FlumeMeter™

RUBICON™

Overview

The FlumeMeter is a ground-breaking all-in-one meter specifically designed for open canals that provides real time and accurate flow measurement from the instant it is installed.

All-in-one means everything has been designed – ultrasonic measurement, power supply, local control keypad and telemetry – to function as one single unit. There are no integration problems or incompatibilities, it simply works.

Unlike traditional meters, the FlumeMeter has very low head loss and never requires calibration. This ensures life-long confidence and low ongoing maintenance costs.

The FlumeMeter uses Rubicon's unique Sonaray® technology which is resistant to turbulence and so does not require straight lengths of pipe or canal upstream or downstream. This means it can be installed in existing structures without costly civil work and in structures where other meters just can't be installed.

The FlumeMeter is installed by sliding into a frame that is fixed to an existing structure. A range of available frames means it can be installed at low cost and even in the presence of an existing control gate.

Simple to manage, the FlumeMeter can be read on-site or remotely when connected to any Modbus, DNP-3 or MDLC compatible SCADA network including Rubicon's SCADAConnect® system.

A TCC® Product

The FlumeMeter is one of the products making up a modular family of precision hardware and software called TCC (Total Channel Control®). TCC is an advanced technology set designed to improve the management and productivity of water in open canal and gravity pipeline distribution. Unlike traditional infrastructure, TCC products can interact and work together to help managers improve:

- water availability
- service and equity to users
- management and control
- canal operator safety

Features

- Sonaray flow measurement accuracy of ±2.5%†
- Exceeds California SBx7-7 measuring and data reporting requirements
- Can be mounted over existing turnout gates
- Solar-charged battery system
- No calibration needed
- Measures when partially full with optional MicronLevel® sensor
- No moving parts to catch debris

An ideal solution for…

- Measuring very low flow rates
- Accurate reading in circumstances where the meter is partially full
- Minimizing civil infrastructure costs
- Sites where there is turbulence, debris or other contaminants
- Remotely located sites

FlumeMeter™

Control Pedestal

Each FlumeMeter installation includes a robust pedestal that provides power and control to the gate and is a secure, weatherproof housing for electronic components and batteries.

The pedestal also serves as a local user interface. A keypad and LCD display are located under the lockable pedestal lid, allowing farmers to monitor, or operators to control and troubleshoot on-site.

Partially full measurement

A MicronLevel ultrasonic water level sensor can be fitted to provide accurate flow measurement when the measurement box is not completely full. The sensor is unaffected by surrounding objects, debris, foam, silt or other contaminants.

- Self-calibrates on every reading to eliminate drift in speed of sound variations due to changes in temperature or humidity
- Specifically designed for use in harsh irrigation canal environments

Accurate flow measurement

Independent laboratory and field testing of the ultrasonic array measurement technique has shown that accuracy is maintained in a wide range of conditions:

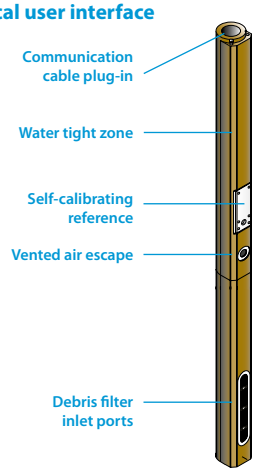
- Turbulent water
- Obstructions at the meter entry
- Water contaminants

Low maintenance

The FlumeMeter requires minimal maintenance. Comprehensive error detection and on-site diagnostics are built into the meter software.

Factory pre-calibrated, its digital measurement does not drift or require periodic recalibration to maintain accuracy.

Local user interface



MicronLevel® sensor detail

SCADAConnect® Live

Remote management option

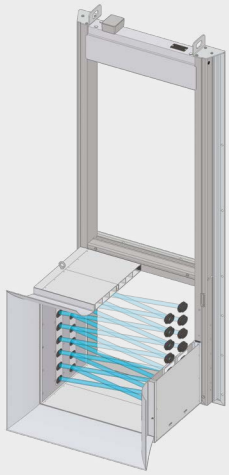
The FlumeMeter can be specified with equipment to allow remote management of the meter using Rubicon's SCADAConnect® Live software. This takes the form of a web page which allows authorised users to remotely view real-time and historical flow information and configure alarms that can be sent via text message to nominated cell phones.

