

**Solutions. For smart water
and energy use.**



Company presentation

HOW RESPONSIBLY ARE YOU USING WATER AND ENERGY?

Global challenges are fundamentally changing the way our industry works.

Climate change calls for new ways of generating energy – and for responsible consumption habits. The increasing global population needs water and energy, but more and more people have no access to clean drinking water.

Urbanisation poses huge challenges for our coexistence in large urban areas. In these times of globalisation, the worldwide networking of infrastructures and processes is becoming increasingly important. The opportunities and risks of digitalisation are palpable in all areas of life.

We owe it to our environmental heritage and later generations to implement effective, far-sighted solutions. Politics, industry, agriculture, and every single one of us – we must all learn to be sustainable in our actions.

Diehl Metering supplies solutions for the intelligent use of water, thermal energy, gas and electricity. All over the globe, we help water and energy suppliers, communities and the industrial sector to make their processes more efficient – from meter reading to billing. We support smart city and smart grid concepts, the reduction of CO₂ levels – and the responsible use of our planet's precious resources.

HOW DO YOU PREVENT WATER LOSSES IN YOUR NETWORK?

Take control of your water and heating network.

Burst pipes, gradual leaks, non-revenue water: all over the world, water suppliers and operators of district heating or cooling networks suffer huge financial setbacks from water losses and non-billable quantities of water and energy. More than anywhere, this happens in places where energy is precious and drinking water is in scarce supply.

Diehl Metering develops solutions for the most demanding requirements. Our robust technologies deliver high-precision results, even under extreme climatic and environmental conditions, or when the shafts are flooded or sand or dirt is caught in the pipes.

Combined with our high-performance Diehl Metering radio technology, our meters are ready for mobile readings (via a mobile or fixed network, for example).

Take full advantage of the high-resolution metering data to monitor the entire water or district heating network. We will help you to quickly detect and fix leaks and water losses in a cost-effective way.

Philippe Cuny, Essilor: "Diehl Metering's solution provides key indicators for every kind of consumption. The process improvements made as a result of analysing this data allow us to use 50% less water in a year. Data analysis enables us to identify leaks or deviations from normal readings so we can take the necessary remedial action more quickly."

HOW CAN YOU OPTIMISE YOUR PROCESSES – FROM METERING TO BILLING?

Produce transparent consumption data – the simple, cost-effective way.

The process from manual readings and administration through to billing is becoming an increasing source of strain for water and energy suppliers. Appointments have to be made and sometimes repeated. Meters installed in dark cellars and shafts are difficult to access. Moving in and out of homes, billing complaints and manual errors – these are all time-consuming and resource-intensive.

Diehl Metering's solutions provide a continuous data stream – from the meter to monitoring, data management and analysis. Obtain accurate reading date values simply and efficiently, especially on moving in/out dates, via mobile readings or a fixed network.

We will help you to get more out of the high-resolution metering data. Automate your monthly billing. Reap the benefits of a wide range of monitoring and analysis functions. Offer new services for your consumers, such as an online consumption overview.

Multi-utility providers have the most to gain, with the ability to read water, thermal energy, gas and electricity data via the same infrastructure. This reduces the costs per metering point and increases overall efficiency.

Thomas Vollmar, Head of Metering – Berliner Wasserbetriebe: "From the collection of meter readings through to the transmission and the billing system, the implementation of the Diehl Metering drive-by solution made the whole process significantly faster, safer and more reliable."

HOW FUTURE-ORIENTED ARE YOUR INVESTMENTS?

A safe, adaptive path towards digitalisation – step by step.

Be on the safe side with a Diehl Metering solution, regardless of how the technological standards evolve in the coming years. Our high-performance IZAR radio system gives you barrier-free access to the Internet of Things (IoT). Our extremely flexible, adaptive solutions comply with the Open Metering System (OMS) specification.

Gradually expand the system with additional functions and services depending upon your current requirements and aims. As a reliable partner, we will support and work with you to develop future-proof business models.

Our strategy: we use high-quality metering technology for our solutions, an area in which we have 150 years of experience. We combine this with over 20 years of experience in smart, modular solutions that grow with your requirements.

Adam Degnan, Managing Director, Enware Australia Pty Limited: "The outstanding partnership between Enware Australia and Diehl Metering has allowed us to successfully roll out a number of AMI projects throughout Australia. Based upon the success of our IZAR deployments, we are well positioned in a market that is rapidly shifting gears in technology use."

DISCOVER THE SOLUTION THAT GROWS WITH YOU.

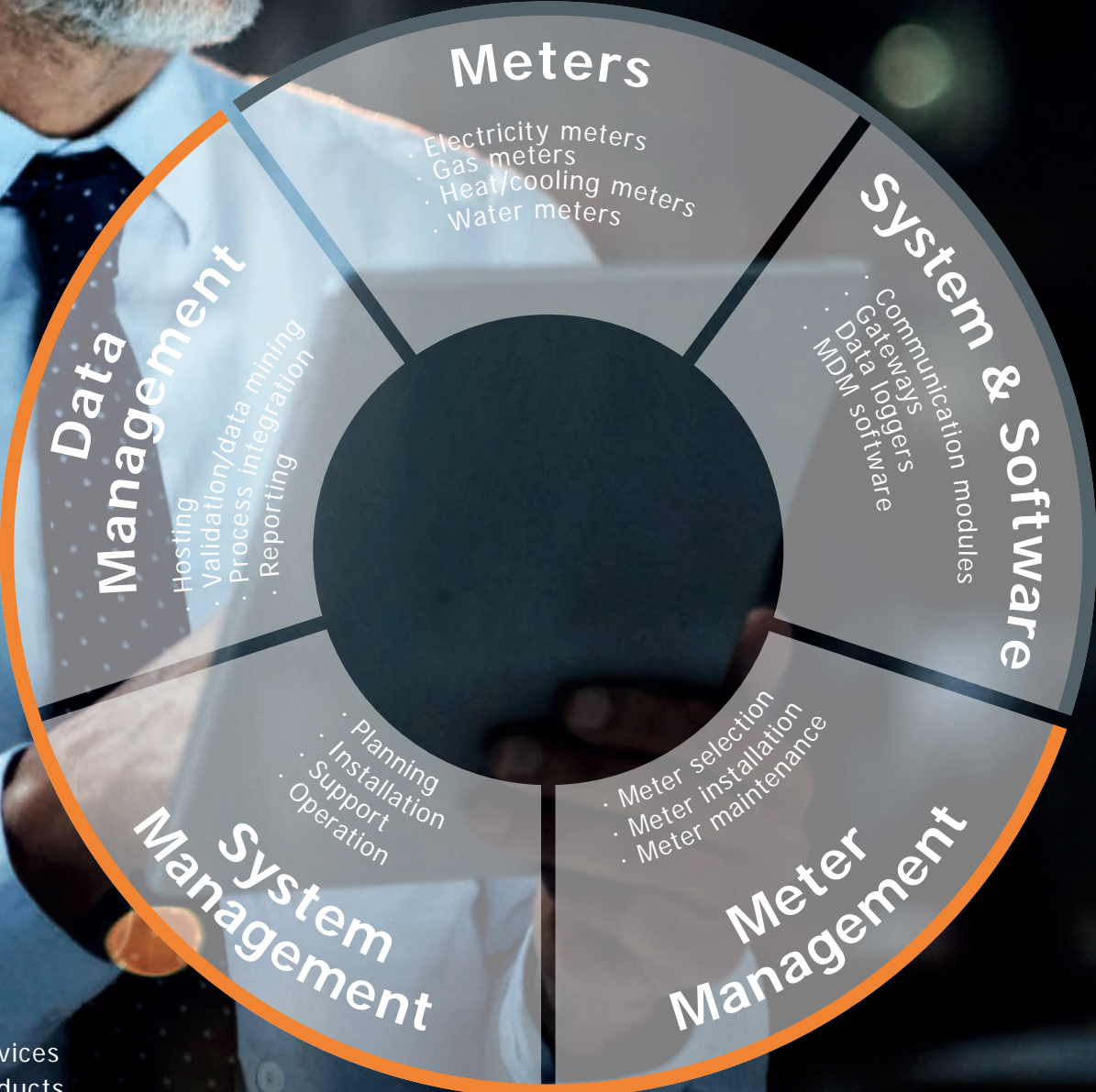
How can you make your processes simpler, safer and more efficient?

