



# GM-10N

## Battery powered thermal Mass Flowmeter for Gases



## Features

- / Standard AA battery powered
- / Touchscreen with password protection
- / Flow units changeable
- / Totalizer
- / High accuracy and dynamic
- / Extremely quick response time
- / No inflow and outflow lines required
- / Real gas calibration
- / Optional multigas
- / Optional 24 VDC supply
- / Optional regulating valve
- / Optional switching contacts

## Description:

The GM-10N with its integrated touchscreen, offers thanks to autonomous operation with standard AA batteries and its insensitivity to pressure surges a highly accurate alternative to variable area flowmeters. The device has a CMOS flow sensor that enables a quick response speed due to its extremely small dimensions, while ensuring excellent accuracy. An all-metal body made of aluminium or stainless steel is equipped in its interior with a flow rectifier and subsequent resistance that divides the volume flow of gases into a defined main and an auxiliary flow. The auxiliary flow is guided through a measuring chamber in which the approximately 1 mm sensor is directly located. The sensor gets cooled by the mass flow of gas in such manner that its heat loss is proportional to the number of gas molecules flowing along regardless of their packing density. Consequently, the mass flow can be ascertained in a wide area without compensating for pressure and temperature. This principle of measurement is unique as against conventional methods like the variable area principle because no inflow and outflow lines are required. In its basic version, the GM-10N displays the standard and the total volume flow as a numerical value on its touchscreen. In addition to the numerical values, the standard volume flow is also shown graphically by a bar graph. The GM-10N can be supplied in its extended levels with additional precision regulating valve and / or adjustable switching contacts.

## Application:

The GM-10N series of thermal gas mass flowmeters has been developed to replace on a longterm basis the variable area flowmeter that enjoyed a fine track-record for years for small gas flows. In contrast to this measurement system, it offers obvious advantages like higher accuracy and insensitive to pressure and temperature changes and it can be deployed even without auxiliary power supply. The device is suited for a number of various gases and covers the volume flow range up to 450 NI/min air. Considering these advantages, the GM-10N can be used in different areas of the industry like, for example, gas supply systems, semiconductor productions, welding technology, machine construction, supply



of compressed air, fuel cells, fermenters, chemical engineering, laboratories, ovens, burners, medical engineering, analyzing devices, laser technology, surface coating and so on. In the laboratory applications especially, the GM-10N is often deployed along with its optionally available integrated manual regulating valve since it permits adjustment of very low gas volume flows and maintenance of constant levels.

## Versions:

### GM-10N Battery powered, thermal Mass Flowmeter for Gases

Normally, the GM-10N works as a battery-powered thermal mass flowmeter displaying the standard and the total volume flow as a numerical value on its touchscreen. In addition to the numerical values, the standard volume flow is also shown graphically by a bar graph. In the next extended level, a manual regulating valve is added to the device to accurately regulate the volume flow. Optionally, the GM-10N can be supplied with electrical switching contacts with or without a regulating valve. However, in this case an external 24 VDC power supply is necessary since the battery capacity is insufficient for operating the switching outputs.

**Measuring tube material:** The measuring tube can be made of anodized aluminium or electropolished stainless steel depending on the media. However, the CMOS sensor is wetted and deployment of the GM-10N is therefore limited to measuring and regulating non-hostile gases. The sealing material used is FKM, optionally it can be supplied in EPDM.

**Accuracy and span:** There are two versions of accuracies available. The more affordable standard variant measures at an accuracy of ± 2% of full scale value (ranges > 200 NI/min ± 3% of full scale) and has a measuring span of 1:50.

The more accurate version has an accuracy of ± 1% of full scale and a measuring span of 1:100 (for units with process connection G 1/4" and measuring ranges up to 50 NI/min with real gas calibration only).

**Medium:** As measuring media all non-hostile and dry gases can be considered. Gases that are not listed in the ordering codes but comply with these requirements can be ordered as special medium. All devices are supplied ex-factory in real gas calibration.

