USER'S GUIDE

Installation & Operation
Instructions

Portable Area-Velocity Flow
Meter

Model MantaRay

Manual Series A.1.1

Ùc^æ¦|ã^ÁT^æˇ¦^{ ^}oˇŠcå Á

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FFÁPæ¸o@¦}ÁÓæ¸\Á
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 Õ¦[••[]ÂÛSFHÁGÒŸÁ

Ùc^æ¦|ã^ÁT^æˇ¦^{ ^}oˇŠcåÊÁFlÍÏˇÌˇÎ¦ÌˇIÐHˇÌ̇Áæ¦^•Oˇ•c^æ¦|ã^{ ^æˇ¦^{ ^}cˇ Ð[È\Èˏ¸ˏÈc^æ¦|ã^{ ^æˇ¦^{ ^}cˇ Ð[Ë\Á

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INDEX

IMPORTANT NOTE: This instrument is manufactured and calibrated to meet product specifications. Please read this manual carefully before installation and operation. Any unauthorized repairs or modifications may result in a suspension of the warranty.

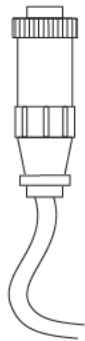*Available in Adobe Acrobat pdf format*

CONNECTIONS

Charger and IO — Sensor — USB

Plug Connector — QZ02L — Thumbdrive
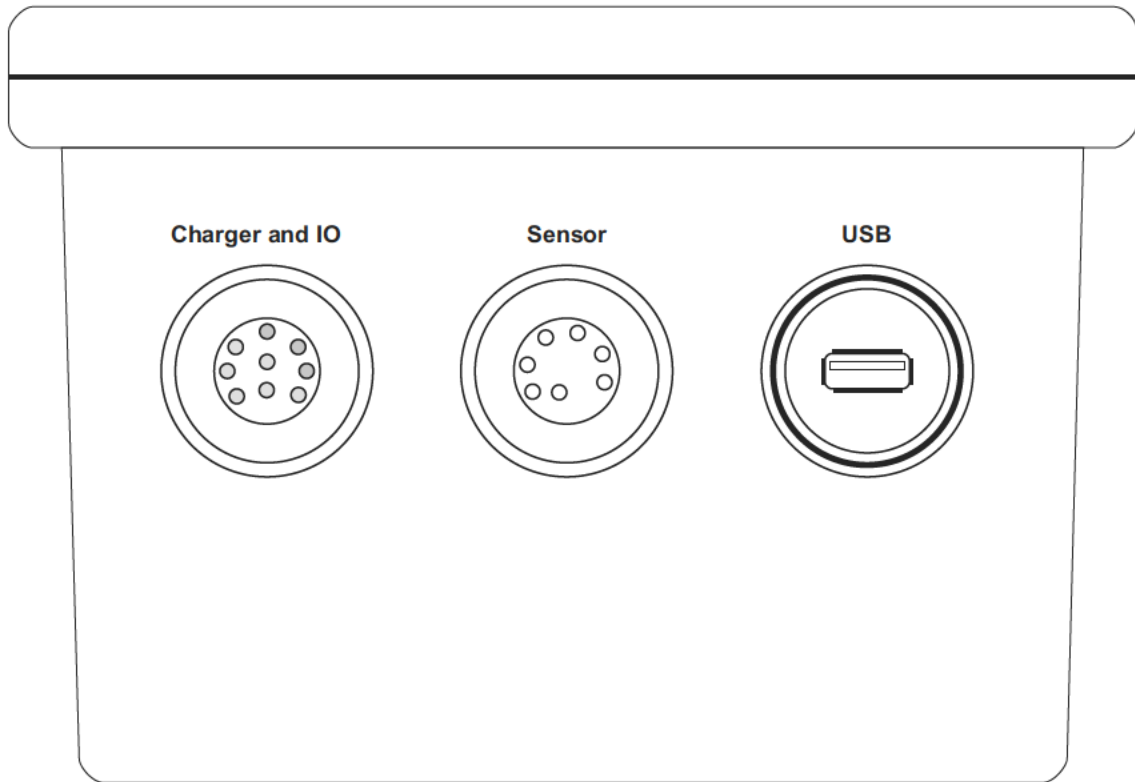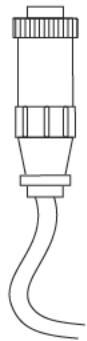
not supplied

Charger or optional Break-out Box pg. 27 — see pg. 28

KEYPAD SYSTEM

The MantaRay uses a menu system. Arrows show the four directions to leave a menu box. Pressing a corresponding keypad arrow will move to the next item in the direction shown. Move the cursor (underline) under numerals and increase or decrease numerals with the ⬆ and ⬇ keys.

