



It is user **RESPONSIBILITY** to check that this manual (in PDF format) refers to product model and version that will be used.

In any case, regarding installation, use and maintenance, the paper-made manual given together with the product **TAKES PRIORITY.**

# BSD SERIES STEPPING MOTOR DRIVES

## 1. GENERAL CHARACTERISTICS

		BSD 02 - BSD 02.V
$V_{DC}$ with stabilized supply (+/- 5%)	(V)	from 22 to 50*
$V_{DC}$ with unstabilized supply (+/- 20%)	(V)	from 24 to 45
$I_{NP}$ min	(A)	0.7
$I_{NP}$ max	(A)	2.2
Dimensions	(mm)	78 × 68 × 21
Operating temperature		from + 5°C to + 45°C (see point 7.3)

Table 1

### Terms definition in Table 1

- $V_{DC}$  Nominal value of DC voltage supply (range) at which the drive can operate.
  - $I_{NP}$  Nominal phase current (peak value) which flows in each motor winding, measurable with motor turning at low speed (see Table 2). Automatic current reduction at motor standstill is 50% of value set.
  - $I_{NP}$  min and max Minimum and maximum value of nominal phase current setting using DIP-SWITCH.
- (\*) **NOTE:** Never use any power supply voltage higher than allowed one.

## 2. LOGIC INPUT AND OUTPUT SIGNALS (AM3 Connector, see Fig. 1, 2, 3, 4 and chap. 7.2)

- CURRENT OFF INPUT:** When this signal is HIGH, the drive is active. When it is LOW, the drive is inhibited, thus motor current (and so holding torque) is turned to zero.
- STEP INPUT:** Step is performed on HIGH to LOW transition of this signal. Suggested duty-cycle: 50%. Max. frequency: 60 KHz with square wave signal supplied from a logic output at 5 volt. With duty cycle different from 50%, STEP signal half period has to be longer than 8  $\mu$ sec.
- DIRECTION INPUT:** With this signal HIGH motor rotation direction is opposite to the one obtained with input LOW. This signal has to be valid at least 100  $\mu$ s before STEP signal and has to stay in this state for at least 100  $\mu$ s after last step sent to the drive.
- DRIVER FAULT OUTPUT:** When drive is normally working, this output is SHORTED to GND; when drive is in no-working state, the output is OPEN. The drive automatically goes in no-working state when some protection is active and automatically recovers when the protection resets.
- 1 and 6- INTERNAL GND:** The terminals are internally connected between each others and to terminals 10 (the power supply common), 11 and 16. They can be used to connect the shield of logic signal cable (this is mandatory or useful depending on type of control system).

