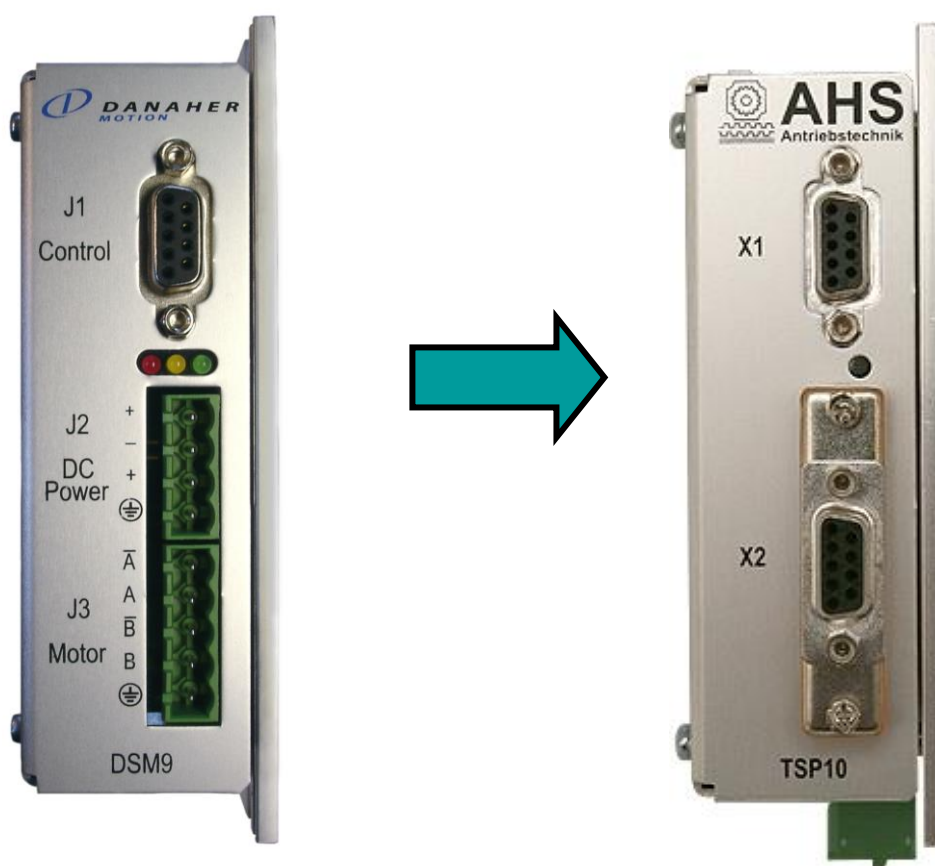


# Application Note

## Change from DSM9-SD to TSP10-BA



- Technical Data
- Connection/ Configuration
- Adjustment values

## Types of device

DSM9-SD-03 is replaced by the TSP10-BA0-00-09 (5V-Version)

DSM9-SD-01 is replaced by the TSP10-BA0-24-09 (24V-Version)

