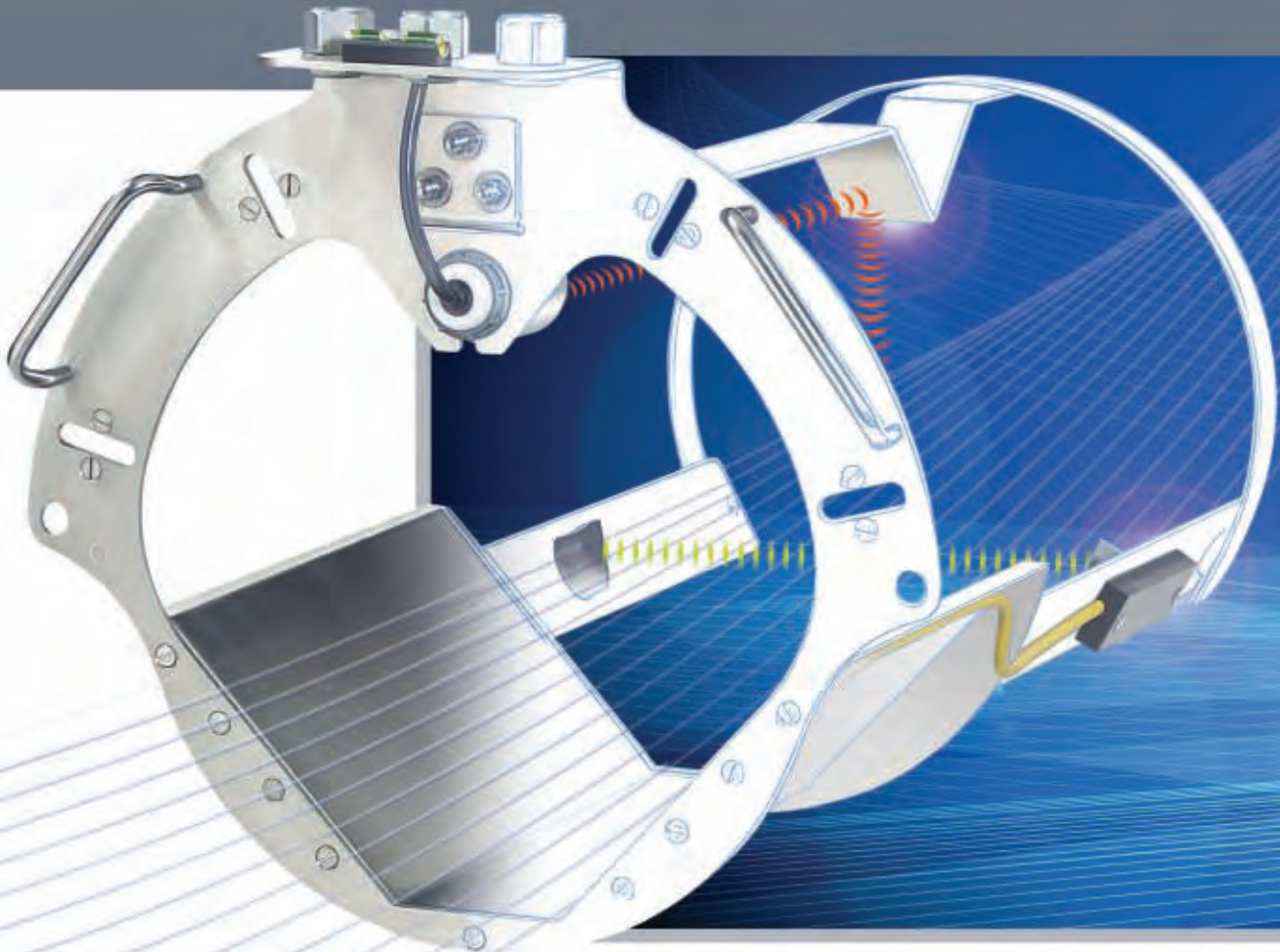


ACCURON[®] 7200

CARTRIDGE METERS



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.



