HYDAC INTERNATIONAL

Components, Systems and Service for Coolant Technology

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Components, Systems and Service for Coolant Technology …

HYDAC – Your competent partner for solutions regarding the use of coolants

HYDAC has been one of the leading suppliers of fluid technology, hydraulics, electronics and cooling equipment for more than 50 years and has over 10,000 members of staff worldwide.

The width and depth of our range of products, combined with our recognized expertise in development, manufacturing and service, has allowed us for some years now to solve the most demanding challenges associated with coolants and mechanical processing in our customers' production plants.

For this purpose, in addition to a number of standard products, HYDAC also offers a variety of custom system solutions from the areas of filtration, cooling, sensor systems and condition monitoring.

This product range is complemented by a comprehensive range of services:

- Optimisation of existing systems
- Creation of filter concepts for new systems
- Letting of fluid maintenance devices
- Digitisation and online monitoring
- System and process chain analyses
- Consultation

HYDAC offers you the comprehensive technical range of components, systems and services – fluid engineering for your coolant. The aim is to optimise the availability and process results of machines and fluid technology systems, to reduce CO_2 and to reduce operating costs in the process. The system operator's needs and requirements are always paramount here.

We therefore support you as a versatile system partner and offer comprehensive advice and solutions regarding the use of coolants. The customer needs of system manufacturers and operators are our top priority.

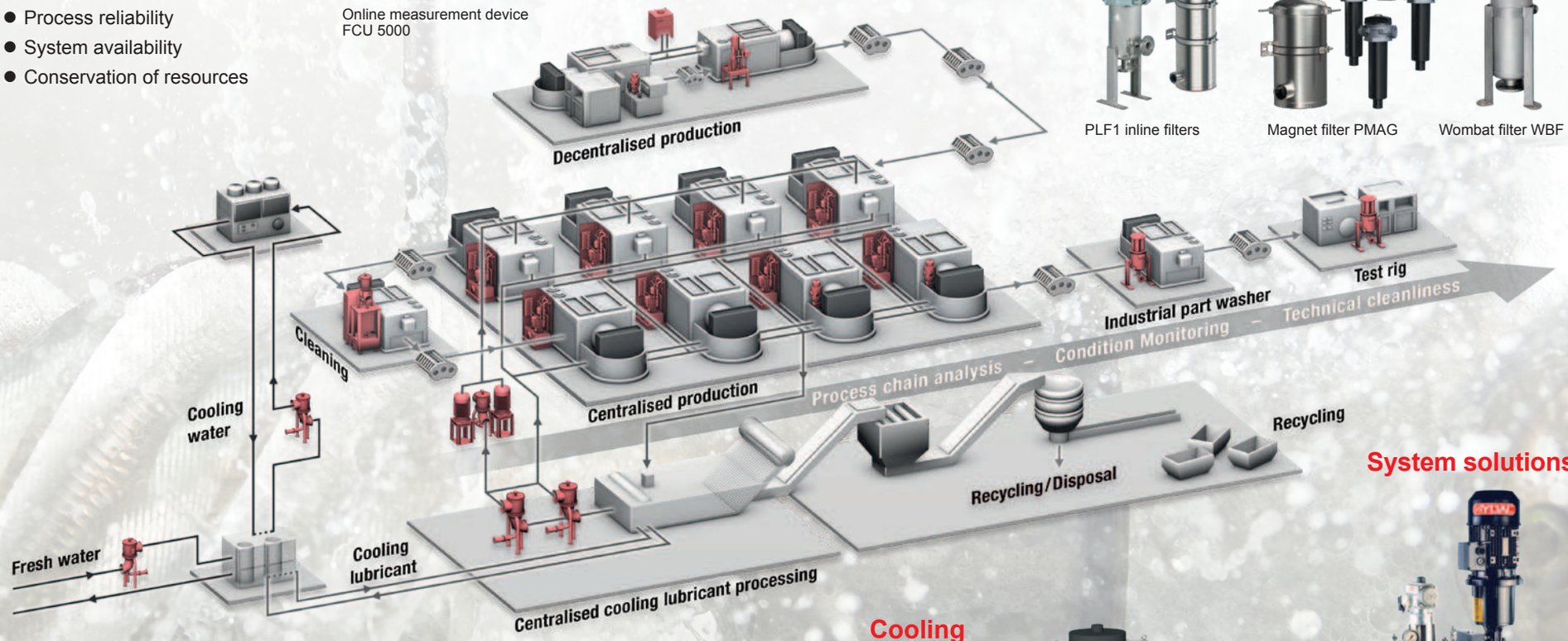
Service and fluid engineering

- Energy efficiency
- Process reliability
- System availability
- Conservation of resources

Condition monitoring and sensor systems

Online measurement device FCU 5000

Pressure transmitter HDA 4000 IO-Link and pressure switch EDS 3000 IO-Link



Coaxial valves and mounting technology

Coaxial valves, CX, modular design

Series strips and DIN clamps

Filtration with back-flushing filters

Automatic back-flushing filters AutoFilt® RF3, RF4, RF9, RF12

Filtration with disposable filter elements

PLF1 inline filters

Magnet filter PMAG

Wombat filter WBF

Cooling solutions

Fluid cooling system WTRE

Immersion cooler RFCS

Plate heat exchanger PWT, gasketed

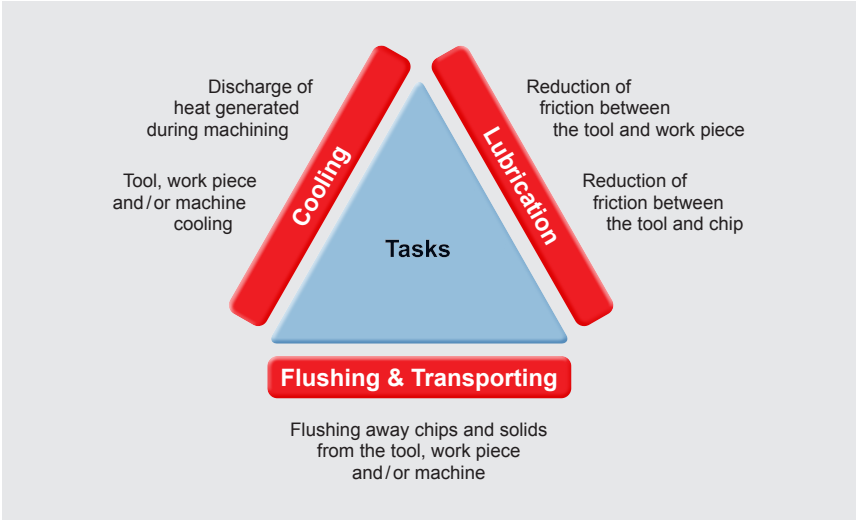
System solutions

Process Booster Unit PBB

General Information about Coolants (MWF)

Functions of coolants

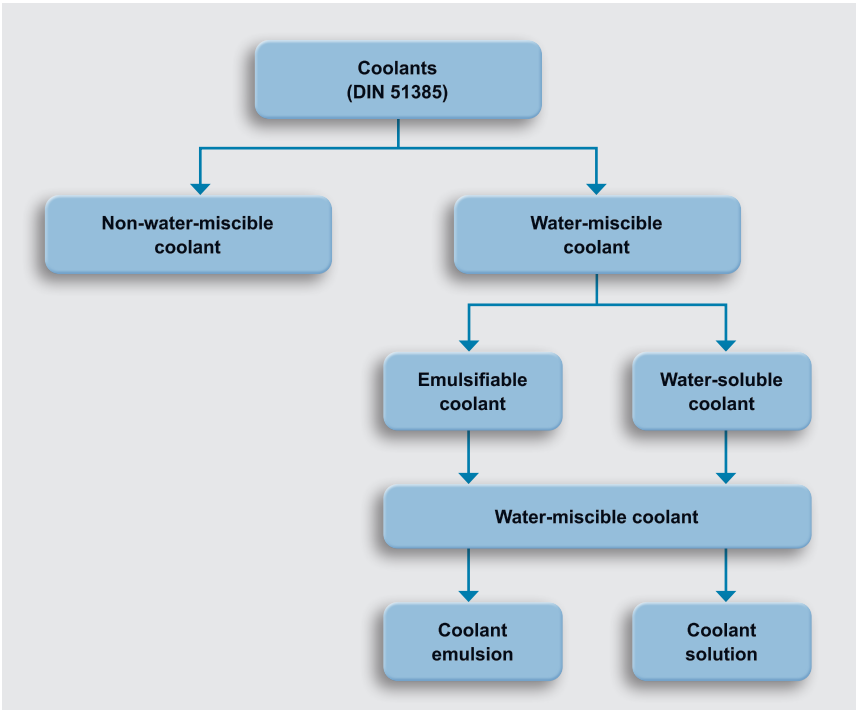
Coolants are used in modern manufacturing for cutting and forming with machine tools and primarily perform the following tasks:



The relative importance and emphasis of the individual criteria are dependent on the particular machining process. In addition, all coolants for metalworking are tailored to a number of secondary requirements, which are dependent on the application conditions:

- Consistent stability for long-term use
- Sufficient corrosion protection
- Neutral behaviour towards machine components (elastomers, coatings, etc.)
- Easy disposal
- Reduced outlay for machine failures and maintenance due to continuous conditioning

Classification of coolants according to DIN 51385



Coolants along the process chain

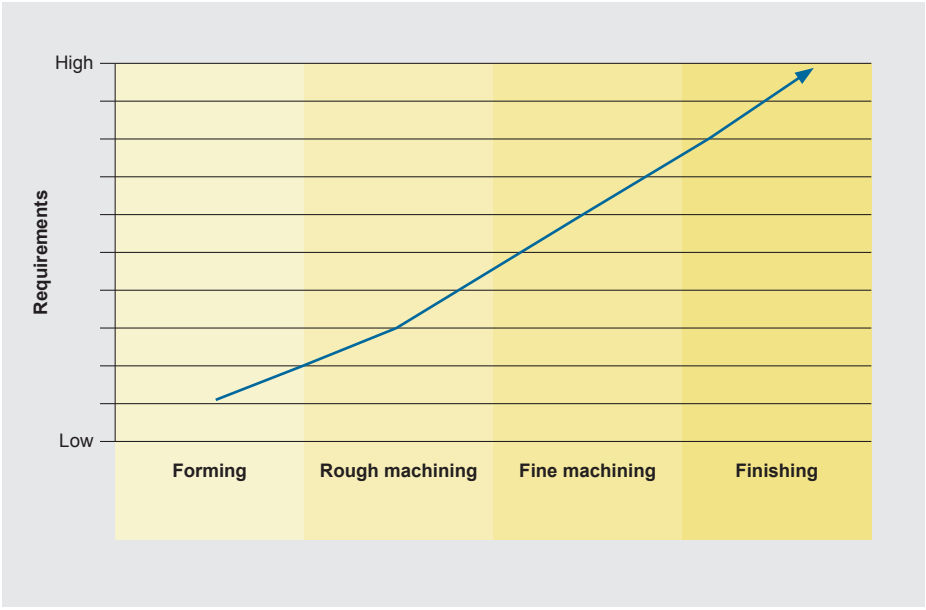
Manufacturing processes are usually classified from rough machining to fine machining, which means the process sequence is designed to achieve an appropriate work piece quality or a certain process result with increasingly finer machining methods and tools.

These process results are largely determined by the quality of the coolant used. Since a coolant in use is confronted with a wide range of influences and disruptive factors, effective care and monitoring are required to ensure an optimal use of the coolant over a long application period.

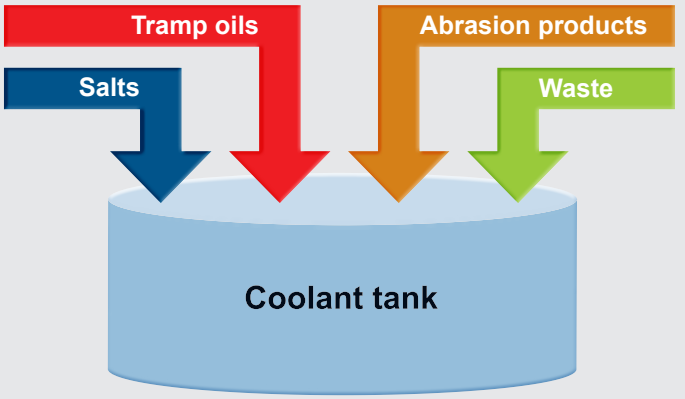
In addition to the process or product requirements, the requirements for the coolant preparation are also determined by the machine tools or their components (high pressure pumps, valves, tool mounts, rotary transfer joints, coolant nozzles, tools, etc.). It is therefore very important to think in terms of processes in order to achieve a technically and equally economic optimum.

With HYDAC components, system solutions and fluid engineering services, we help you to find this optimum in using your coolant and to sustainably ensure it. This optimum is usually also then associated with other positive effects, such as the reduction of scrap and rework or increased system availability.

Requirements for the preparation of the coolant



Disruptive factors for coolants



Possible consequences of inadequate care

Wear on moving parts

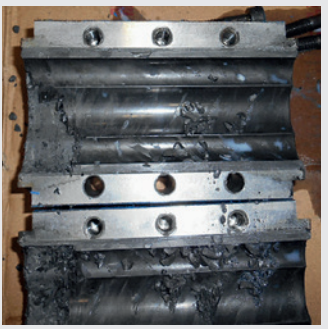


Figure:
Damaged pump case

Valve malfunctions

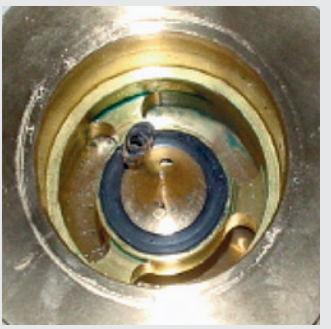
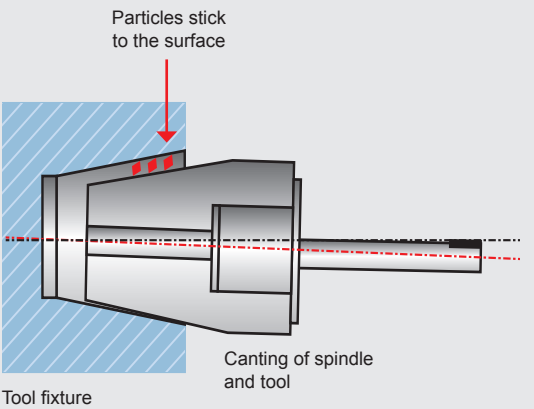


Figure:
Damaged valve sealing seat

Clogging of metering orifices

Figure:
Correctly functioning internal coolant supply (ICS)

Tool fixture malfunctions



Non-water-miscible coolants

Non-water-miscible coolant

- Usually consist of base oil and an additive package for the specific field of application
- Base oils are usually mineral oils, natural or synthetic ester oils, synthetic olefins or polyglycols
- Additives are usually: Compounds of phosphorus or sulphur, natural and synthetic fatty acids, esters, fatty alcohols, corrosion inhibitors, foam inhibitors, antioxidants and antifogging additives
- **Non-water-miscible coolants are used whenever the focus is on the lubricating effect**

Water-miscible coolants

Coolant emulsion

Coolant solution

- Consist of water and an admixed concentrate
- Depending on the type, they are called coolant emulsions (concentrate containing oil) or coolant solutions (concentrate free of oil)
- When it comes to coolant solutions, they are divided into colloid disperse solutions (contain emulsifiers) and molecularly disperse solutions (do not contain any emulsifiers)
- For coolant concentrates containing oil, in addition to the base oil, the following additives are usually also present: emulsifiers, corrosion inhibitors, chemically active substances, active substances that create a lubricating film, solubilisers and still preservatives today (such as biocides)
- **Water-miscible coolants are usually used, then, when the focus is on the cooling effect**

