

# ***AD-7830 Servo Amplifier***

## **Table of Contents**

General Information .....	2
Introduction .....	2
Receiving/Inspection .....	2
Storage .....	2
Equipment Return .....	2
Abbreviations Used in This Manual .....	2
General Description .....	3
Actuator Compatability .....	3
Basic Models .....	3
Specifications .....	3
Installation Wiring .....	3
Set-up and Calibration .....	4-5
Component Location .....	6
Troubleshooting Guide .....	7
Typical Wiring Diagrams .....	8
Major Dimensions .....	9-10

*Due to wide variations in the terminal numbering of actuator products, actual wiring of this device should follow the print supplied with the unit.*

# AD-7830 Servo Amplifier

## INTRODUCTION

Jordan Controls, Inc., designs, manufactures, and tests its products to meet many national and international standards. For these products to operate within their normal specifications, they must be properly installed and maintained. The following instructions must be followed 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 personnel in the proper installation, operation, and maintenance of the product.

Install equipment as specified in Jordan Controls installation instructions and per applicable local and national codes. Connect all products to the proper electrical sources.

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. Substitutions may result in fire, electrical shock, other hazards, or improper equipment operation, and will void product warranty.

Keep all product protective covers in place (except when installing, or when maintenance is being performed by qualified personnel), to prevent electrical shock, personal injury, or damage to the actuator.

## WARNING - SHOCK HAZARD

Installation and servicing must be performed only by qualified personnel.

## WARNING - ELECTROSTATIC DISCHARGE

This electronic control is static-sensitive. To protect the internal components from damage, never touch the printed circuit cards without using electrostatic discharge (ESD) control procedures.

## RECEIVING/INSPECTION

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.

Unpack the product and information packet—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 product is not installed immediately, it should be stored in a clean, dry, non-corrosive environment.

## EQUIPMENT RETURN

**A Returned Goods authorization (RG) number** is required to return any equipment for repair. This must be obtained from Jordan Controls (414/461-9200). The equipment must be shipped, freight prepaid, to the following address after the RG 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:

RG Number on outside of box  
Your Company Name, Contact Person, Phone, Fax  
Address  
Repair Purchase Order Number  
Brief description of the problem

## ABBREVIATIONS USED IN THIS MANUAL

AC	Alternating Current
DC	Direct Current
DIP	Dual Inline Package (switch)
Hz	Hertz
LED	Light Emitting Diode
LOS	Loss of Signal
mA	Milliamp
NC	No Connection
RG	Return of Goods
Vac	Volts ac
Vdc	Volts dc

## GENERAL DESCRIPTION

The AD-7830 servo amplifier is a full-featured device that provides high performance actuator operation when matched with a Jordan Controls dc actuator. Standard features include: selectable command signal inputs, speed control, over current protection, undervoltage protection, short circuit protection, overtemperature protection, a 2 wire, loop powered, 4 - 20mA actuator position output signal, and loss of current command signal features. The amplifier is powered from 120/240 Vac, 50/60 Hz, single phase power supply.

## ACTUATOR COMPATABILITY

The AD-7830 servo amplifier can be mounted integral to all Jordan Controls SM/LA-5000 Series 90 and 180 Vdc motor power actuators, or installed remotely for all other 90 and 180 Vdc motor power actuators.

## BASIC MODELS

**AD-7830:** 120/240 Vac, single phase, 50/60 Hz input power for integral actuator mounting.

**AD-7830-P:** Same as above, designed for remote mounting.

**AD-7830-R73:** Same as AD-7830, but designed for remote mounting as a retrofit to the obsolete AD-7300 servo amplifier.

## SPECIFICATIONS

**Voltage Input:** 120 or 240 Vac +/- 10% (switch selectable), 50/60 Hz, 1-phase. Note: Voltage must be 240 Vac when controlling actuators with 180 Vdc nameplates.

**Current Input:** 15 amps maximum continuous; up to 20 amps for brief periods during actuator movement.

**Voltage output:** Up to 180 Vdc. Factory set (jumper) for the specific actuator to be controlled. This setting is either for 90 or 180 Vdc model actuators.

**Current output:** Up to 20 amps for brief periods during actuator movement.

**Command signal input:** Field selectable 4 - 20mA current command into a 200 ohm impedance. 0 to 5, 0 to 10 Vdc or optionally using EC-10844 for -10 to +10 Vdc command into a 100k ohm impedance.

