



Linear Actuators

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THOMSON

Linear Motion. Optimized.™

Thomson – the Choice for Optimized Motion Solutions

Often the ideal design solution is not about finding the fastest, sturdiest, most accurate or even the least expensive option. Rather, the ideal solution is the optimal balance of performance, life and cost.

The Best Positioned Supplier of Mechanical Motion Technology

Thomson has several advantages that makes us the supplier of choice for motion control technology.

- Thomson own the broadest standard product offering of mechanical motion technologies in the industry.
- Modified versions of standard product or white sheet design solutions are routine for us.
- Choose Thomson and gain access to over 70 years of global application experience in industries including packaging, factory automation, material handling, medical, clean energy, printing, automotive, machine tool, aerospace and defense.
- As part of Fortive Corporation, we are financially strong and unique in our ability to bring together control, drive, motor, power transmission and precision linear motion technologies.

A Name You Can Trust

A wealth of product and application information as well as 3D models, software tools, our distributor locator and global contact information is available at

Talk to us early in the design process to see how Thomson can help identify the optimal balance of performance, life and cost for your next application. And, call us or any of our 2000+ distribution partners around the world for fast delivery of replacement parts.

The Fortive Business System

The Fortive Business System (FBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. FBS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. FBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages Thomson is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.

Local Support Around the Globe



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Introduction

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Introduction

Company Introduction

The history of the Thomson Electrak® actuator goes back to the development of ball screw actuators 40 years ago in Marengo, IL, USA. The first generation of general purpose actuators were developed for control of accessory drives on garden tractors and farm equipment. Since that simple beginning, actuators are now used in all types of equipment to automate a process, remove people from dangerous situations, provide remote control or make difficult, tedious manual jobs easier.

The linear actuators in this catalog represent proven design concepts found in the entire Electrak series. From light load 050s to the high performance Electrak Pro series capable of handling loads up to 1000 pounds, Thomson offers features unavailable anywhere else.









The world's most versatile actuator selection

Thomson combined the clevis to clevis mount Electrak series, and the trunnion mount Electrak PPA units, to provide the most versatile selection of linear actuators available. Our actuator team has solved over 10000 tough application challenges with even tougher actuators. We

built our reputation in the mobile off highway market in extremely demanding operating conditions. And if you can't find the actuator to meet your application, call us for a cost effective actuator built to your needs. Thomson builds more custom actuators than anyone.

You can count on Thomson

Thomson linear actuators – rugged, reliable remote linear motion control with the push of a button. You can count on Thomson for worldwide sales, service, application support and local availability. Please visit www.thomsonlinear.com for more information.

1967	1969	1974	1982	1984	1987	1988	1991
The first generation of actuators for use in garden tractors and farm equipment is released.	First line of ball screw driven actuators with right angle AC and DC motors is released.	First line of actuators with parallel motors and both acme and ball screw drive is released.	The "Tiger" line actuators are released for OEMs.	Electrak 1, 2, 5, 10 and 100 are released for distribution.	Electrak 205 and the first line of MCS controls are released.	Electrak 1SP with feedback potentiometer is released.	The first lifting columns, DMD and DMA, are released.
							

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Introduction

Product Introduction

Thomson actuators are easy to mount and operate, require no maintenance, don't leak hydraulic fluid, are easy to incorporate into an automated process and once installed they will work reliably under the toughest conditions year after year.

Actuators offer advantages over mechanical and hydraulic systems in many applications. They are self-contained, rugged, and durable, making them ideal anywhere you want to lift, lower, push, pull, rotate or position a load.

Compact design

With their compact size, actuators can be located in confined areas. An actuator with a 4 inch stroke length can produce 1500 pounds of force from a 12 inch package. Electrak 1 and 050 series actuators fit small areas with package lengths as short as 6 inches.

Rugged and reliable

All Thomson actuators incorporate strong, high quality components to assure trouble-free service. Rugged spur, worm or helical gearing, aircraft quality lubricants and high performance motors provide the maximum life and value. The actuators are gasketed and sealed throughout for protection in wet, dirty and oily environments and are ideal for use on outdoor equipment. The rod style actuators have stainless steel or aluminum extension tubes to resist corrosion.

Maintenance-free

All adjustments and lubrication are made at the factory and no maintenance is required or recommended.

Consistent, repeatable performance is provided for the entire lifetime of the actuator.

Bidirectional









Thomson actuators can push and pull loads ranging from one pound to 3/4 ton, and can extend up to 36 inches. With the Thomson series of actuator controls, you can create an actuator control system to meet your particular motion control requirements.

Safe operation

Motors used on Electrak actuators utilize thermal switches in their windings or Electronic Load Monitoring to shut the actuator off in case of overheating. A standard overload clutch or Electronic Load Monitoring will stop the motion if the load is too great or at the end of a stroke. All linear actuators will hold their loads with power removed.

Versatile

Stroke lengths of 1 to 36 inches are available and speeds are as high as two inches per second. Actuators are easy to apply, quick to install and usually only requiring two wires for operation. A wide variety of options and controls makes it easy to find the perfect actuator for your application. And if you have special needs, cost effective custom solutions are our speciality.

1992	1994	1998	1999	2000	2004	2011	2013
A patent for a load lock device is granted.	Electrak 1LL is released.	Electrak 150 with two patents is released. AC control line is released.	Electrak 050 with patented design and the first rotary actuators are released.	The first LM80 rodless actuator is released.	The triple profile lifting column TC16 and the "sweeper" actuator are released.	WhisperTrak actuator line released.	Max Jac, Electrak Throttle introduced.
							

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Introduction

The Benefits of Electrification

Electrification is converting manual, hydraulic and pneumatic operations to electromechanical motion. Substantially improved machine performance and cost advantages can be gained through electrification.

Reduce costs

- Electric actuation components cost less than comparable hydraulic and pneumatic systems.
- One electric linear actuator is faster and easier to install than the multiple hydraulic and pneumatic components required to achieve the same function.
- Electric actuators feature quick and predictable system tuning when compared to the headaches of configuring hydraulic systems and their components which contend with power variation, temperature variation, and non-linear performance profiles.
- Compare zero maintenance electric actuators against the fluid replacement, leak repairs and other routine maintenance needed to support hydraulic systems.
- Eliminate the environmental problems and costs associated with hydraulic fluid leaks and fluid disposal.

Boost productivity and efficiency

- Improve control over critical machine operations with:
 - Multiple digital and analog feedback options
 - Fixed and programmable limit switches for “teach and repeat” positions
 - Low voltage switching options that can interface directly with programmable PC/PLC controllers
 - Pulse width modulation for variable speed control
- Superior accuracy and repeatability
- Link and automate simultaneous processes
- Reduce down time with:
 - Zero maintenance
 - Longer component life
 - Redundancy through manual override
- Improve safety and reduce costs by removing people from danger with convenient remote control

Great opportunities for electric conversion

Making jobs easier

- Raising and lowering a deck on a mower, paver or floor scrubber.
- Shifting manual transmission.
- Lifting wheelchairs into a vehicle.
- Opening and closing doors on buses or vans.

Automating a process

- Moving twine across a round bale of hay for consistent wrap.
- Varying the chute opening on a salt/sand spreader based on speed for consistent application.
- Lift and lower pantographs on electrical trains and trams.

Providing remote control

- Throttle control from the rear of garbage trucks.
- Positioning the discharge spout on a large chipper, snowblower or combine.
- Opening a chute on a salt/sand spreader.
- Positioning of solar energy panels and wind power plant turbines.
- Opening/closing the engine hatch on boats.
- Positioning boat, handicap vehicle seats.
- Belt tensioning.

Removing people from danger

- Sliding a cover over the stairs in a recreational vehicle.
- Throttle control for a tree stump grinder to keep the operator away from moving parts or flying debris.
- Medical waste/refuse compacting.

Replacing hydraulics or pneumatics

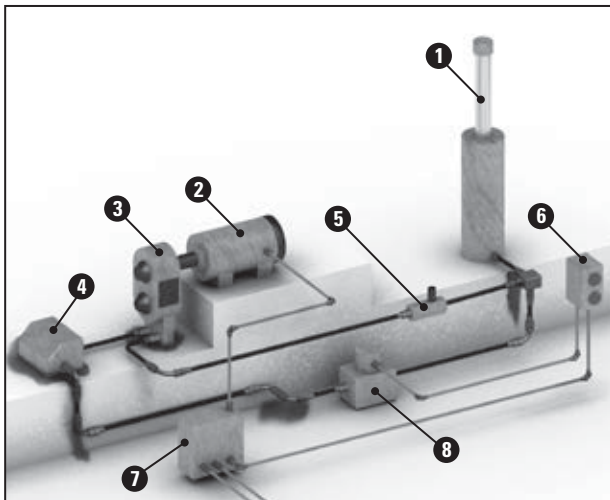
- Power steering.
- Dump beds on ATVs.
- Positioning mower decks on golf course equipment.



Introduction

The Benefits of Electrification

Replacing hydraulic or pneumatic cylinders with electrical linear actuators means a simpler and smaller installation, easier control, lower energy costs, higher accuracy, less maintenance, less noise and a cleaner, healthier environment.

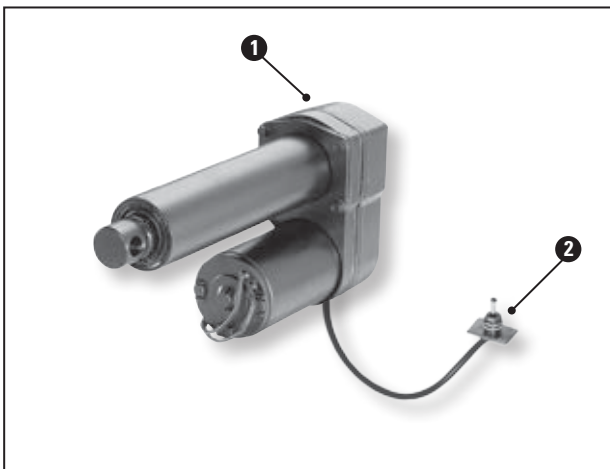


You can design, purchase and install all these components or you can select and install an actuator and switch.

Single acting, uni-directional hydraulic cylinder system

1. Hydraulic cylinder
2. Electric pump motor
3. Hydraulic pump
4. Hydraulic oil reservoir
5. Check valve
6. Operator push button box
7. Relay cabinet
8. Unloading valve

This single acting, uni-directional hydraulic cylinder system is one of the simplest hydraulic solutions. This system only allows consistent performance in one direction. In order to get consistent performance in both directions a bi-directional system would be required which is even more complex and costly.



Plug and play type of connections, simple installation and no need for any set up or adjustments ensures accurate, clean and trouble free operation within the hour.

Electric linear actuator system

1. Linear actuator
2. DPDT switch

This simple electrical actuator system will ensure consistent operation in both directions. It will also give you added features such as end of stroke limit switches, mid stroke protection and manual override operation in case of power failure. Optional features such as analog or digital position feedback and adjustable end of stroke limit switches are also available. Another advantage is that a system like this is easy to integrate with other control systems normally found in industrial systems or vehicles such as PLC's, micro-controllers, computers or simple relay based systems.

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Introduction

Actuator Applications

Thomson Electrak actuators can be found in the most diverse applications, ranging from agricultural to industrial, ventilation and medical equipment. Anywhere you want to lift, lower, push, pull, rotate or position a load - only your imagination will set the limit.

Mobile-off-highway

Actuators are widely used in agricultural, construction, mining, forestry, road work and railway equipment for the control of seats, hoods, doors, covers, balers, pantographs, sprayer booms, throttles and much more.

Turf and garden

Actuators can be found on riding lawn mowers, golf carts, garden tractors, cleaning machines, sky lifts and other utility vehicles.

Industrial equipment

Actuators are used on conveyor belts, for adjustable work tables/platforms and in the opening and closing of hatches, doors and locks. They are also common in machines for dispensing, cutting, packaging, labeling, scanning or printing.

Health and fitness

Actuators are commonly used in patient lifts/beds, handicap adapted vehicles and wheel chairs to position patients or equipment. Other applications include hospital devices, examination chairs/tables and work out/gym apparatus.

Office, domestic and entertainment equipment

At home, in the office and in the entertainment business actuators are used in automatic doors, lifts, garage doors, gates, satellite dishes, beds, reclining chairs, adjustable office desks, arcade games, vending machines, theatre/TV/movie props and theme park attractions.

Marine

On boats, ships and oil rigs actuators are used in seats, hatches, fire doors, rescue equipment, valves and throttles.

Ventilation and process control

Actuators are used for valve control in ventilation and process equipment.



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Introduction

Selection Procedure

By using the simple selection procedure described below and the Performance Overview on the next few pages, the process will be even easier.

Selection procedure

Step 1 - Determine Voltage

DC actuators can be operated by battery, a rectifier or an actuator control with 115/230 Vac input. AC actuators are either 115 or 230 Vac.

Step 2 - Determine Load/Speed

Select the actuator which has the load and speed rating that suits your application.

Step 3 - Select Stroke Length

Choose the desired stroke length from either the Performance Overview pages or the individual product pages.

Step 4 - Verify Design Considerations

Do you need a very short retracted length, adjustable, fixed or programmable limit switches, electronic load monitoring, digital or analog feedback, low voltage power switching, manual override, signal following, clevis mounting, tube mounting or trunnion mounting?

Step 5 - Select Control

The controls in the catalog are designed for use with Electrak actuators and range from a simple switch to a control with membrane switches and feedback display or with a hand pendant.

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Performance Overview

Standard Actuator Range

	ELECTRAK						
	1	1SP	050	2	PPA-DC	10	
							
Product availability							
North America / Europe / Asia ¹	•/•/•	•/•/•	•/•/•	•/ /	•/•/•	•/•/•	
General performance							
Product group rating	good	good	better	better	good	better	
Input voltage - Vdc / Vac [V]	12, 24 /	12, 24 /	12, 24, 36/	12 /	12, 24, 36, 90 ³ /	12, 24, 36/	
Maximum dynamic load [lbf]	75	75	112	250	1500	1500	
Maximum speed [in/sec]	3.0	3.0	1.9	1.2	1.3	2.4	
Maximum stroke length [in]	6	6	8	24	36	24	
Restraining torque [lbf-in]	20	0	0	65	200	100	
Protection class	IP66	IP66	IP66 Q-IP51	IP66	IP54	IP66	
Features							
Mounting configuration	clevis	clevis	clevis	clevis	trunnion	clevis	
Screw type - acme / worm / ball	•/ /	•/ /	/•/	•/ /	/ /•	• ² / /•	
Overload clutch			•	•	•	•	
Motor overload protection	•	•	•	•	•	•	
End of stroke limit switches	•		•				
Potentiometer feedback		•					
Electronic load monitoring							
Dynamic braking			• ⁷				
Manual override							
Optional features							
End of stroke limit switches				• ³	•	• ³	
Potentiometer feedback			•	•	•	•	
Encoder feedback					•		
Programmable limit switches							
End of stroke indication outputs							
Low current power switching							
Signal follower input							
Manual override				•	• ³	•	
More information							
See page ¹	14	16	18	20	22	24	
Actuator Controls							
Recommended control	DPDT Switch	DPDT Switch	DPDT Switch	DPDT Switch	DPDT Switch	DPDT Switch	

¹ Products not available in this region are not further described in this catalog. Go to www.servo2go.com for more information.



² Not available in North America.

						OTHER
	PPA-AC	5	205	THROTTLE	MAX JAC	
						
	•/•/•	•/•/•	•/ /	•/•/•	•/•/•	<p>On the next pages you can find information on the following type of actuators:</p> <ul style="list-style-type: none"> • Non-driven • Rotary • Legacy • Custom
	good	better	better	best	better	
	/ 115, 230	/ 115 ³ , 230, 400 ²	/ 115, 230	12/24	12/24	
	1500	1500	1500	30	182	
	0.6	2.1	2.1	3.7	2.4	
	36	24	24	2	12	
	200	100	100	0	18	
	IP22	IP55	IP55	IP67 / 69K	IP66 / 69K	
	trunnion	clevis	clevis/tube	clevis	clevis	
	/ / •	• ² / / •	/ / •	• / /	• / / •	
	•	•		•		
	•	•	•	•		
			•			
			•		•	
	•	• ³		•		
	•	•		•		
	•				•	
	• ³	•				
	26	28	30	32	34	
	DPDT Switch	MCS-2041	MCS-2051	DPDT, CanBus	DPDT Switch	


³ Not available in Europe. ⁴ For horizontal operation only. ⁵ For vertical operation only. ⁶ With anti-rotation option. ⁷ At end of stroke only.

Performance Overview

Non-driven and Rotary Actuators

	PPA-M	FA14
		
Product availability		
North America / Europe / Asia ¹	• / • / •	• / • / •
General performance		
Product group rating	good	best
Max. input torque [lbf-in]	80	15.9
Max. input speed [rpm]	100	3000
Maximum dynamic load [lbf]	1500	1500
Maximum speed [in/sec]	0.33	1.45
Maximum stroke length [in]	36	23.6
Restraining torque [lbf-in]	200	0
Standard features		
Mounting configuration	trunnion	clevis/trunnion
Screw type - acme / worm / ball	/ / •	• / / •
Overload clutch		•
Optional features		
Manual override		•
Protective bellows	•	
External magnetic position sensors		•
More information		
See page ¹	36	-

¹Products not available in this region are not further described in this catalog.
Contact customer support for more information.

	ROTARY
	DGB
	
Product availability	
North America / Europe / Asia	• / • / •
General performance	
Product group rating	better
Input voltage - Vdc / Vac [V]	12, 24, 36 /
Maximum torque [lbf-in]	100
Maximum speed [rpm]	200
Maximum duty cycle [%]	25
Protection class	IP56
Standard features	
Mounting configuration	clevis/tapped holes
Overload clutch	•
Motor overload protection	•
Optional features	
Dual output shafts	•
Manual override	•
More information	
See page	38





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Performance Overview

Legacy Actuators

	ELECTRAK LEGACY ACTUATORS			
	1SL	150	100	Pro
				
Product availability				
North America / Europe / Asia	• / /	• / • / •	• / /	• / • / •
General performance				
Product group rating	good	better	better	good
Input voltage - Vdc / Vac [V]	12, 24 /	12, 24, 36 / 115 ¹	24 /	12, 24 /
Maximum dynamic load [lbf]	75	450	1500	1000
Maximum speed [in/sec]	3.0	2.8	1.9	2.0
Maximum stroke length [in]	6	16	24	12
Restraining torque [lbf-in]	0	0	100	150 / 0 ⁶
Protection class	IP65	IP56	IP65	IP66
Standard features				
Mounting configuration	clevis	clevis	tube	clevis
Screw type - acme / worm / ball	• / /	/ • /	/ / •	• / / •
Overload clutch				
Motor overload protection		•	•	•
Potentiometer feedback			•	
Fixed end of stroke limit switches	•			
Adjustable end of stroke limit switches			•	
Internally restrained	•	•		
Optional features				
Adjustable end of stroke limit switches		•		
Potentiometer feedback		•		•
Manual override				
External magnetic position sensors				

¹ Not available in Europe.

About Legacy Actuators

The legacy products will not be further described in this catalog. We recommend you choose one of the products on the preceding pages, especially when designing new equipment. However, the legacy actuators can still be purchased and we fully support them. Please contact customer support if you need more information.

About Custom Actuators

The actuators you see on these pages are some of the building blocks we use to create cost effective custom actuators for OEMs. If you can't find the actuator that meets your needs, call us at 540-633-3400. Thomson is the industry leader in custom actuator design.

