Speed | Pressure | Flow rate | Temperature

Fluidistor Gas Flow Meter GD 600 (DN 15 - DN 400)

with integrated Volume corrector/ Flow Computer IFC 1610
for measuring technical and medical gases

Rev.-no.: GD 600-IFC 1610-DS 332 E-V0.12 2024-06-12

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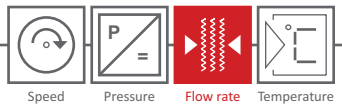

Table of content

Rev.-no.: GD 600-IFC 1610-DS 332 E-V0.12 2024-06-12

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Overview

- Oscillating measuring method suitable for almost all types of gas, no moving components
- Insensitive to contamination, e.g. oil, rust, sulphur
- Density independent measuring method - specially suitable for changing mixed gases
- Very good measurement results even with moist gases with precipitating condensate
- Mounting in falling and rising gas lines, even with 100 % humid gas due to integrated condensate drain
- Intermediate flange version (wafer, uniform installation length 65 mm) for easy replacement of existing flow meters (e.g. differential pressure transducer), simple and space-saving installation regardless of the flange type installed (ISO or ASME flange), shortened inlet section 2.5 x DN
- Optional integrated ball valve for installation and removal of the platinum wire sensor without venting the system
- Short response time of T90 ≤ 50 ms, at flow velocities from 0.25 m/s
- High measuring accuracy (± 1.5 % of the measured value)
- High repetition accuracy
- (± 0.1 % of the measured value)
- Low pressure loss
- Each flow meter with calibration protocol
- No recalibration required (due to maintenance or sensor replacement)
- Volume corrector integrated in the measuring head IFC 1610 (multilingual menu navigation, can be operated via keypad or web browser)
- Freely scalable current output for outputting the current flow rate
- Adjustable pulse weighting (0.1, 1 or 10 or 100 m³ per pulse)
- Optional data transmission with Modbus RTU and Modbus TCP

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Application Range

Mine and digester gas (biogas, sewage gas)

One of the strengths of the fluidistor measuring principle is its insensitivity to particles and moisture in the gas. Particularly in the fields of biogas and sewage gas, excellent measurement results are achieved despite contamination and condensate formation as well as possible sulfur levels of several 100 ppm.

In sewage treatment plants, measurements on the digestion tower often lead to incorrect measurements because the gas is contaminated and has a high level of water vapor saturation. The fluidistor measuring method is insensitive to water vapor saturation and particle pollution of the gas. It does not influence the measured value due to the formation of condensate on the sensor.

The Fluidistor Gas Flow meter has no mechanically moving parts (e.g. turbine wheel or impeller) that could influence the measured value due to deposits due to particle contamination. Deposits occur due to the contamination of the gas in both thermal measuring methods and measuring methods with mechanically moving parts. This can result in gradual measurement errors.

Heavy soiling, caused by e.g. foaming or high sulfur levels can be cleaned independently on the system using a steam jet. Depending on the installation situation of the device, this can in many cases even take place when installed.

The fluidistor measurement process is not affected by water vapor saturation, sulfur pollution or gas pollution and provides exact measurements.

Medical gases

The devices in stainless steel are excellently suited for the measurement of oxygen, nitrous oxide, compressed air, nitrogen, carbon dioxide, argon and helium in medical applications. Especially the GD 500 with a resolution of 1 liter/min is ideal for the billing of small units (licensed beds) in hospitals and contributes to more transparency in billing.

The GD 600 Mini in particular, with its resolution of 1 liter/min, is suitable for billing small units (occupied beds) in hospitals and thus contributes to greater transparency in billing.

Technical gases

In the industrial sector, the devices can be used to measure flow rates of technical gases such as hydrogen, compressed air, nitrogen, oxygen, carbon dioxide (fermentation and cooling), argon (steel production) and natural gas (burner control, supply control for boilers). The Fluidistor also works with changing gas mixtures, as the measuring method is density-independent!

In respect to the very fast response of the GD 600 (T90 ≤ 50 ms) the gas flow meters are especially suited for monitoring and logging of product cycles based on pneumatic energy.