Our approach is tailored to the challenges facing water and energy suppliers: we will support you with powerful, modular radio technology that delivers high-frequency energy data – with stable transmission, a long range and low maintenance.

As a reliable partner, we will support you on your path towards digitalisation – ensuring your investment is sustainable. Our solutions can be seamlessly integrated into other systems – for example, network monitoring and complex smart city concepts. We use OMS 4.0 (Open Metering System specification) and other standards to ensure high connectivity. We are also setting industry standards when it comes to security: our data centre is certified according to DIN 27001. The data encryption for end devices is also at the highest international level.

We will help you to fulfil the legislative requirements with confidence –and to open up all kinds of new opportunities for adding value: for example, with smart tariffs, customer services and automatic billing, leakage recognition, system optimisation and network controlling.

Climb aboard with low investment costs. The OMS 4.0 radio technology from Diehl Metering is IoT ready. Expand your solution gradually and economically with system, software and service modules. Diehl Metering offers a complete one-stop spectrum of services.



INDIVIDUAL SERVICE MODULES. FOR A STRONG MANAGEMENT SYSTEM.

How do you control all your processes – from the convenience of the computer?

With the **IZAR PLUS portal**, we offer a central **online platform** for all kinds of energy data. Make all your processes simpler and more cost-efficient – from meters and remote reading to data management and data validation. Control your planning and monitoring, leakage recognition, network optimisation, automated billing and customer services.

Many water and energy suppliers want to use our IT services in a flexible way. This is why we also offer an option to lease the IZAR PLUS, allowing our customers to enjoy all the advantages of our product “as a service” based upon their needs. A service charge will be levied according to use. This provides security when planning and minimises risks. In the future, the IZAR PLUS portal will unite all the software services from Diehl Metering.

The IZAR PLUS portal offers a full service. Diehl Metering provides complete IT administration, maintenance and updates. You do not need to provide additional employees, and can instead concentrate entirely on optimising processes and achieving your strategic goals.

Our Fixed Network Planning service module supports customers who wish to implement a stationary meter reading network. We offer complete project planning services and will provide the construction plan for an economic, high-performance infrastructure – including optimal antenna locations. Investment costs can be considerably reduced through a more efficient architecture.

Diehl Metering continuously oversees the automatic meter reading network **by means of the Fixed Network Monitoring module.** We will deliver regular status reports for you along the desired quality parameter. If required, we will also maintain and optimise your network – including the changing of meters by our on-site technicians.



FLEXIBILITY. WITH OUR PORTFOLIO OF SERVICES.

How can you find the best solution for your challenges?

Diehl Metering gives water and energy suppliers the ultimate flexibility in their choice of solution: as well as our own IZAR radio fixed network solution, networks based on NB-IoT, LoRaWAN or other communication technology – or a smart combination of these technologies – can be used for fully automatic consumption data collection.

The latest generation of Diehl Metering IZAR radio technology stands for optimised coverage with the highest data quality. With a 100% efficiency rate, all meters within the network can be read reliably at any time and as often as is appropriate. Seamlessly transfer data into the IZAR meter data management software for centralised monitoring of the distribution network – in this way, for example, you can effectively detect water losses.

Carry out walk-by mobile readings or drive-by readings at up to 50km/h. A passive drive-by solution is also possible. For example, refuse collection vehicles can easily be fitted with radio receivers that automatically collect the signals from transmitting meters.

Collect data from consumption meters with minimal effort, correctly bill for the relevant date and automate tiresome routines. Your customers no longer need to read their own meters or be at home for meter readings.

Discover the perfect solution: a radio-based fixed network. All meters are read using permanent receivers in a fully automated, continuous process. Not even complex housing estates or industrial units get in the way of the convenient real-time monitoring of water and energy consumption on the computer. Optimise your networks, offer smart tariffs, cap power surges and provide new consumer services. For instance, consumers can receive an automatic alert if there is a leak in their home to prevent any further losses or damage.

With our solutions we are able to offer you IoT4metering and we can already seamlessly integrate our data into a wide range of smart city platforms via standardised interfaces and an open software architecture – enabling the linked presentation of meter data and a variety of other sensor data.

Our customers are perfectly prepared for the communication infrastructure of the future thanks to the excellent interoperability of our IZAR system solutions. With Diehl Metering's high data granularity and completely up-to-date data, our customers are fully prepared for the market requirements of the future.

We have expanded our portfolio with the latest technologies for the Internet of Things – Narrow-Band IoT (NB-IoT), LoRaWAN and other transmission technologies – and will continue to build on these in the future. We are therefore helping suppliers by making them more flexible and allowing them to respond to the changing conditions in the environment.

A combined solution consisting of our custom-tailored IZAR fixed network and a form of IoT communication technology, such as NB-IoT, has many benefits to offer: it enables water and energy providers to decide which technology they want to use to operate each network segment – we offer a future-proof option for all scenarios.

