Flow meter for bulk solids



- Contactless measurement
- Use in pneumatic conveyance and free fall
- Independent of the transport velocity
- Easy calibration

Area of application

The DYNAmas is a measuring device for determining the mass throughput of free flowing bulk materials. Powder, dust or granules that are transported in free fall or in pneumatic conveyor systems can be measured online reliably and without contact.

Advantages

- Process and quality assurance ensured by reliable throughput measurement
- Use in free fall and pneumatic conveyance
- Low overall height, easy integration into existing systems
- Easy product calibration with calibration assistant
- No influence from moving components in the vicinity
- Optional output of velocity and concentration
- Large measuring range, also suitable for lower product concentrations
- Large selection of sizes
- Switchable direction of flow

Functionality

The device simultaneously measures the bulk solids concentration as well as the velocity of solids. The mass throughput is calculated with these two values as well as the given inner pipe diameter and output via the DYNAcon communication unit.

Concentration: Using the capacitive measuring principle, the DYNAmas generates a homogeneous electromagnetic field. Bulk material that is transported through the sensor has a higher dielectric constant than air and thus increases the measured capacitance of the field. The change in capacity is proportional to the bulk material concentration in the measuring pipe. The calibration can be done either by completely filling the sensor pipe with bulk material or by reference weighing.

Velocity: The particles are recorded at two sensing elements a defined distance apart; a determination of the transit time by means of a correlation calculation gives the velocity in m/s. Since this is an absolute time measurement, no calibration is necessary.

The separate DYNAcon communication unit is equipped with a four-line LCD display and function keys. The following outputs and interfaces are available:
2x analogue output (4 … 20 mA),
3x relay output.

Designs



DYNAmas in 10 sizes – DN25 to DN300 (1“-12“)

Der DYNAmas gets produced in 10 sizes – from DN25 to DN300 (1 to 12 inches). The sensors are available with DIN/EN or ANSI flanges. Due to the wide range of available sizes, the integration into existing plants is simplified and pipe size changes can be avoided. This saves integration height as diameter adapters can be omitted. The risk of blockages due to a diameter reduction at high throughputs is reduced.

Special HT versions are available for high temperature applications:



Technical specifications

Power supply	19 … 31 VDC, max. 10 W
CAN bus	Cable length max. 1000 m
Output by the DYNAcon	2x analogue outputs (4 … 20 mA) for throughput, velocity, concentration. 3x relay outputs for error, simulation value, limit value status.
Output by the DYNAconvert (optional, additional to the DYNAcon)	1x pulse output for throughput.
CAN bus transmission rate	40 kBaud
Measurement accuracy (typical)	1 … 3%
Damping	1 … 30 s
Temperature (ambient)	-40 … 60 °C (40 … 140 °F)
Temperature (process, standard)	Standard max. 130°C (266°F) Optional max. 160 °C (320 °F)
Pressure	10/16 bar, opt. up to max. 64 bar (900 lbs)
Materials (sensor housing)	See order code
Materials (inner sensor pipe)	See order code
Materials (electronics housing)	Die-cast aluminium, painted
International Protection Rating	IP68 (EN 60529)
Interference immunity	According to EN 61326-1

Subject to changes.

Certificates

The Ex version of the DYNAmas can be used in the following zones:
In the pipe: Zone 20
Environment: Zone 1 or 21

Ex1-21 versions:

Gas: II 2G Ex db eb IIC T4 Gb
Dust: II 2D Ex tb IIIC T130°C Db IP68

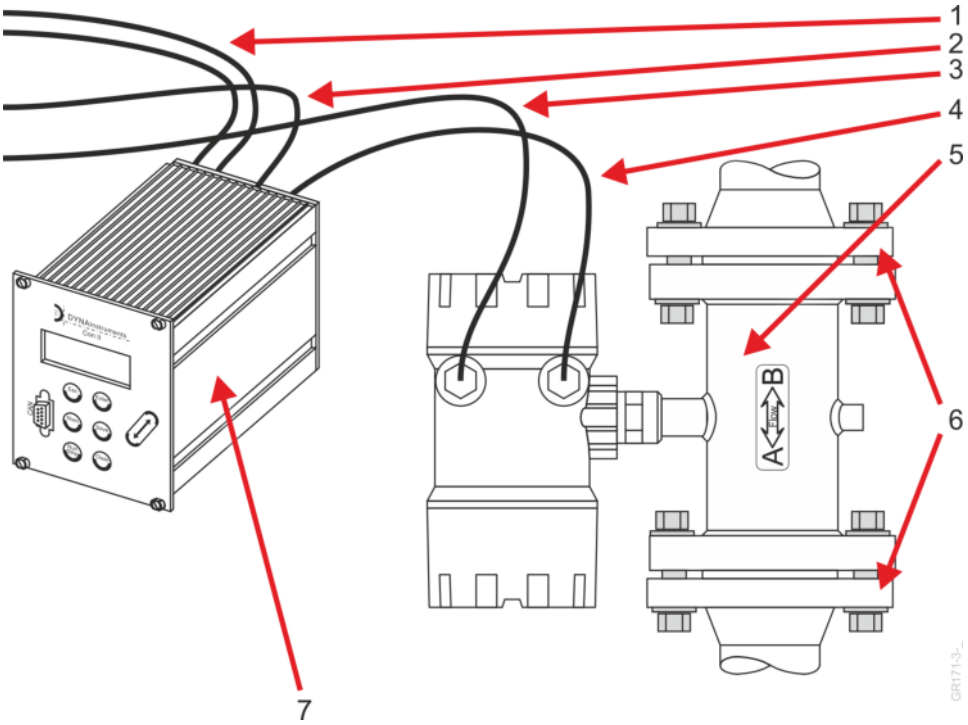
Gas: Ex db eb IIC T4 Gb
Dust: Ex tb IIIC T130°C Db IP68

Ex20-21 versions:

Gas: No explosive gas atmosphere allowed
Dust inside the sensor: II 1D Ex ta IIIC T155°C Da IP68
Dust outside the sensor: II 2D Ex tb IIIC T130°C Db IP68

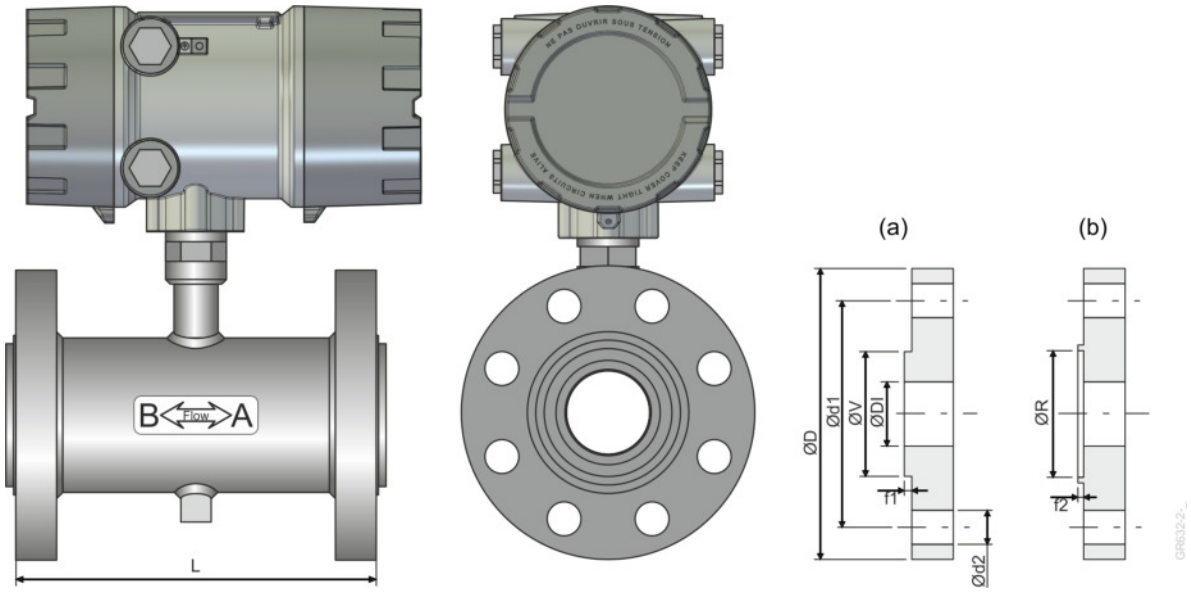
Gas: No explosive gas atmosphere allowed
Dust inside the sensor: Ex ta IIIC T155°C Da IP68
Dust outside the sensor: Ex tb IIIC T130°C Db IP68

System set-up



1 Two 4 ... 20 mA outputs for throughput and velocity, elective velocity and concentration.
2 Power supply of the DYNAcon communication unit.
3 Power supply of the sensor.
4 CAN bus cable:
   - To the sensor: Configuration
   - From the sensor: Measurements, simulation values, error messages.
5 Sensor.
6 Counter flanges (usually not included in the scope of delivery).
7 DYNAcon communication unit.

