LINEAR ACTUATORS

Linear Actuators

We produce and supply a wide range of **electrically powered struts** to suit **many different applications** in addition to lifting engine covers and hatches. Our struts are being used to **lift** tables and steer consoles, to **slide** open roofs, as well as to **hide** barbecues and TV's after use. You can see them **converting** beds at the touch of a switch and even sliding security bars into position behind exposed windows! No limit to the imagination... Different solutions are available to get the most appropriate device for the specific job, with **thrusts from 120 to 2,200 lbs, strokes from 2" to 9-1/2 ft., speed from 0.1 to 1.4 inches/sec** on either **12 or 24 Volt DC** supply. Both **"push only"** and **"push/pull"** versions are available, with or without encoder. But what all our struts have in common is having been designed and built to work in the **marine environment with an IP65 rating:** their structure of anodized light alloy protects the motor and the mechanical components from spray and salt. Replacement parts and repair service available at Scandvik!

To select the appropriate strut suitable for your needs, you have to consider several factors. For instance, if the purpose is to raise a hatch that is the only access to the compartment, we would advise using the "push-only" versions as these permit manual opening in the event of power breakdown. Otherwise an emergency access will have to be provided in order to, at least, unbolt the strut. Other factors to be considered are the point and the angle of thrust that significantly affect the effort required. Moreover, if the lift reaches the tipping point, you must use a "push/pull" version that allows for the opening and closing by the strut. **For more details** please request our instructions. The installation of a pair of struts to work together without encoder is possible only if both the struts required the same effort, otherwise it is necessary to choose the synchronized version with encoder. The pairs must be ordered as such: it is not possible to couple struts supplied as singles.

Linear Actuators

Calculation of the thrust needed at the point of leverage.

The thrust required to open a hatch by means of an actuator depends on the point of the leverage and the weight of the hatch itself. As an example, we provide the data for a rectangular hatch of uniform construction, which is located in a horizontal position when closed. The weight is 220 lbs. Hinged on one side that is 3'-4" from the opposite side. The thrust required to lift varies as follows depending on the distance of the point of thrust of the actuator from the hinges *"a"* and the angle "**G°**" that it forms with the perpendicular:

G°	40" (a)	20" (a)	9" (a)	5" (a)
0°	110 lbs	220 lbs	441 lbs	882 lbs
30°	126 lbs	254 lbs	507 lbs	1,014 lbs
45°	156 lbs	313 lbs	626 lbs	1,252 lbs
60°	220 lbs	441 lbs	882 lbs	1,764 lbs
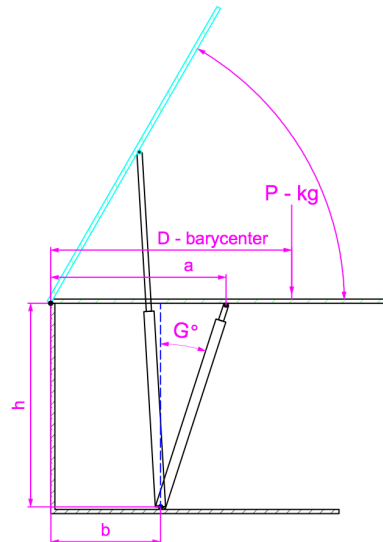
It is evident that the thrust varies greatly according to the chosen assembly, and that the most favorable conditions are obtained by applying the thrust point as far away as possible from the hinges and with the actuator in a position perpendicular to the closed hatch.
For those who wish to proceed to the calculation, the formula for obtaining the necessary thrust for lifting is the following:

$$F = (P * D) / b$$

where **F** is the force required for lifting in pounds, **P** is the weight in pounds of the hatch including everything integral with it, and **D** is the distance of the center of gravity of the hatch from the hinges and **b** is the distance of the point of thrust from the hinges. In most common cases, when the hatch has a rectangular shape and constant density, **D** is simply equal to half the distance between hinges and opposite end of the hatch. In more complicated cases, such as when objects are mounted on the hatch such as seats or more, you can find **D** empirically by resting the hatch on a shaft parallel to the axis of rotation of the hinges (after detaching the hinges) to identify the center of gravity.

The formula for the thrust required of the actuator is a function with respect to the vertical.

