Where it all began

The French mathematician Gaspard-Gustave Coriolis (1792 - 1843) discovered, explained and quantified a force acting perpendicular to the axis of rotation of particles as being dependent on the particles’ mass and its angular velocity. Flow meters utilizing his discovery are named Coriolis mass flow meters.

The next steps in development of the Coriolis flow meter

It was over a hundred years later when Gaspard-Gustave Coriolis’ explanation and discovery lead to the first Coriolis meters. The Coriolis principle enables to do direct measurement of mass. Coriolis mass flow meters are multivariable flow meters and besides measuring the mass flow with a very high accuracy, they are capable of providing the density, temperature, volume flow and concentration measurements at the same time.

In the last decade, the use of Coriolis flow meters has been changing from general purpose to supporting your needs in specific applications. While the technological complexity increased, the demand for simple operation and handling is also a rising requirement. Yokogawa answers these needs by offering six dedicated product lines with two specialized transmitters allowing the highest flexibility — the ROTAMASS Total Insight.
The ROTAMASS philosophy gives total insight throughout the whole lifecycle.

**Advanced Flexibility**
- "Features on Demand" by software key
- Worldwide approvals
- Widest range of I/O combinations
- Universal power supply

**Simplified Selection**
- Six dedicated product lines offering best-suited solutions
- Two specialized transmitters with common platform

**Data Mobility**
- MicroSD card for easy data transfer and remote service
- In-depth process analysis with standard desktop software

**Maintenance Manager**
- Patented "Tube Health Check"
- "Total Health Check" for in-line meter verification

**Expert Guide**
- Wizard for easy setup and configuration
- Simple and user-friendly operating concept

**Process Guard**
- "Event Management" for pro-active operation
- "Data Logging" before, during and after events
Support starts with understanding customer needs. We understand that selecting a product is often a challenge. It is not easy to find balance among several mitigating factors such as process requirements, operation and maintenance, cost and safety. The Rotamass Multi-Tier product line was developed to help alleviate these challenges and offer Total Insight throughout the product and plant lifecycle. Simplified Selection, a founding principle for the Rotamass product line, is organized to meet your requirements for your industry and specific application. Six different sensor lines can be combined with either of the two transmitters to provide highest flexibility and tailor-made solutions. The product selection tools and configuration tools support flexible options for customized applications that are easier to select and operate.

To achieve full operational performance, a multi-variable device like a Coriolis flow meter is essential but typically requires extensive setup to maximize results. The Rotamass Expert Guide supports a simple and user-friendly configuration concept. The intuitive menu structure combined with a large high resolution dot matrix display makes configuration easy and clear. A setup wizard guides the user through the configuration of all important settings and functions. Three different configuration sets can be stored and recalled at any time. Customer pre-defined views provide an overview of all important values within seconds.

Rotamass includes a Process Guard to manage advanced diagnostic capabilities. Nearly 200 different events can be dedicated and classified accordingly (NE 107) by the user. Events can also trigger data-logging of the most important process and device variables. Sustainable and safe operation often requires continuous monitoring, especially of in-line meters. The Maintenance Manager not only continually observes the key sensing elements, but also allows a Total Health Check during operation. Thus necessary interruption of processes can be significantly minimized. With support of the Fieldmate instrument maintenance and configuration tool, a full report including all test results can be provided.

The challenge of flow measurement is the strong interaction between the application, environment and the device. Problems often do not appear when a service engineer is immediately available. The root cause is typically a complex combination of several factors and requires extensive process analyses. The Rotamass Data Mobility concept enables user-defined, event-driven or periodical data logging of all important processes and device values before, during and after the event appears. The data file recorded on a microSD card in the transmitter can be sent from any place in the world to the Yokogawa service center for analysis. Special adjustments can then be returned and uploaded to the device.

Are you ready for the future?
The lifecycle of industrial products decreases or varies with market demands. As a consequence, flexible production units are needed. The changeover from one product to another has to be realized within a short time to maintain high operational availability of the plant. Rotamass Advanced Flexibility allows the user to add function to a device at any time, even after installation, anywhere in the world. Feature on Demand (FOD) allows the user to upgrade the device as needed. The modular I/O concept provides widest variants of in- and outputs as well as bus communication. The universal power supply and worldwide approvals make Rotamass ready to work anytime, anywhere.
The ROTA MASS T1 product family has a common and unified transmitter platform with two options.