## Technical data

	<b>DSM9-SD</b>	<b>TSP10-BA</b>
<b>Supply voltage range</b>	24 - 80 V <sub>DC</sub>	24 - 74 V <sub>DC</sub>
<b>Motor current</b> <b>Number of selectable values</b>	0.4 bis 6.4 A <sub>rms</sub> 32	0.2 bis 7.0 A <sub>rms</sub> 16*
<b>Permissible ambient temperature</b> <b>Operation</b> <b>Storage</b>	0 °C to +50 °C -55 °C to +70 °C	0 °C to +50 °C -55 °C to +70 °C
<b>Motor current @ ambient temperature</b> <b>without heat sink</b> <b>with heat sink</b>	3.1 A @ 25 °C 1.5 A @ 45 °C 6.4 A @ 25 °C 3.1 A @ 45 °C	3.2 A @ 25 °C 1.6 A @ 45 °C 7.0 A @ 25 °C 3.5 A @ 45 °C
<b>Permissible heat sink temperature</b> <b>(forced cooling may be necessary)</b>	Max. 60 °C	Max. 60 °C
<b>Humidity</b>	10-90 %, non-condensing	10-90 %, non-condensing
<b>Fault protection</b>	Short circuit (phase to phase, phase to zero conductor) and over temperature	Short circuit (phase to phase, phase to zero conductor) and over temperature
<b>Idle current reduction</b>	off after 0.05 s after 0.1 s after 1.0 s	off - * after 0.1 s - *
<b>Input interface</b>	Step and direction	Step and direction RS232
<b>Max. input frequency</b>	500 kHz	500 kHz
<b>Chopper frequency of power stage</b>	20 kHz	20 kHz
<b>Adjustable step resolution</b>	200 to 25600	200 to 10000*
<b>Operation lights</b>	three LEDs red, yellow, green	Two-Colour-LED

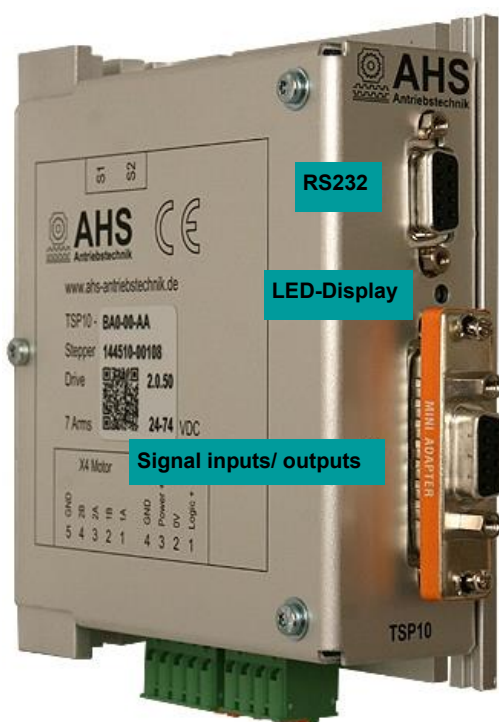
\* set additional values via the RS232 interface

## Connection and adjustment

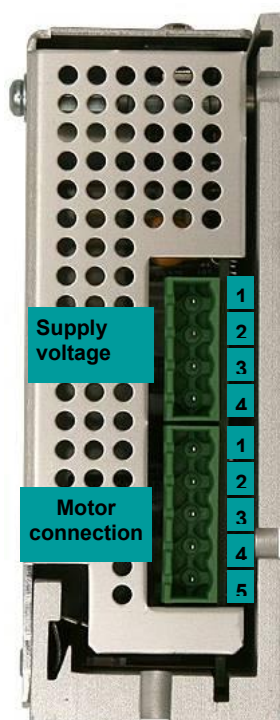
The design and signal assignment of the connectors for power supply and motor current are identical to DSM9-SD.

Because of the B9/S25-serial adapter this applies also to the signal inputs / outputs.

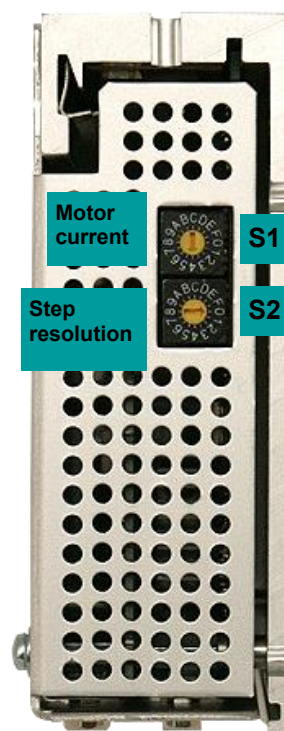
	DSM9-SD	TSP10-BA
<b>Supply voltage</b>	Front side, FKCT 2.5/4-ST	Bottom side, FKCT 2.5/4-ST
<b>Motor connection</b>	Front side, FKCT 2.5/5-ST	Bottom side, FKCT 2.5/5-ST
<b>Signal inputs/ outputs</b>	Front side, Sub-D-socket 9p	Front side, Sub-D-Socket 9p (B9/S25-Seriell-Adapter), 57259
<b>Step resolution/ motor current</b>	Upper side, DIP-switch 8p	Upper side, 2x Hex-rotary switch
<b>Jumper</b>	Inside the device	-
<b>RS-232 Interface</b>	-	Front side, Sub-D-Socket 9p
<b>When using heat sink</b>	Mounting with 4 screws	Mounting with 3 screws



