# Technical data sheet

Flow meter FMO

More than just pumps

## Flow meter FMO

**Advantages/characteristics:**

- Oval rotor design
- For low-viscosity to high-viscosity media
- With integrated digital display unit FLUXTRONIC® or available as pulse version
- Depending on type for use with drum/eccentric worm-drive pump or for use in piping
- Flow rate of 0,04 - 380 l/min
- High accuracy and repeat accuracy
- Signal transduction at FLUXTRONIC® or other external control e. g. PCC possible
- Display in litre, gallon or kilogram possible
- Semiautomatic filling in connection with a switching amplifier possible
- For Ex-application in Zone 1
- Depending on type also suitable for food contact according to EG 1935/2004 and FDA CFR 21

| **Technical data/type** | **FMO 101** | | | **FMO 102** | | | **FMO 104** | | |
|---|---|---|---|---|---|---|---|---|---|
| Description | P/P | P/S | S/S | P/P | P/S | S/S | AL/P | S/P | S/S |
| Connection inlet/outlet | G ¼ | | | G ¼ | | | G ½ | | |
| **Material** | | | | | | | | | |
| Housing | PVDF | PVDF | S | PVDF | PVDF | S | AL | S | S |
| Oval rotors | PPS | S | S | PPS | S | S | PPS | PPS | S |
| Shaft | HC | S | S | HC | S | S | S | S | S |
| Seal | FKM/FFKM/EPDM | | | | | | | | |
| Viscosity max. [mPas] | up to 1.000 | | | | | | up to 1.000 / from 1.000 up to 500.000 | | |
| Flow rate l/min<br>at viscosity < 5 mPas<br>at viscosity > 5 mPas | 0,09-1,67<br>0,04-1,67 | | | 0,44-8,3<br>0,25-8,3 | | | 2-25<br>1-30 | | |
| Measurement error of the flow rate [1]<br>< 5 mPas<br>> 5 mPas | ± 2,5 %<br>± 1 % | | | | | | ± 2 %<br>± 0,5 % | | |
| Repeat accuracy [2] | ± 0,03 % | | | | | | | | |
| Pulse/litre (theo.) | 2.170 | | | 390 | | | 100 | | |
| Theo. calibration constant [L/Imp] | 0,0004608 | | | 0,0025641 | | | 0,0100000 | | |
| Medium temperature [°C]<br>(for non Ex-application and Ex-application with pulse version) | -10 to +60 | | -30 to +120 | -10 to +60 | | -30 to +120 | -30 to +80 | | -30 to +120 |
| Medium temperature [°C]<br>(for Ex-application with FLUXTRONIC®) | – | | | | | | -20 to +40 | | |
| Ambient temperature [°C] | -20 to +40 | | | | | | | | |
| Operating pressure max. [bar] | 10 | | 100 | 10 | | 100 | 130 | | 200 |
| Protection class [IP] | 54 | | | | | | | | |
| Ex-marking | | | II 2G Ex h IIB T4 Gb | | | II 2G Ex h IIB T4 Gb | II 2G Ex h IIB T4 Gb | | |
| Weight [kg] | 0,2 | 0,2 | 0,7 | 0,2 | 0,2 | 0,6 | 1,6 | 4,1 | 4,2 |
| Sensor | Reed/Hall | | | | | | Reed/Reed* | | |
| Approvals | – | – | – | – | – | – | – | – | – |

[1] Difference between the average measured values of a series of the measurements and the theoretical value
[2] Bandwidth between several measurements under identical conditions
* Version Reed/Reed or Hall/Hall possible