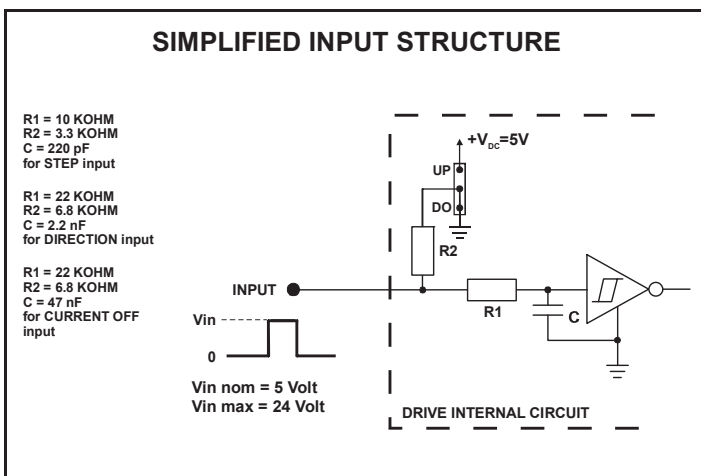


Fig. 1 a

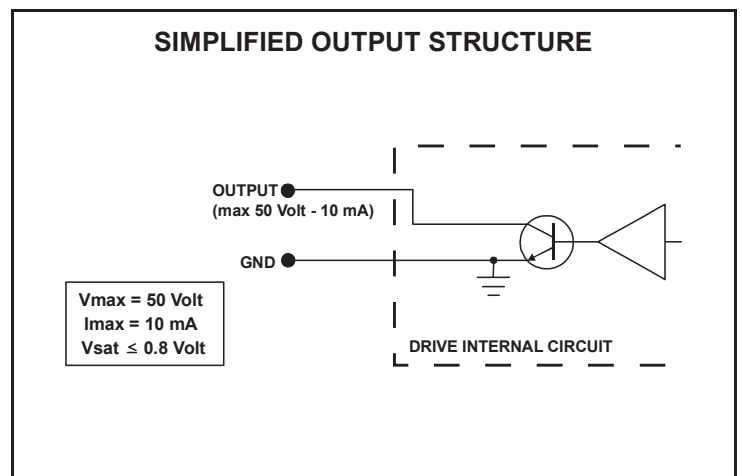


Fig. 1 b

### 3. POWER INPUTS AND OUTPUTS (AM1, AM2 Connectors; see Fig. 2 and 3)

- 9 - Power supply positive pole. (+  $V_{DC\ nom}$ ).
- 10 - Power supply negative pole. (-  $V_{DC\ nom}$ ).
- 11 - GROUND; connect to Protective Earth terminal (PE).
- 12 - Motor winding terminal **A**.
- 13 - Motor winding terminal **A-**.
- 14 - Motor winding terminal **B-**.
- 15 - Motor winding terminal **B**.
- 16 - Connection point for shield of motor shielded cable.

4. **MAIN SETTINGS (Dip switch and jumpers).** Main setting must be done by the user at the installation or replacement time, according to motor type and working condition. Wrong setting could damage drive or motor and cause a not correct work of the motor.

NOMINAL CURRENT $I_{NP}$ (A)			
	Dip 1	Dip 2	BSD 02 - BSD 02.V
▶	ON	ON	0.7
	ON	OFF	1.1
	OFF	ON	1.6
	OFF	OFF	2.2

Table 2

LOGIC INPUTS OPERATION MODE				
		JUMPERS SETTING		
▶	UP	ON	PULL-UP	
	DOWN	OFF		
	UP	OFF	PULL-DOWN	
	DOWN	ON		

Table 3

RISOLUZIONE			
	Dip 3	Dip 4	PASSI PER GIRO BSD 02 - BSD 02.V
	ON	ON	3.200
▶	ON	OFF	1.600
	OFF	ON	800
	OFF	OFF	400

Tabella 4

▶ = **Default settings.**

**NOTE:** It is suggested to use maximum allowed resolution to reduce acoustic noise and vibrations according with the specific application.

### 5. LED DRIVE STATUS:

**LED HV green:** **ON** = supply voltage higher than minimum allowed value.

**OFF** = supply voltage lower than minimum allowed value.

**BLINKING** = Short circuit or wrong connection at motor output.

### 6. MOTOR – DRIVE COUPLING

BSD series drives can be used with the following Sanyo Denki stepping motors or similar. In case of need to use motors with different features

MOTOR CODE	CURRENT SETTING (A)	MOTOR CODE	CURRENT SETTING (A)
103H7823-0740	2.2	103-H5208-0483	1.1
103-H7126-0740	2.2	103-H5210-4240	1.1
103-H7123-0740	2.2	103-547-52500	0.7
103-H7123-5040	2.2		

Table 5

In the typical application conditions, for each setting shown in Table 5, the maximum allowed motion duty-cycle is as follows:

- 100% with 24 VDC
- 50% with 48 VDC

If other motors are used ensure drive current is between 0.7 and 2.2A, Voltage is 24 to 48VDC, inductance 1 to 12mH

### 7. APPLICATION NOTES

#### 7.1. Electromagnetic interference.

Drive and all related connections are source of E.M. interference (conducted and radiated). In order to comply to 2004/108/CE and related standards (EN 61800-3), the installation has to be done in accordance with the schematics in Fig 2 and the following indications:

- Locate drives, power supply, transformer and related cables inside the same enclosure, which has to be hermetic to electromagnetic fields.

