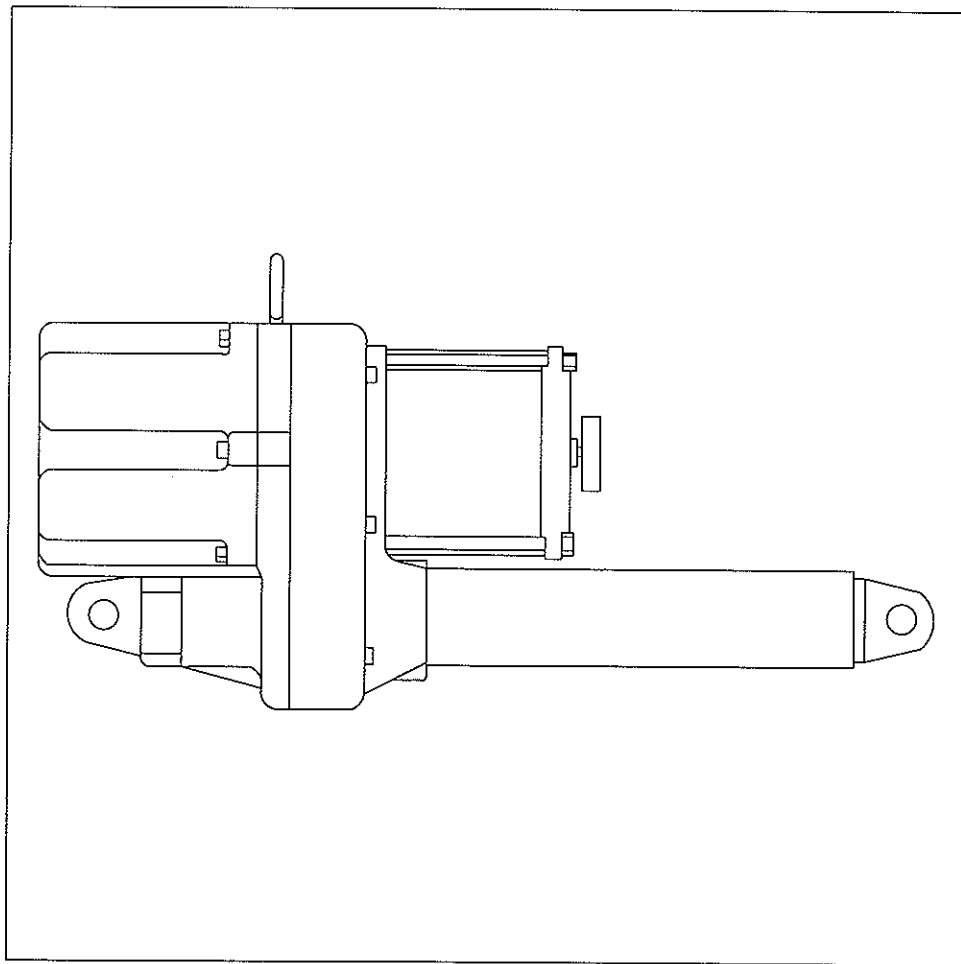


LA-2800 SERIES

Instruction Manual

ELECTRIC LINEAR ACTUATOR



WARNING

Failure to properly wire torque/thrust switches will result in actuator damage.
Refer to the specific wiring diagram supplied with your actuator for correct wiring.



GENERAL INFORMATION

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IDENTIFICATION LABEL

An identification label is attached to each actuator cover. The serial number is also stamped on the aluminum housing, directly above the conduit entry. When ordering parts, requesting information, or service assistance, please provide all of the label information.

EXAMPLE:

MODEL NUMBER LA2810

CODE: LA2810

SERIAL: 1627C92-23456-1

PH/HZ/V/A: 1/60/120/1

MODEL NUMBER: LA28 10

Actuator Series _____ Motor Type _____

CODE: LA2810

_____ Model Series

SERIAL NUMBER: 1627 C 92 - 23456-1

Sequential Number _____ Job Reference No. _____
Month built _____ Year built _____

PH/HZ/V/A: 1/60/120/1

PH=Phase

HZ=Hertz

V=Voltage

A=Amp

RECEIVING

Once you have received the actuator(s), carefully inspect for shipping damage. Damage to the shipping carton is usually a good indication that it has received rough handling. Report all damage immediately to the freight carrier and Jordan Controls, Inc.

INSPECTION

Carefully unpack the actuator(s)— taking care to save the shipping carton and any packing material should return be necessary. Verify that the items on the packing list or bill of lading agree with your own.

STORAGE

If the actuator(s) will not be installed immediately, they should be stored in a clean, dry area where the ambient temperature is not less than -20° F. The actuator(s) should not be stored in a corrosive environment.

EQUIPMENT RETURN

For your convenience Jordan Controls, Inc. will provide an efficient method of returning equipment for repair.

Returned Goods Authorization

A returned goods authorization (RGA) number is required to return any equipment for repair. This must be obtained from the Jordan Controls Service Department. The equipment must be sent to the following address after the RGA number is issued:

Jordan Controls, Inc.
5607 West Douglas Avenue
Milwaukee, Wisconsin 53218
Attn: Service Department

To facilitate quick return and handling of your equipment include:

RGA Number
Your Company Name
Address
Repair Purchase Order Number
Brief description of the problem

INTRODUCTION AND GENERAL DESCRIPTION

INTRODUCTION

Jordan Controls, Inc., designs, manufactures and tests its products to meet many national and international standards. However, for these products to operate within their normal specifications, you must properly install, use and maintain these products. The following instructions must be adhered to and integrated with your safety program when installing, using and maintaining Jordan Controls products.

