Manual and configuration

Enertex® KNX LED Dimmsequenzer 20A/5x
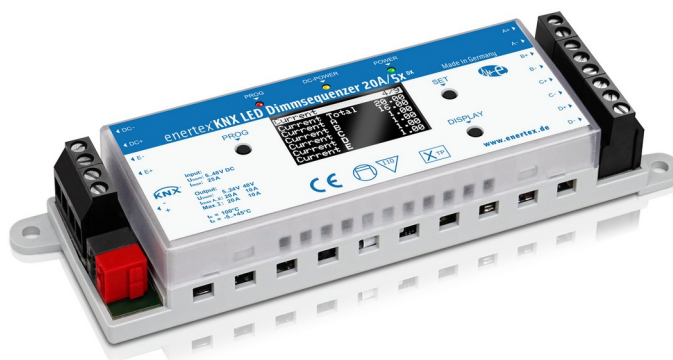
For variants REG and DK

Note

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Contents

Notes

- Installation and assembly of electrical devices may only be carried out by qualified electricians.

- When connecting KNX interfaces, specialist knowledge gained through KNX training is assumed.

- Failure to observe the instructions may result in damage to the device, fire or other hazards.

- These instructions are part of the product and must remain with the end user.

- The manufacturer is not liable for any costs or damages incurred by the user or third parties due to the use of this device, misuse or malfunctions of the connection, malfunctions of the device or the subscriber devices.

- Opening the housing, other unauthorized changes and or modifications to the device will void the warranty!

- The manufacturer is not liable for improper use.

Function

Variants

The Enertex® KNX LED Dimmsequenzer 20A/5x is a pulse width modulating dimmer for LED modules with constant input voltage, as is the case with most LED lightnings today.
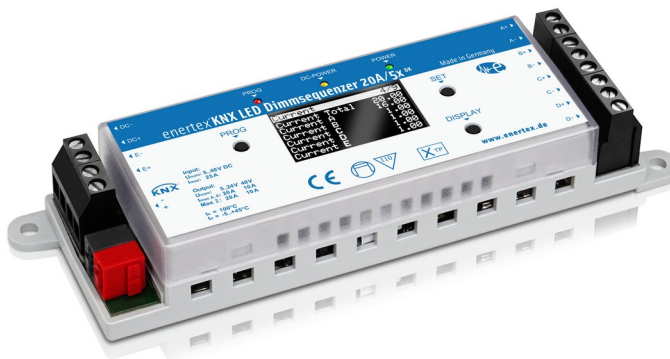
Figure 1: Enertex® KNX LED Dimmsequenzer 20A/5x DK

Figure 1: Enertex® KNX LED Dimmsequenzer 20A/5x REG

The dimmer is available in two design variants: For installation for ceiling mounting (Enertex® KNX LED Dimmsequenzer 20A/5x DK) or as a rail-mounted device with 4 SU (Enertex® KNX LED Dimmsequenzer 20A/5x REG). In the commissioning chapter, explicit reference is made to the differences at the relevant points. The software description applies to both variants.

Brief description

Up to five LED channels can be switched and dimmed via the KNX bus. In total, the dimmer can dim 20A LED current, whereby the power can be distributed as desired over all channels. The total load of the five channels is thereby optimally distributed by the dimming sequencer over the complete switching cycle, which significantly reduces stress on the integrated circuit, as well as on the components of the upstream LED power supply, thereby increasing the expected lifetime of the components.

Lighting scenes can be pre-configured, stored and replayed, also using 1-bit group addresses, to implement lighting control with a simple motion detector, for example: The scene then retrieves a specific color mixture, e.g. of the RGB - illuminants.

Sequences are procedures of color controls in the range of seconds to hours. Thus the lighting is changed e.g. with smooth color changes over a certain period of time. The Enertex® KNX LED Dimmsequenzer 20A/5x has predefined color sequences. This makes the use of this "mood lighting" very easy during commissioning. In addition, the parameterization of own color sequences is possible with the help of the ETS application.

Furthermore, time-controlled sequences are also available, with the help of which the illuminants can be controlled differently depending on the time or relative to sunrise or sunset.

A "stairway lighting function" is also available for all operating modes, which makes it possible to switch off, for example, a light triggered by a motion detector after a parameterizable time.

The Enertex® KNX LED Dimmsequenzer 20A/5x can be adapted to one of the following applications:

- Five independent channels

- RGBCCT: One channel color (Red / Green / Blue / Cool White / Warm White)

  ◦ Application A: Extended RGB: RGB color control with optional automatic white balance, see chapter RGBCCT: Extended-RGB

  ◦ Application B: Extended TW: RGB color control with optional extended TW range,

see chapter RGBCCT: Extended-TW

- RGBW: One channel color (red / green / blue / white) + one independent channel.

  - RGBW Application A: Extended RGB: RGB color control with optional automatic white balance, see chapter Automatic white balance

  - RGBW Application B: Simulated TW: RGB color control with simulated TW range, see chapter RGB: Simulated TW

- RGB: One channel color (Red / Green / Blue) + two independent channels or one Tunable White channel (Cool White / Warm White).

- Two Tunable White channels (cool white / warm white) + one independent channel

- One Tunable White channel + three independent channels

The colors can be controlled either via the primary colors red, green and blue (color mode RGB) or via hue, saturation and brightness (color mode HSV). The control of the color temperature for Tunable White channels takes place either via the percentage of cold white light or via the specification of a temperature value in Kelvin.

Undervoltage, overcurrent and overtemperature can be detected via communication objects. These protective functions, which have been "implemented in hardware" represent an important feature of the Enertex® KNX LED Dimmsequenzer 20A/5x. In these cases, the protection function automatically switches off the connected LED modules. The shutdown is specific, i.e. if an error is only present on one channel, only this channel will be shut down. After elimination of the error, the dimmer restarts automatically.

In addition, the Enertex® KNX LED Dimmsequenzer 20A/5x has an integrated reverse polarity protection, so that during commissioning possible damage due to reverse polarity of the input is excluded. The output (connection of the LED modules) is not critical for the Enertex® KNX LED Dimmsequenzer 20A/5x in this respect.

In addition to these integrated protection functions, protection functions for illuminants or power supply units can also be parameterized. By entering the continuous power and overload capacity of the illuminants or the power supply unit, overload scenarios can be detected. These can be signaled by group objects and, if desired (parameterizable), also lead to shutdown.

The measured values required for these protective functions, such as power supply voltage, current, voltage at the lamp and internal housing temperature, are also made available to the user by means of communication objects. Integrated energy and energy cost counters also provide a detailed cost breakdown of the installed illuminants.

For simple diagnostics and error analysis on the KNX-bus, measured values are available for the average or maximum telegram rate (send direction), as well as a parameterizable telegram rate limitation.

The technical hardware data in the overview:

- 480 W dimming power

- 5 dimming channels pulse width modulated with max. 20 A per channel (note max. permissible currents according to chapter technical data)

- Variable voltage input and output 5..48 V

- Current, voltage and power measurement

- Integrated protection with integrated display against

  - Overcurrent / short circuit

  - Undervoltage

  - Overtemperature

  - Reverse polarity

- Extensive commissioning functions directly on the device by means of push buttons

and OLED display

- Double furniture label (DK variant only)

The main features of the software

- Dimmer addressable in RGB mode or HSV color space mode
- Four different dimming characteristics to choose from with integrated soft dimming function and deep down dimming
- PWM-frequency adjustable between 211 and 1200 Hz for optimal adaptation to the light source
- Free configuration of channels
- Integrated scenes and bit scenes
- Predefined and freely definable sequences
- Time-controlled dimming or Human Centric Lighting (HCL)
- Stairway lighting function
- Locking functions
- Diagnosis/notification of protective functions via KNX group addresses
- Extended protection functions for lamps and power supply
- Measuring and counter functions
- Determination of the lamp voltage (voltage drop via line feed)

Display and control elements

The Enertex® KNX LED Dimmsequenzer 20A/5x features the following display and control elements:

Button / LED	Function
LED „PROG"	Display of the KNX programming mode
LED „DC-POWER"	Operating voltage display LED Power supply (from DC > 4 V)
LED „POWER"	Bus power supply KNX
OLED Display	Display of faults, measured values Commissioning parameters
Button PROG	KNX programming button; Button press > 10s resets the device to factory settings
Button DISPLAY	Activation of the display and navigation to the next page / next entry
Button SET	Selection of the chosen entry

Table 1: Display and control elements

Overcurrent shutdown and illuminant

A common characteristic of LED lamps is a very high inrush current, which is often many times higher than the continuous current during operation (see Fig. 2). For error-free and safe operation, the LED controller must be able to distinguish the inrush current from the continuous current. In the Enertex® KNX LED Dimmsequenzer 20A/5x, the overcurrent shutdown has been dimensioned in such a way that it reliably switches off continuous currents of over 20 A, but does not consider inrush currents of up to 100 A as a fault condition.
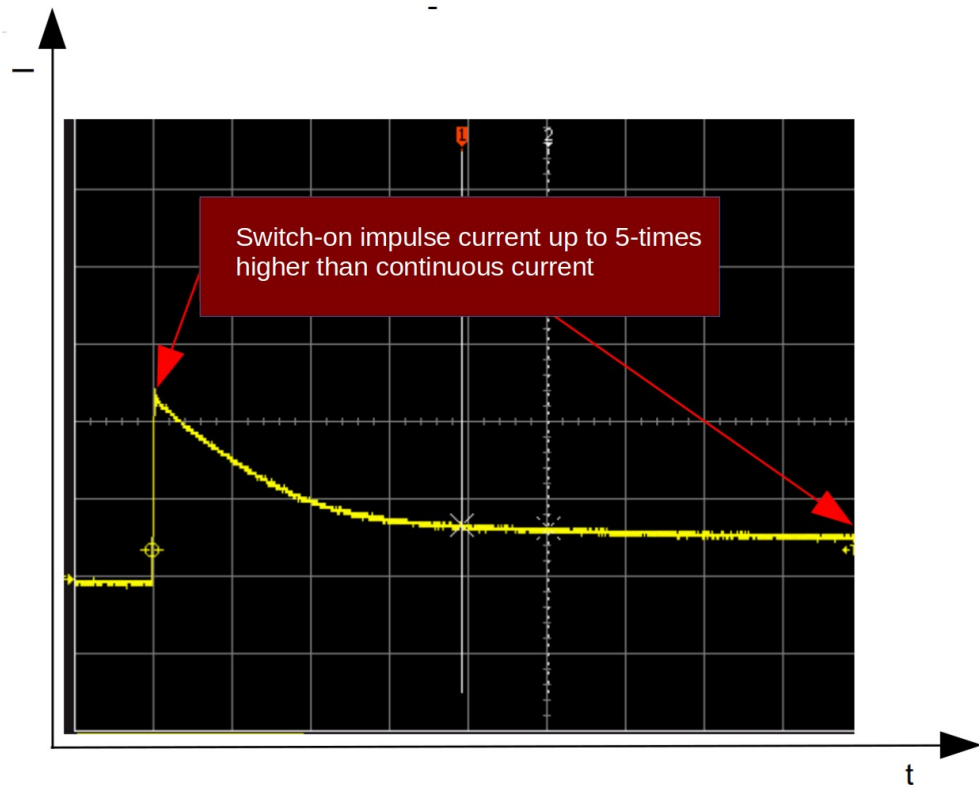
Figure 2: Example: Switch-on pulse Commissioning

Connection sketches and notes
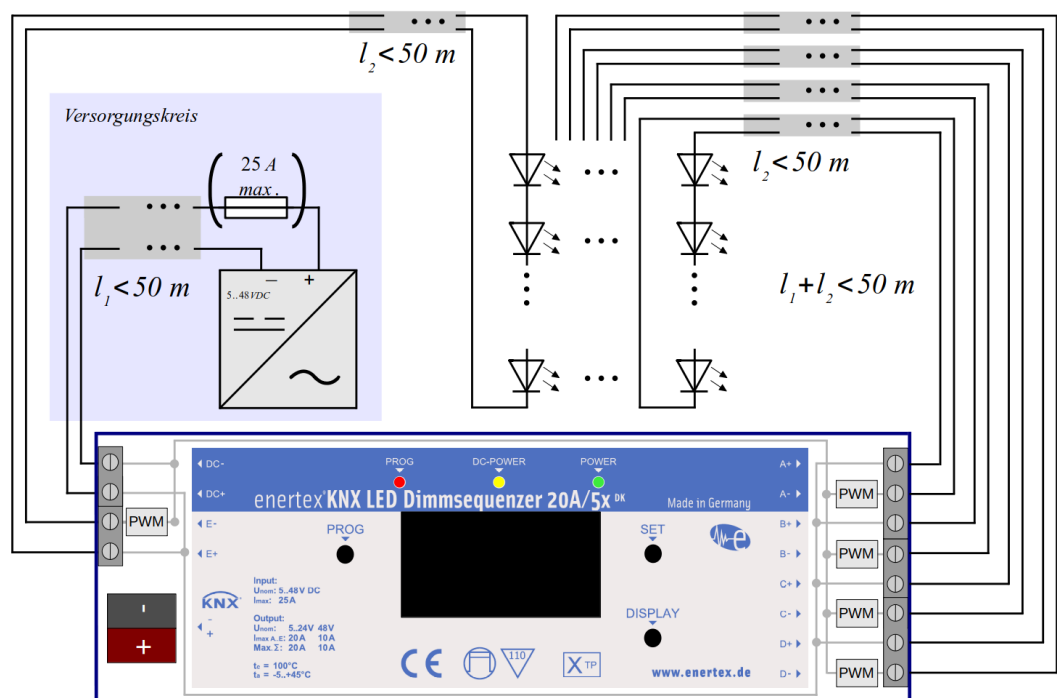
Figure 3: Connection diagram variant DK
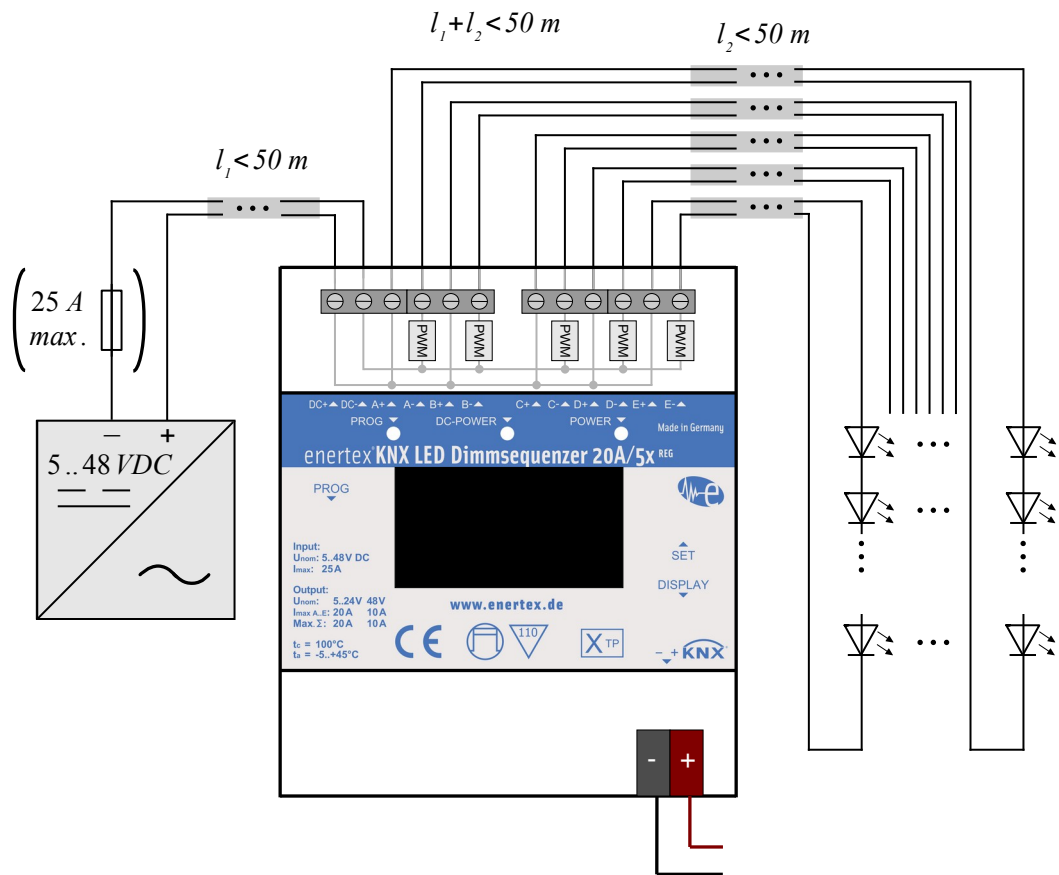
Figure 4: Connection diagram variant REG

CAUTION! DANGER!

Electric shock when touching voltage-carrying parts. Electric shock can lead to death. Before working on the device, disconnect the connecting lines and cover voltage-carrying parts in the vicinity!

KNX bus, LED power supply and LED modules must be connected to the Enertex® KNX LED Dimmsequenzer 20A/5x **according to the specification**.

The following applies for the assignment of colors to the outputs:

	RGBCCT	**RGBW + 1x EK**	**RGB + 2x EK**	**RGB + TW**	**2x TW + 1x EK**	**1x TW + 3x EK**
Channel A	Red	Red	Red	Red	Independent single channel	Independent single channel
Channel B	Green	Green	Green	Green	Cold white 1	Independent single channel
Channel C	Blue	Blue	Blue	Blue	Warm white 1	Independent single channel
Channel D	Cold white	White	Independent single channel	Cold white	Cold white 2	Cold white
Channel E	Warm white	Independent single channel	Independent single channel	Warm white	Warm white 2	Warm white

Table 2: Channel assignment

Connect the external power supply to the screw terminals DC+ and DC- according to the connection diagram. When using a power supply whose rated current is less than 25 A and which also has an overload or overcurrent protection function, it is not necessary to install the fuse shown in the above diagram. The power supply must be certified according to the lamp stan-

dards IEC 61347-1 and 61347-2-13. We recommend the Enertex LED PowerSupply 160. If the overload or an overcurrent protection function is not available in the set power supply, the additional fuse against it is necessary. If the power supply does not meet the lamp standards, the operation is not allowed.

Wires with appropriate current carrying capacity must be selected at the screw terminals. Refer to the Technical Data section at the end of this document for maximum allowable currents per channel.

Lead wires to lighting are to be connected to the terminal A+, B+, C+, D+ or E+ according to the connection diagram. If the total current is permissible (observe the conductor cross-section!), a common forward conductor can be used for several lamp strings. In this case, this forward conductor can be connected to any + terminal, since the outputs A+, B+, C+, D+ or E+ are internally connected to each other.

Return conductors from lighting are to be connected to terminal A-, B-, C-, D- or E- according to the connection diagram.

The maximum load per channel and the maximum total load over all channels must not be exceeded (see chapter Technical Data).

The outputs of the LED channels must not be connected to each other. It is not possible to combine LED channels.

The specified conductor cross-sections must be observed!

Commissioning functions

In addition to the simple readout of various measured variables, the integrated display user interface also releases the temporary adjustment of some parameters for optimum adaptation to the illuminant (test modes). This means that by means of these commissioning functions, for example, the desired dimming curve can be quickly determined by trial and error, but the permanent parameterization must then be carried out as usual in the ETS.

Furthermore, the UI offers the possibility of a 1-touch commissioning: In this case, the dimmer moves each channel once to 100% and measures current and voltage there. This is a simple way to verify the correct wiring and dimensioning of the system (power supply, dimming sequencer, lamps).

Navigation in the UI is done by means of the DISPLAY and SET buttons:

- DISPLAY: Next page / Next entry
- SET: Select entry

Menu structure

#	Page name	Designation	Description
1	Alarms 1	UnderVoltage	Alarm undervoltage (LED power supply) Possible status: OK: Voltage OK ALARM: Undervoltage N/A: Value not yet available (first 2 seconds after startup)
		OverVoltage	Alarm overvoltage (LED power supply) Possible status: OK: Voltage OK ALARM: Overvoltage N/A: Value not yet available (first 2 seconds after startup)
		OverTemperature	Alarm overtemperature (dimmer internal) Possible status: OK: Temperature OK ALARM: Overtemperature N/A: Value not yet available (first 2 seconds after startup)

#	Page name	Designation	Description
		OverCurrent Total	Alarm overcurrent sum Possible status: OK: Total current OK ALARM: Total overcurrent N/A: Value not yet available (first 2 seconds after startup).
2	Alarms 2	OverCurrent A	Alarm overcurrent channel A Possible status: OK: Channel current OK ALARM: Channel overcurrent N/A: Value not yet available (first 2 seconds after start-up)
		OverCurrent B	Alarm OverCurrent Channel B Possible status: like OverCurrent A
		OverCurrent C	Alarm OverCurrent Channel C Possible status: like OverCurrent A
		OverCurrent D	Alarm OverCurrent Channel D Possible status: like OverCurrent A
		OverCurrent E	Alarm OverCurrent Channel E Possible status: like OverCurrent A
3	Protection	PowerSupply	Power supply protection Possible status: OK: Power supply protection active, no error CONT: Power supply protection active, continuous power exceeded I2T: Power supply protection active, I²t value exceeded MAX: Power supply protection active, maximum power exceeded UNLOADED: Power supply protection inactive, application discharged N/A: Power supply protection inactive, deactivated in parameters
		Protection A	Illuminant protection channel A Possible status: like Protection/PowerSupply
		Protection B	Illuminant protection channel B Possible status: like Protection/PowerSupply
		Protection C	Illuminant protection channel C Possible status: like Protection/PowerSupply
		Protection D	Illuminant protection channel D Possible status: like Protection/PowerSupply
		Protection E	Illuminant protection channel E Possible status: like Protection/PowerSupply
4	1-Touch- Com-missioning 1	START	Use SET to switch to the START menu: START: Starts 1-touch commissioning Cancel: Termination
		Status	Displays the status of 1-touch commissioning - possible status: Standby: 1-touch commissioning has not yet been executed. Dim A: Dim channel A high Check A: Measure current and voltage channel A Dim All: Dim all channels high Check All: Measure total current and voltage Completed: 1-touch commissioning completed N/A: Status undefined
		MaxCurrTot	Maximum total current N/A: Measurement not yet performed
		MaxPoweSup	Maximum power at power supply N/A: Measurement not yet performed
		MinVoltSup	Minimum voltage at power supply (max. power) N/A: Measurement not yet performed
		<Exit>	Change from operating mode to display mode
5	1-Touch-Com-missioning 2	MaxCurrA	Maximum current channel A N/A: Measurement not yet performed

#	Page name	Designation	Description
		MaxPoweA	Maximum power channel A N/A: measurement not yet performed
		MinVoltA	Minimum voltage on the illuminant A (corresponds to the CO commissioning voltage A). N/A: mesaurement not yet performed
		MaxCurrB	Maximum current channel B N/A: mesaurement not yet performed
		MaxPoweB	Maximum power channel B N/A: mesaurement not yet performed
		MinVoltB	Minimum voltage on the illuminant B (corresponds to the CO commissioning voltage B). N/A: mesaurement not yet performed
6	1-Touch-Commissioning 3	Follow-up channels analog to 1-touch startup 2	Follow-up channels analog to 1-touch startup 2
7	1-Touch-Commissioning 4	Follow-up channels analog to 1-touch startup 2	Follow-up channels analog to 1-touch startup 2
8	Test modes	Test pwm freq 1	Use SET to switch to the frequency test menu. Use DISPLAY to switch through the different frequencies. All channels oscillate with the selected frequency. SET or <CANCEL> terminates the test mode. The frequency is not permanently adopted (test mode).
		Test pwm freq 2	Analog to test pwm freq 1 with other frequencies
		Test dim curve	Use SET to switch to the dimming curve test menu. Use DISPLAY to switch through the various dimming curves. All channels oscillate with the selected dimming curve. SET or <CANCEL> terminates the test mode. The dimming curve is not permanently adopted (test mode).
		Test dim speed	Use SET to switch to the dimming speed test menu. Use DISPLAY to switch through the different speeds. All channels oscillate at the selected speed. SET or <CANCEL> terminates the test mode. The speed is not permanently adopted (test mode).
		Switch all	Use SET to switch to the Switch All menu. Use DISPLAY to select whether to switch ON or OFF. SET executes the selected option. All channels oscillate with the selected speed. The menu can be exited by pressing <CANCEL>.
		<Exit>	Change from operating mode to display mode
9	Current	Current Total	Current measurement total N/A: Value not yet available (first 2 seconds after startup).
		Current A	Current measurement channel A N/A: Value not yet available (first 2 seconds after start)
		Current B	Current measurement channel B N/A: Value not yet available (first 2 seconds after start)
		Current C	Current measurement channel C N/A: Value not yet available (first 2 seconds after start)
		Current D	Current measurement channel D N/A: Value not yet available (first 2 seconds after start)
		Current E	Current measurement channel E N/A: Value not yet available (first 2 seconds after start)
10	Voltage / Temp	PowerSupply	Voltage measurement DC input
		KNX bus	KNX bus voltage

#	Page name	Designation	Description
		Temp	Device temperature (corresponds to the communication object Device temperature)
11	Brightness	Brightness A	Channel brightness A
		Brightness B	Channel brightness B
		Brightness C	Channel brightness C
		Brightness D	Channel brightness D
		Brightness E	Channel brightness E
12	Change Brightness	Brightness A	Use SET to switch to the brightness change menu. Use DISPLAY to select whether to dim up (+) or down (-). <OK> accepts the current dimming value <CANCEL> exit menu
		Brightness B	Analog to Brightness A
		Brightness C	Analog to Brightness A
		Brightness D	Analog to Brightness A
		Brightness E	Analog to Brightness A
		<Exit>	Change from operating mode to display mode
13	Device info	Phy. address	Physical address (KNX)
		Serial number	Serial number
		FW version	Firmware version
		HW revision	Hardware revision
		Time valid	Displays the current time INVALID, if not set
		Date valid	Displays the current date INVALID, if not set
14	FDSK	FDSK	Key for Secure commissioning not visible if device is in secure mode

Table 3: Menu structure Display-UI

Application instructions

This chapter provides background information on the various application scenarios and parameterization options of the Enertex® KNX LED Dimmsequenzer 20A/5x. A detailed description of the ETS application follows later in the chapter ETS Application. Within the individual chapters, there are often cross-references to the corresponding parameter descriptions. The parameter descriptions contain cross-references to the explanations.

