Datasheet M54

Coriolis Mass Flow Meter for Liquids and Gases

CORI-FLOW Coriolis Mass Flow Meter model M54

> Introduction

Bronkhorst Cori-Tech model M54 **CORI-FLOW™** Mass Flow Meters (MFMs) are precise and compact instruments, based on the Coriolis measuring principle, designed to cover the needs of the low flow market. The MFMs offer "multi-range" functionality: factory calibrated ranges can be rescaled by the user, maintaining the original accuracy specs. The instruments are equipped with a robust IP65 weatherproof housing and are optionally available with ATEX approval for use in Zone 2 hazardous areas. The MFM contains a microprocessor based pc-board with signal and fieldbus conversion and a PID controller for optional mass flow control by means of a separately mounted control valve or pump. The mass flow is provided as analog signal or digitally via RS232 or optional fieldbus. The flow range and wetted materials are determined depending of the type of fluid and the process conditions of the application.

> Technical specifications

Flow sensor rates

Minimum full scale liquid	: 5 kg/h
Minimum full scale gas	: 10 kg/h
Nominal flow	: 50 kg/h
Maximum full scale	: 100 kg/h
Recommended min. flow	: 0,2 kg/h
Zero stability	: < 0,050 kg/h

Performance

Accuracy liquid	: 0,2% of rate, range 1…100%
Accuracy gas	: 0,5% of rate, range 1…100%
Repeatability	: 0,1% of rate (based on digital output)
Mounting position	: preferred mounting position on liquid service upside down

Mechanical parts

Material (wetted parts)	: stainless steel 316L or comparable Optional: Hastelloy-C22
Process connections (welded)	: Compression type or face seal couplings
Ingress protection (housing)	: IP65 (weatherproof)
Leak integrity	: < 2 x 10^{-9} mbar l.s^{-1} He
Pressure rating	: 200 bar
Temperature range	: 0...70°C for standard version, (ambient + fluid) 0...120°C with remote electronics, 130°C ≤ 1 hour allowed for CIP

Electrical properties

Power supply	: +15…24 Vdc ±10% Max. ripple recommended: 50 mV tt
Power consumption	: approx. 80 mA at 15 Vdc
Analog output	: 0…5 (10) Vdc, min. load impedance > 2 kΩ; 0 (4)…20 mA (sourcing), max. load impedance < 375 Ω
Analog setpoint	: 0…5 (10) Vdc, min. load impedance > 424 kΩ;
(for MFM + control valve/pump)	0 (4)…20 mA, load impedance ~250 Ω
Digital communication	: Standard RS232; Options: Profibus-DP®, DeviceNet™, Modbus-RTU, FLOW-BUS

Electrical connections

Analog/RS232	: male, 8-pin Amphenol for power, analog I/O and RS232
Profibus-DP	: bus: 5-pin M12 female; power: 8-pin DIN male
DeviceNet/Modbus/FLOW-BUS	: 5-pin M12 male

Although all specifications in this datasheet are believed to be accurate, the right is reserved to make changes without notice or obligation.

Bronkhorst
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> Model number identification

M54 – A A A – NN – A A

Mass flowmeter
M54 Nominal flow 50 kg/h

Communication (I/O)
A RS232 + Analog (n/c control)
B RS232 + Analog (n/o control)
D RS232 + DeviceNet (n/c control)
E RS232 + DeviceNet (n/o control)
M RS232 + Modbus (n/c control)
N RS232 + Modbus (n/o control)
P RS232 + Profibus-DP (n/c control)
Q RS232 + Profibus-DP (n/o control)
R RS232 + FLOW-BUS (n/c control)
S RS232 + FLOW-BUS (n/o control)

Analog output
A 0…5 Vdc
B 0…10 Vdc
F 0…20 mA sourcing
G 4…20 mA sourcing

Supply voltage
D + 15…24 Vdc

Connections (in/out)
11 1/8" OD compression type
22 ¼" OD compression type
33 6 mm OD compression type
44 12 mm OD compression type
55 ½" OD compression type
77 ¼" Face seal female
88 ¼" Face seal male
99 other

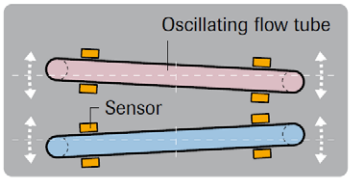
Internal seals
0 None (sensors)
V Viton (valves for gas)
E EPDM
K Kalrez-6375

