



# Cypress™ Ultrasonic Flowmeter

A flowmeter for long-term  
flow monitoring

## Instruction Guide

CLASS I, DIVISION 2, GROUPS A-D T4, -40°C TO +100° C  
TYPE 4/6P



E115800

# Contents

## General Information

Page

General Information . . . . .	3
Technology . . . . .	4
Meter Features . . . . .	4
Dimensions . . . . .	5

## Orcas App

App Features . . . . .	6
App Installation and Setup . . . . .	6
Getting Started . . . . .	6
Location Setup . . . . .	6
Parameter Setup . . . . .	7

## Flowmeter Installation

Straight Pipe Recommendations . . . . .	8
Full Pipe Recommendations . . . . .	9
Flowmeter Orientation . . . . .	9
Transducer Spacing . . . . .	10
Connecting Power and Outputs . . . . .	10
Wiring . . . . .	11
Installing the Flowmeter . . . . .	12
Do's and Don'ts . . . . .	12

## Operation

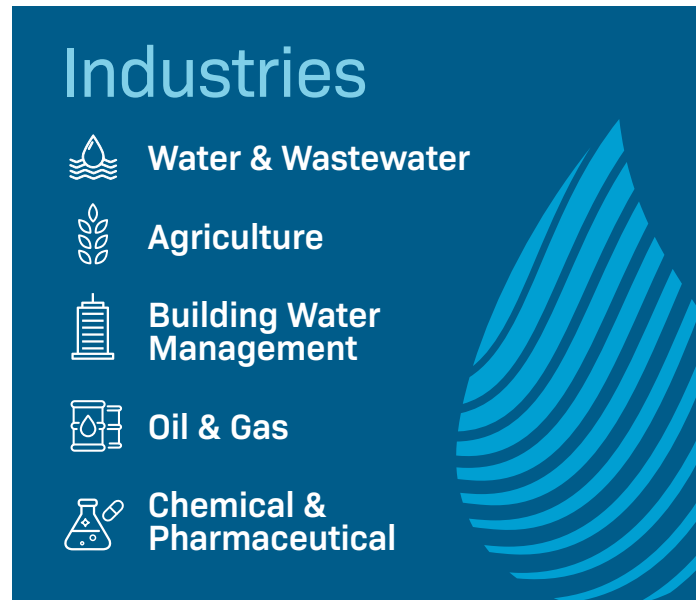
Collecting Your Data . . . . .	13
Data Logging . . . . .	13
Making a Recording . . . . .	14
Uploading Data . . . . .	14
Saving Data . . . . .	14
Explanation of Recording Time . . . . .	15

## Troubleshooting

Problems . . . . .	15
Probable Causes . . . . .	15
Things to Try . . . . .	15

**Cypress** is a compact ultrasonic flowmeter with external power and industrial communications designed for long-term flow monitoring and certified for use in C1D2 hazardous areas. It installs on the outside of your pipe—and senses flow through the pipe wall. The Cypress Flowmeter connects with your mobile device or to the SoundWater Flow Computer for displaying measurements.

Your mobile device helps you set up the hardware and displays readings. Quick, simple installation—5 minutes from start to finish.



## Fast to install, easy to use.

### SoundWater Advantages

#### MEASUREMENTS YOU CAN TRUST

Our proprietary SoundWater Reciprocity Architecture™ prevents zero-flow drift and eliminates the need for calibration, resulting in long-term measurement stability and accuracy.

#### INCREASES PRODUCTIVITY

Featuring compact lightweight construction and intuitive apps, our products reduce installation, training, and setup—saving you time and money.

#### MADE IN USA

Locally owned and operated out of Wenatchee, Washington, our products are built with American quality and ingenuity.

#### WORKS IN TOUGH APPLICATIONS

Our transducers auto-adjust ultrasonic power output depending upon pipe and fluid conditions—giving you more frequent measurements when things get tough (e.g., corroded pipe or murky fluid).

#### LONG LIFE / LOW MAINTENANCE

SoundWater products are built to last using the highest quality materials, gasketed & double O-ring seals, and silicone gel to protect electronics.

#### SERVICE & ACCOUNTABILITY

We establish long-term customer relationships based on trust and service. We will respond to your needs and requests within 24 hours.

**Regulatory Certification** Class I, Division 2, Groups A-D T4, -40°C to +60°C

Complies with UL61010-1, UL121201, CSA C22.2 No 61010-1, CSA C 22.2 No. 213



**WARNING: EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE CONNECTOR WHILE CIRCUIT IS LIVE UNLESS THE AREA IS FREE OF IGNITIBLE CONCENTRATIONS**

**AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS RETIRER NI REMPLACER LE CONNECTEUR PENDANT QUE LE CIRCUIT EST SOUS TENSION, À MOINS LA ZONE EST EXEMPT DE CONCENTRATIONS INFLAMMABLES**

This device complies with Part 15 of FCC Rules and Industry Canada license- exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Contains FCC ID: XDULE40-S2, Contains IC: 8456A-LE4S2. CAN ICES-1/NMB-1; CAN ICES-3 (B)/NMB-3(B) MODEL: SWT ORCAS-01

