

Performance Series pH / ORP Sensors

When specifying pH sensors, the interconnection wiring is often overlooked. The use of extension cables can shorten replacement time of the sensor and ultimately reduce storeroom inventory cost. This paper describes the various sensor termination options available for Barben Performance Series pH / ORP Sensors and explores the proper use of extension cables.

Direct Wiring of pH / ORP Sensors

All wiring options for Barben pH / ORP sensors are shown in Figure 1. Direct wiring of the sensor to the analyzer is the preferred solution only when the analyzer is mounted close (< 10ft or 3m) to the sensor. The pH / ORP sensor cable should be specified as short as possible to allow for easy installation. Excess cable should be avoided.

Barben Analytical's most common wiring option is the "EPP" termination shown below. Pinned leads provide large surface area for a secure grip by the screw terminals

used in most analyzers. The pinned connectors will not deform under compression thus withstand repeated clamping very well.

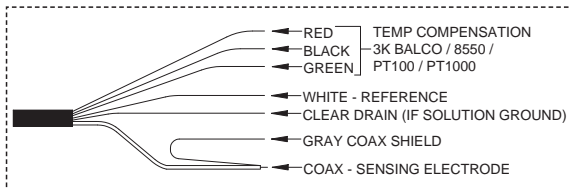
BNC Connectors

pH sensors use coaxial cable to transmit the pH signal. For many years it was common to use a BNC style coaxial connector to mate the sensor cable to the pH analyzer. The typical installation used a male BNC connector on the sensor cable and a female BNC connector at the pH analyzer. In more recent times, this connection method has fallen out of favor. Wire leads shown in the top half of Figure 1 are now the preferred termination method.

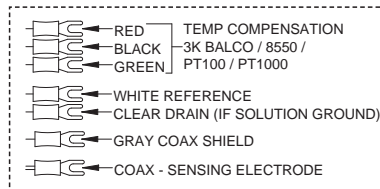
BNC style wiring termination such as the CBT, CBL, and CB2 options shown in Figure 1 should only be specified if the analyzer requires it. In new installations, Barben Analytical promotes the BNC connectors only when used with our B39 extension cables.

Direct Wiring - Frequently Specified

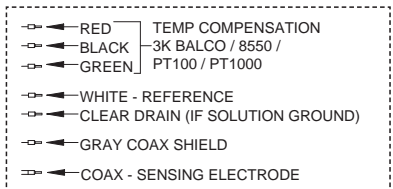
"ETT" Tinned Lead Terminations



"ELL" Lugged Terminations



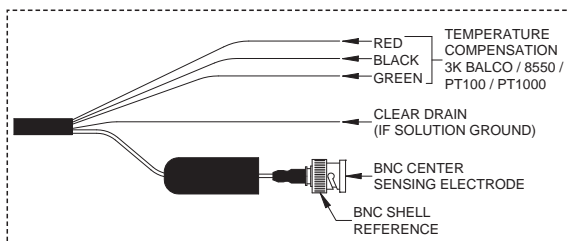
"EPP" Pinned Terminations



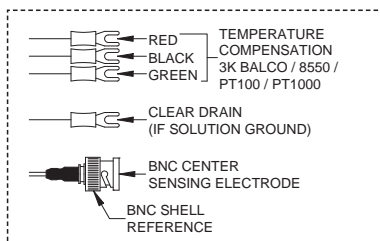
Conventional wiring is specified when the sensor is directly connected to the analyzer. The addition of a shield on the coaxial cable helps to prevent noise on the pH sensing electrode. Barben offers standard tinned leads or the option for spade lugs or pinned leads for compatibility with most pH analyzer wiring terminals. If the sensor is ordered without temperature compensation then no temperature compensation wires will be present.

Direct Wiring - Less Common Options

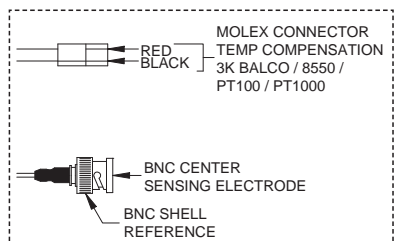
"CBT" Tinned Lead Terminations



"CBL" Lugged Terminations



"CB2" Molex Terminations



Wiring connections using BNC coaxial connector are commonly specified when using separate pH extension cables to connect to the analyzer. The pH measurement and reference signal are carried on the BNC connector. External wires are used for temperature compensation. If the sensor is ordered without temperature compensation then no temperature compensation wires will be present.

Figure 1

Technical Note

Sensor Wiring Techniques

Extension Cables

Not all applications permit the pH sensor to be installed within close proximity to the analyzer. If a long (<100ft or 30m) sensor cable is required then an extension cable will provide a better solution. The B39 Extension Cable is permanently installed between the sensor and pH analyzer. Wiring of the integral sensor cable is done at a junction box located near the sensor mounting point. The sensor cable only needs to be long enough to reach the junction box.

