

# General Specifications

## ROTAMASS Compact Coriolis Mass Flowmeter

Compact-ROTAMASS refers to the integrally mounted digital signal processing electronics mounted in a flameproof metal converter case suitable for use in hazardous areas.

Combined with the detectors unique decoupled measuring system, providing virtual immunity to external plant vibration and mechanical loading through pipe stress, the highly refined signal processing electronics provide, accurate and stable mass flow measurement under real process conditions.

### FEATURES

Integral Mass flow meter for nearly all flowing liquids, including high viscosities, slurries and multi phase flow.

- Refined digital signal processing enables accurate and stable measurement.
- A special detector decoupling system makes the device highly independent from external loads or vibrations.
- Simple flow path means self-draining, sanitary and simple to clean.
- High accuracy and high stability over a wide range : 0.05% of nominal flow.
- Accurate density measurement, up to +/-1g/l.
- Two analog outputs, one pulse output, one status-out and one status-in as standard I/O.
- Offers Explosion Proof.
- Microprocessor-based multifunction capability.
- EEPROM protects parameter settings and totalized values during power failure of any duration.
- High visibly Backlighted LCD display.
- BRAIN communication function.
- Several tube materials available.
- DIN or ANSI as standard flanges.
- Other process connections on request.
- Remote mounted electronics on request

### PRINCIPLE OF MEASUREMENT

Mass flow measurement according to the Coriolis principle. Almost all flowing materials including multiphase fluids, high viscosity liquids (pastes and slurries) and liquid with a certain content of gas. For difficult fluids (e.g. abrasive or highly corrosive fluids) and gases please contact your Yokogawa representative.

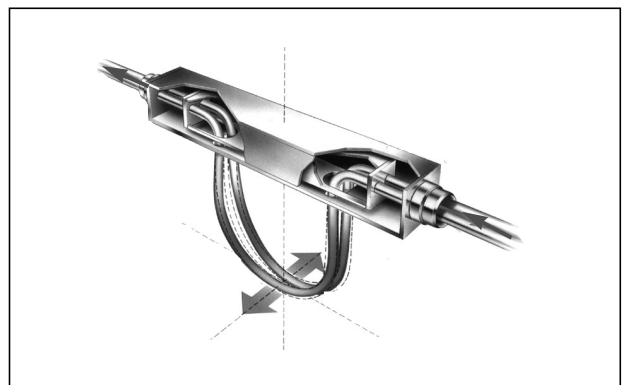


Fig. 1. Principle of measurement

## STANDARD SPECIFICATIONS

**Model** : RCCT 24 to 29

**Fluid to be measured:** Liquid

**Measurement items** : Mass flow, density, temperature (and calculation of volume flow)

### Mass flow measurement

**Measuring range** : refer to table 1.

**Table 1.**

		RCCT24	RCCT26	RCCT28	RCCT29
$Q_{max}$	t/h	3	15	50	120
$Q_{nom}$	t/h	1.6	6	20	60
QF.S. <sub>min</sub>	kg/h	80	300	1000	3000

$Q_{nom}$  is the water flow rate at about 0.5 bar pressure drop.

QF.S.<sub>min</sub> is the minimum settable flow span

### Accuracy

- RCCT24 to 29 : 0.05 %  $Q_{nom}$  (pulse output)

### Density measurement

**Measuring range** : 0.3 to 2.5 kg/l

### Accuracy

- RCCT24 :  $\pm 3$  g/l  
 - RCCT26 :  $\pm 2.2$  g/l  
 - RCCT28, 29 :  $\pm 1.5$  g/l  
 - Optional :  $\pm 1$  g/l (with special calibration)

### Temperature measurement

**Measuring range** : -200 to 230 °C

**Accuracy** :  $\pm 1$  °C,  $\pm 0.5$  % of reading

### Process temperature range

- Standard : -40 to +120 °C  
 - Ex version : Refer to table 2. For max. temp. please do not cover the converter cone with insulating material.