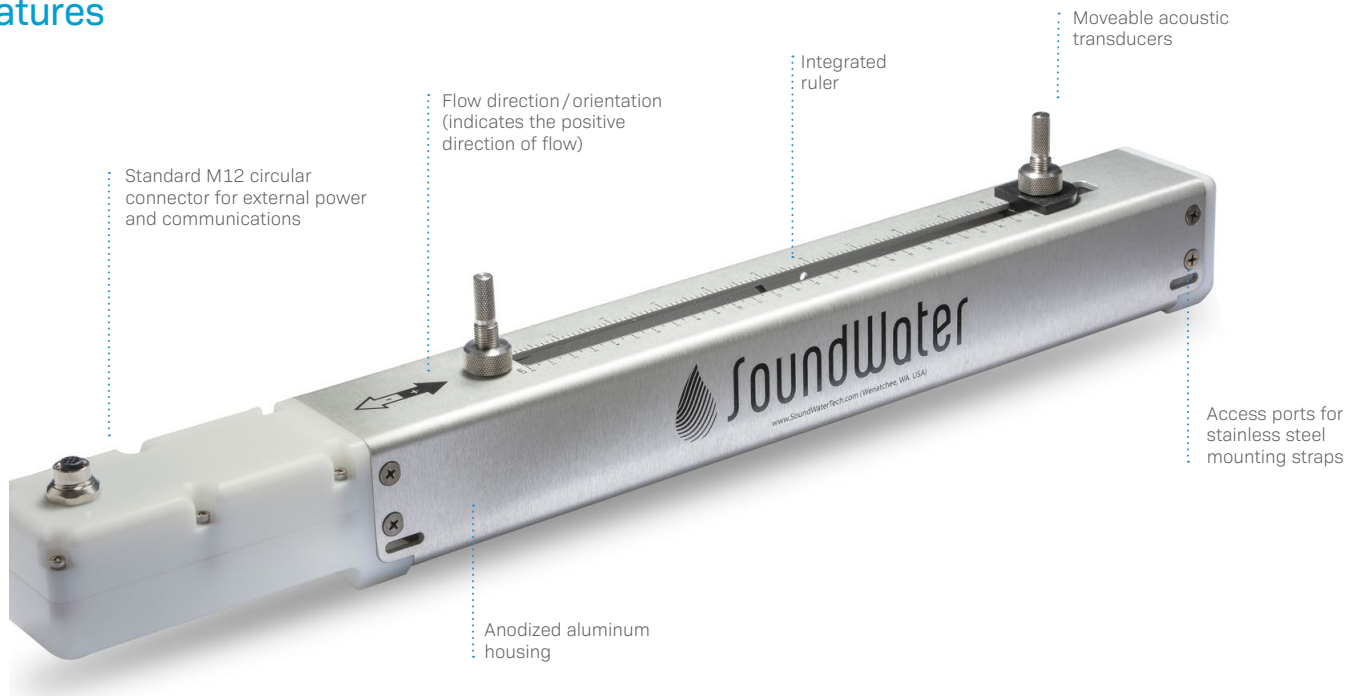
## Technology

The transit time flowmeter operates by alternately transmitting and receiving a burst of sound energy between the two transducers. The burst is first transmitted in the direction of fluid flow and then against fluid flow.

Since sound energy in a moving liquid is carried faster when it travels in the direction of fluid flow (downstream) than it does when it travels against fluid flow (upstream), a difference in the travel times will occur. The sound's travel time is accurately measured in both directions and then used to compute the flow rate.

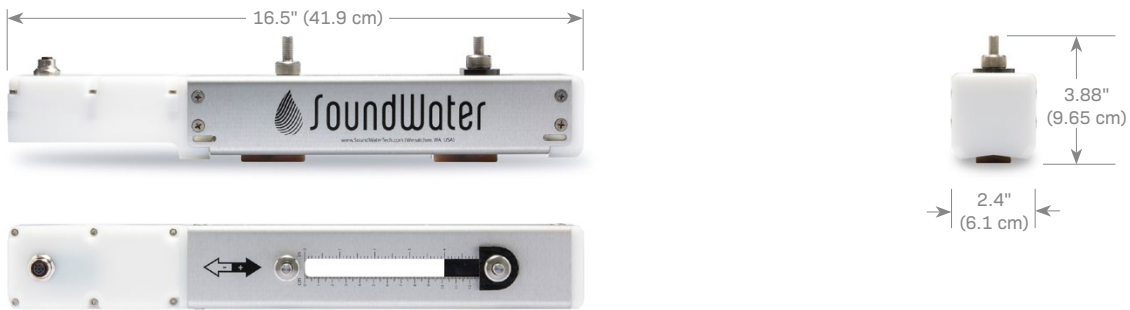


## Features



## Dimensions

### Cypress Txx-C5



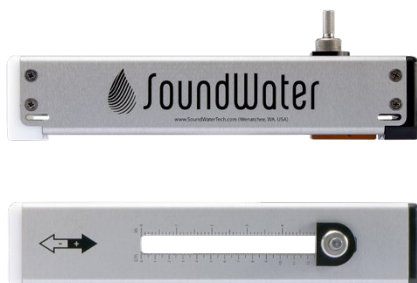
### Cypress Txx-C11



### Cypress Txx-CM5






### Cypress Txx-CM11







## App Features

Interactive smartphone/tablet control app — iOS or Android.

-  Save location information
-  Handy built-in pipe specifications — or add your own
-  Drag and drop the measurements you want to see



-  English or metric units
-  English or Spanish language
-  Easy-to-use data logging
-  Select liner and liquid types — or define your own

## App Installation & Setup

### Getting Started

Begin by downloading the Orcas App to your iPhone™, Android phone, or other Bluetooth enabled mobile device from the Apple Store™ or Google Play™. (Note: On an iPad, you must select iPhone Only in the app store.) If you do not have automatic updates enabled on your device, be sure to update your app when notified that there is a new version available.



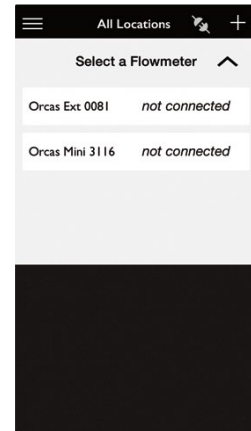
Orcas App

Standard Version

Works for all Orcas Products

#### NOTES:

- Be sure your Bluetooth is enabled, location services allowed, and that your device supports Bluetooth 4.0 (BT LE) or later.
- The following iOS devices support Bluetooth 4.0: iPhone 4S and later, iPad 3rd generation and later, iPad mini, iPad Air, and iPod Touch 5th generation.
- If you have an Android device, check the settings on the device or specifications for the device.



