

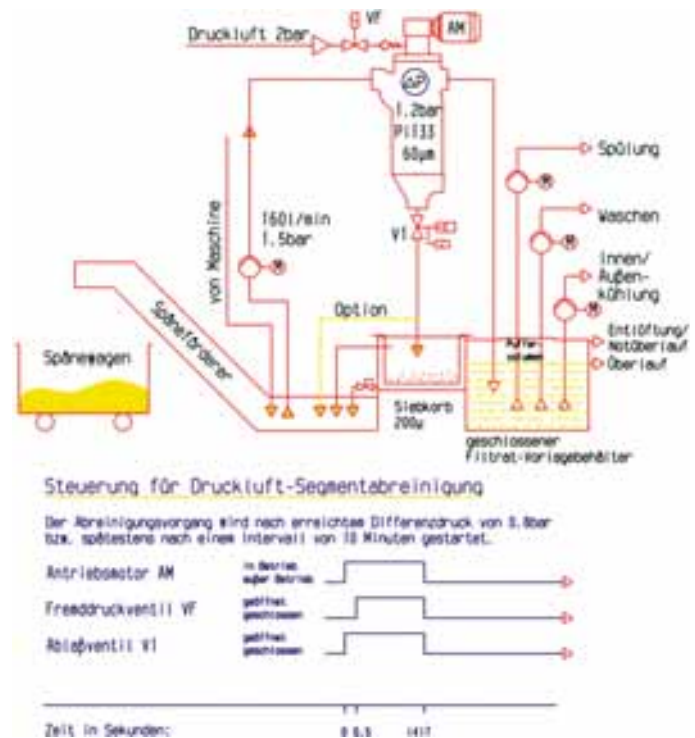
Filter materials

Various filter materials are used, depending on the particular application and the filtration requirements. The permissible volumetric flow rate and the filtration and cleaning properties of the suspensions are evaluated according to the viscosity and the characteristics, size, quality and concentration of the chips or other particles. The filter systems combine ideally in a compact parallel unit or in a single, larger filter for high volumetric flow rates or special filtration requirements.

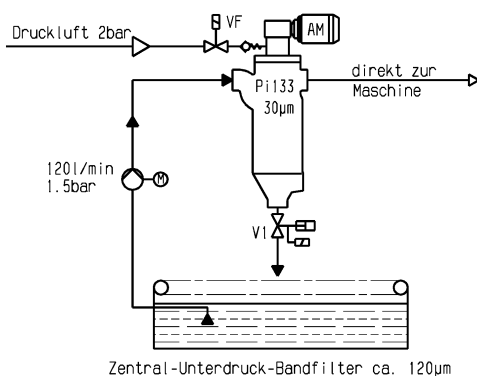
Metal-edge filter with scraper cleaning

The mechanical cleaning principle can also be applied extremely flexibly - despite a number of restrictions - to cooling lubricants for relatively coarse filtration. It ensures a continuous filtrate stream in the discharge and suction sections during in-process cleaning. The filter coils or split tubes with a radial triangular or V-shaped winding which are used for scraper cleaning are rotated against a spring-loaded scraper. The particles or substances on the metal edges are collected by the scraper and scraped

longitudinally away from the gap, which widens towards the inside. The windings for these filters have a gap width of 50 to 100 µm. The drain valve can be opened either during or outside the cleaning cycles. The combination of a scraper and pulsating segment cleaning by means of external pressure surges is preferred for special applications when an adequate residual cleaning effect can only be achieved by using the mechanical scraper principle together with external pressure. Filter elements with radial gaps or with a triangular or V-shaped winding are suitable for this purpose. ■

