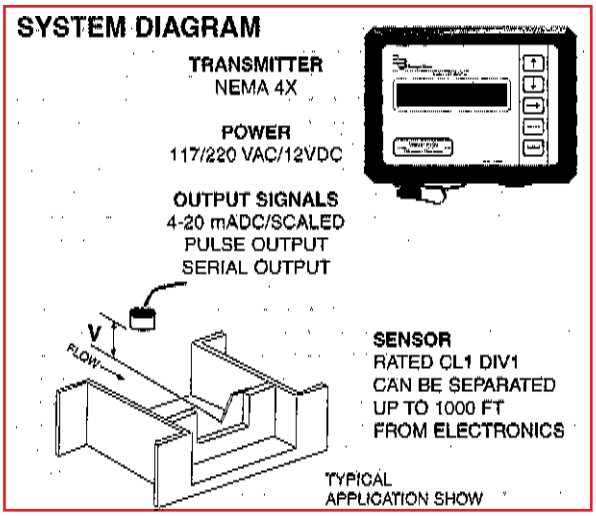
tech BRIEF

MODEL 2100 Ultrasonic Level Flowmeter



Features:

- Fully Field Programmable
- Non-Volatile Memory
- Built-In Temperature Compensation
- Capable of Battery Back-Up During Power Outages
- Non-Contacting Sensor
- Continuous Self-Diagnosis

Description

The Model 2100 flowmeter is a microprocessor-based ultrasonic transmitter utilized for measurement of flow in open channels. The Model 2100 can be used in association with flumes, weirs and open flow nozzles for accurate measurements. By entering a 16 point curve into the menu-driven recalibration mode, specialized H/Q relationships can be made by the Model 2100.

All Model 2100 equipment can be pre-calibrated at the factory to the specified application, but they can be easily recalibrated in the field by using the menu-driven functions to change any or all of these parameters with keypad entry.

Applications

The Model 2100 is normally programmed at the factory for a specific open channel flow measurement application. However, programmed into the unit for simple on-site set up are the standard power functions for Parshall, Manhole, and Lagco flumes and V-Notch weirs. In addition, the unit has the ability to accept a 16 point head versus flow table allowing customization on site.

Electronics

The standard unit is housed in a NEMA 4X enclosure for indoor service; outdoor versions are available. The Model 2100 comes standard with LCD display with keypad driven menus, 4-20 mA output, 4 programmable relays and an RS-232 serial port and allows real time communications operating in a Modbus protocol.

Sensor Head

The Model 2100 sensor head is capable of withstanding indefinite submersion of up to 30 feet and comes standard with 100 feet of cable. The sensor head is constructed of corrosion resistant and weatherproof material and certified to operate in Class 1, Division 1 environment. The sensor head can be mounted up to 1000 feet from the electronics.

Installation and Maintenance

Installation of the 2100 flowmeter is easily accomplished with readily available tools. Installation kits are included with each unit. Maintenance can be achieved from the front panel via a menu-driven self test program to isolate fault parameters.

Options

Recorder - The Model 2100R+ includes the Badger Model 3000+ Circular Chart Recorder. The 2100 electronics are mounted in the recorder's enclosure. See Tech Brief 940739 for description.

Data Logger - The Model 2100L includes a processor-based data logger housed in the standard Model 2100 enclosure full functional for electronically recording flow and totalization. The data logger has the ability to record time tagged records, field selectable from one (1) to 255 minutes. The memory capacity for the logger is 128 K RAM and can roughly store up to 140 days of level and totalized flow data logged at 5 minute intervals. Data is retrieved through the serial communications port on the Model 2100 using the FLARS™ software program. The data can be easily converted into a report or graphical form. FLARS™ operates in a Windows 3.1 or higher environment. Please refer to Tech Brief 941241 for a complete description.

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941259
3/97-1.5M

TECHNICAL SPECIFICATIONS

SPAN RANGE
0-4 inches to 0-120 inches
Deadband is 12.0" min.
Total range: 120" + 12" = 132"
Range can be field programmed by menu-driven functions.

OUTPUT
Analog: 4-20 mADC isolated; 1000 ohms max.
Model 2100R+ 4-20 mADC; 1000 ohms max.
Relay Alarm: Four (4) available, SPDT, .5A @ 120 VAC or 1A @ 24 VDC
RS-232 Serial Port 1200 - 9600 Baud, Modbus Protocol

DISPLAY
2 line, 24 character LCD

Includes 4 digit flow indicator, plus multiplier, 8 digit totalizer, all in specified engineering units and an alarm indication. Also displayed are all menu-driven functions for checking equipment status and for recalibration.

KEYBOARD
Front panel mounted, 5-key keypad to command and enter all parameters of Model 2100 status and recalibration.

