

IK-765SS-B Series

Oxidizer + pH Inline Analyzers For Industrial Cooling & Process Water **Startup Guide**



Pyxis Lab Inc.

May 2022

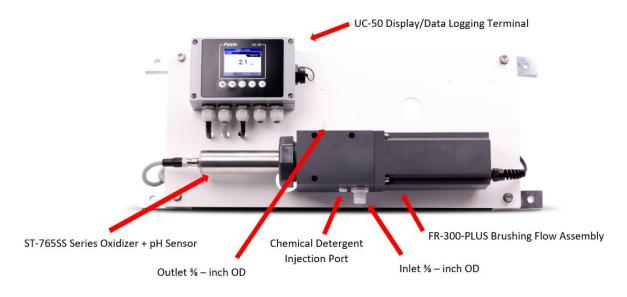
Product Description

The IK-765-B series are dual-parameter inline water analyzers specifically designed as a 'Turn-Key' monitoring solution for challenging water applications including cooling water, food and industrial process water, raw water and treated wastewater effluent applications. The IK-765-B series offers highly accurate, real-time measurement, display and data-logging of up two oxidizer measurement formats as well as pH and Temperature utilizing proprietary Pyxis Lab smart sensor technology, coupled with a Pyxis UC-50 micro display and data logging terminal. The IK-765-B also incorporates a uniquely designed automated mechanical brush flow assembly which is directly controlled via the UC-50 display to maintain optimum sensor electrode cleanliness in the most challenging of system water. The IK-765-B series is offered in a convenient and easy to integrate panel mounted format for rapid installation and simple maintenance.

The IK-765-B series analyzer is offered in two sensor formats depending on the desired oxidant being measured. The panel design is equipped with the propriety Pyxis ST-765SS Series smart sensors based on application needs. The ST-765SS series sensors measure Free Chlorine (FCL) or Chlorine Dioxide (CLO) in addition to pH and temperature of the sample water. This Pyxis sensor design is membrane-free and based on unique principles and incorporates Pyxis' advanced technology in the field of bare-gold electrochemical detection. The ST-765SS-FLC (Free Chlorine + pH) and ST-765SS-CLO (Chlorine Dioxide + pH) sensors measure the oxidant level and pH simultaneously while performing temperature and pH compensation for the measurement of oxidant based on conditions present in the application of use. Each IK-765-B panel is also equipped with the FR-300-PLUS mechanical brushing flow assembly to ensure constant electrode cleanliness and UC-50 micro display/data logging terminal prewired to the ST-765SS series sensor of in RS-485 modbus format with fully integrated sensor diagnostics and calibration interface. This unique platform with internal sensor compensation results in a highly accurate oxidizer measurement consistent with DPD wet chemistry methodology as high as pH 9.0+ and meets EPA-334.0 and ISO-7393 compliance.

Turn-Key Installation

The IK-765-B series analyzer requires a small installation footprint, offers auto-brush-cleaning operation with simple maintenance and is specifically designed for use in challenging industrial cooling and process applications. The analyzers sensor data may be downloaded via USB drive or connected to a receiving device via RS-485 output or 1x 4-20mA output from the UC-50 display/data logging terminal. Users may utilize the 2x 4-20mA outputs directly from the ST-765SS series sensor for terminating to an alternative controller or device, while the sensor is simultaneously connected to the UC-50 in RTU.



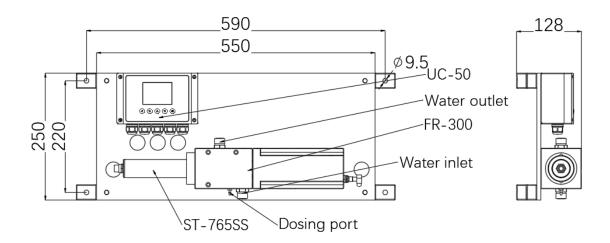
Features

- Pyxis ST-765SS-FCL (Free Chlorine + pH/Temperature) and ST-765SS-CLO (Chlorine Dioxide + pH/Temperature) are three-parameter composite sensors used for the measurement residual free chlorine or chlorine dioxide, pH and temperature in compliance with USEPA 334.0 and ISO-7393 guidelines. The sensors advanced PCB offers built-in temperature and pH parameter compensation (up to pH 9.0+) algorithms eliminating the need for a supplemental pH sensor and controller. Unique Bare-Gold electrode technology for residual oxidizer measurement eliminates membranes and electrode solution replenishment commonly associated with conventional sensors. The ST-765SS Series has a uniquely designed flat bubble pH electrode design for reduced fouling potential. Reduce your maintenance and cost versus colorimetric chlorine measurement or conventional electrochemical sensors by utilizing Pyxis replaceable Electrode Head (EH-765) for this sensor allowing for years of reliable service. The ST-765SS Series may be calibrated in-situ after cleaning via DPD Free Chlorine or Chlorine Dioxide wet chemistry test measurement of active sample.
- The Pyxis FR-300-PLUS is 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 analyte to the sensor 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 accuracy. The brushing frequency and rational speed may be controlled via RS-485 from the UC-50 display/data logging terminal. The FR-300-PLUS also contains a 'chemical detergent injection port' in the assembly housing allowing for the optional injection of cleaning agents at the brush head for extremely challenged industrial waters containing oils and grease. The FR-300-PLUS may be operated at a broad range of sample flow from 200 and 800mL per minute with an inlet pressure of <30 psi. The FR-300-PLUS outlet flow line may be diverted to drain or returned to an atmospheric tank/sump within the process itself for reuse.
- Simple sensor removal and replacement. The ST-765SS Series sensors are connected to the display/data logger via RS-485 modbus (RTU) allowing for integrated sensor calibration interface and diagnostics within the display screen. Convenient and simple to install Back-Panel (IK-765-B Series) for rapid and easy installation. Truly a plumb and power to go platform with intense factory setup, testing and sensor calibration prior to shipment.
- UC-50 micro display/data logger interface with sensor calibration integrated. Display/data logger offers 1x 4-20mA I/O as well as RS-485 with remote diagnosis and parameter adjustment.

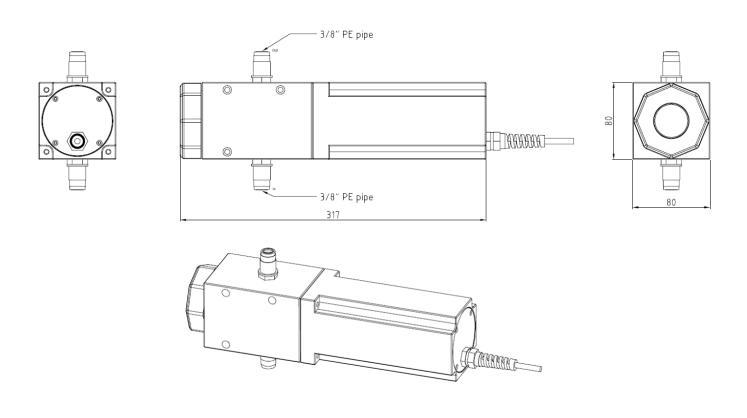
Specifications

ltem	IK-765SS-FCL-B	IK-765SS-CLO-B
P/N	42169	42170
Sensor Body Material	304SS	
Sensor Name	ST-765SS-FCL	ST-765SS-CLO
Oxidizer Measured	Free Chlorine	Chlorine Dioxide
Oxidizer Range	0.00-5.00 ppm FCl2	0.00-5.00 ppm ClO2
Oxidizer Precision	± 0.01mg/L or 1% of the value	w/pH compensation up to 9.0
pH Range	0-	14
pH Precision	± 0.0	1 pH
Sample Operating Temperature	4 °C – 40 °C	(40 – 104 °F)
Sample Inlet Pressure	7.25 – 30 psi (0	0.05 – 0.2MPa)
Sensor Response Time	T95≤60s – Oxid	ant / T95≤5s - pH
Measurement Interval	Cont	inuous
Installation	FR-300-PLUS Magnetic Coupling	Brushing Flow Reservoir Included
FR-300+ Suggested Flow Rate	200 – 800	mL/minute
FR-300+ Sample Inlet /Outlet	3/8 - ir	nch OD
FR-300+ Operation	RS-485 Controlled Pre-Set via UC-50	
FR-300+ Rotational Speed	100-400 RPM – Motori	zed Brush – Adjustable
UC-50 Display	2.8" Color 320 x 240 Resolution	
UC-50 Input	1 x 4-20 mA / RS-485 Modbus-RTU	
UC-50 Output	2 x 4-20 mA from ST-765 Sensor / RS-485 Modbus-RTU / 1 x Contact Relay	
UC-50 Relay	1x Channel Relay Output 24VDC /10 Watt Max Available	
UC-50 Data Storage	32 M Flash	
UC-50 USB	1 x USB host for data downloading	
UC-50 Relative Humidity	5% - 95% (No Condensation)	
UC-50 Altitude	<6,561 feet (<2,000 Meter)	
Panel Power Supply	110/220VAC 5	50/60 Hz, 0.6A
Panel Storage Temperature	-4 – 158 °F ((-20 – 70 °C)
Panel Operating Temperature	32 – 122 °F	(-0 – 50 °C)
Panel Dimension (H x W x D)	Panel (IK-765-B Series) 2	50H x 590W x 128D mm
Panel Approximate Weight	Panel (IK-765-	B Series) ~ 8 kg
Panel Wet Material	UPVC / Polycarbonate	
Rating	IP-65 Panel-Display / IP-67 Sensors	
Selectivity	Non-Selective, cross sensitive to other oxidizing species	
Compliance		/ ISO 7393
Regulation	CE Marked / RoHS	
Typical Electrode Service Life	2 ye	ears
Electrode Warranty	6 Mc	onths
Sensor Body Warranty	13 M	onths

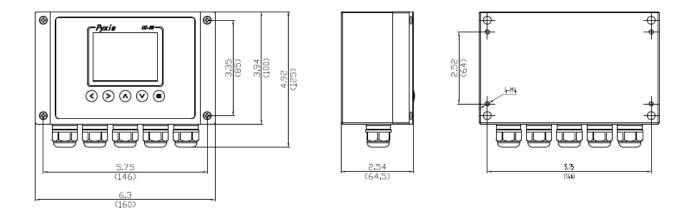
NOTE - Pyxis Lab is consistently updating technologies, as such, specifications may change without notice. Technical specifications on the ST-765SS Series sensors can also be found in the ST-765SS Series Operation Manual. Contact info@pyxis-lab.com for details or www.pyxis-lab.com .



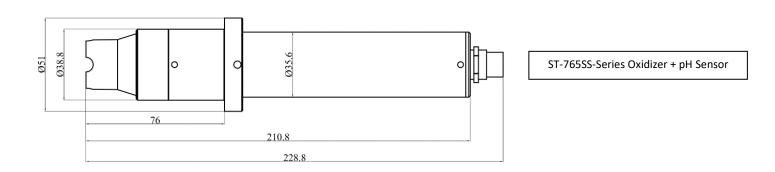
IK-765SS-B Series FR-300-PUS – Flow Reservoir Dimensions (mm)



UC-50 Display/Data Logger Dimensions (mm)



ST-765SS Series Sensor Dimensions (mm)

