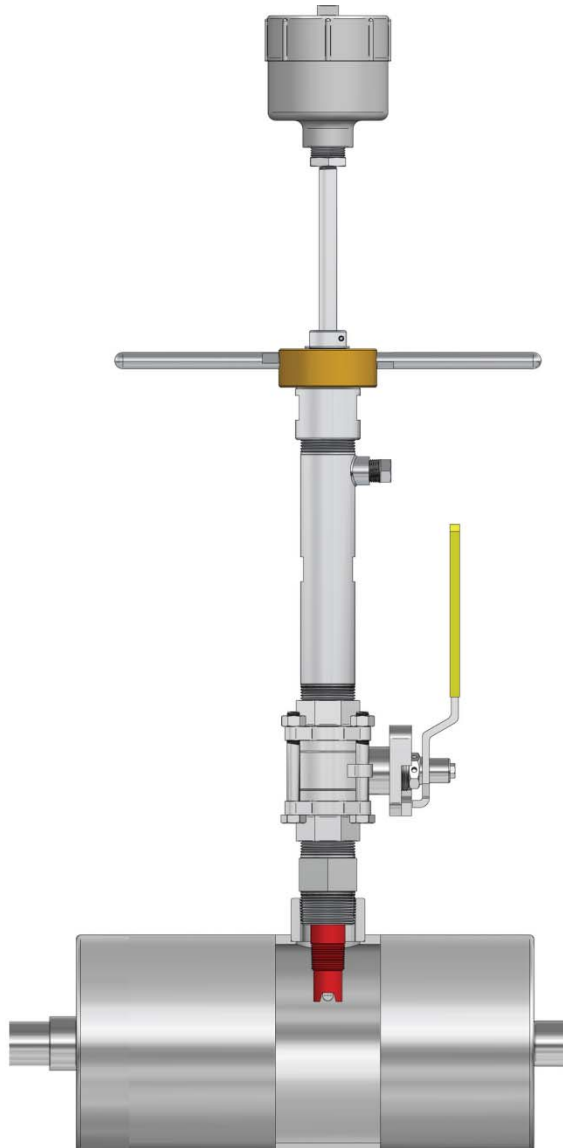




Ametek O'BRIEN
BARBEN ANALYZER TECHNOLOGY, LLC



Operation and Maintenance Manual

High Pressure
Hot-Tap
546 Series

pH / ORP/4-Electrode
Conductivity Products



<u>MANUAL CONTENTS</u>	<u>Page</u>
1.Receiving & Storage.....	2
2.Safety Instructions.....	2
3.Products Covered in this Manual.....	3
4.Installation and Operation.....	3
4(A).Numbered Part List.....	3
4(B).Basic Installation Guidelines.....	5
4(C).Installation Preassembly (Customer Supplied Ball Valve Only).....	6
4(D).Install A New pH Sensor Into Hot-Tap Retraction Assembly.....	6
4(E).Install – Setting Insertion Depth for New Install.....	7
4(F).Operation – Inserting the sensor into pressurized process.....	7
4(G).Operation – Retracting and Removing the Sensor from Process.....	8
5.Changing Sensor.....	8
6.Maintenance/Calibration Guidelines.....	9
7.Spare Parts.....	10

1. Receiving & Storage

Carefully inspect the products immediately upon arrival. If there are missing or damaged items contact the factory or shipping insurance company immediately.



WARNING!! DO NOT LEAVE DRY OR EXPOSED TO AIR

BAT pH sensors are electrochemical devices designed for continuous use in aqueous applications. Avoid prolonged tip exposure to open air, as this will allow air to enter the reference and the reference electrolyte to crystallize, causing sensor failure.

Storage: Cap the sensor tip with tap water and seal with electrical tape for long-term storage or temporarily as needed during various assembly steps (if prolonged assembly time is eminent). The temporary cap must be removed before inserting sensor through ball valve or into process pipeline.

