

FR-PLUS Series

Self-Brushing Flow Reservoirs for Pyxis Turbidity & Oxidizer Sensors

Product Description

The FR-PLUS Series are uniquely designed flow reservoirs for use with flat distillate end Pyxis Lab sensors that provide motorized-sensor brushing capability of the sensor head and reservoir walls. Ideally suited for use in low to medium turbidity water installations, the FR-PLUS Series reservoirs operate in a by-pass format at a 200-1800mL/min flow rate and serve as a calming vessel prior to the sensors measurement while providing an automated cleaning sequence with a uniquely designed top mounted motor driven brushing system. The motorized brush is 24V DC powered and may be configured to operate on an RS-485 input or power-timed relay depending on the quality of water being monitored and frequency desired. The flow reservoir itself design reduces stray light interference and allows for the elimination of air bubble entrainment, drop-out of large particulate and suspended solids including precipitated inorganics such as iron and manganese.

The FR-PLUS Series flow reservoirs assembly comes wall or panel mountable and complete including ¼-inch tubing inlet with isolation valve, 20mm tubing sample output and overflow assembly as well as ½-inch NTP bottom blowdown ball valve for solids removal. The FR-PLUS Series flow reservoirs are specifically designed for use with the Pyxis LT-73X Series ultra-low turbidity and ST-765-SS Series oxidizer + pH sensor platforms.

NOTE Customers with the heritage FR-100 and FR-200 flow-reservoirs (no self-cleaning mechanism) may purchase the automated brush sensor cleaning module as an accessory to install on their existing flow reservoir. Details are outlined in this data sheet.

Typical Applications

- Drinking Water Discharge
- Secondary Disinfection
- Storm Water Monitoring
- Raw Water Influent
- Treated Filter or Clarifier Effluent

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FR-100-PLUS

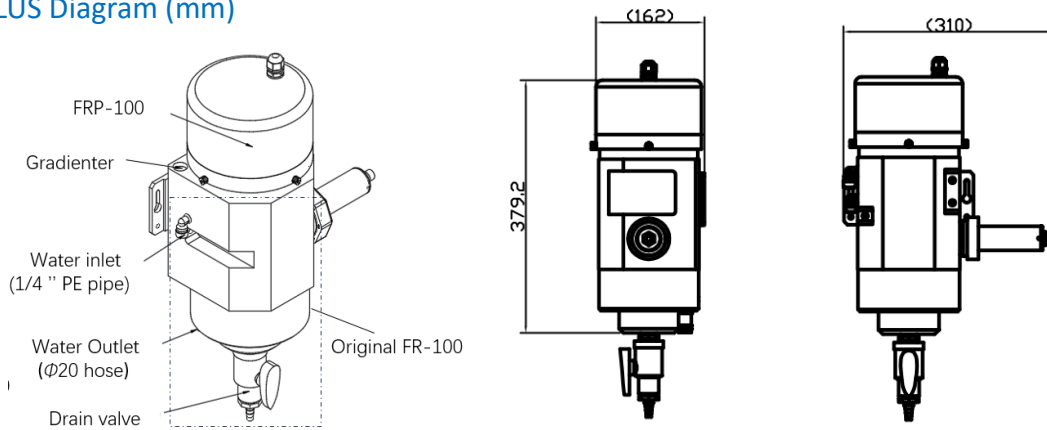
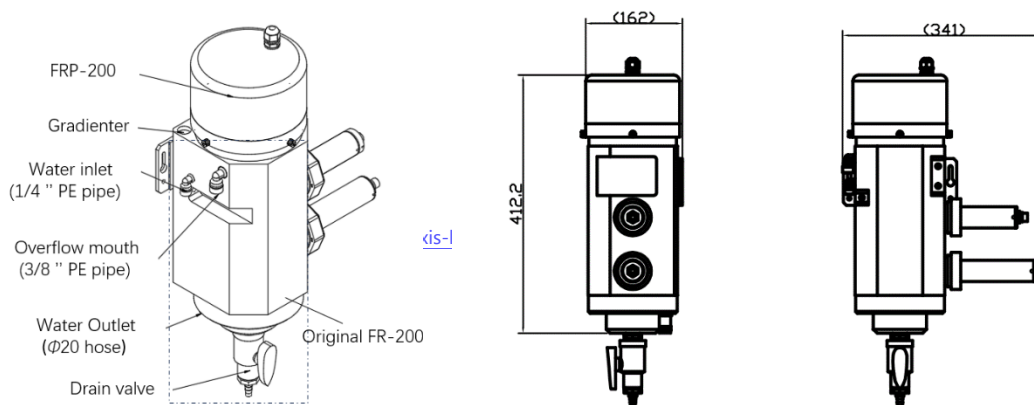


FR-200-PLUS

Specifications

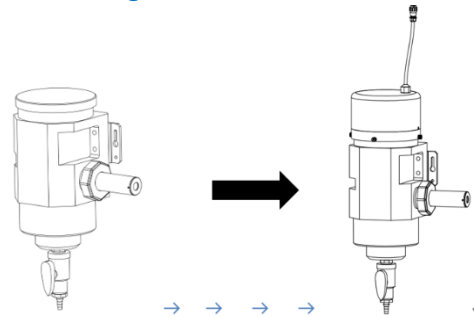
Item	FR-100-PLUS	FR-200-PLUS
P/N	50700-A05	50700-A06
Description	Single Sensor Self-Brushing Reservoir	Dual Sensor Self-Brushing Reservoir
Weight	5048 g (11.13 lbs)	6061 g (13.36 lbs)
Dimension (L x W)	379.2mm L x 162mm W	412.2mm L x 162mm W
Power Supply	24V DC, 1A	
Storage Temperature	-7 °C – 60 °C (20 – 140 °F)	
Operating Temperature	4 °C – 40 °C (40 – 104 °F)	
Control Methodology	RS-485 or 24V DC Power ON/OFF Cycle	
Body Material	ABS	
Wet Material	ABS / 316 Stainless Steel	
Cable Length	0.49-ft, terminated w/IP67 adapter +5 ft flying lead w/IP67 adapters	

NOTE During FR-PLUS Series brushing phase, the sensor readings should be disregarded due to brush interference. When connected to Pyxis display units, this data is not recorded. The same should apply when connected to non-Pyxis display units. Please wait to check the sensor readings until after brushing is completed with a minimum wait time of 1-minute for the cleaning cycle to occur.

FR-100-PLUS Diagram (mm)

FR-200-PLUS Diagram (mm)


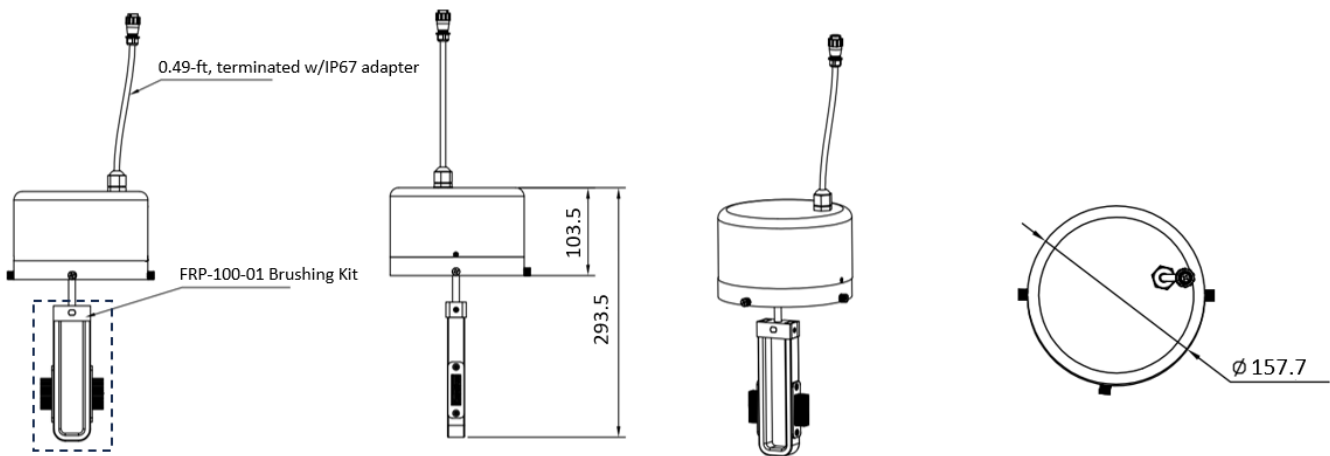
Upgrading a Heritage FR-100/FR-200 with the Motorized Sensor Brushing Module

As mentioned on page 1, the FR-100 (single sensor) and FR-200 (dual sensor) flow reservoirs can be upgraded to install the motorized sensor brushing module with the purchase as an optional accessory. The table below outlines the specific self-brushing module needed for each flow reservoir type.