### Process pressure limits

: 0 to 40 bar (higher pressure on request)

### Ambient temperature limits

: -20 to 50 °C (for standard and Ex version)

**Table 2. Temperature classification of Ex version (integral type)**

Temp. class	Ambient temp.	Process temperature
T6	$\leq 50$ °C	$\leq 65$ °C
T5	$\leq 50$ °C	$\leq 80$ °C
T4	$\leq 50$ °C	$\leq 115$ °C
T3	$\leq 50$ °C	$\leq 120$ °C

### Ambient humidity limits

: 5 to 95 % R.H. non condensing

### Pressure loss

: Pressure loss depends on velocity, viscosity and density of the fluid. For newtonian fluids the pressure loss is shown in table 3 and figures 2 to 6.

**Table 3. Pressure loss (water at 20°C)**

Press. loss		RCCT24	RCCT26	RCCT28	RCCT29
at $Q_{max}$	bar	1.82	3.1	3.75	2.4
at $Q_{nom}$	bar	0.52	0.5	0.6	0.6

**Gas content limits** : Refer to table 4

**Table 4. Limit of gas content**

		RCCT24	RCCT26	RCCT28	RCCT29
Gas content	Vol. %	< 12	< 2.5	< 1.5	< 1

### NOTES:

1. With liquid/gas mixtures the specified accuracy will not be achieved
2. Under Ex-condition gas bubbles should be avoided.

### Power supply and power consumption

: 90 to 264 V AC, 47 to 63 Hz, 22 VA, 9 W  
 or 21.6 to 26.4 V DC, 9 W  
 For Ex version 250 V AC max.

### I/O signal

- Two current outputs : 4 to 20mA DC , galvanically separated from other signals, not galvanically separated between two current outputs. (Load resistance : 0 to 750 Ohm)
- Pulse Output : Transistor contact output  
Output Rate: 0.0001 to 1000 p/s  
(Contact rating : 30V DC, 200mA)
- Status Output : Transistor contact output  
(Contact rating : 30V DC, 200mA)
- Status Input : Voltage-free contact  
(Close:  $\leq 200$  Ohm.,  
Open:  $\geq 100$  kOhm.)

### Digital communication

- : BRAIN communication signal, superimposed on a 4 -20 mA DC signal ( $I_{out 1}$ )
- Load resistance : 250 - 600 Ohm (including cable)
- Load capacitance :  $\leq 0.22$   $\mu$ F
- Load inductance :  $\leq 0.33$  mH
- Power line spacing : 15 cm or more, avoid parallel wiring
- Instrument impedance for receiving the signal : 10 kOhm or more at 2.4 kHz
- Cable length :  $\leq 2$  km when „CEV“ cables are used

### Span setting functions

: Parameter setting is possible by setting the switches on the display or with the BRAIN hand-held terminal

**Display functions** : Instantaneous flow rate, density, temperature or totalized flow can be displayed

**Damping functions** : Settable from 0.4 seconds (63 % response time) to 200 seconds

### Zero adjustment function

: Zero point can be adjusted automatically either by setting the switches on display or with the BRAIN hand-held terminal or with status input when the fluid is stationary.

**Data security during power failure**

: Data storage by EEPROM, no back-up battery required.

**Explosion proof**

: CENELEC EExde [ib] IIC T6..T3 and CENELEC EExd [ib] IIC T6..T3

**Protection class**

: IP67

**Materials**

- Detector housing: SS 1.4301 (304)
- Converter housing
  - : Aluminium alloy with Polyurethane corrosion-resistant coating

**Materials of wetted parts**

- Measuring tubes: SS 1.4404 (316L) or Hastelloy C
- Process connections
  - : SS 1.4404 (316L)/1.4571 (316Ti) or Hastelloy C

**Coating colour**

- Converter/terminal box case
  - : Frosty white
- Converter/terminal box cover
  - : Deep sea moss green

**Calibration**

: The ROTAMASS Flowmeters are factory-calibrated with water.

**Condition**

- Water : 22.5 °C, ±12.5 °C
- Ambient temp. : 22.5 °C, ±12.5 °C
- Pressure : 1 - 1.5 bar
- Density : Density calibration with specific customer-supplied fluids on request.

