

# KTRVB-052.245 – with Off(enforced closed)/day/ECO switch

## KTRVB-052.244 – without a switch

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## Electronic, surface-mounted climate controller with dew point activation and input for external temperature sensor for controlling cooling ceilings

### Safety notice!

This device may only be opened by an electrician and installed in accordance with the corresponding circuit diagram in the housing cover / on the housing / in the operating instructions. The applicable safety regulations should be observed.

**Attention!** Operating in the vicinity of devices which do not comply with the EMC guidelines may affect the device functions. After installation, the installation company should instruct the operator in how the control system works and how to operate it. The operating instructions must be stored somewhere freely accessible to operating and maintenance staff.

### 1. Application

This controller was developed especially for controlling heating/cooling in 2- and 4-pipe systems for hotels, residential properties and business premises, for controlling permanent valve actuators, both closed when de-energised and open when de-energised. The KTRVB-052.24x is especially suitable for controlling cooling ceilings due to the option of dew point monitoring. If used in other areas not envisaged by the manufacturer, the safety specifications applicable to these areas must be observed. For suitability for this, see Section 12. Warranty.

### 2. Functions in general

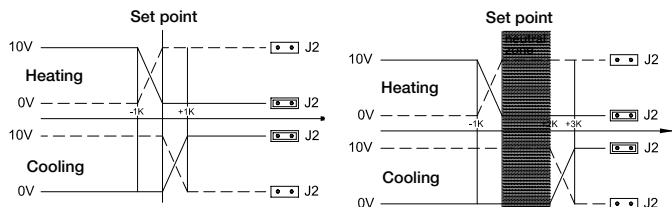
The KTRVB-052.24x has an internal and/or external sensor for measuring the room temperature and activates the heating or cooling in proportion to the deviation from the set setpoint. In order to compensate for the inertia of control paths with cooling ceilings, the KTRVB-052.24x has a temperature sensor input for activating an external radiation sensor (see Section 6. Accessories). As a variant for public authorities that need the controller to be inaccessible to unauthorised people, the external sensor can also be implemented as a room sensor. Using an internal potentiometer, the internal or external sensor, or both sensors, can be selected using adjustable weighting (see Section 2.1). Furthermore, the external sensor can be excluded from the "Heating" operating mode. The external radiation sensor for the "Cooling" function is usually located in the window area so the system can respond quickly to the "Solar radiation" disturbance variable. If the heating is also located in the window area, unforeseeable control deviations may arise in the winter when using the "Heating" function because the radiation sensor is too close to the source of heat. The exclusion process is different in the 2- and 4-pipe systems (see Sections 2.2 and 2.3).

#### 2.1. Sensor selection (internal, external or both sensors with adjustable weighting)

The internal trimmer potentiometer (see Section 9.) can be used to select whether control is based on the internal sensor (left stop) or the external sensor (right stop). In intermediate positions, when using both sensors the weighting is determined between the internal room sensor and external radiation sensor. The weighting allows differing structural circumstances, such as large window areas or geographic directions, to be compensated for. In the centre position, the weighting between the internal and external sensor is 50% / 50%. With very inert control paths, we would recommend assigning the radiation sensor a higher weighting than the internal room sensor.

#### 2.2 Valve type selection

The controller is matched to the corresponding valve types using jumper 2 (see Section 9.). Jumper inserted = closed when de-energised, jumper not inserted – open when de-energised.



### 2.3. Functions and settings in 2-pipe system

The controller is matched to the pipe system present (2 or 4 pipes) using jumper 1 (see Section 9.). In 2-pipe mode, the controller is operated with a combined heating/cooling output, which is switched via an external contact (changeover contact) or upstream sensor (sensor 2 / 47K). Using a changeover contact and parallel wiring, it is possible to achieve central switching for up to 20 controllers. Contact opened and/or supply temperature < 20°C = cooling mode, contact closed and/or supply temperature > 26°C = heating mode. **Attention!** Note wiring information provided in Section 11.1.

#### Exclusion of external sensor in 2-pipe system

Jumper 3 (see Section 9.) can be used in the 2-pipe system to select whether the external sensor (radiation sensor) is to participate in heating mode or not. If the jumper is inserted, the external sensor is also evaluated in heating mode. Without the jumper, the external sensor is no longer taken into account in heating mode and control is simply based on the internal room sensor. We would then recommend excluding the external radiation sensor from heating mode if it is positioned too close to the source of heat for the heating function.

