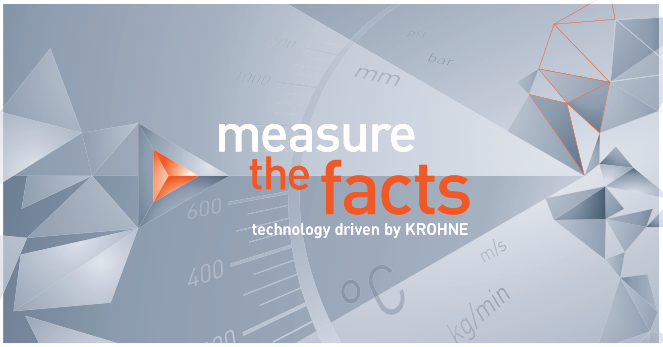
WATERFLUX 3070

Electromagnetic water meter for drinking water applications

KROHNE

measure the facts

- Installation without inlet and outlet sections
- Integrated flow, pressure and temperature measurement
- Communication via Modbus RTU or pulses
- Multiple power concept for any location



KROHNE – Measure the facts

Welcome to KROHNE. As a leader in process measuring technology, we're at home in a wide variety of industries worldwide. The name KROHNE has stood for **innovative and reliable solutions since 1921**. The company now offers a whole spectrum of instruments for **flow, level, temperature and pressure measurement as well as process analysis**. Our portfolio is rounded out by comprehensive services and consulting.

With over 90 years of experience in the water industry KROHNE has developed extensive expertise in accurate water measurements and water quality monitoring. Introduced in 2009, **WATERFLUX series revolutionised water metering** and set the technology standard. The new WATERFLUX 3070 continues this tradition by combining innovative features with the advantage of proven technology.

WATERFLUX 3070 – High precision, 100% KROHNE innovation

WATERFLUX 3070 is a ground breaking electromagnetic water meter for applications in the field of drinking water.

It is the first **all-in-one device** that measures flow, pressure and temperature in just one instrument. With its unique sensor design featuring reduced cross section and an efficient coil construction, WATERFLUX significantly optimises flow velocity and flow profile, and produces **unprecedented accuracy** under virtually all flow conditions.

The water meter **does not require inlets and outlets**, enables **extremely low power consumption**, and provides a **highly durable design** without sensitive moving parts in the flow.
WATERFLUX 3070 is the compelling choice for 21st century drinking water management systems.

Typical applications:

- Measurement of clean (potable) water
- Distribution networks monitoring
- Maintaining water balance
- Pressure monitoring and water quality control with integrated pressure and temperature sensor
- Pressure and pumping stations
- Water consumption and billing
- Checking or billing of ground water

Metrology

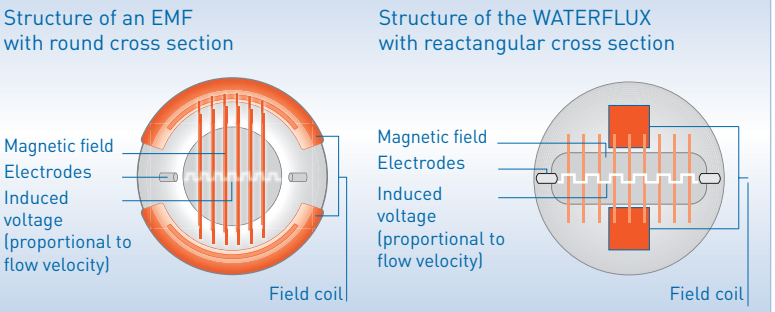
WATERFLUX 3070 is approved to **OIML R49 and MID Annex MI-001** for water meters. The OIML R49 sets out the conditions to which water meters must comply to meet the requirements of the services of legal metrology in countries where these instruments are subject to state controls. The certification applies for **accuracy class 1 and 2**, for the complete diameter range, and fulfils the accuracy requirements **also for installation with 0D inlet and 0D outlet sections**. Access to fiscal parameters can be blocked to prevent intervention of non-authorised persons.

Unique rectangular bore construction

The strengths of the WATERFLUX 3070 lie in its **unique flow sensor design** with a reduced cross section and an efficient coil construction. Mean flow velocity and flow profile are optimised within the cross section thanks to the rectangular design of the sensor. The measurement is therefore **independent from the flow profile**. The coils provide a stronger, more homogeneous magnetic field, leading to an improved signal-to-noise ratio and **stable measurements**.

The benefits of this design are a **very good low-flow performance**, but also a reduction of the additional uncertainty for upstream disturbances. The WATERFLUX 3000 sensor can therefore be installed with zero inlet and outlet lengths. Another major benefit of the rectangular sensor is its very low power consumption, leading to a **long battery lifetime**.

Comparison of cross sections

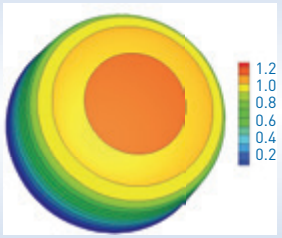


Installation without inlet and outlet sections

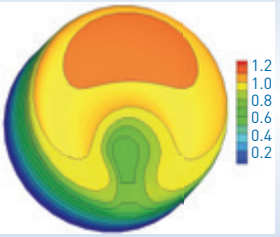
WATERFLUX 3070 has superior uniform flow profile, also with upstream flow disturbances. The WATERFLUX 3000 sensor can therefore be installed with zero inlet or outlet lengths when the sensor is placed directly behind an elbow or reducer. Zero inlet and zero outlet **simplifies the installation footprint**.

Independent studies by the Physikalisch-Technische Bundesanstalt (PTB) in Berlin confirm that the rectangular cross section optimises the flow profile. Tests with different sizes and different types of flow disturbances have demonstrated that the WATERFLUX 3070 is **virtually independent of the examined upstream piping**. Disturbances of the flow profile are reduced by 80%. With zero inlet and outlet the water meter performs well within the requirements of OIML R49 and MID MI-001.

Electromagnetic flowmeter with round cross section



Uninterrupted flow profile



Flow profile after a pipe bend

WATERFLUX with rectangular cross section

Uninterrupted flow profile

Flow profile after a pipe bend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WATERFLUX simplifies installation and minimises maintenance

Water meters are distributed over a widespread area and are often in **difficult-to-reach locations** ranging from:

- Remote sites of water wells
- Long-distance distribution networks
- Measurement chambers under busy roads
- Small, narrow or flooded measurement chambers
- Basements of buildings

The WATERFLUX 3070 offers many features and benefits to **simplify engineering** in various conditions:

- Multiple power concept, providing a power solution for any location
- Diameter range on batteries from DN25 up to DN600
- Compact and remote converter housing
- Reduced straight lengths (0D inlet, 0D outlet) for locations with minimal space
- Subsoil installation where no measurement pit is required

To control costs easy installation and minimal visits to site are prerequisite for water companies. To **simplify the installation on site** the WATERFLUX 3070 offers:

- Battery power option, meaning no electrical wiring on site
- Plug & play MIL connectors further reduce the need for wiring on site
- A standard reference electrode, making grounding rings obsolete
- Compact and low weight design
- Installation without filters or strainers

To **reduce site visits**, the WATERFLUX 3070 has a:

- Robust construction with no obstructions in the flow for a long-term reliability
- Tamper-proof design
- Long-lasting batteries
- Range of communication interfaces to reduce the need for manual collection of data

Installation in measurement chambers

Water meters are used for monitoring and control purposes in the water distribution networks running from the water production plant down to the customer. The meters are often installed in measurement chambers under ground.

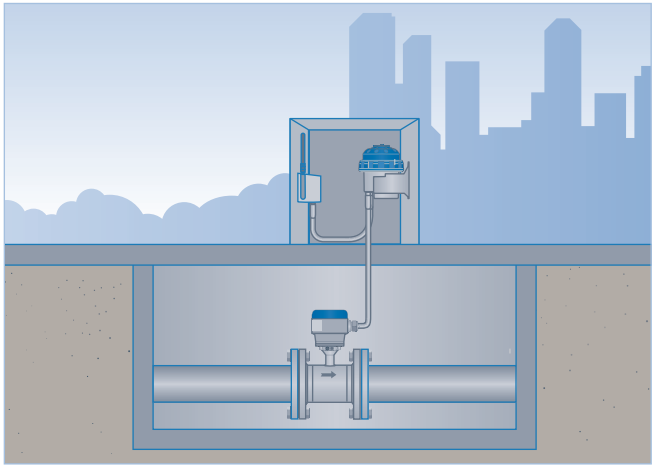
The installation of a WATERFLUX 3070 has some major benefits compared to a mechanical meter because it **does not need upstream and downstream piping** but also **no ancillary equipment** like strainers, filters or isolation valves with a bypass.

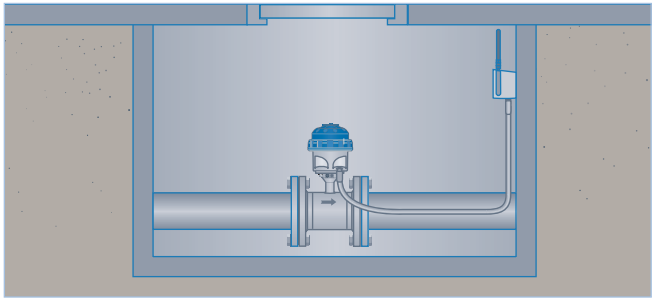
All that is required in the measurement chamber is the sensor itself leading to substantial lower installation costs. A (compact or remote) signal converter and an optional data logger/GPRS unit can be installed either in the measurement chamber or above the ground. Above the ground the remote signal converter and datalogger/GPRS unit are usually placed on a pillar or in an electrical cabinet.

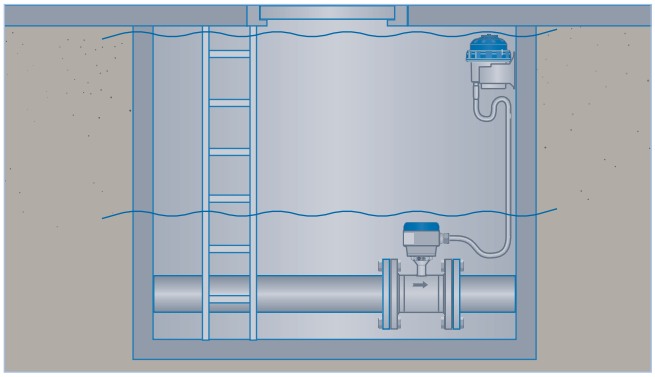
With its **maintenance-free design** also substantial reductions in maintenance costs can be realised. There is **no need for removing the sensor from the line for a recalibration**. The OPTICHECK is available for verifying the integrity of the flow sensor, transmitter and transmitter cable.

Immersion in water (IP68)

As standard the robust WATERFLUX 3000 flow sensor with a stainless steel connection box is **suitable for long-duration immersion** in flooded metering pits, for example in periods of heavy rainfall. Both the compact and remote version of the IFC 070 signal converter allow for installation in measurement chambers with periodic immersion in water. Immersion in water is possible **down to a depth of 10 metres**. The WATERFLUX sensor and signal converter are **IP68** rated according to EN-IEC 60529.







Direct subsurface installation

Thanks to its reliability, maintenance-free operation and its robust construction the flow sensor can also be buried underground.

Burying the sensor directly under the ground has a number of advantages. It can be a **major cost saving** because it eliminates the need for a measurement chamber. With no moving parts to wear out or other parts that can break down, there is little to **no need for meter maintenance**. Verification options on site ensure the integrity of the meter. **All sizes can be buried**. To protect the flow sensor a **special subsoil coating** can be ordered. The remote sensor version has an **IP68** stainless steel connection box.

Long-term reliability

In a world where water is becoming scarce, potable water is a precious resource. Flow measurements of potable water need to be very accurate as they form the basis for efficient water network management and for the billing of water consumption.

Every single flowmeter is **standard wet calibrated** before leaving the factory. As an option **verification to custody transfer** standards (OIML R49, MI-001) can also be ordered. KROHNE operates a large number of accurate calibration facilities including the **world's most precise volumetric calibration rig** for flowmeters.

Thanks to its **unobstructed measuring section**, the WATERFLUX sensor is far superior to conventional mechanical water meters, in terms of pressure loss and long-term stability. The WATERFLUX 3070 performs **automatic self-tests** including an of integrity check of hardware and software and a calculation of the remaining battery lifetime. If required, warnings and error messages are available on the display, via the status outputs or via Modbus.

The **OPTICHECK** provides an **inline health check** to make sure that installed electromagnetic flowmeters are performing within specification. When the tool is connected on site, it gathers measuring data to ensure that the flowmeter is performing within 1% of its factory calibration. A **hard copy verification report** can be printed for every flowmeter. **Contact KROHNE for more information or for an onsite service visit**.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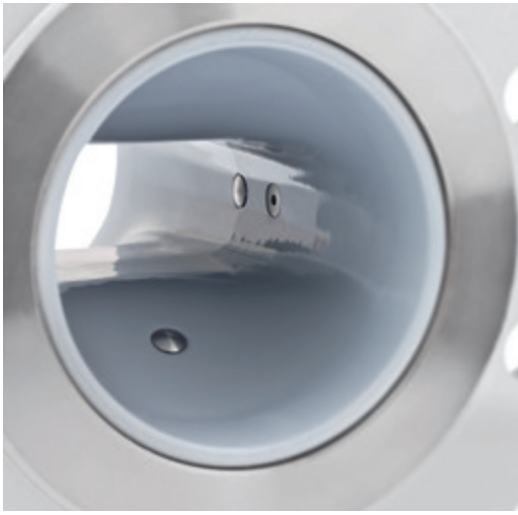
Flow, pressure and temperature measurement with just one device

Maintaining the water balance, reducing pumping costs, pressure monitoring and district zoning (DMA) are focus areas for water companies in drinking water distribution networks. Pressure and flow data give **important input for monitoring and operating networks**. Managing pressure levels is required for efficient transport and delivery of potable water. A large pressure drop is an indicator for leakage.

Safety of drinking water is a key priority for water companies. Temperature control is required because high temperatures may pose a risk to public health and flushing of networks is needed. When potable water has reached a critical value, the WATERFLUX 3070 sounds an alarm.

WATERFLUX 3070 is the first all-in-one water meter that measures **flow, pressure and temperature simultaneously** with just one instrument. The WATERFLUX 3000 sensor is equipped with an **integrated pressure and temperature sensor**.

- Flow, pressure and temperature measurement values can be read on the IFC 070 display and can be read out via Modbus RTU
- An alarm can be generated via the status output or via Modbus when critical limits for pressure and/or temperature are exceeded



Multiple power concept for any location

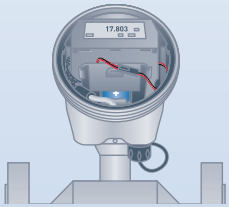
The **battery-powered** WATERFLUX 3070 is ideal for remote locations in the water industry where no mains power is available. KROHNE has developed a special sensor construction requiring very low power for the longest battery lifetime. As standard the IFC 070 signal converter has an internal battery pack with a dual D lithium cell. For an extended battery lifetime an external battery pack, the PowerBlock, with a lithium dual DD cell can be connected to the converter.

For locations where mains power is available, but water companies demand a power backup to ensure continuous measurements, the WATERFLUX 3070 can be equipped with an external IP68 **FlexPower unit**. The input power for the KROHNE FlexPower can be supplied by connecting an 110...230 V AC mains supply source. Should the mains power supply fail, an internal battery will take over the power supply to the IFC 070 signal converter as a backup. To save energy, the meter will automatically switch over to a low-power-consuming battery backup mode.

Solar or wind power can provide an alternative to battery power for locations where no mains power is available. There is a growing market demand for green power sources like wind and/or solar energy. For this purpose the FlexPower unit is delivered with a special power cable for connection to a 10...30 V DC power supply.

Standard

WATERFLUX 3070 with internal battery power

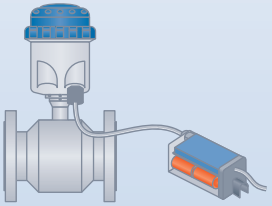


Battery power

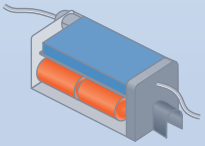
Lithium double D-cell

Option 1

WATERFLUX 3070 with external battery PowerBlock



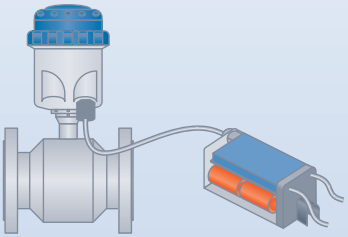
External battery PowerBlock



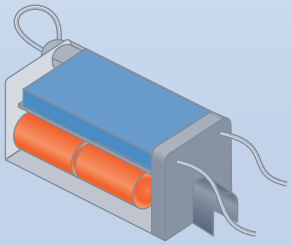
Lithium double DD-cell

Option 2

WATERFLUX 3070 with FlexPower unit



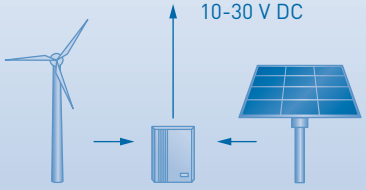
FlexPower unit



Mains power with battery backup (lithium double D-cell)

Power source

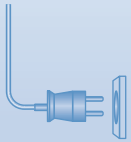
10-30 V DC

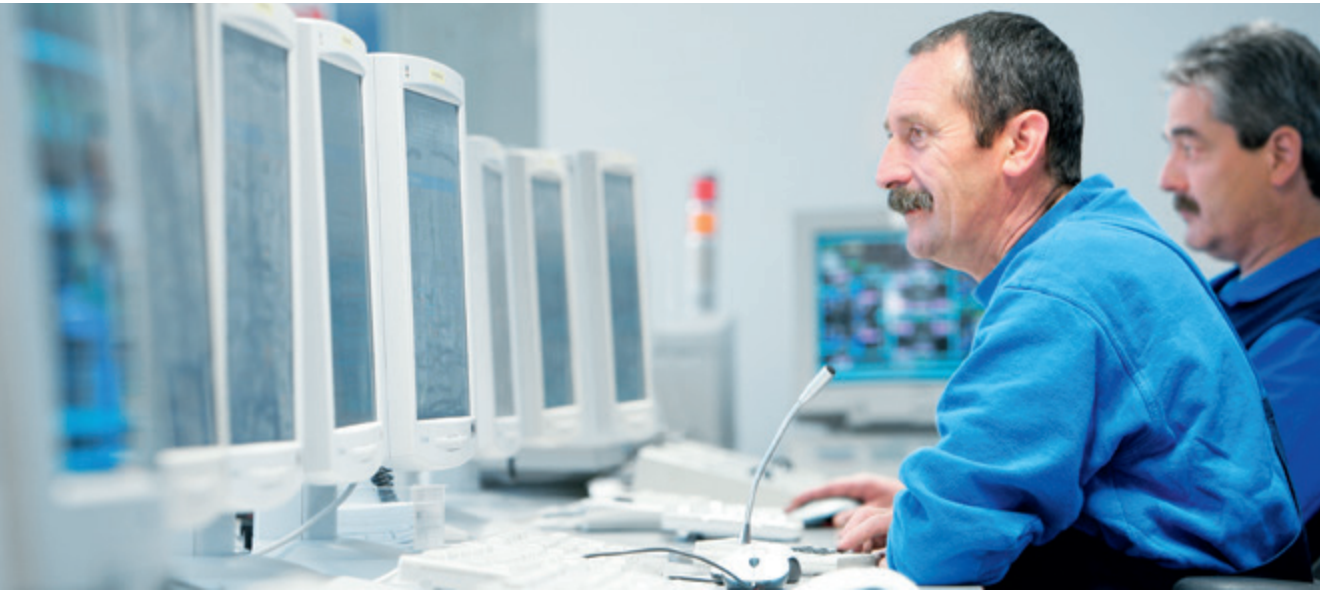


DC distribution box

Power source

100-230 V AC





Data communication options

Our equipment needs to support customer business processes like zoning for water balance (DMA), water abstraction, pressure management, and revenue collection. For this water companies need more measurement data, smart data, accurate data and real-time data.

WATERFLUX 3070 **provides important data** like sum, forward and reverse flows, and flow rates at critical measurement points. With the integrated pressure and temperature sensor the actual values for pressure and temperature become available. It also provides meter and battery status information.

The display forms the main source of data for meters that are used for billing and are subject to custody transfer (OIML R49, MI-001). Measurement and meter status data can be given out either via 2 pulse and 2 status outputs or via a **Modbus RTU RS 485**. Simple data communication requires a **simple interface** between the WATERFLUX 3070 and a wide range of communication equipment and systems in use in the market.

Modbus communication

WATERFLUX 3070 can communicate by RS485 using the Modbus RTU protocol. An add-on board for the **Modbus module is integrated** in the IP68 converter housing. Modbus has been selected because it is a mature, versatile and accepted protocol and can be easily integrated into other communication systems. It forms a standard solution to disclose all data available from the IFC 070 signal converter.

WATERFLUX 3070 **offers two RS 485 Modbus RTU interface options**: a low (battery) power and a high (mains) power Modbus option. The **low power** (non-isolated) Modbus version is unique in the market and can be used for data communication between a battery-powered WATERFLUX 3070 version and a battery-powered data logger GPRS module. In the case of the WATERFLUX 3070 with FlexPower, the mains powered water meter, the **high power** (isolated) Modbus option can be ordered for data communication to process automation systems (SCADA, DCS, PLC).

Modbus options

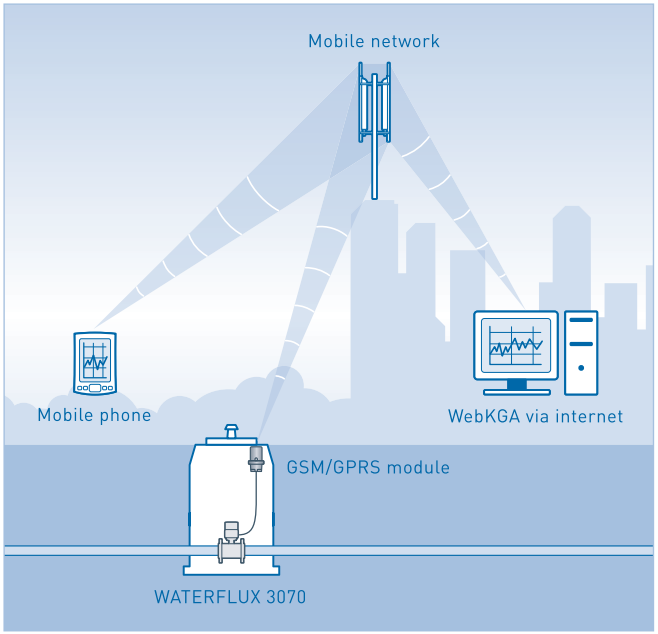
	Battery power	FlexPower (mains power)
Communication	• 2 pulse + 2 status outputs • Optional low power Modbus communication for connection to GSM/GPRS module	• 2 pulse + 2 status outputs • High power Modbus communication for connection to e.g. PLC

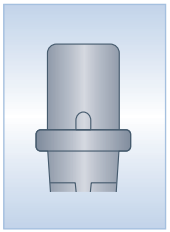
GSM/GPRS delivers information from anywhere in the world

Bulk water meters are often installed over a wide area and at measuring points in remote areas or water chambers under the ground or difficult-to-reach transitional points. The unique low-powered battery Modbus option has a dedicated chipset for a long lifetime and can be connected to a **battery-powered GSM/GPRS data logger** unit for a **complete remote solution**.

Via its outputs the WATERFLUX 3070 **can be connected to a wide range of data logger** and remote communication equipment from various brands that support pulses and/or Modbus. It has already been tested with the following preselected vendors:

- Datawatt
- Jiaxing HgDao
- Lacroix Sofrel
- Metasphere
- Primayer





GSM/GPRS module

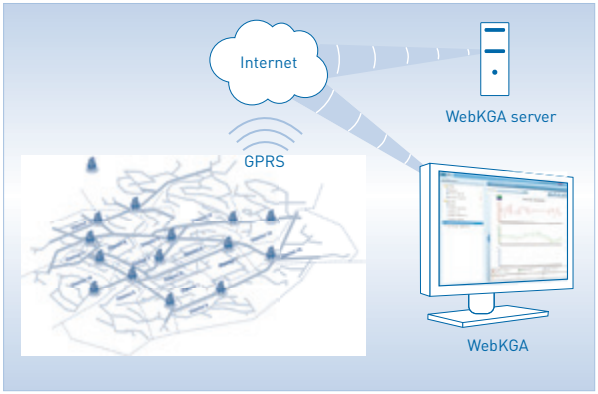
WATERFLUX 3070

Web-based data hosting

Through a dedicated web site, **data can be viewed or exported** for further analysis. The advantages are: a fully secured data base and confidential access to data, no more constraints to handle a SCADA and data presentation can be customised by the end user. Additionally, PC-based data hosting can be used.

A **wide range of collected data** are available, e.g.:

- Trend curves with statistics and printing
- List of data (counters, flow, daily/weekly/monthly reports, measurements, alarms, etc.)
- Data exported in Excel
- automatic alarms to be sent to a dedicated e-mail address
- Data can be sent to a dedicated FTP server



WATERFLUX series – Optimal solution for any application

WATERFLUX 3000 sensor

WATERFLUX 3000 sensor **can be combined** with the IFC 070, IFC 050, IFC 100 and IFC 300 signal converters, dependent on the needs of the applications.