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Electrak 1

12 and 24 Vdc - load up to 75 lbf



Standard Features and Benefits

- Very compact and lightweight
- Integrated end of stroke limit switches
- Corrosion resistant housing
- Self-locking acme screw drive system
- Maintenance free
- Ideal for replacement of comparable size pneumatic and hydraulic cylinders

General Specifications

Parameter	Electrak 1
Screw type	acme
Internally restrained	no
Manual override	no
Dynamic braking	no
Holding brake	no, self-locking
End of stroke protection	end of stroke limit switches
Mid stroke protection	no
Motor protection	auto reset thermal switch
Motor connection	flying leads and connector
Motor connector	Packard Electric Pack-Con male 8911773 with terminal 6294511. Mating connector: 8911772 with terminal 8911639 (p/n 9300-448-001)
Certificates	CE optional*
Options	none

* Contact customer support

Performance Specifications

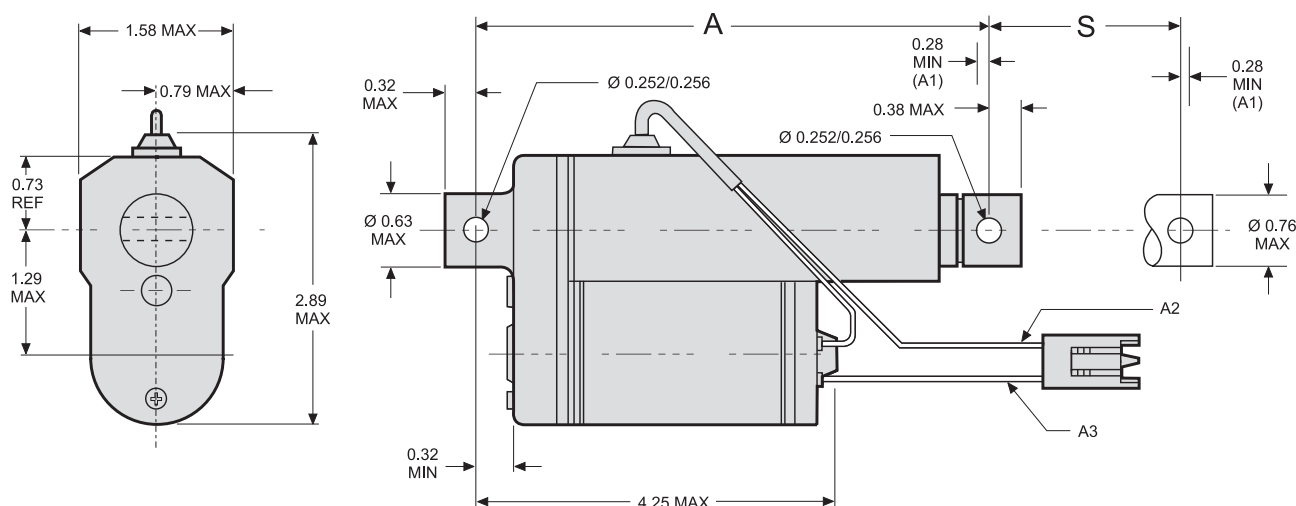
Parameter		Electrak 1
Maximum load, dynamic / static	[lbf]	
S •• -09A4		25 / 300
S •• -17A8		75 / 300
Speed, at no load / at maximum load	[in/sec]	
S •• -09A4		3.00 / 2.10
S •• -17A8		1.00 / 0.65
Available input voltages	[Vdc]	12, 24
Standard stroke lengths	[in]	2, 4, 6
Operating temperature limits	[°F]	-15 – +150
Full load duty cycle @ 77 °F	[%]	25
End play, maximum	[in]	0.036
Restraining torque	[lbf-in]	20
Lead cross section	[AWG]	18
Lead length	[in]	4.5
Protection class		IP66

Compatible Controls

Control model	See page
DPDT switch	46

Electrak 1

12 and 24 Vdc - load up to 75 lbf

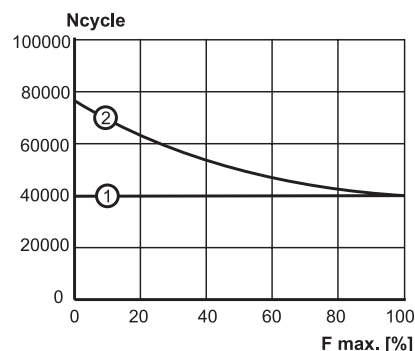


S: stroke
A: retracted length
A1: installation must include at least this much coast beyond limit switch shut off

Ordering stroke	[inch]	2	4	6
Actual stroke (S)	[inch]	1.8	3.8	5.8
Retracted length (A)	[inch]	6.3	8.3	10.3
Weight	[lb]	1.2	1.4	1.5

Performance Diagrams

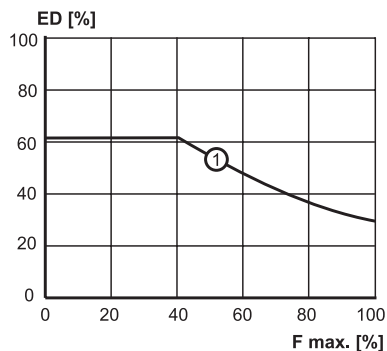
Life vs. Load



Ncycle: life in number of cycles
(one cycle = extend and retract)
F max: percent of maximum rated load

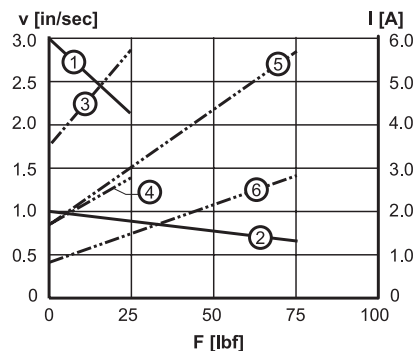
- 1: all models using the internal limit switches for end of stroke
- 2: all models when end of stroke is controlled externally

Duty Cycle vs. Load



ED: duty cycle in percent at 77° F
F max: percent of maximum rated load
1: all models

Speed and Current vs. Load



V: speed I: current F: load
1: speed 25 lbf
2: speed 75 lbf
3: current 25 lbf, 12 Vdc
4: current 25 lbf, 24 Vdc
5: current 75 lbf, 12 Vdc
6: current 75 lbf, 24 Vdc

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Electrak 1SP

12 and 24 Vdc - load up to 75 lbf



Standard Features and Benefits

- Very compact and lightweight
- Potentiometer feedback
- Corrosion resistant housing
- Self-locking acme screw drive system
- Maintenance free
- Internally restrained extension tube
- Ideal for replacement of comparable size pneumatic and hydraulic cylinders

General Specifications

Parameter	Electrak 1SP
Screw type	acme
Internally restrained	yes
Manual override	no
Dynamic braking	no
Holding brake	no, self-locking
End of stroke protection	no
Mid stroke protection	no
Motor protection	auto reset thermal switch
Motor connection	flying leads and connector
Motor connector	Packard Electric Pack-Con male 8911773 with terminal 6294511. Mating connector: 8911772 with terminal 8911639 (p/n 9300-448-001)
Certificates	CE optional*
Options	none

* Contact customer support

Performance Specifications

Parameter		Electrak 1SP
Maximum load, dynamic / static	[lbf]	
SP •• -09A4		25 / 300
SP •• -17A8		75 / 300
Speed, at no load / at maximum load	[in/sec]	
SP •• -09A4		3.00 / 2.10
SP •• -17A8		1.00 / 0.65
Available input voltages	[Vdc]	12, 24
Standard stroke lengths	[in]	2, 4, 6
Operating temperature limits	[°F]	-15 – +150
Full load duty cycle @ 77 °F	[%]	25
End play, maximum	[in]	0.036
Restraining torque	[lbf-in]	0
Lead cross section	[AWG]	18
Lead length	[in]	4.5
Protection class		IP66
Potentiometer	[kOhm]	10**

** See table on page 17 for resistance change per inch.

Compatible Controls

Control model	See page
DPDT switch	46

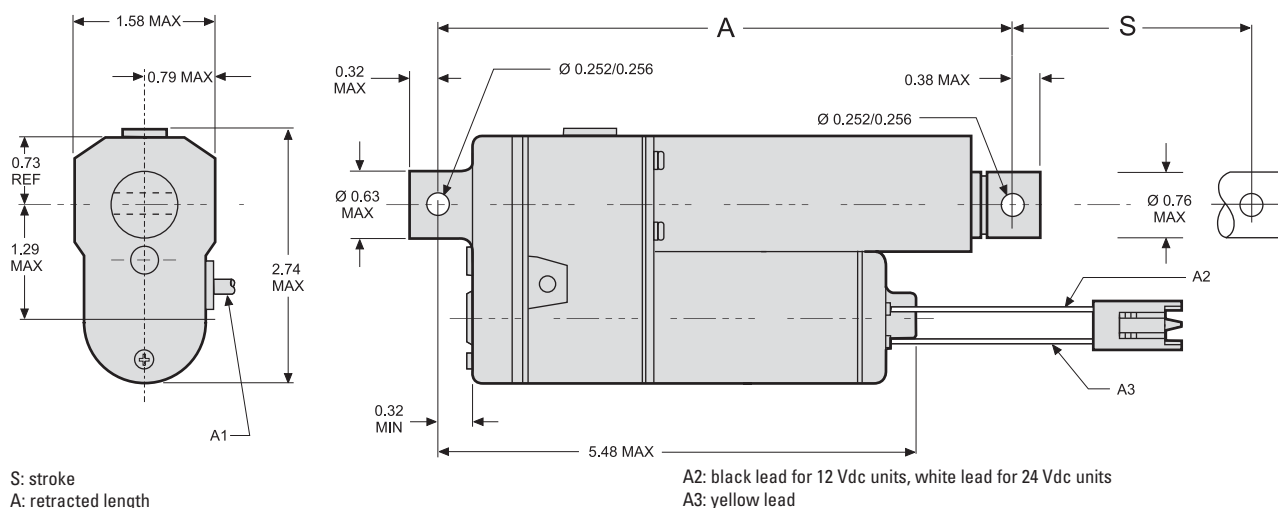
» Ordering Key - see page 56

» Glossary - see page 61

» Electric Wiring Diagram - see page 40

Electrak 1SP

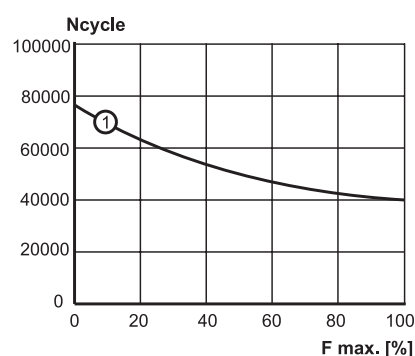
12 and 24 Vdc - load up to 75 lbf



Ordering stroke	[inch]	2	4	6
Actual stroke (S)	[inch]	2.3	4.5	6.8
Retracted length (A)	[inch]	7.8	10.0	12.2
Weight	[lb]	1.2	1.4	1.5
Potentiometer resistance change	[ohm/in]	2400	1200	800

Performance Diagrams

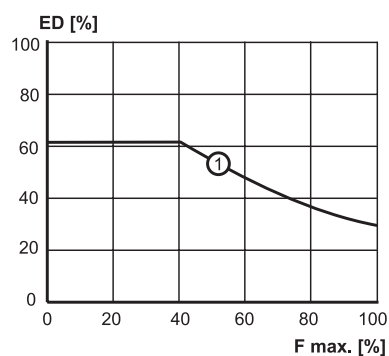
Life vs. Load



Ncycle: life in number of cycles
 (one cycle = extend and retract)
 F max: percent of maximum rated load

1: all models when end of stroke is controlled externally

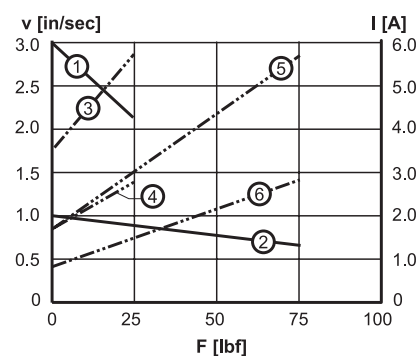
Duty Cycle vs. Load



ED: duty cycle in percent at 77° F
 F max: percent of maximum rated load

1: all models

Speed and Current vs. Load



V: speed I: current F: load

1: speed 25 lbf
 2: speed 75 lbf
 3: current 25 lbf, 12 Vdc
 4: current 25 lbf, 24 Vdc
 5: current 75 lbf, 12 Vdc
 6: current 75 lbf, 24 Vdc

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Electrak 050

12, 24 and 36 Vdc - load up to 112 lbf



Standard Features and Benefits

- Designed for office or medical applications
- Small, quiet and lightweight
- Very short retracted length
- Low cost
- Durable and corrosion free plastic housing
- Color molded into the plastic, no painting required
- End of stroke limit switches with dynamic braking
- Maintenance free
- Internally restrained extension tube
- Estimated life is minimum 40000 cycles
- Q-version for noise sensitive applications (24 Vdc only)

General Specifications

Parameter	Electrak 050
Screw type	worm
Internally restrained	yes
Manual override	no
Dynamic braking	yes, at end of stroke
Holding brake	no, self-locking
End of stroke protection	internal limit switches
Mid stroke protection	overload clutch
Motor protection	auto reset thermal switch
Motor connection	flying leads and connector
Motor connector	Packard Electric Pack-Con male 8911773 with terminal 6294511 Mating connector: 8911772 with terminal 12040508
Certificates	CE optional* Non pot versions are RoHS compliant
Options	<ul style="list-style-type: none"> • potentiometer 10 kOhm** • cross holes rotated 90° • white housing

* Contact customer support

** See performance specification table for resistance change per inch of travel

Performance Specifications

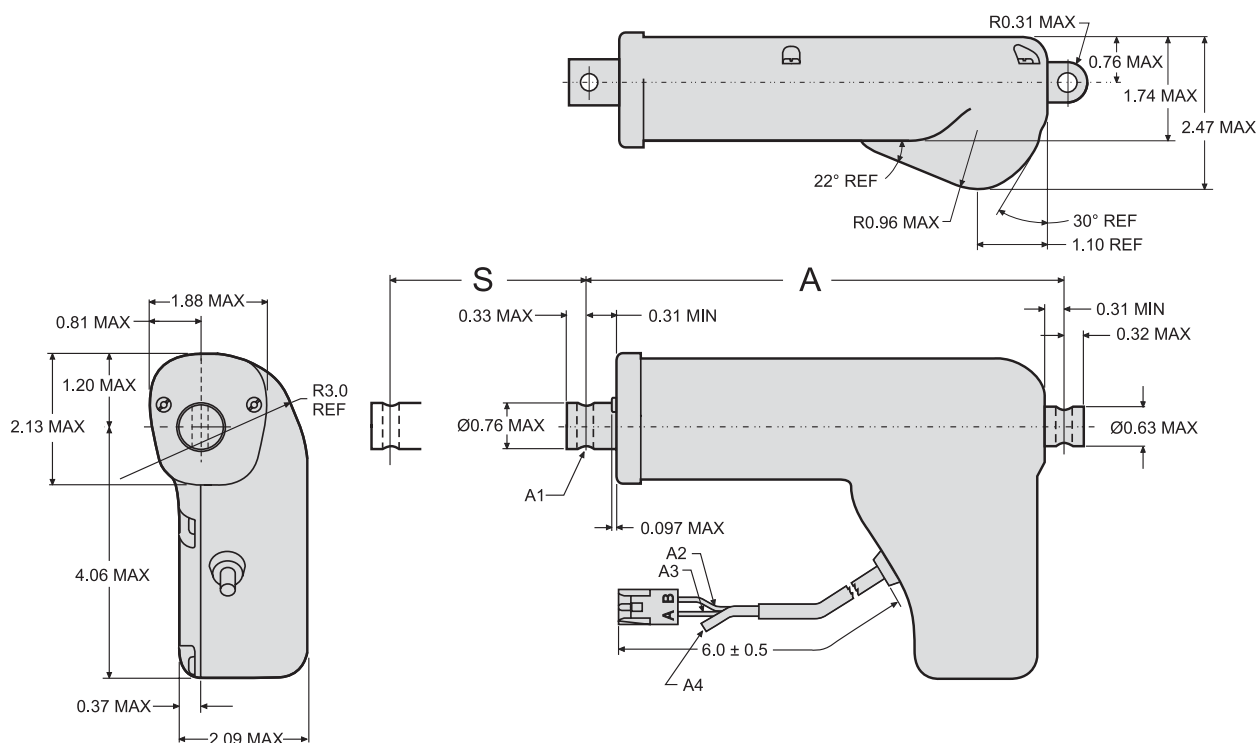
Parameter		Electrak 050
Maximum load, dynamic / static	[lbf]	
DE ••• 17W41		112 / 224
DE ••• 17W42		60 / 120
DE ••• 17W44		30 / 60
Speed, at no load / at maximum load	[in/sec]	
DE •• - 17W41		0.48 / 0.37
DE •• - 17W42		0.95 / 0.72
DE •• - 17W44		1.90 / 1.45
DE24Q17W41		0.36 / 0.30
DE24Q17W42		0.70 / 0.55
DE24Q17W44		1.50 / 1.20
Available input voltages	[Vdc]	12, 24, 36
Standard stroke lengths	[in]	2, 4, 6, 8
Operating temperature limits	[°F]	-30 – +180
Full load duty cycle @ 70 °F	[%]	25
End play, maximum	[in]	0.06
Restraining torque	[lbf-in]	0
Lead cross section	[AWG]	18
Lead length	[in]	6
Protection class		
standard version		IP66
Q-version		IP51
Potentiometer resistance change	[ohm/in]	
DE ••• 17W41		560
DE ••• 17W42		556
DE ••• 17W44		540

Compatible Controls

Control model	See page
DPDT switch	46

Electrak 050

12, 24 and 36 Vdc - load up to 112 lbf



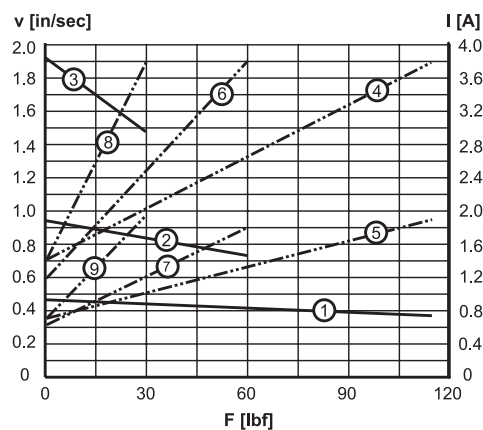
S: stroke
A: retracted length
A1: Ø 0.254 ± 0.003 mounting cross holes (2 ×) in standard position

A2: red lead
A3: yellow lead
A4: vent tube Ø 0.125 inch

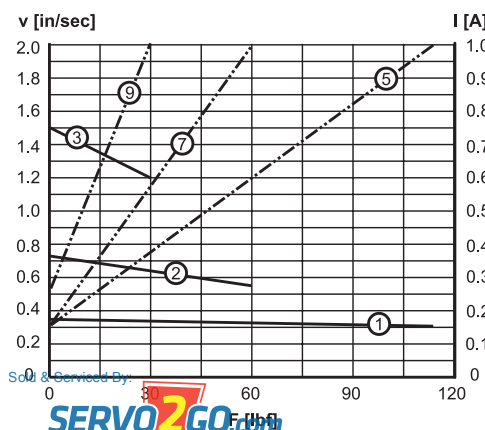
Stroke (S)	[inch]	2	4	6	8
Retracted length (A)	[inch]	5.5	7.5	9.5	11.5
Retracted length, with potentiometer (A)	[inch]	6.75	8.75	10.75	—
Weight	[lb]	1.4	1.6	1.8	2.0
Weight with potentiometer	[lb]	1.6	1.8	2.0	—

Performance Diagrams

050, standard version
Speed and Current vs. Load



050, Q-version
Speed and Current vs. Load



V: speed I: current F: load

- 1: speed 112 lbf
- 2: speed 60 lbf
- 3: speed 30 lbf
- 4: current 12 Vdc, 112 lbf *
- 5: current 24 Vdc, 112 lbf
- 6: current 12 Vdc, 60 lbf *
- 7: current 24 Vdc, 60 lbf
- 8: current 12 Vdc, 30 lbf *
- 9: current 24 Vdc, 30 lbf

* 12 Vdc not possible for Q-version.