- Read and save all instructions prior to installing, operating and servicing this product.
- If you do not understand any of the instructions, contact your Jordan Controls representative for clarification.
- Follow all warnings, cautions and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation and maintenance of the product.
- Install your equipment as specified on Jordan Controls installation instructions and per applicable local and national codes. Connect all products to the proper electrical sources.
- Handle, move and install each product using the appropriate number of personnel and moving devices/equipment (dolly, forklift, crane, etc.). Failure to do so could cause serious personal injury.
- To ensure proper performance, use qualified personnel to install, operate, update, tune and maintain the product.
- When replacement parts are required, ensure that the qualified service technician uses replacement parts specified by Jordan Controls. Unauthorized substitutions may result in fire, electrical shock, other hazards, or improper equipment operation.
- Keep all actuator protective covers in place, (except when maintenance is being performed by qualified personnel), to prevent electrical shock, personal injury, or damage to the actuator.

CAUTION

Before installing the actuator, make sure the actuator supplied is suitable for the intended application with respect to environmental conditions and the voltage/frequency of available line power. If you are unsure of the suitability of this equipment for your installation, consult Jordan Controls prior to proceeding.

WARNING— SHOCK HAZARD

Installation and servicing must be performed only by qualified personnel. De-energize all sources of power BEFORE removing the actuator cover. KEEP COVER TIGHT WHEN CIRCUITS ARE ALIVE. Failure to follow these precautions may result in serious injury.

GENERAL DESCRIPTION

The LA-2800 series are self-contained, bi-directional, electric linear actuators. They feature stroke lengths from 6 to 24 inches (152.4 to 609.6 mm) and can provide up to 1600 pounds (725.7 kg) thrust. The unit has integral thrust overloads that trip when excessive load is placed on the actuator output shaft. Position limit switches are also available. A manual override mechanism will allow the unit to be positioned without electrical power. The enclosure is NEMA Type 4 (IP65) and is also available for hazardous locations for Class I, Division 1, Group D, and Class II, Division 1, Groups E, F, and G.

BASIC MODELS

LA-2810

240/480 Vac, 3 phase, 50/60 Hz, running current 1.3/6.5 amp/leg, stall current 6.4/3.2 amp/leg, 25% duty cycle - maximum 5 minute on-time. The motor is plug reversible.

Control Compatibility: Customer supplied reversing contactor along with Jordan Controls model AD-8813 servo amplifier, MT-6220 remote control and readout.

LA-2820

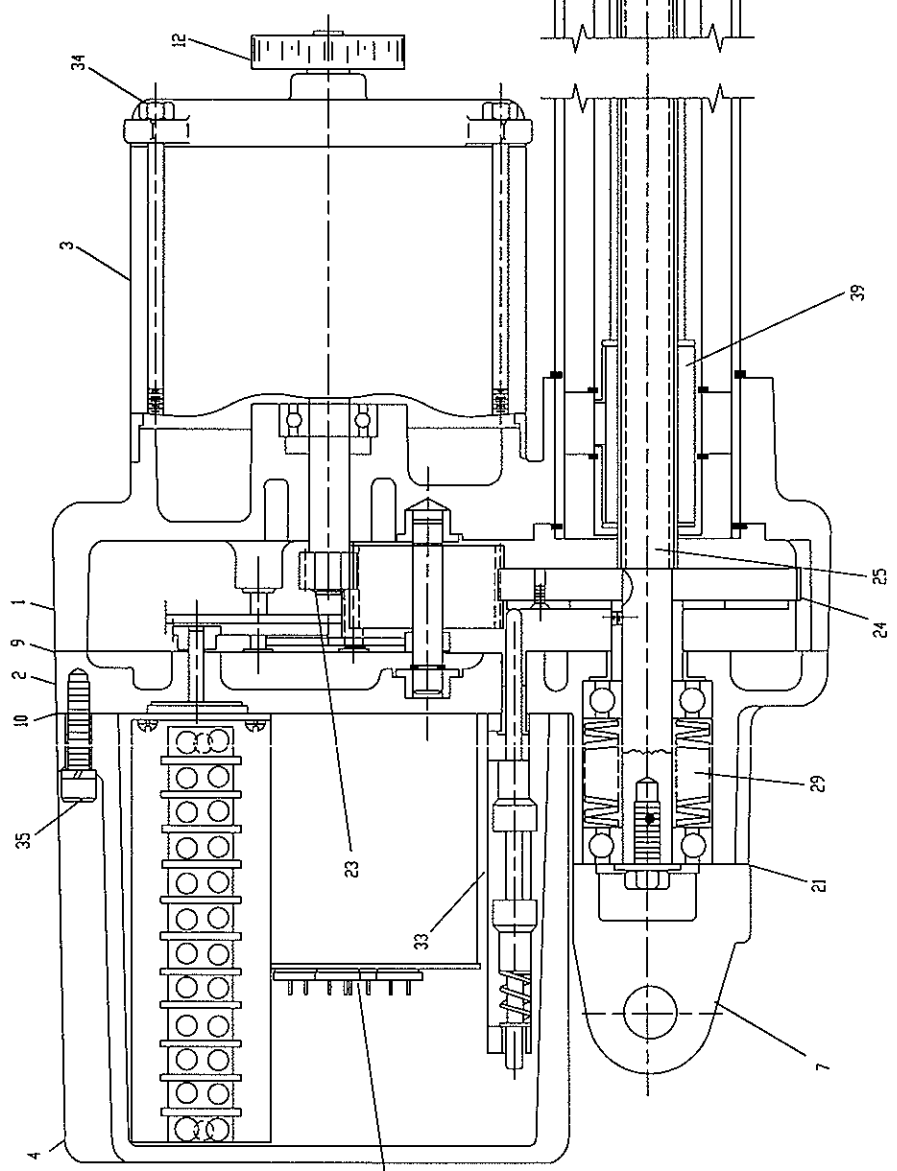
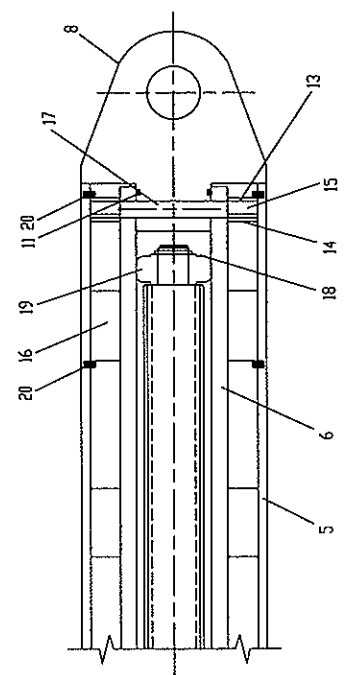
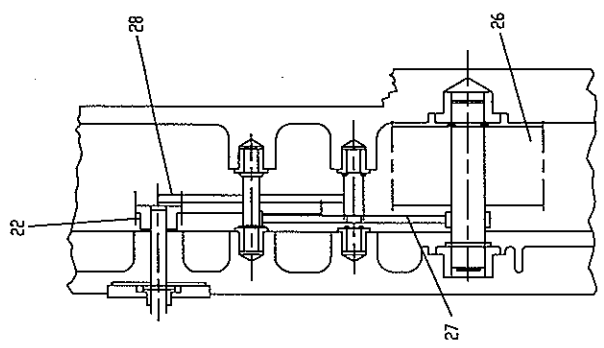
120/240 Vac, 1 phase, 50/60 Hz, running current 7.0/3.5A, stall current 13.2/6.6A, 25% duty cycle - maximum 5 minute on-time. The motor is plug reversible.

