Now that you have received your FloWav Pipeline PSA-AV sensor, inspect the package for all of the contents and their conditions.

The packaging should include the following:

- PSA-AV Sensor assembly, including sensor cable and desiccant housing
- Sensor Cable to Logger Extension cable
- Two #6-32x 1/2" Stainless Steel Screws for installation
- One bag of replacement desiccant

Depending on applications and installation situations, the installer may also require the following:

- Proper size ring, or proper size mounting plate for larger applications
- Cable Ties, varying in length from 4 to 7 inches
- Cable tie anchors
- Cable or chain for hanging the logger
- Wall or floor anchors, dependent on the type of material being anchored to (Large Pipe Installs)
- Drill and proper drill bits for material being drilled into
- Hand tools (#2 Phillips Screwdriver, Cable Tie Cutters, etc.)

Once the application is determined, call FloWav to schedule a time to setup installation of the sensor: (855)2-FloWaV if you are unsure about settings or the setup template. We will be glad to help!
THE FLOWAV SENSOR

The Pipeline Model PSA-AV is a fully integrated, area-velocity sensor specifically designed to have a low overall profile and shed debris. The sensor’s housing is a rugged engineered plastic with an integrated piezoresistive ceramic sensor with Progressive Spectral Analyzing (PSA Patent Pending) velocity-measurement technology. Consequently, the Model PSA-AV is very durable and can easily withstand hostile and corrosive sewer environments and an unpredictable stream bed or a dynamic storm water channel. The ceramic pressure diaphragm ensures high sensitivity across the entire range of measurements with reduced concern for sensor drift. This sensor has the industry’s smallest cable diameter measuring 0.250-inch. Therefore, the cable has the lowest impact on site hydraulics which is of greater concern in small diameter applications.

Top View:

Side View:

Installation
Offset mounting

Silt in the flow is also important to take into consideration when planning an assembly and installation. If silt is present in the installation area, the sensor will need to be offset (rotated either clockwise or counterclockwise) in the installation. Take care to elevate the sensor high enough to avoid the silt line, but also make sure the sensor is not installed to a height that is above minimum flow levels that may happen as the flow level changes. The PSA-AV will record level and velocity no matter how far offset the application requires.

8” – 36” Diameter Applications

In round pipes ranging from 8” to 36” in diameter, a stainless steel ‘Spring Ring is used for installation. These rings are pre-drilled for locating and receiving the two provided #6-32x 1/2" sensor mounting screws, and also have various holes drilled for securing the sensor cable to the ring with cable ties as needed. Both screws are necessary to keep sensor in place.

To install the ring, simply compress the ring by grabbing the two upper edges of the ring in one hand, and slide the ring into the desired position in the pipe, and let go of the edges. The ring will expand to the pipe wall, holding itself into place. Visually examine the flow for disturbances caused by the sensor or cable, and try to locate the sensor and ring so that any disturbances are minimized.
36” and Above Diameter Applications

For larger pipe installations, flat Installation Plates, ranging in length from two to ten foot in length, are available. These plates are pre-drilled to accept floor or wall anchors (Typically hammered-in expanding anchors) as well as the sensor mounting screws. Each masonry anchor should have a bolt on the top side to allow for future sensor removal without the need for additional holes to be drilled onto the pipe. As with smaller diameter applications, predetermining the location and direction of the sensor is important to assembly. Once the installation method is determined, fasten the sensor to the Installation Plate as required, and securely fasten the sensor cable to the Installation Plate with cable ties as required or as best as possible. These installations are often very unique from application to application, so use and location of the Installation Plate will likely vary.

To install the Installation Plate, hold the plate in place in the desired final location, and mark several anchor holes, either by drilling a pilot hole or other marking device, and then set the plate aside. Drill and insert the floor or wall anchors as needed, and then put the Installation Plate onto the anchors in place. Securely fasten the plate to the anchors with the hardware belonging to the anchors (typically a nut and washer).

