**Scope**

This manual contains information concerning the installation, operation and maintenance of the Vantage 2210/2220. To ensure proper performance of the unit, the instructions should be thoroughly understood and followed.

**Keep the manual in a readily accessible location for future reference.**

Changes and additions to the original edition of this manual will be covered by a "CHANGE NOTICE" supplied with the manual. The change notice will identify the sections in this manual where the changes have occurred.

# Vantage 2210/2220
# Table of Contents

# General Specifications

| | |
|---|---|
| Span Range | FB4: 0 to 30 feet. Maximum total range including offset distance is 31 feet. Minimum offset 1 foot.<br>FB2: 0 to 15 feet. Maximum total range including offset distance is 16 feet. Minimum offset 1 foot.<br>FB3: 0 to 50 feet. Maximum total range including offset distance is 52 feet. Minimum offset 2 feet. |
| Outputs | 4-20 mADC isolated; 1000 ohms max.<br><br>Five programmable relays, SPDT .25 amp @ 120 VAC, .5 amp @ 24 VDC.<br><br>RS-232 Serial Port, 9600 – 36500 Baud, Modbus™ Protocol<br><br>RS-485 Serial Port optically isolated, Modbus™ Protocol (2220 only) |
| Display | 4 line, 20 character per line backlit LCD display. |
| Programming | Front panel mounted 16 button keypad. |
| Power | 90/240 VAC, 50/60 Hz, or 12 VDC @ 150 mA continuous. |
| Accuracy | FB4: +/−0.02" or +/−0.05% of target distance<br>FB2: +/- 0.02" or +/−0.05% of target distance<br>FB3: +/−0.08" or +/−0.1% of target distance |
| Sensors | **FB4:**<br>  Temperature Range:  -20° to 160° F (-30° to 70° C) 50 kHz<br>  Operating Frequency:  60 KHz<br>  Beam Angle:  6° included at -3dB Boundary<br>  Housing:  PVC body, PVC cap<br>  Cable:  2 twisted pair, foil shielded, standard lengths of 32 feet (10 meters) or 65 feet (20 meters). May splice up to 1000 ft maximum of Belden 8728 or equal<br><br>**FB2:**<br>  Temperature Range:  -20° to 160° F (-30° to 70° C) 50 kHz<br>  Operating Frequency:  51 KHz<br>  Beam Angle:  8° included at -3dB Boundary<br>  Housing:  Tefzel™ body, Teflon™ cap<br>  Cable:  2 twisted pair, foil shielded, standard lengths of 32 feet (10 meters) or 65 feet (20 meters). May splice up to 1000 ft maximum of Belden 8728 or equal<br><br>**FB3:**<br>  Temperature Range:  -40° to 200° F (-40° to 90° C) 30 kHz<br>  Operating Frequency:  30 KHz<br>  Beam Angle:  14° included at −3dB Boundary<br>  Housing:  Glass filled polyester / Glass reinforced epoxy face<br>  Cable:  100 feet of 2 twisted pair, foil shielded. May splice up to 300 ft maximum of Belden 8728 or equal.<br>**\*Cable lengths over 300 feet require adding an inductor to sensor terminals. See sensor wiring section for component description.** |
| Electronic Enclosure | IP66/NEMA 4X standard, temperature range:  -4° to 158° F (-20° to 70° C)<br>Optional with heater, temperatures downto -40° F (-40°C) |
| Optional Modem | 14400 BBS data speed |

# General Description

The following description applies to both the Vantage 2210 and 2220.

The Vantage 2200 is an ultrasonic level/flow meter. Its' design allows it to be easily programmed as a level meter or an open channel flow meter. It can operate two ultrasonic sensors and can be programmed for two level applications, two flow applications or one level and one flow application.

The Vantage 2200 is supplied with a backlit LCD display with 4 lines and 20 characters per line. In the normal mode the display has two pages with up to 4 lines that can be assigned to each page. The pages are switched by pressing the UP/NEXT key. The information for each line can be assigned and arranged at the users discretion. The backlight of the display can be programmed on or off or timed off.

The programming of the unit is accomplished with the 16 button keypad by means of a drill down type menu structure. The meter stores the steps taken when it was previously programmed. So when a programming parameter needs to be changed, the user can quickly get to the screen to make the change. The display screens can be viewed in three languages: English, Spanish and German.

The Vantage 2200 can be programmed to operate on four different types of sensors. The standard sensors used with the meter are the FB2, FB3 and FB4. The FB2 sensor is normally used for flow or level measurements up to 15 feet. The FB4 sensor is used for flow or level measurements up to 30 feet. The FB3 sensor is used for level measurements of up to 50 feet. The fourth sensor that can be used with the meter is the FB1 sensor that was used with the previous Vantages 2100 and 2500.

When used as an open channel flow meter, the Vantage 2200 has most of the commonly used flumes and weirs stored in memory. For special open channel primary devices, the user can input a Head vs Flow table, or an equation with a K and power factor.

The Vantage 2200 is also capable of being programmed for pump alternation control when used as a level meter. Up to three setpoints and four relays can be used for this function.

The meter also contains a data logger. It will display daily summaries for average flow, minimum flow, maximum flow and total for the last eight days. The logged data can also be displayed in graphic form on the display. With the Vantage 2200 the logged data can be downloaded and converted to a csv (comma separated variable) file to be imported into a spread sheet program such as Excel™.

The 2200 has self diagnosis and any faults, or tripped setpoints, will be displayed if the alarms are assigned to one of the display lines. The following are the alarms that could be displayed:

4-20 – Indicates that the 4-20 mA output loop is open.

Int – Will flash on when contact integrator activates.

Ovr – Indicates that the flow, or level, is above the maximum flow or level.

SP# – Indicates that a setpoint has been tripped.

Sig – Indicates that the meter is not receiving a signal from the sensor.

# Installation

## Enclosure Mounting

The enclosure is rated IP 66 (NEMA 4X). A sunshade is recommended for outdoor installation. There are two stainless steel mounting brackets factory assembled to the enclosure. The mounting feet have slots for ¼" bolts (4 places). The electronics should be mounted with the display at eye level or lower. There are three ½ inch holes in the bottom of the enclosure for conduit fittings. These holes have rubber plugs installed at the factory. The holes used for wiring must be properly prepared and sealed to maintain rating. If you do not use all three holes for conduit, leave the rubber plugs in the holes to protect the enclosure ratings.

### Opening the Enclosure:
There are two hinged door clasps on the front cover of the enclosure. To open, put thumb on one of the hinges, pull toward the outside of the enclosure. Once the hinge pops to the outside it will lower allowing the clasp at the bottom of the hinge to release. Swing the cover towards the front to open. The opposite side will act as a hinge to swing the door freely. To close, clasp the bottom side of the hinge and push the top of the hinge toward the enclosure until it locks.

### Hinge Lock and Optional Door Lock
There are two plastic gray plugs supplied with the Vantage 2200. These plugs may be used to permanently disable one side of the hinged handles. If an optional door lock was supplied with the unit then one side of the hinge handle should be plugged and the other side will have the key lock used. Either side hinge handle may be disabled. Insert the gray plug into the keyhole. **Warning: This will permanently disable the hinge handle.** The other side can be used for the key provided for the optional lock.

