



**SMART MOTOR DEVICES**

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**STEP MOTOR DRIVER  
SMD-4.2DIN ver.3**

***manual***  
**SMDDIN.42.V3.001**

**2023**



### 1. Product designation

Stepper motor driver SMD-4.2DIN ver.3 is an electronic device designed to operate with 2 or 4-phase stepper motor with maximum current per phase up to 4.2 Amp.

### 2. Functions and possibilities

- Pulse position control with standard logic signals «STEP», «DIR» and «ENABLE» is provided. Low level voltage is 0...1VDC and high level voltage is 5...12VDC (up to 24VDC on condition that additional current limiting resistances are used).
- Analog speed control is provided: using internal or external potentiometers or analog voltage signal 0..5VDC or 0..10VDC. The maximum frequency of the internal oscillator is 10 kHz. To select the signal range, a special jumper is provided on the circuit board of the driver. Rotation is started and stopped by pressing a button on the front panel or by the signal level at the input START/STOP.
- Monitoring of the drive state. Output «Fault» and LED indicator on the front panel are used to control the state of the driver.
- Motor phases current reduction by 50% in holding mode.

### 3. Technical characteristic

Table 1.

<b>Common characteristics:</b>	
Maximum output current per phase, Amp	4.2
Minimum output current per phase, Amp	2.7
Phase current setting increment, A	0.1
Microstepping	1/1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, 1/256
Power supply, VDC (stabilized)	12...48
Maximum overall dimensions, mm	116x100x23
<b>Inputs STEP, DIR, ENABLE, START/STOP</b>	
High voltage level, VDC	5...12 (24VDC on condition of using additional current limiting resistors)
Low voltage level, VDC	0...1
Inputs STEP, START/STOP resistance, kOhm, no less	3
Inputs DIR and ENABLE resistance, kOhm, no less	1
Input current of control input STEP, START/STOP, mA	1,4...4
Input current of control inputs DIR и ENABLE, mA	4...12
<b>Analog signal SPD</b>	
Control signal voltage range, V	0.1...5 or 0.1...10
Input resistance, kOhm, not less than	15
Input current, mA	1
<b>Output «FAULT» parameters</b>	
Signal type	Opto-coupler output
Maximum voltage, VDC	48
Maximum load current, mA	50
Resistance, Ohm, no more	15

**Environmental Conditions:**

Ambient Temperature: 0...+40°C

Humidity: 90% RH or less upon condition +25°C

Condensation and freezing: none

Pressure: 650...800 mm of mercury

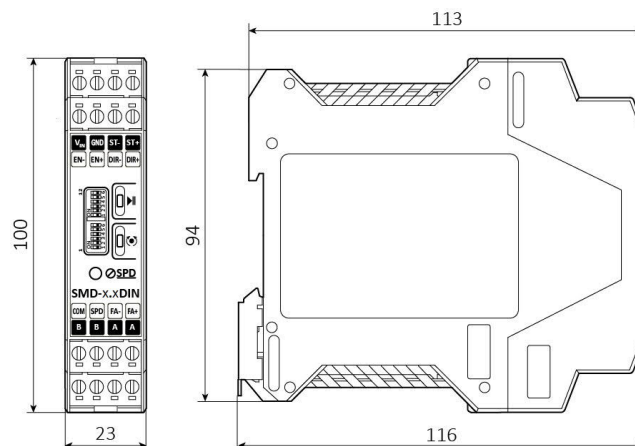


Fig. 1. Dimensions of the stepper motor driver SMD-4.2DIN ver.3

### 4. Construction

The driver SMD-4.2DIN ver.3 is designed as a circuit plate with electronics components, indication and control elements, terminals and connectors. The plastic case of the driver is designed to be mounted on a DIN rail. There are graphical symbols of the control elements and the terminals assignment on the front plate of the controller.



Besides the control elements at the driver frame there are:

- terminals for connection stepper motor phases;
- terminals for connection a power supply unit;
- terminals for connection control input signals STEP (ST), DIR (DIR), ENABLE (EN) and output Fault signal (FA);
- speed adjustment potentiometer SPD;
- terminals for connection analog voltage signal SPD
- LED for indication the drive status;
- start/stop and reverse buttons;
- microswitches for setting the current and microstepping mode.

