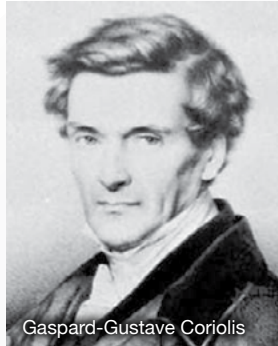


# ROTAMASS

*Total Insight*



# Coriolis History and Working Principle



Gaspard-Gustave Coriolis

## 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**.



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**ROTAMASS**  
nano



For low flow applications

**ROTAMASS**  
prime



Versatility with lowest cost of ownership

**ROTAMASS**  
supreme



Superior performance under demanding conditions

**ROTAMASS**  
intense



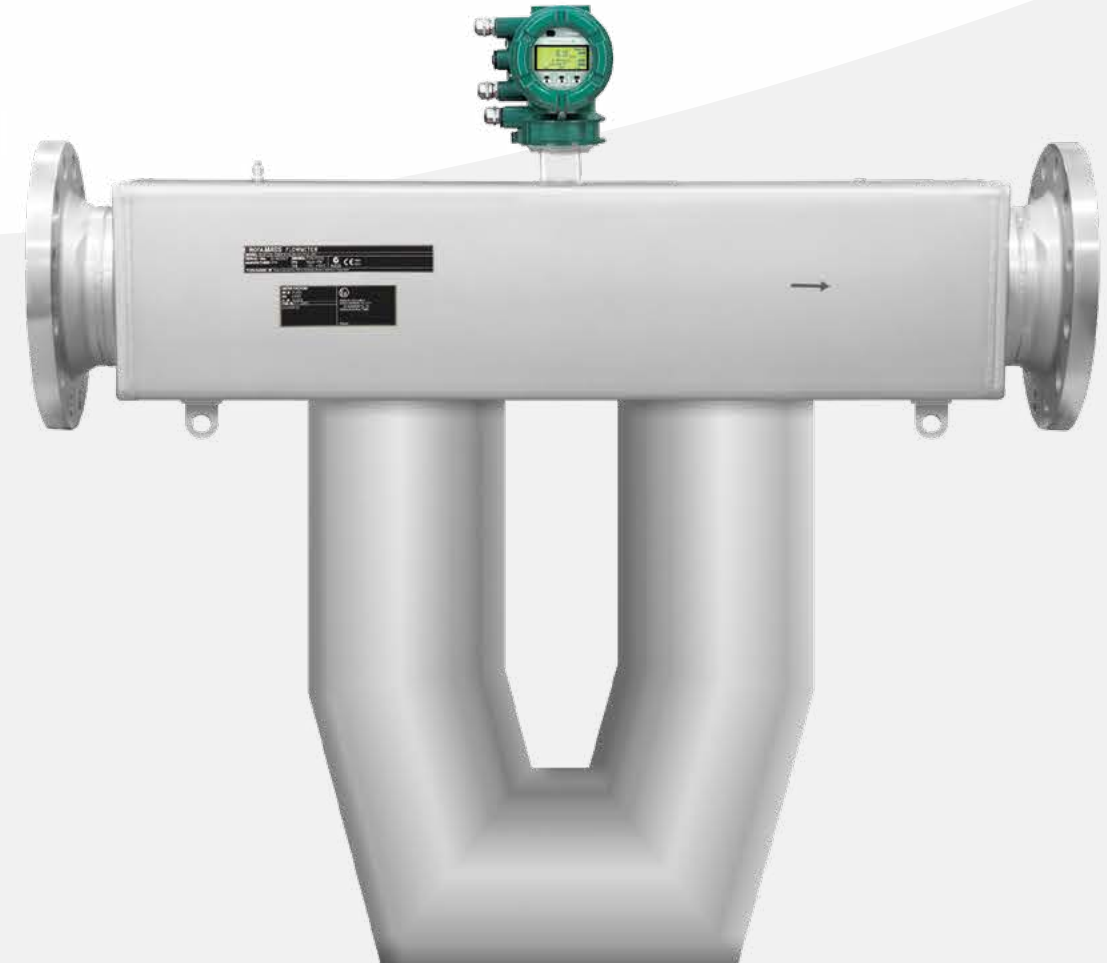
For high pressure applications

