Waterproofing Options for Submersible Installations

Waterproofing Style "A" Series

Suitable For Most Ordinary Submersible Installations when installed with suitable immersion tube (a.k.a. guiderod or standpipe)

Waterproofing Style "B" Series

Suitable For the Most Aggressive Agitated Slurry Solutions & Corrosive Liquids with Complete Cable Isolation With Rugged Tubing Factory Installed

FULLY SUBMERSIBLE ASSEMBLY WITHOUT IMMERSION TUBE

Waterproofing Style "C" Series

Suitable for Aggressive Agitated Slurry Solutions and Corrosive Liquids with additional sealing feature as compared to more basic "A" Series waterproofing

Completely Submersible when installed with suitable immersion tube (a.k.a. guiderod or standpipe)

Waterproofing Style "IT" Series

Suitable For Most Submersible Use & The Most Cost Effective Waterproofing Option

FULLY SUBMERSIBLE WITHOUT USE OF IMMERSION TUBE

DOES MY SENSOR NEED A WATERPROOFING OPTION?

- The sealing on the back of a twist lock and immersion sensors is water resistant, but not waterproof. The standard default isolation on the back of a sensor is a strain relief grommet. This allows for the sensor to be somewhat moved and for some minor water exposure without causing sensor failure. For more aggressive water exposure to the back of the sensor, additional precautions must be taken.
- Sensors NOT intended for continuous exposure of water on the back of cable without a waterproofing seal installed.

GENERAL COMMENTS ON SELECTION OF WATERPROOFING OPTIONS

- The waterproofing options offer anywhere from nominal isolation to extremely robust isolation in the following order going from least isolating to most isolating:
    - WPIT/WPITC << WPA/WPG << WPC << WPB/WPH
    - **See comparison chart of waterproofing options for details and guidance about the best choice for your use.**
- Most users will only ever require the WPIT, WPA, WPC or WPB options but the WPITC, WPG & WPH version with a CPVC material of construction for use in the presence of certain oxidizing chemicals are also available.
- In general, the WPB or WPH sealing is only really required for fully submersible type installations.
    - Note that ONLY the WPIT/WPITC and WPB/WPH waterproofing sealing options provide for COMPLETE cable isolation all the way back to the transmitter.

If you should have any doubt about whether the exact sensor model that you are using is appropriate for the installation style that you are planning to implement, please contact the factory for further assistance!

Waterproofing Style "A" Series

Suitable For Most Ordinary Completely Submersible Installations

Option Available For:

- 3/4" MNPT Rear Threaded Immersion Sensors
  - 6X11, 6X13, 6X12, 6X53, 6X54, 6X32 & 6X42 pH/ORP Sensors
- 3/4" MNPT Rear Threaded Sanitary/HOT-TAP Sensors
  - 5X31, 5X41 & 5X51 pH/ORP Series Sensors
  - 5XX0 Ion Selective (ISE) Series Sensors
  - AST-DO-UNIVERSAL Dissolved Oxygen (DO) Series Sensors in the universal and sanitary/HOT-TAP configurations
- 1" MNPT Rear Threaded Immersion Sensors
  - 6X52, 6X51, 6X31 & 6X41 Series pH/ORP Sensors
  - 6XX0 Series Ion Selective (ISE) Series Sensors
- 1" MNPT Read Threaded Twist Lock Sensors with protective tines (guard) option added
  - 8X52, 8X51, 8X31 & 8X41 Sensor pH/ORP Series
  - 8XX0 Series Ion Selective (ISE) Series Sensors
  - AST-DO-UNIVERSAL Dissolved Oxygen (DO) Series Sensors in the twist lock quick disconnect configuration
- 1-1/4" MNPT Read Threaded Immersion Sensors
  - AB 6100 Fluoride Ion Selective Sensors Only

Features & Recommended Applications:

- Complete isolation of back end threaded fitting from liquid process and good protection of cable from corrosion and chemical attack
- Rear threading is identical to that specified on original sensor specifications prior to application of Waterproofing "A" Option
- Hex Head for wrench flats enable easy installations into fixtures
- Not recommended for extremely corrosive installations or installations which do not utilizes any kind of guide rod or conduit
- Recommended primarily for elongating sensor life where attack of liquid from back end causes death to sensor prior to chemical or physical attack through front of probe

Angle view of AB 6410 Ammonium Ion Selective sensor with WPA submersible option installed

