

Thermal Mass Flowmeter FMT200-D (Sensyflow D)

for compressed air, nitrogen and biogas

- **Direct measurement of mass flow or standard volume flow of compressed air, nitrogen and biogas**
 - independent of media pressure and temperature
- **Wide measuring range of 1:100**
 - Precise measurement even with low flows
 - Measured value display starting at 0 Nm³/h
- **Quick response time < 0.5 s**
- **Negligible pressure loss**
- **No moving parts**
 - no wear, maintenance-free
- **Defined, reproducible mounting position**
 - User-friendly installation via screwed or flanged pipe components
 - Weld-on adapters for larger meter sizes
- **Compact device with signal output at the sensor head**

Applications

- **Measurement of compressed air consumption**
- **Leakage detection**
- **Optimization of compressed air systems**
- **Measurement of the amount of biogas created**
- **Efficiency factor determination and balancing in biogas plants**



Direct mass flow measurement
Easy installation
Compact design

Operating principle and system design

FMT200-D (Sensyflow D) is a compact system for mass flow or standard volume flow measurement of compressed air, nitrogen and biogas.

FMT200-D (Sensyflow D) operates according to the principle of a hot-film anemometer. This measuring method determines the gas mass flow directly, without further need for pressure and temperature compensation. Additional measuring points for pressure and temperature nor a compensation computer are required.

FMT200-D (Sensyflow D) is installed in the appropriate pipe component in a well-defined and non-rotatable position as a part of the measuring line. Pipe components made of galvanized steel are available with external thread fittings in imperial sizes. Pipe components with flange connections as well as the weld-on adapter for meters sizes DN 100 ... DN 250 (4 ... 10") are manufactured from stainless steel.

The transducer accommodates the sensor unit and the evaluation electronics. FMT200-D (Sensyflow D) supplies an output signal linear to the flow. The system is calibrated and immediately ready for use. Output parameters can be set via LKS (local communication interface) adapter (option). A standard power supply unit can be used for powering FMT200-D (Sensyflow D).

Calibration for compressed air, nitrogen and biogas applications

The calibration of the devices is done on a highly precise flow test machine with air as calibration medium. For standard biogas applications, the calibration data are subsequently converted, based on a medium gas composition of 53 Vol% methane, 45 Vol% carbon dioxide and 2 Vol% air.

Devices for applications that clearly deviate from this gas composition must be ordered with a special calibration for biogas. In this case, the exact gas composition must be specified with the order.

Technical data

Measuring ranges

Nominal size (inch)	Maximal upper range value for air/nitrogen				
	kg/h	Nm ³ /h ¹⁾	NI/min ²⁾	lb/h	SCFM
1"	165	125	2100	360	70
1 1/2"	430	330	5500	940	190
2"	740	570	9500	1600	330
3"	1775	1375	22800	3900	800
6"	7500	5800	97000	16500	3400

Nominal size (inch)	Maximal upper range value for standard biogas				
	kg/h	Nm ³ /h ¹⁾	NI/min ²⁾	lb/h	SCFM
1"	130	95	1600	280	55
1 1/2"	310	260	4300	680	150
2"	510	390	6500	1120	230
3"	1200	920	15000	2640	540
6"	5700	4400	73000	12500	2500

¹⁾ Notation also m³/h - qn

²⁾ Notation also l/min - qn

All volume flow rate specifications are referenced to 0 °C/ 1013.25 hPa (32 °F/14.696 psi).

Output

Analog output signal

0/4...20 mA, switchable

Load

< 750 Ω, electrically isolated

Characteristics

Measured error

Air, nitrogen <1.5 % of rate + 0.05 % of end value
Biogas <1.8% of rate + 0.1% of end value
under calibration conditions in specified flow range

Repeatability

< ± 0.25 % of measured value

Response time

T₆₃ ≈ 500 ms

Influences

Temperature effect

< 0.05 %/K of measured value

Pressure effect

≤ 0.2 %/100 kPa (bar [14.5 psi]) of measured value

Pressure drop

<1 kPa (10 mbar [0.145 psi]) at full scale
decreasing quadratically for smaller flow rates

Ambient conditions

Ambient temperature for transducer

-25...+70 °C

Degree of protection

IP 65

Storage temperature

-25 ... 85 °C (-13 ... 185 °F)

Measured medium conditions

Operating temperature

-25 ... 150 °C (-13 ... 302 °F)

Maximum operating pressure

Standard 16×10^2 kPa (= 16 bar [230 psi abs])

Construction

Weight in kg (lbs)

