GENERAL EM-A24 - PCI

EM-A24-PCI 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 enviroments 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.
EM-A24-PCI has PCI-express card edge connector for easy install and re-install.
The locking angle option is also available for demanding installation. When locking angle is installed, then the module can be fastened to the mother PCB with screw pilar (see drawing below) or with plastic spacer.
EM-A24-PCi printed boad verion later than v4, has added RS-485 bus (Modbus)

BW and FW are control inputs starts and stop motor, and these mode can be set also with parameter 1 and 5.
Stop input stops with ramp, but not block new start. Stop input can be also work as analog current limit, this mode can be active with set parameter 6 and 7 to 0
Fault input stop immeadetly without ramp and keeps stop until disappear. Fault out works also as indication output, it can be set with param. 10
Speed-2 input select presetted speed or it can also work as analog speed input. This input can be set also with parameter 5.
Limit input stops motor, these can be for example end limit input. and these inputs have multiple input logic combinations, which can be set with parameter 3

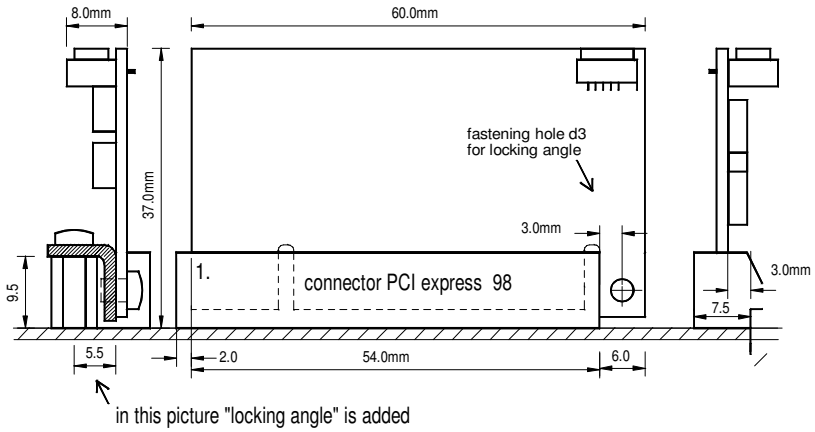
INSTALLATION

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, recommended values 1000uF 35V to supply pins and 470uF 6.3V for 5V output
-If use 5.5V output for sensor voltage notice that max load is 10mA

ADJUSTMENT AND SETTINGS

Adjusting and parameter setting of eg. current limit, ramp times and speed-2 value can be done with various EM-interface units. EM-236 is the basic parameter setting device. EM- 328 is USB to serial converters, which makes possible to set parameters and also update firmware with computer where is installed EmenTool Lite program.



TECHNICAL DATA
(PCB. EM-24-PCI v4 / prog. EM-A24C v2.0)

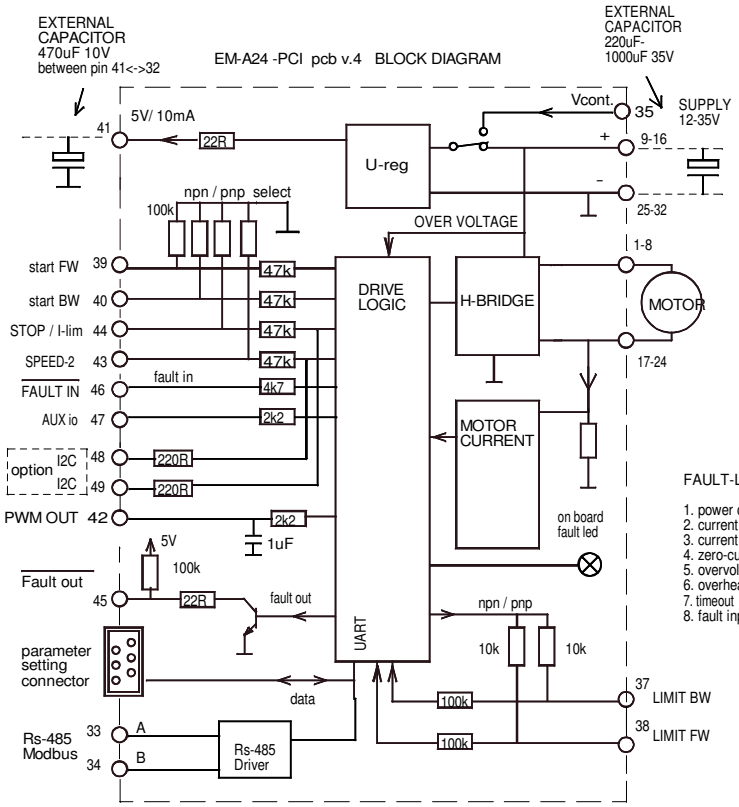
Supply voltage cont. max. 10-35V
Overvoltage limit adjustable 15-40V
Start up voltage 9V, shutdown voltage 8V
Current output when (Ta<50°C)
12A at 100% speed / 7A at 5-99% speed pwm=2kHz
8A at 100% speed / 4A at 5-99% speed pwm=16kHz
Peak (5s.) 30A at 2khz pwm and 25A at 16kHz pwm
Current limit adjustable 0.1-25A (at start max 30A)
Overheat limit 100°C
Start and stop ramp adjustable 0-5s
PWM frequency 2kHz / 16kHz
Speed input scale (speed-2) 0-5V = 0-100% pwm
Input control logic: high =4-30V, low=0-1V
Control input impedances typ. 100 kohm / 2.2kohm
Limit FW / BW input imped. typ 10kohm
Control input response time typ 5ms.
Fault out. NPN open coll. max 30V / 50mA
Fault in actives Uin < 1V (NPN)
Connector PCI-express 98pin
CE-tested for industrial environment (emc)
Operating temp (Ta) -40...60°C
Weight 15 g