Control Compatibility: Jordan Controls models AD-8823 and AD-8843 servo amplifiers, MT-6220 remote control and readout, or any bi-directional contact type control.

LA-2860

90 Vdc, (permanent magnet field), 4.7A, modulating duty.

Control Compatibility: Jordan Controls model AD-7300 (90 Vdc output), or any compatible 90 Vdc output servo amplifier.

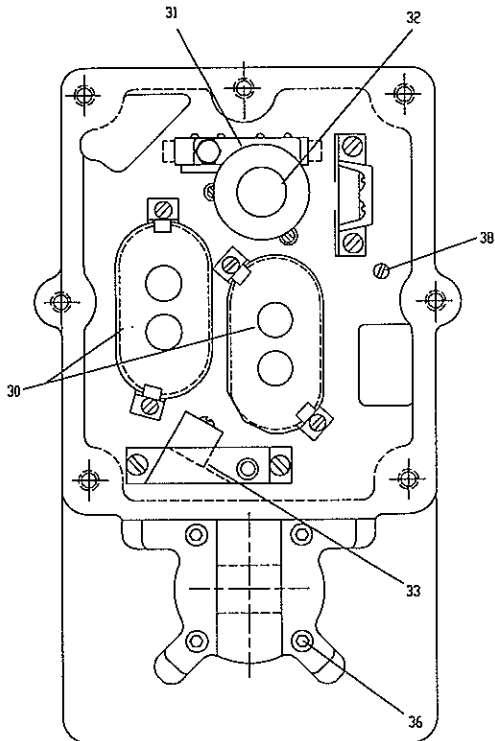


PARTS IDENTIFICATION

- | | | | |
|----------|-------------------------------------|----------|--|
| 1. | Motor Housing | 20. | Tube Bearing and Seal Retaining Ring |
| 2. | Feedback Housing | 21. | Gasket, Stationary Clevis |
| 3. | Motor | 22. | Limit Switch Gear |
| 4. | Electrical Cover | 23. | Motor Pinion |
| 5. | Outer Tube | 24. | Drive Screw Gear |
| 6. | Inner Tube | 25. | Drive Screw |
| 7. | Clevis, Stationary | 26. | Power Idler Gear Assy |
| 8. | Clevis, Tube | 27. | First Stage Feedback Gear Assy |
| 9. | Housing Gasket (weather proof only) | 28. | Second Stage Feedback Gear Assy |
| 10. | Cover Gasket (weather proof only) | 29. | Spring Pack Assy |
| 11. | O'ring, Tube Clevis | 30. | Motor Capacitor, Single Phase |
| 12. | Handcrank | 31. | Position Limit Switch Assy (Multi-Turn Type) |
| 13. | Tube Scraper | 32. | Potentiometer |
| 14. | Tube Seal | 33. | Thrust Limit Switch Assy |
| 15. | Tube Spacer | 34. | Motor Mounting Bolts |
| 16. | Tube Bearing | 35. | Electrical Cover Bolts |
| 17. | Tube Clevis Roll Pin | 36. | Stationary Clevis Bolts |
| 18. | Drive Screw Guide Retaining Ring | 37. | Position Limit Switch Assy (Cam Type) |
| 19. | Drive Screw Guide | 38. | Ground Screw |
| | | 39. | Drive Nut |

