

# Operating Manual

UK

## Passive cooling packages for brine/water heat pumps Professional



WTK 1

WTK 2

WTK 3

WTK 4

WTK 5

WTK 6



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### INFORMATION FOR USERS AND SERVICE PERSONNEL

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### INSTRUCTIONS FOR QUALIFIED TECHNICIANS

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## Please read first

This operating manual provides important information about the handling of the unit. It is an integral part of the product and must be stored in an accessible location within the immediate vicinity of the unit. It must remain available throughout the entire service life of the unit. It must be handed over to subsequent owners or users of the unit.

**In addition to this operating manual, the operating manual for the heating and heat pump regulator and the operating manual for your heat pump must also be available to you.**

Read the operating manual before working on or operating the unit. This applies in particular to the chapter on safety. Always follow all instructions completely and without restrictions.

It is possible that this operating manual may contain instructions that seem incomprehensible or unclear. In the event of any questions or if any details are unclear, contact the factory customer service department or the manufacturer's local partner.

Since this operating manual was written for several different models of the unit, always comply with the parameters for the respective model.

This operating manual is intended only for persons assigned to work on or operate the unit. Treat all constituent parts confidentially. The information contained herein is protected by copyright. No part of this manual may be reproduced, transmitted, copied, stored in electronic data systems or translated into another language, either wholly or in part, without the express written permission of the manufacturer.



## Symbols

The following symbols are used in the operating manual. They have the following meaning:



Information for operators.



Information or instructions for qualified technicians.



### **DANGER!**

Stands for risk of fatal injury due to electric current!



### **DANGER!**

Indicates a direct impending danger resulting in severe injuries or death.



### **WARNING!**

Indicates a potentially dangerous situation that could result in serious injuries or death.



### **CAUTION!**

Indicates a potentially dangerous situation that could result in medium or slight injuries.



### **CAUTION**

Indicates a potentially dangerous situation, which could result in property damage.



### **NOTICE**

Emphasised information.



Reference to other sections of the operating manual.



Reference to other documents of the manufacturer.

## Intended use

The passive cooling package must only be used for its designed purpose.

This means:

- for passive cooling in conjunction with Professional series brine/water heat pumps.

Only operate the unit within its technical parameters.



Overview "Technical data / scope of delivery" and rating plate of the plate heat exchanger

### **! CAUTION**

**Do not operate the passive cooling package with ground water or any other water the use of which has not been expressly authorised by the manufacturer.**

## Functional principle

The cooling function is based on the principle of passive cooling. An existing low temperature level is mixed to a temperature above the dew point and transferred to the heating medium by means of a heat exchanger. The heat pump remains switched off during cooling; only the circulating pumps for the heating circuit and the heat source are in operation.

The cooling power depends on the heat source temperature, which varies seasonally. For example, if the ground stores more heat towards the end of the summer, the cooling power of a brine/water pump is reduced.

Essentially, the effectiveness of passive cooling is generally not comparable to that of an air conditioning system.



### **NOTICE**

**The use of the passive cooling function requires floor or wall heating.**

## Exclusion of liability

The manufacturer is not liable for losses resulting from any use of the unit for which it is not intended.

The manufacturer's liability also lapses:

- if work is performed on the unit and its components in a manner not complying with the terms of this operating manual;
- if work is performed on the unit and its components in an improper manner;
- if work is performed on the unit that is not described in this operating manual, and this work was not expressly approved in writing by the manufacturer;
- if the unit or components in the unit are modified, redesigned or removed without the express written permission of the manufacturer.

## Safety

The unit is safe to operate for its intended use. The design and manufacture of the unit conform to current state of the art standards, all relevant DIN/VDE (German Association for Electrical, Electronic & Information Technologies) regulations and all relevant safety regulations.

Every person who performs work on the unit must have read and understood the operating manual prior to starting any work. This also applies if the respective person has already worked with such a unit or a similar unit or has been trained by the manufacturer



## DANGER!

**Risk of fatal injury due to electric current!**  
Electrical connections may be installed only by qualified electricians.

**Before making electrical connections, disconnect the system from the power supply and secure it to prevent it being switched back on!**

## DANGER!

**Only qualified technicians (trained heating, cooling, refrigerant and electrical technicians) may perform work on the unit and its components.**

## WARNING!

**Wear suitable protective clothing.**  
**With hazardous flow media there is a risk of etching, burning or poisoning.**

## WARNING!

**Observe safety labels on and in the unit.**

## Customer Services

For technical information contact a qualified technician or the manufacturer's local partner.



"Customer service" overview in the heat pump operating manual.

## Warranty / Guarantee

For warranty and guarantee conditions, please refer to the purchase documents.

### NOTICE

**Contact your dealer for all guarantee and warranty matters.**

## Disposal



## Instructions for qualified technicians

### Scope of delivery

Copper-soldered plate heat exchanger (without insulation), 3-way flange valve, valve drive, external sensor for the domestic hot water tank, or the heating return when using separating tanks, matched to the heating and heat pump regulator.



- ① Inspect the delivery for outwardly visible signs of damage...
- ② Check to make sure that the delivery is complete.  
Any defects or incorrect deliveries must be claimed immediately.

Dispose of the transport and packaging materials properly and with respect for the environment.

### Installation and assembly

#### NOTICE

Always comply with the applicable local accident prevention regulations, statutory regulations, ordinances, guidelines and directives.



#### WARNING!

**Only qualified technicians may fit the cooling package!**

#### NOTICE

**Fit the components of the cooling package to allow adequate space for maintenance work.**

#### HEAT EXCHANGER MOUNTING

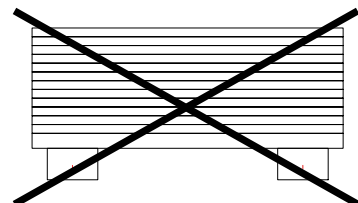
Always fit the heat exchanger vertically and on a bracket (to be supplied by customer). Securing using the connectors alone is not sufficient.



Vertical fitting position

#### CAUTION

Never mount the heat exchanger with the connections facing down.





## CONNECTION TO THE WATER SUPPLY NETWORK

Pollution and deposits which get into the heat exchanger from the supply network can lead to corrosion in the heat exchanger (and for some applications to the heat exchanger freezing up).

Therefore, before connection of the heat exchanger to the supply network, thoroughly clean the piping.

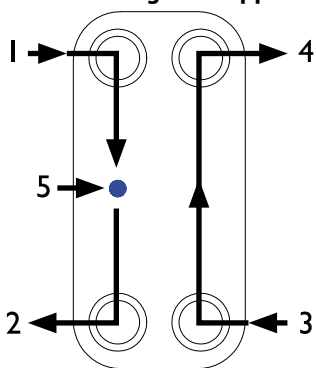
To prevent dirt entering the heat exchanger, install dirt filters in the connections to the heat exchanger.