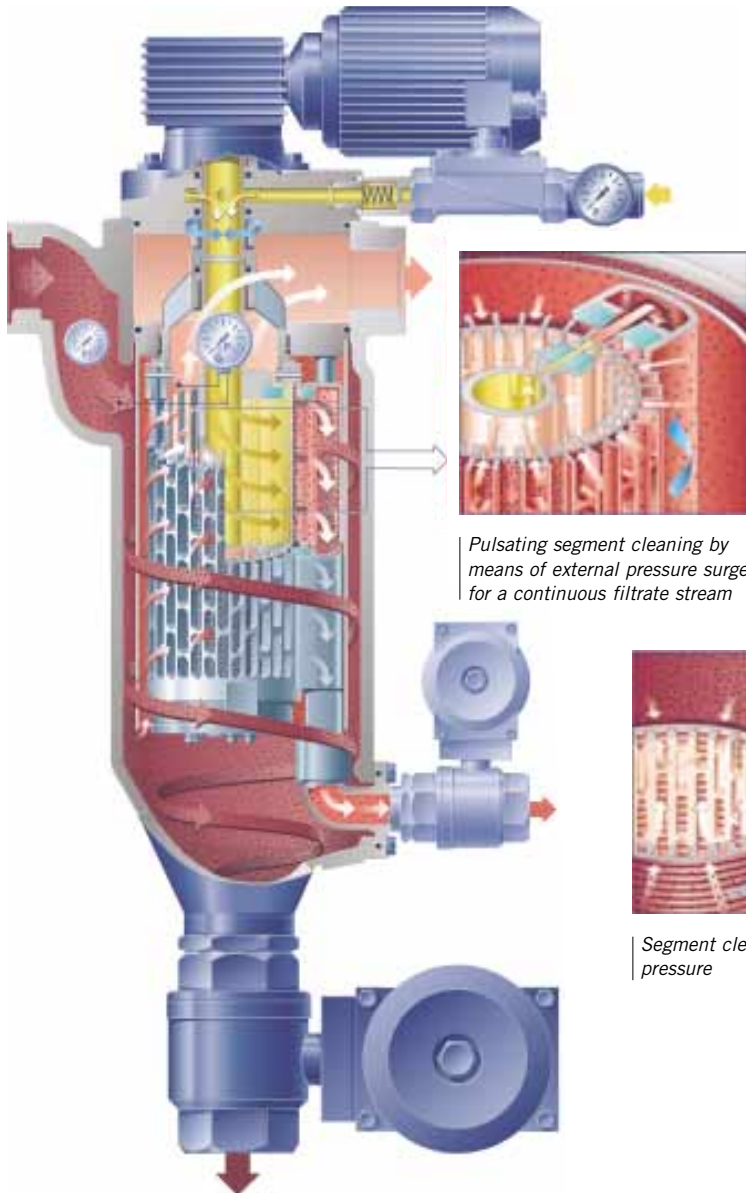


Automatic filter supplied directly by the chip conveyor with a filtrate buffer tank. The discharge flow can be optionally returned to the chip conveyor via a sedimentation tank.



Microfiltration without consumables

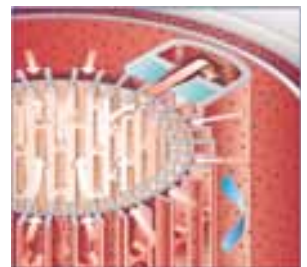
*Flexible automatic filters for a variety of
cooling lubricant needs*



*Pulsating segment cleaning by
means of external pressure surges
for a continuous filtrate stream*



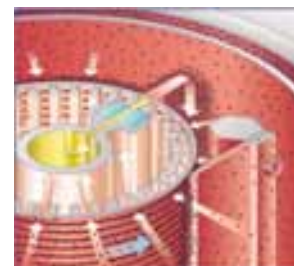
*The principle of pulsating
segment cleaning by external
pressure surges*



| Scraper cleaning



*| Segment cleaning by internal
pressure*



*| Scraper with segment cleaning
by external pressure surges*

Any firm that wants to be successful in Europe and the rest of the world has no choice but to pursue a policy of openness towards all innovations. In order to remain competitive in the face of rising costs, rationalisation potentials have to be

fully exploited and more and more production processes automated. Effective filtration of the machining fluids used in the metalworking industry for cooling, lubricating and flushing is therefore vital. In addition to the high quality requirements

that must be satisfied by the machined workpieces, stringent safety standards in relation to machine functions, a long tool life and maximum machine availability are three very convincing arguments in favour of automatic filtration.

Owing to the increasing complexity of maintenance and disposal regulations, systems which consume filter materials, which have to be cleaned manually or which are designed to be thrown away after use are increasingly being replaced by automatic inline filters. Automatic filters are often installed downstream - for instance, with central filter systems, belt and rotary screen filters or hydraulic cyclo-



By consistently integrating numerous innovative features, Mahle Filtersysteme, based in the small German town of Oehringen, has developed the Vario series of automatic filters, which are ideal for a wide variety of cooling lubricant needs.

nes - either for safety reasons or because their filtration efficiency is not adequate. By consistently integrating numerous innovative features, Mahler Filtersysteme,

Selection table for filter materials

Filter material	 V-shaped napped winding	 Triangular winding	 Top mesh	 Reinforced stainless steel fabric
Filter fineness	Nominal gap width in μm	Open filtering surface in %	Open filtering surface in %	Porosity in %
3	-	-	-	65
5	-	-	4	72
10	-	-	6	-
20	5	-	32	-
30	8	6	39	-
40	10	7	40	-
60	14	11	40	-
100	22	17	-	-
250	31	24	-	-
Filtration efficiency	■■■■■	■■■	■■■■■	■■■■■
Cleaning properties	■■■■■	■■■■■	■■■■■	■■■
Differential pressure resistance	■■■■■	■■■■■	■■■■■	■■■■■

