

Data Sheet

Overview

The FlumeGate™ is a combined flow measurement and control gate designed for open canal applications. Accurate flow measurement, precise motor control, power supply and radio telecommunications are fully integrated in a single device.

In free-flow or submerged conditions, flow is calculated from the gate's own measurements of upstream water level, downstream water level and gate position.

The FlumeGate can be operated as a stand-alone unit, or can coordinate with other gates along the canal to optimize the whole network's flow. It can be managed and monitored on-site or operated remotely when connected to a SCADA network.

The FlumeGate automatically controls the flow of water by varying the gate position based on a desired set-point or on irrigation demand as shown in the table.

Control Objective		Gate Action
Local	Position	Moves to a desired set-point and stays there
	Flow	Maintains a constant flow regardless of upstream or downstream levels
	Upstream Level	Maintains a desired level in the pool immediately upstream
Downstream Level		Maintains a desired level in the pool immediately downstream
Network*	Demand	Changes the flow to match measured outflow from the network below the pool while maintaining a stable downstream water level
	Supply	Changes the flow to match the flow supplied from the network above the gate while maintaining a stable upstream water level

* Network Control is only available when used with other Rubicon gates and Rubicon's NeuroFlo™ network control software.

A TCC® Product

The FlumeGate™ is part of a bigger collection of integrated products called TCC (Total Channel Control®). TCC is a modular suite of hardware and software components that integrate to provide tailored solutions such as network management and control, demand management, or customer order management and invoicing. The FlumeGate can integrate with other TCC components to address challenges faced by irrigation districts such as distribution efficiency, operational control, accurate measurement, and service levels to farmers.



Features

- Fully integrates modernization components
 - Ultrasonic water level measurement
 - Flow calculations and control software
 - Solar-charged or 120V AC charged battery system
 - SCADA ready communication system; can be integrated to many SCADA platforms
- Robust high duty cycle operation
- Overshot design for better water level control
- Not affected by sand, silt or other contaminants
- Standard sizes from 2' to 10' with custom sizes available
- Optional walkways with handrails for staff safety

Ideal Solution For...

- Headgates, turnouts, or check structures requiring low headloss and high accuracy
- Gate modernization projects (more cost-effective than automating an existing gate)
- Remote locations without AC power
- Highly corrosive environments including salt water
- Maintaining canal diversions or upstream water levels
- Measuring flow in canal-to-siphon applications



Local Control Pedestal

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

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

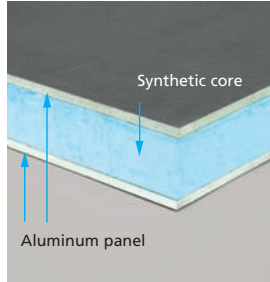


Local user interface

Gate Leaf Technology

FormiPanel™ is Rubicon's high strength gate leaf construction that uses techniques adopted from the aerospace and marine industries.

The gate panel assembly is a laminate construction that utilizes high strength industrial adhesives to bond structural grade aluminum extrusions and skin plates to a synthetic core material. The result is strong, lightweight, and corrosion resistant.



FormiPanel construction

Flow Measurement

The FlumeGate calculates flow using measurements of upstream water level, downstream water level and gate position, achieving in-field, independently verified measurement accuracy of $\pm 5\%$. This accuracy is attributed to its unique design and precision manufacture.

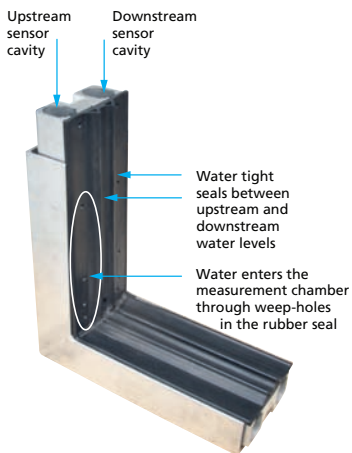


SolarDrive electronics

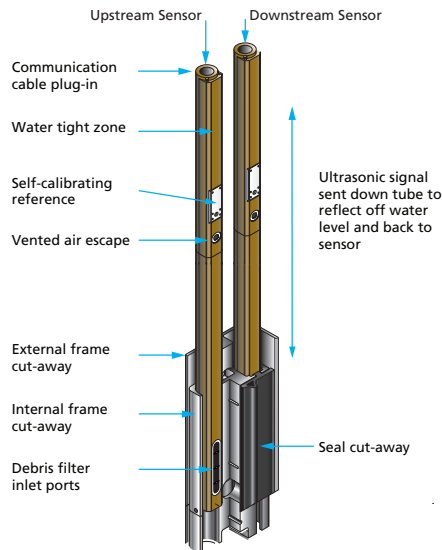
Rubicon's MicronLevel™ water level measurement sensors are housed within the internal frame. A water-tight seal separates the upstream and downstream sensors.