**Position feedback signal:** 1000 ohm potentiometer or 4 - 20 mA, switch selectable. 4 to 20 mA feedback is normally used for remote amplifier installations.

**Other inputs:** Position limit switches (2) and torque or thrust limit switches (2) from actuator. Auto/Manual switch with increase and decrease capability.

**Note:** When using external Auto/Manual switch, DIP SWITCH SW1-4 must be set for manual operation on amplifier.

**Position output signal:** Loop powered, 2 wire, 4 - 20 mA signal.

**Other visual outputs:** LED's for loss of current command signal (1), actuator driving direction (2) and null (1).

**Approximate Weights:** AD-7830-P or R73P: 10 lbs.  
AD-7830-E or R73E: 35 lbs.

## INSTALLATION WIRING

Most installations locate the servo amplifier inside a Jordan Controls actuator, for ease of mounting and to protect the amplifier. This is the preferred mounting arrangement. For remote mounting, the servo amplifier and actuator should be as close to each other as possible. For distances exceeding 50 feet, consult Jordan Controls.

Ensure all connections are correct and tight before applying power. Power, command signal, feedback signal and motor output are the minimum required connections.

- All wiring should be done in accordance with prevailing codes by qualified personnel.
- A typical wiring diagram is shown on page 8 .  
***Due to wide variations in terminal numbering of various actuator products, actual wiring should follow the print supplied with the actuator.***
- Fusing must be installed in line power, and should be of the slow blow type.
- After installation, all conduits **must** be sealed to prevent water damage and to maintain enclosure integrity.
- All low level signal wiring must be shielded type with the shield grounded at source common.

## SET-UP & CALIBRATION

(See Dip Switch Table on page 5 and component locations on page 6 for reference)

When placing the amplifier and actuator into service, the amplifier must be calibrated for the application. The servo amplifier is supplied factory calibrated when ordered with a Jordan Controls actuator and should require only minor adjustment.

*Read and follow the instructions carefully before attempting to make adjustments to the servo amplifier.*

1. Make sure that the 120 or 240 Vac, single phase, line power selector switch is in its proper position (corresponds to the incoming power supply). Improper selection will cause product failure. (Located in blue box labeled SW1)
2. Check connections. **Power should be off and actuator load disconnected for initial set-up.** Check that the amplifier is properly mounted, that all connections to the actuator are in accordance with the correct Jordan Controls wiring diagram, and that the unit is properly grounded in accordance with all prevailing electric codes. Incorrect wiring may cause permanent damage to the servo amplifier and actuator. Verify that the command signal is connected to the proper terminals. Using a voltmeter, confirm that the command signal is present and properly polarized.
3. Verify settings. The DIP SWITCH is located on the servo amplifier. Refer to the dip switch table on page 5. Confirm that the switches are properly set for the intended application. For special applications not listed, consult factory. Incorrect DIP SWITCH settings will prevent proper operation. Again, refer to the wiring diagram supplied with the actuator for correct switch configuration.
4. Insure that the output voltage jumper on TB1 pins is in the correct position to correspond with the actuator nameplate voltage (90 or 180 Vdc). See page 6 for the location of this jumper.
5. Apply input power.
6. Set **ZERO** and **SPAN**. Apply command signal at minimum input value. For 4-20mA systems this would normally be 4mA. Adjust potentiometer ("pot") labeled **ZERO** to move actuator position to correspond with minimum desired position, without actuating the end of travel limit switch. Next apply command signal at maximum input value. For 4-20mA systems this would normally be 20mA. Adjust pot labeled **SPAN** to move actuator position to correspond with maximum desired position, without actuating the end of travel limit switch. Some interaction of the above pot settings will require repeating this procedure until proper accuracy is achieved.
7. **SPEED** adjust pot must be set to limit the output voltage to a maximum of either 90 or 180 Vdc to match actuator nameplate voltage. It may also be adjusted to reduce this voltage output, slowing actuator speed to match system dynamics.  
**WARNING: Do not exceed catalog speed rating.**
8. The **BALANCE** pot is to adjust speed bi-directionally to compensate for driven load dynamics such as overhung and backdriving type applications. The adjustment allows for matching actuator speed in both directions of travel. To adjust, turn the balance pot in one direction or the other until the actuator speed is identical in both directions when under load.
9. Set **DEADBAND** pot. Deadband prevents unstable operation, or "hunting". Counterclockwise rotation of the **DEADBAND** pot will increase the deadband, preventing "hunting". Clockwise rotation of the pot will decrease the deadband, improving accuracy. The correct setting is the point where no "hunting" is observed AND when both the green and yellow LED's go out when the actuator stops.  
**CAUTION:** The deadband must NEVER be adjusted to allow both the yellow and green LED's to be on at the same time. This would result in dangerous motor and amplifier overheating and burnout.
10. Set loop **GAIN** pot. Loop gain is the response and stability of the actuator/amplifier combination. A higher GAIN setting will result in better positioning accuracy, but may cause the actuator to "hunt" or oscillate when in NULL, overheating the amplifier and shortening the actuator life. Clockwise rotation of the **GAIN** pot increases the loop gain. With the amplifier in null (red null LED on and actuator stopped moving after responding to a command signal) adjusts the **GAIN** pot until the actuator JUST BEGINS to become unstable, or "hunts". Then rotate the pot ONE TURN COUNTERCLOCKWISE. After setting loop gain, reset the DEADBAND as described above. It may be necessary to reset the GAIN and DEADBAND until proper loop response is achieved.

