





PN40 / Class 150-300 DN15-25 / NPS 1/2"-1"

- with flanges
- with screwed sockets
- with socket weld ends
- with butt weld ends

(series 650....1) (series 650....2)

(series 650....3)

(series 650....4)



- with flanges - with screwed sockets

- with socket weld ends

PN40 / Class 150-300

DN40-50 / NPS 1 1/2"-2"

- with butt weld ends
- (series 650....1) (series 650....2)
- (series 650....3)
- (series 650....4)

- PN40 / DN15-50
- with flanges(series 650....1)- with socket weld ends (series 650....3)- with screwed sockets(series 650....12)- with butt weld ends(series 650....4)

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- Translated original instructions -

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.

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.).
- Valves must not be used to take 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. See catalog 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

Liquid return temperature limiters with temperature control are used for return control in heating systems.

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 2014/68/EU. 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.

4.2.1 Return temperature limiter with external adjusting device

The return temperature limiter with external adjusting device serves to limit the media temperature in the media return line. It is designed for use with hot water at temperatures up to 140°C (maximum operating temperature). It must not be used for Group 1 fluids.

4.3 Operating principles

(refer to Fig. 1 - Fig. 3 page 4 and Fig. 5 page 6)

Liquid return temperature limiters maintain a constant returning water temperature in a water system; if the returning water temperature falls, the valve will open wider to allow a greater flow into the water heater, and the reverse occurs with a rising temperature in the return line.

When the valve is in the closed position, a snall amount of water will still flow through the valve. This is to ensure that the valve is sensing a representative sample of water in the system and allow rapid response to load changes.

The bi-metallic discs (pos. 24.6) in the controller (pos. 24) arch when heated, moving the annular slide valve (pos. 24.18) to the "closed" position. Conversely, if the discs are cooled by the process fluid, the flatten out, moving the annular slide valve towards the "open" position.

4.4 Diagram



Fig. 1: Liquid return temperature limiter series 650 PN25/40 DN15-25 (with flanges)



Fig. 3: Liquid return temperature limiter -BR650 PN40 / Class 150-300, DN40-50 / NPS 1 1/2" - 2"



Fig. 2: Liquid return temperature limiter -BR650 PN40 DN15-25 (with socket weld ends)





Refer to the data sheet for information about materials with designations and figure numbers.

4.5 Technical data - remarks

for

- Principal dimensions,
- Pressure-temperature-ratings, operating limits,
- Valves with different types of connection , etc. refer to datasheet.

4.6 Marking

CE CE-marking

0090 Notified body

FHI EAC-marking

AWH Manufacturer Address of manufacturer: _ _ _ _ _ Address of manufacturer: refer to item 11.0 Warranty / Guarantee

Тур Туре

Bj. Year of manufacture

According to the Pressure Equipment Directive appendix 2 diagram 7 valves acc. to article 1 paragraph 2.1.2 (pipes) only show the CE-marking from DN40 onwards.

5.0 Installation

5.1 General notes on installation

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



ATTENTION !

- Remove flange covers if present.

- The interior of valve and pipeline must be free from foreign particles.
- Installation in any position (except screw cap downwards). Note installation position with reference to flow, see mark on valve.
- Lay pipelines so that damaging transverse, bending and torsional forces are avoided.
- Protect valves from dirt during construction work.
- Connection flanges must mate exactly.
- Valves must not be used to take 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. See data sheet for weights.
- Centre gaskets between the flanges.
- Precautions against freezing should be taken as a matter of course in any facilities susceptible to frost.
- Planners / construction companies or operators are responsible for positioning and installing products.
- Die Armaturen sind ausgelegt für den Einsatz in witterungsgeschützten Anlagen.
- Für den Einsatz in freistehenden Bereichen oder bei besonders ungünstigen Umgebungsbedingungen, wie korrosionsfördernden Voraussetzungen (Meerwasser,

chemische Dämpfe, etc.) werden spezielle Ausführungen oder Schutzmaßnahmen empfohlen.

