

# Application Note

## TSP10-BA



- **Technical Data**
- **Connection/ Configuration**
- **Adjustment values**

## Types of device

TSP10-BA0-00-AA (5V-Version)  
TSP10-BA0-24-AA (24V-Version)

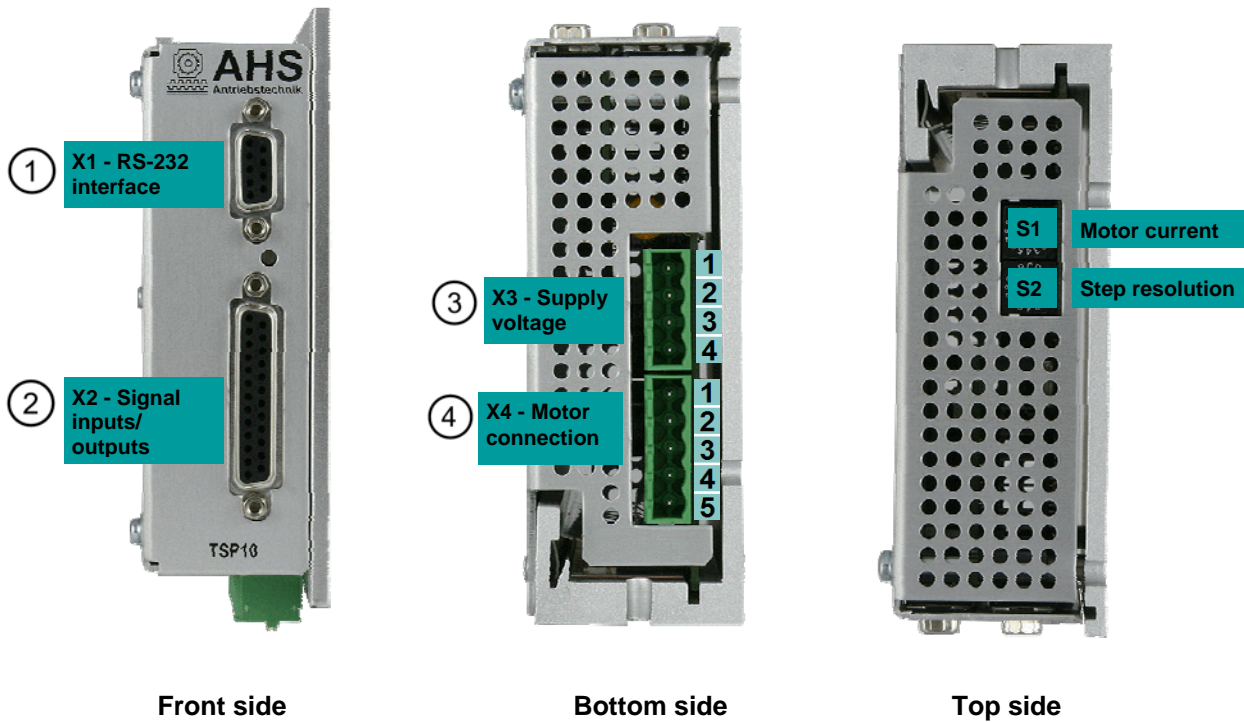
## Technical data

Supply voltage	24 - 74 V <sub>DC</sub>
Motor current Number of selectable values	0,2 at 7,0 A <sub>rms</sub> 16*
Motor current @ ambient temperature without heat sink	3,2 A @ 25 °C 1,6 A @ 45 °C
with heat sink	7,0 A @ 25 °C 3,5 A @ 45 °C
Permissible heat sink temperature	max. 60 °C (forced cooling may be necessary)
Permissible ambient temperature Operation Storage	0 °C to +50 °C -55 °C to +70 °C
Humidity	10-90 %, non condensing
Chopper frequency of power stage	20 kHz
Input signals	Step Direction Enable DE1 ... DE10 (customisable)*
Input interface	RS232
Output signals	Enabled DA1 ... DA4 (customisable)*
Idle current reduction	off (motor current always on 100%) after 0,1 s to 50% after 1 ... 3000 ms (adjustable)* at 0 ... 100% (adjustable)*
Max. input frequency	500 kHz
Adjustable step resolution	200 to 10000*
Preset numbers of steps	200, 400, 500, 800, 1000, 2000, 5000, 10000
Operation lights	Two-Colour-LED
Fault protection	Short circuit (phase to phase, phase to zero conductor) and over temperature

\* set additional values via the RS232 interface

Connection and adjustment

No.	Connection	Position and construction
1	RS-232 interface	X1, front side, Sub-D-Socket 9p
2	Signal inputs and outputs	X2, front side, Sub-D-Socket 25p
3	Supply voltage	X3, bottom side, FKCT 2.5/4-ST
4	Motor connection	X4, bottom side, FKCT 2.5/5-ST



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. The settings for the two rotary switches (S1, S2) can be taken from the tables below.