**Note:** The key will need to be left in the hinge handle if the door is to remain unlocked. The only way the key can be removed is if the hinge handle is locked.
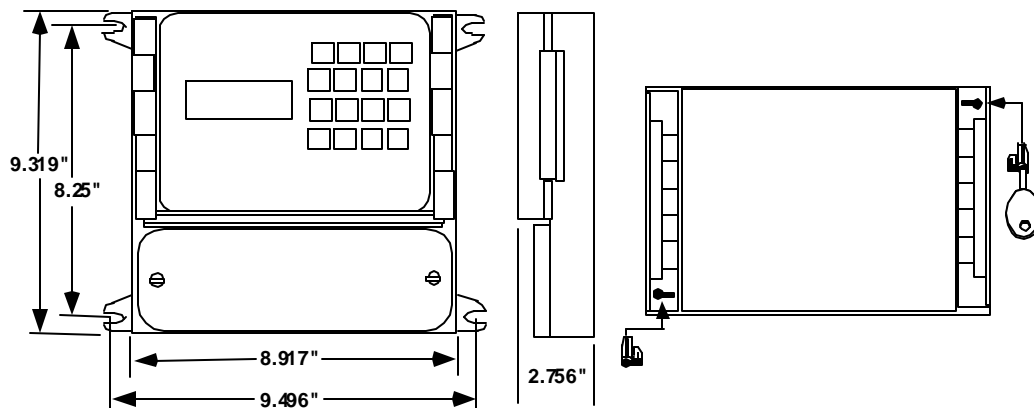


**Note:** When supplied with the optional modem the enclosure height is 12.875" instead of 9.319".
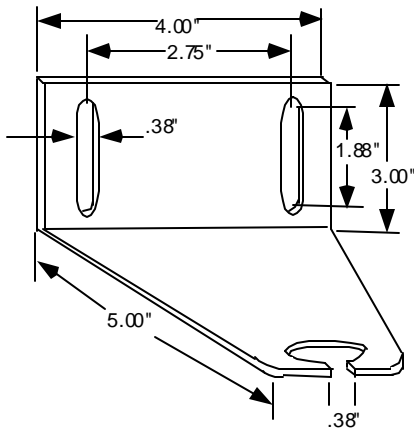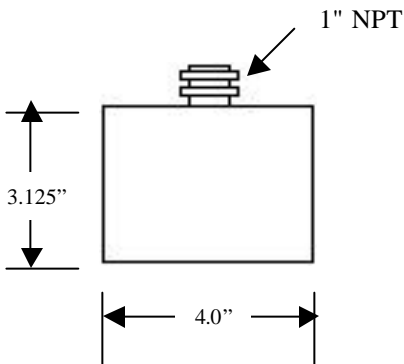
## Sensor Mounting Bracket Dimensions:

The Vantage 2200 is supplied with a stainless steel mounting bracket. The mounting bracket should be leveled in both plains. The 2200 sensor will be mounted to the 1 inch hole in the mounting bracket. Remove the top 1 inch nut from the sensor, slide the cable through the slot in the bracket, and slide the 1 inch nipple on the sensor up through the 1 inch hole in the bracket. Replace the 1 inch nut on the nipple and tighten, or screw conduit fitting to nipple and tighten to secure sensor. Adjust other nut if necessary. Do not over tighten the nut.

**FB2**
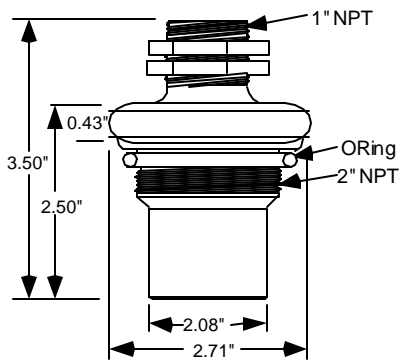
## FB2 Sensor Dimensions:

The FB2 sensor is used with flow or level applications where the maximum head rise (maximum level) is 15.00 ft or less. (See specifications Page 1-2.) There is a 1 inch NPT threaded nipple on top of the sensor for mounting on optional mounting bracket and a 2 inch NPT thread on the bottom barrel of the sensor for tank mounting. An o'ring is provided on the sensor if mounting with 2" NPT thread. This o'ring must be used or sensor operation will be affected.
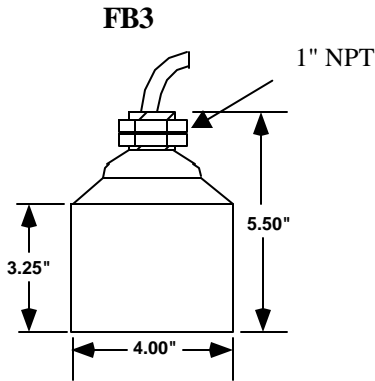
## FB4 Sensor Dimensions:

The FB4 sensor is used with flow or level applications where the maximum head rise (maximum level) is 30.00 ft or less. (See specifications Page 1-2.) There is a 1 inch NPT threaded nipple on top of the sensor for mounting on the mounting bracket.

**FB3**

1" NPT

5.50"

3.25"

4.00"

**FB3 Sensor Dimensions:**

The FB3 sensor is used for applications where the maximum level is 50 feet. (See Specifications Page 1-2.) There is a 1 inch NPT threaded nipple on top of the sensor for mounting on bracket or customer provided flange.

**Sensor Mounting Terms:**

Whether the sensor is to be used for flow in conjunction with a primary element such as flumes or weirs, or used for level measurement only, there are two terms that must be understood to mount the sensor properly in either application.

Minimum
Offset FB2 – 12"
FB3 – 24"

V Mt

Span

Vertical
Mounting
Dimension
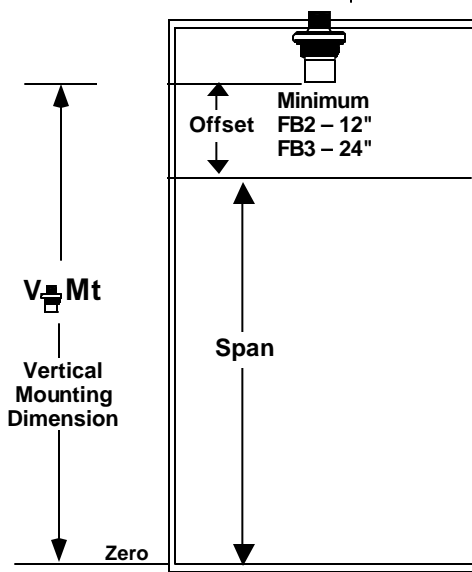
Zero

1. The VMt is the vertical mounting distance between zero level (zero flow level of flumes or weirs or zero level of tank) and the bottom of the sensor. This is the offset plus the span. Consideration must be given when mounting the sensor in respect to side walls. The distance from a wall to the FB2 sensor is 0.875 inch per foot of VMt. For the FB3 it is 1.5 inches per foot of VMt.

2. The HMt is utilized in flow applications. It is the upstream horizontal distance that the sensor needs to be placed from a reference point of the primary element. The HMt dimension is displayed on the 2200 when programming the unit. Refer to Page 3-12 for mounting detail for various primary elements.

# Wiring Diagram

There are three terminal strips provided for all wiring of the Vantage 2200. The AC power terminal is separate from the other two terminal strips. The power terminal strip has three connections for High, Low and Ground for AC voltage only. Refer to the wiring diagram below for all internal wiring connections. The specifications for the load requirements for each input are on Page 1-2 Specifications. The unit may also be powered with 12 VDC at TBA Terminals 18 (+) and 19 (-).
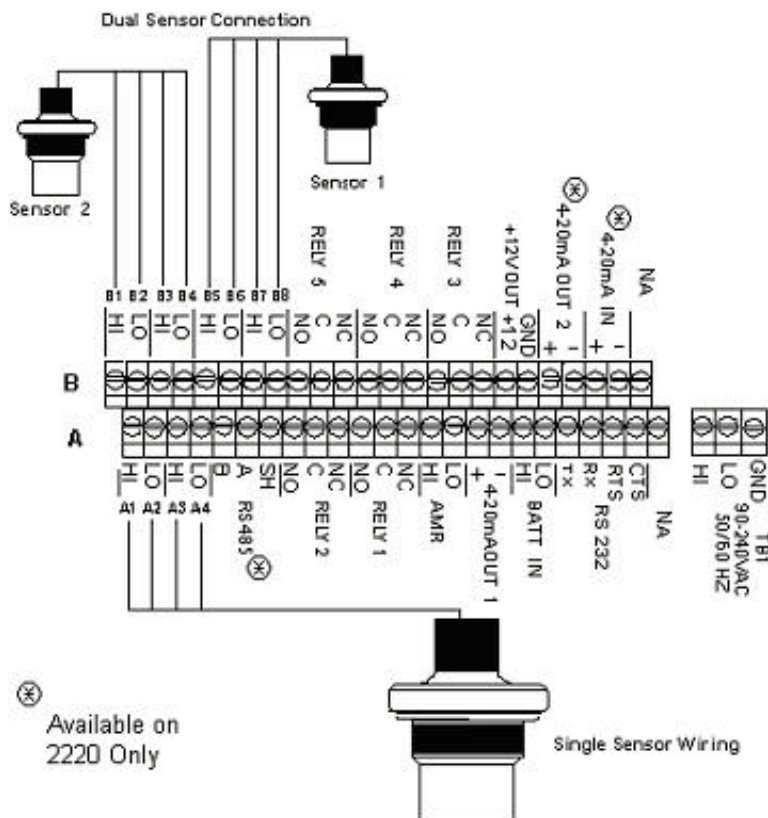


All of the terminal connections for the output signals are depicted in the above drawing. The wiring connections are also on the inside of the enclosure terminal access cover.

