Mechanical Limiters

For the Economical Utilization of
Cooling Water and Pressurized Hot Water

Engineering steam performance

GESTRA
Mechanical Limiters

GESTRAMAT CW cooling-water control valves and KALORIMAT BW return-temperature control valves ensure maximum, efficient use of cooling water and hot water. In many cases, these two special valves are just as effective as more complicated solutions with mechanical or electrical temperature control systems.

CW cooling-water control valves ensure the cooling water or solution in cooling circuits absorbs the heat that is to be discharged up to the set or maximum possible discharge temperature. Enabling the cooling water or solution to take on an optimum amount of heat dramatically reduces consumption. What's more, in larger networks with several parallel heat exchangers, the avoidance of short circuits improves coolant distribution.

Return-temperature control valves type BW ensure the uniform distribution of the hot water or thermal oil throughout the system by automatically adapting their pressure drops to the temperature requirements of the heat exchangers and thereby balancing the system.

GESTRA cooling-water control valves type CW and return-temperature control valves type BW are self-acting valves which are virtually maintenance-free. They have proven themselves for many decades in hundreds of plants. (Examples of application see pages 4 and 7)

Contents

Cooling-Water Control Valves GESTRAMAT CW

Purpose

GESTRA cooling-water control valves are self-acting proportional controllers requiring virtually no maintenance. They regulate the cooling-water flow as a function of the discharge temperature, and reduce the cooling-water consumption to a minimum. The discharge temperature can be individually adjusted with the setting key. A detailed description of the operation of the CW 41 is given on page 5.

Advantages

The cooling-water control valves keep the discharge temperature of the cooling-water at the max. permissible value. The discharge temperature is sensed by the integral thermostat, the valves do not open unless the preset discharge temperature is reached. Cooling is effected with minimum water consumption. The following advantages result:

- Savings in water costs
- Reduced pumping costs
- Reduced costs for water treatment
- Smaller pumps, pipelines, valves and fittings
- Extension of existing systems without increasing pump and cooling tower capacity

Besides savings in operating costs, investment and maintenance costs are also reduced. GESTRA cooling-water control valves automatically balance the system by adapting their flowrates to the process requirements. Short-circuiting is prevented.

Example of savings obtained with a CW

Heat capacity of a cooler
$Q = 2 \cdot 10^5$ J/s (= 2000 kW).

Cooling-water inlet temperature $t_i = 10°C$, outlet temperature $t_{o1} = 15°C$.
Water consumption

$$m_1 = \frac{Q}{cp\,(t_{o1} - t_i)} = \frac{2 \cdot 10^5 \cdot 3600}{4187\,(15-10)}$$

$= 34392$ kg/h $= 34.4$ m³/h

(where cp = specific heat of water = 4187 J/kg K)

After fitting a CW set to discharge at a temperature of $t_{o2} = 28°C$ the flow rate is reduced to

$$m_2 = \frac{2 \cdot 10^5 \cdot 3600}{4187\,(28-10)}$$

$= 9.553$ kg/h $= 9.5$ m³/h

The savings are 72.4%!

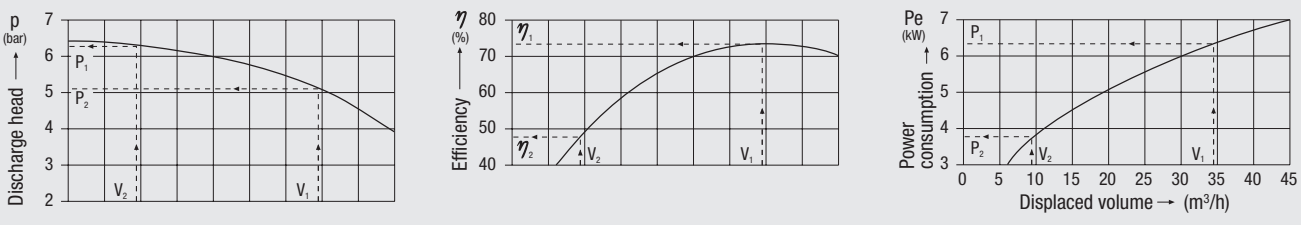
In addition to the water savings, pumping costs are also reduced. In the above example the power consumption of the pump before installation of a CW was 6.5 kW, after installation of a CW only 3.5 kW.

