Mass flow controller (MFC)/ mass flow meter (MFM) for gases

- Nominal flow ranges from 0.010 l/min to 160 l/min
- High measuring accuracy and repeatability
- Very fast response times
- Easy device exchange due to configuration memory
- Optional: ATEX II Cat. 3G/D or USP Class VI, FDA, EC 1935 conformity

Product variants described in the data sheet may differ from the product presentation and description.

Can be combined with

Type 7011 ▶
Direct-acting 2/2-way plunger valve

Type 6013 ▶
Plunger valve 2/2-way direct-acting

Type 0330 ▶
Direct-acting 2/2 or 3/2-way pivoted armature valve

Type ME43 ▶
Fieldbus gateway

Type ME63 ▶
Industrial Ethernet gateway, IP65/ IP67/ IP69k

Type ME61 ▶
EDIP process display

Type ME66 ▶
büS distribution box, IP65/ IP67/ IP69k

Type description

The mass flow controller (MFC)/mass flow meter (MFM) Type 8742 for gases is suitable for a wide range of applications, e.g. metal and glass manufacturing or processing, fermentation processes, test benches or filling systems and packaging machines. Type 8742 is available in two variants: The variant with several analogue or digital (communication) interfaces and the variant with only a CANopen-based interface. The latter is suitable for integration into existing CANopen networks or - in combination with the fieldbus gateway Type ME43 - for integration in all common industry standards for Industrial Ethernet or fieldbus. This variant is tailor-made for applications with many control loops. Up to 32 MFCs/ MFMs can be connected to one fieldbus gateway. Type ME43 transmits the internal CANopen-based communication to Industrial Ethernet and fieldbus standards. The Mass Flow Controller / Mass Flow Meter can always be switched between büS and CANopen communication. Type 8742 can be configured as required as an MFM or MFC. Optionally, up to four calibration curves can be stored in the device. The thermal MEMS sensor is located directly in the gas flow and achieves very fast response times and the highest level of measuring accuracy, with long-term stable calibration. As the actuator, a Bürkert direct-acting proportional valve guarantees high response sensitivity. The integrated PI controller ensures excellent control characteristics of the MFC. Type 8742 is especially designed for use in harsh environments thanks to its high IP protection class and explosion protection.

Table of contents

1. General technical data

Product properties	
Dimensions	Further information can be found in chapter "4. Dimensions" on page 6.
Materials	
Seal	FKM or EPDM (depending on gas)
Housing	Aluminium die casting (coated)
Base block	Aluminium or stainless steel 1.4404/316L
Wetted parts	Stainless steel 1.4310/302, 1.4113/434, 1.4305/303
Total weight	Approx. 950 g (stainless steel base block)
Configuration management	Further information can be found in chapter "9.3. Configuration management for easy device replacement" on page 24.
LED display [1]	RGB-LED according to NAMUR NE107
Performance data	
Nominal flow range (Q_N) [2]	10 ml/min...160 l/min (N_2)
Operating pressure [3]	MFM: max. 25 bar MFC: max. 25 bar (the maximum operating pressure depends on medium and nominal valve size)
Measuring accuracy [4]	± 0.8 % of reading ± 0.3 % FS (under calibration conditions and after warm-up time to achieve the best measuring conditions)
Repeatability	± 0.1 % FS
Turndown ratio	1:50, optionally 1:100
Settling time (MFC)/Response time (MFM) ($t_{95\%}$)	< 300 ms
Control valve (proportional valve)	**Normally closed**
Valve orifice	0.05...8 mm
K_{VS} value range	0.00006...1.1 m³/h
Electrical data	
Operating voltage	24 V DC
Power consumption [5]	MFM: 1 W MFC: max. 3...17.5 W (depending on type of solenoid control valve)
Residual ripple	± 2 %
Voltage tolerance	± 10 %
Electrical connection	
büS/CANopen variant	M12 plug, 5-pin
Analogue variant	M12 plug, 5-pin, M12 socket, 5-pin
Industrial Ethernet variant	M12 plug, 5-pin, 2 x M8 socket, 4-pin
PROFIBUS DPV1 variant	M12 plug, 5-pin, M12 socket, 5-pin
Medium data	
Operating medium	Neutral, pure gases (others on request) Further information can be found in chapter "6.2. Nominal flow range of typical gases" on page 21.
Calibration medium	Operating medium or air
Medium temperature	- 10 °C...+ 70 °C (- 10 °C...+ 60 °C with oxygen)
Process/Port connection and communication	
Analogue interface	4...20 mA, 0...20 mA, 0...10 V or 0...5 V Input impedance > 20 kΩ (voltage) resp. < 300 Ω (current) Maximum current: 10 mA (voltage output) Maximum load: 600 Ω (current output)
Digital communication interface	büS/CANopen, PROFIBUS DPV1, Industrial Ethernet: EtherCAT®, EtherNet/IP, Modbus TCP
Port connection	G ¼, NPT ¼, sub-base, compression fitting or vacuum fitting, tri-clamp (others on request)
Approvals and conformities	
Protection class	IP65
Certificate	Material certificate 3.1 (optionally)
Explosion protection	Further information can be found in chapter "2.4. Explosion protection" on page 5.
North America (USA/Canada)	Further information can be found in chapter "2.5. North America (USA/Canada)" on page 6.

Foods and Beverages/Hygiene	Further information can be found in chapter **"2.6. Foods and beverages/Hygiene" on page 6**.
Oxygen	Further information can be found in chapter **"2.7. Oxygen" on page 6**.
Environment and installation	
Installation position	Horizontal or vertical
Ambient temperature	- 10 °C...+ 50 °C (higher temperatures on request)
Storage temperature	- 10 °C...+ 70 °C
Relative air humidity	< 95 %, non-condensing
Accessories	
Software-Tool	Bürkert Communicator Further information can be found in chapter **"9.1. Bürkert Communicator software" on page 23**.

1.) For a detailed description of LED colours see **operating instructions Type 8742** ▶

2.) Index N: flow rates with respect to 1.013 bar abs and 0 °C, alternatively: Index S with respect to 1.013 bar abs and + 20 °C

3.) Overpressure to atmospheric pressure

4.) If the operating medium is different from the calibration medium, the actual measurement accuracy might vary from the indicated value. If the operating medium is natural gas, the measurement accuracy depends on the composition of the natural gas, which can vary depending on the origin and season.

5.) Information in relation to the typical power consumption (at + 23 °C ambient temperature, nominal flow and 30 min closed-loop control mode). Information according to UL 61010...1 may vary (see **operating instructions Type 8742** ▶).

2. Approvals and conformities

2.1. General notes

- The approvals and conformities listed below must be stated when making enquiries. This is the only way to ensure that the product complies with all required specifications.

- Not all available variants can be supplied with the below mentioned approvals or conformities.

2.2. Conformity

In accordance with the Declaration of Conformity, the product is compliant with the EU Directives.

2.3. Standards

The applied standards which are used to demonstrate compliance with the EU Directives are listed in the EU-Type Examination Certificate and/or the EU Declaration of Conformity.

2.4. Explosion protection

Approval	Description
	Optional: Explosion protection **ATEX:** **EPS 22 ATEX 1 277 X** II 3G Ex ec IIC T4 Gc II 3D Ex tc IIIC T135 °C Dc **IECEx:** **IECEx EPS 22.0066X** Ex ec IIC T4 Gc Ex tc IIIC T135 °C Dc

2.5. North America (USA/Canada)

| Approval	Description
c(UL)us LISTED	**Optional: UL Listed for the USA and Canada** The products are UL Listed for the USA and Canada according to: • UL 61010-1 (ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE – Part 1: General Requirements) • CAN/CSA-C22.2 No. 61010-1

2.6. Foods and beverages/Hygiene

Conformity	Description
FDA	**FDA – Code of Federal Regulations (valid for variable code PL02, PL03)** All wetted materials are compliant with the Code of Federal Regulations published by the FDA (Food and Drug Administration, USA) according to the manufacturer's declaration.
USP	**United States Pharmacopeial Convention (USP) (valid for variable code PL04)** All wetted materials are biocompatible according to the manufacturer's declaration.
(glass & fork symbol)	**EC Regulation 1935/2004 of the European Parliament and of the Council (valid for variable code PL01, PL02)** All wetted materials are compliant with EC Regulation 1935/2004/EC according to the manufacturer's declaration.

2.7. Oxygen

Conformity	Description
O_2	**Optional: Suitability for oxygen (valid for the variable code NL02)** The products are suitable for use with gaseous oxygen, according to the manufacturer's declaration.