**ROTAMASS**  
hygienic



For food & beverage, biotechnology and pharmaceutical utility applications

**ROTAMASS**  
giga



Flexible installation for high flow applications

# ROTAMASS

*Total Insight*

**Essential**



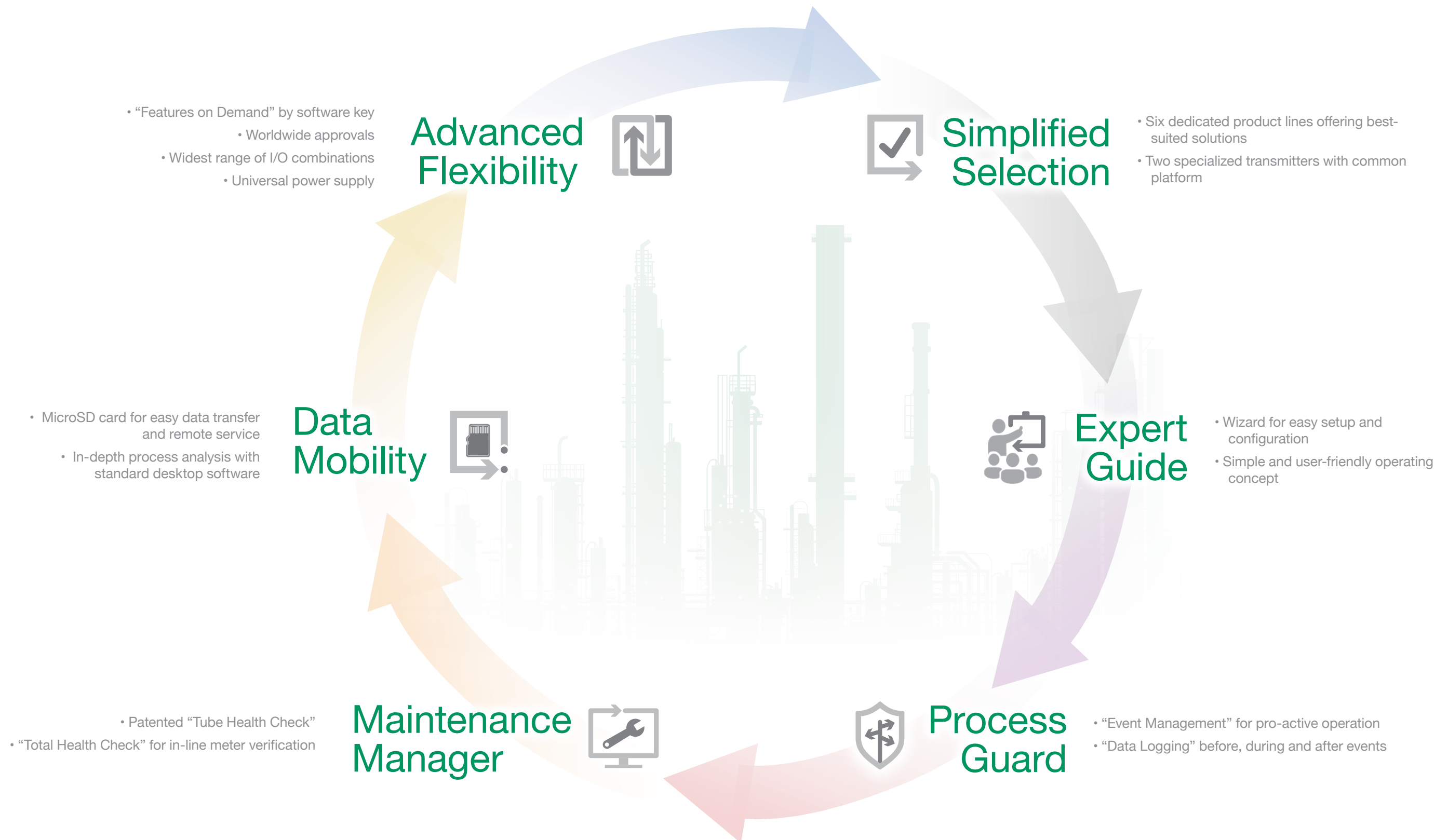
For general purpose application

**Ultimate**



For demanding and critical applications

The ROTAMASS philosophy gives total insight throughout the whole lifecycle



# Total Insight



## Leading edge technology

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.

