SlipGate®

RUBICON™

Data Sheet

Overview

The SlipGate is a new generation of precision sluice or slide gate with an all-in-one design that makes remote automated control as simple as installation.

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

Designed from the ground up with technological innovations, the SlipGate provides precision and reliability even under the high-duty cycles that are a consequence of automation. The patented drive system, laminated panel and unique adjustable seals remove the risk and ongoing maintenance issues associated with trying to automate existing gates.

To enable installation in those remote sites that are most costly to visit, the SlipGate is powered with a high performance solar power system. And that also means you can avoid the electricity costs often associated with automation.

In-built support for the most common SCADA software protocols and a variety of radio or GPRS options provide flexibility without compromising design integrity and reliability.

Automatic control

The SlipGate is designed to easily integrate a third-party level sensor or flow meter or Rubicon's own standalone MicronLevel® water level sensor mounted nearby. The built-in software provides seamless SCADA management of the integrated meter or sensor and the following control possibilities.

Level control	When interfaced with a level sensor, the SlipGate software will collect data from the level sensor and modulate the gate to maintain a desired level in the pool immediately upstream or downstream, depending on the level sensor location.
Flow control	When interfaced with a flow meter, the SlipGate software will collect data from the flow meter and modulate the gate to maintain a desired flow regardless of canal levels.

A TCC® product

The SlipGate 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 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 canal operators

Features

- Local control pedestal and display in multiple languages
- Sophisticated control software
- Designed to integrate with a level sensor or flow meter
- SCADA ready communication system
- Solar-charged or 120V AC charged battery system
- Not affected by seating or unseating head
- High duty cycle operation and low maintenance
- High strength FormiPanel™ construction
- Robust CableDrive™ drive mechanism

Ideal solution for...

- Sites with large operational head variations
- Sites where level and flow measurement is not needed or already exists
- Automating farmer turnouts
- Gates used to evacuate canals in stormwater situations
- Remote locations without AC power

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Local control pedestal

Each SlipGate 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.

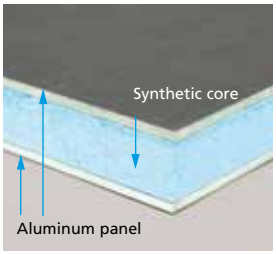
The pedestal also serves as a local user interface. A keypad and LCD display are located under the pedestal lid, allowing farmers to monitor, or operators to control and troubleshoot on-site.

Local user interface

High strength construction

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

The gate panel assembly is made from 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

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 (0.02in).

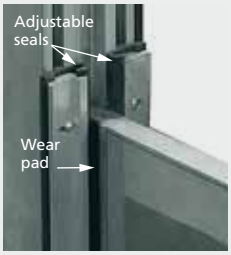
SolarDrive electronics

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 keypad interface.

Unique seal technology

Gate seals are fitted on three or four sides of the gate leaf depending upon whether the entire leaf is under water. The seals are continuous and fitted to the internal frame of the SlipGate. They extend along the full perimeter of the outer and underside of the gate panel.

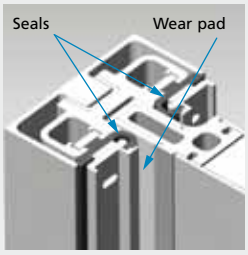
Seals on both the upstream and downstream sides of the gate mean it can hold flow in both directions and is not affected by seating or unseating head.



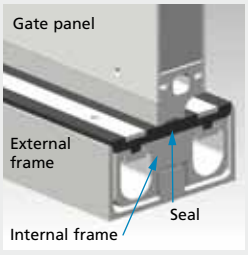
Gate panel and side seals

The crush between the seals and the gate leaf wear pads can be easily adjusted to compensate for wear. The pads are constructed with polyvinyl chloride (PVC) to reduce the coefficient of friction and increase service life, especially under high duty cycles.

The unique gate leaf profile crushes the bottom seal when the gate is closed to ensure an excellent seal.



