Honeywell

11280S HercuLine® Smart Actuator

Installation, Operation and Maintenance Manual

Doc. No.: 61-86-25-09

Release: 0

Last Revision Date: 10/01

Notices and Trademarks

Release 0 October 12, 2001

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

CE Conformity

This product conforms with the protection requirements of the following European Council Directive: 89/336/EEC, the EMC directive and 73/23/EEC, the Low Voltage Directive. Conformance of this product with any other “CE Mark” Directive(s) shall not be assumed.

Attention

The emission limits of EN 50081-2 are designed to provide reasonable protection against harmful interference when this equipment is operated in an industrial environment. Operation of this equipment in a residential area may cause harmful interference. This equipment generates, uses, and can radiate radio frequency energy and may cause interference to radio and television reception when the equipment is used closer than 30 m to the antenna(e). In special cases, when highly susceptible apparatus is used in close proximity, the user may have to employ additional mitigating measures to further reduce the electromagnetic emissions of this equipment

Sensing and Control
Honeywell
11 West Spring Street
Freeport, Illinois 61032

About ThisDocument

Abstract

This manual describes the installation, set up, operation, maintenance, and troubleshooting of the 11280S series of variable speed smart actuators.

References

The following list identifies all documents that may be sources of reference for material discussed in this publication.

Document Title	Doc ID
Herculine 11280S Smart Actuator Specification and Model Selection Guide	61-86-03-13
Modbus® RTU Serial Communications User Manual	51-52-25-66
Modbus® RTU Serial Communications User Manual Configuration/Remote Calibration Interfaces for Herculine® Actuators	51-52-25-103

Contacts

World Wide Web

The following lists Honeywell's World Wide Web sites that will be of interest to our customers.

Honeywell Organization	WWW Address (URL)
Corporate	*http://www.honeywell.com*
Sensing and Control	*http://www.honeywell.com/sensing*
International	*http://www.honeywell.com/Business/global.asp*

Telephone

Contact us by telephone at the numbers listed below.

	Organization	Phone Number	
United States and Canada	Honeywell	1-800-423-9883 1-888-423-9883 1-800-525-7439	Tech. Support Q&A Faxback (TACFAQS) Service
Asia Pacific	Honeywell Asia Pacific Hong Kong	(852) 2829-8298	
Europe	Honeywell PACE, Brussels, Belgium	[32-2] 728-2111	
Latin America	Honeywell, Sunrise, Florida U.S.A.	(954) 845-2600	

Symbol Definitions

The following table lists those symbols used on the product and in this document to denote certain conditions.

Symbol	Definition
	This CAUTION symbol on the equipment refers you to the Product Manual for additional information. This symbol appears next to required information in the manual.
	**WARNING** **PERSONAL INJURY:** Risk of electrical shock. This symbol warns you of a potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 Vdc may be accessible. **Failure to comply with these instructions could result in death or serious injury.**
	ATTENTION, Electrostatic Discharge (ESD) hazards. Observe precautions for handling electrostatic sensitive devices
	Protective Earth (PE) terminal. Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	Functional earth terminal. Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to protective earth at the source of supply in accordance with national local electrical code requirements.
	Earth Ground. Functional earth connection. NOTE: This connection shall be bonded to Protective earth at the source of supply in accordance with national and local electrical code requirements.
	Chassis Ground. Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.

Contents

Tables

Figures

1. Introduction

Product Description

Honeywell's 11280S industrially-rated rotary control actuators are precision engineered for exceptional reliability, accurate positioning, and low maintenance. Designed for very precise positioning of dampers, vanes, and quarter-turn valves, the 11280S actuators perform especially well in continuous-duty applications in extremely demanding environments.

Precise positioning of the actuator is achieved through state-of-the-art motor control and positioning electronics. The motor starts and stops instantaneously, preventing overshoot and hunting. Positioning accuracy of 0.2 % span or better is achievable for extremely tight process control to take full advantage of modern controllers.

A continuous duty, inverter rated motor is combined with a heavy-duty precision machined output worm gear mesh providing a responsive, low maintenance, and non-backdriving actuator. End-of-travel limit switches are provided as standard to prevent damage to the valve or damper.

Honeywell electric actuators provide instantaneous response to a demand signal, eliminating system non-linearity due to dead time. Additionally, since the actuator is electric, the costs associated with providing and maintaining a clean, dry air supply are eliminated.

A Heavy duty cast crank arm and precision rod-end bearing is provided with each 11280S actuator. Crank arms have an adjustable radius to provide flexibility in linkage set-up.

All 11280S actuators are equipped with a manual handwheel for operation during loss of power or installation. A local auto/manual electric handswitch can be provided for local operation and has an “out of auto” contact to annunciate that condition.