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Principle of Measurement

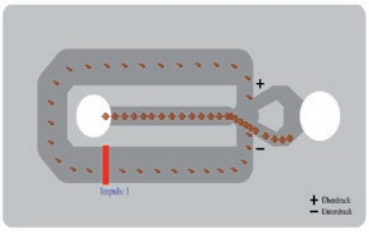
The flow meter GD 600 operates according to the principle of a „Fluidistor oscillator“. The gas passes the Fluidistor measuring head either directly or via an orifice in the main pipe.

The gas is discharged through the orifice into the Fluidistor measuring chamber. Directly behind the inlet there is a triangular damming body, which, due to the unstable middle position, forces the gas either to flow past on the right or left. At the level of the damming body in the right and left wall of the Fluidistor measuring chamber are two openings which are connected to each other by a channel. If the gas flows to the left from the damming body, a negative pressure is created on the left side wall or at the opening of the connecting channel. This negative pressure is balanced through the right opening of the connecting channel. The pressure equalization of the negative pressure causes a change of flow direction from the left to the right side. The entire process is then repeated on the right side.

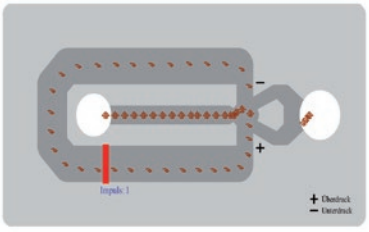
The period of time required for pressure equalization corresponds to a special amount of gas (litre/pulse), which has passed through the GD 600. The frequency of the pressure equalization is proportional to the flow velocity.

The changing flow through the connecting channel is detected by a platinum wire (diameter 15 µ) in the connecting channel. A constant voltage is applied to the wire, which is permanently monitored. At the moment when the pressure equalization occurs in the connecting channel, the wire is not circulated around by gas for a short time and heats up due to the current flowing through the wire. This causes a temporary rise of the resistance in the platinum wire (like a Pt100 sensor) and the voltage drop (V=R*I) increases.

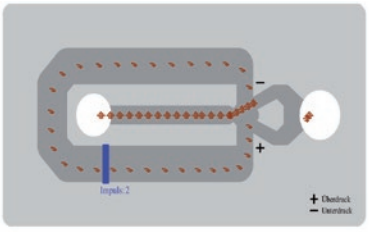
The increase in voltage drop is recorded via the IFC 1610 volume corrector. The measured values can be transmitted either via a current output or optionally via Modbus RTU or Modbus TCP directly to a higher-level PLC system.



- Outflow of the gas through the right outlet
- Active pressure equalization in the connecting channel from right to left



- Pressure compensation in the connecting channel with an incipient change of direction from left to right



- Short-term non-operating of the gas flow in the connection channel
- Heating of the platinum wire

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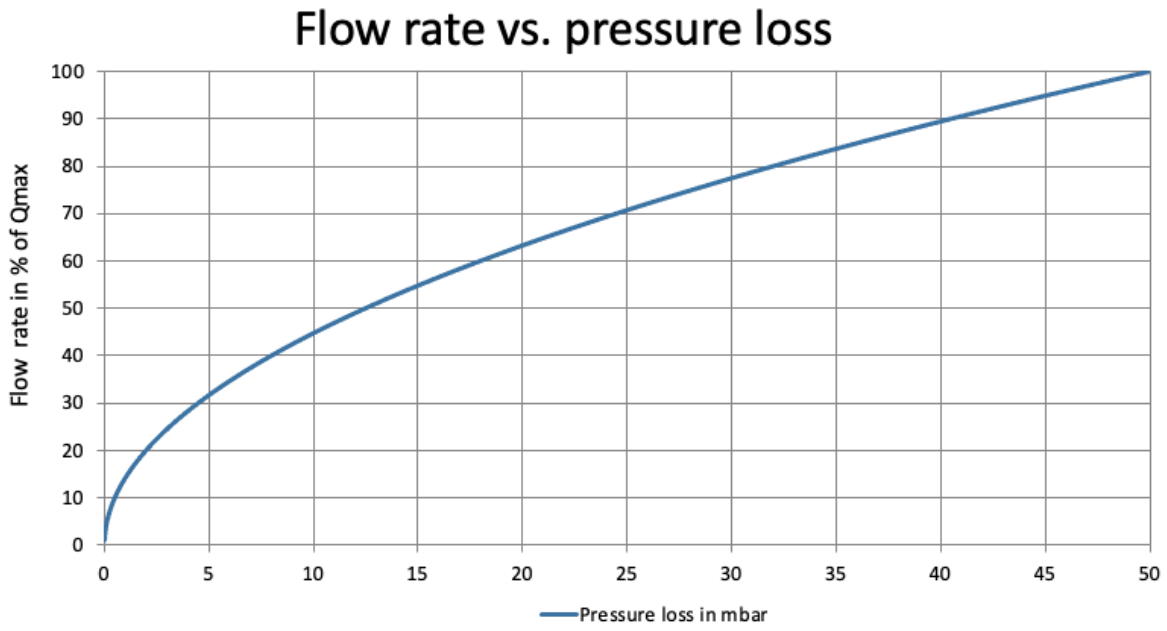
Flow / Pressure Loss

