FR-300-PLUS

Self-Brushing Flow Reservoir for Pyxis Inline Sensors

Product Description

The Pyxis FR-300-PLUS is a magnetic coupling motorized brush flow assembly that provides an inline mechanical cleaning of the ST-765SS Series bare gold electrode enabling sensor accuracy in challenging industrial cooling and process waters. This unique device enhances the convective mass transport of the oxidizer or reducing agent analyte to the sensor electrode surface eliminating the need for precision flow control commonly required for other amperometric sensors on the market. The FR-300-PLUS also provides supplemental deactivation protection of the bare gold electrode for long life, stability, and precision accuracy in extremely challenging waters. The FR-300-PLUS is also designed to be utilized with a wide variety of alternative Pyxis inline sensors for a broad range of measurement. These additional sensors are outline in this document.

The FR-300-PLUS contains a 'chemical injection port' in the assembly housing allowing for the optional injection of cleaning agents at the brush head for extremely challenged industrial waters containing fats, oils and grease. This port may also be used for the addition of Potassium Iodide for measurement of "True Total Chlorine". The FR-300-PLUS may be operated at a broad range of regulated sample flow from 200 and 800mL per minute with an inlet pressure of <30 psi. The FR-300-PLUS outlet flow line should be diverted to drain or returned to an atmospheric tank/sump within the process itself for reuse.

The FR-300-PLUS comes equipped with a magnetically coupled brush mounted in the liquid end of the flow reservoir. Operational life of the brush is typically 1+ year of service however this is application dependent based on water quality. The brush is held in place via magnetic coupling to the motor shaft for rapid tool-free removal and replacement. Brush replacement is outlined in the later sections of this document.

The FR-300-PLUS requires 24VDC power supply at approximately 2.5watts and can be directly connected to the OEM controller or may be powered by the optional Pyxis Lab outlet power supply adapter accessories available for both 110VAC and 230VAC outlet operation. *(Purchased separately)*

Pyxis Lab has developed a wide variety of pre-assembled analyzer panels incorporating the proprietary ST-765SS series sensor in combination with FR-300-PLUS self-brushing flow assembly and the UC-Series of Pyxis display and data logging terminals. Alternatively, the ST-765SS Series sensors and FR-300-PLUS self-brushing flow assembly may be utilized with OEM controllers, PLC's and DCS networks to providing a higher level of control for system chemistry applications while incorporating the unique Pyxis bare-gold sensor technology.