The Essential transmitter is the cost effective solution for general purpose applications, and the Ultimate transmitter provides various additional features for best-in-class measurement.

The Essential features
- Wizard for easy setup and guidance through the main configuration
- “Event Management” as unique and useful support to run the process effectively and safely
- Data mobility provided by microSD card for easy transfer to other devices for fast setup, to PC for in-depth process analysis, for remote service
- Widest range of I/O combinations in the market for most flexible adjustment to the existing system periphery
- Universal power supply to install the device anywhere in the world
- HART communication

The Ultimate extras
- Patented “Tube Health Check” and “Total Health Check” for in-line meter verification without disturbing running measurements
- “Features On Demand” for easy expansion of special functions via software activation key
- Batching function combined with multiple configuration sets to support fast changeover
- “Dynamic Pressure Compensation” for consistently accurate and stable measurement even with significant fluctuations in operating pressures
- In-line concentration measurement
- Integrated net oil computing acc. API standard
- Hart, Foundation Fieldbus, Modbus RTU, Profibus PA

Typical applications
- Batching
- Dosing
- Blending
- Chemical injection
- Dosing systems
- High pressure gases
- Liquid and gas low flow measurement
- Precision coatings
- Metering pump control
- Metrology
- R&D laboratory
- Vacuum thin film coating

Future ready

<table>
<thead>
<tr>
<th>Converter Type</th>
<th>Essential</th>
<th>Ultimate</th>
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<tr>
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<tr>
<td>Supported Mass</td>
<td>Liquid</td>
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<tr>
<td>Flat Spec Accuracy</td>
<td>Gas</td>
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<tr>
<td>Supported Density Accuracy</td>
<td>4-Line Dot Matrix Display</td>
<td>0.054g/l</td>
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<tr>
<td>Universal Power Supply DC / AC</td>
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<td>Mounting</td>
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<tr>
<td>Integral Type</td>
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<tr>
<td>Remote Type</td>
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<td></td>
<td>Data Mobility</td>
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<td></td>
<td>Meter Verification</td>
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<tr>
<td>Special Application Function</td>
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<td>In-line Concentration</td>
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<tr>
<td></td>
<td>Net Oil Computing acc. API Standard</td>
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<tr>
<td></td>
<td>Water Cut</td>
<td>+</td>
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<td></td>
<td>GVF</td>
<td>+</td>
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<td></td>
<td>Batching</td>
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<td>Analog Out</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Pulse/Freq. Out</td>
<td>+</td>
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<tr>
<td></td>
<td>Status Out</td>
<td>+</td>
</tr>
<tr>
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<td>Analog IN</td>
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<td>HART</td>
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<td></td>
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<tr>
<td></td>
<td>Profibus PA</td>
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</tr>
</tbody>
</table>

For more information see overview table on last page
ROTAMASS nano – the world’s smallest dual bent tube Coriolis flow meter series for highly accurate measurement at lowest flows.

The dual tube design compensates for fluctuations of density, temperature, pressure and environment conditions provide a more consistent, repeatable, and accurate measurement as compared to other small size Coriolis flow meters.

Best performance under real-world conditions

• Repeatable and accurate measurement regardless of environment
• Unique in-line temperature measurement to eliminate ambient temperature influences
• Dual bent tube design for optimal measurement under changing process conditions
• Measuring tubes made of alloy C-22 as standard for best resistance to pressure and temperature influence

Industry proven design

• Unsurpassed, industrial design for extreme installation conditions
• All stainless steel, welded and gas tight sensor housing for increased safety
• Widest range of process connections for easy installation without piping modification

Widest process temperature range

• Measurement at low and very high process temperatures
• Constant process temperature over entire flow path by factory-fitted insulation and heat tracing

Typical Line Sizes

<table>
<thead>
<tr>
<th>Inches</th>
<th>DN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot;, 3/8&quot;, 1/2&quot;, 3/4&quot;, 1&quot;, 1 1/2&quot;</td>
<td>DN15, DN25, DN40</td>
</tr>
</tbody>
</table>