After the extension cable is installed the time required to replace a sensor is greatly reduced. The operator no longer needs to repeatedly pull cable through conduit and

across cable trays to reach the analyzer. The extension cable is permanently installed and need not be replaced unless damaged. Only a short length of integral sensor cable is required to reach the junction box where it mates to the extension cable. Storeroom spares cost is reduced since a sensor with long integral cable no longer needs to be purchased. A 5ft integral cable can save up to \$50/unit over a similar 30ft cable.

pH sensors used with extension cables should be specified with CB2 wiring terminations. ORP sensors will not come with the additional Molex connector due to their lack of integral temperature compensation. Please refer to B39 extension cable nomenclature on the following page.

Extension Cable Installations

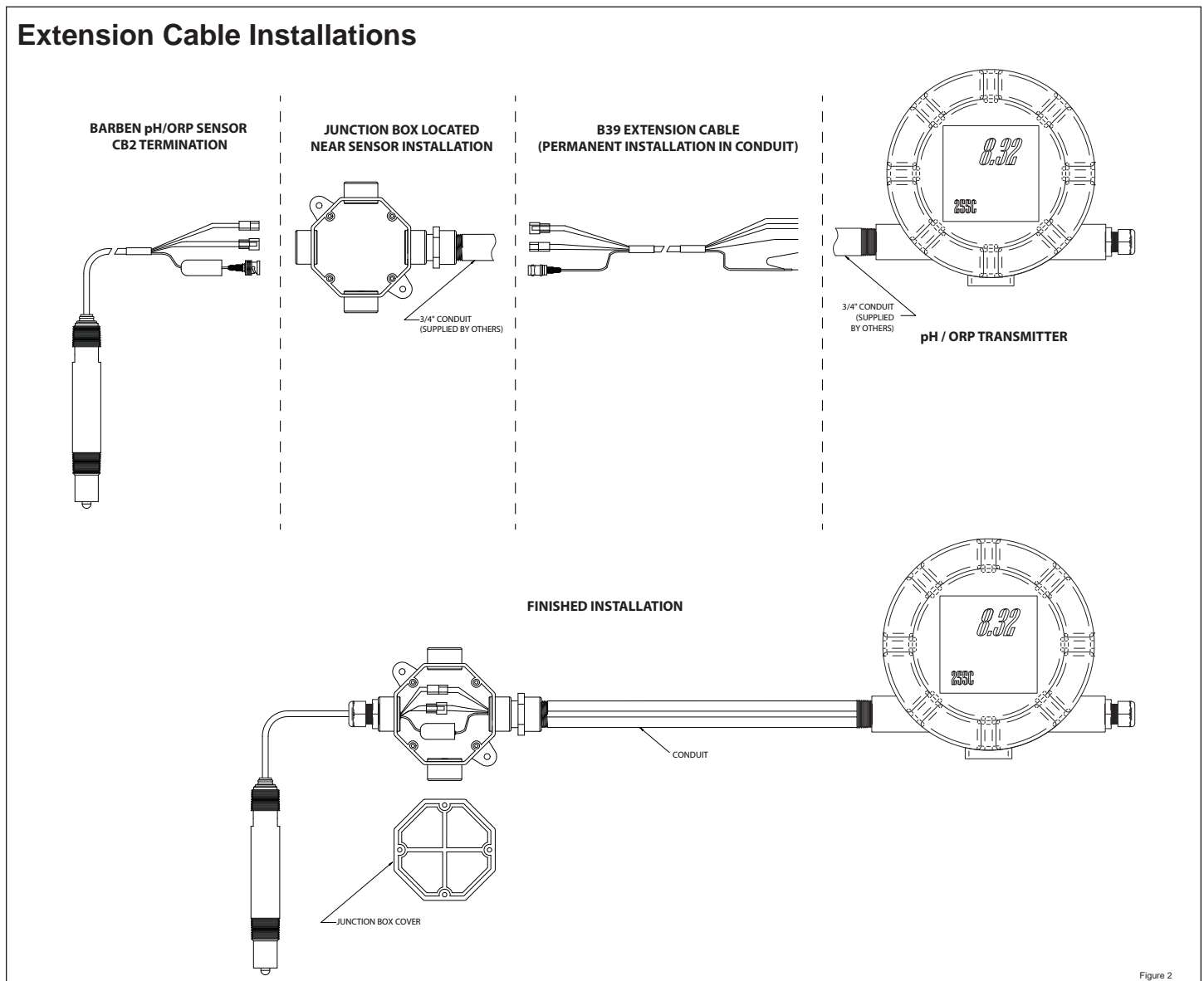


Figure 2

Technical Note

Sensor Wiring Techniques

pH / ORP SENSOR EXTENSION CABLES (FOR USE WITH SENSORS WITH INTEGRAL CABLE AND BN or B2 TERMINATIONS)						
B39	Cable with Female BNC (Interfaces Male BNC Termination on Sensor Cable)					
Cable Type						
C-A	Coax Only 105°C (For pH/ORP sensors w/o Temp Comp or Solution Ground)					
M-2	Multiconductor 130°C, Low Noise, TPE Jacket (Rqd for Temp Comp and/or Solution Ground)					
Reference Conductor						
S	Coax Shield					
I	Independent Lead (Multiconductor Only)					
Solution Ground						
N	None					
G	Independent Lead (Multiconductor Only)					
M - Multiconductor Cable Length - W/ TC, Indep Ref, or Sol Gnd						
#	Special length cut					
5	5' Cable - standard					
15	15' Cable					
30	30' Cable					
50	50' Cable					
60	60' Cable					
70	70' Cable					
80	80' Cable					
90	90' Cable					
100	100' Cable					
Lead Terminations (Transmitter End)						
BN	BNC (Coax Only) NO TC					
TN	Tinned Leads (Coax Only) NO TC					