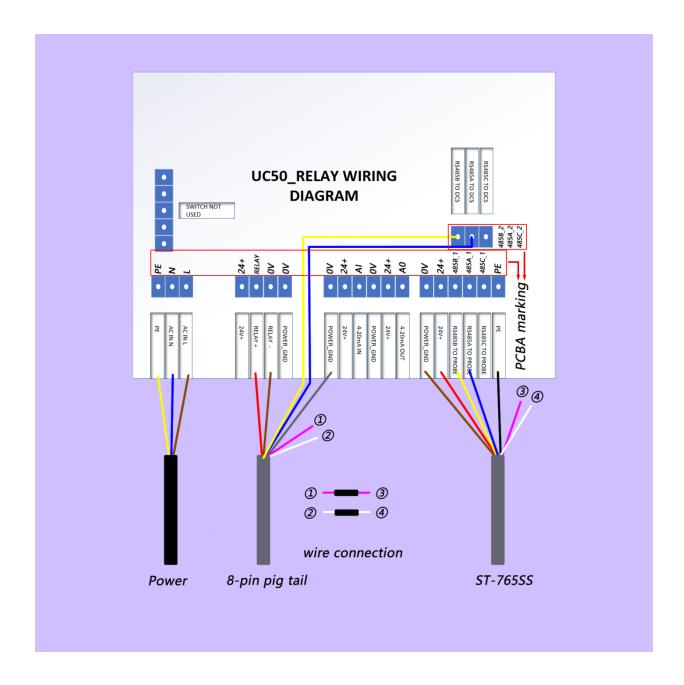


IK-765-B SERIES AND ACCESSORIES ORDER INFORMATION

Order Information IK-765SS-FCL-B (Auto-Brushing Free Chlorine + pH + Temperature Analyzer)	P/N 42169
IK-765SS-CLO-B (Auto-Brushing Chlorine Dioxide + pH + Temperature Analyzer)	42170
Optional / Replacement Accessories Information ST-765SS-FCL (Free Chlorine + pH + Temperature Sensor w/Internal Compensation) ST-765SS-CLO (Chlorine Dioxide + pH + Temperature Sensor w/Internal Compensation) EH-765 (Replacement Electrode Head for ST-765SS-Series Sensors)	P/N 53607 53608 53061
FR-300-PLUS (Replacement FR-300+ Auto-Brushing Flow Assembly Replacement)	50700-A44
FR-300-01 (Replacement Brush Assembly for FR-300+)	50700-A49
UC-50 Display + Data Logging Terminal (Replacement)	43007
SP-200 OxiPocket [™] (Pocket All-Oxidizing Disinfectants Colorimeter & Fluorometer)	50802
Pyxis pH Calibration Combo Pack (4-7-10 Calibration Solution 3-Pack-500mL each)	57007
Zero Oxidizer Calibration Standard Solution (500mL Bottle)	20022
ST-SERIES PROBE CLEANING KIT	SER-01

UC-50 TERMINAL BOARD WIRING DIAGRAM

Please refer to the wiring terminal diagram below for the UC-50 display/data logger. **NOTE** – the UC-50 terminal board provides a preinstalled 8-pin output cable with male adapter for multiple purpose use. This 8-pin output cable enables 2x 4-20mA signal pass through and 1x RS-485 passthrough of the ST-765 Series sensor as well as 1x 24-VDC (10Watt) Relay output from the UC-50 onto another device. Output wiring details can be found in the next section of this manual.



UC-50 OUTPUT SIGNAL/RELAY WIRING DETAILS AND 4-20MA RANGES

As mentioned in the previous section, the UC-50 internal terminal board is prewired with a single 8-pin output cable which allows 2x 4-20mA output signals and 1x RS-485 signal of the ST-765SS Series sensor to be PASSED-THROUGH to another receiving device. Additionally, the prewired 8-pin output cable offers a 24VDC (10Watt) relay for operation of alarm, light, buzzer or other device based on the user relay settings in the UC-50 itself.

To achieve as outlined above, an 8Pin output cable (male/flying lead) is prewired to the UC-50 internal terminal block. Each IK-765-B series panel is also shipped with a loose 8pin output cable (female/flying lead) which is to be connected (female connector to male connector) to the prewired output cable of UC-50. The flying lead section of the loose shipped output cable may then be landed to the input terminal of "ANOTHER DEVICE". This passthrough of the 2x 4-20mA signals and 1x RS-485 signal directly from the ST765 series sensor (pH + Oxidant), as well as the 1x 24VDC Relay for use as desired. Please refer to the wiring table below for proper wiring of 8-pin output cable provided with each UC-50.

Output Wire-Color	Designation
Red	Relay+
Brown	Relay-
Blue	485A
Yellow	485B
Pink	4-20mA+ for pH
Gray	4-20mA-
White	4-20mA+ for Oxidizer
Green	485C

ST-765SS Series Sensor Signal Pass-Through From UC-50				
Unit of Measure	4mA Value	20mA Value		
рН	0.00 pH	14.00 pH		
Oxidant (FCL/CLO2)	0.00 ppm	5.00 ppm		



START-UP PROCEDURE

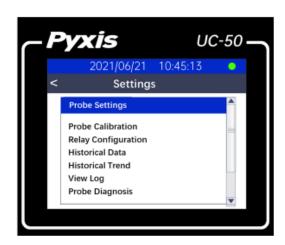


Main key-Return to the main screen from any interface Back key-Return to the last displayed screen Up key-Select different settings or adjust parameters Down key-Select different settings or adjust parameters OK key-Confirm to enter a setting page or confirm parameters