### Connect Your Flowmeter

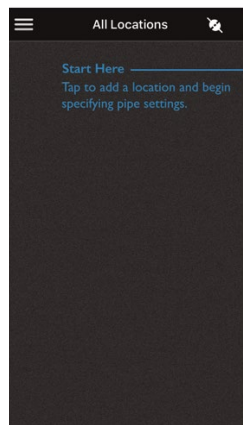
At launch the app will find any nearby Orcas flowmeters. Select the flowmeter you want to connect to from the list.

### Location Setup

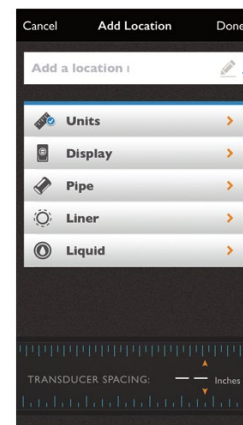
Launching the app lands you on the **All Locations** screen. The app always begins with this screen at launch, making it easy to access previously saved location settings.


Begin by tapping on the **Add Location (+)** button.

Give your location a name and then set the specific parameters for that location. Each location's settings are stored in the Orcas App, ready for reuse.



 Add location



 Name your location

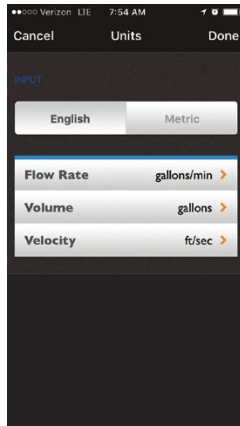
Use the handy parameter selection screens to set your units of measure and display preferences.

Conveniently select pipe, liner, and liquid specifications from lists of pre-loaded values.

Don't see the right option?  
Add your own custom values.

**NOTE:**

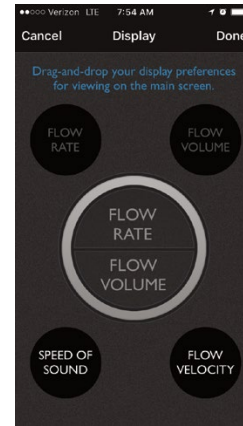
Required menus must be completed.



**Units**

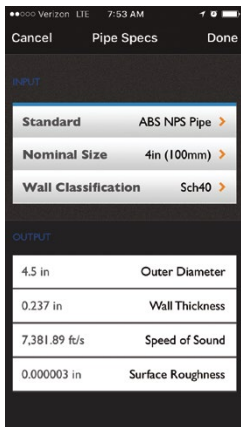
Toggle between **English** and **metric** units of measure.

Select **Flow Rate**, **Volume**, and **Velocity** from our pre-loaded values.



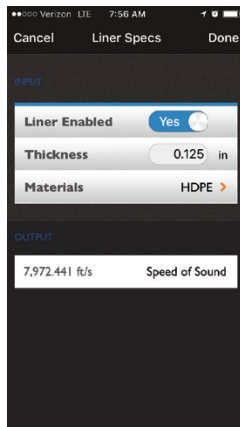
**Display**

The main screen displays two measurement types. Drag and drop the two measurements that you want to see on the screen.



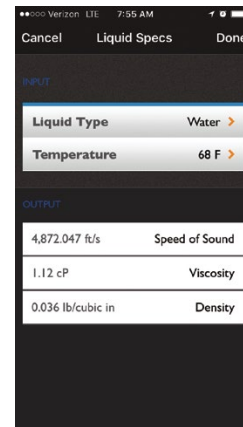
**Pipe**

Select **Pipe Type**, **Size**, and **Wall Classifications** from our pre-loaded values or add custom values by selecting Custom under Pipe Type. When entering a custom type, you must supply the outer diameter, wall thickness, speed of sound through the pipe material, and the surface roughness—enter zero if roughness is unknown.



**Liner**

Switch between liner and no liner. When selecting **Liner Enabled**, enter **Liner Thickness** and choose **Liner Material** from our pre-loaded list or add custom values. When adding a custom material, you must enter the speed of sound through that material.



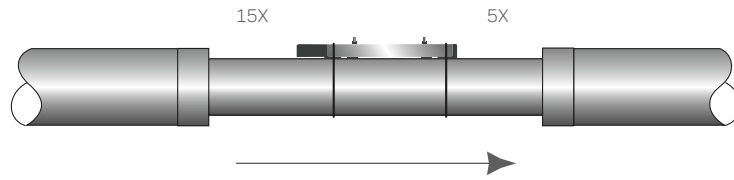
**Liquid**

Select **Liquid Type** and **Temperature** from our pre-loaded list of values or add a custom liquid type. When adding a custom liquid, you will need to enter the speed of sound through that liquid, the viscosity, and the density.

