CROUZET MOTORS

BDE40 : 11 to 36 V DC - 10 A nominal BDE40 Part number 84855101

Control of all 3-phase brushless Hall effect motors

- 4 quadrants, for closed-loop speed control, torque, holding and power braking control
- Ready for use, supplied with guide, braking resistor, protection diodes and connectors
- For use alone or with a PLC (0-10 V and PWM compatible inputs)

Part numbers

	Type	Type
84855101	BDE40	848551

Specifications

Supply voltage (V)	11 →36 (= V DC)
Nominal current (A)	10
Max. current (A)	14 (internal limiting)
Absorbed current (A)	0,1 (consumption without motor)
Temperature rise (^{o} C)	50
Ambient operating temperature (°C)	-20 →40
Storage temperature (^{0}C)	-40 →90
Weight (g)	305
Safety standards	
On/Off input and Direction of rotation input	
Input impedance (kΩ)	59
Level 0 input voltage (VDC)	< 2
Level 1 input voltage (V)	4 →V DC
Speed input and Torque limit / holding / braking input (0-10 V and PWM)	
Input impedance (kΩ)	10
Control voltage	0 →10 V
Level 0 input voltage (V)	0
Level 1 input voltage (V)	11.5 →V DC
Frequency (Hz)	100 →1000
Hall effect inputs	
Output	
Type PNP open collector	●
Max. current (A)	0,02
Encoder output	
Rest state (V)	+ V DC
Number of 250 µs pulses per motor revolution	3 x number of rotor poles
Torque limit reached output	
Rest state (V)	0
Active torque limitation (V)	+ V DC

Principles

Speed setpoint
Adjustable between 10 % and 100 % of 6000 rpm by PWM signal or analogue (0-10 V) signal.
Torque limit
Adjustable between 10 % and 140 % of the nominal card current by PWM signal or analogue 0-10 V signal. If the control is at 0 % or 0 V or non-connected, the current limit is 140 %.
If the current in the motor reaches the specified limit, the "active limiting" output switches to the "+ supply voltage" value and the current in the motor is automatically limited.
Since the torque value is directly related to the current in the motor, the torque limit can be set in this way.
Make sure that this setpoint is set correctly to avoid exceeding the capacities of the motor used.
Holding torque
Activates if on/off= 1 and speed setpoint= 0.
Its value depends on the "torque limit" setpoint.
Encoder and actual direction of rotation outputs
These two related outputs are used for positioning purposes, using the "high-speed counting" function of a Millenium or other PLC with high-speed inputs (>40 K Hz in order to correctly manage the "actual direction of rotation" information and to be able to "upcount and downcount" without losing pulses on changing direction).
Overheating protection
If the temperature is too high, the protection activates and shuts off the motor. After it has cooled down, an action at the "on/off" input (switching "off" and then "on" again) is required in order to restart the motor.
Overheating is detected at the card and at the motor (if the motor is fitted with an NTC, such as BDE40-compatible motors 801405 and 801805).

Undervoltage protection
If the supply voltage becomes insufficient, the protection activates and shuts off the motor. The motor restarts automatically as soon as the supply voltage returns to the operating range.

Principles

Braking
The braking torque value is adjustable and is controlled by means of the "torque limit" setpoint.
The electronic card has two internal devices for dissipating braking energy. The first system is designed for low dissipation values, the second for higher values.
The first system limits overvoltages to 42 V. For inertias and low speeds, this device is adequate.
Example of usage restriction :
- Braking every 8 seconds of 14.5 10^{-4} kg.m^2 from 3000 rpm to 0 rpm.
- Braking every 8 seconds of 25.4 10^{-4} kg.m^2 from 2000 rpm to 0 rpm.
- Caution : If the specified limits are exceeded, this device will overheat and destroy the card.

In case of doubt, or if the braking phase is long or very frequent, the second internal braking circuit must be used ; this requires an external energy dissipation resistor. In this case the trip threshold for this braking can be set to values below 42 V by means of a jumper on the side of the card.

