# Manual for
# BACnet room controller with display

This manual contains information about how to plan, mount/install, start up/configure and operate the BACnet room controller KTRBUu217.456.

# Content

# 1. Notes relating to documentation

Read these instructions carefully before installing and starting up the device. The operating instructions must be stored somewhere freely accessible to operating and maintenance staff.
The following symbols are used in these instructions:

| | |
|---|---|
|  | Warning of personal injury from electric voltage. |
|  | Important information |

## 1.1 Safety notices

When installing the device and during operation, observe the following safety notices:

| | |
|---|---|
|  | This device may only be installed by an electrician in accordance with the corresponding connection diagram in the operating instructions. The applicable safety regulations should be observed. |
|  | Mounting / removal may only be undertaken when de-energised. |
|  | The corresponding terminals are indicated with SELV and/or mains in the circuit diagram. |
|  | Troubleshooting and fault rectification should only be carried out by an electrician. |
|  | Only replace defective parts by genuine parts from the manufacturer. |
|  | Carefully remove dust and dirt from the housing surface using a dry, solvent-free and soft cloth. |

## 1.2 Explanation of symbols

The following symbols may be shown on the device display:

| | |
|---|---|
|  | Button: Increment the value being set |
|  | Button: Decrement the value being set |
|  | Button: Mode button - for function, refer to offline mode |
|  | Button: Menu button - for function, refer to main menu |
|  | Button: positive confirmation - the set value is adopted, the selected function is started .... |
|  | Button: negative confirmation - the function is exited, the set value is not adopted .... |
|  | Button: For fan speed setting, see automatic fan system |
|  | Button: Call up the “Extended presence” function |
|  | Button: Start “Boost mode” |

| | |
|---|---|
| Fn | Button: Call up the “Function menu” |
| ◄ | Button: Navigate to the left |
| ► | Button: Navigate to the right |
| ▲ | Button: Navigate up |
| ▼ | Button: Navigate down |
| an | Button: during the function test, activates the selected output, see settings |
| aus | Button: during the function test, deactivates the selected output, see settings |
|  | Symbol for PROTECTION MODE |
|  | Symbol for COMFORT MODE |
|  | Symbol for boost mode |
|  | Symbol for extended presence |
|  | Symbol for sleep mode |
|  | Clock symbol, see time setting menu |
|  | Calendar symbol, see date setting menu |
|  | Thermometer symbol, see temperature setting menu |
|  | Info symbol, see menu info function |
|  | For symbol settings, see settings menu |
|  | Symbol for an open window, see window open function |
|  | Attention symbol, indicates that an error has occurred / emergency operation, see error rectification |
|  | Fire alarm symbol, see fire alarm |

# 2. General information

## 2.1 Usage

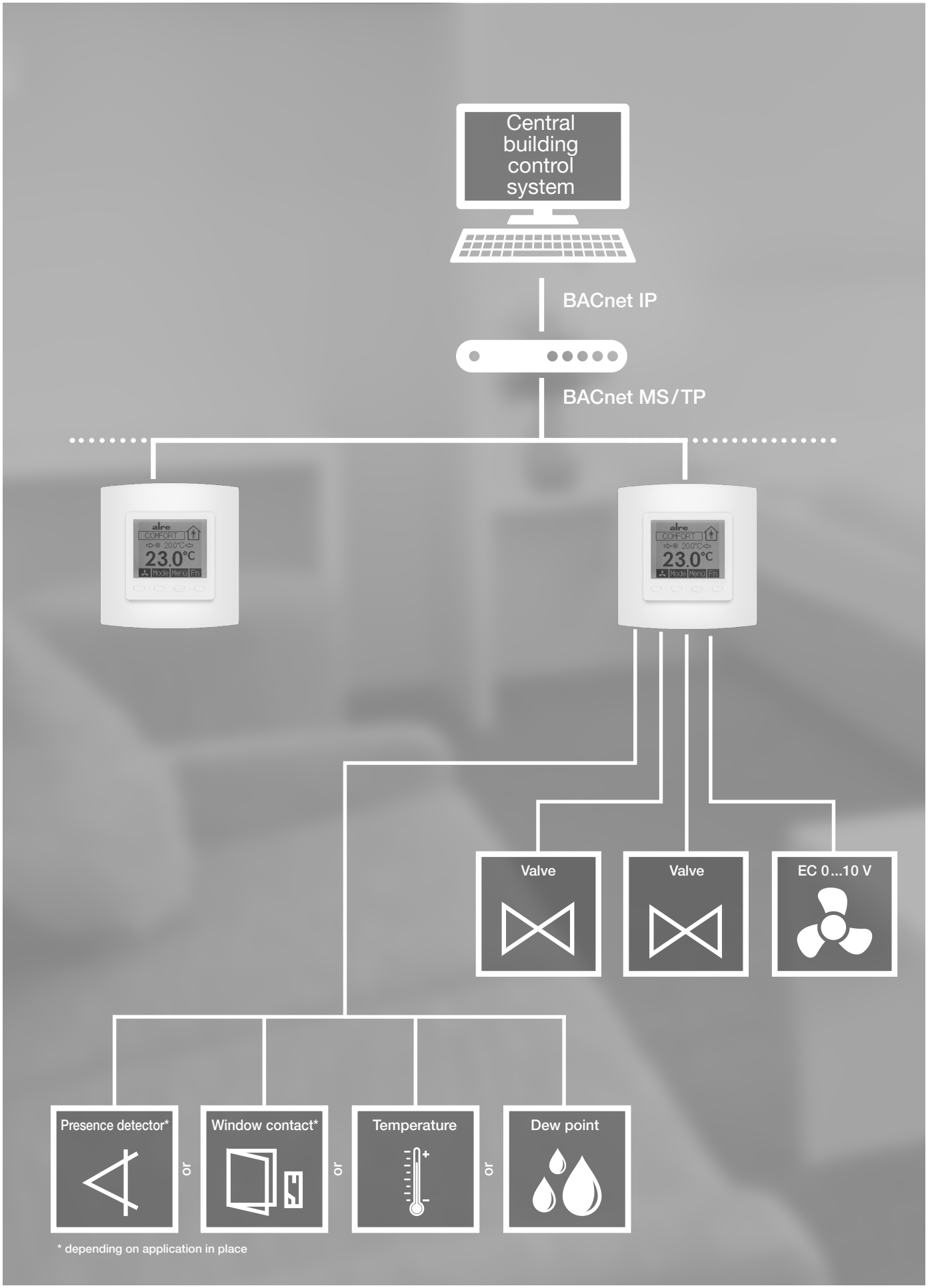
The alre BACnet room controller with graphic display was developed especially for time-based heating and cooling operation in 2- or 4-pipe systems. The controller can be used in various sectors, such as hotels, apartments, offices and business premises as well as hospitals and schools.
The alre BACnet room controller (KTRBUu 217.456) communicates via BACnet according to DIN EN ISO 16484-5 with the BACnet MS/TP network protocol. The room controller is therefore compatible with all common building automation systems. The controller has a “B-AAC” BACnet profile (BACnet Advanced Application Controller).
Numerous applications for controlling room temperatures in room automation are covered by the predefined applications.

The BACnet room controller was awarded the BTL certificate for compliance with the BACnet standard ISO 16484-5, which was proven by means of a BTL conformity test.






## 2.2 System overview



## 2.3 Product overview

| Type / photo | Art. no. | Equipment |
|---|---|---|
| **KTRBUu217.456#21**  | UA230000 | **Surface properties:** gloss<br>**Housing colour:** pure white, similar to RAL 9010<br>Scope of delivery: controller, 50 x 50 mm pure white cover (similar to RAL 9010), gloss, alre “Berlin” frame |
| **KTRBUu217.456#07**  | UA230002 | like KTRBUu217.456#21 but scope of delivery: controller, **50 x 50** mm pure white cover (similar to RAL 9010), **gloss,** without frame |
| **KTRBUu217.456#09**  | UA230003 | like KTRRUu217.456#21 but scope of delivery: controller, 50 x 50 mm pearl white cover (similar to RAL 1013), gloss, without frame |
| **KTRBUu217.456#27**  | UA230004 | like KTRBUu217.456#21 but scope of delivery: controller, **50 x 50** mm traffic white / studio cover (similar to RAL 9016), **gloss,** without frame |
| **KTRBUu217.456#28**  | UA230007 | like KTRBUu217.456 but scope of delivery: controller, cover fits BUSCH-JAEGER Reflex SI / SI Linear pure white (similar to RAL 9010), gloss, without frame |
| **KTRBUu217.456#55**  | UA230005 | like KTRBUu217.456#21 but scope of delivery: controller, **55 x 55** mm pure white cover (similar to RAL 9010), **gloss,** without frame |
| **KTRBUu217.456#56**  | UA230009 | like KTRBUu217.456#21 but scope of delivery: controller, **55 x 55** mm pure white cover (similar to RAL 9010), **matt,** without frame |
| **KTRBUu217.456#57**  | UA230006 | like KTRBUu217.456#21 but scope of delivery: controller, **55 x 55** mm pearl white cover (similar to RAL 1013), **gloss,** without frame |
| **KTRBUu217.456#59**  | UA230008 | like KTRBUu217.456#21 but scope of delivery: controller, **55 x 55** mm traffic white / studio cover (similar to RAL 9016), **gloss,** without frame |

## 2.4 Accessories

| Accessory | Art. no. | Equipment |
|---|---|---|
| **JZ-090.900**  | VV000025 | **Design:** Berlin<br>Surface properties: gloss<br>**Housing colour:** pure white, similar to RAL 9010<br>**Housing material:** plastic PC<br>**General equipment:** alre “Berlin” frame (neutral) for all flush-mounted controllers with 50 x 50 mm cover |
| **JZ-090.910**  | VV000010 | **Design:** Berlin<br>**Surface properties:** gloss<br>**Housing colour:** pearl white, similar to RAL 1013<br>**Housing material:** plastic PC<br>**General equipment:** alre “Berlin” frame (neutral) for all flush-mounted controllers with 50 x 50 mm cover |
| **TPS 1**  | G8000299 | Dew point sensor for recording and reporting the dew point (also refer to Climate technology chapter, page 136)<br>Mounting / attachment: by means of clips on the cooling ceiling capillary tube<br>**Use:** Drywall cooling ceiling (gypsum plasterboard) with capillary matting on top, metal cooling ceiling with integrated capillary tube system<br>**Sensor cable can be extended to:** 50 m with 2 x 0.5 $mm^2$<br>**Scope of delivery:** Sensor, 2 clips for cooling matting |
| **TPS 2**  | G8000300 | Dew point sensor for recording and reporting the dew point (also refer to Climate technology chapter, page 136)<br>Mounting / attachment: by means of clips on the cooling ceiling capillary tube or cable tie on tube<br>**Use:** Piping carrying cold water, plastered cooling ceiling with a capillary tube system<br>**Sensor cable can be extended to:** 50 m with 2 x 0.5 $mm^2$<br>**Scope of delivery:** Sensor, 2 clips for cooling matting, 2 cable ties |
| **TPS 3**  | SN120000 | Dew point sensor for recording and reporting the dew point (also refer to Climate technology chapter, page 136)<br>Mounting / attachment: by means of cable tie on tube<br>**Use:** Piping carrying cold water<br>**Sensor cable can be extended to:** 50 m with 2 x 0.5 $mm^2$<br>**Scope of delivery:** Sensor, 2 cable ties |
| **BTF2-C47-0000**  | SA140014 | “Super flat” surface-mounted room temperature sensor for recording temperature in residential properties and business premises (also refer to Sensors chapter, page 200)<br>**Mounting / attachment:** surface mounting / wall mounting<br>(4-hole attachment to flush-mounted socket)<br>**Housing colour:** pure white, similar to RAL 9010, gloss<br>**Housing material:** plastic ABS<br>**Ambient temperature:** – 10 … + 50 °C<br>**Permissible air humidity:** max. 95 % r. H., non-condensing<br>**Type of protection:** IP 30<br>**Protection class:** III<br>**Electric connection:** 0.33 $mm^2$ to 1.5 $mm^2$ screw terminals |
| **FUFC 47-0000**  | SN090198 | Recess-mounted room temperature sensor for recording temperature in residential properties and business premises (also refer to Sensors chapter, page 201)<br>**Mounting / attachment:** in flush-mounted socket – can be adapted in virtually all 50 x 50 mm wide rocker switch ranges<br>**Housing colour:** pure white, similar to RAL 9010, gloss<br>**Housing material:** plastic PC<br>**Ambient temperature:** – 10 … + 50 °C<br>**Permissible air humidity:** max. 95 % r. H., non-condensing<br>**Type of protection:** IP 30<br>**Protection class:** III<br>**Electric connection:** 0.5 $mm^2$ to 1.5 $mm^2$ screw terminals |
| **AF-2**  | G9040380 | Temperature sensor for recording temperature in outdoor and damp room areas, particularly well protected from dust and dampness (also refer to Sensors chapter, page 203)<br>**Mounting / attachment:** surface mounting / wall mounting<br>**Housing colour:** pure white, similar to RAL 9010<br>**Housing material:** plastic PA (30 % GF reinforced)<br>**Ambient temperature:** – 30 … + 70 °C<br>**Permissible air humidity:** max. 95 % r. H., non-condensing<br>**Type of protection:** IP 65<br>**Protection class:** III<br>**Electric connection:** 0.14 $mm^2$ to 2.5 $mm^2$ screw terminals |

| | | |
|---|---|---|
| **KF-2**<br>  | G9031446 | Cable temperature sensor for recording / restricting temperature of floor or supply air (also refer to Sensors chapter, page 206)<br>Mounting / attachment: in immersion sleeve, protective coil, on tube, etc.<br>**Material / length of cable:** PE, 1.5 m,<br>**Material of sensor sleeve:** V4A (1.4571)<br>**Ambient temperature:** – 35 … + 100 °C<br>**Permissible air humidity:** max. 95 % r. H., non-condensing<br>**Type of protection:** IP 67<br>**Protection class:** III<br>Electric connection: only to safety extra-low voltage<br>max. 30 VAC / 42 VDC |
| **ZBOOA-010.100**<br>  | H9100010 | Electro-thermal valve actuator (also refer to Heating / climate technology chapter)<br>**Mounting / attachment:** M 30 x 1.5<br>**Housing colour:** pure white, similar to RAL 9010<br>**Housing material:** plastic PC, GF (20 %)<br>**Operating voltage:** 230 V~, 50 Hz<br>**Max. power consumption:** 70 W<br>M**ax. switch-on current:** approx. 0.3 A<br>**Ambient temperature:** 0 … 50 °C<br>**Storage temperature:** – 20 … + 70 °C<br>**Permissible air humidity:** max. 95 % r. H., non-condensing<br>**Type of protection:** IP 42<br>**Protection class:** II<br>Average power consumption**:** approx. 3 W<br>Opening **/ closing time:** approx. 4 min<br>**Nominal stroke:** 3 mm<br>Function type**:** closed when de-energised<br>**Nominal closing force:** 90 N<br>**Connection cable:** 0.8 m / 2 x 0.5 mm² |

## 2.5 Integration in switch range

### Suited to all common switch ranges

The alre BACnet single-room controller is mounted in the flush-mounted socket. The housing fits perfectly in 50 x 50 mm, 55 x 55 mm and 60 x 60 mm design frames from the wide rocker switch ranges of well-known manufacturers such as e.g. Berker, Busch-Jaeger, Gira, Jung, Merten, Peha, Hager or Feller (CH).

## 2.5.1 Adaptation list

| Manufacturer | Range | RAL 9010 colour (surface properties) | Adaptation possible in switch range (55 x 55) with … | "50X50" adaptation possible with … (intermediate frame from switch manufacturer needed) |
|---|---|---|---|---|
| BERKER | S.1 | Polar white (matt) | KTRBUu217.456#56 | Not needed |
| BERKER | S.1 | Polar white (gloss) | KTRBUu217.456#55 | Not needed |
| BERKER | Arsys | Polar white (gloss) | | KTRBUu217.456#07 + 1108 01 69 |
| BERKER | B.3 | Aluminium / polar white (matt) | KTRBUu217.456#56 | Not needed |
| BERKER | B.3 | Aluminium / polar white (gloss) | KTRBUu217.456#55 | Not needed |
| BERKER | B.7 | Glass / polar white (matt) | KTRBUu217.456#56 | Not needed |
| BERKER | B.7 | Glass / polar white (gloss) | KTRBUu217.456#55 | Not needed |
| BERKER | K.1 | Polar white (gloss) | | KTRBUu217.456#07 + 1108 71 09 |
| BUSCH-JAEGER | Reflex SI/SI Linear | Alpine white (gloss) | KTRBUu217.456#28 | Not needed |
| BUSCH-JAEGER | Busch-balance SI | Alpine white (gloss) | KTRBUu217.456#55 | Not needed |
| BUSCH-JAEGER | impuls | Alpine white (gloss) | | KTRBUu217.456#07 + 1746/10-74 |
| BUSCH-JAEGER | solo/future/axcent etc. | Studio white – see RAL 9016 below | | |
| Elso | Joy | Pure white (gloss) | KTRBUu217.456#55 | Not needed |
| Elso | Fashion/Riva/Scala | Pure white (gloss) | | KTRBUu217.456#07 + (203084) |
| GIRA | Wide rocker switch | Pure white (gloss) | | KTRBUu217.456#07 + 0282 112 |
| GIRA (System 55) | Standard/E 2 | Pure white (silk matt) | KTRBUu217.456#56 | Not needed |
| GIRA (System 55) | Standard/E 2/E3 | Pure white (gloss) | KTRBUu217.456#55 | Not needed |
| GIRA (System 55) | E 22 | Pure white (gloss) | KTRBUu217.456#55 | Not needed |
| GIRA (System 55) | Event | Pure white (silk matt) + opaque… | KTRBUu217.456#56 | Not needed |
| GIRA (System 55) | Event | Pure white (gloss) + opaque… | KTRBUu217.456#55 | Not needed |
| GIRA (System 55) | Esprit | Pure white (silk matt) + glass, aluminium … | KTRBUu217.456#56 | Not needed |
| GIRA (System 55) | Esprit | Pure white (gloss) + glass, aluminium … | KTRBUu217.456#55 | Not needed |
| GIRA | S-Color | Pure white (high gloss) | | KTRBUu217.456#07 + 0282 40 |
| JUNG | CD 500/CD plus | Alpine white (gloss) | | KTRBUu217.456#07 + CD 590 Z WW |
| JUNG | A 500/A 550/AS 500/A plus/A flow | Alpine white (gloss) | KTRBUu217.456#55 | Not needed |
| JUNG | LS 990 | Alpine white (gloss) | | KTRBUu217.456#07 + LS 961 Z WW |
| JUNG | LS plus | Alpine white (glass) | | KTRBUu217.456#07 + LS 961 Z WW |
| JUNG | A creation | Alpine white (gloss) | KTRBUu217.456#55 | Not needed |
| JUNG | LS Design | Alpine white (gloss) | | KTRBUu217.456#07 + LS 961 Z WW |
| MERTEN (System M) | M-Smart, M-Plan, M-Pure | Polar white (matt) | KTRBUu217.456#56 | Not needed |
| MERTEN (System M) | M-Smart, M-Plan, M-Creativ, M-Pure | Polar white (gloss) | KTRBUu217.456#55 | Not needed |
| MERTEN (basic system) | 1-M/Atelier-M | Polar white (gloss) | KTRBUu217.456#55 | Not needed |
| MERTEN (area system) | Artec/Antik | Polar white (gloss) | | KTRBUu217.456#07 + 5160 99 |
| MERTEN | 1-M/M-Smart/M-Plan/M-Pure/D-Life | Active white – see RAL 9016 below | | |
| PEHA | Standard | Pure white (gloss) | | KTRBUu217.456#07 + 80.670.02 ZV |
| PEHA | Dialog | Pure white (gloss) | | KTRBUu217.456#07 + 95.670.02 ZV |
| PEHA | Aura | Pure white (matt) / glass | | KTRBUu217.456#07 + 20.670.02 ZV |
| PEHA | Badora | Pure white (gloss) | | KTRBUu217.456#07 + 11.670.02 ZV |

