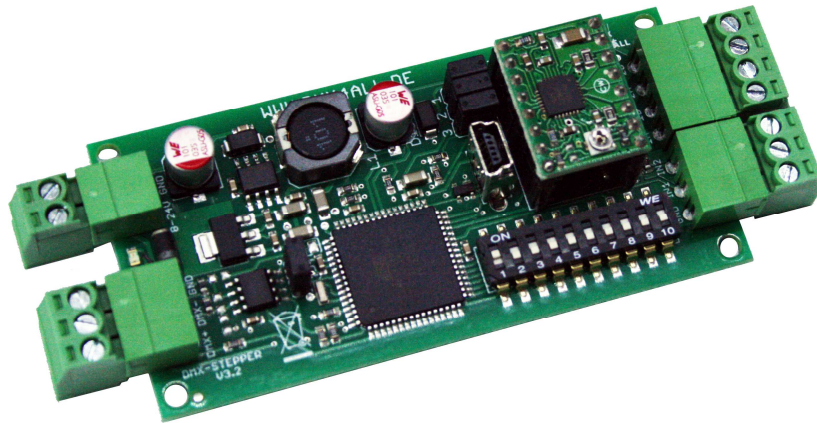


DMX-Stepper-Control

User Manual



DMX®
4
ALL



For your own safety, please read this user manual and warnings carefully before installation.

Content

Description.....	3
Data Sheet.....	4
Content	4
Connection	5
LED-Display-Codes	6
DMX-Addressing	6
Operation Modes	7
Configuration via DIP-Switch	11
Configuration per DMX	12
Initialization (0-Position).....	14
Micro-Step-Setting	15
Maximum step speed.....	15
Step motor driver	16
Operation with Pololu A4988 (Delivery status)	16
Operation with TMC2100 SilentStepStick.....	17
Operation with TMC2208.....	17
Operation with an external stepper motor driver	18
Execute Firmware-Update	20
Dimension.....	21
Accessory	22
CE-Conformity	23
Risk-Notes	24

Description

The **DMX-Stepper-Control** is designed for controlling a stepping motor (Stepper) via DMX.

Several operating modes

The several operating modes allow a continuous operation with a variable speed or the starting of defined positions.

Micro step operating modes

This DMX-Stepper-Control supports Full-Step (1/1) / Half-Step (1/2) / Quarter-Step (1/4) / Eighth-Step (1/8) / Sixteenth-Step (1/16)

Exchangeable stepping motor driver

The standard Pololu A4988 stepper motor driver is suitable for 8-24 V voltage and can trigger a power of 2A per phase.

Alternatively, the stepper motor driver can be changed with a SilentStepStick with Trinamic TMC2100 / TMC2208 or an external stepper motor driver BRIDGE can be used optionally.

Adjustable current limiting

The A4988 stepper motor driver has an adjustable current limiting.

Left and right limit switch

Inputs for a left and a right limit switch allow the limitation the path.

Initialization after starting

Optionally an initialization can be done after starting. In this case the motor drives to the limit switch and stores this position as start / end point.

Data Sheet

Power supply:	8-24V DC / 50mA without connected motor
Motor-Voltage:	8-24V DC (equal to power supply)
Input:	1-4 Channel (depending on operation mode)
Output Driver:	Pololu A4988 stepper motor driver (standard) SilentStepStick (optionally available as accessory) TMC2100 SilentStepStick TMC2208 Bridge for externe stepper driver
Connections:	Screw terminals
Dimensions:	80mm x 39mm

Content

1x	DMX-Stepper-Control
1x	Screw clamps 2pin / RM3,5
2x	Screw clamps 3pin / RM3,5
1x	Screw clamps 4pin / RM3,5
1x	Radiator for driver
1x	Quick guide german and english

Connection



Connection with bipolar stepper motor



Connection with unipolar stepper motor



ATTENTION:

This DMX-Stepper-Control is **NOT AUTHORISED** for applications to whose relevance for security requirement or dangerous situations can arise!