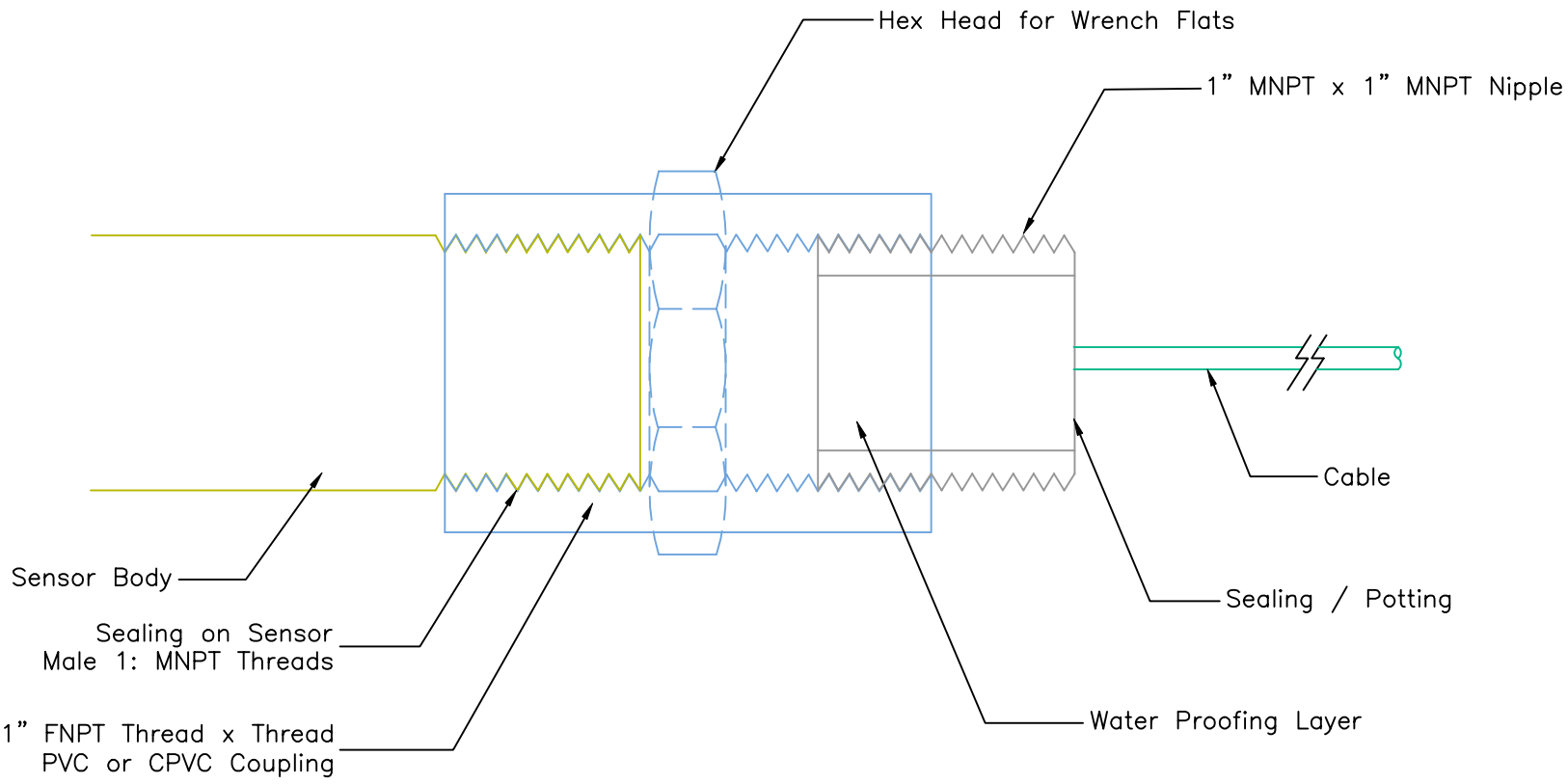
WPA on sensor without preamplifier shown in 1"MNPT rear thread size

Close-up rear view of WPA submersible option showing MNPT threads and grommet strain relief

For Applications Requiring Waterproofing Assemblies to be constructed of only CPVC (for strong oxidative or reducing solutions - i.e. chlorine, chlorine dioxide, strong hydrogen peroxide or ozone solutions... etc.); Change Waterproofing part description from Waterproofing "A" to "G"