Front side



Bottom side



Top side

## Adjustment

The setting of motor current, the step resolution and the current reduction is done at TSP10-BA with two rotary switches (S1 = motor current, S2 = step resolution and current reduction). This type of parameter setting is less complex and easier to handle than the setting with dip switches and jumpers.

Comparative tables – rotary switch settings to DIP switch settings - will be omitted. The settings for the two rotary switches (S1, S2) can be taken from the tables below.

## Motor current

The motor current is set with rotary switch S1 according to the following table:

Switch S1 Position	Motor current [A <sub>rms</sub> ]
0**	0.2**
1	0.4
2	0.7
3	1.0
4	1.5
5	2.0
6	2.5
7	3.0
8	3.5
9	4.0
A	4.5
B	5.0
C	5.5
D	6.0
E	6.5
F	7.0

**\*\*Switch S1 to position 0 = factory set-up.**

For the switch position 0, the motor current is a preset value. This value can be modified and saved in the TSP10-BA with the set-up program "TopSuite".

Values range: 0 ... 7.0 A<sub>rms</sub>

**Step resolution / Idle current reduction**

With the rotary switch for the step resolution (S2), also the delay time for the current reduction is set. The motor current is reduced to 50% after the delay time expires (position 0...7). No current reduction is done for the switch positions 8 to F.

S2 Position 0 ... 7 idle time = 0.1 Second, Idle Current Reduction to 50 %  
 S2 Position 8 ... F no current reduction

Switch S2 position	Revolutions per steps (parts of a full step)	Idle time	Current reduction
0**	10000 (1/50)	100 ms	50 %
1	200 (1/1 = full step)	100 ms	50 %
2	400 (1/2 = half step)	100 ms	50 %
3	500 (1/2,5)	100 ms	50 %
4	800 (1/4)	100 ms	50 %
5	1000 (1/5)	100 ms	50 %
6	2000 (1/10)	100 ms	50 %
7	5000 (1/25)	100 ms	50 %
8***	10000 (1/50)	-	100 %
9	200 (1/1 = full step)	-	100 %
A	400 (1/2 = half step)	-	100 %
B	500 (1/2.5)	-	100 %
C	800 (1/4)	-	100 %
D	1000 (1/5)	-	100 %
E	2000 (1/10)	-	100 %
F	5000 (1/25)	-	100 %

\*\* Switch S2 to Position 0 = factory set-up.

\*\*\* same step resolution as position 0, but without current reduction.

Step resolution, delay time and current reduction values are preset for the switch position 0. These values can be modified and saved in the TSP10-BA using the set-up program "TopSuite". The value for the step resolution will also be transmitted to the switch position 8.

Step resolution: 200 ... 25600 (Value must be divisible by 50)  
 Idle time: 1 ... 3000 ms  
 Current reduction: 0 % ... 100% at nominal value

## Enable signal

At step motor control DSM9-SD the enable signal input can be configured. This can be used, for example, to activate the step motor control after switching-on without establishing an enable input.

J6 bridge 5-6 set: enable = optocoupler on

J6 bridge 5-6 drawn: enable = optocoupler off

At the step motor control TSP10-BA, the sense of enable signal input cannot be configured.