The diagram applies to gases with a density of air at NTP (0°C and 1013 mbar). The decrease of pressure is always proportional to the gas density. If e.g. the operating pressure rises by 100% the pressure drop doubles.



Accuracy of Measurement

At low flow rates the density (or actually the viscosity) of the gas influences the accuracy.

Above the limit value (Q_t), the accuracy is 1,5 % of the measured value. Below Q_t the accuracy is 5 % of the measured value.

Example measurement range:

Q_t with 1,5% accuracy

DN (mm)	inches	m³/h		kg/Nm³	m³/h	
		$Q_{min\ (5\ \%)}$	$Q_{t\ (1,5\ \%)}$	density	%	Q_{max}
15	1/2“	0,06	3,52	0,5	16	22
80	3“	8,00	64	1,0	8	800
80	3“	8,00	48	1,2	6	800
150	6“	30,0	240	1,0	8	3.000
150	6“	30,0	180	1,2	6	3.000

Example:

At a density of x kg/m³ the limit value is Q_t = y % of Q_{max}.

density kg/m³		limit value Q_t
0,5	=	16%
1,0	=	8%
1,2	=	6%
2,0	=	4%
4,0	=	2%
8,0	=	1%

For natural gas with a methane component of 85 % a density of 0,85 kg/m³ is assumed.

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Technical Details

GD 600 Mini and GD 600

	GD 600 Mini with external pipe thread	GD 600 with intermediate flange wafer/sandwich
		
Nominal size	DN 15 (R 1/2“), DN 25 (G1“)	DN 25 - DN 400
Process connection	External pipe thread R 1/2” G 1” Installation length: 230, 300 mm	Intermediate flange, wafer/sandwich Installation length: 65 mm
Pressure range*	0,5 bar, 10 bar, 16 bar, 40 bar	0,5 bar, 10 bar, 16 bar
Temperature Medium	-20 bis +80°C	
Ambient temperature	-20 bis +80°C	
Measuring head, labyrinth	Material stainless steel 1.4404, aluminum	
Tube body	-	Material stainless steel 1.4404
Sensor	Material platinum	
Protection class	IP 65	
Volume Corrector/ Flow Computer	Each device has an IFC 1610 volume corrector integrated in the measuring head. Technical details of the IFC 1610 can be found on the following page.	
Options		
Standardization/ Normalization	Integration of pressure and temperature sensors to standardize the measured values Temperature sensor: -25 ... 125°C Pressure sensors: 0 ... 1.3; 10;16 bar (abs.) or -50 ... 250 mbar (rel.); 0 ... 10; 16 bar (rel.)	
Ball valve	-	AV - ball valve (blocking valve) for GD 600 removal/installation of the platinum wire sensor without emptying the system

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Integrated Flow Computer/ Volume Corrector IFC 1610