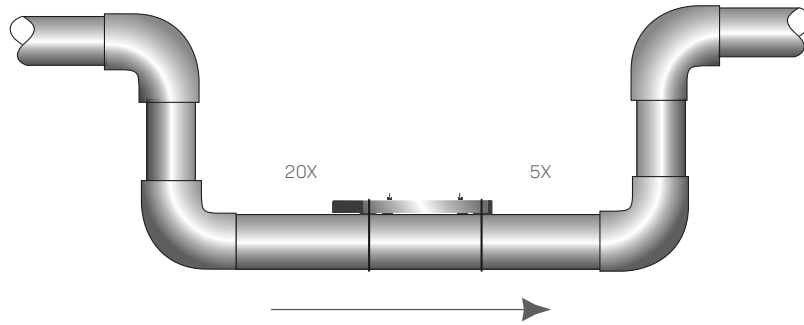
# Flowmeter Installation

## Straight Pipe Recommendations (X = diameter)

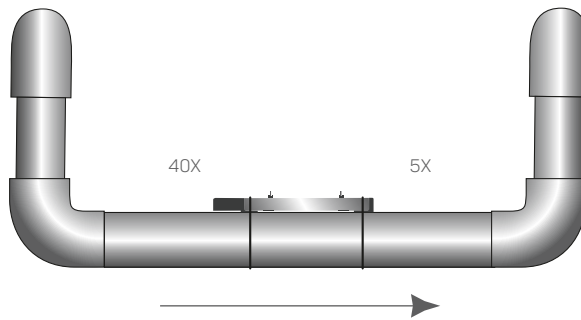
Reduced Pipe



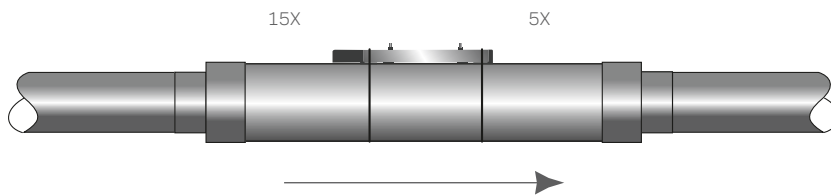
Two Elbows In Plane



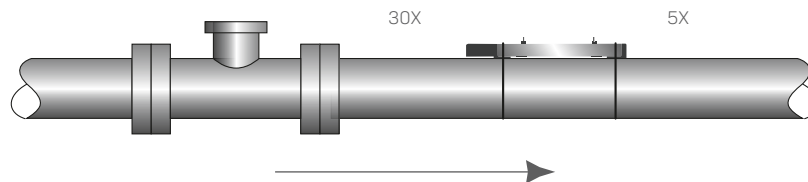
Two Elbows, Out Of Plane



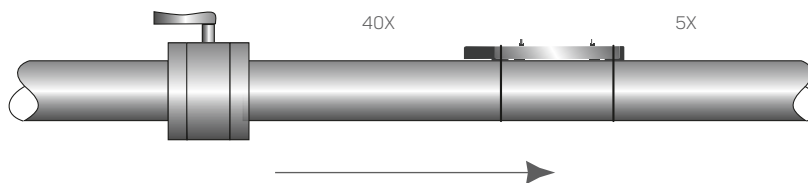
Expanded Pipe



Swirling Flow:  
Propeller Meter

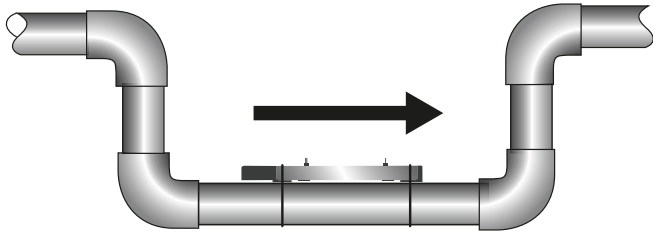


Swirling Flow:  
Partially Open  
Butterfly Valve



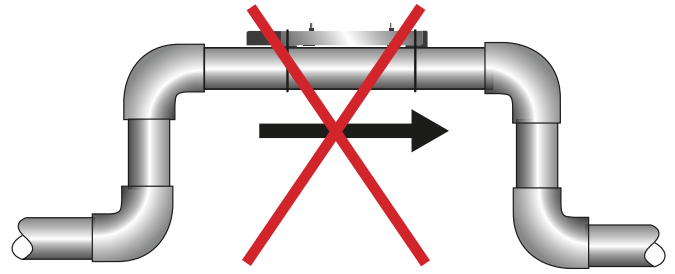


## Full Pipe Recommendations



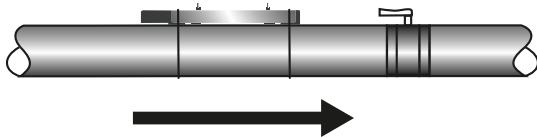
### RECOMMENDED:

Keeps pipe full at meter for accuracy



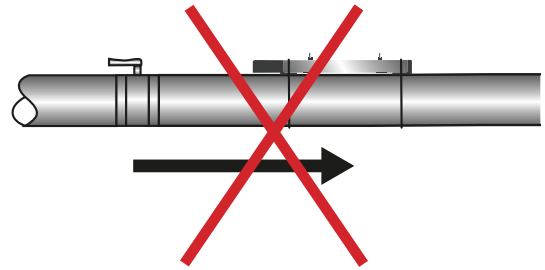
### NOT IDEAL:

Allows air pockets to form at meter



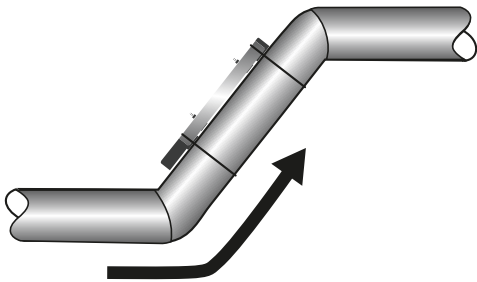
### RECOMMENDED:

Keeps pipe full at meter for accuracy



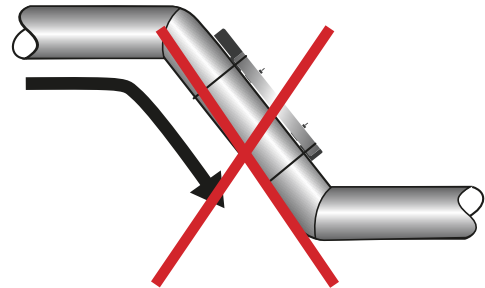
### NOT IDEAL:

Post-valve cavitation can create air pocket



### RECOMMENDED:

Allows air to bleed off



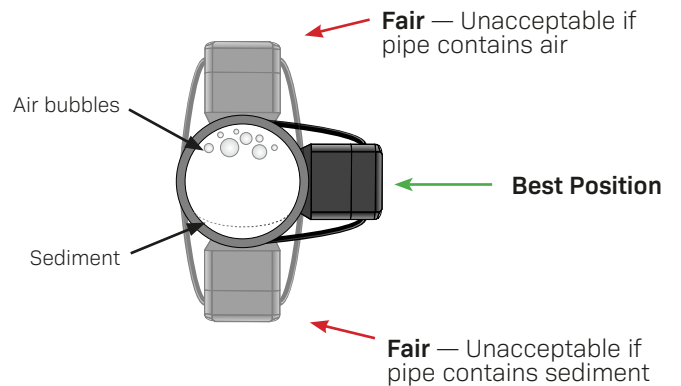
### NOT IDEAL:

Air can be trapped

## Flowmeter Orientation

This is a view looking directly into a horizontal pipe, with the meter in multiple possible positions on the side of the pipe.