To store calibration values permanently (even through power interruptions), press ✓.
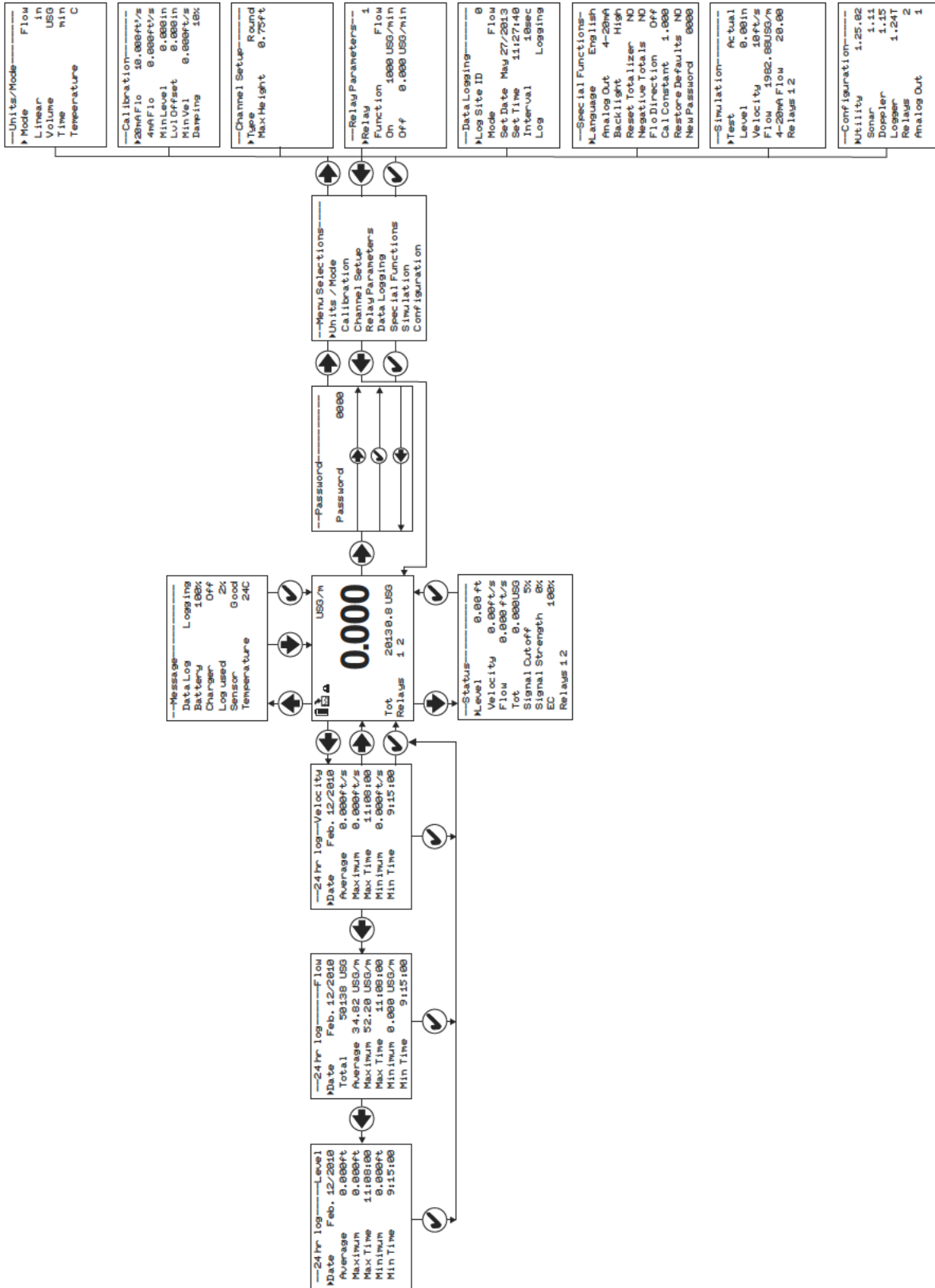
**Area Velocity
Flow Meter
MANTA RAY**
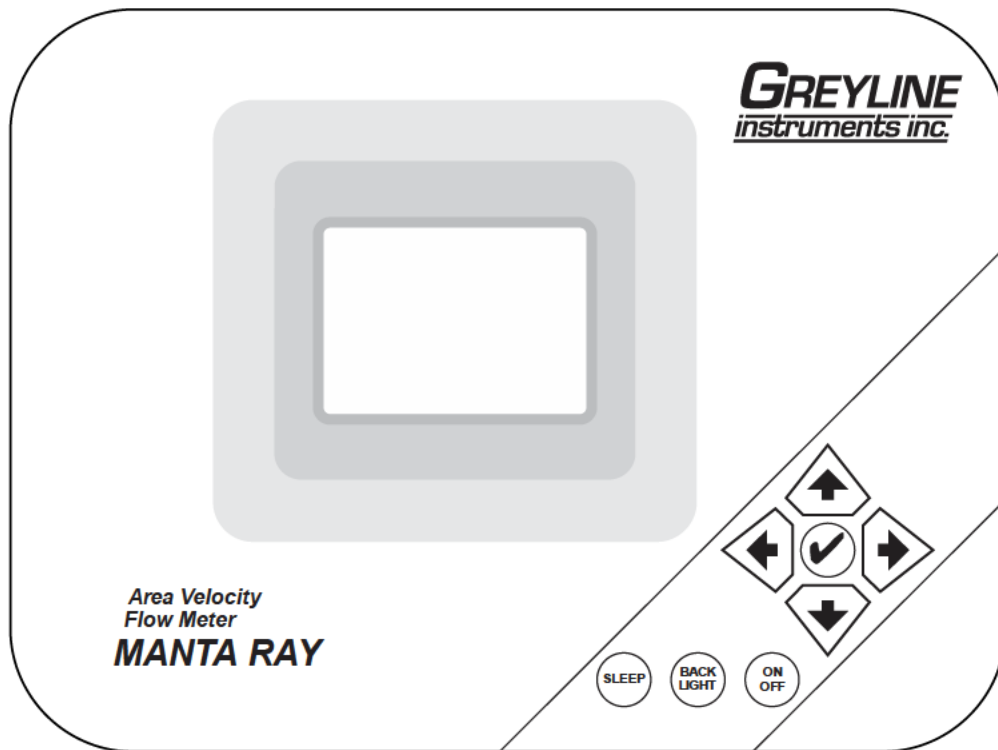
BATTERY

- A built-in rechargable NiMH battery supplies power for 48 hours continuous operation when fully charged.
- Display brightness is adjustable to conserve power.
- The MantaRay will switch off automatically when the battery is fully discharged.
- Full charge requires approximately 6 to 9 hours charging.
- Sleep mode extends battery life for long term data logging (30 days for 5 minute logging).

CHARGING BATTERY

A 16V AC-DC power module is supplied for battery charging and continuous use. Full charge requires 6-9 hours when fully drained. Solid battery icon and/or full charge adapter icon indicates when battery is fully charged.

CALIBRATION MENU

---Units/Mode---
▶Mode   Flow
Linear   in
Volume   USG
Time   min
Temperature   C

---Calibration---
▶20mAFlo 10.000ft³/s
4mAFlo   0.000ft³/s
MinLevel   0.000in
LvlOffset 0.000in
MinVel   0.000ft/s
Damping   10%

---Channel Setup---
▶Type   Round
Max Height 0.75ft

---Relay Parameters---
▶Relay   1
Function   Flow
On   1000 USG/min
Off   0.000 USG/min

---Data Logging---
▶Log Site ID   0
Mode   Flow
Set Date May 27/2013
Set Time   11:27:40
Interval   10sec
Log   Logging

---Special Functions---
▶Language   English
Analog Out   4-20mA
Backlight   High
Reset Totalizer   NO
Negative Totals   NO
Flo Direction   Off
Cal Constant   1.000
Restore Defaults NO
New Password   0000

---Simulation---
         Actual
▶Test
Level   0.00in
Velocity   10ft/s
Flow 1982.00USG/m
4-20mA Flow 20.00
Relays 1 2

---Configuration---
Utility   1.25.02
Sonar   1.11
Doppler   1.15
Logger   1.24T
Relays   2
Analog Out   1

---Menu Selections---
▶Units/Mode
Calibration
Channel Setup
Relay Parameters
Data Logging
Special Functions
Simulation
Configuration

---Password---
Password   0000

---Message---
▶Data Log   Logging
Battery   100%
Charger   Off
Log used   2%
Sensor   Good
Temperature   24C

USG/m

0.000

Tot   20130.0 USG
Relays 1 2

---Status---
▶Level   0.00 ft
Velocity 0.000ft/s
Flow   0.000ft/s
Tot   0.000USG
Signal Cutoff   0%
Signal Strength   0%
EC   100%
Relays 1 2

