User's Manual

SpireTap Ultrasonic Water Meter

UM-ST280WD-I02

Revised October 10, 2021

General Information

Introduction

The SpireTap ultrasonic water meter offers the most advanced water measurement in the market by using state-of-the-art ultrasonic flow measurement technology. The SpireTap water meter does not have moving parts to wear out, thus, it literally requires no maintenance. It is also very cost-effective, especially in the long run. This means both commercial and residential installations can profit from the advantages of wear-free water measurement, such as precision, operating security, and long service life.

Manufactured to be rugged, the SpireTap meter has sensor bodies constructed of high-quality stainless-steel. Its performance has been fully tested by international labs and proven to exceed AWWA C715 standards. The SpireTap has been approved by NSF61-G for lead-free, suitable for drinking water. It has also proved by FCC and PRCTB.

The meter is an AMI ready smart water meter. It may come with a serial port that can be connected to Spire's pulse module, encoder module or other interface modules, or it may come with a built-in Narrow Band Internet-of-Things (NB-IoT) wireless interface. If it features a NB-IoT built-in wireless interface, it will send the meter data to the cloud directly without any data collector, concentrator or repeater. Together with Spire's transformational cloud-based plarfort, SpireCapture, Spire offers a unique metering data collection and management solution that makes the water consumption metering, utility revenue collection, water system monitoring and assets management easy and economical.

The SpireTap meter is an ideal solution for water metering applications where conventional water meters fail due to harsh environments, solids in the water, high maintenance, magnetic vandalization, or failed leakage detection.

General Safety

Before installing your new SpireTap please consider the following:
- Read this instruction guide carefully and follow the factory directions.
- Injury or damage may occur if the user doesn't read and understand this installation guide.
- Consider handling and lifting instructions to avoid damage.
- Never hold and transport the meter by the electronics housing, but instead only by the threaded joint.
- Assembling and dismantling should be performed only when there is no pressure in the pipe
- Beware of sharp edges.
- After installation, the tightness must be verified by pressurizing with cold water.

- Use the meter only under the specified operating conditions. When conducting the pressure test, make sure the pressure does not exceed 2.5MPa. Otherwise, dangers may arise and will void the warranty.
- The SpireTap water meter is not certified for use in hazardous environments. The local site safety codes and regulations must be observed.
- The SpireTap water meter contains Lithium batteries. Please check to see if they're working before using the water meter. The batteries must be recycled or disposed of properly.

Unpacking and package contents

Your new SpireTap meter has been fully tested and calibrated. After careful unpacking please inspect the meter for shipping damage. You should also have the following:

- The SpireTap meter (flow cell body and the integral electronic display).

- The installation Guide (for large order, one copy per container)

- Certificate of calibration (for large order, one copy per container)

Product Identification

The SpireTap ultrasonic water meter is made according to AWWA C715 standard. It has a stainless-steel main casing. The casing spuds for meter sizes from ½" to 1 ½" have external straight threads (NPSM) and those for 1 ½" and 2" have oval type flange connections.

Non-return valve

The SpireTap water meter may or may not come with non-return valve. If you do not have non-return valves, please stop here and order the non-return valves.

You may order the non-return valves from third-party suppliers. You may also order them from us by sending email to sales@spiremt.com or calling us at +1 978 263 7100. Please specify the sizes of the meters that the non-return valves are for when you place the order.

 It is highly recommended to install a non-return valve downstream of the water meter. This is particularly important for meter sizes of 1 ½" and smaller. Those small size meters are commonly installed in branch pipelines which are connected to a main water pipeline, such as the case in an apartment building. The flow in the main pipeline will cause the pressure in the branch pipelines to fluctuate, thus, cause the water in the branch pipelines to move back and forth even the valve in the branch pipeline is closed. Therefore, the water meter will count the flow even though the tenant's valve is closed. A non-return valve installed downstream of the meter will solve this problem.

Operation

Built-in Battery

The instrument uses a built-in Lithium battery, which is long-lasting battery with up to 10 years of operating time under standard condition.

Due to transport regulations, the battery might be deactivated by an insulating strip, which must be removed completely in order to activate the meter. If a replacement battery is needed, please contact your representative or Spire Metering. If the meter needs to be sent by air freight, then the battery will be removed prior to shipping.

For safety precautions, the batteries should not be opened, come into contact with water, or be exposed to temperatures above 80 °C (176°F). Batteries should be disposed of at proper collection centers.

Powering On

First, make sure to activate the battery and that the display will turn on. If the meter LCD is on, the meter is active already and no further action is needed. Generally, there should be no error messages, and the water meter will cycle between the total volume and the flow rate.