2. Safety Instructions



Read complete manual to understand proper operation and safety concerns BEFORE Install & Operation. Improper use may cause: Burns, process release, and/or exposure to chemicals



WARNING: Always wear protective equipment (e.g. face shield, gloves and other protective clothing) and follow safety rules when clearing the line, inserting or retracting sensor.
WARNING: Never stand directly behind the ball valve, extraction housing sensor or retraction hardware. Process and equipment can be HOT – Wear Protective Equipment.

**3. Products Covered in this Manual**

High Pressure Ball Valve Insertion Systems—Complete Assemblies		
Description	Part Number	Drawing
SS316 1-¼" Assembly with Factory Supplied Valve, Viton O-Rings	B5104-S125V	2P0086
SS316 1-¼" Assembly with Factory Supplied Valve, EPDM O-Rings	B5104-S125E	2P0086
SS316 1-¼" Assembly with Factory Supplied Valve, Kalrez O-Rings	B5104-S125K	2P0086

High Pressure Ball Valve Insertion Systems—Assemblies for Customer's 1-1/4" Ball Valve		
Description	Part Number	Drawing
SS316 Assembly with Viton O-Rings, NO Valve	B5104K-S125V	2P0087
SS316 Assembly with EPDM O-Rings, NO Valve	B5104K-S125E	2P0087
SS316 Assembly with Kalrez O-Rings, NO Valve	B5104K-S125K	2P0087
Titanium Gr. 2 Assembly with Viton O-Rings, NO Valve	B5104K-T125V	2P0087
Titanium Gr. 2 Assembly with EPDM O-Rings, NO Valve	B5104K-T125E	2P0087
Titanium Gr. 2 Assembly with Kalrez O-Rings, NO Valve	B5104K-T125K	2P0087

High Pressure Ball Valve Insertion Systems—Assemblies for Customer's 1-1/2" Ball Valve		
Description	Part Number	Drawing
SS316 Assembly with Viton O-Rings, NO Valve	B5104K-S150V	2P0088
SS316 Assembly with EPDM O-Rings, NO Valve	B5104K-S150E	2P0088
SS316 Assembly with Kalrez O-Rings, NO Valve	B5104K-S150K	2P0088
Titanium Gr. 2 Assembly with Viton O-Rings, NO Valve	B5104K-T150V	2P0088
Titanium Gr. 2 Assembly with EPDM O-Rings, NO Valve	B5104K-T150E	2P0088
Titanium Gr. 2 Assembly with Kalrez O-Rings, NO Valve	B5104K-T150K	2P0088

4. Installation and Operation**4(A). Numbered Part List**

1. Cable Feed Tool
2. Insertion Tube Assembly
3. Guide Nipple
4. Ball Valve
5. Extraction Housing Assembly
6. Extraction Cap
7. Capture Nut Assembly
8. Snap Ring
9. Collar Stop
10. Reducer
11. (Junction Box) O-Ring
12. Junction Box and Cover

