

Thermal Mass Flowmeter FMT200-ECO2 (Sensyflow eco 2)

for air, compact

- **Direct mass-flow-measurement of air**
 - No additional pressure and temperature compensation required
 - mass flow or standard volume flow measuring values
- **Wide measuring range of 1:100 with high accuracy**
- **Highly dynamic, response time < 90 ms**
 - optimized for advanced control systems
- **Compact design with low weight**
- **No moving parts**
 - no wear, maintenance-free
- **Arbitrary mounting orientation**
- **Variable process connections**
 - flanges, threads, tubes
- **Variety of output signals**
 - current, voltage, frequency, pulse, alarm, parameter setting via RS 232 interface
- **Ex version for zone 2 and zone 22**
 - II 3 G EEx n A II T4 X
 - II 3 D T 135 °C IP 65 X

Applications

- **Paint robot control**
 - air dosing
- **Compressed air systems**
 - balancing
 - leakage detection



Direct mass-flow-measurement
Wide measuring range
Quick, flexible, compact

Function and system design

FMT200-ECO2 (Sensyflow eco 2) is a compact, highly dynamic measuring system for mass flow or standard volume flow measurement of air.

The device consists of an easy to install pipe component which accommodates the sensor unit and the evaluation electronics. It directly provides a linearized output signal, and it is calibrated and immediately ready for use.

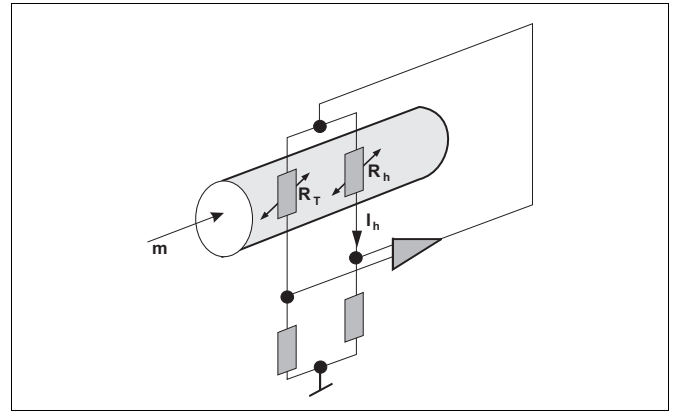
A standard RS 232 interface allows you to change over between the individual output signals (current, voltage, frequency, pulse and alarm) and to configure the device.

Due to its flexible connection concept this measuring instrument can be installed in pipes or tubes of different types and sizes. Various process adapters are available for this purpose.

A standard power supply unit can be used for powering FMT200-ECO2 (Sensyflow eco 2).

Measuring principle

The FMT200-ECO2 (Sensyflow eco 2) operates according to the principle of the hot-film anemometer. This method of measurement is based on the abstraction of heat from a heated body by an enveloping gas flow. The flow-dependent „cooling impact“ is used as the measuring impact.



The gas stream flows past two temperature-sensitive resistors R_h and R_T which are part of an electrical bridge circuit. Due to the chosen resistance ratio $R_h < R_T$, R_h is heated by the current I_h , and R_T adopts the same temperature as the gas. The current I_h is preset by the electronic control circuit to produce a constant temperature difference between the heated resistor R_h and the temperature of the gas.

The electrical power generated with resistor R_h exactly compensates its loss of heat to the gas flow. As this loss of heat is dependent on the number of particles which collide with the surface of resistor R_h , I_h represents a measure of the mass flow rate.

Technical data

Measuring principle

Thermal: hot-film anemometer

Input

Measured medium

Air

Measuring ranges¹⁾

0 (1)...100 kg/h or 0 (12)...1250 Nl/min²⁾

Output

Analog output signal

0... 5 V
0...10 V
0/4...20 mA

Load

< 500 Ω

Error indication

< 3.5 mA or > 22 mA

Digital output

24 V, 20 mA

Frequency output

variable 1...2500 Hz

Counter pulse

Pulse evaluation and pulse duration configurable

Alarm values

Minimum and maximum, adjustable

Polarity adjustable

Characteristics

Measured error

< ± 3.0 % of measured value

Repeatability

< ± 0.5 % of measured value

Response time

T₆₃ ≈ 25 ms; T₉₈ ≈ 90 ms

Influences

Temperature effect

< 0.1 %/K of measured value

Pressure effect

≤ 0.2 %/100 kPa (/bar) of measured value

Pressure drop

< 10 kPa (100 mbar) at full scale and using the small flange adapter DN 25;
decreasing quadratically for smaller flow rates