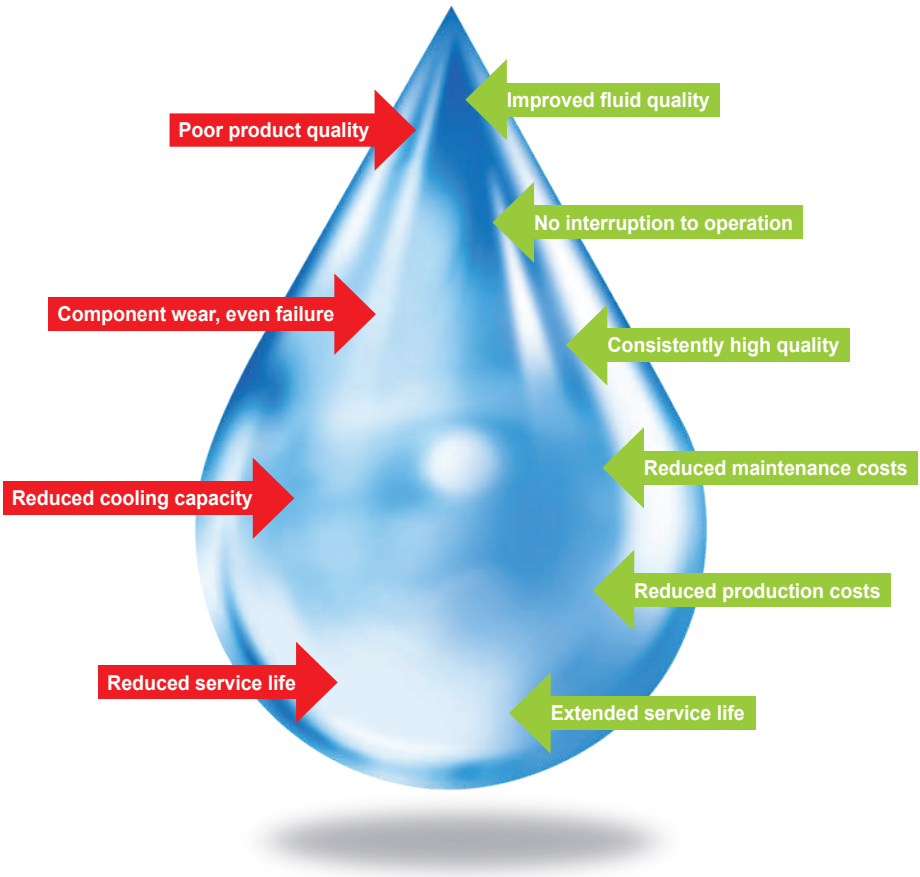
Optimised Filtration Technology

Top quality pays off in the long run.

The aim of the filtration is to keep coolant at a constant purity level during the entire application duration. The purity requirements of the coolant are defined by the machining method itself and by the machine tool or its components.

Sustainable filter concepts for complying with the purity requirement for the coolant are important parts of the holistic process solution. Correctly selecting high quality filter technology where it is needed and choosing cost-effective solutions wherever they are possible is crucial here. The wrong filter concept or even a missing of filtration can lead to serious problems in the system operation or process sequence. By selecting the correct filter or by optimising the existing filter concept, operating costs can be significantly reduced.

With HYDAC as your partner, you benefit from the advantages of optimal filtration.

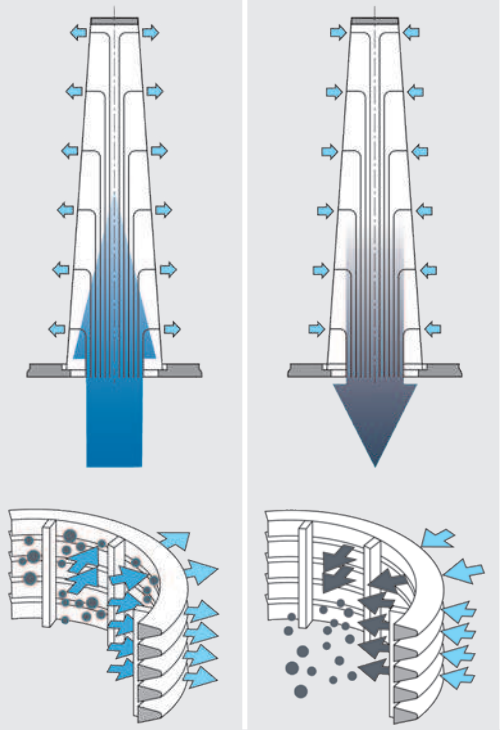


Filtration with Back-flushing Filters

Automatic back-flushing filters of the AutoFilt® product family are automatically operated filters that usually work according to the working principle of a surface filter and automatically regenerate after back-flushing.

This means downtimes, such as is the case with manual filters, can be avoided so that these filters are also ideal for large amounts of inflowing dirt.

Function principle



Filtration

- The fluid flows through the filter elements from the inside to the outside
- In the process, the particles are deposited on the smooth inside surface of the filter elements
- As the level of contamination increases, the differential pressure between the dirty and the clean side of the filter increases
- When the differential pressure reaches the pre-set trigger point, back-flushing starts automatically

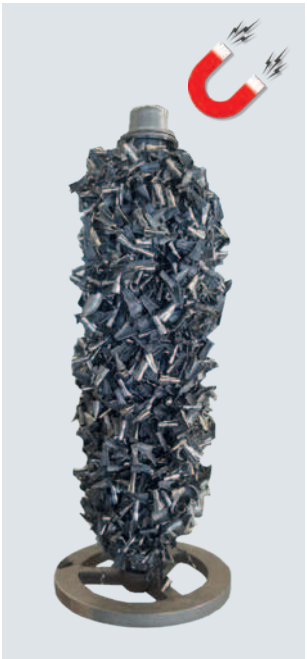
Automatic back-flushing is triggered:

- When the triggering differential pressure is exceeded
- By means of an adjustable time relay

As soon as back-flushing has been triggered, the back-flushing filter starts to clean the filter elements.

The back-flushing function depends on the selected control type.

Magnet technology



Increased efficiency thanks to magnetic force

- Specially developed for applications with ferritic contamination, e.g.: Filtration of coolants or wash emulsions
- Effective retention of contamination, even finer than the set filtration rating
- Stainless steel magnet inserts – ideally suited for usage in parts cleaning
- High separation efficiency thanks to usage of magnets with a very high magnetic field strength
- In a practical test, automatic filters with magnet inserts were able to double their filtration time between two back-flush cycles
- Available for filter types:
  - AutoFilt® RF3 automatic filter (also as retrofit set)
  - PLF1 process inline filter
  - PMAG process magnet filter

Filtration with Back-flushing Filters

Automatic filter AutoFilt® RF3 / RF5 / RF7

RF3 / RF5 / RF7, filter elements

Technical details

Connection size
- DN 50 to DN 900

Flow rate Q_{max}
- 7500 m³/h

Design pressure p_{min} / p_{max}
- 2.5 bar / 100 bar (by request)

Temperature T_{max}
- 90 °C

Filter material and filtration rating
- Wedge wire: 50 – 3000 µm
- Wire mesh SuperMesh: 25 – 60 µm
- Optional SuperFlush non-stick coating

Housing material
- Carbon steel, nickel-plated
- Stainless steel

Application
- Secondary and protective filtration of coolants in centralised and decentralised treatment systems
- Filtration of process and cooling water

Customer benefits / advantages
- Self-cleaning automatic filter
- No interruption of the filtrate flow during back-flushing
- Optional: AutoFilt® Control Unit ACU
  - Open connectivity to all commonly used customer interfaces
  - Remote monitoring possible with smartphone or tablet
  - Self-diagnosis, system diagnosis, process monitoring
- Magnet technology for retrofitting to existing AutoFilt® RF3

Automatic filter AutoFilt® RF4

RF4, filter elements

Technical details

Connection size
- Inlet and outlet: G 1"; G 1 ½" ; G 2"

Flow rate Q_{max}
- 385 l/min

Design pressure p_{min} / p_{max}
- 2.5 bar / 16 bar

Temperature T_{max}
- 80 °C

Filter material and filtration rating
- Wedge wire: 30 – 1000 µm
- Wire mesh SuperMesh: 25 – 60 µm
- Optional SuperFlush non-stick coating