The flow measurement program will always operate in the background of the user interface. This means that the flow measurement will keep running regardless of any user window browsing or viewing.

Once it is turned on, the SpireTap meter will keep on running until its battery runs out. There is no need to turn off the device when not in use; the display will turn off by itself to save the battery.

Wireless Activation

The SpireTap of model ST-280W-WD-x-B comes with a built-in NB-IoT wireless module. As the main meter, the wireless module is also powered by the built-in battery. In order to save battery as well as to comply with transportation regulations, the wireless interface of the meter might be deactivated in the factory before shipping. Therefore, after installing the meter and before putting the meter in service, you shall active the wireless interface by using a factory IR tool and a PC software. An alternative is to wait for the water consumption to be more than the 0.5m3, above which the meter will automatically active the NB-IoT wireless.

As soon as the meter wireless is activated, the meter will try to connect with the nearby cellular station which offers the NB service. When the connection is established, the meter is ready to send data to the cloud through the NB cellular network.

The NB-IoT wireless interface has an eSIM card that has been provided by the NB service provider. The eSIM card has been programmed in the factory and no further programming is needed.

The ST-280W-WD-x-B transmits the meter data to the cloud SpireCapture platform once per day. With special request at order, it may be programmed to transmit the data twice a day.

For information on SpireCapture platform, please contact support@spiremt.com.

Menu Windows

The SpireTap meter has a big LCD display. Under normal operation, it shows the flow total and flow rate circularly. If there is an alarm, the status menu which has the alarm code will be displayed as well. Below is the LCD display drawing. The top row symbols are for alarms. They are displayed only when the alarm is triggered.

¥	Note used
R	Reverse flow
ID	Serial number
✿	Note used
🕐	Clock
⋀	Positive flow
⋁	Negative (reverse) flow
🚰	Leakage
🔋	Battery indicator
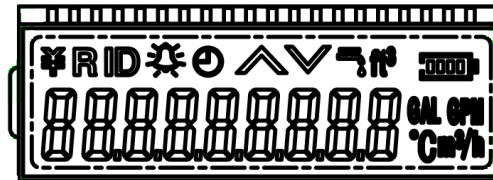
In case there is a need to display more meter information, one can use factory IR tool to switch the display content. The following parameters can be displayed with the aid of the IR tool:

    Date and Time
    Meter Serial Number
    Meter Version Number
   Flow total in high resolution (for calibration only)

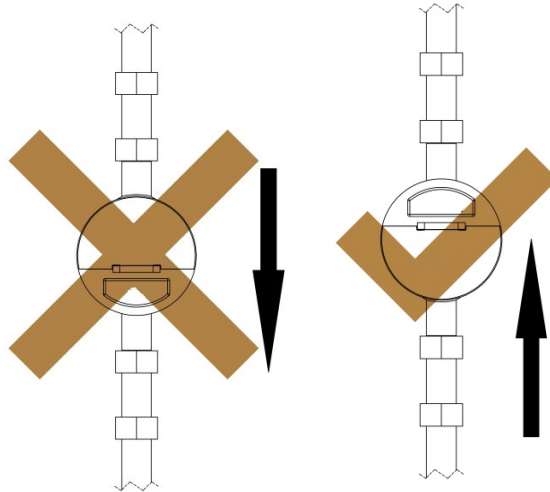# Installation

Site Selection

Find a suitable location for connecting the flow cell (the "tube" part of the device where water flows through) to the pipeline.

