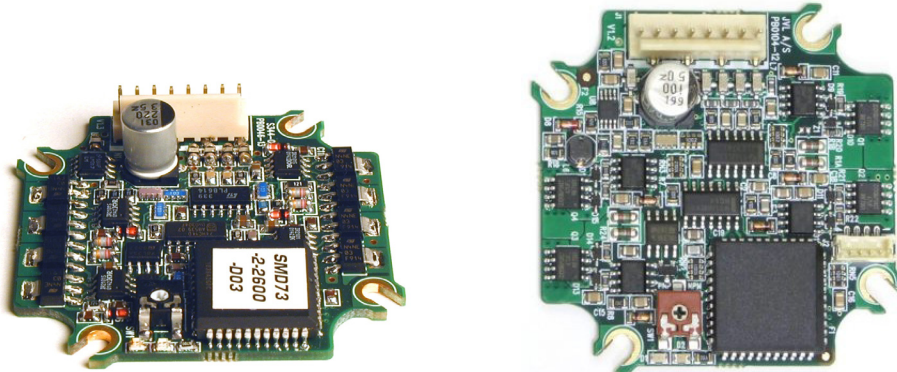# Step Motor Driver SMD73 and SMD74. 0-3 A RMS and 18-48VDC

Step Motor Driver SMD73 and SMD74 are a miniature driver that measures only 52.4x52.4 mm and is ideal for direct mounting onto a step motor. It fits onto most types of high-torque motors, but of course can also be mounted on a sur-face. A heatsink is not necessary in normal applications.

The Driver can supply from 0-3 A RMS in each phase, and cur-rent is automatically regulated to 1/3 when the motor is not receiving step pulses. The Driver can handle up to 50 ksteps/sec and a ministep current regu-lation ensures that the current is increased by a factor of 1.4 on each phase, in order to yield maximum motor torque.

The Driver can be powered from a 18 - 48 VDC supply. It is equipped with 2 indicators: a green LED indicates that power is on and a red LED indicates an error condition.

The Driver is available with step resolutions of 1/1, 1/2, 1/4, 1/5, 1/8 steps/ rev., and with selectable motor current and 24V PNP/NPN and 5V input.

The Driver is equipped with an 8-pole connector. 4 terminals are used to connect the motor, 2 are used for the external pow-er supply, and the remaining 2 are used to control the motor via step-pulse and direction signals.

SMD74 have optional a 4 pin connector where "Enable" input and "Error" output signal are available.

- OEM low-price driver for Step motors

- Dimensions only 52.4x52.4x14 mm

- SMD73 Power Supply from 18-28VDC

- SMD74 Power Supply from 18-48VDC

- LED indicators for error and power on

- Operates in 200, 400, 800, 1000 or 1600 steps/rev. to order

- Motor current 0-3 A RMS selectable by resistor

- 24 V NPN/PNP and 5 V inputs available

- Can be mounted on a surface or directly on NEMA23/34 High Torque motors

- Motor control via step-pulse and direction signals

- Can handle up to 50 ksteps/ sec.

- Also available with built-in step generator and as DC driver, up to 4 A RMS

- Protected against thermal overload, current overload, short-circuit
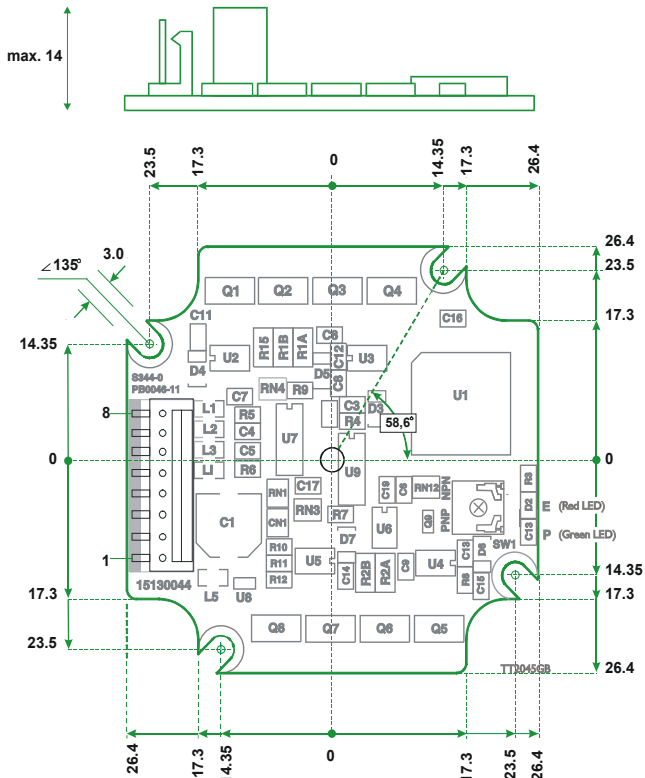
Step Motor Driver SMD74 offer:

Step Motor Driver SMD74 is a miniature driver that measures only 52.4x52.4 mm and is ideal for direct mounting onto a step motor or in a cabinet. It's can also be used in JVL MIS23x integrated steppermotors and MIL23x linear integrated stepper motors. SMD74 are new and improved version compared to SMD73 that it can replace 100%. Additional features compared to SMD73 are supply voltage up to 48VDC for higher speed and also more efficient driver so it can work up to 85'C degree. Also a 4 pin connector with error output and enable input available. It will work with almost any type of high-torque stepper motors and can be mounted on a plane surface.

- Supply voltage up to 48VDC
- Use more efficient MOSFET for higher operation temperature
- Ultra efficient driver with low heat dissi pation
- Better EMC noise filtering in power and motor lines
- Additional 4pin connector for Error output and Enable input
- Ultra high efficient driver for up to 85'C degree operation.
- Motor current 0,1 to 3.0 Amp RMS to order
- Protected against thermal overload, cur rent overload, short-circuit
- Many cables can be delivered with Molex or M12 connector for easy adaption to own cabinet.
- Can be coated with for environment with eg condensation water.

System

PLC/PC	Step Motor Driver SMD73	Step Motor

Step-pulse

Direction

Ground

18-28VDC

TT2046GB
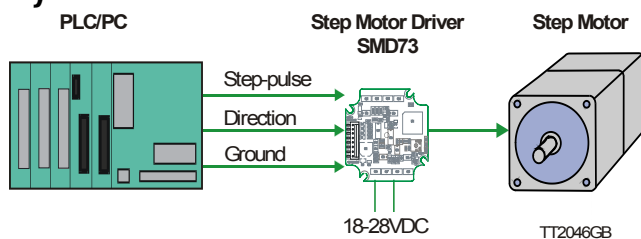
Physical Dimensions SMD73

All dimensions in mm
Tolerance +/- 0,1 mm

Mounting :
Use standard M3 screws with Ø6 mm heads to avoid collision with components on the PCB. Note that there are components on the top side only. The reverse surface is plane and can therefore be mounted directly on another surface using a heat-conducting silicon plate between the Driver and surface.

Technical Data SMD73 and SMD74

		Min	Max.	Units
Power supply				
Supply voltage SMD73		18	28	VDC
Supply voltage SMD74		18	48	VDC
Supply current			5	ADC
Driver stage				
Chopper frequency		18	20	kHz
Motor current (per phase)		0,0	3,0	A RMS
Standby current		0,0	3,0	A RMS
Step-pulse input: "SCK" "IN1"				
Voltage logic "1"		10	30	VDC
Voltage logic "0"		0	5	VDC
Pulse width logic "1"		10		s
Pulse width logic "0"		10		s
Rise time			1	s
Fall time			1	s
Frequency		0	50	kHz
Step resolution				
No. of steps per whole step: 1/2/4/5/8				
Direction input: "DIR" "IN2"				
Voltage logic "1"	1)	10	30	VDC
Voltage logic "0"	1)	0	5	VDC
Various				
Temperature range	2)	0	45	°C
Weight		14	17	gram

1) TTL input: 0–5 VDC
2) Temperature range for E version is –20 to 70°C and humidity up to 90% RH