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.

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.

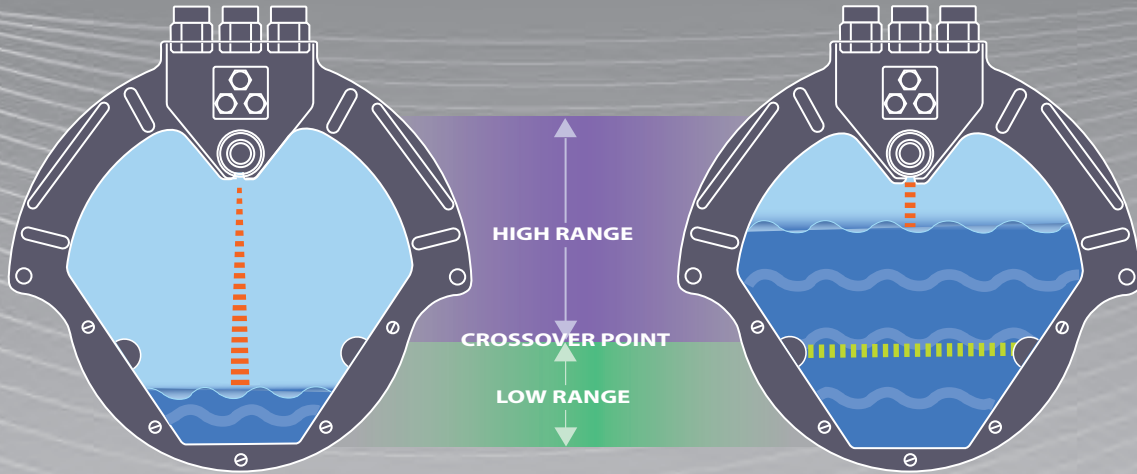
FULLY OPERATIONAL IN 30 MINUTES

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.

DUAL RANGE FLOW TECHNOLOGY

LOW RANGE (Hydraulic Structure)
Accuracy $\pm 3-5\%$ Turndown 60:1

HIGH RANGE (Area-Velocity)
Accuracy $\pm 1-2\%$ Turndown 60:1



Below the Crossover Point (1/3 pipe), the volume of flow is measured by a trapezoidal flume and level sensor utilizing U.S. Bureau of Reclamation flume equations.

Above the Crossover Point (1/3 pipe), the volume of flow is measured by a pair of transit-time velocity sensors and level sensor utilizing proven area-velocity measurement methods.



ACCURON® 7200

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.

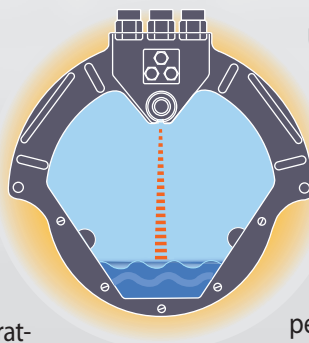
LOW FLOW MONITORING

Accuracy $\pm 3-5\%$ (act. rate) Turndown: 60:1

During periods of minimal flow (Zero to 1/3 pipe diameter), the Accuron measures flow within its 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 $\pm 0.02"$ 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.

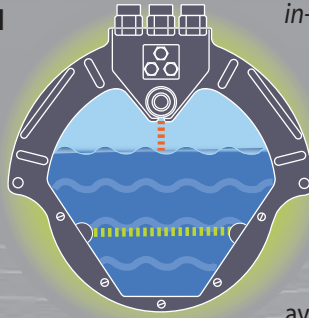
LEVEL SENSOR SPECIFICATIONS

Sensor Housing	Teflon®, Submersible Nema 4, 4X
Sensor	Temperature Compensated
Temperature	-40° to 158°F (-40° to 70°C)
Accuracy	$\pm 0.02"$ or 0.05% of target distance
Warranty	18 months

HIGH FLOW MONITORING

Accuracy $\pm 1-2\%$ (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.