IFC 16xx- im Messkopf integrierter Mengenumwerter	
LCD display	4 lines of 20 characters each Size: 66 x 40mm, font size 4,8 mm Color: black on white
Current	0(4) - 20 mA, resolution 14 bit Flow: 0 - 100.000 m^3/h, resolution 0,1 m^3/h
Relay K1, K2	2 x relay (NO) freely programmable - Pulse output (0,1, 1 or 10 or 100 m^3 per impulse, - Counter output quantity or - Limit value or - Device status
Power supply	- 24 V, DC ± 3 V (Standard), max. 200 mA
Barometric sensor	Integrated barometric sensor for recording the atmospheric pressure
WLAN interface (commonly called Wi-Fi)	- Integrated WLAN hotspot for direct connection with the device. The operation of the device can be performed via web browser. - Integration of the flow computer into the WLAN network on the plant side
LAN interface [1](Optional)	- Integration of the flow computer into the plant LAN network. - The device can be operated via web browser.
Fieldbus interface [1] (Optional)	- Modbus RTU - Modbus RTU & TCP (LAN option is a prerequisite for Modbus TCP. LAN network and Modbus TCP can be used parallel).
Operation	- Complete device configuration via keypad, no additional software required or - Remote control using a web browser via integrated WLAN hotspot or integration of the IFC 1610 in the system network (WLAN or optional LAN) - Multilingual menu navigation (German, English, French, Spanish, Italian, Bulgarian, Polish, others in preparation)

[1] The functions can be activated subsequently by purchasing an activation code.

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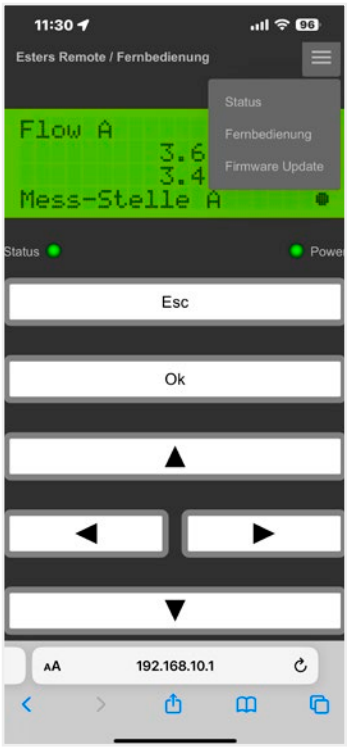
Ranges of values	
Date	Acc. to ISO8601/EN28601
Counter pulses	Max. 999.999.999.999.999.999 Pulse (1*10^18 - 1 pulse), resolution 1 pulse (In the event of a counter overflow, the counter starts at zero.)
Pulse output	0,001 - 1.000.000 m^3/pulse, resolution 1l/pulse Max. 10 pulses/s for Bm^3 or Nm^3
Flow „operational“	Max. 100 Bm^3/s, 360.000 Bm^3/h
Flow „Standardized“	Max. 1.000 Nm^3/s, 3.600.000 Nm^3/h
Counter Operating quantity Standardized quantity	Max. 99.999.999.999.999,9999999 m^3 (<1*10^{15}) resolution 0,1 cm^3 Display: 99.999.999.999.999,9 m^3 or Nm^3 (In the event of a counter overflow, the counter starts at zero.)

Electrical values & ambient conditions	
Accuracy	± 0,05 % EW ± 1 digit at 23 °C
Ambient temperature	-10 to +55°C
Storage temperature	-20 to +85°C
Test voltage	3 kV
Humidity class	E-DIN 40040
Electromagnetic compatibility	acc. to EN 61000

Rev.-no.: GD 600-IFC 1610-DS 332 E-V0.12 2024-06-12

IFC 1610 - Remote control via web browser



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Measuring Range

GD 600 Mini with external pipe thread

DN (mm)	Inches	m³/h			
		Orifice 16		Orifice 20	
		Q_{min}	Q_{max}	Q_{min}	Q_{max}
15	R 1/2“	0,048	12	0,06	15
25	G 1“	0,048	12	0,06	15

GD 600 with intermediate flange (wafer/ sandwich)

