

Safety

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Safety

+/-1VDC maximum on field wiring terminals.
24 VDC maximum on internal card surfaces.

1. Installation

1.1 OP_ext: Services

The OP_Ext driver measures a remote pH sensor connected to an Aquatrac MultiFlex, 'AS' or Flex series controller.

'AS' & Flex Series Controllers: The Controller powers the OP_ext card using its internal 12VDC supply and measures pH on one of the 'C', 'D' or 'G' to 'N' inputs.

MultiFlex Controllers: The Controller powers the OP_ext card using its internal 15VDC supply and measures pH on a single or dual 'OP' card input.

Faster Response – Lower Temperature

The OP_ext responds immediately to pH changes.

The extremely high sensor input impedance of the OP_Ext supports cooling tower pH measurement below 40F, 5C.

Caution: Solution Ground Required

The faster response and improved low temperature performance makes the pH sensor more sensitive to electrical noise and requires a solution ground for both operation and calibration. Do not calibrate the pH sensor on-line or in a buffer solution unless the solution ground is connected and immersed in the same sample as the pH sensor.

Caution: Static Discharge

The faster response and improved low temperature performance also makes the OP_Ext driver sensitive to static discharge at the sensor connection terminals. If you touch or contact the sensor terminals with the OP_Ext power ON. Turn the controller power OFF/ON to reset sensor input. Static discharge will lock-up the sensor input. You'll experience the lock-up up as a pH measurement that does not change as the process pH changes.

1.2 Driver Card Installation

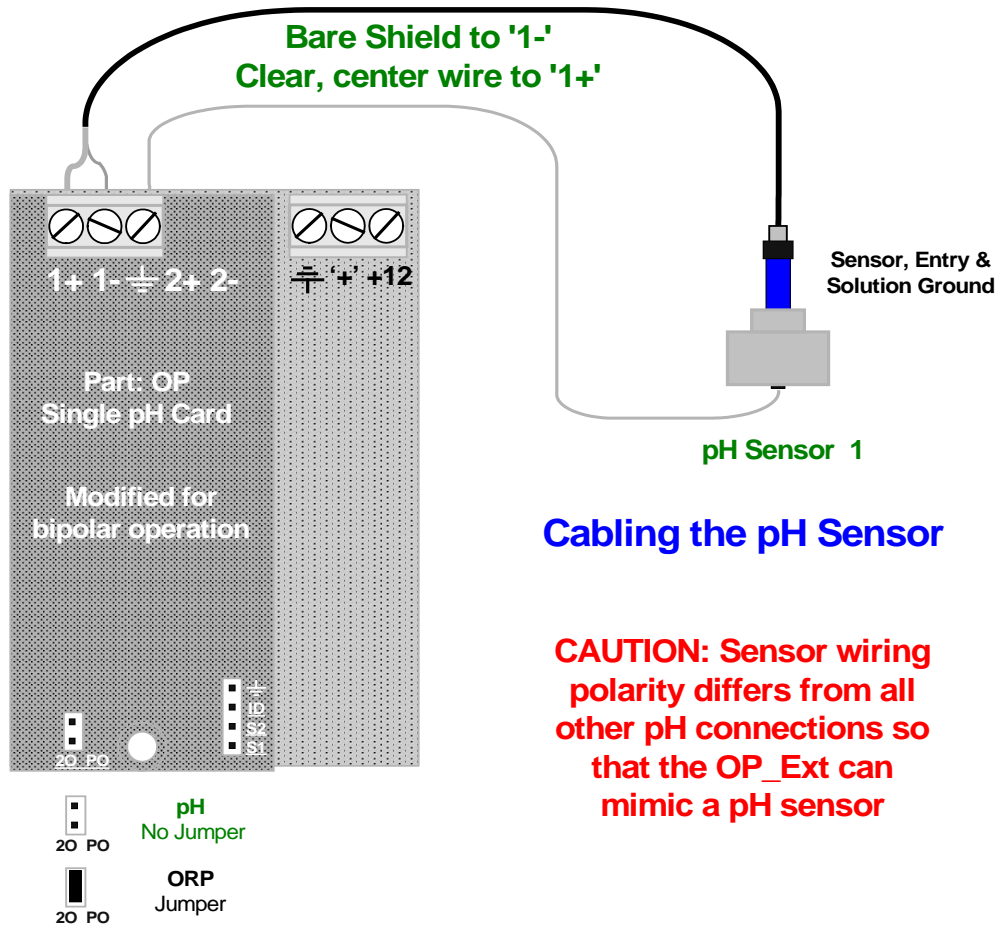
1. **'AS'-Flex Controllers:** Enable one of the controller analog inputs 'G' through 'N'.
MultiFlex Controllers: Install a single or dual pH driver card, part Driver OP
2. Turn OFF the controller AC power
3. Connect an AWG 22 three conductor cable between the controller and OP_Ext driver as shown on the following graphics for each controller type.
4. Connect the pH sensor to the OP_Ext field wiring terminals, center conductor to terminal '1+' and shield to '1-' .
5. Connect the green solution ground cable to the ground terminal
6. Turn ON the controller after installing & cabling the OP_Ext.