F/cos G°

Where *"G°"* is the angle of the actuator relative to the vertical when it is closed.
In practice the force **F** obtained by the first formula to be multiplied by the following values:

15° = 1.035   30° = 1.15   45° = 1.42   60° = 2.0   75° = 3.86

When calculating the necessary thrust, take into account the friction caused by the hinges, increasing the value obtained by 20%.
In the case where superstructures, such as seats, console, etc., are mounted on the hatch, presents another problem. When the opening angle exceeds the point where the perpendicular to the center of gravity falls outside the hatch, this will increase the opening without need for further thrust. You will then have to use a push-pull actuator to "pull" the door being closed.
The possible use of two parallel actuators (Coupled) to lift hatches or doors.
Large, heavy hatches or doors can be lifted on both sides by two paired actuators. It is important ensure that the actuators have the same speed during operation. The speed depends on the load, so if the two actuators are carrying a different load, the speed will always be different. Encoded controlled actuators are available to synchronize the motion of two actuators, regardless of the load differential. Not all models can be controlled synchronously. Only the customer can determine which solution is applicable.

THRUST 220 LBS.

Inch Dimension + stroke = length of strut closed + stroke = length of strut extended

11-3/8" + stroke
8-5/8" + stroke
2"
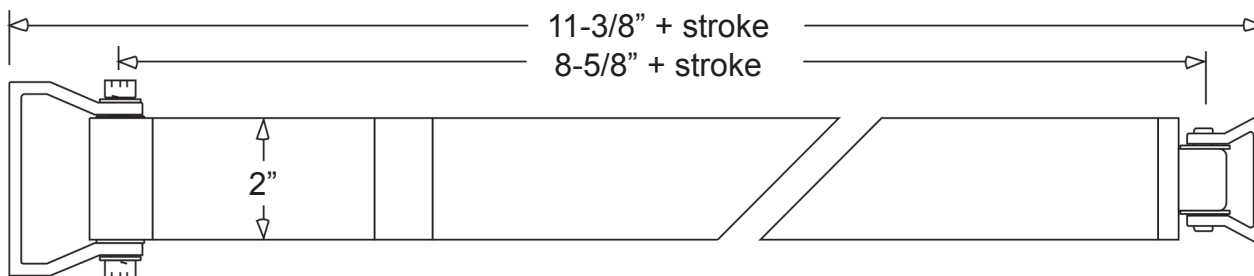
#40121	Push-Pull	with magnetic end of stroke	Stroke 19"	12 Volt
#40124	Push-Pull	Encoded	Stroke 19"	12 Volt
#40125	Push-Pull	with magnetic end of stroke	Stroke 36"	12 Volt
#40126	Push-Pull	Encoded	Stroke 36"	12 Volt

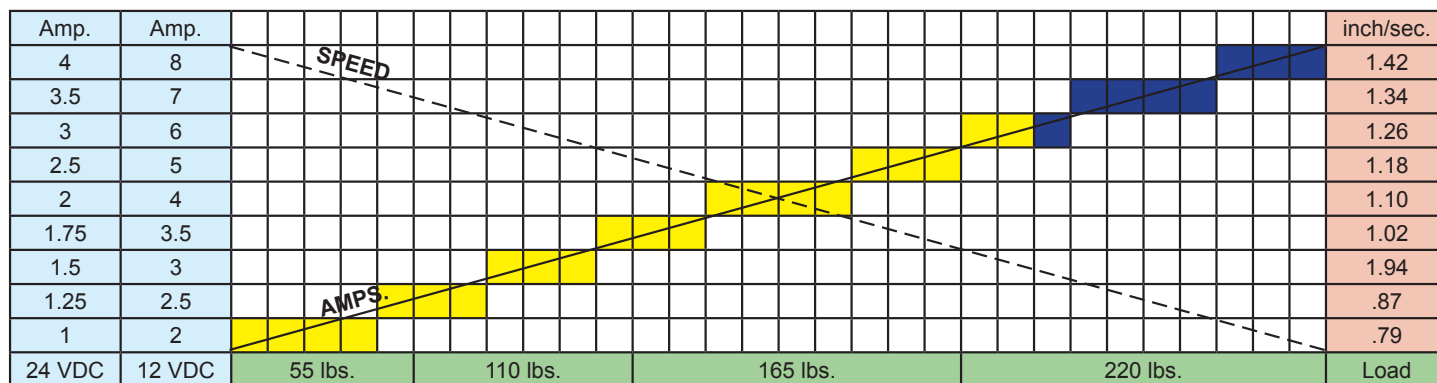**Cylinder, piston and brackets in anodized Aluminum.**

HIGH SPEED VERSIONS: Ideal for handling structures with long stroke due to their high travel speed, not suitable for lifting. It is essential that long struts are properly supported if positioned horizontally to prevent flex.

