mini CORI-FLOW™ MI-series MKII

Industrial Coriolis Mass Flow
Meters/Controllers for Liquids and Gases

Ex Manual

English

Bronkhorst®

Table of Contents

1 Safety information

1.1 Symbols and signal words in this document

The following symbols and signal words are used to indicate the type and severity level of the risk.

Warnings

DANGER

Signal word used to indicate an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Signal word used to indicate a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Signal word used to indicate a potential risks of damage to the product.

Important information and recommendations

Important information where there is no risk to people or product.

1.2 General safety instructions

⚠ Please read this document and all other applicable documents carefully before installing and operating the product.

All instructions must be observed. Failure to comply with instructions may result in material damage and personal injury, including danger to life.

The user and / or installer are / is considered to have professional experience level and knowledge about Ex-safety issues and installation, operational requirements for its industry and type of application and national requirements according to relevant IECEx 005 modules and EN/IEC such as (but not limited to) 60079-0 and 60079-14 standards.

⚠ Modifications

The product may not be disassembled or modified in any way or for any purpose. Unauthorized modifications can undo safety features, compromise system specifications and cause failure to comply with applicable laws, regulations and directives.

Any unauthorized modification will be considered as unintended and improper use.

⚠ Electrical work

Electrical connections must be made by or under supervision of a qualified electrician.

► Before working on the product or system: de-energize the product before connecting or disconnecting electrically.

⚠ Electrostatic discharge

The product contains electronic components that are susceptible to electrostatic discharge (ESD).

► Take appropriate measures to prevent electrostatic discharge while working with the product.

2 Product information

2.1 Scope of this manual

All standard manuals remain valid unless this document is specifically stating further limitations or more stringent requirements.

This manual is extending the following standard manuals, in case the product is used in Hazardous Environments for Gas or Dust atmospheres group II or III (non-mining):

Product series	Doc. no.	Doc. title
mini CORI-FLOW™	9.17.206	mini CORI-FLOW™ MI-series MKII Industrial Coriolis Mass Flow Meters/Controllers for Liquids and Gases

Tab. 1. Standard documents

2.2 Product series

Product series within scope of this manual are Mass Flow Meters and Mass flow Controllers as listed in the certificate (» Tab. 4, page 5).

A complete model list is included in the Ex-certificate.

The Bronkhorst® products can be recognized by the first part of the model key:

Product series	Model key
mini CORI-FLOW™	MI130
mini CORI-FLOW™	MI140

Tab. 2. Product type designation

2.3 Designated use

- Maximum fluidic temperature is limited to the maximum ambient temperature (» Tab. 4, page 5).
- The product is suitable for use in a Zone 2/22 or Gc/Dc hazardous location (» Par. 2.4).
- Each product is supplied and specified for specific process conditions including maximum pressure, temperature, and type of media (gas or liquid).

► For additional information, see the supplied instruction manual mini CORI-FLOW™ MI series (document number 9.17.206).

2.4 Ex-rating per model

The following Ex-ratings and corresponding zones are applicable per model:

Ex-rating		Zone	MI130 MKII	MI140 MKII
Gas	Ⓔx II 3G Ex ec IIC T4 Gc	2	▪	▪
Dust	Ⓔx II 3D Ex tc IIIC T100 °C Dc	22	▪	▪

Tab. 3. Ex-rating and corresponding zone per model

2.5 Specific conditions for use

- The product may not be equipped with factory-fitted cable glands or blanking plugs: all available entries need to be closed with suitable cable glands or blanking plugs by the user.
- The equipment shall only be opened in a controlled area in which condensation or airborne pollution is reduced to pollution degree 2 (as defined in IEC 60664-1).
- The equipment is suitable for an area of pollution degree 2 (as defined in IEC 60664-1) without anti-condensation/breather plug.
- The product can operate in a pollution degree 3 (as defined in IEC 60664-1) if equipped with suitable anti-condensation/breather plug.

3 Installation

DANGER

Risk of explosion due to spark discharges!

Disconnecting the product without turning off the electrical power first, may cause a spark. This may lead to an explosion.

► Remove electrical power from the product before connecting or disconnecting electrically.

CAUTION

Risk of personal injury due to pressure release!

Pressurized fluids may cause personal injury if released suddenly.

► Release the pressure from the fluidic lines slowly.

► Check applicable ratings of the accessories which can be subject to change by the original manufacturer before installation.
► If not mounted: install the product with cable glands, blanking plugs or breathing plugs, according to EN/IEC 60079-14 with respect to the type of protection and relevant environmental factors.
► Refer to the standard manual supplied with the product for additional information (» par. 2.1, page 3).

3.1 Mounting location

NOTICE

An explosive mixture within the measuring tube is only allowed for a short period of time (and according to EPL Gc).

The product is to be sufficiently protected against external heat ingress due to direct sunlight or other heat sources.

► Apply suitable sun or heat protection if the maximum rated ambient temperature may be exceeded.

