











We offer competent solutions for a large number of measurement applications in many different industrial sectors. Our expert know-how covers a broad spectrum in the area of flow measurement, density measurement and level metering, including the commissioning, securing and conformity assessment of the measurement system, according to the Measuring Instruments Directive 2004/22/EC (MID, former national initial calibration).

Nowadays tasks are getting increasingly complex and their solution goes far beyond the function of individual components. The ongoing automation and increasing integration of application processes leads to a complexity, which is successfully solved by the Engineering, Measurement and Service Divisions of the Bopp & Reuther Messtechnik Group.



Bopp & Reuther Messtechnik supports you with solutions for individual measuring points as well as by consulting, designing and commissioning of measuring systems for the transfer of gases and liquids in pipelines, loading and metering operations.

The design and construction of test and calibration equipment is one of the core competencies of the Engineering Division of Bopp & Reuther Messtechnik.

Our customers additionally benefit from the professional after-sales service of our group, e.g. calibration and commissioning.



# OVAL WHEEL METERS CLASSIC

### METERS CLASSICS



#### **Application**

The oval wheel meter was invented by Bopp & Reuther and protected as a patent in 1932. This precision measuring instrument has proved its value in a variety of industries.

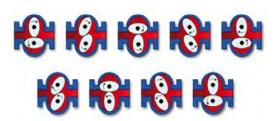
#### Reliability

- In the oil industry for the measurement of crude oil or refined products or for the measurement of LPG
- In dosing and loading applications for the measurement of defined amounts of various fuels and additives
- In the petrochemical industry for measuring of products such as ethylene or propylene liquid
- In the chemical industry for measuring of various acids or alkalis
- In mechanical engineering for measurement of process liquids or lubricants
- In shipbuilding for measuring of fuel consumption

#### **Measurement Principle**

Oval wheel meters are direct volumetric meters for liquids.

Their measuring element consists of two toothed precision oval wheels, rolling on each other driven by the fluid pressure. Such a defined amount of liquid is transported through the meter for each rotation of the oval wheels.



Therefore the number of revolutions is an accurate measure for the amount of liquid flowing through the meter.



# OVAL WHEEL METERS CLASSIC

### METERS CLASSICS

#### **Application**

Volume measurement of liquids and liquefied gases in loading applications for chemical and petrochemical industry, petroleum industry and of food and beverages

#### Reliability

- high measurement accuracy
- robust mechanics
- national and international approvals
- custody certification / OIML / MID 2004/22/EC
- SIL2

#### **Special features**

- mechanical or electronic counters available
- no straight inlet and outlet pipe sections required
- wide viscosity range
- easy installation and commissioning
- maintenance-free

#### Technical data

- DN 6 to DN 400
- 120 l/h to 1,200m<sup>3</sup>/h
- <0.3 to 100,000 mPas</li>
- -40 ° C to +290°C
- up to 100 bar
- current and pulse output







Oval Wheel Meter with Universal Smart Transmitter (UST)



Double pointer indicator D



Roller counter M5









Flowal® Series OF

#### **Application**

Universal flowmeter for measuring the volume of fluids in mechanical engineering, factory automation and process instrumentation. The modular design combines reliable mechanical sensors with modern electronics.

#### Reliability

- oval wheel meters for low viscosity liquids
- high measurement accuracy
- robust mechanics
- reduced noise level

#### **Special features**

- no straight inlet and outlet pipe sections required
- measuring principle independent of the viscosity
- compact design
- easy start-up
- maintenance-free

- DN 8 up to DN 50
- 1 I/min to 700 I/min
- process connections with pipe threads, flanges or customized
- built-in temperature sensor
- battery-supplied compact devices
- detection of flow direction
- pulse output / current output



# FELOWAL® PLASTIC PLASTIC

#### **Application**

Precise instruments for measuring the volume of corrosive liquids - acids, alkalis, solvents, dyes ...

#### Reliability

- measuring principle of oval wheel meters
- high measurement accuracy
- robust mechanics

#### **Special features**

- no wetted metal parts
- no straight inlet and outlet pipe sections required
- measuring principle independent of the viscosity
- compact design
- low weight
- easy start-up
- maintenance-free

- DN 8 up to DN 50
- 1 I/min to 350 I/min
- process connections with pipe threads, flanges or customized
- battery-supplied compact devices
- detection of flow direction possible
- pulse output/current output





# MASS FLOW METER W METER



#### **Application**

Measuring the flow rate and mass of liquids in the chemical and petrochemical industry, in the mineral oil industry and in the food and beverage industry. The electronics converts the measured volume under consideration of the actual fluid temperature and the corresponding actual density into a mass signal.

