USER MANUAL

denro ONE Basic

VERSION 1.0

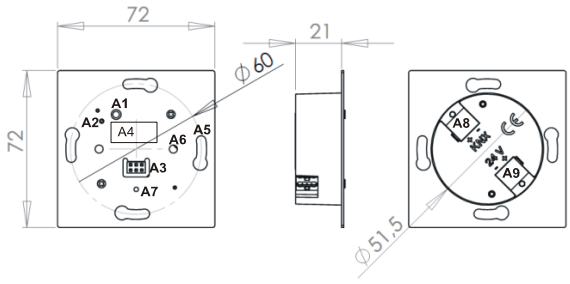
User manual V1.0

Product family:	Operation/display/control
Product type:	Room controller
Manufacturer:	denro AG
Name:	denro ONE basic
Order No.:	

Overview of contents

1 Technical data

1.1 BCU specifications



A1 Lerntaste: Zum Umschalten Normalmodus und Adressiermodus
A2 rote Anzeige-LED: Zur Kontrolle der Busspannung und zur Anzeige Normalmodus(LED AUS) und Adressiermodus (LED AN)
A3 Anwenderschnittstelle (AST) zum Anschluß von RaumController
A4 Beschriftungsfeld (für physikalische Adresse)
A5 Langlöcher für die Befestigung an der Installationsdose
A6 Löcher für die Befestigung des Busendgerätes mittels Führungsstiften
A7 Gewinde für die zusätzliche Befestigung des RaumControllerals Fixierung und als Diebstahlschutz
A8 Busklemme KNX für eindrähtige Leiter mit 0,6 ... 0,8mm Durchmesser
A9 Busklemme DC24 für eindrähtige Leiter mit 0,6 ... 0,8mm Durchmesser

Figure 1: View of the BCU with description of the interfaces

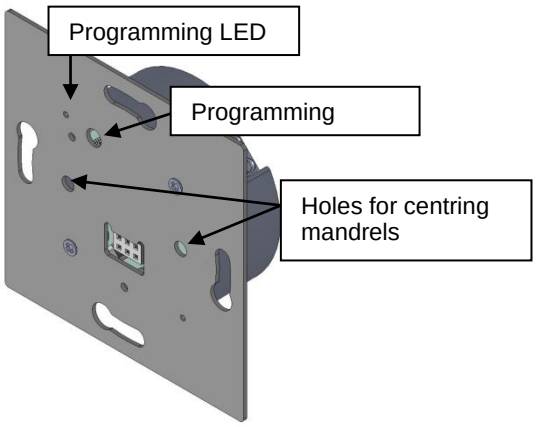


Figure 2: Bus coupler unit for installation at BCU point

Power supply:

-Input voltage

Bus: DC 24 V, 7 mA (DC 21...30 V)
Additional voltage DC 24 V, <15 mA (DC 12...30 V)
Output voltages to DC RC 3.3 V <150 mA

Control elements:
The unit has a single button for activating the programming function.

Display elements:
The unit has an LED screen for displaying the programming readiness status for the physical address.

Connections:
Bus line: Bus terminal, screwless, Ø 0.6 ... 0.8 mm single-wire
Additional terminal, screwless, Ø 0.6 ... 0.8 mm single-wire
6-pin male connector

Physical data:
Housing: Plastic
Dimensions (Ø x H): 51.5 mm x 21 mm

Electrical safety:
Degree of pollution (in accordance with IEC 60664-1): 2
Protection class (in accordance with EN 60529): IP 20
Overvoltage category (in accordance with IEC 60664-1): II
Bus: Safety Extra Low Voltage (SELV) DC 24 V
Additional supply voltage (SELV) DC 24 V
The unit is EN 50090-2-2 and IEC 60664-1 compliant

EMC requirements:
Compliant with EN 50090-2-2

Environmental conditions:
Climatic resistance: EN 50090-2-2 Ambient operating temperature: -5 ... +45 °C
Storage temperature: -25 ... +70 °C
Relative humidity: 5% to 93% (not condensing)

Test certification:
EIB, KNX

EC labelling:
In accordance with EMC directive (residential and functional buildings), low voltage directive

1.2 Technical specifications - denro ONE

Power supply:
-BCU input voltage via 6-pin male connector, 3.3V DC

Control elements:
The unit has a rotating knob with a press function and a touch-function display:

Display elements:
The unit has a 320 x 240-pixel 2.8" colour display with touch screen and 18-bit colour depth; 16-bit colour depth can be effectively used.

Temperature sensor:
Measurement range: -5 .. 50 °C
Resolution: 0.1 K
Tolerance: ± 0.5 K at 25 °C

Brightness sensor:
Measurement range: 20 .. 10000 lx

User interface:
6-pin male connector for connecting to the BCU

Physical data:
Housing: Plastic, in titanium white
Dimensions (L x W x D): 116 x 86 x 14 mm
Installation: plugged into the BCU and secured with M2.5 x 5 Philipps screws

Electrical safety:
Protection class (in accordance with EN 60529): IP 20
Overvoltage category II in accordance with IEC 60664-1:2003
Safety Extra Low Voltage SELV DC 24 V
The unit is EN 50090-2-2 and IEC 60664-1 compliant

EMC requirements:

DIN EN 50090-2-2: 2007/11
IEC 61000-6-1:2005-03
(Harmonized Standard EMCD)
IEC 61000-6-3:2006-07
(Harmonized Standard EMCD)
Environmental conditions:
Climatic resistance: EN 50090-2-2 Ambient operating temperature: -5 ... +45 °C
Avoid sustained direct exposure to sunlight
Storage temperature: -25 ... +70 °C
Relative humidity: 5% to 93% (not condensing)

Test certification:
EIB, KNX

EC labelling:
In accordance with EMC directive (residential and functional buildings), low voltage directive

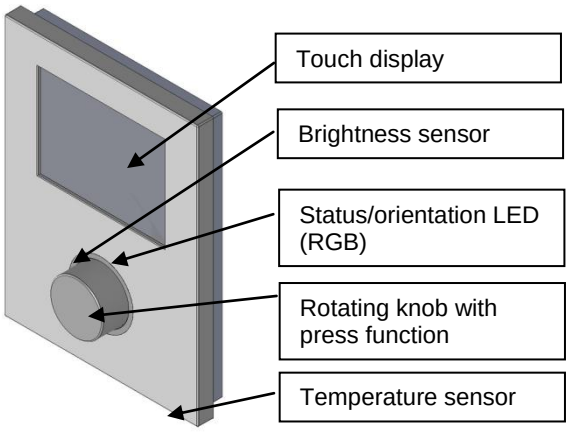


Figure 3: Front side of denro ONE

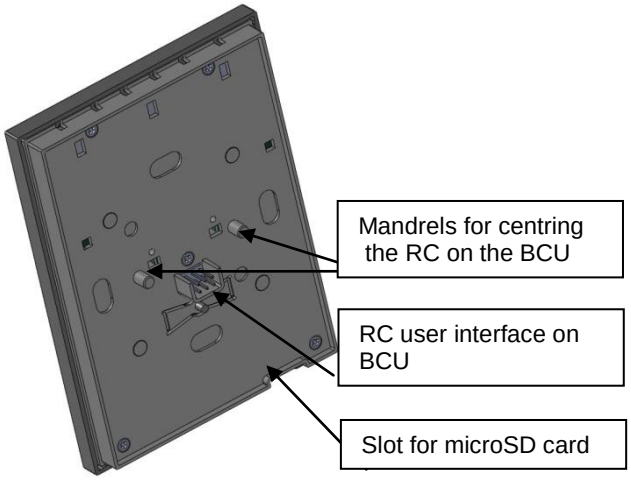


Figure 4: Rear side of denro ONE without BCU

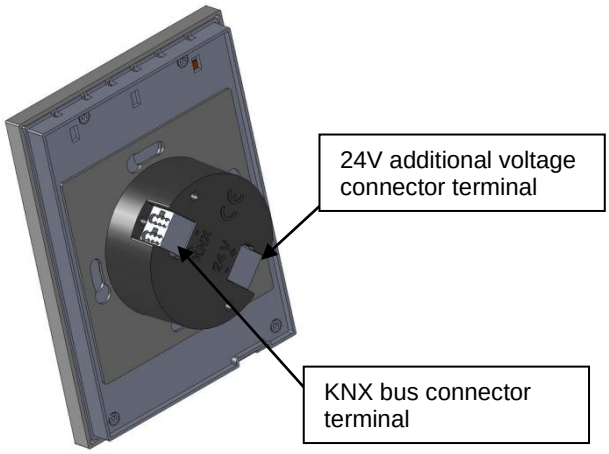


Figure 5: Rear side of denro ONE with BCU connected

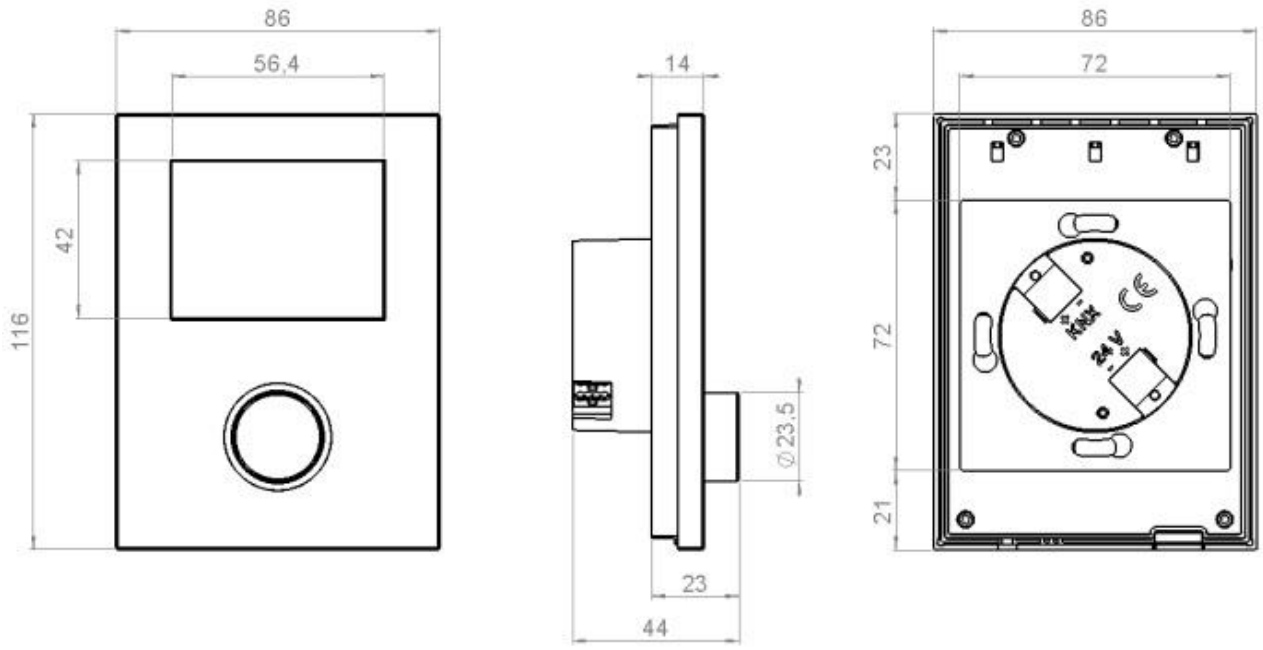


Figure 6: View of room controller with BCU and dimensions

Installation instructions

- The unit can be used in fixed installations indoors, in dry rooms, in installations in flush-mounted boxes.
- Direct exposure to sunlight should be avoided.
- Ensure that the unit is installed in a location which is free from vibration.

WARNING

- The unit must only be installed and commissioned by a licensed electrician.
  - The unit must not be connected to a 230 V power supply, or placed in the same box as 230 V units and/or cabling.
  - The applicable safety and accident prevention regulations must be observed.
  - The unit must not be opened. A defective unit must be returned to the denro AG branch responsible.

Installation and wiring

General description:

- The BCU is mounted in 60 mm Ø installation boxes and screwed into position. The bus line is connected using screw-less plug terminals for single-wire cabling.

Note:

The BCU must be mounted in such a way that the user interface (UI) is on the lower side (see Figure 2). This is to ensure that the Denro ONE which is to be connected to the UI is mounted in the correct operating position.

Unplugging the bus terminal and power supply terminal

- The bus terminal and power supply terminal can be found on the rear side of the BCU.

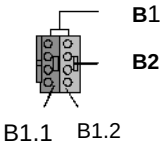


Figure 7: Bus terminal

- The bus terminal (terminal block) (B1) consists of two parts (B1.1, B1.2), each of which have four terminal contacts. You must ensure that neither of the two test sockets (B2) is damaged either by the bus cabling (accidental connection attempt) or by the screwdriver (when attempted to remove the bus connector).
- The screwdriver should be carefully inserted into the wire insertion slot in the grey section of the bus terminal before then withdrawing the bus terminal from the BCU.

Reference

Do not pry out the bus terminal from underneath! Short circuit hazard!

Attaching the bus terminal and power supply terminal

Insert the bus connector (B1) into the BCU guide groove and press bus terminal (B2) downward as far as it will go.

Connecting the bus cabling and supply cabling

Bus cabling:

- The bus terminal (D1) is designed for 0.6 -0.8 mm Ø single-wire cabling.
- Strip the ends of the cables (D2) and insert these into the terminal (D1) (red = +, black = -).

Power supply cabling:

- The bus terminal (D1) is designed for 0.6 -0.8 mm Ø single-wire cabling.
- Strip the ends of the cables (D2) and insert these into the terminal (D1) (yellow = +, white = -).

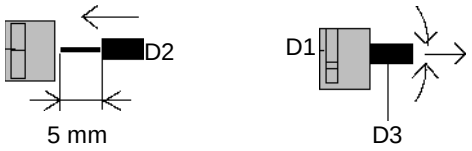


Figure 8: Bus cabling

Disconnecting the bus cabling

- Remove the bus terminal (D1) and the bus cabling (D3) by pulling these outwards and downwards at the same time.

1.2.1 Commissioning the denro ONE

As well as its user interface, the denro ONE has a removable data drive (microSD card). This flash card contains the various files for commissioning the denro ONE which were generated by denro ONE Manager. The denro ONE must be removed from the BCU in order to insert the memory card. This is done by removing the rotating knob and the loosening the mounting screws. After inserting the microSD card into the denro ONE's slot (with the contacts facing towards the front of the denro ONE) and connecting this to the BCU, the new files are automatically loaded onto the denro ONE. Once the denro ONE has automatically rebooted, the memory card should be removed. In order to do this, the denro ONE must once again be withdrawn from the BCU, the memory card removed, and finally, the BCU reconnected and the mounting screws re-tightened. All changes have now been applied, and are now permanently stored in memory.

Should the microSD card be changed during operations without removing the unit from the BCU, the unit will need to be re-started in order to transfer the data.

Both microSD and microSDHC cards can be used as storage media.

1.2.2 Firmware updates

The denro ONE offers the possibility of performing firmware updates. New unit firmware is provided by the manufacturer in the form of a file. The file is selected using denro ONE Manager (see Chapter 4.10), and transferred to the unit using the microSD card.

2 Functional description

2.1 BCU

The denro ONE BCU enables the denro ONE room controller to be connected to the bus line via the user interface (UI). The messages received over the bus line are processed by the BCU and then forwarded to the bus end-unit (denro ONE). In the opposite direction, signals coming from the bus end-unit are converted into messages and sent.
The BCU is directly connected to the bus, monitors this constantly and is thus always informed whether the bus line is free or busy with a message. When an event occurs and the bus line is free, the BCU starts to transmit immediately. Otherwise the transmission request is saved until the bus line is free. The BCU is mounted in 60 mm Ø installation boxes and screwed into position. The bus line is connected using screw-less plug terminals.
The denro ONE room controller is plugged into the BCU by means of guiding pins, and screwed into position.
If the bus line is connected with reverse polarity, the bus coupler is switched off by a protective device (reverse polarity protection). This also applies to the required DC 24V additional supply voltage.

2.2 denro ONE

The denro ONE is a multifunctional display/operating unit which enables tasks to be performed, status displays and temperature adjustments in a single room in connection with the KNX building bus system.
The denro ONE enables the user to access an extremely wide variety of functions within the room as well as the building in an extremely simply manner. The denro ONE also enables the building management system to adjust in-room functions. The denro ONE provides a variety of measurement values and data from the integrated sensor equipment.
The basis of the unit is a high-quality 320 x 240-pixel 2.8" colour display with touch screen and rotating knob with press function.

The denro ONE is operated by means of the touch screen and the rotating knob. The buttons shown on the display can be used to dim lights, as command control for blinds or to call up and save scenarios. In order to achieve this, various graphical elements are integrated into the buttons.

When operated, the display lighting activates and switches off again automatically after an adjustable time period. Each operation on the unit restarts the time interval for the display switch-off (hibernate)
When the rotating knob is first pressed when the display is in hibernation mode (the display is inactive), a basic function (such as basic lighting) as defined in scenario 1 can be called up via the KNX bus. The display is simultaneously activated, and is now available for use for further functions. When first pressed when the display is switched off, the functions of the rotating knob correspond to those on the currently active operation page.

Various design versions are available for the display of the display and operation buttons, functions and status messages. Different styles already take into account an extremely wide range of customer and project requirements. These designs can be changed by the user using the standalone version of denro ONE Manager without needing to use the ETS.

denro ONE is configured with the ETS and the denro ONE Manager plug-in. This enables the use of basic functions such as setting switches, dimming, blinds and values, as well as complex functions such as scenario control, as well as heating and ventilation control. The desired functions and status displays are selected during configuration. The appropriate communication objects are displayed for each selected function or status display, and these must then be linked to group addresses in the ETS.
The integrated room thermostat can be used as a two-point controller (a thermostat) or as a continuous controller (P or PI controller) as well as for only heating or ventilation operation as well as for combined heating and ventilation operation.
The associated application programme compares the actual temperature measured by the thermostat with the desired target temperature and calculates the corresponding control value. This is then either transferred as a switch command (On/Off) to switch actuators (such as UP 562 binary output) for the control of electrothermal positioning actuators using two-point control or as a positioning command (0 ... 100 %) for the control of motorised valve actuators using continuous control.

The denro ONE Manager is also available without ETS, and is then used to configure the interface without being able to change the parameters on the KNX side.

Each function and term can be described using plain text in different languages.
Symbols indicate conditions, functions and navigation commands.
The symbols can be individually adapted or set on a customer and/or project-specific basis for each design version.

The denro ONE allows up to 64 scenarios to be saved and retrieved. These scenarios can be directly retrieved and saved in Administration mode using the user interface on the display.
Weekly switching plans can be set up for the functions using a timer. Each function can in this way be assigned switching times in 15-minute increments. These schedules are compiled using the stand-alone version or the ETS plug-in of the denro ONE Manager.
denro ONE offers alarm functions. The Alarms page displays the alarm messages in chronological order.

The current time and date are set as communications objects in denro ONE. The time is used to control programme functions such as the timer and to display time stamps for alarms and messages.
The denro ONE has an internal beeper which emits acoustic alarm messages and can also be used as feedback for any key actuation.

Note:
denro ONE Manager is compatible with Windows XP SP3, Vista SP1 and Windows 7 (32-bit versions in each case). The plug-in is intended for ETS 3.0f. The installation and operation of both components is described in detail in Chapter 4.

2.3 General functions and definitions

2.3.1 Restarting the unit

Conditions such as

- Bus voltage recovery
- Additional voltage recovery
- Programming (ETS download)
- Bus reset

are dealt with in the same way in terms of functionality, and require the denro ONE to be restarted.
These events are hereinafter referred to as "power recoveries", and are not differentiated in any other way.

2.3.2 Querying of status objects

In certain situations, the values of communications objects are actively queried by denro ONE via the bus (read requests). These include for example sensor data as well as channel status information.
When starting the denro ONE:

- External interior temperature sensor (#118)
- Exterior temperature sensor (#116)
- Time/date (#111 and #112)
- Basis target value (#120)
- Window 1 to 4 (#134 to #137)
- Presence (#138)
- Status objects for switching and dimmer channels
- Status objects for shutter and blind channels
- Message-type input objects for channels
- Room operation mode (#140), queried only when *Room operation mode after voltage recovery = Automatic* and *Automatic mode via = Bus message*

are queried.

The bus querying only occurs following an adjustable time interval (see Chapter 3.2.2).

When no reply is given to a status query, the following standard values are assumed:

- External interior temperature sensor: configurable default value
- Exterior temperature sensor: configurable default value
- Time/date: not set
- Basic target value: configurable value
- Window contacts: closed
- Presence: absent
- Status objects for switching and dimmer channels: off and/or 0%
- Status objects for shutter and blind channels: undefined state
- Message-type input objects for channels: undefined ("?" is displayed)
- Room operation mode: Protected mode (only when *Room operation mode after voltage recovery = Automatic* and *Automatic mode via = Bus message*

3 Operation

3.1 General operation

After starting the denro ONE (after connecting the external power supply, a bus voltage recovery or a bus reset) the display activates while the user pages are initialised and the denro logo appears.

This initialisation can take up to one minute. The unit cannot be operated during this time. When transferring a new configuration from the microSD card, the initialisation time can be significantly longer, depending on the number of menu pages.

ATTENTION: The denro logo is only displayed AFTER all configuration data have been transferred from the microSD card to the denro ONE's internal memory. The RGB LED above the rotating knob flashes during the copying process. The LED colours during the start-up process have the following meaning:

Red, violet, white colour alternation (approx. 2s): Bootloader is starting

Continuous red: No programme in memory. A programme must be transferred using the microSD card (RC.bin).

Continuous blue: Data is being written from the microSD card to the internal memory of the Countouch

Continuous green: denro ONE is starting

Flashing white: The configuration on the microSD card is not a compatible BCU configuration.

After start-up, the colours of the LED depend on the active functions and alarm status.

in order to display valid values after start-up and/or to be able to further process these in appropriate programmes, the denro ONE sends a read request to certain status objects (see Chapter 2.3.2). Finally, the denro ONE starts by displaying the home page.

Figure 9: denro ONE displaying home page

The displayed buttons are active surfaces, and touching these will activate the appropriate defined function. This can include retrieving another page, a direct function (e.g. dimming, switching) or a scenario.
The active buttons are labelled individually using denro ONE Manager or the ETS plug-in (see Chapter 4).

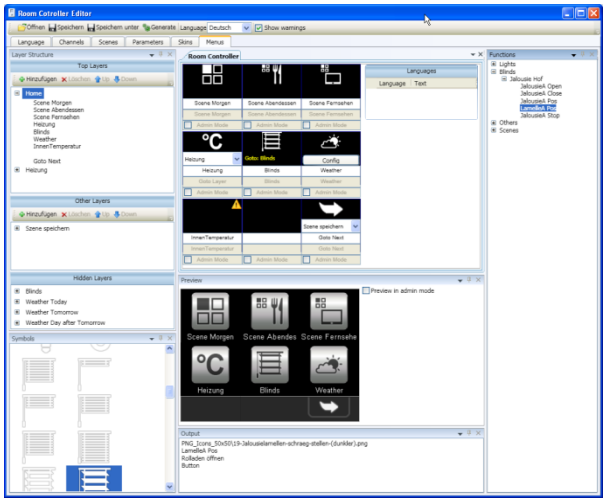


Figure 10: ETS plug-in – Setting up the menu structure

3.1.1 General interface concepts

Touch screen operations are divided into different pages. Individually configurable pages can be displayed on the denro ONE. The following page types are available:

1. Home page
2. Function pages
3. Operation pages

The number of configurable pages is dependent on the individual configuration of the denro ONE, as the unit features dynamic memory management. Configurations with multiple active languages thus require more memory. The amount of free memory (in percent) is displayed by the ETS plug-in or the stand-alone version of the denro ONE Manager during configuration.

The denro ONE can display all characters in accordance with ISO-8859-1. The following languages are thus supported:

- Afrikaans (*È/è, É/é, Ê/ê, Ë/ë, Î/î, Ï/ï, Ô/ô, Û/û*),
- Albanian (*Ç/ç, Ë/ë*),
- Basque (*Ñ/ñ*),
- Danish (*Å/å, Æ/æ, Ø/ø*),
- German (*Ä/ä, Ö/ö*, in foreign words: É/é, no Euro symbol and if nec.,*ß*),
- English (*£, ¢*; antiquated: *Æ/æ, ä, ë, ï, ö, ü*, but not *Œ/œ*),
- Faroese (*Á/á, Ð/ð, Í/í, Ó/ó, Ú/ú, Ý/ý, Æ/æ, Ø/ø*),
- Finnish (*Ä/ä, Ö/ö*, in foreign words: Å/å, but not *Š/š, Ž/ž*),
- French (*Æ/æ, À/à, Â/â, È/è, É/é, Ê/ê, Ë/ë, Î/î, Ï/ï, Ô/ô, Ù/ù, Û/û, Ç/ç, Ü/ü, ÿ*, but not *Œœ; Ÿ*),
- Irish Gaelic, new orthography (*Á/á, É/é, Í/í, Ó/ó, Ú/ú*),
- Icelandic (*Á/á, Ð/ð, É/é, Í/í, Ó/ó, Ú/ú, Ý/ý, Þ/þ, Æ/æ, Ö/ö*),
- Italian (*À/à, È/è, É/é, Ò/ò, Ù/ù*),
- Catalan (*À/à, Ç/ç, È/è, É/é, Í/í, Ï/ï, Ò/ò, Ó/ó, Ú/ú, Ü/ü,* but not *Ŀ/ŀ·l*),
- Dutch (not *IJ/ij* but *ÿ*),
- Norwegian, Bokmål and Nynorsk (*Å/å, Æ/æ, Ø/ø, Ò/ò*),
- Portuguese incl. Portuguese (Brazil) (*À/à, Á/á, Â/â, Ã/ã, Ç/ç, É/é, Ê/ê, Í/í, Ó/ó, Ô/ô, Õ/õ, Ú/ú, Ü/ü*),
- Raeto-Romanic,
- Scottish Gaelic (*À/à, È/è, Ì/ì, Ò/ò, Ù/ù*)
- Swedish (*Å/å, Ä/ä, Ö/ö*),
- Spanish (*¡, ¿, ª, º, Á/á, É/é, Í/í, Ñ/ñ, Ó/ó, Ú/ú, Ü/ü*, formerly also *Ç/ç*),
- Swahili and
- Walloon (*Â/â, Å/å, Ç/ç, È/è, É/é, Ê/ê, Î/î, Ô/ô, Û/û*).

3.1.1.1 Home or function pages

Up to six functions can be positioned on each home or function page. The pages are divided into two areas - the button area (A) and the navigation area (B).

Figure 11: Home page

Figure 12: Function page

The arrow keys on the right and left of the footer on either side of the Home button provide direct navigation to neighbouring pages. It is thus possible to flip through all of the pages in order, from front to back, or from back to front. Pressing the Home button returns you to the front (Home) page.
Items such as the time and exterior temperature can be displayed in the left and central positions of the footer on the Home page.
The button area can accommodate a maximum of 6 functions. Their functions and text displays are selected, described, and configured in denro ONE Manager.

The Home and function pages are identical in terms of the content and structure of their button areas. Only the navigation area differs. On the Home page, the left and central fields can be used to display data:

- Time (12/24-hour system)
- Date (DD.MM.YY, MM/DD/YY)
- Exterior temperature (°C/°F)
- Interior temperature (°C/°F) (temperature, current values for int. + ext. sensors)
- Heating operation mode (Manual/Auto; operation mode, comfort extension)
- Current fan level
- Language selection (buttons); can also be positioned in the buttons area
- Cleaning function (buttons); can also be positioned in the buttons area

On the functions pages, all of the fields of the navigation area are reserved for navigation buttons. The final functions page has no button for forward navigation

The details for configuring the pages can be found in Chapter 4.8.

3.1.1.2 Operation pages

Operation pages are used to control individual functions and are pre-configured. Adding a function to a Home or function page automatically inserts the relevant operation page. Manual modifications to the operation pages are not possible.
Operation pages have the same navigation area as Home and functions pages. The left-hand arrow returns you to the previously displayed page. The buttons area is, however, differently structured depending on its function. Figure 13 shows a sample operation page for the "Send value – variable" function.

Figure 13: Operation page

3.1.1.3 General visual display

Meaning of the following elements

Possible status displays on the Home page
e.g.: time, exterior temperature

Icon to activate jump back to Home page

Icon to activate jump one page back

Icon to activate jump one page forward

Button borders

Normal status; not clicked
Buttons with no focus
= No colour

Buttons clicked, icon with focus
= Colour 1

Functions activated with an extended button press (such as successful save of scenarios)
= Colour 2

Rotating knob function

A complete rotation of the knob (360° ≙ 30 raster levels) performed slowly results in an 8.5% dimming of the overall dimming range.
A faster rotation results in a larger dimming increment.

Rotating knob active; the value is only sent once the rotating knob is pressed
The rotating knob function is displayed as a circular line with two arrow-shaped tips; the press function is shown as a solid circle

Rotating knob active; values are applied immediately upon rotation (function-specific set value can also be sent after a delay. For example, the target temperature is set after a 3s delay)
The rotating knob function is displayed as the circular line with two arrow-shaped tips

Rotating knob active with two functions; values are applied immediately upon rotation. Pressing activates further functions.
Example: Dimming:
Turn: Dimming value
Press: On/Off

The rotating knob function is displayed as the circular line with two arrow-shaped tips. The press function is shown as a solid circle with a coloured border

Status indicators

Status for percentage values:

Colour: Status: OFF
Bar: displays no value
e.g. dimming

Status for percentage values

Colour: Status: ON
Bar: Current value

e.g. dimming

Switches: Status: OFF

Switches: Status: ON

The following functions are available for use:

For the 18 channels on the denro ONE, alternatively:

- Switching
- Dimming
- Switches with positive guidance
- Blinds / shutters
- Sent values: 1 byte, 2 bytes, 4 bytes, fixed / variable
- Retrieve/save scenario
- Alarms/messages

Further, non-channel specific functions:

- Scenario controller
- Room temperature control
- Time control
- RGB dimmer
- Weather information display

3.1.2 General remarks

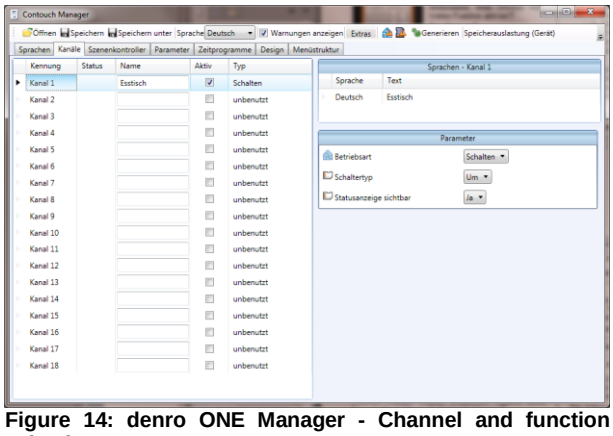


Figure 14: denro ONE Manager - Channel and function selection

The denro ONE Manager offers eighteen freely-selectable functions. Additional configuration settings are made available depending on the selected function.
These are then displayed in the channel window, in the right-hand column under the selected function.