### 5. Connection

Please follow this manual carefully for connection and assembly.

**Please, connect wires only when power is off. Do not attempt to change wiring while the power is ON.**

Please, provide a reliable contact in connection terminals. During wiring, please, observe the polarity and wire management.

When connecting, observe the polarity. Incorrect polarity, as well as exceeding the supply voltage, can damage the unit. During installation, it is necessary to strictly observe the correct connection of all wires.

Connection examples are shown in figures 2 - 11. Possible connection schemes for motors are given below in the table 2.

Connection of input and output signals of the driver:

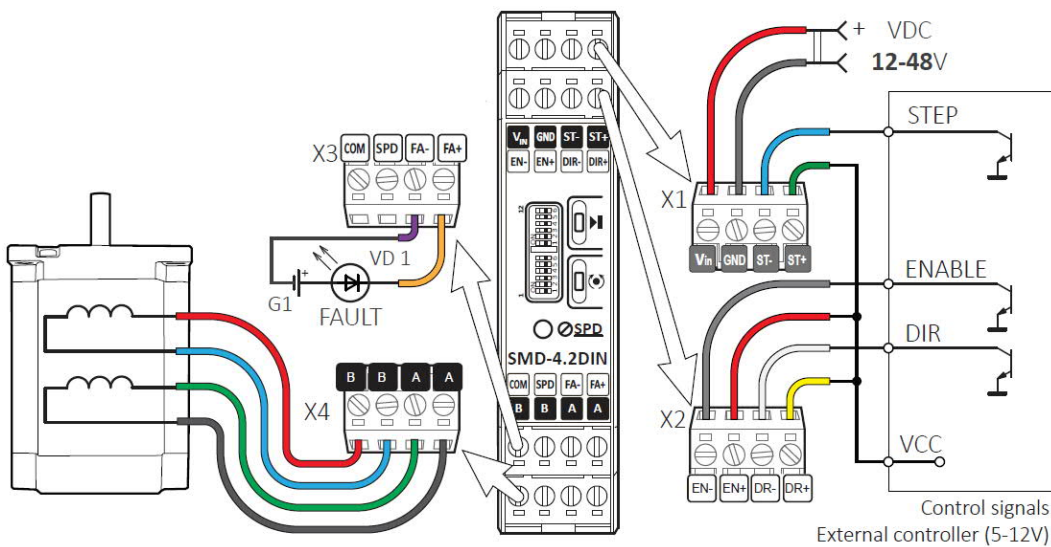


Fig.2. Example of connection to a source of logical signals STEP/DIR/ENABLE - open collector, NPN

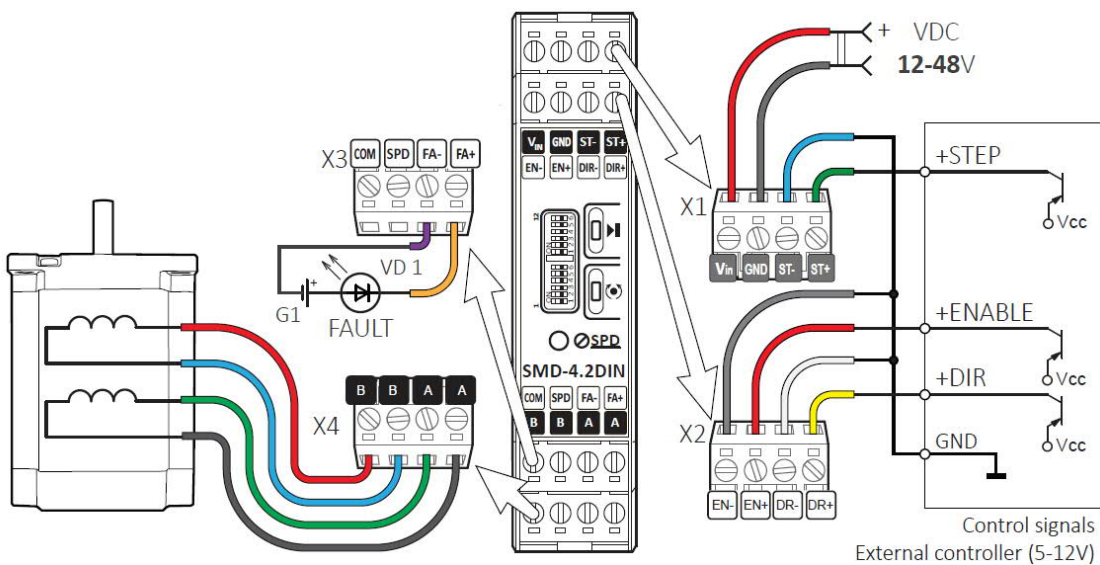


Fig.3. Example of connection to a source of logical signals STEP/DIR/ENABLE - open collector, PNP

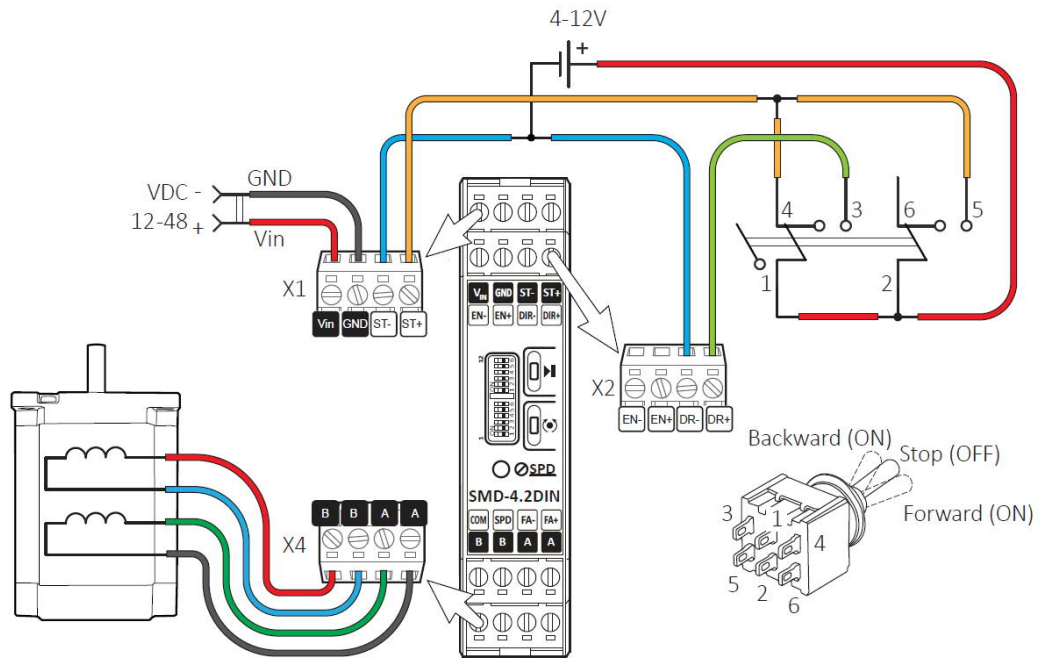


Fig.4. Example of connecting discrete input signals of the driver in analog speed control mode. 1.