DYNAmas in detail



Sensor flange illustration with (a) male face respectively (b) return

Dimensions DIN

DN	ØDi	L	ØV	ØR	f1	f2	ØD.	Ød1	Ød2	Number	PN
25	24.8	250	57.9	58.0	4	3	115	85	14	4	16
40	39.3	250	75.9	76.0	4	3	150	110	18	4	16
50	54.5	250	87.9	88.0	4	3	165	125	18	4	16
65	70.3	250	109.9	110.0	4	3	185	145	18	4	16
80	82.5	250	120.8	121.0	4	3	200	160	18	8	16
100	107.1	250	149.8	150.0	4.5	3.5	220	180	18	8	16
125	131.7	250	175.8	176.0	4.5	3.5	250	210	18	8	16
150	159.3	300	203.7	204.0	4.5	3.5	285	240	22	8	16
200	207.3	350	259.7	260.0	4.5	3.5	340	295	22	8	10
300	309.7	450	363.6	364	4.5	3.5	445	400	22	12	10

Dimensions ASME

DN	ØDi	L	ØV	ØR	f1	f2	ØD.	Ød1	Ød2	Number	PN
1"	24.8	250	57.9	58.0	4	3	123.8	88.9	19	4	300lbs
2"	54.5	250	87.9	88.0	4	3	165.1	127.0	19	8	300lbs
3"	82.5	250	120.8	121.0	4	3	209.5	168.3	22.2	8	300lbs
4"	107.1	250	149.8	150.0	4.5	3.5	228.6	190.5	19	8	150lbs
5"	131.7	250	175.8	176.0	4.5	3.5	254.0	215.9	22.2	8	150lbs
6"	159.3	300	203.7	204.0	4.5	3.5	279.4	241.3	22.2	8	150lbs
8"	207.3	350	259.7	260.0	4.5	3.5	342.9	298.5	22.2	8	150lbs

Dimensions, unless otherwise stated, in mm.
Subject to changes. Different sizes and pressure levels on request.

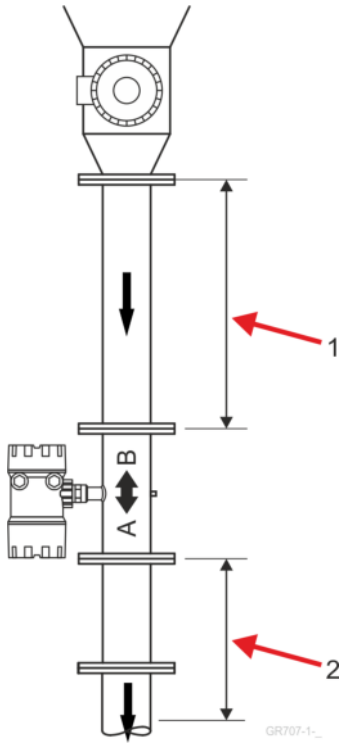
Counter flanges

We will provide you with drawings for the required counter flanges. If required, we will be happy to supply you with the flanges.

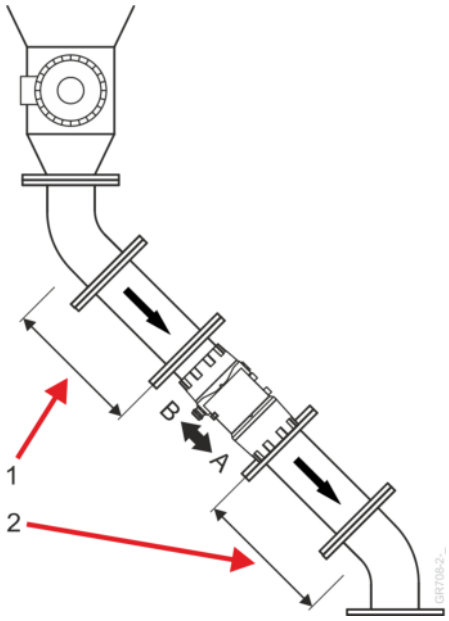
Please specify the inside diameter and the material of the pipe.