5.2 Installation instructions for welding

(refer to Fig. 2 page 4)

Please note that only qualified persons using appropriate equipment and working in accordance with technical rules are allowed to install fittings by welding. The responsibility for this lies with the system owner.

Please refer to the catalogue sheet for information on type and instructions relating to welding socket weld ends/butt weld ends.

When welding products to the pipeline system these should be adequately cooled to preclude any adverse effect on the complete controller assembly (pos. 24). The heat-affected zone should in principle be restricted to the immediate weld seam area! Note pre- and post-welding heat treatment in accordance with Material Fact Sheet DIN EN 10222.

If there are plans to etch the facility before putting it into operation, the complete controller units (pos. 24) should be removed, replaced by etch inserts, and refitted after etching (see 7.1). In such an event please contact the manufacturer.

5.3 Controller adjustment

5.3.1 Version without external adjusting device

(refer to Fig. 5 page 6)

- The controller (pos. 24) has a stroke limiter at approx. 130°C.

- Possible closing temperature range: 60°C to 130°C.

- The controller (pos. 24) is factory set as ordered by the customer.

The setting can subsequently be readjusted as follows without disassembling the screw cap (pos. 6):

ATTENTION !

- refer to item 10.0 and 11.0 prior to dismantling and repair work!

- Open the plug (pos. 43) when unpressurised.

- Using a socket wrench a/f 7, adjust the closing temperature direct from outside (half a clockwise turn of the spindle (pos. 24.3) gives a temperature increase of approx. 10 K).
- Screw plug (pos. 43) in and tighten (see 7.3).



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5.3.2 Return temperature limiter with external adjusting device

The adjusting device allows the return temperature of the medium flow to be altered externally without interrupting operation.

- The regulator is set in the factory to 180°C or according to the customer's specification.
- The closing temperature can be set between 0°C and 270°C.
- One turn corresponds to a temperature change of approx. 20 K.
- The temperature is increased by turning clockwise (+) up to the stop.
- Turning anticlockwise (-) reduces the temperature up to the closing position of the regulator.
- The factory setting can be restored by turning the adjusting screw three turns back from the (+) stop in the (-) direction.



ATTENTION !

Mechanical damage may be caused to the regulator if the adjusting screw is turned beyond the stops!



5.3.2.1 Adjustment procedure



ATTENTION !

The medium inside the valve can leak out during the adjustment and cause damage or injury to persons, plant or the environment! There is a risk of burns or toxification.

Ensure compliance with all relevant regulations relating to safety, occupational health and fire prevention. Personal protective equipment must be worn at all times. All work must be carried out by suitably trained persons.

- Unscrew the acorn nut (pos. 68) while steadying it with the hexagon nut (pos. 67).
- Loosen the hexagon nut (pos. 67) a maximum of one turn while steadying it with the screw (pos. 44, a/f 7).
- Turn the screw (pos. 44) with a ring spanner (a/f 7) without applying axial pressure. The screw is sealed by the Viton O-ring (pos. 49) and by the internal Cu sealing ring.
- The screw can be adjusted a maximum of twelve turns when cold.

- It is only allowed to be adjusted with a low torque of no more than 5 Nm to avoid damaging the regulator in the end positions.
- After adjusting the valve, tighten the hexagon nut (pos. 67) again while steadying it with the screw (pos. 44). The system is permanently sealed from the outside by the internal Cu sealing ring (pos. 42).
- Finally, screw on the acorn nut (pos. 68) loosely while steadying it with the hexagon nut (pos. 67).

If a leak develops to the outside, the seal (pos. 42) must be replaced. The valve must be removed from service for this purpose and not dismantled until it is cold, empty and pressureless. The setting is lost when the screw cap is dismantled and must be re-made after assembly. It is therefore a good idea to determine the current setting prior to dismantling the valve by counting the number of turns up to the stop (+). This means opening the regulator fully and readjusting it to the former position after assembly procedure. It should be adjusted approx. five turns in the (-) direction to prevent the screw from being turned past the (+) stop when the screw cap is re-fitted, thereby damaging the regulator.