Material
S Stainless steel
H Hastelloy-C22

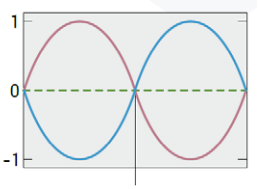
> Measuring principle

The **CORI-FLOW™** contains two serial tube loops, forming part of an oscillating system. When a fluid flows through the tubes, Coriolis forces cause a variable phase shift between the loops, which is detected by sensors and fed into the integrally mounted pc-board. The resulting output signal is strictly proportional to the real mass flow rate..

No flow

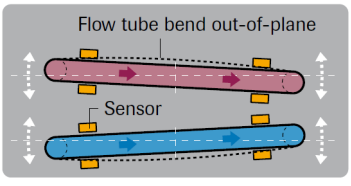


Differential sensing mode - top view

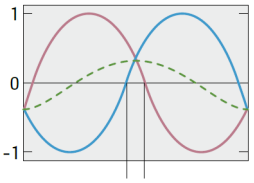


Δ Phase = 0

Flow



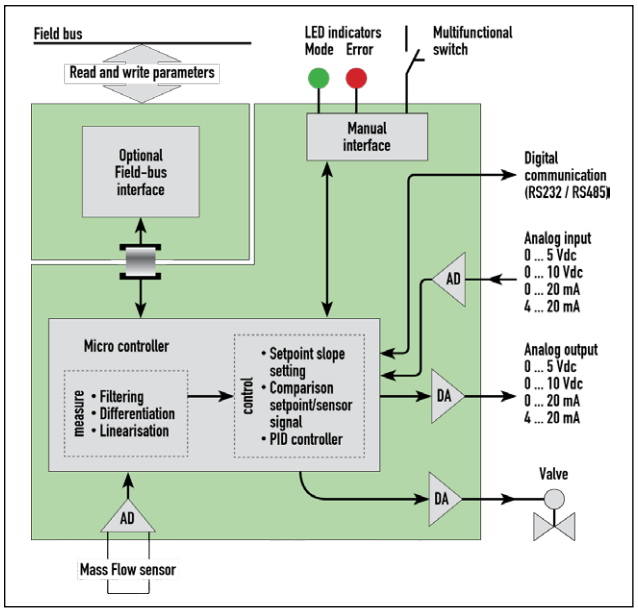
Differential sensing mode - top view



Δ Phase

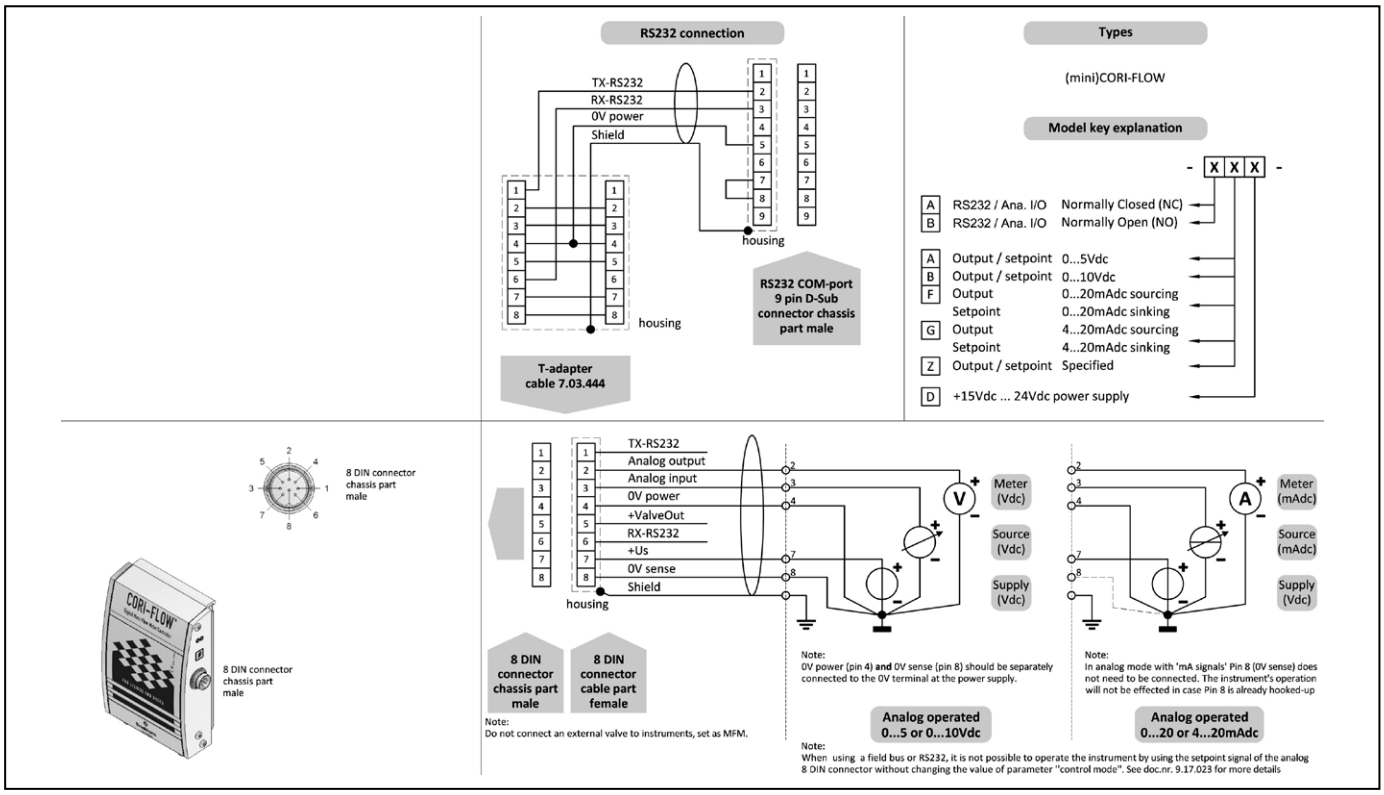
> State of the art digital design

CORI-FLOW™ series are equipped with a digital pc-board, offering high accuracy, excellent temperature stability and fast response. The basic digital pc-board contains all of the general functions needed for measurement and control. In addition to the standard RS232 output the instruments also offer analog I/O. Furthermore, an integrated interface board provides DeviceNet™, Profibus-DP®, Modbus-RTU or FLOW-BUS protocols.



Functional scheme of the digital PC-board

> Hook-up diagram for analog or RS232 communication



> Hook-up diagrams for fieldbus communication