Motor current - with the set-up program

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>

Motor current - without the set-up program

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

S1 Position	0*	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Motor current	0,2*	0,4	0,7	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0	5,5	6,0	6,5	7,0

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

### Step resolution / Idle current reduction - with the set-up program

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

All values may be independently set.

### Step resolution / Idle current reduction - without the set-up program

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.

## Enable signal

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 (optocoupler on) to activate the stepper motor controller.

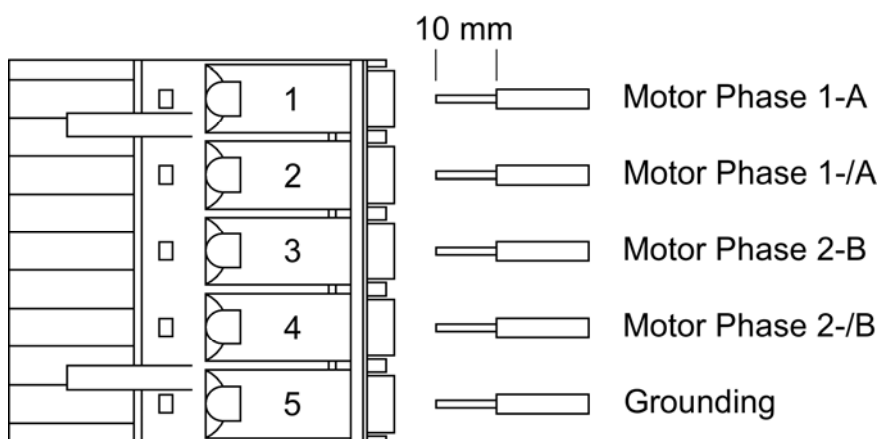
## Operation lights

LED-Display	Description/ Notes
Green, blinking	After powering on the TSP10-BA, the firmware version is indicated as a blinking code. e.g., 1x blinking, break; 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

X3 - Supply voltage		
Terminal No.	Line	Description/ Notes
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

X4 – Motor connection		
Terminal No.	Line	Description/ Notes
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



*Motor cable plug*

## 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).

X1 – Serial interface (no galvanic isolation)		
Terminal No.	Signal	Description/ Notes
1	DCD	Indicates the connection with the device
2	TXD	Send Data
3	RXD	Received Data
4	DTR	Not used
5	GND	Reference potential for all signals

## Signal inputs and outputs

The set-up program "TopSuite" is used to configure of the signal functions.

X2 - Signal inputs and outputs		
Terminal No.	Signal	Descriptions/ Notes
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 -	Release or activate the motor current
6	Clock -	Clock pulse input, 1 clock puls = 1 step
7	GND-DA	Reference potential of the outputs DA1 - DA4
8	Clock +	Clock pulse input, 1 clock puls = 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