If the unit is supplied with the modem option, the telephone connection is made on the Relay #5 NO and NC terminals as shown below.



Telephone connections
for modem
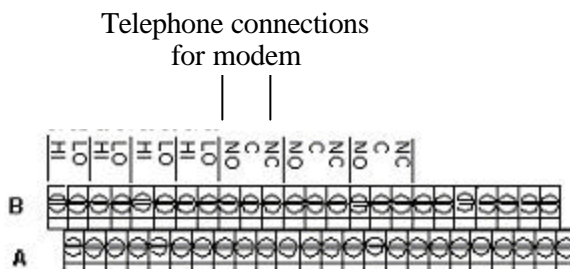
The color code for the wiring of the sensor is shown below. The sensor cable contains two pairs of twisted wires with foil shielding around each pair. A foil shield is also around both pairs of wires. There is a bare tracer wire in each shield. **It is important that the bare wire in each shield be attached as shown below. Care needs to be taken that the foil shields be separated so that the inside of the foils are not touching each other.**

### Single Sensor

| | |
|---|---|
| Red | A1 |
| Blue (Black) & Shield | A2 |
| Yellow (White) | A3 |
| Green & Shield | A4 |
| Outer Shield To TB4 | |

### Dual Sensor Wiring

| Term | | |
|---|---|---|
| B1 | Red | |
| B2 | Blue (Black) / Shield | Sensor 2 |
| B3 | Yellow (White) | |
| B4 | Green/Shield | |
| B5 | Red | |
| B6 | Blue (Black) /Shield | Sensor 1 |
| B7 | Yellow (White) | |
| B8 | Green/Shield | |
| Outer shields to TB4 | | |

**When additional cable is spliced on to the sensor cable and the total length is greater than 300 feet, a jumper must be made on the circuit board.  For Sensor #1 the shorting plug should be moved onto the two pins of J4 and for Sensor #2 the shorting plug should be moved onto the two pins of J3.**
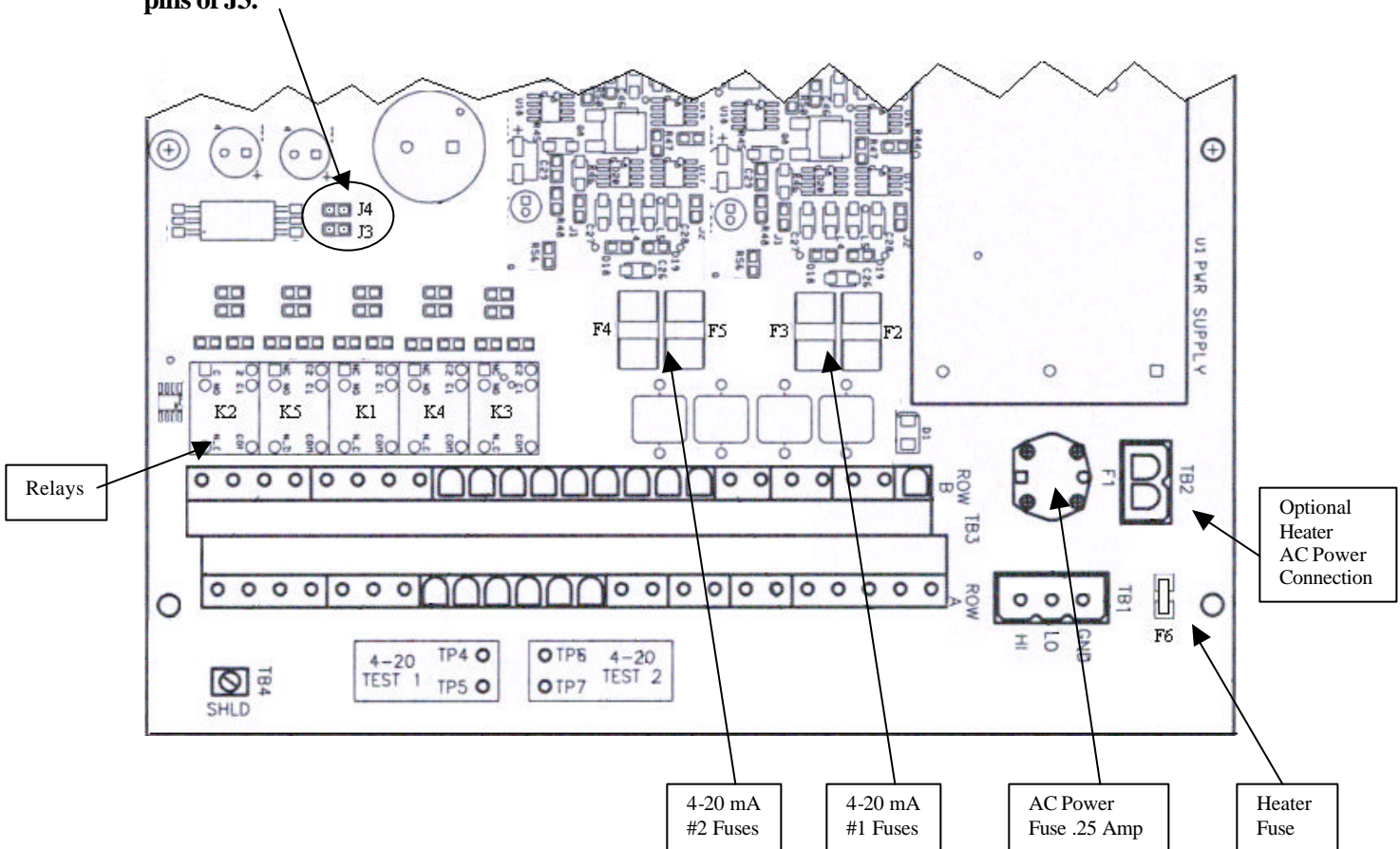
# Vantage 2200 Splice Procedure

When additional cable length is required, cable can be spliced up to a total length of 1000 feet. The cable provided with the 2200 sensor has 2 twisted pairs with shields around each pair and a shield around both pairs. Eastech Badger splice kit part number is 544700-0001 which will include butt splice connectors and coax seal strips. Prepare the sensor end wire and the wire to be spliced per the following instructions. **Recommended cable:** Belden type 8728, 2 twisted pairs, 22 awg (7x30) shielded wire.

1. Slice the outer cover on the wire and spread open to expose the foil on the two wire pairs. **<u>Be careful not to slice into the foil or the inner wires.</u>** There will be two pairs of wires, each being covered by a colored foil. Split the two pairs of wire.

2. Use electrical tape and tape the end of the foil on each bundle to keep the bundles separate.

3. Place the end of the wires into the butt splice connectors. Use pliers and crimp the round part of the butt splice connectors. There will be seven (7) splices which includes the four colored wires and three shields.

4. Wrap each spliced pair with its' shield wire with electrical tape.

5. Use the two strips of coax seal to wrap the entire splice after verifying operation of the unit.

# QuikCal Menu Functions

```
Flw1     00  GPM
1T    00x10  GAL
Lvl1     00  In
Alm Sig  4-20
```

MENU

The screen to the left represents the normal screen. Up to eight lines may be assigned to the normal screen. Pressing the UP/Next key will switch to the second four lines and back. To program, recalibrate or change any function in the Vantage 2200, press the "**MENU**" key. This will display the main menu selections for all of the functions of the Vantage 2200 QuikCal firmware. Below is a quick reference for the main menu and a brief description of each to allow the user to navigate to the required locations.

