Climate Controller

Type 148941 (white)

Type 148942 (black)

Type 148943 (white with Modbus interface)

Type 148944 (black with Modbus interface)

User manual

Keep these instructions in a safe place for future use!

KAMPMANN
Genau mein Klima.

Table of Contents

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1   About these Instructions

Carefully read these instructions in full prior to any assembly and installation work!

Anyone involved with the installation, commissioning and use of this product is obliged to pass these instructions on to tradespeople who are involved at the same time or subsequently, as well as to end users or operators. Retain these instructions until final decommissioning!

We reserve the right to make content or design-related changes without prior notice!

Key to Symbols

Caution! Danger!
Non-compliance with this information can lead to serious personal injuries or damage to property.

Danger from electrocution
Non-compliance with this information can lead to serious personal injuries or damage to property.

This symbol highlights useful hints, recommendations and information for efficient and trouble-free operation.

2   Intended Use

The Kampmann Climate Controller type 148941/ type 148942/ type 148943 and type 148944 has been designed in compliance with the state of the art and recognized safety-related regulations. Nevertheless, its use can result in danger to people or damage to the units or other material property if it is not appropriately installed and operated or correctly and properly used.

Applications
The Climate Controller type 148941 / type 148942 / type 148943 / type 148944 should only be used as a Climate Controller in conjunction with Kampmann systems.

The Climate Controller is solely intended for use indoors (e.g. residential and commercial properties, showrooms etc.).

The Climate Controller cannot be used
- outdoors
- in humid areas, such as swimming pools, in wet rooms
- in areas where there is a risk of explosion
- in areas with a high dust content
- in areas with an aggressive atmosphere

Protect the products from any moisture during installation. Check the intended use with the manufacturer in case of any doubt. Any other use than the use specified above is deemed not to be correct and proper. The operator of the unit is solely responsible for any damage arising as a result of this. Intended use is deemed to include observing the installation instructions described in these instructions.

Specialist Knowledge
The installation of this product requires specialist knowledge of heating, cooling, ventilation and electrical engineering. This knowledge, generally learned in vocational training in one of the fields mentioned above, is not described separately. Damage caused by improper installation is the responsibility of the operator. The installer of these units should have adequate knowledge of the following gained from specialist vocational training
- safety and accident prevention regulations
- guidelines and recognised technical regulations of the respective country, i.e. Association of German Electricians (VDE) regulations, DIN and EN standards

Purpose and Scope of these Instructions
These instructions contain information on the commissioning, functionality and operation of the Kampmann Climate Controller type 148941 / type 148942 / type 148943 / type 148944. The information contained in these instructions can be changed without prior notification.

3 Safety Information

Only allow a qualified electrician to perform installation, assembly and maintenance work on electrical units in compliance with VDE guidelines. Wiring should comply with the applicable VDE regulations and provisions laid down by the regional electricity providers. Non-compliance with the regulations and operating instructions can result in the units malfunctioning with consequential damage and danger to people. There is a danger of fatal injury caused by wires being swapped due to incorrect wiring! Disconnect all parts of the system from the mains power supply and prevent them from being reconnected before starting any connection and maintenance work! Please read these instructions in full to ensure correct and proper installation and the correct operation of the Climate Controller.

Please note the following safety-relevant information:
- Disconnect all parts of the system that are being worked on.
- Ensure that the system cannot be accidentally re-connected!
- Before commencing installation/maintenance work, wait until the fan has come to a standstill after the unit has been switched off.
- Caution! Pipes, casings and fittings can become very hot or very cold depending on the operating mode!
- Qualified personnel must have undergone training to provide them with adequate knowledge of the following:
  - safety and accident prevention regulations
  - guidelines and recognized technical regulations, i.e. Association of German Electricians (VDE) regulations
  - DIN and EN standards
  - accident prevention regulations VBG, VBG4, VBG9a
  - DIN VDE 0100, DIN VDE 0105
  - EN 60730 (Part 1)
  - technical wiring regulations (TABs) issued by the regional electricity providers

Protect the products from any moisture during installation. Check the use with Kampmann GmbH in case of any doubt. Any use other than the use specified above is deemed not to be correct and proper. The operator of the unit is solely responsible for any damage arising as a result of this. Intended use is deemed to include observing the installation instructions described in these instructions.

Modifications to the Unit
Do not undertake any modifications, conversions or additions to the control unit or attachment parts without discussing them with the manufacturer as they could impair the safety and operation of the unit. Do not carry out any measures on the unit not described in this manual. Make sure that on-site systems and cabling are suitable for connection to the intended system!

4   Operation of the Climate Controller

The Kampmann Climate Controller is a control unit with a high-quality glass surface for the control of secondary air equipment with EC fans and 2- or 4-pipe systems.
The timer program with 3 channels and 4 changeover points allows the user to adjust the room temperature control on demand.

Product features:
- 2.5" LCD display
- High-quality glass surface with capacitive keys
- LED ring acts as key feedback
- Selection of the value to be displayed (room temperature, setpoint, setpoint offset)
- Automatic LED background lighting
- Integrated NTC temperature sensor for room temperature control
- Standby mode
- Eco/day changeover
- Manual or automatic mode
- Functional display
- Alarm display
- Filter message appears on the display
- Timer program with 3-time channels, each with 4 switchover points
- German and english language
- Modbus interfaces (only with type 148943 and type 148944)

4.1 Operation and Display Elements

The Climate control is operated using keys (5) to (9). These keys are used to change fan stages/automatic mode, temperature setpoints and operating conditions.
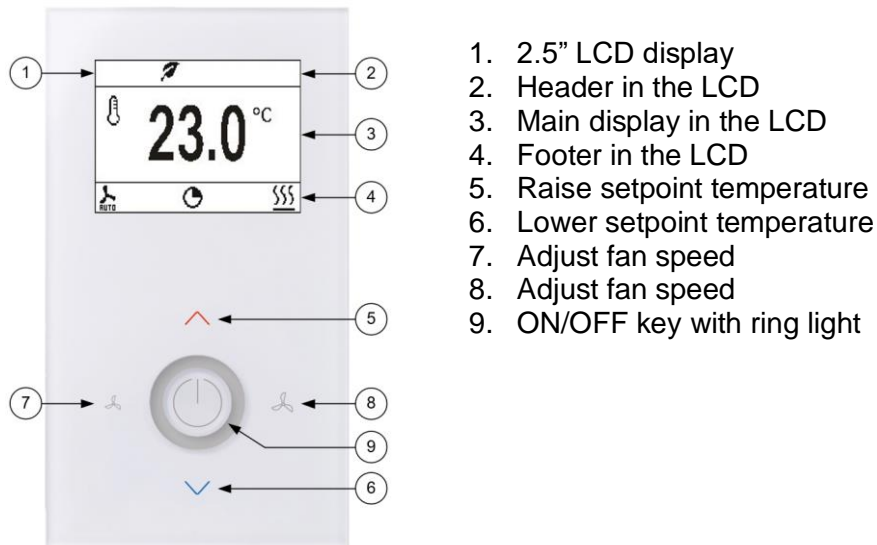The user menu can be accessed by simultaneously pressing keys (5), (7) and (8) for 3s. You can set the time and date and parametrise timer programs in this menu (see chapter 7).
Special system requirements can be configured in the password-protected expert menu (see chapter 8). The following system requirements are available:
- Display
- Lock operating functions
- Type of setpoint setting
- Inputs and outputs
- Sensor calibration
- Control and regulation parameters

1.96 Climate Controller Type 148941 / Type 148942 / Type 148943 / Type 148944
Operation manual

1. 2.5" LCD display
2. Header in the LCD
3. Main display in the LCD
4. Footer in the LCD
5. Raise setpoint temperature
6. Lower setpoint temperature
7. Adjust fan speed
8. Adjust fan speed
9. ON/OFF key with ring light

The footer of the LCD displays shows the following room statuses, depending on the configuration:

⅄₀ ⅄₁	Fan stage (visible as standard)
◖ ◗	Active timer channel (visible as standard)
∬ ❄	Heating / cooling (visible as standard)
⌂ᵢ ⌂	Presence (not visible as standard)
⬚ ⠛	Window contact / dewpoint (not visible as standard)

The header of the LCD displays shows the following operating statuses, depending on the configuration and the system status:

✋	Manual operation (priority 4)
⚠	Active alarm (priority 3)
✿	Active Eco mode (priority 2)
i	Filter message (priority 1)

The message with the highest priority (priority 4, …) is displayed if these operating messages occur simultaneously.