### 2.4. Functions and settings in 4-pipe system

The controller is matched to the pipe system present (2 or 4 pipes) using jumper 1 (see Section 9.). In the 4-pipe system, the heating and cooling valve are controlled separately with two outputs. The neutral zone between the heating and cooling functions is approx. 2K.

#### Exclusion of external sensor in 4-pipe system

Because the controller in the 4-pipe system cannot independently detect heating or cooling mode, unlike the setup in the 2-pipe system, jumper 2 cannot be used to preselect exclusion or use of the external radiation sensor. If the controller has been matched to a 4-pipe system using jumper 1, jumper 3 no longer has a function. If you want to exclude the external sensor from the control process, you will have to do this in the 4-pipe system using the changeover contact. Contact open = external sensor is used for control purposes, contact closed = external sensor not taken into consideration.

**Example:** The weighting between the internal room sensor and external radiation sensor is set to 50% / 50% (see Section 2.1).

If the changeover contact is open, the average of the two sensors is always taken and used for control purposes. Comparing the nominal and actual value therefore produces a heating or cooling request and the corresponding valve is then activated.

If the changeover contact is closed, only the actual value of the internal room sensor is used for control purposes. Comparing the nominal and actual value therefore produces a heating or cooling request and the corresponding valve is then activated. **Note:** The process for excluding the external radiation sensor from the control process described in Section 2. is usually only appropriate for the heating function.

### 2.5. Using optional dew point sensor to interrupt cooling if condensation forms

The cooling function can be interrupted if condensation forms using an optional external sensor. The dew point sensor must be mounted in the place where the dew point is most likely to occur on the cooling circuit. If this location cannot be clearly identified up to 5 dew point sensors can be connected to the controller in parallel. Ideally, the dew point sensors should be mounted on the intake running into the room and/or in the window area. Also refer to Section 6. Accessories.

### 2.6. Energy-saving function (ECO mode)

The energy-saving function can be triggered by an external contact (ECO contact) or the switch. When this function is selected, in heating mode the temperature is reduced by 3K and in cooling mode increased by 3K. Central energy savings can therefore be made manually or in a time-controlled manner

using a timer contact if rooms or entire floors are not occupied and/or being used.

Contact closed = ECO function, contact open = normal mode.

**Attention!** Note wiring information provided in Section 11.1.

### 2.7 Off function

The off function can be activated by an external contact (Off contact) or the switch. If the off function is activated, the frost protection function is also activated (as described in 2.9). Contact closed = controller off, contact open = normal function. **Attention!** Note wiring information provided in Section 11.1.

### 2.8. Switch functions

The KTRVB-052.245 has an "Off(enforced closed)/day/ECO" switch. When in the OFF position, the controller delivers frost protection.

### 2.9. Frost protection function

If the KTRVB-052.245 switch is in the OFF (enforced closed) position, the room temperature is still monitored and the valves are forced open at temperatures below 5°C when there is a risk of frost. Frost protection monitoring is activated regardless of the functions selected and the positions of the jumpers when the switch is in the OFF position. When triggered, the valves are opened and activation indicated by the red lamp.

### 2.10. Limitation of the setting range

The setting range can be mechanically limited using the setting pins under the knob. (Refer to Section 8.).

### 3. Displays

The controller has a lamp to indicate the control state.

Blue = cooling (controller requesting cold)

Red = heating (controller requesting heat)

Red in Off switch position = frost protection

Green = dew point indication

Flashing red = sensor failure or short circuit of external sensor. The internal sensor continues to be used for control purposes.

### 4. Mounting

To simplify mounting, the controller is supplied open. Mounting on a flush-mounted socket is recommended. It may also, however, be mounted on a level, non-conductive subsurface. The controller opens and closes as described in Section 8. First take off knob, use a slotted screwdriver to gently push in hooklet and fold down controller cap to open it. The ventilation slots must not be closed since this will lead to defective control. When using the internal sensor, the controller must not be exposed to direct sources of heat or cold. Ensure that the controller is not exposed to external heating or cooling at the rear, e.g. with wooden walls from draughts or rising mains.

