DATA SHEET

Type 8745

bürkert
FLUID CONTROL SYSTEMS

Mass Flow Controller (MFC)/ Mass Flow Meter (MFM) for gases

- Nominal flow ranges from 20 l/min up to 2500 l/min
- High accuracy and repeatability
- Communication via standard signals or Industrial Ethernet
- Electromagnetic and motor-driven valve actuation available
- Easy device exchange through configuration memory

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

Can be combined with

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

Type 6027 ▸
Direct-acting 2/2 way plunger valve

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

Type 0290 ▸
Servo-assisted 2/2-way diaphragm valve

Type description

The mass flow controller (MFC) / meter (MFM) Type 8745 is suitable for mass flow control of high flow rates.
Type 8745 can be configured as MFM or MFC. Optional, four different gases can be calibrated.
The thermal inline sensor is located directly in the main gas stream and therefore reaches very fast response times while causing a very low pressure drop.
A direct-acting proportional valve as regulating unit guarantees high sensitivity. The integrated PI controller ensures outstanding control characteristics of the MFC.
MFC Type 8745 is available in two versions:
with electromagnetic proportional valve and with motor-driven proportional valve.

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1. General technical data

1.1. General

Product properties	
Dimensions	Detailed information can be found in chapter "4. Dimensions" on page 6.
Material	
Body	Aluminium or stainless steel
Housing	PC (Polycarbonate)
Seal	FKM or EPDM (dep. on gas)[1.)]
Configuration memory	Detailed information can be found in chapter "8.2. Configuration management for easy device replacement" on page 22.
Electrical data	
Power supply	24 V DC
Electrical connection	
Industrial Ethernet version	2 x RJ45 (Switch)[2.)]
Analogue version	D-Sub 9[3.)] or terminal block 6 pin
Residual ripple	±2 %
Voltage tolerance	±10 %
Medium data	
Operating medium	Neutral, non-contaminated gases, others on request
Calibration medium	Operating gas or air with correction function
Medium temperature	-10°C[4.)]…+70 °C (-10°C[4.)]…+60 °C with oxygen)
Process/Port connection & communication	
Analogue interfaces	4…20 mA, 0…20 mA, 0…10 V or 0…5 V Input impedance >20 kΩ (voltage) or <300 Ω (current) Max. Current: 10 mA (voltage output); Max. Load: 600 Ω (current output)
Digital (communication) interfaces	PROFINET, Ethernet/IP, EtherCAT, Modbus-TCP
Port connection	G or NPT ¼", ⅜", ½", ¾", 1" Flange
Environment and installation	
Installation position	Horizontal or vertical
Ambient temperature	-10 °C…+50°C[5.)] (higher temperatures on request)
Accessories	
Software-Tool	Bürkert Communicator Detailed information can be found in chapter "8.1. Software Bürkert Communicator" on page 21.

1.) When using a motor valve additionally:
- Type 3280 DN 4: Seat seal in PEEK
- Type 3285: Seat seal in Al2O3

2.) Supply voltage via separate terminal block.

3.) The analog version with D-Sub 9 features an additional digital input and a relay output.

4.) When using a motor valve the minimum medium temperature is 0 °C.

5.) Max. Ambient temperature for versions with cULus approval is 40 °C.

1.2. Version with electromagnetic proportional valve

Type 8745 can be configured as MFM or MFC. For MFCs the direct-acting proportional valves of Types 287x are used. These solenoid proportional valves are normally closed and stand for highest accuracy and repeatability with settling/response times of a few hundred milliseconds.

Product properties	
Dimensions	Detailed information can be found in chapter "4.1. Version with electromagnetic proportional valve" on page 6.
Total weight	Approx. 1.8 kg (Al, 16 W valve) Approx. 3.1 kg (VA, 16 W valve)
Device status	RGB-LED based on NAMUR NE107

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Control valve (proportional valve)	**Normally closed**
Valve orifice range	0.8…12 mm
k_{VS} value range	0.02…2.5 m³/h
Performance data	
Settling (MFC) / response time (MFM)[1.]	< 500 ms
Nominal flow range (Q_{nom})	20…1500 l_N/min (N_2) MFM up to 2500 l_N/min (N_2)
Turndown ratio	1:50[2.]
Max. operating pressure (overpressure to atmospheric pressure)	10 bar (with MFCs the max. pressure depends on the orifice of the valve) optional up to 25 bar for MFM
Accuracy	±1.5 % o.R. ±0.3 % F.S. (after 15 min. warm up time)
Repeatability	±0.1 % F. S.
Electrical data	
Power consumption[3.]	Max. 4 W (as MFM) Max. 12.5…31.5 W (as MFC, depending on proportional valve type)
Approvals and certificates	
Degree of protection	IP20

1.) Times given do not contain further times needed for communication with connected devices.

2.) With vertical installation and flow downwards the turndown ratio is 10:1

3.) Referring to the typical power consumption (at 23 °C ambient temperature, nominal flow and 30 min. regular operation) The data according to UL 61010-1 may differ (see manual)

1.3. Version with electromotive proportional valve

The Type 8745 with motor-driven valves is especially designed for applications with high inlet pressures of up to 22 bars or high flow rates (at a low pressure drop). The motor's power consumption to hold a specific opening position is nearly zero. This key feature can reduce the energy consumption of a plant dramatically. Without electrical power the valve remains in its current position.
The maximum duty cycle of the motor depends on the ambient temperature. The duty cycle does not refer to the duty cycle of the device but to the duty cycle of the motor. The motor is not switched on unless the valve is to move. Frequent setpoint input changes will drastically increase the duty cycle of the motor.

Product properties	
Dimensions	Detailed information can be found in chapter "4.2. Version with electromotive proportional valve" on page 11.
Total weight	Approx. 1.67 kg (Al, standard, valve Type 3280) Approx. 2.94 kg (VA, standard, valve Type 3280)
Device status[1.]	For MFM: RGB-LED acc. to NAMUR NE107 For valve: RGB-LED to indicate the valve opening
Control valve (proportional valve)	Normally persistent Valve orifice range: 2…20 mm K_{VS} values: 0.5…7.8 m³/h
Performance data	
Settling (MFC) / response time (MFM)[2.]	< 5 sec.
Nominal flow range (Q_{nom})	20…2500 l_N/min (N_2)
Measuring span	1:50[3.]
Max. operating pressure (overpressure to atmospheric pressure)	22 bar (with MFCs the max. pressure depends on the orifice of the valve)
Accuracy	±2 % o.R. ±0.5 % F.S. (after 15 min. warm up time)
Repeatability	±0.5 % F.S.
Electrical data	
Power consumption	Max. 4 W (as MFM), Max. 12 W (as MFC)[4.]
Approvals and certificates	
Degree of protection	IP20

1.) Detailed description of the LED colours: see manual.

2.) Times given do not contain further times needed for communication with connected devices.

3.) With vertical installation and flow downwards the turndown ratio is 10:1.

4.) Data during moving of the valve. The power to hold a specific valve opening < 1 W.

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2. Approvals

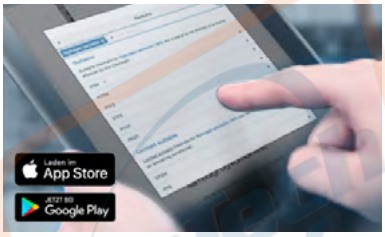
Note:

- 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 types can be supplied with the above approvals or conformities.

Approvals	Description
c UL us LISTED	UL Listed according to DIN EN 61010-1 for USA and Canada
USP U.S. Pharmacopeial Convention	**Conformity of all materials in contact with the medium** USP Class VI chapter “87 in vitro” and “88 in vivo, Implantation” – Code of Federal Regulations Title 21 Paragraph 177 (CFR 21 177.2600)
FDA	**Conformity of all materials in contact with the medium** FDA – Code of Federal Regulations Title 21 Paragraph 177 (CFR 21 177.2600)

3. Materials

3.1. Chemical Resistance Chart – 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

Note:
For the basic blocks 00 or A1, the following table applies in each case.

A	Thread depth
G ¼	12
NPT ¼	11
G ⅜	12
NPT ⅜	11
G ½	15
NPT ½	14
G ¾	16
NPT ¾	15

Note:
For the basic blocks A2 or A3, the following table applies in each case.