Sonaray® flow measurement technology

Thirty-two transducers across eight planes send and receive ultrasonic pulses to determine velocity by measuring the transit time taken for the pulses to travel between transducers. The measurements from each plane are then integrated to construct the flow velocity distribution.

This technique is resistant to swirl, or other non-uniform velocity distributions caused by garbage or other debris.

It also eliminates the need for flow profile calibrations that are required for single-point, single-path and doppler flow meters.



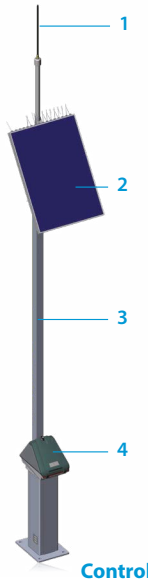
FlumeMeter™ components

Control Pedestal

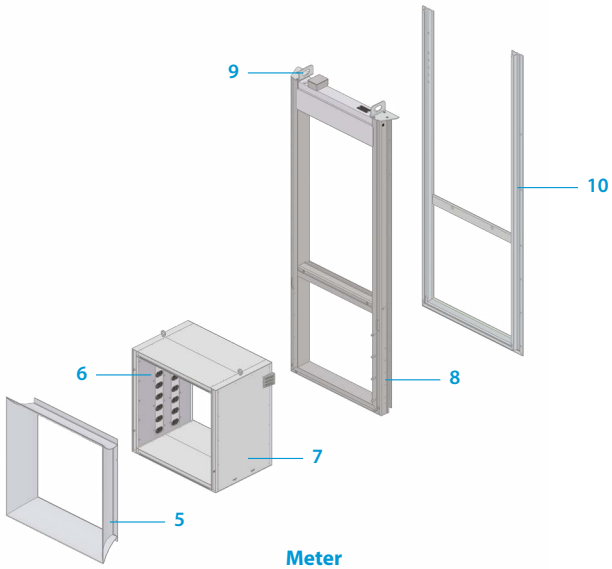
1 Antenna
2 Solar panel
3 Hinged mast
4 Secure controller housing with LCD display

Meter

5 Entry flare
6 Sonaray sensors
7 Meter box
8 Internal frame (houses optional level sensor)
9 Lifting hooks
10 External frame



Control Pedestal



Meter

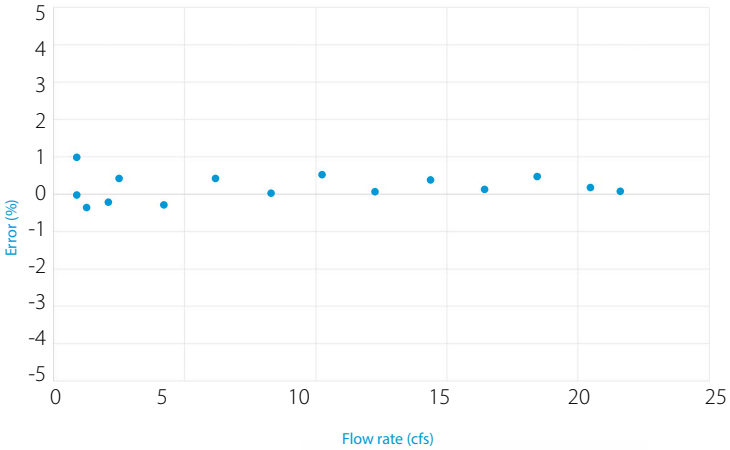
Easy to install

Using a slide-in frame, FlumeMeters are designed to retrofit upstream of existing turnout gates to significantly reduce costs associated with civil work. They can also be mounted to purpose built emplacements.