### 5. Technical data

Supply and switching voltage:	24V, 50/60Hz, protective extra low voltage
Outputs / switching power:	2 x 0 ... 10V can be switched to 10 ... 0V, max. 5mA
Control range:	21°C ±8K
Proportional zone for heating and cooling:	1K
Neutral zone:	approx. 2K
Triggering of frost protection:	< 5 °C
ECO zone:	±3K fixed setting
Scale:	grey tapering arrows, comfortable point
Sensors:	NTC internal sensor and/or NTC 2 (47K) external sensor, optional NTC 2 (47K) upstream sensor and TPS 1/2/3 dew point sensors, see 6. Accessories
Electric connection:	0.5 ... 2.5 mm² screw terminals
Power consumption:	< 0.6W (1.0VA)
Type of protection:	IP30 following appropriate mounting
Protection class:	III protective extra low voltage
Mounting:	surface mounting / wall mounting
Ambient temperature:	0 ... 40 °C
Storage temperature:	-20 ... +70°C
Permissible air humidity:	max. 95% r.H. non-condensing
Housing material and colour:	ABS plastic, pure white (similar to RAL 9010)
Equipment:	mech. range reduction Off(enforced closed)/day/ECO switch with KTRVB-052.245
Degree of contamination:	2
Rated impulse voltage:	500 V
Energy efficiency class:	I (contribution to seasonal room heating energy efficiency 1%)

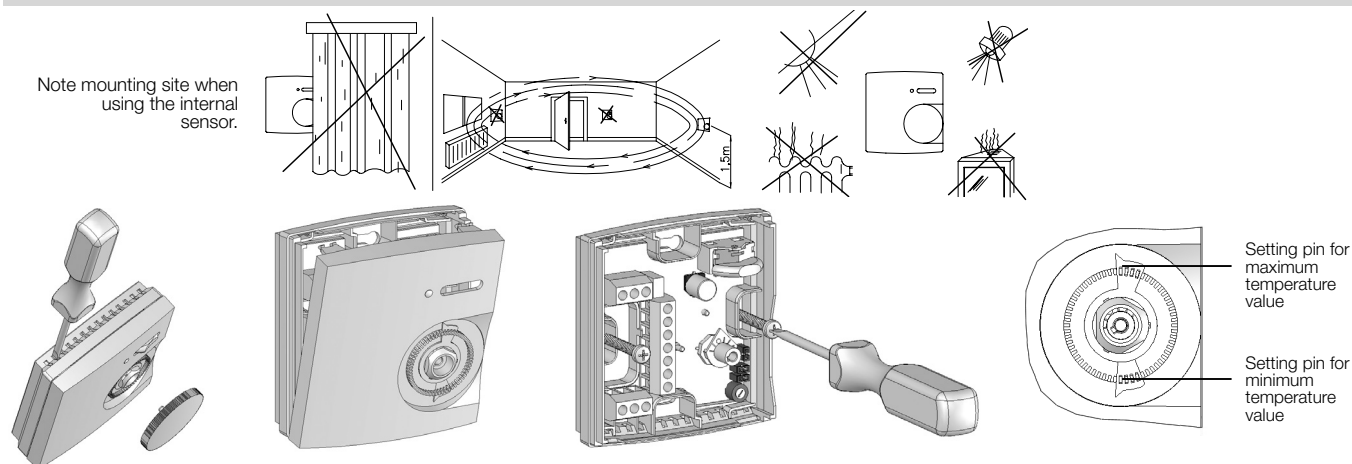
### 6. Accessories (not included in scope of delivery)

– TPS 1, TPS 2 and TPS 3 dew point sensors.  
– External temperature sensor, e.g. PFC47 (radiation sensor as swing sensor), STF-2 (radiation sensor in room sensor casing), BTF2 (room sensor) or KF-2 (sleeve sensor)