3.2 General settings

3.2.1 Overview

3.2.1.1 Language

The denro ONE allows you to change the set language using the KNX bus. A 1-byte communications object is used to set the language on the denro ONE. The available languages are defined in denro ONE Manager. Detailed information can be found in Chapter 4.8.2.

3.2.1.2 Time/Date

The denro ONE requires the correct time and day of the week for room temperature control, the timer and the time stamp for alarms and messages. These are each provided using DPT_TimeOfDay (10.001) and DPT_Date (11.001) data-type communications objects to the denro ONE. In the event of the failure of the external timepiece, the denro ONE can independently re-calculate the time and day of the week. Accuracy in this case is however severely limited, as the Countouch does not have its own real time clock. The time should be updated once an hour.

If the day of the week in data type DPT_TimeOfDay is not available, the date is used (from DPT_Date) to calculate the day of the week.

ATTENTION: The day of the week or date must compulsorily be set in a message. If there is no time / date message upon initialisation, the time programme / alarm time stamp is disabled until a time / date message is received.

When the time is updated, it is possible that a time may appear twice in rapid succession, or not at all. This is caused by the internal time calculation shifting the time forward or back. The time programme is designed in such a way that this switching point only occurs once in either of the above situations.

Example of a switching point at 12:00.

A) Change from 11:58 to 12:02 ➔ Switching point is applied at 12:02.

A) Change from 12:02 to 11:58 ➔ Switching point is applied at 12:00. There is no second application. (the next application occurs when another switching point is applied)

This also applies when switching from summer time to winter time, and vice-versa.

3.2.1.3 Cleaning function

This function is used as a cleaning switch. This prevents the use of the touch screen and the rotating knob for a set time. The cleaning function is activated by a button and is configured using denro ONE Manager (see Chapter 4.8.8).

The cleaning function can be added as a function to the operations or Home page as well as a button in the toolbar.

3.2.1.4 Administration mode

The Admin mode is used to enable the saving of scenarios and buttons (e.g. to make hidden operation pages accessible).

Admin mode can be activated in the following ways (depending on the configuration):

- Permanently active
- Activation by location*
- Enabled by bus message and activated by location*

* by pressing for longer than 5 s on the lower left-hand side of the Home page screen (see Figure 15)

When not permanently active, the active Administrator mode is indicated by a coloured border around the entire screen (see Figure 16).

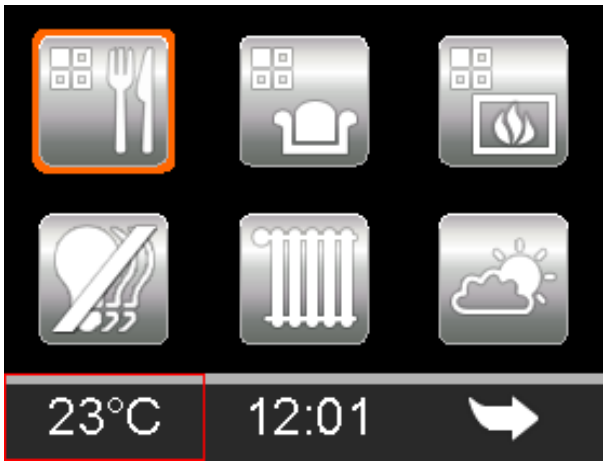


Figure 15: Administration mode activation area

Note: The red rectangle is only used to indicate the area, and is not displayed during operations.

Figure 16: Active administration mode

The communications object for Administration mode is used to enable or disable the Admin mode in denro ONE. This communications object is controlled by two parameters. The "Admin-Mode always active" parameter switches the denro ONE Admin mode permanently on. This cannot then be disabled using a communications object. The red border is not displayed in this setting.

The "Administrator mode activation" parameter defines whether Administrator mode can be directly activated via the display or whether this must first be enabled by a bus message. This function is useful in such settings as public buildings, as the unit's Administrator mode cannot be activated without authorisation.

3.2.1.5 RGB LED orientation light

The denro ONE has a RGB LED orientation light. This can be found on the colourless ring in the 12 o'clock position. This has 3 setting parameters. These parameters set the colour, saturation and brightness of the RGB LED in its normal condition. (For further information on colour spaces, please also refer to http://de.wikipedia.org/wiki/HSV-Farbraum).

The RGB LED is also used to display alarms. This is described in Chapter 3.8.

Figure 17: Orientation LED

3.2.2 Parameter

The following parameters are used for general configuration:

Parameter	Settings
Standby is activated after	10 secs **30 secs** 1 min 2 min 5 min 10 min
The display duration of the denro ONE display is set using this parameter. If the display is not used, the display is automatically switched off after this time period has elapsed.	
Transfer: ETS	
Parameter page: General	
Upon operation in Standby mode, jump to	**Home** Last used page
This parameter is used to set whether touching the display or operating the rotating knob when in Standby mode opens the Home page or the last operated page.	
Transfer: ETS	
Parameter page: General	
Acoustic feedback upon button actuation	No **Yes**
This parameter is used to set whether touch actuation to trigger a command or function should be indicated by an acoustic feedback sound (a short beep tone).	
Transfer: ETS	
Parameter page: General	
Administrator mode always active	**No** Yes
This parameter is used to switch Administrator mode permanently on. When set to YES, external activation cannot be controlled via the communications object.	
Transfer: ETS	
Parameter page: General	
Administrator mode activation	**Always possible by location** By location upon enabling
by an external object	
This parameter is used to control Administrator mode activation. Enabling by activation using an external object is useful in such settings as public buildings.	
Transfer: ETS	
Parameter page: General	
This parameter is only visible when: Administrator mode permanently active = No	
Automatically exit Admin mode after	Never 1 min **2 min** 5 min 10 min 20 min
This parameter is used to set the automatic shutdown of Administrator mode.	
Transfer: ETS	
Parameter page: General	
This parameter is only visible when: Administrator mode permanently active = No	
Activation of Cleaning mode for	5 .. 255 s (Default: 60 s)
This parameter is used to define how long the cleaning function is active.	
Transfer: ETS	
Parameter page: General	
LED Colour	0 .. 255 (Default: 85)
This parameter is used to define the colour of the LED when used as an orientation light (0=Red, 42=Yellow; 85=Green, 128=Turquoise, 170=Blue, 213=Violet). Note: Red should not be used for the orientation light as this colour is used to display alarms.	
Transfer: ETS	
Parameter page: General	
LED Brightness	0 .. 255 (Default: 128)
This parameter is used to define the brightness of the LED when used as an orientation light. 0 = OFF 255 = 100% ON	
Transfer: ETS	
Parameter page: General	
LED Saturation	0 .. 255 (Default: 128)
This parameter is used to define the saturation of the LED when used as an orientation light. 0 = No saturation; white light 255 = Maximum saturation; full colours are shown	
Transfer: ETS	
Parameter page: General	
Temperature display	**°C** °F
This parameter is used to define the units in which the temperature is displayed. Note: Temperature values are exclusively transferred to the bus in °C and/or K.	
Transfer: ETS	
Parameter page: General	

Parameter	Settings
Time display	**24 h** 12 h
This parameter is used to set the format for the time display. In 12 hour format, the time display adds the indicator "am" (morning) or "pm" (afternoon). Sample displays: 24 h -> 17:25 12 h -> 5:25 pm	
Transfer: ETS	
Parameter page: General	
Date display	**DD.MM.YY** MM/DD/YY
This parameter is used to set the format for the date display.	
Transfer: ETS	
Parameter page: General	
Status Object Query Delay	0 secs **10 secs** 20 secs 30 secs 1 min 2 min 3 min 4 min 5 min
This parameter is used to set the delay time after which the following status objects are queried following a power recovery: - External interior temperature sensor (#118) - Exterior temperature sensor (#116) - Time/date (#111 and #112) - Basis target value (#120) - Window 1 to 4 (#134 to #137) - Presence (#138) - Status objects for switching and dimmer channels - Room operation mode (#140)	
Transfer: ETS	
Parameter page: General	
Send All Status Objects Upon Power Recovery	**No** Delayed by 10 secs Delayed by 15 secs Delayed by 18 secs
This is used to set whether and what delay is used when sending the following status objects following a restart: #113: Brightness, actual value #117: Temperature, actual value of internal sensor #119: Temperature, actual value, weighted interior #121: Target value, shifting #122: Temperature, target value #123..#127: Status object operation mode (here, only the object for the active operation mode is sent) #142: Controller status (Eberle) #143: Controller status (RHCC) #154: Fan operation mode	
Transfer: ETS	
Parameter page: General	
Interval between messages	50 .. 500 ms (Default: 200 ms)
This parameter is used to set the time interval between messages - when sending multiple queries/status notifications in a sequence.	

Parameter	Settings
Transfer: ETS	
Parameter page: General	
Extended key press from	2 secs 3 secs **5 secs** 10 secs
This parameter is used to set the time at which a continuous key operation (of the touch display) is considered an extended press. Extended key presses are required, for example to save scenarios.	
Transfer: ETS	
Parameter page: General	

3.2.3 Communications objects

Obj.	Object name	Function	Type	Flags
108	Language	Receive	1 byte	KSÜA
This object is used to change the language over the denro ONE KNX bus. This receives the language ID which has been set in denro ONE Manager for the particular language to be activated. Values from 1-255 can be used. Unrecognised language IDs are ignored. For configuring available languages, see Chapter 4.8.2. The received value is permanently stored in memory, so that it is still available after a power recovery.				
111	Time/Day of the week	Receive	3 bytes DPT_TimeOfDay	KSÜA
This object can be used to receive and synchronise the time with the day of the week from an external timepiece in the KNX system via the bus. During a power recovery, this communications object sends a read request.				
112	Date	Receive	3 bytes DPT_Date	KSÜA
This object can be used to receive and synchronise the date from an external timepiece in the KNX system via the bus. During a power recovery, this communications object sends a read request.				
197	Admin mode	Receiving: Can be activated	1 bit	KSA
This communications object is used to switch Admin mode to a mode in which it can be activated. Final activation is then performed on the display. 1 enables Administrator mode activation, 0 disables this. The received value is permanently stored in memory, so that it is still available after a power recovery.				
This object is only visible when: Administrator mode permanently active = No and Administrator mode activation = By location upon enabling by an external object				

Obj.	Object name	Function	Type	Flags
234	Info	Send	14 bytes	KLÜ
This object can be used to query the version information of the unit for support purposes.				

3.3 Sending sensor values

3.3.1 Functional overview

3.3.1.1 Temperature sensor

The denro ONE includes an integrated temperature sensor. This measures the room temperature within a range of 0°C to +45°C with an accuracy of 0.1K. In the event that the temperature falls below 0°C, the display indicates "LOW", and **0°C** is also sent to the communication object. At temperatures above **45°C**, the display indicates "HIGH", and 45°C is also sent to the communications object. Further details on configuration and communications objects can be found in Chapter 3.7.

3.3.1.2 Brightness sensor

The denro ONE is also fitted with a light measurement sensor to measure brightness. The light measurement sensor is located behind the colourless ring which surrounds the rotating knob. Direct exposure to sunlight should be avoided. A time interval can be set for transmissions of sensor values. The internal update time for the sensor value is 1 sec. This means that external queries in intervals of less than 1 second may lead to identical feedback values, even when the actual brightness has changed.
The measurement range is 20-10,000 Lux. Linearisation and temperature compensation are not required.
The values determined and corrected by the sensor are sent over the communications objects listed below. The sending interval can be adjusted.

3.3.2 Configuration

The configuration of the temperature sensor is described in chapter 3.7.14.

The following parameters are used in the configuration of the brightness sensor:

Parameter	Settings
Minimum time between two messages for audible alerts	0 - 25.5 secs (Default: 5.0 s)
This parameter is used to set the minimum time interval between two events when an event is triggered (Value = 0 secs -> no value is sent; step: 0.1 s).	
Transfer: ETS	
Parameter page: General	
Send brightness values	**0 s (no value sent)** 5 secs 10 secs 15 secs 30 secs 1 min 2 min 5 min 10 min 15 min 30 min 60 min 120 min
This parameter is used to set the cycle time for the transmission of values. When the value = 0 secs, no value is sent.	
Transfer: ETS	
Parameter page: General	
Brightness sensor correction value	0 .. 2000 lx (Default: 0 lx)
This parameter is used to set the correction value for the brightness sensor. The set value is then subtracted from the value provided by the sensor and sent. The following steps are performed when determining this: 1. Set Offset to 0 lx 2. Completely darken the denro ONE 3. Query the measured value from the communications object and enter as Offset	
Transfer: ETS	
Parameter page: General	

3.3.3 Communications objects

The communications objects of the temperature sensor are described in chapter 3.7.15.

The following communications objects relate to the brightness sensor:

Obj.	Object name	Function	Type	Flags
113	Brightness, actual value of internal sensor	Send	2 byte DPT_ Value_ Lux	KLÜ
This object is used to send the values measured and corrected by the brightness sensor.				

3.4 Weather information display

3.4.1 Functional overview

The denro ONE can display current weather and weather forecast information. The relevant operation page is accessed using a button. The positioning of the buttons is configured in the denro ONE Manager (see Chapter 4.8.8).
Weather forecast information for three days (today, tomorrow and the day after) is displayed on each of their operation pages, and these can be flipped through using the navigation buttons. Besides the navigation buttons, no other buttons are active.

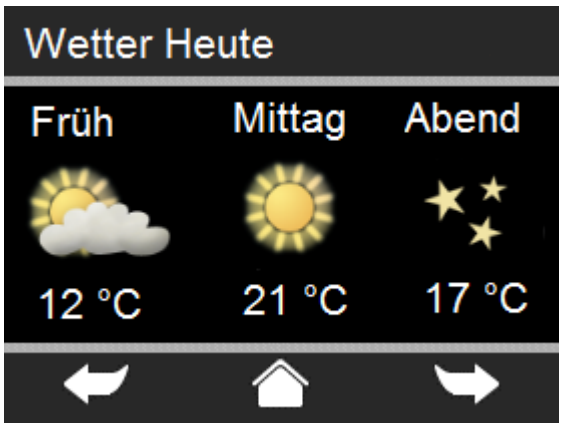


Figure 18: Function page - weather information

The preparation of weather data is performed by systems such as **denro THINK**. This queries weather data from a dedicated denro server according to the relevant configuration and makes this available to the denro ONE via a communications object.

3.4.2 Configuration

The configuration of the weather information display in terms of location and group address connections is achieved by using the configuration programme in **denro THINK**.
The displayed elements are configured in denro ONE Manager (see Chapter 4.8.8).

3.4.3 Communications objects

Obj.	Object name	Function	Type	Flags
109	Weather data request	Send	1 bit	KÜ
This object is used to send a 1 when the denro ONE is started to initialise the receipt updated weather information. The weather information is received by the communications object *Weather information*.				
110	Weather data	Receive	14 bytes	KSA
This object is used to receive the weather information.				

3.5 RGB dimmer

3.5.1 Functional overview

The denro ONE can operate an RGB dimmer. The relevant operation page is accessed by pressing a button. The positioning of the button is configured in denro ONE Manager (see Chapter 4.8.8).

Figure 19: RGB dimmer operation page

Each of the three fields - colour, saturation and brightness - can be actuated on the touch-screen. The selected value is then finally altered using the rotating knob. The selected value is displayed on a narrow bar, which moves upwards as the value increases. The RGB values are calculated from the selected values and output via the communications objects. The denro ONE can update the display by means of bus messages which are received via the status communications objects.

3.5.2 Configuration

The RGB dimmer requires no further configuration.

3.5.3 Communications objects

Obj.	Object name	Function	Type	Flags
198	RGB	Send	4 bytes	KLÜ
This object is used to send brightness information for the colour components. Bits: 00000000BBBBBBBBGGGGGGGGRRRRRRRR B = blue G = green R = red				
199	RGB red	Send	1 byte DPT_ Scaling	KLÜ
This object is used to send brightness information for the red colour component.				
200	RGB green	Send	1 byte DPT_ Scaling	KLÜ
This object is used to send brightness information for the green colour component.				
201	RGB blue	Send	1 byte DPT_ Scaling	KLÜ
This object is used to send brightness information for the blue colour component.				
202	RGB red status	Receive	1 byte DPT_ Scaling	KSÜ A
This object is used to receive brightness information for				

Obj.	Object name	Function	Type	Flags
the red colour component.				
203	RGB green status	Receive	1 byte DPT_ Scaling	KSÜ A
This object is used to receive brightness information for the green colour component.				
204	RGB blue status	Receive	1 byte DPT_ Scaling	KSÜ A
This object is used to receive brightness information for the blue colour component.				

3.6 Control of audio playback devices

3.6.1 Functional overview

The denro ONE can be used to control audio playback devices. These can include, for example, various KNX audio devices or even software solutions such as **denro THINK** (when connected to, for example, a Logitech SqueezeBox). The control includes the following functions:

- Play/Pause
- Next track
- Previous track
- Volume control
- Mute

The relevant operation page is accessed by pressing a button.

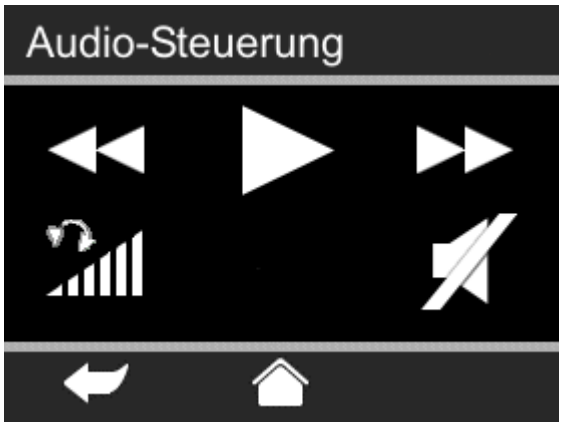


Figure 20: Audio operation page

The Back, Play, Forward and Mute buttons are active. The volume can be controlled using the rotating knob. The current volume is displayed above the volume status icon.

3.6.2 Configuration

The controlled audio system is defined by configuring the respective KNX audio device or also for example **denro THINK**.

The positioning of the buttons for accessing the operation page is configured in denro ONE Manager (see Chapter 4.8.8).

3.6.3 Communications objects

Obj.	Object name	Function	Type	Flags
211	Audio volume	Send	DPT_ Scaling	KLÜ
When any change is made using the rotating knob, the volume value is sent using this object.				
212	Audio volume status	Receive	DPT_ Scaling	KSÜA
This object is used to receive the volume value to compare the displayed and internal values.				
213	Audio mute	Send	1 bit	KLÜ
This object is used to send either a 1 or a 0 when the "Mute" button is pressed.				
214	Audio back	Send	1 bit	KLÜ
This object is used to send either a 1 when the "Previous track" button is pressed.				
215	Audio play	Send	1 bit	KLÜ
This object is used to send either a 1 or a 0 alternately when the "Play" button is pressed.				
216	Audio play status	Receive	1 bit	KSÜA
This object is used to receive a value to compare with the internal Play value.				
217	Audio forward	Receive	1 bit	KSÜA
This object is used to send a 1 when the "Next track" button is pressed.				

3.7 Room temperature control

3.7.1 Functional overview

The room temperature control function consists of multiple function blocks which can be combined with each other in different ways, and in which the following functions are available:

- Switching between automatic/manual mode as well as switching between room operation modes using the display or communications object,
- Target value shifting (as target value set point in °C or target value shift in K) using the rotating knob,
- Display/adjustment of fan levels
- Display whether manual mode is activated and current room operation mode (Comfort, Pre-comfort, Energy-saving and Protected modes),
- Display whether the heating or cooling valve is open, and/or the regulating variable is >0,
- Display the dew point alarm and open windows (overall report for all windows).

The room temperature control can be set to:

- Heat only,
- Cooling only,

- Heating and cooling,

Each can be selected to
- Heat using a thermostat,
- Heat using PI control,
- Heating with PI control and sequence control (e.g. for floor and radiator heating),
- Cooling using a two-position control
- Cooling using PI control,
- Cooling with PI control and sequence control (e.g. for cooling ceilings and supply air cooling),

Room temperature control includes the following part functions:
- Room temperature measurement using an internal temperature sensor,
- Room temperature measurement using an external temperature sensor,
- Calculation of actual value for current room temperature (weighted for internal and external sensors),
- For target value shifts: Calculation of actual target value for current room temperature from basic target value, operation mode and shift,
- Comfort mode extension: Time-limited cancellation of Pre-comfort, Energy-saving and Protected operation modes,
- PI control for heating / cooling with continuous (in %) or switching regulating variable output (PWM).

3.7.2 Operating levels

Step 1: Enter the room temperature control sub-menu via the Heating buttons (e.g. using the Temperature buttons)

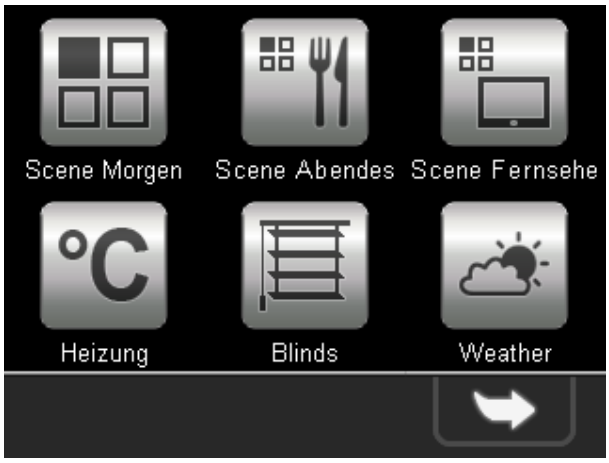


Figure 21: Home page on denro ONE

The menu is displayed, with the following options
- Operation mode switching
- Temperature setting
  - Target value shift (max. +/-5K) OR
  - Direct target value setting (16-26°C) with absolute temperature display for Comfort mode
  - All settings in 0.5 K or 1°F steps
- Comfort extension
- Status icons for:
  - Cooling valve open,
  - Heating valve open,
  - Dew point alarm,
  - Window open

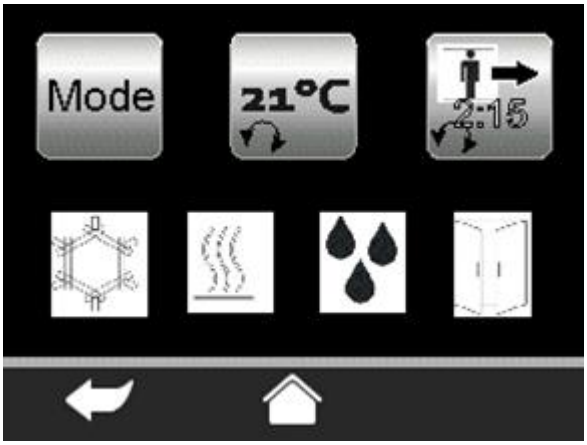


Figure 22: Room temperature control start page

In Step 2: Calling up the Operation mode switching sub-menu using the button

This button calls up an operation page on which the operation modes can be manually switched through (see Figure 23). Manual operation mode selection is only possible when the controller is not in "Continuous protected operation" mode.
Pressing the button displays the operation page with the different operation modes which have been configured in denro ONE Manager. At most, the following operation types/modes are possible:

- Automatic/manual mode
- Comfort (present)
- Pre-comfort (not present)
- Energy-saving (Night-time reduction)
- Protected mode
- Fan levels (Automatic, 0, 1, 2, 3)

In "Auto" mode, operation modes are switched either by bus message or by internal timer programme. The "Automatic mode using" parameter sets the control type which is used. Switching commands of any other control type are ignored. Any changes to the operation mode, either via the bus or by an internal timer programme, are displayed as "Automatic".

Figure 23: Operation mode switching (1-5) and Fan level (6) pages

The number of visible buttons is dependent on the respective configuration (available operation modes, fans).

The fan level display is shown in Figure 33.
Fan level operation is described in Chapter 3.7.13.

3.7.3 Continuous PI controller

It is possible to adjust whether "Heating" only or "Cooling" only, or "Heating and cooling" are required. Room temperature controls for heating and cooling can be individually adjusted, and can be achieved as required using a two-position control or a continuous PI controller with sequence control. Sequence control can be used for example when a room has both floor and radiator heating (see Chapter 3.7.12). It is also possible to set if the controller should switch between two room operation modes (Comfort and Protected mode), three room operation modes (Comfort, Energy-saving and Protected mode) or four room operation modes (Comfort, Pre-comfort, Energy-saving and Protected mode).
When using continuous PI control, the proportional range and reset time are adjustable. The regulating variable calculated from the actual value and target value can be transferred as a continuous set point value (EIS 6) within a 0...100% range or as a pulse-width modulated On/Off command (EIS 1) via the KNX bus.

3.7.4 Two-position control

A two-position control can be used as an alternative to continuous PI control. Except in the event of any change in the target value, this is only activated at discrete intervals in order to determine the current set point value. The cycle duration of the two-position control and hysteresis can be adjusted.
The two-position control is simple to configure and can be used in systems in which small variations in room temperature are acceptable.

3.7.5 Determining actual value

3.7.5.1 Internal interior temperature sensor

The denro ONE includes an integrated temperature sensor. This measures the room temperature within a range of 0°C to +45°C with an accuracy of 0.1K. The measured value can be adjusted by means of an adjustable offset against environmental influences (e.g. when mounted on a cold outer wall).
The internal update time for the sensor value is 10 seconds. This means that external queries in intervals of less than 10 seconds may lead to identical feedback values, even when the actual temperature has changed.
The values determined and corrected by the sensor are sent over the communications objects listed below, and can also be read from these. The sending interval can be adjusted.

ATTENTION: The offset should not be applied immediately after installing the unit, as the unit will to a certain extent warm itself. A wait of approx. 1 hour after commissioning is instead recommended before setting the offset.

The corrected value is used to determine the actual value.
A configurable hysteresis can be used to prevent continuous new actual values being sent.

3.7.5.2 External interior temperature sensor

The controller also has an additional object for temperature values measured by an external temperature sensor. This object can where required send cyclical "read requests" to the relevant object of the external temperature sensor, so that this then transmits the current value. In principle, an external sensor should however automatically transmit any change in temperature. After a power recovery, the controller will independently request the external temperature value from the sensor. When the external sensor does not provide a value or no value can be queried, the following values

- Basic target value
- Exterior temperature
- External interior temperature sensor

are each given a configurable standard value.

3.7.5.3 Room temperature - actual value

The programme uses the temperature values from the integrated and external sensors to determine the current room temperature actual value allowing for a configurable "Weighting". The "weighting" sets the percentage of the external measured temperature value which is used to calculate the temperature actual value.
The thus determined room temperature actual value can be read at any time by an individual object and/or be sent automatically upon any change in a configurable value or even cyclically.
A configurable "Hysteresis" ensures that the controller does not continuously "see" new room temperature actual values with every slight temperature variation. Thus, if the room temperature actual value only varies within the hysteresis, the last used room temperature actual value is used for control functions.

3.7.6 Setting / calculating target values

3.7.6.1 Setting target values

The target value shift is given either directly in °C/°F or as a relative value in K. The relative value (the target value shift) is calculated internally and included in the target value calculation.

Depending on the configuration, the target value is directly displayed as a temperature or as a shift on the basic target value on the room temperature control start page (Figure 22).

Figure 24: Target value directly displayed as a temperature

A direct temperature display relates to Comfort operation mode.

Figure 25: Target value displayed as a shift

3.7.6.2 Calculating the target value

With any target value shift, the current target value is determined from the current room operation mode, the basic target value and any target value shift to be allowed for.
The basic target value can either be adjusted by the relevant object (basic target value) or be set at a fixed value using a parameter. If a default basic target value is set for the relevant object, this basic target value is automatically queried via the bus upon any power recovery.
The given target value can be adjusted to a higher or lower value by a room user using the rotating knob on the controller, and the range of this shift is adjustable. Any shift and/or change in the target value is sent with a 3-second delay.

3.7.6.3 Exterior temperature-based tracking of target value

The Cooling operation mode allows the exterior temperature target value to be tracked. This exterior temperature is read by the object "Temperature, exterior temperature". This object can where required send cyclical "read requests" to the relevant object of the external exterior temperature sensor, so that this then transmits the current value. In principle, an external temperature sensor should however automatically transmit any change in temperature. If the exterior temperature is above 26 degrees and 6K above the current target temperature, the target temperature is set to a value 6K below the exterior temperature. In this event, no target value shift is possible which would have a lesser effect than the tracked target temperature based on the exterior temperature, and operation modes also have no influence (the mode will be changed, however, if the the target temperature is once again defined above the external temperature). Protected mode and the dew point alarm are exceptions: Should the target value exceed the set high temperature protection value, the target temperature is then set to the value which is defined by the high temperature protection parameter. If the dew point alarm is active, the cooling valve is then completely closed.

3.7.7 Room operation types

The following operation types are differentiated:

- Automatic operation (using an internal time switch programme or externally using bus messages)
- Comfort mode
- Pre-comfort mode
- Energy-saving mode
- Protected mode

Automatic operation is described in Chapter 3.8.

Figure 26 provides an overview of the times when each operation type is possible. The criteria are explained in the following chapters.