The sensor should be installed as far into the upstream pipe as physically possible to ensure uniform hydraulic conditions. Typically the sensor is installed 24” into the incoming pipe. The primary objective is to minimize the impacts of the manhole/pipe connection and manhole channel transitions that
routinely disrupt the flow hydraulics in a manhole. The sensor must be reversed and pointed upstream to function properly if installed in the downstream pipe.

**Logger Installation and Desiccant Canister**

The FloWav FW-33 Logger canister is the power source, data logging instrument, as well as the telemetry unit for the FloWav PSA-AV Sensor. The logger canister will need to be programmed to tell the sensor such things as the pipe diameter and shape, any offsets of the sensor, silt levels, data collection intervals, and where the logger is to communicate with, if telemetry is being used.

The FW-33 Logger Canister should be securely hung at the top of the manhole or chamber, from the base of the canister by both handles with a cable or chain. Being sure to leave enough slack in the sensor cable to allow for the canister to be removed periodically, coil any extra sensor cable neatly and secure to the top of the canister on one side with a cable tie. If an antenna is being installed, again be sure to leave enough slack for canister removal and free movement in the chamber, and secure any extra to the other top side of the canister.

The Desiccant Canister located on the sensor cable should be fastened separately but securely next to the spare sensor cable with cable ties as needed. Be sure to locate the canister so that the grey cap is pointing down when the meter is hung in the chamber, to avoid any condensation or excess water resting inside the cap, leading to more frequent desiccant changes. The zip ties need to be secure, but should not be tight enough to obstruct the air flow in the vent tube. Desiccant needs to be properly maintained and blue during installation.
Once the sensor and logger are both installed as required, connect the sensor to the logger using the sensor extension cable. Connect the proper end to each the logger and the sensor, making sure the connector is secure to the logger with dialectic grease. The logger end of the extension cable will have 4 pins, while the sensor end will have 7 pins.

Be sure that all caps on unused ports or ports without cables attached have their respective covers fastened securely upon completion of the installation, or after any maintenance procedures.

**FW-33 Logger Serial Communications**

Serial communication is required for all new FloWav PSA-AV or FW-33 installations. Even if the logger is intended to be programmed remotely, a serial communication session is required to check the Internet Protocol (IP) address that the internal modem is programmed to call to. Also, all other operations, such as sensor programming or meter verifications, can be performed by serial communication.

To properly communicate with a FW-33 Logger canister, the user needs to have a Windows-Based computer with Telogers for Windows (TFW), minimum version 5.01, Build #5, or newer. (LINK FOR DOWNLOAD?) The minimum firmware version required for proper programming is 3.303. Any older versions will create communication and/or programming issues, and the user’s computer will need to be upgraded prior to any communication sessions to avoid possible long-term issues.

1. **Connect** the Cu-CTS serial communication cable to the Ru-33
2. **Connect** other end to an RS-232 port on a PC running Telogers for Windows.

   The Status LED on the cable next to the Tamper Button should be flashing once per second.

**Configure Comport**

1. On the PC start Telogers for Windows

2. Click Setup | Options | Communications

3. Check Enable Local Comm
4. In Local port select the Com port used by the PC to communicate with Ru-33.
Communicate and Collect Data

1. **Go** to the Communicate menu

2. **Select** “with Local Recorder”

3. **Select** Collect Data | Start. The LED on the Cu-CTS cable will turn solid while the Telogers for Windows software is communicating with the Ru-33

Once the communication session is complete the Ru-33 is added to the Telogers for Windows database. The Ru-33 configuration may be modified by going to the SETUP | RECORDERS menu. From the list select the recorder’s ID; select Modify. All parameters in the Ru-33 are modified from this screen. Go to the Help menu and select CONTENTS | HOW TO.. | RU-33 section for details on how to configure the Ru-33.

**Communicate Remotely**

Once the programming is completed force a call into the server.

1. **Press** the tamper button on the Cu-CTS cable and hold for two seconds. The LED will turn on solid within two seconds. The Ru-33 will call the IP address stored as the “Primary phone # to use when placing a call”.

2. **Verify** the call was completed successfully at the server end.

