

Ex Manual/ESI KCs

Zone 2/22 Mass Flow and Pressure meters/controllers



Essential Safety Instructions

English

9.27.094B - 2023-04

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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 KCs C / IEC 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.

1.3 Disclaimer

Bronkhorst High-Tech B.V. cannot be held liable for any damage and/or injury resulting from unintended, improper or unsafe use, or use with other media and/or under other process conditions than specified at ordering time.

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. number	Doc. title
IN-FLOW, IN-PRESS	9.32.022	General instructions digital General instructions digital Mass Flow / Pressure instruments laboratory style
CORI-FLOW™	9.32.031	General instructions digital Mass Flow instrument CORI-FLOW™
mini CORI-FLOW™	9.32.050	mini CORI-FLOW™ M1x series Compact 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, equipped with an integrated or separate valve as listed in the certificate reference.

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

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

Product series	Model key
IN-FLOW	F-xxxxl
IN-PRESS	P-xxxxl
mini CORI-FLOW™	M1x
CORI-FLOW™	M5x

Tab. 2. Product type designation

2.3 Ex-rating per model

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

Ex-rating	Zone	Models F-x4x (only)	Other models
Gas  II 3G Ex ec IIC T4 Gc	2	▪	▪
Dust  II 3D Ex tc IIIC T70 °C Dc	22		▪

Tab. 3. Ex-rating, type of protection, and corresponding zone per model

2.4 Designated use

- Maximum fluidic temperature is limited to the maximum ambient temperature (» Tab. 6, page 9).
- The product is suitable for use in Zone 2 IIC T4 or Zone 22 IIIC 70 °C rated hazardous areas.
- Product is to be sufficiently protected against external heat ingress due to direct sunlight or other heat sources.

2.5 Conditions for safe use

- Bronkhorst® valves shall only be used in combination with Bronkhorst® Digital Mass Flow Meters, Electronic pressure transducers or Coriolis Mass Flowmeters.
- The device shall be electrically connected and mechanically protected against impact in compliance with (EN) IEC 60079-0 requirements, providing and maintaining degree of protection at least IP54 according, and protection against mechanical impact.

2.5.1 Specific conditions for use

The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC 60664-1.

3 Standards and certificates

3.1 Standards

The date and edition of the standards can be taken from the certificate.

- IEC 60079-0, edition 7.0: General requirements
- IEC 60079-7, edition 5.0: Protection by increased safety "e"
- IEC 60079-31, edition 2.0: Protected by enclosures "t"

3.2 Certificates

Product series	KCs certificate
IN-FLOW MFM	18-KA4BO-0600X
IN-FLOW MFC	20-KA4BO-0308X
IN-PRESS	20-KA4BO-0309X
CORI-FLOW™	20-KA4BO-0310X
mini CORI-FLOW™	20-KA4BO-0311X

Tab. 4. KCs certificates

4 Installation and commissioning

! 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.

! WARNING

Risk of explosion due to improper installation!

Unprotected electrical connections may lead to unforeseeable issues, which may lead to personal injury.

- ▶ Install the supplied IP65 caps (» par. 4.4).

! 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.

4.1 Product labeling

- ▶ Read the serial number label on the product and check applicability of:
 - Flow/pressure rate
 - Fluid to be metered and compatibility
 - Up- and downstream pressures
 - Input/output signal
- ▶ Check from the red-colored sticker on the product, that the test pressure is in agreement with the required safety factor for the application.

4.2 Transport bolts (model M15 only)

The model M15 is fitted with transport bolts, which need to be removed before energizing the product.

- ▶ Remove the bolts according to the instructions supplied with the product.

4.3 Preparations and process connection

- ▶ Refer to the standard manual supplied with the product for complete installation instructions and commissioning (» par. 2.1, page 3).
- ▶ Release the pressure from the fluidic lines.
- ▶ Clear the fluidic lines of hazardous gas or liquid.
- ▶ Install the meter/controller in the line.
- ▶ Tighten the fluidic (gas/liquid) fittings according to the instructions of the supplier of the fittings.

4.4 Electrical connections

i When making electrical connections, it is important to follow the instructions of the connector manufacturer. This to ensure and maintain ingress protection and a secure mechanical connection.

- ▶ De-energize product and cables.
- ▶ Use the supplied mating cables.
- ▶ Make sure, both the chassis socket and the cable connectors, are clean and dry.
- ▶ Insert the cable connector in the designated chassis socket.

- ▶ Tighten the connector-ring hand-tight.
- ▶ Use supplied IP65 caps to close unused electrical connections.
- ▶ Before energizing: check all electric connections according to the supplied hook-up diagram.

4.4.1 Use of extension cables

! DANGER!

Risk of explosion due to unsafe connections.