3.2 Application in harsh environments (pollution degree 3)

Pollution degree 3 typically concerns harsh non-environmentally protected industrial environments that are not protected against dirt, condensation, or moisture. Therefore, the product comes with a pre-installed anti-condensation/breather plug.

3.3 Electrical connections

A detailed hook-up (connection) legend is printed on the inside of the top cover.

► Refer to the applicable hook-up diagram for information about connecting the correct signals.
► Refer to the supplied manufacturer's instructions of the cable glands for correct use.

3.3.1 Wiring the terminals

► Use only 1 conductor per terminal.
► Use solid wires or flexible wires (excluding ferrule) with a 0.25 ... 1.5 mm² diameter.
► Use suitable ferrule in case of flexible wires and fine stranded cores.
► Tighten the wires in the terminal to a torque of 0.5-0.6 Nm.

For additional information, refer to the standard manual supplied with the product (» par. 2.1, page 3).

3.3.2 Accessing the wire terminals

To connect the product, the cover has to be removed in order to access the wiring terminal box. To remove the top cover:

► Unscrew the 4 screws of the top cover.
► Remove the top cover.
► Make the connections according the applicable hook-up diagram.
A hook-up legend is also printed on the inside of the cover.

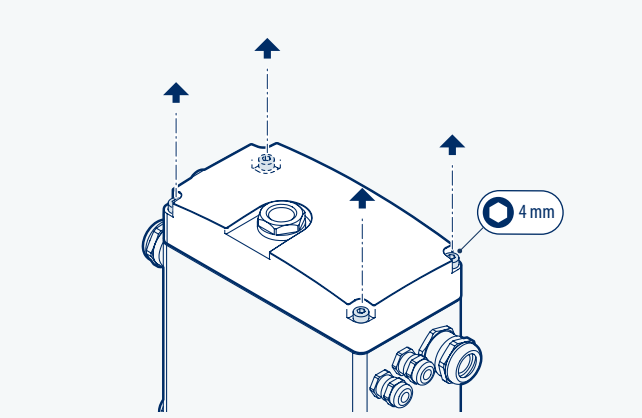

Fig. 1. Removing the top cover

To close the top cover:

► Check the seal inside the top cover on wear and damage.
► Replace the seal if needed.
► Place the top cover on the housing with the sight glass facing forward.
► Tighten the 4 screws crosswise to a torque of 5 Nm.

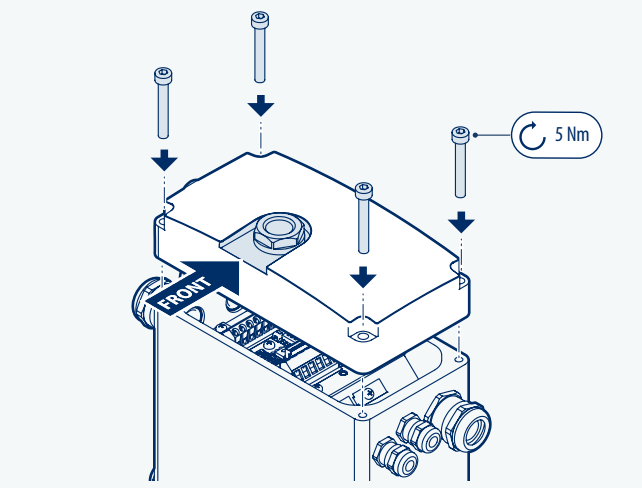

Fig. 2. Closing the top cover

3.3.3 Earthing

The product must be earthed according to EN/IEC 60079-14. The product can be earthed using the ground terminal [1].

► Use a cable (4 - 6 mm²) with cable lug.

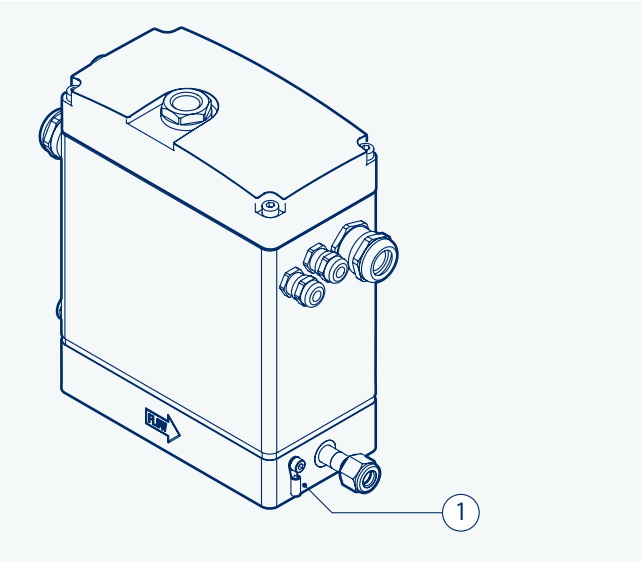

Fig. 3. Earthing connection

1. Ground terminal (M4)

3.4 Using (cable) entries

Top cover entries should only be used for suitable blanking plug, breathing plugs or sight glasses. The use of cable glands is prohibited.