1.3 Sensor Types

Aquatrac pH sensor type A261100.

Generally, all pH sensors with a single coaxial cable may be used with the OP_ext drivers.

1.4 Sensor Wiring



Cabling the pH Sensor

Do not install sensor cabling in the same conduit as AC power cabling.

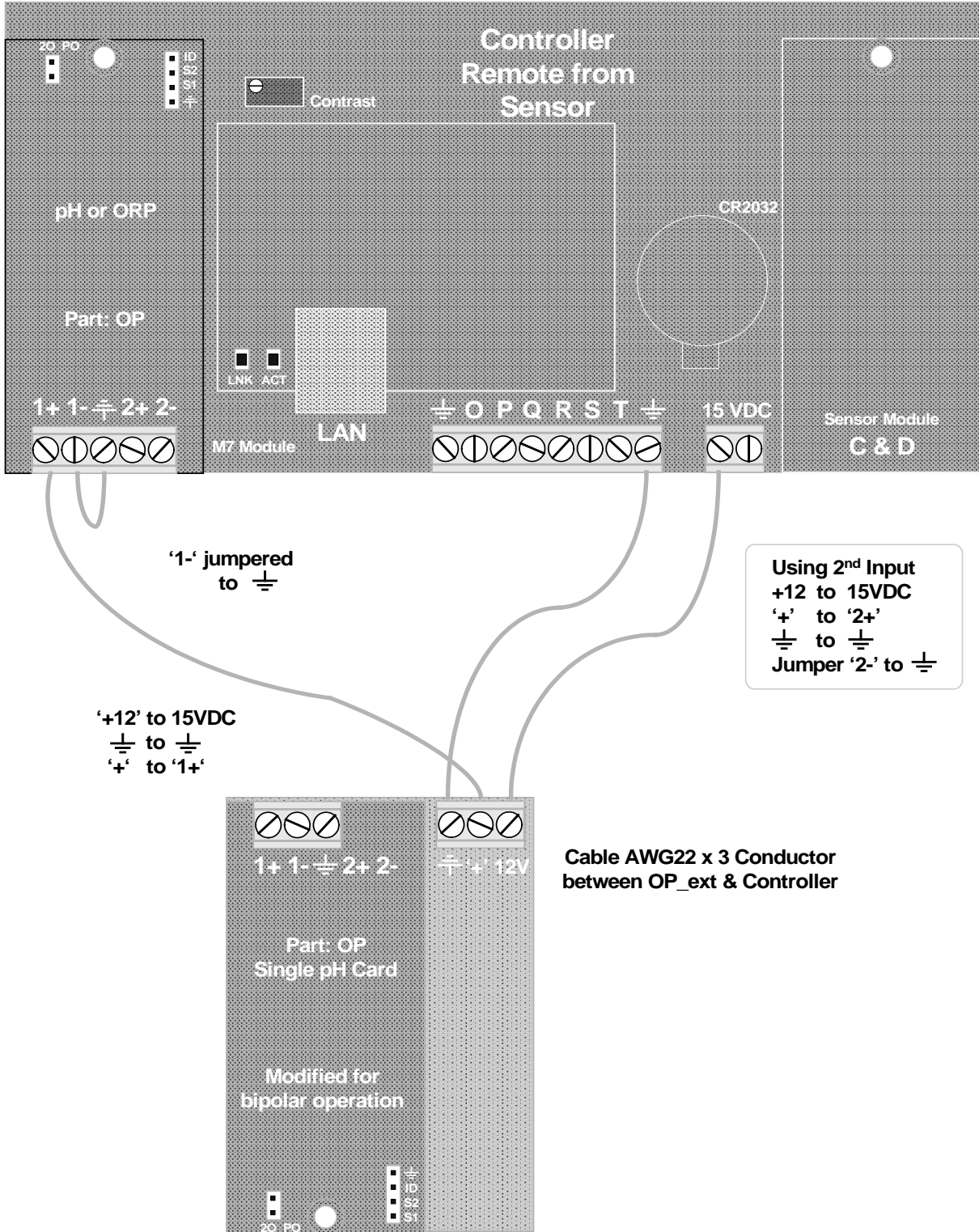
pH sensor cabling may share a common conduit with other sensors, water meter and contact set cabling. Solution grounds are single conductor AWG18-22 / 0.25-0.75 mm².

