



## DC BRUSHLESS MOTOR CONTROLLER BLD-20DIN

Manual

**BLD.20.DIN.001**

### 1. Product designation

Brushless controllers BLD-20 are electronic devices designed to operate and control brushless synchronous 3-phase dc motors with Hall encoder.

### 2. Technical characteristic

Controllers are designed to control speed, direction, smooth start and stop of brushless motors by input signals "START/STOP", "DIR" "HARD STOP", analog signal and potentiometers to control motor speed, acceleration and current limiting.

Table 1. Technical characteristic.

Model	BLD-20DIN
Power supply	24 – 48 VDC
Power supply protection	20 – 51 VDC
Regulation of peak power	300 – 1400 W
Rated current in motor phase	<20 Amp
Maximum current in motor phase	<80 Amp
Input resistance of SPEED input	20 kOhm
Input voltage range of SPEED input	0..5 VDC
Dimensions	116x100x23 mm

Dimensions of the controllers are shown on fig. 1

Connection scheme is shown on fig. 2

Environmental Conditions:

Ambient Temperature: -25...+50°C

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

Condensation and freezing: none

Pressure: 650...800 mm of mercury

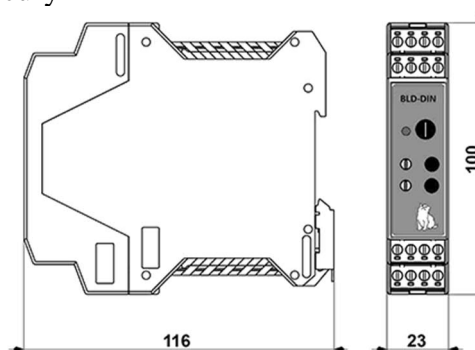


Fig.1. Dimensions

### 3. Construction and control elements

BLD-20DIN is designed as circuit plate with electronics elements, covered with a case with DIN rail mount. Besides electronic components, there are indicating and control elements, connection terminals and connectors on the board:

- terminal screws for power supply, brushless motor windings and encoder lines, and control circuit



connection;

- button and connectors «START/STOP» for connection of an external signal – to start and stop of a motor;
- button and connectors “START/STOP” for connection of an external signal – to change motor rotation direction;
- internal preset potentiometers to acceleration and consumption current limiting;
- internal potentiometer to control motor speed;
- terminals for connection of an external potentiometer for motor speed control;
- terminals for connection of external signal of emergency stop “HARD STOP”;
- LED for indication of the controller operation status;
- internal brake for recuperation energy consumption (10 W, 11 Ohm);

Location of terminals and control elements are shown on fig. 2.

