

MADECO MDCM2 Series

Digital Thermal Mass Flow Meters and Controllers for Gas

MADECO MDCM2 Series

MDCM2 Mass Flow Meters and Controllers for gas applications have a housing designed for laboratory and clean processing conditions. The instruments are truly unique in their capability to measure and control flow ranges between 0,014...0,7 ml_n/min and 8...1670 l_n/min with pressure rating between vacuum and 400 bar – all in one range of instruments. This versatility in flow ranges and in operating conditions has ensured that the MDMF series remains our most popular and field proven of instruments.

Today's MDCM2 series are equipped with a digital pc-board, offering high accuracy, excellent temperature stability and fast response (settling times t_{90} down to 500 msec). The main 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, EtherCAT, PROFINET or FLOW-BUS protocols.

Selectable gases and flow ranges

The MDMF design features optional Multi-Gas / Multi Range functionality, providing (OEM-) customers with extra flexibility and process efficiency. Users of MDCM2 Series in pilot plants or laboratories can rescale their instruments on site, saving time and money; substantial costs for stock keeping, (dis)mounting and also for service and recalibration are no longer applicable. Our free and easy-to-use software tool "FlowTune" enables the user to change the instrument's configuration swiftly via the RS232 port of a lap-top.

Mass Flow Controllers for every application

There is a standard direct acting valve for common applications, a pilot operated valve for high flow rates, the so-called Vary-P valve that can cope with 6 up to 400 bar ΔP and a bellows valve for applications with very low differential pressure.



MDCM2 features

- fast response, excellent repeatability
- high accuracy
- virtually pressure and temperature independent
- pressure ratings up to 400 bar
- optional metal sealed and downported constructions

Digital features

- DeviceNet[™], PROFIBUS[®], Modbus-RTU/ASCII, EtherCAT, PROFINET or FLOW-BUS slave; RS232 interface
- optional Multi Gas / Multi Range functionality up to 10 bar
- storage of max. 8 calibration curves
- alarm and counter functions
- control characteristics user-configurable

Technical specifications

Measurement / control system

| | |
|-------------------------------|--|
| Accuracy (incl. linearity) | standard: $\pm 0,5\%$ Rd plus $\pm 0,1\%$ FS |
| (based on actual calibration) | $\pm 0,8\%$ Rd plus $\pm 0,2\%$ FS for F-110C-005/F-200CV-005 $\pm 2\%$ FS for F-110C-002/F-200CV-002 |
| Turndown | 1 : 50 (in digital mode up to 1:187,5) |
| Repeatability | < 0,2% Rd |
| Settling time (controller) | standard: 1...2 seconds option: down to 500 msec |
| Control stability | < $\pm 0,1\%$ FS (typical for 1 l _v /min N ₂) |
| Operating temperature | -10...+70°C |
| Temperature sensitivity | zero: < 0,05% FS/°C; span: < 0,05% Rd/°C |
| Pressure sensitivity | 0,1% Rd/bar typical N ₂ ; 0,01% Rd/bar typical H ₂ |
| Leak integrity, outboard | tested < 2 x 10 ⁻⁹ mbar l/s He |
| Attitude sensitivity | max. error at 90° off horizontal 0,2% at 2 bar, typical N ₂ |
| Warm-up time | 30 min. for optimum accuracy 2 min. for accuracy $\pm 2\%$ FS |

Mechanical parts

| | |
|------------------------------|--|
| Material (wetted parts) | stainless steel 316L or comparable |
| Process connections | compression type or face seal couplings |
| Seals | standard: Viton®; options: EPDM, Kalrez®, FFKM) |
| Ingress protection (housing) | IP40 |