# Essential and Ultimate Transmitter



## 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

The ROTAMASS TI 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

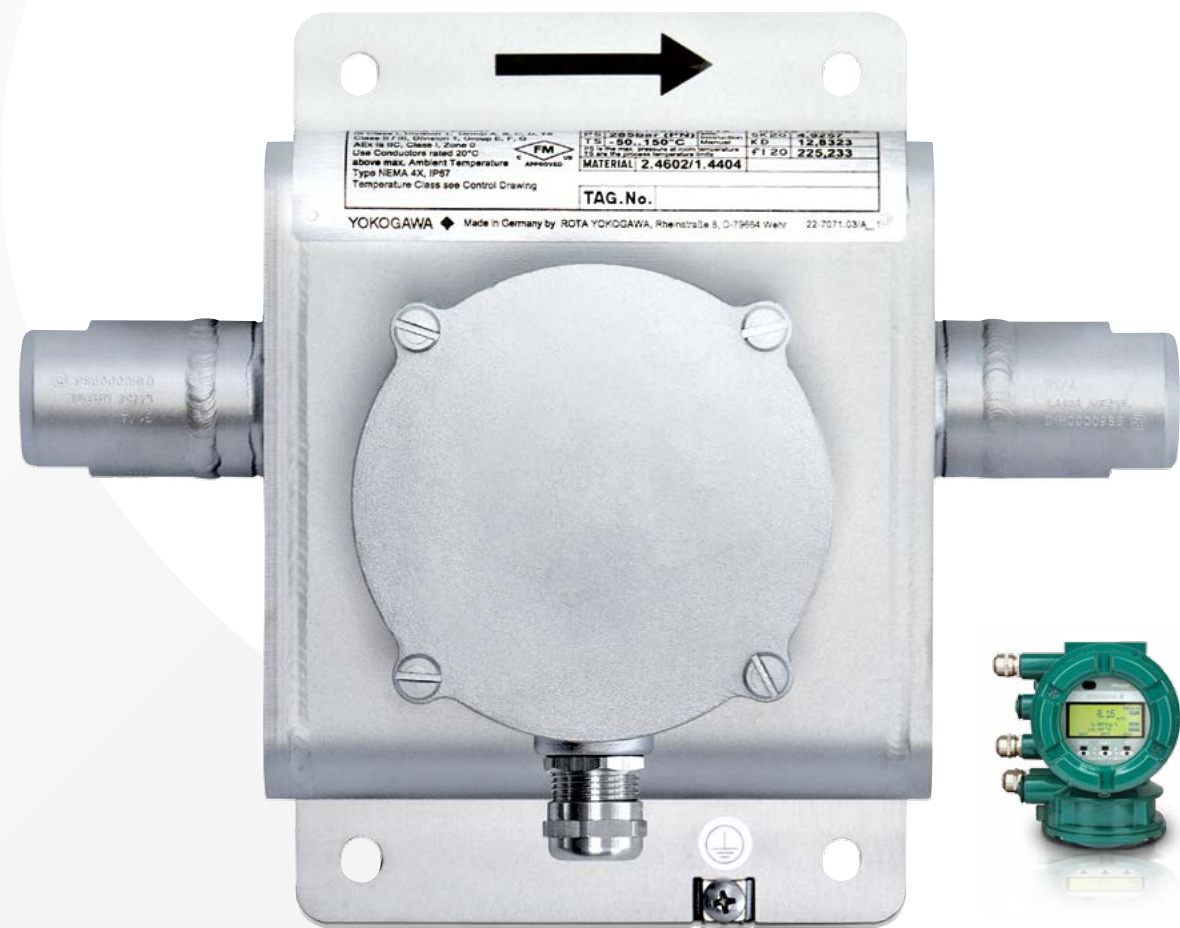
### The Ultimate extras

- 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

Converter Type	Essential	Ultimate
<b>Performance</b>		
Supported Mass	Liquid 0.2%/0.15%	0.1%
Flow Accuracy:	Gas 0.50%	0.50%
Flat Spec Accuracy	•	•
Supported Density Accuracy	0.004g/l	0.0005g/l
4-Line Dot Matrix Display	•	•
Universal Power Supply DC / AC	•	•
<b>Mounting</b>		
Integral Type	•	•
Remote Type	•	•
<b>Special Function</b>		
Wizard	•	•
Event Management	•	•
Data Mobility	•	•
Meter Verification	○	○
<b>Special Application Function</b>		
Dynamic Pressure Compensation		•
In-line Concentration		•
Net Oil Computing acc. API Standard		■
Water Cut		■
GVF		■
Batching		■
<b>IO capabilities</b>		
Analog Out	•	•
Puls/ Frequ. Out	•	•
Status Out	•	•
Analog IN		•
Status IN	•	•
IrDA Service Port	•	•
<b>Communication</b>		
HART	•	•
Modbus		■
Fieldbus		•
Profibus PA		■