11. Loop powered 4-20mA transmitter. This amplifier is equipped with an on-board loop powered transmitter that can transmit the true actuator output shaft position in 4-20mA units. The transmitter requires an external 12-36 Vdc regulated power supply, load resistor, and indicator; available from Jordan Controls at extra charge. After wiring is completed per the wiring diagram shipped with the actuator, adjustment is as follows: Apply a command signal to the actuator at the minimum value. For 4-20mA systems this would normally be 4 mA. After the actuator moves to position and stops, adjust the pot labeled 4mA until the indicator displays 4mA. Then apply a 20mA command signal and wait for the actuator to move and stop. Then adjust the pot labeled 20mA until the indicator displays 20mA. Some interaction of the above pot settings will require repeating this procedure until proper accuracy is achieved. Adjustment is complete.
12. Loss of 4-20mA signal. In the event of a loss of current command signal ("LOS"), the servo amplifier can be programmed to either lock in place or go to a preset position. Referring to the DIP SWITCH TABLE, select one option and position the

DIP SWITCH accordingly. If "move to preset" option is selected, the preset position must be adjusted now.

With the servo amplifier in normal operation, remove the positive command signal wire from the amplifier. The LED labeled LOS lights, indicating a loss of command signal, and the actuator will move to the preset LOS pot setting. Slowly adjust the LOS pot until the actuator shaft is in the position desired when loss of command signal occurs. Reconnect the command signal. Adjustment is complete.

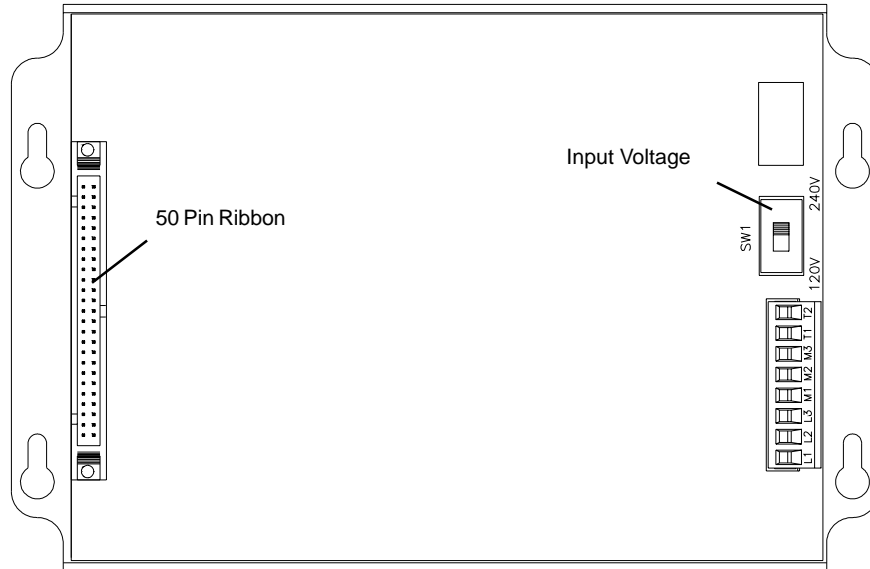
**Note:** With Dip Switch 4 in its manual position, momentary switches S1, S2 and S3 can be used to manually stroke the actuator. Depressing S1 will cause the actuator to move in one direction, and depressing S2 will cause the actuator to move in the opposite direction. The end of travel limit switches in the actuator will protect against overtravel in either direction.