In addition, the date and time can be enabled in the settings and thus appear in the header.

5 Functionality of the Climate Controller

5.1 General

The type number of the Climate Controller is displayed on the start screen.

The Climate Controller can be switched on and off using the On/Off key (9). In this mode, the display is switched off and the controller is disabled. Only the protection functions (unit frost protection, room frost protection, heat protection) remain enabled. This function is not enabled when using the key card function.

The ring LED gives feedback each time a button is pressed. The main screen is displayed if no key is pressed for 3 seconds.

> The key fields of the Climate Controller are calibrated as soon as mains power is applied. Therefore the user interface should not be touched for 60s after voltage has been connected.

5.2 Fan Control

The EC fan is controlled by the 0-10 V output of the Climate Controller. Manual fan stages and/or Automatic mode can be adjusted using keys (7) and (8). A user-set speed is overwritten by the timer channel at the start of a new timer channel segment. The speed increment between the individual stages depending on the number of fan stages set up:
    1 stage: 100% increment
    2 stages: 50% increments
    3 stages: 33% increments
    4 stages: 25% increments
    5 stages: 20% increments (default setting)

> The fan is actuated for 1s at maximum speed to ensure the safe start-up of the fan.

5.3 Temperature Control

The Climate Controller has an internal temperature sensor, which is used by default for temperature control. Optionally, input 1 can be configured with an external temperature sensor. In this case, this measured value is automatically the basis for temperature control.

5.3.1 Temperature control in 4-pipe mode

In 4-pipe mode, the controller automatically specifies the operating mode based on the room temperature and the setpoint inputted. The parameters:

- Neutr. zone 4-p
- Valve hysteresis
- Nat. convection heating
- Nat. convection cooling

are used to define the properties of the room temperature control.

The parameter Neutr. zone 4-p is used to define the setpoint value for heating and cooling mode. The corresponding valve is controlled depending on this value and the hysteresis valve parameter. The fan is controlled depending on the neutral zone and natural convection. The control voltage for the fan is calculated on the basis of the P-band as well as the minimum and maximum speed of the fan.
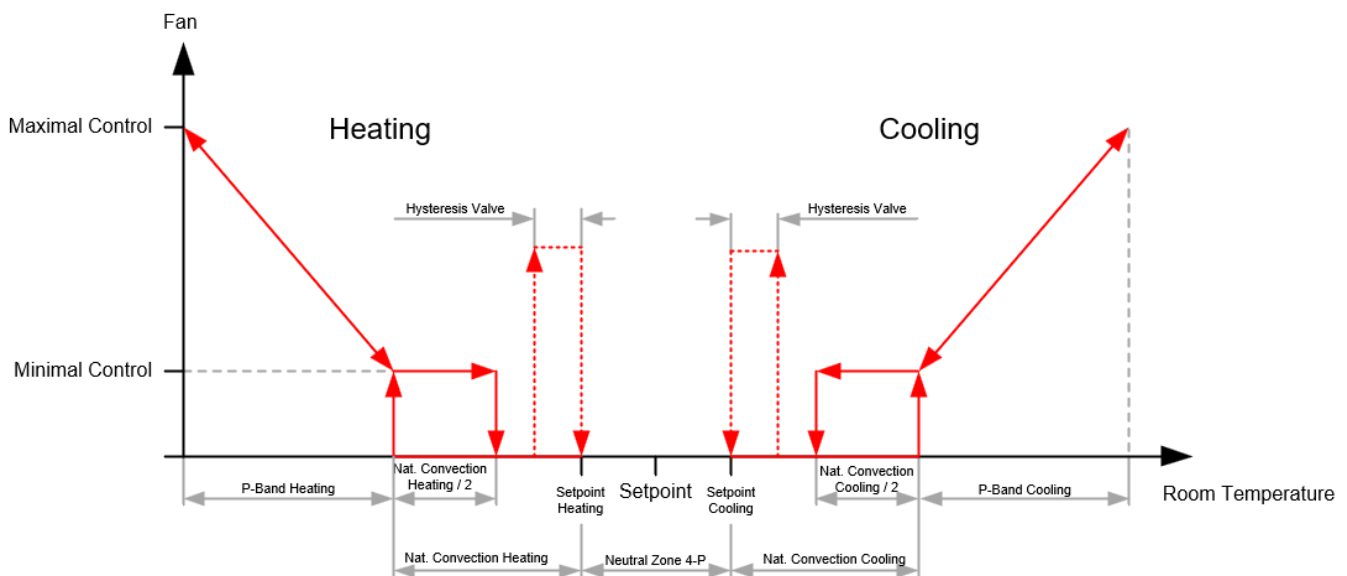
The Climate Controller is factory-configured as a 2-pipe unit (Heating). The inputs and outputs need to be adapted if the unit is a 4-pipe system.

Input 1:   no function
Input 2:   no function
Output 1:   Cooling
Output 2:   Heating

If ECO mode is enabled in heating mode, the heating setpoint is lowered by the ECO setback parameter.
If ECO mode is enabled in cooling mode, the cooling setpoint is raised by the ECO rise parameter.

5.3.2   Temperature control in 2-pipe mode

The operating mode can be defined according to the following functions in 2-pipe mode:

- Changeover sensor
- Changeover DI

The Climate Controller is in 2-pipe mode if an input is assigned with one of these functions. The unit is also in 2-pipe mode if the outputs are only assigned with Heating function or only with Cooling function. Otherwise the Climate Controller is in 4-pipe operation.

The parameters:

- Valve hysteresis
- Nat. convection heating
- Nat. convection cooling

are used to define the properties of the room temperature control.