3. Materials

3.1. Bürkert resistApp
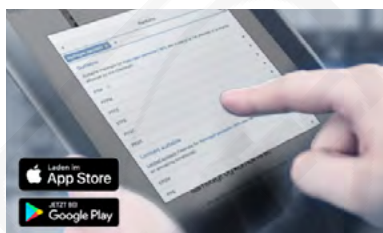
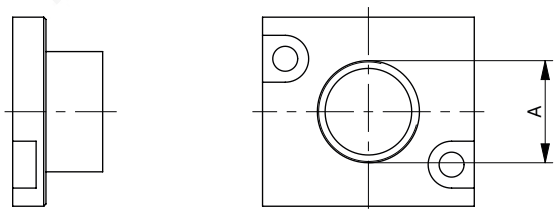**Bürkert resistApp – Chemical Resistance Chart**

You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

Start chemical resistance check
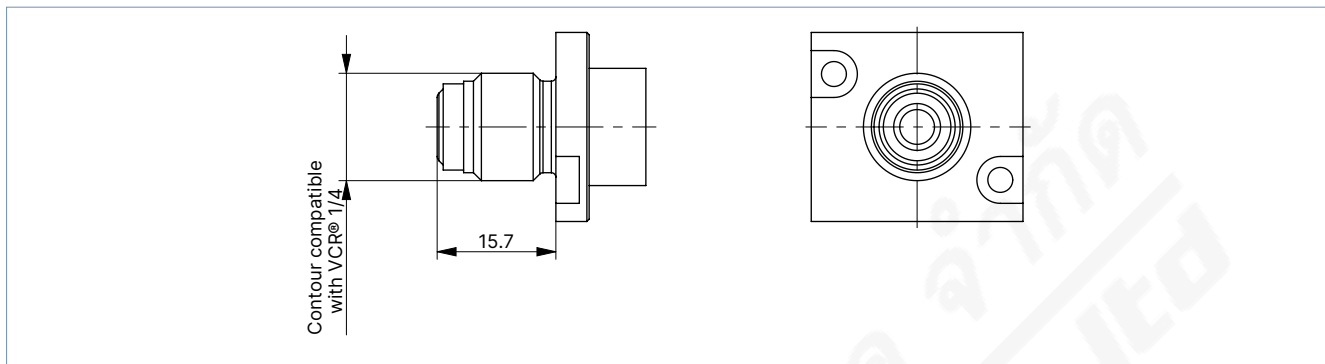
4. Dimensions

4.1. Threaded variant connections

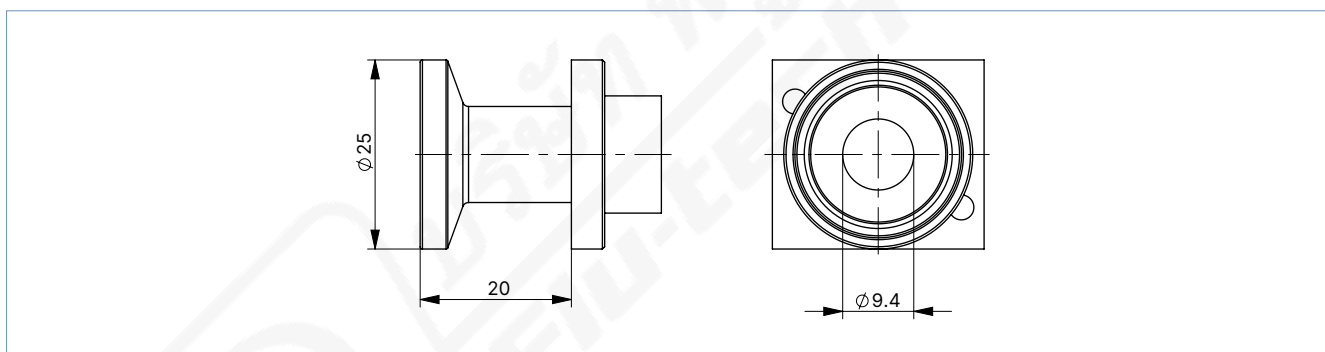**Small nominal flow rates, with internal threaded connection**

Dimensions	Thread (A)	Thread depth [mm]
	G ¼, NPT ¼	12
	G ⅛, NPT ⅛	12

@flutech.co.th   0 2384 6060   www.flutech.co.th   sales@flutech.co.th

Type 8742

Small nominal flow rates, compatible with VCR®

Note:
Dimensions in mm

Contour compatible with VCR® 1/4

15.7

Small nominal flow rates, with tri-clamp DN 15... ½"

Note:
Dimensions in mm

Ø 25

20

Ø 9.4
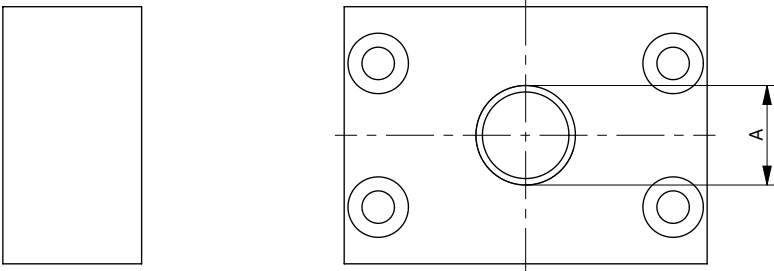
Small nominal flow rates, with tri-clamp DN 20... ¾"

Note:
Dimensions in mm

Ø 25

20

Ø 15.75

Large nominal flow rates, with internal threaded connection

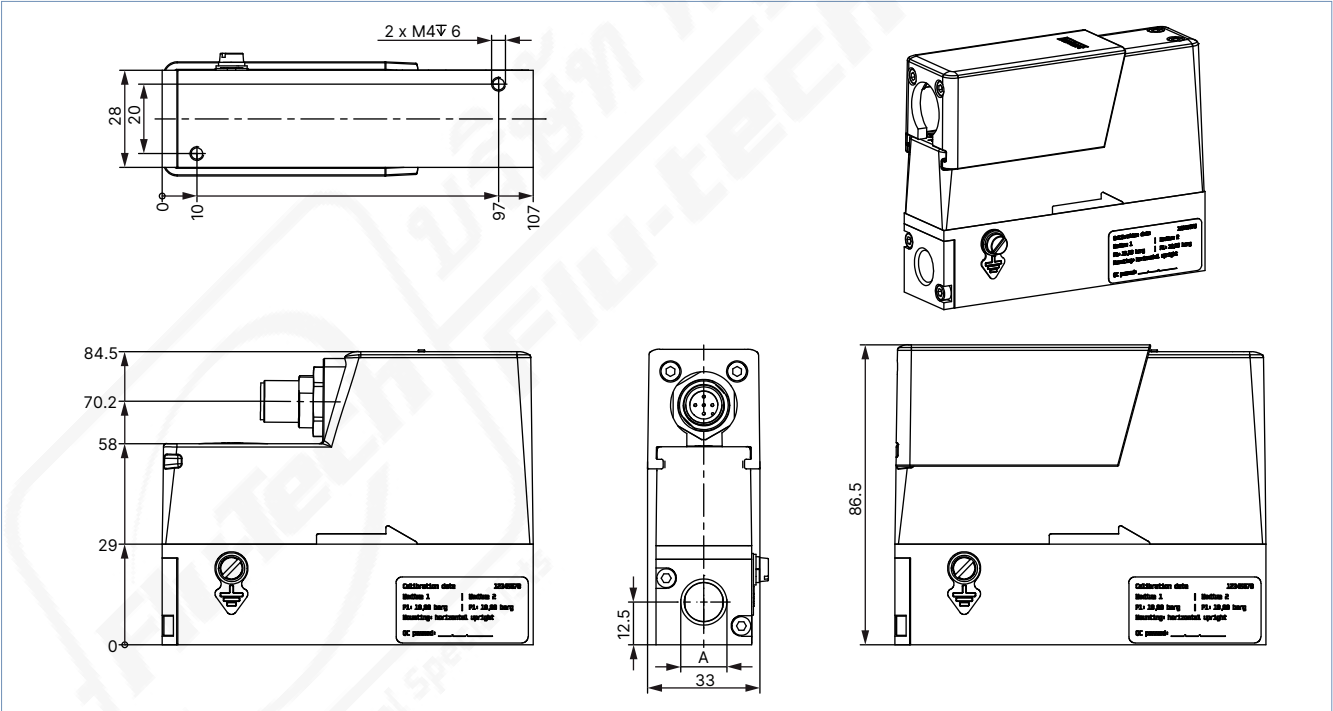| Dimensions		Thread (A)	Thread depth [mm]
		G ¼	12
		NPT ¼	11
		G ⅜	12
		NPT ⅜	11
		G ½	15
		NPT ½	14
		G ¾	16
		NPT ¾	15

4.2. Variant with büS/CANopen interface

MFC with valve Type 2871/MFM

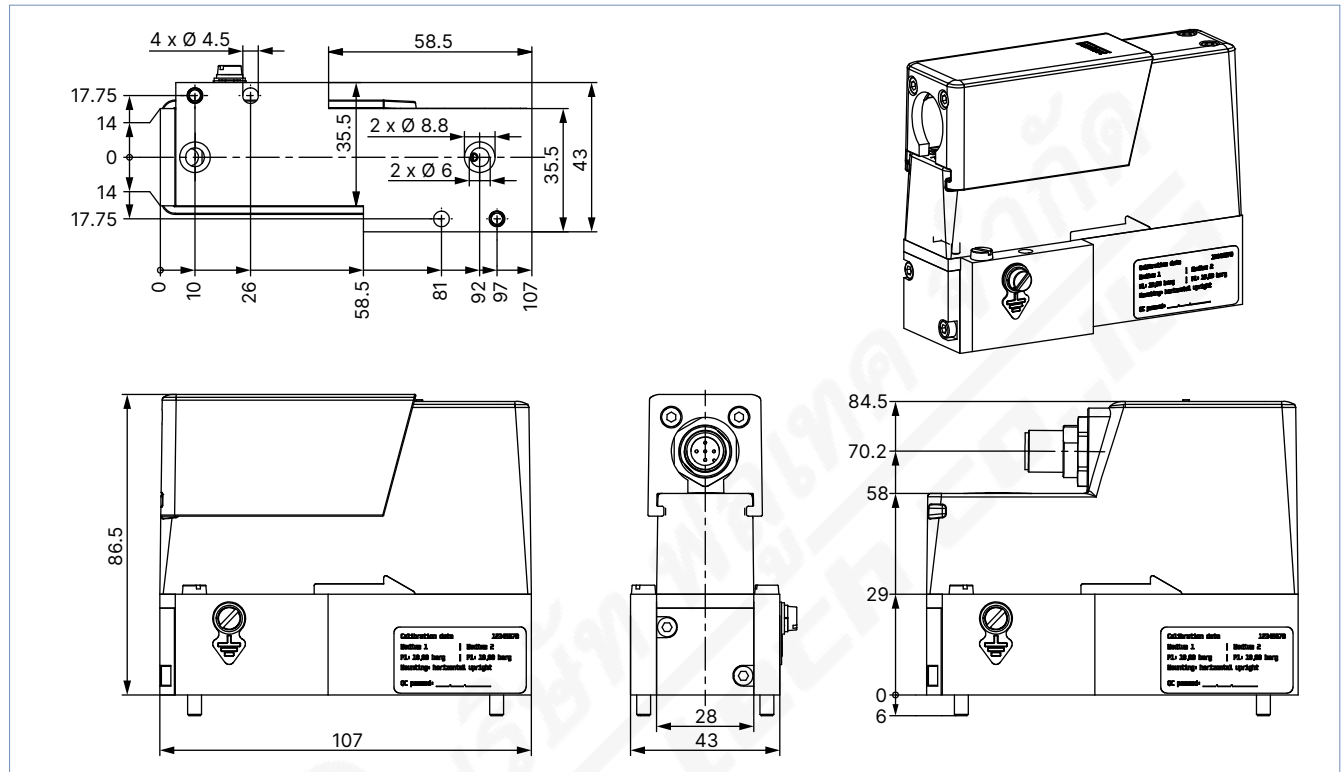**Variant with base block C0...C4 for small nominal flow rates**