Horizontal (3 o'clock or 9 o'clock position) is the preferred installation orientation, since it avoids problems with trapped air and sediment.

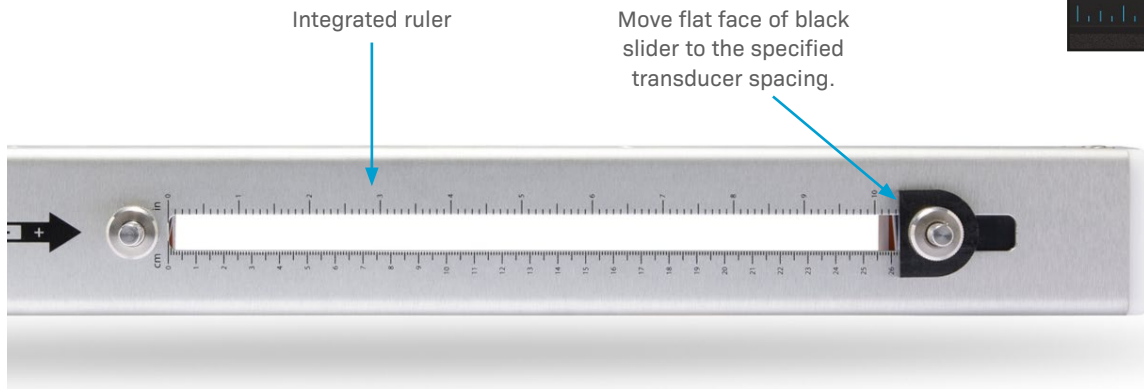
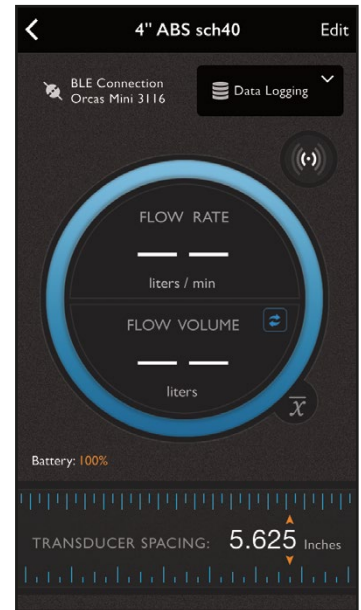


## Transducer Spacing

Once you entered your parameters in the previous section, the app automatically computed the proper transducer spacing. This is shown at the bottom of the main app screen.

The next step is to adjust the transducer spacing on the flowmeter as follows:

1. Rotate the short wide silver knob to unlock the horizontal motion for each transducer.
2. Move the transducers to the specified transducer spacing by sliding them along the integrated ruler. **Note:** It is not necessary to start at zero on the ruler, so long as the actual spacing is correct.
3. Lock into place using the short wide silver knobs. This is important to prevent the transducer spacing from moving when mounting the flowmeter!



## Connecting Power and Outputs

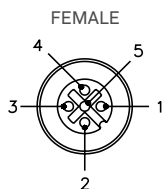
**REQUIRED: UL/CSA 62368-1 Listed Class 2 supply.**

Connect 12-24V DC power using the supplied cable. Check the pinout tables at right for proper setup.

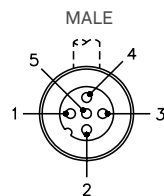
**REQUIRED:**

**The cover must be installed on the equipment before use.**

### Flowmeter Pinout



### Supplied Cable Pinout



SoundWater recommends that you use the supplied connecting cable to wire your flowmeter. If you need a different length, use a compatible part to *Turk USA*, # *RSS 4.5T* (5 pin M12 Male Cordset).

### Supplied Cable Wire Colors and Pin Codes

(for optional 4-20mA & Pulse)

- 1 Not Used
- 2 Pulse (NPN type open drain)
- 3 Power 12-24VDC (1.2W max)
- 4 Power ground 0V
- 5 4-20mA Active Output

(for optional MODBUS RTU / RS-485)

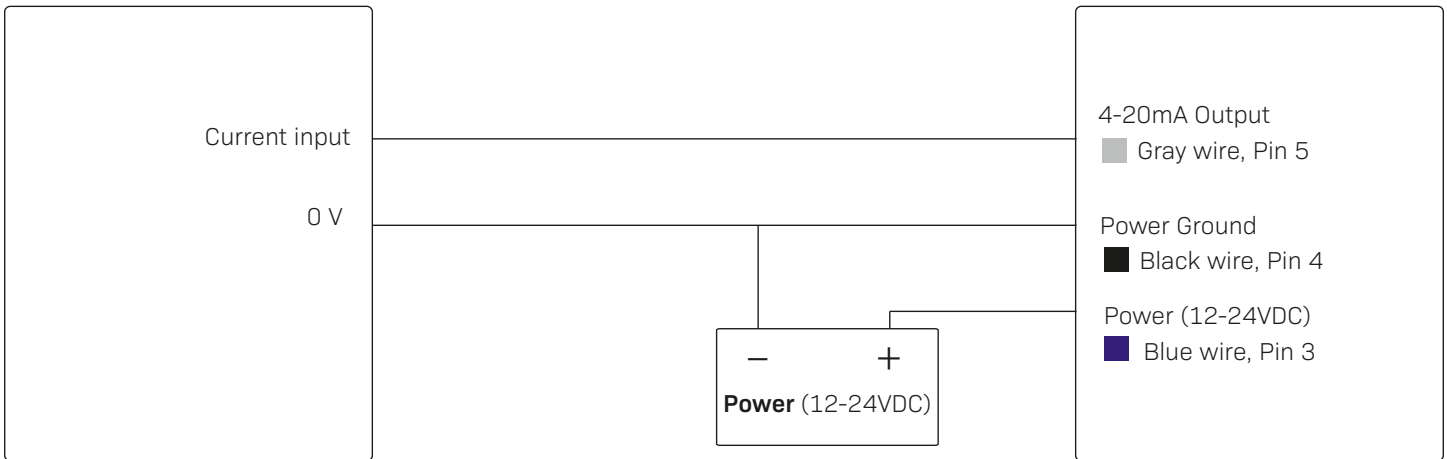
- 1 Not Used
- 2 RS485 Data (+)
- 3 Power 12-24VDC (1.2W max)
- 4 Power ground 0V
- 5 RS485 Data (-)