The corresponding valve is opened and closed depending on the setpoint, the operating mode enabled and the valve hysteresis parameter. The fan is controlled depending on the setpoint and natural convection. The control voltage for the fan is calculated on the basis of the P-band as well as the minimum and maximum speed of the fan.
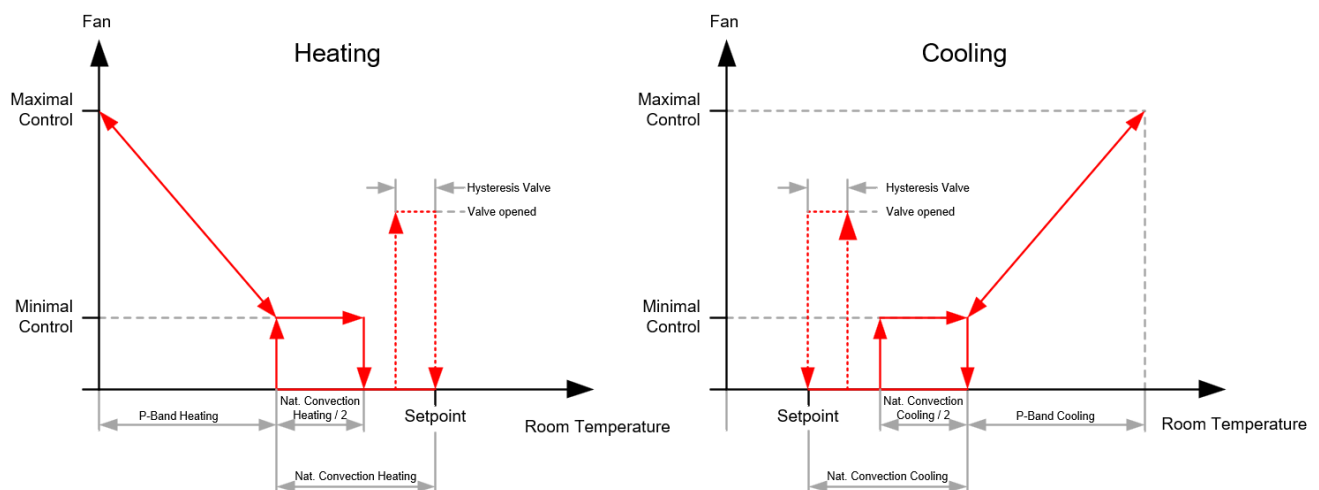
	The Climate Controller is factory-configured as a 2-pipe unit (Heating).
	If the Climate Controller is used for a 2-pipe unit (Heating / Cooling) the digital input with the function Change-Over-DI is used to switch between heating / cooling.
	The inputs and outputs need to be adapted if the unit is a 2-pipe system (Cooling).
	Input 1 → Polarity: Break contact (NC)
	Input 2 → Polarity: Break contact (NC)
	Output 1: Cooling

If ECO mode is enabled in heating mode, the setpoint is lowered by the ECO setback parameter.
If ECO mode is enabled in cooling mode, the setpoint is raised by the ECO boost parameter.

5.3.3 Temperature setting, relative value

The temperature setpoint is inputted from the default view using keys (5) and (6).

Do not perform an operation on the Climate Controller for 3 seconds to call up the default view.

The temperature control is stored as a base setpoint (factory setting: 22°C). Starting from the base setpoint, the control setpoint can be raised or lowered by an offset (factory setting: 3K). The increment is 1 Kelvin.

5.3.4 Temperature setting, absolute value

The temperature setpoint is inputted from the default view using keys (5) and (6).

Do not perform an operation on the Climate Controller for 3 seconds to call up the default view.

The temperature control is stored as a base setpoint (factory setting: 22°C). This base setpoint value can be raised or lowered within a defined range (factory setting: 8-35°C). The increment is 1 Kelvin.

6 Alarm Messages

The Climate Controller displays the alarms listed in the following table in the event of a fault. They appear on the main display according to their priority. The alarms can be generated by the Climate Controller or by corresponding activation and parametrisation of the digital inputs.

Code	Alarm message	Priority
A11	Faulty control sensor	1
A12	Motor fault (local stop)	2
A13	Room frost protection	3
A14	Condensation alarm	4
A15	General alarm	5
A16	External sensor faulty	6
A17	Unit frost protection	7

6.1 Troubleshooting

6.1.1 A11 Control sensor faulty

The room temperature is regulated on the selected control sensor. Depending on the configuration, the external room sensor/intake sensor or the internal room temperature sensor may be faulty.

Cause:

The internal or external temperature sensor measures a temperature ≥ 90°C or the input has shorted.

Effect of this alarm:

The fan is switched off and the valves close

6.1.2   A12 Motor protection

The message "A12" appears in the display if a motor fault occurs.
Cause:

A digital input has been assigned the function 'Motor fault' and has triggered

Effect of this alarm:

The fan is switched off and the cooling valve is closed.

6.1.3   A13 Room frost protection

The room temperature is monitored in each state to the configured value (factory setting: 8°C). If the room temperature falls below this value, then the room frost protection function is enabled. This function is disabled as soon as the room temperature exceeds the configured value by 0.5K.
Cause:

The Climate Controller or the external sensor measures a temperature greater than or equal to the configured limit value.

Effect of this alarm:

The fan is switched on at stage 1 and the heating valve is opened.

> The factory- set limit value of 8°C should not normally be changed!

6.1.4   A14 Condensation alarm

The parametrised input for detecting condensation is continuously monitored and "A14" appears in the display of the Climate Controller if a condensation alarm occurs.
Cause:

Presence of condensation.

Effect of this alarm:

The fan is switched on at stage 1 and the cooling valve is closed.

6.1.5   A15 General alarm

The parametrised input for the general fault is continuously monitored and "A15" appears in the display of the Climate Controller if a general alarm is emitted.
Cause:

/

Effect of this alarm:

The fan is switched off and the heating/cooling valve is closed.

6.1.6   A16 Sensor faulty

The sensor alarm is displayed if no plausible measured values are detected by an external sensor.

Cause:

There needs to be an external sensor configured as a room temperature sensor, intake sensor or changeover sensor and detect a temperature ≥ 90°C or the input has shorted.

Effect of this alarm:

The fan is switched off and the heating/cooling valve is closed.

6.1.7   A17 Unit frost protection

The unit frost protection function is enabled if the temperature measured falls below 4°C. This function is disabled as soon as the measured temperature rises 0.5 K above the limit value.

Cause:

The Climate Controller or a external sensor measures a temperature greater than or equal to the configured limit value.

Effect of this alarm:

The fan is switched off and the heating and cooling valve is opened.

7   Timer Settings

The user menu can be accessed by simultaneously pressing keys (5), (7) and (8) for a minimum of 3 seconds.
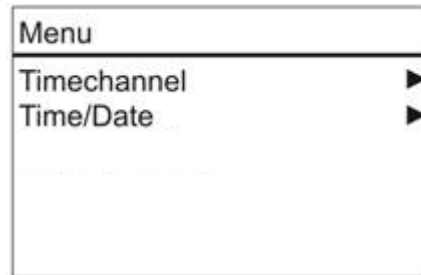
Keys (5), (6), (7) and (8) can be used to navigate through the menu. The On/Off key confirms the adjustments performed. The user accesses a sub-menu by navigating to the required menu using keys (5) and (6) and using key (8) to open it. If the cursor is positioned in the header, key (7) can be used to open the higher-level menu. The Parameter menu is automatically exited after 60 seconds with no input. The values are stored if key (7) is used to exit a sub-menu.

7.1 Timer Channels

There are 3 timer channels each with 4 configurable time segments. Timer switching channel 3 has the highest priority and timer switching channel 1 the lowest priority. A base temperature setpoint can be assigned to each timer segment. There is also an option of enabling ECO mode.
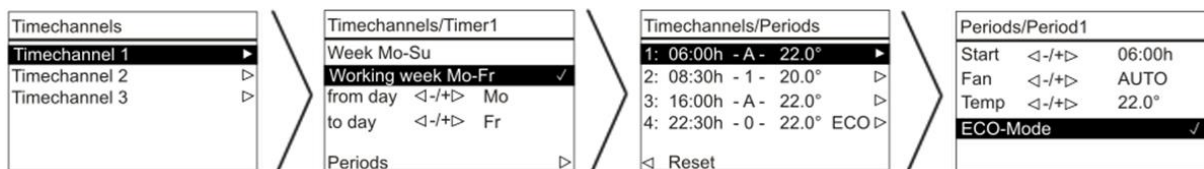
Once the line of the timer channel to be processed has been selected, key (8) is used to call up the next sub-menu. There is an option of selecting an entire week, a working week or any period within a week. A starting time, a setpoint temperature and a fan mode (Off/Auto) can then be prescribed for the 4 different time segments in the following sub-menus and the ECO-Modbus can be activated if necessary.

