INSTALLATION & OPERATING MANUAL

EASTECH
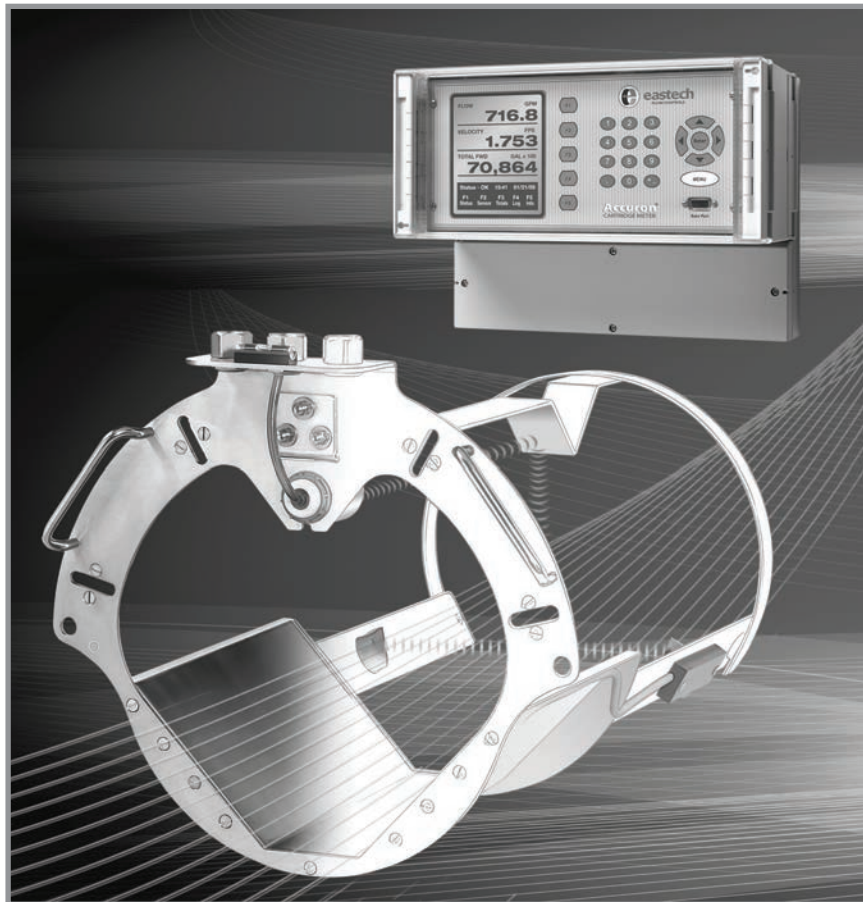
SCOPE OF MANUAL

This manual contains information concerning the installation, operation and maintenance of the Accuron 7200 Cartridge Meter. To ensure proper performance of the meter, the instructions given in this manual 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 explain any changes made to the product described in this manual.

UNPACKING & INSPECTION

Retain the container and all packing material for possible use in reshipment or storage.

Visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts, or any other sign of damage that may have occurred during shipment.

Note: If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damaged in transit is the sole responsibility of the customer.

To avoid damage in transit, Eastech Flow Controls products are shipped to the customer in special shipping containers. Upon receipt of the product, perform the following unpacking and inspection procedures:

Note: If damage to the shipping container is evident upon receipt, request the carrier to be present when the product is unpacked.

Carefully open the shipping container following any instructions that may be marked on the box. Remove all cushioning material surrounding the product and carefully lift the product from the container.

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GENERAL DESCRIPTION

The Series 7200 Cartridge Meter is designed to measure flow in open channels or partially filled conduits. The Cartridge Meter utilizes ultrasonic measurments techniques to determine fluid velocity and fluid depth for calculating volume of flow.

The Series 7200 Cartridge Meters are calibrated at the factory to the application parameters provided by the customer. On-site calibration of the system is usually never required.

By combining proven flume/level sensor technology with chordal transit-time velocity measurements, the Accuron 7200 (pat.pend.) ushers in a new age of highly efficient open channel flowmeters consistently operating in a 1-5% (actual rate) accuracy range.

Eastech combines two highly accurate and proven tech-nologies within a single-dual range unit. Low flows are consistently measured by an extremely reliable stainless steel trapezoidal flume/Teflon® level sensor combination. Higher flows are accurately ascertained by combining the same Teflon level sensor with a pair of non-fouling transit-time velocity sensors. Transit-time chordal meas-urement is the most viable technique for predicting aver-age velocity. It provides for detection of chordal velocity across the entire path of the fluid being measured.

LOW FLOW MONITORING

Accuracy ±3-5% (act.rate)
Turndown: 60:1 During periods of minimal flow (Zero to 1/3 pipe diameter), the Accuron measures flow within it's low operating range by utilizing the highly efficient combination of a trapezoidal flume and ultra-sonic level sensor.
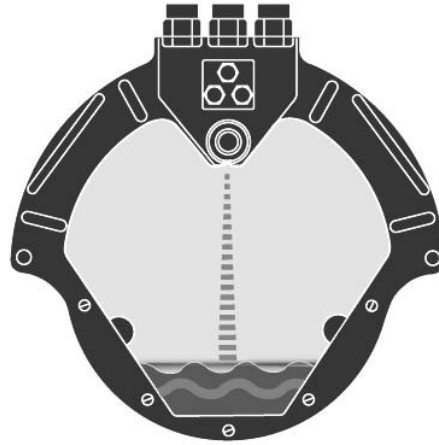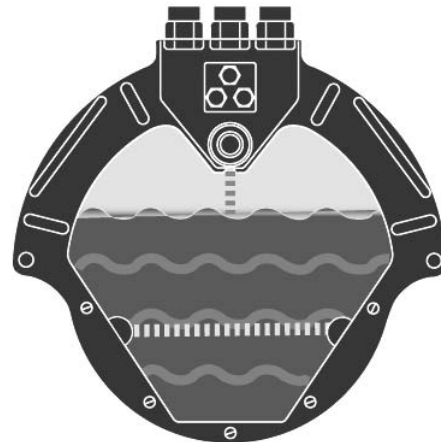
HIGH FLOW MONITORING

Accuracy ±1-2% (act.rate)
Turndown: 60:1 During periods of maximum flow (1/3 to full pipe diameter). The Accuron measures flow within its high operating range by utilizing an extremely accurate area-velocity system that combines an ultra-sonic level sensor with a pair of transit-time velocity sensors.

GENERAL SPECIFICATIONS
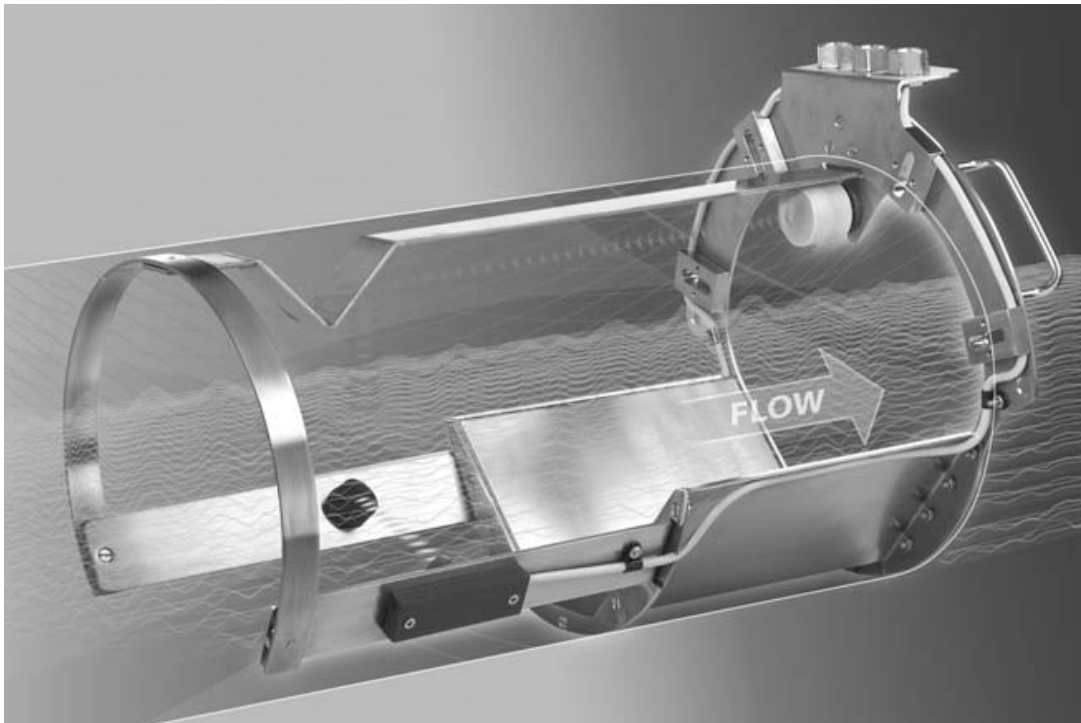
CARTRIDGE: 304 Stainless Steel.

ULTRASONIC LEVEL SENSOR: The risk and expense associated with repetitive confined space entry due to fouled submerged sensor problems is eliminated by utilizing an "above the flowstream" submersible Teflon level sensor.

TRAPEZOIDAL FLUME: The flat straight through bottom permits the flume to pass debris quite readily and reduces the problem of sediment build-up upstream of the flume.

TRANSIT-TIME VELOCITY SENSORS: Designed to prevent the accumulation of rags, branches and similar debris from interfering with the performance of the transducers.

Pipe Size Range	8 " to 24"
Output:	Three 4-20mADC isolated; 850 ohms max. Flow, Level and Velocity
	Three programmable relays, SPDT .25 amp @ 120 VAC, .5 amp @ 24 VDC
	RS-232 Serial Port, 9600 – 38400 Baud, Modbus ™ Protocol
	RS-485 Serial Port optically isolated, Modbus
	12VDC, 100ma Maximum
	Data Logger & software CD
Display	Backlit LCD, 160 x 128 pixel Graphic Module
Programming	Front panel mounted 24 button keypad
Power	80/240 VAC 50/60 Hz or 12-24 VDC @ 150 mA continuous
Accuracy	Low Flow +/- 3 to 5% of actual flow
	High flow +/- 1-2% of actual flow

Sensors:	Velocity Sensors:	
	Temperature Range:	-20° to 160°F (-30° to 70℃)
	Operating Frequency:	1280 KHZ
	Housing:	PVC
	Cable:	30 feet of Triaxial PVC coated (standard)
		Optional: 1000 ft maximum
	Level Sensor:	
	Temperature Range:	-20° to 160°F (-30° to 70℃)
	Operating Frequency:	51 KHZ
	Housing:	Teflon
	Cable:	30 feet of Triaxial PVC coated (standard)
		Optional: 1000 ft maximum

Enclosure	IP66, Nema 4x standard
Temperature Range	-4° to 158°F (-20° to -70℃)
Optional w/ heater:	-40°F to -158°F (-40° to -70℃)

6

FIELD READY INSTALLATION

THE CARTRIDGE METER IS A SINGLE FACTORY INTEGRATED UNIT, DESIGNED FOR 30 MINUTE FIELD INSTALLATION AND VALIDATION.

PRE-SIZED

Each field ready cartridge is pre-sized for it's intended application. Gasketed and manufactured of 304 stainless steel, cartridges are installed within minutes.

PRE-ALIGNED

Installed accuracy is guaranteed through precision factory alignment and calibration of each component encased within the cartridge.

PRE-PROGRAMMED

Every Cartridge Meter is factory programmed in strict accordance to customer supplied operating specifications.

CARTRIDGE INSTALLATION

HARDWARE
(Supplied by Eastech)

Masonry drill bit (1)
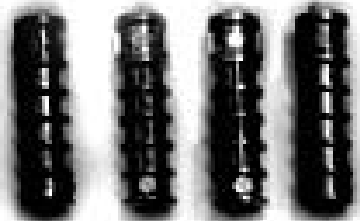
Lag shields (4)	Lag bolts (4)
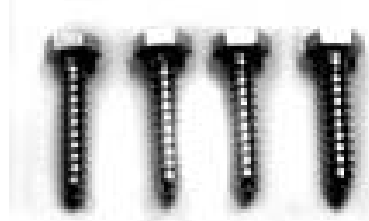
Turnbuckles (2)
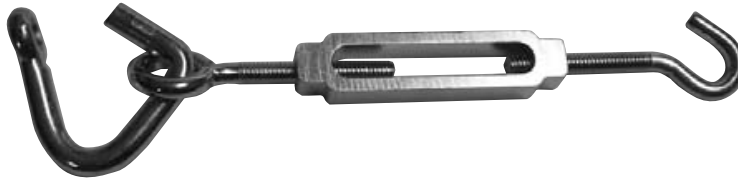
Flat washes (10)	Socket Drill Bit (1)

Marker (1)

STEP 1
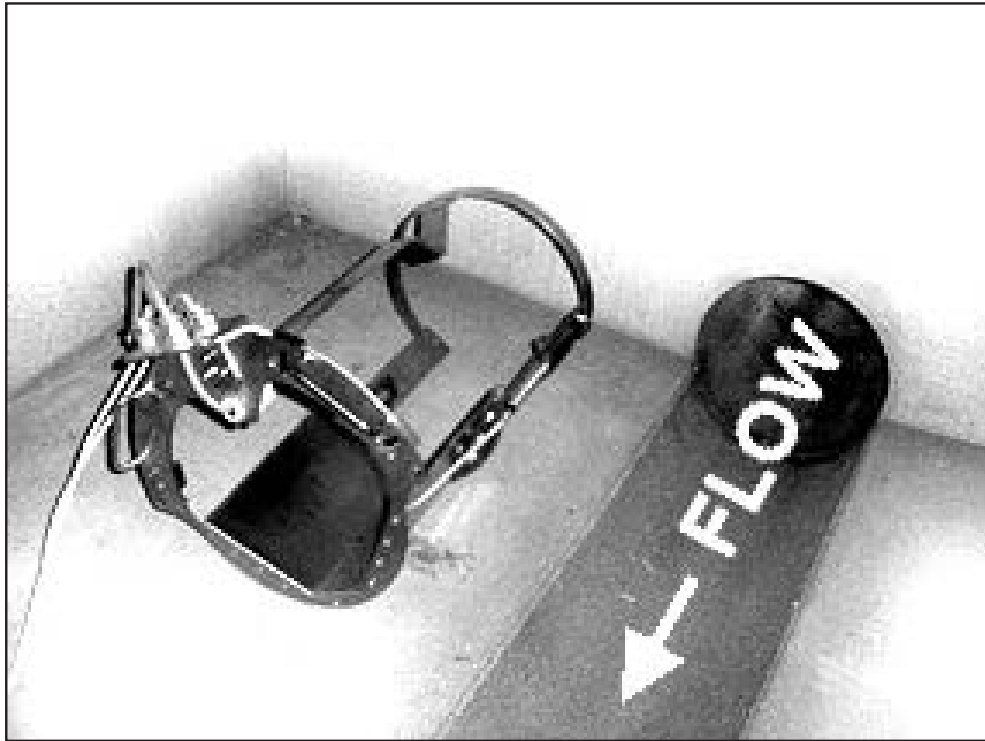
The Cartridge should be installed in the incoming pipe of the manhole.

