



SpiRely™ Series

AWWA ULTRASONIC WATER METER

Spire Metering offers the latest in Commercial/Industrial ultrasonic metering technology for reliable flow measurement. The rugged SpiRely 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 water and water distribution network
- Waste water, irrigation water, reclaim water and storm water
- 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 low life cycle costs

Features & Benefits

- No moving parts; dependable ultrasonic performance without maintenance; lifetime accuracy without degrading
- Fully encapsulated in a heavy-duty enclosure with IP68 / NEMA 6P submersible rating
- Straight through flow cell design without diameter reduction, neither strainer. Ignorable pressure loss, saves significant pumping cost
- NSF61-G proved. Meets or exceeds AWWA C715
- Detect active leak, backflow, tampering, flow rate, and pipe burst
- 10 years battery lifetime with battery life indication. Battery replaceable in the field
- Does not measure entrained air in pipe and is unaffected by magnetic interference
- AMR / AMI ready with LoRa wireless, 4G, Pulse, Encoder, Modbus and 4-20mA
- Data Logger with 700 daily totals and 24 monthly totals

DS-Sp280W-CI2-180901_Rev.3



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SpiRely™ series Ultrasonic Water Meter is specially designed for municipal, commercial and industrial water metering applications where the demand is challenging and traditional mechanical water meters fail.

The SpiRely™ series 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 NEMA 6P/IP68 submersible rated. It is suitable for both outdoor and indoor applications and anywhere the meter may be submersible.

The SpiRely™ series offers the most advanced water flow measurement by

using state-of-the-art multi-path ultrasonic technology. It employs 2 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 SpiRely™ series water meter meets the ISO 4064 (or OIML R49) water meter standards for Class D accuracy, and exceeds the AWWA C715 water meter standard. The operational temperature ranges from 32.2°F to 140°F continuous duty. 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 can be configured as encoder, RS485/Modbus, pulse, or LoRa wireless. The LoRa wireless can be used for both drive-by and AMI meter reading.

Spire Metering's SpiRely™ series Ultrasonic Water Meter stands out among the competition due to its rugged design, multi-path technology, wide dynamic range, long last battery with field replaceable feature and extensive AMR functions. The SpiRely™ series is even able to perform 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.



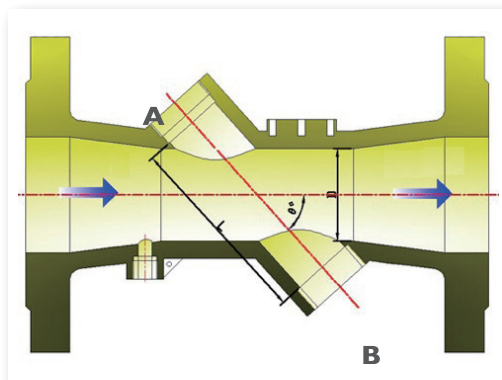


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Operating Principle

The SpiRely™ 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.



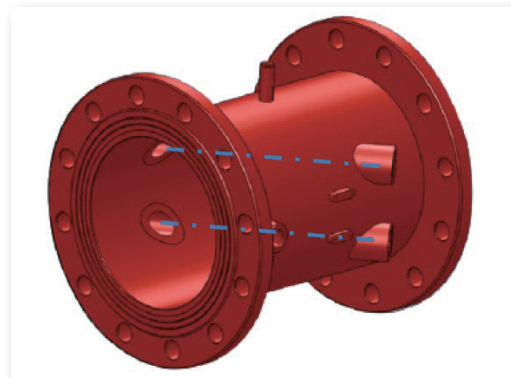
The integrator (or calculator) controls the two ultrasonic transducers to transmit and receive ultrasounds to conduct precise flow measurement. Specifically, it operates the two transducers which transmit a pulse of ultrasonic energy into the water flow toward the opposite transducer. The integrator 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 Multi-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 multi-path technology to solve this problem. Two pairs of ultrasonic transducers are mounted on the flow sensor body to interrogate the flow from two different paths. 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 SpiRely™ series water meter offers a variety of interface options, such as Pulse, RS485/Modbus, encoder, 4-20mA and wireless (LoRa Radio). This flexibility allows for easy integration 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 RS485/Modbus networks, LoRa wireless networks, 4G 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

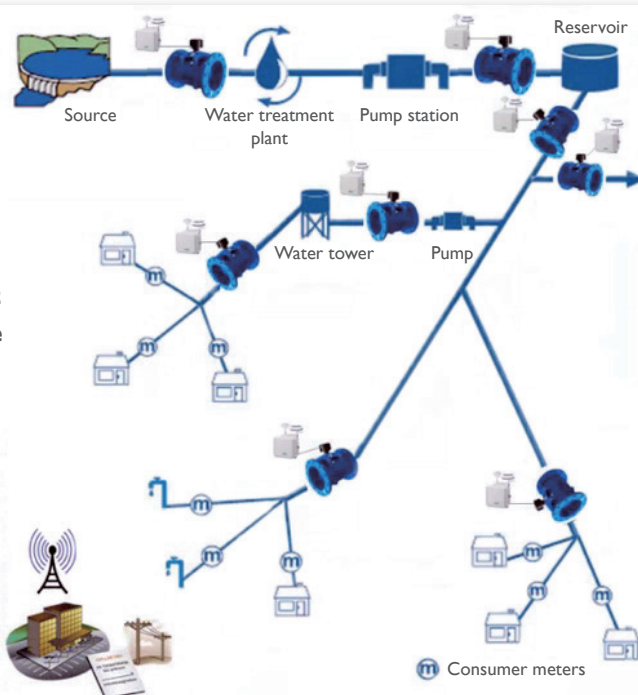
timely, high-resolution meter reading. This data enables gas, water, heat and electric utilities to eliminate on-site visits and estimated reads, reduce theft and loss, implement time-of-use billing, and profit from all of the financial and operational benefits of fixed-network AMI/AMR.