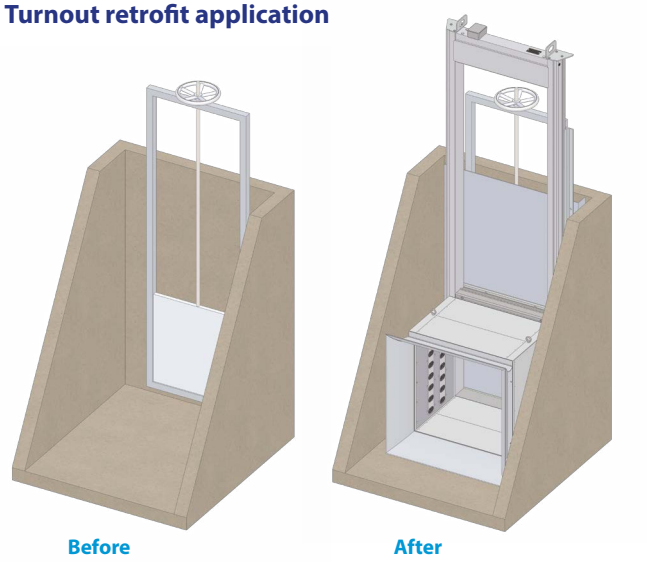
In most cases it can be installed and operational in two days; during irrigation or the off-season.

FlumeMeter™ measurement accuracy

(24in FlumeMeter measured under normal operating conditions relative to ABB Magmaster in Rubicon hydraulics laboratory)



Turnout retrofit application



FlumeMeter™ specifications

General	
User interface	LCD screen
Data interface	RS232/485, USB, Ethernet
Unit of measure	Metric/imperial
Local interface language	English, Spanish, French, Chinese and Italian
Data storage	All volumetric usage is accumulated and backed up to an SD card. Historical data can be uploaded locally via USB for post processing.
Data tags	A comprehensive set of tags are available for integration into SCADA systems
Electronics	SolarDrive® power management and control technology housed in the local control unit. Each unit passes a 12hr heat pre-stress and 100% functional test.
Flow measurement	
Technique	Cross-path ultrasonic transit-time
Transit time measurement resolution	100 picoseconds
Measurement frequency	2.5 seconds
Accuracy	†±2.5% in accordance with ISO 4064/OIML R 49
Velocity measurement range	Accuracy listed above is achieved at flow velocities greater than 1 in/s
Sensor quantity	32 individual ultrasonic sensors, across 8 planes of measurement
Calibration method	Factory pre-claibrated. Ultrasonic level sensor is also internally self-calibrated. Simple in-field verification process.
Alarming	Alarm indicates if meter is not full; with partially-full measurement optioned, alarm indicates if water falls below minimum level
Water level measurement (optional)	
Technique	Ultrasonic
Accuracy	0.02in (0.5mm)
Resolution	0.004in (0.1mm)
Material	
Frames	Extruded marine grade aluminum
Meter panels	Marine grade aluminum sheet and aluminum extrusion
Hardware	Stainless steel
Corrosion protection	Polyamine-cured epoxy coating is available for additional protection against chemical corrosion in consultation with Rubicon technical staff
Water level sensor	Anodized aluminum and copolymer acetyl plastic with stainless steel fittings
Power	
Power supply	12V DC self-contained battery charged from solar panel or AC line power
Solar panel	80, 120 or 160 watt polycrystalline silicon solar cell
Batteries	Sealed gel lead acid with temperature sensor (~5yr life, provides ~5 days of operation without solar or AC line power) or optional lithium LiFePO4
Communications	
Protocols	DNP3, MDLC, Modbus, PLC-5, SLC500, TCP/IP

Specifications subject to change.

