



SONATA INSTALLATION GUIDE

Category: Residential Metering

Type: Installation Manual

Issue: Operation

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1 Introduction

The Sonata is an ultrasonic water meter available with either an embedded Allegro radio and antenna, an embedded 3G radio and antenna, or an encoder output communication. The Sonata is designed for accurate measurement of potable water for residential applications. In sizes 3/4" and 1", the Sonata can be installed in accordance with NFPA 13D when installations are intended to be covered by the scope of UL Subject 327B residential fire applications listed (5/8" and 5/8"x3/4" excluded). The Sonata's unique design delivers precise flow measurement without any moving parts – for long life, sustained accuracy, and exceptional performance. Sonata is a maintenance free device for up to 20 years of operation.

2 General Information

- Read the instructions below before installing the meter.
- To prevent injury or damage, do not install, operate, or maintain the meter without following the instructions in this guide.
- Store the meter in a cool, dry place.
- Follow all warnings and instructions marked on the product.

3 Package Contents

The following items are included in the package:

- Sonata Ultrasonic Water Meter
 - QTY 6 to a package on sizes 5/8" x 1/2", 5/8" x 3/4", and 3/4"
 - QTY 4 to a package on 1" size

4 Accessories – Optional

1. EPDM gaskets

5 Unpacking and Handling

- Carefully unpack the meter and inspect all contents for shipping damage before attempting to install. If any indication of physical damage is found, immediately contact the responsible transportation service and your local Master Meter representative.
- Do not carry the Sonata by its lid.
- Avoid hard blows, jolts, or impact to the meter.



6 Operating Conditions

Maximum Working Pressure	175 PSI
Liquid Temperature	33° F - 122° F (0.5° C to 50° C)
Referenced Standards	Most recent revision of ANSI / AWWA Standard C715 ISO 4064 rev. 2014
Power Source	Lithium Thionyl Chloride battery: 1 x D size for Allegro model, 2 x C size for 3G and Encoder model (Sonata Encoder will include 1 C Cell Battery beginning Q2 2023)
Environmental Protection	IP68 (NEMA 6) Ambient operation temperature -13° F to 131° F (- 25° C to 55° C)
Data Units	Multi-line 9-digit Liquid Crystal Display (LCD) Programmable Volume Units of US Gallons, Cubic Feet, or Cubic Meters Programmable Rate of Flow of GPM, Lt/s, or M3/h
Threads	External straight threads (NPSM) conforming to ASME B1.20.1
Construction	HP Glass Reinforced Polymer or Brass with Polymer Liner
Certifications/Listings	Federal Communications Commission (FCC) Industry Canada (IC) UL Subject 327b for 3/4" and 1" (5/8" and 5/8"x3/4" excluded) * NSF/ANSI 61, NSF/ANSI 372, and Safe Drinking Water Act (SDWA)

*IP Environmental Protection rating was not evaluated by UL Calibration and friction loss was not verified by UL in the reverse flow direction

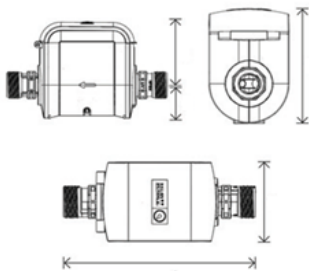


7 Operating Characteristics and Dimensions

Sonata Operating Characteristics and Dimensions	5/8" x 1/2" (15 x 13 mm)	5/8" x 3/4" (15 x 20 mm)	3/4" Short (20 mm)	1" (25 mm)
Safe Maximum Operating Capacity	25 GPM (5.7 m ³ /h)	35 GPM (7.9 m ³ /h)	35 GPM (7.9 m ³ /h)	55 GPM (12.5 m ³ /h)
UL Operating Range (98.5% - 101.5% Accuracy)*	-	-	2 - 35 GPM (0.45 - 7.9 m ³ /h)	2 - 55 GPM (0.45 - 12.5 m ³ /h)
Normal Operating Range (98.5% - 101.5% Accuracy)*	0.10 - 25 GPM (0.023 - 5.7 m ³ /h)	0.10 - 35 GPM (0.023 - 7.9 m ³ /h)	0.10 - 35 GPM (0.023 - 7.9 m ³ /h)	0.38 - 55 GPM (0.09 - 12.5 m ³ /h)
Extended Low Flow (97% - 103% Accuracy)	0.03 GPM (0.007 m ³ /h)	0.05 GPM (0.01 m ³ /h)	0.05 GPM (0.01 m ³ /h)	0.11 GPM (0.025 m ³ /h)
Length	7-1/2" (190 mm)	7-1/2" (190 mm)	7-1/2" (190 mm)	10-3/4" (273 mm)
Width	3" (80 mm)	3" (80 mm)	3" (80 mm)	3" (82 mm)
Height (Integrated Allegro)	4-1/2" (117 mm)	4-1/2" (117 mm)	4-1/2" (117 mm)	4-3/4" (121 mm)
Height from Center Pipe (Integrated Allegro)	3" (80 mm)	3" (80 mm)	3" (80 mm)	3-1/4" (82 mm)
Height (Encoder and Integrated 3G)	4-1/2" (117 mm)	4-1/2" (117 mm)	4-1/2" (117 mm)	4-3/4" (121 mm)
Height from Center Pipe (Encoder and Integrated 3G)	3" (80 mm)	3" (80 mm)	3" (80 mm)	3-1/4" (82 mm)
Weight (Brass)	4 lbs (1.8 kg)	4 lbs (1.8 kg)	4 lbs (1.8 kg)	6 lbs (2.7 kg)
Weight (Polymer)	2 lbs (0.9 kg)	2 lbs (0.9 kg)	2 lbs (0.9 kg)	2.5 lbs (1 kg)