# Technical data sheet

Flow meter FMO 110/140/150

| **Technical data/type** | **FMO 110** | | | | | | **FMO 140** | | | **FMO 150** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Description | P/P | AL/P | S/P | S/S | S/S | | AL/P | S/P | S/S | AL/P | S/P | S/S |
| Connection inlet/outlet | G 1 | | | | Clamp 1 ½“ | Clamp 2“ | Flange DIN 1092 PN16/DN40 A150/ LK110/ holes 4x ø18 mm | | | Flange DIN 1092 PN16/DN50 A165/ LK125/ holes 4x ø18 mm | | |
| **Material** | | | | | | | | | | | | |
| Housing | PVDF | AL | S | S | | | AL | S | S | AL | S | S |
| Oval rotors | PPS | PPS | PPS | S | | | PPS | PPS | S | PPS | PPS | S |
| Shaft | HC | S | S | S | | | S | S | S | S | S | S |
| Seal | FKM / FFKM / EPDM | | | | | | | | | | | |
| Viscosity max. [mPas] | up to 1.000 / from 1.000 to 500.000 | | | | | | | | | | | |
| Flow rate l/min<br>at viscosity < 5 mPas<br>at viscosity > 5 mPas | 9,5-150<br>5,7-170 | | | | | | 15-227<br>9,5-245 | | | 23-380<br>15-380 | | |
| Measurement error of the flow rate [1<br>< 5 mPas<br>> 5 mPas | ± 2 %<br>± 0,5 % | | | | | | ± 1 %<br>± 0,5 % | | | | | |
| Repeat accuracy [2 | ± 0,03 % | | | | | | | | | | | |
| Pulse/litre (theo.) | 45 | | | | | | 17 | | | 9 | | |
| Theo. calibration constant [L/Imp] | 0,0222222 | | | | | | 0,0588235 | | | 0,1111111 | | |
| Medium temperature [°C]<br>(for non Ex-application and Ex-application with pulse version) | -10 to +60 | -30 to +80 | | -30 to +120 | | | -30 to +80 | -30 to +120 | | -30 to +80 | -30 to +120 | |
| Medium temperature [°C]<br>(for Ex-application with FLUXTRONIC®) | -10 to +40 | -20 to +40 | | | | | | | | | | |
| Ambient temperature [°C] | -20 to +40 | | | | | | | | | | | |
| Operating pressure max. [bar] | 10 | 130 | | 200 | 16 | | 16 | | | | | |
| Protection class [IP] | 54 | | | | | | | | | | | |
| Ex-marking | | II 2G Ex h IIB T4 Gb | | | | | | | | | | |
| Approvals | – | – | – | – | | FDA | – | – | – | – | – | – |
| Weight [kg] | 1,5 | 1,7 | 4,3 | 4,5 | 4,5 | | 5,1 | 13,4 | 13,9 | 5,8 | 15,2 | 16,2 |
| Sensor | Reed/Reed* | | | | | | | | | | | |

[(1 Difference between the average measured values of a series of the measurements and the theoretical value

[2 Bandwidth between several measurements under identical conditions

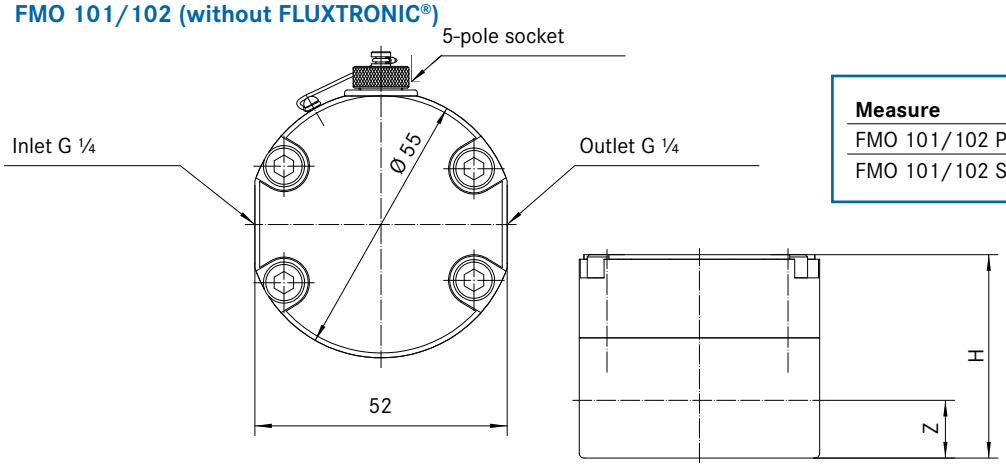
* Version Reed/Reed or Hall/Hall possible