| | | |
|---|---|---|
| >01) Review Meter | Selection of this will display the parameters that the meter is programmed. (e.g. Max level, Offset, VMt, Totalizer, Logger, etc>) | |
| >02) Program | 01) Level | To program for use as a level meter. |
| Use the UP or DOWN key to scroll through the selections. Press the number to make a selection. Where there is a F2, the 2nd Function key is pressed, then the number. | 02) Flow | To program for use as a flow meter. |
| | 03) Totalizer | To select totalizer engineering units and multiplier. |
| | 04) 4-20 Out | To adjust or assign to 4-20ma output. |
| | 05) Setpoints | To assign setpoints. (e.g. Hi or Lo alarms) |
| | 06) Sensor Cal | To calibrate distance calibration from target to face of sensor. |
| | 07) Damping | To adjust damping time. |
| | 08) Lost Echo | To adjust Lost echo time and Fail to zero or span. |
| | 09) Flow Sim. | To check flow simulation of H vs Q. |
| | 10) Integrator | To set contract integrator time for relay. |
| | 11) Pump Alternation | Selection of setpoint for pump alternations. |
| | 12) Relays | Relay assignment for all relays. |
| >03) Status | 01) Sensor | To review signal strength, temperature and gain. |
| | 02) Level | To review distance level. |
| | 03) Alarms/Relays | To review alarms tripped and 4-20 loop. |
| | 04) Logger | To review time, store at times, amount stored and amount left for logging. |
| | 05) History | To review logged channel history. |
| | 06) Daily Sum | To review daily total, minimum and maximum flows. |
| >04) Data logger | 01) Set Time/date | To set the time and date for the Vantage 2200 |
| | 02) Storage Rate | To set logger storage intervals. |
| | 03) Secondary | To set secondary trip point and time intervals. |
| | 04) Log channels | To set channels to log and values to log. |
| | 05) Clear data | To clear all stored logger data. |
| >05) System Setup | 01) Language | To set unit to display language to be used. |
| | 02) Display | To set display contrast and backlighting. |
| | 03) Communications | To set communication parameters and enable modem. |
| | 04) Display lines | To assign up to eight lines to be displayed on the main screen. |
| | 05) Sensors Used | To select the type and quantity of height sensor to be used. |
| | 06) Options | To select additional relays and Isolated 485. |
| | 07) Totals Reset | To reset the totalizer. |
| | 08) New Password | To change password. |
| | 09) Summary Reset | To clear daily summary. |
| | 10) Meter reset | To reset to factory defaults. |
| | 11) New Firmware | To upload new firmware into meter. |
| >06) Calibration | 01) Flow Simulation | To check flow simulation of H vs Q. |
| | 02) 4-20 Adjustment | To adjust 4-20ma output signal. |
| | 03) Sensor Cal. | To adjust distance calibration from target to face of sensor. Same as sensor cal. under program menu. |

# >2) Program

### Programming for Level Applications

```
LvL1      00  In
Alm Sig   4-20
```

From the main screen press the MENU key, then the number 02 keys. Enter Security ID (00000000 from the factory), press the ENTER key and then the number 01 key. The following screen will be visible on the display.

```
Level Units
  01) Inches
  02) Feet
  03) Millimeters
  04) Centimeters
  05) Meters
```

Press the number on the keypad that corresponds to the engineering units desired.

```
Sensor #1
Units- ****
Max Level    _ _·_ _
Offset       _ _·_ _
```

The sensor # and the previously programmed level units will be displayed. If two sensors are used, the screen will prompt for which sensor to calibrate. Move the cursor to the desired location in Max level by using the DOWN/LEFT arrow key. Enter the maximum range that the unit is to be programmed. Use the UP/NEXT key to drop the cursor to program the offset region. Enter the sensor offset value.

The next screen will allow the user to assign the 4-20mA output. The unit can be programmed to have 4.00mADC at zero level and 20.00mADC at span level or 20.00mADC at zero level and 4.00mADC at span level. Press 1 on the keypad to toggle the desired assignment. Press the ENTER key.

If two sensors are being used, press 01 (Program) and repeat the previous programming procedure.

This completes the level programming.
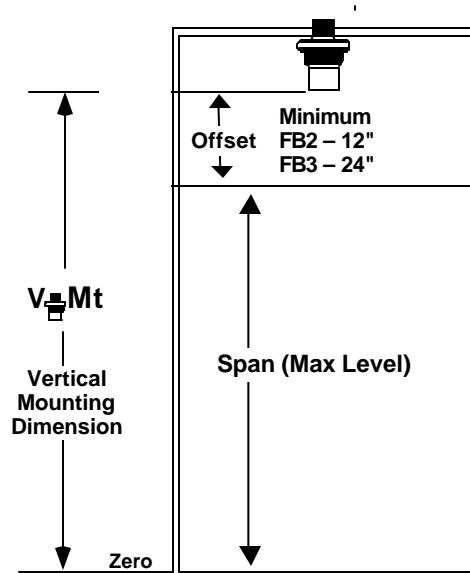
# >2) Program Continued

## Programming for Flow Applications

```
Flw1     00    GPM
1T    123456    GAL
LvL1     00     In
Alm Sig  4-20
```

From the main screen press the MENU key, then the number 02 keys. Enter Security ID (00000000 from the factory), then press the ENTER key and then the 02 keys. The Level Units screen will be visible on the display. **If two sensors are being used, the next screen requires the selection of the sensor for which the programming applies.**

```
Level Units
01)     Inches
02)     Feet
03)     Millimeters
04)     Centimeters
05)     Meters
```

Press the numbers on the keypad that corresponds to the engineering units desired.

Select the flow engineering unit desired by pressing the number in front of the selection. Units available are:

| | | |
|---|---|---|
| 01) GPM, gallons/minute | 06) CFD, cubic foot/day | 11) MS3, cubic meters/second |
| 02) GPD, gallons/day | 07) LPS, liters/second | 12) M3H, cubic meter/hour |
| 03) MGD, million gallons/day | 08) LPM, liters/minute | 13) M3D, cubic meter/day |
| 04) CFS, cubic foot/second | 09) LPD, liters/day | 14) IGM, imperial gallons/minute |
| 05) CFM, cubic foot/minute | 10) MLD, million liters/day | 15) BPH; barrels/hour |

The FLOW DISPLAY FORMAT screen asks how many digits you want to show to the right of the decimal point. Press the number that corresponds to your selected value:
01) #.          02) #.#          03) #.##          04) #.###
Example: GPM, #., will show a direct flow reading (e.g. 100 GPM)

The next three screens will be the selection for the type and size of primary element:

| >01) Flumes | 01) **Parshall** | 1) 2 inch | 4) 9 inch | 7) 24 inch | $F_2$1) 60 inch |
|---|---|---|---|---|---|
| | | 2) 3 inch | 5) 12 inch | 8) 36 inch | $F_2$2) 72 inch |
| | | 3) 6 inch | 6) 18 inch | 9) 48 inch | $F_2$3) 84 inch |
| | 02) **Manhole** | 1) 4 inch | 2) 6 inch | 3) 8 inch | $F_2$4) 96 inch |
| | | 4) 10 inch | 5) 12 inch | | |
| | 03) **Palmer Bowlus** | 1) 6 inch | 4) 12 inch | 7) 21 inch | |
| | | 2) 8 inch | 5) 15 inch | 8) 24 inch | |
| | | 3) 10 inch | 6) 18 inch | | |
| | Plasti-Fab HQ curves are used for the above, if other manufacturer use SPECIAL. | | | | |
| | 04) **Trapezoidal** | 1) Small V60 | 3) X-Large V60 | | |
| | | 2) Large V60 | 4) 3.0 Ft V60 | | |
| | Plasti-Fab HQ curves are used for the above. | | | | |
| | 05) **H Flume** | 1) H 4.5 Ft | 4) HS .6 Ft | | |
| | | 2) HL 4.5 Ft | 5) HS .8 Ft | | |
| | | 3) HS .4 Ft | 6) HS 1.0 Ft | | |
| | Plasti-Fab HQ curves are used for the above. | | | | |
| | 06) **Lagco** | 1) 6 inch | 4) 12 inch | 7) 21 inch | |
| | | 2) 8 inch | 5) 15 inch | 8) 24 inch | |
| | | 3) 10 inch | 6) 18 inch | | |

# >2) Program Continued

| >02)Weirs | 01) **V-Notch** | 1) 11.25 degree | 4) 45 degree | |
| | | 2) 22.5 degree | 5) 60 degree | |
| | | 3) 30 degree | 6) 90 degree | |
| | 02) **Contracted** | 1) 12 inch | 5) 36 inch | 9) 96 inch |
| | | 2) 18 inch | 6) 48 inch | $F_2$1) 120 inch |
| | | 3) 24 inch | 7) 60 inch | $F_2$2) Other . . . |
| | | 4) 30 inch | 8) 72 inch | |
| | 03) **Suppressed** | 1) 12 inch | 4) 36 inch | 7) Other . . . |
| | | 2) 18 inch | 5) 48 inch | |
| | | 3) 24 inch | 6) 60 inch | |
| | 04) **Cipolletti** | 1) 12 inch | 4) 36 inch | 7) Other . . . |
| | | 2) 18 inch | 5) 48 inch | |
| | | 3) 24 inch | 6) 60 inch | |

NOTE: If you have a special length weir plate you will need to select Other. Enter the width of the weir.

| >03)Nozzles | 01) **Open Flow** | 1) 6 inch | 4) 12 inch | 7) 18 inch |
| | | 2) 8 inch | 5) 14 inch | 8) 20 inch |
| | | 3) 10 inch | 6) 16 inch | 9) 24 inch |
| | 02) **Kennison** | 1) 8 inch | 2) 10 inch | 3) 12 inch |

**>04) Manning**  You will need to know the following information to program Manning's equation into the Vantage 2200.
1. % of pipe slope
2. Roughness coefficient  (concrete pipe is typically 0.013)
3. Pipe I.D. for circular and Channel Width for rectangular

**>05) Special**  Note: If the equation or data input is to be used, you must program the flow engineering units and the level engineering units into the unit first before using this function. (e.g. Q = CFS and H = head in feet, program the 2200 for CFS and FT. Once the SPECIAL program is completed you may change the flow units and level units to the desired units.

**1) Q=KH^PWR**  Enter the K value by using the number and decimal keys. Use the LEFT arrow key to position the cursor for the number of digits to be entered. Once the last digit is entered in the K selection the cursor will drop to the Power input. Enter the Power function. Press the ENTER key.

**2) Data Input**  Enter Level and Flow in selected engineering units by using the number and decimal keys. Use the LEFT arrow key to position the cursor for the number of digits to be entered. Once the last digit is entered in the Level section the cursor will drop to the Flow input. There are a maximum of 32 points available for H/Q input. It is recommended that you do not use less than 10 points. Use the last point input as zeros, this will automatically advance to the next screen.

# >2) Program Continued

```
┌─────────────────────────────┐
│ Flow Primary Element        │
│ Max Flow      ***.**        │
│ VMt=          **.**         │
│ HMt=          **.**         │
│                             │
└─────────────────────────────┘
```

Once the primary element type and size is selected the screen at the left will appear. This screen displays the Maximum flow of the Primary Element, the suggested VMt (vertical mounting distance of the bottom of the sensor to zero flow, and the HMt (horizontal mounting distance of the sensor for the primary element chosen). The VMt dimension is a recommended mounting distance. If you choose to relocate the sensor head change the VMt distance in the next screen. These values will not change. They are for reference only. Press the ENTER key.

```
┌─────────────────────────────┐
│ Enter Application           │
│ Max Flow and Vmt            │
│ Max Flow        **.**       │
│ VMt=            **.**       │
│                             │
└─────────────────────────────┘
```

```
┌─────────────────────────────┐
│ Press ENTER to store        │
│ Any changes.                │
│ Press any other key         │
│ To not store changes.       │
│                             │
└─────────────────────────────┘
```

This screen allows the user to change the maximum flow rate and the vertical mounting distance (VMt). To change the maximum flow rate use the LEFT arrow key to go to the most significant digit. Press the number wanted on the keypad, this will send the cursor to the next number. Once all numbers have been entered the cursor will drop to the VMt line displayed. If the user chooses to change the VMt of the sensor, enter the number by using the keypad. **If a VMt value entered is less than the minimum offset plus the head rise of the selected maximum flow rate, the minimum the VMT value will not change.** Press the ENTER key and then the MENU key. If the new parameters are to be stored then press the ENTER key. If you do not wish to save the new parameters, press any other key. You are now back at the programming selection list. Press the MENU key to return to the normal display screen.

## Totalizer Setup

To program the totalizer press the 03 keys when in the Program selection list. The next screen will be the engineering unit selection. The available options for the engineering units are:

```
┌─────────────────────────────┐
│ 03) Totalizer               │
│                             │
│                             │
│                             │
│                             │
└─────────────────────────────┘
```

| | |
|---|---|
| 01) GAL, Gallons | 05) BARR, Barrels |
| 02) MET3, Cubic Meters | 06) CUFT, Cubic Feet |
| 03) LTRS, Liters | 07) ACFT, Acre feet |
| 04) IGAL, Imperial Gallons | |

Press the numbers on the keypad that corresponds to the engineering units desired.

The next screen selection is the totalizer multiplier. There are eight selections for totalizer multiplier. Use the UP or DOWN key to display all multipliers available. Press the number key that corresponds to the multiplier required.

# >02) Program Continued

<table>
<tr><td>

04) 4-20 Out

</td><td>

**4-20 Output Assignment and Adjustment**
Selection 4 in the programming menu is the 4-20mA output and assignment adjustment. Press the 04 key to adjust or assign the 4-20mADC output.
1) Adjustment: To adjust or calibrate the 4-20mA DC output press the 01 key. For the Vantage 2220 another screen will prompt to select which sensor 4-20 output to adjust.

</td></tr>
</table>

<table>
<tr><td>

>1) Up     2) Down
. . . . . . . . . . . . . . . .
>3) Coarse  4) Fine
>5) 4 mA   6) 20 mA

</td><td>

To adjust Zero: Press the 5 key, the cursor arrow will appear before the 5) 4 mA line. Press the 3 key for coarse adjustment or the 4 key for fine adjustment. Now press the 1 key to adjust the mA upwards or the 2 key to adjust downwards.

To adjust Span: Press the 6 key, the cursor arrow will appear before the 6) 20 mA line. Press the 3 key for coarse adjustment or the 4 key for fine adjustment. Now press the 1 key to adjust the mA upwards or the 2 key to adjust downwards.

To assign the 4-20mA loop the level or flow press the 02 key at the 4-20 Out selection. To select the 4-20 signal to track level press the 01 key. To select the 4-20 signal to track flow press the 2 key. Press the ENTER key. If two sensors are being used, added assignments for Flow 2, Level 2, Flow 1 + 2 and Flow 1 – 2 will be available.

</td></tr>
</table>

<table>
<tr><td>

05) Setpoints

</td><td>

**Programming Setpoints**
This selection will allow the user to assign up to three setpoints for High or Low alarm conditions. Press the 05 keys to enter the setpoint selections. Press the 01 keys for Setpoint #1. Press the 02 keys for Setpoint #2. Press the 03 keys for Setpoint #3. The next screen allows the user to assign the setpoint selected to level or flow. Press the 01 keys for Level and the 02 keys for Flow. The level selection will be in the engineering units selected for level. The flow selection will be in engineering units selected for flow. The next screen will allow the user to input ON and OFF points for the setpoint selected. For Low alarm the ON value will be less than the OFF value. For High alarm the ON value will be greater than the OFF value. To program move the cursor to the left most significant digit by using the DOWN/LEFT arrow key. Enter the number desired by using the keypad. The cursor will advance to the right after the selection is entered. Press the ENTER key. The Setpoints must be assigned to a Relay. (14 keys under Program.).

</td></tr>
</table>

<table>
<tr><td>

>06) Sensor Cal.

</td><td>

**Sensor Calibration**
To adjust the sensor calibration, press the 06 keys. The dimension physically measured from the bottom the sensor to any target or liquid level is the distance that will be displayed in the next screen. If the dimensions displayed vary from the distance measured, use the 1 or 3 key to adjust the displayed length to the measured length.

</td></tr>
</table>

# >02) Program Continued

<table>
<tr><td>

07) Damping

</td><td>

**Output Damping Adjustment**
To adjust the 4-20mA output damping press the 07 keys. This will allow the user to adjust the damping time. The damping times available are:

| | |
|---|---|
| 01) None | 05) 60 Seconds |
| 02) 5 Seconds | 06) 2 Minutes |
| 03) 15 Seconds | 07) 4 Minutes |
| 04) 30 Seconds | 08) 8 Minutes |

</td></tr>
<tr><td>

08) Lost Echo

</td><td>

**Lost Echo Setting**
To adjust the Lost Echo time. (This is how long the meter will hold the last value after losing the signal until failing to the Lost Echo 420 mADC assignment).

To set the Lost Echo time press the 08 key. The lost echo times available are:

| | |
|---|---|
| 01) 5 Seconds | 05) 2 Minutes |
| 02) 15 Seconds | 06) 4 Minutes |
| 03) 30 Seconds | 07) 8 Minutes |
| 04) 60 Seconds | 08) 16 Minutes |

After pressing the desired number, or ENTER key, the next screen to appear is the Lost Echo 4-20mA assignment. In this screen the user will select the default for the 4-20mADC output during a lost echo. The selections are:
01) Fail to Zero
02) Fail to Span
03) Hold last value

Press the number desired, this will return to the main program screen.

