FD2.1E

Integrated stepper motor driver

FD2.1E belongs to FD family micro-stepper drives. It is designed in a compact solution to be mounted directly on motor end-shield.

MAIN CHARACTERISTICS

Supply voltage	24 – 130 V_{DC}
Motor current	Up to 10 A_P per phase
Motor type	Bipolar, 4 wires
IP	40 or 54 (suffix W)
Inputs	7 Digital opto-insulated
Outputs	3 Digital pnp-type
Field-bus interfaces	Modbus (RS-232) EtherCAT (CoE)
Encoder	12-bit/rev absolute single revolution
Dimensions [mm]	120 x 86 x 16 mm + motor 124 x 90 x 16 mm + motor (suffix W)

FEATURES

- Torque Control loop

Adjustable I_{MAX} (current at maximum torque)
Adjustable I_{MIN} (current at no torque)

- Step accumulator with programmable alarm limit

- 12-bit absolute encoder

Absolute multi-turn position recovery at power on

- Step / dir or quadrature steps

- 32 programmable cycles, 10 cycles sequences

Predefined movements can be selected, started, stopped using digital inputs. Configurable speed, acceleration, deceleration, target position with linear, parabolic and jerk motion profiles.
Complex cycles as homing, delta stop, delay or sequence of cycles are also selectable and started.

- Position resolution

Configurable µsteps per revolution (400 – 208 400 µsteps/rev)

- Over temperature (100 °C), over voltage and short circuit alarms

- Fully re-programmable via RS-232

- EtherCAT using CoE protocol (CAN over EtherCAT),

- External Logic supply

24 V_{DC} to supply the logic and the communication (multi-turn position retention, communication always active)

FD drives are all controlled by 72 MHz ARM-based microcontroller. They are equipped with very low R_{DS-on} MOSFETs and Hall effect current sensors to optimize power efficiency.

The drive is equipped with 12-bit magnetic encoder, which can be used to verify the correct execution of the ordered steps, to modulate the motor current with the load and other functions which are described in detail on firmware manuals.

FD2.1E is equipped with configurable I/O's (7 inputs and 3 outputs), which can be used as step / dir or quadrature steps mode and start, stop, cycle selection mode, plus transceivers RS-232 (from 4 800 up to 115 200 bps) for Modbus communication, firmware and parameters reprogramming.

FD2.1E implements EtherCAT communication through industrial circular connectors (M12). Modes of operations such as CSP, CSV, Homing, Profile position mode, profile velocity mode are implemented.

Suffix R, i.e. FD2.1ER, identifies the drives equipped with mild electronic brake, that gets active when power supply is off.

To avoid unwanted heat dissipation FD2.1E implements motor torque control, which reduce the current in absence of resistant torque and increase it proportionally with the load till the maximum value configured. Torque control is active all the times, also at zero speed, which means that if a load is applied when the motor is stopped, the drive will counteract the load, increasing motor current.

The step accumulation function provides great benefits to the application: it allows to accumulate the steps which cannot be executed because of a sudden resistant torque above the maximum motor torque. In this case FD2.1E maintains the maximum motor torque and, when the load decreases, it recovers the steps accumulated, accelerating and reaching the reference position. The engage, which is the change from chasing mode to synchronous mode, takes place through bump-less speed adjustment, without vibrations.

Fig. 1 FD2.1E applied on NEMA 34 stepper motors.

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