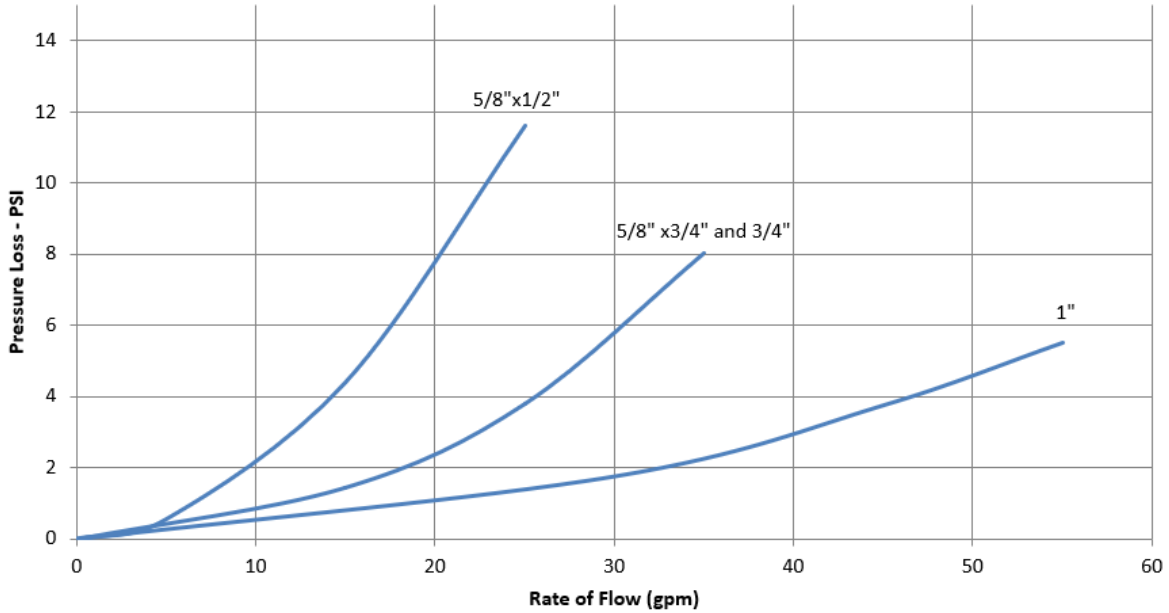
* In the water temperature of 45° to 85° F (7° to 30° C), meter consumption is accurately measured at:

- +/- 1.5% in the Normal Operating Range
- +/- 3% in the Extended Low Flow





8 Pressure Loss Chart



9 Transmitter Information

The User and the Installer should be aware that changes and modifications to the equipment not expressly approved by Master Meter could void warranty and the user's authority to operate the equipment.

Professionally trained personnel should install the equipment.

The Integrated Sonata Allegro and Sonata 3G are equipped with an internal antenna/transmitter and 1) must be installed at a minimum separation distance of at least 20 cm from all persons, and 2) must not be co-located or operating in conjunction with any other antenna or transmitter.





10 FCC and Industry Canada (IC) Statements

The digital portion of the transceiver has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

FCC and Industry Canada (IC) statements

This device complies with Part 15 of FCC Rules and with 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.

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS-102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.