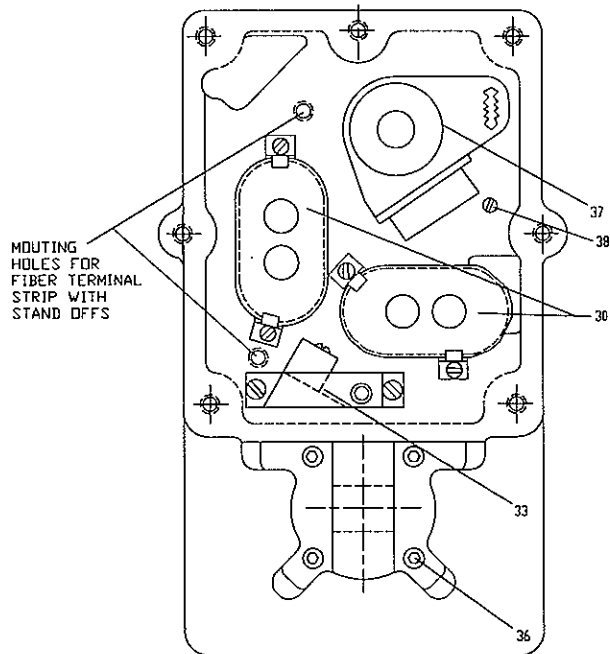
PARTS IDENTIFICATION

- 30..... Motor Capacitor, Single Phase
- 31..... Position Limit Switch Ass'y (Multi-Turn Type)
- 32..... Potentiometer
- 33..... Thrust Limit Switch Ass'y
- 36..... Stationary Clevis Bolts
- 37..... Position Limit Switch Ass'y (Cam Type)
- 38..... Ground Screw



LA-2820 (SINGLE PHASE) ELECTRICAL HOUSING SIDE ASSEMBLY WITH MULTI-TURN TYPE LIMIT SWITCH ASSEMBLY.

LA-2810 (THREE PHASE) AND LA-2860 (DC) IS THE SAME EXCEPT FOR THE REMOVAL OF CAPACITORS ITEM NUMBER (#30).



LA-2820 (SINGLE PHASE) ELECTRICAL HOUSING SIDE ASSEMBLY WITH CAM LIMIT SWITCH ASSEMBLY.

LA-2810 (THREE PHASE) AND LA-2860 (DC) IS THE SAME EXCEPT FOR THE REMOVAL OF CAPACITORS ITEM NUMBER (#30).

POSITION FEEDBACK / THRUST LIMIT PROTECTION

POSITION FEEDBACK (OPTIONAL)

Position feedback is provided through the use of a potentiometer attached to the limit switch multi-turn screw shaft. As the shaft is driven by the actuator gearing, the potentiometer is simultaneously driven to provide position feedback.

Position Feedback Alignment (Multi-Turn Type)

1. Establish if full extend or full retract is to be used for zero indication. On slide gate installations, zero indication is normally used when the actuator is fully extended and the gate closed.
2. Use an ohmmeter to monitor the position of the feedback potentiometer wiper to determine which end of the potentiometer gives a zero indication.
3. Turn the handwheel on the motor until the ohmmeter reads 50 ohms for a 1000 ohm potentiometer or 500 ohms for a 10,000 ohm potentiometer. The clevis and inner extension tube may have to be turned in or out by hand to accomplish this reading.
4. Adjust the bolt on the multi-turn screw to trip the appropriate position limit switch. Lock the bolt in position with the jam nut.
5. Hold the motor shaft handwheel so that the gear train cannot move and turn the clevis in or out to the desired position. Do not allow the clevis to rotate while completing alignment procedures.
6. Turn the motor shaft handwheel to position the actuator at the other end of travel.
7. Adjust the bolt on the multi-turn screw to trip the other position limit switch. Lock the bolt in position with the jam nut.

Position Feedback Alignment (Cam Type)

Follow notes 1 through 3 above.

4. Plastic Frame - key the limit switch cams at 0 for PL1 and 90 for PL2. If PL3 and PL4 are used they are also keyed at 0 and 90 respectively. For fine adjustment of 2%, remove fine adjustment pin and set PL1 at 0, PL2 at 4 and if PL3 and PL4 are used, set them at 2 and tighten down pin.
- Go to step 5 if the output shaft is fully extended. Go to step 6 if the output shaft is fully retracted.
5. If the output shaft is fully extended, rotate limit switch assembly until PL2 trips at 0 (read on PL2 cam) and lock in place.
 6. If the output shaft is fully retracted rotate limit switch assembly until PL1 trips at 100 (read on PL1 cam) and lock in place. **When either PL1 or PL2 are set, the opposite end is also set.**
 7. Turn the motor shaft handwheel to check position of the actuator at the other end of travel.
 8. Fine adjust as necessary.

