Arcus-EDS

Application Description

Gateway KNX / DMX
KNX-GW-DMX
Art.-Nr. 40120186

Active Principle and Application Area

The KNX-DMX Gateway is an **Interface** between the **KNX bus** and the **DMX512** bus.
It combines elements of building automation with a multitude of lighting and special effects devices for every need.

Application and Functionality

The KNX-DMX Gateway is unidirectional, receives data telegrams on the KNX bus and transmits the data onto the DMX512 bus. The interface allows the DMX512 actuators to communicate via the KNX bus using the full range of the channel.
The KNX-DMX Gateway contains 8 adjustable sequence positions within the whole channel range. Individual scenes with all 512 channels can be saved and retrieved using KNX group addresses. This function allows all channels to be connected simultaneously to one single object without causing any undo load on the KNX bus.

The sequences are saved internally and can be retrieved even after a power outage. (A sequence can only be saved 10000 times during the lifetime of the device. The automatic save function should not be set for short intervals.) The set value in sequence 8 is also „on" for all channels when using 1 bit objects.

The KNX-DMX Gateway is ready to use and can be positioned to the main group addresses with an S1 rotary switch. It is not necessary to project via the ETS.

The KNX-DMX Gateway has 1556 objects with three types of telegrams available:

DPT 1.001 (1bit; switch) single channel
DPT 1.001(1bit; switch) save sequence and retrieve
DPT 3.007 (4bit; relative dimming) single channel
DPT 5.001 (1byte; show value) single channel

The S2 rotary switch adjusts the transition period from one preset brightness to the next, 15 (F) being immediate, 0 a time period of 1 second from 0% to 100%.

The S3 rotary switch automatically sets the dimming function (s.u.) parameters, 0 is no automatic dimming, otherwise dimming time = 1.5 sec * switch value (S3 = 1 .. 15 (F)) in increments of 1% (dimming value 0111b or 1111b).

The rotary switch settings will be prompted when starting and can be readjusted during operation by using the T1 button.

Necessary requirements are a KNX bus, DMX 512 bus and a power supply.

The KNX-DMX Gateway in REG casing IP20 is available in sizes of 6 units.
Firmware upgrades can be done with ArcSuite via USB port.

Automatic Dimming Function:

Automatic dimming function can be switched on or off for all channels using an object, or can be parameterized by S3 when booting up.

Thereby the properties are controlled when a dimming telegram (DPT 3.007) appears.

-   Automatic function Off (S3 = 0)

    A dimming object (4 bit) value range +7 .. -7 singularly reduces or increases the DMX value percentage-wise. Appropriate for MicroVis dimming function (Standard 6% per rotary click) or similar rotary device.

-   Automatic function On (S3 <> 0)

    A uniquely transmitted dimming setting is repeated during a time period (dimmer repetition) until it reaches a value of 0 or 100% or until it is manually stopped. When 100% is transmitted, the preset value in „dimming curve" is used (basic setting 1%).
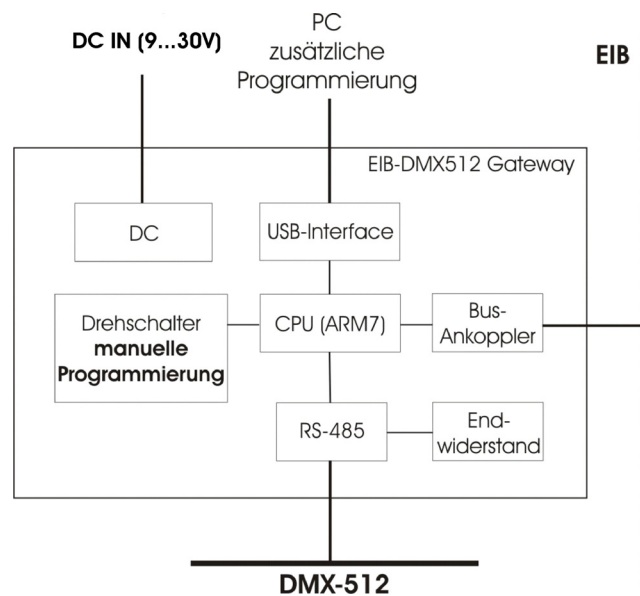
This function allows the integration of the KNX-Gateway for an installation with standard key buttons. A standard key button transmits a 100% upward or downward command in dimming function when pushed and held and a stop command when let go. A dimming setting can thus be set. The dimming time period can be adjusted separately using either the parameter repetition or the dimmer curve.

The basic setting after booting up is 1% dimming. The repetition rate is controlled by the rotary switch S3 and gives a dimming time result of circa 1.5 sec * switching value (S3 = 1 .. 15 (F)).

Address Diagram

The KNX-DMX Gateway is a master device in the DMX bus. It possesses an internal data memory and constantly transmits the data at a DMX rate of 250k baud to all 512 DMX channels. When receiving valid KNX telegrams the values in the memory are changed.

The transfer of the KNX telegram is preconfigured so that individual programming is not necessary.   The KNX data points are managed in 3 address rooms. That means that switching or dimming can be accessed on every channel.

The group addresses diagram must be set up using the S1 rotary switch before initial operation (voltage supply). Changes become effective after a reboot. The main group addresses from 0 – 15 are set up with the 16 stage rotary switch. The middle and lower group addresses are set by the predetermined address rooms (see table 1).   The DPT 5.001 allocates the first 512 address on the KNX bus. After that the DPT 1.001 and DPT 3.007. Finally, the sequence commands, a test function and dimming parameters are coded.

Group Address Allocation Lower Group (bi-level KNX Address Room):

Set Channel Value: **with DPT 5.001 1 byte value (0 .. 100%)**

Addresses 0 - 511
To set a 1 byte value, use the lower group addresses 0-511 which correspond to the channels 1-512 on the DMX bus.

Switch Channel Value: **with DPT 1.001 1 bit value (switch)**

Addresses 512 - 1023
Using a switch, this function can be used to switch every channel separately. When the value is 0 the channel is switched off (0), when it is 1 the saved value in sequence 8 is accessed and transmitted to the DMX512 bus. Every DMX channel can be independently switched.

Before the values are transmitted, there must be defined values saved in **Sequence 8**. This is the case for default settings at the time of delivery (255 for all channels). To reset the default settings use either the defined value with DPT 5.001 (group address x/0-511) or the function „Central On" (group address x/1552) all values to 255. Then save this to Sequence 8 (group address x/1551). This establishes a **maximum value** for every channel.

Dimming Channel: **with DPT 3.007: 4 bit Value (Dimming)**

Addresses 1024 - 1535

Table 1:

Possible Dimming Value as 4 bit Object:

0	=	Stop
1	=	100% down
2	=	50% down
3	=	25% down
4	=	12% down
5	=	6% down
6	=	3% down
7	=	1% down
8	=	Stop
9	=	100% up
10	=	50% up
11	=	25% up
12	=	12% up
13	=	6% up
14	=	3% up
15	=	1% up

410 e11

Using the automatic dimming function affects the performance when a dimming telgram is received.

Choose Sequence: **with DPT 1.001 1 bit Value (Switch)**

Addresses 1536 - 1543
A complete sequence with 512 channels can be output via the DMX bus.
All previously saved values are displayed on channels 1-512.
There is a choice of 8 sequences at the addresses 1536-1543.
The default value at the time of delivery is 255 for sequence 8 and 0 for sequences 1-7.

Save Sequence: **with DPT 1.001 1 bit Value (Switch)**

Addresses 1544-1551
Here the current DMX values can be saved in one of the 8 sequences. The current brightness will be saved.
There is a choice of 8 sequences at the addresses 1544-1551.

Central On: **with DPT 1.001 1 bit Value (Switch)**

Address: 1552
All 512 channels display 100% when a 1 is transmitted and 0% when a 0 is transmitted.

Dimmer Repetition Rate: **with DPT 5.001 1 byte Value (0 .. 250)**

Address: 1553

Set repetition rate parameters
The repetition rate affects the dimming time. At increments of 1%, a dimming time of 1.5 sec * is achieved.
Standard settings can be set using S3 (1 .. 15 (F)).
Suggested values are 2-40.

Downwards Dimming Curve: **with DPT 3.007 4 bit Value (Dimming)**

Address: 1554

Set dimming down to 100%.
When the automatic dimming function is chosen, the command „0001b" (100% dim down) is received and the programmed dimming setting will be repeated (see Repetition Rate Object 1553) until 0 has been reached or until it is manually stopped.

Standard setting „0111b" = -1%
Possible dimming values as 4 bit object, see table 1

Upwards Dimming Curve: **with DPT 3.007 4 bit Value (Dimming)**

Address: 1555

Set dimming up to 100%.
When the automatic dimming function is chosen, the command "1001h" (100% dim up)is received and the programmed dimming setting will be repeated (see Repetition Rate Object 1553) until 255 has been reached, or until it is manually stopped.

Standard setting „1111b" =+1%
Possible dimming values as 4 bit object, see table 1

Activate Automatic Dimming: **with DPT 1.001 1 bit Value (Switching)**

Address: 1556

Automatic Dimming
Standard setting 0 if S3=0, otherwise 1
0 = automatic dimming switches off, no repetition of dimming.
1= automatic dimming switches on, repetition of dimming.

Initial Operation

Circuit Points

Clamp RS485 /DMX (Bild1)

1 DMX specific mass (0V)
2 DMX Data - (B)
3 DMX Data + (A)

Clamp DC IN (9...30V)

1   **-** DC 0V
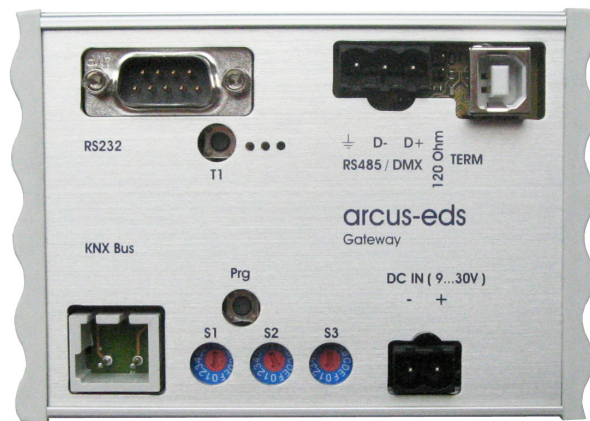**2**   **+** DC 9-30V

Clamp KNX BUS

Bild 1

Switch on the voltage supply.
The group addresses are coded by S1 when the DC voltage in KNX-DMX Gateway is switched on. Soft-start (slow start-up to protect lights) can be adjusted using S2 and S3 sets the dimming function. Turning the rotary switch afterwards has no Effect unless restarting the device or pushing the T1-Button. When pushing the **T1**-Button you can **switch all DMX-Channels simultaneously on/off**.

The **prog-**button on the mainboard inputs the **physical addresses** via a dummy application into the ETS.

The Jumper J1 **(120R TERM)** times the RS485 Bus with 120 Ohm load resistance in its initial state.

The KNX bus is galvanically separated from the DMX 512 bus!
The power supply is galvanically separated from the DMX 512 bus and the KNX bus!

Technical Data:

Measurements:	107x75x31mm
Degree of Protection: I	IP20
Mounting:	modular device with 92 mm
Surrounding Temperature:	-5 °C to 45 °C
Control Element:	3 x 16 staged rotary switch, 1 x Push Button (User) , 2 x LED (User), 1 x EIB-Push Button + LED
KNX Connection:	KNX clamp block
KNX Power Supply:	20 - 32V DC, approx. 150 mW
DMX Connection:	3 screw clamps 0.8mm²
	KL1 GND, KL2 Data – (B) , KL3 Data+ (A)
Load Resistance DMX512:	120 Ohm via Jumper
Forth Programming:	USB Slot and PC Software ArcSuite (Only Forth Users, for additional tools)
Power Supply:	9-30V DC, 100mA, internal galvanically separated 2 screw clamps KL1 - GND, KL2 - +V
DMX512 Bus:	RS485 - 250Kbaud, incl. galvanic separation DMX512 log Please note the DMB512 specific connecting configurations (bus connection, number of receiving slaves, bus topology)

410 e11

Table 1 Group Addresses Diagram (three stages):

