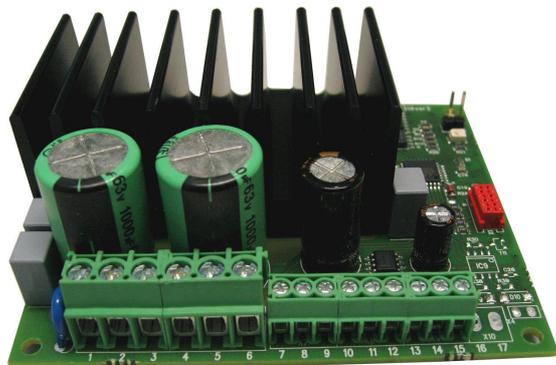


# EM-314A-60V STEPPER MOTOR DRIVER 6A 12-48V

## microstepping, index and Modbus interface



### FEATURES

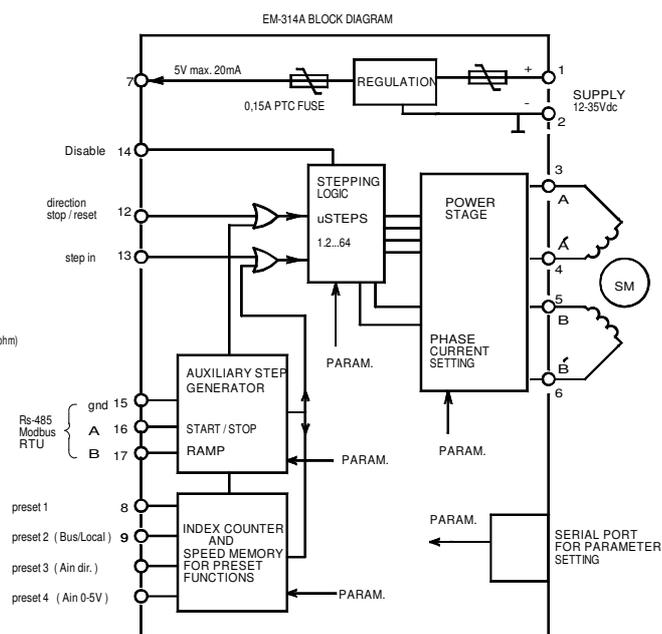
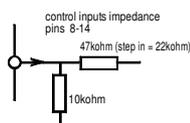
- Bipolar chopper
- 1, 1/2, 1/4.....1/64 steps
- Four preset function inputs
- PNP or TTL control
- Quiet run current control
- Acceleration / deceleration ramps
- Low EMC emissions
- Also available with Molec connector
- DIN-rail base mountable
- Firmware v1.4 new features
  - + Analog speed control input
  - + Modbus control option
- Firmware v1.5 param. 24 added

EM-314A is a bipolar chopper type microstepping stepper motor controller. The bipolar operation principle suits most stepper motors and provides the best torque. The microstepping function also enables great performance at low rpm. The stepping and current regulation have been synchronized, providing smooth and quiet operating. There are 7 different stepping options to choose from, ranging from full- to 1/64-step operation. This provides various possibilities for different speed applications.

The controller has its own auxiliary oscillator, which can be used for preset speed driving. The preset speeds can be activated by using 4 digital function inputs. The oscillator features an acceleration ramp function, which allows frequencies to be altered flexibly. The motor will also start up reliably even to higher frequencies and it is possible to shift to the desired velocity without a pace drop. The auxiliary oscillator includes an indexing part, which offers the possibility of running presettable operating sequences. These sequences can be activated with 4 digital inputs. A sequence is a movement with the selected speed, direction and distance (as steps). All of the inputs are activated with positive logic commands. So the commands and functions are activated by connecting the input to a positive voltage. Control can also be done with TTL-logic level commands. Newest firmware version there is also possibility analog speed control and Modbus RTU control with Rs-485 port

All of the controller settings are made digitally, using a separate setting device, EM-236 Interface Unit. With this device the settings are easily copied to multiple controllers.

Operating voltage	12-48Vdc ( 10-60V )
Idle current	n. 20mA
Current settings	0.1 -6A ( step 0.1A, recom. max 4A )
Auxiliary oscillator	50-10000Hz
Frequency accuracy	typ. 0.5%
Ramp adjust	0.1-5s ( 0 to 10000Hz )
Control level	"on" when Uin 4 -30V "off" when Uin 0-1V or open
Max. step freq.	15kHz
Ain range	0-5V ( pulse freq. 0-10kHz )
Rs-485	half-duplex 9600/19200 baud
Operating temp.	0-50°C
Dimensions	87x72.5x25mm
Weight	139g



Operating voltage 12-48Vdc, ripple smaller than 20%. The card has no internal fuse. The use of an external fuse is recommended. Incorrect supply polarity can damage the controller. All control inputs work with positive control 4-30V. Inputs can be controlled with PLC or TTL signals. 5V auxiliary output (terminal 7) can source max. 20mA.