For the available fielbus options we refer to the various hook-up diagrams as indicated below. If you are viewing this datasheet in digital format, you may use the hyperlink to each of the drawings. Otherwise please visit the download section on http://www.bronkhorst-cori-tech.com or contact our local representatives.

> Dimensions (mm) and weight (kg)

Weight: 3,1 kg

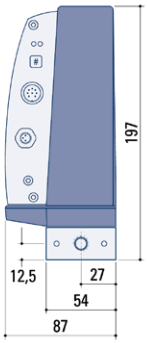


Table 1 (Z-values in mm)

Compression type	Size Z
adapter 1/8" OD	201
adapter 1/4" OD	204
adapter 6 mm OD	204

Face-seal	Size Z
adapter 1/8" male	194
adapter 1/4"male	202
adapter 1/4" female	202

> Options and accessories

- Free software support for operation, monitoring, optimizing or to interface between digital instruments and windows software.	
- BRIGHT compact local Readout/Control module - E-5700 / E-7000 Power Supply	
- Interconnecting cables for power and analog/digital communication - PiPS Plug-in Power Supply	
- Impact protection cover for ATEX Zone 2 applications	

> Alternatives

- Model M55 **CORI-FLOW™** Mass Flow Meter (flow rates from 0,5 upto 600 kg/h)	
- Model **mini CORI-FLOW™** Mass Flow Meter (flow rates from 0,03 upto 30 kg/h)	
- Model M54C0I / M54C1I / M54C2I / M54+F-004AI / M54C5I **CORI-FLOW™** Mass Flow Controller (flow rates from 0,2 upto 100 kg/h)	
- Model M54 **CORI-FLOW™** Mass Flow Meter with Pressure Actuated Valve for fluids such as ethylene, propylene, supercritical CO_2 (flow rates from 0,2 upto 100 kg/h)	

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