



DIMinBOX 1-10V X4

4-channel analogue 1-10V actuator for the control of electronic ballasts or dimmable lighting drivers

ZDI110X4

Application program version: [1.0]

User manual edition: [1.0]_a

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1 INTRODUCTION

1.1 DIMINBOX 1-10V X4

DlMinBOX 1-10V X4 is a passive/sink type 1-10V control dimmer capable of controlling and dimming different types of electronic ballasts connected to its outputs, allowing the on/off control of luminaires and the dimming of brightness through a 1-10V control signal.

Its main features include the following:

- **4 independent dimming outputs**, with one relay per channel to cut the power supply phase of the ballasts when the dimming level is 0%. Each output allows:
 - 2 customisable dimming times.
 - Economic mode, limiting the maximum lighting level.
 - Limiting the minimum lighting level to avoid flickering.
 - Simple timer and flashing.
 - Configuration of up to 10 scenes or 10 sequences.
 - Customisable switching on and off, both in terms of dimming value and dimming time.
 - Automatic shutdown of the load connected to the output.
 - Channel lock.
 - Custom initialisation.
- **Manual control / supervision** of relay outputs on-board pushbuttons and LEDs.
- 20 customisable multi-operation logic functions.
- **Heartbeat** or periodical “still-alive” notification.
- **KNX Secure**. For detailed information about the functionality and configuration of KNX secure, consult the specific user manual “KNX Secure Guide”, available in the product section of the Zennio web portal (www.zennio.com).

1.2 START-UP AND POWER LOSS

During the start-up of the device, the Prog./Test LED will blink in blue colour for a few seconds before DIMinBOX 1-10V X4 is ready. External orders will not be executed during this time, but afterwards.

Depending on the configuration, some specific actions will also be performed during the start-up. For example, the integrator can set whether the output channels should switch to a particular state and whether the device should send certain objects to the bus after the power recovery. Please consult the next sections of this document for further details.

On the other hand, when a bus power failure takes place, DIMinBOX 1-10V X4 will interrupt any pending actions, and will save its state so it can be recovered once the power supply is restored.

2 CONFIGURATION

2.1 GENERAL

After importing the corresponding database in ETS and adding the device to the desired project topology, the configuration process is started by accessing the device parameters tab.

ETS PARAMETERISATION

The only screen that can be parameterised by default is General. From this screen it is possible to activate/deactivate all the necessary functions.

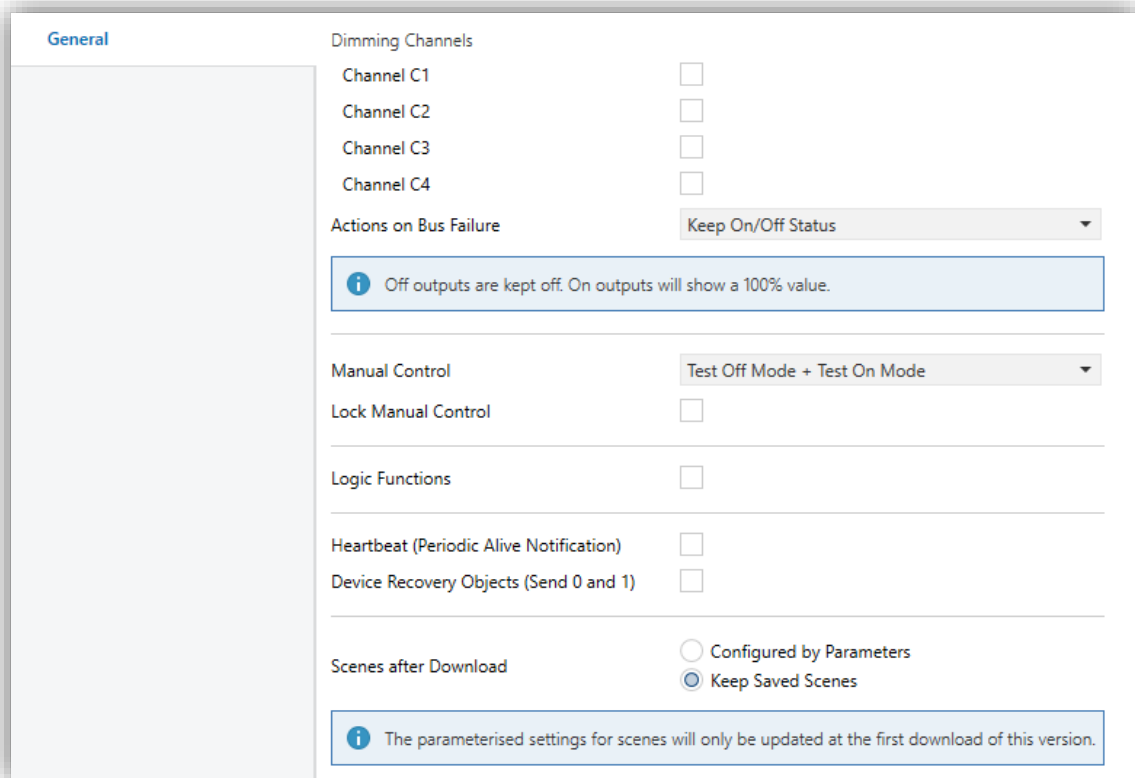


Figure 1. "General" screen.

- **Regulation channels.** Channel CX [enabled / disabled]¹: once enabled, additional tabs will be included for each channel in the left menu. See section 2.2 for more details.

¹ The default values of each parameter will be highlighted in blue in this document, as follows: [default / rest of options].

- **Actions on Bus Failure** [[Keep On/Off Status](#) / [Off](#)]: allows to configure the action to be taken by the cut-off relays during bus failure, allowing the connected loads to remain in their previous status or to be shutdown.

Note: if the “Keep On/Off Status” option has been configured, if the outputs are on, DlMinBOX 1-10V X4 will not be able to regulate the voltage, so they will be 100%.

- **Manual Control** [[Disabled](#) / [Only with Test Off Mode](#) / [Only with Test On Mode](#) / [Test Off Mode + Test On Mode](#)]: allows to configure the behaviour of the manual control on the outputs of the device by means of a push button. See section **¡Error! No se encuentra el origen de la referencia.** for more details.
- **Lock Manual Control** [[enabled](#) / [disabled](#)]: allows to configure the behaviour of the manual control lock, as well as its initialisation. See section **¡Error! No se encuentra el origen de la referencia.** for more details.
- **Logic Functions** [[enabled](#) / [disabled](#)]: enables or disables the “Logic functions” tab in the left menu. See section **¡Error! No se encuentra el origen de la referencia.** for more details.
- **Heartbeat (Periodic Alive Notification)** [[enabled](#) / [disabled](#)]: allows the addition of a one-bit object (“[Heartbeat] Object to send ‘1’”) that shall be sent periodically with the value “1” in order to notify that the device is operating (*still alive*).

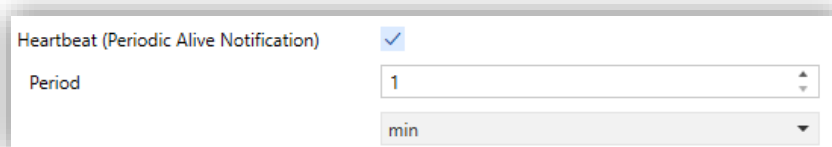


Figure 2. Heartbeat (Periodic Alive Notification).

Note: the first sending after download or bus failure takes place with a delay of up to 255 seconds, to prevent bus overload. The following sendings match the period set.

- **Device Recovery Objects (Send 0 y 1)** [[disabled](#) / [enabled](#)]: this parameter lets the integrator activate two new communication objects (“[Heartbeat] Device Recovery”), which will be sent to the KNX bus with values “0” and “1” whenever the device begins operation (for example, after a bus power failure). It is possible to parameterise a certain **delay** [[0...255](#)] [s] to this sending.

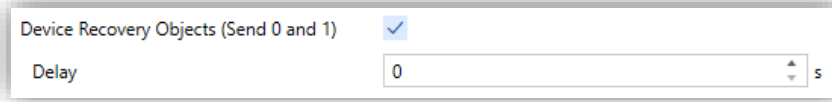


Figure 3. Device Recovery Objects

Note: after download or bus failure, the sending takes place with a delay of up to 6,35 seconds plus the parameterised delay, to prevent bus overload.

- **Scenes after Download** [Configured by Parameters / Keep Saved Scenes]: allows to define whether the value of the scenes is the one configured by parameter or whether the previously saved value is kept after downloading.

Note: if the “Keep saved scenes” option has been configured, but it is the first download of the device or of a different version to the current one, the values configured by parameter will be adopted. If new scenes are added in subsequent downloads, it will be necessary to perform a download by checking the option “Configured by parameters” to ensure the correct operation of these scenes.

2.2 CANAL CX

DlMinBOX 1-10V X4 incorporates four analogue voltage outputs that provide a voltage signal from 1 to 10 VDC proportional to a certain voltage value received through a communication object.

Each analogue output can be enabled or disabled by parameter and allows the ballast supply phase to be cut off when the dimming level is 0%.

The device incorporates an **LED indicator** associated to each output to know its status. The LED will remain on whenever the dimming status of that channel is other than 0%, and will turn off otherwise. In other words, the LEDs will be on whenever the relay is closed, and off when the relay is open.

After enabling ‘CX Channel’ in the General screen (see section 2.1), a new tab is added to the left menu.

When any channel is enabled, four default objects are included for each channel:

- **[CX] On/Off:** one-bit object that allows the relay associated with the channel output to be opened or closed.

- **[CX] Relative Dimming:** four-bit object that allows the control of the relative regulation of the channel.
- **[CX] Absolute Dimming:** one-byte object that allows, in percentage terms, the control of the absolute regulation of the channel.
- **[CX] Lighting Level (status):** one-byte object that receives, in percentage terms, the value of the output signal.

In addition, for each channel, two sub-tabs are enabled in the menu on the left:

2.2.1 CONFIGURATION

In this sub-tab it is possible to configure particular characteristics of the enabled channel, such as regulation times and limits, as well as enable the desired functions.

ETS PARAMETERISATION

Dimming Times [0% to 100%]	
Dimming Time 1	5 s
Dimming Time 2	10 s
Dimming Time Objects	☐
Dimming Limits	
Enable Economical Mode	☐
Enable Minimum	☐
Functions	
Status Objects	☐
Custom On/Off	☐
Simple Timer	☐
Flashing	☐
Scenes/Sequences	☐
Lock	☐
Auto Off	☐
Initialization Settings	☒ Default ☐ Custom

Figure 4. Canal CX: Configuration

- **Dimming Times [0% a 100%]:** includes the configuration options for the dimming times used in the channel. The following options are shown:

- **Dimming Time (1 and 2)** [1...10...120] [s] / [1...5] [min]: this is the time the device spends to progressively transition between the 0% and 100% regulation levels.
- **Dimming Time Objects** [enabled / disabled]: enables two objects to modify the regulation times at run time.
- **Dimming Limits**: includes the configuration options for modifying the maximum and minimum values of the regulation limits.
 - **Enable Economical Mode** [enabled / disabled]: enables economy mode.
 - **Maximum Dimming Value** [1...80...100] [%]: configures the maximum dimming value (in percentage) for economy mode.
 - **Enable Minimum** [enabled / disabled]: enables the minimum dimming value.
 - **Minimum Dimming Value** [0...10...99] [%]: configures the minimum value (in percentage) of dimming.

Dimming Limits	
Enable Economical Mode	☒
Maximum Dimming Value	80 %
Enable Minimum	☒
Minimum Dimming Value	10 %

Figure 5. Parameterisation of the dimming limits.

- **Functions**: includes all the functions that can be enabled independently for each channel.
 - **Status Objects** [enabled / disabled]: enables the “Status Objects” sub-tab in the left menu. See section 0 for more details.
 - **Custom On/Off** [enabled / disabled]: enables the “Custom On/Off” sub-tab. See section 0 for more details.
 - **Simple Timer** [enabled / disabled]: enables the configuration of the simple timers. See section 0 for more details.
 - **Flashing** [enabled / disabled]: allows the configuration of flashing by enabling a new sub-tab. See section 2.2.5 for more details.

- **Scenes/Sequences** [*enabled / disabled*]: enables the “Scenes/Sequences” sub-tab in the left menu. See section 2.2.9 for more details.
- **Lock** [*enabled / disabled*]: allows to configure the “Lock” functionality in a new sub-tab. See section 2.2.10 for more details.
- **Auto Off** [*enabled / disabled*]: enables the automatic shutdown, allowing it to be configured in a new sub-tab. See section 2.2.11 for more details.
- **Initialisation Settings** [*Default / Custom*]: in case of selecting “*Custom*”, the “Custom initialisation” sub-tab is enabled in the left menu. See section 2.2.12 for more details.

2.2.2 SWITCH & DIMMING

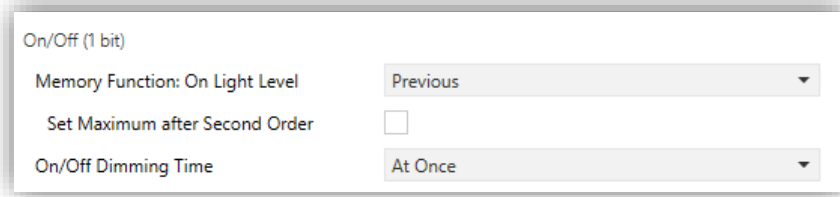
This sub-tab is always visible when Channel X is enabled. From here it is possible to configure all the options related to the switching and dimming of the channel.

ETS PARAMETERISATION

General	On/Off (1 bit)
Channel C1	Memory Function: On Light Level Maximum
Configuration	On/Off Dimming Time At Once
Switch & Dimming	Relative Dimming (4 bits)
Custom Initialization	Relative Dimming Time Dimming Time 1
	Allow Switching On via Relative Dimming ☒
	Allow Switching Off via Relative Dimming ☒
	Absolute Dimming (1 byte)
	Absolute Dimming Time Dimming Time 1
	Dimming Pattern
	Adjust Characteristic Curve ☐

Figure 6. Switch & Dimming

- **On/Off (1 bit)**: allows to configure aspects related to On/Off switching.



On/Off (1 bit)

Memory Function: On Light Level Previous

Set Maximum after Second Order ☐

On/Off Dimming Time At Once

Figure 7. Parameterisation of the On/Off configuration

- **Memory Function: On Light Level** [[Maximum](#) / Previous / Defined by Object]: allows you to select the “On Light Level” when receiving switched commands via the “[CX] On/Off” object.

In case of selecting “Previous” or “Defined by object” a new check will be enabled:

- **Set Maximum after Second Order** [[enabled](#) / [disabled](#)]: in case of enabling this parameter, a new switch-on command will overwrite the switch-on value by the maximum possible. In case of keeping it disabled, it will be kept at the same level.
- **On/Off Dimming Time** [[At Once](#) / [Dimming Time 1](#) / [Dimming Time 2](#)]: allows to set the time at which switching takes place.
- **Relative Dimming (4 bits)**: allows configuration of relative load regulation.
 - **Relative Dimming Time** [[At once](#) / [Dimming Time 1](#) / [Dimming Time 2](#)]: allows configuring the time used for relative dimming.
 - **Allow Switching On via Relative Dimming** [[enabled](#) / [disabled](#)]: allows switching on the load with a relative dimming command. When disabled, any relative command that tries to turn on an off load will be ignored and the current lighting status (0%) will be sent to the bus.
 - **Allow Switching Off via Relative Dimming** [[enabled](#) / [disabled](#)]: allows the load to be turned off with a relative dimming command. When disabled, any relative command that tries to turn off a lit load will dim the load to the parameterized minimum dimming value and the status will be sent to the bus.

Note: in case no minimum dimming value has been parameterized, it will be allowed to turn off the load through a relative dimming command even if this parameter is not enabled.

- **Absolute Dimming (1 byte):** allows configuration of absolute load regulation.
- **Absolute Dimming Time** [*On Time* / *Dimming Time 1* / *Dimming Time 2*]: allows to select the time it takes to perform absolute dimming.
- **Dimming Pattern:** allows to configure aspects related to the dimming pattern.
 - **Adjust Characteristic Curve** [*enabled* / *disabled*]: when this parameter is enabled, a new tab appears under “Switching and dimming” that allows the dimming pattern to be modified by defining pairs of values (x,y), where x is the control value (%) and y is the dimming value (%).

2.2.2.1 CHARACTERISTIC CURVE

This tab is displayed when the **Adjust Dimming Pattern** parameter of the “Switching and dimming” tab is enabled, allowing a new dimming pattern to be defined.

ETS PARAMETERISATION

General	Number of Value Pairs	2
Channel C1	<i>Minimum Control < Maximum Control</i> <i>Minimum Dimming < Maximum Dimming</i> A wrong parameter setting may result in undesired behaviour.	
Configuration	Minimum Control	1 %
Switch & Dimming	Minimum Dimming	1 %
Characteristic Curve	Maximum Control	100 %
Custom Initialization	Maximum Dimming	100 %

Figure 8. Configuration of the characteristic curve.

- **Number of Value Pairs** [*2* / *3* / *4*]: allows you to select the number of pairs of points that are to be used to set the dimming pattern.

When selecting 3 pairs of values, new parameters will appear to define the point given by (Control 1, Dimming 1) and, in case of selecting 4 pairs of values, parameters will also appear to define the point given by (Control 2, Dimming 2).

Parameter	Value	Unit
Minimum Control	1	%
Minimum Dimming	1	%
Control 1	50	%
Dimming 1	50	%
Control 2	75	%
Dimming 2	75	%
Maximum Control	100	%
Maximum Dimming	100	%

Figure 9. Configuration of the dimming pattern with 4 pairs of values.

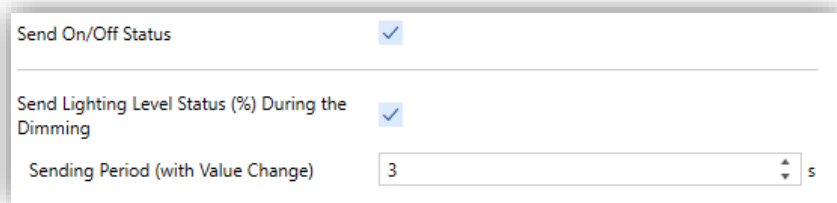
- **Minimum Control** [1] [%]: sets the control value (X_{MIN}) of the first pair of values. This value cannot be changed.
- **Minimum Dimming** [1...99] [%]: sets the dimming value (Y_{MIN}) of the first pair of values.
- **Control 1** [2...50...99] [%]: sets an intermediate control value. Only appears when the number of pairs is greater than 2.
- **Dimming 1** [2...50...99] [%]: sets an intermediate dimming value. Only appears when the number of pairs is greater than 2.
- **Control 2** [2...75...99] [%]: sets a second intermediate setpoint. Only appears when the number of pairs is equal to 4.
- **Dimming 2** [2...75...99] [%]: sets a second intermediate dimming point. Only appears when the number of pairs is equal to 4.
- **Maximum Control** [100] [%]: sets the control value (X_{MAX}) of the last pair of values. This value is not modifiable.
- **Maximum Dimming** [2...100] [%]: sets the dimming value (Y_{MAX}) of the last pair of values.

Notes:

- A wrong parameterisation setting may result in undesired behaviour. Please note:
 - Minimum Control < Control 1 < Control 2 < Maximum Control
 - Minimum Dimming < Control 1 < Control 2 < Maximum Dimming
- There should not be two different dimming values (Y-axis) for the same control value (X-axis).

2.2.3 STATUS OBJECTS

This function provides, for the channel in question, a one-bit On/Off status object and a one-byte (percentage) status object that will inform other devices about the status of the channel at any time.

ETS PARAMETERISATION


Send On/Off Status	☒
Send Lighting Level Status (%) During the Dimming	☒
Sending Period (with Value Change)	3 s

Figure 10. Status Objects.

- **Send On/Off Status** [*enabled* / *disabled*]: enables the one-bit communication object “[CX] On/Off (status)”, which reports the on/off status of the output channel when a change occurs.

In addition, it is sent automatically upon receipt of an On/Off command via the analogue control object.

- **Send Lighting Level Status (%) During the Dimming** [*enabled* / *disabled*]: enables the single-byte communication object “[CX] Lighting (status)”, which reports (each time it changes) the status of the output channel lighting level in terms of percentage.

Note: if a dimming command is received during a lockout (see section), these objects (if enabled) will be sent to the bus with the value they had, in order to inform that the requested command has been bypassed.

If enabled, the following parameter appears:

- **Sending Period (with Value Change)** [1...3...120] [s]: establishes how often the status object must be sent to the bus during progressive (soft) dimming, assuming that the value has changed with respect to the last sending.

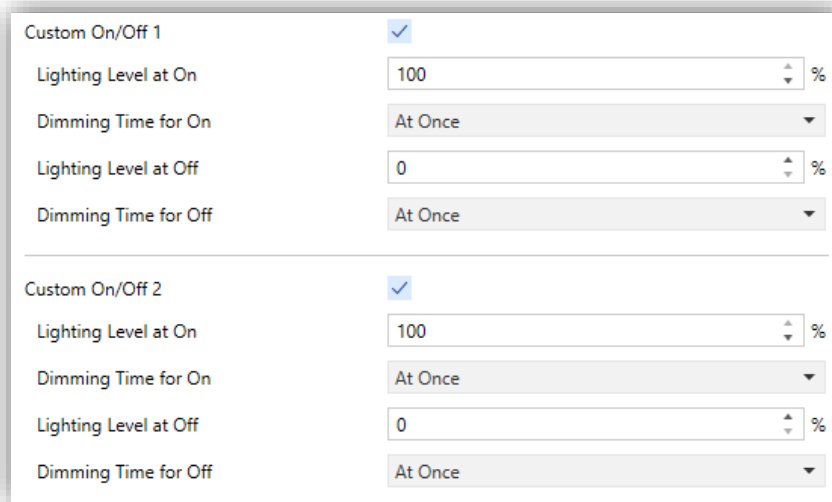
2.2.4 CUSTOM ON/OFF

This function offers the possibility to enable two additional On/Off controls for the output channel, and thus up to two new communication objects to switch the load on or off.

These additional controls allow customisation of the output illumination level for the “On” and “Off” states and the type of switching (immediate or soft).

The “Custom On/Off” function is particularly useful when specific lighting levels are desired for different rooms, different from the maximum lighting level of the default On/Off control. In these cases, both functions (default and custom On/Off) can coexist and be used depending on the situation.

ETS PARAMETERISATION



Custom On/Off 1	☒
Lighting Level at On	100 %
Dimming Time for On	At Once
Lighting Level at Off	0 %
Dimming Time for Off	At Once
Custom On/Off 2	☒
Lighting Level at On	100 %
Dimming Time for On	At Once
Lighting Level at Off	0 %
Dimming Time for Off	At Once

Figure 11. Custom On/Off.

Once enabled, two additional On/Off controls for the channel appear in the left menu sub-tab.

Both can be configured independently through the following parameters:

- **Lighting Level at On** [0...100] [%]: sets the percentage of lighting to be applied to the channel when a “1” is received by the object “[CX] On/Off custom Y” (where “Y” is equal to 1 or 2).
- **Dimming Time for On** [*At Once* / *Dimming Time 1* / *Dimming Time 2*]: establishes the type of dimming desired for switching on the channel.
- **Lighting Level at Off** [0...100] [%]: sets the percentage of lighting to be applied to the channel when a “0” is received by the object “[CX] On/Off custom Y” (where “Y” is equal to 1 or 2).
- **Dimming Time for Off** [*At Once* / *Dimming Time 1* / *Dimming Time 2*]: establishes the type of dimming desired for switching off the channel.

2.2.5 SIMPLE TIMER

This function allows the loads to be switched on and then switched off automatically (timed). Delays can also be applied and the duration time, lighting level and type of dimming can be parameterised. The desired effect can also be configured if the switch-on command is received several times (action on restart).

The timed switch-off can also be triggered on request before the end of the countdown.

This function can be useful for **motion-dependent** lighting control or when the load is to be switched on and then automatically switched off after a certain time.

ETS PARAMETERISATION

Lighting Level at On	100	%
On Duration (Staircase Timing) (0 = Endless)	0	s
On Delay (0 = No Delay)	0	s
Off Delay (0 = No Delay)	0	s
On/Off Dimming Time	At Once	
Action in Case of Retriggering	Nothing	

Figure 12. Simple Timer.

- **Lighting Level at On** [1...100] [%]: sets the percentage of lighting to be applied to the channel when a “1” is received by the object “[CX] Timer”.
- **On Duration (Staircase Timming)** **(0 = Endless)** [0...3600] [s] / [0...1000] [min] / [0...100] [h]: determines the time of the power-on phase before the load is automatically switched off.

Notes:

- *The time defined here is the total time of the phase in which the load is switched on, including (if applicable) the “Y dimming time”. If the dimming is too slow and the switch-on time is too short, the complete transition will not occur.*
- *If the value of the **On duration** is changed by object but the output is already switched on by a simple timing, this change will not be taken into account until a new timing is started.*
- **On Delay (0 = No Delay)** [0...3600] [s] / [0...1000] [min] / [0...100] [h]: sets the time the device must wait between receiving the command to start timing (when a “1” is received by the object “[CX] Timer”) and the power on of the load.
- **Off Delay (0 = No Delay)** [0...3600] [s] / [0...1000] [min] / [0...100] [h]: sets the time the device must wait between receiving the command to start timing (when a “0” is received by the object “[CX] Timer”) and the power on of the load.
- **On/Off Dimming Time** [At Once / Dimming Time 1 / Dimming Time 2]: establishes the type of dimming to be applied during the timed switching on/off.
- **Action in Case of Retriggering** [Nothing / Restart / Multiply]: allows configuring the behaviour when simple timing is in progress and a new order to start timing is received by the “[CX] Timer” object. It presents three configuration options:
 - Nothing: the current timing will not be restarted.
 - Restart: the running part of the timing will restart its counter from zero.
 - Multiply: the running part of the timing will be multiplied by “n”, where “n” is the number of times the command is received (up to five times).

