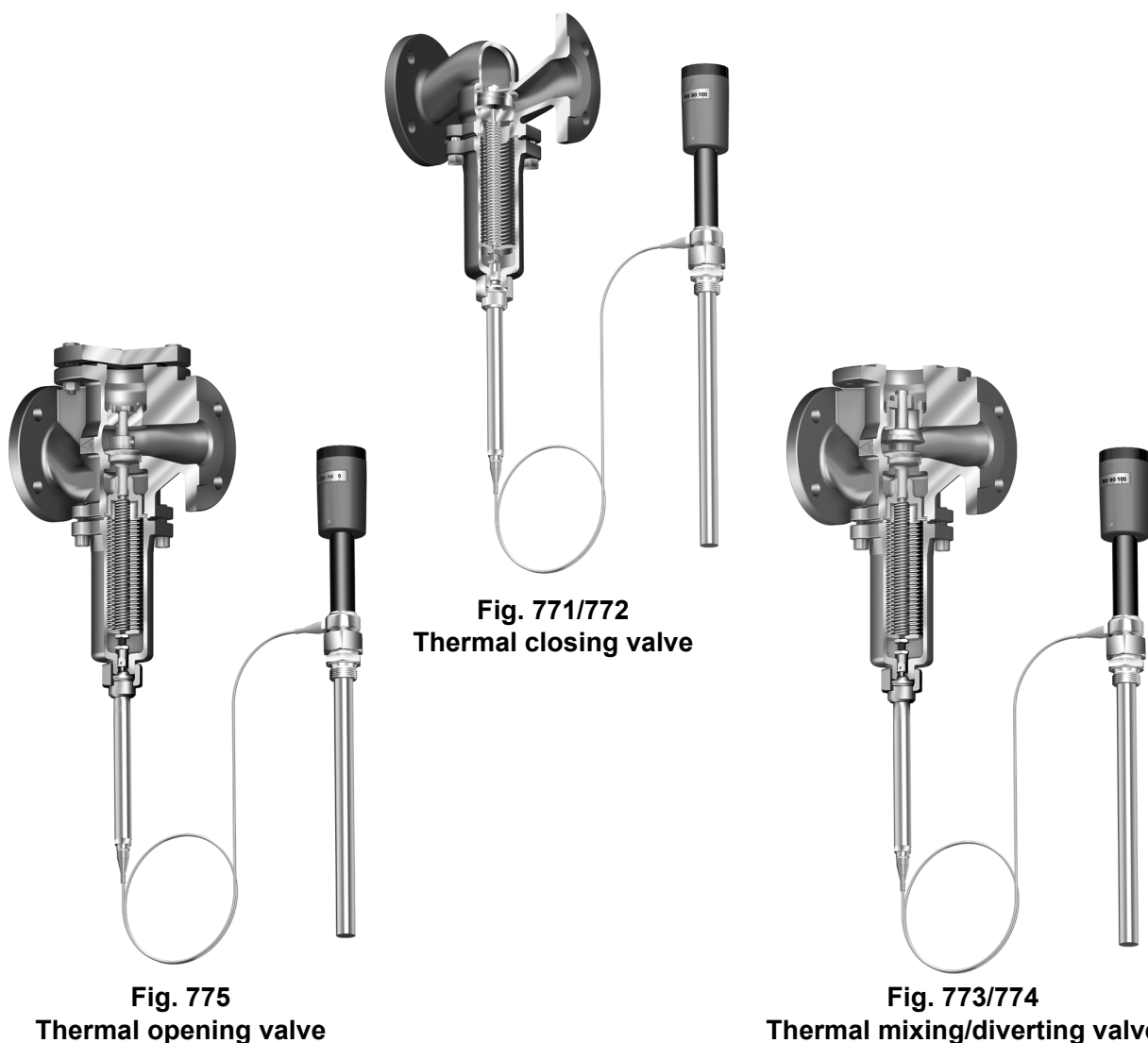


Operating and installation instructions

Temperature regulator TEMPTROL®



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1.0 General information on operating instructions

These operating instructions provide information on mounting and maintaining the fittings. Please contact the supplier or the manufacturer in case of problems which cannot be solved by reference to the operating instructions.

They are binding on the transport, storage, installation, start-up, operation, maintenance and repair.

The notes and warnings must be observed and adhered to.

- Handling and all work must be carried out by expert personnel or all activities must be supervised and checked.

