SUGGESTED SPECIFICATIONS: An ultrasonic microprocessor-based Cartridge Meter shall be installed at the location on the plans in accordance with the manufacturers recommendation. A field-ready (pipe size) stainless steel cartridge, containing a stainless steel trapezoidal flume/ultrasonic level sensor/transit-time velocity sensor combination shall be provided with each flowmeter. The IP66/Nema 4,4X flowmeter (or Chartmeter) shall be factory programmed for the specific application and be provided with a datalogger integral to the electronics. The Cartridge Meter must be capable of field validation prior to installation of permanent power. The unit shall be Model Accuron 7200 as manufactured by Eastech Flow Controls, Tulsa, OK, or equal.

ORDERING GUIDE

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<td>Velocity Sensors</td>
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</tbody>
</table>

*For Cartridges larger than 15 inches please specify manhole entry size.
For Cartridge Meters larger than 24" or custom sizes, please contact factory.
Ordering Example: Accuron Cartridge Meter, 12" pipe size, PVC, Sched. 40, 3 relays, programming GPM: 7210-12" – P-S-W-A

www.eastechflow.com
4250 S. 76th E. Ave.
Tulsa, OK 74145
e-mail: info@eastechflow.com
918-664-1212
800-226-3569
Fax: 918-664-8494
High Performance Cartridge Meters

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.

SETTING THE STANDARD
Eastech gave its engineers an uncompromising mandate. Design an extremely cost-efficient, high performance area-velocity flowmeter that is fully operational in 30 minutes, guaranteed accurate, provides a turndown ratio of 60:1, and is free from the ongoing maintenance problems of fouled sensors and accumulated debris.

The result was the Accuron Cartridge Meter. A technologically advanced area-velocity flowmeter with Dual Range capabilities. The potential problems of fouled sensors, pressure transducer drift, variable water surfaces, and non-uniformity of particle distribution frequently encountered with alternative technologies are totally eliminated.

PRECISION DUAL RANGE ACCURACY
Eastech combines two highly accurate and proven technologies 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 measurement is the most viable technique for predicting average velocity. It provides for detection of chordal velocity across the entire path of the fluid being measured.

FULLY OPERATIONAL IN 30 MINUTES
Eastech guarantees accuracy and cost efficiency by providing the end user with a pre-engineered field ready system designed for “out of the box” installation. A single cartridge, pre-sized for its specific application, arrives at the job site as a fully integrated unit, requiring only 30 minutes for installation. Every component is factory precision aligned, calibrated and programmed in strict accordance to customer supplied operating specifications.

LOW RANGE (Hydraulic Structure)
- Accuracy ±3-5%
- Turndown 60:1

HIGH RANGE (Area-Velocity)
- Accuracy ±1-2%
- Turndown 60:1
High Performance Cartridge Meters

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.

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Precision Dual Range Accuracy
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Technology for Real World Applications

The high performance design of the Accuron 7200 was based upon information and recommendations obtained through extensive open channel metering field tests conducted by the Environmental Protection Agency and the U.S. Bureau of Reclamation. The challenge was to engineer an open channel flowmeter that was field ready, highly accurate and maintenance free.

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 its 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.

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 ultrasonic level sensor.

TRAPEZOIDAL FLUME
The 304 stainless steel trapezoidal flume, integrated within the Cartridge and accordingly sized for each specific pipe dimension, is designed to operate efficiently from its full maximum flow capacity to a minimum turn-down ratio of 60:1. Their inherent advantage of measuring very low flows and their capability to effectively clear sediment and easily pass floating debris have made trapezoidal flumes increasingly popular for industrial and municipal applications (EPA Report 600/R-01/043).

ULTRASONIC LEVEL SENSOR
The overall accuracy of an ultrasonic open channel flowmeter is dependent upon conversion of level to flow. Two factors influence the final resulting data. The accuracy of the sensor and the accuracy of the meter. Accuron ultrasonic level sensors are accurate within ± 0.02” and were found to be the only sensor to “successfully penetrate through 20cm of dish soap foam” in a five year study of level sensors sponsored by the U.S. Bureau of Reclamation (ITRC Report No. R99-002). This was attributed to the sensors relatively small beam angle and powerful signal.

LEVEL SENSOR SPECIFICATIONS
- Sensor Housing: Teflon®, Submersible Nema 4, 4X
- Temperature: Compensated
- Accuracy: ±0.02” or 0.05% of target distance
- Warranty: 18 months

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 ultrasonic level sensor with a pair of transit-time velocity sensors.