| Manufacturer | Range | RAL 9016 colour (surface properties) | Adaptation possible in switch range (55 x 55) with … | For adaptation of KTRBUu, size "50 x 50", an intermediate frame is needed from the switch manufacturer |
|---|---|---|---|---|
| BUSCH-JAEGER | solo/future/future linear | Studio white (RAL 9016 gloss) | | KTRBUu217.456#27 + 1746/10-84 |
| BUSCH-JAEGER | axcent | Studio white (RAL 9016 gloss) | | KTRBUu217.456#27 + 1746/10-84 |
| BUSCH-JAEGER | carat (glass, bronze, gold) | Studio white (RAL 9016) | | KTRBUu217.456#27 + 1746/10-84 |
| BUSCH-JAEGER | alpha (nea/exclusive*) | Studio white (RAL 9016 gloss) | | KTRBUu217.456#27 + 1746/10-24G |
| MERTEN | M-Smart, M-Plan, M-Pure | Active white (RAL 9016 gloss) | KTRBUu217.456#59 | Not needed |
| MERTEN | 1-M/Atelier-M | Active white (RAL 9016 gloss) | KTRBUu217.456#59 | Not needed |
| Merten | D-Life | Lotus white (RAL 9016) | | KTRBUu217.456#27 + MEG4500-6035 |
| PEHA | Standard | arctic | | KTRBUu217.456#27 + D 80.670 ZV AW |

*) when mounting, 4 plastic lugs on the rear should be removed

NOTE: Most light switch ranges are produced in a shade "similar to 9010" and the switch manufacturers use different designations for this. Even coloured or glass and aluminium frames are combined with white rockers or sockets meaning that controllers with white covers can be integrated in these frames too. The specific use should be checked in each individual case. The frames have different surface properties (matt / gloss). For a good design, the controller cover should have the same surface. We assume no liability for slight colour and surface deviations or for fitting accuracy. If being installed in multiple frames, temperature controllers should always be fitted in the bottom position.

"50 x 50 controllers": The housing covers of 50x50 controllers have edge dimensions of 50 x 50 mm. When using 50 x 50 mm intermediate frames according to DIN 49075, this enables them to be integrated in virtually all light switch ranges. The 50 x 50 mm intermediate frames should be ordered from the light switch manufacturer and/or wholesalers. The order number of the intermediate frame suited to the respective switch range can be found in the "For adaptation of controller KTRBUu in size '50 x 50'" column.

"55 x 55 controllers": The housing covers of 55x55 controllers have edge dimensions of 55 x 55 mm. Many light switch ranges have internal dimensions of 55 x 55 mm. The 55 x 55 controllers can therefore be integrated directly in these light switch frames without the use of an intermediate frame. To establish whether the 55 x 55 controller fits in the respective light switch range, consult the "Adaptation in switch range (55 x 55)" column (KTRBUu217.456#xx).

All details relating to ranges and article numbers of switch manufacturers are correct as at 12/2019. | All information is supplied without guarantee. | We reserve the right to technical amendments.
You will find an adaptation list for RAL 1013 switch ranges online at www.alre.de.

# 3. Mounting / electric connection

| | |
|---|---|
| ⚠ | This device may only be installed by an electrician in accordance with the corresponding connection diagram in the operating instructions. The applicable safety regulations should be observed. |
| ⚠ | Mounting and the electric connection may only be undertaken when de-energised. |
| ⚠ | Troubleshooting and fault rectification should only be carried out by an electrician. |
| ⚠ | A cable tie should be placed on each of the single conductors of the mains voltage supply and sensor/contact/data cables to protect them from being moved (see Fig. 4). Ensure they have the smallest spacing possible but that there is no more than 15 mm between the cable tie and mains connection and/or sensor / contact terminals. |
| ⚠ | This device has no End-of-Line termination. If the KTRBUu217.456 is the first or last device on the MS/TP bus, a termination resistor (120 Ω) must be applied across terminals D+ and D-. |
| ⚠ | The corresponding terminals are indicated with SELV and/or mains in the circuit diagram. |
| ⚠ | Do not route sensor/contact/data cables in parallel with cables carrying mains voltage. |

The device is intended for mounting in the flush-mounted socket and must not be exposed to direct sources of heat or cold. Ensure that the device is not exposed to external heating or cooling at the rear, e.g. with wooden walls from draughts or rising mains. The supporting ring should be fitted on the wall covering / lining. The device with the 50 x 50 mm housing cover can be integrated into virtually all switch ranges using intermediate frames from switch manufacturers in accordance with DIN 49075. The device with the 55 x 55 mm or 60 x 60 mm housing cover is also suitable for various switch ranges. With multiple frames, the device should always be fitted in the bottom position. It is connected to the electricity supply in accordance with the connection diagram in Item 3.2 / Fig. 3. The plug-in terminals can be conveniently pre-wired for this purpose and connected with the device when fitting in the flush-mounted socket (see Fig. 1). To open the housing, grip the housing cover at the top and bottom and pull as shown in Fig. 2.

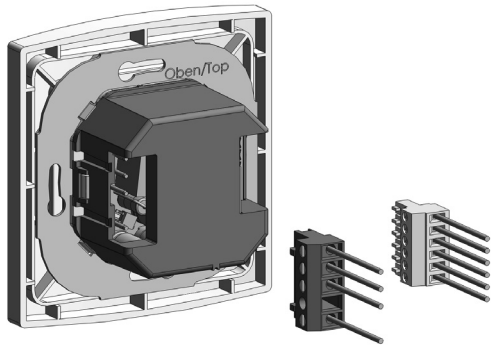



**Fig. 1**

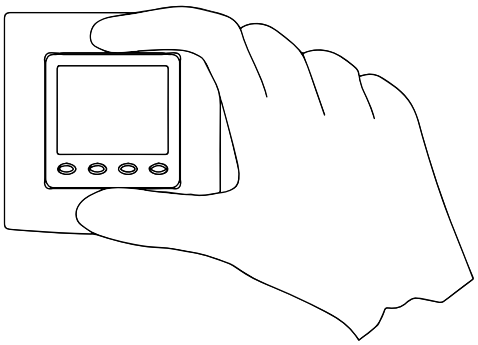


**Fig. 2**

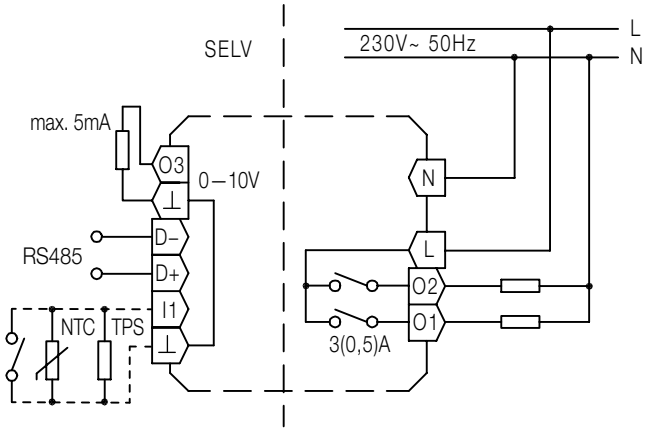



**Fig. 3**

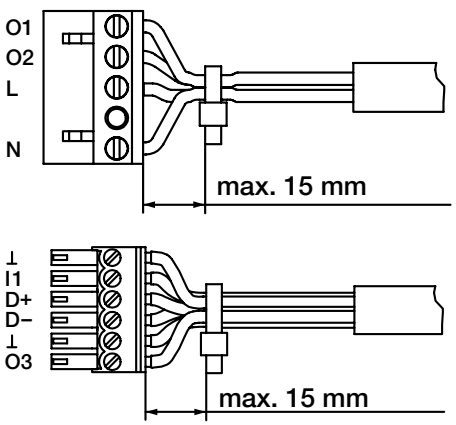



**Fig. 4**

# 4. Start-up

The following settings are automatically queried when starting up:

## 4.1 BACnet (configuration of MS/TP interface)

The settings required here are stipulated by the system operator. Only when the device has been correctly set up, can it be reached via the network. This step can be jumped using the **End** button and carried out later on. Until set up correctly, the device is in offline mode (normal operation with local setting options).

For description of settings, see 5.1.5.3 BACnet

| | |
|---|---|
| ⚠ | **Offline mode**<br>If the communication interface has not yet been configured or if the connection to the central building control system has been interrupted, the device automatically runs normal operation with limited local setting options (time, date, setpoints, operating mode, controller settings). When the connection is restored, the settings made via the central building control system apply again. |

## 4.2 System diagram (functions)

Choice of system diagram. Depending on the system diagram selected, further settings for external sensors/ contacts, valve types etc. may be possible. The settings required here are stipulated by the system operator. Once the system diagram has been selected, the device restarts.

2 = 2-pipe system
4 = 4-pipe system
RA = Radiator
FB = Floor temperature control
KD = Ceiling temperature control
UK = Underfloor convector
HR = Heating coil
KR = Cooling coil

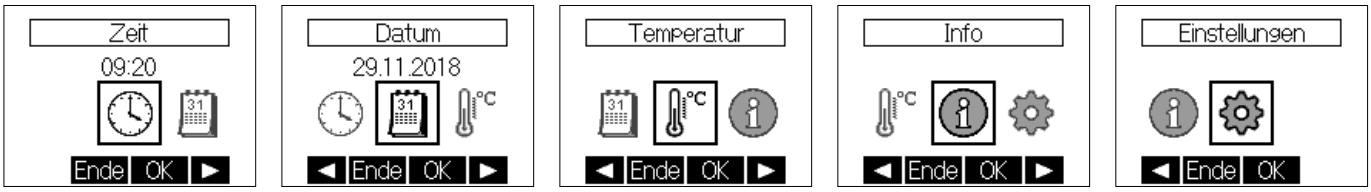
| | | Systems | | | | | | | | Ext. sensors | | | | | Actuators | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Type** | **Application** | 2-pipe system | 4-pipe system | Radiator | Floor temperature control | Ceiling temperature control | Underfloor convector | Heating coil | Cooling coil | TP Dew point sensor | TB Thermal cut-out | Supply air temperature | Room air temperature | Screed temperature | Fan 0...10V | VAV 0...10V | Heating valve | Cooling valve | Heating / cooling valve | 6-way ball cock 0...10V |
| 2-pipe system, underfloor heating with screed temperature sensor | 2FB001 | • | | | • | | | | | | | | | • | | | • | | | |
| 2-pipe system, underfloor heating with cut-out | 2FB002 | • | | | • | | | | | | • | | | | | | • | | | |
| 2-pipe system, cooling/heating ceiling with dew point monitor | 2KD001 | • | | | | • | | | | • | | | | | | | | | • | |
| 2-pipe system, cooling / heating coil with fan and supply air temperature | 2HRKR001 | • | | | | | | • | • | | | • | | | • | | | | • | |
| 2-pipe system with radiator with external room temperature sensor | 2RA001 | • | | • | | | | | | | | | • | | | | • | | | |
| 4-pipe system, radiator (heating), cooling ceiling with dew point monitor | 4RAKD001 | | • | • | | • | | | | • | | | | | | | • | • | | |
| 4-pipe system radiator, cooling coil with fan and supply air thermal cut-off* | 4RAKR001 | | • | • | | | | | • | | • | | | | • | | • | • | | |
| 2-pipe system, underfloor convector with room temperature sensor and fan | 2UK001 | • | | | | | • | | | | | | • | | • | | | | • | |
| 4-pipe system, floor temperature control with thermal cut-out | 4FB001 | | • | | • | | | | | | • | | | | | | • | • | | |
| 4-pipe system, cooling/heating ceiling with dew point monitor and 6-way ball cock | 4KD001 | | • | | | • | | | | • | | | | | | | | | | • |
| 4-pipe system, cooling/heating ceiling with dew point monitor and VAV | 4KD002 | | • | | | • | | | | • | | | | | | • | • | • | | |
| 4-pipe system, cooling/heating ceiling with dew point monitor | 4KD003 | | • | | | • | | | | • | | | | | | | • | • | | |
| 4-pipe system, cooling and heating coil with fan and supply air temperature | 4HRKR001 | | • | | | | | • | • | | | • | | | • | | • | • | | |
| 4-pipe system, underfloor convector with dew point monitor and fan | 4UK001 | | • | | | | • | | | • | | | | | • | | • | • | | |

For description of settings, see 5.1.5.4 System

# 5. Functions and settings on device in normal operation

## 5.1 Main menu

Pressing the **Menu** button calls up the main menu.




The “Time setting”, “Date setting”, “Setpoint temperatures setting, “Info function” and “Device settings” menu items are available in both offline and online mode. If necessary, the time, date and temperature input are overwritten by the central building control system. The day program can only ever be set via the central building control system.

### 5.1.1 Time

Setting for hours and minutes. Once changes have been confirmed with the **OK** button, the values are adopted and you are taken back to the main menu. The seconds are set to 0 at the same time.

### 5.1.2 Date

Setting for date (year, month, day). Once changes have been confirmed with the **OK** button, the values are adopted and you are taken back to the main menu.

### 5.1.3 Temperatures

Depending on the system diagram selected (see Item 4.2), the following temperatures can be set:

| | Minimum set value | Maximum set value |
|---|---|---|
| **Setpoint for comfort heating** | 8°C | 30°C |
| **Setpoint for pre-comfort heating** | 7°C | Maximum setpoint for comfort heating -1K |
| **Setpoint for ECO heating** | 6°C | Maximum setpoint for pre-comfort heating -1K |
| **Setpoint for building protection heating** | 5°C | Maximum setpoint for ECO heating -1K |
| **Setpoint for comfort cooling*** | Setpoint for comfort heating +1K(≥ 18°C) | 37°C |
| **Setpoint for pre-comfort cooling*** | Minimum setpoint for comfort cooling +1K | 38°C |
| **Setpoint for ECO cooling*** | Minimum setpoint for pre-comfort cooling +1K | 39°C |
| **Setpoint for building protection cooling*** | Minimum setpoint for ECO cooling +1K | 40°C |

* Only for applications with a cooling function.

These settings must be configured in full. If you exit this function using the **End** button, none of the values are adopted.

If the settings undertaken by the central building control system infringe the defined dependencies, these are corrected automatically.

### 5.1.4 Info

The device type, firmware version and any other information required are displayed.

### 5.1.5 Settings

#### 5.1.5.1 Controller

##### 5.1.5.1.1 Language

Users can choose between German and English.
The factory setting is German

#### 5.1.5.1.2 Summer time (automatic changeover between summer and winter time)

Standard summer time in the European Union runs from 2 am CET on the last Sunday of March until 3 am CEST on the last Sunday of October (Directive 2000/84/EC of the European Parliament and Council). The temperature controller automatically changes the time at these times. The automatic changeover between summer and winter time can be deactivated for time changes on other dates or in regions without daylight saving time.
Factory setting: On

#### 5.1.5.1.3 Valve protection

The valve protection function serves to prevent the valve seat from seizing up and is only available when using valve-based system diagrams. The valve protection function is activated as standard but can be deactivated on the device (not via the central building control system!).
The valve protection function is run regardless of the current operating mode. If the valve has not been moved for a week, the control function is interrupted and the valve is activated once for a period of 10 minutes. The control function is resumed afterwards. There is no local display showing that valve protection is active.

#### 5.1.5.1.4 Weighting (only with system diagram 2RA001 or 2UK001)

This function can be used to set the weighting between the external sensor (max. 100%) and internal sensor (max. 100%) in 10% steps. The user can therefore set whether the controller operates with an adjustable weighting using only the internal or external sensor or using a mean value from both sensors.
The factory setting is 100% external

#### 5.1.5.1.5 Display content

Users can choose between the following display content:
1. Time
2. Temperatures
3. Time & temperatures (in turn)

Factory setting: Time & temperatures

#### 5.1.5.1.6 Factory setting (factory reset)

This function is used to reset the device to the state in which it was supplied.

| | |
|---|---|
| ⚠ | You will need to access the menu functions in order to trigger this function. Access to the main menu can be restricted via the central building control system by means of PIN protection. If the menu can be accessed, the central building control system has no means of influencing or preventing a factory reset.<br>The central building control system cannot effect a factory reset. |

### 5.1.5.2 Function test

The function test can be used to test the function of connected devices, such as thermal actuators, fans, temperature sensors etc.

| | |
|---|---|
| ⚠ | The function test is only intended for specialists. This test may trigger states which are not permitted in regular normal operation. For example, both outputs (heating and cooling) may be activated at the same time. |

By selecting “Function test” from the menu, the outputs present are switched to their “off state” and the analogue output set to 0%. The function test can be exited using the **End** button. If no buttons are pressed for 2 minutes, the function is exited automatically.

Depending on the system diagram selected, various test functions will be available. Inputs and outputs not used in the system diagram cannot be tested.

The controller’s individual inputs and outputs (depending on the system diagram set) are tested by the mechanic as follows:

O1 output (if used in the selected system diagram)
O1 output can be activated or deactivated using the **on** or **off** button (depending on state of output).

O2 output (if used in the selected system diagram)
The selected O2 output can be activated or deactivated using the **on** or **off** button (depending on state of output).

