flownetix

300series® Ultrasonic Smart Water Meter

Technical Data Sheet

FNDOC-UK-DS-300/1-01, October 2008

FEATURES

- No moving, vibrating or pressure changing parts
- Full bore meter; no reduction in bore or separate measurement chamber, all measured water passes through measurement section
- No errors due to wear
- Measuring elements have no contact with water
- Does not measure air
- Unaffected by grit and particulates
- Wide temperature specification range
- Low pressure drop, simple flow path
- WRAS approved wetted parts
- Low power battery powered electronics (10 year life)
- Visual display and AMR
- Long term accuracy and reliability due to internal self verification and correction
- Strainers and non-return values not required [1]
- No reverse flow measurement
- High pressure rating
- Continuous operation
- Simple pulse output to replace mechanical meters
- Automatic viscosity and temperature compensation
- Intelligent with data bus for more remote use
- High production volume, low cost
- OEM branding for volume customers and utilities
- 100% performance test in production
- Tamper resistant

[1] Not required to protect the meter; local regulations may require

APPLICATIONS

- Domestic water metering
- Commercial water metering
- Sub-metering for landlords
- Irrigation water use measurement

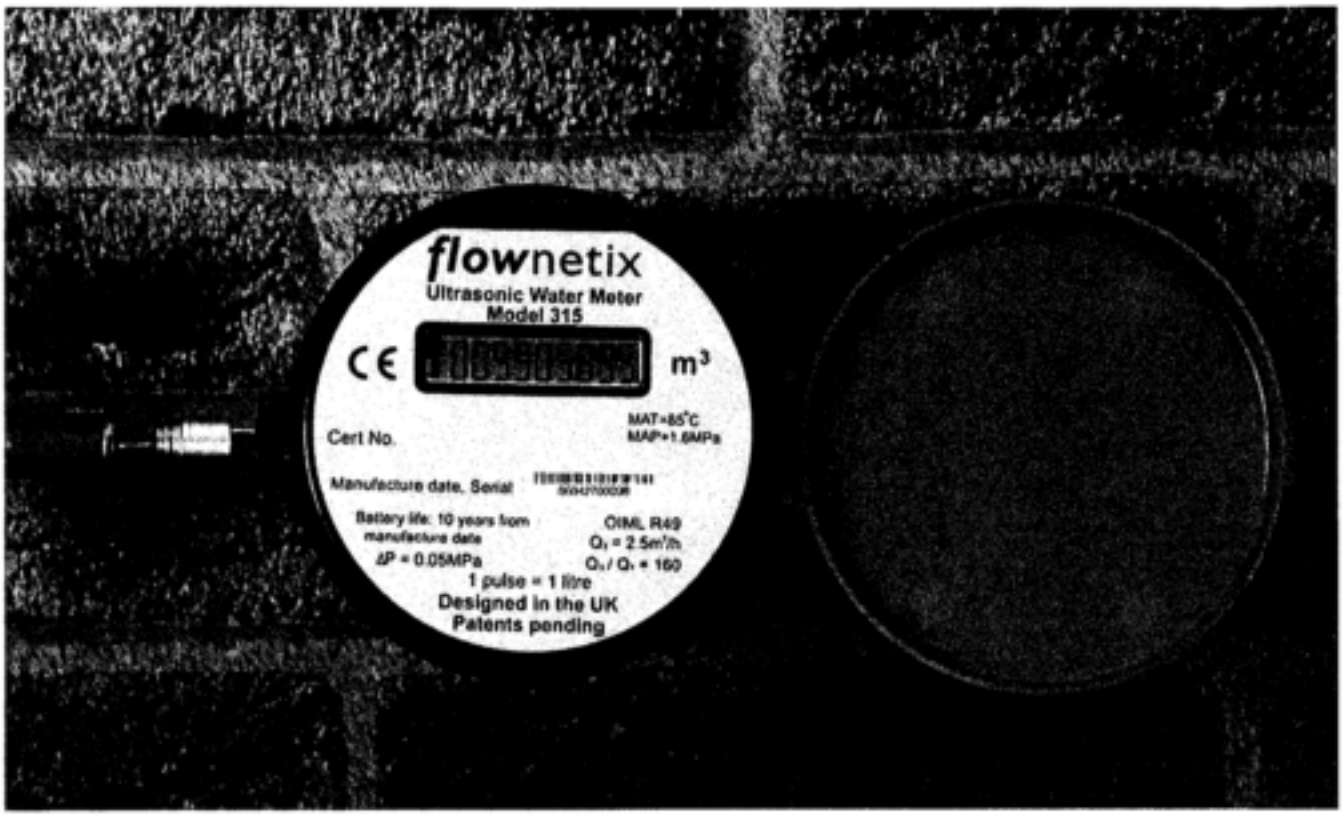
DESCRIPTION

The Flownetix 300series® is unique in that, for the first time, a fully electronic non-moving part consumer water meter is available to the mass market at a price comparable to mechanical metering solutions, but with a huge number of advantages to utilities and consumers.