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Electrak 2

12 Vdc - load up to 250 lbf



Standard Features and Benefits

- Economical and robust actuator for medium loads
- Stainless steel extension tube
- Self-locking acme screw drive system
- Overload clutch for mid and end of stroke protection
- Motor with thermal switch
- Maintenance free

General Specifications

Parameter	Electrak 2
Screw type	acme
Internally restrained	no
Manual override	no, optional
Dynamic braking	no
Holding brake	no, self-locking
End of stroke protection	overload clutch
Mid stroke protection	overload clutch
Motor protection	auto reset thermal switch
Motor connection	flying leads and connector
Motor connector	Packard Electric 56 series 2984883 with terminal 2962987. Mating connector: 2973781 with terminal 2962573 (p/n 9100-448-001)
Certificates	CE optional*
Options	<ul style="list-style-type: none"> • potentiometer* • manual override* • limit switches*

* Contact customer support

Performance Specifications

Parameter	Electrak 2
Maximum load, dynamic / static [lbf]	250 / 1000
Speed, at no load / at maximum load [in/sec] D12-10A5 (high speed) D12-20A5 (standard speed)	1.20 / 1.00 0.61 / 0.55
Available input voltages [Vdc]	12
Standard stroke lengths [in]	4, 8, 12, 18*, 24*
Operating temperature limits [°F]	-15 – +150
Full load duty cycle @ 77 °F [%]	25
End play, maximum [in]	0.08
Restraining torque [lbf-in]	65
Lead cross section [AWG]	14
Lead length [in]	7.5
Protection class	IP66

* Contact customer support

Compatible Controls

Control model	See page
DPDT switch	46

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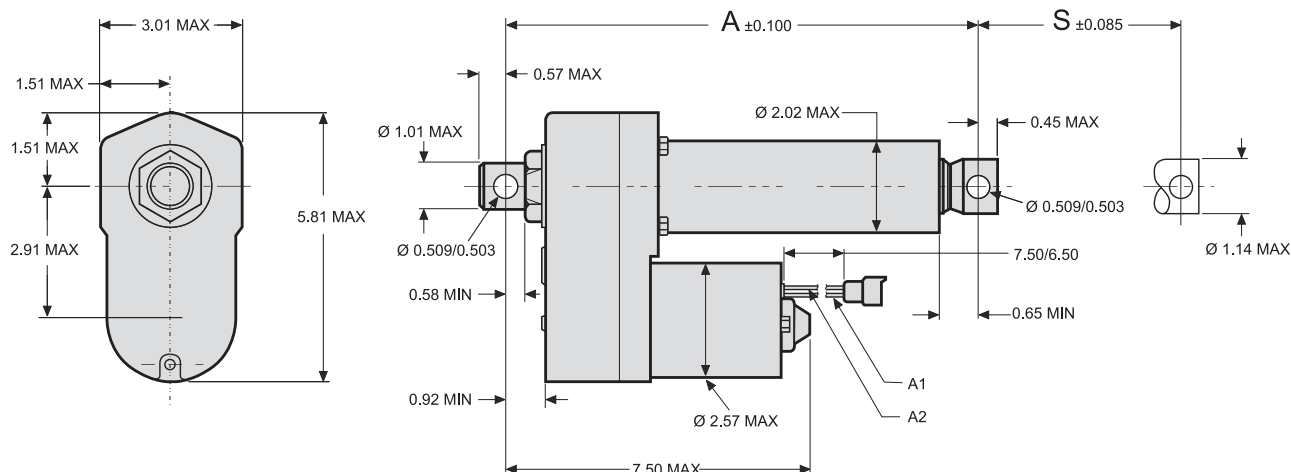
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Electrak 2

12 Vdc - load up to 250 lbf

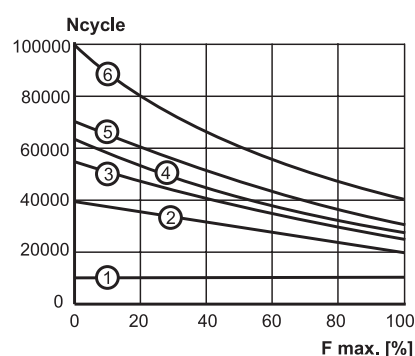


S: stroke
A: retracted length
A1: yellow lead
A2: red lead

Stroke (S)	[inch]	4	8	12
Retracted length (A)	[inch]	10.3	14.3	18.3
Weight	[lb]	10.0	10.7	11.4

Performance Diagrams

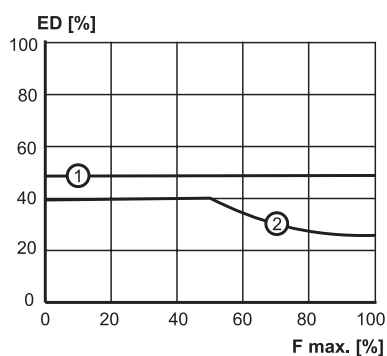
Life vs. Load



Ncycle: life in number of cycles
(one cycle = extend and retract)
F max: percent of maximum rated load

- 1: all models using the clutch at the end of stroke
- 2: standard speed model, 12 inch stroke
- 3: standard speed model, 8 inch stroke
- 4: high speed model, 12 inch stroke
- 5: high speed model, 8 inch stroke and standard speed model, 4 inch stroke
- 6: high speed model, 4 inch stroke

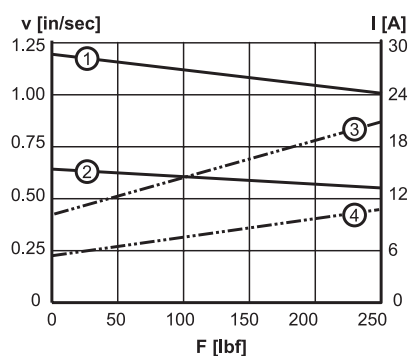
Duty Cycle vs. Load



ED: duty cycle in percent at 77° F
F max: percent of maximum rated load

- 1: standard speed model
- 2: high speed model

Speed and Current vs. Load



V: speed I: current F: load

- 1: speed high speed model
- 2: speed standard speed model
- 3: current high speed model
- 4: current standard speed model

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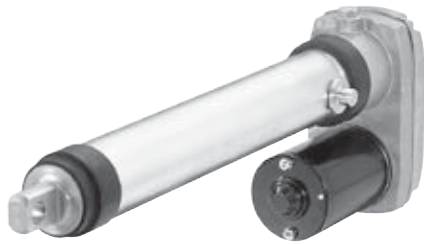
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Electrak PPA-DC

12, 24, 36 and 90 Vdc - load up to 1500 lbf



Standard Features and Benefits

- Strong and versatile heavy duty actuator
- High duty cycle
- Highly efficient ball screw drive system
- Overload clutch for mid and end of stroke protection
- Stroke lengths up to 36 inch
- Four different input voltages to chose from
- Motor with thermal switch
- Maintenance free
- Large range of options

General Specifications

Parameter	Electrak PPA-DC
Screw type	ball
Internally restrained	no
Manual override	no, optional
Dynamic braking	no
Holding brake	yes
End of stroke protection	overload clutch
Mid stroke protection	overload clutch
Motor protection	auto reset thermal switch
Motor connection	flying leads
Motor connector	no
Certificates	CE optional*
Options	<ul style="list-style-type: none"> • end of stroke limit switches • potentiometer • encoder • protective bellows • manual override*

* Contact customer support

Performance Specifications

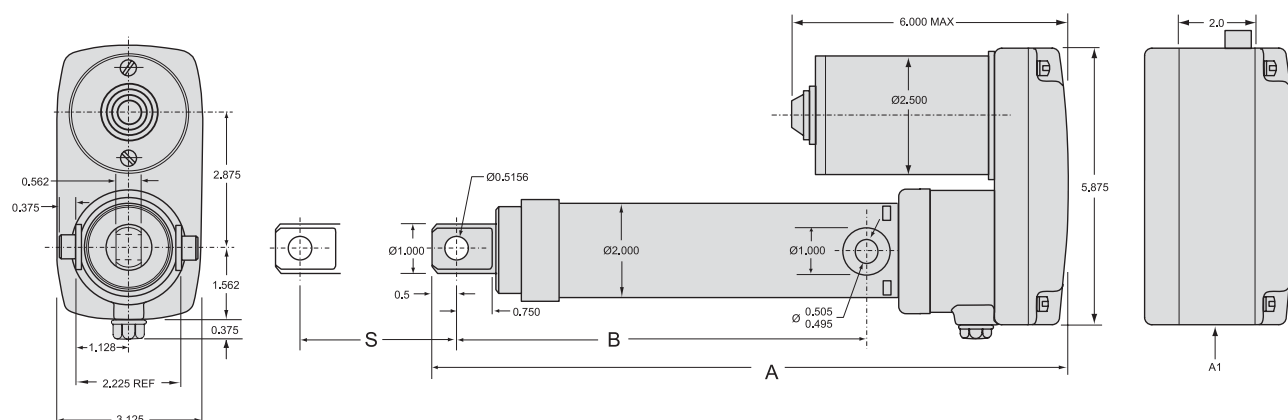
Parameter		PPA-DC
Maximum load, dynamic / static	[lbf]	
PPA •• -18B65		750 / 3000
PPA •• -58B65		1500 / 3000
Speed, at no load / at maximum load	[in/sec]	
PPA12(24)-18B65		1.26 / 1.10
PPA12(24)-58B65		0.49 / 0.37
PPA90-18B65		0.80 / 0.63
PPA90-58B65		0.17 / 0.17
Available input voltages	[Vdc]	12, 24, 36, 90
Standard stroke lengths	[in]	4, 8, 12, 18, 24, 36
Operating temperature limits	[°F]	-15 – +150
Full load duty cycle @ 77 °F	[%]	30
End play, maximum	[in]	0.040
Restraining torque	[lbf-in]	
PPA •• -18B65		100
PPA •• -58B65		200
Lead cross section	[AWG]	14
Lead length	[in]	16.5
Protection class		IP54

Compatible Controls

Control model	See page
DPDT switch	46

Electrak PPA-DC

12, 24, 36 and 90 Vdc - load up to 1500 lbf



S: stroke

A: retracted length

B: retracted length to trunnions

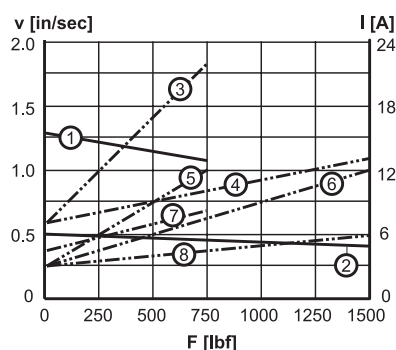
A1: housing dimensions for limit switch, encoder or potentiometer options

Stroke (S)	[inch]	4	8	12	18	24	36
Retracted length (A) without options	[inch]	13.7	17.7	21.7	29.7	35.7	47.7
Retracted length (A) with limit switch, encoder or potentiometer	[inch]	15.7	19.7	23.7	31.7	37.7	49.7
Retracted length to trunnions (B)	[inch]	8.8	12.8	16.8	24.8	30.8	42.8
Weight	[lb]	10	11.6	13.3	15.9	18.5	23.8
Add on weight for limit switch, encoder or potentiometer	[lb]	1.7	1.7	1.7	1.7	1.7	1.7

Performance Diagrams

Speed and Current vs. Load

12, 24 and 36 Vdc models



V: speed I: current F: load

- 1: speed 750 lbf
- 2: speed 1500 lbf
- 3: current 750 lbf, 12 Vdc
- 4: current 1500 lbf, 12 Vdc
- 5: current 750 lbf, 24 Vdc
- 6: current 1500 lbf, 24 Vdc
- 7: current 750 lbf, 36 Vdc
- 8: current 1500 lbf, 36 Vdc

90 Vdc model

Contact the factory for 90VDC applications.

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Electrak 10

12, 24 and 36 Vdc - load up to 1500 lbf



Standard Features and Benefits

- Robust, strong and reliable
- Withstands very harsh environments
- Stainless steel extension tube
- Highly efficient ball screw drive system
- Overload clutch for mid and end of stroke protection
- Motor with thermal switch
- Maintenance free

General Specifications

Parameter	Electrak 10
Screw type	ball
Internally restrained	no
Manual override	no, optional
Dynamic braking	no
Holding brake	yes
End of stroke protection	overload clutch
Mid stroke protection	overload clutch
Motor protection	auto reset thermal switch
Motor connection	flying leads and connector
Motor connector	Packard Electric 56 series 2984883 with terminal 2962987. Mating connector: 2973781 with terminal 2962573 (p/n 9100-448-001)
Certificates	CE optional*
Options	<ul style="list-style-type: none"> • potentiometer* • manual override* • limit switches*

* Contact customer support

Performance Specifications

Parameter	Electrak 10
Maximum load, dynamic / static [lbf]	
D •• -05B5	500 / 3000
D •• -10(20)B5	1000 / 3000
Contact customer support	1500 / 3000
Speed, at no load / at maximum load [in/sec]	
D •• -05B5	2.40 / 1.40
D •• -10B5 (high speed)	1.30 / 0.80
D •• -20B5 (standard speed)	0.60 / 0.45
Available input voltages [Vdc]	12, 24, 36
Standard stroke lengths [in]	4, 8, 12, 18*, 24*
Operating temperature limits [°F]	-15 – +150
Full load duty cycle @ 77 °F [%]	25
End play, maximum [in]	0.04
Restraining torque [lbf-in]	100
Lead cross section [AWG]	14
Lead length [in]	7.5
Protection class	IP66

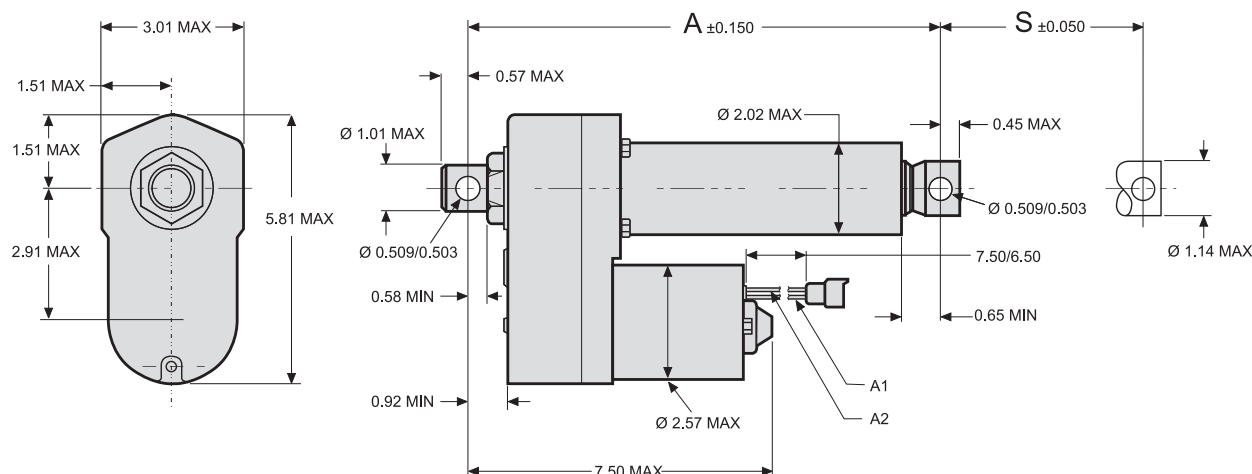
* Contact customer support

Compatible Controls

Control model	See page
DPDT switch	46

Electrak 10

12, 24 and 36 Vdc - load up to 1500 lbf

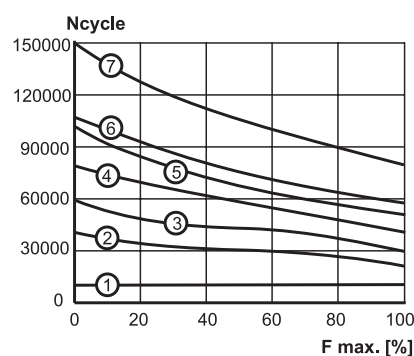


S: stroke
A: retracted length
A1: yellow lead
A2: red lead

Stroke (S)	[inch]	4	8	12
Retracted length (A)	[inch]	11.9	15.9	19.9
Weight	[lb]	11.3	12.0	12.7

Performance Diagrams

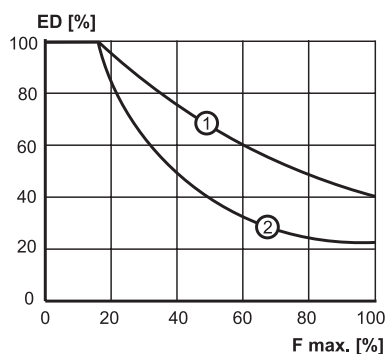
Life vs. Load



Ncycle: life in number of cycles
(one cycle = extend and retract)
F max: percent of maximum rated load

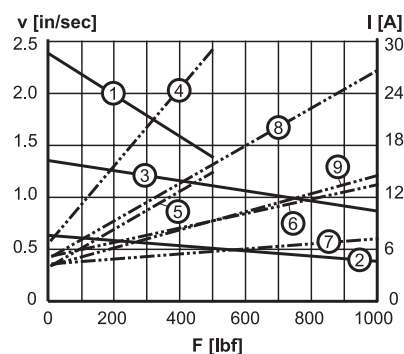
- 1: all models using the clutch at the end of stroke
- 2: 1000 lbf, 12 inch stroke
- 3: 1000 lbf, 8 inch stroke
- 4: 500 lbf, 12 inch stroke
- 5: 1000 lbf, 4 inch stroke
- 6: 500 lbf, 8 inch stroke
- 7: 500 lbf, 4 inch stroke

Duty Cycle vs. Load



ED: duty cycle in percent at 77° F
F max: percent of maximum rated load
1: 1000 lbf, standard speed
2: 500 lbf

Speed and Current vs. Load



V: speed I: current F: load
1: speed 500 lbf
2: speed 1000 lbf, standard speed
3: speed 1000 lbf, high speed
4: current 500 lbf, 12 Vdc
5: current 500 lbf, 24 Vdc
6: current 1000 lbf, 12 Vdc, standard speed
7: current 1000 lbf, 24 Vdc, standard speed
8: current 1000 lbf, 12 Vdc, high speed
9: current 1000 lbf, 24 Vdc, high speed

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Electrak PPA-AC

115 and 230 Vac - load up to 1500 lbf



Standard Features and Benefits

- Strong and versatile heavy duty actuator
- High duty cycle
- Highly efficient ball screw drive system
- Overload clutch for mid and end of stroke protection
- Stroke lengths up to 36 inch
- Motor with thermal switch
- Maintenance free
- Large range of options

General Specifications

Parameter	Electrak PPA-AC
Screw type	ball
Internally restrained	no
Manual override	no, optional
Dynamic braking	no
Holding brake	yes
End of stroke protection	overload clutch
Mid stroke protection	overload clutch
Motor protection	auto reset thermal switch
Motor connection	flying leads
Motor connector	no
Certificates	RoHS compliant
Options	<ul style="list-style-type: none"> • end of stroke limit switches • potentiometer • encoder • protective bellows • anti-coast brake * • electrical brake ** • manual override***

* External capacitor, which is supplied with the actuator, is required to run actuators with anti-coast brake option. See page 47 for capacitor dimensions

** Only possible on 115 Vac models *** Contact customer support

Performance Specifications

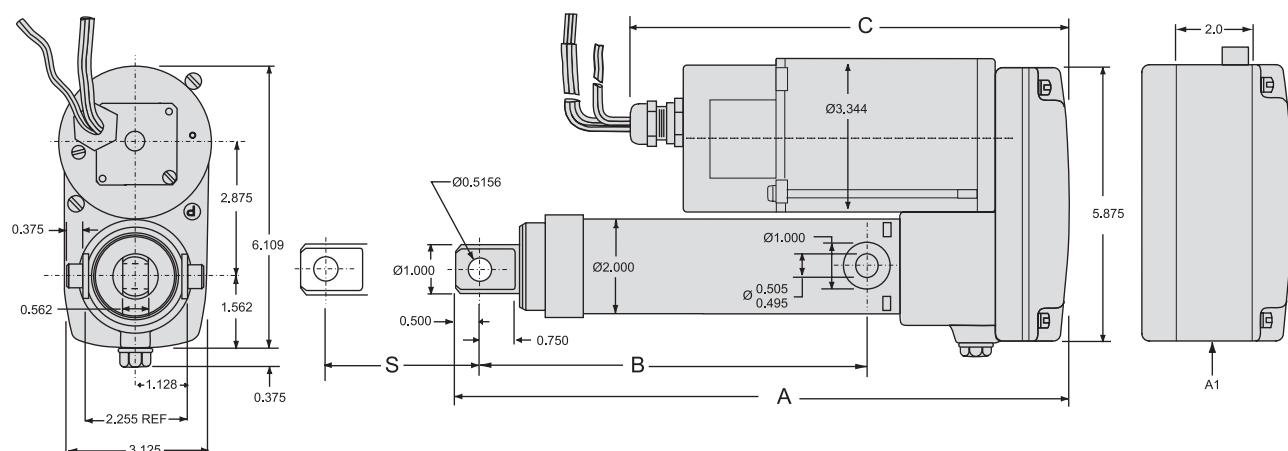
Parameter	PPA-AC
Maximum load, dynamic / static PPA •• -18B65 PPA •• -58B65	[lbf] 500 / 3000 1500 / 3000
Speed, at no load / at maximum load PPA11-18B65 PPA22-18B65 PPA •• -58B65	[in/sec] 0.63 / 0.60 0.55 / 0.50 0.17 / 0.17
Available input voltages Single phase	[Vac] 115, 230
Input frequency 1 × 115 Vac model 1 × 230 Vac model	[Hz] 50/60 50/60
Standard stroke lengths	[in] 4, 8, 12, 18, 24, 36
Operating temperature limits	[°F] -15 – +150
Full load duty cycle @ 77 °F	[%] 30
End play, maximum	[in] 0.040
Restraining torque PPA •• -18B65 PPA •• -58B65	[lbf-in] 100 200
Lead cross section	[AWG] 18
Lead length	[in] 19.5
Protection class	IP22

Compatible Controls

Control model	See page
DPDT switch	46

Electrak PPA-AC

115 and 230 Vac - load up to 1500 lbf



S: stroke

A: retracted length

B: retracted length to trunnions

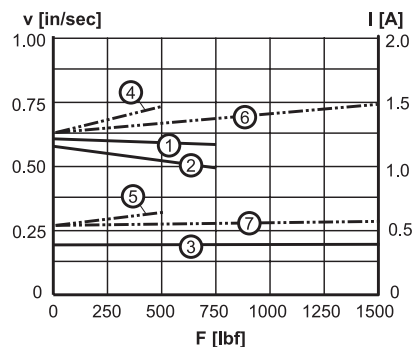
C: motor length

A1: housing dimensions for limit switch, encoder or potentiometer options

Stroke (S)	[inch]	4	8	12	18	24	36
Retracted length (A) without options	[inch]	13.7	17.7	21.7	29.7	35.7	47.7
Retracted length (A) with limit switch, encoder or potentiometer	[inch]	15.7	19.7	23.7	31.7	37.7	49.7
Retracted length (B)	[inch]	8.8	12.8	16.8	24.8	30.8	42.8
Motor length (C) without brake	[inch]	9.5	9.5	9.5	9.5	9.5	9.5
Motor length (C) with anti-coast brake	[inch]	7.5	7.5	7.5	7.5	7.5	7.5
Motor length (C) with electrical brake	[inch]	11.0	11.0	11.0	11.0	11.0	11.0
Weight	[lb]	13.2	14.8	16.5	19.1	21.6	27.0
Weight with electrical brake	[lb]	14.6	16.2	17.9	20.5	23.0	28.4
Add on weight for limit switch, encoder or potentiometer	[lb]	1.7	1.7	1.7	1.7	1.7	1.7

Performance Diagrams

Speed and Current vs. Load



V: speed I: current F: load

1: speed 500 lbf, 115 Vac

2: speed 500 lbf, 230 Vac

3: speed 1500 lbf

4: current 500 lbf, 115 Vac

5: current 500 lbf, 230 Vac

6: current 1500 lbf, 115 Vac

7: current 1500 lbf, 230 Vac

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Electrak 5

115 and 230 Vac - load up to 1500 lbf



Standard Features and Benefits

- Robust, strong and reliable
- Stainless steel extension tube
- Highly efficient ball screw drive system
- Overload clutch for mid and end of stroke protection
- Heavy duty motor with thermal switch
- Anti-coast brake for repeatable positioning
- Maintenance free

General Specifications

Parameter	Electrak 5
Screw type	ball
Internally restrained	no
Manual override	no, optional
Dynamic braking	no
Holding brake	yes
End of stroke protection	overload clutch
Mid stroke protection	overload clutch
Motor protection	auto reset thermal switch
Motor connection	flying leads
Certificates	UL, CSA, CE optional*
Options	<ul style="list-style-type: none"> • potentiometer* • manual override* • limit switches*

* Contact customer support

» Ordering Key - see page 58

» Glossary - see page 61

» Electric Wiring Diagram - see page 42

Performance Specifications

Parameter	Electrak 5
Maximum load, dynamic / static [lbf] A •• -05B5 A •• -10B5 Contact customer support	500 / 2500 1000 / 2500 1500 / 2500
Speed, at no load / at maximum load [in/sec] A •• -05B5 A •• -10B5	2.10 / 1.70 1.10 / 1.00
Available input voltages** [Vac] Single phase	115, 230
Input frequency [Hz] 1 × 120 Vac model 1 × 230 Vac model	60 50/60
Standard stroke lengths [in]	4, 8, 12, 18, 24
Operating temperature limits [°F]	-15 – +150
Full load duty cycle @ 77 °F [%]	25
Maximum on time [sec]	45
End play, maximum [in]	0.04
Restraining torque [lbf-in]	100
Lead cross section [AWG]	18
Cable length [in]	23
Protection class	IP55

** Capacitor required to run the actuator. 115 Vac = 35 µF, p/n 9200-448-002,
230 Vac = 10 µF, p/n 9200-448-003.

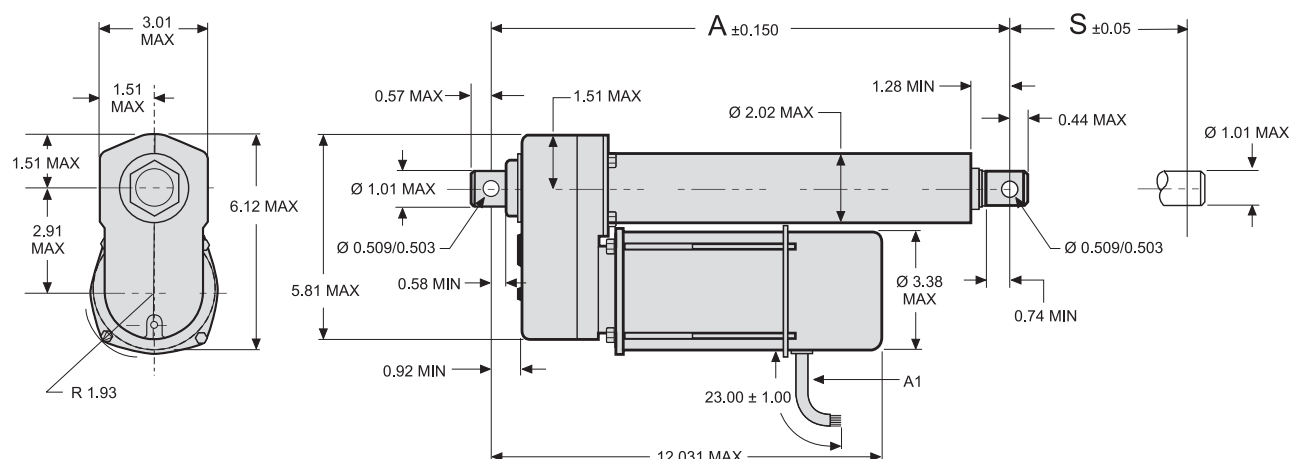
Compatible Controls

Control model	See page
DPDT switch	46
MCS-2041***	48

*** This control include a capacitor making an external capacitor redundant.

Electrak 5

115 and 230 Vac - load up to 1500 lbf



S: stroke

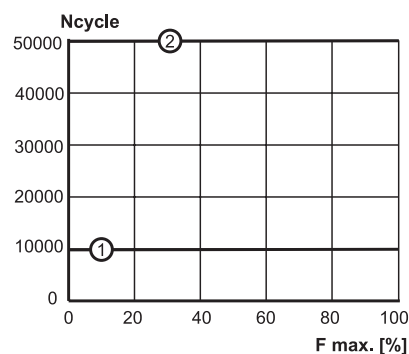
A: retracted length

A1: cable

Stroke (S)	[inch]	4	8	12	18	24
Retracted length (A)	[inch]	15.0	19.0	23.0	29.0	35.0
Weight	[lb]	14.4	15.2	16.1	17.3	18.6

Performance Diagrams

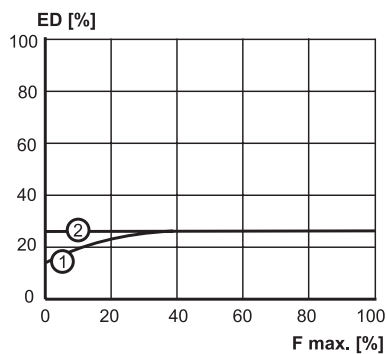
Life vs. Load



Ncycle: life in number of cycles
(one cycle = extend and retract)
F max: percent of maximum rated load

- 1: all models using the clutch at the end of stroke
- 2: all models using the anti-coast brake at the end of stroke only

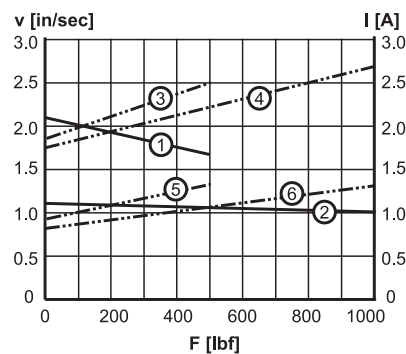
Duty Cycle vs. Load



ED: duty cycle in percent at 77° F
F max: percent of maximum rated load

- 1: 50 Hz input frequency
- 2: 60 Hz input frequency

Speed and Current vs. Load



V: speed I: current F: load

- 1: speed 500 lbf
- 2: speed 1000 lbf
- 3: current 500 lbf, 115 Vac
- 4: current 1000 lbf, 115 Vac
- 5: current 500 lbf, 230 Vac
- 6: current 1000 lbf, 230 Vac

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Electrak 205

115 and 230 Vac - load up to 1500 lbf



Standard Features and Benefits

- Robust, strong and reliable
- Stainless steel extension tube
- Highly efficient ball screw drive system
- Electrical brake for accurate positioning
- Motor with thermal switch
- Adjustable end of stroke limit switches
- Potentiometer
- Universal mounting clamp for tube mounting available
- Maintenance free

General Specifications

Parameter	Electrak 205
Screw type	ball
Internally restrained	no
Manual override	no
Dynamic braking	no
Holding brake	yes
End of stroke protection	adjustable limit switches
Mid stroke protection	no
Motor protection	auto reset thermal switch
Motor connection	terminal strip in the housing
Cable entrance	1/2" NPT
Certificates	none
Options	none

Performance Specifications

Parameter	Electrak 205
Maximum load, dynamic ALP •• -05 ALP •• -10 Contact customer support	[lbf] 500 1000 1500
Maximum load, static tension ALP •• - ••	[lbf] 4000
Maximum load, static compression ALP •• - •• (stroke under 24 inch) ALP •• - •• (24 inch stroke)	[lbf] 4000 2500
Speed, at no load / at maximum load ALP •• -05 ALP •• -10	[in/sec] 2.05 / 1.75 1.10 / 0.90
Available input voltages* Single phase	[Vac] 115, 230
Input frequency 1 × 120 Vac model 1 × 230 Vac model	[Hz] 60 50/60
Standard stroke lengths	[in] 4, 8, 12, 18, 24
Operating temperature limits	[°F] -15 – +150
Full load duty cycle @ 77 °F	[%] 25
End play, maximum	[in] 0.035
Restraining torque	[lbf-in] 100
Max. terminal strip lead cross section	[AWG] 14
Protection class	IP55
Potentiometer	[kOhm] 10
Potentiometer resistance change	[ohm/in] 385

* Capacitor required to run the actuator. 115 Vac = 35 µF, p/n 9200-448-002,
230 Vac = 10 µF, p/n 9200-448-003.
Universal mounting kit. 9200-448-006

Compatible Controls

Control model	See page
DPDT switch	46
MCS-2051**	49

** This control include a capacitor making an external capacitor redundant.

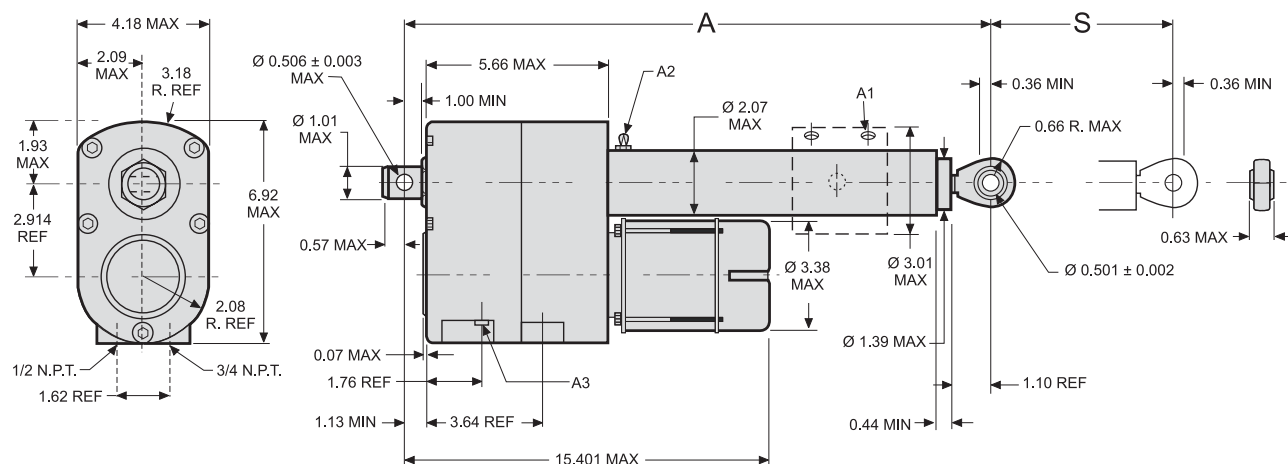
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Electrak 205

115 and 230 Vac - load up to 1500 lbf



S: stroke

A: retracted length

A1: universal mounting clamp

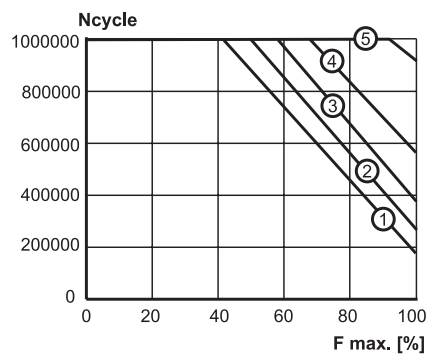
A2: grease fitting

A3: limit switch adjustment

Stroke (S)	[inch]	4	8	12	18	24
Retracted length (A)	[inch]	22.2	26.2	30.2	36.2	42.2
Weight	[lb]	25.5	27.5	29.5	32.5	35.5

Performance Diagrams

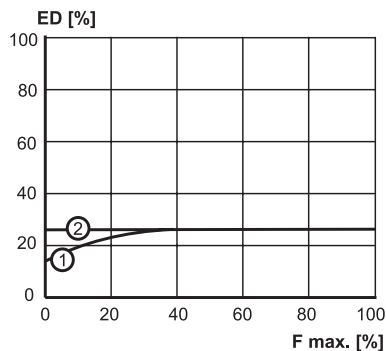
Life vs. Load



Ncycle: life in number of cycles
(one cycle = extend and retract)
F max: percent of maximum rated load

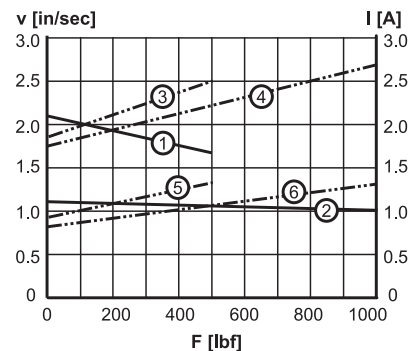
- 1: 1000 lbf, 24 inch stroke
- 2: 1000 lbf, 18 inch stroke
- 3: 1000 lbf, 12 inch stroke
- 4: 1000 lbf, 8 inch stroke
- 5: 1000 lbf, 4 inch stroke

Duty Cycle vs. Load



ED: duty cycle in percent at 77° F
F max: percent of maximum rated load
1: 50 Hz input frequency
2: 60 Hz input frequency

Speed and Current vs. Load



V: speed I: current F: load
1: speed 500 lbf
2: speed 1000 lbf
3: current 500 lbf, 115 Vac
4: current for 1000 lbf, 115 Vac
5: current 500 lbf, 230 Vac
6: current 1000 lbf, 230 Vac

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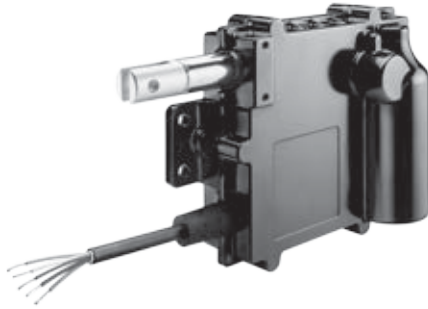
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Electrak Throttle

12 and 24 Vdc - load up to 30 lb



Standard Features and Benefits

- Designed for industrial applications
- Rugged aluminum housing with IP69K/IP67 sealing
- E-coated housing for corrosion resistance
- Minimal maintenance
- Integrated electronic options
- High end features at a low cost
- Integrated mounting holes

General Specifications

Parameter	Electrak Throttle
Screw type	worm
Internally restrained	yes
Manual override	no
Dynamic braking with option CN with option NP, FN, FP	yes no
Holding brake	no (self locking)
End of stroke protection	yes
Mid stroke protection	yes
Motor protection with temperature rating S with temperature rating E	auto reset thermal switch no
Motor connection	flying leads or Deutsch connector
Certificates	CE, RoHS
Options	<ul style="list-style-type: none"> • extended temperature range • adapter orientation • right angle cable exit • analog position feedback sensor • internal end of stroke limit switches • CANBUS SAE J1939

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» Ordering Key - see page 60

» Glossary - see page 61

» Electric Wiring Diagram - see page 44

Performance Specifications

Parameter		Electrak Throttle
Maximum load, dynamic / static ET••-084 ⁽¹⁾ ET••-174	[N (lbf)]	45 (10) / 90 (20) 130 (30) / 260 (60)
Speed, no load / at max. load ET••-084 ⁽¹⁾ ET••-174	[mm/s (in/s)]	96 (3.7) / 83 (3.3) 48 (1.9) / 37 (1.45)
Available input voltages	[VDC]	12, 24
Current draw, max. ⁽²⁾ 12 VDC models 24 VDC models	[A]	4 2
Operating temperature, min	[°C (F)]	- 40 (-40)
Operating temperature, max ET••-•••-•S ET••-•••-•E	[°C (F)]	85 (185) 125 (257)
Full load duty cycle @ 25 °C ⁽³⁾	[%]	50
End play, maximum	[mm (in)]	1.5 (0.06)
Restraining torque	[Nm (lbf-in)]	0
Motor cable lead cross section	[mm ² (AWG)]	0.8 (18)
Motor cable length	[mm (in)]	165 (6.5)
Protection class		IP69K, IP67
Operational life	[cycles]	500000
Retracted length	[mm (in)]	184.7 (7.27)
Stroke length	[mm (in)]	50.8 (2)
Weight	[kg (lbs)]	1.11 (2.5)
Analog feedback sensor linearity	[± %]	1

⁽¹⁾ The ET••-084 (high speed version) can only be ordered in combination with operating temperature rating E.

