



wPrime™ Series 280W-CI

ULTRASONIC WATER METER

Spire Metering offers the latest in Commercial/Industrial ultrasonic metering technology for reliable flow measurement. The rugged 280W-CI water meter will provide sustained flow accuracy for the life of the meter while providing connectivity to smart AMR/AMI solutions.

Applications

- Any application that requires high accuracy across all flow rates for revenue billing
- Municipal, commercial, and distribution applications including reclaim and irrigation water requirements
- Commercial buildings: malls, campus, hospitals, industrial parks, airports, facilities
- Industrial water: steel, heavy manufacturing plants, power plants, food & beverage



- Leak and tamper detection, DMA (District Metered Area) leakage detection system
- AMR/AMI projects which require flow accuracy with an economical solution

Features & Benefits

- The only quad-path technology available on the market! Improves accuracy, increases tolerance to installation error and reduces straight-pipe run requirement
- Low pressure drop. Saves significant pumping cost
- Fully encapsulated in a heavy-duty enclosure with IP68 rating
- No moving parts; dependable ultrasonic performance without maintenance
- Not affected by water impurity. Withstands the challenges in harsh environments, such as the Middle East and Africa
- Excellent performance at all flow rates; accuracy does not degrade over the life of the meter
- NSF-61G Approved
- Exceed ISO4064 Class D and AWWA C750
- 10 Year battery life
- Bi-directional flow; no strainer required
- Does not measure entrained air in pipe
- Unaffected by magnetic interference
- DN50 (2") to DN300 (12") sizes
- Tamper-proof design
- AMR/AMI ready with Encoder, 4-20mA, M-Bus, Modbus, BACnet, long range RF or GPRS wireless
- Data Logger with 700 daily totals and 24 monthly totals
- Built-in temperature sensor for wide range temperature compensation
- Built-in pressure sensor for pipeline pressure monitoring in real time

DS-280W-CI-1309_Rev21



Spire Metering Technology LLC, 249 Cedar Hill Street, Marlborough, MA 01752, USA

Tel +1 978 263-7100 / 888 738-0188 (toll-free) **Fax** +1 978 418-9170 **sales@spiremt.com** **www.SpireMT.com**



wPrime™ Series 280W-CI ULTRASONIC WATER METER



A member of the wPrime™ Series, the 280W-CI Ultrasonic Water Meter is specially designed for commercial and industrial water metering applications where the environment is challenging and traditional mechanical water meters fail.

280W-CI is carefully engineered to offer robust performance in harsh environments. The flow sensor utilizes a crystal to generate an ultrasonic signal. There are no moving parts to wear out over time, as in traditional mechanical meters. The electronics, transducers and cables are all encapsulated in a heavy-duty metal enclosure which is IP 68 rated. It is suitable for both outdoor and indoor applications and anywhere the meter may be submersible.

The 280W-CI offers the most advanced water flow measurement by using state-of-the-art

quad-path ultrasonic technology. It employs at least 4 pairs of ultrasonic transducers to interrogate the flow from different positions, so that flow profile distortion has minimal impact on the measurement results. This is a significant improvement compared to single-path ultrasonic flow meters, because it is very common in real applications that there is not enough straight-pipe run after an elbow, a valve or a pump, or the sensor installation is not perfectly aligned with existing pipe line. In those scenarios, turbulence (swirl) or other type of secondary flow could cause errors with single-path flow meters.

The technical specification of the 280W-CI water meter meets the ISO 4064 (or OIML R49) water meter standards for Class D accuracy, and exceeds the AWWA C750-10 water meter standard. The operational temperature ranges from 0.1°C (32.2°F) to 60°C (140°F) including safety temperature up to 85°C. The built-in pressure sensor provides critical real-time pressure information of the pipeline for leak detection and network pressure optimization. The large display can be set to display the flow total, flow rate, working time, leakage alarm, reverse flow, and more. The meter also has a remote readout which could be configured as M-Bus, RS485/Modbus, 4-20mA, BACnet, or wireless.

Spire Metering's 280W-CI Ultrasonic Water Meter stands out among the competition due to its rugged design, quad-path technology, wide dynamic range, real-time pressure information and extensive AMR functions. The 280W-CI performs reliably when the water has high particulate or the environment is harsh. Both commercial and industrial installations can profit from the advantages of precision, wear-free water flow measurement, operational security and long service life.