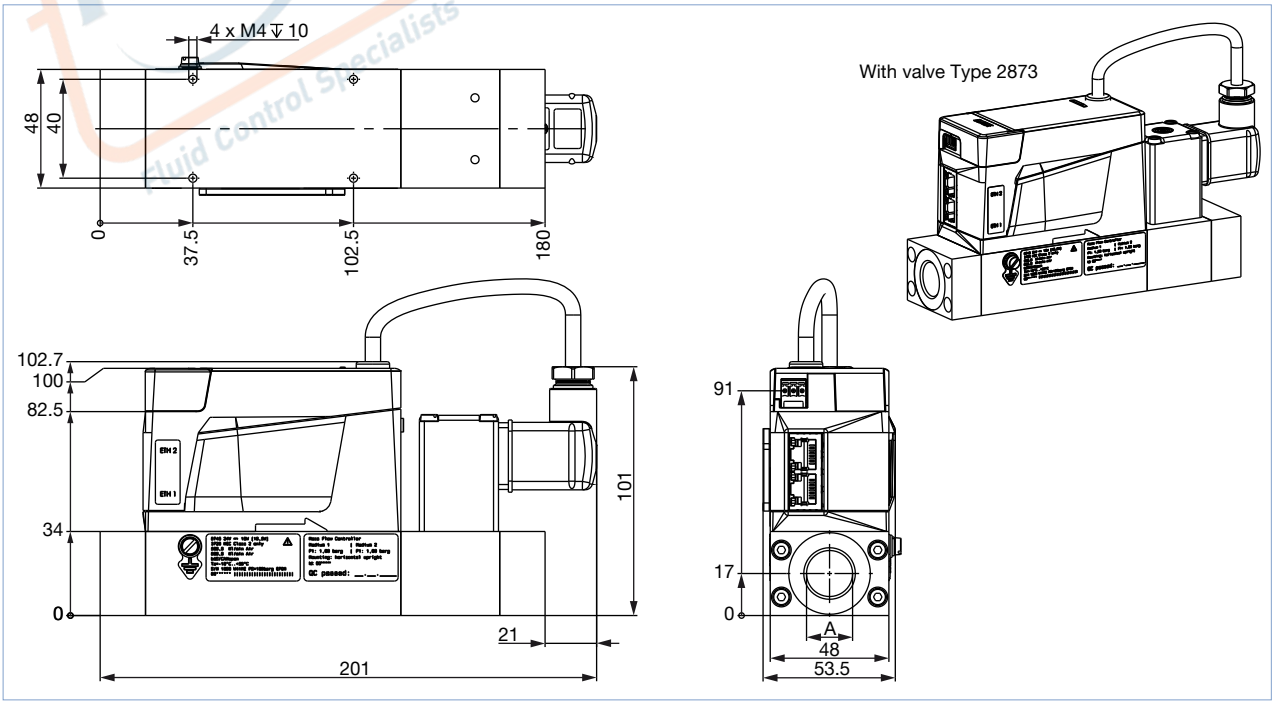
A	Thread depth
G ½	15
NPT ½	14
G ¾	16
NPT ¾	15
G 1	18
NPT 1	16.8

4.1. Version with electromagnetic proportional valve

MFC with valve Type 2873 (9 W coil)

Version with basic block 00 or A1 for small nominal flow rates

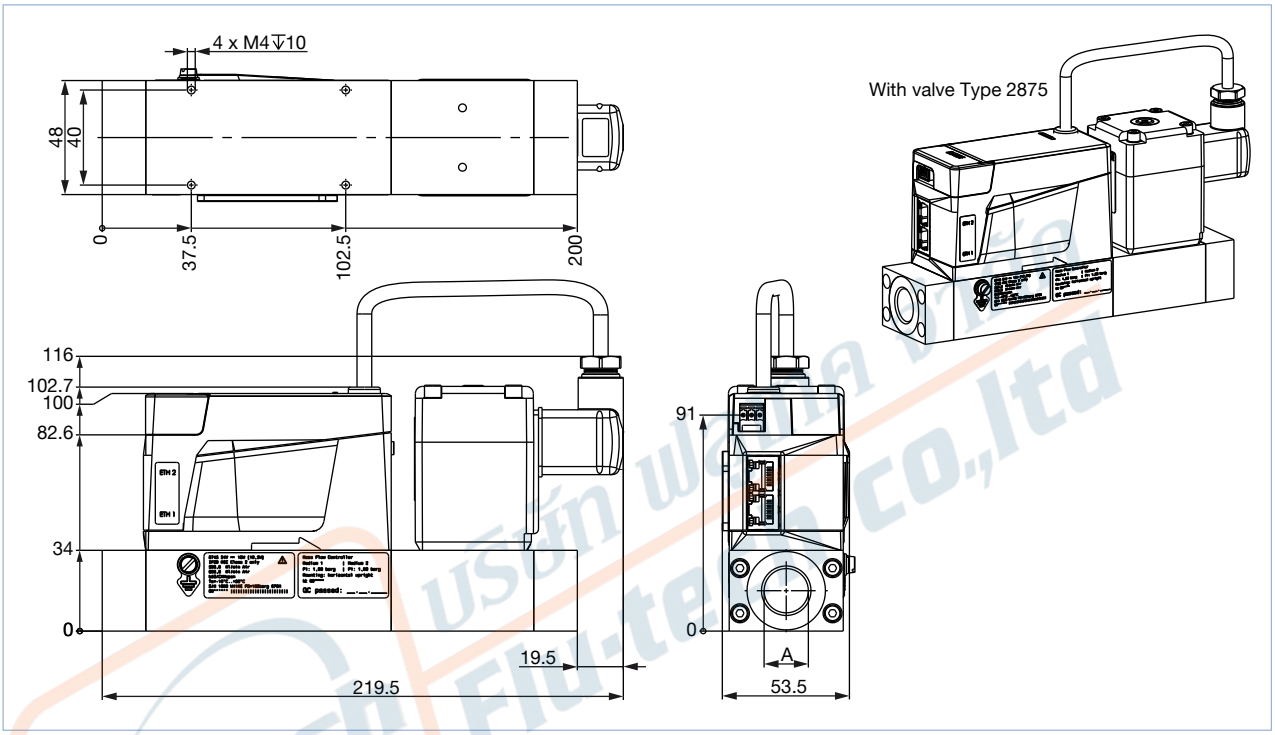
Note:
Dimensions in mm



MFC with valve Type 2875 (16 W coil)

Version with basic block 00 or A1 for small nominal flow rates

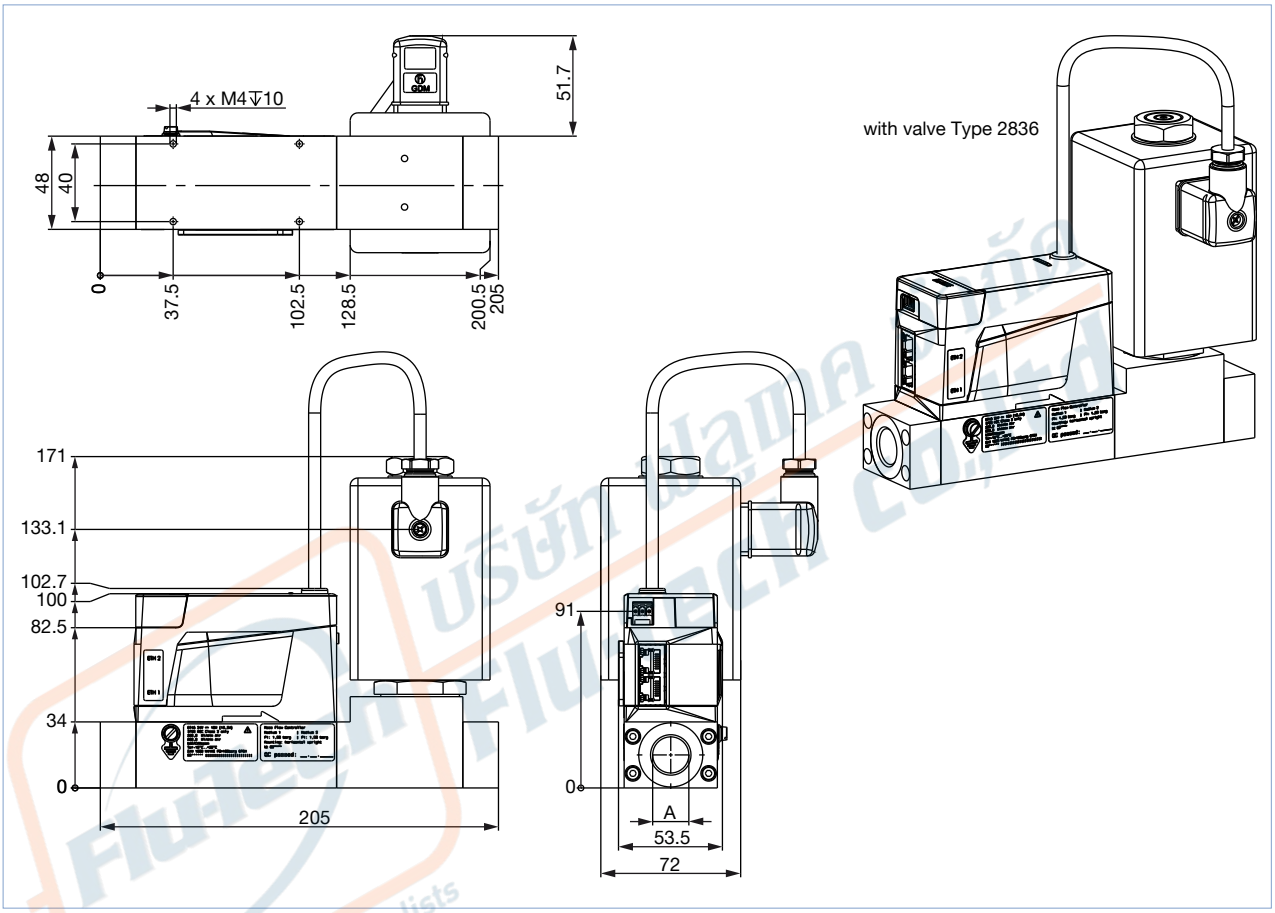
Note:
Dimensions in mm



MFC with valve Type 2836 (24 W coil)