Note:
Dimensions in mm

@flutech.co.th   0 2384 6060   www.flutech.co.th   sales@flutech.co.th

Type 8742

Sub-base variant

Note:
Dimensions in mm

MFC with valve Type 2873

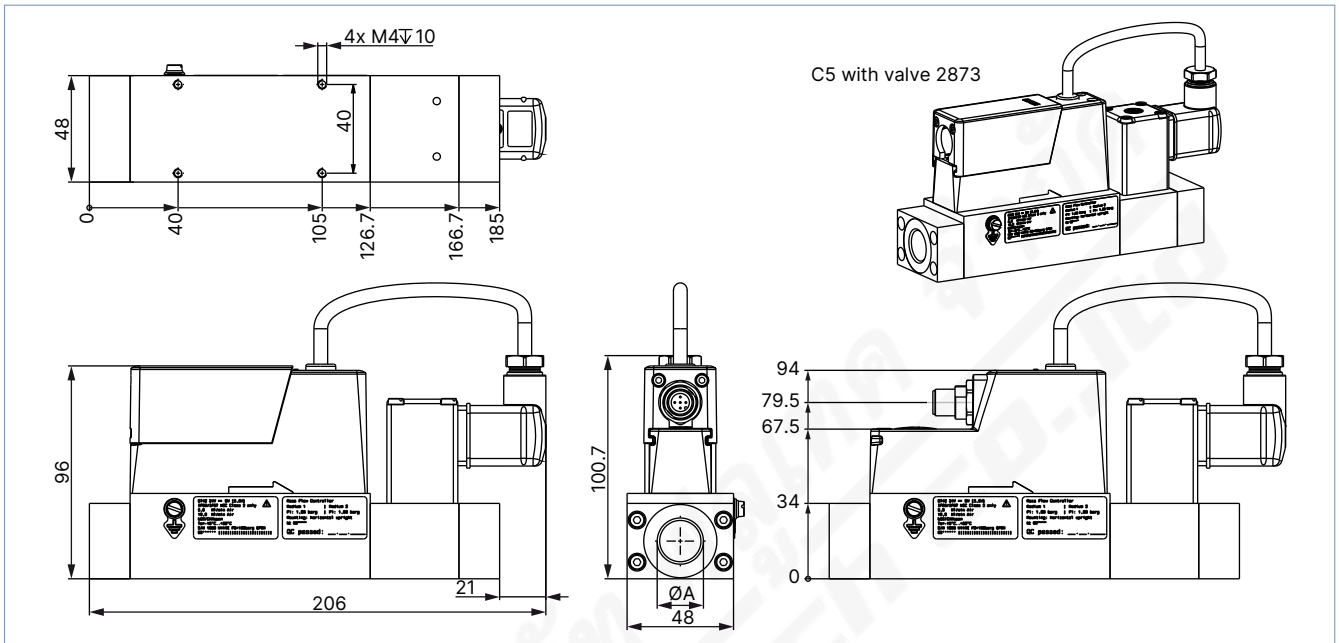**Variant with base block C0...C4 for small nominal flow rates**
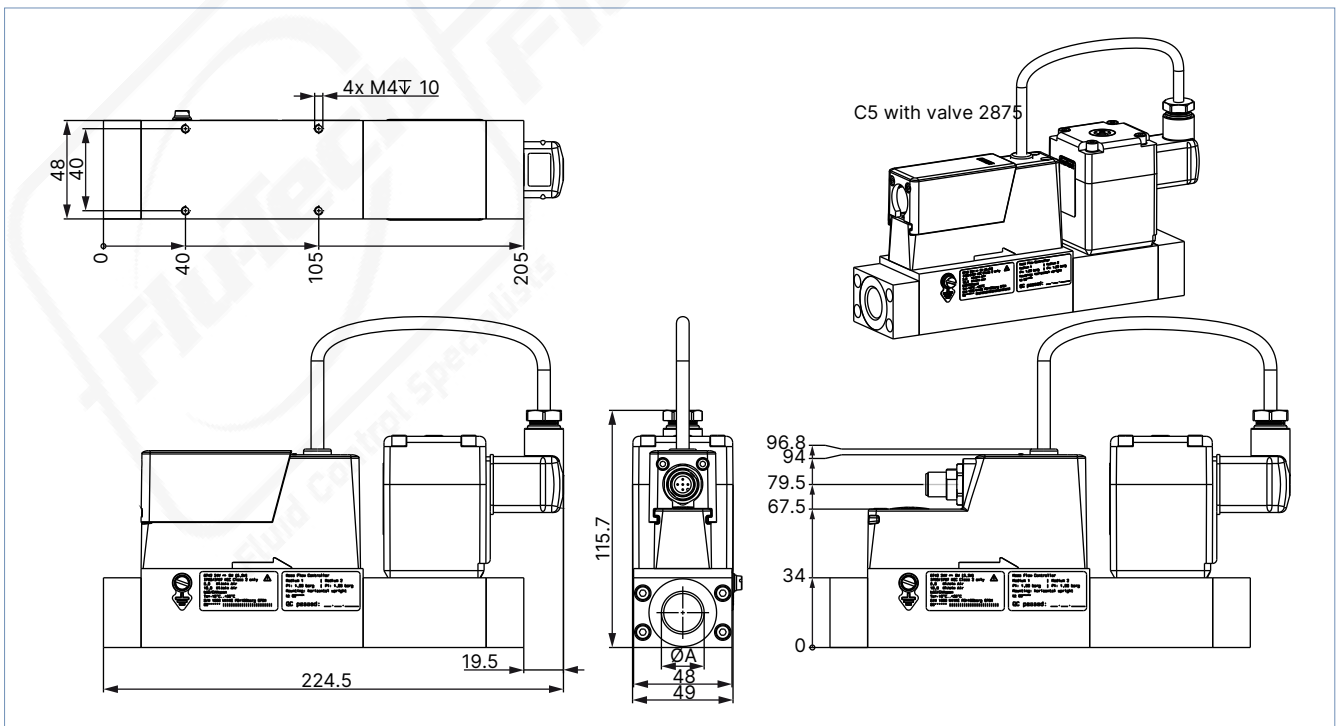
Note:
Dimensions in mm

with valve 2873

Version EXTV screw connection
with metal sealing disc

Contour compatible
with VCR® 1/4

burkert
FLUID CONTROL SYSTEMS

Variant with base block C5 for large nominal flow rates

Note:
Dimensions in mm

C5 with valve 2873

MFC with valve Type 2875

Variant with base block C5 for large nominal flow rates

Note:
Dimensions in mm

C5 with valve 2875

@flutech.co.th   0 2384 6060   www.flutech.co.th   sales@flutech.co.th

Variant with base block C5 for large nominal flow rates
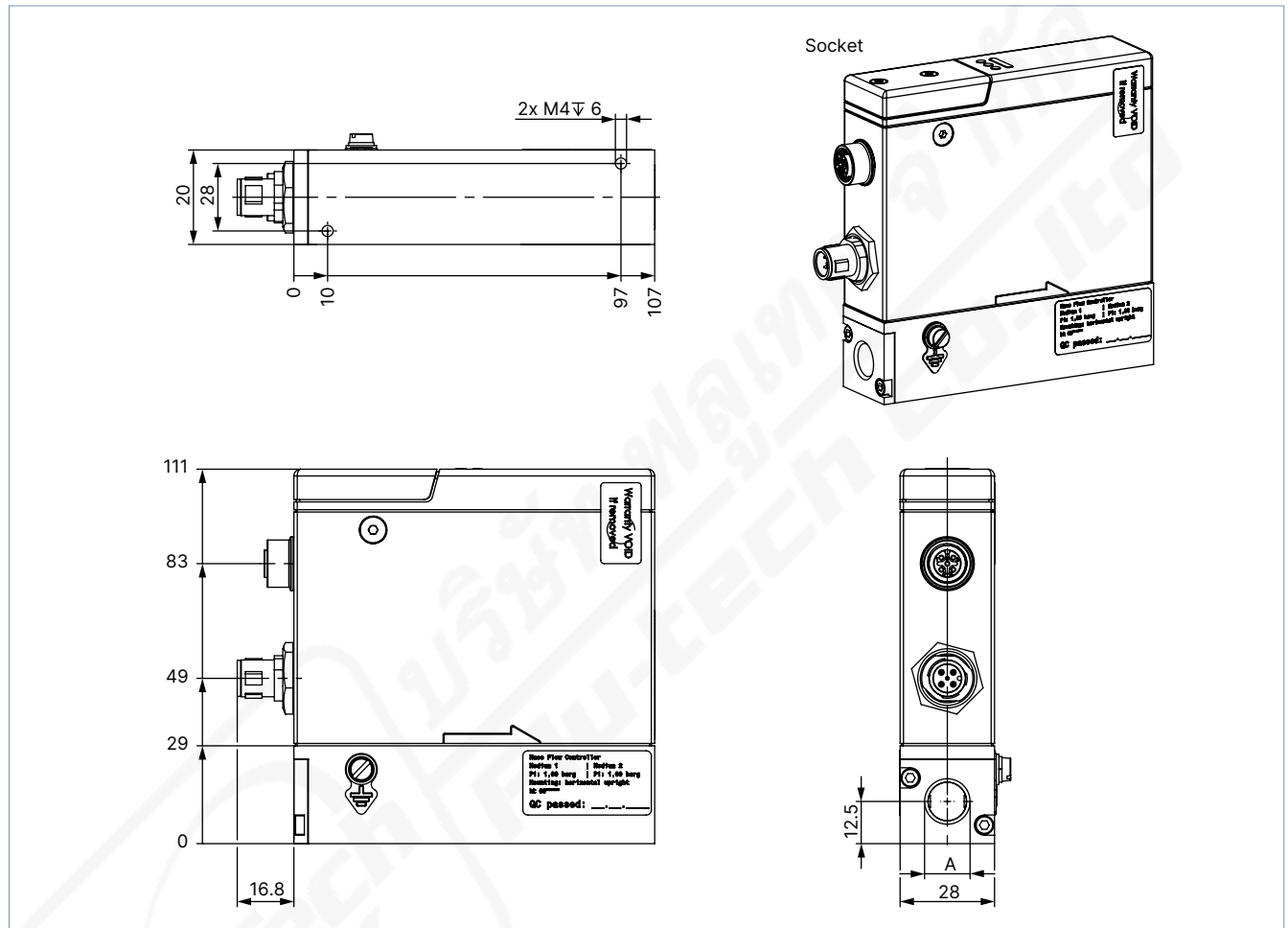
Note:
Dimensions in mm

