



active
Water treatment

Safe production with
clean water

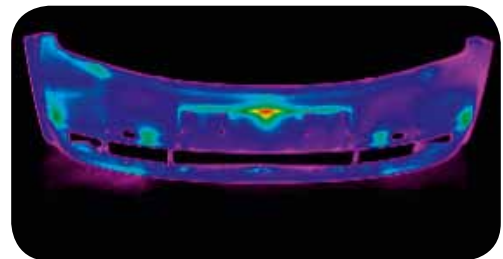
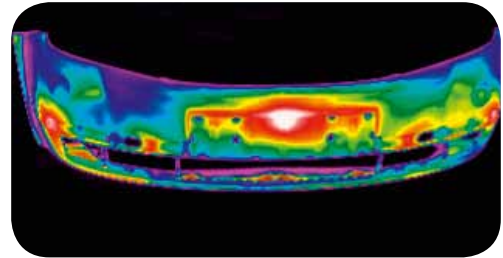


Water quality – key condition for efficiency



Improved product quality

Temperature conditioning and cooling have a decisive influence on the quality of moulds. Homogenous temperature distribution is a condition for good mechanical and optical qualities. Strict measurement tolerances can only be ensured by even cooling. Due to its superior characteristics for heat transfer, water is the most widely used medium for temperature conditioning and cooling. However, pollution in the water settles on the heat-exchanging surfaces in the water circuit, which results in inhomogeneous temperature distribution. Increased pollution decreases the quality of the moulded part; in the worst case, the product becomes useless. It is therefore important to ensure permanently good water quality.



Infrared images of a moulded part before and after cleaning of heating and cooling channels in the mould. The increase of productivity was equivalent to 2.500 production hours p.a.

Increased productivity

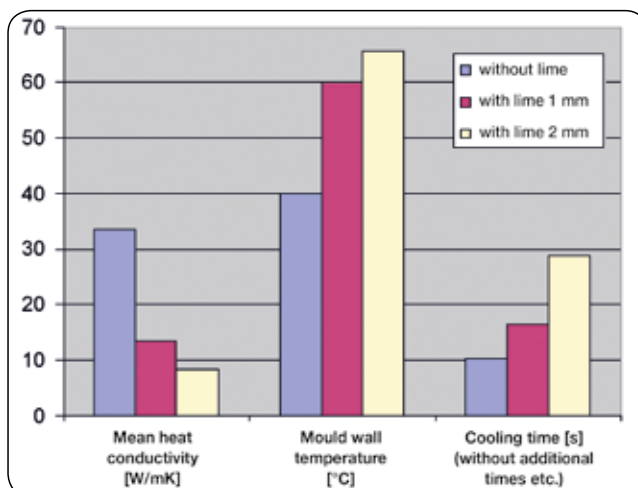
Dirty cooling channels also slow down the cooling process of the moulded part. Formation of heat insulating layers results in a partial increase of the temperature in the mould wall, and therefore in a longer cooling time in the mould areas concerned. The cooling time for the overall product depends on maintaining stable dimensions and the non deformation of these segments ensuring the shortest cycle time. In practise, the pro-

longation of the cooling time often happens gradually. Necessary service intervals become shorter, lowering productivity even further. Cleaning of the cooling circuits and proper care of the water will re-establish maximum productivity.

Reduced costs

Dirty water in cooling circuits causes enormous costs for personnel and means of production, which are clearly reflected in the cost per piece of the produced products. Permanent monitoring and conditioning of the water keep cooling times at the lowest possible level, the number of rejects is reduced and operating and maintenance costs are minimized. The investment for this is low, compared to the effect and will be amortized after a short time.

Deposits on the walls of the cooling channel reduce heat transfer and cause increased mean mould wall temperature. As a result, cooling time is increased, which results in a significant decrease of productivity.



Equipment and technical data

active mk

- Automatic top up unit
- Reverse osmosis system for demineralisation of the top up water (module 1)
- Separate hydraulic circuits (for two-circuit version)
- Partial flow filter system with automatic flushing for removal of undissolved particles in the water
- Dosing station for corrosion protection and biocide
- Corrosion measurement line with metal pieces for visual monitoring of the corrosion behaviour of the metals used in the cooling system: Blank steel, copper, aluminium (modules 2 + 3)
- Conductivity measuring to monitor the quality of the circuit water (modules 2 + 3)
- Conductivity measuring to monitor the quality of the demineralisation of the top up water (modules 2 + 3)
- pH-value measuring to monitor the circuit water (modules 2 +3)
- Softening of the top-up water (module 4)
- Monitoring of the top up water hardness (module 5)

active mini

The **gwk active mini** offers the same scope of functions as the **gwk active mk**. Due to its very compact design, this type refrains from a modular construction.