Version with basic block 00 or A1 for small nominal flow rates

Note:
Dimensions in mm



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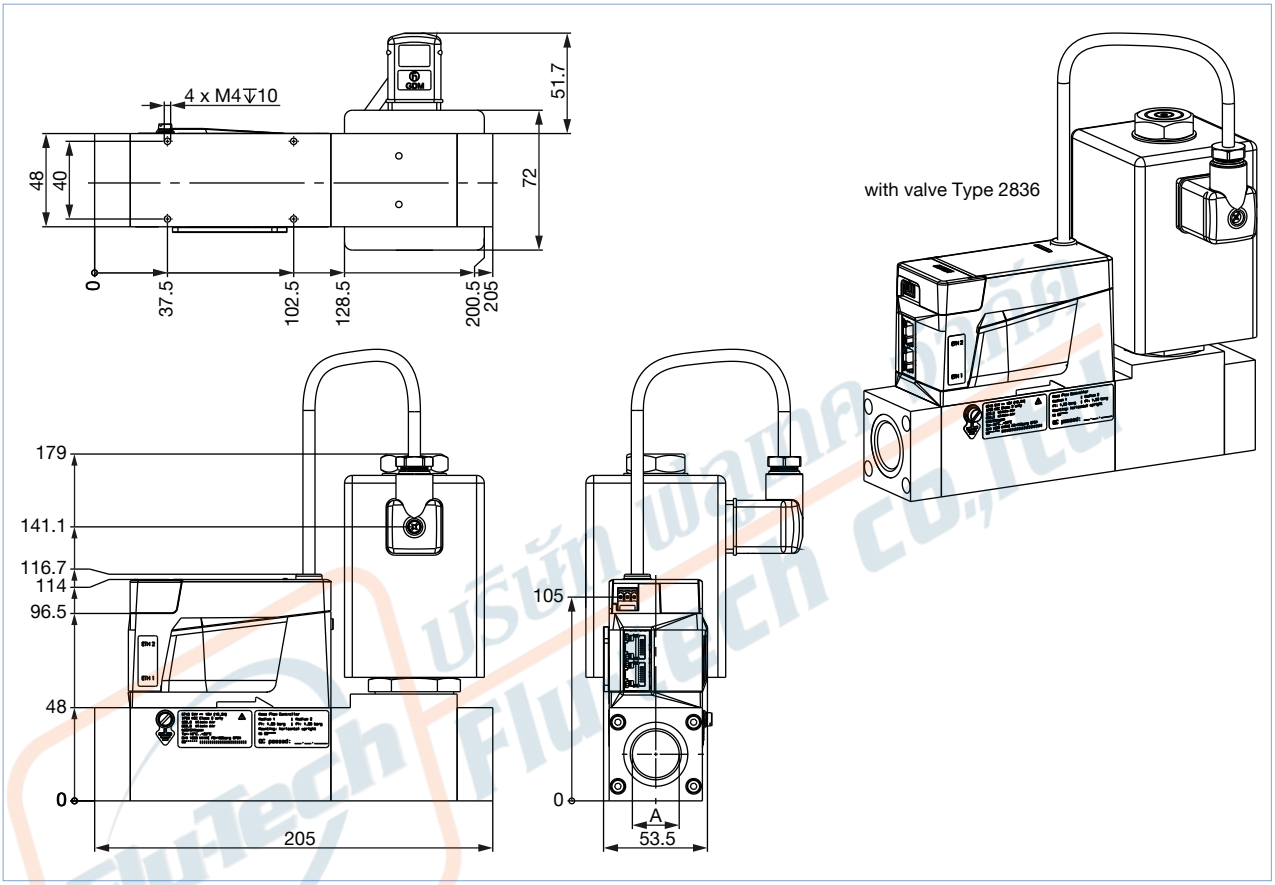
Version with base block A2 for large nominal flow rates

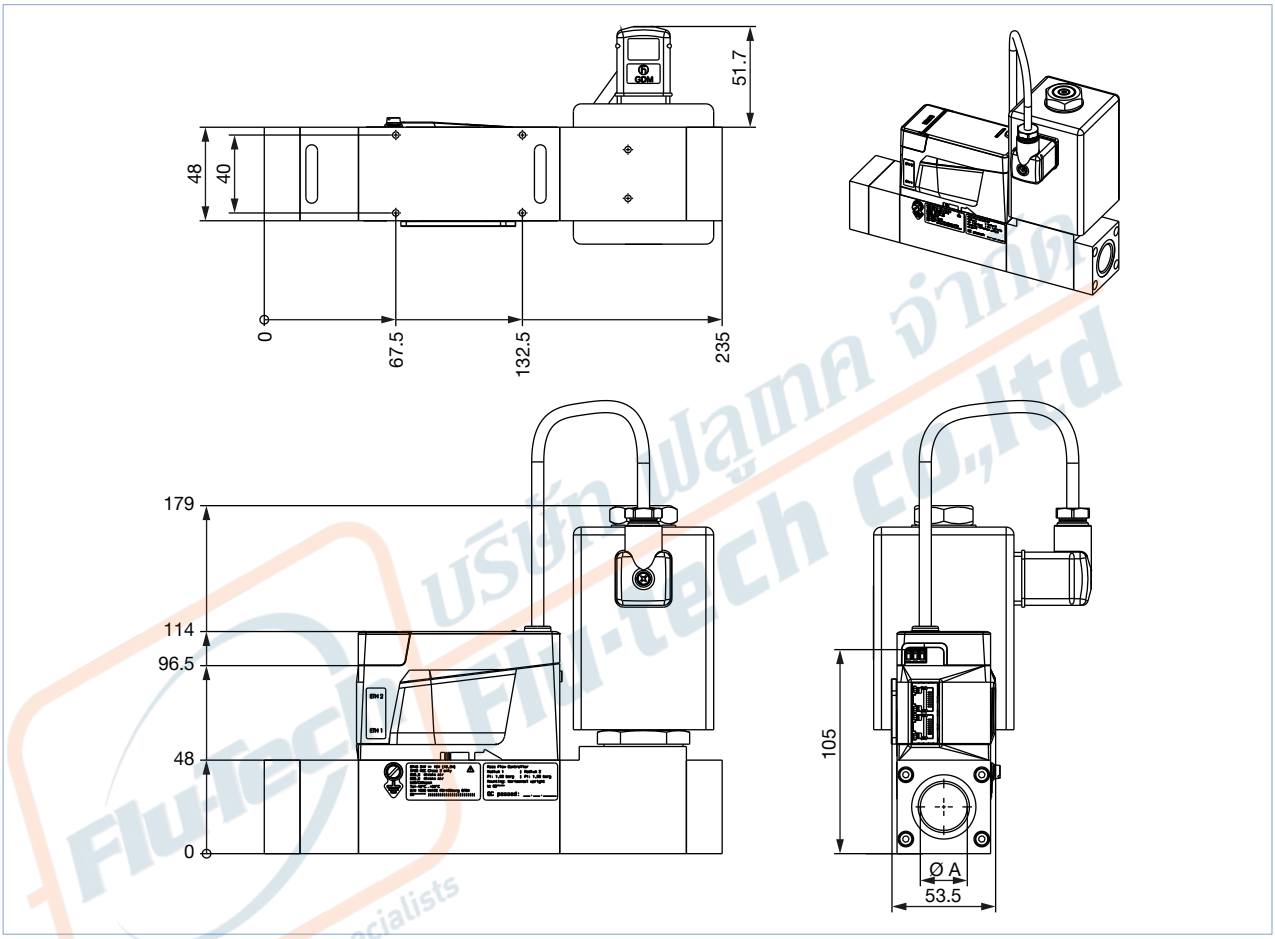
Note:
Dimensions in mm



Version with base block A3 for very large nominal flow rates

Note:

- From a nominal flow rate Q_{Nom} >1500 l_N/min the overall length increases by 30 mm.
- Dimensions in mm

