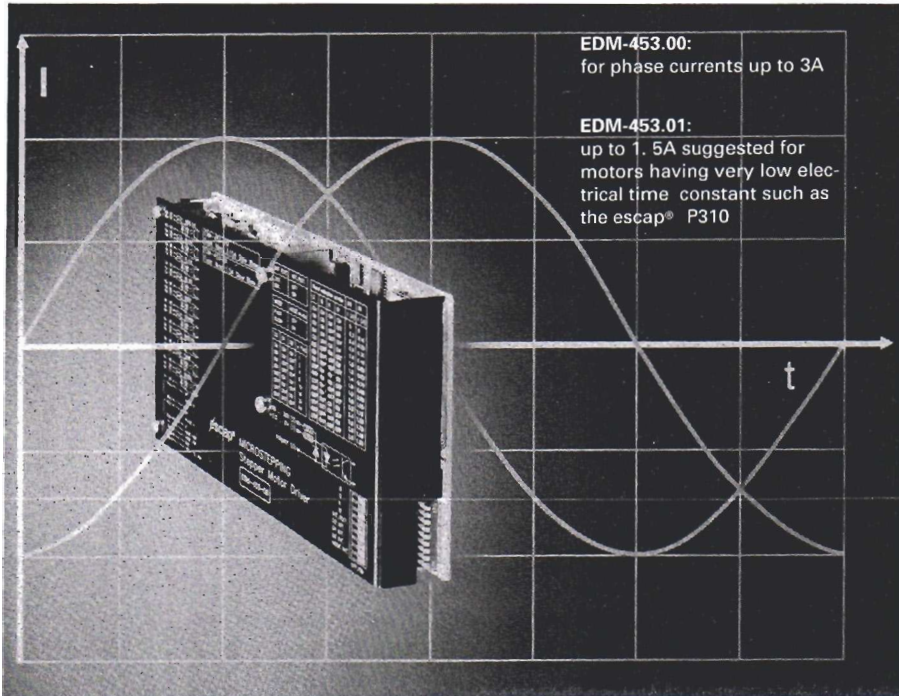


Drive Circuit for Microstep Mode escap[®] EDM-453



- Single power supply voltage 12 V to 45 V_{DC}
- Choice of 8 various resolutions by switches or by logic inputs, from full step to 64 microsteps per full step
- Output current up to 1.5A or 3A per phase selected by switches
- Boost and stand-by current facility
- Chopper control mode selectable between regenerative and freewheeling
- All inputs opto-isolated
- Short-circuit and overtemperature protection
- Clock frequencies up to 150 kHz
- Eurocard format 160x100x30 mm, 0.3 kg
- Recommended for the escap[®] motor types P310, P430, P520, PP520, P530, PH632, P630, P850

The EDM-453 offers the choice between full step or microstep operation, with 2, 4, 8, 10, 16, 32 and 64 microsteps per full step. Microstep operation of a stepper motor provides substantial advantages: increased system resolution, smooth movement, reduction of noise in the motor, the driver, and the load. escap[®] disc magnet stepper motors designed especially for microstepping feature a pure sinusoidal torque function and very little detent torque. This makes positioning on any microstep possible; both static and dynamic angular accuracy are excellent.

From a control input or a front panel switch the EDM-453 chopper can be set to either freewheeling or regenerative mode. This assures optimum results: freewheeling provides low current ripple for reduced noise and heat generation; in regenerative mode the dynamic system response is optimised. Boost and standby current values may also be called up through control inputs, providing more torque during acceleration and reduced power dissipation at stall. The driver is designed for motors which have a short electrical time constant, allowing to taking full advantage of their dynamic performance.

Implementation of the EDM-453 is very easy. Selection of the nominal phase current value is done by front panel switches. The number of microsteps may be changed both through control signals and through switches. The control inputs use optocouplers for highest noise immunity, they may be driven from 3.5V to 6V (input 1) or from 10 to 30 V sources (input 2). With the LED cathode also accessible complete freedom in selecting the control mode is provided for every input. Overtemperature and short-circuit protections are also part of the design of this high performant yet economic microstepping drive.

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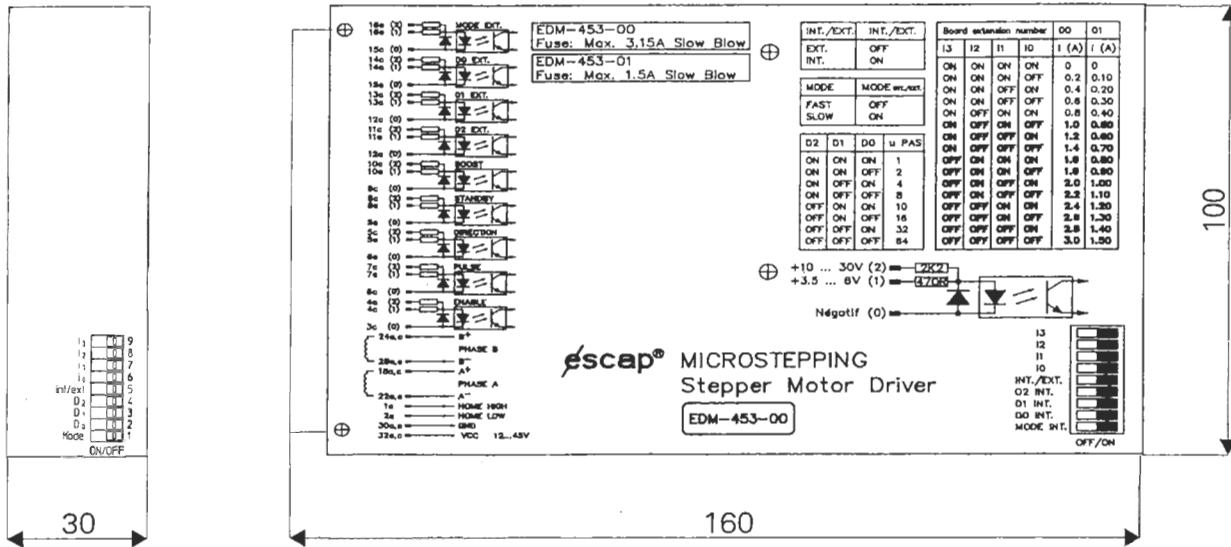
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Drive Circuit for Microstep Mode escap® EDM-453



Dimensions in mm

| | |
|---------------------------------------|--|
| Power supply voltage | 12 to 45 V _{DC} , unregulated |
| Max. phase current EDM-453.00 | 3 A, fuse max. 3.15 A slow blow |
| Max. phase current EDM-453.01 | 1.5 A, fuse max. 1.5 A slow blow |
| Boost/standby current values | nominal + or - 33% (3 A max.) |
| Optocoupler inputs: | |
| input 0 | 0 V or GND |
| input 1 (int. series resistor 470 Ω) | +3.5 ... +6 V |
| input 2 (int. series resistor 2.2 kΩ) | +10...+30 V |
| current | 15 mA typ., 20 mA max. |
| Max. clock frequency | 150 kHz |
| Operating temperature | 0°C to +50°C |
| Permissible plate temperature | + 70 °C |
| Dimensions | 160x100x30 mm, 0.3 kg |
| Connector | DIN 41612/D64 |