Physical Dimensions SMD74
Same measurements as SMD73
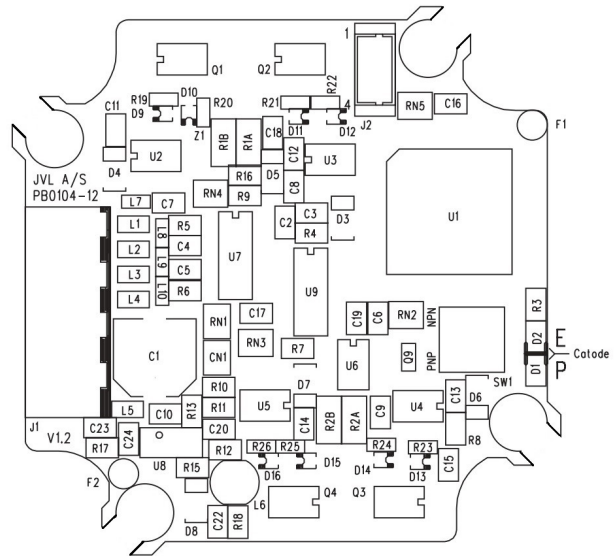
Connections SMD73 and SMD74

Connection to the Driver is made via an 8-pole connector with 2.54 pin separation. Designations are:

1 "GND" Supply ground. Also used as ground for "DIR" and "SCK" inputs.
2 "24V" Supply. Must be fused, max. T5A
3 "SCK" Step-pulse input. Each pulse applied to this "IN1" input makes the motor move 1 step.
4 "DIR" Direction input. Selects the "IN2" direction of motor movement.
5 "MB–" Motor output, phase B–
6 "MB+" Motor output, phase B+
7 "MA–" Motor output, phase A–
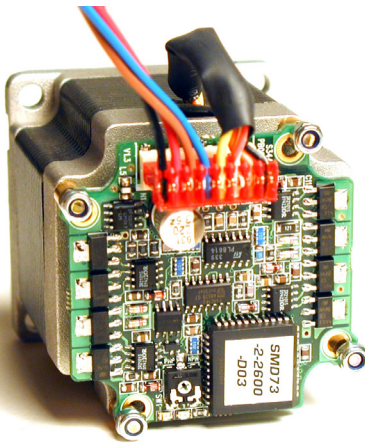8 "MA+" Motor output, phase A+

The "SCK" and "DIR" inputs must be supplied with signals

4pin connector (SMD74 only)

1 NC
2 Enable input. 1 Kohm to Gnd. Max 3.3V. Motor ignore pulses when active high.
3 Error output. 3.3 VDC. Active parallel with ERROR LED.
4 Gnd

Technical Data SMD74 4pin connector

	Min	Max.	Units
Enable input			
Voltage logic "1"	2,7	3,3	VDC
Voltage logic "0"	0	0,5	VDC
Error output			
Voltage logic "1"	2,5	3,3	VDC
Voltage logic "0"	0	0,8	VDC

Step resolution:

As standard, the SMD73 and SMD74 can be delivered with step resolutions of 1/1, 1/2, 1/4, 1/5 and 1/8 (200, 400, 800, 1000 and 1600 pulses/rev).

Running current:

The default running current is 2.6 ARMS and standby current is 0.86 Amp. Changing 2 resistors, R5 and R6, (see next page), can alter the oper-ating current. Standby current will always be 1/3 of the running current. Other currents can be achieved by selecting other resistor values. However the two resistors must always have the same value. The table below gives typical values for running current and standby current for different resistor values. The current is measured RMS at 50 step/sec.

Standby current:

Standby current is always 1/3 of running current (1:3). Different ratios from 1:1 and up to 1:31 can be specially programmed by JVL for orders of more than 100 units per shipment. JVL modifies the EPLD U1 and the user cannot do this.

R5 and R6 (ohm)	Running Current RMS (mA)	Standby current RMS (mA)
150	250	80
270	500	170
390	750	250
560	1000	330
664	1250	420
820	1500	500
980	1750	580
1150	2000	660
1260	2250	750
1500 (default)	2600	860
1800	3000	1000

Minimum current

Note that the minimum current is dependent on winding inductance and resistance in the step motor. If e.g. a step motor with low inductance is used and the current of 0.10 Amp is required, this cannot be accomplished because of a small time delay in the driver. (Min. current = SupplyVoltage*0.02/Phase Resistance). For example, the Vexta PK245-01A has 3.3 ohm phase resistance. At 24V this results in a minimum current of 0.15 Amp.)