Specifications

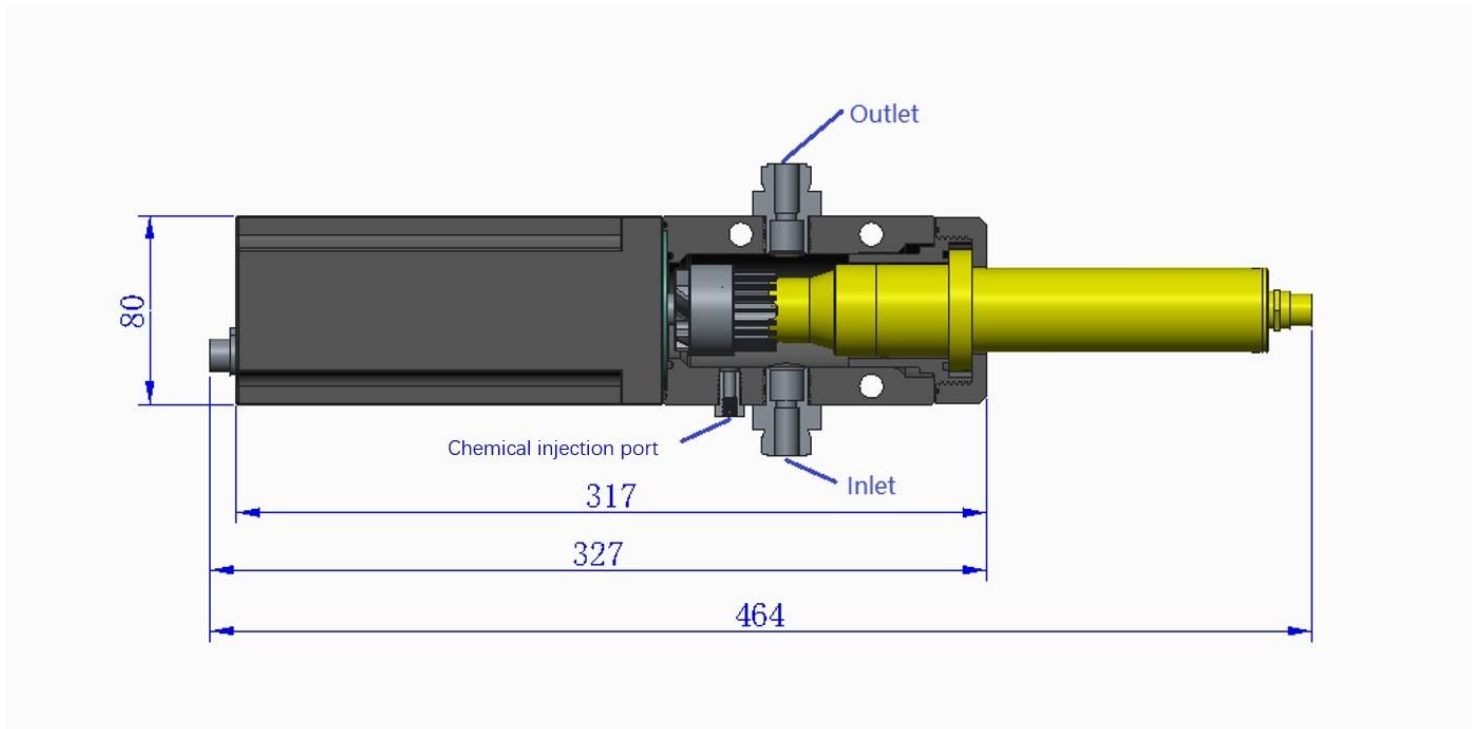| Item	FR-300-PLUS
P/N	50700-A44
Description	Self-Brushing Single Flow-Reservoir Assembly for Pyxis Sensors
Power Supply	24V DC, ≤5W *(Included one CE-FE-4.9 Flying Lead Cable & one CE-ME-FE-2.0 PowerPack Connect Cable*
Storage Temperature	-7 °C – 60 °C (20 – 140 °F)
Control Methodology	RS-485 or Powered Relay
Dimension (L x W x H)	Length 12.48-inch (317 mm), Body Square 3.15-inch (80 mm)
Body Material	UPVC
Weight	2600 g (5.732 lbs)
Operating Temperature	4 °C – 49 °C (40 – 120 °F)
Sample Inlet Pressure	7.25 – 30 psi (0.05 – 0.2MPa)
Minimum Speed	100 RPM
Maximum Speed	400 RPM
Sample Inlet/Outlet	3/8 - inch OD
Suggested Maintained Flow Rate	200 - 800 mL/min *(Consistent Flow Rate Required)*
Wet Material	UPVC & ABS & 316 Stainless Steel
Cable Length	1-Foot Terminated w/IP67 adapter + 4.9 feet flying lead w/IP67 adapters

NOTE – Pyxis Lab specifications are subject to change without notice.   Contact service@pyxis-lab.com for any questions.

## Pyxis Sensors Compatible with FR-300-PLUS

A wide variety of inline Pyxis sensors are specifically ideal for use with the FR-300-PLUS covering a broad range of measurement capability in dirty and challenged waters where previous sensor accuracy and maintenance was an issue.   Please refer to current sensors below.