Using Flownetix's unique low cost, low power Ultrasonic Flow Measurement Technology, flowengine®, the 300series® solves all the problems commonly encountered in growing markets demanding metering of consumer water usage where mechanical meters fail and alternative technologies are too costly. Discontinuous supply due to high populations or shortage of available water, high levels of entrained solids, aggressive desalinated water, long periods of air only flow, high pressure high air flow rates, low pressure water flow or zero flow are all handled without degrading the performance or life of the meter. Performance is maintained across a wide liquid and ambient temperature range.

With no moving parts or sensors in contact with the water and using a single WRAS approved plastic material for the simple flow rube results in very low (or zero) pressure loss, offering improved efficiency and removing the need for strainers or non-return valves to protect the meter. Battery powered with operation for up to 10 years, the unit is sealed for life, does not require maintenance and offers IP68 ingress protection. Air flow is not metered offering consumer confidence, particles up to the size of the meter's bore pass without jamming or clogging the meter.

The Flownetix 300series® is available in a full range of sizes from 15mm to 50mm; 15mm meters are competitively priced compared to quality mechanical products, large bore meters benefit from the simple flow cell design to offer consider savings over all other consumer or industrial meters, both in purchase and installation cost.



ORDERING INFORMATION

Flownetix products are made in volume to order at our dedicated production facility. In order to ensure the correct configuration of parts ordered, please order using only the following part numbering format:

FN315-OEM/FNX
(1) (2)

(1) Model type (315, 320, 325, 340, 350)
(2) Branding (FNX or specific code for high volume customers requiring their own branding)

Standard items[1] available:

PRODUCT	NOMINAL BORE	FITTING	NOMINAL FLOW RATE	PULSE OUTPUT	ORDER CODE
315	15mm (½")	½ BSP	2.5m³/h	1 pulse = 1 litre	FN315-OEM/FNX
320	20mm (¾")	¾ BSP	4.0m³/h	1 pulse = 1 litre	FN320-OEM/FNX
325	25mm (1")	1 BSP	6.3m³/h	1 pulse = 1 litre	FN325-OEM/FNX
340	40mm (1½")	1½ BSP	16.0m³/h	1 pulse = 10 litres	FN340-OEM/FNX
350	50mm (2")	2 BSP	25.0m³/h	1 pulse = 10 litres	FN350-OEM/FNX

[1] Non-standard items are subject to a minimum production quantity from the factory of 10,000 units of any one type. Not all combinations and values are available. Please consult Flownetix before ordering non-standard parts.

ABSOLUTE MAXIMUM RATINGS

Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. Voltages are relative to the COMMON connection on the 4 pin connector.

Supply voltage	Powered by internal battery
NPN pulse output current	50mA
NPN pulse output voltage	30V
All inputs/outputs	-0.3V
Ambient temperature	80°C
Liquid temperature	85°C to maintain WRAS approval
Storage temperature	Always in operating state
Maximum torque	315, 320, 325 : 20Nm 340, 350 : 150Nm