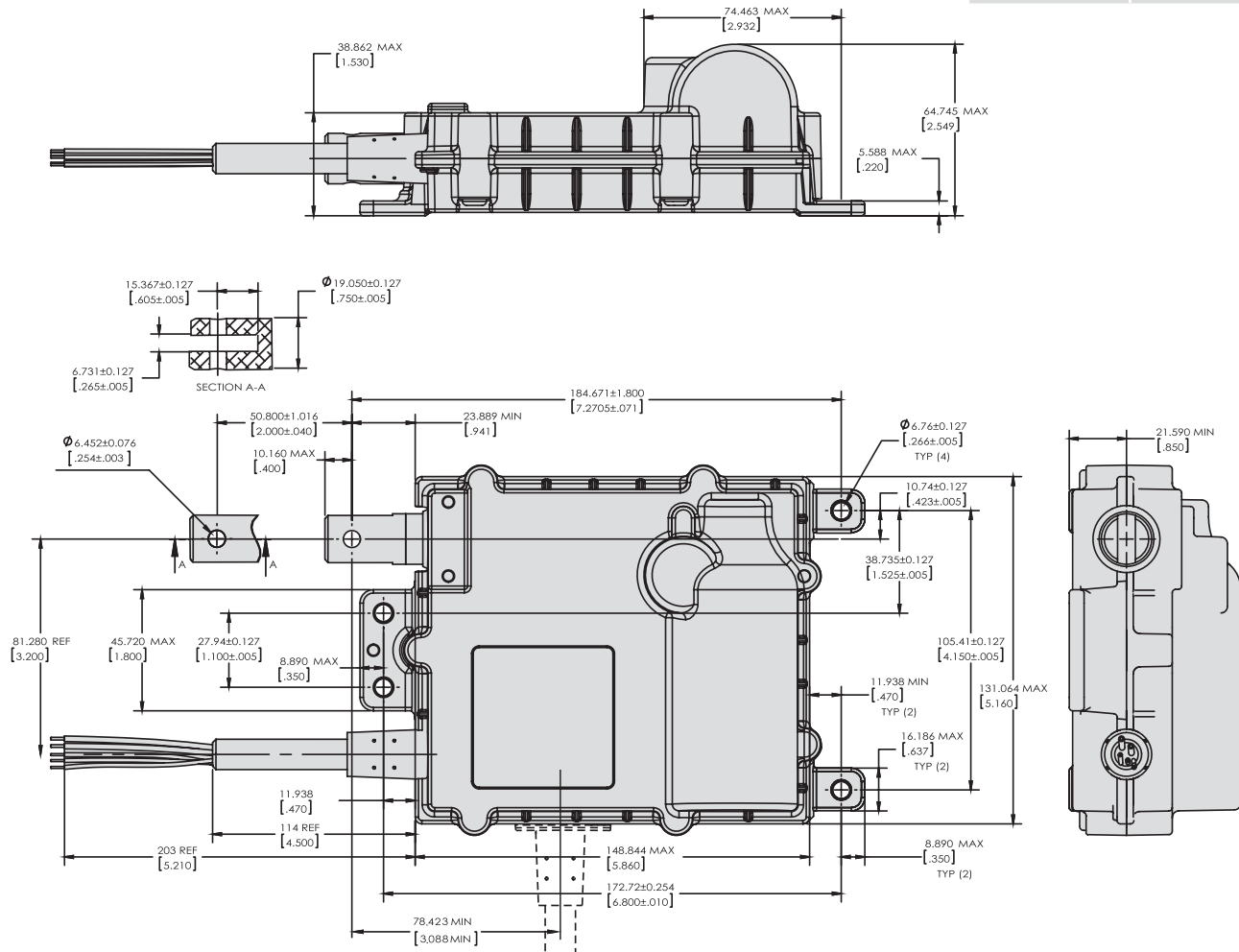
⁽²⁾ Max. current draw ratings do not include motor inrush current. Typical inrush current values are 12 A at 12 VDC and 6 A at 24 VDC.

⁽³⁾ For all models and load ranges.

Electrak Throttle

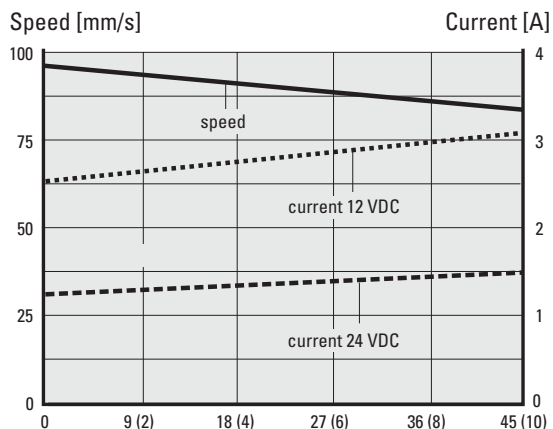
12 and 24 Vdc - load up to 30 lb

Dimensions	Projection
METRIC [INCH]	



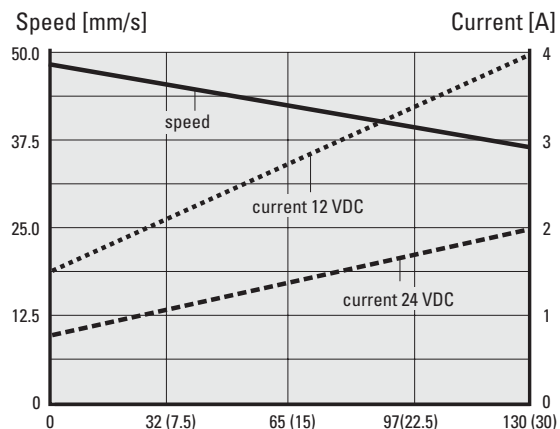
Performance Diagrams

ET●●-084



Dynamic load [N (lbf)]

ET●●-174



Dynamic load [N (lbf)]

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Max Jac

12 and 24 Vdc - load up to 30 lb



Standard Features and Benefits

- Designed for industrial applications
- Rugged aluminum housing with IP69K
- High efficiency
- Long life
- Hard coat anodizing for high corrosion resistance
- Virtually maintenance free
- Worm or ball screw models
- Non contact analog position feedback signal

General Specifications

Parameter	Max Jac
Screw type	worm or ball
Internally restrained	no
Manual override	no
Dynamic braking	no
Self locking worm screw models ball screw models	yes no
End of stroke protection	no
Mid stroke protection	no
Motor protection	no
Motor connection	flying leads or cable with connector
Motor connector	AMP Superseal Series 1,5
Certificates	CE
Options	Encoder position feedback

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» Ordering Key - see page 60

» Glossary - see page 61

Performance Specifications

Parameter		Max Jac
Maximum load, dynamic / static MX •• W (worm screw) MX •• B (ball screw)	[N]	500 / 2000 800 / 100 - 350 ⁽¹⁾
Speed, at no load / at maximum load MX •• W (worm screw) MX •• B (ball screw)	[mm/s]	33 / 19 60 / 30
Available input voltages	[VDC]	12, 24
Standard stroke lengths	[mm]	50, 100, 150 200, 250 ⁽²⁾ , 300 ⁽²⁾
Operating temperature limits	[°C]	-40 to +85
Full load duty cycle @ 25 °C	[%]	25
End play, maximum	[mm]	0,3
Restraining torque	[Nm]	2
Lead cross section	[mm ²]	1
Standard cable lengths	[mm]	300, 1600
Protection class		IP66/IP69K
Salt spray resistance	[h]	500
Life	[cycles]	500000 ⁽³⁾
Analog position feedback signal	[VDC]	0,5 - 4,5
Encoder position feedback option Supply voltage Pulses per mm, worm / ball screw Channels	[VDC]	5 9,86 / 5,84 A, B

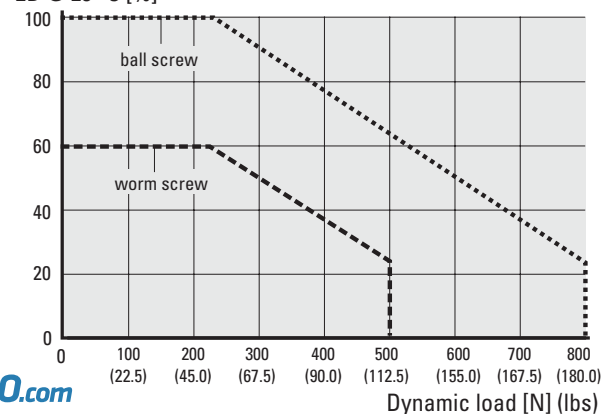
⁽¹⁾ The static force (i.e. the backdriving force) for a ball screw unit varies and is dependant on the number of cycles it have been running and at wich loads.

⁽²⁾ Strokes possible for ball screw models only.

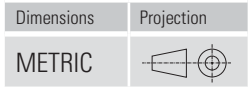
⁽³⁾ For ball screw actuator with 100 mm stroke, average load of 500 N and changing load direction.

Duty Cycle vs. Load

ED @ 25 °C [%]



12 and 24 Vdc - load up to 30 lb



* Strokes possible for ball screw models only.

Performance Diagrams

The graph illustrates the relationship between dynamic load, speed, and current for a 12VDC and 24VDC system. The x-axis represents dynamic load in Newtons (N) and pounds (lbs). The left y-axis represents speed in mm/s, and the right y-axis represents current in Amperes (A). The speed decreases linearly as the load increases. The current for the 12VDC system increases linearly with load, while the current for the 24VDC system also increases linearly but at a lower rate.

Dynamic load [N (lbs)]	Speed [mm/s]	Current 12 VDC [A]	Current 24 VDC [A]
0	34	1.2	0.8
100 (22.5)	31	1.8	1.0
200 (45.0)	28	2.4	1.2
300 (67.5)	25	3.0	1.4
400 (90.0)	22	3.6	1.6
500 (112.5)	19	4.2	1.8

The graph illustrates the relationship between speed, current, and dynamic load for a 12VDC motor. The speed decreases linearly as the load increases, while the current increases linearly. A dashed line represents the current at 24VDC, which is lower than the 12VDC current for the same load.

Dynamic load [N (lbs)]	Speed [mm/s]	Current 12 VDC [A]	Current 24 VDC [A]
0	60	0.5	0.5
100 (22.5)	56.25	1.5	0.75
200 (45.0)	52.5	2.5	1.0
300 (67.5)	48.75	3.5	1.25
400 (90.0)	45.0	4.5	1.5
500 (112.5)	41.25	5.5	1.75
600 (135.0)	37.5	6.5	2.0
700 (157.5)	33.75	7.5	2.25
800 (180.0)	30.0	7.5	3.5

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Electrak Non-driven Actuator PPA-M

Load up to 1500 lbf

» Ordering Key - see page 59

» Glossary - see page 61



Standard Features and Benefits

- Actuator with double input shafts to which a customer supplied motor or/and an intermediate shaft can be mounted
- Can be operated manually
- Robust and versatile
- Withstands very harsh environments
- Highly efficient ball screw drive system
- Holding brake prevents back driving
- Trunnion to clevis mounting
- Maintenance free

Performance Specifications

Parameter		PPA-M
Maximum load, dynamic / static	[lbf]	1500 / 3000
Maximum speed at max. load	[in/sec]	0.33
Maximum input torque	[lbf-in]	80
Maximum input speed	[rpm]	100
Standard stroke lengths	[in]	4, 8, 12, 18, 24, 36
Operating temperature limits	[°F]	-15 – +150
End play, maximum	[in]	0.04
Restraining torque	[lbf-in]	200

General Specifications

Parameter	Electrak PPA-M
Screw type	ball
Internally restrained	no
Manual override	no*
Holding brake	yes
End of stroke protection	no
Mid stroke protection	no
Certificates	—
Options	protective bellows

* Either of the two input shafts can be used for manual operation if both shafts are not connected to a motor or an intermediate shaft.

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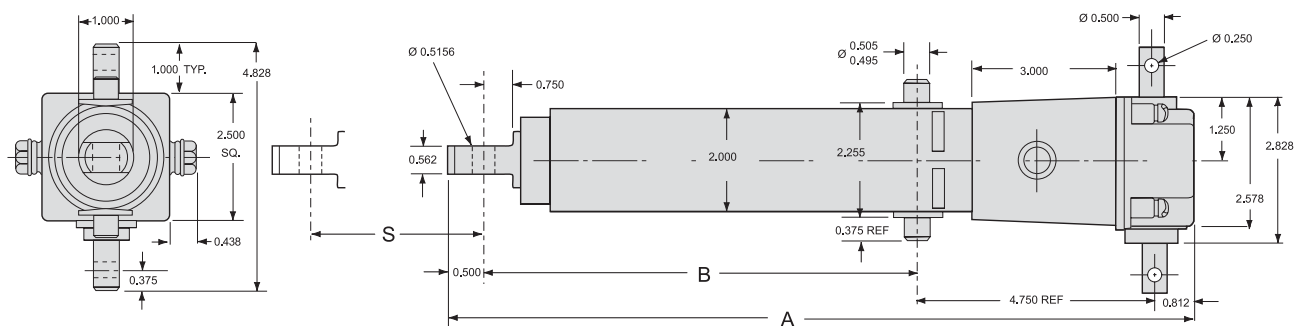
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Electrak Non-driven Actuator PPA-M

Load up to 1500 lbf



S: stroke

A: retracted length

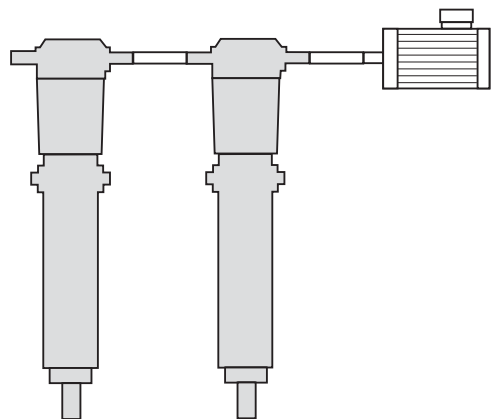
B: retracted length to trunnions

Stroke (S)	[inch]	4	8	12	18	24	36
Retracted length (A)	[inch]	14.8	18.8	22.8	30.8	36.8	48.8
Retracted length to trunnions (B)	[inch]	8.8	12.8	16.8	24.8	30.8	42.8
Weight	[lb]	7.6	9.2	10.6	13.5	16.0	21.4

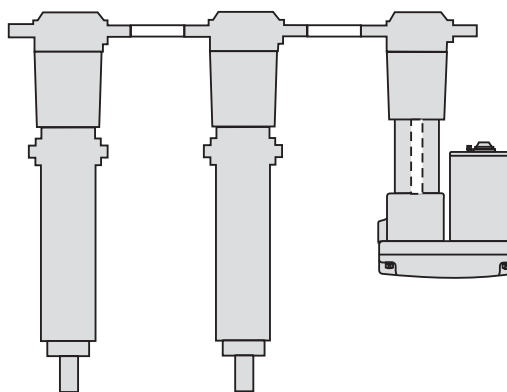
Synchronous Operation

Two or more PPA-M actuators can easily be mechanically linked for synchronous operation. They can either be driven directly by motor (1) or by the PPA synchronous operation kit (2). Intermediate shafts, couplings and motors (white details) are supplied by the customer. For more information about the PPA synchronous operation kit, see Accessories and Spare Parts on page 46.

1. With motor



2. With PPA synchronous operation kit



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Rotary Actuator DGB

12, 24 and 36 Vdc - load torque up to 100 lbf-in

» Ordering Key - see page 53

» Glossary - see page 61

» Electric Wiring Diagram - see page 36



Standard Features and Benefits

- Rotary actuators for industrial and outdoor use
- Easy and fast clevis mounting
- Overload clutch
- Thermal protected motor
- Manual override or dual output shafts as option

General Specifications

Parameter	DGB
Manual override	no
Dynamic braking	no
Holding brake	yes
Overload protection	overload clutch
Motor protection	auto reset thermal switch
Motor connection	flying leads and connector
Motor connector	Packard Electric 56 series 2984883 with terminal 2962987. Mating connector: 2973781 with terminal 2962573 (p/n 9100-448-001)
Certificates	CE optional*
Options	<ul style="list-style-type: none"> • manual override • dual output shafts • other speeds*

* Contact customer support

Performance Specifications

Parameter		DGB
Maximum load torque	[lbf-in]	100
Speed, at no load / at maximum load	[rpm]	200 / 80
D •• -21GB		140 / 75
D •• -30GB ¹		
Available input voltages	[Vdc]	12, 24, 36
Weight	[lb]	
D •• - •••• - XXCL		7.7
D •• - •••• - XXMO		7.7
D •• - •••• - XXDS		7.7
Operating temperature limits	[°F]	-15 – +150
Full load duty cycle @ 77 °F	[%]	25
Lead cross section	[AWG]	14
Lead length	[in]	7.0
Protection class		IP56

Compatible Controls

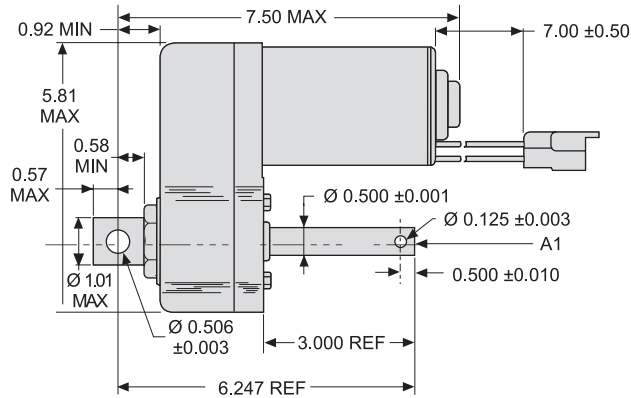
Control model	See page
DPDT switch	41

¹ D •• -30GB is not available for 36 Vdc.

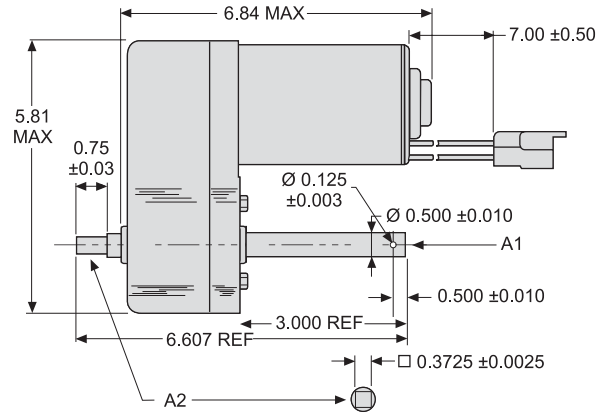
Rotary Actuator DGB

12, 24 and 36 Vdc - load torque up to 100 lbf-in

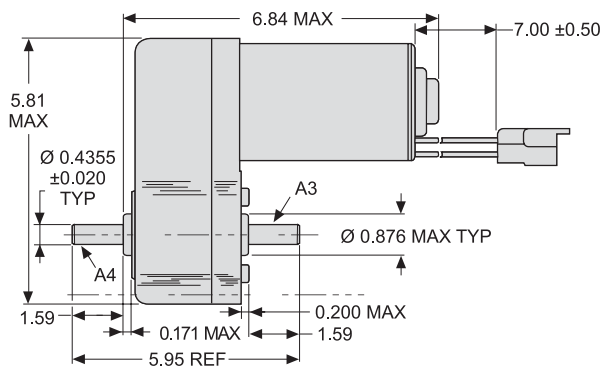
D •• - 21GB-XXCL, D •• - 30GBXXCL (clevis mount)



D •• - 21GBXXMO (manual override)



D •• - 21GB-XXDS (dual output shafts)



A1: output shaft

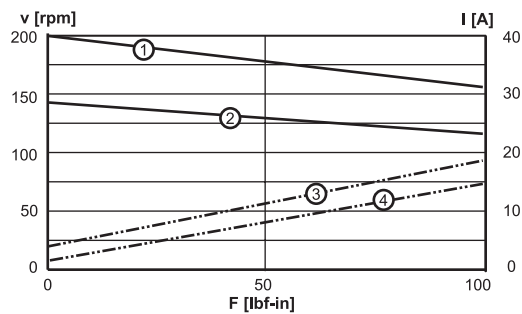
A2: shaft for manual override

A3: first output shaft

A4: second output shaft

Performance Diagrams

Speed and Current vs. Load



V: speed I: current F: load

- 1: speed D12-21GB
- 2: speed D12-30GB
- 3: current D12-21GB
- 4: current D12-30GB

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Contact customer support for data on 24 and 36 Vdc models (D •• -30GB is not available for 36 Vdc).