It is the owner's responsibility to define areas of responsibility and competence and to monitor the personnel.

- In addition, current regional safety requirements must be applied and observed when taking the fittings out of service as well as when maintaining and repairing them.

The manufacturer reserves the right to introduce technical modifications at any time.

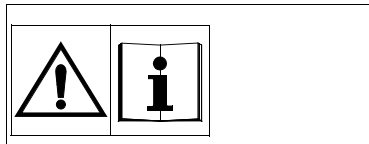
These Operating Instructions comply with the requirements of EU Directives.

2.0 Notes on possible dangers

2.1 Significance of symbols



Warning of general danger.



Non-compliance with operating instructions is dangerous!
Read the operating instructions before installation, operation, maintenance or disassembly and adhere to them strictly.

2.2 Explanatory notes on safety information

In these Operating and Installation Instructions dangers, risks and items of safety information are highlighted to attract special attention.

Information marked with the above symbol and "**ATTENTION !**" describe practices, a failure to comply with which can result in serious injury or danger of death for users or third parties or in material damage to the system or the environment. It is vital to comply with these practices and to monitor compliance.

All other information not specifically emphasised such as transport, installation, operating and maintenance instructions as well as technical data (in the operating instructions, product documentation and on the device itself) must also be complied with to the fullest extent in order to avoid faults which in turn can cause serious injury to persons or damage to property.

3.0 Storage and transport

**ATTENTION !**

- *Protect against external force (like impact, vibration, etc.).*
- *Valve mountings such as actuator, capillary tube, bonnets, temperature sensors must not be exposed to external forces, e.g. they are not designed for use as climbing aids, or as connecting points for lifting gear.*
- *Suitable materials handling and lifting equipment should be used.*
Refer to catalogue sheet for weights.

- At -20°C to +65°C.

- The paint is a base coat to protect against corrosion during transportation and storage. Do not damage paint protection.

4.0 Description

4.1 Scope of applications

Temperature regulators are used for „regulating the temperature of fluids, air or steam used in heating and ventilation systems for industrial or residential applications, ocean going vessels and also in cooling systems“ and complies to type of operating mode 2B acc. to DIN EN 14597.

**ATTENTION !**

- *Refer to the data sheet for applications, limits on use and possibilities.*
- *Certain media require or preclude the use of special materials.*
- *The valves are designed for standard operating conditions. If conditions exceed these requirements, e.g. aggressive or abrasive media, the operator should state the higher requirements when ordering.*
- *Valves made from grey cast iron are not authorised for use in systems subject to TRD 110.*

The information complies to the Pressure Equipment Directive 97/23/EC.

It is the responsibility of the machine planner to ensure compliance.

The special markings on the valve must be taken into account.

Refer to the catalogue sheet to see which materials are used in standard versions.

Please contact the supplier or the manufacturer if you have any questions.

4.2 Operating principles

The temperature regulator TEMPTROL® is a self acting proportional controller for temperature of fluid, gas and vapour media of Fluid Group I pursuant to Pressure Equipment Directive 97/23/EC. No auxiliary energy is needed.

The temperature regulator is a combination of controller and valve and is working acc. to the principle liquid expansion by changing temperatures.

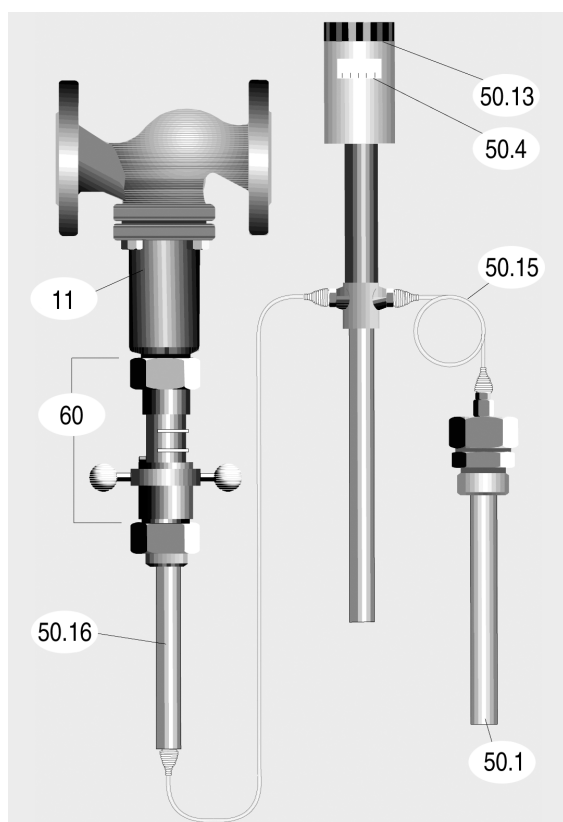
- **Thermal closing valves** reduce the flow with rising sensor temperature (heating application).
- **Thermal opening valves** raise the flow with rising sensor temperature (cooling application).
- **Thermal mixing valves** mix 2 flows (inlet A and inlet B to outlet AB).
- **Thermal diverting valves** divert one flow into 2 flows (AB to A and B).

Mixing/diverting valves open inlet A and closes inlet B with rising temperature.

Valves are available in several materials for specific media e.g. heating water, steam, thermal oil, coolant water (other media available on request).

- **Thermal detectors** acc. to DIN EN 14597 can only be adjusted to the intended value with tools.

4.3 Diagram



4.3.1 Parts

Pos.	Designation
11	Bonnet (valve)
50.1	Sensor
50.4	Set-point indicator
50.13	Indicator unit
50.15	Capillary tube
50.16	Actuator
60	Manual control device (accessory)

Fig. 1: : Illustration of closing valve Fig. 771 with controller type 990038604 and manual control device (for other controller types refert to data sheet)

4.4 Technical data - remarks

for example

- Principal dimensions

- Pressure-temperature-ratings, etc. refer to data sheet.

Valve

Nominal diameter:	DN 15 - DN 100
Pressure class:	PN 16 / 25 / 40
Body material:	EN-JL1040, EN-JS1049, 1.0619+N, 1.4408, CC491K, SA105
Temperature - valve:	acc. to pressure-temperature table refer to data sheet: max. 150 °C without cooling spacer (Fig. 771, 775, 773) max. 300 °C with cooling spacer (Fig. 772, 774, 776)
Disc seal:	Metal

Thermal controller / Detector

Setting range:	-20 ... +50°C 0 ... +70°C +30 ... +100°C +60 ... +130°C +130 ... +200°C Excess temperature: for short time max. 30K
Ambient temperature:	max. +70°C for indicator unit (DIN EN 14597 „T70“)

Sensor pocket

	<u>Brass</u>	<u>Stainless steel</u>
Pressure:	max. 25 bar	max. 40 bar
Temperature:	max. 130 °C	max. 250 °C

Approval

TÜV-certified acc. to DIN EN 14597
Reg. No. TR91006 / TW91106

For all necessary project planning data, refer to data sheet (acc. to DIN EN 14597 table BX); e.g. Kvs-value, lengths of sensor pocket, max. operating ranges pressure/temperature, etc.

4.5 Marking

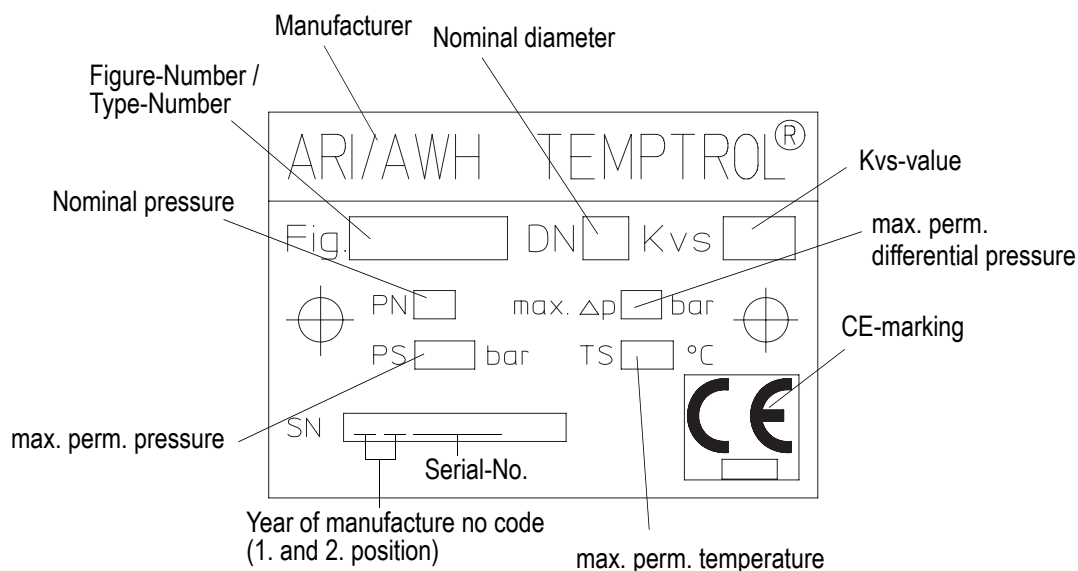


Fig. 2: Valve

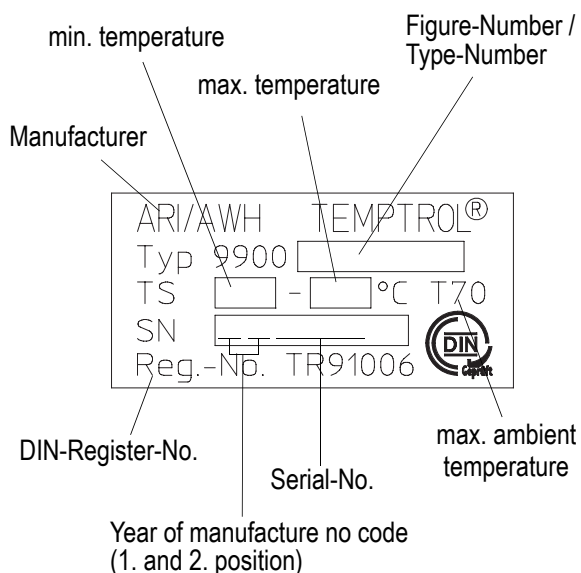


Fig. 3: Thermo controller

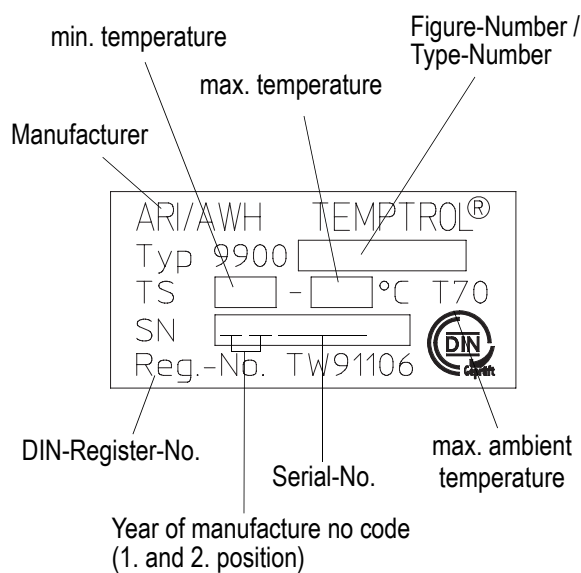


Fig. 4: Detector

- Address of manufacturer:
refer to item 12.0 EC declaration of conformity

5.0 Installation

5.1 General notes on installation

The following items should be taken into account besides the general principles governing installation work:

Refer to data sheet for necessary resp. relevant data for correct installation;
e.g. dimensions, connections, max. operating limits, etc.



ATTENTION !

- *Pressureless pipe system.*
- *Medium must be cool.*
- *Plant must be drained.*
- *Purge piping systems in case of caustic, inflammable, aggressive or toxic media.*
- *Remove flange covers if present.*
- *The interior of valve and pipeline must be free from foreign particles.*
- *Note installation position with reference to flow, see mark on valve.*
- *Steam line systems should be designed to prevent water accumulation.*
- *Lay pipelines so that damaging transverse, bending and torsional forces are avoided.*
- *Protect valves from dirt during construction work.*
- *Connection flanges must mate exactly.*
- *Connecting bolts for pipe flanges should be mounted preferably from the counter flange side (hexagon nuts from the valve side).*
At DN15-32: If valves should be mounted directly to valves, the upper flange connecting bolts should be preferably executed with studs and hexagon nuts on both sides.
- *Valve mountings such as actuator, capillary tube, bonnets, temperature sensors must not be exposed to external forces, e.g. they are not designed for use as climbing aids, or as connecting points for lifting gear.*
- *Suitable materials handling and lifting equipment should be used.*
Refer to data sheet for weights.

- Planners / construction companies or operators are responsible for positioning and installing products.
- The valves are designed for application, not influenced from weather.
- For application outside or in adverse environments like corrosion-promoting conditions (sea water, chemical vapours, etc.), special constructions or protective measures are recommended.
- Valve and controller/detector are delivered separately.
- Before installing the temperature regulator, rinse and clean the system otherwise the seat / disc will be damaged and the control hole will be blocked.
- Centre packings between the flanges.

- Flow direction:

- Thermal closing valves:

The flow direction must correspond with the arrow on the valve body.

- Thermal opening valves (Inlet B closed):

Flow direction for thermal opening valves is preferably from A to B.

Inlet B must be closed with a blind flange.

(Flow direction from AB to A is possible, but not recommended, because oncoming flow goes contrary the usual flow direction onto the plug.

- Thermal mixing/diverting valves:

When installing 3-way valves, it is important to distinguish between mixing and diverting of flow.

- Mixing:

The flow media inlets are A and B (the warmer medium should enter inlet B).

- Diverting:

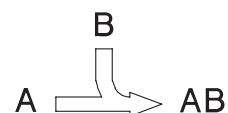
The medium enters through inlet AB and exits out of outlets A and B.

In order to assure proper regulation, the pressures of both partial flows (inflow for mixing or outflow for diverting) must be of equal magnitude.

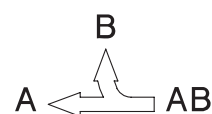
Please note, that with rising sensor temperature, inlet B (mixing) or outlet B (diverting) are throttled.

The flow direction must correspond with the arrow on the valve body.

Mixing function



Diverting



5.2 Requirements at the place of installation

The place of installation should be easily accessible and provide ample space for maintenance and removing the actuator and extracting the temperature sensor out of the piping or tank. Install a stop valve upstream and downstream of the temperature regulator to enable repair and maintenance work, without emptying the system. Also a strainer should exist in front of the control valve (refer to point 5.5), to exclude wear between seat and disc.

Insert thermometer to control the medium temperature. The piping diameters before and behind the valve must ensure, that the allowed flow velocities are not exceeded.

- When insulating, the bonnet, actuator, capillary tube and temperature sensor must stay free.
- The capillary tube of the temperature regulator must be installed in such a way that no large temperature alterations and vibrations occur. The max. distance between the tube holders is 250 mm. The min. bending radius is 50 mm. The connecting pipe is part of a hydraulic system. It must not be disconnected or damaged.
- Temperature sensors (pos. 50.1) can be installed in systems with sensor pockets. The sensor pocket enables easy installation, when a change is necessary the system must not be emptied. Note the longer time constant!
- Installation with actuator hanging.

5.2.1 Thermo controller with 2 temperature sensors

- The first temperature controller (pos. 50.1a) (a bar sensor for liquids or a spiral sensor for air) measures the external temperature (regulating variable).
- The second temperature controller (pos. 50.1b) (a bar sensor) measures the external temperature (command variable). It should be mounted outside wall - north side away from the sun, 2m above ground and protected from wind.

- The influence of the external temperature on the controlled temperature is possible due to the difference in volume between the first sensor (regulating variable) and the second sensor (command variable).
- The set point indicator has a trend scale with a middle mark (refer to setting diagrams in the data sheet).

5.2.2 Selection of temperature sensor- Location

- The temperature sensor (pos. 50.1) must be completely immersed.
Care should be taken to assure adequate circulation.
- At low flow rates, we recommend installing the temperature sensor (pos. 50.1) horizontally (for example in boilers at 2/3 height).
- The control thermometer should be installed near the location from temperature sensor.
- In pipelines, a threaded coupler must be welded into the pipe and the temperature sensor mounted against the flow direction.
- When installing the temperature sensor (pos. 50.1) directly, be sure the connection is free of leaks (gasket is included).
- Room temperature sensors should not be exposed to interference such as drafts, sunlight and other sources of heat.

5.3 Installation instructions concerning actuators (Connection of valve with thermal controller)



ATTENTION !

- *It is not permitted to mantle / dismantle actuators with valves operating and in service conditions (temperature and pressure) (refer to item 10.0).*

Construction

- Set point of the thermal controller/detector, turn to maximum. Hold the set point indicator with the other hand.
- Connect the actuator (pos. 50.16) (ca. 100 Nm) through the connecting nut to the valve (pos. 11). (Attention: The actuator must not turn whilst connecting, because the capillary tube (pos. 50.15) will be damaged!).
- The actuator (pos. 50.16) seals the valve interior only metallic; not extra gasket is allowed!

