



Water & Heat Metering

2021 Product Catalogue



Who we are

Polish tradition and high technologies

Apator Powogaz SA is a member of Apator SA, a corporate group of the largest Polish manufacturers of metering instruments and systems for utilities. Apator Powogaz covers the whole utility sector by providing metering solutions for water, heat, natural gas, and electricity.

Based in Poznań, Poland, our listed corporation is a global leader in water meter production. Apator Powogaz is ranked 6th in EMEA. The strong market presence stems from great experience and professionalism in the production of metering solutions. We have been delivering high-tech and competitive metering devices for 95 years.

The product range of Apator Powogaz includes water meters, the core business of the production operations, with heat meters and heating cost allocators. Apator Powogaz always follows the latest trends in technology; the range of our solutions expands to services in AMR, utility billing, and water and heat distribution management. The products of Apator Powogaz are sold in Poland, Europe, and beyond. They have been popular in the Middle East, the Far East, Africa, and both Americas. Stepping up to the increasing demands of customers around the globe, Apator Powogaz continues to develop its products and improve the quality of services as a part of a consistent strategy of leadership in the industry.

Structure of the Apator Group:



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Heat metering

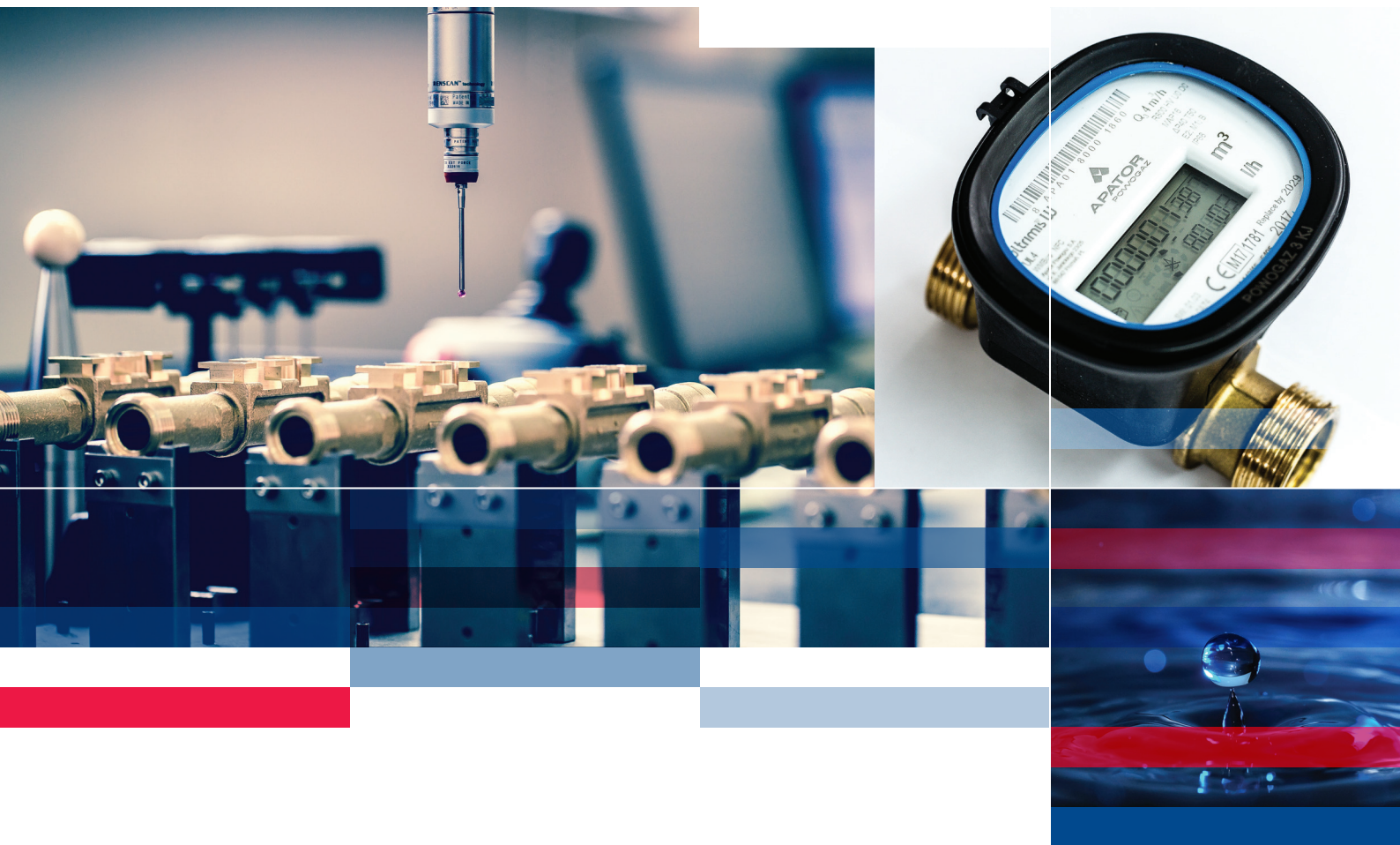
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Water metering

UL ULTRIMIS W

Ultrasonic water meters (DN15-50)



ULTRIMIS W

UL ULTRIMIS W

Application

Measurement of water flow and volume up to 50°C in full-flow rated, closed-loop systems, MAP 16 bar, where the application requires precision metering of water consumption. The water meter is a smart device which supports latest connectivity solutions, like NFC and RF AMR walk-by and drive-by systems. Complete with an electronic display (IP68), the water meter can be installed in any orientation (H; V; H/V) and requires no straight piping upstream or downstream of the connection ports UODO.

Measurement range (MID):

- Cold water: **R250, R400, R500 or R800**



Table 1. Basic technical data

Type		Q ₃ (m ³ /h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)
Cold water meters – brass body						
UL 2,5 Ultrimis W	R800 max	2.5	15	80; 110; 115; 165	G ³ / ₄ G ⁷ / ₈ -> G ³ / ₄ *	0.48 to 0.60
UL 4 Ultrimis W	R800 max	4	20	105; 115; 130; 190	G1	0.61 to 0.77
UL 6,3 Ultrimis W	R800 max	6.3	25	165; 260	G1 ¹ / ₄	1.05; 1.39
UL 10 Ultrimis W	R800 max	10	32	260	G1 ¹ / ₂	1.68
UL 16 Ultrimis W	R800 max	16	40	300	G2	2.15
UL 25 Ultrimis W	R500 max	25	50	200; 270; 300	G2 ¹ / ₂ or flanged**	6.29; 6.75; 6.95
Cold water meters – composite body						
UL 2,5 -01 Ultrimis W	R800 max	2.5	15	80; 110	G ³ / ₄	0.29; 0.31
UL 4-01 Ultrimis W	R800 max	4	20	105; 130	G1	0.33; 0.34

* Thread size 7/8" -> 3/4" available for 115 mm long units only

** Connection flange bolt hole pattern:

- Standard: PN-EN 1092-2 (PN10), DIN 2532, DIN2501 (PN10), BS4504 (PN10)

- Special: PN-EN 1092-2 (PN16) (available on request)

Product features

- Measurement based on a unique and patented ultrasonic beam path through the measurement chamber: the W-Sonic Technology
- No moving components in the measurement chamber
- Immune to EM fields
- IP68 as standard
- Resistant to hydrodynamic impact
- Requires no strainers or check valves
- High measurement stability insensitive to any metering system contamination
- Measurement range up to R800 in every operating orientation (H, V, H/V)
- Starting flow from 0.75 l/h for DN15
- Very low pressure loss
- Battery life guaranteed up to 12 years with RF connectivity enabled and the RF data frames transmitted 24/7 at a fixed transmission interval of 12 s***
- Various body materials available: brass or composite
- Hygiene standard compliant: including DVGW, WRAS, and ACS
- WELMEC 7.2 Ed. 5 compliant

*** If in compliance with the installation instructions

JS SMART D+

Single-jet vane-wheel dry water meters (DN15-20)

Application

Measurement of water flow and volume up to 90°C in full-flow rated, closed-loop systems, MOP 16 bar (PN16). For installation in horizontal piping with the counter upward (**H** ↑) or to either side (**H** →) and in vertical piping with the counter sideways (**V**). The standard Smart D+ water meters feature low-profile 8-barrel counters (IP65), brass bodies, and pre-equipment for AMR (automatic meter reading) connectivity.

Measurement range (MID):

- Cold water: **R160;R200 – (H↑); R63;R80 - V, (H→)**
- Hot water: **R160 – (H↑); R80 - V, (H→)**



JS SMART D+

JS SMART D+



Table 2. Basic technical data

Type		Q_3 [m³/h]	DN [mm]	Length (mm)	Connection ends	Net weight (kg)
Cold water meters						
JS 1,6-05 Smart D+	R160	1,6	15	110	G3/4	0,463
JS 1,6-07 Smart D+	R160	1,6	15	110	G3/4	0,463
JS 2,5-05 Smart D+	R200	2,5	15	110	G3/4; G7/8	0,458
JS 2,5-07 Smart D+	R200	2,5	15	110	G3/4; G7/8	0,458
JS 2,5-G1-05 Smart D+	R200	2,5	20	130	G1	0,589
JS 2,5-G1-07 Smart D+	R200	2,5	20	130	G1	0,589
JS 4-05 Smart D+	R200	4	20	130	G1	0,552
JS 4-07 Smart D+	R200	4	20	130	G1	0,552
Hot water meters						
JS90 1,6-05 Smart D+	R160	1,6	15	110	G3/4	0,463
JS90 1,6-07 Smart D+	R160	1,6	15	110	G3/4	0,463
JS90 2,5-05 Smart D+	R160	2,5	15	110	G3/4; G7/8	0,458
JS90 2,5-07 Smart D+	R160	2,5	15	110	G3/4; G7/8	0,458
JS90 2,5-G1-05 Smart D+	R160	2,5	20	130	G1	0,589
JS90 2,5-G1-07 Smart D+	R160	2,5	20	130	G1	0,589
JS90 4-05 Smart D+	R160	4	20	130	G1	0,552
JS90 4-07 Smart D+	R160	4	20	130	G1	0,552

Water meter version:

- **-05** - 8-barrel counter, brass body, pre-equipped for communication module installation, version with a snap ring with a cover
- **-07** - 8-barrel counter, brass body, pre-equipped for communication module installation, version with a snap ring without a cover
- **-Ti/Ir** - with counter pointer in optical reading version or for APT-WMBUS-NA-1 module induction reading

Product features

- High measuring sensitivity R-rating
- Revised water meter counter guard with improved resistance to tampering
- Reliable readings by compliance with the latest MID requirements
- Pre-equipped for: RF module for Wireless M-Bus, pulse, and M-Bus modules
- Easy counter reading
- Fogging-resistant hermetical counter (by increased sealing)
- Counter mechanism rotation lock at 360° of turn
- Frost-damage protection
- Double-sided rotor bearings
- Water meter outlet end preequipped for an optional check valve

JS SMART C+

Single-jet vane-wheel dry water meters (DN15-20)

Application

Measurement of water flow and volume up to 50°C in full-flow rated, closed-loop systems, MOP 16 bar (PN16). For installation in horizontal piping with the counter upward (**H** ↑) or to either side (**H** →) and in vertical piping with the counter sideways (**V**). The standard Smart C+ water meters feature 8-barrel counters (IP65), SN+ anti-tamper magnetic protection, brass bodies, and pre-equipment for AMR (automatic meter reading) connectivity.



JS SMART C+

Measurement range (MID):

- Cold water: **R160** - (**H** ↑); **R63** - **V**, (**H** →)



Table 3. Basic technical data

Type		Q_3 (m ³ /h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)
Cold water meters*						
JS 1,6-02 Smart C+	R160	1.6	15	110	G $\frac{3}{4}$	0.43
JS 2,5-02 Smart C+	R160	2.5	15	110	G $\frac{3}{4}$	0.43
JS 2,5-G1-02 Smart C+	R160	2.5	20	130	G1	0.57
JS 4-02 Smart C+	R160	4	20	130	G1	0.53

Water meter versions:

- **02** – 8-barrel counter, brass body, communication module installation ready

Available on request:

- **IP68** – counter ingress protection (IP) rating

- **Ti/Ir** – with counter pointer in optical reading version or for APT-WMBUS-NA-1 module induction reading

Product features

- Immune to strong EM fields
- Pre-equipped for: RF module for Wireless M-Bus, pulse, and M-Bus modules
- Reliable readings by compliance with the latest MID requirements
- Easy counter reading
- Fogging-resistant hermetical counter (by increased sealing)
- Counter mechanism rotation lock at 360° of turn
- External mechanical tamper protection
- Frost-damage protection
- Double-sided rotor bearings
- Water meter outlet end preequipped for an optional check valve

JS SMART +

Single-jet vane-wheel dry water meters (DN15-20)

Application

Measurement of water flow and volume up to 30°C or 50°C or 90°C hot water in full-flow rated, closed-loop systems, MOP 16 bar (PN16). For installation in horizontal piping with the counter upward (**H↑**) or to either side (**H→**) and in vertical piping with the counter sideways (**V**). The standard Smart+ water meters feature 8-barrel counters (IP65), SN+ anti-tamper magnetic protection, brass bodies, and pre-equipment for AMR (automatic meter reading) connectivity.



JS90 SMART+

JS SMART+

Measurement range (MID):

- Cold water: **R100** - (**H↑**); **R50** - **V**, (**H→**)
- Hot water: **R80** - (**H↑**) or **R100****** - (**H↑**); **R40** - **V**, (**H→**) or **R50****** - **V**, (**H→**)



Table 4. Basic technical data

Type*		Q ₃ (m ³ /h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)
Cold water meters						
JS 1,6-02 Smart+	R100	1.6	15	110	G¾	0.43
JS 1,6-03 Smart+	R80	1.6	15	110	G¾	0.25
JS 2,5-02 Smart+	R100	2.5	15	110***	G¾	0.43
JS 2,5-03 Smart+	R80	2.5	15	110	G¾	0.25
JS 2,5-G1-02 Smart+	R100	2.5	20	130	G1	0.57
JS 4-02 Smart+	R100	4	20	130	G1	0.53
Hot water meters**						
JS90 1,6-02 Smart+	R100****	1.6	15	110	G¾	0.43
JS90 1,6-03 Smart+	R80	1.6	15	110	G¾	0.25
JS90 2,5-02 Smart+	R100****	2.5	15	110***	G¾	0.43
JS90 2,5-03 Smart+	R80	2.5	15	110	G¾	0.25
JS90 2,5-G1-02 Smart+	R100****	2.5	20	130	G1	0.57
JS90 4-02 Smart+	R100****	4	20	130	G1	0.53

*Water meter versions:

-02 – 8-barrel counter, brass body, communication module installation ready

-03 – 8-barrel counter, composite body (available in JS 1,6 and JS 2,5 with 110 mm of length, R100 for cold water and R80 for hot water)

Available on request:

-IP68 – counter ingress protection (IP) rating

-Ti/Ir – with counter pointer in optical reading version or for APT-WMBUS-NA-1 module induction reading

** Special versions available on request:

-02-5 – hardened bearing version (for hot water circulation systems)

*** On request: 80 mm long versions (available in JS 2,5 and JS90 2,5 with brass bodies)

**** Available on request

Product features

- Immune to strong EM fields
- Pre-equipped for: RF module for Wireless M-Bus, pulse, and M-Bus modules
- Reliable readings by compliance with the latest MID requirements
- Easy counter reading
- Fogging-resistant hermetical counter (by increased sealing)
- Counter mechanism rotation lock at 360° of turn
- External mechanical tamper protection
- Frost-damage protection
- Water meter outlet end preequipped for an optional check valve
- Double-sided rotor bearings

JS-NK

Single-jet vane-wheel dry water meters (DN15-20)

Application

Measurement of water flow and volume up to 30°C or 50°C or 90°C hot water in full-flow rated, closed-loop systems, MOP 16 bar (PN16). For installation in horizontal piping with the counter upward (**H**↑) or to either side (**H**→) and in vertical piping with the counter sideways (**V**). Complete with pulse modules (JS-NK). The standard versions feature 5-barrel counters (IP65), SN+ anti-tamper magnetic protection, and brass bodies. The water meters can support AMR (automatic meter reading) connectivity.