Route the pipelines so that no vibrations, no voltages and no shocks or pulsation can affect the heat exchanger.

Connect the pipelines to the heat exchanger using the threaded connections on the heat exchanger.

### NOTICE

**Connect the heat exchanger to the supply network so that primary and secondary media flow through it in opposite directions.**



- 1 Heat source inlet (primary side)
- 2 Heat source outlet (primary side)
- 3 Inlet secondary side
- 4 Outlet secondary side
- 5 Colour spot to label the heat source side

Hydraulic connection, page 12

## FITTING THE 3-WAY FLANGE VALVE

Fit the 3-way flange valve as shown in the hydraulic connection diagram.

Hydraulic connection, page 12

### CAUTION

**Observe the flow direction marked on the valve.**

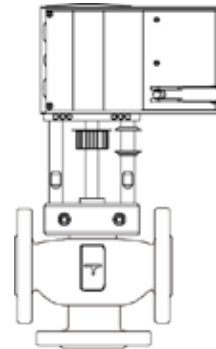
### NOTICE

**Fit the 3-way flange valve so that the valve drive can be attached from above or from the side. Fitting of the valve drive from below (suspended) is not permitted.**

The 3-way flange valve can be adjusted to any intermediate position using the electric valve drive. With the valve stem pulled out, the normal load of the valve is closed.

## VALVE DRIVE MOUNTING

Fit the valve drive onto the 3-way flange valve. The valve stem is automatically and tightly connected to the driving spindle. Secure with a nut or with screws.



### CAUTION

**Make sure that the cone does not turn on the seat and the sealing surface is not damaged.**

### CAUTION

**Do not fit the valve drive so that it is vertically suspended from the 3-way flange valve.**

### CAUTION

**Make sure that no condensation or dripping water can get into the drive. If fitting outside, protect the device against the weather.**

## VALVE DRIVE OPERATING PRINCIPLE

Dependent on the connection type, the valve drive can be used as a continuous (0...10 V and/or 4...20 mA), as a 2-point (OPEN/CLOSED) or as 3-point drive (OPEN/STOP/CLOSED).

The valve drive running time can be adjusted using switches S1 and S2 according to the particular requirements. Switches S3 and S4 are used to configure the characteristic curve (equal percentage, linear or quadratic).

The external crank handle enables manual positioning. When the crank handle is folded out, the motor is switched off. After folding the crank handle back in, the set position is returned to (without initialisation). Once the crank handle is folded out, the drive remains in this position.

## ELECTRICAL CONNECTION VALVE DRIVE

The housing contains three break-out cable bushings, which are automatically broken out as the cable bushing is screwed in. The stepper motor/electronics concept guarantees the parallel running of several valve drives of the same type. The cross section of the connection cable must be chosen according to the cable length and the number of valve drives (we recommend using a wire cross-section 1.5 mm<sup>2</sup> with five parallel switched drives and a cable length of 50 m (valve drive power consumption x 5)).

At most the valve drive can be equipped with a 230 V module, an additional accessory (auxiliary contact or potentiometer) as well as the split-range unit.





## CONNECTION TO A CONTROL VOLTAGE (0...10 V AND/OR 4...20 MA)

The integral position regulator controls the drive dependent on the controller control signal  $y$ . A voltage signal (0...10 V-) at terminal 3u, or a current signal at terminal 3i acts as a control signal. If a control signal is applied to both terminals (3u (0...10 V) and 3i (4...20 mA)) simultaneously, the input with the highest value takes priority.

As the control signal increases, the coupling rod extends and opens the valve (normal load).

Control direction 2 (mains voltage applied to internal connection 2b):

As the control signal increases, the coupling rod retracts and closes the valve (normal load). The start point as well as the control range are fixed. To adjust the partial ranges (and only for voltage input 3u) a split range unit is available as an accessory (see function split range unit), which is provided for insertion in the drive.

After application of the supply voltage and initialisation, the drive traverses, dependent upon the control signal, between 0% and 100%, every valve stroke. Thanks to the electronics and the distance measurement system, no stroke is missed and the valve drive needs no periodic re-initialisation. Upon reaching the end positions, these positions is checked, corrected as necessary and stored again. The parallel running of several drives of the same SUT type is thus guaranteed. The response signal  $y_0 = 0...10\text{ V}$  corresponds to the effective valve stroke of 0 to 100%.

If the 0...10 V control signal is interrupted in control direction 1, the stem retracts completely and the valve is closed. So that the valve can be opened (control direction 1), connect a voltage of 10V between terminal 1 and 3u or switch over to control direction 2.

The characteristic curve of the valve can be adjusted using the coding switch. Equal percentage and quadratic characteristic curves can only be created if the valve drive is used as a continuous drive. The running times can be selected using further switches (applicable with 2-point, 3-point or continuous functions).

## CONNECTION AS A 2-POINT VALVE DRIVE (24 V)

This control (OPEN/CLOSED) can be operated with two wires. Apply voltage to terminals 1 and 2a. Application of voltage (24 V) to terminal 2b extends the coupling rod and opens the valve. Once this voltage is turned off, the drive travels to the opposite end position and closes the valve. In the end positions (valve stop or reaching of the maximum stroke) or in case of overloading, the electronic motor cutoff activates (no limit switch).

Use the coding switch to adjust the running time. The characteristic curve cannot be selected here (the result is the valve characteristic curve). The terminals 3i, 3u and 44 must not be connected.

## CONNECTION AS A 3-POINT VALVE DRIVE (24 V)

By application of a voltage to terminal 2a (or 2b) the valve can be moved to any desired position. If a voltage is applied to terminal 1 and 2b, the coupling rod extends and opens the valve. It retracts and closes the valve if the circuit is closed via terminals 1 and 2a.

In the end positions (valve stop or reaching of the maximum stroke) or in case of overloading, the electronic motor cutoff activates (no limit switch). The stroke direction can be changed by changing over the connections.

Use the coding switch to adjust running time. The characteristic curve cannot be selected here (the result is the valve characteristic curve). The terminals 3i, 3u and 44 must not be connected.



## SPLIT-RANGE UNIT (ACCESSORIES AT ADDITIONAL COST)

The split-range unit can be integrated in the drive or be attached externally to an electrical distribution box. The start point  $U_0$  as well as the control voltage  $\Delta U$  can be adjusted using a potentiometer. The regulator control signal can thus operate several actuators in a sequence or in a cascade. The input signal (partial range) is converted into an output signal from 0...10 V.

## SWITCH CODING



Reference to other sections of the operating manual.