**Flow units:** It can be chosen between a large number of standardized and normalized flow units of the Imperial, US customary and SI measuring systems (with user adjustable reference conditions). The units are selectable from the integrated menu both for the actual and the totalized flow.

**Alarm functions:** In the version with contacts, the GM-10N provides three configurable alarms with 5 different selectable triggers (e.g. min. alarm, max. alarm, windows alarm, overflow alarm and totalizer alarm).

**Options:** Alternative sealing materials, external 24 VDC power supply instead of battery-operation, a housing for switch panel mounting, separately deliverable calibration protocols and a multigas calibration (e.g. one measuring device can be used for up to 3 different gases or gas mixtures) are available as options at additional charges.

## Ordering Codes:

Order number	GM-10N.	1.	2.	1/	N.	□.	T1
<b>GM-10N Battery powered, thermal Mass Flowmeter for Gases</b>							
<b>Version /</b>							
1 = flowmeter							
2a = flowmeter with regulating valve							
2b = flowmeter with regulating valve (flanged)							
3 = flowmeter with switching contacts							
4a = flowmeter with regulating valve and switching contacts							
4b = flowmeter with regulating valve (flanged) and switching contacts							
<b>Measuring tube material /</b>							
1 = aluminium anodized							
2 = stainless steel electropolished							
<b>Options (multiple selection such as 1/2/5 possible) /</b>							
0 = none							
1 = seals EPDM instead of FKM							
2 = external supply 24 VDC instead of battery for GM-10N.1/2							
4 = switch panel mounting							
5 = calibration protocol							
6 = multigas (up to 3)							
<b>Medium /</b>							
L = air							
N = nitrogen (N2)							
O = oxygen (O2)							
AR = argon (Ar)							
HE = helium (He)							
C = carbon dioxide (CO2)							
P = propane (C3H8)							
H = hydrogen (H2)							
M = methane (CH4)							
99 = please specify special type medium in detailed text							
<b>End value for measuring range /</b>							
□□□ = Please specify. Possible values from 0...50 Nml/min to 450 NI/min (air). From 60 NI/min on, the gas-connector is G 1/2" female							
<b>Accuracy and span /</b>							
T1 = ± 1% of full scale (up to 50 NI/min); span 1:100							
T2 = ± 2% of full scale (> 200 NI/min ± 3% of full scale); span 1:50							



## Technical Specifications:

<b>Media /</b>	dry, non-hostile gases (see also list in ordering codes)
<b>Accuracy &amp; Dynamics /</b>	
Type T1:	± 1% of full scale; dynamics 1:100 (for units with process connection G 1/4" and measuring ranges up to 50 NI/min with real gas calibration only)
Type T2:	± 2% of full scale; dynamics 1:50 (ranges > 200 NI/min ± 3% of full scale)
<b>Reaction time /</b>	max. 300 msec (depending on filter configuration)
<b>Response /</b>	from 500 ms (depending on the application)
<b>Repeatability /</b>	± 0,5% of measured value
<b>Longterm stability /</b>	< 1% of measured value / year
<b>Operating pressure /</b>	0,2 . . .11 bar abs.
<b>Temperature /</b>	0 . . .50°C
<b>Materials /</b>	
Measuring tube:	aluminium anodized or stainless steel electropolished
Sensor:	silicon, silicon oxide and glass
Valve:	brass nickel-plated or stainless st.
<b>Seals /</b>	FKM, optional EPDM (FDA)
<b>Pressure sensitivity /</b>	< 0,2%/ bar of reading (typical N2)
<b>Temperature sensitivity /</b>	< 0,025% FS measuring range type / °C
<b>Warm-up time /</b>	< 1 sec. for full accuracy
<b>Gas connection /</b>	G¼"-female up to 60 NI/min above this G½"-female (for air)
<b>Inflow line /</b>	not required
<b>Mounting position /</b>	up to 5 bar any, above this horizontal
<b>Testing pressure /</b>	16 bar abs.
<b>Leakage rate /</b>	<1 x 10 <sup>-6</sup> mbar l/s He
<b>Display /</b>	touchscreen 128 x 64 px backlighted with external power supply only (Micro-USB or 24 VDC)

