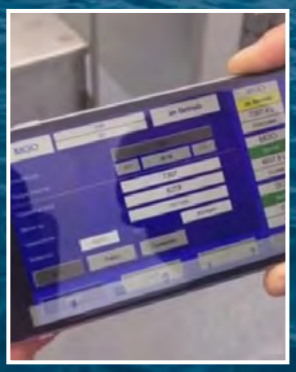
EXAMPLES OF SOLUTIONS

METERING ON A BUNKER SHIP

Volumetric metering systems acc. MID requirements including volume measurement for

- 1 x Diesel und 1 x Gas oil, 3000 l/min
- 1 x Lubrication oil, 300 l/min
- 2 x density meters DIMF 1.3
- 2 x Flow Computer UR06
- 1 x PLC to control pumps, valves and alarm signals
- 1 x touchscreen 10“ for visualization and operation incl. data transfer to smart phone



Replication of visualization on Smart phone or Tablet

Flow Computer cabinet

Metering system for diesel measurement

EXAMPLES OF SOLUTIONS

DOSING METER OK-TRONIC

- Oval wheel meter with high accuracy
- also available with Massflow Meter
- Flow computer DC155
- 2 step shut down
- for high viscosity (up to 10000 mPa·s)
- measuring of non-conductive liquids
- no need of in- or outlet section
- Menu driven configuration
- also available for Ex-zone

MOBILE DOSING SYSTEM FOR LUBRICATING OIL

- high accuracy up to ±0.1 %
- repeatability better than ±0.02%
- viscosity of 1.5 % up to 1000 mPa·s
- with Type Examination Certificate, acc. to MID
- intuitive operation
- Containers from 5 liter
- easy installation with reduced set-up times

PRODUCT LINES OVERVIEW

PRODUCT SELECTION GUIDE

FLOW TECHNOLOGY	PRODUCT LINES	PAGE	
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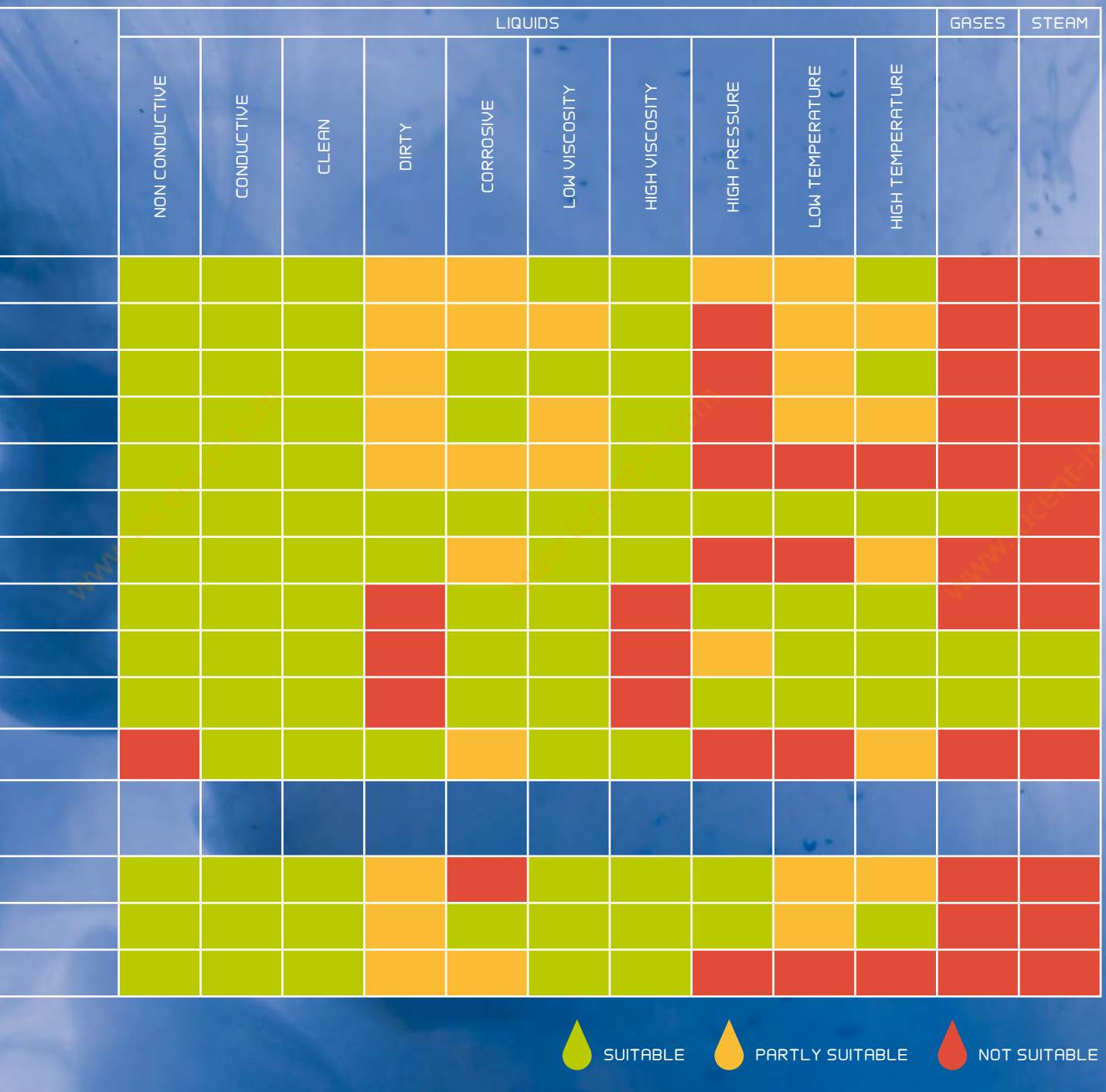
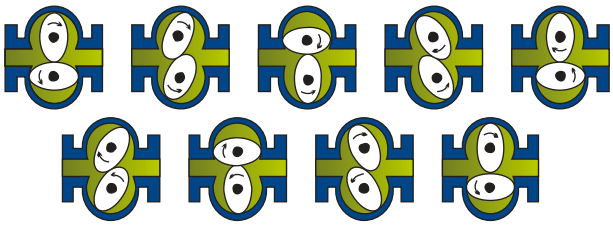


