SlipMeter®

RUBICON™

Overview

The SlipMeter is a breakthrough all-in-one gate and meter for use as farm supply points, in-channel regulators and at offtakes. Now it's less labour intensive to provide irrigators with a reliable, flexible and accurate water delivery service.

You can remotely pre-set the SlipMeter to automatically deliver a constant and accurately measured flow rate and volume. This means you can provide a great service day or night, even when supply channel levels are fluctuating.

And the all-in-one design means everything – drive system, motor control, ultrasonic measurement, power supply, local control keypad and telemetry – functions as a single unit, avoiding installation problems or incompatibilities.

The SlipMeter's ability to measure accurately at high and very low flow rates means it is suitable for all crop types. And the extremely low head loss means that command is not compromised even when very little head is available.

It has been designed to be installed in existing structures without costly civil work, by simply sliding into a frame that is fixed to the existing structure.

The built-in software provides the following control possibilities:

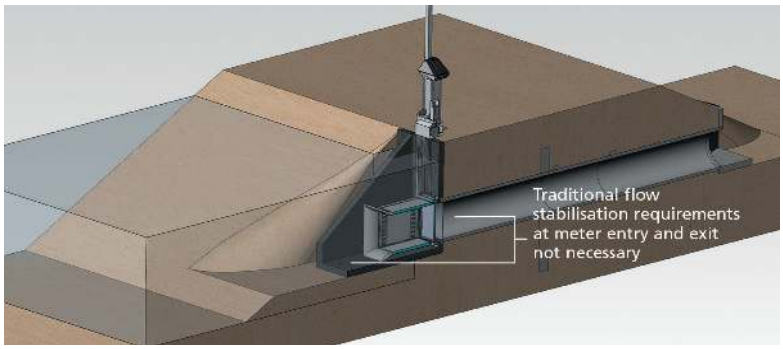
Control objective		Gate action
Local site	**Position**	Automatically moves the gate to a desired position and stays there
	Flow	Automatically adjusts the gate to maintain a constant flow rate, regardless of the site's upstream and downstream water levels
	Upstream water level	Automatically adjusts the gate to maintain a desired water level immediately upstream of the SlipMeter, regardless of channel flow
	Downstream water level	Automatically adjusts the gate to maintain a desired water level immediately downstream of the SlipMeter, regardless of channel flow
Network*	**Supply**	Automatically moves the gate to match measured outflow from the network below the pool while maintaining a stable downstream level
	Demand	Automatically moves the gate to match measured outflow from the network above the SlipMeter while maintaining a stable upstream level

*Networked control is available when used with other Rubicon gates and NeuroFlo® software.

A TCC® product

The SlipMeter 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 channel and gravity pipeline distribution. Unlike traditional infrastructure, TCC products can interact and work together to help managers improve:

- the availability of water
- service and equity to users
- management and control
- health and safety for channel operators



Features

- Independently verified Sonaray® flow measurement accuracy of ±2.5%†
- Meets AS 4747 accuracy requirements
- Solar-charged battery system or mains power
- Robust high-duty cycle operation and long life
- SCADA ready communication system – can be integrated to many SCADA platforms

An ideal solution for…

- Measuring and controlling flow in farm supply points
- Channel-to-pipe applications
- Automation of channel regulators
- Automation of channel offtakes
- Lowering civil costs because there is no need to stabilise flow at entry and exit
- Supply points requiring very low head loss and/or high accuracy

SlipMeter®

Control Pedestal

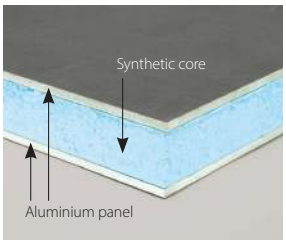
Each SlipMeter installation includes a robust pedestal that provides power and control to the gate and is a secure, weatherproof housing for electronic components and batteries.

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

Control Pedestal

High strength construction

The gate panel is made from FormiPanel™, Rubicon's high-strength laminate construction method that uses techniques adopted from the aerospace and marine industries. Industrial adhesives are used to bond structural grade aluminium extrusions and skin plates to a synthetic core material. The result is strong, lightweight, and corrosion resistant.



FormiPanel™ construction

Gate control technology

CableDrive™ is Rubicon's actuation system designed to provide precision gate position accuracy and repeatability in harsh environments. The drive is a wire-rope (cable) and drum mechanism that provides positive drive in both the raise and lower directions. It is designed for high duty cycle operation and provides precise gate positioning to within ±0.5mm. The drive is managed by Rubicon's SolarDrive® technology – a purpose built integrated circuit board that manages gate positioning, solar power regulation, battery charge, fusing and the pedestal user interface.

SolarDrive® electronics

Low maintenance

The SlipMeter's modular design allows it to be maintained in the field with minimal tools, training, and easily replaceable parts.