Socket C5
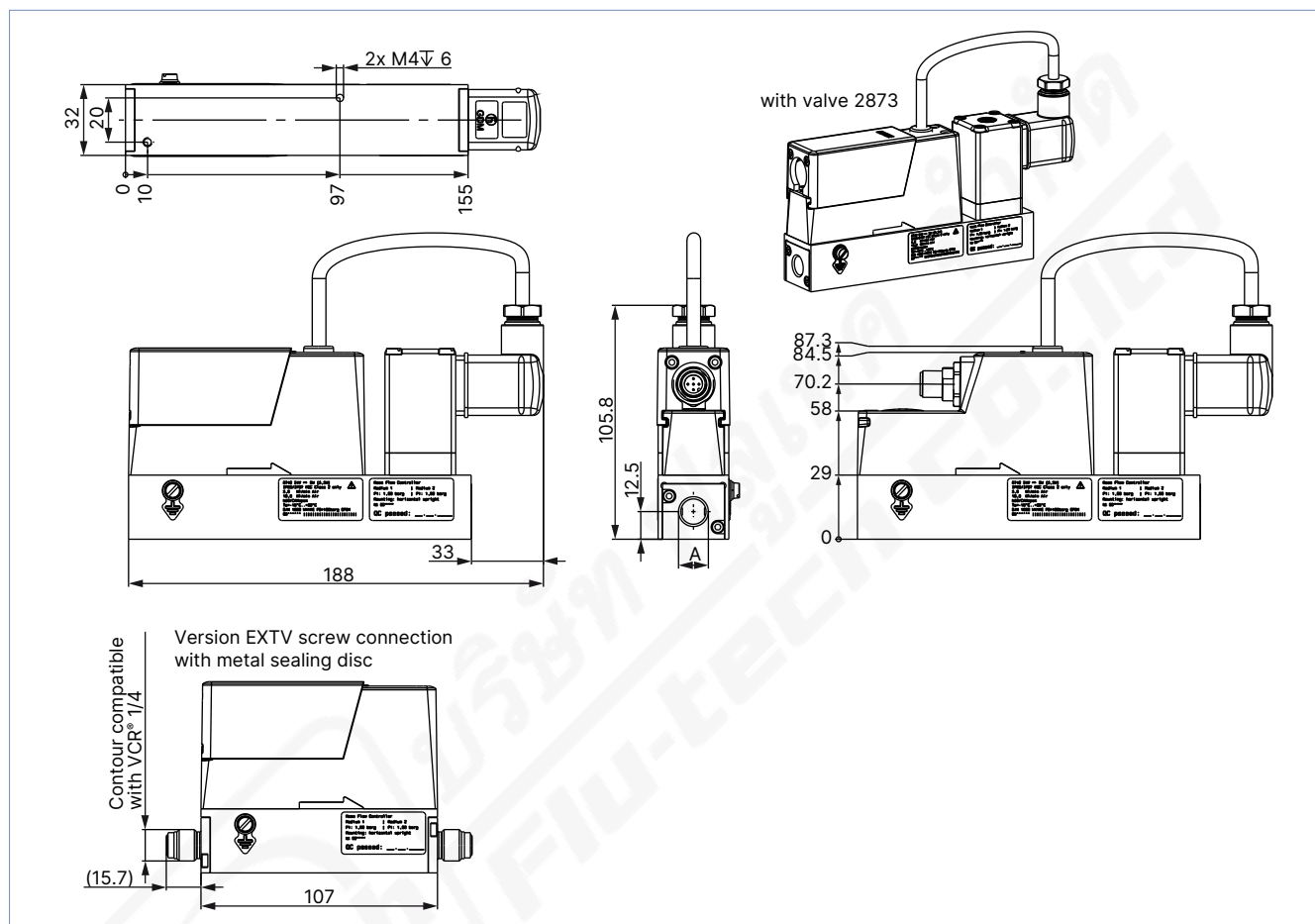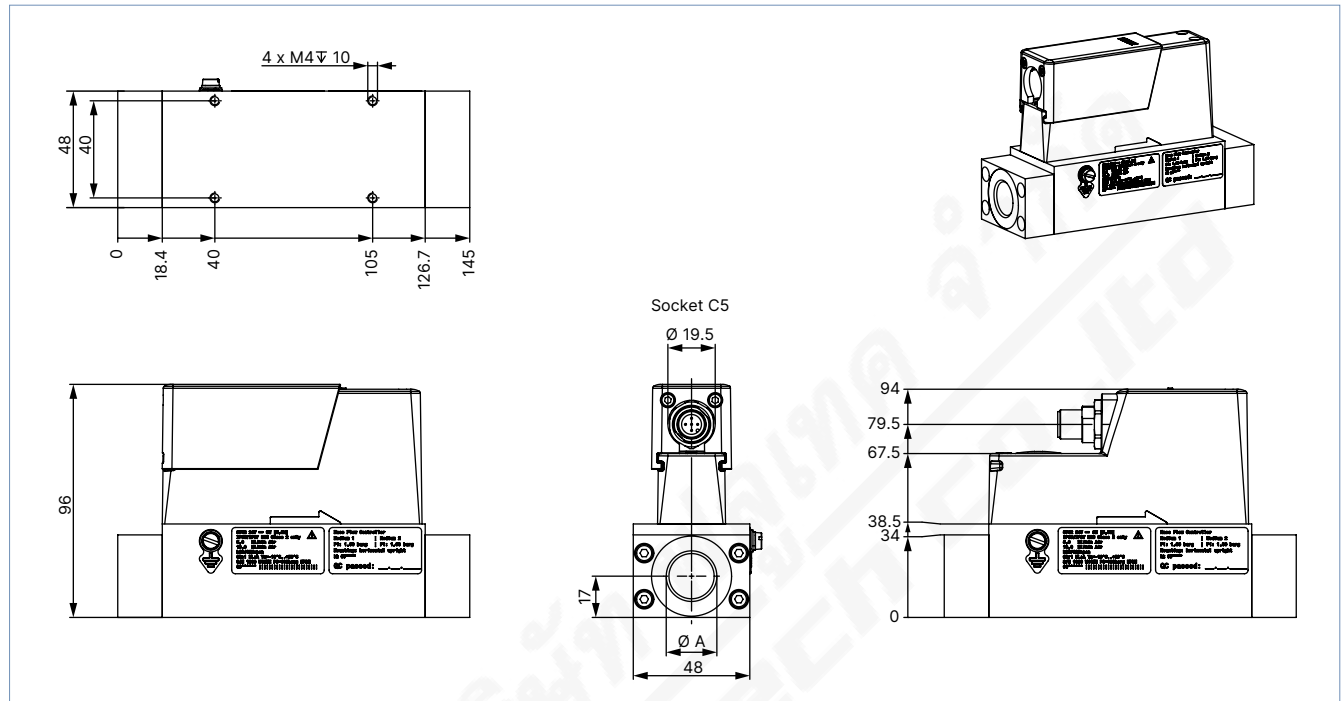
4.3. Variant with analogue or PROFIBUS DPV1 interface

