: This output may require an external pull up resistor if interfacing equipment does not include one.

QSB PC BOARD
Pulse Out - Open Collector Square Wave

Coil A & B
(Non-polarized)

Pulse
Input

ISOLATED PWR SUPPLY
12-36VDC / 12-30VAC, 50-60 Hz

+
- 12VDC OR 12VAC, 50-60 Hz
(POLARITY DOESNT
MATTER)

SIGNAL
+
- OPEN COLLECTOR OUTPUT
WILL REQUIRE A PULL-UP
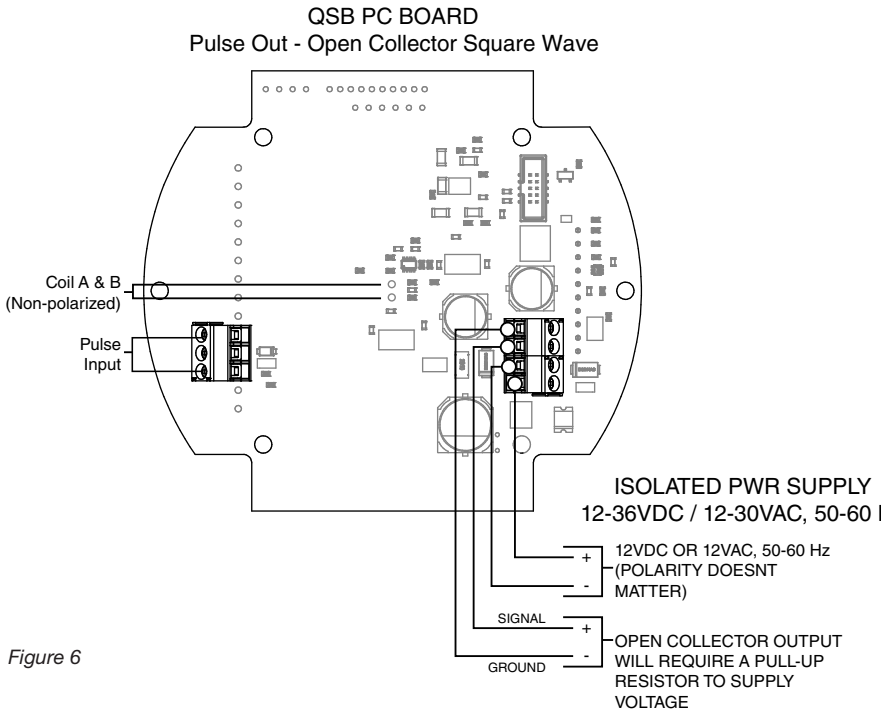RESISTOR TO SUPPLY
VOLTAGE

GROUND

Figure 6

The pulse output from the QSB provides 2500V galvanic isolation from the QSB digital circuitry to the external customer equipment. The QSB pulse output is an open collector design which requires an external pull up resistor to an external power supply. The resistance must be chosen such that the QSB will not sink more than 30mA of current. The external power supply voltage must also be less than +36VDC to prevent damage to the QSB.
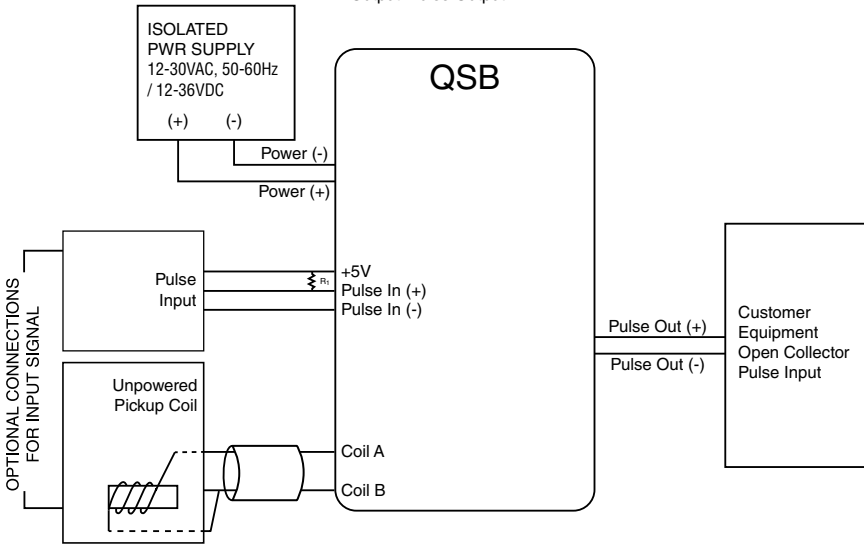
WIRING DIAGRAM

Output: Pulse Output

Figure 7

The wire gauge for the pulse output cable should be between 16 to 26 AWG to properly fit in the wire termination connector.

The pulse output ground should be properly connected to the customer equipment ground, while the pulse output signal should be properly connected to both the customer equipment pulse input and an external pull up resistor to an external supply (if the customer equipment doesn't contain the pull up resistor).

QSI VERSION 1 PC BOARD

RS-485

BTU

RTDs

RS-485
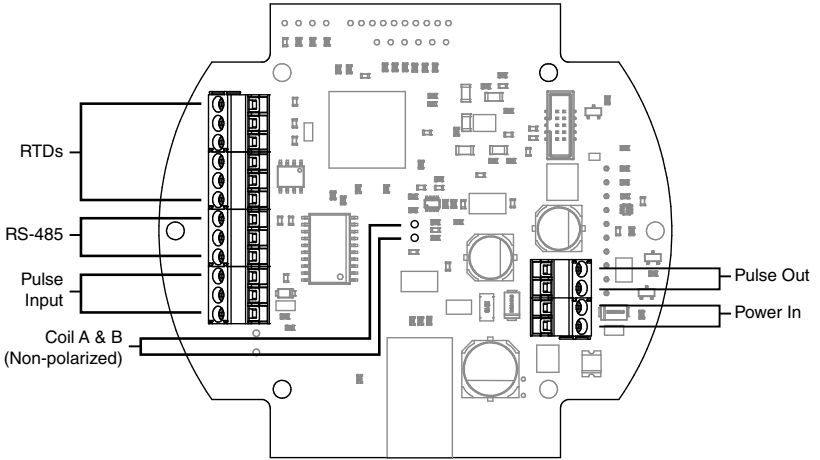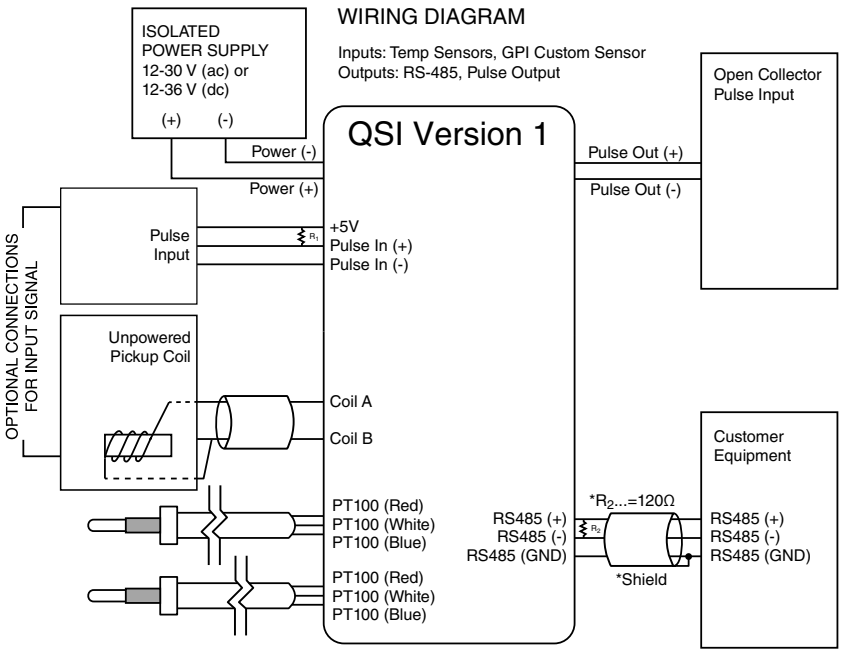
Pulse
Input