Sensor

WATERFLUX 3000

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Signal converter

IFC 070

IFC 050

IFC 100

IFC 300

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Flowmeter

WATERFLUX 3070

WATERFLUX 3050

WATERFLUX 3100

WATERFLUX 3300

Battery / Mains power
(Sum) Counter

Mains power
Flow rate

	IFC 050	IFC 100	IFC 300	IFC 070
				
Housing variants	Compact, Wall	Compact, Wall	Compact, Wall, Rack, Field	Compact, Field
Protection category	IP66/67	IP66/67	IP66/67	IP68
Mains power	100...230 VAC 24 VDC	100...230 VAC 12-24 VDC 24 VAC/DC	100...230 VAC 12-24 VDC 24 VAC/DC	110...230 VAC 10...30 VDC
Battery backup	-	-	-	yes
Battery power	-	-	-	internal or external
Measurement accuracy	±0.5% of MV above 0.5 m/s ±2.5 mm/s for 0.5 m/s	±0.3% of MV ±1 mm/s	±0.2% of MV ±1 mm/s	±0.2% of MV ±1 mm/s (*) ±0.4% of MV ±1 mm/s (**)
OIMLR49, MI-001 certification	-	-	yes	yes
Outputs	current (active) pulse (active) status/limit switch	current (passive) pulse (passive) status/limit switch	current (active) pulse (active) status/limit switch	- pulse (passive) status/limit switch
Control inputs	-	yes	yes	-
Communication	HART® Modbus	HART® Modbus Profibus PA /DP Fieldbus	HART® Modbus Profibus PA /DP Fieldbus	Modbus
Primary measurement	flow rate (m^3/h)	flow rate (m^3/h)	flow rate (m^3/h)	flow counter (m^3)
Secondary/ optional measurement	-	-	-	flow rate, pressure, temperature

(*) DN25-300, (**) DN350–600

Operating and installation conditions

	WATERFLUX 3070 | Water meter
Medium	• Potable water, raw water, irrigation water • Conductivity: ≥20 µS/cm
Process temperature	-5...+70°C; +23...+158°F
Ambient temperature	-25...+65°C; -4...+149°F
Operating pressure	Up to 16 bar; 232 psi for DN25...200; 1...8" Up to 10 bar; 150 psi for DN250...600; 10...24"
Immersion in water	Protection category according to EN-IEC 60529 for compact (C) and field (F) version: IP68 (NEMA4X/6P)
Flow	Bidirectional
Subsurface installation	Protective subsoil coating (option)
Inlets and outlets	0DN/0DN, certified to MI-001, OIML R49 for DN25...600

Technical data

Sensor construction	Unique rectangular flow sensor design for DN25 to DN600; 1"to 12" Built-in reference electrode
Pressure and temperature sensor	Optional: built-in for DN50...200 with compact and remote versions
Measuring accuracy	• DN25...300; 1...12'' down to 0.2% of the measured value ±1 mm/s (*) • DN350...600; 14...24'' down to 0.4% of the measured value ±1 mm/s (*)
Power supply	• 2 internal batteries: Dual D-cell (lithium, 3.6 V, 38 Ah) • External battery pack (PowerBlock): Dual DD-cell (lithium, 3.6 V, 70 Ah) • FlexPower unit for mains power incl. battery backup (Dual D-cell lithium, 3.6 V, 38 Ah): 110...230 V AC; 9...30 V DC/50-60 Hz
Outputs	• 2 passive pulse outputs • 2 passive status outputs (one status output can be used as a third pulse output)
Communication	• Version with internal or external batteries: Passive pulses or non-galvanic separated (low power) Modbus • Version with FlexPower unit: Passive pulses or galvanic separated (high power) Modbus
Process connections	• Flanges: EN1092-1, ASME, JIS, AS 4087, AS2129 • Threads: DN25 (G1) and DN40 (G1.5)
Wetted materials	• Coating: Rilsan® polymer • Electrodes: Stainless steel, Hastelloy® C (option)
Sensor material	• Housing: Sheet steel • Connection box: Stainless steel (IP68)
Material converter housing	Polycarbonate
Custody transfer approvals	OIML R49, MID MI-001 Contact KROHNE for national approvals
Potable water approvals	ACS, DVGW W270, NSF / ANSI Standard 61, TZW, WRAS

(*) The specified measurement accuracy refers to use with 3D inlet and 1D outlet

KROHNE – Process instrumentation
and Measurement solutions

- Flow
- Level
- Temperature
- Pressure
- Process analysis
- Services

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