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 $\pm 1-2\%$ 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).

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

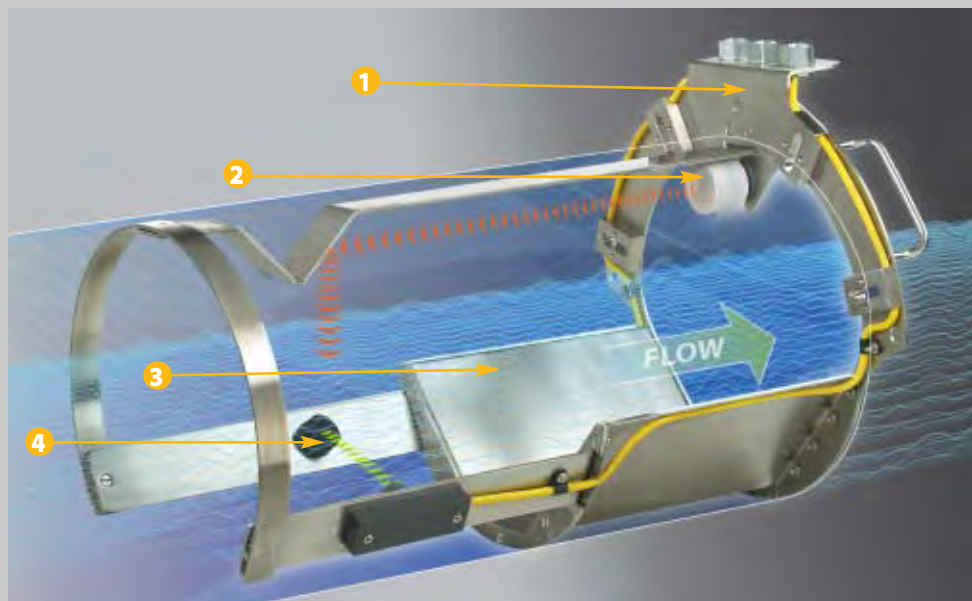
The accurate measurement of average velocity is the major technical problem encountered when attempting continuity measurements. Ideally, the requirement is to accurately measure the flow velocity at each and every point within a given cross-section of the fluid. A very limited method of velocity estimation 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*

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	$\pm 0.25\%$
Linearity	$\pm 0.5\%$
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 fouled 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.



ACCURON® 7200



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.

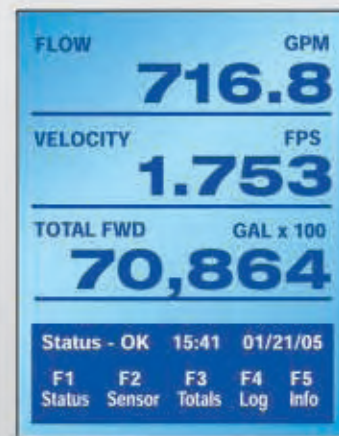
DATA LOGGING

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®, 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	.05% Full Scale	Recording Time	24 Hour, 7 day, 31 day (user selectable)
Power Source	80/240 VAC, 50/60 Hz	Response Time	4 sec. - 60 sec. (user selectable)
	12-28 VDC @ 150 mA	Calibration	Pen Arm
Channels	One	Relays	3 SPDT (plug-in) 2.5 Amps
Recorder Display	112 x 16 Graphical	Chart Replacement Alarm	Flashing LED (Red)
Chart Rotation	User Selectable	Environmental protection	Nema 4, 4X
Chart Range	0 - 100% of Full Scale	Temperature	Standard: -4° to 158°F (-20° to 70°C)
Chart Size:	100 mm Diameter		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 Class I ,Grps. C & D, Class II, Grps. E, F, G, Div. 1 & 2
Accessories	Heater and thermostat, Door Lock

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 (Flow, Level, Velocity)	Analog isolated into 800 ohms max, monitored to detect open circuits. RFI and gas discharge surge protection and two fuses.
Relay Alarms	3 SPDT (plug-in) 2.5 Amps
RS-232 Serial Port	1200-38400 Baud, Modbus RTU
RS-485 Serial Port	Optically isolated, Modbus RTU
Network Protocols	Modbus, Profibus or DeviceNet
DC Power Out	12 VDC. 100mA maximum

DISPLAY

Backlit LCD	160 x 128 pixel graphical LED
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POWER

Wattage	30
Voltage	80/240 VAC, 50/60 Hz / 12-28VDC @ 150 mA.