Dimming characteristics

The dimming sequencer offers four different dimming curves to choose from:

- Linear,

- Exponential,

- Power function,

- Enertex.

The human eye generally perceives brightness values logarithmically, i.e. at twice the light intensity, the human eye does not perceive the brightness to be twice as high, but much lower. Although effects such as pupil aperture and the light-dark adaptation of the visual cones and rods also play a major role, visual perception is often modeled logarithmically. It is assumed that, for example, with double illumination, the "perceived" brightness increases by a factor of only 1.4.

Control via KNX-compliant % values is performed in a total of 255 steps. Therefore the control of the LEDs is done in 255 discrete steps. These control points (=brightness of the LED) must be distributed by the Enertex® KNX LED Dimmsequenzer 20A/5x over the possible dimming range (see figure 5). The dimming characteristic of the dimmer can be set in the ETS application.

Dimming curve

Note

The following statements about perception are partly subjective and may differ from person to person in individual cases. The actual perception also depends on other factors, such as the LEDs, their integrated control circuitry, their characteristic curves, etc. Nevertheless, the tendency of the differences should be clarified.
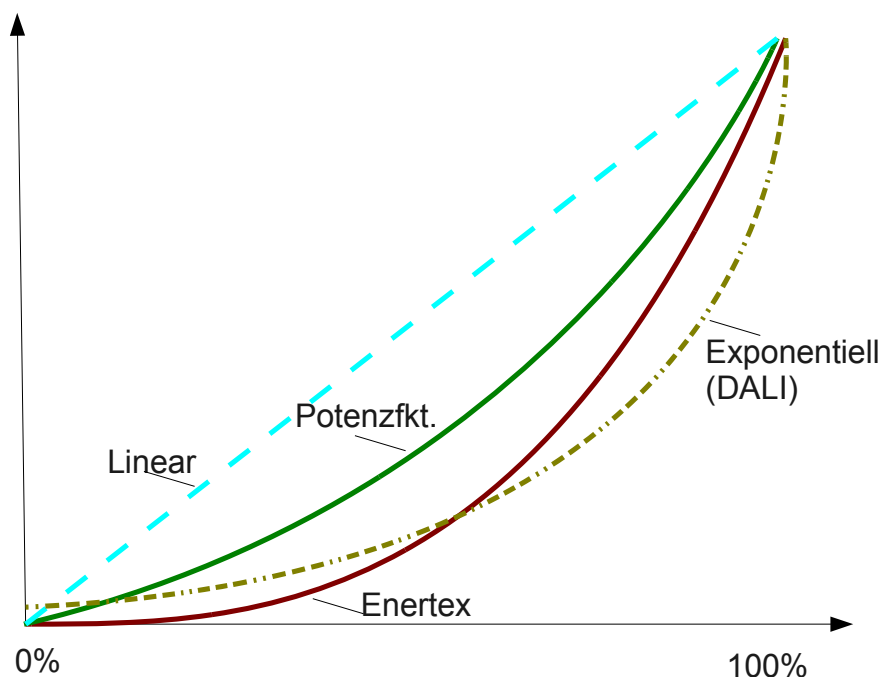
Figure 5: Dimming Curves

Linear

For humans[1], an increase in the upper range of the control (> 80% to 100%) is usually perceived as smaller with this characteristic curve. In the lower range (<10%), on the other hand, a small increase in the control value will have a large effect for the human eye. In the range 40 to 60%, the subjective perception of the brightness change is often quite good.

Note: If the CW component is shifted in the cold/warm white operating mode with the corresponding objects, this will result in a slight "dent" in the sum brightness during the dimming process, if a dimming curve other than the linear one is selected. If this behavior is not acceptable, the linear curve must be selected in this case. At the end of the dimming process, the total brightness for each curve is then equal to the initial brightness again.

Exponential

Based on the assumption that the perception is logarithmic, an exponential control is implemented for DALI illuminants, for example (inverse function). This is provided with an offset in the lower range, i.e. when the LEDs are switched on, a clear jump in brightness will be perceptible once. Often the LEDs cannot be dimmed down to the lower limit with this characteristic. In the range up to 40%, the dimming behavior is very soft and largely corresponds to perception. From about 50%, the step is relatively large, so that the increase by a few percentage steps can pretend to the perception of a significantly higher increase. Overall, this dimming curve of the Enertex® KNX LED Dimmsequenzer 20A/5x is based on the DALI standard.

Power function

In the upper dimming range (from 60%), this dimming curve usually reproduces the perception regarding brightness very well. In the range up to 10%, the gradation is better adapted to the eye than is the case with the linear curve, but subjectively less good than the exponential dimming curve. The dimming curve itself is derived as a mathematical power function.

Enertex

This dimming curve is a mixture of the three linear, exponential and potential dimming curves mentioned so far. It can be dimmed very far in the lower range and is adjusted as evenly as possible to the sensation of the eye in all other ranges. This curve has been specially adapted at Enertex® Bayern GmbH to the dimming behavior of the dimming sequencer and connected

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1 assuming a logarithmic perceptual characteristic curve

LEDs and is highly recommended in residential areas.

General note:

For single channel operation the curve "Enertex" is recommended, because here a steady brightness increase/decrease for the eye has been implemented. For RGB and TW channel groups, on the other hand, the linear dimming curve is recommended if the colors or color temperatures are to be changed frequently and value is placed on color-true reproduction. If this is not the case, the "Enertex" curve is also considered to be the more beautiful (more uniform). Depending on the illuminant and the selected dimming curve, it can happen that this only switches on the LEDs from 3% brightness control. To make this comfortable for the user in such situations, a "restriction" of the dimming range can be defined for the dimming channel (cf. chapter Restrict dimming range, S. 16)

Dimming behavior

In addition to the effects mentioned for human perception, which result from this splitting of the dimming curves into 255 individual points, an important unique selling point of the Enertex® KNX LED Dimmsequenzer 20A/5x is the "soft" dimming during the transition from a certain starting point to an end point.

Due to a special control of the dimmer, no step, i.e. sudden change in brightness of the illuminants is perceptible even during slow dimming and dimming is continuous at all times.

With short dimming times over a larger range, this control ensures that no flickering occurs for the human eye.

Even in the lowest brightness range (<5%), the control releases continuous dimming of the illuminants, so that for the human eye, the LEDs are switched off or on without a noticeable jump in brightness.

With the Enertex® KNX LED Dimmsequenzer 20A/5x, flickering is avoided regardless of the choice of dimming curve; the transitions are always smooth or appear jerk-free.

Restrict dimming range

The dimming ranges can be restricted. The options Restrict and Spread are available for the single channel and Tunable White operating modes, and minimum and maximum values can be parameterized. In RGB operating mode, only maximum values can be specified and it always follows the principle of spreading (=scaling).

An absolute dimming value of 0 leads to switching off in every parameterization.
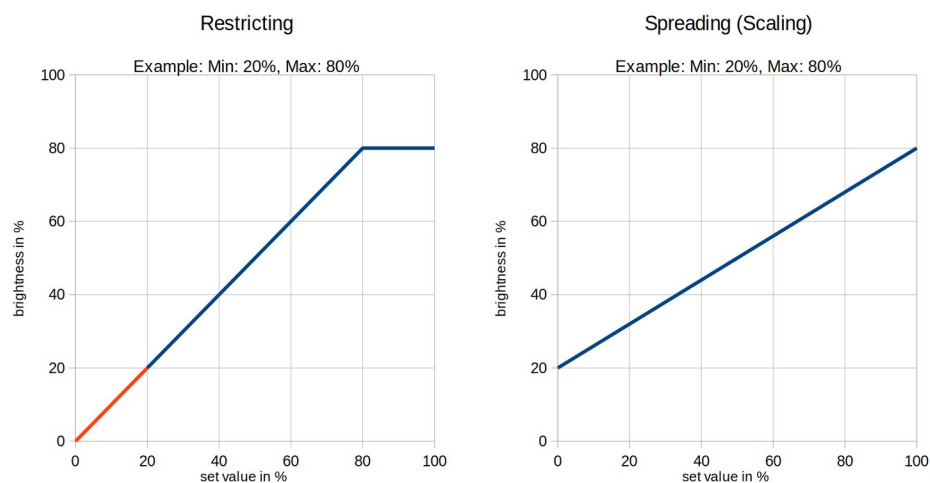
Figure 6: Restricting the dimming range - comparison restricting and spreading (scaling)

Measurements and counters

→ Parameter: Measurements and counters

Measurements

→ Parameter: Measurements

The Enertex® KNX LED Dimmsequenzer 20A/5x has integrated measuring circuits for current, voltage, temperature and telegram rate and can show these measured values on the display and, if desired, also make them available via CO. All measured values can be sent to the bus cyclically and/or on change. For the value output of current, voltage and temperature values, different KNX data types are also available in each case.

Line losses: In order to be able to calculate the voltage at the illuminant using the internally measured voltage at the channel, the cable length and cross-section must be parameterized in the application in the "Measurements and counters" tab, as well as whether the channels have a common return line, which is often the case with RGB illuminants, for example.

Note: This information about the conductors is also mandatory for a correct function of the lamp protection (see chapter Alarm objects and protection functions).

Counter

→ Parameter: Counter

The integrated energy meter counts the energy consumed on the mains side, based on a (parameterizable) average efficiency of the upstream LED power supply. The energy meter also becomes a cost meter by means of a parameterizable electricity price. Both meters can be used as a totalizer and/or per channel/channel group.

Alarm objects and protection functions

→ Parameter: Alarm objects and protection functions

The dimming sequencer provides various 1-bit alarm objects that indicate the activity of the integrated protection circuits for undervoltage (power supply voltage), overtemperature and overcurrent (channel-specific). The thresholds for triggering these protective shutdowns are "cast in hardware" and cannot be parameterized. The protective shutdowns are self-healing, i.e. as soon as the cause of the fault is eliminated, the channels are switched on again.

Illuminant protection

→ Parameter: Illuminant protection

Some illuminants that combine several channels (such as Tunable White (TW), RGB, RGBW, RGBCCT) are designed in such a way that the illuminant is thermally overloaded when all channels are fully controlled at the same time.

The Enertex® KNX LED Dimmsequenzer 20A/5x therefore offers a parameterizable protection function that protects the illuminants from thermal overload.

For the activation and the correct function of the illuminant protection, information about the (thermal) continuous power, overload capacity (in %) and the maximum duration of the overload must be provided. In addition, a correct voltage measurement is a prerequisite, which in turn is only possible if the entries for the lines have been made completely (cf. chapter Measurements, Section "Line losses").

Separate 1-bit alarm objects are available for exceeding

- the continuous power

- the I²t value (for explanations, see chapter Explanation of the I²t shutdown)

- the maximum power.

Optionally, a shutdown can be parameterized for the various overload scenarios. In contrast to the integrated dimmer protection functions, the illuminant protection shutdown is not self-resetting, i.e. as soon as the cause of the error is eliminated, the channels must be switched on again manually.

Example configuration:

- Illuminant: Tunable White

- Continuous power (sum of both channels): 20 W

- Overload capacity: 50%

- Maximum duration overload: 60 s

→ Trigger of the alarm objects or (if parameterized) of the shutdown

- CO Continuous power when exceeding a power of 20 W

- CO Maximum power when exceeding a power of 30 W

- CO I²t when exceeding a power of 20 W for more than 60 s or (according to equation 1) of, for example

  ◦ 25 W for more than 48 s, or

  ◦ 35 W for more than 34 s, or

  ◦ 100 W for more than12 s

$$Time[s] = \frac{ContinuousPower[W] \cdot MaximumOverloadTime[s]}{MeasuredPower[W]}$$

equation 1: Calculation overload duration

Power supply protection

→ Parameter: Power supply protection

Analogous to the lamp protection, the dimming sequencer can also protect the upstream LED power supply from overload. For this purpose, specifications must also be made for the continuous power, the overload capacity (in %) and the maximum duration of the overload. Separate 1-bit alarm objects are available for the exceeding of

- the continuous power

- the I²t – value (explanations, see chapter Explanation of the I²t shutdown)

- the maximal power

Optionally, a shutdown can be parameterized for the various overload scenarios. Like the illuminant protection shutdown, the power supply protection shutdown is not self-resetting, i.e. as soon as the cause of the fault has been eliminated, the channels must be switched on again manually.

The Enertex® LED PowerSupply 160 has an integrated overload protection that throttles the output power to 160W. So for this power supply, the protection function is not needed at all.

Example configuration for any other power supply:

- continuous power 100 W

- Overload capability: 50 %

- Maximum duration overload: 600 s (10 min)

→ Trigger of the alarm objects or (if parameterized) of the shutdown.

- CO Continuous power when exceeding a power of 100 W

- CO Maximum power when exceeding a power of 150 W

- CO I²t if a power of 100 W is exceeded for more than 600 s or (also according to equation 1) of, for example
    - 120 W for more than 500 s (~ 8,3 min), or
    - 180 W for more than 333 s (~ 5,6 min), or
    - 200 W for more than 300 s (~ 5 min)

Explanation of the I²t shutdown

Illuminant and power supply disconnections can be parameterized in such a way that they come close to the behavior of a fuse. These generally function in such a way that the switch-off occurs as soon as the nominal current is exceeded by a certain amount for a sufficient time. The higher the current, the faster the disconnection.

With reference to the protective functions of the Enertex dimming sequencer, we are specifically concerned here with the powers between the parameterized continuous power (powers below this are never switched off) and the maximum power (powers above this are switched off immediately). The powers in between (in Fig. 7 these would be values between 100 and 200 W) are switched off depending on the amount of power after a time of 500 s (at 200 W) to 1000 s (at 100 W).

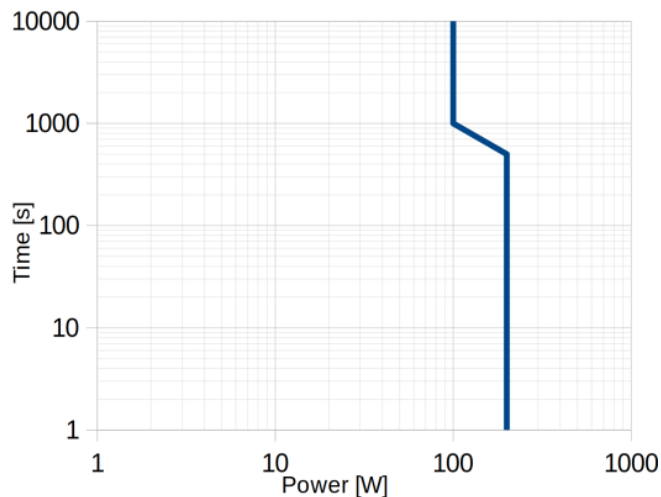Figure 7: I²t-shutdown

RGB

→ Parameter: RGB - Configuration

The application of the Enertex® KNX LED Dimmsequenzer 20A/5x offers the possibility to control specific colors by means of special RGB parameters and a "Colour-Picker" displayed directly in the ETS (see Fig. 8). In addition, various communication objects are available with which the color channels can be addressed individually or together.
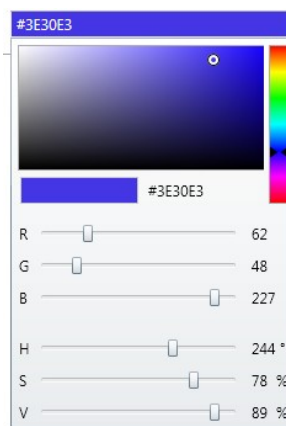
Figure 8: ETS Colour-Picker

For illuminants that have one (RGBW) or two (RGBCCT) white channels integrated, additional functions are available (see corresponding subchapter RGBW or RGBCCT: Extended-RGB).

RGBCCT: Extended-RGB

→ Parameter: RGBCCT (as RGB-Extended) – White channels

Automatic white balance

An RGBCCT (R-G-B-Correlated-Color-Temperature) illuminant combines red, green, blue, cool white and warm white LEDs in one illuminant. The application allows the two white channels to be automatically mixed in when the saturation of a color value is lowered. This results in a "nicer" white tone than the white tone mixed by the RGB colors. Enertex was the first to intro-duce this mode to the market in the present generation of devices and calls it "Extended RGB".

The calculation of the color spaces and the white channel admixture is done internally in the de-vice and does not have to be parameterized by the user. Only the desired color temperature of the white LEDs must be specified. The color mixing can be influenced via dimming curves and, if necessary, brightness limits. However, this is not recommended in normal cases, since the Enertex algorithm already achieves optimal results..

Standard Mode

If this automatic mixing is not desired, the brightness can also be parameterized separately or also adjusted during runtime by means of CO.

Example

- Initial value: Pure blue with 100% saturation and brightness (cf. Fig. 9)
- New value: Saturation reduced to 50%.
  - In the normal RGB application or when automatic mixing is deactivated, saturation reduction is achieved by mixing the R and G channels by 50% each (see Fig. 10)
  - In Extended-RGB mode, the white channels are additionally mixed in to reduce sat-uration
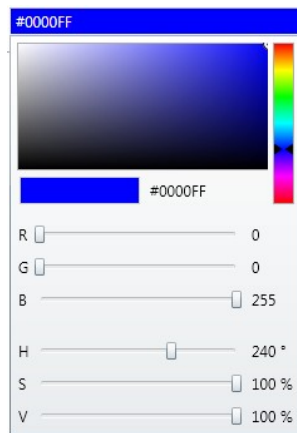
Figure 9: Initial value
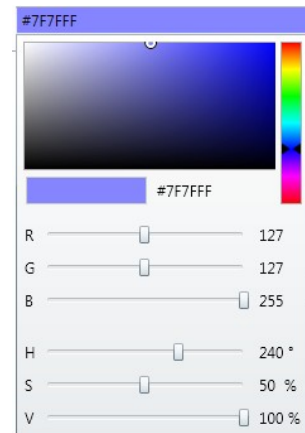
Figure 10: New value

A Default value of

- R: 127
- G: 127
- B: 255
- or
- H: 240 °
- S: 50 %
- V: 100 %

thus leads, in addition to the corresponding control of the R/G/B channels, to the admixture of the Tunable White channel with intensity 50% (0% saturation would lead to 100% TW bright-ness).
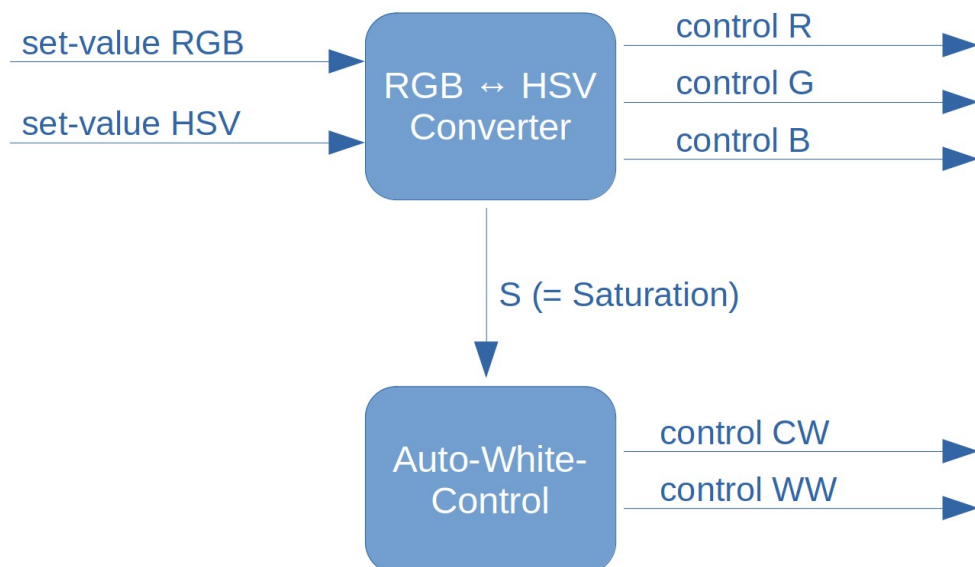
Figure 11: Automatic white control „Extended RGB"

The mixing ratio of the two white channels can also be parameterized either as "Fix" or sepa-rately for the individual application scenarios or also adjusted by means of CO.

RGBW

→ Parameter: RGBW - White channel

Automatic white balance

An RGBW illuminant combines red, green, blue and white LEDs in one illuminant. The RGBW application allows the white channel to be automatically mixed in when the saturation of a color value is lowered (analogous to RGBCCT: Extended-RGB, with only one white channel). This results in a "nicer" white tone than the white tone mixed by the RGB colors. Enertex was the first to introduce this mode to the market in the present generation of devices and calls this "Extended RGB".

The calculation of the color spaces and the white channel admixture is done internally in the device and does not have to be parameterized by the user. Only the color temperature of the white LED must be specified. The color mixing can be influenced via dimming curves and, if necessary, brightness limits. However, this is not recommended in normal cases, as the Enertex algorithm already achieves optimal results.

Standard Mode

If this automatic mixing is not desired, the brightness can also be parameterized separately or also adjusted during runtime by means of CO.

Color spaces RGB and HSV

The Enertex® KNX LED Dimmsequenzer 20A/5x offers the possibility to set the color control via RGB objects or HSV objects. In addition, the dimmer calculates the other state objects in each case and outputs them to the bus according to the parameterization.