Notes:

- The sending of "0" by the object "[CX] Timer" without having activated the timing will cause the start of a timed shutdown (if the output was on).
- If a dimming command of another type arrives during a simple timing, the timing will be cancelled and the most recent command will be executed.

2.2.6 FLASHING

This function allows on/off sequences with customisable **on/off** duration to be executed and a customisable power level to be set. It is also possible to determine a certain number of repetitions (up to 255) or to set an endless repetition, as well as the illumination level of the output after the last repetition (or when a command is received to interrupt the flashing).

The flashing starts when the device receives a "1" through the object "[CX] Flashing" and stops once all configured repetitions have been executed (unless an infinite duration sequence has been parameterised). It is possible to interrupt the intermittence at any time by sending a "0" to the intermittence object.

Sending any other control command (e.g. On/Off, scenes, etc.) will also interrupt the flasher. In addition, it is possible to send a command to the device to restart the flashing at runtime.

ETS PARAMETERISATION

Lighting Level at On	100	%
On Duration	2	s
Off Duration	2	s
Number of Repetitions (0 = Endless)	0	
Final Lighting Level	0	%

Figure 13. Flashing.

- **Lighting Level at On** [1...100] [%]: sets the percentage of lighting to be applied to the load during the ignition phases.

- **On duration** $[1...2...3600] [s] / [1...1000] [min] / [1...24] [h]$: sets the duration of the “On” phases.
- **Off duration** $[1...2...3600] [s] / [1...1000] [min] / [1...24] [h]$: sets the duration of the “Off” phases.
- **Number of Repetitions (0 = Endless)** $[0...255]$: sets the number of times the on/off cycle will be repeated during flashing. If a value of “0” is set, the flashing will be unlimited in duration and will be repeated until a command is received to interrupt the flashing or a dimming command is received.
- **Final Lighting Level** $[0...100] [\%]$: sets the desired percentage of lighting after the last repetition or after receiving a “0” from the “[CX] Flashing” object.

2.2.7 SCENES/SEQUENCES

This function allows the definition of up to ten scenes/sequences per channel. These consist of a specific lighting environment or dimming sequence that can be started by sending the corresponding scene number to the device via the “[CX] Scenes/Sequences” object.

In the menu on the left, as many scenes/sequences are enabled in the ‘Scenes/Sequences’ sub-tab as the number of scenes/sequences parameterised.

ETS PARAMETERISATION

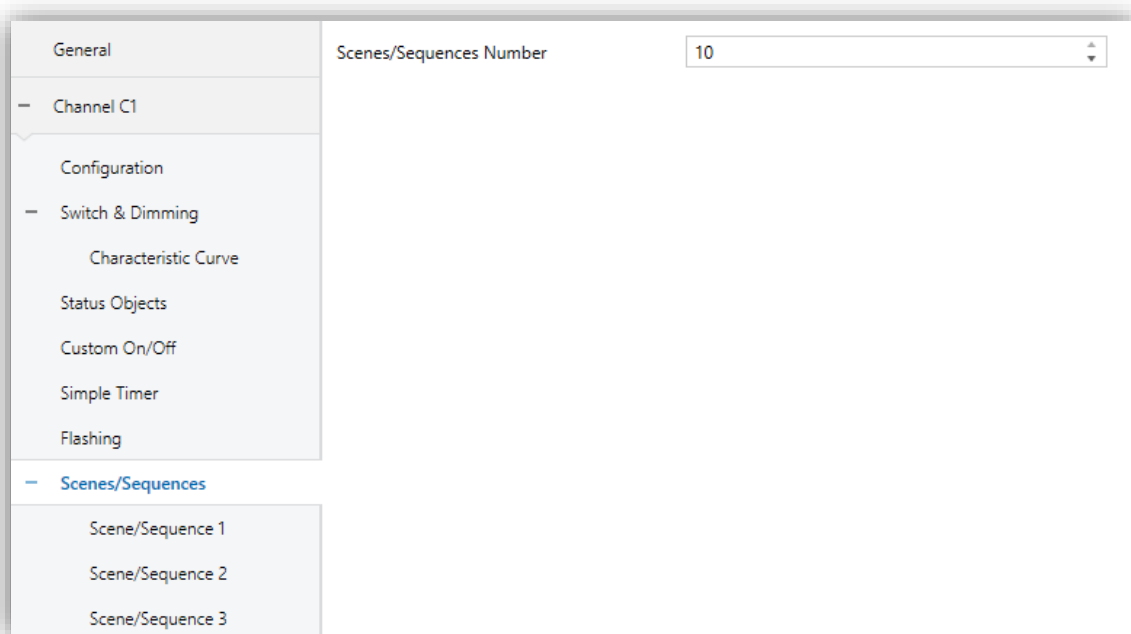
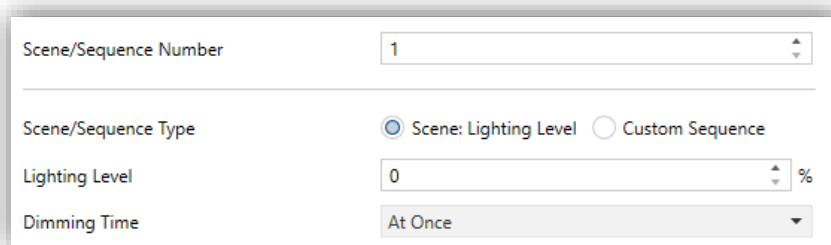


Figure 14. Scenes/Sequences.

When accessing each of the scenes/sequences that have been enabled in the tree on the left, a screen will be displayed with the default configuration as “Scene”.

The following fields can be configured here:

- **Scene/Sequence Number** [[1...64](#)]: establishes the scene/sequence identifier number. The reception of this number through the object “[CX] Scenes/Sequences” will make the controller execute the corresponding actions.
- **Scene/Sequence Type** [[Scene: Lighting Level](#) / [Custom Sequence](#)]: allows configuring the type of configuration.
 - [Scene: Lighting Level](#): consists of activating a certain level of lighting when the scene number is received via the object “[CX] Scenes/Sequences”.