THRUST LIMIT PROTECTION

In figure 1, the actuator has tried to extend but the load on the tube clevis has exceeded 1600 pounds. Because the actuator continues to operate, the screw shaft begins to move backward against the spring pack. The thrust limit switch rod is simultaneously pushed back by the face of the screw shaft gear. Actuator operation will continue until the rod has moved enough to cause the collar to trip the extend limit switch or approximately two-tenths to four-tenths of one inch from its normal position. On actuators with dc and three phase motors, this condition will "open" the extend thrust limit switch circuit. Refer to the wiring instructions to ensure power removal from the motor or actuator damage may result.

Figure 2 shows a similar situation but with the actuator in a retract mode. The load on the tube clevis prevents the shaft from moving inward and when the load exceeds 1600 pounds (725.7 kg), the screw shaft begins to compress the spring pack and move forward. In doing so, the screw shaft gear moves forward and the thrust limit switch rod is pushed forward by its spring. Actuator operation will continue until the rod has moved enough to cause the collar to trip the retract limit switch or approximately two-tenths to four-tenths of one inch from its normal position. On actuators with dc and three phase motors, this condition will "open" the retract thrust limit switch circuit. Refer to the wiring instructions to ensure power removal from the motor or actuator damage may result.

The thrust limit switch collars are preset during manufacture. Do not adjust the collar positions unless they can be properly reset to actuate the switches at 1600 pounds (725.7 kg) of load or rated load. Setting the collars for higher load conditions may damage the actuator.

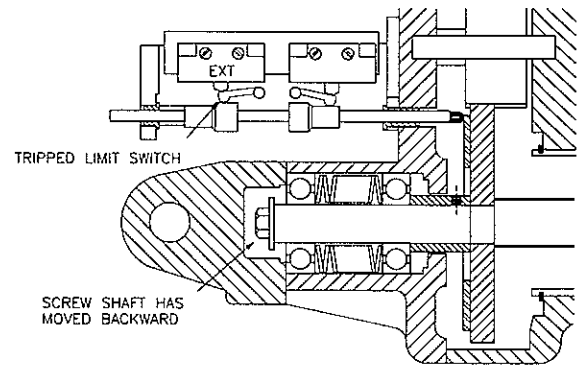


FIGURE 1. TRIPPED EXTENDED THRUST LIMIT SWITCH

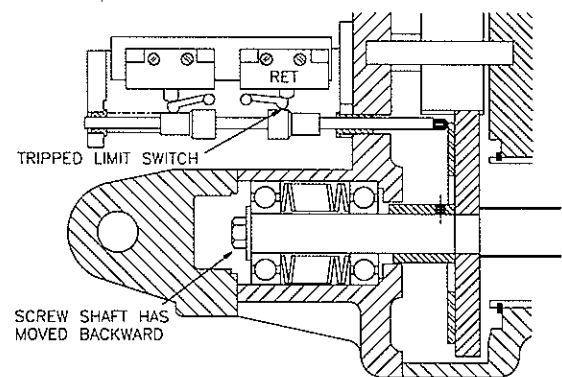


FIGURE 2. TRIPPED RETRACTED THRUST LIMIT SWITCH.

INSTALLATION

MOUNTING

The outline and mounting dimensions for a standard unit are shown on the last page of this brochure. Overall dimensions are included to assist in determining clearance requirements.

Upon arrival, carefully uncrate the actuator. If any damage is noticed, report it immediately to the carrier. Do not allow the tube clevis to rotate. Rotation of the clevis will change the alignment of the feedback mechanism.

The eyebolt, shipped with the actuator, is designed to lift only the actuator. Do not lift the actuator and attached equipment with the eyebolt. The actuator must be mounted using only the clevises. Do not use a clamp on the outer support tube. The device to which the tube clevis is attached must not be permitted to rotate during operation as this will change the feedback mechanism alignment at the rate of one inch per second of operation.

After the actuator is mounted, turn the motor shaft handwheel until the actuator is positioned to one-half its fully extended position. This will aid the electrical checkout during initial start up. The motor shaft handwheel must be operated by hand. The use of tools to turn the wheel may damage the actuator.

TECHNICAL DATA

Single phase ac units have dual balanced windings and use a capacitor for phase shift and reversal of direction. DC units are permanent magnet and require polarity reversal of armature voltage to reverse direction.

The standard travel rate for the LA-2800 series is 0.9 inches/second with a maximum thrust of 1600 pounds (725.7 kg). An optional ball screw is available to provide a travel rate of 2.2 inches/second.

MAINTENANCE

Under normal service conditions the motor, gearing, bearings and parts are all pre-lubricated and should not require periodic maintenance. If for any reason the unit is disassembled in the field, all oilite bushings should be resaturated with a S.A.E. 30 non detergent oil and all gearing heavily coated with an Amoco Amolith Premium Grease #2 or equal. The screw shaft (25) and drive nut (39) are lubricated with Lesen EP-50. Care should be taken to ensure that no foreign material is allowed to become entrained with the grease in the gear train, which may cause premature failure.

ELECTRICAL INTERCONNECT

The LA-2800 series are available with a 120/240 Vac single phase motor, a 240/480 Vac three phase motor, or a 90 Vdc permanent magnet motor. Check the unit to be sure the proper motor is installed. Check the available power supply to ensure that it does not vary by more than 10% of the motor voltage rating. Low line voltage can cause the motor to stall and burn out under load. High voltage can overheat and burn out the motor.