JS90-NK

JS-NK

Measurement range (MID):

- Cold water: **R100** - (**H**↑); **R50** - **V**, (**H**→)
- Hot water: **R80** - (**H**↑); **R40** - **V**, (**H**→)



Table 5. Basic technical data

Type		Q ₃ (m³/h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)	NK pulse value (dm³/pulse)	
							Standard	On request
Cold water meters								
JS 1,6-XX*	R100	1.6	15	110	G¾	0.65	10	0.25; 1; 2.5 25; 100 250; 1000
JS 1,6-03-XX*	R80	1.6	15	110	G¾	0.47		
JS 2,5-XX*	R100	2.5	15	110***	G¾	0.65		
JS 2,5-03-XX*	R80	2.5	15	110	G¾	0.47		
JS 2,5-G1-XX*	R100	2.5	20	130	G1	0.75		
JS 4-XX*	R100	4	20	130	G1	0.75		
Hot water meters**								
JS90 1,6-XX*	R80	1.6	15	110	G¾	0.65	10	0.25; 1; 2.5 25; 100 250; 1000
JS90 1,6-03-XX*	R80	1.6	15	110	G¾	0.47		
JS90 2,5-XX*	R80	2.5	15	110***	G¾	0.65		
JS90 2,5-03-XX*	R80	2.5	15	110	G¾	0.47		
JS90 2,5-G1-XX*	R80	2.5	20	130	G1	0.75		
JS90 4-XX*	R80	4	20	130	G1	0.75		

Water meter versions:

*-XX notation:

-NK – with reed-relay transmitter, standard wiring length 2 lin.m (10 lin.m maximum) for remote volume reading output

-03-NK – 5-barrel counter, plastic body (available in JS 1,6 and JS 2,5 with 110 mm of length, R80 for cold and hot water)

** Special water meter versions available on request:

-S – hardened bearing version (for hot water circulation systems), not applicable to version 03

*** On request: 115 mm or 80 mm long versions (available in JS 2,5 and JS90 2,5 with brass bodies)

Available on request:

IP68 – counter ingress protection (IP) rating

Product features

- Reliable readings by compliance with the latest MID requirements
- Pre-equipped for AMR systems
- Easy counter reading
- Fogging-resistant hermetical counter (by increased sealing)
- Counter mechanism rotation lock at 360° of turn
- External mechanical tamper protection
- Frost-damage protection
- Double-sided rotor bearings
- Water meter outlet end preequipped for an optional check valve

JS MASTER C+ | JS-NK MASTER C+

Single-jet vane-wheel dry water meters (DN25-40)

Application

Measurement of water flow and volume up to 30°C or 50°C in full-flow rated, closed-loop systems, MOP 16 bar (PN16). For installation in horizontal piping with the counter upward (**H**) and in vertical piping with the counter sideways (**V**).

The JS Master C+ water meters are available in the standard version with a 5-barrel counter (IP65), a brass body with anti-tamper magnetic protection and pre-equipment for RF, pulse and M-Bus modules. A special version of the water meter is available with the NK transmitter module.

The water meters are designed for operation in AMR systems. COMING SOON: An IP68-rated version (copper and glass design), compatible with the APT-WMBUS-NA-1 RF induction module.



Measurement range (MID):

- Cold water: **R160 - H; R63 - V**



Table 6. Basic technical data

Type		Q ₃ (m³/h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)	NK pulse value (dm³/pulse)*	
							Standard	On request
Cold water meters								
JS 6,3 Master C+	R160	6.3	25	260	G1¼	2.0	10	100
JS 6,3-NK Master C+	R160	6.3	25	260	G1¼	2.2		
JS 10 Master C+	R160	10	32	260	G1½	2.2		
JS 10-NK Master C+	R160	10	32	260	G1½	2.4		
JS 16 Master C+	R160	16	40	300	G2	2.5	100	10
JS 16-NK Master C+	R160	16	40	300	G2	2.7		

Water meter versions:

NK – water meter with a reed relay transmitter, standard wiring length: 2 m, remote volume reading output

Counter versions available on request:

* IP68, pre-equipped for operation with the NK transmitter module only

** IP68 glass and copper design version, pre-equipped for operation with the APT-WMBUS-NA-1 module only

Product features

- Pre-equipped for: RF module for Wireless M-Bus, pulse, and M-Bus modules (not applicable to the JS-NK version)
- Easy counter reading
- Fogging-resistant hermetical counter (by increased sealing)
- Counter mechanism rotation lock at 360° of turn
- External mechanical tamper protection
- Double-sided rotor bearings

JS MASTER+ | JS-NK MASTER+

Single-jet vane-wheel dry water meters (DN25-40)

Application

Measurement of water flow and volume up to 30°C or 50°C or 130°C hot water in full-flow rated, closed-loop systems, MOP 16 bar (PN16). For installation in horizontal piping with the counter upward (**H**) and in vertical piping with the counter sideways (**V**).

The JS Master C+ water meters are available in the standard version with a 5-barrel counter (IP65), a brass body with anti-tamper magnetic protection and pre-equipment for RF, pulse and M-Bus modules. A special version of the water meter is available with the NK transmitter module.

The water meters are designed for operation in AMR systems.

Measurement range (MID):

- Cold water: **R100 - H; R50 - V**
- Hot water: **R80 - H; R40 - V**



Table 7. Basic technical data

Type		Q ₃ (m³/h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)	NK pulse value (dm³/pulse)*	
							Standard	On request
Cold water meters								
JS 6,3 Master+	R100	6.3	25	260	G1¼	2.0	10	100
JS 6,3-NK Master+	R100	6.3	25	260	G1¼	2.2		
JS 6,3/165 Master+	R100	6.3	25	165	G1¼	1.6		
JS 6,3/165-NK Master+	R100	6.3	25	165	G1¼	1.8		
JS 10 Master+	R100	10	32	260	G1½	2.2		
JS 10-NK Master+	R100	10	32	260	G1½	2.4	100	10
JS 16 Master+	R100	16	40	300	G2	2.5		
JS 16-NK Master+	R100	16	40	300	G2	2.7		
Hot water meters								
JS130 6,3 Master+	R100	6.3	25	260	G1¼	2.0	10	100
JS130 6,3-NK Master+	R100	6.3	25	260	G1¼	2.2		
JS130 10 Master+	R100	10	32	260	G1½	2.2		
JS130 10-NK Master+	R100	10	32	260	G1½	2.4		
JS130 16 Master+	R100	16	40	300	G2	2.5	100	10
JS130 16-NK Master+	R100	16	40	300	G2	2.7		

Water meter versions:

NK – water meter with a reed relay transmitter, standard wiring length: 2 m, remote volume reading output

Counter versions available on request:

* IP68, pre-equipped for operation with the NK transmitter module only

** IP68 glass and copper design version, pre-equipped for operation with the APT-WMBUS-NA-1 module only, applies to cold water meters

Product features

- Pre-equipped for: RF module for Wireless M-Bus, pulse, and M-Bus modules (not applicable to the -NK version)
- Easy counter reading
- Fogging-resistant hermetical counter (by increased sealing)
- Counter mechanism rotation lock at 360° of turn
- External mechanical tamper protection
- Double-sided rotor bearings

JS IMPERO | JS-NKOP IMPERO

Single-jet vane-wheel dry water meters (DN50-100)

Application

Precision metering of high cold water consumption up to 50°C in full-flow rated, closed-loop systems, MOP 16 bar (PN16). For installation in horizontal piping with the counter upward (**H**). The standard versions of type JS, -NKOP feature 6-barrel counters (IP65) and powder-coated cast-iron bodies. The water meters are designed for operation in AMR systems.

Measurement range (MID):

- Cold water: **R315 - H**









JS IMPERO -IP68**



JS IMPERO



Table 8. Basic technical data

Type		Q ₃ (m ³ /h)	DN (mm)	Length (mm)	Connection ends *****	Net weight (kg)	Pulse value (dm ³ /pulse)		
							NK*		NO*
							Standard	On request	
Cold water meters									
 JS 50	R315	25	50	270	flanged	11.8	100	10	1
	R315	25	50	300***	flanged	14.3			
 JS 50-XX*	R315	25	50	270	flanged	12.2			
	R315	25	50	300***	flanged	14.7			
 JS 65	R315	40	65	300	flanged	16.6			
 JS 65-XX*	R315	40	65	300	flanged	17.0			
 JS 80	R315	63	80	300	flanged	20.0			
	R315	63	80	350***	flanged	21.6			
 JS 80-XX*	R315	63	80	300	flanged	20.4			
	R315	63	80	350***	flanged	22.0			
 JS 100	R315	100	100	360	flanged	23.5			
	R315	100	100	350***	flanged	23.0			
 JS 100-XX*	R315	100	100	360	flanged	23.9			
	R315	100	100	350***	flanged	23.4			

Water meter versions:

* **DN-XX / DN-G-XX - -XX** notation:

-**NKP** – water meter counter (IP65) or (IP68) pre-equipped for installation of NK transmitter modules

-**NKOP** – water meter counter (IP65) pre-equipped for installation of NK and/or NO transmitter modules

The water meter pulse output feature requires installation of a separately purchased transmitter module:

NK transmitter module, cold water applications (IP65) 31-8027-010000; (IP68) 31-8027-050000

NK transmitter module, cold water applications (IP65) 31-7112-010000

** IP68 glass and copper design version, pre-equipped for operation with the APT-WMBUS-NA-1 module only, applies to cold water meters

*** Available on request (ISO 4064 standardized body length)

**** Connection flange bolt hole pattern:

- Standard: PN-EN 1092-2 (PN10), DIN 2532, DIN2501 (PN10), BS4504 (PN10)

Product features

- Pre-equipped for: RF module for Wireless M-Bus, pulse, and M-Bus modules (not applicable to the JS-NKOP version)
- Wide metering range
- Low starting flow
- Double-sided rotor bearings
- Removable measuring insert
- Easy counter reading
- Counter mechanism rotation lock at 360° of turn
- Standard pre-equipment for RF or pulse module installation
- Reliable readings
- Hermetic IP68 counter available on request
- Optional version of the body with a pressure gauge connection port

SV-RTK

Cold water volumetric dry water meters (DN15-40)

Application

Measurement of water flow and volume up to 30°C or 50°C in full-flow rated, closed-loop systems, MOP 16 bar (PN16). For installation in horizontal, vertical and sloping piping at **any orientation** with full metrological performance. The standard water meter versions feature eight-barrel counters (IP65) and brass bodies.

Measurement range (MID):

- Cold water: **R200 - H/V**



SV-RTK



Table 9. Basic technical data

Type		Q ₃ (m ³ /h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)
Cold water meters						
SV-RTK 2,5	R200	2.5	15	110	G ³ / ₄	1.0
	R200	2.5	20	165	G1	1.4
SV-RTK 4,0	R200	4.0	20	190	G1	1.3
SV-RTK 6,3	R200	6.3	25	260	G1 ¹ / ₄	3.2
SV-RTK 10	R200	10	32	260	G1 ¹ / ₂	4.6
SV-RTK 16	R200	16	40	300	G2	6.9

Product features

- Pre-equipped for: RF module for Wireless M-Bus and M-Bus modules
- Extremely high measurement accuracy already at the minimum water flow
- Steady metrological parameters insensitive to the installation orientation
- Extremely low starting flow: already from 1.5 dm³/h in DN15 size
- External mechanical tamper protection
- Redundant protection against ingress of contaminant to the metering unit
- Water meter outlet end preequipped for an optional check valve

MWN NUBIS | MWN-NKOP | MWN130 NUBIS | MWN130-NKP

Horizontal rotor axis propeller water meters (Woltman) (DN40-400)

Application

Measurement of high cold water consumption up to 30°C or 50°C and hot water up to 130°C, MOP 16 bar (PN16). For installation in horizontal piping with the counter upward (**H**), in vertical piping with the counter sideways (**V**), or in sloping piping (**H/V**). The standard versions of type MWN feature 6-barrel counters (IP66; optionally available with IP68) and powder-coated cast-iron bodies. The water meters are designed for operation in AMR systems.

Measurement range (MID):

MWN / MWN130

- Cold water: **R100÷200 - H, V**
- Hot water: **R25÷40 - H, V**

MWN-G / MWN130-G

- Cold water: **R100 - H, V**
- Hot water: **R40 - H, V**



Table 10. Basic technical data

Type		Q ₃ (m³/h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)	Pulse value (dm³/pulse)		
							NK		NO
							Standard	On request	

Cold water meters									
MWN 40 Nubis	R100	25	40	200	flanged****	7.9	10	10	1
MWN 40-XX* Nubis	R100	25	40	200	flanged****	8.3			
MWN 50 Nubis	R100	40	50	200	flanged****	9.9			
MWN 50-XX* Nubis	R100	40	50	200	flanged****	10.3			
MWN 50-G Nubis	R100	40	50	200	G2½	5.4			
MWN 50-G-XX* Nubis	R100	40	50	200	G2½	5.8			
MWN 65 Nubis	R125	63	65	200	flanged****	10.6			
MWN 65-XX* Nubis	R125	63	65	200	flanged****	11.0			
MWN 80 Nubis	R160	100	80	225	flanged****	13.8			
				200***	flanged****	13.3			
MWN 80-XX* Nubis	R160	100	80	225	flanged****	14.2			
				200***	flanged****	13.7			
MWN 100 Nubis	R200	160	100	250	flanged****	15.6			
MWN 100-XX* Nubis	R200	160	100	250	flanged****	16.0			
MWN 125 Nubis	R160	250	125	250	flanged****	18.1			
MWN 125-XX* Nubis	R160	250	125	250	flanged****	18.5			
MWN 150 Nubis	R200	400	150	300	flanged****	40.1			
MWN 150-XX* Nubis	R200	400	150	300	flanged****	40.5			
MWN 200 Nubis	R125	630	200	350	flanged****	51.1			
MWN 200-XX* Nubis	R125	630	200	350	flanged****	51.5			
MWN 250 Nubis	R100	1000	250	450	flanged****	75.1			
MWN 250-XX* Nubis	R100	1000	250	450	flanged****	75.5			
MWN 300 Nubis	R125	1600	300	500	flanged****	103.1			
MWN 300-XX* Nubis	R125	1600	300	500	flanged****	103.5			