**NOTE:**

- Figures 2 to 6 show the pressure loss for newtonian fluids. Please inquire pressure losses for non-newtonian fluids from your Yokogawa representative.
- The pressure losses are valid for stationary flows. Pulsating flow causes a considerably higher pressure loss on average.
- For all fluids with flow as basis, please proceed as follows:
  - a. Determine the pressure loss from the figures. Read the pressure loss for the given mass flow and viscosity on the ordinate. For pastes and slurries (thixotrope liquids), the pressure loss is often 2 - 4 times lower than the given value.
  - b. Determine measuring uncertainty from fig. 6. Take the preferred flow and the sensor type, find the corresponding point in the error curve and read the uncertainty on the ordinate.
- Evaluation :
  - a. If the pressure loss calculated is too high, take the larger size detector at reduced accuracy.
  - b. If the accuracy is too low, take the smaller size detector at enhanced pressure loss.

**Insulation resistance of converter\***

- between power and ground terminal : 100M $\Omega$ /500 V DC
- between power and I/O terminals : 20 M $\Omega$ /100 V DC
- between I/O terminals and ground : 20 M $\Omega$ /100 V DC

**Dielectric strength\***

- between power and ground terminal : 1,500 V AC for 1 min.

\* When remove Surge Arrestors

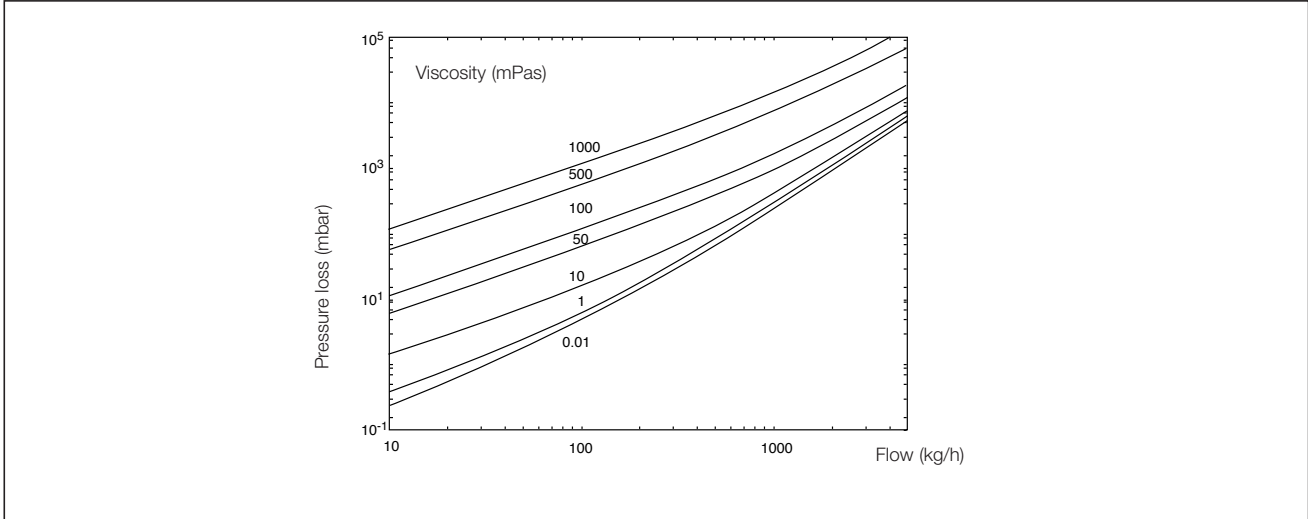


Fig. 2. Pressure loss RCCT24

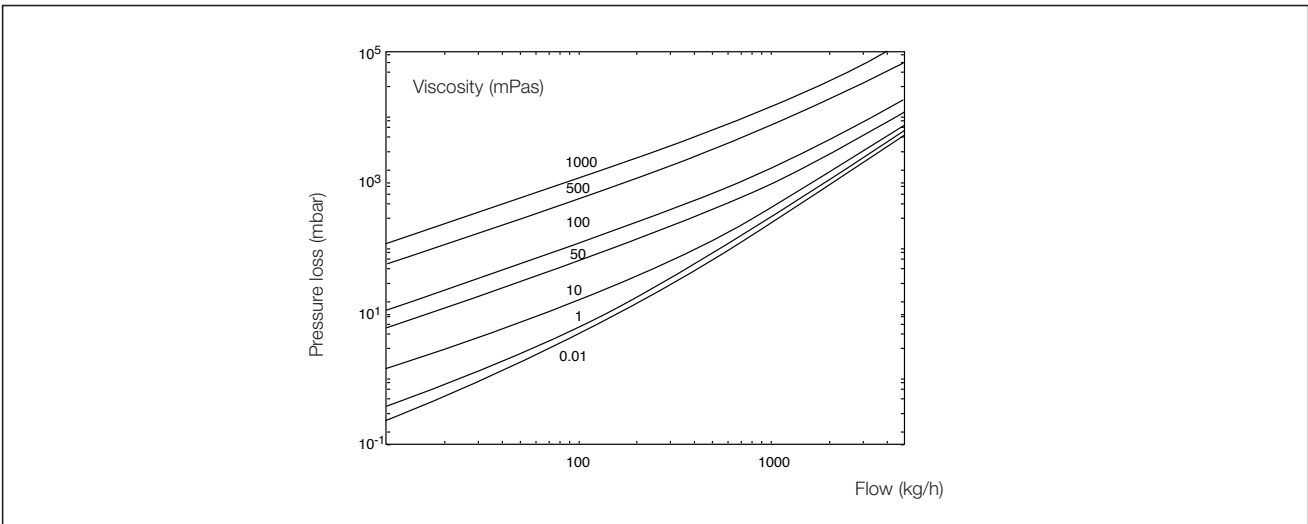


Fig. 3. Pressure loss RCCT26

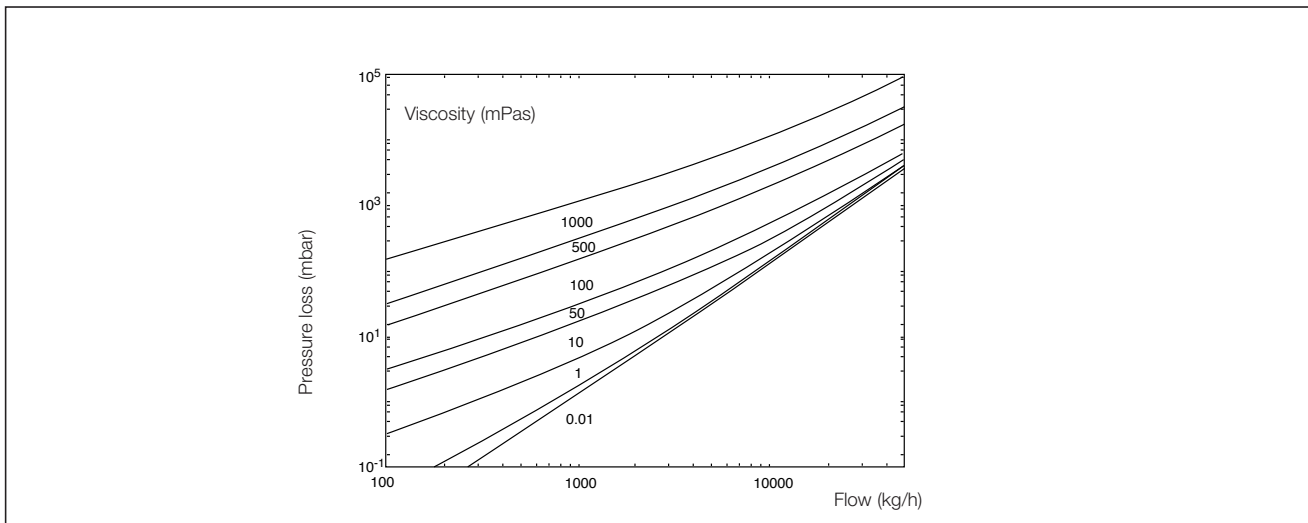


Fig. 4. Pressure loss RCCT28

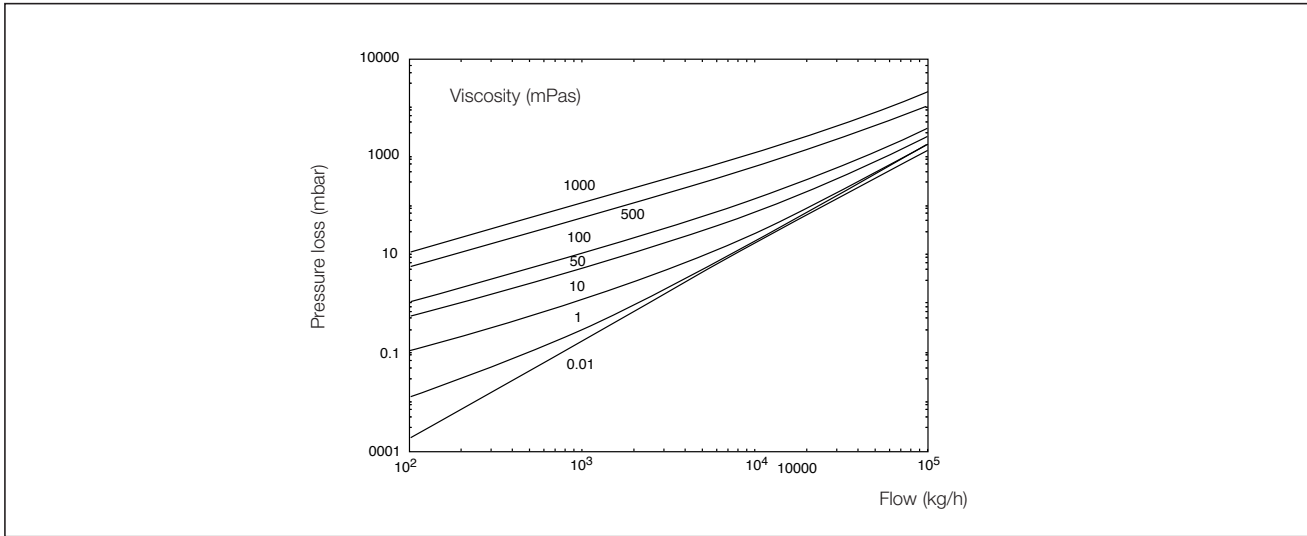


Fig. 5. Pressure loss RCCT29

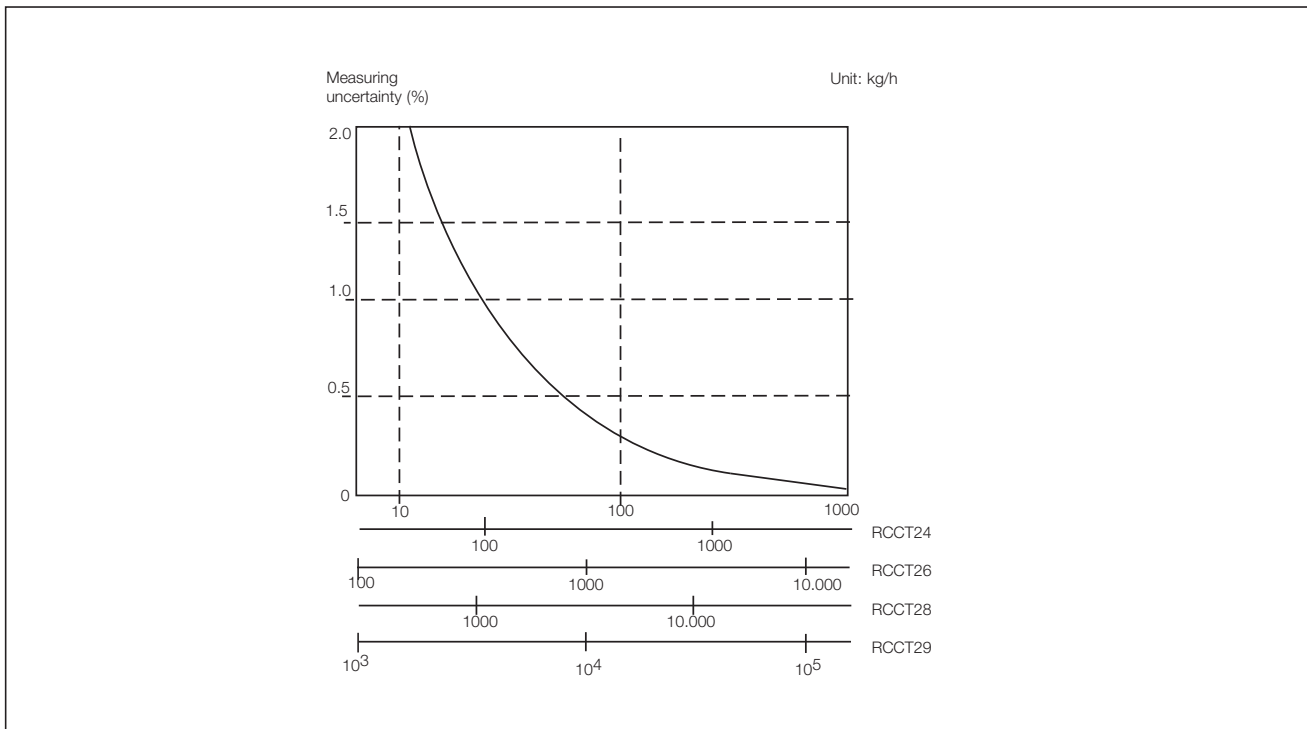


Fig. 6. Measuring uncertainty

## MODEL AND SUFFIX CODES

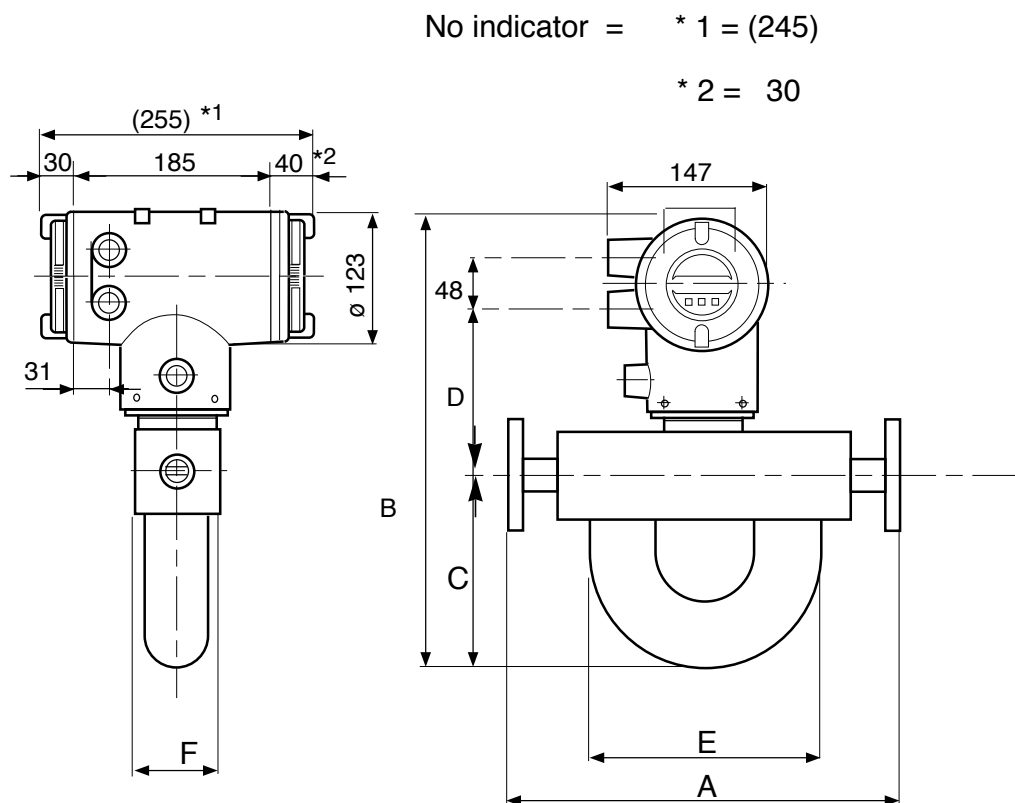
Model	Suffix code	Option code	Description