MFC with valve Type 2871/MFM

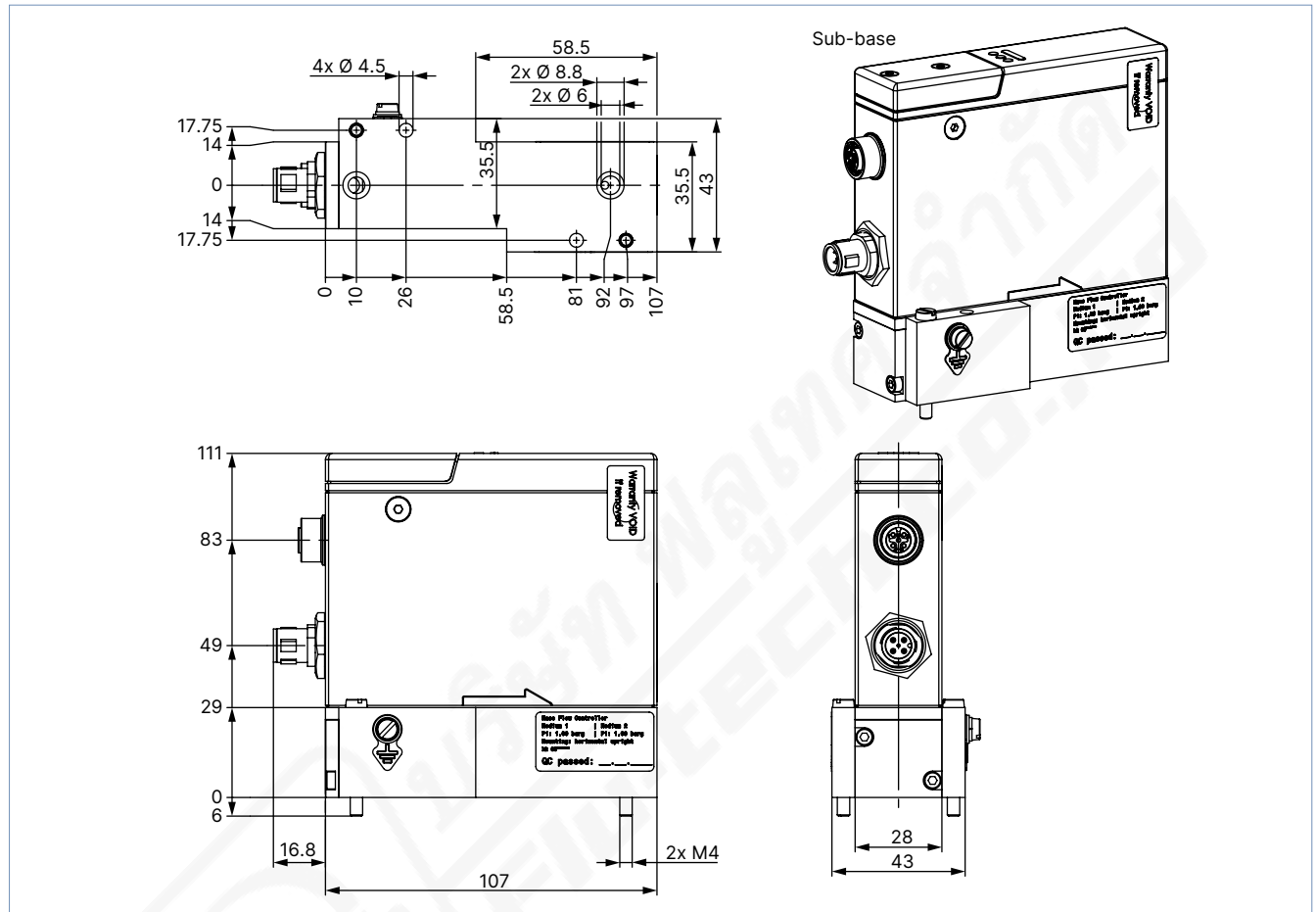**Variant with base block C0...C4 for small nominal flow rates**

Note:
Dimensions in mm

@flutech.co.th   0 2384 6060   www.flutech.co.th   sales@flutech.co.th

Type 8742

Sub-base variant

Note:
Dimensions in mm

MFC with valve Type 2873

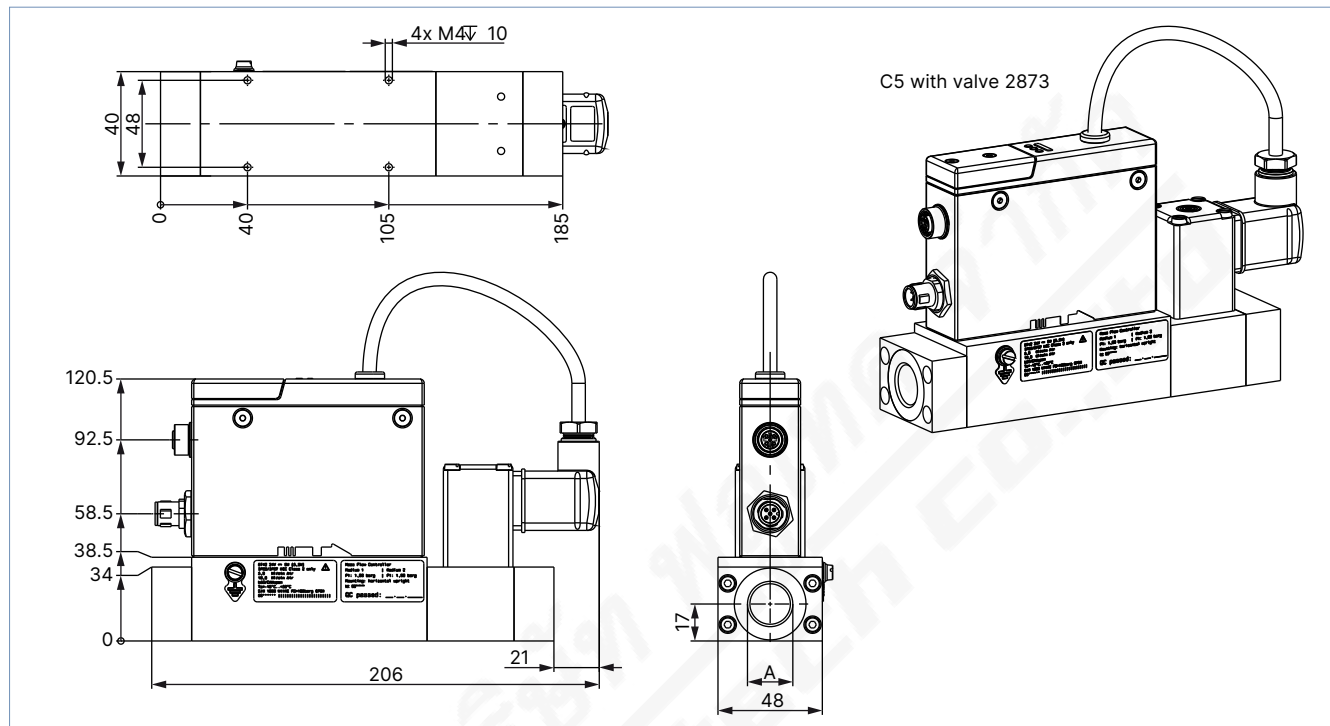### Variant with base block C0...C4 for small nominal flow rates

Note:
Dimensions in mm

with valve Type 2873

EXTV screw connection variant
with metal sealing disc

Contour compatible
with VCR® 1/4

Variant with base block C5 for large nominal flow rates

Note:
Dimensions in mm

C5 with valve 2873

MFC with valve Type 2875

Variant with base block C5 for large nominal flow rates

Note:
Dimensions in mm

C5 with valve 2875

Type 8742

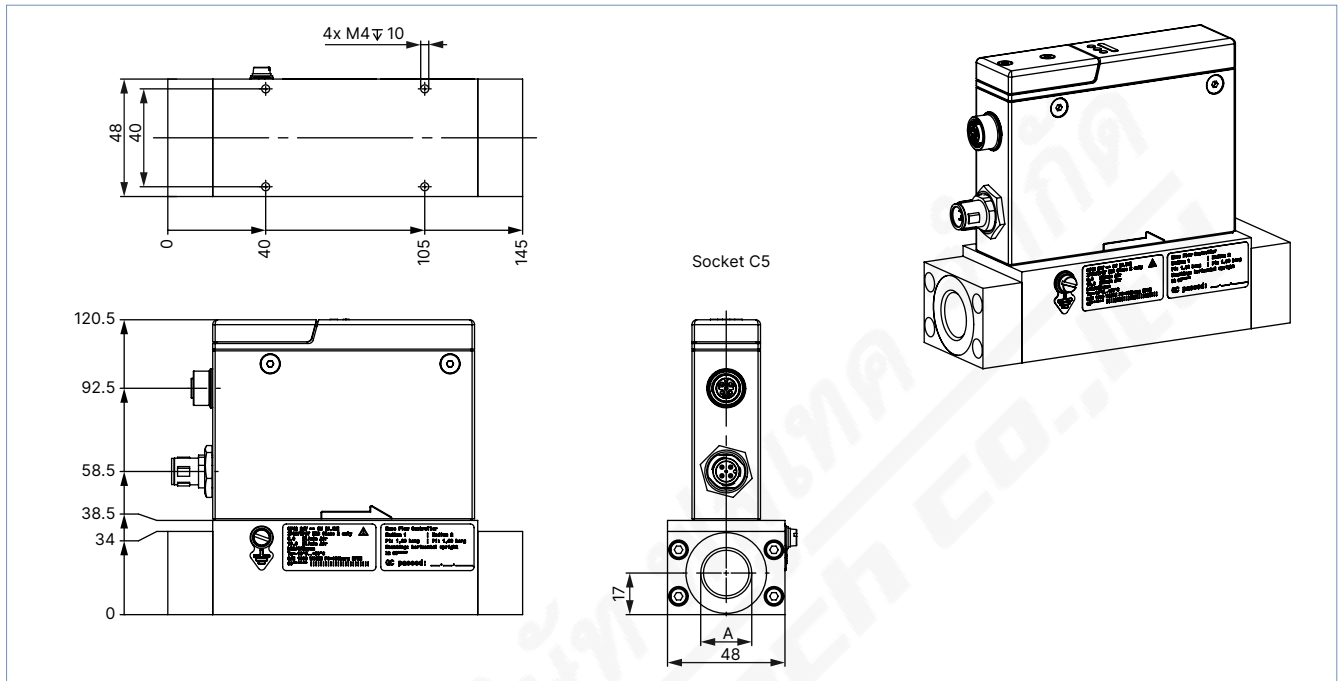**Variant with base block C5 for large nominal flow rates**