For more information see overview table on last page

# ROTAMASS nano



### 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

## When every drop counts

**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	
Inches	1/4", 3/8", 1/2", 3/4", 1", 1 1/2"
DN	DN15, DN25, DN40
Flow Rate Capacities	
Maximum Flow Rate	1.5 t/h (~3307 lb/h)
Flow & Density Accuracies (up to)	
Mass Flow-Liquid	±0.1%
Mass Flow-Gas	±0.5%
Density-Liquid	±0.0005 g/cm <sup>3</sup>
Pressure Rating	
Standard Process Connection	up to 285 bar (4133 psi)
Process Temperature	
Min/Max	-50 / +260°C (-58 / 500°F)
Structural Features	
Wetted Parts Material	Nickel alloy C22 (2.4602) / AISI 316L (1.4404)
Secondary Containment	AISI 304 (1.4301)
Typical Rupture Pressure for Secondary Containment	65 bar (942 psi)
Mounting & Ingress Protection Rating	
Remote Type	IP66/67

For more information see overview table on last page

# ROTAMASS prime



## Typical applications

- Batching
- 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

## 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 Line Sizes

Inches	3/8", 1/2", 1", 1 1/2", 2", 2 1/2", 3"
DN	DN15, DN25, DN40, DN50, DN80

### Flow Rate Capacities

Maximum Flow Rate	76 t/h (167551 lb/h)
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### 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
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### Process Temperature

Min./Max	-70 / +200°C (-94 / 392°F)
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### 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)

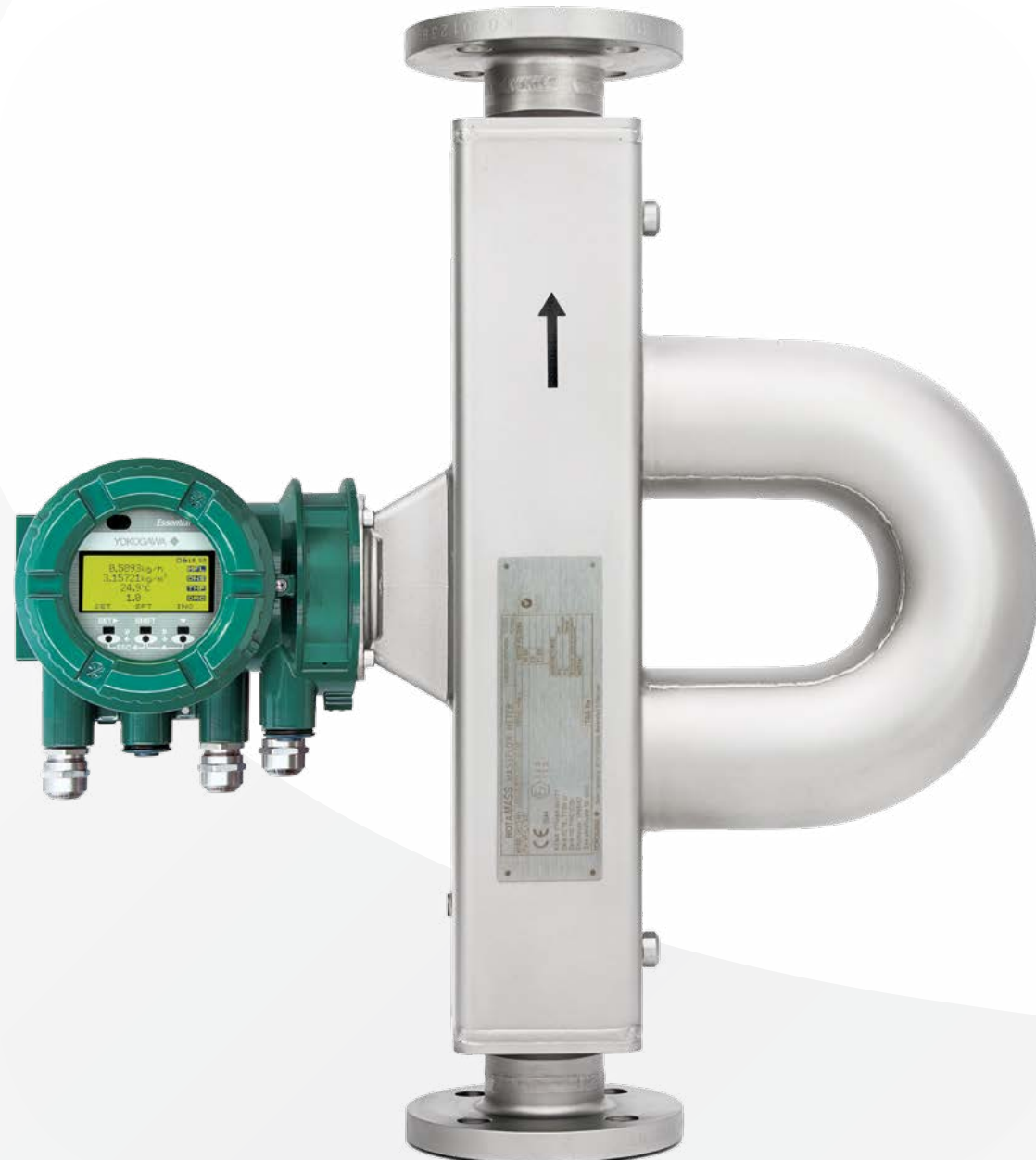
### Mounting & Ingress Protection Rating