OVAL WHEEL METER

The oval wheel meter was invented by Bopp & Reuther and protected as a patent in 1932. The first Weights and Measure approval was granted in 1933 by the PTR in Berlin.

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.

Application

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

- 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 as well as lubricating oil

Characteristics

- high measurement accuracy:
  Single case Oval Wheel Meter:
  accuracy: Flowal® Plus up to ±0.25 %
  accuracy: OI up to ±0.1 %
  Double case Oval Wheel Meter:
  accuracy: OP up to ±0.15 %
  accuracy: OaP up to ±0.05 %

Special features

- mechanical or electronic counters available
- no straight inlet and outlet pipe sections required
- wide viscosity range
- easy installation and commissioning
- maintenance-free
- national and international approvals
- custody certification / OIML / MID 2014/32/EU (old version 2004/22/EC)
- Evaluation certificate (Welmec 8.8)
- SIL2 (series OaP)
- Llyods Register (OI, OaP)
- Approved for custody transfer
- ATEX
- PED
- NACE

Technical datas in general

Nominal size	6 to 400 mm (1/4” to 16”)
Process connection	Females threading Flanges according to DIN or ANSI
Material	Pressure relevant: cast steel, stainless steel, PVDF Other wetted parts: PEEK, aluminium, brass, ceramics, stainless steel, others
Flow Range	0.03 l/min to 24,000 l/min (0.008 gal/min 6,340 gal/min)
Linearity	±0.05 % to ±0.5 % o. R.
Repeatability	±0.02 %
Viscosity	0.1 to 100,000 mPa·s
Process temperature	-40°C to 290°C (-40°F to 554°F)
Process pressure	max. 100 bar (1,450 psi)
Ex-protection	Flame proof or intrinsically safe

Oil and gas
Chemistry and pharmaceutical
Mechanical and plant engineering
Food and beverage
Energy and power plants
Shipbuilding

OVAL WHEEL METER

Oval Wheel Meter OaP

TYPE OAP

Application

Oval Wheel Meters Type OaP are used for measuring liquid raw-, intermediate- or finished- products such as liquefied gases, gasolines, heating oils, lubricating oils, transmission oils, solvents, bitumen, alkaline solutions, acids and other chemical liquids.

Characteristics

- oval wheel meters for low-, mid- and high viscosity liquids
- high measurement accuracy
- low pressure loss
- high life time

Special features

- double case meter design
- no straight inlet and outlet pipe sections required
- measuring principle independent of the viscosity
- compact design
- easy start-up
- maintenance-free
- the only SIL 2 oval wheel meter world wide
- broad range of custody transfer approvals

Technical data

Nominal size	25 to 400 mm (1” to 16”)
Process connection	Flanges according to DIN or ANSI
Material	Pressure relevant: cast steel, Other wetted parts: aluminium, brass, stainless steel, others
Flow Range	300 l/h to 24,000 l/min (79 gal/h to 6,340 gal/min)
Linearity	±0.05 % to ±0.5 % o. R.
Repeatability	±0.02 %
Viscosity	0.1 to 100,000 mPa·s
Process temperature	-40°C to +290°C (-40°F to +554°F)
Process pressure	max. 100 bar (1,450 psi)
Ex-protection	Flame proof or intrinsically safe

- Oil and gas
- Chemistry and pharmaceutical
- Mechanical and plant engineering
- Food and beverage
- Energy and power plants
- Shipbuilding

OIML Lloyd's Register NMi PTB

OVAL WHEEL METER

TYPE OP

Application
Oval Wheel Meters Type OP are used for measuring liquids such as gasolines, heating oils, lubricating oils, diesel oil, bio ethanol and some chemical liquids.