## Commissioning

- ① Check that the operating data given on the rating plate of the heat exchanger are not exceeded...
- ② Check the tightening of the screwed connections...
- ③ Open the valves in the flow and return simultaneously as slowly as possible until the operating temperature is reached...

### ! CAUTION

**The pumps supplying the heat exchanger must be equipped with shut-off devices. Pumps or systems producing higher operating pressures than specified for the heat exchanger must be fitted with safety valves.**

**The pumps must not take in any air, so that no operating faults are caused by water hammer. To prevent water hammer, start up the pumps with closed valves.**

- ④ During filling, bleed the heat exchanger using the bleed valves available in the supply network...

### ! CAUTION

**Avoid water hammer.**

### i NOTICE

**Inadequately bled heat exchangers do not operate at maximum efficiency. Residual air increases the risk of corrosion.**

- ⑤ Shutdown the primary and secondary side slowly and simultaneously. If this is not possible, shutdown the hot side first.

After commissioning, check that no pressure pulsations act on the exchanger. If the heat exchanger is fitted between a control valve and a differential pressure regulator, ensure that if both control devices are closed simultaneously, no negative pressure can form so that steam hammer is avoided.

Check the control devices for correct operation. In general ensure that no operating conditions can arise which do not comply with this operating manual.

### ! CAUTION

**Steam hammers, as well as pressure and temperature pulsations can lead to leaks in the heat exchanger. Ensure there is sufficient equipotential bonding so that the corrosion protection is not compromised.**



## VALVE DRIVE LED DISPLAY

|                               |  |
|-------------------------------|--|
| Both LEDs flash red           | Initialising   |
| Top LED steady red            | Top stop or "CLOSED" position reached                              |
| Bottom LED steady red         | Bottom stop or "OPEN" position reached                             |
| Top LED flashes green         | Drive running, moves towards "CLOSED" position                     |
| Top LED steady green          | Drive stationary, last running direction "CLOSED"                  |
| Bottom LED flashes green      | Drive running, moves towards "OPEN" position                       |
| Bottom LED steady green       | Drive stationary, last running direction "OPEN"                    |
| Both LEDs steady green        | Waiting time after switching on or after the emergency positioning |
| No LED is on                  | No voltage supply (terminal 2a or 2b)                              |
| Both LEDs flash red and green | Gear is in manual mode.  |

## Cleaning

If due to water quality (for example the degree of hardness or heavy pollution) deposit formation is expected, then regular cleaning of the heat exchanger must be carried out by rinsing.

Rinse the heat exchanger against the normal direction of flow using a suitable cleaning solution.

### ! CAUTION

**The chemicals used for cleaning must not be incompatible with stainless steel, copper or nickel, as such chemicals can destroy the heat exchanger.**

If the system is to be shutdown for a long period, completely empty and clean the heat exchanger.



## Technical Data

### HEAT EXCHANGER

| Type  | Technical Data <sup>1)</sup>  |
|-------|---|
| WTK 1 | Copper soldered plate heat exchanger (Stainless steel 1.4404) for brine/water heat pumps (27 kW H and 33 kW H)<br>Dimensions (W x H x D) in mm: 271 x 532 x 84<br>Empty weight: 26 kg, connections: G 2"<br>Cooling capacity (computed value): approx. 30 kW <sup>2)</sup>                                  |
| WTK 2 | Copper soldered plate heat exchanger (Stainless steel 1.4404) for brine/water heat pumps (43 kW, 41 kW H, 50 kW H, 54 kW, and 70 kW H)<br>Dimensions (W x H x D) in mm: 271 x 532 x 131<br>Empty weight: 37 kg, connections: G 2½"<br>Cooling capacity (computed value): approx. 70 kW <sup>2)</sup>        |
| WTK 3 | Copper soldered plate heat exchanger (Stainless steel 1.4404) for brine/water heat pumps 67 kW, 82 kW, 85 kW H, 100 kW H, 110 kW and 125 kW)<br>Dimensions (W x H x D) in mm: 271 x 532 x 201<br>Empty weight: 53 kg, connections: G 2½"<br>Cooling capacity (computed value): approx. 125 kW <sup>2)</sup> |
| WTK 4 | Copper soldered plate heat exchanger (Stainless steel 1.4404) for brine/water heat pumps (160 kW)<br>Dimensions (W x H x D) in mm: 271 x 532 x 272<br>Empty weight: 69 kg, connections: G 2½"<br>Cooling capacity (computed value): approx. 163 kW <sup>2)</sup>  |
| WTK 5 | Copper soldered plate heat exchanger (Stainless steel 1.4404) for two brine/water heat pumps (125 kW)<br>Dimensions (W x H x D) in mm: 386 x 1030 x 471<br>Empty weight: 250 kg, flange connections: DN 100<br>Cooling capacity (computed value): approx. 125 kW <sup>2)</sup>                              |
| WTK 6 | Copper soldered plate heat exchanger (Stainless steel 1.4404) for two brine/water heat pumps (160 kW)<br>Dimensions (W x H x D) in mm: 386 x 1030 x 542<br>Empty weight: 290 kg, flange connections: DN 100<br>Cooling capacity (computed value): approx. 125 kW <sup>2)</sup>                              |

<sup>1)</sup> see also the name plate on the heat exchanger • <sup>2)</sup> cooling capacity with a heat source temperature (primary circuit) of 10 °C / ΔT 3-4 K and secondary circuit 25 °C / ΔT 5 K

### CORROSION RESISTANCE

### ! CAUTION

**Take into account the corrosion behaviour of the material components of the heat exchanger (stainless steel, copper solder).**

| Dissolved matter  | Unit  | Guideline value  |
|---|-------|--|
| pH-value  |       | 7 - 9<br>(taking the saturation index into account)                      |
| Saturation index (ΔpH-value)                              |       | -0.2 < 0 < +0.2  |
| Total hardness  | °dH   | 6 - 15   |
| Conductivity  | μS/cm | 10 ... 500   |
| Filterable substances                                     | mg/l  | < 30   |
| Chloride  | mg/l  | temperature dependent, see table<br>(above 100 °C no chloride permitted) |
| Free chlorine   | mg/l  | < 0.5  |
| Hydrogen sulphide (H <sub>2</sub> S)                      | mg/l  | < 0.05   |
| Ammonia (NH <sub>3</sub> / NH <sub>4</sub> <sup>+</sup> ) | mg/l  | < 2  |
| Sulphate  | mg/l  | < 100  |
| Hydrogen carbonate  | mg/l  | < 300  |
| Hydrogen carbonate / sulphate                             | mg/l  | > 0.1  |
| Sulphide  | mg/l  | < 1  |
| Nitrate   | mg/l  | < 100  |

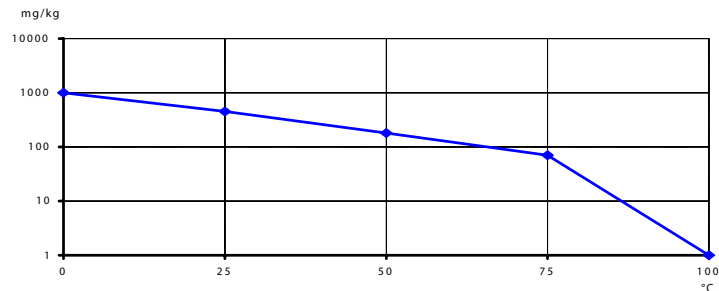
The stated values are guideline values, which may differ under certain operating conditions.



| Dissolved matter              | Unit | Guideline value |
|-------------------------------|------|-----------------|
| Nitrite                       | mg/l | < 0.1           |
| Dissolved iron                | mg/l | < 0.2           |
| Manganese                     | mg/l | < 0.1           |
| Free aggressive carbonic acid | mg/l | < 20            |

The stated values are guideline values, which may differ under certain operating conditions.