Dismantling

- Loosen the connecting nut of the actuator (pos. 50.16). (Attention: The actuator must not turn, because the capillary tube (pos. 50.15) will be damaged!).



ATTENTION !

- *When loosening the actuator, dangerous media can escape (hot condensate, steam)*

5.4 Manual control device

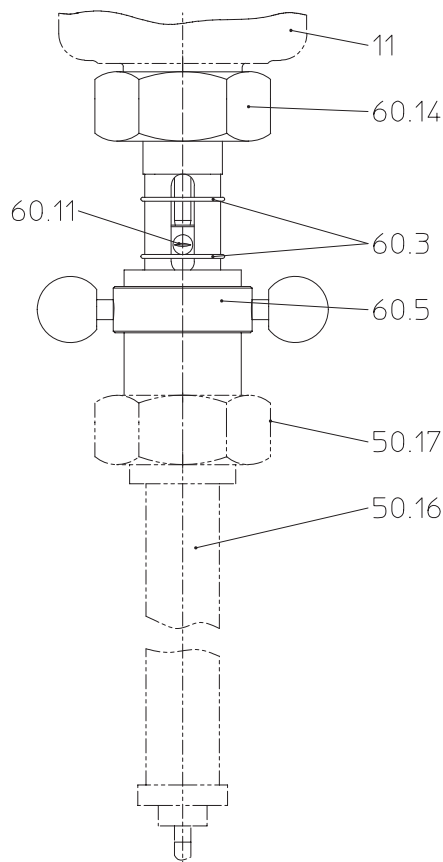


Fig. 5

Pos.	Designation
11	Bonnet (valve)
50.16	Actuator
50.17	Connecting nut (actuator)
60.3	Securing ring
60.5	Adjusting ring
60.11	Pin
60.14	Connecting nut

- The manual control device is installed between the valve (pos. 11) and the actuator (pos. 50.16) of the thermal control valve (Fig. 5).
- Note, that here also the sealing is only metallic, no extra gasket!
- The connecting nut (pos. 60.14) is fastened with about 100 Nm to the valve (pos. 11), the actuator (pos. 50.16) with about 50 Nm to the manual control device.

In the following, a setting example is shown for a closing valve:

- Turn the adjusting ring (pos. 60.5) clockwise till the valve (pos. 11) is closed (mechanical endpoint). The upper securing ring (pos. 60.3) is put in line with the notch of the pin (pos. 60.11).
- Now turn the adjusting ring (pos. 60.5) anti-clockwise, till the valve (pos. 11) is full open (max. flow). The bottom securing ring (pos. 60.3) is put in line with the notch of the indicator pin (pos. 60.11). In the system you can then see the lift over the open and closed position between the securing rings (pos. 60.3).
- Note, that when working the adjusting ring (pos. 60.5) must be in the opening position of the valve; closed valve can't be opened through the thermal controller!

5.5 Strainer



ATTENTION !

*Install a strainer before the temperature regulator with the sieve sideways (with the medium steam) to avoid the collection of condensate.
The strainer must be cleaned from time to time.*

6.0 Putting the valve into operation



ATTENTION !

- Before putting the valve into operation, check material, pressure, temperature and direction of flow.
- Putting into operation only through expert personnel.
- Regional safety instructions must be adhered to.
- Residues in piping and valves (dirt, weld beads, etc.) inevitably lead to leakage.
- Touching the valve when it is operating at high ($> 50\text{ °C}$) or low ($< 0\text{ °C}$) media temperatures can cause injury.

Affix warning notice or protective insulation as appropriate!

Before putting a new plant into operation or restarting a plant after repairs or modification, always make sure that:

- All works has been completed!
- The valve is in the correct position for its function.
- Safety devices have been attached.
- To avoid a to higher temperature on the sensor, firstly adjust to the max. range of the setting range.

The operation is then as follows:

- After installation, valve and piping must be filled over the return line. If this is not possible, slowly open (half open) the stop valve before the control valve, and carefully without pressure surges, fill the piping. Then slowly fully open the stop valve.
- Any leakage tests may be conducted only when the valve is not closed.
Otherwise, internal valve components could be damaged.