Coil A & B
(Non-polarized)

Pulse Out

Power In

Figure 8

ISOLATED
POWER SUPPLY
12-30 V (ac) or
12-36 V (dc)

(+)   (-)

WIRING DIAGRAM

Inputs: Temp Sensors, GPI Custom Sensor
Outputs: RS-485, Pulse Output

Open Collector
Pulse Input

QSI Version 1

Power (-)

Power (+)

Pulse Out (+)

Pulse Out (-)

OPTIONAL CONNECTIONS
FOR INPUT SIGNAL

Pulse
Input

R_1

+5V
Pulse In (+)
Pulse In (-)

Unpowered
Pickup Coil

Coil A

Coil B

Customer
Equipment

PT100 (Red)
PT100 (White)
PT100 (Blue)

PT100 (Red)
PT100 (White)
PT100 (Blue)

RS485 (+)
RS485 (-)
RS485 (GND)

*R_2...=120Ω

R_2

*Shield

RS485 (+)
RS485 (-)
RS485 (GND)

Figure 9

11

Pulse In
BTU

RTDs

Coil A & B
(Non-polarized)

Pulse
Input

Pulse Out

Power In

Figure 10

WIRING DIAGRAM

Inputs: Temp Sensors, GPI Custom Sensor
Outputs: Pulse Output

ISOLATED
POWER SUPPLY
12-30 V (ac) or
12-36 V (dc)

(+)   (-)

QSI Version 2

Power (-)

Power (+)

OPTIONAL CONNECTIONS
FOR INPUT SIGNAL

Pulse
Input

+5V
R_i
Pulse In (+)
Pulse In (-)

Pulse Out (+)

Pulse Out (-)

Customer
Equipment
Open Collector
Pulse Input

Unpowered
Pickup Coil

Coil A

Coil B

PT100 (Red)
PT100 (White)
PT100 (Blue)

PT100 (Red)
PT100 (White)
PT100 (Blue)

Figure 11

QSI VERSION 3 PC BOARD
4-20mA

Coil A & B (Non-polarized)

Pulse Input

4-20mA

Pulse Out

Power In
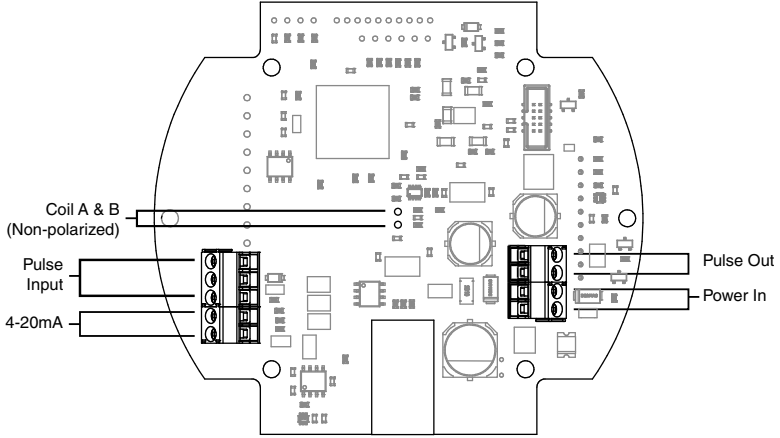
Figure 12

WIRING DIAGRAM

Inputs: GPI Custom Sensor
Outputs: 4-20mA, Pulse Outputs

ISOLATED POWER SUPPLY
12-30 V (ac) or
12-36 V (dc)

(+)   (-)

QSI Version 3

Power (-)

Power (+)

Pulse Out (+)

Customer Equipment

Pulse Out (-)

OPTIONAL CONNECTIONS FOR INPUT SIGNAL

Pulse Input

+5V
Pulse In (+)
Pulse In (-)

R_1

4-20mA (+)

Min. V = 8.5
Max. V = 36

Customer Equipment

Unpowered Pickup Coil

4-20mA (-)