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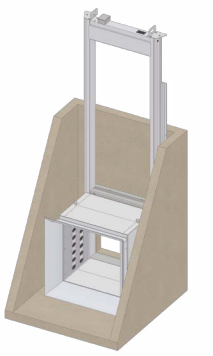
Dimensions and maximum water levels

Model	A	B	C	D	E	F	Weight	Min flow rate	Max flow rate
	in	in	in	in	in	in	lb	(cfs)	(cfs)
FMB-450-1200	18	48	29	74	48	56	287	0.60	9.34
FMB-600-1500	24	60	34	90	37	67	284	1.06	16.61
FMB-600-1800	24	71	34	109	37	79	313	1.06	16.61
FMB-600-2400	24	95	34	133	37	103	344	1.06	16.61
FMB-600-3000	24	119	34	152	37	126	373	1.06	16.61
FMB-750-1800	30	71	40	109	38	79	352	1.66	25.95
FMB-750-2400	30	95	40	133	38	103	383	1.66	25.95
FMB-750-3000	30	119	40	152	38	126	411	1.66	25.95
FMB-900-1800	36	71	46	109	49	79	456	2.39	37.36
FMB-900-2400	36	95	46	133	49	103	486	2.39	37.36
FMB-900-3000	36	119	46	152	49	126	515	2.39	37.36
FMB-1050-2400	42	95	52	140	49	103	528	3.26	50.86
FMB-1050-3000	42	119	52	160	49	126	557	3.26	50.86
FMB-1200-2400	48	95	58	140	49	103	578	4.25	66.42
FMB-1200-3000	48	119	58	160	49	126	606	4.25	66.42

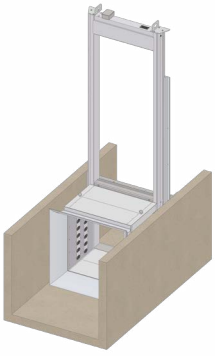
Contact Rubicon for complete dimensions or additional sizes. Consultation with a Rubicon engineer or agent is recommended prior to sizing.

- **A** Measurement box internal size
- **B** Maximum upstream water depth (also referred to as pressure rating)
- **C** Internal frame width
- **D** Overall meter height
- **E** Box length
- **F** Maximum headwall height

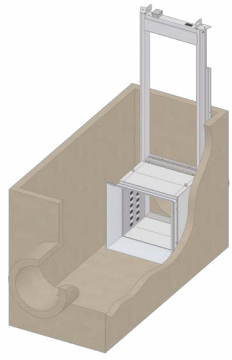
Installation options



Headwall

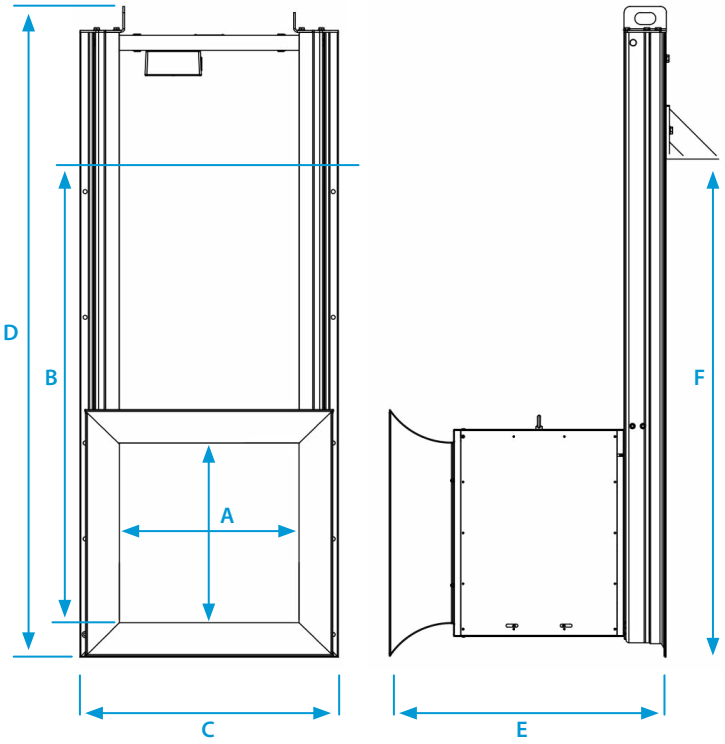


Sidewalls



Control box

Front and side views



About Rubicon Water

Rubicon Water delivers advanced technology that optimizes gravity-fed irrigation, providing unprecedented levels of operational efficiency and control, increasing water availability and improving farmers' lives.

Founded in 1995, Rubicon has more than 30,000 gates and meters installed in TCC systems in 15 countries.

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