# Wiring

## 4-20mA Analog Output

### User Current Input Device

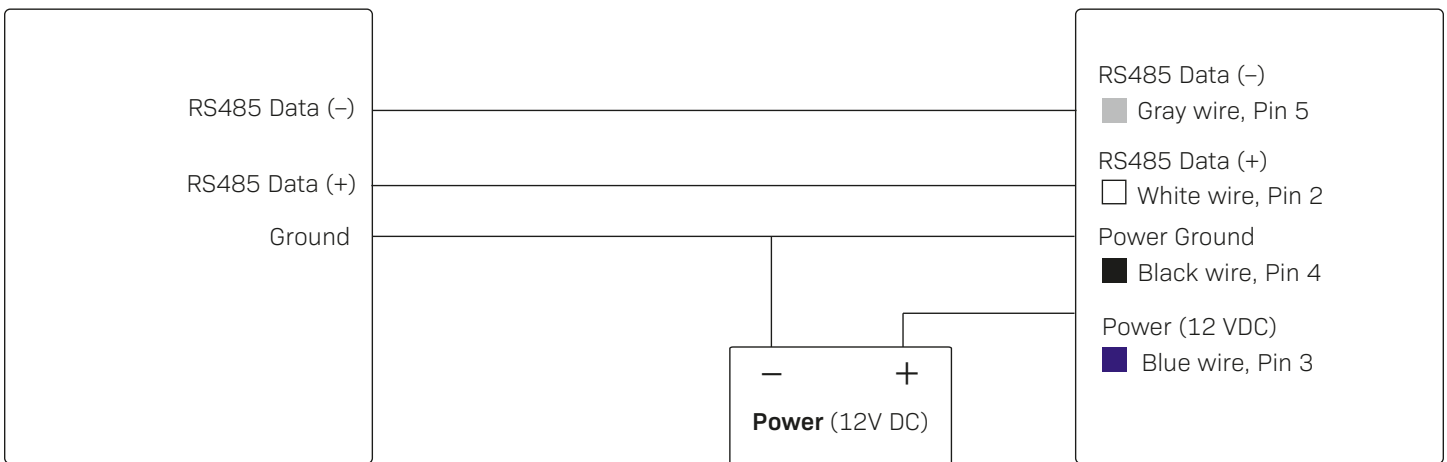
### SoundWater Flowmeter



## MODBUS RTU/RS-485 Output

### User MODBUS Master Device

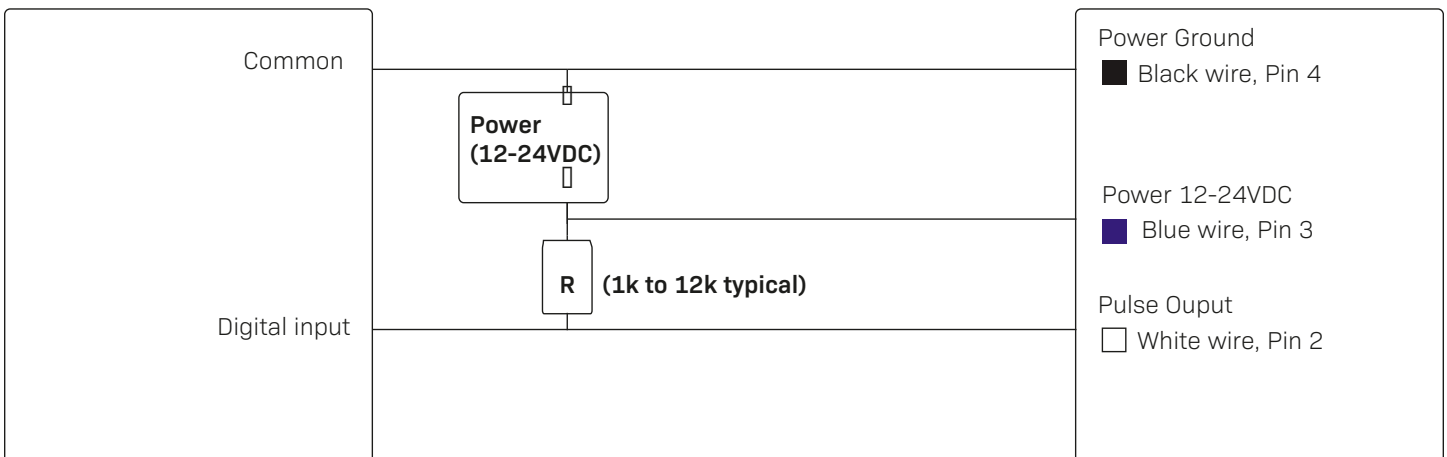
### SoundWater Flowmeter



## Pulse Output

### User Digital Counter

### SoundWater Flowmeter



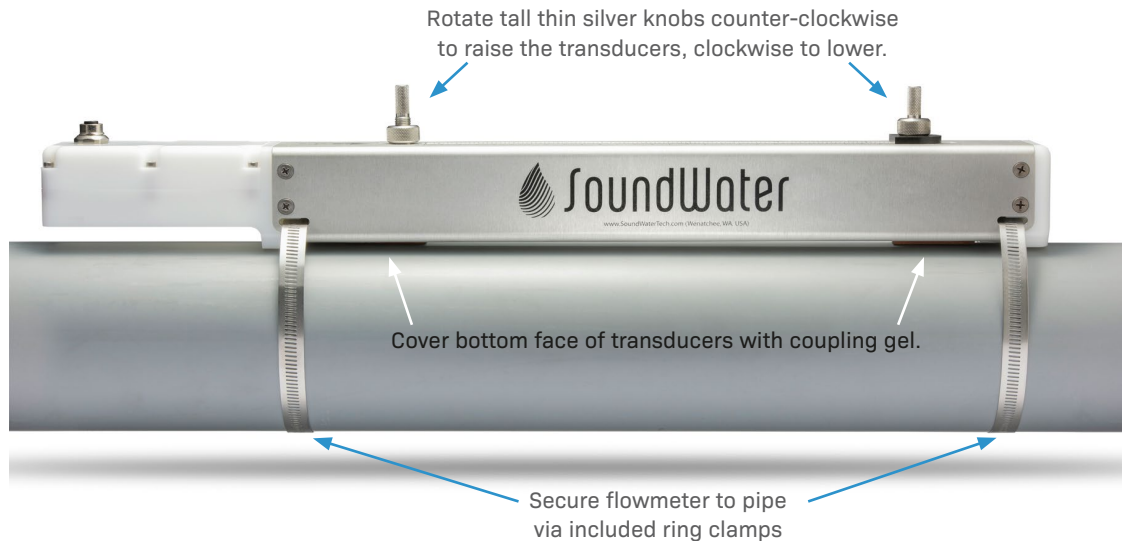
## Installing the Flowmeter

Once the transducer spacing has been set and locked in place, you are ready to install the flowmeter on your pipe.

1. Thread the stainless steel mounting straps through the access ports located on either side of the flowmeter.
2. Rotate the tall thin silver knobs counter clockwise until they stop. This raises the transducers up above the meter footings.
3. Apply coupling gel liberally to the transducer faces, covering the entire bottom face of each transducer.

4. Place flowmeter on pipe, assuring that the footings are flush with the pipe and the meter is aligned with the axis of the pipe.
  5. Strap the meter to pipe with the mounting straps, securing the straps with a socket or flat head driver.
  6. Rotate thin silver knobs clockwise to press transducers onto the pipe. Hand tighten only until seated firmly.
- WARNING: Tightening too much can lift the meter away from the pipe, causing incorrect readings.**

### Standard Single Part Design



### Two-Part Design for High Corrosion, Large Pipe or Tight Spaces Designs



## Do's and Don'ts

- Do** store your Cypress in a dry, indoor area when not in use.
- Do** keep your Cypress in its protective case when transporting to prevent damage.
- Do** gently clean the transducer pads regularly with isopropyl alcohol to prevent hardening and build up of used coupling gel.