With Dip Switch 4 in its manual or automatic position, depressing S3 will immediately stop actuator travel.

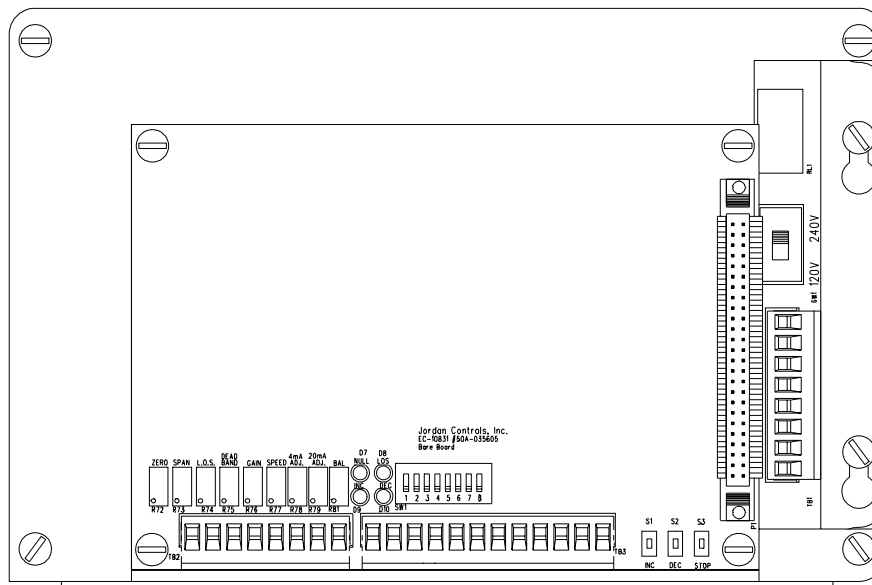
AD-7830 DIP SWITCH TABLE		
Switch	Position	Function
1	On	4-20mA Command Signal
	Off	Not Using 4-20mA Command
2	On	Voltage Command Signal
	Off	Current Command Signal
3	On	Loss of Signal - Park in Place
	Off	Loss of Signal - Go to Set Point
4	On	Auto Operation
	Off	Manual Operation
5	On	0-5 Vdc Command Signal
	Off	0-10 Vdc Command Signal
6	On	4-20mA Remote Feedback
	Off	Pot Feedback
7	On	Not Used
	Off	Not Used
8	On	Not Used
	Off	Not Used

# Component Location

## Amplifier Power Board (Enclosed in Metal Case)



## Customer Interface Board



## Spare Parts List

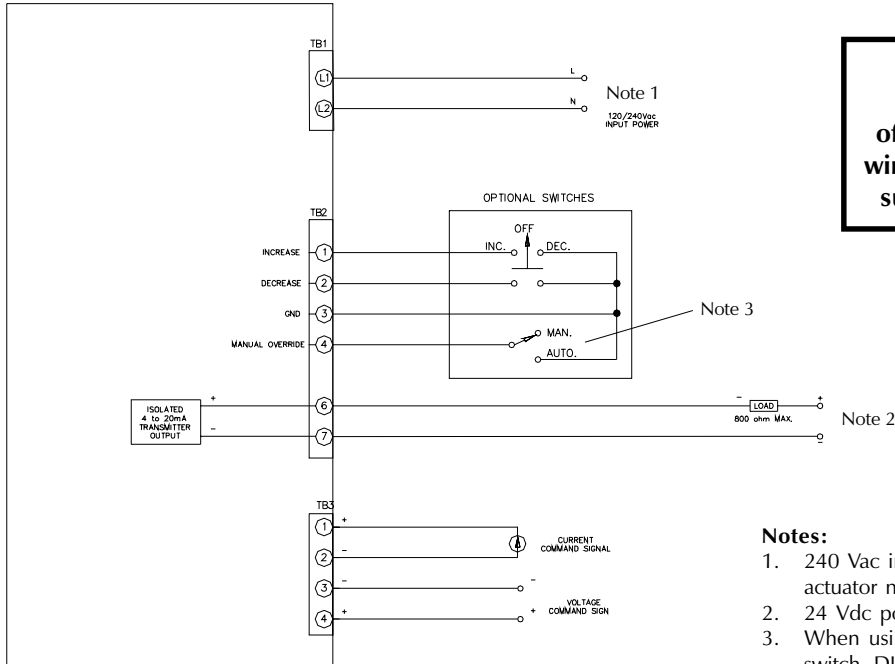
1	(Blue Box) Driver Board	68C-038504-001
2	Interface Board	68C-035606-001
3	Ribbon Cable	25A-035285-002