O3 output (if used in the selected system diagram)

The O3 analogue output can be set to between 0% (0V) and 100% (10V) here. The + – buttons can be used to change the voltage at the O3 output. The output test is exited using the OK button. The set value applies at the output until the end of the function test.

I1 input (if used in the selected system diagram)
Depending on the selected system diagram, this can be used to check the function of a connected sensor (temperature sensor or dew point sensor).

| | |
|---|---|
| Temperature sensor | Once selected, the temperature measured by the connected sensor is displayed. A possible sensor break (open loop) or closing of the sensor (shorted loop) is displayed in the event of an error. |
| Dew point sensor | Once selected, the status (dew or dry) detected by the connected sensor is displayed. A possible closing of the sensor (shorted loop) is displayed in the event of an error. |

### 5.1.5.3 BACnet

The settings of the MS/TP interface can be changed in this menu.

The settings required here are stipulated by the system operator. Only when the device has been correctly set up, can it be reached via the network. Until set up correctly, the device is in offline mode (normal operation with local setting options).

| | |
|---|---|
| ⚠ | **Offline mode**<br>If the communication interface has not yet been configured or if the connection to the central building control system has been interrupted, the device automatically runs normal operation with limited local setting options (time, date, setpoints, operating mode, controller settings). When the connection is restored, the settings made via the central building control system apply again. |

The device is integrated in the superordinate central building control system via BACnet MS/TP. The MS/TP and BACnet parameters can be altered in a shared “BACnet” menu by going to Settings. If no settings are configured, they are queried after each restart. The right settings are needed for communication to take place and must match the communication of other participants. Changes to the communication parameters are adopted when the device is restarted.

**BACnet settings**

| | |
|---|---|
| Device instance | The device instance can be defined as values between 0 and 4194302. The factory setting is 78. |
| Network number | Values between 1 and 65534 can be set as the network number. The factory setting is 101. |

**MS/TP settings**

| | |
|---|---|
| Baud rate | The following values can be set as baud rates: 9600, 19200, 38400, 57600, 76800 or 115200. The factory setting is 115200. |
| MS/TP address | Values between 1 and 127 are permitted as the setting for the MS/TP address. 128 is the factory setting - this setting deactivates the communication interface. |
| Max info frame | Values between 1 and 50 are permitted as the setting for the max info frame communication parameter. The factory setting is 8. |
| Max master | The max master can be set to a value of between 1 and 127. The factory setting is 127. |

5.1.5.4 System

The system diagram currently selected can be changed in this menu and it can be adapted to the valve type used.

5.1.5.4.1 System diagram

| | |
|---|---|
| ⚠ | The device inputs and outputs may have different functions depending on the system diagram. This should be noted for any devices already connected, such as actuators, fans and sensors, if the diagram is changed. |

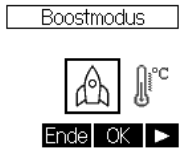
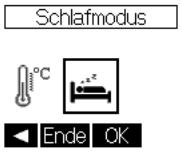
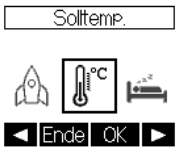
| System diagram | Application |
|---|---|
| 2FB001 | Room temperature control using T1 with maintenance of a Tmin underfloor temperature |
| 2FB002 | Room temperature control using T1 with limitation at Tmax. via underfloor heating |
| 2KD001 | Room temperature control of a cooling/heating ceiling using T1 |
| 2HRKR001 | Room temperature control using T1 via Fancoil |
| 2RA001 | Room temperature control using T2 via radiator |
| 4RAKD001 | Room temperature control using T1 via cooling/heating ceiling and radiator |
| 4RAKR001 | Room temperature control using T1 via Fancoil and radiator |
| 2UK001 | Room temperature control using T2 via fan coil unit/underfloor convector |
| 4FB001 | Room temperature control using T1 via underfloor heating |
| 4KD001 | Room temperature control using T1 via 6-way valve with different flow rates (heating/cooling ceiling) |
| 4KD002 | Room temperature control using T1 via cooling/heating ceiling |
| 4KD003 | Room temperature control using T1 via cooling/heating ceiling |
| 4HRKR001 | Room temperature control using T1 via Fancoil |
| 4UK001 | Room temperature control using T1 via fan coil unit/underfloor convector |

5.1.5.4.1 Valve type

| | |
|---|---|
| Only for system diagrams with thermoelectric actuators | Normally closed |
| | Normally open |
| Only for system diagrams with constant actuators | 2-10 V |
| | 10-2 V |
| | 0-10 V |
| | 10-0 V |

## 5.2 Function menu

Function menu: The Function menu is opened by pressing the **Fn** button.

| | | |
|---|---|---|
|  |  |  |
| The “Boost mode” menu selection is available if the difference between the setpoint and actual value in heating mode is >+1K and in cooling mode is <-1K. | The “Sleep mode” menu selection is not available if the Function menu is called up from the “Extended presence” screen. | If just one menu selection is available, this is run directly without the Function menu being displayed |

The selected mode and/or setting function is called up by pressing the **OK** button.

### 5.2.1 Boost mode

This function is used to reach the temperature setpoint faster. To achieve this, some control parameters are modified compared with normal control as is the fan speed. The function can only be activated if the difference between setpoint and actual is >1K. The function can only be activated in comfort mode and during extended presence by being selected in the Function menu.
If the requirements for starting boost mode are met, the corresponding option for selecting this function appears in the Function menu. Boost mode is started by pressing the **OK** button.

For as long as boost mode is active, the heating output is activated in heating mode and the cooling output in cooling mode. If a fan is defined in the active system diagram, this is also activated at 100%.

Boost mode is exited if the setpoint is reached or (when heating) if the setpoint is exceeded or (when cooling) if the temperature falls below the setpoint. During boost mode, the **End** button can be used to manually exit the function straight away.

### 5.2.2 Automatic fan system

The button is used to call up the screen for setting the maximum fan speed. The automatic fan system can be manually adjusted here. When the setting screen is called up, the maximum speed currently set is instantly output to the fan.

The user of the room can use the **+** and **–** buttons to set the maximum speed to between central building control system maximum (“High Limit” property of “Fan Control” object) and central building control system minimum (“Low Limit” property of “Fan Control” object ) in 10 steps. When the **OK** button is pressed, the set value applies as the new, local maximum for fan speed. Pressing the **End** button cancels the setting and the local maximum is again the value set before the setting screen was called up.

The locally set maximum for speed can be deleted in the central building control system using the “Reset user settings” function. The central building control system maximum then applies until the next local setting.

### 5.2.3 Offline mode

A BACnet object called “Heartbeat” is used to establish whether there is a central building control system present. This object regularly receives a numerical value from the central building control system. This value corresponds to the number of seconds until offline mode is triggered. The controller decrements this value every second. Once a value of 0 is reached, the controller switches to offline mode. If the value is > 0, the controller is in online mode.

In order to run the controller in online mode, the central building control system must write a new value to the object before the value of 0 is reached.

The table below shows the access options available in offline mode, normal operation and via the central building control system

| | Central building control system | Local normal operation | Local offline mode |
|---|---|---|---|
| **BACnet object properties** | ✓ | ✗ | ✗ |
| **Set configuration PIN** | ✓ | ✗ | ✗ (PIN deactivated) |
| **Set adjustment range for setpoint** | ✓ | ✗ | ✗ |
| **Setting for setpoints** | ✓ | ! (in hidden, password-protected menu) | ✓ |
| **Configuration of control** | ✓ | ✗ | ✗ |
| **Set the operating mode schedule** | ✓ | ✗ | ✗ |
| **Operating mode specification** | ✓ | ✗ | ✓ |
| **Operating mode specification (H/C)** | ✓ | ✗ | ✓ (4 pipes: automatic) (2 pipes: adjustable) |

If the heartbeat was received once and then failed, the following information, received previously from the BACnet, is assumed constantly by the controller:

| Information from the BACnet | State after central building control system failure |
|---|---|
| Presence detector | Person present |
| Window contact | Window closed |
| Heating/cooling mode in 4-pipe system | Change over automatically |
| BACnet button inhibit | Local buttons released |

### 5.2.4 Sleep mode

This function can be activated by the user to reduce any noise being produced by a fan. Provided there is a fan in the system diagram, when in “Sleep mode” the fan speed is reduced to the central building control system minimum (“Low Limit” property of “Fan Control” object). The temperature is controlled using the setpoints from PRE-COMFORT mode. “Sleep mode” is only available during “COMFORT” operating mode.

Selecting “Sleep mode” in the Function menu calls up the function for setting the duration of “Sleep mode”. The **+** and **−** buttons can be used to select the time until which the function is active. This can be set in 15-minute steps. The maximum duration is 23 hours and 45 minutes. Pressing the **End** button exits the setting function without starting “Sleep mode”. Once the **OK** button has been pressed, the setting function is exited and “Sleep mode” is started.

Active “Sleep mode” is indicated by the corresponding symbol and the set time. “Sleep mode” is exited when the set time is reached or using the **End** button.

#### 5.2.5 Extended presence

In ECONOMY or PRE COMFORT mode, the device can be put back into COMFORT mode for an adjustable length of time. The temperature is controlled using the setpoints from COMFORT mode.

The button calls up the function for setting the duration of “Extended presence”. The **+** and **–** buttons can be used to select the time until which the “Extended presence” is active. This can be set in 15-minute steps. The maximum duration is 120 minutes. Pressing the **End** button exits the setting function without starting “Extended presence”. Once the
**OK** button has been pressed, the setting function is exited and “Extended presence” is started.

Active “Extended presence” is indicated by the corresponding symbol and the set time. “Extended presence” is exited when the set time is reached or using the **End** button. If COMFORT mode is specified by the central building control system before the set time is reached, the function is exited.

### 5.3 More functions and settings

#### 5.3.1 BACnet button inhibit

This function allows the central building control system to fully deactivate scope for operating the controller locally.

The BACnet object designated “User Control Lock” is made available. Its “Present-Value” can be described by the central building control system. This allows operation of the device locally to be approved or blocked (all local buttons on the device cease to work and are hidden).

| BACnet object | Value | Description |
|---|---|---|
| User Control Lock | 0 | User operation approved. |
| | 1 | Device operation by the user blocked. |

Should the central building control system fail (see Offline mode), the function is switched once to the “Button inhibit cancelled” state.

The value of the BACnet object is stored in the volatile memory area so that restarting the device restores the default value (“Button inhibit cancelled”).

#### 5.3.2 Window open function

The “Window State” Binary_Value object can be described via the central building control system depending on the status of a window contact.
For as long as the controller reads the value for “Window opened” from the above BACnet object, the controller is in protection mode. While the window is open, notification to this effect is displayed on the controller.

| BACnet object | Value | Description |
|---|---|---|
| Window State | 0 | Window closed |
| | 1 | Window open |

If a window contact no longer reports the correct state to the central building control system, the connection to the window contact in the central building control system has to be disconnected and the controller’s “Window State” BACnet object has to be manually set to the window closed state via the central building control system.

Should the central building control system fail, the window is switched once to the closed state.

### 5.3.3 Fire alarm

The central building control system can switch the controller to the “Fire alarm” state via the BACnet object (Binary_Value object “Fire Alarm”). When in this state, the valves are closed and the fan is set to the minimum speed. This state is indicated in the display by means of permanent illumination and notification to this effect. The fire alarm is also reset via the central building control system or (in offline mode only) by going to the “Settings” menu on the device.

| BACnet object | Value | Description |
|---|---|---|
| Fire Alarm | 0 | No fire alarm |
| | 1 | Fire alarm |

### 5.3.4 Switching between heating / cooling mode

The central building control system can switch the controller to heating or cooling mode via the “Control-Mode BMS” BACnet object.

In applications with 4-pipe systems, the device can be operated without external switching between heating / cooling mode. In such cases, the controller uses the set setpoints and measured temperature to decide whether heating or cooling mode is to be activated.

| BACnet object | Value | Description |
|---|---|---|
| Control-Mode BMS | 1 | Heating mode |
| | 2 | Cooling mode |
| | 3 | If the temperature falls below the setpoint for heating “COMFORT” by more than 0.3K, the controller switches to heating mode.<br>If the temperature exceeds the setpoint for cooling “COMFORT” by more than 0.3K, the controller switches to cooling mode. |

### 5.3.5 PIN protection

In “Online mode”, the main menu can be protected using a password. In “Offline mode”, the main menu can be accessed without entering a password.

If the wrong PIN is entered, you are taken back to normal operation. The main menu is opened if the input is correct.

The current position is set using the + and − buttons. The ▶ button is used to select the next PIN position. The input is completed using the OK button.

The present value of the BACnet object with the name “Local Config PIN” defines the PIN (factory setting: 1234). A distinction should be made between two scenarios:

| BACnet object | Value | Description |
|---|---|---|
| Local Config PIN | 0000 | No PIN is requested when calling up the main menu (PIN deactivated). |
| | > 0000 | The defined PIN is requested when calling up the main menu (PIN activated). |

### 5.3.6 Presence function

The status reports of a presence detector are written to the “Presence Detector” BACnet object by the central building control system.

| BACnet object | Value | Description |
|---|---|---|
| Presence Detector | 0 | No presence. |
| | 1 | Presence. |

When changing from “No presence” to “Presence”, the controller is switched once to COMFORT mode. A permanent presence report does not result in a permanent switch to COMFORT mode - the controller is only switched over once when the state changes.

When changing from “Presence” to “No presence”, COMFORT mode (activated once) is exited and the controller switches back to the operating mode specified by the central building control system. (If COMFORT mode (activated once) has in the meantime been changed by another party, the operating mode is not changed).

(Also refer to Offline mode)

### 5.3.7 Setpoint adjustment

Setpoint adjustment can allow users to change the setpoint such that the central building control system still provides a central setpoint specification but the user is able to make minor adjustments as he or she sees fit.

Setpoint adjustment is only effective in “COMFORT” mode (i.e. during extensions to the usage time). It is assumed that the “COMFORT” operating mode is always used when there are people in the room. The other operating modes are used for various scenarios in which people are not usually present in the room.

Users can change the setpoint temperature within the framework of the setpoint adjustment function via the **FN** function menu when in “COMFORT” operating mode or during extended presence. The setpoint from the central building control system is shown in the info line. The **+** and **−** buttons can be used to adapt the setpoint within the specifications of the central building control system. Pressing “OK” adopts the setpoint adjustment and the “End” button can be used to cancel the setting without the modified value being accepted.

The “Analog-Value:5” BACnet object can be used to define the number of Kelvin by which people in the room can adjust the setpoint on the device.

| BACnet object | Value | Description |
|---|---|---|
| Analog-Value:5 | 0 | User is not able to adjust the setpoint |
| | 0.5 to 3 | User is able to +/- adjust the setpoint by the stated value |

The set setpoint adjustment can be reset by resetting the user settings.

Another way of resetting a locally set setpoint adjustment to 0 via the central building control system is to temporarily set the maximum adjustment to 0K. Then the controller limits the locally set setpoint adjustment to the permitted range (i.e. 0). The maximum adjustment can then subsequently be reset to the original value.

### 5.3.8 Operating modes

The operating modes represent predefined operating states. The central building control system can set four different operating modes via the “Operation Mode BMS” BACnet object. These can also be set on the controller in offline mode. Each of these four operating modes has at least one setpoint for the control function. In systems with a heating and cooling function, each of the four operating modes has two setpoints (“Analog-Value 12-15 and 22-25” BACnet objects).

Other operating modes do exist but they can’t be selected. Instead they can be activated by special functions. These operating modes use either one of the other setpoints or behave in a special manner, requiring no setpoint (e.g. valve protection).

| BACnet object | Value | Description |
|---|---|---|
| Operation Mode BMS | 1 | PROTECTION |
| | 2 | ECONOMY |
| | 3 | PRE COMFORT |
| | 4 | COMFORT |

| Operating mode | Display content | Function of button 1 | Function of button 2 | Function of button 3 | Function of button 4 |
|---|---|---|---|---|---|
| **PROTECTION** | Setpoint<br>Actual value<br>Logo<br>Operating mode text<br>Operating mode symbol | None | Online = none<br>Offline = “operating mode selection” | Online = none (setting of setpoints in hidden, password-protected menu)<br>Offline = “menu” | None |
| **ECONOMY** | Time<br>Date<br>Logo<br>Setpoint<br>Actual value<br>Operating mode text | None (in applications with “fan speed” fan) | Online = none<br>Offline = “operating mode selection” | Online = none (setting of setpoints in hidden, password-protected menu)<br>Offline = “menu” | “Extended presence” |
| **PRE COMFORT** | Time<br>Date<br>Logo<br>Setpoint<br>Actual value<br>Operating mode text | None (in applications with “fan speed” fan) | Online = none<br>Offline = “operating mode selection” | Online = none (setting of setpoints in hidden, password-protected menu)<br>Offline = “menu” | “Extended presence” |
| **COMFORT** | Time<br>Date<br>Logo<br>Setpoint<br>Actual value<br>Operating mode text<br>Operating mode symbol | None (in applications with “fan speed” fan) | Online = none<br>Offline = “operating mode selection” | Online = none (setting of setpoints in hidden, password-protected menu)<br>Offline = “menu” | “Function menu” |
| **EXTENDED PRESENCE** | Logo<br>Actual value<br>Operating mode text<br>Operating mode symbol | None (in applications with “fan speed” fan) | End of extended presence | Online = none (setting of setpoints in hidden, password-protected menu)<br>Offline = “menu” | “Function menu” |
| **VALVE PROTECTION** | *Display corresponds to PROTECTION/ECONOMY/PRE COMFORT/COMFORT - depending on requirement of central building control system* | | | | |
| **BOOST MODE** | Logo<br>Operating mode symbol | None | End of boost mode | None | None |
| **SLEEP MODE** | Logo<br>Operating mode symbol | None | End of sleep mode | None | None |
| **EMERGENCY-OPERATION** | Logo<br>Operating mode text<br>Operating mode symbol | None | None | Online = none (setting of setpoints in hidden, password-protected menu)<br>Offline = “menu” | None |
| **FIRE ALARM** | Logo<br>Operating mode symbol | None | None | None | None |

### 5.3.9 Control function

The control function runs permanently and is only deactivated during special functions (e.g. boost mode or fire alarm) or device defects (also refer to emergency operation and error display).

One or two BACnet loop objects are used to determine the variable. There is a corresponding BACnet object for applications where only heating or only cooling is to take place. Two loop objects are produced for applications supporting both.

The LOOP objects use Analog_Value, 1 (“Active Setpoint”) and Analog_Input, 1 (“Temperature”) to control the temperature by means of the Analog_Output, 11(21) variable (“Control Value Heating(Cooling)”). Here “Present Value Heating (Cooling)” is used to convert the variable into output activation.

The LOOP objects have the “Proportional Constant”, “Integral Constant” and “Derivative Constant” properties in order to change the PID control parameters. Appropriate parameters have been determined under lab conditions for each type of heating and cooling which can be set. These are set when changing application but can be adapted individually to change the control response in isolated cases.

Control cycles of 10 minutes have been defined to map the analogue variable (0-100%) to e.g. digital outputs (On / Off relays). The 10-minute duration provides a balance between control comfort and the service life of the switching outputs. At the start of a control cycle, the way in which the outputs behave during the cycle duration is defined. Provided that the basic control conditions (setpoint, operating mode etc.) don‘t change, the control cycle is worked through and a new behaviour is only determined when the next cycle starts. If the basic control conditions change, a new control cycle is started right away.

In order to convert the constant variable to the two relay states (On / Off), at the start of a control cycle, the switch-on duration of the relay is determined (e.g. a variable of 30% results in a cycle with 3 min “active” and 7 min of relay “inactive”).

Provided that the application uses an automatic fan system, the variable is used to issue constant voltage at the fan output during a control cycle. The variable refers to the fan limits currently set such that a variable of 0% results in the set central building control system minimum for the fan output and a variable of 100% in the locally set maximum (also refer to 5.2.2 Automatic fan system).

Provided that the application uses a ball cock output, the variable is used to issue constant voltage at the ball cock during a control cycle. The variable for heating is mapped onto the opening range for the ball cock’s heating mode and the variable for cooling to the opening range for cooling mode.

### 5.3.10 Dew point approach

If a system diagram which involves using a dew point sensor is selected, dew is detected by the connected dew point sensor and further active cooling is interrupted or prevented.

This status is retained for as long as the dew point sensor reports dew. Cooling only takes place again when dew is no longer detected at the start of a new control cycle.

An interruption to cooling brought about due to the dew point is NOT shown in the display. Information is provided by the corresponding BACnet object (“Dew point sensor” object) - an alarm is also produced by this object.

### 5.3.11 Thermal limitation of air flow in cooling mode

The purpose of the thermal limitation of air flow in cooling mode function is to avoid the room user experiencing draughts. Since the central building control system is able to specify a maximum difference between room temperature and air temperature, this allows a balance to be reached between rapid room cooling and the supplied air being too cold.

The function is only available if an application diagram is selected where the external temperature sensor has a function to limit the air temperature.

A value of 0-20K can be specified by the “Air Temperature Max-Offset” BACnet object - initially this value is 5K.

The following condition (BedA) is checked as the program runs. BedA: Is the difference between room temperature and external sensor temperature (int - ext) greater than “Air Temperature Max-Offset”?

If “BedA” is met, the fan output is reduced by 5/100 steps. The maximum reduction is by 100 steps to the set fan minimum.
If BedA is not met, the fan output may be reduced by 5/100 steps if necessary.
The process is repeated after a pause of 30 sec.

### 5.3.12 Thermal cut-out function

The thermal cut-out function generally allows maximum and minimum values to be set via BACnet for the temperature measured at the external sensor and for each of the two limits to be activated or deactivated. If an activated limit value is not observed, the controller switches on / off regardless of the control state.

The thermal cut-out function can only be used in system diagrams with an external temperature sensor.

The BACnet object for the external sensor is set to three properties for the thermal cut-out function. The “High Limit” property can be used to define a maximum temperature and “Low Limit” to define a minimum. The “Limit Enable” property can be used to set which of the two temperature limits the controller responds to.

If the central building control system has stipulated a thermal cut out, when the limits are violated the controller responds as follows depending on whether heating/cooling mode is active:

If the temperature exceeds the activated “High Limit” in heating mode, the heating output is deactivated (regardless of setpoint and actual value) (e.g. underfloor temperature limitation).

If the temperature falls below the activated “Low Limit” in heating mode, the heating output is activated (regardless of setpoint and actual value) (e.g. minimum underfloor temperature).

If the temperature exceeds the activated “High Limit” in cooling mode, the cooling output is activated (regardless of setpoint and actual value).

If the temperature falls below the activated “Low Limit” in cooling mode, the cooling output is deactivated (regardless of setpoint and actual value).

Requirements exist for the thermal cut-out function in some system diagrams. These requirements are set once **when selecting the system diagram**, but can be adjusted during operation.

| Requirement according to system diagram | Active limits | Low limit | High limit |
|---|---|---|---|
| T2 is used to maintain a Tmin underfloor temperature. | **Low limit** | **18°C** | 35°C |
| TB is used to limit the Tmax underfloor temperature. | **High limit** | 10°C | **28°C** |
| T2 limits the supply air temperature >17°C<br>(in addition to the fan’s thermal cut-out in cooling mode) | **Low limit** | **17°C** | 30°C |
| TB is used to limit the inlet temperature to a maximum and a minimum. | **Low limit**<br>**High limit** | **18°C** | **30°C** |

### 5.3.13 Time programs

The BACnet controller’s time programs are realised using a schedule BACnet object. This makes complete calendar programming possible.

The schedule is deactivated upon delivery (out-of-service) and has the following factory setting:

Monday to Sunday:

“COMFORT” operating mode from 6 am … 10 pm
(during this time, the controller uses the currently valid “comfort” setpoint)

“ECONOMY” operating mode from 10 pm ... 6 am
(during this time, the controller uses the currently valid “ECO” setpoint)

### 5.3.14 Resetting the user settings

This function can be used to reset the settings undertaken by the user not using the menu.

The central building control system is able to write value 1 to the present value of the binary value object 4 / “User Reset”.

The controller checks the status of the present value every second. If value 1 is read, the reset is performed.

| BACnet object | Value | Description |
|---|---|---|
| User Reset (Binary_Value:4) | 0 | No reset |
| | 1 | - “setpoint adjustment” to 0 K<br>- “maximum fan speed level” to 10<br>- active boost mode is interrupted<br>- active usage time extension is interrupted<br>- active sleep mode is interrupted |

The present value of the binary value object 4 / “User Reset” is then set to the value 0.

# 6. Care and maintenance

| | |
|---|---|
|  | The opened device must not be cleaned. |
|  | Only replace defective parts by genuine parts from the manufacturer. |

Carefully remove dust and dirt from the housing surface using a dry, solvent-free and soft cloth.

# 7. Removal and disposal

| | |
|---|---|
|  | This device may only be removed by an electrician in accordance with the corresponding connection diagram in the operating instructions. The applicable safety regulations should be observed. |
|  | Removal may only be undertaken when de-energised. Before removal, de-energise and lock so device cannot be switched on again. |

Remove device and dispose of correctly.

# 8. Technical data

| | |
|---|---|
| Operating voltage: | 230 VAC, 50Hz |
| Electric connection: | Screwed plug-in terminals, at mains voltage end 0.75 – 2.5 $mm^2$, at low voltage end 0.08 – 1.5 $mm^2$ |
| Switching contact: | 2 relays / normally open contacts, type 1C |
| Switching capability O1/O2: | per 3 (0.5) A / 230VAC, max. 5 valve actuators per output |
| Analogue output O3: | 0-10V (SELV), max. 5mA for fan or valve activation |
| Setting ranges: | 5 … 30°C heating<br>18 … 40°C cooling |
| Type of protection: | IP 30 |
| Protection class: | II, following appropriate mounting |
| Permissible air humidity: | max. 95%, non-condensing |
| Ambient temperature: | 0 … 40°C |
| Display: | illuminated, graphic display |
| Mounting /attachment: | in flush-mounted socket, can be adapted in virtually all wide rocker switch ranges |
| Software class: | A |
| Rated impulse voltage: | 4000 V |
| Degree of contamination: | 2 |
| Energy efficiency class: | I (contribution to seasonal room heating energy efficiency 1 %) |

# 9. Error rectification

| | |
|---|---|
|  | Troubleshooting and error rectification on this device may only be carried out by an electrician. The applicable safety regulations should be observed. |
|  | Troubleshooting and error rectification on an opened device may only be undertaken when de-energised. Before opening, de-energise and lock so device cannot be switched on again. |

## 9.1 Problems when starting up the device

| Problem | Solution |
|---|---|
| No display and illumination not active. | Check voltage supply on device. |
| No display but illumination active. | If a display does not appear within 1 minute, contact customer service. |
| “alre” shown continually in display. | If another display does not appear within 1 minute, contact customer service. |
| The buttons aren't working. | Check that the display is correctly mounted. |

## 9.2 Problems with BACnet communication

| Problem | Solution |
|---|---|
| The device cannot be found in the BACnet. | Check whether the bus connections are connected correctly. Inconsistent and unclear bus line designations (A, A-, B, B-, B+) are used for RS485 interfaces so that it is not always obvious which of the lines is the inverted one and which is the non-inverted one. In the KTRBUu217.456, the inverted line is designated as D-.<br>Check on the device whether the communication parameters have been set. If “BACnet” is shown as the first menu item when the main menu is called up, then the communication parameters have not been defined adequately.<br>Check whether the communication parameters have been set correctly. The device instance must be unique within the entire BACnet network. The MS/TP baud rate must match the other communication partners in the MS/TP network. The MS/TP address must be unique within the MS/TP network and must be between 1 and 127. The Max info frames and Max master must be appropriate for the MS/TP network set up. |
| Writing a BACnet object is not working. | Many of the BACnet objects present are regularly described by the KTRBUu217.456 such that you may get the impression with writeable objects that these objects cannot be written. These objects can be overwritten with a higher priority.<br>Refer to the PICS list to see which BACnet objects can be written. |

### 9.3 Problems during operation

| Problem | Solution |
|---|---|
| Why are the mode and menu buttons being displayed even though the KTRBUu217.456 is connected to a central building control system? | The KTRBUu217.456 itself cannot determine whether a central building control system is present or not. To do this, it provides a heartbeat object which the central building control system can use to communicate that it is reaching the KTRBUu217.456. The present value of the “Heartbeat Input” object is set by the central building control system to a value and the KTRBUu217.456 counts down this value every second. If the central building control system does not write the value again before a value of zero is reached, the KTRBUu217.456 switches to offline mode. |
| Why is there no option for changing the fan speed? | The option for setting a maximum fan speed is only available if an application with a fan has been selected.<br>The permissible range of values for fan speed can be restricted by the central building control system using the “Fan Control” BACnet object. |
| Why is the KTRBUu217.456 displaying emergency operation? | Emergency operation is displayed if the KTRBUu217.456 does not have access to the information it needs. If the control function is reliant on an external temperature sensor, but a valid temperature value cannot be recorded via the external temperature sensor, then emergency operation is displayed. Possible causes of emergency operation include an incorrectly set application or a defective sensor. |

# 10. Support

If you have any technical questions about your product, please contact our technical support team:

support@alre.de

# 11. 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.

# 12. Annex

## 12.1 PICS



### General Information

| | |
|---|---|
| **Date** | 05.03.2019 |
| **Vendor Name** | ALRE-IT Regeltechnik GmbH |
| **Vendor ID** | 934 |
| **Product Name** | KTRBUu217.456 |
| **Product Model Number/ID** | UA23000x |
| **Application Software Version** | 1.0.0.0 |
| **Firmware Revision** | D2.01.04 |
| **BACnet Protocol Revision** | Version 1, Revision 12, (135-2010). |
| **Product Description** | The KTRBUu217.456 is a room controller for heating/cooling applications with BACnet MS/TP. |

**BACnet Standardized Device Profile (Annex L)**
BACnet Advanced Application Controller (B-AAC)

## BACnet interoperability building blocks supported (Annex K)

| | |
|---|---|
| **Data Sharing** | ReadProperty-B (DS-RP-B)<br>ReadPropertyMultiple-B (DS-RPM-B)<br>WriteProperty-B (DS-WP-B)<br>WritePropertyMultiple-B (DS-WPM-B)<br>ChangeofValue-B (DS-COV-B)<br>ChangeofValue-Unsolicited-B (DS-COVU-B |
| **Alarm and Event Management** | Notification Internal-B (AE-N-I-B)<br>ACK-B (AE-ACK-B)<br>Alarm Summary-B (AE-ASUM-B)<br>Enrollment Summary-B (AE-ESUM-B)<br>Information-B (AE-Info-B) |
| **Scheduling** | Scheduling-Internal-B (SCHED-I-B) |
| **Device and Network Management** | Dynamic Device Binding-B (DM-DDB-B)<br>Dynamic Object Binding-B (DM-DOB-B)<br>DeviceCommunicationControl-B (DM-DCC-B)<br>TimeSynchronization-B (DM-TS-B)<br>UTCTimeSynchronization-B (DM-UTC-B)<br>ReinitializeDevice-B (DM-RD-B)<br>Backup and Restore-B (DM-BR-B)<br>Restart-B (DM-R-B) |

## BACnet object types supported

| Object Type | Supported | Dynamically creatable | Dynamically deletable |
|---|---|---|---|
| AnalogInput (AI) | ✓ | ✗ | ✗ |
| AnalogOutput (AO) | ✓ | ✗ | ✗ |
| AnalogValue (AV) | ✓ | ✗ | ✗ |
| BinaryInput (BI) | ✓ | ✗ | ✗ |
| BinaryOutput (BO) | ✓ | ✗ | ✗ |
| BinaryValue (BV) | ✓ | ✗ | ✗ |
| Device (DEV) | ✓ | ✗ | ✗ |
| File (FIL) | ✓ | ✗ | ✗ |
| Loop (LOO) | ✓ | ✗ | ✗ |
| MultiStateValue (MV) | ✓ | ✗ | ✗ |
| NotificationClass (NC) | ✓ | ✗ | ✗ |
| Program (PRG) | ✓ | ✗ | ✗ |
| Schedule (SCH) | ✓ | ✗ | ✗ |

## AnalogInput

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 0 | Acked_Transitions | BITSTRING | R | - |
| 17 | Notification_Class | Unsigned | R | - |
| 22 | Cov_Increment | REAL | R | - |
| 25 | Deadband | REAL | W | - |
| 28 | Description | CharacterString | R | - |
| 31 | Device_Type | CharacterString | R | - |
| 35 | Event_Enable | BITSTRING | W | - |
| 36 | Event_State | ENUMERATED | R | - |
| 45 | High_Limit | REAL | W | - |
| 52 | Limit_Enable | BITSTRING | W | - |
| 59 | Low_Limit | REAL | W | - |
| 65 | Max_Pres_Value | REAL | R | - |
| 69 | Min_Pres_Value | REAL | R | - |
| 72 | Notify_Type | ENUMERATED | R | - |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 81 | Out_Of_Service | BOOLEAN | W | - |
| 85 | Present_Value | REAL | W | - |
| 103 | Reliability | ENUMERATED | W | - |
| 106 | Resolution | REAL | R | - |
| 111 | Status_Flags | BITSTRING | R | - |
| 113 | Time_Delay | Unsigned | W | 0..6553s |
| 117 | Units | ENUMERATED | R | - |
| 118 | Update_Interval | Unsigned | R | - |
| 130 | Event_Time_Stamps | ArrayOfBACnetTimeStamp | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 351 | Event_Message_Texts | ArrayOfCharacterString | R | - |
| 514 | 159-Dpref_Value | Unsigned | R | - |
| 516 | 159-Dpref_Reliability | Unsigned | R | - |
| 538 | 159-Covu_Nc | Unsigned | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |
| 546 | 159-Min_Dp_Value | INTEGER | R | - |
| 547 | 159-Max_Dp_Value | INTEGER | R | - |
| 548 | 159-Min_Obj_Value | REAL | R | - |
| 549 | 159-Max_Obj_Value | REAL | R | - |
| 550 | 159-Attenuation_Dp | Unsigned | R | - |
| 556 | 159-Reliability_Range | Unsigned | R | - |
| 560 | 159-Offset | REAL | R | - |

## AnalogOutput

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 0 | Acked_Transitions | BITSTRING | R | - |
| 17 | Notification_Class | Unsigned | R | - |
| 22 | Cov_Increment | REAL | R | - |
| 25 | Deadband | REAL | W | - |
| 28 | Description | CharacterString | R | - |
| 31 | Device_Type | CharacterString | R | - |
| 35 | Event_Enable | BITSTRING | W | - |
| 36 | Event_State | ENUMERATED | R | - |
| 45 | High_Limit | REAL | W | - |
| 52 | Limit_Enable | BITSTRING | W | - |
| 59 | Low_Limit | REAL | W | - |
| 65 | Max_Pres_Value | REAL | R | - |
| 69 | Min_Pres_Value | REAL | R | - |
| 72 | Notify_Type | ENUMERATED | W | - |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 81 | Out_Of_Service | BOOLEAN | W | - |
| 85 | Present_Value | REAL | W | - |
| 87 | Priority_Array | BACnetPriorityArray | R | - |
| 103 | Reliability | ENUMERATED | W | - |
| 104 | Relinquish_Default | REAL | W | - |
| 106 | Resolution | REAL | R | - |
| 111 | Status_Flags | BITSTRING | R | - |
| 113 | Time_Delay | Unsigned | W | 0..6553s |
| 117 | Units | ENUMERATED | R | - |
| 130 | Event_Time_Stamps | ArrayOfBACnetTimeStamp | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 351 | Event_Message_Texts | ArrayOfCharacterString | R | - |
| 514 | 159-Dpref_Value | Unsigned | R | - |
| 515 | 159-Dpref_Overridden | Unsigned | R | - |
| 516 | 159-Dpref_Reliability | Unsigned | R | - |
| 538 | 159-Covu_Nc | Unsigned | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |
| 546 | 159-Min_Dp_Value | INTEGER | R | - |
| 547 | 159-Max_Dp_Value | INTEGER | R | - |
| 548 | 159-Min_Obj_Value | REAL | R | - |
| 549 | 159-Max_Obj_Value | REAL | R | - |
| 556 | 159-Reliability_Range | Unsigned | R | - |
| 560 | 159-Offset | REAL | R | - |