The use of industrial (non-explosion protected) rated components such as (digital) bus terminators or T-parts provide insufficient protection.

- ▶ Only use correct Ex-certified terminal or junction boxes for cable extensions or cable splits.
- ▶ Only use the supplied mating cables in the safe area.

If the supplied cables need to be extended, the area in which the connection is made must be taken into account.

- ▶ Only use suitable Ex-certified terminal- or junction boxes [1].
- or -
- ▶ Only extend supplied mating cables in the safe area [2].

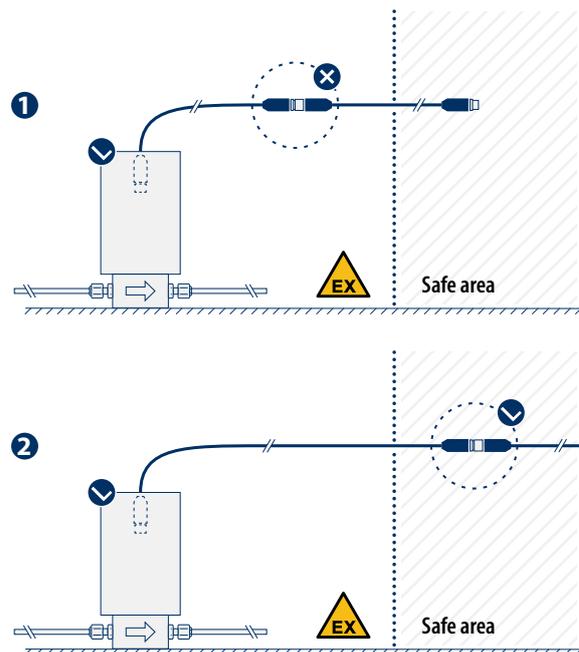


Fig. 1. Extension cables in the Ex-area

1. Not allowed connection in the hazardous area (Ex-area).
2. Allowed connection in the safe area (non-Ex area).

4.5 Impact protection of electrical connections

The product is supplied with (impact) protection cover protecting electrical connections. In case of alternative means of impact protection, see '4.6 Alternative impact protection or cabling' on page 9.

To mount the supplied protection cover:

- ▶ Identify applicable model and cover (» Fig. 2 ... Fig. 10).
- ▶ Place the cover up to the fixed stop [A].
- ▶ Insert the bolts [2].
- ▶ Tighten the bolts evenly with indicated torque [3].