Characteristics
- oval wheel meters for mid to high viscosity liquids
- low pressure loss
- high life time

Special features
- double case meter design
- no straight inlet and outlet pipe sections required
- measuring principle independent of the viscosity
- easy start-up
- maintenance-free

Technical data

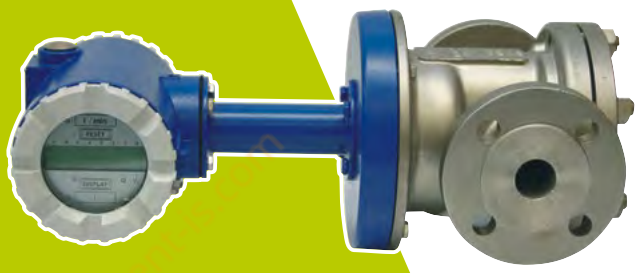
Nominal size	15 to 150 mm (1/2” to 6”)
Process connection	Flanges acc. to DIN or ANSI
Material	Pressure relevant: cast steel, stainless steel Wetted parts: aluminium or stainless steel
Flow Range	5 l/min to 5,000 l/min (1.32 gal/min to 1,320 gal/min)
Linearity	±0.2 % to ±0.5 % o. R. option special calibration: +/-0.15 %
Repeatability	±0.02 %
Viscosity	0.3 to 120 mPa·s
Process temperature	-10°C to +110°C (14°F to 230°F)
Process pressure	max. 40 bar (580 psi)
Ex-protection	Flame proof or intrinsically safe

OIML PTB

Oval Wheel Meter OP

Oil and gas
Chemistry and pharmaceutical
Mechanical and plant engineering
Food and beverage
Energy and power plants
Shipbuilding

OVAL WHEEL METER



Oval Wheel Meter OI

- Oil and gas
- Chemistry and pharmaceutical
- Mechanical and plant engineering
- Food and beverage
- Energy and power plants
- Shipbuilding

TYPE OI

Application

Oval Wheel Meters Type OI are used for the measurement of liquid products such as liquefied gases, acids, alkaline solutions, fats, alcohols, solvents, dispersions, polymers, poly-condensates, paints, colors and adhesives etc.

Characteristics

- oval wheel meters for mid to high viscosity liquids
- high measurement accuracy
- low pressure loss
- high life time

Special features

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

Technical data

Nominal size	25 mm to 100 mm (1” to 4”)
Process connection	Flanges acc. to DIN or ANSI
Material	Pressure relevant: cast steel, cast iron, stainless steel Wetted parts: aluminium, brass, cast Iron
Flow Range	8 l/min to 1,000 l/min (2 gal/h to 264 gal/min)
Linearity	±0.1 % to ±0.3 % o. R.
Repeatability	±0.02 %
Viscosity	0.3 to 3,000 mPa·s (standard) 1.5 to 60,000 mPa·s (ball bearing)
Process temperature	-60°C up to +180°C (-76°F up to +356°F) High temperature design: Special clearances / extension 300 mm Low temperature design: Special clearances / extension 400 mm +2 Magn. Coupling / pmax = 0,5 x PN
Process pressure	max. 40 bar (580 psi)
Ex-protection	Flame proof or intrinsically safe

OVAL WHEEL METER

TYPE FLOWAL® PLUS

Application
Versatile flowmeter for measuring the volume of liquids in mechanical engineering, factory automation and process instrumentation, such as suited for industrial fluids, chemical fluids, mineral oils and fuels. The modular design combines reliable mechanical sensors with modern electronics. The plastic version is suitable for measuring the volume of corrosive liquids, acids, alkalis, solvents, dyes …

Characteristics
- oval wheel meters for low to mid viscosity liquids
- battery powered model avaible
- low pressure loss

Special features
- single case meter design
- no straight inlet and outlet pipe sections required
- measuring principle independent of the viscosity
- easy start-up
- maintenance-free
- plastic version: no wetted metal parts and low weight
- built-in temperature sensor
- battery-supplied compact devices
- detection of flow direction

Technical data

Nominal size	G1/4“, G1/2“, G3/4“, G1“, G2“ Flanges DN15, DN25, DN50 Flanges ½“, 1“, 2“
Process connection	inside threads acc. to ISO 288, flanges acc. to DIN or ANSI
Material	Pressure relevant:, stainless steel, Aluminium, PVDF, PP Other wetted parts: PEEK, stainless steel
Flow Range	0.03 l/min to 660 l/min (0,008 gal/min to 174 gal/min)
Linearity	±0.25 % to ±0.5 % o. R.
Repeatability	±0.02 %
Viscosity	0.3 up to 3,000 mPa·s
Process temperature	-40°C up to +130°C (-40°F up to +266°F)
Process pressure	up to 68 bar (986 psi)
Ex-protection	Intrinsically safe (ATEX or IEC-Ex)

Flowal® Series OR Plastic

Flowal® Series OF

Oil and gas
Chemistry and pharmaceutical
Mechanical and plant engineering
Food and beverage
Energy and power plants
Shipbuilding

OVAL WHEEL METER

Oval Wheel Meter OD

- Oil and gas
- Chemistry and pharmaceutical
- Mechanical and plant engineering
- Food and beverage
- Energy and power plants
- Shipbuilding

TYPE OD

Application

The focus is on the measurement of non-conductive liquids. This meter is designed for the measurement of e.g. oil or demineralized water. Due to the measuring principle, there is no need for an inlet or outlet section.