| | A | C | |
|------------------|------|---|------------------|
| NC | φ 1 | φ | HOME H |
| NC | φ 2 | φ | HOME L |
| NC | φ 3 | φ | ENABLE 0 |
| ENABLE 1 | φ 4 | φ | ENABLE 2 |
| DIRECTION 1 | φ 5 | φ | DIRECTION 2 |
| DIRECTION 0 | φ 6 | φ | CLOCK 0 |
| CLOCK 1 | φ 7 | φ | CLOCK 2 |
| STANDBY 1 | φ 8 | φ | STANDBY 2 |
| STANDBY 0 | φ 9 | φ | BOOST 0 |
| BOOST 1 | φ 10 | φ | BOOST 2 |
| D ₂ 1 | φ 11 | φ | D ₂ 2 |
| D ₂ 0 | φ 12 | φ | D ₁ 0 |
| D ₁ 1 | φ 13 | φ | D ₁ 2 |
| D ₀ 1 | φ 14 | φ | D ₀ 2 |
| D ₀ 0 | φ 15 | φ | MODE 0 |
| MODE 1 | φ 16 | φ | MODE 2 |
| NC | φ 17 | φ | NC |
| PHASE A+ | φ 18 | φ | PHASE A+ |
| NC | φ 19 | φ | NC |
| NC | φ 20 | φ | NC |
| NC | φ 21 | φ | NC |
| PHASE A- | φ 22 | φ | PHASE A- |
| NC | φ 23 | φ | NC |
| PHASE B+ | φ 24 | φ | PHASE B+ |
| NC | φ 25 | φ | NC |
| NC | φ 26 | φ | NC |
| NC | φ 27 | φ | NC |
| PHASE B- | φ 28 | φ | PHASE B- |
| NC | φ 29 | φ | NC |
| 0 VDC | φ 30 | φ | 0 VDC |
| NC | φ 31 | φ | NC |
| + VDC | φ 32 | φ | + VDC |

The nine front panel switches

The nominal phase current value is selected using the four switches I0 to I3.

It is normally set to the nominal value, 1-ph-on, given in the escap® catalogue. With the ENABLE input open the driver is inhibited.

Switch 5 INT/EXT determines whether the selection of the number of microsteps per step and of the chopper control mode is made through the logic inputs (OFF = EXT) or through the front panel switches (ON = INT).

Switches 2 to 4 (D0 to D2) determine the number of microsteps.

The chopper control mode is selected by switch 1: MODE INT = OFF selects the regenerative mode, MODE INT = ON selects freewheeling.

Attention: Switch 5 overrides the selection made on switch 1. With 5 = OFF, the mode is set according to the state of the MODE input pin 16: open = regenerative mode, energised = freewheeling mode.

Levels required at the D0/D1/D2 inputs as a function of the number of microsteps:

| μst/step | 1 | 2 | 4 | 8 | 10 | 16 | 32 | 64 |
|----------|---|---|---|---|----|----|----|----|
| D0 | H | L | H | L | H | L | H | L |
| D1 | H | H | L | L | H | H | L | L |
| D2 | H | H | H | H | L | L | L | L |

Leaving inputs open, or the switch in position OFF, is equivalent to LOW. Energising them or switch in position ON is equivalent to HIGH.

The HOME H output is at +5 V. It should normally be connected to HOME L. Then its level is pulled down to zero each time the drive is in the home position of a sequence (phase A full positive current, phase B no current).

Positions of switches I0 to I3 and resulting nominal phase current values (I₀₀ values are for the "EDM-453.00" version for currents up to 3 A, I₀₁ values are for the "I₀₁" version providing currents up to 1.5 A):

| I ₀₀ | 0 | 0.2 | 0.4 | 0.6 | 0.8 | 1 | 1.2 | 1.4 | 1.6 | 1.8 | 2 | 2.2 | 2.4 | 2.6 | 2.8 | 3 |
|-----------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| I0 | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| I1 | ON | ON | OFF | OFF | ON | ON | OFF | OFF | ON | ON | OFF | OFF | ON | ON | OFF | OFF |
| I2 | ON | ON | ON | ON | OFF | OFF | OFF | OFF | ON | ON | ON | ON | OFF | OFF | OFF | OFF |
| I3 | ON | ON | ON | ON | ON | ON | ON | ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| I ₀₁ | 0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 |