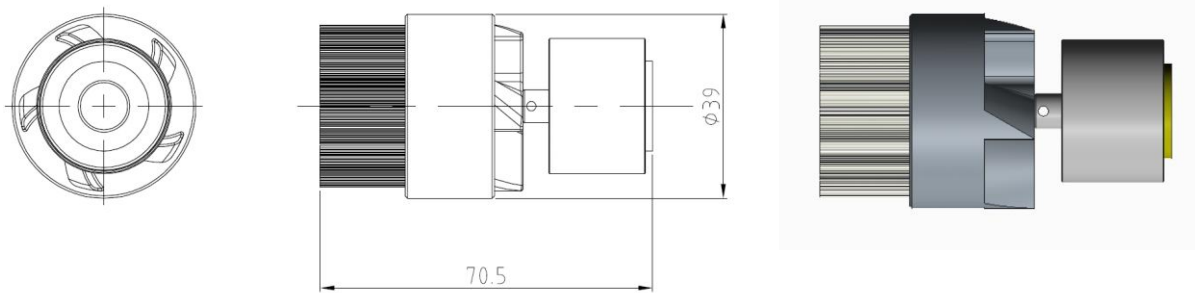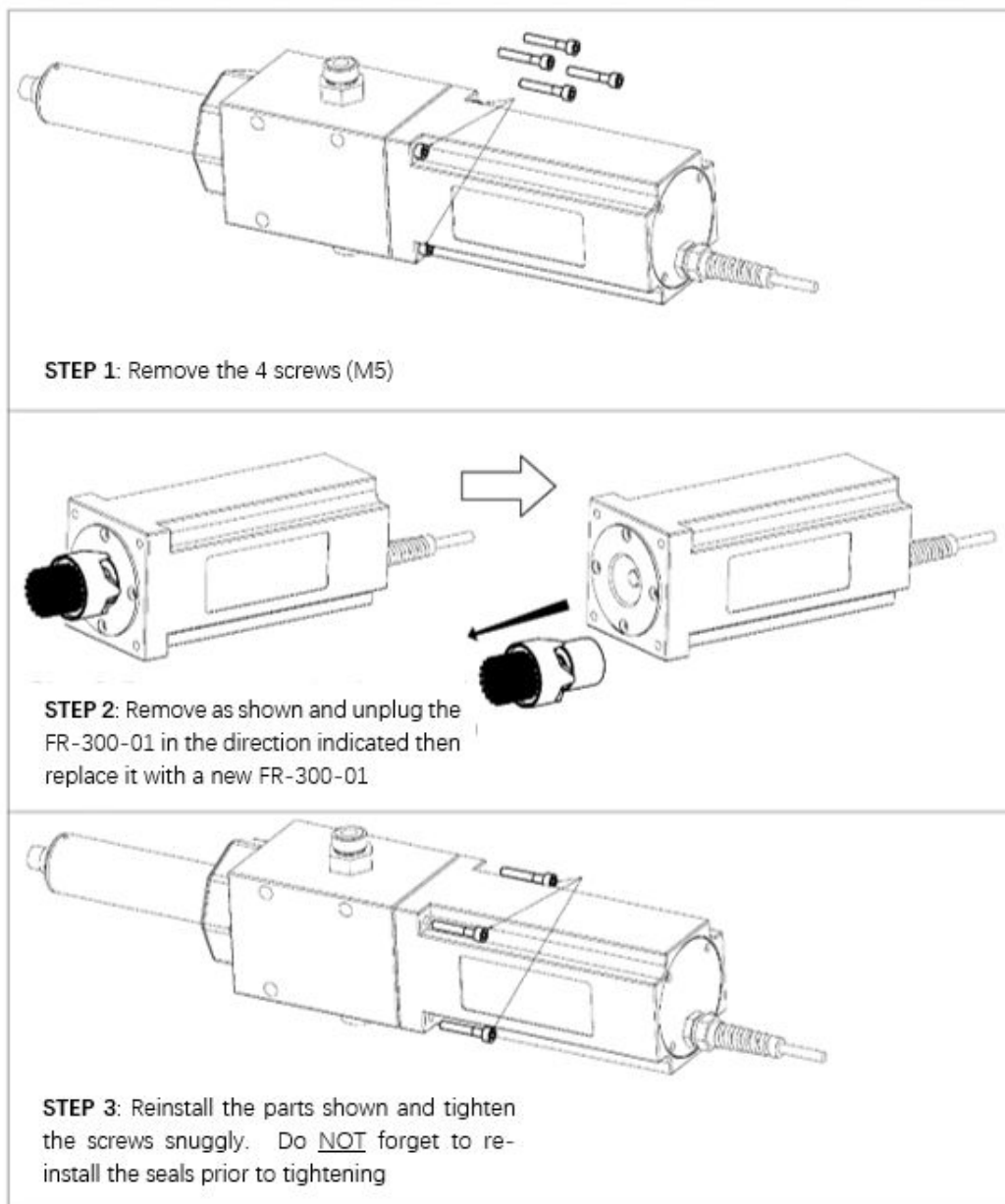| Sensor Name	Measurement	P/N
ST-765SS-FCL	Free Chlorine + pH + Temp	53607-NFR
ST-765SS-CLO	Chlorine Dioxide + pH + Temp	53608-NFR
ST-765SS-Br	Bromine + pH + Temp	59643
ST-765SS-O3	Ozone + pH + Temp	53614
ST-765SS-SO3	Sulfite + pH + Temp	53624
ST-765SS-DCL	Free Chlorine + Sulfite + pH + Temp	58444
ST-772T	Dissolved Oxygen (stainless)	53719
ST-772T-P	Dissolved Oxygen (CPVC)	53721
ST-710	pH (CPVC)	53001
ST-711	ORP (CPVC)	53002
ST-712	pH + ORP (CVPC)	53003
ST-710SS	pH (stainless)	53030
ST-711SS	ORP (stainless)	53031
ST-712SS	pH + ORP (stainless)	53032
ST-720	Conductivity/TDS	53101
ST-726	Conductivity/TDS	53114

