

Efficient oil filter systems

From filter to fluid management

Oil filter systems are increasingly performing other functions in addition to simple oil filtration – such as oil pressure control, oil cooling or crankcase ventilation.

MANN+HUMMEL is one of the world's leading companies for the development and production of oil filters and complete oil filter modules. The requirements of the automobile manufacturers range from the supply of simple oil filters through to complete oil filter systems that can be easily integrated in the engine as a single unit. MANN+HUMMEL reacts to these demands with its flexible oil filter systems.

An important development in the industry is the increasing complexity of the engine and the related reduction of installation space. This means that modern oil modules have to be very compact.

MANN+HUMMEL thus develops complete oil filter systems based on oil filters that perform other functions in addition to their main job of oil filtration – such as the management of liquids, temperature and pressure. The reduction of engine interfaces, extension of service intervals and easy recycling are only a few examples for the advantages of modern oil filters and oil modules.

MANN+HUMMEL, development partner and system supplier for the international automotive industry, will continue to meet these requirements in future with its oil filters and complete oil filter systems. MANN+HUMMEL constantly offers innovative developments for the automotive industry – one example being the world's first oil module with a fully plastic housing.



Efficient oil filters for modern engines



Compact spin-on filters



Oil module with integrated crankcase ventilation and electric heating

Spin-on filters The compact unit

The pressure-stable, non-corrosive metallic housing and metalfree filter element in spin-on filters form a compact unit that is replaced as a whole during maintenance work.

Up to three valves supplement the range of functions. Dirty and clean side return stop valves prevent the filter and oil ducts from running empty when the engine is switched off. This makes sure that the required oil pressure in the oil system responds immediately when the engine is started. Moreover, spin-on filters have a filter bypass valve that is set exactly to the engine's operating pressure and ensures a supply of oil to the engine, even when the filter element is blocked.

A very practical feature of spin-on filters are the release aids which allow a quick and easy installation and removal of the oil filter – very important in difficult installation situations.

Oil filter module The flexible system

One alternative to spin-on filters, depending on the application case, are multifunctional oil filter systems that integrate several functions. The heart of the oil module is the metal-free and thus fully incinerable filter element. The housing is made of either diecast aluminium or a plastic material.

An oil-water heat exchanger can be flange mounted on the housing. This permits an optimum temperature control of the engine through the variable design of the number of cooling plates. The addition of a cooler bypass valve ensures the supply of oil to the engine in even unfavourable operating conditions. An oil module can be equipped with not only a cooler and filter bypass valve, but also a pressure control and return stop valve.

Crankcase ventilation for separation of blow-by gases is becoming increasingly important.

These gases, which enter the crankcase as a result of the combustion process, are diverted, cleaned and returned to the intake air. This protects the turbocharger and valves, reduces oil consumption and makes an active contribution to environmental protection.





Compact oil filter module with heat exchanger

Housing oil filter with metal-free element

An oil pressure switch and sensors to measure the oil pressure and temperature are just two further optional components for the complete module and contribute to the multifunctionality of the oil filter system. External functions such as mounting points for cable and hose holders or mountings for design covers can also be integrated.

The oil module can also be used as an aggregate holder for dynamos, pumps and other filters, for example. This functional integration brings some clear advantages: A reduction of engine interfaces, optimum use of the limited installation space and a simplification of series installation and maintenance.

Moreover, FEM calculations permit a significant reduction of the overall weight. For example, the overall system weight can be reduced by up to 40 percent through the integration of the oil pump and oil-water heat exchanger. Today multifunctional oil modules are in serial use by all European automobile manufacturers.



Plastic oil module The innovative alternative

MANN+HUMMEL has developed and produced the world's first oil module with a fully plastic housing. This has been made possible through the use of new materials, progressive production processes, as well as computer-assisted calculation systems. Depending on the respective application, plastics are now a viable alternative to the aluminium and steel previously used.

To select the right material, MANN+HUMMEL has to be involved in the engine development process at an early enough stage. This is also the only way to ensure an optimum adjustment to the installation space and the best cost-value ratio.

Solutions with fully plastic housing meet the multifunctionality requirements of the oil module and, just like oil filter systems with diecast aluminium housing, also withstand the required pressure and temperature loads.

The fully plastic housings have a number of advantages. They are lighter than comparable models of diecast aluminium. Polyamide can be processed into complex components in a single procedure. This permits the optimum use of small installation spaces in the engine compartment. Furthermore, geometries can be manufactured that would have been impossible with a diecast aluminium solution. Both the complete housing of plastic as well as the metalfree filter element are recyclable and can thus be disposed of easily and ecologically.

Production and assembly

New technologies are used in the production and assembly of the plastic oil module. Modern injection moulding machines allow the manufacture of the oil module in its final complex shape within short cycle times.

There is no need for any metal-cutting work such as turning on a lathe, drilling and milling. The process and logistics complexity is significantly reduced since the complete plastics processing from the granulate through to the finished product is in the hands of one manufacturer. The components are assembled and the leak test performed on a special, highly automated assembly line.

Nevertheless, diecast aluminium as a housing material will not be fully replaced by plastic in the future. The application depends on the later use and the individual requirements of the customer.

Filter media The new generation

The requirements for oil filter elements are also rising with the advanced development of engines. Service intervals for oil filters for today's passenger cars are already around 50,000 kilometres and continue to rise. As the most significant component in the filter, the filter media used by MANN+HUMMEL meet and exceed the ever-increasing requirements of the market with superior dirt absorption capacity.

Up until now, the standard material for producing oil filter media was cellulose. However, latest studies show that modern synthetic engine oils, so called 0W oils, can contribute to the premature ageing of conventional filter media. MANN+HUMMEL has therefore developed a filter medium made of polyester fleece which is up to 15 times more resistant than the materials previously used.

MANN+HUMMEL can thus offer filter media that meet the requirements of both a higher dirt absorption capacity and an improved resistance. Furthermore a residue-free incineration and thus environmentally friendly disposal of the filter media is guaranteed.



Fully synthetic filter element with maximum efficiency



Comparison of ageing resistance of various filter media

Advantages of the oil filter systems

Spin-on filter

- · Low cost and compact oil filter unit
- Easy installation and removal

Plastic oil module

- Lighter than comparable models of diecast aluminium.
- Metal-free fully plastic housing facilitates recycling
- Reduction of the manufacturing steps by using an injection moulding process
- · Manufacture of complex components

Oil module

- Individual integration of numerous additional functions
- Efficient use of the restricted installation space through compact design
- Reduction of engine interfaces
- Low-cost service since only the metal-free filter element has to be replaced
- environmentally friendly

