

General Specifications

ROTAMASS 3- Series Coriolis Mass Flowmeter FOUNDATION Fieldbus Communication Type

Addendum to GS 01R04B04

Fieldbus is the digital communication line for field instruments, whose signal is internationally standardized by the Fieldbus Foundation.

The fieldbus bi-directional digital communication performance makes it possible for field instruments and the control devices to constitute a complete on-line system, superseding the existing analog transmission lines. Also, the precise transmission of various process data including the PV and MV of the field instruments is well established by the fieldbus multi-sensing function. Thus, based on FOUNDATION fieldbus specifications, RCCT3 Fieldbus models offer more flexible instrumentation through a greater level communication capability as well as cost reduction by multi-drop wiring with fewer cables.

FEATURES

- **Interoperability**

FOUNDATION Fieldbus specifications ensures interoperability of the field instruments without the requirement for designated software for the instrument.

- **Reduction of instrumentation cost**

The multi-drop wiring on the Fieldbus communication line contributes to the reduction of wiring costs.

- **6 Analog Input function blocks**

RCCT3 Fieldbus model has 4 independent AI function blocks for mass flow, volume flow, density and temperature calculation.
2 AI function blocks for concentration measurement and net flow calculation are available as option.

- **2 Integrator function blocks**

RCCT3 Fieldbus model has 2 independent IT function blocks for mass, volume or net totalization.

- **Alarm function**

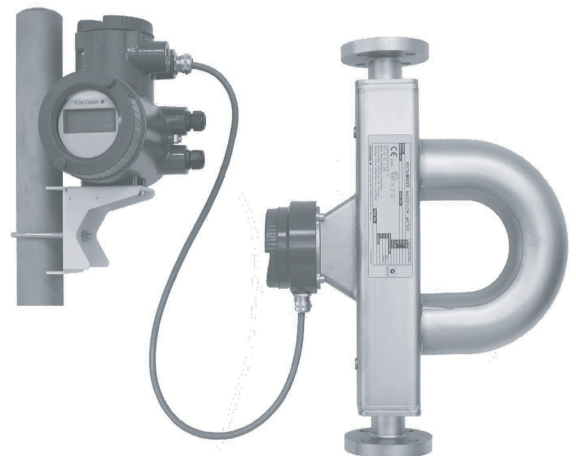
RCCT3 Fieldbus model securely support various alarm functions, such as high/low alarm, notice of block error, etc. based on FOUNDATION Fieldbus specification.

- **Self-diagnostic function**

The reliable self-diagnostic function detects the measuring range failure, hardware failure, or parameter range violation.

- **Link Master function**

RCCT3 fieldbus models support the Link Master function. This function enables backup of network manager and local control only by field devices.



OPTIONS

- **PID function block**

PID function block (proportional-integral-derivative) enables field devices to control processes.

- **Software download function**

The software download enables the update of communication software during operational conditions.

STANDARD SPECIFICATION

For items other than those described below, refer to each General Specification sheet.

Applicable Model :

- Integral type: RCCT3x series
- Remote type: RCCF31 + RCCS3x series

Output Signal :

- Digital communication signal based on FOUNDATION Fieldbus protocol.

Supply Voltage of Communication Line :

- 9V to 32V DC for general purpose and flame-proof (/KF3) type
- 9V to 24V DC for intrinsic safe FF-output type (Entity model)
- 9V to 17.5V DC for intrinsic safe FF-output type (FISCO model)

Condition of Communication Line :

- Supply voltage: 9 to 32V DC
- Current draw: 15.0 mA (max)

Power Supply Performance Effect :

- No effect (within the supply voltage of 9 to 32V DC)

Functional Specifications :

- Functional specifications for Fieldbus communication conform to the standard specification (H1) of FOUNDATION Fieldbus.

