MFC 300 Technical Datasheet

Coriolis Mass Flow Converter

- Modular family of converters for all applications
- Industry standard outputs including NAMUR etc.
- Common hardware for all housings
- Stainless steel housings for offshore and Food & Beverage applications
- Dual redundancy of calibration data
- Advanced diagnostics with software tools

KROHNE

The high-performance solution

The **MFC 300** is a universal coriolis mass flow converter suitable for a wide range of applications and installations. The common platform for the modular hardware allows easy selection for the output options required, and is suitable for mounting in various housing configurations.

The **MFC 300** is also suitable for all current and future mass flow sensors. The split architecture solution for the mass flow family ensures maximum security and redundant back up of calibration parameters, should a failure occur. There is no need for reprogramming after a failed unit is replaced.

❶ Same housing for Ex and non-Ex
❷ Large graphic display with optical buttons
❸ Available for AC and DC voltage operation

❶ Common hardware for various housings
❷ Multiple outputs are available depending on options selected

Highlights

- Modular versions from a basic converter to a high-end option with multiple output options
- Advanced diagnostic functions
- Excellent long-term stability
- Easy to install and program due to improved Human Machine Interface (HMI)
- Highest process safety

Industries

- Chemicals
- Food & Beverages
- Machinery
- Minerals & Mining
- Oil & Gas
- Pharmaceuticals
- Power Plants
- Pulp & Paper
- Water
- Wastewater

Applications

- Liquids and gases
- Slurries and viscous products
- Concentration measurement for quality control
- Referred volume measurements
- Density measurement
- Referred density measurement

Mass flowmeter product family

All meters consist of a sensor and a converter, which may be mounted integral to the sensor, or remotely, either with a field mount kit, a wall mount housing or a 19˝ rack mount module.

A sensor mount converter (MFC 010) with a Modbus® output only is also possible for OEM manufacturers or where the user does not require a converter with analogue outputs.

Converter: Common hardware for all converters makes spares holding simpler

❶ **MFC 300 C:** Compact or integrally mounted on sensor

❷ **MFC 300 F:** Field mount up to 300 m / 1000 ft from sensor

❸ **MFC 300 W:** Wall mount for non-hazardous areas

❹ **MFC 300 R:** 19˝ Rack mount module for control room installation

❺ **MFC 010:** Sensor electronics with Modbus ® output

Sensor: Sensors for any applications

❶ **OPTIMASS 1000:** The general purpose solution for the process industry

❷ **OPTIMASS 3000:** The meter for low flow applications

❸ **OPTIMASS 7000:** The optimum solution for the chemical, food & beverage and pharmaceutical industry

❹ **OPTIMASS 8000:** The meter for high pressure and elevated temperatures

❺ **OPTIMASS 9000:** The high temperature solution up to 350°C / 660°F

Technical Data

Model

C (compact)	MFC 300 C
F (field), W (wall), R (19" rack)	MFC 300 F, MFC 300 W, MFC 300 R

Display

With local display (2 meas. pages: 1 status page, 1 graphical page)	Standard
User interface via 4 optical keys	Standard

Languages

English, French, German, Spanish	Standard
Other languages (pending)	Standard

Combinations

OPTIMASS 1000	DN15...50 / ½...3"
OPTIMASS 3000	DN01...04
OPTIMASS 7000	DN06...80 / ¼...3"
OPTIMASS 8000	DN15...100 / ½...4"
OPTIMASS 9000	DN15...100 / ½...4"

Communication

Current, pulse & status output, frequency output, limit switch	Standard
HART communication, control input, 3 counters	Standard
Ex-i	Option
Foundation Fieldbus	Option ❶
Profibus PA	Option
Profibus DP	Option

Verification

Integrated verification, diagnostics:	Standard
- instrument / process / measurement	Standard
- advanced diagnostics	Optional

Power supply

100...230 VAC (-15/+10%), 50/60 Hz	Standard
12...24 VDC / 9...31 VDC	Option
24 V AC/DC	Option
Power consumption	22 VA / 12 W

Approval

Non Ex	Standard
EEx - zone 1 / 2	Option ❷
FM - Class I DIV 1 / 2 (pending)	Option ❷
CSA - GP / Class I DIV 1 / 2 (pending)	Option ❷
SAA - Aus Ex zone 1 / 2 (pending)	Option ❷
TIIS - zone 1 / 2 (pending)	Option ❷

