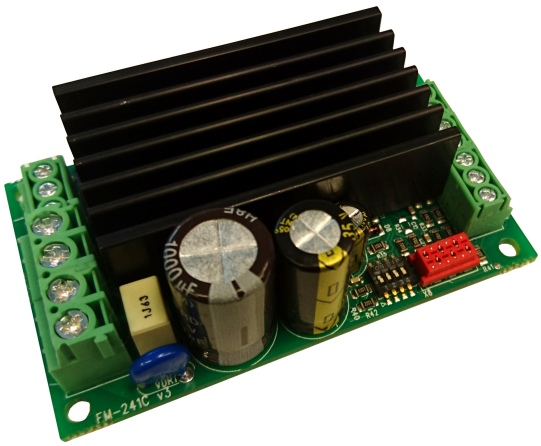
EM-241-C DC-MOTOR CONTROLLER 12-24V 15A

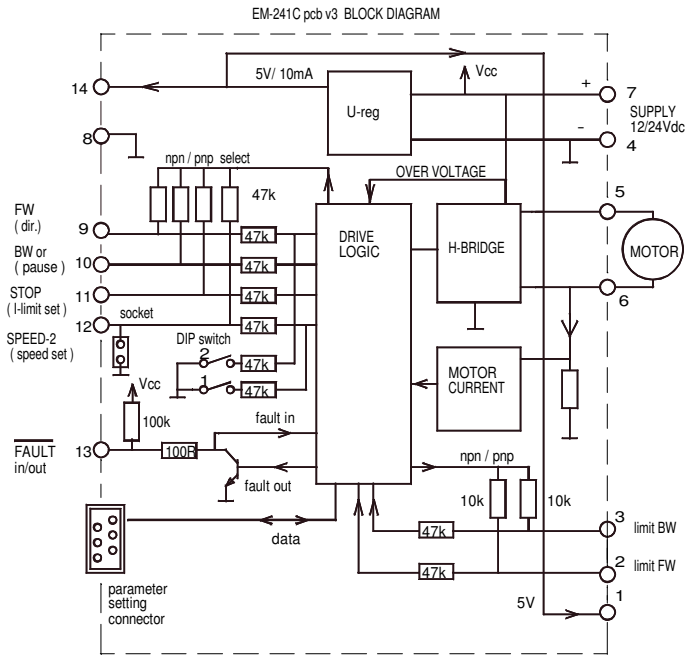


- small size
- high current output
- current limit
- zero current limit
- overvoltage brake
- speed setting
- flexible control inputs
- impulse / continuous mode
- rail base mountable
- digital parameter setting
- C-version replaces A and B versions
- C-firmware can be loadad B ver. card
- C.version available with molex connector
- current limit setting input (new)
- freewheel options (new)
- 2 or 16kHz PWM freq. (new)
- input range adjust (new from prog. v1.5)
- bus option / pause input (new from v1.7)

EM-241C is a full bridge DC-motor starter. It is designed to work with DC-motor in applications where some special functions are needed. Starter has adjustable acceleration and deceleration ramps, which make possible the smooth starts and stops. Adjustable current limit protects motor against overcurrent and it can also be used as an end-stop. This device has also two settable speeds, which are usefull in positioning applications. Control inputs FW and BW start the forward and backward run. STOP is for the motor shut-down but there are also available individual limit inputs for FW and BW directions. SPEED-2 input activates preset speed-2, but it can also be used as input for analog speed control signal 0-5V. STOP input can be set to work as current limit setting. FAULT terminal has at the same time input and output function, 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 thenew start. For example, it is possible to link fault pins of several units together and achieve a synchronous stop. C-version includes wo new parameter: freewheel options for realease the rotor of motor. and pwm frequency select, but notice, that in silence 16kHz pwm frequency. the output current is smaller!
There are two selectable control modes, continuous and impulse. In continuous mode the motor runs as long as the control is active. In impulse mode a short comand starts the motor, and only a new impulse will change the status. There is also few special settings start-kick and auto reverse. The card has selectable input logics. Inputs are divided in two groups, control and limit -inputs. Groups can be individually set for NPN or PNP logic.
For parameters setting there is next options: EM-236 interface unit, EM-268 with EmenTool-Lite PC-program and EM-326 with EmenTool-App application for smartphone

TECHNICAL DATA (prog ver. 241Cv1.7)

Supply voltage cont. max. 10-35V
Overvoltage limit adjustable 15-40V
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=2kHz
10A at 100% speed / 5A 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)
NOTICE! during start ramp current limit is 50% boosted
Overheat limit 100°C
Start and stop ramp adjustable 0-5s
PWM frequency 2kHz / 16kHz
Speed input range (pin 12) 0-5V / 0-10V = 0-100% pwm
I-limit input scale (stop input) 0-5V = 0-20A
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 actives Uin < 1V (NPN)
Motor and supply connectors 2.5mm
Control connectors 1mm
Molex connector option KK 508 / KK 6410 (see page 2)
Dimensions 42x72x25mm
Dimensions in DIN-rail base 45x80x45mm
CE-tested for industrial environment (emc)
Operating temp (Ta) -40...60°C
Weight 75g



ELECTROMEN Oy www.electromen.com

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.

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...

Limit inputs FW / BW

These inputs stop motor without ramp with dynamic brake
But in control mode "2-speed" dynamic brake is enabled
only when speed-2 is activated.
If motor has stopped with limit switch the dynamic brake is
at least 1s. active, also in case when freewheel is selected.