Function Block :

- Four AI function blocks:
AI 1 monitors the mass flowrate
AI 2 monitors the volume flowrate
AI 3 monitors the density
AI 4 monitors the temperature
- Two AI function blocks (option /Cxx):
AI 5 monitors the measured concentration
AI 6 monitors the net flowrate
- One PID block (for a model with /LC1 option)
- Two IT function blocks (Integrator):
IT 1 totalized mass-, volume- or net flowrate
IT 2 totalized mass-, volume- or net flowrate

Update Period :

- Mass flow value: 100 ms
- Density, temperature: 100 ms

Function Block Execution Time

Block name	Number	Execution time	Note
AI	6	< 30 ms	For Mass flow, Volume flow, Density, Temperature, Concentration measurement, Net flow
PID	1	< 50 ms	Applicable when option /LC1 is selected.
IT	2	< 30 ms	For Mass total, Volume total, Net total

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Link Master function :

- Link Master (LM) function is supported.
See 'Settings when shipped' and 'Ordering information'.

HAZARDOUS AREA SPECIFICATION

ATEX APPROVAL

Remote converter RCCF31 (option /KF3) :

- KEMA 02ATEX 2183 X
- Flame proof with intrinsic safe connection to detector (ib)
- EEx d(e) [ib] IIC T6
- Group II, Category 2 GD
- Max. surface temperature for dust application : 70°C

Remote converter RCCF31 (option /KF4) :

- KEMA 02ATEX 2183 X
- Flame proof with intrinsic safe connection to detector (ib) and intrinsic safe output (Foundation Fieldbus) (ia).
- EEx d(e) [ia] [ib] IIB/IIC T6
- Group II, Category 2 GD
- Max. surface temperature for dust application : 70°C

Integral type RCCT34 .. 39 (option /KF3) :

- KEMA 02ATEX 2183 X
- Flame proof with intrinsic safe connection to detector (ib)
- EEx d(e) [ib] IIC T6...T3
- Group II, Category 2 GD
- Max. surface temperature for dust application : 150°C

Integral type RCCT34 .. 39 (option /KF4) :

- KEMA 02ATEX 2183 X
- Flame proof with intrinsic safe connection to detector (ib) and intrinsic safe output (Foundation Fieldbus) (ia).
- EEx d(e) [ia] [ib] IIB/IIC T6...T3
- Group II, Category 2 GD
- Max. surface temperature for dust application : 150°C

Electrical data Remote converter RCCF31 / RCCT3x :

- - Foundation Fieldbus output /KF4 :

FISCO model:

EEx [ia] IIC: $U_i = 17.5 \text{ V}$; $I_i = 380 \text{ mA}$; $P_i = 5.32 \text{ W}$
 $L_i = 1.6 \text{ } \mu\text{H}$; $C_i = 2.7 \text{ nF}$

EEx [ia] IIB: $U_i = 17.5 \text{ V}$; $I_i = 460 \text{ mA}$; $P_i = 5.32 \text{ W}$
 $L_i = 1.6 \text{ } \mu\text{H}$; $C_i = 2.7 \text{ nF}$

Entity model:

EEx [ja] IIC: $U_i = 24 \text{ V}$; $I_i = 250 \text{ mA}$; $P_i = 1.2 \text{ W}$
 $L_i = 1.6 \text{ } \mu\text{H}$; $C_i = 2.7 \text{ nF}$

Settings When Shipped

Item	Settings			
Tag number (Tag plate, Option /BG)	As specified in order. *1			
Software tag (PD_TAG)	Set to "FT1004" by default unless otherwise specified when ordered. *2			
Node address	Set to 0xF6 (246) by default unless otherwise specified when ordered.			
Operation Functional Class	Set to 'BASIC' unless otherwise specified when ordered .			
Analog Input Function Block	AI 1 MassFlow	AI 2 Volume Flow	AI 3 Density	AI 4 Temperature
Upper and lower operating range limits and unit (XD_SCALE)	The upper range limit will be set to the mass flow rate range specified on the order sheet (PS), or to 0 to 100<unit> range when the order sheet is not supplied.	The upper range limit will be set to the volume flow rate range specified on the order sheet (PS) or to 0 to 100<unit> range when the order sheet is not supplied.	The upper range limit will be set to the density range specified on the order sheet (PS) or to 0 to 100kg/l range when the order sheet is not supplied.	The upper range limit will be set to the temperature range specified on the order sheet (PS) or to 0 to 100°C range when the order sheet is not supplied
Upper and lower output range limits and unit (OUT_SCALE)				
Damping time constant	3 sec	3 sec	15 sec	15 sec
Analog Input Function Block (Option)	AI5 Concentration Measurement		AI 6 Net Flow	
Upper and lower operating range limits and unit (XD_SCALE)	The upper range limit will be set to the concentration measure range specified on the order sheet (PS), or to 0 to 100<unit> range when the order sheet is not suppliedd The unit depends on the selected concentration.		The upper range limit will be set to the net flow rate range specified on the order sheet (PS), or to 0 to 100<unit> range when the order sheet is not supplied.	
Upper and lower output range limits and unit (OUT_SCALE)				
Damping time constant	10 sec		3 sec	
Output mode (L-TYPE)	'Direct' for all AI blocks unless otherwise specified when ordered.			