Scene/Sequence Number	1
Scene/Sequence Type	☒ Scene: Lighting Level ☐ Custom Sequence
Lighting Level	0 %
Dimming Time	At Once

Figure 15. Scenes/Sequences: Scene.

- **Lighting Level** [[0...100](#)] [%]: determines the percentage of lighting to be applied to the scene.
- **Dimming Time** [[At once](#) / [Dimming Time 1](#) / [Dimming Time 2](#)]: allows you to select the dimming time to be applied.
- [Custom Sequence](#): the response will be a sequence of up to five steps or actions defined rough the following parameters:

Actions	Enable	Lighting Level	Dimming Time	Duration	Duration (units)
Action 1	☐				

Figure 16. Scenes/Sequences: Custom Sequence.

- **Cyclic** [[No](#) / [Yes](#)]: allows to define whether the sequence is to be executed cyclically.
- **Next Scene/Sequence** [[Scene/Sequence N](#) / [None](#)]: offers the possibility to launch, after the last step of the sequence, another scene or sequence.
- **Lighting Level Status Sending (%)** [[Send Continuously](#) / [Send when Sequence Ends](#)]: establishes the configuration to be taken into account regarding the sending of lighting. Two cases are possible:
 - [Send Continuously](#): the lighting level will be sent through the object “[CX] Lighting Level (status)” if there are changes and the parameter **Send lighting level (%) during dimming** is enabled in the ‘Status objects’ sub-tab.
 - [Send when Sequence Ends](#): the lighting status will be sent through the object “[CX] Lighting Level (status)” once the last step of the sequence has ended if this has changed, regardless of whether the sending of statuses during dimming has been enabled.
- **Configuration for Action Z** [[Set New Value](#) / [Keep Previous Value](#)]: for each of the actions (taking Z from 1 to 5). Only Action 1 can be configured as “Keep Previous Value”, this means that neither the lighting level nor

the dimming time of Action 1 can be customised, and only the duration of the action can be modified. The following parameters can be configured:

- **Lighting Level** [\[0...100\]](#) [%]: establishes the desired lighting level. If **Keep Previous Value** has been enabled for Action 1, this parameter cannot be modified for this Action.
- **Dimming Time** [\[At Once / Dimming Time 1 / Dimming Time 2\]](#): establishes the type of dimming to be carried out between actions
- **Duration** [\[1...2...3600\]](#) [s] / [\[1...1000\]](#) [min] / [\[1...24\]](#) [h]: establishes the duration of the action.

Note: *the duration time includes the dimming time, so if the dimming is too slow and the duration is too short, the complete transition will not occur.*

Note: *the object "[CX] Start/Stop Sequence" allows the possibility, by sending a "1", to start (from the first action) the last sequence executed or to stop, by sending a '0', the sequence in execution. This object will only affect the sequences of the dimming, so it will be ignored in the case of scenes.*

2.2.8 LOCK

This function allows the channel lock via the communication object "[CX] Lock". From that moment, any action that the channel is executing will be stopped and the load will take the lighting level indicated in the parameterisation.

Dimming commands during the locking state will be ignored, while objects common to the channels and which do not involve a change in the lighting level will continue to respond.

The device unlocks the channel when this is done via the locking object and outputs the lighting level specified in the parameterisation.

Notes:

- *After a bus fault, if the channel was locked, it shall remain locked and return to the lighting state of the lock, not the initialisation state. However, after an ETS*

download, the device shall start unlocked unless it is a group address download, where the existing lock status shall be retained.

- Dimming commands received during locking will be responded to with the existing dimming status via the objects “[CX] On/Off (status)” and “[CX] Lighting (status)” (and with the object “[CX] Lock (status)” in case it is parameter-enabled), indicating to the user that the command sent has not been heeded.
- If the channel is locked, the automatic shutdown will not be executed, understanding that the locking is a higher priority. In this way, the countdown for the automatic shutdown will be restarted when exiting the locked state.

ETS PARAMETERISATION

Lock Action	No Change
Unlock Action	No Change
Lock Object Polarity	☒ 0 = Unlock; 1 = Lock ☐ 0 = Lock; 1 = Unlock
Lock Status Object	☐

Figure 17. Lock.

- **Lock Action** [[No Change](#) / Off / On / Default Value]: allows to select the action to be taken when the channel enters “Lock” mode. If **Defined Value** is selected, a new parameter will be enabled:
 - **Dimming Value** [[0...100](#)] [%]: sets the dimming level to a specific value if channel lock is enabled.
- **Unlock Action** [[No Change](#) / Off / On / Default Value]: allows to select the action to be taken when the channel exits “Lock” mode. If **Defined Value** is selected, a new parameter will be enabled:
 - **Dimming Value** [[0...100](#)] [%]: sets the dimming level to a specific value if channel lock is Off.
- **Lock Object Polarity** [[0 = Unlock; 1 = Lock](#) / [0 = Lock; 1 = Unlock](#)]: allows the polarity of the lock object to be configured.
- **Lock Status Object** [[enabled](#) / [disabled](#)]: enabling this function adds a “[CX] Lock (status)” object.

2.2.9 AUTO OFF

If the Auto Off function is enabled, the channel-controlled load will automatically switch off after a certain time with a lighting level below a parameterisable limit.

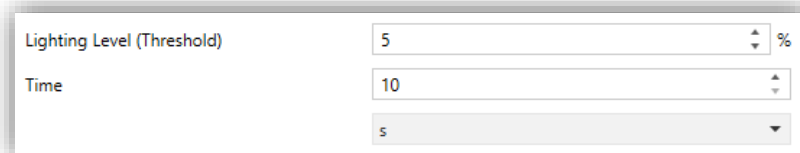
The Auto Off function counts the time elapsed since the output falls below a certain lighting threshold.

If the configured maximum time is exceeded, DIMinBOX 1-10V X4 will shut down the load. The counter will stop if a command is received to increase the lighting level above the threshold.

Notes:

- *If a very long dimming time and a sufficiently high automatic switch-off percentage are parameterised, the load will be switched off without reaching the set dimming level. This happens because the lighting threshold will be below the lighting threshold long enough to switch off the load.*
- *If the automatic shutdown lighting threshold is set below the minimum lighting level, the automatic shutdown action will never take place. This would be an incorrect setting.*
- *If a maximum dimming level has been defined, the automatic switch-off will take the percentage shown by the object “[CX] Lighting Level (Status)”, between 0% and 100%, as the value to be compared with the threshold.*

ETS PARAMETERISATION



Lighting Level (Threshold)	5	%
Time	10	s

Figure 18. Auto Off.