Once the communication session has ended, on the main TFW screen, a padlock icon should be visible as the second icon in from the right. To enable programming of the logger, ensure that the lock icon appears in the ‘unlocked’ position.
Assign Template

1. **Click** on Setup.

![Setup Tab](image1)

2. **Select** Recorders…

![Select Recorders](image2)

3. **Scroll** down the list and **select** the recorder you want to modify.

![Recorder List](image3)

4. **Click** Modify…

![Modify Recorder](image4)

5. In Recorder tab **Click** Templates…

   *Note: Review the summary of the steps for configuring FW-33. To remove the summary click “X”.*

![Templates Tab](image5)

6. **Scroll** down in Available Templates window to the template you want to assign to a recorder then **select** this template.

![Available Templates](image6)
7. Click Restore.

8. Click Yes.

9. To complete modifications click OK, if there are changes you want to implement in other areas of recorder you can select appropriate tab.

   Note: Recorder Type will change to flowmeter specific information.

   If you want to accept the default settings of the template click OK. To continue configuration of the recorder review and change the settings in other tabs.

**Configure Channels**

1. To adjust input channels select Channels tab.

   Note: The recorder configuration is set to factory defaults. Review the settings and adjust them to meet your requirements. If Telogers software is open use F1 function key to access the page in the Help file that corresponds with the active window.
2. In the Configuration tab **click** the boxes under turn On/Off label to permit or disallow storing sensor’s data.

   *Note: If required to view additional portions of the screen, use the **scroll** bar on the right to view all configuration settings, or select standard operating system expand icon to get a full window view.*
3. In the Recording tab, set Sample Rate and Recording Interval.

*Note: Short Recording Interval cuts down the battery life.*

4. In the Alarm tab, set the alarm’s thresholds and dwelling time for each type of alarm. To view all four alarm types, use the scroll bar on the bottom of the tab.

To complete Channel tab modifications, click OK if there are changes you want to implement in other areas of the recorder. You can select the appropriate tab.

**FloWay Sensors:** This tab is where the sensor parameters are set. There are two separate sections, one for each sensor being used.
For *round* pipes, be sure that ‘Circular’ is selected in the ‘Pipe Type’ category, and simply enter the pipe diameter in inches, and any offsets or silt measurements, and when the logger is programmed, the sensor will be programmed with a corresponding ‘pipe table’ for accurate velocity calculations.

For *odd shaped* pipes, select ‘Custom,’ and a button for ‘Pipe Table’ appears below the menu. Select the button and a new window will appear. Here, a rectangular shape pipe can be selected under the ‘Shapes’ button, or a custom pipe table can be assembled by entering measurements taken in the pipe, and a pipe table built based on that.

Be sure to check the “Reset DV Table” checkbox. If you do not see the checkbox on this screen, an updated version of Telogers is needed. Call (585)742-3000 to get your upgraded version.

**ULS Sensors:** This tab is for use with the FloWav Ultrasonic downward looking sensors. More specific instructions for this tab accompany the respective sensors.

**Alarm Sampling:** The standard PSA-AV Sensor setup does not require any changes to settings under this tab.

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**Configure Communications**

1. **Select** Communications tab.

2. In Configuration tab **ensure** the correct device type is selected. To change the device type, **check** the box Allow Device Type Changed and follow the prompt.

   *Note: The type of the device in Device: window will dictate whether an IP address or phone number has to be added in Numbers tab.*
3. For battery operated systems **remove** check box from the Phone Answering check box.

**Note:** Removing the check from the “Recorder should answer”, prevents the device from draining the battery.

4. **Select** Numbers tab. Make no changes to “IP or Phone...” area nor to the “Call schedule...” settings.

**Note:** Most recorders shipped from the factory have a default configuration that will connect them to the Telog host. Review the settings and adjust them to meet your requirements. If Telogers software is open use F1 function key to access the page in the Help file that corresponds with the active window.

5. **Click** inside of area titled IP address of primary workstation and **enter** the IP address/TCP port of the server Ru-33 will communicate with. If necessary configure the secondary IP entry.

