3.6 Pin assignment

3.6.1 Overview
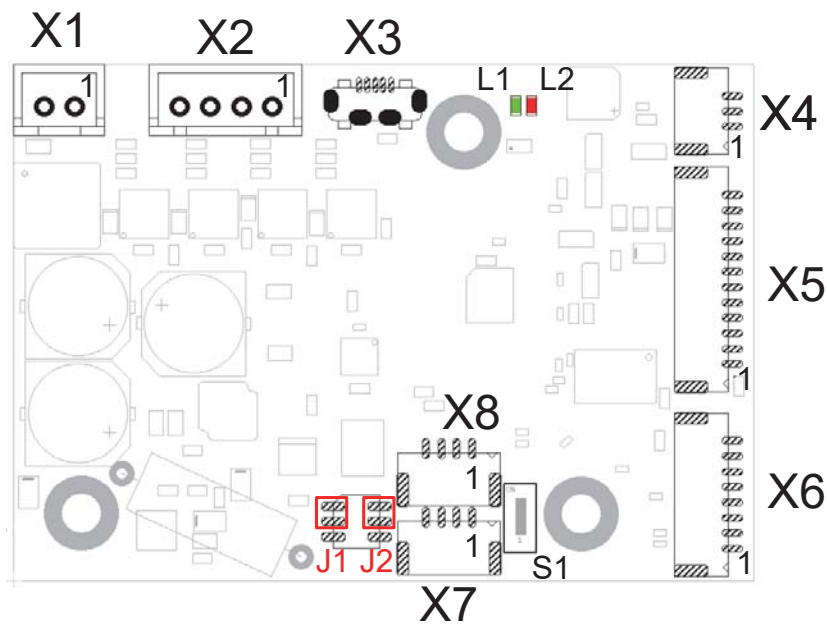
Connector	Function
X1	Voltage supply
X2	Motor connection
X3	Micro USB
X4	RS-232 connection
X5	Digital/analog inputs and outputs
X6	Encoder/Hall sensor
X7	CANopen / RS-485 IN
X8	CANopen / RS-485 OUT
S1	Switch for 120 ohm termination resistor
J1	Jumper: switches between CAN_L or RS-485-
J2	Jumper: switches between CAN_H or RS-485+
L1	Status LED green
L2	Status LED red

3.6.2 Connector X1 - voltage supply

Voltage source

The operating or supply voltage supplies a battery, a transformer with rectification and filtering, or a switching power supply.
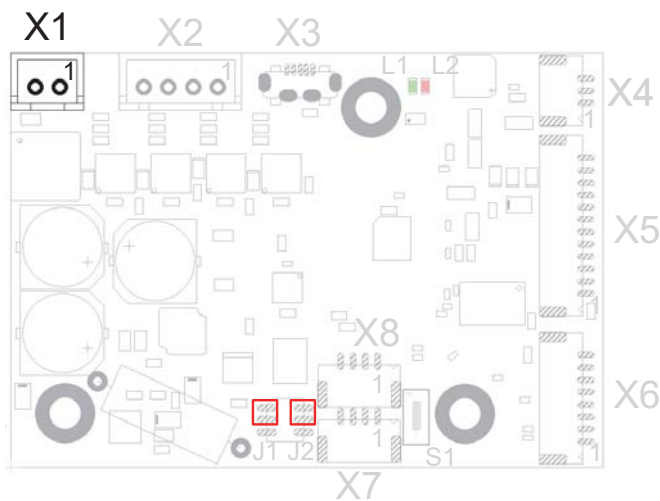
Note

ℹ️
- EMC: For a DC power supply line longer than 30 m or when using the motor on a DC bus, additional interference-suppression and protection measures are necessary.
- An EMI filter is to be inserted in the DC supply line as close as possible to the controller/motor.
- Long data or supply lines are to be routed through ferrites.

Connections

Connector type: JST XH

In the following figure, pin 1 is marked with a "1".

PIN	Function	Note
1	+UB	12 V - 24 V ±5%
2	GND	

Permissible operating voltage

The maximum operating voltage is 28.5 V DC. If the input voltage of the controller exceeds this threshold value, the motor is switched off and an error triggered. Above 27.5 V, the integrated ballast circuit (3 W power) is activated.