Coil A

Coil B
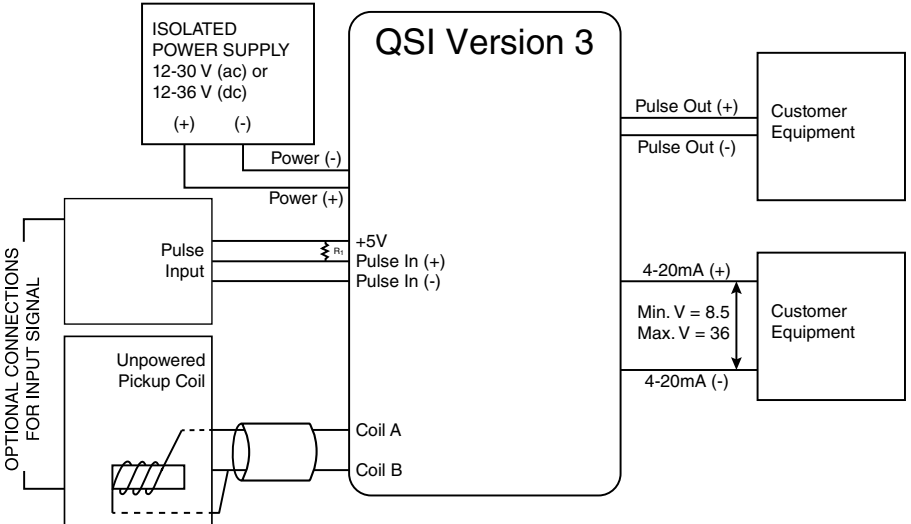
Figure 13

WIRING DIAGRAM

Customer Equipment without Built-in Power Supply
- 4-20mA Output with Separate Power Supply

ISOLATED
POWER SUPPLY
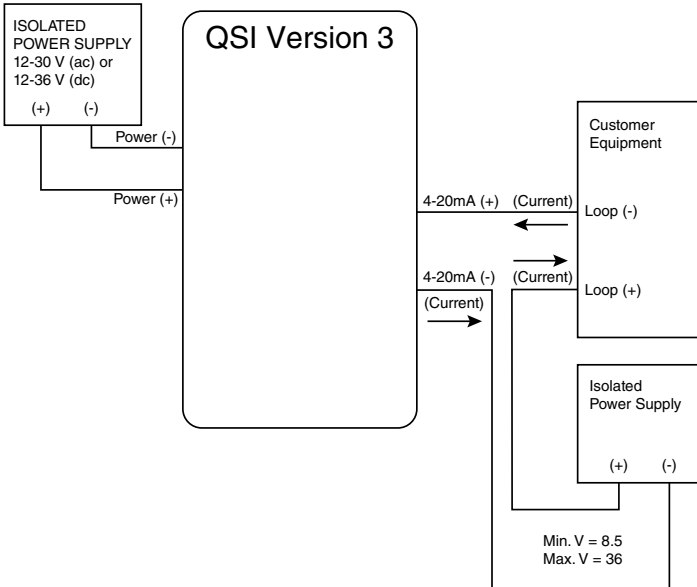12-30 V (ac) or
12-36 V (dc)

(+)   (-)

QSI Version 3

Power (-)

Power (+)

Customer
Equipment

4-20mA (+)   (Current)   Loop (-)

4-20mA (-)   (Current)   Loop (+)

(Current)

Isolated
Power Supply

(+)   (-)

Min. V = 8.5
Max. V = 36

Figure 14

14

ISOLATED POWER SUPPLY
24 V (dc)
24 V (dc) recommended for use with both
QSI & Conditioned Signal Output Module

(+)   (-)

Power (-)

WIRING DIAGRAM

**Customer Open Collector Signal Output
Into QSI Versions 1, 2 or 3**

Power (+)

Red   +9 to 35 V (dc)

Pull Up
Resistor

Terminal
Block

1

2   Black

3

4

White

Common
Ground

+5V
+
-

Pulse Input

Open Collector
Signal

-
+

Power

Figure 15

(FLOMEC *Conditioned Signal Output
Module wiring shown above. Diagram
is excerpt from module owner's
manual.)*