Housing material
- Aluminium
- Carbon steel, nickel-plated
- Stainless steel

Application
- Special design for use as a protective filter on machine tools
- Filtration of process and cooling water

Customer benefits / advantages
- Self-cleaning automatic filter
- Available as a fully automatic and manual filter variant
- No interruption of the filtrate flow during back-flushing
- Compact design
- Maximum utilisation of the filter area
- Full filtration performance following back-flushing
- Optional: AutoFilt® Control Unit ACU
  - Open connectivity to all commonly used customer interfaces
  - Remote monitoring possible with smartphone or tablet
  - Self-diagnosis, system diagnosis, process monitoring

Hydropneumatic filter AutoFilt® RF9

RF9, filter elements

Technical details

Connection size
- DN 50 to DN 350

Flow rate Q_{max}
- 1000 m³/h

Design pressure p_{min} / p_{max}
- 1.5 bar / 16 bar

Temperature T_{max}
- 160 °C

Filter material and filtration rating
- Chemicron® metal fibre fleece: 5 – 20 µm
- Lace tissue, 5 – 30 µm
- Wire mesh SuperMesh: 20 – 100 µm

Housing material
- Steel
- Cast

Application
- Fine filtration of coolants
- Fluids with high viscosity

Customer benefits / advantages
- Self-cleaning automatic filter
- Back-flushing driven by external fluid
- No mixing with the compressed air
- Adjustable back-flushing intensity
- Efficient hydraulic cleaning
- High cleaning efficiency
- No pressure reduction during back-flushing
- Defined back-flush volume
- Low compressed air consumption
- Low flow losses
- Intelligent control system
- Large filter surface for its compact size
- Low-maintenance and service-friendly design
- Optional: Sludge Treatment Unit STU for back-flush treatment

Automatic filter AutoFilt® RF12

RF12, filter elements

Technical details

Connection size
- G 1 ½"

Flow rate Q_{max}
- 80 l/min

Design pressure p_{min} / p_{max}
- 0.7 bar / 10 bar

Temperature T_{max}
- 90 °C

Filter material and filtration rating
- Wedge wire: 30 – 1000 µm
- Wire mesh SuperMesh: 25 – 60 µm
- Optional SuperFlush non-stick coating

Housing material
- Aluminium

Application
- Filtration of coolants in low pressure applications
- Particularly suitable for filtering coolants in individually supplied machine tools

Customer benefits / advantages
- Self-cleaning automatic filter
- Discontinuous filtration
- Energy-optimised filtration and back-flushing principle
- Not dependent on pressure of filtrate
- Efficient alternative to a cyclone separator
- Compact design
- Simple design
- Simple integration and flexible adaptation to the machine tool
- Maintenance-friendly design

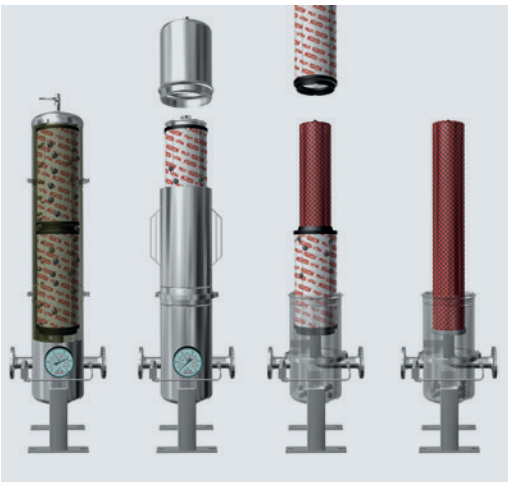
Filtration with Disposable Filter Elements

Disposable filter elements cannot be regenerated and therefore must be replaced once contaminated to a certain level. Disposable filter elements usually work according to the depth filter principle. However, a distinction is made here between so-called nominal filters and filters with a defined separation rate. The latter are in particular used in cases of strictest requirements for coolant purity.

Since the filter change is manual work and this must be done during standstills, HYDAC disposable filter elements are also available in double or switchover design. This ensures that one filter is always carrying out the filtration task, while the second filter is available for the exchange, even during full operation of the system.

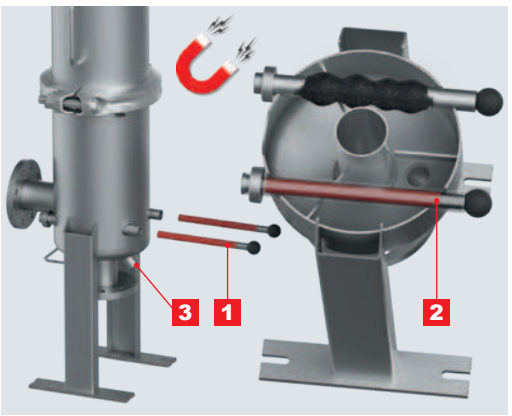
The magnetic separators have a special place in the HYDAC portfolio.
They are infinitely reusable thanks to a manual cleaning.
The solenoid technology is available both as an optional extra for certain disposable filter elements, as well as an independent product family.

Function principle



- There is flow through the filter element is from the outside to the inside
- The particles are deposited on the outside of the filter element
- The filter elements should be replaced once the maximum permitted differential pressure is reached

Magnet technology



To increase service life of the filter elements in fields of application with ferritic contamination

1. Bar magnets integrated into the filter housing – filter housing does not need to be opened to clean the bar magnets
2. No contact with the magnet surface thanks to special tube-in-tube design – no contact with contamination / medium and magnet during handling
3. Reliable discharge of dirt through drain line

Pressure filter FMND / FLND

FMND, FLND, stainless steel wire mesh element

We offer our changeover pressure filters of the FMND series (up to 250 bar) and FLND (up to 63 bar) as per DIN 24550 for a reliable filtration of coolant media.

Combined with the proven stainless steel HYDAC filter elements, these convince with the highest efficiency in the filtration of coolant media.

The MWF elements with plastic structure specially developed for coolant filtration are an alternative to the stainless steel wire mesh elements.

Technical details

Pressure ranges
- FLNF: up to 63 bar
- FMND: up to 250 bar

Flow rates
- Up to 400 l/min

Filtration ratings
- Stainless steel: 25, 50, 100, 200 µm
- Plastic: 25, 50, 70 µm

Filtration materials
- Stainless steel wire mesh
- Plastic

Housing material
- FLND: Aluminium / steel
- FMND: cast / steel

Customer benefits / advantages

- Maximum efficiency filtration of the coolant with a low pressure loss
- Smooth operating change-over design allows elements to be changed without shutting down the system (24 hour operation)
- Low leakage when changing elements thanks to the single plug and integrated non-return valves
- Automatic hydraulic balance thanks to the integration in the changeover fitting
- Standard-compliant design of the housing and elements as per DIN 24550

WombatFilter WBF

WBF, Wombat / Flexmicron / filter bags

The WombatFilter WBF is used for the pre-filtration and main filtration of fluids. It provides excellent protection for components and systems primarily in coolant and industrial part washers as well as in hydraulic and lubrication systems.

The option of using these different types of filter elements (Wombat, filter bag, Flexmicron) provides a high level of flexibility in system planning and in operation.

Technical details

Pressure ranges
- 10 bar
- 16 bar

Flow rates
- Max. 400 l/min

Filtration ratings
- 1 .. 200 µm

Filtration materials
- Polypropylene
- Polyamide
- Polyester
- Glass fibre

Housing material
- Stainless steel

Customer benefits / advantages

- High flexibility thanks to variable use of different element technologies
- Very high filtration efficiency: > 99.8 % in various filtration ratings are possible with Wombat filter elements
- Economic operation through high quality standards, defined filtration rates and high separation values
- Compact housing with high flow rates
- Efficient system and component protection
- Easy to service
- Good adjustment to different fluids thanks to the variety of materials

Filtration with Disposable Filter Elements

MultiRheo filter MRF

MRF1 / Flexmicron elements, MRF2, MRF4

The MultiRheo filters of the MRF series are bypass flow filters for use in open systems which are continually exposed to external contamination.

