

EM-243C-JS1 DC-MOTOR CONTROLLER 12-48V 50A



- JS1 is specially for joystick use
- three point calibration
- compact size
- for motor up to 500W
- high current output
- current limit
- overvoltage brake
- own speed ranges for FW and REV.
- rail base mountable
- digital parameter setting
- JS1 program can be update also for standard EM-243A or 243C boards
- Board version C has extended operating voltage 42V -> 48V
- Prog. 1.3 direction change input added
- Prog. 1.4 stop input, brake output and fan output options added
- Prog 1.6 wire breakage detection added

EM-243C-JS1 is a full bridge DC-motor starter. It is designed for joystick controlled DC-motor applications. The driver has adjustable acceleration and deceleration ramps, which enable the smooth starts and stops. Adjustable current limit protects the motor against overcurrent and it can also be used as an end-stop. This device has also two settable speeds, separate speed ranges for forward and reverse direction. Control input is specially designed for joystick control. The joystick range calibration is done automatically, when calibration function is activated. Calibration detects forward, reverse and midpoint positions. FAULT terminal has simultaneously both input and output functions, the pin is normally high, but is pulled down in overheat and conditionally also in current trip situation. If FAULT-line is pulled down externally it will cause a stop and prevent it from starting again. For example, it is possible to link fault pins of several units together and achieve a synchronous stop.

There are also special settings as start-kick which can be used in case the device is in danger of being jammed.

Limit input can be individually set for NPN or PNP logic.

The parameter's settings can be done with various EM- interface units. Operation of the controller and some of its functional values can also be monitored with interface units.

TECHNICAL DATA

Supply voltage nominal 12-48V, limits 10-58V

Start up voltage 9V, shutdown voltage 8V

Idle current typ 15mA

Motor current max. with 2kHz pwm

100% pwm 50A

20-99pwm% 35A and peak 100A (5s)

Motor current max. with 16kHz pwm

100% pwm 40A

20-99pwm% 20A and peak 60A (5s)

Current limit adjustable 1-100A

Notice! current limit is increased 50% at start

Overheat limit 100°C

Start and stop ramp adjustable 0-5s

PWM frequency 2kHz or 16kHz (selectable)

joystick input scale 0-5 or 0-10V (if dip 1 is ON)

Input control logic: high =4-30V, low=0-1V

Control input impedances typ. 10kohm

Control input response time typ 5ms.

Fault out. NPN open coll. max. 50V / 1A

Fault in activates $U_{in} < 1V$ (NPN)