RCCT24			Nominal value: 1.6 t/h = 26.7 kg/min
RCCT26			Nominal value: 6 t/h = 100 kg/min
RCCT28			Nominal value: 20 t/h = 333 kg/min
RCCT29			Nominal value: 60 t/h = 1000 kg/min
Explosion proof	-G ..... -X .....		Not explosion proof CENELEC EExde (ib) IIC T6 .. T3 CENELEC EExd (ib) IIC T6 .. T3
Power supply	A ..... D .....		100 - 240 V AC 24 V DC
Indicator direction	H ..... V ..... N .....		Detector installation horizontal Detector installation vertical Without indicator
Cable conduit connection	D ..... A .....		DIN PG 13.5 ANSI 1/2 NPT
Process connection size	01 ..... 02 ..... 04 ..... 05 ..... 06 ..... 08 ..... 10 ..... 12 .....		DN15, 1/2" DN25, 1" DN40, 1 1/2" DN50, 2" DN65, 2 1/2" DN80, 3" DN100, 4" DN125, 5"
Process connection rating and style	A1 ..... A2 ..... D4 ..... S2 ..... S4 ..... S8 .....		ANSI flange 150 lbs ANSI flange 300 lbs DIN flange PN40 Screwing DIN 11851 Tri-Clamp, DIN inside diameter Tri-Clamp, ANSI inside diameter
Material of wetted parts	SG ..... HC .....		316L (1.4404) / 316Ti (1.4571) HASTELLOY C
Style	*A .....		Style A
Options			
Tag number		/BG .....	With Tag number
Special calibration		/K1 .....	Massflow: customer specified full scale value
		/K2 .....	Massflow: customer specified measuring points
		/K3 .....	Density: with several liquids 0.7 < p < 1.3 kg/l
		/K4 .....	Density: with customer specified liquid
		/K5 .....	Massflow: with DKD certificate
Certificates		/P2 .....	with compliance of the order: '2.1' EN 10204 (DIN 50 049)
		/P4 .....	Test report: '2.2' EN 10204 (DIN 50049)
		/P6 .....	Inspection certificate: '3.1B' EN 10204 (DIN 50549)
Housing pressure test		/J1 .....	Pressure proof housing: 40 bar (RCCT24, 26), 25 bar (RCCT28), 10 bar (RCCT29)
Special order		/Z .....	Special design must be specified in an extra text