Single Phase Motor Wiring

Refer to the wiring diagram shown on page 9. The LA-2820 single phase motor is pre-wired to the position limit switches and the thrust limit switches and may be wired directly. Also wire the position feedback if used. With power applied, the actuator will run until a position or thrust limit switch is tripped.

Direct Current Wiring

Refer to factory for wiring requirements.

Three Phase Motor Wiring and Startup

Refer to the wiring diagram shown on page 9. Motor phasing, position limit switch wiring and thrust limit switch wiring are not pre-wired and must be done at installation.

Failure to properly wire the LA-2810 three phase motor unit may cause damage to the actuator and void all warranties.

The motor should be installed with two four-pole motor contactors, one for extended motor power and one for retract motor power. The fourth contact is used as a cross interlock to prevent both contactors from being energized at the same time.

Checking for proper phasing requires two people. One to operate the controls and one to observe actuator shaft travel and limit switches for proper operation.

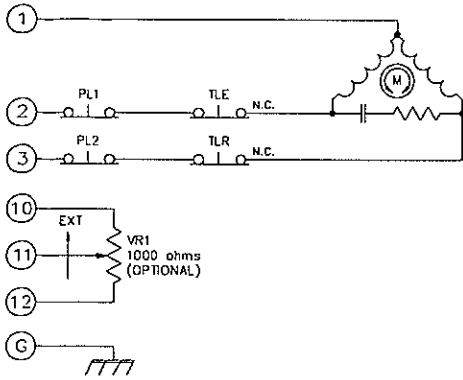
Apply power to the actuator and activate the extended contactor. If the actuator shaft extends, the motor phasing is correct. If the actuator shaft retracts, stop it immediately. Disconnect power to the actuator and reverse any two of the motor leads. Reposition the shaft to the mid-point of its travel by turning the handwheel. Apply power and again activate the extended contactor. The actuator shaft should now extend. Repeat the procedure using the retract contactor.

Actuate the extend contactor. With the shaft extending, trip the extend thrust limit switch by hand or by disconnecting the wire to the extend switch circuit. The actuator must stop. If the actuator does not stop, disconnect power immediately to prevent damage to the actuator. If necessary, rewire the limit switches and repeat the test procedure for both extend and retract operations.

Another method of testing operation is to jog the actuator to its extended or retracted position by alternately operating the switch on-off controls. When the position or thrust limit switch is activated, the actuator must stop. If it does not stop, disconnect power immediately to prevent damage to the actuator.

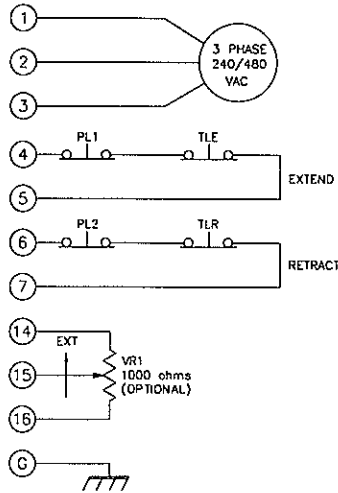
TYPICAL WIRING DIAGRAMS

LA-2820



See Note 1

LA-2810



See Note 2

NOTES:

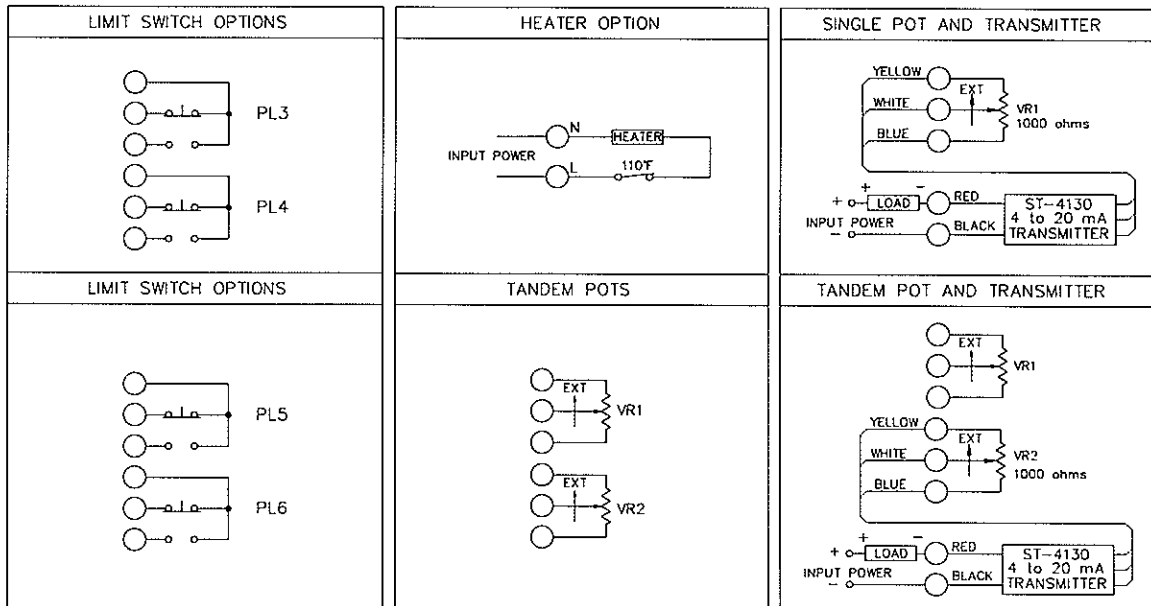
1. Motor: To operate actuator without an amplifier, apply 120 Vac (or 240 Vac as specified) to terminals 1 and 2, or 1 and 3. Voltage to terminals 1 and 2 extends actuator shaft. Voltage to terminals 1 and 3 retracts actuator shaft.