Environmental conditions

Ambient temperature for transducer

0...50 °C

Degree of protection

IP 65

Storage temperature

-25...+85 °C

Measured medium conditions

Operating temperature

0...50 °C

Maximum operating pressure

Standard 10 × 10² kPa (= 10 bar abs.)
High pressure version 16 × 10² kPa (= 16 bar abs.)

Construction

Weight

0.51 kg (Accessories: see ordering information)

Material

Transducer aluminium, Hostadur, tinned Cu, glass
Process connections aluminium
Fittings aluminium

Process connection

see ordering information

Electrical connection

Sub-D connector, serie 712, 8 pin, IP 65

Power supply³⁾

Voltage

24 V DC ± 10 %

Power consumption

< 15 W

Current

Peak < 1 A; operation < 0.6 A
Slow-blow fuse of at least 2 A recommended

Communication interface

RS 232

ATEX version zone 2/22

Gas: II 3 G EEx n A II T4 X
Dust: II 3 D T 135 °C IP 65 X

Accessories (optional)

- Inlet and outlet runs
- Pipe fittings
- Connection adapter
- Quick-clamping connectors
- Reducers
- Power supply unit
- Display unit
- Display and supply unit completely installed in an IP 65 housing

¹⁾ Approximate values are given for applications with air under atmospheric conditions. The values in brackets indicate the low limit of the measuring range for which the measured value accuracy indicated is specified.

²⁾ It is possible to specify any unit which you can transform into a mass or standard volume flow. (can also be written as l/min-q_n)

³⁾ Power supply with safe electrical separation in accordance with EN 61010 and IEC 950, with max. output power of 150 W.