CONTROL -inputs

STEP IN is the input for stepping pulses. One step is done with the positive edge of the input pulse.  
 DIR/STOP/RESET input is normally used to choose the rotational direction. If preset functions are used (terminal 8 to 11) this input can act as a stop input and if a preset sequence is used it will also reset the index counter. This input is triggered with leading pulse edge.  
 DISABLE will shutdown power stage and hold it disabled. This input has the highest priority, but it will not reset a sequence. So it is recommended to stop and reset functions before releasing disable to avoid any possible uncontrolled startups.  
 PRESET IN 1-4 are presettable function inputs. These are used to activate the chosen preset function. Function parameters include speed, direction, and distance in steps.  
 If stepping distance is chosen to be zero, the drive will continue as long as input is selected or STOP is activated. In other words the function works as preset speed driving.

CONTROL MODES

Step + dir is a conventional control method, where step pulses leads to the step input and running direction will select with direction input

Continuous run with internal step generator, direction and speed can be selected with parameters 7-14, Preset speed can be started with digital input 8-11. Notice! in continuous run mode set the index parameters 15-22 = 0

Index run mode you can set also the rate of step pulses of internal index counter. Select speed and direction as above and rate of steps with parameters 15-22

Analog in speed setting is special mode, which can be select with set parameter 14 = 0, then input pin 11 is speed input 0-10V and pin 12 is as an direction input. Preset options 1 and 2 (pin 8 and 9) are still also available.

Modbus control work with Rs-485 serial interface. See separate guide for modbus use "Modbus register definitions for EM-308,-314 and -318"

More about control mpdes in application sheet "app-stepper-3xx"

"HOMING"

The internal index counter can be reset with direction input in cases when has selected Index run mode, this can be used to reset counter if needed.

The card settings and monitoring are made with EM-236 Interface Unit or with Ementool Lite PC software and EM-32 USB-dongle. Device is connected to a red connector on the card.

PARAMETER EFFECT

1. The stepping mode determines how much the motor moves when the card receives a step pulse. The most precise results are achieved with a so called microstepping setting (partial step) and the highest possible resolution is 1/64-motor step.
2. Ramp setting is common for acceleration and deceleration. Ramp is in use with preset functions.
3. The current drop function limits the current to the set percentage during the rest-stage. This reduces the amount of the heat that motor has to dissipate. Notice. Lower values than 100% can reduce precision in microstep driving.
4. Phase current limiting during the drive.
- 5 and 6. is for Rs-485 serial port setting.
- 7-22. These are for determining preset functions that are activated with PRESET IN # inputs. There are four preset functions available to be determined.
- 7-10. Parameters to select the preset direction.
- 11-14. Parameters to set the stepping frequency = speed
- 15-22. Parameters for stepping amount = distance

For example: Par.15 set to 408 and Par.16 set to 41 will result in 41408 steps total when terminal 8 (preset in 1) is activated.