- Interpose a filter (CORCOM mod. 6VVK1) near the main supply entrance.
- Use only shielded cable (outside the enclosure) for connecting motor and drive.
- Connection made to Protective Earth terminal (PE), shown in Fig.2, must be short and have the lowest possible inductance.
- Use a supply transformer with a metal shield between primary and secondary winding and connect this shield to PE.

### 7.2. **Input logic signals.**

- Rated nominal voltage of external logic: 5 volt ; minimum voltage: 3.5 volt ; maximum voltage: 24 volt  
Input low level < 1.0 volt ; Input high level > 2.4 volt
- It's not allowed to use relay to drive inputs.

### 7.3. **Forced cooling.**

According to operating conditions (ambient temperature, current setting, duty-cycle) forced cooling could be necessary.

### 7.4. **Switching power supply.**

It is possible to use a switching power supply instead of a traditional power supply indicated in Fig. 2, provided that you have a capacitor of at least 1000  $\mu$ F on the output line of power supply. This capacitor should be located at a distance not greater than 1 - 2 meter from Vdc input of the drive. The purposes of the capacitor are:

- To feed the high frequency current pulses required by the drive chopper system.
- To absorb the reverse energy generated by motor during the deceleration phases. In those applications in which the reverse energy is potentially large (high load inertia and / or high motor speed), it can be necessary to use a capacitor with a capacitance value much larger than the minimum value indicated above.



## NOTICES, HAZARDS AND CAUTIONS



- BSD series drives are BDM (Basic Drive Module), as defined in the EN 61800-3. They are sub-assemblies without a direct function, foreseen to be integrated in a more complex machine or installation by a professional assembler, expert in the field of motor drives and in their related problems. Only a professional assembler can install and put in service this component.
- CE marking: Products here described conform to 2006/95/CE and 2004/108/CE and further modifications, when correctly installed and used.
- They are intended to drive stepping motors with two phases, base step angle 1.8 degree and phase inductance between 1.0 and 12.0 mH. Use with different kind of motor is not allowed.
- Protection degree IP00: use only inside a protective enclosure able to avoid electric shock hazard. Main setting, connector insertion or extraction has to be done with drive switched off.
- Installation is allowed in local environment with pollution degree N°2 . Installation in presence of explosive and/or flammable and/or chemically aggressive and/or electrically conductive gas, vapour or dust and installation near easily flammable or heat sensitive materials is strictly forbidden.
- Use for safety related functions is forbidden (EN 60204-1); it is also forbidden any application arrangement in which a drive fault or failure could generate a hazardous condition. It is forbidden to use this material in application covered from one or more EEC directive before the conformity to those directives has been confirmed.
- Residual voltages: depending on supply type (assembled by user) and application conditions, a waiting time greater than 5 seconds after switching off could be necessary.
- Scald hazard: due to the presence of some components operating at high temperature (120°C), wait some minutes after switching off in order to avoid scalds.
- Driver could generate electromagnetic interference (both radiated and conducted) if instruction about installation directions are not respected (chap. 7). We remember however that compliance to 2004/108/CE directive has to be tested on whole machine in normal working condition and in accordance with specific standards covering the particular application.
- In case of drive failure, dangerous high voltage could appear on logic in / OUT connections. For this reason, regarding to machine safety, you have to consider that a voltage equal to  $V_{DC}$  could be present at the I/O in case of failure.
- Insulation of the drive parts is dimensioned for pollution degree N°2 and for overvoltage class II. The drive can't be connected to the main and it has to be supplied by a power supply equipped with transformer main insulation.

**IMPORTANT NOTES**

- 1) C, typical values:  
 C=10.000 µF with V<sub>DC</sub>=24 Volt  
 C=4.700 µF with V<sub>DC</sub>=48 Volt
- 2) Transformer power, typically:  
 50 VA with V<sub>DC</sub>=24 Volt  
 100 VA with V<sub>DC</sub>=48 Volt  
 depending on:
  - Current setting
  - Motor model
  - Motor speed
  - Duty-cycle
- 3) Fuse F1: time lag with nominal current according transformer power.
- 4) Fuse F2: it's mandatory the installation of fast fuse 4A.
- 5) Rectifier bridge: according transformer power.
- 6) Terminals 1, 6, 10, 11 and 16 are internally interconnected.
- 7) C capacitor must be near AM2 connector; max cables length = 1 m.
- 8) The maximum motor cable length is 20 meters; section according phase current RMS value.
- 9) Vac nom : from 18 to 32 Vac.