This means 46.2% of savings in pump energy.

The valves pay for themselves in a very short period, lying between a few days and three months.

Cooling-water control valve GESTRAMAT CW 44, PN 25, 3/8“, 1/2“, 3/4“, 1“

Cooling-water control valve GESTRAMAT CW 41, PN 16, DN 25, 40, 50, 80, 100 mm (1“, 1 1/2“, 2“, 3“, 4“)



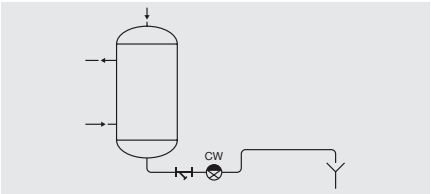
Savings in cooling water and pump energy by increasing the cooling-water discharge temperature.

Cut the Cost of Water and Power

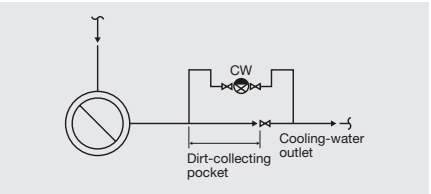
Cooling-Water Control Valves GESTRAMAT CW

Examples of Application

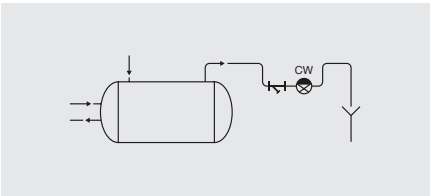
GESTRA cooling-water control valves are used downstream of any cooling surface, such as condensers, air and oil coolers, coils in induction furnaces, chemical baths, compressors and cold-storage houses. For brine circuits down to –37°C special designs are available (code letter “k”).



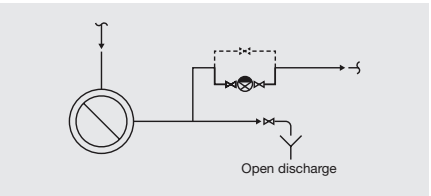
Application downstream of a counter-flow cooler



Installation in a bypass, closed system

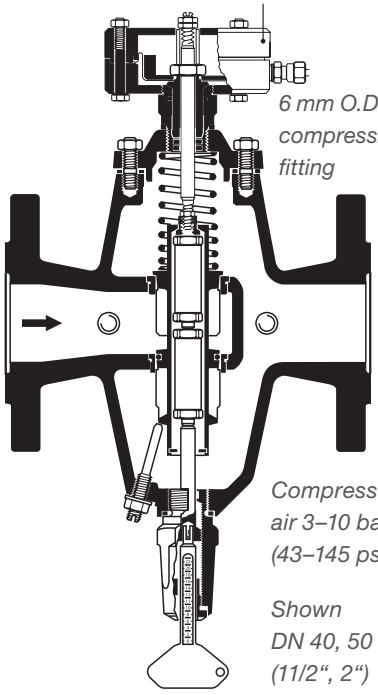


Application downstream of oil cooler



Installation in a bypass, open discharge

Diaphragm actuator complete with cover



Available Designs, Technical Data

Cooling-water control valves	CW 44	CW 44 k	CW 41		
Nominal sizes (DN)	3/8“, 1/2“, 3/4“, 1“ BSP		25 (1“)	40, 50 (1 1/2“, 2“)	80, 100 (3“, 4“)
Nominal pressure (PN)	25	25	16	16	16
Max. pressure barg (psig)	25	25	16	16	16
Max. diff. pressure bar (psi)	16	16	6	6	6
Adjustable outlet temperature	–2 °C to 106 °C	–37 °C to 71 °C	depending on thermostat/ cone combination 20 °C to 60 °C 3 °C to 100 °C –32 °C to 74 °C		

Cooling-water control valve MCW 41 with diaphragm actuator for dirt-charged cooling systems

All cooling-water control valves can be retrofitted with a diaphragm actuator (MCW 41). The MCW 41 ensures trouble-free operation also with untreated cooling water, e.g. river water.

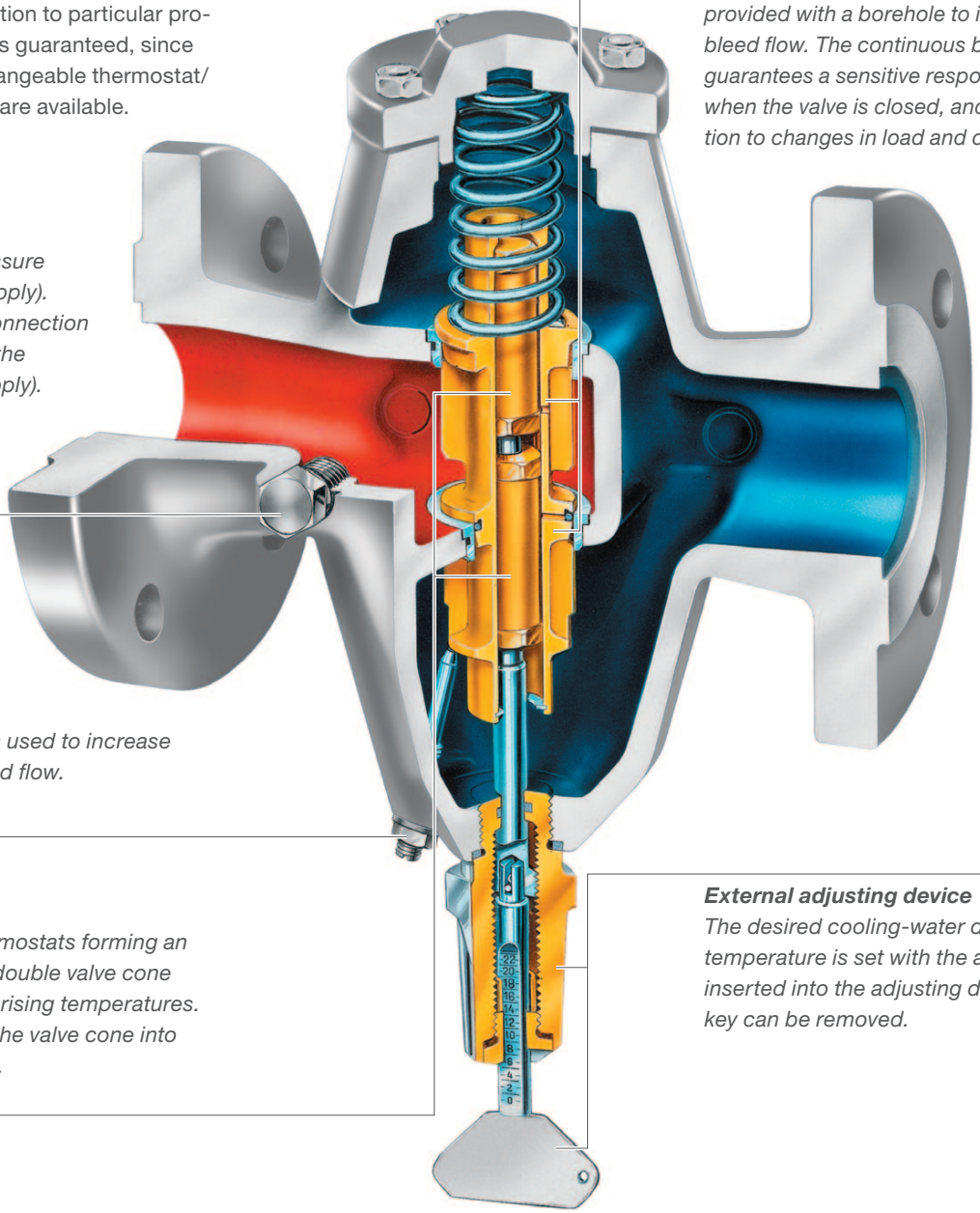
All dirt accumulations are purged by actuated opening of the valve. The operation of the pneumatic actuator can, for example, be effected from a control room.

Design and Operation

The valves are available in all standard sizes, so that they can be easily installed, also into existing systems without the necessity of modifying the pipe layout. An optimum adaptation to particular process requirements is guaranteed, since six different interchangeable thermostat/cone combinations are available.

Shut-off
A balanced double valve cone is used as closing unit. The upper cone closes tight, while the lower one is designed with a tolerance to form a leak passage or is provided with a borehole to increase the bleed flow. The continuous bleed flow guarantees a sensitive response, even when the valve is closed, and rapid reaction to changes in load and during start-up

Connections
Connection for pressure gauge (standard supply). Not represented: connection for thermometer in the outlet (standard supply).



Setting screw
The setting screw is used to increase the continuous bleed flow.

Thermostats
The solid-state thermostats forming an integral part of the double valve cone open the latter with rising temperatures. The spring pushes the valve cone into the closing position.

External adjusting device
The desired cooling-water discharge temperature is set with the adjusting key inserted into the adjusting device. The key can be removed.

Optimum Utilization of Heat Energy

GESTRA Return-Temperature Control Valves BW

Purpose

Economic operation of a heating system depends to a large extent on an optimum flowrate through each heater and an efficient utilization of the heat content of the heating fluid. GESTRA return-temperature control valves were specially developed for this purpose in hot-water and thermal-oil heating systems.These self-acting control valves, requiring no maintenance, maintain constant return temperatures within their proportional range. The valves are set at our works to the desired closing temperature. On request an external adjusting device with graduated scale can be supplied.

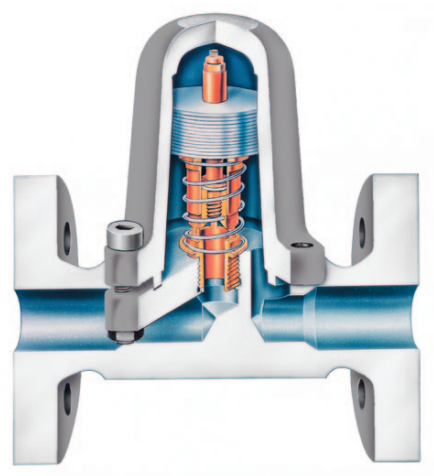
The integral thermostat of the valve senses the temperature of the heating fluid and moves the valve sleeve to regulate the flow, i.e. with rising temperatures the sleeve is moved towards the closed position (reduced cross-sectional area), with falling temperatures towards the open position (enlarged cross-sectional area).

The different pressure drops across each heat exchanger are balanced by the BW, so that pressure, quantity and temperature are always properly distributed throughout the system. System-balancing is superfluous. A uniform distribution of the heating fluid is guaranteed, insufficient heating or overheating of heat exchangers at the end of the system are prevented, as is short-circuiting.

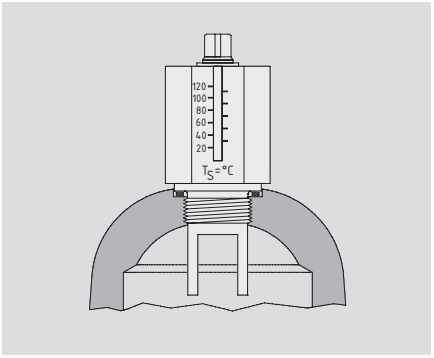
Advantages

Heat exchangers are quite frequently oversized. New systems equipped with return-temperature control valves can be sized smaller, so that operating costs are considerably reduced. But also in existing systems savings can be obtained by equipping the heat exchangers with BW. The resulting optimum flow distribution, the prevention of short-circuits and the reduction in pumping energy ensure that the valves pay for themselves within a short period. Existing systems can often be extended without increasing the pump size or modifying the piping system.