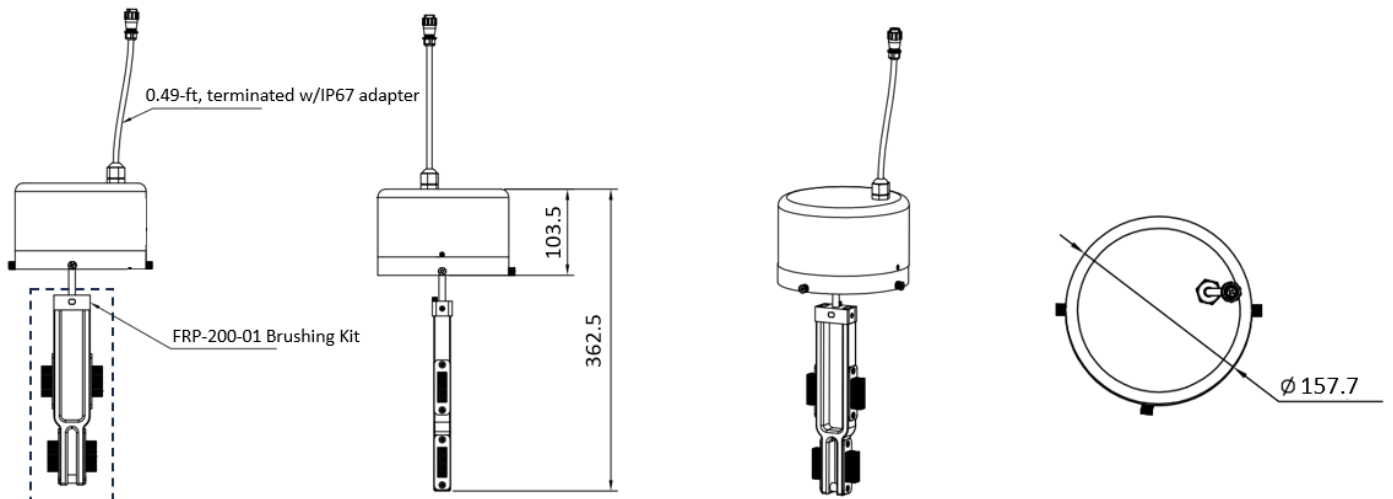


Item	FRP-100	FRP-200
P/N	50700-A16	50700-A17
Description	Motorized Brushing Module Accessory – Purchased Separately	
Flow Reservoir Use	FR-100 (Single Sensor Flow Reservoir P/N 50779)	FR-200 (Dual Sensor Flow Reservoir P/N 50781)

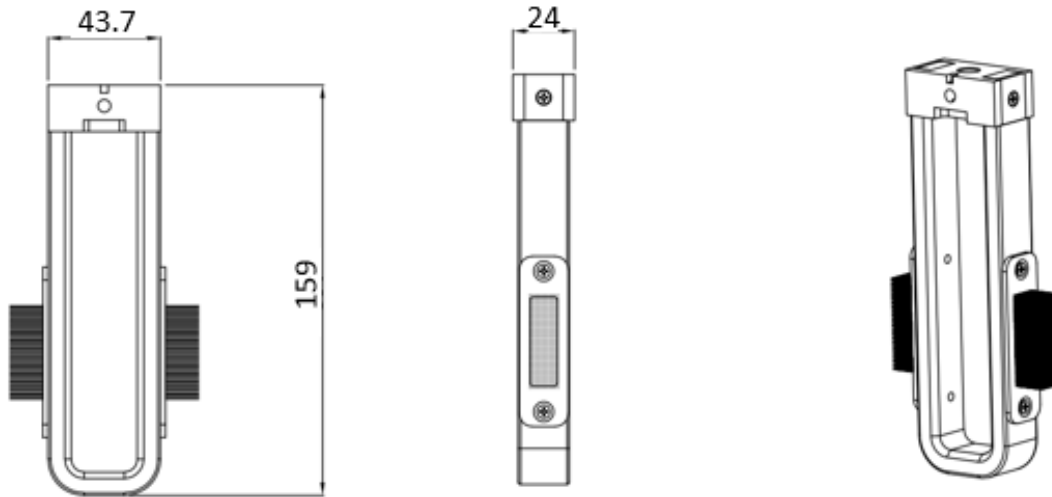
FRP-100 (P/N 50700-A16) Single Sensor Motorized Sensor Brushing Module Diagram (mm)