7.2 Timer Settings

The timer settings in the "Time/Date" menu need to be adjusted to use the timer program. The date and time can be shown in the header of the main screen by means of appropriate parametrisation. In addition, automatic changeover between summer and winter time can also be enabled.

> The power reserve to store the time and date is dependent on the operating time of the control panel. The time should therefore be set at the end of commissioning.

8   Parameter Settings
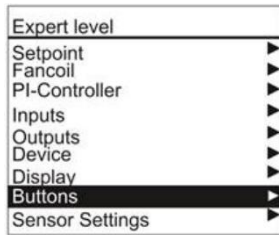
Special system requirements can be configured using parameter settings in the Expert menu. The following system requirements are available:

- Display
- Lock operating functions
- Type of setpoint setting
- Inputs and outputs
- Sensor calibration
- Control and regulation parameters

The expert level is protected by the password "0022".

8.1   Setpoint

In this menu, you can adjust setpoints and limit values, as well as room temperature control functions.

Base setpoint:
> Base setpoint for room temperature control. Both with relative value and absolute value temperature setting.

Minimum
> Lower limit of the adjustment range of the absolute setpoint.

Maximum
> Upper limit of the adjustment range of the absolute setpoint.

Adjustment range:
> Maximum offset of the control setpoint to the base setpoint with relative value temperature setting.

Increment:
> Increment width for temperature adjustment.

Frost protection (room frost protection)
> Temperature at which the room frost protection function and the corresponding alarm is enabled.

Heat protection
> Temperature at which the heat protection function is enabled.

Unit frost protection
> Temperature at which the unit frost protection function and the corresponding alarm is enabled.

Presence/Offset
> Hold: Offset is retained when changing from occupied to unoccupied.
>
> Reset: Offset is set to "0" when changing from occupied to unoccupied.

> This function is valid for the relative and absolute value temperature setting.

8.2 Fan Stages

8.2.1 General

Number of stages

1 to 5 fan stages can be selected. The speed of each respective fan stage is calculated based on the number of fan stages.

Minimum

Minimal fan actuation.

Maximum

Maximum fan actuation.

> Fan speed restriction by parameters "Minimum" and "Maximum" reduces the speed in a linear manner throughout the speed range.
> Example: Fan speed setpoint = 70%
> Minimum = 0%
> Maximum = 80%
> Fan actuation = 56%

Start-up time

To bridge the breakaway torque of the fan, it is actuated at maximum speed for a set time (factory setting 1s)

Classification

H: Fan assistance only in heating mode
C: Fan assistance only in cooling mode
H/C: Fan assistance in heating and cooling mode

Switching behaviour

The fan is only controlled when the calculated fan control is greater than or equal to this parameter.

Fan speed restriction

A: Speed restriction using the "Minimum" and "Maximum" parameters is only enabled in Automatic mode.
M/A: Speed restriction by the "Minimum" and "Maximum" parameters is enabled in Manual and Automatic mode.

8.2.2 Threshold values

The threshold values release/lock fan levels, depending on the temperature measured by the changeover sensor.

Hysteresis

Hysteresis for the threshold values for heating and cooling mode.

Release

Release of fan speed limits by the threshold values.

> The function is enabled by the Release parameter, although a changeover sensor is essential!

> If this function is enabled, the heating/cooling symbol flashes if the unit is to provide heating or cooling because of the temperature configurations, but the first threshold level has not been activated.

8.2.3 Heating threshold values

Stage 1

Release of fan actuation up to 20% when the configured temperature is exceeded.

Stage 2

Release of fan actuation up to 60% when the configured temperature is exceeded.

Stage 3

Release of fan actuation up to 100% when the configured temperature is exceeded.

8.2.4 Cooling threshold values

Stage 1

Release of fan actuation up to 20% when the configured temperature is transgressed.

Stage 2

Release of fan actuation up to 60% when the configured temperature is transgressed.

Stage 3

Release of fan actuation up to 100% when the configured temperature is transgressed.

8.3 Controller

It provides the option of adapting general temperature control parameters and specific control functions for heating and cooling mode. The following parameters can be altered in the "Controller" "General" menu:

Hysteresis:

Switching-on and off hysteresis for the heating and cooling valve. (refer to chapter 5.3 for the effect)

Start-up mode:

This parameter specifies the controller mode after a restart of the unit.

Neutr. zone 4-p

In 4-pipe mode, the heating and cooling setpoint is calculated depending on the neutral zone.
Heating setpoint = setpoint – (Neutr. zone 4-p / 2)
Cooling setpoint = setpoint + (Neutr. zone 4-p / 2)

Standby

If the unit is in standby mode, the setpoint for heating mode is reduced by the set parameter. In cooling mode, the setpoint is increased accordingly.

ECO setback

In ECO mode, the setpoint for heating mode is lowered by the parametrised value.

ECO boost

In ECO mode, the setpoint for cooling mode is raised by the parametrised value.

Presence/Eco

This parameter is used to define the interaction between the presence function and ECO mode:

Hold: ECO mode is enabled/disabled independently of the occupied status.

Top: ECO mode is locked providing the presence message 'occupied' is showing.

The following parameters can be adapted for heating mode:
Type:

A 2-point or PI controller can be selected as the control type. The PI controller can also be configured as a pure P controller.
PI controller
The fan is controlled depending on the control deviation
2-point controller
The fan is controlled at maximum speed as soon as:
Room temperature < Heating setpoint - natural convection

Xp

Proportional gain of the PI controller. It describes at which control deviation the control signal is 100%.

Tn

PI controller reset time. The time that elapses until the I-integral action component generates the same control amplitude as is immediately produced by the P gain. This parameter can be disabled so that a pure P controller is enabled.

The following parameters can be adapted for cooling mode:
Type

A 2-point or PI controller can be selected as the control type. The PI controller can also be configured as a pure P controller.
PI controller
The fan is controlled depending on the control deviation
2-point controller
The fan is controlled at maximum speed as soon as:
Room temperature > cooling setpoint + natural convection

Xp

Proportional gain of the PI controller. It describes at which control deviation the control signal is 100%.

Tn

PI controller reset time. The time that elapses until the I-proportion generates the same control amplitude as is immediately produced as a result of the P-gain. This parameter can be disabled so that a pure P controller is enabled.

8.4 Inputs

A distinction is made between potential-free inputs and a 230 V input in the "Inputs" menu. An external sensor can only be used in conjunction with input 1.
There is an option to change the polarity with all inputs.

The following functions can be assigned to the inputs:
- External sensor (input 1 only)
- Changeover sensor (input 1 only)
- Changeover DI
- Intake sensor (input 1 only)
- Window contact

- Dewpoint contact
- Presence contact
- Key card switch
- On / Off
- Day / Eco
- Condensation alarm
- Unit frost protection
- Room frost protection
- Motor fault
- Filter alert
- General error

> ℹ️ The Climate Controllers with Modbus interface (type 148943 and 148944) only have input 1 (universal/potential-free) and input 3 (230 V). Input 2 is used as a Modbus interface.

8.4.1 External sensor

If an external temperature sensor is connected to input 1, the thermostat regulates based on the measured value of the external sensor.

8.4.2 Intake sensor

If an intake sensor is configured, the "Minimal" parameter in the "Fan control General" menu must be at least 20% to ensure continuous fan operation.

8.4.3 Changeover DI

The digital input can be used to switch between heating and cooling mode in a 2-pipe system. Only the heating or cooling controller is enabled in the Climate Controller depending on the contact.