STEP 2
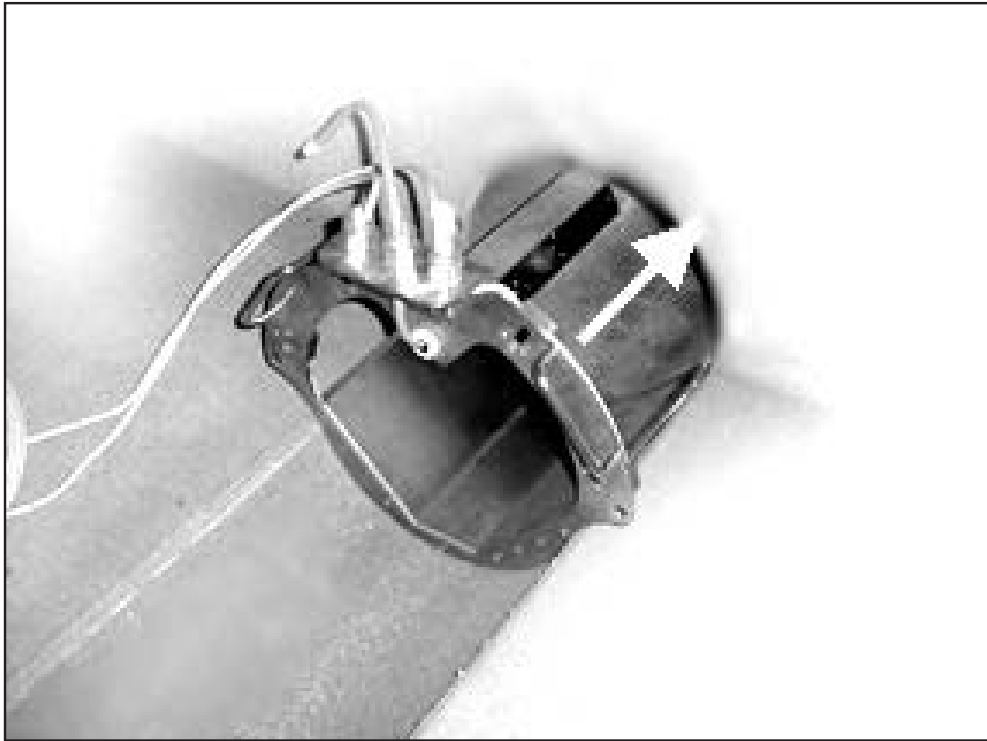
Slide the Cartridge into the pipe until the upstream flange is in contact with the wall.

STEP 3
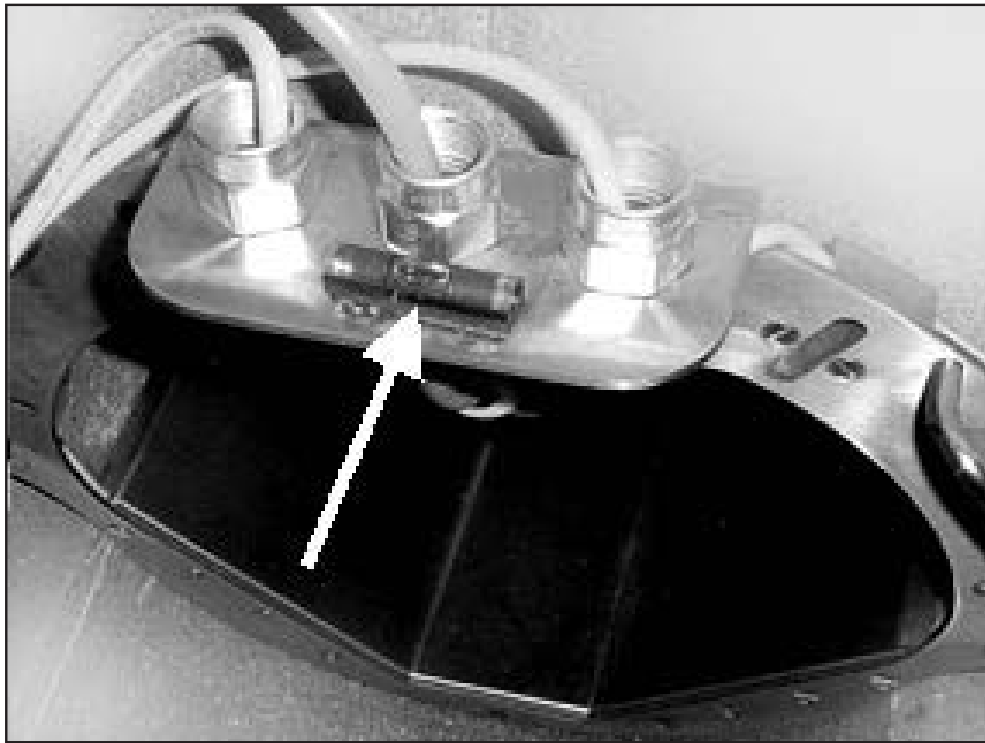
Rotate the Cartridge until the bubble in level provided is centered.

STEP 4

Use a pencil or marker and mark the four slot-ted holes provided in the flange of the Cartridge. Remove the cartridge from the pipe.

NOTE: If the sewer pipe is not flush with the sewer wall, utilize the two turnbuckles provid-ed. Insert the hook end into the hole below the handle of the Cartridge and attach other end to the sewer wall with the lag bolt.

STEP 5

Using the drill and the masonry drill bit provided, drill all four holes for the lag shield.

STEP 6
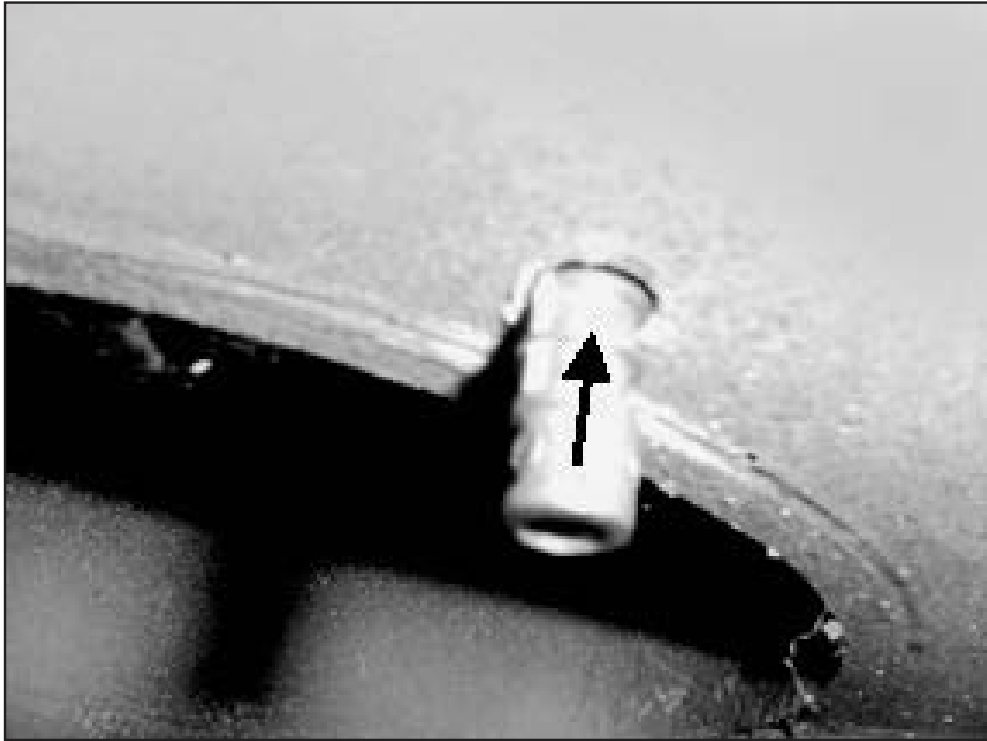
Insert the lag shields flush to the wall.

STEP 7
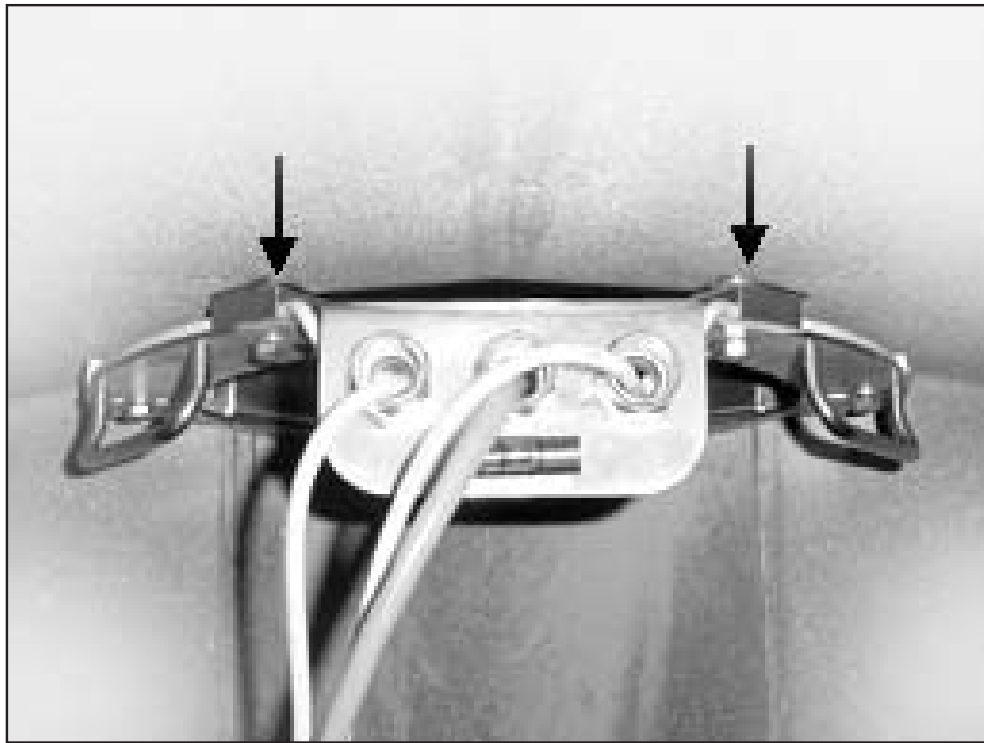
If installing the Cartridge in a round manhole, it may be necessary to use flat washers as spacers between the Cartridge flange and the wall.

STEP 8
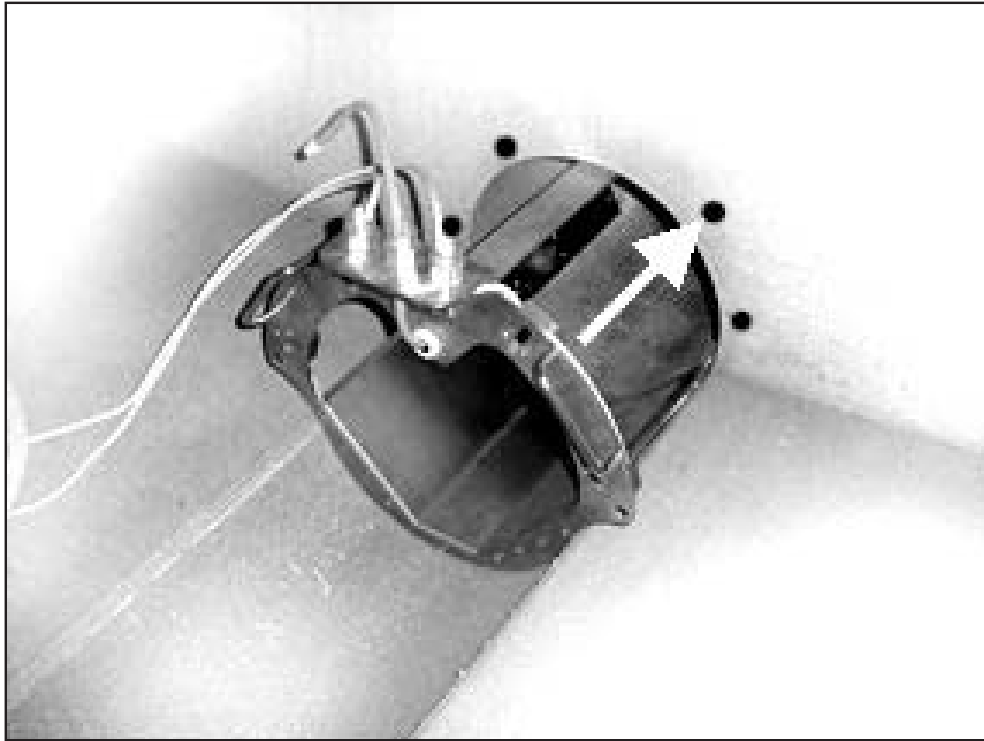
Re-insert the Cartridge. Line up the slots with the lag shield holes and screw the lag bolts with the flat washers through the flange in the Cartridge and snug tight.

ENCLOSURE MOUNTING
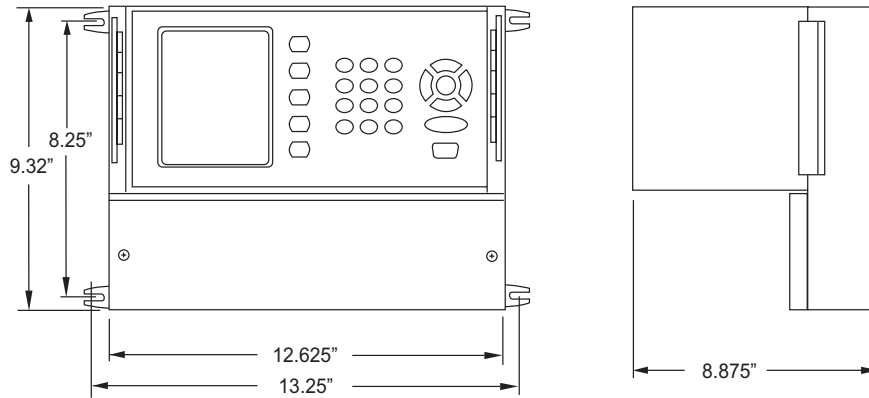
Do not face the display towards the sun. A sunshade must be used for outdoor installation. Conduit openings must be properly prepared and sealed to maintain the NEMA 4X rating. The enclosure is rated IP 66 (NEMA 4X) and can be mounted indoors or out. There are two stainless steel mounting brackets attached to the enclosure.

The mounting tabs have slots for 1/4" bolts (4 places). The electronics should be mounted with the display at eye level or lower. There are five 1/2" holes in the bottom of the enclosure for conduit fittings. These holes have rubber plugs installed at the factory.

Opening the Enclosure:
There are two hinged floor clasps on the front cover of the enclosure. To open, place thumb on one of the hinges, pull toward the outside of the enclosure. Once the hinge pops to the outside it will retract 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, re-attach the hinge into the clasp and push the top of the hinge toward the enclosure until it locks.

Hinge Lock and Optional Key Lock
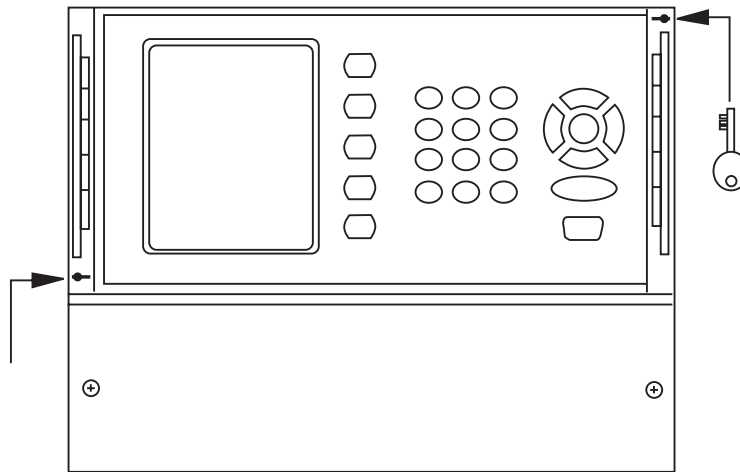
Two plastic gray plugs are supplied with the Accuron meter housing. The plugs may be utilized to permanently lock either side of the cover by inserting them into the keyhole. The optional Keylock may than be used to lock and unlock the other side of the cover. The key can only be removed if the cover is in the locked mode.

SENSOR CABLE PREPARATION

VELOCITY SENSORS (PAIR)

IMPORTANT

Before pulling the sensor cables through the conduits, mark the ends of the cables to indicate which is the upstream and downstream sensor cable. Leave approximately 1 foot of cable extending from the conduit in the enclosure. Prepare the cable ends in the following manner.

NOTE: All Drawings are to scale. They may be used as a template.

1. Remove outer cable cover. Measure 1-7/8" from the end of the cable. With a cutting tool, carefully cut through the outer cover making sure not to cut into the outer shield. Remove the outer cover.

1

1-7/8"
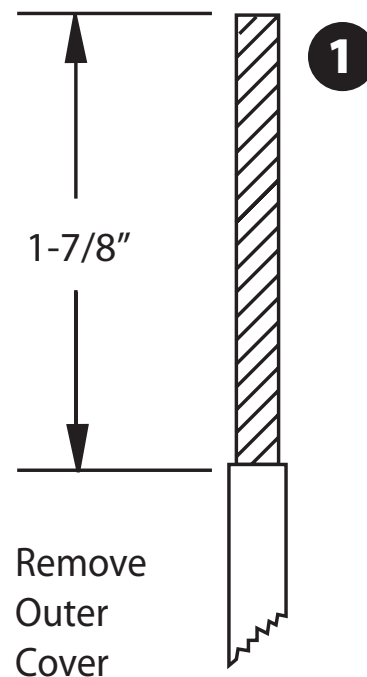
Remove Outer Cover

2. Remove outer shield. Measure 1-3/8" from the end of the cable. With a pair of small side cutters, cut the shield around the cable at the measured point and remove the outer shield.