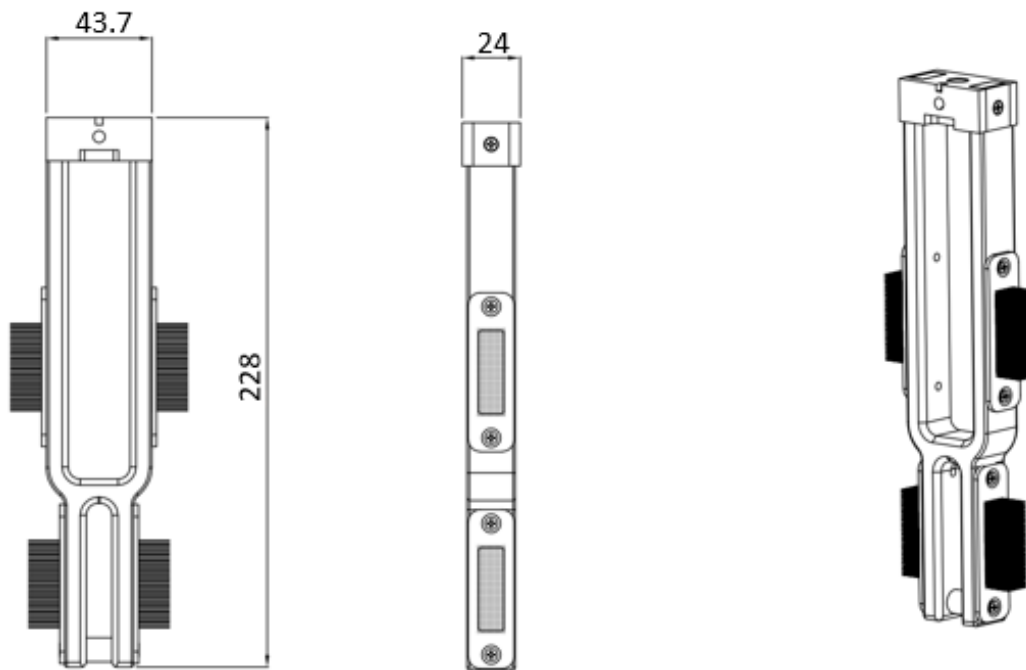
FRP-200 (P/N 50700-A-17) Dual Sensor Motorized Sensor Brushing Module Diagram (mm)



FRP-100-01 Replacement Brushing Kit Diagram (mm)

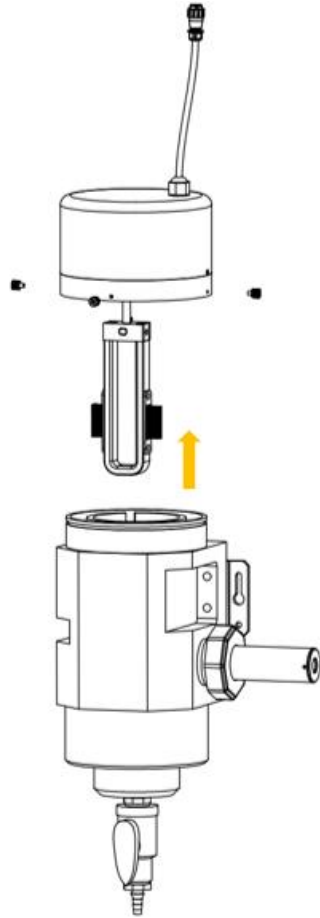


FRP-200-01 Replacement Brushing Kit Diagram (mm)



FRP-100-01 / FRP-200-01 Brushing Kit Replacement Procedure

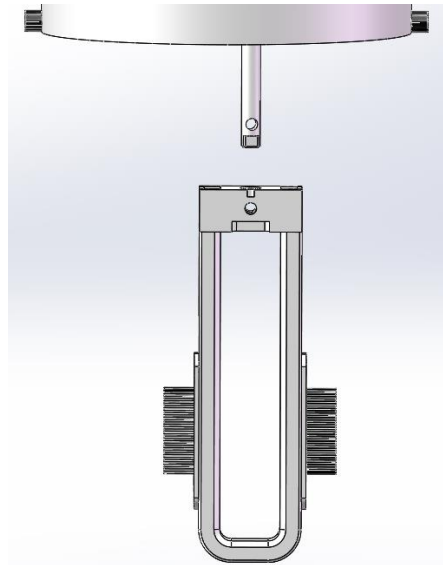
STEP 1: Remove the 3 screws, separate FRP Series motorized brushing module from flow reservoir main body.