## AnalogValue

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 0 | Acked_Transitions | BITSTRING | R | - |
| 17 | Notification_Class | Unsigned | R | - |
| 22 | Cov_Increment | REAL | R | - |
| 25 | Deadband | REAL | W | - |
| 28 | Description | CharacterString | R | - |
| 35 | Event_Enable | BITSTRING | W | - |
| 36 | Event_State | ENUMERATED | R | - |
| 45 | High_Limit | REAL | W | - |
| 52 | Limit_Enable | BITSTRING | W | - |
| 59 | Low_Limit | REAL | W | - |
| 72 | Notify_Type | ENUMERATED | W | - |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 81 | Out_Of_Service | BOOLEAN | W | - |
| 85 | Present_Value | REAL | W | - |
| 103 | Reliability | ENUMERATED | W | - |
| 111 | Status_Flags | BITSTRING | R | - |
| 113 | Time_Delay | Unsigned | W | 0..6553s |
| 117 | Units | ENUMERATED | W | - |
| 130 | Event_Time_Stamps | ArrayOfBACnetTimeStamp | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 351 | Event_Message_Texts | ArrayOfCharacterString | R | - |
| 514 | 159-Dpref_Value | Unsigned | R | - |
| 516 | 159-Dpref_Reliability | Unsigned | R | - |
| 538 | 159-Covu_Nc | Unsigned | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |
| 546 | 159-Min_Dp_Value | INTEGER | R | - |
| 547 | 159-Max_Dp_Value | INTEGER | R | - |
| 548 | 159-Min_Obj_Value | REAL | R | - |
| 549 | 159-Max_Obj_Value | REAL | R | - |
| 556 | 159-Reliability_Range | Unsigned | R | - |

## BinaryInput

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 0 | Acked_Transitions | BITSTRING | R | - |
| 4 | Active_Text | CharacterString | R | - |
| 6 | Alarm_Value | ENUMERATED | R | - |
| 15 | Change_Of_State_Count | Unsigned | W | only 0 writeable |
| 16 | Change_Of_State_Time | BACnetDateTime | R | - |
| 17 | Notification_Class | Unsigned | R | - |
| 28 | Description | CharacterString | R | - |
| 31 | Device_Type | CharacterString | R | - |
| 33 | Elapsed_Active_Time | Unsigned | W | only 0 writeable |
| 35 | Event_Enable | BITSTRING | W | - |
| 36 | Event_State | ENUMERATED | R | - |
| 46 | Inactive_Text | CharacterString | R | - |
| 72 | Notify_Type | ENUMERATED | R | - |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 81 | Out_Of_Service | BOOLEAN | W | - |
| 84 | Polarity | ENUMERATED | R | - |
| 85 | Present_Value | ENUMERATED | W | - |
| 103 | Reliability | ENUMERATED | W | - |
| 111 | Status_Flags | BITSTRING | R | - |
| 113 | Time_Delay | Unsigned | W | 0..6553s |
| 114 | Time_Of_Active_Time_Reset | BACnetDateTime | R | - |
| 115 | Time_Of_State_Count_Reset | BACnetDateTime | R | - |
| 130 | Event_Time_Stamps | ArrayOfBACnetTimeStamp | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 351 | Event_Message_Texts | ArrayOfCharacterString | R | - |
| 514 | 159-Dpref_Value | Unsigned | R | - |
| 516 | 159-Dpref_Reliability | Unsigned | R | - |
| 538 | 159-Covu_Nc | Unsigned | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |
| 556 | 159-Reliability_Range | Unsigned | R | - |

## BinaryOutput

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 0 | Acked_Transitions | BITSTRING | R | - |
| 4 | Active_Text | CharacterString | R | - |
| 15 | Change_Of_State_Count | Unsigned | W | only 0 writeable |
| 16 | Change_Of_State_Time | BACnetDateTime | R | - |
| 17 | Notification_Class | Unsigned | R | - |
| 28 | Description | CharacterString | R | - |
| 31 | Device_Type | CharacterString | R | - |
| 33 | Elapsed_Active_Time | Unsigned | W | only 0 writeable |
| 35 | Event_Enable | BITSTRING | W | - |
| 36 | Event_State | ENUMERATED | R | - |
| 40 | Feedback_Value | ENUMERATED | R | - |
| 46 | Inactive_Text | CharacterString | R | - |
| 66 | Minimum_Off_Time | Unsigned | R | - |
| 67 | Minimum_On_Time | Unsigned | R | - |
| 72 | Notify_Type | ENUMERATED | R | - |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 81 | Out_Of_Service | BOOLEAN | W | - |
| 84 | Polarity | ENUMERATED | R | - |
| 85 | Present_Value | ENUMERATED | W | - |
| 87 | Priority_Array | BACnetPriorityArray | R | - |
| 103 | Reliability | ENUMERATED | W | - |
| 104 | Relinquish_Default | ENUMERATED | R | - |
| 111 | Status_Flags | BITSTRING | R | - |
| 113 | Time_Delay | Unsigned | W | 0..6553s |
| 114 | Time_Of_Active_Time_Reset | BACnetDateTime | R | - |
| 115 | Time_Of_State_Count_Reset | BACnetDateTime | R | - |
| 130 | Event_Time_Stamps | ArrayOfBACnetTimeStamp | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 351 | Event_Message_Texts | ArrayOfCharacterString | R | - |
| 514 | 159-Dpref_Value | Unsigned | R | - |
| 515 | 159-Dpref_Overridden | Unsigned | R | - |
| 516 | 159-Dpref_Reliability | Unsigned | R | - |
| 517 | 159-Dpref_Feedback | Unsigned | R | - |
| 538 | 159-Covu_Nc | Unsigned | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |
| 556 | 159-Reliability_Range | Unsigned | R | - |

## BinaryValue

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 0 | Acked_Transitions | BITSTRING | R | - |
| 4 | Active_Text | CharacterString | R | - |
| 6 | Alarm_Value | ENUMERATED | R | - |
| 15 | Change_Of_State_Count | Unsigned | W | only 0 writeable |
| 16 | Change_Of_State_Time | BACnetDateTime | R | - |
| 17 | Notification_Class | Unsigned | R | - |
| 28 | Description | CharacterString | R | - |
| 33 | Elapsed_Active_Time | Unsigned | W | only 0 writeable |
| 35 | Event_Enable | BITSTRING | W | - |
| 36 | Event_State | ENUMERATED | R | - |
| 46 | Inactive_Text | CharacterString | R | - |
| 66 | Minimum_Off_Time | Unsigned | R | - |
| 67 | Minimum_On_Time | Unsigned | R | - |
| 72 | Notify_Type | ENUMERATED | R | - |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 81 | Out_Of_Service | BOOLEAN | W | - |
| 85 | Present_Value | ENUMERATED | W | - |
| 103 | Reliability | ENUMERATED | W | - |
| 111 | Status_Flags | BITSTRING | R | - |
| 113 | Time_Delay | Unsigned | W | 0..6553s |
| 114 | Time_Of_Active_Time_Reset | BACnetDateTime | R | - |
| 115 | Time_Of_State_Count_Reset | BACnetDateTime | R | - |
| 130 | Event_Time_Stamps | ArrayOfBACnetTimeStamp | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 351 | Event_Message_Texts | ArrayOfCharacterString | R | - |
| 514 | 159-Dpref_Value | Unsigned | R | - |
| 516 | 159-Dpref_Reliability | Unsigned | R | - |
| 538 | 159-Covu_Nc | Unsigned | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |
| 556 | 159-Reliability_Range | Unsigned | R | - |

## Device

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 10 | Apdu_Segment_Timeout | Unsigned | R | - |
| 11 | Apdu_Timeout | Unsigned | R | - |
| 12 | Application_Software_Version | CharacterString | R | 0..64 Bytes |
| 24 | Daylight_Savings_Status | BOOLEAN | R | - |
| 28 | Description | CharacterString | R | - |
| 30 | Device_Address_Binding | ListOfBACnetAddressBinding | R | - |
| 44 | Firmware_Revision | CharacterString | R | 0..64 Bytes |
| 56 | Local_Date | Date | R | - |
| 57 | Local_Time | Time | R | - |
| 58 | Location | CharacterString | R | - |
| 62 | Max_Apdu_Length_Accepted | Unsigned | R | - |
| 63 | Max_Info_Frames | Unsigned | R | 1..10 |
| 64 | Max_Master | Unsigned | R | 1..127 |
| 70 | Model_Name | CharacterString | R | 0..64 Bytes |
| 73 | Number_Of_APDU_Retries | Unsigned | R | - |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 76 | Object_List | ArrayOfBACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 96 | Protocol_Object_Types_Supported | BITSTRING | R | - |
| 97 | Protocol_Services_Supported | BITSTRING | R | - |
| 98 | Protocol_Version | Unsigned | R | - |
| 107 | Segmentation_Supported | ENUMERATED | R | - |
| 112 | System_Status | ENUMERATED | R | - |
| 119 | Utc_Offset | INTEGER | R | -780..+780 |
| 120 | Vendor_Identifier | Unsigned | R | - |
| 121 | Vendor_Name | CharacterString | R | 0..64 Bytes |
| 139 | Protocol_Revision | Unsigned | R | - |
| 152 | Active_Cov_Subscriptions | ListOfBACnetCovSubscription | W | - |
| 153 | Backup_Failure_Timeout | Unsigned | R | 1..65535 |
| 154 | Configuration_Files | ArrayOfBACnetObjectIdentifier | R | - |
| 155 | Database_Revision | Unsigned | R | - |
| 157 | Last_Restore_Time | BACnetTimeStamp | R | - |
| 167 | Max_Segments_Accepted | Unsigned | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 196 | Last_Restart_Reason | ENUMERATED | R | - |
| 202 | Restart_Notification_Recipients | ListOfBACnetRecipient | R | - |
| 203 | Time_Of_Device_Restart | BACnetTimeStamp | R | - |
| 338 | Backup_And_Restore_State | ENUMERATED | R | - |
| 339 | Backup_Preparation_Time | Unsigned | R | - |
| 340 | Restore_Completion_Time | Unsigned | R | - |
| 341 | Restore_Preparation_Time | Unsigned | R | - |
| 537 | 159-Object_List_Oos | ArrayOfBACnetObjectIdentifier | R | - |
| 555 | 159-Serial_Number | CharacterString | R | 0..64 Bytes |

## File

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 13 | Archive | BOOLEAN | W | - |
| 28 | Description | CharacterString | R | 0..64 Bytes |
| 41 | File_Access_Method | ENUMERATED | R | - |
| 42 | File_Size | Unsigned | W | 0 writeable only during restore |
| 43 | File_Type | CharacterString | R | 0..64 Bytes |
| 71 | Modification_Date | BACnetDateTime | R | - |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | R | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 99 | Read_Only | BOOLEAN | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |

## Loop

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 0 | Acked_Transitions | BITSTRING | R | - |
| 2 | Action | ENUMERATED | R | - |
| 14 | Bias | REAL | W | - |
| 17 | Notification_Class | Unsigned | R | - |
| 19 | Controlled_Variable_Reference | BACnetObjectPropertyReference | R | - |
| 20 | Controlled_Variable_Units | ENUMERATED | R | - |
| 21 | Controlled_Variable_Value | REAL | R | - |
| 22 | Cov_Increment | REAL | W | - |
| 25 | Deadband | REAL | W | - |
| 26 | Derivative_Constant | REAL | W | - |
| 27 | Derivative_Constant_Units | ENUMERATED | R | - |
| 28 | Description | CharacterString | R | - |
| 34 | Error_Limit | REAL | W | - |
| 35 | Event_Enable | BITSTRING | W | - |
| 36 | Event_State | ENUMERATED | R | - |
| 49 | Integral_Constant | REAL | W | - |
| 50 | Integral_Constant_Units | ENUMERATED | R | - |
| 60 | Manipulated_Variable_Reference | BACnetObjectPropertyReference | R | - |
| 61 | Maximum_Output | REAL | W | - |
| 68 | Minimum_Output | REAL | W | - |
| 72 | Notify_Type | ENUMERATED | R | - |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 81 | Out_Of_Service | BOOLEAN | W | - |
| 82 | Output_Units | ENUMERATED | R | - |
| 85 | Present_Value | REAL | W | - |
| 88 | Priority_For_Writing | Unsigned | R | - |
| 93 | Proportional_Constant | REAL | W | - |
| 94 | Proportional_Constant_Units | ENUMERATED | R | - |
| 103 | Reliability | ENUMERATED | R | - |
| 108 | Setpoint | REAL | W | - |
| 109 | Setpoint_Reference | BACnetSetpointReference | R | - |
| 111 | Status_Flags | BITSTRING | R | - |
| 113 | Time_Delay | Unsigned | W | 0..6553s |
| 118 | Update_Interval | Unsigned | R | - |
| 130 | Event_Time_Stamps | ArrayOfBACnetTimeStamp | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 351 | Event_Message_Texts | ArrayOfCharacterString | R | - |
| 535 | 159-Comment | CharacterString | R | 0..64 Bytes |
| 538 | 159-Covu_Nc | Unsigned | R | - |
| 542 | 159-Integral_Stop | BOOLEAN | W | - |
| 543 | 159-Neutralize | BOOLEAN | W | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |
| 551 | 159-Derivative_Filter_Constant | REAL | W | - |
| 552 | 159-Integral_High_Limit | REAL | W | - |
| 553 | 159-Integral_Low_Limit | REAL | W | - |
| 554 | 159-Deviation_Deadband | REAL | W | - |

## NotificationClass

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 1 | Ack_Required | BITSTRING | R | - |
| 17 | Notification_Class | Unsigned | R | - |
| 28 | Description | CharacterString | R | - |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 86 | Priority | ArrayOfUnsigned | R | - |
| 102 | Recipient_List | ListOfBACnetDestination | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 539 | 159-Covu_Period | Unsigned | R | - |
| 540 | 159-Covu_Referenced_Objects | ArrayOfBACnetObjectIdentifier | R | - |
| 541 | 159-Nc_Referenced_Objects | ArrayOfBACnetObjectIdentifier | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |

## Program

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 28 | Description | CharacterString | R | 0..64 Bytes |
| 29 | Description_Of_Halt | CharacterString | R | 0..64 Bytes |
| 48 | Instance_Of | CharacterString | R | 0..64 Bytes |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | R | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 81 | Out_Of_Service | BOOLEAN | W | - |
| 90 | Program_Change | ENUMERATED | W | - |
| 91 | Program_Location | CharacterString | R | 0..64 Bytes |
| 92 | Program_State | ENUMERATED | R | - |
| 100 | Reason_For_Halt | ENUMERATED | R | - |
| 103 | Reliability | ENUMERATED | R | - |
| 111 | Status_Flags | BITSTRING | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |

## Schedule

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 28 | Description | CharacterString | R | - |
| 32 | Effective_Period | BACnetDateRange | W | - |
| 38 | Exception_Schedule | ArrayOfBACnetSpecialEvent | W | 0..8x1..8 entries |
| 54 | List_Of_Object_Property_References | ListOfBACnetDeviceObjectPro-pertyReferePnce1 | | |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 81 | Out_Of_Service | BOOLEAN | W | - |
| 85 | Present_Value | any primitive | W | - |
| 88 | Priority_For_Writing | Unsigned | R | - |
| 103 | Reliability | ENUMERATED | R | - |
| 111 | Status_Flags | BITSTRING | R | - |
| 123 | Weekly_Schedule | ArrayOfBACnetDailySchedule | W | 0..8 per day |
| 168 | Profile_Name | CharacterString | R | - |
| 174 | Schedule_Default | any primitive | R | - |
| 518 | 159-Next_Exec_Time | Time | R | - |
| 519 | 159-Next_Exec_Val | any primitive | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |

## MultiStateValue

| Property | | Datatype | W | Restrictions |
|---|---|---|---|---|
| 0 | Acked_Transitions | BITSTRING | R | - |
| 7 | Alarm_Values | ListOfUnsigned | R | - |
| 17 | Notification_Class | Unsigned | R | - |
| 28 | Description | CharacterString | R | - |
| 35 | Event_Enable | BITSTRING | W | - |
| 36 | Event_State | ENUMERATED | R | - |
| 39 | Fault_Values | ListOfUnsigned | R | - |
| 72 | Notify_Type | ENUMERATED | R | - |
| 74 | Number_Of_States | Unsigned | R | up to 128 |
| 75 | Object_Identifier | BACnetObjectIdentifier | R | - |
| 77 | Object_Name | CharacterString | W | 1..64 Bytes |
| 79 | Object_Type | ENUMERATED | R | - |
| 81 | Out_Of_Service | BOOLEAN | W | - |
| 85 | Present_Value | Unsigned | W | - |
| 103 | Reliability | ENUMERATED | W | - |
| 110 | State_Text | ArrayOfCharacterString | R | - |
| 111 | Status_Flags | BITSTRING | R | - |
| 113 | Time_Delay | Unsigned | W | 0..6553s |
| 130 | Event_Time_Stamps | ArrayOfBACnetTimeStamp | R | - |
| 168 | Profile_Name | CharacterString | R | - |
| 351 | Event_Message_Texts | ArrayOfCharacterString | R | - |
| 514 | 159-Dpref_Value | Unsigned | R | - |
| 516 | 159-Dpref_Reliability | Unsigned | R | - |
| 538 | 159-Covu_Nc | Unsigned | R | - |
| 544 | 159-Object_Flags | BITSTRING | R | - |
| 556 | 159-Reliability_Range | Unsigned | R | - |