---24 hr log---Velocity
▶Date   Feb. 12/2010
Average   0.000ft/s
Maximum   0.000ft/s
Max Time   11:08:00
Minimum   0.000ft/s
Min Time   9:15:00

---24 hr log---Flow
▶Date   Feb. 12/2010
Total   50130 USG
Average 34.82 USG/m
Maximum 52.20 USG/m
Max Time   11:08:00
Minimum 0.000 USG/m
Min Time   9:15:00

---24 hr log---Level
▶Date   Feb. 12/2010
Average   0.000ft
Maximum   0.000ft
Max Time   11:08:00
Minimum   0.000ft
Min Time   9:15:00

ICONS

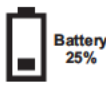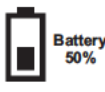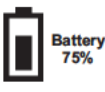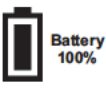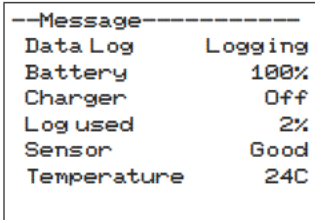|	
1.　 2.	Message waiting. Press ⬆.
	Data logging <u>off</u>.
1.　 2.	Data logging <u>on</u>.
1. , 2. , 3. , 4.	USB file download.
	File download completed.
	Download Error.
1.　 2.　 3.	Echo OK.
	No Echo.
Battery 0%　Battery 25%　Battery 50%　Battery 75%　Battery 100%	Battery status / charging icon.
	External Battery Source.
	Full charge powered by 16V adapter.
Z　Z^Z　Z^{Z^Z}	Sleep mode icon indicates that MantaRay is running in sleep mode. The icon appears only during the wake cycle when the display is fully lit.
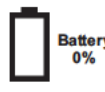
```
⬛🔜⌂              USG/m

    0.000
Tot        20130.8 USG
Relays    1 2
```
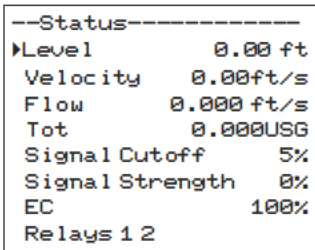
MAIN DISPLAY

The main display shows the units selected from the `Units/Mode` menu, Flow or Velocity rate being measured, TOTALIZER and RELAY states. The MantaRay will start-up with this display.

```
--Message----------
Data Log      Logging
Battery          100%
Charger           Off
Log used           2%
Sensor           Good
Temperature       24C
```

MESSAGE ICON

Press ⬆ from the main display to view temperature measurement, status of the data logger battery and error/warning messages provided by the instrument. The Message Icon will appear on the main display if error messages are being generated by the instrument. Press ✓ to return to the main display.

```
--Status-----------
▶Level         0.00 ft
 Velocity    0.00ft/s
 Flow       0.000 ft/s
 Tot        0.000USG
 Signal Cutoff      5%
 Signal Strength    0%
 EC               100%
 Relays 1 2
```

STATUS

Press ⬇ from the MAIN display to view instrument status.

`Velocity`	Will be displayed in `ft/sec` or `m/sec`.
`Level`	Is displayed in the selected units.
`Tot`	Displays the current totalizer reading.
`Signal Cutoff`	Adjust the setting in percent to suppress flow readings at zero flow when fluid swirling or pipe vibration may cause the instrument to continue reading. Example: `Signal Cutoff` at `5%` will force the display and outputs to zero when signal strength drops below 5%.
`Signal Strength`	Displays percentage of signal being received by the ultrasonic sensor.
`EC`	Displays level measurement Echo Confidence
`Relays 1 2`	Energized relays will display with reversed font eg: ⬛2

```
--24 hr log------Flow
▶Date      Feb. 12/2010
 Total        50138 USG
 Average   34.82 USG/m
 Maximum   52.20 USG/m
 Max Time    11:08:00
 Minimum   0.000 USG/m
 Min Time     9:15:00
```

```
--Password----------

 Password        0000
       ➡
       ✔
       ⬅
```

24 HR LOG

Press ⬅ from the MAIN display to view a formatted flow report from instruments with a built-in data logger. Press ⬅ to pan through `Level`, `Velocity` and `Flow` summaries. Press ⬇ to scroll down one day or repeatedly to scroll to a specific date. Up to 365 days can be stored. Newest date will overwrite the oldest. Press ✓ to return to the main display.

PASSWORD

The `Password` (a number from 0000 to 9999) prevents unauthorized access to the `Calibration` menu.

From the Main display press ➡ to get to `Password`. Factory default password is 0000 and if it has not been changed press ✓ to proceed to the `Menu Selections` screen.

If a password is required, press ➡ to place the cursor under the first digit and ⬇ or ⬆ to set the number, then ➡ to the second digit, etc. Press ➡ or ✓ to proceed to the `Menu Selections` screen.

A new password can be stored by going to `Special Functions/New Password.`

```
--Units/Mode--------
▶Mode          Flow
 Linear          in
 Volume         USG
 Time           min
 Temperature      C
```

```
--Units/Mode--------
 Mode          Flow
▶Linear         [in]
                 ft
                  m
                 mm
```

```
--Units/Mode--------
 Mode
 Linear
▶Volume        [USG]
               ft3
               bbl
                 L
                m3
               IMG
                IG
              USMG
```

```
--Units/Mode--------
 Mode          Flow
 Linear          in
 Volume         USG
▶Time          [sec]
                day
                 hr
                min
```

```
--Units/Mode--------
 Mode          Flow
 Linear          in
 Volume         USG
 Time           min
▶Temperature    [C]
                  F
```

UNITS/MODE

From ▶Mode press the ➡ and then the ⬆ or ⬇ to select Flow, Velocity or Level. Flow mode displays the flow rate in engineering units (e.g. gpm, litres/sec, etc.) Press the ✓ to store your selection then the ⬇ to the next menu item.

From ▶Linear press the ➡ key and then the ⬆ or ⬇ to select your units of measurement. Press the ✓ to store your selection.

Press the ⬇ key to move the ▶ symbol to each subsequent menu item and the ✓ to save your selections.

Note: the volume selection "bbl" denotes U.S. barrels.

▶ Temperature press ➡ then ⬆ ⬇ to select C or F.

Press ⬅ or ✓ to return to the Menu Selections screen.

```
--Calibration-------
▸20mA Flo    10.000ft³/s
 4mA Flo      0.000ft³/s
 Min Level    0.000in
 Lvl Offset   0.000in
 Min Vel      0.000ft/s
 Damping        10%
```

CALIBRATION

Press ⬇ to `Calibration` and ➡ to enter. Use ⬇ or ⬆ to position ▸ before each menu item and ➡ to enter. When settings are completed press ✓ to store and return to the Calibration menu.