8.4.4 Changeover sensor

The changeover sensor can be used for automatic switching between heating and cooling mode in a 2-pipe system. The sensor can be connected to input 1. If the temperature is below 19°C, the controller is in cooling mode, and if the temperature is above 29°C the controller is in heating mode.

> ℹ️ A 3-way valve needs to be installed when using a clip-on sensor for heating/cooling changeover!

8.4.5 Window contact

Temperature control is disabled when a window contact is enabled. Only the protection functions (frost protection, heat protection) remain enabled.

8.4.6 Dewpoint contact

If the dewpoint contact is enabled, the cooling controller is locked and the fan disabled.

8.4.7 Presence contact

When the presence function is enabled, the heating setpoint is lowered by the "Standby" parameter and the cooling setpoint is raised by the "Standby" parameter in "Room unoccupied" mode.

8.4.8 Key card switch

If the key card is not inserted, the heating setpoint is lowered by the "Standby" parameter and the cooling setpoint is raised by the "Standby" parameter. In addition, the display is switched off and operation of the keys is locked.

8.4.9 On / Off

The Climate Controller can be switched on/off via an external contact. If the unit is switched off, only the protection functions (frost protection, heat protection and unit frost protection) are enabled. The Climate Controller can only be switched on again by resetting the input.

8.4.10 Day / Eco

It is possible to switch between Day and Eco modes using an external contact. You can continue to switch to Eco mode using the timer program. The heating setpoint is lowered by the "ECO setback" parameter and the cooling setpoint is raised by the "ECO boost" parameter.

> Eco state has the highest priority. Eco mode is executed as soon as it is enabled by a digital input or the timer program.

8.4.11 Condensation alarm

The parametrised input for detecting condensation is continuously monitored and "A14" appears in the display of the Climate Controller if a condensation alarm is emitted. In addition, the alarm-specific system statuses are assumed (see chapter 6.1).

8.4.12 Unit frost protection

The parametrised input for detecting unit frost protection is continuously monitored and "A17" appears in the display of the Climate Controller if the input is triggered to indicate a risk of frost. In addition, the alarm-specific system statuses are assumed (see chapter 6.1).

8.4.13 Motor fault

The parametrised input for detecting a motor fault is continuously monitored and "A12" appears in the display of the Climate Controller if the input is triggered to indicate a unit fault. In addition, the alarm-specific system statuses are assumed (see chapter 6.1).

8.4.14 Filter message

The parametrised input for detecting a filter message is continuously monitored and the "i" symbol appears in the header of the display if the input is triggered to indicate the presence of a filter message.

8.4.15 Room frost protection

The parametrised input for detecting frost protection is continuously monitored and "A13" appears in the display of the Climate Controller if the input is triggered to indicate frost protection. In addition, the alarm-specific system statuses are assumed (see chapter 6.1).

8.4.16 General error

The parametrised input for the general error is continuously monitored and "A15" appears in the display if the input is activated to indicate that there is a general error. In addition, the fan is switched off and the heating and cooling valve closed.

8.5 Outputs

"Output 1" and "Output 2" functions can be assigned in the respective sub-menus in the "Outputs" menu. The polarity of the outputs can be individually changed. The outputs are assigned with the following functions:
- Heating valve
- Cooling valve
- Collective fault (set as soon as one of the error messages A11 – A18 is enabled)
- Condensation/dewpoint
- Motor fault
- Frost protection fault
- Unit frost protection fault

The following parameters can be set in addition to the functions of the outputs:
Max. heating load:

This parameter is used to optimise compensation of inherent heating when there is a switched load. The maximum possible load produced by the heating valve and fan speed must be taken into account when selecting the value.

Max. cooling load:

see maximum heating load

Valve protection:

The Climate Controller features a valve protection function to ensure that the valves remain functional even when not used for an extended period of time. Valve protection is only started if the corresponding valve has not been activated for more than 96 hours.

Valve protection for the heating valve is fixed at Fridays 11:00, and 11:15 for the cooling valve. The valves are each actuated for 5 minutes.
This feature can be disabled.

Manual mode:

The digital outputs and the analogue output can be manually actuated to check that they are working correctly in the Manual mode menu. If an output is set to manual mode, it is indicated by an icon (✋) in the header of the Home screen.

8.6 Unit

General settings for the Climate Controller can be entered in 'Unit Settings'.
Status after Power On
The Climate Controller assumes a defined state after the power supply has been switched on depending on this parameter.
Values after Power On
This parameter describes whether the set values are maintained or reset after a power reset.
Language
There is an option to choose between German and English.
Lighting
The brightness of the LCD display during operation and that of the ring LED can be adjusted independently of each other.
Filter
A counter ("Filter alarm" parameter) can be enabled in the Filter menu, which enables a filter message following expiry of the parametrised weeks. The counter can be reset in the same menu. The counter is activated as soon as it is > 0.
Factory settings
This function is used to reset the parameters to the factory settings.

8.7 Screen

8.7.1 Home screen

Various display values can be configured in the home screen of the LCD. There is an option to display:
* the base setpoint ± offset
* the offset
* the temperature
* nothing.

8.7.2 Header

The date and time can also be shown in the header as well as the information symbols.

> The power reserve to store the time and date is dependent on the operating time of the control panel. The time should therefore be set at the end of commissioning.

8.7.3 Footer

Up to five icons can be displayed in the footer bar.

Icon	Description
Fan stage	(visible as standard)
Active timer channel	(visible as standard)
Heating / cooling	(visible as standard)
Presence	(not visible as standard)
Window contact / dewpoint	(not visible as standard)

8.7.4 Setpoint adjustment

The type of setpoint adjustment can be changed in this menu.

Absolute

Displays the absolute setpoint if the setpoint is changed by the temperature setting keys.

Offset

Displays the offset if the setpoint is changed by the temperature setting keys.

8.8 Keys

AUTO fan

Selection of automatic mode by the fan control keys can be locked or released.

8.8.1 Central key

Various functions can be assigned to the On/Off key in the middle of the keypad:

No special function

The unit can be switched on and off by the key.

Presence toggle

Briefly pressing the key switches between "Room occupied" and "Room unoccupied" statuses.

Room occupied

Briefly pressing the key enables "Room occupied" status.

Room unoccupied

Briefly pressing the key enables "Room unoccupied" status.

Locked

The On/Off button is locked.

8.9 Sensor Settings

This menu displays the current reading of the internal and external temperature sensor. In addition, an offset for the reading can be set. The "Unit" parameter lets you switch between °C and °F.