</td></tr>
<tr><td>

09) Flow Sim.

</td><td>

**Flow Simulation**
The flow simulation screen will allow the user to check the flow curve programmed into the unit. Enter the flow level in the engineering units displayed. The Flow line will display the flow at the entered interval. If the flow displayed is different than expected, check the programming of the flume, weir or special H/Q programming. Pressing the UP key will allow the user to test the totalizer function. Press the MENU key to return to the main program screen.

</td></tr>
<tr><td>

10) Integrator

</td><td>

**Integrator Setup**
The next option in the program menu is the Integrator screen. To select this, press the 10 keys. This screen will allow the user to assign the contact closure time for a contact integrator. The cursor will appear on the most significant digit. Use the number keys to enter the totalized flow value you want to have for a contact output. Press the ENTER key to return to the main program screen.

</td></tr>
<tr><td>

11) Pump Alt.

</td><td>

**Pump Alternation Setup**
The next option in the program menu is the Pump alternation screen. To select this press the 11 keys. The first screen shows the selection of the three setpoints and the four relays. The NN indicated that nothing has been selected for that position. Press the 5 key to enter into the selection of setpoints and relays.

</td></tr>
</table>

# >02) Program Continued

| 11) Pump Alt. |
| --- |

The first screen is for Setpoint Position #1. Select the number corresponding to the setpoint desired. After the selection, the next setpoint position will be shown. After the setpoint position #3 is selected, the relay position screen will be shown. Select the number corresponding to the relay for that position. After the selection, the next relay position will be shown. After the relay position #4 is selected, press the MENU key, then the ENTER key to save changes.

For example: a sewer line will feed into a wet well at a lift station. The station employs three pumps. The wet well is 20 feet deep. As the wet well fills, the operator wants to turn on the pump (Pump 1) when the level reaches 12 feet and off at 2 feet. If the level in the well continues to rise with only one pump running, the operator will probably require the second pump (Pump 2) to come on at a level of 16 feet and off at 8 feet. If the level in the well continues to rise with both pumps running, the operator will initiate a third pump (Pump 3) to come on at a level of 18 feet and off at 12 feet.

There are three setpoints: on at 12 feet, off at 2 feet (Setpoint Position 1); on at 16 feet, off at 8 feet (Setpoint Position 2); on at 18 feet, off at 12 feet (Setpoint Position 3).

The relay positions are then selected depending on which ones are to control the pumps.

**Relay Assignment**

| 12) Relays |
| --- |

The next option in the program menu is the Relays screen. To select this press 2nd Function then 3 ($F_2$3) keys. This option will allow the user to assign each of the five relays to the following selections:

| | | |
| --- | --- | --- |
| 1) None | 4) Setpoint #3 | 7) Over range 1 |
| 2) Setpoint #1 | 5) Lost Signal | 8) Over range 2 |
| 3) Setpoint #2 | 6) 4-20 Loop | 9) Contact Integrator |

Press selection desired. Press the ENTER key to save any changes. Should the Relays screen not show as a selection, go to the Main selection screen and select 05) System Setup, then 06) Options, then 01) Relays Added. Select the number of relays you want active.

# >03) Status

| >03) Status |
| --- |

The status selection allows the user to view the status on the following options:

01) Sensor: View signal strength, temperature and the signal gain.

02) Level: Indicates the distance between the sensor and the target and the level.

03) Alarms/Relays: View the Alarms Set and the Relays Energized.

04) Logger: View the logger Time and Time to Store, Amount of logging Stored and the Amount of free space to Store.

## >03) Status Continued

05) History: View logged data in graphic form for each of the eight channels available to log. Select the channel to be viewed by pressing the number on the keypad. Press the UP or DOWN key to scroll through the data.

06) Daily Sum: View the Average, Minimum and Maximum flows and the time of the event for the last eight days of flow.

Press the ENTER key to return to the main program menu.

## >04) Data Logger

>04) Data Logger

The next selection in the program menu is the data logger selection. There are five selections in the data logger menu.

1) Set Time/Date. Press the UP key to move the arrow to the date or time that is to be changed. Press the number value on the key pad to change. Note the time is entered and viewed as military time.

2) Storage Rate. This will allow the user to select the storage rate for the logging. Selections are:
   01) 1 minute      03) 10 minute      05) 30 minute
   02) 5 minute      04) 15 minute      06) 60 minute

3) Secondary. This will allow the user to select a secondary log rate to store logging at a different interval than the main interval. This may be used to store at faster intervals during storms or flow events. The selections available are:
   01) Not active      02) Setpoint #1      03) Setpoint #2      04) Setpoint #3

   If setpoints are selected then the next screen will be storage rate times available.

4) Log Channels. There are up to 8 channels available for logging. The selections for each channel are:
   01) Not Used    04) Flow 1    07) Total 2          10) Sensor2 Temp
   02) Level 1     05) Flow 2    08) Setpoints        11) Lvl1-Lvl2
   03) Level 2     06) Total 1   09) Sensor 1 Temp

5) Clear Data. Press the 5 key to clear all stored data.

### 2200 Data Logger Download Program

Refer to the Data Download software manual for instructions in retrieving the data from the meter.

## >05 System Setup

The system setup option will allow the user to set up the Vantage 2200 for the following options.

01) Language: This will allow the user to select the language displayed in the Vantage 2200. The options are 01) English, 02) German, 03) Spanish.

02) Display: Choosing this feature allows the user to select the contrast of the display from 01) Highest to 08) Lowest. This feature also allows to display the back light to turn it off, or to program for a timed "off" of the display if the key pad is not touched in a selected time interval.

03) Communications: This option will allow the user to set the baud rate, flow control and slave I.Ds of the RS-232 and RS-485 communications.
  01) Baud Rate - Select the bade rate desired to communicate with meter.
  02) Flow Control - Hardware .should be selected unless a device requires no flow control.
  03) Slave ID - Select the desired Slave Identification number.
  04) Modem Init - If a modem is being used select 02) Enable, otherwise select 01) Disabled.

04) Display Lines: This option will allow the user to select the eight display lines to be viewed on the main screen during operation. The options for the display lines are:

| | | | |
|---|---|---|---|
| 01) Level 1 | 06) Total 2 | 11) Signal 1 | 15) Distance 1 |
| 02) Level 2 | 07) Tot1&2 Dif | 12) Signal 2 | 16) Distance 2 |
| 03) Flow 1 | 08) Tot1&2 Sum | 13) Lvl1-Lvl2 | 17) Date/Time |
| 04) Flow 2 | 09) Relays | 14) Flw1+Flw2 | 18) Blank line |
| 05) Total 1 | 10) Alarms | | |

05) Sensor Used: This option will select the unit being programmed for one or two sensors and the type of sensors being used. Following is the options for sensors.
  01) FB1/FB4 - 60KHZ,  60KHZ, PVC, range 1-30 feet, w/1 ft. offset.
  02) FB2 -    51KHZ, white teflon, sensor range 1-15 feet, w/1 ft. offset.
  03) FB3 -    30KHZ, black plastic sensor, range 2-50 feet w/2 ft. offset.

This option will also display the temperature of the sensor and give the option of calibrating the temperature and optimizing the electronics to the frequency of the sensor.

06) Options: This option will select any optional relays being used and a selection to activate the isolated RS-485.

07) Totals Reset: This option will reset the totalizer to zero. Press 5 to begin.

08) New Password: This option will allow the user to change the password to enter into the QuikCal programming.

09) Summary Reset: This clears the Daily Summary memory.

10) Meter Reset: This option will reset all parameters to the factory defaults.

11) New firmware: This option will allow the user to upload any new firmware to the latest revision. This requires connection to the RS232 Data Port with a computer or Palm PDA. **Do not enter into this screen unless you are prepared to upload new firmware.**

## >6 Calibration

```
>06)
Calibration
```

The next option in the programming menu is Calibration. The options available in the Calibration menu are:

01) Flow Simulation: The flow simulation screen will allow the user to check the flow curve programmed into the unit. Enter the flow level in the engineering units displayed. The Flow line will display the flow at the entered interval. If the flow displayed is different than expected check the programming of the flume, weir or special H/Q programming. Pressing the UP key will allow the user to test the totalizer function.

```
>1) Up    2) Down
. . . . . . . . . . . . . . .
>3) Coarse   4) Fine
>5) 4 mA   6) 20 mA
```

02) 4-20 Adjustment: To adjust or calibrate the 4-20mADC output, Press the 1 key. The screen shown on the left will appear.