Warning 1: Do not install pH sensors without installing and connecting a solution ground. Unstable, drifting pHs will occur if the solution ground is disconnected.

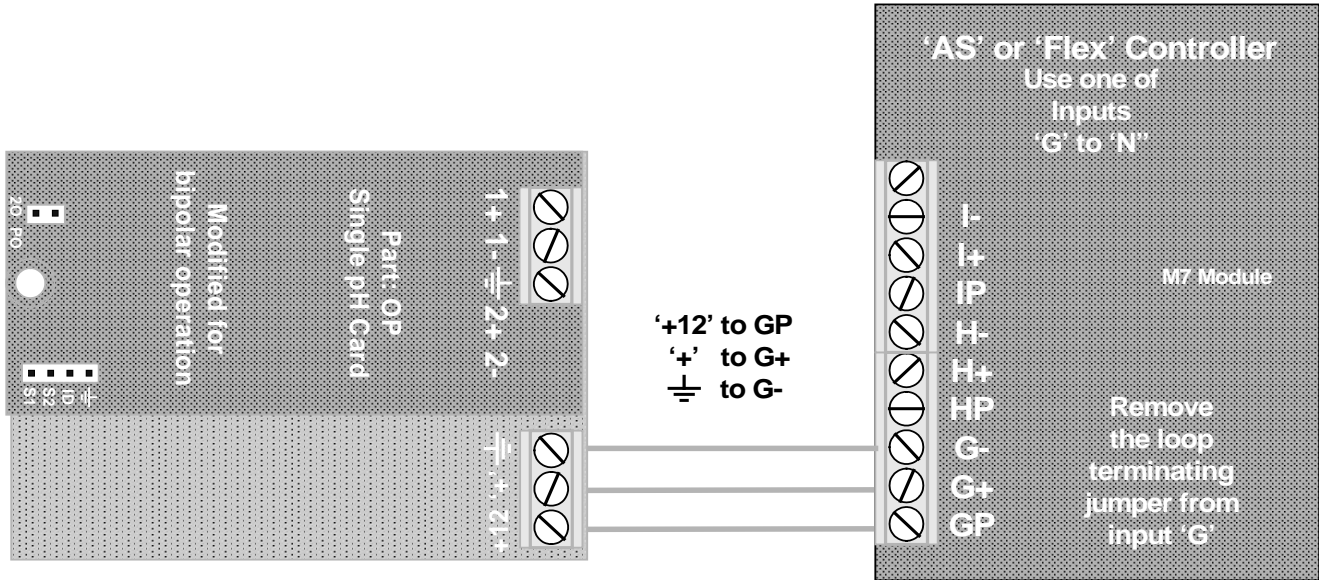
Warning 2: Turn OFF the controller before connecting or disconnecting pH sensors.

1.5 Controller Wiring

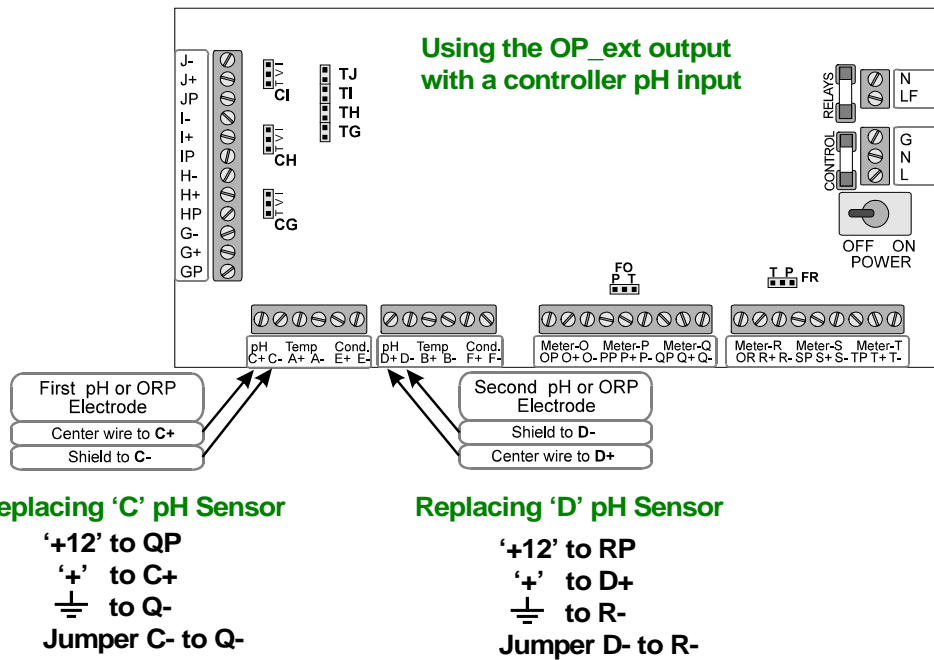
Cabling MultiFlex Controllers & OP_ext driver



Cabling 'AS' - Flex Controllers & OP_ext driver



Cable AWG22 x 3 Conductor between OP_ext & Controller



2. Configuration - Operation

2.1 Replaces pH Sensor

The OP_Ext emulates a pH sensor, converting the sensor from a high resistance voltage source to a low impedance, low noise voltage source. The controller measures the output from the OP_ext using the same offset and gain default values and the same single point calibration method that the controller uses for all other pH sensors.