NOTE: *Pull up resistor shown in
FLOMEC Conditioned Signal Output
Module wiring diagram above is not
required for use with QSI Versions 1,
2, or 3. If resistor is already installed,
there is no need to remove it.*

MECHANICAL	
Cover Plate Port Threads	Female 1/2-20 UNF-2B (Compatible with PG7 thread)
Port Strain Relief	Hubble PG7
Grip Range	0.11"-0.26" (2.79 - 6.6mm)
Operation Temperature	+32°F to +140°F (0°C to +60°C)
Ambient Air Operation Temp	0°F to +140°F (-18°C to +60°C)
POWER SUPPLY	
Voltage Requirement	Min. 12 VDC or 12 VAC, 50-60 Hz
	Max. 36 VDC or 30 VAC, 50-60 Hz (higher voltage may damage unit)
MAX POWER CONSUMPTION	
QSB	50mA

To learn how to get started using the FLOMEC App, visit:

FLOMEC.net/downloads/flomec-app-quickstart.pdf
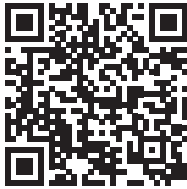
MAINTENANCE

Check cable-entry seals periodically. Tighten and/or apply sealant if needed. This is especially important in environments containing heavy concentrations of dust, oil mist, or other residue.

Check all wiring connections occasionally for oxidation or corrosion. Clean and re-seat if such conditions are noted.

If necessary, check and re-seat any connections that may have been subjected to strain (during rework or construction, for example).

REPLACING BATTERY

The QSI2 and QSI3 communications module has a 3V lithium coin cell battery installed on the PC board. In case of power failure the battery functions as power backup to maintain the internal system time. Any QSI2 or QSI3 feature that uses a time reference as part of its functionality will be immediately accurate to the current time when power is restored.

To Replace Battery:

DISCONNECT POWER TO METER

WITHOUT DISPLAY

- Remove (6) screws retaining the cover plate to the base and lift the cover plate free of the base (see Figure 16).

- Flip the cover plate over and remove (4) screws retaining the PC board assembly (see Figure 17).

- Remove and replace the coin cell battery (CR2032) on the back side of PC board (see Figure 18).

- Reverse the procedure to reassemble the cover plate to the base. Make sure the cover plate seal is seated before tightening the (6) cover plate screws.

WITH DISPLAY

On units with a display, only the display needs to be removed to replace the coin cell battery. The battery is accessible through the opening where the display is installed (see Figure 19).

- Remove (4) screws retaining the display to the cover plate. Lift the display straight up to disconnect the 10-pin bridge connector. The bridge connector could disengage from either socket connector (display or PCB assembly) or both.

- Remove and replace the coin cell battery (CR2032).

- Reverse the procedure to reassemble the display to the base. Make sure the display seal is seated before tightening the (4) display screws.
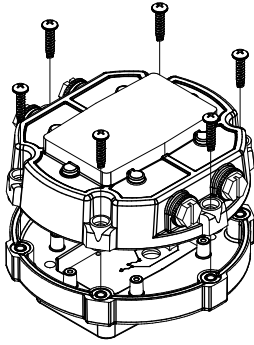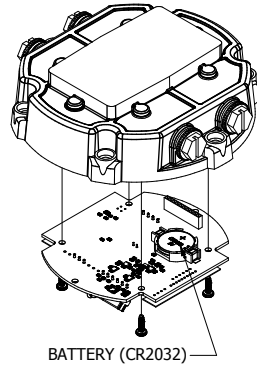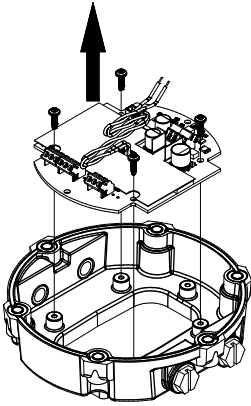
Figure 16

Figure 18

BATTERY (CR2032)