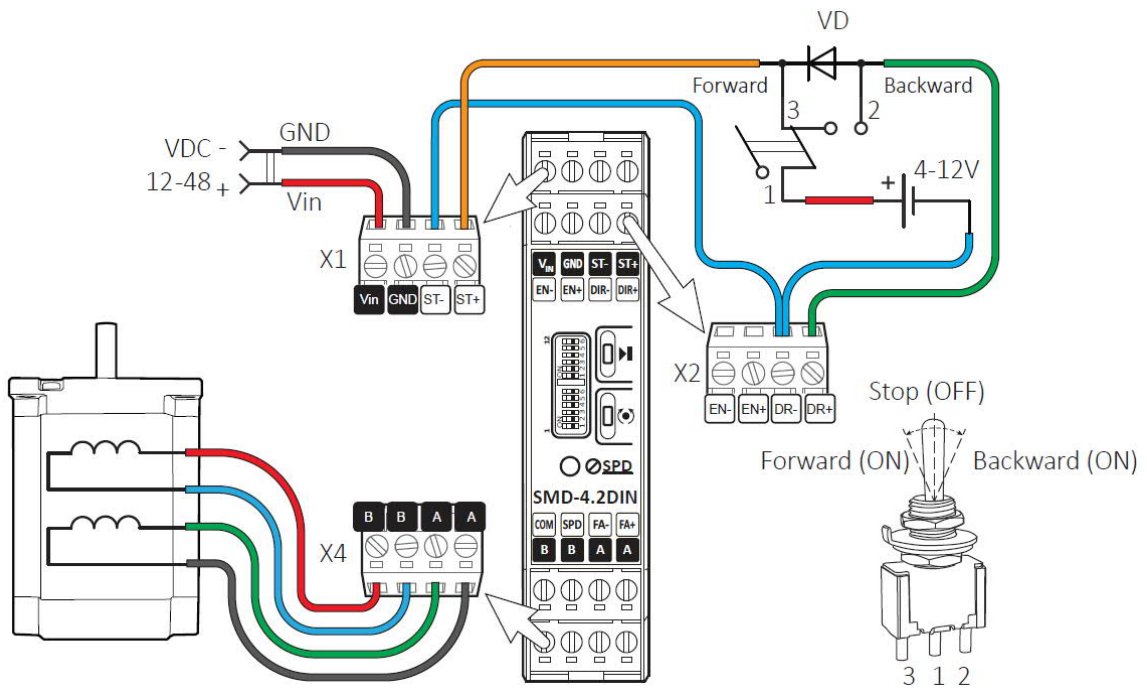


Fig.5. Example of connecting discrete input signals of the driver in analog speed control mode. 2.

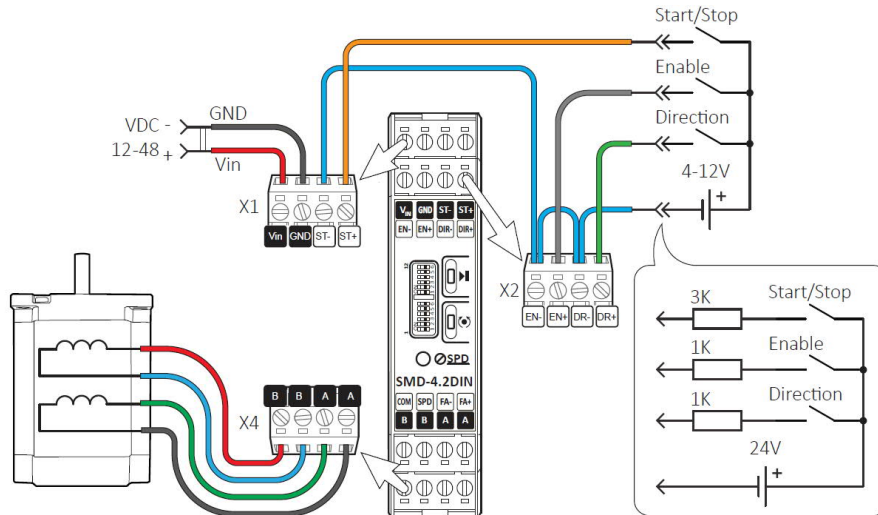


Fig.6. Example of connecting discrete input signals of the driver in analog speed control mode. 3.

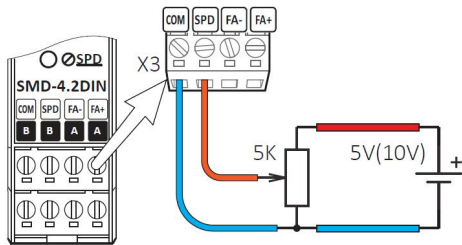


Fig. 7a. Examples of connecting an external analog signal input - speed adjustment with an external potentiometer

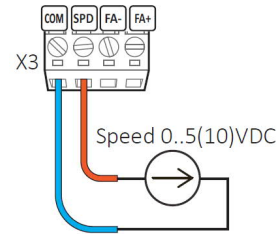


Fig. 7b. Examples of connecting an external analog signal input - speed regulation by an external voltage source

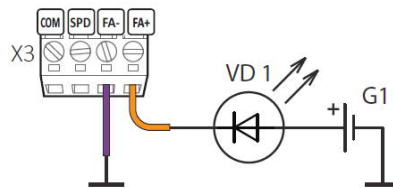


Fig. 8. Example of connecting the alarm output signal FAULT alarm.