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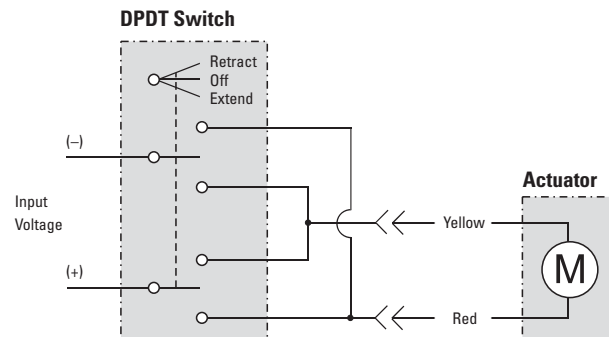
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Electrical Wiring Diagrams

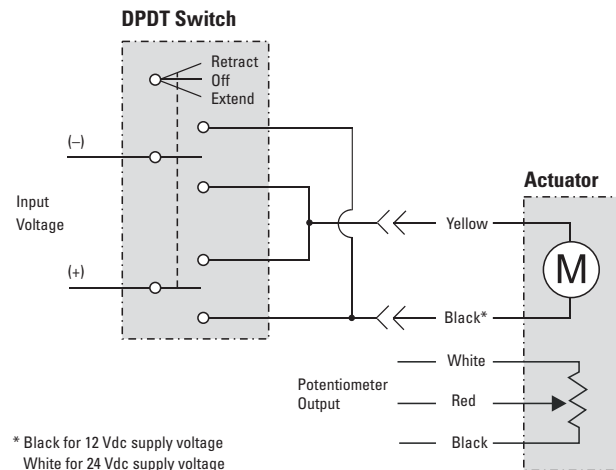
DC-actuators

Electrak 1, 2,10 and DGB



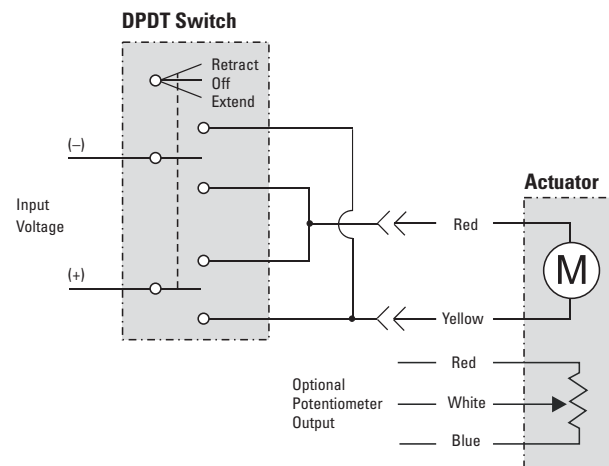
Connect the red lead to positive and yellow to negative to extend the actuator/rotate the output shaft in clockwise direction. Change polarity to retract the actuator/rotate the output shaft counterclockwise. Electrak 1 actuators should be protected from overload conditions by a customer provided fuse in the circuit (6 A for 12 Vdc and 3 A for 24 Vdc).

Electrak 1SP



Connect the black or white* lead to positive and yellow to negative to extend the actuator. Change polarity to retract the actuator. The potentiometer output has 0 ohm between white and red when the actuator is fully retracted. The actuator should be protected from overload conditions by a customer provided fuse in the circuit (6 A for 12 Vdc and 3 A for 24 Vdc).

Electrak 050



Connect the yellow lead to positive and red to negative to extend the actuator. Change polarity to retract the actuator. The potentiometer output has 0 ohm between white and red when the actuator is fully retracted.

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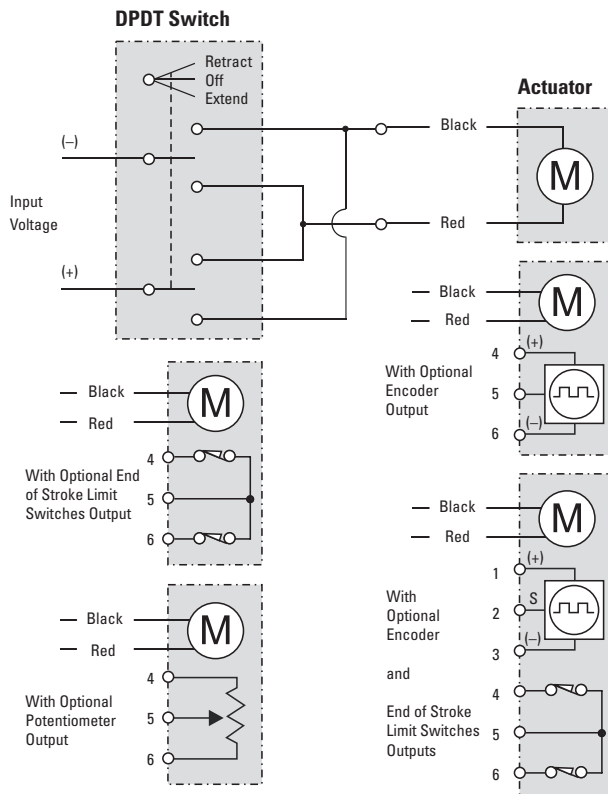
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Electrical Wiring Diagrams

DC-actuators

Electrak PPA-DC



Connect the black lead to positive and red to negative to extend the actuator. Change polarity to retract the actuator. The encoder is supplied with 4.5 - 12 Vdc between terminals 4 or 1 and 6 or 3 and the pulse train signal is generated on terminal 5 or 2. The potentiometer output has 0 ohm between terminal 4 and 5 when the actuator is fully retracted.

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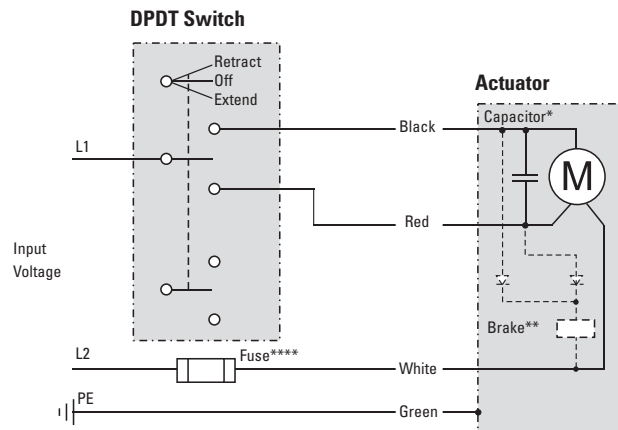
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Electrical Wiring Diagrams

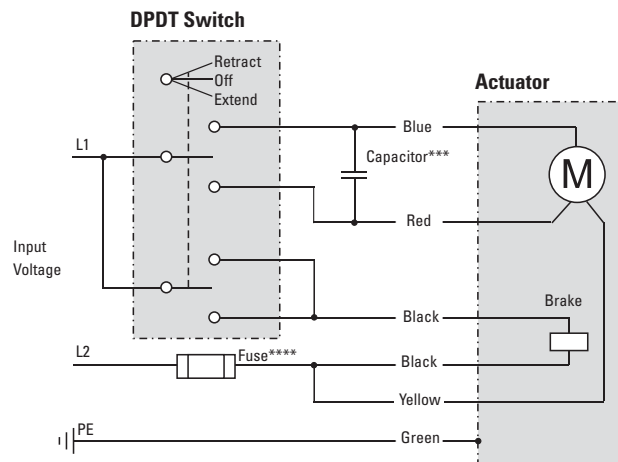
AC-actuators

Electrak PPA-AC

Without brake or with electrical brake (dotted wiring)



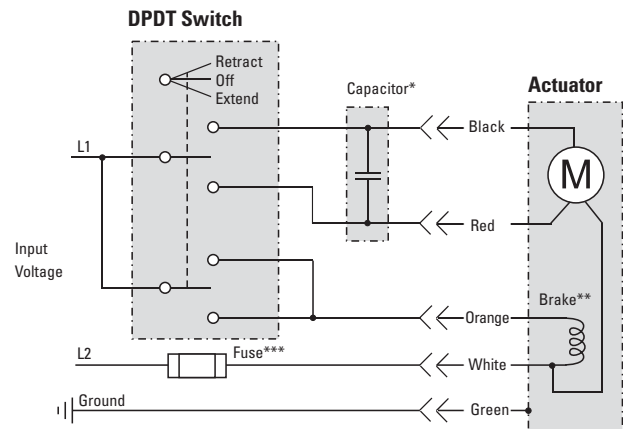
With anti coast brake



- * The actuator comes with prewired capacitor from factory.
- ** Electrical brake only possible on 115 Vac models.
- *** The capacitor is supplied with the actuator but needs to be fitted by the customer externally.
- **** Supplied by customer.

For versions without brake or with electrical brake, connect the red lead to L1 and yellow to L2 to extend the actuator. Change L1 from red to black lead to retract the actuator. If the actuator is equipped with an electrical brake the internal wiring automatically lifts the brake when the motor is energized. For versions with anti coast brake, connect the red lead to L1 and yellow to L2 to extend the actuator. Change L1 from red to blue lead to retract the actuator. Release the anti-coast brake by connecting black leads to L1 and L2.

Electrak 5



- * Capacitor required to run the actuator. 115 Vac = 35 μ F, p/n 9200-448-002, 230 Vac = 10 μ F, p/n 9200-448-003.
- ** Anti coast brake.
- *** Supplied by customer.

Connect the red lead to L1 and white to L2 to extend the actuator. Change L1 from red to black lead to retract the actuator. Release the anti coast brake by connecting orange lead to L1.

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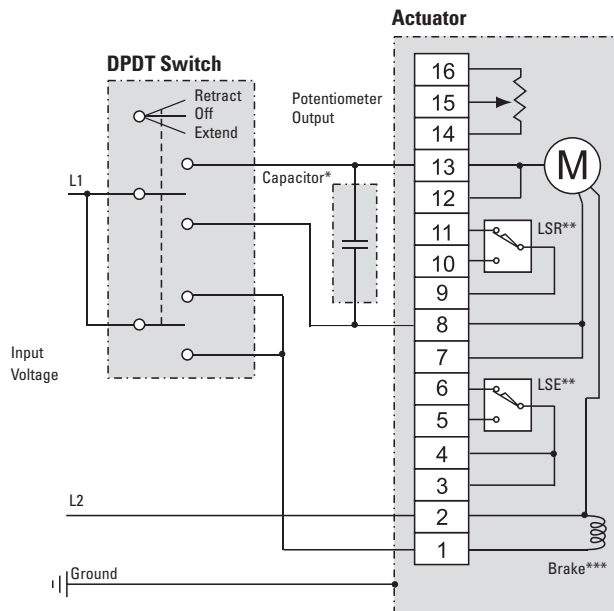
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Electrical Wiring Diagrams

AC-actuators

Electrak 205



* Capacitor required to run the actuator. 115 Vac = 35 μ F, p/n 9200-448-002,
230 Vac = 10 μ F, p/n 9200-448-003.

** LSR = end of stroke limit switch in retracted position,
LSE = end of stroke limit switch in extended position.

*** Electrical brake.

The terminal strip is accessed by opening the rear cover of the actuator housing. Connect terminal 8 to L1 and terminal 2 to L2 to extend the actuator. Change L1 from terminal 8 to 13 to retract the actuator. Release the anti coast brake by connecting terminal 1 to L1. The potentiometer output is connected to terminals 14, 15 and 16.

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Electrical Wiring Diagrams

AC-actuators

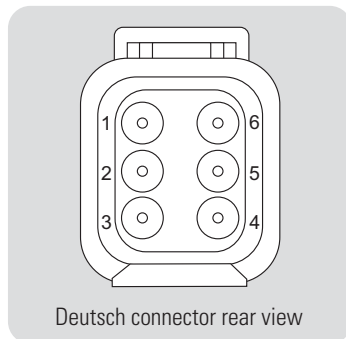
Electrak Throttle

Connect the actuator according to the table below. Actuator will extend if connected as in the table, shift polarity between red (pin 1) and black (pin 3) leads and it will retract. Mating Deutsch connector kit can be ordered from Thomson (P/N 9100-448-021). Note: Connector pin 2 is not used, but contains a sealing plug.

Option name and order key code	Lead color or Deutsch DTM04-6P connector pin number				
	Red (1)	Black (3)	Brown (4)	White (5)	Green (6)
Analog position feedback sensor (NP)	Motor (+)	Motor (-)	VDC in (+)	VDC out	VDC in (-)
End of stroke limit switches (FN)	Motor (+)	Motor (-)	-	-	-
Analog position feedback sensor and limit switches (FP)	Motor (+)	Motor (-)	VDC in (+)	VDC out	VDC in (-)
CANBUS SAE J1939 (CN)	Power (+)	Power (-)	CAN High	CAN Shield*	CAN Low

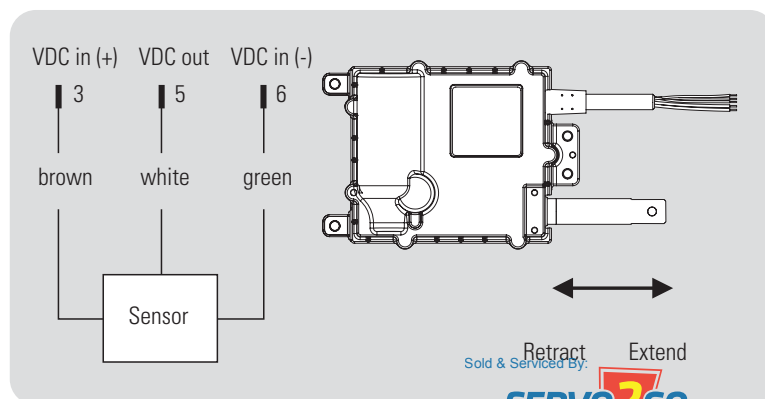
See Installation Manual for additional information.

* Not required to connect.



Analog Position Feedback Sensor Installation Data

Brown (pin 3) and green (pin 6) are connected to a voltage source. When extending the actuator the voltage will increase between green (pin 6) and white (pin 5).



Sensor Specifications

Input voltage, max. (VDC in)	[VDC]	32
Output voltage (VDC out) at fully retracted at fully extended	[VDC]	< 5 % VDC in > 75% VDC in
Max. output current	[mA]	1
Linearity	[± %]	1

Actuator Controls

General

Whether you plan to operate from a simple pushbutton or a programmable controller, Thomson controls can make your system easy to design, install and operate. Designed to drive actuators, the controls on the following pages are equipped either with easy to use terminal strips or plugs compatible with the actuators for ease of wiring. The controls have built in capacitors for AC models. Some of the controls have rocker switches and some touch sensitive membrane key pads while other have hand held pendants for operating the actuators. We also have other controls which may meet your particular needs. Contact customer service if you don't see the right control for your application.



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Actuator Controls

Switches

DPDT Switch



- Robust switch
- Double pole, double throw (DPDT)
- 15 A rating at 270 Vac
- Center "off"
- Two momentary contacts
- Wiring diagram on label

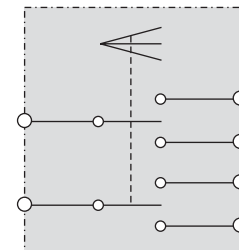
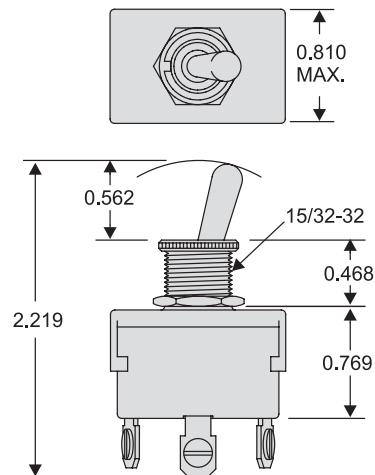
Specifications

Parameter		DPDT Switch
Maximum voltage	[Vac]	270
Maximum current	[A]	15
Part number		830-8004-016

Actuator Compatibility

Electrak 1, Electrak 1SP, Electrak 050, Electrak 2, Electrak PPA-DC, Electrak 10, Electrak Pro, Electrak PPA-AC, Electrak 5, Electrak 205, DGB

Dimensions



Wiring Diagram

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Actuator Controls

Switches

DPDT Switch Box



- Robust rocker switch mounted in an enclosure
- Double pole, double throw (DPDT)
- 15 A rating at 270 Vac
- Center “off”
- Two momentary contacts
- Mounting bracket included
- Wiring diagram on label

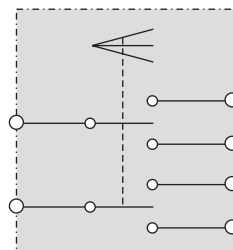
Specifications

Parameter		DPDT Box
Maximum voltage	[Vac]	270
Maximum current	[A]	15
Protection class		NEMA 1
Part number		6932-101-054

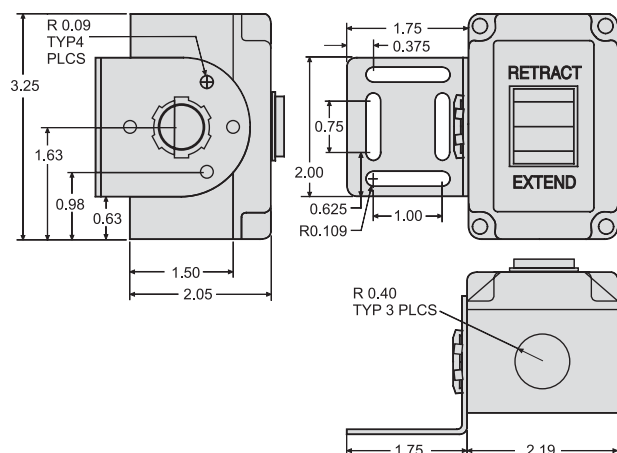
Actuator Compatibility

Electrak 1, Electrak 1SP, Electrak 050, Electrak 2, Electrak PPA-DC, Electrak 10, Electrak Pro, Electrak PPA-AC, Electrak 5, Electrak 205, TC16, DMD, DMA, LM80-H, LM80-V, DGB

Wiring Diagram



Dimensions



Note: some AC actuators require a capacitor in the wiring to run. This capacitor will not fit in this box due to space limitations.

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Actuator Controls

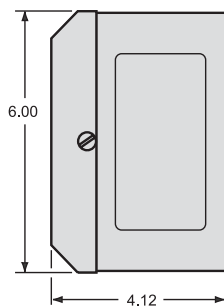
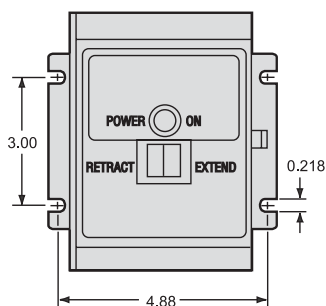
Electronic Controls

Control MCS-2041



- Robust and compact metal enclosure with a front panel extend and retract rocker switch
- Prewired internal capacitor
- Fuse protects actuator in case of stalling caused by overload
- “Power On” light illuminates whenever power applied to the control
- Terminal strip for easy electrical connection
- The switch controls both the actuator motor and its anti coast brake to provide optimum performance

Dimensions



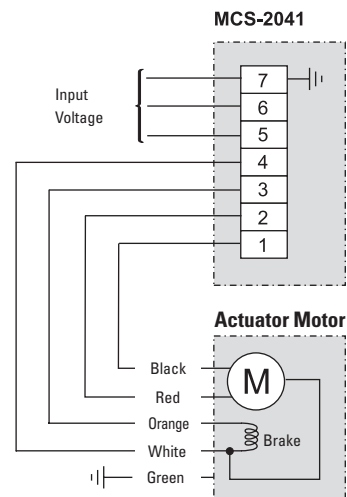
Specifications

Parameter		MCS-2041
Input voltage	[Vac]	1 × 115
Input frequency	[Hz]	50/60
Output voltage	[Vac]	1 × 115
Maximum output current	[A]	15
Protection class		NEMA 1
Part number		6932-448-010

Actuator Compatibility

Electrak 5

Wiring Diagram



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Actuator Controls

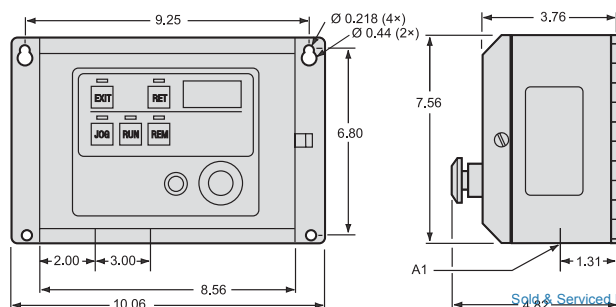
Electronic Controls

Control MCS-2051



- Control designed to operate an Electrak 205 actuator
- Robust metal enclosure with front cover mounted membrane switches and LED indicator lights for extend, retract, jog, run and remote control
- Emergency stop/off pushbutton remains in position when activated
- LCD display shows the extension tube position
- Internal "Run" mode jumper which causes the actuator to reverse automatically upon reaching the extend end of stroke limit switch. Reverse motion continues until reaching the retract end of stroke limit switch
- The control provides an analog output signal for an external customer provided control/meter
- Inputs for external extend and retract switches
- Inputs for two external end of stroke limit switches
- Dynamic braking
- Terminal strip for easy electrical connection

Dimensions



A1: Cable entrance, 1/2 inch standard conduit (2 ×)

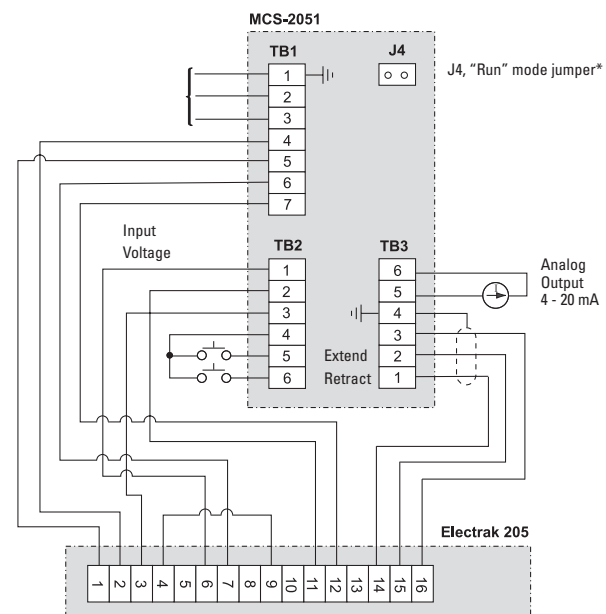
Specifications

Parameter		MCS-2051
Input voltage	[Vac]	1 × 115
Input frequency	[Hz]	50/60
Output voltage	[Vac]	1 × 115
Maximum actuator output current	[A]	8
Analog output signal	[mA]	4 - 20
Protection class		NEMA1
Part number		6932-448-015

Actuator Compatibility

Electrak 205

Wiring Diagram



* Inserting jumper J4 causes the actuator to reverse automatically upon reaching the extend end of stroke limit switch. Reverse motion continues until reaching the retract end of stroke limit switch.