Our system solutions use the manufacture-independent and cross-sector Open Metering System (OMS) communication standard, which ensures that a wide range of sensors and devices from various manufacturers can be seamlessly integrated into an existing infrastructure. This allows water and energy providers to integrate both interoperable consumption meters and IoT sensors for other applications into the Diehl Metering network solution – today and in the future. With Diehl Metering, utility companies can establish themselves as operators of their own smart-city-compatible IoT infrastructure at an early stage – and move towards analysis and diagnostics.

HIGH-END METERING. FOR WATER, THERMAL ENERGY, GAS AND ELECTRICITY.



How sustainable is your infrastructure?



Water measurement technology

HYDRUS 2.0 – our legendary ultrasonic water meter is now also available as a bulk water meter. With OMS 4.0, the HYDRUS 2.0 solution is highly connective and ready for use with the IoT (Internet of Things). It meets the highest international requirements for data protection and data security. With this system, we are helping to prepare water and energy suppliers for digitalisation. A modern classic, our ALTAIR V4 is setting new standards for volume measurement technology. The clip-on radio module means it is fully communicative.

Diehl Metering has over 150 years of experience in the development and production of water meters. We offer the technology to suit any of the specific needs of municipal and private water management: velocity flowmeters based upon the single-jet or multi-jet principle, Woltmann large water meters, volume meters and piston flow meters, with extreme nominal sizes and custom-made products also available on request.

Measurement technology for thermal energy

The SHARKY heat/cooling meter also features legendary Diehl Metering ultrasonic technology and is supplied ready for automatic meter reading (AMR) and smart metering with its integrated radio. Flow rate and temperature sensors allow for numerous individual calculations. SHARKY impresses thanks to its precise measurements with long-term stability and extreme durability – as a cooling meter from 5°C or as a heat meter up to 150°C.

Diehl Metering offers an extensive range of solutions for local and district heating, as well as for refrigeration. The ultrasonic meters we develop and produce in-house have been proving themselves for many years in system projects all over the world, even under the most testing of conditions. All Diehl Metering energy meters are equipped with interfaces for communication via radio or M-Bus.

Gas measurement technology

The innovative AERIUS gas meter is an original development from Diehl Metering: the microthermal measuring principle determines the exact standard volume, pressure-independent and temperature-corrected, without deviations. AERIUS is a high-precision system for fair billing that works quietly and requires very little maintenance. AERIUS is also instantly ready for use with automatic meter reading (AMR) and smart metering.

The micro-thermal measuring principle ensures precise measurement results and reliable operation at all times. This process has proven its efficiency in the industry for many years, and now Diehl Metering is also making this technology available for use in the household and commercial sectors.

Electricity measurement technology

The ELICIUS electricity meter is also supplied with smart communication technology – for seamless integration into automatic meter reading (AMR) and smart metering. The precise, secure meter features net parameter recognition, a device clock for establishing billing periods, tamper recognition and numerous other innovative functions.

The ELICIUS is the first electricity meter to make Diehl Metering radio technology available for the electricity sector. ELICIUS also delivers exact reading date values – in monthly breakdowns, for example. Thus ELICIUS provides an objective data basis and conforms to the political, economical and association requirements for consumption transparency and fair billing. ELICIUS is the economical, future-proof solution for smart metering rollout.

YOU'LL FIND US WHEREVER OUR CUSTOMERS ARE. WORLDWIDE.

What individual solution do you need for your region?



Worldwide presence: we manage a network of business units to serve our international markets.

Scandinavia

The Scandinavians are energy efficiency pioneers, and the demand for intelligent networks, data availability and up-to-date data is correspondingly high in these markets. Energy consumption, production and distribution processes require optimisation.

Western Europe

Efficient and responsible treatment of natural resources and energy is key to the Western European markets. The requirements for precision, quality and durability are high. European energy guidelines need to be translated into national legislation.

Eastern Europe

Precise technology with long-term stability is in demand in the Eastern European markets, as are mobile reading and intelligent data transfer. Water losses need to be reduced and the efficiency of maintenance cycles must be increased; distribution and district heating networks must also be expanded.

Russia and "the Stans"

Automatic meter reading (AMR) – both mobile and stationary – is also an important requirement for Russia and the Stans. The focus here is increasingly on energy efficiency and consumption-based billing, and the distribution and district heating networks are being expanded.

North and South America

Intelligent networks are becoming increasingly popular in North America. There is a great deal of interest in remote reading and leakage recognition in Central and South America and the Caribbean. High precision, quality and long-term stability are in demand across all the American markets.

Africa

Intelligent systems safeguard the water supply and combat leakages in South Africa. In order to protect the vital resource of water, the trend in North and Central Africa is shifting towards particularly robust meters that are able to withstand extreme temperatures and sand in the pipes.

Middle East

Fixed network solutions are called for in the Middle Eastern markets as they ensure transparent consumption data with a high level of availability. Robust and precise technology safeguards the valuable drinking water in this region, even at extreme temperatures and if there is air or sand in the pipes.

Asia, Australia

With the growing levels of energy consumption in China, the extreme requirements for measuring technology due to flooding in South East Asia and the need for automatic metering for entire districts in Australia and Oceania, precise solutions with long-term stability and intelligent remote reading are becoming increasingly popular here.

WE ARE DEFINING THE HISTORY OF METERING. SINCE 1862.

How much experience is required in order to implement digitalisation?



As a major player in the industry, Diehl Metering stands for innovative technology and smart metering. But our roots date back to the early years of industrialisation: The Neptun company was founded in Breslau in 1862 – as a foundry and manufacturing plant for water and gas installations. It was here that the world's first Woltmann large water meter was developed and produced in 1895. The company changed its name to Hydrometer in 1912 – and even today, industry experts still consider this name as a sign of high-quality measurement and readout technology.

In 1951, the company headquarters was relocated to Ansbach, then it was gradually modernised and expanded over the years; a modern, large-scale production plant was added in the Thuringian town of Apolda in 1991. The path towards becoming a group of companies was completed in 1998 with the incorporation of the French company Sappel and its subsidiary Mirometr. The Group was systematically expanded in 2001 with the incorporation of the Austrian company Elin Wasserwerkstechnik and the Hungarian company MOM.

From 2003, the Hydrometer Group was managed as an operative holding of the Diehl Group. One of the main aims of the merger was to bring together all the different metering-related expertise under one roof: everything from the development and production of the meters, the development of electronics, system components and software right through to service would take place at the company's own sites.

The company's fusion to create the strong international brand Diehl Metering took place at the turn of the year 2014/15. We have been the fifth corporate division of the Diehl Group alongside Metal, Controls, Defence and Aerosystems since 2010. As a provider of multi-utility solutions and services, we have geared our range of services towards strategic markets – and we are tackling the great challenges the international energy sector is currently facing.



THE GROUP

INTO THE FUTURE WITH TRADITION.

Always state of the art with
our innovative technology

Diehl Metering is a corporate division of the Diehl Group. The family business Diehl was founded in 1902 and boasts a stable ownership structure, is financially independent and unites

various high-tech sectors. The Diehl Group comprises the Metal, Controls, Defence, Aviation and Metering corporate divisions.

Diehl Metall produces semi-finished products and forgings made from copper and copper alloys.

Diehl Controls designs, develops and produces mechanical, electro-mechanical and electronic controls for household appliances.

Diehl Defence pools the defence technology activities within the Diehl Group.

Diehl Aviation fits commercial and military aircraft with avionic and cabin systems and functions.

Diehl Metering provides services and supplies meters, systems, software and measuring devices for the intelligent use of water, thermal energy, gas and electricity.

Facts and Figures 2016

Diehl Group
Employees: 16,385
Turnover: € 3.41 billion
Family business since 1902

Diehl Metering GmbH
Employees: 1,661
Turnover: € 292 million

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DIEHL
Metering

HYDRUS 2.0 BULK SMART WATER METERING

With superb metrology and connectivity
the best of two worlds



HYDRUS 2.0 BULK – THE BEST OF TWO WORLDS.

THE GAME CHANGER FOR WATER UTILITIES. THE FIRST HYDRUS BULK WATER METER WITH THE PROVEN ULTRASONIC TECHNOLOGY AND INTEGRATED SMART FUNCTIONS.

FOR METROLOGY AND ...

Measures. Just better.

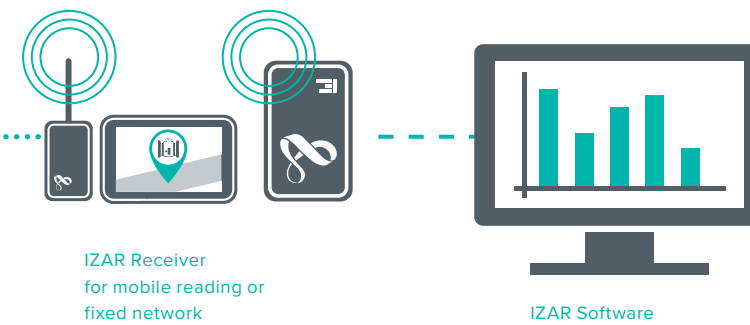
Everything that cannot be measured will not be billed. So do not miss a drop. With HYDRUS 2.0 BULK and its ultrasonic measuring technology, you can benefit from even more accurate consumption values for billing and decrease non-revenue water.

- Precise ultrasonic measuring technology with two measuring paths
- High measuring dynamic range of up to R 1000
- Minimal starting flow of 15 l/h for DN 50
- High overload flow rate of up to 2x Q₄
- Full range from DN 50 to DN 200 with all common body lengths

Measures. Just longer.

HYDRUS 2.0 BULK is a sustainable investment, since this quality product ensures endurance and durability over its entire lifetime. Benefit from exact measuring results for a long time and save costs for meter exchanges.

- Long-term measuring stability
- Resistance towards particles
- Ultra-robust and waterproof design (IP 68)
- No calming sections (UODO) and grounding required
- Less energy consumption of the pumps thanks to pressure loss class of 0.16 bar
- No magnetic manipulation possible
- No measurement of air
- Battery lifetime of 16 years



... CONNECTIVITY.

Generates information. Just smarter.

HYDRUS 2.0 BULK provides more than only the total water volume for billing. Its smartness creates valuable information about unwanted events which need quick measures, e.g. leakages.

- Generates billing and metrological information as well as parameters for grid monitoring on-site at the meter or for the overall water network
- Easy-to-read display with symbols, loops and error & alarm codes
- Extensive data logging functions with hourly, daily, weekly, monthly values and due dates
- Self-check monitoring with fallback mode

Transmits information. Just more efficient.

The combination of HYDRUS 2.0 BULK and Diehl Metering's IZAR connectivity solutions makes a powerful system infrastructure that helps you to easily obtain the information of all meters in your distribution network.

- Integrated communication functions for mobile reading and fixed network
- Read-out via radio R4+, wired M-Bus or L-Bus or Pulse
- High radio range and robustness even for challenging meter installation locations such as pits
- High data granularity and timeliness
- OMS Generation 3 or 4, profile B
- Other IoT technologies possible like LoRaWAN® and NB-IoT – please contact our sales team for more details

LoRaWAN® is a registered trademark of Semtech Corporation and is therefore legally protected

GENERATED INFORMATION FOR YOUR USE CASES

What you can see in the IZAR software with high data granularity and timeliness

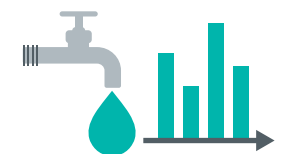
BILLING

Easy export to your billing software



CONSUMPTION MONITORING

Clear visualization of water consumption history per meter



DEVICE & ANOMALIES MONITORING

Error & alarm codes to act quickly



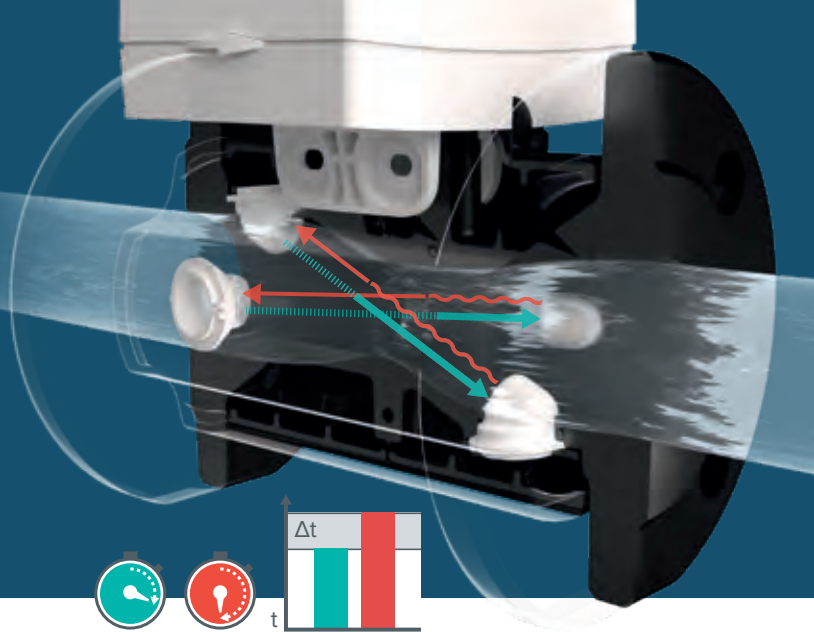
WATER LOSS MANAGEMENT

Detection of losses in zones of your distribution network



METROLOGY AT ITS BEST.

HYDRUS 2.0 BULK – the right bulk meter for extremely low and high water flows with ultrasonic performance and long-term operation.