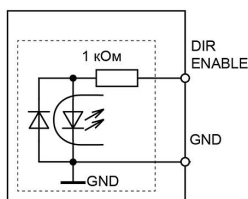


Fig. 9. Circuit design of DIR and EN inputs.

High level signal voltage 4...12 V.  
It is possible to use the voltage 24VDC as a high level signals for inputs DIR and ENABLE on condition of using additional current limiting resistors 1k Ohm.

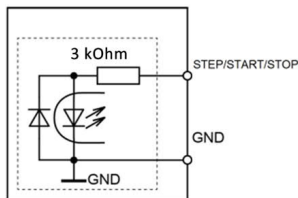


Fig. 10. Circuit design of ST input.

High level signal voltage 4...12 V.  
It is possible to use the voltage 24VDC as a high level signals for the input STEP on condition of using additional current limiting resistors 3k Ohm.

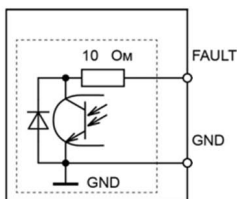


Fig. 11. Circuit design of the FAULT alarm output.

The FAULT output signal is intended to monitor the state of the driver. In normal condition, the resistance between terminals "FA+" and "FA-" tends to infinity. When an emergency occurs, the resistance outputs "FA+" and "FA-" are closed.  
Signal type – opto-coupler output. Max. voltage: 48VDC, max. current: 50 mA



**Connection of a stepper motor**

The driver provides operation with 2 or 4-phase stepper motors, 4, 6 or 8 wires. Winding connection examples are in the table 2. Connect stepper motor wires to A+, A-, B+ and B- terminals of the driver according to the table 2.

Table 2.

 Scheme 1	 Scheme 2	 Scheme 3	 Scheme 4
8 wires stepmotor connection (4 phases): Scheme 1 – serial connection; Scheme 2 – parallel connection. 6 wires stepmotor connection (2 phases with midpoint taps): Scheme 3; 4 wires stepmotor connection (2 phases without midpoint taps): Scheme 4.			

**6. Controller parameters settings**

Adjustment is carried out by microswitches on the front panel of the driver.

Set the phase current according to the table 3. The phase current is set using the microswitches SW1 - SW4.

Table 3. Phase current

microswitches				SMD-4.2DIN ver.3
SW1	SW2	SW3	SW4	Phase current, A
OFF	OFF	OFF	OFF	2,7
OFF	OFF	OFF	ON	2,8
OFF	OFF	ON	OFF	2,9
OFF	OFF	ON	ON	3
OFF	ON	OFF	OFF	3,1
OFF	ON	OFF	ON	3,2
OFF	ON	ON	OFF	3,3
OFF	ON	ON	ON	3,4
ON	OFF	OFF	OFF	3,5
ON	OFF	OFF	ON	3,6
ON	OFF	ON	OFF	3,7
ON	OFF	ON	ON	3,8
ON	ON	OFF	OFF	3,9
ON	ON	OFF	ON	4
ON	ON	ON	OFF	4,1
ON	ON	ON	ON	4,2

Selection of a control mode, analog signal, setting of the holding current and inversion of the enable signal are set by microswitches according to the table 4.

Table 4. Common settings

Enable inversion		Selecting an analog signal		Holding current		Control mode	
SW5		SW6		SW7		SW8	
OFF	Turned off	OFF	External signal	OFF	100%	OFF	Analog speed control
ON	Turned on	ON	Built-in potentiometer	ON	50%	ON	STEP/DIR/EN pulse position control

Microstepping mode is set by the switches SW9 to SW12 as shown in the table 5.