- **Lighting Level (Threshold)** [2...5...99] [%]: sets the lighting level that will activate the counter.
- **Time** [10...3600] [s] / [1...1000] [min] / [1...24] [h]: sets the time to elapse before switching off the channel.

2.2.10 CUSTOM INITIALISATION

This function allows specifying the desired state of the load after a KNX bus failure.

In case the **default initialisation** (load off after an ETS download, and previous lighting level after a bus or power failure) is adjusted to the needs of the integrator, it is not necessary to configure this function.

ETS PARAMETERISATION

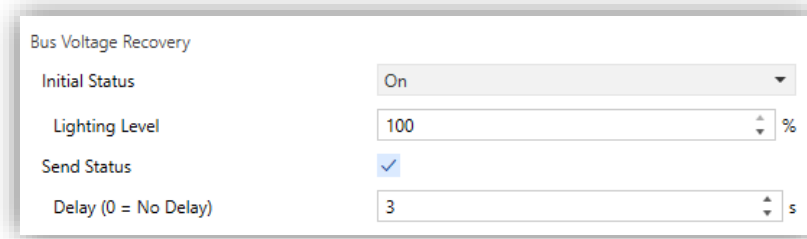


Figure 19. Custom Initialisation

- **Initial Status** [Off / On / Previous]: allows setting the initial state of the load after recovering from a bus fault or after a discharge. If “On” is selected, a new parameter will be enabled:
 - **Lighting Level** [1...100] [%]: allows setting the lighting level that the load will have at start-up.
 - **Send Status** [enabled / disabled]: enables the sending of statuses after a restart caused by a bus fault or a discharge. If enabled, a new parameter will be displayed.
 - **Delay (0 = No Delay)** [0...3...250] [s]: allows to set the delay time that the device will wait to send its statuses to the KNX bus.

2.3 MANUAL CONTROL

DlMinBOX 1-10V X4 allows you to manually control the status of its outputs by means of the pushbuttons located on the upper side of the device. Thus, each of the outputs has an associated pushbutton.

This manual control can be exercised in two different modes, called **Test On** (for testing the installation during the configuration of the device) and **Test Off** (for use at any other time). From ETS it is possible to configure whether manual control is available and, if so,

which of the two modes is allowed. Also, a binary object can be enabled by parameter to lock or unlock the manual control at runtime.

Notes:

- **Test Off mode** (unless disabled by parameter) is available at any time without the need for specific activation after download or reset: the pushbuttons will respond to user actions from the start.
- On the other hand, to access **Test On mode** (unless disabled by parameter), the Prog./Test push-button must be held down for three seconds until the LED turns yellow. At this point, when the button is released, the LED turns green to indicate that the Test Off mode has given way to Test On mode. Pressing the button again will turn the LED back to yellow and then turn off (after releasing the button). The device will then leave the Test On mode. Please note that this mode will also be exited if a bus fault occurs or if a manual control lock is sent via the KNX bus.

2.3.1 TEST OFF MODE

While the outputs of the device are controlled in this mode, they can be controlled not only by the commands sent through the communication objects, but also by using the physical pushbuttons located on the device.

Pressing any of them acts directly on the output as if a command had been received through the corresponding communication object.

By pressing the button, the device will act on the output depending on the duration of the press and the current state of the output:

- **Short Press:** action equivalent to a 0% or 100% dimming command on the output control object. The status is sent via the associated status object.
- **Long Press:** initiates upward dimming at all times unless the initial status is the maximum dimming level, in which case it will be downward. The status object shall be sent to the bus after stopping the press or reaching the minimum or maximum level.

In Test Off mode, any press on the buttons of the **outputs disabled** by parameter will be **ignored**.

2.3.2 TEST ON MODE

Once the Test On mode is activated, the outputs can only be controlled by direct action on the control buttons. All commands received via communication objects will be ignored, regardless of the output to which they are addressed.

There are two exceptions to this functionality: manual control locking, which will be dealt with immediately, and the locking of each channel, which will be dealt with when exiting Test On mode.

- The action performed on the output by pressing the physical buttons will be the same as described in Test Off mode except that the status objects will not be affected.

As described above, if the device is in Test On mode, any commands sent from the KNX bus to the actuator will not affect the outputs and no status objects will be sent (only periodic temporary objects such as Heartbeat or logic functions continue to be sent to the bus) as long as the Test ON mode is active.

Important: *in the factory default state, the device is delivered with all outputs disabled and with both manual control modes (Test OFF and Test ON modes) enabled.*

ETS PARAMETERISATION

Manual Control (enabled by default in section 2.1) is configured from the “General” tab.

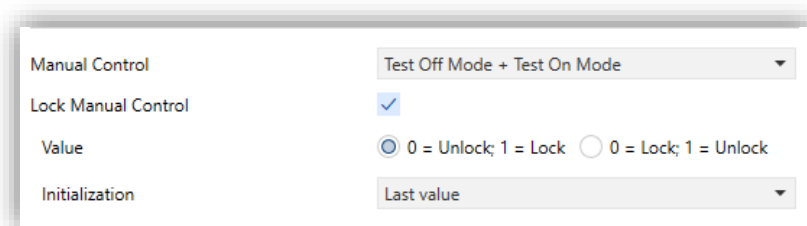


Figure 20. Manual Control.

- **Manual Control** [*Disabled / Only with Test Off Mode / Only with Test On Mode / Test Off Mode + Test On Mode*]: depending on the selection, the device shall allow, or not, to use manual control in Test Off mode, Test On mode or both. Note that, as mentioned above, no additional action is required to use Test Off mode, while a long press on the Prog./Test button is required to switch to Test On mode.
- **Lock Manual Control** [*disabled / enabled*]: unless the previous parameter is 'disabled', the manual control lock parameter provides an optional procedure to

lock the manual control at run time. For this purpose, when this box is enabled, the “**Lock manual control**” object appears, as well as two new parameters:

- **Value** [*0 = Lock; 1 = Unlock / 0 = Unlock; 1 = Lock*]: defines whether the locking/unlocking of the manual control should take place when the values “0” and “1” respectively are received or vice versa.
- **Initialisation** [*Unlocked / Locked / Last Value*]: specifies how the manual control locking is to remain after device initialisation (after ETS download or bus fault). “*Last Value*” at first initialisation shall correspond to Unlocked.

2.4 LOGIC FUNCTIONS

This module makes it possible to perform numeric and binary operations to incoming values received from the KNX bus, and to send the results through other communication objects specifically enabled for this purpose.

DlMinBOX 1-10V X4 can implement **up to 20 different and independent functions**, each of them entirely customisable and consisting of **up to 4 consecutive operations each**.