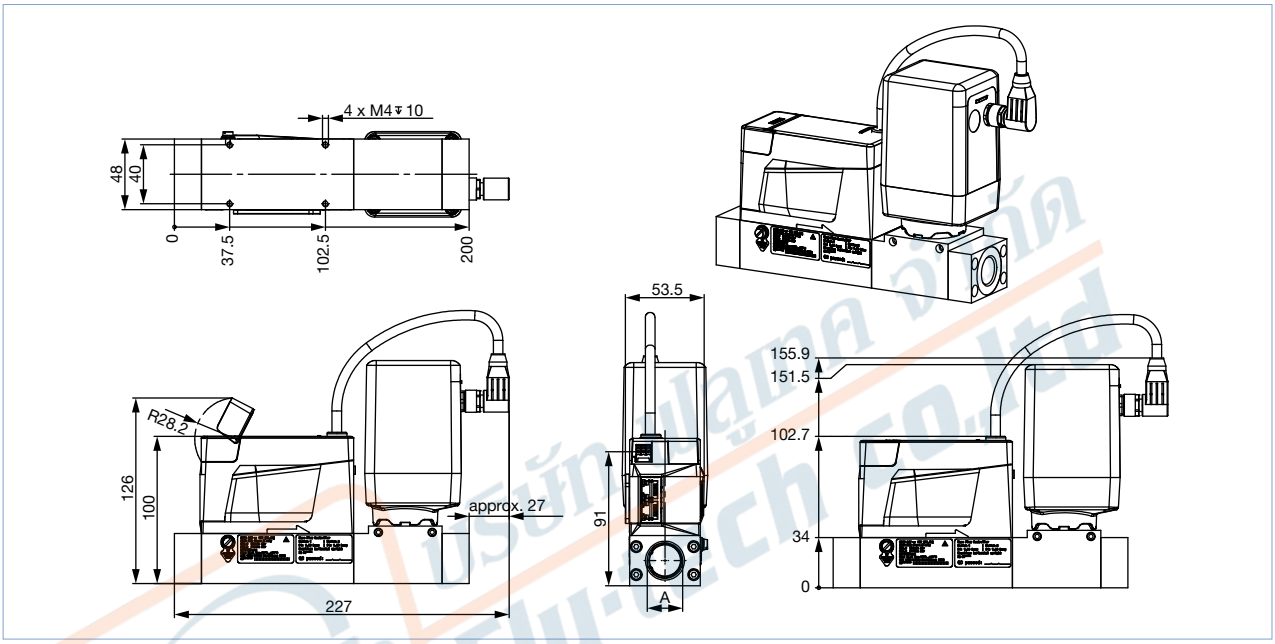


4.2. Version with electromotive proportional valve

MFC with valve Type 3280

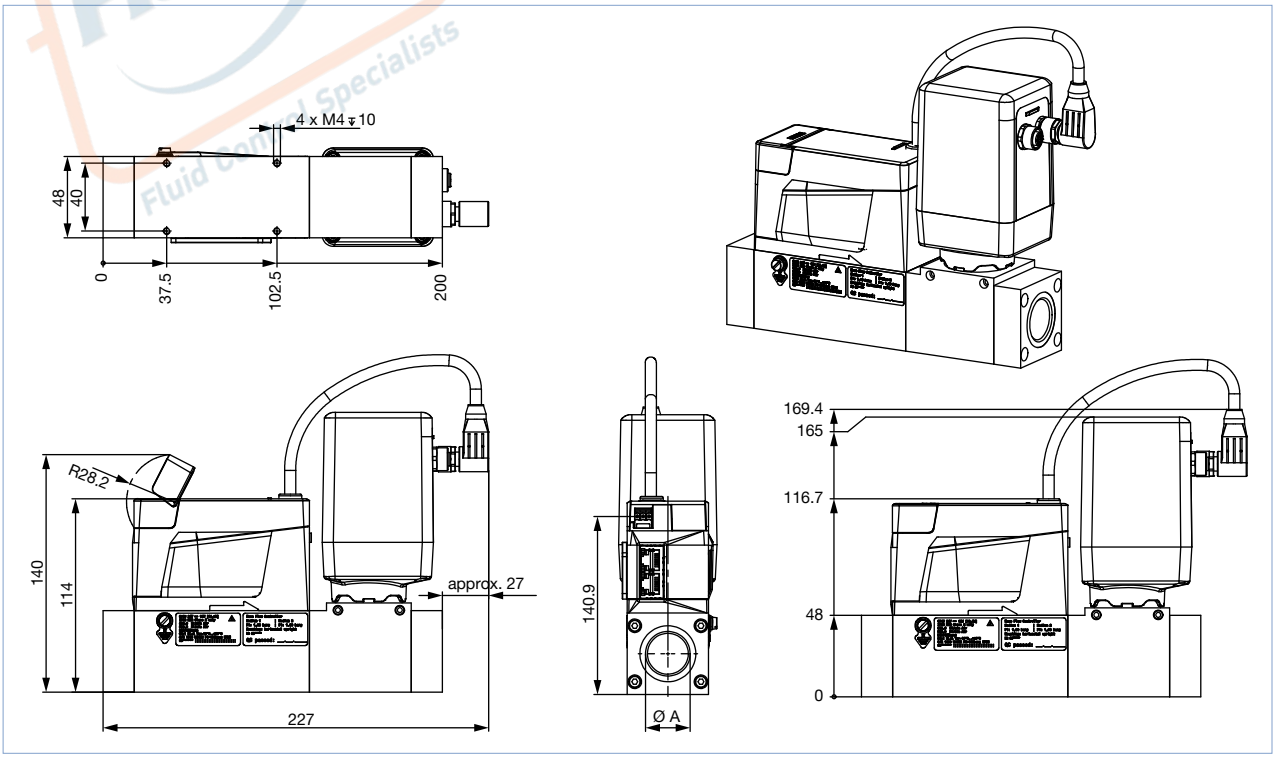
Version with basic block 00 or A1 for small nominal flow rates

Note:
Dimensions in mm



Version with base block A2 for large nominal flow rates

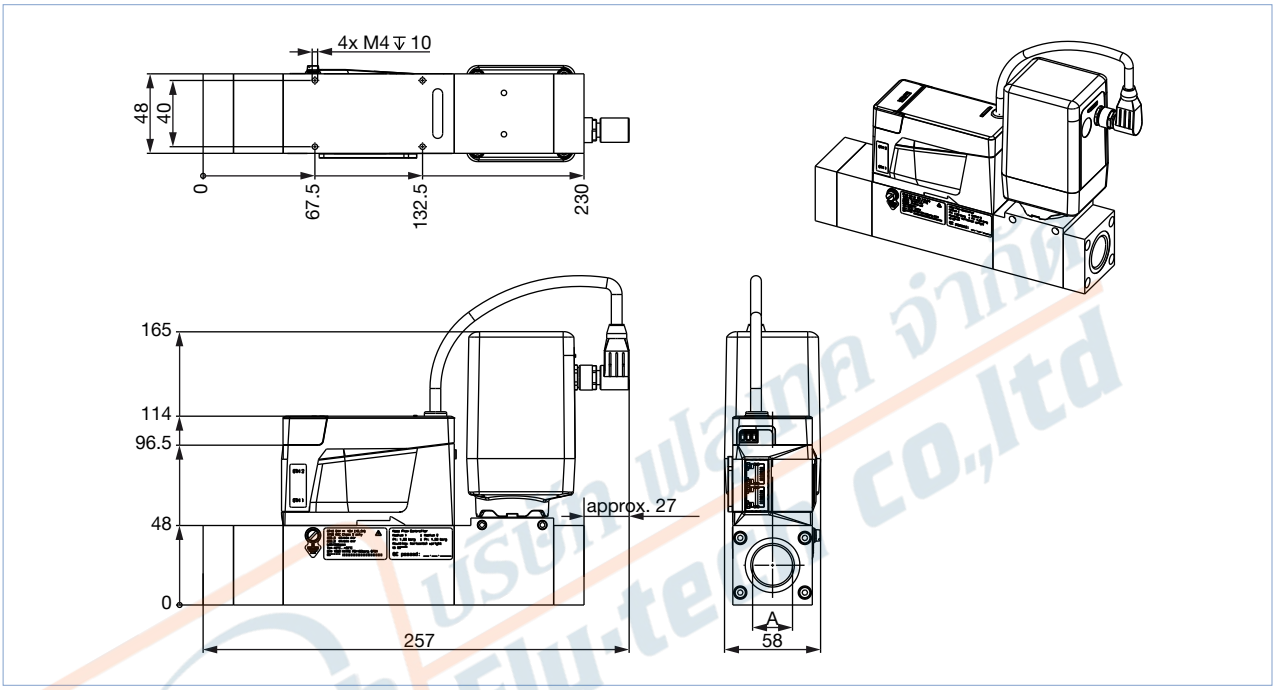
Note:
Dimensions in mm



Version with base block A3 for very large nominal flow rates

Note:

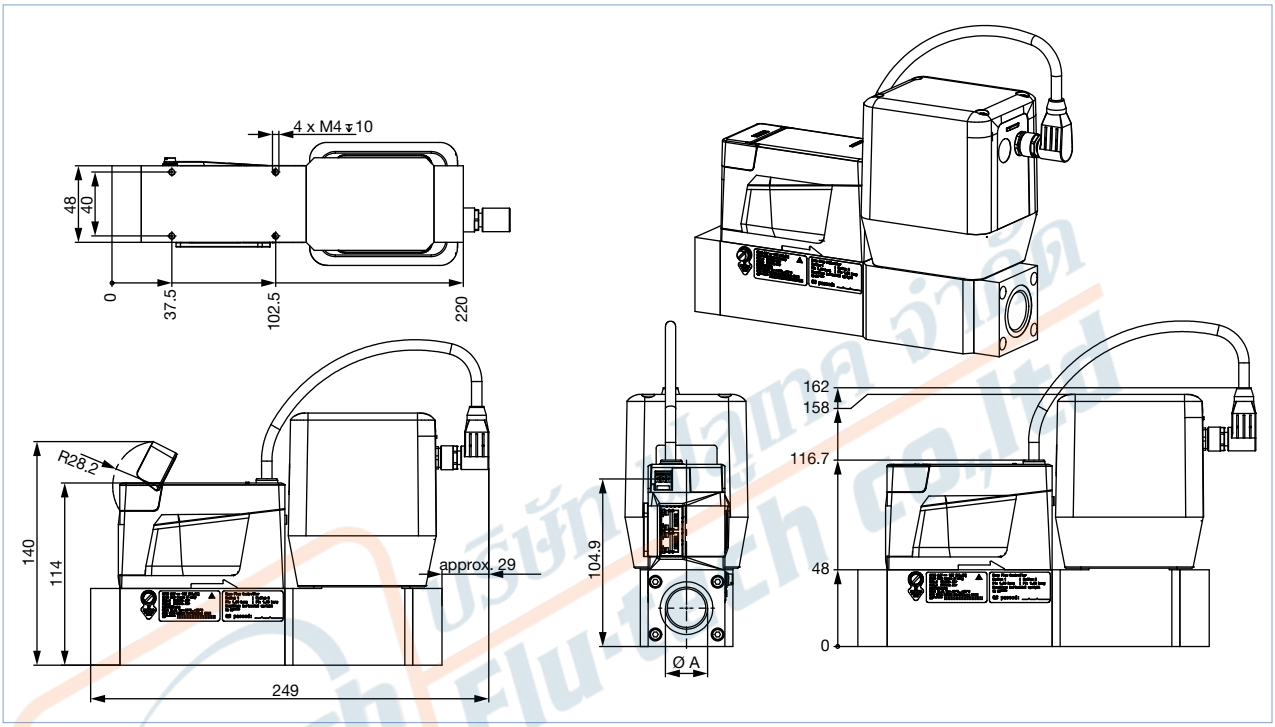
- From a nominal flow rate Q_{Nom} >1500 l_N/min the overall length increases by 30 mm.
- Dimensions in mm



MFC with valve Type 3285 (DN 12 and DN 15)

Version with base block A2 for large nominal flow rates

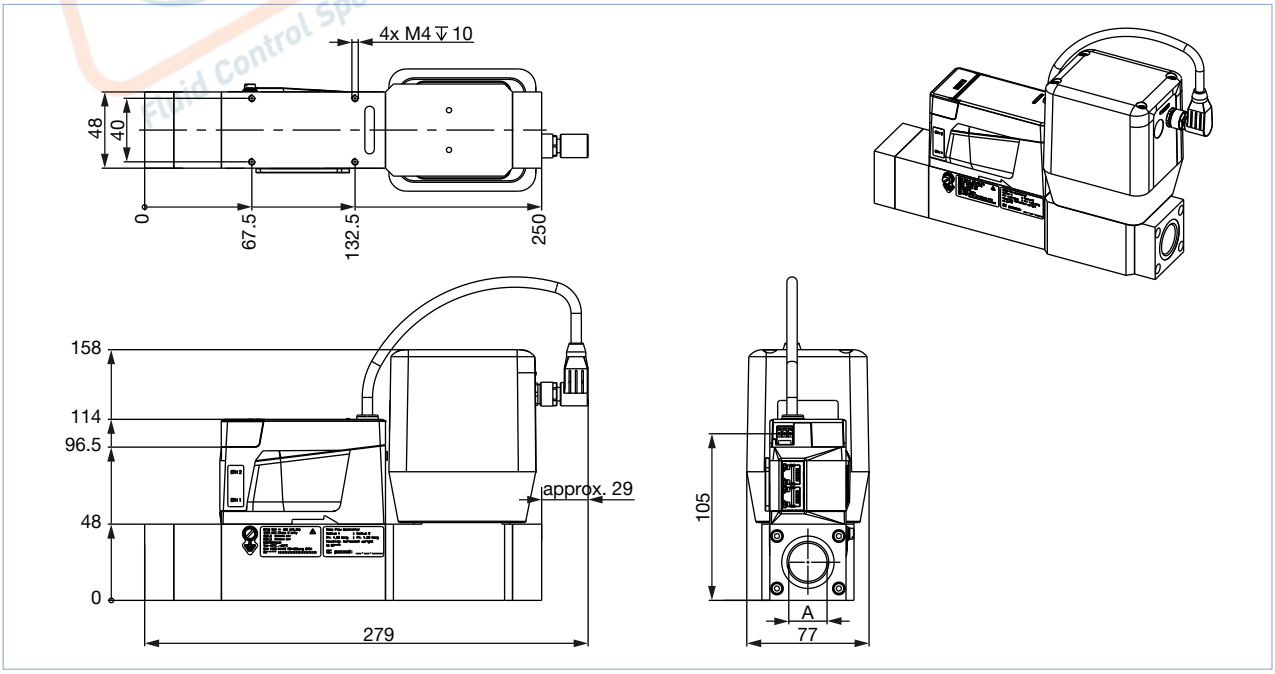
Note:
Dimensions in mm



Version with base block A3 for very large nominal flow rates

Note:

- From a nominal flow rate Q_{Nom} >1500 l_N/min the overall length increases by 30 mm.
- Dimensions in mm



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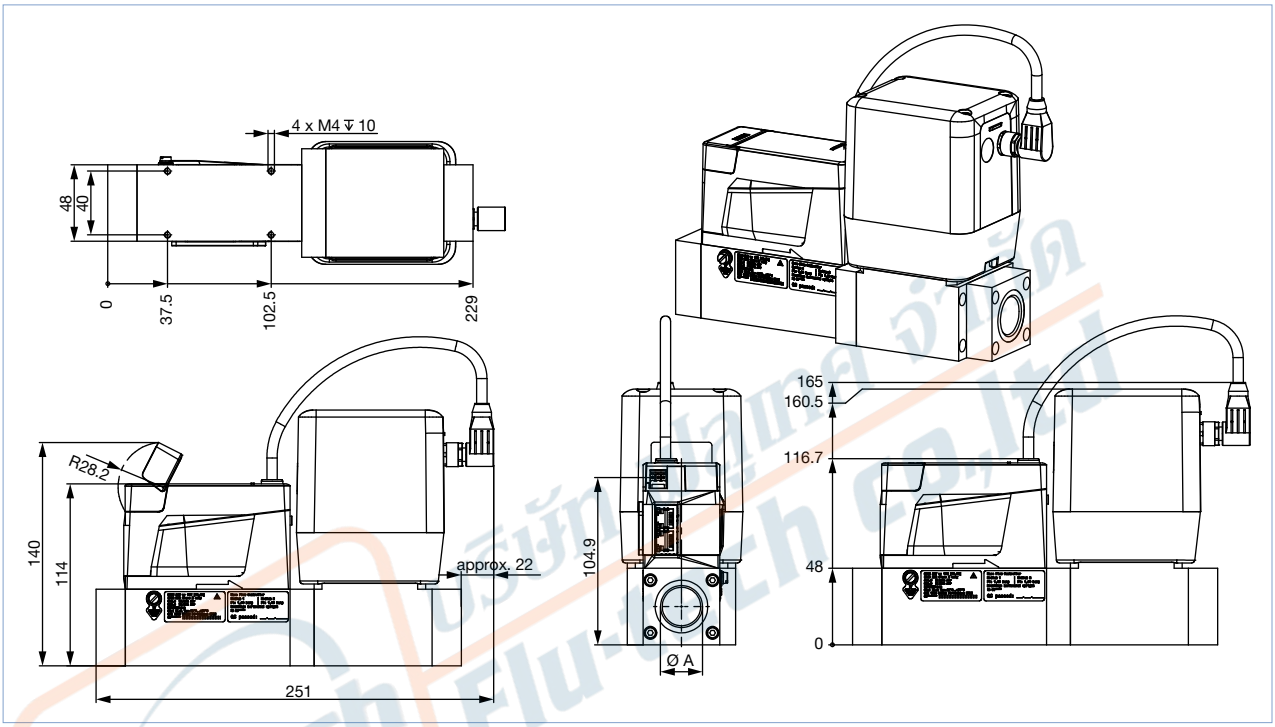
MFC with valve Type 3285 (DN 20 and DN 25)