Note:
Dimensions in mm

Socket C5

@flutech.co.th   0 2384 6060   www.flutech.co.th   sales@flutech.co.th
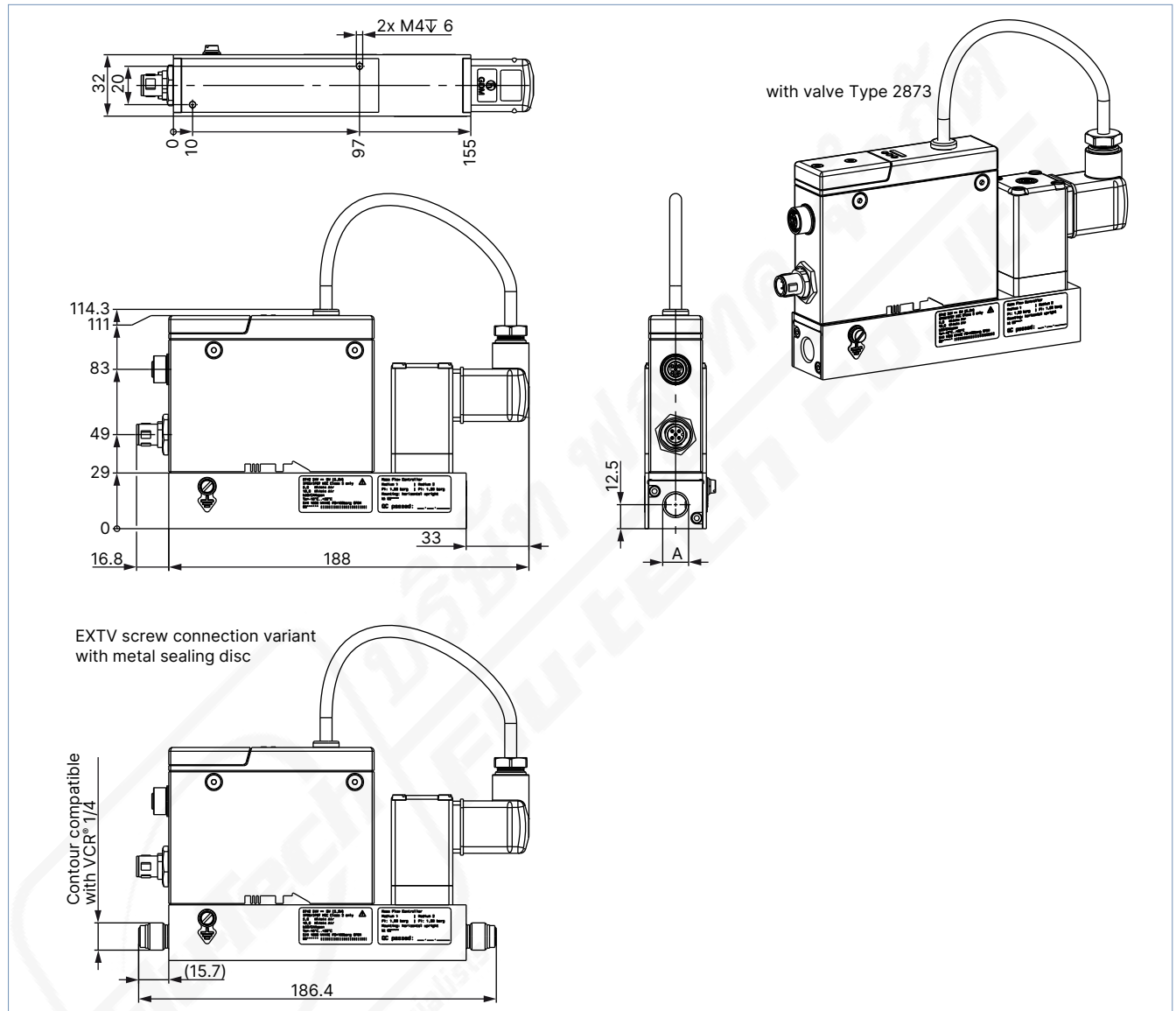
4.4. Variant with Industrial Ethernet interface

Note:
Dimensions in mm

burkert
FLUID CONTROL SYSTEMS
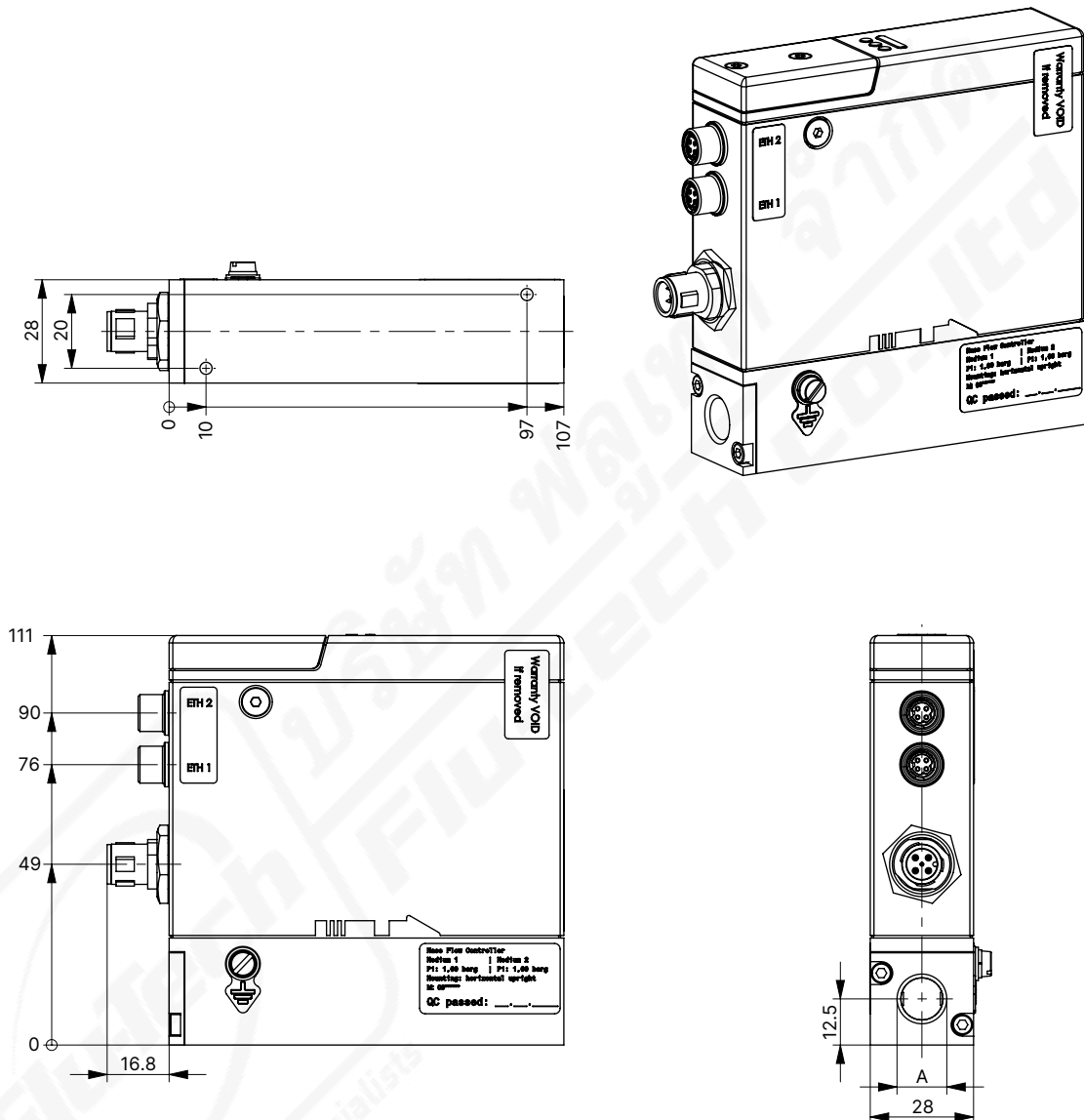
5. Device / Process connections

5.1. büS/CANopen
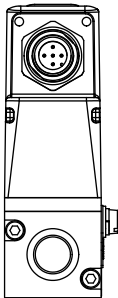
M12 plug, 5-pin (A-coded)	Pin	Assignment
	1	Shielding
	2	24 V
	3	DGND
	4	CAN_H
	5	CAN_L

5.2. Industrial Ethernet
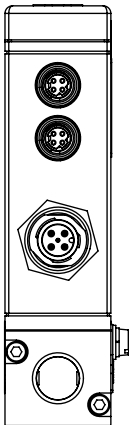
2 x M8 socket, 4-pin (D-coded)	Pin	Assignment
	1	TX +
	2	RX +
	3	TX −
	4	RX −

M12 plug, 5-pin (A-coded)	Pin	Assignment
	1	Shielding
	2	24 V
	3	GND
	4	Not connected
	5	Not connected

5.3. Analogue
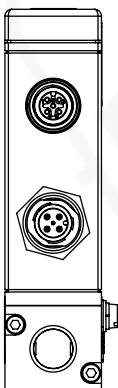
M12 socket, 5-pin (A-coded)	Pin	Assignment
	1	Digital input GND
	2	Digital input +
	3	Relay, reference contact
	4	Relay, normally closed contact
	5	Relay, normally open contact

M12 plug, 5-pin (A-coded)	Pin	Assignment
	1	GND for the analogue output (for MFM) or GND for the analogue output and the set-point value input (for MFC)
	2	24 V
	3	GND for supply voltage
	4	Set-point value input (not connected for MFM)
	5	Analogue output for the measured value