Characteristics

- direct measurement of volume
- measurement of non-conductive and conductive liquids
- high accuracy / repeatability also for small quantities
- high long term stability

Special features

- Fillings from 10 ml available
- Very short dosing times > 250 ms
- Automatic zero point adjustment
- High resolution (e.g. DN 10: 3,333 pulses/l)
- Wide range of filling quantities with various diameters
- Combinable with the batch controller MDS-PLC

Technical data

Nominal size	DN10, DN15, DN25
Process connection	TriClamp to DIN 32676
Material	Body: stainless steel Oval wheels: stainless steel Seals: Viton, alternative FEP
Flow Range	0.2 l/min to 5 l/min (0.05 gal/min to 1.32 gal/min) 3,333 pulse/l 1 l/min to 30 l/min (0.26 gal/min to 7.93 gal/min) 1,000 pulse/l
Linearity	±0.25 % to ±0.5 % o. R.
Repeatability	±0.02 %
Viscosity	0.3 to 1,500 mPa·s
Process temperature	Liquid temperature: -10°C to +130°C (-14°F to +266°F) Ambient temperature: -20°C to +70°C (-4°F to +158°F)
Process pressure	max. 16 bar (232 psi)
Ex-protection	not available

COMMUNICATION UPGRADE KITS

ELECTRONIC SOLUTIONS TO FACELIFT YOUR PROVEN INSTALLATION BASE SUITABLE FOR OVAL WHEEL METER SERIES OI AND OAP

- 4-20 mA output/passive
- NAMUR or Open Collector pulse output/passive
- large local indicator flowrate/totalizator, battery powered
- approved and released by the original manufacturer
- secure your installed investments
- enable a better integration in modern systems (HART, Modbus options)

Before
Upgrade Kit

After

Kit Type	LCD local indicator	Power supply	4-20 mA output	Pulse output	Data transfer
FW	17 mm	Battery or 24 VDC	yes	Open Collector	Modbus
MFE	5 mm	Battery or 24 VDC	yes	Open Collector	no
UST	8 mm	24 VDC	yes	NAMUR	HART (PACT-ware)

TURBINE METER

RQ Series 1 with Universal Smart Transmitter (UST)

The turbine meter is used for flow and volume measurement of liquid.

Measuring principle:
The turbine meter is an indirect volume meter. It essentially consists of a freely rotating axial turbine wheel in a liquid flow. The turbine wheel is rotated by the liquid and spins at a rotational speed, which corresponds to the average flow velocity of the liquid in the free cross section of the turbine flow meter. The rotational speed of the turbine wheel is thus proportional to the volumetric flow and the number of revolutions is proportional to the volume, which flows through.

The rotational movement is transmitted through the casing wall in a non-interacting manner to the outside by means of magnetic-inductive pulse pick up. A pick up mounted outside of the casing is used for this purpose. An electromagnetic field is generated with a coil located in the scanning head.

Ferromagnetic components move through this field and induce electrical voltage. The ferromagnetic components consist, depending on the series of the turbine meter, of the turbine wheel blades or pins, which are arranged around the cover band of the turbine wheel.

Per blade or pin an electrical voltage pulse is produced, which corresponds to a certain volume. This value is the meter factor K (pulse/volume unit). A preamplifier amplifies and transforms the voltage pulse into a square-wave signal corresponding to NAMUR, which allows secure transmission at up to 1000 meters.

Applications:
Measuring liquids and liquified gases in the chemical and petrochemical industry, in the mineral oil industry and loading systems, especially for high operating pressures and low viscosities.