Enable = optocoupler on

The enable input is disabled at factory set-up, means the step motor control TSP10-BA is directly active after turning on power.

Using the set-up program "TopSuite" the enable input can be turned on and this setting can be saved in the TSP10-BA. In this case an enable signal is required (opto-coupler on) to activate the stepper motor controller.

## Operation lights

DSM9-SD: three LEDs (red, yellow, green).

TSP10-BA: a single two-colour-LED.

By the two-colour-LED displays you find the following information:

LED-Display	Description/ Notes
Green, blinking	After turning on the TSP10-BA, the firmware version is indicated as a blinking code. e.g., 1x blinking, stop period, 2x blinking = version 1.2
Orange, briefly on, repeated after 3 s.	TSP10-BA powered on but not enabled
Green, permanently on	Motor current on, motor stopped
Orange, blinking	Motor current on, motor is running
Red, blinking	TSP10-BA turned off because of an error. The blinking codes indicates the type of error. 4 x blinking = over temperature 7 x blinking = over current

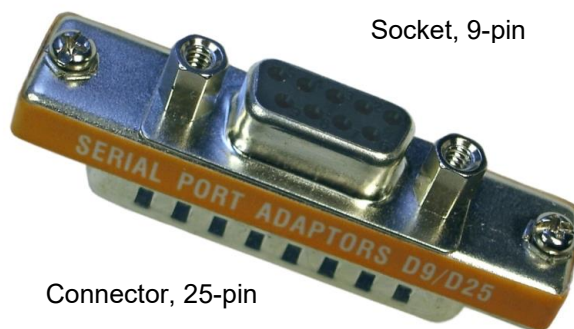
**Pin-out**

<b>Power supply</b>		
<b>Terminal No.</b>	<b>Line</b>	<b>Description/ Notes</b>
1	Logic +	+24 ... +74 Volt
2	0 Volt	Ground this connection externally
3	Power +	+24 ... +74 Volt, max. 7 A
4	Grounding	Connected with the case in the device

<b>Motor connection</b>		
<b>Terminal No.</b>	<b>Line</b>	<b>Description/ Notes</b>
1	1-A	motor phase 1-A
2	1-/A	motor phase 1-/A
3	2-B	motor phase 2-B
4	2-/B	motor phase 2-/B
5	Grounding	Connect with the motor case

<b>Signal input/ output (with B9/S25-Serial-Adapter)</b>		
<b>Terminal No.</b>	<b>Signal</b>	<b>Description/ Notes</b>
1	Clock +	Clock pulse input, 1 clock puls = 1 step
2	Direction +	Input to control the direction of motor rotation
3	Enable +	TSP10 factory set-up: Signal without function
4	Activated (Collector)	Transistor turned on at activated motor current
5	Not connected	
6	Clock -	Clock pulse input, 1 clock puls = 1 step
7	Direction -	Input to control the direction of motor rotation
8	Enable -	TSP10 factory set-up: Signal without function
9	Activated (Emitter)	Transistor turned on at activated motor current
Housing	Shield	Use shielded cable

<b>B9 to S25 Serial-Adapter part number: 57259</b>	
<b>B9 Pin No.</b>	<b>S25 Pin No.</b>
1	8
2	3
3	2
4	20
5	7
6	6
7	4
8	5
9	22



Socket, 9-pin

Connector, 25-pin

**Note:**

The serial adapter is only used to convert the signal allocation to the DSM9-SD pin-out.  
Do not confuse with the serial interface for the set-up program "TopSuite"!

**Advanced connectivity****Serial interface**

Serial interface for the set-up program "TopSuite".

For connecting one 1:1 cable with connector and socket is needed (AHS part number KAB-TSP-232).

<b>Serial Interface (no galvanic isolation)</b>		
<b>Terminal No.</b>	<b>Signal</b>	<b>Description/ Notes</b>
1	DCD	Indicates the connection with the device
2	TXD	Send Data
3	RXD	Received Data
4	DTR	not used
5	GND	Common for all signals

**Signal input/ output**

Additional input and output signals are available without B9/S25 serial adapters. The set-up program "TopSuite" is used to configure of the signal functions.