Technically the RGB - LED illuminants are composed of the three colors red-green-blue. Therefore, the control via an RGB object, which outputs an intensity from 0 to 100% for each of the three colors, is technically easy to realize. The resulting light color is composed of the three color channels, but it is considerably more complex for the user to set a color value CYAN, for example. This is different when using HSV objects. Here the H - value (color angle) specifies the color tone. This is given as a so-called color angle, which corresponds to a color in the color wheel. Each angle value means a different color, e.g. 0° for red, 30° for orange, 60° for yellow and so on. The color transitions are fluent, cf. Figure 12.

Bildquelle: Wikipedia; gemeinfrei.
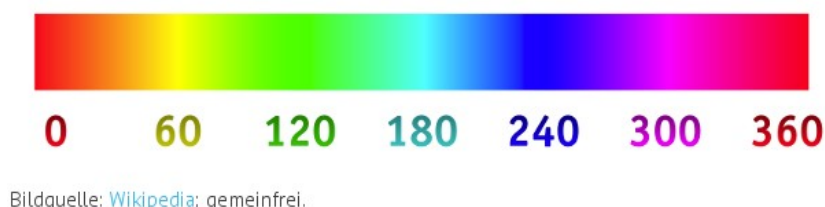
Figure 12: Farbwinkel

With the room controller Enertex® SynOhr® MultiSense KNX (www.enertex.de/d-synohr.html) with integrated voice control, the voice command _COLOR (YELLOW, BLUE...) can be used to directly send an H-value via a corresponding telegram to the bus and change the light color without the need for additional logic.

The S - value (saturation) indicates the color saturation. S = 0% means white light and S = 100% complete lighting only in the set color tone. "White" is to be understood in the context of the possibilities of the illuminant, because white light is only created by mixing the three colors (see section White balance). However, this white light is not always pleasant or sufficiently white for human perception, so RGBW illuminants offer an additional white LED channel that is adjusted to an appropriate white light by the manufacturer. When working with RGBW illuminants, this additional white channel is available in the application and can also be specified in the sequence. The saturation value S is not directly influenced by the white channel, the two values S and white channel are to be considered separately.

The V- value (brightness value) specifies the brightness of the lighting. 0% means OFF and 100% maximum brightness.

Limit dimming range

→ Parameter: RGB - Configuration

The white light is provided by mixing the control of the individual color channels. Depending on the LED illuminant, the resulting white light may not be considered optimal by the user, so that an adjustment of the white light must be made. The Enertex® KNX LED Dimmsequenzer 20A/5x can be used to define the mixing ratio of the three individual channels.

If you set the white balance (CO) to ON via telegram, you specify the setting via the RGB or HSV values which best matches the desired white light at maximum brightness. Then set the object to OFF. Then the values are stored. If, for example, the illuminant has a blue component that is a little too high for a pleasant white light, R=100%, G=100%, B=80% will be determined during the white balance. After ending the white balance, the dimmer is controlled relative to this, i.e. the blue component from 0 to 80% is scaled to the value range 0 to 100%.

Note: This scaling is retained when the device is restarted and the application is downloaded from the ETS. It can only be overwritten by a new white balance.

Alternatively, these maximum values can also be defined by means of parameters.

Tunable White

→ Parameter: Tunable White – Dimming settings

A Tunable White illuminant consists of white LEDs of two different color temperatures - a cool white and a warm white tone.

By allocating two channels (a TW channel pair) of the Enertex® KNX LED Dimmsequenzer 20A/5x, it can take over the control of brightness and color temperature of the illuminant.

The mixing ratio of the two channels can be permanently parameterized for different application scenarios, but can also be changed at runtime by means of group addresses. The mixing ratio is specified as "% cold white" by default, but can also be specified directly in Kelvin instead if the color temperatures of the two white channels (cold and warm white) are made known / parameterized to the application accordingly. The latter could be advantageous, for example, if different tunable white illuminants are used in a room and an adjustment of the color temperatures is to be undertaken.

The warm white light color (2000 to 3300 K) is often perceived by people as pleasantly calming. The cold white light color (from 6000 K) describes a white color spectrum with an increased blue component. This increased blue component causes the observer to be in a heightened state of alertness. Therefore, it can be advantageous, e.g. in office rooms, to increase the cold white portion in the morning and the warm white portion in the evening. By means of a time-controlled sequence, a course of the day with its different color temperatures can be easily mapped (cf. chapter Time-controlled dimming and Human Centric Light (HCL)).
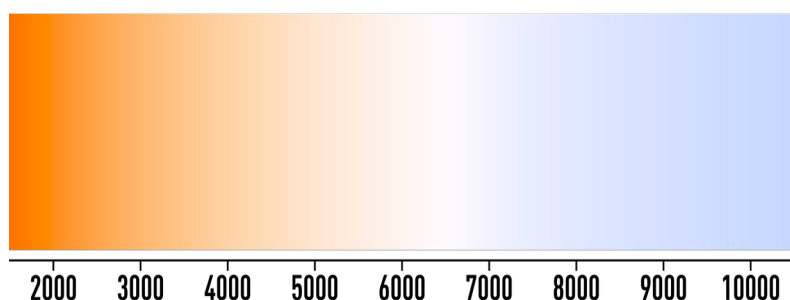
Figure 13: Color temperature in Kelvin (Source: Wikipedia, License: CC BY-SA 4.0, permitted editing)

RGBCCT: Extended-TW

→ Parameter: RGBCCT (as TW-Extended) - Configuration

An RGBCCT (R-G-B-Correlated-Color-Temperature) illuminant combines red, green, blue, cool white and warm white LEDs in one illuminant. The "Extended-TW" application allows to extend

the color temperature range of the Tunable White channel by automatically mixing color channels R, G and B in both directions. In addition to the temperature values of the two white channels cool white and warm white, the extended limits (also in Kelvin) must be specified. Enertex was the first to introduce this mode in the present generation of devices on the market and calls this "Extended TW". The user does not have to make any complex calculations here or carry out tests with the individual illuminants. Only the light temperature of the white LEDs must be specified. The Enertex algorithm automatically determines the optimal control. To allow additional color control, the COs for RGB control are also visible in this mode.

Example:

- Parameterization:
    ◦ Color temperature illuminant warm white: 2700 K
    ◦ Color temperature illuminant cool white: 6000 K
    ◦ Minimum value: 1000 K
    ◦ Maximum value: 10000 K

- Without TW-Extended, color temperatures between 2700 and 6000 K can be achieved by mixing the two white channels.

- With TW-Extended - by mixing the three color channels - the warm white range is extended up to 1000 K and the cool white range up to 10000 K.

    Note: The %-coldwhite parameters or CO then also no longer refer only to the white channels, but to the extended limits, e.g.:
    ◦ 0% CW component → 1000 K
    ◦ 100% CW component → 10000 K

- Figure 14 shows the behavior on the color scale
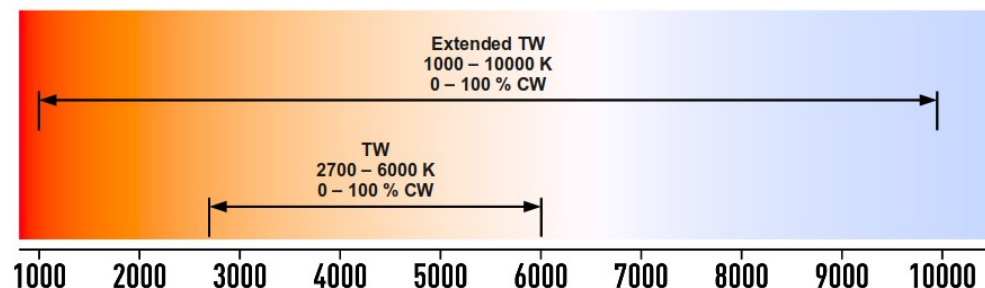
Figure 14: Beispiel Extended-TW
(Source: Wikipedia, License: CC BY-SA 4.0, permitted editing)

RGBW: Simulated TW

→ Parameter: RGBW (als Simulated TW) - Configuration

A Tunable White application can also be realized with a 4-channel RGBW illuminant (Simulated Tunable White). By mixing the color channels (red/green in the direction of warm white and blue/green in the direction of cool white) with the actual white tone of the white LED, significant shifts in the color temperature can be realized. Analog to the Extended-TW with RGBCCT illuminants, the color temperature of the white LED as well as the maximum color temperatures must be specified in the parameter set.

The user does not have to make complex calculations or carry out tests with the individual illuminants. The Enertex algorithm independently determines the optimal control. To additionally allow color control, the COs for RGB control are also visible in this mode.

Example:

- Parameterization:
    - Color temperature illuminant white: 5000 K
    - Minimum Value: 1000 K
    - Maximum Value: 10000 K
- With activated Sim-TW, a Tunable White is now realized internally by mixing color.

    Note: The %-cold white parameters or CO then also refer to the extended limits, e.g.:

    - 0% CW-ratio → 1000 K
    - 100% CW-ratio → 10000 K
- Figure 15 shows the behavior on the color scale
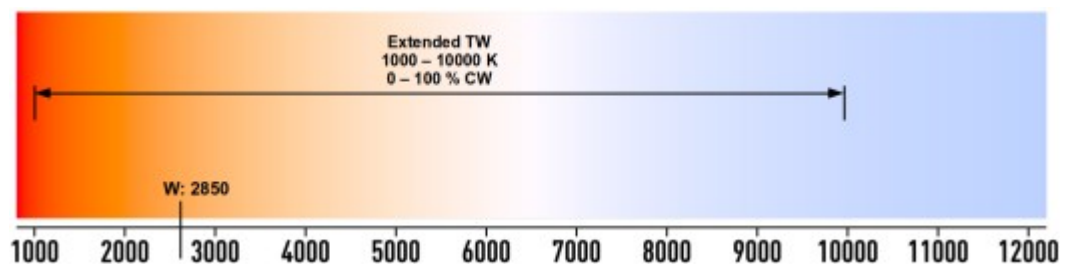
Figure 15: Example simulated TW
(Source: Wikipedia, License: CC BY-SA 4.0, permitted editing)

RGB: Simulated TW

The implementation of a Tunable White simulation for a 3-channel RGB illuminant was deliberately omitted. The color intensities of individual illuminants are so different that a simple parameter set as in the RGBW: Simulated TW is not purposeful, or only unsatisfactory results can be achieved depending on the illuminant.

With a little testing effort and an external logic device like the Enertex EibPC² a Tunable White application can be implemented:

1. Determination of the lighting-specific RGB values of several control points from warm white to cool white
2. Definition of scenes with these values
- Start-up of the scenes by means of an external logic module

Dim-2-Warm

→ Parameter: Tunable White – Dimming settings

This functionality can be used to simulate the dimming behavior of earlier halogen illuminants whose color temperature shifts towards warm white as the brightness decreases. For this purpose, two points are defined, each with brightness and color temperature.

Example configuration:

	Brightness	Color Temperature
Threshold value 1	10 %	2500 K
Threshold value 2	60 %	4000 K

Table 3: Example configuration Dim-2-Warm

Resulting effect:

- Total brightness of 10 % and less → Color temperature 2500 K.

- Total brightness between 10 and 60 % → Linear interpolation of color temperature between 2500 and 4000 K

- Total brightness greater than 60 % → Color temperature 4000 K

Note: If Dim-2-Warm is activated, the color temperature cannot be adjusted otherwise by means of parameters or COs.
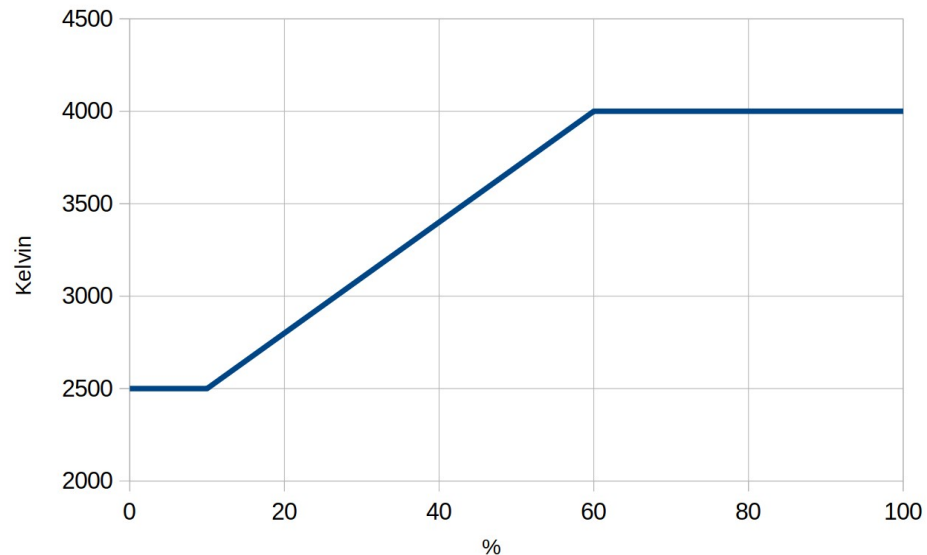
Figure 16: Example: Dim-2-Warm

Time-controlled dimming and
Human Centric Light (HCL)

→ Parameter: Time-controlled dimming or HCL

Via integrated timers, it is possible to run through sequences that are dependent on the time of day. These times, which are accompanied by changes in brightness or color value, can be parameterized as fixed times or relative to sunrise or sunset. A mixture of fixed and relative times is also possible. Up to ten time points with associated brightness or color values can be parameterized. The parameterized time points do not have to be chronological. They are automatically put into the correct order daily at 00:00 after calculation of the sunrise and sunset for the day.

Human Centric Light (HCL) describes time-controlled dimming in the Tunable White operating mode. This is less about changing the overall brightness and more about shifting the color temperature within the specified spectrum.

Figure 14 shows typical starting points for an HCL cycle: The day begins in the morning hours with a very warm light similar to sunrise, before the color temperature increases more and more in the course of the morning, i.e. it becomes colder. In the midday hours, the light (as well as the sun at its zenith) is at its coldest. In the course of the afternoon, the temperature decreases again, i.e. becomes warmer, and culminates in its warmest point with the sunset.
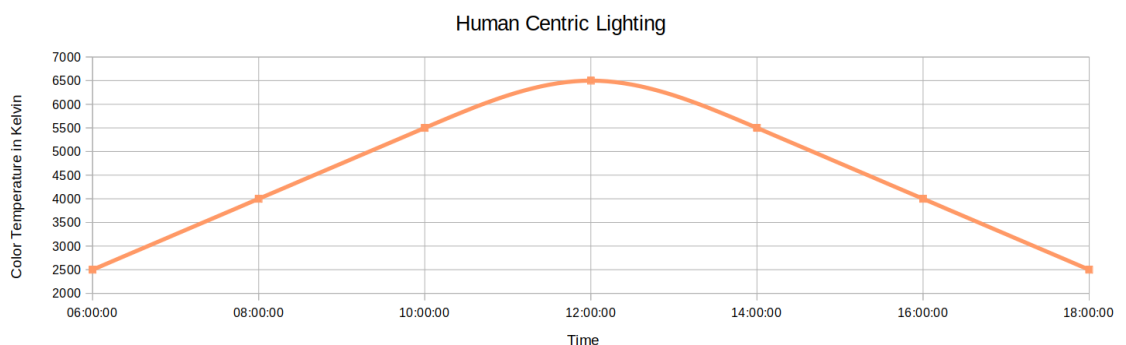
Figure 17: Example: Human Centric Lighting

ETS Application

Specification

ETS: from version 5.7.4

Database file

At https://www.enertex.de/d-downloads.html you will find the current ETS database file, as well as the current product description.

Parameter

Note: Depending on the parameterization, some setting options may not be available. In these cases, they are not displayed in the ETS.

General

Note: This tab is always available.

Figure 18: Parameter General

Parameter	Auswahl	Beschreibung
Operating mode	5x Single channel (EK) 1x RGBCCT 1x RGBW + 1x EK 1x RGB + 2x EK 1x RGB + 1x TW 2x TW + 1x EK 1x TW + 3x EK	Determination of the operating mode: RGB: Red/Green/Blue RGBW: Red/Green/Blue/White RGBCCT: Red/Green/Blue/Cold White/Warm White TW: Tunable White: Cold White + Warm White
Extension	RGB-Extended TW-Extended	Restriction: The parameter is only available if • Operating Mode: 1x RGBCCT Specifying the type of extension for RGBCCT: RGB Extended: RGB operation mode where white can be automatically mixed in. TW-Extended: TW operating mode in which the warm white and cool white limits can be extended by mixing in the corresponding color. Further explanations of the two extensions can be found in the chapters RGBCCT: Extended-RGB or RGBCCT: Extended-TW
Use	Checkbox	Release of the channel / channel group

Table 4: Parameter general

Configuration

Note: This tab is always available.

Global settings

Note: A global parameter is valid for all channels/channel groups. For some parameters, it is possible to define whether they are to be defined globally or channel/channel group-specific.

| PWM frequency | 488 Hz ▾ |

Note: Generally, lower PWM frequencies are recommended in order to be able to dim down as far as possible. Higher frequencies can be used if flickering is noticeable at the lower frequencies.

| Behaviour on bus voltage recovery | ◉ Global ○ Specific |
| | Illuminant Off ▾ |

Switch-on delay	Global with day / night distinction ▾
Switch-on delay day	0 ▴▾ s
Switch-on delay night	0 ▴▾ s
Switch-off delay	Global with day / night distinction ▾
Switch-off delay day	0 ▴▾ s
Switch-off delay night	0 ▴▾ s

Behaviour of status output	◉ Global ○ Specific
	During the dimming process in defined time steps + At the end ▾
Status output all	1 ▴▾ s
Cyclical status output	◉ Global ○ Specific
	5 min ▾

| Telegram rate limitation (Tx) | 50 ▴▾ T / s |

| Release external mains relay? | ○ No ◉ Yes |

Figure 19: Parameter General / Configuration

Parameter	Selection	Description
PWM Frequency	211 Hz 488 Hz 600 Hz 832 Hz 1000 Hz 1200 Hz	Determination of the PWM frequency. This applies to all channels. Recommendation: 488 Hz Note: Generally lower PWM frequencies are recommended to be able to dim down as far as possible. Higher frequencies can be used if flickering can be detected at the lower frequencies.
Behavior on bus voltage recovery	Global Specific Illuminant Off Last value Fixed value	Determines whether the behavior on bus voltage recovery is to be defined globally or channel/channel group-specifically. If global: Illuminant Off: All channels are off. Last value: Each channel dims to the brightness value it had before bus voltage failure Fixed value: All channels dim to one parameterizable brightness value
Brightness of all channels	0 – 100 %	Restriction: The parameter is only available if • Behavior on bus voltage recovery: Global and Fixed value Switch-on brightness after bus voltage recovery

Parameter	Selection	Description
Switch-on delay	Global Global with day / night distinction Specific Specific with distinction day / night	Definition of whether the switch-on delay (switch-on by means of switch object) is to be defined globally or channel/channel group-specifically. In both cases, it is also possible to determine whether there should be a distinction between day and night.
Switch-on delay	0 – 60 s	Restriction: The parameter is only available if • Switch-on delay: Global Definition of the switch-on delay in seconds, independent of the time of day.
Switch-on delay day	0 – 60 s	Restriction: The parameter is only available if • Switch-on delay: Global with distinction day / night Definition of the switch-on delay for day in seconds
Switch-on delay night	0 – 60 s	Restriction: The parameter is only available if • Switch-on delay: Global with distinction day / night Definition of the switch-on delay for night in seconds
Switch-off delay	Analog to switch-on delay	Analog to switch-on delay
Behavior status output	Global Specific At the end of the dimming process During the dimming process in defined % steps + At the end During dimming in defined time steps + At the end	Determination whether the behavior Status outputs is to be set globally or channel/channel group specific. If global: At the end of the dimming process: All relevant status objects are output at the end of the dimming process. During the dimming process in defined % steps + At the end: All relevant status objects are output at the end of the dimming process and also in parameterizable percentage steps during the dimming process. During the dimming process in defined time steps + At the end: All relevant status objects are output at the end of the dimming process and also in parameterizable time steps during the dimming process.
Status output all	5 % 10 % 20 % 50 % or 1 – 60 s	Restriction: The parameter is only available if - Behavior Status output: During the dimming process in defined % steps or At the end or During the dimming process in defined time steps + At the end Defining the step size of the status outputs during the dimming process
Cyclic status output	Global Specific Off 1 min 5 min 10 min 30 min 60 min	Definition of whether the behavior Cyclic status outputs (regardless of whether a dimming process is currently running or not) is to be set globally or channel/channel group-specifically. If global: Selection of the step size for the cyclical status output of all relevant status objects.
Telegram rate limitation (Tx)	5 – 50 Telegrams / s	Limitation of the transmission power of the dimming sequencer in order not to overload the bus load during status outputs in projects with a high base load. Telegrams that cannot be sent immediately due to the limitation are buffered and successively written to the bus.
Release external mains relay	Yes No	Enabling of the external switching actuator to switch off the LED power supply on the mains side when there is no demand.

Table 5: Parameter General / Configuration

Dimming settings

Note: This tab is always available.

Global settings

Note: A global parameter is valid for all channels/channel groups. For some parameters, you can define whether they are to be defined globally or channel/channel group-specifically.

Dimming curve   ⦿ Global   ○ Specific

                           Enertex (D)   ▼

Note: For single-channel operation, the "Enertex" curve is recommended, as it implements a brightness increase/decrease that is constant for the eye. For RGB and TW channel groups, on the other hand, the linear dimming curve is recommended.
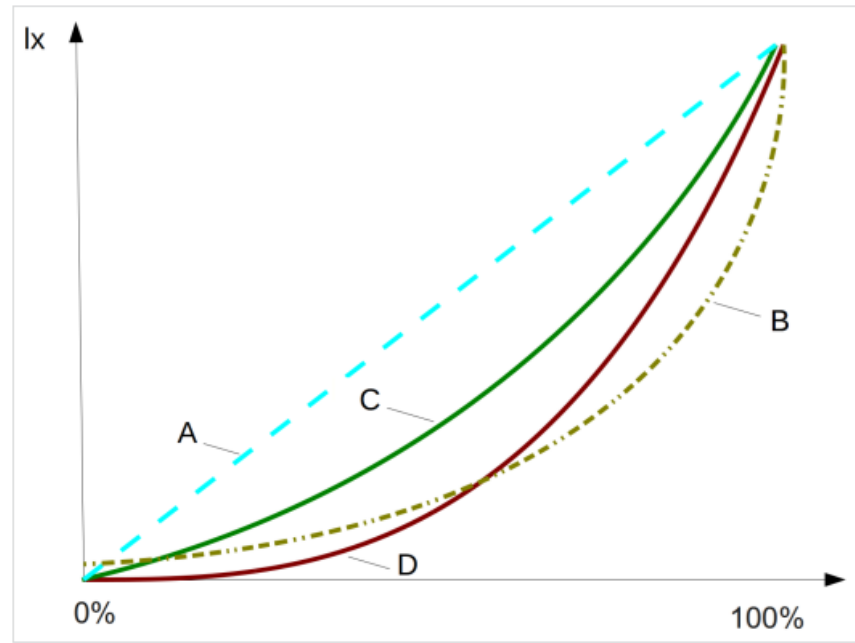
Switch during dimming   ⦿ Global   ○ Specific

                            ○ No   ⦿ Yes

Definition of dimming speed Absolute	○ Time per dimming operation ⦿ Time from 0 -> 100%
Definition of dimming speed Relative	○ Time per dimming operation ⦿ Time from 0 -> 100%
Dimming speeds	Global ▼
Dimming speed absolute	3 s
Dimming speed relative	3 s
Switch-on speed	3 s
Switch-off speed	3 s

Figure 20: Parameter General / Dimming settings

Parameter	Selection	Description
Dimming curve	Global Specific	Definition of whether the dimming curve is to be set globally or channel/channel group-specifically.
	Linear (A) Exponential (B) Power function (C) Enertex (D)	If global: Selection of the dimming curve (see also Dimming curve) Note: For single channel operation, the "Enertex" curve is recommended, as a continuous brightness increase/decrease is implemented for the eye. For RGB and TW channel groups, on the other hand, the linear dimming curve is recommended.