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Accessories and Spare Parts

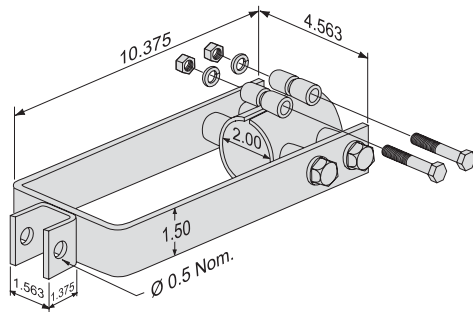
Mounting Components

PPA Rear Clevis Mounting Kits

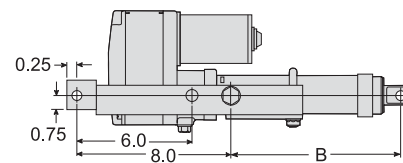
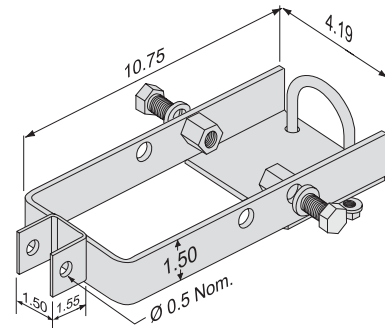
Designation	Compatible Actuators	Part Number
PPA rear clevis mounting kit for DC actuators	Electrak PPA-DC	7827320
PPA rear clevis mounting kit	Electrak PPA-DC, Electrak PPA-AC	7824295

The rear clevis mounting kits are attached to the tube of an Electrak PPA actuator allowing the actuator to be mounted clevis to clevis style. Note that one of the kits fits both PPA-DC and PPA-AC actuators while the other only fits PPA-DC actuators.

PPA Rear Clevis Mounting Kit



PPA Rear Clevis Mounting Kit for DC Actuators



B: retracted length to trunnion, also see product pages.

Accessories and Spare Parts

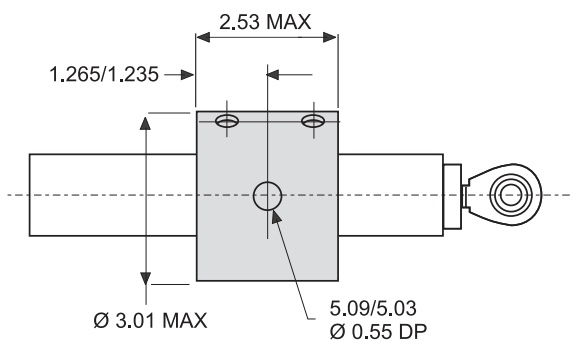
Mounting Components

Tube Mounting Kits

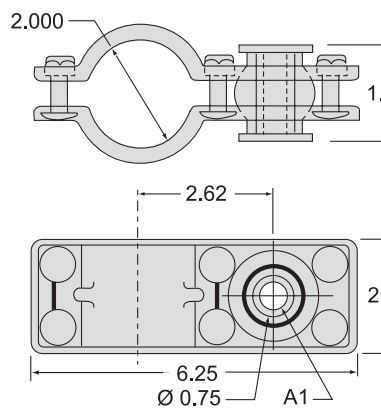
Designation	Compatible Actuators	Part Number
Electrak 205 tube mount	Electrak 205	9200-448-006
Electrak PPA tube mount - light duty 750 lbf	Electrak PPA-DC, Electrak PPA-AC	7822520
Electrak PPA tube mount - heavy duty 1500 lbf	Electrak PPA-DC, Electrak PPA-AC	7821783

The tube mounting kits work as a clamp that is mounted at any desired position along the actuator tube. Trunnion pins for the tube mount clamp are supplied and mounted by the customer.

Electrak 205 Tube Mount

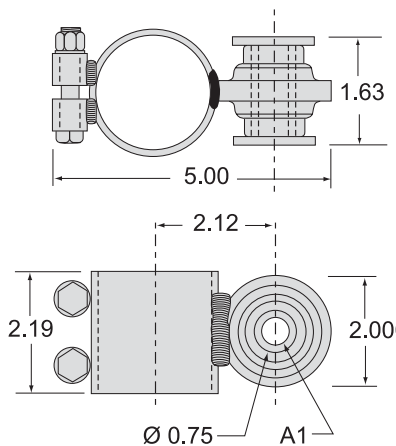


Electrak PPA Tube Mount - Light Duty 750 lbf



A1: hole diameter 0.50 with bushing.

Electrak PPA Tube Mount - Heavy Duty 1500 lbf



A1: hole diameter 0.50 with bushing.

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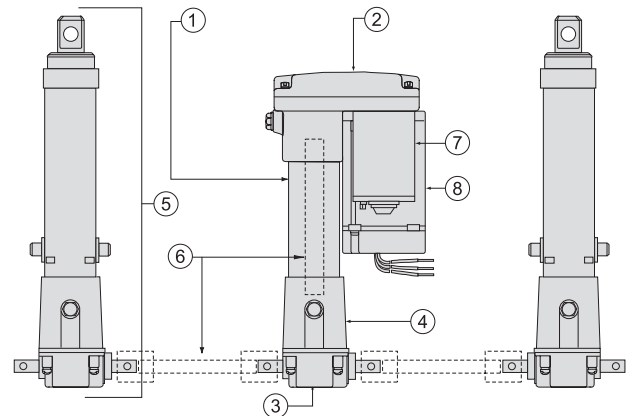
Accessories and Spare Parts

Mounting Components

Electrak PPA Synchronous Operation Kit

Designation	Part Number
PPA manual gearbox	5704305
PPA adapter	7820621
PPA drive tube kit	7825740
PPA motor-gearbox 12 Vdc, gear ratio 18:1	7820240
PPA motor-gearbox 12 Vdc, gear ratio 58:1	7820241
PPA motor-gearbox 24 Vdc, gear ratio 18:1	7830934
PPA motor-gearbox 24 Vdc, gear ratio 58:1	7830935
PPA motor-gearbox 36 Vdc, gear ratio 18:1	7821239
PPA motor-gearbox 36 Vdc, gear ratio 58:1	7821240
PPA motor-gearbox 90 Vdc, gear ratio 18:1	7820262
PPA motor-gearbox 90 Vdc, gear ratio 58:1	7820264
PPA motor-gearbox 115 Vac, gear ratio 18:1, anti coast brake	7825377
PPA motor-gearbox 115 Vac, gear ratio 58:1, anti coast brake	7825378
PPA motor-gearbox 115 Vac, gear ratio 18:1	7825379
PPA motor-gearbox 115 Vac, gear ratio 58:1	7825380
PPA motor-gearbox 115 Vac, gear ratio 18:1, electrical brake	7830123
PPA motor-gearbox 115 Vac, gear ratio 58:1, electrical brake	7829838
PPA motor-gearbox 230 Vac, gear ratio 18:1	7825811
PPA motor-gearbox 230 Vac, gear ratio 58:1	7825812
PPA motor-gearbox 230 Vac, gear ratio 18:1, electrical brake	7829371
PPA motor-gearbox 230 Vac, gear ratio 58:1, electrical brake	7829372

Synchronous operation can easily be obtained by using the Electrak PPA synchronous operation kit and one or several standard Electrak PPA-M actuators. The Electrak PPA synchronous operation kit consist of a manual gearbox, an adapter, a drive tube kit and motor gear-box with motor and gear ratio of customer choice. These components are ordered separately and assembled by the customer. The customer must also supply the shaft running in the drive tube kit (the drive tube can be cut to fit the application) between the adapter and the motor gear box and the shafts and couplings that are needed to connect the Electrak PPA synchronous operation kit and the Electrak PPA-M actuator(s).



- 1: PPA drive tube kit
 • 1 x 26 inch drive tube
 • 1 x screw
 • 1 x lock washer
 • 2 x couplings
 2: PPA motor-gearbox

- 3: PPA manual gearbox
 4: PPA adapter
 5: Standard Electrak PPA-M actuator
 6: Customer supplied shafts
 7: Size of DC motors
 8: Size of AC motors

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Accessories and Spare Parts

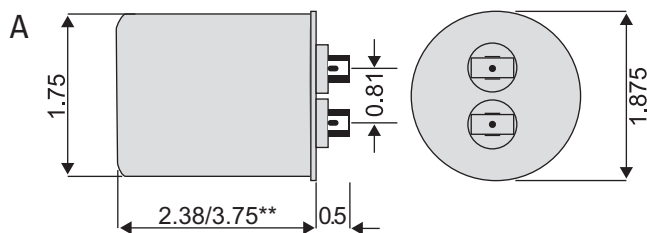
Electrical Components

Capacitor Kits

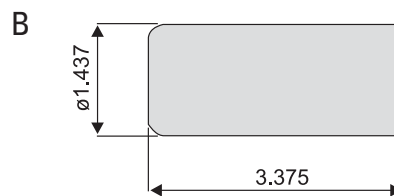
Designation	Figure	Compatible Actuators	Actuator Supply Voltage	Part Number
Capacitor kit	A	Electrak 5	115 Vac	9200-448-002
Capacitor kit	A	Electrak 5	230 Vac	9200-448-003
Capacitor kit *	B	Electrak PPA-AC	115 Vac	5704687
Capacitor kit *	C	Electrak PPA-AC	230 Vac	7825261

* External capacitor only needed if the actuator has the anti-coast brake option, otherwise the capacitor is installed internally in the actuator.

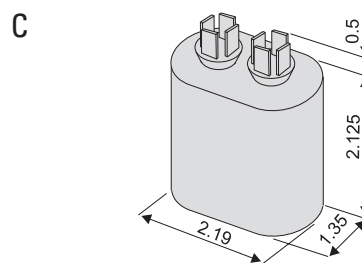
All 230 and 115 Vac actuators require a capacitor to be wired between the windings to run. It is either mounted internally from factory (on Electrak PPA-AC actuators without brake option or with electrical brake option) or it needs to be mounted externally by the customer (on the rest of the 230 and 115 Vac actuators). Also see the Electrical Wiring Diagrams section.



** Dimensions apply to part numbers 9200-448-002/9200-448-003



Note: screw terminal connection



Note: cable clip connection

Mating Connectors

Designation	Compatible Actuators	Part Number
Electrak 1 mating connector	Electrak 1, Electrak 1SP	9300-448-001
Electrak 050 mating connector	Electrak 050	9300-448-001
Electrak 2 mating connector	Electrak 2	9100-448-001
Electrak 10 mating connector	Electrak 10	9100-448-001
Electrak Pro mating connector	Electrak Pro	9200-101-042
Electrak Pro mating connector with 1 m pigtail	Electrak Pro	9200-101-043

Actuators with connectors are supplied with a mating connector. Extra mating connectors can be ordered by the part numbers listed above.

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Accessories and Spare Parts

Spare Parts

Sealing Plugs

Designation	Compatible Actuators	Part Number
Electrak 205 limit switch seal	Electrak 205	9200-680-002
Electrak Pro manual override seal	Electrak Pro	9200-680-001

A rubber plug covers the adjustment screws for the end of stroke limit switches on the Electrak 205 and for the manual override on the Electrak Pro. If this plug gets lost or broken it must be replaced to maintain the IP rating of the actuator.

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Accessories and Spare Parts

Spare Parts

Electrak PPA Spare Parts	
Designation	Part Number
PPA motor-gearbox 12 Vdc, gear ratio 18:1	7820240
PPA motor-gearbox 12 Vdc, gear ratio 58:1	7820241
PPA motor-gearbox 24 Vdc, gear ratio 18:1	7830934
PPA motor-gearbox 24 Vdc, gear ratio 58:1	7830935
PPA motor-gearbox 36 Vdc, gear ratio 18:1	7821239
PPA motor-gearbox 36 Vdc, gear ratio 58:1	7821240
PPA motor-gearbox 90 Vdc, gear ratio 18:1	7830262
PPA motor-gearbox 90 Vdc, gear ratio 58:1	7830264
PPA motor-gearbox 115 Vac, gear ratio 18:1, anti coast brake	7825377
PPA motor-gearbox 115 Vac, gear ratio 58:1, anti coast brake	7825378
PPA motor-gearbox 115 Vac, gear ratio 18:1	7825379
PPA motor-gearbox 115 Vac, gear ratio 58:1	7825380
PPA motor-gearbox 115 Vac, gear ratio 18:1, electrical brake	7830123
PPA motor-gearbox 115 Vac, gear ratio 58:1, electrical brake	7829838
PPA motor-gearbox 230 Vac, gear ratio 18:1	7825811
PPA motor-gearbox 230 Vac, gear ratio 58:1	7825812
PPA motor-gearbox 230 Vac, gear ratio 18:1, electrical brake	7829371
PPA motor-gearbox 230 Vac, gear ratio 58:1, electrical brake	7829372
PPA actuator lift kit - 4 inch	7820146
PPA actuator lift kit - 6 inch	7827142
PPA actuator lift kit - 8 inch	7820950
PPA actuator lift kit - 12 inch	7820147
PPA actuator lift kit - 18 inch	7821066
PPA actuator lift kit - 24 inch	7821193
PPA actuator lift kit - 36 inch	7822047
PPA limit switch kit 12 Vdc, with housing	7823091
PPA limit switch kit 24 Vdc, 36 Vdc, 90 Vdc, 115 Vac, 230 Vac, with housing	7822519
PPA encoder kit with housing	7822048
PPA encoder kit without housing	7821764
PPA 10 kOhm potentiometer kit (only for ball screw driven units)	7821157
PPA 115 Vac capacitor kit	5704687
PPA 115 Vac capacitor kit - heavy duty	7825590
PPA 230 Vac capacitor kit	7825579

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Ordering Keys

Electrak DC-actuators

Electrak 1

1	2	3
S24 -	09A4 -	06
1. Model and input voltage S12 - = Electrak 1, 12 Vdc S24 - = Electrak 1, 24 Vdc	2. Dynamic load capacity 09A4 - = 25 lbf 17A8 - = 75 lbf	3. Stroke 02 = 2 inch 04 = 4 inch 06 = 6 inch

Electrak 1SP

1	2	3
SP24 -	09A4 -	06
1. Model and input voltage SP12 - = Electrak 1SP, 12 Vdc SP24 - = Electrak 1SP, 24 Vdc	2. Dynamic load capacity 09A4 - = 25 lbf 17A8 - = 75 lbf	3. Stroke 02 = 2 inch 04 = 4 inch 06 = 6 inch

Electrak 050

1	2	3	4	5	6
DE24 -	17W44 -	06	FN	HH	N
1. Model and input voltage DE12 - = Electrak 050, 12 Vdc DE24 - = Electrak 050, 24 Vdc DE36 - = Electrak 050, 36 Vdc DE24Q = Electrak 050, 24 Vdc, Q-version		3. Stroke 02 = 2 inch 04 = 4 inch 06 = 6 inch 08 = 8 inch		5. Rear and front mounting HH = standard crosshole in both ends MH = crossholes rotated 90°	
2. Dynamic load capacity 17W41 - = 112 lbf 17W42 - = 60 lbf 17W44 - = 30 lbf		4. End of stroke limit switches and potentiometer FN = limit switches and no potentiometer FP = limit switches and potentiometer ¹		6. Color N = black housing W = white housing ¹ Not possible in combination with 8 inch stroke.	

Electrak 2

1	2	3	4
D12 -	20A5 -	12	D
1. Input voltage D12 - = 12 Vdc 2. Dynamic load capacity and speed 10A5 - = 250 lbf, high speed 20A5 - = 250 lbf, standard speed	3. Stroke¹ 04 = 4 inch 08 = 8 inch 12 = 12 inch 20A5 - 12 inch	4. Shipment version² D = distributor version ¹ Contact customer service for other stroke lengths. ² Contact customer support for OEM version.	

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Ordering Keys

Electrak DC-actuators

Electrak PPA-DC					
1	2	3	4	5	6
PPA24 -	58B65 -	18	N -	LS	X
1. Model and input voltage PPA12 - = Electrak PPA-DC, 12 Vdc PPA24 - = Electrak PPA-DC, 24 Vdc PPA36 - = Electrak PPA-DC, 36 Vdc PPA90 - = Electrak PPA-DC, 90 Vdc 2. Dynamic load capacity 18B65 - = 750 lbf 58B65 - = 1500 lbf		3. Stroke 04 = 4 inch 08 = 8 inch 12 = 12 inch 18 = 18 inch 24 = 24 inch 36 = 36 inch 4. Brake option N - = no brake option		5. Feedback option XX = no feedback option LS = end of stroke limit switches PO = potentiometer ¹ HS = encoder HL = encoder + end of stroke limit switches 6. Bellows option X = no bellows C = bellows ¹ Not available with limit switches.	

Electrak 10		
1	2	3
D12 -	20B5 -	04
1. Input voltage D12 - = 12 Vdc D24 - = 24 Vdc D36 - = 36 Vdc	2. Dynamic load capacity and speed 05B5 - = 500 lbf 10B5 - = 1000 lbf, high speed 20B5 - = 1000 lbf, standard speed	3. Stroke 04 = 4 inch 08 = 8 inch 12 = 12 inch

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Ordering Keys

Electrak AC-actuators

Electrak PPA-AC

1	2	3	4	5	6
PPA22 -	18B65 -	18	SB	XX	C
1. Model and input voltage PPA11 - = Electrak PPA-AC, 1 × 115 Vac PPA22 - = Electrak PPA-AC, 1 × 230 Vac 2. Dynamic load capacity 18B65 - = 500 lbf 58B65 - = 1500 lbf		3. Stroke 04 = 4 inch 08 = 8 inch 12 = 12 inch 18 = 18 inch 24 = 24 inch 36 = 36 inch 4. Brake option¹ N - = no brake option SB = anti coast brake EB = electrical brake ²		5. Feedback option XX = no feedback option LS = end of stroke limit switches PO = potentiometer ³ HS = encoder HL = encoder + end of stroke limit switches 6. Bellows option X = no bellows C = bellows ⁴ ¹ See "Brake" in the Glossary section on page 57 for more information. ² Only possible for 1 × 115 Vac models. ³ Not available with limit switches. ⁴ Only possible on 12 inch stroke or longer.	