The product is equipped with entry sizes M12 to M20, depending on execution.

- All entries must be equipped with a suitable cable gland or blanking plug to maintain the type of protection and ingress rating (IP).
- Housing entries are intended as cable entry or suitable blanking plug.
- Top cover entries are intended for suitable blanking plug, breathing plugs or sight glasses.

4 Maintenance and inspection

DANGER

Risk of explosion due to spark discharges!

Disconnecting the product without turning off the electrical power may cause a spark. This may lead to an explosion.

- ► Remove electrical power from the product before connecting or disconnecting electrically.
- ► Open the top cover only after disconnecting the product electrically.

Warning

Risk of electrical shock!

- ► If any part of the body comes into contact with live parts, there is an immediate risk of electrical shock.
- ► Turn off electrical power and secure against unintentional reconnection before carrying out any work.
- ► Electrical connections must be made by or under supervision of a qualified electrician.

CAUTION

Risk of personal injury due to pressure release!

Pressurized fluids may cause personal injury if released suddenly.

- ► Release the pressure from the fluidic lines slowly.

- ► Inspect according to this document and relevant requirements of EN/IEC 60079-14 and EN/IEC 60079-17 related to protection method “e” and “t”.
- ► Refer to the standard manual supplied with the product for maintenance and inspection instructions (» par. 2.1, page 3).

4.1 Removing the top cover

Removing the top cover is allowed in a controlled area.

- ► Make sure that the product is sufficiently protected against ingress of rain, moisture & dirt before opening.
- ► See for opening and closing the top cover par. 3.3.2 on page 4.

4.1.1 SIP/CIP

All factory mounted glands are suitable for SIP/CIP (service/cleaning-in-place) if the following conditions are met:

- The power is switched off.
- The temperature of the cleaning fluid does not exceed 120 °C.

5 Technical specifications

Description	Unit	Value
Ambient temperature	°C	-20 ... +70
Fluid/process temperature	°C	-20 ... +70
Fluid/process temperature de-energized[1]	°C	-20 ... +120
Rh operation [%] ambient		0 ... 99
Pollution degree operation (macro environment)[2]		2 / 3
Pollution degree during installation or service (macro environment)		2
Ingress Protection		IP66 / IP67
Process Pressure max.	barg	See serial number plate
Entries number		1 ... 5
Electrical specification		
Supply voltage	Vdc	15 ... 24 ± 10%
Max. supply current	A	0.45
Analog out, setpoint (input)	mA (Vdc)	0/4 ... 20 (0 ... 5/10)
Max. supply current valve out	mA	265
Max. supply voltage actuator out	mA	265
Actuator external supply	Vdc	24 ± 10%
Fuses	A	2 A slow
Ex-certificates		DEKRA 21ATEX0002X DEKRA 23UKEX6010X IECEx DEK21.0006X

Tab. 4. Technical specifications

5.1 EMC category

EMC category	Value
For emission IEC 61326-1 / IEC 61000-6-3	Residential, light industrial and laboratory use
For immunity IEC 61326-1/ IEC 61000-6-2	Industrial use

Tab. 5. EMC category

6 Accessories and spare parts

Application range of accessories is based on or limited to specifications of the product after installation. Subject to the foregoing, replacement and spare parts can be ordered based on the serial number printed on the product label.

6.1 Fuse replacement

- ► Only use fuses as specified (» Tab. 6).

Brand	type	Art. no. manufacturer
Littelfuse®	NANO2 series, slo-blo 2 A	0454002

Tab. 6. Fuse replacement

1 For additional information, refer to the standard manual supplied with the product (» par. 2.1, page 3).
2 Pollution degree 3 only with breather plug.

6.2 Minimum ratings for Ex-accessories

NOTICE

The installation of accessories must be evaluated and carried out by a competent Ex-specialist.

The use, selection and installation of Ex Components with valid Ex (e.g. ATEX and/or IECEx) certification should be carried out according to the applicable manufacturer instructions with respect to cable diameter clamping range (in case of cable glands).

Listed ratings are based on maintaining full Ex-specification range of the product. Application of accessory with (limited) ratings may be allowed: depending on applicable project and environmental data.

	Breather plug, cable gland and sight glass	
Entry thread	M12x1.5	M20x1.5
Ambient temp.	-20 ... +70 °C	
Fluid temp.	-20 ... +70 °C	
Pollution degree 2	IP66	
Pollution degree 3	IP67	
EPL 3G (zone 2)	Ex ec IIC	
EPL 3D (zone 22)	Ex ec IIIC	
SIP/CIP cleaning[3]	T ambient + 10 K	
Max. thread length	8 mm	

Tab. 7. Ratings for cable glands blind- and breathing plugs

3 Max. allowed fluid temperature during SIP/CIP: 120 °C

Service

Contact

Downloads

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