Side seals (cross section)



Bottom gate seal (cross section)

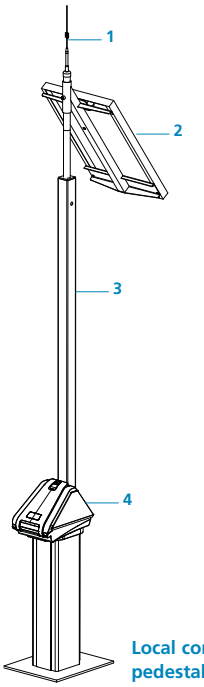
SlipGate® components

Control pedestal

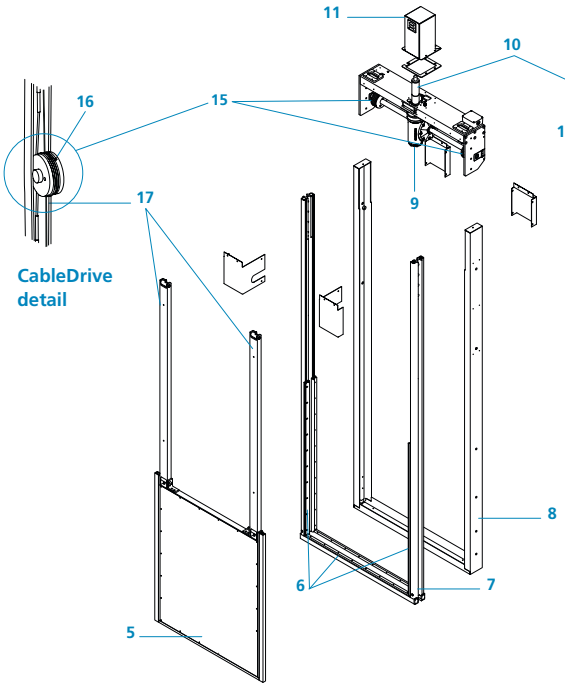
1 Antenna
2 Solar panel
3 Hinged mast
4 Secure controller housing with LCD display

Control unit

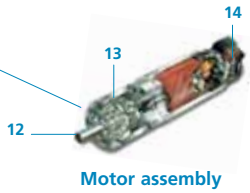
5 Gate panel
6 Gate seals
7 Internal frame
8 External frame
9 Output drive assembly (gear box)
10 Motor and encoder
11 Motor cover
12 Motor drive shaft
13 Planetary gear box
14 Encoder
15 Cable drive assembly
16 Cable drum
17 Cable guide



Local control pedestal



CableDrive detail



Motor assembly detail

Low maintenance

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

- Easily adjustable and replaceable gate seals
- On-site diagnostics built into the control software

Easy to install

Using a slide-in frame, Rubicon's SlipGates are designed to retrofit to existing check type regulating structures or mount to existing headwall structures 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.

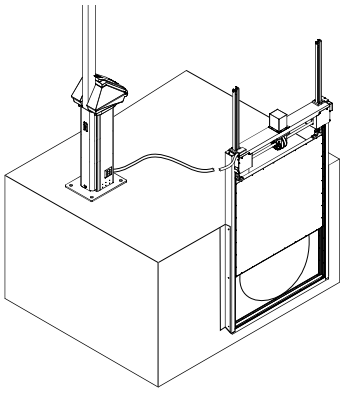
SlipGate® specifications

General	
Data interface	Local display (4 line LCD with keypad), Modbus serial, data radio
Unit of measure	User definable (metric/imperial (US))
Keypad language	Available languages: English, Spanish, French, Chinese and Italian
Data tags	140+ 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	Refer to the dimensions and maximum water levels table on page 4
Motor	12V DC; 28 AH
Seating/unseating head	Not affected by seating or unseating head due to double-sided seal
Gate position	256 count magnetic encoder
Seal performance	<0.05 gal/ft/min (exceeds AWWA* 513 leakage standards)
Actuation options	12V DC powered (solar); 120V AC powered; Manual with hand-crank or car battery
Material	
Frames	Extruded marine grade aluminum (6351-T5)
Gate panel	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 (Duro hardness of 50 on bottom seal and 70 on side seals)
Wear strip	PVC
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 lead acid with temperature sensor (~5yr life, provides ~5 days of operation without solar or AC line power)
Communications	
Protocols	Modbus, analog/digital outputs
Data communications	DNP3, MDLC, Modbus
Environmental	
Operating temp	14°F to 140°F (-10°C to 60°C)
Operating humidity	0% to 100%
Water temperature	33.8°F to 122°F (1°C to 50°C)