ULTRASONIC LEVEL SENSOR
(Described in Low Flow Monitoring Section on page 4)

NOTE: In the high flow range, it is possible that when the pipe becomes full, the level sensor will be submerged. A special algorithm has been developed that will instantaneously convert the sensor reading from “in air” to “in water”, thereby enabling the Accuron to ascertain flow from zero to 100% of pipe capacity.

TRANSIT-TIME VELOCITY SENSORS
The accurate measurement of average velocity is the major technical problem encountered when attempting continuity measurements. Ideally, the requirement is to accurately measure the flow velocity at each and every point within a given cross-section of the fluid. A very limited method of velocity estimation utilizes a single point velocity measurement and correlates this value with average velocity. This approximation is invalid in the case of non-uniform flow and not sufficiently accurate over an entire regime of flow conditions. To provide a viable commercial result, a multitude of in-situ calibrations must be conducted in order to develop a meaningful correlation.

Chordal measurement, utilizing a pair of highly accurate transit-time ultrasonic sensors, provides detection of the chordal velocity along an entire path across the fluid being measured. A predictable correlation exists between chordal and average velocity. Because the chordal velocity more nearly represents the average area-velocity over the entire flow profile, this correlation permits accuracies within ± 1-2% in the high measurement range of the Accuron 7200. Transit-time ultrasonic technology provides for highly efficient measurement of bi-directional flow throughout consistently changing flow conditions. In addition, the effects of backwatering or stagnation are eliminated (EPA Report 600/2-76/243).

VELOCITY SENSOR SPECIFICATIONS
- Environmental Rating: Submersible Nema 4, 4X
- Sensor Housing: PVC
- Temperature: -40° to 158°F (-40° to 70°C)
- Standard Cable Length: 30ft.
- Warranty: 18 months
- Accuracy: ±0.015 FPS
- Repeatability: ±0.25%
- Linearity: ± 0.5%
- Turndown: 60:1

MAINTENANCE FREE OPERATION

1- CARTRIDGE: 304 Stainless Steel.
2- ULTRASONIC LEVEL SENSOR: The risk and expense associated with repetitive confined space entry due to fluid submerged sensor problems is eliminated by utilizing an “above the flowstream” submersible Teflon level sensor.
3- 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.
4- TRANSIT-TIME VELOCITY SENSORS: Designed to prevent the accumulation of rags, branches and similar debris from interfering with the performance of the transducers.
Technology for Real World Applications

The high performance design of the Accuron 7200 was based upon information and recommendations obtained through extensive open channel metering field tests conducted by the Environmental Protection Agency and the U.S. Bureau of Reclamation. The challenge was to engineer an open channel flowmeter that was field ready, highly accurate and maintenance free.

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LOW FLOW MONITORING

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LEVEL SENSOR SPECIFICATIONS
- Sensor Housing: Teflon®, Submersible Nema 4, 4X
- Sensor: Temperature Compensated
- Temperature: -40° to 158°F (-40° to 70°C)
- Accuracy: ± 0.02” or 0.8% of target distance
- Warranty: 18 months

HIGH FLOW MONITORING

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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 ultrasonic level sensor with a pair of transit-time velocity sensors.

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4. TRANSIT-TIME VELOCITY SENSORS: Designed to prevent the accumulation of rags, branches and similar debris from interfering with the performance of the transducers.
**Data Logging**
The Accuron has a built-in datalogger with eight distinct channels for logging flow and totals. The storage capacity for a single channel at 5 minute intervals is 113 days. Logger data may be visually accessed on the display of the meter in pre-programmed time intervals or retrieved through a laptop or optional modem installed within the enclosure of the meter.

**Daily Averages:** Daily summary allows viewing of the previous eight days. This includes times, dates, averages, minimums, maximums and totals.

**Logger Graph:** In addition, a bar graph may be visually displayed on the Accuron. The graph will display the stored logger data in pre-programmed time intervals.

**Data Retrieval:** Logger data can be collected by using a laptop computer or an optional modem installed within the Accuron enclosure.

**Information Display**
The Accuron utilizes a 160 x 128 graphical LED backlit display. The main screen can be programmed to display up to eight lines of meter information such as flow, level, velocity, time, date and relay alarms. The order of display line information is programmed to user preference. The backlit display may be programmed to be ON or OFF, or to remain OFF during a selected time interval. Display contrast is fully adjustable.

