

GENERAL

EM-A24 is a DC-motor driver module. It's based on EM-241 driver card. This module is PCB mountable and it needs a very small pcb area, because it will be installed vertically. This module has effective H-bridge power stage. The power stage has low EMC emission and it can meet EMC directives for industry and household environments without external components. This big benefit when integrated this module to the "motherboard". Module has two pwm frequency option 2kHz offer more current, and 16kHz is noiseless.

There is available various firmware version for this module This version EM-A24C-JS1 is specially for joystick and thumb throttle use use, and included two or three point calibration. Firmware includes also many basic features for dc motor driver, like current limits, stop and start ramps, and load compensation. The settings of device can be done digitally with parameters. Firmware update can be done also with Ementool interface unit.

INSTALLATION

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

NOTIFICATIONS !

- Wrong polarity can be damage the unit.
- Module doesn't have an internal fuse, so an external fuse should be added if a fuse is required.
- Module needs two external capacitors
1000uF 35V or 220-470uF 35V if uses Low ESR capacitor,
Above Cap. should be close of supply pins
470uF 6.3V for 5V output
- If use 5.5V out for sensor voltage notice that max load is 10mA

ADJUSTMENT AND SETTINGS

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 the basic parameter setting device. EM- 328 are USB-serial converters, which makes possible to set parameters also with computer where is installed EmenTool Lite program.

PARAMETERS for prog. ver. EM-A24C-JS1 v1.8 (defaults in brackets)

- not in use
- stop input (pin 16) and I-trip re-start options 0-2 (0)
0= new start is possible only opposite direction
1= stop input work as a pause and I-trip like above
2= start both direction, speed setting 0 works as a reset
- input limit inputs 1-4 PNP/NPN (1)
1= limit inputs PNP 2= limit input NPN
3= limit inputs PNP N.C. 4= limit inputs NPN N.C.
- max. speed FW, 0-100% / 0-100 (100)
- max. speed REV, 0-100% / 0-100 (100)
- current limit FW, 0.1-20A / 1-200 (30)
- current limit REV, 0.1-20A / 1-200 (30)
- current trip 0= disabled, 1= enabled : (1)
- not in use
- Fault output combinations: 0-2 (1)
0= overtemp, current trip, overvoltage
1= as above + calibration indication
2= current limit indication
3= "run" indication (pull down when motor is running)
NOTICE ! fault input is disabled in setting 2 and 3
- overvoltage limit: 15-40V / 15-40 (35)
Overvoltage can be caused by load driving the motor or when braking the speed down but supply cannot 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 40V fixed dynamic brake point = motor pole shorted
- load compensation: 0-255 / 0-255 (0)
Load compensation (Rxl) improves low speed and start torque, but too high compensation will 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%
- timeout: 0-255s. / 0-255 (0=not in use) (0)
- reset for start and hour-counter 0/1 (0)
selecting 1 and push SAVE => reset counters
- start ramp: 0-5s / 0-500 (50)
- stop ramp: 0-5s / 0-500 (20)
- 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.
- Dead band wide 0-50% / 0-50 (5)
- 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
- Pwm frequency 1=2kHz / 2=16kHz

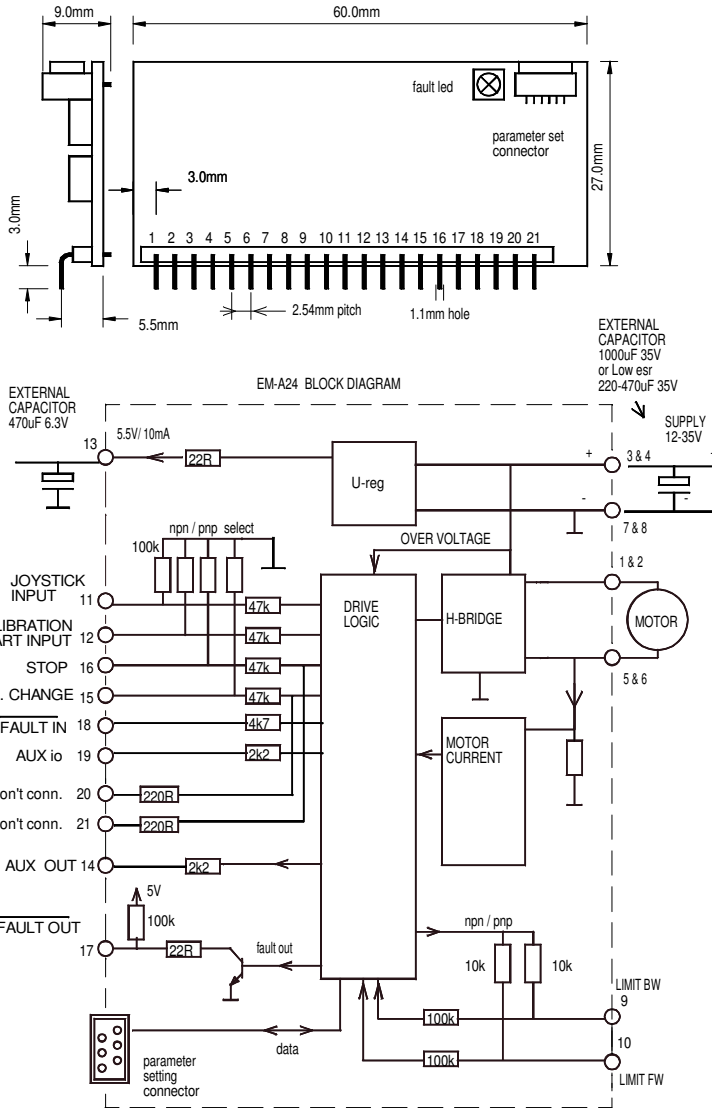
FAULT-LED signal codes

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

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

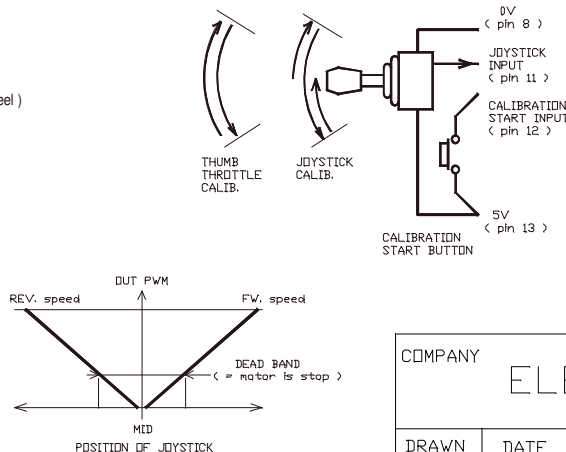
MONITORABLE VALUES

- 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.65535s)
- 5/6 carry counter for start counter
- 6/6 joystick position 0-1024



TECHNICAL DATA (prog ver. EM-A24C-JS1 v1.8)

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
12A at 100% speed / 7A at 5-99% speed (pwm freq 2kHz)
8A at 100% speed / 4A 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
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 coil. max 30V / 50mA
Fault in actives U_{in} < 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



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 start to blink = calibration done
In thumb throttle cal. use only only two position full and idle

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

COMPANY

ELECTROMEN OY

DRAWN

K.M.K

DATE

3.11.25

TITLE

DATASHEET
EM-A24 DC-motor driver module
with EM-A24-JS1 v1.8 firmware