Integral Remote Type	IP66/67
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For more information see overview table on last page



# ROTAMASS supreme



## 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

## Experience meets innovation

**ROTAMASS 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

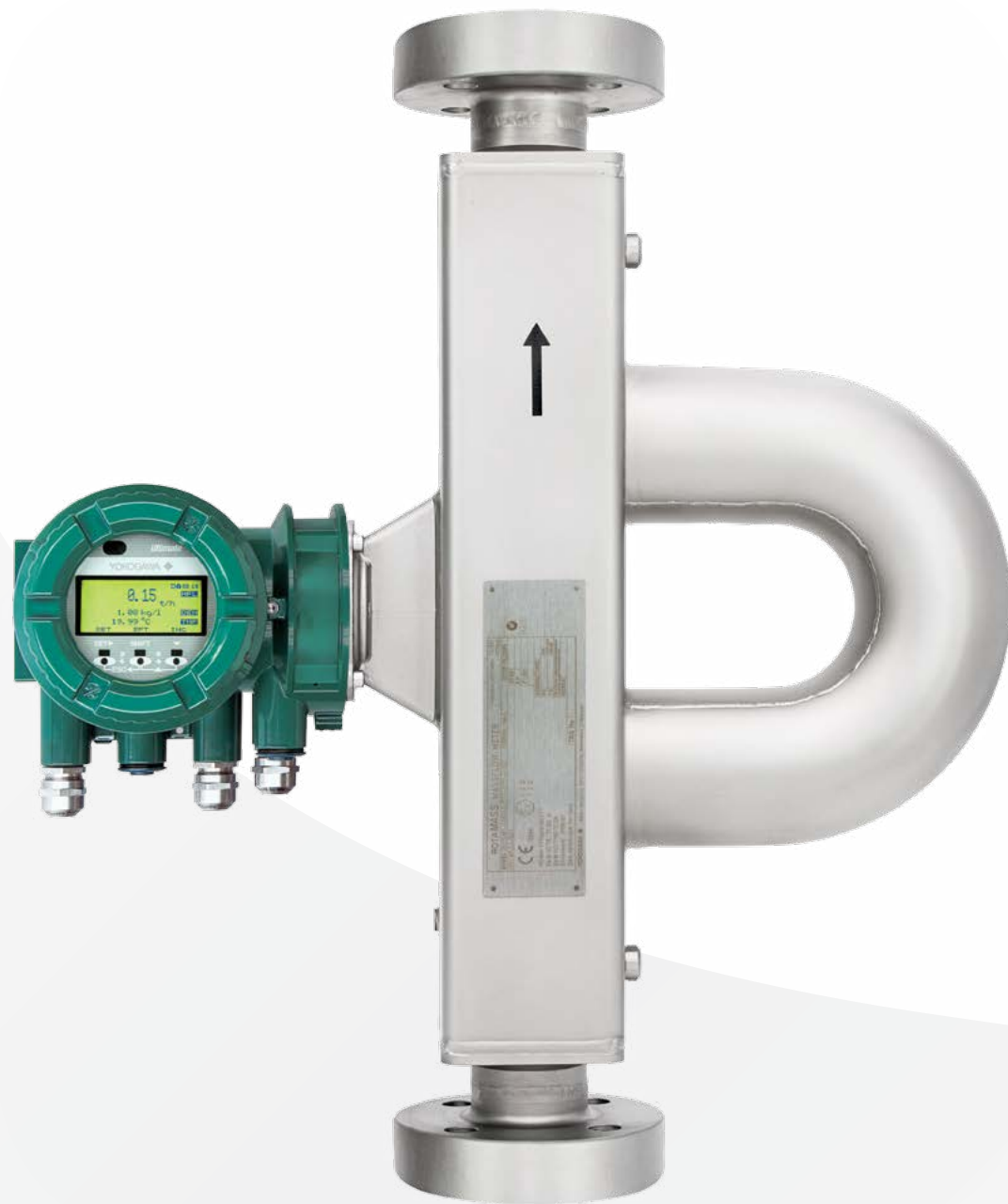
- Optimum decoupling of core measuring element from external influences by proven box-in-box-design
- Measurement at cryogenic and very high process temperatures
- Factory-fitted insulation and heat tracing ensuring heating continuity for increased field reliability