DATA LOGGING

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

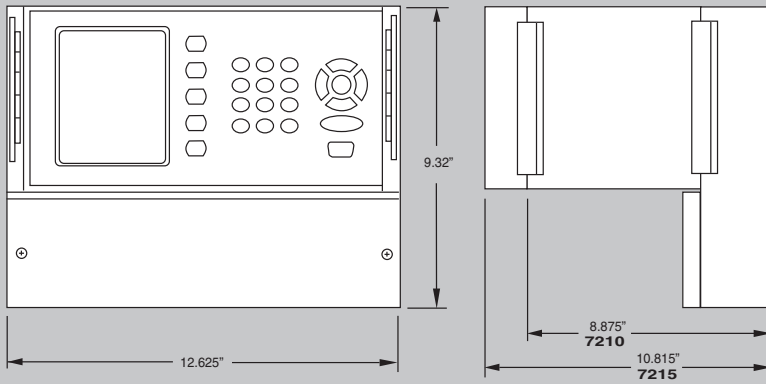
PREVIEW® FIELD VALIDATION

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.

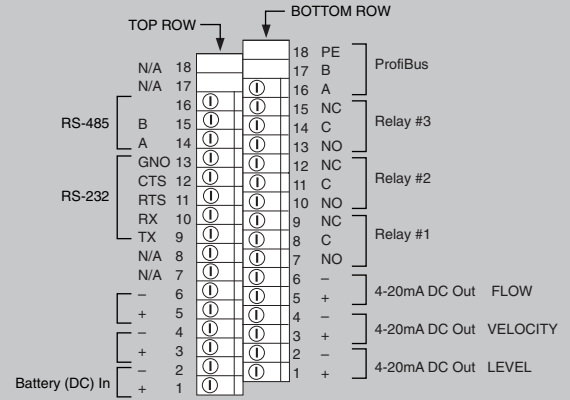
By simply connecting the Preview® Validation Pac to the input terminals of the meter, correct sensor wiring, installation, programming and data display can be confirmed and datalogged.



DIMENSIONS


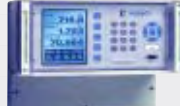


WIRING SCHEMATIC



SUGGESTED SPECIFICATIONS: An ultrasonic microprocessor-based Cartridge Meter shall be installed at the location on the plans in accordance with the manufactures 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

CARTRIDGE	METER	NOMINAL PIPE SIZE	PIPE MATERIAL	PIPE SCHED.	PIPE CONST.	SENSOR CABLE	OPTIONS	PROGRAM	DATA RETRIEVAL
 Stainless Steel Cartridge Trapezoidal Flume Level Sensor Velocity Sensors	METER 10  Nema 4,4X • IP66 3-4-20mA • RS232/485 3 Relays • Datalogger Bi-directional	8"	Concrete K	10 R	Lined LN	30 ft W	Heater & Thermostat B	Gal./Min. A	Modem (phone line) M
		10"	Ductile L	40 S	Unlined UL	50 ft. X	Keylock C	Cu. Ft./Sec. H	Profibus E
		12"	Cast Iron M					Mil. Gal./Day J	
		15"	Carbon Steel N	80 T		100 ft. Y	Splice Kit D	Lit./Sec. K	Device-Net F
		*18"							
		*21"	PVC P			200 ft. Z		Gal./Hr. L	
		*24"	Clay Q			(Over 200 ft. please specify)		Other (please specify)	
		Other (please specify)							

*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-S-W-A