Attention

11 General Installation Requirements

1. Ensure that the connecting pipes are aligned (Figure 1).
2. Check for the proper distance between the pipe unions to avoid mechanical stress (Figure 2).
3. The meter may be installed in any orientation (Figure 3). There are no straight pipe requirements for the Sonata.
4. Always use new gaskets and ensure that the coupling nut surfaces are clean.

Installation Notes

- Do not install the meter on the suction side of a pipe.
- Avoid exposing the meter to excessive vibration.
- Support of the pipeline on both sides of the meter is recommended.

12 Installing the Sonata

1. Unpack the Sonata. Install/assemble accessories, if supplied, and as needed.
2. Note the proper flow direction as indicated on the meter. The Sonata is a bi-directional flow meter and will also measure reverse flow.
3. Install new gaskets in the coupling nuts.
4. Place the meter in position and carefully tighten the coupling nuts by hand. Make sure each coupling nut is smoothly screwed onto the meter threads. Use a wrench to tighten the coupling nuts to a minimum torque setting of 10 lb-ft up to a maximum of 35 lb-ft (Figure 4).
5. Once installed, open the upstream valve to allow water to fill the meter and piping.
6. Open a downstream valve to flush all air out of the pipeline.
7. Close the downstream valve and verify that there are no leaks.

This product has been thoroughly inspected and tested prior to shipment and is ready for operation.

13 Disposal

This product contains Lithium Thionyl Chloride batteries. Local and national regulations for proper battery disposal should be followed.

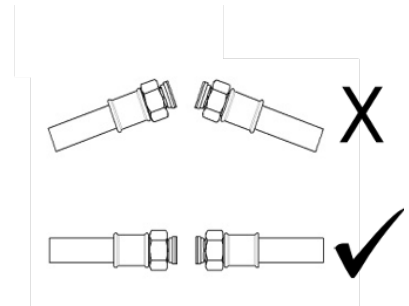


Figure 1

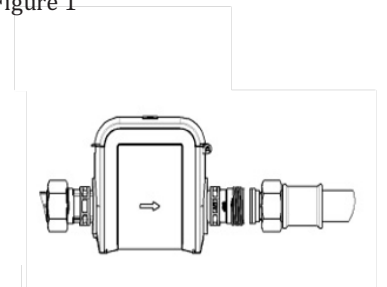


Figure 2

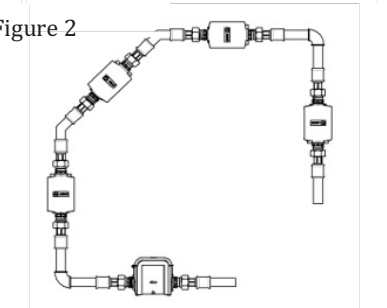


Figure 3

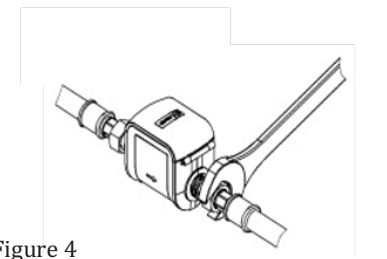
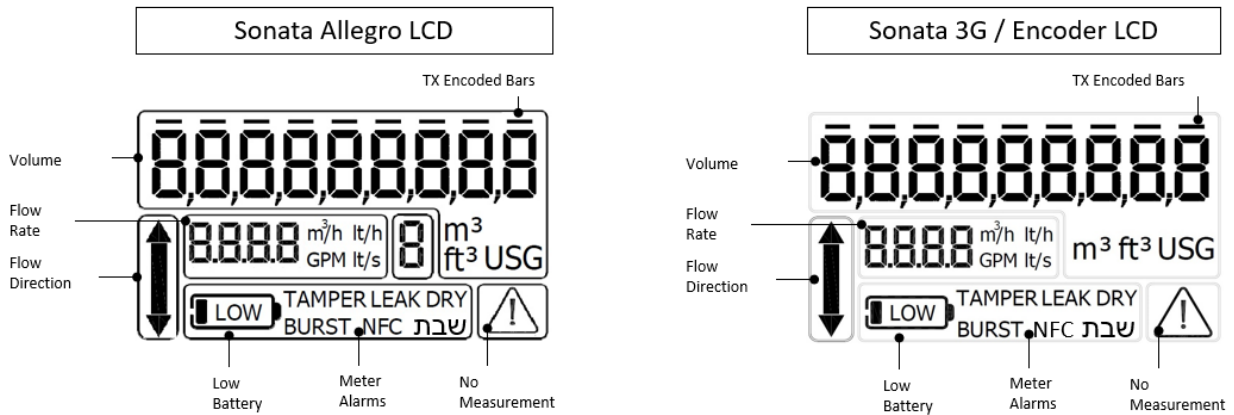


