



# wPrime™ Series 280W-R

RESIDENTIAL ULTRASONIC WATER METER

## Applications

- Revenue metering
- Residential submetering
- Commercial buildings
- Leakage detection
- AMR / AMI and billing
- Drive-by metering
- Prepaid metering
- U0D0 / U5D3



## Features

- Residential potable water consumption metering
- Temperature compensation for cold water as well as hot water up to 60°C (140°F)
- No moving parts. Wear-free ultrasonic technology
- Durable, proven BRASS sensor body. Solves the challenges in harsh environments
- Patented sensor design. provides precise signal, robust performance, and is not impacted by water impurity
- Excellent long-term stability with consistent performance. Accuracy does not degrade over time
- U0D0 / U5D3
- Leakage detection
- Tamper-proof design. Records when tampering is detected
- Built-in valve for remote open/close or prepaid application
- Not affected by magnetic interference
- Does not measure entrained air in pipe
- Low pressure drop
- For DN40 meter, able to measure pressure with an integrated pressure sensor
- Free positioning for installation
- Large LCD, 9 digits display
- More than 5 year battery life
- IP 68 water-proof
- OIML R49 / ISO 4064 Class D
- NSF 61-G Certified
- OMS-complaint wMBus, NB-IoT, LoRaWAN or LoRaLAN for drive-by, AMR/ AMI meter reading
- Data Logger with 700 daily totals and 24 monthly totals
- Support SpireWater AMR/AMI, prepaid or billing solutions



DS-280WR1\_2310\_Rev22

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# wPrime™ Series 280W-R

## RESIDENTIAL ULTRASONIC WATER METER



A member of the wPrime™ Series, the 280W-R Residential Ultrasonic Water Meter is specially designed for domestic water metering applications where conventional water meters fail due to harsh environment, solids in water, performance degradation, magnetic vandalization or are incapable of leakage detection.

The 280W-R offers the most advanced water flow measurement by using state-of-the-art ultrasonic technology. Its flow sensor does not have any moving parts that can wear or tear, which provides a robust and accurate meter with no maintenance required.

The technical specifications of the 280W-R meet the standards for residential utility metering with Class D performance, operational temperature from 0.1°C to 60°C and safety temperature up to 85°C, as well as nominal pressure of 1.6MPa. The wide dynamic range allows for a load up to double the rating, thereby ensuring high operation security. The large LCD can display the flow total, leakage alarm, reverse flow, and more. The meter also has a remote readout which could be configured as wired M-Bus, wMBus, RS485, LoRaWAN, LoRaLAN, NB-IoT, etc.

There are two varieties in the wPrime™ Series, 280W-R-NV water meter and 280W-R-V water meter with built-in ball valve. For the last version, the valve in the meter is a highly reliable ball valve that can be opened or closed remotely. This provides water company an efficient way to manage their water resources. In addition, the DN40 meter can also seamlessly integrate a pressure sensor to measure flow pressure.

Spire Metering's 280W-R Residential Ultrasonic Water Meter stands out among its competition due to its robust performance, patented sensor design, tamper-proof feature, multiple AMR / AMI options and capability to detect very low flowrates. It works reliably even when the water has particles and the environment is harsh, such as the case in Middle East and Africa. Residential installations can profit from the advantage of the wear-free water flow measurement, namely, precision, operation security and long service life.





# wPrime™ Series 280W-R

## RESIDENTIAL ULTRASONIC WATER METER

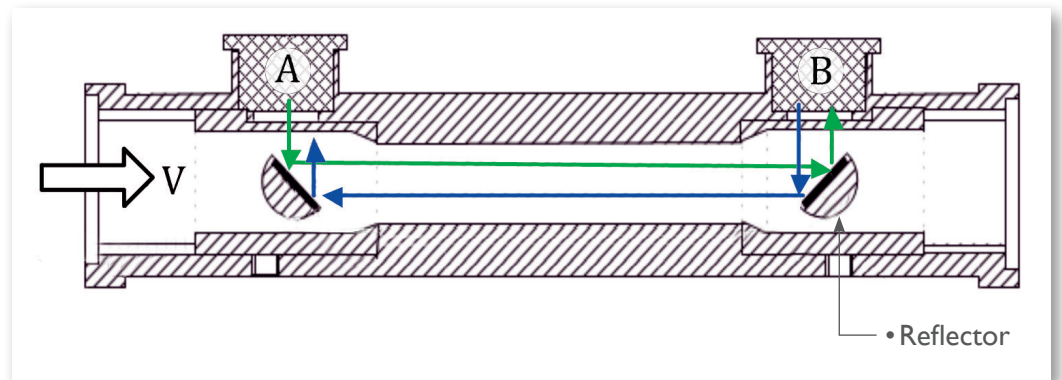
### Operating Principle

The wPrime™ series water meter consists of a flow sensor and an integrator. The flow sensor is a flow-cell made from brass (figure below.) Two ultrasonic transducers, A and B, are firmly mounted on the flow-cell at optimal positions, with two reflectors inside of the flow tube. The ultrasonic signal generated by one transducer is directed toward the flow direction by the reflector below it. When the ultrasonic signal reaches the other reflector, it is redirected to the transducer above it. Therefore, each transducer can receive the signal sent from the other transducer.