@flutech.co.th   0 2384 6060   www.flutech.co.th   sales@flutech.co.th

5.4. PROFIBUS DPV1
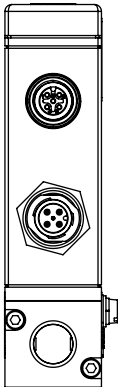
M12 socket, 5-pin (B-coded)	Pin	Assignment
	1	5 V
	2	RxD / TxD (Line A)
	3	DGND
	4	RxD / TxD (Line B)
	5	Not connected

M12 plug, 5-pin (A-coded)	Pin	Assignment
	1	Shielding
	2	24 V
	3	GND
	4	Not connected
	5	Not connected

6. Performance specifications

6.1. MFM pressure loss diagram

The diagram shows an example of the pressure loss characteristics when air flows through. To determine the pressure loss of other gases, the corresponding air equivalent must first be calculated and the base block used for the other gas taken into account.
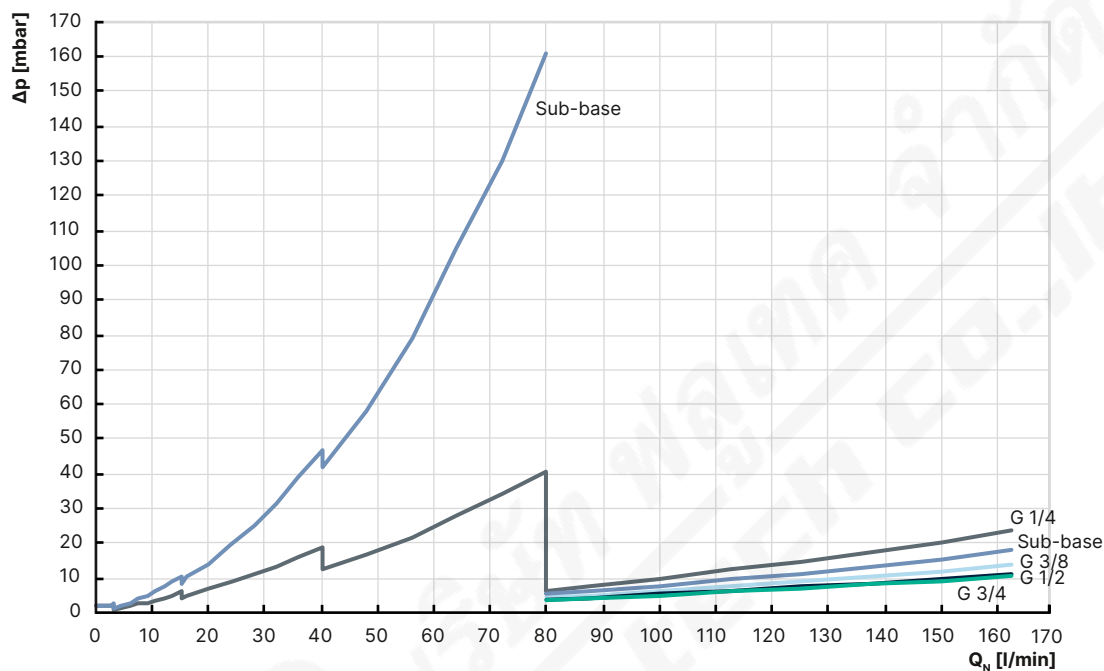
6.2. Nominal flow range of typical gases

Note:

- All values refer to 1013.25 mbar abs and 273.15 K (0 °C) (Index N)
- Other gases and gas mixtures are possible on request.

Gas	Min. Q_N [l/min]	Max. Q_N [l/min]
Acetylene	0.01	65
Argon	0.01	160
Helium	0.01	1000
Carbon dioxide	0.02	80
Air	0.01	160
Methane	0.01	160
Propane	0.03	44
Oxygen	0.01	160
Nitrogen	0.01	160
Hydrogen	0.01	1000

7. Product operation

7.1. Measuring principle

Measurement takes place via bypass. A laminar flow element (LFE) in the main channel creates a low pressure drop. A part of the gas flow is thereby directed into a side channel. A sensor measures the mass flow as temperature difference. The measurement is performed in a specially shaped flow channel whose wall contains a Si chip with an etched membrane. A heating resistor and 2 temperature sensors, one upstream and one downstream, are placed on this membrane.
If the heating resistor is fed with a constant voltage, the differential voltage of the temperature sensors indicate the gas flow over the chip.
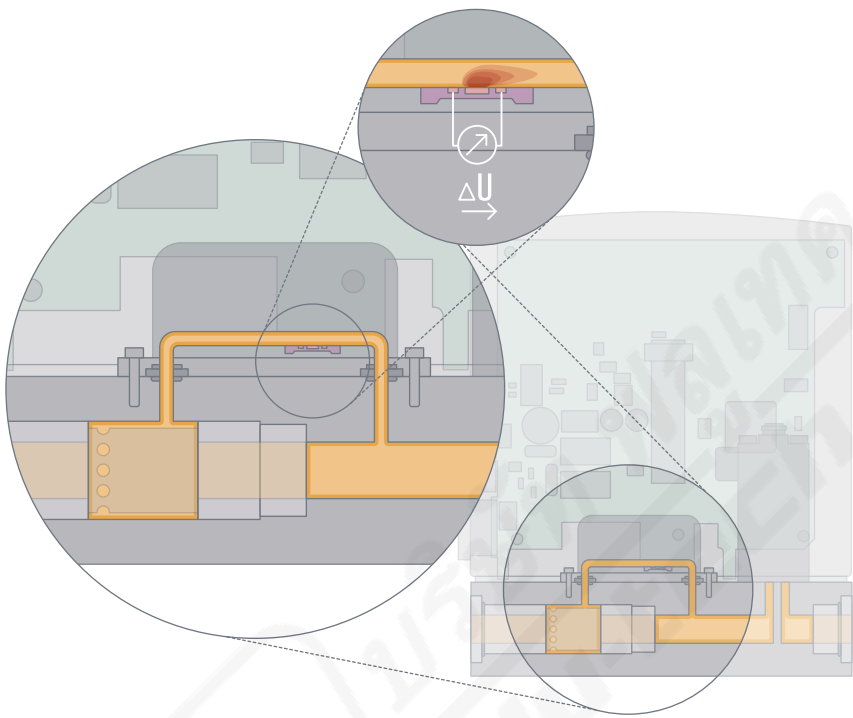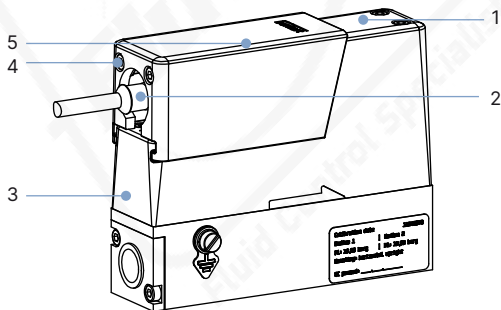

8. Product design and assembly

8.1. Measures to comply with ATEX requirements

Note:
Devices with ATEX conformity meet protection class IP65.

No.	Description
1	The standard requirements for cable glands are fulfilled for variants with external valve.
2	The M12 plug provides protection class IP65 regardless if plugged in or not.
3	The die-cast housing provides IP protection even under high mechanical stress.
4	The screws prevent loosening of the protection cap and hence the M12 connection under tensile stress.
5	The protection cap prevents damage of the M12 plug and all connected elements if mechanical stress is applied. No particular ATEX sockets are required.

9. Product accessories

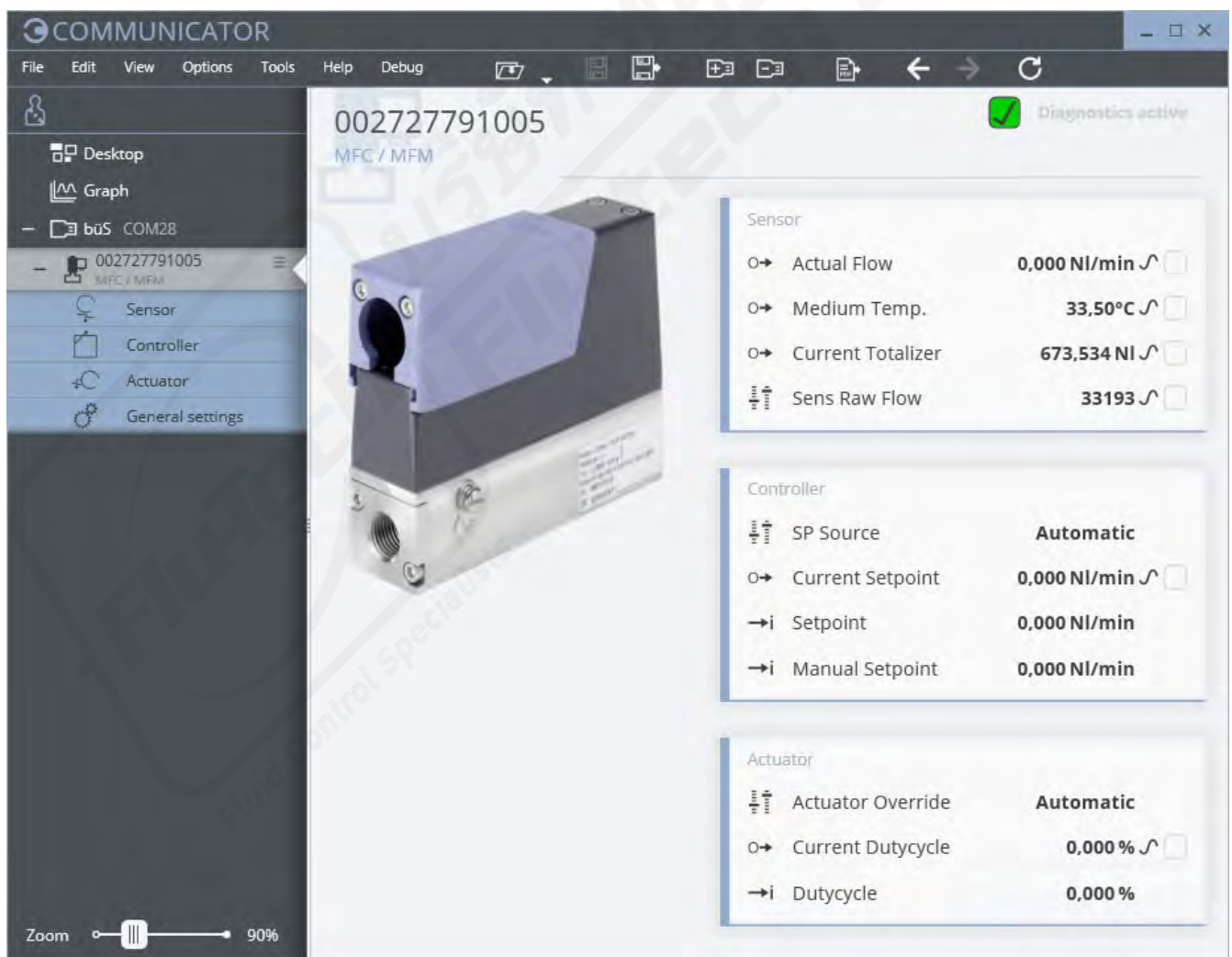## 9.1. Bürkert Communicator software

Note:
The corresponding communication software can be downloaded from the website **Type 8920 ▶**.