FR-300-PLUS Component Schematic

FR-300-PLUS – Flow Reservoir Dimensions (mm)
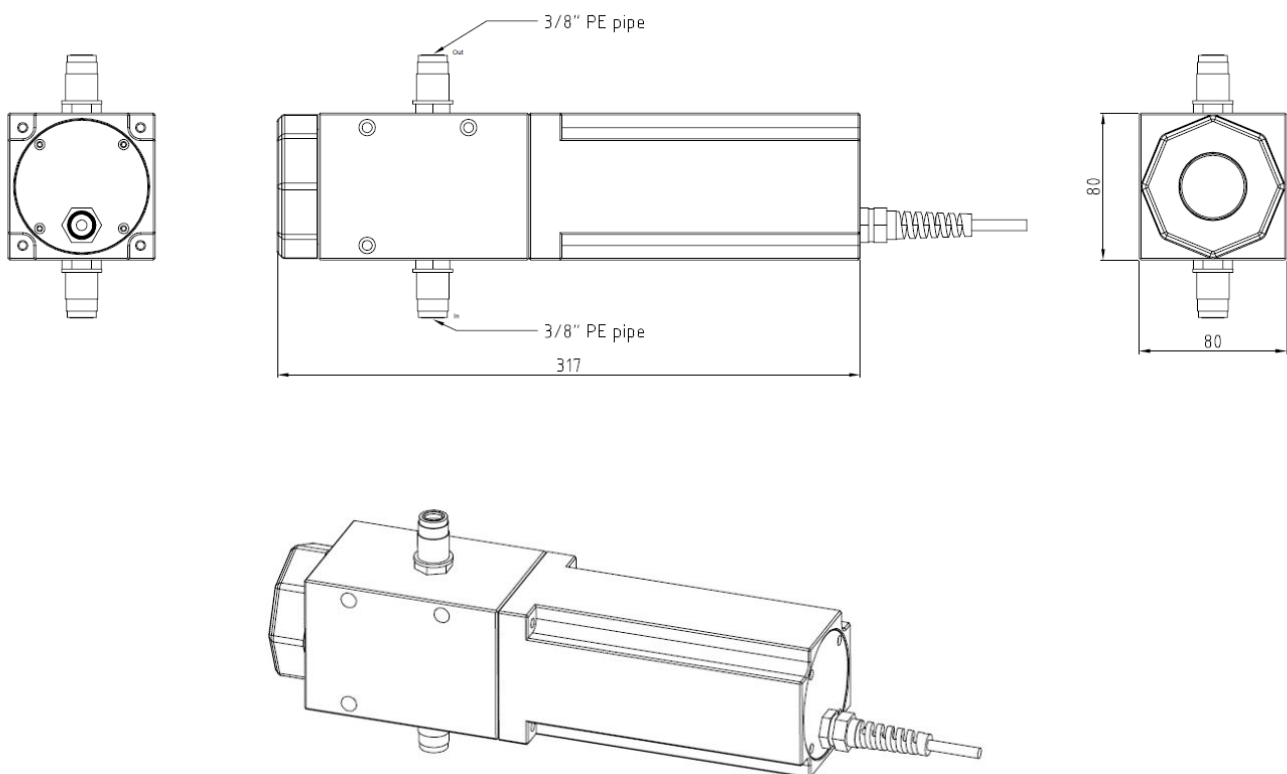
FRP-300-01 Replacement Brushing Assembly Dimensions (mm) & Image