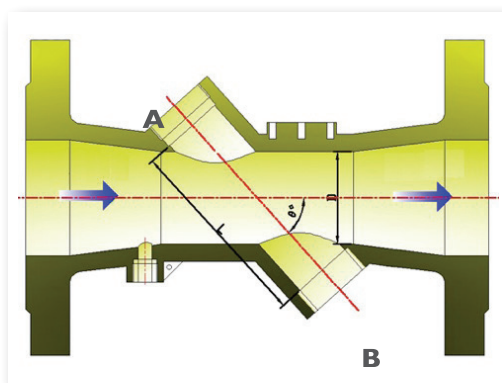




wPrime™ Series 280W-CI ULTRASONIC WATER METER

Operating Principle

The wPrime series ultrasonic water meter consists of a flow-cell, a pair of ultrasonic flow transducers and an integrator. The transducers are firmly mounted on the flow-cell at the optimal position. As illustrated, the transducers face each other with one on the upstream, and the other on the downstream.



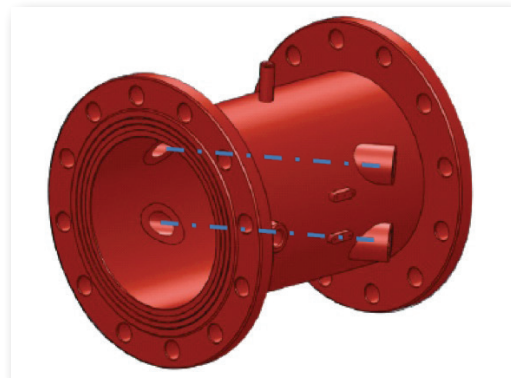
The integrator (or calculator) controls the two ultrasonic transducers to transmit and receive ultrasounds to conduct precise flow measurement. Specifically, it operates the two transducers which transmit a pulse of ultrasonic energy into the water flow toward the opposite transducer. The integrator detects the pulse signal which has traveled within the flow tube, and then is received by the opposite transducer. With advanced digital signal processing technology, the integrator precisely measures the arrival (or transit) time of each pulse signal.

Since the transit-time difference between the two pulses is directly proportional to flow velocity, it can calculate the flow velocity and flow rate. This is accomplished by combining it with the geometry of the flow-cell and fluid dynamics theory.

Only ultrasonic pulses are used to interrogate the flow which enables the meter to have no moving parts. Since the principle is based on the transit-time *difference* instead of transit-time, all the interfering factors, such as temperature, pressure, solids concentration and water quality, are cancelled out. The end result is an ultrasonic metering system which is inherently robust!

Unique Quad-path Technology

In real application, it is not easy to install the flow sensor perfectly in line with the pipe line. A slight misalignment could cause flow profile distortion inside the flow sensor, and thus cause significant measurement errors. Spire Metering developed a unique quad-path technology to solve this problem. Four pairs of ultrasonic transducers are mounted on the flow sensor body to interrogate the flow from four different paths (for illustration purposes, the figure shows a dual-path sensor design.) A flow calculation algorithm based on fluid dynamics theory is then used to derive an average flow reading with improved accuracy.





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Automatic Meter Reading

The wPrime series water meter offers a variety of interface options, such as M-Bus, RS485/Modbus, BACnet, Encoder, 4-20mA and wireless (GPRS and Radio). It is very flexible to be integrated into an AMR/AMI system.

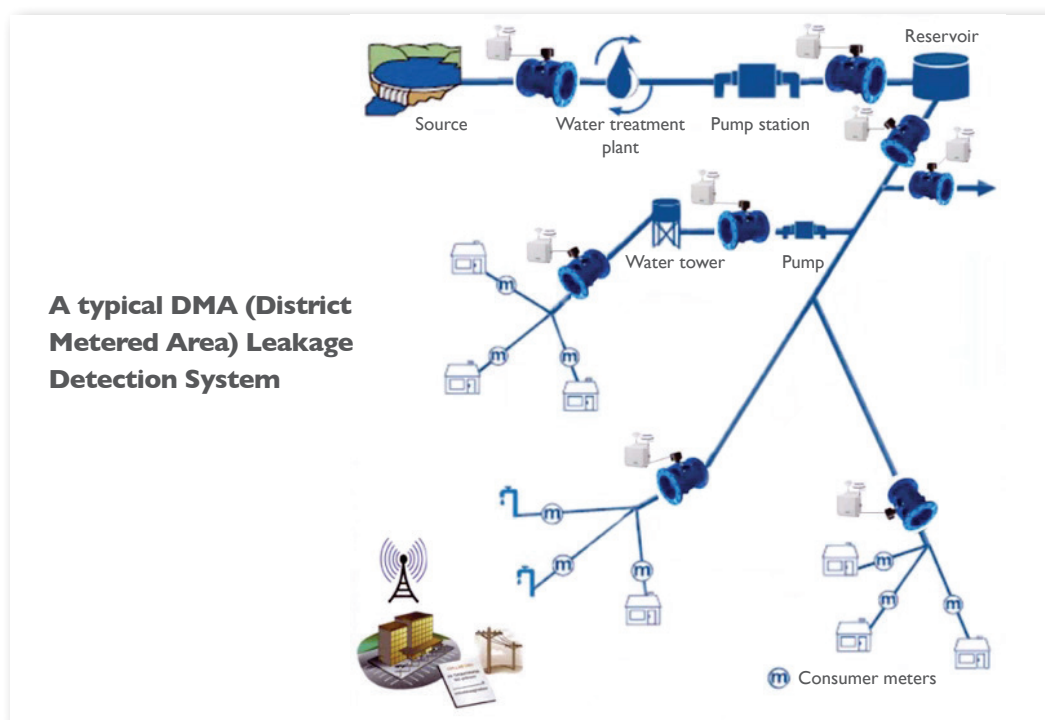
Spire Metering also offers a complete range of AMR/AMI solutions as well as an integrated billing system. The SpireCapture system is a cutting edge fixed automatic meter reading system which integrates both wired and wireless AMR/AMI technologies. The system provides a unified platform for meter reading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