The following liquid media can be measured with the turbine meter:

- crude oil
- mineral oil
- acids
- alkaline solutions
- solvents
- water
- liquified gases
- refined oil products (gasoline, Kerosene, Jet A1, JP8, Diesel)
- vinyl chlorid

Characteristics:

- high accuracy
- high repeatability
- proven and reliable measuring instruments

Special features:

- high flow capacity
- approved for fiscal metering

Technical data:

Nominal size	DN15 to DN300 (1/2“ to 12“)
Process connection	Flanges DIN or ANSI
Material	Carbon steel, stainless steel (option: Hastelloy, Duplex)
Flow Range	0.15 to 2,400 m³/h (40 gal/h to 643,013 gal/h)
Linearity	±0.15 % to ±0.5 % o. R.
Repeatability	±0.02 %
Viscosity	0.2 to 50 mPa·s
Process temperature	-60°C to +250°C (-76°F to +482°F)
Process pressure	up to 320 bar (4,641 psi)
Output	current and pulse output
Ex-protection	Flame proof or intrinsically safe

OIML PTB

RQ Series 2 with Universal Smart Transmitter (UST)

Oil and gas
Chemistry and pharmaceutical
Mechanical and plant engineering
Food and beverage
Energy and power plants
Shipbuilding

VORTEX METER

VTX sandwich version

The VTX vortex meter is used for flow and volumetric measurements of conductive and non-conductive fluids, gases and vapours in all industrial branches.

Principle of measurement

When a liquid or gaseous medium flows around an object, the medium will be capable of following the contour of the object only to a limited extent and to a certain point at the object‘s surface. Thereafter the flow will stall and behind the object vortexes will form which are entrained in the downstream flow about the object‘s axis whereby the vortexes rotate in opposing directions. Thus vortex street is produced. This effect has for a long time now been known as „Karman vortex street“. The frequency of the emerging vortexes is proportional to the velocity of the flow.

In the vortex meter from the VTX series, a trapezoidal object is used to generate the vortexes. This ensures in the instance of both fluid and gaseous media as well as vapours a precise and highly reliable generation of the vortexes.

By suitably designing the bluff body with a well-defined edge at which the vortexes form, excellent linearity can be ensured. The vortices forming at the bluff object and rotating downstream in opposing directions to each side of the axis give rise to local changes in velocity and pressure which may be detected by a piezoelectric sensor and which are then converted by the sensor electronics with autoadaptive microprocessor controlled filtering in to standardised signals.

Application

Applications include volumetric measurements for balancing (compressed air systems, heat carriers, vapours, chemical products, for example), process control and high throughput applications, thermal oil.

Characteristics

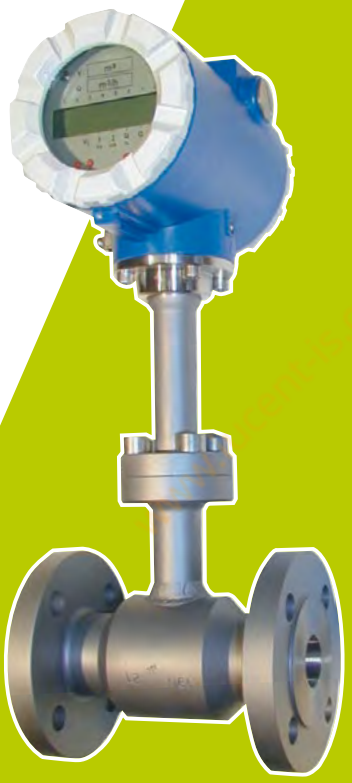
- extremly rugged and stable measuring instrument
- maintenance-free

Special features:

- insensitive to pulsations, pressure bursts and temperature shocks
- with auto-adaptive digital signal processing
- with P- and T-correction
- three simultaneously and independently usable signals (current output, HART®, pulses)
- suited for high operating temperatures
- with an optional shut-off valve, the sensor and the electronics can be replaced under process conditions
- optional with complete measuring section and universal flow computer for pressure and temperature compensation

Technical data

Nominal size	DN15 to DN300
Process connection	Wafer, flanges DIN or ANSI
Material	stainless steel
Flow Range	0.4 m³/h to 20,000 m³/h (106 gal/h to 5,283.4 gal/h)
Linearity	up to ±0.6 % o. R.
Process temperature	-40°C up to +260°C / 450°C (-40°F up to +500°F / 842°F)
Process pressure	up to PN100
Output	current output with HART®, or current pulses and scalable pulse output acc. to NAMUR
Display	eight digit display up front with operating keys, DTM and AMS drivers are available
Ex-protection	Flame proof or intrinsically safe



VTX flange version

Oil and gas
Chemistry and pharmaceutical
Mechanical and plant engineering
Food and beverage
Energy and power plants
Shipbuilding

COMPACT ORIFICE

Triple compact orifice

The oriflow compact orifice is used for flow measurements of conductive and non conductive fluids, gases and vapours in all industrial branches.

Principle of measurement

The principle of measuring the differential pressure is based on the fact that a differential pressure is created across that section of a pipe where its cross section is reduced. This is then taken as a measure for the flow. For the differential pressure produced (differential pressure Δp at the point where the pressure is read) and the flow q, the flowing equation applies:

$$q = k \bullet \sqrt{\Delta p}$$

This principle of measurement is so popular because related terms, definitions and equipment characteristics have been laid down by way of standards already at a very early stage. The agreement between theoretical calculations and measured values has been proven through comprehensive experiments. This has been the basis for wide-spread acceptance throughout the industry. Today, about 50% of all flow meters rely on the principle of measuring the differential pressure.