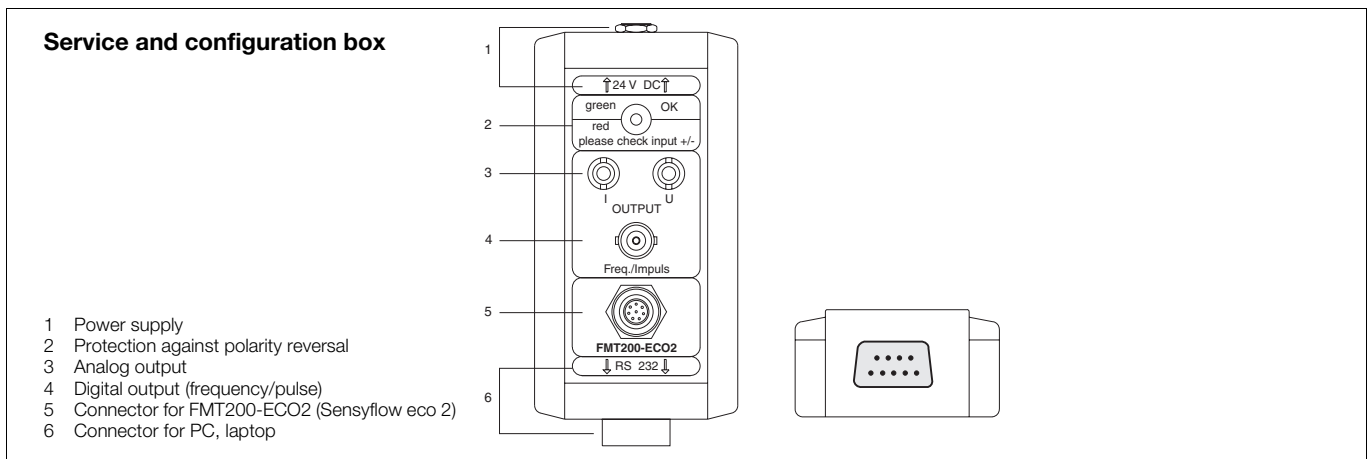
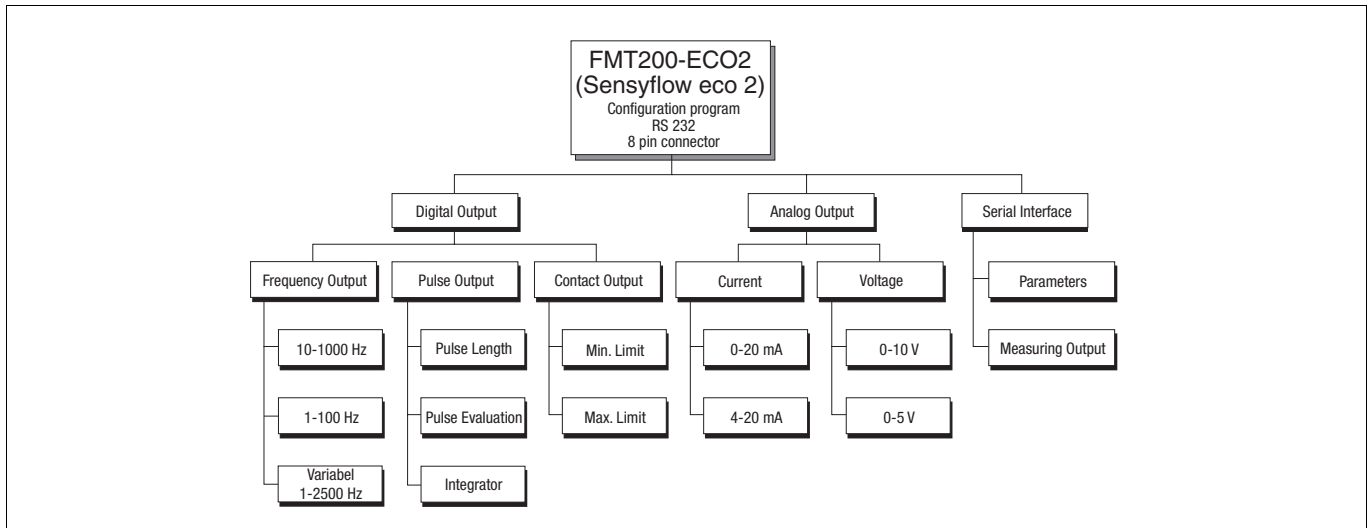
Configuration

The FMT200-ECO2 (Sensyflow eco 2) can simultaneously serve one analog output (current 0/4...20 mA or voltage 0...5/10 V), one digital output (frequency, pulse, alarm) and a serial RS 232 interface.

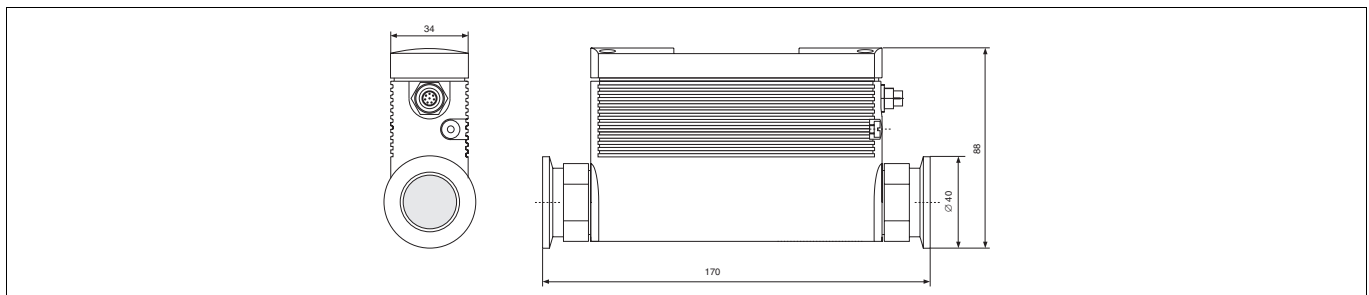
Additionally, Sensyflow eco 2 can be configured via the serial interface. With this, it is possible to change the output signals or

the settings of the measuring ranges and signals by using a standard PC or laptop.

The configuration program is included in the standard scope of delivery. A service and configuration box is available as an accessory part. It will help to connect the different signals of FMT200-ECO2 (Sensyflow eco 2) quickly and easily.



Dimensional drawing (dimensions in mm)



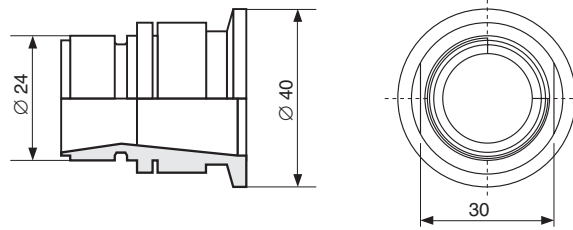
Transducer, example with mounted small flange process adapter

Accessories

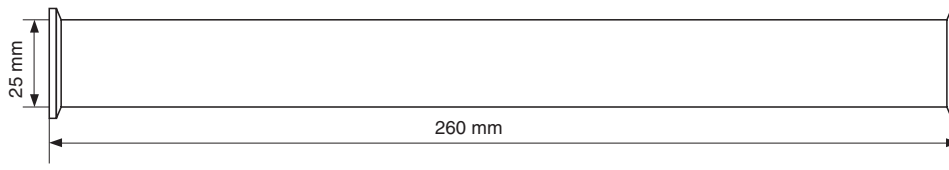
Process connections

Flange connections

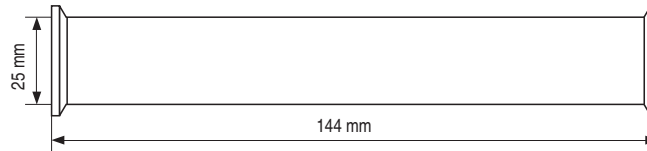
Process adapter flange KF DN 25, inlet run and outlet run, 2 clamp rings und 2 sealing rings



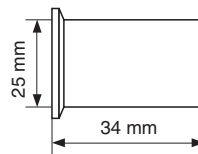
Inlet run length 10 x D, both sides with KF-DN 25 connections



Outlet run length 5 x D, both slides with KF DN 25 connections

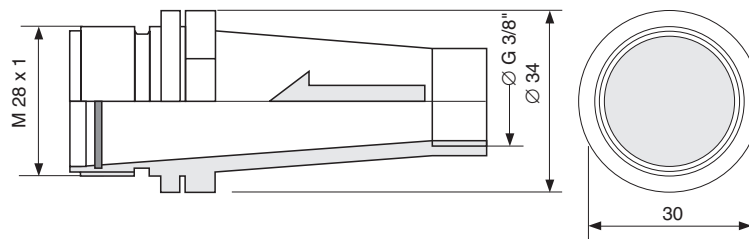


Hose adapter for KF DN 25,
incl. 1 flange, 1 clamping ring and 1 sealing ring

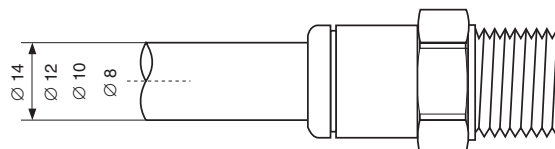


Threads

Threads G 3/8", also connection for Legris-tube adapters
One pair for inlet run and outlet run. Outlet run adapter includes a high-tech flow conditioner



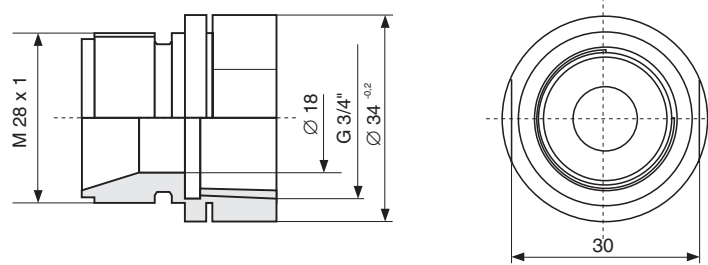
Legris-tube adapter (pair)



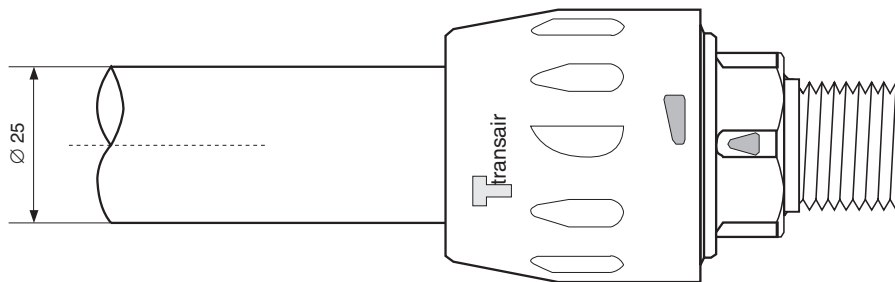
Process connections

Threads

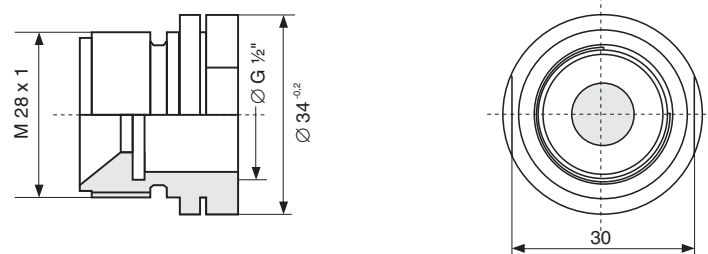
Thread G 3/4", also connection for Transair system 25 mm (pair)



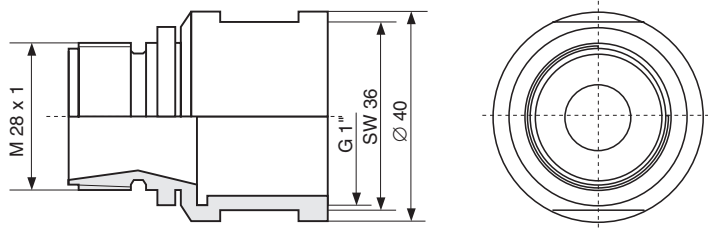
Transair adapter 25 mm (pair)



Threads G 1/2"
Pair for inlet run and outlet run. Inlet run adapter includes a high-tech flow conditioner



Thread G 1"



Straight undisturbed pipes must be provided as steadying lengths. On the inlet side they should have a length of approx. 10 × D. When using the G 1/2" and G 3/8" adapters no additional steadying lengths are required, as flow-conditioning components are implemented in the adapters on the inlet side.

Note that flow conditioner causes a considerable pressure drop. Components affecting the flow like valves or shut-off devices should be installed on the outlet side, i.e. downstream of the measuring point.

Ordering information

	Catalog No.					Code		
Thermal Mass Flowmeter FMT200-ECO2	V14252-							
Standard calibration 0-100 kg/h weight: 0.51 kg								
Operating pressure 1 to 10 bar abs. customer specified configuration: measuring range, unit, standard state, upper range value acc. to Code Nos 110 and 114 incl. 5 m connecting cable, configur. software	1							
High pressure version, operating pressure 10 to 16 bar abs. customer specified configuration: measuring range, unit, standard state, upper range value acc. to Code Nos 110 and 114 incl. 5 m connecting cable and configuration software	2							
Customer specified calibration								
Operating pressure 1 to 10 bar abs. customer specified configuration: measuring range, unit, standard state, Nos 110 and 114 incl. 5 m connecting cable and configuration software	3							
High pressure version, operating pressure 10 to 16 bar abs. customer specified configuration: measuring range, unit, standard state, upper range value acc. to Code Nos 110 and 114 incl. 5 m connecting cable and configuration software	4							
Activated analog output								
0... 5 V	1							
0...10 V	2							
0...20 mA (alarm > 22 mA)	3							
4...20 mA (alarm < 3.5 mA)	4							
4...20 mA (alarm > 22 mA)	5							
Activated digital output								
Counter pulse output (high level), pulse evaluation Code-No 310	1)	1						
Counter pulse output (low level), pulse evaluation Code-No 310	1)	2						
Frequency output adjustable up to 2500 Hz, standard 10..1000 Hz		4						
Alarm output (alarm = high), alarm values Code-Nos 312...313		5						
Alarm output (alarm = low), alarm values Code-Nos 312...313		6						
Process connection								
1 pair process adapter KF DN 25, incl. 2 clamping rings and 2 sealing rings		1						
1 pair of threads G 3/8", also connection for Legris-tube adapters		2						
1 pair of threads G 1/2"		3						
1 pair of threads G 3/4", also connection for Transair System 25 mm		4						
1 pair of threads G 1"		5						
Design								
Standard		0						
ATEX version zone 2/22		1						