`20mA Flo`
[5V Flo]
[OFF]

Press ➡ and enter the flow rate value for 20mA.

Note: Analogue output can be selected as 4-20mA or 0-5V in Special Functions.

`4mA Flo`
[0V Flo]
[OFF]

Press ➡ and enter the flow rate value for 4mA.

`Lvl Offset`

Optional for QZ02L sensor (use for mud or silt conditions). Press ➡ and enter an offset to level measurement. Set to 0.00 when sensor mounted on floor of channel. When sensor is mounted above the floor of the channel enter the distance between channel floor and bottom of sensor. Maximum offset is ± 36" (914 mm).

Note: 4mA is not affected by `Lvl Offset` settings. 4mA is the bottom of the channel or pipe.
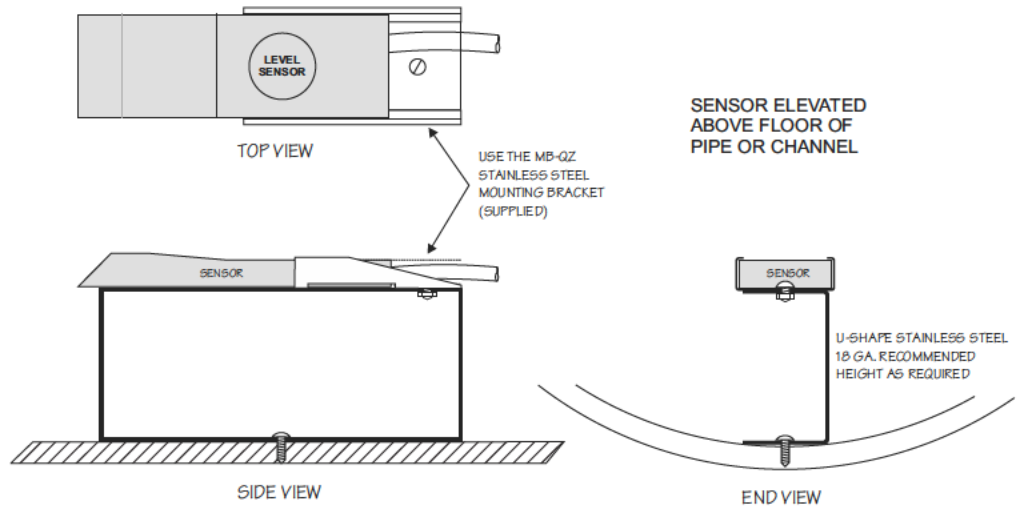
`Min Vel`

Press ➡ and enter a minimum velocity cutoff. Forward and reverse velocities less than `Min Vel` will be forced to zero.

`Damping`

Increase damping to stabilize readings under turbulent flow readings or to reject spurious level readings. Decrease for faster response to changes in flow.

Press ✓ from the `Calibration` display to return to Menu Selections.

```
--Channel Setup------
▶Type          Round
 Max Height   0.75ft
```

CHANNEL SETUP

Round   Select `Round` for open pipes. Set `Max Height` to the inner diameter of the pipe.

Rectangle   Select `Rectangle` for rectangular channels. Enter the channel width.

Trapezoid   Select `Trapezoid` for trapezoidal shaped channels. Specify the `Width` and `Slope` of the channel as shown in the following illustration.

$$SLOPE = \frac{x}{y}$$

TRAPEZOIDAL
CHANNEL

x
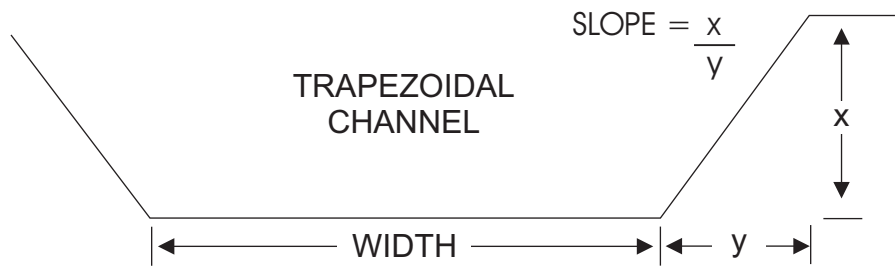
← WIDTH → ← y →

Egg   Select `Egg` for Egg shaped channels. Enter the `Max Height` of the channel.

R

2R

HEIGHT
= 3R

3R

R/2
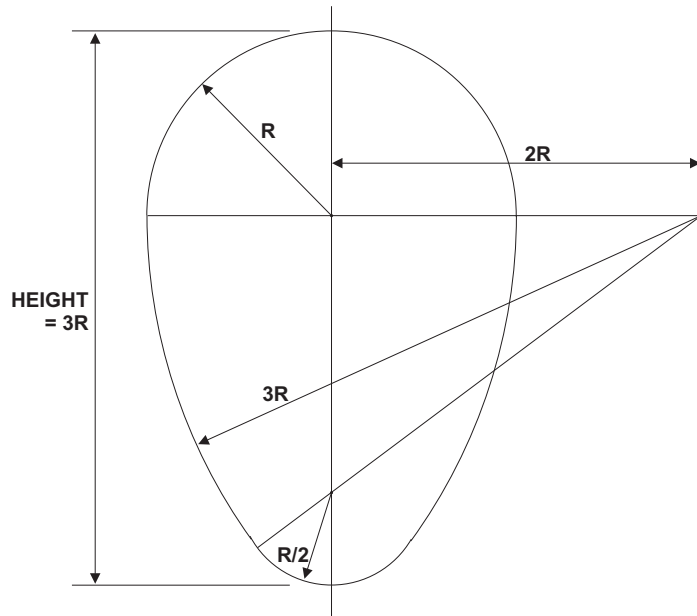
```
--Custom Channel-----
▶Type          Custom
 Reset Data        No
 Max Height   0.75 ft
 Division     0.05 ft
 Increment #        0
 Width       0.000 ft
 Level       0.000 ft
```
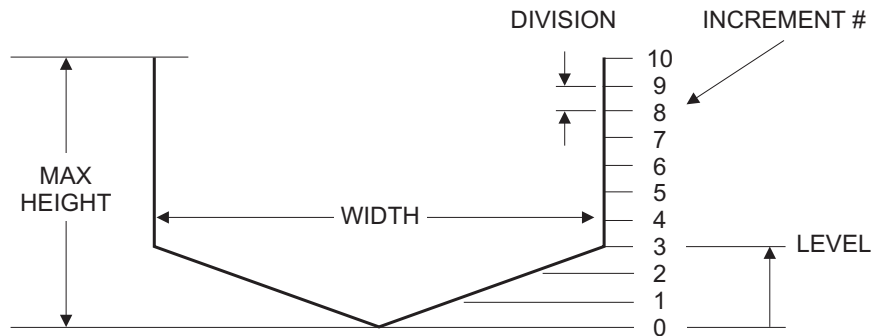
CUSTOM CHANNELS

Reset Data   Old data <u>MUST</u> be removed before entering data for a new channel. Press ➡ then press ⬆ to Yes and press ✓ to clear old data.

Max Height   Enter the maximum height of the channel.

Division   Divide the maximum height into equal increments (maximum of 40) and enter this division value (example 1", 1 cm etc.)

Increment #   Enter the increment number if you want to edit a previous entry or to skip entering widths for some levels (Note: The custom channel will interpolate widths between entry points).

Width   Enter the measured width of the channel at the level shown (Note: To enter 0 width you must press ➡ and then ✓ to store a 0 width data point).

Level   Displays the level of the channel for each increment and width entry.

<u>Note</u>:

Custom channel data in equal width increments with variable height measurements must be converted to the format shown above using the "Channel Data Translator" PC software.

```
--Relay Parameters--
▶Relay            1
 Function      Flow
 On       1000 USG
 Off     0.000 USG
```

RELAY PARAMETERS

Relay   Press ➡ and ⬇ or ⬆ to select a relay (2 relays).

Function   Press ⬇ or ⬆ to select `Off, Pulse, Flow,`
                  `Velocity` or `Level`.

      Flow

          On Position the cursor under the numerals and press ⬇ or ⬆ to set digits to the relay `On` set point.

       Off set digits to the `Off` set point.

    Pulse Press ⬇ and set digits to the flow volume per relay pulse. Use this feature for remote samplers, chlorinators or totalizers. Minimum time between pulses is 2.25 seconds and pulse duration is 350 milliseconds.

                  Return to `Relay` and enter settings for each relay.

    Velocity

          On Position the cursor under the numerals and press ⬇ or ⬆ to set digits to the relay `On` set point.

       Off set digits to the `Off` set point.

    Level

          On Position the cursor under the numerals and press ⬇ or ⬆ to set digits to the relay `On` set point.

       Off set digits to the `Off` set point.

       LOE mode Specify the state of the relay for loss of echo condition: `Off, On` or `Hold`.

                  Press ✓ to return to `Menu Selections`

```
--Data Logging-------
▶Log Site ID       00
                   99
 Mode           Flow
            Velocity
 Set Date Feb 18/2008
          Mar 19/2009
 Set Time    11:27:40
             12:28:41
 Interval      10sec
               60min
               30min
               15min
               10min
                5min
                2min
                1min
               30sec
 Log            Stop
               Start
              Delete
```

DATA LOGGING

Setup

Select Data Logging from Menu Selections.

Log Site ID   Enter a number from 00 to 99. The site ID will become part of the downloaded file name to help distinguish downloads from different instruments.
Press ✓ to store the setting.

Mode   Select Velocity, LVT, Level or Flow.
Press ✓ to store the setting.

Set Date   Press ⬆ or ⬇ to scroll and select Month, Day and Year.
Press ✓ to store the setting.

Set Time   Press ⬆ or ⬇ to select the current time in Hours, Minutes and Seconds.
Press ✓ to store the setting.

Interval   Press ⬆ or ⬇ to select the logging interval.
Press ✓ to store the setting.

Log   Stop, Start or Delete the log file.
Press ⬆ or ⬇ to Delete and ✓ to delete the log file.
Press ⬆ or ⬇ to Start and ✓ to start the logger.

Note: You <u>MUST</u> delete old log and start a new log <u>AFTER</u> having set changes to Log Site ID, Mode and/or Interval for those changes to be applied to the log file.

View 24-hr formatted Reports on the MantaRay display. Press ⬅ from the MAIN display to view a formatted flow report from instruments with a built-in data logger. Press ⬅ to pan through Level, Velocity and Flow summaries. Press ⬇ to scroll down one day or repeatedly to scroll to a specific date. Up to 365 days can be stored. Newest date will overwrite the oldest. Press ✓ to return to the main display.

RETRIEVE LOG FILE

Plug a USB Flash Memory Drive (not supplied by Greyline) into the USB output cable from the instrument. The instrument display will show the USB file download icon until the log file is transferred to the memory card and then display file download completed icon. The USB flash drive may be removed.

Download file names will appear in this format:

```
AVFM_ _00A.LOG
```
MODEL   TAG DOWNLOAD

Tag is set according to the `Log Site ID` entered in the instrument Data Logging menu.

Download letter will be A for the first download from an instrument. B for the second, then C etc. At the letter Z a - character will appear indicating that the maximum number of downloads for that instrument are on the USB flash drive. Older files can be erased or moved from the flash memory drive or a new memory drive can be used.

OPENING LOG FILES

Install Greyline Logger on your PC or laptop. Refer to the Help menu in the program for detailed instructions.

Select File/Open/Instrument Log (.log) to open the log file from your USB flash drive.

SPECIAL FUNCTIONS

```
--Special Functions-
▶Language     English
 Analog Out    4-20mA
 Backlight       High
 Reset Totalizer   NO
 Negative Totals   NO
 Flo Direction    Off
 Cal Constant   1.000
 Restore Defaults  NO
 New Password    0000
```

```
--Special Functions-
 Language     English
▶Backlight       High
                Medium
                  Low
              Key Hi/Lo
              Key High
               Key Med
               Key Low
                  Off
```

Language	Select `English`, `French` or `Spanish`
Analog Out	Select 4-20mA, 0-5V or OFF mode for the analog output.
Backlight	Select `High`, `Medium` or `Low` for continuous backlight.
	Select `Key Hi/Lo` for high backlight (for 1 minute) after a keypress and then `Lo` backlight until a key is pressed again.
	Select `Key High`, `Med` or `Low` for backlight after a keypress and then backlight off until a key is pressed again.
Reset Totalizer	Press ➡ and select `Yes` to erase and restart the totalizer at zero.
Negative Totals	Select `Yes` to have reverse flow readings deducted from the totalizer. Select `No` to totalize forward flow only and ignore reverse flow.
Flo Direction	Select `On` to enable flow direction measurement. Select `Off` to disable flow direction measurement. Select `Invert` to invert the sense of the flow measurement.
Cal Constant	Scales the velocity (& Flow) reading. Set to 1.000 for QZ02L sensor.
Restore Defaults	Select `Yes` and press ✓ to erase all user settings and return the instrument to factory default settings.
New Password	Select any number from `0000` to `9999` and press ✓. Default setting of 0000 will allow direct access to the calibration menus. Setting of any password greater than 0000 will require the password to be entered to access the calibration menus.

