

# SMC81 RP

## Manual



## Driver for 2-phase bipolar motors



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Thank you for selecting our product!

This instruction will help you at correct service and accurate exploitation of described device.

Information included in this instruction were prepared with high attention by our specialists and is description of the product without any responsibilities within the meaning of the commercial law. Based on the information should not be inferred a certain features or suitability for a particular application. This information does not release the user from the obligation of own judgment and verification. P.P.H. WObit E.K.J. Ober S.C. reserves the right to make changes without prior notice.

- Please read instructions below carefully and adhere to its recommendation
- Please pay special attention to the following characters:



### CAUTION!

Not adhere to instruction can cause damage or impede the use of hardware or software.

## 1. Safety rules

- Prior to first start-up of the device carefully read the manual.
- Prior to first start-up of the device make sure all cables are properly connected.
- Provide appropriate working conditions, in compliance with the device specifications (e.g.: power supply voltage, temperature, maximum current consumption).
- Prior to any modifications of cables connections, disconnect power supply voltage.
- Usage of described device in special meaning systems (e.g.: medical applications, vehicles, etc.) requires use of additional safety measures against operational errors.
- This device can't be used in open space. It can cause an electric shock and shorten lifetime of the device.
- Exceeding of recommended operational parameters can lead to damage of the device or to fire.

## 2. Device description

Miniature stepper motor driver SMC81 is designed for control of two-phase stepper motor. It allows control with full step or step divided into 2, 4, 8, 16 or 32 parts. It enforces a proper current value in motor winding regardless of voltage supply value. Each pulse causes motor to reverse one step or step part ahead in dependence on step division set by jumpers or by signals on signal connector. Motor rated current is set by additional resistors (soldered to standard) set in proper places from parts side (usually current value is 0,5 A – see table). Red diode signals voltage supply. In standard equipment of the driver is passive cooling (radiator – R). Driver can be mounted on a standard mounting rail. SMC81 RP is also equipped with socket for signal connector (it is a miniature connector with joints clamped on cables). It allows instantaneous connection to PC or other devices.

Non-connected inputs are treated as inputs with high state –H (“1”). While braking motor energy must be received by supply system, it implies that driver should be equipped with capacitor with minimum capacity 4700 uF/50 V (10000 uF recommended) (at driver PCB is mounted a capacitor with capacity 1000 uF/50 V).

Caution: increase of power supply above 38 V causes a damage of driver integrated circuit. Setting of rated current is made by enclosing additional resistors to power setting resistors or by their exchange – see table.

For motor power supply it is recommended to use twisted pair cables, and if possible use a ferrite bead assumed on the wire.

### 2.1 Features

- Microprocessor, integrated power stage for 2-phase bipolar motors
- Power supply, max 36 V
- Rated current 1,5 A
- Full step operation or with step division up to 1/32
- Step frequency 20 kHz

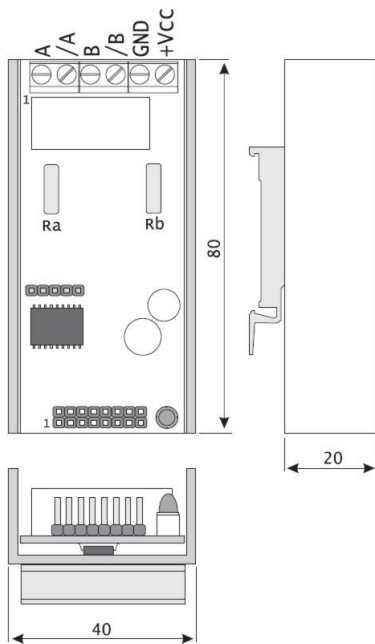


- LED indicator for power supply
- Power supply, signals for motor and controlling on connectors.

