

Ultrasonic water meter DN15 – DN600 with factory-integrated communication – NB-IoT, wM-Bus, LoRaWAN, M-Bus and more

MID 2014/32/EU · MI-001

OIML R 49:2013

CLASS 2

UP TO R 800

U0 / D0

IP68

> 13 YRS BATTERY

One measuring platform from the service connection to the trunk main

The VUSWM is a static ultrasonic water meter for cold and hot water, available on **one single measuring platform** from the domestic metering point up to the trunk main. Measuring technology, communication options, data model and software integration are identical across the entire size range. This considerably simplifies procurement, stockholding, installation training and system integration in large-scale rollouts.

Measurement is based on the **transit-time difference principle**: piezoelectric transducers transmit and receive ultrasonic waves with and against the direction of flow, and the difference in transit time is proportional to flow velocity. As no moving part sits in the measuring path, there is no mechanical wear – accuracy remains stable over the entire service life and no recalibration is required. Sand, suspended solids and air bubbles do not affect the measurement.

The communication version is defined at the time of ordering and integrated into the meter ex works; NB-IoT, wireless M-Bus, LoRaWAN, M-Bus, RS485/BACnet and pulse output are available. In the **NB-IoT version**, data is transmitted at board level directly over the licensed mobile network into the target platform – with no plug-on module, no gateway and no dedicated radio infrastructure.



DN15 – DN600

19 sizes on one platform – identical metrology, communication and data model across the entire range.

NB-IoT ex works

Standard version, integrated at board level – no plug-on module, no gateway, no dedicated radio network. Alternatively wM-Bus, LoRaWAN, M-Bus, RS485 or pulse.

U0 / D0

No straight inlet or outlet sections required – across all sizes. Saves space in chambers, basements and retrofits.

> 13 years

Battery life DN15 – DN300: two full verification cycles without battery replacement. DN350 – DN600 over 6 years.

Product features

- Static ultrasonic meter without moving parts – no wear, no recalibration
- Straight measuring tube for low pressure loss; unaffected by sand, suspended solids and air bubbles
- Selectable turndown ratio **R 250 / R 400 / R 500 / R 800**, accuracy class 2 to MID
- Bidirectional measurement with separate totalisation of reverse flow
- Any mounting position – horizontal, vertical or inclined, with no loss of accuracy
- Local data logger: 720 days at hourly resolution, 36 monthly and 16 annual values
- Automatic retransmission of buffered values after a communication outage (NB-IoT version)
- Leakage, reverse flow, empty pipe, tamper, temperature and battery alarms
- Non-resettable calculator, sealing and protected metrological software

Typical applications

- **Drinking water supply** – consumption metering in residential, commercial and industrial use
- **Billing** – custody transfer metering to MID 2014/32/EU and OIML R 49
- **Sub-metering** – cost allocation in residential and commercial buildings
- **Network monitoring** – district metering, minimum night flow, loss localisation
- **Pressure monitoring** – network pressure and load analysis with optional pressure sensor
- **Remote shut-off** – remote opening and closing with optional valve (DN15 – DN25)
- **Smart metering rollouts** – area-wide deployment without dedicated radio infrastructure

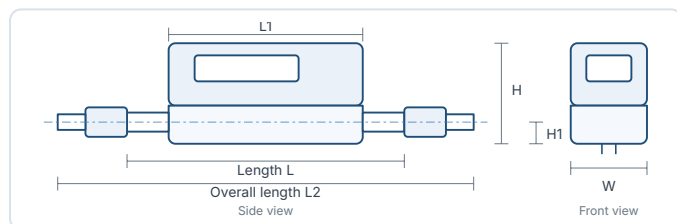
01 Hydraulic performance data

DN	Q3 M ³ /H	Q1 M ³ /H	LENGTHS MM	THREAD / FLANGE
15	2.5	0.00313	110 / 165 / 175 ¹	G ¾ B / G 1¼ B ¹
20	4	0.005	130 / 190 / 195 / 175 ¹	G 1 B / G 1¼ B ¹
25	6.3	0.00788	160 / 225 / 260	G 1¼ B
32	10	0.0125	180 / 230 / 260	G 1½ B
40	16	0.02	200 / 245 / 300	G 2 B
50	25	0.03125	200 / 270 / 280 / 300	4 × ø18
50	40	0.05	200 / 270 / 280 / 300	4 × ø18
65	40	0.05	200 / 300	4 × ø18
80	63	0.07875	225 / 300 / 350 / 370	8 × ø18
100	100	0.125	250 / 350 / 360 / 370	8 × ø18