Press ✓ to return to `Menu Selections`.

```
--Simulation--------
▶Test         Actual
 Level        0.00in
 Velocity     10ft/s
 Flow   1982.88USG/m
 4-20mAFlow    20.00
 Relays 1 2
```

SIMULATION

Exercises the 4-20mA (0-5V) outputs, digital display and control relays.

Test   Select `Maximum` and press ✓ to simulate maximum Flow, Level and Velocity and to output 20mA (5V) to the analog channels.

Select `Minimum` and press ✓ to simulate minimum Flow, Level and Velocity and to output 4mA (0V) to the analog channels.

To simulate an intermediate Flow, Level and Velocity set `Test` to `Actual` and then enter a value for the `Level` and `Velocity`. The Flow calculation, analog outputs and control relays will respond to the simulated values.

INSTALLATION - SENSOR LOCATION

1. Choose a sensor mounting location where silt or deposits are least likely to accumulate.

2. For best results flow should be evenly distributed across the channel and relatively free of turbulence. (The MantaRay is very effective at averaging level and velocity readings in turbulent conditions, but best accuracy and response time is achieved with evenly distributed flow.)

3. Avoid vertical drops, obstructions or elbows immediately up and downstream from the sensor. Locate the QZ02L sensor at least 10 times maximum Head (level) and 10 times the channel width from these flow disturbances.

4. The QZ02L submerged level-velocity sensor requires a minimum water level of 1 in. (25.4 mm).

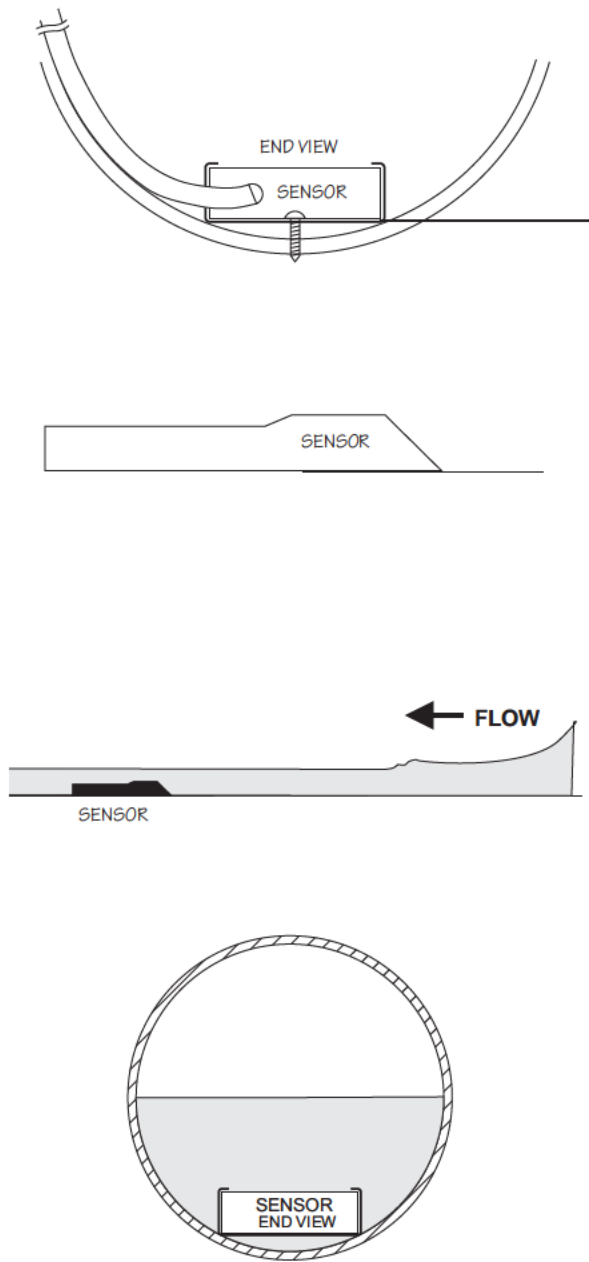## QZ02L VELOCITY-LEVEL SENSOR MOUNTING

Mount the QZ02L sensor with the stainless steel bracket and hardware supplied. Ensure that the sensor is parallel to the water surface (check with a level). Mount with the tapered end of the sensor pointing upstream and the sensor cable pointing downstream.

Clip or tie wrap the sensor cable securely to the pipe or channel wall.
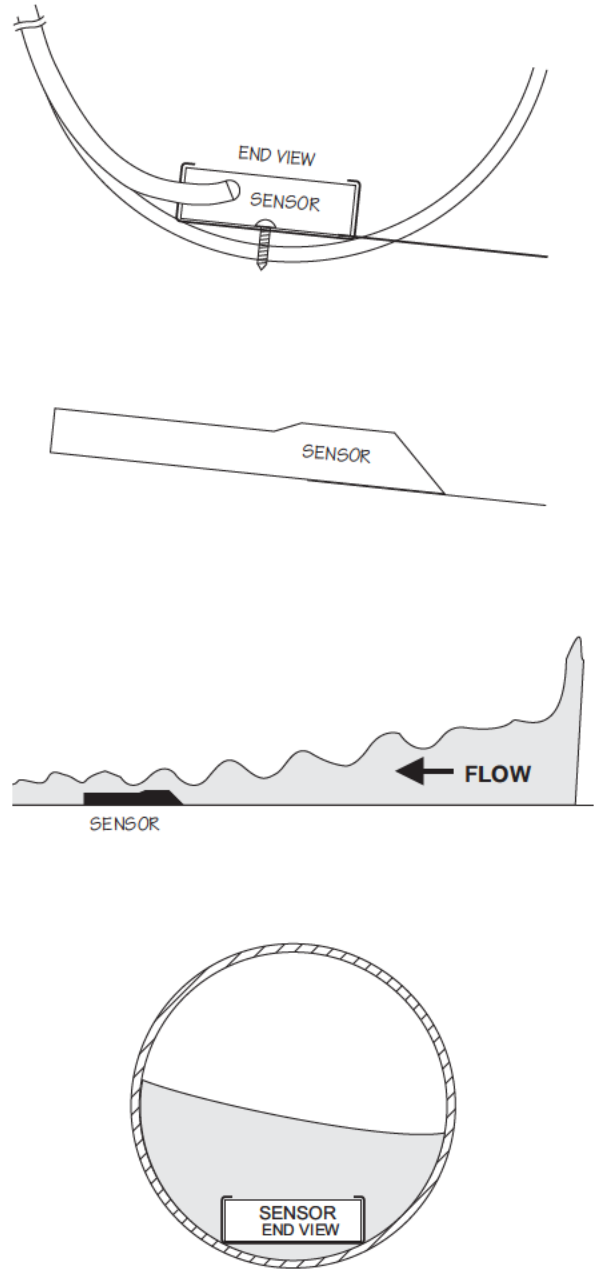
Note: The mounting bracket is designed to release the sensor if weeds or rags are caught by the sensor.