### PERMISSIBLE CHLORIDE CONTENT DEPENDENT ON THE TEMPERATURE



### 3-WAY FLANGE VALVE

| Type  | Nominal diameter | Connection | kvs value |
|-------|------------------|------------|-----------|
| WTK 1 | DN 50            | PN 16/10   | 28 m³/h   |
| WTK 2 | DN 65            | PN 16/10   | 49 m³/h   |
| WTK 3 | DN 80            | PN 16/10   | 78 m³/h   |
| WTK 4 | DN 100           | PN 16/10   | 124 m³/h  |
| WTK 5 | DN 125           | PN 16/10   | 200 m³/h  |
| WTK 6 | DN 125           | PN 16/10   | 200 m³/h  |

| Type  | Weight  | Valve stroke |
|-------|---------|--------------|
| WTK 1 | 10.9 kg | 8 mm         |
| WTK 2 | 14.7 kg | 20 mm        |
| WTK 3 | 18.8 kg | 20 mm        |
| WTK 4 | 29.0 kg | 40 mm        |
| WTK 5 | 42 kg   | 40 mm        |
| WTK 6 | 42 kg   | 40 mm        |

|                       |                               |    |
|-----------------------|-------------------------------|----|
| Operating temperature | -10 °C – 150 °C <sup>1)</sup> |    |
| Operating pressure    | up to 120 °C                  | 16 |
|                       | up to 130                     | 13 |
|                       | up to 150 °C                  | 10 |

|                            |             |                  |
|----------------------------|-------------|------------------|
| Valve characteristic curve | Normal load | equal percentage |
|                            | Mixing load | linear           |

Valve adjustment ratio > 50:1

Stop bushing 2 EPDM O-rings

|              |             |                          |
|--------------|-------------|--------------------------|
| Leakage rate | Normal load | ≤ 0.05% of the kvs value |
|              | Mixing load | ≤ 1% of the kvs value    |

<sup>1)</sup> ≤ 0 °C use stuffing box heating. ≥ 100 °C use temperature adapter

| Type            | $\Delta p_{max}$ [bar] | close/off pressure    |
|-----------------|------------------------|-----------------------|
| As mixing valve |                        | As distribution valve |

$\Delta p_{max}$  = maximum allowable pressure difference across the valve, with which the drive can still reliably open and close the valve taking into consideration  $\Delta p_v$   
 close/off pressure = maximum possible pressure difference across the valve in controlled operation mode at which the drive can still open and close the valve. In this mode, allowance must be made for reduced service life. Cavitation, erosion and water hammer can damage the valve. The values only apply for the assembled combination of the valve fitted on the valve drive.



| Type  | $\Delta p_{max}$ [bar] | close/off pressure |
|-------|------------------------|--------------------|
| WTK 1 |                        |                    |
| WTK 2 | 3 6.5                  | 1.0 6.9            |
| WTK 3 | 3 4.4                  | 0.7 4.6            |
| WTK 4 | 2 2.8                  | 0.5 2.9            |
| WTK 5 | 1.5 1.8                | 0.5 1.9            |
| WTK 6 | 1.5 1.8                | 0.5 1.9            |

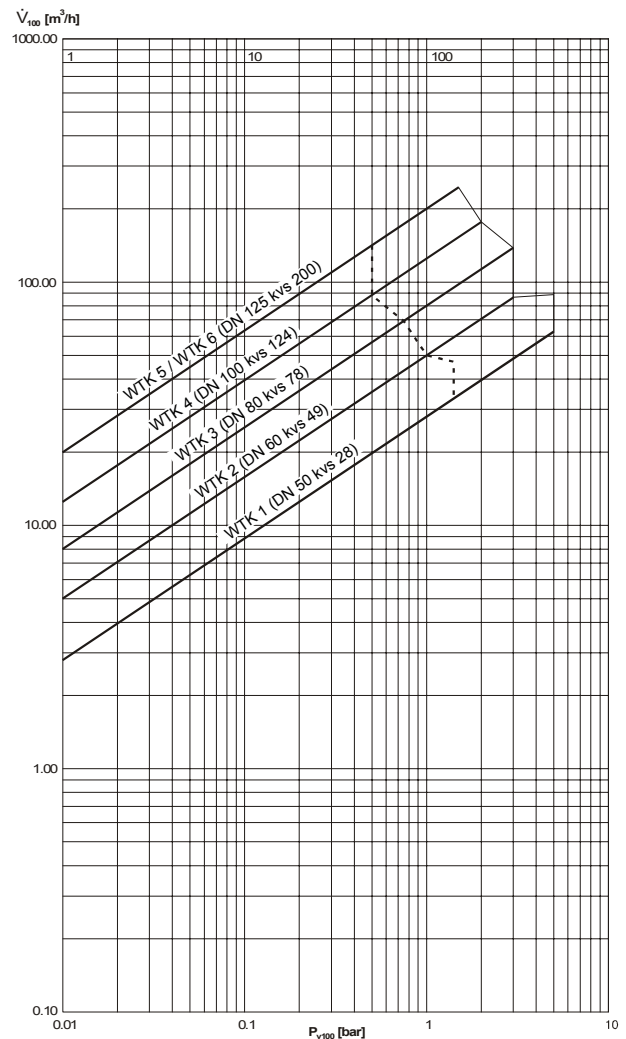
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| Type  | As mixing valve | As distribution valve |
|-------|-----------------|-----------------------|
| WTK 1 | 5               | 1.5                   |
| WTK 2 | 3               | 1.0                   |
| WTK 3 | 3               | 0.75                  |
| WTK 4 | 2               | 0.5                   |
| WTK 5 | 1.5             | 0.5                   |
| WTK 6 | 1.5             | 0.5                   |

$\Delta p_v$  = maximum allowable pressure difference across the valve for every stroke position, limited by the noise level and corrosion

### FLOW DIAGRAM

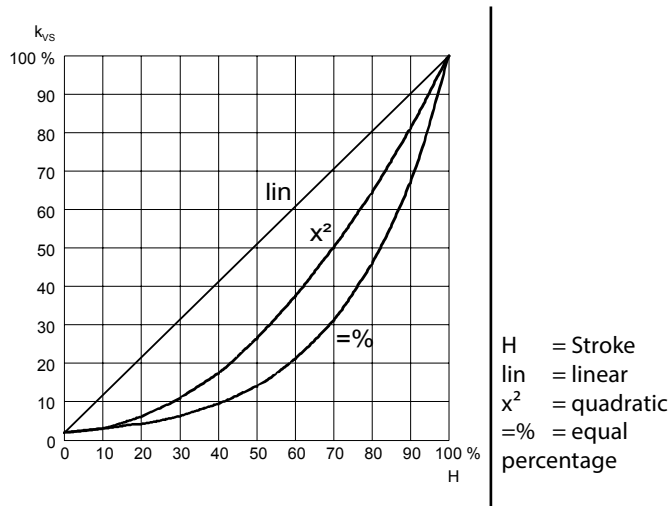


—  $\Delta p_v$  against the pressure  
 - - -  $\Delta p_v$  with the pressure

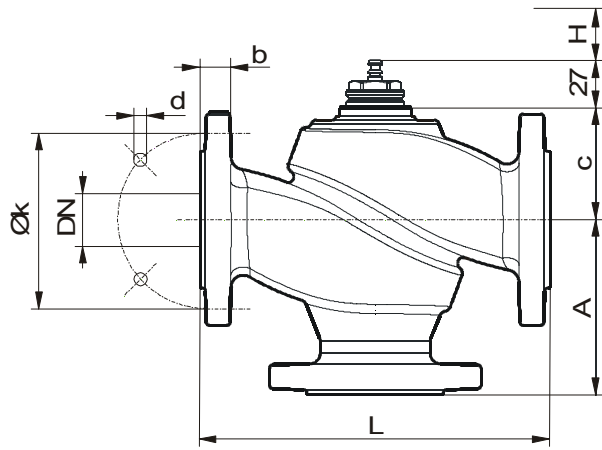




### CHARACTERISTIC CURVE WITH VALVE DRIVE

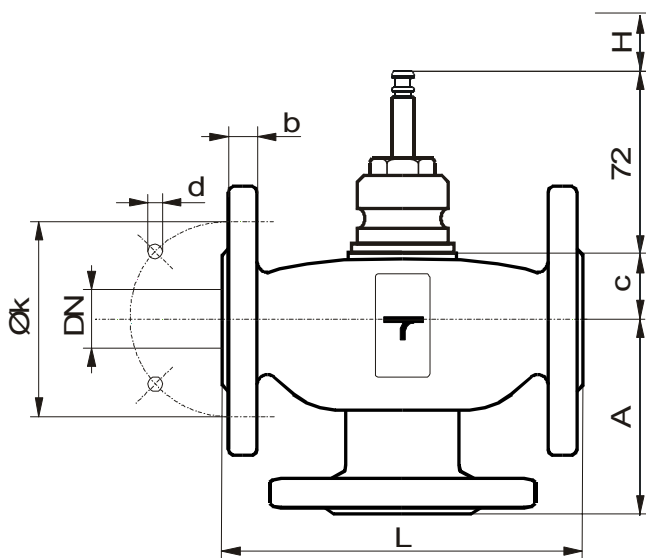


### DIMENSIONAL DRAWING 3-WAY FLANGE VALVE WTK 1



|       | DN | A   | c  | L   | H | k   | d      | b  |
|-------|----|-----|----|-----|---|-----|--------|----|
| WTK 1 | 50 | 115 | 71 | 200 | 8 | 125 | 19 x 4 | 20 |

### DIMENSIONAL DRAWING 3-WAY FLANGE VALVE WTK 2 – WTK 6



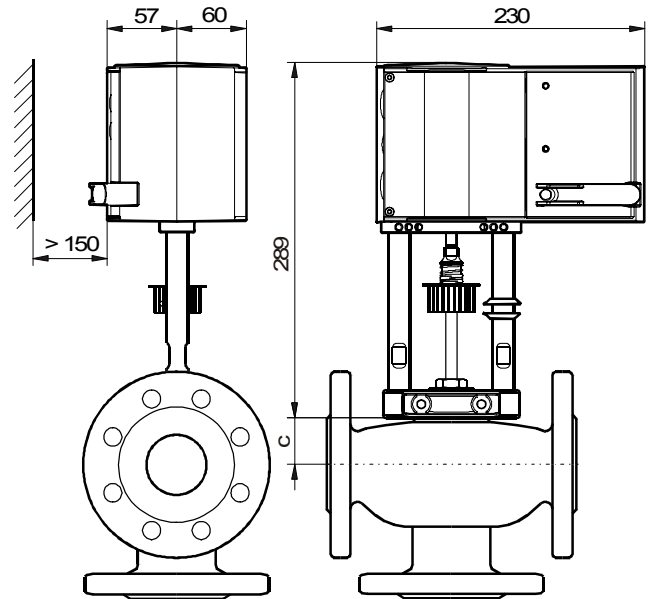
|       | DN  | A   | c     | L   | H  | k   | d      | b  |
|-------|-----|-----|-------|-----|----|-----|--------|----|
| WTK 2 | 65  | 145 | 62    | 290 | 20 | 145 | 19 x 4 | 20 |
| WTK 3 | 80  | 155 | 62    | 310 | 20 | 160 | 19 x 8 | 22 |
| WTK 4 | 100 | 175 | 93    | 350 | 40 | 180 | 19 x 8 | 24 |
| WTK 5 | 125 | 200 | 105,5 | 400 | 40 | 210 | 19 x 8 | 26 |
| WTK 6 | 125 | 200 | 105,5 | 400 | 40 | 210 | 19 x 8 | 26 |

### VALVE DRIVE

|                                     |   |
|-------------------------------------|---|
| Control signal 1                    | 0...10 V, $R_i > 100 \text{ k}\Omega$   |
| Control signal 2                    | 4...20 mA, $R_i = 50 \Omega$  |
| Response signal                     | 0...10 V, Load $> 2.5 \text{ k}\Omega$  |
| Start point $U_0$                   | 0 or 10 V   |
| Connection control range $\Delta U$ | 10 V  |
| Switching range $X_{sh}$            | 300 mV  |
| Supply voltage                      | 24 V~ $\pm 20\%$ , 50...60 Hz<br>24 V- $\pm 15\%$<br>with accessories 230 V~ $\pm 15\%$ |
| Power consumption                   | 10W 18VA  |
| Stroke                              | 8...49 mm   |
| Maximum medium temperature          | 130   |
| Allowable ambient temperature       | -10 °C...55(60) °C  |
| Allowable ambient humidity          | < 95% rF without condensation   |
| IP rating                           | IP 66 in accordance with EN 60529   |
| Protection class                    | III according to IEC 60730  |
| 3-point response time               | 200 ms  |
| Installation position               | Vertically upright to horizontal  |

| Duration     | Stroke    | Thrust | Voltage | Weight |
|--------------|-----------|--------|---------|--------|
| 2 / 4 / 6 mm | 0...40 mm | 2500 N | 24 V~   | 4.1 kg |