The Flexmicron filter elements protect the components here, such as metering orifices and high pressure pumps or the working filtration. Various sizes with a variety of connection options are available.

Technical details

Pressure ranges
- 16 bar
- 40 bar

Flow rates
- Max. 5600 l/min

Filtration ratings
- 1 .. 90 µm

Filtration materials
- Polypropylene
- Polyamide
- Polyester
- Glass fibre

Housing material
- Carbon steel
- Stainless steel

Customer benefits / advantages

- Economic operation through high quality standards, defined filtration rates and high separation values
- Compact housing with high flow rates
- Service-friendly for replacing elements
- Efficient system and component protection
- Environmentally safe disposal of elements (incinerable)

OffLine filter series OLF 15 – 60

OLF 15 – 60, Dimicron element

The OLF 15 / 30 / 45 / 60 series of filtration units are robust offline filters for stationary applications in hydraulic and lubrication systems with a large oil volume.

Technical details

Pressure ranges
- Max. 6 bar

Flow rates
- 15 .. 60 l/min

Filtration ratings
- 2 .. 30 µm (absolute)

Filtration materials
- Cellulose

Housing material
- Stainless steel

Customer benefits / advantages

- Improved component and system filter lifetime
- Increased machine availability
- Longer oil change intervals
- High service-friendliness
- High contamination retention capacity of the elements
- Environmentally safe disposal of elements (incinerable)
- Optional sensors available to monitor the contamination in the oil

Process inline filter PLF1

PLF1, Processmicron® elements

Technical details

Connection size
- DN 50 (G2") to DN 150

Flow rate Q_{max}
- 100 m³/h

Standard pressure range
- 16 bar

Temperature T_{max}
- Processmicron® PES: 90 °C
- Processmicron® PP: 60 °C

Filter material and filtration rating
- Processmicron® HighFlow 6", HighFlow 9" / HLC: 1 – 90 µm

Housing material
- Stainless steel

Application

Continuous separation of solids from low-viscosity fluids, such as:
- Coolants
- Processing oils

Customer benefits / advantages

- Compact design
- Superior handling compared to commonly available disposable filter elements
- Protection of the clean side during filter element replacement thanks to fixed support tube
- Modular design gives optimal flexibility in catering for every application
- Low pressure drops due to large cross sections and filter areas
- Short maintenance times
- High contamination retention capacity, filtration efficiency and media compatibility
- Management of high flow rates thanks to parallel control of several PLF1
- Completely incinerable elements
- Magnet technology to increase service life of the filter elements in fields of application with ferritic contamination

Process magnet filter PMAG

PMAG, magnet insert

Technical details

Connection size
- G1" to G2"

Flow rate Q_{max}
- 400 l/min

Standard pressure range
- 6 bar / 10 bar

Temperature T_{max}
- 80 °C

Magnet technology
- Bar magnet with neodymium magnets, retention rate in accordance with flow velocity

Housing material
- Plastic
- Aluminium
- Stainless steel

Application

- Coolants
- Bypass filter
- Pre-separator for unloading other filters
- Applications with ferritic contaminations
- Particle filter

Customer benefits / advantages

- Available as single or double filter
- Optimised for filter performance of downstream filters, such as automatic filters or inline filters
- Bar magnet can be removed easily without having to detach the filter from the pipe
- High magnetic field strength for effective retention of ferritic contamination
- Economical and environmentally friendly as not a consumable

Cooling Solutions for the Highest Quality and Stable Processes

On typical metalworking methods on modern machines, the mechanical power fed to the point of action - the main part of the drive power – is nearly all converted into heat.
That is why the three core tasks of lubricants are to cool the tool, the work piece and the machine body itself.

The fastest possible removal of the heat from the point of action can keep the material properties of the work piece and the tool constant. This results in an optimal quality of the work piece and a maximum service life of the tool.

Since coolants are circulated, the process heat must be removed from the coolant again. For this purpose, HYDAC offers different energy-efficient and highly accurate cooling solutions and concepts.

We are happy to help you to develop a corresponding concept for your custom cooling task in order to find the optimal solution from technical and economic viewpoints, both for new systems and existing systems.

Continuous cooler RFCS

The compressor cooler is supplied with operating medium via a customer pump or suctions the operating medium from the customer tank using its own pump. This is cooled via an evaporator (plate heat exchanger) and fed back into the customer tank.

A sensor detects the temperature of the operating medium and the PID controller controls the temperature according to the nominal value setting.

Technical details

Cooling capacity

- 6 kW

Refrigerant / coolant

- Water
- Water-glycols
- Oils
- Customer-specific fluids by request

Flow rates

- 80 l/min

Customer benefits / advantages

- Optionally with various communication interfaces (RS485, RS232, EtherCAT, ProfiNET®, ProfiBUS®, Modbus TCP)
- Use of the same controller as with the standard RFCS
- Can be set up next to the system
- Autonomous system → can be connected to the existing customer tank system
- With air liquefier or water liquefier

Immersion cooler RFCS

The compressor cooler is used in the customer tank from above. The evaporator (heat exchanger) is located below the fluid level and cools the medium down. A sensor detects the temperature of the operating medium and the PID controller controls the temperature according to the nominal value setting.

Technical details

Cooling capacity

- 13.5 kW

Refrigerant

- Emulsion

Customer benefits / advantages

- Optionally with various communication interfaces (RS485, RS232, EtherCAT, ProfiNET®, ProfiBUS®, Modbus TCP)
- Use of the same controller as with the standard RFCS
- With air liquefier or water liquefier
- Easy-to-clean heat exchanger
- Contamination-resistant
- Optionally with agitator for an improved heat exchange
- Continuous run technology saves space

Fluid cooling system WTRE

The WTRE can be used as an intermediate circuit in machine tools to cool applications with different temperatures and media. It essentially consists of a plate heat exchanger and a control system. Sensors record the temperature of the operating medium, the PID controller evaluates the data and controls the amount of coolant via the control ball valve. In this way, the media temperature to the consumer can be kept at a set value.

Customer benefits / advantages

The WTRE can replace an immersion cooler in coolant systems. This has several advantages:

- Space saving
- Less filling volume of coolant
- Energy savings
- Cost savings

Plate heat exchanger – brazed and gasketed

Plate heat exchangers are used wherever thermal energy (heat) has to be transferred from one fluid to another. The advantage is that they can maintain the fluid temperature at a very low and stable level – depending on the temperature of coolant. Plate heat exchangers consist of a stack of stamped heat exchange plates which are either brazed together or clamped together in a frame with gaskets.

The design and construction of the **brazed plate heat exchangers** are particularly compact and efficient. The heat transfer plates are made in stainless steel and are brazed with copper as standard. For use with aggressive media, nickel braze can also be used. Copper brazed plate heat exchangers are pressure resistant up to 30 bar, nickel brazed up to 10 bar. Special models are however also suitable for higher pressures.

Gasketed plate heat exchangers are particularly suitable for large flows and high cooling capacities. The stack of heat transfer plates and gaskets is clamped together with bolts in a frame. This means that the plate heat exchanger can also be dismantled for cleaning and maintenance. Furthermore it is possible to add more plates at a later date to achieve a higher capacity.

Condition Monitoring and Sensor Systems

A seamless monitoring of the coolant saves operating costs

To achieve an optimal effect of a coolant and therefore to ensure an optimal machining process, it is crucial that the coolant is supplied to the point of action in the correct quantity, with the correct temperature, with the correct pressure and in the correct quality.

To ensure this, HYDAC offers an extensive portfolio of sensor systems for the measured variables of flow, pressure, temperature and filling level.

In the context of increasing digitalisation, the sensors are also available as smart sensors with IO-link interfaces and a variety of diagnostic options such as device temperature, temperature-standardised operating times and measuring range monitoring, to mention but a few.

In addition, HYDAC also offers monitoring solutions for the chemical parameters of a coolant. This allows the user to monitor the use of his coolant and to regulate it automatically. The coolant use can be optimised so that processes can be operated in the limit area of the optimal point without having to maintain a costly safety buffer.