Brake output NPN max. 5A 60V

Fan output NPN max. 2A 40V

Motor and supply connectors 4mm

Control connectors 1mm

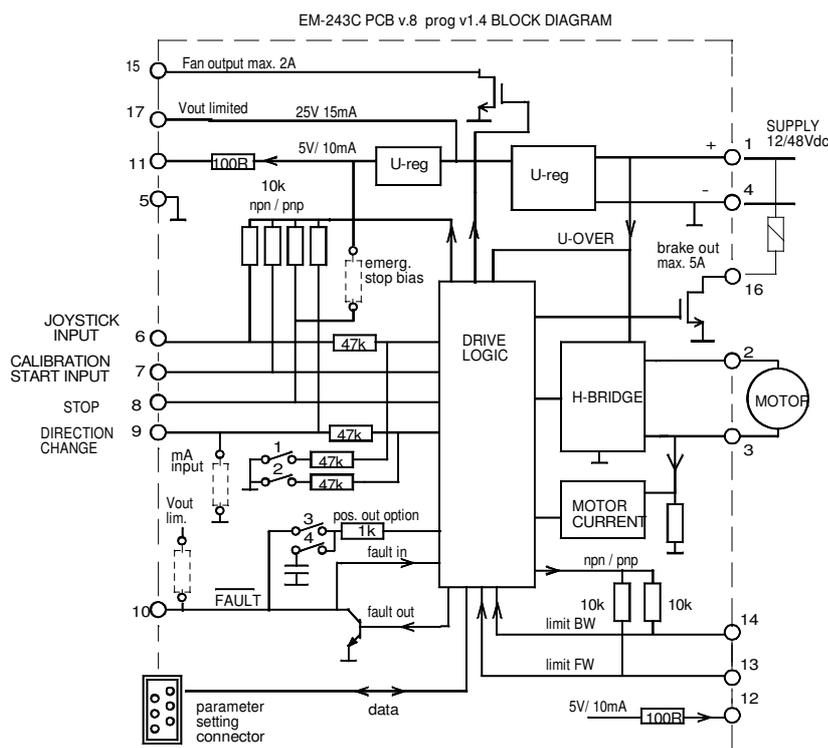
Dimensions 107x72x40mm

Dimensions in DIN-rail base 110x80x55mm

CE-tested for industrial environment (EMC)

Operating ambient temp (Ta) -40...60°C

Weight 190g



CONNECTIONS

Supply voltage recommendation is 12-48VDC and ripple should be less than 30% at full load. Supply voltage limit is 58Vdc
CAUTION ! Wrong polarity can damage the unit.
CAUTION ! Unit doesn't have an internal fuse, so an external fuse should be added if fuse required.

MONITORABLE VALUES

- 1/6 Motor current 0-20A (0-200)
- 2/6 PWM-level-% 0-100% (0-100)
- 3/6 hour counter (max.65535h)
- 4/6 start counter (max.65535)
- 5/6 carry counter for start counter
- 6/6 joystick position 0-1024

FAULT-LED signal codes

- 1. power on one blink
- 2. current on limit led is lit
- 3. current trip fast blinking...
- 4. zero-cur trip long blink- short pause...
- 5. overvoltage 4 x blink -pause...
- 6. overheat short blink- long pause...
- 7. timeout 3 x blink + long blink...
- 8. fault input 2 x short + 1x long blink...
- 9. wiring fault 2 x short + pause...

Special codes for calibration mode
 solid light = calibration can be done
 blink light = calibration is done

ADJUST AND SETTINGS (prog ver. EM-243C-JS1 v1.4)

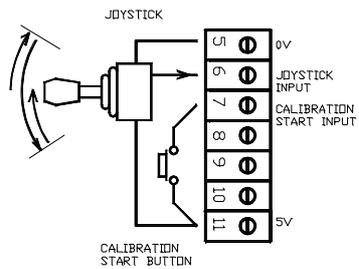
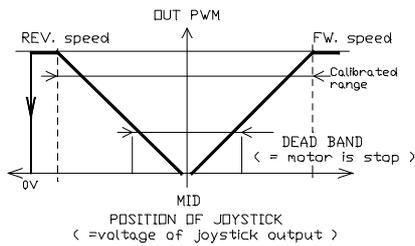
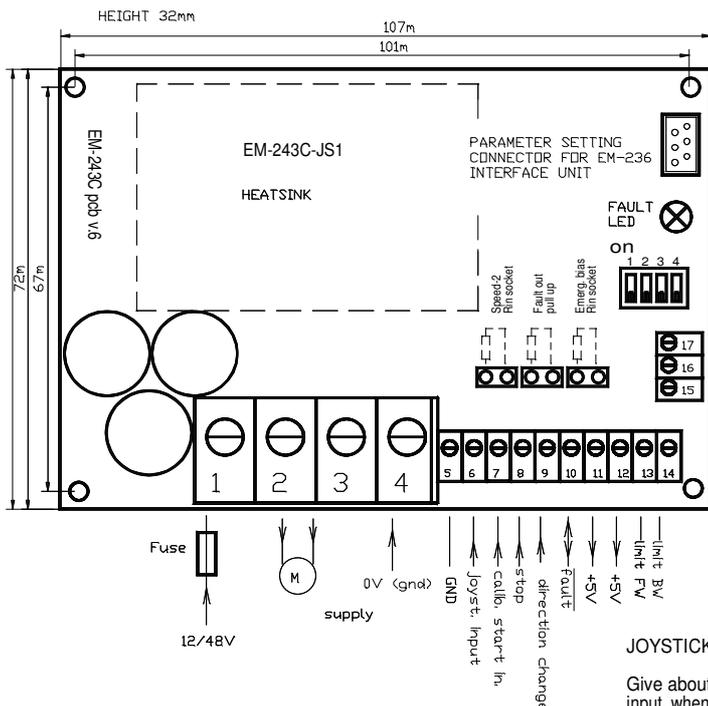
Adjusting and parameter setting of eg. current limit value, ramp times and speed-2 value can be done with various EM-interface units EM-236 is basic parameter setting device. EM-268 and EM- 328 are USB-serial converters, which makes it possible to set parameters also with computer where is installed EmenTool Lite program. EM-326 is Bluetooth -dongle which can be used in smart devices with the EmenTool App.