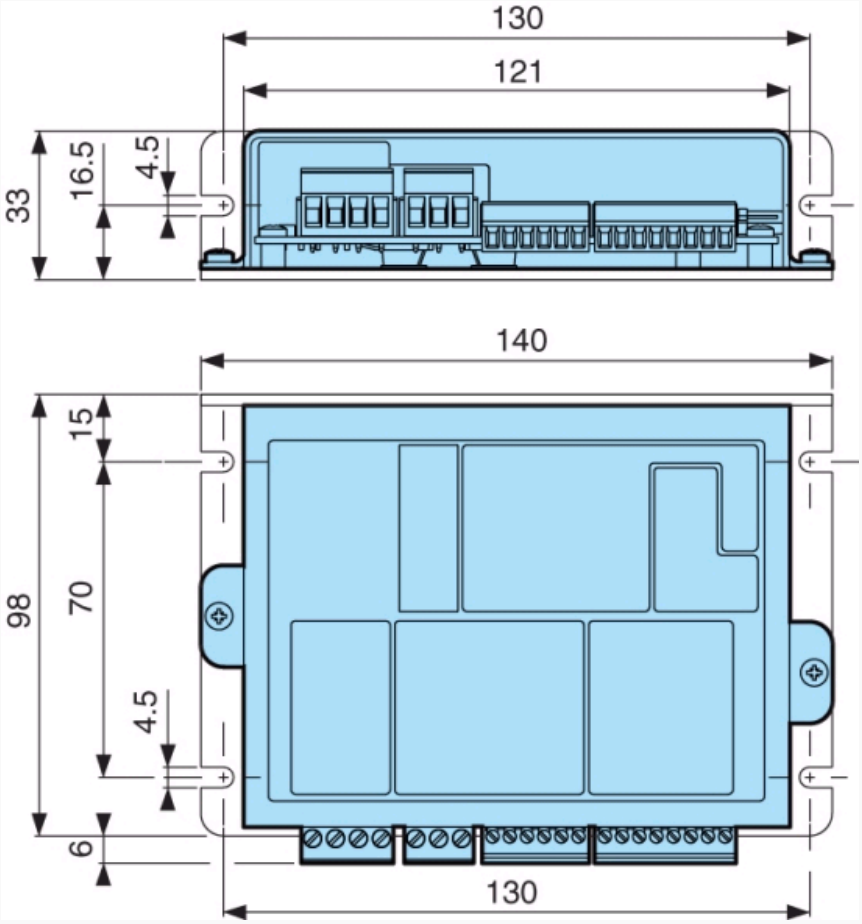
Overvoltage limiting jumper
Located on the side of the card ; various positions allow overvoltages due to heavy braking to be reduced.
Always set the jumper to a value greater than or equal to the "supply voltage + 2 V" to avoid disrupting the power supply.

Number of poles jumper
In order to limit the rotational speed to 6000 rpm, this jumper must be set to the number of "pairs of rotor poles" on the motor used.
Otherwise the speed will be adjusted within a different range. For example, a 4-pole motor (2 pairs) and a jumper set to 4 pairs will give a speed range of up to 12000 rpm. On the other hand, with an 8-pole motor (4 pairs) and a jumper set to 2 pairs, the speed range will be limited to 3000 rpm.

Braking resistor
The control card is supplied with a braking resistor to enable you to carry out your tests. However, you must check that its characteristics correspond to your requirements. Depending on your application, it is possible that it may overheat, in which case it will have to be replaced with a more suitable resistor.
The lower the resistor value, the higher the braking current. Typical values are in the region of a few ohms. The resistor must also be matched to the dissipation power (average and peak), see the guide supplied with the card.
The card is supplied with a 3.3 Ω - 25 W resistor.

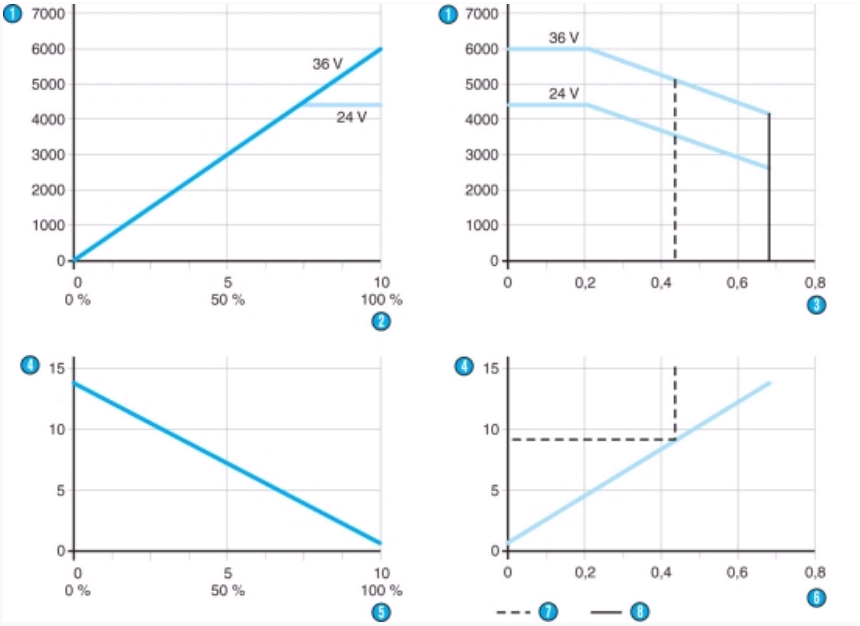
"Non-return" diodes
In some cases, overvoltages due to braking must be prevented from returning to the power supply or other equipment (see "braking" in the basic concepts). If necessary, use the diodes supplied with the card. For connections please refer to the guide supplied with the card.