- Unique, integrated stilling wells 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

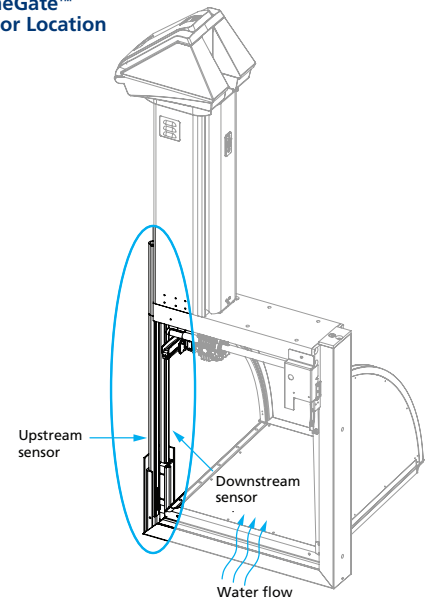
FlumeGate™ Frame Corner Section



FlumeGate™ Sensor Detail



FlumeGate™ Sensor Location



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 $\pm 0.5\text{mm}$ ($\pm 0.02\text{in}$).

The drive is managed by Rubicon's SolarDrive® technology – a purpose built integrated circuit board that manages gate positioning, solar power regulation, battery charge and the pedestal user interface.

Low Maintenance

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

- Retractable level sensors allow for easy in-field servicing
- Seals can be replaced
- On-site diagnostics
- Service can be done by local Rubicon field technicians or authorized/trained independent local integrators

Easy to Install

Rubicon's FlumeGate products are designed to retrofit to existing check type regulating 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-commissioned