Parameter	Selection	Description
Dimming speed Absolute day	0 – 60 s	Restriction: The parameter is only available if • Dimming speeds: Global with distinction day / night Definition of the dimming speed for absolute dimming processes in seconds during the day.
Dimming speed Relative day	0 – 60 s	Restriction: The parameter is only available if • Dimming speeds: Global with distinction day / night Definition of dimming speed for relative dimming processes in seconds during the day
Switch-on speed day	0 – 60 s	Restriction: The parameter is only available if • Dimming speeds: Global with distinction day / night Definition of the dimming speed for switch-on processes in seconds during the day. The value refers to a switch-on brightness of 100%. For smaller values, the time is scaled accordingly.
Switch-off speed day	0 – 60 s	Restriction: The parameter is only available if - Dimming speeds: Global with distinction day / night Definition of the dimming speed for switch-off processes in seconds during the day. The value refers to the process of 100 → 0 %. For lower output brightness, the time is scaled accordingly.
Dimming speed Absolute night	Analogous to dimming speed Absolute day	Analogous to dimming speed Absolute day
Dimming speed Relative night	Analogous to dimming speed Relative day	Analogous to dimming speed Relative day
Switch-on speed night	Analogous to switch-on speed Day	Analogous to switch-on speed Day
Switch-off speed night	Analogous to switch-off speed Day	Analogous to switch-off speed Day

Table 6: Parameter General / Dimming settings

Time functions

Note: This tab is always available.

Day / night changeover

Note: The day / night change-over can either be done by means of a 1-bit CO, or automatically on the basis of the sunrise/sunset calculation if time and date have been set by means of a CO.

Note: After a restart, the internal day/night status is invalid until the corresponding COs have been written. Until then, the parameterisations for "Day" are used.

Day / night switching by means of	⦿ CO ⦾ Internal timer (sunrise/sunset)
Polarity day / night	⦿ Day (0) / Night (1) [KNX DPT Standard] ⦾ Day (1) / Night (0)

Timer

Note: If the timer objects are released, the time and date must be set by means of a CO after the device start for proper function.

Release time objects (required for all time functions)?	⦾ No ⦿ Yes
Request timer objects on bus voltage recovery	⦾ No ⦿ Yes

Note: For the calculation of sunrise and sunset times, the following information on the location is necessary.

Set location:	⦿ City selection ⦾ Coordinates
City selection	Forchheim, 49.7°N, 11.1°E ▼
Automatic switching between summer and winter time	⦾ No ⦿ Yes

Figure 21: Parameter General / time functions

Parameter	Selection	Desription
Day / night switching by means of	CO Internal Timer	Release communication object day/night. This parameter defines whether the day/night switchover is to be performed externally by means of CO or on the basis of an internally calculated sunrise/sunset (only possible if time/date is set by means of CO).
Polarity day / night	Day (0) / Night (1) Day(1) / Night (0)	Restriction: The parameter is only available if • Day / night changeover by means of: CO Depending on the parameterization polarity day is set for value 0 (KNX DPT standard) or for value 1.
Release time objects?	Yes No	Release of the communication objects Time and Date. This release is a prerequisite for the use of time-controlled dimming.
Request timer objects on bus voltage recovery	Yes No	Restriction: The parameter is only available if • Release time objects: Yes If Yes, time and date objects are automatically requested after device start.
Set location	City selection Coordinates	Restriction: The parameter is only available if • Release time objects: Yes Location selection for sunrise/sunset calculation
City selection	Div. cities	Restriction: The parameter is only available if • Release time objects: Yes • Set location: City selection Location selection for sunrise/sunset calculation
Longitude East	-180 - +180 °	Restriction: The parameter is only available if • Release time objects: Yes • Set location: Coordinates Location selection for sunrise/sunset calculation
Latitude North	-90 - +90 °	Restriction: The parameter is only available if • Release time objects: Yes • Set location: Coordinates Location selection for sunrise/sunset calculation
Time zone with regard to world time (UTC)	Div. Time zones	Restriction: The parameter is only available if • Release time objects: Yes • Set location: Coordinates Set time zone against UTC
Automatic switching between summer and winter time	Yes No	Restriction: The parameter is only available if • Release time objects: Yes Defines whether an automatic summer/winter time changeover is to take place.

Table 7: Parameter General / Time functions

External power relay

Note: This tab is only available if parameter "Release external power relay" under General / Configuration is set to Yes.

External mains relay

Note: To minimise standby losses, the device offers the possibility to switch off the LED power supply on the mains side by an external switching contact. Due to the start-up time of the power supply unit, the dimming process can be started with a delay.

Optimised start of dimming at	23	V
Switch-off delay	1	min

Figure 23: Parameter Allgemeines / Netzrelais

Parameter	Selection	Description
Optimized start of dimming at	4 – 48 V	The switch-on process only starts when the threshold voltage parameterized here is reached after switching on the LED power supply. Recommendation: The value should be 1 to 2 V below the nominal voltage.
Switch-off delay	0 – 180 min	To avoid too frequent switch-off processes of the LED power supply in certain scenarios, a switch-off delay can be parameterized here.

Tabelle 8: Parameter Allgemeines / Netzrelais

Measurements and counters

→ Explanations: Measurements and counters

Note: This tab is always available.

The information about the line is necessary for the calculation of the voltage drop at the conductor and thus for the voltage measurement at the illuminant (commissioning function), as well as for the illuminant protection functions. If these functions are not used, the parameters can be ignored.

Necessary information

ⓘ The following information about the line is necessary for voltage measurement (at the lamp), as well as for the lamp protection functions (see menu "Protection functions and alarms").

	Cable length	Conductor cross-section	Return line via channel
Channel A	18,6 m	1.5 mm² (AWG 15 - 16)	A
Channel B	18,6 m	1.5 mm² (AWG 15 - 16)	B
Channel C	18,6 m	1.5 mm² (AWG 15 - 16)	C
Channel D	18,6 m	1.5 mm² (AWG 15 - 16)	D
Channel E	18,6 m	1.5 mm² (AWG 15 - 16)	E

Approvals

Release measurements?   No ● Yes

Release counter?   No ● Yes

Figure 22: Parameter Measurements and counters

Parameter	Selection	Description
Cable length	0,5 – 50 m	Parameterization of the cable length (single) in meters.
Conductor cross-section	0,75 mm² 1,5 mm² 2,5 mm² 4,0 mm²	Parameterization of the conductor cross-section.

Parameter	Selection	Description
Return line via channel	A B C D E	RGB(CCT/W), as well as TW illuminants often have common return conductors. This can be taken into account here.
Release measurements	Yes No	Release the "Measurements" tab.
Release counter	Yes No	Release the "Counter" tab

Table 9: Parameter Measurements and counters

Measurements

→ Explanation: Measurements

Note: This tab is only available if parameter "Release measurements" under Measurements and Counters is set to Yes.

Communication objects "Measurement

	Object release	Cyclic output	Output on change
Power supply voltage	On (DPT 14.027)	10 min	> 10 %
Power	Total power + Per channel	10 min	> 10 %
Current	Total current + per channel (DPT 14.019)	10 min	> 10 %
Commissioning voltage	On (DPT 14.027)		
Device temperature	On (DPT 14.068)	10 min	> 10 %
Telegram rate (Tx)	○ No ◉ Yes	10 min	> 10 %

Note on data type for voltage measurement:
DPT 9.020: floating point - millivolt
DPT 14.027: floating point - volt

Note on data type for current measurement:
DPT 9.021: Floating point - miliampere
DPT 14.019: Floating point - ampere

Note on data type for temperature measurement:
DPT 9.001: °C
DPT 14.068: °C

Figure 23: Parameter Measurements

Parameter	Selection	Description
Object release	Div.	Enabling of the communication objects for the various measured variables. Depending on the measured variable, it can be parameterized whether communication object(s) for the sum variable or individual channels/channel groups are Released and/or the desired DPT.
Cyclic output	Off 1 min 5 min 10 min 30 min 60 min	Restriction: The parameter is only available if • Object release: Not Off or No Cyclic sending of the communication objects of the measured variable.
Output at change	Off > 5 % > 10 % > 20 % > 50 %	Restriction: The parameter is only available if • Object release: Not Off or No Automatic sending of the measured value CO in case of changes by a certain percentage value.

Table 10: Parameter Measurements

Counter

→ Explanation: Counter

Note: This tab is only available if parameter "Release counter" under Measurements and counters is set to Yes.

Figure 24: Parameter Counters

Parameter	Selection	Description
Object release	Off Sum Per channel Sum + Per channel	Enabling of the communication objects for the various counters. It can be parameterized whether communication object(s) are released for the totalizing variable or individual channels/channel groups.
Cyclic output counter	Off On the quarter hour On the hour To the full day	Restriction: The parameter is only available if • Object release: Not Off Cyclic sending of the communication objects of the respective counters.

Table 11: Parameter Counters

Alarm objects and protection functions

→ Explanation: Alarm objects and protection functions

Note: This tab is always available.

Figure 25: Parameter Alarm objects and protection functions

Parameter	Selection	Description
Release alarm objects	Yes No	Release communication objects Alarm: undervoltage, overvoltage, overcurrent, overtemperature
Activate additional device protection	Yes No	Release additional device protection: Provides the option to lower the trigger threshold for the integrated overtemperature shutdown.
Activate lamp protection	Yes No	Release illuminant protection: Provides the possibility to alarm overload scenarios at the illuminant (communication objects) by parameterization of continuous power and inputs for overload capability and to switch off if desired.
Activate power supply protection	Yes No	Release power supply protection: Provides the possibility to alarm overload scenarios at the LED power supply (communication objects) by parameterization of continuous power and inputs for overload capability and to switch off if desired.

Table 12: Parameter Alarm objects and protection functions

Additional device protection

Note: This tab is only available if parameter "Activate additional device protection" under Alarm objects and protection functions is set to Yes.

Figure 26: Parameter Additional device protection

Parameter	Selection	Description
Overtemperature shutdown at	60 – 120 °C	Defining the threshold above the overtemperature shutdown is triggered.

Table 13: Parameter Additional device protection

Illuminant protection

→ Explanation: Illuminant protection

Note: This tab is only available if parameter "Activate lamp protection" under Alarm objects and protection functions is set to Yes.

Illuminant protection

Note: Since some LED strips cannot be operated with maximum total current, alarm and protection functions can be parameterised here.

Note: If an overload capacity > 0 % is parameterised and a maximum duration overload 0 s, this means that the LED can be permanently overloaded. If this is not the case, please parameterise the maximum duration.

> ℹ Since the power is measured in the dimmer, it is imperative to enter the details of the line in the "Measurements and Counters" menu in order to be able to correctly calculate the power at the lamp.

	Continuous power	Overload capacity	Maximum duration overload
Channel A	20 W	0 %	0 s
Channel B	20 W	0 %	0 s
Channel C	20 W	0 %	0 s
Channel D	20 W	0 %	0 s
Channel E	20 W	0 %	0 s

Figure 27: Parameter Illuminant protection

Parameter	Auswahl	Beschreibung
Continuous power	1 – 480 W	Parameterization of the continuous power of the illuminants of the channel / channel group in watts.
Overload capacity	0 – 100 %	Parameterization of the overload capacity of the illuminant of the channel / channel group in percent. Recommendation: 20%
Maximum duration overload	0 – 36000 s	Parameterization of how long the overload parameterized under "Overload capacity" may be present. If 0 is parameterized here, the illuminant may be permanently overloaded. Recommendation: 20 s
Release protective shutdownn	Off When the continuous power is exceeded When exceeding the I²t value When the maximum power is exceeded When exceeding the maximum power or the I²t value	Definition of whether lamp overload should lead to shutdown. Options: Shutdown at: - Exceeding of the parameterized continuous load - Exceeding of the parameterized maximum load - Exceeding the I²t threshold defined by overload capacity and duration (see chapter Illuminant protection) Recommendation: When exceeding the maximum power or the I²t value

Table 14: Parameter Illuminant protection

Power supply protection

→ Explanation: Power supply protection

Note: This tab is only available if parameter "Activate power supply protection" under Alarm objects and protection functions is set to Yes.

Power supply protection

Note: Analogous to the lamp protection, the dimmer can also protect the upstream LED power supply unit.

Note: If an overload capacity > 0 % is parameterised and a maximum duration overload 0 s, this means that the LED power supply unit can be permanently overloaded. If this is not the case, please set the maximum duration.

	Continuous power	Overload capacity	Maximum duration overload
Power supply unit	100 W	50 %	600 s

Activate protective cut-off   When exceeding the maximum power or the I^2t value ▼
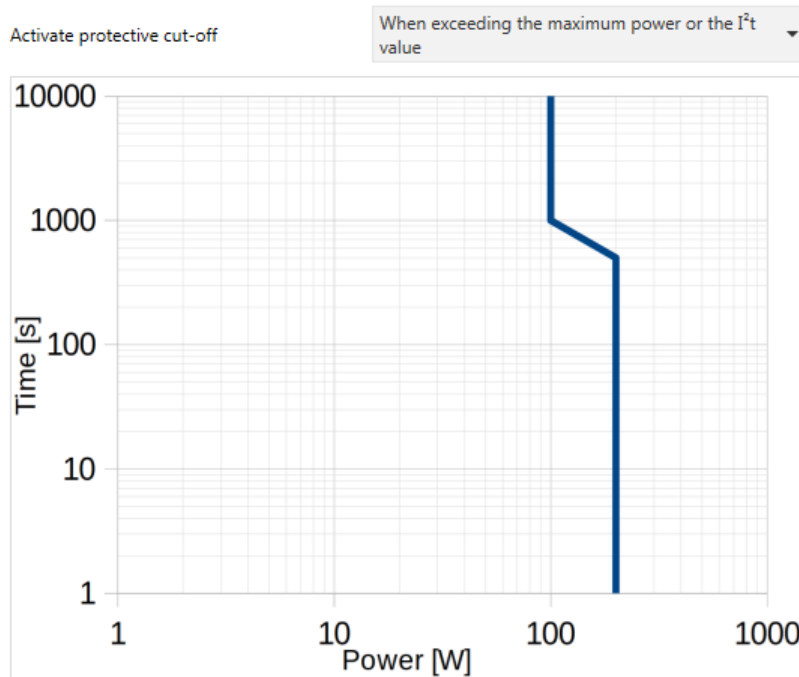
Figure 28: Parameter Power supply protection

Parameter	Selection	Description
Continuous power	1 – 1000 W	Parameterization of the continuous power of the power supply unit in watts.
Overload capacity	0 – 100 %	Parameterization of the overload capacity of the power supply unit in percent. Recommendation: 20 %.
Maximum duration overload	0 – 36000 s	Parameterization of how long the overload parameterized under "Overload capacity" may be present. If 0 is parameterized here, the power supply may be permanently overloaded. Recommendation: 60s
Release protective shutdown	Off When the continuous power is exceeded When exceeding the I^2t value When the maximum power is exceeded When exceeding the maximum power or the I^2t value	Definition of whether power supply overload should lead to shutdown. Options: Shutdown at: - Exceeding of the parameterized continuous load - Exceeding of the parameterized maximum load - Exceeding of the I^2t threshold defined by overload capacity and duration (see chapter Power supply protection) Recommendation: When exceeding the maximum power or the I^2t value

Table 15: Parameter Power supply protection

Single channel - configuration

Note: This channel is only available if an "Operating mode" is selected under General that con-

tains at least one individual channel and this is selected under "Use" (see General).

Note: The parameters that are parameterized as "Specific" under General / Configuration also appear in this case here in the channel in the corresponding tabs. Selection and description are analogous to "global".

Channel A - Configuration

| Object name | A: |

ⓘ The following parameters also include those that were parameterised to "Specific" in the "General" tab.

| Switch-on behaviour | Fixed value ▼ |
| Switch-on brightness | 100 ▲▼ % |

Limit dimming range	Spread ▼
Minimum brightness	0 ▲▼ %
Maximum brightness	50 ▲▼ %

Note: "Restrict" leads to a reduction of the dimming range. "Spread" leads to a scaling of the limited dimming range to 0 to 100 %.

Figure 29: Parameter Single Channel - Configuration

Parameter	Selection	Description
Object name	Free text (up to 30 bytes)	Free definition of a channel name. This is used for the parameter tabs and for the names of the communication objects for an optimum overview.
Switch-on behavior	Fixed value Fixed value with day / night differentiation Last value Last value with differentiation day / night	Definition of the switch-on behavior (switching on via switch object): Fixed value or Last value (this is saved when switching off). In both cases, it is also possible to specify whether there should be a differentiation between day and night.
Switch-on brightness	0 – 100 %	Restriction: The parameter is only available if • Switch-on behavior: Fixed value Definition of the channel brightness for the switch-on process.
Switch-on brightness day	0 – 100 %	Restriction: The parameter is only available if • Switch-on behavior: Fixed value with differentiation day / night Definition of the channel brightness for the switch-on process during the day.
Switch-on brightness night	0 – 100 %	Single Channel – Configuration Restriction: The parameter is only available if • Switch-on behavior: Fixed value with differentiation day / night Definition of the channel brightness for the switch-on process at night.
Limit dimming range	Off Restrict Restrict with day / night distinction Spread Spread with day / night distinction	Definition of whether the dimming range for the channel is to be limited. Two alternatives are available for this: Spread: The range between parameterized minimum and maximum brightness is scaled to 0 to 100 %. Restrict: The range between the parameterized minimum and maximum brightness is not scaled to 0 to 100 %. If values greater than the maximum value or less than the minimum value are dimmed, the maximum value or minimum value is dimmed. Absolute dimming 0% always switches off. In both cases, it is also possible to specify whether there should be a distinction between day and night.
Minimum brightness	0 – 100 %	Restriction: The parameter is only available if • Limit dimming range: Not "Off Defining the minimum brightness for the channel.
Maximum brightness	0 – 100 %	Restriction: The parameter is only available if • Limit dimming range: Restrict or Spread Defines the maximum brightness for the channel.
Maximum brightness day	0 – 100 %	Restriction: The parameter is only available if • Limit dimming range: Restrict with distinction day / night or Spread with distinction day / night. Defines the maximum brightness for the channel during the day.
Maximum brightness night	0 – 100 %	Restriction: The parameter is only available if • Limit dimming range: Restrict with distinction day / night or Spread with distinction day / night. Determination of the maximum brightness for the channel at night.

Table 16: Parameter Single Channel - Configuration

RGB - Configuration

Note: The RGB channel group is only available if an "Operating mode" containing the channel group is selected under General and this is selected under "Use" (see General).

Note: The parameters that are parameterized as "Specific" under General / Configuration also appear in this case here in the channel in the corresponding tabs. Selection and description are analogous to "global".

RGB - Configuration

Object name	RGB:

ℹ The following parameters also include those that have been parameterised to "Specific" in the "General" tab.

Switch-on behaviour	Fixed value ▼
Colour value Switch-on	#0000FF

Limit dimming range	Parameter ▼

	R		G		B	
Maximum brightness	100	%	100	%	100	%

Note: The limited dimming range is later scaled to 0 to 100 % at runtime.

Figure 30: Parameter RGB - Configuration

Parameter	Auswahl	Beschreibung
Object name	Free text (up to 30 bytes)	Free definition of a channel group name. This name is used for the parameter tabs as well as for the names of the communication objects for an optimal overview.
Switch-on behavior	Switch-on behavior	Fixed value Fixed value with distinction day / night Last value Last value with distinction day / night
Color value switch on	RGB-value	Restriction: The parameter is only available if • Switch-on behavior: Fixed value Definition of the RGB color value for the switch-on process.
Color value switch on day	RGB-value	Restriction: The parameter is only available if • Switch-on behavior: Fixed value with distinction day / night Defines the RGB color value for the switch-on process during the day.
Color value switch on night	RGB-value	Restriction: The parameter is only available if • Switch-on behavior: Fixed value with distinction day / night Definition of the RGB color value for the switch-on process at night.
Limit dimming range	Off CO Parameter	Definition of the maximum brightness of individual channels to be limited. The limited dimming range is later scaled to the values 0 to 100 % at runtime. Options: CO: The limitation is made during operation (see the description of communication object 204 in chapter Communication objects). Parameter: A parameter for defining the max. brightness is available for each channel of the channel group.
Maximum brightness	Red: 0 – 100 % Green: 0 – 100 % Blue: 0 – 100 %	Restriction: The parameter is only available if • Limit dimming range: Parameter Definition of the max. brightnesses for the individual channels of the channel group.

Table 17: Parameter RGB - Configuration

RGBW - White channel

→ Explanations: RGBW

Note: The RGBW channel group is only available if the corresponding operating mode is selected under General and this is selected under "Use" (seeGeneral).

Note: The parameters that are parameterized as "Specific" under General / Configuration also appear in this case here in the channel in the corresponding tabs. Selection and description are analogous to "global".

Note: The settings of the RGBW application essentially correspond to those of RGB - Configu-

ration supplemented by settings for the white channel. Only these are shown here.

White channel settings

Automatic brightness control White   ◉ No   ○ Yes

Switch-on behaviour - brightness   100   ⌃⌄ %

Figure 31: Parameter RGBW – White channel

Parameter	Selection	Description
Automatic brightness control White	Yes No	Specifies whether the white channel should be automatically mixed depending on the current saturation value (see RGBW).
Switch-on behavior - brightness	0 – 100 %	Restriction: The parameter is only available if • Automatic brightness control white: No Defines the switch-on brightness for the white channel.

Table 18: Parameter RGBW – White channel

RGBCCT (as RGB-Extended) – White channels

→ Explanation: RGBCCT: Extended-RGB

Note: The RGBCCT channel group is only available if the corresponding operating mode is selected under General in conjunction with the RGB-Extended extension and the channel group is selected under "Use" (see General).

Note: The parameters that are parameterized as "Specific" under General / Configuration also appear here in the channel in the corresponding tabs in this case. Selection and description are analogous to "global".

Note: The settings of the RGBCCT application essentially correspond to those of RGB - Configuration supplemented by settings for the two white channels. Only these are shown here.

White channel settings

Automatic brightness control White   ◉ No ○ Yes

Behaviour Maximum brightness   ◉ Total brightness 100
                                       ○ Brightness 100 % per channel

Indication of the mixing ratio between cool   ○ Cold white ratio in %
and warm white   ◉ Light temperature in Kelvin

ℹ Please specify the colour temperatures of the warm white or cool white light source.

ℹ If a value is parameterised later or written during the runtime by means of CO that is not
   within the range, the value for warm white is used if the value falls below the range, and the
   value for cool white is used if the value exceeds the range.

| 1000 | 2000 | 3000 | 4000 | 5000 | 6000 | 7000 |

Colour temperature warm white   [2000] K

Colour temperature Cold white   [6500] K

Mixing ratio of the white channels   ○ Fix ◉ Parameterisable

CO Release mixing ratio?   ○ No ◉ Yes

Switch-on behaviour - brightness   [100] %

Switch-on behaviour - colour temperature   [4000] K

Figure 32: Parameter RGBCCT (as RGB-Extended) – White channels

Parameter	Selection	Description
Automatic bright-ness control White	Yes No	Specifies whether the white channels should be automatically mixed de-pending on the current saturation value (see RGBCCT: Extended-RGB).
Behavior Maximum brightness	Sum brightness 100 % Brightness 100 % per channel	Defines if the Tunable-White brightness refers to the sum brightness of cool and warm white or if 100 % per channel should be controlled. Note: The setting "100 % per channel" can lead to an overload of the illu-minants, as they are often only designed for a sum power of 100 %.
Specification of the mixing ratio be-tween cold and warm white	Cold white ratio in % Light temperature in Kelvin	Definition whether all parameters and CO concerning the TW mixing ratio are to be released as "Cold white ratio in %" or as "Light temperature in Kelvin". In the latter case, specifications must be made for the color tem-peratures of both channels CW and WW.
Color temperature warm white	1800 – 3300 Kelvin	Restriction: The parameter is only available if • Specification of the mixing ratio between cold and warm white: Light temperature in Kelvin Definition of the color temperature of the used warm white illuminant.
Color temperature cool white	4700 – 7000 Kelvin	Restriction: The parameter is only available if • Specification of the mixing ratio between cold and warm white: Light temperature in Kelvin Defines the color temperature of the cold white illuminant used.
Mixing ratio of white channels	Fixed Parameterizable	Specifies whether the mixing ratio of the white channels is to be defined as fixed here or whether it is to be flexibly parameterizable for the individ-ual operating modes.