#### Reliability

- high measuring precision and stability over many years
- high reliability and long life-times up to 40 years

#### **Special features**

- no in- and outlet section necessary
- large measuring range
- wide viscosity range
- broad range of materials for a large variety of liquids
- electronic totalizers

- DN 8 to DN 100
- 5 l/min to 1,200 l/min
- < 0.3 to 100,000 mPas
- -40 °C to +80 °C
- up to 40 bar
- current and pulse output



# TURBINE METER METER

#### **Application**

Volume measurement of liquids and liquefied gases in the chemical and petrochemical industry, in the mineral oil industry and in loading facilities, especially at high operating pressures and low viscosities.

#### Reliability

- high measuring precision over decades
- high repeatability
- proven and reliable measuring system

#### **Special features**

- high flow capacity
- calibration certified by the German Bureau of Standards / OIML

#### **Technical data**

- DN 10 to DN 300
- 0.15 to 2,400 m<sup>3</sup>/h
- 0.2 to 50 mPas
- -196°C to +250°C
- up to 320 bar
- current and pulse output, HART®







RQ Series 2 with Universal Smart

transmitter (UST)



# VORTEX METER METER



VTX sandwich version



#### **Application**

The VTX2 vortex meter is used for flow-rate and volumetric measurements of conductive and non-conductive fluids, gases and steam in all industrial sectors. Applications include volumetric measurements for balancing (for example compressed air systems, heat carriers, steam, and chemical products), process control and high flowrate applications.

#### Reliability

- extremely rugged and stable measuring instrument
- maintenance-free

#### **Special features**

- insensitive to pulsations, pressure and temperature shocks
- with auto-adaptive digital signal processing
- three simultaneously and independently usable signals (current output, HART®, pulses)
- suited for high operating temperatures
- wide measurement range
- with manifold for changing the sensor under operating conditions (options)

- DN 15 to DN 300 (larger sizes upon request)
- 0.4 to 20,000 m<sup>3</sup>/h
- -40°C to + 260°C / 450°C
- up to PN 100
- current output with HART®, or current pulses and scalable pulse output according to NAMUR
- on-site eight digit display with operating keys
   DTM and AMS drivers available







# COMPACTORIFICE T ORIFICE

#### **Application**

The Oriflow compact orifice is used for flow measurements of conductive and non-conductive fluids, gases and steam in all industrial sectors. Applications include flow measurements (volume/mass) for balancing (for example compressed air systems, heat carriers, steam and chemical products), process control and high flowrate applications.

#### Reliability

- already over 5,000 units in operation
- extremely rugged and stable measuring instrument
- suited for extreme applications
- highest acceptance in the market

#### **Special features**

- dry calibration possible
- high repeatability
- easy to install without pulse piping

#### Technical data

- DN 15 to DN 1000
- 0.2 to 150,000 m<sup>3</sup>/h
- -40°C to +400°C
- up to PN 40 (up to 320 bar on request)
- current output
- materials: Stainless Steel, Hastelloy, Tantalum, Titanium, PVDF, etc.
- current output / Foundation Fieldbus / Profibus PA







Triple compact orifice



Compact Oriflow with transmitter



# DENSITY METER METER



#### **Application**

Continuous measurement of density and concentration of liquids.

#### Reliability

- high repeatability
- maintenance-free
- high long-term stability

#### **Special features**

- special calibration within the required density range
- fiscal metering for DIMF 1.3
- also useable for highly aggressive liquids, pastes and foams
- output signals scalable for density and concentration
- materials: Stainless Steel, Hastelloy, Tantalum, Monel Inconel, etc.
- 400-points correction table for customer specific calibration

- DN 6 to DN 50, flanges or Swagelok, sanitary threads, sterile fittings
- 0 to 5,000 kg/m<sup>3</sup>
- -40°C to +210°C
- up to 300 bar
- current output, frequency output, RS232







# MID-MDS DOSING MODULES SING MODULES MODULES MODULES

#### **Application**

Modular dosing system (MDS) for filling conductive liquids in packaging machinery fitted with magnetic-inductive flow rate meters.

#### Reliability

- easy cleaning in comparison with piston fillers (CIP / SIP)
- easy adjustment of filling quantities
- no mechanical forces are applied to the product

#### **Special features**

- shortest dosing times less than 100 ms possible
- small dimensions of the sensor
- complete system for linear and circular filling machines
- PLC or PC interface
- wide range of filling quantity with various diameters
- direct control of the dosing valve
- CIP / SIP approved
- change of flow transmitter without re-programming possible

- DN 10 to DN 40
- various connections are available: e.g. hygienic connection for milk,
   TRI-CLAMP, sterile connection, sterile mini-flange
- 3A approved
- compact electronics
- expansible for up to 540 filling points









# FLOWCOMPUTER MPUTER



Flow computer URS 09



Flow computer UR 06



Flow computer URS 06

#### **Application**

The flow computers are used to register, display and output mass- and volumetric flow rates, including calculation of net values for standard conditions. The URS models with integrated PLC also allow the control of automated dispensing or filling operations. Plug-in modules enable the connection of different sensor systems for detection of mass flow, pressure, temperature or density.