An integrator (or calculator) controls the two ultrasonic transducers to transmit and receive ultrasound in an orderly fashion to conduct precise flow measurement. Specifically, the integrator operates the two transducers to simultaneously transmit a pulse of ultrasonic energy into the water flow. The pulse signal travels along the flow and reaches the other transducer under the guidance of the two reflectors. Obviously, the downstream pulse (from A to B) travels faster than the upstream pulse (from B to A). The travel time (or transit-time) difference of the two pulses is directly proportional to flow velocity. Therefore, the flow rate can be derived from the transit-time difference accordingly.

The wPrime™ series water meter has used advanced digital signal processing technology to precisely measure the transit-time of each ultrasonic pulse. A statistic algorithm is also used to counter interference which could come from solids or air bubbles in the water. The flow-cell is optimally designed according to our patented technology, so that the multimode reflection in the flow tube is significantly attenuated. It allows a significant increase in signal strength and quality, thus, the robustness of the system. The flow rate calculation is based not only on transit-time difference and the geometry of the flow-cell, but also on fluid dynamics theory.

Only ultrasonic pulses are used to interrogate the flow which enables the meter to have no moving parts. Therefore, there is nothing to wear out or cause a reduction in accuracy. In addition, the principle is based on the transit-time difference instead of transit-time, all the interfering factors, such as the temperature, pressure, solids concentration and water quality, are cancelled out. The end result is that the system is inherently robust!





# wPrime™ Series 280W-R RESIDENTIAL ULTRASONIC WATER METER

## Automatic Meter Reading

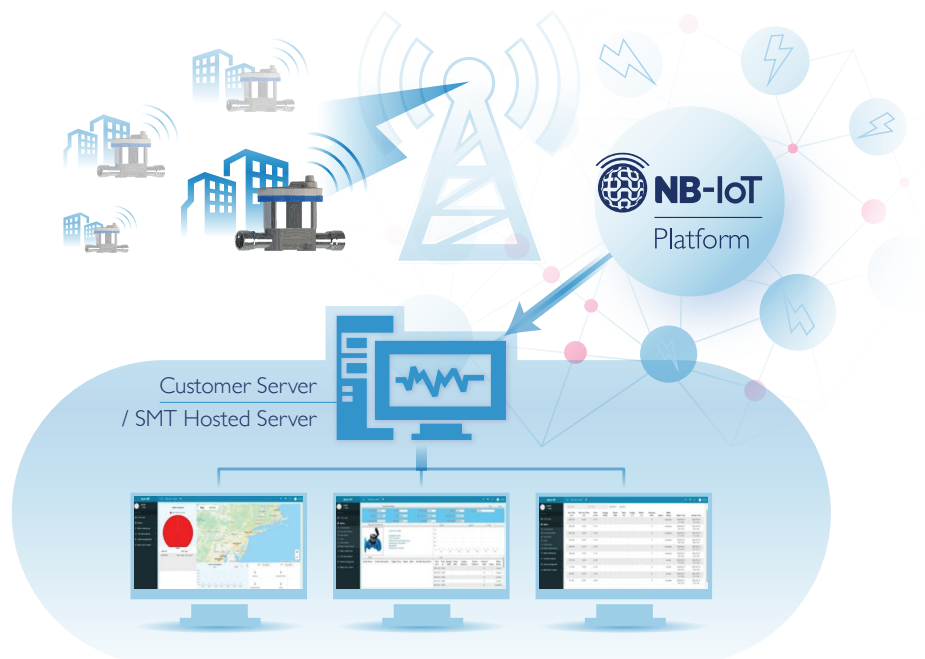
The wPrime™ series water meter offers a variety of interface options, such as M-Bus, RS485 with Modbus, as well as built-in OMS-compliant WMBus, LoRaWAN, LoRaLAN, etc.. It is flexible to be integrated into an AMR/AMI system or a drive-by system.