Parameter	Selection	Description
Proportion cold white	0 – 100 %	Restriction: The parameter is only available if • Specification of the mixing ratio between cold and warm white: Proportion of cold white in %. • Mixing ratio of white channels: Fixed Definition of the fixed color temperature for the TW channel group.
Color temperature	600 – 11000 Kelvin	Restriction: The parameter is only available if • Specification of mixing ratio between cold and warm white: light temperature in Kelvin • Mixing ratio of white channels: Fixed Definition of the fixed color temperature for the TW channel group..
CO Release mixing ratio	Yes No	Restriction: The parameter is only available if • Mixing ratio of the white channels: Parameterizable Release communication object for absolute or relative dimming of TW color temperature.
Switch-on behavior - Brightness	0 – 100 %	Restriction: The parameter is only available if • Automatic brightness control White: No Definition of switch-on brightness for the TW channel group.
Switch-on behavior - CW ratio	0 – 100 %	Restriction: The parameter is only available if • Automatic brightness control white: No • Specification of mixing ratio between cold and warm white: Proportion of cold white in %. • Mixing ratio of white channels: Parameterizable Specification of the color temperature for the TW channel group.
Switch-on behavior - color temperature	600 – 11000 Kelvin	Restriction: The parameter is only available if • Automatic brightness control white: No • Specification of mixing ratio between cold and warm white: Light temperature in Kelvin • Mixing ratio of white channels: Parameterizable Specification of the color temperature for the TW channel group.

Table 19: Parameter RGBCCT (as RGB-Extended) – White channels

Tunable White - Konfiguration

→ Explanation Tunable White generally: Tunable White

Note: The TW channel group is only available if an "Operating mode" is selected under General that contains the channel group and is selected under "Use" (see General).

Note: The parameters that are configured as "Specific" under General / Configuration also appear here in the corresponding tabs in the channel. The selection and description are analogous to "global".

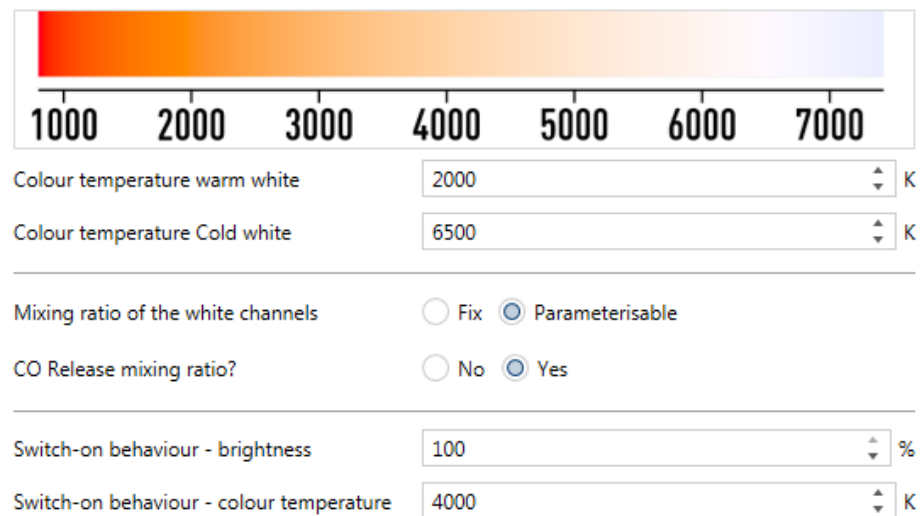Note: The parameters shown here for Tunable White channel 1 (TW 1) apply analogously to TW 2.

Tunable White 1 - Configuration

Object name   [TW 1:]

ℹ The following parameters also include those that have been set to "Specific" in the "General" tab.

Behaviour Maximum brightness   ⦿ Total brightness 100
                                         ○ Brightness 100 % per channel

Indication of the mixing ratio between cool and warm white   ○ Cold white ratio in %
                                                               ⦿ Light temperature in Kelvin

ℹ Please specify the colour temperatures of the warm white or cool white lamp.

ℹ If a value is parameterised later or written via CO during the runtime that is not within the range, the value for warm white is used if the value falls below the range, and the value for cool white is used if the value exceeds the range.

```
1000    2000    3000    4000    5000    6000    7000
```
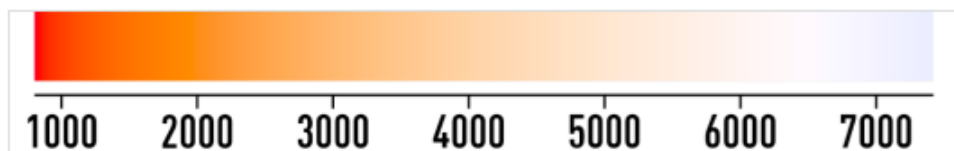
Colour temperature warm white   [2000] K

Colour temperature Cold white   [6500] K

Switch-on behaviour   [Fixed value with differentiation day / night ▾]

	Day	Night
Switch-on brightness	100 %	20 %
Colour temperature	4000 K	2000 K

Limit dimming range   [Off ▾]

Note: "Restrict" leads to a reduction of the dimming range. "Spread" leads to a scaling of the limited dimming range to 0 to 100 %.

Note: For Tunable-White channel groups, the maximum value refers to the value configured under the parameter Behaviour Maximum Brightness.

Figure 33: Parameter TW - Configuration

Parameter	Selection	Description
Object name	Free text (up to 30 Bytes)	Free definition of a channel group name. This is adopted for the parameter tabs as well as for the names of the communication objects for an optimal overview.
Behavior maximum brightness	Sum brightness 100 % Brightness 100 % per channel	Determination of whether the tunable white brightness relates to the total brightness of cold and warm white, or 100% per channel should be controlled. Note: The setting "100% per channel" can lead to overloading of the lamps, as these are often only designed for a total output of 100%.
Specification of the mixing ratio between cold and warm white	Proportion Cold white in % Color temperature in Kelvin	Determination of whether all parameters and CO relating to the TW mixing ratio should be released as "cold white%" or as "light temperature in Kelvin". In the latter case, information about the color temperatures of the two channels CW and WW must be made.
Color temperature warm white	1800 – 3300 Kelvin	Restriction: The parameter is only available if • Specification of the mixing ratio between cold and warm white: Light temperature in Kelvin. Specifies the color temperature of the warm white illuminant used.

Parameter	Selection	Description
Color temperature cold white	4700 – 7000 Kelvin	Restriction: The parameter is only available if • Specification of the mixing ratio between cold and warm white: light temperature in Kelvin Definition of the color temperature of the cold white illuminant used
Switch-on behavior	Fixed value Fixed value with day / night distinction Last value Last value with distinction day / night	Definition of the switch-on behavior (switching on via switch object): Fixed value or Last value (this is saved when switching off). In both cases, it is also possible to specify whether there should be a distinction between day and night.
Switch-on behavior - brightness	0 – 100 %	Restriction: The parameter is only available if • Switch-on behavior: Fixed value Definition of the TW brightness for the switch-on process.
Switch-on behavior – brightness day	0 – 100 %	Restriction: The parameter is only available if • Switch-on behavior: Fixed value with differentiation day / night Definition of the TW brightness for the switch-on process during the day.
Switch-on behavior – brightness night	0 – 100 %	Restriction: The parameter is only available if • Switch-on behavior: Fixed value with distinction day / night Definition of the TW brightness for the switch-on process at night.
Switch-on behavior – proportion CW	0 – 100 %	Restriction: The parameter is only available if • Switch-on behavior: Fixed value • Specification of mixing ratio between cold and warm white: Proportion of cold white in %. • TW 1 / Dimming settings / Activate Dim-2-Warm: No Specification of the CW proportion for the switch-on process.
Switch-on behavior – proportion CW day	0 – 100 %	Restriction: The parameter is only available if • Switch-on behavior: Fixed value with distinction day / night • Specification of mixing ratio between cold and warm white: Proportion of cold white in %. • TW 1 / Dim settings / Activate Dim-2-Warm: No Specification of the CW proportion for the switch-on process during the day.
Switch-on behavior – proportion CW night	0 – 100 %	Restriction: The parameter is only available if • Switch-on behavior: Fixed value with distinction day / night • Specification of mixing ratio between cold and warm white: Proportion of cold white in %. • TW 1 / Dim settings / Activate Dim-2-Warm: No Specification of the CW proportion for the switch-on process at night.
Switch-on behavior - color temperature	600 – 11000 Kelvin	Restriction: The parameter is only available if • Switch-on behavior: Fixed value • Specification of mixing ratio between cold and warm white: Light temperature in Kelvin • TW 1 / Dimming settings / Activate Dim-2-Warm: No Specification of the color temperature for the switch-on process.
Switch-on behavior – color temperature day	600 – 11000 Kelvin	Restriction: The parameter is only available if • Switch-on behavior: Fixed value with distinction day / night • Specification of mixing ratio between cold and warm white: Light temperature in Kelvin • TW 1 / Dim settings / Activate Dim-2-Warm: No Specification of the color temperature for the switch-on process during the day.
Switch-on behavior – color temperature night	600 – 11000 Kelvin	Restriction: The parameter is only available if • Switch-on behavior: Fixed value with distinction day / night • Specification of mixing ratio between cold and warm white: Light temperature in Kelvin • TW 1 / Dim settings / Activate Dim-2-Warm: No Specification of the color temperature for switching on at night..

Parameter	Selection	Description
Limit dimming range	Off Restrict Restrict with day / night distinction Spread Spread with day / night distinction	Definition of whether the dimming range for the channel group is to be limited. Two alternatives are available for this: Spread: The range between parameterized minimum and maximum brightness is scaled to 0 to 100 %. Restrict: The range between the parameterized minimum and maximum brightness is not scaled to 0 to 100 %. If values greater than the maximum value or less than the minimum value are dimmed, the maximum value or minimum value is dimmed. Absolute dimming 0% always switches off. In both cases, it is also possible to specify whether there should be a distinction between day and night.
Minimum brightness	0 – 100 %	Restriction: The parameter is only available if • Limit dimming range: Not "Off Defines the minimum brightness for the channel group
Maximum brightness	0 – 100 %	Restriction: The parameter is only available if • Limit dimming range: Restrict or Spread Defines the maximum brightness for the channel group. The value refers to the value parameterized under "Behavior maximum brightness".
Maximum brightness day	0 – 100 %	Restriction: The parameter is only available if • Limit dimming range: Restrict with distinction day / night or Spread with distinction day / night. Determination of the maximum brightness for the channel group during the day. Setting the maximum brightness for the channel group. The value refers to the value parameterized under "Behavior maximum brightness".
Minimum Brightness night	0 – 100 %	Restriction: The parameter is only available if • Limit dimming range: Restrict with distinction day / night or Spread with distinction day / night. Determination of the maximum brightness for the channel group at night. Setting the maximum brightness for the channel group. The value refers to the value parameterized under "Behavior maximum brightness"..

Table 20: Parameter TW - Configuration

Tunable White – Dimming settings

→ Explanations of Tunable White generally: Tunable White

→ Explanations to Dim-2-Warm: Dim-2-Warm

Note: The TW channel group is only available if an "Operating mode" containing the channel group is selected under General and this is selected under "Use" (see General).

Note: The parameters that are parameterized as "Specific" under General / Configuration also appear in this case here in the channel in the corresponding tabs. Selection and description are analogous to "global".

Note: The parameters shown here for Tunable White channel 1 (TW 1) apply analogously to TW 2.

TW 1 - Dimming settings

Note: The following parameters also include those that have been parameterised to "Specific" in the "General" tab.

Release Dim-2-Warm?   ○ No ● Yes

ℹ️ If Dim-2-Warm is activated, the behaviour of the lamp is fixed and the colour temperature cannot be further parameterised at other points or adjusted by means of CO.

	Brightness threshold	Colour temperature
Brightness threshold 1	20 %	4000 K
Brightness threshold 2	60 %	4000 K

Note:
-> colour temperature 1 for brightness values < threshold 1
-> colour temperature 2 for brightness values > threshold 2
-> interpolation of the colour temperature between the two thresholds

Figure 34: Parameter TW – Dimming settings

Parameter	Selection	Description
Activate Dim-2-Warm	Yes No	Activate Dim-2-Warm Note: If active, all parameters and communication objects concerning the mixing ratio are not released for the entire channel group.
Threshold values brightness	0 – 100 %	Restriction: The parameter is only available if • Activate Dim-2-Warm: Yes Definition of the two interpolation points.
Color temperature	0 – 100 %	Restriction: The parameter is only available if • Release Dim-2-Warm: Yes • Specification of mixing ratio between cold and warm white: Proportion of cold white in %. Definition of the color temperature in cold white % for the two supporting points.
Color temperature	600 – 11000 Kelvin	Restriction: The parameter is only available if • Release Dim-2-Warm: Yes • Definition of mixing ratio between cold and warm white: Light temperature in Kelvin Definition of the color temperature in Kelvin for the two supporting points.

Tabelle 21: Parameter TW – Dimming Settings

RGBCCT (as TW-Extended) - Configuration

→ Explanation: RGBCCT: Extended-TW

Note: The RGBCCT channel group is only available if the corresponding operating mode in connection with the extension TW-Extended is selected under General and the channel group underneath is selected under "Use" (see General).

Note: The parameters that are configured as "Specific" under General / Configuration also appear here in the corresponding tabs in the channel. The selection and description are analogous to "global".

Note: The settings of the RGBCCT application (as TW-Extended) essentially correspond to those of Tunable White – Dimming settings, supplemented by settings for adding the color channels. Only these are shown here.

Tunable White 1 - Configuration

Object name　　　　　　　　　　TW 1:

ⓘ Please enter the colour temperatures of the warm white or cool white lamp.

ⓘ If a value is parameterised later or written during runtime by means of CO that is not within the range, warm or cold colours are added by means of the RGB LEDs.

Colour temperature warm white	2000 ⇕ K
Colour temperature Cold white	6500 ⇕ K
Minimum value	650 ⇕ K
Maximum value	10000 ⇕ K
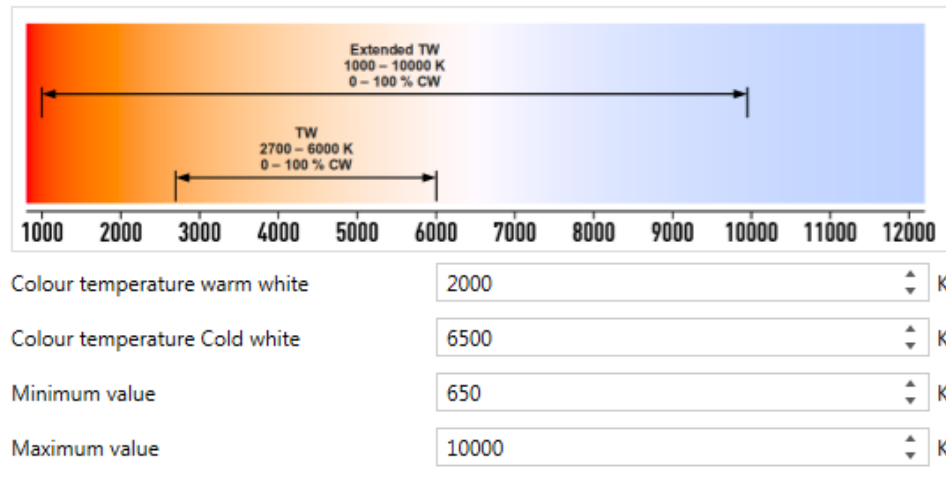
Figure 35: Parameter RGBCCT (as TW-Extended) - Configuration

Parameter	Auswahl	Beschreibung
Color temperature warm white	1800 – 3300 Kelvin	Definition of the color temperature of the warm white illuminant used.
Color temperature cold white	4700 – 7000 Kelvin	Definition of the color temperature of the cool white light source used.
Minimum value	600 – 1800 Kelvin	Extension of the color temperature range down to the value configured here.
Maximum value	7000 – 11000 Kelvin	Extension of the color temperature range upwards to the value configured here.

Tabelle 22: Parameter RGBCCT (als TW-Extended) – Konfiguration

RGBW (als Simulated TW) - Configuration

→ Explanation: RGBW: Simulated TW

Note: The TW channel group is only available if the RGBW operating mode in connection with the parameter "Activate simulated tunable white" is selected under General and the channel group is selected under "Use" (see General).

Note: The parameters that are configured as "Specific" under General / Configuration also appear here in the corresponding tabs in the channel. The selection and description are analogous to "global".

Note: The settings of the RGBW application (with sim. TW) essentially correspond to those of Tunable White – Dimming settings, supplemented by settings for adding the color channels. Only these are shown here..

Tunable White 1 - Configuration

Object name   TW 1:

ℹ Please specify the colour temperature of the white light source. By automatically adding red, green and blue, the white tone can be shifted up to the specified limit values.

Extended TW
1000 – 10000 K
0 – 100 % CW

W: 2850

1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000 12000

Colour temperature White   5000   K

Minimum value   650   K

Maximum value   10000   K
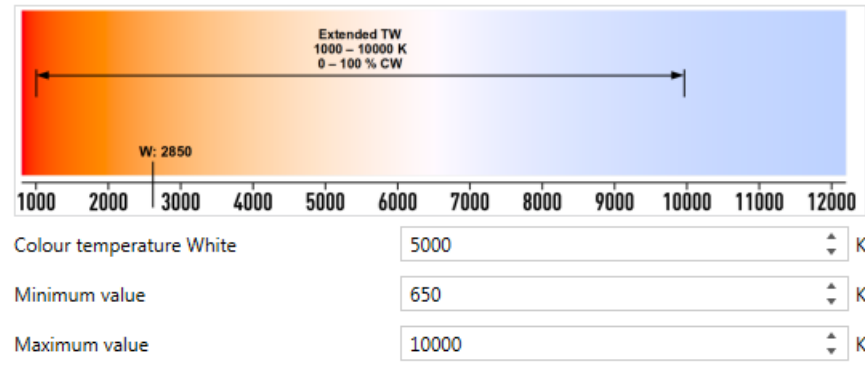
Figure 36: Parameter RGBW (with sim. TW) - Configuration

Parameter	Selection	Description
Color temperature white	600 – 11000 Kelvin	Definition of the color temperature of the used white illuminant.
Minimum value	600 – 4500 Kelvin	Extension of the color temperature range down to the here parameterized value.
Maximum value	4500 – 11000 Kelvin	Extension of the color temperature range up to the here parameterized value.

Table 23: Parameter RGBW (with sim. TW) - Configuration

Approvals

Note: This tab is available for every channel / every channel group.

RGB - Release

Release stairway lighting function?   ○ No ● Yes

Release scenes?   ○ No ● Yes

Release Bitscenes?   ○ No ● Yes

Release locking functions?   ○ No ● Yes

Release sequences?   ○ No ● Yes

Number of sequences   5

Release time-controlled dimming?   ○ No ● Yes

Figure 37: Parameter Freigaben

Parameter	Selection	Description
Release stairway lighting function	Yes No	Release Stairway lighting function
Release scenes	Yes No	Release Scenes
Release bit scenes	Yes No	Release Bit scenes
Release locking functions	Yes No	Release Locking functions

Parameter	Selection	Description
Release sequences	Yes No	Restriction: The parameter is only available for RGB (CCT / W) and TW channel groups. Release Sequences
Number of sequences	1 - 5	Restriction: The parameter is only available for RGB (CCT / W) and TW channel groups. Set number of sequences
Release time-controlled dimming	Yes No	Release Time-controlled dimming or HCL Note: HCL (=Human Centric Lighting = time-controlled dimming in operating mode Tunable White)

Tabelle 24: Parameter Freigaben

Stairway lighting function

The stairway lighting function releases a luminaire triggered by a motion detector, for example, to be switched off again automatically after a parameterized activation time. If a new trigger occurs during the activation time, this can either be ignored, the time restarted or added up.

Furthermore, if desired, a dimming time and brightness can be parameterized. As a warning for the user that the lighting is about to go out, this brightness is controlled for the duration of the dimming time after the activation time has elapsed.

When the stairway lighting function is activated, the switch-on brightness and switch-on speed result from the settings made under Configuration or Dimming settings.

Of course, the so-called "stairway lighting function" can not only be used for stairway lighting, but is generally suitable for all areas of application in which the lighting is to go out again automatically after a defined time.

Note: The function is shown here for the operating mode RGBCCT (as RGB Extended) with deactivated automatic white admixture, as this offers the maximum number of parameters. The parameters Color Temperature White are also shown here in Cold White %. The parameters can also be set in Kelvin if the parameter "Specification of mixing ratio between warm and cool white" is changed accordingly (RGBCCT (as RGB-Extended) – White channels). For other operation modes the parameters for brightness, color selection, CW ratio are reduced accordingly.

Note: This tab is only available if parameter "Release stairway lighting function" under Channel group / Release is set to Yes.

Figure 38: Parameter Stairway lighting function

Parameter	Selection	Description
Activation time for stairway lighting	0 – 3600 s	Definition of the activation duration of the stairway lighting.
Behavior in the event of a retrigger during runtime	No Reaction Start time again Add-up time	Definition of the behavior if a new trigger occurs during the activation time. No reaction: The current process continues unaffected. Restart time: The running process continues with the new remaining time = activation time stairway lighting. Add time: The current process continues with the new remaining time = Old remaining time + Activation time stairway lighting.
Dim before switching off	Yes No	Definition of whether a temporary, dimmed value is to be approached after the activation time has elapsed. If no is parameterized here, it is switched off.
Dimming time	0 – 3600 s	Restriction: The parameter is only available if • Dim before switch off: Yes Definition of the time for which the dimmed brightness is to be maintained
Dim to value	0 – 100 %	Restriction: The parameter is only available if • Dim before switch off: Yes Definition of the dimmed brightness. In single channel mode the value corresponds to the new channel brightness, in TW to the TW brightness and in RGB channel groups the individual colors are scaled starting from the switch-on brightness.
Allow switching off by CO	Yes No	Definition of whether the stairway lighting can be switched off during the activation time by means of the CO "Switch stairway lighting" OFF.
Time specification via bus	Yes No	Release the "Stairway lighting time factor" communication object, which can be used to assign an integer factor to the parameterized activation time.
Activate the stairway lighting function via the "Stairway lighting time" object	Yes No	Restriction: The parameter is only available if • Before time setting via bus: Yes Defines whether sending a factor to CO "Stairway timer factor" also starts the stairway lighting function immediately or not.

Table 25: Parameter Stairway lightning function

Scenes

The Enertex® KNX LED Dimmsequenzer 20A/5x has a scene function. Using the 8-bit scene address, up to eight different scenes can be stored per channel or channel group (e.g. RGB). Each scene can be assigned a scene number (1 ... 64). The scene is to be understood as a specific lighting setting.

When controlling the scenes, the brightness value is changed with the speed of the absolute dimming.

Note: The function is shown here for the operating mode RGBCCT (as RGB Extended) with deactivated automatic white admixture, as this offers the maximum number of parameters. The parameters Color Temperature White are also shown here in Cold White %. The parameters can also be set in Kelvin if the parameter "Specification of mixing ratio between warm and cool white" is changed accordingly (see RGBCCT (as RGB-Extended) – White channels). For other operation modes the parameters for brightness, color selection, CW proportion are reduced accordingly.

Note: This tab is only available if parameter "Release scenes" under Channel group / Releases is set to Yes.