Relative assessment ■■■■■ Very good ■ Poor

Various filter materials are used, depending on the particular application and the filtration requirements. The permissible volumetric flow rate and the filtration and cleaning properties of the suspensions are evaluated according to the viscosity and the characteristics, size, quality and concentration of the chips or other particles.

based in the small German town of Oehringen, has succeeded in solving these problems and developed the Vario series of automatic filters, which are ideal for a wide variety of cooling lubricant needs. These inline pressure filters can be cleaned without interrupting operation, so that no special maintenance or disposal measures of the kind unavoidable with consumable filter materials are necessary. The various available cleaning systems, filter materials and equipment combinations enable these compact automatic filters to be used for defined fine and microfiltration applications and adapted extremely flexibly to the respective filtration requirements.

Integrated cyclone effect

In all Mahle inline filters with an integrated cyclone effect there is a tangential, downward flow around an immersion pipe via the outer inlet chamber. This helical flow relieves the load on the segmental element or the filter coil, and particularly with low-viscosity liquids causes the coarse and heavy particles to be pre-separated and settle in the collecting cone. Defined residual separation then takes place on the filter material via the inner inlet chamber.

Pulsating segment cleaning by external pressure surges

Automatic filters with pulsating segment cleaning by means of external pressure surges are used for fine and microfiltration of the most diverse cooling lubricants. The system combines highly efficient cleaning with robustness and insensitivity even to very coarse chips or high differential pressures. When the differential pressure limit or a time limit is reached, or during the intervals between machining cycles, the segmental element is turned in the opposite direction for quick cleaning with compressed air or filtered liquid. The external pressure valve and the drain valve are opened. The individual segments pass through the external pressure nozzle one at a time, whereby this nozzle is opened and sealed alternately. When it is sealed, the integrated external pressure accumulator is pressurised, so that as soon as it opens again an outward pressure surge causes the separated particles to be cleaned in each individual filter segment. One rotation is sufficient to clean all the segments. The residue that has settled in the collecting cone and the particles that have been removed

from the element leave the system via the drain valve.

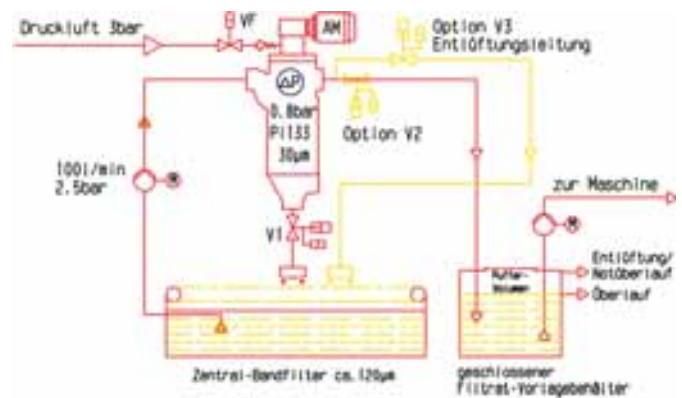
The principle of pulsating segment cleaning by means of external pressure surges can also be combined with an external channel for cleaning a continuous filtrate stream. With this system, the filtrate stream is neither interrupted nor noticeably reduced during the cleaning process - which in any case is only short. When the filter element is turned, each pair of opposite segments passes one at a time through the external pressure nozzle on the inside and the flushing channel on the outside. The particles which are cleaned by the pulsating external pressure surges are collected by the flushing channel on the outside and discharged almost exclusively with external medium.

Segment cleaning by internal pressure

The internal pressure principle is likewise used for fine and microfiltration of cooling lubricants. For in-process cleaning, however, the internal pressure or a small side stream of the internal filtrate is utilised. The segmental element is turned briefly and at the same time the cleaning valve is

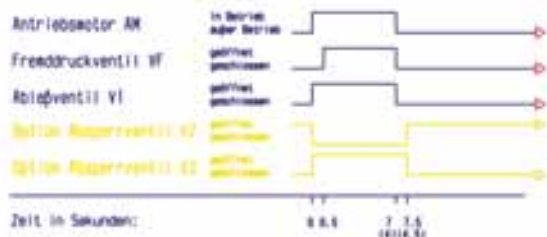
opened. The segments then pass through the flushing channel one at a time. The pressure difference between the filtrate side and the flushing channel results in back-flush cleaning, whereby the particles are discharged via the flushing channel. The principle of segment cleaning by means of internal pressure necessitates a pressure of at least 2 bar (0.2 Mpa) upstream of the filter, so that a cleaning pressure of approximately 1 bar (0.1 Mpa) can be built up on the filtrate side with the aid of a regulating throttle. The residue that has settled in the collecting cone can be drained either

during idle periods or - without interrupting operation - via the drain valve.