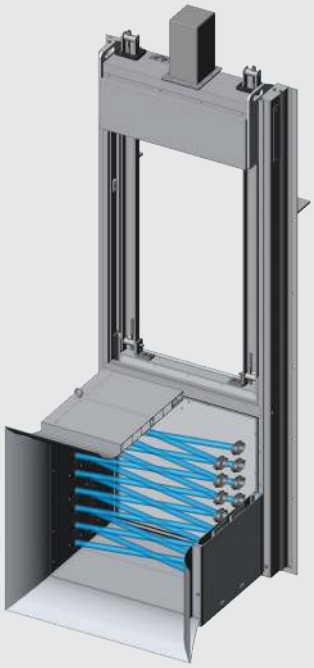
- Does not require periodic recalibration to maintain accuracy
- Seals can be replaced
- On-site diagnostics built into the software
- Service can be done by local Rubicon field technicians or authorised/trained independent local integrators

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.



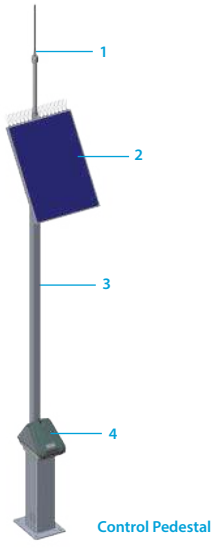
SlipMeter® components

Control Pedestal

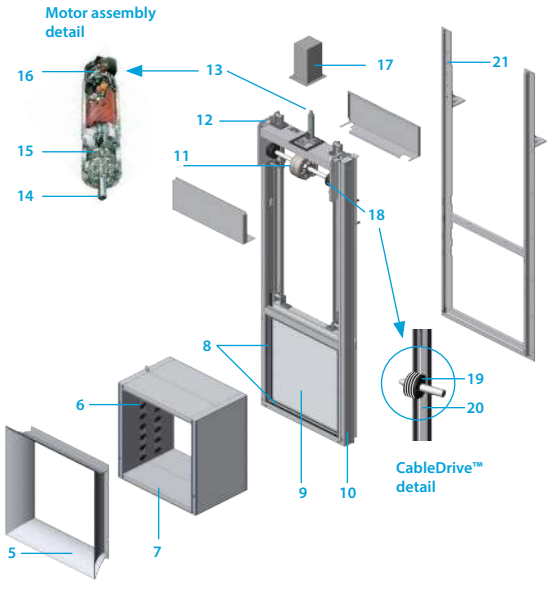
1 Antenna
2 Solar panel
3 Hinged mast
4 Secure controller housing with LCD display

Meter/control unit

5 Entry flare
6 Sonaray sensors
7 Meter box
8 Gate seals
9 Gate panel
10 Internal frame (one side houses the optional ultrasonic level sensor)
11 Output drive assembly (gear box)
12 Lifting hooks
13 Motor and encoder
14 Motor drive shaft
15 Planetary gear box
16 Encoder
17 Motor cover
18 CableDrive assembly
19 Cable drum
20 Cable guide
21 External frame



Control Pedestal



Easy to install

SlipMeters are designed to mount to existing headwall structures as well as purpose-built emplacements, significantly reducing costs associated with civil work.

- Installed and operational in two days during irrigation or off-season
- Factory calibrated and pre-configured

Remove existing manual gate and...

replace with SlipMeter

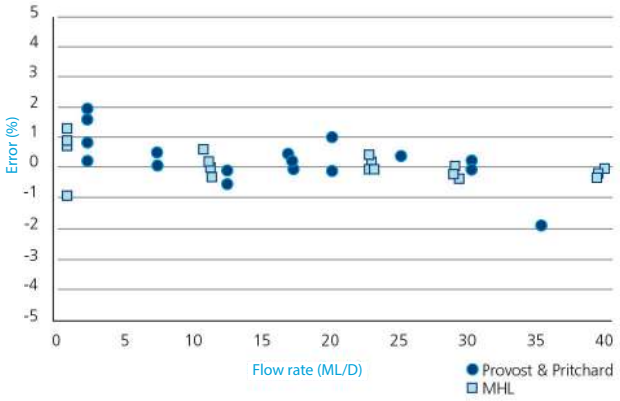
Independently tested flow measurement accuracy

The SlipMeter's flow measurement accuracy has been independently verified under a wide range of conditions in the laboratory and in the field.