Protection category (according IEC 529 / EN 60 529)

C (compact)	IP 66 / 67 (eq. to NEMA 4X)
F (remote)	IP 66 / 67 (eq. to NEMA 4X)
W (wall)	IP 65 (eq. to NEMA 4/4X)
R (19" rack)	IP 20 (eq. to NEMA 1)

Temperature

Process temperature	See flow sensor
Ambient temperature	-40...+65°C / -40...+149°F
Storage temperature	-50...+70°C / -58...+158°F

Signal cable (for F,W,R version)

Standard 4 core shielded cable	Max. 300 m / 1000 ft

Cable connection

M20 x 1.5	Standard
½" NPT	Option
PF ½	Option

Materials used

Die-cast aluminum (polyurethane coated); C and F version only	Standard
Polyamide - polycarbonate; W version only	Standard
Stainless steel 316 L (1.4404); C and F version only	Option
Custody transfer lead & sealing; C and F version only	Option

Measurement functions

Mass flow rate	g, kg, t, lb per second, minute, hour, day
Density	g, kg, t, lb per cm³, litre, m³, ft³, US gallon, specific gravity (SG), referred density
Volume flow rate	Litre, m³, ft³, US gallon per second, minute, hour, day, or barrel
Totaliser	Mass, volume
Temperature	°C, °F, K
Concentration	°Brix, °Baume, °Plato, NaOH, 0% Mass, 0%Volume API (2540 Table 5B) + free unit conversion
Velocity	m/s, ft/s

Low flow cut-off

User programmable	0...20% of nominal flow rate for each sensor size

Time constant for flow measurement

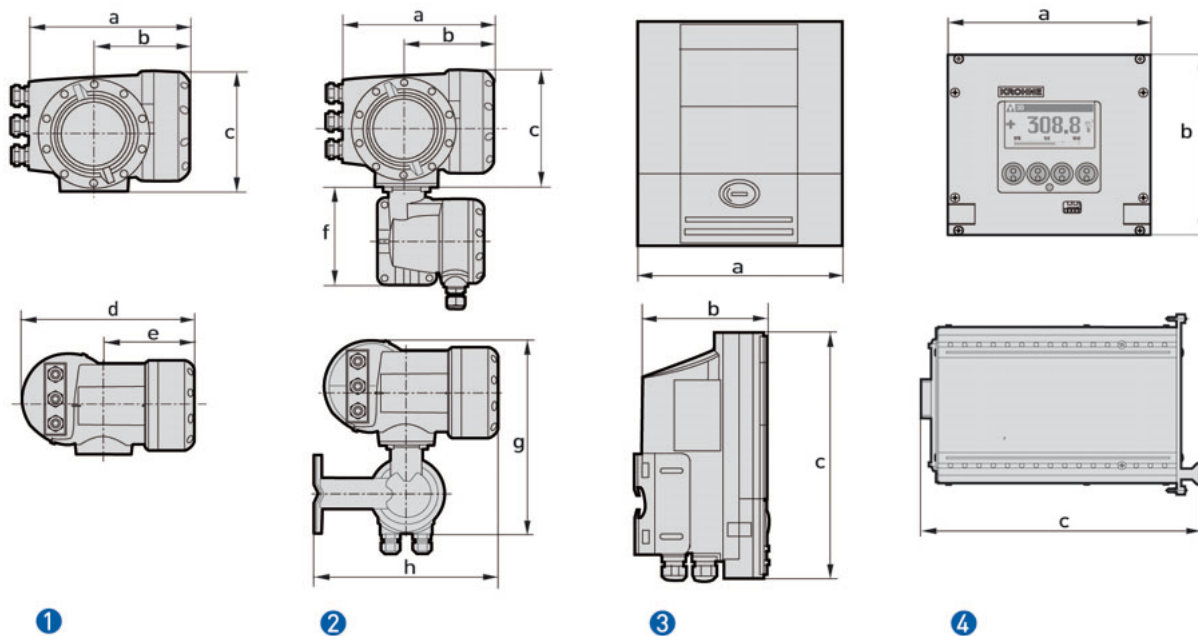| User programmable for all outputs	0.1....100 seconds