Application

This bulk meter can be used for billing or just for measuring the water volume in main supply lines of the overall distribution network or certain zones/district metered areas (DMA). In combination with domestic meters you can capture the supply and consumption of the complete water network, which is helpful for water balance or water loss detection purposes.

Ultrasonic for ultra performance

HYDRUS 2.0 BULK as the first ultrasonic bulk meter of the HYDRUS series applies its proven Diehl Metering measuring technology based on the transit time difference principle. With its four transducers and therefore two measuring paths in an orthogonal set-up, metrological high-performance is assured.

Long-term measuring operation and accuracy

The static free-flow principle of HYDRUS 2.0 BULK without any moving parts ensures an unobstructed water path during measuring. With IP 68 the meter is robust, water and dust proof.

The fallback mode makes sure that in case one measurement path is not working any longer that the meter will continue its operation with the remaining path.



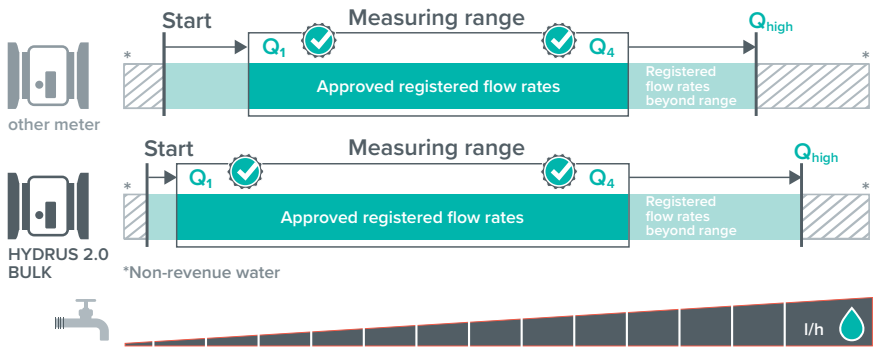
DN 50 up to DN 200



MEASURES. JUST BETTER.

MEASURING DYNAMIC

- ▶ Approved measuring range of up to R 1000
- ▶ A huge spectrum of water flows used in practice can be covered



Your benefit

Only what is measured can be billed. The higher the dynamic, the less is the non-revenue water level.

STARTING + OVERLOAD FLOW RATE

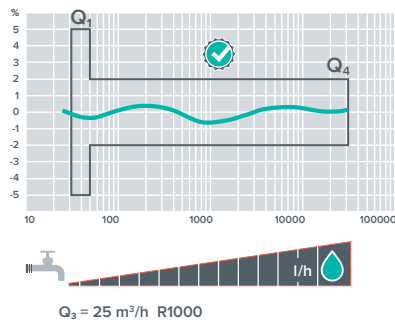
- ▶ Registers very low and high flow rates
- ▶ High overload flow rate up to $2 \times Q_4$
- ▶ Minimal starting flow of 15 l/h for DN 50

Your benefit

Regardless, if very small or extremely high water flows are in use – every registered flow reduces non-revenue water.

MEASURING ACCURACY

- ▶ Less deviations at all measured water flows
- ▶ More accurate results
- ▶ Repeatability and reproducibility tests prove its precision



Your benefit

No matter what kind of water flow occurs, accuracy for the overall spectrum is the goal. Less deviations lead to more precise billing.

MEASURING STABILITY

- The measuring accuracy of typical mechanical meters can get less with time due to increasing wear and tear.
- ▶ HYDRUS 2.0 BULK assures precise measuring results during the entire meter lifetime
- ▶ Strong battery that lasts for 16 years

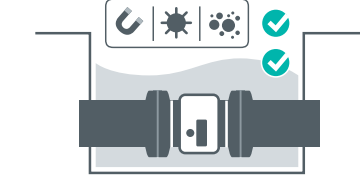


Your benefit

Permanent measuring accuracy over the entire meter lifetime to provide always reliable results and to reduce non-revenue water.

ROBUSTNESS

- HYDRUS 2.0 BULK performs even under extreme environmental conditions. It is resistant towards:
- ▶ Particles such as sand in the pipe
- ▶ Pressure surges
- ▶ Vibrations
- ▶ Magnetic manipulation
- ▶ UV radiation
- ▶ Flooding

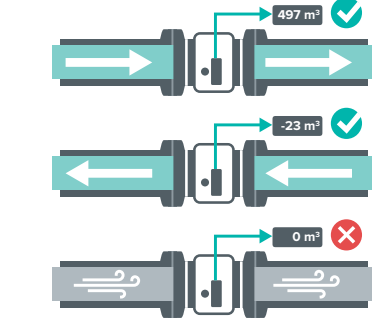


Your benefit

Maintenance-free and long-term smooth operation extends the meter lifetime. Therefore, you can save costs and effort for meter exchanges.

MEASURING VALIDITY

- HYDRUS 2.0 BULK guarantees always reliable measuring values.
- ▶ Measures the forward volume, but also reverse flows precisely
- ▶ Only water will be registered and no air



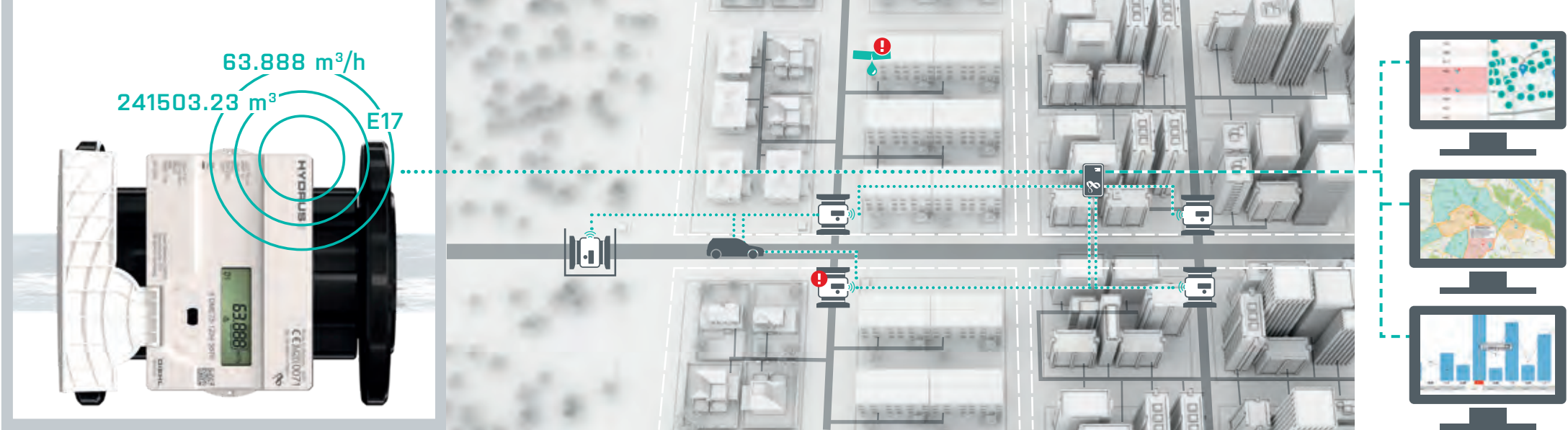
Your benefit

The validity of the measured values for billing and water balances can be assured.