2. Motor: Apply 240 Vac 3-phase (or 480 Vac 3-phase as specified) to terminals 1, 2 and 3. Switches and reversing motor starter required to change motor direction must be supplied by customer.

3. Potentiometer: Wiper travels in direction shown for Ram extensions.

4. Limit Switches: TLE and PL1 operate when actuator shaft extends. TLR and PL2 operate when actuator shaft retracts.

OPTIONS



TROUBLESHOOTING

TROUBLE	POSSIBLE CAUSE	REMEDY
The motor does not operate.	a. No power to the motor. b. The actuator is at full extend or retract position and opposite thrust limit switch is actuated, cutting off power to the motor. c. Thrust limit switch activated from overloaded condition. d. Motor is wired incorrectly. e. Motor in thermal overload (thermal overload tripped). f. Motor is burnt out. g. Motor and feedback potentiometer are out of phase.	a. Restore power. b. Remove cause of thrust overload. c. Operate actuator in opposite direction to reset thrust limit switch. Locate and remove overload. d. Correct wiring per wiring diagram. e. Let motor cool. Reduce load and/or duty cycle. f. Replace motor. g. Reverse potentiometer end leads. Reverse motor direction leads.
The motor operates but screw shaft does not move.	a. Damaged power gearing. b. Screw drive nut stripped or pulled out of tube.	a. Replace damaged gears. b. Repair or replace screw drive nut.
Position limit switch does not stop motor operation.	a. Position limit switch not properly wired to control circuit. b. Defective position limit switch. c. Switches not aligned.	a. Correct wiring per the wiring diagram. b. Replace switch. c. Re-align switches.
Thrust limit switch does not stop motor operation.	a. Thrust limit switch not properly wired to control circuit. b. Thrust limit switch collars loose or not properly adjusted. c. Thrust limit switch defective. d. Thrust limit switch shaft bent and binding. e. Thrust limit switch mounting or bushing is bent or damaged. f. Thrust limit switch mounting block not aligned or secured.	a. Correct wiring per wiring diagram. b. Adjust and tighten collars as required. c. Replace switch. d. Replace shaft. e. Replace as required. f. Align and secure blocks as required.
The retract thrust limit switch is always activated.	a. The actuator is overloaded in a retract operation. b. The switch collar is loose or out of adjustment. c. The switch is defective. d. Screw shaft main bearings are frozen to screw shaft or housing.	a. Operate the actuator in the opposite direction to reset the thrust limit switch. Locate and remove overload condition. b. Adjust and secure. c. Replace the switch. d. Repair and replace as required.
The extend thrust limit switch is always activated.	a. The actuator is overloaded in the extended direction. b. The switch collar is loose or out of adjustment. c. Switch shaft is bent. d. Switch shaft spring is weak or broken. e. Switch block bent or bushing bent in main housing.	a. Operate actuator in opposite direction to reset thrust limit switch. Locate and remove overload condition. b. Adjust and secure as required. c. Replace switch shaft. d. Replace spring. e. Repair or replace switch block and bushing.
Position feedback device not operating.	a. Defective pot(s). b. Loose or broken feedback gear(s).	a. Replace pot(s). b. Tighten or replace gear(s).
The motor runs in one direction only.	a. Motor and feedback potentiometer are out of phase. b. Motor has an open winding. c. Position or thrust limit switch is defective.	a. Reverse potentiometer end leads. Reverse motor direction leads. b. Replace motor. c. Replace defective limit switch.

SPARE PARTS LIST

PART NUMBER	DESCRIPTION
23D-029028-002	3 phase motor, LA-2810 (NEMA 4)
23D-029028-001	1 phase motor, LA-2820 (NEMA 4)
61B-024887-001	90 Vdc motor, LA-2860 (NEMA 4)
23D-016698-001	3 phase motor, LA-2810 (x-proof)
23C-018319-001	1 phase motor, LA-2820 (x-proof)
61A-025569-001	Motor Pinion Gear
65A-014927-001	Power Idler Gear Ass'y
65A-009938-001	1st Stage Fdbk Gear Ass'y
61A-013004-002	Drive Nut
13D-013008-002	Electrical Cover Gasket (NEMA 4)
19A-010802-001	Tube Seal (two per unit)
14A-009919-001	Tube Bearing
61A-010846-001	Tube Scraper
46A-010016-001	Thrust Limit Switch, ac units (two per unit)
46A-010016-003	Thrust Limit Switch, dc units (two per unit)
70A-019948-001	ST-4130, 4 to 20 mA Transmitter
73A-032878-001	Screw Shaft Grease