Threaded pipe component		Flange pipe component	
Meter size	kg (lbs)	kg (lbs)	kg (lbs)
1"	1.5 3.3	5.6 12.3	
1 1/2"	3.0 6.6	8.4 18.5	
2"	5.5 12.1	11.0 24.3	
3"	9.5 20.9	19.0 41.9	

Weld-on adapter incl. lock nut	
kg (lbs)	kg (lbs)
0.5	1.1

Flowmeter primary	
kg (lbs)	kg (lbs)
1.8	4.0

Materials, process connection

Flowmeter primary	Stainless steel, e.g. 1.4301
Pipe component with external threads R 1"...3"	Galvanized steel
Pipe component with connection flanges DN 25 ... DN 80	Stainless steel, e.g. 1.4301
Weld-on adapter	Stainless steel, e.g. 1.4301
Connection flange according to EN1092-1 Form B1, PN40	

Power supply

Voltage

24 V AC/DC \pm 25 %

Power consumption

< 15 W

Current consumption

< 600 mA, slow-blow fuse of at least 2 A recommended,
cable gland M20 x 1.5

Communication interface

LKS (Local communication interface) adapter

Accessories (optional)

- Power supply unit
- Display unit
- Totalizer with display (current-to-pulse converter)

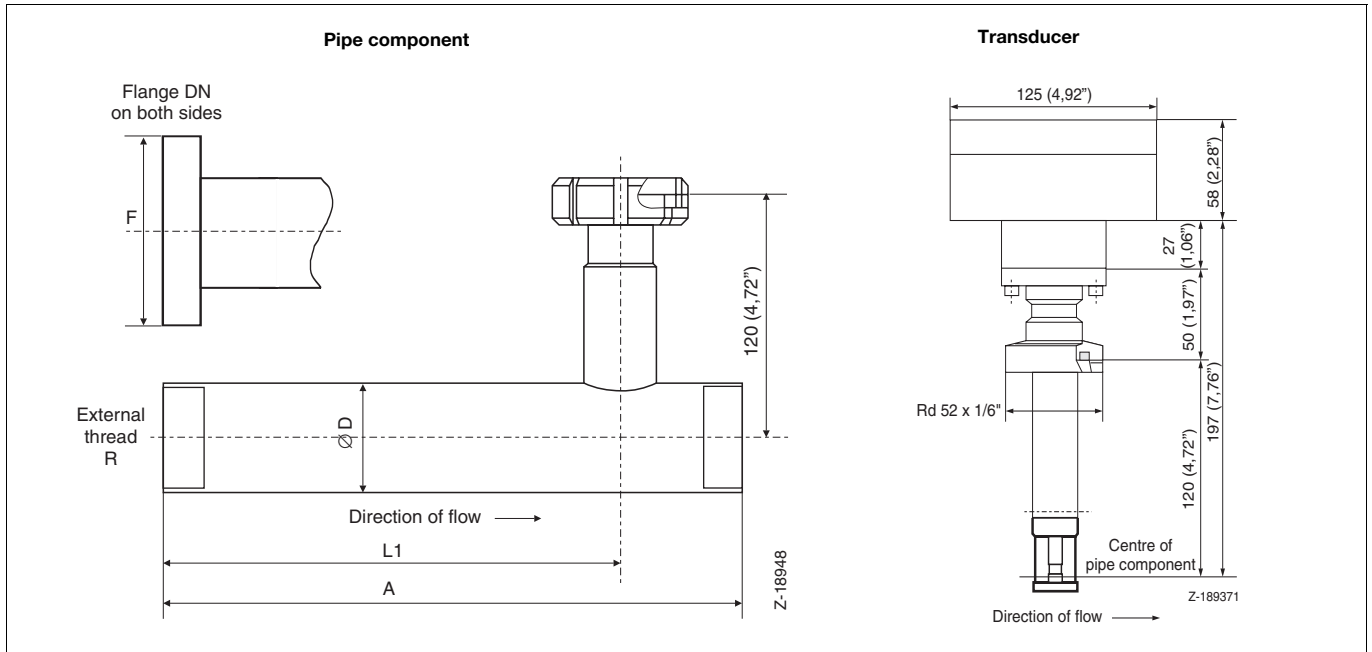
Configuration

The analog output of the FMT200-D (Sensyflow D) can be switched between 0...20 mA and 4...20 mA.

Additionally, there is the opportunity to define a measurement window in a way that a flow rate smaller than the calibrated one causes an output signal of 20 mA. The signal for error indication can be set to < 3.5 mA and > 22 mA.

The device can be configured via the LKS (local communication interface) adapter by using a PC or laptop. You can select the output signal to be used and define the measuring range.