- Provost & Pritchard engineers in California conducted in-situ testing in a customer supply point configuration under calm and turbulent conditions
- Manly Hydraulics Laboratory in Sydney, Australia conducted laboratory tests under wave disturbance, upstream disturbance and submerged conditions
- Testing has demonstrated compliance with AS 4747

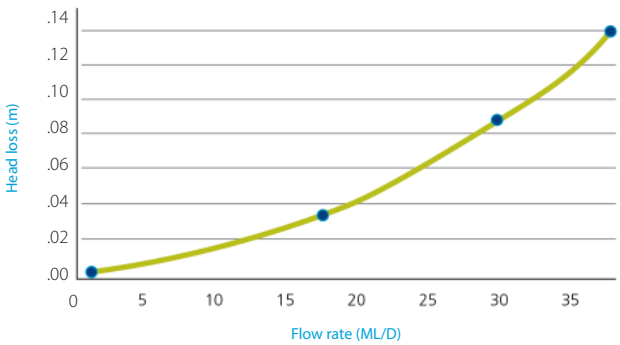
SlipMeter® measurement accuracy

(600mm 45° path SlipMeter measured under normal operating conditions relative to ABB Magmaster)



SlipMeter® head loss

(600mm 45° path SlipMeter measured at Manly Hydraulics Laboratory)



SlipMeter® 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 tags	A comprehensive set of tags are available for integration into SCADA systems
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.
Not full alarm	Alarm indicates when meter box is not full
Control	Local or remote via SCADA
Electronics	SolarDrive® power management and control technology housed in the local control pedestal. Each unit passes a 12hr heat pre-stress and 100% functional test.
Motor	12V DC
Gate position	256 count magnetic encoder
Seal performance	<0.02 litres/second per lineal metre of seal (exceeds the American and European standards AWWA C513 & DIN 19569)
Actuation options	12V DC powered (solar); 120-240V AC powered; mechanical override; electrical override pendant and battery
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 AS 4747 and ISO 4064/OIML R 49. †Accuracy of 600mm SlipMeter verified by Manly Hydraulics Laboratory, April 2011 and Provost & Pritchard, November 2011.
Velocity/ measurement range	Accuracy listed above is achieved at flow velocities greater than 25mm per second
Sensor quantity	32 individual acoustic sensors, arranged in four cartridges, across 8 planes of measurement
Calibration method	Factory pre-calibrated. Ultrasonic level sensor is also internally self-calibrated
Water level measurement (optional)	
Technique	Ultrasonic
Accuracy	0.5mm
Resolution	0.1mm
Material	
Frames	Extruded marine grade aluminium
Gate panel	Composite laminate construction using marine grade aluminium sheet bonded to RTM Styrofoam on aluminium extrusion
Hardware	Stainless steel
Shafts	Stainless steel
Seals	EDPM rubber
Wear strip	PVC
Pressure rating	Refer to the Dimensions and Maximum Water Level table on page 4
Water level sensor	Anodized aluminium and copolymer acetyl plastic with stainless steel fittings and gold-plated connectors
Corrosion protection	Polyamine-cured epoxy coating is available for additional protection against chemical corrosion in consultation with Rubicon technical staff
Power	
Power supply	12V DC self-contained battery charged from solar panel or AC mains 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 mains power input) or optional LiFePO4
Communications	
Protocols	DNP3, MDLC, Modbus, PLC-5, SLC500, TCP/IP