TT	All Tinned Leads					
PP	All Wire Ferrules					
BT	BNC & Tinned Leads for TC					
Series	Type	Ref	SG	Length	Term	Typical Model Number
B39	M-2	S	N	15	TT	B39-M-2-S-N-15-TT

TOP68 Quick Disconnect

Barben Analytical also offers a quick disconnect solution for pH sensors. The TOP68 Plug Head Connector can be manufactured directly on the rear of the sensor or built onto the sensor cable (*cable mounting of the TOP68 is the preferred option for 547 retractable sensor installations*).

The TOP68 connector provides an IP68 water-tight seal when mated with the B68 Extension Cable. The female connector is made from Ryton (PPS) with Viton seals. These materials are ideal for industrial applications where corrosion is a concern. Maximum extension cable length is 60ft (18m). Figure 3 shows typical installation options.

TOP68 Quick Disconnect with B68 Extension Cable

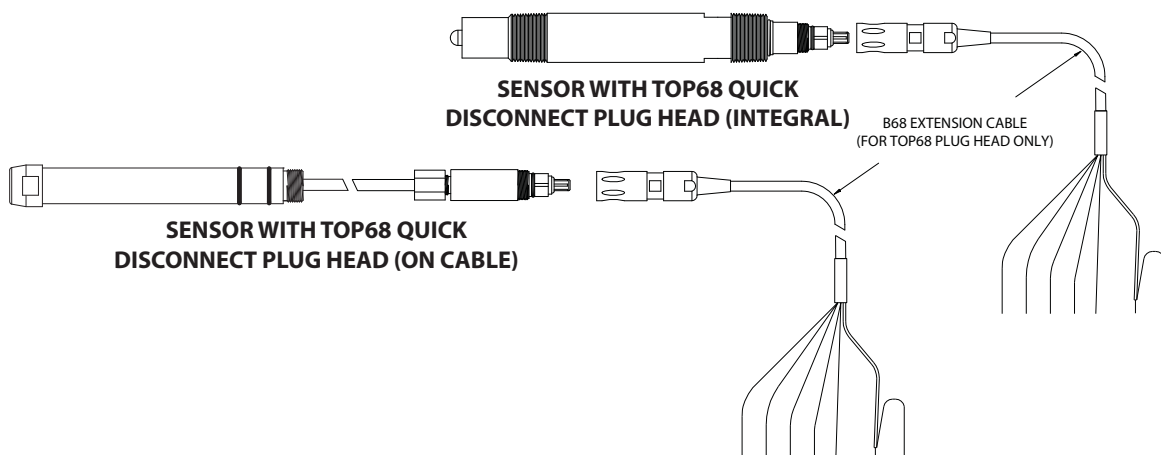


Figure 3

Technical Note

Sensor Wiring Techniques

Long Distance (> 100ft or 30m) installations

In rare cases the cable length requirement will be longer than 100ft or 30m. If moving the analyzer closer to the sensor is not a feasible solution then a pre-amplifier must be installed. Barben Analytical offers low cost battery powered pre-amplifier solutions. These pre-amplifiers are fully compatible with all analyzer / transmitters currently on the market. Consult Barben Technical support (Sales.UAI-BAT@Ametek.com) for assistance.

Contact Us

Barben Analytical is a leading supplier of analytical measurement technology targeting the industrial marketplace. It is a wholly owned subsidiary of Ametek.

Ametek has nearly 14,000 colleagues at over 120 manufacturing locations around the world. Supporting those operations are more than 80 sales and service locations across the United States and in more than 30 other countries around the world.

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