SPECIFICATIONS

Using water with $T_a = T_{liquid} = 25°C$ unless otherwise stated

PARAMETER	CONDITIONS	315	320	325	340	350	UNIT
MECHANICAL							
Continuous operating pressure	$T_{liquid} = 25°C$	1.6	1.6	1.6	1.6	1.6	MPa
		16	16	16	16	16	bar
	$T_{liquid} = 60°C$						MPa
							bar
	$T_{liquid} = 85°C$						MPa
							bar
Maximum pressure [1]	$T_a = 25°C$, 1 minute	3.2	3.2	3.2	3.2	3.2	MPa
		32	32	32	32	32	bar
Flow cell configuration		Inline U-tube	Inline U-tube	Inline U-tube	Straight	Straight	
Materials (wetted parts)		EMS Grivory HTV-4X1 Black 9205	EMS Grivory HTV-4X1 Black 9205	EMS Grivory HTV-4X1 Black 9205	EMS Grivory HTV-4X1 Black 9205	EMS Grivory HTV-4X1 Black 9205	
Materials (enclosure)		PC GE Lexan 243R	PC GE Lexan 243R	PC GE Lexan 243R	PC GE Lexan 243R	PC GE Lexan 243R	
Materials (lid)		PP	PP	PP	PP	PP	
WRAS listing (material)		0707527	0707527	0707527	0707527	0707527	
WRAS listing (product)		TBC	TBC	TBC	TBC	TBC	
Connection type		½ BSP	¾ BSP	1 BSP	1¼ BSP	2 BSP	
Dimensions (overall)		145x107x121	201x107x161	199x107x161	245x118x137	245x118x137	mm
Dimensions (casing)		92x92x121	133x107x161	133x107x161	152x118x137	152x118x137	mm
Mass		0.49	0.79	0.79	0.76	0.81	kg
Protection class [1]		IP68 (BS EN 60529)	IP68 (BS EN 60529)	IP68 (BS EN 60529)	IP68 (BS EN 60529)	IP68 (BS EN 60529)	
Interface connector		Switchcraft EN3C4M	Switchcraft EN3C4M	Switchcraft EN3C4M	Switchcraft EN3C4M	Switchcraft EN3C4M	

SPECIFICATIONS (continued)

PARAMETER	CONDITIONS	315	320	325	340	350	UNIT
FLOW (performance as prescribed by OIML R49)							
Nominal flow rate (Q3)		2.5	4.0	6.3	16.0	25.0	m^3/h
Maximum flow rate (Q4) [3]		3.0	5.0	7.0	20.0	30.0	m^3/h
Transitional flow rate (Q2)		25.0	40.0	63.0	160.0	250.0	l/h
Minimum flow rate (Q1)		15.6	25.0	40.0	100.0	156.0	l/h
Turndown ratio (Q4/Q1)		200	200	200	200	200	
OIML R49 Q3/Q1		160	160	160	160	160	
Minimum registered flow	Typical	8	14	20	50	80	l/h
ISO4064 equivalent class		C	C	C	C	C	
Accuracy [1]	T_{liquid} < 30°C, Q2 < Q < Q4	±2	±2	±2	±2	±3	% reading
	T_{liquid} >= 30°C, Q2 < Q < Q4	±3	±3	±3	±3	±3	% reading
	Q1 < Q < Q2	±5	±5	±5	±5	±5	% reading
Resolution (display)		1	1	1	1	1	l
Resolution (internal)		0.001	0.001	0.001	0.001	0.001	l
Ambient temperature [2]		-10 - 80	-10 - 80	-10 - 80	-10 - 80	-10 - 80	°C
Liquid temperature [2]		0 - 85	0 - 85	0 - 85	0 - 85	0 - 85	°C
Pressure loss	Q = Q4	0.04	0.04	0.04	0	0	MPa
		0.4	0.4	0.4	0	0	bar
Suitable liquid sound speeds		1380-1580	1380-1580	1380-1580	1380-1580	1380-1580	m/s
Max. admissible pressure (MAP)	$T_a = T_{liquid}$ = 25°C	1.6	1.6	1.6	1.6	1.6	MPa
		16	16	16	16	16	bar
Max. admissible temperature (MAT)	$T_a = T_{liquid}$ = 25°C	85	85	85	85	85	°C

PARAMETER	CONDITIONS	315/320/325	340/350	UNIT
ELECTRICAL				
POWER SUPPLY				
External supply		n/a	n/a	
Nominal battery voltage		3.6	3.6	V
Battery type		$LiSOCl_2$	$LiSOCl_2$	
Battery life		>10	>10	years
Battery size		C	C	
DISPLAY				
Type		Liquid crystal (LCD)	Liquid crystal (LCD)	
Maximum display		999999.999	999999.999	m^3
Minimum display		000000.000	000000.000	m^3
PULSE OUTPUT				
Pulse rate [5]	Standard	1	10	l/pulse
Pulse edge time resolution [4]	Standard	32	32	ms
Typical pulse LOW voltage	V_{ext} = 5V, R_{ext} = 10kΩ	0.1	0.1	V
	V_{ext} = 5V, R_{ext} = 3.3kΩ	0.3	0.3	V
	V_{ext} = 5V, R_{ext} = 1kΩ	0.8	0.8	V
	V_{ext} = 24V, R_{ext} = 10kΩ	0.4	0.4	V
	V_{ext} = 24V, R_{ext} = 3.3kΩ	1.0	1.0	V
	V_{ext} = 24V, R_{ext} = 1kΩ	3.6	3.6	V
Typical pulse rise time	V_{ext} = 5V, R_{ext} = 10kΩ	<10	<10	µs
	V_{ext} = 5V, R_{ext} = 3.3kΩ	<10	<10	µs
	V_{ext} = 5V, R_{ext} = 1kΩ	<10	<10	µs
	V_{ext} = 24V, R_{ext} = 10kΩ	<10	<10	µs
	V_{ext} = 24V, R_{ext} = 3.3kΩ	<10	<10	µs
	V_{ext} = 24V, R_{ext} = 1kΩ	<10	<10	µs