To adjust Zero: Press the 5 key, the cursor arrow will appear before the 5) 4 mA line. Press the 3 key for coarse adjustment or the 4 key for fine adjustment. Now press the 1 key to adjust the mA upwards or the 2 key to adjust downwards.

To adjust Span: Press the 6 key, the cursor arrow will appear before the 6) 20 mA line. Press the 3 key for coarse adjustment or the 4 key for fine adjustment. Now press the 1 key to adjust the mA upwards or the 2 key to adjust downwards.

03) Sensor Cal: This option will allow the user to calibrate the system by measuring the distance between the face of the sensor and the target (or water) and adjusting the displayed distance value up or down with the 1 or 3 key to calibrate the unit to the correct distance of the target.

There is a Near and Far distance adjustment when calibrating the meter.
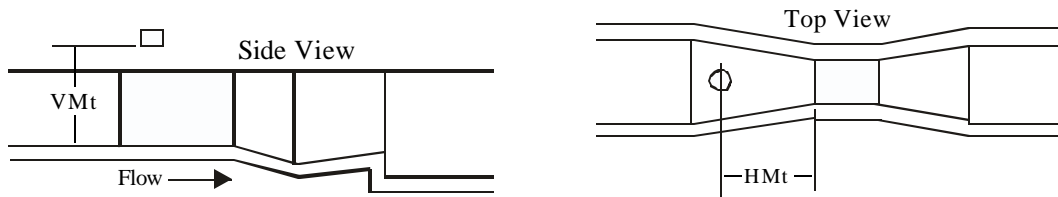
The Near distance adjustment should be made with a target being at least the offset value from the face of the sensor. This distance should be no more than 36 inches. The meter automatically determines the distance is less than 36 inches. Use the 1 or 3 keys to adjust the displayed distance value to the actual target distance. Should the distance be greater than 36 inches, the meter can be forced into the Near adjustment mode by pressing the 4 or 6 keys. Near will appear on the display when the 4 or 6 key is pressed.

The Far distance adjustment should be made with a target being at the Vertical Mounting (Vmt) value or slightly less from the face of the sensor. This distance should be more than 36 inches. Use the 1 or 3 keys to adjust the displayed distance value to the actual target distance. The meter automatically determines the distance is than 36 inches. Should the distance be less than 36 inches, the meter can be forced into the Far adjustment mode by using the 7 or 9 keys instead of the 1 and 3 keys. Far will appear on the display when the 7 or 9 key is pressed.

The Near and Far adjustment may need to be made several times until distance readings are correct for both adjustments without making adjustments to either.
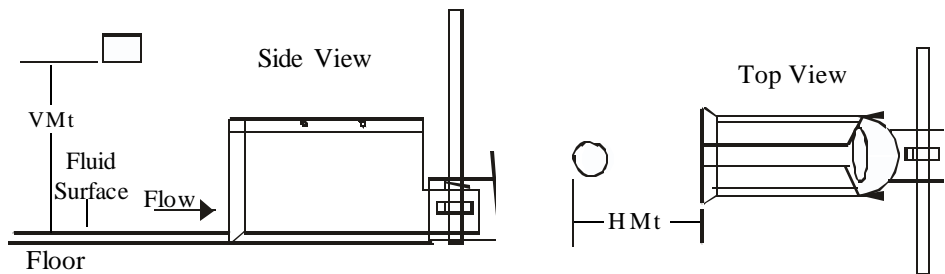
# Sensor Vertical and Horizontal Mounting References

## PARSHALL FLUMES



| Size | H Dim. | Vcal | Full Scale (GPM) | | Full Scale Head Rise |
|------|--------|------|------|------|------|
| (in.) | (in.) | (in.) | Min. | Max. | Max (in.) |
| 2 | 11.00 | 21.46 | 60 | 210 | 9.46 |
| 3 | 12.00 | 30.21 | 85 | 850 | 18.21 |
| 6 | 16.00 | 30.29 | 180 | 1800 | 18.29 |
| 9 | 22.50 | 38.01 | 280 | 4500 | 26.01 |
| 12 | 35.25 | 42.70 | 375 | 7500 | 30.70 |
| 18 | 37.25 | 43.70 | 550 | 12000 | 31.70 |
| 24 | 39.25 | 43.47 | 700 | 16000 | 31.47 |
| 36 | 43.25 | 43.98 | 1100 | 25000 | 31.98 |
| 48 | 47.00 | 44.75 | 1350 | 35000 | 32.75 |

## MANHOLE FLUMES



| Size | H Dim. | Vcal | Full Scale (GPM) | | Full Scale Head Rise |
|------|--------|------|------|------|------|
| (in.) | (in.) | (in.) | Min. | Max. | Max (in.) |
| 4 | 5.75 | 17.86 | 45 | 90 | 5.86 |
| 6 | 7.75 | 20.94 | 60 | 250 | 8.94 |
| 8 | 9.75 | 24.32 | 75 | 550 | 12.32 |
| 10 | 11.75 | 27.58 | 80 | 1000 | 15.58 |
| 12 | 13.75 | 29.99 | 100 | 1500 | 17.99 |

# PALMER BOWLUS FLUMES

## Side View

Flow →

V Mt

← HMt ┤  Top View
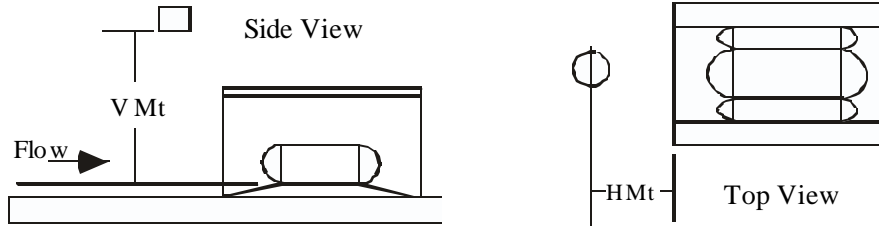
| Size | H Dim. | Vcal | Full Scale (GPM) | | Full Scale Head Rise |
| (in.) | (in.) | (in.) | Min. | Max. | Max (in.) |
|---|---|---|---|---|---|
| 6 | 3.00 | 17.16 | 130 | 200 | 5.16 |
| 8 | 4.00 | 18.77 | 145 | 400 | 6.77 |
| 10 | 5.00 | 20.46 | 175 | 700 | 8.46 |
| 12 | 6.00 | 22.15 | 200 | 1100 | 10.15 |
| 15 | 7.50 | 24.96 | 220 | 2000 | 12.96 |
| 18 | 9.00 | 27.13 | 270 | 3000 | 15.13 |
| 21 | 10.50 | 29.85 | 300 | 4500 | 17.85 |
| 24 | 12.00 | 32.77 | 325 | 6500 | 20.77 |

# LAGCO FLUMES

## Side View

V Mt

Flow →

← HMt ┤  Top View
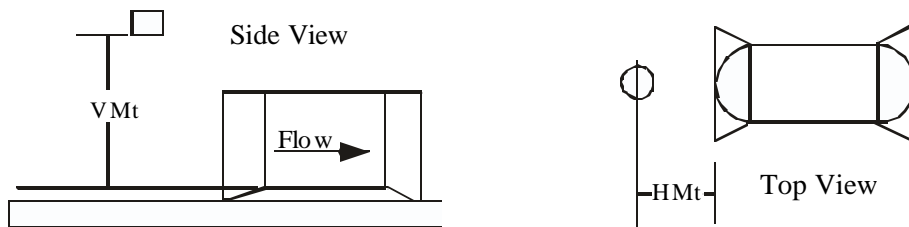
| Size | H Dim. | Vcal | Full Scale (GPM) | | Full Scale Head Rise |
| (in.) | (in.) | (in.) | Min. | Max. | Max (in.) |
|---|---|---|---|---|---|
| 6 | * | 16.91 | 10 | 140 | 4.91 |
| 8 | * | 17.98 | 135 | 250 | 5.98 |
| 10 | * | 20.16 | 180 | 500 | 8.16 |
| 12 | * | 21.06 | 210 | 700 | 9.06 |
| 15 | * | 23.19 | 250 | 1200 | 11.19 |
| 18 | * | 24.77 | 300 | 1750 | 12.77 |
| 21 | * | 28.45 | 360 | 3000 | 16.45 |
| 24 | * | 29.05 | 400 | 3600 | 17.05 |