DN (mm)	m³/h					
	Orifice 13		Orifice 15		Orifice 17	
	Q_{min}	Q_{max}	Q_{min}	Q_{max}	Q_{min}	Q_{max}
25	0,20	20	0,35	35	0,7	70
32	0,2	20	0,6	60	1,00	100
40	0,20	20	0,90	90	2,00	200
50	0,20	20	1,10	110	2,50	250
65	0,90	90	1,70	170	4,50	450
80	1,40	140	4,50	450	8,00	800
100	2,70	270	6,50	650	10,00	1.000
125	4,00	400	8,00	800	15,00	1.500
150	6,00	600	12,00	1.200	30,00	3.000
200	12,00	1.200	25,00	2.500	60,00	6.000
250	20,00	2.000	40,00	4.000	75,00	7.500
300	30,00	3.000	50,00	5.000	130,00	13.000
350	40,00	4.000	70,00	7.000	140,00	14.000
400	50,00	5.000	100,00	10.000	160,00	16.000

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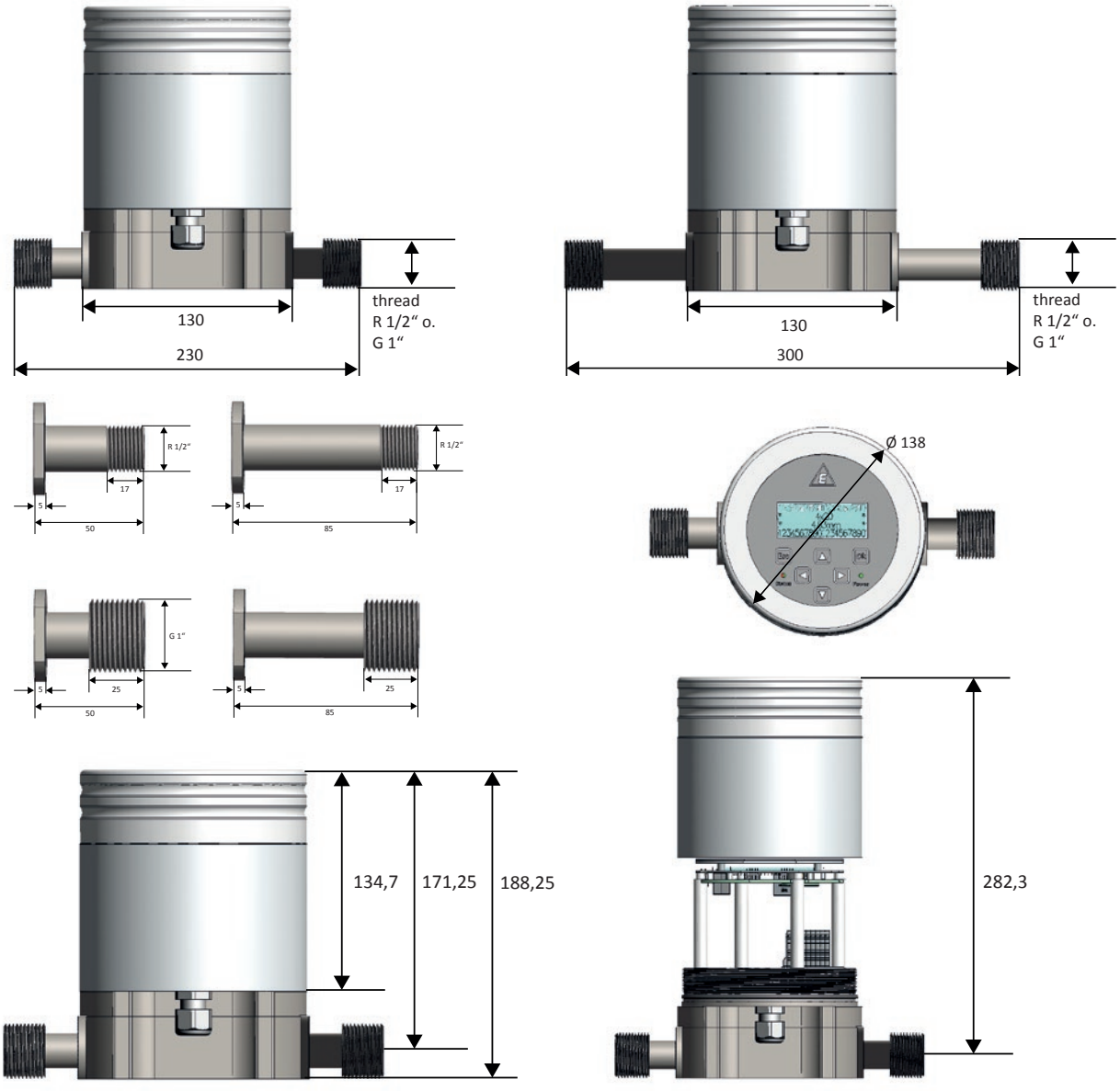
Dimensions and Weight