Figure 17

SCREWS (4)
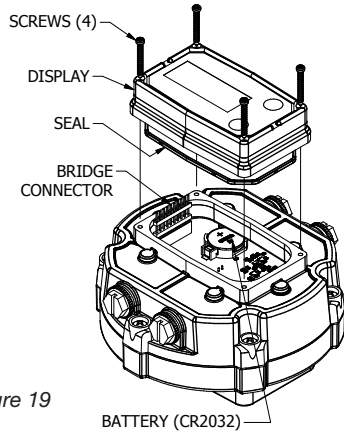
DISPLAY

SEAL

BRIDGE
CONNECTOR

Figure 19

BATTERY (CR2032)

SERVICE

For warranty consideration, contact your local distributor. If you need further assistance, contact the GPI Customer Service Department at:

1-888-996-3837

You will need to:

- Provide information from the decal on your meter.
- Receive a Return Authorization number.
- Flush any fluid from the meter before shipping to the factory.

RETURNING PARTS

Please contact the factory before returning any parts. It may be possible to diagnose the trouble and identify needed parts in a telephone call. GPI can also inform you of any special handling requirements you will need to follow covering the transportation and handling of equipment which has been used to transfer hazardous or flammable liquids.

CAUTION: Do not return equipment without specific authority from the GPI Customer Service Department. Due to strict regulations governing transportation, handling, and disposal of hazardous or flammable liquids, GPI will not accept equipment for rework unless it is completely free of liquid residue.

The Waste Electrical and Electronic Equipment (WEEE) directive (2002/96/EC) was approved by the European Parliament and the Council of the European Union in 2003. This symbol indicates that this product contains electrical and electronic equipment that may include batteries, printed circuit boards, liquid crystal displays or other components that may be subject to local disposal regulations at your location. Please understand those regulations and dispose of this product in a responsible manner.

RoHS Compliant (2011/65/EU)

This product is in compliance with the RoHS Directive of the European Parliament and of the Council on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.

Great Plains Industries, Inc. 5252 E. 36th Street North, Wichita, KS USA 67220-3205, hereby provides a limited warranty against defects in material and workmanship on all products manufactured by Great Plains Industries, Inc. This product includes a 1 year warranty. Manufacturer's sole obligation under the foregoing warranties will be limited to either, at Manufacturer's option, replacing or repairing defective Goods (subject to limitations hereinafter provided) or refunding the purchase price for such Goods theretofore paid by the Buyer, and Buyer's exclusive remedy for breach of any such warranties will be enforcement of such obligations of Manufacturer. The warranty shall extend to the purchaser of this product and to any person to whom such product is transferred during the warranty period.

The warranty period shall begin on the date of manufacture or on the date of purchase with an original sales receipt. This warranty shall not apply if:

A. the product has been altered or modified outside the warrantor's duly appointed representative;

B. the product has been subjected to neglect, misuse, abuse or damage or has been installed or operated other than in accordance with the manufacturer's operating instructions.

To make a claim against this warranty, contact the GPI Customer Service Department at

316-686-7361 or 888-996-3837. Or by mail at:
Great Plains Industries, Inc.
5252 E. 36th St. North
Wichita, KS, USA 67220-3205

The company shall, notify the customer to either send the product, transportation prepaid, to the company at its office in Wichita, Kansas, or to a duly authorized service center. The company shall perform all obligations imposed on it by the terms of this warranty within 60 days of receipt of the defective product.
GREAT PLAINS INDUSTRIES, INC., EXCLUDES LIABILITY UNDER THIS WARRANTY FOR DIRECT, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGES INCURRED IN THE USE OR LOSS OF USE OF THE PRODUCT WARRANTED HEREUNDER.
The company herewith expressly disclaims any warranty of merchantability or fitness for any particular purpose other than for which it was designed.
This warranty gives you specific rights and you may also have other rights which vary from U.S. state to U.S. state.
Note: In compliance with MAGNUSON MOSS CONSUMER WARRANTY ACT – Part 702 (governs the resale availability of the warranty terms).

$$C\,\epsilon$$

Wichita ⸳ Sydney ⸳ Mexico City   **GREAT PLAINS INDUSTRIES** /GPI®