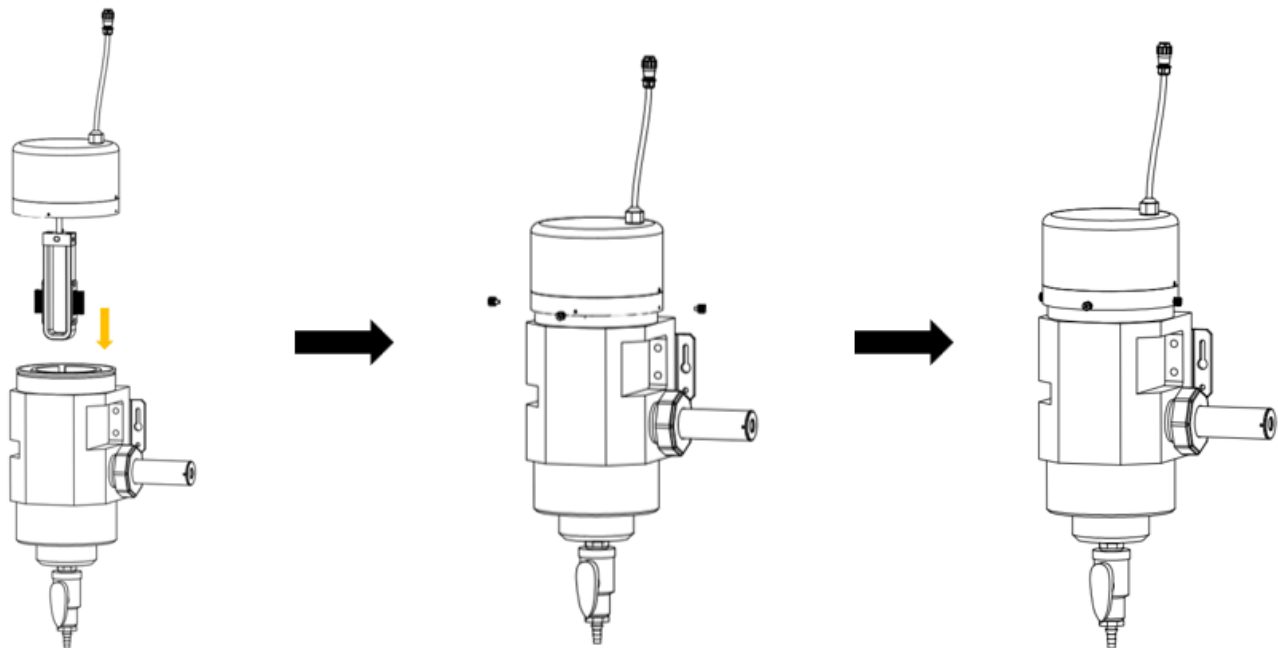
STEP 2: Manually loosen and remove the anti-stripping screws in the red circle below, then pull out the pin.



STEP 3: Remove the brush and replace it with a new one. Reinsert the pin and tighten the anti-stripping screws.



STEP 4: Gently insert the FRP-100 motorized brushing module back into the flow reservoirs main body, please pay attention to the three screw gaps between the module and the main body. Reinstall the 3 screws and tighten the screws snugly.



FR-PLUS Series Wiring Instructions

The FR-PLUS Series flow reservoir may be operated simply by providing the unit with 24VDC power supply from an active relay.

NOTE During the FR-PLUS Series brushing phase, the sensor readings should be disregarded due to brush interference. Please wait to a minimum time of 1-minute after the cleaning cycle before recording sensor readings, allowing ample time for the vessel water to calm after the cleaning cycle.

It is recommended to use a separate DC power supply with an output rating of 22–26 VDC @1A.