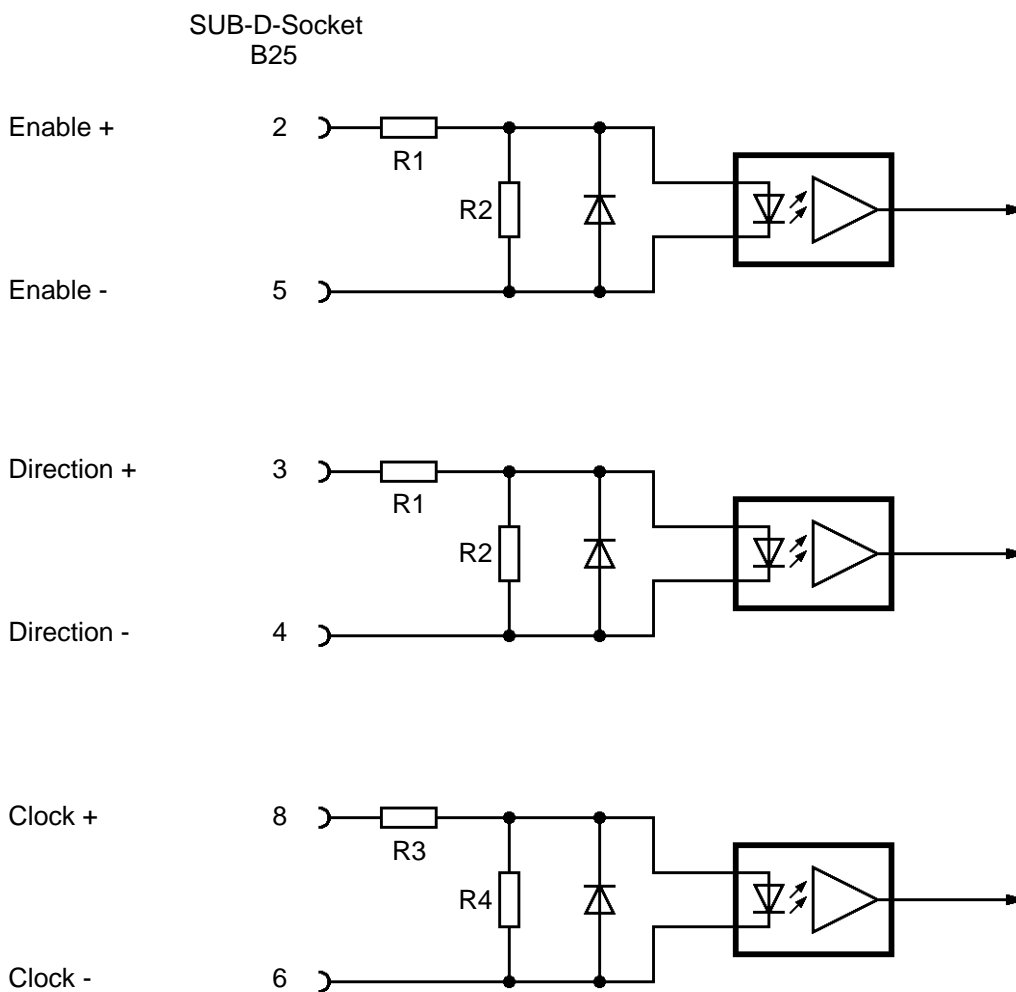
### Definition of signal inputs and outputs

There are two groups of signal inputs and outputs:

- signal inputs with two contacts/ signal outputs with two contacts
- signal inputs with common reference potential/ signal outputs with common reference potential

The factory setting of the signal inputs and outputs is set so that only the two contacts signal group is necessary to operate the TSP10 with step and direction signal. All signal inputs and outputs are opto-isolated and their function may be customised with the set-up program "TopSuite". The following pages show the wiring principle of the signal inputs and outputs, the actual implementation may deviate in details from the shown version.