GOOD

BAD

END VIEW

SENSOR

SENSOR

SENSOR

FLOW

SENSOR

END VIEW

SENSOR

SENSOR

SENSOR

FLOW
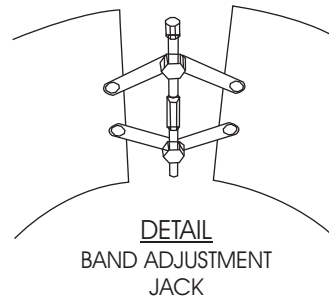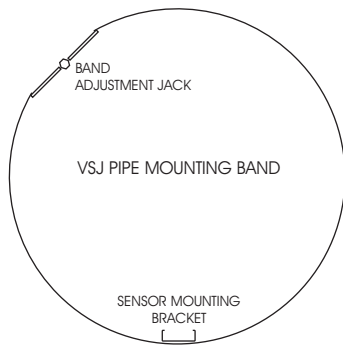
SENSOR

SENSOR
END VIEW
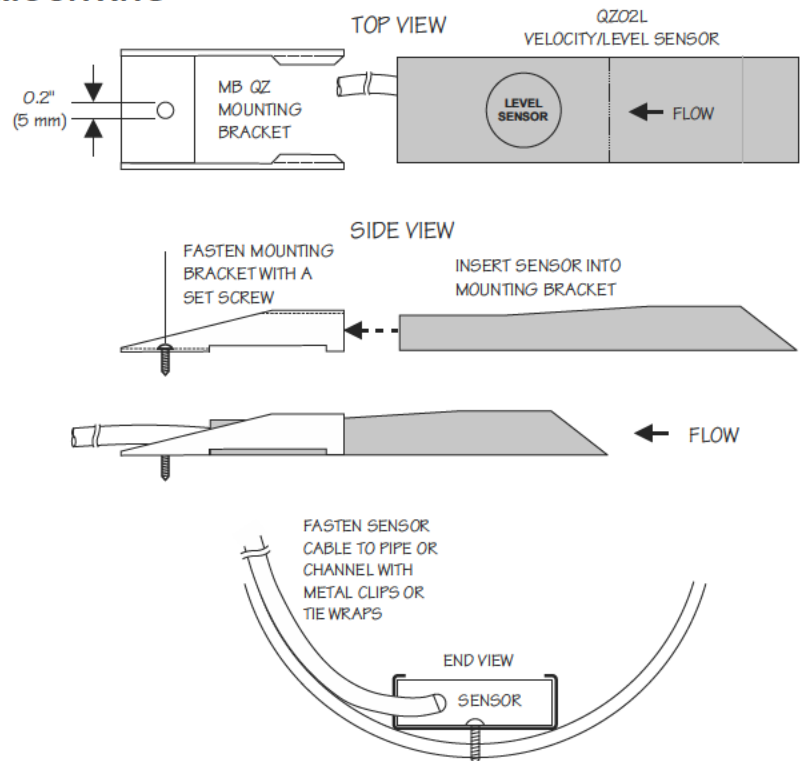
SENSOR
END VIEW

OPTIONAL PIPE BAND MOUNTING WITH QZ02L SENSOR

Install the stainless steel pipe band with the sensor mounting bracket at the invert (bottom) of the pipe. Ensure that the sensor bracket is parallel to the water surface (check with a level). Mount so the tapered end of the sensor will point upstream and the sensor cable will point downstream. (Turn the ¼" adjustment nut clockwise to expand the bracket and secure to the pipe wall by friction fit.)
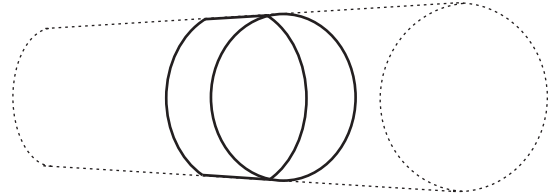
Insert the sensor into the mounting bracket and tie-wrap the sensor cable securely to the pipe band using the holes provided.
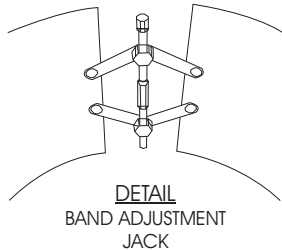
BAND
ADJUSTMENT JACK

VSJ PIPE MOUNTING BAND

SENSOR MOUNTING
BRACKET

DETAIL
BAND ADJUSTMENT
JACK

OPTIONAL QZ02L-DP VELOCITY SENSOR MOUNTING

Mount the velocity sensor at or near the bottom of the channel or pipe in a position where it will be continuously submerged. The QZ02L-DP velocity sensor does not have to be parallel to the water surface. Position where silt or solids will not build-up on the sensor.

CLEANING

Cleaning is not required as a part of normal maintenance.

SS PIPE MOUNTING BAND – OPTION VSJ

DETAIL
BAND ADJUSTMENT
JACK

Use optional VSJ stainless steel Pipe Mounting Bands for easy Sensor installation in round pipes.

Each Pipe Band includes:

🖉 Band Adjustment Jack allowing ±0.5" (13 mm) adjustment from the nominal band size
🖉 Stainless steel bracket for Sensor mounting
🖉 Pre-drilled for tie wraps (included) to secure Sensor cable

BAND ADJUSTMENT JACK

VSJ PIPE MOUNTING BAND

SENSOR MOUNTING BRACKET
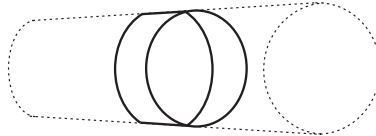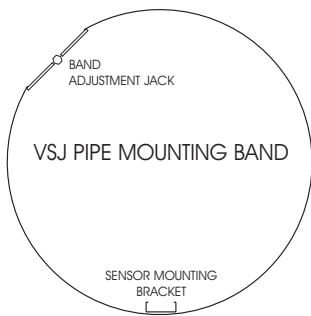
CODE	BAND SIZE
VSJ6	6"/150 mm ID pipes
VSJ8	8"/200 mm ID pipes
VSJ10	10"/250 mm ID pipes
VSJ12	12"/300 mm ID pipes
VSJ14	14"/350 mm ID pipes
VSJ15	15"/375 mm ID pipes
VSJ16	16"/400 mm ID pipes
VSJ18	18"/450 mm ID pipes
VSJ20	20"/500 mm ID pipes
VSJ24	24"/600 mm ID pipes
VSJ30	30"/750 mm ID pipes