The minimum operating voltage is 10 V DC. If the input voltage of the controller falls below this threshold value, the motor is switched off and an error triggered.

A charging capacitor of at least 4700 µF / 50 V (approx. 1000 µF per ampere rated current) must be connected to the supply voltage to avoid exceeding the permissible operating voltage (e.g., during braking).

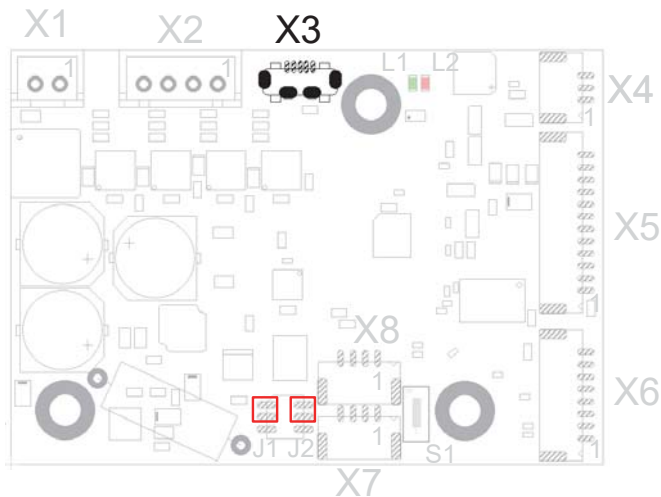## 3.6.3 Connector X2 – motor connection

Connector type: JST XH

In the following figure, pin 1 is marked with a "1".
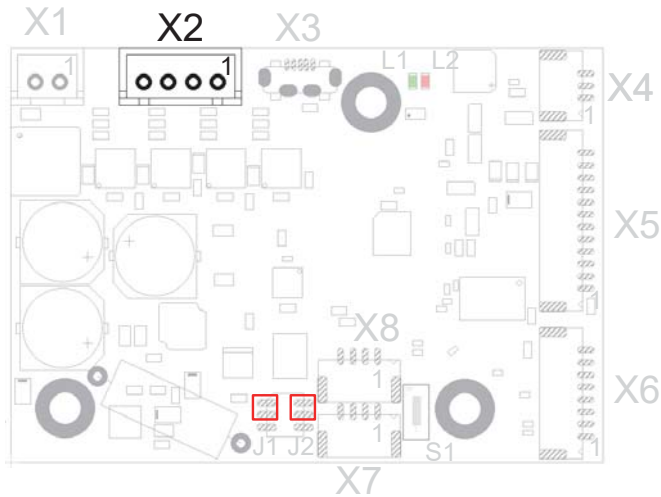
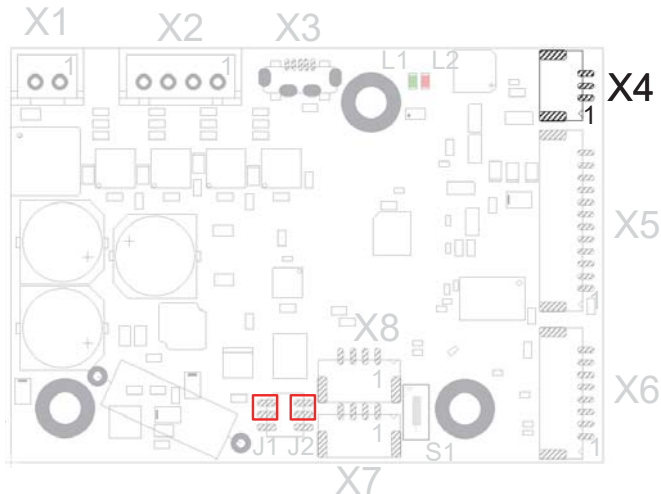| PIN	Function (stepper motor)	Function (BLDC)
1	A	U
2	A\	V
3	B	W
4	B\	Not used

