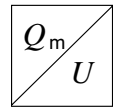
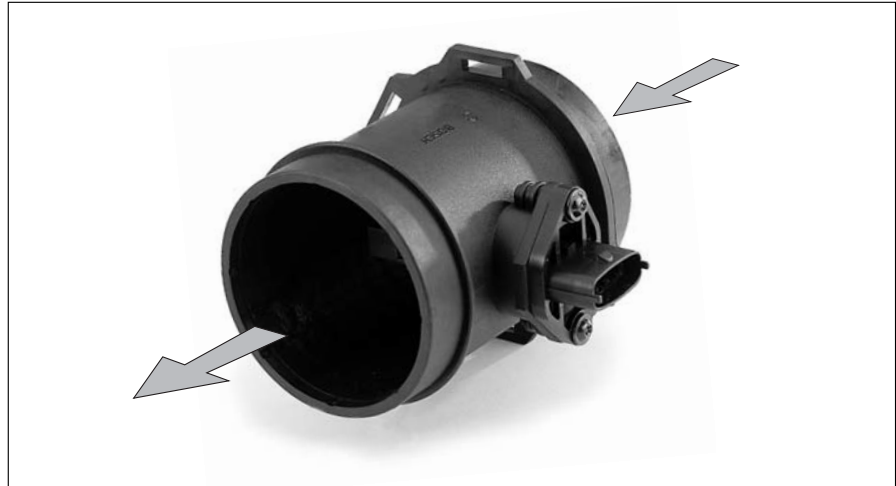


Hot-film air-mass meter, Type HFM 5

Measurement of air-mass throughflow up to 1000 kg/h



- Compact design.
- Low weight.
- Rapid response.
- Low power input.
- Return-flow detection.



Application

In order to comply with the vehicle emission limits demanded by law, it is necessary to maintain a given air/fuel ratio exactly.

This requires sensors which precisely register the actual air-mass flow and output a corresponding electrical signal to the open and closed-loop control electronics.

Design

The micromechanical sensor element is located in the plug-in sensor's flow passage. This plug-in sensor is suitable for incorporating in the air filter or, using a measurement venturi, in the air-intake passages. There are different sizes of measurement venturi available depending upon the air throughflow. The micromechanical measuring system uses a hybrid circuit, and by evaluating the measuring data is able to detect when return flow takes place during air-flow pulsation.

Operating principle

The heated sensor element in the air-mass meter dissipates heat to the incoming air. The higher the air flow, the more heat is dissipated. The resulting temperature differential is a measure for the air mass flowing past the sensor.

An electronic hybrid circuit evaluates this measuring data so that the air-flow quantity can be measured precisely, and its direction of flow.

Only part of the air-mass flow is registered by the sensor element. The total air mass flowing through the measuring tube is determined by means of calibration, known as the characteristic-curve definition.

Technical data / range

Nominal supply voltage U_N	14 V
Supply-voltage range U_V	8...17 V
Output voltage U_A	0...5 V
Input current I_V	< 0.1 A
Permissible vibration acceleration	≤ 150 ms ⁻²
Time constant $\tau_{63}^{1)}$	≤ 15 ms
Time constant $\tau_{\Delta}^{2)}$	≤ 30 ms
Temperature range	-40...+120 °C ³⁾

Part number	0 280 217 123	0 280 218 019	0 280 217 531	0 280 218 008	0 281 002 421
Measuring range Q_m	8...370 kg/h	10...480 kg/h	12...640 kg/h	12...850 kg/h	15...1000 kg/h
Accuracy ⁴⁾	≤ 3%	≤ 3%	≤ 3%	≤ 3%	≤ 3%
Fitting length L_E	22 mm	22 mm	22 mm	16 mm	22 mm
Fitting length L_A	20 mm	20 mm	20 mm	16 mm	20 mm
Installation length L	96 mm	96 mm	130 mm	100 mm	130 mm
Connection diam. D	60 mm	70 mm	80 mm	86/84 mm ⁶⁾	92 mm
Venturi ID	50 mm	62 mm	71 mm	78 mm	82 mm
Pressure drop at nominal air mass ⁵⁾	< 20 hPa	< 15 hPa	< 15 hPa	< 15 hPa	< 15 hPa
Temperature sensor	Yes	Yes	Yes	No	Yes
Version	1	2	3	4	5

¹⁾ In case of sudden increase of the air-mass flow from 10 kg · h⁻¹ auf 0,7 $Q_{m,nominal}$, time required to reach 63% of the final value of the air-mass signal.

²⁾ Period of time in case of a throughflow jump of the air mass $|\Delta m/m| \leq 5\%$.

³⁾ For a short period up to +130 °C.

⁴⁾ $|\Delta Q_m/Q_m|$: The measurement deviation ΔQ_m from the exact value, referred to the measured value Q_m .

⁵⁾ Measured between input and output

⁶⁾ Inflow/outflow end

Accessories for connector

Plug housing	Contact pins	Individual gaskets	For conductor cross-section
1 928 403 836	1 987 280 103	1 987 280 106	0.5...1 mm ²
	1 987 280 105	1 987 280 107	1.5...2.5 mm ²

Note: Each 5-pole plug requires 1 plug housing, 5 contact pins, and 5 individual gaskets.
For automotive applications, original AMP crimping tools must be used.

Application

In internal-combustion engines, this sensor is used for measuring the air-mass flow so that the injected fuel quantity can be adapted to the presently required power, to the air pressure, and to the air temperature.

Explanation of symbols

Q_m	Air-mass flow rate
ΔQ_m	Absolute accuracy
$\Delta Q_m/Q_m$	Relative accuracy
τ_{Δ}	Time until measuring error is ≤ 5%
τ_{63}	Time until measured-value change 63%