Q1 at R 800; for R 250 / R 400 / R 500, Q1 = Q3 / R. Q2 = 1.6 × Q1 · Q4 = 1.25 × Q3. ¹ DN15 / DN20 optionally G 1¼ B, length 175 mm. Pressure loss ≤ 0.25 / 0.40 bar (Δp 25 / Δp 40) for DN15 – DN40, ≤ 0.10 / 0.25 bar (Δp 10 / Δp 25) from DN50. Further lengths are type-approved for each size – list on request.

02 Installation dimensions DN15 – DN40

DN	H MM	H1 MM	W MM	L1 MM	L2 – L	THREAD A	UNION B
15	91	31	90	97	+ 94	G ¾ B	R ½
20	91	28	90	97	+ 104	G 1 B	R ¾
25	91	25	90	97	+ 120	G 1¼ B	R 1
32	128	29	90	97	+ 120	G 1½ B	R 1¼
40	139	36	90	97	+ 128	G 2 B	R 1½



L = length as per table 1. L2 = overall length including unions at both ends. Dimensions from DN50 on request.

03 Construction and materials

Body DN15 – DN40	Brass or stainless steel SUS304, threaded connection
Body DN50 – DN600	Grey or ductile cast iron, coated, flanged connection
Measuring tube	Stainless steel SUS304 / SUS316L (1.4301 / 1.4404), analysis to ISO 16143-1
Transducers	Piezoceramic in stainless steel: 2 sensors (DN15 – DN40), 2 pairs (DN50 – DN300), 3 pairs (DN350 – DN600)
Ingress protection	IP68, permanently submersible
Calculator	Non-resettable – no change to measuring program or data after factory programming

DN	Q3 M ³ /H	Q1 M ³ /H	LENGTHS MM	THREAD / FLANGE
125	160	0.2	250 / 350	8 × ø18
150	250	0.3125	300 / 350 / 500	8 × ø22
200	400	0.5	350 / 500	12 × ø22
250	630	0.7875	400 / 450	12 × ø26
300	1000	1.25	450 / 500	12 × ø26
350	1600	2.0	500	16 × ø26
400	2500	3.125	500 / 550 / 600	16 × ø30
450	2500	3.125	600	20 × ø30
500	4000	5.0	600 / 650 / 800	20 × ø33
600	4000	5.0	750 / 800	20 × ø36

04 Accuracy and classification

Maximum permissible error	± 2 % for Q2 ≤ Q ≤ Q4 (≤ 30 °C), ± 3 % (> 30 °C), ± 5 % for Q1 ≤ Q < Q2
Accuracy class	Class 2 to MID 2014/32/EU, Annex III (MI-001)
Turndown ratio Q3/Q1	Selectable R 250 / R 400 / R 500 / R 800 (OIML R 49-1:2013)
Temperature class	T30 / T50; DN15 – DN40 additionally T70
Flow profile sensitivity	U0 / D0 – no straight inlet or outlet sections required
Working pressure	MAP 10 (1.0 MPa), MAP 16 (1.6 MPa); MAP 25 optional
Ambient temperature	–25 °C to +55 °C
Environmental classes	Mechanical M1, electromagnetic E1 / E2
Flow direction	Forward and reverse, depending on parameter setting
Display range	99 999 m ³ (DN15 – DN40), 99 999 999.99999 m ³ (from DN50)
Test resolution	0.01 dm ³ (DN15 – DN40)

05 Installation and operating conditions

Medium temperature	0.1 – 30 °C or 0.1 – 50 °C by class; DN15 – DN40 optionally 70 °C
Mounting position	Horizontal, vertical or inclined, with no loss of accuracy
Straight sections	Not required (class U0 / D0)
Power supply	3.6 V lithium cell, replaceable; optionally 24 VDC external
Battery life	> 13 years (DN15 – DN300), > 6 years (DN350 – DN600); depending on transmission interval, signal quality, temperature
Flow direction	Arrow on the meter body

