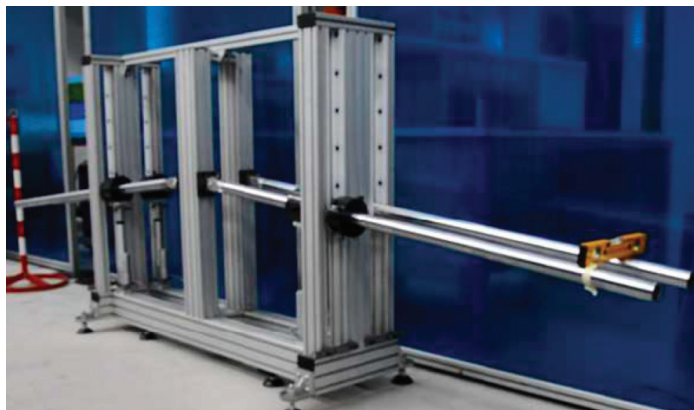# Electronic L.A.C. (Linear Actuator Controller)

Simple solution to control linear actuators powered with low voltage DC motors

The **electronic LAC module** can be used for general applications that use electrical actuators with or without feedback. Stand alone or multi synchronization operations are possible through a simple and high efficient serial network (I2C).

The unit is based on a simple PWM power circuit. The electrical motor is controlled by open loop power/speed mode; breaking action is made by decreasing command PWM and by short circuiting motor wires at the stop or on the target. It's strongly recommended to use it with acme screw actuators.
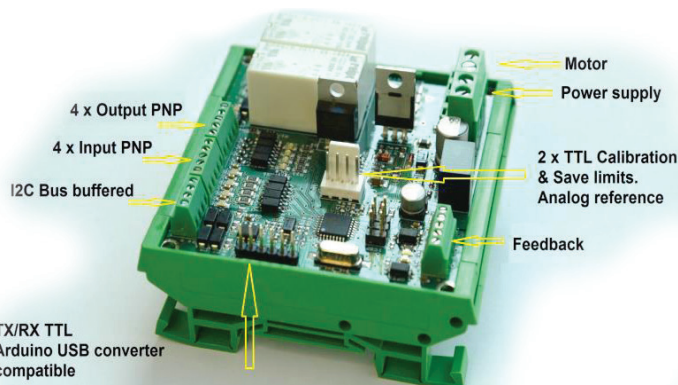
Positioning functions are available with feedback position sensor. The unit is programmable with: two virtual end strokes, "in windows position" gap, "max. error follower" alarm, from analog reference position, remote PC positioning and Master/Slaves synchronization. Actuator positioning accuracy depends on stroke length in case of the potentiometer or on total pulses included in the whole stroke.

This module may be interface to PLC or other control modules with optocoupled Input/Output signals at 12/24 voltage levels.

LAC is supplied with a proprietary Servosystem FW, but it includes the "boot loader" of the ARDUINO and may be re-programmed by user using a standard Arduino USB Serial Converter and the Arduino software IDE environment.

Features

- Operating modes:
    1. *Stand-alone ON/OFF*
    2. *Parallel synchronized (max 32 units)*
    3. *Analog voltage input reference*
    4. *Remote command positioning*
- Calibration and Homing modes:
    1. *Manual*
    2. *Learning on current end strokes*
    3. *Forward Presetting on current end stroke*
    4. *Backward Homing on current end stroke*
    5. *Presetting by Sw Pc configurator.*
    6. *Automatic homing on "Balance Window"*
- Start and Stop Ramps
- Independent settable current limit for both directions
- Independent settable minimum power/speed for both directions
- Four input commands
- Four output status signals
- Status diagnostic Led for each signals

- Available feedback types interface:
    1. *None*
    2. *2 x magnetic hall sensors*
    3. *Potentiometer*
    4. *2 x end of stroke sensors*
    5. *2 x threshold current on mechanical stop*
- TTL Rx/Tx serial port pins compatible with Arduino USB serial converter.
- User friendly PC/SW Configurator

Technical Data

- Supply voltage   24 Vdc +20/-15% or 12 Vdc +20/-15%
- Continuous actuator current   max 5 A (8 A with heatsink) @ 25°C ambient
- Duty Cycle   max 10% or 2 min. ON / 18 min. OFF
- Currents limits regulation   0-15 A
- PWM frequency   2 kHz
- Hall inputs frequency   max 200 Hz
- Pulses count logic   Quadrature (4 counts* halls sensor signal period)
- Inputs control voltage   4 x 12/24 Vdc PNP optoisolated with status led
- Outputs status voltage   4 x 12/24 Vdc PNP optoisolated with status led
- Analog inputs   2 x 0-5 Volt. 1 x Feedback, 1 x Reference)
- Dimensions   Standard 73x76x25 mm (DIN rail base optional)
- Operating temperature   -20°C, +60°C
- Serial TX/RX port   TTL signal compatible with Arduino USB converter
- I2C bus   400 kHz buffered, able load cable till 3000 pF
- Calibration inputs   2 x TTL level. 1 x Calibration mode, 1 x Record end strokes
- Certification   CE (EMC November 2016)
  1) **EN 61000-6-2: 2005 + /EC:2005 + /IS1:2005**.
     Electromagnetic compatibility (EMC). Part 6-2:
     Generic standards - Immunity for industrial environments.
  2) **EN 61000-6-3:2007 + /A1:2011**.
     Electromagnetic compatibility (EMC). Part 6-3:
     Generic standards - Emission standard for residential, commercial and light industrial environments.

Warnings and recommendations

- Although the module has several dedicated functions as protection of the module and motor, it is not able to guarantee a fail-safe itself. User must evaluate and add the protections requested by the application.
- It's strongly recommended to use this electronic module with acme screw actuators working intermittently.
- Without heatsink, critical temperature may be reach in the following cases:
  1. *Duty cycle greater than 10%*
  2. *Continuous current greater than 5 A*
  3. *Ambient temperature over 40°C*
- In synchronized applications, the electronic module and the actuator must be chosen with proper power margin in order to guarantee minimum control loop.
- In synchronized applications cables of I2C must be shorter as possible, shielded and with low parasitic capacitance for each meter length. In case of many actuators connected to I2C, more deep analysis could be required.
- For analog feedback (potentiometer) actuators, sensor cable must be shielded.
- Specifications can be changed without notice.
- SERVOSYSTEM and SETEC do not have any responsibility over the possible errors in this data sheet.