- Automatic top up unit
- Demineralisation by ion exchange
- Partial flow cartridge filter to remove undissolved particles in the water
- Dosing station for corrosion protection and biocide
- Corrosion measurement line with metal pieces for visual monitoring of the corrosion behaviour of the metals used in the cooling system: iron, copper, aluminium
- Conductivity measuring to monitor the quality of the circuit water
- Conductivity measuring to monitor the quality of the demineralisation of the top up water
- pH-value measuring to monitor the circuit water



active		mini	mk 100-1	mk 100-2
Top up water supply	l/h	up to 1.200	250	250
Top up water capacity*	m ³	max. 5.5	-	-
Water hardness top up water**	°dH	-	< 15	< 15
Filter pump capacity	m ³ /h	7	11	22 (2 x 11)
Number of cooling circuits	Number	1	1	2
Dimensions: width x length x height footprint	mm m ²	1,500 x 800 x 1,540 2.7	2,100 x 1,170 x 1,850 4.6	2,750 x 1,170 x 1,850 5
Electrical system: voltage power consumption	V/50 Hz kW	380 - 400 0.3	380 - 400 1.0	380 - 400 1.5
Hydraulic connections:				
Top up water		Rp ¾"	Rp ¾"	Rp ¾"
Supply		40 DN	40 DN	40 DN
Return		40 DN	40 DN	40 DN
Drain		Rp ¾"	40 DN	40 DN

*) Capacity in relation to untreated water hardness of approx. 10°dH (1.8 mmol/l)

Subject to technical modification without notice!



gwk active-mk 100-1:
The compact system for cleaning and conditioning of cooling water for single-circuit cooling systems.

active mk – Modular water processing

active-mk by **gwk** incorporates almost all processes for processing, conditioning and care of top up and circuit water for open and closed heat transfer systems in one appliance. The series is adjusted to the requirements of different cooling systems in terms of technical design and performance.

Modular structure:

The system is used for preparing, conditioning and servicing cooling water in semi-closed heat transfer systems.

The modules are set up as five functional units:

1. Conditioning and service for circulating water
2. Preparation of top up water
3. Control of circulating water condition and quality
4. Water softening
5. Water hardness control

The basic module contains the basic functions for optimal conditioning and servicing of circulating water. The optional modules achieve an improvement of the top up water quality as well as circuit water quality. In addition the quality of top up and circuit water can be monitored and controlled.

active-mk 100-1

The **active-mk 100-1** is designed for cleaning and servicing of a single circuit cooling system.

The basic module, installed in a stable casing with central control cabinet contains the following functional units:

- One filter unit
- One top up system
- One level monitoring
- One water conditioning with biocide and corrosion protection.

active-mk 100-2

The **active-mk 100-2** is designed for cleaning and servicing of a dual-circuit cooling system.

The basic module, installed in a stable casing with central control cabinet contains the following functional units:

- Two filter units
- One top up system
- Two level monitoring systems
- Two water conditioning systems with biocide and one with corrosion protection



gwk active-mk 100-2:
compact system for cleaning and conditioning of cooling water for dual-circuit cooling systems

active mk –

Functions of the basic module

Cooling water cleaning

Decaying biological material as well as corrosion products which get into the cooling water from the production process during mould changes pollute the cooling water circuit.

gwk active-mk is therefore equipped with a filter system. The filter system operates on a partial flow basis. A pump operating independently of the operating and cooling water pumps draws the circuit water from the cooling water container and transfers it via a flush filter back into the tank. The filtration of the circuit removes undissolved matter and the cooling water remains clean all the time. The filter back flushes automatically when the degree of pollution is high and cleans itself.

The dual-circuit system **active-mk 100-2** is equipped with two filtration units.



The advantages of mechanically clean water are obvious:

- Electro-chemical (galvanic) corrosion through deposits of metal particles is drastically reduced.
- Dosing of corrosion inhibitors, intended to protect metallic surfaces from alien particles is reduced.
- Clean water offers little food for germs and bacteria thus reducing the amount of biocide to be dosed.
- Dosing of dispersers to prevent deposits of undissolved matter is not necessary.

Automatically dosed biocide dispensing

To suppress and fight biological growth, **gwk active-mk** is equipped with a dosing station for biocide. The biocide is dosed into the circuit water in low concentrations and suppresses the growth of algae and mucilaginous bacteria. The decayed biological material leaves the heat-transferring surfaces in the shape of brown-grey flakes and is carried away by the circuit water. Controlled addition of a low dose of biocide prevents cost-intensive bulk dosing.

gwk water technology provides biocides for economically and ecologically optimal disinfection.

Dosing of corrosion protection

Due to the metallic agents contained in temperature-control and cooling circuits and due to the gases and acids in the water it is necessary to address the risk of corrosion, especially when water temperatures are high, by dosing a suitable corrosion protection agent. "**active-mk**" fulfils this task automatically in the basic module.