Typical Line Sizes	
Inches	'3/8", 1/2", 3/4", 1", 1 1/2", 2", 2 1/2", 3", 4", 5"
DN	DN15, DN25, DN40, DN50, DN80, DN100, DN125
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/cm <sup>3</sup>
Pressure Rating	
Standard Process Connection	up to PN100, ASME Class 600
Process Temperature	
Min/Max	-200 / +350°C (-328 / 662°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	80...120 bar (1160...1740 psi)
Mounting & Ingress Protection Rating	
Integral Remote Type	IP66/67

For more information see overview table on last page

# ROTAMASS intense



### 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

## Safe under high pressure

**ROTAMASS 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 Line Sizes	
Inches	1/2", 1", 2"
DN	
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/cm <sup>3</sup>
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

# ROTAMASS

hygienic



### 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

## With pure dedication

ROTAMASS 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

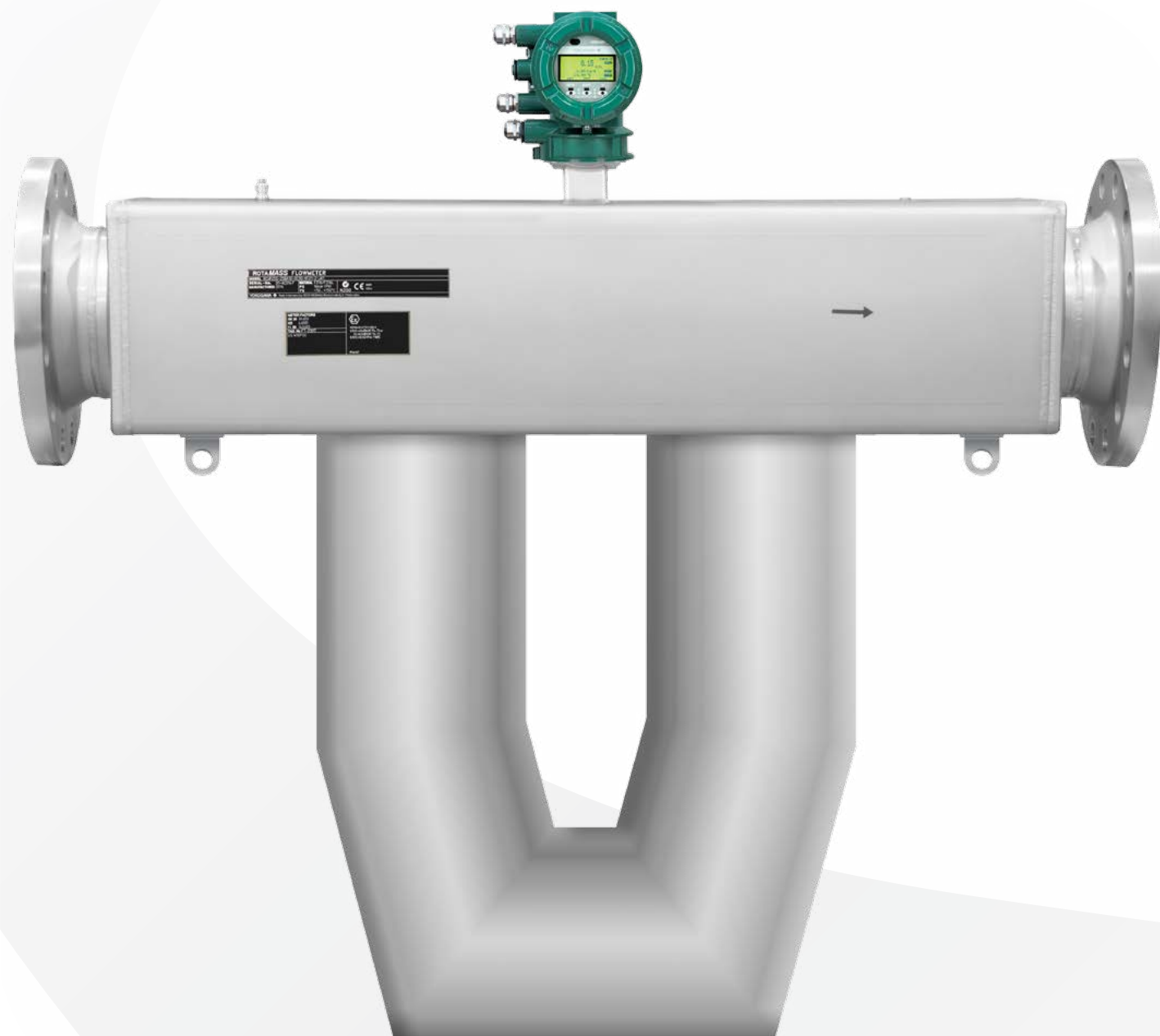
- Multiple configuration sets to support fast changeover in batch production
- Concentration measurement including pre-defined Brix, Vol% and WT% measurement
- Uninterrupted and reliable measurement under extreme aeration condition by “Rotamass Smart Power Management”