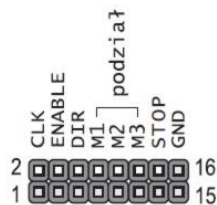
## 2.2 Technical description

Power supply	DC 18 up to 36V
Phase current	0,5– 3A
Set current	Current resistor
Automatic current reduction	No
Type of work	bipolar
Step division	1, ½, ¼, 1/8, 1/16, 1/32
Step frequency	0-16 kHz
Input signals	TTL, CMOS
Optically isolation	No
Input signals current	For 0V max 0,5A
Operation temperature range	0-40°C
Connection motor	Screw connector
Dimensions	45*80*25mm
Way of mounting	Handle for DIN 35m rail

## 2.3 Device scheme

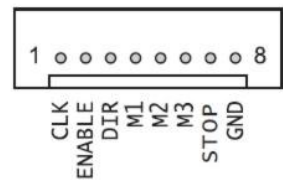


## 2.4 Connectors description

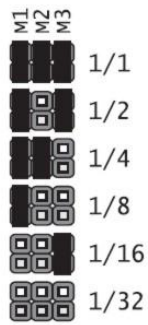


### Controlling signals (two types of connectors)

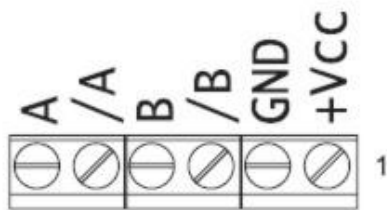
1÷15	GND	
2	CLK	1
4	Enable input – active 0	2
6	DIR input – 0 - left	3
8	M1 Setting	4
10	M2 of step	5
12	M3 division	6
14	STOP – locking of CLK signal (holding)	7
16	GND	8



### Setting of step division



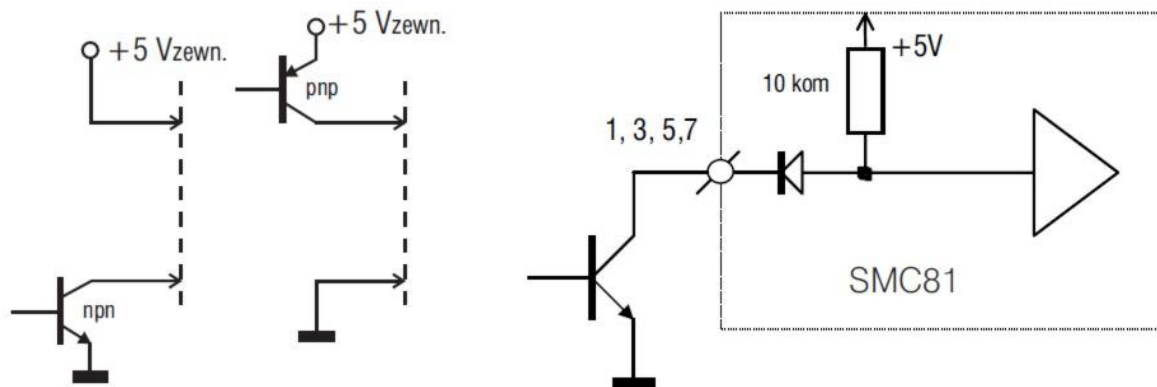
### Power supply and output connectors



- 1 A phase
- 2 /A phase
- 3 B phase
- 4 /B phase
- 5 power supply – (GND)
- 6 power supply – (+Vcc)

RA, RB – resistor for motor current setting (see 3 chapter)

### 2.5 Controlling signals



### 3. Power supply

The driver must be supply from source with proper output voltage (max. 36V) and current efficiency. The feeder also must receive motor braking energy, which is provided by initial capacitors with capacity at least 2200 $\mu$ F. It is recommended to use dedicated for drivers ZN100 feeder. For driver supply **can't be** used a regulated power supply.

Safe power supply is lower than allowable maximal supply, because to voltage supply is add motor braking energy and short pulses arising due fast turning off large inductivity of motor winding. While the driver is first time turning on, it is recommended to use ammeter (analog device is the best choice for this purpose) to monitor supply current.