GD 600 Mini with external pipe thread

DN (mm)	Inches	Weight (Kg) ±5 % aluminum	Weight (kg) ±5 % stainless steel 1.4404
15	R 1/2“	4,00	8,00
25	G 1“	4,00	8,00

Dimensions, installation lengths, process connections and housing



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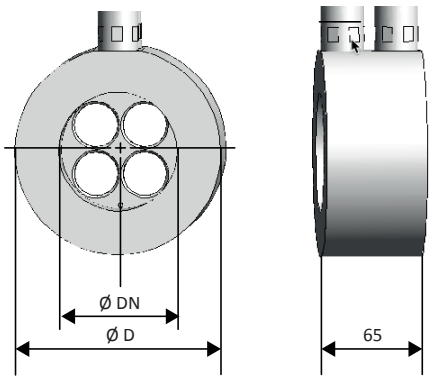
GD 600 with intermediate flange (wafer/ sandwich)

Dimension intermediate flanges, weight

mm^{+0-1} DN (Nominal size)	mm^{+0-1} D (Outer diameter)	Weight (kg) ±5 % Material meas. head: aluminum	Weight (kg) ±5 % Material meas. head: stainless steel 1.4404
25	70,50	4,30	10,50
32	81,00	5,90	12,10
40	91,00	6,30	12,05
50	105,50	6,80	13,00
65	126,00	7,55	13,75
80	142,00	8,70	14,90
100	161,00	9,80	16,00
125	191,00	10,10	16,30
150	217,00	11,80	18,00
200	272,00	13,10	19,30
250	327,00	16,80	23,00
300	377,00	20,20	26,40
350	437,00	43,65	49,85
400	488,00	36,50	42,70