Installation

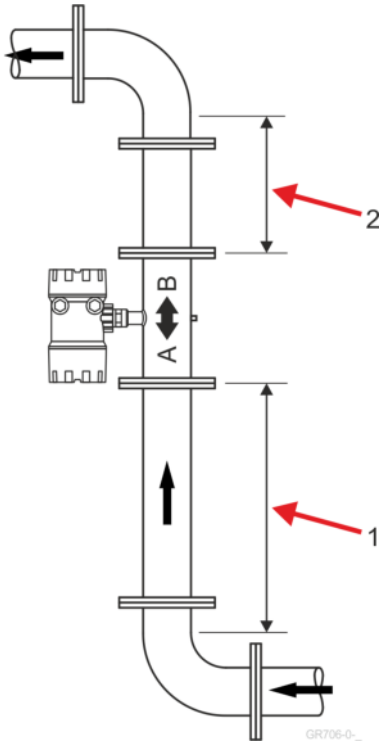
Free fall



Sliding conveyance



Pneumatic conveyance



1 Inlet section.
2 Outlet section.

The DYNAmas can be used both in free fall and in pneumatic conveyor systems.

Installation in sloping pipelines is also possible.

With regard to the installation of the DYNAmas in the conveyor pipe, the direction of flow through the device is not relevant, as it can easily be adjusted in the software if necessary (A<>B).

The bulk material should be conveyed through the sensor as evenly as possible over the pipe cross-section. Correspondingly, inlet and outlet sections must be observed. Your regional DYNA Instruments contact person will be happy to advise you on the optimal installation location.

The measuring device may have to be supported separately.
Components such as rotary feeders or loading bellows must not be mounted directly on the measuring device without strain relief and vibrations must be avoided.

Calibration of the sensor

In order to be able to record the mass throughput precisely, the flow meter must be calibrated to the bulk material. There are two methods available for this:

Conveyance method (Reference weighing)

Ideally, the calibration is carried out using reference weighing:

The product is transported through the sensor and then for example collected in a big bag and weighed.

Alternatively, a pre-weighed product quantity can also be conveyed through the sensor.

The determined mass is then entered via the DYNAcon communication unit.

The integrated calibration assistant automatically calculates the respective calibration point for the product concentration.

The velocity measurement does not require calibration to the product. Only a few parameters have to be adapted to the process.

Full pipe method

If reference weighing cannot be implemented, there is an alternative option to calibrate the DYNAmas:

A simple slide valve can be positioned under the DYNAmas to close the pipeline for calibration.

The DYNAmas must be completely filled with the product, if necessary through a flap in the pipeline above the device.

As soon as the device is filled with the product, the product concentration in the pipeline is assigned to the signal.

Alternatively, the device can also be pre-calibrated before it is installed.

Order code DYNAmas a/b/c/d/e/f/g/h/i/j

	a	Flange norm										
	AF	ASME standard										
	DF	EN standard										
		b	Flange shape									
		1	male and female face joints									
		3	female face on both sides									
		5	male face on both sides (default)									
			c	Nominal pressure PN								
			[Number]	[Number] bar (DF) or lbs (AF), see "DYNAmas in detail"								
				d	Nominal size DN							
				[Number]	[Number] mm, see "DYNAmas in detail"							
					e	Inner diameter Di						
					[Number]	[Number] mm (DF) or inch (AF), see "DYNAmas in detail"						
						f	Material of the sensor housing					
						00	galvanised steel, chromated, painted (standard for DN150 to 300)					
						10	1.4307 / AISI 304L stainless steel (standard for DN25 to 125)					
						12	Housing: 1.4307 / AISI 304L, Flange cover: 1.4571 / AISI 316Ti					
						13	Housing: Galvanized steel, chromated, painted, normal steel Flanges: 1.4307. stainless steel					
						20	1.4571 / AISI 316Ti (stainless steel)					
							g	Material of the sensor pipe				
							01	glass fibre reinforced epoxy resin				
							02	vinyl ester resin				
							20	PTFE				
							40	ceramic				
								H	Seal material			
								00	nitrile butadiene rubber (NBR)			
								10	fluorocarbon rubber (FPM/FKM)			
								20	silicone (MH)			
									i	Options		
									HT160	Temperature max. 160 °C		
										j	Approvals	
										Ex1/21		
										Ex20-21		
DYNAmas												

Example: DYNAmas DF/5/16/100/107.1/10/40/10

Other designs on request.

Innovative solutions - proven technology for over 30 years

- Mass flow measurement
- Flow monitoring
- Dust measurement
- Velocity measurement
- Fill level detection
- Particle size measurement

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Subject to technical changes. All information describes the products in general terms. They do not represent a guarantee of properties within the meaning of Section 459, Paragraph 2, BGB and do not constitute any liability.

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