# Troubleshooting Guide

Trouble	Possible Cause	Remedy
Motor does not operate	a. No power to amplifier	a. Restore power
	b. Amplifier is defective	b. Replace amplifier
	c. Amplifier is in Loss of Signal mode (Red LOS LED is on)	c. Restore command signal
	d. Actuator/amplifier is wired incorrectly	d. Correct per wiring diagram furnished with unit
	e. Amplifier deadband is too wide	e. Reduce deadband setting
	f. Dip Switches not properly set	f. Set Dip Switches per Dip Switch table
Actuator does not go full stroke	a. Zero and span pots not properly adjusted	a. Adjust per set-up and calibration instructions
	b. Actuator position limit switch activated	b. Limit switches must be set to trip just outside of zero and span set points
	c. Dip Switches not properly set	c. Set Dip Switches per Dip Switch Table
	d. Actuator torque or thrust limit switch activated	d. Determine cause for overload and correct
Yellow and Green LEDs stay on around null or at null	a. Deadband is too narrow	a. Increase deadband setting
	b. Command signal is too noisy	b. Command signal wiring must be shielded with shield grounded at source common only
Actuator stroking speed is too fast or too slow for application in one or both directions	a. Speed pot not properly adjusted	a. Adjust speed pot as required but not faster than catalog ratings
	b. Bal pot needs adjustment	b. Adjust Bal pot as required
Amplifier output voltage does not match actuator nameplate voltage	a. Input voltage selector switch not in correct position	a. Correct position as required
	b. 180 Vdc actuators must have 240 Vac input to amplifier	b. Insure proper power supply is available
	c. Amplifier output voltage jumper selector in wrong position	c. Correct jumper position
Actuator does not pull load	a. Mechanical binding in actuator or driven load	a. Repair/replace as needed
	b. Inadequate voltage to actuator	b. Refer to installation wiring and set-up & calibration procedures in this manual
Amplifier burned up at power-up	a. Power connected to wrong terminals	a. Replace amplifier and wire per wiring diagram furnished with equipment.
No 4- 20 mA output	a. Incorrect external wiring.	a. Make sure power supply is in sequence with transmitter.
	b. Incorrect external power supply.	b. Measure power supply output volatage.