### Display units /

<b>Flow:</b>	g/sec, g/min, g/h, kg/sec, kg/min, lb/sec, lb/min, lb/h, mln/min, mln/h, ln/sec, ln/min, nlpm, ln/h, m <sup>3</sup> n/h mls/min, mls/h, sccs, sccm, ls/sec, ls/min, slpm, ls/h, scfm, scfh, m <sup>3</sup> s/h, l/s, l/min, l/h, cc/sec, cc/min, cc/hr
<b>Totalizer:</b>	g, kg, lb, ln, mln, m3n, ls, mls, m <sup>3</sup> s, scc, sf, scf, l, cc

### Totalizer /

2 (1 x resettable, 1 x non-resettable)

## Electrical Specifications:

### Supply voltage /

GM-10N.1/2:	standard AA battery (lifetime in months depending on operation, approx. 56 h of continuous operation) or Micro-USB power supply (DIN 62684) Option: external supply +12 to 30 VDC (current consumption max. 100 mA)
GM-10N.3/4:	12 . . .30 VDC (max. 200 mA) or Micro-USB (DIN 62684)

### Connection cable /

for external power supply: 2 m with loose ends (special lengths on request)

### Protection class /

IP 50

### EMC /

EN 61326-1

### Limit switch /

<b>Quantity:</b>	3, freely adjustable
<b>Function:</b>	normally closed (NC), normally open (NO), hysteresis and auto / manual reset
<b>Trigger:</b>	min. alarm, max. alarm, windows alarm, overflow alarm and totalizer alarm

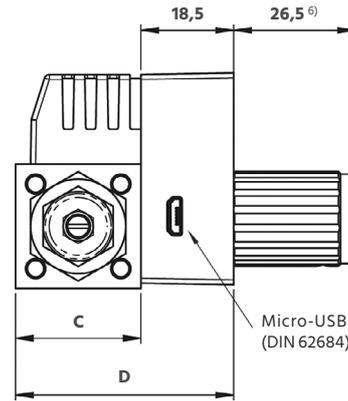
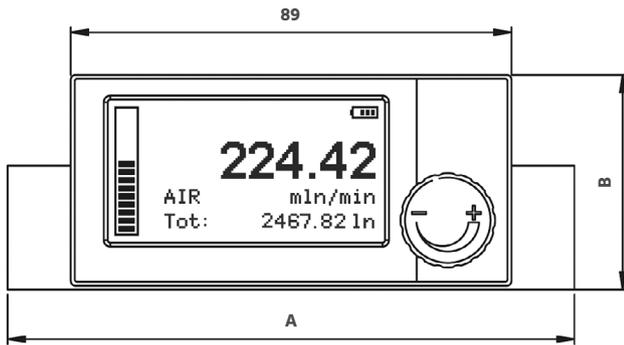


# Possible Configurations:

Selection	GM-10N.1	GM-10N.2	GM-10N.3	GM-10N.4
Touchscreen	x	x	x	x
Totalizer (resettable)	x	x	x	x
Totalizer (not resettable)	x	x	x	
Multigas (max. 3 gases)		- optional -		
Regulating valve		x		x
Alarm functions			x	x

Selection	GM-10N.1	GM-10N.2	GM-10N.3	GM-10N.4
Battery supply	x	x		
24 VDC supply	- optional -		x	x
Micro-USB supply	x	x		

# Dimensions in mm:



<sup>6)</sup> only with valve (GM-10N.2a/b and GM-10N.4a/b)

Operating range end ≅ 60 NI/min (air)	Process-connection	A [mm]	B [mm]	C [mm]	D [mm]
GM-10N.1					
GM-10N.2a/b	G 1/4" IG	114	44	25	44
GM-10N.3					
GM-10N.4a/b					

Operating range end ≅ 60 NI/min (air)	Process-connection	A [mm]	B [mm]	C [mm]	D [mm]
GM-10N.1		160			
GM-10N.3	G 1/2" IG	207	54	35	54
GM-10N.2a/b					
GM-10N.4a/b					