## BACnet object description

| Object Name | Object Type / Instance | Description | Values for „Present Value“ (* Values Application dependent) | Existence Application Dependent? |
|---|---|---|---|---|
| Temperature | "analog-input", 1 | Temperature sensor | -30 .. 70 | ✗ |
| External Temperature | "analog-input", 2 | external Temperature sensor | -30 .. 70 | ✓ |
| Dew point sensor | "binary-input", 1 | Dew point sensor | dewpoint-sensor wet/dewpoint-sensor dry | ✓ |
| Minimum Floor Temperature | "analog-value", 2 | Heating is active if Floor-Temperature falls below this value | | ✓ |
| Maximum Floor Temperature | "analog-value", 2 | Heating is inactive if Floor-Temperature rises above this value | | ✓ |
| Air Temperature Max-Offset | "analog-value", 2 | Fan-Speed is reduced if airtemperature falls more below room-temperature than this value | | ✓ |
| Maximum/ Minimum Floor Temperature | "analog-value", 2 | Floor-Temperature is kept between Min/Max-Values of this value | | ✓ |
| checksum.sez | "file", 100 | | | ✗ |
| | „file“, 101 | | | ✗ |
| Operation Mode BMS | "multistate-value", 2 | Requested mode from Building Management System | PROTECTION/ ECONOMY/ PRE COMFORT/ COMFORT | ✗ |
| Active Operation Mode | "multistate-value", 3 | currently active operation mode | PROTECTION/ ECONOMY/ PRE COMFORT/ COMFORT/ EXTENDED PRESENCE/VALVE PROTECTION/ BOOST MODE/ SLEEP MODE/ EMERGENCY-OPERATION | ✗ |
| Maximum Local Offset | "analog-value", 5 | Maximum offset for local setpoint-changes | 0 .. 3 | ✗ |
| Local Config PIN | "analog-value", 4 | PIN to access local menu on Device | 0 .. 9999 | ✗ |
| Active Setpoint | "analog-value", 1 | currently used setpoint | 5 .. 40 | ✗ |
| "Output Heating" | "binary-output", 1 | Output | on/off | ✓ |
| "Output Cooling" | "binary-output", 1 | Output | on/off | ✓ |
| "Output Heating/ Cooling" | "binary-output", 1 | Output | on/off | ✓ |
| Output Cooling | "binary-output", 2, | Output | on/off | ✓ |
| Fan Control | "analog-output", 1 | Controlsignal Fan | 0 .. 100 | ✓ |
| Ball Valve Control | "analog-output", 1 | Controlsignal Ball Valve | 0 .. 100 | ✓ |

| Object Name | Object Type / Instance | Description | Values for „Present Value“ (* Values Application dependent) | Existence Application Dependent? |
|---|---|---|---|---|
| Active Control-Mode | "multistate-value", 5 | currently active control-mode | Heating/Cooling | ✓ |
| Control Value Heating | "analog-output", 11 | Control Value for Heating | 0 .. 100 | ✓ |
| Control Value Cooling | "analog-output", 21 | Control Value for Cooling | 0 .. 100 | ✓ |
| Setpoint PROTECTION Heating | "analog-value", 12 | Setpoint PROTECTION Heating | | ✓ |
| Setpoint ECONOMY Heating | "analog-value", 13 | Setpoint ECONOMY Heating | | ✓ |
| Setpoint PRE COMFORT Heating | "analog-value", 14 | Setpoint PRE COMFORT Heating | | ✓ |
| Setpoint COMFORT Heating | "analog-value", 15 | Setpoint COMFORT Heating | | ✓ |
| Setpoint PROTECTION Cooling | "analog-value", 22 | Setpoint PROTECTION Cooling | | ✓ |
| Setpoint ECONOMY Cooling | "analog-value", 23 | Setpoint ECONOMY Cooling | | ✓ |
| Setpoint PRE COMFORT Cooling | "analog-value", 24 | Setpoint PRE COMFORT Cooling | | ✓ |
| Setpoint COMFORT Cooling | "analog-value", 25 | Setpoint COMFORT Cooling | | ✓ |
| Regulator Heating | "loop", 10 | Regulator Heating | 0 .. 100 | ✓ |
| Regulator Cooling | "loop", 20 | Regulator Cooling | 0 .. 100 | ✓ |
| Control-Mode BMS | "multistate-value", 4 | Requested Control-Mode from Building Management System | Heating/Cooling/ Automatic* | ✓ |
| Notificationclass for Alarms | "notification-class", 10 | Notification distribution for Alarms | | ✗ |
| Notificationclass for Faults | "notification-class", 20 | Notification distribution for Faults | | ✗ |
| Notificationclass for Operational Messages | "notification-class", 30 | Notification distribution for Operational Messages | | ✗ |
| Operation-Mode-Schedule | "schedule", 1 | Schedule for Operation Modes | | ✗ |
| Heartbeat Input | "analog-value", 30 | Heartbeat interval in seconds | 0 .. 3600 | ✗ |
| Window State | "binary-value", 2 | Window Open/Closed Input | open/closed | ✗ |
| Presence Detector | "binary-value", 3 | To set presence of person in the room | Person Presence/ Person Absence | ✗ |
| User Reset | "binary-value", 4 | Reset user settings | Reset/done | ✗ |

| Object Name | Object Type / Instance | Description | Values for „Present Value“ (* Values Application dependent) | Existence Application Dependent? |
|---|---|---|---|---|
| User Control Lock | "binary-value", 5 | Block all local controls | Usercontrol unlocked/ Usercontrol locked | ⊗ |
| A | "device", B | KTRBUu217.456 | | ⊗ |
| PRG0000001_ BOOT | "program", 1 | | | ⊗ |

## Segmentation capability

| | |
|---|---|
| **Segmented requests supported Windows Size** | 4 |
| **Segmented responses supported Windows Size** | 16 |

## Data Link Layer Options

| | |
|---|---|
| BACnet IP, (Annex J) | ⊗ |
| BACnet IP, (Annex J), Foreign Device | ⊗ |
| ISO 8802-3, Ethernet (Clause 7) | ⊗ |
| ANSI/ATA 878.1,2.6 Mb. ARCNET (Clause 8) | ⊗ |
| ANSI/ATA 878.1,RS-485 ARCNET (Clause 8) | ⊗ |
| MS/TP Master (clase 9), baud rates | 9600, 19200, 38400, 57600, 76800, 115200 |
| MS/TP Slave (clase 9), baud rates | ⊗ |
| Point-To-Point, EIA 232 (Clause 10), baud rates | ⊗ |
| Point-To-Point, modem (Clause 10), baud rates | ⊗ |
| LonTalk, (Clause 11), medium: ... TF/FT-10 | ⊗ |

## Device adress binding

| | |
|---|---|
| Is static device binding supported? | ⊗ |

## Networking options

| | |
|---|---|
| Router, Clause 6 – List all routing configurations | ⊗ |
| Annex H, BACnet Tunneling Router over IP | ⊗ |
| BACnet IP Broadcast Management Device (BBMD) | |
| Does the BBMD support registriations by foreign devices? | ⊗ |
| Does the BBMD support network adress tramslation? | ⊗ |

**Character sets supported**

| | |
|---|---|
| ANSI X3.4 | ✓ |
| ISO 10646 (UCS-2) | ✗ |
| IBMTM/MircosoftTM DBCS | ✗ |
| ISO 10646 (UCS-4) | ✗ |
| ISO 8859-1 | ✓ |
| JIS C 6226 | ✗ |
| UTF-8 | ✓ |

**Networking security options**

| | |
|---|---|
| Non-secure Device – is capable of operating without BACnet Network Security | ✓ |
| Secure Device – is capable of using BACnet Network Security (NS-SD BIBB) | ✗ |
| Supports encryption (NS-ED BIBB) | ✗ |
| Multiple Application-Specific Keys: | ✗ |
| Key Server (NS-KS BIBB) | ✗ |

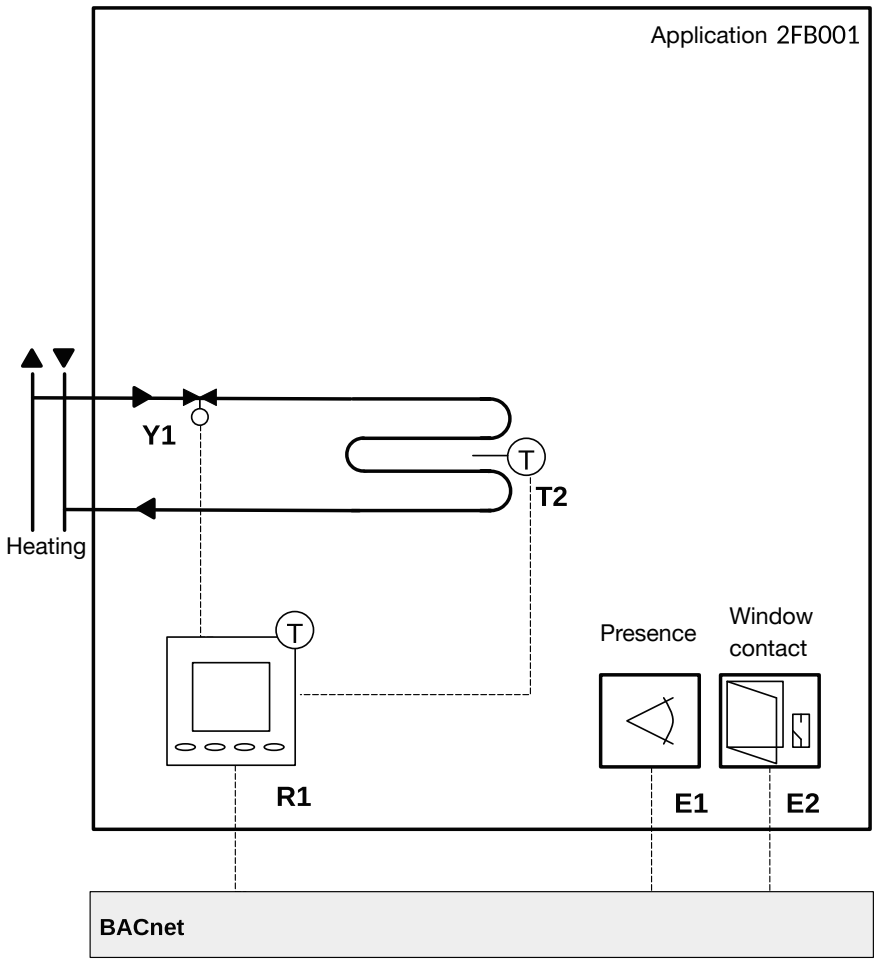
## 12.2 EDE

The EDE lists for the various system diagrams can be found at https://alre.de/download/

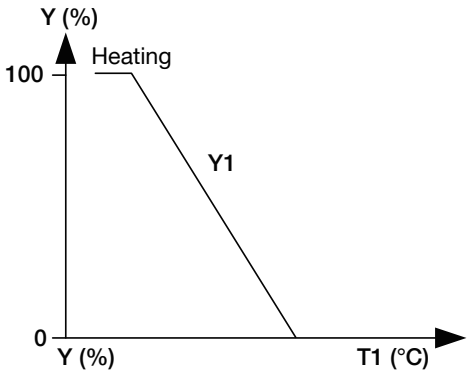
## 12.3 System diagrams

### 2FB001- Room temperature control using T1 with maintenance of a Tmin underfloor temperature

The system diagram controls underfloor heating systems in a 2-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the heating valve as required.
The external temperature sensor monitors the floor temperature and prevents the temperature from falling below the selected minimum temperature.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence), which are connected via the BACnet.

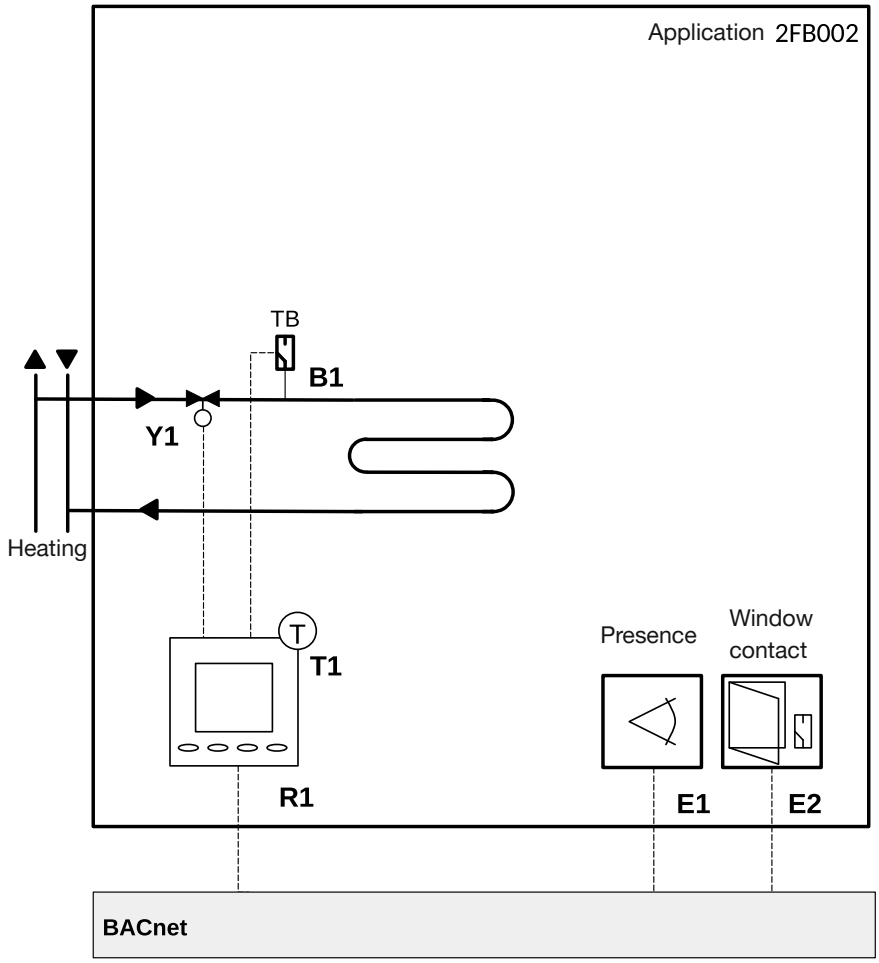



**T1** Room temperature
**T2** Temperature sensor
**Y1** Heating valve
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**Y** Control output signal

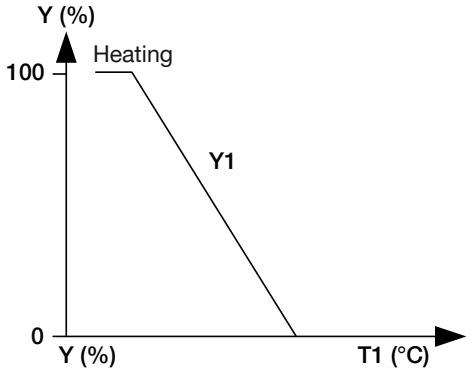


## 2FB002- Room temperature control using T1 with limitation at Tmax. via underfloor heating

The system diagram controls underfloor heating systems in a 2-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the heating valve as required.
The external temperature sensor monitors the floor temperature and prevents the temperature from exceeding the selected maximum temperature.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.

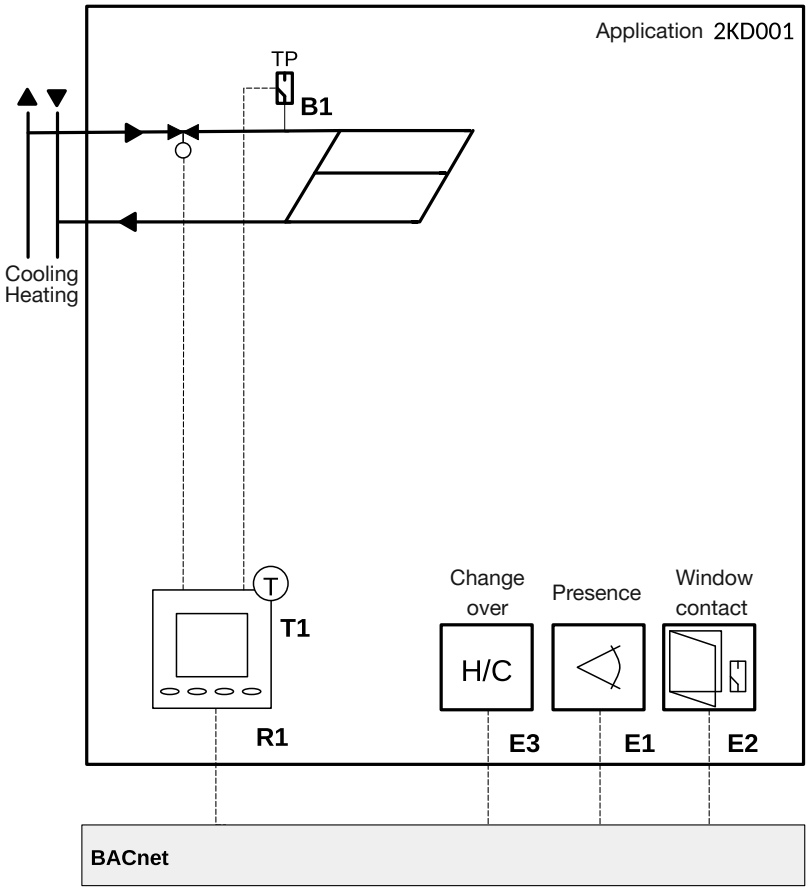



**T1** Room temperature
**B1** Temperature limiter
**Y1** Heating valve
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**Y** Control output signal

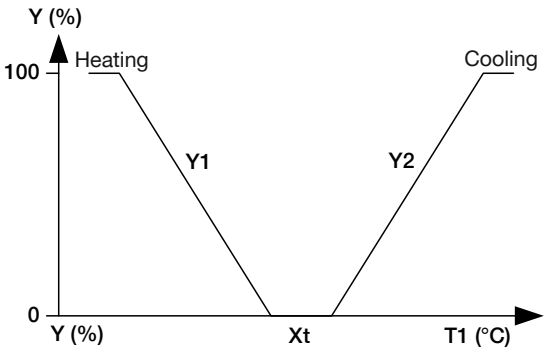


## 2KD001- Room temperature control of a cooling/heating ceiling using T1

The system diagram controls heating and cooling ceilings in a 2-conductor system. The temperature sensor used in the control unit measures the room temperature and regulates the control valve as required.
The external dew point sensor serves to monitor the room air humidity and switches the cooling ceiling off if this is exceeded.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.
The signal for switching between heating and cooling also comes from the BACnet protocol.

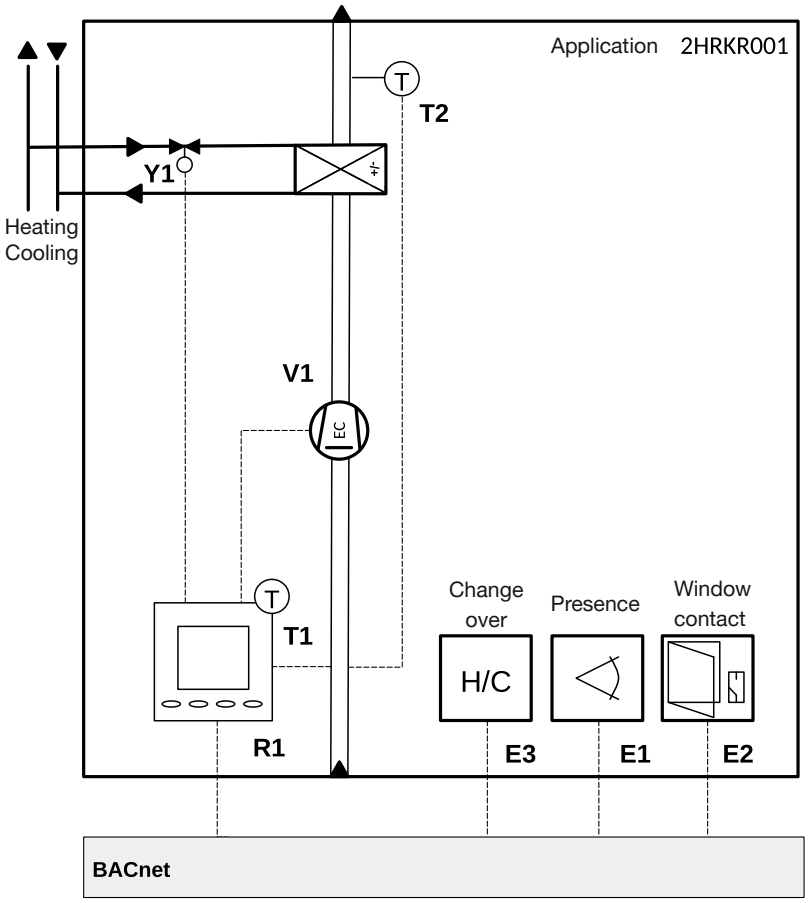



**T1** Room temperature
**B1** Dew point sensor
**Y1** Heating/cooling valve
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**E3** Change over via BACnet
**Xt** Neutral zone
**Y** Control output signal

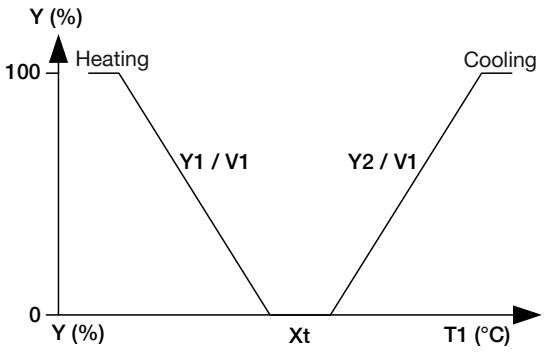


## 2HRKR001- Room temperature control using T1 via Fancoil

The system diagram controls a fan coil unit in a 2-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the control valve as required.
The room controller specifies the fan speed of the Fancoil (0-10V) via the difference in temperature measured (setpoint/actual value).
The external temperature sensor serves to limit the supply air temperature of the Fancoil to achieve maximum cosiness in the room climate.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.
The signal for switching between heating and cooling also comes from the BACnet protocol.