# Wiring Diagrams

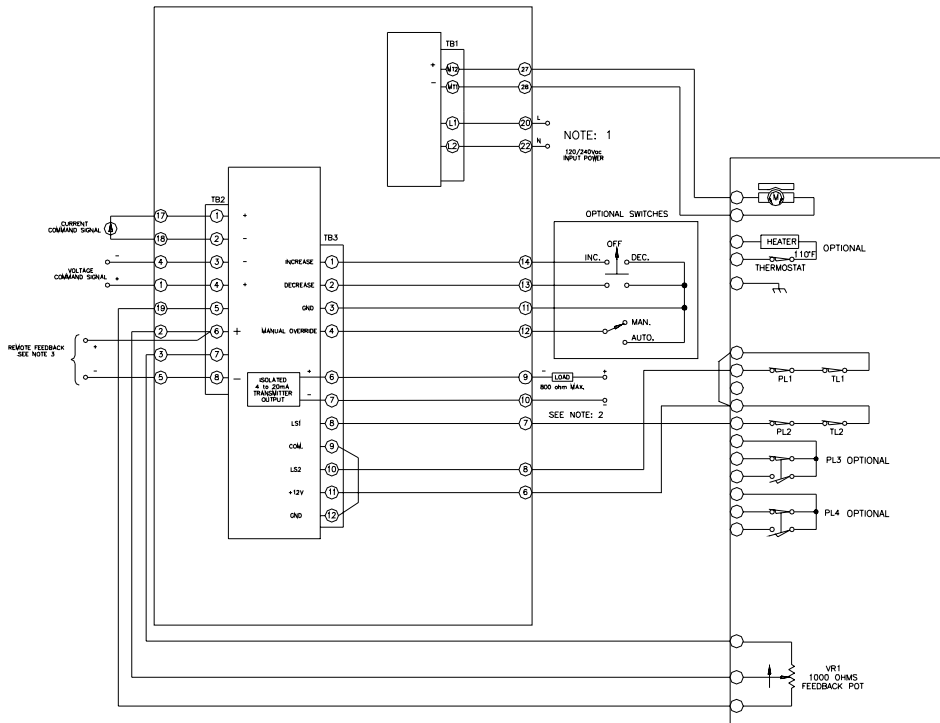
## With AD-7830 Integral to Actuator



**Notes:**

1. 240 Vac input is required where actuator nameplate voltage is 180 Vdc.
2. 24 Vdc power supply is required.
3. When using external Auto/Manual switch, DIP SWITCH SW1-4 must be set for manual operation on amplifier.

## With AD-7830 Remote from Actuator



**Notes:**

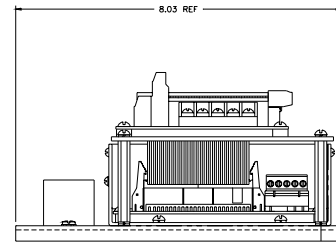
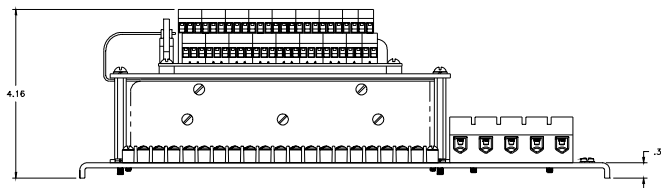
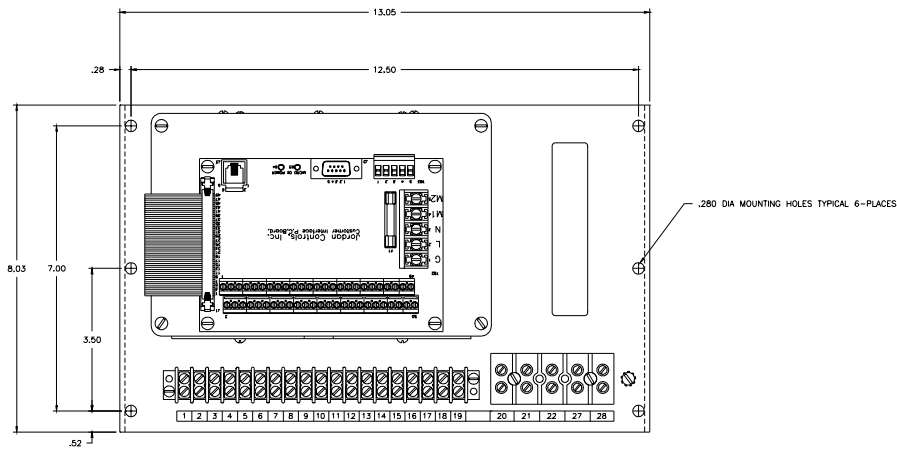
1. 240 Vac input is required where actuator nameplate voltage is 180 Vdc.
2. 24 Vdc power supply is required.
3. VRI potentiometer signal requires conversion to 4-20mA signal at actuator with 24 Vdc loop power when amplifier distance from actuator exceeds 50 feet of wiring.



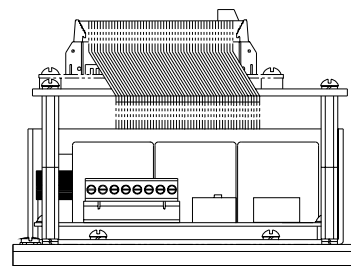
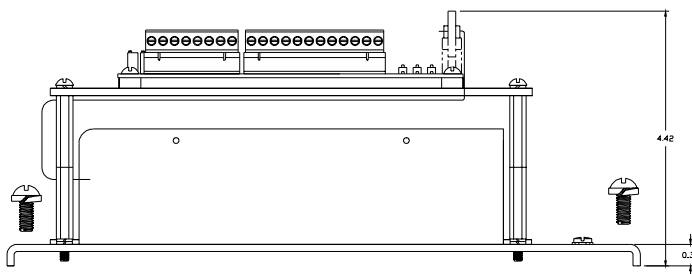
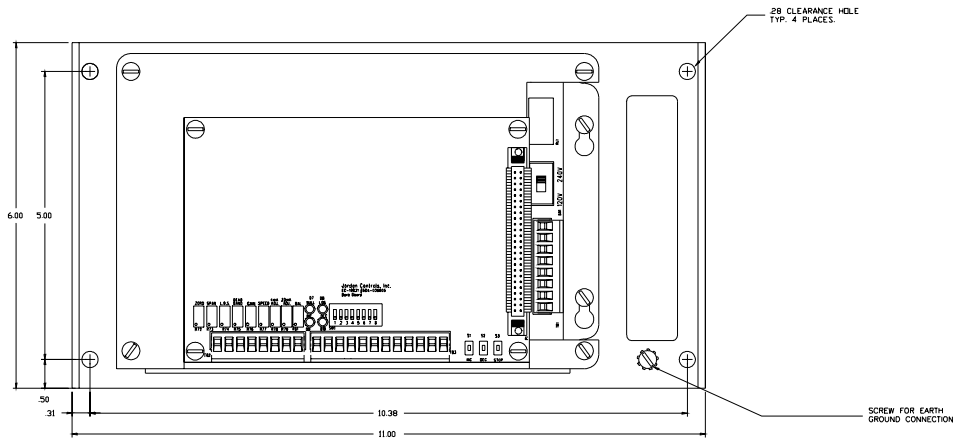
# Major Dimensions