Flow Rate Capacities

<table>
<thead>
<tr>
<th>Maximum Flow Rate</th>
<th>1.5 t/h (~3307 lb/h)</th>
</tr>
</thead>
</table>

Flow & Density Accuracies (up to)

| Mass Flow-Liquid | ±0.1% |
| Mass Flow-Gas | ±0.5% |
| Density-Liquid | ±0.0005 g/cm³ |

Pressure Rating

<table>
<thead>
<tr>
<th>Standard Process Connection</th>
<th>up to 285 bar (4133 psi)</th>
</tr>
</thead>
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Process Temperature

<table>
<thead>
<tr>
<th>Min/Max</th>
<th>-50 / +260°C (-58 / 500°F)</th>
</tr>
</thead>
</table>

Structural Features

<table>
<thead>
<tr>
<th>Wetted Parts Material</th>
<th>Nickel alloy</th>
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</thead>
<tbody>
<tr>
<td>Secondary Containment</td>
<td>AS1.304 (1.4301)</td>
</tr>
<tr>
<td>Typical Rupture Pressure for Secondary Containment</td>
<td>65 bar (942 psi)</td>
</tr>
<tr>
<td>Mounting &amp; Ingress Protection Rating</td>
<td>Remote Type IP66/67</td>
</tr>
</tbody>
</table>

For more information see overview table on last page.
VERSATILE IN APPLICATIONS

ROTAMASS prime – the favorably priced and versatile Coriolis flow meter with lowest pressure drop in the market.

Ideal for a broad range of standard applications, this series is a flexible and cost-effective solution for highly accurate flow and density measurements.

Features such as concentration measurement or the Tube Health Check function allow the meter to be adjusted to customer needs.

HIGHEST FLEXIBILITY
- Widest flow range per meter size in market
- High flat spec accuracy for wide range of standard applications
- Variable process connections for easy adaption to piping

LOWEST COST OF OWNERSHIP
- Lowest pressure drop in market for most cost-effective meter size selection
- Economic solution for multi-variable measurement
- Minimized changeover times by compact and drainable design

OPTIONAL CAPABILITIES
- Patented “Tube Health Check” function and “Total Health Check” for in-line meter verification without disturbing running measurements
- Continuous in-line density and concentration measurement for product quality control
- Integrated net oil computing acc. API standard

TYPICAL APPLICATIONS
- Batch
- Blending
- Chemical recovery
- Continuous reaction
- In-line concentration and density measurement
- Catalyst feed
- Filling and dosing
- Mass balance
- Net oil computing
- Palm oil
- Process control

TYPICAL LINE SIZES

<table>
<thead>
<tr>
<th>Inches</th>
<th>DN</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot;</td>
<td>DN15</td>
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<tr>
<td>1/2&quot;</td>
<td>DN20</td>
</tr>
<tr>
<td>1&quot;</td>
<td>DN25</td>
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<tr>
<td>1 1/2&quot;</td>
<td>DN40</td>
</tr>
<tr>
<td>2&quot;</td>
<td>DN50</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>DN80</td>
</tr>
</tbody>
</table>

FLOW RATE CAPACITIES
Maximum Flow Rate: 76 t/h (167551 lb/h)

FLOW & DENSITY ACCURACIES (UP TO)
- Mass Flow-Liquid ±0,1%
- Mass Flow-Gas ±0,5%
- Density-Liquid ±0,0005 g/cm³

PRESSURE RATING
- Standard Process Connection: up to PN100, ASME Class 600
- Process Temperature: Min./Max. -70 / +200°C (-94 / 392°F)

STRUCTURAL FEATURES
- Wetted Parts Material: AISI 316L (1.4404)
- Secondary Containment: AISI 304 (1.4301)
- Typical Repetition Pressure for Secondary Containment: 59 bar (855 psi)
- Mounting & Ingress Protection Rating: Integral Remote Type IP65, 67

For more information see overview table on last page.
**Experience meets innovation**

**ROTA**

**MASS supreme**

ROTA MASS supreme – the most accurate Coriolis flow meter with industry’s best zero stability.

The successful Rotamass series has been progressively developed and is also newly equipped with the latest technology.