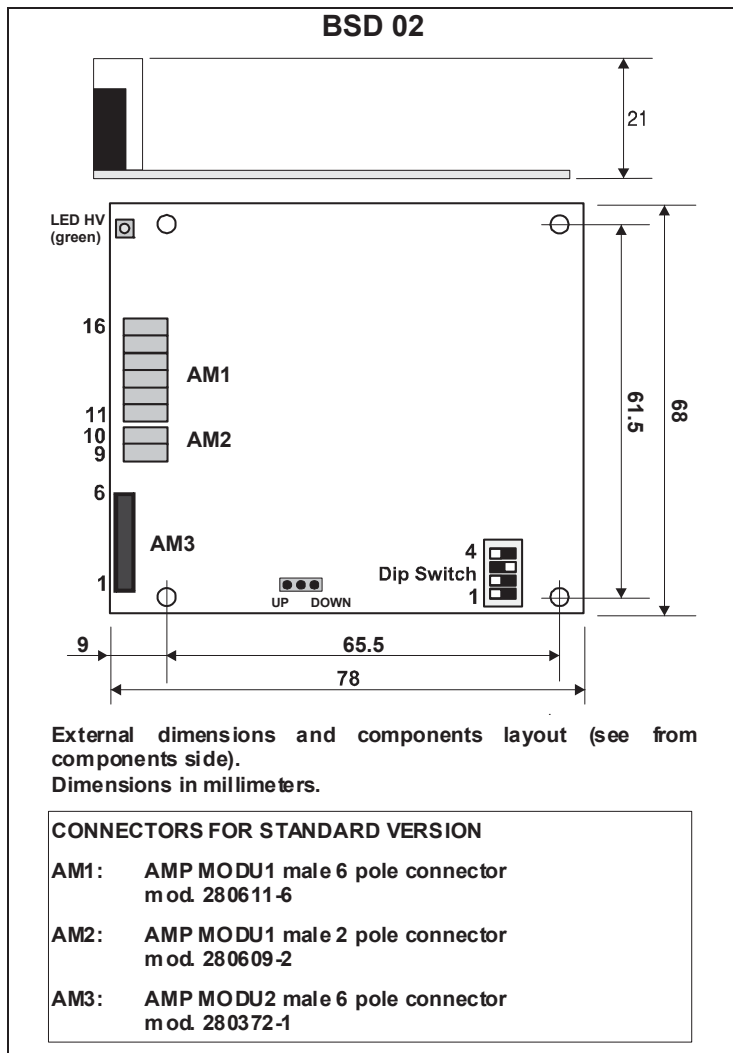
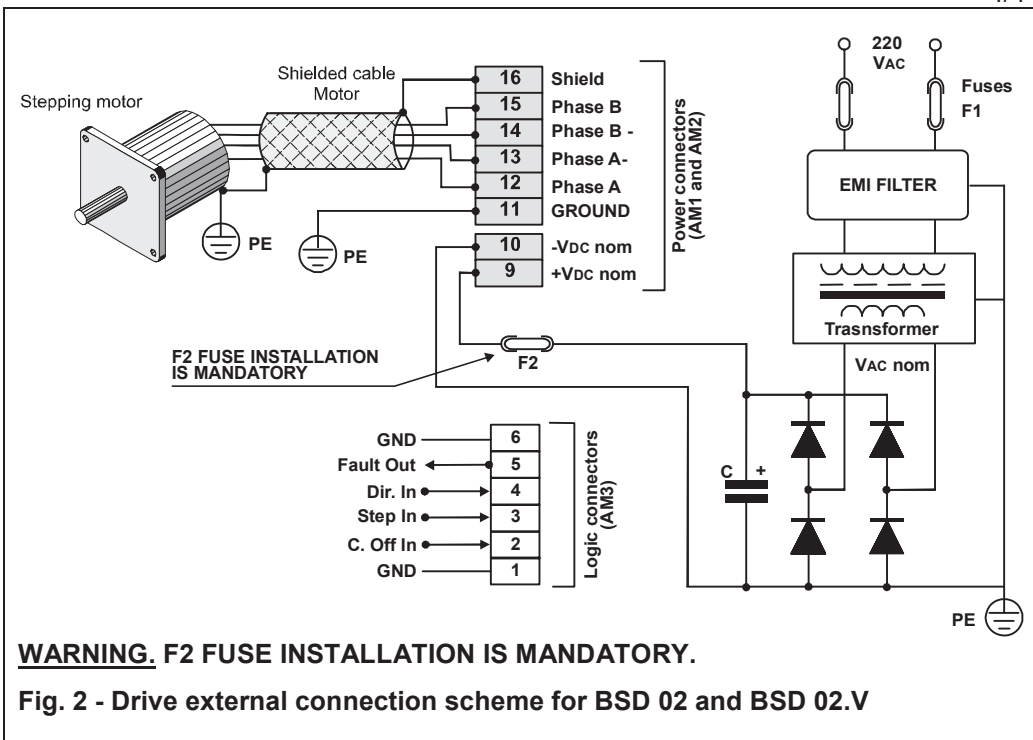