Diagnostic information is retrieved via a menu-driven self-test program capable of isolating fault parameters such as: loss of signal, 4-20 mA loop failure, logger memory full, communications error, sensor fault and open transmitter cable connection.

**Data Acquisition**
- **Current Output:** Three 4-20 mA. Isolated, 800 ohms maximum.
- **Relay Outputs:** Three SPDT relays available for alarm conditions.
- **Serial Outputs:** RS-232/485: With Modbus protocol.
- **Data Logging:** Eight distinct channels are available.
- **Communication Protocols:** Modbus, Profinet or DeviceNet

**Factory Programmed Flowmeters**
Pre-programmed at the factory for specific customer applications, the Accuron flowmeter is a highly advanced microprocessor-based ultrasonic flow transmitter for extremely precise measurement of flow in open channels.

**The Chartmeter**
A single Nema 4, 4X unit incorporating a chart recorder, flowmeter and datalogger

- **Fully Integrated Package**
- **Powered by Flowmeter**
- **User Selectable Output Ranges and Recording Times**

**Meter (Bi-directional)**

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<tr>
<th>Parameter</th>
<th>Specification</th>
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<tr>
<td><strong>Enclosure</strong></td>
<td>IP66 / Nema 4, 4X polycarbonate enclosure</td>
</tr>
<tr>
<td><strong>Optional</strong></td>
<td>Explosionproof, Aluminum Enclosure</td>
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<tr>
<td><strong>Class</strong></td>
<td>1, Grps. C &amp; D, Class II, Grps. E, F, G, Div. 1 &amp; 2</td>
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<tr>
<td><strong>Temperature</strong></td>
<td>Standard: -4° to 158°F (-20° to 70°C)</td>
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<tr>
<td></td>
<td>With Heater: -40° to 158°F (-40° to 70°C)</td>
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<tr>
<td><strong>Outputs</strong></td>
<td>3) 4-20 mA Analog isolated into 800 ohms max, monitored to detect open circuits. RFI and gas discharge surge protection and two fuses.</td>
</tr>
<tr>
<td><strong>Relay Alarms</strong></td>
<td>3 SPDT (plug-in) 2.5 Amps</td>
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<tr>
<td><strong>Network Protocols</strong></td>
<td>Modbus, Profinet or DeviceNet</td>
</tr>
<tr>
<td><strong>DC Power Out</strong></td>
<td>12 VDC, 100mA maximum</td>
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<tr>
<td><strong>Display</strong></td>
<td>Backlit LCD 160 x 128 pixel graphical LED</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>Wattage: 30</td>
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<tr>
<td><strong>Voltage</strong></td>
<td>80/240 VAC, 50/60 Hz / 12-28VDC @ 150 mA</td>
</tr>
<tr>
<td><strong>Data Logging</strong></td>
<td>Non-volatile flash memory, storage of up to 32768 records.</td>
</tr>
</tbody>
</table>

**Pre-Validation Field Confirmation**
A Preview® Validation Pac is provided with every Accuron®. This allows for immediate field confirmation (up to 4 hours) of proper installation, programming, and operational integrity prior to hook-up of permanent power.

By simply connecting the Preview® Validation Pac to the input terminals of the meter, correct sensor wiring, installation, programming and data display can be confirmed and datalogged.
The Accuron has a built-in datalogger with eight distinct channels for logging flow and totals. The storage capacity for a single channel at 5 minute intervals is 113 days. Logger data may be visually accessed on the display of the meter in pre-programmed time intervals or retrieved through a laptop or optional modem installed within the enclosure of the meter.

**Daily Averages:** Daily summary allows viewing of the previous eight days. This includes times, dates, averages, minimums, maximums and totals.

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**Data Retrieval:** Logger data can be collected by using a laptop computer or an optional modem installed within the Accuron enclosure.

**FACTORY PROGRAMMED FLOWMETERS**

Pre-programmed at the factory for specific customer applications, the Accuron flowmeter is a highly advanced microprocessor-based ultrasonic flow transmitter for extremely precise measurement of flow in open channels.

**INFORMATION DISPLAY**

The Accuron utilizes a 160 x 128 graphical LED backlit display. The main screen can be programmed to display up to eight lines of meter information such as flow, level, velocity, time, date and relay alarms. The order of display line information is programmed to user preference. The backlit display may be programmed to be ON or OFF, or to remain OFF during a selected time interval. Display contrast is fully adjustable.

Diagnostic information is retrieved via a menu-driven self-test program capable of isolating fault parameters such as: loss of signal, 4-20 mA loop failure, logger memory full, communications error, sensor fault and open transmitter cable connection.