Dimensions (mm)



Curves

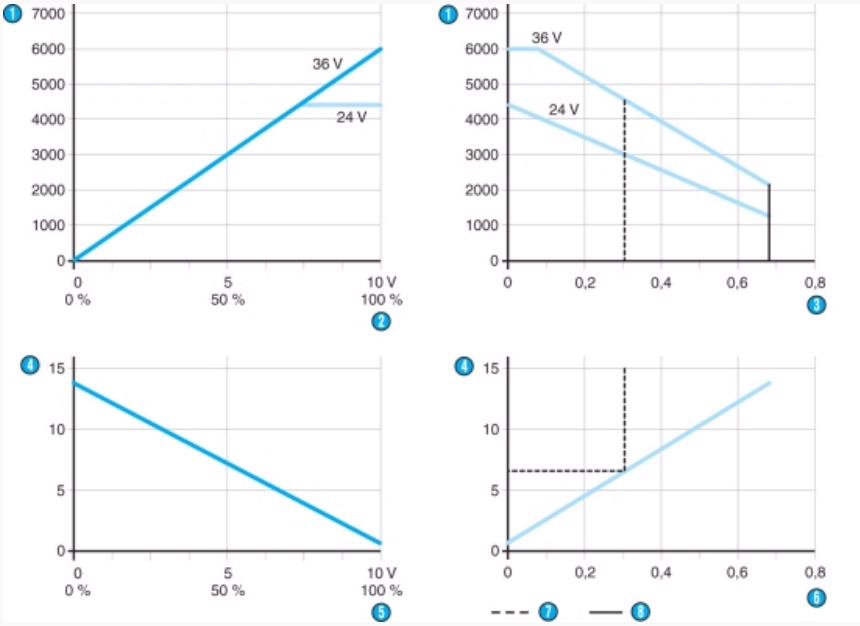
Motor 80190502



Nº	Legend
1	Speed (RPM)
2	Speed setpoint
3	Torque (Nm)
4	Current (A)
5	Torque limit setpoint
6	Torque (N.m)
7	Nominal torque
8	Peak torque

Curves

Motor 80180506

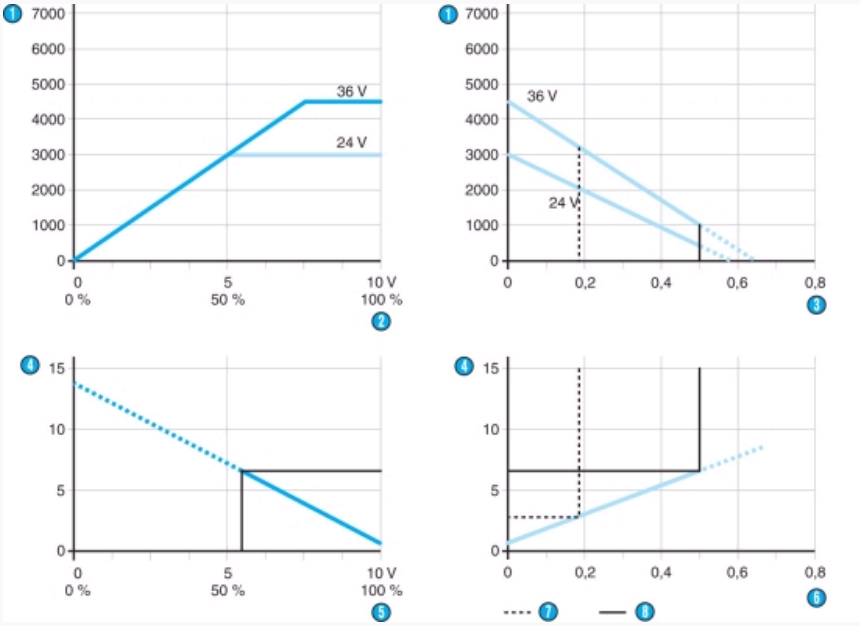


Nº	Legend
1	Speed (RPM)
2	Speed setpoint
3	Torque (Nm)