Typical 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/cm <sup>3</sup>
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

For more information see overview table on last page

# ROTAMASS giga



## Typical applications

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

## Big in performance

ROTAMASS 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 Line Sizes	
Inches	4", 5", 6", 8"
DN	DN100, DN125, DN150, DN200
Flow Rate Capacities	
Maximum Flow Rate	600 t/h (~ 1322773 lb/h)
Flow & Density Accuracies (up to)	
Mass Flow-Liquid	±0.1%
Mass Flow-Gas	±0.5%
Density-Liquid	±0.002g/cm3
Pressure Rating	
Standard Process Connection	up to PN100, ASME Class 600
Process Temperature	
Min/Max	-200 / +350°C (-328 / 662°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	50 bar ( 725 psi)
Mounting & Ingress Protection Rating	
Integral Remote Type	IP66/67

For more information see overview table on last page

# FieldMate™



## 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

# 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 DTMs per the FDT 1.2/2 standard. FieldMate supports built-in DTM interpreting of existing Device Description (DD) instantaneously for other vendor's devices that do not have DTMs 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

## Fieldmate Main Specification

Available Version	FieldMate and FieldMate Lite
License	Free*
OS	"Windows 8.1 / 8.1 Pro 32bit/64bit Update or later Windows 7 Prof., Home Premium 32bit/64bit SP1 or later"
<b>OS Language</b>	
Communication Protocols **	HART, Foundation Fieldbus H1, Profibus, ISA100.11a, Modbus
Segment Viewer	HART, Foundation Fieldbus H1, Profibus, ISA100.11a, Modbus

## Supported Function

User Management	●
Device Configuration	●
Configuration Wizard	■
Monitoring	●
History Function	●
Field Diagnostic Function (NE107)	●
Reporting Function	●
Database Function	●
PRM Synchronization	●
3rd Party DTM Function***	●

## Supported Function Rotamass TI

Concentration Tool	●
Back-up and Restore	●
Health Check Report Tool	●
Event Management	●
Post Function Activation	●