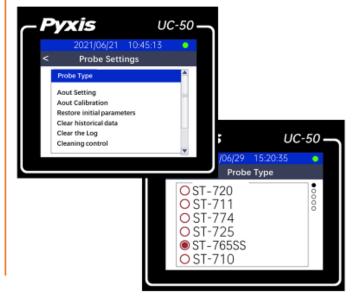
The UC-50 display of the IK-765 panel is connected via RS-485 Modbus (RTU) to the ST-765SS Series probe when it leaves the Pyxis factory. After the UC-50 is turned on, the main interface of the UC-50 will display the residual chlorine or chlorine dioxide concentration, pH value, and temperature of the tested solution. The green dot in the upper right corner of the UC-50 main interface indicates that the communication between the UC-50 and ST-765SS probe is normal. If used, the 4-20mA input signal, 4-20mA output signal and relay output status are displayed at the bottom of the UC 50 main interface.



Click the back key on the main interface, UC-50 will display the setting interface. All probe-related settings and UC-50 settings can be selected on this page. If you need to connect a new probe, please select the Probe Settings and then click the ok key button to enter the probe setting page

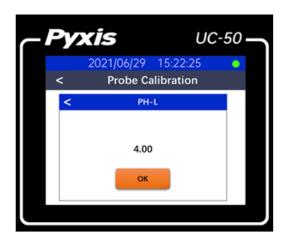


Select the probe setting to enter the desired Pyxis Probe Type setting interface. UC-50 controller supports manual selection of the probe type or automatic identification of the probe type. Please use the up/down keys to select the correct probe type or select automatic identification.

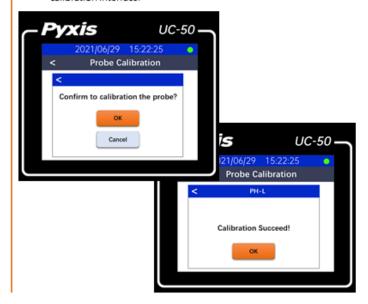


pH LOW - CALIBRATION PROCEDURE

PH-L calibration should selected on the **Probe Calibration** page. Remove and place the ST-765SS Series probe in the pH 4.0 standard solution, measure for 1 minute and wait for the measurement result to stabilize, click the **OK** button to start the PH-L calibration.

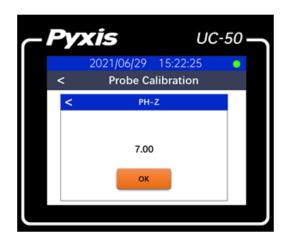


Select the **OK** button on the probe calibration confirmation page. The UC-50 controller sends the **PH-L** calibration command to the ST-765SS probe and waits for the probe calibration result. The probe calibration result will be automatically displayed on the calibration interface.

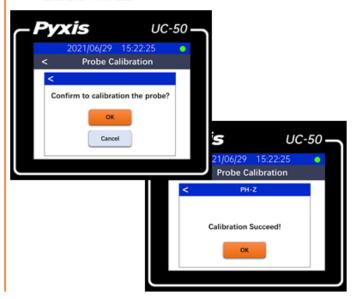


pH MID (Z) - CALIBRATION PROCEDURE

PH-Z (7) calibration should be selected on the **Probe** Calibration page. Place the probe in the pH 7.0 standard solution, measure for 1 minute and wait for the measurement result to stabilize, click the OK button to start the PH-Z calibration.

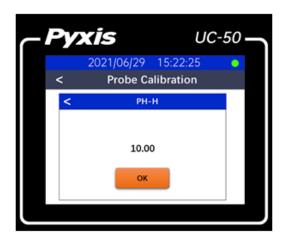


Select the **OK** button on the probe calibration confirmation page. The UC-50 controller sends the **PH-Z calibration** command to the ST-765SS probe and waits for the probe calibration result. The probe calibration result will be automatically displayed on the calibration interface.



pH HIGH - CALIBRATION PROCEDURE

PH-H calibration should be selected on the Probe Calibration page. Place the probe in the pH 10.0 standard solution, measure for 1 minute and wait for the measurement result to stabilize, click the OK button to start the PH-H calibration.