Electrical properties

| | | | |
|---------------------------------|---|-----------------|----------------|
| Power supply | +15...24 Vdc | | |
| Max. power consumption | Supply | at voltage I/O | at current I/O |
| | Meter: | 15 V 95 mA | 125 mA |
| Controller: | 24 V 65 mA | 85 mA | |
| | 15 V 290 mA | 320 mA | |
| 24 V 200 mA | 215 mA | | |
| Extra for fieldbus: PROFIBUS DP | add 53 mA (at 15 V) or 30 mA (at 24 V) | | |
| (if applicable) EtherCAT® | add 66 mA (at 15 V) or 41 mA (at 24 V) | | |
| PROFINET | add 77 mA (15 V supply) or 48 mA (24 V supply) | | |
| DeviceNet™ | add 48 mA (at 24 V) | | |
| Analog output/command | 0...5 (10) Vdc or 0 (4)...20 mA (sourcing output) | | |
| Digital communication | standard: RS232 options: PROFIBUS DP, DeviceNet™, EtherCAT®, Modbus-RTU/ASCII, PROFINET, FLOW-BUS | | |

Electrical

| | |
|---------------------------|--|
| Analog/RS232 | 9-pin D-connector (male); |
| PROFINET | bus: 9-pin D-connector (female); power: 9-pin D-connector (male); |
| DeviceNet™ | 5-pin M12-connector (male); |
| EtherCAT®/ PROFINET | 2 x RJ45 modular jack (in/out) |
| FLOW-BUS/Modbus-RTU/ASCII | RJ 45 modular jack |

Technical specifications and dimensions subject to change without notice.

Modeles and flow range (based on Air)

Mass Flow Meters (MFM); PN100 (pressure rating 100 bar)

| Model | min. flow | max. flow |
|-------------|----------------------------------|-------------------------------|
| MDCM2-110C | 0,014...0,7 ml _v /min | 0,06...9 ml _v /min |
| MDCM2-111B | 0,16...8 ml _v /min | 0,16...25 l _v /min |
| MDCM2-111AC | 0,4...20 l _v /min | 0,6...100 l _v /min |
| MDCM2-112AC | 0,8...40 l _v /min | 1,4...250 l _v /min |
| MDCM2-113AC | 4...200 l _v /min | 8...1670 l _v /min |

For ranges of 200 or 400 bar rated MFMs see model number identification.

Mass Flow Controllers (MFC); PN64 / PN100

| Model | min. flow | max. flow |
|-----------------------------------|----------------------------------|-------------------------------|
| MDCM2-200CV/F-210CV ¹⁾ | 0,014...0,7 ml _v /min | 0,06...9 ml _v /min |
| MDCM2-201CV/F-211CV ¹⁾ | 0,16...8 ml _v /min | 0,16...25 l _v /min |
| MDCM2-201AV/F-211AV ¹⁾ | 0,4...20 l _v /min | 0,6...100 l _v /min |
| MDCM2-202AV/F-212AV ²⁾ | 0,8...40 l _v /min | 1,4...250 l _v /min |
| MDCM2-203AV/F-213AV ³⁾ | 4...200 l _v /min | 8...1670 l _v /min |

¹⁾ K_{v-max} = 6,6 x 10⁻² ²⁾ K_{v-max} = 0,4 ³⁾ K_{v-max} = 1,5

Mass Flow Controllers (MFC); PN200

| Model | min. flow | max. flow |
|--------------------------|-------------------------------|------------------------------|
| MDCM2-220M ⁴⁾ | 0,2...10 ml _v /min | 3...15 ml _v /min |
| MDCM2-221M ⁴⁾ | 0,3...15 ml _v /min | 0,4...20 l _v /min |

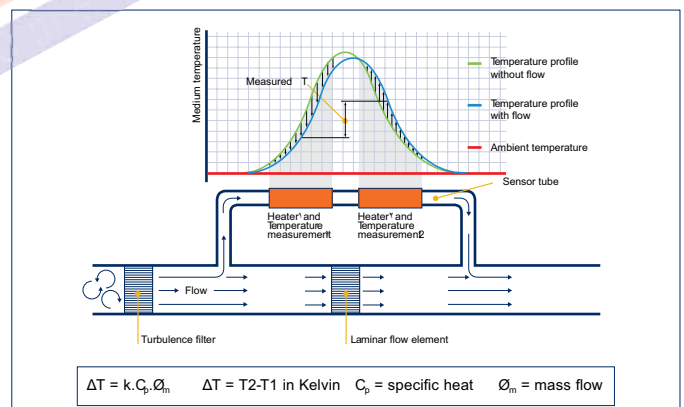
⁴⁾ K_{v-max} = 1,65 x 10⁻³

MFCs for high-pressure / high-ΔP applications; PN400

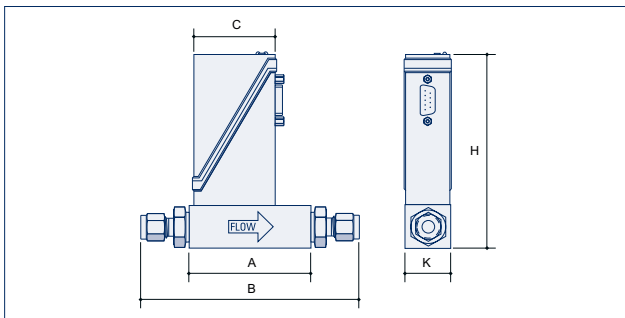
| Model | min. flow | max. flow |
|------------|-------------------------------|-------------------------------|
| MDCM2-230M | 0,2...10 ml _v /min | 10...500 ml _v /min |
| MDCM2-231M | 10...500 ml _v /min | 0,2...10 l _v /min |
| MDCM2-232M | 0,2...10 l _v /min | 2...100 l _v /min |

Thermal mass flow measuring principle

The heart of the thermal mass flow meter/controller is the sensor, that consists of a stainless steel capillary tube with resistance thermometer elements. A part of the gas flows through this bypass sensor, and is warmed up by heating elements. Consequently the measured temperatures T₁ and T₂ drift apart. The temperature difference is directly proportional to mass flow through the sensor. output is proportional to the total mass flow rate.



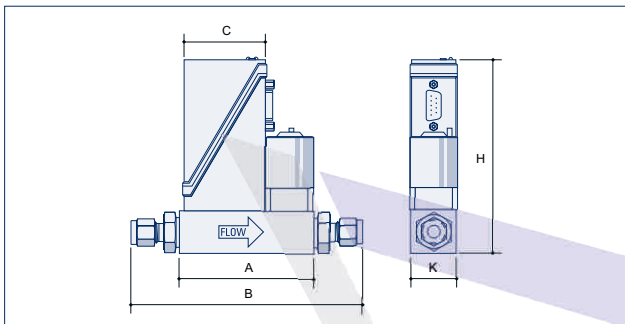
Dimensions



Mass Flow Meter

| Model | A | B | C | H | K | Weight (kg) |
|-----------------------|-----|-----|----|-----|----|-------------|
| MDCM2-110C (1/8" OD) | 47 | 98 | 47 | 111 | 25 | 0,4 |
| MDCM2-111B (1/4" OD) | 69 | 126 | 47 | 111 | 25 | 0,5 |
| MDCM2-111AC (1/4" OD) | 69 | 126 | 47 | 123 | 26 | 0,6 |
| MDCM2-112AC (1/2" OD) | 65 | 130 | 47 | 139 | 59 | 1,3 |
| MDCM2-113AC (1/2" OD) | 112 | 179 | 47 | 153 | 74 | 3,0 |

Dimensions in mm.



Mass Flow Controller

| Model | A | B | C | H | K | Weight (kg) |
|--|-----|-----|----|-----|----|-------------|
| MDCM2-200CV/MDMF-210CV (1/8" OD) | 77 | 128 | 47 | 111 | 25 | 0,6 |
| MDCM2-201CV/MDMF-211CV (1/4" OD) | 77 | 134 | 47 | 111 | 25 | 0,6 |
| MDCM2-201AV/MDMF-211CV (1/4" OD) | 78 | 135 | 47 | 123 | 26 | 0,7 |
| MDCM2-202AV/MDMF-212AV (1/2" OD) | 112 | 169 | 47 | 139 | 59 | 2,1 |
| MDCM2-203AV/MDMF-213AV (1/2" OD) | 171 | 238 | 47 | 153 | 74 | 4,9 |
| MDCM2-220M/MDMF-221M (1/4" OD) | 85 | 139 | 47 | 126 | 28 | 0,9 |
| MDCM2-230M/MDMF-231M/MDMF-232M (1/4" OD) | 115 | 172 | 47 | 163 | 69 | 3,4 |

Dimensions in mm.