<b>Signal input/ output (without B9/S25-Serial-Adapter)</b>		
<b>Terminal No.</b>	<b>Signal</b>	<b>Description/ Notes</b>
1	GND-DE	Reference potential for the inputs DE1 - DE10
2	Enable +	Release or activate the motor current
3	Direction +	Input to control the direction of motor rotation
4	Direction -	Input to control the direction of motor rotation
5	Enable -	Enable or disable the motor current
6	Clock -	Clock pulse input, 1 pulse = 1 step
7	GND-DA	Reference potential of the outputs DA1 - DA4
8	Clock +	Clock pulse input, 1 pulse = 1 step
9	DE1	Digital Input
10	DE2	Digital Input
11	DE3	Digital Input
12	DE4	Digital Input
13	DE5	Digital Input
14	DE6	Digital Input
15	DE7	Digital Input
16	DE8	Digital Input
17	DE9	Digital Input
18	DE10	Digital Input
19	5 - 24 V external	Collectors of the output transistors for DA1 - DA4
20	Activated (collector)	Transistor turned on at activated motor current
21	DA1	Digital Output (Emitter)
22	Activated (emitter)	Transistor turned on at activated motor current
23	DA2	Digital Output (Emitter)
24	DA3	Digital Output (Emitter)
25	DA4	Digital Output (Emitter)
Case	Shielding	Use shielded cable

## Definition of signal inputs/ outputs

All signal inputs and outputs are opto-isolated.

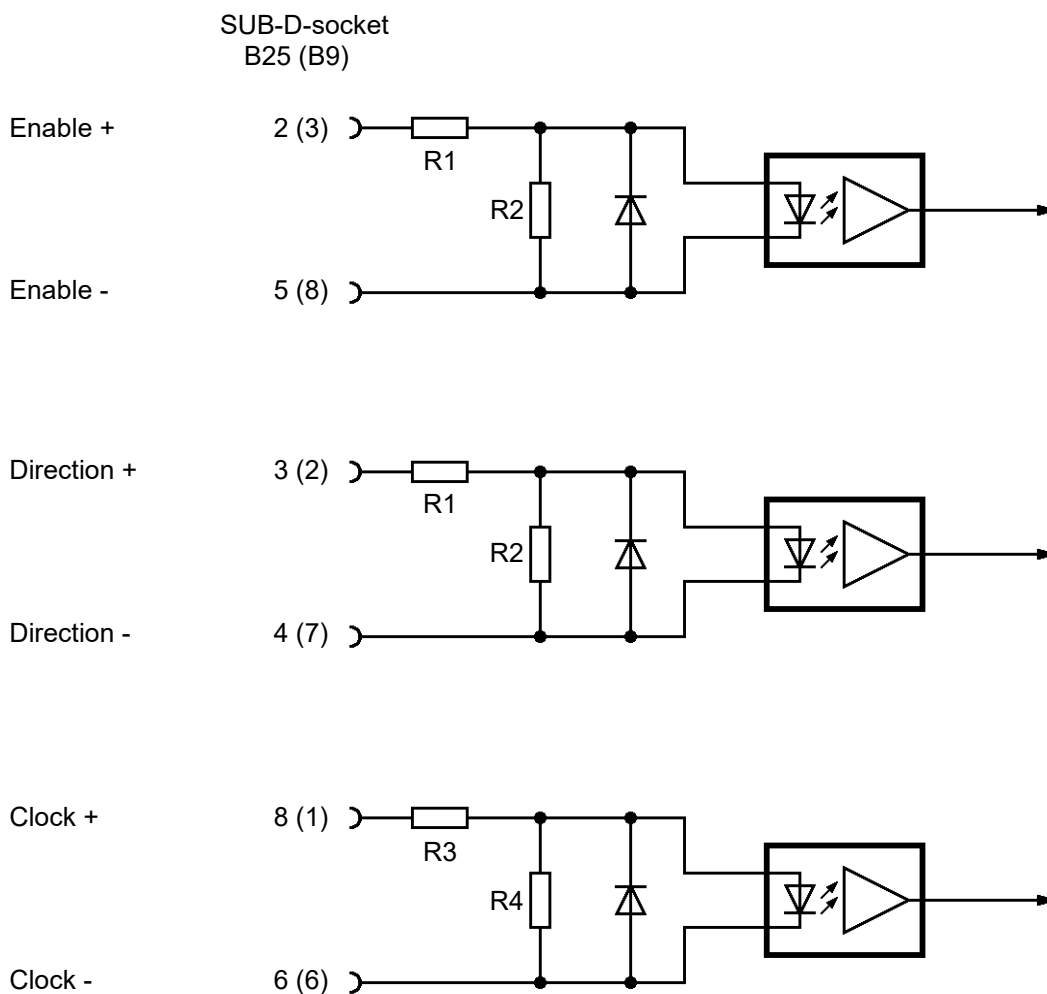
The input/output schematics shown below are used to explain the principle I/O-function.