No matter whether an analogue signal, digital or communication interfaces, such as IO-Link, we are happy to advise you individually and find the right product for your measurement task.

FluidControl Unit FCU 5000 and CM Package CMP 5000

FCU 5000

CMP 5000

The FCU 5000 & CMP 5000 are online measurement devices for monitoring key fluid parameters in water-miscible coolants. Automated additional metering of the coolant concentrate (optional) ensures that the specified concentration can be kept almost constant in the system.

FCU 5000: for retrofitting
central and decentralised existing systems

CMP 5000: For immediate integration
at the system manufacturer

They continuously monitor the pH value, conductivity, refractive index and temperature. Any deviations in the measurement can be corrected by checking the zero point and errors can be detected. The measured values can be evaluated by using HYDAC's own software CoolTools or fed into a higher-level customer system.

Application

- Coolant applications in different machining processes
- Monitoring centralised and decentralised systems in production facilities

Customer benefits / advantages

- Reliable determination of coolant concentration in machining processes
- Defined sampling in the by-pass
- Storage of measured data with the date and time (data logger with timestamp)
- Automatic alarms above limit values
- Switching output for fully automatic metering pumps (concentrate and additive)
- Creation of digital lab reports

Multiplexer Unit

- Extension version in conjunction with FCU 5000 for sensor-supported additional metering via external mixer device from up to 7 decentralised coolant supplies
- Database-based measurement data memory
- Visualisation of key system parameters of all connected machines via web server
- Documentation of all relevant data

Sensors

To prevent premature tool damage or excessive wear, sensors can be used to monitor the coolant system.

HYDAC offers ELECTRONIC sensors for this purpose:

- Pressure
- Differential pressure
- Temperature
- Fill level
- Flow

As part of progressing digitisation, the sensors are also available as IO-Link, smart and / or smart IO-Link. They offer various diagnostic possibilities, such as device temperature, temperature-standardised operating times, measurement range monitoring, and much more.

Application

- Coolant central systems
- Coolant in high pressure and low pressure

Customer benefits / advantages

- Monitoring the pressure and the temperature
- Monitoring the contamination level of a filter element in pressure filters
- Automatic fill level detection and readjustment to central systems
- Monitoring the flow rates to the tool in internally cooled tools
- Protection of critical tools and machining parts
- Fluid level measurement and temperature measurement combined
- Optimal, demand-driven cooling and therefore energy savings

	Product	Measured value
IO-Link smart 	**EDS 824** (IO-Link) **HPT 1000** (IO-Link/smart) **HDA 4000** (IO-Link) **EDS 3000** (IO-Link)	**Pressure** -1..1 bar up to 1,000 bar
IO-Link 	**HPT 500** (IO-Link)	**Differential pressure** 2; 5; 8 bar
IO-Link smart 	**HTT 1000** (IO-Link/smart) **ETS 4000** (IO-Link/smart) **ETS 3000** (IO-Link)	**Temperature** -25 .. +125 °C
IO-Link 	**ENS 3000** (IO-Link) **HNS 3000** (IO-Link) **HNS 526** non-contact	**Fill level** Measuring range of up to 658 mm HNS 526 to 6,400 mm
	**HFT 3100 / EVS 3100** **HFT 2000 / HFS 2000** **HFT 250 / HFS 250**	**Flow** Measuring ranges up to 600 l/min

The product range also encompasses **data recorders and measuring instruments** for the parametrisation and analysis of smart sensors. In addition, the HYDAC ELECTRONIC product range includes **network interface modules (IO-Link Master)** which enable connection to the control level and the Internet of Things.

IO-Link 	**HMG 4000**	**Data recorder** - Up to 38 sensors can be connected - Up to 100 measurement channels can be displayed simultaneously - IO-Link interface for parametrisation
IO-Link PROFINET® 	**IO-Link Master**	**Network interface** - 4 or 8 ports - Class A or class B
IO-Link 	**ZBE P1**	**USB – IO-Link programming adapters**

Coaxial Valves and Module Blocks

System components – proven technology for stable processes and high flexibility

The wide range of coaxial valves (CX valves) means HYDAC can offer a variety of product solutions. Coaxial valve technology is a tried-and-tested means of controlling different types of media, e.g. vacuum, gaseous, fluid, abrasive, contaminated and aggressive, and is therefore universally applicable.

HYDAC offers a wide range of nominal sizes, connection variants and sealant and housing materials adapted to the respective medium. HYDAC develops tailor-made solutions for a nearly unlimited range of applications.

The HYDAC coaxial valves save space, are process-controlled, low-maintenance and are available in a stainless steel design. Special block solutions based on interlinked coaxial valves reduce the amount of piping and save installation space in your system.

Coaxial valves open and close by axial motion. Compressed air or solenoid force moves a control tube in a horizontal direction and opens the valve seat. For optimum integration in blocks and systems, our valves are not just available as single valves, but also in stacking configurations and as customised special solutions.

Coaxial valves – direct-acting and pilot-operated

Coaxial valves, modular design

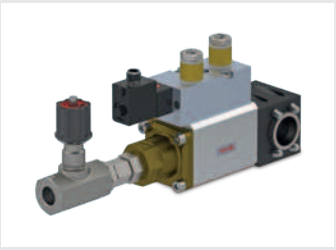
Application

- Low pressure & high pressure in one module block
- Two separate inputs with a separation between the two circuits
- Safe switching position closed without power in case of a fault
- Combination of direct acting & externally controlled module valves
- Variable setting ranges can be switched in milliseconds
- Installation position optional
- Modular manifold assembly with expansion options

Customer benefits / advantages

- Rapid opening and closing times
- CX valves can be inserted and removed as a complete unit
- Module block does not need to be removed, fits in existing valve nest
- Highly contamination-resistant and durable
- High Kv values and viscosities possible
- Very compact design
- The geometry of these valves allows them to be built as module blocks (space-saving, maintenance-friendly and minimises the installation outlays)
- No pressure differential required
- Resistant to back pressure and flow possible in both directions

CX module valve with flow regulation



Application

- High pressure coolant distributor I M12x1 IP67 for use with splash water (coolant)
- Flow regulation for individual setting
- Flow regulation with visual display
- Separating covers for different setting ranges
- Low pressure and high pressure application
- Installation position optional
- Modular manifold assembly with expansion options

Customer benefits / advantages

- Cost savings, since there is no pre-assembly
- No expensive rework, since HYDAC checks leakage points (100% inspection)
- Flow regulation for optimal water flows during machining
  → Improved quality
- Reproducible setting thanks to the scale on the hand wheel
- Retrofittable unit for existing machines and standard for new machines, minimised storage costs
- Much smaller installation space for compact fluid cabinet

CX module block with flow sensor

Application

- High pressure coolant closed loop pressure control
- Pressure control for switching over the setting ranges
- Optimal cooling of the tools and grinding results
- Safe switching position closed without power in case of a fault
- Combination of switching and pressure reducing valves
- Variable setting ranges can be switched in milliseconds
- Installation position optional
- Modular manifold assembly with expansion options

Customer benefits / advantages

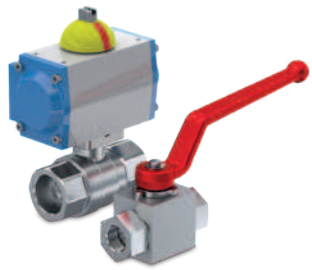
- Automatic control for different work pieces
  → Cost savings for machine changeover
- Flushing and pressure-reducing valve integrated
- No expensive rework, since HYDAC checks leakage points (100% inspection)
- Additional shut-off valve is omitted, since there is a reliable function of the valves
- Optimised flow values for now shorter machining times
- Continuous M12 x1 technology yields cost savings in wiring, standard cables worldwide

Armatures and Mounting Technology

System Components – proven technology for stable processes and high flexibility

The comprehensive HYDAC range offers the right components – from a single source – wherever currents are shut off or redirected, where lines and components are securely fastened.

Ball valves



Pneumatic and manual ball valves

Due to a high level of in-house manufacturing and state-of-the-art machinery, HYDAC ball valves enable efficient series production as well as customer-specific solutions.

Our products are known for their quality, functionality, safety, service life and flexibility.

Customer benefits / advantages

- Full-flow passage to ensure unrestricted flow of the medium
- Self-sealing due to sealing principle with floating ball
- Easy actuation, even at high pressures
- Maintenance-free, no adjustment of the seal necessary

Mounting technology

Clamping bands, interconnecting rails, DIN 3015, Buegu clamp, HY loop

HYDAC clamping bands
Fastening of large-volume containers or components of different sizes (round and / or square) and materials

HY-ROS interconnecting rails
Quick and safe assembly of hose groups and (dynamically loaded) pipe groups

DIN 3015 clamps
Perfected modular system for fastening pipes with static and dynamic loads

Buegu clamp
For individual lines and pairs of lines in the diameter range from 6 to 32 mm

HY-Loop Velcro clamp
for laying / fastening a wide range of cables, lines and hoses in modern machines and systems.

Customer benefits / advantages

- Tank fastening, regardless of the tank shape (round, square)
- Customer-specific, space-saving base fastening elements
- Worldwide availability of DIN and standard parts
- Space-saving interconnecting rails in standard design or customer-specific adapted to your installation space
- Vibration-optimised fastening to the noise optimisation
- Long-term corrosion protection thanks to stainless steel and ZnNi coating

Displays / control

FSA / FSK

Fluid level gauges FSA and controls FSK

FSA and FSK are used to check and control the fluid level in a tank. HYDAC offers a variety of sizes and configuration options.

Fields of application include: Machine tools, system engineering, hydraulic, lubricating and cutting oil containers as well as gearboxes.

Customer benefits / advantages

- Simple standardised installation conditions
- Simple, robust, unbreakable
- Can be used in all industrial sectors

Customised System Solutions

Customised and all from one supplier

Thanks to the breadth of their own portfolio and flexible use of external components, HYDAC is able to supply customised system solutions for coolant supply and care.

The assortment ranges from pressure booster stations in valve block design or as a fluid panel to customised individual supply systems.

Process Booster Block PBB

Process Booster Block PBB with conical filter elements

Combines full functionality in a compact system:

- Automatic protection filtration: AutoFilt® RF4
- Pressure monitoring: HYDAC electronic pressure and differential pressure switch
- High-pressure distribution: HYDAC CX coaxial valve
- Pressure control: HYDAC CX CBB valve
- Pressure increase: high-pressure pump – optionally with HYDAC Kinesys frequency converter
- Pressure limiting: HYDAC release valve
- Optional: available with tank
- Optional: available with bayonet fitting

Technical details

Connection size

- Inlet: G 1"
- Outlet, low or high pressure: up to G 1"
- Tank line / back-flush line: up to G ¾"

Flow rate Q_{max}

- 80 l/min

Design pressure p_{min} / p_{max}

- 2 bar / 70 bar

Temperature T_{max}

- 80 °C

Filter material and filtration rating

- Wedge wire: 30 to 1000 µm
- Wire mesh SuperMesh: 25 – 60 µm
- Optional SuperFlush non-stick coating

Housing material

- High-pressure block: aluminium
- Pump case: cast

Application

- Internal cooling supply on machine tools
- High-pressure coolant supply to machine tools

Customer benefits / advantages

- Compact design
- Modular system – standard components
- Simple design and integration into the machine
- Ready for connection unit
- Low space requirements
- Reliable HYDAC valve technology
- Quick and easy error analysis
- Reduced maintenance costs

Fluid panel

A fluid panel is a self-supporting unit which combines all the fluid control components of a machine tool. It includes the cooling, electronics, cooling lubricant, hydraulics and pneumatics.

By using defined interfaces accurately coordinated with the machine tool manufacturer, it is possible to design a subsystem to concentrate all the fluidics for a machine tool in one area.
From the technical calculation, through to the installation including piping and wiring, right up to function testing the unit, HYDAC is your system partner with all the expertise.

Customer benefits / advantages

- Quick and simple installation through the use of defined hydraulic, pneumatic and electronic interfaces (quick release couplings, connectors, etc.)
- Concentration of all the fluidics in the machine → Clearer overview, improved maintenance, simpler error diagnostics
- Machine tool manufacturer has one contact for the different fields: cooling, electronics, coolant, hydraulics and pneumatics
- Everything from a single source – reduces the number of interfaces and minimises number of suppliers

Customised system solutions for coolant supply and maintenance

Digitisation – Your Way to Industry 4.0

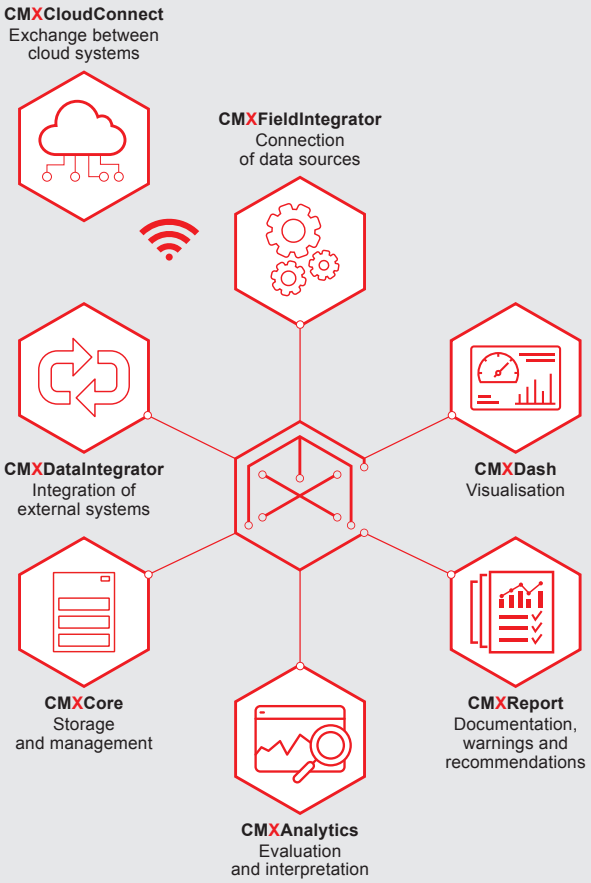
HYDAC CMX for the digitalisation of hydraulic processes

HYDAC CMX “Condition Monitoring and More” is an IoT software scalable from edge to cloud Based on individual modules, CMX provides a modular system for digitising machine functions, states and processes on local servers at the customer’s location or in the cloud.

In addition to sounding malfunction alarms and providing visual representations of machines and production lines, the suite is able to suggest recommended actions and identify potential optimisations. The user can programme their own logic or integrate their own algorithms. Furthermore, specific algorithms, such as anomaly detection module, are available.

CMX undergoes constant development - especially in terms of responding to customer requirements.

Diverse possibilities with CMX modules



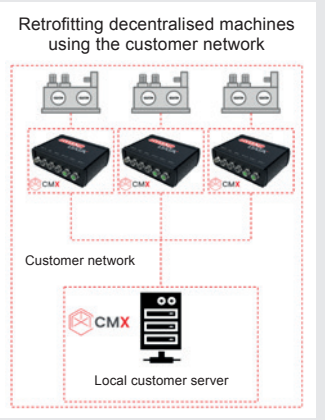
No time-consuming installation – easy-to-use

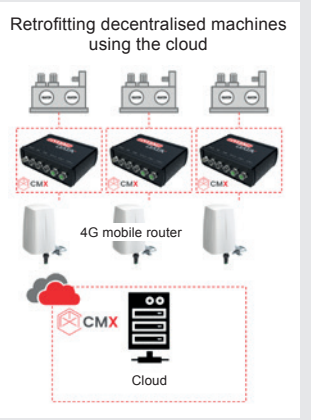
Our edge-computing solution “HYDAC DATA+”, together with the HYDAC CMX software, offer you a simple way to connect sensors and machine control units and therefore start intelligent data use.

Simple set-up
The CMX software is pre-installed on the edge computer and is accessible via the web server – no additional installation is necessary.

Open interfaces
The software can easily be integrated into other systems thanks to the programming interface. Common interfaces are supported at the field level, such as Modbus TCP or OPC-UA.

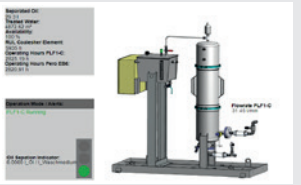
Integration into the customer’s network or in the cloud
The system can be integrated into the existing customer network as well as a cloud solution.

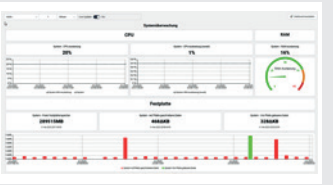




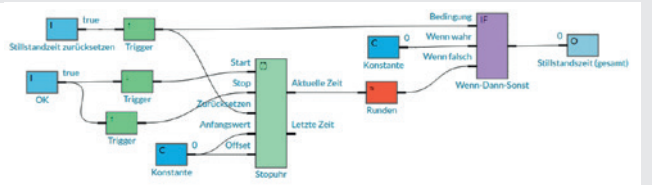
Production at a glance

Easy set-up of dashboard thanks to pre-made display elements / widgets, progress bar, tachometer, graph, etc.





Creation of KPIs using graphic programming (such as downtime of a machine)



Creation of complex calculations using JavaScript Editor, e. g. hysteresis for threshold value

Fluid Engineering – Everything from a Single Source

For over five decades, HYDAC has been working on solutions to extend service life and protect components. HYDAC is responsible for a large proportion of the cooling, energy storage and filtration of fluids used in production, including hydraulic, lubrication and testing oils, cleaning fluids and cooling lubricants. Filtering, cooling and fluid monitoring are vital factors in making fluids last as long as possible and thus to increasing machine and system availability. HYDAC - your reliable partner for expertise in production.

Reduced power consumption and CO_2 emissions due to

- Variable-speed drive systems and hydraulic start / stop technology
- Energy-efficient machine cooling and heat recovery
- Optimised components and systems (e. g. hydraulic accumulators, filters and filter elements, ball valves, armatures and valve manifolds)

Reliable production processes and product quality due to

- Optimisation of industrial part washers and cleaning processes (e. g. filtration concepts)
- Services for technical cleanliness (e. g. process chain analysis, laboratory service, mobile laboratories, training, consulting)
- Products and devices for the technical cleanliness of components and systems (e. g. extraction units, flushing rigs)

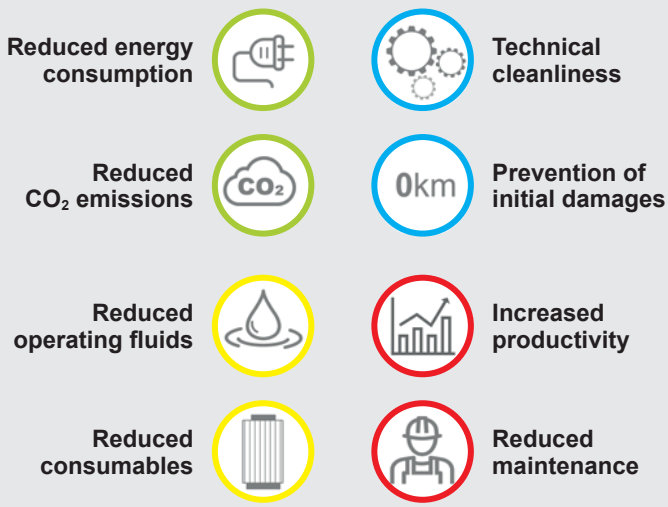
Extended service life of fluids and wear parts due to

- High quality and specific filters and filter elements for a wide variety of applications
- Repair and conditioning of fluids (e. g. removing varnish, dewatering and degassing fluids)
- Expert fluid analyses (oils, water, coolants, cleaning media, diesel and gases) and fluid optimisation of systems

Increased system availability and increased productivity due to

- Sensors for monitoring fluids (e. g. particle contamination, oil condition, pressure, temperature, distance measuring systems)
- Mobile and stationary measuring and display devices for condition monitoring of systems
- Maintenance contracts and service concepts

Cost savings and economic efficiency thanks to

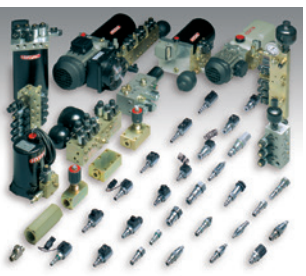


Accumulator Technology 30.000

Filter Technology 70.000

Process Technology 77.000

Filter Systems 79.000



Compact Hydraulics 53.000

Accessories 61.000

Electronics 180.000

Cooling Systems 57.000

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Local Expertise.
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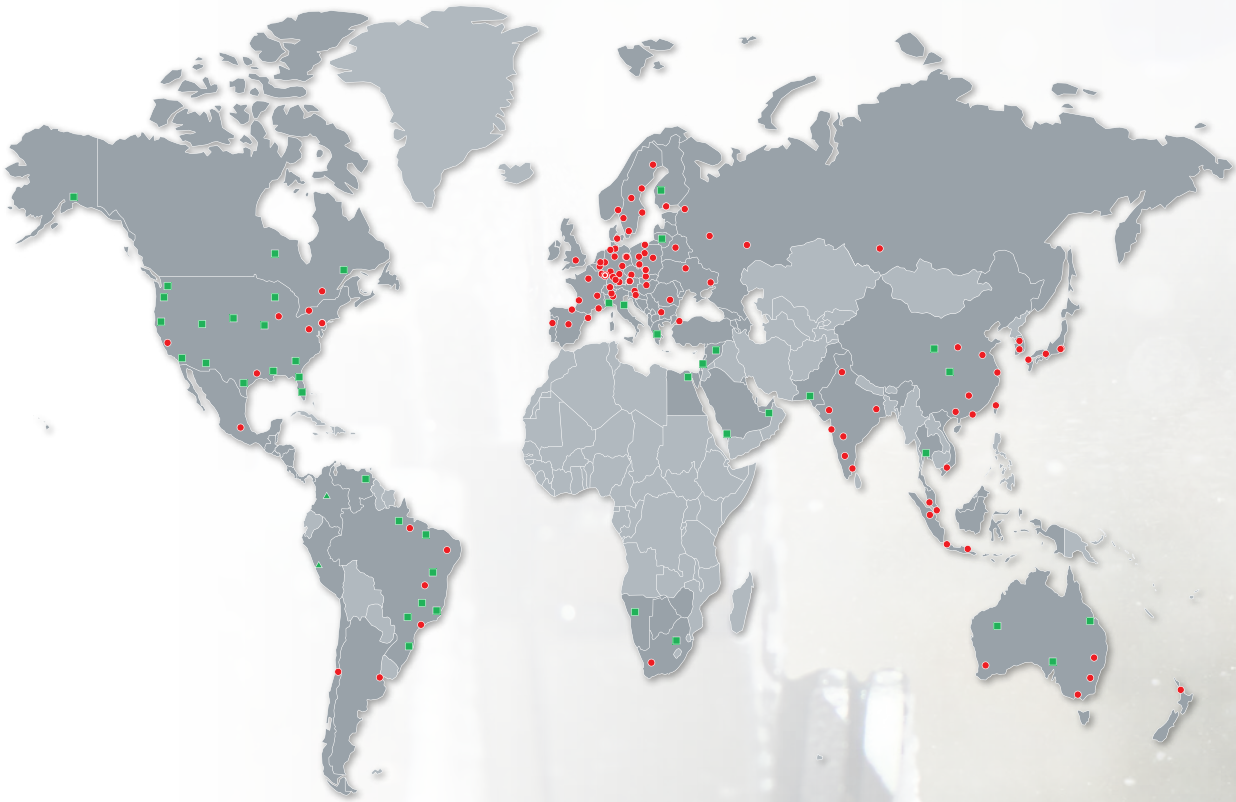

- HYDAC Headquarters
- HYDAC Companies
- HYDAC Sales and Service Partners
- Free Sales Partners

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Note

The information in this brochure relates to the operating conditions and applications described. For applications and/or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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