System control

User assignable output	Status message, limit switch
User assignable input	Zero calibration, Totaliser reset, sensor standby, hold outputs, range change

❶ pending
❷ Only for C and F version

Dimensions and Weights

❶ MFC 300 C

❷ MFC 300 F

❸ MFC 300 W

❹ MFC 300 R

Dimensions and Weights in mm and kg

Version	Dimensions [mm]								Weights [kg]
	a	b	c	d	e	f	g	h	
MFC 300 C	202	120	155	260	137	-	-	-	4.2
MFC 300 F	202	120	155	-	-	140.5	295.8	277	5.7
MFC 300 W	198	138	299	-	-	-	-	-	2.4
MFC 300 R	142	129	195	-	-	-	-	-	1.2

Dimensions and Weights in inches and lbs

Version	Dimensions [inches]								Weights [lbs]
	a	b	c	d	e	f	g	h	
MFC 300 C	7.75	4.75	6.10	10.20	5.40	-	-	-	9.30
MFC 300 F	7.75	4.75	6.10	-	-	5.50	11.60	10.90	12.60
MFC 300 W	7.80	5.40	11.80	-	-	-	-	-	5.30
MFC 300 R	5.59	5.08	7.68	-	-	-	-	-	2.65

I/O Specifications

Overall functionality

Function	Continuous measurement of mass flow, density, temperature, volume flow, velocity, concentration
	Bidirectional flow measurement and totalisation
	Flow direction identified via status or current output

Current output

Function	All operating data configurable; galvanically isolated; HART communication
Settings	Q = 0%: 0...15 mA
	Q = 100%: 10...22 mA
	Error identification: 0...22 mA
Connection	
Basic / Modular IO: Active	$I \leq 22$ mA / $R_L \leq 1$ kOhm
Ex-i: Active	$I \leq 22$ mA / $R_L \leq 470$ Ohm
	$U_0 = 21$ V / $I_0 = 90$ mA
	$P_0 = 0.5$ W
	$C_0 = 90$ nF / $L_0 = 2$ mH
Basic / Modular IO: Passive	$I \leq 22$ mA / $U \leq 32$ VDC
Ex-i: Passive	$I \leq 22$ mA
	$U_i = 30$ V / $I_i = 100$ mA
	$P_i = 1$ W
	$C_i = 10$ nF / $L_i \sim 0$ mH

Pulse output and Status output

Function	Configurable as pulse output, identification for automatic range change, indicator of flow direction, overflow, errors, trip point
Settings	Q = 100%: 0.0001...10000 pulses per second or pulses per unit volume
	Pulse width: 0.05...2000 ms or auto or sym.
	Status: On or Off
Connection	
Basic / Modular IO: Passive	$f \leq 10$ kHz: $I \leq 20$ mA
	$f \leq 10$ Hz: $I \leq 100$ mA
	$U \leq 32$ VDC / $I \leq 100$ mA
Passive	$U_i = 30$ V / $I_i = 100$ mA
	$P_i = 1$ W
	$C_i = 10$ nF / $L_i \sim 0$ mH
Active	U_{nom} 24 VDC / $I < 1$ mA
	$U_0 = 1.5$ V at 10 mA
Namur (acc. to EN 60947-5-6)	Passive

Control input

Function	Freeze output (e.g. during cleaning), forced return to zero, counter and error reset, ext. range selection
Settings	Freeze outputs, output zero, reset counter, reset error
Connection	
Basic / Modular IO: Active	I_{nom} 16 mA / U_{nom} 24 VDC
Basic / Modular IO: Passive	$U \leq 32$ VDC
	$U_{on} > 19$ VDC / $U_{off} < 2.5$ V DC
Namur (acc. to EN 60947-5-6)	Active

I/O-module combination possibilities

Communication	Basic I/O	Ex-i I/O	Modular I/O

Current output

	Basic I/O	Ex-i I/O	Modular I/O
Active / passive	■	■	■
HART	■	■	■

Pulse and status output

	Basic I/O	Ex-i I/O	Modular I/O
Active			▨
Passive	■	■	▨
Namur (acc. to EN 60947-5-6)			▨