Dry install



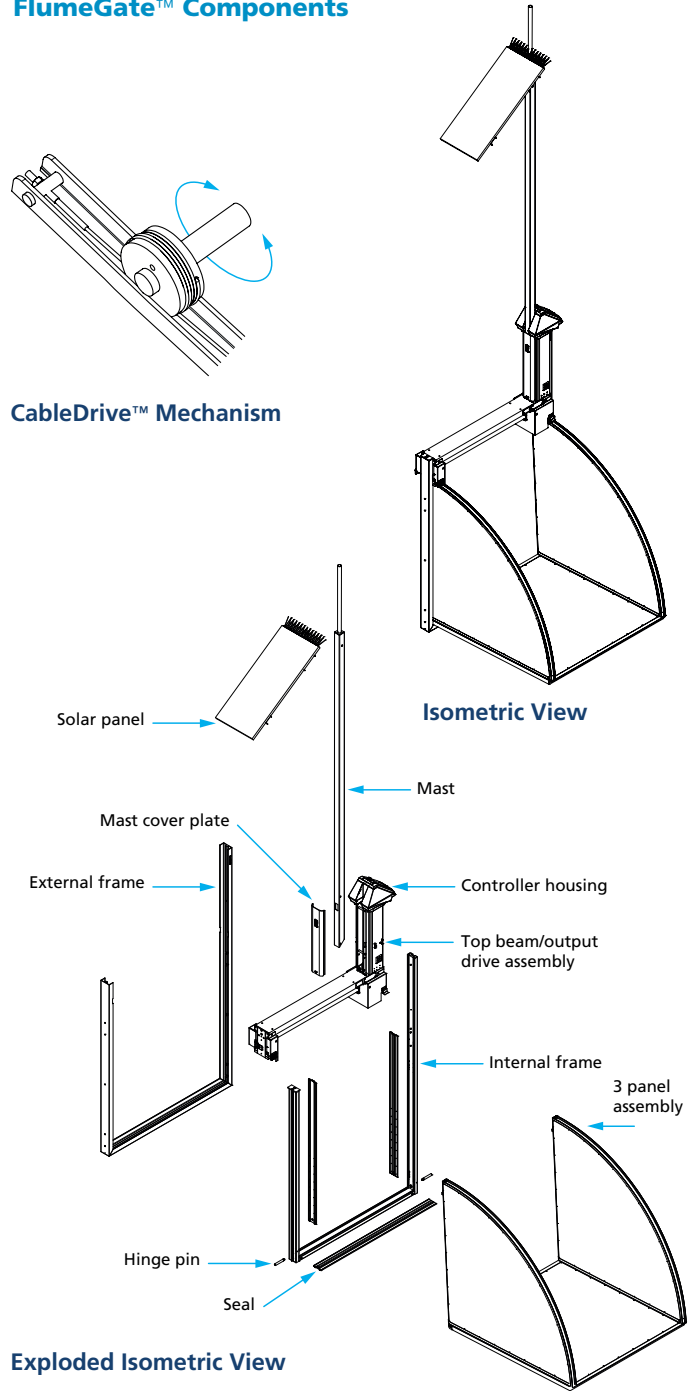
Wet install

FlumeGate™ Specifications

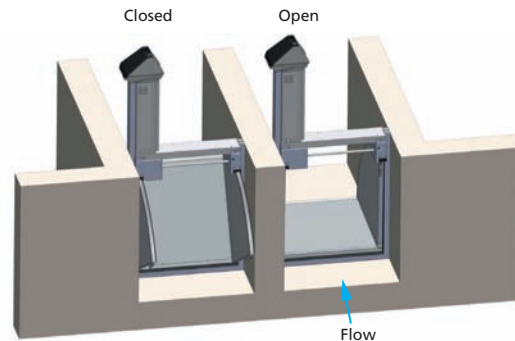
General	
Maximum flow rate	Varies by gate size, refer to flow rating table
Data interface	Local display (4 line LCD with keypad), Modbus serial, data radio
Data tags	144 available for integration into SCADA systems
Control	Local or remote via SCADA
Drive mechanism	CableDrive™ stainless steel wire rope and cable drum assembly for precision positioning and long life
Electronics	SolarDrive® power management and control technology housed in the local control pedestal. Each unit passes a 12hr heat soak pre-stress and 100% functional test.
Typical weight	2.5ft wide gate = 350lbs; 6.5ft wide gate = 1,500lbs
Motor	3-stage, 12V DC
Gate position	256 count magnetic encoder
Seal performance	<0.05 gallons per minute per lineal foot of seal (exceeds AWWA* C513 standard)
Actuation options	12V DC powered (solar); 120V AC powered; Manual with hand-crank or car battery
Flow Measurement	
Accuracy	±2.5% in the lab, ±5% in the field
Sensor quantity	2 or 4 (dual redundancy)
Measurement frequency	10 seconds
Calibration method	Factory pre-calibrated and internal self-calibrating sensors
Material	
Construction	40 year design life
Frames	Extruded marine grade aluminum (6351-T5)
Gate panels	Composite laminate construction using marine grade 5083-H321 aluminum sheet bonded to RTM Styrofoam on 6351-T5 aluminum extrusion
Hardware	304, 316 stainless steel
Shafts	304, 316, 431 stainless steel
Seals	EDPM rubber
Hinge	2205 duplex stainless steel
Water level sensors	Anodized 6063-T6 grade aluminum and copolymer acetyl plastic with 316 grade stainless steel fittings and gold-plated connectors
Standards	All materials compliant with relevant US Standards
Power	
Power supply	12VDC self-contained battery charged from solar panel or AC line power
Solar panel	85W monocrystalline
Batteries	(2) or (3) 12V 28 Ampere-hour sealed gel led acid with temperature sensor (~5yr life, ~5 day operation)
Communications	
Protocols	Modbus, analog/digital outputs
Radio communications	DNP3, MDLC, Modbus
Environmental	
Operating temp	14°F to 140°F
Operating humidity	0% to 100% condensing
Water temperature	33.8°F to 122°F