1-3/8"

2

Remove
Outer
Shield
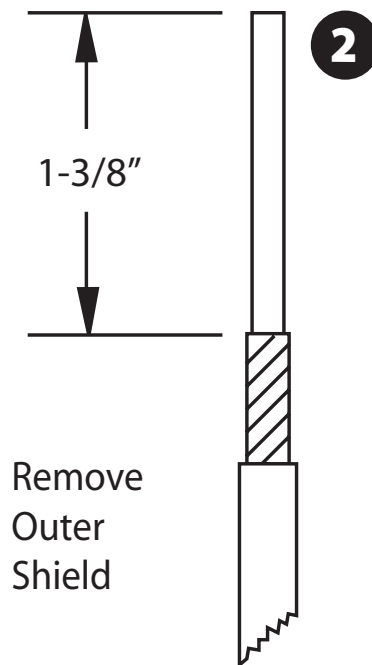
3. Remove middle cover. Measure 1-1/8" from the end of the cable. With a cutting tool, carefully cut through the middle cover making sure not to cut into the middle shield. Remove the middle cover.

1-1/8"

3

Remove
Middle
Cover
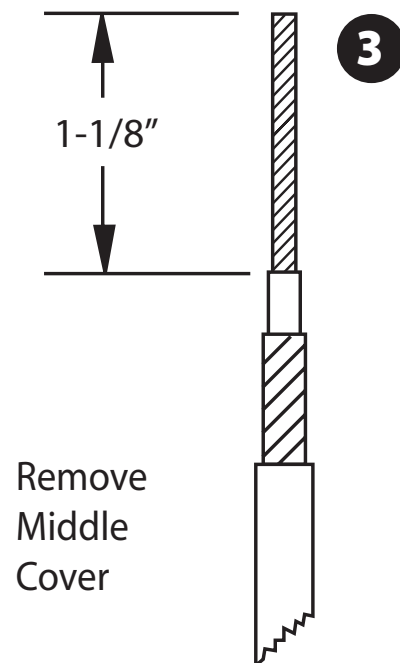
4. Remove middle shield. Measure 3/4" from the end of the cable. With a pair of small side cutters, cut the shield around the cable and remove middle shield.

3/4"

4

Remove
Middle
Shield
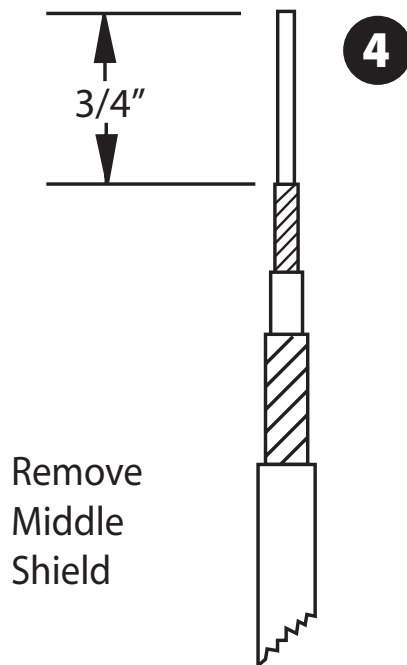
5. Remove inner cover. Measure 1/2" from the end of the cable. With a cutting tool or pair of wire strippers, carefully cut the inner covering, making sure not to cut into the center conductor. Remove the inner cover.

1/2"

5

Remove
Inner
Cover
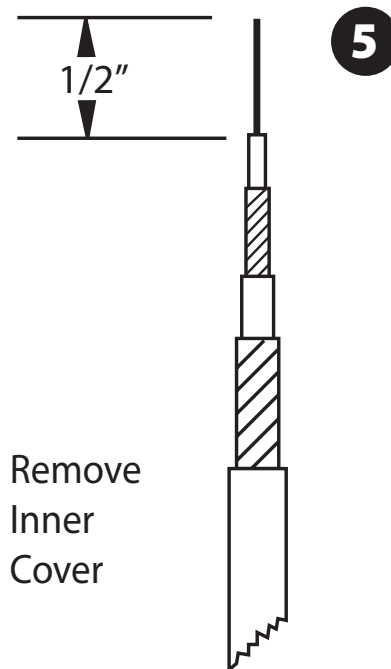
USE DRAWING BELOW AS TEMPLATE
FOR CONFIRMATION
OF CORRECT CABLE PREPARATION

1/2"

1/4"

3/8"

1/4"

1/2"

Completed
Cable
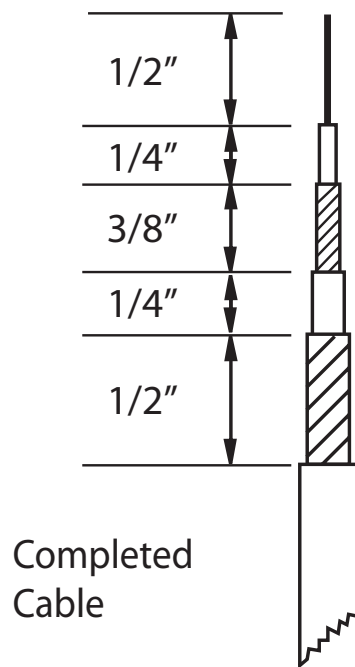
LEVEL SENSOR CABLE PREPARATION

SINGLE LEVEL SENSOR

RED   WHITE
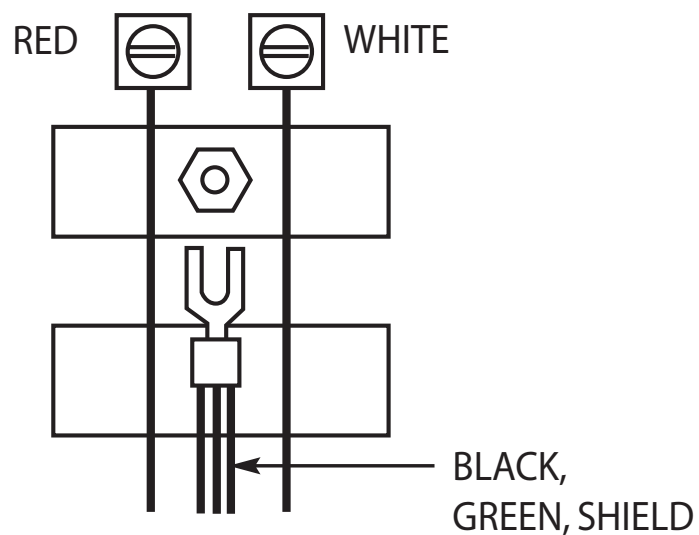
BLACK, GREEN, SHIELD

Red Wire:

Strip wire approximately 1/4 to 3/8"

White Wire:

Strip wire approximately 1/4 to 3/8"

Black, Green and Shield Wires:

Strip black and green wire and crimp all three wires into the spade lug provided.

VELOCITY & LEVEL SENSOR WIRING

METER ENCLOSURE WIRING
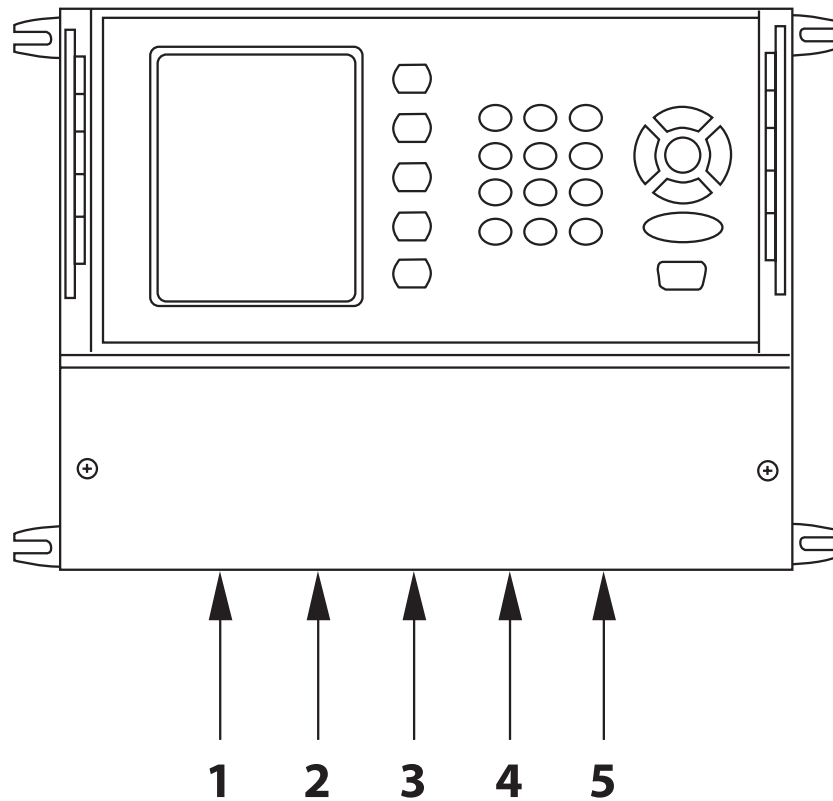
The bottom of the Accuron enclosure is furnished with (5) 1/2" conduit entrances

METER WIRING DIAGRAM

There are three terminal strips provided for all wiring of the Accuron 7200. the AC power terminal is separate from the other two terminal strips. The power terminal strip has three connections for High (Hot), Low (Neutral), and Ground for AC voltage only. Refer to the wiring diagram below for all internal wiring connections. The unit may also be powered with 12-24 VDC at row B. Terminals 1 (+) and 2 (-).

ROW B
TOP ROW

ROW A
BOTTOM ROW

POWER

G	GND	(ground)
N	LO	(neutral)
L	HI	(hot)

90-240 VAC
50/60 HZ

	ROW B			ROW A	
	N/A	18		18	PE
	N/A	17		17	B
RS-485		16		16	A
	B	15		15	NC
	A	14		14	C
RS-232	GNO	13		13	NO
	CTS	12		12	NC
	RTS	11		11	C
	RX	10		10	NO
	TX	9		9	NC
	N/A	8		8	C
	N/A	7		7	NO
	–	6		6	–
	+	5		5	+
	–	4		4	–
	+	3		3	+
	–	2		2	–
Battery (DC) In	+	1		1	+

ProfiBus (18 PE, 17 B, 16 A)

Relay #3 (15 NC, 14 C, 13 NO)

Relay #2 (12 NC, 11 C, 10 NO)

Relay #1 (9 NC, 8 C, 7 NO)

4-20mA DC Out   FLOW (6 –, 5 +)

4-20mA DC Out   VELOCITY (4 –, 3 +)

4-20mA DC Out   LEVEL (2 –, 1 +)

LEVEL SENSOR
W — WHITE
R — Black, Green & Shield
RED

(Optional)
SM-15
Surcharge
Sensor
W — WHITE
R — Black, Green & Shield
RED

VELOCITY
SENSORS
(CHANNEL 1)
DOWNSTREAM
UPSTREAM

METER WIRING cont.

OUTPUTS

3) 4-20 mADC Terminals 1-6 (bottom)	Isolated into 850 ohms max Flow, Level and Velocity
3 Programmable Relays Terminals 7-15 (bottom)	SPDT .25 amp @ 120 VAC, .5 amp @ 24 VDC
RS-232 Serial Port Terminals 9-13 (top)	9600-38400 Baud, Modbus Protocol
RS-485 Serial Port Terminals 14-16 (top)	Optically isolated, Modbus Protocol
DC Power In Terminals 1-2 (top)	12 VDC. 100mA maximum
Data Logger & Software CD	

VELOCITY SENSOR

CABLE CONNECTIONS

After the ends of the cables have been prepaired, loosen the screws on the terminals and remove the two pairs of clamps on the velocity sensor cable terminal board.

CHANNEL 1

UPSTREAM
SEMSOR
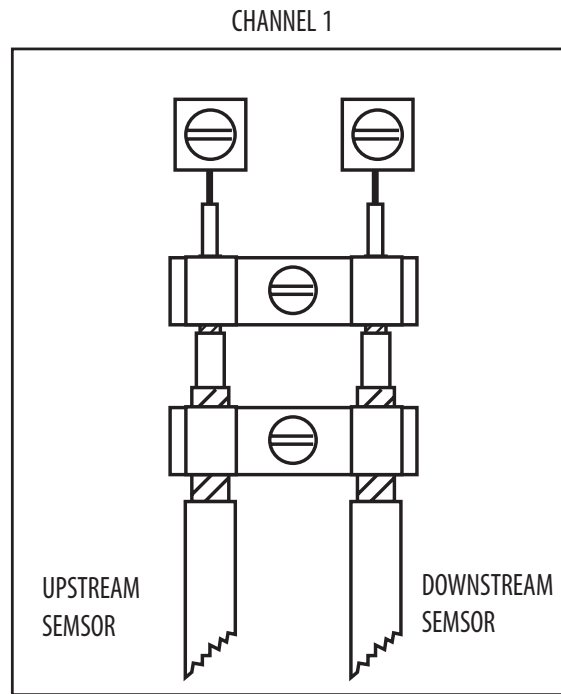
DOWNSTREAM
SEMSOR

Take the upsteam cable and insert the center conductor into the upstream terminal connection and tighten the screw. Slightly pull on the cable to insure the wire is secured to the terminal. Take the downstream cable and insert the center conductor into the downstream terminal connection and tighten the screw. Slightly pull on the cable to insure the wire is secured to the terminal.

Place the two clamps over the top and bottom shields and secure them into place. Verify that the clamps are making good contact with the shields and that frayed shield wires are not extending beyond their own clamp-down area.

VELOCITY SENSOR

PROPER INSTALLATION CONFIRMATION

Sensor cable connection continuity test.
This test will require the use of an ohmmeter. With the power off, connect the test leads of the ohmmeter to Points 1 and 3 of the sensor cable connections on the sensor terminal block. The ohmmeter should read 10,000 ohms +/- 5%. Repeat this test at Points 2 and 3.

SENSOR CABLE CONNECTIONS
ON POWER SUPPLY BOARD

UPSTREAM
SEMSOR

DOWNSTREAM
SEMSOR
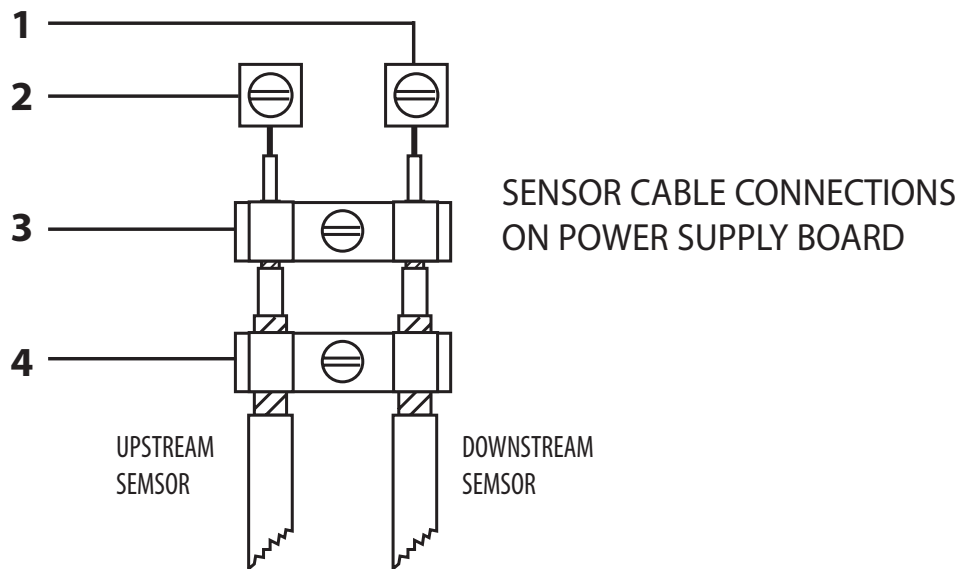
Connect the test leads to Points 3 and 4.
The reading should indicate infinity (or an open).