RGB - Scenes

Release saving?	No	● Yes
Overwrite stored brightness when reprogramming the application program	No	● Yes
Release Scene A	No	● Yes
Release Scene B	No	● Yes
Release Scene C	● No	Yes
Release Scene D	● No	Yes
Release Scene E	● No	Yes
Release Scene F	● No	Yes
Release Scene G	● No	Yes
Release Scene H	● No	Yes

	Number	Action	RGB	Brightness White	Colour temp. white
Scene A	1	Brightness value	#1E5DED	10 %	80 % CW

	Number	Action	RGB	Brightness White	Colour temp. white
Scene B	2	Switch-on value or switch-on value (day / night)			

Figure 39: Parameter Scenes

Parameter	Selection	Description
Release save	Yes No	Defines whether the parameterized brightnesses for a scene can also be overwritten (saved) during operation.
Overwrite saved brightness when reprogramming the application program	Yes No	Restriction: The parameter is only available if • Release saving: Yes Defines whether the brightness saved during operation is to be overwritten with a reprogramming of the application via ETS.
Release Scene [A-H]	Yes No	Release parameters of the selected scene and communication object.
Scene Number	1 – 64	Determination of the scene number. This number can be called up or saved (overwritten) during operation via the scene object..
Scene Action	Brightness value Switch-on value or switch-on value day / night No change	Defines what happens when a scene is called up: Brightness value: A parameterized brightness is approached. Switch-on value or switch-on value day / night: The switch-on brightness is approached. If a day / night distinction is parameterized for the switch-on behavior, the corresponding value is approached. No change: The current brightness value remains unchanged.
RGB	RGB-value	Restriction: The parameter is only available if • Scene Action: Brightness value Defines the RGB color value for the scene.
Brightness white	0 – 100 %	Restriction: The parameter is only available if • Scene Action: Brightness value • White channels / Automatic brightness control White: No Defines the TW brightness for the scene.

Parameter	Selection	Description
Color temperature white	0 – 100 %	Restriction: The parameter is only available if • Scene Action: Brightness value • White channels / Mixing ratio of the white channels: Parameterizable Definition of the cold white ratio of the white channels for the scene.

Table 26: Parameter Scenes

Bit scenes

For each channel or channel group (e.g. RGB), the Enertex® KNX LED Dimmsequenzer 20A/5x has five bit scene objects. This allows, for example, a specific lighting setting to be specified directly with any single pushbutton. Two bit scenes can be loaded with each of these objects (one parameterization each for 0 and 1).

When the bit scenes are activated, the brightness value is changed at the speed of the absolute dimming.

Note: The function is shown here for the operating mode RGBCCT (as RGB Extended) with deactivated automatic white admixture, as this offers the maximum number of parameters. The parameters Color Temperature White are also shown here in Cold White %. The parameters can also be set in Kelvin if the parameter "Specification of mixing ratio between warm and cool white" is changed accordingly (see RGBCCT (as RGB-Extended) – White channels). For other operation modes the parameters for brightness, color selection, CW proportion are reduced accordingly.

Note: This tab is only available if parameter "Release bit scenes" under Channel group / Releases is set to Yes.

Figure 40: Parameter Bitscenes

Parameter	Selection	Description
Release Bit scene [1-5]	Yes No	Release the parameters and communication objects of the selected bitscenes.
Action	Brightness value Switch-on value or switch-on value day / night No change	Defines what happens when the bitscene is called up for the value 1 or 0: Brightness value: A parameterized brightness is approached. Switch-on value or Switch-on value day / night: The switch-on brightness is approached. If a day / night distinction is parameterized for the switch-on behavior, the corresponding value is approached. No change: The current brightness value remains unchanged.
RGB	RGB-value	Restriction: The parameter is only available if • Action: Brightness value Defines the RGB color value for the bit scene.
Brightness white	0 – 100 %	Restriction: The parameter is only available if • Action: Brightness value • White channels / Automatic brightness control White: No Defines the TW brightness for the bit scene.
Color temperature white	0 – 100 %	Restriction: The parameter is only available if • Action: Brightness value • White channels / Mixing ratio of the white channels: Parameterizable Definition of the cold white ratio of the white channels for the bitscene.

Table 27: Parameter Bitscenes

Locking functions

Two separate disable objects are available for each channel or channel group (e.g. RGB). These objects can be used to set the channel or channel group to a locked or unlocked state via a 1-bit group address. In the locked state, all objects except the lock objects are ignored. The other channels / channel groups can continue to be used and operated without restriction during this time.

Various actions can be carried out in conjunction with the locking or unlocking process:

- Dimming to brightness value

- Dimming to switch-on value

- No change

- As before

When the locking functions are activated, the brightness value is changed at the speed of the absolute dimming.

Note: The function is shown here for the operating mode RGBCCT (as RGB Extended) with deactivated automatic white admixture, as this offers the maximum number of parameters. The parameters Color Temperature White are also shown here in Cold White %. The parameters can also be set in Kelvin if the parameter "Specification of mixing ratio between warm and cool white" is changed accordingly (see RGBCCT (as RGB-Extended) – White channels). For other operation modes the parameters for brightness, color selection, CW proportion are reduced accordingly.

Note: This tab is only available if parameter "Release locking functions" under Channel group / Releases is set to Yes.

RGB - Locking functions

Release lock object 1?   ○ No ● Yes

Release lock object 2?   ○ No ● Yes

	Action	RGB	Brightness White	Colour temp. white
Lock 1 - Lock (1)	Brightness value ▼	#D92323	0 ↕ %	50 ↕ % CW
Lock 1 - Unlock (0)	As before ▼			

	Action	RGB	Brightness White	Colour temp. white
Lock 2 - Lock (1)	Brightness value ▼	#000000	100 ↕ %	100 ↕ % CW
Lock 2 - Unlock (0)	As before ▼			

Figure 41: Parameter Locking functions

Parameter	Selection	Description
Release lock [1 / 2]	Yes No	Release parameters and communication objects of the selected lock.
Lock / Unlock - Action	Brightness value Switch-on value or switch-on value day / night No change As before	Defines what happens during locking/unlocking in addition to the actual locking/unlocking of the channel (group) brightness: Brightness value: A parameterized brightness is approached. Switch-on value or Switch-on value day / night: The switch-on brightness is approached. If a day / night distinction is parameterized for the switch-on behavior, the corresponding value is approached. No change: The current brightness value remains unchanged. As before: When unlocking, the value that was active before locking is approached. When locking, the behavior corresponds to that of "No change".
Lock / Unlock - RGB	RGB-value	Restriction: The parameter is only available if • Lock / Unlock Action: Brightness value Defines the RGB color value for the lock function.
Lock / Unlock - Brightness White	0 – 100 %	Restriction: The parameter is only available if • Lock / Unlock Action: Brightness value • White channels / Automatic brightness control White: No Defines the TW brightness for the lock function.
Lock / Unlock - White color temperature	0 – 100 %	Restriction: The parameter is only available if • Lock / Unlock Action: Brightness value • White channels / Mixing ratio of white channels: Parameterizable Definition of the cold white ratio of the white channels for the disable function.

Table 28: Parameter Locking functions

Sequences

In all operating modes except single channel, up to five optionally predefined or freely definable sequences can be started or stopped by means of CO

Note: The function is shown here for the operating mode RGBCCT (as RGB Extended) with de-activated automatic white admixture, as this offers the maximum number of parameters. The parameters Color Temperature White are also shown here in Cold White %. The parameters can also be set in Kelvin if the parameter "Specification of mixing ratio between warm and cool white" is changed accordingly (see RGBCCT (as RGB-Extended) – White channels). For other operation modes the parameters for brightness, color selection, CW proportion are reduced accordingly.

Note: This tab is only available if parameter "Release sequences" under Channel group / Releases is set to Yes.

Figure 42: Parameter Sequences

Parameter	Selection	Description
Behavior with absolute / relative dimming / switching with switch object	Execute action with fallback to sequence Execute action without fallback to sequence Locked (No reaction)	Defines the behavior for an Absolute / Relative dimming action or a switching action during a running sequence: Execute action with fallback: The dimming/switching operation is executed, after a parameterized time has elapsed, the sequence is continued. Execute action without fallback: The sequence is aborted and the dimming/switching operation is executed. Locked (no reaction): The dimming/switching function is not executed.
Fallback time to sequence	Various time durations between 1 minute and 24 hours.	Restriction: The parameter is only available if • Behavior for absolute / relative dimming / switching with switch object: Execute action with fallback to sequence Definition of the duration after which the sequence is continued after an interruption.
Behavior with "Stop" control object	Stop sequence Switch off	Definition of what happens when Stop is written to the "Sequence start / stop" communication object: Stop: sequence is stopped and current brightness values are retained Switch off: Sequence is stopped and channel group is switched off.
Sequence	User-defined sequence Predefined sequence Random sequence Random color temperature	Sequence Type Definition: User defined: Free definition of steps with brightnesses and times Predefined sequence: Selection of a predefined sequence Random sequence: Channel brightnesses, as well as times (up to parameterized maximum values) randomly Random color temperature: Similar to random sequence, but with defined steps
Endless loop	Yes No	Restriction: The parameter is only available if • Sequence: Not "Random sequence Defines whether the sequence is to run in an endless loop (until aborted by CO Sequence Stop).

Parameter	Selection	Description
Number of repetitions	0 - 255	Restriction: The parameter is only available if • Sequence: "User defined sequence" or "Random color temperature". Defines how many times in a row the sequence should be repeated.
Behavior after sequence	Hold last value Switch off Start sequence 1 Start sequence 2 Start sequence 3 Start sequence 4 Start sequence 5	Restriction: The parameter is only available if • Sequence: "User defined sequence" or "Random color temperature". Defines what should happen after a sequence has finished: Hold last value: Sequence is ended, brightnesses of the last step are kept Switch off: Sequence is ended, channel group is switched off Start sequence [1-5]: sequence is finished, a new one is started
Number of steps	2 - 5	Restriction: The parameter is only available if • Sequence: "User defined sequence" or "Random color temperature". Defines the number of steps of a sequence.
Predefined sequence	Div. operating mode dependent predefined sequences	Restriction: The parameter is only available if • Sequence: "Predefined sequence". Selection of a predefined sequence. Their definitions can be found in the tables Table 30: Predefined RGB Sequences or Table 31: Predefined TW Sequences.
Total Sequence Duration	1 – 65535 s	Restriction: The parameter is only available if • Sequence: "Predefined Sequence Definition of how long a run of a predefined sequence should last (the hold and transition times are stored there relative to the total duration).
Color	RGB-value	Restriction: The parameter is only available if • Sequence: "User defined sequence". Defines the RGB color value for a step of a sequence..
Hold time	1 – 65535 s	Restriction: The parameter is only available if • Sequence: "User defined sequence" or "Random color temperature". Defines the time for which a specific color value is held for the step of a sequence.
Transition time	1 – 65535 s	Restriction: The parameter is only available if • Sequence: "User defined sequence" or "Random color temperature". Defines the dimming time for the transition from one step to the next.
Brightness White	0 – 100 %	Restriction: The parameter is only available when • Sequence: "User defined sequence". Definition of the TW brightness for the step of a sequence.
Color temperature White	0 – 100 %	Restriction: The parameter is only available if • Sequence: "User defined sequence". Definition of the cold white percentage of the white channels for the step of a sequence.
Max. Hold time	1 – 65535 s	Restriction: The parameter is only available if • Sequence: "Random sequence Definition of the maximum hold time for a random sequence. For each random step a random number between 0 and this max. dwell time is determined.
Max. Transition time	1 – 65535 s	Restriction: The parameter is only available if • Sequence: "random sequence" Definition of the maximum transition time for a random sequence. For each random step, a random number between 0 and this maximum transition time is determined.

Table 29: Parameter Sequences

Name	Number of steps	Number of repetitions	Step	Red	Green	Blue	Holding time proportionate to total time [%]	Transition time proportionate to total time [%]
Amber room	5	0	1	255	179	56	0	20
			2	255	186	25	0	20
			3	255	198	25	0	20
			4	255	204	0	0	20
			5	255	191	0	0	20
Warm col-ors	2	0	1	255	0	132	0	50
			2	251	255	0	0	50
Cold colors	2	0	1	102	252	255	0	50
			2	174	71	255	0	50
Rainbow colors	3	0	1	255	0	0	0	34
			2	0	255	0	0	33
			3	0	0	255	0	33
TV	3	0	1	64	183	128	30	0
			2	82	128	161	20	0
			3	39	216	98	50	0
Sunset	4	0	1	255	242	0	0	25
			2	255	119	0	0	25
			3	255	0	0	0	25
			3	0	0	0	0	25
Warp	2	2	1	0	0	219	20	40
			2	0	179	224	0	40
Strobo-scope	2	5	1	255	255	255	50	0
			2	0	0	0	50	0
Good Morning	4	0	1	0	0	0	0	40
			2	51	128	0	0	40
			3	94	61	43	0	15
			3	255	242	230	5	0
Glow	4	0	1	0	3	0	0	30
			2	51	3	0	0	30
			3	94	5	0	0	20

Name	Number of steps	Number of repetitions	Step	Red	Green	Blue	Holding time proportionate to total time [%]	Transition time proportionate to total time [%]
			4	255	3	0	0	20
Comfort-able	4	0	1	99	79	26	0	40
			2	115	92	51	0	40
			3	26	5	0	0	15
			4	18	3	0	0	5
Red	2	0	1	153	61	61	0	50
			2	255	0	0	0	50
Green	2	0	1	115	153	61	0	50
			2	149	255	0	0	50
Railway station	2	0	1	102	128	128	0	50
			2	102	111	128	0	50
Night light	2	0	1	51	24	15	0	50Transition time proportionate to total time
			2	51	51	28	0	50
Green and yellow	2	0	1	125	255	125	0	50
			2	151	153	14	0	50

Table 30: Predefined RGB Sequences

Name	Number of steps	Number of repetitions	Step	TW-Brightness	CW-Proportion	Holding time proportionate to total time[%]	Transition time proportionate to total time [%]
Sunrise	4	0	1	25	0	0	50
			2	153	0	0	20
			3	204	127	0	15
			4	255	127	15	0
Sunset	4	0	1	255	127	0	20
			2	204	102	0	30
			3	51	76	0	50

Name	Number of steps	Number of repetitions	Step	TW-Brightness	CW-Proportion	Holding time proportionate to total time[%]	Transition time proportionate to total time [%]
			4	0	0	0	0
Alarm	2	0	1	100	255	50	0
			2	100	255	50	0
Warp	3	0	1	127	0	20	20
			2	204	127	0	20
			3	127	0	20	20
Stroboscope	2	5	1	255	127	50	0
			2	0	127	50	0
Candlelight	3	0	1	204	0	50 (*)	5 (*)
			2	255	10	20 (*)	5 (*)
			3	204	0	20 (*)	0 (*)

Table 31: Predefined TW Sequences

(*) For the TW sequence "Candlelight" the relative times represent maximum values. Random values between 0 and maximum value are determined for each sequence run.

Time-controlled dimming or HCL

→ Explanation: Time-controlled dimming and Human Centric Light (HCL)

Note: The function is shown here for the operating mode RGBCCT (as RGB Extended) with de-activated automatic white admixture, as this offers the maximum number of parameters. The parameters Color Temperature White are also shown here in Cold White %. The parameters can also be set in Kelvin if the parameter "Specification of mixing ratio between warm and cool white" is changed accordingly (see RGBCCT (as RGB-Extended) – White channels). For other operation modes the parameters for brightness, color selection, CW proportion are reduced accordingly.

Note: This tab is only available if the time objects under General / Time functions are released, as well as the parameter "Release time-controlled dimming" under Approvals . In addition, the communication objects Date and Time must be written once for the correct function after the device start.

RGB - Time-controlled dimming

> ℹ In order to start time-controlled dimming, the date and time must be written once by means of CO after the unit has been started.

Dimming behaviour   ◉ Uniform transition between two times
                           ○ Abs. dimming at time

Note: There is no smooth transition between the last parameterised time and time 1, but the last brightness value is held and only dimmed absolutely to brightness value 1 at time 1.

Behaviour with absolute / relative dimming /   Execute Action with fallback to time-controlled
switching with switch object   dimming   ▼

Release time for time-controlled dimming   1 minute   ▼

Behaviour with "Stop" control object   ○ Stop sequence   ◉ Switch off

Number of times   7   ▲▼

Note: For time, either fixed times or times dependent on sunrise or sunset can be set.

	Time		RGB		Brightness White		Colour temp. white	
Time 1	06:00	▼	#000000	▦	70	%	2700	K
Time 2	10:00	▼	#000000	▦	93	%	5318	K
Time 3	11:00	▼	#000000	▦	96	%	5685	K
Time 4	12:00	▼	#000000	▦	98	%	5800	K
Time 5	13:00	▼	#000000	▦	98	%	5685	K
Time 6	14:00	▼	#000000	▦	97	%	5318	K
Time 7	18:00	▼	#000000	▦	82	%	2700	K

Figure 43: Parameter Time-controlled dimming

Parameter	Selection	Description
Dimming behavior	Smooth transition between two points in time Abs. dimming at time	Defines the basic behavior of time-controlled dimming: Uniform transition: Between two successive interpolation points, there is a uniform transition of the parameterized brightnesses. Exception: Between the last parameterized setpoint of a day and the first of the following day, the last brightness value is held instead and only dimmed absolutely to its brightness value at the time of the first setpoint of the following day. Abs. dimming process at the time: When each setpoint is reached, its brightness is dimmed absolutely. The brightness is maintained between the setpoints.
Behavior with absolute / relative dimming / switching with switch object	Execute action with fallback to time-controlled dimming Execute action without fallback to time-controlled dimming Locked (no reaction)	Defines the behavior for an Absolute / Relative dimming action or a switching action during a running sequence: Execute action with fallback: The dimming/switching operation is executed, after a parameterized time has elapsed, the sequence is continued. Execute action without fallback: Time-controlled dimming is canceled and the dimming/switching operation is executed. Locked (no reaction): The dimming/switching function is not executed.
Fallback time to time-controlled dimming	Various time durations between 1 minute and 24 hours.	Restriction: The parameter is only available if • Behavior for absolute / relative dimming / switching with switch object: Execute action with fallback to time-controlled dimming Definition of the duration after which the sequence is continued after an interruption.
Behavior with "Stop" control object	Stop sequence Switch off	Definition of what happens when Stop is written to the "Time-controlled dimming start / stop" communication object: Stop: Time-controlled dimming is stopped and current brightness values remain. Switch off: Time-controlled dimming is stopped and channel group is switched off.
Number of time points	2 – 10	Definition of the number of time points (interpolation points)

Parameter	Selection	Description
Time	Selection of a time or Sunrise +/- Offset or sunset +/- offset	Definition of a control point
RGB	RGB value	Definition of the RGB color value for a control point.
Brightness White	0 – 100 %	Determination of the TW brightness for a control point.
Color temp. white	0 – 100 %	Defining the cold white ratio of the white channels for a control point.

Table 32: Parameter Time-controlled dimming

Communication objects

Note: Depending on the parameterization, some objects may not be available.

ID	Name	Object function	Description and approval	Length	DptTyp
1	Time	Time	Set the time of the internal real-time clock. This is required for the time-controlled dimming functions and for automatic day/night switching. Release: "Release timer objects" parameter under General / Time functions	3 Bytes	DPST-10-1
2	Time	Date	Set the date of the internal real-time clock. This is required for the time-controlled dimming functions and for the astro function (calculation of sunrise and sunset). Release: parameter "Release timer objects" under General / Time functions	3 Bytes	DPST-11-1
3	Time	Date / Time	Set time and date of the internal real-time clock (combined CO). Release: Parameter "Release timer objects" under General / Time functions	8 Bytes	DPST-19-1
4	Time	Day / Night	Set the dimming sequencer to day or night mode. Depending on this, different switch-on brightnesses can be parameterized, for example (see parameter description). Release: "Day / Night switchover by means of" parameter under General / Time functions	1 Bit	DPST-1-24
6	Relay	Switch external mains relay	Switch object for an external switch actuator for demand-dependent switching on/off of the LED power supply. Release: Parameter "Release external mains relay" under General / Configuration	1 Bit	DPST-1-1
7	Relay	External mains relay status	Status feedback object of the external switching contact. Release: Parameter "Release external mains relay" under General / Configuration	1 Bit	DPST-1-1
8	Alarm	Undervoltage	Returns alarm (1) if the measured power supply voltage falls below the value of 4 V. Release: "Release alarm objects" parameter under Alarm objects and protection functions.	1 Bit	DPST-1-5
9	Alarm	Overvoltage	Returns alarm (1) when the measured power supply voltage exceeds the value of 53 V. Release: "Release alarm objects" parameter under Alarm objects and protection functions.	1 Bit	DPST-1-5
10	Alarm	Overtemperature	Returns alarm (1) when the measured internal device temperature exceeds the value of 125°C. Release: "Release alarm objects" parameter under Alarm objects and protection functions.	1 Bit	DPST-1-5
11	Alarm	Overcurrent cum	Returns alarm (1) when the measured sum current exceeds the value of 20 A. Release: "Release alarm objects" parameter under Alarm objects and protection functions.	1 Bit	DPST-1-5

ID	Name	Object function	Description and approval	Length	DptTyp
12	Alarm	Overcurrent channel A	Returns alarm (1) when the measured channel current exceeds the value of 20 A. Release: "Release alarm objects" parameter under Alarm objects and protection functions.	1 Bit	DPST-1-5
13	Alarm	Overcurrent channel B	Analogous to CO "Overcurrent channel A"	1 Bit	DPST-1-5
14	Alarm	Overcurrent channel C	Analogous to CO "Overcurrent channel A"	1 Bit	DPST-1-5
15	Alarm	Overcurrent channel D	Analogous to CO "Overcurrent channel A"	1 Bit	DPST-1-5
16	Alarm	Overcurrent channel E	Analogous to CO "Overcurrent channel A"	1 Bit	DPST-1-5
20	Measure-ment	Current sum	Returns the measured total current. Release: "Object release" parameter under Measurements and counters / Measurements	4 Bytes	DPST-14-19
21	Measure-ment	Current channel A	Returns the measured channel current A. Release: "Object release" parameter under Measurements and counters / Measurements.	4 Bytes	DPST-14-19
22	Measure-ment	Current channel B	Analog to CO "Current channel A"	4 Bytes	DPST-14-19
23	Measure-ment	Current channel C	Analog to CO "Current channel A"	4 Bytes	DPST-14-19
24	Measure-ment	Current channel D	Analog to CO "Current channel A"	4 Bytes	DPST-14-19
25	Measure-ment	Current channel E	Analog to CO "Current channel A"	4 Bytes	DPST-14-19
26	Measure-ment	Lamp voltage at commissioning channel A	Returns the measured voltage from 1-Touch-Commissioning for channel A. This measured value represents the voltage at the illuminant under full load. For this, the parameters for the lines must be set in the Measurements and counters tab and the 1-touch commissioning must have been executed once via the display. Release: Parameter "Object release" under Measurements and counters / Measurements	4 Bytes	DPST-14-27
27	Measure-ment	Lamp voltage at commissioning channel B	Analogous to CO "Lamp voltage at commissioning channel A"	4 Bytes	DPST-14-27
28	Measure-ment	Lamp voltage at commissioning channel C	Analogous to CO "Lamp voltage at commissioning channel A"	4 Bytes	DPST-14-27
29	Measure-ment	Lamp voltage at commissioning channel D	Analogous to CO "Lamp voltage at commissioning channel A"	4 Bytes	DPST-14-27
30	Measure-ment	Lamp voltage at commissioning channel E	Analogous to CO "Lamp voltage at commissioning channel A"	4 Bytes	DPST-14-27
31	Measure-ment	Unit temperature	Returns the measured internal device temperature. Release: "Object release" parameter under Measurements and counters / Measurements	4 Bytes	DPST-14-68
32	Measure-ment	Average telegram rate (T/s) sent over the last minute	Returns the average telegram rate (telegrams per second) of the telegrams sent by the dimming sequencer within the last minute. Release: "Object release" parameter under Measurements and counters / Measurements	2 Bytes	DPST-7-1
33	Measure-ment	Average telegram rate (T/s) sent over the last 5 minutes	Returns the average telegram rate (telegrams per second) of the telegrams sent by the dimming sequencer within the last 5 minutes. Release: "Object release" parameter under Measurements and counters / Measurements	2 Bytes	DPST-7-1
34	Measure-ment	Average telegram rate (T / s) sent over the last 15 minutes	Returns the average telegram rate (telegrams per second) of the telegrams sent by the dimming sequencer within the last 15 minutes. Release: "Object release" parameter under Measurements and Counters / Measurement	2 Bytes	DPST-7-1