Magnetic End of Stroke: Adjustable magnetic pick-up sensors can be placed at the appropriate locations along the cylinder to stop the movement of the piston in both directions.

Encoder: Struts for installation in pairs, equipped with encoded electronics and control unit to obtain a perfect synchronization, even when subject to different loads. It is possible to store up to four different and independent end positions, pre-set by the user at the time of installation, selectable with just a short press of a single button. Can also be used individually when such a precise movement is required, defining a different points of start and end of stroke. Comes with backlit push button control and programming control box.

- Push-Pull Versions allows the same power in both directions (in and out).
- Push-Only Versions allows to lift the struts by hand in case of lack of power or breakdown.
- Available as a pair.
- Supplied with an electronic control box for each strut to control and protect against overloads.
- It's necessary to add a 3 positions switch with automatic return to the OFF state.
- Available for 12 or 24VDC power.
- Available with strokes ranging between 4" and 114".

220 LB. CAPACITY

Amp.	Amp.							inch/sec.
4	8							1.42
3.5	7							1.34
3	6							1.26
2.5	5							1.18
2	4							1.10
1.75	3.5							1.02
1.5	3							1.94
1.25	2.5							.87
1	2							.79
24 VDC	12 VDC	55 lbs.	110 lbs.	165 lbs.	220 lbs.			Load

SPEED

AMPS.

☐ Max. 4 cycles/10 minutes   ■ Max. 2 cycles/10 minutes

Linear Actuators

THRUST 330 LBS.

Inch Dimension + stroke = length of strut closed + stroke = length of strut extended

10-7/8" + stroke

8-1/8" + stroke

2"
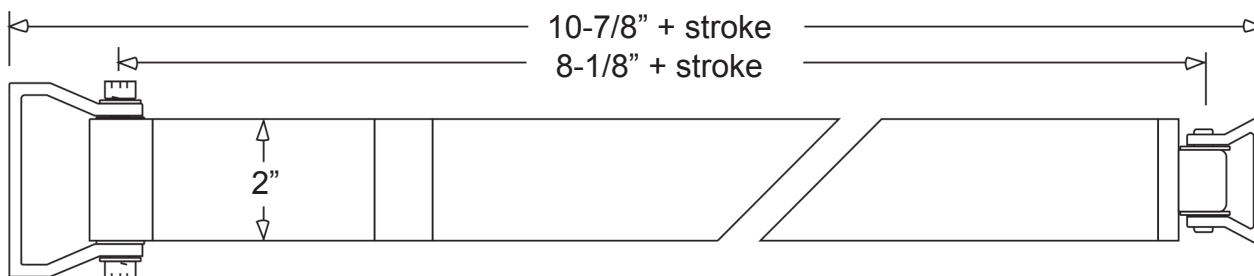
#40104	Push-Pull	Stroke 4.5"	12 Volt
#40105	Push-Pull	Stroke 12"	12 Volt
#40112	Push-Pull	Stroke 12"	24 Volt
#40100	Push Only	Stroke 19"	12 Volt
#40101	Push Only	Stroke 23"	12 Volt

Cylinder, piston and brackets in anodized Aluminum.

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- Supplied with an electronic control box for each strut to control and protect against overloads.
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- Available with strokes ranging between 4" and 114".

330 LB. CAPACITY

Amp.	Amp.	SPEED / AMPS	inch/sec.
3	6		.63
2.75	5.2		.59
2.25	4.5		.55
2	4		.51
1.6	3.2		.47
1.35	2.7		.44
0.6	1.2		.39
24 VDC	12 VDC	110 lbs. 150 lbs. 200 lbs. 240 lbs. 280 lbs. 330 lbs.	Load

Max. 4 cycles/10 minutes Max. 2 cycles/10 minutes

Linear Actuators

THRUST 440 LBS.