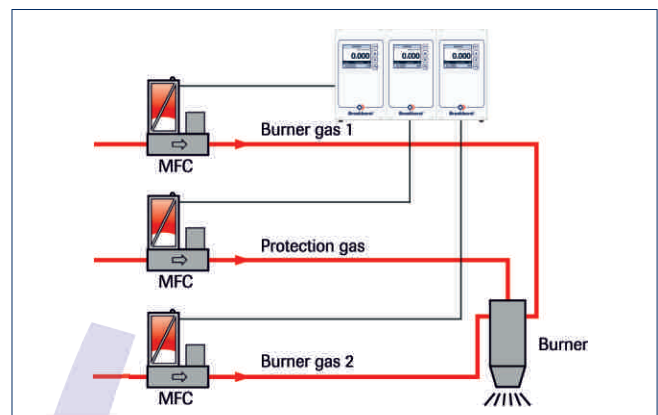
Fields of application

The MDCM2 series have been successfully applied in a wide variety of both OEM and laboratory applications in the following markets (typically):

- Semiconductor processing
- Analysis and environmental measurements
- Burner control
- Vacuum technology
- Surface treatment installations
- Process control in food, pharmaceutical and (petro-) chemical industries

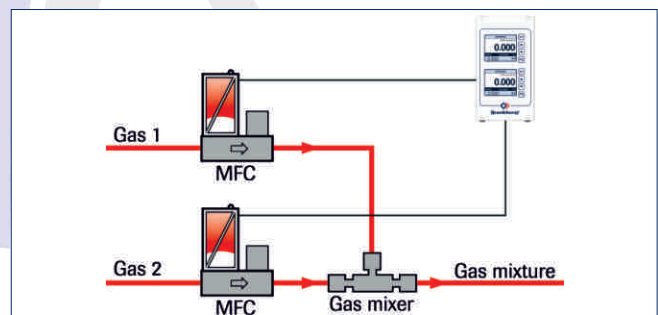
To give an impression of the many varied applications, we hereby sketch some basic examples. In reality, these applications are commonly far more complex and with far more variations and adaptations.

Burner control



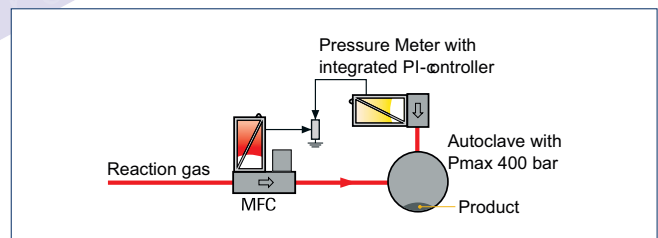
Burner control using Mass Flow Controllers brings many advantages compared to conventional systems, where flow is adjusted through needle valves. When burner orifices get clogged or when gas supply pressure varies, an MFC will automatically adapt to the changed conditions. For the control of relatively large flows with low differential pressure, which is typical for natural gas or CH₄, MADECO offers mass flow meters with separate pressure compensated bellows valves.

Making gas mixtures



MFC's are often used to make precise and stable mixtures of two or more gases. A MADECO PS/Readout system can be applied to maintain the ratio of mixed gases by operating in master-slave mode. In the example above, the flow range of gas 1 is much smaller than the other. For this purpose Bronkhorst developed a gas mixer, to guarantee a homogeneous gas mixture.

Feeding of reactors



Flow control is often combined with the control of reactor pressure, using an MDCM2 back pressure controller, or as depicted, an MDMF Pressure Meter with integrated PI-controller. Typical applications: high pressure hydrogenation systems and autoclave processes using a 400 bar rated Mass Flow Controller with Vary-P control valve.