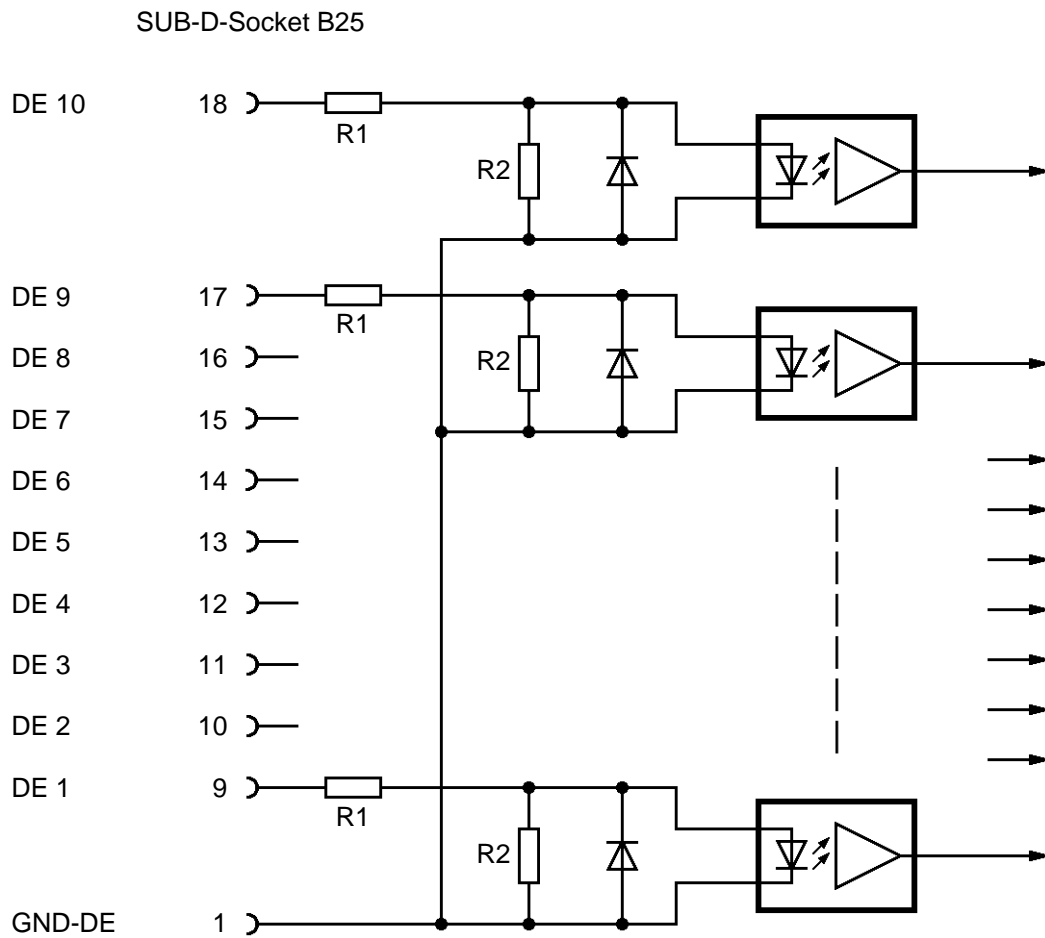
### Signal inputs with two contacts



	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

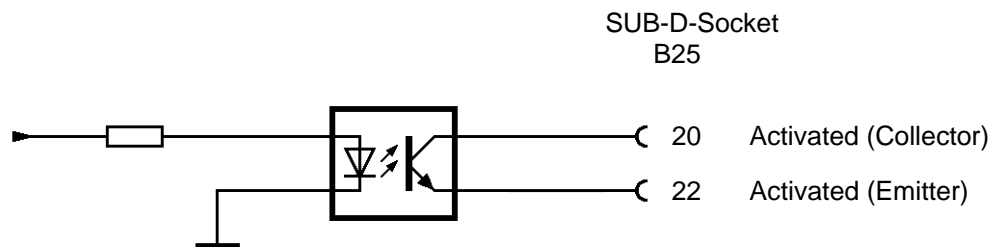


## Signal inputs with common potential

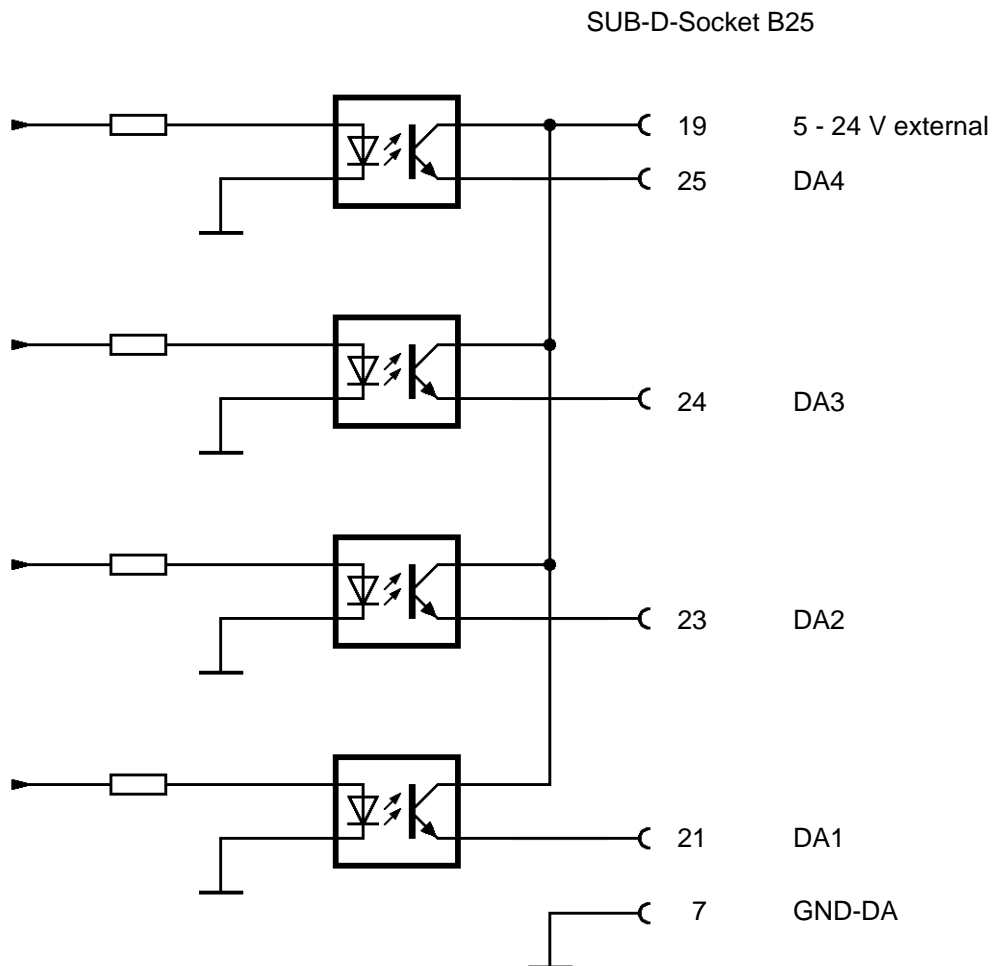


	5-volt input	24-volt input
<b>R1</b>	330 Ohm	2.53 KOhm
<b>R2</b>	1 KOhm	1 Kohm

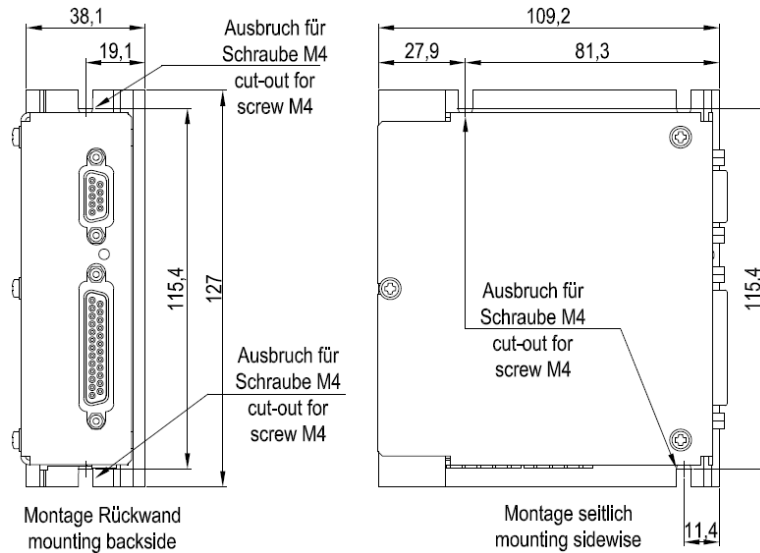
Signal outputs with two contacts



Signal outputs with common reference potential



Dimensions



All dimensions in mm

Ordering code

TSP10-BA0-00-AA = standard version of the basic device

TSP10 Type code

T	S	P	1	0	-	B	A	0	-	0	0	-	A	A
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Drive Series														
Max. Output Power = 10 A <sub>peak</sub>														
Basic Device (Step & Direction, RS232) .....						BA								
Profibus .....						PB								
Profinet (in preparation) .....						PN								
ModBus .....						MB								
CAN-Bus .....						CB								
Standard (no feedback) .....							0							
Encoder RS422/TTL .....							E							
Encoder HTL .....							H							
Encoder Biss-C .....							C							
Digital inputs = 24V; Step & Direction = 5V.....										00				
Digital inputs = 5V; Step & Direction = 5V.....										05				
Digital inputs = 24V; Step & Direction = 24V.....										24				
Standard .....													AA	
Customization .....													XX	
Follow up identifier DSM9...														09

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