6.1 Setting range

6.1.1 Controller

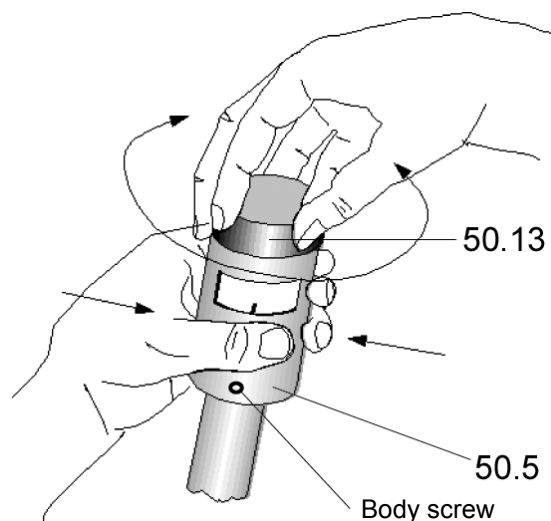


Fig. 6: Setting range

- The temperature setting is done through turning the setting ring (pos. 50.13). The body (pos. 50.5) must be held fast; it is not allowed to turn.
- Setting of higher ranges is allowed without any restrictions.
- Setting for lower ranges when installed, is only allowed in small steps smaller 30 K. Between the steps, the temperature regulation (system dependent about 15 min.) must be waited for.
- When alterations larger than 30 K are done, the excess temperature indicator can respond. This can be seen when the setting ring (pos. 50.13) has moved upwards from the body (Fig. 7) (pos. 50.5). In this case, the temperature regulation must be waited for, before further alterations are done. Excess responses from the indicator shortens the lifetime from the thermal controller!

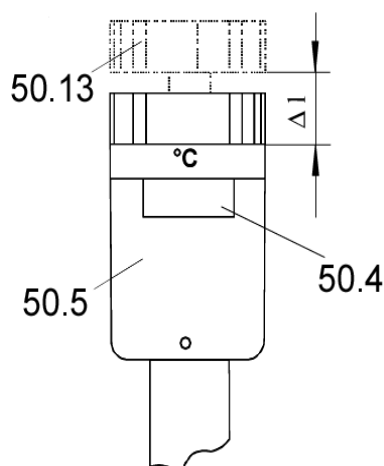


Fig. 7: Excess temperature indicator

- After the temperature regulation in the system has been fulfilled, the actual temperature can be seen on the control manometer.
- If both values which have been set are reached, then the procedure is ended.
- If the values are not correct, then a correction must be done on the set point indicator. The set point must be altered to the actual value (see point 6.2).

6.1.2 Detector

Procedure see point 6.1.1, but instead of the alteration of the setting ring, the intended setting is done with 11-box spanner or 8-key wrench.

Before you must remove the black ring (Pos. 50.13, Fig. 6) through pulling off, and then push on after setting.

6.2 Setting correction

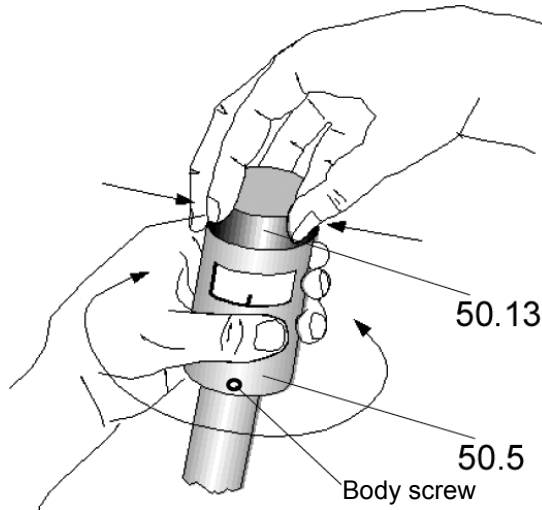


Fig. 8: Setting correction

- Loosen the body screw (M4).
- The correction is done through turning the body (pos. 50.5) till the setting is equal to the actual temperature (actual value on control manometer). The setting ring (pos. 50.13) (tools with detector) must be held; it is not allowed to turn.
- Set to the needed value.
(Turn the setting ring (pos. 50.13) (tools with detector) - Hold body (pos. 50.5)).
- After the temperature regulation in the system had been fulfilled, read again the actual temperature.
- If both values are the same, the procedure is ended.
- If the value has not been successfully reached, repeat the setting correction.
- When the correction is done, turn the body (pos. 50.5) so far, that the setting range can be seen, then fasten the screw.