Table with minimum and maximum flow ranges for MDCM2 instruments suitable for Multi Fluid / Multi Range functionality (valid for operating conditions from 0.8 to 10 bar abs and 0 to 70°C)

| MFM Model # | MFC Model # | Air flow ranges Minimum/Nominal/Maximum | Min/Max flow ranges for other gases | | | | | | | | | | | |
|-------------------|---------------------------------|---|-------------------------------------|----------------------------|-------------------------------|----------------------------|--------------------------|----------------------------|-----------------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------|
| | | | Ar | CH ₄ | C ₂ H ₆ | CO | CO ₂ | H ₂ | He | N ₂ | N ₂ O | O ₂ | | |
| MDCM2-110C - 002 | MDCM2-200CV - 002 | Min. 0.014 - 0.7 mL/min Nom. 0.014 - 2 mL/min Max. 0.014 - 5 mL/min | Min Max | 0.02 - 1 0.02 - 6 | 0.012 - 0.6 0.012 - 3.5 | 0.008 - 0.4 0.008 - 2 | 0.014 - 0.7 0.014 - 5 | 0.012 - 0.6 0.012 - 3 | 0.014 - 0.7 0.014 ₅ | 0.02 - 1 0.02 - 7 | 0.014 - 0.7 0.014 - 5 | 0.012 - 0.6 0.012 - 3 | 0.014 - 0.7 0.014 - 5 | mL/min |
| MDCM2-110C - 005 | MDCM2-200CV - 005 | Min. 0.06 - 3 mL/min Nom. 0.06 - 5 mL/min Max. 0.06 - 9 mL/min | Min Max | 0.07 - 3.5 0.07 - 9.5 | 0.04 - 2 0.04 - 5.5 | 0.028 - 1.4 0.028 - 4 | 0.06 - 3 0.06 - 9 | 0.04 - 2 0.04 - 4.5 | 0.06 - 3 0.06 - 7.2 | 0.07 - 3.5 0.07 - 10 | 0.06 - 3 0.06 - 9 | 0.04 - 2 0.04 - 4.5 | 0.06 - 3 0.06 - 9 | |
| MDCM2-111B - 020 | MDCM2-201CV - 020 | Min. 0.16 - 8 mL/min Nom. 0.16 - 20 mL/min Max. 0.16 - 30 mL/min | Min Max | 0.2 - 10 0.2 - 30 | 0.11 - 5.5 0.11 - 18 | 0.08 - 4 0.08 - 13 | 0.16 - 8 0.16 - 30 | 0.14 - 7 0.14 - 16 | 0.144 - 7.2 0.144 - 25 | 0.2 - 10 0.2 - 35 | 0.16 - 8 0.16 - 30 | 0.12 - 6 0.12 - 16 | 0.16 - 8 0.16 - 30 | |
| MDCM2-111B - 050 | MDCM2-201CV - 050 | Min. 0.4 - 20 mL/min Nom. 0.4 - 50 mL/min Max. 0.4 - 75 mL/min | Min Max | 0.54 - 27 0.54 - 75 | 0.34 - 17 0.34 - 47 | 0.22 - 11 0.22 - 34 | 0.4 - 20 0.4 - 75 | 0.3 - 15 0.3 - 39 | 0.42 - 21 0.42 - 65 | 0.56 - 28 0.56 - 90 | 0.4 - 20 0.4 - 75 | 0.3 - 15 0.3 - 38 | 0.4 - 20 0.4 - 73 | |
| MDCM2-111B - 100 | MDCM2-201CV - 100 | Min. 0.8 - 40 mL/min Nom. 0.8 - 100 mL/min Max. 0.8 - 150 mL/min | Min Max | 1.12 - 56 1.12 - 150 | 0.64 - 32 0.64 - 95 | 0.42 - 21 0.42 - 70 | 0.8 - 40 0.8 - 150 | 0.62 - 31 0.62 - 79 | 0.84 - 42 0.84 - 130 | 1.12 - 56 1.12 - 180 | 0.8 - 40 0.8 - 150 | 0.6 - 30 0.6 - 77 | 0.8 - 40 0.8 - 140 | |
