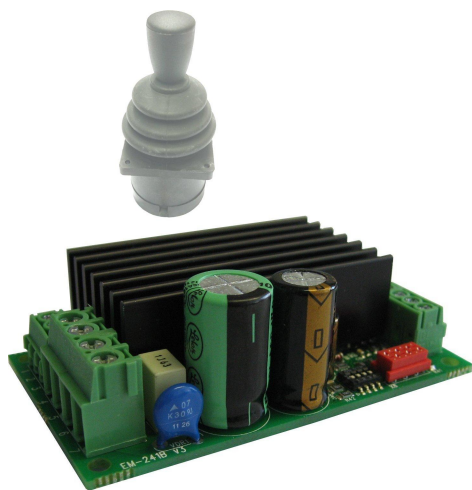


EM-241C-JS1 DC-MOTOR CONTROLLER 12-24V 15A



- JS1 is specially for joystick use
- three point calibration
- small size
- high current output
- current limit
- overvoltage brake
- 2 or 16kHz pwm frequency
- motors up to 200W
- own speed ranges for FW and REV.
- rail base mountable
- digital parameter setting
- JS1 program can be update also for standard EM-241 board
- Prog. 1.3 direction change input added
- Prog. 1.4 stop input options added
- Prog. 1.6 joystick wire breakage detection

EM-241C-JS1 is a full bridge DC-motor starter. It is designed for joystick controlled DC-motor applications. The motor 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.

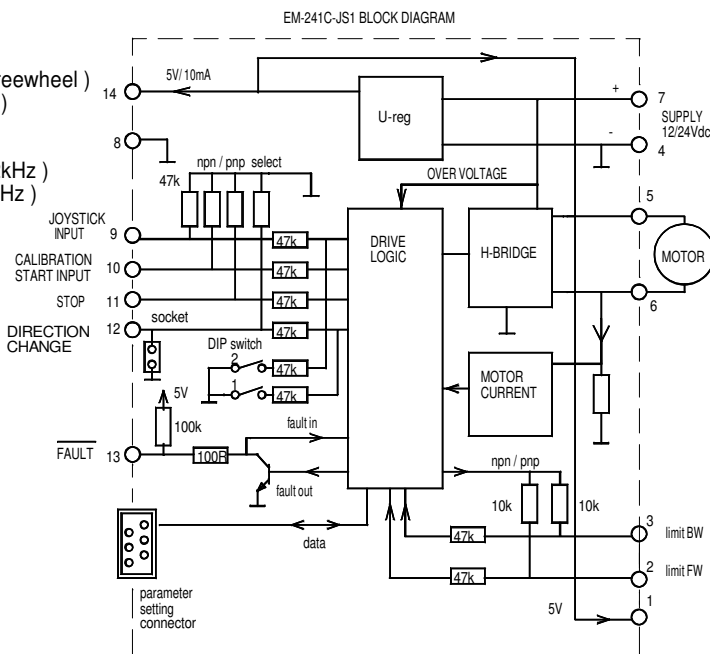
There are also special settings as start-kick which can be used in case the device is in danger of being jammed.

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

The parameters 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 (prog ver. 241C-JS1 v1.6)

Supply voltage cont. max. 10-35V
 Overvoltage limit adjustable 15-40V (connect motor to freewheel)
 Overvoltage dynamic brake 40V (shorting motor poles)
 Start up voltage 9V, shutdown voltage 8V
 Continuous current output when ambient temp. is < 50°C
 15A at 100% speed / 10A at 5-99% speed (pwm freq. 2kHz)
 10A at 100% speed / 5A at 5-99% speed (pwm freq 16kHz)
 Peak current (5s.) 30A at 2kHz / 25A at 16kHz
 Current limit adjustable 0.1-25A (at start max. 30A)
 Overheat limit 100°C
 Start and stop ramp adjustable 0-5s
 PWM frequency 2kHz / 16kHz (selectable)
 Joystick input scale 0-5V or 0-10V (if dip 2 = ON)
 Input control logic: high =4-30V, low=0-1V
 Control input impedances typ. 47kohm
 Limit FW / BW input imped. typ 10kohm
 Control input response time typ 5ms.
 Fault out. NPN open coll. max 30V / 50mA
 Fault in activates Uin < 1V (NPN)
 Motor and supply connectors 2.5mm
 Control connectors 1mm
 Dimensions 42x72x25mm
 Dimensions in DIN-rail base 45x80x45mm
 CE-tested for industrial environment (emc)
 Operating temp (Ta) -40...60°C
 Weight 75g