MULTI-TURN TYPE LIMIT SWITCHES

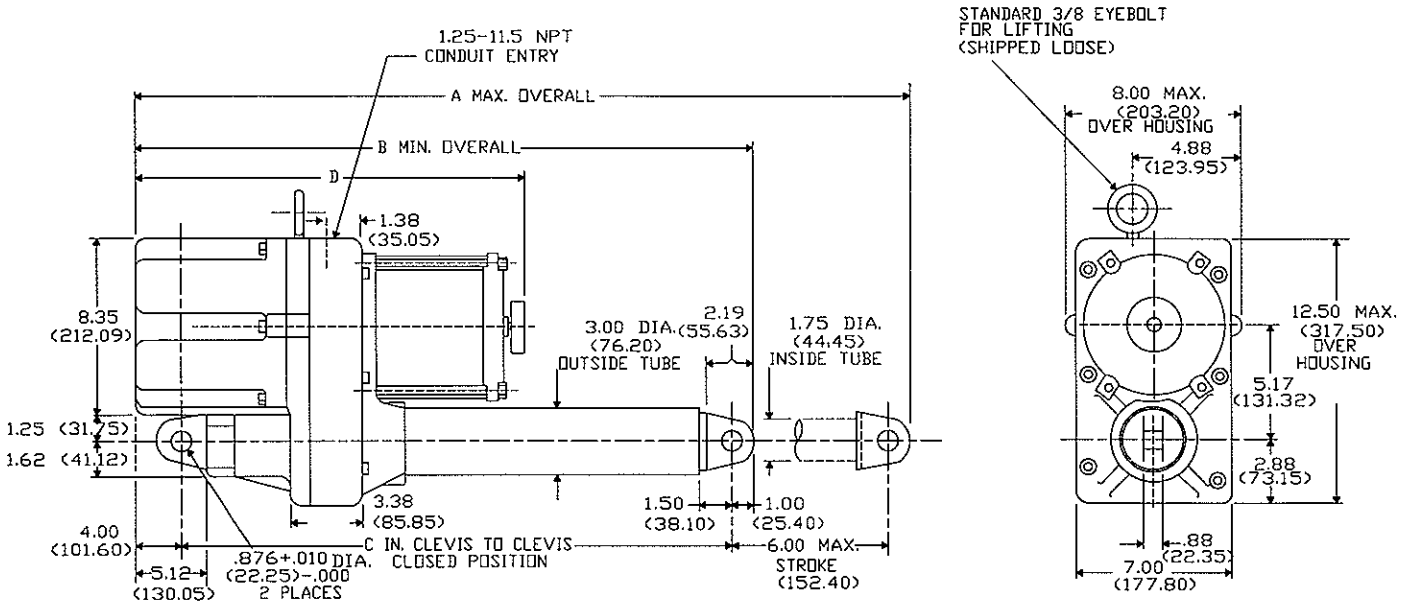
PART NUMBER	DESCRIPTION
65A-013383-001	2nd Stage F.B. Gear Ass'y - 6"
65A-013383-002	2nd Stage F.B. Gear Ass'y - 12"
65A-013383-003	2nd Stage F.B. Gear Ass'y - 18"
65A-013383-004	2nd Stage F.B. Gear Ass'y - 24"
16B-003803-077	Limit Switch Gear - 6"
16B-003803-065	Limit Switch Gear - 12"
16B-003803-066	Limit Switch Gear - 18"
16B-003803-072	Limit Switch Gear - 24"
46B-004053-400	Position Limit Switch, SPDT
46B-004053-419	Position Limit Switch, DPDT
34B-100033-001	1K Potentiometer
34B-100033-007	1K/1K Potentiometer

CAM TYPE LIMIT SWITCHES

PART NUMBER	DESCRIPTION
65A-016154-002	2nd Stage Fdbk Gear Ass'y - 6"
65A-016154-001	2nd Stage Fdbk Gear Ass'y - 12"
65A-017033-001	2nd Stage Fdbk Gear Ass'y - 18"
16B-017634-001	Limit Switch Gear - 6"
16A-016152-001	Limit Switch Gear - 12"
16A-016134-001	Limit Switch Gear - 18"
68B-021608-001	Position Limit Switch Ass'y, ac units
68B-021608-002	Position Limit Switch Ass'y, dc units
68B-021608-003	Position Limit Switch Ass'y, DPDT
34B-033104-001	1K Potentiometer
34B-003956-160	1K/1K Potentiometer

*Part numbers listed are for standard LA-2800s at the time of publishing. The model number and serial number of your unit should be given to our Parts Department when ordering spare parts. Part numbers are subject to change without notice.

INSTALLATION DIMENSIONS



STROKE LENGTH	ACME SCREW			BALL SCREW			D	Weight approx. 90 lbs.
	A	B	C	A	B	C		
6 In.(152.4)	31.50(800.1)	25.50(647.7)	20.50(520.7)	33.62(853.9)	27.62(701.6)	22.62(574.5)		
12 In.(304.8)	43.50(1104.9)	31.50(800.1)	26.50(673.1)	45.62(1158.7)	33.62(853.9)	28.62(726.9)		
18 In.(457.2)	55.50(1409.7)	37.50(952.5)	32.50(825.5)	58.62(1488.9)	40.62(1031.7)	35.62(904.7)	LA-2810	19.69 (500.1)
24 In.(609.6)	68.50(1739.9)	44.50(1130.3)	39.50(1003.3)	71.62(1819.1)	47.62(1209.5)	42.62(1082.5)	LA-2820	20.50 (520.7)

NOTE: ALL DIMENSIONS IN PARENTHESIS () ARE IN MILLIMETERS

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IM-0476 10/93
 Supersedes IM-0476 2/79

Jordan Controls reserves the right to institute changes in design, materials, or specifications without notice in keeping with our policy of continued product improvement.