ID	Name	Object function	Description and approval	Length	DptTyp
35	Measure-ment	Max. Telegram rate (T / s) sent within the last minute	Returns the maximum telegram rate (telegrams per second) of the telegrams sent by the dimming sequencer within the last minute. Release: "Object release" parameter under Measurements and Counters / Measurements	2 Bytes	DPST-7-1
36	Measure-ment	Max. Telegram rate (T / s) sent within the last 5 minutes	Returns the maximum telegram rate (telegrams per second) of the telegrams sent by the dimming sequencer within the last 5 minutes. Release: "Object release" parameter under Measurements and Counters / Measurements max.telegram rate (T / s) sent within the last 15 minutes	2 Bytes	DPST-7-1
37	Measure-ment	Max. Telegram rate (T / s) sent within the last 15 minutes	Returns the maximum telegram rate (telegrams per second) of the telegrams sent by the dimming sequencer within the last 15 minutes. Release: "Object release" parameter under Measurements and Counters / Measurements	2 Bytes	DPST-7-1
38	Measure-ment	Power supply voltage	Returns the voltage measured at the input (LED power pack). Release: "Object release" parameter under Measurements and Counters / Measurements	4 Bytes	DPST-14-27
39	Measure-ment	Power sum	Returns the total power expected from the power supply voltage and total current. Release: "Object release" parameter under Measurements and Counters / Measurement	4 Bytes	DPST-14-56
40	Measure-ment	Power channel A	Returns the channel power expected from the power supply voltage and the current measured on channel A. Release: "Object release" parameter under Measurements and Counters / Measurements	4 Bytes	DPST-14-56
41	Measure-ment	Power channel B	Analogous to CO "Power channel A"	4 Bytes	DPST-14-56
42	Measure-ment	Power channel C	Analogous to CO "Power channel A"	4 Bytes	DPST-14-56
43	Measure-ment	Power channel D	Analogous to CO "Power channel A"	4 Bytes	DPST-14-56
44	Measure-ment	Power channel E	Analogous to CO "Power channel A"	4 Bytes	DPST-14-56
45	Counter	Absorbed energy life-time total	Returns the energy absorbed by the power supply. The average efficiency of the LED power supply unit parameterized under Counter is included here. The value refers to the entire lifetime of the dimming sequencer and cannot be reset. Release: "Object release" parameter under Measurements and counters / Counter	4 Bytes	DPST-13-10
46	Counter	Absorbed energy life-time channel A or Absorbed energy life-time channel RG-BCCT resp. Recorded energy life-time channel RGBW resp. Absorbed energy life-time channel RGB	Analogous to CO "Total Absorbed Energy Lifetime", but reduced to the energy absorbed by channel A. For the operating modes RGBCCT, RGBW, or RGB, the CO stores the energy value of the entire channel group.	4 Bytes	DPST-13-10
47	Counter	Absorbed energy life-time channel B	Analogous to CO "Total Absorbed Energy Lifetime", but reduced to the energy absorbed by channel B.	4 Bytes	DPST-13-10
48	Counter	Absorbed energy life-time channel C	Analogous to CO "Absorbed energy lifetime channel B".	4 Bytes	DPST-13-10
49	Counter	Absorbed energy life-time channel D or Absorbed energy life-time channel TW 1	Analogous to CO "Total Absorbed Energy Lifetime", but reduced to the energy absorbed by channel D. For the Tunable White operating mode, the CO stores the energy value of the TW 1 channel group.	4 Bytes	DPST-13-10

ID	Name	Object function	Description and approval	Length	DptTyp
50	Counter	Absorbed energy life-time channel E bzw. Absorbed energy life-time channel TW 2	Analogous to CO "Absorbed energy lifetime total", but reduced to the energy absorbed by channel E. For the Tunable White operating mode, the CO stores the energy value of the TW 2 channel group.	4 Bytes	DPST-13-10
51	Counter	Absorbed energy since last analysis reset Total	Analogous to CO "Total absorbed energy lifetime", but with a different analysis interval that can be reset using CO "Perform analysis reset".	4 Bytes	DPST-13-10
52	Counter	Absorbed energy since last analysis reset Channel A or Absorbed energy since last analysis reset RGBCCT or Absorbed energy since last analysis reset RGBW or Absorbed energy since last analysis set RGB	Analogous to CO "Absorbed energy since last analysis reset total", but reduced to the energy absorbed by channel A. For the operating modes RGBCCT, RGBW, or RGB, the CO stores the energy value of the entire channel group.	4 Bytes	DPST-13-10
53	Counter	Absorbed energy since last analysis reset channel B	Analogous to CO "Absorbed energy since last analysis reset total", but reduced to the energy absorbed by channel B.	4 Bytes	DPST-13-10
54	Counter	Absorbed energy since last analysis reset channell C	Analogous to CO "Absorbed energy since last analysis reset channel B"."	4 Bytes	DPST-13-10
55	Counter	Absorbed energy since last analysis reset channel D or Absorbed energy since last analysis reset channel TW 1	Analogous to CO "Absorbed energy since last analysis reset total", but reduced to the energy absorbed by channel D. For Tunable White mode, the CO stores the energy value of the TW 1 channel group.	4 Bytes	DPST-13-10
56	Counter	Absorbed energy since last analysis reset channel E or Absorbed energy since last analysis reset channel TW 2	Analogous to CO "Absorbed energy since last analysis reset total", but reduced to the energy absorbed by channel E. For the operating mode Tunable White the CO stores the energy value of the TW 2 channel group.	4 Bytes	DPST-13-10
57	Counter	Costs lifetime total	Returns the cost (in ct) of the energy absorbed by the network. The average efficiency of the LED power supply unit parameterized under Counter and the electricity price parameterized there are included here. The value refers to the entire lifetime of the dimming sequencer and cannot be reset. Release: "Object release" parameter under Measurements and counters / Counters	4 Bytes	DPST-13-1
58	Counter	Costs lifetime channel A or Costs lifetime RGBCCT resp. Costs lifetime RGBW resp. Costs lifetime RGB	Analogous to CO "Costs lifetime total", but reduced to the costs generated by channel A. For the operating modes RGBCCT, RGBW, or RGB, the CO stores the counter reading of the entire channel group.	4 Bytes	DPST-13-1
59	Counter	Cost lifetime channel B	Analogous to CO "Cost lifetime total", but reduced to the costs generated by channel B.	4 Bytes	DPST-13-1
60	Counter	Costs lifetime channel C	Analogous to CO "Cost lifetime channel C".	4 Bytes	DPST-13-1

ID	Name	Object function	Description and approval	Length	DptTyp
61	Counter	Costs lifetime channel D or Cost of lifetime TW 1	Analogous to CO "Costs lifetime total", but reduced to the costs generated by channel D. For the Tunable White operating mode, the CO stores the counter reading of the TW 1 channel group.	4 Bytes	DPST-13-1
62	Counter	Cost lifetime channel E or Costs lifetime TW 2	Analogous to CO "Total lifetime costs", but reduced to the costs generated by channel E. For the Tunable White operating mode, the CO stores the counter reading of the TW 2 channel group.	4 Bytes	DPST-13-1
63	Counter	Costs since last analysis reset total	Analogous to CO "Total lifetime costs", but with a different analysis interval that can be reset using CO "Perform analysis reset".	4 Bytes	DPST-13-1
64	Counter	Costs since last analysis reset channel A or Costs since last analysis reset RGBCCT resp. Costs since last analysis set RGBW resp. Costs since last analysis set RGB	Analogous to CO "Costs since last analysis reset total", but reduced to the costs generated by channel A. For the operating modes RGBCCT, RGBW, or RGB, the CO stores the counter reading of the entire channel group.	4 Bytes	DPST-13-1
65	Counter	Costs since last analysis reset channel B	Analogous to CO "Costs since last analysis reset total", but reduced to the costs generated by channel B.	4 Bytes	DPST-13-1
66	Counter	Costs since last analysis reset channel C	Analogous to CO "Costs since last analysis set channel B".	4 Bytes	DPST-13-1
67	Counter	Costs since last analysis set channel D or Costs since last analysis set TW 1	Analogous to CO "Costs since last analysis reset Total", but reduced to the costs generated by channel D. For the Tunable White operating mode, the CO stores the counter reading of the TW 1 channel group.	4 Bytes	DPST-13-1
68	Counter	Costs since last analysis reset channel E or Costs since last analysis reset TW 2	Analogous to CO "Costs since last analysis reset total", but reduced to the costs generated by channel E. For the Tunable White operating mode, the CO stores the counter reading of the TW 2 channel group.	4 Bytes	DPST-13-1
69	Counter	Perform analysis reset	Resets the energy and cost counters with the extension "since last analysis reset" to 0. Release: Parameter "Object release" under Measurements and counters; object released if energy and/or cost counter objects are released.	1 Bit	DPST-1-17
70	Counter	Electricity price (0.01 cents per kWh)	This CO can be used to transfer a price that deviates from the parameterized electricity price. The value is retained until the next reprogramming and is specified in hundredths of a cent per kWh → Ex.: The transfer of 3111 results in an electricity price of 31.11 cents / kWh. Release: "Object release" parameter under Measurements and counters / Meters.	2 Bytes	DPST-7-1
75	Illuminant protection	Channel A continuous power exceeded or Channel RGBCCT Continuous power exceeded resp. Channel RGBW Continuous power exceeded resp. Channel RGB Continuous power exceeded	Returns alarm (1) if the value "Continuous power" parameterized under Alarm objects and protection functions / Illuminant protection is exceeded. Depending on the operating mode, the CO affects channel A (single channel mode) or the channel group RGBCCT, or RGBW, or RGB. Release: Parameter "Activate lamp protection" under alarm objects and protection functions	1 Bit	DPST-1-5

ID	Name	Object function	Description and approval	Length	DptTyp
76	Illuminant protection	Channel B continuous output exceeded	Returns alarm (1) if the "Continuous power" parameterized value for channel B under alarm objects and protection functions / light protection is exceeded. Release: "Activate lamp protection" parameter under alarm objects and protective functions	1 Bit	DPST-1-5
77	Illuminant protection	Channel C continuous output exceeded	Analogous to CO "Channel B continuous output exceeded"	1 Bit	DPST-1-5
78	Illuminant protection	Channel D continuous output exceeded or Channel TW 1 continuous output exceeded	Returns alarm (1) if the "continuous output" value configured under alarm objects and protection functions / light protection is exceeded. Depending on the operating mode, the CO affects channel D (single channel mode) or the channel group Tunable White 1. Release: "Activate lamp protection" parameter under alarm objects and protective functions	1 Bit	DPST-1-5
79	Illuminant protection	Channel E continuous output exceeded or Channel TW 2 continuous output exceeded	Return alarm (1) if the "continuous output" value configured under alarm objects and protection functions / light protection is exceeded. Depending on the operating mode, the CO affects channel E (single channel mode) or the channel group Tunable White 2. Release: "Activate lamp protection" parameter under alarm objects and protective functions	1 Bit	DPST-1-5
80	Illuminant protection	Channel A I²t value exceeded or Channel RGBCCT I²t value exceeded or Channel RGBW I²t value exceeded or Channel RGB I²t value exceeded	Returns alarm (1) if the I²t threshold for channel A configured under alarm objects and protection functions / light protection is exceeded. Notes on I²t shutdown can be found in the Illuminant protection chapter. Depending on the operating mode, the CO affects channel A (single channel mode) or the channel group RGBCCT, or RGBW, or RGB. Release: "Activate lamp protection" parameter under alarm objects and protective functions	1 Bit	DPST-1-5
81	Illuminant protection	Channel B I²t value exceeded	Returns alarm (1) if the I²t threshold for channel A configured under alarm objects and protection functions / light protection is exceeded. Notes on I²t shutdown can be found in the Illuminant protection chapter. Depending on the operating mode, the CO affects channel A (single channel mode) or the channel group RGBCCT, or RGBW, or RGB. Release: "Activate lamp protection" parameter under alarm objects and protective functions Channel B I²t value exceeded	1 Bit	DPST-1-5
82	Illuminant protection	Channel C I²t value exceeded	Analogous to CO "Channel B I²t value exceeded"	1 Bit	DPST-1-5
83	Illuminant protection	Channel D I²t value exceeded or Channel TW 1 I²t value exceeded	Returns alarm (1) if the I²t threshold for channel D configured under alarm objects and protection functions / light protection is exceeded. Notes on I²t shutdown can be found in the Illuminant protection. chapter. Depending on the operating mode, the CO affects channel D (single channel mode) or the channel group Tunable White 1. Release: "Activate lamp protection" parameter under alarm objects and protective functions	1 Bit	DPST-1-5
84	Illuminant protection	Channel E I²t value exceeded or Channel TW 2 I²t value exceeded	Returns alarm (1) if the I²t threshold for channel E configured under alarm objects and protection functions / light protection is exceeded. Notes on I²t shutdown can be found in the Illuminant protection. Depending on the operating mode, the CO affects channel E (single channel mode) or the channel group Tunable White 2. Release: "Activate lamp protection" parameter under alarm objects and protective functions	1 Bit	DPST-1-5

ID	Name	Object function	Description and approval	Length	DptTyp
85	Illuminant protection	Channel A maximum power exceeded or Channel RGBCCT maximum power exceeded or Channel RGBW maximum power exceeded or Channel RGB maximum power exceeded	Channel RGB maximum power exceeded Returns alarm (1) if the value configured under alarm objects and protection functions / light protection is exceeded. Depending on the operating mode, the CO affects channel A (single channel mode) or the channel group RGBCCT, or RGBW, or RGB. Release: "Activate lamp protection" parameter under alarm objects and protective functions	1 Bit	DPST-1-5
86	Illuminant protection	Channel B maximum power exceeded	Returns alarm (1) if the value parameterized under alarm objects and protection functions / light source protection parameterized "continuous power" + overload capacity (= maximum power) for channel B is exceeded. Release: "Activate lamp protection" parameter under alarm objects and protective functions	1 Bit	DPST-1-5
87	Illuminant protection	Channel C maximum power exceeded	Analogous to CO "Channel B maximum power exceeded"	1 Bit	DPST-1-5
88	Illuminant protection	Channel D maximum power exceeded or Channel TW 1 maximum power exceeded	Returns alarm (1) if the value configured under alarm objects and protection functions / light protection is exceeded. Depending on the operating mode, the CO affects channel D (single channel mode) or the channel group Tunable White 1. Release: "Activate lamp protection" parameter under alarm objects and protective functions	1 Bit	DPST-1-5
89	Illuminant protection	Channel E maximum power exceeded or Channel TW 2 maximum power exceeded	Returns alarm (1) if the value "Continuous power" + overload capability (= maximum power) parameterized under Alarm objects and protective functions / Lamp protection is exceeded. Depending on the operating mode, the CO affects channel E (single channel mode) or the channel group Tunable White 2. Release: parameter "Activate lamp protection" under alarm objects and protection functions	1 Bit	DPST-1-5
95	Power supply protection	Power supply continuous power exceeded	Returns alarm (1) if the "Continuous power" value parameterized under Alarm objects and protective functions / Power supply protection is exceeded. Release: "Activate power supply protection" parameter under Alarm objects and protective functions	1 Bit	DPST-1-5
96	Power supply protection	Power supply I²t value exceeded	Returns alarm (1) if the I²t threshold parameterized under Alarm objects and protective functions / Power supply protection is exceeded. Notes on I²t shutdown can be found in the Power supply protection chapter. Release: Parameter "Activate power supply protection" under Alarm objects and protection functions	1 Bit	DPST-1-5
97	Power supply protection	Power supply maximum power exceeded	Returns alarm (1) if the value "Continuous power" + overload capability (= maximum power) parameterized under Alarm objects and protective functions / Power supply protection is exceeded. Release: parameter "Release power supply protection" under Alarm objects and protection functions	1 Bit	DPST-1-5
101	Channel A	Switching	Switch channel A. The switching behavior (switch-on behavior (brightness value, switch-on speed, etc.) or corresponding switch-off behavior) depends on the parameterization. Release: Always available if single channel A is released.	1 Bit	DPST-1-1
102	Channel A	Switch stairway lighting	Switch channel A stairway lighting. The switch-on behavior (brightness value, switch-on speed, etc.) depends on the parameterization. Switching off the stairway lighting can be prevented by means of the parameter "Allow switch-off by CO" under Individual channel / Stairway lighting function. Release: "Release stairway lighting function" parameter under Individual channel / Releases	1 Bit	DPST-1-1

ID	Name	Object function	Description and approval	Length	DptTyp
103	Channel A	Stairway lighting time factor	This CO can be used to assign a factor to the time defined under the "Stairway lighting activation time" parameter. If the parameter "Activate stairway lighting function via stairway lighting time object" under Individual channel / Stairway lighting function is set to Yes, the stairway lighting function is also started immediately when a factor is sent. Release: "Release stairway lighting function" parameter under Individual channel / Release and "Time setting via bus" under Individual channel / Stairway lighting	1 Byte	DPST-5-10
104	Channel A	Dimming absolute	Dim channel A absolutely to a percentage value. Release: Always available if single channel A is released..	1 Byte	DPST-5-1
105	Channel A	Dimming relative	Dim channel A relatively. Release: Always available when single channel A is released.	4 Bit	DPST-3-7
106	Channel A	Lock 1	Release / disable channel A lock 1. Release: "Release disable functions" parameter under Single channel / Release and "Release disable object 1" under Single channel / Disable functions.	1 Bit	DPST-1-1
107	Channel A	Lock 2	Activate / deactivate channel A lock 2. Release: "Release disable functions" parameter under Individual channel / Release and "Release disable object 2" under Individual channel / Disable functions.	1 Bit	DPST-1-1
108	Channel A	Scene	Activate channel A scene or save current brightness value for scene (the latter only if parameterized accordingly under "Release saving" under Individual channel / Scenes. Release: "Release scenes" parameter under Individual channel / Releases	1 Byte	DPST-18-1
109	Channel A	Bitscene 1	Enable / disable channel A bit scene 1. Release: "Release bit scenes" parameter under Single channel / Release and "Release bit scene 1" under Single channel / Bit scenes	1 Bit	DPST-1-1
110	Channel A	Bitscene 2	Analog to CO channel A / bit scene 1	1 Bit	DPST-1-1
111	Channel A	Bitscene 3	Analog to CO channel A / bit scene 1	1 Bit	DPST-1-1
112	Channel A	Bitscene 4	Analog to CO channel A / bit scene 1	1 Bit	DPST-1-1
113	Channel A	Bitscene 5	Analog to CO channel A / bit scene 1	1 Bit	DPST-1-1
114	Channel A	Time-controlled dimming Start / Stop	Start / stop time-controlled dimming. Release: "Release time-controlled dimming" parameter under Individual channel / Release	1 Bit	DPST-1-10
115	Channel A	Status On/Off	Status object, indicates whether channel A is ON (for brightness values greater than 0) or OFF. Release: Always available when individual channel A is released.	1 Bit	DPST-1-1
116	Channel A	Status Brightness	Status object shows channel brightness as value 0 - 255. Release: Always available if single channel A is released.	1 Byte	DPST-5-1
117	Channel A	Status Lock	Status object, shows whether channel A is locked (1 for locked). Release: "Release disable functions" parameter under Individual channel / Release and "Release disable object 1" and/or "Release disable object 2" under Individual channel / Disable functions.	1 Bit	DPST-1-1
118	Channel A	Status time-controlled dimming	Status object, indicates whether time-controlled dimming is currently active for channel A (1 for active). Release: "Release time-controlled dimming" parameter under Individual channel / Releases	1 Bit	DPST-1-11

ID	Name	Object function	Description and approval	Length	DptTyp
121 - 198	Channel B – Channel E	Channel B – Channel E analog to Channel A	Channel B – Channel E analog to Channel A		
201	RGB	Switching	Switch RGB(CCT/W) channel group. The switching behavior (switch-on behavior (brightness value, switch-on speed, etc.) or corresponding switch-off behavior) depends on the parameterization. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	1 Bit	DPST-1-1
202	RGB	Switch stairway lighting	Switch RGB(CCT/W) channel group stairway lighting. The switch-on behavior (brightness value, switch-on speed, etc.) depends on the parameterization. Switching off the stairway lighting can be prevented by means of the parameter "Allow switch-off by CO" under RGB(CCT/W) / Stairway lighting function. Release: Parameter "Release stairway lighting function" under RGB(CCT/W) / Releases	1 Bit	DPST-1-1
203	RGB	Stairway lighting factor	This CO can be used to assign a factor to the time defined under the "Stairway lighting activation time" parameter. If the parameter "Activate stairway lighting function via stairway lighting time object" under RGB(CCT/W) / Stairway lighting function is set to Yes, the stairway lighting function is also started immediately when a factor is sent. Release: "Release stairway lighting function" parameter under RGB(CCT/W) / Release and "Time setting via bus" under RGB(CCT/W) / Stairway lighting function	1 Byte	DPST-5-10
204	RGB	Store maximum brightness Start / Stop	By sending 0 to this CO, the current brightness values are stored as maximum values for the respective channels of the RGB(CCT/W) channel group. From this point on, the default values are scaled accordingly. By sending 1 to this CO, the stored maximum values for the respective channels of the channel group are reset to Maximum brightness (255). Release: "Limit maximum brightness" parameter under RGB(CCT/W) / Configuration to "CO"	1 Bit	DPST-1-10
205	RGB	Dimming absolute R	Dim channel red absolute to a percentage value. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	1 Byte	DPST-5-1
206	RGB	Dimming absolute G	Kanal Grün absolut auf einen Prozentwert dimmen. Freigabe: Immer verfpprovalügbar wenn die Kanalgruppe RGBCCT, RGBW oder RGB freigegeben ist.	1 Byte	DPST-5-1
207	RGB	Dimming absolute B	Dim channel blue absolutely to a percentage value. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	1 Byte	DPST-5-1
208	RGB	Dimming absolute W	Dim channel white absolutely to a percentage value. Release: Channel group RGBW released and "Automatic brightness control" under RGB(CCT/W) / White channel set to No.	1 Byte	DPST-5-1
210	RGB	Dimming absolute RGBW	Dim channel group RGBCCT or RGBW absolutely. For RGBW, the four individual values correspond to the brightnesses for red, green, blue and white; for RGBCCT, the transferred white value refers to the TW brightness (see CO "TW 1 Dimming absolute brightness"). Release: Channel group RGBCCT or RGBW released and "Automatic brightness control" under RGB(CCT/W) / white channel set to No	6 Bytes	DPST-251-600
211	RGB	Dimming absolute RGB	Dim red/green/blue values of a RGBCCT, RGBW or RGB channel group absolutely. Release: Always available if the channel group RGBCCT, RGBW or RGB is released..	3 Bytes	DPST-232-600