Type		Q ₃ (m³/h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)	Pulse value (dm³/pulse)		
							NK		NO
							Standard	On request	
MWN 400 Nubis	Class B	1000 (Q _n)	400	600	flanged****	240.0	10000	1000	105.2632
MWN 400-XX* Nubis	Class B	1000 (Q _n)	400	600	flanged****	240.4			
Hot water meters									
MWN130 40 Nubis	R40	25	40	200	flanged****	7.9	10	10	—
MWN130 40-XX* Nubis	R40	25	40	200	flanged****	8.3			
MWN130 50 Nubis	R40	25	50	200	flanged****	9.9	100		
MWN130 50-XX* Nubis	R40	25	50	200	flanged****	10.3			
MWN130 50-G Nubis	R40	25	50	200	G2½	5.4			
MWN130 50-G-XX* Nubis	R40	25	50	200	G2½	5.8			
MWN130 65 Nubis	R40	40	65	200	flanged****	10.6			
MWN130 65-XX* Nubis	R40	40	65	200	flanged****	11.0			
MWN130 80 Nubis	R40	63	80	200***	flanged****	13.3			
				225	flanged****	13.8			
MWN130 80-XX* Nubis	R40	63	80	200***	flanged****	13.7			
				225	flanged****	14.2			
MWN130 100 Nubis	R40	100	100	250	flanged****	15.6	1000		
MWN130 100-XX* Nubis	R40	100	100	250	flanged****	16.0			
MWN130 125 Nubis	R40	160	125	250	flanged****	18.1			
MWN130 125-XX* Nubis	R40	160	125	250	flanged****	18.5			
MWN130 150 Nubis	R40	250	150	300	flanged****	40.1			
MWN130 150-XX* Nubis	R40	250	150	300	flanged****	40.5	1000		
MWN130 200 Nubis	R25	400	200	350	flanged****	51.1			
MWN130 200-XX* Nubis	R25	400	200	350	flanged****	51.5			
MWN130 250 Nubis	R25	630	250	450	flanged****	75.1			
MWN130 250-XX* Nubis	R25	630	250	450	flanged****	75.5			
MWN130 300 Nubis	R25	1000	300	500	flanged****	103.1	1000	—	
MWN130 300-XX* Nubis	R25	1000	300	500	flanged****	103.5			

Water meter versions:

* **DN-XX / DN-G-XX** – **-XX** notation:

-**NKP** – water meter counter (IP65) or (IP68) pre-equipped for installation of NK transmitter modules

-**NKOP** – water meter counter (IP65) pre-equipped for installation of NK and/or NO transmitter modules

The water meter pulse output feature requires installation of a separately purchased transmitter module:

NK transmitter module, cold water applications (IP65) 31-8027-010000; (IP68) 31-8027-050000

NK transmitter module, hot water applications (IP65) 31-2440-010000

NK transmitter module, cold water applications (IP65) 31-7112-010000

** IP68 glass and copper design version, pre-equipped for operation with the APT-WMBUS-NA-1 module only, applies to cold water meters

*** Available on request (ISO 4064 standardized body length)

**** Connection flange bolt hole pattern:

- Standard: PN-EN 1092-2 (PN10), DIN 2532, DIN2501 (PN10), BS4504 (PN10)

- Special: PN-EN 1092-2 (PN16) (available on request)

- Extra: ANSI B16.5 Class 150 (DN40-300) (available on request)

Product features

- Pre-equipped for: RF module for Wireless M-Bus, pulse, and M-Bus modules (not applicable to hot water meters or the NKOP transmitter version)
- Wide metering range
- Low starting flow
- Removable measuring insert
- Double-sided rotor bearings
- Easy counter reading
- Hermetic IP68 counter available on request
- Counter mechanism rotation lock at 360° of turn
- Reliable readings
- Other bolt hole patterns available on request

MK-01 | MK-01-NKOP

Chamber mount vertical rotor axis water meters (Woltman) (DN50-150)

Application

Measurement of high cold water consumption up to 30°C, MOP 16 bar (PN16). For installation at water drawing locations (i.e. deep wells). The water meter is installed at the piping direction transition from the vertical to the horizontal, and with the counter upward. The standard versions of type MK feature 6-barrel counters (IP65; optionally available with IP68) and powder-coated cast-iron bodies. The water meters are designed for operation in AMR systems.

Measurement range (MID):

- Cold water: **R63**



Table 11. Basic technical data

Type		Q ₃ (m³/h)	DN (mm)	Length (mm)***	Connection ends	Net weight (kg)	Pulse value (dm³/pulse)		
							NK		NO
							Standard	On request	
Cold water meters									
MK 50-01	R63	25	50	150	flanged****	14.0	100	10	1
MK 50-01-XX*	R63	25	50	150	flanged****				
MK 80-01	R63	63	80	180	flanged****	18.0			
MK 80-01-XX*	R63	63	80	180	flanged****				
MK 100-01	R63	100	100	200	flanged****	24.0			
MK 100-01-XX*	R63	100	100	200	flanged****		1000	100	10
MK 150-01	R63	250	150	250	flanged****	45.0			
MK 150-01-XX*	R63	250	150	250	flanged****				

Water meter versions:

*) **DN-XX** – **-XX** notation:

-**NKP** – water meter counter (IP65) or (IP68) pre-equipped for installation of NK transmitter modules

-**NKOP** – water meter counter (IP65) pre-equipped for installation of NK and/or NO transmitter modules

The water meter pulse output feature requires installation of a separately purchased transmitter module:

NK transmitter module, cold water applications (IP65) 31-8027-010000; (IP68) 31-8027-050000

NK transmitter module, cold water applications (IP65) 31-7112-010000

** IP68 glass and copper design version, pre-equipped for operation with the APT-WMBUS-NA-1 module only, applies to cold water meters

*** Size as measured from the inlet vertical line to the cross-section plane of the outlet flange

**** Connection flange bolt hole pattern:

- Standard: PN-EN 1092-2 (PN10), DIN 2532, DIN2501 (PN10), BS4504 (PN10)

Product features

- Pre-equipped for (applies to MWN/JS): RF module for Wireless M-Bus, pulse, and M-Bus modules (not applicable to the NKP and NKOP transmitter versions)
- Wide metering range
- Low starting flow
- Removable measuring insert
- Double-sided rotor bearings
- Easy counter reading
- Hermetic IP68 counter available on request
- Counter mechanism rotation lock at 360° of turn
- Reliable readings
- Other bolt hole patterns available on request

FIRE HYDRANT WATER METERS MH-01 | MWN50-GH | JS16-H

- Vertical (MH-01) / horizontal (MWN50-GH) rotor axis propeller water meters
- Single-jet vane wheel water meters (JS16-H)

Application

MH-01 – Instant measurement of water volume up to 30°C by quick-release connection to 80 mm underground fire hydrants, MOP 16 bar (PN16). The fire hydrant outlet requires a size 75 Storz quick-release coupling.

JS16-H and **MWN50-GH** – Instant measurement of water volume up to 30°C (JS16-H) or 50°C (MWN50-GH) by quick-release connection to DN80 and DN100 fire hydrants with size 75 Storz quick-release couplings, MOP 16 bar (PN16). The water meter to-fire hydrant connection is designed for the counter oriented upward.

Measurement range (MID):

MH-01

- Cold water: **R63**

MWN50-GH, JS16-H

- Cold water: **R100-H**



Table 12. Basic technical data

Type		Q_3 (m³/h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)
Cold water meters						
MH-01	R63	25	50	130*	75T hull	9.5
	R63	40	65	130*	75T hull	10.5
JS16-H	R100	16	40	430	75T union i 52T Storz	3.6
MWN50-GH**	R100	40	50	300	75T union i 75T Storz	5.6

* Size as measured from the inlet vertical line to the cross-section plane of the outlet flange

** Counter versions available on request:

- IP68, pre-equipped for operation with the NK transmitter module only in the pulse range of 100 dm³/pulse
- IP68 glass and copper design version, pre-equipped for operation with the APT-WMBUS-NA-1 inductive communication module only

Product features

- A mobile metering solution
- Easy counter reading
- Hermetic counter
- Counter mechanism rotation lock at 360° of turn
- Double-sided rotor bearings

MWN/JS-S

Spring-action valve coupled water meters (DN50-150)

Application

Measurement of cold water consumption up to 30°C or 50°C with wide flow rate fluctuations (from minimum to maximum values), MOP 16 bar (PN16). Recommended for installation in industrial plants, public facilities (including hospitals, schools, and hotels), and apartment buildings – especially with fire hydrant couplings. For installation in horizontal piping with the counter upward (H). The standard versions of the coupled water meters are available with counters (IP65). The water meters are designed for operation in AMR systems.

MWN/JS IP68**



MWN/JS-S

Measurement range (MID):

- Cold water: **R630 ÷ R4000 - H**

Side water meter installation

- Standard version: right-hand (looking in the direction of flow)
- On request: left-hand (looking in the direction of flow)



Table 13. Basic technical data

Type			Q ₃ (m³/h)	DN (mm)	Length (mm)	Connection ends****	Net weight (kg)	NK pulse value (dm³/pulse)	
								Standard	On request
MWN / TYPE JS SIDE WATER METER – Single-jet vane-wheel dry water meter									
■ MWN/JS 50/4,0-S	R630	25	50	270	flanged	17.5	100 / 10	10 / 0.25 1 2.5 25 100 250 1000	
				300***	flanged	19.4			
■ MWN/JS 50/4,0-S-NKP*	R630	25	50	270	flanged	18.0			
				300***	flanged	19.9			
■ MWN/JS 65/4,0-S	R1000	40	65	300	flanged	21.0			
■ MWN/JS 65/4,0-S-NKP*	R1000	40	65	300	flanged	21.5			
■ MWN/JS 80/4,0-S	R1600	63	80	300	flanged	25.0			
				350***	flanged	27.7			
■ MWN/JS 80/4,0-S-NKP*	R1600	63	80	300	flanged	25.5			
				350***	flanged	28.2			
■ MWN/JS 100/4,0-S	R2500	100	100	360	flanged	30.0			
				350***	flanged	30.0			
■ MWN/JS 100/4,0-S-NKP*	R2500	100	100	360	flanged	30.5			
				350***	flanged	30.5			
■ MWN/JS 150/16-S	R1600	250	150	500±15	flanged	75.0	1000 / 100	–	
■ MWN/JS 150/16-S-NKP*	R1600	250	150	500±15	flanged	75.5			
■ MWN/JS 50/4-S JS R160 Smart C+ side water meter	R1000	25	50	270	flanged	17.5	–	–	
				300***	flanged	19.4			
■ MWN/JS 65/4-S JS R160 Smart C+ side water meter	R1600	40	65	300	flanged	21.0			
■ MWN/JS 80/4-S JS R160 Smart C+ side water meter	R2500	63	80	270	flanged	25.0			
				350***	flanged	27.7			
■ MWN/JS 100/4-S JS R160 Smart C+ side water meter	R4000	100	100	360	flanged	30.0			
				350***	flanged	30.0			
■ MWN/JS 150/16-S JS R160 Master C+ side water meter	R2500	250	150	500±15	flanged	75.0			

Water meter versions:

* **-NKP** – water meter counter (IP65) or (IP68) pre-equipped for installation of NK transmitter modules

The water meter pulse output feature requires installation of a separately purchased transmitter module:

NK (master water meter) (IP65) 31-8027-010000 or; (IP68) 31-8027-050000

NK (side water meter), (IP65) 31-9051-020000

** IP68 glass and copper design version, pre-equipped for operation with the APT-WMBUS-NA-1 module only, applies to cold water meters

*** Body length available on request

**** Connection flange bolt hole pattern: Standard: PN-EN 1092-2 (PN10), DIN 2532, DIN2501 (PN10), BS4504 (PN10)

Product features

- Pre-equipped for: RF module for Wireless M-Bus, pulse, and M-Bus modules
- Wide metering range
- Low starting flow
- Removable measuring insert
- Double-sided rotor bearings
- Easy counter reading
- Hermetic IP68 counter available on request
- Counter mechanism rotation lock at 360° of turn
- Reliable readings

WI-03; -04 | WI-03; -04-NKP

Irrigation water meters (DN40-250)

Application

Measurement of water drawn from rivers and other bodies of water, and the output of contained wastewater piping in STPs up to 50°C, MOP 16 bar (PN16). For installation in horizontal piping with the counter upward (**H**), in vertical piping (**V**), or in sloping piping. The standard version of the irrigation water meters feature IP75 counters (IP68 counters are available in version -04 only) and pre-equipped for operation in AMR systems.



Meter versions:

- **-03** - plastic guards and a rotating counter
- **-04** - plastic guards and an IP68 rotating counter

Table 14. Basic technical data

Type	Q ₃ (m³/h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)	NK pulse value (dm³/pulse)	
						Standard	On request
Cold irrigation water meters							
WI 40-03	25	40	200	flanged**	7.5	1000	100
WI 40-03-XX*	25	40	200	flanged**	7.6		
WI 40-04	25	40	200	flanged**	7.5		100
WI 40-04-XX*	25	40	200	flanged**	7.6		
WI 50-03	25	50	200	flanged**	8.1		100
WI 50-03-XX*	25	50	200	flanged**	8.2		
WI 50-04	25	50	200	flanged**	8.1		100
WI 50-04-XX*	25	50	200	flanged**	8.2		
WI 65-03	40	65	200	flanged**	9.6		100
WI 65-03-XX*	40	65	200	flanged**	9.7		
WI 65-04	40	65	200	flanged**	9.6	100	
WI 65-04-XX*	40	65	200	flanged**	9.7		

Type	Q ₃ (m ³ /h)	DN (mm)	Length (mm)	Connection ends	Net weight (kg)	NK pulse value (dm ³ /pulse)	
						Standard	On request
WI 80-03	63	80	225	flanged**	12.0	1000	100
WI 80-03-XX*	63	80	225	flanged**	12.1		
WI 80-04	63	80	225	flanged**	12.0		100
WI 80-04-XX*	63	80	225	flanged**	12.1		
WI 100-03	100	100	250	flanged**	14.7		100
WI 100-03-XX*	100	100	250	flanged**	14.8		
WI 100-04	100	100	250	flanged**	14.7		100
WI 100-04-XX*	100	100	250	flanged**	14.8		
WI 125-03	160	125	250	flanged**	17.7		100
WI 125-03-XX*	160	125	250	flanged**	18.8		
WI 125-04	160	125	250	flanged**	18.7		100
WI 125-04-XX*	160	125	250	flanged**	18.8		
WI 150-03	250	150	300	flanged**	24.5		100
WI 150-03-XX*	250	150	300	flanged**	24.6		
WI 150-04	250	150	300	flanged**	24.5		100
WI 150-04-XX*	250	150	300	flanged**	24.6		
WI 200-03	400	200	350	flanged**	34.6		100
WI 200-03-XX*	400	200	350	flanged**	35.1		
WI 200-04	400	200	350	flanged**	34.6		100
WI 200-04-XX*	400	200	350	flanged**	34.7		
WI 250-03	630	250	450	flanged**	43.0		—
WI 250-03-XX*	630	250	450	flanged**	43.1		
WI 250-04	630	250	450	flanged**	43.0		
WI 250-04-XX*	630	250	450	flanged**	43.1		

IP68 counter version available on request

* Meter versions: -XX notation:

-NKP – pre-equipped for installation of NK transmitter modules

** Connection flange bolt hole pattern: Standard: PN-EN 1092-2 (PN10), DIN 2532, DIN2501 (PN10), BS4504 (PN10)

Product features

- Easy counter reading
- Hermetic counter (optionally rated at IP68)
- Counter mechanism rotation lock at 360° of turn
- Double-sided rotor bearings
- Reliable readings



Heat metering

ELF 2 ELF INVONIC FAUN



Indivtive rotor movement detection sensing with immunity to magnetic field



Digital connectivity with ultrasonic sensors



Extensive configuration options



Measurement class 2 (PN-EN-1434)



Measurement class 2 (PN-EN-1434)



Various power supply options



Extensive archiving of measurement data



For operation in heating and/or cooling systems



For operation in heating and/or cooling systems



For operation in heating systems



Supports 2-wire temperature sensors



3 versions of body integrity



For operation in heating and cooling system (applies to Elf 2)



Battery-powered (for off-mains operation); optionally available with mains power connectivity



Digital connectivity with ultrasonic sensors



1/4 rotor turn detection



Interchangeable communication modules



Simultaneous operation with two independent and interchangeable communication modules



Supports 2-wire temperature sensors



Easy and convenient assembly, also on the transducer



Supports 2-4-wire temperature sensors



Battery-powered (for off-mains operation)



Large and clear LCD panel



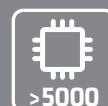
Measurement starts already from 0.1 °C



Interchangeable communication modules



Extensive archiving of measurement data



Large memory size for over 5000 records



Easy and convenient installation



Easy and convenient assembly, also on the transducer



Large and clear LCD panel



Large and clear LCD panel



Multiple levels of configuration security

ELF 2

The latest-generation compact heat and cooling meter with a JS90-T1 propeller flow sensor (DN15-20)

Application

The meter can work in heating and cooling systems operated in residential, office, and utility buildings, and individual apartments. The stylish design helps with seamless installation in any interior setting. The meter can measure heat or cold or heat and cold in the same system. For installation in horizontal piping with the counter sideways (**H**) or in vertical piping (**V**).

The dynamic temperature measurement period and integration (2 to 6 s) makes the meter perfect for application in apartment-wide space heating and DHW subconnections ("Logotermas"). The extensive connectivity options enable operation in wired or wireless AMR systems and BMS (building automation systems).

ACCURACY CLASS:

- Class **2 (H)**
- Class **3 (V)**

Product features

- Latest, microprocessor-driven, multi-functional thermal meter
- One-button operation
- Battery-powered for off-mains operation
- Standard version: 6 years or option 12 years battery life
- Total immunity to external EM fields
- Flat error response of the flow transducer
- High measurement accuracy (dynamic range: q_v/q_p 1:100)
- 2 m long sensor connection cable



ELF 2



ELF 2

Table 15. Basic technical data

Type	Dynamic range	q_p (m³/h)	DN (mm)	Length (mm)	Connection ends	Weight (kg)
ELF 2*	1:100 H; 1:50 V	0.6	15	110	G¾	0.58
		1	15	110	G¾	0.58
		1.5	15	110	G¾	0.58
		1.5	20	130	G1	0.68
		2.5	20	130	G1	0.68

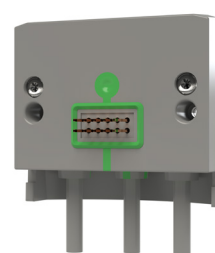
- Medium temperature range: 5...105°C.**
- Nominal pressure: PN16
- Meter ingress protection rating: IP65
- Energy units: GJ or kWh

* With a temperature sensor pair: one integrated with the body, the other in the connection T-pipe

** With the heat meter installed on the return line. If the heat meter is installed on the supply line: $t_{max} = 90^\circ\text{C}$.

Interchangeable communication modules:

- M-Bus + 4 pulse inputs
- M-Bus + 2 pulse inputs + 1 pulse output
- RS485 Modbus enabled
- Wireless M-Bus T1 + 2 pulse inputs
- USB (service access)



ELF

A compact heat meter with a JS90-NI* rotor flow transducer (DN15-20)

Application

A high-precision and reliable compact heat meter with a high-class rated heat counter and class 2 flow transducer, electronic rotor turn reading, and archiving storage of multiple measurement data parameters. Complete with a modern finish design. The heat meter is intended for metering the heat network energy consumption at small dwellings and office units. The heating medium maximum temperature is 90°C (105°C**); MOP 16 bar (PN16). For installation in horizontal piping with the counter upward (**H**) or in vertical piping (**V**).

ACCURACY CLASS:

- Class **2 (H)**
- Class **3 (V)**



ELF

Product features

- Latest, microprocessor-driven, multi-functional thermal meter
- One-button operation
- Battery-powered for off-mains operation
- Standard version: 5 + 1 years of maximum battery life; special version: 10 + 1 years of maximum battery life
- Total immunity to external EM fields
- Flat error response of the flow transducer
- High measurement accuracy (dynamic range: q_v/q_p 1:100)
- 2 m long sensor connection cable



Table 16. Basic technical data

Type	Dynamic range	q_p (m ³ /h)	DN (mm)	Length (mm)	Connection ends	Weight (kg)
ELF*	1:100 H; 1:50 V	0.6	15	110	G $\frac{3}{4}$	0.58
		1	15	110	G $\frac{3}{4}$	0.58
		1.5	15	110	G $\frac{3}{4}$	0.58
		1.5	20	130	G1	0.68
		2.5	20	130	G1	0.68

- Medium temperature range: 5...105°C.**
- Nominal pressure: PN16
- Meter ingress protection rating: IP54
- Energy units: GJ or kWh

* With a temperature sensor pair: one integrated with the body, the other in the connection T-pipe

** With the heat meter installed on the return line. If the heat meter is installed on the supply line: $t_{max} = 90^\circ\text{C}$.

Interchangeable communication modules:

- M-Bus + 4 pulse inputs
- M-Bus + 2 pulse inputs + 1 pulse output
- 4 pulse inputs (independently configurable pulse weight on each input)
- 3 pulse inputs + 1 pulse output
- AT-WMBUS-MR-01 or AT-WMBUS-MR-01-1 wireless module
- USB (service and configuration access)



INVONIC H

Ultrasonic hybrid heat and cooling meter (DN15-100)

Application

INVONIC H is a modern and precise meter for the measurement of heat and cooling* consumption in residential, office and industrial buildings. The applied ultrasonic flow transducer in a brass body guarantees high accuracy, dynamic performance and stability of measurement in any installation orientation (horizontal or vertical) with immunity to magnetic fields. The communication modules enable remote reading of the meter data by wired (M-Bus, Modbus-RTU, and pulse / analogue outputs) or wireless (Wireless M-Bus, 868 MHz) connectivity. This makes INVONIC H compatible with different reading and building automation systems.

ACCURACY CLASS:

■ Class 2



INVONIC H

Table 17. Basic technical data

Type	Dynamic range	q _p (m³/h)	DN (mm)	APPROVED Length (mm)	CLASS Connection ends	READY Weight (kg)
INVONIC H 0,6	1:100	0.6	15	110	G¾	0.8
		0.6	20	190	G1	1.1
		0.6	20	190	flanged	2.9
INVONIC H 1,0		1.0	15	110	G¾	0.8
		1.0	20	190	G1	1.1
		1.0	20	190	flanged	2.9
INVONIC H 1,5	1.5	20	130	G1	0.9	
INVONIC H 1,5	1:100 1:250*	1.5	15	110	G¾	0.8
		1.5	20	190	G1	1.1
		1.5	20	190	flanged	2.9
INVONIC H 2,5		2.5	20	130/190	G1	0.9/1.1
		2.5	20	190	flanged	2.9
INVONIC H 3,5		1:100	3.5	25	260	G1¼
	3.5		25	260	flanged	6.1
INVONIC H 6,0	1:100 1:250*	6.0	25	260	G1¼	3.6
		6.0	25	260	flanged	6.1
INVONIC H 10,0		10.0	40	300	G2	7.2
		10.0	40	300	flanged	8.4
INVONIC H 15,0		15.0	50	270	flanged	8.5
INVONIC H 25,0		25.0	65	300	flanged	13.0
INVONIC H 40,0		40.0	80	300	flanged	15.0
INVONIC H 60,0		60.0	100	360	flanged	18.0

- Medium temperature range: 5 to 130°C. The minimum temperature specification applies to the type approval only (the meter measures from 0.1°C).
- Nominal pressure: PN16/PN25*
- Ingress protection ratings: transducer: IP65/IP67*; calculator: IP65
- Energy units: GJ (kWh, MWh, Gcal)*

* Optional

Advantages

- Compatible with water or water/glycol (ethylene or propylene) cycles: available in versions from q_p 0.6 to 15 m³/h
- A clear 8-segment LCD with the meter operation status icons and one-button operation
- The calculator can be rotated relative to the transducer body every 180 degrees in DN15-DN20 or every 90 degrees in DN25-DN100. The standard connection cable length is 1.2 m.
- 230 V AC / 24 V AC/DC mains power or battery power (11 years of maximum battery life)
- A built-in data logger provides storage of data from the last 36 months for 15 years without any power supply
- Provided with energy and volume pulse outputs or two water meter pulse inputs
- Can be installed with communication modules without breaching the verification markings

FAUN

Electronic calculator for heat and cooling meters

Application

FAUN is a high-precision, reliable, high-class heat calculator for energy metering applications in heating and cooling water systems. The extensive communication options enable easy and reliable reading and transfer of measurement data. The device is perfect for heating substations, residential or commercial buildings, and industrial installations.

Depending on the selected version and configuration, the calculator can be applied as a:

- Heating system heat meter
- Cooling system heat meter
- Integrated heating and cooling system heat meter



FAUN



Table 18. Specifications

FAUN heat meter electronic calculators		FAUN
Energy unit	–	GJ, MWh, kWh, or Gcal
Volume units	–	m ³
Temperature range limits	°C	$\Theta_{\min} = 1^{\circ}\text{C}$ $\Theta_{\max} = 180^{\circ}\text{C}$
Differential temperature range limits	°C	$\Delta\Theta_{\min} = 3^{\circ}\text{C}$ $\Delta\Theta_{\max} = 175^{\circ}\text{C}$
Nominal flow rate range	m ³ /h	0.6 to 3,000
Pulse constant range	dm ³ /pulse	1 to 10,000
of the flow transducer	pulse/dm ³	0.01 to 300
MPE	%	$E_e = \pm (0.5 + \Delta\Theta_{\min} / \Delta\Theta)$
Compatible temperature sensors	–	- Pt100 – 2 or 4-wire versions *) - Pt500 – 2 or 4-wire versions *)
Compatible flow transducers	–	Any if configured with pulse outputs
Cooling measurement switchover in operation in integrated heating and cooling single-cycle systems	–	Supply temp. < return temp. and supply temp. < preset threshold value
Power supply	–	Lithium battery, 3.6 V, type: AA, 2xAA, C or D or 24 V AC or 230 V AC power adapter *)
Battery life	years	6-12, depending on the battery type
Environmental class	PN-EN 1434	–
	MID	–
		E1, M1
Ambient temperature	°C	5 to 55
Ingress protection rating	–	IP54 or IP65 or IP68

* Depending on the product version

Advantages

- Large and clear 8-segment display with an additional 4-segment indicator, multiple intuitive icons, and displayed value units
- Intuitive two-button operation
- Can be custom-configured with a dedicated service software suite (available for Windows PC)
- Manual configuration of select calculator parameters with the operating buttons
- Can be installed with two independent communication modules (without breaching the verification marking), with selectable communication protocol options

Interchangeable communication modules:

- M-Bus
- RS232
- RS485
- Pulse outputs (x2)
- Pulse inputs and outputs (2 Class OB, OC, or OD outputs and 2 Class IB or IC inputs)
- Analogue outputs (x2, 0/4-20 mA or 0-10 V)
- LonWorks
- AT-WMBUS-MR-10 or AT-WMBUS-MR-10-1 wireless module
- IMR-AIUT telemetry RF module

JS90-NC | JS130-NC

Single-jet vane-wheel heat meter flow transducers (DN15-40)

Application

For integration with the indicating calculators in heat meters or for the measurement of water flow and volume up to 90°C (JS90-NC) or 130°C (JS130-NC), MOP 16 bar (PN16). Recommended for installation in space heating and DHW supply systems of residential or industrial buildings. For installation in horizontal piping with the counter upward (**H**) (JS90-NC and JS130-NC) or in vertical piping (**V**).

Measurement range (MID):

- JS90-NC range: $q_v/q_p = 1:50 - \text{H}; 1:25 - \text{V}$
- JS130-NC range: $q_v/q_p = 1:50 - \text{H}; 1:10 - \text{V}$

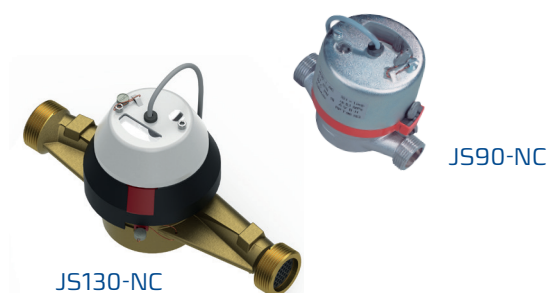


Table 19. Basic technical data

Type	q_p (m ³ /h)	DN (mm)	Length (mm)*	Connection ends**	Weight (kg)	NC pulse value (dm ³ /pulse)	
						Standard	On request
JS90-0,6-NC	0.6	15	110	G $\frac{3}{4}$	0.49	10	0,25; 1; 2,5; 25; 100; 250; 1000
JS90-1-NC	1	15	110	G $\frac{3}{4}$	0.49		
JS90-1,5-NC	1.5	15	110	G $\frac{3}{4}$	0.49		
JS90-1,5-G1-NC	1.5	20	130	G1	0.56		
JS90-2,5-NC	2.5	20	130	G1	0.58	10	2,5; 25; 100; 250; 1000
JS130-3,5-NC	3.5	25	260	G1 $\frac{1}{4}$	2.2		
JS130-6-G1 $\frac{1}{4}$ -NC***	6	25	260	G1 $\frac{1}{4}$	2.4		
JS130-6-NC***	6	32	260	G1 $\frac{1}{2}$	2.4	100	2,5; 10; 25; 250; 1000
JS130-10-NC***	10	40	300	G2	2.7		

NC – reed relay transmitter with a standard 2 m connection cable for remote output of volume readings

* Other length options available on request

** Other connection end options on request

*** Currently in development

Product features

- Low starting flow
- Easy counter reading
- Hermetic counter
- Counter mechanism rotation lock at 360° of turn
- Resistant to external magnetic fields
- Reliable readings

MWN130-NC

Heat meter propeller flow transducers (DN40-300)

Application

For integration with the indicating calculators in heat meters or for the measurement of water flow and volume up to 130°C, MOP 16 bar (PN16). Recommended for installation in space heating supply systems of residential or industrial buildings. For installation in horizontal piping with the counter upward (**H**) (MWN130-NC; MP130-NC) or in vertical piping (**V**) (MWN130-NC) and sloping piping with the counter sideways, or in any sloping orientation (**H/V**) (MWN130-NC).



MWN130-NC

Measurement range (MID):

- MWN130-NC range: $q_r/q_p = 1:25$ – H/V DN40-200
range: $q_r/q_p = 1:10$ – H/V DN250;300



Table 20. Basic technical data

Type	q_p (m ³ /h)	DN (mm)	Length (mm)	Connection ends*	Weight (kg)	NC pulse value (dm ³ /pulse)	
						Standard	On request
MWN130-40-NC	15	40	200	flanged	7.9	100	2.5 10 25 250 1000
MWN130-50-NC	15	50	200	flanged	9.9		
MWN130-65-NC	25	65	200	flanged	10.6		
MWN130-80-NC	40	80	200**	flanged			
			225	flanged	13.3		
MWN130-100-NC	60	100	250	flanged	15.6	1000	25,100 250,2500 10,000 250,2500, 10000
MWN130-125-NC	100	125	250	flanged	18.1		
MWN130-150-NC	150	150	300	flanged	40.1		
MWN130-200-NC	250	200	350	flanged	51.1		
MWN130-250-NC	400	250	450	flanged	75.1		
MWN130-300-NC	600	300	500	flanged	103.1		

NC – reed relay transmitter with a standard 2 m connection cable for remote output of volume readings

* Connection flange bolt hole pattern: Standard: PN-EN 1092-2 (PN10), DIN 2532 (PN10), BS 4504 (PN10); On request: PN-EN 1092-2 (PN16)

** Available on request

Product features

- Wide measurement range with a low starting flow
- Removable measuring insert
- Hermetically sealed dial and barrel counter
- Counter mechanism rotation lock at 360° of turn
- Resistant to external magnetic fields
- Reliable readings

SHARKY 473

Ultrasound transducers (DN15-100)

Application

For integration with the indicating counters of combined heat meters in water applications between 5°C and 130°C at 0.6-2.5 m³/h or 5°C to 150°C at 3.5-60 m³/h, MOP 16 bar (PN16). Recommended for installation in space heating supply systems of residential or industrial buildings, as well as A/C systems or hybrid heating and cooling systems with the medium temperature already from 5°C. Any installation orientation is supported.



SHARKY 473



Table 21. Basic technical data

Type		q_p (m³/h)	DN (mm)	Length (mm)	Connection ends	Weight (kg)
SHARKY 473 - 0.6 m³/h	class 2	0.6	15	110	G¾B	0.6
SHARKY 473 - 1.5 m³/h	class 2	1.5	15	110	G¾B	0.6
			20	130	G1B*	0.61
SHARKY 473 - 2.5 m³/h	class 2	2.5	20	130	G1B	0.61
			20	190*	G1B	0.63
SHARKY 473 - 3.5 m³/h	class 2	3.5	25	260	G1¼B	1.35
SHARKY 473 - 6.0 m³/h	class 2	6	25	260	G1¼B	1.35
			32	260	flanged	4.65
SHARKY 473 - 10 m³/h	class 2	10	40	200	G2B	2.6
			40	300	flanged	6.6
SHARKY 473 - 15 m³/h	class 2	15	50	270	flanged	7.45
SHARKY 473 - 25 m³/h	class 2	25	65	300	flanged	9.45
SHARKY 473 - 40 m³/h	class 2	40	80	300	flanged	11.1
SHARKY 473 - 60 m³/h	class 2	60	100	360	flanged	16.9

MOP PN16(PN25)

* Custom version

Product features

- Highly dynamic measurement; standard version with $q_l/q_p = 1:100$, at $q_p = 1.4; 2.5; 6; 10; 15; 25$ m³/h; optional version with $q_l/q_p = 1:250$
- Low starting flow
- Low minimum flow
- Low pressure loss
- Extremely long measurement stability
- Resistant to contaminated water and scale
- Does not require any upstream or downstream straight piping
- Extremely low electrical power usage
- Battery-powered from the heat meter calculator
- Immune to external magnetic fields
- Standard pulse rates for the default version: 1 / 10 / 100 l/pulse
- Test output

TOP 1068

Wired resistive temperature sensors for heat meters

Application

The TOP 1068 wired resistive temperature sensor pairs are intended for applications in pairs with heat meters. The sensors are based on Pt100 or Pt500 resistive elements. Each sensor features an external OG sheath with a threaded adapter.



Installation

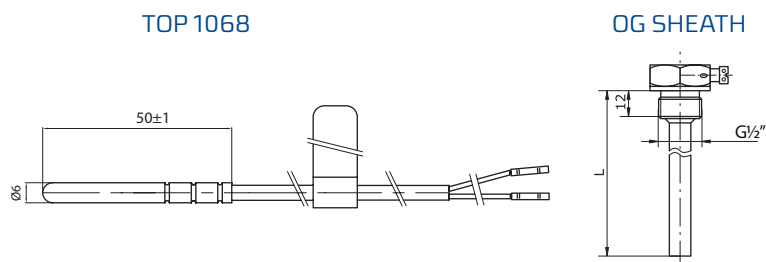
- The sensors can only be installed in their external sheaths:
 - Square to the flow direction of the liquid heat medium
 - 45° to the flow direction of the liquid heat medium, and with the sensor tip opposite to the flow direction
 - In a piping bend, with the sensor tip opposite to the flow direction
- The installation side of the sensor (supply or return) must conform to the colour-coded tagging (with red for the supply side and blue for the return side)
- Install the sensor with the sensing element at the centreline of the liquid heat medium piping

Table 22. Basic technical data

Type		TOP 1068	
Temperature range		°C	$\Theta_{\min} = 0^{\circ}\text{C}$ $\Theta_{\max} = 150^{\circ}\text{C}$
Differential temperature range		°C	$\Delta\Theta_{\min} = 3^{\circ}\text{C}$ $\Delta\Theta_{\max} = 150^{\circ}\text{C}$
Measuring resistor		–	Pt100 or Pt500, PN-EN 60751:2009 Class A or B
Time constant		s	$T_{0.5} \leq 10.5$
Maximum operating pressure (MOP) with the OG sheath		MPa	2.5
Sensor sheath material		–	Brass / stainless steel
Connection cable		–	Pair cord, 2x0.25 mm ²
Wire resistance		Ω/m	ca. 0.15
Wiring insulation		–	Silicone
Maximum measurement current		Pt100	3 mA
		Pt500	1 mA
Cable length		Pt100	1 to 3 m, in 0.5 m steps*
		Pt500	1 to 15 m, in 1 m steps*
Minimum immersion depth		mm	25
Ambient conditions	climate	–	5°C to 55°C
	mechanical	–	Class M2
	EM	–	Class E2
MID approval		–	PL 09 001/MI- 004

* 3 m is standard

Temperature sensor and sheath sizing



Note: TS200 sensors with the same parameters as TOP 1068 are offered alternatively

TOPE 41*

Wired resistive temperature sensors for heat meters

Application

The TOPE 41 wired resistive temperature sensors are intended for applications in pairs with heat meters. The sensors are based on Pt100 or Pt500 resistive elements. The sensors are supplied in pairs only. The sensors can be installed in pair wells on tees and valves (for combined heat meter sizes DN15 and DN20) in a configuration with one sensor installed in the tee or valve and the other directly on the transducer, e.g. Sharky DN15 and DN20.



TOPGN 12/C*

Connection-head mount temperature sensors for heat meters

Application

The TOPGN 12/C sensors are intended for liquid heat media temperature sensing applications, installed in pairs with heat meters. The sensors are based on Pt100 or Pt500 resistive elements. The sensors are installed directly in the piping.



TOP 146.1*

Connection-head mount temperature sensors for heat meters

Application

The TOP 146.1 temperature sensors are intended for applications in pairs with heat meters. The sensors are based on Pt100 or Pt500 resistive elements. Each sensor features an external 1H18N9T grade steel OG sheath with a threaded adapter.



*NOTE: on special order, sensors for direct mounting in TS400 installation tees and head sensors for mounting in TSH202 sheaths are also available.

E-ITN 30.51

Two-sensor electronic heating cost allocator

The E-ITN 30.51 heating cost allocator is intended for calculating and billing the costs of space heating in district heating systems. The recommended application scope includes horizontal or vertical single or two-pipe heating systems with the mean minimum / maximum design temperature of the heating medium 35°C / 90°C (inclusive).

Table 23. Basic technical data

Characteristics	E-ITN 30.51
Outdoor reading range	< 250 m
Data protocol format	Wireless M-Bus
Frequency range	868 MHz
Transmitter power	5 mW
Ingress protection rating	IP42
Weight	0.076 kg



E-ITN 30.51

Advantages

- Three reading options: visual (direct reading of the display), with an IRU optical reader, or over an RF module.
- The heating cost allocator features a conveniently positioned LCD for easy reading of current heat consumption values. The data is logged in an integrated memory module. This enables end-to-end analysis of heat consumption and the in-heating season operating conditions.
- Aside from precision measurement of radiator temperature, the E-ITN 30.51 heating cost allocator supports logging of mean indoor temperatures at the installation location. The heating cost allocator is driven by a software which measures the actual heat consumption at the connected flat and the heat supplied from the heating risers and the heat exchange between the adjacent units in the building.
- Every attempt at unauthorized tampering (by breaking the electronic tamper seal) is logged with a precise timestamp. Each tamper event is output during the next RF reading.



AMR

(automatic meter
reading) systems

RF AMR

Application

Reading of water meters, heat meters, cooling meters, and heating cost allocators installed in residential, building or commercial / industrial buildings. The RF AMR system is based on a PN-EN 13757 Wireless M-Bus compliant communication protocol operating in the 868 MHz band with a unidirectional reading mode (T1) and a bidirectional configuration mode (T2). Select device models feature a configurable RF data frame transmission interval (in months, days, and hours).

Communication

Depending on the device type, RF module model and the configuration, the RF data output can feature different data types (see the product specification sheets for details). Examples of RF data outputs:

Water meters / heat and cooling meters – serial number; reading date; actual reading value; monthly reading history; events.

Heating cost allocators – serial number; reading date; actual reading value; mean radiator temperature; mean indoor temperature; billing period start date; events.

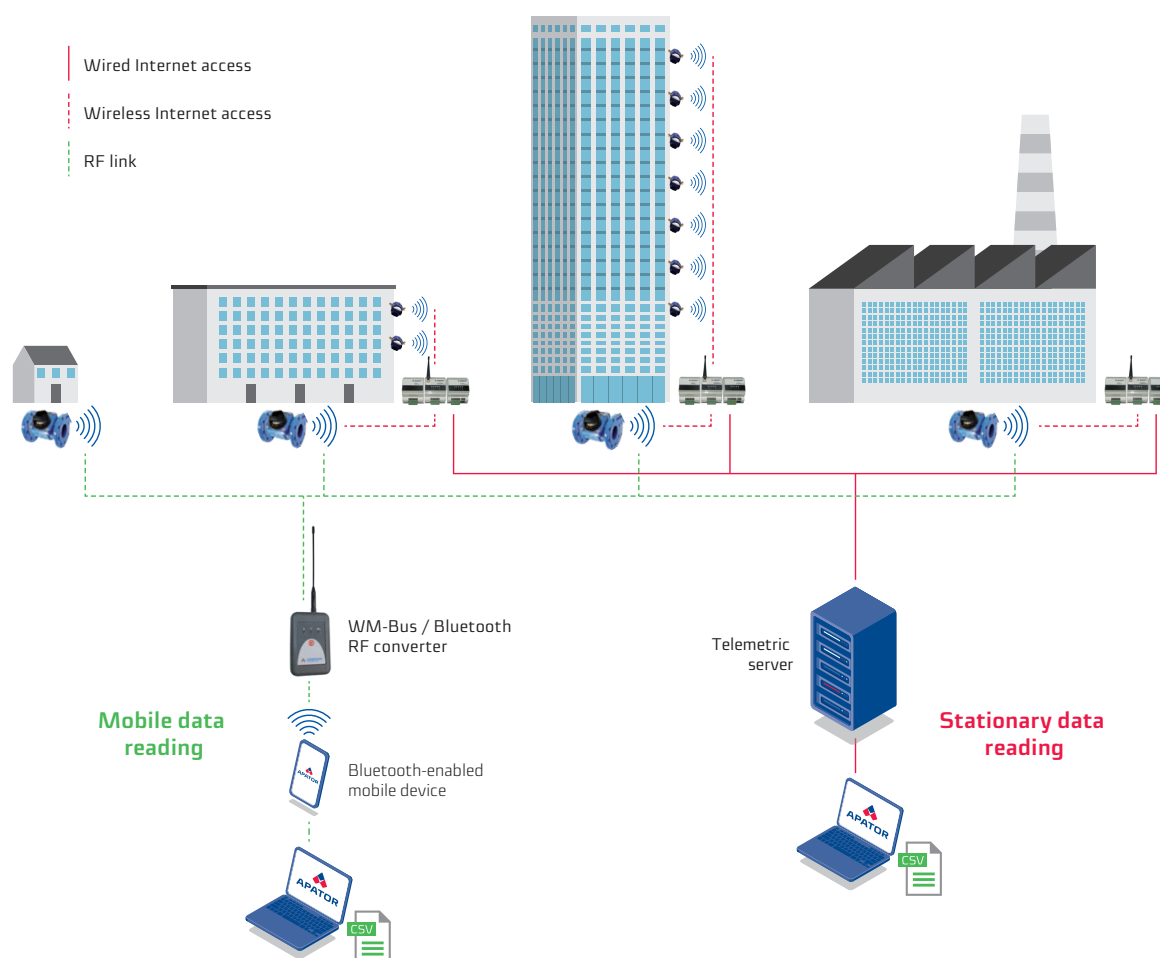
Data reading methods

- **MOBILE** (walk-by / drive-by) – a meter reading method with potential manual input of the readings from the meters.
- **STATIONARY** – an AMR method implemented in a stationary AMR network the data from which are output live to a telemetric server.

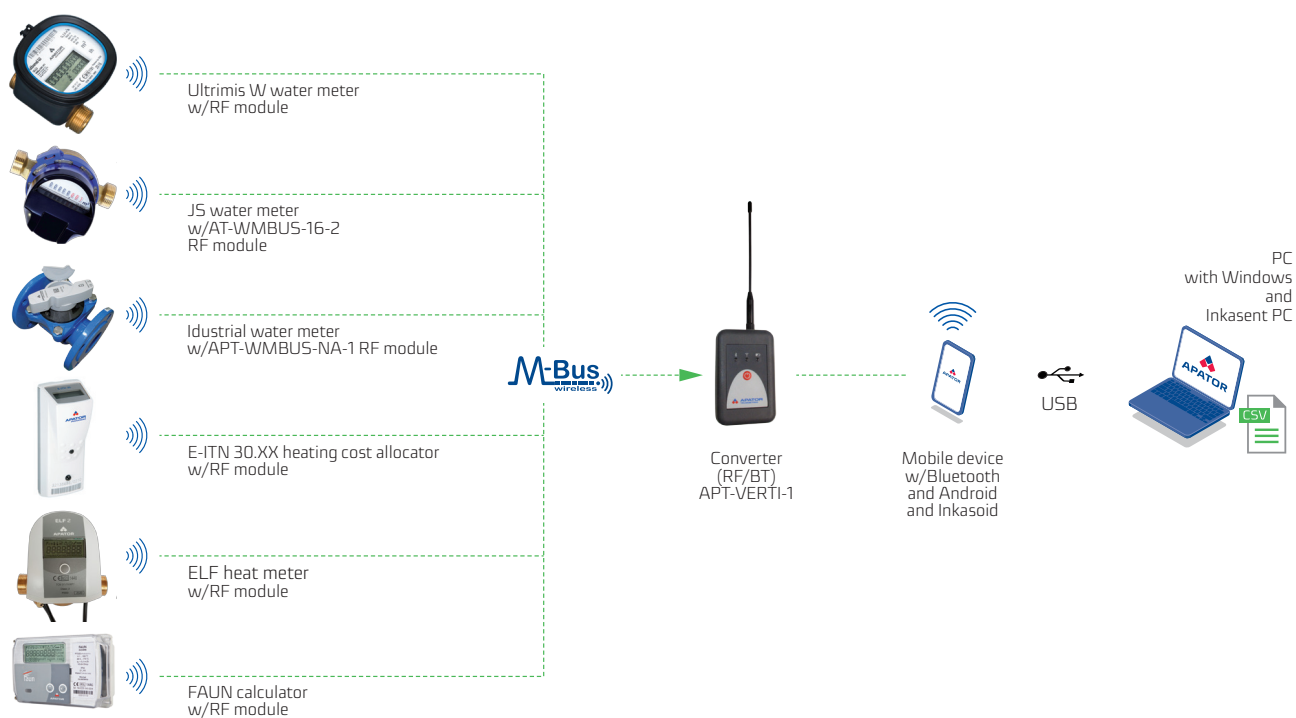
Advantages

- Short meter reading round times and optimised utilization of resources;
- Eliminates human error;
- Reading of device units installed in inaccessible locations and/or with the consuming tenants absent from the premises;
- Reduced billing period duration for improved financial fluidity of the utility provider;
- Billing per actual consumption;
- Fast response to undesired events;
- Low reading costs per device unit.

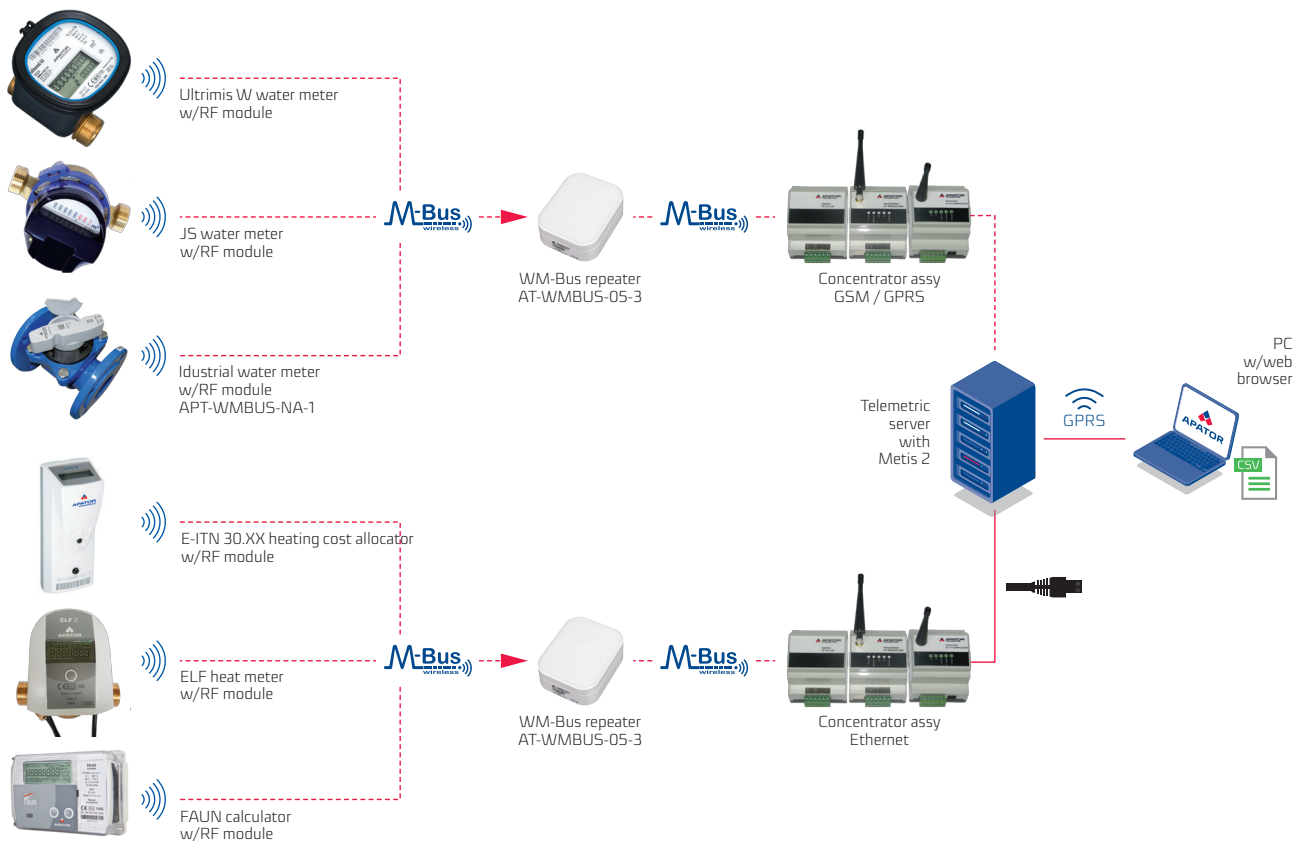
AMR schematic diagram



Mobile AMR: configuration examples



Stationary AMR: configuration examples



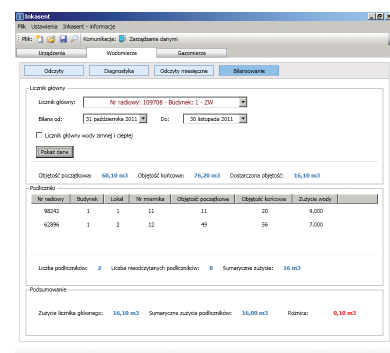
RF AMR SOFTWARE MOBILE AMR SYSTEM

INKASENT PC SOFTWARE

The Inkasent PC software application is dedicated for the operation of mobile RF AMR (automatic meter reading) systems. The software application was developed for Windows PCs.

Basic software functionalities:

- AMR structure creation and management (with a meter address database + measurement points)
- AMR structure import / export from / to file
- Creation and uploading of data collector's routes to mobile devices
- Master + slave meter billing reporting
- Visual metering and diagnostic data output from mobile terminal units
- Acquired data export to CSV file



Inkasent PC requires installation of the Inkasoid mobile app on the mobile devices the software is to operate with.

INKASOID APPLICATION

An application for Android mobile terminals. Enables data exchange over an RF-BT/USB converter with all metering devices which support the WM-Bus standard.

Basic software functionalities:

- Reading of utility meter data along the reading routes generated in Inkasent PC
- Supports manual reading and input of metering data
- Provides diagnostic features for meters and RF modules
- Enables configuration programming of water meter RF modules
- Supports RF communication profiles for water meter RF modules

STATIONARY AMR SYSTEM

METIS 2 SOFTWARE

The Metis 2 software suite is dedicated for the operation of stationary RF AMR (automatic meter reading) systems. The system is a part of a telemetric server the primary use of which is reading the measurement device data over an RF transmission network, acquisition of the data and its processing. The software applications requires Internet connectivity and a web browser.

Basic software functionalities:

- AMR transmission and metering structure creation and management (with a meter address database + measurement points)
- Acquisition and storage of meter reading and diagnostic data
- Task scheduling (periodic meter reading acquisition, reporting, and more)
- Data analysis and visual output
- Master + slave meter billing reporting
- Data export to third-party systems
- System user account setup and management

RF AMR SYSTEM DEVICES

MOBILE DEVICES

An Android OS smartphone or another Android device with the dedicated Inkasoid application installed for remote RF configuration programming and reading data of measurement device communication modules. The mobile device communicates with the AMR terminal devices over WM-Bus and an RF-BT/USB converter. Recommended mobile device models: myPhone Hammer Explorer and Samsung Galaxy A70.

APT-VERTI-1RF-BT/USB CONVERTER

The APT-VERTI-1 converter is an RF intermediate transmission device between RF data output modules of meters and the meter data collector's installed on a mobile device which serves as a reading terminal. Its main task is to convert the signal between the RF modules which operate in the unlicensed ISM 868 MHz band and the BT/USB interface. The communication with the converter is handled via the Inkasoid or Ceris Reader app installed on the mobile terminal. The mobile terminal listens for and receives the spontaneous T1 mode RF data frames. It can also read the RF module configuration data in the two-way T2 mode.

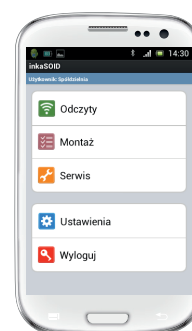


Table 27. Basic technical data

Parameter	APT-VERTI-1
Transmission frequency	868.95 MHz in T1 868.30 MHz in T2
Power supply	Li-ion battery pack
Continuous operating time	max. 24 h
Operating temperature range	0°C to 60°C
Ingress protection rating	IP30
Weight	0.130 kg

AT-WM-BUS-05-3 REPEATER

An RF repeater mediates in the RF data communication between RF modules and an RF concentrator. The RF repeater extends the maximum range between the devices. The RF repeater accepts the RF data frames and retransmits them to the receiver.

Product features

- Wall mounted with quick mount wall plugs or screws
- The transmission line can be extended with a maximum of 8 RF repeaters
- 230 V mains power supply
- Continuous operation
- Compatible with AMR and transmission structure devices over Wireless M-Bus
- Hermetically IP67 enclosure with cable glands (for the AT-WMBUS-05-3h and AT-WMBUS-05-3d versions)

AT-WMBUS-05-3d PRODUCT COMPONENTS:

- AT-WMBUS-05-3 h module
- L5 antenna bracket
- 12 m power cable
- Metal power cabinet, complete with a B6 overcurrent breaker, a 12 V DC / 300 mA power adapter and the power cable



APT-VERTI-1



AT-WMBUS-05-3



AT-WMBUS-05-3d



AT-WMBUS-05-3h

Table 28. Basic technical data

Parameter	AT-WMBUS-05-3	AT-WMBUS-05-3h	AT-WMBUS-05-3d
Communication protocol	Wireless M-Bus (T1)	Wireless M-Bus (T1)	Wireless M-Bus (T1)
Transmission frequency	868 MHz	868 MHz	868 MHz
Modulation	FSK, frequency deviation: ± 50 kHz	FSK, frequency deviation: ± 50 kHz	FSK, frequency deviation: ± 50 kHz
Antenna	internal	internal	external
Transmitter power output	10 mW / 50 Ω	10 mW / 50 Ω	10 mW / 50 Ω
Receiver sensitivity	-100 dBm	-100 dBm	-100 dBm
Power supply	Mains	Mains	Mains
Ingress protection rating	IP54	IP67	IP67
Dimensions	110 x 81 x 40 mm	120 x 80 x 55 mm	120 x 80 x 55 mm
Operating temperature	-20°C to 55°C	-20°C to 55°C	-20°C to 55°C

RF DATA CONCENTRATOR

The RF data concentrator is intended for acquisition of the reading data output by RF repeaters or directly from the RF modules installed on the measurement devices. The acquired data is relayed to the AMR telemetric server for further analysis.

AT-WMBUS-ZE-GSM-01 CONCENTRATOR

The concentrator device relays the acquired meter data to a telemetric server over a GSM modem. The meters are communicated with via unlicensed ISM 868 MHz band. The concentrator device comprises three modules installed in a single lockable rack intended for indoor installation. The concentrator features interface connectors for RF antennas installed outside of the rack. The concentrator runs on mains power.

Product components:

- AT-WMBUS-06th WM-Bus concentrator
- AT-K-GSMRS232-3Gth GSM 3G modem
- AT-Z-2-2th power adapter
- CN-AR-1-3 metal rack cabinet
- AT-A-1-3 868 MHz RF antenna
- AT-A-1-4 GSM antenna
- 3 m power cable

Table 29. Basic technical data

Parameter	AT-WMBUS-ZE-GSM-01
Power supply	230 V
Dimensions	250 x 220 x 120 mm
Operating temperature	0°C to 55°C



AT-WMBUS-ZE-GSM-01
(in the enclosure)



AT-WMBUS-ZE-GSM-01

AT-WMBUS-ZE-ETH-01 CONCENTRATOR

The concentrator device relays the acquired meter data to a telemetric server over an Ethernet interface. The meters are communicated with via unlicensed ISM 868 MHz band. The concentrator device comprises three modules installed in a single lockable rack intended for indoor installation. The concentrator features an interface connector for an RF antenna installed outside of the rack. The concentrator runs on mains power.

Product components:

- AT-WMBUS-06th WM-Bus concentrator
- AT-K-ETHRS232th Ethernet interface
- AT-Z-2-2th power adapter
- CN-AR-1-3 metal rack cabinet
- AT-A-1-3 868 MHz RF antenna
- 3 m power cable

Table 30. Basic technical data

Parameter	AT-WMBUS-ZE-ETH-01
Power supply	230 V
Dimensions	250 x 220 x 120 mm
Operating temperature	0°C to 55°C



AT-WMBUS-ZE-ETH-01
(in the enclosure)



AT-WMBUS-ZE-ETH-01

SUPPORTED EVENT ICONS



Maximum flow



Minimum flow



Back flow



Measurement Unchanged



Leak



Water meter communication module disconnected



Magnetic field



Strong light detection



Low battery

RF AMR WATER METER MODULES

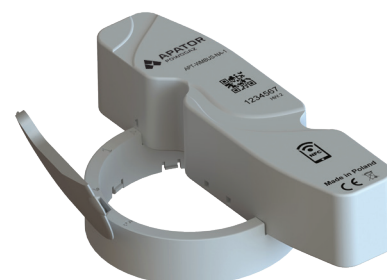
APT-WMBUS-NA-1 MODULE

A universal RF module intended for direct installation on the counter mechanisms of water meters from Apator Powogaz SA with induction pointers*.

The RF module provides wireless output of measurement data in AMR walk-by and drive-by systems (with a power output of 20 mW and a maximum outdoor service range of 800 m). The induction scanning mechanism of the counter pointer is an excellent solution for heavy-duty operating conditions (including wet water meter chambers prone to flooding).

Product features

- Quick and easy configuration with mobile devices
- Spontaneous transmission (T1): RF data frame output at a fixed transmission interval of 10 s (between 5:00 and 21:00) and 60 s (between 21:00 and 5:00)
- Memory of 12 historical water meter readings, as configured by the user, and with the memory reading on request (T2)
- Detection, logging and indication of water usage irregularities and RF module performance irregularities
- Supports an external antenna for a greater RF range
- Features NFC (near-field communication) for switching from the warehouse mode to the operating mode, actual and historical measurement data reading and detailed event reading



APT-WMBUS-NA-1

Compatible water meters:

- Apartment water meters, home water meters and industrial water meters from Apator Powogaz SA complete with dedicated induction pointers

* Not applicable to the water meter types MWN (IP68), WI and SV-RTK



Table 31. Basic technical data

Parameter	APT-WMBUS-NA-1	APT-WMBUS-NA-1 M
Antenna	internal (standard version)	ext. antenna line L=3 m
Installation method	Water meter interface ring	
Pulse counting method	Induction resonance module	
Power supply	3.6 V A lithium battery	
Battery life	12 years of operation + 1 years in warehouse mode with a temperature profile: 10% of operating time at 10°C, 80% of operating time at 20°C, 10% of operating time at 30°C 6 years of operation + 1 years in warehouse mode with a temperature profile: 100% of operating time at 60°C**	
Operating temperature	-15°C to 60°C	
Ingress protection rating	IP68	
Transmission type	Unidirectional (T1): consumption data and event flags Bidirectional (T2) consumption data, diagnostic data, and event details (configuration)	
Transmission interval	10 s from 5:00 to 21:00 60 s from 21:00 to 05:00	
Protocol	Wireless M-Bus	
Transmission frequency	868.95 MHz	
Transmitter power output	20 mW / 50 Ω	
Transmitter power output level stability	+1 dB / -2 dB	
Receiver sensitivity	-100 dBm	
Weight	0.106 kg	0.138 kg

** For temperature class T130 and T50 water meters

AT-WMBUS-16-2 MODULE

An RF module for direct installation on the counter mechanism of apartment water meters. Power output: 10 mW; outdoor service range: 300 m.