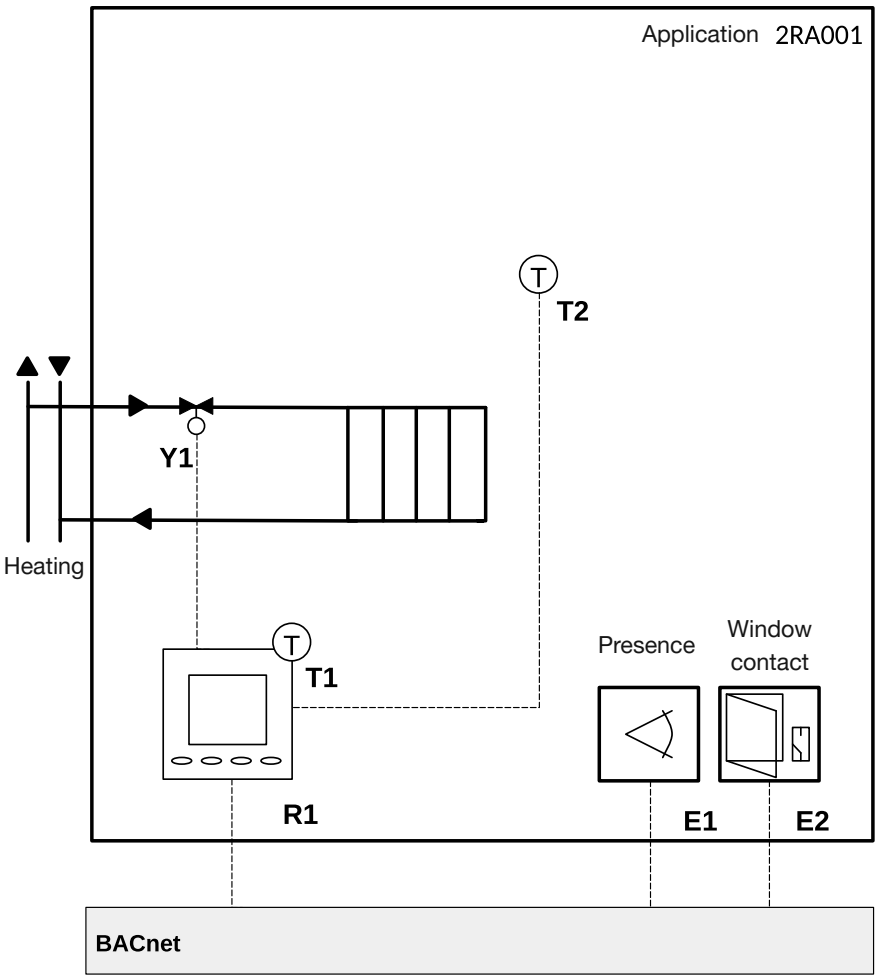



**T1** Room temperature
**T2** Dew point sensor
**Y1** Heating/cooling valve
**V1** Fan (0...10V)
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**E3** Change over via BACnet
**Xt** Neutral zone
**Y** Control output signal

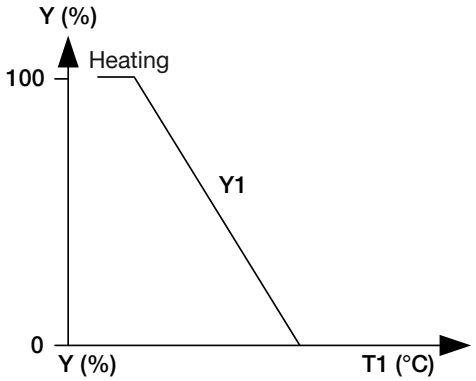


## 2RA001- Room temperature control using T2 via radiator

The system diagram controls radiator systems in a 2-conductor system. The temperature sensor used in the control unit and an external temperature sensor measure the room temperature by means of an adjustable weighting (factory setting is 100% external) between the two and regulate the heating valve as required. Rooms in which the location of the controller makes it hard to take a real-life room temperature measurement can thereby also be controlled with precision.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.

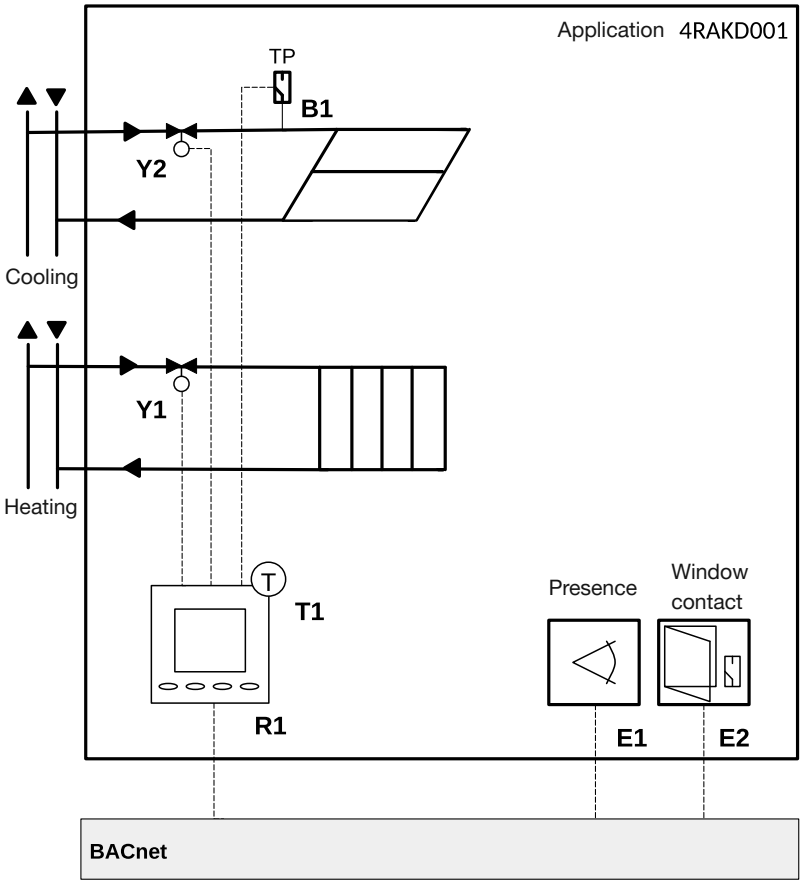



**T1** Room temperature
**T2** Room temperature
**Y1** Heating valve
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**Y** Control output signal

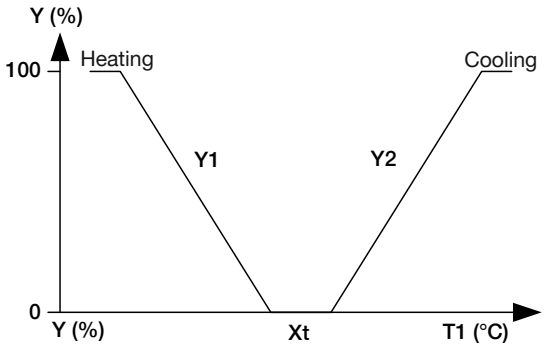


## 4RAKD001- Room temperature control using T1 via cooling/heating ceiling and radiator

The system diagram controls a cooling ceiling in combination with a radiator in a 4-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the control valves as required.
The external dew point sensor serves to monitor the room air humidity and switches the cooling ceiling off if this is exceeded.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.

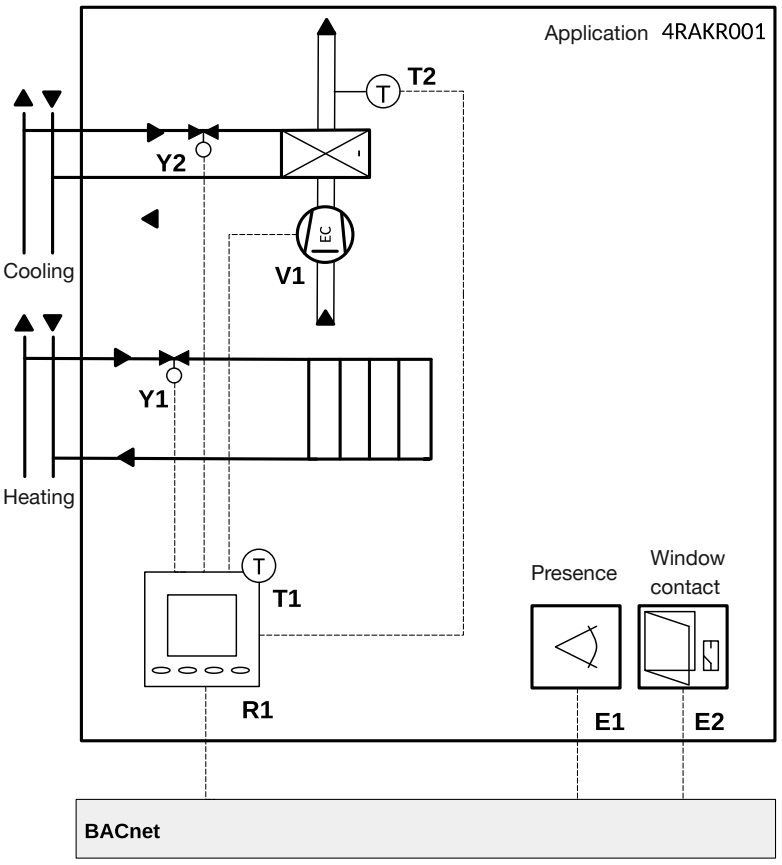



**T1** Room temperature
**B1** Dew point sensor
**Y1** Heating valve
**Y2** Cooling valve
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**Xt** Neutral zone
**Y** Control output signal

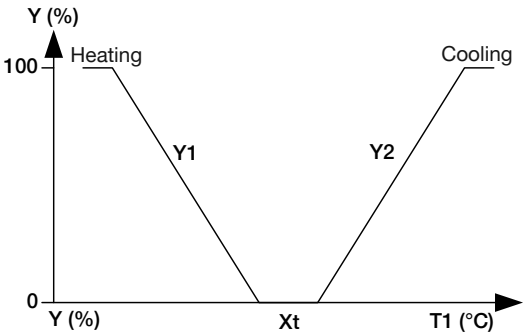


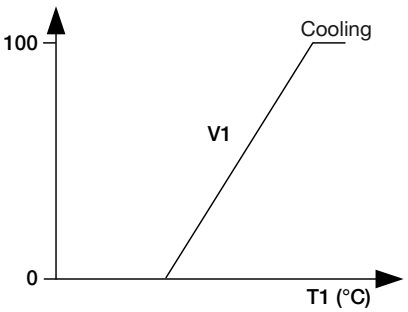
## 4RAKR001- Room temperature control using T1 via Fancoil and radiator

The system diagram controls a fan coil unit in combination with a radiator in a 4-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the control valves as required.
The room controller specifies the fan speed of the Fancoil (0-10V) via the difference in temperature measured (setpoint/actual value).
The external temperature sensor serves to limit the supply air temperature of the Fancoil to achieve maximum cosiness in the room climate.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.



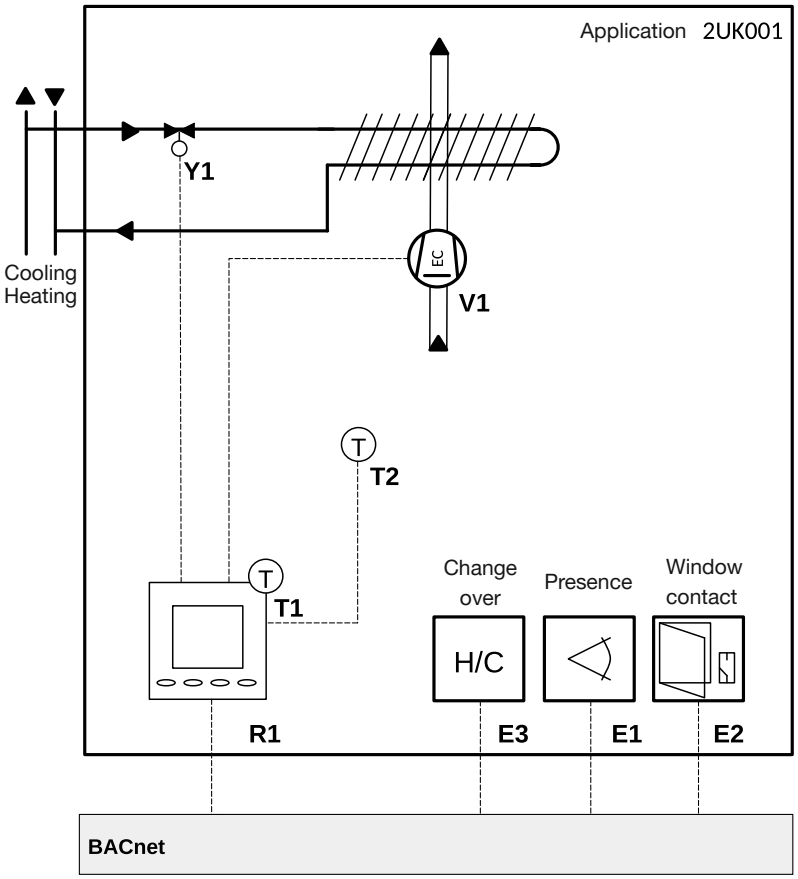

**T1** Room temperature
**T2** Supply air temperature (limiter)
**Y1** Heating valve
**Y2** Cooling valve
**V1** Fan (0...10V)
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**Xt** Neutral zone
**Y** Control output signal



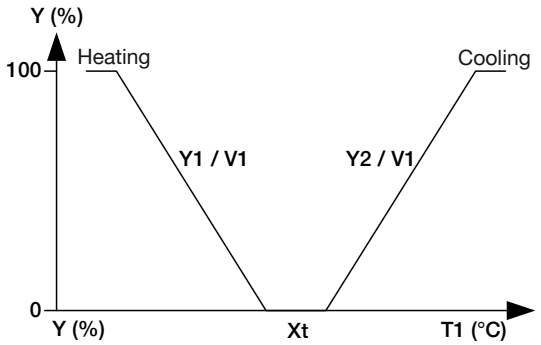



## 2UK001- Room temperature control using T2 via fan coil unit/underfloor convector

The system diagram controls a fan coil unit/underfloor convector in a 2-conductor system.
The temperature sensor used in the control unit and an external temperature sensor measure the room temperature by means of an adjustable weighting (factory setting is 100% external) between the two and regulate the heating valve as required.
The room controller specifies the fan speed of the underfloor convector (0-10V) based on the difference in temperature measured (setpoint/actual value).
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.
The signal for switching between heating and cooling also comes from the BACnet protocol.

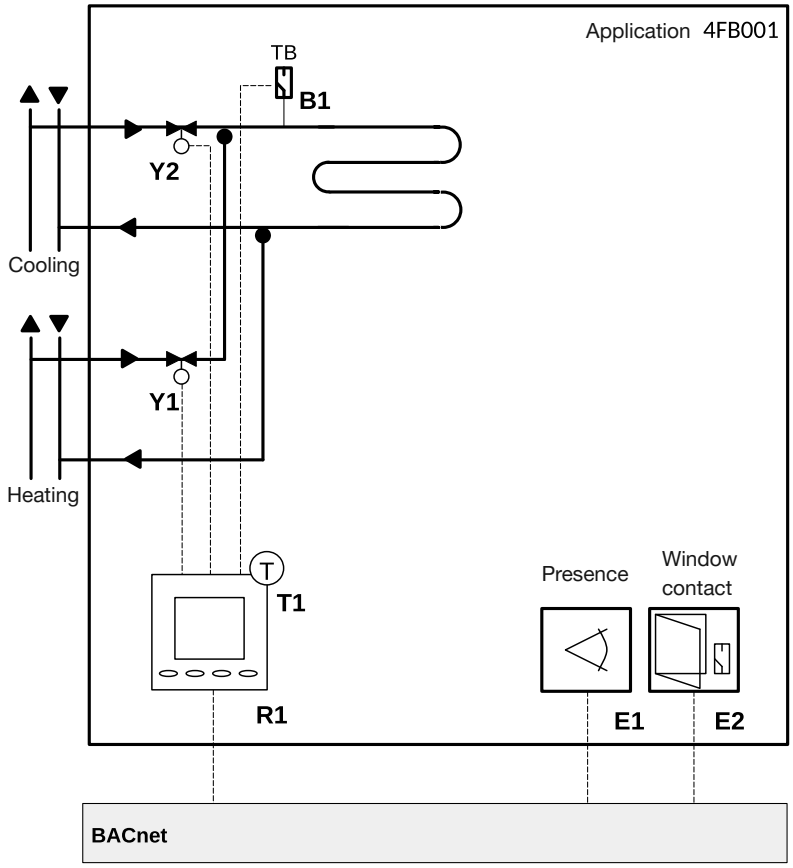



**T1** Room temperature
**T2** Room temperature 2
**Y1** Heating/cooling valve
**V1** Fan (0...10V)
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**E3** Change over via BACnet
**Xt** Neutral zone
**Y** Control output signal

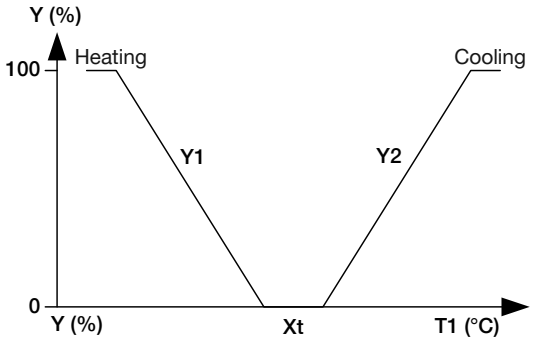


## 4FB001- Room temperature control using T1 via underfloor heating

The system diagram controls underfloor heating systems in a 4-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the control valves as required.
The external temperature sensor monitors the floor temperature and prevents the temperature from falling below or exceeding the selected minimum and maximum temperatures.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.