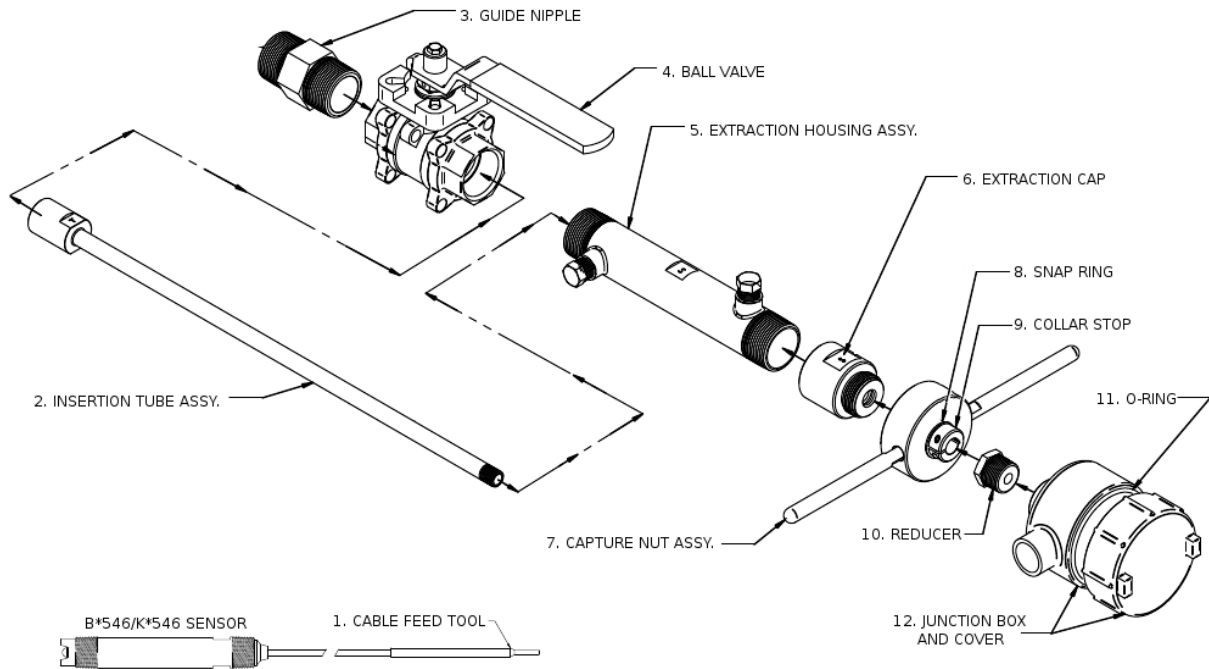


Figure 1. High Pressure Hot Tap Assembly

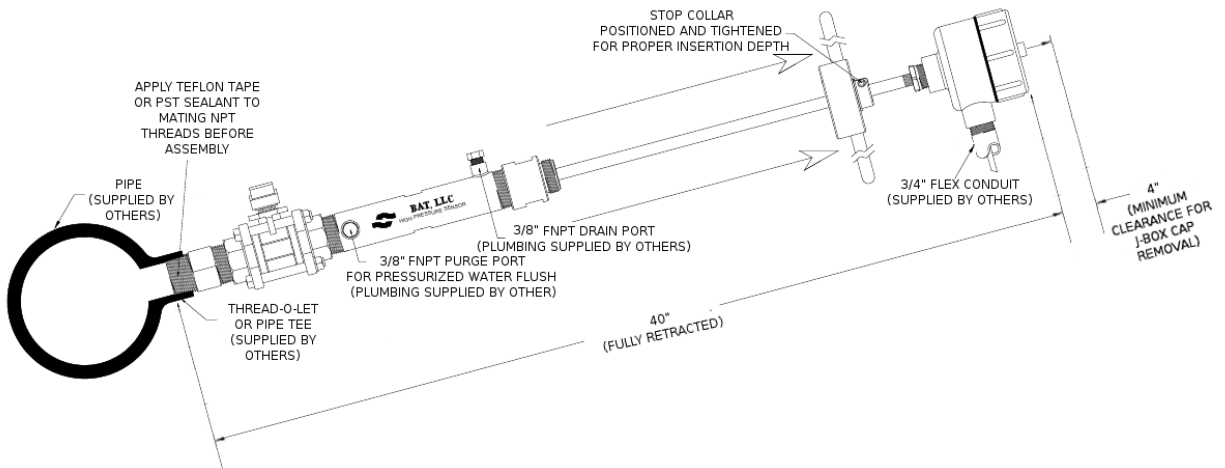


Figure 2. Hot Tap Assembly (Fully Retracted Sensor, Valve Closed)