KNX 3 Level Structure				DMX512	Sequence	KNX-DMX Gateway	
Main Groups	MG	UG	Value	Channel Nr.	Nr.	Function	Detail
0-15 (S1)	0	0-255	0 .. 255	001-256	-	DPT 5.001 transmits 1byte value (Absolute value)	1 Byte value is stored into the corresponding DMX-Channel directly.
0-15 (S1)	1	0-255	0 .. 255	257-512	-	DPT 5.001 transmits 1byte value (Absolute value)	
0-15 (S1)	2	0-255	0 / 1	001-256	-	DPT 1.001 value transmission (Switch)	When a 1 is received the value stored in sequence Nr. 8 is sent to the corresponding DMX-Channel. When a 0 is received the DMX-Channel is turned off.
0-15 (S1)	3	0-255	0 / 1	257-512	-	DPT 1.001 value transmission (Switch)	
0-15 (S1)	4	0-255	-7 .. +7	001-256	-	DPT 3.007 value transmission (Dimming)	Relatively lighter or darker dimming than the current level. See description below.
0-15 (S1)	5	0-255	-7 .. +7	257-512	-	DPT 3.007 value transmission (Dimming)	
0-15 (S1)	6	0-7	0 / 1	All Channels	0-7	DPT 1.001 value transmission (Switch) access saved sequences	The selected sequence values of all 512 channels are transmitted on the DMX512 bus.
0-15 (S1)	6	8-15	0 / 1	All Channels	0-7	DPT 1.001 value transmission (Switch) save new sequence	All current DMX- values in channels 1-512 are stored in the selected sequence position
0-15 (S1)	6	16	0 / 1	All Channels	-	DPT 1.001 value transmission (Switch) all channels central on	All 512 channels display 100% when 1 is transmitted, 0% when 0 is transmitted.
0-15 (S1)	6	17	0 .. 255	All Channels	-	DPT 5.001 value transmission, repetition rate parameters	Repetition rate of 10msec is multiplied with this value default 3.
0-15 (S1)	6	18	0 .. 7	All Channels	-	DPT 3.007 value transmission, set downward dimming curve	Dim down repetition value. Default 15=1%, see table
0-15 (S1)	6	19	0 .. 7	All Channels	-	DPT 3.007 value transmission, set upward dimming curve	Dim up repetition value. Default 15=1%, see table
0-15 (S1)	6	20	0 / 1	All Channels	-	DPT 1.001 value transmission (Switch) deactivate automatic dimming	Disables automatic dimming when value = 0

410 e11

Table 2 Group Addresses Diagram (two stages):

KNX 2 Level Structure			DMX512	Sequence	KNX-DMX Gateway	
Main Groups	**Subgroups**	**Value**	**Channel Nr.**	**Nr.**	**Function**	**Detail**
0-15 (S1)	000 - 511	0 .. 255	001-512	-	DPT 5.001 1byte value transmission (absolute value)	1 Byte value is stored into the corresponding DMX-Channel directly.
0-15 (S1)	511 - 1023	0 .. 255	001-512	-	DPT 1.001 value transmission (Switch)	When a 1 is received the value stored in sequence Nr. 8 is sent to the corresponding DMX-Channel. When a 0 is received the DMX-Channel is turned off.
0-15 (S1)	1024 - 1535	-7 .. +7	001-512	-	DPT 3.007 value transmission (Dimming)	Relatively lighter or darker dimming than the current level. See text
0-15 (S1)	1536 - 1543	0 / 1	All Channels	0-7	DPT 1.001 value transmission (Switch) access saved sequences	The selected sequence values of all 512 channels are transmitted on the DMX512 bus.
0-15 (S1)	1544 - 1551	0 / 1	All Channels	0-7	DPT 1.001 value transmission (Switch) save new sequences	All current DMX values in channels 1-512 are stored in the selected sequence position
0-15 (S1)	1552	0 / 1	All Channels		DPT 1.001 value transmission (Switch) all channels central on	All 512 channels display 100% when 1 is transmitted, 0% when 0 is transmitted.
0-15 (S1)	1553	0 .. 255	All Channels		DPT 5.001 value transmission, repetition rate parameters	Repetition rate of 10msec is multiplied with this value default 3.
0-15 (S1)	1554	0 .. 7	All Channels		DPT 3.007 value transmission, set downward dimming curve	Dim down repetition value. Default 15=1%, see table
0-15 (S1)	1555	0 .. 7	All Channels		DPT 3.007 value transmission, set upward dimming curve	Dim up repetition value. Default 15=1%, see table
0-15 (S1)	1556	0 / 1	All Channels		DPT 1.001 value transmission (Switch) deactivate automatic dimming	Disables automatic dimming when value = 0.

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