

Using the pHionics STs pH Sensor with a HOBO® RX3000 Station

This application note describes how to connect, calibrate, and operate the pHionics STs pH sensor with the HOBO RX3000 station. The pH sensor is compatible with any RX3000 configuration (cellular, Ethernet, or Wi-Fi) that is equipped with the optional four-channel analog input module (RXMOD-A1). It is suggested that a 6-watt solar panel be used to ensure that the battery is kept charged properly.

Portions of the pHionics Technical Manual are used within this application note, but the full manual is available at http://www.phionics.com/130216_phionics_006.htm#pdf_downloads and should be read and understood before attempting to use this device with the RX3000 station. Questions regarding the specific application, accuracy or use of the pHionics sensor should be sent to pHionics directly at <http://www.phionics.com/> or contact@phionics.com.

More information on configuring the RX3000 station with HOBOLink® can be found in the HOBOLink User's Guide at <http://www.onsetcomp.com/support/manuals/17672-hobolink-users-guide>. More information on the RX3000 station hardware can be found in the product manual at <http://www.onsetcomp.com/manual/rx3000>.

To ensure the best accuracy for your application and to confirm proper operation of the transmitter, periodic recalibration is recommended. The frequency of the recalibration is best determined empirically for each application. If you wish to discuss your application to determine the best calibration frequency, contact pHionics directly at <http://www.phionics.com/>.



Specifications:

Series STs Channel 1, pH transmitter

pH sensing range	0-14 pH, custom ranges available
Output Current	4 to 20 mA, true 2-wire
Power supply voltage	7 to 36 vdc
Isolation	600 vdc, >70 db at 50/60 hz
Linearity	± 0.004 pH
Accuracy	± 0.014 pH (after calibration)
Sensitivity	± 0.01 pH
Stability	± 0.03 pH
Repeatability	± 0.01 pH
Electrode type	glass, Teflon double junction
Response time (including electrodes)	95% < 5 seconds
Temperature compensation	automatic, 0-50 °C
Pressure	0-100 psi
Humidity	0-100%
Wetted materials	316 ss, PVDF or Delrin, Viton, glass, titanium optional
Length	362 mm (14.25 in.)
Diameter	19 mm (0.750 in.) maximum
Weight (excluding cable)	< 0.22 kg (0.5 lb.)
Cable type	Removable, shielded polyurethane, water-blocked Kevlar reinforced, 1.36 kg/100 feet
Cable length (standard)	7.6 meters (25 feet)
Cable from transmitter to power supply	4 conductor, twisted pair, 3 mile maximum
pH channel wire colors	Red (+), Black (-)

Channel 2, temperature transmitter

Range	0-50 °C
Output Current	4 to 20 mA, true 2-wire
Linearity	± 0.5 °C
Accuracy	± 1 °C
Power supply voltage	7 to 36 vdc
Isolation	600 vdc, >70 db at 50/60 hz
Cable from transmitter to power supply	4 conductor, twisted pair, 3 mile maximum
Temperature channel wire colors	White (+), Green (-)

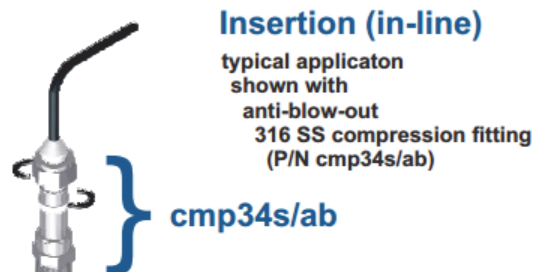
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Insertion (in-line)

typical application
shown with
anti-blow-out
316 SS compression fitting
(P/N cmp34s/ab)