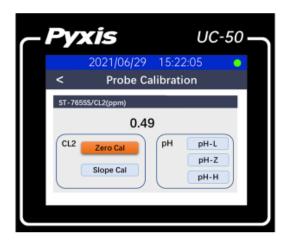


Select the OK button on the probe calibration confirmation page. The UC-50 controller sends the PH-H calibration command to the ST-765SS probe and waits for the probe calibration result. The probe calibration result will be automatically displayed on the calibration interface.



ZERO OXIDIZER - CALIBRATION ROCEDURE

Select the Probe calibration in the setting interface to enter the ST-765SS probe calibration interface as shown in the figure below. Use the up and down keys to select 5 calibration types. Zero calibration is selected on the Probe Calibration page, first put the probe into the zero-oxidizer standard solution (Pyxis P/N 20022) or 100us/cm Conductivity Standard is also acceptable for zero standard solution. After the probe reading is stable for at least 10 minutes, click the OK button to start the zero calibration.

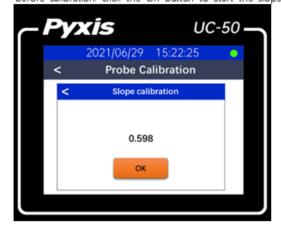


Select the OK button on the probe calibration confirmation page. The UC-50 controller sends the Zero calibration command to the ST-765SS probe and waits for the probe calibration result. The probe calibration result will be automatically displayed on the calibration interface.



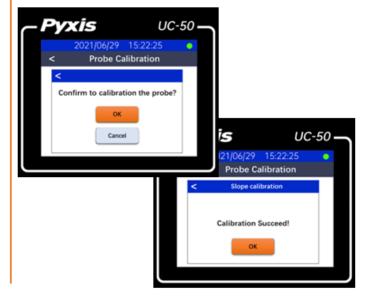
SLOPE OXIDIZER -CALIBRATION ROCEDURE

Slope calibration should be selected on the Probe Calibration page, While the sensor is exposed to active flow of 200-800mL/min in the FR-300 plus flow reservoir. Enter the free chlorine, total chlorine or chlorine dioxide concentration determined by the DPD method and ensure that probe reading has been stable for at least 10 minutes before calibration, click the OK button to start the slope



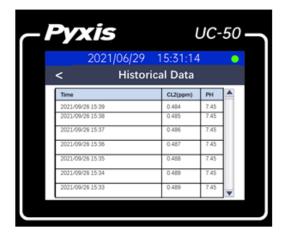
NOTE: The ST-765SS Series must be slope calibrated in the FR-300plus flow reservoir provided with the sensor and have consistent flow.

Select the OK button on the probe calibration confirmation page. The UC-50 controller sends the Slope calibration command to the ST-765SS probe and waits for the probe calibration result. The probe calibration result will be automatically displayed on the calibration interface.

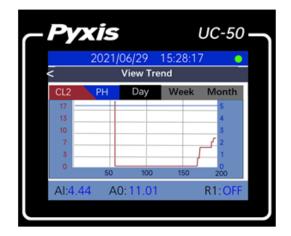


HISTORICAL DATA & TRENDING

Select **Historical Data** on the setting interface of the UC-50 controller. You can view the stored historical measurement data of ST-765SS. UC-50 controller stores measurement data of ST-765SS every 1 minute. This time period may be adjusted if desired. You can browse the data of different time periods with the up and down keys.



Select the **Historical Trend** on the setting interface of the UC-50 controller. You can view the historical measurement data saved by the UC-50 controller in the form of a trend graph. Use the up and down keys and the confirm key to select to view the data of the last day, week or month.



HISTORICAL TREND SCALE ADJUSTMENT

Select the **Setup Trend** on the historical trend interface to modify the maximum and minimum values of the Y-axis of the curve. Please set the appropriate Y-axis range according to the actual measurement situation so that the historical curve can be better displayed. Use the up and down keys and confirm keys to modify.



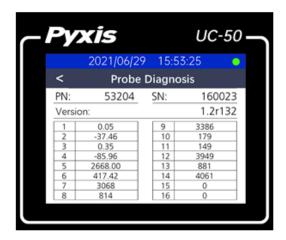
UC-50 Quick Start Guide

RESTORING FACTORY PARAMETERS & PROBE DIAGNOSIS

If the abnormal reading of the probe is caused by improper calibration, you can select the Restore initial parameters function in the probe setting interface of the UC-50 controller to restore the ST-765SS probe to the factory parameters.