Version with base block A2 for large nominal flow rates

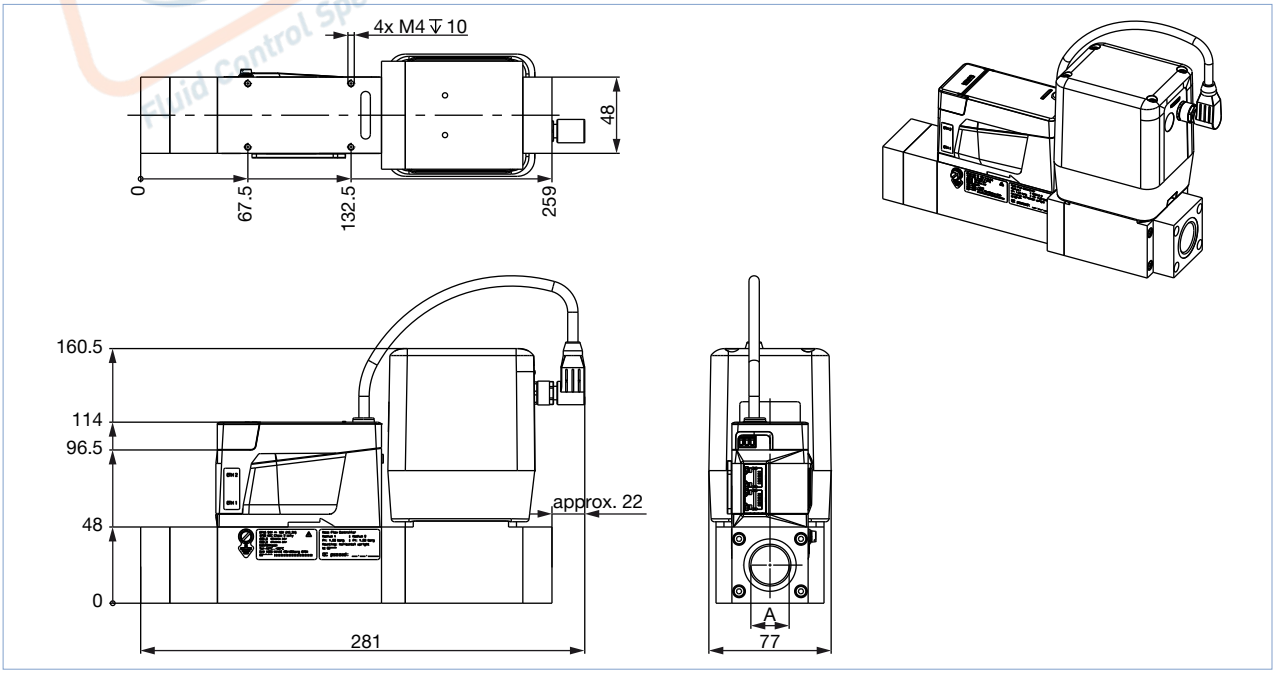
Note:
Dimensions in mm



Version with base block A3 for very large nominal flow rates

Note:

- From a nominal flow rate Q_{Nom} >1500 l_N/min the overall length increases by 30 mm.
- Dimensions in mm



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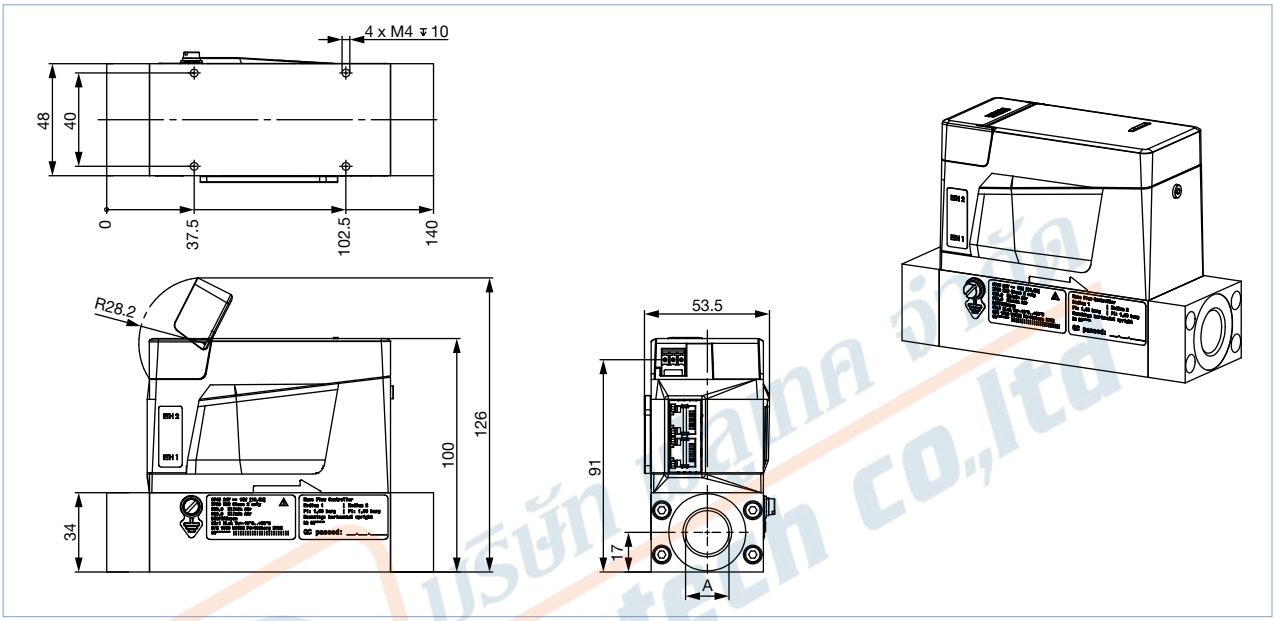
4.3. MFM version

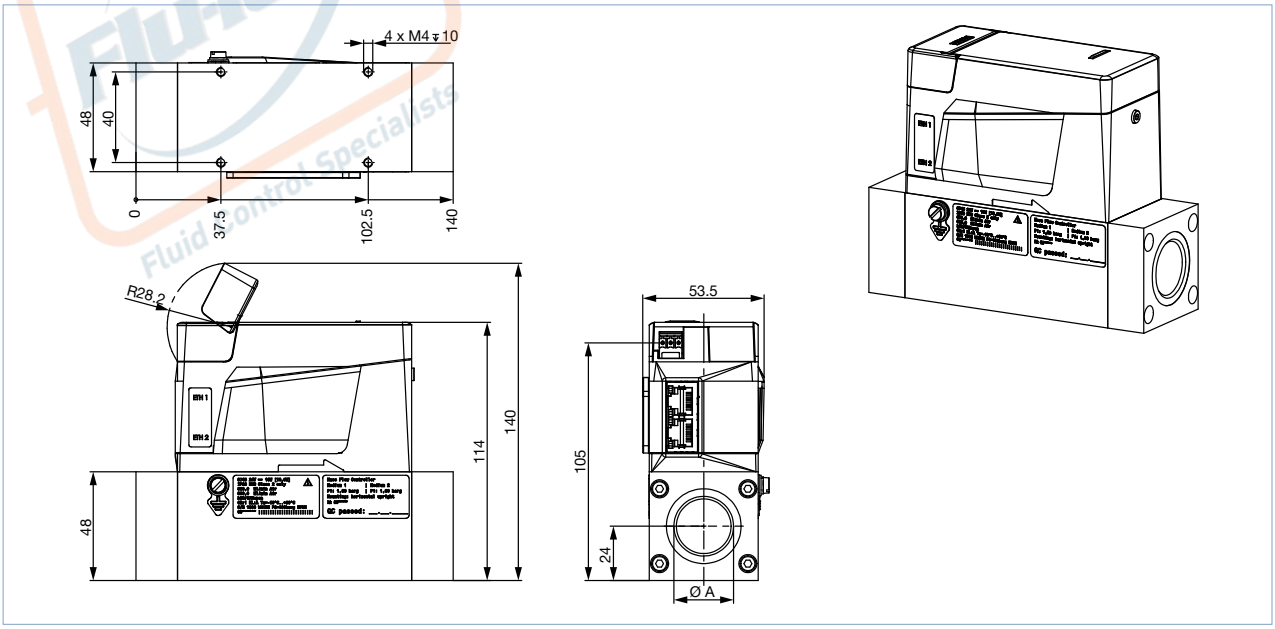
Version with basic block 00 or A1 for small nominal flow rates