Spire Metering also offers a complete range of AMR/AMI solutions, prepaid solutions as well as an integrated billing system. The SpireWater system is a cutting edge fixed automatic meter reading system which integrates both wired and wireless AMR/AMI technologies. The system provides a unified platform for meter reading and data management through M-Bus networks, RF wireless networks, 4G networks, BACnet networks as well as TCP/IP networks. In addition, it works seamlessly with Spire Metering's billing software to make data exchange easy, fast and reliable.

SpireWate is an advanced, highly robust meter reading solution that delivers comprehensive

usage information as well as timely, highresolution meter reading. This data enables gas, water, heat and electric utilities to eliminate onsite visits and estimated reads, reduce theft and loss, implement time-of-use billing, and profit from all of the financial and operational benefits of a fixed-network AMI/AMR.

In addition to an automatic meter reading, Spire Metering also offers a drive-by solution and prepaid system solution. For detailed information please contact us at **[solutions@spiremt.com](mailto:solutions@spiremt.com)**.



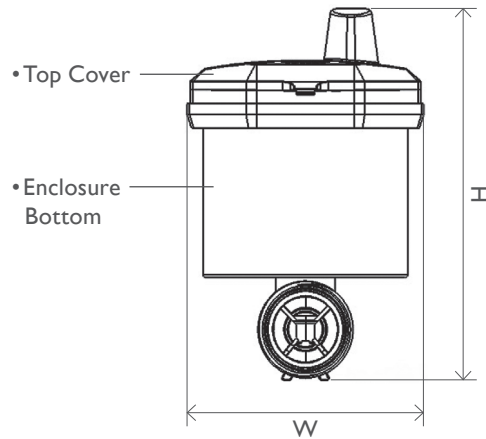


# wPrime™ Series 280W-R

## RESIDENTIAL ULTRASONIC WATER METER

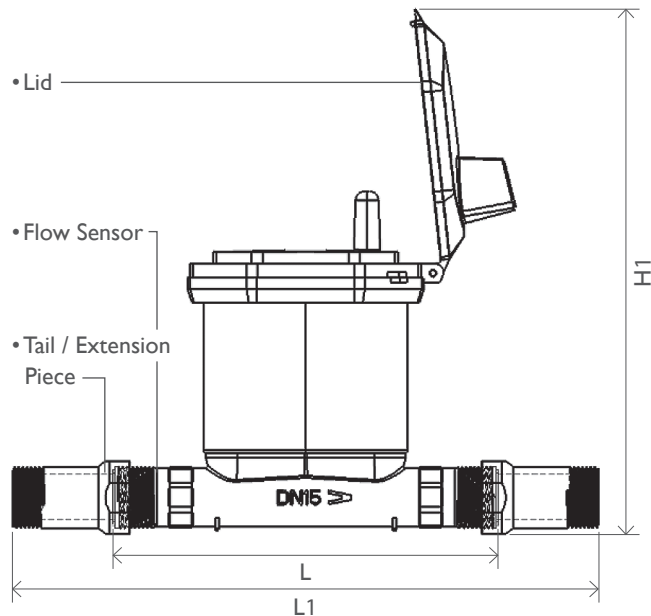
### Technical Specifications

Size		Flowrate						Dimensions					Pressure Loss (bar)	Weight (kg)	Pipe Joint (BSP)		
mm	in	Q <sub>3</sub>		Q <sub>4</sub>	Q <sub>2</sub>	Q <sub>1</sub>	Q <sub>s</sub>	L		H	H1	W			Sensor	Ext. Piece	
		m <sup>3</sup> /h	GPM	m <sup>3</sup> /h	L/h	L/h	L/h	mm	in	mm	mm	mm					
15	½	2.5	11.0	3.125	16	10	3	165	6½	260	152	226	105	0.63	0.8	G¾B	R½
20	¾	4	17.6	5	25.6	16	4	190	7.68	294	162	236	105	0.63	0.95	G1B	R¾
25	1	6.3	27.74	7.875	40.32	25.2	5	225	8.86	347	165	240	105	0.63	1.2	G1¼B	R1
32	1¼	10	44.03	12.5	64	40	6	230	9.05	356	185	260	105	0.63	1.4	G1½B	R1¼
40	1½	16	70.45	20	102.4	64	8	245	9.64	373	195	270	105	0.63	1.6	G2B	R1½



**Notes:**

- Default pipe joint is BSP threading.
- NPT threading is available upon request.
- L is flow sensor length. L1 is the total length of flow sensor plus extension pieces.
- Weight does not include extension piece. Weight may vary.
- 1m<sup>3</sup>/h is about 4.4GPM.
- Optional strainer.