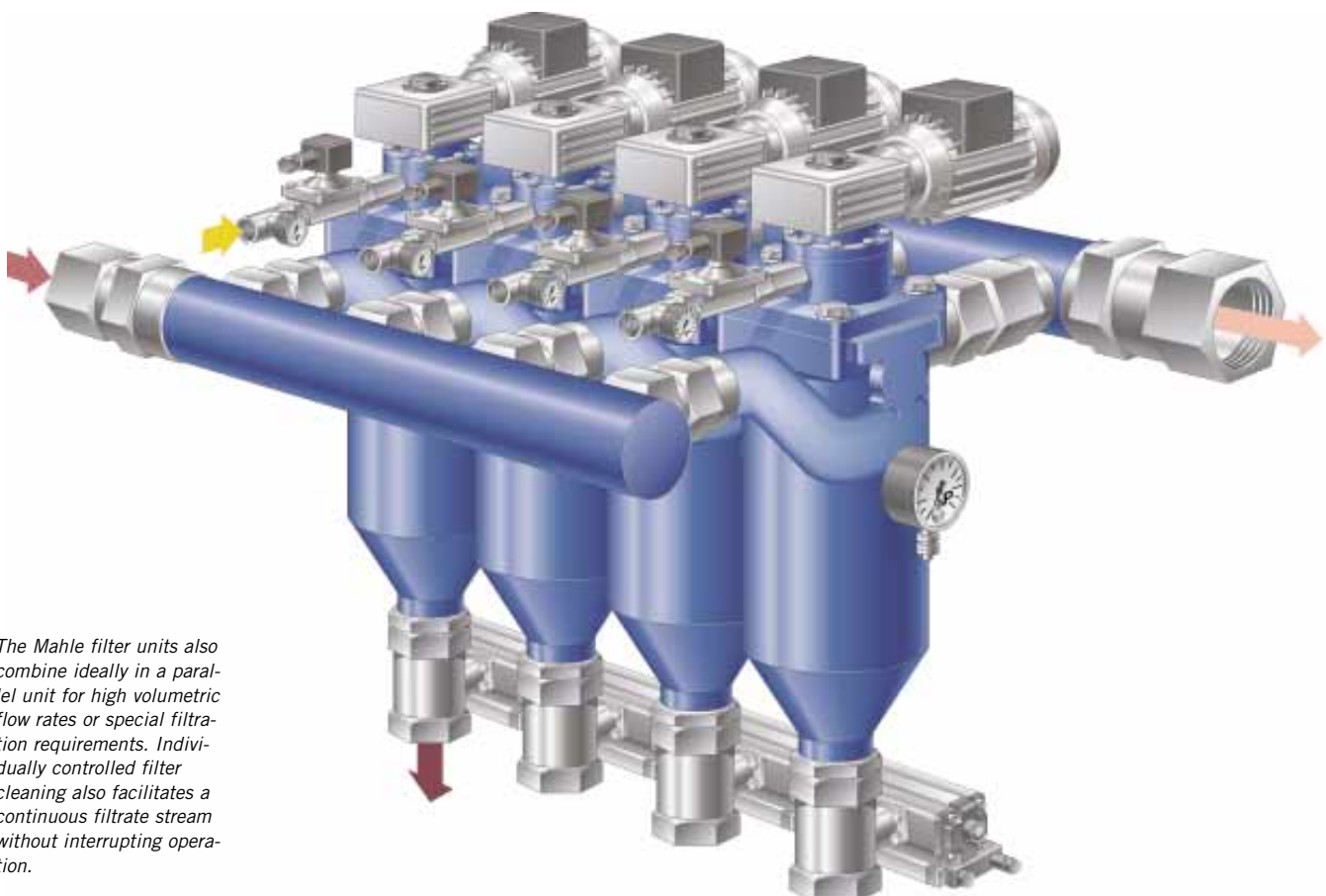


Steuerung für Druckluft-Segmentabreinigung

Der Abreinigungsvorgang wird nach erreichtem Differenzdruck von 0,8 bar bzw. spätestens nach einem Intervall von 5 Minuten gestartet.



Automatic filter for defined fine filtration installed downstream of a central belt filter with a filtrate buffer tank. The discharge flow is returned to the central belt filter.



The Mahle filter units also combine ideally in a parallel unit for high volumetric flow rates or special filtration requirements. Individually controlled filter cleaning also facilitates a continuous filtrate stream without interrupting operation.