This meter delivers unsurpassed performance for demanding and critical applications with superior aeration handling and advanced diagnostic functionality.

**Superior flow and in-line density measurement**

- Highest flat spec accuracy for optimal final product quality
- With best zero stability in market – unbeatable accurate measurement to the low end
- Density calibration with different fluids for most accurate in-line density, concentration and volume flow measurement

**Unsurpassed capabilities**

- Uninterrupted and reliable measurement under extreme aeration conditions by “Rotamass Smart Power Management”
- Patented “Tube Health Check” function and “Total Health Check” for in-line meter verification without disturbing running measurements
- Widest range of process connections for lowest installation costs

**Stable operation under all conditions**

- Optimum decoupling of core measuring element from external influences by proven box-in-box design
- Measurement at cryogenic and very high process temperatures
- Factory-fitted insulation and heat tracing ensuring heating continuity for increased field reliability

**Typical applications**

- Batching
- Burner control
- Feed and product control
- Filling and dosing
- Gas void fraction
- In-line concentration and density measurement
- Loss control
- Material and mass balance
- Net oil computing
- Process control
- Solvents
- Water cut measurement

**Typical Line Sizes**

<table>
<thead>
<tr>
<th>Inches</th>
<th>DN</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;3/8&quot;, 1/2&quot;, 3/4&quot;, 1&quot;, 1 1/2&quot;, 2&quot;, 2 1/2&quot;, 3&quot;, 4&quot;, 5&quot;</td>
<td>DN15, DN25, DN40, DN50, DN80, DN100, DN125</td>
</tr>
</tbody>
</table>

**Flow Rate Capacities**

| Maximum Flow Rate | 170 t/h (374785 lb/h) |

**Flow & Density Accuracies (up to)**

| Mass-Flow-Liquid | ±0.1% |
| Mass Flow-Gas | ±0.5% |
| Density-Liquid | ±0.0005 g/cm³ |

**Pressure Rating**

| Standard Process Connection | up to PN160, ASME Class 600 |

**Process Temperature**

| Min/Max | -200 / -365°C (-328 / 662°F) |

**Structural Features**

| Wetted Parts Material | AISI 316L (1.4404) or Nickel alloy C22 (2.4603) |
| Secondary Containment | AISI 304 (1.4301) |
| Typical Rupture Pressure for Secondary Containment | 80...120 bar (1160...1740 psi) |
| Mounting & Ingress Protection Rating | IP66/67 |

For more information see overview table on last page
Safe under high pressure

**ROTA MASS intense – the Coriolis meter**

with the most robust and durable design for precise measurement in high pressure applications.

Safety is always a concern, especially when operating at high pressures. Therefore, this series has been designed to meet the highest safety requirements. Combined with advanced diagnosis such as the “Total Health Check” function, operation is always under secure control.

**Best performance even at high pressures**

- High flat spec accuracy and optimum zero point stability for demanding applications
- “Dynamic Pressure Compensation” function ensures a consistently accurate and stable measurement even in unstable operating conditions
- Optimum decoupling of core measuring element from pipe vibrations and torsion by proven box-in-box-design

**No compromise on safety**

- Thickest seamless measuring tubes in industry
- All stainless steel, welded and gas tight sensor housing with industry approved rupture discs and dual seals for increased safety
- Patented tube health check function and in situ meter verification for “Total Health Check” without disturbing running measurements

**Worry-free installation**

- No need for bulky and heavy support structures due to box-in-box-design
- Wide range of process connections for easy adaption to piping
- Dual certified flanges for higher pressure ratings

**Typical applications**

- Chemical injection
- Compressed gases
- Fuels
- Glycol TEG/MEG
- High pressure gases
- Hydraulic oil
- Hydrocarbons
- Liquified gases
- Natural gas hydration
- Offshore and onshore
- Oil refinery processes
- Solvents

**Typical Line Sizes**

<table>
<thead>
<tr>
<th>Inches</th>
<th>DN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;, 1&quot;, 2&quot;</td>
<td></td>
</tr>
</tbody>
</table>