# wPrime™ Series 280W-R

## RESIDENTIAL ULTRASONIC WATER METER

### Approvals

OIML R49, ISO 4064, NSF61-G, MID B

### Electrical Data

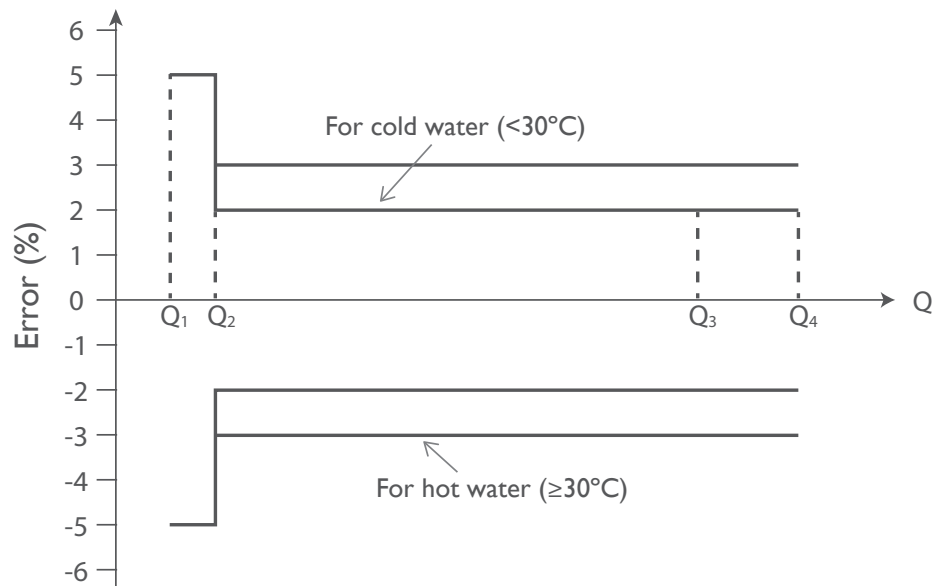
Power Supply:	Battery, 3.6V, Lithium
Replacement Interval:	>5 years at $t_{BAT} < 30^{\circ}\text{C}$ (86°F) based on one remote reading per day.
Power Consumption:	<0.1W
Backup Power Supply:	Internal SuperCap
Communication Interface*:	M-Bus (default) Optional: wMBus, NB-IoT, LoRaWAN, LoRaLAN or RS485/Modbus
CE approval:	EN61326-1:2006
Electromagnetic Class:	E2

### Accuracy / MPE (Maximum Permissible Error)

MPE according to ISO 4064: 2005 or OIML R49
$\pm 2$ in the range $Q_2 \leq Q < Q_4$ ; $\pm 5$ in the range $Q_1 \leq Q \leq Q_2$ [for $T \leq 30^{\circ}\text{C}$ (85°F)]
$\pm 3$ in the range $Q_2 \leq Q < Q_4$ ; $\pm 5$ in the range $Q_1 \leq Q \leq Q_2$ [for $T > 30^{\circ}\text{C}$ (85°F)]
Dynamic Range: 250 (For others please contact SpireMT)

**\*Note:**

- For OMS-compliant wMBus, please contact [support@spiremt.com](mailto:support@spiremt.com) for details.
- LoRaLAN is a proprietary protocol of Spire Metering.







# wPrime™ Series 280W-R

## RESIDENTIAL ULTRASONIC WATER METER

### Pressure Sensor

Sensor Mounting: Built into the flow sensor, seamlessly integrated into the DN40 water meter

Measurement Range: 0-1.6MPa. Overload capability: 150%

Accuracy: 2% FS

### Mechanical Data

Metrological Class: 2 (according to ISO 4064: 2005 or OIML R49)

Environmental Class: B / C

Environmental Temp: 0 ~ 60°C (32 ~ 140°F)

Permissible Flow Temp: 0.1 ~ 60°C (35 ~ 140°F) for long term and up to 85°C (185°F) for <24 hours.

Enclosure Protection: IP68

Integrator Detachable: No

Pressure: PN16

### Pressure Loss

The pressure loss of a flow sensor is proportional to the square on the flow:  $\Delta p = k \times Q^2$

Here  $\Delta p$  is pressure loss,  $Q$  is volume flow rate and  $k$  is the coefficient.