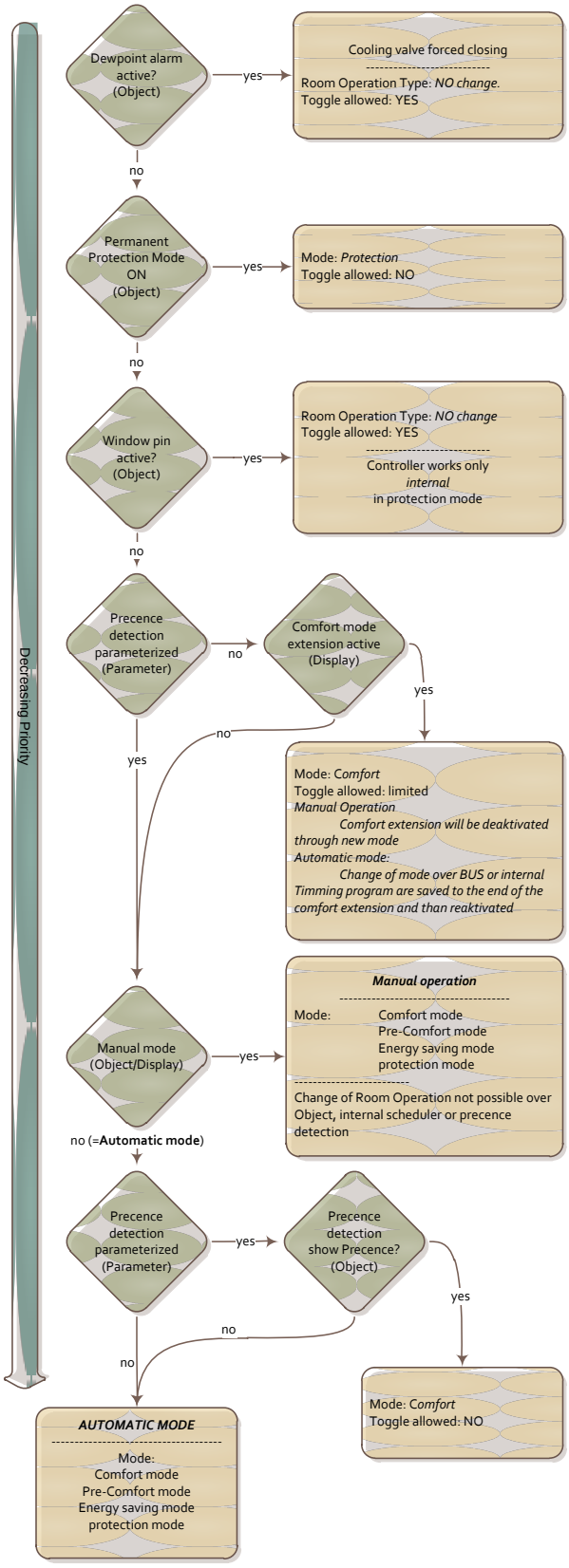


Figure 26: Room temperature control priorities

3.7.1.1 Comfort mode

This room operation type is indicated by a relevant icon in the display. The target value in the "Comfort operation" room operation type is not dependent on whether heating or cooling is active. It corresponds either to the value set directly on the rotating knob of the controller in °C or to that calculated from the basic target value and the preset target value shift.

Dead zone

In order to ensure that the heating and cooling valves are not opened at the same time in "Heating and cooling“ configuration, a dead zone has been defined. This is applied symmetrically around the range of the target temperature. – The way in which it works is described in Figure 28. In the event of a power recovery, the mode (heating or cooling) is set directly by the current temperature: T < target value ≙ heat, T ≥ target value ≙cool

The dead zone is only active in Comfort mode.

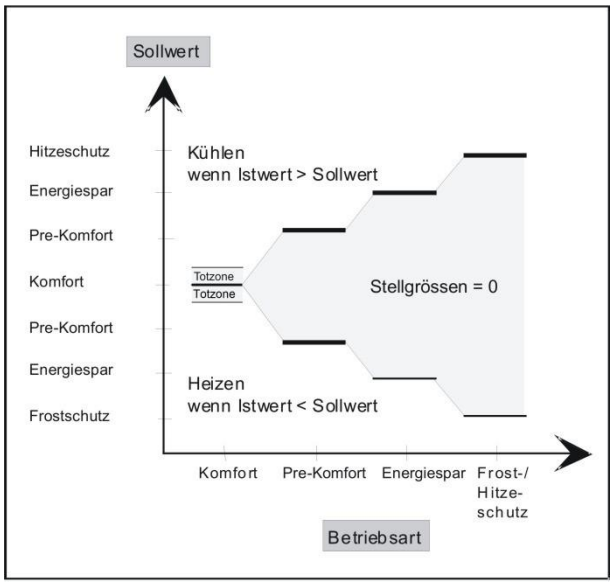


Figure 27: Target values and dead zone in sample P-control

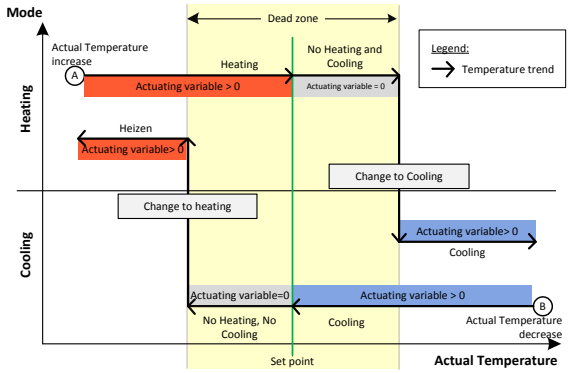


Figure 28: Dead zone operating method in as an example of P-control

3.7.1.2 Pre-comfort mode (previously: Standby mode)

This room operation type is indicated by a relevant icon in the display. The target value in the "Pre-comfort" room operation mode is dependent on whether heating or

cooling is active. When heating, the Pre-comfort mode target value corresponds to the basic target value minus the temperature drop for Pre-comfort mode, while for cooling, this corresponds to the basic target value plus the temperature increase for Pre-comfort mode, respectively plus or minus the set target value shift (see Figure 22: Room temperature control start page). The drop and increase values in Pre-comfort mode are adjustable using the parameters in the "Temperature, target values" configuration window.

3.7.7.3 Energy-saving mode (Also: Night reduction)

This room operation type is indicated by a relevant icon in the display. The target value in the "Energy-saving" room operation mode is dependent on whether heating or cooling is active. When heating, the Energy-saving mode target value corresponds to the basic target value minus the temperature drop for Energy-saving mode, while for cooling, this corresponds to the basic target value plus the temperature increase for Energy-saving mode, respectively plus or minus the set target value shift (see Figure 22). The drop and increase values in Energy-saving mode are adjustable using the parameters in the "Temperature, target values" configuration window.

3.7.7.4 Protected mode (frost / heat protection)

This room operation type is indicated by a relevant icon in the display. The target value in this operation mode is entirely dependent on whether heating or cooling is active. When heating, the target value corresponds to the adjustable parameter value for "Frost protection" in the "Temperature, target values" configuration window, while when cooling, this corresponds to the adjustable parameter value for "Heat protection".

3.7.7.5 Permanent Protected mode

If you want to switch the room temperature control permanently to Protected mode (e.g. during the holidays), you can use the special "Permanent protected mode" communications object. If the "Protected mode" room operation mode is switched on using this object, it can only be switched off again in this way. Display actuations, time switch messages, presence detectors and window contacts which act on the "normal" "Protected mode" object to close down Protected operation will be ignored as long as the "Permanent protected mode" object is switched on. When "Permanent protected mode" is switched off in automatic mode via message, the system switches back to the saved room operation mode, except where this was not simultaneously overwritten by a message with another room operation mode, or where another operation mode has been determined by the timer programme.
If the last mode before the activation of the permanent protected mode was "Manual mode", the system switches to Energy-saving mode upon deactivating Permanent protected mode – as long as this operation mode is available, otherwise Protected mode remains active.
When accessing the Heating function page, the "normal" operation page is not displayed when the Permanent protected mode is active; instead, the following notice on the Permanent protected mode appears:

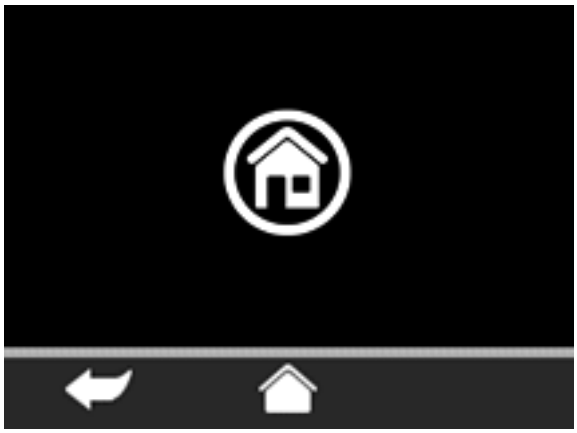


Figure 29: Heating operation page in Permanent protected mode

3.7.7.6 Opening / closing windows

A window status assessment allow the controller to react to the opening of windows or doors. Four window objects are thus assigned to the controller, which are mutually interlinked internally via a logical OR function. When at least one of the window objects reports an open window, Protected mode is activated internally, meaning that the room temperature target value is set to the frost protection value when heating and to the heat protection value for cooling, no operation mode changes are allowed from the outside, and the target temperature reported by the communication object remains unchanged. When at least one window is open, this is additionally indicated on the display by an appropriate icon. Switching to the frost or heat protection target values usually leads to the immediate closure of the heating/cooling valves. Heating or cooling energy waste is thus prevented when a window is open.
Once all windows are once again closed, the internal Protected mode is then de-activated. If an opened window triggers a switch to another operation mode (such as through a bus message or internal timer programme), although this operation mode is communicated by bus message – it is only activated once all windows are closed.
A further parameter controls whether opening a window leads to a switch to internal Protected mode immediately or after 30 secs, thus ensuring that there is no reaction to a briefly opened window.
Internal room operation mode changes caused by a window opening are not reported to the bus.

3.7.7.7 Comfort mode extension

The controller offers the possibility of extending the duration of the Comfort mode. This is done by pressing the "Comfort mode extension" button on the "Room temperature control" operation page (Figure 22: Room temperature control start page) and setting the duration using the rotating knob. The button is only available if the presence detector is not used for presence reporting ("Object presence visible" parameter = No). The Comfort mode extension can be set in all available operation modes (Exception: Permanent protected mode). If the controller is not in Comfort mode, it then switches to this mode. The maximum duration of the comfort mode

extension is set using the "Maximum comfort extension duration" parameter.
The Comfort mode extension can be re-set to a different value at any time.

In Automatic mode, the internal timer programme applies the following:

- Upon expiry/end of the Comfort mode extension, the system switches to the room operation mode which is active at the current time according to the internal timer programme.

In Automatic mode, via bus message, the following applies:

- Switching commands which are received during an active comfort mode extension are not immediately activated, but cached.
- Upon expiry/end of the Comfort mode extension, the system switches to the last room operation mode set by bus message.

In manual mode, the following occurs:

- Upon expiry/end of the Comfort mode extension, the system switches to Energy-saving mode or Protected mode (if Energy-saving mode is not available).

A premature termination of an ongoing Comfort mode extension, with automatic switch back to the saved room operation mode, is possible at any time by setting the Comfort mode extension duration to "0" in the relevant menu or by manually changing the room operation mode (see Figure 26).
When a Comfort mode extension is active, the currently remaining time is displayed on the button. In the event of any change to the displayed remaining time using the rotating knob, the displayed remaining time is immediately applied as the new value.

The currently set mode is saved so that this can be restored following any power failure.

3.7.7.8 Dew point mode

When a dew point monitor fitted to a cooling ceiling is triggered in cooling mode, the controller switches to "Dew point mode". This then completely closes the cooling ceiling valve so long as the dew point alarm continues. A triggered "Dew point mode" is indicated by a relevant icon in the display.
When Dew point mode has been triggered, the operation mode can be switched back, but the active dew point mode must first be shut down, meaning that the cooling valve remains completely closed until this is done.

3.7.7.9 Automatic/manual mode

The room operation status is normally controlled in "Automatic mode" by message via a time switch, the integrated timer programme or the central control of a building automation system. It is also however possible to permanently set a desired room operation mode manually via the controller display. For this, "Permanent protected mode" must not be switched on.
Pressing the relevant button allows the selection of any room operation mode which the controller recognises (thus according to the selected setting - the Comfort, Pre-comfort, Energy-saving or Protected modes).
The operation mode permanently activated in "Manual mode" via the menu function cannot be changed by bus message, the internal operation mode switching timer programme or presence detector, with the exception of Permanent protected mode. For priorities see Figure 26

3.7.7.10 Presence detector

The controller contains an optional object for "Presence" status for use in rooms with a presence detector. When a "Presence = ON“ message is received, Comfort mode is switched on. When a "Presence = OFF" message is received again, the room operation mode activated by the internal timer programme and/or bus message is restored. When a message to switch to another room operation mode is received with "Presence=ON", this is cached and is only effective once the object value "0" is received via the presence object and 10 seconds have elapsed.
When a window is opened with "Presence=ON", "Protected mode" is activated internally so long as a window remains open.
If "Manual mode" is switched on, the messages from the presence detector are ignored.

3.7.7.11 Setting the available operation modes

The number of available room operation modes can be set using the "Room operation modes" parameter. The following settings are possible:

- Comfort /Protected mode
- Comfort /Energy-saving/Protected mode
- Comfort /Pre-comfort/Energy-saving/Protected mode

3.7.8 Regulating variable output

Continuous PI control allows users to set whether the regulating variables for Heating and Cooling are limited by an upper and/or lower value, and if these are inverted if necessary. Users can also set whether the regulating variable is to be transferred as a permanent value in percent or as an On/Off switch command. When an On/Off switching command is issued, the regulating variable is converted into a pulse-width modulated switching command. The cycle time required for this conversion (Period T) is adjustable.

3.7.9 Warning messages

When a dew point alarm is triggered, the relevant display appears on the heating operation page (see Figure 22).
When the frost and/or heat alarm temperatures are reached or undercut, these messages are output via 1-bit communications objects and can thus be evaluated as an alarm. For this evaluation, each alarm channel must be connected via a group address with the heat and frost alarm communication object (see Chapter 3.8).

3.7.10 Operation mode changes via bus

3.7.10.1 1-bit objects

The temperature controller makes available 5 1-bit objects for switching between room operation modes and four for reporting. Switching between Comfort, Pre-comfort, Energy-saving and Protected modes only requires an ON switch command via the relevant 1-bit object. A mode change by message is always immediately indicated by the relevant symbol, but is only performed by the controller after a period of approx. 3 seconds. All objects whose switching status is altered by switching to the new room operation mode are automatically sent. In this process, a 0 is sent for the abandoned operation mode, and a 1 for the switched-to operation mode.
The "Frost alarm" and/or "Heat alarm" status as well as the "Heating / Cooling" operation mode are determined by the controller itself, and sent via these objects. For 2-wire units with only one heat exchanger and a regulator valve, through which either cold or warm water flows through the pipe network, the controller must however be switched using the "Heating / Cooling" object via the bus to the respective current operation mode.
The controller can be switched on and off by means of a further 1-bit object. When the controller is switched off, the following occurs:

- The regulating variable is internally set to 0.
- All operation modes are marked as inactive on the display
- A current temperature assessment is performed so that temperature and frost/heat alarm messages can be sent
- The current temperature target value in the communications object is retained as the last active value
- Availability of 1-bit and 8-bit objects is ascertained (Bits for operation modes = 0)

When the controller is turned on again, in both manual and automatic mode, it first switches to Protected mode by means of a bus message. In Automatic mode, the timer-programmed active room operation mode is switched on by the internal timer programme. In Automatic mode, the controller sets itself by bus message to the last room operation mode selected via bus message.

3.7.10.2 8-bit objects

A parameter allows you to set whether the room operation mode can also be switchable using an 8-bit object, as well as whether the current room operation mode should be sent via an 8-bit status object. The following object values are in this case respectively assigned to the following operation modes:

0 = Automatic operation (controlled by an internal time switch programme or bus messages)
1 = Comfort mode
2 = Pre-comfort mode
3 = Energy-saving mode
4 = Protected mode

Inbound, "0" deactivates Manual mode. In this case, the last operation mode received by bus or set by the internal timer programme is activated – in this way, the sequence of the control bus messages does not matter (meaning that this can be received for example as an 0 and then a 1, or vice-versa).

If the controller receives via this 8-bit object a message with a value which is not between 0 and 4, or a value for an operation mode which is not available on this controller, the message is discarded as faulty.
A further parameter in the "Functions, objects" allows you to see whether an 8-bit object, "Controller operation mode" should be made available for compatibility reasons with older controllers. Upon any change, this object is used to send not only the room operation mode but also the controller operation mode, and this can also be queried. The individual bits of this 8-bit object have the following meaning:

Bit 0: 1 =Comfort mode On
Bit 1: 1 = Pre-comfort mode On
Bit 2: 1 =Energy-saving mode On
Bit 3: 1 =Protected mode On
Bit 4: 1 = Dew point alarm
Bit 5: 1 = Heating mode, 0 = Cooling mode
Bit 6: 1 = Controller on, 0 = Controller off
Bit 7: 1 = Frost/heat alarm

The table below explains which operating status corresponds to which bit-combination.

	Bit							
Operating status	7	6	5	4	3	2	1	0
Heating, Comfort mode	0	1	1	0	0	0	0	1
Heating, Pre-comfort mode	0	1	1	0	0	0	1	0
Heating, Energy-saving mode	0	1	1	0	0	1	0	0
Heating, Protected mode	0	1	1	0	1	0	0	0
Frost alarm	1	1	1	x	x	x	x	x
Cooling, Comfort mode	0	1	0	0	0	0	0	1
Cooling, Pre-comfort mode	0	1	0	0	0	0	1	0
Cooling, Energy-saving mode	0	1	0	0	0	1	0	0
Cooling, Protected mode	0	1	0	0	1	0	0	0
Heat alarm	1	1	0	x	x	x	x	x
Dew point alarm	x	1	x	1	x	x	x	x
Controller Off	0	0	0	0	0	0	0	0

3.7.11 Regulating variable output

Continuous PI control allows to you to set whether the regulating variables for Heating and Cooling are limited by maximum and/or minimum values, and whether these should be assigned normally or inverted (inverted output causes the reversed operation of the regulating variable; inverted output is for example required for thermal actuators which are opened when unpowered). Users can also set whether the regulating variable is to be transferred as a permanent value in percent (see Figure 30) or as a On/Off switch command.

When an On/Off switching command is issued, the regulating variable is converted into a pulse-width modulated switching command (see Figure 31). The cycle time required for this conversion (Period T) is adjustable.

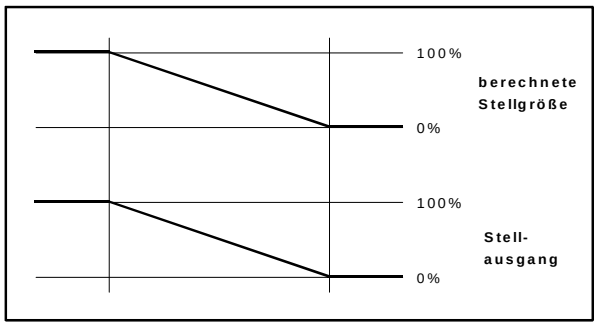


Figure 30: Continuous regulating variable output

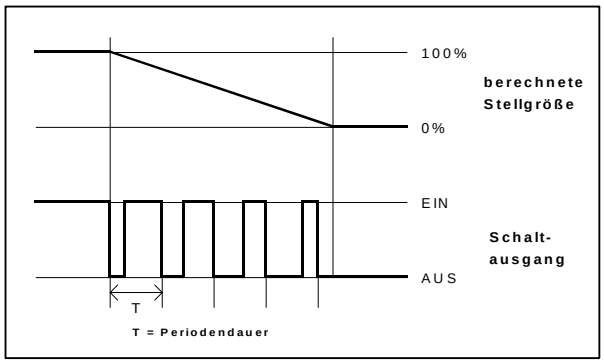


Figure 31: Switching regulating variable output

3.7.12 Sequence control

It is possible to heat a room using two different modes (e.g. using floor heating and radiator heating), and it is therefore recommended to control the two heat sources with the room temperature controller not in parallel but rather in sequence, meaning one after the other. If the room temperature is below the target value, the floor heating valve is opened first. Once this is 100% open and it is still not warm enough, the valve for the heating element is also opened. If on the other hand it is too warm in the room, first the heating element valve followed by the floor heating valve is closed sequentially.
Whether to use sequence control for heating and/or cooling can be set on the controller. When sequence control is used, the "internal" regulating variable calculated by the controller is converted to two output variables (regulating variable sequence 1 and regulating variable sequence 2). The internal regulating value from which regulating variable sequence 2 starts can be set (see Figure 32). The percentage change in the regulating variable above which the bus should send the regulating variable can also be set. This can be set separately for sequence 1 and sequence 2 (Parameter: Heating, sequence 1, regulating variable change for autom. sending Heating, sequence 2, regulating variable change for autom. sending, analogue). The regulating variable output for sequences 1 and 2 is always continuous. PWM output using a 1-bit object is not possible. "Minimum heating regulating variable", "Maximum heating regulating variable" and "Direction of operation / scale of heating regulating variable" parameters have no effect on sequence control. The same applies when cooling.

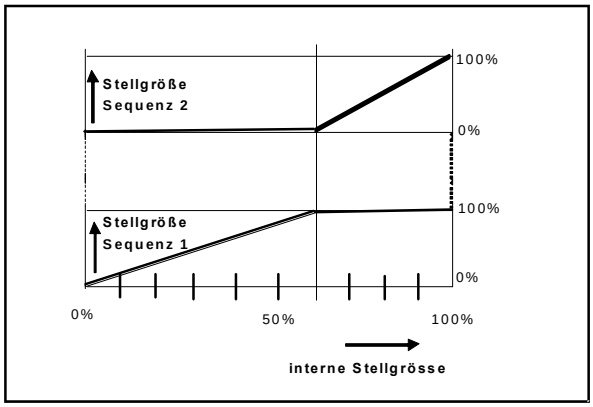


Figure 32: Regulating variables in sequence control

3.7.13 Ventilation

3.7.13.1 Functional overview

Functions:
- The fan level switch commands are sent.
- The fan operation mode is switched between Automatic / Manual.
- The active fan level is displayed.
- Automatic/manual mode display.

When fan level "0" is selected, the fans are switched off, and any open valve is closed in operating modes with unequal two-position control, meaning that the room is then neither heated nor cooled. This does not include frost or heat protection. In these cases, the fan level is set to Automatic.

Figure 33: Fan control button

The relevant set fan level is shown as follows:

A – Automatic
0 - OFF
1 - Level 1
2 - Level 2 (if configured)
3 - Level 3 (if configured)

in the centre of the button (see Figure 33). If no fan control has been activated, the button is faded out.

Adjustments are made by pressing the button and then turning the rotating knob.

If the fan control is not in Automatic mode, this is further adjusted under the following conditions:
- Upon any change in the room operation mode by means of bus message and/or internal timer programme, or

- Manual change in room operation mode when fan level = 0 or
- Protected mode (frost / heat protection)

The option to manually adjust the fan level on denro ONE can be de-activated by using a parameter – the symbol in this case nonetheless remains visible in the status display.

The denro ONE can also display fan level set by other bus components by means of 3 status objects. When more than 1 object has been set, the highest level has priority.

Automatic fan level activation
When using a two-position control, there is no automatic fan level activation – the relevant fan levels must be manually set. Otherwise, the fan levels are connected to fixed heating and cooling valve settings.
In the event that the PWM value is used, the relative time of the "open" valve setting is used. Table 1 provides an overview of which fan levels are activated with which valve setting, and the maximum possible fan level.

It is possible to configure the fan rotation speed for each fan level.

Table 1 Fan level activation - dependent on the number of configured fan levels and the position of the heating valve

	Number of configured fan levels		
	1	2	3
OFF	0%	0%	0%
Level 1	0,5 – 100%	0,5 – 50%	0,5 – 33%
Level 2	-	50,5% - 100%	33,5 – 67%
Level 3	-	-	67,5 – 100%

As some fans do not start up correctly when fan level 1 is activated, the fan level at which start-up occurs can be set using a parameter. The fan will then be run for 2 seconds at the selected level before then switching back to level 1.

To ensure that two fan levels are never selected at the same time, when a new level is selected, the previously selected fan level is switched off for 0.5 secs. To ensure that this timing is also adhered to by the switch actuator which is used to select the fan levels, it is recommended that the denro ONE and the fan switch actuator be connected to the same bus line.

When lower speeds are defined for higher fan levels than for the lower level in each case, the lower levels are maintained when switched automatically.

3.7.14 Configuration

The room temperature controller is configured on multiple configuration pages. The visibility of the following parameters depends on the main page *Room temperature controller - General*:

Configuration page	Visibility
Room temperature controller - General	Always, as this is the home page
Operating mode - controller	Unit function = controller + operating unit
Operating mode - operating unit	Unit function = operating unit
Temperatures, current value	Always
Heating, two-position control	Unit function = controller + operating unit and **(**Operating mode = HEATING: two-position control or Operating mode = HEATING & COOLING: two-position control or Operating mode = HEATING: two-position control, COOLING: sequence control or Operating mode = HEATING: two-position control, COOLING: PI control**)**
Heating, PI control	Unit function = controller + operating unit and **(**Operating mode = HEATING: PI control or Operating mode = HEATING: PI control, COOLING: two-position control or Operating mode = HEATING: PI control, COOLING: sequence control**)**
Cooling, PI control	Unit function = controller + operating unit and **(**Operating mode = COOLING: PI control or Operating mode = HEATING: two-position control, COOLING: PI control or Operating mode = HEATING: Sequence control, COOLING: PI control**)**
Heating and Cooling, PI control	Unit function = controller + operating unit and Operating mode = HEATING & COOLING: PI control
Heating, Sequence control	Unit function = controller + operating unit

Configuration page	Visibility
	and **(**Operating mode = HEATING: Sequence control or Operating mode = HEATING & COOLING: Sequence control or Operating mode = HEATING: Sequence control, COOLING: Two-position control or Operating mode = HEATING: Sequence control, COOLING: PI control**)**
Cooling, sequence control	Unit function = controller + operating unit and **(**Operating mode = COOLING: Sequence control or Operating mode = HEATING & COOLING: Sequence control or Operating mode = HEATING: two-position control, COOLING: sequence control or Operating mode = HEATING: PI control, COOLING: Sequence control**)**
Ventilation	Fan available = Yes

Parameter	Settings
Unit function	**Controller + operating unit** Operating unit
This parameter determines whether the denro ONE operates as a controller or "only" as an operating unit.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Automatic mode via	**Internal timer programme** Bus messages
This parameter determines the way in which room operating modes are switched in Automatic mode. Switching commands for any other control type are ignored.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
This parameter is only visible when: Unit function = controller + operating unit	
Basic target value	16 – 26 °C (Default: 21°C)
This parameter provides the basic target value for Comfort mode. The value defined here can be changed using the "Basic target value" communications object.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Basic target value object visible	No **Yes**
This parameter is used to set the visibility of the "Basic target value" communications object.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Target value shift range	±2.0 K **±3.0 K** ±4.0 K ±5.0 K
This parameter sets the temperature range in Kelvin over which the basic target value can be shifted upward or downward.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
This parameter is only visible when: Target value setting enabled = Yes	
Target value shift display	**Temperature** Shift
This parameter sets the way in which the target value set point is displayed. Where: Temperature -> Display new target temperature in °C or °F Shift -> Display target value shift in K	
Transfer: ETS	
Parameter page: Room temperature controller - General	
This parameter is only visible when: Target value setting enabled = Yes	
Perform target value calculation	**No** Yes
This parameter sets whether the room temperature controller only operates as a control station or whether it can also perform its own target value calculations. The relevant objects and parameters are then displayed.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
This parameter is only visible when: Unit function = operating unit	
Object presence visible	**No** Yes
This is used to set whether the "Presence" communications object should be added. The messages passing through this communications object are evaluated in order to activate the "Comfort" room operation mode.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Permanent protected mode object visible	**No** Yes
This sets whether the "Permanent protected mode" communications object should be added; this enables the controller to be permanently switched to "Protected" room operation mode.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Maximum comfort extension duration	Inactive 15 min 30 min 45 min 60 min

Parameter	Settings
	90 min 120 min **180 min** 210 min 240 min
This parameter defines the maximum duration of the comfort extension which can be set in the display. inactive: A comfort extension is not possible. The relevant function is not available on the display. 15-240 minutes: The relevant function is available on the display and the duration of the comfort extension can be set within the provided range in 15-minute intervals.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
This parameter is only visible when: Object presence visible = No	
Comfort extension object status	**No** Yes
This is used to set whether the "Comfort extension status" communications object should be added.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
This parameter is only visible when: Object presence visible = No and Maximum comfort extension duration <> inactive	
Enable operation type adjustment	No **Yes**
This parameter enables adjustments to the operation modes of the room temperature controller by the user (Manual mode).	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Enable target value adjustments	No **Yes**
This parameter enables adjustments to the target values by the user.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Room operation mode following power recovery	**as before power failure** Automatic Comfort mode Pre-comfort mode Energy-saving mode Protected mode
This parameter sets which room operation type is automatically activated following a power recovery. The settings Comfort mode, Pre-comfort mode, Energy-saving mode and Protected mode indicate that the controller will be switched to Manual mode.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Reaction to window opening	Immediate 15 secs **30 secs** 60 secs
This parameter is used to set the time for window status evaluations. A "Window open" status causes the room temperature target value, depending on its setting, to be set to frost protection value in Heating mode and to the heat protection value in Cooling mode, and Protected mode to be internally activated (no message over the bus or operation mode switch on the display) either immediately or only after the set time. Setting a delay ensures that the system does not switch to internal Protected mode for every brief window opening.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
8-bit room operation mode object / room operation mode status	**No** Yes
This sets whether both communications objects, "Room operation mode" and "Room operation mode status" are added. The values transferred by means of these objects are used to set the room operation mode and/or to report the current room operation mode.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
8-bit object controller status (Eberle)	**No** Yes
This is used to set whether the "Controller status (Eberle)" communications object should be added. This object is used to send controller and room operation mode status reports. Queries for this object are also possible. Bit 0: 1 =Comfort mode On Bit 1: 1 = Pre-comfort mode On Bit 2: 1 =Energy-saving mode On Bit 3: 1 =Protected mode On Bit 4: 1 = Dew point alarm Bit 5: 1 = Heating mode, 0 = Cooling mode Bit 6: 1 = Controller on, 0 = Controller off Bit 7: 1 = Frost/heat alarm	
Transfer: ETS	
Parameter page: Room temperature controller - General	
16-bit object controller status (RHCC)	**No** Yes
This is used to set whether the "Controller status (RHCC)" communications object should be added. This object is used to report the status of the controller and the room operation mode.	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Invert window contact 1	**No** Yes
This sets whether the signal from window contact #1 is inverted. If this object is set to "Yes", 0 is interpreted as "Open" and 1 as "closed".	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Invert window contact 2	**No** Yes
This sets whether the signal from window contact #2 is inverted. If this object is set to "Yes", 0 is interpreted as "Open" and 1 as "closed".	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Invert window contact 3	**No** Yes
This sets whether the signal from window contact #3 is inverted. If this object is set to "Yes", 0 is interpreted as "Open" and 1 as "closed".	