As top up water is added to the cooling water containers corrosion protection is fed proportionately in order to minimize the corrosive properties.

gwk water technology provides inhibitors for optimal corrosion protection.



active – additional modules

Module 1: Reverse osmosis

Water demineralisation

Independent from the quality of the top-up water available, provided it is water with a quality that corresponds to the German Drinking Water Ordinance and with a water hardness of $< 15^\circ \text{dH}$ (2,7 mmol/l), the **gwk active mk** desalts the water and provides an optimal demineralized top-up water (for hardness degrees $> 15^\circ \text{dH}$ an external softening unit (DWS series) can be added to the **active mk**). This way the problem of mineral deposits in the cooling system is solved from the beginning. By adding a finely dosed corrosion inhibitor to the raw water, the long-term function of the installed components is supported.

As soon as the minimum filling level in the external cooling water container is reached, the solenoid valve for top up opens. Top up water flows through a fine screen and is then de-salted by reverse osmosis. If there are no level switches that can be used for controlling the **active-mk** they should be retro-fitted.

Functional principle of reverse osmosis

Osmotic pressure is the driving force that helps to create equilibrium between two solutions of different concentration through a semi-permeable membrane. The membrane is structured in a way that water molecules can pass, leaving the dissolved salts of the solution behind whilst clean salt free water can pass. This process can be reversed by employing higher pressure on the side of the higher concentration than would be equal to the osmotic pressure of this solution. The process is called “reverse osmosis”. The concentrate generated is fed into the channel at a 1 : 3 ratio or conducted back into the de-salting process. The de-salted water (permeate) is fed back into the cooling container. When the max. filling level is reached the top up valve closes.

If in case of greater water loss the dry running protection is triggered, on standby the cooling water tank will be directly filled up via an emergency top up without osmosis. Nevertheless, corrosion protection is added in dependence of the quantity. The emergency top up system is also activated when the active is on standby.



Dosing station for softening, biocide dosing and corrosion inhibitors

Module 2: Measuring and regulating technology

The module for measuring and regulating technology is responsible for process monitoring and visualization. It consists of the following components:

- Corrosion control path
- Measuring of pH-value in the filter circuit
- Measuring of conductivity in the osmosis and filter circuit

The measured values are displayed in the compact regulator where they are also controlled.

When the conductivity is too high the filter system is triggered and the system is back-washed. In a corrosion control path the condition of the cooling water is visually checked.

Module 3:

For the dual-circuit system **active-mk 100-2**, the number of the components of module 2 is doubled. This ensures individual monitoring of both circuits.



Module 4:

The top-up water requires softening in order to protect the reverse osmosis membrane. If there is no central water softening unit on site, module 1 has to be combined with module 4.

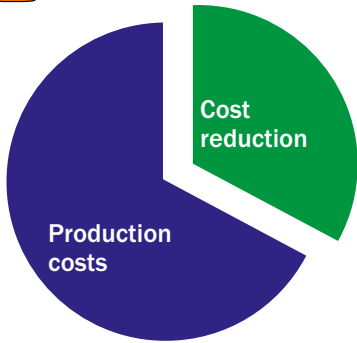
If the hardness of the top-up water exceeds 15° dH (2.7 mmol/l) a softening system, e.g. a gwk DWS softening unit must be connected upstream.

Module 5:

In order to guarantee the longterm functionality of the reverse osmosis membrane, module 4 can be extended by module 5 – water hardness control – for additional control.

Module 5 also serves for function control of module 4, in case the hardness degree on the top water shows major deviations.

gwk Perfect Cooling and Temperature Control



Increased productivity

In many areas of the industry, cooling and temperature control provides a great potential for increasing productivity and thus for lowering costs.

Many factors serve to improve productivity:

- Reduction of cooling time, therefore savings in required machine hours
- Improvement of product quality
- Increasing availability of production plants
- Decreasing running cost
- Reduction of maintenance cost



gwk-integrat 4D

Optimal product quality through homogeneous temperature distribution with close-to-cavity cooled mould inserts.



gwk-HSW

Cost reduction by means of advanced heat recovery systems.



gwk-system integrat

Increase of productivity by means of specific and segmented control of the mould cooling.



gwk-hermeticool hybrid

Innovative cooling system to decrease the running and maintenance cost in comparison to conventional cooling systems.



gwk-teco cw

Most economic system to extract heat from consumers at very low temperatures by patented cold water temperature control.



gwk-KU-plants

The simplest and cheapest solution to increase the availability and to decrease the maintenance cost of open cooling systems.



gwk-teco cs

The universal solution for standard applications in the temperature range up to 160 °C. Provides efficient options for continuous process monitoring.



gwk-moldclean

Increased productivity through effective, automatically controlled cleaning of heat exchange surfaces in cooling and temperature controlled circuits.



gwk-SKL/SKW

Reliable and economic supply of cooling water in the low temperature range, even under the toughest ambient conditions.



gwk-service

Decreasing the maintenance cost and protection of company owned resources through professional installation and service including maintenance of cooling water.

gwk