LED-Display-Codes

The integrated green LED is a multi-functional display.

During to the normal operation mode the LED lights permanently. In this case the device is working.

Furthermore, the LED shows the current status. In this case the LED lights up in short pitches and then is missing for longer time.

The number of the flashing lights is equal to the status number.

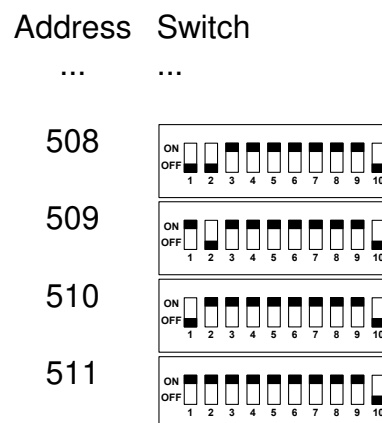
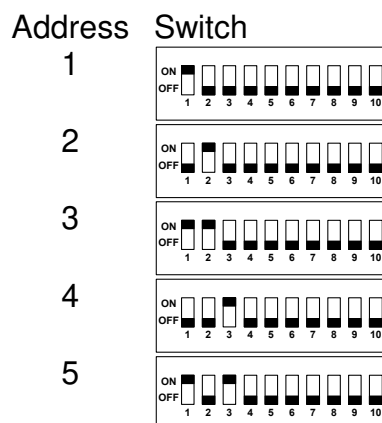
Status-Number	Error	Description
1	No DMX	No DMX-Signal detected
2	Address error	Please check, if a valid DMX-Start address is set via the DIP-Switch
3	Configuration stored	The configuration, adjusted via switches, is stored
4	DMX-Configuration stored	The configuration received via DMX is stored

DMX-Addressing

The starting address is adjustable via the DIP-switches.

Thereby switch 1 has the valency 2^0 (=1), switch 2 the valency 2^1 (=2) and so on until switch 9 has the valency 2^8 (=256).

The switches showing ON represent in sum the starting address.



Operation Modes

Speed and direction via one DMX-Channel

MODE 0

DMX-Channel	Value	Description
1	0-126	Left-hand rotation fast → slow
	127-129	STOP
	130-255	Right-hand rotation slow → fast
2		Do initialize if DMX value goes from greater 127 to lower 128

Speed and direction via each one DMX-Channel

MODE 1

DMX-Channel	Value	Description
1	0 1-255	STOP slow → fast
2	0-127 128-255	Right-hand rotation Left-hand rotation
3		Do initialize if DMX value goes from greater 127 to lower 128

Speed and direction via one DMX-Channel / only one direction

MODE 2

DMX-Channel	Value	Description
1	0 1-255	STOP slow → fast
2		Do initialize if DMX value goes from greater 127 to lower 128

Index of position and speed via one DMX-Channel without Overroll MODE 3

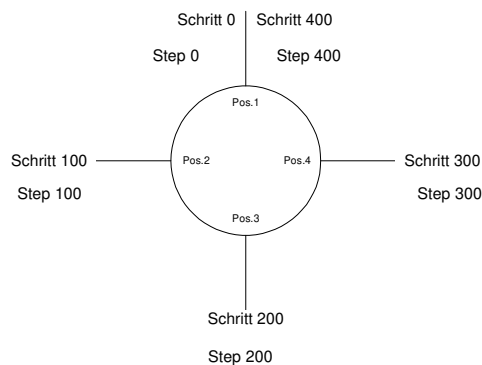
This mode allows a start-up from several positions. During the configuration the number of positions will be defined. The interface divides the positions even between step 0 and the last step. Also the DMX-Value area will be divided even.

By controlling the motor no Roll-Over is used. That means that e.g. the way of the last position to the first position takes about all other positions.

DMX- Channel	Value	Description
1	0-255	Position Index
2	0-255	Slow → Fast
3		Do initialize if DMX value goes from greater 127 to lower 128

Example: 4 positions and 400 steps are predefined.
Thereby this results in the following DMX-value assignments:

DMX-Channel	Value	Description
1	0-63 64-127 128-191 192-255	Position 1 Position 2 Position 3 Position 4



Index position and speed via one DMX-Channel with Roll-Over MODE 4

This mode is identical to the prior Mode 3, with the exception that here is a Roll-Over used and so the shortest way to the new position is taken.

8Bit position and speed without Roll-Over

MODE 5

This mode divides the steps equal to the Position-Values.

DMX-Channel	Value	Description
1	0-255	Position
2	0-255	Slow → Fast
3		Do initialize if DMX value goes from greater 127 to lower 128

8Bit position and speed with Roll-Over

MODE 6

This mode is identical to the prior Mode 5, with the exception that here is a Roll-Over used and so the shortest way to the new position is taken.

16Bit position and speed without Roll-Over

MODE 7

This mode allows to run-up one motors step. This step to run-up is thereby specified as 16Bit-Value via 2 DMX-Addresses.

DMX-Channel	Value	Description
1	0-255	Step LOW
2	0-255	Step HIGH
3	0-255	Slow → Fast
4		Do initialize if DMX value goes from greater 127 to lower 128

16Bit position and speed with Roll-Over

MODE 8

This mode is identical to the prior Mode 7, with the exception that here is a Roll-Over used and so the shortest way to the new position is taken.

8Bit Position and speed without Roll-Over with EndlessRotation

MODE 9

This mode divides the steps of the motor evenly to the position values and offers the possibility to let the stepper rotate endlessly via another DMX channel.

DMX channel	Value	Description
1	0-255	Position
2	0-255	Slow → fast
3	0-127 128-191 192-255	Go to position Continuous left rotation Continuous right rotation
4		Run initialization when DMX value is greater than 127 to less than 128

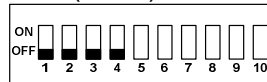
Configuration via DIP-Switch

The method in which this DMX-Interface controls the stepper motor depends on the selected operating mode. The assignment of the DMX-values is to take from the table. For the interface mode settings follow the following steps:

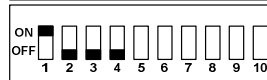
- Turn off the power supply
- Set the DIP-Switch 10 on ON
- Adjust via the DIP-Switches 1-9 the operating mode

Adjusting the mode (S1-4):

MODE0:



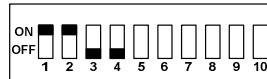
MODE1:



MODE2:



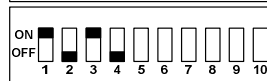
MODE3:



MODE4:



MODE5:



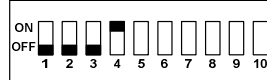
MODE6:



MODE7:

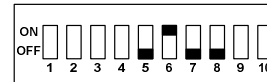


MODE8:



Number of positions for mode3+4:

2:



3:

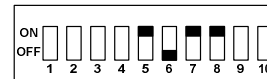


4:

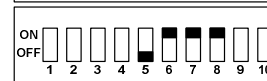


:::

13:



14:

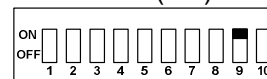


15:

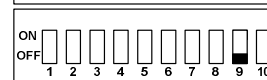


Adjusting initialization left (S9):

ON:



OFF:



- Turn on the interface and wait until the LED lights up
- Adjust DIP-Switch 10 on OFF to store the values
- After the memory the LED lights up with the status number 3
- Turn off the power supply again
- Adjust via the DIP-switches 1-9 the DMX-Start address

Configuration per DMX

The configuration per DMX allows additionally settings, which are not possible via the configuration with DIP-Switches. For the mode settings per DMX please follow the following steps:

- Turn off the power supply
- Adjust DIP-switch 10 on ON
- Now adjust DIP-switch 1-4 on ON and 5-9 on OFF
- Place the DMX-signal with the values for the configuration to the interface
- Turn on the interface and wait until the LED lights up 5 seconds minimum
- Adjust DIP-switch 10 on OFF to store the values
- After the memory process the LED lights up with the event number 4
- Turn off the power supply
- Adjust via the DIP-switches 1-9 the DMX-starting address