Parameter	Settings
Transfer: ETS	
Parameter page: Room temperature controller - General	
Invert window contact 4	**No** Yes
This sets whether the signal from window contact #4 is inverted. If this object is set to "Yes", 0 is interpreted as "Open" and 1 as "closed".	
Transfer: ETS	
Parameter page: Room temperature controller - General	
Room operation modes	Comfort /Protected mode Comfort /Energy-saving/Protected mode **Comfort /Pre-comfort/Energy-saving/Protected mode**
This parameter sets the room operation modes which room temperature control must differentiate between.	
Transfer: ETS	
Parameter page: Operation mode controller, operation mode operating unit	
Operating Mode	HEATING: Two-position control **HEATING: PI control** HEATING: Sequence control COOLING: Two-position control COOLING: PI control COOLING: Sequence control HEATING & COOLING: Two-position control HEATING & COOLING: PI control HEATING & COOLING: Sequence control HEATING: Two-position control, COOLING: Sequence control HEATING: Two-position control, COOLING: PI control HEATING: PI control, COOLING: Two-position control HEATING: PI control, COOLING: Sequence control HEATING: Sequence control, COOLING: Two-position control HEATING: Sequence control, COOLING: PI control
Set which operation modes should be used	
Transfer: ETS	

Parameter	Settings
Parameter page: Operating mode - controller	
Dead zone between heating and cooling	±0.25 K ±0.5 K **±0.75 K** ±1.0 K ±1.5 K ±2.0 K ±2.5 K ±3.0 K
This parameter sets the dead zone between heating and cooling. The dead zone is only active in Comfort mode.	
Transfer: ETS	
Parameter page: Operating mode - controller	
This parameter is only visible when: Operating mode = Heating and cooling	
Reduction in Pre-comfort mode heating	1 K **2 K** 3 K 4 K 5 K
This parameter sets the target value by which the room temperature should drop when "Comfort" operation mode is switched to "Pre-comfort" operation mode in Heating mode.	
Transfer: ETS	
Parameter page: Operating mode - controller	
This parameter is only visible when: (Operation mode = Heating or Operating mode = Heating and cooling) and Room operation modes = Comfort /Pre-comfort/Energy-saving/Protected mode	
Reduction in Energy-saving mode heating	1 K 2 K 3 K **4 K** 5 K 6 K
This parameter sets the target value by which the room temperature should drop when "Comfort" operation mode is switched to "Energy-saving" operation mode.	
Transfer: ETS	
Parameter page: Operating mode - controller	
This parameter is only visible when: (Operation mode = Heating or Operating mode = Heating and cooling) and (Room operation modes = Comfort /Pre-comfort/Energy-saving/Protected mode or Room operation modes = Comfort /Energy-saving/Protected mode)	
Increase in Pre-comfort mode cooling	1 K **2 K** 3 K 4 K 5 K
This parameter sets the target value by which the room temperature should increase when "Comfort" operation mode is switched to "Pre-comfort" operation mode in	

Parameter	Settings
Cooling mode.	
Transfer: ETS	
Parameter page: Operating mode - controller	
This parameter is only visible when: (Operation mode = Cooling or Operating mode = Heating and cooling) and Room operation modes = Comfort /Pre-comfort/Energy-saving/Protected mode	
Increase in Energy-saving mode cooling	1 K 2 K 3 K **4 K** 5 K 6 K
This parameter sets the target value by which the room temperature should increase when "Comfort" operation mode is switched to "Energy-saving" operation mode.	
Transfer: ETS	
Parameter page: Operating mode - controller	
This parameter is only visible when: (Operation mode = Cooling or Operating mode = Heating and cooling) and (Room operation modes = Comfort /Pre-comfort/Energy-saving/Protected mode or Room operation modes = Comfort /Energy-saving/Protected mode)	
Target value for frost protection heating	5 °C 6 °C **7 °C** 8 °C 9 °C 10 °C
This parameter is used to set the target value for "Frost protection" operation mode. Frost protection mode (internal only) is activated for example when the "Window open" status is received, and the controller is in Heating mode.	
Transfer: ETS	
Parameter page: Operating mode - controller	
This parameter is only visible when: (Operation mode = Heating or Operating mode = Heating and cooling)	
Target value for Heat protection cooling	30 °C 31 °C 32 °C 33 °C 34 °C **35 °C** 36 °C 37 °C 38 °C 39 °C 40 °C
This parameter is used to set the target value for "Heat protection" operation mode. Heat protection mode (internal only) is activated for example when the "Window open" status is received, and the controller is in Cooling mode.	

Parameter	Settings
Transfer: ETS	
Parameter page: Operating mode - controller	
This parameter is only visible when: (Operation mode = Cooling or Operating mode = Heating and cooling)	
Set Cooling target temperature depending on exterior temperature	No **Yes**
This sets whether the target temperature in cooling mode should track the exterior temperature. If "Yes" is selected, the target temperature tracks the exterior temperature if this exceeds 26°C and is 6 K above the current target temperature. The target temperature in this case then stands at 6 K below the exterior temperature. Should the target value exceed the set high temperature protection value, the target temperature is then set to the value which is defined by the high temperature protection parameter. If the dew point alarm is active, the cooling valve is then completely closed.	
Transfer: ETS	
Parameter page: Operating mode - controller	
This parameter is only visible when: (Operation mode = Cooling or Operating mode = Heating and cooling)	
Limit value for frost alarm	Not applicable 0 °C 0.5 °C 1.0 °C 1.5 °C 2.0 °C 2.5 °C 3.0 °C 3.5 °C 4.0 °C 4.5 °C **5.0 °C**
The controller indicates "Frost alarm" when the temperature set here is reached or undercut.	
Transfer: ETS	
Parameter page: Operation mode controller, operation mode operating unit	
Send cycle time for frost alarm	5 min 6 min 7 min 8 min 9 min **10 min** 12 min 15 min 17 min 20 min 25 min 30 min 40 min 50 min 60 min 90 min 120 min Inactive
The send interval for the frost alarm is displayed here. In addition to automatic transmissions when there is a	

Parameter	Settings
change, the "Frost alarm" object is thus sent on a cyclical basis, for example every 10 minutes. This cyclical transmission only occurs however when an alarm condition is present.	
Transfer: ETS	
Parameter page: Operation mode controller, operation mode operating unit	
Limit value for heat alarm	Not applicable 30 °C 31 °C 32 °C 33 °C 34 °C 35 °C 36 °C 37 °C 38 °C 39 °C **40 °C** 41 °C 42 °C 43 °C 44 °C 45 °C
This parameter allows the temperature to be set at which the controller issues a "Heat alarm".	
Transfer: ETS	
Parameter page: Operation mode controller, operation mode operating unit	
Send cycle time for heat alarm	5 min 6 min 7 min 8 min 9 min **10 min** 12 min 15 min 17 min 20 min 25 min 30 min 40 min 50 min 60 min 90 min 120 min Inactive
The send interval for the heat alarm is set here. In addition to automatic transmissions when there is a change, the "Heat alarm" object is thus sent on a cyclical basis, for example every 10 minutes. This cyclical transmission only occurs however when an alarm condition is present.	
Transfer: ETS	
Parameter page: Operation mode controller, operation mode operating unit	
Cycle time for automatic transmission of actual temperature values	5 min 6 min 7 min 8 min 9 min 10 min 12 min 15 min
	17 min 20 min 25 min 30 min 40 min 50 min 60 min 90 min 120 min **Inactive**
This sets the time interval after which the actual values should be re-sent, in addition to the automatic transmissions in the event of any change.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
Change for automatic transmission of actual temperature values	0.1 K 0.2 K 0.3 K 0.4 K 0.5 K 0.6 K 0.7 K 0.8 K 0.9 K 1.0 K 1.2 K 1.5 K 1.8 K 2.0 K 2.5 K 3.0 K 3.5 K 4.0 K 4.5 K 5.0 K **Inactive**
This sets the amount by which the actual value must change before this is resent automatically. Note: The object is only updated internally every 10 secs.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
Hysteresis for actual temperature value	±0.1 K ±0.3 K **±0.5 K** ±0.7 K
This parameter allows a hysteresis to be set. This prevents minor temperature variations from continuously triggering new actual value transmissions. The parameter refers to the value for the actual temperature value determined after weighting.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
Internal interior temperature sensor, offset from measurement value	+10 K +8.0 K +7.0 K +6.5 K +6.0 K +5.5 K +5.0 K +4.5 K +4.0 K +3.5 K +3.0 K

Parameter	Settings
	+2.5 K +2.0 K +1.5 K +1.2 K +1.0 K +0.8 K +0.6 K +0.5 K +0.4 K +0.3 K +0.2 K +0.1 K **No offset** -0.1 K -0.2 K -0.3 K -0.4 K -0.5 K -0.6 K -0.8 K -1.0 K -1.2 K -1.5 K -2.0 K -3.0 K -3.5 K -4.0 K -4.5 K -5.0 K -5.5 K -6.0 K -6.5 K -7.0 K -8.0 K -10 K
This parameter defines the correction value which is added to the temperature value measured by the internal sensor.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
External interior temperature sensor	**No** Yes
This sets whether the room temperature is also measured in another location in the room. If this object is set to "Yes", the communications objects "Temperature, actual value for internal ext. sensor" and "Temperature, actual value, internal weighted" are added.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
External interior temperature sensor, query cycle time	5 min 6 min 7 min 8 min 9 min 10 min 12 min 15 min 17 min 20 min 25 min 30 min 40 min 50 min 60 min

Parameter	Settings
	90 min 120 min **Inactive**
This sets the time interval within which the additional interior temperature measurement values should be queried.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
This parameter is only visible when: External interior temperature sensor = Yes	
Weighting for external / internal interior temperature sensors	External sensors only 90 % / 10 % 80 % / 20 % 70 % / 30 % 60 % / 40 % 50 % / 50 % 40 % / 60 % 30 % / 70 % 20 % / 80 % 10 % / 90 % **Internal sensors only**
This parameter sets the proportion (weighting) of external and internal sensor measurement values in order to calculate the current actual values. The first value corresponds to the weighting of the external sensor	
Transfer: ETS	
Parameter page: Temperatures, actual value	
This parameter is only visible when: External interior temperature sensor = Yes	
External interior temperature sensor, offset from measurement value	+10 K +8.0 K +7.0 K +6.5 K +6.0 K +5.5 K +5.0 K +4.5 K +4.0 K +3.5 K +3.0 K +2.5 K +2.0 K +1.5 K +1.2 K +1.0 K +0.8 K +0.6 K +0.5 K +0.4 K +0.3 K +0.2 K +0.1 K **No offset** -0.1 K -0.2 K -0.3 K -0.4 K -0.5 K -0.6 K -0.8 K

Parameter	Settings
	-1.0 K -1.2 K -1.5 K -2.0 K -3.0 K -3.5 K -4.0 K -4.5 K -5.0 K -5.5 K -6.0 K -6.5 K -7.0 K -8.0 K -10 K
This parameter defines the correction value which is added to the temperature value measured by the external sensor.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
This parameter is only visible when: External interior temperature sensor = Yes	
External interior temperature sensor, default value	0 – 40 °C (Default: 18°C)
This parameter is used to set the value of the externally measured interior temperature, which is used when no value is received from the relevant communication object.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
This parameter is only visible when: External interior temperature sensor = Yes	
Exterior temperature sensor, offset for measurement value	+10 K +8.0 K +7.0 K +6.5 K +6.0 K +5.5 K +5.0 K +4.5 K +4.0 K +3.5 K +3.0 K +2.5 K +2.0 K +1.5 K +1.2 K +1.0 K +0.8 K +0.6 K +0.5 K +0.4 K +0.3 K +0.2 K +0.1 K **No offset** -0.1 K -0.2 K -0.3 K -0.4 K -0.5 K -0.6 K

Parameter	Settings
	-0.8 K -1.0 K -1.2 K -1.5 K -2.0 K -3.0 K -3.5 K -4.0 K -4.5 K -5.0 K -5.5 K -6.0 K -6.5 K -7.0 K -8.0 K -10 K
This parameter defines the correction value which is added to the temperature value measured by the exterior temperature sensor.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
Exterior temperature sensor, query cycle time	5 min 6 min 7 min 8 min 9 min 10 min 12 min 15 min 17 min 20 min 25 min 30 min 40 min 50 min 60 min 90 min 120 min **Inactive**
This sets the query interval for the exterior temperature sensor.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
Exterior temperature sensor, default value	0 – 40 °C (Default: 18°C)
This parameter is used to set the value of the exterior temperature, which is used when no value is received from the relevant communication object. The exterior temperature sensor is used to automatically adjust the target temperature during cooling.	
Transfer: ETS	
Parameter page: Temperatures, actual value	
Heating hysteresis	±0.1 K ±0.2 K ±0.3 K ±0.4 K **±0.5 K** ±0.6 K ±0.7 K ±1.0 K ±1.2 K ±1.5 K ±1.7 K

Parameter	Settings
	±2.0 K ±2.2 K ±2.5 K
The switching hysteresis for the two-position control for heating mode is set here. The smaller the hysteresis, the more accurate the temperature target value will be, but also the higher the switching frequency of the controller will be.	
Transfer: ETS	
Parameter page: Heating, two-position control	
Double hysteresis for Energy-saving/Protected mode	**No** Yes
It is here possible to set double permitted room temperature variation (hysteresis) in Energy-saving or frost protection mode in order to reduce the switching frequency of - and thus protect - the valves.	
Transfer: ETS	
Parameter page: Heating, two-position control	
Operating direction of the regulating variable	**Normal** Inverted
This parameter sets the format in which the regulating variable is output. When set to "Normal", the regulating variable is output in accordance with the calculated regulating variable. When this is set to "Inverted", the operating direction of the regulating variable is reversed. The setting of this parameter is dependent on the type of valve (open or closed when not unpowered) and/or actuator used.	
Transfer: ETS	
Parameter page: Heating, two-position control	
Heating two-position control cycle time	0.5 min 1 min 2 min 3 min 4 min **5 min** 6 min 7 min 8 min 9 min 10 min 11 min 12 min 13 min 14 min 15 min
The time interval after which the two-position control is re-activated is set here (meaning that the two-position control is only re-activated every 5 minutes, for example). The hysteresis and cycle time influence how much the room temperature can deviate from its target value.	
Transfer: ETS	
Parameter page: Heating, two-position control	
Cooling hysteresis	±0.1 K ±0.2 K ±0.3 K ±0.4 K **±0.5 K** ±0.6 K ±0.7 K ±1.0 K ±1.2 K

Parameter	Settings
	±1.5 K ±1.7 K ±2.0 K ±2.2 K ±2.5 K
The two-position control switching hysteresis for cooling mode is set here. The smaller the hysteresis, the more accurate the temperature target value will be, but also the higher the switching frequency of the controller will be.	
Transfer: ETS	
Parameter page: Cooling, two-position control	
Double hysteresis for Energy-saving/Protected mode	**No** Yes
It is here possible to set double permitted room temperature variation (hysteresis) in energy-saving or heat protection mode in order to increase energy savings.	
Transfer: ETS	
Parameter page: Cooling, two-position control	
Operating direction of the regulating variable	**Normal** Inverted
This parameter sets the format in which the regulating variable is output. When set to "Normal", the regulating variable is output in accordance with the calculated regulating variable. When this is set to "Inverted", the operating direction of the regulating variable is reversed. The setting of this parameter is dependent on the type of valve (open or closed when not unpowered) and/or actuator used.	
Transfer: ETS	
Parameter page: Cooling, two-position control	
Cooling two-position control cycle time	0.5 min 1 min 2 min 3 min 4 min **5 min** 6 min 7 min 8 min 9 min 10 min 11 min 12 min 13 min 14 min 15 min
The time interval after which the two-position control is re-activated is set here (meaning that the two-position control is only re-activated every 5 minutes, for example). The hysteresis and cycle time influence how much the room temperature can deviate from its target value.	
Transfer: ETS	
Parameter page: Cooling, two-position control	
Regulating variable output type for heating and cooling	**Via separate objects** Continuous (8-bit) for common objects Switching (1-bit) for common objects
This parameter allows the output type for regulating	

Parameter	Settings
variables in "Heating and Cooling" operation mode to be set. If "Via separate objects" is set, the settings for heating and cooling are set separately on their respective configuration pages. If "continuous" is selected, the calculated regulating variables are output with a resolution of 8 bits. If "Switching" is selected, the regulating variables are output as "pulse-width modulated" switching commands, and the duty cycle between "On" and "Off" corresponds to the calculated regulating variables.	
Transfer: ETS	
Parameter page: Heating and Cooling, PI control	
Heating regulating variable output type	**Continuous (8-bit)** Switching (1-bit)
This parameter allows the setting of the output type for regulating variables. If "continuous" is selected, the calculated regulating variables are output with a resolution of 8 bits. If "Switching" is selected, the regulating variables are output as "pulse-width modulated" switching commands, and the duty cycle between "On" and "Off" corresponds to the calculated regulating variables.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control	
Proportional range, heating	1.0 K 1.1 K 1.2 K 1.3 K 1.4 K 1.5 K 1.6 K 1.7 K 1.8 K 2.0 K 2.2 K 2.5 K **3.0 K** 3.5 K 4.0 K 4.5 K 5.0 K
This parameter sets the proportional range of the PI controller for heating mode. A proportional range of 3 K means that a control deviation of 3 K results in a regulating variable change of 100%.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control Heating, Sequence control	
Heating reset time	5 min 6 min 7 min 8 min 9 min 10 min 12 min 15 min 17 min 20 min 25 min **30 min** 40 min

Parameter	Settings
	50 min 60 min 90 min 120 min 150 min 180 min 210 min 240 min Inactive
This parameter sets the reset time for the PI controller in heating mode. A reset time of 30 minutes means that during this time, the I portion is equal to the P portion.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control Heating, Sequence control	
Minimum regulating variable, heating	**0 %** 1 % 2 % 3 % 4 % 5 % 7 % 10 % 15 % 20 % 25 % 30 % 35 % 40 % 45 % 50 % 55 % 60 % 65 % 70 % 75 % 80 % 85 % 90 % 95 % 100 %
This parameter allows the setting of a lower limit value for the regulating variable for heating. Internal regulating variables below the value defined here are always output as 0%.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control	
This parameter is only visible when: Heating regulating variable output type = continuous (8-bit) OR Heating and cooling regulating variable output type = continuous (8-bit) on the same object	
Maximum regulating variable, heating	0 % 1 % 2 % 3 % 4 % 5 % 7 % 10 % 15 %

Parameter	Settings
	20 % 25 % 30 % 35 % 40 % 45 % 50 % 55 % 60 % 65 % 70 % 75 % 80 % 85 % 90 % 95 % **100 %**
This parameter allows the setting of an upper limit value for the regulating variable for heating. Internal regulating variables which exceed the value defined here are always output as the value defined here.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control	
This parameter is only visible when: Heating regulating variable output type = continuous (8-bit) OR Heating and cooling regulating variable output type = continuous (8-bit) on the same object	
Operation direction / scaling of heating regulating variables (limited regulating variable times % value/100)	+1% +2% +3% +4% +5% +7% +10% +15% +20% +30% +40% +50% +60% +70% +80% +85% +90% +95% **+100% (normal)** -1% -2% -3% -4% -5% -7% -10% -15% -20% -25% -30% -40% -50% -60%

Parameter	Settings
	-70% -80% -85% -90% -95% -100% (inverted)
This parameter sets the format in which the regulating variable is output. When set to "100% (normal)", the controller assumes that with a regulating variable of +100%, the valve is open. If on the other hand the valve is for example 100% closed, the operating direction of the regulating variable must be reversed (inverted). Reducing the percentage figure will produce compression (scaling) of the regulating variable. The setting depends on the type of valve and/or actuator used.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control	
This parameter is only visible when: Heating regulating variable output type = continuous (8-bit) OR Heating and cooling regulating variable output type = continuous (8-bit) on the same object	
Regulating variable change for autom. sending, heating	1 % 2 % 3 % 4 % **5 %** 7 % 10 % 15 % 20 % 25 % 30 % 35 % 40 % 45 % 50 % 55 % 60 % 65 % 70 % 75 % 80 % 85 % 90 % 95 % 100 %
This parameter is used to define the changes in the regulating variable which result in the automatic transmission of the heating regulating variable.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control	
This parameter is only visible when: Heating regulating variable output type = continuous (8-bit) OR Heating and cooling regulating variable output type = continuous (8-bit) on the same object	
Cycle time for cyclical sending of	Not

Parameter	Settings
heating regulating variables	applicable 5 min 6 min 7 min 8 min 9 min 10 min 12 min **15 min** 17 min 20 min 25 min 30 min 40 min 50 min 60 min 90 min 120 min
This parameter is used to set the cycle time for the automatic transmission of the heating regulating variable.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control	
This parameter is only visible when: Heating regulating variable output type = continuous (8-bit) OR Heating and cooling regulating variable output type = continuous (8-bit) on the same object	
Operating direction of the heating regulating variable	**Normal** Inverted
The operating direction of the regulating variable during heating is set here.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control	
This parameter is only visible when: Heating regulating variable output type = switching (1-bit) Heating and cooling regulating variable output type = switching (1-bit) on the same object	
Always ON for heating	40 % 50 % 60 % 65 % 70 % 75 % 80 % 85 % **90 %** 95 % 98 % 100% of the regulating variable
The percentage of the regulating variables whose output is always set to "ON" is set here. Adjustments to the valve characteristics can be made in order to reduce switching frequency.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control	

Parameter	Settings
This parameter is only visible when: Heating regulating variable output type = switching (1-bit) Heating and cooling regulating variable output type = switching (1-bit) on the same object	
Always OFF until Heating	1 % 3 % 5 % 7 % **10 %** 15 % 20 % 25 % 30 % 35 % 40 % 45 % 50 % of the regulating variable
The percentage of the regulating variables whose output is always set to "OFF" is set here. Adjustments to the valve characteristics can be made in order to reduce switching frequency.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control	
This parameter is only visible when: Heating regulating variable output type = switching (1-bit) Heating and cooling regulating variable output type = switching (1-bit) on the same object	
Periodic duration of the heating pulse width modulation	1 min 2 min 3 min 4 min 5 min 6 min 7 min 8 min 9 min **10 min** 12 min 15 min 20 min 25 min 30 min
This parameter sets the periodic duration for the pulse width modulation of the switching regulating variable output in heating mode. The regulating variable thus corresponds to the duty cycle (temporal relationship) between "ON (1)" and "OFF (0)" within a period. ATTENTION: When working with thermal actuators, it must be ensured that the selected periodic duration is not shorter than the sum of the re-heating and cooling times of the thermal actuator.	
Transfer: ETS	
Parameter page: Heating, PI control Heating and Cooling, PI control	
This parameter is only visible when: Heating regulating variable output type = switching (1-bit) or Heating and cooling regulating variable output type = switching (1-bit) on the same object	

Parameter	Settings
Cooling regulating variable output type	**Continuous (8-bit)** Switching (1-bit)
This parameter allows the setting of the output type for regulating variables. If "continuous" is selected, the calculated regulating variables are output with a resolution of 8 bits. If "Switching" is selected, the regulating variables are output as "pulse-width modulated" switching commands, and the duty cycle between "On" and "Off" corresponds to the calculated regulating variables.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control	
Cooling proportional range	1.0 K 1.1 K 1.2 K 1.3 K 1.4 K 1.5 K 1.6 K 1.7 K 1.8 K 2.0 K 2.2 K 2.5 K **3.0 K** 3.5 K 4.0 K 4.5 K 5.0 K
This parameter sets the proportional range of the PI controller for cooling mode. A proportional range of 3 K means that a control deviation of 3 K results in a regulating variable change of 100%.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control Cooling, sequence control	
Cooling reset time	5 min 6 min 7 min 8 min 9 min 10 min 12 min 15 min 17 min 20 min 25 min **30 min** 40 min 50 min 60 min 90 min 120 min 150 min 180 min 210 min 240 min Inactive
This parameter sets the reset time for the PI controller in cooling mode. A reset time of 30 minutes means that during this time, the I portion is equal to the P portion.	

Parameter	Settings
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control Cooling, sequence control	
Minimum regulating variable, cooling	**0 %** 1 % 2 % 3 % 4 % 5 % 7 % 10 % 15 % 20 % 25 % 30 % 35 % 40 % 45 % 50 % 55 % 60 % 65 % 70 % 75 % 80 % 85 % 90 % 95 % 100 %
This parameter allows the setting of a lower limit value for the regulating variable for cooling. Internal regulating variables below the value defined here are always output as 0%.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control	
This parameter is only visible when: Cooling regulating variable output type = continuous (8-bit) OR Heating and cooling regulating variable output type = continuous (8-bit) on the same object	
Maximum regulating variable, cooling	0 % 1 % 2 % 3 % 4 % 5 % 7 % 10 % 15 % 20 % 25 % 30 % 35 % 40 % 45 % 50 % 55 % 60 % 65 % 70 % 75 %

Parameter	Settings
	80 % 85 % 90 % 95 % **100 %**
This parameter allows the setting of an upper limit value for the regulating variable for cooling. Internal regulating variables which exceed the value defined here are always output as the value defined here.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control	
This parameter is only visible when: Cooling regulating variable output type = continuous (8-bit) OR Heating and cooling regulating variable output type = continuous (8-bit) on the same object	
Operation direction / scaling of cooling regulating variables (limited regulating variable times % value/100)	+1 % +2 % +3 % +4 % +5 % +7 % +10 % +15 % +20 % +30 % +40 % +50 % +60 % +70 % +80 % +85 % +90 % +95 % **+100 % (normal)** -1 % -2 % -3 % -4 % -5 % -7 % -10 % -15 % -20 % -25 % -30 % -40 % -50 % -60 % -70 % -80 % -85 % -90 % -95 % -100 % (inverted)
This parameter sets the format in which the regulating variable is output. When set to "100 % (normal)", the controller assumes that with a regulating variable of +100 %, the valve is open. If on the other hand the valve is for example 100 % closed, the operating direction of the regulating variable must be reversed (inverted). Reducing the percentage figure will produce compression (scaling) of the regulating variable. The setting depends on the type of valve and/or actuator used.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control	
This parameter is only visible when: Cooling regulating variable output type = continuous (8-bit) OR Heating and cooling regulating variable output type = continuous (8-bit) on the same object	
Regulating variable change for autom. sending, cooling	1 % 2 % 3 % 4 % **5 %** 7 % 10 % 15 % 20 % 25 % 30 % 35 % 40 % 45 % 50 % 55 % 60 % 65 % 70 % 75 % 80 % 85 % 90 % 95 % 100 %
This parameter is used to define the changes in the regulating variable which result in the automatic transmission of the cooling regulating variable.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control	
This parameter is only visible when: Cooling regulating variable output type = continuous (8-bit) OR Heating and cooling regulating variable output type = continuous (8-bit) on the same object	
Cycle time for cyclical sending of cooling regulating variables	Not applicable 5 min 6 min 7 min 8 min 9 min 10 min 12 min **15 min** 17 min 20 min 25 min 30 min

Parameter	Settings
	40 min 50 min 60 min 90 min 120 min
This parameter is used to set the cycle time for the automatic transmission of the cooling regulating variable.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control	
This parameter is only visible when: Cooling regulating variable output type = continuous (8-bit) OR Heating and cooling regulating variable output type = continuous (8-bit) on the same object	
Operating direction of the cooling regulating variable	**Normal** Inverted
The operating direction of the regulating variable during cooling is set here.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control	
This parameter is only visible when: Cooling regulating variable output type = switching (1-bit) OR Heating and cooling regulating variable output type = switching (1-bit) on the same object	
Always ON for cooling	40 % 50 % 60 % 65 % 70 % 75 % 80 % 85 % **90 %** 95 % 98 % 100% of the regulating variable
The percentage of the regulating variables whose output is always set to "ON" is set here. Adjustments to the valve characteristics can be made in order to reduce switching frequency.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control	
This parameter is only visible when: Cooling regulating variable output type = switching (1-bit) OR Heating and cooling regulating variable output type = switching (1-bit) on the same object	
Always OFF until Cooling	1 % 3 % 5 % 7 % **10 %** 15 % 20 % 25 % 30 %

Parameter	Settings
	35 % 40 % 45 % 50 % of the regulating variable
The percentage of the regulating variables whose output is always set to "OFF" is set here. Adjustments to the valve characteristics can be made in order to reduce switching frequency.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control	
This parameter is only visible when: Cooling regulating variable output type = switching (1-bit) OR Heating and cooling regulating variable output type = switching (1-bit) on the same object	
Periodic duration of the cooling pulse width modulation	1 min 2 min 3 min 4 min 5 min 6 min 7 min 8 min 9 min **10 min** 12 min 15 min 20 min 25 min 30 min
This parameter sets the periodic duration for the pulse width modulation of the switching regulating variable output in cooling mode. The regulating variable thus corresponds to the duty cycle (temporal relationship) between "ON (1)" and "OFF (0)" within a period. ATTENTION: When working with thermal actuators, it must be ensured that the selected periodic duration is not shorter than the sum of the re-cooling and cooling times of the thermal actuators.	
Transfer: ETS	
Parameter page: Cooling, PI control Heating and Cooling, PI control	
This parameter is only visible when: Cooling regulating variable output type = switching (1-bit) OR Heating and cooling regulating variable output type = switching (1-bit) on the same object	
Heating controller regulating variable value, with which Sequence 2 begins	5 .. 95 % (Default: 50 %)
This parameter is used to define the regulating variable from which the controller output for heating for Sequence 2 should start.	
Transfer: ETS	
Parameter page: Heating, Sequence control	
Heating, sequence 1, regulating variable change for autom. sending	1 % 2 % 3 % 4 % **5 %**

Parameter	Settings
	7 % 10 % 15 % 20 % 25 %
This parameter is used to define the changes in the regulating variable which result in the automatic transmission of the regulating variable for "Heating, Sequence 1 ".	
Transfer: ETS	
Parameter page: Heating, Sequence control	
Heating, sequence 2, regulating variable change for autom. sending	1 % 2 % 3 % 4 % **5 %** 7 % 10 % 15 % 20 % 25 %
This parameter is used to define the changes in the regulating variable which result in the automatic transmission of the regulating variable for "Heating, Sequence 2 ".	
Transfer: ETS	
Parameter page: Heating, Sequence control	
Cooling controller regulating variable value, Cooling, with which Sequence 2 begins	5 .. 95 % (Default: 50 %)
This parameter is used to define the regulating variable from which the controller output for cooling for Sequence 2 should start.	
Transfer: ETS	
Parameter page: Cooling, sequence control	
Cooling, sequence 1, regulating variable change for autom. sending	1 % 2 % 3 % 4 % **5 %** 7 % 10 % 15 % 20 % 25 %
This parameter is used to define the changes in the regulating variable which result in the automatic transmission of the regulating variable for "Cooling, Sequence 1 ".	
Transfer: ETS	
Parameter page: Cooling, sequence control	
Cooling, sequence 2, regulating variable change for autom. sending	1 % 2 % 3 % 4 % **5 %** 7 % 10 % 15 % 20 % 25 %
This parameter is used to define the changes in the regulating variable which result in the automatic transmission of the regulating variable for "Cooling, Sequence 2 ".	
Transfer: ETS	
Parameter page: Cooling, sequence control	
Fan available	**No** Yes
This parameter defines whether the fan is connected.	
Transfer: ETS	
Parameter page: Ventilation	
Automatic fan control for	Heating Cooling **Heating and cooling**
This parameter sets the controller operation modes in which automatic fan control is active.	
Transfer: ETS	
Parameter page: Ventilation	
This parameter is only visible when: Fan available = Yes and (Operating mode = HEATING & COOLING: PI control or Operating mode = HEATING & COOLING: Sequence control or Operating mode = HEATING: PI control, COOLING: Sequence control or Operating mode = HEATING: Sequence control, COOLING: PI control)	
Fan manually operable	No **Yes**
This parameter can be used to enable manual settings for fan levels. When enabled, the denro ONE can be manually switched to Automatic, OFF, 1, 2 or 3.	
Transfer: ETS	
Parameter page: Ventilation	
This parameter is only visible when: Fan available = Yes	
Number of fan levels	1 2 **3**
This parameter sets how many fan levels can be selected. If this number is less than 3, correspondingly fewer parameters are displayed as a result.	
Transfer: ETS	
Parameter page: Ventilation	
This parameter is only visible when: Fan available = Yes	
If fan =OFF, start at level	**1** 2 3
This parameter sets the fan level at which a previously switched off fan will briefly be switched on (for 2 secs) so that it will run safely when switched to level 1. There is always a pause of 0.5 secs when switching from one fan level to another.	
Transfer: ETS	
Parameter page: Ventilation	
This parameter is only visible when: Fan available = Yes	
Fan revolutions at Level 1	1 .. 100 %

Parameter	Settings
	(Default: 33)
This parameter sets the desired relative revolutions of the fan at level 1. At a setting of 100% a value of 255 is transmitted by the bus.	
Transfer: ETS	
Parameter page: Ventilation	
This parameter is only visible when: Fan available = Yes	
Fan revolutions at Level 2	1 .. 100 % (Default: 67)
This parameter sets the desired relative revolutions of the fan at level 2. At a setting of 100% a value of 255 is transmitted by the bus.	
Transfer: ETS	
Parameter page: Ventilation	
This parameter is only visible when: Fan available = Yes and (Number of fan levels = 2 or Number of fan levels = 3)	
Fan revolutions at Level 3	1 .. 100 % (Default: 100)
This parameter sets the desired relative revolutions of the fan at level 2. At a setting of 100% a value of 255 is transmitted by the bus.	
Transfer: ETS	
Parameter page: Ventilation	
This parameter is only visible when: Fan available = Yes and Number of fan levels = 3	
Fan level holding time	**Inactive** 1 min 2 min 5 min
So that valve setting changes within the areas around the switching thresholds of the fan levels do not constantly change the fan speed, this parameter can be used to define the minimum retention time for the particular fan level. This is only applicable to automatic switching via the controller by means of the valve setting.	
Transfer: ETS	
Parameter page: Ventilation	
This parameter is only visible when: Fan available = Yes	
Display fan level via speed	**No** Yes
This parameter sets whether the displayed current fan level should be re-calculated for display in revolutions. When "Yes", the value which is received from the object "Fan speed status" is used for the calculation. When "No", the object "Fan level <1..3> status" is displayed directly.	
Transfer: ETS	
Parameter page: Ventilation	
This parameter is only visible when: Fan available = Yes	

Parameter	Settings
Invert fan operation mode value	**No** Yes
This parameter can be used to invert the meanings of the "0" and "1" values for the receipt and sending of the fan operation mode. If "No", "1" = Automatic mode, "0" = Manual mode. If "Yes", "1" = Manual mode, "0" = Automatic mode.	
Transfer: ETS	
Parameter page: Ventilation	
This parameter is only visible when: Fan available = Yes	

3.7.15 Communications objects

Obj.	Object name	Function	Type	Flags
116	Exterior temperature sensor	Receive	2 byte DPT_ Value_ Temp	KSÜ A
This communications object receives the exterior temperature from an external sensor. During a power recovery, this communications object sends a read request. When no answer is received, a configurable default value is used.				
117	Temperature, actual value of internal sensor	Send	2 byte DPT_ Value_ Temp	KLÜ
This object is used to send the values measured and corrected by the internal temperature sensor (in °C). This value can also be sent automatically if the temperature changes by a configurable value. The temperature can also be queried.				
118	Temperature, actual value of interior external sensor sensors	Receive	2 byte DPT_ Value_ Temp	KSÜ A
This object receives the current actual temperature value from the external interior temperature sensors (in °C). Cyclical read messages can be sent via this object to the external temperature sensor, so that this then sends back its current value. During a power recovery, this communications object sends a read request. When no answer is received, a configurable default value is used.				
This object is only available when: External interior temperature sensor = Yes				
119	Temperature, actual value, weighted interior	Send	2 byte DPT_ Value_ Temp	KLÜ
This object contains the current actual temperature value for the controller. This value is calculated from the measured values of the corrected internal and external interior temperature sensors with due consideration to the configured weighting, and automatically transmitted upon a configurable change.				
This object is only available when:				

Obj.	Object name	Function	Type	Flags
External interior temperature sensor = Yes				
120	Basic target value	Receive	2 byte DPT_ Value_ Temp	KLS ÜA
This object can read and change the basic target value (in °C) by means of a bus message. This value corresponds to the target value in Comfort mode when the target value shift = 0. If a value beyond the 16-26°C range is received, the value is set to the relevant minimum or maximum value. During a power recovery, this communications object sends a read request. When no answer is received, a configurable default value is used.				
This object is only available when: Basic target value object visible = Yes				
121	Target value shift	Send	2 byte DPT_ Value_ Tempd	KLÜ
This object transmits any change in the target value shift (in Kelvin).				
122	Temperature, target value	Send	2 byte DPT_ Value_ Temp	KLÜ
This object contains the current room temperature target value (in °C), which is calculated taking into account the basic target value, operation mode and shift.				
123	Automatic mode	Receive/Send : On/Off	1 bit	KLS ÜA
This object can be used to switch on Automatic mode via the bus. Upon receipt, only "1" messages are evaluated, while "0" messages are discarded. The status is also sent via this object (0: Manual mode, 1: Automatic mode)				
124	Comfort mode	Receive/Send : On/Off	1 bit	KLS ÜA
When the parameter "Automatic mode via" is set to "Bus message", "Comfort" room operation mode can be switched on via the bus. Upon receipt, both "1" and "0" messages are evaluated. Upon receipt of a "0", if an appropriate order is not received within 3 seconds, this switches to Energy-saving mode - or if this is not available, to Protected mode. Notification is also issued via this object when there is a change in the Comfort mode status (such as by the internal timer programme or manually).				
125	Pre-comfort mode	Receive/Send : On/Off	1 bit	KLS ÜA
When the parameter "Automatic mode via" is set to "Bus message", "Pre-comfort" operation mode (Standby mode) can be switched on via the bus. Upon receipt of a "0", if an appropriate order is not received within 3 seconds, this switches to Energy-saving mode - or if this is not available, to Protected mode. Notification is also issued via this object when there is a change in the Pre-comfort mode status (such as by the internal timer programme or manually).				
This object is only available when:				

Obj.	Object name	Function	Type	Flags
The controller can activate 4 room operation modes				
126	Energy-saving mode	Receive/Send : On/Off	1 bit	KLS ÜA
When the parameter "Automatic mode via" is set to "Bus message", "Energy-saving" operation mode (Night mode) can be switched on via the bus. Upon receipt of a "0", if an appropriate order is not received within 3 seconds, Energy-saving mode remains active. Notification is also issued via this object when there is a change in the Energy-saving mode status (such as by the internal timer programme or manually).				
This object is only available when: The controller can activate 3 or 4 room operation modes				
127	Protected mode	Receive/Send : On/Off	1 bit	KLS ÜA
When the parameter "Automatic mode via" is set to "Bus message", "Protected" operation mode (frost/heat protection) can be switched on via the bus. Upon receipt of a "0", if an appropriate order is not received within 3 seconds, this switches to Energy-saving mode (if this is available - otherwise, it remains in Protected mode). Notification is also issued via this object when there is a change in the Protected mode status (such as by the internal timer programme or manually).				
128	Permanent protected mode	Receiving: On/Off	1 bit	KLS ÜA
This object can be used to switch the controller continuously to "Protected" operation mode (frost/heat protection) (such as during extended holiday absence). This cannot then be switched to another operation mode by any other operation mode object in a timer programme, a timer, a presence detector or manually. When "Permanent protected mode" is switched off, the controller switches automatically to the following operation mode: - In Manual mode, to "Energy-saving mode" if available otherwise to Protected mode - In Automatic mode, to the current active mode (via bus message or internal timer programme) The received value is permanently stored in memory, so that it is still available after a power recovery.				
This object is only available when: Permanent protected mode object visible = Yes				
129	Controller	Receiving: On/Off	1 bit	KLSA
This object can be used to switch the controller on and off. If the controller is set to "Heating and Cooling", both controllers are switched on or off together. When the controller is switched OFF, the regulating variables for Heating and Cooling are set to "0". The value "0" is sent once after the controller has been switched off.				
This object is only available when: Unit function = controller + operating unit				
130	Heating / cooling	1 = Heating / 0 = Cooling	1 bit	KLS ÜA
This object indicates whether the controller is in Heating mode or in Cooling mode. This is sent automatically following				

Obj.	Object name	Function	Type	Flags
any change in status. In 2-wire systems, the controller can be switched between Heating and Cooling mode using this object.				
131	Frost alarm	Send: On/Off	1 bit	KLÜ
If the measured temperature drops below the set frost alarm limit value, "Frost alarm = ON“ is sent automatically.				
132	Heat alarm	Send: On/Off	1 bit	KLÜ
If the measured temperature climbs above the set heat alarm limit value, "Heat alarm = ON“ is sent automatically.				
133	Dew point alarm	Receiving: On/Off	1 bit	KSA
This object can be used to receive a dew point alarm sent by the dew point monitor in Cooling mode and show this on the display. A received dew point alarm causes the controller to switch to "Dew point mode" and leads to the closure of the cooling valve for as long as the dew point alarm exists. This object is only evaluated if the controller is in Cooling mode.				
134	Window 1	Receive	1 bit	KSÜA
This object is used to receive the status of Window 1. If the object value = "1" (Window open), the room temperature controller switches internally to "Protected mode" and remains in this operation mode so long as any window object has an object value = "1". The behaviour of this object can be inverted using a parameter. During a power recovery, this communications object sends a read request.				
135	Window 2	Receive	1 bit	KSÜA
This object is used to receive the status of Window 2. If the object value = "1" (Window open), the room temperature controller switches internally to "Protected mode" and remains in this operation mode so long as any window object has an object value = "1". The behaviour of this object can be inverted using a parameter. During a power recovery, this communications object sends a read request.				
136	Window 3	Receive	1 bit	KSÜA
This object is used to receive the status of Window 3. If the object value = "1" (Window open), the room temperature controller switches internally to "Protected mode" and remains in this operation mode so long as any window object has an object value = "1". The behaviour of this object can be inverted using a parameter. During a power recovery, this communications object sends a read request.				
137	Window 4	Receive	1 bit	KSÜA
This object is used to receive the status of Window 4. If the object value = "1" (Window open), the room temperature controller switches internally to "Protected mode" and remains in this operation mode so long as any window object has an object value = "1".				

Obj.	Object name	Function	Type	Flags
The behaviour of this object can be inverted using a parameter. During a power recovery, this communications object sends a read request.				
138	Presence	Receive On/Off	1 bit	KSÜA
The controller contains an optional object for "Presence" status for use in rooms with a presence detector. Its messages are evaluated when switching room operation mode (see Chapter 3.7.7.10). During a power recovery, this communications object sends a read request.				
This object is only available when: Object presence visible = Yes				
139	Comfort extension status	Send: On/Off	1 bit	KLÜ
This object is used by the controller for notification that "Comfort extension" operation mode has been switched on or off.				
This object is only available when: Object presence visible = No and Comfort extension object status = Yes				
140	Room operation type	Receiving: 0..4	1 byte	KSÜA
This object switches the room operation mode dependent on the received value. The following assignments apply: 0 = Automatic mode 1 = Comfort mode 2 = Pre-comfort mode 3 = Energy-saving mode 4 = Protected mode. If a value other than 0-4, or an operation mode which is not available on the controller is received, the message is dismissed as defective. When the parameter "Automatic mode via" is set to "Internal timer programme", only the value "0" is evaluated - other values are ignored. If a 0 is received when the parameter "Automatic mode via" is set to "Bus message", the room operation mode is set to the operation mode last received by the 8-bit or 1-bit object. During a power recovery, this communications object sends a read request.				
This object is only available when: 8-bit room operation mode objects / Room operation mode status = Yes				
141	Room operation type status	Send: 0..4	1 byte	KLÜ
This object reports the current operation mode after switching room operation mode. Where "Controller + Operating unit" is applicable, the following assignments apply to the transferred values: 1 = Comfort mode 2 = Pre-comfort mode 3 = Energy-saving mode 4 = Protected mode. 0 (= Automatic mode) never occurs in this case, as an operation mode which differs from "0" always applies.				

Obj.	Object name	Function	Type	Flags
Where "Operating unit" is applicable with an internal timer programme, the following assignments apply to the transferred values: 1 = Comfort mode 2 = Pre-comfort mode 3 = Energy-saving mode 4 = Protected mode. Where "Operating unit" is applicable with an external timer programme, the following assignments apply to the transferred values: 0 = Automatic mode (ext. timer switching programme) 1 = Comfort mode 2 = Pre-comfort mode 3 = Energy-saving mode 4 = Protected mode. Here, values <> 0 indicate Manual mode.				
This object is only available when: 8-bit room operation mode objects / Room operation mode status = Yes				
142	Controller status (Eberle)	Send	1 byte	KLÜ
This object contains the current controller status, and is automatically sent upon any change in status. The individual bits have the following meaning: Bit 0: 1 =Comfort mode On Bit 1: 1 = Pre-comfort mode On Bit 2: 1 =Energy-saving mode On Bit 3: 1 =Protected mode On Bit 4: 1 = Dew point alarm Bit 5: 1 = Heating mode, 0 = Cooling mode Bit 6: 1 = Controller on, 0 = Controller off Bit 7: 1 = Frost/heat alarm (depending on the value of bit 5)				
This object is only available when: 8-bit object controller status (Eberle) = Yes				
143	Controller status (RHCC)	Send: 16-bit status	2 byte	KLÜ
This contains the current controller status, and is automatically sent upon any change in status. This supports the following bits: *Fault* (Bit 0), *HeatCoolMode* (Bit 8), *DewPointStatus* (Bit 12), *FrostAlarm* (Bit13) and *OverheatAlarm* (Bit 14). The other bits (1..7, 9..11 and 15) are all set to 0. Meaning of the individual bits: *See description in KNX manual, DPT 22.101.*				
This object is only available when: 16-bit object controller status (RHCC) = Yes				
144	Heating / Cooling, regulating variable switching	Send: On/Off	1 bit	KLÜ
In Heating as well as in Cooling mode, this object sends the regulating variable as an ON/OFF switching command.				
This object is only available when: Unit function = controller + operating unit and ((Heating = using a two-position control and Cooling = using a two-position control) or (Heating = using PI control and Cooling = using PI control and Heating and cooling regulating variable output type = switching (1-bit) on the same object))				
145	Heating / Cooling, regulating variable continuous	Send: 0..100 %	1 byte DPT_ Scaling	KLÜ
In Heating as well as in Cooling mode, this object sends the regulating variable as a percentage.				
This object is only available when: Unit function = controller + operating unit and Heating = using PI control and Cooling = using PI control and Heating and cooling regulating variable output type = continuous (8-bit) on the same object				
146	Heating, regulating variable switching	Send: On/Off	1 bit	KLÜ
In Heating mode, this object sends the regulating variable as an ON/OFF switching command.				
This object is only available when: Unit function = controller + operating unit and (Heating = using a two-position control or (Heating = using PI control and Regulating variable output type for heating and cooling = via separate objects and Heating regulating variable output type = switching (1-bit))				
147	Heating, regulating variable continuous	Send: 0..100 %	1 byte DPT_ Scaling	KLÜ
In Heating mode with PI control, this object sends the regulating variable as a percentage value, while for PI control with sequence control, it sends the controller's "internal" regulating value.				
This object is only available when: Unit function = controller + operating unit and (Heating = using PI control or Heating = using PI control and sequence control) and				

Obj.	Object name	Function	Type	Flags
Regulating variable output type for heating and cooling = via separate objects and Heating regulating variable output type = continuous (8-bit)				
148	Heating, regulating variable Sequence 1	Send: 0..100 %	1 byte DPT_ Scaling	KL Ü
In Heating mode with sequence control, the regulating variable of the first sequence is sent as a percentage value via this object.				
This object is only available when: Unit function = controller + operating unit and Heating = using PI control and sequence control				
149	Heating, regulating variable Sequence 2	Send: 0..100 %	1 byte DPT_ Scaling	KL Ü
In Heating mode with sequence control, the regulating variable of the second sequence is sent as a percentage value via this object.				
This object is only available when: Unit function = controller + operating unit and Heating = using PI control and sequence control				
150	Cooling, regulating variable switching	Send: On/Off	1 bit	KLÜ
In Cooling mode, this object sends the regulating variable as an ON/OFF switching command.				
This object is only available when: Unit function = controller + operating unit and (Cooling = using a two-position control or (Cooling = using PI control and Regulating variable output type for heating and cooling = via separate objects and Cooling regulating variable output type = switching (1-bit)))				
151	Cooling, regulating variable continuous	Send: 0..100 %	1 byte DPT_ Scaling	KL Ü
In Cooling mode with PI control, this object sends the regulating variable as a percentage value, while for PI control with sequence control, it sends the controller's "internal" regulating value.				
This object is only available when: Unit function = controller + operating unit and (Cooling = using PI control or Cooling = using PI control and sequence control) and Regulating variable output type for heating and cooling =				

Obj.	Object name	Function	Type	Flags
via separate objects and Cooling regulating variable output type = continuous (8-bit)				
152	Cooling, regulating variable Sequence 1	Send: 0..100 %	1 byte DPT_ Scaling	KL Ü
In Cooling mode with sequence control, the regulating variable of the first sequence is sent as a percentage value via this object.				
This object is only available when: Unit function = controller + operating unit and Cooling = using PI control and sequence control				
153	Cooling, regulating variable Sequence 2	Send: 0..100 %	1 byte DPT_ Scaling	KL Ü
In Cooling mode with sequence control, the regulating variable of the second sequence is sent as a percentage value via this object.				
This object is only available when: Unit function = controller + operating unit and Cooling = using PI control and sequence control				
154	Fan operation mode	Send	1 bit	KLÜ
This object sends the set fan operation mode. Depending on the setting of the "Invert fan operation mode value" parameter, the following applies: No: Value "0" = Fan manual mode, Value "1" = Fan automatic mode Yes: Value "1" = Fan manual mode, Value "0" = Fan automatic mode				
This object is only available when: Fan available = Yes				
155	Fan operation mode status	Receive	1 bit	KSA
This object receives the fan operation mode status and displays this. Depending on the setting of the "Invert fan operation mode value" parameter, the following applies: No: Value "0" = Fan manual mode, Value "1" = Fan automatic mode Yes: Value "1" = Fan manual mode, Value "0" = Fan automatic mode				
This object is only available when: Fan available = Yes				
156	Fan level	Send: 0..100 %	1 byte DPT_ Scaling	KLÜ
This object sends the current fan revolutions after any change in fan level, in Automatic as well as Manual mode. This object can therefore if required be used to control a fan by adjusting its speed within a 0-100% range. The assigned fan level speed value set in the "Fan" parameter window determines the fan level icon which is shown in the display.				

Obj.	Object name	Function	Type	Flags
This object is only available when: Fan available = Yes				
157	Fan revolution status	Receiving: 0..100 %	1 byte DPT_ Scaling	KSA
This object is used to receive the fan's current revolutions.				
This object is only available when: Fan available = Yes				
158	Fan level 1	Send: On/Off	1 bit	KLÜ
This object sends the order to switch fan level 1 on or off.				
This object is only available when: Fan available = Yes				
159	Fan level 2	Send: On/Off	1 bit	KLÜ
This object sends the order to switch fan level 2 on or off.				
This object is only available when: Fan available = Yes and (Number of fan levels = 2 or Number of fan levels = 3)				
160	Fan level 3	Send: On/Off	1 bit	KLÜ
This object sends the order to switch fan level 3 on or off.				
This object is only available when: Fan available = Yes and Number of fan levels = 3				
161	Status - Fan level 1	Receiving: On/Off	1 bit	KSA
This object receives the status of Fan level 1 and displays this. If the status is set of several objects 161-163 is set, the respective highest fan level value is displayed.				
This object is only available when: Fan available = Yes				
162	Status - Fan level 2	Receiving: On/Off	1 bit	KSA
This object receives the status of Fan level 2 and displays this. If the status is set of several objects 161-163 is set, the respective highest fan level value is displayed.				
This object is only available when: Fan available = Yes and (Number of fan levels = 2 or Number of fan levels = 3)				
163	Status - Fan level 3	Receiving: On/Off	1 bit	KSA
This object receives the status of Fan level 3 and displays this. If the status is set of several objects 161-163 is set, the respective highest fan level value is displayed. This object is only available when: Fan available = Yes and Number of fan levels = 3				

3.8 Timer programme

3.8.1 Functional overview

The scheduler enables the setting of programmes for the different categories - Heating, Scenarios and individual channels. Programmes for different days of the week can in this way be defined.

3.8.2 Configuration

Timer programmes are set in denro ONE Manager (see Chapter 4.8.6).

3.8.3 Communications objects

The timer switching programme for scenarios and individual channels can be activated/de-activated using the following communications objects:

Obj.	Object name	Function	Type	Flags
186	Timer programme, scenarios	Receiving: Activate	1 bit	KSLA
This object receives a 1-bit command to activate ("1") or de-activate ("0") the internal scenario timer programme. If de-activated, all scenario switching programmes are inactive. The received value is permanently stored in memory, so that it is still available after a power recovery.				
187	Timer programme, individual channels	Receiving: Activate	1 bit	KSLA
This object receives a 1-bit command to activate ("1") or de-activate ("0") the internal timer programme for individual channels. If de-activated, all channel switching programmes are inactive. The received value is permanently stored in memory, so that it is still available after a power recovery.				

3.9 Channel-specific functions

Denro ONE has 18 channels to which different functions can be assigned. The options are:

- Switching
- Dimming
- Blind control
- Shutter control
- Send values
- Positive guidance
- Alarms/messages
- Scenario control

Different communications objects are enabled depending on the channel type. The associated communications objects are explained in the descriptions of the individual functions.

3.9.1 Configuration

The channel types are configured using parameters.
The following parameters refer to channels 1-18:

Parameter	Settings
Channel type	**Unused** Switching Dimming Blinds Shutters Send values Positive guidance Alarms/messages Scenario control
This parameter is used to set the channel type and channel activation.	
Transfer: ETS/SD card	
Parameter page: Channel	

3.10 Switching channel function

3.10.1 Functional overview

The switching function is used to send 1-bit objects for a wide variety of functions, such as switching lights, sockets on and off, etc. The correct configuration also enables the following conditions to be triggered:

- Switch ON only
- Switch OFF only
- Switch TO
- Ring function variation 1: Press = 1, Release = 0,
- Ring function variation 2: Press = 0, Release = 1

The status display can be de-activated by configuration. The associated status object is always visible, as this is also used to compare the internal status for switching TO. The status display is solely controlled by the status object. Thus, if no status object is linked, there is no change in the status display.

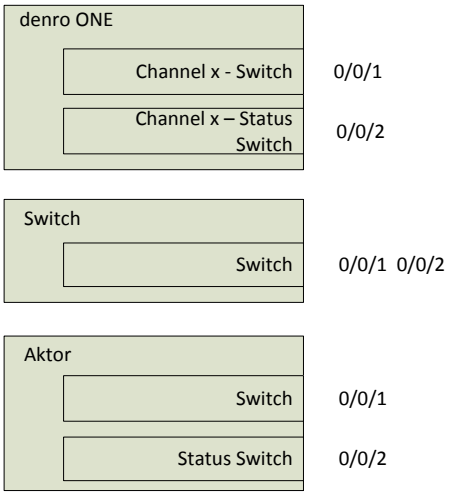
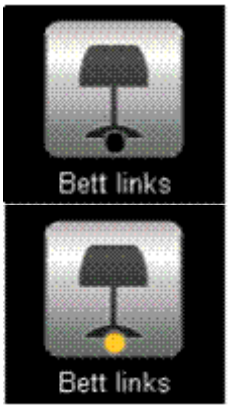


Figure 34: Sample connection of group addresses for "Switching"-type channel

Function: Switching ON/OFF



- Function: Switching ON/OFF
-Status Light is switched off

-Action: The operator has pressed a button on the display; the light is switched on

-Status Light is switched on (indicated by a change in colour of the dot)

3.10.2 Configuration

Configuration is achieved using parameters.
The following parameters refer to channels 1-18:

Parameter	Settings
Switch type	Off On **To** Ringing: On when pressed, Off when released Ringing: Off when pressed, On when released
This parameter is used to set the switch type.	
Transfer: SD card	
Parameter page: Channel	
Status display visible	**Yes** No
This parameter is used to define whether a switching status is displayed onscreen.	
Transfer: SD card	
Parameter page: Channel	

3.10.3 Communications objects

The following communications objects refer to channels 1-18:

Obj.	Object name	Function	Type	Flags
0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102	<Channel name> - Switch	Send: On/Off	1 bit	KÜ
This object sends a 1-bit switching message when a button is operated.				
1,7, 13, 19, 25, 31, 37, 43, 49, 55, 61, 67, 73, 79, 85, 91, 97, 103	<Channel name> - Switch status	Receiving: On/Off	1 bit	KSÜA
The status is displayed depending on the value received for this object. The values are also used to synchronise internal status when switching. During a power recovery, this communications object sends a read request.				

3.11 Dimming light control channel function

3.11.1 Functional overview

The configured buttons on the display show the function for the relevant light.

The Dimming function is activated by selecting the relevant button. This is indicated by border colour 1. Finally, an ON or OFF command is sent by pressing the press-button on the rotating knob. Rotating the rotating knob sets the brightness. Here, a slow rotation adjusts the dimming value by one bit (approx. 0.4 percentage points) per notch – rapid rotation results in a higher change in value.

The dimmer is normally switched ON and OFF by means of the 1-bit object. The condition of the dimmer when it is switched on (e.g., 100% or the last dimming value) must then be configured on the dimmer. The 1-bit switching message is linked to the press of the rotating knob.

Switching on and off can also be achieved using an 8-bit object. In this case, however, the dimmer must be suitably configured. The 8-bit dimming value message is linked to the rotation of the rotating knob.

At its minimum dimming value, the bar becomes circular in form.
In order to ensure correct functionality, all communications objects (including status objects in particular) for the dimming channel must be linked in. Functionality may otherwise be impaired.

The status display displays the dimmer target value during actuation for a certain time (up to 5 seconds after the last operation). Only after this time has elapsed is the dimmer value status sent by the dimmer applied and the status display updated to the current dimmer value. This means that the status display indicates the target value for a certain time, but then displays the current actual value of the dimmer after actuation. This function prevents jumps in the dimmer value and the status display.

If the status objects are not correctly linked, the denro ONE will be unable to track the internally-held status correctly, which will cause the following behaviour if there is another participant in the bus switching operations:

- Switching processes on the denro ONE may require dual operation
- Dimming processes on the denro ONE are based on the last dimmer value set by the denro ONE

Function: Light dimming

- Function: Light dimming

-Status Dimming by 60%

- The circular line with the 2 arrows indicates the rotating knob function.

-Action: The operator has pressed a button on the display; The focus is on the dimmer channel; rotating the rotating knob can set the brightness, or pressing this switches the lights OFF.

-Status Status 60%

3.11.2 Configuration

Dimmer channels require no further configuration.

3.11.3 Communications objects

The following communications objects refer to channels 1-18:

Obj.	Object name	Function	Type	Flags
0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102	<Channel name> - Switch	Send: On/Off	1 bit	KÜ
These objects send 1-bit switching messages when a button is operated.				
1, 7, 13, 19, 25, 31, 37,	<Channel name> - Switch	Receiving: On/Off	1 bit	KSÜA

Obj.	Object name	Function	Type	Flags
43, 49, 55, 61, 67, 73, 79, 85, 91, 97, 103	status			
The internal status is adjusted and displayed depending on the value received for this object. During a power recovery, this communications object sends a read request.				
2, 8, 14, 20, 26, 32, 38, 44, 50, 56, 62, 68, 74, 80, 86, 92, 98, 104	<Channel name> - Dimmer value	Send: Value	1 byte DPT_ Scaling	KÜ
This objects sends 8-bit values stepwise modified by the rotating knob.				
3, 9, 15, 21, 27, 33, 39, 45, 51, 57, 63, 69, 75, 81, 87, 93, 99, 105	<Channel name> - Dimmer value status	Receiving: Value	1 byte DPT_ Scaling	KSÜA
The values received by this object are displayed as feedback values by the length of the bar. During a power recovery, this communications object sends a read request.				

The settings are made using the denro ONE Manager ETS plug-in.

3.12 Switches with positive guidance channel function

3.12.1 Functional overview

Actuators with positive guidance access allow an override of certain actuator outputs by central control interventions. In this way, the switching on of certain lights or loads can be forcibly prevented in Energy-saving or Night mode.
The "Switching with positive guidance" function makes it possible to switch an object and thus activate positive guidance or to de-activate an activated positive guidance (without switching).

The following surface commands and buttons are available for positive guidance:

- Activate positive guidance and switch status "ON" (Send "11")
- Activate positive guidance and switch status "OFF" (Send "10")
- De-activate positive guidance (Send "00")

Briefly pressing a button on the touch screen sends the relevant command immediately.

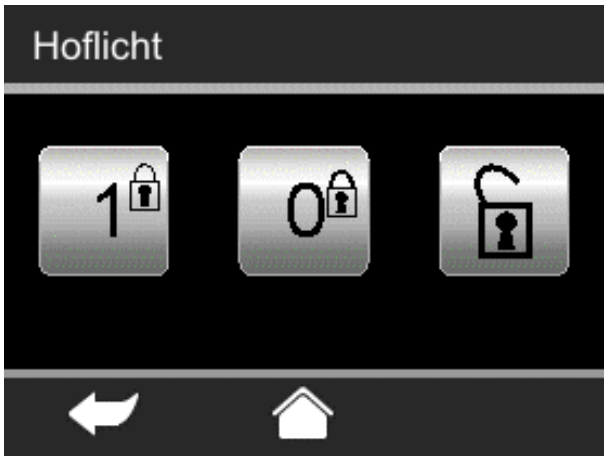


Figure 35: Display for positive guidance

3.12.2 Configuration

Positive guidance requires no further configuration.

3.12.3 Communications objects

The following communications objects refer to channels 1-18:

Obj.	Object name	Function	Type	Flags
0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102	<Channel name> - Positive guidance	Send	2 bit	KÜ
These objects are used to send the positive guidance control messages for the respective channel.				

3.13 Blind, shutter, sliding shutter channel function

3.13.1 Functional overview

The "Blind" channel type and the associated operation page provide direct access to all of the required buttons for the operation of a blind. It is thus possible to lower or raise the sunshade at the press of a button, as well as to stop its progress by pressing the STOP button. For technical reasons, a further press of the Stop button will move the leaves of the blind by a single step.
A STOP command always sends a "0". The motion of the blind can be stopped at any time by pressing the STOP button.

Besides 1-bit communications objects, the blind and shutter channel types can also use 8-bit values. These 8-bit communications objects can be used in scenarios

for the direct positioning of sunshades/roller blinds and slats.

ATTENTION: Most blind actuators differentiate between manual and manual/automatic operation. In Manual/Automatic operation mode, it is possible to switch between manual and automatic mode by means of the communications object. The 8-bit communications objects for positioning can only be used by the actuators in manual operation mode, or in Manual /Automatic operation mode in "Automatic" mode (see Figure 36)

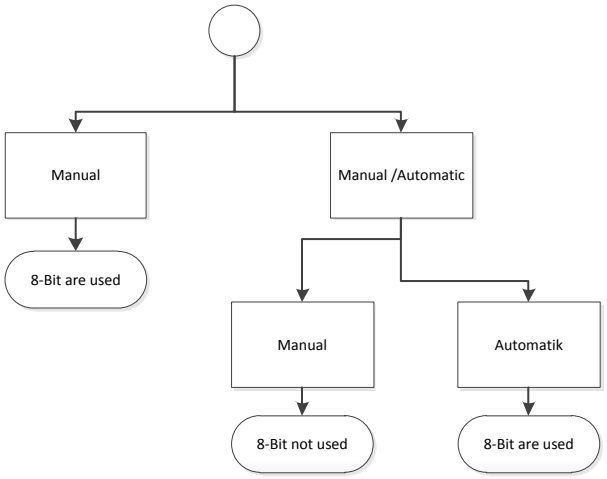


Figure 36: Blind control operation modes

It is theoretically possible to use these 8-bit values in scenarios, if the actuator is generally set to "Automatic". This must be checked on an application by application basis. It is therefore recommended that actuators with integrated scenario functions be used for blind and shutter control in scenarios. These can be controlled via the 8-bit scenario object. Also see Chapter 3.15 for further information.

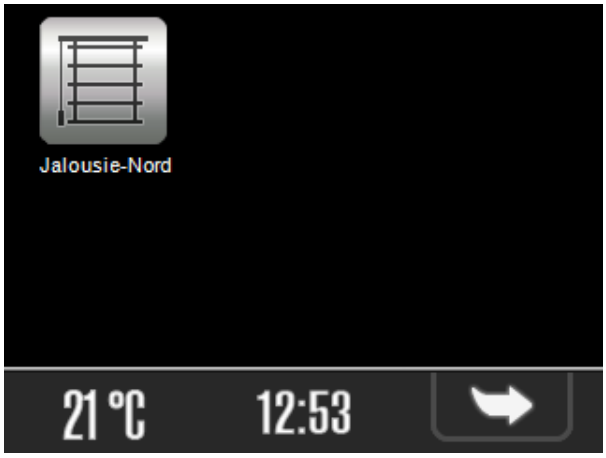


Figure 37: Button for calling up the operation page for a blind

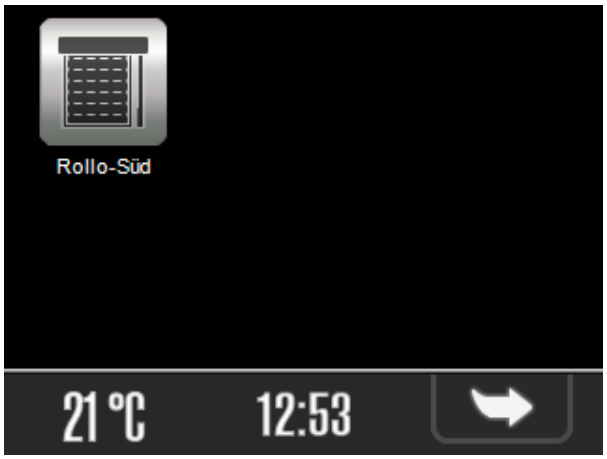


Figure 38: Button for calling up the operation page for a roller blind

Pressing the button takes the user to the relevant operation page. The individual functions can then be operated here.

Two different operation page versions (blinds / shutters) are also available, which are configured in denro ONE Manager.

3.13.2 Blinds

In Version 1 (blind without status objects), the following blind functions are available.

- Sunshade up (function start via touch screen)
- Sunshade down (function start via touch screen)
- Stop (function start via touch screen)
- Slat position (via rotating knob, clicking sends a 1-bit value immediately, the rotating knob remains active – regardless of the active button)

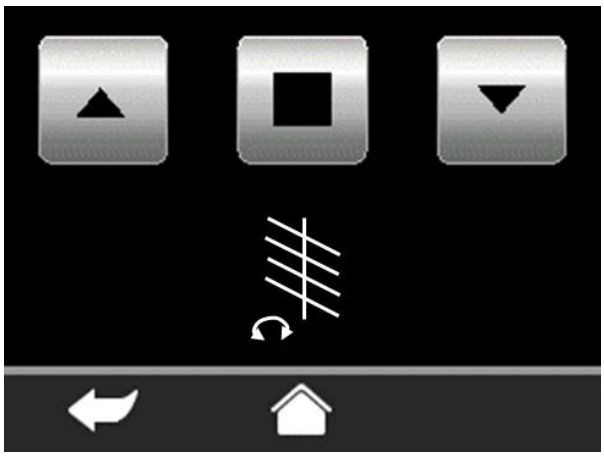


Figure 39: Operation page - blind without status display

In Version 2 (blind with status objects), the following blind functions are available.

- Sunshade up (function start via touch screen)

- Sunshade down (function start via touch screen)
- Stop (function start via touch screen)
- Slat position (via rotating knob, clicking sends a 1-bit value immediately, the rotating knob remains active – regardless of the active button)
- Status: Position of sunshade
- Status: Position of slats

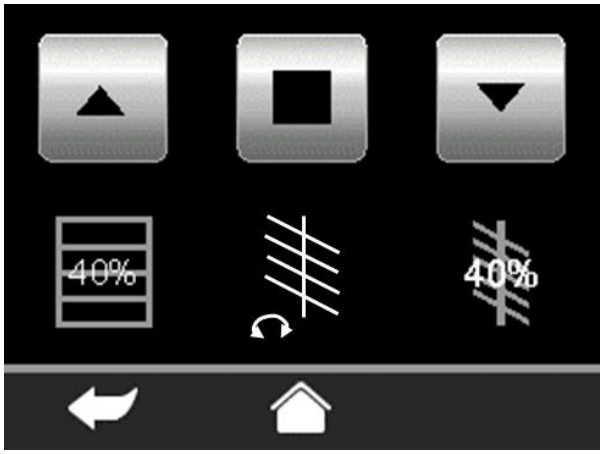


Figure 40: Operation page - blind with status display

3.13.2.1 Configuration

Configuration is achieved using parameters.
The following parameters refer to channels 1-18:

Parameter	Settings
Reverse rotation slat adjustment	Yes **No**
This parameter allows a rotation direction to be reversed. No: Clockwise rotation sends "Slats close" (1) Yes: Anti-clockwise rotation sends "Slats open" (0)	
Transfer: SD card	
Parameter page: Channel	
Actuator status object present	**Yes** No
This parameter sets whether the used actuator is provided with an 8-bit status object (blind position). The actuator status object must be connected with the channel status object.	
Transfer: ETS/SD card	
Parameter page: Channel	

3.13.2.2 Communications objects

The following communications objects refer to channels 1-18:

Obj.	Object name	Function	Type	Flags
0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96,	Shelter from the sun	Send: Up/Down	1 bit	KÜ
102				
This object sends a 1-bit movement command when a button is operated.				
1, 7, 13, 19, 25, 31, 37, 43, 49, 55, 61, 67, 73, 79, 85, 91, 97, 103	Stop/Slats	Send: Stop, Open/Close	1 bit	KÜ
This object sends a 1-bit switching message when a button is operated. The Sunshade receives the command "Stop" or "Open or Close".				
2, 8, 14, 20, 26, 32, 38, 44, 50, 56, 62, 68, 74, 80, 86, 92, 98, 104	Sunshade setting	Send: Value	1 byte	KÜ
This object sets the position of the sunshade directly. The value 0 is sent to fully open the blind. This object is used by the internal scenario controller to initiate the sunshade positioning.				
3, 9, 15, 21, 27, 33, 39, 45, 51, 57, 63, 69, 75, 81, 87, 93, 99, 105	Sunshade setting status	Receiving: Value	1 byte	KSÜA
The feedback icon is displayed depending on the value received for this object. A 0 value indicates an undefined position, a 1 value indicates that the blind is fully open. "?" is displayed in the event of an undefined position.				
4, 10, 16, 22, 28, 34, 40, 46, 52, 58, 64, 70, 76, 82, 88, 94, 100, 106	Slat position	Send: Value	1 byte	KÜ
This object sets the position of the slat directly. The value 0 is sent to fully open the slats. This object is used by the internal scenario controller to set the slat positioning.				
5, 11, 17, 23, 29, 35, 41, 47, 53, 59, 65, 71,	Slat position status	Receiving: Value	1 byte	KSÜA

Obj.	Object name	Function	Type	Flags
77, 83, 89, 95, 101, 107				
The feedback icon is displayed depending on the value received for this object. A 0 value indicates an undefined position, a 1 value indicates that the slats are fully open. "?" is displayed in the event of an undefined position.				

3.13.3 Shutters

In contrast to the blind operation page, the shutter page only offers the following functions. Here too, 2 versions are available.

In Version 1 (Shutters without status objects), the following shutter functions are available.

- Shutters up (function start via touch screen)
- Shutter down (function start via touch screen)
- Stop (function start via touch screen)

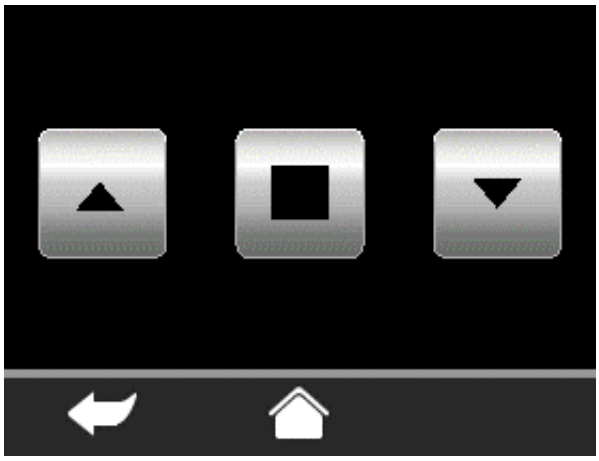


Figure 41: Operation page - Shutters without status display

In Version 2 (Shutters with status objects), the following shutter functions are available.

- Shutters up (function start via touch screen)
- Shutter down (function start via touch screen)
- Stop (function start via touch screen)
- Status: Shutter position

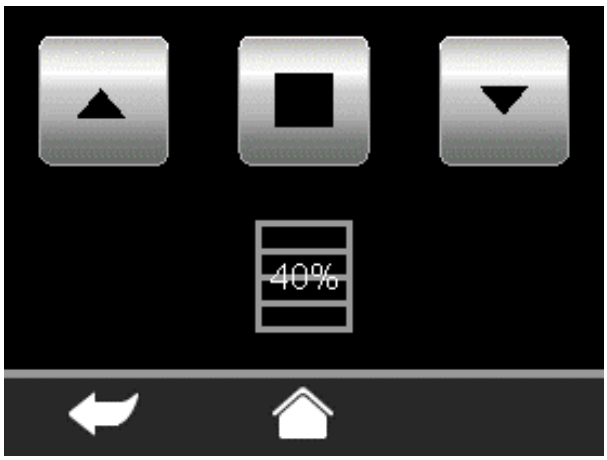


Figure 42: Operation page - Shutters with status display

The rotating knob is inactive in both versions.

3.13.3.1 Configuration

Configuration is achieved using parameters.
The following parameters refer to channels 1-18:

Parameter	Settings
Actuator status object present	**Yes** No
This parameter sets whether the used actuator is provided with an 8-bit status object (shutter position). The actuator status object must be connected with the channel status object.	
Transfer: ETS/SD card	
Parameter page: Channel	

3.13.3.2 Communications objects

The following communications objects refer to channels 1-18:

Obj.	Object name	Function	Type	Flags
0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102	Shutters	Send: Up/Down	1 bit	KÜ
This object sends a 1-bit movement command when a button is operated.				
1, 7, 13, 19, 25, 31, 37, 43, 49, 55, 61, 67, 73, 79, 85, 91, 97, 103	Stop	Send	1 bit	KÜ
This object sends a 1-bit switching message when a button is operated. The shutter receives the command "Stop"				
2, 8, 14,	Shutter	Send:	1 byte	KÜ

Obj.	Object name	Function	Type	Flags
20, 26, 32, 38, 44, 50, 56, 62, 68, 74, 80, 86, 92, 98, 104	positioning	Value		
This object sets the position of the shutter directly. The value 0 is sent to fully open the shutter. This object is used by the internal scenario controller to initiate the shutter positioning.				
3, 9, 15, 21, 27, 33, 39, 45, 51, 57, 63, 69, 75, 81, 87, 93, 99, 105	Shutter position status	Receiving: Value	1 byte	KSA
The feedback icon is displayed depending on the value received for this object. A 0 value indicates an undefined position, a 1 value indicates that the shutter is fully open. "?" is displayed in the event of an undefined position.				

3.14 Send value channel function

3.14.1 Functional overview

The "Send value" channel type is used to send values to the bus. Different data types and units can be used for this. There are differences between the sending of fixed and variable values.

3.14.1.1 Send value – fixed

The transmission of fixed values is achieved by simply assigning a button to the channel. There is no operation page. The rotating knob has no function here.

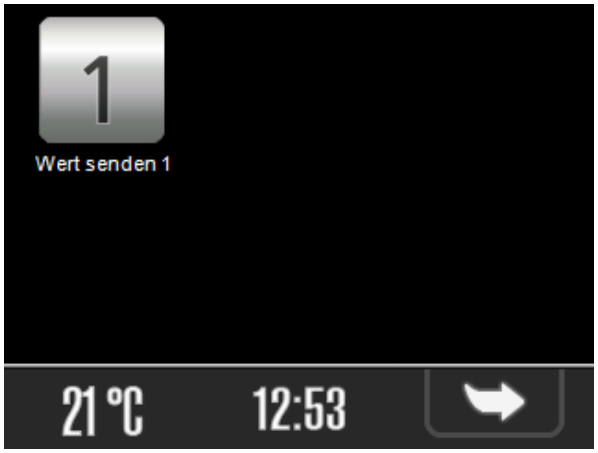


Figure 43: Calling up the operation page for the "Send value" function from the home page

3.14.1.2 Send value – variable

The transmission of variable values is achieved via an operation page (see Figure 44). This is called up via a function page (see
Figure 43) Minimum and maximum values can be set using parameters. The smallest increment (for slow rotations) is determined by the data type resolution. A single decimal place after the decimal point is displayed for floating point data types. The smallest increment size is therefore 0.1. Warning: In floating point numbers, the minimum possible increment varies depending on the the current set value. Examples based on the 2-byte floating point data type:
- 0.08 at values of +/-100
- 0.64 at values of +/-1000
- 5.12 at values of +/-10000
- 81.92 at values of +/-100000

For 4-byte floating point numbers, the display shows 0 .. +/- 9,999,999 directly (e.g.: 204,1). The increment here is 0.1. From 10,000,000 onwards, this switches to normalised exponential display (e.g.: 1,000E+8).
For faster rotation, the increment adapts dynamically to the predetermined value range. Should a smaller step size than provided by the increment be required in order to achieve precise maximum or minimum figures, this is adjusted appropriately so that the minimum and maximum values can be reliably achieved.
The values are set by rotating the rotating knob, while sending the values is achieved by pressing on the rotating knob. The set value is saved permanently on the unit – this is therefore available when the operation page is called up again (even after a power recovery). The communications object can be used to set the set value even via bus message. This is checked and limited against configured minimum and maximum values. the rotating knob is immediately active after activating the operation page.
The control page title corresponds to the channel name.

Figure 44: Operation page: Send value – variable

3.14.2 Configuration

Configuration is achieved using parameters.
The following parameters refer to channels 1-18:

Parameter	Settings
Data type	**1 byte in %**

Parameter	Settings
	1 byte counter, unsigned 1 byte counter, signed 2 byte floating point 2 byte counter, unsigned 2 byte counter, signed 4 byte floating point 4 byte counter, unsigned 4 byte counter, signed
This parameter is used to select the data type to be sent.	
Transfer: ETS/SD card	
Parameter page: Channel	
Variable value	**Yes** No
This parameter is used to set whether the value to be sent is a fixed or variable - settable by the room controller - value.	
Transfer: ETS/SD card	
Parameter page: Channel	
value	Value within the range specified by the data type (Default: 0)
This parameter is used to set the value to be sent for the sending of fixed values.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Variable value = No	
Minimum	Value within the range specified by the data type (Default: Smallest value in value range)
This parameter is used to set the minimum input value for the input of variable values. This is displayed when the operation page is called up if the object 'Value' has not yet received a value. For each further call-up of the operation page, the last sent/received value for the relevant channel is displayed.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Variable value = Yes	
Maximum	Value within the range specified by the data type (Default: Largest value in value range)
This parameter is used to set the maximum input value for the input of variable values.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Variable value = Yes	
Unit	
This parameter is used to set the unit which is displayed after the numeric value in the denro ONE display. Maximum length: 14 characters	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when:	
Variable value = Yes	

3.14.3 Communications objects

The following communications objects refer to channels 1-18:

Obj.	Object name	Function	Type	Flags
3, 9, 15, 21, 27, 33, 39, 45, 51, 57, 63, 69, 75, 81, 87, 93, 99, 105	Value *(Data type)*	Send	1 byte, 2 byte, 4 byte	KSÜA
This object is used to send a value by operating the button (fixed value) or the rotating knob (variable value). If parameter **Variable value = Yes** , then the value can also be received via this object. If a value < minimum is received, the minimum value is used; if a value > maximum is received, the maximum value is used.				

3.15 Channel function Scenario control

3.15.1 Functional overview

A scenario is used to make certain switching states reproducible in a retrievable manner.
Scenarios can include the following channel types, individually or in combination.

- Switching
- Dimming
- Blinds
- Shutters
- Positive guidance
- Send values

ATTENTION: Scenarios are addressed on the bus with numbers 0-63, but with numbers 1-64 in the operating units.

Scenario 1 thus has a special role to play, as it is called up with the very first press of the rotating knob in hibernation mode (when the display is inactive). Two different operation modes are available for scenario control in the denro ONE:

1. An integrated scenario controller, which handles the storage and retrieval of values.
2. The denro ONE acts purely as a control element. The storage of scenario values is done in the actuators themselves

3.15.1.1 Scenario control via the integrated scenario controller

The scenario controller is used to manage the channels within the scenarios. This allows the management of up to 64 scenarios. Values are assigned and defined in denro ONE Manager (see Chapter 4.8.4). All values for

a scenario are actively queried from memory by the status communications objects of the actuators and saved in the denro ONE. When a scenario is called up, the saved values are sent to the relevant group addresses. The interval between two messages is adjustable using a parameter.
When calling up and saving a scenario, besides the value data of the channels, the scenario ID is also sent as an 8-bit communications object (DPT_SceneControl, 18.001).
1-bit communications objects are available for the first 10 scenarios, which enables the manual call-up of scenarios via external buttons. It is not possible to save via the 1-bit communications object.
The call-up and saving of scenarios is possible via a further 8-bit communications object (DPT_SceneControl, 18.001).

In order to be able to save values for scenarios, it is necessary to link the relevant status objects of the actuators for switching (1-bit), dimmer (8-bit), shutter (8-bit) and blind/slat (2 x 8-bit) channel types with the status input objects of the denro ONE.

The current scenario control values are permanently held in the denro ONE and are then available following a power recovery.
A description of how to create a scenario can be found in Chapter 4.8.4 Configuration of scenarios.
Pressing the button for a scenario sends the values defined for the associated communications objects to the respective actuators. When Admin mode is active, an extended press of the button (≥ 5 s) saves the scenario.

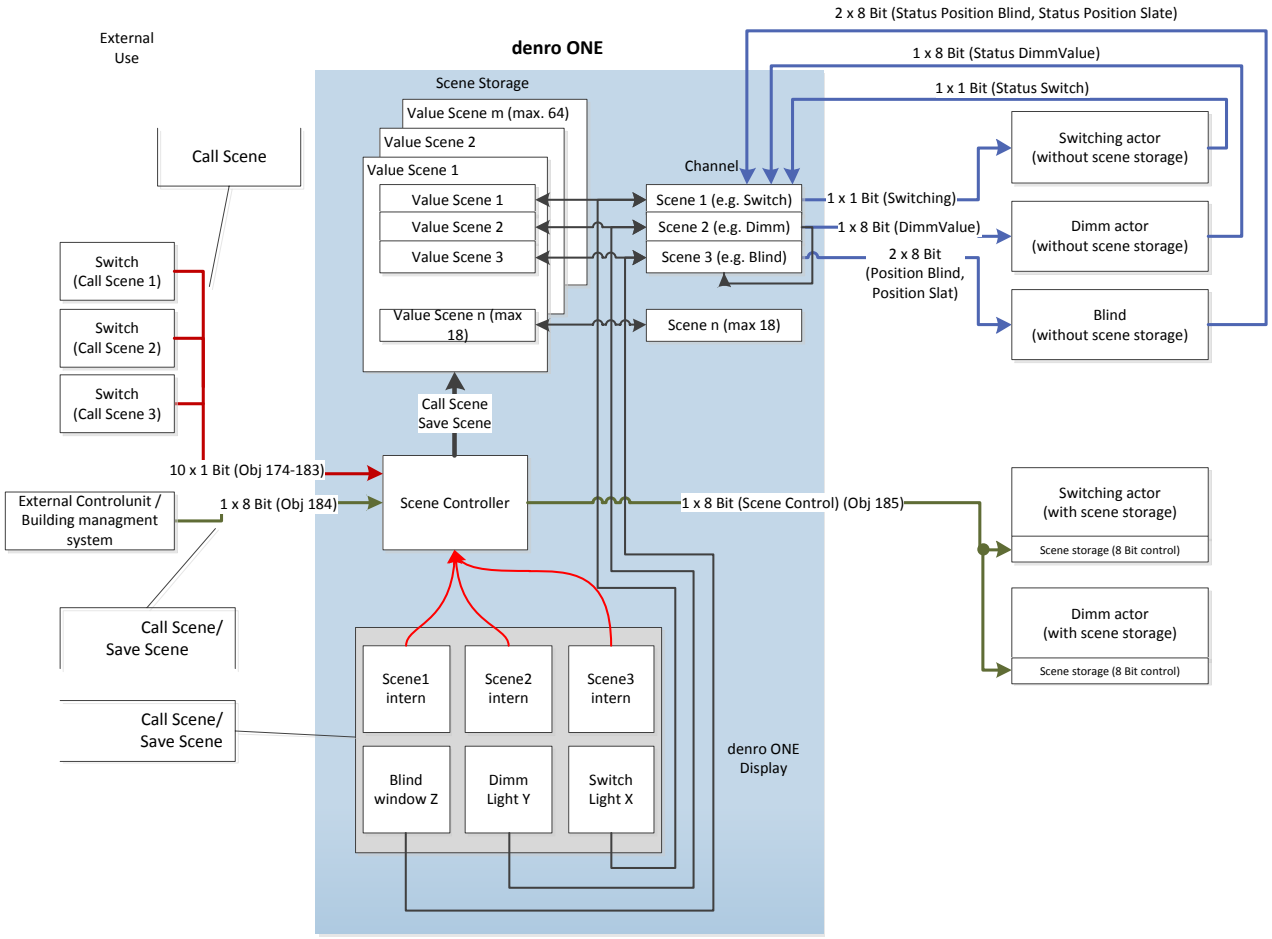


Figure 45: Overview of internal scenario control (scenario controller)

ATTENTION:
Most blind actuators differentiate between manual and manual/automatic operation. In Manual/Automatic operation mode, it is possible to switch between manual and automatic mode by means of the communications object. The 8-bit communications objects for positioning can only be used by the actuators in manual operation mode, or in Manual /Automatic operation mode in "Automatic" mode (see Figure 36).

The practical use of the internal scenario controller is thus subject to a number of restrictions.
This is remedied in scenario control by the fact that the actuators which are used have integrated scenario administration, and can be controlled via the 8-bit scenario object (DPT_SceneControl, 18.001). In this case, the 8-bit position objects (blinds/slats) are not populated with group addresses. The scenario values are saved in the actuator. Setting a default in the denro ONE Manager will have no effect, as will de-activating a

channel in a scenario. All actuators which are connected with the 8-bit scenario object are also always active. Writing the scenario settings back on to the microSD card however contains the correct values for these channels, but these cannot be used as new scenario values after re-loading.

3.15.1.2 8-bit/1-bit scenario function (external saving of scenario values)

In this case, the integrated scenario controller is not involved. The scenario settings are solely compiled by means of the configuration of the linked actuators and group address allocation in the ETS.

Scenarios are retrieved and saved either by means of two 1-bit objects per scenario or a common 8-bit object (DPT_SceneControl, 18.001) for all scenarios. One scenario is addressed per channel.

ATTENTION: The values of the respective scenario are saved in the actuators and not in the denro ONE. For this reason, suitable actuators which offer this functionality must be used.

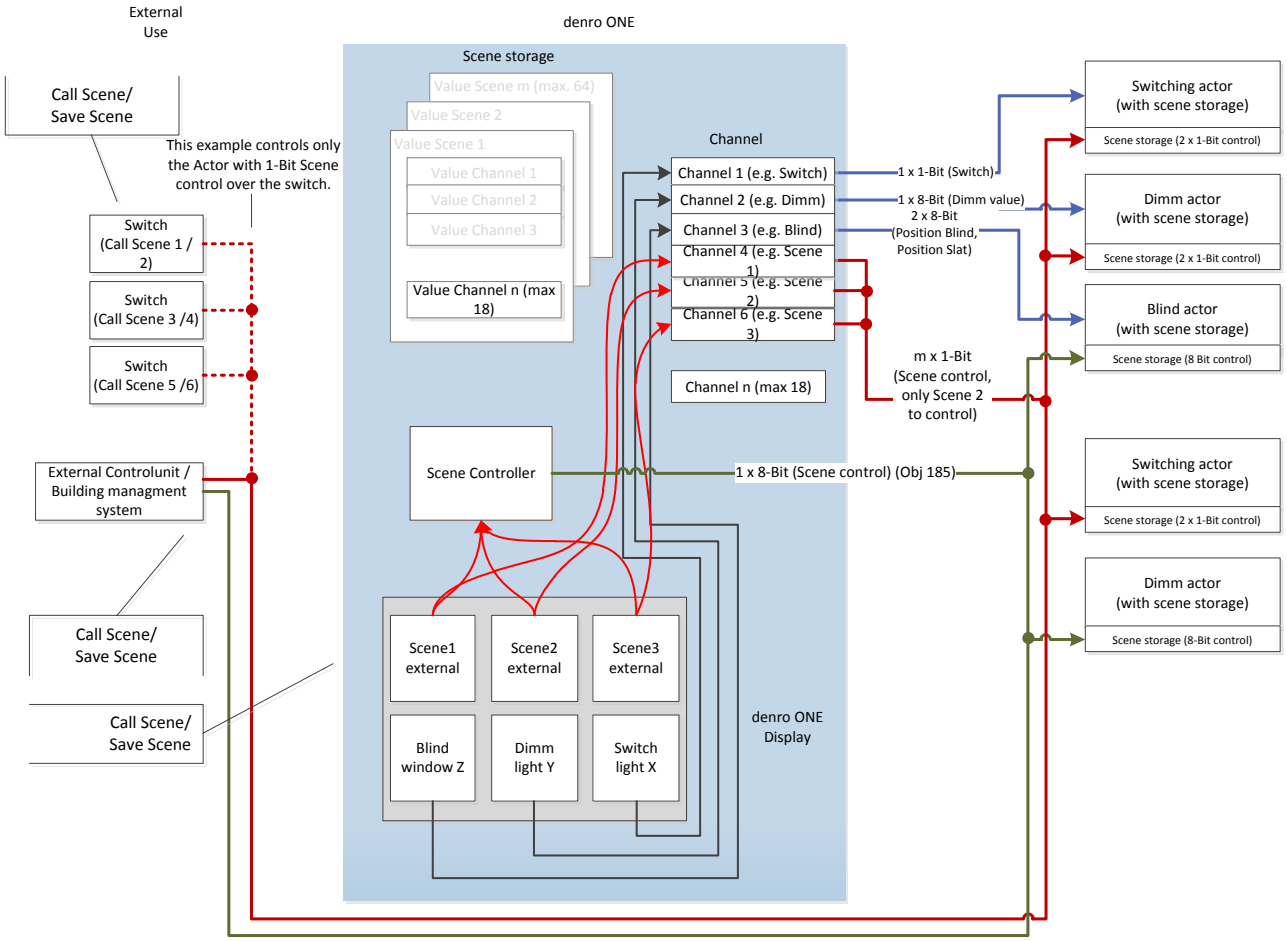


Figure 46: Overview of external scenario control

This figure shows only a general overview of external scenario control. There are for example also buttons which can use the 8-bit scenario messages.

3.15.2 Operating scenarios on the denro ONE

The display shows the buttons defined for a scenario. When pressed, the button acquires the focus, indicated by border colour 1 around the button. The respective values of the communications objects of the functions used in this scenario are sent via the bus.

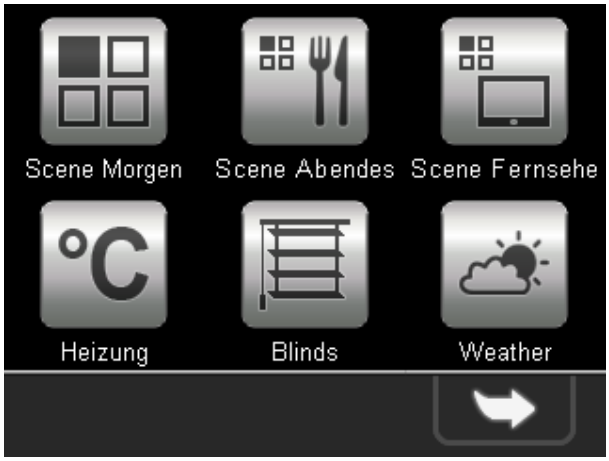


Figure 47: Scenarios on the home page on the denro ONE

Figure 48: Activating the Eating scenario

3.15.3 Changing scenario settings on the denro ONE

The values in the channels used in the scenarios can be adjusted to individual requirements in the denro ONE. To do this, the denro ONE must be set to Administration mode (see 3.2.1.4 Administration mode).

The contents of the channels used in this scenario can now be changed using the navigation arrows on the menu pages. This activates the channel, and this can then be adjusted as required. This can be continued until all functions are set as required. Finally, the button for the now altered scenario is changed, and saved by an extended press of the button. A successful save is indicated by a change from border colour 1 to border colour 2, as well as with an audible sound. Internal and external scenarios are saved in exactly the same way.

The "recording" of scenarios takes into account both switching processes which were made on denro ONE as well as those actuated by other bus users (recorded via the channel status objects).

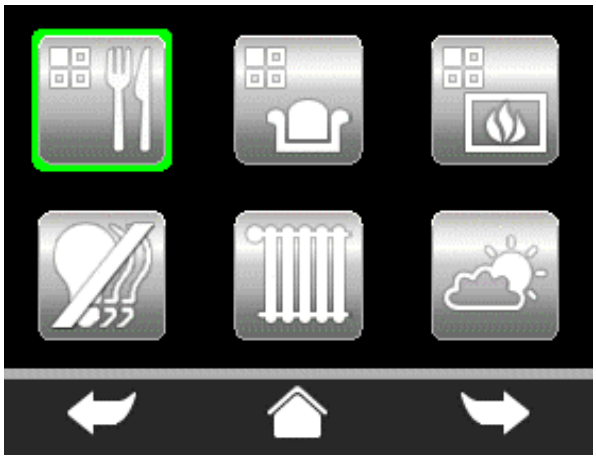


Figure 49: A successful scenario save

3.15.4 Configuration

To activate a scenario on the denro ONE, scenarios 1-10 can be called up by a 1-bit value from an external module by means of a communications object.
Alternatively, the command to activate a saved scenario or to save a scenario can be sent via an individual communications object. Bits 0-5 of the 8-bit scenario message refer to the scenario number (1 – 64). To activate a scenario, bit 7 is sent with a 0 value. To save a scenario, bit 7 is sent with a 1 value.

The following parameters refer to channels 1-18:

Parameter	Settings
Scenario number	1 .. 64 (Default: 1)
This parameter defines the number of the scenario which is sent over the 8-bit scenario control communications object. Values 0 - 63 are sent via the bus.	
Transfer: SD card	
Parameter page: Channel	

3.15.5 Communications objects

Internal scenario controller communications objects

Obj.	Object name	Function	Type	Flags
174, 175, 176, 177, 178, 179, 180, 181, 182, 183	Call up scenarios 1-10	Receive	1 bit	KS
These objects can be used to call up scenarios 1 to 10 directly. When an undefined scenario is called up, the message is discarded. A 1 value is always expected. A 0 value is ignored.				
184	8-bit scenarios	Receiving: Activate/Save	1 byte	KS
A value between 0-63 is received in the internal scenario				

Obj.	Object name	Function	Type	Flags
controller in order to activate a scenario between 1-64. A value between 128-192 (the scenario number + 127) is received in order to save a scenario between 1-64. When a scenario for which there is no definition is called up, the message is discarded (object no. 185 is similarly not processed).				
185	8-bit scenarios	Send: Activate/Save	1 byte	KÜ
A value between 0-63 is sent in order to activate scenarios 1-64. A value between 128-192 (the scenario number + 127) is sent in order to save a scenario between 1-64.				

The following communications objects refer to channels 1-18 for external scenario saves:

Obj.	Object name	Function	Type	Flags
0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102	<Channel name> - Call up scenario	Send	1 bit	KÜ
This object is used to send a 1-bit value to call up a scenario. A 1 value is always sent.				
1, 7, 13, 19, 25, 31, 37, 43, 49, 55, 61, 67, 73, 79, 85, 91, 97, 103	<Channel name> - Save scenario	Send	1 bit	KÜ
This object is used to send a 1-bit value to save a scenario. A 1 value is always sent.				
185	8-bit scenarios	Send: Activate/Save	1 byte	KÜ
A value between 0-63 is sent in order to call up a scenario between 1-64. A value between 128-192 (the scenario number + 127) is sent in order to save a scenario between 1-64.				

3.16 Alarm/message channel function

3.16.1 Functional overview

denro ONE offers 1-bit alarm and message functions. It is possible to flip through triggered alarms and messages using the navigation buttons. The first alarm as well as every subsequent alarm is automatically activated as they occur. When this occurs, the display is – if configured to do so - automatically switched on. The display then switches off once again after the normal display switch-off time. A triggered alarm can be continuously displayed by a red signal LED and an audible signal until it is acknowledged. The behaviour of the LED, audible signal and display during an alarm are configured on a channel-specific basis using parameters (see Section 3.16.4). The respective signal is OR-linked. This means that for example: if an alarm is configured to be audible, and a second one is not, and both alarms are active, – the audible alarm is sounded. The same applies to the LED.
If an as-yet unacknowledged alarm is de-activated (using a corresponding contradictory message on the "Alarm input" communications object), the alarm LED and sound are switched off; the alarm is however still displayed – but its status is marked as de-activated (a green check on the display).

There is no specific way of dealing with messages, meaning that in this event, the overview page must be manually called up. To do this, the alarm and message overview function in denro ONE Manager must be configured to a button. Similarly, neither LED nor audible signals are available.
The first alarm or message can be accessed by means of buttons which can be placed on any function page. Separate buttons are provided for alarms and messages.

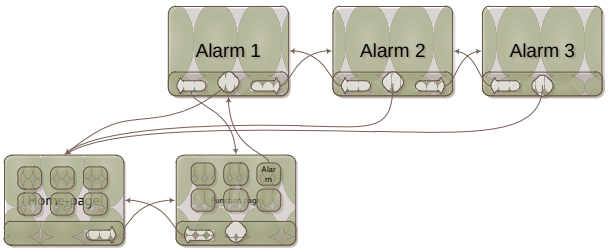


Figure 50: Alarm display navigation

Figure 51: Alarm and message start buttons

3.16.2 Alarm display

Alarms are automatically displayed when they occur. The alarms can also be displayed by activating the "Alarms" button - this then displays the first alarm in the list. The display includes the pre-configured icon, the alarm's occurrence time stamp and its name. When no alarm is active, the following message is displayed:

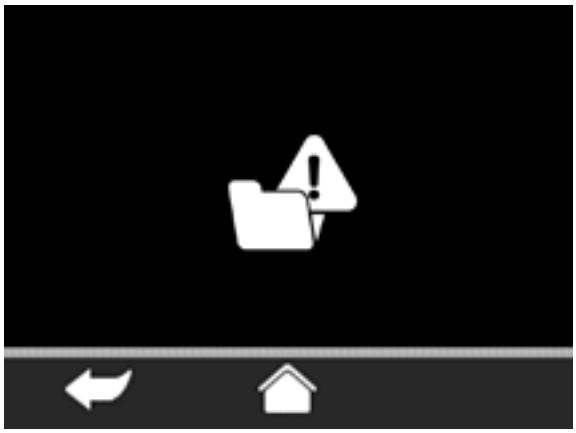


Figure 52: No active alarms display

When browsing, the alarm display sequence is based on the set alarm priorities and their date: The highest priority alarms come first, and when they have the same priority, the newest is displayed first.
Displayed alarm text and icons are set using parameters.
Clicking on the "OK" button acknowledges the displayed alarm. This acknowledgement moves the alarm to the background and the LED and the audible signal are de-activated (so long as there are no further alarms). The acknowledgement can also send a message over the bus. Acknowledgements can also be set externally (via a communications object). This is particularly advantageous in that alarms can be displayed on multiple devices. Acknowledging a single device is in this case sufficient to acknowledge the alarms on all devices.
Alarms are only removed from the list when they are acknowledged (via bus message or manually) and de-activated (via bus message).
The next/previous alarm can be navigated to using the "Forward" and "Back" buttons.

Figure 53: Display of an individual alarm with acknowledgement button

3.16.3 Messages display

Activating the "Messages" button displays the operation page with the first message. The message sequence corresponds to the channel sequence. Messages are not removed from the list, as a valid status always applies.

The displayed time corresponds to the time at which the message appeared. The displayed icon and text can each be configured for the values "1" and "0" received by the "Message" object.

If a query of the object value fails following the start of the Contouch (until an appropriate bus message arrives), a "?" message text is shown.

The next/previous message can be navigated to using the "Forward" and "Back" buttons.

Figure 54: Sample message with value "1"

Figure 55: Sample message with value "0"

3.16.4 Configuration

Configuration is achieved using parameters.

Global parameters for all alarms:

Parameter	Settings
Automatic switch-off of audible alarm after	10 secs 30 secs **1 min** 2 min 3 min 4 min 5 min 6 min 10 min 15 min 20 min 25 min 30 min

Parameter	Settings
This input field is used to set the time after which the audible signal is switched off. The alarm sounds for the duration of this configurable period, as long as the alarm is not acknowledged.	
Transfer: SD card	
Repeat audible alarm after automatic switch-off after	10 secs 30 secs 1 min 2 min 3 min 4 min **5 min** 6 min 10 min 15 min 20 min 25 min 30 min
This input field is used to set the time after which the audible signal is sounded again after being automatically switched off. This configurable time is only applicable if the "continuously repeat audible alarm" setting is selected during the configuration of the individual alarms below. The alarm must not be acknowledged if the audible alarm signal is to be repeated.	
Transfer: SD card	
Repeated alarm signal after acknowledgment after	Never **1 min** 2 min 3 min 4 min 5 min 6 min 10 min 15 min 20 min 25 min 30 min 60 min 120 min
This parameter is used to set the time interval after which an alarm is displayed again after it has been acknowledged if it is still set as active using the "Alarm input" communication object. If, after acknowledgment, the alarm is still active after the configured time interval: - Show the alarm in the display - LED is switched on (if configured) - Audible alarm (if audible alarm is configured)	
Transfer: SD card	

The following parameters can be individually used for each "Alarm"-type channel:

Parameter	Settings
Function	**Message** Alarm
If this field is activated, the message is classified as an alarm message. Upon receipt of a bus message with a value which triggers an alarm, this message is automatically shown on the display. For this, an additional object is created in the appropriate format to trigger the alarm.	
Transfer: ETS/SD card	

Parameter	Settings
Parameter page: Channel	
Alarm text	
This parameter defines the text which is displayed when the alarm conditions are fulfilled. This has a maximum text length of 64 characters.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Alarm	
Alarm icon	
This selection field can be used to select an appropriate icon for alarms. This is displayed on the display when the alarm conditions are fulfilled.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Alarm	
Priority	**1** 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
This setting sets the alarm priority. Priority 18 is the lowest setting, 1 the highest. Alarms are sorted by priority in the event list. Alarms with equivalent priority are displayed by "age", meaning that "older" alarms are further down the list than "younger" alarms.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Alarm	
Alarm text to be sent	(Default: "Warning alarm")
This input field is used to set the text which is sent via the appropriate communications object when an alarm is triggered. This has a maximum text length of 14 characters. It is not possible to enter an empty character string.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Alarm	
Behaviour in the event of an alarm	No audible alarm **Sound audible alarm once** Repeat audible alarm continuously
This parameter is use to set whether or how the	

Parameter	Settings
triggering of an alarm is audibly indicated. If "No audible alarm" is set, no audible signal is played when an alarm is triggered. The alarm is silently shown on the display. If "Sound audible alarm once" is set, a single audible alarm is played for a certain, configurable time when an alarm is triggered. If "Repeat audible alarm continuously" is set, a single audible alarm is repeated for a certain, configurable time when an alarm is triggered. Following the sounding of this audible alarm, the alarm message is silently displayed for a certain, configurable time before the audible signal is once again sounded.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Alarm	
LED behaviour during an alarm	from Continuous red **Flashing red**
When an alarm arrives, the orientation LED can be set to the following conditions: OFF, ON or FLASHING.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Alarm	
Display backlighting during an alarm	No change in status **Switch on**
When an alarm arrives, the display backlighting can be set to ON. If "No change in status" is set, the current display backlighting status remains unchanged.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Alarm	
Conditions for alarm activation (1-bit)	0 **1**
This parameter is used to set the values for an alarm trigger object for which an alarm is triggered.	
Transfer: SD card	
Parameter page: Channel	
An alarm is triggered	**Only upon the first alarm** On each alarm
When "On each alarm" is set, an alarm is always triggered when an update is made to the trigger object with a value which is (=) identical to the configured threshold value. When "Only upon the first alarm" is set, an alarm is triggered once when the value of the trigger object is (=) identical to the configured threshold value.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Alarm	
Object value for alarm acknowledgment	**1** 0
This setting is used to define the value which should be sent to the object after an acknowledgment.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Alarm	

The following parameters can be individually used for each "Message"-type channel:

Parameter	Settings
Icon for value = "1"	
This selection field can be used to select an appropriate icon. This is shown in the display when the value content is "1".	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Message	
Icon for value = "0"	
This selection field can be used to select an appropriate icon. This is shown in the display when the value content is "0".	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Message	
Text display for value = "1"	(Default: "On")
This input field can be used to input a text. This text is shown in the display when the value content is "1". This has a maximum text length of 64 characters.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Message	
Text display for value = "0"	(Default: "Off")
This input field can be used to input a text. This text is shown in the display when the value content is "0". This has a maximum text length of 64 characters.	
Transfer: SD card	
Parameter page: Channel	
This parameter is only visible when: Function = Message	

3.16.5 Communications objects

The following communications objects refer to channels 1-18 when Function = Alarm:

Obj.	Object name	Function	Type	Flags
4, 10, 16, 22, 28, 34, 40, 46, 52, 58, 64, 70, 76, 82, 88, 94, 100, 106	<Channel name> - Alarm input	Receive	1 bit	KS
The value content of this object is compared with a trigger condition ("0" or "1"). Based on this, an alarm is then triggered or de-activated.				
This object is only available when: Function = Alarm				

Obj.	Object name	Function	Type	Flags
2, 8, 14, 20, 26, 32, 38, 44, 50, 56, 62, 68, 74, 80, 86, 92, 98, 104	<Channel name> - Alarm output	Send	1 bit	KÜ
When an alarm is triggered (the alarm conditions are fulfilled) the value of this object is set to "1" and sent. When the alarm is de-activated, a "0" is sent. No action occurs upon acknowledgement.				
This object is only available when: Function = Alarm				
3, 9, 15, 21, 27, 33, 39, 45, 51, 57, 63, 69, 75, 81, 87, 93, 99, 105	<Channel name> - Alarm text	Send	14 byte DPT_String_ASCII	KÜ
When the conditions for an alarm are fulfilled and an alarm is thus triggered, a configurable alarm text is sent over the bus via this object.				
This object is only available when: Function = Alarm				
0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102	<Channel name> - Alarmacknowledgement output	Send	1 bit	KÜ
When an alarm is shown on the display after being triggered, the value of this object is set to "1" or "0" and sent. If the acknowledgement occurs by bus, no message is sent by this route.				
This object is only available when: Function = Alarm				
1, 7, 13, 19, 25, 31, 37, 43, 49, 55, 61, 67, 73, 79, 85, 91, 97, 103	<Channel name> - Alarm acknowledgement input	Receive	1 bit	KS
This object can be used to receive an alarm acknowledgement via the bus. The alarm acknowledgment is confirmed depending on the configured object value.				
This object is only available when: Function = Alarm				
196	Acknowledg e all alarms	Receive	1 bit	KS
This object can be used to receive an acknowledgement for all alarms via the bus. For acknowledgements, a "1" value is always expected, and a "0" value is ignored.				

The following communications objects refer to channels 1-18 when Function = Message:

Obj.	Object name	Function	Type	Flags
4, 10, 16, 22, 28, 34, 40, 46, 52, 58, 64, 70, 76, 82, 88, 94, 100, 106	<Channel name> - Message	Receive	1 bit	KSÜA
Depending on the received value, a configured text and icon are displayed via this object. During a power recovery, this communications object sends a read request. If a query of the object value fails (until an appropriate bus message arrives), a "?" message text is shown.				
This object is only available when: Function = Message				

4 denro ONE Manager

4.1 Overview

The denro ONE Manager is a plug-in for the ETS, and is called up as a configuration window. The denro ONE Manager enables the complete configuration of the room controller via the KNX bus. This configuration includes the surface settings (menu structures, icons, graphical styles) as well as the configuration of the functionality of the devices.
Due to the bandwidth limitations of the KNX bus, the complete configuration of the denro ONE in this way is not possible (or it would take an unreasonably long time). Therefore, in addition to the KNX bus, a microSD card is used as a second means of transferring configuration data. The microSD card is used to transfer menu structures, bitmaps and firmware updates. The functionality configuration parameters are transferred via the KNX bus.

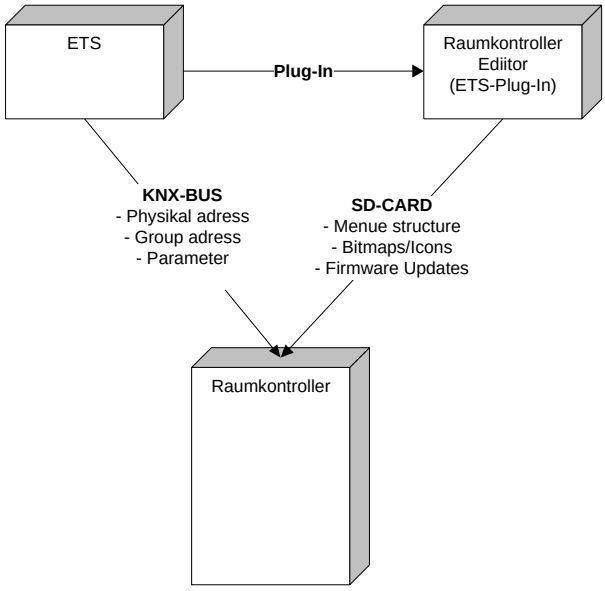


Figure 56: The denro ONE Manager interfaces

4.2 System requirements

- Operating system: Windows XP SP3, Vista SP1 or Windows 7 (in their respective 32-bit versions)
- Screen resolution: 1024x768 pixels or higher
- Reader for microSD or microSDHC format memory cards (if necessary via Adapter SD to microSD) to write to microSD cards
- Microsoft .Net Framework 3.5 SP1
- For the plug-in: ETS Version 3.0f

4.3 Operation modes

There are two different configuration operation modes:
- Plug-in for ETS Version 3.0f
- Windows-based offline programme version as a standalone programme

4.3.1 Plug-in in the ETS

The ETS plug-in is used during the building commissioning. The ETS plug-in enables complete configuration:
- Configuration of functions
- Configuration of the KNX-relevant parameters
- Configuration of scenarios
- Configuration of timer programme
- Configuration of the menu structure
- Configuration of the alarms/messages

4.3.2 Standalone Windows-based programme

This mode is primarily intended for maintenance purposes, to enable menu adjustments without an ETS licence. Without the ETS, only a limited configuration is possible due to the lack of a KNX connection:
- Configuration of scenarios
- Configuration of timer programme
- Configuration of the menu structure

The use of the standalone programme does not require the ETS to be installed.
KNX-relevant parameters can not be processed in this mode – for this, the project must be saved and imported into the ETS plug-in. The same applies for creating, deleting, activating, de-activating and editing channels.

4.4 Installation

The denro ONE Manager/ETS plug-in are installed using their own separate setup packages. The installation requires the Windows Installer to be present. During the installation, any dialogue boxes are shown in the current user language of the operating system. German and English are available, and English is the default language.

4.4.1 ETS plug-in

The ETS plug-in setup programme is included in the VD5 file. This must not be installed separately as this is automatically called up when the menu item "Editing parameters" is called up. The installation is interrupted whenever one or more of the following conditions are not met:
- Minimum requirements relating to operating system version met (Windows XP SP3 or higher)
- DotNet Framework 3.5 SP1 installed
- Current user logged in as Administrator

An appropriate error message is displayed in this event. In the event that DotNet Framework 3.5 SP1 is not installed, a link to the download site is shown (in the operating system user language). Following a successful

installation of the DotNet framework, the configuration dialogue box must be called up once again.
The standalone version is not contained in the VD5 file, and must be installed separately.

4.4.2 Standalone Program module

The standalone version is installed using a separate setup package. This installation is typically only run on systems without ETS, but can be installed and used in parallel with the ETS plug-in. The installation is subject to the same requirements as the plug-in installation.

4.5 Data transfer

4.5.1 Data transfer

The Figure 57 shows the transfer of the configuration data to the denro ONE. In standalone programme mode, only transfers by microSD card are possible. As part of the ETS plug-in, system-related components of the configuration are transferred via the KNX bus.

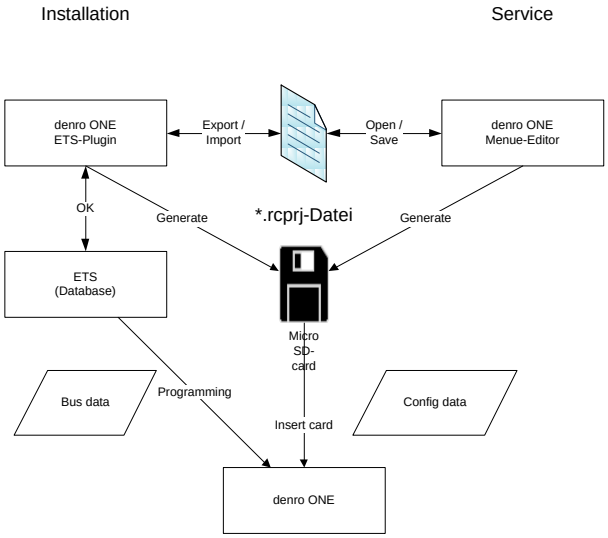


Figure 57: Data flow

4.5.2 Export and Import

As the standalone programme module cannot access the ETS database, it is necessary to export the data through the ETS plug-in before using the standalone programme. The resulting file has the file extension "*.rcprj". This file is opened in denro ONE Manager (the standalone programme module), and changes can be saved by pressing the "Save" button.

4.6 Configuration steps

The denro ONE Manager and the plug-in are grouped thematically according to configuration steps. The selected sequence of steps supports the user by recording basic data such as the languages used, channels with their functions and scenarios as well as their names. After defining the parameters and installing the timer programme, the menu surfaces for the room controller are designed.

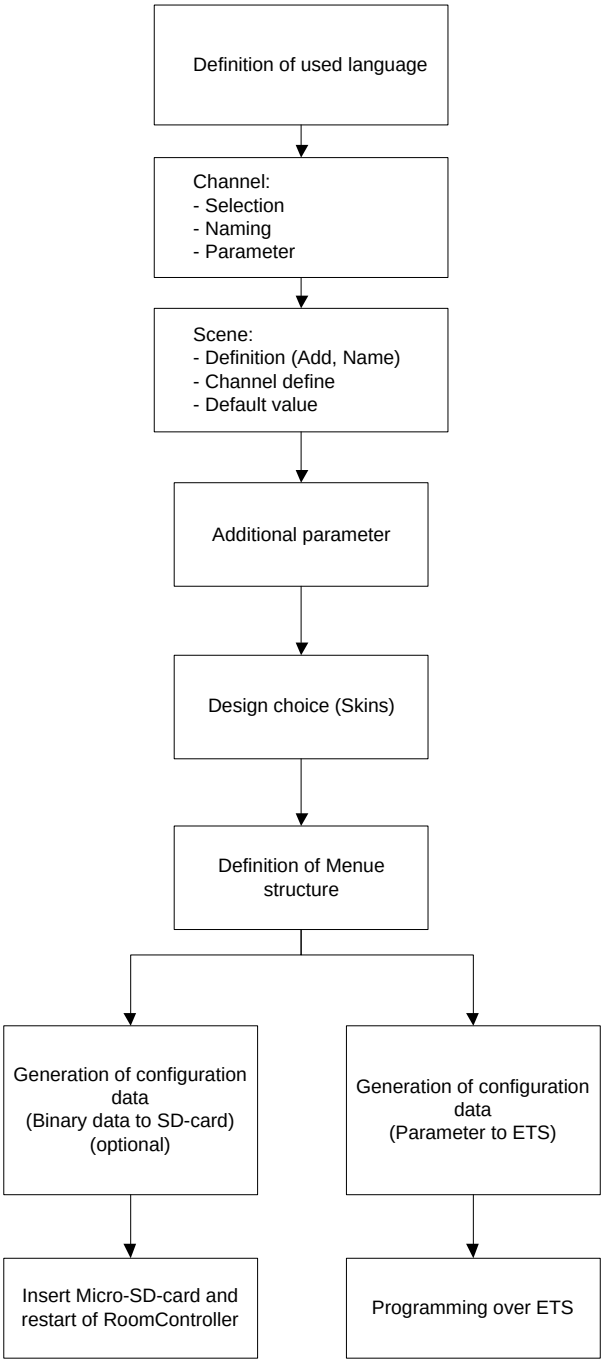


Figure 58: Configuration steps

The configuration window takes up the configuration steps given above, and orders these in a logical sequence as tabs for editing (see Figure 59). This sequence is recommended, but need not absolutely be respected.

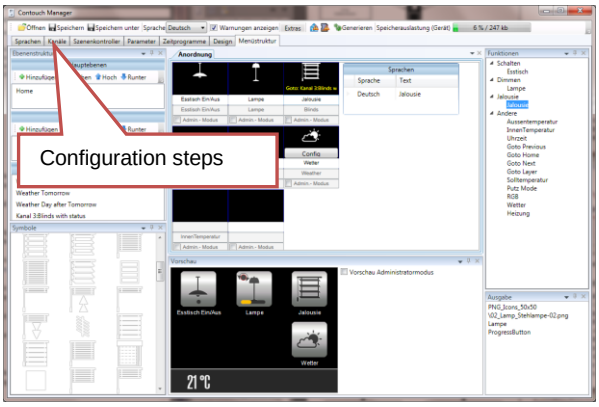


Figure 59: General window structure

4.6.1 Warnings

When entering text and parameters, these entries are continuously checked for their correctness and completeness. When an entry is determined to be missing, this is indicated by a warning icon - a yellow triangle with an exclamation mark. An explanatory error text is displayed by clicking on the warning icon or as a tool-tip text when rolled over with the mouse. A check is made for the presence of texts for all active languages as well as to ensure that the maximum lengths is not exceeded.

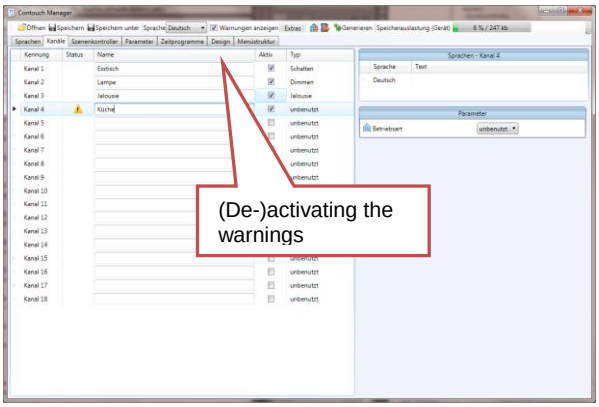


Figure 60: Warning display

The warnings can be shown or hidden by using the menu bar.

4.6.2 Text inputs

All text inputs are checked for length based on the context of their use (e.g. button descriptions). If a text is too long, a warning is shown. Text length is evaluated on a pixel basis in order to appear consistent in terms of length in the denro ONE menus.
It is therefore not possible to give a maximum number of permitted characters, as the text length is dependent on the type of letters it contains.

All texts can be exported in a text file and later re-imported, so as to make these available to translators. Note that the text length check in this case can only be done during the re-import process. It is therefore recommended that the texts be directly input by the translator in RCEdit.
All language-specific texts can be exported or imported by clicking the Extras, Export/Import Strings menu entry. A selection dialogue box appears. The data format used is CSV (comma-separated lists), which can easily be edited in Excel. During the export/import process, the localised texts are written or read in the current set language. The current values are overwritten when reading. The check for maximum length and completeness is performed by setting the warnings (see Chapter 4.6.1) and generating the output data for the denro ONE.

4.6.3 Parameter types and transferring these to the denro ONE

During the configuration of the denro ONE, certain parameters are transferred using the microSD card, others using ETS (KNX bus) or even using both transfer methods. The respective transfer type is displayed by an icon in front of the parameter names (see Figure 61).

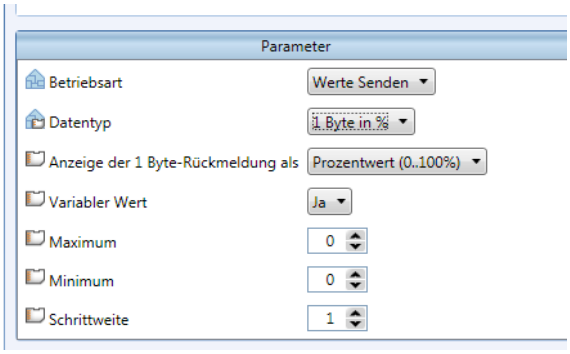


Figure 61 Identifying parameter types

The following different icons are used:

- ETS only
- microSD card and ETS
- microSD card only

4.7 Starting the programme

4.7.1 Starting as ETS plug-in

The denro ONE Manager is started as an ETS plug-in via the denro ONE Properties dialogue box.

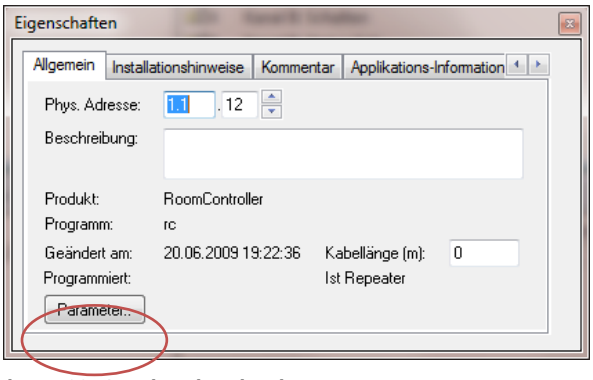


Figure 62: Starting the plug-in

The operation elements are provided in German and English. These are selected based on the ETS's set GUI language as follows:

ETS GUI language	ETS plug-in GUI language
German	German
All others	English

4.7.2 Starting as standalone programme

The denro ONE Manager is started as an application via the Windows Start menu. A programme group has been set up here.
Note that when the programme is started from the Windows Start menu, no ETS parameters can be modified. This version is primarily intended for making changes to the menu structures. All parameters which cannot be modified are de-activated.
The operation elements are provided in German and English. These are selected based on Windows' set GUI language as follows:

Windows GUI language	denro ONE Manager GUI language
German	German
All others	English

4.8 denro ONE configuration steps

4.8.1 Displaying the available disk space

The amount of disk space (in percent) remaining on the denro ONE is displayed during configuration.

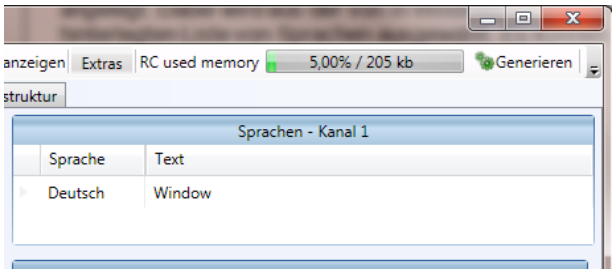


Figure 63 Displaying the available disk space

4.8.2 Definition of target languages

The first step in the configuration is to define the target languages. Defining different target languages is useful in settings such as hotels or public buildings. Should only one target language be required, this configuration step can be skipped. It is also possible to add further target languages at a later stage, as well as to expand relevant texts.
The GUI language of the ETS (for the plug-in) or the Windows GUI language (for the standalone programme module) is used for any new data set.

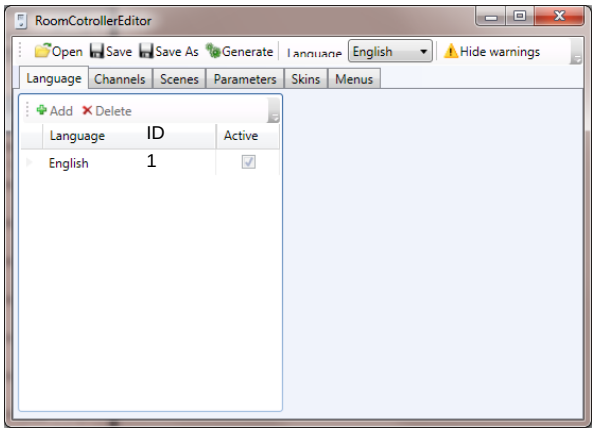


Figure 64: Setting the target languages

A new language is created by clicking on the + (Add) button. The language can then be selected from the list stored in Windows. Up to 6 languages can be activated. Languages can also be deleted. The system however ensures that at least one language is defined. All already defined texts for a language are automatically deleted at the same time.
Languages have an ID, which is displayed and which must be used during the language selection via a communications object to select the appropriate language (see Figure 64).
When multiple languages are used, the texts of the active text input fields for all languages are displayed simultaneously on the right-hand side of the window and edited. In addition, the displayed standard language for all text fields can be switched. in this way, all texts for the selected language are visible at the same time (see Figure 65).

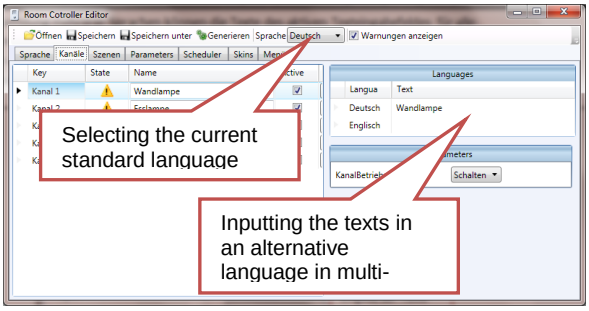


Figure 65: Inputting language-specific texts

4.8.3 Configuring the channels

Configuring the channels activates and names the used functions. The name assigned in the "Name" column is used as a default for the menu signatures, as well as to improve orientation along the subsequent steps.

The communications objects of the activated channels appear with their name in the ETS. The channel name and object function are used as the name of the communications object. For example: Dining table – 1-bit switch. The following functions can be selected here:

- Switching
- Dimming
- Blinds
- Shutters
- Send values
- Alarms/messages
- Scenario control

Depending on the selected channel function, a number of parameters can be set. The parameters of the selected channel are displayed on the right-hand side of the window.

Whenever a parameter is altered, it is also necessary to update the configuration data using the SD card!

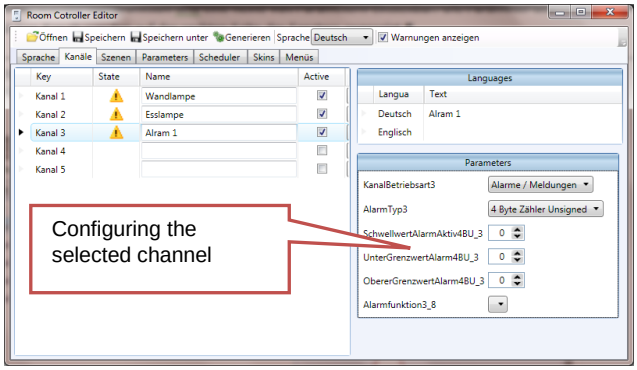


Figure 66: Channel selection and naming

The channels which are to be used must be marked as active. Only then will these be included in the following configuration steps.

4.8.4 Configuration of scenarios

Scenarios are used to summarise switching processes which lead to the creation of a certain state. A scenario called "Home cinema" would for example switch off the room light, close the shutters and turn on a wall lamp. Up to 64 scenarios can be set up in Scenario configuration. These display all of the functions given in the channels which are switched to active objects. These are allocated to an individual scenario by activating a checkbox. The assigned identifying name is used as a default for the menu captions, as well as to improve orientation along the subsequent steps.
In addition to the identifying names for the scenarios, pre-settings must also be set for each channel. These pre-settings can also be changed at a later stage via the appropriate menu definition, and then saved.
Each scenario is assigned a scenario ID (1..64). The scenario ID allows scenarios to be activated and saved via the communications objects. This is fixed, even when scenarios are deleted. This means that Scenario 2 keeps ID 2 even when Scenario 1 is deleted.

Scenario ID1 is always created automatically. In denro ONE the scenario with ID1 is used as the default scenario for the push-switch on the rotating knob when the display is de-activated. Thus, a user need not be informed of the presence of the denro ONE when entering the room. He or she can still switch on the light by simply pressing the rotating knob.
Further scenarios are created by pressing the "+" button. Once this has been created, the scenario can then be given a name. In the next step, the desired channels are activated by clicking the checkbox in the respective scenario. The default values are then entered for the activated channels. These are automatically differentiated according to the selected channel - it is thus possible for example to only select between ON and OFF when switching.

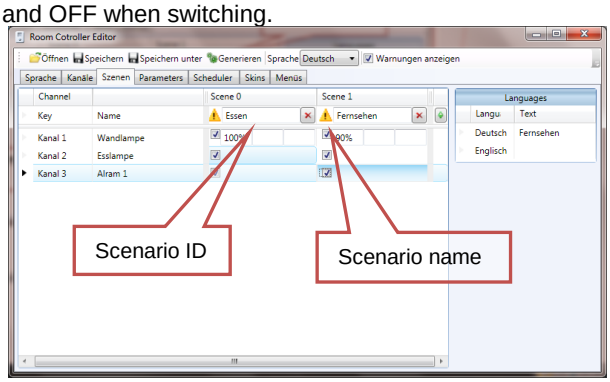


Figure 67: Scenario configuration

Right-clicking on the scenario header allows the duplication of scenarios via the context menu.

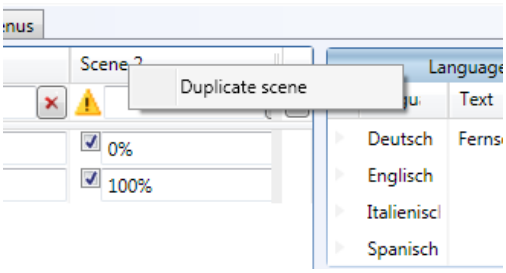


Figure 68: Duplicating scenarios via the context menu

4.8.5 Configuring the ETS parameters

The further ETS parameters are categorised together by theme under the "Parameters" tab. A selection list with further configuration themes can be found on the left-hand side. Selecting the relevant theme displays further control elements for parameter-setting on the right-hand side. The individual parameters are described in the Excel file ChannelParameterMatrix.xlsx.

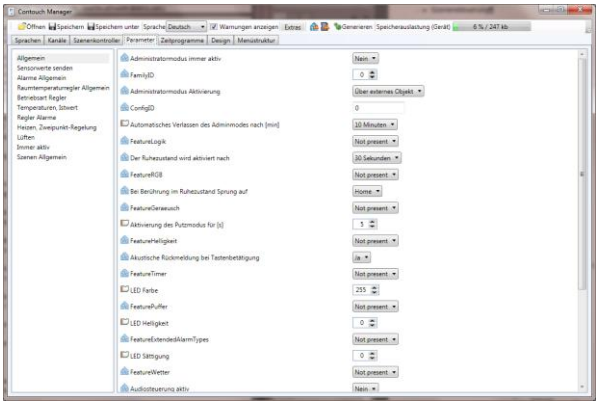


Figure 69: Parameter configuration

4.8.6 Configuring the scheduler

The scheduler enables the setting of switching programmes for the different categories - heating, scenarios and individual channels. A programme can be defined for heating, scenarios and each individual channel per weekday. A maximum of 16 switching points can be defined per programme.
The scheduler for heating is activated in "Automatic" heating operation mode.
After a power failure, past switching points for scenarios and channels are not run again. For heating, the current operation state is accepted, even if the last switching point is already past.
The scheduler is configured using the denro ONE Manager ETS plug-in. The functions (on which day of the week and at what time these are triggered) are defined here.

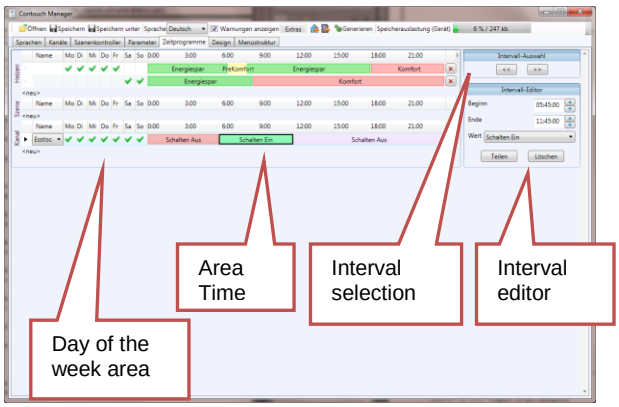


Figure 70: Configuring the scheduler

Selecting the day of the week:
Setting ticks in the Days of the week area allows programmes to be individually assigned to days of the week. It is impossible to select the same day for different programmes in the Heating and Scenario categories. These can be freely allocated in the Channels category.

?
The use in scenarios of channels which are also used in timer programmes can lead to unexpected results. It is therefore recommended that you only use channels which are not configured for scenarios, or to prevent their simultaneous activation via the day of the week.

Time:
The Time area displays intervals with their set values over time. An interval can be selected by clicking on it. The associated data are displayed in the Interval editor. The smallest interval is 15 minutes.

Interval editor:
The start and end times can be set here, together with their associated values. Room operation types must be set for the heating category, while for scenarios, a scenario must be selected. For channels, this depends on the value of the respective data type.

Interval selection:
Besides the possibility of selecting intervals by clicking on them, it is also possible to navigate between intervals via the buttons in the interval selector. This function is useful, for example when the intervals to be set are very small.

Priorities:
The timer programmes can be edited using the time control in the sequence of listed programmes, from top to bottom. This sequence is important when the same channel or the heating is set to different values in different programmes at the same time point. This can for example occur if a channel is also used in a scenario which is part of a timer programme.

4.8.7 Design selection

A variety of designs are available for the button layouts. The design is used for the overall menu structure, and cannot be individually defined for each page. A list of pre-defined designs can be selected from. A preview is available for each design. The design can be changed at any time. After any change in the design, it is necessary to transfer the configuration data to the denro ONE using the microSD card.

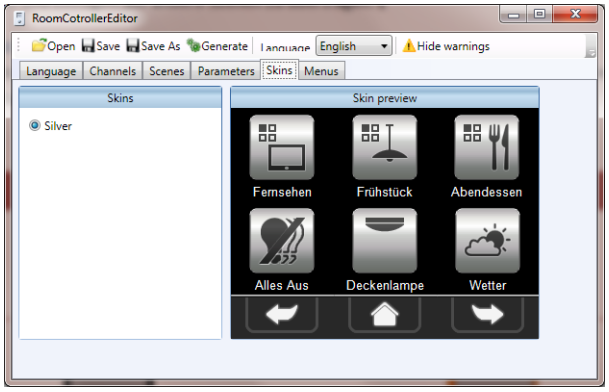


Figure 71: Design selection

4.8.8 Configuring the menu structure

4.8.8.1 General structure of the "Menu" work area

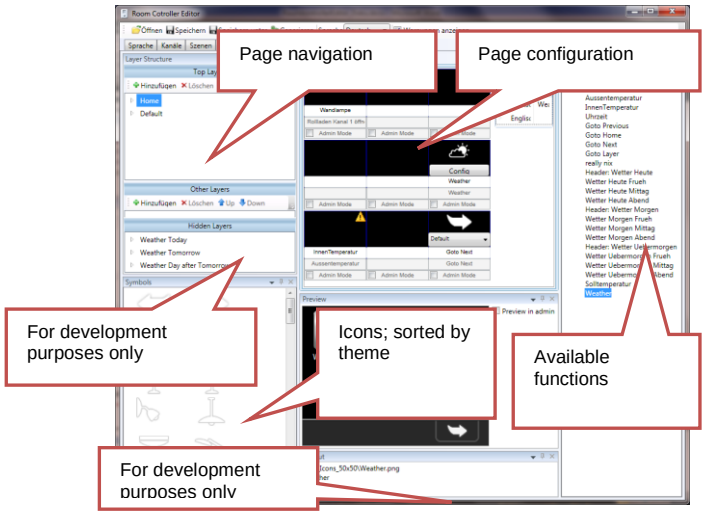


Figure 72: ""Menu" work area

4.8.8.2 General denro ONE screen layout

The menu structure is defined using a graphic editor. To make configuration easier, different templates are available for individual pages. The standard layout comprises 6 function and 3 navigation buttons.

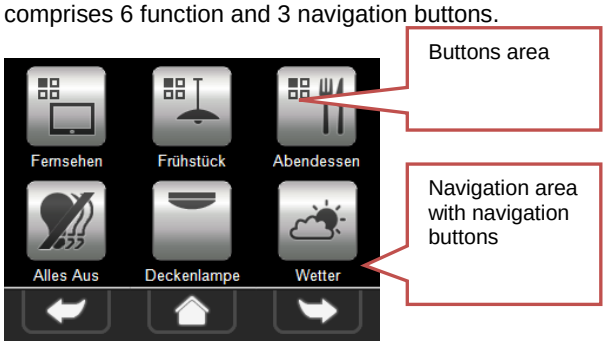


Figure 73: General denro ONE screen layout

4.8.8.3 Navigation buttons

The navigation buttons enable switching between the previous, the next and the home pages. The navigation buttons are automatically generated and cannot then be changed.

4.8.9 Inserting pages

Pages are inserted by clicking the "+" Add button in the page navigation window. This opens a dialogue box to prompt you to select a template for the page layout.

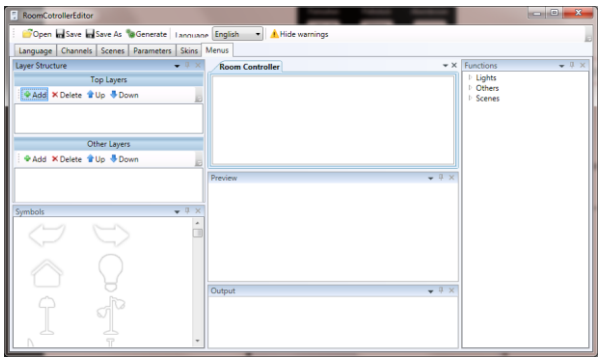


Figure 74: Inserting a page

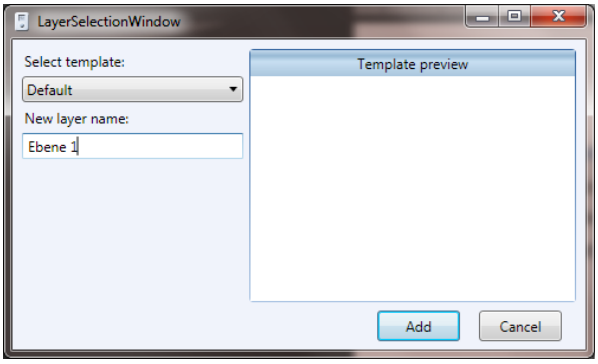


Figure 75: Selecting a page template

The sequence of pages can be changed using the "Up" and "Down" buttons. The top page is also the start page. This has a special function, in that instead of the "Back" and "Start" navigation buttons, further functions such as a clock can be positioned here. The home page is always available and cannot be removed or moved to a deeper location.

4.8.9.1 Assigning functions to buttons

Each function button can be assigned a function (switching, dimming, blind channel, temperature, navigation to other pages, etc.) and an icon by dragging and dropping from the menu. The text is transferred from the function description or channel description, but can however be individually edited.

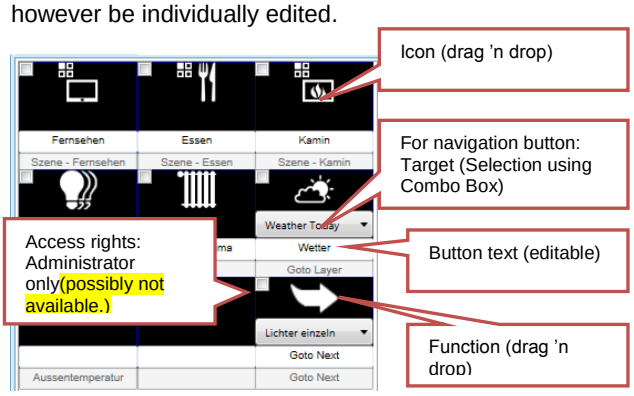


Figure 76: Assigning functions to buttons

Each function is automatically assigned to a suitable control element. Besides traditional control elements such as buttons, more complex control elements such as buttons with progress bars and buttons which call up further pages can be integrated. One example of a

button which calls up further pages is the weather control element. Positioning the weather control element automatically adds the three weather forecast pages. These pages can be neither be directly altered or individually deleted. Deleting the weather control element also deletes the associated pages.

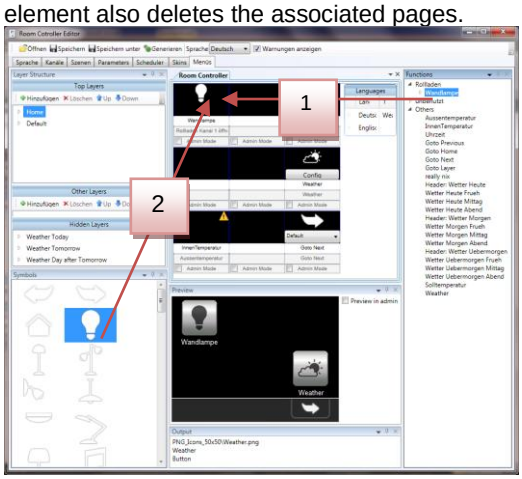


Figure 77: Designing the menus using drag 'n drop

4.9 Automatic generation of group addresses and group address connections

The plug-in version of the denro ONE Manager offers the possibility of automatically generating group addresses and connections thereto for all active communications objects in the denro ONE. This behaviour is configured using the Extras -> Automatic group addresses menu item. This menu is not available in the "Standalone programme" version.

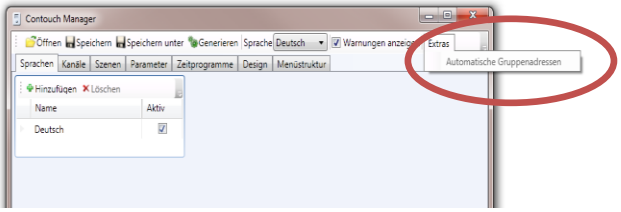


Figure 78: 'Automatic group addresses' menu

After selecting the menu item, a configuration dialog box appears. The following parameters are set here.

- Main and middle groups are generated in the group addresses
- Start group addresses from which this generation starts (group addresses are generated with consecutive addresses)

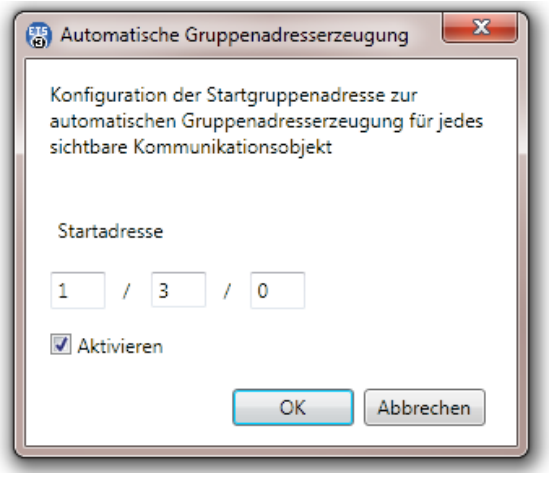


Figure 79: Dialog box for the configuration of automatic group address generation

When automatic group address generation is activated, when the editor is terminated by clicking OK, a group address is generated for each active communications object, and a connection to this is created. This starts at the defined start address and is counted upwards. Already "occupied" group addresses are skipped. No group address is generated for communications objects which already have a connection to a group address. When the maximum number of group addresses (255) is exceeded when generating group addresses, an error message is shown. In this event, the Editor can be called up again and another group address area can be selected for the remaining communications objects. The group addresses are generated according to the following naming scheme:
<Room/plant name>.<Unit name>.<Communications object name>
Example: Living room. denro ONE.Cooling

The unit name is composed of the value of the ***Description*** ETS field and "denro ONE".
The maximum number of characters available for the individual name components is derived from the maximum group address name length (50) and the number of components (3).

4.10 Firmware Manager

The Editor is supplied as standard with a defined version of the firmware files. This can be found in the ".\Input" directory and is transferred to the unit during generation.

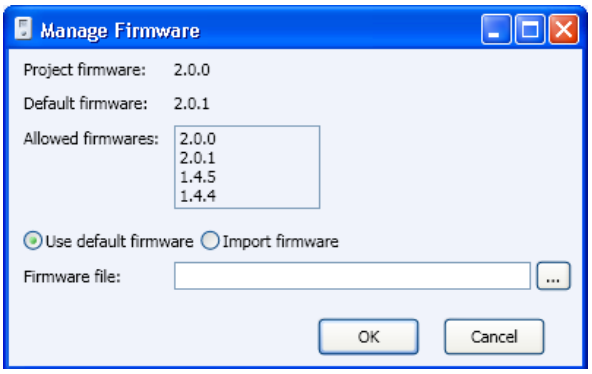


Figure 80 Firmware Manager

An adjusted firmware file (e.g.: rc_V1.0.0.firmware) can be imported by means of an appropriate button or a menu entry. In this way, the only files accepted are those whose version number is equal to that defined during the setup configuration. In the event of a failure, an appropriate message is displayed. The imported firmware file is saved together with the project (as project data or in the ETS project) and used during generation instead of the standard file. Saving these within the project ensures that all required information is available should the project be transferred.
If the standard file (with a matching version number) is selected for import, the firmware file saved in the project is deleted, and the standard file is then again transferred during generation.

4.11 Exporting and importing configuration data

The configuration can be saved in a file using the Export and Import (ETS plug-in) as well Open and Save (denro ONE Manager) buttons, and can then be read from this. The KNX bus parameters and group address connections are also saved and read in the same way. When importing, the existing group address connections are deleted. Missing group addresses are inserted. Group address names and comments are created for newly generated group addresses, but not for existing ones.

4.12 Transferring the parameters and menu structure to the denro ONE

4.12.1 Completeness check

The completeness of the configuration is continually checked during input. The following are checked:

- Presence of all texts in all languages
- Are all functions accessible? This includes not only the channels but also scenarios and alarm functions

4.12.2 Generating the configuration data (binary data on the SD card)

Clicking on the "Generate" button generates the configuration data which was not transferred via the KNX bus (menu structure, etc.) and writes this into the ".\Output" folder.
The configuration data are checked for errors or warnings before generation. If this is the case, a dialog box is displayed which lists the warnings/errors. After confirming this dialog box, a tab is displayed which once again lists these messages, so that the causes can be resolved. In the event of an error, the generation of the configuration data is interrupted.
The "RC.bin" firmware file is also copied into the ".\Output" folder. The firmware file imported into the project is used as source. If no firmware file has been imported, the standard file is used.
If a file named "RC-Programming-card.info" is found in the root directory of the removable disk, this is interpreted as a denro ONE microSD and the configuration data are automatically copied to this card. If no removable disk is found with this file, you will then be prompted to select the disk.

☛ Existing data are overwritten without prompting!

The microSD card is then inserted into the denro ONE, and the denro ONE restarted. Please see the detailed description in the denro ONE specification.

4.12.3 Transferring the parameters to the BCU

Clicking the "OK" button in ETS plug-in mode saves all configuration data into the ETS database, hides and displays the communications objects if necessary, and adjusts the names according to the channel designation. The imported group address configuration is created (see Chapter 4.11).
If the "Automatic group addresses" option is activated (see Chapter 4.9), this is created.
The denro ONE must then be programmed using the "Programming parameters and/or group addresses" ETS function.

ATTENTION: Certain parameters require an update to the BCU using the ETS **and** denro ONE via the microSD card. For this, the BCU must first be programmed; only after this can the parameters be updated using the microSD card. Should the process be reversed, the copying of the parameters from the microSD card is denied and the denro ONE displays an error message.

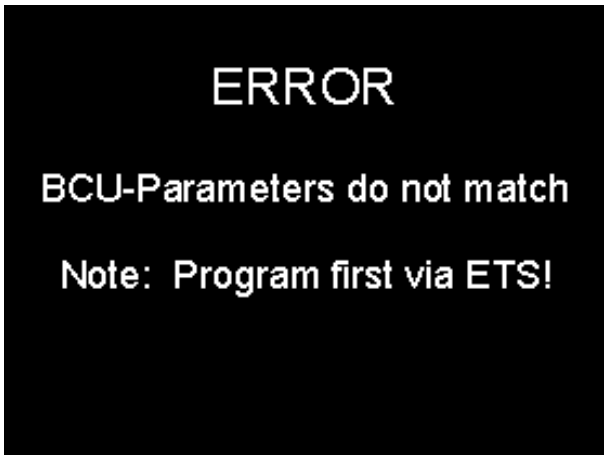


Figure 81 Error message in the event that the BCU and operating unit parameters do not match

- A language-specific error message is not available, as the menu and language entries are not loaded during an error. Similarly, no designs are used to display the error message.

In the event that a denro ONE has never received a correct configuration via the microSD card, the LED flashes white in the event of an error.