**Note:** Choice of the device in Configuration | Device: window will dictate whether an IP address or phone number has to be added.
7. **Click** “Use when…” and **select** the triggers to initiate a call each number.

**Click OK** to accept the changes.

*Note: At a minimum Telog recommends using triggers selected in the graphic. To select settings best fitting your application review Telogers Help File | When To Call.*

8. Unless advised by Telog technician make no changes to the Protocol tab.

9. Modbus tab settings should not be adjusted unless specified in your detailed factory instructions.

To complete the Communication tab modifications **click OK**, if there are changes you want to implement in other areas of recorder you can select the appropriate tab.

**Security**

While it is possible to password protect the logger if needed, the standard PSA-AV Sensor setup does not require any changes to settings under this tab.
MAINTENANCE

The Pipeline PSA-AV Sensor requires little overall maintenance to ensure operation. However, periodic service such as Depth and Velocity Verifications, Sensor and logger cleaning, battery changes and desiccant changes are all important to ensure proper sensor and logger operations.

Logger Maintenance:

The logger requires a singly 6-volt lantern-style battery, which goes into the bottom of the canister. All new FW-33’s come from the factory with a new battery in them, but over time, they will need to be changed. It is important to note that for routine maintenance, battery changes will not cause the logger to lose the given programming or any stored data due to the removal of the battery for short durations. However, after a battery change, it is recommended to either communicate locally or tamper the logger into a database to ensure that the battery change was effective, and that the logger is functioning properly as it was before the change. Battery life of the FW-33 is determined by many factors including:

- Sensor sample rate
- Sensor excitation current
- Sensor excitation duration
- Communications technology
- Cellular signal strength
- Instant message call schedule
- Maintenance call schedule

The battery voltage is reported to the host computer during every maintenance call and stored in the data base for user review. Second, the Ru-33 can make a low-battery alarm call to the user if this feature is enabled in the Ru-33 call condition configuration.

To change the battery, use a long, narrow object (such as a long shaft screwdriver) to pass through both holes in the top of the canister, being sure not to put pressure on any connectors or communication ports. Similarly, use a long handled tool to pass through both handles on the battery compartment at the bottom of the canister. Firmly hold the top of the canister, and twist off the bottom, until the battery comes out of the compartment. New battery installation is the reverse process, and battery orientation is not critical, as the terminals allow any positioning to enable proper function.

Depth and Velocity Verification:

Periodic checks to ensure the recorded depth and velocity are accurate will ensure the sensor and logger are working correctly. To perform a verification, a communication session with the logger will have to be initiated.

To communicate serially, setup the logger and computer as described. After opening the Local Communications window (‘Communications’, ‘Local Recorder’), select the ‘Display Latest Readings’
button on the left, and then select ‘Start.’ This will communicate with the recorder, and initiate another pop up window, where the current readings taken by the sensor will automatically appear as they are taken. Comparison of these readings with level and velocity readings taken manually from the flow will show the user the accuracy of the PSA-AV and that the equipment is functioning correctly.

Sensor and Logger Cleaning:

While the PSA-AV Sensor is designed to minimize the buildup of debris, it is still possible that the sensor may require cleaning or removing of debris in the field. This is easily accomplished with a long handled scrub brush with stiff bristles. Brush away any silt or debris that may be covering or lying alongside the sensor, as this may affect both the level and velocity readings.

Cleaning of the logger is limited to ensuring that the communication, antenna, and sensor connections on top of the logger are kept clean and dry, to prevent corrosion or malfunction of the logger. Also ensure that the battery compartment remains clean and dry, and that the terminals are in good condition. The outside housing of the logger requires no cleaning.

Desiccant Changing:

Over time in a damp environments. The desiccant in the canister will absorb moisture to avoid damage to the pressure measurement sensor and gradually turn pink. The beads act as a filter to keep moisture out of the pressure sensor vent hose, as well as gauge the exposure of the vent to atmospheric water as well as surcharge conditions. Under frequent surcharge or high humidity atmospheres, it will become more important to change the desiccant, and those services will be required more frequently than normal. To ensure proper sensor performance, the desiccant should be replaced if more than ¾ of the desiccant turns pink. (picture below).