Other versions

Step Motor Driver SMD73 can also be configured by JVL to include a step generator and to control DC- or step motors at selectable velocity, stand-by/operating current, change of direction, etc. For example, it is possible to control a DC motor so that input 1 selects start/stop and input 2 determines velocity. Example of order number for special versions:

Ordering code

SMD73-2-1000E03☐
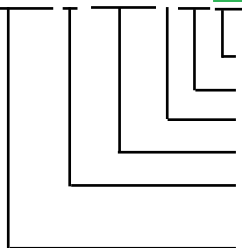
- Blank: Step Driver, G: DC Driver, H: Special coating, Mxvvv:Built-in Oscillator
- Standby current ratio 01-31 (Example: 03 = 1/3 standby current)
- D: 24V NPN Inputs, E: 24V PNP inputs, F:5V inputs.
- Running current in mA
- Step resolution 1: 1/1 (200 steps/rev.); 2: 1/2 (400 steps/rev.); 4: 1/4 (800 steps/rev.); 5: 1/5 (1000 steps/rev.); 8: 1/8 (1600 steps/rev.)
- Step motor driver SMD73 and SMD74

Step and direction input:

The standard version of the Step Motor Driver is intended for 24V NPN signals. By turning the PNP/NPN Switch anti-clockwise, the step and direction inputs can be changed to 24V PNP. If 5V input is required, solder a jumper on Z1 (see next page), on the back of the PCB. The table below gives the "High" and "Low" signal levels for NPN and PNP inputs. Placement of the resistors can be seen below on the circuit board illustration and the circuit diagram.

	"High signal" [Volt]	"Low signal" [Volt]	PNP/NPN selector	5V/24V selector Z1 (on rear side of print)
PNP	7,5–30VDC	0–7,5VDC	Turn left (PNP)	Off
NPN (Default)	7,5–30VDC	0–7,5VDC	Turn right (NPN)	Off
5V TTL/CMOS	7,5–30VDC	0–2,5VDC	Don't care	On
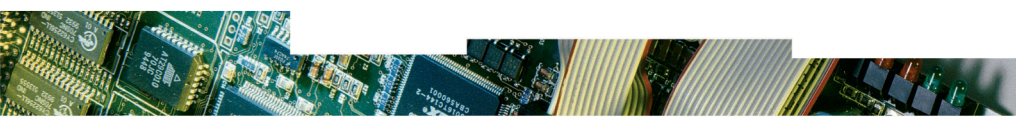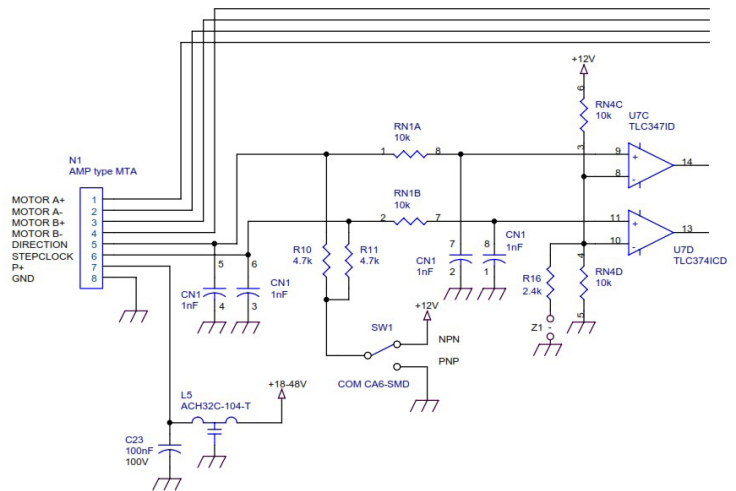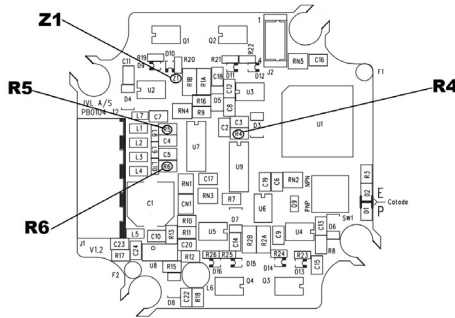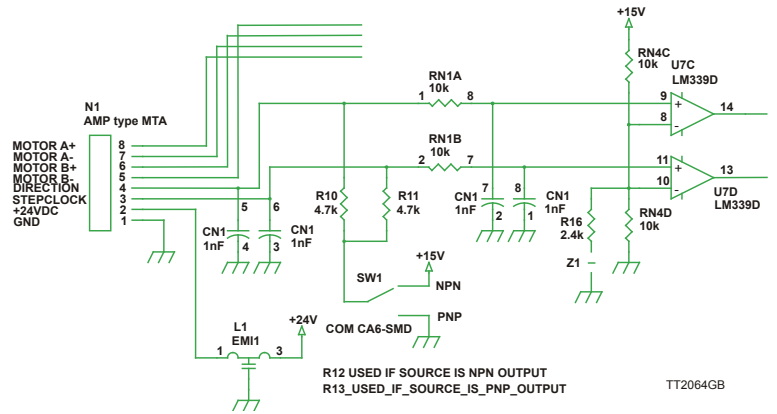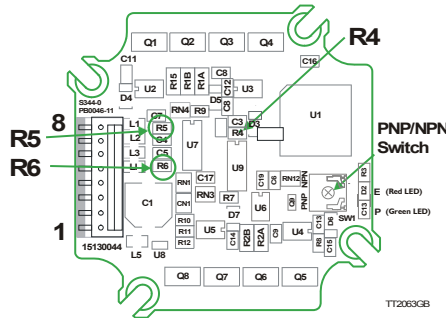
DC driver