# Dimensions

Flow meter FMO

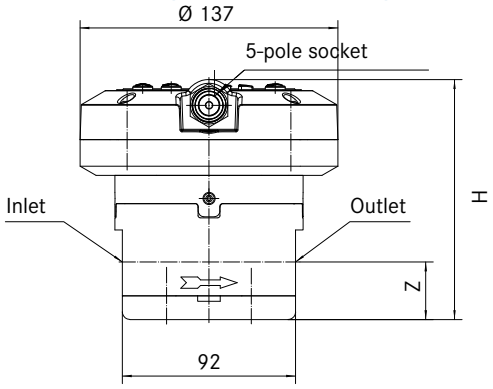
**Dimensions [mm]**

## FMO 101/102 (without FLUXTRONIC®)



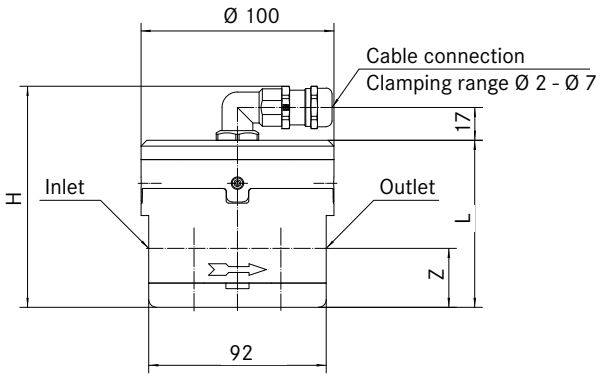

| Measure | H | Z |
|---|---|---|
| FMO 101/102 P | 48 | 16 |
| FMO 101/102 S | 44 | 13 |

## FMO 104/110 (with FLUXTRONIC®)



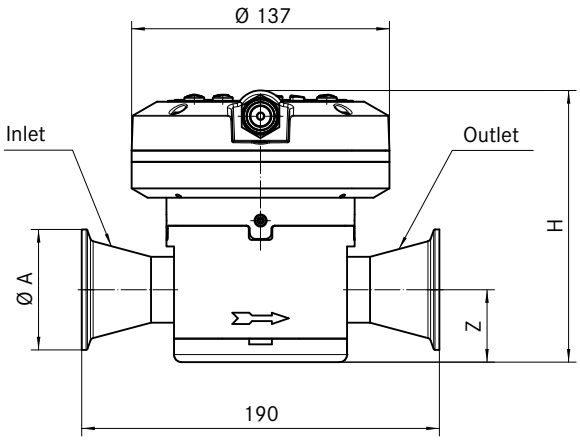

| Measure | H | Z |
|---|---|---|
| FMO 104 | 128 | 31 |
| FMO 110 | 139 | 39 |

## FMO 104/110 in pulse version (without FLUXTRONIC®)



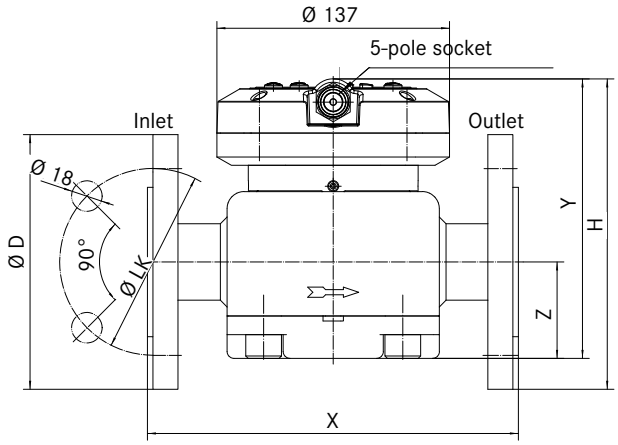

| Measure | H | Z | L |
|---|---|---|---|
| FMO 104 | 115 | 31 | 87 |
| FMO 110 | 126 | 39 | 98 |

## FMO 104/110 with Clamp (with FLUXTRONIC®)




| Measure | H | Z |
|---|---|---|
| FMO 104 | 134 | 31 |
| FMO 110 | 144 | 39 |

## FMO 140/150 (with FLUXTRONIC®)




| Measure | Ø D | Lk | H | X | Y | Z |
|---|---|---|---|---|---|---|
| FMO 140 | 150 | 110 | 189 | 212 | 171 | 57 |
| FMO 150 | 165 | 125 | 202,5 | 264 | 181 | 61 |

# Part numbers

Flow meter FMO

More than just pumps

## For media with viscosities up to 1.000 mPas

**Flow meter with FLUXTRONIC®**

| Material | Seal | FMO 104 | FMO 110 | | | FMO 140 | FMO 150 |
|---|---|---|---|---|---|---|---|
| Connection | | G ½ | G 1 | Clamp 1 ½“ | Clamp 2“ | Flange DN 40 | Flange DN 50 |
| AL/P | EPDM | 10-A06 04 100 | 10-A06 10 100 | – | – | 10-A06 40 101 | 10-A06 50 101 |
| | FKM | 10-A06 04 110 | 10-A06 10 110 | – | – | 10-A06 40 111 | 10-A06 50 111 |
| | FFKM | 10-A06 04 120 | 10-A06 10 120 | – | – | 10-A06 40 121 | 10-A06 50 121 |
| S/P | EPDM | 10-A06 04 200 | 10-A06 10 200 | – | – | 10-A06 40 201 | 10-A06 50 201 |
| | FKM | 10-A06 04 210 | 10-A06 10 210 | – | – | 10-A06 40 211 | 10-A06 50 211 |
| | FFKM | 10-A06 04 220 | 10-A06 10 220 | – | – | 10-A06 40 221 | 10-A06 50 221 |
| S/S | EPDM | 10-A06 04 300 | 10-A06 10 300 | 10-A0610302 | 10-A0610303 | 10-A06 40 301 | 10-A06 50 301 |
| | FKM | 10-A06 04 310 | 10-A06 10 310 | 10-A0610312 | 10-A0610313 | 10-A06 40 311 | 10-A06 50 311 |
| | FFKM | 10-A06 04 320 | 10-A06 10 320 | – | – | 10-A06 40 321 | 10-A06 50 321 |
| P/P | EPDM | – | 10-A06 10 400 | – | – | – | – |
| | FKM | – | 10-A06 10 410 | – | – | – | – |
| | FFKM | – | 10-A06 10 420 | – | – | – | – |

**Flow meter in pulse version (without FLUXTRONIC®)**

| Material | Seal | FMO 101 | FMO 102 | FMO 110 |
|---|---|---|---|---|
| P/S | EPDM | 10-AB6 01 100 | 10-AB6 02 100 | – |
| | FKM | 10-AB6 01 110 | 10-AB6 02 110 | – |
| | FFKM | 10-AB6 01 120 | 10-AB6 02 120 | – |
| S/S | EPDM | 10-AB6 01 300 | 10-AB6 02 300 | – |
| | FKM | 10-AB6 01 310 | 10-AB6 02 310 | – |
| | FFKM | 10-AB6 01 320 | 10-AB6 02 320 | – |
| P/P | EPDM | 10-AB6 01 400 | 10-AB6 02 400 | 10-AB6 10 400 |
| | FKM | 10-AB6 01 410 | 10-AB6 02 410 | 10-AB6 10 410 |
| | FFKM | 10-AB6 01 420 | 10-AB6 02 420 | 10-AB6 10 420 |

| Material | Seal | FMO 104 | FMO 110 |
|---|---|---|---|
| AL/P | EPDM | 10-AB6 04 100 | 10-AB6 10 100 |
| | FKM | 10-AB6 04 110 | 10-AB6 10 110 |
| | FFKM | 10-AB6 04 120 | 10-AB6 10 120 |
| S/P | EPDM | 10-AB6 04 200 | 10-AB6 10 200 |
| | FKM | 10-AB6 04 210 | 10-AB6 10 210 |
| | FFKM | 10-AB6 04 220 | 10-AB6 10 220 |
| S/S | EPDM | 10-AB6 04 300 | 10-AB6 10 300 |
| | FKM | 10-AB6 04 310 | 10-AB6 10 310 |
| | FFKM | 10-AB6 04 320 | 10-AB6 10 320 |