**Flow Rate Capacities**

| Maximum Flow Rate | 50 t/h (110231 lb/h) |

**Flow & Density Accuracies (up to)**

| Mass Flow-Liquid | ±0.1% |
| Mass Flow-Gas | ±0.5% |
| Density-Liquid | ±0.0005 g/ml |

**Pressure Rating**

| Standard Process Connection | up to ASME Class 1500 |

**Process Temperature**

| Min/Max | -70 / +150°C (-94 / 302°F) |

**Structural Features**

| Wetted Parts Material | AISI 316L (1.4404) or Nickel alloy C22 (2.4602) |
| Secondary Containment | AISI 304 (1.4301) |
| Typical Rupture Pressure for Secondary Containment | 120 bar (1740 psi) |

**Mounting & Ingress Protection Rating**

| Remote Type | IP66/67 |

For more information see overview table on last page.
With pure dedication

**ROTA MASS hygienic** – specifically designed and certified for food & beverage, biotechnology and pharmaceutical utility applications.

This series is the appropriate answer to the daily constraints of hygienic processes, ensuring continuous product quality and minimizing losses. This is made easy by the provided multi-variable measurement and various dedicated features.

**Stringent hygienic design**
- Lowest pressure loss in market
- Compact, drainable and CIP/SIP cleanable design
- All stainless steel sensor housing
- Dead-space-free design with smooth surface finish and seamless measuring tubes without any gasket
- Wide range of hygienic process connections

**Accurate product monitoring**
- Low flow velocity and low excitation frequency to avoid change of fluid characteristics
- Repeatable and highly precise flow and density measurement for continuous control of product quality
- Pre-defined “trend views” for deeper process observation

**Dedicated features**
- Multiple configuration sets to support fast changeover in batch production
- Concentration measurement including pre-defined Brix, Vol% and WT% measurement
- Uninterrupted and reliable measurement under extreme aeration condition by “Rotamass Smart Power Management”

**Typical applications**
- Bioreactor feeds
- Bottling
- Carbonation of beverages
- Deionized water
- Fermentation
- Juice processing
- Molasses measurement
- Online sugar concentration
- Raw milk tanker unloading
- Process water reclamation
- Product quality control
- Sugar industry

**Typical Line Sizes**
- Inches: 1”, 1 1/2”, 2”, 2 1/2”, 3”
- DN: DN25, DN40, DN50, DN65, DN80

**Flow Rate Capacities**
- Maximum Flow Rate: 76 t/h (167551 lb/h)

**Flow & Density Accuracies (up to)**
- Mass Flow-Liquid: ±0.1%
- Mass Flow-Gas: ±0.5%
- Density-Liquid: ±0.0005 g/cm³

**Pressure Rating**
- Standard Process Connection: up to 40 bar (580 psi)

**Process Temperature**
- Min/Max: -70 / +200°C (-94 / 392°F)

**Structural Features**
- Wetted Parts Material: AISI 316L (1.4404)
- Secondary Containment: AISI 304 (1.4301)
- Typical Rupture Pressure for Secondary Containment: 59 bar (855 psi)

**Mounting & Ingress Protection Rating**
- Integral Remote Type: IP66/67
**Big in performance**

**ROTA MASS giga** – delivering best-in-class accuracy and most flexible installation at high flow rates.

The unmatched accuracy at the low end of the measuring range offers maximum flexibility from engineering to final operation. This series unifies a long service life with low maintenance costs and reliable performance.

**Repeatable and accurate high flow measurement**
- High flat spec accuracy meeting typical oil and gas industry requirements
- Excellent zero stability for accurate measurement to the low end
- Ideal solution for high accuracy bunker blending

**Time and cost saving solution**
- Space-saving installation, small in footprint and weight; no in- or outlet runs required
- Extraordinary selection of process connections for easy adaption to piping
- For high temperature processes available with factory-fitted insulation
- With heat tracing for constant process temperature over entire flow path

**Safety by design**
- Thick wall tubes for durability
- Patented “Tube Health Check” function and “Total Health Check” for in-line meter verification during operating mode
- All stainless steel, welded and gas tight sensor housing for increased safety

**Typical applications**
- Bitumen
- Distribution networks
- Drillingmud
- LNG
- Rail car loading
- Ship loading
- Truck loading
- Tar
- Offshore and onshore
- Oil well cementing and hydrofracturing