7.0 Care and maintenance

Maintenance and maintenance-intervals have to be defined by the operator according to the requirements.

8.0 Troubleshooting

In the event of malfunction or faulty operating performance check that the installation and adjustment work has been carried out and completed in accordance with these Operating Instructions.



ATTENTION !

It is essential that the safety regulations are observed when identifying faults.

If malfunctions cannot be eliminated with the help of the following table

“9.0 Troubleshooting table”, the supplier or manufacturer should be consulted.

9.0 Troubleshooting table



ATTENTION !

- read item 10.0 and 11.0 prior to dismantling and repair work !
- read item 5.0 and 6.0 before restarting the plant !

Fault	Possible cause	Corrective measures
No flow	Valve closed (manual control device)	Bring manual control device in complete open position
	Flange covers not removed	Remove flange covers
Flow too small	Valve not sufficiently open (manual control device)	Bring manual control device in complete open position
	Dirt sieve clogged	Clean / replace sieve
	Piping system clogged	Check piping system
Thermal closing valve: Flow too large, no temperature regulation possible	Leaky capillary tube system	Change the thermal control device
	mounted against the allowed flow direction	Mount valve in the correct flow direction
Thermal opening valve: Flow too small, no temperature regulation possible	Leaky capillary tube system	Change the thermal control device
	mounted against the allowed flow direction	Mount valve in the correct flow direction
Thermal mixing/diverting valve: no or inadequate mixing or diverting function	Leaky capillary tube system	Change the thermal control device
	mounted against the allowed flow direction	Mount valve in the correct flow direction

10.0 Dismantling the valve or the top part



ATTENTION !

The following points must be observed:

- *Pressureless pipe system.*
- *Medium must be cool.*
- *Plant must be drained.*
- *Purge piping systems in case of caustic, inflammable, aggressive or toxic media.*

11.0 Warranty / Guarantee

The extent and period of warranty cover are specified in the "Standard Terms and Conditions of Albert Richter GmbH & Co. KG" valid at the time of delivery or, by way of departure, in the contract of sale itself.

We guarantee freedom of faults in compliance with state-of-the-art technology and the confirmed application.

No warranty claims can be made for any damage caused as the result of incorrect handling or disregard of operating and installation instructions, datasheets and relevant regulations.

This warranty also does not cover any damage which occurs during operation under conditions deviating from those laid down by specifications or other agreements.

Justified complaints will be eliminated by repair carried out by us or by a specialist appointed by us.

No claims will be accepted beyond the scope of this warranty. The right to replacement delivery is excluded.

The warranty shall not cover maintenance work, installation of external parts, design modifications or natural wear.

Any damage incurred during transport should not be reported to us but *rather* to the competent cargo-handling depot, the railway company or carrier company immediately or else claims for replacements from these companies will be invalidated.



Technology for the Future. GERMAN QUALITY VALVES

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12.0 EC declaration of conformity

**AWH Armaturenwerk Halle GmbH,
Turmstrasse 118, D-06110 Halle/Saale**

EC declaration of conformity
acc. to
the Pressure Equipment Directive 97/23/EC

Herewith we declare,

that according to the above mentioned Pressure Equipment Directive (PED) the below listed products comply and have been approved according to module A diagram 6 (art. 3, annex II).

Bodies from pressure bearing equipment without safety function.

Category I (fluid group 1)

Temperature regulator
TEMPTROL®
Type 771, 772, 773, 774, 775, 776

in connection with
controller / detector / manual control device / sensor pocket
(Article 3, paragraph 3 acc. to „sound engineering practice“)

Type 990038601 to 990038636
Type 990038746 to 990038796
Type 990039001
Type 990038600Z22 to 990038600Z36

Applied standard:

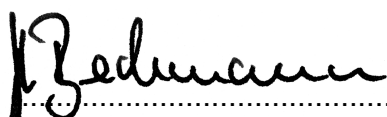
DIN 3840 (DIN EN 12516)

DIN EN 14597

AD 2000 leaflet A4

- Cast iron with spheroidal graphite
- Cast steel, Forged steel
- Stainless steel
- Brass

Schloß Holte-Stukenbrock, 18.08.2010


.....
(Brechmann, Managing director)