

## Mass Airflow Meter - MAF (standard abbreviation)

The MAF is a highly important component to provide an efficient, low-emission and thus environmentally friendly combustion process. Mass airflow meters are part of the intake system of modern diesel and Otto engines, which are usually installed in the interior intake port between air filter and throttle valve. The MAF is supposed to exactly determine the volume, temperature and pressure of the sucked air, which is available to the engine for combustion. The characteristic data were sent as electric signals to the engine control unit (ECU). Based on this data, the engine management calculates the optimal amount of fuel to be ejected. In the case of diesel engines the MAF will be also used to control the recirculation of exhaust.

## One-part and two-part MAF:

### One-part MAF,

#### 5 occupied pins with 6-pole plug

- Pin 1 – supply + 5 Volt
- Pin 2 – mass (sensor)
- Pin 3 – supply + 12 Volt
- Pin 5 – mass (battery / body)
- Pin 6 – MAF signal

Pin numbering is visible at the MAF.

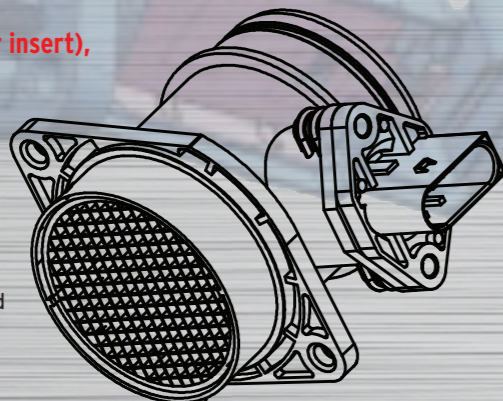


### Two-part MAF (tube with sensor insert),

#### 4 occupied pins with 5-pole plug

- Pin 2 – supply + 12 Volt
- Pin 3 – mass (sensor)
- Pin 4 – supply + 5 Volt
- Pin 5 – MAF signal

In the two-part MAF, pin 1 is placed at the rounded side of the plug.



## A MAF defect becomes apparent as listed:

- The engine control lamp lights up
- Engine switches to emergency mode on highways (max. 100 kph)
- The diagnostic device indicates a fault in the MAF or in the lambda sensor
- Rough idling
- Bad or delayed throttle response
- Reduced torque
- Poor cold runnings characteristics
- Loss of power
- Rough engine running over the whole rpm range
- High fuel consumption

## Quality

AUTLOG mass airflow meters are produced in dust-free atmosphere according to ISO/TS 16949.



Test of the MAF at high temperatures of 120°C



Test of the MAF at low temperatures of -15°C



Test of susceptibility to corrosion  
35+/-2°C – saltwater 5%, test period 96 hours



Changing temperatures from -40°C to 120°C

- 10 min low temperature
- 2 min changing temperature
- 10 min high temperature
- 25x replicates



Vibration test



Final control Every MAF is finally calibrated

## Function:

### I. Generation =

#### Hot Wire Mass Airflow Meter - HW MAF (standard abbreviation)

The mass airflow meter consists of a hot wire component (platinum wire) and an air temperature sensor. There are no moving parts which may occur any flow resistance in the MAF. Mostly, the measuring unit is fitted in a bypass channel, to avoid multiple measurements caused by pulsation in the inlet pipe. The hot wire element is heated electrically. The air temperature sensor determines the heating current demand, which is electronically regulated in such a way, that the temperature difference between the hot wire element and the air flow (100°C) is kept constant. Accordingly, the more air passes the hot wire, the higher the heating current has to be.

The heating current is a measurement of the air volume that flows through the bypass channel. This measuring principle is able to compensate fluctuations in both air pressure and temperature. You'll get a clean hot wire by „burning free“ following the short increase in heat (1000°C) after turning off the engine.

These particular mass airflow meters will fail in cases of increasing pollution of the hot wire! The problem has mostly been solved by the new generation of hot wire mass airflow meters.

### Current Generation =

#### Hot Coat Mass Airflow Meter - HC MAF (standard abbreviation)

The electrically heated sensor element rises into the air flow. The sensor's temperature is always kept at a constant level. Heat is extracted from the sensor element by the air flow. This means that more energy is used with larger air mass flow, to keep the sensor's temperature constant. In this design, burning-free is no longer required.

An analogue voltage signal (e.g. between 0 and 5 V) for the control unit of fuel engines is used as a tool to calculate the injection quantity, and the exhaust gas recirculation rates of diesel engines.

Oil, moisture and vibrations (diesel) make MAF clog up and soiled. Thus HC MAF are not wearfree and will partially fail – depending on the conditions of use – after 30000 km, or will cause incorrect measured values.

## Causes of MAF defects:

- Increased vibrations due to construction errors in the vehicle, frequently in diesel engines, or incorrect installation of the MAF may cause a break of the sensor plate - then the MAF immediately fails.
- Soiled or damaged surface. External influences, such as poorly filtered intake air (average flow velocity ca. 50- 200 m/s) abrade like sandpaper, too much moisture in the air drawn, which is additionally spoilt with dissolved aggressive road salt in winter, or even oil, that comes through the crankcase ventilation, will run down the MAF more quickly.
- Ageing after a mileage of 100000 km. Thus decreasing measurement value and performance losses.
- Racing air filters usually increase the risk of premature wear of the MAF.

## Replacement of the MAF

- Be sure to thoroughly check the surroundings of the MAF before changing, such as: blocked intake channels, dirty air filter, low boost pressure (for turbo diesel), leakage between MAF and charger, and strong oil/soot deposits behind the exhaust gas recirculation.
- As experience shows, the sole cause is mostly the defective MAF. By replacing the MAF the problem is solved quickly
- **Adaption to the ECU is affordable!**
- Recommended additional repair: air filter