<table>
<thead>
<tr>
<th>Typical Line Sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inches</td>
</tr>
<tr>
<td>DN</td>
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<table>
<thead>
<tr>
<th>Flow Rate Capacities</th>
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<tbody>
<tr>
<td>Maximum Flow Rate</td>
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<table>
<thead>
<tr>
<th>Flow &amp; Density Accuracies (up to)</th>
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<tbody>
<tr>
<td>Mass Flow-Liquid</td>
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<tr>
<td>Mass Flow-Gas</td>
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<tr>
<td>Density-Liquid</td>
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<tbody>
<tr>
<td>Standard Process Connection</td>
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<td>Min/Max Process Temperature</td>
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<table>
<thead>
<tr>
<th>Structural Features</th>
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<tbody>
<tr>
<td>Wetted Parts Material</td>
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<tr>
<td>Secondary Containment</td>
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<tr>
<td>Typical Rupture Pressure for Secondary Containment</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting &amp; Ingress Protection Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integral Remote Type</td>
</tr>
</tbody>
</table>

For more information see overview table on last page.
The perfect team

FieldMate - Versatile Device Management provides full support of the ROTAMASS Total Insight philosophy.

FieldMate 3.0 is a PC or tablet-based configuration tool that performs numerous tasks, including initial setup, daily maintenance, reporting, troubleshooting, and configuration backup for device replacement. FieldMate is independent from communication protocols and device vendors.

FieldMate incorporates the open FDT/DTM standard and is compliant with DTM per the FDT 1.2/2 standard. FieldMate supports built-in DTM interpreting of existing Device Description (DD) instantly for other vendor’s devices that do not have DTM available.

Expert Guide
- Integrated wizard guides the user through a complete and error-free configuration
- Clearly arranged device parameter tree for intuitive and simple handling

Process Guard
- NE107 and event management configuration for quick setups, such as alarms and device behavior
- Permanent data-logging of important measurements

Maintenance Manager
- Total Health Check of the device including corrosion and upcoming maintenance demand
- Report function with all relevant customer and device information and test results in various formats

Data Mobility
- Integrated tool for process and sensor data-logging by configurable interval or based on events
- Data-logging on microSD card accessible with standard desktop software for in-depth data analysis and remote services

Advanced Flexibility
- Post activation of function (FOD 4.0) at any time
- The FieldMate activation tool allows the user to activate all ROTAMASS Ultimate Transmitter function by activation key

Typical support function
- Multi Protocol Access
- Device Configuration
- Monitoring
- Back-up and restore
- Total Meter Verification
- Reporting Function
- NE107 Configurator
- Event Management Tool
- Post Function Activation (FOD 4.0)
- Concentration Configuration
- PRM Synchronization

Fieldmate Main Specification

<table>
<thead>
<tr>
<th>Available Version</th>
<th>License</th>
<th>OS Language</th>
<th>Communication Protocols</th>
<th>Supported Function</th>
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<tbody>
<tr>
<td>FieldMate and FieldMate Lite</td>
<td>Free*</td>
<td>Windows 8.1 / 8.1 Pro 32bit/64bit Update or later</td>
<td>HART, Foundation Fieldbus H1, Profibus, ISA100.11a, Modbus</td>
<td>User Management</td>
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<tr>
<td>FieldMate Lite</td>
<td></td>
<td>Windows 7 Prof., Home Premium 32bit/64bit SP1 or later**</td>
<td>HART, Foundation Fieldbus H1, Profibus, ISA100.11a, Modbus</td>
<td>Monitoring</td>
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Supported Function Rotamass TI

<table>
<thead>
<tr>
<th>Supported Function</th>
<th>Concentration Tool</th>
<th>Back-up and Restore</th>
<th>Health Check Report Tool</th>
<th>Event Management</th>
<th>Post Function Activation</th>
</tr>
</thead>
</table>

* some functions such as Total Health Check reporting function might require license
** requirement on interface, modem, interface card and driver; please see GS01R01A01-01E
*** informal of the available DTM