- Don't** store, transport, or use your Cypress where the device may exceed 150°F (65°C).
- Don't** bang or drop the Cypress on hard objects or surfaces.
- Don't** nick the transducer pads.

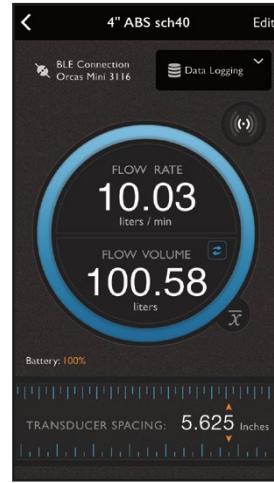
# Operation

## Collecting Your Data

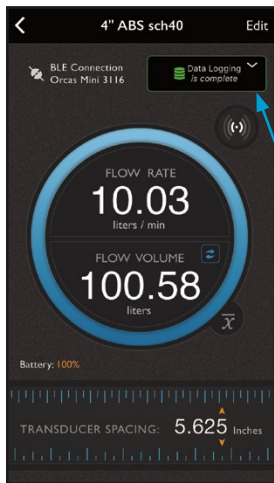
1. Be sure the app is running on your mobile device and the flowmeter is plugged into a power source. .
2. The app will display a list of all Cypress flowmeters within its range. Tap the one you are currently using.

**Note:** Your app will check the flowmeter to be sure it has the most recent programming. If there is a newer version available, it will give you the option of updating the meter. Updating the meter may take three to five minutes.

3. Your flow data will display on the Orcas App. 
4. When you are done collecting data, snap the cords out of their cam cleats and you are ready to move on to your next location. The next time you return to this location, the Orcas App will remember your settings.



## Data Logging



The purpose of Cypress's built-in data logger is to record flow for a specified period of time. It may be used to conveniently record flow for as long as 365 days, 10,000 measurements, or 50,000 datapoints or as little as one minute.

Cypress has limited memory. Thus, only one data log may be used at any one time. As the Cypress data logger uses Bluetooth (BLE) to transfer data from the flowmeter to the mobile device, data transfer speed is limited by BLE, which is not designed to transfer large data sets. Transferring the maximum sized data set will take up to 5 1/2 minutes.

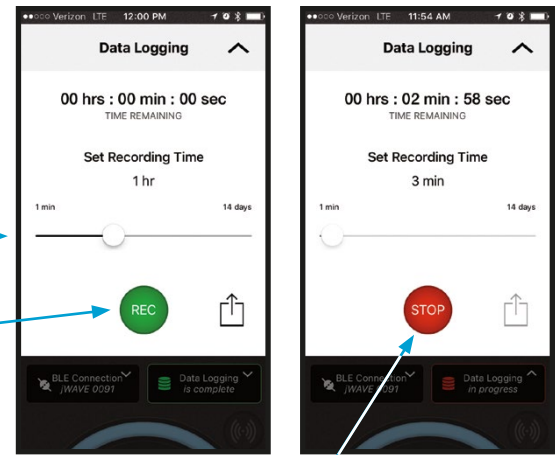
All data logging functions are accessed by tapping the **Data Logging** button in the measurement view.