2.1 'AS' – Flex Series Controllers

CONTROLLERS *WITHOUT* SERIAL COMMUNICATIONS, 'R2' OR 'RM' OPTION

The LCD display and remote keypad calibration option are used to implement an in-stream, single point calibration.

Note the **Offset** & **Gain** displayed as a result of the calibration. Only the **Offset** varies with a single point calibration with values in the 6 to 8 range indicating an operational pH sensor.

CONTROLLERS *WITH* SERIAL COMMUNICATIONS, 'R2' OR 'RM' OPTION

This procedure permits calibration without removing the pH sensor by correcting the sensor offset. Connect to the controller serial port using either Windows Terminal or Hyperterminal.

The following example assumes connection to controller input '**G**', labeled "Remote pH"

1. Using the PAG command enter: **PAG,Remote pH, 0.017, 7**
2. Allow a minute for the controller to measure & update the pH.
3. If the controller displayed pH is reading 0.2 pH higher than the measured pH, lower the offset by 0.2 by entering **PAG,,,6.8**
4. Offsets in the range of 6-8 indicate a functioning pH sensor.

Type **PA** & Enter to view the **PA** command syntax. Note that the number of commas in any command are significant since the commas place data in the correct command field.

2.3 MultiFlex Controllers

The pH sensor measured by the OP_Ext may be single point calibrated using either the Keypad or Browser user interface. User also have access to sensor diagnostics, detailed in the following table.

MultiFlex Diagnostics

Parameter	LCD Display	Browser	Value : Use
Sensor Location		OK	A: Installation slot. LCD displays slot letter on screen.
Input Card Type	OK	OK	pH Sensor: verifies driver card type
Current State	OK	OK	Operational / Alarmed:
Displayed Value	OK	OK	8.12 pH: Current measured pH, display user set units, 'pH' default. Displayed with user set resolution
Period Maximum		OK	8.15 pH: Data from current log interval. Used to assess controls.
Period Minimum		OK	8.05 pH:
Period Average		OK	8.10 pH:
Sample Size		OK	122: Samples in Period Max. Min. & Average
Current Period		OK	18 minutes: Elapsed time in current log period
Log Period		OK	15 minutes: User set log period 5 to 1440 minutes
Compensation	OK	OK	None:
Measured Level	OK	OK	62.3 mV: Raw sensor level in mV, before Gain & Offset after ID Level correction.
Gain Multiplier	OK	OK	0.0170: User set Gain
Default Gain	OK	OK	0.0170: Factory default Gain, 59mV/pH Gain selected by Input Card ID
Offset Adjust	OK	OK	7.2361: Offset. Calibration adjusts Offset. Displayed Value = Measured Level x Gain Multiplier + Offset Adjust
Default Offset	OK	OK	7.0000: Factory default Offset. Offset selected by Input Card ID
Input Card ID	OK	OK	1147 mV: Dual pH Design level = 1150 mV. Single pH Design level = 1050 mV PH – ORP Design level = 1450 mV

Sensor Type	Default Gain	Calibration Offset Span	Default Offset
PH	0.017	6 - 8	7

Calibration: A calculated offset outside of the Calibration Offset Span requires a user selected Override to complete calibration.

Driver Verification Test:

Connect a pH sensor, center conductor to 1+ and shield to 1-. Immerse sensor into pH10 buffer and connect a solution ground wire with an exposed wire end immersed in the buffer. Measured Level = 170mV +/-25mV

3. Specifications

Function		Notes
Input Range	+/- 1000mV 0-14 pH	
Resolution	ORP: 0.1mV PH: 0.01 pH	
Accuracy	+/- 0.1mV +/- 0.02pH	Requires installed solution ground immersed in the common stream with the pH sensor
Input Impedance	> 500 MOhm	Fully differential. 10M ohm power OFF input resistance
DC Power	8 VDC minimum to 25 VDC maximum @ 20mA	
Controller-to-Op_ext Cabling	3 Conductor AWG22	Do not exceed 100ft from controller to OP_ext module using AWG22 cabling

Notes:

1. Accuracy stated after sensor calibration.