3.6.4 Connector X3 – micro USB

3.6.5 Connector X4 – RS-232 connection

Connector type: JST GH
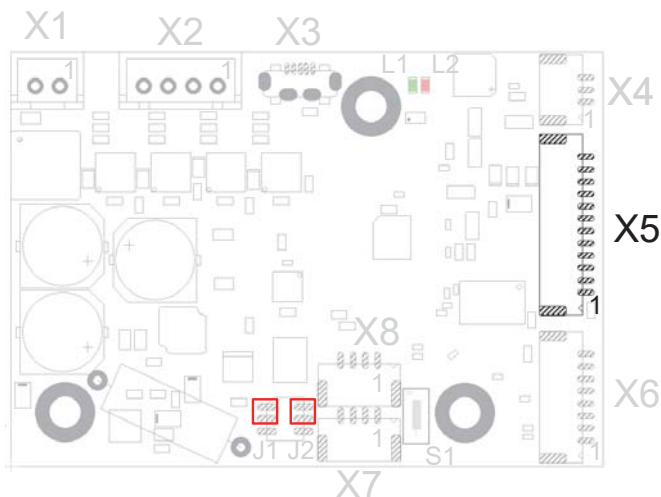
In the following figure, pin 1 is marked with a "1".

PIN	Function	Note
1	RS-232-RX	
2	RS-232-TX	
3	GND	

3.6.6 Connector X5 – digital/analog inputs and outputs

Connector type: JST GH

In the following figure, pin 1 is marked with a "1".

| PIN	Function	Note
1	+10 V DC	Output voltage, max. 200 mA
2	Digital input 1	5 V signal, max. 1 MHz
3	Digital input 2	5 V signal, max. 1 MHz
4	Digital input 3	5 V signal, max. 1 MHz ("direction" in clock-direction mode)
5	Digital input 4	5 V signal, max. 1 MHz ("clock" in clock-direction mode)
6	Digital input 5	5 V signal, max. 1 MHz

PIN	Function	Note
7	Analog input 1	10 bit, 0-10 V or 0-20 mA, switchable by means of software with object **3221**$_h$, default setting: 0-10 V
8	Analog input 2	10 bit, 0-10 V, not switchable by means of software
9	Digital output 1	Open drain, max. 24 V/100 mA
10	Digital output 2	Open drain, max. 24 V/100 mA
11	Digital output 3	Open drain, max. 24 V/100 mA
12	GND	

The following switching thresholds apply for inputs 1 to 5:

Switching thresholds	
On	**Off**
> approx. 3 V	< approx. 1 V

The current consumption is approximately 0.4 mA. The following internal circuit diagram applies for the digital inputs:
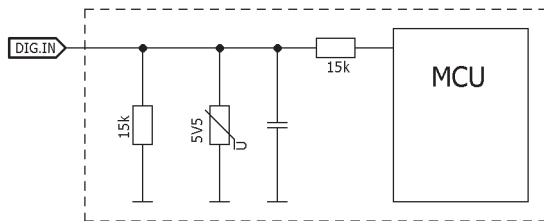
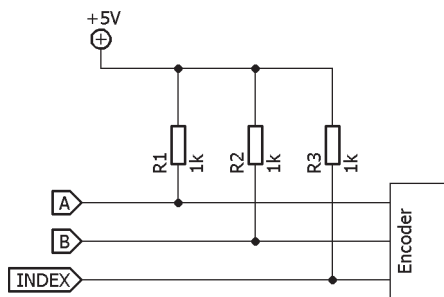### 3.6.7 Connector X6 – encoder/Hall sensor

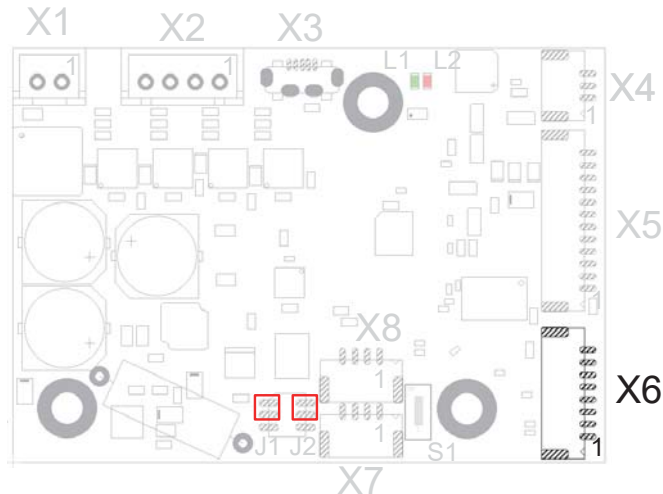| **Note** |
|---|
| The controller with hardware version W004b does **not** function with the following encoders without additional wiring (see below): |

- WEDS5541
- WEDS5546
- HEDS5540

With these encoders, a PULL-UP resistor must be connected to 5 V on cables A, B and INDEX.