## For media with viscosities from 1.000 to max. 500.000 mPas

**Flow meter with FLUXTRONIC®**

| Material | Seal | FMO 104 | FMO 110 | | FMO 140 | FMO 150 |
|---|---|---|---|---|---|---|
| Connection | – | G ½ | G 1 | Clamp 2“ | Flansch DN 40 | Flansch DN 50 |
| AL/PV | EPDM | 10-A06 04 105 | 10-A06 10 105 | – | 10-A06 40 106 | 10-A06 50 106 |
| | FKM | 10-A06 04 115 | 10-A06 10 115 | – | 10-A06 40 116 | 10-A06 50 116 |
| | FFKM | 10-A06 04 125 | 10-A06 10 125 | – | 10-A06 40 126 | 10-A06 50 126 |
| S/PV | EPDM | 10-A06 04 205 | 10-A06 10 205 | – | 10-A06 40 206 | 10-A06 50 206 |
| | FKM | 10-A06 04 215 | 10-A06 10 215 | – | 10-A06 40 216 | 10-A06 50 216 |
| | FFKM | 10-A06 04 225 | 10-A06 10 225 | – | 10-A06 40 226 | 10-A06 50 226 |
| S/SV | EPDM | 10-A06 04 305 | 10-A06 10 305 | 10-A0610307 | 10-A06 40 306 | 10-A06 50 306 |
| | FKM | 10-A06 04 315 | 10-A06 10 315 | 10-A0610317 | 10-A06 40 316 | 10-A06 50 316 |
| | FFKM | 10-A06 04 325 | 10-A06 10 325 | – | 10-A06 40 326 | 10-A06 50 326 |

**Flow meter in pulse version (without FLUXTRONIC®)**

| FMO 104 | FMO 110 |
|---|---|
| – | – |
| 10-AB6 04 105 | 10-AB6 10 105 |
| 10-AB6 04 115 | 10-AB6 10 115 |
| 10-AB6 04 125 | 10-AB6 10 125 |
| 10-AB6 04 205 | 10-AB6 10 205 |
| 10-AB6 04 215 | 10-AB6 10 215 |
| 10-AB6 04 225 | 10-AB6 10 225 |
| 10-AB6 04 305 | 10-AB6 10 305 |
| 10-AB6 04 315 | 10-AB6 10 315 |
| 10-AB6 04 325 | 10-AB6 10 325 |

**Connecting piece made of stainless steel (S)**

| To connect | Connection | Part no. |
|---|---|---|
| FMO 104 - FLUX drum pump | G ½ A - G 1 ¼ | 10-959 06 227 |
| FMO 104 - FLUX progressive cavity pump | G ½ A - G 1 ½ | 10-959 06 225 |
| FMO 110 - FLUX drum pump | G 1 A - G 1 ¼ | 10-959 06 144 |
| FMO 110 - FLUX progressive cavity pump | G 1 A - G 1 ½ | 10-959 06 122 |

**Connecting piece made of polyvinylidene fluoride (PVDF)**

| To connect | Connection | Part no. |
|---|---|---|
| FMO 110 P/P - at FLUX drum pump | G 1 A - G 1 ¼ | 10-959 06 145 |

# Technical data sheet
Digital display unit FLUXTRONIC®

## Digital display unit FLUXTRONIC®

**Advantages/characteristics:**

- Simple operating concept
- All data will be maintained when replacing the battery
- Four safety levels with PIN setting
- Three additional outlets
- For mounting on flow meters, on nozzles or e.g. on the wall
- Calibration on medium possible
- Shows filled quantity (normal operation)
- With switching amplifier batch mode possible (automatic mode)
- Ex-proofed

| **Technical data** | |
|---|---|
| Ambient temperature | -20 to +40 °C (at temp. below 0 °C the LCD-display is slowed) |
| Housing material | PP |
| Pulse length | 2 mS |
| Power supply | Lithium battery CR 2032 |
| Protection class | IP 54 |
| Input | Mechanical contact (reedsensor) start/stop (button) |
| Output | NAMUR: redirection, signal 1 – e. g. for motor, signal 2 – e. g. for valve, error signal OK signal |
| Ex-marking | II 2G Ex ia IIB T6 Gb |

| **Description** | **Part no.** | |
|---|---|---|
| External digital display FLUXTRONIC® for FMO 101, FMO 102 | 10-001 42 111 | |
| External digital display FLUXTRONIC® for FMO 104, FMO 110 in pulse version | 10-001 42 113 | |
| Protecting cap for FLUXTRONIC® | 10-001 42 121 | |
| Pulse cable for connecting the flow meter in pulse version with FLUXTRONIC® | 5 m | 10-934 08 032 |
| | 10 m | 10-934 08 033 |
| | 15 m | 10-934 08 034 |