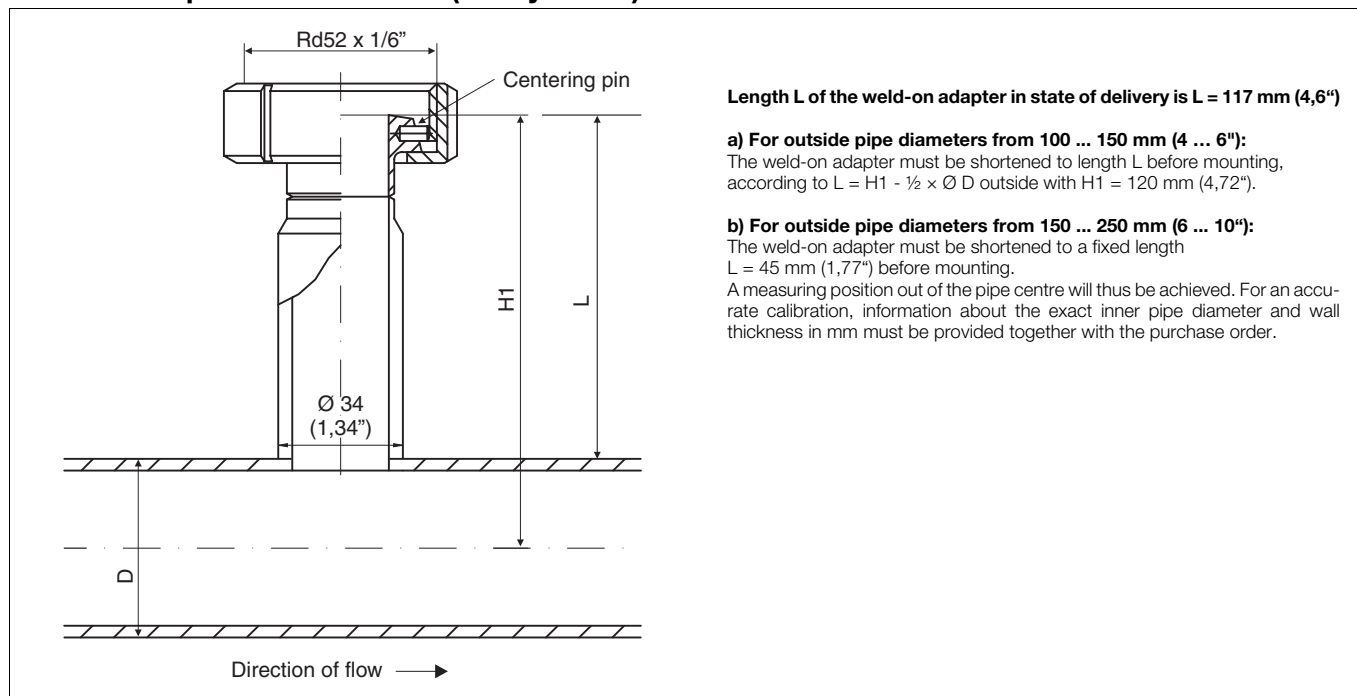
Dimensional drawings dimensions in mm (inch)



Nominal size	A	L1	Ø D interior	Thread R	Flange F
1"	550 (21,65")	410 (16,14")	27,3 (1,07")	R1": 33,7 × 1,2	DN 25: 115 (4,53")
1½"	820 (32,28")	615 (24,21")	41,9 (1,65")	R1½": 48,3 × 3,2	DN 40: 150 (5,91")
2"	1080 (42,52")	810 (31,89")	53,9 (2,12")	R2": 60,3 × 3,2	DN 50: 165 (6,50")
3"	1600 (62,99")	1200 (47,24")	79,9 (3,15")	R3": 88,9 × 4,5	DN 80: 200 (7,87")

Dimensions in mm (inch)

Weld-on adapter for FMT200-D (Sensyflow D)-transducers



Note for all meter sizes:

- The weld-on adapter must be welded to the pipe always together with the cap-nut. It is not possible to mount the cap-nut after the welding process.
- Observe the pipeline wall thickness and amount of shrinkage when welding.
- The distance H1 from the top edge of the adapter to the pipe center line must be within a tolerance of $\pm 2 \text{ mm}$ (for outside pipe diameters from 100 ... 150 mm (4 ... 6")).
- Rectangularity to the pipe axis must be absolutely kept (max. tolerance: 2°).
- The centering pin of the adapter must be aligned in flow direction to the pipe axis exactly (at outlet run length, behind measuring point).
- After welding the free passage for inserting the transducer must be at least 28 mm (if required, use drill to clear).