Product features

- Quick and easy configuration with mobile devices
- Storing and reading the volume data from 1 to 16 months
- Three selectable operating profiles of the RF module to adjust the data transmission schedule and interval as required by the user
- Detection, logging and indication of water usage irregularities and RF module performance irregularities
- Supports an external antenna for a greater RF range (applies to AT-WMBUS-16-2-1)

Compatible water meters:

- JS and JS90 1,6 ÷ 4,0 Smart+ and Smart C+



AT-WMBUS-16-2



AT-WMBUS-16-2-1

Table 32. Basic technical data

Parameter	AT-WMBUS-16-2	AT-WMBUS-16-2a	AT-WMBUS-16-2-1
Communication protocol	Wireless M-Bus	Wireless M-Bus	Wireless M-Bus
Transmission frequency	868 MHz	868 MHz	868 MHz
Consumption detection	optical	optical	optical
Power supply	Lithium battery, 3.6 V / ½ AA	Lithium battery, 3.6 V / AA	Lithium battery, 3.6 V / ½ AA
Ingress protection rating	IP65	IP65	IP65
Signal output	internal antenna		external antenna (2 m)
Battery life (configuration-dependent)	10 years max.*	10 years max.*	10 years max.*
Output antenna power	10 mW / 50 Ω	10 mW / 50 Ω	10 mW / 50 Ω
Dimensions	h = 26.2 mm; φ = 65.5 mm	h = 26.2 mm; φ = 65.5 mm	h = 26.2 mm; φ = 65.5 mm
Operating temperature	0°C to 55°C	0°C to 55°C	0°C to 55°C
Weight	0.033 kg	0.033 kg	0.065 kg

* For temperature class T30 and T50 water meters operating at 25°C of ambient temperature

APT-03A-1 MODULE

An RF module for direct installation on the counter mechanism of apartment water meters. Power output: 10 mW; outdoor service range: 300 m.

Product features

- Quick and easy configuration with mobile devices
- Storing and reading the volume data from 1 to 16 months
- Detection, logging and indication of water usage irregularities and RF module performance irregularities



APT-03A-1
w/external antenna



APT-03A-1
w/AA battery

Compatible water meters:

■ JS and JS90 1,6÷4,0 Smart+ and Smart C+



Table 33. Basic technical data

Parameter	APT-03A-1 1.65.1.1.01	APT-03A-1 2.65.1.1.12	APT-03A-1 1.65.H.1.07
Communication protocol	Wireless M-Bus	Wireless M-Bus	Wireless M-Bus
Transmission frequency	868 MHz	868 MHz	868 MHz
Consumption detection	optical	optical	optical
Power supply	Lithium battery, 3.6 V / ½ AA	Lithium battery, 3.6 V / AA	Lithium battery, 3.6 V / ½ AA
Ingress protection rating	IP65	IP65	IP65
Signal output	internal antenna	internal antenna	external antenna w/2 m cable
Battery life (configuration-dependent)	12 years max.*	12 years max.*	12 years max.*
Output antenna power	10 mW / 50 Ω	10 mW / 50 Ω	10 mW / 50 Ω
Dimensions	h = 44.1 mm; φ = 65.5 mm	h = 34 mm; φ = 65.5 mm	h = 26.2 mm; φ = 65.5 mm
Operating temperature	0°C to 55°C	0°C to 55°C	0°C to 55°C
Weight	0.033 kg	0.033 kg	0.065 kg

* For temperature class T30 and T50 water meters operating at 25°C of ambient temperature

APT-03A-2 MODULE

An RF module for direct installation on the counter mechanism of apartment volumetric water meters. Power output: 10 mW; outdoor service range: 300 m.

Product features

- Quick and easy configuration with mobile devices
- Storing and reading the volume data from 1 to 16 months
- Detection, logging and indication of water usage irregularities and RF module performance irregularities



APT-03A-2
w/external antenna

Compatible water meters:

■ SV-RTK 2.5 - 16



Table 34. Basic technical data

Parameter	APT-03A-2 (2.65.1.1.02)	APT-03A-2 (2.65.H.1.08)
Communication protocol	Wireless M-Bus	Wireless M-Bus
Transmission frequency	868 MHz	868 MHz
Consumption detection	optical	optical
Power supply	Lithium battery, 3.6 V / AA	Lithium battery, 3.6 V / AA
Ingress protection rating	IP65	IP65
Signal output	internal antenna	external antenna w/2 m cable
Battery life (configuration-dependent)	12 years max.*	12 years max.*
Output antenna power	10 mW / 50 Ω	10 mW / 50 Ω
Dimensions	h = 44.1 mm; φ = 65.5 mm	h = 44.1 mm; φ = 65.5 mm
Operating temperature	0°C to 55°C	0°C to 55°C
Weight	0.056 kg	0.065 kg

* For temperature class T30 and T50 water meters operating at 25°C of ambient temperature



APT-03A-2

APT-03A-3 MODULE

An RF module for direct installation on the counter mechanism of home water meters. Power output: 10 mW, outdoor service range: 300 m.

Product features

- Quick and easy configuration with mobile devices
- Storing and reading the volume data from 1 to 16 months
- Two selectable operating profiles of the RF module to adjust the data transmission schedule and interval as required by the user
- Detection, logging and indication of water usage irregularities and RF module performance irregularities
- Supports an external antenna for a greater RF range

Compatible water meters:

- JS and JS130 6,3÷16 Master+ and Master C+



Table 35. Basic technical data

Parameter	APT-03A-3 (2.65.11.03)	APT-03A-3 (2.65.H.1.09)
Communication protocol	Wireless M-Bus	Wireless M-Bus
Transmission frequency	868 MHz	868 MHz
Consumption detection	optical	optical
Power supply	Lithium battery, 3.6 V / AA	Lithium battery, 3.6 V / AA
Ingress protection rating	IP65	IP65
Signal output	internal antenna	external antenna w/2 m cable
Battery life (configuration-dependent)	10 years max.*	10 years max.*
Output antenna power	10 mW / 50 Ω	10 mW / 50 Ω
Dimensions	h = 44.1 mm; φ = 65.5 mm	h = 44.1 mm; φ = 65.5 mm
Operating temperature	0°C to 55°C	0°C to 55°C
Weight	0.056 kg	0.065 kg

* For temperature class T30 and T50 water meters operating at 25°C of ambient temperature



APT-03A-3
w/external antenna



APT-03A-3

APT-03A-4 MODULE

An RF module for direct installation on the counter mechanism of industrial water meters. Power output: 10 mW; outdoor service range: 300 m.

Product features

- Quick and easy configuration with mobile devices
- Storing and reading the volume data from 1 to 16 months
- Detection, logging and indication of water usage irregularities and RF module performance irregularities
- Supports an external antenna for a greater RF range



APT-03A-4
w/external antenna



APT-03A-4

Compatible water meters:

■ MWN and MWN130 40 ÷ 300; MP and MP130 40 ÷ 100; MK50 ÷ 150; JS50 ÷ 100



Table 36. Basic technical data

Parameter	APT-03A-4 (2.65.1.1.14)	APT-03A-4 (2.65.H.1.15)
Communication protocol	Wireless M-Bus	Wireless M-Bus
Transmission frequency	868 MHz	868 MHz
Consumption detection	optical	optical
Power supply	Lithium battery, 3.6 V / AA	Lithium battery, 3.6 V / AA
Ingress protection rating	IP65	IP65
Signal output	internal antenna	external antenna w/2 m cable
Battery life (configuration-dependent)	12 years max.*	12 years max.*
Output antenna power	10 mW / 50 Ω	10 mW / 50 Ω
Dimensions	h = 44.1 mm; φ = 65.5 mm	h = 44.1 mm; φ = 65.5 mm
Operating temperature	0°C to 55°C	0°C to 55°C
Weight	0.056 kg	0.065 kg

* For temperature class T30 and T50 water meters operating at 25°C of ambient temperature

APT-03A-5 MODULE

An IP68 RF module for direct installation on the counter mechanism of industrial water meters.

Product features

- Quick and easy configuration with mobile devices
- Storing and reading the volume data from 1 to 16 months
- Three selectable operating profiles of the RF module to adjust the data transmission period and interval as required by the user
- Detection, logging and indication of water usage irregularities and RF module performance irregularities



APT-03A-5
w/external antenna



APT-03A-5

Compatible water meters:

■ MWN 40 ÷ 300 (IP68)



Table 37. Basic technical data

Parameter	APT-03A-5 (2.68.1.1.05)	APT-03A-5 (2.68.H.1.11)
Communication protocol	Wireless M-Bus	Wireless M-Bus
Transmission frequency	868 MHz	868 MHz
Consumption detection	optical	optical
Power supply	Lithium battery, 3.6 V / AA	Lithium battery, 3.6 V / AA
Ingress protection rating	IP68	IP68
Signal output	internal antenna	external antenna w/2 m cable

Parameter	APT-03A-5 (2.68.11.05)	APT-03A-5 (2.68.H.111)
Battery life (configuration-dependent)	12 years max.*	12 years max.*
Output antenna power	10 mW / 50 Ω	10 mW / 50 Ω
Dimensions	h = 47.5 mm; ϕ = 65.5 mm	h = 47.5 mm; ϕ = 65.5 mm
Operating temperature	0°C to 55°C	0°C to 55°C
Weight	0.056 kg	0.065 kg

* For temperature class T30 and T50 water meters operating at 25°C of ambient temperature

AT-WMBUS-04 | AT-WMBUS-04-1 MODULE

An outdoor RF module intended for water meters with NK pulse transmitter modules. Power output: 10 mW; outdoor service range: 300 m.

Compatible water meters:

- All models with NK / NO** transmitter modules



AT-WMBUS-04

Table 38. Basic technical data

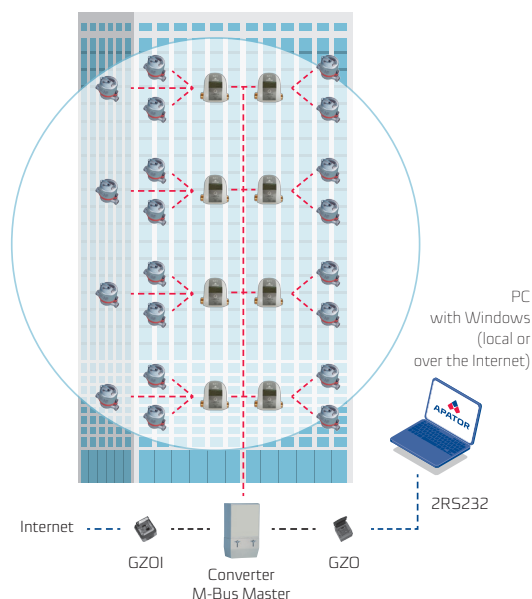
Parameter	AT-WMBUS-04	AT-WMBUS-04-1
Outdoor reading range	< 300 m	< 300 m
Data protocol format	Wireless M-Bus	Wireless M-Bus
Frequency range	868.95 MHz	868.95 MHz
Power output	10 mW / 50 Ω	10 mW / 50 Ω
Ingress protection rating	IP65	IP68
Weight	0.180 kg	0.180 kg

** Compatible with NO transmitter modules if an auxiliary 5÷24 V DC power supply source is connected.

WIRED AMR SYSTEMS

Application

Remote reading of water meters and heat and cooling meters installed in residential, building or commercial / industrial buildings. The AMR system is based on the M-Bus communication protocol or pulse outputs. For the M-Bus communication option, the total wiring length in the AMR network must be 1 km or less. The maximum number of network nodes (communication modules) is 250, which can be multiplied with each connected M-Bus Master converter. The M-Bus Master converter enables reading of the data from the communication modules and relay of the data over a wired or wireless link (via the Internet) to the AMR software installed on a PC.



Communication

Depending on the measurement device type and the RF module type and configuration, the data output can feature different data types (see the product specification sheets for details). Examples of transmitted data outputs:

Water meters / heat and cooling meters – serial number; reading date; actual reading value; monthly reading history; events.

Data reading methods

- Stationary – an AMR method implemented in a stationary AMR network the data from which are output live to an AMR software application.

Advantages

- Short meter reading round times and optimised utilization of resources
- Eliminates human error
- Reading of device units installed in inaccessible locations and/or with the consuming tenants absent from the premises
- Reduced billing period duration for improved financial fluidity of the utility provider
- Billing per actual consumption
- Fast response to undesired events
- Low reading costs per device unit
- Low AMR transmission network deployment costs: a network of 250 nodes (communication modules) requires just one concentrator
- Reading of measurement device at any time required
- Enable pulse-output based connection between water meters and the M-Bus module of the heat meters to reduce the required number of network nodes

WIRED AMR SYSTEM SOFTWARE

The Flat Standard software is dedicated for AMR of actual and archive data and events from the measurement devices with M-Bus wired modules installed. The software application was developed for Windows PCs.

Basic software functionalities:

- AMR structure creation and management (with a meter address database + measurement points)
- AMR structure import / export from / to file
- Visual output of measurement data, historical data and diagnostic data acquired over the wired network
- Enables invalidation of historical events output by the measurement devices
- Enables configuration programming of water meter wired modules

WIRED AMR SYSTEM DEVICES

KWI-1 WATER METER CONCENTRATOR

KWI-1 counts the pulse outputs generated by measurement devices enabled with pulse outputs. Up to 16 measurement devices can be connected. The KWI-1 concentrator features no display. The states of counters can be read over the M-Bus interface, using the Flat Standard software on a PC.

Table 39. Basic technical data

Parameter	KWI-1
Number of pulse inputs	16
Pulse constants	1 / 2.5 / 10 / 25 / 100 / 250 / 1000 / 2500 dm ³ /pulse
Power supply	Battery-powered, 5 years of max. battery life
Interface	M-Bus
Configuration settings	The pulse constant and the initial status (independent for each input); M-Bus network number; baud rate
Weight	0.3 kg



KWI-1

M-BUS MASTER CONVERTER

Table 40. Basic technical data

Parameter	LSD (Local Data Station)	M-Bus/RS232 converter
Recommended no. of M-Bus nodes supported by the converter	60 (130*)	200 (250*)
Operating output current (continuous)	200 mA	600 mA
Maximum output current	0.3 A	1 A
Converter power supply	230 V AC	24 V DC
Version	wall-mounted enclosure	rail-installed product kit in an installation rack box

* Applies to the LQM-III-... heat meters



LSD

REMOTE READING INTERFACE RECEPTACLE GZO | GZOI

Reading options:

GZO - local reading

GZOI - reading over the Internet (Ethernet)



GZO

GZOI

M-BUS NETWORK OVERVOLTAGE PROTECTORS

Provide continuous protection against induced overvoltage states in the M-Bus network (e.g. during thunderstorms).



OVERVOLTAGE PROTECTOR

APT-GSM-UT-2 CONCENTRATOR

The APT-GSM-UT-2 external communication module is intended for the logging of readings from water meters and other measurement devices. The concentrator logs events and their instance messages over GSM / GPRS and via any APN. The device features 4 pulse inputs for connecting up to 2 measurement devices or 4 alarm devices. It enables detecting and logging events, and sending information about events via text messages or to Metis 2. An embedded NFC module enables direct reading of measurement data from the device and its complete programming with mobile devices with a dedicated configuration management application.