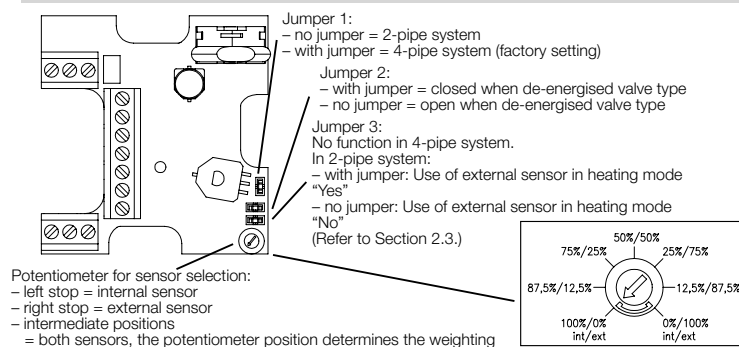
### 7. Symbols used

Operating and display symbols		Terminal symbols	
Normal mode	☀	Heating / cooling	H/K
ECO mode (switch)	ECO	Heating	H
Control OFF (frost protection)	○	Phase operating voltage	24V~
Heating ON	☀	Mass	⊥
Cooling ON	☀	Heating/cooling changeover	C/O
Comfortable temperature approx. 21°C	●	ECO contact	ECO
		Dew point sensor	TPS
		OFF contact	AUS
		External temperature sensor	F

## 8. Installation and assembly instructions



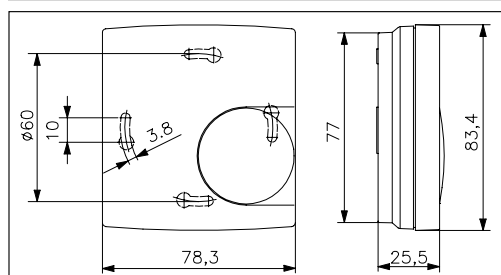
## 9. Adjustment positions



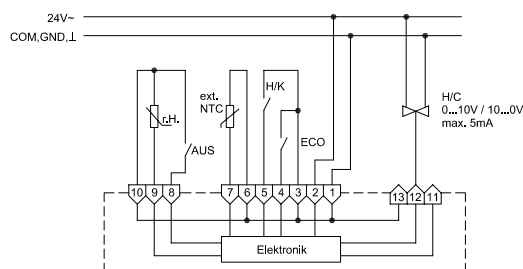
## 10. Sensor characteristic curve of external sensor

Sensor (NTC 47k)	
Sensor temperature [°C]	Resistance value [kΩ]
-10	264.028
0	155.480
10	94.377
15	74.314
20	58.910
25	47.000
30	37.732
40	24.750
50	16.597

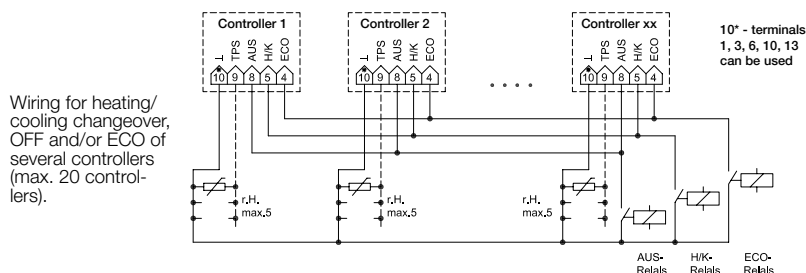
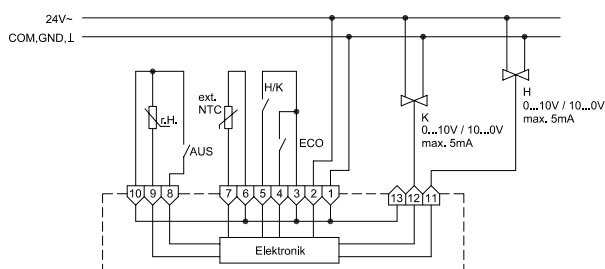
## 11. Dimensional drawings and connection diagrams



Connection in 2-pipe system (also refer to Section 9., Jumper 1)



Connection in 4-pipe system (also refer to Section 9., Jumper 1)



## 12. Liability

We determined the technical data provided in an inspection and test environment suited to this task (we are happy to provide details on request) and this data only presents the agreed properties on this basis. The purchaser / customer is responsible for checking the suitability of the use or usage intended by the purchaser / customer under the specific conditions of use; we do not accept any liability for this. We reserve the right to amendments.