SpireCapture is an advanced, highly robust meter reading solution that delivers

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

For information on AMR/AMI parts, such as concentrators, repeaters, protocol convertors, data collection devices and more,

please contact : solutions@spiremt.com





wPrime™ Series 280W-CI

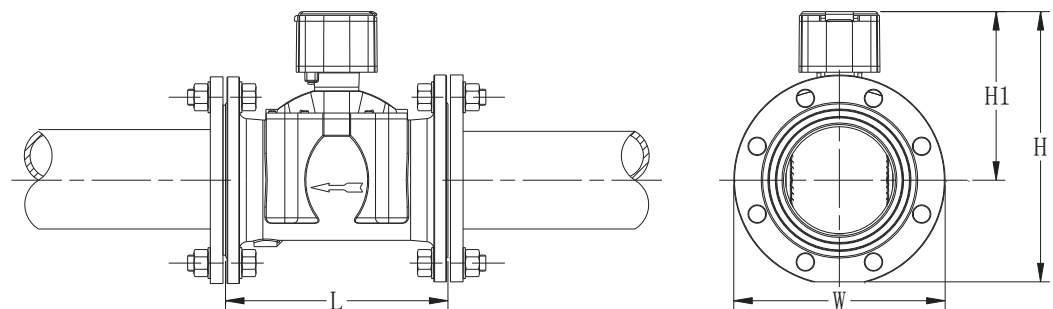
ULTRASONIC WATER METER

Technical Specifications

Nominal Size		DN50 2"	DN65 2.5"	DN80 3"	DN100 4"	DN125 5"	DN150 6"	DN200 8"	DN250 10"	DN300 12"
L	mm	200	200	225	250	250	300	350	450	500
	inch	7.9	7.9	8.9	9.8	9.8	11.8	13.8	17.7	19.7
W	mm	175	185	200	220	250	285	340	405	460
	inch	6.89	7.3	7.9	8.7	9.8	11.2	13.4	15.9	18.1
H1	mm	178	186	203	209	227	245	274	300	348
	inch	7.01	7.3	8	8.2	8.9	9.6	10.8	11.8	13.7
H	mm	263	276	292	315	348	383	438	480	578
	inch	10.35	10.9	11.5	12.4	13.7	15.1	17.2	18.9	22.8
Q4	m³/h	31.25	50	78.75	125	200	312.5	500	787.5	1250
	GPM	137.6	220.1	346.7	550.4	880.6	1375.9	2201.4	3467.3	5503.6
Q3	m³/h	25	40	63	100	160	250	400	630	1000
	GPM	110.1	176.1	277.4	440.3	704.5	1100	1761.2	2773.8	4402.9
Q2	m³/h	0.16	0.256	0.4032	0.64	1.024	1.6	2.56	4.032	6.4
	GPM	0.7	1.13	1.78	2.82	4.51	7.04	11.27	17.15	28.18
Q1	m³/h	0.1	0.16	0.252	0.4	0.64	1	1.6	2.25	4
	GPM	0.44	0.70	1.11	1.76	2.82	4.40	7.04	9.91	17.61
Qs	m³/h	24	31	42	68	96	132	224	352	512
	GPM	0.11	0.14	0.18	0.30	0.42	0.58	0.99	1.55	2.25
Pipe Joint		Flange (Default: DIN)								
		Nut4-M16	Nut4-M16	Nut8-M16	Nut8-M16	Nut8-M16	Nut8-M20	Nut12-M20	Nut12-M24	Nut12-M24
Body Material		304 SS or Ductile Iron					Ductile Iron			

Note:

- 1) Quad-path ultrasonic technology.
- 2) Default flange is DIN type (metric) flange. ANSI flange is available upon request.
- 3) The data listed in above table is for dynamic range R250. For R500, Q2 and Q1 data would be half of those for R250.
- 4) Meter size larger than DN300 (12") is available upon request. The flow cell body material is carbon steel.