**DATA ACQUISITION**

**Current Output:** Three 4-20 mA. Isolated, 800 ohms maximum.

**Relay Outputs:** Three SPDT relays available for alarm conditions.

**Serial Outputs:** RS-232/485: With Modbus protocol.

**Data Logging:** Eight distinct channels are available.

**Communication Protocols:** Modbus®, Profibus® or DeviceNet®

**THE CHARTMETER**

A single NEMA 4, 4X unit incorporating a chart recorder, flowmeter and datalogger

- **Fully Integrated Package**
- **Powered by Flowmeter**
- **User Selectable Output Ranges and Recording Times**

**Accuracy:** 0.05% Full Scale

**Power Source:** 80/240 VAC, 50/60 Hz

**Channels:** One

**Recorder Display:** 112 x 16 Graphical

**Chart Rotation:** User Selectable

**Chart Range:** 0 - 100% of Full Scale

**Chart Size:** 100 mm Diameter

**Recording Time:** 24 Hour, 7 day, 31 day (user selectable)

**Response Time:** 4 sec - 60 sec, (user selectable)

**Calibration:** Pen Arm

**Relays:** 3 SPDT (plug-in) 2.5 Amps

**Chart Replacement Alarm:** Flashing LED (Red)

**Environmental Protection:** Nema 4, 4X

**Temperature:** Standard: -4° to 158°F (-20° to 70°C)

**With Heater:** -40° to 158°F (-40° to 70°C)

**METER (Bi-directional)**

**ENCLOSURE**

- Standard: IP66 / Nema 4, 4X polycarbonate enclosure
- Optional: Explosionproof, Aluminum Enclosure

**TEMPERATURE**

- Standard: -4° to 158°F (-20° to 70°C)
- With Heater: -40° to 158°F (-40° to 70°C)

**OUTPUTS**

- 3) 4-20 mA Analog isolated into 800 ohms max, monitored to detect open circuits. RFI and gas discharge surge protection and two fuses.
- 3 SPDT (plug-in) 2.5 Amps
- 12 VDC. 100mA maximum

**DISPLAY**

- Backlit LCD: 160 x 128 pixel graphical LED

**POWER**

- Wattage: 30

**DATA LOGGING**

- Non-volatile flash memory, storage of up to 32768 records.

**PREVIEW® FIELD VALIDATION**

A Preview® Validation Pac is provided with every Accuron®. This allows for immediate field confirmation (up to 4 hours) of proper installation, programming, and operational integrity prior to hook-up of permanent power.

By simply connecting the Preview® Validation Pac to the input terminals of the meter, correct sensor wiring, installation, programming and data display can be confirmed and datalogged.
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<th>PROGRAM</th>
<th>DATA RETRIEVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete K</td>
<td>8&quot;</td>
<td>Lined</td>
<td>10</td>
<td>R</td>
<td>30 ft</td>
<td>Gal/Min.</td>
<td>A</td>
<td>Modem</td>
<td></td>
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<tr>
<td>Ductile L</td>
<td>10&quot;</td>
<td>Unlined</td>
<td>40</td>
<td>S</td>
<td>50 ft</td>
<td>Cu.Ft./Sec.</td>
<td>B</td>
<td>Profibus</td>
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<tr>
<td>Cast Iron M</td>
<td>12&quot;</td>
<td></td>
<td></td>
<td></td>
<td>100 ft</td>
<td>Keylock</td>
<td>C</td>
<td>Device-Net</td>
<td></td>
</tr>
<tr>
<td>Carbon Steel N</td>
<td>15&quot;</td>
<td></td>
<td></td>
<td></td>
<td>200 ft</td>
<td>Splice Kit</td>
<td>D</td>
<td>Other</td>
<td></td>
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<tr>
<td>PVC P</td>
<td>&quot;18&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gal/Hr.</td>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clay Q</td>
<td>&quot;21&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lit./Sec.</td>
<td>F</td>
<td></td>
<td></td>
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<tr>
<td>Other</td>
<td>&quot;24&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Other</td>
<td>H</td>
<td></td>
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</tr>
</tbody>
</table>

*For Cartridges larger than 15 inches please specify manhole entry size.

For Cartridge Meters larger than 24" or custom sizes, please contact factory.

Ordering Example: Accuron Cartridge Meter, 12" pipe size, PVC, Sched. 40, 30' cable, 3 relays, programming GPM: 7210-12" – P-W-A