For appliances with shut-off valves (option AV), the weight increases by 1.5 kg



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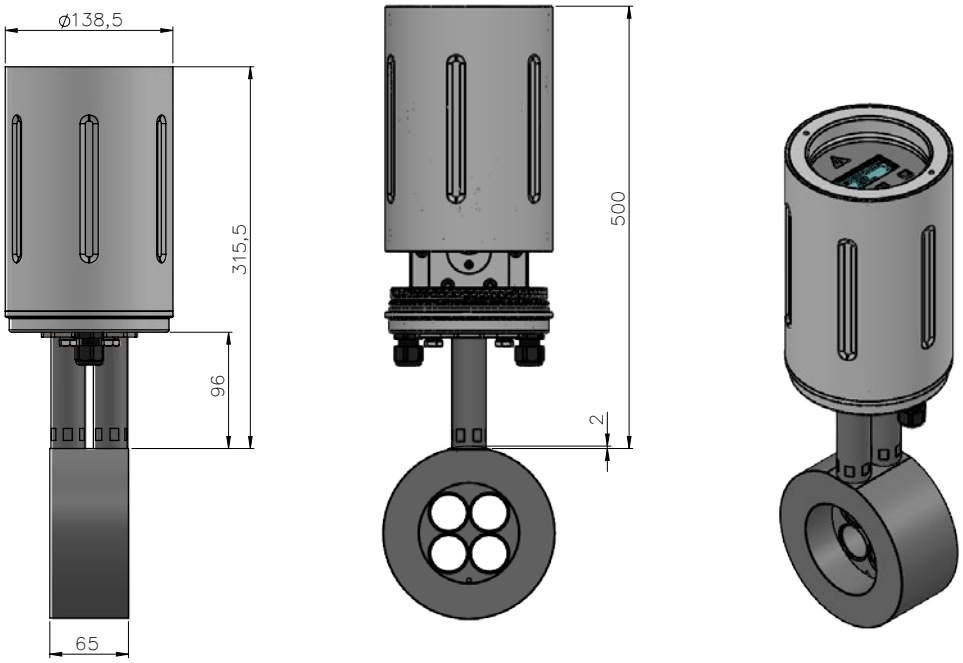
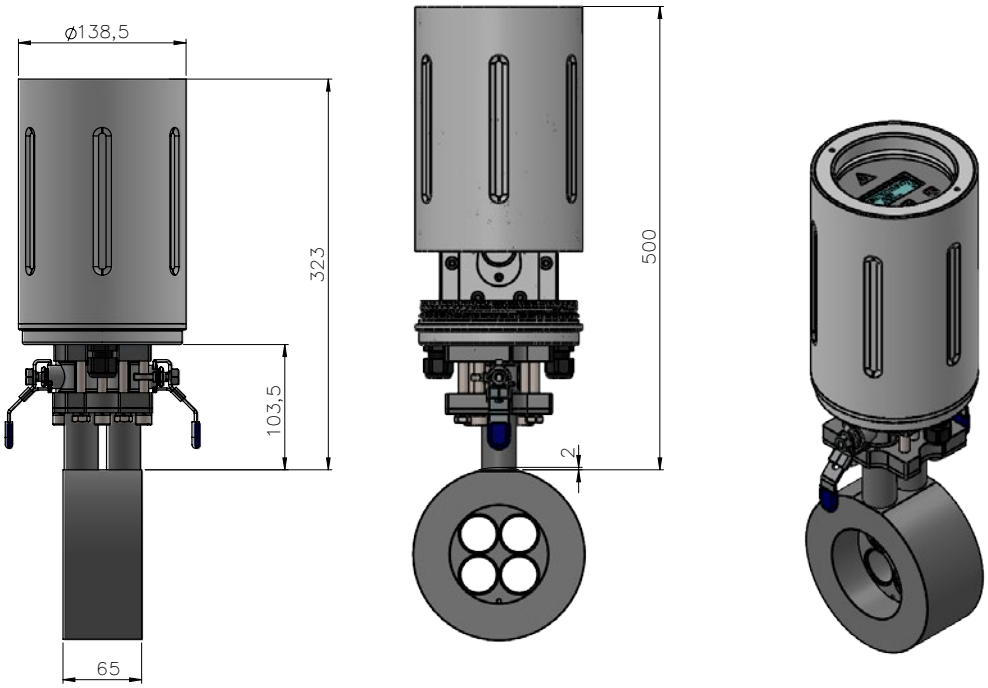
Dimensions GD 600 (standard)



Dimensions GD 600 with shut-off valves



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Project planning

The following points must be observed when configuring:

- Ensured that the pipe width is not increased by the gas meter to avoid measurement errors.
- The defined measurement ranges for individual nominal diameters must not be exceeded.
- In case of falling below the Q_{min} (measuring range) display of measured values is not possible.
- In the pipe network in front of the flow meter, the gas velocity may not exceed supersonic speed.
- Supercritical pressure drops and pulsating flows must be avoided.
- For the GD 600 with intermediate flange, a straight inlet and outlet section of 2.5 x DN must be provided.
- The GD 600 flow meter can be installed in a horizontal (measuring head upwards) or vertical position.
- When installed horizontally, the measuring head must point upwards, otherwise this will lead to incorrect measurements.
- A condensate drain is integrated in the measuring head, which ensures the drainage of condensate when the gas is 100 % humid and does not offer any storage possibilities.
- If the GD 600 is installed below an object (e.g. ceiling, pipes, etc.), a distance of at least 230 mm must be maintained from the cover to the object so that the cover can be removed for connection.
- It should also be noted that this makes it more difficult to read the display and program the device.
- The oscillating measuring method based on the fluidistor principle requires neither moving parts nor sensitive sensor materials, which means that the GD 600 can be operated virtually maintenance-free.
- The platinum wire sensor integrated in the head can be replaced without removing the device from the line.
- Changing the sensor has no effect on the calibration of the flow meter.