FRP-300-01 Replacement Brushing Assembly Replacement Procedure

STEP 1: Remove the 4 screws (M5)

STEP 2: Remove as shown and unplug the FR-300-01 in the direction indicated then replace it with a new FR-300-01

STEP 3: Reinstall the parts shown and tighten the screws snuggly. Do NOT forget to re-install the seals prior to tightening

FR-300-PLUS Installation and Startup

Mounting: The FR-300-PLUS must be securely mounted to a back panel through the three (3) pre-drilled screw mounting holes in the reservoir body, with the Pyxis sensor aligned in a horizontal format as seen in the figure below. *NOTE* *Sensor may be aligned to the left or right as desired.*

UC-50 Display/Data Logging Terminal

ST-765SS Series Oxidizer + pH Sensor

Chemical Detergent Injection Port

FR-300-PLUS Brushing Flow Assembly

Outlet ⅜ – inch OD

Inlet ⅜ – inch OD
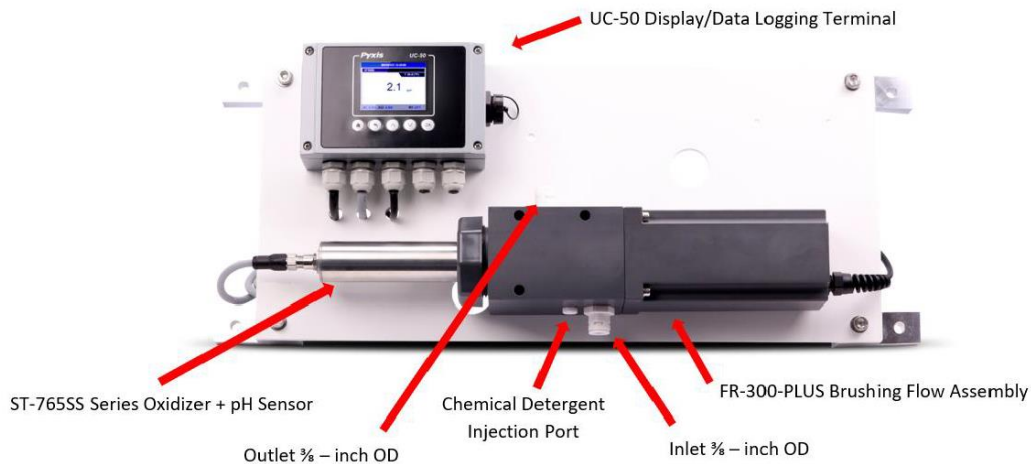
Controller/PLC Provided Power Supply & Operation Mode: The FR-300-PLUS is a stand-alone unit and requires 24VDC power supply to operate. Operating 100% of the time or on a system operational flow basis is the Pyxis recommended mode of operation. This can be done via the connected controller as a powered relay activating the FR-300-PLUS on a system flow switch relay or with a constant 24VDC power supply. Each FR-300-PLUS will be shipped with both a flying lead cable (CE-FE-4.9) and PowerPACK connection cable (CE-ME-FE-2.0) as a standard. User can choose which cable they desire to use based on need.

Outlet Provided Power Supply & Operation Mode: For applications that require outlet provided power supply to the FR-300-PLUS, Pyxis offers **MA-AC-7US** (P/N 26398) and **MA-AC-7EU** (P/N 28787) power supply adapters in both 110VAC-USA (Type A) and 230VAC-EU (Type DIN) formats as optional accessories. These accessories allow the FR-300-PLUS to be outlet powered and operational 100% of the time. See order information section of this document for details.

RS-485 Communication: The FR-300-PLUS offers RS-485 connectivity which allows for rotational brush speed, operation, and duration for those desiring precision control. Contact Pyxis for RS-485 details.

Inlet/Outlet Flow: When mounted horizontally the inlet water flow to the FR-300-PLUS should enter the bottom of the unit via inlet port (3/8-inch OD) as seen in image above. The outlet water flow should exit the top of the unit via the outlet port (3/8-inch OD). The inlet water pressure should not exceed 30 psi. The outlet water should be returned to an open sump at atmospheric pressure and prevent siphoning with valve if necessary. The range of flow through the FR-300-PLUS should be consistently regulated between 200 and 800mL/minute. An inlet rotameter may be installed to verify and regulate inlet flow however, this is not absolutely necessary and a manual flow verification test is sufficient as long as flow remains consistently regulated. *NOTE* *The FR-300-PLUS should be installed in a way to ensure the ST-765 series sensor remains flooded and wet regardless of flow condition.* Pyxis recommends the 24VDC power supply to the ST-765 series sensor be turned OFF for systems that experience extended periods of stagnant water conditions.