06 NB-IoT communication

Availability	Standard version – alternatives see 09
Technology	3GPP Cat-NB2 (Rel. 13/14), licensed spectrum; integrated at board level ex works, no plug-on module
Link budget	164 dB MCL – up to 20 dB margin over GSM
Frequency bands EU	Band 3 (1800 MHz), band 8 (900 MHz) and band 20 (800 MHz)
SIM	Included, no separate mobile contract required
Transmission interval	1 minute to 1 day, configurable
Backend	MQTT, REST, webhook; VERILOG or existing HES / MDM / ERP systems
Encryption	AES-128/256 to 3GPP, SIM-based device authentication, optional APN with VPN
Resilience	Three-stage watchdog with automatic recovery
Energy management	Adaptive transmit power and sleep depth by signal quality and temperature
Antenna	Internal, optional external SMA connector

07 Alarm and status functions

Leakage	Continuous flow over a defined period, including very low flow rates
Reverse flow	Detection and separate totalisation
Empty pipe	Dry running or partially filled measuring tube
Tamper	Housing opened, sealing status in the telegram
Temperature	Medium temperature above or below limits
Battery	Early warning for meter and communication module
Signal quality	Warning on weak radio signal strength
Device status	Temporary / permanent device error, application status

10 Versions and options

Pressure sensor	Pipe pressure measurement with display and transmission in kPa
Shut-off valve	DN15 – DN25: remote opening and closing
External antenna	SMA connector with extension cable

08 Display, data logger and diagnostics

LC display with selectable menus (normal, scrolling and single-value display); from DN50 as single- or dual-screen version. Operation is contactless via a **magnetic switch** – hold the magnetic pen on the symbol position of the display.

Displayed values	Forward volume (default) and reverse volume, instantaneous flow, water temperature, pipe pressure (with pressure sensor), date / time
Service values	Operating and alarm hours, primary / secondary address, battery voltage, software version and checksum, display test
Alarm symbols	Empty pipe, transducer fault with channel, water temperature < 4 °C
Data logger	720 daily values at hourly resolution, 36 monthly and 16 annual values
Retransmission	Buffered values transmitted automatically with time stamp (NB-IoT version)

09 Communication interfaces

The communication version is defined at the time of ordering and integrated ex works; field retrofit is not intended. Telegrams to EN 13757.

NB-IoT	3GPP Cat-NB2, direct transmission without gateway (standard version)
Optical	Standard, EN 1434-3 / EN 61107, bidirectional, 2400 baud
M-Bus (wired)	EN 13757, 300 – 9600 bit/s
wireless M-Bus	433 / 868 / 169 MHz, EN 13757, OMS
RS485 / BACnet	300 – 9600 bit/s, EN 13757, Modbus, BACnet
LoRa / LoRaWAN	EU868
Cellular (alternative)	GPRS, LTE Cat-1 and 4G
Pulse	Volt-free, 2- or 5-wire (S0 / reed)

External supply	24 VDC additional supply
Display version	From DN50 single- or dual-screen display
Retrofit unit	External NB-IoT device for existing meters with pulse or encoder output

Approvals, standards and test evidence

Conformity assessment	MID 2014/32/EU, Annex II modules B + D, Annex III MI-001; notified body NB 2275 (MRC, RO)	Standards and evidence	OIML R 49-1/-2:2013, EN 13757; WRAS (GB), PZH (PL), material and IP test reports by SGS – on request. Verification period Germany: cold water 6 years (MesseEV annex 7), extension by sampling procedure under § 35 MesseEV
Certificates	EU type examination RO-2275-26715 (DN15 – DN40) and RO-2275-26716 (DN50 – DN600), valid until 14 Apr 2036; module D RO-2275-26-454, valid until 23 Feb 2029	Marking and security	CE and metrology marking with the identification number of the notified body (art. 21 MID); mechanical sealing, software and data electronically protected