Application

Applications include flow measurements (volume / mass) for balancing (compressed air systems, heat carries, vapours, chemical products, for example), process control and high throughput applications, redundant solutions for safety applications.

Characteristics

- highest market acceptance already over 10,000 units in operation worldwide
- extremly rugged and stable measuring instrument
- suitable for extreme applications

Special features

- dry calibration
- high repeatability
- easy installation without pressure lines

Technical data

Nominal size	DN15 up to DN1000
Process connection	Wafer, flanges DIN or ANSI
Material	stainless steel, Hastelloy, Tantalum, Titanium, PVDF, Monel
Flow Range	0.2 m³/h bis 150,000 m³/h (52.83 to 39,625808 gal/h)
Linearity	up to ±0.6 % o. R.
Process temperature	-40°C up to +400°C (-40°F up to +752°F)
Process pressure	up to PN40 (up to 320 bar/4,641 psi on request)
Output	current output / Foundation Fieldbus / Profibus A
Ex-protection	Flame proof or intrinsically safe

Compact Oriflow with Transmitter

Oil and gas
Chemistry and pharmaceutical
Mechanical and plant engineering
Food and beverage
Energy and power plants
Shipbuilding

DENSITY AND CONCENTRATION METER

DIMF 1.3 TVS

DIMF 2.0 TVS

The density meter is used for continuous measurement of density and concentration of liquids.

Principle of measurement:
The DIMF series of oscillation type of density sensors provides the possibility for the continuous measurement of the density and concentration of liquids, liquid mixtures and multiphase fluids.

The central component of the DIMF series of density sensors is an oscillating element consisting of an oscillating fork, type DIMF 1.3, or an oscillation pipe, type DIMF 2.0 and DIMF 2.1. The liquid to be measured flows through the oscillating element, which is electromagnetically excited and oscillating at its characteristic frequency. Changes in density result in changes in the characteristic frequency.

These frequency changes are measured. The frequency is registered directly by the transmitter and transformed into a signal proportional to the density and concentration. At the same time, an integral temperature sensor measures the temperature of the material. This temperature is then used to make corrections. In doing so, the temperature influence of the oscillation element and the temperature behavior of the liquid density are also considered.

The corrections are made directly in the transmitter. The frequency and the temperature can be transmitted to a Bopp & Reuther density computer or to a density-massflow converter, series UR06, and processed further there.

Application
Continuous monitoring of density, mass flow measurement, fiscal measurements, quality control, monitoring of waste water, product recognition, dosing, injection or blending of additives, control of chemical reactions, measurement of concentrations; monitoring and control of distillation, filtration, sedimentation, mixing or fermentation processes; process control, measurement of solid percentages in liquids, measurement of foams and suspensions etc.

Characteristics

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

Special features

- special calibration within the required density range
- fiscal metering for DIMF 1.3 (Evaluation Certificate)
- 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

Technical data

Nominal size	DN6 to DN50
Process connection	Flanges or Swagelok, sanitary threads, sterile fittings
Material	Stainless steel, Hastelloy, Tantalum, Monel, Inconel, 304 L
Density Range	0 to 5,000 kg/m³ (0 to 312 lb/ft³)
Linearity	up to ±0.1 kg/m³ depending on model
Process temperature	-40°C to +210°C (-40°F to +410°F)
Process pressure	up to 300 bar (4,351 psi)
Output	current output, frequency output, RS232
Ex-protection	Flame proof or intrinsically safe

DIMF – compact

Oil and gas
Chemistry and pharmaceutical
Mechanical and plant engineering
Food and beverage
Energy and power plants
Shipbuilding

CORIOLIS MASS FLOW METER: SERIES FMO

Coriolis
Mass Flow Meter
FMO 08

Coriolis
Mass Flow Meter
FMO 15

- Oil and gas
- Chemistry and pharmaceutical
- Mechanical and plant engineering
- Food and beverage
- Energy and power plants
- Shipbuilding

Mass flow meters dedicated to the measurement of liquids and gases.

Principle of measurement

The mass flow meter utilizes the Coriolis force for flow measurement. The omega loop has proven itself particularly suitable for this purpose.

The measuring tubes, which are bent to omega loops, are completed by two measuring bars and vertically secured torsion bars to create a harmonious oscillator. This carefully balanced and robust design has an extremely low power consumption. The frequency of the system essentially depends on the mass of the bars and the elasticity module of the torsion bars.

Two electromagnetic coils set the system in motion. As soon as liquid or gas flows through the oscillating omega tubes, the resultant Coriolis force causes displacement of the tubes. The resulting phaseshift is detected by sensor and is proportional to the mass flow.