1) The digital output can have states High = 24 V or Low = 0 V.
Please specify the required polarity

Additional ordering information

				Code		
Measuring range	.....			110		
Unit	.....	unit	2)	111		
Standard state	.....	°C, mbar abs.	3)	112		
Conversion factor for unit	.....			113		
Upper range-value (MUV), adjusted to	.....	value	4)	114		
Frequency output, min and max value	.....	Hz, Hz	6)	115		
Pulse evaluation	.....	value	5)	310		
Alarm, minimum value	.....	in % of MUV		312		
Alarm, maximum value	.....	in % of MUV		313		

2) Customer specified unit: please specify a unit, which can be transformed to kg/h or l/min - qn.

3) Standard state for vol. flow units. Please specify your reference conditions,
e.g. standard state 0 °C, 1013 mbar.

4) The measuring upper range value (MUV) must be smaller than the calibrated measuring range
(100 kg/h or 1250 l/min - qn)

5) Please specify how many units of the totalized flow should produce one pulse
at the integrator output.

6) Please specify the frequencies for flow = 0 and flow = max.
The min is 1 Hz, the max 2500 Hz.

*) N = Norm...; Can also be written as: l/min - q_n

for air, compact

Accessories

	Weight	Catalog No.	Code		
Process connections					
Process adapter KF DN 25 for entry and exit incl. 2 clamping rings and 2 sealing rings	0.1 kg	7962850			
Entry length 10 x D both sides with KF DN 25 connections	0.2 kg	7962801			
Exit length 5 x D both sides with KF DN 25 connections	0.11 kg	7962802			
Clamping ring and seal for KF DN 25 connection	0.08 kg	7962809			
Hose adapter KF DN 25, flange 1 clamping ring and 1 sealing ring	0.01 kg	7962803			
Threads					
Thread G 3/8", also connection for Legris-tube adapter, pair of entry and exit; Entry adapter includes a high-tech flow conditioner	0.08 kg	7962851			
Legris-tube adapter (pair)	0.08 kg				
8 mm		7962855			
10 mm		7962856			
12 mm		7962857			
14 mm		7962858			
Thread 3/4" also connection for Transair System 25 mm (pair)	0.08 kg	7962853			
Transair-adapter 25 mm (pair)	0.4 kg	7962812			
Thread G 1/2", pair for entry and exit Entry adapter includes a high-tech flow conditioner	0.08 kg	7962852			
Thread G 1" (pair)	0.08 kg	7962854			
Installation accessories					
Additional connecting cable, 5 m with 1 plug	0.3 kg	7962817			
Service and configuration box Connection hub from FMT200-ECO2 to plug connections for RS 232, power supply, digital and analog output, incl. connecting cable 2 m (6 ft) with 2 plugs	0.11 kg	7962818			
Electrical adapter for connecting cable type eco 1 to FMT200-ECO2 Length approx. 20 cm (2/3 ft)	0.2 kg	7962819			
Installation adapter for busbar mounting	0.04 kg	7962816			
Power supply unit and digital displays					
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 display, 3 1/2 digit LED, 24 V DC		7957527			
Digital display, 3 1/2 digit LED, 230 V AC		7957526			
Flow Totalizer FCU200-T (SensyCal T), Data Sheet 10/18-5.22 EN		V18022-5.....			
Power supply unit and display mounted in IP 65 housing		call			
Complete set FMT200-ECO2					
Suitcase with FMT200-ECO2 with standard calibration incl. the above mentioned process connections and fittings incl. configuration box, 2 m connecting cable software and power supply 24 V / 2.5 A		7962814			

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