Figure 4

14 Sonata Display Appearance



15 Display Icons

The Sonata is provided with a 9-digit volume digital display factory programmed to your specifications. The LCD also has a 4-digit rate of flow indicator. At the time of order, you can select

- **Volume units:** US Gallons, Cubic Feet, or Cubic Meters.
- **Rate of Flow units:** US Gallons per Minute (GPM), Cubic Meters per Hour (M³/h), or Liters per Second (It/s). When US Gallons or Cubic Feet are selected for the Volume Consumption units, the Rate of Flow will be GPM.
- **Alarms:** Low Battery, Tamper, Leak, Dry Pipe, Burst Pipe, or Measurement Failure (as indicated by the triangle with the exclamation point on the lower right side of the LCD).
- **Notifications:** The NFC icon on the LCD will be illuminated when connected with an NFC programming cable. Shabbat/Sabbath mode, as indicated by Hebrew letters, is not supported in the North American Market.
- **Flow Direction** is represented by a bi-directional arrow. When no flow is being used, the two arrows will disappear, leaving a solid black bar as indicated in the image shown. When flow is being used, one of the two triangles will also darken creating what appears to be an arrow pointing in the direction flow is passing.
- **Network Status icon** (only available on the Sonata Allegro LCD) is located in the box to the right of the Rate of Flow and is represented by a seven-segment character. See the table below for an explanation of the symbols that may appear in this box.
- **Checksum:** When there is no flow through the meter, every 60 seconds the last four digits of the software checksum will display in the Flow Rate field for a duration of two seconds. Checksum is not displayed if the meter is registering flow.

16 Activating the Allegro Radio

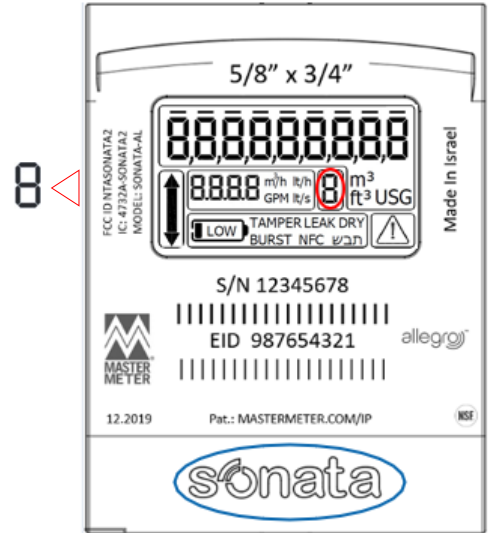
To activate the embedded Allegro radio place a strong magnet over the center of the Sonata logo on the meter faceplate (circle on the image to the right).

When activated with a magnet, the Network Status icon (marked by a circle on the image to the right) will light up all segments, resembling an “8”. See below table for more information on the network status icon.








Remove the magnet when the “Magnet Sensing” Icon is visible.

After activating with the magnet, the LCD will run through a series of programmed functions of the Sonata Allegro. These include:

- Main board firmware version
- Radio firmware version
- Unit Identification Number (ID)
- Uplink frequency
- Measurement units
- Rate of Flow units



Sonata Allegro Network Status Icon Definition

Network Status	Icon	Definition
Handled Portable Device (HPD) and Base Station (BS) Seeking		If a Sonata Allegro was previously connected to a Base Station but lost connection, this icon will appear. The unit is seeking for a Base Station and Handled Portable Device.
Connected to BS, HPD Seeking		When a Sonata Allegro has just been connected to Base Station it will have this indication. The icon indicates that the meter is connected to a Base Station, and it will continue seeking for an HPD for 15 minutes after connection.
Connected to BS, No HPD Seeking		When a Sonata Allegro has just been connected to Base Station for more than 15 minutes it will have this indication. The icon indicates that the meter is connected to a Base Station and is no longer seeking for an HPD.
HPD Seeking Only		This icon appears in Sonata Allegro units that are shipped to Master Meter. The icon indicates that the meter is in HPD seeking only. It is designed for minimal power consumption.
Drive-by Mode Working Hours		This icon indicates that a Sonata Allegro is activated in drive-by mode during “Working Hours”.
Drive-by Mode Non-Working Hours		This icon indicates that a Sonata Allegro is activated in drive-by mode during “Non-Working Hours”.
Magnet Sensing		When activated with a magnet, all segments will turn on.