Electrak 5

1	2	3	4
A12 -	05B5 -	04	D
1. Model and input voltage A12 - = Electrak 5, 1 × 115 Vac A22 - = Electrak 5, 1 × 230 Vac	2. Dynamic load capacity 05B5 - = 500 lbf 10B5 - = 1000 lbf	3. Stroke 04 = 4 inch 08 = 8 inch 12 = 12 inch 18 = 18 inch 24 = 24 inch	4. Shipment version¹ D = distributor version ¹ Leave position blank for OEM version.

Electrak 205

1	2	3	4
ALP22 -	10B5 -	04	
1. Model and input voltage ALP12 - = Electrak 205, 1 × 115 Vac ALP22 - = Electrak 205, 1 × 230 Vac	2. Dynamic load capacity 05B5 - = 500 lbf 10B5 - = 1000 lbf	3. Stroke 04 = 4 inch 08 = 8 inch 12 = 12 inch 18 = 18 inch 24 = 24 inch	4. Shipment version¹ D = distributor version ¹ Leave position blank for OEM version.

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Ordering Keys

Non-driven and Rotary Actuators

Electrak PPA-M			
1	2	3	4
PPA00 -	01B65 -	24	N-XXX
1. Model PPA00 - = Electrak PPA-M	2. Dynamic load capacity 01B65 - = 1500 lbf	3. Stroke 04 = 4 inch 06 = 6 inch 08 = 8 inch 12 = 12 inch 18 = 18 inch 24 = 24 inch 36 = 36 inch	4. Bellows option N-XXX = no bellows N-XXC = bellows

DGB		
1	2	3
D36 -	21GB -	XXCL
1. Input voltage D12 - = 12 Vdc D24 - = 24 Vdc D36 - = 36 Vdc	2. Load torque capacity and no load speed 21GB - = 100 lbf-in, 200 rpm 30GB - = 100 lbf-in, 140 rpm ¹	3. Version XXCL = one output shaft + clevis mount XXMO = one output shaft + manual override XXDS = dual output shafts ¹ Not possible with 36 Vdc input voltage.

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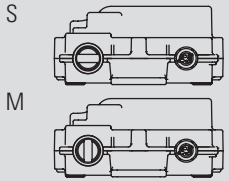
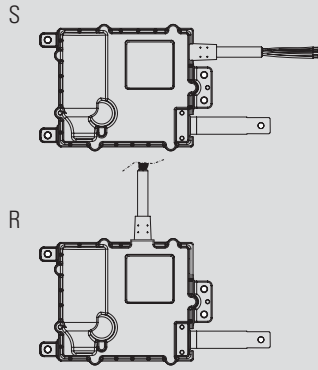
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Ordering Keys

Electrak DC-actuators

Electrak Throttle

1	2	3	4	5	6	7
ET12-	084-	S	S	NP	1	S
1. Actuator type and supply voltage ET12- = Electrak® Throttle, 12 VDC ET24- = Electrak® Throttle, 24 VDC		4. Temperature rating S = standard: -40 (-40) to +85 (+185) °C (F) E = high temperature: -40 (-40) to +125 (+257) °C (F)		6. Connection options 1 = flying leads 2 = Deutsch DTM04-6P connector		
2. Max. dynamic load and speed version 084- = 45 N (10 lbf), high speed* 174- = 130 N (30 lbf), standard speed		5. Control option NP = analog position feedback sensor FN = end of stroke limit switches FP = analog position feedback sensor and end of stroke limit switches CN = CANBUS SAE J1939		7. Adapter options S = standard adapter orientation M = adapter rotated 90°		
3. Harness orientation S = parallel to adapter R = rotated 90° in housing						
						

* Can only be ordered with high temperature rating (code E in position 4). Note that there is no thermal switch to protect the motor on the high temperature rated models.

Max Jac

1	2	3	4	5
MX12-	B8	M15	P	1
1. Actuator type and supply voltage MX12- = Max Jac 12 VDC MX24- = Max Jac 24 VDC 2. Max. dynamic load, screw type and max. speed B8 = 800 N, ball screw, 55 mm/s W1 = 500 N, worm screw, 35 mm/s		3. Stroke (S) M05 = 50 mm M10 = 100 mm M15 = 150 mm M20 = 200 mm M25 = 250 mm* M30 = 300 mm*	4. Position feedback option P = analog signal (standard) E = encoder signal	5. Cable and connectors 0 = 300 mm long flying leads 1 = 300 mm long cable and connector** 2 = 1600 mm long cable and connector** ** AMP Super seal series 1,5 connector

* Strokes possible for ball screw models only.

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Glossary

A – Du

Acme Screw

Acme screws withstand vibration and shock better than ball or worm screws and are used for applications with these characteristics. Also see “lead screw”.

Actuator Housing

The actuator housing provides environmental protection for the internal components and may also be a structural member of the actuator.

Adapters

The front and rear adapters are the connection points for mounting most Thomson actuators. The front adapter is usually a cross hole but optionally may be a tapped hole, threaded rod, or universal rod end. The rear adapter may be cast into the actuator housing or held in place with a nut.

Adjustable End of Stroke Limit Switches

The adjustable end of stroke limit switches may be moved to positions inside the full stroke of the actuator and will shut off the actuator when it reaches the limit switch. Also see “end of stroke limit switches”.

Anti Coast Brake/Electrical Brake

Depending on the load, AC ball screw actuators may coast to a stop when power is removed. This overrun is eliminated by an anti coast brake or an electrical brake. The anti coast brake (pawl type) will allow up to one revolution of the motor after power is removed. They are used on the Electrak 5 and PPA-AC with anti coast brake. An electrical brake (electrically released) operates much faster after power is removed and allow less coast than the pawl type. Electrak 205 and the PPA-AC with electrical brake use this type of brake. Also see “brake”.

Anti Rotation Mechanism

A feature available on some actuators that resolves the restraining torque within the actuator. The extension tube will not rotate on actuators with this feature.

Ball Screw

Ball screws are highly efficient and are used for high loads and speeds. Also see “lead screw”.

Brake

Actuators using a acme or worm screw are inherently self-locking while ball screw driven actuators are not. To prevent ball screw actuators from backdriving they incorporate an anti backdriving brake (holding brake). Ball screw actuators with an AC motor can also be equipped with an anti coast brake. Also see “anti coast brake/electrical brake” and “holding brake”.

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Capacitor

The ac actuators use permanent split capacitor motors and require the use of a start/run capacitor in the control circuit to operate. The controls for the ac actuators have the capacitor included in the control. For customer supplied controls, a separate capacitor is required and the part number is included on the actuator product page.

Certificates

CE certification and UL listing are the two main third party approvals available for actuators. Most of the AC actuators are UL listed as standard and UL has no standard for DC actuators under 48 Vdc. All actuators sold in the EU are CE certified while some actuators sold outside of the EU may not be. If you order your actuator outside of the EU and need a CE certification, contact the factory to verify availability and be sure to include the request on your order.

Controls

Controls can be external to the actuator and provide the actuator with the correct voltage, have either membrane or pendant operators and some have position indicators. The Pro series also has internal controls that continuously monitor the operation of the actuator.

Cover Tube

The cover tube provides protection for the lead screw and provides protection and support for the extension tube. For the Electrak 100 and PPA and as an option on the Electrak 205 actuators, the cover tube also provides the rear mounting connection.

Customization

Even the most versatile actuator may not always suit all applications. But whatever your need is, our engineers are ready to help you to customize the actuators according to your requirements. We build more exclusive actuators than anyone else and have decades of experience of producing actuators to meet special needs.

Duty Cycle

$$\text{Duty cycle} = \frac{\text{on time}}{(\text{on time} + \text{off time})}$$

Example: 15 sec on, 45 sec off

$$\frac{15 \text{ sec}}{(15 \text{ sec} + 45 \text{ sec})} = 25\% \text{ duty cycle}$$

The duty cycle is a function of load for dc actuators. The duty cycle charts for each actuator should be reviewed when lower loads and higher duty cycles are needed. All actuators have at least a 25% duty cycle at full rated load. Ambient temperatures above 77° F may affect the final rating.

Glossary

Dy – Lo

Dynamic Load

The dynamic load rating is how much load the actuator will move when power is applied. Also see “load rating”.

Dynamic Braking

Dynamic braking is a feature on the Pro series which short circuits the motor windings at power off resulting in a shorter coasting distance before the actuator comes to a complete stop. Dynamic braking can be accomplished on other dc actuators by wiring the control to short the motor leads when power is removed.

Electronic Limit Switches (ELS)

ELS stands for Electronic Limit Switches and it is a current sensing function used in some actuator control models. The ELS senses the current and if the current exceeds a pre-set level the control cuts the power to the motor. This function can be used to detect and stop at the ends of the actuator stroke or to stop the actuator if it runs into an obstacle.

Electronic Load Monitoring (ELM)

A built-in microprocessor inside the Pro series actuators continuously monitors the performance of the actuator. The microprocessor will stop the movement at the end of stroke, in case of mid stroke stall, at overload conditions or if the duty cycle is too high. It also eliminates the need of a clutch and provides dynamic braking.

Encoder Feedback

Encoders provide a digital output signal that can be used to determine the position of the extension tube. An encoder equipped actuator must return to a “home” position if power is removed and restored in order to reset its starting point. Also see “potentiometer feedback”.

End of Stroke Limit Switches

End of stroke limit switches are switches that are incorporated in some actuator models, either as standard or as an option, that will shut off power when the end of stroke is achieved. Also see “fixed end of stroke limit switches” and “adjustable end of stroke limit switches”.

End Play (Backlash)

The stack up of tolerances within the lead screw assembly and gearing allowing some linear movement of the extension tube without rotating the motor. Typical end play or backlash varies by model. The range is 0.015 to 0.080 inch.

Extension Tube

The extension tube slides in and out of the actuator and is connected via the front adaptor to the load being moved or positioned.

Fixed End of Stroke Limit Switches

The fixed end of stroke limit switches allow the full stroke of the actuator to be used and will shut off power when the end of stroke is achieved. Also see “end of stroke limit switches”.

Holding Brake

The Electrak 1, 2, 050, 150 and some Pro series incorporate an acme screw which is inherently self-locking while Electrak 5, 10, 100, 205 and the high load Pro series actuators have a ball screw drive incorporating an anti backdriving brake (holding brake) that engages when the actuator has come to a complete stop. Also see “brake”.

Input Voltage

The nominal voltage required to operate the actuator. All actuators will accept at least a $\pm 10\%$ variation of the nominal voltage but a change in the voltage will result in a change of the speed of dc actuators. Controls are available that accept 115 or 230 Vac input and provide 24 Vdc output to operate 24 Vdc actuators.

Installation Instructions

Each actuator has an installation manual to answer typical questions about mounting and wiring the actuators.

Lead Screw

Actuators use three different types of lead screws depending on the configuration and load requirements of the actuator. Ball screws are highly efficient and are used for high loads and speeds. Acme screws withstand vibration and shock better and are used for applications with these characteristics. Worm screws are self locking and will not backdrive.

Lifetime Expectancy

Life is a function of load, stroke length and how often the overload clutch is operated. The specific load/life charts for each actuator will provide a life estimate for your particular application.

Lifting Columns

Lifting columns provide a stable base for adjusting the height of tables or platforms. The column provides both the lifting force and the ability to resolve high moment forces from off axis loads.

Linear Actuators

Actuators providing a linear thrust via an extension tube to lift, lower, push, pull or position a load.

Load Rating

The load rating is the minimum amount of force the actuator will provide during its lifetime. The load rating of all rod style actuators is the same for both compression and tension loads. Also see “dynamic load”, “static load” and “tension and compression load”.

Glossary

M – P

Manual Override (Hand Wind)

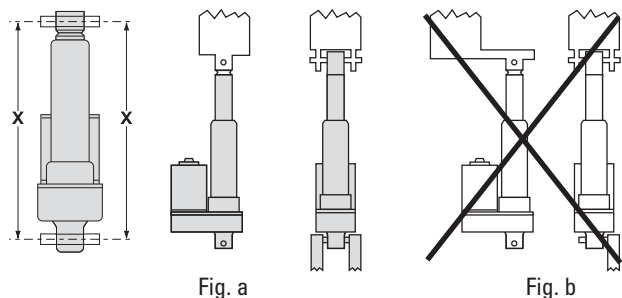
Allows manual operation of the actuator in both directions in case of a power failure. The actuator accepts a standard hexagon key to rotate the motor in either direction. Optional on some models and standard on the Pro series.

Maximum On Time

The maximum amount of time an actuator may operate without stopping to “cool off”. For high load and long stroke actuators this may be one extend and retract cycle. The actuator should not exceed 25% duty cycle at full rated load.

Mounting

Electrak actuators are quickly and easily mounted by slipping pins through the holes on each end of the unit and into brackets on the machine frame and the load. Electrak 100 units must be mounted by the cover tube and a swivel rod end. PPA actuators are mounted by the rear trunnions on the cover tube and the clevis on the extension tube. The Electrak 205 can be mounted by either the rear clevis or by a tube mount. Half inch diameter solid pins (1/4 inch solid pins for Electrak 1 and 050) provide maximum holding strength and a retaining or cotter pin on each end will prevent the solid pin from falling out of its mounting bracket. Roll or spring type mounting pins should be avoided. The mounting pins must be parallel to each other as shown below (Fig. a). Pins which are not parallel may cause the actuator to bind. The load should act along the axis of the actuator since off center loads may cause binding (Fig. b).



Non-driven Actuators

Actuators supplied without a motor and driven manually or by a customer supplied motor.

Operating and Storage Temperature

The operating temperature is the range in which the actuator may be safely operated. For the high end of the range, the duty cycle will be lower than 25 %. All actuators can be stored or transported at the same temperature as the operating temperature. Contact customer support if the operating temperature will be exceeded during storage or transportation.

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Output Voltage

Output voltage is the voltage from the control to run the actuator. The controls for dc actuators have 24 Vdc output. The controls for ac actuators have either 115 or 230 Vac output.

Overload Clutch

Electrak 050, 2, 5, 10, 100, 205 and PPA series linear actuators are protected by a load limiting mechanical clutch which prevents the motor from stalling at either end of the actuator stroke. It will also slip when the factory-set load limit is exceeded. The clutch is a ball detent design, assuring a consistent slip point and long life.

Potentiometer Feedback

Potentiometers provide an analog output signal that can be used to determine the position of the extension tube. A potentiometer will “remember” its position if power is removed and restored. All potentiometers are set to a minimum value on full retract. Also see “encoder feedback.”

Programmable Limit Switches

An optional control contained inside the Pro series to which an external programming box or customer supplied switches can be connected to set and reset the end of stroke limits as often as needed. The programming box has a “jog to position” switch and a “set limit” switch.

Protection Class

The protection class refers to the environmental rating of the enclosure. The first digit applies to airborne contaminants and the second digit to water/moisture.

IP33: protected against the penetration of solid objects with a diameter greater than 12 mm and against direct sprays of water up to 60 degrees from vertical.

IP44: protected against the penetration of solid objects with a diameter greater than 1 mm and against water sprayed from any direction.

IP45: protected against the penetration of solid objects with a diameter greater than 1 mm and low pressure water jets from any direction.

IP51: protected from dust and vertical dripping water/condensation.

IP52: protected from dust and dripping water/condensation falling at an angle up to 15 degrees from vertical.

IP56: protected from dust and high pressure water jets from any direction.

IP65: dust tight and protected against low pressure water jets from any direction.

IP66: dust tight and protected against high pressure water jets from any direction.

IP67: dust tight and protected against the effect of immersion in water between 150 mm (5.9 inch) and 1 meter (39.4 inch).

Glossary

R – W

Restraining Torque

The torque which is developed between the clevis on the extension tube and rear mount (clevis or trunnion) when the unit extends or retracts and ratchets the clutch (Fig. c).

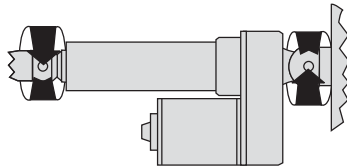


Fig. c

Rodless Actuators

Rodless actuators provide support for the load as well as thrust. The load is supported and moved by a carriage on the actuator rather than pushed or pulled by an extension rod. Rodless actuators are ideal for applications requiring long strokes (up to 5 feet), high speeds (up to 4.3 in/sec), movement of the load within the shortest envelope possible or the load supported by the actuator.

Rotary Actuators

Actuators providing a rotary output to position a load, turn a winch, or rotate a gear or sprocket.

Service and Maintenance

Actuators are generally maintenance free. The Electrak 2, 5, 10, 100, 205 and Pro series have repair kits available from your local distributor or OEM.

Signal Follower Input / Control

An optional control contained inside the Pro series actuators that will cause the extension tube position to follow a customer supplied potentiometer signal. Also known as a position follower control.

Speed

DC actuators have a direct load/speed relationship. As the load increases, the speed of the dc actuators decreases. There are curves on each product page to show the speed from no load to full rated load. AC actuators have very little speed fluctuations based on load but there are load/speed curves on all the ac actuator product pages.

Spline Safety Function

An optional safety function on the rodless actuator (LM80) that will stop downward motion in case the carriage (the moving member) collides with an obstacle. The motor will keep running but the carriage will stand still and not pull down on the obstacle. When reversing the motor rotation the carriage will automatically start to move upwards again.

Static Load

The static load rating is how much load the actuator will hold with power off. The static load rating is normally twice the dynamic load rating. Also see "load rating".

Synchronous Operation

Motor speed cannot be controlled with enough precision to ensure that the actuators will remain synchronized and a binding effect could take place. Non-driven actuators may be mechanically linked and thereby synchronized.

Tension and Compression Load

A tension load tries to stretch the actuator and a compression load tries to compress the actuator (Fig. d). Most actuators can manage the same tension and compression load. Also see "load rating".

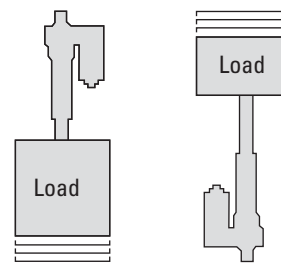


Fig. d

Vent Tube

The Electrak 050 and 150 have a breather tube in the wiring harness to allow the actuator to operate without creating a vacuum and drawing water through the seals on the cover tube.

Worm Screw

Worm screws are self locking and will not backdrive. Also see "lead screw".

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Application Data Form

Worksheet

Application Data Form*		
Submitted by:	Phone:	Date:
1. Company name	20. Do you need any special retracted length (cross hole c/c in inches)?	
2. Street address	21. Is anti-rotation of the extension tube required (yes/no)?	
3. City-state, zip	22. What is the input voltage?	
4. Contact name	23. Do you need any of the optional features of the actuator?	
5. Phone	24. How will the actuator be connected (standard or special cabling)?	
6. Fax	25. Is mating connector required if connector is included in the actuator?	
7. E-mail	26. Do you need any special paint or finish?	
8. What is the estimated annual volume?	27. Is manual override necessary?	
9. What is the target price?	28. What are the environmental conditions (dusty, outdoors, wash down)?	
10. What is the current or alternative solution?	29. What is the operation temperature range in Farenheit?	
11. How much load is moved in pounds?	30. What is the duty cycle (on-time / on-time + off-time) in sec?	
12. How much load do you need to hold in pounds?	31. Do you need any certificate(UL, CE, etc.)?	
13. How will the actuator be mounted (horizontal/vertical)?	32. Do you require any print (dwg, dxf, faxed)?	
14. Is the load trying to stretch or/and compress the actuator?	33. Describe any additional requirements (packaging, labeling. etc.)	
15. What speed do you want the actuator to move in in/sec?		
16. What is the life of the unit in cycles (one cycle = extend and retract)?		
17. What is the stroke length?		
18. How will the actuator be mounted to the extension tube?		
19. How will the actuator be mounted to the rear adaptor?		

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* Please enter all fields in the form and send it and any drawing to sales@servo2go.com by mail or fax. See the back of the catalog for the nearest location.

Application Data Form

Drawing/Notes

A large grid of graph paper for calculations, consisting of 20 columns and 20 rows of squares.

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Linear_Actuators_CTEN-0005-04 | 20170920KB

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