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

● supported ○ optional ◐ partially supported ■ in preparation

# ROTAMASS Overview Tables

## Sensors

						
<b>Flow Rate Capacities</b>						
Max. Flow Rate	1.5 t/h 3307 lb/h	76 t/h 167551 lb/h	170 t/h 374785 lb/h	50 t/h 110231 lb/h	76 t/h 167551 lb/h	600 t/h 1322773 lb/h
<b>Performances (up to)</b>						
Supported Mass-Flow Accuracy	Liquid	0.1%	0.1%	0.1%	0.1%	0.1%
	Gas	0.5%	0.5%	0.5%	0.5%	0.5%
Flat Spec Accuracy	●	●	●	●	●	●
Supported Density Accuracy	Liquid	0.0005 g/cm <sup>3</sup>	0.0005 g/cm <sup>3</sup>	0.0005 g/cm <sup>3</sup>	0.0005 g/cm <sup>3</sup>	0.002 g/cm <sup>3</sup>
<b>Typical Line Sizes</b>						
Inches	1/4" ... 1 1/2"	3/8" ... 3"	3/8"...5"	1/2" ... 2"	1" ... 3"	4"... 8"
DN	15 ... 40	15 ... 80	15 ... 125	/	25...80	100 ... 200
<b>Pressure Rating (up to)</b>						
Standard Process Connection	285 bar 4183psi	PN100 ASME 600	PN100 ASME 600	ASME 1500	40 bar 580 psi	PN100 ASME 600
<b>Process Temperature</b>						
Standard	-50...+150°C -58...+302°F	-70...+200°C -94...+392°F	-70...+150°C -94...+302°F		-70...+200°C -94...+392°F	-70...+150°C -94...+302°F
Mid/High Temperature	-50...+260°C -58...+500°F		-70...+230°C -94...+446°F			-70...+230°C -94...+446°F
Low Temperature / Cryogenic			0...+350°C -32...+662°F			0...+350°C -32...+662°F
<b>Structural Features</b>						
Wetted Parts Material	316L (1.4404) / alloy C-22 (2.4602)	●				
	316L (1.4404)		●	●	●	●
	Nickel Alloy C-22 (2.4602)			●	●	●
Secondary Containment	●	●	●	●	●	●
Rupture Disk			●	●		●
<b>Mounting (Ingress Protection Rating)</b>						
Remote Type (IP66/67)	●	●	●	●	●	●
Integral Type (IP66/67)		●	●	●	●	●
<b>Capabilities</b>						
Self-Draining	●	●	●	●	●	●
Two-Phase Flow / Entrained gas	●	⊙	●	●	⊙	●
Factory-Fitted Insulation & Heat Tracing	●		●			●
<b>Typical Process Connection Types</b>						
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-clover (tri-clamp) and Mini Clamp					●	

## Transmitters

		
<b>Performances (up to)</b>		
Supported Mass-flow Accuracy	Liquid	0.15%
	Gas	0.50%
Flat Spec Accuracy (extended low flow range)	●	●
Supported Density Accuracy	Liquid	0.004 g/cm <sup>3</sup>
<b>Power Supply</b>		
Universal AC/DC	●	●
<b>LCD Display</b>		
4-Line Dot Matrix Display	●	●
Infrared Switches	●	●
<b>Mounting &amp; (Ingress Protection Rating)</b>		
Integral Type (IP66/67)	●	●
Remote Field-mount (IP66/67)	●	●
<b>Outputs/Inputs</b>		
Analog Out; Puls/ Freq. Out; Status Out	●	●
Status In	●	●
Analog In		●
IrDA Service Port	●	●
<b>Digital Communication</b>		
HART®	●	●
FOUNDATION™ Fieldbus		●
Profibus PA		■
Modbus RTU	■	■
<b>General Functions</b>		
Wizard	●	●
Event Management/NE 107	●	●
Data Mobility (µSD card)	●	●
Features on Demand (FOD)		●
<b>Advanced Diagnostics</b>		
Empty Pipe Detection	●	●
Slug Flow Detection	●	●
Tube Health Check (tube integrity)	○	○
Total Health Check (meter verification)	○	○
<b>Application Functions</b>		
Dynamic Pressure Compensation		●
Reference Density Acc. API standard	●	●
In-line Concentration		●
Net Oil Computing / Water Cut / Gas Void Fraction Acc. API standard		■
Gas Density Measurement		●
Calorific Function		●
<b>Hazardous Area Certifications</b>		
ATEX	●	●
IECEX	●	●
FM (USA & Canada)	●	●
NEPSI	■	■
INMETRO	■	■
Kosha	■	■
EAC	■	■
<b>Safety Integrity Level</b>		
Sensor & Transmitter	SIL2 (SIL3)	SIL2 (SIL3)

● supported ○ optional ⊙ partially supported ■ in preparation

# YOKOGAWA

Co-innovating tomorrow™

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