To install new “blue” desiccant, first check the hydrostatic filter for caked-on debris or damage. Then simply unscrew the filter on the end of the canister opposite the end with the brass fitting and its clear plastic tube. Pour out the spent desiccant from the canister, and examine to make sure there is no extra moisture build up inside the canister housing. If so, dry the canister with compressed air or warm air before refilling with new desiccant. Once dry, pour new desiccant from the spare desiccant bad supplied with the sensor. Before reinstalling the canister cap, examine the cap to ensure no large amounts of dirt and debris are covering the cap. The top cover of the canister cap can be removed to ease in the removal of any debris by prying in the openings along the edge of the
cap with a small screwdriver, and then snapped back on once any cleaning is done. Rethread the canister cap back onto the canister securely, but do not over tighten. Under no circumstances should you remove the clear plastic tube from the brass fitting at the other end of the canister.

**CONFINED SPACES**

Additional training in pre-entry testing, ventilation, entry procedures, evacuation/rescue procedures and safety work practices are necessary to ensure against the loss of life if the PSA-AV sensor is installed in a confined spaces.

On April 15, 1993, OSHA's final ruling on CFR 1910.146, Permit Required Confined Spaces, became law. This standard directly affects more than 250,000 industrial sites in the United States and was created to protect the health and safety of workers in confined spaces. A Confined Space is any location or enclosure that presents or has the immediate potential to present one or more of the following conditions:

- An atmosphere with less than 19.5% or greater than 23.5% oxygen and/or more than 10 ppm Hydrogen Sulfide (H2S).
- Toxic materials which upon contact or inhalation, could result in injury, impairment of health, or death

Confined spaces are not designed for human occupancy. They have restricted entry and contain known or potential hazards. Examples of confined spaces include manholes, stacks, pipes, vats, switch vaults, and other similar locations. Standard safety procedures must always be followed prior to entry into confined spaces and/or locations where hazardous gases, vapors, mists, dusts, or fibers
may be present. Before entering any confined space check with your employer for procedures related to confined space entry.

TROUBLESHOOTING

Logger Will Not Communicate:
- Low/No Battery
- Tamper Cable is not securely connected
- Communications Port not set up correctly

Logger Not Collecting Data:
- Improper Extension Cable Orientation
- Saturated/Wet Extension Cable Connection: Dry and clean connectors, consider electrical grease to keep water out

Logger Not Calling In:
- Wrong IP Address
- Antenna placement causing poor signal strength
- Antenna wire damaged: Repair/Replace antenna

Logger Calls in at Wrong Interval (Self-Tampering):
- Saturated/Wet Tamper Pins: Dry pins, Re-secure cap properly

Level Inaccurate:
- Desiccant clogged: Change out pink desiccant for blue, Scrub sensor of debris
- Desiccant Cap is clogged: Remove any visible particles from desiccant tube cap
- Desiccant Hoses has restricted air flow: Make sure zip-ties are not too tight
- Improper Level Offset
- Debris buildup on sensor: Clean sensor of Debris

Velocity Inaccurate:
- Silt/Debris back-up: Offset sensor above silt/debris back-up and change offset in the configuration
- Poor hydraulics: Consider Relocation
- Make sure after instillation that the Reset DV Table checkbox was checked

Logger Functioning, Sensor is not Logging:
- Make sure the correct channels are checked in the Configuration
- Make sure sensor is properly connected to logger
• Saturated/Wet Extension Cable Connector: Dry and clean connectors, consider electrical grease to keep water out

* Tampering to a server generally takes a minute and a half to go through the process of a call. If the LED light returns to flickering a considerable amount sooner than that, it is possible that the call was not completed. If a significant amount of data is being pushed to the server (initial call-in, logger has been collecting data, but hasn’t called in, etc…), it will take longer than a minute and a half, depending on the amount of data.