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
2	1			

WATERPROOFING "A" SERIES



ASTI *Advanced Sensor Technologies, Inc.*				
WATERPROOFING "A" SERIES				
ASSEMBLY	SIZE 2	FSCM NO.	DWG NO. ASTI-011SA.DWG	REV 1
DRAWN BY: PETE CSISZAR	SCALE NONE	DATE: DEC. 31, 2000	SHEET 1 OF 1	

BLACK&BAIRDLTD

8/5/99

PRC

Waterproofing Style "B" Series

Suitable For the Most Aggressive Agitated Slurry Solutions and Corrosive Liquids - Recommended for Installations without guide rod or conduit - Direct Insertion into volatile tank - COMPLETE CABLE ISOLATION WITH VINYL OR NORPRENE TUBING & NO METAL PARTS WHATSOEVER

Option Available For:

- 3/4" MNPT Rear Threaded Immersion Sensors
  - 6X11, 6X13, 6X12, 6X53, 6X54, 6X32 & 6X42 Series pH/ORP Sensors
- 3/4" MNPT Rear Threaded Sanitary/HOT-TAP Sensors
  - 5X31, 5X41 & 5X51 pH/ORP Series Sensors
  - 5XX0 Ion Selective (ISE) Series Sensors
  - AST-DO-UNIVERSAL Dissolved Oxygen (DO) Series Sensors in the universal and sanitary/HOT-TAP configurations
- 1" MNPT Rear Threaded Immersion Sensors
  - 6X52, 6X51, 6X31 & 6X41 Series pH/ORP Sensors
  - 6XX0 Series Ion Selective (ISE) Series Sensors
- 1" MNPT Twist Lock Sensors with protective tines (guard) option added
  - 8X52, 8X51, 8X31 & 8X41 Sensor pH/ORP Series
  - 8XX0 Series Ion Selective (ISE) Series Sensors
  - AST-DO-UNIVERSAL Dissolved Oxygen (DO) Series Sensors in the twist lock quick disconnect configuration
- 1-1/4" MNPT Read Threaded Immersion Sensors
  - AB 6100 Fluoride Ion Selective Sensors Only

Features & Recommended Applications:

- Complete isolation of back end threaded fitting from liquid process and good protection of cable from corrosion and chemical attack
- Major Rear threading is identical to that specified on original sensor specifications prior to application of Waterproofing "B" Option
- Hex Head for wrench flats enable easy installations into fixtures
- Recommended for extremely corrosive installations and/or sites do not utilizes any kind of guide rod or conduit, or extremely slurry/viscous solutions which can abraid cable assemblies
- Elongates sensor life where attack of liquid from back end causes death to sensor prior to chemical or physical attack through front of probe

Angle view of 3/4"MNPT rear threads with WPB submersible option

Side close-up view of 3/4"MNPT rear threads with WPB submersible option

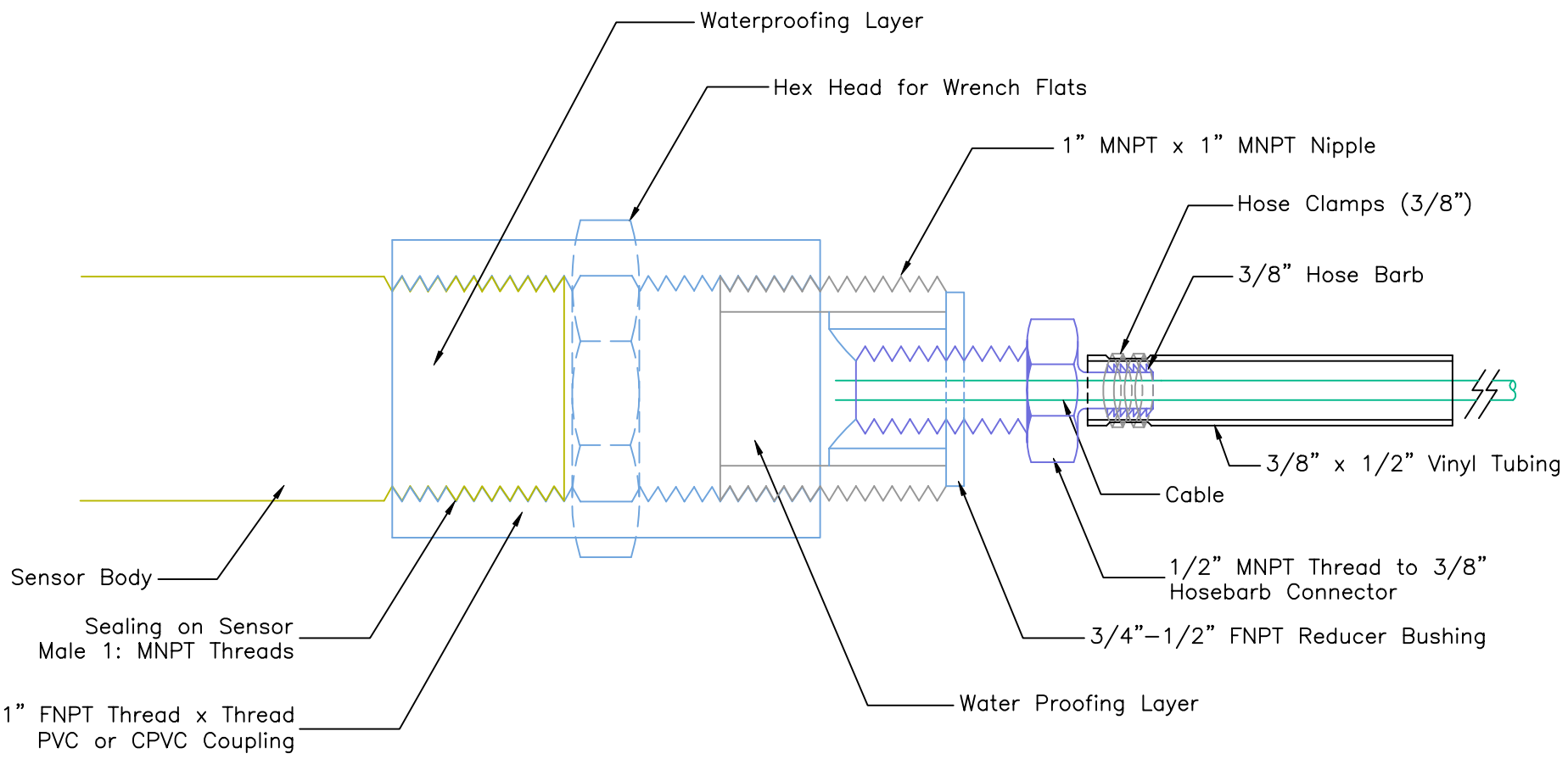
Wide view of AB 6100 Fluoride ISE sensor with WPH submersible option & integral preamplifier, 10 feet vinyl tubing & Q7M snap connector

Close-up rear view of WPH submersible option sealing assembly

For Applications Requiring Waterproofing Assemblies to be constructed of only CPVC (for strong oxidative or reducing solutions - i.e. chlorine, chlorine dioxide, strong hydrogen peroxide or ozone solutions... etc.); Change Waterproofing part description from Waterproofing "B" to "H" (as shown in photos to right)

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
2	1			

WATERPROOFING "B" SERIES



ASTI Advanced Sensor Technologies, Inc.			
WATERPROOFING "B" SERIES			
ASSEMBLY	SIZE 2	FSCM NO.	DWG NO. ASTI-012SA.DWG / REV 1
DRAWN BY: PETE CSISZAR	SCALE NONE	DATE: DEC. 31, 2000	SHEET 1 OF 1

BLACK&BAIRDLTD 8/5/99 PRC

Waterproofing Style "C" Series

Suitable for Most Aggressive Agitated Slurry Solutions and Corrosive Liquids

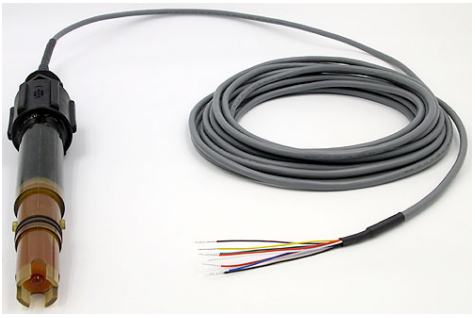
Recommended for similar installations as Waterproofing Style "B" but lacks the complete Cable Isolation offered by "B" Style so immersion tube is required

Option Available For:

- 3/4" MNPT Rear Threaded Immersion Sensors
    - 6X11, 6X13, 6X12, 6X53, 6X54, 6X32 & 6X42 pH/ORP Sensors
- 3/4" MNPT Rear Threaded Sanitary/HOT-TAP Sensors
    - 5X31, 5X41 & 5X51 pH/ORP Series Sensors
    - 5XX0 Ion Selective (ISE) Series Sensors
    - AST-DO-UNIVERSAL Dissolved Oxygen (DO) Series Sensors in the universal and sanitary/HOT-TAP configurations
- 1" MNPT Rear Threaded Immersion Sensors
    - 6X52, 6X51, 6X31 & 6X41 Series pH/ORP Sensors
    - 6XX0 Series Ion Selective (ISE) Series Sensors
- 1" MNPT Twist Lock Sensors with protective tines (guard) option
    - 8X52, 8X51, 8X31 & 8X41 Sensor pH/ORP Series
    - 8XX0 Series Ion Selective (ISE) Series Sensors
    - AST-DO-UNIVERSAL Dissolved Oxygen (DO) Series Sensors in the twist lock quick disconnect configuration
- 1-1/4" MNPT Read Threaded Immersion Sensors (Special Order Only)

Features & Recommended Applications:

- Complete isolation of back end threaded fitting from liquid process and good protection of cable from corrosion and chemical attack
- Rear threading is identical to that specified on original sensor specifications prior to application of Waterproofing "C" Option
- Hex Head for wrench flats enable easy installations into fixtures
- Not Recommended for extremely installations which do not utilizes any kind of guide rod or conduit
- Recommended for extremely corrosive and/or slurry, viscous or high-speed process solutions which can abraid cable assemblies
- Elongates sensor life where attack of liquid from back end causes death to sensor prior to chemical or physical attack through front of probe



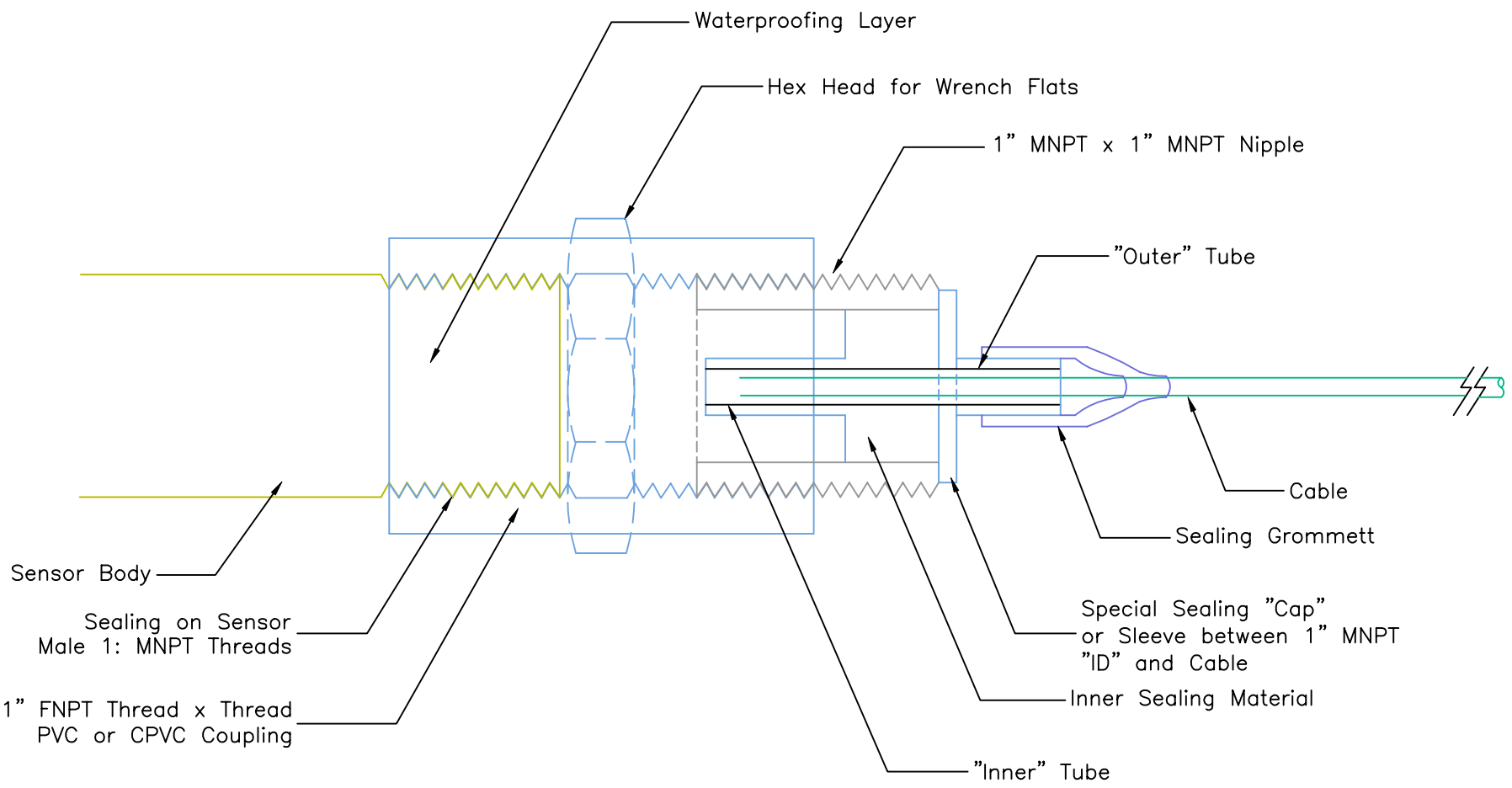
PNCGR 8331/8131/8631-3081HT-25-WPC Submersible High Temperature & Slurry Resistant pH Sensor with WPC sealing option & integral analog preamplifier with tinned lead wire terminations