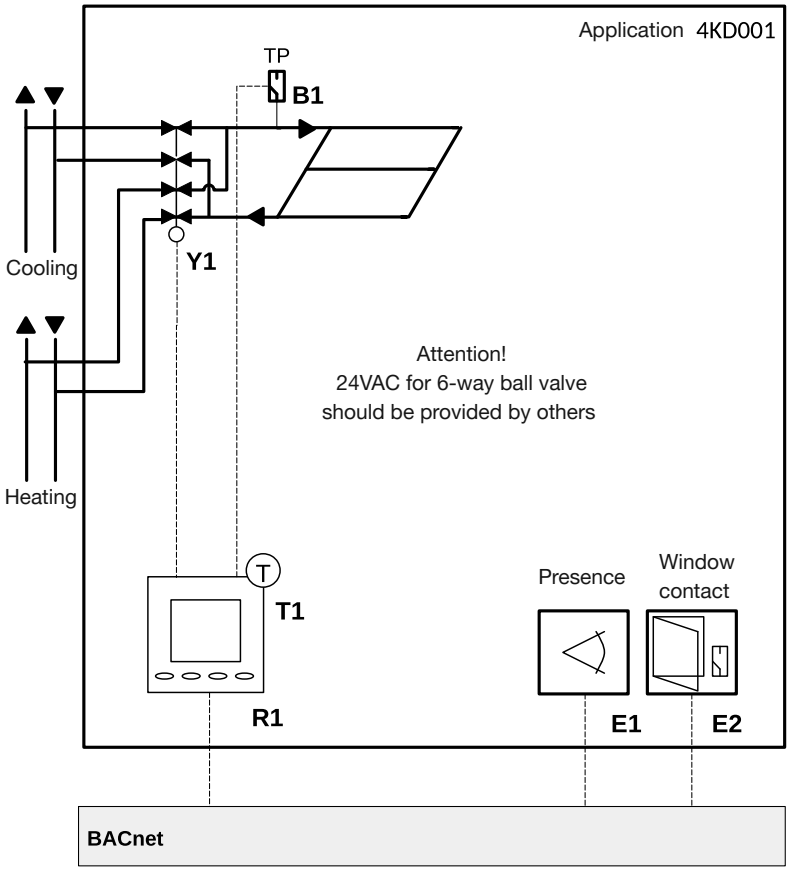



**T1** Room temperature
**B1** Temperature limiter
**Y1** Heatingvalve
**Y2** Cooling valve
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**Xt** Neutral zone
**Y** Control output signal

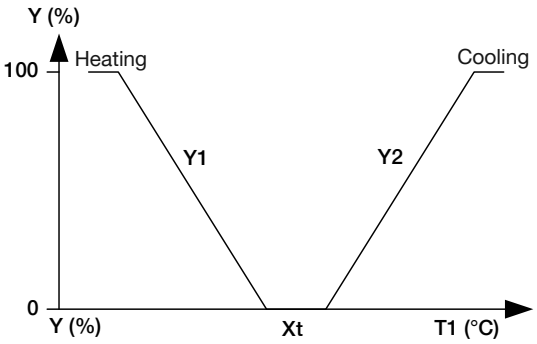


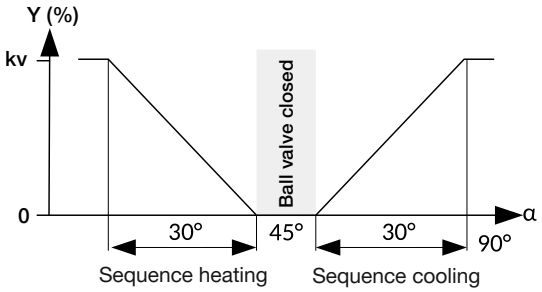
## 4KD001- Room temperature control using T1 via 6-way valve with different flow rates (heating/cooling ceiling)

The system diagram controls heating and cooling ceilings in a 4-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the control valve (0-10V; 2-10V;10-0V;10-2V) as required.
The external dew point sensor serves to monitor the room air humidity and switches the cooling ceiling off if this is exceeded.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.



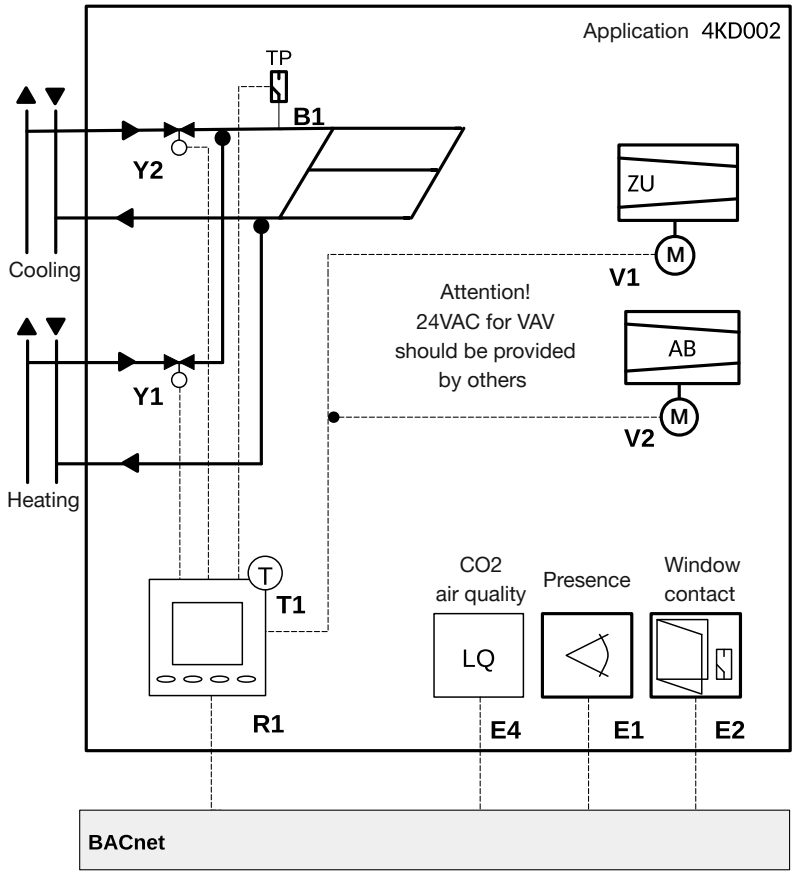

**T1** Room temperature
**B1** Dew point sensor
**Y1** Heating/cooling valve (6-way valve)
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**Xt** Neutral zone
**Y** Control output signal



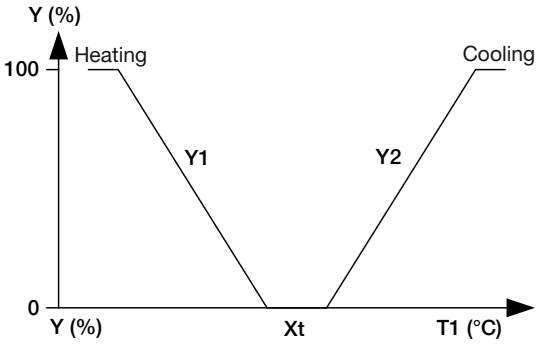



## 4KD002- Room temperature control using T1 via cooling/heating ceiling

The system diagram controls heating and cooling ceilings in a 4-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the control valves as required.
The external dew point sensor serves to monitor the room air humidity and switches the cooling ceiling off if this is exceeded.
The 0-10V output controls the volumetric flow valves for supply air and exhaust air in a parallel setup depending on air quality (BACnet).
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.

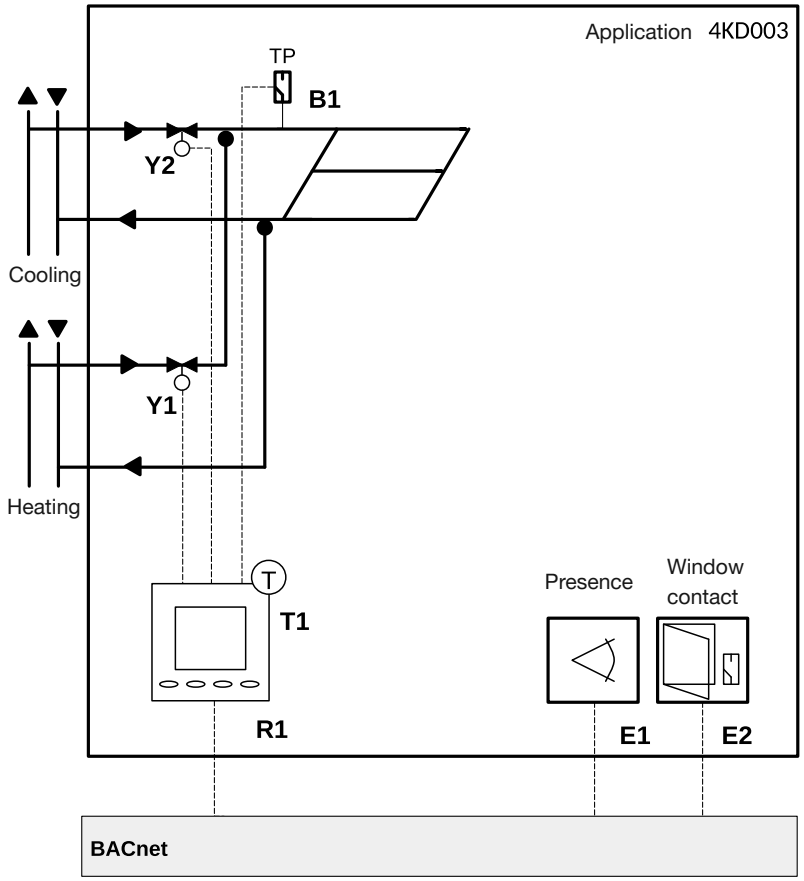



**T1** Room temperature
**B1** Dew point sensor
**Y1** Heating valve
**Y2** Cooling valve
**V1** VAV supply air (0...10V)
**V2** VAV extract air (0...10V)
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**E4** Air Quality CO2/VOC
**Xt** Neutral zone
**Y** Control output signal

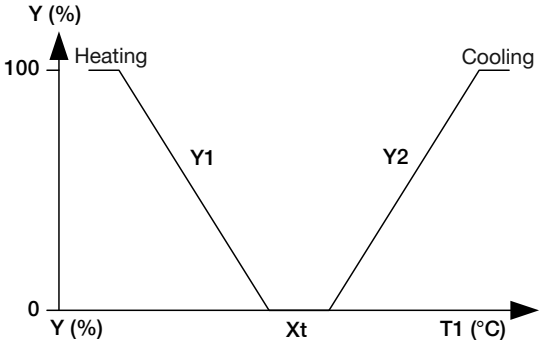


## 4KD003- Room temperature control using T1 via cooling/heating ceiling

The system diagram controls heating and cooling ceilings in a 4-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the control valves as required.
The external dew point sensor serves to monitor the room air humidity and switches the cooling ceiling off if this is exceeded.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.

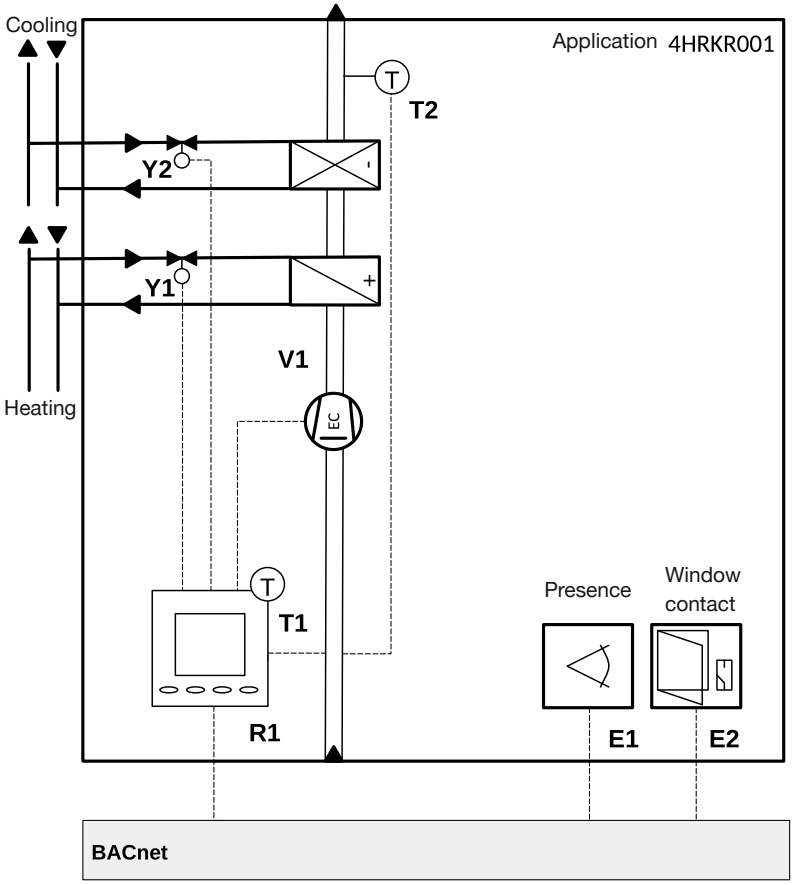



**T1** Room temperature
**B1** Dew point sensor
**Y1** Heating valve
**Y2** Cooling valve
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**Xt** Neutral zone
**Y** Control output signal

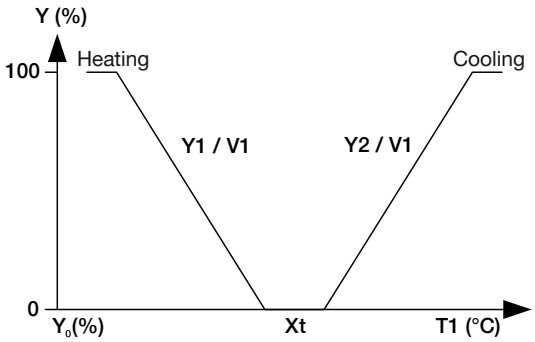


## 4HRKR001- Room temperature control using T1 via Fancoil

The system diagram controls a fan coil unit in a 4-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the control valves as required.
The room controller specifies the fan speed of the Fancoil (0-10V) via the difference in temperature measured (setpoint/actual value).
The external temperature sensor serves to limit the supply air temperature of the Fancoil to achieve maximum cosiness in the room climate.
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.

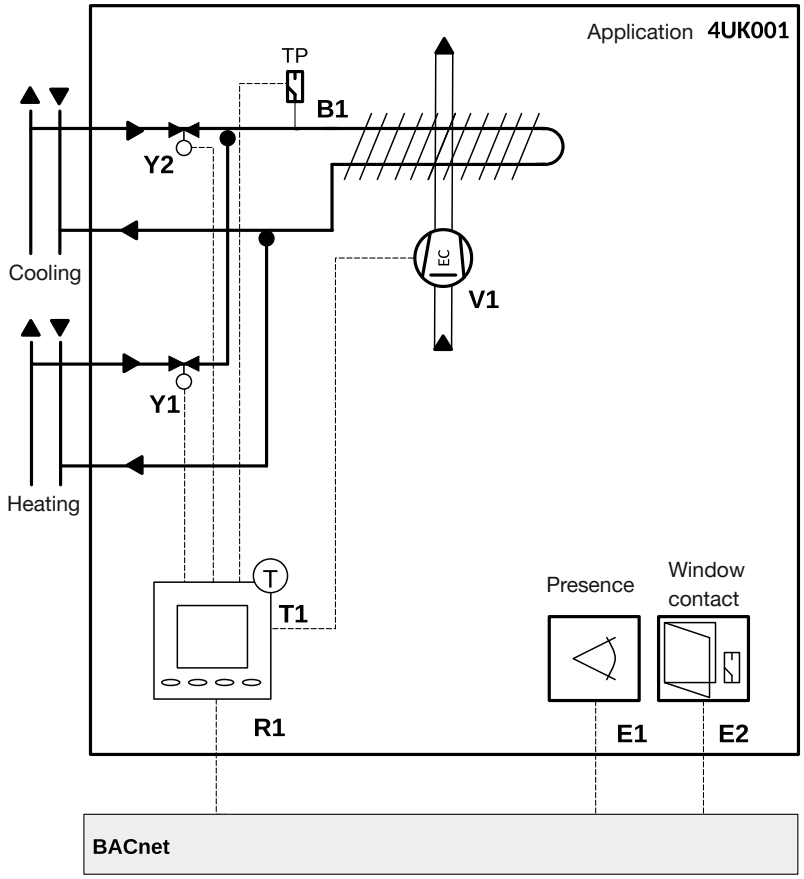



**T1** Room temperature
**T2** Supply air temperature
**Y1** Heating valve
**Y2** Cooling valve
**V1** Fan (0...10V)
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**Xt** Neutral zone
**Y** Control output signal



## 4UK001- Room temperature control using T1 via fan coil unit/underfloor convector

The system diagram controls a fan coil unit/underfloor convector in a 4-conductor system.
The temperature sensor used in the control unit measures the room temperature and regulates the control valves as required.
The external dew point sensor serves to monitor the room air humidity and switches the underfloor convector off if this is exceeded.
The room controller specifies the fan speed of the Fancoil (0-10V) via the difference in temperature measured (setpoint/actual value).
The controller can also evaluate further external sensors for presence and/or contact sensors (presence) , which are connected via the BACnet.




**T1** Room temperature
**B1** Dew point sensor
**Y1** Heating valve
**Y2** Cooling valve
**V1** Fan (0...10V)
**R1** Room controller BACnet
**E1** Presence detector via BACnet
**E2** Window contact via BACnet
**Xt** Neutral zone
**Y** Control output signal