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*1: Specified Tag Number is engraved on the stainless steel plate: Up to 16 letters using any of alphanumerics and symbols of [-], [.] and [/].

*2: Specified Software Tag is entered in the amplifier memory: Up to 32 letters using any of alphanumerics and symbols of [-], [.] and [/].

Explanation of parameters listed above:

- (1) XD_SCALE: Defines the input values from the transducer block (input range of sensor) corresponding to 0% and 100% values in the calculation inside the AI function block.
For the RCCT3/RCCF31 the values set as the mass flow span, volume flow span, density span and temperature span are stored in this parameter.
Optional concentration span and net flow span can be set in this parameter.
- (2) OUT_SCALE: Output scaling parameter. Defines the output values corresponding to 0% and 100% values in the calculation inside the AI function blocks.
- (3) CAL_UNIT: The unit of calibration by sensor. This is used as the unit of XD_SCALE of mass flow rate.
- (4) L_TYPE: Determines if the values passed by the transducer block to the AI block may be used directly (Direct) or if the value is in different units and must be converted linearly (Indirect Linear) using the input range defined by XD_SCALE and the associated output range (OUT_SCALE).

Additional Model Code for RCCF31 + RCCT3x with FF-communication

Model	Suffix Code	Option Code	Description
RCCF31- RCCT3x-	----- -----		Remote converter to be combined with detector RCCS3x Integral flowmeter
Options (see also GS 01R04B04) : FOUNDATION Fieldbus		/FB	Output signal according FOUNDATION Fieldbus H1 specification
Options (ONLY allowed in combination with /FB) :			
PID Function		/LC1	Provides a PID control function block
Software Download Function		/EE	Provides software download capability (Based on spec FF-883, download class: Class 1)
ATEX Approval		/KF3	ATEX flame proof converter (+ intrinsic safe detector connection) (See page 2)
ATEX Approval		/KF4	ATEX flame proof converter (+ intrinsic safe detector connection + intrinsic safe FF output) (See page 2)

Options (NOT allowed in combination with /FB) :

Active Pulse Output	/AP	One active pulse output (not with /KF2)
NAMUR Switch	/NM	One pulse output according EN50277 (NAMUR)
Analogue Alarm Levels	/NA	Analog output alarm levels 2.4mA or 21.6mA (Standard is acc. NAMUR rec. 43)
ATEX Approval	/KF1	ATEX flame proof converter (+ intrinsic safe detector connection)
ATEX Approval	/KF2	ATEX flame proof converter (+ intrinsic safe detector connection + intrinsic safe outputs)

Ordering Information

1. Model, suffix codes, and optional codes
2. Option /PS
 - Operating range (XD_SCALE)
 - Units of operating range (XD_SCALE)
 - Output mode (L_TYPE) ; Select 'Direct' or 'Indirect Linear'.
 - Output scale and units (OUT_SCALE)
 - Software Tag (PD Tag)
 - Node address
 - Operation Functional Class ; Select 'Basic' or 'Link Master'.
3. Option /BG
 - Tag Number (for tag plate)

Related Instruments

The customer should prepare instrument maintenance tool, terminator, fieldbus power supply etc.

Safety barrier for version with intrinsically safe FF-output (option /KF4)

See web page www.yokogawa.com/fbs/interoperability/fbs-accessories-en.htm

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