

GLA-Q40 12V DC 250N Actuator

Summary Specifications

Updated 01.11.2023



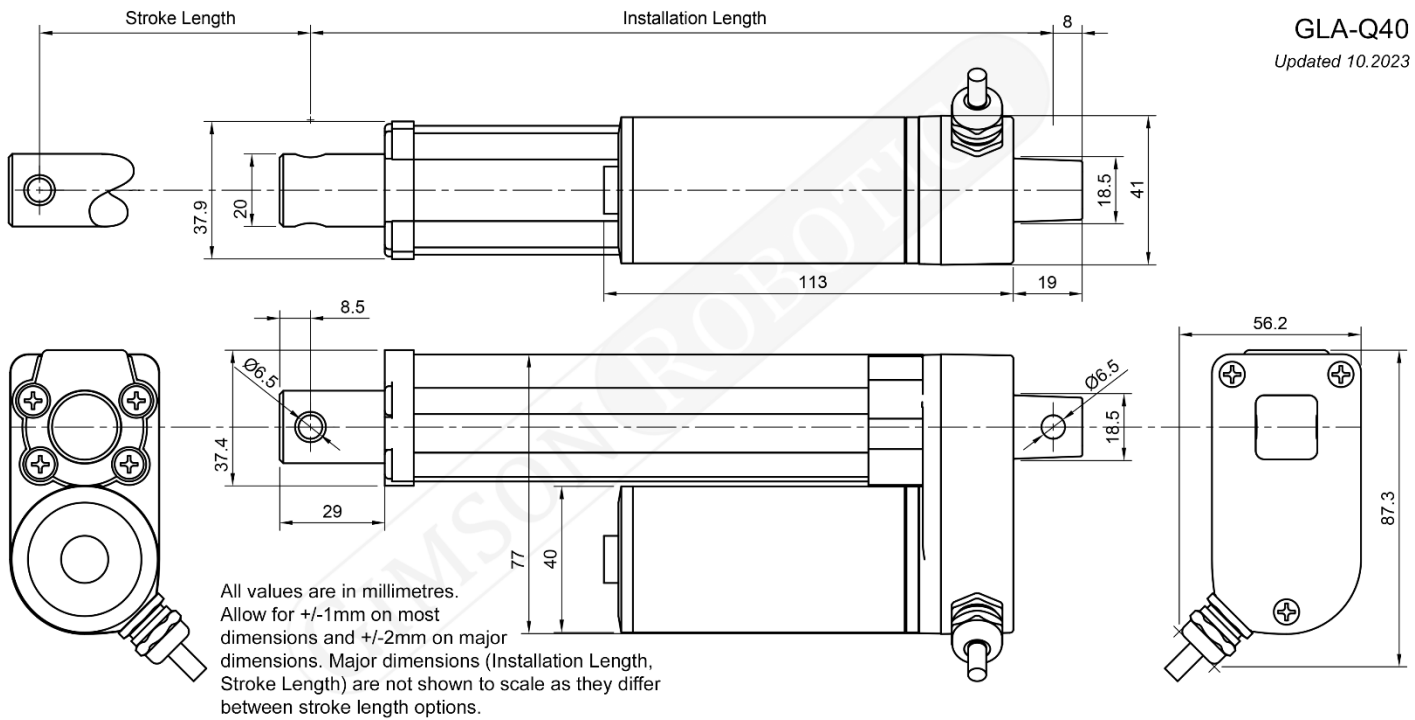
Gimson Robotics Model	GLA-Q40-12V-250N		
Motor	12V DC, brushed permanent magnet <i>24V version also available, contact us for details</i>		
Maximum Rated Load	250N (25kg)		
No-load Speed, Current	30mm/s, 1A <i>Approximate values, a small amount of variability between actuators is normal</i>		
Speed, Current for Max. Load	20mm/s, 3.5A <i>Approximate values, a small amount of variability between actuators is normal</i>		
Stroke Length	Standard sizes: 50mm, 100mm, 150mm, 200mm, 300mm <i>Other sizes are available on a made-to-order basis</i>		
Minimum Installation Length	Stroke Length + 105mm <i>Refer to drawing on page 2.</i>		
Maximum Duty	10% (up-to 2 minutes continuous, e.g. 2 minutes moving, 18 minutes static)		
Stall Current	Up-to 13A. Motor internal resistance minimum ~0.90hm. <u>Overcurrent protection must be provided on the input</u> , to protect both the motor and the gearbox from overloading		
Transmission	2-stage gearbox, 1 st stage 54:11 helical gears, 2 nd stage 41:10 spur gears, total ratio ¹¹⁰⁷ / ₅₅ :1 (20.127:1 3dp). Low-noise polymer (POM 100P) gears, stress-tested for longevity		
Weight	50mm stroke: 840g 200mm stroke: 1100g	100mm stroke: 930g 300mm stroke: 1280g	150mm stroke: 1020g
Materials, Enclosure Rating	Body, sleeve & rod: Aluminium Enclosure: IPX5 <i>Only suitable for protected (shielded) outdoor use</i>		
Operating Temperature (Ta)	-10°C ~ 40°C <i>Please note that current draw can be expected to be higher at temperatures <0°C</i>		
Cable	As standard: 2m long 6-core lead (to connector), with 2 x 18AWG cores (Brown and Blue, to motor) plus 4 x 24AWG cores (to quadrature encoder). Male 6-pin connector (5557 type, 4.2mm pitch) included, see connection diagram on page 2. <i>Lead length and connectors can be customised</i>		
Sensors	Internal quadrature encoder, 5V supply voltage, with a resolution of 10.735 (5sf) pulses per millimetre of travel when reading both encoder channels. The encoder signal allows this actuator model to have its position tracked, also allowing for multiple actuators to be synchronised when used with a suitable controller (such as the GR-SYNC)		
Limit Switches	Built-in, microswitches and diodes to automatically turn motor current off, unidirectionally (and with motor braking), at the 0mm and Stroke Length (full travel) positions. See page 3 for circuit diagram		
Product Standards	EN 55014-1: 2021 RoHS Directive 2015/863 (RoHS 3) EN 55014-2: 2021 <i>Be aware that EMC performance is dependent upon connected hardware</i>		

Dimensioned Drawing. Note that 'Installation Length' = Stroke Length + 105mm

GIMSON ROBOTICS

GLA-Q40

Updated 10.2023



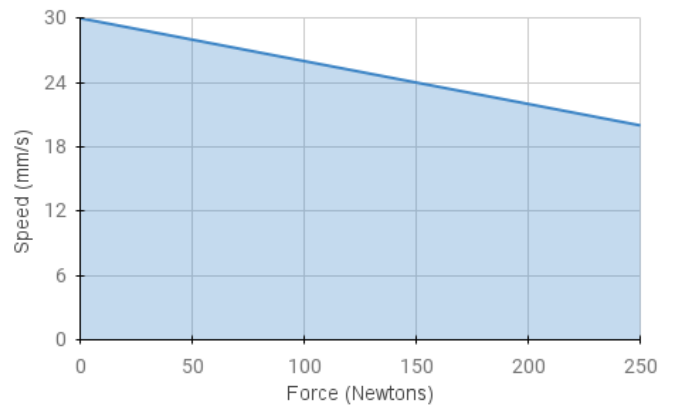
As indicated above, the standard mounting points at either end of the actuator are $\varnothing 6.5$ mm (diameter).

Mechanical & Electrical Characteristics

As with any brushed DC permanent magnet motor or actuator, there are some key principles that apply to the GLA-Q40, this includes the fact that:

- As load increases, travel speed decreases, this is an approximately linear relationship (see graph to right).
- As load increases, the current draw of the motor also increases, and this increase is also approximately linear between the no-load current up to the full load current.
- The level of measured current can help you to deduce the amount of mechanical load in the system.
- At a complete stall the peak current of the motor would be much greater than the normal load current (up to ~13A for the 250N, 12V version of GLA-Q40), in this condition the motor and transmission can be permanently damaged, and so overcurrent protection, and sensible mechanical design with an appropriate safety factor, should be used to avoid this.
- By changing the voltage reaching the actuator, the travel speed can be modified. When lower voltages (which can be via PWM duty cycling) are supplied, this does also mean that the current, and therefore the force, of the actuator also fall (e.g. approximately half-speed and half-force if the actuator were run at 6V). The actuator should not normally be overvolted, although as an exception a fully charged 12V battery is usually OK (which can be ~13.8V charged).

GLA-Q40-12V-250N Force vs. Speed

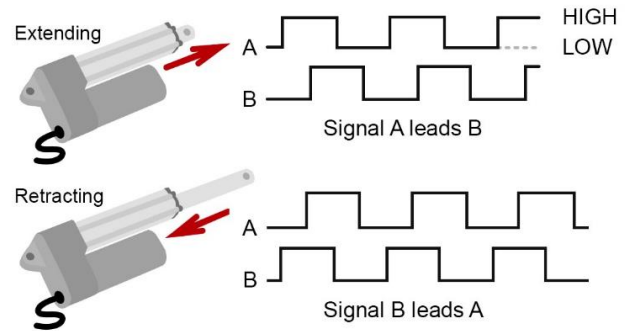


Further considerations include:

- This actuator is NOT suitable for bending/off-axis loading, and so in the case of a pivoting driven assembly, both ends of the actuator should be allowed to freely pivot with minimal friction, whereas in the case of a linearly-moving (sliding) assembly, the assembly should be independently supported in the axial direction, in line with the actuator.
- Shock loads through the mounting points should be avoided (shock/impact loads may impart a force greater than the rated load through the actuator).
- The actuator is *capable* of generating a greater force than the rated force, but such loads must be avoided to prevent overstressing the transmission, which would contribute towards premature failure. If using motor current sensing to limit the maximum load, ensure that the overcurrent response of the controller is fast enough to prevent loads exceeding the actuator rating from being sustained. With appropriate fast-response current limiting, the motor should be automatically turned off before it is able to reach a stall condition.

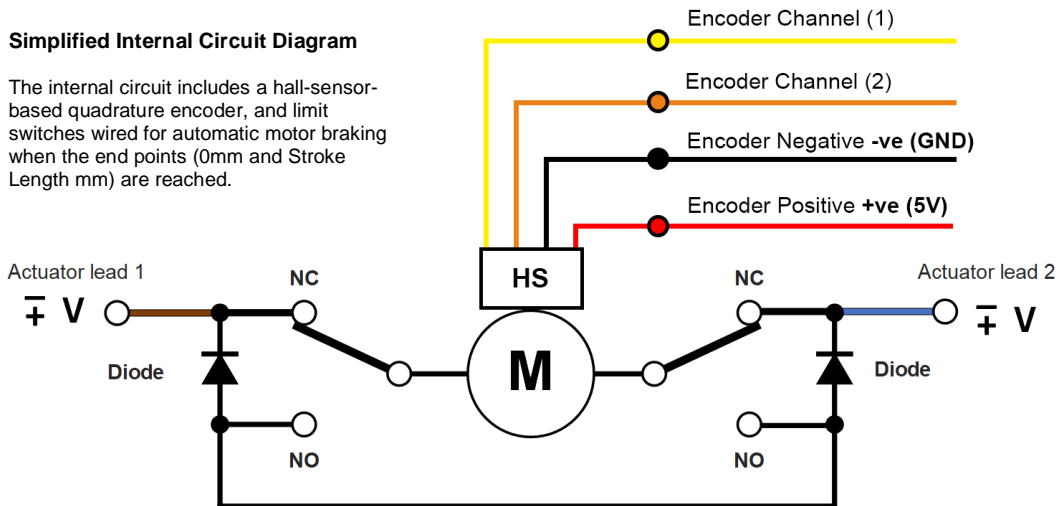
Integrated Encoder, for position detection and synchronisation

The actuator has a hall-sensor based quadrature encoder built-in to the motor. The encoder is powered by two of the six cores of the main cable (+Vcc **Red**, -GND **Black**) and accepts a supply voltage of 5V. It has a dual-channel output (channel A **Yellow** lead, Channel B **Orange** lead), with a combined (counting both together) resolution of 10.735 (5sf) pulses per millimetre. As typifies quadrature encoders, one of the channels is out of phase with the other, as such it is possible to tell both the speed (from pulse frequency) and direction (by reading the pulses of one channel and comparing it to the other) of the motor. The nature of the signals that are generated is illustrated to the right. Given a no-load travel rate of 30mm/s for the 12V motor (when run at 12V) you could expect a pulse frequency across *each* encoder channel to be around 161Hz at this speed. When used with the appropriate controller the encoder signals can be used for positional control with much greater accuracy and consistency than potentiometer-based actuator feedback systems.



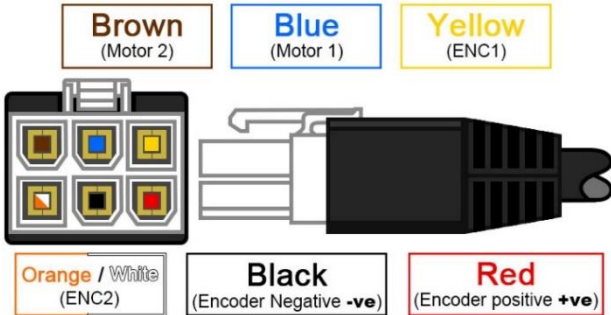
Simplified Internal Circuit Diagram

The internal circuit includes a hall-sensor based quadrature encoder, and limit switches wired for automatic motor braking when the end points (0mm and Stroke Length mm) are reached.

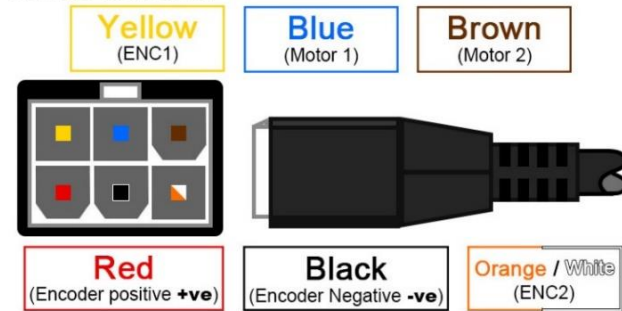


Connectors. A Male 6-pin connector is included at the end of the standard actuator lead, Female connectors are available separately.

Male Connector



Female Connector



Safety Considerations

Linear actuators such as this model are low-voltage electromechanical components that are used in a wide variety of different applications. It is important that the safety of each installation is assessed according to its own requirements, construction, end user and environment.

To ensure that a system utilising these actuator(s) is safe here are some principles that should be followed (*this is not an exhaustive list*):

- The actuator should not be overloaded mechanically, or run above its specified duty cycle limit. Both it and any connected hardware should be designed with an appropriate safety factor (margin above the design load) for the application.
- As actuators such as this are capable of generating a very large force, care should be taken to mitigate any possible entrapment or falling mass hazards that could be created by the assembly that you are installing them into.
- Overcurrent protection must be used, ideally tuned to each system (current limiting), but at a minimum an appropriately rated fuse.
- Power and control hardware should be appropriately specified to provide the voltage and current required of the actuator.
- Mechanical overrides should be factored in to a design, where appropriate, due to the self-locking nature of the actuator.
- End product and application-specific regulations should be checked, and appropriate risk assessments and compliance testing carried out on the basis of the planned usage.

If you have any questions, would like to place an order, or if you need help in determining the suitability of this item for your application, please contact us at support@gimsonrobotics.com