[1] 100% production tested
[2] Do not allow liquid to freeze inside the meter
[3] Unlike mechanical meters, the maximum flow can be sustained continuously. Exceeding the maximum flow may affect output accuracy but will not damage the meter as long as maximum pressure ratings are not exceeded
[4] Pulses are designed for counting, measuring frequency is not recommended due to software interrupt time resolution
[5] Other pulse rates may be available on request, battery life will be reduced

MECHANICAL INSTALLATION

Fittings

The pipe connections are BSP threads and suitable couplings of the correct size for the meter must be used. The 300series meters are constructed from tough, durable materials; however when connecting the meter to the pipework, the fittings should be tightened to no more than the maximum torque figures given above.

A strainer and non-return valve are not required in order to protect the meter; these items may be mandated by local regulations and should be installed additionally if required.

To prevent causing damage to the meter the load should be braced against the pipework and not against the meter tail or body. The meter should be supported by a second spanner on the flats at the meter tails. To prevent leaks, it is recommended that PTFE tape or a suitable thread sealant be used on the meter tails during installation. DO NOT OVER-TIGHTEN.

IMPORTANT SAFTEY INFORMATION FOR INSTALLATION INTO METAL PIPELINES

The meter body and pipe connections are plastic; continued earth bonding of the supply pipe must be made by an external earth cable connecting the inlet and outlet sides together.

Once the water supply is connected the presence of water in the meter can be confirmed by the appearance of drop symbol on the display which flashes under flow conditions.

Installation position

The 300series® may be installed at any angle although it is recommended that in situations where there is the likely to be large amounts of air present in the water supply the meter should be mounted vertically for best performance.

The meter should not be placed on the suction side of a pump, always on the outlet side. A pipe inlet diameter that matches the inlet on the meter is recommended.

THE 300SERIES® IS NOT GUARANTEED SANITARY FROM THE FACTORY AND SHOULD BE FLUSHED, CLEANED OR TREATED AS REQUIRED BY LOCAL REGULATIONS BEFORE INSTALLATION.

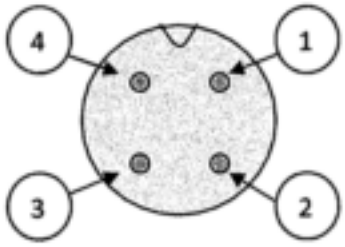
Entrained air/solids

This meter is designed to operate on clean liquids only. Higher levels of air or solid can prevent transmission of the ultrasonic signal and the output will fall to zero, although will cause no damage to the meter.

ELECTRICAL CONNECTIONS

Interface connector

Connector pinout - viewed from side of meter
(Mating plug: Switchcraft EN3C4M 4 pin IP68 locking connector)



PIN	COLOUR	NAME	DESCRIPTION
1	Black	COMMON	Common/GND
2	Red	TOUCHPAD	Connection to Flownetix 300PAD inductive touchpad
3	Yellow	DATA IN	Data bus input, leave unconnected or tie to COMMON if not used
4	Blue	PULSE/DATA OUT	Open drain pulse output and data bus output, requires pull-up resistor

OUTPUT FUNCTIONS

OUTPUT FUNCTION	EMPTY TUBE CONDITION	NO FLOW CONDITION	FORWARD FLOW CONDITION	REVERSE FLOW CONDITION
Pulse output	No pulses [1]	No pulses [1]	Pulse rate proportional to flow rate [2]	No pulses
LCD count	No accumulation	No accumulation	Accumulates according to volume of water	No accumulation
LCD ♦ symbol	OFF (blinking ON every 16 seconds)	ON (blinking OFF every 16 seconds)	Blink speed increases with flow rate [3]	Blink speed increases with flow rate [3]

[1] Pulse may stop in the LOW or HIGH condition to mimic mechanical meters
[2] Pulses are designed for counting, due to software interrupt speed resolution measuring the frequency is not recommended
[3] Non-linear relationship for indication only due to wide flow turndown ratio