Side view of WPC submersible option sealing assembly

Rear view close-up on sealing portion of WPC submersible assembly

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
2	1			

WATERPROOFING "C" SERIES



ASTI Advanced Sensor Technologies, Inc.				
WATERPROOFING "C" SERIES				
ASSEMBLY	SIZE 2	FSCM NO.	DWG NO. ASTI-013SA.DWG	REV 1
DRAWN BY: PETE CSISZAR	SCALE NONE	DATE: DEC. 31, 2000	SHEET 1 OF 1	

BLACK&BAIRDLTD

8/5/99

PRC

Waterproofing Style "IT" Series

Suitable For Most Applications and the Most Cost Effective Waterproofing Option. COMPLETE CABLE ISOLATION WITH VINYL OR NORPRENE TUBING WITH NO METAL PARTS USED WHATSOEVER.

Option Available For:

- 3/4" MNPT Rear Threaded Immersion Sensors
  - 6X11, 6X13, 6X12, 6X53, 6X54, 6X32 & 6X42 pH/ORP Sensors
- 3/4" MNPT Rear Threaded Sanitary/HOT-TAP Sensors
  - 5X31, 5X41 & 5X51 pH/ORP Series Sensors
  - 5XX0 Ion Selective (ISE) Series Sensors
  - AST-DO-UNIVERSAL Dissolved Oxygen (DO) Series Sensors in the universal and sanitary/HOT-TAP configurations
- 1" MNPT Rear Threaded Immersion Sensors
  - 6X52, 6X51, 6X31 & 6X41 Series pH/ORP Sensors
  - 6XX0 Series Ion Selective (ISE) Series Sensors
- 1" MNPT Read Threaded Twist Lock Sensors with protective tines (guard) option added
  - 8X52, 8X51, 8X31 & 8X41 Sensor pH/ORP Series
  - 8XX0 Series Ion Selective (ISE) Series Sensors
  - AST-DO-UNIVERSAL Dissolved Oxygen (DO) Series Sensors in the twist lock quick disconnect configuration
- 1-1/4" MNPT Read Threaded Immersion Sensors
  - AB 6100 Fluoride Ion Selective Sensors Only

Features & Recommended Applications:

- Complete isolation of back end threaded fitting from liquid process and good protection of cable from corrosion and chemical attack
- Major Rear threading is identical to that specified on original sensor specifications prior to application of Waterproofing "IT" Option
- Suitable for the majority of Submersible Applications and the Most Economical and Cost Effective Waterproofing Option Available
- Recommended primarily for elongating sensor life where attack of liquid from back end causes death to sensor (typically by corrosion along cable) prior to chemical or physical attack through front of probe

6X61 series smart digital pH sensor with WPIT polypropylene sealing & 10 feet NORPRENE tubing; 20 feet cable with HiQ4m snap connector

Rear close-up of 6X61 analog sensor with WPIT polypropylene sealing & NORPRENE tubing; Fully submersible to 115 degrees Celsius Max