Application

- custody transfer for mineral oils, bitumen and other viscous media
- process measurement of mechanical and plant engineering

Characteristics

- high accuracy
- easy installation
- independence on the flow profile
- low sensitivity to air bubbles

Special features

- suitable for high pressure applications
- measurement of corrosive fluids
- various electronic converters available

Technical data

Nominal size	DN15 up to DN300 (1/2” up to 12”)
Process connection	female threading, Flange DIN or ANSI
Material	Stainless steel, Hastelloy, Tantalum, Duplex
Flow Range	0.004 up to 30,000 kg/min (0.009 lb/min up to 66,139 lb/min)
Linearity	±0.15 % o. R.
Repeatability	±0.05 %
Process temperature	-200°C up to +400°C (-328°F up to +752°F)
Process pressure	1,379 bar (20,000 psi)
Ex-protection	Flame proof or intrinsically safe

CORIOLIS DOSING MASS FLOW METER: SERIES FMD

The dosing mass flow meter extends the range of dosing-sensors with special attention to the dosage of non-conductive media and direct mass dosage.

Principle of measurement
Dosing flowmeters that use the Coriolis principle are classified as direct mass flowmeters. They consist of two U-shaped measuring tubes, an actuator and two sensors. In operation, the two measuring tubes are stimulated to an antiphase oscillation. Without flow, both sides of the measuring tubes vibrate equally and the sensors deliver in-phase signals.

When liquid flows through the measurement tubes, the inlet end of the tube decelerates and the outlet end of the tube accelerates by the occurring Coriolis effect. As a result a phase difference in the two sensor signals is generated, which is proportional to the mass flow.

Application
The focus is on the measurement of non-conductive liquids with a low content of gas or solids. This equipment is also designed for the purposes of measurement of oil, distilled water or alkanes. Due to the measuring principle, direct measurement of the mass of dosage is possible.

Characteristics
- compact design
- direct measurement of mass
- measurement of non-conductive and conductive liquids
- high accuracy / repeatability
- no moving parts
- easy to clean compared with piston filler
- product gentle filling

Special features
- Outstanding fast fillings
- Fillings from 10 ml
- Very short dosing times > 250 ms
- High accuracy / repeatability also for small quantities
- High resolution (e.g. DN10: 63660 pulses/kg)
- Wide range of filling quantity with various diameters
- Wear-free measurement
- Fully welded, no gaskets
- Combinable with controller MDS-PLC

Technical data:

Nominal size	DN10, DN15 (3/8”, 1/2”)
Liquid temperature	0°C to 90°C (32°F to 194°F)
Connections	Tri Clamp acc. DIN 32676 Sanitary thread acc. DIN 11851
Cleanability	CIP / SIP up to 140°C (284°F)

Coriolis Dosing Mass Flow Meter FMD

Oil and gas
Chemistry and pharmaceutical
Mechanical and plant engineering
Food and beverage
Energy and power plants
Shipbuilding

DOSING TECHNOLOGY

MID-MDS

MID–MDS DOSING MODULES

Modular dosing system (MDS) for filling conductive liquids in filling machines fitted with electromagnetic flowmeters.

Principle of measurement

Electromagnetic flowmeters belong to the group of direct volumetric meters. They work according to the Faraday principle. They work according to the Faraday principle. In contrast to all other magnetic-inductive flow meters available in the market, they work in an alternating field instead of a synchronised DC field. This enables higher measuring dynamics and faster, precise measurements for dosing filling timing down to 100 ms.

Application

Their function is based on conductive liquids (>1 µS/cm) in filling machines. These machines are mainly used in the food and beverage industry as well as in the pharmaceutical and fine chemicals industry. Among others, milk and dairy products (also with pieces of fruit), ketchup, mayonnaise, mustard, sauces, dressings, cleaning and washing agents, medical products (e.g. stomach gels), sterile injection products and cosmetics are measured.

Characteristics

- easy cleaning in comparison with piston fillers (CIP/SIP)
- easy adjustment of filling quantities
- no shear 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 rotative filling machines
- wide range of filling quantity with various diameters
- direct control of the dosing valve
- CIP / SIP cleaning
- change of flow transmitter without re-programming possible

Batch controllers

- MID-MDS system to control the filling (measurement and valves)
  - up to 540 electromagnetic meters series MID and valves
  - with communication interface RS232 to communicate with the PLC
- MDS-Terminal to configure and visualize the MID-MDS system
- UV14 converter module to use custom PLCs
- MID-PLC to build up small filling application up to 4 meters and 4 valves