GD 600 nominal width DN 200

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Order Code

GD 600 Mini with external pipe thread
DN 15 bis DN 25

GD 600-AAABB-MIDD-EFGH	AAA	BB	MI	DD	E	F	G	H	Description
Nominal size	-015								R 1/2“, inst. length 230 mm
	-025								G 1“, inst. length 230 mm
	-A15								R 1/2“, inst. length 300 mm
	-A25								G 1“, inst. length 300 mm
Orifice		16							Meas. range: 0,048 - 12 m³/h
		20							Meas. range: 0,060 - 15 m³/h
Process connection			-MI						external pipe thread
Pressure range				00					0,5 bar
				04					4 bar
				10					10 bar
				16					16 bar
Material connection					-V				Stainless steel 1.4404
Material Gehäuse						A			Aluminum
						V			Stainless steel 1.4404
Material measuring head							A		Aluminum
							V		Stainless steel 1.4404
Power Supply								0	24 V, AC

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GD 600 with intermediate flange (wafer/ sandwich)
DN 25 bis DN 400

GD 600-AAABB-WADD-EFGH	AAA	BB	WA	DD	E	F	G	H	DESCRIPTION
NOMINAL SIZE	-025								DN 25
	-032								DN 32
	-040								DN 40
	-050								DN 50
	-065								DN 65
	-080								DN 80
	-100								DN 100
	-125								DN 125
	-150								DN 150
	-200								DN 200
	-250								DN 250
	-300								DN 300
	-350								DN 350
	-400								DN 400
ORIFICE		13							Measurement range see table page 10
		15							
		17							
PROCESS CONNECTION			-WA						Intermediate flange (wafer / sandwich)
PRESSURE RANGE				00					0,5 bar
				10					10 bar
				16					16 bar
MATERIAL CONNECTION					-V				Stainless steel 1.4404
MATERIAL HOUSING						A			Aluminum
						V			Stainless steel 1.4404
MATERIAL MEAS. HEAD							A		Aluminum
							V		Stainless steel 1.4404
POWER SUPPLY								0	24 V, AC

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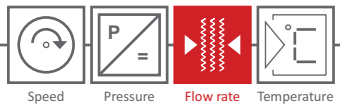

Options: Integration of pressure and temperature sensors for standardization, interface integration and additional functions

GD 600-AAABB-MIDD-EFGH- GD 600-AAABB-WADD-EFGH-	III	TTT	PPP	XX	DESCRIPTION
INTEGRATED PRESSURE AND TEMPERATURE SENSORS*	-1PT				Integrated pressure and temperature sensors in the measuring head
TEMPERATURE SENSOR VERSION**		T02			ptexxx Meas. range: -25 ... 125°C
PRESSURE SENSOR VERSION **			A01		0 ... 1300 mbar (abs.)
			A02		0 ... 10 bar (abs.)
			A03		0 ... 16 bar (abs.)
			AS0		0...2 bar (abs.)
			R01		-50 ... 250 mbar (rel.)
			R02		0 ... 10 bar (rel.)
			R03		0 ... 16 bar (rel.)
INTERFACES*				-LA	LAN interface
				-RT	Modbus RTU
				-TC	Modbus RTU und TCP
BALL VALVE*				-AV	ball valve (blocking valve) (only Wafer connection)

*Only to be defined if option is required Abbreviation is added accordingly
Example: GD 600-20017WA00-VAA0-**RT-AV**,
GD 600-20017WA00-VAA0-1PT-T02A01-**RT-AV**

**Only define if -1PT
Example: GD 600-20017MI00-VAA0-**1PT-T02A01**

Rev.-no.: GD 600-IFC 1610-DS 332 E-V0.12 2024-06-12

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Technical gases - industrial gases

Quantity measurement of hydrogen, nitrogen, oxygen, carbon dioxide (fermentation and cooling), argon (steel production) and natural gas (burner control, supply control for boilers).

The Fluidistor continues to function even with changing gas mixtures!

Sewage, mine, landfill and biogas

Sewage gas: Contamination and high saturation of the gas with water vapor lead to incorrect measurements at the digester with other measuring principles.

Biogas: High humidity and sulphur loads of several 100 ppm lead to measurement errors.

The Fluidistor is the functioning alternative!

Medical gases

Consumption measurement of oxygen, nitrous oxide, xenon, nitrogen, medical carbon dioxide and helium from the total line measurement to the hospital bed or surgical theater with the Fluidistor

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