### VALVE DRIVE DIMENSIONAL DRAWING



|       | c     |
|-------|-------|
| WTK 2 | 62    |
| WTK 3 | 62    |
| WTK 4 | 93    |
| WTK 5 | 105,5 |
| WTK 6 | 105,5 |



SWITCH CODING

| W              | A | B | C | D |
|----------------|---|---|---|---|
| = %            |   |   |   |   |
| x <sup>2</sup> |   |   |   |   |
| lin            |   |   |   |   |
| = %            |   |   |   |   |
| lin            |   |   |   |   |

- W = Required characteristic curve
- A = Switch coding
- B = Valve characteristic curve
- C = Valve drive characteristic curve
- D = Effective at the valve
- =% = equal percentage
- x<sup>2</sup> = quadratic
- lin = linear
- V =
- H = Stroke
- S = Signal
- = Factory setting

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| L / mm | A | L = 14 mm H | L = 20 mm H | L = 40 mm H |
|--------|---|-------------|-------------|-------------|
| 2s     |   | 28s ± 1     | 40s ± 1     | 80s ± 2     |
| 4s     |   | 56s ± 2     | 80s ± 2     | 160s ± 4    |
| 6s     |   | 84s ± 4     | 120s ± 4    | 240s ± 8    |

- L/mm = Running time per mm
- A = Switch coding
- L = Running time
- H = Stroke
- = Factory setting

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## SENSOR

### NTC clamp-on sensor

Diameter 6.0 mm  
(Requires 8 mm diameter thermometer well)

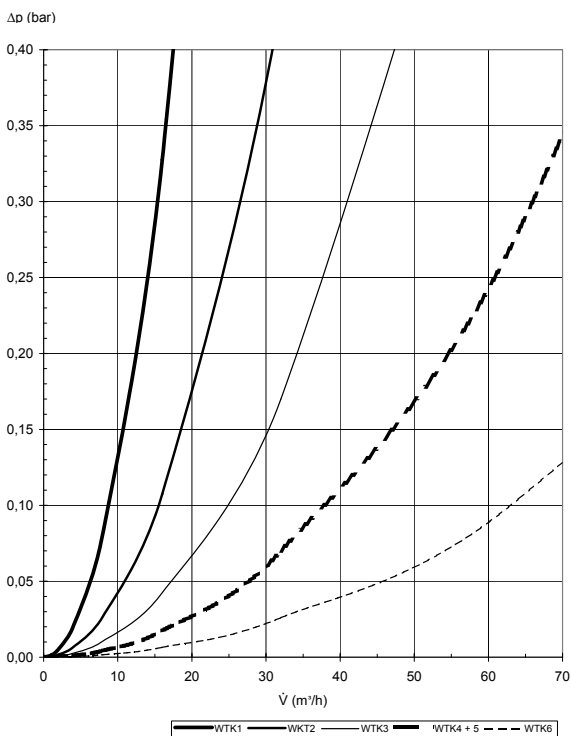
Connection cable 2 m

### SENSOR CHARACTERISTIC CURVE

| T / °C | R / kΩ |
|--------|--------|
| -20    | 16.538 |
| -15    | 12.838 |
| -10    | 10.051 |
| -5     | 7.931  |
| +/- 0  | 6.306  |
| +5     | 5.040  |
| +10    | 4.056  |
| +15    | 3.283  |
| +20    | 2.674  |
| +25    | 2.200  |
| +30    | 1.825  |
| +35    | 1.510  |
| +40    | 1.256  |
| +45    | 1.056  |
| +50    | 0.891  |
| +55    | 0.751  |
| +60    | 0.636  |
| +65    | 0.534  |

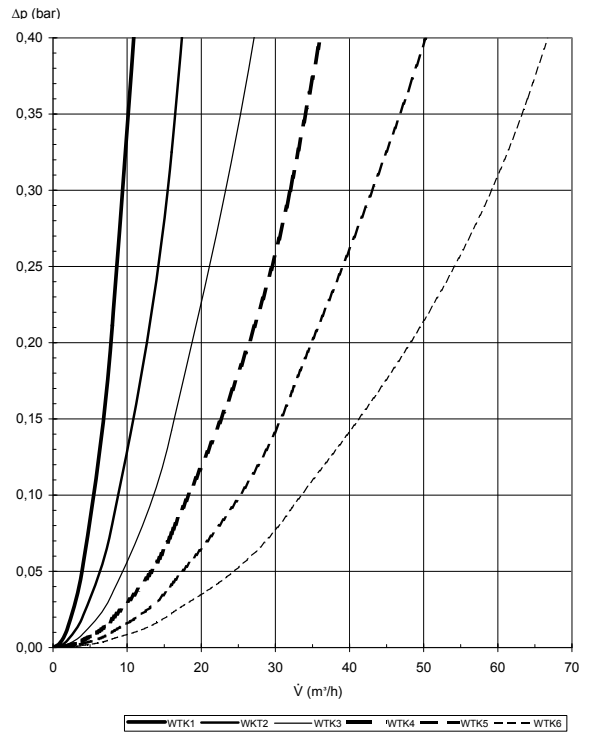
## Pressure loss curves

### HEAT SOURCE HEATING MODE



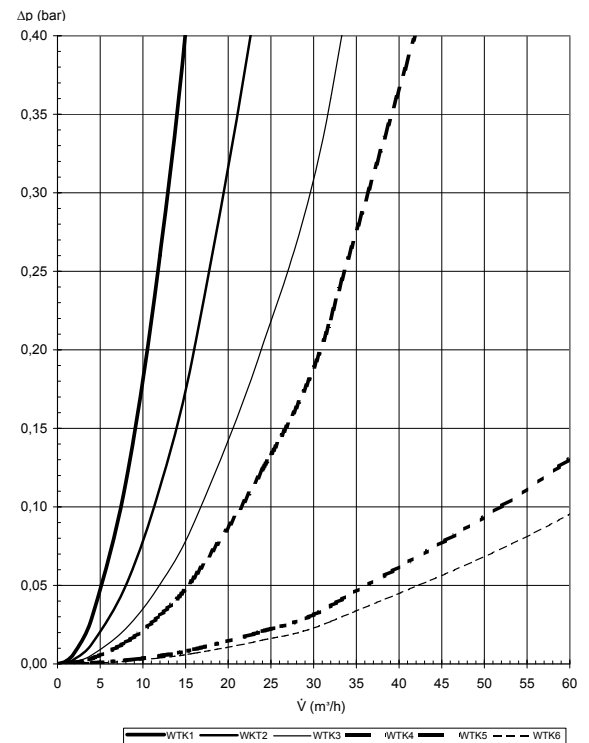
$\dot{V}$  Volume flow, heat source heating mode  
 $\Delta p$  Pressure loss

### HEAT SOURCE COOLING MODE



$\dot{V}$  Volume flow, heat source cooling mode  
 $\Delta p$  Pressure loss

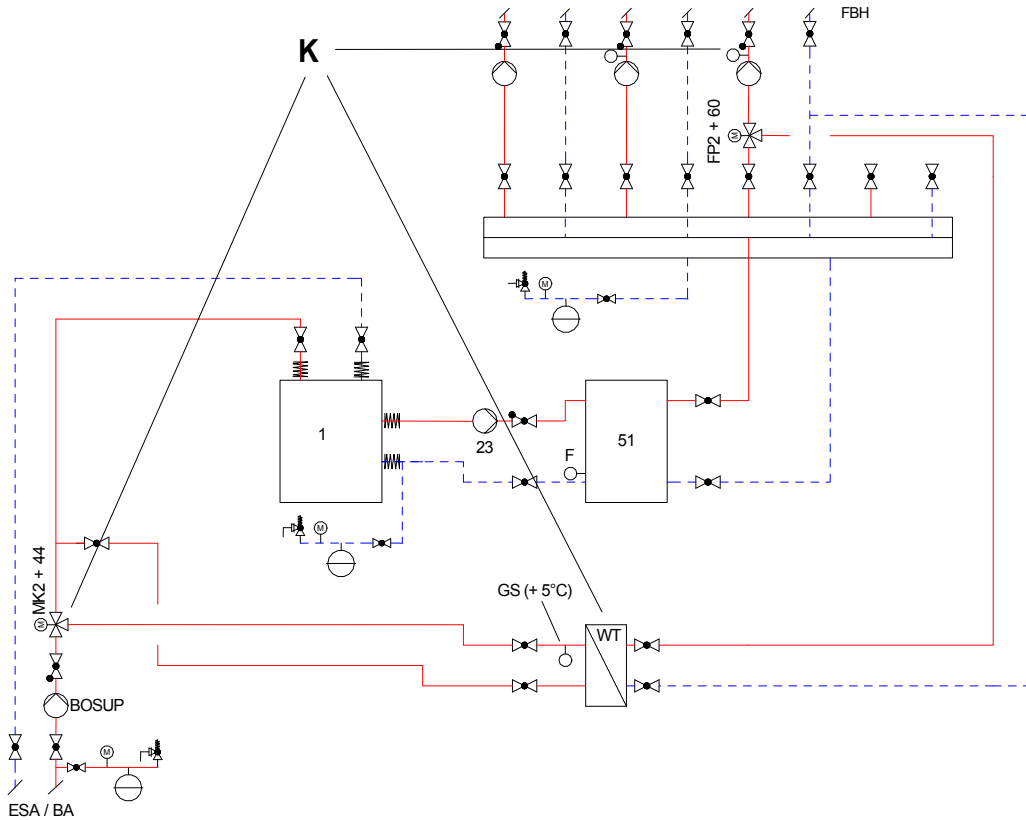
### HEATING CIRCUIT



$\dot{V}$  Volume flow, heating circuit  
 $\Delta p$  Pressure loss



## Cooling of a control circuit



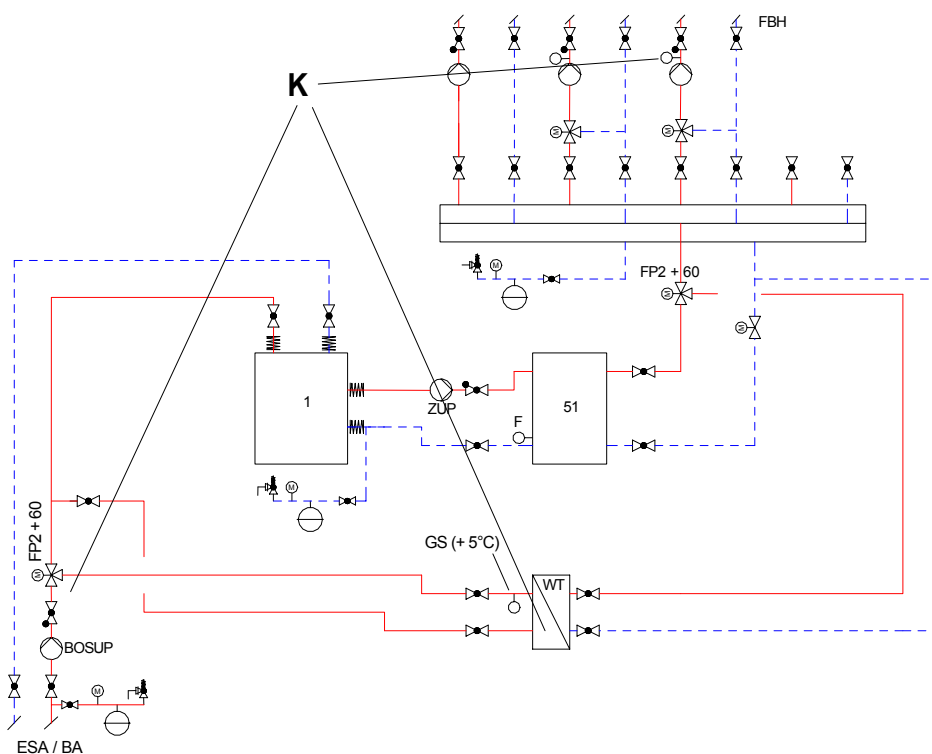
## Cooling package hydraulic connection

- K Cooling package accessories:  
Plate heat exchanger, 3-way valve, cooling circuit feed-flow sensor
- 1 Heat pump
- 23 Booster circulating pump
- 51 Separating tank
- 60 Switching valve cooling mode
- BOSUP Well / brine circulating pump
- ESA/BA Ground source heat pump / well system
- FBH Passive cooling:  
Cooling ceiling, consumer circuits with dew-point monitoring during comfort cooling (comfort PCB necessary)
- FP Mixed circuit circulating pump
- GS Freezing protection
- MK Mixer circuit
- WT Heat exchanger

### NOTICE

**During control circuit cooling, the 3-way valve can be connected as a control valve.**

## Cooling of several control circuits



## Cooling package hydraulic connection

- K Cooling package accessories:  
Plate heat exchanger, 3-way valve, cooling circuit flow sensor
- 1 Heat pump
- 23 Booster circulating pump
- 51 Separating tank
- 60 Switching valve cooling mode
- BOSUP Well / brine circulating pump
- ESA/BA Ground source heat pump / well system
- FBH Passive cooling:  
Cooling ceiling, consumer circuits with dew-point monitoring during comfort cooling (comfort PCB necessary)
- FP Mixed circuit circulating pump
- GS Freezing protection
- MK Mixer circuit
- WT Heat exchanger

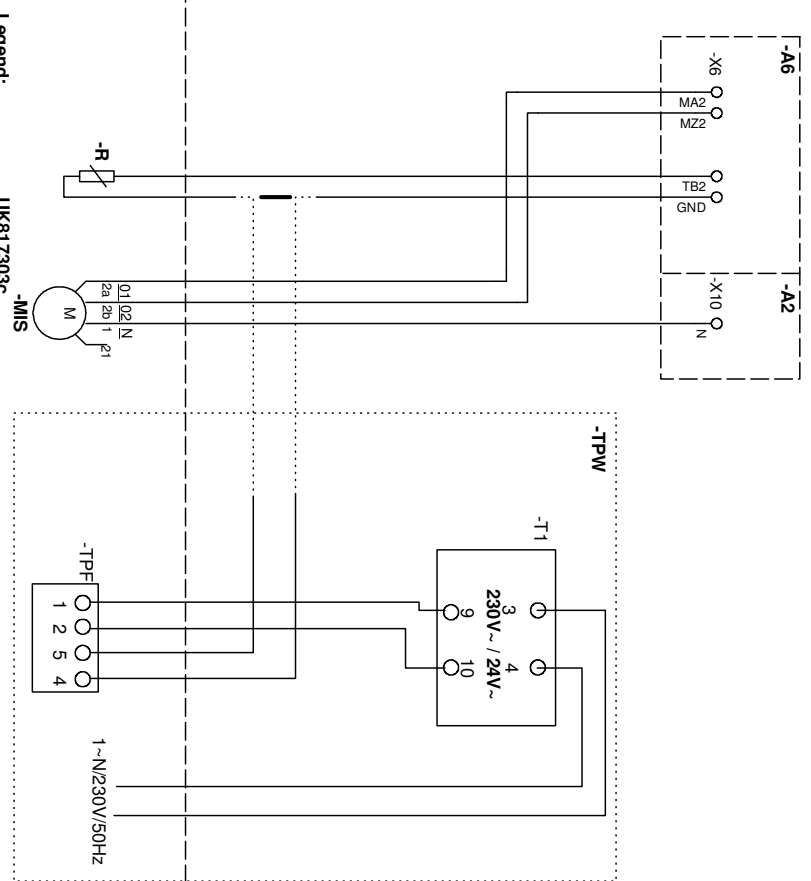
### NOTICE

**When cooling several control circuits, connect the 3-way valve as a switching valve.**

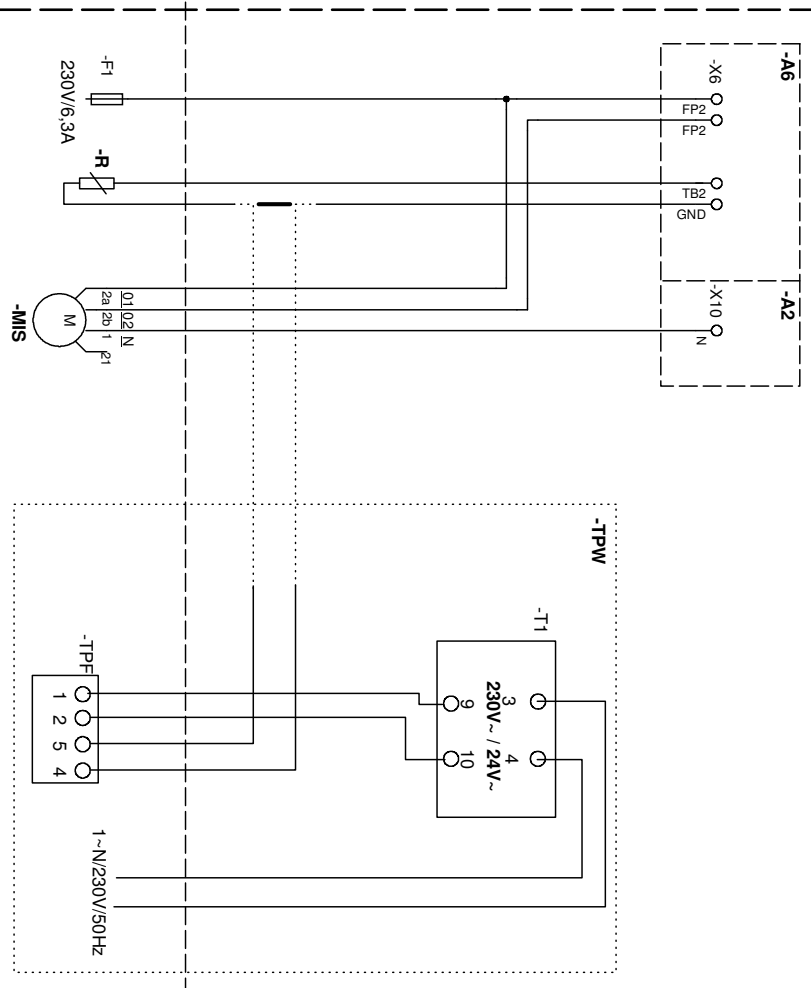


# Cooling package

## 3 point controller



## 2 point controller



# Terminal diagram



- Legend:**
- Operating materials
  - 1-N/230V/50HZ
  - A6
  - A2
  - F1
  - FP2
  - R
  - MA2/MZ2
  - MIS
  - T1
  - TPF
  - TPW
  - X6
  - X10
- UK817303c**
- Function: Supply control transformer dew point monitor
  - L,N: Supply control transformer dew point monitor
- UK817303c**
- Comfort board 2
  - Terminals in heat pump switchbox
  - Pump back-up fuse, mixing circuit 2 max. 230V 6.3AA floating contact
  - Pump, mixing circuit 2 floating contact
  - Control sensor
  - Charge/discharge/cooling mixer 2
  - Cooling mixer
  - Accessories: Transformer 230V / 24V
  - Accessories: Dew point sensor
  - Accessories: Dew point sensor; On connection of the dew point sensor,
- Terminal strips on Comfort board 2
- Terminal strip in switchbox of heat pump; N/PE distribution for external 230V units