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ULTRASONIC WATER METER

Pressure Sensor

Pressure Range: 0.00~10.00 Bar*

Pressure Accuracy: +/-1% (@25°C) span

Temperature Range: -20°C ~ 85°C

Update time: 8s

Protection: Hermetically sealed

***Note:** the sensor can measure higher pressure, but the error will be higher than the specified.

Electrical Data

Power Supply: Battery, 3.6V, Lithium

Replacement Interval: 10 years at $t_{BAT} \leq 30^\circ\text{C}$ (86°F) based on 1 reading per day through communication module

Power Consumption: <0.1W

Backup Power Supply: Internal SuperCap

Communication Interface: M-Bus, Optional: RF 433MHz or RF 868MHz wMBUS*. RF 470MHz long range, Encoder, GPRS, 4~20mA, Modbus, BACnet / MSTP

CE approval: EN61326-1:2006

Electromagnetic Class: E2

***Note:** for OMS-compliant wMBus, please contact support@spiremt.com for details.

Accuracy / MPE (Maximum Permissible Error)

MPE according to OIML R49 / ISO4064

+/-2% in range $Q2 \leq Q < Q4$; ± 5 in range $Q1 \leq Q \leq Q2$

Metrology Data

Accuracy Class: 2 (according to ISO4064 / OIML R49)

Metrological Class: D (according to ISO4064 / OIML R49)

Range Q3/Q1: 250 (R500 available as an option)

Temperature Rating T30

Mechanical Data

Environmental Class: B. Optional A

Electromagnetic Class: E1

Environmental Temp: 0~55°C(32~131°F)

Permissible Flow Temp: 0.1~60°C (32.2~140°F) for permanent and up to 85°C (185°F) for short term (<24hours). However, factory calibration is done at room temperature only

Enclosure Protection: IP68

Integrator Detachable: No

Lid Cover Protection: Yes

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 Δp is pressure loss, Q is volume flow rate and k is the coefficient.

All meters have Δp less than 0.63bar at Q3, meet ISO4064 / OIML R49 standard and AWWA standard.



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ULTRASONIC WATER METER

Order Specifications

Base Unit

Attention



You must also order one output interface module from the Required Components table to make a complete system.

280W - CI - - - - -

Meter Size

Metric Unit System	English Unit System
DN50	IN2
DN65	IN2.5
DN80	IN3
DN100	IN4
DN125	IN5
DN150	IN6
DN200	IN8
DN250	IN10
DN300	IN12

Flange / Body Pressure

DIN Flange / PN16 (Default)	A
ANSI Flange* / RF150#	B
DIN Flange / PN25	C
ANSI Flange* / RF300#	D

Pressure Sensor

N	Without (Default)
Y	With (available for ductile iron sensor only)

Dynamic Range

A	250 (Default)
B	500 (available for ductile iron sensor only)

Sensor Body Material

1	Ductile Iron (for DN50/2"~DN300/12")
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*Note:

- The actual outer diameter of the water meter flange is slightly smaller than the ANSI flange standard. All other parameters of the flange comply with the ANSI standard.

Required Components (Choose One)

Output Interface Module	Model No.
M-Bus Module	280WA-MB
RS485 / Modbus Module	280WA-485MOD
RS485 Module (for 485-BACnet/MSTP Adapter Only)	280WA-485
Encoder Module for Metric Unit	280WA-E-DNxx
Encoder Module for English Unit	280WA-E-INxx
4-20mA & RS485 / Modbus Module	280WA-MODAO
433MHz RF with Battery (wMBus-OMS)	280WA-RF433-B
470MHz RF Module with Battery (long range)	280WA-RF470-B
868MHz RF Module with Battery (wMBus-OMS)	280WA-RF868-B

Optional Components

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

Example

280W-CI-DN100-A-1-A-N stands for the wPrime series C&I water meter for DN100 size with DIN flange and Metric Unit display. Flow cell body is made from ductile iron. R250 dynamic range.

280WA-RF470-B stands for a battery powered RF wireless module operating at 470MHz free frequency band.



wPrime™ Series 280W-CI

ULTRASONIC WATER METER

Order Specifications

For Stainless Steel Water Meters

280W - CI - - - - -

Meter Size

Metric Unit System	English Unit System
DN50	IN2
DN65	IN2.5
DN80	IN3
DN100	IN4

Flange / Body Pressure

DIN Flange / PN16	A
DIN Flange + Matching Flange / PN16	B

Sensor Body Material

304 SS	1
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Dynamic Range

250 (Default)	A
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Pressure Sensor

Without (Default)	N
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Attention

You must also order one output interface module from the Required Components table (see previous page) to make a complete system.