MEASURES. JUST LONGER.

CONNECTIVITY AT ITS BEST.

Digitalized processes and valuable information about your distribution network with smart and connectivity functions.



Smart functions

HYDRUS 2.0 BULK provides you a considerable amount and variety of valuable information you would miss without this smart device installed. Not only does it save the due date consumption volume for billing, with also metrological information and other parameters generated permanently along its operation, it creates a water consumption history and informs about

possible anomalies of the water network on-site. Leakage or reverse flow alerts could give a hint that the water supply grid has a defect.

HYDRUS 2.0 BULK makes use of its continuously self-check function that generates instantly error and alert codes when something is wrong with the device. With quick actions, long function interferences can be avoided.

Connectivity for digitalized processes

The integrated communication function of each installed HYDRUS 2.0 BULK enables the gathering of the data (e.g. for billing) via AMR/AMI meter read-outs. That is why the HYDRUS 2.0 BULK is the smart key component of the complete connectivity solution which – with system and software – makes the effortful and time-consuming pit meter reading processes obsolete.

Connectivity for analysis

Imagine the possibilities with the aggregation of all HYDRUS 2.0 BULK and smart domestic meters in a fully automatic system infrastructure. A fixed network solution does not only read-out all meters at once, you get also information about your overall distribution network. The highly granular (up to hourly) consumption history and other metrological information get

visualized in the IZAR software which assists you to analyze the water supply and usage. Alerts about the device status or leakages in zones or houses will be obtained in real time due to a high data timeliness. Make smart and fast decisions to lower costs and non-revenue water. Save resources and optimize your water network to provide a crucial contribution to sustainability.

GENERATES INFORMATION. JUST SMARTER.

SMART INFORMATION

Billing & metrological information

- Total volume
- Due date volumes
- Current & reverse flow volume
- Temperature (ambient/medium)

Error & alarm codes

For grid anomalies on-site, e.g.

- Leakages
- Air in the pipe
- Reverse flows

For device status, e.g.

- Low battery
- Fallback mode



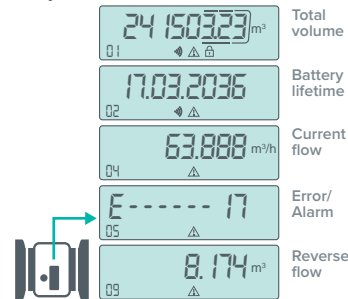
Your benefit

Obtain the consumption volume on the due date for billing and information about water grid or meter anomalies to reduce or avoid severe damages.

DISPLAY

Easy to read on-site with the electronic display.

- High resolution with 9 digits
- Switching loops for more information
- Helpful symbols, e.g. leakage or low battery



Your benefit

See smart information on-site for taking actions immediately when anomalies occur.

DATA LOGGING

- Data logging memory capability with hourly, daily, weekly, monthly values and due dates
- Stores measuring values, errors and alarms
- Logging can be read-out with an opto head on-site

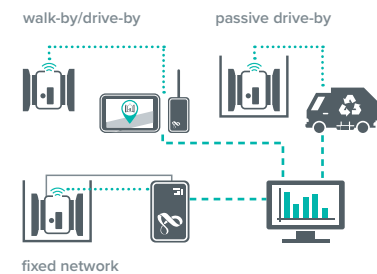


Your benefit

In case of anomalies, get more transparency about what happened by tracking down past information and rectify the problem on-site.

MOBILE READING AND FIXED NETWORK

- For walk-by/drive-by/passive drive-by incl. fixed network ready
- For fixed network
- For wired M-Bus, L-Bus, Pulse
- Other IoT technologies possible like LoRaWAN® and NB-IoT

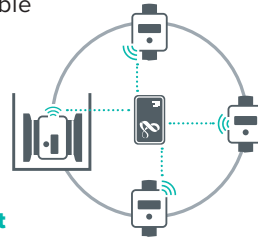


Your benefit

Have efficiencies in the way you get values and obtain information to take actions in your distribution network. Select the best communication technology fitting your requirements.

IZAR RADIO PERFORMANCE

- Integrated radio communication
- Drive-by up to 50 km/h
- Optimized Extra Long Range Mode R4+ with four times higher coverage compared to standard metering radio and reliable robustness
- For reaching meters in challenging installation situations like pits or other hard-to-read locations
- High data granularity and timeliness
- Configurable telegram content



Your benefit

Reliable coverage for large areas with less receivers to have lower total cost of ownership for your system infrastructure.

DATA SECURITY & PRIVACY

- OMS Generation 3 or 4, profile B
- Role concept to give the right person the right access key



Your benefit

Your customers appreciate a safe data flow and their privacy.

HYDRUS 2.0 BULK BATTERY LIFETIME OF 16 YEARS

Independent from:

- Reading technology
- Climatic environment
- Interferences by other radio networks



HYDRUS 2.0 BULK

ULTRASONIC METER

DIEHL
Metering



APPLICATION

HYDRUS 2.0 BULK is a static water meter operating on ultrasonic measuring technology. This technology enables accurate calculation of water consumption with long-term stability and eliminates measuring deviations caused by sand, suspended particles, scale or air pockets. Moreover it does not require any earthing.

Developed within the framework of the MID, HYDRUS 2.0 BULK complies with the European regulations and holds sanitary conformity certificates (ACS, WRAS, BELGAQUA, DM174 and others). The meter is also designed for cold and hot water.

Its integrated radio enables remote reading of the meter's index and alarms both in mobile (walk-by, drive-by, passive drive-by) and fixed network mode.

HYDRUS 2.0 BULK offers a wide choice of connectivities compatible with the different IZAR reading modes.

A complete Diehl Metering solution is thus available to meet your needs.