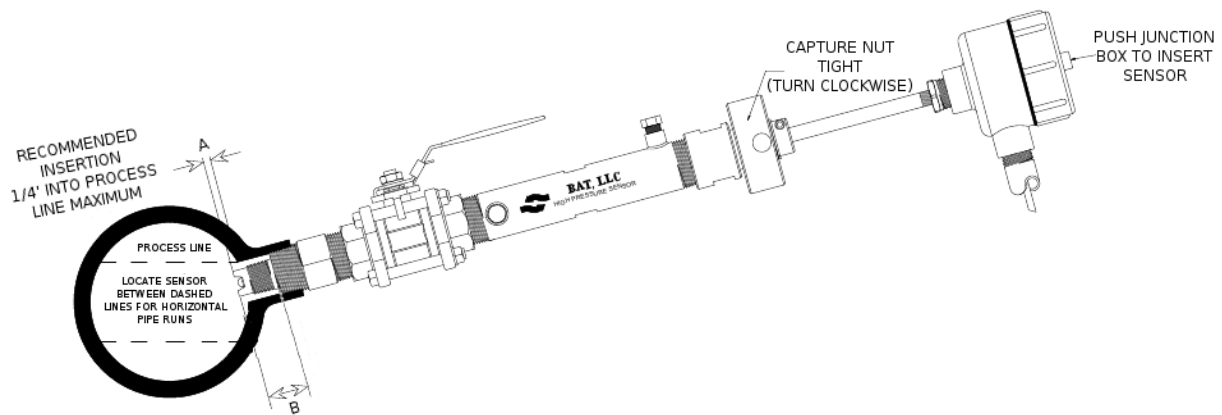


Figure 3. Hot Tap Assembly (Fully Inserted, Valve Open)

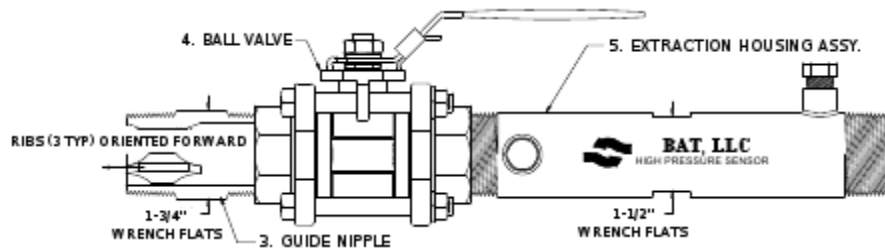


Figure 4. Hot Tap Partial Assembly 1 (Nipple-Ball Valve-Extraction Housing)

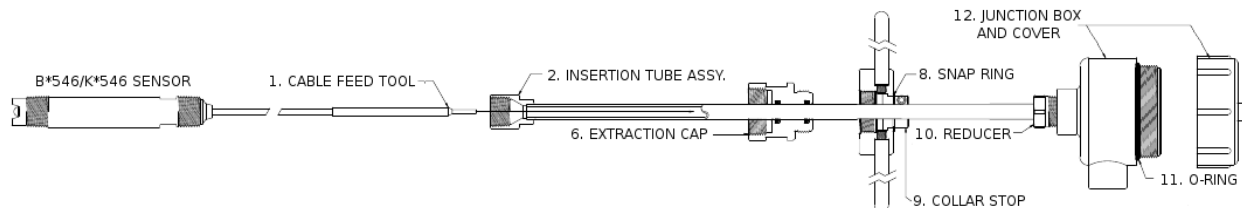


Figure 5. Hot Tap Partial Assembly 2 (Sensor-Feed Tool-Insertion Tube-Cap-Junction Box)

4(B). Basic Installation Guidelines

- The sensor tip's insertion depth (A measurement, Figure 3) should be targeted for a depth just inside the process pipe wall (approximately 1/4").
- Sensor should extend between 1" (minimum) and 4.5" (maximum). Refer to B measurement in Figure 3.
- Allow enough room for the installation of the hot tap assembly at full extension and an additional 4" clearance for the removal of the junction box cover (#12). For the pre-assembled 546 high-pressure hot tap, the distance (at full extension) is approximately 40" from the tip of the guide nipple to the top of the junction box. See Figure 2.



4(C). Installation Preassembly (Customer Supplied Ball Valve Only)

NOTE: The retraction assembly housing is pre-assembled at the factory. The hot-tap assembly arrives completely assembled when ordered with the factory ball valve (#4); the hot-tap assembly arrives assembled using a (1-¼" or 1-½") coupling in place of the ball valve (#4) when the customer supplies the ball valve.

NOTE: For partially assembled hot-tap retraction assembly (e.g. customer supplied ball valve), apply Teflon tape or PST sealant to all mating threads on the supplied guide nipple (#3) and extraction housing assembly (#5).