END BRACKET

VSJ HALF-PIPE MOUNTING BAND

FLOW
ADJUSTMENT JACK
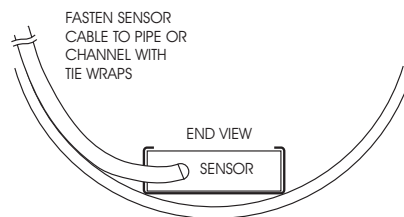SENSOR MOUNTING BRACKET
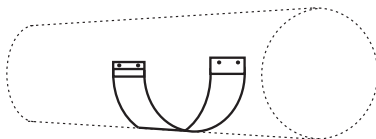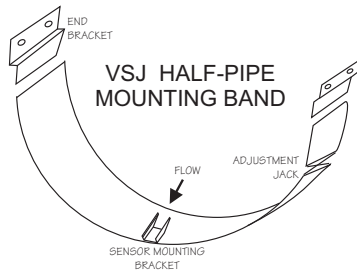
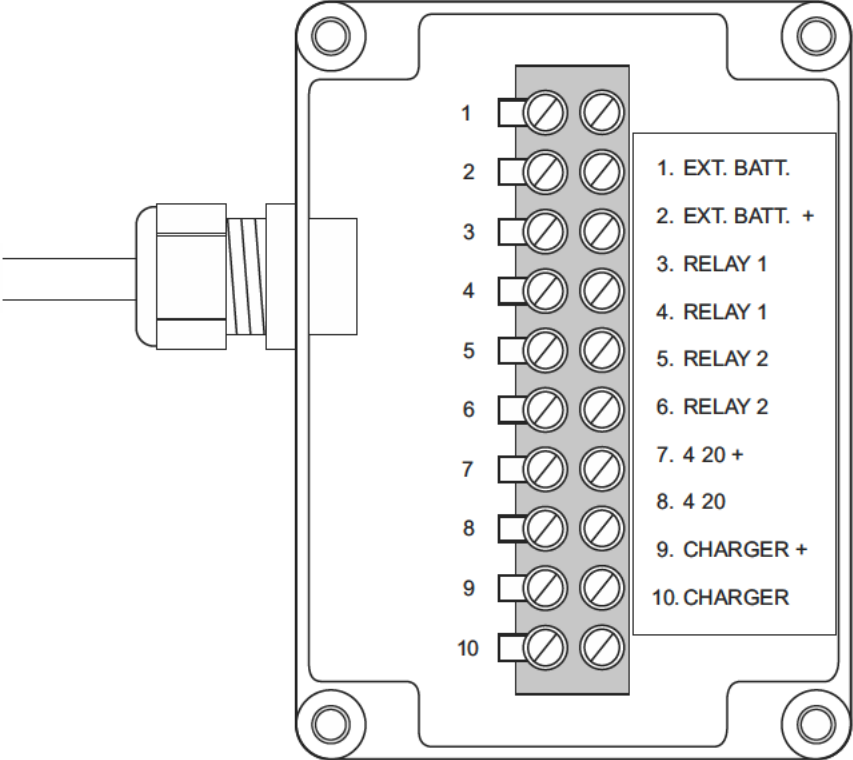| VSJ32-40 | 32-40" / 800-1000 mm ID pipes |
| VSJ42-54 | 42-54" / 1100-1375 mm ID pipes |
| VSJ56-72 | 56-72" / 1400-1800 mm ID pipes |

Mounting Instructions:

Install the stainless steel pipe band with the sensor mounting bracket at the invert (bottom) of the pipe. Ensure that the sensor bracket is parallel to the water surface (check with a level). Mount so the tapered end of the sensor will point upstream and the sensor cable will point downstream. Turn the ¼" adjusting nut clockwise to expand the bracket and secure to the pipe wall by friction fit.

Insert the sensor into the mounting bracket and tie wrap the sensor cable securely to the stainless steel pipe band.

FASTEN SENSOR CABLE TO PIPE OR CHANNEL WITH TIE WRAPS

END VIEW
SENSOR

BREAK-OUT BOX

1. EXT. BATT.
2. EXT. BATT. +
3. RELAY 1
4. RELAY 1
5. RELAY 2
6. RELAY 2
7. 4 20 +
8. 4 20
9. CHARGER +
10. CHARGER

NEMA 4X / IP66
DUST TIGHT / SPLASH PROOF

SPECIFICATIONS

Channel Types:	Round pipe, Rectangular, trapezoid, egg or custom shapes
Electronics Enclosure:	Watertight, airtight, dust proof (IP 67) polycarbonate
Operating Temp. (Electronics):	-5° to 140°F (-20° to 60°C)
Accuracy:	Level: ±0.25% of Range. Velocity: ±2% of Reading. Repeatability and Linearity: ±0.1%
Display:	White, backlit matrix - displays flow rate, totalizer, relay states, operating mode and calibration menu
Programming:	built-in 5-key calibrator with English, French or Spanish language selection
Battery:	internal rechargeable NiMH, 12VDC, 10,000 mAh
Battery Charger:	4.2A (70W Max), 100-240VAC 50/60Hz input, UL and CE listed
Outputs/Communications:	4-20mA, 500 ohm or 0-5VDC (100 mA) by menu selection 2 solid-state Relays, 32V AC/DC max., rated 400mA; programmable for flow proportional pulse (sampler/totalizer), flow and/or level alarm
Breakout Box:	Connections for charger input, external battery input, 2 relays, 4-20mA (0-5V)
Electrical Surge Protection:	Sensor, 4-20mA outputs and AC power input
Data Logger:	Programmable 2-million point data capacity, time and date stamped plus formatted flow reports including Total, Average, Minimum, Maximum and times of occurrence. Includes USB output to Flash Drives
Logger Intervals:	programmable 10, 30 sec, 1, 2, 5, 10, 15, 30, 60 min
Software:	Greyline Logger for Windows. Graph and data table presentation, level/velocity to flow conversion, exports data to Excel™, exports graphs
Approximate Shipping Weight:	15 lbs. (6.8 kg)

Velocity/Level Sensor QZ02L

Velocity Measurement Range:	0.1 to 10 ft/sec (0.03 to 3.05 m/sec)
Level Measurement Range:	Minimum Head: 1 in (25.4 mm). Maximum Head: 15 ft. (4.5 m)
Operating Temperature:	5 to 150°F (-15 to 65°C)
Exposed Materials:	PVC, polyurethane, epoxy
Sensor Cable:	25 ft. (7.6 m) submersible polyurethane jacket, shielded, 3 coaxial
Sensor Mounting:	includes MB-QZ stainless steel mounting bracket
Temperature Compensation:	Automatic, continuous