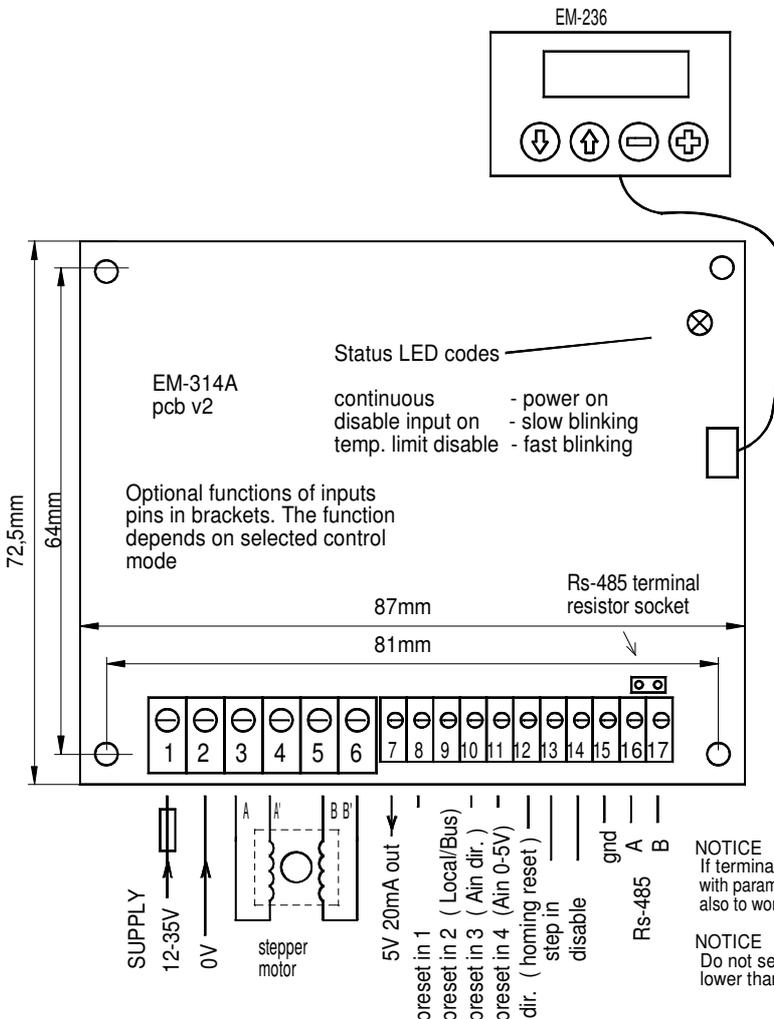
Notice.  
 The movement is in direct ratio to the used stepping mode. With 1/64 mode the movement is smallest:  
 41408/64 = 647 full steps.

MONITORABLE VALUES

1. Last activated preset function
2. Index sequence count down counter to zero
3. Index sequence count down counter to zero "thousands"
4. Position counter, reset only when homing
5. Position counter, reset only when homing, "thousands"

PARAMETERS of EM-314A prog v1.5 default values in brackets.

1. Stepping mode ( 0-6 ) [2]  
 0 = Full step  
 1 = Half step  
 2 = Quarter step  
 3 = 1/8 step  
 4 = 1/16 step  
 5 = 1/32 step  
 6 = 1/64 step
2. Ramp time 0.1-5s ( 1-50 ) [10]
3. Current 1s after stop ( 1-4 ) [4]  
 1. 100% ( = normal )  
 2. 50% ( reduced )  
 3. 25% ( reduced )  
 4. 0% ( current disabled )
4. Phase current 0.1-6A ( 1-60 ) [10]  
 ( recom. max. 4A )
5. Rs-485 uart settings ( 3 )  
 0= 9600, EVEN, 1 3=19200, EVEN, 1  
 1= 9600, ODD, 1 4=19200, ODD, 1  
 2= 9600, NONE, 2 5=19200, NONE, 2
6. Modbus address 1-247 ( 1 )  
 Preset run directions
7. Preset 1. 0=fwd 1=rev [0]
8. Preset 2. 0=fwd 1=rev [1]
9. Preset 3. 0=fwd 1=rev [0]
10. Preset 4. 0=fwd 1=rev [1]
11. Preset run frequencies  
 11. Preset 1. 50-10000Hz ( 5-1000 ) [30]  
 12. Preset 2. 50-10000Hz ( 5-1000 ) [30]  
 13. Preset 3. 50-10000Hz ( 5-1000 ) [100]  
 14. Preset 4. 50-10000Hz ( 1-1000 ) [100]  
 values 0-4 = Ain 0-10V activated
15. Index run counting values 0-1000000 step  
 Setting 0= continuous run
15. Preset 1. 0-999 ( 0-999 ) [0]
16. Preset 1. 0-1000 x 10<sup>3</sup> ( 0-1000 ) [0]
17. Preset 2. 0-999 ( 0-999 ) [0]
18. Preset 2. 0-1000 x 10<sup>3</sup> ( 0-1000 ) [0]
19. Preset 3. 0-999 ( 0-999 ) [0]
20. Preset 3. 0-1000 x 10<sup>3</sup> ( 0-1000 ) [0]
21. Preset 4. 0-999 ( 0-999 ) [0]
22. Preset 4. 0-1000 x 10<sup>3</sup> ( 0-1000 ) [0]
23. Min start freq. 50-10000Hz ( 5-1000 ) [10]
24. Modbus/Local selection  
 0=Local control only ( but monitoring with bus possible )  
 1=Bus control only ( except for disable input )  
 2=Local/bus selection with pin 9 ( pin "low"= local )



NOTICE  
 If terminal 11 is activated for Analog input with parameter 14, then terminal 10 change also to work as direction input

NOTICE  
 Do not set preset run frequencies ( param. 11-14) lower than min start freq, which is set with parameter 23