The UC-50 controller supports displaying the original diagnostic data of the ST-765SS. To help troubleshooting possible issues with the probe, please save images of these data when the probe is respectively placed in a clean water (tap water), in a free chlorine/chlorine dioxide or pH standard solutions. Email the images to service@pyxis-lab.com for technical support. Selecting the Probe Diagnosis in the setting interface of UC-50 controller will display the internal original diagnosis data interface.



USB FUNCTION FOR HISTORICAL DATA UPLOAD AND FREQUENCY

UC-50 has a built-in USB interface to support historical data export and firmware upgrade function. Before accessing USB functions, please make sure USB thumb drive is properly plugged into UC-50 USB interface. For data download and upload to the UC-50 a USB device with a storage capacity between 8 and 64MB *Megabytes* is recommended.

Export UC-50 Historical Data

Select USB Settings from the Settings screen. In the USB settings screen, historical data can be downloaded to a USB thumb driver by selecting Data Export function. Make sure a USB thumb drive is plugged into UC-50 before exporting historical data.





Further select the historical data date and time range or simply choose All Export to export all historical data. Once data export 100% completed, you can safely unplug the USB thumb drive.

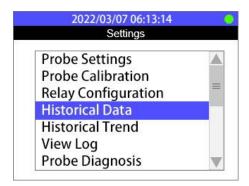




Adjust UC-50 Historical Data Interval

By default, UC-50 will save sensor value every 60 seconds to its internal data storage, if an application requires 3 months historical data export, UC-50 will generate over 10,000 lines of historical data if the historical data interval is set to 60 seconds. However, UC-50 allows customer to adjust historical data interval to

- 1) Reduce exported historical data file size if high resolution data is not required
- 2) Capture high resolution data if sensor value changes rapidly







Upgrade UC-50 Firmware

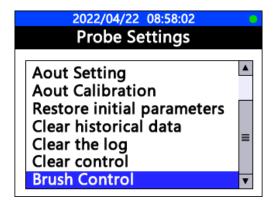
Copy the target UC-50 firmware file (.bin) to the root directory of USB thumb drive, plug the thumb drive to UC-50 USB interface, select USB Settings in Settings page and select Program Upgrade function in USB Settings page. UC-50 will automatically start firmware upgrading procedure and reboot itself once the procedure completed.

FR-300-PLUS BRUSH CONFIGURATION

Select Brush Control from the Probe Settings screen. In the Brush Control interface, there are two control modes: MANUAL MODE and TIME MODE. The MANUAL MODE can manually turn on/off the brush as desired. The TIME MODE can turn on/off the brush with a set time duration and cycle. Addr is the RS-485 modbus communication address of FR-300-PLUS. Target Speed (rpm) is the operating speed of the FR-300-PLUS brush motor in a range of 100 to 400 RPM.

In MANUAL MODE, the brush can be manually turned on/off through the On/Off button in the bottomright of the page.

In TIME MODE, the user may configure the Cycle and Duration parameters. Cycle (hr) is the control cycle of the FR-300-PLUS. **Duration** is the brush turn on time in one control cycle. For example if the Cycle was set to a 24-hour and the Duration was set to 12-hours, the FR-300-PLUS brush motor would operate (run) for 12-hours in each 24-hour cycle.



2022/04/22 08:58:02	
< Brush Control	
Mode:	Manual
Addr:	200
Target Speed(rpn	n): 200
Cycle(hr):	24
Duration(hr):	12
Speed:200	On

2022/04/22 08:	58:02
< Brush Control	
Mode:	Manual
Addr:	200
Target Speed(rpm):	200
Cycle(hr):	24
Duration(hr):	12
Speed:200	On

The parameters can be selected and set by pressing the keys. The cursor shows black is the selection mode, and blue is the editing mode. In the selection mode, click the OK key to enter the editing mode, and the up and down keys can be used to adjust the setting item and the value of the setting item. The setting here is Target Speed (rpm), the default value is 200rpm, and the adjustable range is 100-400rpm.