- Do not install the meter within 0.5m of an AC power line or a high-frequency radiation source.
- It is highly recommended to have a 5D straight pipe run upstream and 2D straight pipe run downstream, where D stands for pipe diameter.
- When two or more water meters are installed closely, make sure they are distanced by 5D or more.
- Do not install where back flow or pressure fluctuations may occur. An alternative is to install a non-return valve to prevent the backflow. If the meter comes with a non-return valve preinstalled, you are all set and there is no need to install an additional one. If the meter does not come with a non-return valve, you need to install a non-return valve on the downstream of the meter in order to prevent backflow or pressure fluctuations. We do offer easy-to-install insertion non-return valve. Please consult us for more information.
- When using a wrench, hold the metal part of the sensor.
- When connecting to a pipe line, use an O-ring for the sealing. Make sure the O-ring is centered at the joining point. Otherwise, it could generate flow disturbance, thus degrade the meter accuracy
- The meter sensor can be installed vertically or horizontally: When it is installed vertically, make sure the flow goes upward When it is installed horizontally, the flow-cell should be installed in a way so that the display faces upward and the two ultrasonic transducers on the horizontal plane.
- **If the meter comes with NB-IoT wireless, please make sure the meter installation location can receive celluar signal.** You may put your cell phone to that location and check if you get at least one bar signal. If not, please find a difference location to install!
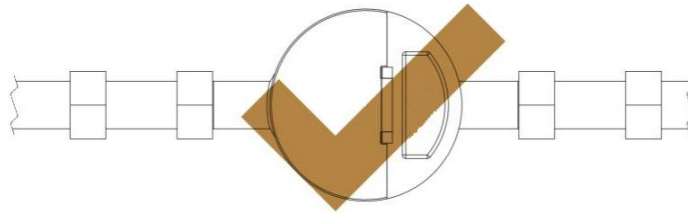
Please refer to the following diagrams for correct installation and handling.
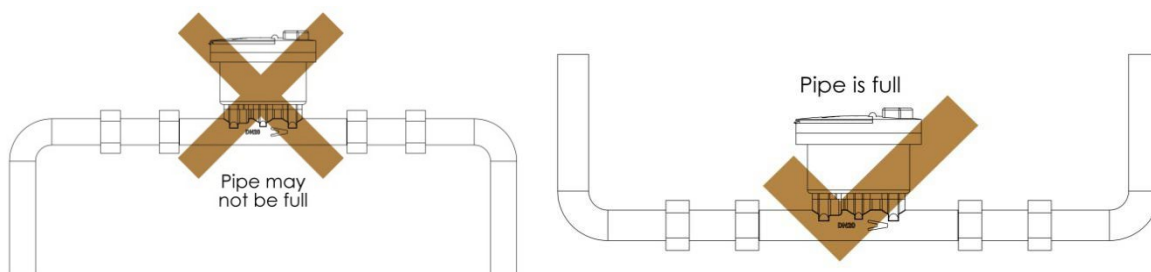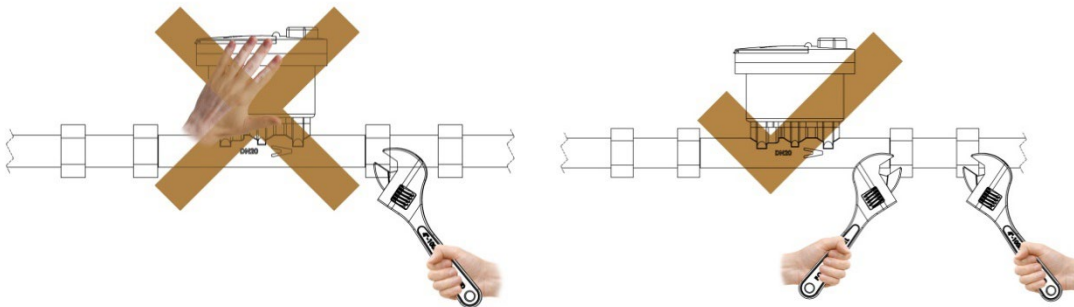

Correct installation of meter on U-configuration

For proper and accurate reading, flow should go against gravity

Sensor can be on the side after installation

Handle the metal of the meter during installation

Meter Installation

The water meter body should be completely full at all times for proper flow measurements. When this is not the case, there will be a loss of signal and the meter will not measure. The signal will be restored as soon as the pipe is full again.

To make sure the pipe is full of water and to avoid measuring errors and malfunctioning of the flow meter due to air or an empty pipe, please observe the following precautions:

- Installation of the flow meter should be at the lowest point of the system, if possible. Air pockets will build up at the highest point of a system.
- If possible, maintain positive back pressure in meter outlet piping.
- For vertical pipe, make sure the flow goes upward. If not, make sure there is back pressure so the water inside of the pipe will be full.
- In order to avoid cavitation, always install control valves downstream of the flow meter and never install the flow meter on a pump suction side.
- After completing the installation, open the valves in full to flush out the debris and air in the water meter.

FLOW DIRECTION:

The SpireTap is calibrated for one directional measurement. Note the indicating arrow for forward flow. Even though the meter can be used to measure the reverse flow when there is no non-return valve installed, the accuracy for reverse flow measurement is not guaranteed.

Spire recommends keeping the lid closed in case of direct sunlight exposure. However, no direct damage will occur while the lid is open temporarily.

Do not expose the meter to excessive vibration. To prevent this from occurring, support the connection pipe spools on both ends of the water meter.

Operations Check

- After the installation is complete, the air in the pipe has to be purged out completely.
- Make sure the pressure in the system is normal.
- Use meter only under the specified operating conditions. Make sure flow rate range is proper for the pipe.
- Turn on valve or faucet and let water flow through the meter for one minute. You should see the display of the meter showing flow total and flow rate alternatively.
- **Important: The pipe must be full of liquids during operation!**

Recording

- For recording purpose, please take a picture of the meter to show the meter and installation site
- Write down the meter SN#, an 8 digits number printed on the meter, and the location, such as building# and apartment#
- Upload those information to the server if you have an app installed on your phone. Or email the information to support@spiremt.com together with your account information

Troubleshooting

When there is an error or an alarm, the LCD will display the status menu. There are 8 numbers in this menu which represent different error/alarm code.