1. Close process valves. Follow appropriate procedures to ensure against the release of process materials into the environment.
2. Remove the ball valve (#4) from the process line.
3. Attach and tighten the supplied guide nipple (#3) (oriented "ribs forward") to the outlet on the ball valve (#4).
4. Attach and tighten the partially assembled hot-tap assembly via the extraction housing assembly (#5) to the inlet of the ball valve (#4). See Figure 4.

4(D). Install A New pH Sensor Into Hot-Tap Retraction Assembly

NOTE: For completely assembled hot-tap retraction assembly, ensure that the ball valve (#4) is in the open position and that the hot-tap assembly is in the fully inserted position (Figure 3).

NOTE: Refer to Figure 5 when completing this procedure.

1. Remove junction box cover (#12).
2. Position cable feed tool (#1) over all sensor leads.
3. Align the narrow end of the cable feed tool (#1) and guide into the insertion tube assembly (#2).
4. Use the feed tool (#1) to feed the sensor cable entirely through the insertion tube assembly and junction box (#12).
5. Remove the cable feed tool (#1) from the cable and store for future use.
6. Pull the remaining cable through junction box while guiding back of sensor toward mating threads in the insertion tube assembly (#2).
7. Apply sealant to threads on back of sensor and tighten to insertion tube assembly (#2).
NOTE: Guard against over-tightening the threads. Over-tightening the threads will cause sensor damage and failure.
8. Pull the remaining cable through the junction box (#12) conduit port.
9. Replace junction box cover (#12).



Ametek O'BRIEN
BARBEN ANALYZER TECHNOLOGY, LLC

4(E). Install – Setting Insertion Depth for New Installation

NOTE: Ensure that the Allen head screw on the collar stop (#9) is loosened before starting this procedure. Use a $\frac{9}{64}$ " Allen wrench to loosen the screw, if necessary.

1. With the hot tap assembly in the fully inserted position (Figure 3), measure the distance from the exposed end of the guide nipple (#3) to the top of the capture nut assembly (#7). Record this value.
2. Measure the process pipe wall thickness. Record this value.
3. Measure the length of the standoff from the process pipe. Record this value.
4. Add the lengths from step 1, 2 and 3. Record this value.
5. Subtract $\frac{1}{4}$ " from the value obtained in step 4. Record this value.
6. Using the junction box (#12) and the insertion tube assembly (#2), adjust the insertion depth of the sensor so that the distance between the tip of the sensor and the top of the capture nut assembly (#7) is equal to the value obtained in step 5.
7. With tape or a permanent marker, place a mark on the insertion tube assembly (#2) just above the collar stop (#9).
8. Use a $\frac{9}{64}$ " Allen wrench and tighten Allen head screw on the collar stop to secure the insertion depth and the hot-tap retractable assembly.

4(F). Operation – Inserting the sensor into pressurized process



WARNING: Always wear protective equipment (e.g. face shield, gloves and other protective clothing) and follow safety rules when clearing the line, inserting or retracting sensor.



WARNING: Never stand directly behind the ball valve, extraction housing, sensor or retraction hardware.

NOTE: Ensure that the $\frac{3}{8}$ " drain/purge ports on the extraction housing assembly (#5) are sealed. See Figure 2

1. Open the ball valve (#4).
2. Insert the sensor through the open ball valve (#4) by gripping the tee handles and sliding the capture nut assembly (#7) up against the extraction cap (#6). NOTE: The junction box (#12) may be used as an aid to push the sensor into position. See Figure 3.
3. Tighten the engaging threads of the capture nut assembly (#7) by rotating the handles clockwise.



4(G). Operation – Retracting and Removing the Sensor from Process



WARNING: Always wear protective equipment (e.g. face shield, gloves and other protective clothing) and follow safety rules when clearing the line, inserting or retracting sensor.



WARNING: Never stand directly behind the ball valve, extraction housing, sensor or retraction hardware.