Recommended steadying length for FMT200-D (Sensyflow D) acc. to DIN EN ISO 5167-1

<p>Z-189501</p>			
<p>Z-189391</p>	<p>Expansion</p> <p>$X = 0$</p>	<p>Z-189421</p>	<p>Two 90° elbows in one level</p> <p>$X = 10$</p>
<p>Z-189401</p>	<p>Reduction</p> <p>$X = 0$</p>	<p>Z-189431</p>	<p>Two 90° elbows in two levels</p> <p>$X = 25$</p>
<p>Z-189411</p>	<p>90° elbow</p> <p>$X = 5$</p>	<p>Z-189441</p>	<p>Valve / slide</p> <p>$X = 35$</p>

Ordering information

Thermal Mass Flowmeter		Variant digit No.	1-7	8	9	10	Code				
FMT200-D		Catalog No.	V14223-								
Transducer											
Calibration Type											
Standard calibration for air and nitrogen Operating pressure 1 ... 10 bar abs., operating temperature 0 ... 60 °C Upper range value see Data Sheet Details according to Code Nos. 514-519 (see additional ordering information)		1)	1								
Special calibration for air and nitrogen according to Code-Nos. 512-519 (see additional ordering information)			2								
Standard calibration for biogas Operating pressure 1 ... 10 bar abs., operating temperature 0 ... 60 °C Upper range value see Data Sheet Details according to Code Nos. 514-519 (see additional ordering information)		1)	3								
Special calibration for biogas according to Code-Nos. 511-519 (see additional ordering information)			4								
Analog Output											
4 ... 20 mA (alarm < 3.5 mA)			1								
4 ... 20 mA (alarm > 22 mA)			2								
0 ... 20 mA			3								
Pipe Component											
1" threaded			1								
1 1/2" threaded			2								
2" threaded			3								
3" threaded			4								
DN 25 flanges			A								
DN 40 flanges			B								
DN 50 flanges			C								
DN 80 flanges			D								
weld-on adapter DIN 11851 incl. Cap-nut, DN 100 / 4 in. to DN 250 / 10 in.			N								
Additional ordering information											
	value	unit									
Flow unit		(clear text)	1)				515				
Standard conditions	(clear text)	°C, mbar abs.	2)				519				
Operating temperature	(clear text)	°C					512				
Operating pressure	(clear text)	mbar abs.					513				
Calibrated measuring range	(clear text)	(clear text)	3)				514				
Nominal size, pipe inner diameter	(clear text)	mm	4)				518				
Upper measuring range value adjusted to	(clear text)	(clear text)	1)				520				
Biogas composition for special calibration		Vol %					511				
Material certificate acc. to EN 10204 3.1	for transducer and pipe component							30A			
Certificate											
GOST Russland metrological approval								CG1			
GOST Kazakhstan metrological approval								CG2			

- 1) Possible units are: kg/h ; kg/min ; kg/s ; m3 /h -qn ; m3 /min -qn ; m3 /s -qn ; l/h -qn ; l/min -qn ; l/s -qn ; SCFM
- 2) Standard state for volume flow units:
Please specify the conditions, e.g. 0 °C, 1013 mbar (standard)
- 3) Please specify in case of special calibration or when weld-on adapter is used
- 4) To be specified when weld-on adapter is used

Accessories

FMT200-D	Catalog No.	Code			
LKS Adapter Local Communication Interface for parameterization incl. Communication software	7962828				
Power supply unit Housing for rail mounting 62.5 mm x 75 mm x 139 mm Input 230 V AC Output 24 V DC / 2.5 A	7962800				
Digital LED display	see Data Sheet 10/33-2.16 EN	V33264A-			
Flow Totalizer FCU200-T (SensyCal T)	see Data Sheet 10/18-5.22 EN	V18022-5...			

ABB has Sales & Customer Support expertise in over 100 countries worldwide.

www.abb.com/flow

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

Printed in the Fed. Rep. of Germany (03.2008)

© ABB 2008



ABB Ltd.
Oldends Lane, Stonehouse
Gloucestershire, GL10 3TA
UK
Tel: +44(0)1453 826661
Fax: +44(0)1453 829671

ABB Inc.
125 E. County Line Road
Warminster, PA 18974
USA
Tel: +1 215 674 6000
Fax: +1 215 674 7183

ABB Inc.
3450 Harvester Road
Burlington Ontario L7N 3W5
Canada
Tel: +1 905 681 0565
Fax: +1 905 681 2810

ABB Automation Products GmbH
Borsigstr. 2
63755 Alzenau
Germany
Tel: +49 551 905-534
Fax: +49 551 905-555
CCC-support.deapr@de.abb.com