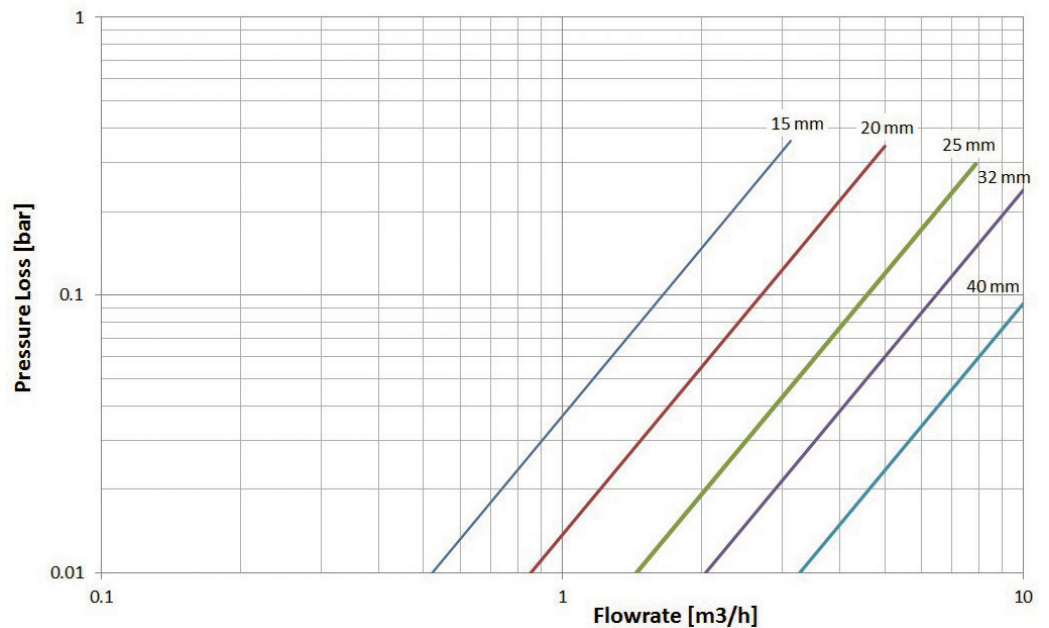
The DN15 (1/2") meter has  $k=0.067$  and  $\Delta p$  less than 0.48bar at  $Q_3$ .

The DN20 (3/4") meter has  $k=0.019$  and  $\Delta p$  less than 0.27bar at  $Q_3$ .

The DN25 (1") meter has  $k=0.006$  and  $\Delta p$  less than 0.23bar at  $Q_3$ .

The pressure loss for all sizes meet the ISO 4064: 2005, OIML R49 standards.

### Pressure Loss vs. Flowrate





# wPrime™ Series 280W-R

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### Order Specifications

Base Unit

280W-R- <input type="checkbox"/> -DN <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> - <input type="checkbox"/> - <input type="checkbox"/> - <input type="checkbox"/>			
<b>Meter Type</b>			
Meter Without Valve	NV		
Meter With Valve (for DN15 & DN20)	V		
Meter With Pressure (for DN40)	NVP		
<b>Meter Size</b>			
DN15 / 1/2"	15		
DN20 / 3/4"	20		
DN25 / 1"	25		
DN32 / 1 1/4"	32		
DN40 / 1 1/2"	40		
<b>Pipe Joint (For Tail Piece)</b>			
BSP (default)	A		
NPT	B		
<b>Accessory</b>			
With tail piece and non-return valve (default)	1		
		<b>Comm Interface</b>	
0	TTL serial (default)		
1	M-bus		
4	RF868-Wmbus		
5	RF433-Wmbus		
6	RF915-LoRaWan		
B	NB-IoT		
F	RF868-LoRaWan		
J	RF866-LoRaLan		
N0	NB-IoT BC28		
		<b>Dynamic Range</b>	
A	R160		
B	R250 (default)		
C	R315		
D	R400		

#### Required Components (Choose one if TTL serial interface is selected in the base unit)

Output Interface Module	Model No.
M-Bus Module (wired)	280WA-MB
RS485 / Modbus Module	280WA-485MOD
RS485 Module (for 485-BACnet / MSTP Adapter only)	280WA-485

#### Optional Components

External Adapter	Model No.
485-BACnet / MSTP Adapter (RS485 Module is required)	280WA-BACTP485

#### Example

##### • 280W-R-NV-DN20-A-1-B-B

stands for the 280W-R wPrime™ Series Residential Water Meter of R250 with NB-IoT wireless for pipe DN20mm BSP pipe joint and a pair of tail pieces with non-return valve, but without built-in ball valve.

## About Spire Metering Technology

Spire Metering is a global leader in flow and energy management solutions. Through continuous innovation, we transform complex ultrasonic technology into affordable, reliable solutions for accurate flow and energy measurement. Spire Metering offers water, heat, electricity and gas meters as well as AMR/AMI and prepaid solutions. To find out how we can help today, please tell us about your application.