The Driver can also be used for controlling DC motors. The 2 inputs can for example be configured to select direction, enable or low/high speed. Other configurations are possible. If one DC motor is controlled, the current can be a maximum of 8 Amp. If 2 DC motors are to be controlled, the maximum current for each is 4 Amp.

Pin no. on SMD73 connector	Pin description SMD73/4	WG0104* 4 pole connector	WG0108* 8 pole connector	WG0114 Clk/dir with shield and power	WG112 Motor cable with shield	WG0805 Male 5 pin	WG0813 Female 4 pin D-type	MST001A-73 Motor with special clk-dir + power cable
8	MA+		Grey (8)		Black (4)			White/Black from motor
7	MA-		Orange (7)		Orange (3)			Orange from motor
6	MB+		White (6)		Red (2)			White/red from motor
5	MB-		Yellow (5)		White (1)			Yellow from motor
4	DIR	Blue (4)	Blue (4)	Blue		Black (4)	Grey (2)	Blue
3	SCK	Brown (3)	Brown (3)	White		White (2)	Pink (4)	Brown
2	24V/48V	Red (2)	Red (2)	Red		Brown (1)	Blue (1)	Red
1	GND	Black (1)	Black (1)	Black + Shield Black		Grey (5)	Red (3)	Black
Connector		AMP MTA-100 640440-4	AMP MTA-100 640440-8	AMP MTA-100 640440-4	AMP MTA-100 640440-4	AMP 770602-8 770601-1	JST ZHR-4 SZH-002T-P0,5	AMP MTA-100 640440-8
Number of conductors		4	8	4 + Shield	4 + Shield to cable clamp	4	4	4
Conductor area		AWG22 0,35mm²	AWG22 0,35mm²	AWG22 0,35mm²	AWG22 0,35mm²	-	-	AWG22 0,35mm²
Cable diameter		-	-	4,5mm	5mm	-	-	
Length		1m	1m	5m	5m	-	-	2m

Connector:

We recommend an AMP connector type MTA-100 640440 because the AWG22 cable fits that connector. Other connector types with 2.54 mm spacing can also be used. Remember to use a cable and terminal in the connector that can withstand currents up to 4 Amp.

Measuring Points TP1 and TP2

Wires can be connected to the measuring points TP1 and TP2 for other purposes.

1: "Power", green LED on SMD73, is supplied from +24VDC via a resistor of 4,7 kOhm. The cathode of the LED is connected to ground. The measuring point TP2 is the anode of the LED. When the LED is lit, there is 1 volt on TP2. If the LED is removed, there will be +24VDC on TP1.