POWER
117/230 VAC, 50/60 Hz, 10 watts Std; or 12 VDC
For heater/thermostat: 210 watts
For Model 2100R: 117/230 VAC 50/60 Hz, 20 Watts Std.
For heater/thermostat: 220 watts
Power consumption with no relays is 75 mA; with all four (4) relays energized, 235 mA. Capable of connecting external battery for uninterruptable meter operation due to AC power loss.

OPERATING SPECIFICATION
Accuracy: +/- .1% of target distance or +/- .08", whichever is greater. +/- .5% H/Q curve reproducibility
Repeatability: +/- 0.2%
Zero/Span Resolution: +/- 0.01 inch

TEMPERATURE
Sensor: -20° to 160°F (-30° to 70°C) Std.
Transmitter: +30° to 150°F (0° to 65°C) Std.
-40° to 150°F (-40° to 65°C) Option

ENCLOSURE
Model 2100: NEMA 4X (Optional heater and thermostat)
Model 2100R+: NEMA 12 Std., NEMA 4 Optional

PRIMARY ELEMENT UTILIZATION
The Microprocessor-based electronics accommodate the following primary device functions as standard: Parshall flume, Manhole Flume™, Lagco flume, and V-Notch weirs. All other types of flumes and weirs are programmable in the field by utilizing the primary element's flow curves, which are supplied in the 2100 IOM Manual.

SENSOR
PVC plastic housing, epoxy filled, 100 feet of cable standard, optional to 300 feet. Beam angle is three (3) degrees. The sensor is certified for operation in Class 1, Division 1, Groups A, B, C and D (except acetic atmospheres) environments. Certification available upon request.

Sample Specifications
Model 2100/2100R+

SERIES 2100
GENERAL

An ultrasonic level flowmeter shall be installed at the (weir/flume) shown on the plans in accordance with the manufacturer's recommendations. The flowmeter shall have microprocessor-based electronics, a LCD display with keypad driven menus and shall produce an isolated 4-20 mADC signal proportional to the flow, over a measurement range of _____ to _____. The flowmeter shall be self-compensating for ambient temperature conditions. The flowmeter shall also have as standard, four relay outputs available for alarm conditions, sampling or pulsing external totalizer. The unit shall be capable of simulating flow/level without any external devices for verifying outputs and calibrations. The unit shall be a Badger Meter Model 2100.

Accuracy of the unit shall be unaffected by temperature changes within the specified ambient temperature range. Flow sampling shall be a minimum of 15 samples per second and the unit shall be able to operate with as few as 2% of the samples taken successfully. In the event of the prolonged loss of acoustic signal, the unit shall indicate the condition by a flashing status indication on the front display panel. The flow signal shall be an isolated 4-20 mADC operating into a maximum of 1000 ohms. The accuracy shall be +/- 0.1% of target distance or +/- .08", whichever is greater. Repeatability shall be within +/- 0.2%.

TRANSMITTER

The transmitter shall contain all necessary circuitry to utilize the signal from the acoustic sensor and shall produce an accurate 4-20 mADC (depth/flow) signal. An RS-232 serial port connection shall be provided for computer interface for real-time communications, operating in a Modbus protocol. The transmitter shall be supplied with an LCD indicator to display flow rate and flow total and their respective flow units and multipliers. The display shall be capable of monitoring the status of the meter by a menu-driven keyboard on the front panel of the transmitter. The unit shall also be capable of recalibration in the field by the menu-driven keyboard. The transmitter shall also produce four relay output connections for external alarms, sampling or pulse output to drive a remote totalizer. The unit shall be enclosed in a NEMA 4X (indoor/outdoor) housing suitable for wall mounting at the location indicated on the plans. The unit shall function over an ambient temperature range of 32°F to 150°F indoors or -40°F to 150°F outdoors.

The unit shall operate using (117/230) VAC, (50/60) Hz electrical service with the ability to connect an external battery for uninterrupted operation due to power loss. Power consumption shall be less than (10 watts indoor/210 watts outdoor) for Model 2100 and (20 watts indoor/220 watts outdoor) for Model 2100R+. All user wiring connections shall be made via well-marked terminal blocks.

ACOUSTIC SENSOR

The acoustic sensor shall be permanently mounted at the measuring site and positioned according to the manufacturer's approved method. Sensor mounting adaptor shall be supplied by the manufacturer. The sensor shall transmit and receive an acoustic signal to accurately measure fluid depth at the monitoring site. The sensor shall have built-in temperature compensation to maintain accuracy. The transmitted beam angle shall not be greater than three degrees. The sensor shall be capable of an indefinite submergence of 30 feet without degradation. The sensor shall function over an ambient temperature of -20°F to 160°F. The sensor shall be designed and rated for operation in hazardous environments such as sanitary sewers.

One hundred feet (100') of sensor cable shall be supplied by the flowmeter manufacturer to prevent splicing, and shall be connected from the sensor to the transmitter housing. The cable shall be installed in an exclusive 3/4" to 1" rigid or flexible, continuous, watertight, metallic conduit. The sensor shall be capable of being located up to 1000' from the transmitter.

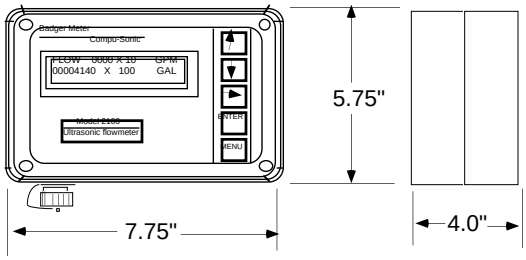
OPTIONAL RECORDER SPECIFICATIONS (2100R+)

The microprocessor-based circular chart recorder shall be capable of indicating, totalizing and recording. The pen mechanism has a linear motion marking on a 12" uniform chart.

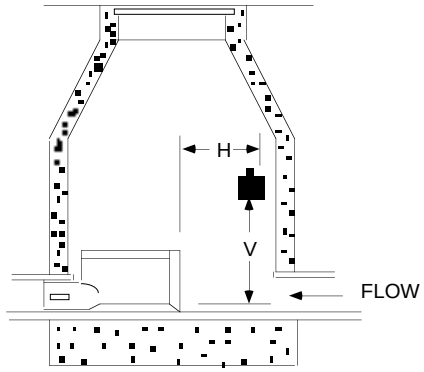
The unit must be fully programmable with built-in keypad mounted on the chart plate. Rate and totals shall be in engineering units and be displayed on a two line LCD display. The unit shall have the capabilities for contact integration, alarm set points, linearization, summation and 4-20 mA retransmission.

The 2100 transmitter shall be mounted in the recorder housing. The recorder shall be enclosed in a (NEMA 12/NEMA4) housing suitable for (wall/panel) mounting.

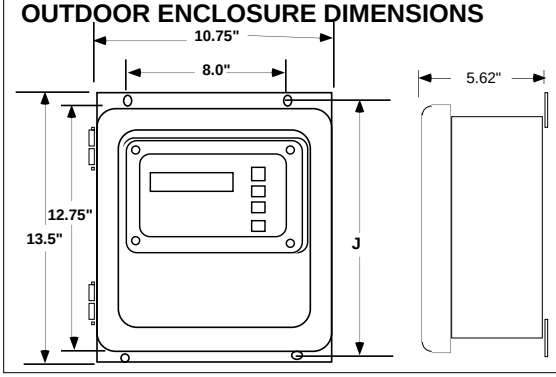
2100 ENCLOSURE DIMENSIONS



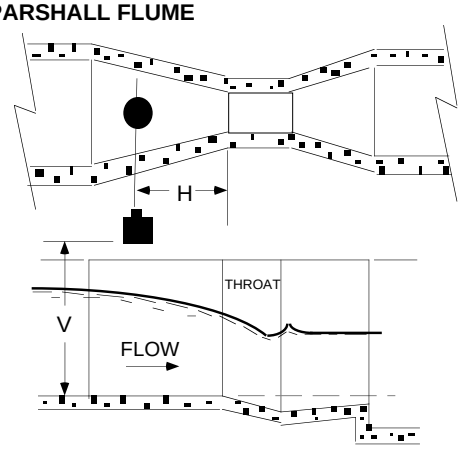
MANHOLE FLUME



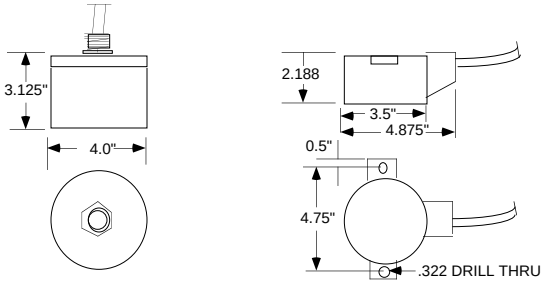
OUTDOOR ENCLOSURE DIMENSIONS



PARSHALL FLUME

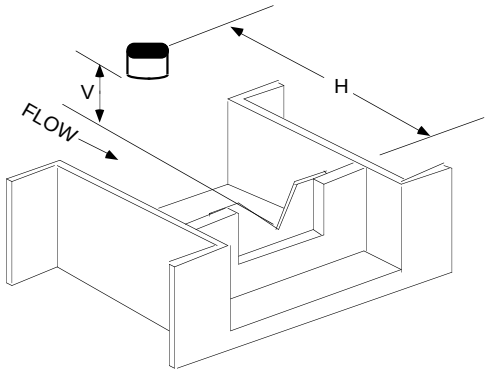


2100 SERIES SENSORS



FB-1 STYLE **STD. STYLE**

V -NOTCH WEIR



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