Connect the test leads to Points 1 and 4, then 2 and 4.
The reading should indicate infinity (or an open).

LEVEL SENSOR
CABLE CONNECTIONS

LEVEL
SENSOR

WHITE
Black, Green & Shield
RED

(Optional)
SM-15
Surcharge
Sensor

WHITE
Black, Green & Shield
RED
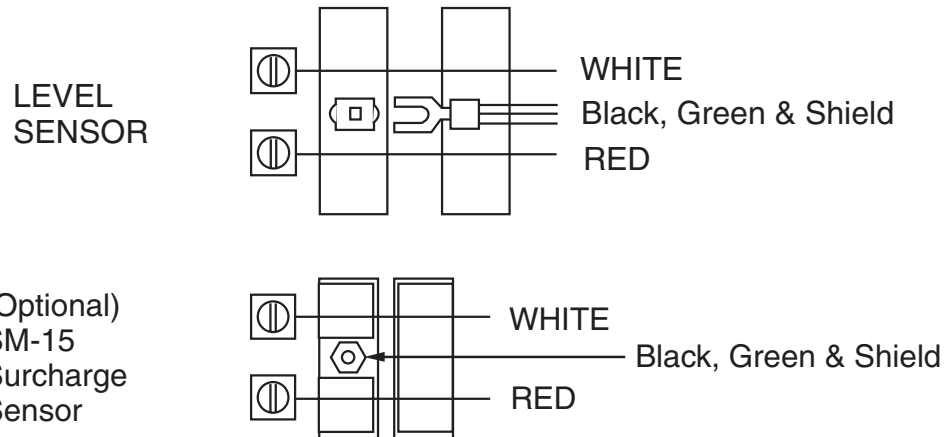
Red Wire: Terminate as shown

White Wire: Terminate as shown

Black, Green and Shield Wires:
Crimp all three wires into the spade lug provided.
Loosen the nut on the wiring termination and slide the
lug under the nut. Hand tighten the nut on top of the
lug wire.

PROGRAMMING

ENTER AND ADJUSTMENT KEYS

NUMERIC PROGRAMMING KEYS

5 FUNCTION KEYS

Programming of the sensor parameters for the Cartridge Meter is not necessary. Since each unit is pre-sized for it's intended application, and the velocity and level sensors are precision factory aligned prior to shipment, the only field programming required is specific user operating preferences.

Power-up Screen

On power up, the display will indicate for a few seconds the current revision and check/sum (used to validate the firmware integrity) before progressing to the main screen.

Main Screen

The Accuron 7200 main screen displays flow, velocity and totals. A status of the velocity signal crossing the pipe is also given. "OK" signifies proper reception of the crossing signal. A "No signal" signifies that there are interruptions of the crossing signal that will prevent the meter from registering flow.

A function map of the five F-keys is displayed at the bottom of the screen.

The keys provide rapid one button access to commonly used functions.

```
FLOW                    GPM
                        00
VELOCITY                FPS
                        00
TOTAL       GAL  x100
                         1

Status - M.Bd Err
       08/30 09:10:39
 F1    F2    F3    F4    F5
Status Sensor Totals Log Info
```
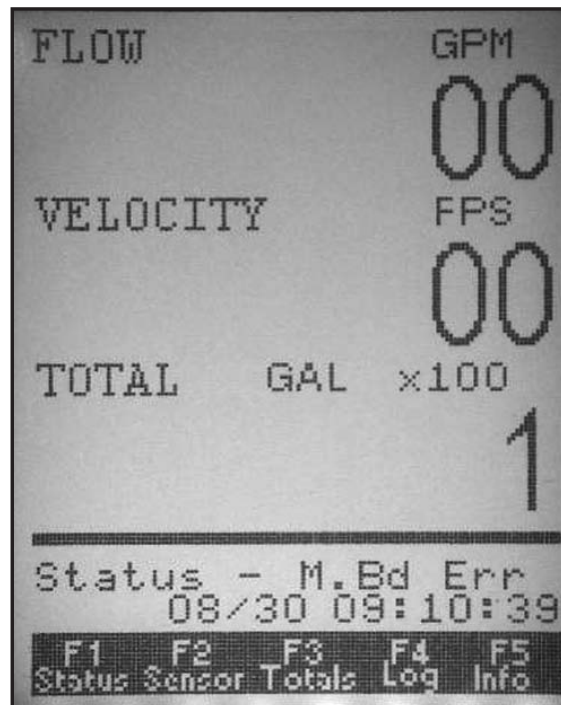
Three pages of details can be accessed from the F1 key; F1-1, F1-2 and F1-3.

F1-1

F1-1 displays phase shift in degrees, transit time in milliseconds, velocity in feet per second, the measured distance from the level sensor to the fluid, and the calculated level of the water, in user selectable units (see OPTIONS section), above the 0 flow point of the channel.

```
         Phase
                    00
       Transit Time
                    00
        Velocity 1
                    00
        Velocity 2
                    00
    Distance    Level
         00          00
```
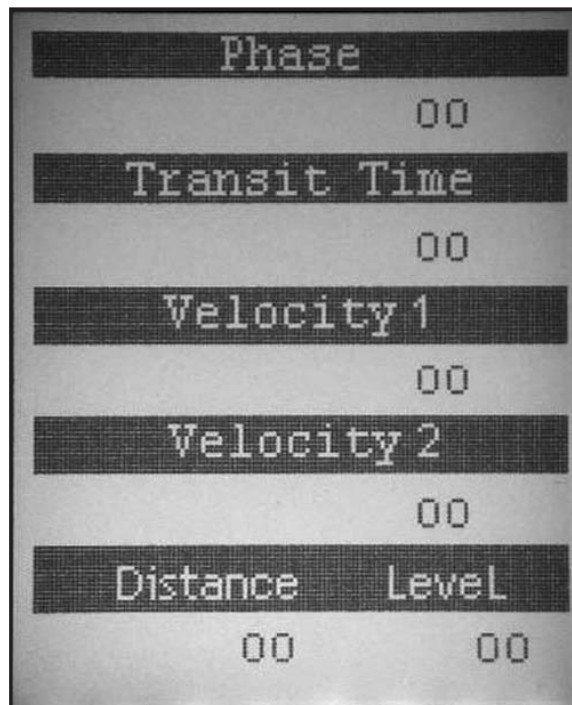
Press the ENTER key to cycle to the next status page (F1-2). Cycling through all of the status pages will return you to the main screen.

F1-2

F1-2 displays the status and gain required by each channel to maximize the signal strength (a lower number indicates a strong signal). Typical values for the velocity sensors will be between 650 and 850. Gain values for the height sensor should be between 300 and 400. The temperature and fluid level as monitored by the level sensor will also be displayed.

Press the ENTER key to cycle to the next status page (F1-3). Cycling through all of the status pages will return you to the main screen.

F1-3

F1-3 displays the status of the alarms based on set points, the 4-20mA loop and assigned relays (see OPTIOINS for assigning set points).
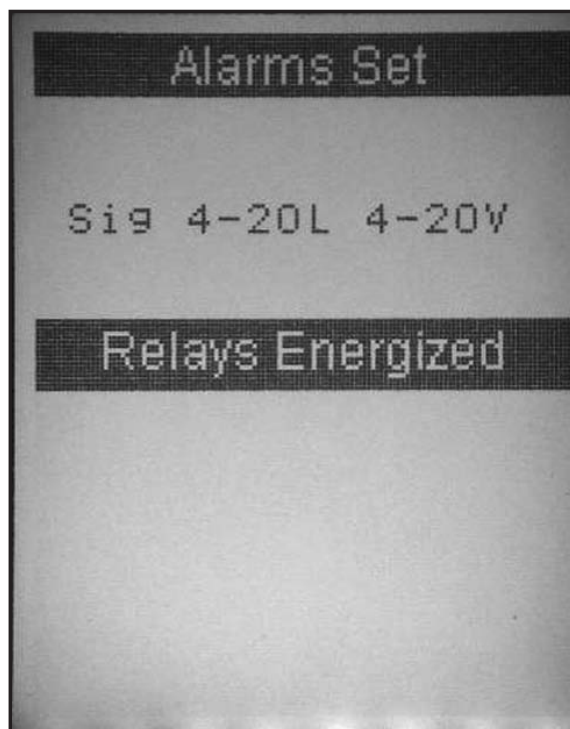
Press ENTER to return to the main screen.

F2

Two pages of details can be accessed from the F2 key; F2-1and F2-2

F2-1 and F2-2 display sensor set-up details programmed at the factory. These details are provided for reference only.
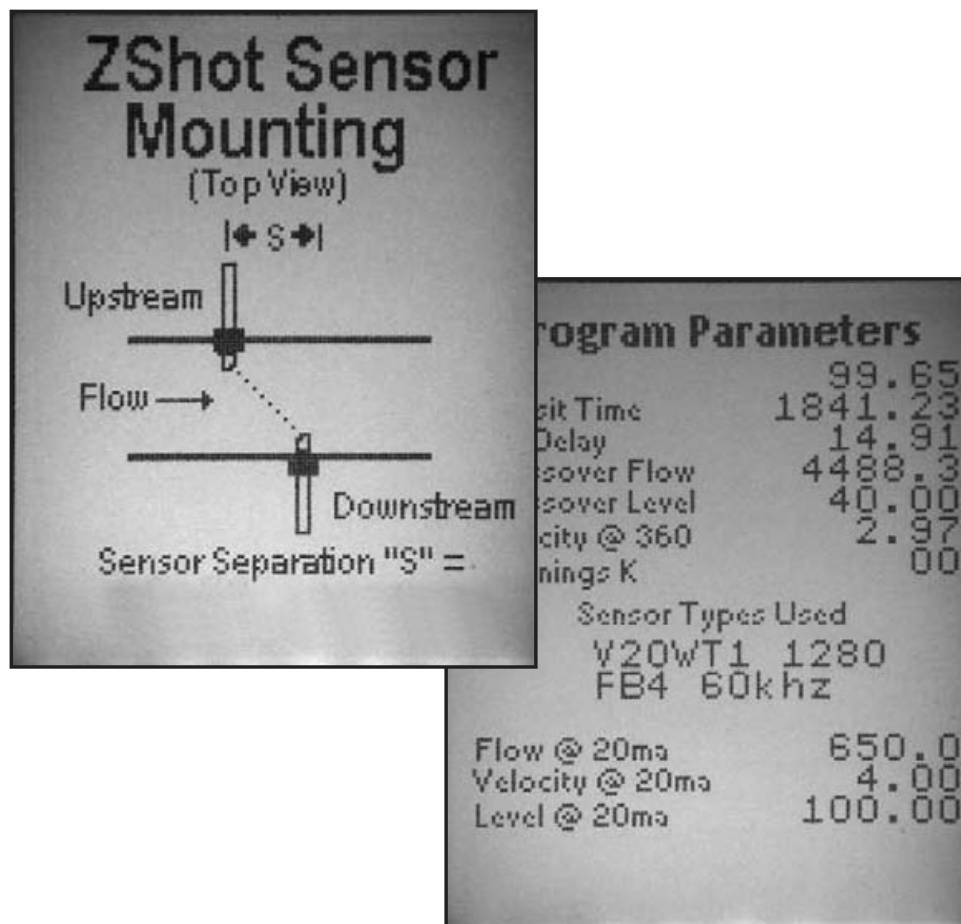
Press ENTER to cycle through the status pages and return to the main screen.

F3

F3 displays forward and reverse (reverse velocity) totals from the last 8 days. Starting with day 0 (current day) pressing the left and right arrow keys will cycle through day 8 in a wraparound fashion.

```
        ** Day 0 **
  Measure Unit
                GAL×100
     Forward Totals

                  00

     Reverse Totals

                  00
```

Press Enter to return to main screen.

F4

F4 displays the eight available channels and the currently selected parameters (see OPTIONS for choosing other parameter settings). Entering the channel selection will display an X Y graph of logged values.

```
Select Log Channel
▶01) Log Ch #1
 02) Log Ch #2
 03) Log Ch #3
 04) Log Ch #4
 05) Log Ch #5
 06) Log Ch #6
 07) Log Ch #7
 08) Log Ch #8


Present Settings
Ch #1 FlowF
Ch #2 Vel#1
Ch #3 Level
Ch #4 Not used
Ch #5 Not used
Ch #6 Not used
Ch #7 Not used
Ch #8 Not used
```

The X range can be adjusted by pressing the left and right arrow keys. The Y scale can be altered with the F2 and or F3 key. F2 will adjust the range and F3 will adjust the offset.
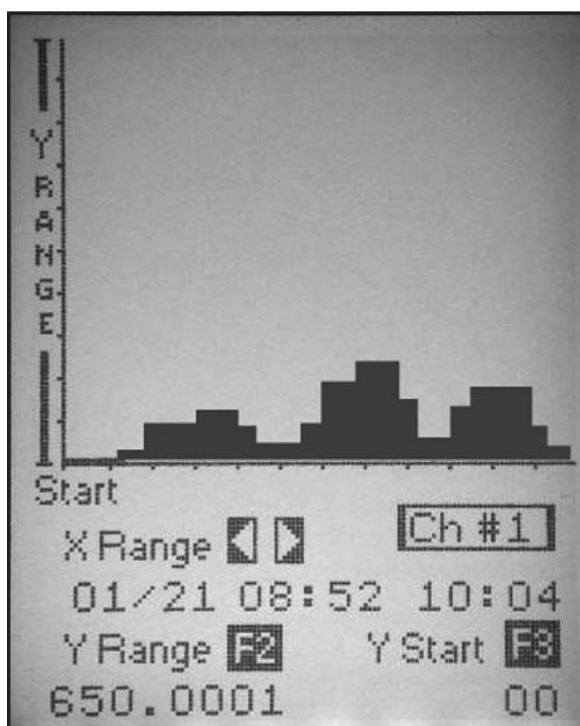
Continuous pressing of the Enter key will return the display to the main screen.

F5

F5 displays firmware revision and check/sum.

Press Enter to return to the main screen.

OPTIONS

Programming Overview

Although all of the necessary parameters have been pre-programmed at the factory, some applications may require changing these parameters. Pressing MENU on the keypad, while viewing the main screen, will display the MAIN MENU. The MAIN MENU is the first branch in a tree type topology that provides access to all the 7200 QuickCal Firmware setting.

```
Select Operation

▶01) Review Meter
 02) Program
 03) Daily Totals
 04) Data Logger
 05) System Setup
```
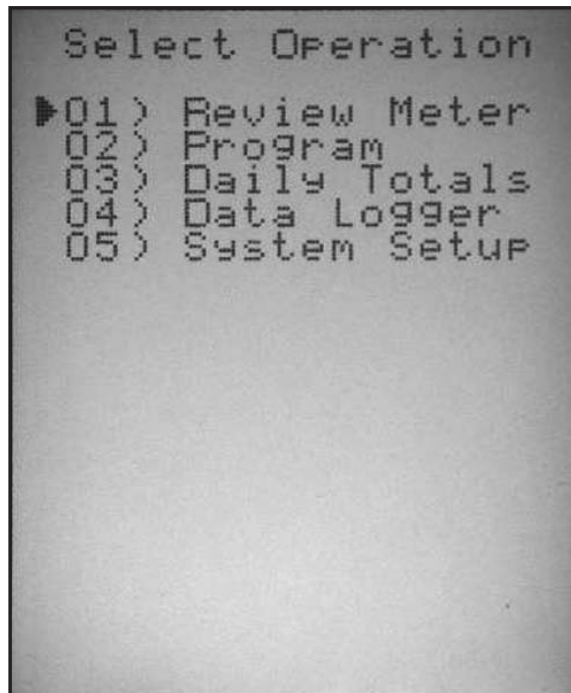
Select 01 through 05 to display each OPTION or re-press MENU to exit to the main screen.

Below is a quick overview of the menu system.