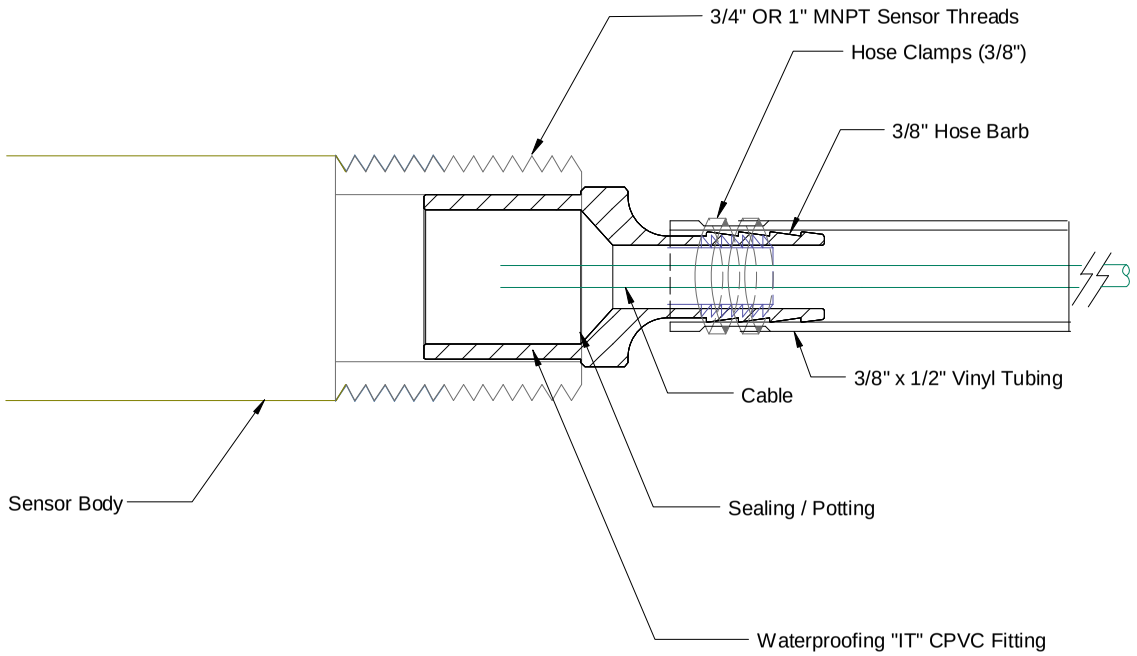
Front view of 5X31 series sensor with WPITC CPVC submersible option & 10 feet vinyl tubing & tinned lead wire terminations

Side view of WPITC CPVC submersible option sealing assembly

For Applications Requiring Waterproofing Assemblies to be constructed of only CPVC (for strong oxidative or reducing solutions - i.e. chlorine, chlorine dioxide, strong hydrogen peroxide or ozone solutions... etc.); Change Waterproofing part description from Waterproofing "WPIT" to "WPITC" (as shown in photos to right)

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	1			

WATERPROOFING "IT" SERIES



ASTI *Advanced Sensor Technologies, Inc.*			
WATERPROOFING "IT" SERIES			
ASSEMBLY	SIZE	FSCM NO.	DWG NO. ASTI-WPIT.DWG REV 1
DRAWN BY: PETE CSISZAR	SCALE NONE	DATE: FEB 16, 2010	SHEET 1 OF 1

BLACK&BAIRDLTD

8/5/99

PRC

BEST PRACTICE FOR INLINE USE

INDOOR:
If a standard sensor such as the immersion or twist lock sensor series is used for inline installations and no immersion or submersible use is planned then no special precautions are required if it is for indoor use. This assumes that the back of the sensor will not be exposed to corrosive gas present and/or the plant will not cause any process media to get onto the back of the sensor, nor give it significant water exposure by washing down the area.

OUTDOOR:
If a standard sensor such as an immersion or twist lock sensor series is used for inline installations and no immersion or submersible use is planned then there generally ARE special precautions required for outdoor inline use. The most common is to seal the back end of the sensor in conduit to isolate the back end of the sensor. The most common approach so to use sufficient TEFLON tape and a NPT coupling to create this back sensor seal, and then either a rigid or flexible conduit back to the transmitter where is the lead wires are terminated for cable isolation. This creates a barrier that makes the sensor suitable for conditions were rain and other outdoor elements could damage the seal on the back of the sensor. Specifically, this can prevent water from attacking along the sensor cable and causing internal shorting to solder joins inside the unit itself. Another approach for sealing the back of the sensor if there will be significant water exposure is to add a waterproofing option. In general, for such cases just the least expensive WPIT option is which sufficient provided that tubing is properly installed. The WPIT waterproofing option has a slight surcharge for extended cable lengths. In some cases the more robust WPA option can also be used to fulfill this purpose. Unfortunately waterproofing options cannot be added once a sensor has been fabricated but rather must be installed at the time of manufacture.