## AD-7830-R73P

### Retro-fit for AD-7300 Series



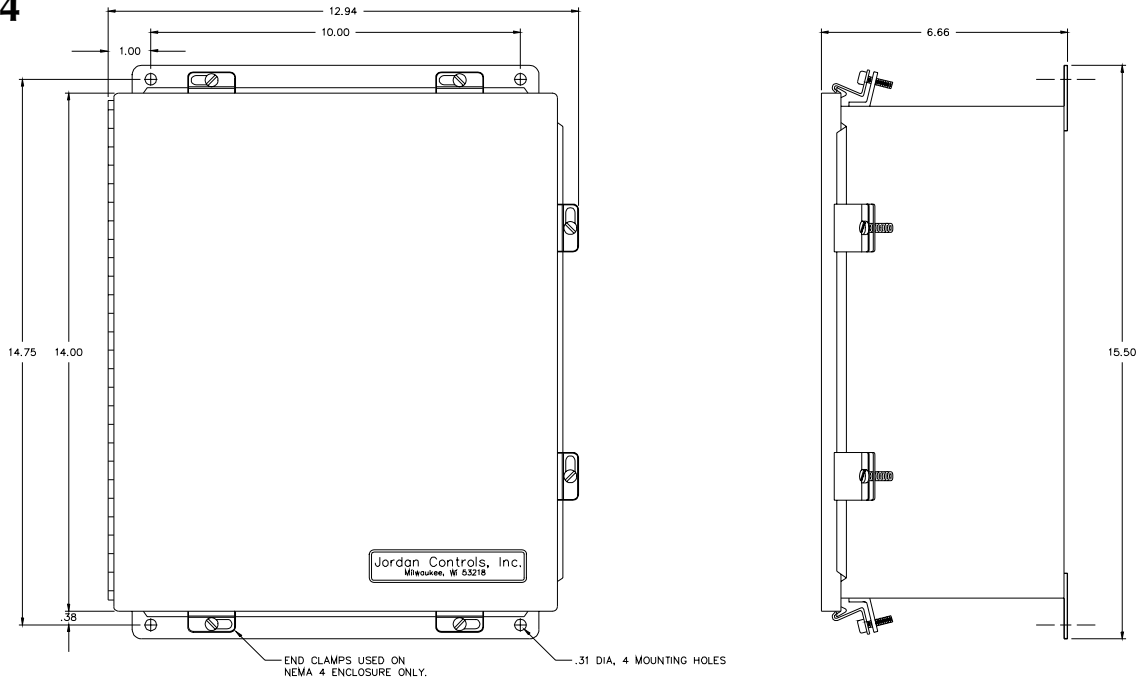
## AD-7830-P - Amplifier Mounted on a Panel



# Major Dimensions (Remote Mount)

## AD-7830-E Installed in remote enclosure

**NEMA 4**



### NOTES:

1. When the AD-7830 series amplifier is remotely located, consult factory when distance to actuator exceeds 50 feet of wire run distance.
2. Shielded wiring is required with the shield grounded at source common for all low level circuits. This includes command & feedback signals and position torque limit switches.

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IM-0606 2/00

These dimensions are subject to change without notice and should not be used for preparation of drawings or fabrication of installation mounting. Current installation dimension drawings are available upon request.