DIP SWITCHES

- Dip-1 Damping pin 6 if set ON (joystick input)
- Dip-2 Damping pin 9 if set ON
- Dip-3 NOT in use keep always OFF
- Dip-4 NOT in use keep always OFF

SETTABLE PARAMETERS 21pcs. prog. v1.6 (defaults in brackets)

- 1- not in use
- 2- stop input options 0-1 (input pin 8) (0)
 0= stop with command , new start is possible
 1= stop command stops with ramp and stay stopped as long as command occurred, it starts again when command disappears
- 3- input logic for limit inputs 1 or 4 PNP/NPN (1)
 1= limit inputs PNP 2= limit input NPN
 3= limit inputs PNP N.C. 4=limits inputs NPN N.C.
 (N.C.= normally closed = open circuits stops.)
- 4- max. speed FW. 0-100% / 0-100 (100)
- 5- max. speed REV. 0-100% / 0-100 (100)
- 6- current limit FW. 1-100A / 1-100 (30)
- 7- current limit REV. 1-100A / 1-100 (30)
- 8- current trip 0= disabled, 1= enabled : (1)
- 9- not in use
- 10- Fault output combinations: 0-3 (1)
 0= overtemp, current trip. overvoltage
 1= as above + calibration indication
 2= current limit indication
 3= "run" indication (pull down when motor drives)
NOTICE ! fault input is disabled in setting 2 and 3
- 11- overvoltage limit: 15-60V / 15-60 (55)
 Overvoltage can be caused by load driving the motor or when braking the speed down but supply can not accept the current back from driver. Exceeding the limit will cause the power stage set to free-wheel state.
 With a direct battery supply the brake current is charging the battery and the voltage will not normally rise.
 There is also 60V fixed dynamic brake point = motor pole shorted
- 12- load compensation: 0-255 / 0-255 (0)
 Load compensation (Rxl) improves low speed and start torque, but too high compensation achieve unstable running. Run motor at low speed (30%) Increase compensation with small steps until motor start behaviour becomes unstable, then decrease value about 10%
- 13- timeout: 0-255s. / 0-255 (0=not in use) (0)
- 14- reset for start and hour-counter 0/1 (0)
 selecting 1 and push SAVE => reset counters
- 15- start ramp: 0-5s / 0-500 (50)
- 16- stop ramp: 0-5s / 0-500 (20)
- 17- start-kick 0-200ms / 0-200 (0)
 This gives full drive at start and I-lim is 30A
 The start kick length is 0-200ms.
- 18- Dead band width 0-50% / 0-50 (10)
- 19- Freewheel options 0-3 (0)
 0= no freewheel
 1= freewheel when stopped
 2= freewheel during stop ramp.
 3= freewheel during stop ramp and if stopped
- 20- Pwm frequency 1=2kHz / 2=16kHz (1)
- 21- Brake output options (pin 16)
 0= overvoltage activates output (brake resistor use)
 1= output activates when motor run (magn. brake use)
 2= output activates when motor run and with stop input



JOYSTICK CALIBRATION
 Give about 3s. control signal to CALIB input. when Fault-led of device will be lit: (led is active only if parameter 10 is set to 1)
 -push joystick full reverse, then
 -pull joystick full forward, then
 -release joystick to mid position, then
 -wait until led starts to blink = calibration done

NOTICE ! calibration above defines joystick full fw, full rev. and mid point positions. But the max. speed can be set with parameters 4 and 5

NOTICE 2 ! Firmware version 1.6 and later has added joystick wire breakage detection This function watches pin 6 voltage, and if it goes to 0V or open circuit, then driver will shutdown motor. (fault ind. with 2 blink + pause)