1. Rotate the tee handles counterclockwise and slowly loosen the capture nut (#7). NOTE: Maintain hand control throughout this step.
2. Pull the junction box (#12) until the sensor is in a fully retracted position. See Figure 2. NOTE: Maintain hand control throughout this step to avoid damaging the sensor and/or the hot-tap sub-assemblies.
3. Close the ball valve (#4).
4. If utilized, purge and drain residual process via the $\frac{3}{8}$ " drain/purge port on the extraction housing assembly (#5). See Figure 2.
5. Loosen the extraction cap (#6) from the extraction housing (#5) and separate the sensor/extraction cap/capture nut/collar stop/connector/junction box assembly from the extraction housing (#5).

5. Changing Sensor



WARNING: Always wear protective equipment (e.g. face shield, gloves and other protective clothing) and follow safety rules when clearing the line, inserting or retracting sensor.



WARNING: Never stand directly behind the ball valve, extraction housing, sensor or retraction hardware.

1. Retract and remove the sensor. (Follow “Operation — Retracting and Removing...” instructions.)
2. Loosen the mating threads of the insertion tube assembly (#2) and the sensor.
3. Extract the used sensor and sensor cable from the insertion tube assembly (#2).
4. Replace the used sensor with a new sensor.
5. Install the new sensor. (Follow “Install A New pH Sensor...” instructions.)
6. Apply fresh Teflon tape or PST sealant to exposed threads of extraction housing (#5).
7. Slide the extraction cap (#6) forward on the insertion tube assembly (#1) and tighten the assembly to the extraction housing (#5).
8. Insert the sensor assembly. (Follow “Operation — Inserting...” instructions.)



6. Maintenance/Calibration Guidelines

- Sensors should be stored at room temperature with a wetted cap in place at the measuring end. The cap can be wetted with pH 7 buffer or with tap water.
- Scaling, oils and other coatings can be removed by soaking the reference in 3-10% HCl solution for a few minutes, followed by a rinse in tap water. Repeat for heavier coatings.
- Routine cleaning can be accomplished by running measuring end of the sensor under tap water and wiping the glass clean with a clean, soft cloth.
- Oils and greases can be removed by stirring the sensor in a solvent such as isopropyl alcohol and wiping with a clean, soft cloth. Repeat for heavy build-up.
- During storage, isolate the connections on the ends of the sensors from moisture and corrosive gases.
- Frequency of calibration is process dependent. Use a two (2) point calibration of 4 pH and 7 pH buffer for most processes. Use a one (1) point calibration for extremely acidic or basic processes. Consult your analyzer's instruction manual for appropriate calibration procedures.



7. Spare Parts

		List Number	Description	Part Number		
WETTED MATERIALS	SS316	2	Insertion Tube Assembly	B5205-0052		
		3	1-¼" Guide Nipple	B4951-0102		
			1-½" Guide Nipple	B4951-0108		
		4	1-¼" Ball Valve	B4955-0001		
		5	Extraction Housing Assembly	B5110-0012		
		6	Extraction Cap	EPDM O-Ring	Kalrez O-Ring	Viton O-Ring
	B4951-0104E			B4951-0104K	B4951-0104V	
	TITANIUM	2	Insertion Tube Assembly	B5205-0053		
		3	1-¼" Guide Nipple	B4951-0109		
			1-½" Guide Nipple	B4951-0103		
		4	1-¼" Ball Valve	B4955-0005		
		5	Extraction Housing Assembly	B5110-0013		
		6	Extraction Cap	EPDM O-Ring	Kalrez O-Ring	Viton O-Ring
	B4951-0105E			B4951-0105K	B4951-0105V	
	Hastelloy C	6	Extraction Cap	EPDM O-Ring	Kalrez O-Ring	Viton O-Ring
				B4951-0132E	B4951-0132K	B4951-0132V
		1	Cable Feed Tool	B9502-0014		
		7	Capture Nut Assembly	B4953-0032		
8		Snap Ring	B4215-0001			
9		Collar Stop	B5106-0361			
10		Reducer	B4951-0125			
11		2-235 Junction Box O-Ring	B4904-0046			
12		Junction Box	B5023-0005			
			O-Ring Replacement	EPDM	Kalrez	Viton
			B4904K-1009	B4904K-1010	B4904K-1011	