Startup Errors

When powered on, the SpireTap meter automatically starts the self-diagnosis process to see if there are any hardware or software problems. If a problem is identified, an error message will be displayed. **There are 8 numbers in this menu which represent different error/alarm code.** The following are the possible error messages, the corresponding causes, and their solutions:
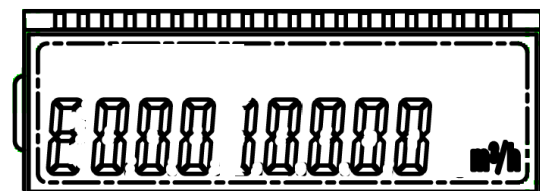
Empty pipe:
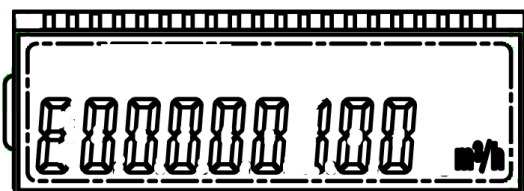
If this error is displayed, it means there is no water flowing through the water meter. Check the pipe's water supply and try to get it so that the pipe is full of water.
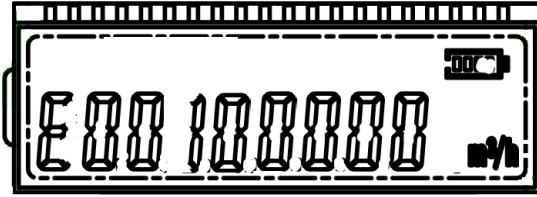
Hardware failure:
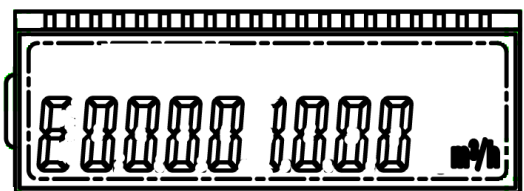
If this error is displayed, it means that there is hardware problem.
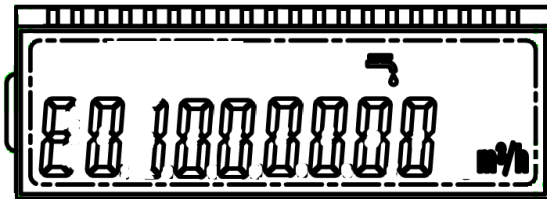
Over flow:

If this error is displayed, it means that the flow is over the upper threshold. It could be an indication of pipe burst.
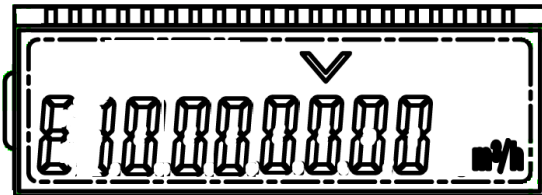
Battery flow:

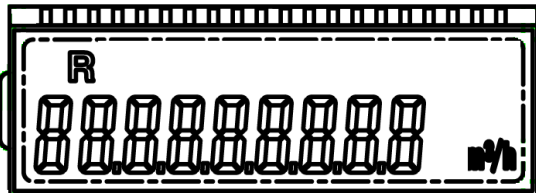If this error is displayed, it means that the battery is low.

Leakage:

If this error is displayed, it means that a water leakage is detected.

Reverse flow:

If this error is displayed, it means that the flow is reversed.

Radio transmission:

If R shows up on the top row, the meter wireless interface is transmitting data. The meter and wireless are both working properly.

Other Problems and Solutions

Q1: Why does the instrument display 0.0000 flow rate while the liquid in the pipe is actually flowing?

A1: There might not be enough water in the pipe. Try to get it so that water flow through the flow cell is almost full. Additionally, check the installation to see if it is in a desirable location.

Q2: The displayed flow rate is much lower or much higher than the actual flow rate in the pipe under normal working conditions. Why?

A2: The flow cell and meter might have been installed incorrectly. Check the connection.

The amount of straight pipe run upstream and downstream may be too small. This can cause the data reading to be inaccurate.

When the meter sensor is installed vertically, make sure the water flow goes upward. When it is installed horizontally, make sure the ultrasonic transducers of the flow cell are on the side instead of the top or bottom, as this may skew results.

For support, please go to website www.SpireMT.com, or email to support@spiremt.com.

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