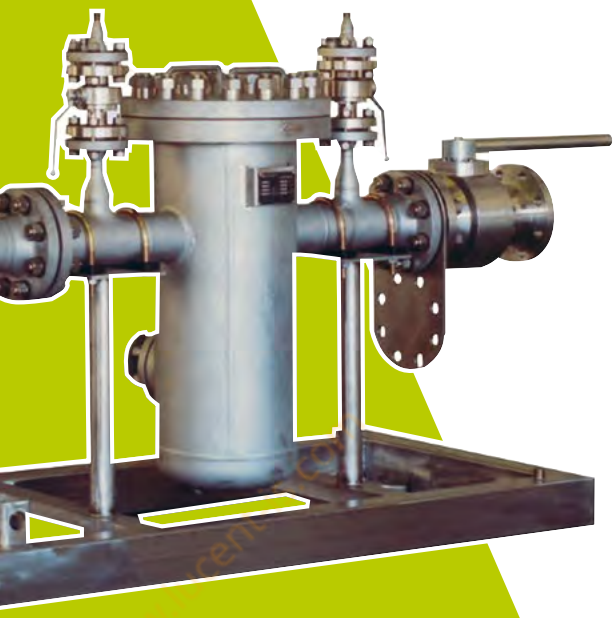
Technical data

Nominal size	DN10 up to DN40
Process connections	Tri-Clamp, hygienic connection for milk, sterile connections, sterile mini flange
Material	stainless steel
Conductivity	>1µS/cm
Flow ranges	0.25 m/s to 10 m/s
Repeatability	±0.1 % (depends on the flow range)
Process temperature	up to 95°C – cleaning up to 140°C (up to 203°F – cleaning up to 284°F)
Process pressure	up to 16 bar
Ex-Protection	not available

UV 14

Oil and gas
Chemistry and pharmaceutical
Mechanical and plant engineering
Food and beverage
Energy and power plants
Shipbuilding

ACCESSORIES



Strainer NC welded design

Strainer

- Oil and gas
- Chemistry and pharmaceutical
- Mechanical and plant engineering
- Food and beverage
- Energy and power plants
- Shipbuilding

STRAINER

Application

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

Characteristics

- 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 (2014/68/EU)
- customized design
- NACE

Technical data

Nominal size	DN15 to DN400 (1/2” to 16”)
Process connection	Flanges DIN or ANSI
Material	Carbon steel, cast steel, stainless steel (option: Hastelloy)
Flow range	up to 3,000 m³/h (792516 gal/h)
Process temperature	-200°C to +300°C (-328°F to +572°F)
Process pressure	up to 420 bar (6,092 psi)

CENTRIFUGAL GAS SEPARATOR

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

Characteristics
- 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)
- if applicable, necessary for measuring systems in legal transactions and measuring systems for tax billing of liquids except water
- Bopp & Reuther Centrifugal Gas Separators have received European design approval
- OIML and EC-Certificates are available
- manufactured according to Pressure Equipment Directive (2014/68/EU) ASME, CODAP
- NACE

Technical data

Nominal size	DN25 to DN400 (1” to 16”)
Material	Flanges DIN or ANSI
Process connection	Carbon steel, stainless steel
Flow range	up to 25,000 l/min (6604 gal/min)
Viscosity	up to 20 mPa·s
Process temperature	-200°C to +300°C (-328°F to +572°F)
Process pressure	up to PN100 (1,450 psi)

OIML PTB LNE

Centrifugal Gas Separator
Series ZGA

Oil and gas
Chemistry and pharmaceutical
Mechanical and plant engineering
Food and beverage
Energy and power plants
Shipbuilding

ACCESSORIES

MDS-PLC

COMPACT BATCH CONTROLLER SERIES MDS-PLC

Application

The area of application for the MDS-PLC is the control of meters and valves in small filling machines. The MDS-PLC configures the parameters and settings, visualizes the data and controls the valves.

By using this compact controller filling machine manufacturers can quickly integrate the dosing functions in their filling machines. There is no need for an extra PLC. The compact controller is operated via the external inputs or via the touch screen. All accuracy-related functions are integrated in the compact controller: even if a low-cost PLC will be used, for other purposes on the dispensing quantity.

Characteristics

- max. for 4 meters like electromagnetic flowmeters, mass flowmeter, oval wheel meters or others with pulse output
- Color Touch Panel
- many features out of 30 years experiences in filling applications

Special features

- 4 counting inputs 100 kHz
- 4 valve outputs 0,2A
- suitable for fast dosing applications
- with overflow correction and max. dosing time shutdown

Technical data

Inputs	4 counting inputs 100 kHz 4 Start inputs 4 Stop inputs 1 CIP input
Outputs	4 valve outputs 0.2 A 4 tolerance outputs 4 outputs for valve closing
Power	24 VDC (20 – 28 V)
Temperature range	0 to +50°C (32°F to +122°F)
Display	Color Touch Screen 320 x 240 Pixels
Dimensions	170 x 135 x 80 mm (6.7 x 5.9 x 3.1 inches)

- Oil and gas
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UNIVERSAL FLOW COMPUTER FOR LIQUIDS

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. This flow computer is for metering and batching mineral oil and chemical liquid products.

Characteristics

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

Special features

- extensive data logging function
- OIML approval
- Evaluation Certificate
- MID 2014/32/EU (former 2004/22/EC)
- RS232, RS485, Ethernet
- MBus, Modbus, Profibus

Technical data

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

Flow computer URS 09

Flow computer UR 06

Flow computer URS 06

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