| MDCM2-111B - 200 | MDCM2-201CV - 200 | Min. 1.6 - 80 mL/min Nom. 1.6 - 200 mL/min Max. 1.6 - 300 mL/min | Min Max | 2.4 - 120 2.4 - 300 | 1.3 - 65 1.3 - 190 | 0.88 - 44 0.88 - 140 | 1.6 - 80 1.6 - 300 | 1.22 - 61 1.22 - 150 | 1.68 - 84 1.68 - 260 | 2.4 - 120 2.4 - 360 | 1.6 - 80 1.6 - 300 | 1.2 - 60 1.2 - 150 | 1.6 - 80 1.6 - 290 | |
| MDCM2-111B - 500 | MDCM2-201CV - 500 | Min. 4 - 200 mL/min Nom. 4 - 500 mL/min Max. 4 - 750 mL/min | Min Max | 5.4 - 270 5.4 - 750 | 3.2 - 160 3.2 - 470 | 2.2 - 110 2.2 - 340 | 4 - 200 4 - 750 | 3 - 150 3 - 390 | 4.2 - 210 4.2 - 650 | 5.6 - 280 5.6 - 900 | 4 - 200 4 - 750 | 3 - 150 3 - 380 | 4 - 200 4 - 730 | |
| MDCM2-111B - 1K0 | MDCM2-201CV - 1K0 | Min. 8 - 400 mL/min Nom. 8 - 1000 mL/min Max. 8 - 1500 mL/min | Min Max | 11.2 - 560 11.2 - 1500 | 6.4 - 320 6.4 - 950 | 4.2 - 210 4.2 - 680 | 8 - 400 8 - 1500 | 6.2 - 310 6.2 - 790 | 8.4 - 420 8.4 - 1300 | 11.2 - 560 11.2 - 1800 | 8 - 400 8 - 1500 | 6 - 300 6 - 770 | 8 - 400 8 - 1400 | |
| MDCM2-111B - 2K0 | MDCM2-201CV - 2K0 | Min. 16 - 800 mL/min Nom. 16 - 2000 mL/min Max. 16 - 3000 mL/min | Min Max | 24 - 1200 24 - 3000 | 13 - 650 13 - 1900 | 8.8 - 440 8.8 - 1300 | 16 - 800 16 - 3000 | 12.2 - 610 12.2 - 1500 | 16.8 - 840 16.8 - 2600 | 24 - 1200 24 - 3600 | 16 - 800 16 - 3000 | 12 - 600 12 - 1500 | 16 - 800 16 - 2900 | |
| MDCM2-111B - 5K0 | MDCM2-201CV - 5K0 | Min. 0.04 - 2 L/min Nom. 0.04 - 5 L/min Max. 0.04 - 7.5 L/min | Min Max | 0.054 - 2.7 0.054 - 7.5 | 0.032 - 1.6 0.032 - 4.7 | 0.022 - 1.1 0.022 - 3.3 | 0.04 - 2 0.04 - 7.5 | 0.03 - 1.5 0.03 - 3.9 | 0.042 - 2.1 0.042 - 6.5 | 0.056 - 2.8 0.056 - 9 | 0.04 - 2 0.04 - 7.5 | 0.03 - 1.5 0.03 - 3.8 | 0.04 - 2 0.04 - 7.3 | |
| MDCM2-111B - 10K | MDCM2-201CV - 10K | Min. 0.08 - 4 L/min Nom. 0.08 - 10 L/min Max. 0.08 - 15 L/min | Min Max | 0.112 - 5.6 0.112 - 15 | 0.064 - 3.2 0.064 - 9.5 | 0.042 - 2.1 0.042 - 6.9 | 0.08 - 4 0.08 - 15 | 0.062 - 3.1 0.062 - 7.9 | 0.084 - 4.2 0.084 - 13 | 0.112 - 5.6 0.112 - 18 | 0.08 - 4 0.08 - 15 | 0.06 - 3 0.06 - 7.7 | 0.08 - 4 0.08 - 14 | |