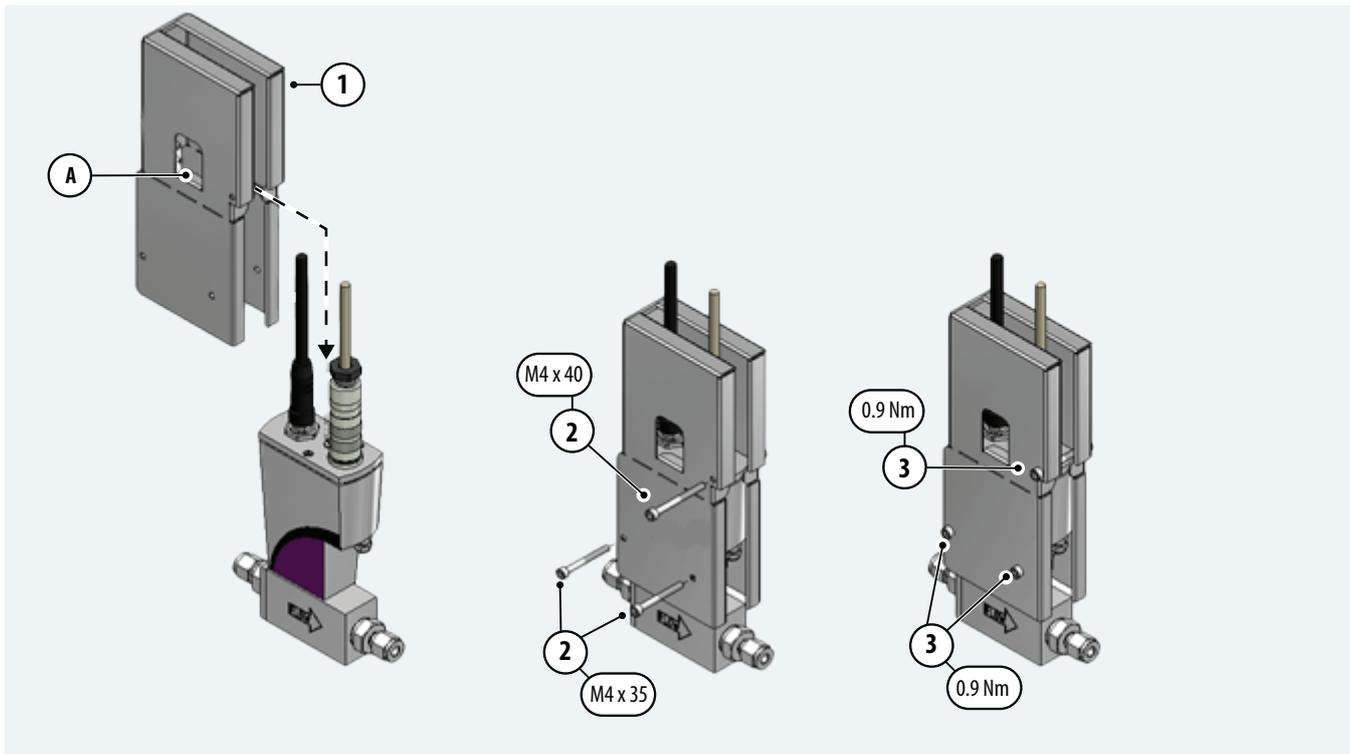


Fig. 2. IN-FLOW, IN-PRESS - protection cover placement

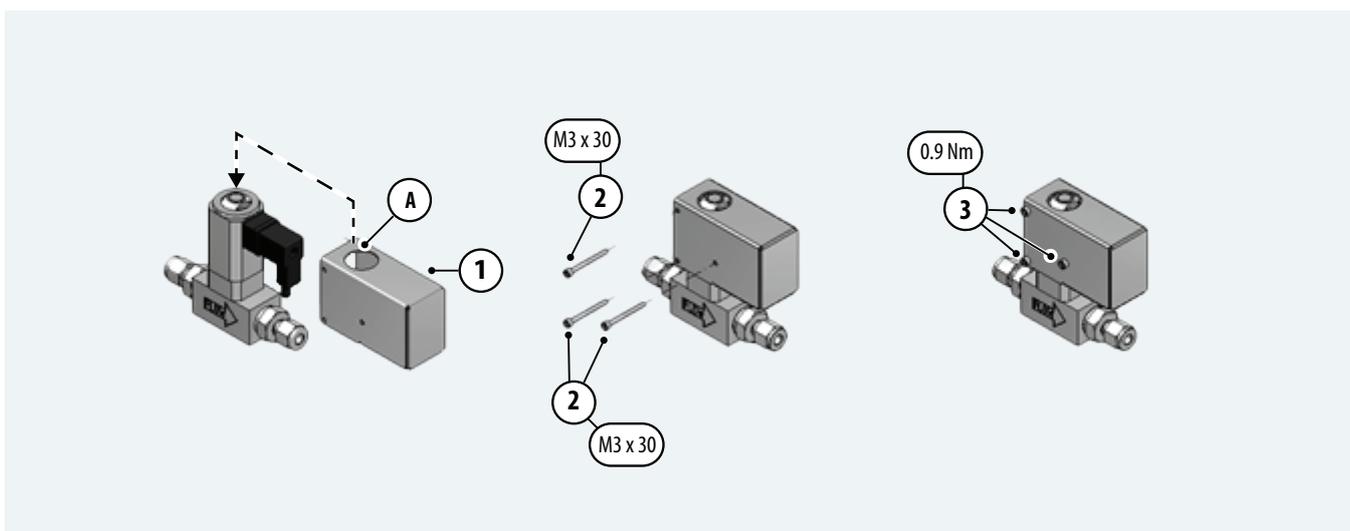


Fig. 3. Valve F-001AI, F011AI, F-021AI - protection cover placement

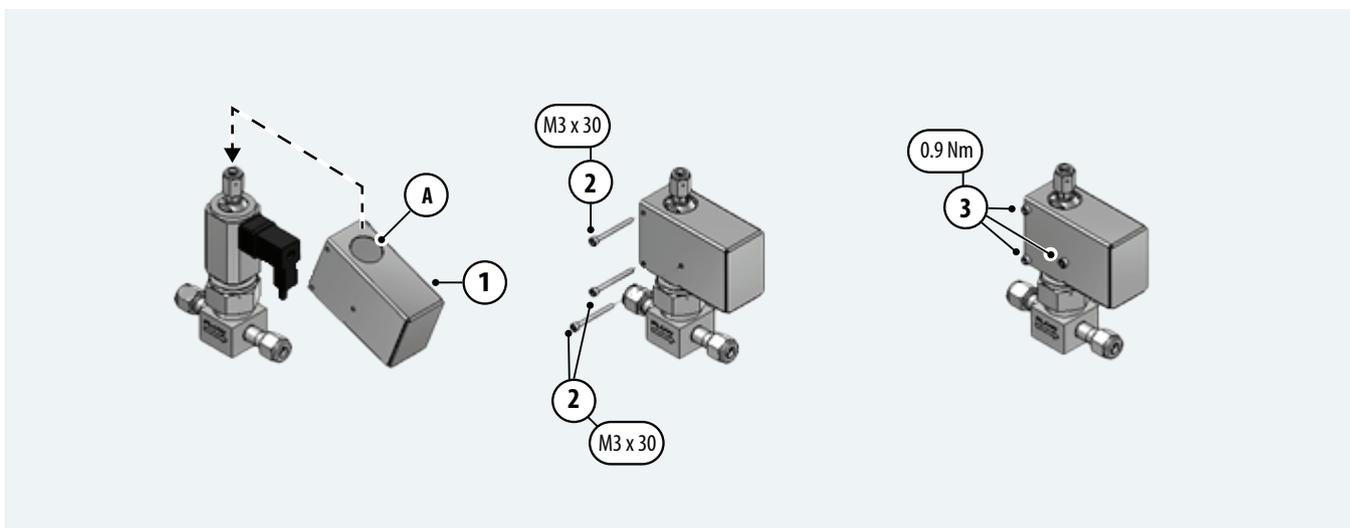


Fig. 4. Valve C2I - protection cover placement

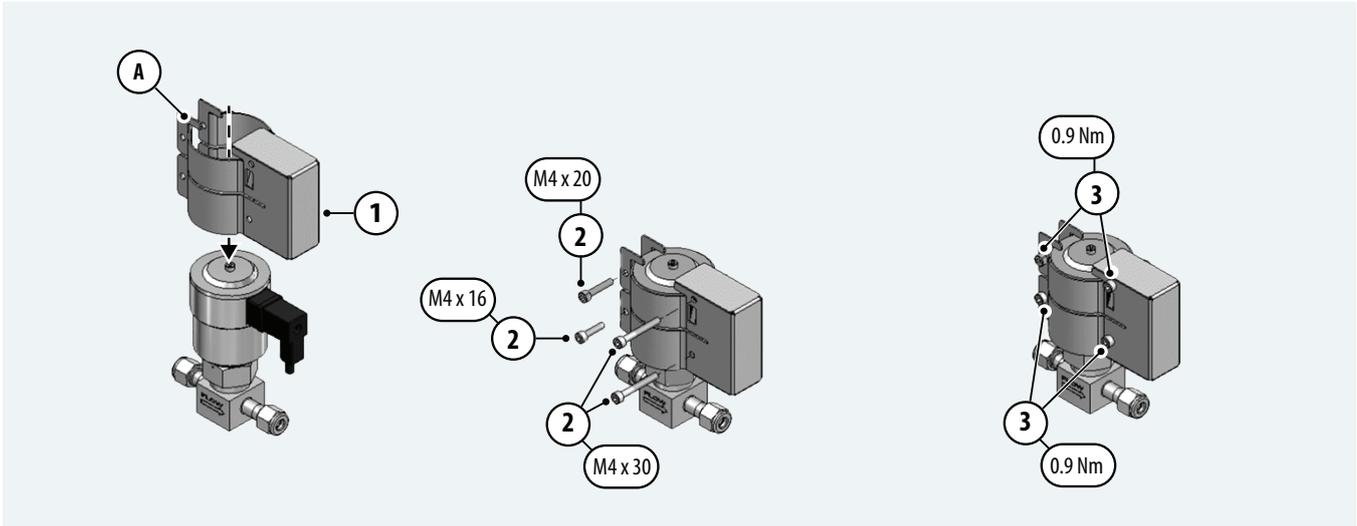


Fig. 5. Valve CSI - protection cover placement

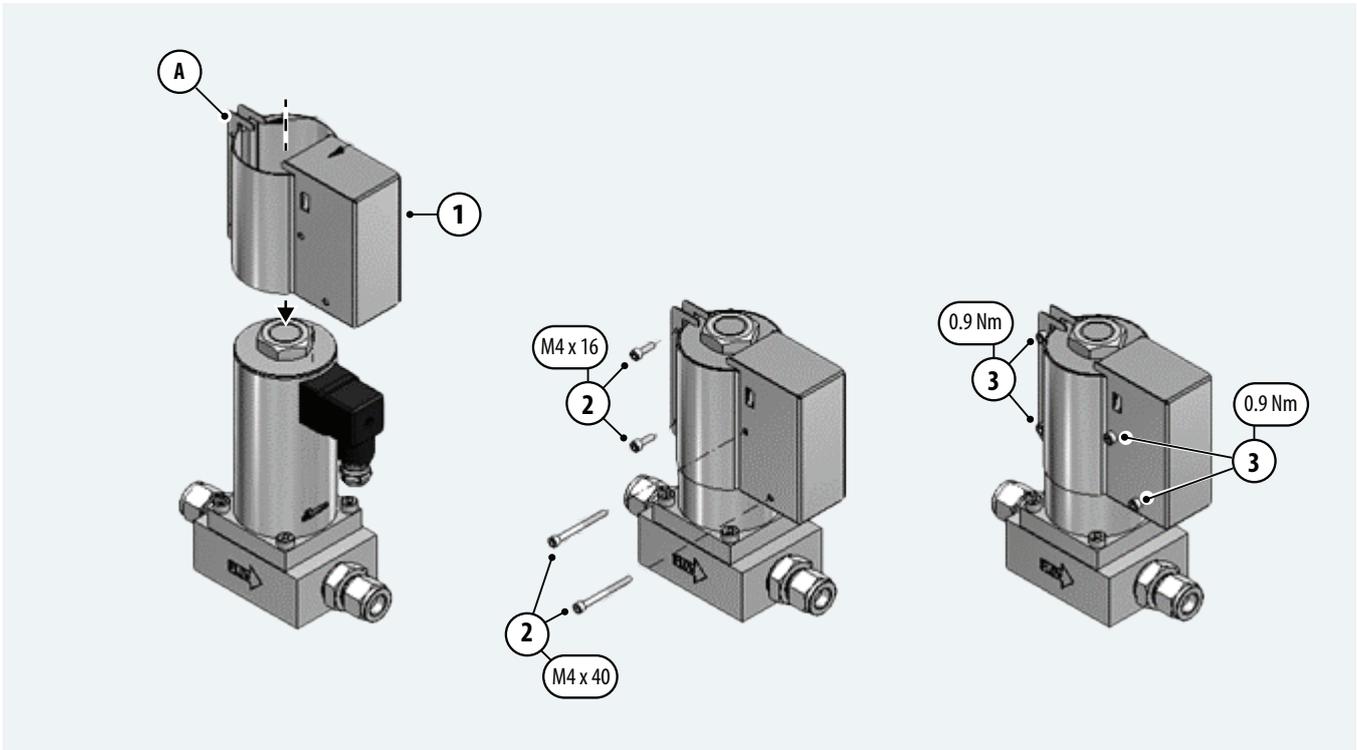


Fig. 6. Valve F-004 - protection cover placement

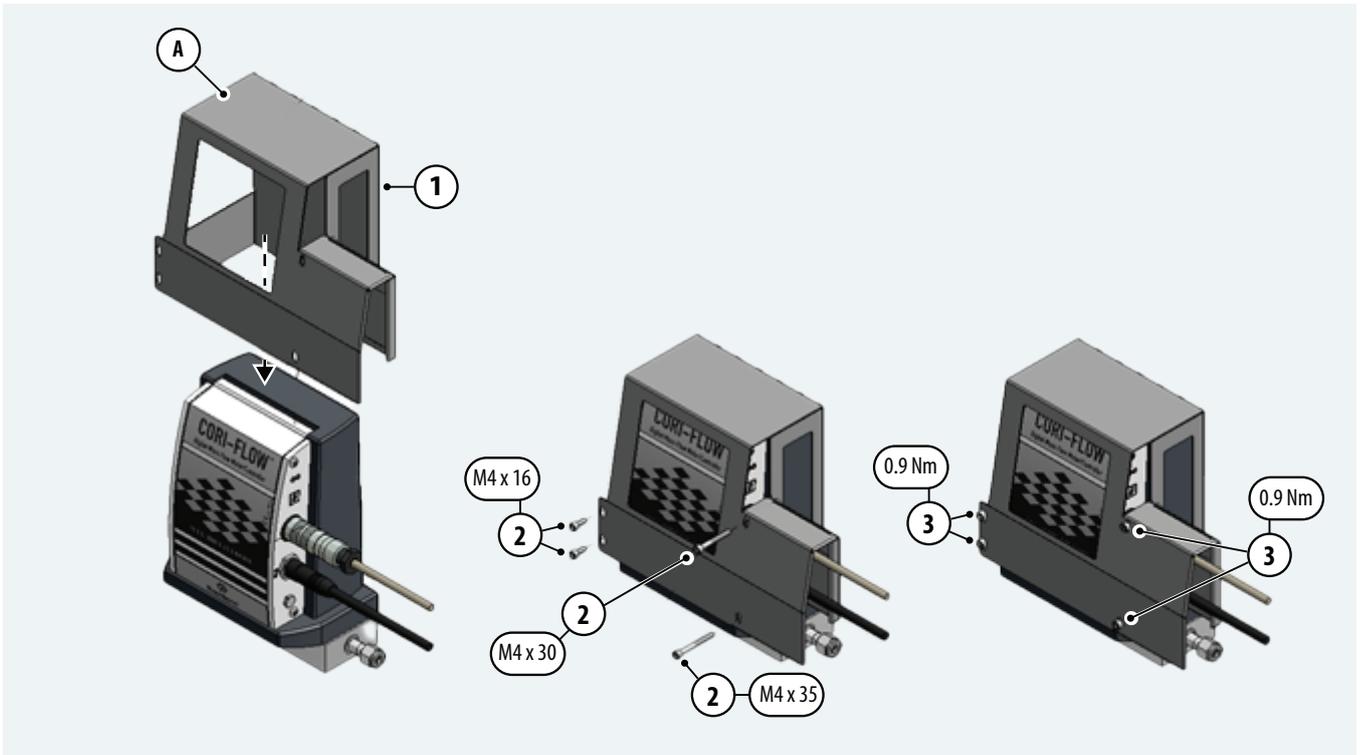


Fig. 7. CORI-FLOW™ - protection cover placement

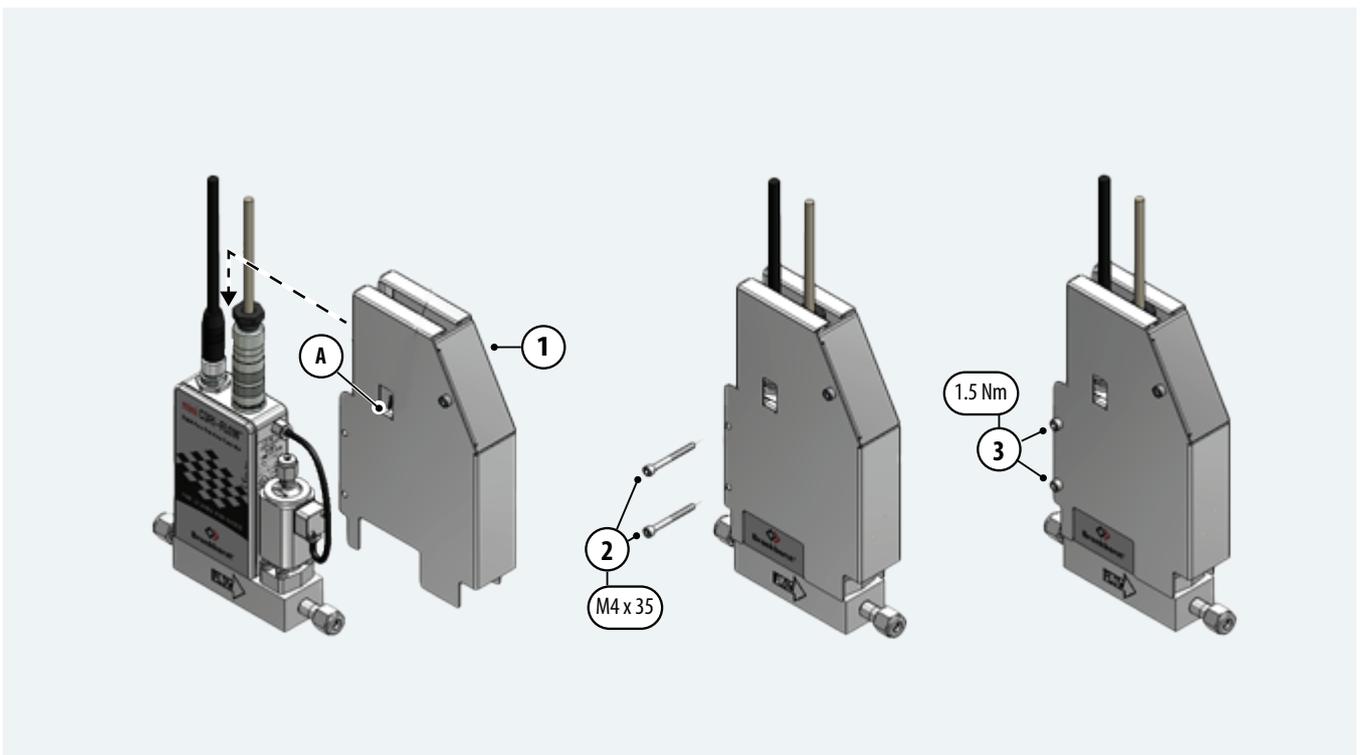


Fig. 8. mini CORI-FLOW™ MFC - protection cover placement

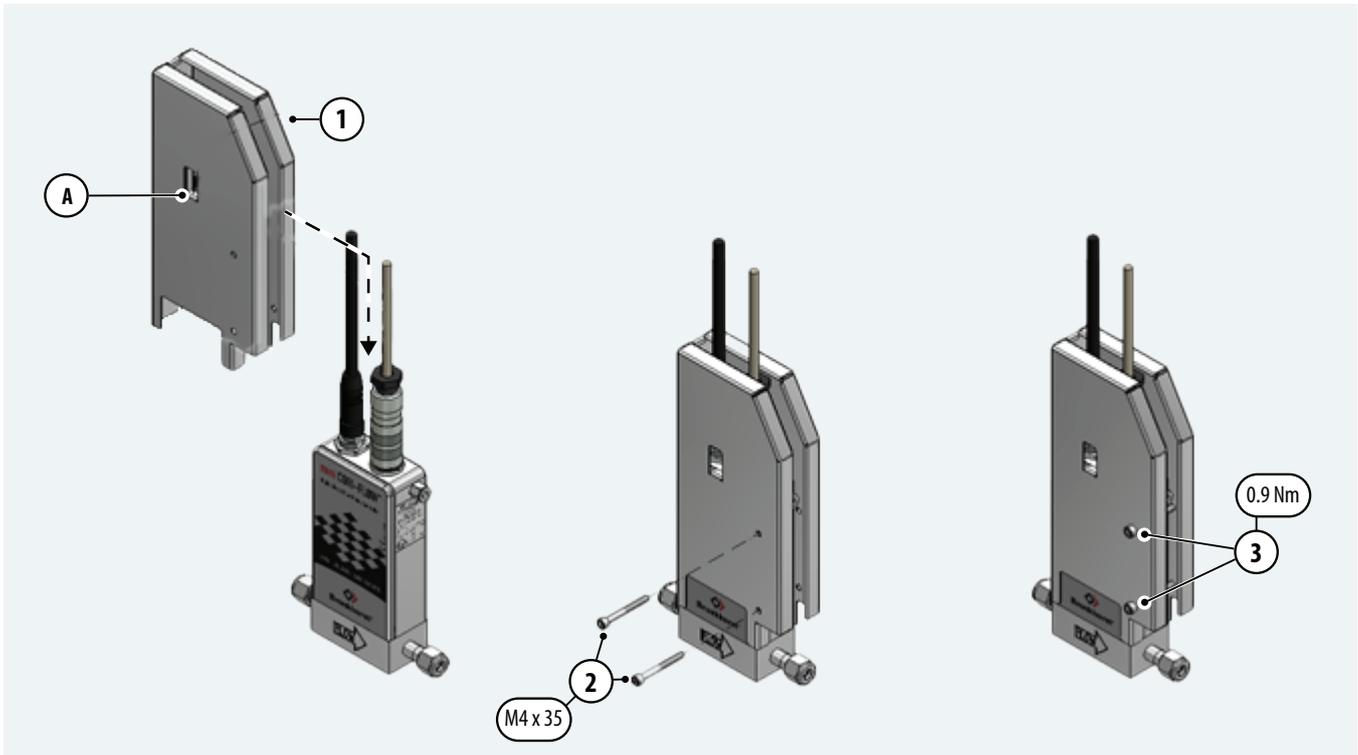


Fig. 9. mini CORI-FLOW™ MFM - protection cover placement