2: "Error", red LED on SMD73, is supplied from an IC (EPLD) output of 3.3VDC via a 470 ohm resistor. The cathode of the LED is connected to ground. The measuring point TP1 is the anode of the LED. When the LED is lit, there is approximately 1 Volt on TP1. If the LED is removed, there will be +3.3VDC on TP1.
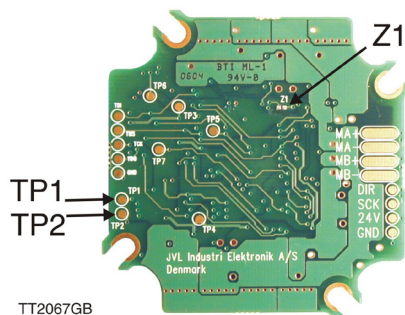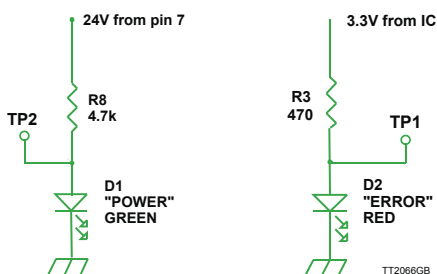
SMD74 Test point on the PCB

|	
TP1	Error LED anode
TP2	Power LED anode
TP3	3.3VDC
TP4	12VDC
TP5	Start up circuit
TP6	4.25 MHz
TP7	Reset

TT2067GB

* Warning.

If these cables are used for "SMD7x-x-xxxx-Fxx" (drivers with input set-up for 5V) be sure that the ground wire (black) is not longer than 10-20 cm from the signal source producing the clock and direction signal. If a longer ground wire is used it can introduce unintended noise at the clock signal which will make the motor stall or be unstable.

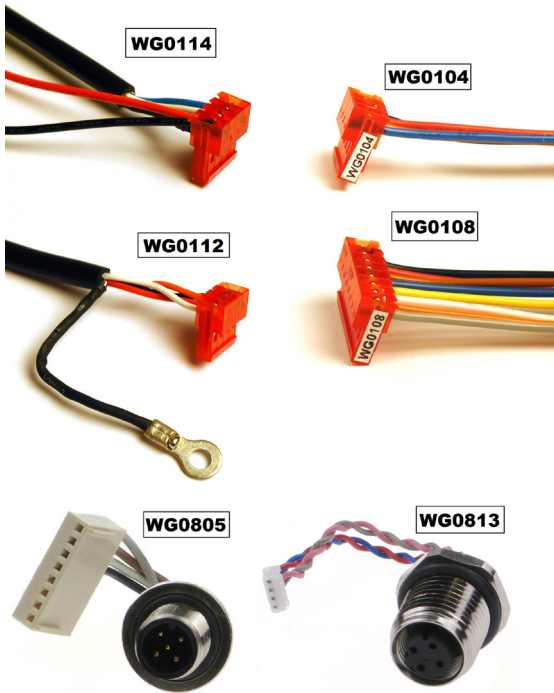In general it is recommended to split the ground wire in 2 wires as close to the driver as possible. One ground for the power supply and one for the clock and direction signal. An idea could be to use the mounting holes as supply ground since they are internally grounded. All 4 mounting holes are
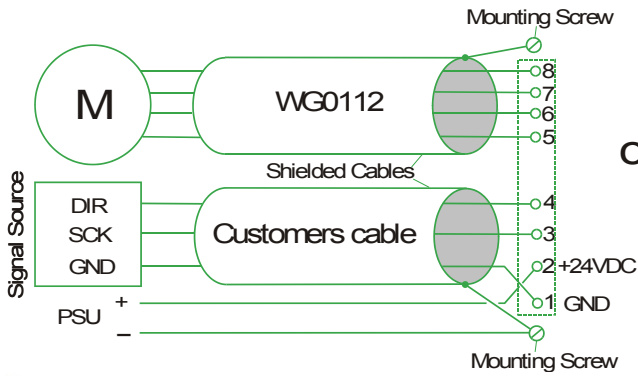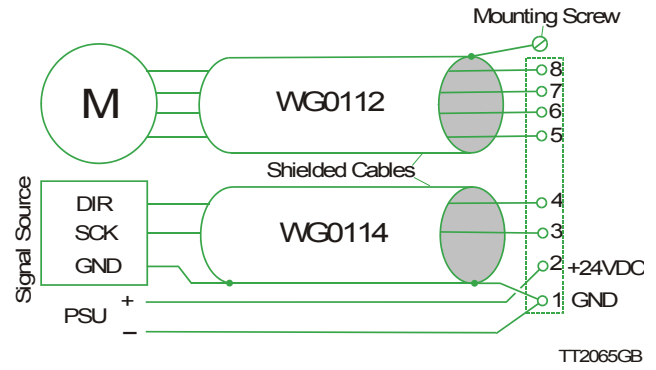
Cables

A variety of cables are available for connecting the SMD73 driver to other equipment.