The actual circuit design may differ in detail.

The port numbers refer to the 25-pin SUB D socket on the TSP10-SD.

The values in parentheses ( ) are the port numbers of the 9 pin SUB D socket when using the B9/S25 serial adapter to convert to the DSM9-SD pin-out.

## DSM9-SD-compatible signal input

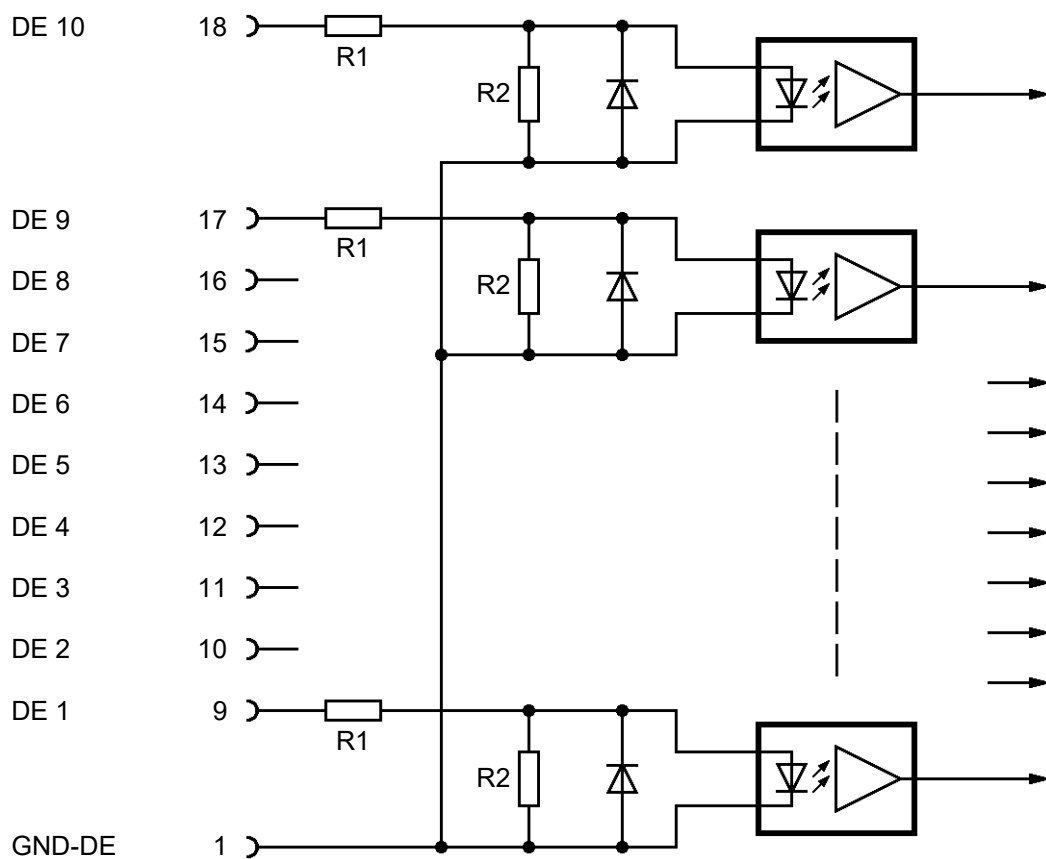


	5 Volt-Input	24 Volt-Input
<b>R1</b>	330 Ohm	2.53 KOhm
<b>R2</b>	1 KOhm	1 KOhm
<b>R3</b>	470 Ohm	2.67 KOhm
<b>R4</b>	1 KOhm	1 KOhm

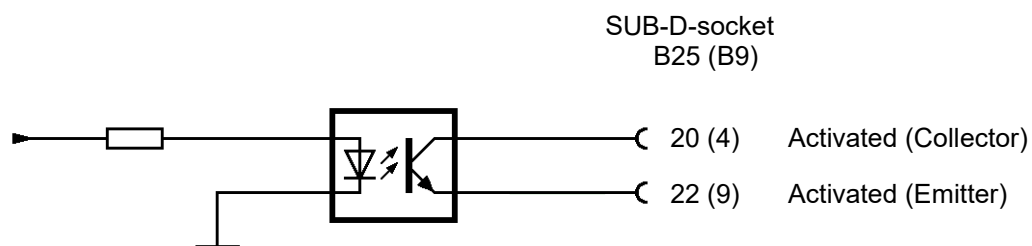
**Further signal input / 25-pin SUB-D-socket**

(Only available without B9/S25-Serial-Adapter)