Excerpt from the hazard checklist

- Hazard due to liquids and gases under pressure
- Hazard due to high-pressure fluid injection or ejection
- Thermal hazards resulting in: Burns, chilblains and other injuries caused by contact of persons with objects or materials with an extremely high or low temperature, by flames or explosions and also by radiation of heat sources
- Damage to health due to hot or cold working environments
- Hazards due to contact with or inhalation of harmful fluids, gases, mists, fumes and dusts
- Hazard due to fire or explosion

5.4 Replacing the controller of the return temperature limiter with external adjusting device

5.4.1 Removing the old controller

Remove the cheese head screw (pos. 18) from the hand grip (pos. 19), then remove the hand grip from the setting spindle (pos. 139)

Remove the screw plug (pos. 141) and the retaining ring (pos. 140)

Pull the setting spindle (pos. 139) and the indicator ring (pos. 138) up out of the adjusting device

Remove the O-ring seals (pos. 142) from the setting spindle (pos. 139) and carefully clean the seal faces if necessary

Remove the screw cap (pos. 6) in the case of DN 15 to 25 or the cover (pos. 6) for DN 40 to 50

Carefully clean the seal face of the screw cap or the cover

Unscrew the controller (pos. 24) from the body

Carefully clean the seal face and the thread inside the body (pos. 1)

5.4.2 Setting range

The standard setting range corresponds to a temperature range from 23 to 120°C; the recommended setting range is from 40 to 120°C. Return temperature limiters with a setting range up to 140°C can be supplied on request.

5.4.3 Controller

Replacement controllers supplied by the manufacturer are preset to a closing temperature of 23°C. This must not be altered by the user prior to installation. If the controller setting is inadvertently altered by turning the square nut (pos. 24.71), the original setting can be restored again as follows.

- Store the controller for at least 2 hours at room temperature (between 21 and 25°C) until thermal equilibrium is achieved.
- Then adjust the temperature-regulated controller by turning the square nut (pos. 24.71), so that the gap between the annular slide valve (pos. 24.18) and the valve seat (pos. 24.1) is just about closed.



5.4.4 Installing the controller

- Coat the thread and the seal face of the controller (pos. 24) with a thin film of metal-free fitting grease
- Screw the controller (pos. 24) into the body (pos. 1) and tighten to the specified torque
- Fit the cover or the screw cap

DN 15-25:

- Coat the thread and the seal face of the screw cap (pos. 6) with a thin film of metal-free fitting grease.
- Fit the screw cap and tighten to the specified torque.

DN 40- 50:

- Insert the gasket (pos. 26) into the grooves on the body (pos. 1) and the wafer type flange (pos. 37)
- Place the wafer type flange (pos. 37) and the cover (pos. 6) on the body
- Insert the cover screws (pos. 27) and tighten to the specified torque in crosswise sequence.
- Fit new O-rings (pos. 142) onto the grooves of the setting spindle (pos. 139) and grease them lightly
- Position the indicator ring (pos.138) flush with the bottom end of the setting spindle (pos.139)
- Insert the setting spindle (pos. 139) into the scale part (pos. 136) of the adjusting device, so that the groove is aligned with the square nut (pos. 24.71) of the controller (pos. 24). At

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the same time, align the indicator ring (pos. 138) so that it fits into the grooves of the scale section (do not turn more than $+/-60^{\circ}$)

- Carefully press down the setting spindle (pos. 139) as far as the stop
- Fit the retaining ring (pos. 140) and the screw plug (pos. 141), then tighten to the specified torque
- Fit the hand grip (pos. 19) and the cheese head screw (pos. 18) onto the setting spindle (pos. 139), then tighten to the specified torque
- Set the desired closing temperature by turning the hand grip

5.5 Steam trap testing through ultrasonic measurement

Testing the operation of the return temperature limiter in the installed state is straightforward with the "ARImetec[®]-S" mulitfunctional testing device.

Refer to data sheet "ARImetec[®]-S".