Calibration: Once flow has been established and regulated, an in-situ slope calibration of the sensor can should be conducted using field analysis of the sample being measured. *(ie. DPD Free Chlorine)* See ST-765SS Series Operation Manual for detailed calibration instructions.

FR-300-PLUS Wiring Instructions

Follow the wiring table below to connect the FR-300-PLUS to a controller or the Pyxis UC-50 via 24VDC and RS-485 modbus.   Alternatively, any OEM controllers capable of providing 24VDC power supply may also be used.   The FR-300-PLUS may be operated 100% of the time with no issue, simply by providing the unit 24VDC power supply.   Some users may also consider operating the FR-300-PLUS as desired in an ON/OFF relay format based on their application needs. Each FR-300-PLUS will be shipped with one flying lead cable (CE-FE-4.9) for direct wiring to terminal and one PowerPACK connection cable (CE-ME-FE-2.0) for direct adapter connection to Pyxis PowerPACK Series for power supply. *NOTE – The FR-300-PLUS may also be operated via 110VAC or 230VAC outlet power supply by utilizing optional Pyxis power supply adapter cables with plug purchased separately.   See the ORDER DETAILS section of this document for details.*

Pin #	Wire-color	Designation
1	Red	24V
2	Black	0V
3	Blue	485A
5	Yellow	485B
7	Silver	Ground
4	White	NA
6	Green	NA

FR-300-PLUS Modbus Communication Settings

FR-300-PLUS Modbus Settings	
Baudrate	9600 bps
Databit	8-bit
Stopbit	1-bit
Parity Check	Even
Bus Type	RS-485

FR-300-PLUS Modbus Protocol

FR-300-PLUS 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-300-PLUS Modbus Registers

Register Address	Function Code		Type of Data	Description
	Read	Write		
42001	0x03	0x06	16-bit unsigned integer	Mailing address, Range: 1-250,default:200
42002	0x03	---	16-bit unsigned integer	Communication Data Bits
42003	0x03	0x06	16-bit unsigned integer	Communication parity, 0: no parity, 1: even parity, 2: odd parity
42004	0x03	---	32-bit unsigned integer	Communication Baud Rate
48001	0x03	0x06	16-bit unsigned integer	Start/stop, 1 is start, 0 is stop
48002	0x03	---	16-bit unsigned integer	Reserve
48003	0x03	---	16-bit unsigned integer	Real-time speed, unit "RPM"
48004	0x03	0x06	16-bit unsigned integer	Target speed, unit "RPM" Range 100-400
48013	0x03	---	16-bit unsigned integer	Alarm flag, 0 means no alarm, others are alarm
48014	0x03	0x06	16-bit unsigned integer	Alarm timeout, within this time, the real-time speed has not reached the target speed, then start the alarm. Unit "seconds", range 1-600
48017	0x03	0x06	16-bit unsigned integer	Mode selection, 0 is normally open/normally closed mode, 1 is timing mode
48018	0x03	0x06	16-bit unsigned integer	Enable time in timing mode, unit "second", range 1-30000
48019	0x03	0x06	16-bit unsigned integer	Deactivation time in timing mode, unit "minute", range 1-30000

Order Information

	P/N
FR-300-PLUS *(Replacement FR-300-PLUS Auto-Brushing Flow Assembly Replacement)*	50700-A44
FRP-300-01 *(Replacement Brush Assembly for FR-300-PLUS)*	50700-A49
CE-FE-4.9 *(Replacement 1.5meter Flying Lead w/7-Pin Waterproof Adapter Cable for FR-300-PLUS)*	50762
CE-ME-FE-2.0 *(Replacement 0.6meter Cable w/7-pin Dual Adapters for FR-300-PLUS to PowerPACK)*	15526
MA-AC-7US *(110VAC-24VDC Power Adapter for 7-Pin Pyxis Devices with USA Type A Plug)*	26398
MA-AC-7EU *(230VAC-24VDC Power Adapter for 7-Pin Pyxis Devices with EU Type DIN Plug)*	28787