BEST PRACTICE FOR IMMERSION USE

Immersion use is defined as when the sensor is immersed into the process media, but the entire sensor is not submersed. This mean that the back of the sensor is NOT completely below the process media level. Immersion installations always require the back of the sensor/waterproofing to be sealed with a mating FNPT coupling and the cable run in conduit. The WPIT, WPA or WPC waterproofing options can be added if desired/required to make the sensor life better even for such immersion installations. It is possible to use the standard immersion or twist lock sensor for immersion use without adding a waterproofing option if VERY GOOD care is taken to seal the back of the sensor with a coupling and properly running the cable in conduit back to the transmitter.

BEST PRACTICE FOR FULLY SUBMERSIBLE USE

Submersible use is defined as when the sensor is COMPLETELY immersed into the process media (anywhere from 1 feet below the fluid level to much, much deeper). In this case the entire sensor IS submersed. This mean that the back of the sensor is COMPLETELY below the process media level. Submersible installations always require the back of the sensor/waterproofing to be sealed with a mating NPT coupling and the cable run in conduit. For additional sealing option a WPA, WPC or WPB waterproofing option can be added if desired/required. There is a special surcharge if the sensor has a longer cable length that the standard 5 feet for the WPIT and WPB waterproofing options only. It is possible to use the standard immersion or twist lock sensor for submersible use without adding a waterproofing option is VERY, VERY GOOD care is taken to seal the back of the sensor with a coupling and properly running the cable in conduit back to the transmitter. The use of Waterproofing Option WPA, WPB or WPC is VERY STRONGLY recommended (although not strictly required) for submersible installations.

Waterproofing Options Comparison Chart

Submersible option choice is based upon three factors:

1) Material of Construction • Polypropylene (PP) or CPVC 2) Family of Waterproofing 3) Type & length of sealing hose • WPB, WPH & WPIT/WPITC					
Description of Waterproofing Option	**Material**	**Family "A" Std. Submersible with Standpipe**	**Family "B" Full Submersible with Cable Isolation**	**Family "C" Fully Submersible with Standpipe**	**Family "B" Full Submersible with Cable Isolation**
Most Submersible Applications	**PP**	**WPA**	**WPB**	**WPC**	**WPIT**
Halogen (Chlorine) & Oxidizer Use	**CPVC**	**WPG**	**WPH**	***Not Available***	**WPITC**

GENERAL NOTES ABOUT WATERPROOFING OPTIONS:

1. All options are available for sensors with 3/4" MNPT, 1.0" MNPT or 1.25" MNPT rear threads.
2. Max temperature for continuous usage of the polypropylene (PP) waterproofing options is 105 °C (220 °F).
3. Max temperature for continuous usage of the CPVC waterproofing options is 90 °C (195 °F).
4. The waterproofings with the polypropylene (PP) material of construction are the best choice for most applications. There are some selected process solutions that contain chemicals for which CPVC is a better choice than PP such as in some strong oxidizers such as chlorine and chlorine dioxide as well as diluted nitric acid. In general, however, the PP material of construction is a better choice for chemical resistance, particularly if organic solvents may be present.
5. All waterproofing types are suitable for use in outdoor installations where rain and moisture may be present on a continuous basis. All waterproofing options are also suitable for facilities that perform washdowns such that the back of the sensor may become thoroughly wetted.
6. The WPA and WPC sealing should use an immersion tube sealing to the rear NPT threads of the watetproofing feature for fully submersible use.
7. The WPB, WPH, WPIT waterproofings can be installed with /8"X5/8" braid reinforced vinyl tubing or NORPRENE® polypropylene tubing for fully submersible installation without use of immersion tube (a.k.a. standpipe or guiderod).
8. The NORPRENE® polypropylene tubing is primarily intended to be employed for locations where the entire cable assembly will be exposed to the 105 degrees Celsius (including the hose) or else for process media that is incompatible with vinyl tubing. The NORPRENE® polypropylene hose installation assembly includes a special NYLON clamp to act as a secondary securing feature although the factory installation of the NORPRENE® polypropylene hose results in a very reliable seal even without use the optional NYLON clamp.
9. Total tubing for WPB, WPH & WPIT indicated with /XX suffix for vinyl tubing & /XXPP suffix for the NORPRENE® polypropylene tubing where XX is the length of hose in feet. Typically the maximum supported hose length possible is 35 feet (10.7 meters). Inquire to factory if a hose length longer than 35 feet is required for your installation.
10. The length of installed tubing is recommended not to exceed 65% of the total cable length for best results.

Last Revised 2017-05-16