SETTABLE PARAMETERS EM-A24C v2.0 22pcs. (defaults in brackets)

1- command mode: 0,1 and 2 (0)
0= continuos FW / REV
1= impulse commands FW / REV. with stop
2=impulse commands FW / REV without stop
2- start condition combinations: 0-3 (1)
0= start both direction after I-trip and Stop
1= start only opposite direction after I-trip
2= start only opposite direction after Stop
3= start only opposite direction after I- and Stop
3- limit input logic combinations 0-3 PNP/NPN (0)
0= PNP (positive)
1= PNP N.C. (opening contact function)
2= NPN (gnd control)
3= NPN N.C (opening contact function)
4- running speed-1: 0-100% / 0-100 (100)
5- running speed-2: 0-100% / 0-100 (50)
special parameter values of param. 5
0= "speed 2" input is used as analog 0-5V speed control input.
1= "speed 2" input is used as analog 0-5V speed input and FW direction work as default, and direction can be change with FW input
6- current limit FW: 0-25A / 0-250 (30)
7- current limit REV: 0-25A / 0-250 (30)
notice! If both 6 & 7 is set = 0, then I-limit input is enabled
8- Trip combinations: 0-3 (1)
0= no I-trip, no zero-current-trip
1= only I-trip
2= only zero-current-trip
3= both I-trip and zero-current-trip
9- I-trip delay: 0-255ms / 0-255 (20)
10- Fault output combinations: 0-3 (1)
0= I-trip and zero current won´t cause fault output signal
1= only I-trip causes fault output signal
2= only zero current causes fault output signal
3= both I-trip and zero currenT causes fault output signal.

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 rice.
There is also 40V fixed dynamic brake point = motor pole shorted
12- load compensation: 0-255 / 0-255 (0)
Load compensation (RxI) improves low speed and start torgue, but too high compensation achieve unstable running. Run motor at low speed (30%) Increase compensation with small steps until motor start behaviour unstable, t hen 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 (100)
16- stop ramp: 0-5s / 0-500 (100)
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- I-trip auto reversing 0-5s / 0-500 (0)
Change automatically run direction when I-trip occurs the revesing time will select with this parameter
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
21 Serial port configuration, speed, parity, and number of stop bits (1)
1 =9600bps 8N1 5 =19200bps 8N1
2 =9600bps 8N2 6 =19200bps 8N2
3 =9600bps 8E1 7 =19200bps 8E1
4 =9600bps 8O1 8 =19200bps 8O1
22 Modbus address 1-247 (1)

EM-A24 -PCI pcb v.4 BLOCK DIAGRAM



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...

MONITORABLE VALUES

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

COMPANY	ELECTROMEN OY	
DRAWN	DATE	TITLE
K.M.K	4.2.2023 a24pcc20	DATASHEET EM-A24-PCI pcb v.4 DC-MOTOR DRIVER with EM-A24C v2.0 firmware