## SELECTION TABLE PROCESS CONNECTION

Size		-01	-02	-04	-05	-06	-08	-10	-12
		DN15, 1/2"	DN25, 1"	DN40, 1 1/2"	DN50, 2"	DN65, 2 1/2"	DN80, 3"	DN100, 4"	DN125, 5"
RCCT24	Material	A1,A2,D4 SG	A1,A2,D4 SG, HC S2, S4, S8 SG						
	Material								
RCCT26	Material		A1,A2,D4 SG	A1,A2,D4 SG, HC S2, S4, S8 SG	A1,A2,D4 SG, HC				
	Material								
RCCT28	Material			D4 SG	A1,A2,D4 SG, HC S2, S4, S8 SG	A1,A2 SG, HC	A1, A2, D4 SG, HC		
	Material								
RCCT29	Material						A1,A2,D4 SG	A1,A2,D4 SG	A1,A2 SG
	Material							S2, S4, S8 SG	

## WEIGHT AND DIMENSIONS

Unit: mm



Type	A	B	C	D	E	F	Weight
RCCT24	370	430	180	160	220	80	13
RCCT26	500	480	240	160	270	80	17
RCCT28	600	520	270	170	270	100	26
RCCT29	1000	700	440	180	380	120	64

Dimensions in mm  
Weight in kg

## Installation length (dimension A) for process connections S2, S4 and S8

Type	S2	S4	S8
RCCT24	408	385	385
RCCT26	540	520	530
RCCT28	625	610	600
RCCT29	1050	1020	1020

Dimensions in mm

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