JVL Order no.	Description	Protection class
WG0104	4 pole con with 1m wire 0,5mm. 2 for motor or inputs. Not shielded	–
WG0108	8 pole con with 1m wire 0,5mm. 2 for motor and inputs. Not shielded.	–
WG0112	4 pole con with 5m cable 0,5mm. 2 for motor. Shielded	–
WG0114	4 pole con with 5m cable 0,5mm. 2 for inputs. Shielded	–
WG0805	5 pin M12 A male with 62mm wires for motor and puls/dir	IP67
WG0813	4 pin M12 D female with 87mm wires for additional IO connector.	IP67

Driver with internal oscillator. (Only available with SMD7x-4 with ¼-step resolution)

The M version provides the possibility for an internal oscillator so that the motor will run simply by activation of input1 (Step-clock). The direction of rotation can be changed by activating input 2 (Direction). 24V PNP/NPN and 5 V inputs as well as different currents are possible. The step resolution is fixed at 800 ministeps/revolution.

Changing the value of resistor R4 will change the speed. No acceleration or deceleration is introduced which means that the motor speed will immediately go up to the chosen value. If too high a speed is chosen, the motor will not start since the load inertia is too high. The table below shows how to change the speed. Please interpolate between the values if other speeds

are required. Please note that the PWM frequency of the motor voltage will also change. If a motor with a low inductance is used, the PWM frequency can be audible. The speed tolerance is +/- 10 %, mostly because of initial tolerances and temperature changes.

R4	Speed (M1) SMD7x-4-xyzM1vvv	Speed (M2) SMD7x-4-xyzM2vvv	Speed (M3) SMD7x-4-xyzM3vvv	PWM frequency	vvv
470 Ohm	86,4 RPM	172,8 RPM	345,6 RPM	17,6 kHz	470
560 Ohm	78,2 RPM	156,4 RPM	312,8 RPM	15,92 kHz	560
680 Ohm	67,2 RPM	134,4 RPM	268,8 RPM	13,68 kHz	680
820 Ohm	61,2 RPM	138,0 RPM	244,8 RPM	12,02 kHz	820
1K Ohm	53,5 RPM	107,0 RPM	214,0 RPM	10,90 kHz	1K0
1K5 Ohm	44,0 RPM	88,0 RPM	176,0 RPM	8,96 kHz	1K5
2K2 Ohm	30,7 RPM	61,4 RPM	122,8 RPM	6,25 kHz	2K2
2K7 Ohm	22,4 RPM	44,8 RPM	89,6 RPM	4,56 kHz	2K7
Custom made	-	-	-	-	S01

WARNING !

Do not change the value of R4 to a value outside the range given above, since this can damage the driver.
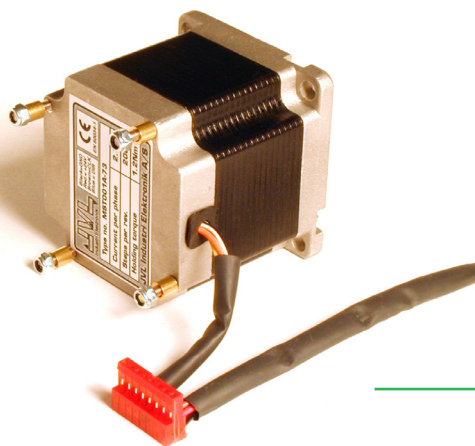
Ordering example:

1.25 amp/phase motor. Speed 236 RPM and 24V PNP. Select the M3 version and change R4 resistor from 470 ohm to 820 Ohm. PWM frequency will be about 12 kHz.

Order no. SMD73-4-1250E03M3. For orders over 100 units, JVL can mount the resistor. Order no. SMD73-4-1250E03M3820

Motor for Driver SMD73

A special version of the high torque step motor MST001A is available as type MST001A-73. This model is prepared for rear mounting of the SMD73 driver and can be delivered from stock. It is provided with fixtures for the driver and cabling with driver connector, and thus offers an optimal solution for a complete integrated small step motor.
The combination includes 1000mm lead wires for supply, step CLK and direction.