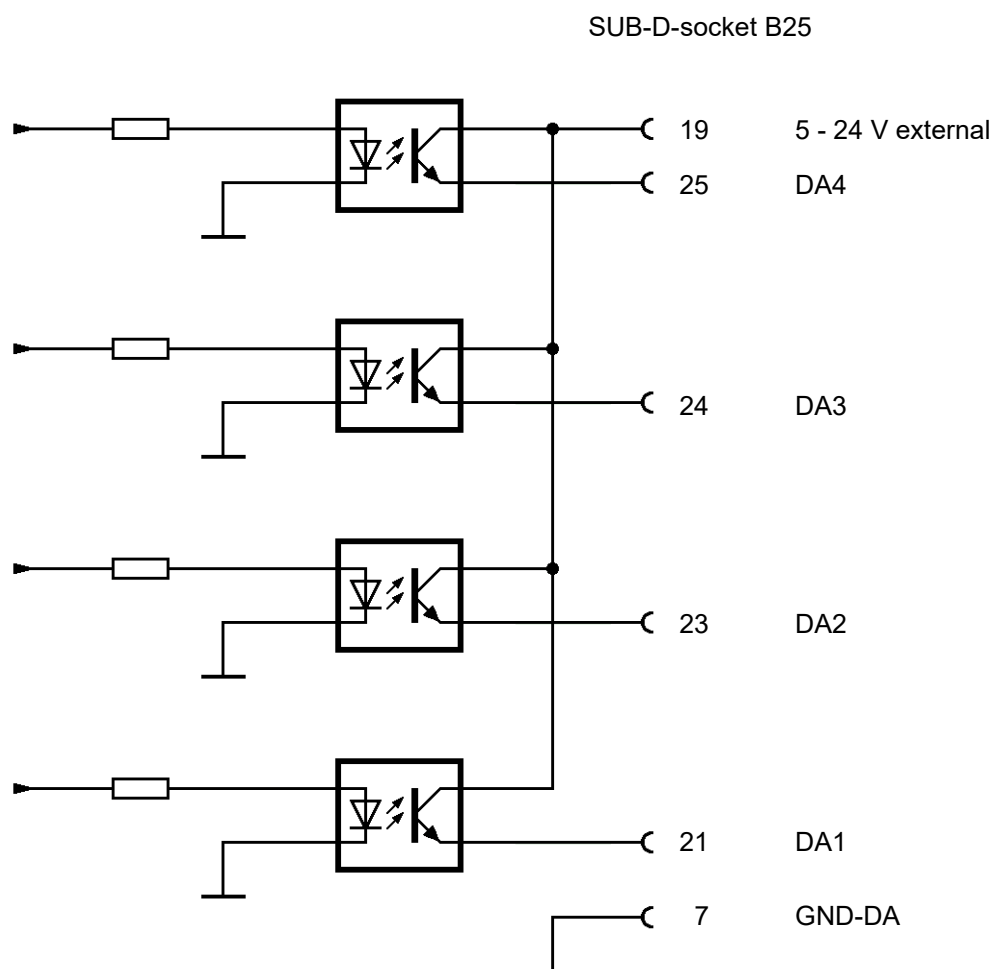
SUB-D-socket B25

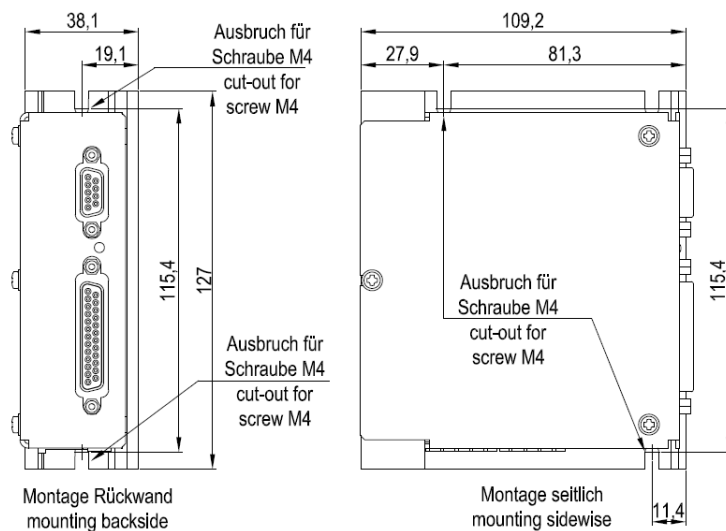


	5 Volt-Input	24 Volt-Input
<b>R1</b>	330 Ohm	2.53 KOhm
<b>R2</b>	1 KOhm	1 KOhm

**DSM9-SD-compatible signal output****Further signal output / 25-pin SUB-D-socket**

(Only available without B9/S25-Serial-Adapter)



**Dimensions**

All dimensions in mm

**Ordering code**

TSP10-BA0-00-09 = Replacement for DSM9-SD-03 (5V-Version)

TSP10-BA0-24-09 = Replacement for DSM9-SD-01 (24V-Version)

**TSP10 Type code**

T	S	P	1	0	-	B	A	0	-	0	0	-	A	A
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Drive Series

Max. Output Power = 10 A<sub>peak</sub>

Basic Device (Step &amp; Direction, RS232) .....

Profibus .....

Profinet .....

Analog (+/- 10 Volt) .....

ModBus .....

CAN-Bus .....

BA

PB

PN

AN

MB

CB

Standard (no feedback) .....

0

Encoder RS422/TTL .....

E

Encoder HTL .....

H

Encoder Biss-C .....

C

Digital Inputs = 24V; Step &amp; Direction = 5V..... 00

Digital Inputs = 5V; Step &amp; Direction = 5V..... 05

Digital Inputs = 24V; Step &amp; Direction = 24V.... 24

Standard ..... AA

Customization ..... XX

Follow up identifier DSM9... 09

Note: Not all combinations of the type code are possible.