ID	Name	Object function	Description and approval	Length	DptTyp
212	RGB	Dimming absolute HSV	Dim Hue/Saturation/Value values of a RGBCCT, RGBW or RGB channel group absolutely (explanation see chapter Color spaces RGB and HSV). Release: Always available if the channel group RGBCCT, RGBW or RGB is released. Note: If the CO is described from the ETS group monitor, the RGB ColorPicker appears there. The transmitted value, (e.g. #00FFFF), is not interpreted as RGB, but as HSV, which in the example results in H=0°, S=100% and V=100%, i.e. a pure red.	3 Bytes	DPST-232-600
213	RGB	Dimming absolute H	Dim Hue value of a RGBCCT, RGBW or RGB channel group absolutely (explanation see chapter Color spaces RGB and HSV). Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	1 Byte	DPST-5-3
214	RGB	Dimming absolute S	Dim saturation value of a RGBCCT, RGBW or RGB channel group absolutely (explanation see chapter Color spaces RGB and HSV). Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	1 Byte	DPST-5-1
215	RGB	Dimming absolute V	Value Dim value of a RGBCCT, RGBW or RGB channel group absolutely (explanation see Color spaces RGB and HSV). Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	1 Byte	DPST-5-1
216	RGB	Dimming relative R	Dim channel red relatively. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	4 Bit	DPST-3-7
217	RGB	Dimming relative G	Dim channel green relatively. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	4 Bit	DPST-3-7
218	RGB	Dimming relative B	Dim channel blue relatively. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	4 Bit	DPST-3-7
219	RGB	Dimming relative W	Dim channel white relatively. Release: Channel group RGBW released and "Automatic brightness control" under RGB(CCT/W) / White channel set to No.	4 Bit	DPST-3-7
221	RGB	Dimming relative RGBW	Relatively dim channel group RGBCCT or RGBW. With RGBW, the four individual values correspond to the brightness levels for red, green, blue and white; with RGBCCT, the transferred values for white relate to the TW brightness (see CO "TW 1 dimming absolute brightness"). Release: Channel group RGBCCT or RGBW released and "Automatic brightness control" under RGB (CCT / W) / white channel to No.	5 Bytes	DPST-252-600
222	RGB	Dimming relative RGB	Relatively dim red / green / blue values of an RGBCCT, RGBW or RGB channel group. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	3 Bytes	DPST-254-600
223	RGB	Dimming relative HSV	Relatively dim the Hue / Saturation / Value values of an RGBCCT, RGBW or RGB channel group (for an explanation, see chapter Color spaces RGB and HSV). Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	3 Bytes	DPST-254-600
224	RGB	Dimming relative H	Absolutely dim the hue value of an RGBCCT, RGBW or RGB channel group (for an explanation, see chapter Color spaces RGB and HSV). Release: Always available if the channel group RGBCCT, RGBW or RGB is released..	4 Bit	DPST-3-7
225	RGB	Dimming relative S	Absolute dimming of the saturation value of an RGBCCT, RGBW or RGB channel group (for an explanation see chapter Color spaces RGB and HSV). Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	4 Bit	DPST-3-7

ID	Name	Object function	Description and approval	Length	DptTyp
226	RGB	Dimming relative V	Value Dim the value of an RGBCCT, RGBW or RGB channel group absolutely (for an explanation, see chapter Color spaces RGB and HSV). Release: Always available if the channel group RG-BCCT, RGBW or RGB is released..	4 Bit	DPST-3-7
227	RGB	Lock 1	Activate / deactivate lock 1 for channel group RGB (CCT / W). Release: Parameter "Release disabling functions" under RGB (CCT / W) / releases and "Release disabling object 1" under RGB (CCT / W) / locking functions	1 Bit	DPST-1-1
228	RGB	Lock 2	Activate / deactivate lock 2 for channel group RGB (CCT / W). Release: Parameter "Release disabling functions" under RGB (CCT / W) / releases and "Release disabling object 1" under RGB (CCT / W) / locking functions	1 Bit	DPST-1-1
229	RGB	Scene	Channel group RGB (CCT / W) Activate scene or save current brightness value for scene (the latter only if parameterized accordingly under "Save release" under RGB (CCT / W) / scenes. Release: "Release scenes" parameter under RGB (CCT / W) / Release	1 Byte	DPST-18-1
230	RGB	Bitscene 1	Activate / deactivate bit scene 1 of the RGB (CCT / W) channel group. Release: Parameter "release bit scenes" under RGB (CCT / W) / releases and "release bit scene 1" under RGB (CCT / W) / bit scenes	1 Bit	DPST-1-1
231	RGB	Bitscene 2	Analog to CO „RGB Bitscene 1"	1 Bit	DPST-1-1
232	RGB	Bitscene 3	Analog to CO „RGB Bitscene 1"	1 Bit	DPST-1-1
233	RGB	Bitscene 4	Analog to CO „RGB Bitscene 1"	1 Bit	DPST-1-1
234	RGB	Bitscene 5	Analog to CO „RGB Bitscene 1"	1 Bit	DPST-1-1
235	RGB	Time-controlled dimming Start / Stop	Start / stop time-controlled dimming of the RGB (CCT / W) channel group. Release: Parameter "Release time-controlled dimming" under RGB (CCT / W) / Release	1 Bit	DPST-1-10
236	RGB	Sequence 1 Start / Stop	Start / stop sequence 1 of channel group RGB (CCT / W). Release: Parameter "release sequences" under RGB (CCT / W) / releases and "number of sequences" under RGB (CCT / W) / releases	1 Bit	DPST-1-10
237	RGB	Sequence 2 Start / Stop	Analog to CO „RGB Sequence 1 Start / Stop"	1 Bit	DPST-1-10
238	RGB	Sequence 3 Start / Stop	Analog to CO „RGB Sequence 1 Start / Stop"	1 Bit	DPST-1-10
239	RGB	Sequence 4 Start / Stop	Analog to CO „RGB Sequence 1 Start / Stop"	1 Bit	DPST-1-10
240	RGB	Sequence 5 Start / Stop	Analog to CO „RGB Sequence 1 Start / Stop"	1 Bit	DPST-1-10
241	RGB	Status On/Off	Status object, indicates whether the channel group RGB (CCT / W) is ON or OFF. It is ON when one or more channels in the channel group have a brightness greater than 0. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	1 Bit	DPST-1-1
242	RGB	Status R	Status object shows the channel brightness of the red channel as a value 0 - 255. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	1 Byte	DPST-5-1
243	RGB	Status G	Status object shows the channel brightness of the green channel as a value of 0 - 255. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	1 Byte	DPST-5-1

ID	Name	Object function	Description and approval	Length	DptTyp
244	RGB	Status B	Status object shows the channel brightness of the blue channel as a value 0 - 255. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	1 Byte	DPST-5-1
245	RGB	Status W	Status object shows the channel brightness of the white channel as a value 0 - 255. Release: Always available if the channel group RGBW is released.	1 Byte	DPST-5-1
247	RGB	Status RGBW	Status object shows the channel brightnesses of the channels red, green, blue and white; with RGBCCT the value for white refers to the TW brightness. Release: Always available if the channel group RG-BCCT or RGBW is released.	6 Bytes	DPST-251-600
248	RGB	Status RGB	Status object shows the channel brightnesses of the channels red, green and blue. Release: Always available if the channel group RGBCCT, RGBW or RGB is released.	3 Bytes	DPST-232-600
249	RGB	Status HSV	Status object shows Hue / Saturation / Value values of an RGBCCT, RGBW or RGB channel group (see Color spaces RGB and HSV). Release: Always available if the channel group RG-BCCT, RGBW or RGB is released..	3 Bytes	DPST-232-600
250	RGB	Status H	Status object shows the Hue value of an RGBCCT, RGBW or RGB channel group (see Color spaces RGB and HSV). Release: Always available if the channel group RG-BCCT, RGBW or RGB is released.	1 Byte	DPST-5-3
251	RGB	Status S	Status object shows the saturation value of a RG-BCCT, RGBW or RGB channel group (see Color spaces RGB and HSV). Release: Always available if the channel group RG-BCCT, RGBW or RGB is released.	1 Byte	DPST-5-1
252	RGB	Status V	Status object shows the value of a RGBCCT, RGBW or RGB channel group (see Color spaces RGB and HSV). Release: Always available if the channel group RG-BCCT, RGBW or RGB is released	1 Byte	DPST-5-1
253	RGB	Status lock	Status object, indicates whether RGB(CCT/W) channel group is locked (1 for locked). Release: "Release disable functions" parameter under RGB(CCT/W) / Release and "Release disable object 1" and/or "Release disable object 2" under RGB(CCT/W) / Locking functions.	1 Bit	DPST-1-1
254	RGB	Status Time-controlled dimming	Status object, indicates whether time-controlled dimming for channel group RGB(CCT/W) is currently active (1 for active). Release: parameter "Release time-controlled dimming" under RGB(CCT/W) / Releases	1 Bit	DPST-1-11
255	RGB	Status sequence 1	Status object, indicates whether sequence 1 for channel group RGB(CCT/W) is currently active (1 for active). Release: Parameter "Release sequences" under RGB(CCT/W) / Release and "Number of sequences" under RGB(CCT/W) / Release.	1 Bit	DPST-1-11
256	RGB	Status sequence 2	Analog to CO „RGB Status sequence 1"	1 Bit	DPST-1-11
257	RGB	Status sequence 3	Analog to CO „RGB Status sequence 1"	1 Bit	DPST-1-11
258	RGB	Status sequence 4	Analog to CO „RGB Status sequence 1"	1 Bit	DPST-1-11
259	RGB	Status sequence 5	Analog to CO „RGB Status sequence 1"	1 Bit	DPST-1-11
262	TW 1	Switching	Switch channel group. The switching behavior (switch-on behavior (brightness value, switch-on speed, etc.) or corresponding switch-off behavior) depends on the parameterization. Release: Always available if the channel group is released.	1 Bit	DPST-1-1

ID	Name	Object function	Description and approval	Length	DptTyp
263	TW 1	Switch stairway lightning	Switch stairway lighting channel group. The switch-on behavior (brightness value, switch-on speed, etc.) depends on the parameterization. Switching off the stairway lighting can be prevented by means of the parameter "Allow switch-off by CO" under TW 1 / Stairway lighting function. Release: Parameter "Release stairway lighting function" under TW 1 / Releases	1 Bit	DPST-1-1
264	TW 1	Stairway lightning factor	This CO can be used to apply a factor to the time defined under the "Stairway lighting activation time" parameter. If the parameter "Activate stairway lighting function via stairway lighting time object" under TW 1 / Stairway lighting function is set to Yes, the stairway lighting function is also started immediately when a factor is sent. Release: Parameter "Release stairway lighting function" under TW 1 / Release and "Time setting via bus" under TW 1 / Stairway lighting function	1 Byte	DPST-5-10
265	TW 1 or RGBCCT with RGB-Extended	Dimming absolute brightness	Dim brightness of TW channel group absolutely. Release: Channel group released and for RGBCCT with RGB Extended additionally: Under RGBCCT / White channels set the parameter "Automatic brightness control of TW channels" to No	1 Byte	DPST-5-1
266	TW 1 or RGBCCT with RGB-Extended	Dimming absolute color temperature (Portion CW in %)	Dim cold white part of channel group absolutely. Release: Channel group released and • for TW channel groups additionally: set parameter "Specification of mixing ratio" under TW 1 / Configuration to Cold white ratio in % and "Activate Dim-2-Warm" under TW 1 / Dimming settings to No • and for RGBCCT with RGB-Extended additionally: Under RGBCCT / White channels set the parameter "Specification of mixing ratio" to Proportion of cold white in % and "Mixing ratio of white channels" to Parameterizable and "Release CO mixing ratio" to Yes	1 Byte	DPST-5-1
267	TW 1 or RGBCCT with RGB-Extended	Dimming absolute color temperature (Kelvin)	Dim cold white proportion of channel group absolutely. Release: Channel group released and • for TW channel groups additionally: parameter "Specification of mixing ratio" under TW 1 / Configuration to Light temperature in Kelvin and "Release Dim-2-Warm" under TW 1 / Dim settings to No • and for RGBCCT with RGB-Extended additionally: Under RGBCCT / White channels set the parameter "Specification of mixing ratio" to Light temperature in Kelvin and "Mixing ratio of white channels" to Parameterizable and "Release CO mixing ratio" to Yes	2 Bytes	DPST-7-600
268	TW 1	Dimming absolute transition (brightness and color temperature)	Combined object for simultaneous change (absolute dimming) of brightness and color temperature. Release: Channel group released and parameter "Specify mixing ratio" under TW 1 / Configuration set to Light temperature in Kelvin and "Release Dim-2-Warm" under TW 1 / Dim settings set to No +	6 Bytes	DPST-249-600
269	TW 1 or RGBCCT with RGB-Extended	Dimming relative brightness	Dim brightness of TW channel group relatively. Release: Channel group released and for RGBCCT with RGB-Extended additionally: Under RGBCCT / White channels set the parameter "Automatic brightness control of TW channels" to No	4 Bit	DPST-3-7

ID	Name	Object function	Description and approval	Length	DptTyp
270	TW 1 or RGBCCT with RGB-Extended	Dimming relative color temperature (Portion CW in %)	Dim cold white part of channel group relatively. Release: Channel group released and • for TW channel groups additionally: set parameter "Specification of mixing ratio" under TW 1 / Configuration to Cold white ratio in % and "Activate Dim-2-Warm" under TW 1 / Dim settings to No • and for RGBCCT with RGB-Extended additionally: Under RGBCCT / White channels set the parameter "Specification of mixing ratio" to Proportion of cold white in % and "Mixing ratio of white channels" to Parameterizable and "Release CO mixing ratio" to Yes	4 Bit	DPST-3-7
271	TW 1	Dimming relative transition (brightness and color temperature)	Kombiniertes Objekt zum gleichzeitigen Ändern (rel. Dimmen) von Helligkeit und Farbtemperatur. Freigabe: Kanalgruppe freigegeben und Parameter „Angabe des Mischverhältnisses" unter TW 1 / Konfiguration auf Lichttemperatur in Kelvin und „Dim-2-Warm aktivieren" unter TW 1 / Dimmeinstellungen auf Nein	3 Bytes	DPST-250-600
272	TW 1	Lock 1	Activate / deactivate lock 1 for channel group. Release: "Release disable functions" parameter under TW 1 / Release and "Release disable object 1" under TW 1 / Disable functions.	1 Bit	DPST-1-1
273	TW 1	Lock 2	Activate / deactivate lock 2 for channel group. Release: "Release disable functions" parameter under TW 1 / Release and "Release disable object 2" under TW 1 / Disable functions.	1 Bit	DPST-1-1
274	TW 1	Scene	Activate channel group scene or save current brightness value for scene (the latter only if parameterized accordingly under "Release saving" under TW 1 / Scenes. Release: Parameter "Release scenes" under TW 1 / Releases	1 Byte	DPST-18-1
275	TW 1	Bitscene 1	Enable / disable bit scene 1 of channel group TW 1. Release: Parameter "Release bit scenes" under TW 1 / Release and "Release bit scene 1" under TW 1 / Bit scenes.	1 Bit	DPST-1-1
276	TW 1	Bitscene 2	Analog to CO „TW 1 Bitscene 1"	1 Bit	DPST-1-1
277	TW 1	Bitscene 3	Analog to CO „TW 1 Bitscene 1"	1 Bit	DPST-1-1
278	TW 1	Bitscene 4	Analog to CO „TW 1 Bitscene 1"	1 Bit	DPST-1-1
279	TW 1	Bitscene 5	Analog to CO „TW 1 Bitscene 1"	1 Bit	DPST-1-1
280	TW 1	HCL Start / Stop	HCL (= Human Centric Lighting = time-controlled dimming of a TW channel group) start / stop. Release: "Release time-controlled dimming (HCL)" parameter under TW 1/ Release	1 Bit	DPST-1-10
281	TW 1	Sequence 1 Start / Stop	Start / stop sequence 1 of channel group TW 1. Release: "Release sequences" parameter under TW 1 / Release and "Number of sequences" under TW 1 / Release.	1 Bit	DPST-1-10
282	TW 1	Sequence 2 Start / Stop	Analog zu CO „TW 1 Sequenz 1 Start / Stop"	1 Bit	DPST-1-10
283	TW 1	Sequence 3 Start / Stop	Analog zu CO „TW 1 Sequenz 1 Start / Stop"	1 Bit	DPST-1-10
284	TW 1	Sequence 4 Start / Stop	Analog zu CO „TW 1 Sequenz 1 Start / Stop"	1 Bit	DPST-1-10
285	TW 1	Sequence 5 Start / Stop	Analog zu CO „TW 1 Sequenz 1 Start / Stop"	1 Bit	DPST-1-10

ID	Name	Object function	Description and approval	Length	DptTyp
286	TW 1	Status On/Off	Status object, indicates whether the channel group TW 1 is ON or OFF. It is ON if one or more channels of the channel group have a brightness greater than 0. Release: Always available when the channel group is released.	1 Bit	DPST-1-1
287	TW 1 or RGBCCT with RGB-Extended	Status brightness	Status object shows the brightness of the TW channel group. Release: Always available when the channel group is released..	1 Byte	DPST-5-1
288	TW 1 or RGBCCT with RGB-Extended	Status color temperature (portion CW in %)	Status object shows the mixing ratio of the TW channel group in proportion cold white 0 - 255. Release: Channel group released and • for TW channel groups additionally: parameter "Specification of mixing ratio" under TW 1 / configuration to share cold white in %. • and for RGBCCT with RGB Extended additionally: Under RGBCCT / White channels the parameter "Specification of mixing ratio" to Proportion cold white in % and "Mixing ratio of white channels" to Parameterizable and "Release CO mixing ratio" to Yes	1 Byte	DPST-5-1
289	TW 1 or RGBCCT with RGB-Extended	Status color temperature (Kelvin)	Status object displays the mixing ratio of the TW channel group in Kelvin. Release: Channel group released and • for TW channel groups additionally: parameter "Specification of mixing ratio" under TW 1 / Configuration to Light temperature in Kelvin • and for RGBCCT with RGB Extended additionally: Under RGBCCT / White channels the parameter "Specification of mixing ratio" to Light temperature in Kelvin and "Mixing ratio of white channels" to Parameterizable and "Release CO mixing ratio" to Yes	2 Bytes	DPST-7-600
290	TW 1	Status lock	Status object, indicates whether TW channel group is locked (1 for locked). Release: "Release blocking functions" parameter under TW 1 / Release and "Release blocking object 1" and/or "Release blocking object 2" under TW 1 / Blocking functions.	1 Bit	DPST-1-1
291	TW 1	Status HCL	Status object, indicates whether HCL (= Human Centric Lighting = time-controlled dimming for TW channel group) is currently active (1 for active). Release: "Release time-controlled dimming" parameter under TW 1 / Release functions.	1 Bit	DPST-1-11
292	TW 1	Status sequence 1	Status object, indicates whether sequence 1 for channel group TW 1 is currently active (1 for active). Release: "Release sequences" parameter under TW 1 / Release and "Number of sequences" under TW 1 / Release.	1 Bit	DPST-1-11
293	TW 1	Status sequence 2	Analog to CO „TW 1 Status sequence 1"	1 Bit	DPST-1-11
294	TW 1	Status sequence 3	Analog to CO „TW 1 Status sequence 1"	1 Bit	DPST-1-11
295	TW 1	Status sequence 4	Analog to CO „TW 1 Status sequence 1"	1 Bit	DPST-1-11
296	TW 1	Status sequence 5	Analog to CO „TW 1 Status sequence 1"	1 Bit	DPST-1-11
299 - 333	TW 2	TW 2 analog to TW 1, without RGBCCT extension	TW 2 Analog to TW 1, without RGBCCT extension		

Table 33: Communication objects

Technical Data

	Variant DK	Variant REG
Inputs	External power supply: Voltage: 5 - 48 V DC from control gear according to EN 61347-2-13 (or IEC 61347-2-13) with constant output voltage Max. Current: 25 A. Alternatively, a more powerful power supply unit with an additional 25A fuse at the output can be used. KNX connection: Voltage: 20 ... 32 V DC Current consumption <30 mA	
Outputs	5 pulse-width modulated DC voltage outputs for illuminants: Voltage: 5 - 48 V DC Max. Current per channel at 5 .. 24 V: Up to 488 Hz (recommended dimming frequency): Channel A - E with a cable length of up to 50m (I_1 + I_2): 15 A. Channel E with a cable length of up to 13m (I_1 + I_2): 20 A. 600 Hz: Channel A - E with a cable length of up to 50m (I_1 + I_2): 12 A. Channel E with a cable length of up to 13m (I_1 + I_2): 20 A. 832 Hz - 1200 Hz: Channel A - E with a cable length of up to 50m (I_1 + I_2): 7 A Channel E with a cable length of up to 13m (I_1 + I_2): 10 A. Max. Current per channel at 48 V: 50% of the maximum currents of 5 .. 24V Max. Total current over all 5 channels at 5 .. 24 V: 20 A Max. Total current over all 5 channels at 48 V: 10 A Dimming frequency: 211 .. 1200 Hz, recommended: 488 Hz	5 pulse-width modulated DC voltage outputs for lamps: Voltage: 5 - 48 V DC Max. Current per channel at 5 .. 24 V: Up to 488 Hz (recommended dimming frequency): Channel A - E with a cable length of up to 50m (I_1 + I_2): 15 A. Channel A with a cable length of up to 13m (I_1 + I_2): 20 A. 600 Hz: Channel A - E with a cable length of up to 50m (I_1 + I_2): 12 A. Channel A with a cable length of up to 13m (I_1 + I_2): 20 A. 832 Hz - 1200 Hz: Channel A - E with a cable length of up to 50m (I_1 + I_2): 7 A Channel A with a cable length of up to 13m (I_1 + I_2): 10 A. Max. Current per channel at 48 V: 50% of the maximum currents of 5 .. 24V Max. Total current over all 5 channels at 5 .. 24 V: 20 A Max. Total current over all 5 channels at 48 V: 10 A Dimming frequency: 211 .. 1200 Hz, recommended: 488 Hz
Protective functions	Reverse polarity protection Overcurrent shutdown (self-healing) Overtemperature shutdown (self-healing) Undervoltage shutdown (self-healing) Overvoltage shutdown (self-healing)	
Control and display elements	OLED Display LEDs: „PROG", „DC-POWER", POWER" Button: „PROG", „DISPLAY", „SET"	
Connections	DC voltage supply input: Type: screw terminal, tightening force: 0.5 Nm Conductor cross-section: 0.5 - 4.0 mm² solid Conductor cross-section: 0.5 - 4.0 mm² finely stranded without ferrule Conductor cross-section: 0.5 - 2.5 mm² finely stranded with wire end ferrule Pulse width modulated DC voltage outputs for illuminants: Type: screw terminal, tightening force: 0.5 Nm Conductor cross-section: 0.5 - 4.0 mm² solid Conductor cross-section: 0.5 - 4.0 mm² finely stranded without ferrule Conductor cross-section: 0.5 - 2.5 mm² finely stranded with wire end ferrule KNX connection: Type: black / red connection terminal (type 5.1) Conductor diameter: 0.8 mm solid conductor	
Casing	Electronics housing with flange for screw mounting Dimensions: 157,0 (136,0 without flange) x 45,0 x 25,5 mm (L x B x T) Flammability class: UL94-V0 (casing) UL94-V2 (lid)	DIN rail housing for 35 mm mounting rails width: 4 SU Dimensions: 71,5 x 89,6 x 62,9 mm (L x B x H) Flammability class: UL94-V0 (casing) UL94-V2 (lid)
Additional	For indoor use only Only for installation in false ceilings, electrical sockets and on furniture, if not accessible Highest ambient temperature t_a = 45 °C Lowest ambient temperature $t_{a\,min}$ = -5 °C Protection class III Protection class: IP20 Audits: KNX certified Safety: Certificated DIN EN 61347-2-13 IEC 63044-3 EMV: Certificated IEC 63044-5-2 (Living area), IEC 63044-5-3 (Industrial area), Vicinity: Certificated DIN EN 50491-2	For indoor use only For operation in the control cabinet only Highest ambient temperature t_a = 45 °C Lowest ambient temperature $t_{a\,min}$ = -5 °C Protection class III Protection class: IP20 Audits: KNX certified Safety: Certificated DIN EN 61347-2-13 EC 63044-3 EMV: Certified IEC 63044-5-2 (Living area), IEC 63044-5-3 (Industrial area), Vicinity: Certificated DIN EN 50491-2