Connector type: JST GH

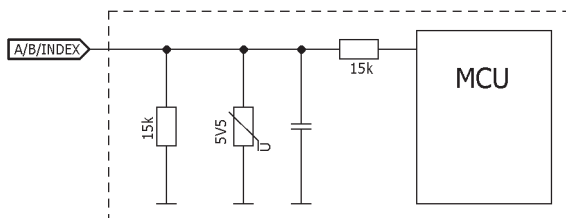In the following figure, pin 1 is marked with a "1".

PIN	Function	Note
1	+5 V DC	Supply voltage for encoder/Hall sensor, max. 200 mA
2	A	5 V signal, max. 1 MHz
3	B	5 V signal, max. 1 MHz
4	Index	5 V signal
5	H1	5 V signal, max. 1 MHz
6	H2	5 V signal, max. 1 MHz
7	H3	5 V signal, max. 1 MHz
8	GND	

The following switching thresholds apply for the encoder inputs:

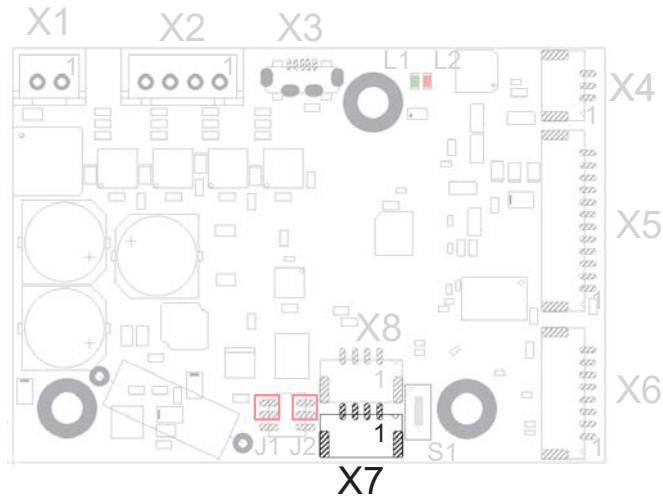| Switching thresholds	
Safe switch on	**Safe switch off**
> approx. 2.8 V	< approx. 1.1 V

The internal wiring of the encoder inputs is shown in the following.

3.6.8 Connector X7 – CANopen/RS-485 IN

Connector type: JST GH

In the following figure, pin 1 is marked with a "1".

PIN	CANopen function	RS-485 function	Note
1	+UB Logic	+UB Logic	24 V DC input, external logic supply for communication, input voltage, current consumption approx. 36 mA
2	CAN+	RS-485+	The changeover is performed via jumper J2.
3	CAN-	RS-485-	The changeover is performed via jumper J1.
4	GND	GND	

> **Note**
>
> The windings of the motor are not supplied by the logic supply.
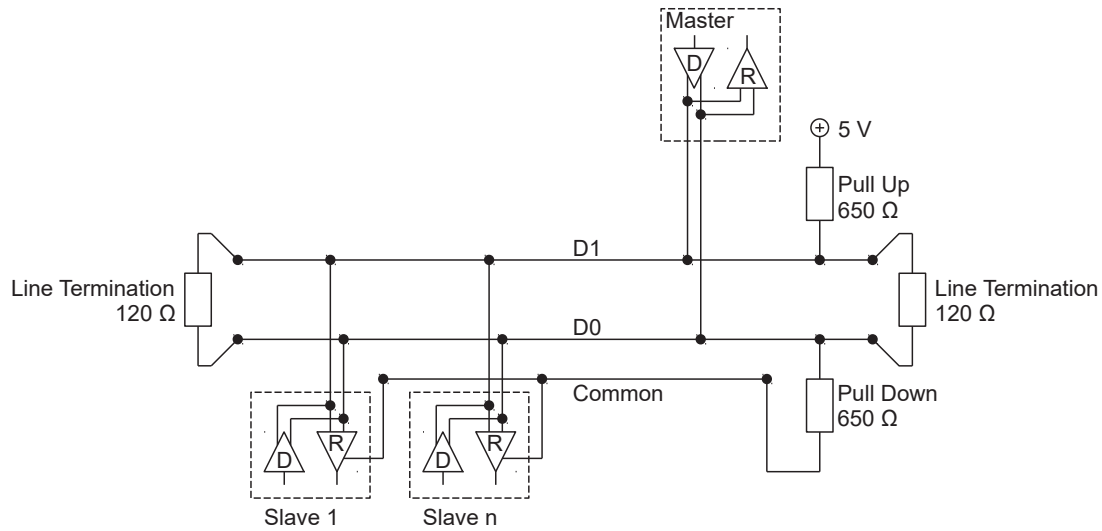
RS-485 line polarization