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9 Installation

9.1 Technical Data

Measured variable	Temperature
Internal temperature sensor	Measuring range: 0…+50 °C
Analogue output	0…10 V; max. 5 mA (EC fan actuation, max. cable length: 30 m)
Digital outputs	2x NO contacts 230 V; max. load 3 A
Power supply	85…260 V AC
Temperature accuracy	± 1K (typ. at 21°C)
Inputs	1x input for NTC 10K or potential-free contact 1x potential-free contact (only type 148941 and 148942) 1 x Modbus interface (only with type 148943 and 148944) 1x 230 V AC
Electrical connection Low voltage	Max 1.5 mm² screw terminals Max 1.0mm² screw terminals
Display	2.5" LCD; 240x160 px, blue background lighting
Colour	Pure white (RAL9010) or black (RAL9004)
Enclosure type	IP30 in accordance with DIN EN 60529
Ambient conditions	0...+50°C max. 85% r.h. non-condensing
Weight	approx. 195 g
Installation	On standard flush-mounted back box (Ø=68 mm)

9.2 Dimensions
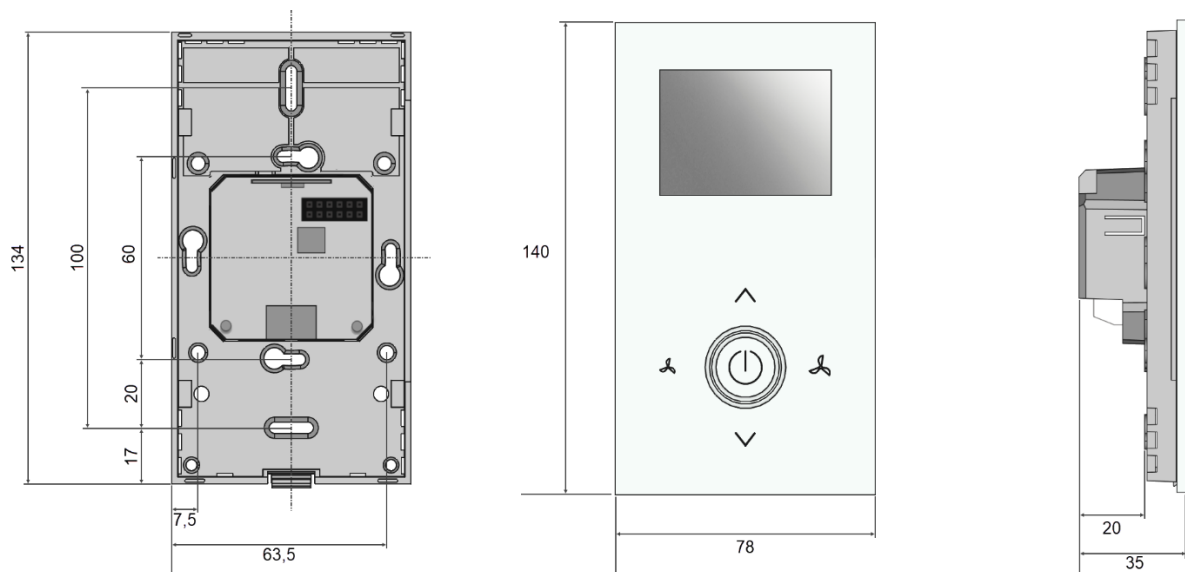
> ℹ Cover cavity wall boxes after installation with a wall covering, as otherwise the edge of the back box adjacent to the wall will be visible under the unit.

9.3 Electrical Wiring
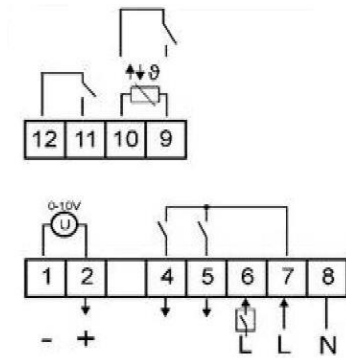
Term.	connection	Type
1	EC fan	GND
2	EC fan	0…10 V, max. 5 mA
3		
4	Output 2	230 V AC, max. 3A
5	Output 1	230 V AC, max. 3A
6	Input 3	Digital/230 V AC
7	L	
8	N	
9	Input 1	Universal/potential-free
10		
11	Input 2	Digital/potential-free (type: 148941 & 148942)
12		Modbus interface (type: 148943 & 148944)

9.4 Cabling
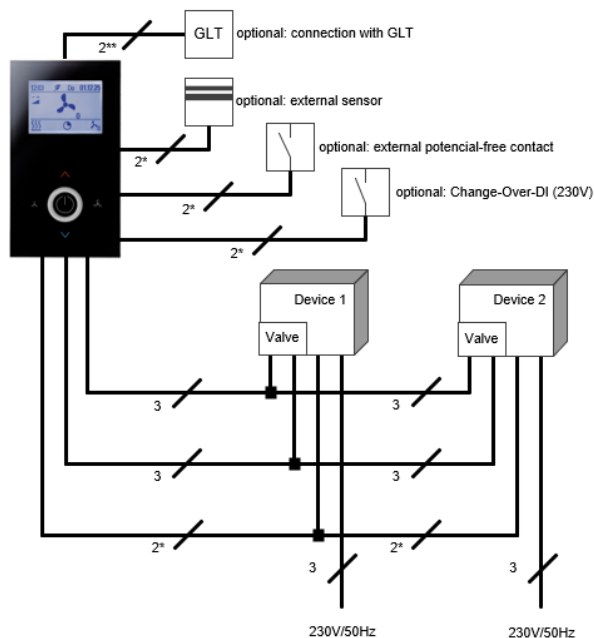
- Route all low voltage cables along the shortest route.
- Ensure that low voltage and power cables are separated, using metal partitions on cable harnesses.
- Use only shielded cables as low voltage cables

Important
- *): Shielded cable, IY(ST)Y 0.8 mm or similar. Lay separately from high-voltage cables.
- **): Shielded paired cable e.g UNITRONIC® BUS LD 2x2x0.22 or similar. Lay separately from high-voltage cables.
- All other connections can be done with NYM-J (or similar).
- Wire cross-sections of unshielded cables are not specified, as the length of the cable is involved in the calculation of the cross-section.
- Specifies the number of wires including protective conductor.

Maximum cable lengths	
Total length between the Climate Controller and the last unit	max. 30m
Total length between the Climate Controller and the ext. sensor	max. 30m
Total length between the Climate Controller and the pot. contact	max. 10m

> The key fields of the Climate Controller are calibrated as soon as mains power is applied. The user interface should not therefore be touched for 60 s after voltage has been connected.

9.5 Climate Controller Versions and Accessories

Figure	Article	Properties	Article number
	Climate Controller without Modbus interface, white	– Climate Controller for wall mounting with high-quality glass surface and capacitive keys – 2.5" LCD display with automatic back light – Integral room temperature sensor – English and German – Password-protected parameter level – Dimensions (W x H x D): 78 x 140 x 35 mm – Installation height approx. 15 mm – Actuation of EC fans 0-10 V DC – Optional: Automatic fan, 5 manually selectable fan stages – Valve control for 2-pipe and 4-pipe applications for thermoelectric valve actuators 230 V AC (Open/Close) – Timer program with 3 timer channels, each with 4 changeover points – 2 x potential-free contacts (input) – 1 x 230 V AC contact (input)	196000148941
	Climate Controller without Modbus interface, black	- See Properties 196000148941	196000148942
	Climate Controller with Modbus interface, white	- Climate Controller for wall mounting with high-quality glass surface and capacitive keys - 2.5" LCD display with automatic back light - Integral room temperature sensor - English and German - Password-protected parameter level - Dimensions (W x H x D): 78 x 140 x 35mm - Installation height approx. 15 mm - Actuation of EC fans 0-10 V DC - Optional: Automatic fan, 5 manually selectable fan stages - Valve control for 2-pipe and 4-pipe applications for thermoelectric valve actuators 230 V AC (Open/Close) - Timer program with 3 timer channels, each with 4 changeover points - Network connection option via serial interface (Modbus RTU, maximum 32 units per network) - 1 x potential-free contact (input) - 1 x 230 V AC contact (input)	196000148943

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1.96 Climate Controller Type 148941 / Type 148942 / Type 148943 / Type 148944
Operation manual