4	Current (A)
5	Torque limit setpoint
6	Torque (N.m)
7	Nominal torque
8	Peak torque

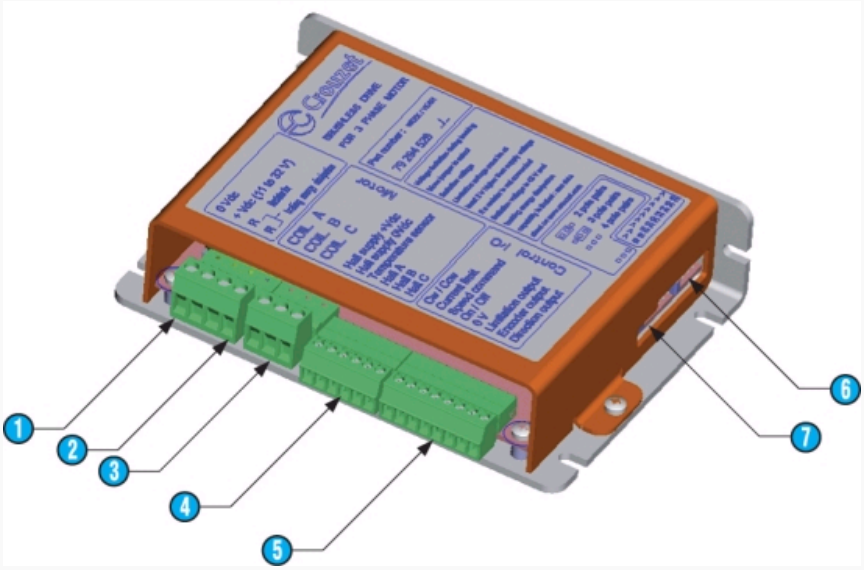
Curves

Motor 80140510



Nº	Legend
1	Speed (RPM)
2	Speed setpoint
3	Torque (Nm)
4	Current (A)
5	Torque limit setpoint
6	Torque (N.m)
7	Nominal torque
8	Peak torque

Connections

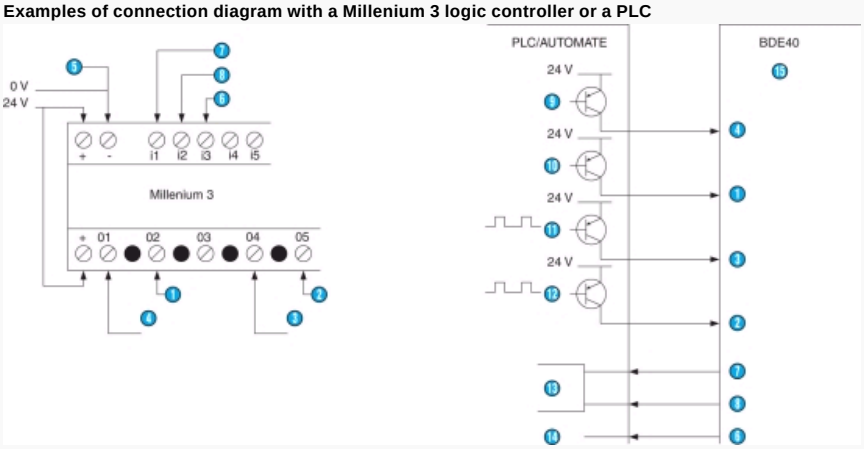


P1 : Supply connector 1 : 0 V 2 : + V DC 3 - 4 : Braking energy dissipation resistor P2 : Motor power 1 : Phase 1 2 : Phase 2 3 : Phase 3 P3 : Hall sensors 1 : Hall supply output +10 V DC 2 : 0 V DC Hall supply 3 : Temperature sensor 4 : Hall sensor 1 5 : Hall sensor 2 6 : Hall sensor 3 P4 : Control I/O 1 : Direction of rotation 2 : Current limit 3 : Speed control 4 : On/off 5 : 0 V 6 : Current limiting output 7 : Encoder output 8 : Actual direction of rotation output

Nº	Legend
1	Supply voltage
2	Braking resistor
3	Motor windings
4	Motor Hall effect
5	Inputs and outputs
6	Braking overvoltage limiting jumper
7	Number of pairs of rotor poles selection jumper

Connections

Examples of connection diagram with a Millenium 3 logic controller or a PLC



NB : The "tachometer" and "actual direction of rotation" card outputs must be connected to inputs i1 and i2 respectively in order to be able to use the Motomate high-speed counter function.

Nº	Legend
1	Direction input
2	Torque limit input
3	Speed setpoint input
4	On/off input
5	Ground
6	Active limiting output
7	12 points/rev encoder output

8	Direction of rotation output
9	Digital PNP output
10	Digital PNP output
11	PWM 100 Hz to 1 K Hz
12	PWM 100 Hz to 1 K Hz
13	24 V counter input (40 K Hz minimum)
14	24 V digital input
15	Control connector

Product adaptations

- Optimisation of settings according to individual applications (speed and torque limit ranges, speed controller parameters, current limits)
- Versions available without accessories (connectors, resistor, diodes, casing)
- Some programming elements for your machine's automation system can be integrated into the card micro-controller