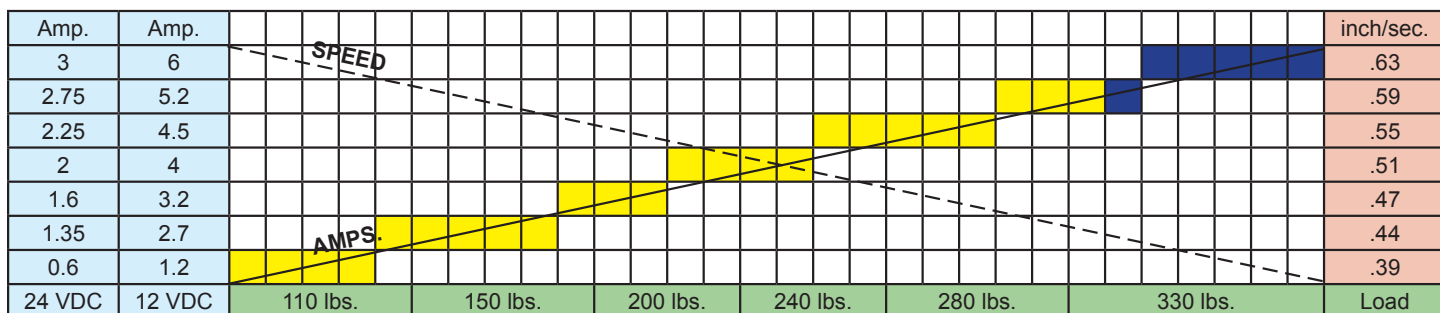**Inch Dimension + stroke = length of strut closed + stroke = length of strut extended**

10-7/8" + stroke
8-1/8" + stroke
2"
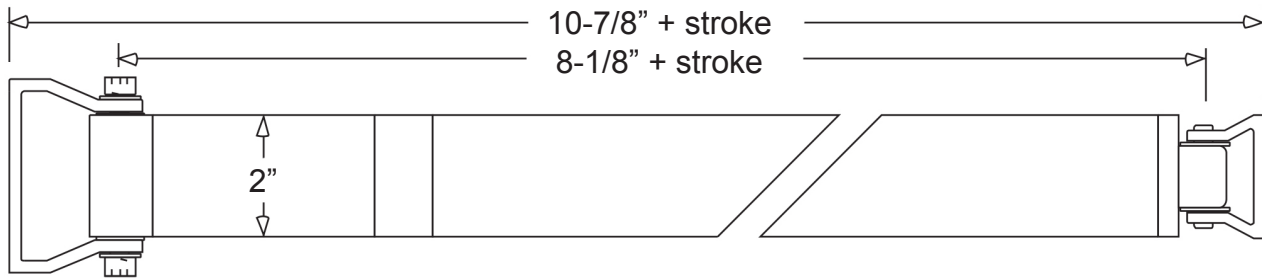
#40102		Push Only	Stroke 19"	12 Volt
#40106		Push Only	Stroke 19"	24 Volt
#40107		Push-Pull	Stroke 19"	12 Volt
#40103		Push Only	Stroke 23"	12 Volt
#40117	Pair	Push Only	Stroke 23"	12 Volt
#40110		Push Only	Stroke 23"	24 Volt
#40115		Push-Pull	Stroke 23"	12 Volt
#40118	Pair	Push-Pull	Stroke 23"	12 Volt

Cylinder, piston and brackets in anodized Aluminum.

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- Push-Only Versions allows to lift the struts by hand in case of lack of power or breakdown.
- Available as a pair.
- Supplied with an electronic control box for each strut to control and protect against overloads.
- It's necessary to add a 3 positions switch with automatic return to the OFF state.
- Available for 12 or 24VDC power.
- Available with strokes ranging between 4" and 114".

440 LB. CAPACITY

Amp.	Amp.																inch/sec.
4	8																.71
3.5	7																.67
3	6																.63
2.5	5																.59
2	4																.55
1.75	3.5																.51
1.5	3																.47
1.25	2.5																.44
1	2																.39
24 VDC	12 VDC	110 lbs.			220 lbs.			330 lbs.				440 lbs.					Load

Max. 4 cycles/10 minutes   Max. 2 cycles/10 minutes