The Bürkert Communicator is the most important software component of the EDIP (Efficient Device Integration Platform). Various features of this universal tool simplify the configuration and parametrisation of devices equipped with a digital CANopen-based interface. With this tool, the user has a complete overview of cyclic process values as well as acyclic diagnostic data. The integrated graphical programming environment enables the creation of decentralised sub-system control functions. The connection to the PC is established with a USB büS interface set. The adapter is available as an accessory (see).

The Bürkert Communicator enables:

- Configuration, parametrisation and diagnosis of EDIP devices / networks
- Switching between defined gases
- Easy and comfortable mapping of cyclic values
- Graphic display, monitoring and storage of process values
- Firmware update of the connected EDIP devices
- Saving and restoring device configurations
- Zero-point adjustment in case of changed ambient conditions
- Guided re-calibration routine

9.2. Connecting Type 8742 with the Bürkert Communicator software

The Bürkert Communicator interface is based on CANopen. The appropriate bus termination is mandatory. For Type 8742 Analogue, Industrial Ethernet or PROFIBUS DPV1, activate the termination resistor switch on the büS stick. For Type 8742 büS/CANopen, the termination resistor must not be activated in case the device is already integrated in a properly terminated bus network.

- For Type 8742 Analogue, Industrial Ethernet or PROFIBUS DPV1, the connection is established via the device's micro USB socket (USB büS interface set 2 contains the necessary accessories).
- For Type 8742 büS/CANopen, the connection is established via the 5-pin M12 plug (USB büS interface set 1 contains the necessary accessories).

Please note: no external power supply must be connected to the micro USB socket. The device must be provided with power as described in chapter **"5. Device / Process connections" on page 19**.

9.3. Configuration management for easy device replacement

Depending on the electrical connection of the MFC, the following options for device replacement are available:

- If a device needs to be replaced, the memory card can be removed from the defective device and inserted into the new one. This transfers all data of the device to be replaced to the new device. The memory card is available as an accessory and must be ordered separately (see **"10.5. Ordering chart accessories" on page 25**).
- Option for Type 8742 büS/CANopen: The device is exchanged via the configuration provider of the higher-level gateway control (ME43 or ME63). In the gateway, a memory card is required. The memory card is available as an accessory and must be ordered separately (see **"10.5. Ordering chart accessories" on page 25**).

In order to successfully exchange the device, it is necessary that both the new device and the device to be replaced possess the same device ID.

9.4. Web server for Industrial Ethernet variant

The Industrial Ethernet-based devices (except for the EtherCAT® protocol) from software version A.13.00.00 or higher dispose of an integrated web server. The server can be accessed via a web browser by entering the device's IP address (factory setting IP192.168.1.100).

10. Ordering information

10.1. Bürkert eShop

Bürkert eShop – Easy ordering and quick delivery

You want to find your desired Bürkert product or spare part quickly and order directly? Our online shop is available for you 24/7. Sign up and enjoy all the benefits.

Order online now

10.2. Recommendation regarding product selection

Note:
Use the Product Enquiry Form (see **"10.4. Bürkert Product Enquiry Form" on page 25**) for the device details and send it to us once completed.

For the proper choice of the actuator orifice within the MFC, you need to know not only the required maximum flow rate Q_N but also the pressure values directly before and after the MFC (p_1, p_2) at Q_N. In general, these pressures are not the same as the overall inlet and outlet pressures of the whole plant, because usually, additional flow resistors (tubing, additional shut-off valves, nozzles etc.) are present both before and after the MFC.

Please use the Product Enquiry Form to indicate the pressures directly before and after the MFC. If these are unknown or not accessible to measurement, estimates are to be made by taking into account the approximate pressure drops over the flow resistors before and after the MFC, at Q_N flow rate. In addition, please quote the maximum inlet pressure $p_{1\,max}$ to be encountered. This data is needed to make sure the actuator is able to provide a close-tight function within all the specified modes of operation.

@flutech.co.th   0 2384 6060   www.flutech.co.th   sales@flutech.co.th
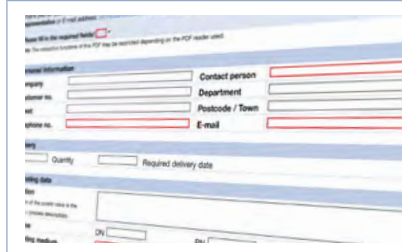
10.3. Bürkert product filter

Bürkert product filter – Get quickly to the right product

You want to select products comfortably based on your technical requirements?
Use the Bürkert product filter and find suitable articles for your application quickly and easily.

[Try out our product filter]

10.4. Bürkert Product Enquiry Form

Bürkert Product Enquiry Form – Your enquiry quickly and compactly

Would you like to make a specific product enquiry based on your technical requirements? Use our Product Enquiry Form for this purpose. There you will find all the relevant information for your Bürkert contact. This will enable us to provide you with the best possible advice.

[Fill out the form now]

10.5. Ordering chart accessories

| Description	Article no.
General accessories	
USB büS interface set 1 (Type 8923) for connection to the Bürkert Communicator software: includes connection cable (M12 and micro USB), stick with integrated terminating resistor, power supply and software	772426 🛒
USB büS interface set 2 (Type 8923) for connection to the Bürkert Communicator software: including büS stick, connection cable to M12 plug, M12 connection cable on micro USB for the büS service interface and Y-distributor, cable length: 0.7 m	772551 🛒
Power supply unit Phoenix Class2 (Type 1573), 85...240 V AC/24 V DC, 1.25 A, NEC Class 2 (UL 1310)	772438 🛒
Power supply unit for standard rail (Type 1573), 100...240 V AC/24 V DC, 1 A, NEC Class 2 (UL 1310)	772361 🛒
Power supply unit for standard rail (Type 1573), 100...240 V AC/24 V DC, 2 A, NEC Class 2 (UL 1310)	772362 🛒
Power supply unit for standard rail (Type 1573), 100...240 V AC/24 V DC, 4 A	772363 🛒
Memory card	On request
Device description files for software interfaces	Download from **Type 8742** ▶
Bürkert Communicator software	Download from **Type 8742** ▶
For Type 8742 büS/CANopen	
büS cable extension, M12, cable length: 0.1 m	772492 🛒
büS cable extension, M12, cable length: 0.2 m	772402 🛒
büS cable extension, M12, cable length: 0.5 m	772403 🛒
büS cable extension, M12, cable length: 1 m	772404 🛒
büS cable extension, M12, cable length: 1 m	772405 🛒
büS socket, M12, straight, A-coded [1]	772416 🛒
büS plug, M12, straight, A-code [1]	772417 🛒
büS socket, M12, angled, A-coded [1]	772418 🛒
büS plug, M12, angled, A-coded [1]	772419 🛒
büS Y plug	772420 🛒
büS Y plug for linking two separately supplied segments of a büS network	772421 🛒
büS plug, M12, terminating resistor 120 Ω	772424 🛒
büS plug, M12, terminating resistor 120 Ω	772425 🛒
LabVIEW device driver	On request

Description	Article no.
EDS file	Download from **Type 8742** ▶
For Type 8742 Industrial Ethernet	
M8 plug, D-coded, to M12 plug, D-coded, cable length: 0.3 m	575443 🛒
For Type 8742 Analogue	
M12 plug with cable, on strand, A-coded, cable length: 5 m	566923 🛒
M12 plug with cable, on strand, A-coded, cable length: 10 m	571393 🛒
M12 socket with cable, on strand, A-coded, cable length: 5 m	560365 🛒
M12 socket with cable, shielded, 5-pin, cable length: 10 m	563108 🛒
For Type 8742 PROFIBUS DPV1	
M12 socket with cable, on strand, A-coded, cable length: 5 m	560365 🛒
M12 socket with cable, on strand, A-coded, cable length: 10 m	563108 🛒
büS socket, M12, straight, A-coded [1]	772416 🛒
M12 plug, 5-pin, B-coded, straight	918198 🛒
M12 socket, 5-pin, straight (coupling)	918447 🛒
PROFIBUS DPV1 T distributor	918531 🛒
PROFIBUS DPV1 terminating resistor, M12 plug, B-coded	902553 🛒

1.) For space reasons, M12 individual cable plugs may not be suitable for simultaneous use on the same side as a Y-distributor. Use a commercially available covered cable in this case.

@flutech.co.th 0 2384 6060 www.flutech.co.th sales@flutech.co.th