| MDCM2-111B - 20K | MDCM2-201CV - 20K | Min. 0.16 - 8 L/min Nom. 0.16 - 20 L/min Max. 0.16 - 25 L/min | Min Max | 0.2 - 10 0.2 - 25 | 0.13 - 6.5 0.13 - 16 | 0.088 - 4.4 0.088 - 11 | 0.16 - 8 0.16 - 25 | 0.122 - 6.1 0.122 - 14 | 0.168 - 8.4 0.168 - 25 | 0.24 - 12 0.24 - 30 | 0.16 - 8 0.16 - 25 | 0.12 - 6 0.12 - 14 | 0.16 - 8 0.16 - 25 | |
| MDCM2-111AC - 50K | MDCM2-201AV - 50K | Min. 0.4 - 20 L/min Nom. 0.4 - 50 L/min Max. 0.4 - 75 L/min | Min Max | 0.54 - 27 0.54 - 75 | 0.32 - 16 0.32 - 47 | 0.22 - 11 0.22 - 34 | 0.4 - 20 0.4 - 75 | 0.3 - 15 0.3 - 39 | 0.42 - 21 0.42 - 65 | 0.56 - 28 0.56 - 90 | 0.4 - 20 0.4 - 75 | 0.3 - 15 0.3 - 38 | 0.4 - 20 0.4 - 73 | |
| MDCM2-111AC - 70K | MDCM2-201AV - 70K | Min. 0.6 - 30 L/min Nom. 0.6 - 70 L/min Max. 0.6 - 100 L/min | Min Max | 0.9 - 45 0.9 - 100 | 0.5 - 25 0.5 - 60 | 0.4 - 20 0.4 - 45 | 0.6 - 30 0.6 - 100 | 0.5 - 25 0.5 - 50 | 0.6 - 30 0.6 - 90 | 0.9 - 45 0.9 - 125 | 0.6 - 30 0.6 - 100 | 0.5 - 25 0.5 - 50 | 0.6 - 30 0.6 - 90 | |
| MDCM2-112AC - M10 | MDCM2-202AV ¹⁾ - M10 | Min. 0.8 - 40 L/min Nom. 0.8 - 100 L/min Max. 0.8 - 150 L/min | Min Max | 1.12 - 56 1.12 - 150 | 0.64 - 32 0.64 - 95 | 0.42 - 21 0.42 - 68 | 0.8 - 40 0.8 - 150 | 0.62 - 31 0.62 - 79 | 0.84 - 42 0.84 - 130 | 1.12 - 56 1.12 - 180 | 0.8 - 40 0.8 - 150 | 0.6 - 30 0.6 - 77 | 0.8 - 40 0.8 - 140 | |
| MDCM2-112AC - M20 | MDCM2-202AV ¹⁾ - M20 | Min. 1.4 - 70 L/min Nom. 1.4 - 200 L/min Max. 1.4 - 250 L/min | Min Max | 2 - 100 2 - 250 | 1.1 - 55 1.1 - 170 | 0.7 - 35 0.7 - 120 | 1.4 - 70 1.4 - 250 | 1 - 50 1 - 130 | 1.4 - 70 1.4 - 200 | 2 - 100 2 - 300 | 1.4 - 70 1.4 - 250 | 1 - 50 1 - 130 | 1.4 - 70 1.4 - 250 | |
| MDCM2-113AC - M50 | MDCM2-203AV ¹⁾ - M50 | Min. 4 - 200 L/min Nom. 4 - 500 L/min Max. 4 - 750 L/min | Min Max | 5.4 - 270 5.4 - 750 | 3.2 - 160 3.2 - 470 | 2.2 - 110 2.2 - 340 | 4 - 200 4 - 750 | 3 - 150 3 - 390 | 4.2 - 210 4.2 - 650 | 5.6 - 280 5.6 - 900 | 4 - 200 4 - 750 | 3 - 150 3 - 380 | 4 - 200 4 - 730 | |
| MDCM2-113AC - 1M0 | MDCM2-203AV ¹⁾ - 1M0 | Min. 8 - 400 L/min Nom. 8 - 1000 L/min Max. 8 - 1670 L/min | Min Max | 11.2 - 560 11.2 - 1670 | 6.4 - 320 6.4 - 900 | 4.2 - 210 4.2 - 750 | 8 - 400 8 - 1500 | 6.2 - 310 6.2 - 850 | 8.4 - 420 8.4 - 1350 | 11.2 - 560 11.2 - 1850 | 8 - 400 8 - 1670 | 6 - 300 6 - 840 | 8 - 400 8 - 1500 | |