5.6 Installation position

The preferred installation position for the return temperature limiter is horizontal, but inclined positions of the screw cap (pos. 6) are possible.

Observe installation position with regard to flow.

6.0 Putting the valve into operation

ATTENTION !

- Before putting the valve into operation, check material, pressure, temperature and direction of flow.

- 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 °C) or low (< 0 °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.

7.0 Care and maintenance

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

ATTENTION !

refer to item 10.0 and 11.0 prior to dismantling and repair work! refer to item 6.0 before restarting the plant !

Prior to installation, threads and seal faces should be coated with temperaturestable lubricant (e.g. "OKS Anti-Seize Paste" white/metal-free for PN 16-40 / Class 150-300).

7.1 Cleaning / replacing controller assembly

- (refer to Fig. 1 page 4 Fig. 5 page 6)
- Depressurise unit.
- Release and disassemble screw cap (pos. 6).
- Unscrew bimetallic controller (pos. 24).
- Clean body (Pos 1), screw cap (pos. 6) and all seal faces.
- Clean bimetallic controller (pos. 24) and check sealing parts at seat (pos. 24.1). If the operator thinks there are unwarranted leakages we recommend checking the controller setting or replacing the complete bimetallic controller (pos. 24).
- Screw in and tighten bimetallic controller (pos. 24) (see 7.3).
- Assemble screw cap (pos. 6) (see 7.3).

Version with plug-in thermometer:

- Unscrew thermometer adapter (pos. 47) with thermometer (pos. 48) and clean parts/seal faces.
- Fit thermometer adapter (pos. 47), making sure seal faces are clean.
- Tighten thermometer adapter (pos. 47) (see 7.3).
- Assemble in reverse order (see 7.3).

7.2 Option thermometer adapter with thermometer

It is possible to monitor the process temperature in situ with the thermometer (pos. 48).

Note section 7.3 when installing and operating.



7.3 Tightening torques

(refer to Fig. 1 page 4 - Fig. 8 page 11)

pos.	Liquid return temperature limiter PN25/40	Torque (Nm)
6	Screw cap	100
21	Screw plug	70
24	Controller	80
27	Cheese head screw	40
43	Plug	70
47	Thermometer adapter	50
48	Thermometer	50
67	Nut	20
68	Cover nut	15
pos.	Return temperature limiter with external adjusting device PN40	Torque (Nm)
6	Screw cap	100
27	Cover screw	50
136	Scale part	80
141	Screw plug	60
18	Cheese head screw	6

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 eliminate with the help of the following table **"9.0 Troubleshooting table**", the supplier or manufacturer should be consulted.

9.0 Troubleshooting table

 $\underline{\land}$

ATTENTION !

refer to item 10.0 and 11.0 prior to dismantling and repair work!
 refer to item 6.0 before restarting the plant !

Fault	Possible cause	Corrective measures
No flow	Installed in wrong flow direction.	Fit valve in direction of flow arrow. Note installation position
	Flange covers not removed	Remove flange covers
Little flow	Piping system clogged	Check piping system
	Changed upstream pressure or back pressure operating conditions	Correct selection according to flow diagram

Operating and installation instructions Liquid return temperature limiter

Fault	Possible cause	Corrective measures
No closure, or internal	Controller clogged	Clean controller; refer to item 7.1
leakage	Controller worn out	Change controller; refer to item 7.1
	Controller shifted / misadjustedt	Check adjustment; refer to item 5.3
	Controller incorrectly screwed into body	Check seal face between body and con- troller, tighten controller correctly; refer to item 7.3
	Controller operated above safe operating pressure	Observe operating limits as per data sheet
External leakage	Screw cap (pos. 6) not properly tightened	Tighten; refer to item 7.3
	Plug (pos. 43) not properly tightened	Tighten; refer to item 7.3

10.0 Dismantling the valve or the body

\triangle

ATTENTION !

The following points must be observed:

- Pressureless pipe system.
- Medium must be cool.
- Plant must be drained.

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, technical data sheets and relavant 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.

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