FAULT in/out

This NPN input pull down when fault. Combination can be
selected with parameter 10.
If this input is pulled down with externally, then it would
disabled motor as long as pulled down.

SPEED-2 input

This input activates speed-2 when 2-speed mode is selected
In analog speed modes this input work as speed set input

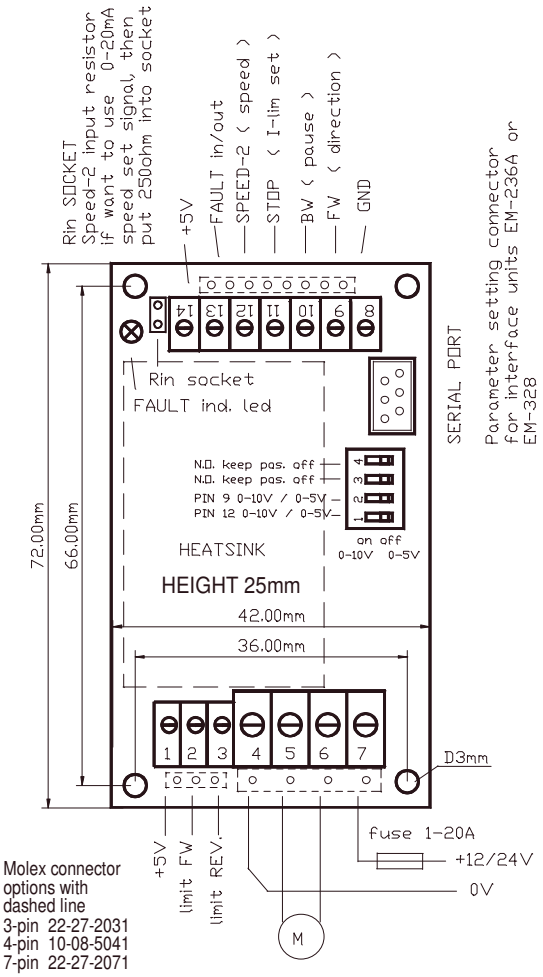
SERIAL PORT (red micromatch connector)

This is normally for parameter settings and monitoring with
Ementool program or EM-interface units.
But there is also availability for open protol control (Modbus)
This option has own instruction guide.

SPECIAL INPUT FUNCTIONS (brackets in drawing)

Analog speed modes sets input as below, mode select with parameter 5
*Analog speed mode-1, pin12=speed set.
*Analog speed mode-2 pin12=speed set, 9=direction, 10=pause

**Analog I -lim input can be enabled with set param. 6&7= 0



Molex connector
options with
dashed line
3-pin 22-27-2031
4-pin 10-08-5041
7-pin 22-27-2071

SETTINGS and MONITORING (prog ver. EM-241C v1.7)

Settings can be done with three interface device options.
1. EM-236 interface unit
2. EM-268 interface unit with EmenTool Lite PC-software
3. EM-326 interface unit with EmenTool App smartphone application
   When using App you can set device-specific access code,
   which protects device against unauthorized smartphone connections.
   The access code can be reset with simultaneous FW and BW
   comand, when power switch on.

SETTABLE PARAMETERS prog. 241C v1.7 (def. in brackets)

1 command mode: (0)
  continuous = 0,
  impulse = 1 direction change with stop
  impulse 2 = 2 dir. change 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 input logic combinations 0-7 PNP/NPN (0)
  PNP control with positive signal and input has pull down res.
  NPN control with negative signal and input has pull up res.
  N.C. = input resistor as above, but control signal logic is inverted
  0= cont. PNP, limits PNP 4=cont. PNP, limits PNP N.C.
  1= cont. NPN, limits PNP 5=cont. NPN, limits PNP N.C.
  2= cont. PNP, limits NPN N.C. 6=cont. PNP, limits NPN
  3= cont. NPN, limits NPN N.C. 7=cont. NPN, limits NPN
4 running speed-1: 0-100% / 0-100 (100)
  If analog speed input mode is select with parameter 5,
  then parameter 4 work analog input range adjust
*5 control mode / running speed-2 preset 0-100% / 0-100 (50)
  0= Analog speed mode -1
    "speed 2-input" is used as analog 0-5V speed control input.
  1= Analog speed mode -2
    as above but FW direction is automatically "on" and
    FW input works as direction change input.
    BW input works as pause input
  2-100 = 2-speed mode (two digitally settable speed)
    speed-1 preset with param. 4 and speed-2 with param. 5)
**6 current limit FW: 0.1-25A / 1-250 (30)
**7 current limit REV: 0.1-25A / 1-250 (30)
  NOTICE ! If both 6 & 7 is set = 0, then I-limit input is enabled,
  and works as current limit adjust input.
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.
 4= overcurrent indication = pull down
 5= "run" indication = pull down when motor run
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 rice.
12 load compensation: 0-255 / 0-255 (0)
  Load compensation (Rxl) improves low speed and start
  torgue, but too high compensation achieve unstable running.
  Run motor at low speed (30%) Increace compensation
  with small steps until motor start behaviour 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 (100)
16 stop ramp: 0-5s / 0-500 (100)
17 start kick 0-200ms / 0-200 (0)
  gives short 0-200ms full drive pulse for start
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= freewheeling when overvoltage
  1= freewheeling when overv. or stopped
  2= freewheeling when overv. or during stop ramp
  3= freewheeling when overv. or when stopped or during stop ramp
20- Pwm frequency 1=2kHz / 2=16kHz (1)
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)

MONITORABLE VALUES

1 Motor current 0-2.0A (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