#### Reliability

- 24-bit AD converter
- modular design
- short cycle times
- error curve linearization

#### **Special features**

- extensive data logging function
- OIML approval, MID 2004/22/EC
- RS232, RS485, Ethernet
- MBus and Modbus

- integrated PLC
- up to 4 current inputs
- 6 frequency Inputs
- 2 temperature Inputs
- 7 digital outputs
- 4 current outputs



### LEVEL METER METER

#### **Application**

The innovative TDR technology enables direct, precise and highly reliable continuous level measurement as well as limit level detection in almost every liquid and solid – independent of changing process conditions (such as density, conductivity, temperature, pressure, vapour and turbulence). It is suitable for all types of process and storage tank applications and has an exceptional performance in fluids with low dielectric constant (low reflectivity) such hydrocarbons, or liquified gases.

#### Reliability

- maximum energy transmission on sensor based on 4-wire concept
- maintenance free

#### **Special features**

- fast reaction time of 0.5 sec
- ± 3 mm accuracy
- precise continuous level measurement and reliable limit detection combined in one device
- for liquids as well as powdery solids
- no influences caused by tank / vessel internals
- modular design; one probe head for all versions
- plastic coating, such as PTFE or ISOFAN
- active current output
- unmatched price/performance ratio

- -40 °C to +150 °C
- up to PN40
- Rod / Rope / Coaxial Version
- from 100 mm to 20.000 mm
- special design up to +250°C







### CENTRIFUGAL GAS SEPARATORS

### GAS SEPARATORS



#### **Application**

To avoid measuring errors that result from air or gas contained in liquids measured with volumetric meters.

#### Reliability

- maintenance-free
- complete emptying via drainage valve

#### **Special features**

- with automatic float-deaeration device or level probe and controlled magnetic valve or defined reflux to the process (orifice)
- mandatory for fiscal metering with pump operation in Germany
- Bopp & Reuther Centrifugal Gas Separators have received European design approval
- OIML and EC-Certificates are available
- manufactured to according to Pressure Equipment Directive (97/23/EC)

- DN 25 to 400
- up to 20 mPas
- up to 25,000 l/min
- up to PN 50



# STRAINERS FOR THE CHEMICAL INDUSTRY HE CHEMICAL INDUSTRY HE CHEMICAL INDUSTRY

#### **Application**

To avoid measuring errors and damage caused by solid particles contained in the fluid.

#### Reliability

 the strainer can be completely drained using the drain valve at the lowest position of the strainer and the conical design of the device (only cast strainers)

#### **Special features**

- low pressure loss because of large filtration area (up to 16 times larger than the pipeline cross section)
- according to Pressure Equipment Directive (97/23/EC)
- customized design

- DN 15 to DN 400
- -200°C to +300°C
- up to  $3,000 \text{ m}^3/\text{h}$
- up to PN 100





### SYSTEMS ENGINEERING

### ENGINEERING







Besides sensors, our group also provides customized engineering services, ranging from consulting services to detailed engineering, construction supervision and commissioning, providing full support for all your questions. Later on you can benefit from our after-sales service to the extent that is required.

#### Loading systems

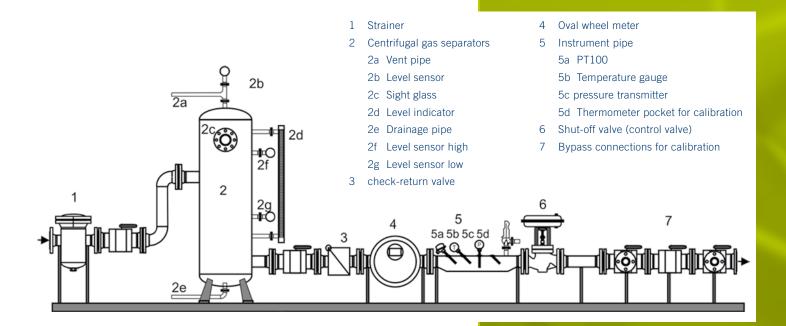
- for oil and chemical industry
  - -tank truck loading
  - -rail tank cars
  - -marine loading and unloading systems
  - -tank farm management
- fiscal metering
- customer and vehicle data management
- interface to higher-level systems (e.g. SAP)
- tank farm management software

#### Testing and calibration equipment

- for all flow meters and volume meters
- provers
- master meter test equipment
- calibrated tanks
- stationary and mobile versions
- equipment for calibration and inspection authorities
- skid-mounted units for field service operation
- automatic sequencing and reporting generation







#### The complete solution from one source:

As a competent manufacturer of complete measuring systems for liquids other than water, which fulfil the MID Directive (2004/22/EC), we have received the required design certificate. Our quality management system is approved according to the MID / module D by PTB.

#### Our services include:

- MID site consulting
- determination of requirements
- applications with the PTB
- design, construction, commissioning and calibration of the measuring system
- conformity assessment
- conformity declaration and generation of the required documentation