(*) HORIZONTAL MOUNTING DIMENSIONS; LOCATE SENSOR JUST UPSTREAM OF CONVERGENCE ON ALL SIZES
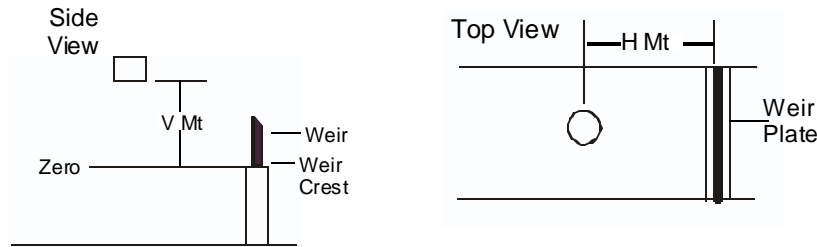
## TRAPEZOIDAL FLUMES

Front View

VMt

HMt

Flow

Top View

## H FLUMES

Front View

V Mt

TOP
VIEW

HMt

Flow
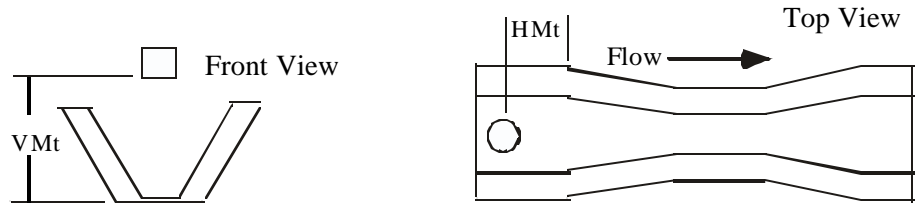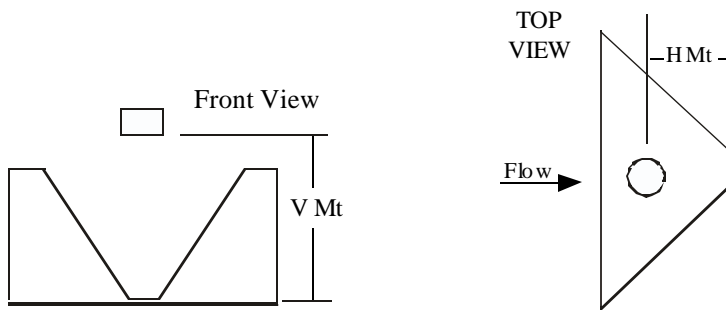
# WEIRS

## RECTANGULAR WEIR WITH END CONNECTIONS

| Size | H Dim. | Vcal | Full Scale (GPM) | | Full Scale Head Rise |
|------|--------|------|------|------|------|
| (in.) | (in.) | (in.) | Min. | Max. | Max (in.) |
| 12 | * | 19.96 | 280 | 700 | 7.96 |
| 18 | * | 24.71 | 420 | 2100 | 12.71 |
| 24 | * | 26.52 | 600 | 3500 | 14.52 |
| 36 | * | 29.27 | 850 | 7000 | 17.27 |
| 48 | * | 35.17 | 1200 | 14500 | 23.17 |
| 60 | * | 40.69 | 1500 | 25000 | 28.69 |
| 72 | * | 46.78 | 1800 | 40000 | 34.78 |
| 84 | * | 53.17 | 2000 | 60000 | 41.17 |
| 96 | * | 59.54 | 2400 | 85000 | 47.54 |

## V-NOTCH WEIRS

| Size | H Dim. | Vcal | Full Scale (GPM) | | Full Scale Head Rise |
|------|--------|------|------|------|------|
| (Degrees.) | (in.) | (in.) | Min. | Max. | Max (in.) |
| 22.5 | * | 36.00 | 15 | 1261 | 24.00 |
| 30 | * | 48.00 | 20 | 4729 | 36.00 |
| 45 | * | 48.00 | 30 | 7241 | 36.00 |
| 60 | * | 48.00 | 42 | 10096 | 36.00 |
| 90 | * | 48.00 | 72 | 17491 | 36.00 |

(*) HORIZONTAL MOUNTING DIMENSION FOR ALL WEIRS IS 4 TIMES MAXIMUM HEAD RISE

# OPEN FLOW NOZZLES
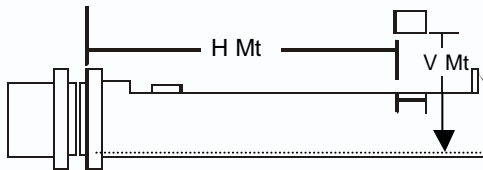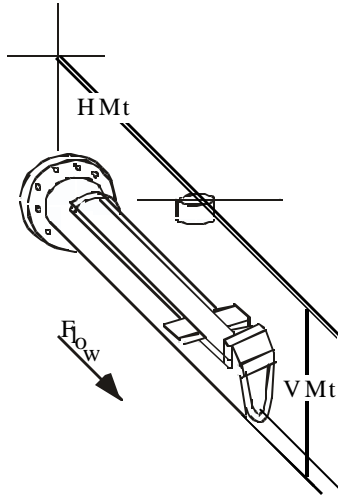


| Size | H Dim. | Vcal | Full Scale (GPM) | | Full Scale Head Rise |
|------|--------|------|------|------|------|
| (in.) | (in.) | (in.) | Min. | Max. | Max (in.) |
| 6 | 21.00 | 16.79 | 125 | 180 | 4.79 |
| 8 | 23.00 | 18.66 | 150 | 400 | 6.66 |
| 10 | 25.00 | 20.77 | 165 | 800 | 8.77 |
| 12 | 29.00 | 21.55 | 145 | 1100 | 9.55 |
| 14 | 31.00 | 24.75 | 85 | 1600 | 12.75 |
| 16 | 35.00 | 25.87 | 100 | 2100 | 13.87 |
| 18 | 38.00 | 28.16 | 85 | 2600 | 16.16 |
| 20 | 40.00 | 30.78 | 90 | 3700 | 18.78 |
| 24 | 46.00 | 35.07 | 95 | 7000 | 23.07 |

# Vantage 2200 Parts List

| ITEM # | PART NUMBER | DESCRIPTION |
|--------|-------------|-------------|
| 001 | 544730-0002 | Chassis & Housing Assembly (Electronics) |
| 002 | 528076-0001 | Sensor Mounting Bracket (FB2/FB3) |
| 003 | 501607-0001 | FB2A Sensor Head W/32 Feet Cable (Flow/Level) |
| 004 | 501607-0002 | FB2B Sensor Head W/65 Feet Cable (Flow/Level) |
| 005 | 501607-0003 | FB2C Sensor Head W/ 98 Feet Cable (Flow/Level) |
| 006 | 544536-0001 | FB3A Sensor Head W/98 Feet Cable (Level) |
| 007 | 544536-0002 | FB3B Sensor Head W/295 Feet Cable (Level) |
| 008 | 544706-0001 | Data Logger Data Retrieval Software |
| 008 | 161105 | Fuse 4-20 100 ma |
| 009 | 160978-0006 | Fuse 5 x 20 mm .250 amp |
| 010 | 544700-0001 | Splice Kit (Cable) |
| 011 | 500064-0028 | Sensor Cable |

## WARRANTY

Eastech Badger warrants meters and parts manufactured by it and supplied hereunder to be free from defects in materials and workmanship for a period of 3 years from date of shipment. If within such period any meters or parts shall be proved to Seller's satisfaction to be defective, such meters or parts shall be repaired or replaced at Seller's option. Seller's obligation hereunder shall be limited to such repair and replacement and shall be conditioned upon Seller's receiving written notice of any alleged defect within 10 days after its discovery and, at Seller's option, return of such meters or parts f.o.b. to Seller's factory. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES WHATSOEVER INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES (EXCEPT OF TITLE) OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Eastech Badger shall not be liable for any defects attributable to acts or omissions of others after shipment, nor any consequential, incidental or contingent damage whatsoever.

**A claim for equipment damaged in transit is the sole responsibility of the customer.**

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