**Switching amplifier for non-Ex applications**

| **Description** | **Part no.** |
|---|---|
| FSV 100 (2 signals*) for installation in flow meter | 10-001 49 040 |
| Connecting cable switching amplifier/motor | 10-934 08 035 |
| Connecting cable switching amplifier/magnetic valve | 10-934 08 036 |
| Connecting cable shielded 5 m FSV/external FLUXTRONIC® | 10-934 08 030 |
| Connecting cable shielded 10 m FSV/external FLUXTRONIC® | 10-934 08 031 |

**Switching amplifier for Ex-application**

| **Description** | **Part no.** |
|---|---|
| FSV 121-1 Ex<br>Ex-marking:<br>II 2(1) G Ex db eb [ia Ga] IIC T6 Gb | 10-001 49 039 |
| FSV 132 (2 signals*) for installation in the control cabinet<br>Ex-marking:<br>II (1) G [Ex ia Ga] IIC | 10-940 04 020 |
| FSV 133 Ex (1 signal) for installation in the control cabinetfor redirection<br>Ex-marking:<br>II 3 (1) G Ex nAc nCc [ia] IIC T4 | 10-940 04 041 |
| Control cable 5 m Flow meter/FSV | 10-934 08 038 |
| Control cable 10 m Flow meter/FSV | 10-934 08 040 |

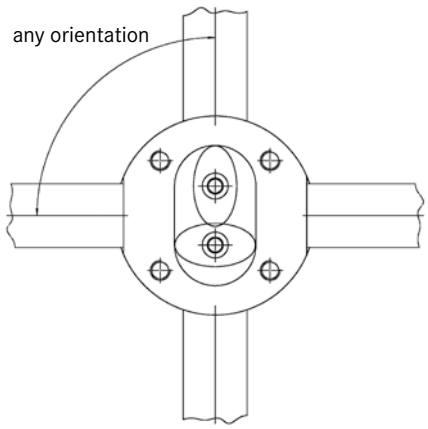
* e. g. for switching the motor and valve

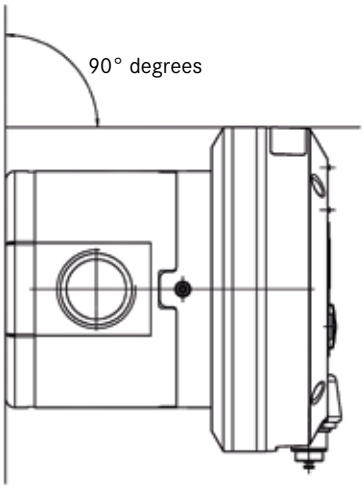
**Maximal flow rate (l/min) for different viscosities and x bar pressure drop**

| Viscosity [mPas] | Pressure drop x [bar] | Type | | | | | |
|---|---|---|---|---|---|---|---|
| | | FMO 101* | FMO 102* | FMO 104 | FMO 110 | FMO 140 | FMO 150 |
| 1 | 1<br>*0,1<br>**0,5 | 1,67* | 4* | 23* | 130 | 180** | 380 |
| < 140 | | 0,24* | 1,2* | 7,6* | 75 | 150 | 220 |
| < 400 | | - | - | 15,5 | 34 | 70 | 105 |
| < 900 | | - | - | 8,5 | 18 | 45 | 65 |
| < 2.500 | 10 | - | - | 19 | 43 | 90 | 123 |
| < 5.000 | | - | - | 13 | 29 | 60 | 82 |
| < 10.000 | | - | - | 9 | 19 | 40 | 55 |
| < 15.000 | | - | - | 6 | 13 | 27 | 37 |
| < 30.000 | | - | - | 4 | 9 | 18 | 24 |
| < 60.000 | | - | - | 3 | 6 | 12 | 16 |
| < 120.000 | | - | - | 2 | 4 | 8 | 11 |
| < 250.000 | | - | - | 1 | 3 | 5 | 7 |
| < 500.000 | | - | - | - | 2 | 4 | 5 |

**Mounting position FMO**

When mounting the flow meter type FMO make sure that neither the bottom nor the cover of the meter housing will be ground off by the weight of the oval rotors.

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