Note:
Dimensions in mm



Version with base block A2 for large nominal flow rates

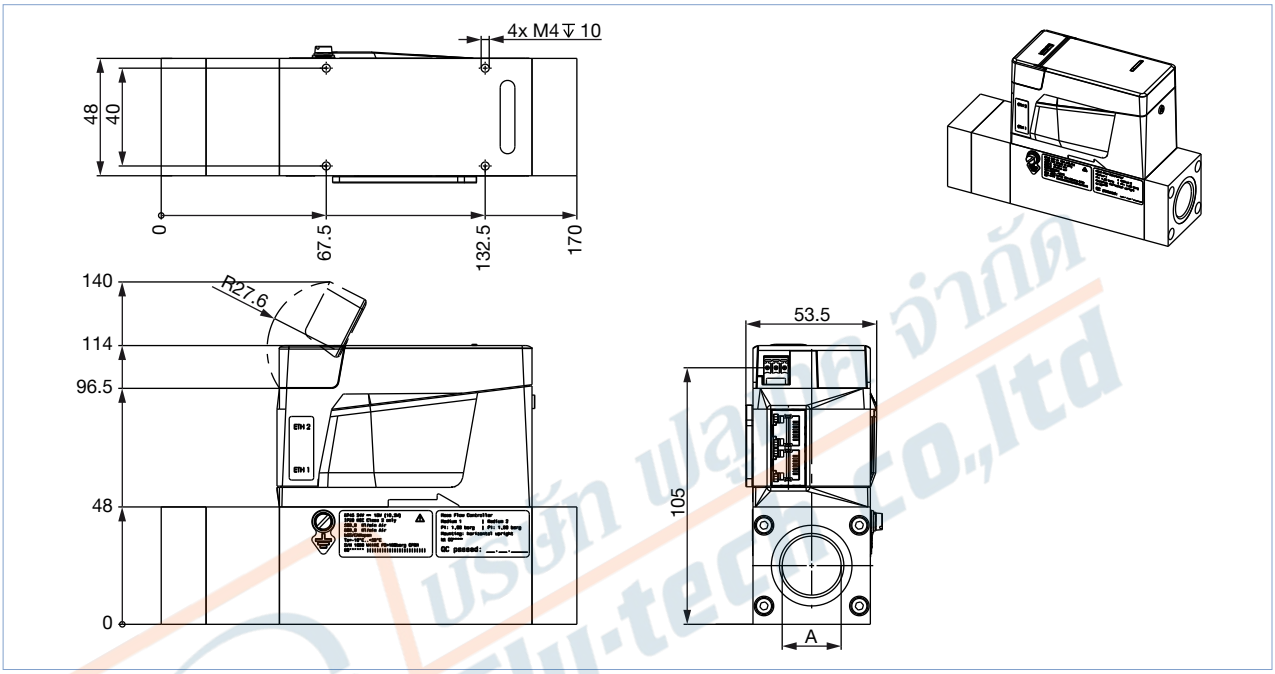
Note:
Dimensions in mm



Version with base block A3 for very large nominal flow rates

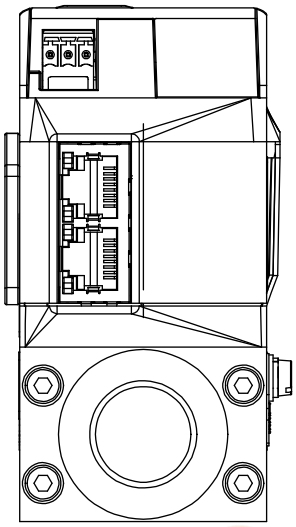
Note:

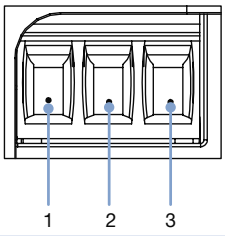
- For a nominal flow Q_{Nom} > 1500 l_N/min the overall length increases by 30 mm.
- Dimensions in mm

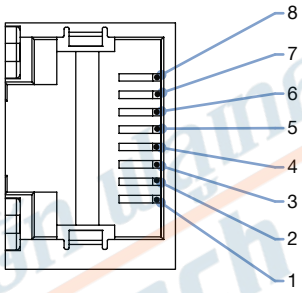


5. Device / Process connections

5.1. Industrial Ethernet



Terminal block, 3 pin	Pin	Assignment
	1	FE (Functional earth)
	2	DGND
	3	+24 V DC

RJ45 socket	Pin	Assignment
	1	TX +
	2	TX -
	3	RX +
	4	Not connected
	5	Not connected
	6	RX -
	7	Not connected
	8	Not connected
	Body	SHIELD

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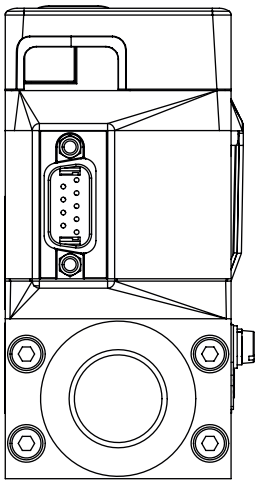
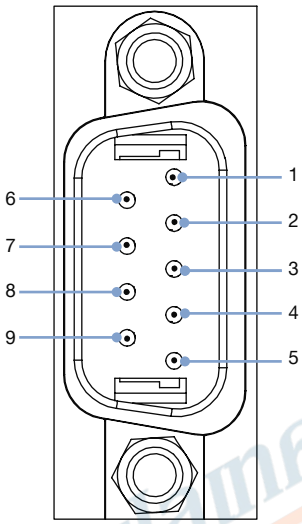
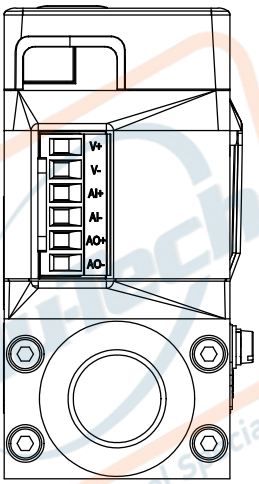
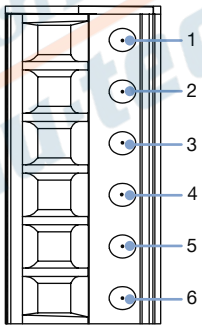
FLU-TECH CO.,LTD
845/3-4 หมู่ 3 ถ.เทพารักษ์ ต.เทพารักษ์ อ.เมือง จ.สมุทรปราการ 10270
845/3-4 Thepharak RD., T.Thepharak, A.Muang, Samutprakarn 10270 THAILAND
Tel. 0 2384 6060, Fax 0 2384 5701, Email : sales@flutech.co.th, www.flutech.co.th

5.2. Analogue



D-Sub 9 pin, plug	Pin	Assignment
	1	Digital input
	2	GND (for supply voltage and digital input)
	3	+24 V DC
	4	Relay - Opener
	5	Relay - Reference contact
	6	Setpoint input +
	7	Setpoint input GND
	8	Actual value output
	9	Actual value output GND
	Body	SHIELD



Terminal block, 6 pin	Pin	Assignment
	1	+24 V DC
	2	GND
	3	Setpoint input +
	4	Setpoint input GND
	5	Actual value output +
	6	Actual value output GND

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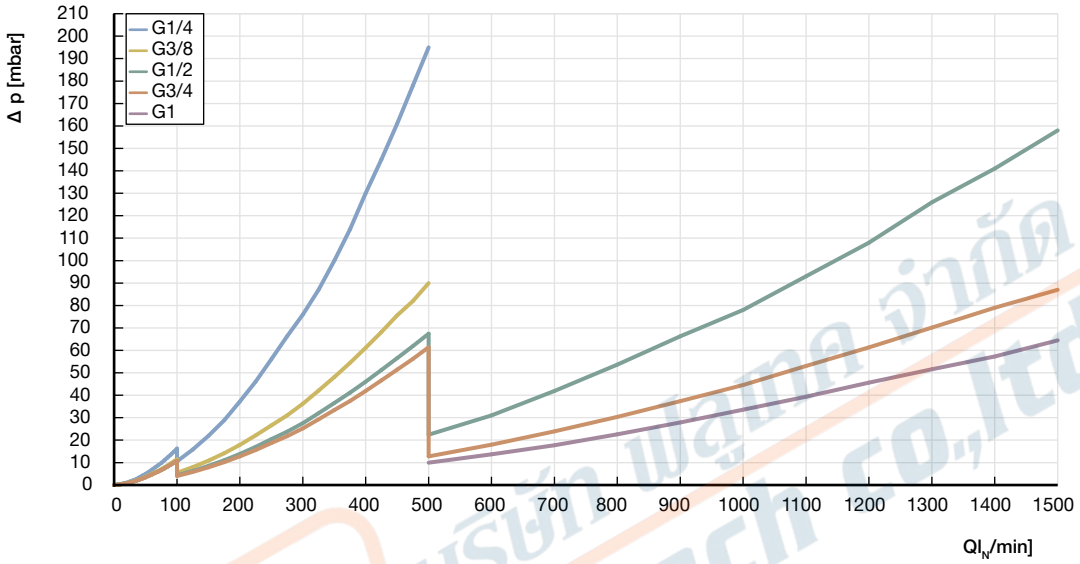
6. Performance specifications

6.1. Pressure Loss Diagram of the MFM

The diagram shows an example of the pressure loss characteristics when air flows through. To determine the pressure loss of another gas, the corresponding air equivalent must first be calculated and the basic fluidics used for the other gas taken into account.