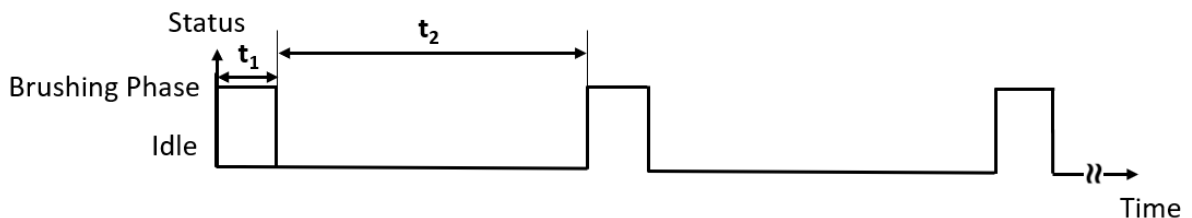
The table below also highlights the connection of RS485 Modbus cables of the FR-PLUS series to a controller or PLC. These should be used only if digital brushing target speed and cycle quantity control and adjustment is desired.

Each FR-PLUS Series flow reservoir will be shipped with one 5-ft flying lead cable (CE-FE-4.9) for direct wiring to the terminal.

Pin #	Wire-color	Designation
1	Red	24V+
2	Black	Power ground
3	Blue	485A
5	Yellow	485B
7	Silver	Earth Ground
4	White	NA
6	Green	NA

Configuration of the Automatic Brush Cycle via RS-485

The FR-Plus Series works according to the following timing diagram after powering on.



t1 = Brushing Phase: Up to 1-minute depending on the target speed & number of brushings set.

t2 = Brushing Wait Cycle: Idle time between brushing cycles.

NOTE When using the Pyxis UC-50, UC-80 and UC-100 Series Display-Data Logging Terminals, the automatic brush cycle is configured using the **"Clean Control"** function offered in the dropdown menu. Please refer to the operating instructions of the Pyxis display for further information.

In addition, users may configure brush cycle via a Modbus RTU connection, see section below.

FR-PLUS Series Modbus Communication Setting

FR-PLUS Series Modbus Settings	
Baudrate	9600 bps
Databit	8-bit
Stopbit	1-bit
Parity Check	Even
Bus Type	RS-485

FR-PLUS Series Modbus Protocol

FR-Series Modbus RTU Protocol	
Register Address Model	PLC Address Base 1
Byte Order	CDAB Little Endian Byte Swap
Supported Function Code	
03	Read Holding Register
06	Write Single Register
16	Write Multiple Registers

FR-PLUS Series Modbus Registers

Register Address	Function Code		Type of Data	Description
	Read	Write		
42001	0x03	0x06	16-bit unsigned integer	Mailing Address, Range: 1-250, <u>Default:201</u>
42002	0x03	---	16-bit unsigned integer	Communication Data Bits: <u>8-bit</u> (read-only)
42003	0x03	0x06	16-bit unsigned integer	Communication Parity, 0: No Parity, 1: Odd Parity, 2: Even Parity, <u>Default: 2</u>
42004	0x03	---	32-bit unsigned integer	Communication Baud Rate: <u>9600</u> (read-only)
48001	0x03	0x06	16-bit unsigned integer	Start/Stop, 1 is start, 0 is stop
48002	0x03	---	16-bit unsigned integer	Alarm Flag, 0 means no alarm, Others are alarm (read-only)
48003	0x03	0x06	16-bit unsigned integer	Target Speed, <u>Default: 5000</u> , Range 1000-10000 *NOTE* RPM = Target speed /3200*60
48005	0x03	0x06	16-bit unsigned integer	Brush Rotation Direction, <u>default: 0</u> 0 means counterclockwise rotation, 1 means clockwise rotation
48006	0x03	0x06	16-bit unsigned integer	Brushing Cycle, <u>Default: 60</u> , Range 5-30000 minutes
48008	0x03	0x06	16-bit unsigned integer	Number of Brushings, <u>Default: 3</u> , Range 1-30

Order Information**P/N**

FR-100-PLUS (<i>Single Sensor Self-Brushing Flow Reservoir</i>)	50700-A05
FR-200-PLUS (<i>Dual Sensor Self-Brushing Flow Reservoir</i>)	50700-A06
FRP-100 (<i>Complete Automatic Brush Cleaning Module For FR-100</i>)	50700-A16
FRP-200 (<i>Complete Automatic Brush Cleaning Module For FR-200</i>)	50700-A17
FRP-100-1 (<i>Replacement Brush Kit For FR-100-PLUS</i>)	50700-A14
FRP-200-1 (<i>Replacement Brush Kit For FR-200-PLUS</i>)	50700-A15

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