Specifications subject to change

RUBICON™

Dimensions and maximum water levels

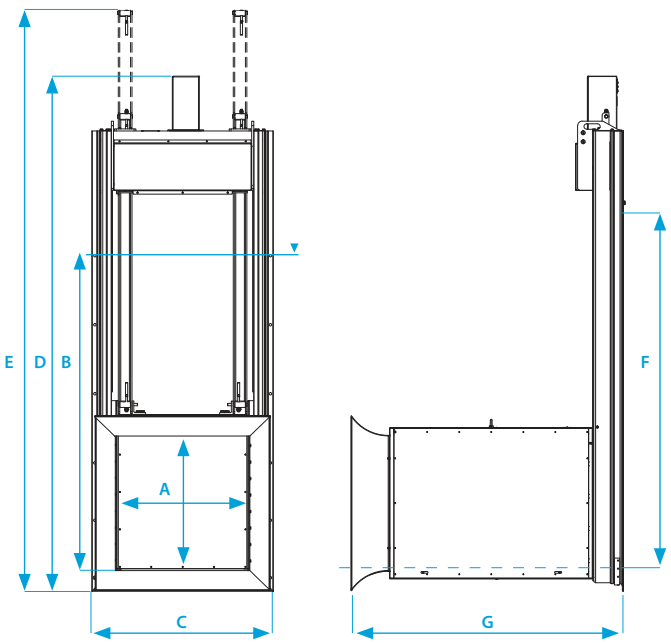
Model ‡	A	B	C	D	E	F	G	Weight	Min flow rate
	mm	mm	mm	mm	mm	mm	mm	(kg)	(ML/d)
SMB 450-1200	450	1200	712	2098	2288	1250	1213	166	1.46
SMB 450-1500	450	1500	712	2398	2588	1550	1213	173	1.46
SMB 450-1800	450	1800	712	2875	3065	2000	1213	191	1.46
SMB 450-2400	450	2400	712	3475	3665	2600	1213	205	1.46
SMB 450-3000	450	3000	712	3975	4165	3100	1213	218	1.46
SMB 600-1500-C	600	1500	862	2398	2738	1550	927	176	2.6
SMB 600-1500	600	1500	862	2398	2738	1550	1208	201	1.0
SMB 600-1800-C	600	1800	862	2875	3215	2000	927	189	2.6
SMB 600-1800	600	1800	862	2875	3215	2000	1208	214	1.0
SMB 600-2400-C	600	2400	862	3475	3815	2600	927	208	2.6
SMB 600-2400	600	2400	862	3475	3815	2600	1208	233	1.0
SMB 600-3000-C	600	3000	862	3975	4315	3100	927	221	2.6
SMB 600-3000	600	3000	862	3975	4315	3100	1208	246	1.0
SMB 750-1800-C	750	1800	1012	2875	3415	1950	957	269	4.06
SMB 750-1800	750	1800	1012	2875	3415	1950	1521	319	1.56
SMB 750-2400-C	750	2400	1012	3475	4015	2550	957	288	4.06
SMB 750-2400	750	2400	1012	3475	4015	2550	1521	340	1.56
SMB 750-3000-C	750	3000	1012	3975	4515	3050	957	311	4.06
SMB 750-3000	750	3000	1012	3975	4515	3050	1521	361	1.56
SMB 900-1800-C	900	1800	1162	2875	3565	1950	1239	327	5.85
SMB 900-1800	900	1800	1162	2875	3565	1950	1521	357	2.25
SMB 900-2400-C	900	2400	1162	3475	4165	2550	1239	346	5.85
SMB 900-2400	900	2400	1162	3475	4165	2550	1521	376	2.25
SMB 900-3000-C	900	3000	1162	3975	4665	3050	1239	369	5.85
SMB 900-3000	900	3000	1162	3975	4665	3050	1521	399	2.25
SMB 1050-2400-C	1050	2400	1312	3675	4515	2700	1239	402	7.96
SMB 1050-2400	1050	2400	1312	3675	4515	2700	1803	472	3.06
SMB 1050-3000-C	1050	3000	1312	4175	5015	3750	1239	425	7.96
SMB 1050-3000	1050	3000	1312	4175	5015	3750	1803	495	3.06
SMB 1200-2400-C	1200	2400	1462	3675	4665	2700	1239	440	10.4
SMB 1200-2400	1200	2400	1462	3675	4665	2700	1803	515	4.0
SMB 1200-3000-C	1200	3000	1462	4175	5165	3750	1239	458	10.4
SMB 1200-3000	1200	3000	1462	4175	5165	3750	1803	533	4.0
SMB 1500-3000	1500	3000	1762	4375	5680	3240	1530	785	16.2

‡ C denotes a compact SlipMeter with a smaller footprint for situations where space is limited. Compact SlipMeters have marginally higher minimum flow rate in comparison to the standard SlipMeter, due to the configuration of the transducer paths.

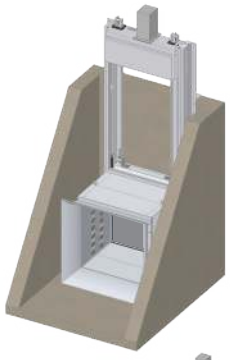
A consultation with a Rubicon engineer or agent is recommended to assist in meter selection. Weights are approximate and inclusive of external frame.

A Gate size
B Maximum height of water above meter invert
C Frame width
D Overall gate height
E Fully open height
F Maximum headwall height
G Box length

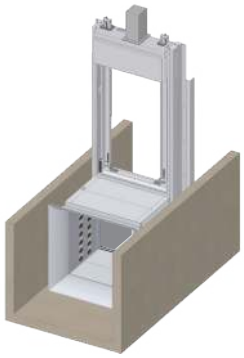
Front and side views



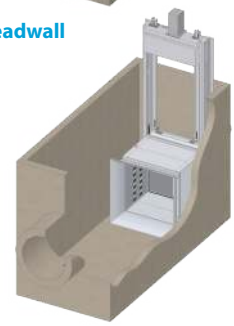
Mounting options



Headwall



Sidewalls



Control box

About Rubicon Water

Rubicon Water delivers advanced technology that optimises 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.

DM-SM-08/19-AU

1 Cato Street
Hawthorn East
Victoria 3123
Australia

Tel: +61 3 9832 3000
Fax: +61 3 9832 3030
enquiry@rubiconwater.com