The values are assigned to the DMX-channels:

DMX-Channel	Value	Description
1	0-9	Mode selection
2	0-255	Number of positions (only for Mode3 + Mode4)
3	0-127 128-255	Initialization left OFF Initialization left ON
4	0-127 128-255	Initialization right OFF Initialization right ON
5	0-255	Number of steps (HIGH) (for Mode0 up to Mode6)
6	0-255	Number of steps (LOW) (for Mode0 up to Mode6)
7	222 <>222	Use speed-up ramp in Mode 3-8 (for Mode3 up to Mode8) No speed-up ramp
8	222 <>222	Additional DMX-Channel for RESET (Initialization) No DMX-Channel for RESET (Initialization)
9	222 <>222	End switch left in mode deactivated End switch left in mode active
10	222 <>222	End switch right in mode deactivated End switch right in mode active



The DMX-Configuration channels 7 and 8 (Speed-up and RESET) are available from Firmware version V3.1.

The DMX configuration channels 9 and 10 (deactivate end switch) are only available from firmware version V3.22.

Example 1:

Mode 5 / Init left OFF / Init right OFF

Number of steps = 1600 ($6 \cdot 256 + 64$)

The DMX-Values are:

Ch1: 5

Ch2: 0

Ch3: 0

Ch4: 0

Ch5: 6

Ch6: 64

Ch7: 0

Ch8: 0

Example 2:

Mode 3 / 10 Position / Init left ON / Init right OFF / Acceleration ramp ON

Number of steps = 3200 ($12 \cdot 256 + 128$)

The DMX-Values are:

Ch1: 3

Ch2: 10

Ch3: 222

Ch4: 0

Ch5: 12

Ch6: 128

Ch7: 222

Ch8: 0

Initialization (0-Position)

The **DMX-Stepper-Control** offers the possibility that the stepper motor moves to a 0 position when switching on or via DMX.

To perform this function at power-up, INIT-Stepper LEFT or INIT-Stepper RIGHT must be activated during configuration.

Alternativ kann die Initialisierung der 0-Position während des Betriebs per DMX gestartet werden. Diese Funktion muss über die Konfiguration per DMX aktiviert werden!

When the initialization is performed, the direction Left (if enabled) and the direction Right (if enabled) will be executed first.

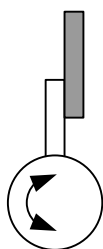
Depending on the direction, the stepper motor rotates until the input IN1 (left) or IN2 (right) is activated or until the maximum number of steps has been reached.

Thus, the motor stops either when triggering the contact or when reaching a mechanical stop.

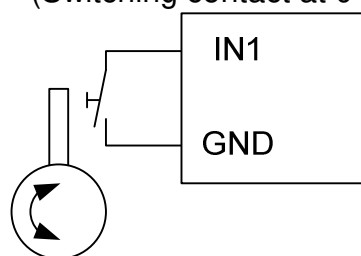
The reached position to the left is used as the 0 position.

Examples of construction:

Mechanical stop:
(Touch)

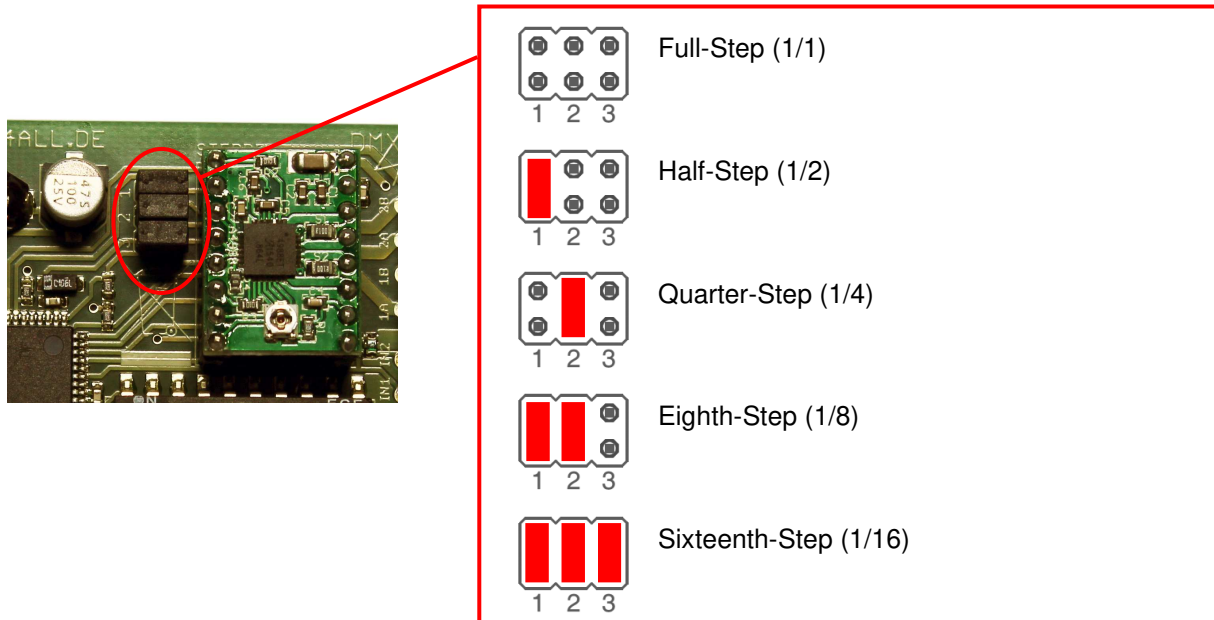


Electrical stop:
(Switching contact at 0-position)



Micro-Step-Setting

The adjusting in which micro-step-resolution the stepper motor will be controlled occurs about Jumper 1-3.



The micro-Step setting affects both the control by the microcontroller of the DMX-Stepper-Control as well as the attached step motor driver.

By using alternative stepper motor drivers it can be necessary not to connect the signals CFG1, CFG2 and CFG3 (MS1, MS2 and MS3 at the stepper motor driver see page 13).

Maximum step speed

The maximum step speed depends of the micro step setting.

Full-Step (1/1)	375 Steps/s
Half-Step (1/2)	750 Steps /s
Quarter-Step (1/4)	1500 Steps /s
Eighth-Step (1/8)	3000 Steps /s
Sixteenth-Step (1/16)	6000 Steps /s

Step motor driver

The DMX-Stepper-Control uses a wide spreaded Step-Stick stepper motor driver.

The driver sockets connection assignment is as follows:

○ ENABLE	VMOT	○
○ MS1	GND	○
○ MS2	2B	○
○ MS3	2A	○
○ RESET	1A	○
○ SLEEP	1B	○
○ STEP	VDD	○
○ DIR	GND	○



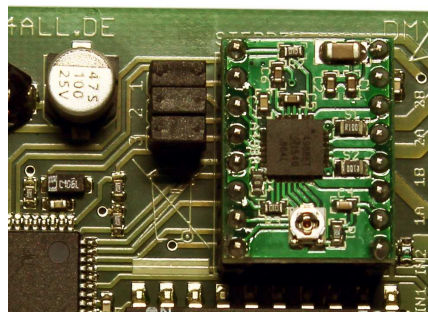
Note, to plug the stepper motor driver only in the correct orientation and only when it is disconnected to the power supply!

The motor connections must be pointed to the motor connection.

Plug in with the wrong orientation or with connected power supply will destroy the DMX-Stepper-Control and / or the stepper modules.

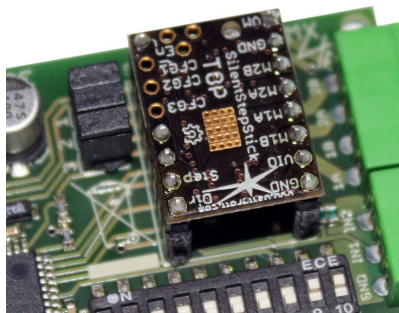
Operation with Pololu A4988 (Delivery status)

The **DMX-Stepper-Control** is equipped with the stepper motor driver Pololu A4988 in the delivery condition.



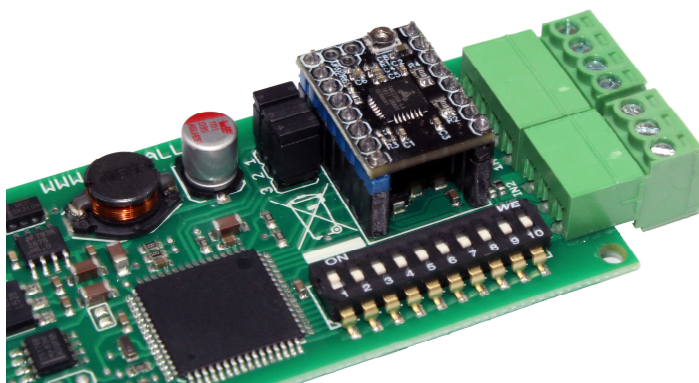
Operation with TMC2100 SilentStepStick

A SilentStepStick with Trinamic TMC2100 can also be plugged to the **DMX-Stepper-Control**. In this case the connections CFG1, CFG2 and CFG3 must not be connected.



Operation with TMC2208

To use the DMX-Stepper-Control with a Trinamic TMC2208, plug the TMC2208 with the motor connector to the outside of the board as shown in the picture. It may be necessary to remove the connection pins MS1, MS2 and MS3 (see page 13) and not to connect them.

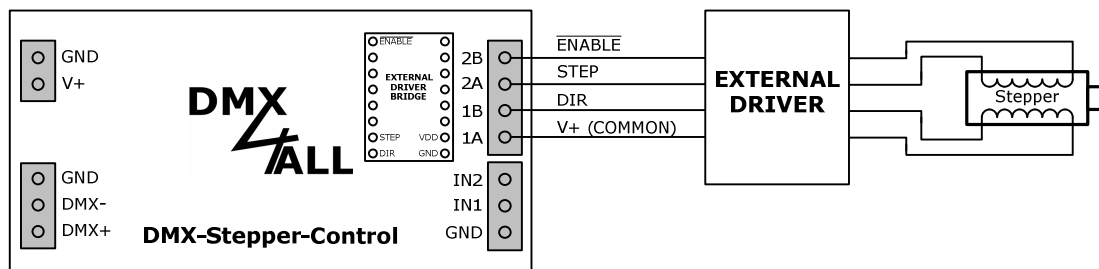


Operation with an external stepper motor driver

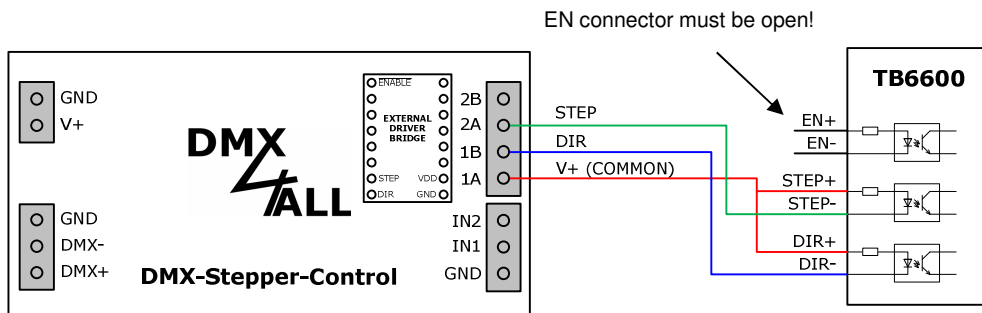
A stepper motor driver BRIDGE is available as accessory for the **DMX-Stepper-Control** (EXTERNAL DRIVER BRIDGE).

With the stepper motor driver BRIDGE, it is possible to connect external stepper motor driver to the DMX-Stepper-Control.

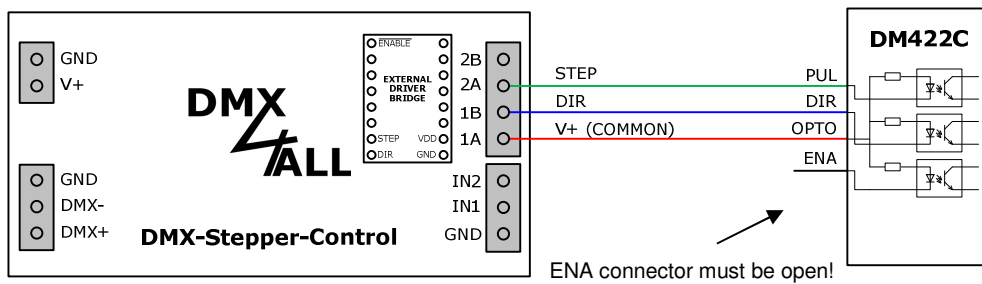
The signals STEP, DIR and ENABLE are bridged by the stepper motor driver to the motor connection and can be used in this way for controlling an external stepper motor driver.



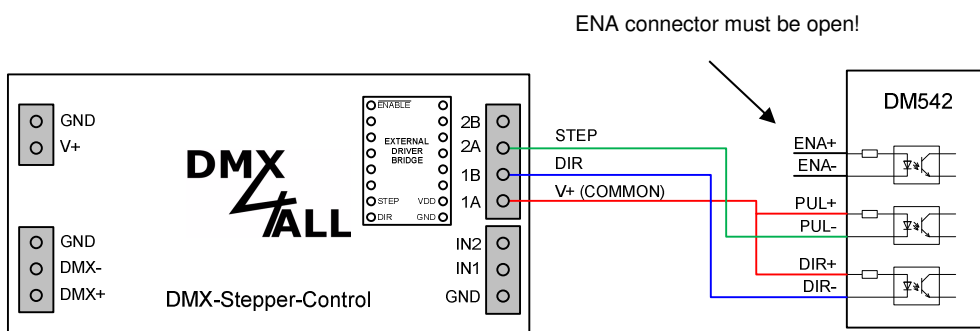
Connection example with TB6600:



Connection example with DM422C:



Connection example with DM542:



Execute Firmware-Update

(from hardware V3.2)

The **DMX-Stepper Control** has an update-function which enables transferring prospective firmware-versions.

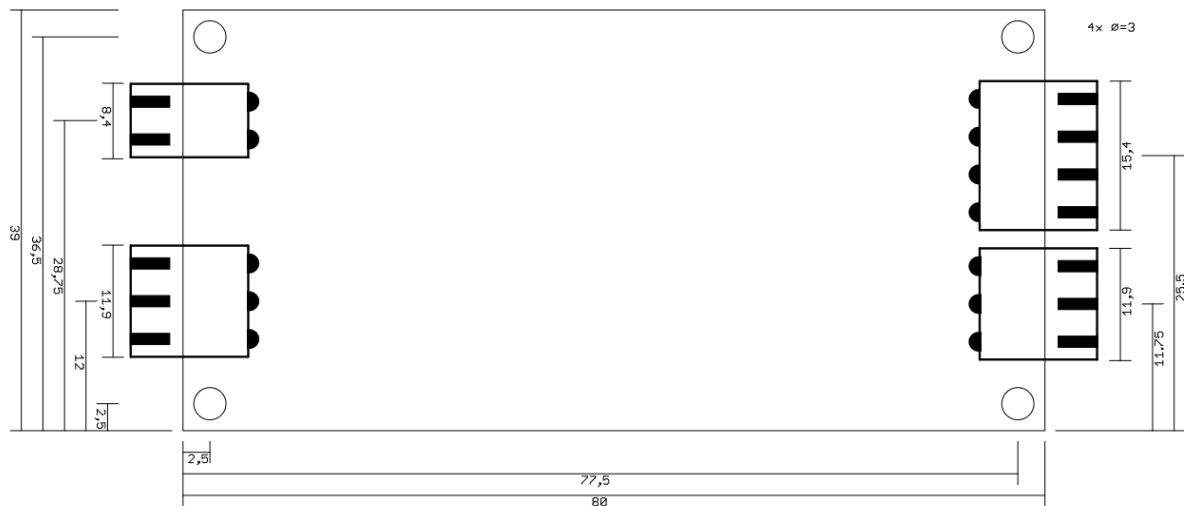
Proceed as follows:

- Turn off the device (Disconnect power supply and USB!)
- Release UPDATE jumper
- Generate USB connection to PC
- If necessary install USB driver
- Start update software **DMX4ALL USB-Updater**
- Select DMX-Stepper Control from list
- Click *Firmware-Update*
- Select and confirm firmware file (.bin)
- Wait until the update has finished
- Disconnect USB connection and USB
- Pin UPDATE-Jumper again



If an error occurs during the update you can start from the beginning at any time. In this case you must turn off the DMX-Stepper Control and close the software before executing the firmware update again.

Dimension

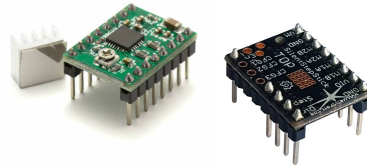


(All details in mm)

Accessory

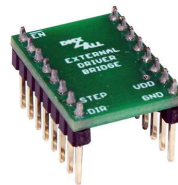
Stepper motor driver

A4988 / TMC2100 / TMC2208



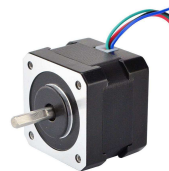
Stepper motor driver

BRIDGE



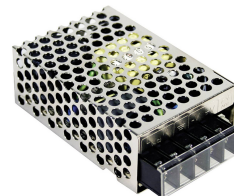
Stepper motor driver

NEMA17 12V/400mA



Switching power supply

12V / 25W (2,1A)



System clamp 3,5mm

2polig / 3polig / 4polig

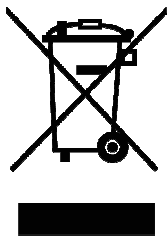


CE-Conformity



This assembly (board) is controlled by a microprocessor and uses high frequency. In order to maintain the properties of the module with regard to CE conformity, installation into a closed metal housing in accordance with the EMC directive 2014/30/EU is necessary.

Disposal



Electronical and electronic products must not be disposed in domestic waste. Dispose the product at the end of its service life in accordance with applicable legal regulations. Information on this can be obtained from your local waste disposal company.

Warning



This device is no toy. Keep out of the reach of children. Parents are liable for consequential damages caused by nonobservance for their children.

Risk-Notes



You purchased a technical product. Conformable to the best available technology the following risks should not be excluded:

Failure risk:

The device can drop out partially or completely at any time without warning. To reduce the probability of a failure a redundant system structure is necessary.

Initiation risk:

For the installation of the board, the board must be connected and adjusted to foreign components according to the device paperwork. This work can only be done by qualified personnel, which read the full device paperwork and understand it.

Operating risk:

The Change or the operation under special conditions of the installed systems/components could as well as hidden defects cause to breakdown within the running time.

Misusage risk:

Any nonstandard use could cause incalculable risks and is not allowed.

Warning: It is not allowed to use the device in an operation, where the safety of persons depend on this device.



DMX4ALL GmbH
Reiterweg 2A
D-44869 Bochum
Germany

Last changes: 14.06.2024

© Copyright DMX4ALL GmbH

All rights reserved. No part of this manual may be reproduced in any form (photocopy, pressure, microfilm or in another procedure) without written permission or processed, multiplied or spread using electronic systems.

All information contained in this manual was arranged with the greatest care and after the best knowledge. Nevertheless, errors are to be excluded not completely. For this reason, I see myself compelled to point out that I can take over neither a warranty nor the legal responsibility or any adhesion for consequences, which decrease/go back to incorrect data. This document does not contain assured characteristics. The guidance and the characteristics can be changed at any time and without previous announcement.