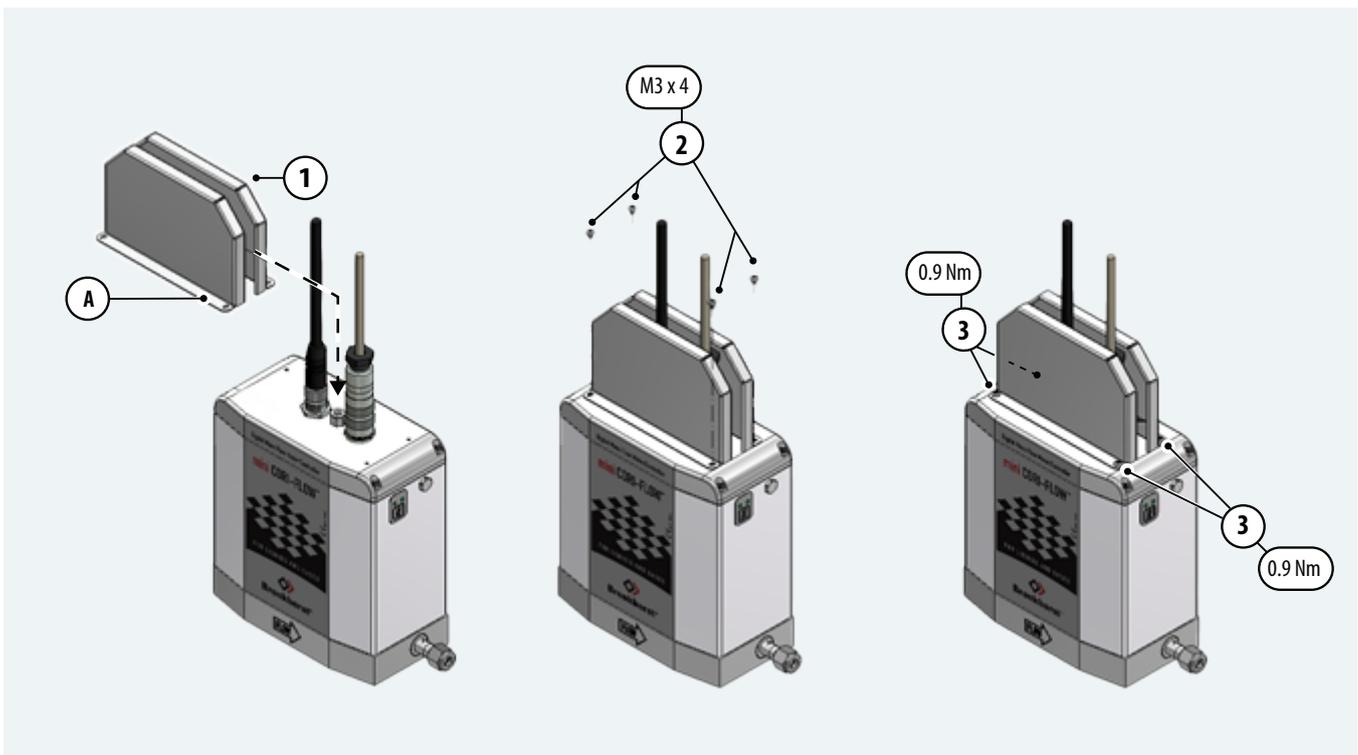


Fig. 10. mini CORI-FLOW™ M15 - protection cover placement

4.6 Alternative impact protection or cabling



It is the user-responsibility that the mating connectors maintain the same level of protection and installation requirements according to category 3 / EPL Gc or EPL Dc.

In case third party mating connectors and mating cables or impact protection covers are used:

- ▶ Evaluate the suitability of the third party mating materials based on an assessment performed by qualified personnel (who are familiar with the requirements of KCs C / IEC 60079-0 and 60079-14 standards).

Alternative mating cables

It is recommended to use standard supplied cables and connectors from Bronkhorst.

DIN/M12 and connectors and cables should also comply with below listed specifications:

Description	Unit	Value
Contact-pin material		Gold or silver plated
Corrosion resistant metal body		Zinc or brass nickel-plated metal or stainless-steel connector material
Minimum continuous operating temperature range	°C	-5...+80°C
Minimum pollution degree		2
Overvoltage category		I, II or III (rated at ≤ 50V)
Insulation material group		III, II, I
Clearance/creepage/dimensions/coding		According to IEC 60130-9 (DIN fem 8 pin 45°,270°) or according to IEC 61076-2-101 (M12-A, M12-B coded)
Locking type		Screw
Min. nominal Voltage range	V	25
Min. nominal Current range	A	1
Min. impulse withstand voltage	V	500
Min. insulation resistance	Ω	> 10 ⁸

Tab. 5. Cable requirements

Alternative mating connectors must easily fit within the confinement of the supplied protective impact covers, unless:

- Other adequate protection against risk of mechanical impact is applied according to KCs C / IEC 60079-0 protecting all electrical connections including valve connectors and cable glands against mechanical impact and:
- The ingress protection (IP) should be maintained at least IP65 unless the environmental specification allows a lower IP rating but shall be not less than IP54.

5 Service 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.



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 chapter 4 of this document and relevant requirements of KCs C / IEC 60079-14 and 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).

Before releasing the process connections

- ▶ Take appropriate preventive measures, such as:
 - Cleaning
 - Flushing or purging of the process lines and wetted parts of the product.

6 Technical specifications

All technical data may be subject to change without notice.

- ▶ Check the Bronkhorst website for latest product information.
- ▶ See for web address on the back cover of these instructions.

Description	Unit	Value
Ambient temperature	°C	0 ... +50
Fluid/process temperature, Tfluid	°C	0 ... +50
Pollution degree (IEC 60664-1)		2
Ingres Protection		IP65
Process Pressure max.	barg	See product sticker
Supply voltage	VDC	15 ... 24
Max. supply current mini CORI-FLOW™	A	0.45
Max. supply current	A	0.35

Tab. 6. Technical specifications

7 Accessories and spare parts

Replacement and spare parts can be ordered based on serial number which is on the label of the product. The following replacement and spare parts are available:

- Mating cables
- IP65 caps
- Transport bolts (CORI-FLOW M15 only)

8 Domestic explosion-proof certification requirements

- List of applicable standards and date of revision: Safety certification notice for protective devices No. 2021-22.
- Installation of explosion-proof equipment must follow KS C IEC 60079-14.
- Regarding maintenance and repair, there is a limit on the responsibility of the user and manufacturer, such as the method and subject.

9 Contact information

Contact information can be found on the back cover of this document.

9.1 Contact information South Korea

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Service



Helpdesk



Downloads



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