



## Overview

The KCMF Coriolis Mass Flowmeter by Kanagawa Instruments is a high-performance solution designed for precise and reliable measurement of mass flow, density, and calculated volume flow of liquids and gases across a wide range of industrial applications.

Based on the Coriolis measurement principle, the sensor features dual parallel tubes that are continuously driven at their natural resonance frequency. As fluid passes through the tubes, the resulting Coriolis forces generate a phase shift and slight deformation between the inlet and outlet sections. This phase difference is accurately detected and processed by the transmitter, producing a highly linear output directly proportional to the mass flow rate.

The KCMF series is engineered to deliver exceptional accuracy up to  $\pm 0.05\%$ , maintaining stable performance even under complex flow conditions, varying gas fractions, and demanding process environments. It supports operation across extreme temperatures, making it suitable for applications ranging from cryogenic processes to high-temperature systems.

Designed for versatility, the KCMF flowmeter is compatible with a wide range of process connections and is suitable for industries such as chemical, petrochemical, oil & gas, food & beverage, and pharmaceuticals. It is also widely used in precision dosing, batching, and loading/unloading operations, where measurement accuracy is critical.

The device supports multiple communication outputs including 4–20 mA, HART<sup>®</sup>, Modbus, Profibus and industrial Ethernet protocols, ensuring seamless integration into modern control systems.

Manufactured in compliance with international standards, the KCMF series meets key safety and performance requirements, including SIL 2/3 functional safety and explosion-proof certifications (IECEx / ATEX based on IEC 60079 standards), ensuring reliable operation in hazardous environments.

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## Features

Product features and available options may vary depending on the device configuration. Please contact Kanagawa Instruments to confirm compatibility with your specific requirements.

Wide nominal diameter range from DN 3 to DN 300, suitable for diverse industrial applications

Multiple design configurations:

Compact type for standard conditions

Remote type for flexible installation

High-temperature design up to +400 °C

Cryogenic design down to -200 °C

Various sensor geometries, including U-type, micro-bent, triangular, and super-bent designs for optimized performance across applications

DSP-based transmitter, ensuring fast, stable, and fully digital signal processing

Reliable operation in hazardous environments with Ex ib IIC T3–T6 explosion protection

Flexible power supply options: 24 V DC or 220 V AC

Industrial communication via RS485 or HART protocols

Combined pulse and 4–20 mA signal outputs for easy integration with control systems

High-pressure capability up to 250 bar

Measurement accuracy options of  $\pm 0.1\%$ ,  $\pm 0.2\%$ , and  $\pm 0.5\%$ , depending on configuration

Robust enclosure with IP65 to IP67 protection rating, suitable for harsh environments

Certified in accordance with CE, ATEX, IECEx, NEPSI, and ISO standards

Suitable for measuring mass flow, density, and calculated volume flow of liquids and gases

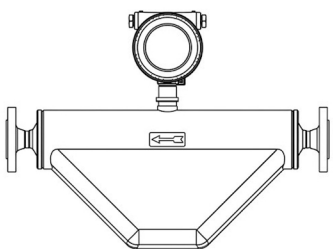
Adaptable to a wide range of industries, including oil & gas, chemical, energy, and general process applications

## Main Parameters

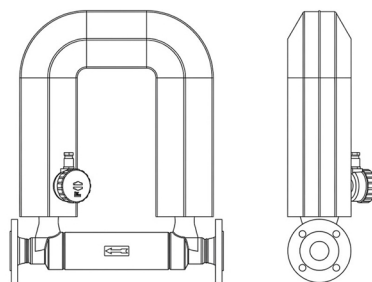
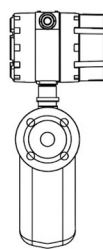
Model	Diameter (mm)	Max.flow (kg/h)	Max.working pressure (MPa)	Accuracy grade	Zero stability (kg/h)
KCMF.003	3	360	4	0.1,0.15, 0.2	0.012
KCMF.006	6	1200	4	0.1,0.15, 0.2	0.04
KCMF.015.L	15	3000	4/25	0.1,0.15, 0.2	0.12
KCMF.015.H	15	4200	4/25	0.1,0.15, 0.2	0.19
KCMF.020	20	7200	4/25	0.1,0.15, 0.2	0.36
KCMF.025	25	12000	4	0.1,0.15, 0.2	0.62
KCMF.040	40	30000	4	0.1,0.15, 0.2	1.6
KCMF.050	50	60000	4	0.1,0.15, 0.2	2.38
KCMF.080	80	180000	4	0.1,0.15, 0.2	7.05
KCMF.100	100	260000	4	0.1,0.15, 0.2	12.0
KCMF.150	150	480000	4	0.1,0.15, 0.2	50.0

For sizes larger than DN150, please contact the manufacturer

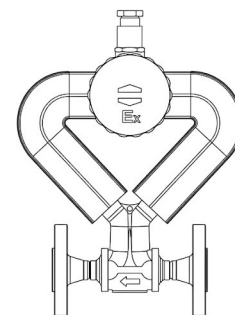
## Physical Structure & Design Overview



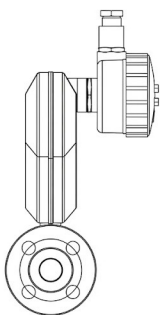
Trapezoidal-Tube



U-Tube



Delta -Tube



## Specifications of Trapezoidal Type

### Technical Characteristics

**Trapezoidal Geometry:** The internal flow tubes are bent into a trapezoidal or "truncated triangle" shape. This creates a distinct flat bottom section where the sensors and drivers are typically mounted.

**Dual-Tube Oscillator:** Like most high-precision Coriolis meters, it uses two parallel tubes vibrating in opposition to cancel out external environmental noise.

**Integrated Transmitter:** The device features a top-mounted digital transmitter with a local display for real-time monitoring of mass flow, density, and temperature.

### Design Advantages

**Structural Rigidity:** The trapezoidal shape is inherently more rigid than a large, rounded U-tube. This helps maintain a stable resonant frequency and reduces the impact of secondary vibrations.

**High Dynamic Sensitivity:** The flat section at the base of the trapezoid provides a stable "lever arm" for the Coriolis force. This design yields high precision even when measuring fluids with fluctuating densities or low flow velocities.

**Compact Vertical Profile:** It offers a shorter vertical height compared to traditional U-type meters, making it easier to integrate into skid-mounted systems or areas with limited overhead clearance.

**Excellent Thermal Stability:** The geometric symmetry of the trapezoid allows the tubes to expand and contract uniformly under temperature stress, minimizing zero-point drift in high-temperature applications.

### Summary Table for Datasheets

Feature	Advantage
High Precision	Exceptional accuracy for mass flow, density, and temperature.
Mechanical Stability	Rigid design offers better immunity to pipe vibrations.
Compact Installation	Reduced vertical footprint for easier system integration.
Optimized Signal	High signal-to-noise ratio for reliable low-flow measurement.

## Specifications of U Type

### Technical Characteristics

**U-Shaped Geometry:** The sensor contains one or two parallel tubes bent into a "U" shape. The flow is diverted through these bends, where the Coriolis forces are most pronounced.

**Low-Frequency Oscillation:** Due to the larger mass and shape of the U-tubes, they typically operate at a lower resonant frequency compared to straight-tube or delta designs.

**Dual-Tube Configuration:** Most U-type meters utilize a split-flow design where the fluid passes through two tubes simultaneously to increase sensitivity and cancel out external vibration noise.

### Design Advantages

**Maximum Sensitivity:** The wide "U" shape provides a larger surface area and a longer lever arm for the Coriolis force to act upon. This results in an extremely high signal-to-noise ratio, making it ideal for very low flow rate applications.

**High Turndown Ratio:** Because of its high sensitivity, this design can maintain accuracy over a very wide range of flow rates (often 100:1 or better).

**Thermal Expansion Tolerance:** The curved shape naturally accommodates the mechanical stress caused by extreme temperature fluctuations (thermal expansion or contraction) without damaging the sensor or affecting calibration.

**Durability in Harsh Fluids:** U-type meters are often built with thicker walls, providing better resistance to high-pressure environments and abrasive fluids compared to more compact geometries.

### Summary Table for Datasheets

Feature	Advantage
High Precision	Exceptional accuracy for mass flow, density, and temperature.
Rangeability	Maintains performance across a wide flow spectrum.
Stability	Less affected by fluid-induced vibrations or external stress.
Versatility	Suitable for a broad range of industrial liquids and gases.

## Specifications of Delta Type

### Technical Characteristics

**Triangular (Delta) Geometry:** The sensor splits the flow into two streams that follow a triangular or "V" shaped path. The tubes form a loop that maximizes Coriolis force at the apex (the tip of the triangle).

**High-Frequency Oscillation:** Due to the rigid and compact structure of the delta loop, these meters typically operate at a higher resonant frequency compared to U-type sensors.

**Streamlined Design:** This configuration achieves the necessary tube length for precise measurement within a smaller, vertically optimized footprint.

### Design Advantages

**Optimized for Hygienic Applications (Self-Draining):** The angled "V" structure facilitates complete fluid drainage when mounted vertically, preventing residue buildup and bacterial growth. This makes it ideal for the food, beverage, and pharmaceutical industries.

**Enhanced Sensitivity:** The specialized geometry amplifies the Coriolis force effect at the point of measurement, leading to excellent accuracy, even for very small flow volumes and low flow velocities.

**Lower Pressure Drop:** The delta path is often more streamlined than the sharper bends found in some U-tube or curved straight-tube designs, which can result in a smaller pressure drop across the meter.

**Better Vibration Immunity:** The rigid nature of the delta loop makes the sensor less susceptible to external pipe vibrations, enhancing signal stability.

### Summary Table for Datasheets

Feature	Advantage
Self-Draining Design	Optimal for food, beverage, and pharma (hygienic) applications.
Compact Size	Ideal for installation in tight spaces where large U-tubes are not feasible.
Low Pressure	Loss More efficient fluid transport and lower operational costs.
High Precision	Exceptional accuracy for mass flow, density, and temperature.

## Warranty Terms & Conditions:

Kanagawa Instruments provides a standard 24-month (2-year) warranty from the date printed on the device nameplate. During this period, technical support and spare parts are provided free of charge for meters operated in accordance with the user manual. Kanagawa remains committed to providing life-long maintenance services beyond the initial warranty period.

## Warranty Exclusions

The following cases are not covered by this limited warranty and any associated costs shall be at the buyer's expense:

Inadequate maintenance or normal wear and tear (especially cables).

Unsuitable power sources or adverse environmental conditions.

Accidents, misuse, improper installation, or unauthorized modification/repair.

Use of unauthorized replacement parts or improper storage and handling.

## Important Provisions

**Service Costs:** Unless pre-authorized in writing by Kanagawa, all costs related to dismantling, reinstallation, freight, and site travel expenses for diagnosis shall be borne by the buyer.

**Repaired Goods:** Parts replaced or repaired during the warranty period are warranted for the remainder of the original period or 90 days, whichever is longer.

**Exclusivity:** This limited warranty is the sole warranty provided by Kanagawa and supersedes all other representations, express or implied, including merchantability or fitness for a particular purpose.