6.2. Flow characteristic

Nominal flow range of typical gases

Note:

- All values refer to 1.013 bar(a) and 0 °C (Index N)
- Other gases on request

Gas	Min. Q_{nom} [l_N/min]	Max. Q_{nom} [l_N/min]
Acetylene	20	975
Ammonia	8	1000
Argon	20	1600
Carbon dioxide	20	800
Air, Oxygen, Nitrogen	20	2500
Methane	20	400
Propane	20	400

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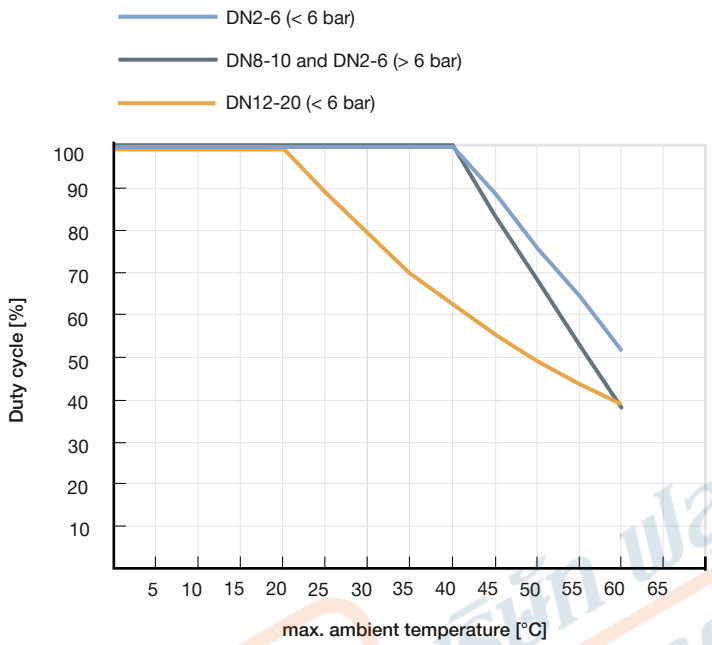
6.3. Derating diagram

Electrically motor-driven versions



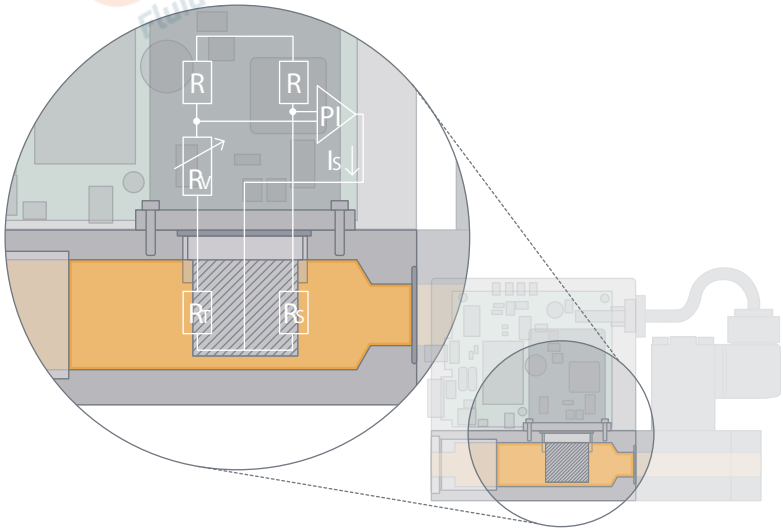
7. Product operation

7.1. Measuring principle

This sensor works as a hot-film anemometer in the so called CTA operational mode (Constant Temperature Anemometer). To do this, two resistors with precisely specified temperature coefficients located directly in the media flow and three resistors located outside the flow are connected together to form a bridge.

The first resistor in the gas flow (RT) measures the fluid temperature, while the second, low value resistor (RS) is heated so that it is maintained at a fixed, predefined overtemperature with respect to the fluid temperature. The heating current required to maintain this is a measure of the heat being removed by the flowing gas, and represents the primary measurement.

An adequate flow conditioning within the MFC and the calibration with high quality flow standards ensure that the mass of gas flowing per time unit can be derived from the primary signal with high accuracy.



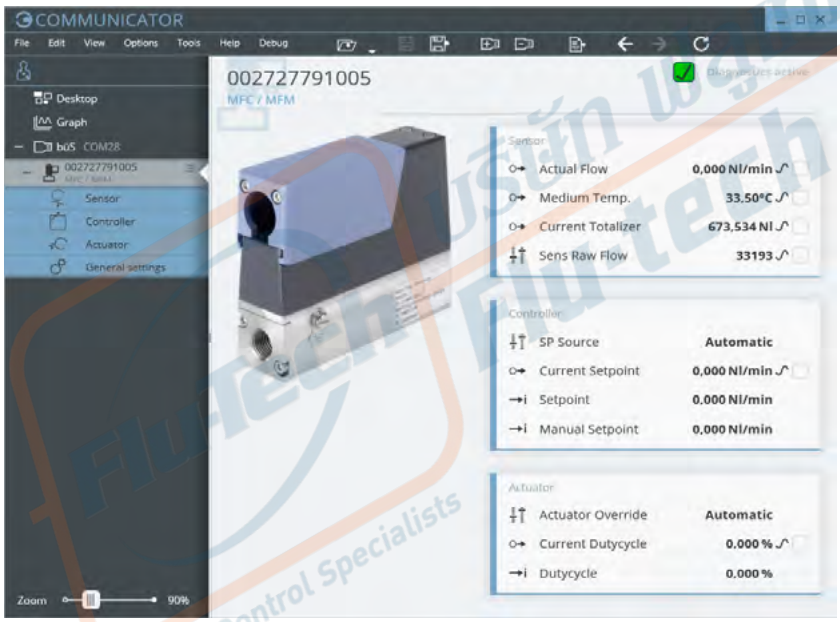
8. Product accessories

8.1. Software Bürkert Communicator

Note:
To install the software, click here.

Part of Bürkert's EDIP program (Efficient Device Integration Platform) is the Bürkert Communicator. This software can be run under MS-Windows and it is available on Bürkert's website for free. The Bürkert Communicator allows convenient system configuration and parametrisation of all connected field devices. An accessory part, the büS-stick serves as the interface between computer and process instruments (see "9.4. Ordering chart accessories" on page 23). It transfers "USB data" to "CAN data". The Communicator allows:

- Diagnosis
- Parametrization
- Registration and storage of process data
- To watch graph of process
- To update firmware of the büS device connected
- Guided re-calibration



Type 8745 connection with Bürkert Communicator software

The interface to the "Bürkert Communicator" software tool is based on CANopen. The appropriate bus termination is mandatory. Hence, please activate the termination resistor switch on the büS-stick.

To connect the MFC / MFM with the "Bürkert Communicator" software tool, you need a büS-stick. The büS-stick sets contain the necessary accessories. The connection is made via the micro-USB socket on the unit (büS stick set 2 contains the necessary accessories).

ATTENTION: No external power supply may be connected to the micro-USB socket! The power supply to the unit must be provided as described in chapter "5. Device / Process connections" on page 17.

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8.2. Configuration management for easy device replacement

8745 analogue or industrial Ethernet: The MFC is supplied with a µSIM card on which all relevant data are stored. If a device needs to be replaced, the µSIM can be removed from the defective device and inserted into the new one. This transfers all data of the unit to be replaced to the new unit.
The prerequisite for a successful device replacement using the configuration memory is that both devices have the same device ID.

8.3. Web server for Industrial Ethernet versions

The Industrial Ethernet based devices (with the exception of the EtherCAT protocol) from software version A.13.00.00 have an integrated web server. This can be accessed via a web browser by entering the IP address of the device (factory setting IP 192.168.1.100).

9. Ordering information

9.1. Bürkert eShop – Easy ordering and quick delivery

Bürkert eShop – Easy ordering and fast 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

9.2. Recommendation regarding product selection

Note:
The product questionnaire form on last page contains the relevant fluid specification. Using the experience of Bürkert engineers already in the design phase provide us with a copy of the request containing the necessary data together with your inquiry or order.

For the proper choice of the actuator orifice within the MFC, not only the required maximum flow rate Q_{nom}, but also the pressure values directly before and after the MFC (p_1, p_2) at this flow rate Q_{nom} should be known. In general, these pressures are not the same as the overall inlet and outlet pressures of the whole plant, because usually there are additional flow resistors (tubing, additional shut-off valves, nozzles etc.) present both before and after the controller.

Please use the product questionnaire form on last page to indicate the pressures directly before and after the MFC. If these are unknown or not accessible to a measurement, estimates are to be made by taking into account the approximate pressure drops over the flow resistors before and after the MFC, respectively, at a flow rate of Q_{nom}. 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.

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9.3. 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

9.4. Ordering chart accessories

Note:

- To connect the MFC / MFM with the „Bürkert Communicator“ software tool, you need a büS-stick. The connection is made via the micro-USB socket on the device (büS-Stick Set 2 contains the necessary accessories).
- Please note: The interface to the „Bürkert Communicator“ software tool is based on CANopen. The appropriate bus termination is mandatory. Hence, please activate the connectible termination resistor on the büS-Stick.

Description	Article no.
büS-stick Set 2 (incl. cable (M12 and Micro-USB) and büS-stick with integrated terminating resistor)	772551
Power supply Type 1573 for rail mounting, 100…240 V AC/ 24 V DC, 1.25 A, NEC Class 2 (UL 1310)	772438
Power supply Type 1573 for rail mounting, 100…240 V AC/ 24 V DC, 1 A, NEC Class 2 (UL 1310)	772361
Power supply Type 1573 for rail mounting, 100…240 V AC/ 24 V DC, 2 A, NEC Class 2 (UL 1310)	772362
Power supply Type 1573 for rail mounting, 100…240 V AC/ 24 V DC, 4 A	772363
Device description files for CANopen (EDS), PROFINET (GSDML), Ethernet/IP (EDS), EtherCAT (ESI)	Download from www.burkert.com
Bürkert Communicator Software	Download from www.burkert.com
For Type 8745 Analogue	
Terminal block 6 pin (for Type 8745 standard; included in delivery of the corresponding analogue version)	On request
Connector cable D-Sub 9 to leads, 5 m	580882
Connector cable D-Sub 9 to leads, 10 m	580883

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