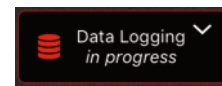
**Cypress's data logger stores only one data set at any time. Selecting "REC" (which creates a new data log) will overwrite the existing data log. A message appears when selecting the "REC" button indicating that the existing data log will be overwritten if a new data log is started and gives the user the ability to continue with the new data log or to cancel.**

## Making a Recording

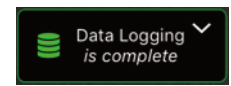
- Connect to the meter with the Orcas App.
- Tap the **Data Logging** button to access the data logger features.
- Using the slider bar in the app's data logger setup view, set the recording time. (See Explanation of Recording Times on the next page.)
- Tap **“REC”** to start the recording. Data will start recording on the meter. You can disconnect the mobile app during recording. The meter will turn off when done to save power, unless still connected to the app.
- To stop recording prior to completing the time period, connect the Orcas App to the meter, tap the Data Logging button, and tap **“STOP.”**



The status of the data logger is indicated by the color and text of the data logger setup button, located in the measurement view. If data logger is active, the button is outlined in red, shows a red disk drive, and displays the text “in progress.” If the data logger is completed, the button is outlined in green, shows a green disk drive, and displays the text “complete.” The data logger setup view also displays the remaining recording time for conveniently checking progress of data logging.



Active data logging session running.



Data logging session complete.



Upload data by tapping the “Share” button.

## Uploading Data

Data is stored on the flowmeter and may be retrieved at any time. To upload data, the data logger must be either complete or stopped and the app must be connected to the flowmeter. Data is uploaded using the “Share” button located to the right of the **“REC”** button. Uploading the maximum sized data set may take up to 5 1/2 minutes.

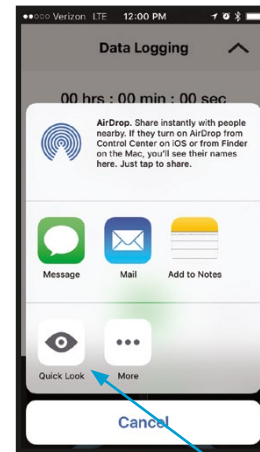
If you want to quickly review your data at any time, tap the “share” button, and then tap Quick Look (iOS devices). This displays the data log in a spreadsheet for immediate viewing on your mobile device.

## Sharing Data

You only need to upload the data log once from Cypress. Once the data is uploaded, it may be shared any number of times without additional uploading until a new data log is started.

Tap the “Share” button to share the data by a number of methods: email, text, AirDrop, etc. Shared data is formatted in a CSV file (comma delimited file). The file name is unique and contains both the date and time that the data log was started as well as the location name. Setup information such as the date and time the data log was started, the number of samples, sampling period, and location name are located at the top of the data file.

The data is arranged in rows, where each row contains a single flow measurement including sample number, time stamp, flow rate, velocity, volume, and quality. The data file can be viewed or printed as a text file or formatted using most spreadsheet and database programs, such as Microsoft® Excel or Access.



sample number	time (hrs:min:sec)	flow rate (gallons/min)	flow vol
1	00:00	0.1171	0.1171
2	00:04	0.1172	0.2343
3	00:08	0.1173	0.3516
4	00:12	0.1171	0.4687
5	00:16	0.1170	0.5857
6	00:20	0.1171	0.7028
7	00:24	0.1172	0.8200
8	00:28	0.1173	0.9373
9	00:32	0.1171	1.0544
10	00:36	0.1170	1.1714
11	00:40	0.1171	1.2885
12	00:44	0.1170	1.4055
13	00:48	0.1171	1.5226
14	00:52	0.1172	1.6396
15	00:56	0.1173	1.7571
16	01:00	0.1171	1.8742
17	01:04	0.1171	1.9913
18	01:08	0.1172	2.1085
19	01:12	0.1173	2.2256
20	01:16	0.1171	2.3429

Tap **“Quick Look”** for immediate viewing of your data.



**NOTE:**  
The app must be connected to Cypress in order to share the data or view it with Quick Look.

## Explanation of Recording Time

The sampling period (time between recorded flow measurements) and total number of recorded measurements (samples) is controlled by Cypress. The maximum number of measurements that can be recorded is 10,000, where each measurement includes five data points (flow rate, velocity, total volumetric flow, time, and measurement quality). The minimum sampling period is 5 seconds, or in other words, the fastest sampling rate is 12 samples/minute.

The Cypress data logger will minimize the sampling period based on your selected recording time (i.e., maximize the number of measurements). For example, if you select to record flow for one minute, then the Cypress will set the sampling period at its minimum of 5 seconds and will record 12 flow measurements (covering a total of 60 seconds). If you record flow for 30 days, then the Cypress again will maximize the number of flow measurements.

However, recording flow every 5 seconds for 30 days will exceed 10,000 measurements, so the Cypress will increase the sampling period to 260 seconds (30days /10000) to record 10,000 measurements.

Recording Time	Sample Period
1 minute	5 seconds
1 hour	5 seconds
10 hours	5 seconds
1 day	9 seconds
10 days	86 seconds (1 min. 26 sec.)
1 month	260 seconds (4 min. 20 sec.)
6 months	1577 seconds (26 min. 17 sec.)
12 months	3154 seconds (55 min. 34 sec.)

## Troubleshooting

Problem	Probable Causes	Things to try...
<b>Continuously displays “Analyzing Flow”</b>	Incorrect setup	Confirm pipe settings
	Air in pipe	Rotate meter to 3 o'clock position Remove air Relocate meter to another location where there is no air
	Corroded rusty pipe	Relocate meter to clean section of pipe. If no clean section is available, move meter to other locations until a signal is found—try to find a section of pipe with less corrosion or rust.  Older steel and ductile iron pipes may be heavily corroded, which can prevent ultrasound transfer and flow measurements. For these types of applications, SoundWater has a special transducer configuration that helps to penetrate corrosion, making flow measurement possible. Please contact us to discuss your application and how to select the best transducer.
<b>Orcas App not displaying any flowmeters to connect</b>	Bluetooth not enabled	Open your iOS or Android system settings and enable Bluetooth. Quit and relaunch the Orcas App.  Orcas App is compatible only with Bluetooth 4.0 (or later), also known as Bluetooth LE, or Bluetooth Low Energy. Most mobile devices are BLE enabled; however some older devices may use standard Bluetooth and may not be compatible.
	Location Services not enabled	Open your iOS or Android system settings and enable locations services for the Orcas App.



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