Compatible water meters:

- Compatible with the water meters which have pulse outputs

Table 41. Basic technical data

Parameter	APT-GSM-UT-2
Data protocol format	TCP/IP
Frequency range	850 ÷ 900 MHz, 1800 ÷ 1900 MHz
GPRS multichannel transmission class	12
Compatibility with SIM cards	3 V / 1,8 V
Pulse input count	4
Pulse signal type	potential-free (reed relay) transistor key (OC, OD)
Minimum pulse duration	1 ms
Max. pulse frequency	16 Hz
Voltage levels corresponding to the logical values	V_{LO} : 0 to 0,5 V, V_{HI} : 2 to 15 V
Power supply	lithium battery, 3.6 V
Memory type	RAM
Operating time (configuration-dependent)*	up to 6 years
Cable	2 x 0.14 mm ²
Cable length	4 x 1.5 m
Operating temperature	-20°C to 55°C
Installation method	ø 5 mm wall plugs (4 pcs.)
Dimensions	120 x 104 x 63 mm
Weight	<0.5 kg
Ingress protection rating	IP67

* For operation at 25°C of ambient temperature.



APT-GSM-UT-2

WIRED AMR WATER METER MODULES

APT-MBUS-NA-1 | APT-MBUS-NA-2 | APT-MBUS-NA-3 | APT-MBUS-NA-4 MODULES

The M-Bus module is designed for direct installation on the counter mechanism of Apator Powogaz SA water meters. The device directly transmits the water meter readings to the wired M-Bus network.

Product features

- The product features a system of optical sensors for optical reading of water meter data and detection of the water flow direction, which makes the reading completely accurate with the water meter readings.
- Detection, logging and indication of water usage irregularities and RF module performance irregularities.

Compatible water meters:

- APT-MBUS-NA-1-C – JS and JS90 1,6÷4,0 Smart+ and Smart C+
- APT-MBUS-NA-2-C – JS and JS130 6,3÷16 Master+ i Master C+
- APT-MBUS-NA-3-C – SV-RTK 2,5÷16
- APT-MBUS-NA-4-C – MWN and MWN130 40÷300; MP and MP130 40÷100; JS50÷100, MK50÷150



APT-MBUS-NA-1



APT-MBUS-NA-2; -3; -4

Table 42. Basic technical data

Parameter	APT-MBUS-NA-1	APT-MBUS-NA-2; -3; -4
Communication protocol	M-Bus with the manufacturer's layer	M-Bus with the manufacturer's layer
Consumption detection	optical	optical
Pulse outputs	2 (OD)	2 (OD)
Power supply	Lithium battery, 3.6 V / ½ AA	Lithium battery, 3.6 V / AA
Ingress protection rating	IP65	IP65
Battery life	10 years max.*	10 years max.*
Cable	YTTY 2x0.14 mm ²	YTTY 2x0.14 mm ²
Cable length	1.5 m	1.5 m
Dimensions	h = 26.2 mm; φ = 65.5 mm	h = 44.1 mm; φ = 65.5 mm
Operating temperature	0°C to 60°C	0°C to 60°C

* For operation at 25°C of ambient temperature and no M-Bus network power output, the battery life is 5 years maximum

AT-MBUS-NE-01 | -01-1h | -02 | -03 MODULE

The AT-MBUS-NE microprocessor pulse module is designed for direct installation on the counter mechanism of Apator Powogaz SA water meters. The device directly transmits the water meter readings to the receivers with a pulse input. The pulse value and two pulse outputs can be specified on custom order.

Product features

- The product features a system of optical sensors for optical reading of water meter data and detection of the water flow direction, which makes the reading completely accurate with the water meter readings.
- Enables selection of the pulse mode for each pulse output
- Detection, logging and indication of water usage irregularities and RF module performance irregularities over a wired configuration interface
- The pulse output is NC; each pulse breaks the output for 250 ms

Compatible water meters:

- AT-MBUS-NE-01 – **MWN and MWN130 40÷300; MP and MP130 40÷100; JS50÷100, MK50÷150**
- AT-MBUS-NE-01-1h – **MWN40÷300 (IP68)**
- AT-MBUS-NE-02 – **JS and JS90 1,6÷4,0 Smart+ and Smart C+**
- AT-MBUS-NE-03 – **JS 6,3÷16 Master+ and Master C+**



AT-MBUS-NE-01; -01-1h i -03

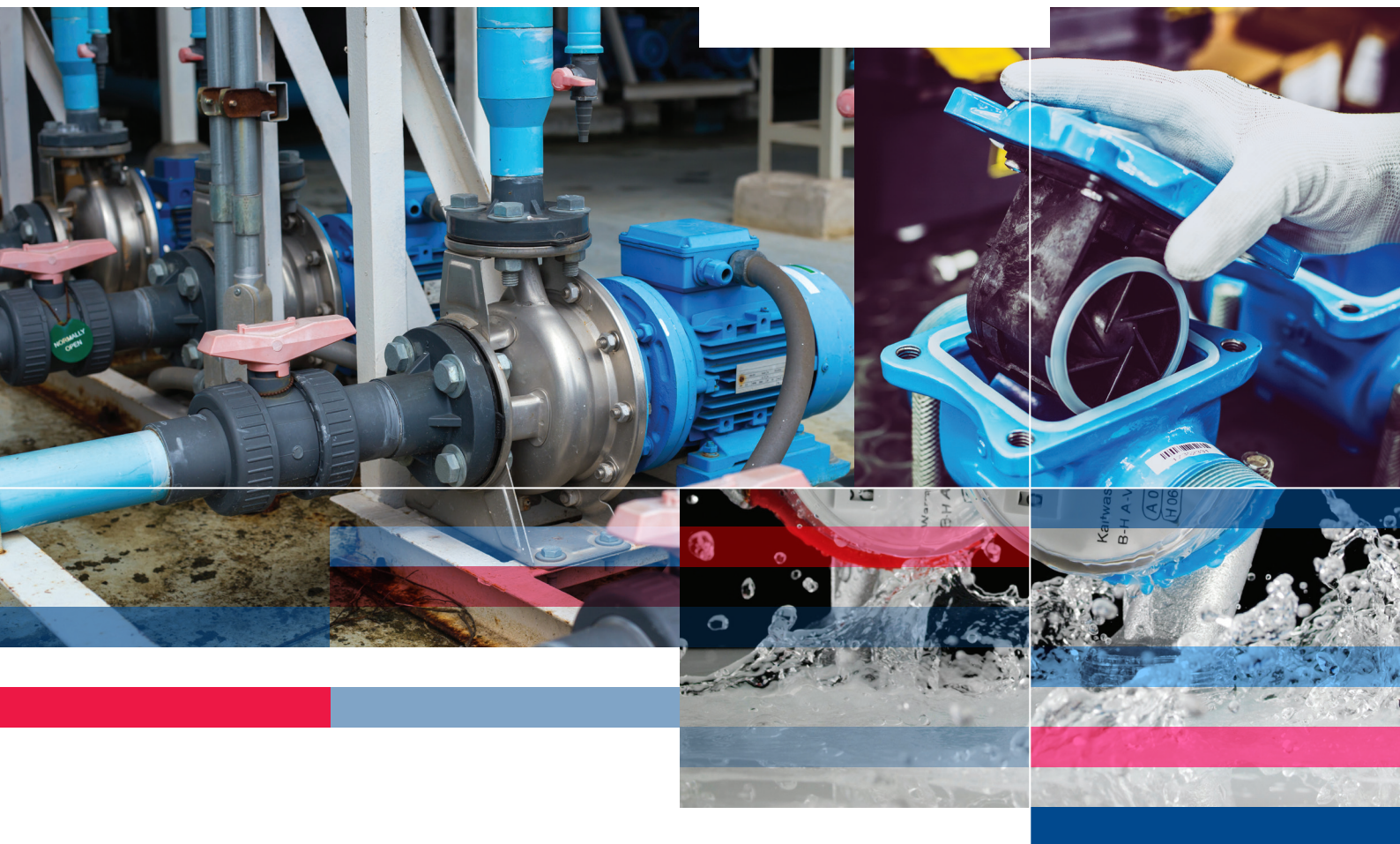


AT-MBUS-NE-02

Table 43. Basic technical data

Parameter	AT-MBUS-NE-01, -03	AT-MBUS-NE-01-1h	AT-MBUS-NE-02
Consumption detection	optical	optical	optical
Pulse outputs	2 (type OD)	2 (type OD)	2 (type OD)
Power supply	Lithium battery, 3.6 V / AA	Lithium battery, 3.6 V / AA	Lithium battery, 3.6 V / AA
Ingress protection rating	IP65	IP68	IP65
Battery life	10 years max.*	10 years max.*	10 years max.*
Cable	YTLY 4x0.14 mm ²	YTLY 4x0.14 mm ²	YTLY 4x0.14 mm ²
Cable length	1.5 m	1.5 m	1.5 m
Dimensions	h = 44.1 mm; ϕ = 65.5 mm	h = 44.1 mm; ϕ = 65.5 mm	h = 26.2 mm; ϕ = 65.5 mm
Operating temperature	0°C to 60°C	0°C to 60°C	0°C to 60°C

* For temperature class T30 and T50 water meters operating at 25°C of ambient temperature



Complementary range

WATER AND HEAT METER ACCESSORIES

Table 44. Water and heat meter half unions

Model	Nut size (G)	Port size (g)	Diameter (d)	Length (L)
DN15 mm kit of half unions w/gaskets	¾"	½"	17 mm	37,5 mm
DN20 mm kit of half unions w/gaskets	1"	¾"	23 mm	45,6 mm
DN25 mm kit of half unions w/gaskets	1¼"	1"	29 mm	46,5 mm
DN32 mm kit of half unions w/gaskets	1½"	1¼"	36 mm	56,0 mm
DN40 mm kit of half unions w/gaskets	2"	1½"	43 mm	66,0 mm
DN50 mm kit of half unions w/gaskets	2½"	2"	54 mm	74,2 mm

Table 45. Water and heat meter extension pieces

Model	G	L
DN20 mm extension piece	1"	20 mm; 30 mm; 40 mm; 60 mm

Table 46. Coupling check valves for water and heat meters

Model	Port size (g)
EA check valve, installed on the DN15 mm water meter outlet	½"
RV-FK valve, installed in the DN15 mm spool	½"

Table 47. Spools with check valves for heat and water meters

Model	Port size (g)	Nut size (G)	Length
DN15 mm spool w/check valve	½"	¾"	34 mm
DN20 mm spool w/check valve	¾"	1"	46 mm
DN25 mm spool w/check valve	1"	1¼"	58 mm

Table 48. Coupling clamps w/snap-on tamper seals

Model	Blue
DN15 (½") clamp with tamper seal	X
DN20 (¾") clamp with tamper seal	X
DN25 (1") clamp with tamper seal	X
DN32 (1¼") clamp with tamper seal	X
DN40 (1½") clamp with tamper seal	X
DN50 (2") clamp with tamper seal	X

Table 49. Butterfly tamper seal with seal wires

Model	Seal wire length
Butterfly tamper seal	40 cm
Butterfly tamper seal	60 cm

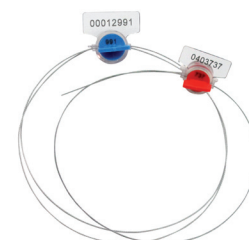
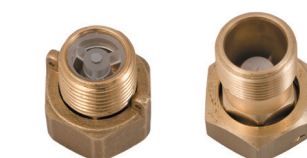
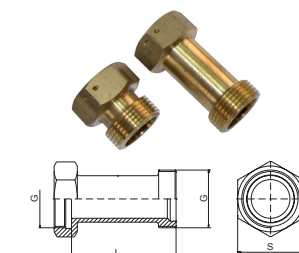
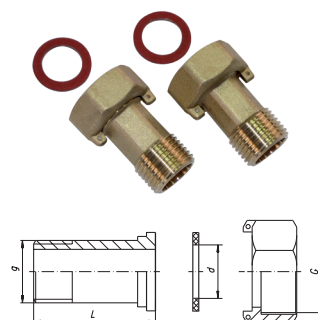


Table 50. Tee pipes for immersion temperature sensors

Model	Size	Length
DN15 / M10x1 tee	1/2"	55 mm
DN20 / M10x1 tee	3/4"	63.5 mm

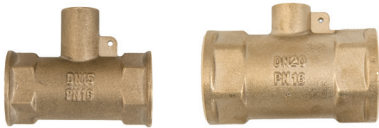


Table 51. Reducer for immersion temperature sensors

Model	Size
DN15 / M10x1 reducer	1/2"



Table 52. Ball valves for immersion temperature sensors

Model	Size
Ball valve, DN15 / M10x1	1/2"
Ball valve, DN20 / M10x1	3/4"



Table 53. Ball valves

Model	Size
DN15 ball valve	1/2"
DN20 ball valve	3/4"
DN25 ball valve	1"



Table 54. Water meter reducers

Model	G1	G2	L
1" x 3/4" reducer	1"	3/4"	20

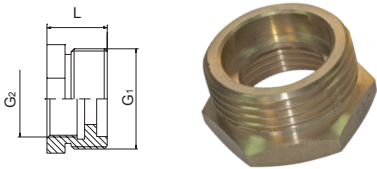
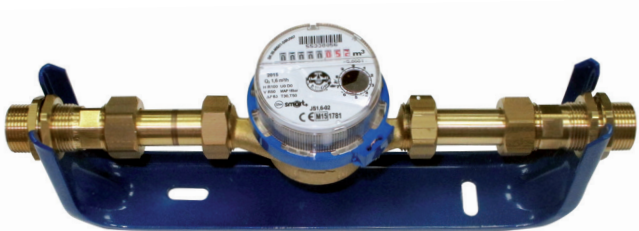
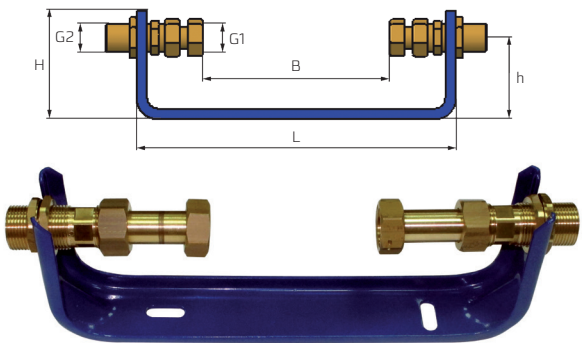


Table 55. Water meter brackets with double-sided adjustment

Water meter	Bracket length L (mm)	Bracket height H (mm)	Bracket height h (mm)	Spacing range B (mm)	Water meter coupling thread G1	Bracket outlet thread G2
DN15 / 1/2"	≈280	115	68	80-150	G3/4	G3/4
DN20 / 3/4"	≈280	123	68	130-150	G1	G1

NOTE: Single-sided adjustment brackets are available.



The data presented herein is valid on the date of issue hereof.

The manufacturer has the right to modify and improve the products without notice.

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Apator Powogaz SA

Jaryszki 1C, 62-023 Żerniki, Poland

e-mail: handel.powogaz@apator.com

Office: phone +48 61 8418 101

Sales: phone +48 61 8418 ext. 133 / 136 / 138 / 148

Export: phone +48 61 8418 139

www.apator.com

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