> **Note**
>
> The controller is **not** equipped with line polarization and expects the master device to have one.

If the master device on the bus does not have line polarization of its own, a pair of resistors must be attached to the RS-485 balanced cables:

- A pull-up resistor to a 5V voltage on the RS-485+ (D1) cable
- A pull-down resistor to earth (GND) on the RS-485- (D0) cable

The value of these resistors must be between 450 ohm and 650 ohm. A 650 ohm resistor permits a higher number of devices on the bus.
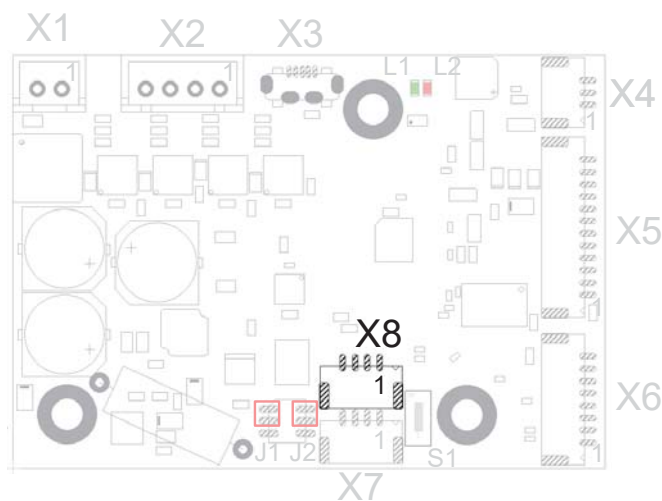
In this case, a line polarization must be attached at a location for the entire serial bus. In general, this location should be on the master device or its connection. All other devices then no longer need to implement line polarization.

3.6.9 Connector X8 – CANopen/RS-485 OUT

Connector type: JST GH

In the following figure, pin 1 is marked with a "1".

PIN	CANopen function	RS-485 function	Note
1	+UB Logic	+UB Logic	24 V DC input, external logic supply for communication, input voltage, current consumption approx. 36 mA
2	CAN+	RS-485+	The changeover is performed via jumper J2.
3	CAN-	RS-485-	The changeover is performed via jumper J1.
4	GND	GND	

Note

The windings of the motor are not supplied by the logic supply.

RS-485 line polarization
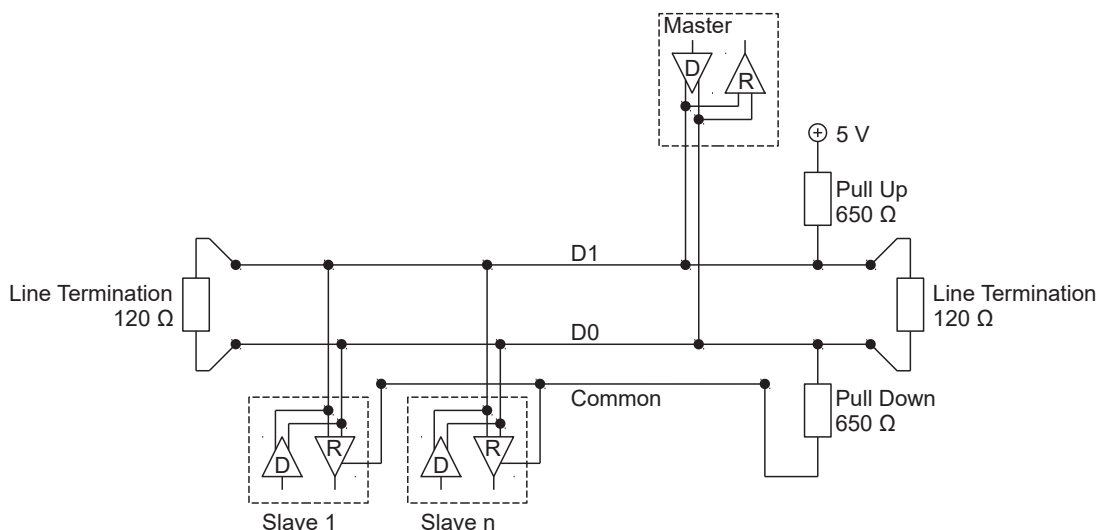
ⓘ	**Note**
	The controller is **not** equipped with line polarization and expects the master device to have one.