cmp34s/ab

Mounting

1-1/2 inch PVC
or equivalent

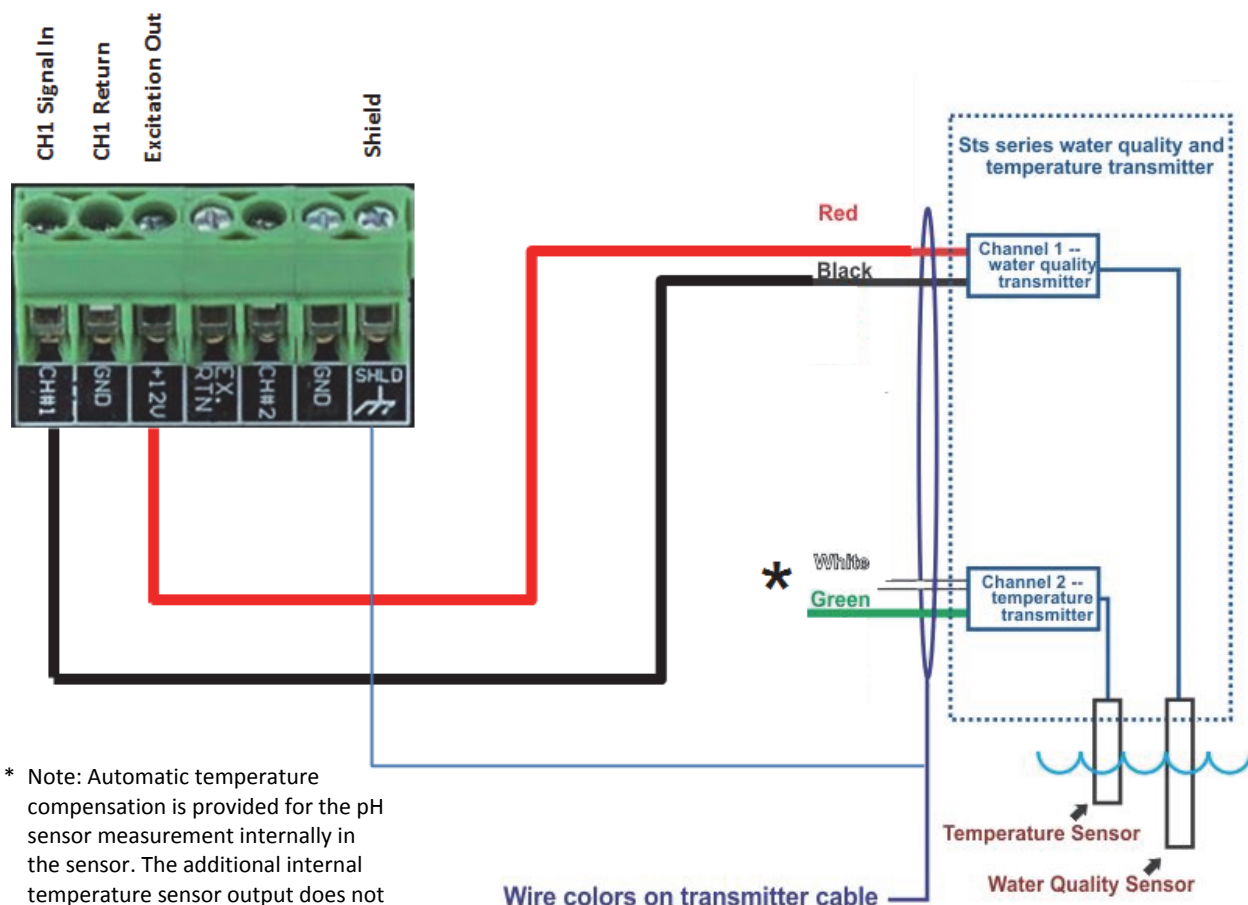


Submersion

Simply lower the transmitter and cable into the tank, lake, well, etc.. For applications that require more stability and/or protection of the cable and transmitter from mixers, chemical injection points, etc. -- reverse the cmp34s compression fitting and mount at the end of a standpipe or equivalent, as shown. (Conductivity transmitter shown in example at right)



Wiring to the RX000 Analog Sensor Module (RXMOD-A1)



Calibrating the Sensor using the RX3000 Station and HOBOLink

Important: For the instructions in this section, be sure to follow safe laboratory procedures when handling pH buffers. Rubber gloves and eye protection are suggested.

1. Immerse the pH sensor in a liquid of a known, stable pH value near the bottom of the range to be monitored (this example uses a pH 4.01 buffer).
2. From your device page in HOBOLink, select Configure and then Module/Sensor Configuration.



3. In the Module Configuration screen, configure the RX3000 analog input module for a 1-minute logging interval. Select “Use excitation power.” Select “Warmup” and enter 3 seconds. Click Next; this will save the configuration and take you to the next menu item.

Module Configuration

General
Readout
Smart Sensors
Logging
Solar Radiation
Pressure
Temperature (air)
RH
Dew Point
Temperature (water)
Module 1: Analog Sensors
Logging
Channel 1: Select Analog Sens
Channel 2: Select Analog Sens
Channel 3: Select Analog Sens
Channel 4: Select Analog Sens
Battery
Start/Stop
Alarms

*Logging Interval:
0 hours 1 minutes 0 seconds

Sampling Interval:
☐ Enable 0 minutes 0 seconds

Statistics: ☐ Minimum ☐ Maximum ☐ Average ☐ Std Dev

☒ Use excitation power
☒ Warmup 3 seconds 0 milliseconds
☐ Continuous

Serial Number: 10732658

Back Save Next

Actual usage to date
46% of plan
This Month

Estimated usage with this configuration
47% of plan
This Month

*Data usage estimation assumes no tripped alarms or logger launches.

4. Select “Enable Graph” and “Enable this channel” in the Sensor Configuration screen. Select “RAW-C-20, Raw Current -20mA” under Sensor Type/Input. Click Save.

Sensor Configuration

General
Readout
Smart Sensors
Logging
Solar Radiation
Pressure
Temperature (air)
RH
Dew Point
Temperature (water)
Module 1: Analog Sensors
Logging
Channel 1: Select Analog Sens
Channel 2: Select Analog Sens
Channel 3: Select Analog Sens
Channel 4: Select Analog Sens
Battery
Start/Stop
Alarms

Latest Value:

☒ Enable Graph
☒ Enable this channel

Label:

Sensor/Input Type:
RAW-C-20, Raw Current 0-20 mA

☐ Enable Scaling

Raw Scaled Units

*Units: mA

*Value 1: 0.0 =

*Value 2: 20.0 =

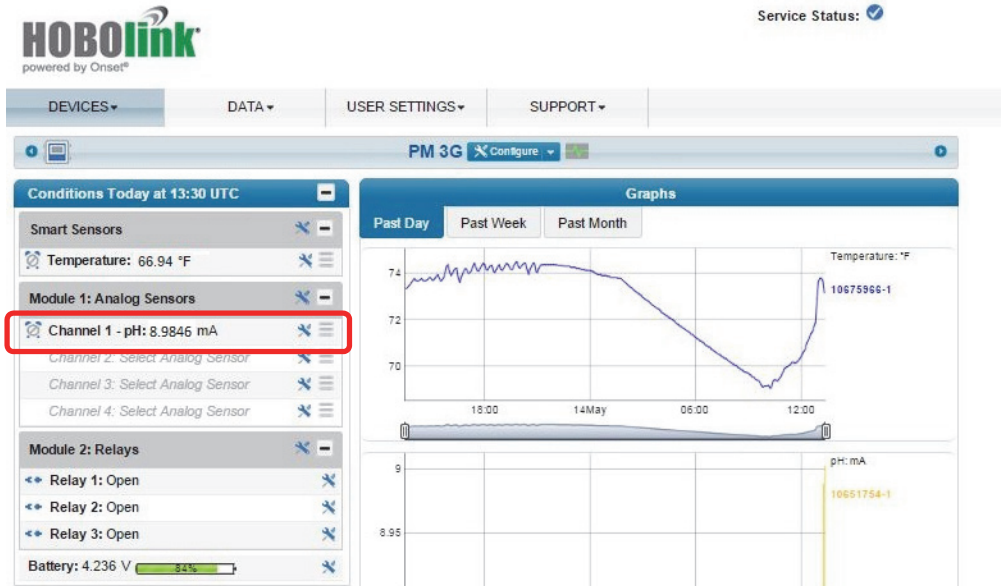
*Scaled Measurement Type:

Back Save Next

Current input maximum is 20.0 mA

5. Allow the sensor to stabilize (a minimum of 5 minutes).
6. Initiate a call to HOBOLink by pressing the Connect button below the cloud icon on the RX3000 station.
Note: If the station is not currently logging, press the Start button instead of the Connect button to begin logging data.

- Take note of the mA value reported on your device page in HOBOLink.



- Immerse the sensor in liquid of a second known pH value (this example uses a pH 7.00 buffer).
- After stabilization, initiate another call to HOBOLink by pressing the Connect button below the cloud icon on the station. Take note of the reported mA value on your device page in HOBOLink as you did in step 7.
- From your device page, select Configure and Modules/Sensor Configuration. Select Channel 1 from the left menu to set up scaling for the sensor. Click "Enable Scaling" and enter the two mA values as your two raw scaled values and the known concentrations as your respective scaled values. Enter pHionics as the Scaled Measurement Type. Click Save.

The screenshot shows the 'Sensor Configuration' page in HOBOLink. The left sidebar contains a tree view with 'General', 'Readout', 'Smart Sensors', 'Logging', 'Temperature (water)', 'Temperature (air)', 'Solar Radiation', 'Pressure', 'RH', 'Dew Point', 'Module 1: Analog Sensors', 'Logging', 'Channel 1 - pHionics', 'Channel 2: Select Analog Sensor', 'Channel 3: Select Analog Sensor', 'Channel 4: Select Analog Sensor', 'Battery', 'Start/Stop', and 'Alarms'. The 'Channel 1 - pHionics' item is selected. The main content area shows the 'Sensor Configuration' for 'Channel 1'. It includes a 'Latest Value: 7.3002 pH' and buttons for 'Back', 'Save', and 'Next'. There are checkboxes for 'Enable Graph' and 'Enable this channel'. A 'Label' field is present. The 'Sensor/Input Type' is set to 'RAW-C-20, Raw Current 0-20 mA'. A red box highlights the 'Enable Scaling' section, which includes a 'Help' button, a table for scaling, and a 'Scaled Measurement Type' field. The table has columns for 'Raw' and 'Scaled Units'. The 'Scaled Measurement Type' is set to 'pHionics'.

Raw	Scaled Units
*Units: mA	pH
*Value 1: 8.9846	= 4.01
*Value 2: 12.2380	= 7.00

*Scaled Measurement Type: pHionics

- From the left menu, select Module 1 and reset the analog module logging interval from 1 minute to your desired value. Click Save.
- Initiate another call to HOBOLink or wait until the next scheduled connection for the changes to take effect.