The execution of each function can depend on a configurable **condition**, which will be evaluated every time the function is **triggered** through specific, parameterisable communication objects. The result after executing the operations of the function can also be evaluated according to certain **conditions** and afterwards sent (or not) to the KNX bus, which can be done every time the function is executed, periodically or only when the result differs from the last one.

Please refer to the “**Logic Functions**” user manual available under the product section at the Zennio homepage (www.zennio.com) for detailed information about the functionality and the configuration of the related parameters.

ANNEX I. COMMUNICATION OBJECTS

- “**Functional Range**” shows the values that, with independence of any other values permitted by the bus according to the object size, may be of any use or have a particular meaning because of the specifications or restrictions from both the KNX standard or the application program itself.

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
1	1 Bit	O	C R - T -	DPT_Trigger	0/1	[Heartbeat] Object to Send '1'	Sending of '1' Periodically
2	1 Bit	O	C R - T -	DPT_Trigger	0/1	[Heartbeat] Device Recovery	Send 0
3	1 Bit	O	C R - T -	DPT_Trigger	0/1	[Heartbeat] Device Recovery	Send 1
4	1 Bit	I	C - W - -	DPT_Enable	0/1	Lock Manual Control	0 = Unlock; 1 = Lock
	1 Bit	I	C - W - -	DPT_Enable	0/1	Lock Manual Control	0 = Lock; 1 = Unlock
5, 23, 41, 59	1 Bit	I	C - W - -	DPT_Switch	0/1	[Cx] On/Off	0 = Off; 1 = On
6, 24, 42, 60	1 Bit	O	C R - T -	DPT_Switch	0/1	[Cx] On/Off (Status)	0 = Off; 1 = On
7, 25, 43, 61	4 Bit	I	C - W - -	DPT_Control_Dimming	0x0/0x8 (Stop) 0x1...0x7 (Dec.) 0x9...0xF (Inc.)	[Cx] Relative Dimming	4-Bit Dimmer Control
8, 26, 44, 62	1 Byte	I	C - W - -	DPT_Scaling	0% - 100%	[Cx] Absolute Dimming	1-Byte Dimmer Control
9, 27, 45, 63	1 Byte	O	C R - T -	DPT_Scaling	0% - 100%	[Cx] Lighting Level (Status)	0% - 100%
10, 11, 28, 29, 46, 47, 64, 65	2 Bytes	I/O	C R W - -	DPT_TimePeriodSec	0 - 65535	[Cx] Dimming Time x	Time in Seconds
12, 30, 48, 66	1 Byte	I	C - W - -	DPT_Scaling	0% - 100%	[Cx] Memory Function: Light Level	0% - 100%
13, 31, 49, 67	1 Byte	I	C - W - -	DPT_Scaling	0% - 100%	[Cx] Minimum Dimming Value	0% - 99%
14, 32, 50, 68	1 Bit	I	C - W - -	DPT_Switch	0/1	[Cx] Custom On/Off 1	0 = Off; 1 = On
15, 33, 51, 69	1 Bit	I	C - W - -	DPT_Switch	0/1	[Cx] Custom On/Off 2	0 = Off; 1 = On
16, 34, 52, 70	1 Bit	I	C - W - -	DPT_Start	0/1	[Cx] Timer	0 = Switch Off; 1 = Switch On
17, 35, 53, 71	2 Bytes	I	C - W - -	DPT_TimePeriodSec	0 - 65535	[Cx] Timer: On Duration Time	Time in Seconds
18, 36, 54, 72	1 Bit	I	C - W - -	DPT_Start	0/1	[Cx] Flashing	0 = Deactivate; 1 = Activate
19, 37, 55, 73	1 Byte	I	C - W - -	DPT_SceneControl	0-63; 128-191	[Cx] Scenes/Sequences	Scene/Sequence Value
20, 38, 56, 74	1 Bit	I	C - W - -	DPT_Start	0/1	[Cx] Start/Stop Sequence	0 = Stop; 1 = Start
21, 39, 57, 75	1 Bit	I	C - W - -	DPT_Enable	0/1	[Cx] Lock	0 = Lock; 1 = Unlock
	1 Bit	I	C - W - -	DPT_Enable	0/1	[Cx] Lock	0 = Unlock; 1 = Lock
	1 Bit	O	C R - T -	DPT_Enable	0/1	[Cx] Lock (Status)	0 = Unlock; 1 = Lock
22, 40, 58, 76	1 Bit	O	C R - T -	DPT_Enable	0/1	[Cx] Lock (Status)	0 = Lock; 1 = Unlock

77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140	1 Bit	I	C - W - -	DPT_Bool	0/1	[LF] (1-Bit) Data Entry x	Binary Data Entry (0/1)
141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172	1 Byte	I	C - W - -	DPT_Value_1_Ucount	0 - 255	[LF] (1-Byte) Data Entry x	1-Byte Data Entry (0-255)
173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204	2 Bytes	I	C - W - -	DPT_Value_2_Ucount	0 - 65535	[LF] (2-Byte) Data Entry x	2-Byte Data Entry
	2 Bytes	I	C - W - -	DPT_Value_2_Count	-32768 - 32767	[LF] (2-Byte) Data Entry x	2-Byte Data Entry
	2 Bytes	I	C - W - -	9.xxx	-671088.64 - 670433.28	[LF] (2-Byte) Data Entry x	2-Byte Data Entry
205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220	4 Bytes	I	C - W - -	DPT_Value_4_Count	-2147483648 - 2147483647	[LF] (4-Byte) Data Entry x	4-Byte Data Entry
221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240	1 Bit	O	CR - T -	DPT_Bool	0/1	[LF] Function x - Result	(1-Bit) Boolean
	1 Byte	O	CR - T -	DPT_Value_1_Ucount	0 - 255	[LF] Function x - Result	(1-Byte) Unsigned
	2 Bytes	O	CR - T -	DPT_Value_2_Ucount	0 - 65535	[LF] Function x - Result	(2-Byte) Unsigned
	4 Bytes	O	CR - T -	DPT_Value_4_Count	-2147483648 - 2147483647	[LF] Function x - Result	(4-Byte) Signed
	1 Byte	O	CR - T -	DPT_Scaling	0% - 100%	[LF] Function x - Result	(1-Byte) Percentage
	2 Bytes	O	CR - T -	DPT_Value_2_Count	-32768 - 32767	[LF] Function x - Result	(2-Byte) Signed
	2 Bytes	O	CR - T -	9.xxx	-671088.64 - 670433.28	[LF] Function x - Result	(2-Byte) Float

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