ADJUSTMENT AND SETTINGS (prog ver. EM-241C-JS1 v1.6)

CONNECTIONS

Supply voltage must be filtered DC of 10-35V, and ripple should be less than 30% at full load.
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

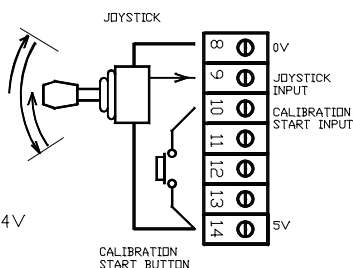
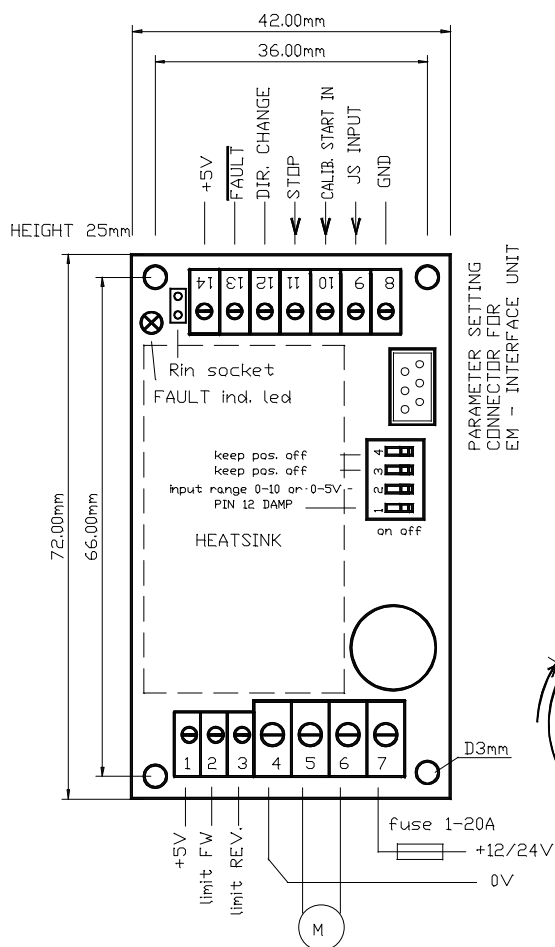
1. power on	one blink
2. current on limit	led is lit
3. current trip	fast blinking...
4. zero-cur trip	long blink- short pause...
5. overvoltage	4 x blink -pause...
6. overheat	short blink- long pause...
7. timeout	3 x blink + long blink...
8. fault input	2 x short + 1x long blink...

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

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.

SETTABLE PARAMETERS 20pcs. prog. v1.6 (defaults in brackets)

- 1- not in use
- 2- stop input options 0-1 (input pin 11) (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 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. 0.1-20A / 1-200 (30)
- 7- current limit REV. 0.1-20A / 1-200 (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: 15-40V / 15-40 (35)
 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)



JOYSTICK CALIBRATION

Give about 3s. control signal to CALIB input. when Fault-led of device will be lit:
 -push joystick full forward, then
 -pull joystick full reverse, 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 9 voltage, and if it goes to 0V or open circuit, then driver will shutdown motor.