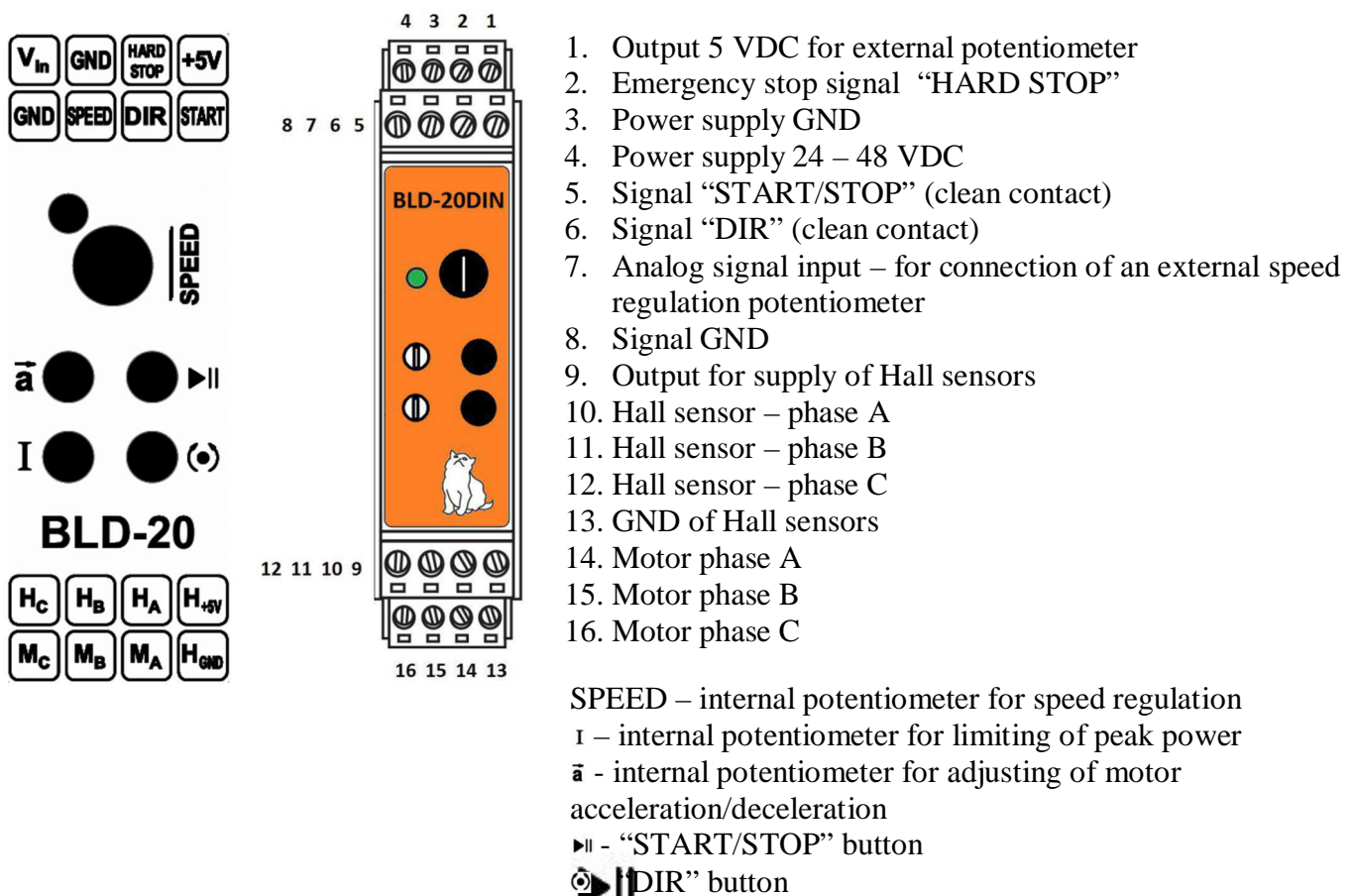


Fig. 2. Location of terminals and control elements

## 4. Assembly and connection

Please, learn this manual carefully before connection and assembly.

Please, wire just 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

Follow the next instruction during connection:

1. Connect a motor to the controller according the fig. 2. Motor phases must be connected to terminals 14 – 16. Hall sensors signals must be connected to terminals 10 – 12. GND of HALL sensors must be connected to the terminal 13, supply of HALL sensors signals must be connected to terminal 9.



2. Connect external control elements according schemes on fig. 3:

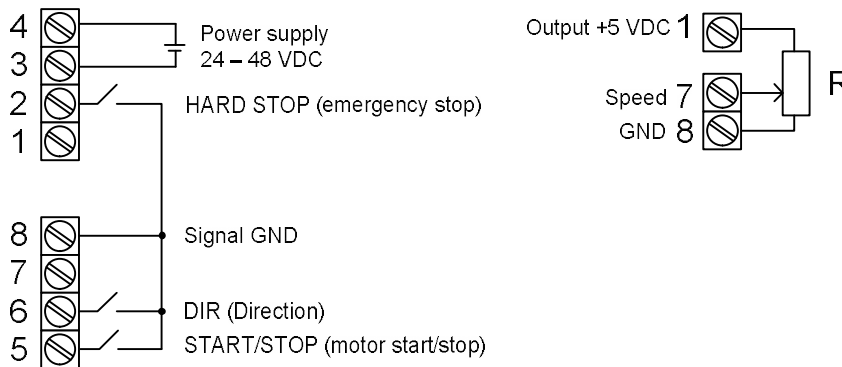


Fig. 3. Connection of power supply and external control elements

- type of external signals «START/STOP», «DIR», «HARD STOP» - clean contact;
- full resistance of external potentiometer for speed control - approximately 4.5 KOhm.

3. Connect power supply to the contacts 3 and 4 according to the specification of the power supply unit. Input voltage range 24 – 48 VDC is allowed. The power supply unit should provide working voltage without voltage slump (choose power supply unit with ample of power). Connection wires should be suitable for the motor current.

## 5. Operation

1. Make sure the power supply is turned off. Please, wire just when power is off.
2. Connect the motor and power supply to the controller according to section 4.
3. Choose the speed adjusting method:
  - Internal potentiometer - additional connection isn't required. End CW position of the potentiometer is related to maximum motor rotation speed.
  - External potentiometer – connect external potentiometer to the speed contacts 1 (+5V), 7 (SPEED) and 8 (GND). Minimum resistance of the potentiometer is related to maximum motor rotation speed. Increasing of the potentiometer resistance leads to motor speed decreasing. Internal speed adjusting potentiometer should be turned to the end CCW position.
4. If needed, connect control elements to the “START/STOP”, “DIR” and “HARD STOP” contacts – according to the section 4 and fig. 3. As a default, “START/STOP” and “DIR” inputs are handled as per the front edge of the signal. Please, contact the manufacturer or official representative if need to change signals handling to a signal level type.  
Input “HARD STOP” is intended for emergency stop. This contact should be closed for normal operation.
5. Set suitable to an application motor acceleration/deceleration by using of internal potentiometer (fig. 2). End CCW position of the potentiometer is related to the maximum acceleration time.
6. Set suitable to the motor limit of peak power (fig. 2). If the consumption peak power will be exceeded for 15  $\mu$ s, it will lead to emergency stop.
7. Turn on the power supply. The controller is ready for operation.

## 6. Alarms indication

LED on the front panel of the controller indicates the controller operation status. In case of normal operation the indicator is green. Green indicator blinks during motor operation (approx. 1 time per second). In case, if during operation the indicator turns to red and doesn't blink, it means the maximum torque is reached, speed stabilization impossible – for proper work choose a motor with more output power. In case of alarms the indicator blinks green and red. The number of red blinks represents the alarm code (refer to the table 2).



Table 2. Alarms indication

Alarm code	Alarm	Alarm code	Red blinks number
0	Normal operation	4	Internal power switches overheating
1	Input voltage range exceeded	5	Wrong motor connection
2	Short circuit in a motor phase	6	Emergency stop
3	Internal brake circuit overheating	7	Testing version of firmware

## 7. Delivery in complete sets

The brushless motor controller BLD-20DIN  
Manual BLD20.DIN.001.

1 pcs.  
1 pcs.

## 8. 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 – section 2.

The manufacturer sales department address: Smart Motor Devices OÜ,

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Date of sale: