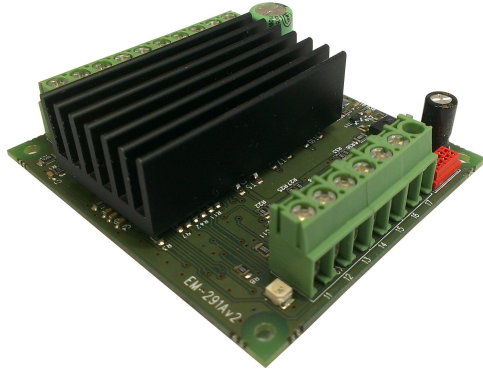


EM-291A BRUSHLESS DC-MOTOR DRIVER 12-35V 4A / 3A



FEATURES

- Only for motors with hall sensors
- Three phase output
- Speed adjustment
- Current limit and trip
- Open/closed loop modes
- Settable indication output
- Good efficiency
- Low current version available (-LC)
- Low EMC emissions
- DIN-rail mountable

GENERAL

EM-291A is a brushless DC-motor driver for motors with hall sensor feedback. The unit has a mosfet power stage with good efficiency and it meets today's EMC requirements. The unit has basic digital command inputs like direction, start/stop and analog input for speed control. The device has one NPN output for fault and overcurrent indication use. Indication output functions can be defined with parameters. The fault situations are also indicated with on-board LED.

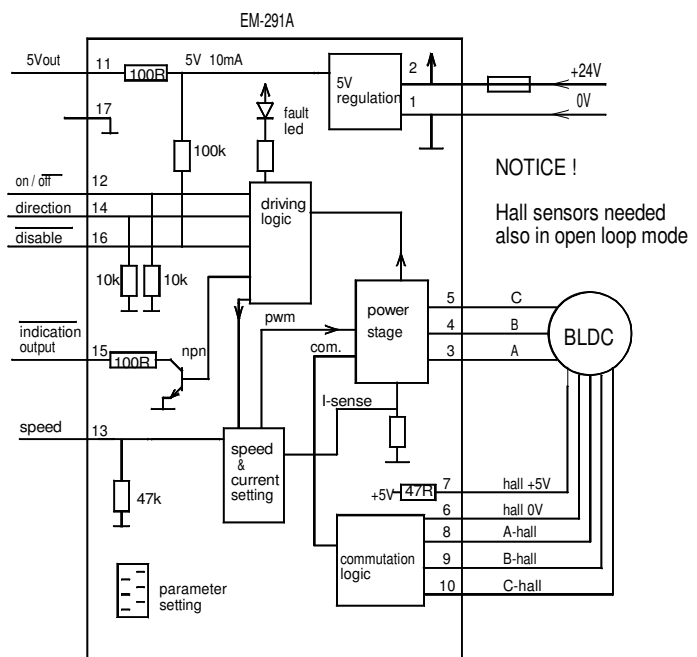
There are two control options for speed. Direct control (open loop) sets motor voltage in proportion to control voltage as with a standard DC-motor. Closed loop mode uses hall sensor feedback for speed control. This mode offers good speed regulation. Start and stop ramps are working in both modes. Speed adjust range, closed loop rpm range and ramps can be set with parameters. Analog input is filtered, so that PWM signal of PLC can be used to control speed.

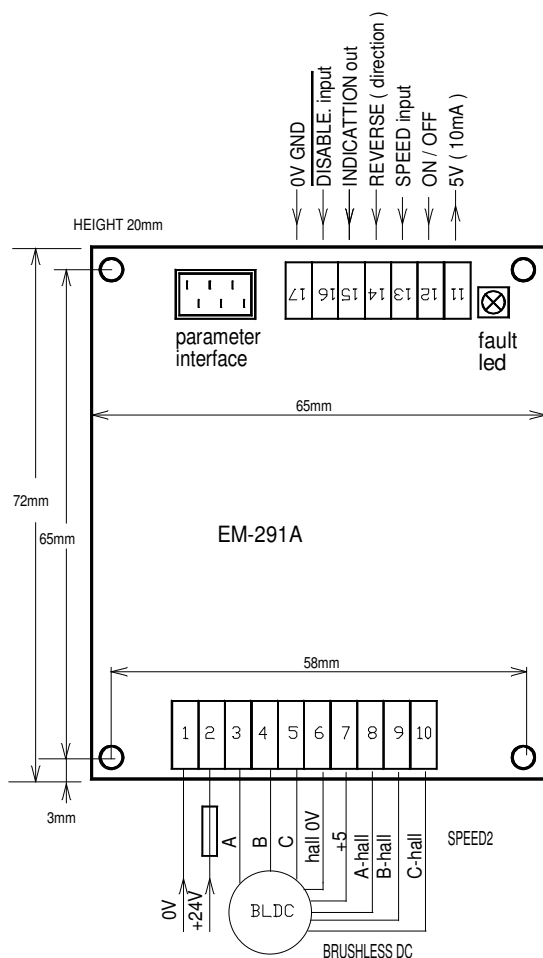
Parameter setting can be done digitally with EM-236 interface unit or with Emen-Tool lite PC-program and EM-268 adapter. There is also the option of using an iPhone with Ementool-APP and EM-326 adapter. The parameter settings are stored into driver's non-volatile memory. The parameter interfaces can be also used for motor current monitoring.

Driver card can be installed in DIN-rail base and some enclosure options are also available.

TECHNICAL DATA

Supply voltage 12-24V (11-35Vdc)
 Idle current typ. 30mA
 Max current 4A cont. (Tamb. 40 °C)
 Max. current 3A cont. (without heatsink / LC vers.)
 Max current peak 6A (max 5s)
 PWM frequency typ. 16kHz
 Current limit setting 0.1-6A (step 0.1 A)
 Logic level of digital inputs
 0-1V or open = "off" / 4-30V = "on"
 Logic level of disable input
 0-1V or open =disabled / 4-30V =on duty
 Input impedance of logic inputs 10k
 Response time of digital inputs 2ms
 Analog input range 0-5V or 0-10V
 Input impedance of analog input 47k
 Speed input low pass filter fc. = 40Hz
 Speed input pwm freq. recom. > 300Hz
 NPN Indication output impedance 100ohm
 EMC measured for industrial and household env.
 PCB material flammability class UL94V-0
 Screw connectors, max 2.5mm² cable
 Dimensions 72x65x20mm
 Din-rail option EM-KP72-65
 Metal-enclosure option EM-T17
 Weight 78g (44g -LC ver.)





EM-291A WIRING and INTRODUCTION

Supply: filtered 12-35VDC with ripple < 20% with full load.
CAUTION ! reverse polarity can damage the unit.
CAUTION ! use an external fuse.

Switch off the power before connecting motor and power supply to EM-291A unit. Prepare the control circuit.
 Switch on the unit, connect the interface and set current limit and ramp time according to application.
 If the motor will not start and takes a lot of current or runs unsmoothly, check the wiring of the motor and hall-sensors.

In open loop mode motor rpm will drop when loaded. The load compensation parameter can be used to reduce speed dropping in open loop mode.
 In closed loop mode the feedback control tries to keep speed constant (in relation to control voltage) until the current limit is exceeded.

ON/OFF and REV... inputs can be used with switches or NPN outputs of a logic. Voltage signal greater than 4V is logic "1", maximum input voltage is 30V. ON/OFF input will start up the motor in forward direction. REVERSE input will start up the motor in reverse direction. When the motor is already running in forward direction, a reverse command will change rotation of direction.
 The disable input releases the power stage, so the motor will run freely. When disable is removed, the motor will start with ramp function.
 Notice that the disable input works with negative logic.

On-board fault led indicates overcurrent or current trip.

PARAMETERS SETTINGS (prog. 291A v1.2)

EM-291A parameters set with interface unit EM-236 or with Ementool-Lite and EM-268 or with Ementool-APP and EM-326 (default values in brackets)

- Operating mode
0 = Open loop / 1 = Closed loop (0)
- Rpm range in closed loop 1000-18000rpm / 1-18 (6)
- Closed loop dynamic 1-5 (3)
higher value means slower dynamic
- Input scale 0 =0-10V / 1= 0-5V
- Load compensation (only open loop use) 0-50 (0)
- Start ramp 0-8 / 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.7, 1.0, 1.5s (4)
- Stop ramp 0-8 / 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.7, 1.0, 1.5s (4)
- Current limit 0-6A / 0-60 (15)
- Current trip delay 0= trip disabled
1-200 = 1-200ms delay(40)
- Indication output function (1)
0 =not in use, 1=current trip, 2= current limit, 3= motor stopped

PARAMETERS DEFINITION

- Open loop or closed loop selection
- Closed loop RPM range can be defined with this parameter, 1000 means that motor speed range is 0-1000rpm
- Closed loop dynamic sets the closed loop control response. The higher the value, slower the response.
- Two selectable basic speed input scale ranges
- Load compensation can be needed in open loop use. It gives additional torque at low rpm. The compensation value depends on the motor. The right value can be found by driving the motor at low speed in open loop mode. For example, increase the compensation value 5 steps at once and try to load the motor. You can feel that the motor torque has increased. Notice that too high compensation value will cause the motor to behave nervously. Keep the compensation value at 0 during closed loop mode.
- & 7. Acceleration and deceleration ramps. These parameters are for smoothening the start stop situations. The start ramp also decreases start current spikes.
- Current limit parameter defines maximum value for current. Driver limits or trips if set value is exceeded. The current is in ratio to motor torque.
- This parameter sets reaction time for current trip. Value 0 disables current trip action and the current will be limited to the value set with parameter 8. The values 1-200ms determine for how long the current limit has to be exceeded, until the driver will shutdown the motor.
- Disabling or selecting the indication output function.

MONITOR VALUES

- Trip status
0= no trip, 1= tripped for FW dir, 2=tripped for REV. dir.
- Speed input signal value
- Motor current 0-30 = 0-3.0A

OTHER.

An iPhone access code can be set when EmenTool-APP control is used. This code can be reset with simultaneous REV. and ON/OFF commands at the same time when power switch on.