Figure	Article	Properties	Article number
	Climate Controller with Modbus interface, black	- See Properties 196000148943	196000148944
	Room temperature sensor	- Home temperature sensor, surface-mounted - Temperature measuring range from -35°C to +70°C - Plastic housing, pure white (similar to RAL 9010) - Dimensions (W x H x D): 84.5 x 84.5 x 25mm - NTC sensor 10K@25°C, β3435	196003250110
	Clip-on temperature sensor	- Temperature measuring range from -20°C to +70°C - Connecting cable length approx. 3m - Sensor element with tensioning strap - NTC sensor 10K@25°C, β3435	196003250115
	Intake air sensor	- To detect entering air temperature - NTC sensor 10K@25 °C, β3435 - Cable length 600 mm - Probe length 170 mm - Probe diameter 8 mm - Cable length 1000 mm - Probe length 50 mm - Probe diameter 4 mm	196003250151 000001066759
	Surface frame	- Dimensions (W x H x D): 77 x 138 x 26,5mm - Plastic housing, pure white (similar to RAL 9010)	197901376070
	Surface frame	- Dimensions (W x H x D): 77 x 138 x 26,5mm - Plastic housing, deep black (similar to RAL 9005)	197901376073

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9.6 Cabling Diagram

Climate Controller
230V / 50Hz / <3VA / 0-10VDC

*1) Digital Input 2 is omitted by type 196000148943 & 196000148944. In exchange: Modbus interface with wiretype 2**
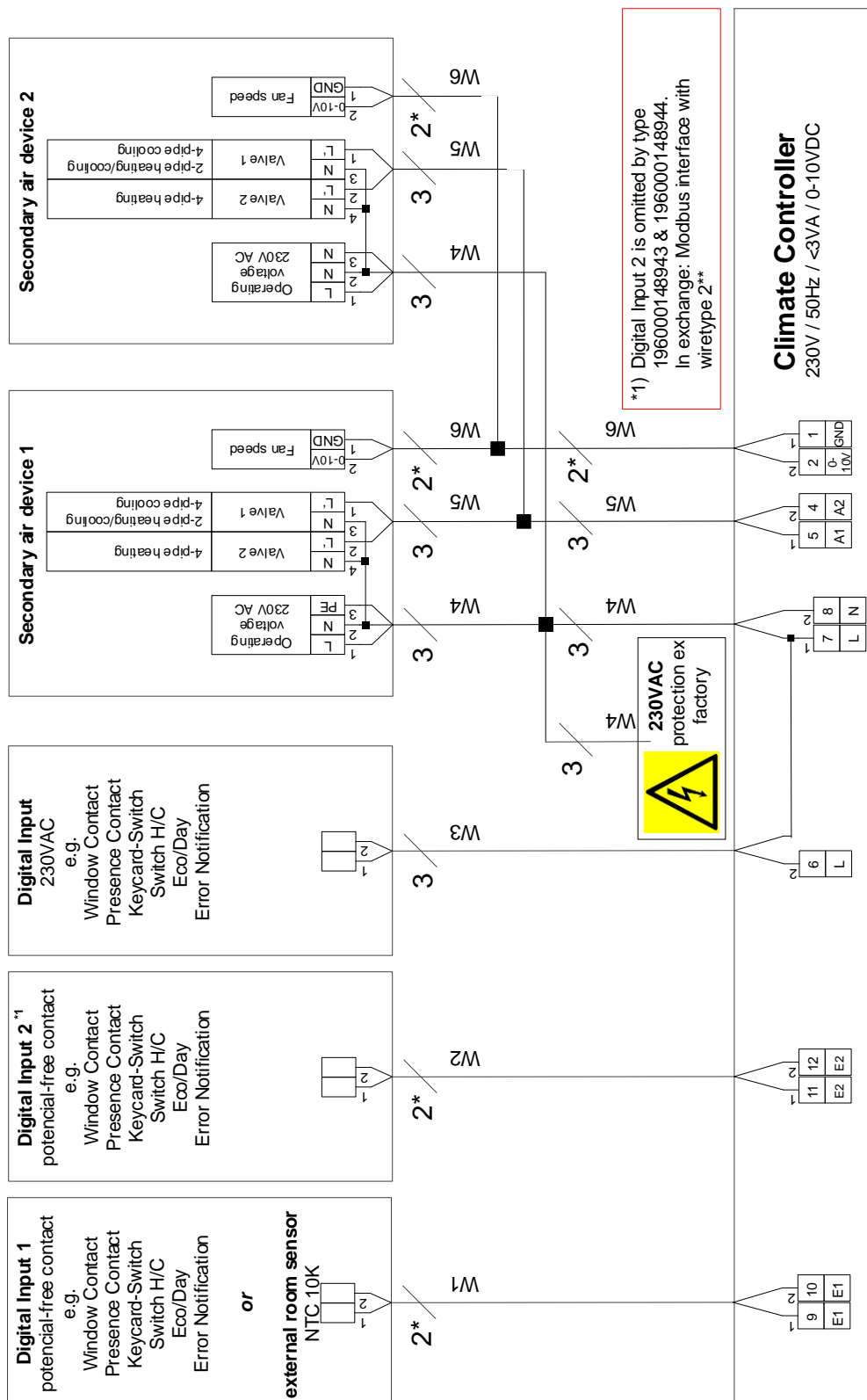
W1:   Potential-free contact or external sensor
W2:   Potential-free contact (type: 196000148941 & 196000148942)
         Modbus interface (type: 196000148943 & 196000148944) **)
W3:   Contact 230 V
W4:   Power supply
W5:   Heating/cooling N/O contact
W6:   Control signal for the fan
*:   Shielded cables (e.g. IY(ST)Y 0.8 mm) or similar. Lay separately from high-voltage cables.
**:   Shielded, paired cables, e.g UNITRONIC® BUS LD 2x2x0.22 or similar. Lay separately from high-voltage cables.
Refer to the secondary ventilation unit documentation in the event of deviation from the circuit diagrams!

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10 Modbus Settings

10.1 Modbus Interface Configuration

To configure the Modbus interface, please open Modbus settings by pressing 5 and 6 simultaneously for approximately 3 seconds.

The modbus master interface and the climate control interface (as a slave) have to be adjusted equally.

The default settings of the modbus interface are:

Transmission Code:	RTU, Slave Mode
Adresse:	32
Baud Rate:	19200
Parity:	Gerade
Stop Bits:	2

10.2 Modbus - Parameter List

Datenpunktbeschreibung	Wertebereich	Registertyp	Protokoll Adresse
Intern temperature sensor	0 – 500 ≙ 0 – 50°C	Input Register	514
Extern temperature sensor	0 – 500 ≙ 0 – 50°C	Input Register	515
Operating condition controller	0: Off 1: Heating 2: Cooling	Input Register	525
Control variable controller	0 – 100 ≙ 0 – 100%	Input Register	524
Alert notification	11: Control sensor damaged 12: Engine error 13: Room frost protection 14: Condensation alarm 15: General error 16: Extern sensor damaged 17: Unit frost protection	Input Register	528
Filter alert	0: inactive 1: active	Input Register	529
State input 1	0: open	Input Register	519
State input 3	1: closed	Input Register	520
Heating Setpoint	0 – 500 ≙ 0 – 50°C	Input Register	511
Cooling Setpoint	0 – 500 ≙ 0 – 50°C	Input Register	512
Offset Setpoint	0 – 500 ≙ 0 – 50°C	Input Register	513
Default setpoint Offset	-90 – 90 ≙ -9,0 – 9,0°C	Holding Register	257
Default operating condition On/Off	0: On 1: Off	Holding Register	262
Eco / Day	0: Eco 1: Day	Holding Register	264
Default Change - Over	0: Heating 1: Cooling 65535: no Function	Holding Register	261