SENSOR CLEANING & MAINTENANCE

Most cleaning of the ST-765SS is facilitated by removing the sensor, rinsing it with tap or DI water and gently wiping the sensor head with a soft cloth or Q-tips, then re-rinse. For a highly fouled sensor, soak the lower half of the sensor in 100 mL Pyxis inline sensor cleaning solution for 10-15 minutes. Gently rub the sensor electrode head with the provided Q-tips. If the surface is not entirely clean, continue to soak the sensor for an additional time until clean. Rinse the sensor with distilled water. Pyxis Lab Inline Sensor Cleaning Solution can be purchased at our online Estore/Catalog at https://pyxis-lab.com/product/probe-cleaning-kit/



ST-Series Probe Cleaning Kit (P/N SER-01)

COMMON SENSOR TROUBLESHOOTING

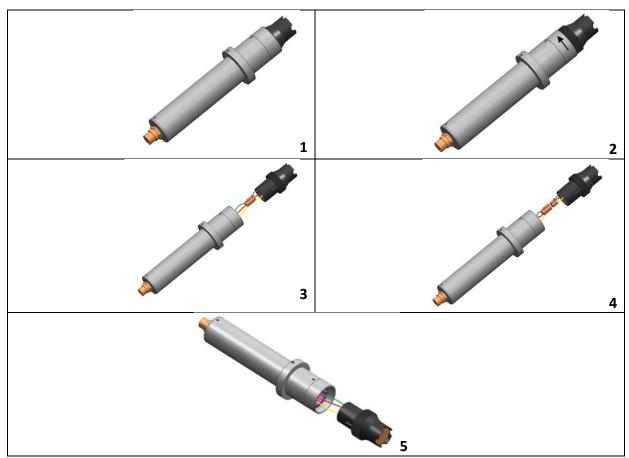
If the ST-765SS sensor output signal is not stable and fluctuates significantly, make an additional solution ground connection-connect the black ground wire to a conductor that contacts the sample water electrically such as a brass pipe adjacent to the ST-765SS.

REPLACING pH / OXIDIZER ELECTRODE HEAD

The pH/oxidizer electrode head of ST-765SS Series can be replaced when the original electrode head reaches its working life.

Order a replacement electrode head EH-765 (P/N 53061) from Pyxis and follow instructions as below.

- 1. Turn off the sensor if it is powered on.
- 2. Make sure there is no water on the sensor.
- 3. Hold the ST-765SS main body with one hand and use the other hand to twist the stainless-steel locking ring counter-clockwise until the front end of the black electrode is completely unscrewed, as shown in Figure 2.
- 4. Pull out the electrode head as shown in Figure 3.
- 5. Loosen the electrode plug connector, and remove the electrode head, as show in Figure 4.
- 6. To assemble the new electrode head, connect the plug, then insert the new electrode head into the main sensor housing and ensure that the two protrusions on the electrode head are aligned with the notches in the sensor main housing.
- 7. Then twist the stainless-steel lock ring of ST-765SS in a clockwise direction until the threads of the electrode head completely enter the ST-765SS housing as shown in Figure 1.



Replacing EH-765 pH and Oxidizer Electrode Head

Order Information	P/N
IK-765SS-FCL-B (Auto-Brushing Free Chlorine + pH + Temperature Analyzer)	42169
IK-765SS-CLO-B (Auto-Brushing Chlorine Dioxide + pH + Temperature Analyzer)	42170
Optional / Replacement Accessories Information	P/N
ST-765SS-FCL (Free Chlorine + pH + Temperature Sensor w/Internal Compensation)	53607
ST-765SS-CLO (Chlorine Dioxide + pH + Temperature Sensor w/Internal Compensation)	53608
EH-765 (Replacement Electrode Head for ST-765SS-Series Sensors)	53061
FR-300-PLUS (Replacement FR-300+ Auto-Brushing Flow Assembly Replacement)	50700-A44
FR-300-01 (Replacement Brush Assembly for FR-300+)	50700-A49
UC-50 Display + Data Logging Terminal (Replacement)	43007
SP-200 OxiPocket TM (Pocket All-Oxidizing Disinfectants Colorimeter & Fluorometer)	50802
Pyxis pH Calibration Combo Pack (4-7-10 Calibration Solution 3-Pack-500mL each)	57007
Zero Oxidizer Calibration Standard Solution (500mL Bottle)	20022
ST-SERIES PROBE CLEANING KIT	SER-01