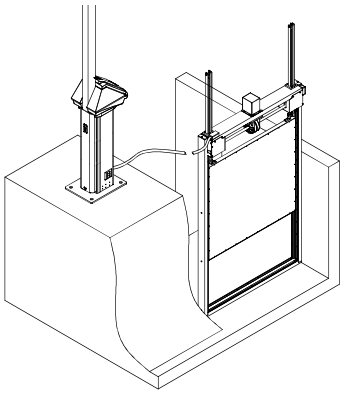
*AWWA (American Water Works Association). Specifications subject to change

Typical installations

(Note: Maximum length of cable from pedestal to gate is 29.5')



Face mount



Side mount

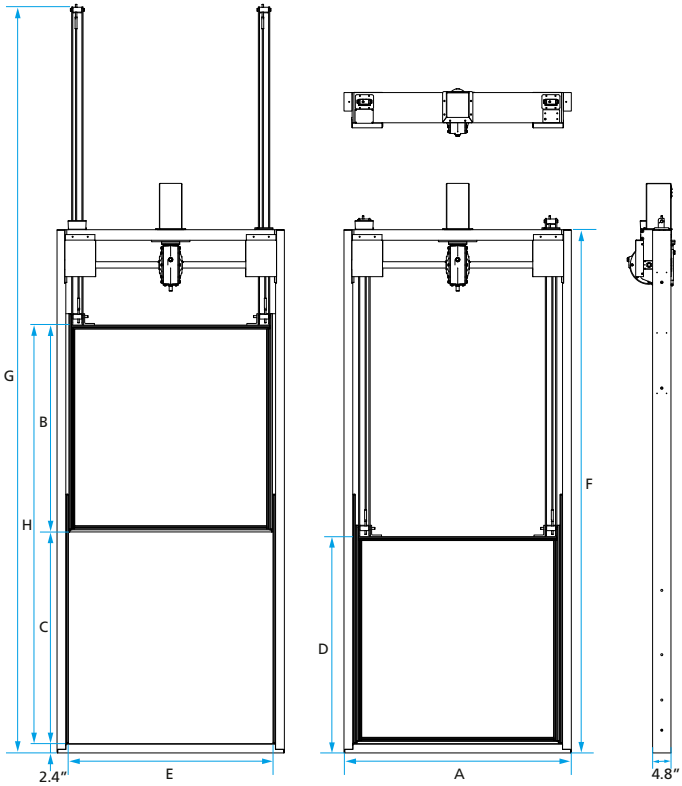
Dimensions and maximum water levels

Model	A	B	C	D	E	F	G	H	Weight
	in	in	in	in	in	in	in	in	lbs
SG-1050-0915	47	36	36	38	41	94	133	72	299
SG-1050-1220	47	48	48	50	41	118	169	96	340
SG-1050-1525	47	60	60	62	41	142	205	120	427
SG-1050-1830	47	72	72	74	41	166	241	144	345
SG-1180-0915	52	36	36	38	46	94	133	72	321
SG-1180-1220	52	48	48	50	46	118	169	96	345
SG-1180-1525	52	60	60	62	46	142	205	120	362
SG-1180-1830	52	72	72	74	46	166	241	144	450
SG-1370-1220	59	48	48	50	53	118	169	96	367
SG-1370-1525	59	60	60	62	53	142	205	120	387
SG-1370-1830	59	72	72	74	53	166	241	144	478
SG-1485-1220	64	48	48	50	58	118	169	96	381
SG-1485-1525	64	60	60	62	58	142	205	120	403
SG-1485-1830	64	72	72	74	58	166	241	144	495
SG-1675-1220	71	48	48	50	65	118	169	96	408
SG-1675-1525	71	60	60	62	65	142	205	120	433
SG-1675-1830	71	72	72	74	65	166	241	144	528
SG-1790-1220	76	48	48	50	70	118	169	96	422
SG-1790-1525	76	60	60	62	70	142	205	120	442
SG-1790-1830	76	72	72	63	70	166	241	144	538

A Minimum structure width
B Gate panel height
C Clear opening height (maximum stroke)
D Top of gate panel (fully closed)
E Clear opening width (gate width)
F Frame height
G Overall height (fully open)
H Maximum check height (upstream water depth)

Contact Rubicon for complete dimensions. Consultation with a Rubicon engineer or agent is recommended prior to gate sizing. Utilize the standard orifice equations listed in the USBR Water Measurement Manual to determine the flow through an undershot gate.

Front and side views



Fully open **Fully closed**

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 15,000 gates installed in TCC systems in 10 countries.

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