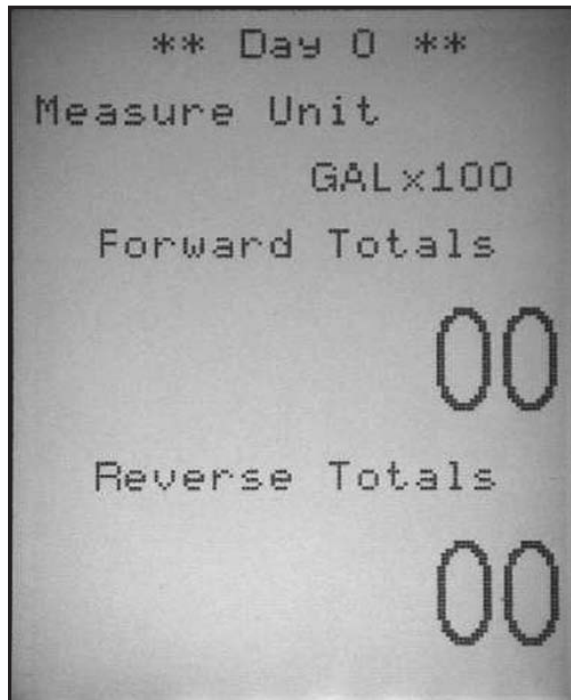|		
>01) Review Meter	(ENTER)	Displays the sensor mounting and programmed parameters.
>02) Program	01) Measure Units	Assign units of flow, velocity, temperature and distance.
	02) Level (H) Sensor	To set sensor frequency, distance and temperature calibration.
	03) Totalizer	To set totalizer units and multiplier.
	04) 4-20 Outputs	To adjust, assign and scale the 4-20mA output and assign low flow shutdown.
	05) Damping	To adjust damping time.
	06) Lost Signal	To set lost signal time and "fail to" option.
	07) Flow Sim.	To test outputs at simulated area and velocity combinations
	08) Integrator	To assign closure rates for the contact integrator.
	09) Setpoints	To set operating points for relays, alarms, recording rates…
	10) Relays	To assign relay activity.
	11) Meter Factor	Zero offset and meter factor adjustments.
>03) Daily Totals	Day 0 - 7	Display total for the last seven days.
>04) Data Logger	01) Set Time/Date	To set the time, day and date for logging functions.
	02) Storage Rate	To set logger storage interval.
	03) Secondary	To set secondary trip point storage interval.
	04) Log Channels	To assign logging values for up-to eight channels.
	05) Logged Graph	To define and view graphs of recorded data.
	06) Logged Data	To review recorded data.
	07) Amount Stored	To view the time of the last recorded value, number of records stored and remaining available records.
	08) Clear Data	To clear recorded data.
>05) System Setup	01) Display	To adjust contrast and backlighting.
	02) Comm Ports	To set RS-232 and 485 baud rates, IDs, flow control and modem initialization string.
	03) Display Modes	To select alternate lines of display on the main screen.
	04) Totals Reset	To reset the totalizer.
	05) New Password	To change the password.
	06) Daily Tot Rst	To clear the daily summary.
	07) Sensor Option	To change the velocity sensors power and polarity.
	08) Meter Reset	To reset the meter to factory defaults.
	09) New Firmware	To upload new firmware to the meter.

PROGRAMMING OPTIONS

>01) Review Meter

01-1 and 01-2 display sensor set-up details programmed at the factory. These details are provided for reference only.
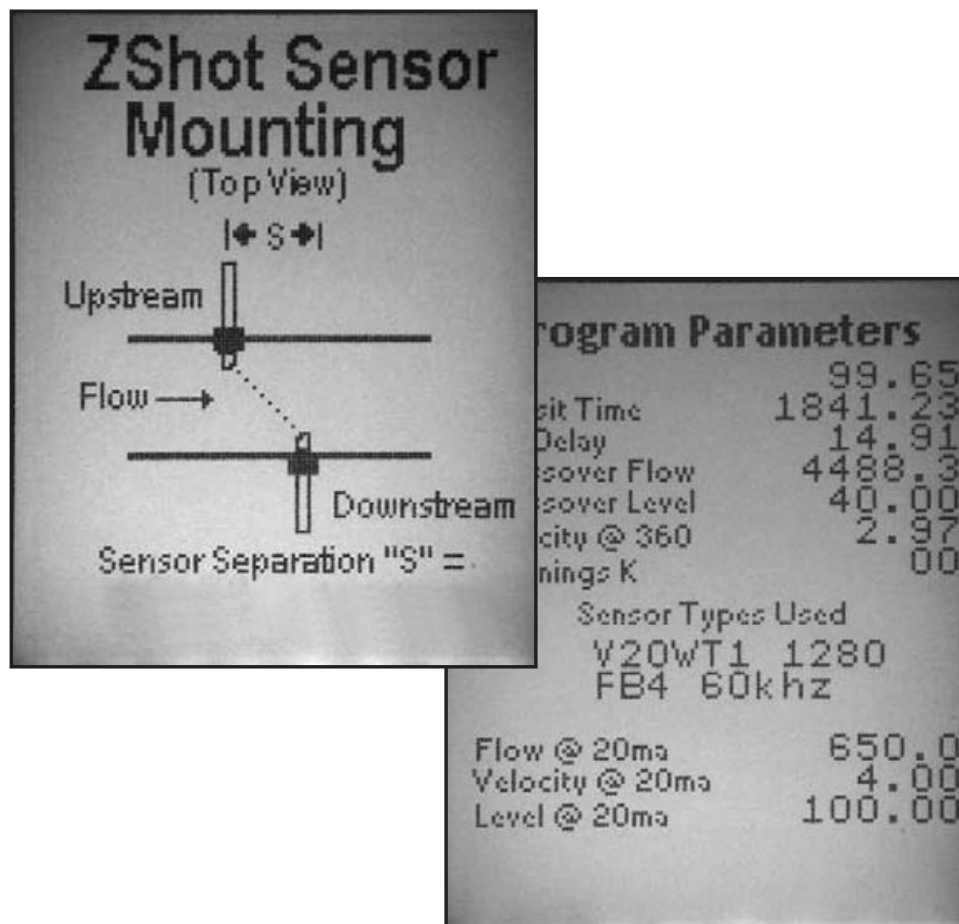
Press ENTER to cycle through the status pages and return to the MAIN MENU.

>02) Program

Programming parameters are password protected in order to prevent accidental or malicious changes. Initially the password is factory set to 00000000. The 02 program has eleven sub menus that provide access to critical system options and calibration.

```
Select Operation

 01) Review Meter
▶02) Program
 03) Daily Totals
 04) Data Logger
 05) System Setup
```

```
Enter Password to
       Continue

    00000000
```

```
      Program/Cal.

▶01) Measure Units
 02) HSensor Setup
 03) Totalizer
 04) 4-20 Outputs
 05) Damping
 06) Lost Signal
 07) Flow Sim.
 08) Integrator
 09) Setpoints
 10) Relays
 11) Meter Factor
```
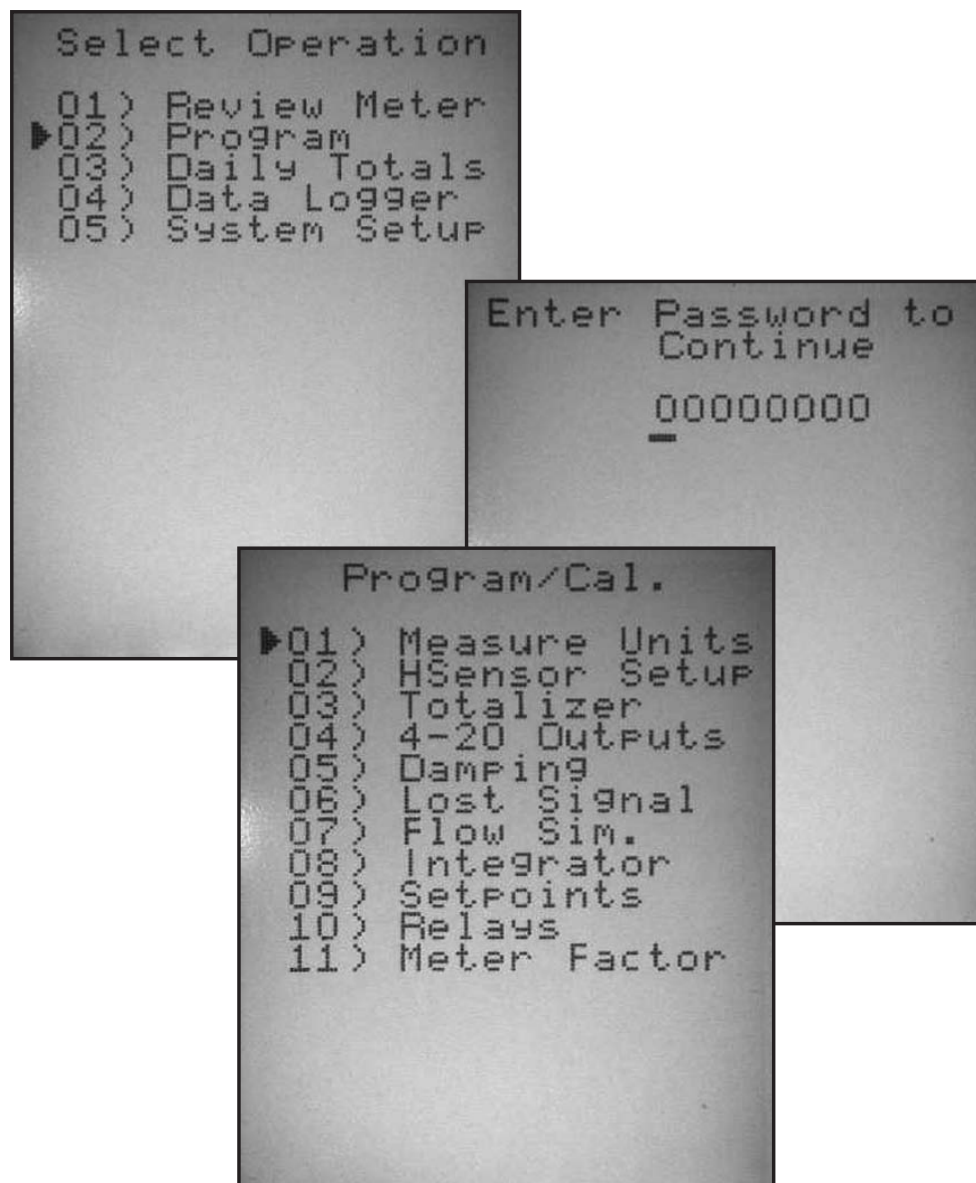
>02) Program

01) Measure Units:

From the main screen press the MENU key then the number 02. Enter the password (default is 00000000) and press the ENTER key followed by 01.

Flow Units:

Select the units of measure desired by entering numerals in front of the selection desired. The available units are:

01)	GPM, gallons/minute	09)	LPD, liters/day
02)	GPD, gallons/day	10)	MLD, million liters/day
03)	MGD, million gallons/day	11)	M3S, cubic meters/second
04)	CFS, cubic feet/second	12)	M3H, cubic meters/hour
05)	CFM, cubic feet/minute	13)	M3D, cubic meters/day
06)	CFD, cubic feet/day	14)	IGM, imperial gallons/minute
07)	LPS, liters/second	15)	BPH, barrels/hour
08)	LPM, liters/minute		

After pressing the selected flow unit, the next screen will automatically appear.
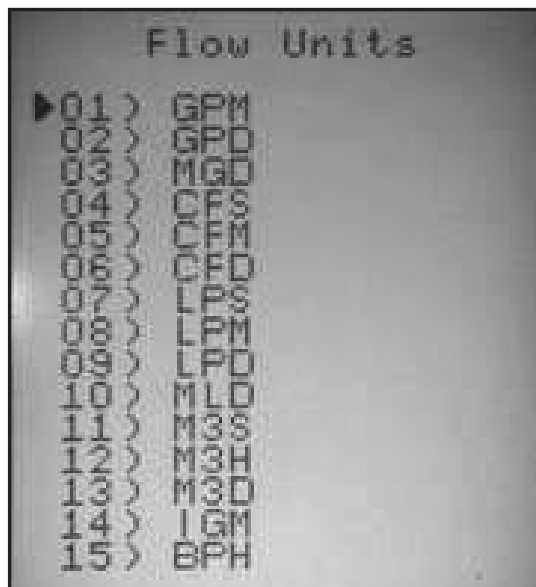
Flow Display format:

The FLOW DISPLAY FORMAT screen allows selection of the number of digits displayed to the right of the decimal point.

Example: GPM, #.## would display 100 gallons per minute as 100.00 GPM.

The decimal format selection automatically advances the program to the next screen.


```
Flw Display Format

 01)  #.
▶02)  #.#
 03)  #.##
 04)  #.###
```
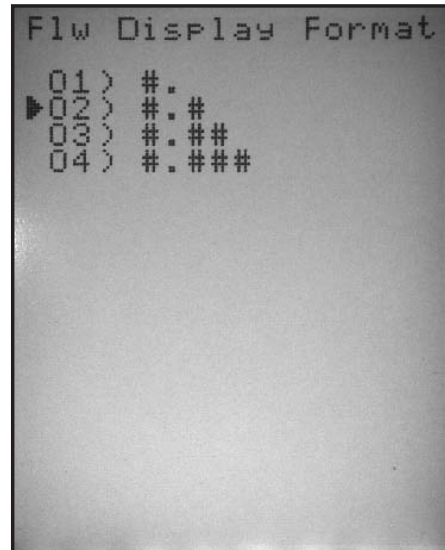
Velocity Units:

The VELOCITY UNITS screen allow the user to enter 01) FPS feet per second or 02) MPS meters per second.

The velocity units selection automatically advances the program to the next screen.


```
Velocity Units

▶01)  FPS
 02)  MPS
```

Dimension Units:

Five options are presented for the DIMENSION UNITS: 01) Inches, 02) Feet 03) Meters, 04) Centimeters, 05) Millimeters. The dimension units selection automatically advances the program to the next screen.

```
Dimension Units
▶01) Inches
  02) Feet
  03) Meters
  04) Centimeters
  05) Millimeters
```
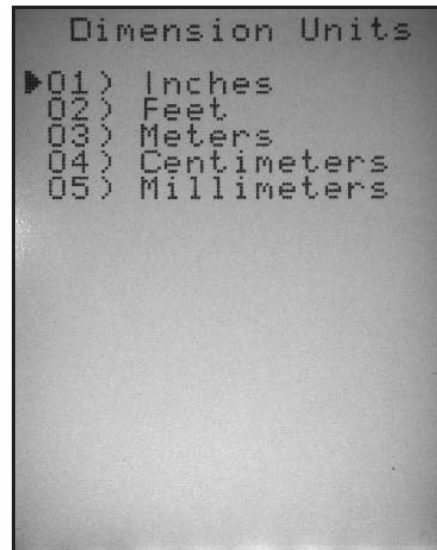
Temperature Units:

The two options are 01) Celsius or 02) Fahrenheit.

```
Temperature Unit
▶01) Celcius
  02) Fahrenheit
```

IMPORTANT: Press MENU and ENTER to store changes.

>02) Program

02) Level (H) Sensor Set-up:
From the MAIN SCREEN, press the MENU key then the number 02. Enter the password (default is 00000000) and press the ENTER key followed by 02).

01) Distance Calibration:
The Accuron 7200 series meters are pre-calibrated as a unit at the factory. There may be situations however that require recalibration of the Level or optional Surcharge sensor. To properly perform calibration it may be necessary to remove the head from the cartridge. Select 01) for distance calibrations. Press the left arrow (Near Distance). Place a target parallel to the face of the sensor at a distance from 12 to 36 inches. Make an accurate physical measurement of the distance from the face of the sensor. Using the up or down arrow keys, adjust the distance reading to equal the measurement distance. Press the right arrow (Far Distance) and repeat the process with an accurately measured target distance greater than 40 inches. Using the meter, measure the zero flow distance, making sure it matches the V&mt (vertical mount) as displayed on the screen.