FEATURES

- ▶ DN 50 to 200
- ▶ MID approval up to R=1,000
- ▶ IP 68
- ▶ Wireless M-Bus radio, Wired M-Bus/Pulse/Pulse, Wireless M-Bus radio/L-Bus/Pulse, Pulse (IZAR BE PULSE compatible)
- ▶ Display with symbols and error codes
- ▶ Self-monitoring function
- ▶ Battery lifetime up to 16 years

HYDRUS 2.0 BULK

ULTRASONIC METER

TECHNICAL DATA

HYDRUS 2.0 BULK			
Water temperature	°C	+0.1 ... +50 (T30 / T50) +0.1 ... +90 (T90)	
Accuracy		Class 2 according to ISO 4064:2014 / OIML R49:2013	
Ambient operating temperature	°C	-10 ... +55	
Ambient storage temperature	°C	-10 ... +70 (>35 °C max. 4 weeks)	
Environmental class		O (Outdoors)	
Mechanical environmental class		M2	
Electromagnetic environmental class		E2	
Flow profile sensitivity class		U0/D0 (no calming sections required)	
Installation position		Horizontal, inclined 45°, inclined 90°, vertical	
Nominal pressure	PN	bar	16
Pressure loss class	Δp	bar	0.16
Power supply		3.6 V lithium battery (D-cell)	
Battery lifetime ¹		Up to 16 years (all communication interfaces)	
Communication interfaces		Optical, OMS wireless M-Bus 434 or 868 MHz, M-Bus, L-Bus and Pulse	
Data storage		For errors, alarms and measuring values, data logging capabilities to record up to 512 daily + 32 monthly values	
Protection class		IP 68	

¹ Theoretical lifetime, depends on the sending interval of the radio telegram, the telegram length and the ambient temperature at the installation.

TECHNICAL DATA DISPLAY

HYDRUS 2.0 BULK	
Display indication	LCD, 9-digit, additional symbols/display counter/unit
Units displayed DN 50 - 100	Volume (m ³ + 2 digits after decimal point) and flow rate (m ³ /h + 3 digits after decimal point)
Units displayed DN 125 - 200	Volume (m ³ + 1 digit after decimal point) and flow rate (m ³ /h + 3 digits after decimal point)
Values displayed	Display test - volume - battery lifetime - firmware version - software checksum - flow - current/continuous/historical error - alarm status - high resolution volume - due date - due date volume - reverse volume - flow direction - display counter - low battery indication - leakage indication - metrological log access - radio signal ON/OFF - alarm indication - billing value

COMMUNICATION INTERFACES

HYDRUS 2.0 BULK	
Optical	For switching the display loop, reading and configuration with IZAR@MOBILE 2
Radio	434 or 868 MHz, Open Metering Standard (OMS) radio frame (short frame) for mobile reading sent every 14 seconds, long range radio frame for fixed network sent every 5 minutes, extra long range radio frame for fixed network sent every 15 minutes
M-Bus	2,400 baud, cable length 1.5 m*, power supply only via built-in battery - is combined with 2 pulse outputs
L-Bus	In combination with radio, cable length 1.5 m* (only 1 interface communicating at the same time)
Pulse (Open drain)	2 pulse outputs, or 1 pulse and 1 L-Bus output, pulse cable length 1.5 m*

*May vary by up to ±3.5% due to manufacturing tolerances.

SECURITY

HYDRUS 2.0 BULK	
Versions	OMS Generation 3 - Profile A or OMS Generation 4 - Profile B

PRIVACY

The HYDRUS 2.0 BULK saves 512 daily consumption values. This data can be read locally and accessed only by using the IZAR@MOBILE 2. As a second logging, a small amount of 32 monthly consumption values can be stored. Both the radio protocol and the optical interface are encrypted by default.

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Subject to technical adjustments.

HYDRUS 2.0 BULK

ULTRASONIC METER

VOLUME / PULSE OPEN DRAIN

HYDRUS 2.0 BULK		
Max. input voltage	V	30
Max. input current	mA	27
Max. voltage drop at active output	V/mA	2 / 27
Max. current through inactive output	µA/V	5 / 30
Max. reverse voltage without destroying outputs	V	6 (in case current does not exceed 27 mA)
Pulse rates DN 50	l/pulse	1 / 10 / 100 / 1,000 (depending on nominal size)
Pulse rates DN 65 - 150	l/pulse	10 / 100 / 1,000 (depending on nominal size)
Pulse rates DN 200	l/pulse	100 / 1,000 (depending on nominal size)
Configuration pulse output 1	Total volume or forward volume	
Configuration pulse output 2	Flow direction or error, reverse volume, forward volume	
Pulse frequency	Max. frequency 10 Hz	
Pulse width	50 ms	

AVAILABLE VERSIONS

HYDRUS 2.0 BULK	
Wireless M-Bus radio/Pulse/L-Bus	3 wires - only forward volume for pulse output 2 (minimum 10L/pulse)
Wireless M-Bus radio only	without wire
Wired M-Bus/Pulse/Pulse	5 wires - forward volume on pulse output 1 and reverse volume on pulse output 2
Pulse (IZAR BE PULSE compatible)	4 wires - total volume on pulse output 1 and direction on pulse output 2 with fraud

HYDRUS 2.0 BULK

ULTRASONIC METER

PERFORMANCE DATA - COLD WATER (T30 / T50) HORIZONTAL

Nominal diameter	DN	mm	50	65	80	100	125	150	200
Permanent flow rate	Q ₃	m ³ /h	25	40	63	100	160	250	400
Dynamic (Q ₃ /Q ₁)	R		800	800	800	800	800	800	800
Overload flow rate	Q ₄	m ³ /h	31.25	50	78.75	125	200	312.50	500
Transitional flow rate	Q ₂	l/h	50	80	126	200	320	500	800
Minimum flow rate	Q ₁	l/h	31.25	50	78.75	125	200	312.50	500
Starting flow rate		l/h	15	27	35	45	70	250	400
Pressure loss at Q ₃		bar	0.16	0.15	0.16	0.13	0.15	0.11	0.12
Pressure loss at Q ₄		bar	0.25	0.23	0.25	0.2	0.23	0.18	0.19
Maximum flow rate ²	Q _{high}	m ³ /h	62.5	100	157.5	250	400	625	1000
Flow rate at ΔP = 1 bar		m ³ /h	63	105	158	280	420	747	1140

² Outlet pressure minimum 3 bar, maximum 100 hours per year, closed pipeline network

PERFORMANCE DATA - HOT WATER (T90) HORIZONTAL

Nominal diameter	DN	mm	50	65	80	100	125	150	200
Permanent flow rate	Q ₃	m ³ /h	25	40	63	100	-	-	-
Dynamic (Q ₃ /Q ₁)	R		400	400	400	400	-	-	-
Overload flow rate	Q ₄	m ³ /h	31.25	50	78.75	125	-	-	-
Transitional flow rate	Q ₂	l/h	100	160	250	400	-	-	-
Minimum flow rate	Q ₁	l/h	63	100	160	250	-	-	-
Starting flow rate		l/h	15	27	35	45	-	-	-
Pressure loss at Q ₃		bar	0.16	0.15	0.16	0.13	-	-	-
Pressure loss at Q ₄		bar	0.25	0.23	0.25	0.2	-	-	-
Flow rate at ΔP = 1 bar		m ³ /h	63	105	158	280	-	-	-