11 Parameter List

Menu	Parameter	Default setting	Min	Max	Unit	Comment
Setpoints	Base setpoint	22	0	50	°C	
	Adjustment range	3	0	10	K	
	Increment	1	0,1	2	K	
	Minimum	8	0	20	°C	
	Maximum	32	20	50	°C	
	Frost protection	8	-10	10	°C	
	Heat protection	40	25	60	°C	
	Unit frost protection	4	-10	10	°C	
	Presence/Offset	Reset	-	-	-	Hold: Offset is retained when changing from occupied to unoccupied. Reset: Offset is set to 0 when changing from occupied to unoccupied.
Fan levels/General	Number of stages	5	0	5	-	
	Minimum	0	0	100	%	Minimum fan speed
	Maximum	100	0	100	%	Maximum fan speed
	Start-up time	1	0	10	S	Time for fan actuation with max. control voltage at start-up
	Assignment	H/C			-	H/C: Fan is actuated in heating and in cooling mode. H: Fan is actuated only in heating mode. C: Fan is actuated only in cooling mode.
	Switching behaviour	-1	-1	100	%	
	Fan speed restriction	M/A			-	M/A: The speed limit is enabled in automatic and manual mode A: The speed limit is only enabled in automatic mode
Fan levels/Threshold levels	Hysteresis	1,0	0	3	C	
	Release	Off			-	Off: Threshold values are not taken into account for activation of fan stages in cooling mode. On: Release of fan stages on the basis of the threshold values and changeover sensor.
Fan levels/Threshold levels/Heating	Stage 1 (20%)	29	0	100	°C	
	Stage 2 (60%)	31	0	100	°C	
	Stage 3 (100%)	33	0	100	°C	
Fan levels/Threshold levels/Cooling	Stage 1 (20%)	18	0	100	°C	
	Stage 2 (60%)	18	0	100	°C	
	Stage 3 (100%)	18	0	100	°C	
Inputs/Potential-free/Input 1/Functions	External sensor	Disabled			-	
	Intake air sensor	Disabled			-	
	Changeover DI	Disabled			-	
	Changeover sensor	Disabled			-	
	Window contact	Disabled			-	
	Condensation alarm	Disabled			-	
	Dewpoint contact	Disabled			-	
	Presence contact	Disabled			-	
	Key card switch	Disabled			-	
	On / Off	Disabled			-	

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Menu	Parameter	Default setting	Min	Max	Unit	Comment
	Eco / Day	Disabled			-	
	Unit frost protection	Disabled			-	
	Motor fault	Disabled			-	
	Filter alert	Disabled			-	
	Room frost protection	Disabled			-	
	General error	Disabled			-	
	Polarity				-	
Inputs/Potential-free/Input 2/Functions	Changeover DI	Active			-	
	Window contact	Disabled			-	
	Condensation alarm	Disabled			-	
	Dewpoint contact	Disabled			-	
	Presence contact	Disabled			-	
	Key card switch	Disabled			-	
	On / Off	Disabled			-	
	Eco / Day	Disabled			-	
	Unit frost protection	Disabled			-	
	Motor fault	Disabled			-	
	Filter alert	Disabled			-	
	Room frost protection	Disabled			-	
	General error	Disabled			-	
	Polarity	N/O			-	
Inputs/230 V/Input 3/functions	Changeover DI	Disabled			-	
	Window contact	Disabled			-	
	Condensation alarm	Disabled			-	
	Dewpoint contact	Disabled			-	
	Presence contact	Disabled			-	
	Key card switch	Disabled			-	
	On / Off	Disabled			-	
	Eco / Day	Disabled			-	
	Unit frost protection	Disabled			-	
	Motor fault	Disabled			-	
	Filter alert	Disabled			-	
	Room frost protection	Disabled			-	
	General error	Disabled			-	
	Polarity				-	
Output	Max. heating load	2	2	6	A	
	Max. cooling load	2	2	6	A	
	Valve protection	ON				On: Valve protection enabled Off: Valve protection disabled
Outputs/Output 1	Not used	Disabled			-	
	Heating	Active			-	
	Cooling	Disabled			-	
	Collective fault	Disabled			-	
	Condensation/dewpoint	Disabled			-	

Operation manual

Menu	Parameter	Default setting	Min	Max	Unit	Comment
	Motor fault	Disabled			-	
	Frost protection fault	Disabled			-	
	Unit frost protection fault	Disabled			-	
	Polarity	N/O			-	
Outputs/Output 2	Not used	enabled			-	
	Heating	Disabled				
	Cooling	Disabled			-	
	Collective fault	Disabled			-	
	Condensation/dewpoint	Disabled			-	
	Motor fault	Disabled			-	
	Frost protection	Disabled			-	
	Unit frost protection	Disabled			-	
	Polarity	N/O			-	
Outputs/Manual mode	Off 1 (0-10 V)	Auto	0	10	V	
	Off 2 (230 V)	Auto				On: Output is closed Off: Output is opened Auto: Output is switched depending on control status.
	Off 3 (230 V)	Auto				On: Output is closed Off: Output is opened Auto: Output is switched depending on control status.
Display/Home screen	Absolute setpoint	Disabled			-	
	Offset setpoint	Active			-	
	Temperature	Disabled			-	
	Off	Active			-	
Display/Header	Time	Off			-	Off 12-hour mode 24-hour mode
	Date	Off			-	Off DD.MM.YYYY YYYY/MM/DD
Display/Footer	Symbol 1	Fan			-	Off
	Symbol 2	Off			-	Fan
	Symbol 3	Time channel			-	Heat./Cool.
	Symbol 4	Off			-	Time channel
	Symbol 5	Heat./Cool.			-	Presence Wind./Dewp.
Display/Setpoint adjustment	Absolute	Disabled			-	
	Offset	Active			-	
Keys	Auto fan speed	Yes			-	Yes No
Keys/Central key	No special function	Active			-	
	Presence toggle	Disabled			-	
	Room occupied	Disabled			-	
	Room unoccupied	Disabled			-	
	Locked	Disabled			-	

1.96 Climate Controller Type 148941 / Type 148942 / Type 148943 / Type 148944
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Menu	Parameter	Default setting	Min	Max	Unit	Comment
Sensor settings	Internet offset	0	-9.9	9.9	K	
	External offset	0	-9.9	9.9	K	
	Unit	°C			-	°C °F
Controller/General	Hysteresis	0.3	0	15	K	
	Start mode	Auto				
	Neutr. zone 4-p	0.4	0	15	K	
	Standby	5	0	15	K	
	Eco setback	3K	0	15		
	Eco boost	3K	0	15		
	Presence/Eco	Over				
Controller/Heating	Type	PI			-	PI 2 point
	Xp	1.5	0	25	K	
	Tn	Off	0	100	min	
	Natural convection	0,5	0	25	K	
Regulator/Cooling	Type	PI			-	PI 2 point
	Xp	2.0	0	25	K	
	Tn	Off	0	100	min	
	Natural convection	0.0	0	25	-	
Unit settings/Status after Power On	Standby	Disabled			-	
	Last status	Disabled			-	
	On	Active			-	
Unit settings/Values after Power On	Retain	Disabled			-	
	Reset	Active			-	
Unit settings/Language	German	Active			-	
	English	Disabled			-	
Unit settings/Lighting	Brightness of LCD	90	0	100	%	
	Brightness of LED	20	0	100	%	
Unit settings/Filter	Filter alarm	0	0	104		
Unit settings/Factory setting	Factory setting	Disabled				
Keys	AUTO fan	Yes			-	Yes: Automatic mode can be set No: Automatic mode cannot be set
Keys/Central key	No special function	Active			-	
	Presence toggle	Disabled			-	
	Room occupied	Disabled			-	
	Room unoccupied	Disabled			-	
	Locked	Disabled			-	