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## Sensors

### Flow Rate Capacities

<table>
<thead>
<tr>
<th>Flow Rate</th>
<th>1.5 t/h</th>
<th>3307 lb/h</th>
<th>78 t/h</th>
<th>16755 lb/h</th>
<th>170 t/h</th>
<th>374785 lb/h</th>
<th>50 t/h</th>
<th>110231 lb/h</th>
<th>76 t/h</th>
<th>167551 lb/h</th>
<th>600 t/h</th>
<th>1322773 lb/h</th>
</tr>
</thead>
</table>

### Performances (up to)

<table>
<thead>
<tr>
<th>Supported Mass-Flow Accuracy</th>
<th>Liquid</th>
<th>0.1%</th>
<th>0.1%</th>
<th>0.1%</th>
<th>0.1%</th>
<th>0.1%</th>
<th>0.1%</th>
<th>0.1%</th>
<th>0.1%</th>
<th>0.1%</th>
<th>0.1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat Spec Accuracy</td>
<td>Liquid</td>
<td>0.0005 g/cm³</td>
<td>0.0005 g/cm³</td>
<td>0.0005 g/cm³</td>
<td>0.0005 g/cm³</td>
<td>0.0005 g/cm³</td>
<td>0.0005 g/cm³</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Typical Line Sizes

- **DN**: 15, 25, 40, 50, 65, 80, 100, 125, 150, 200.

### Pressure Rating (up to)

- **Standard Process Connection**
  - Universal AC/DC
  - LCD Display
  - 4-Line Dot Matrix Display
  - Infrared Switches
  - Remote Field-mount (IP66/67)
  - HART®
  - FOUNDATION™ Fieldbus
  - PROFIBUS PA
  - Modbus RTU
  - Wizard
  - Event Management/NE 107
  - Data Mobility (µSD card)
  - Features on Demand (FOD)
  - Advanced Diagnostics
  - Empty Pipe Detection
  - Slag Flow Detection
  - Tube Health Check (tube integrity)
  - Total Health Check (meter verification)
  - Oil Density Measurement
  - Material Function
  - Hazardous Area Certifications
  - ATEX
  - IECEx
  - FM (USA & Canada)
  - NEPSI
  - INMETRO
  - Kosha
  - EAC

### Structural Features

- Wetted Parts Material
  - 316L (1.4404) / alloy C-22 (2.4602)
- Nickel Alloy C-22 (2.4602)
- Secondary Containment
- Rupture Disk

### Mounting (Ingress Protection Rating)

- Remote Type (IP66/67)
- Integral Type (IP66/67)
- Outputs/Inputs
  - Analog Out; Pulse Frequency Out; Status Out
  - Status In
  - Analog In
  - Ex-DA Service Port

### Typical Process Connection Types

- Flanges According EN, ASME, JIS, JPI
- Female Thread (G, NPT)
- Thread According DIN 11851, DIN 11864
- Clamp According DIN 32676, SMS 1145, IDF (ISO&JIS)
- Tri-clamp (tri-clamp) and Mini Clamp

### Transmitters

#### Performances (up to)

- **Supported Mass-flow Accuracy**
  - Liquid: 0.15%
  - Gas: 0.50%
- **Flat Spec Accuracy (extended low flow range)**
- **Supported Density Accuracy**
  - Liquid: 0.004 g/cm³
  - Gas: 0.002 g/cm³
- **Power Supply**
  - Universal AC/DC
- **Digital Communication**
  - HART®
  - FOUNDATION™ Fieldbus
  - PROFIBUS PA
  - Modbus RTU
- **Safety Integrity Level**
  - Sensor & Transmitter: SIL2 (SIL3)

<table>
<thead>
<tr>
<th>Essential</th>
<th>Ultimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15%</td>
<td>0.10%</td>
</tr>
<tr>
<td>0.004 g/cm³</td>
<td>0.002 g/cm³</td>
</tr>
<tr>
<td>0.50%</td>
<td>0.50%</td>
</tr>
<tr>
<td>0.15%</td>
<td>0.10%</td>
</tr>
<tr>
<td>0.004 g/cm³</td>
<td>0.002 g/cm³</td>
</tr>
<tr>
<td>0.50%</td>
<td>0.50%</td>
</tr>
</tbody>
</table>

- supported
- optional
- partially supported
- in preparation