Table 5. Microstepping

SW9	SW10	SW11	SW12	Microstepping
OFF	OFF	OFF	OFF	256
OFF	OFF	OFF	ON	128
OFF	OFF	ON	OFF	64
OFF	OFF	ON	ON	32
OFF	ON	OFF	OFF	16
OFF	ON	OFF	ON	8
OFF	ON	ON	OFF	4
OFF	ON	ON	ON	2
ON	OFF	OFF	OFF	1
ON	OFF	OFF	ON	1



ON	OFF	ON	OFF	1
ON	OFF	ON	ON	1
ON	ON	OFF	OFF	1
ON	ON	OFF	ON	1
ON	ON	ON	OFF	1
ON	ON	ON	ON	1

**7. Stepper motor control**

If used **STEP/DIR pulse position control mode (SW8 = ON)**, give a sequence of signals «STEP» (pulse), «DIR» (level) and «ENABLE» to the inputs ST, DIR and EN accordingly.

High level of the signals – 4..12VDC, low level - 0..1VDC.

One step (or microstep) executes as front edge of the voltage pulse at the «STEP» input. Direction switches by changing voltage level at the «DIR» input. The motion is enabled if the signal to «ENABLE» input is given. The signals oscillogram is shown in fig.12.

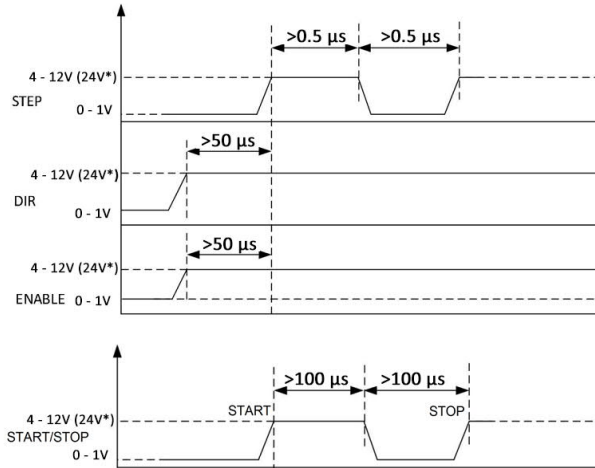


Fig.12. signals order and duration

\*Connect additional current limiting resistance if use high level signal +24VDC: 3KOhm for ST input, 1KOhm for all the rest inputs.

If used **analog speed control mode (SW8 = OFF)** – adjust the rotation speed with the built-in SPD potentiometer or external analog signal. Control can be carried out by buttons located on the front panel or by external control signals EN/ST/DIR.

The range of the external analog signal is set by the jumper shown in Fig. 14. The jumper is located on the circuit-board under the case. To open the case, it is necessary releasing the two latches next to the connectors.



Fig.13. Taking of the case of the driver.

To set the jumper:

- Disconnect the terminals from the controller;
- Open the housing as shown in figure 3;
- Press down on the latch with a flathead screwdriver on both sides;
- Pull the top and bottom of the case apart;
- Set the jumper to the required position (fig.14).



Fig.14. – jumper for selecting the analog signal range.

**8. Errors detection**

The output signal "Fault" is intended to monitor the state of the driver. In the normal state, the resistance between terminals "FA+" and "FA-" tends to infinity. In the event of an emergency, the resistance outputs "FA +" and "FA-" are closed.

Detailed information on LED status indication is given in the table 6.

Table 6. State indication

LED	Meaning
Lit green	Normal state – standby, motor phases are de-energized
Blinking green 1 time per second	Normal state – motor phases energized
Blinking green 2 times per second	Normal state – motor phases energized, internal generator is in operation
Blinking red 2 times per second	Short circuit in motor phases A, phases are de-energized
Blinking red 3 times per second	Short circuit in motor phases B, phases are de-energized
Blinking red 4 times per second	The driver is overheated, phases are de-energized



### 9. Delivery in complete sets

Stepper motor driver SMD-4.2DIN ver.3

1 pcs

### 10. Manufacturer information

Smart Motor Devices adheres to the line of continuous development and reserves the right to make changes and improvements in the design and software of the product without prior notice.

The information contained in this manual is subject to change at any time and without prior notice.

### 11. Warranty

**Any repair or modifications are performed by the manufacturer or an authorized company.**

The manufacturer guarantees the failure-free operation of the controller for 12 months since date of sale when the operation conditions are satisfied.

The manufacturer sales department address:

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Date of sale:

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