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

please contact : solutions@spiremt.com



A typical DMA (District Metered Area) Leakage Detection System





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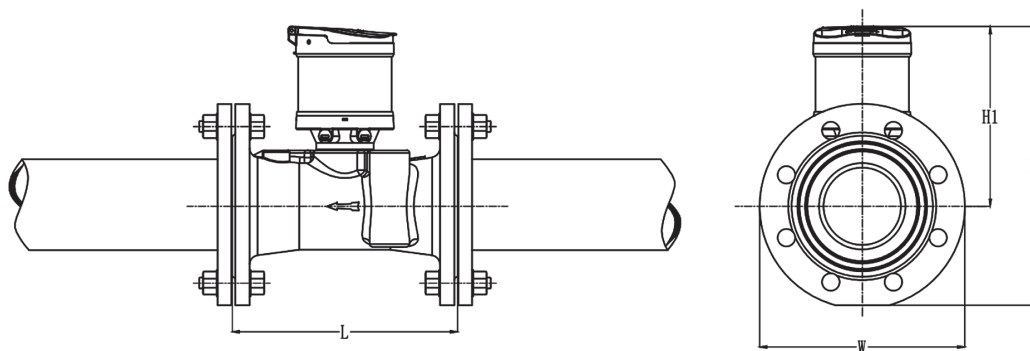
Technical Specifications

Metrology Performance

	Unit	Nominal Size			
		DN80	DN100	DN150	DN200
		3"	4"	6"	8"
Start Flow	GPM	0.15	0.18	0.3	0.5
Minimum Flow Rate (100%+/-5%)		1.40	2.24	5.59	8.80
Normal Flow Range -L (100%+/-1.5%)		2.23	3.58	8.94	14.08
Normal Flow Range -U (100%+/-1.5%)		550	881	2200	3465
Safe Max Operating Capacity		550	881	2200	3465
Pressure Loss at SMOC	psi	3.14	2.99	2.84	3.37

Dimensions and Weight

L	mm	225	250	300	350
	inch	8.9	9.8	11.8	13.8
W	mm	201	221	284	340
	inch	7.9	8.7	11.2	13.4
H1	mm	231	235	254	273
	inch	9.1	9.25	10	10.74
H	mm	320	335	385	434
	inch	12.6	13.2	15.15	17.1
Weight	kg	10	12.5	23	31
	lbs	22	27.5	50.7	68.3





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Electrical Data

Power Supply:	Battery, 3.6V, Lithium
Replacement Interval:	10 years at $t_{BAT} < 86^{\circ}\text{F}$, replaceable
Backup Power Supply:	Internal SuperCap
Communication Interface:	LoRa Wireless, Pulse, RS485 / MODBUS, Encoder, 4-20mA
CE approval:	EN61326-1:2006

Metrology Data

Meets AWWA C715 standard as well as ISO4064 / OIML R49 standard

Accuracy Class:	2 (according to ISO4064 / OIML R49)
Metrological Class:	D (according to ISO4064 / OIML R49)
Temperature Rating	T30

Mechanical Data

Environmental Class:	B. Optional A
Electromagnetic Class:	E1
Environmental Temp:	32~131°F
Permission Flow Condition:	fully charged pipe, water with suspended solids less than 5%. Solid size less than 1/16". None viscous fluids.
Permissible Flow Temp:	32.2~140°F for permanent and up to 185°F for short term (<24hours). Higher temperature rating can be made upon request. However, factory calibration is done at room temperature only
Enclosure Protection:	NEMA 6P / IP68
Integrator Detachable:	No
Lid Cover Protection:	Yes
Working Pressure:	232 psi

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 Q_3 , meet ISO4064 / OIML R49 standard and AWWA standard.



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Order Specifications

Base Unit

SP – 280W – CI2 – – – – F –

Meter Size	ID
3"	IN3
4"	IN4
6"	IN6
8"	IN8

Output Interface	ID
Serial TTL (default)	0
LoRa 915MHz Wireless for drive-by and AMI	5

ID	Flange / Body Pressure
B	ANSI Flange* / RF150#

ID	Sensor Body Material
1	Ductile Iron

***Note:**

- The flange OD and thickness of the meter have slight deviation than that of an ANSI 150# flange.
- The meter body length is shorter than AWWA C715 standard.

Optional Components

Output Interface Module*	Model No.
Encoder Module	280AP-E-INxx
4-20mA & RS485 / Modbus Module	280AP-MODAO
LoRa 915MHz Wireless Endpoint with Antenna for Drive-by and AMI	280AP-MR-LR2915
Pulse Output Module (dry contact, requires 12-24VDC)	280AP-P2
BACnet / MSTP Module (requires 12-24VDC)	280AP-MSTP

***Note:** Those modules require the base unit to have Serial TTL output interface. Therefore, please choose option 0 in the Output Interface option in the main unit model number.

Example

SP-280W-CI2-IN4-0-1-F-B stands for the SpiRely™ series C&I water meter for 4" size with TTL serial output ductile iron body and ANSI RF150# flange.



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Memo

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 solutions. To find out how we can help today, please tell us about your application. You can contact us by email at solutions@spiremt.com or by phone at +978 263 7100.