APPROVAL

DN 50 - 200		
Approval		MID DE-19-MI001-PTB011
Dynamic range (Q ₃ /Q ₁)	R	Up to R=1,000
Standards		ISO 4064 EN 14154 OIML R49
Sanitary conformity		ACS WRAS DM174 BELGAQUA

DYNAMIC RANGE

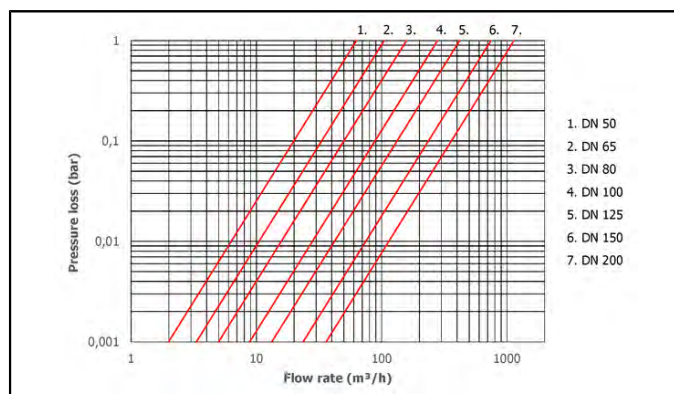
DN 50 - 200		
Q ₃ 25 ... 400 m ³ /h - T30	R	800
Q ₃ 25 ... 400 m ³ /h - T50	R	800H / 250V
Q ₃ 25 ... 100 m ³ /h - T90	R	400H / 160V

H=horizontal installation position / V=vertical installation position

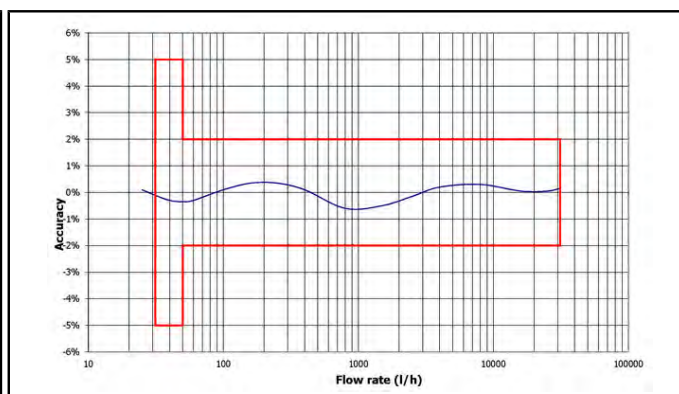
HYDRUS 2.0 BULK

ULTRASONIC METER

PRESSURE LOSS GRAPH / TYPICAL ERROR GRAPH

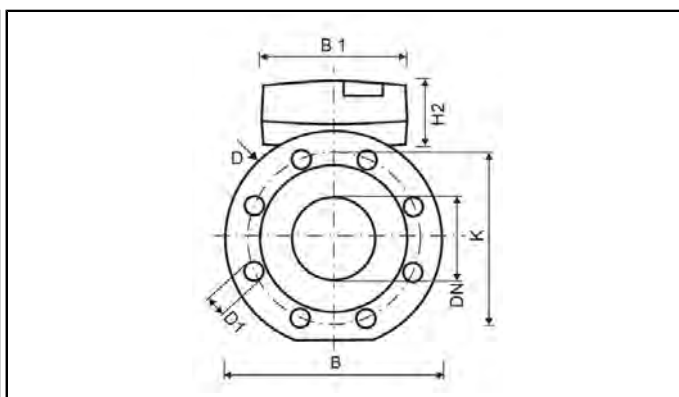
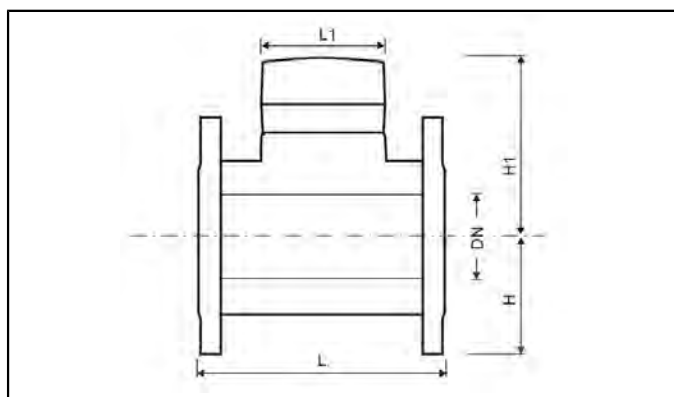


Pressure loss graph



Typical error graph - $Q_3=25 \text{ m}^3/\text{h}$

DIMENSIONS



Nominal diameter	DN	mm	50	65	80	100	125	150	200
Overall length (T30 / T50)	L	mm	200 / 270 / 300 ³	200 / 300 ³	200 / 225 / 300 / 350 ³	250 / 350 ⁴ / 360	250	300 / 500	350
Overall length (T90)	L	mm	200	200	200 / 225	250	-	-	-
Flange diameter ⁵	D	mm	165	185	200	220	250	285	340
Hole circle diameter ⁵	K	mm	125	145	160	180	210	240	295
Number of screwholes ⁵		pcs	4	4	8	8	8	8	12 ⁶
Screwhole diameter ⁵	D1	mm	19	19	19	19	19	23	23
Height	H	mm	74	87	95	105	120	135	161
Height	H1	mm	121	143	147	165	177	185	215
Height	H2	mm	61	61	61	61	61	61	61
Counter length	L1	mm	98	98	98	98	98	98	98
Meter width	B	mm	165	185	200	220	250	285	340
Counter width	B1	mm	139	139	139	139	139	139	139
Overall weight (approx.)		kg	7 / 9 / 9	8 / 11	11 / 13 / 14 / 15	17 / 19 / 20	23	38 / 45	51

³ Optionally with rotatable flange

⁴ Rotatable flange

⁵ Flanges according to EN 1092, PN 10/16

⁶ 8 Screwholes for PN 10

HYDRUS 2.0 BULK

ULTRASONIC METER

METER BODY VARIANTS



- a) The cold water meters come with an epoxy-coated cast iron housing as standard. ISO short length variants can optionally be manufactured with a stainless steel housing.
- b) ISO long length meters with diameters up to DN 100 can optionally come with rotatable flanges.
- c) Hot water meters are always provided with stainless steel housings (EN 1.4408, AISI 316).

REACH

Information pursuant to Article 33 (1) of Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006:

This product series contains articles with the following substances in a concentration of more than 0.1% weight by weight (w/w):

- Lead