Control input

	Basic I/O	Ex-i I/O	Modular I/O
Active			▨
Passive	■	▨	▨
Namur (acc. to EN 60947-5-6)			▨

Foundation Fieldbus

	Basic I/O	Ex-i I/O	Modular I/O
Foundation Fieldbus (pending)		▨	▨

Profibus

	Basic I/O	Ex-i I/O	Modular I/O
Profibus PA		▨	▨
Profibus DP			▨

Protection

	Basic I/O	Ex-i I/O	Modular I/O
Ex-d / e	▨	▨	▨

■ standard ▨ optional □ on request

Note:

Ex-i I/O: up to 1 additional in-/output module possible (see I/O-module combinations)

Modular I/O: up to 2 additional in-/output module possible (see I/O-module combinations)

I/O modules

1	I/O	2	1st module	3	2nd module	
1	Basic	0	no module possible	0	no module possible	
2	Ex-i (Ia + Pp)	1	Ex-i (Ia + Pp/Cp)			
3	Ex-i (Ip + Pp)	2	Ex-i (Ip + Pp/Cp)			
4	Modular (Ia + Pa)	8	no module	8	no module	
6	Modular (Ia + Pp)	A	Ia	A	Ia	Ia = current output - active
7	Modular (Ia + Pn)	B	Ip	B	Ip	Ip = current output - passive
8	Modular (Ip + Pa)	C	Pa/Sa	C	Pa/Sa	Pa/Sa = pulse/status output - active, high current
B	Modular (Ip + Pp)	E	Pp/Sp	E	Pp/Sp	Pp/Sp = pulse/status output - passive, high current
C	Modular (Ip + Pn)	F	Pn/Sn	F	Pn/Sn	Pn/Sn = pulse/status output - passive, Namur
D	Profibus PA	G	Ca	G	Ca	Ca = control input - active, high current
E	Foundation Fieldbus ❶	H	Cn	H	Cn	Cn = control input - active, Namur
F	Profibus DP	K	Cp	K	Cp	Cp = control input - passive, high current
❶ in preparation						

The **MFC 300 with standard basic I/O** covers almost all applications, having 4 I/Os:

- active/passive current output (+HART)

- passive pulse/status output

- passive status output

- passive status output / control input

The I/O-module combination is thus 1-0-0 (see above).

The **MFC 300 with modular I/O** can be tailor-made to any application:

- Suppose you require a converter with passive pulse output and 3 passive current outputs. The I/O-module combination then becomes B-B-B.

- Suppose you require a converter with 2 active pulse/status outputs. The I/Omodule combination then becomes either 4-C-8 or 8-C-8 (depending on whether active or passive current output is required). The latter '8' indicates that 1 additional module can be added in the future.

- Suppose you require a converter with Profibus PA communication, 1 active current output and 1 passive control input. The I/O-module combination then becomes D-A-K.

For I/O-module combinations, not described in the overview on the right, please consult KROHNE.

Example for combination of I/O's

Basic I/O

1	2	3
1	0	0

Ex- I/O

1	2	3
2	0	0
		1
		2
3	0	0
		1
		2
D	0	0
		1
		2
E	0	0
		1
		2

Modular I/O

1	2	3		1	2	3		1	2	3
4	8	8		8	8	8		D	8	8
	A	B			B	8			A	8
		A				B				A
		C				C				C
		G				G				K
	C	8			C	8			C	8
		C				C				C
		G				G				K
	G	8			G	8			K	8
		G				G				K
6	8	8		B	8	8		E	8	8
	A	8			B	8			A	8
		A				B				A
		E				E				C
		K				K				K
	E	8			E	8			C	8
		E				E				C
		K				K				K
	K	8			K	8			K	8
		K				K				K
7	8	8		C	8	8		F	8	0
	A	8			B	8			A	
		A				B			B	
		F				F			C	
		H				H			D	
	F	8			F	8			E	
		F				F			F	
		H				H			G	
	H	8			H	8			H	
		H				H			K	

KROHNE Product Overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Mass flowmeters
- Ultrasonic flowmeters
- Vortex flowmeters
- Flow controllers

- Level measuring instruments
- Pressure gauges
- Temperature measuring instruments
- Water solutions & analysis
- Oil and gas turnkey solutions

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