¹⁾ Multi Gas / Multi Range option not available for these models

Multi Gas / Multi Range features

- Rangeability up to 187,5 : 1
- Flexible, user-programmable ranges and gas types
- Easy-to-use configuration software
- Multi Gas / Multi Range functionality up to 10 bar; pressure rating up to 100 bar
- High accuracy and repeatability

Notes

- Multi Gas / Multi Range is optional on the MDCM2 series and must be requested at the point of ordering
- Extended rangeability for digital communication only; turndown 50:1 when using analog I/O options
- The selected orifice of the control valve may limit the rangeability
- Standard accuracy (based on actual calibration): $\pm(0,5\% \text{ RD} + 0,1\% \text{ FS})$; $\pm 0,8\% \text{ Rd}$ plus $\pm 0,2\% \text{ FS}$ for F-110C-005/F-200CV-005; $\pm 2\% \text{ FS}$ for F-110C-002/F-200CV-002
- Maximum range for gases not mentioned in this list; rule of thumb: nominal range for Air x Conversion Factor; e.g. F-111B - 1K0: maximum range for $\text{SF}_6 = 1000 \times 0.27 = 270 \text{ ml}_n/\text{min}$
- Minimum range for gases not mentioned in this list; rule of thumb: minimum range for Air x Conversion Factor; e.g. F-111B - 1K0: minimum range for $\text{SF}_6 = 400 \times 0.27 = 108 \text{ ml}_n/\text{min}$



Model number identification

MDCM2- 2 0 0C/0CV - A - A A D - 1 - V

Base

| | |
|---|------------|
| 0 | Valve only |
| 1 | Meter |
| 2 | Controller |

Pressure rating

| | |
|---|---------|
| 0 | 64 bar |
| 1 | 100 bar |
| 2 | 200 bar |
| 3 | 400 bar |

Ranges

for PN64/PN100 Flow Meters/Controllers

| | |
|---------|--|
| 0C/0CV | 0...0,7 / 0...9 ml _v /min |
| 1B/1CV | 0...8 / 0...25000 ml _v /min |
| 1AC/1AV | 0...20 / 0...100 l _v /min |
| 2AC/2AV | 0...40 / 0...250 l _v /min |
| 3AC/3AV | 0...200 / 0...1670 l _v /min |

for PN200/PN400 Flow Meters

| | |
|----|---|
| 0M | 0...10 / 0...15 ml _v /min |
| 1M | 0...15 / 0...20000 ml _v /min |
| 2M | 0...10 / 0...250 l _v /min |
| 3M | 0...200 / 0...1250 l _v /min |

for PN200 Flow Controllers

| | |
|----|---|
| 0M | 0...100 / 0...15 ml _v /min |
| 1M | 0...15 / 0...20000 ml _v /min |

for PN400 Flow Controllers

| | |
|----|---------------------------------------|
| 0M | 0...10 / 0...500 ml _v /min |
| 1M | 0...0,5 / 0...10 l _v /min |
| 2M | 0...10 / 0...100 l _v /min |

Nominal range

Factory selected

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 (n/c control) |
| Q | RS232 + PROFIBUS (n/o control) |
| R | RS232 + FLOW-BUS (n/c control) |
| S | RS232 + FLOW-BUS (n/o control) |
| T | RS232 + EtherCAT® (n/c control) |
| U | RS232 + EtherCAT® (n/o control) |
| V | RS232 + PROFINET (n/c control) |
| W | RS232 + PROFINET (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)

| | |
|---|---------------------------|
| 1 | 1/8" OD compression type |
| 2 | 1/4" OD compression type |
| 3 | 6 mm OD compression type |
| 4 | 12 mm OD compression type |
| 5 | 1/2" OD compression type |
| 6 | 20 mm OD compression type |
| 8 | 1/4" Face seal male |
| 9 | other |

Internal seals

| | |
|---|---------------------------|
| V | Viton® (factory standard) |
| E | EPDM |
| K | Kalrez®(FFKM) |





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