Fig. 3a

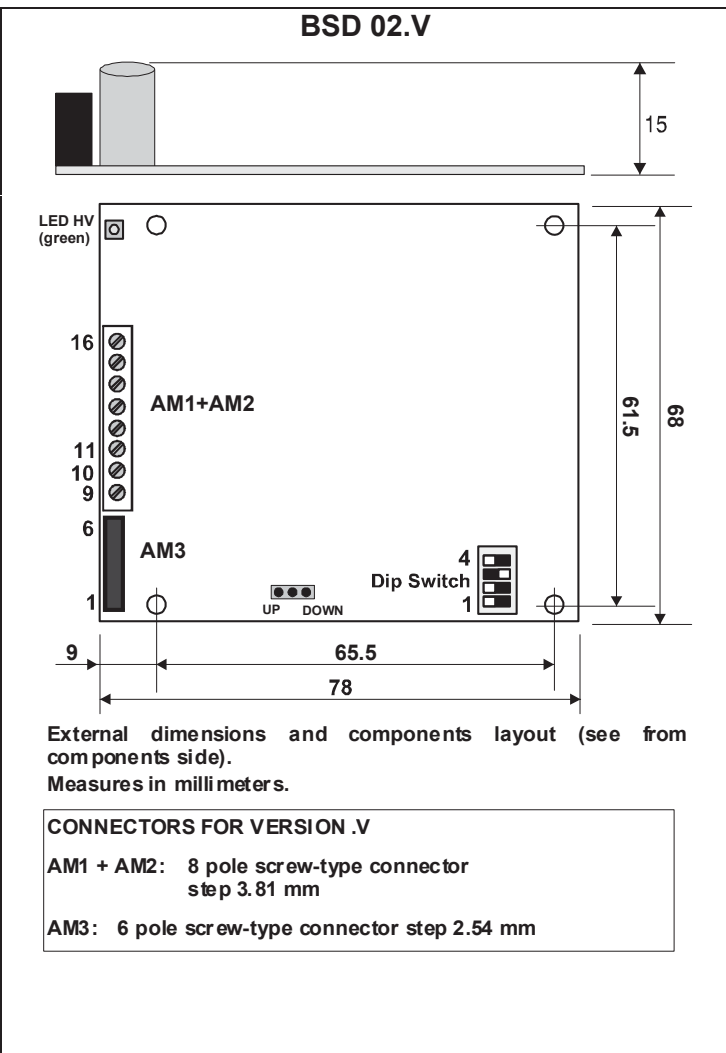


Fig. 3b