Press MENU and ENTER to store changes.
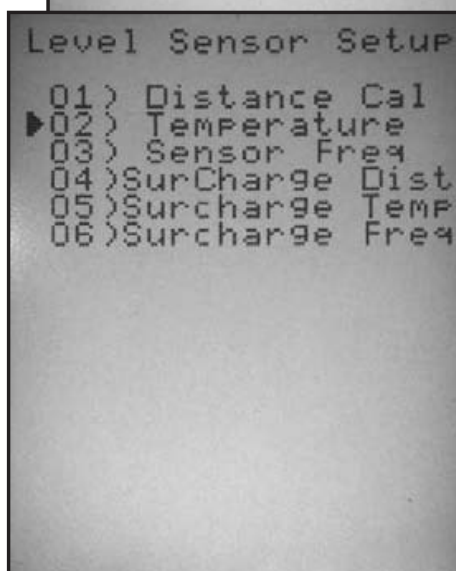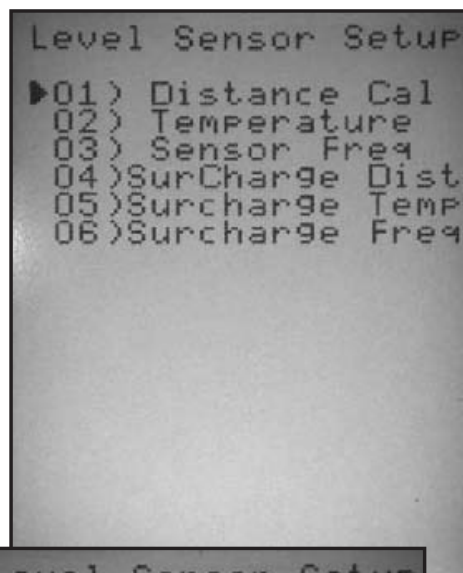
>02) Program

02) Temperature:

Temperature compensation is important to accuracy. To adjust the temperature select 02). The current reading will be displayed for reference. Enter the actual temperature as measured by an external device.

Press MENU and ENTER to store changes.

```
UH Temperature Set
Sensor Temperature

        00

Enter correctValue

        00
```

03) Sensor Frequency:

To reduce the chance of a lost signal the appropriate frequency must be chosen. To optimize the frequency, select 03), and with a stationary target use the 1 and 3 keys to move the frequency up and down until the lowest gain is achieved.

Press MENU and ENTER to store changes.

```
Level Sensor Setup

  01) Distance Cal
  02) Temperature
▶03) Sensor Freq
  04)SurCharge Dist
  05)Surcharge Temp
  06)Surcharge Freq
```

Each of the above steps can be repeated for the optional SM-15 Surcharge Monitor.

04) Surcharge Distance

05) Surcharge Temperature

06) Surcharge Frequency

Press MENU and ENTER to store changes.

```
Sensor Optimize

Press key 1 or 3
to adjust number
  shown below to
its lowest value.

Pause between each
keypress to allow
number to adjust

      2416
```

>02) Program

03) Totalizer:

From the main screen, press the MENU key then the number 02. Enter the password (default is 00000000) and press the ENTER key followed by 03).

The Totalizer Units:

Select the units of measure desired by entering numerals in front of the selection desired. The available units are:

01) GAL, gallons
02) MET3, cubic meters
03) LTRS, liters
04) IGAL, imperial gallons
05) BARR, barrels
06) CUFT, cubic feet
07) ACFT, acre foot

Totalizer Multiplier:

The next screen selection is the Totalizer Multiplier. There are eight selections for the Totalizer Multiplier ranging from X.001 to X10K. Select the number that corresponds to the multiplier required. The display will indicate the flow as a multiple of that value. For example: Selecting 07) would indicate 80 Gal x1000 for 80,000 gallons.
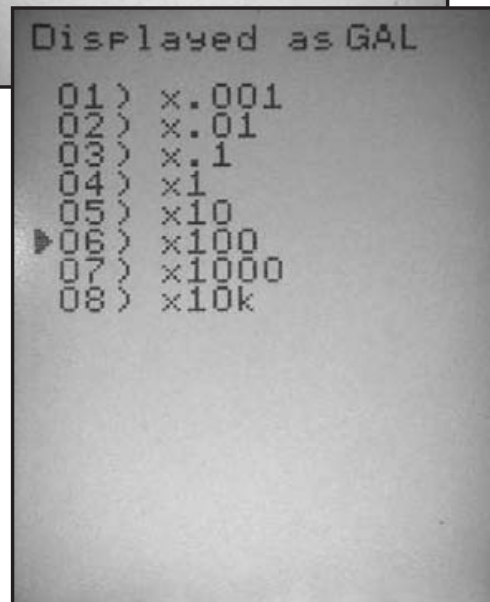
Changes to the multiplier do not affect historical data.

Press the MENU key and ENTER to store changes.

56

>02) Program

04) 4-20 Outputs

From the main screen, press the MENU key then the number 02. Enter the password (default is 00000000) and press the ENTER key followed by 04).

4-20 adjustment:

Each of the three 4-20mA loops can be adjusted by entering the corresponding number to the left of the selection. Enter 01) for level, 02) for velocity, and 03) for flow. The next screen will indicate the arrow keys needed to navigate and adjust the signal. The left arrow sets the zero level output. A calibrated current meter should be used to verify a 4mA output at the appropriate terminals. Use the up and down arrows to adjust the current. The right arrow will set the full span output. Check the output for 20mA. Use the up and down arrows to adjust the current. It is sometimes necessary to repeat these steps two or more times for critical applications.
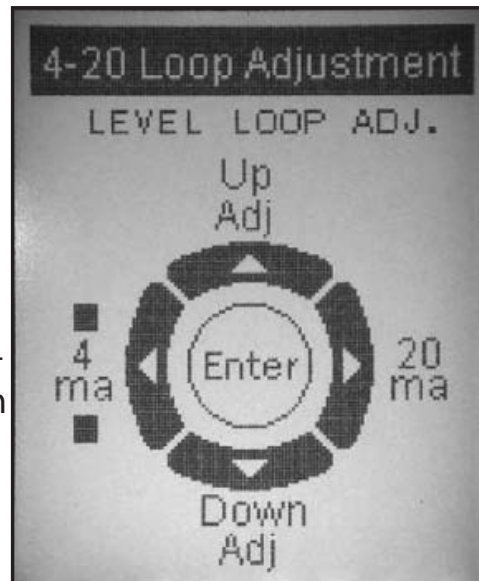
Press ENTER to advance to the next screen.

>02) Program
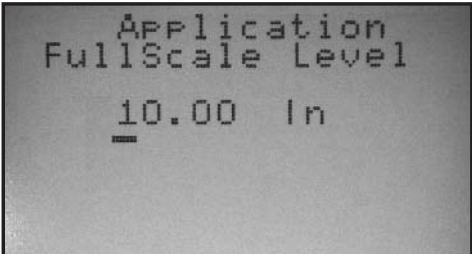
Application Full Scale:
Enter the Full Scale values for level, velocity and flow.

Press ENTER to advance to SHUTDOWN screen.
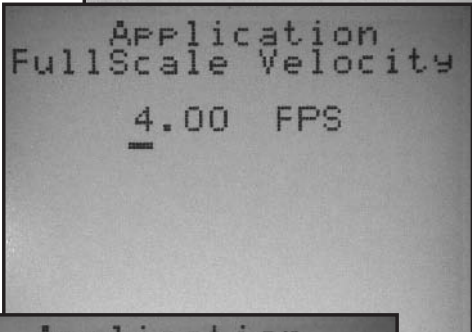
Application Flow Rate Shutdown:
It may be desirable to force the meter not to register insignificant flow. The APPLICATION SHUTDOWN allows the user to enter a minimum registered flow rate.
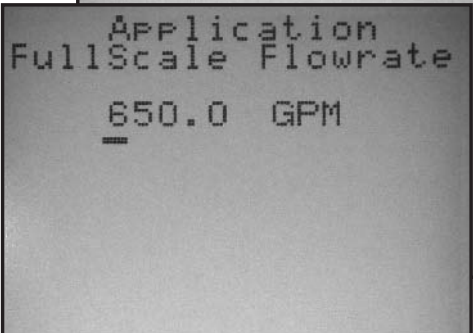
Press the MENU key and ENTER to store changes.
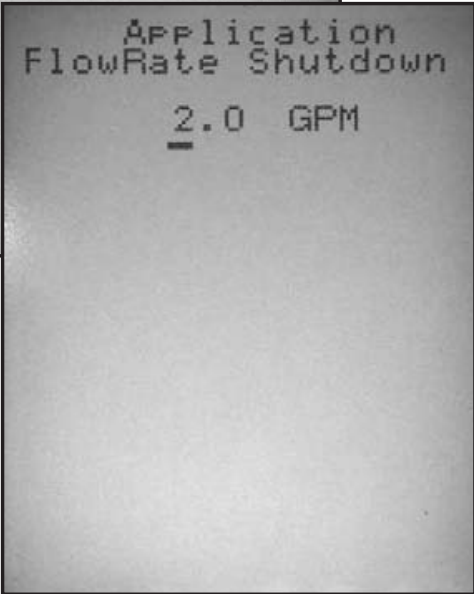
```
    Application
 FullScale Level

   10.00  In
```

```
    Application
 FullScale Velocity

   4.00  FPS
```

```
    Application
 FullScale Flowrate

   650.0  GPM
```

```
    Application
 FlowRate Shutdown

   2.0  GPM
```
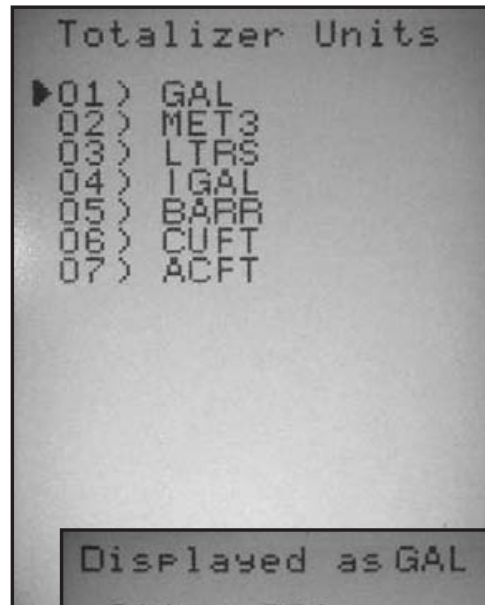
>02) Program

05) Damping:

From the main screen, press the MENU key then the number 02. Enter the password (default is 00000000) and press the ENTER key followed by 05).

Five damping options, from none to 120 seconds are available. Damping will smooth the displayed values when encountering a fluctuating signal. Press MENU and ENTER to store changes.

```
Flow Damping
01)           None
▶02)     10  Seconds
03)     30  Seconds
04)     60  Seconds
05)    120  Seconds
```

```
Lost Signal Time
01)     5  Seconds
▶02)    15  Seconds
03)    30  Seconds
04)    60  Seconds
05)     2  Minutes
06)     4  Minutes
07)     8  Minutes
08)    16  Minutes
```
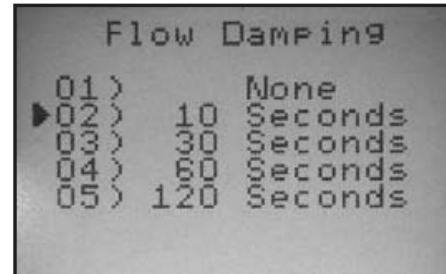
06) Lost Signal Time:

Press MENU, 02, Password, ENTER and 06.

The response to lost signals can be delayed from 5 seconds to 16 minutes by selecting a setting from 01) to 08).

The selection will automatically change to "Lost Signal Action" after choosing a lost signal time.
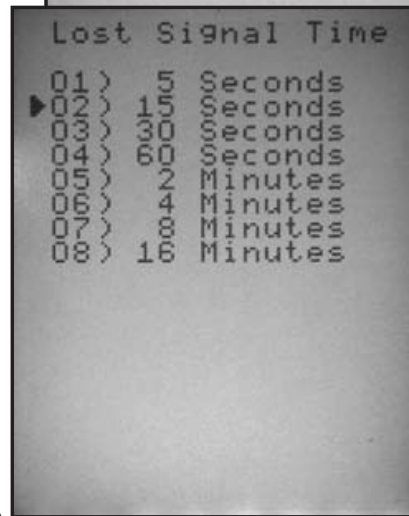
Lost signal action:

Some applications require special handling of lost signals. It can be important to indicate or ignore such occurrences. The Accuron 7200 offers three lost signal management options:

    01) Fail to Zero
    02) Fail to Span
    03) Hold last Value.

Press MENU and ENTER to store changes.

```
Lost Signal Action
▶01)  Fail to Zero
02)  Fail to Span
03)  Hold last Val
```
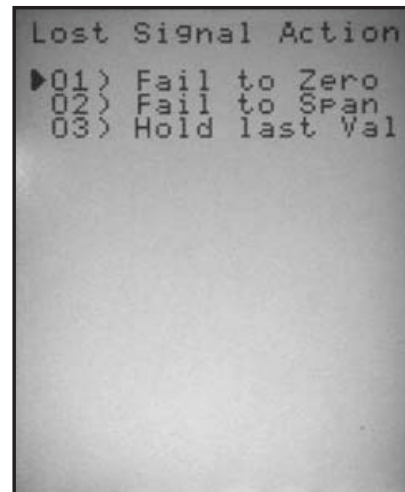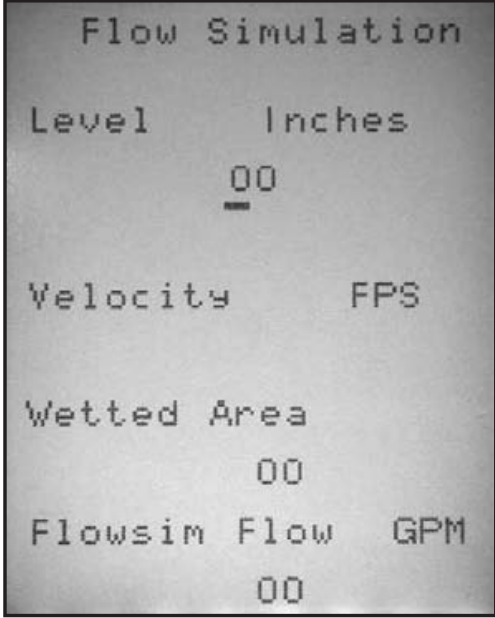
>02) Program

07) Flow Simulation:

Press MENU, 02, Password, ENTER and 07.

The Flow Simulator allows the user to enter an arbitrary level and velocity to observe the meters calculated area and flow. The resulting output can be an aid to diagnosing abnormal flow profiles, incorrect programming and 4-20mA scaling errors. Press MENU and ENTER to store changes.
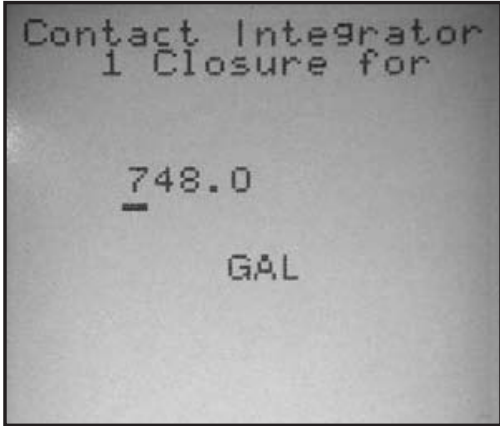
```
      Flow Simulation

Level        Inches
          00


Velocity       FPS



Wetted Area
          00

Flowsim Flow   GPM
          00
```

08) Contact integrator:

Press MENU, 02, Password, ENTER and 08.

The contact integrator will close a relay (if assigned) when the flow totals increases by a specified amount. For instance, in the example shown, the relay would close once and re-open for every 748 gallons passing through the meter. Press MENU and ENTER to store changes.

```
Contact Integrator
   1 Closure for


     748.0

       GAL
```
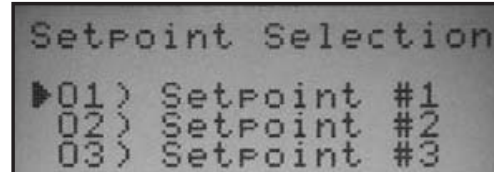
>02) Program
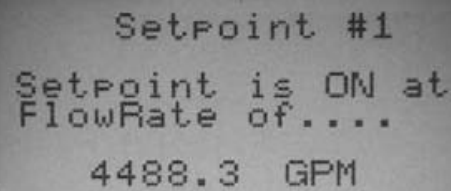
09) Set points:
Press MENU, 02, Password, ENTER and 09.
Three set points are available to outline flow conditions requiring action or alarm. Off and On values can be set through the keypad to create action windows that can be assigned to relays and alarms. Press MENU and ENTER to store changes.
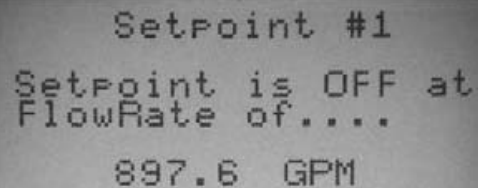
>02) Program

10) Relays:
Press MENU, 02, Password, ENTER and 10.
The Accuron 7200 has three assignable relays. Entering the number to the left of your selection will open the next screen. There are eleven options for relay assignment. Any of the eleven options can be applied to any chosen relay.

Press MENU and ENTER to store changes.

11) Meter Factor
Press MENU, 02, Password, ENTER and 11.
For applications with unusual flow profiles, or requiring in-place calibration, a Zero Offset Adjustment and Meter Factor is available to fine tune the meter readings.

Press MENU and ENTER to store changes.

```
    Relay Assignment

▶01)  Relay #1
  02)  Relay #2
  03)  Relay #3
```

```
       Relay #1

▶01)  None
  02)  Setpoint #1
  03)  Setpoint #2
  04)  Setpoint #3
  05)  Lost Signal
  06)  4-20 Fwd
  07)  Rev. Flow
  08)  FwdTotal
  09)  RevTotal
  10)  Cont. Int.
  11)  4-20 Rev
```

```
    Zero Offset Adj

          00
          —
          GPM

  To enter neg.# use
        +/- KEY
```

```
     Meter Factor

        1.000
        —

  Range of number
  .800 to 1.200
```
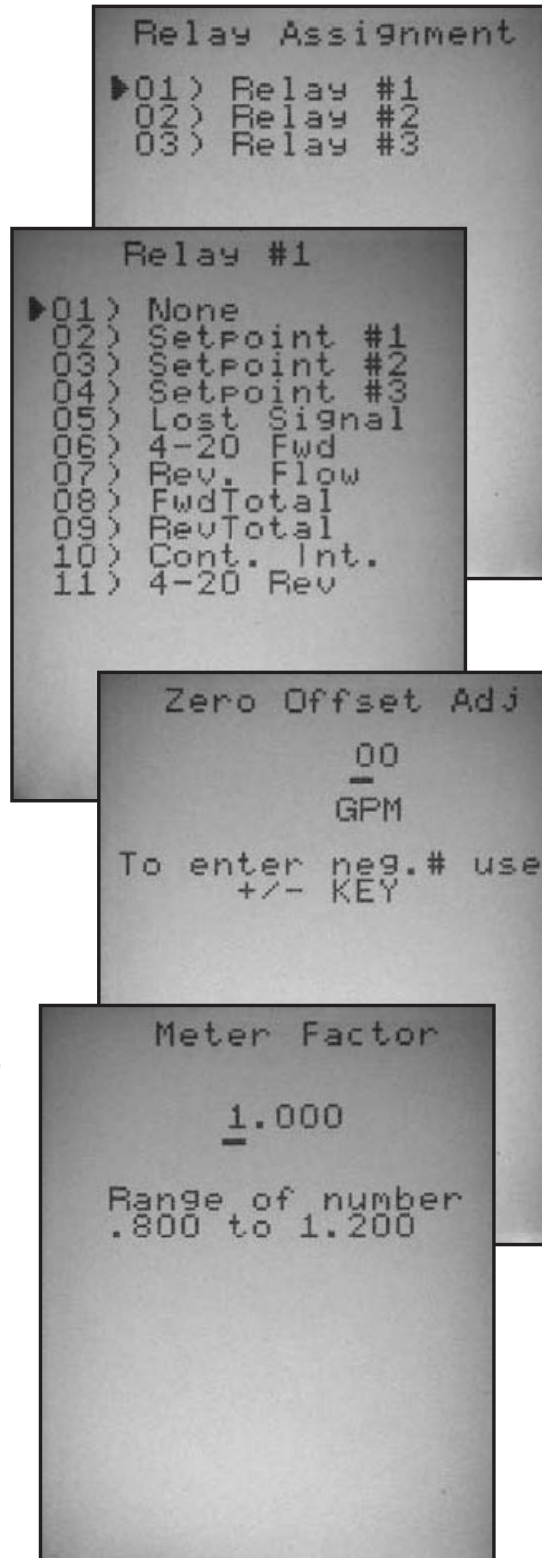
>03) Daily Totals

Daily Totals:

Press MENU followed by 03.
Displays forward and reverse
(reverse velocity) totals from the
last 8 days. Starting with day 0
(current day) pressing the left
and right arrow keys will cycle
through day 8 in a wraparound
fashion.

Press ENTER to return
to MAIN MENU.

```
Select Operation
 01) Review Meter
 02) Program
▶03) Daily Totals
 04) Data Logger
 05) System Setup
```

```
   ** Day 0 **
Measure Unit
         GALx100
   Forward Totals
              00
   Reverse Totals
              00
```
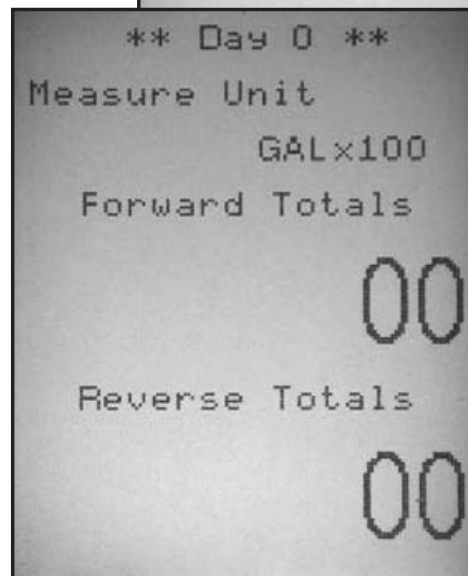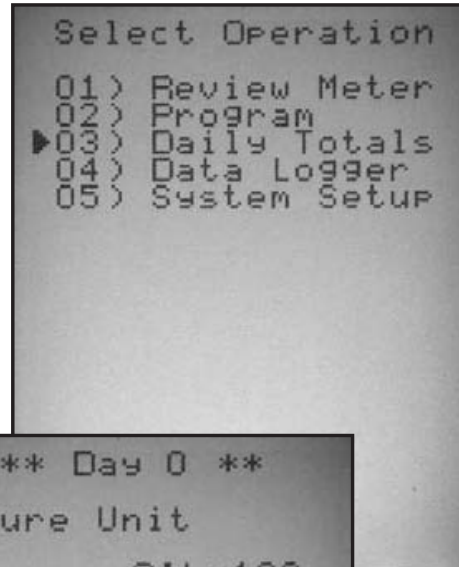
>04 Data Logger

The data logger is the fourth branch of the main menu. It provides access to eight critical functions of the 7200's built in 32,000 record data logger. Password protection is provided to prevent unauthorized changes to the logs and logging options.

```
Select Operation

 01) Review Meter
 02) Program
 03) Daily Totals
▶04) Data Logger
 05) System Setup
```

```
Enter Password to
      Continue

   00000000
```

```
   Logger Setup

▶01) Set Time/Date
 02) Storage Rate
 03) Secondary
 04) Log Channels
 05) Logged Graph
 06) Logged Data
 07) Amount Stored
 08) Clear Data
```

>04 Data Logger

01) Set Time:
Press MENU, 04, Password, ENTER and 01.
Use the arrow keys and numeric key pad to enter and set time for data logging functions. *Press MENU followed by ENTER to save any changes*

02) Storage Rate:
Press MENU, 04, Password, ENTER and 02.
There are six time intervals to choose from: 1, 5, 10, 15, 30, and 60 minutes. The buffer is a 32,768 bite FIFO. The first in first out static memory ensures that the latest data will be preserved even with the loss of power. The storage rate and number of channels being logged will affect the total number of days that will remain in the logger before the oldest data is lost.
Press MENU followed by ENTER to save any changes

Channels Used		1	2	3	4	5	6	7	8
Records per Channel		32768	16384	8192	4096	2048	1024	512	256
Storage Interval	1 Minute	22.8	11.4	7.6	5.7	4.6	3.8	3.3	2.9
	5 Minutes	113.8	56.9	37.9	28.5	22.8	19.0	16.3	14.2
	10 Minutes	227.6	113.8	75.9	56.9	45.5	37.9	32.5	28.5
	15 Minutes	341.3	170.7	113.8	85.3	68.3	56.9	48.8	42.7
	30 Minutes	682.7	341.4	227.6	170.7	136.5	113.8	97.5	85.3
	60 Minutes	1365.3	682.7	455.1	341.3	273.1	227.6	195.0	170.7
		Days of Available Storage							

>04 Data Logger

03) Secondary:
Press MENU, 04, Password, ENTER and 03.
Data can be stored at different rates. This secondary storage rate will be in effect when the condition of the selected set-point is satisfied. Enter 02, 03 or 04 to make a selection. *Press MENU followed by ENTER to save any changes*

04) Log Channels:
Press MENU, 04, Password, ENTER and 04.
Up to eight channels can be logged. Present Settings are indicated on the bottom half of the screen as a guide for making or changing the selection

Channel #:
When the Channel # screen appears, it lists the nine options available for logging. The arrow indicates the current setting. Make your selection, then press MENU followed by Enter to store any changes.

```
     Secondary point

 ▶01)  Not active
   02)  Setpoint #1
   03)  Setpoint #2
   04)  Setpoint #3
```

```
  Select Log Channel

 ▶01)  Log Ch #1
   02)  Log Ch #2
   03)  Log Ch #3
   04)  Log Ch #4
   05)  Log Ch #5
   06)  Log Ch #6
   07)  Log Ch #7
   08)  Log Ch #8

 Present Settings
 Ch #1  FlowF
 Ch #2  Vel#1
 Ch #3  Level
 Ch #4  Not used
 Ch #5  Not used
 Ch
 Ch
 Ch
```

```
      Channel #1

   01)  Not used
   02)  Velocity1
   03)  Velocity2
 ▶04)  FlowF
   05)  FlowR
   06)  TotalF
   07)  TotalR
   08)  Setpoints
   09)  Level
```

>04 Data Logger

05) Logged Graph:
Press MENU, 04, Password, ENTER and 05.
The Logged Graph displays eight available channels and currently selected perimeters. Entering the channel selection will display a graph of logged values.
This menu is assigned to the F4 key for quick access.

The X range can be adjusted by pressing the left and right arrow keys. The Y scale can be altered with the F2 and or F3 key. F2 will adjust the range and F3 will adjust the offset.
Press MENU followed by ENTER to save any changes.
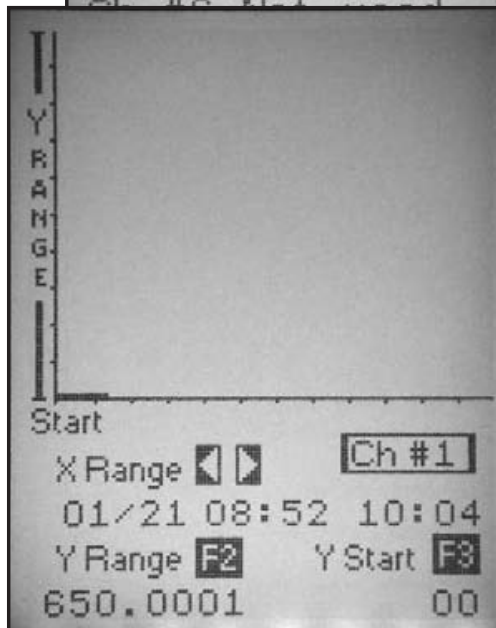
>04 Data Logger

06) Logged Data

Press MENU, 04, Password,
ENTER and 06.
The Logged Data displays the
stored decimal values indi-
cated on the graph.
*Press MENU followed by
ENTER to save any changes.*


```
 Time  /    Store at
09:56:55  10:00:00

  Amount Stored
       363
  Storage Left
      10559
```
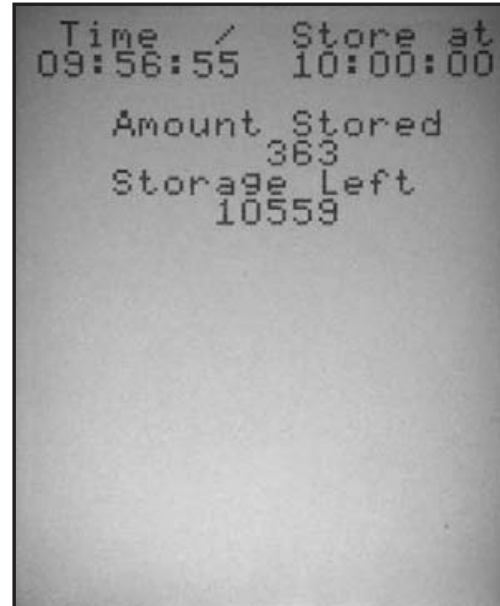
07) Amount Stored

Press MENU, 04, Password,
ENTER and 07.
Displays the amount of data stored and the remaining
space in Bytes. The memory is a First in First out buffer.
When it becomes full, the old data will be lost as new
data is stored.
Press MENU followed by ENTER to save any changes.

08) Clear Data

Press MENU, 04, Password, ENTER and 08.
Clears all stored Data. To prevent accidental erasure, you
will be prompted to press 5 for confirmation.
Press MENU followed by ENTER to save any changes.

>05 System Set-up

System Set-up provides admittance to nine system configuration sub-menus. The set-up functions are password protected due to the systems dependence on these settings. Each system is set-up at the factory, therefore, other than initial password and ID selections, the typical user will not generally need to access these options.

```
Select Operation

01) Review Meter
02) Program
03) Daily Totals
04) Data Logger
►05) System Setup
```

```
Enter Password to
        Continue

    00000000
```

```
System Setup

►01) Display
02) Comm Ports
03) Display Modes
04) Totals Reset
05) New Password
06) Daily Tot Rst
07) Sensor Option
08) Meter Reset
09) New Firmware
```
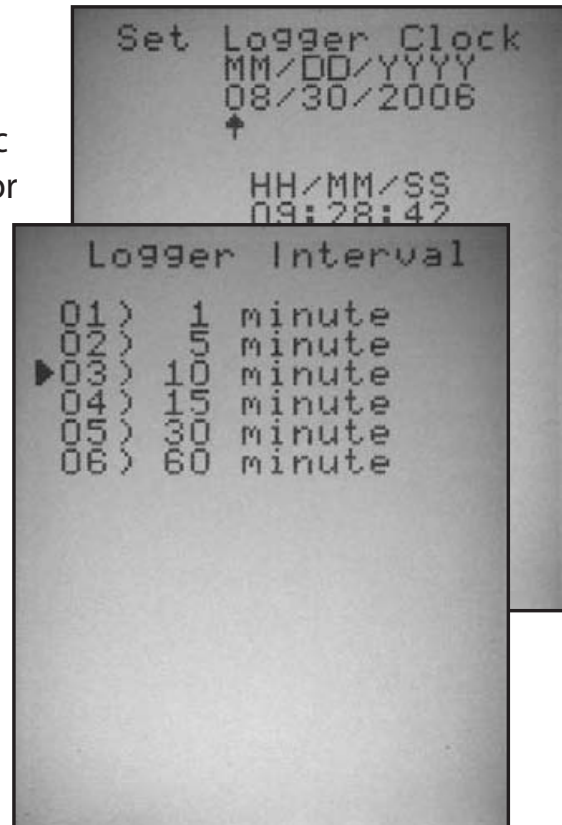
>04 Data Logger

01) Set Time:

Press MENU, 04, Password, ENTER and 01.

Use the arrow keys and numeric key pad to enter and set time for data logging functions. *Press MENU followed by ENTER to save any changes*

02) Storage Rate:

Press MENU, 04, Password, ENTER and 02.

There are six time intervals to choose from: 1, 5, 10, 15, 30, and 60 minutes. The buffer is a 32,768 bite FIFO. The first in first out static memory ensures that the latest data will be preserved even with the loss of power. The storage rate and number of channels being logged will affect the total number of days that will remain in the logger before the oldest data is lost.

Press MENU followed by ENTER to save any changes

Channels Used	1	2	3	4	5	6	7	8
Records per Channel	32768	16384	8192	4096	2048	1024	512	256
1 Minute	22.8	11.4	7.6	5.7	4.6	3.8	3.3	2.9
5 Minutes	113.8	56.9	37.9	28.5	22.8	19.0	16.3	14.2
10 Minutes	227.6	113.8	75.9	56.9	45.5	37.9	32.5	28.5
15 Minutes	341.3	170.7	113.8	85.3	68.3	56.9	48.8	42.7
30 Minutes	682.7	341.4	227.6	170.7	136.5	113.8	97.5	85.3
60 Minutes	1365.3	682.7	455.1	341.3	273.1	227.6	195.0	170.7
	Days of Available Storage							

(Leftmost column label: Storage Interval)

>05 System Set-up

RS-232/485 Comm Port:
There are three parameters that must be set correctly before a communication link can be made (four if a modem is used). The baud rate must match the system you are communicating with. Hardware Flow Control should be set to None and the Slave ID must match the masters request. *See appendices for Modbus functions and registry map*

03) Display Modes:
Press MENU, 05, Password, ENTER and 03. Two Display Modes are available: 01) is the default and indicates the current flow rate, velocity, and total forward flow. 02) adds a reverse total. Press MENU and ENTER.

04) Total Reset:
Press MENU, 05, Password, ENTER and 04. The flow Total can be reset to 0. A prompt will ask you to press 5 for confirmation. Press MENU and ENTER.

05) New Password:
Press MENU, 05, Password, ENTER and 05. The default password is 00000000 but can be changed to any 8 digit number. Press MENU and ENTER.

```
        Communications
  ▶01)  RS-232
    02)  RS-485
```

```
RS-232 Comm Port

▶01)  Baud Rate
  02)  Flow Control
  03)  Slave ID
  04)  Modem Init
```

```
        Baud Rate
  01)    1200
  02)    2400
  03)    4800
  04)    9600
```

```
RS232 Flow Control
▶01)  Hardware
  02)  None
```

```
        Slave ID
  ▶01)   01
    02)   02
    03)   03
    04)   04
    05)   05
    06)   06
    07)   07
    08)   08
    09)   09
    10)   10
    11)   11
    12)   12
    13)   13
    14)   14
    15)   15
    16)   16                ↓
```

71
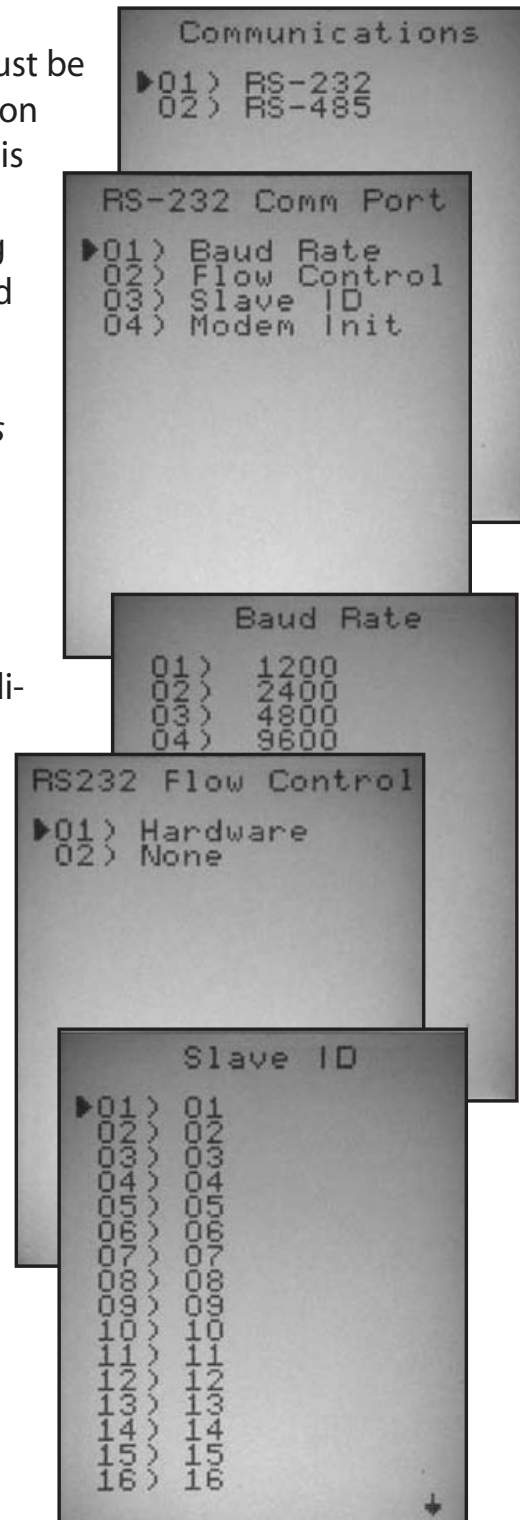
>05 System Setup

06) Daily Tot Reset:
Press MENU, 05, Password, ENTER and 06.
Daily totals can be reset. To prevent an accidental reset, press the 5 key to confirm.
Press MENU and ENTER.

```
Clear all stored
      data.

Press 5 to begin.
```

```
  Sensor Options
▶01) Sens Power
 02) Sens Polarity
```

```
  Sensor TX Power

 01) Normal TX Pwr
▶02) High TX Pwr
```

07) Sensor Option:
Press MENU, 05, Password, ENTER and 07.
The velocity sensor can be operated in a normal or high power mode and in forward or reverse polarity. 01) provides the option of normal or high transmit power while 02) selects normal or reverse polarity.
Press MENU and ENTER.

```
  Sensor Options
 01) Sens Power
▶02) Sens Polarity
```

```
  Sensor Polarity
▶01) Normal
 02) Reversed
```

>05 System Setup

08) Meter Reset:

Press MENU, 05, Password, ENTER and 08.

Entering 08) resets the meter to it original settings. The 5 key must be pressed to confirm.

Press MENU and ENTER.

```
Reset all values
 stored to factory
defaults!
 Press 5 to begin.
```
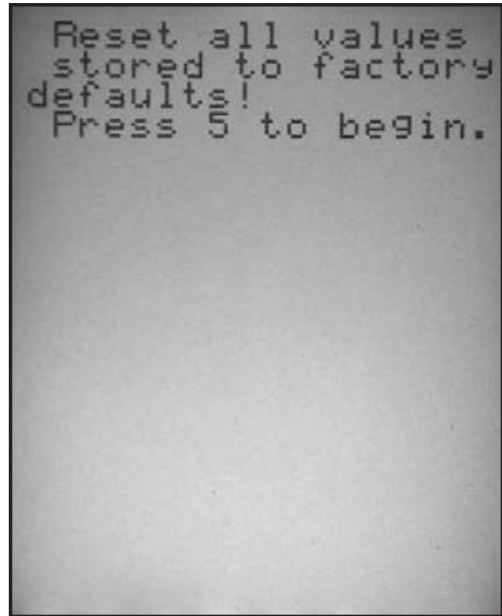
09) New Firmware:

Press MENU, 05, Password, ENTER and 09.

This utility is provided for future updates in firmware.

```
Upload Firmware
   into meter

Press 5 to begin.
```
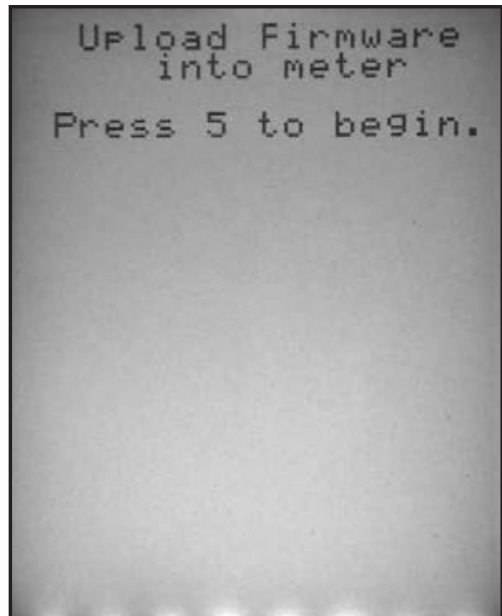
Factory Assistance

For Technical Assistance, please call
Eastech at **1-800-226-3569**

7200 Appendice A

MODBUS

Modbus Map

MOD_MAP: **Address**   **Description**

;0001 - 0002

    dc.w   RXGAIN1A,RXGAIN1B+1,RXGAIN2A,RXGAIN2B+1

;0003 - 0004

    dc.w   T12_Time,T12_Time+1,T12_Time+2,T12_Time+3

;0005 - 0006

    dc.w   Phase,Phase+1,Phase+2,Phase+3

;0007 - 0008

    dc.w   Phase_Filtered,Phase_Filtered+1,Phase_Filtered+2,Phase_Filtered+3

;0009 - 0010

    dc.w   Phase_Ratio,Phase_Ratio+1,Phase_Ratio+2,Phase_Ratio+3

;0011 - 0012

    dc.w   Flow,Flow+1,Flow+2,Flow+3

;0013 - 0014

    dc.w   Velocity,Velocity+1,Velocity+2,Velocity+3

;0015 - 0016

    dc.w   Display_Year,Display_Month,Display_Date,Display_Hour

;0017 - 0018

    dc.w   Display_Min,Display_Sec,next_hour,next_min

;0019 - 0020

    dc.w   Level1,Level1+1,Level1+2,Level1+3

;0021 - 0022

    dc.w   DistanceUH1,DistanceUH1+1,DistanceUH1+2,DistanceUH1+3

;0023 - 0024

    dc.w   TotFCnt,TotFCnt+1,TotFCnt+2,TotFCnt+3

;0025 - 0026

    dc.w   TotRCnt,TotRCnt+1,TotRCnt+2,TotRCnt+3

;0027 - 0028

    dc.w   Alarms_Disp,none_comm,none_comm,none_comm

;0029 - 0030

    dc.w   Level2,Level2+1,Level2+2,Level2+3

;0031 - 0032

    dc.w   DistanceUH2,DistanceUH2+1,DistanceUH2+2,DistanceUH2+3

;0033 - 0034

    dc.w   none_comm,none_comm,none_comm,none_comm

;0035 - 0036

```
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0037 - 0038
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0039 - 0040
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0041 - 0042
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0043 - 0044
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0045 - 0046
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0047 - 0048
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0049 - 0050
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0051 - 0052
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0053 - 0054
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0055 - 0056
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0057 - 0058
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0059 - 0060
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0061 - 0062
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0063 - 0064
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0065 - 0066
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0067 - 0068
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0069 - 0070
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0071 - 0072
        dc.w                    none_comm,none_comm,none_comm,none_comm
```

```
;0073 - 0074
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0075 - 0076
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0077 - 0078
        dc.w                    Data_Start,Data_Start,Data_Start+1,Data_Start+2
;0079 - 0080
        dc.w                    Data_End,Data_End,Data_End+1,Data_End+2
;0081 - 0084
        dc.w                    Records_Stored,Records_Stored+1,Records_Stored+2,Records_Stored+3
;0085 - 0086
        dc.w                    Records_Avail,Records_Avail+1,Records_Avail+2,Records_Avail+3
;0087 - 0088
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0089 - 0090
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0091 - 0092
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0093 - 0094
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0095 - 0096
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0097 - 0098
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0099 - 0100
        dc.w                    none_comm,none_comm,none_comm,none_comm
;0101 - 0102
        dc.w                    R_Main,R_CalSection,R_Default,R_CommSelect
;0103 -0104
        dc.w                    R_DimUnits,R_FlowUnits,R_FlowFormat,R_VelUnits
;0105 - 0106
        dc.w                    R_VelFormat,R_TotalUnits,R_TotalMul,R_TempDisp
;0105 - 0106
        dc.w                    R_232Select,R_485Select,R_Options,R_420Setup
;0107 - 0108
        dc.w                    R_420Mode,none_comm,R_420_Span1,R_420_Zero1
;0109 - 0110
```

```
                    dc.w                    R_420_Span2,R_420_Zero2,R_420_Span3,R_420_Zero3
;0111 - 0112
                    dc.w                    R_MZType,R_RelaySelect,R_DispMode,R_StatSection
;0113 - 0114
                    dc.w                    R_Maintenance,R_LogSection,R_UHSetSelect,R_Display
;0115 - 0116
                    dc.w                    R_Contrast,R_Backlight,R_TimedOff,R_LightBrite
;0117 - 0118
                    dc.w                    R_Backlight_Timer,R_232Baud,R_232Slave
;0119 - 0120
                    dc.w                    R_232Flow,R_485Baud,R_485Slave,R_PulseWdth
;0121 - 0122
                    dc.w                    R_SetPntSel,R_Relay1,R_Relay2,R_Relay3
;0123 - 0124
                    dc.w                    R_ContIntNum
;0125 - 0126
                    dc.w                    R_SetPnt1On
;0127 - 0128
                    dc.w                    R_SetPnt1Off
;0129 - 0130
                    dc.w                    R_SetPnt2On
;0131 - 0132
                    dc.w                    R_SetPnt2Off
;0133 - 0134
                    dc.w                    R_SetPnt3On
;0135 - 0136
                    dc.w                    R_SetPnt3Off
;0137 - 0138
                    dc.w                    R_LogStore,R_LogTrip,R_LogSecStore,R_LogChannels
;0139 - 0140
                    dc.w                    R_LogChannel1,R_LogChannel2,R_LogChannel3,R_LogChannel4
;0141 - 0142
                    dc.w                    R_LogChannel5,R_LogChannel6,R_LogChannel7,R_LogChannel8
;0143 - 0144
                    dc.w                    R_Flw_CustFS
;0145 - 0146
                    dc.w                    R_Vel_CustFS
```

```
;0147 - 0148
                dc.w                        R_Lvl1_CustFS
;0149 - 0150
                dc.w                        R_PhaseVelConv
;0151 - 0152
                dc.w                        R_PhaseFlowConv
;0153 - 0154
                dc.w                        R_EffDia
;0155 - 0156
                dc.w                        R_EffArea
;0157 - 0158
                dc.w                        R_PipeInsert
;0159 - 0160
                dc.w                        R_PipeID
;0161 - 0162
                dc.w                        R_BottomW
;0163 - 0164
                dc.w                        R_WallAng
;0165 - 0166
                dc.w                        R_UH1_Invert
;0167 - 0168
                dc.w                        R_ChanHeight
;0169 - 0170
                dc.w                        R_XovrFlow
;0171 - 0172
                dc.w                        R_XovrLvl
;0173 - 0174
                dc.w                        R_BotOffset
;0175 - 0176
                dc.w                        R_SonicVel
;0177 - 0178
                dc.w                        R_Viscosity
;0179 - 0180
                dc.w                        R_SpecificGrav
;0181 - 0182
                dc.w                        R_Cable1Len
;0183 - 0184
```

```
                        dc.w                    R_Cable2Len
;0185 - 0186
                        dc.w                    R_SenSep
;0187 - 0188
                        dc.w                    R_Kfactor
;0189 - 0190
                        dc.w                    R_ZeroOffset
;0191 - 0192
                        dc.w                    R_SystemDelay
;0193 - 0194
                        dc.w                    R_T12Min,R_T12Max
;0195 - 0196
                        dc.w                    R_SensFreq,R_Polarity,R_FluidType,R_PipeType
;0197 - 0198
                        dc.w                    R_LoFloEq,none_comm,none_comm,none_comm
;0199 - 0200
                        dc.w                    R_UH1Freq_Adj,R_UH1SensorType,R_UH1Damping,R_UH1LostEcho
;0201 - 0202
                        dc.w                    R_UH1LostEcho,R_UH1LostEcho_act,none_comm,none_comm
;0203 - 0204
                        dc.w                    R_UH1RX_TimeSpan
;0205 - 0206
                        dc.w                    R_UH1RX_TimeZero
;0207 - 0208
                        dc.w                    R_UH1deg_zero_pnt
;0209 - 0210
                        dc.w                    R_SensType,R_ChannelType,R_SensWetted,R_SensSpool
;0210 - 0212
                        dc.w                    R_ShotType,R_Damping,R_LostSignal,R_LostSignal_act
;0213 - 0214
                        dc.w                    R_PassWord
;0215 - 0216
                        dc.w                    R_TXPwr,R_SensOpt,none_comm,none_comm
;0217 - 0218
                        dc.w                    R_SensED
;0219 - 0220
                        dc.w                    R_Cust_CutOff
```

```
;0221 - 0222
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0223 - 0224
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0225 - 0226
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0227 - 0228
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0229 - 0230
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0231 - 0232
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0233 - 0234
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0235 - 0236
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0237 - 0238
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0239 - 0240
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0241 - 0242
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0243 - 0244
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0245 - 0246
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0247 - 0248
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0249 - 0250
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0251 - 0252
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0253 - 0254
            dc.w                    none_comm,none_comm,none_comm,none_comm
;0255
            dc.w                    none_comm,none_comm
```

eastech
FLOW CONTROLS

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