Caution: the lower power supply the bigger current consumption from feeder. Never connect power supply cables to non discharged feeder (without loading the feeder can hold energy accumulated in electrolytic capacitors for a long time).

#### 4. Motor operation current

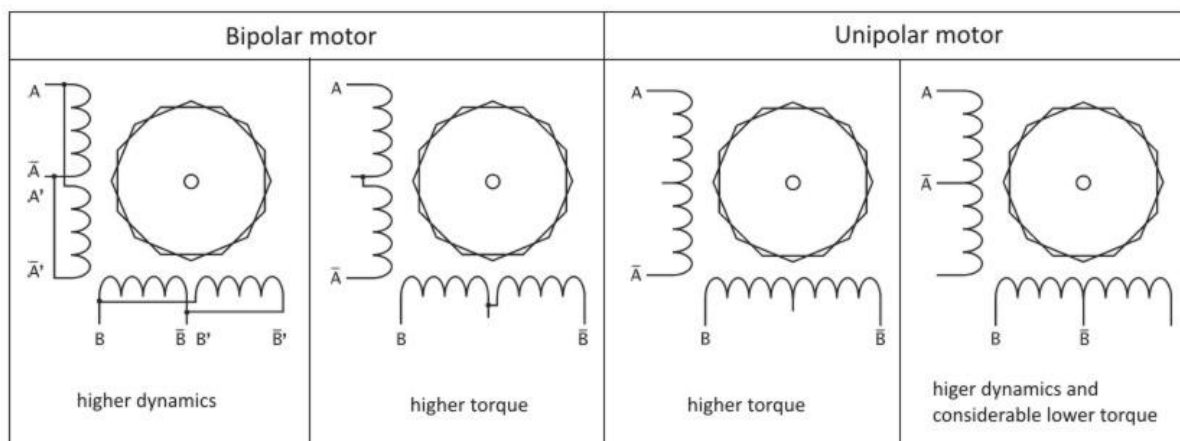
The driver is factory equipped with resistors for setting motor current on 0,5 A. To adjust this current to motor, in places marked RA and RB (on picture at 1.4 chapter) you should solder additional resistors (1 W) to resultant resistance has values as in table below or you should give current value while ordering.

Rated current	(A)	0,5*	1	1,5
RA and RB resistors	( $\Omega$ )	0,5	0,25	0,17

\* factory settings

## 5. Mounting recommendation

1. It is recommended to twist motor wires in pairs (one phase – one pair). If the noise generated by motor wires is too big to accept, wires should be shielded, and shield should be connected to the driver GND. To reduce generated noise, ferrite rings should be used.
2. As signal wires may be used cross-section AWG14 to 28, and to supply AWG22 or greater.
3. Signal wires should be keep as far as it is possible from supply wires. Minimum distance between this cables is 10cm. Newer twist this cables together!
4. It is recommended to mount motor to metal devices of machinery because of that the working temperature of motor is about 70°C. Motor temperature monitoring is also recommended (maximum motor temperature is 85°C).
5. It is recommended to mount driver as close to motor as it is possible.
6. Ends of motor wires should be soldered to provide good connection.
7. Motor wires have a possibility to connect phases in series or parallel. Selection of serial or parallel connection of the motor phases is typically determined by the speed requirements of the system. If slow speeds are required, the motor can be connected in serial. For operation at higher speeds, the motor phases can be connected in parallel.



8. In case of transferring torque on other axis, it is recommended to use couplers. It lets to eliminate deviation of shaft position, and increase motor bearings lifetime. Oldham type couplers are very good for this purpose.
9. Mechanical modification of motor shaft is not allowed. Any mechanical interferences cause lost of motor torque.
10. Magnetic or viscosity resonance suppressor could be used to correct dynamic characteristic.
11. Stepper motor is an electric machine. The general rules for operating electrical machines are applying. Before turning on the driver please make sure that moving parts of the machine or motor will not run afoul of other parts and will not hurt people.