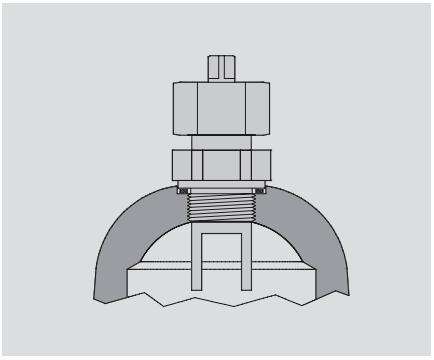
The installation of the return-temperature control valves is very easy. The valves are supplied in standardized overall lengths to DIN.



Return-temperature control valve CALORIMAT BW 31, BW 31a, PN 25, DN 15, 20, 25 mm (1/2“, 3/4“, 1“)



External adjusting device for BW 31, DN 15–40 mm (1/2–1 1/2“)



External adjusting device for BW 31a, DN 15–40 mm (1/2–1 1/2“)

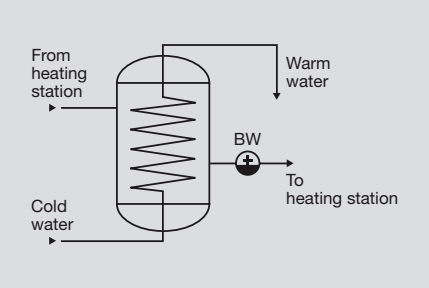
Return-Temperature Control Valves KALORIMAT BW

Examples of Application

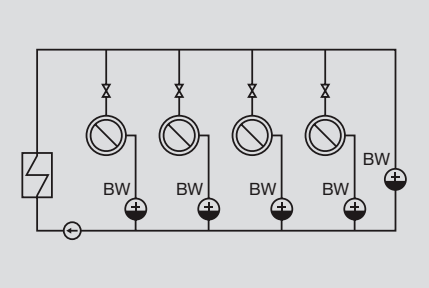
GESTRA return-temperature control valves are used in hot-water or thermal-oil heating systems, in particular heating systems of large factories, for tracing systems, etc. Further applications: air heaters, any heat exchanger heated with hot-water or thermal oil, such as washing baths, chemical or galvanic baths, hot-water vessels, etc. One particular application: temperature control of thermal-oil heated moulds for forced drying of precast concrete parts.

Available Designs, Technical Data

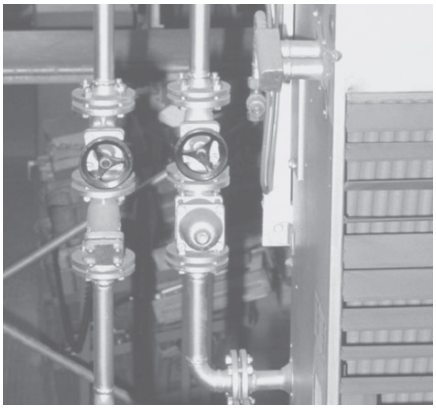
Return-temperature control valves	BW 31	BW 31A
Nominal sizes (DN)	15–40 mm (1/2–1 ½“)	15–40 mm (1/2–1 ½“)
Nominal pressure (PN)	25	25
Max. pressure barg (psig)	22 (230)	17
Max. differential pressure bar (psi)	6 (85)	6 (85)
Max. temperature of feed circuit	180 °C	320 °C
Adjustable closing temperatures (according to size)	20 - 130 (110) with adjusting device: 60 (20) - 130 (75)	120 (100) - 270 (280) with adjusting device: 90 (25) - 270 (85)
Heating fluid	Hot water	Thermal oil



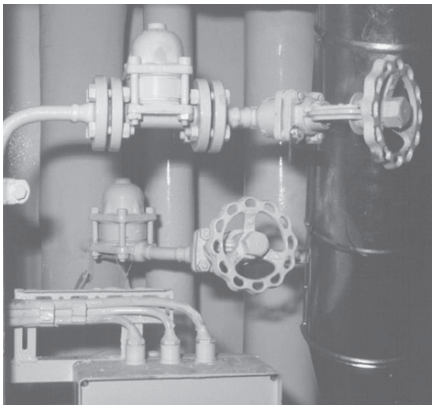
Installation in the outlet line of water heater



Installation in a system with parallel heat exchangers



BW installed downstream of an air heater (space heating)



Tank-heating system equipped with BW on an ore carrier

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