If the master device on the bus does not have line polarization of its own, a pair of resistors must be attached to the RS-485 balanced cables:

• A pull-up resistor to a 5V voltage on the RS-485+ (D1) cable
• A pull-down resistor to earth (GND) on the RS-485- (D0) cable

The value of these resistors must be between 450 ohm and 650 ohm. A 650 ohm resistor permits a higher number of devices on the bus.

In this case, a line polarization must be attached at a location for the entire serial bus. In general, this location should be on the master device or its connection. All other devices then no longer need to implement line polarization.
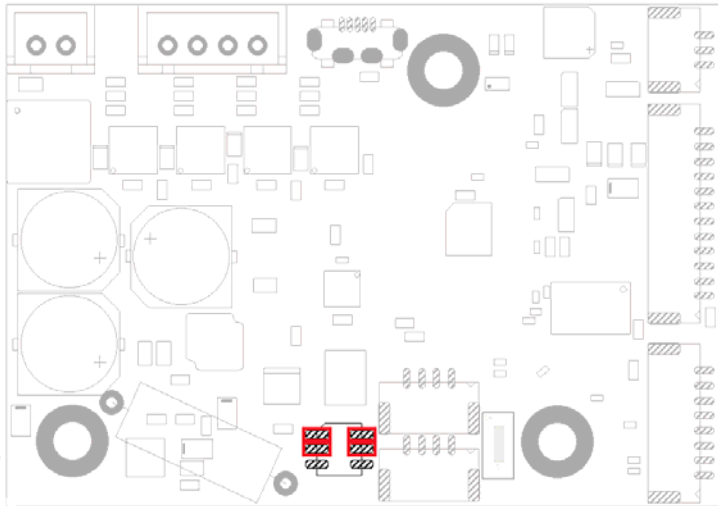

3.6.10 Switch S1 – Termination resistor
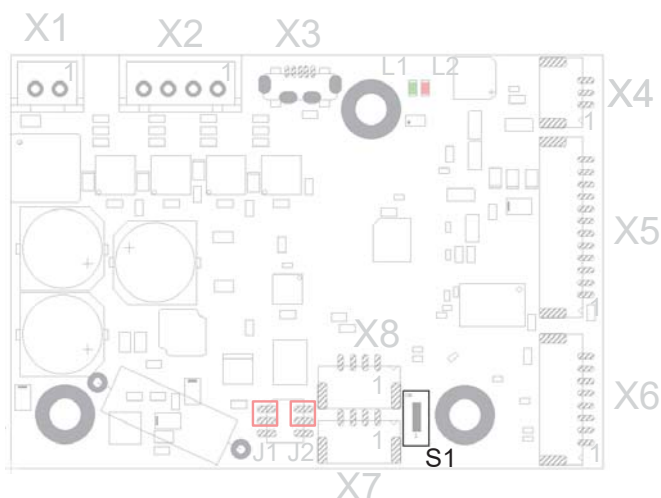
A termination with 120 ohm between CAN+ and CAN- or RS-485- and RS-485+ can thereby be switched on or off.

3.6.11 Jumper J1/J2

With these jumpers, it is possible to change between CANopen or RS-485.

RS-485 setting

To use the RS-485 bus, jumpers J1 and J2 must be plugged in facing the middle of the board (see following figure).

CANopen setting

To use the CANopen bus, jumpers J1 and J2 must be plugged in facing the edge of the board (see following figure).