*AWWA (American Water Works Association)
Specifications subject to change

FlumeGate™ Components



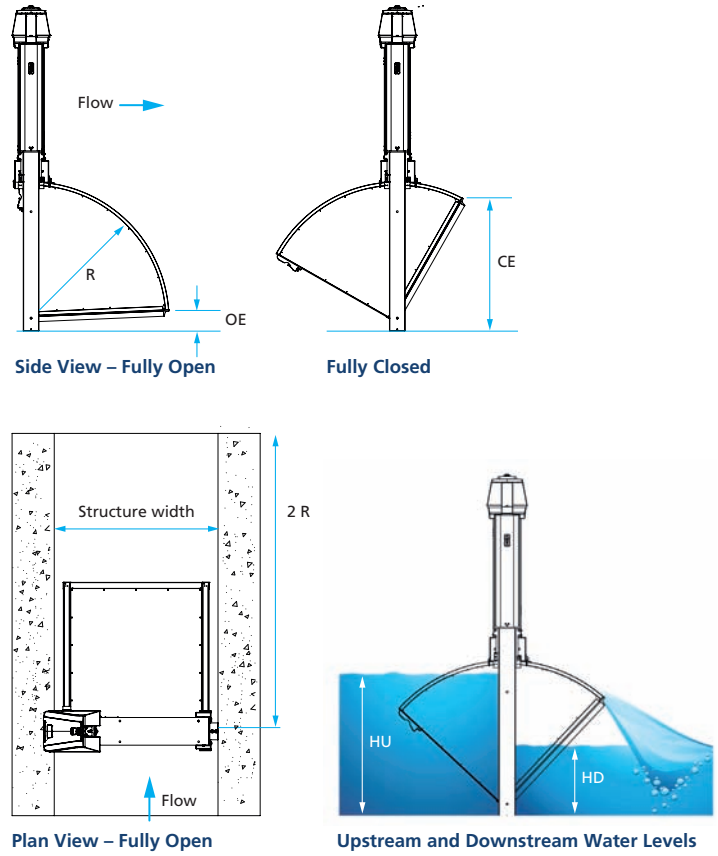
Typical Installation



FlumeGate™ Dimensions and Maximum Flow Rates

Model	Structure width	OE	CE	HUmax	HDmax	Q1	Q3
	ft	in	in	in	in	cfs	cfs
FGB-0626-0674	2.5	4.9	28	27	24	18	13
FGB-0626-0866		5.3	35	33	30	25	18
FGB-0626-1077		6.3	41	39	36	30	21
FGB-0626-1273		6.5	48	48	45	43	29
FGB-0760-0866	3	5.3	35	33	30	31	22
FGB-0760-1077		6.3	41	39	36	38	26
FGB-0760-1273		6.5	48	48	45	54	36
FGB-1050-0674	4	4.9	28	27	24	31	23
FGB-1050-0866		5.3	35	33	30	42	30
FGB-1050-1077		6.3	41	39	36	54	38
FGB-1050-1273		6.5	49	48	45	78	52
FGB-1050-1437		7.5	55	54	51	92	60
FGB-1050-1587		7.9	60	60	57	107	68
FGB-1050-1804		7.7	68	66	63	127	79
FGB-1180-0866	4.4	5.3	35	33	30	48	34
FGB-1180-1077		6.3	41	39	36	62	43
FGB-1180-1273		6.5	48	48	59	88	59
FGB-1180-1437		7.5	55	54	51	105	68
FGB-1180-1587		7.9	60	60	57	122	78
FGB-1370-0674	5	4.9	28	27	24	40	30
FGB-1370-0866		5.3	35	33	30	56	40
FGB-1370-1077		6.3	41	39	36	72	50
FGB-1370-1273		6.5	48	48	45	104	69
FGB-1370-1437		7.5	55	54	51	123	80
FGB-1370-1587		7.9	60	60	57	144	92
FGB-1370-1804		7.7	68	66	63	170	106
FGB-1485-0620	5.4	4.1	24	24	21	38	29
FGB-1485-1077		6.3	41	39	36	79	55
FGB-1485-1273		6.5	48	48	45	113	75
FGB-1485-1437		7.5	55	54	51	132	86
FGB-1485-1587		7.9	60	60	57	157	100
FGB-1485-1804		7.7	68	66	63	185	116
FGB-1675-0674		6	4.9	28	27	24	50
FGB-1675-0866	5.3		35	33	30	70	50
FGB-1675-1077	6.3		41	39	36	90	62
FGB-1675-1273	6.5		48	48	45	128	85
FGB-1675-1437	7.5		55	54	51	150	98
FGB-1675-1587	7.9		60	60	57	178	114
FGB-1675-1804	7.7		68	66	63	211	132
FGA-1675-3038	18.7		115	114	111	390	224
FGB-1790-1077	6.4	6.3	41	39	36	96	67
FGB-1790-1587		7.9	60	60	57	191	122
FGB-1790-2186		16.3	87	87	84	292	177
FGB-2268-1587	8	7.9	60	60	57	246	157
FGB-2268-2186		16.3	87	87	84	378	229
FGA-2268-3038		18.7	115	114	111	558	320

OE Fully open gate elevation
 CE Fully closed gate elevation (checking height)
 Structure width Compatible structure width
 HUmax Maximum upstream water level (CE – freeboard)
 HDmax Maximum downstream water level
 Q1 Maximum flow at freefall condition (HU=HUmax, HD=0)
 Q3 Maximum flow at fully submerged condition (HD=HDmax)
 R Gate radius



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 have more than 10,000 gates installed in TCC Systems in seven countries.

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Contact Rubicon for complete mechanical dimensions, flow rating tables, or additional gate sizes. Consultation with a Rubicon engineer or agent is recommended prior to gate sizing.



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