Applications

Honeywell actuators have a long and respected history in the industrial actuator market. 11280S actuators are designed for precision modulation of final control devices such as dampers and vanes, in applications such as induced draft, forced draft, burner tilt, fluid couplings, scoop tubes, and coal mill dampers. The robustness of the design serves as the basis for long-term reliability and reduced operating costs.

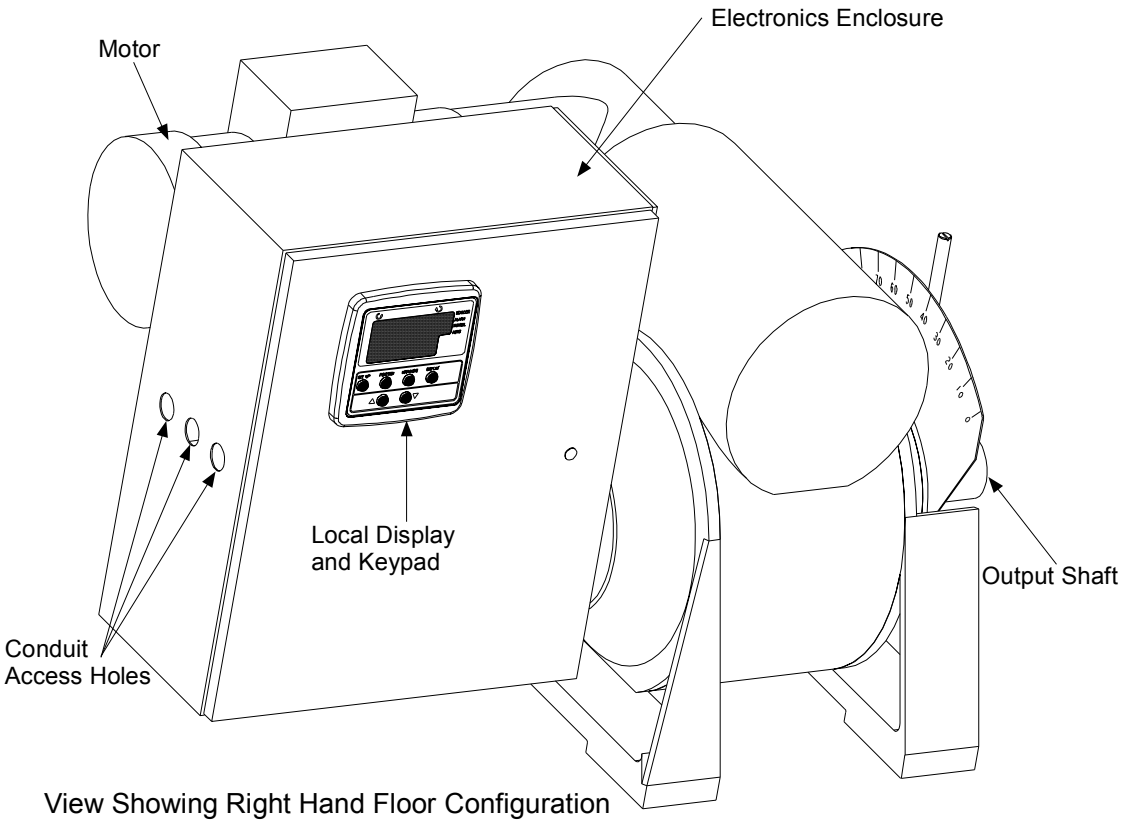


Figure 1 11280S Smart Actuator

Features

Non-contact Position Sensing (NCS) with True Shaft Position Indication

Non-contact position sensing eliminates maintenance problems and nuisance shutdowns that are common with slidewire or potentiometer position sensing. The non-contact position sensor replaces the slidewire and wiper assembly for position sensing.

The non-contact position sensing assembly consists of a position sensor (PWA and metal spoiler) and a bracket as shown in Figure 2. The position sensor "spoiler" is connected directly to the output shaft, reflecting true shaft position. As the output shaft rotates, the sensor "spoiler" rotates and the sensing circuit board detects the change in position. Sensing is accomplished by the changing magnetic field created by the spoiler moving over the coils in the sensing circuit board. There is no contact between circuit board and spoilers.

Once calibrated, the non-contacting position sensor requires no maintenance.

Slidewire Emulation

The slidewire emulation assembly consists of a non-contact position sensor and a bracket as shown in Figure 2. The position sensor is identical to that described previously in the non-contact position-sensing feature.

A potentiometric voltage from the controller is supplied to the slidewire emulation circuit. This voltage is ratiometrically conditioned with respect to the output shaft position from 0 to 100% and is available to the controller. Voltages of 1 to 20 Vdc are accepted and this device will emulate 100 to 1000 ohm slidewires.

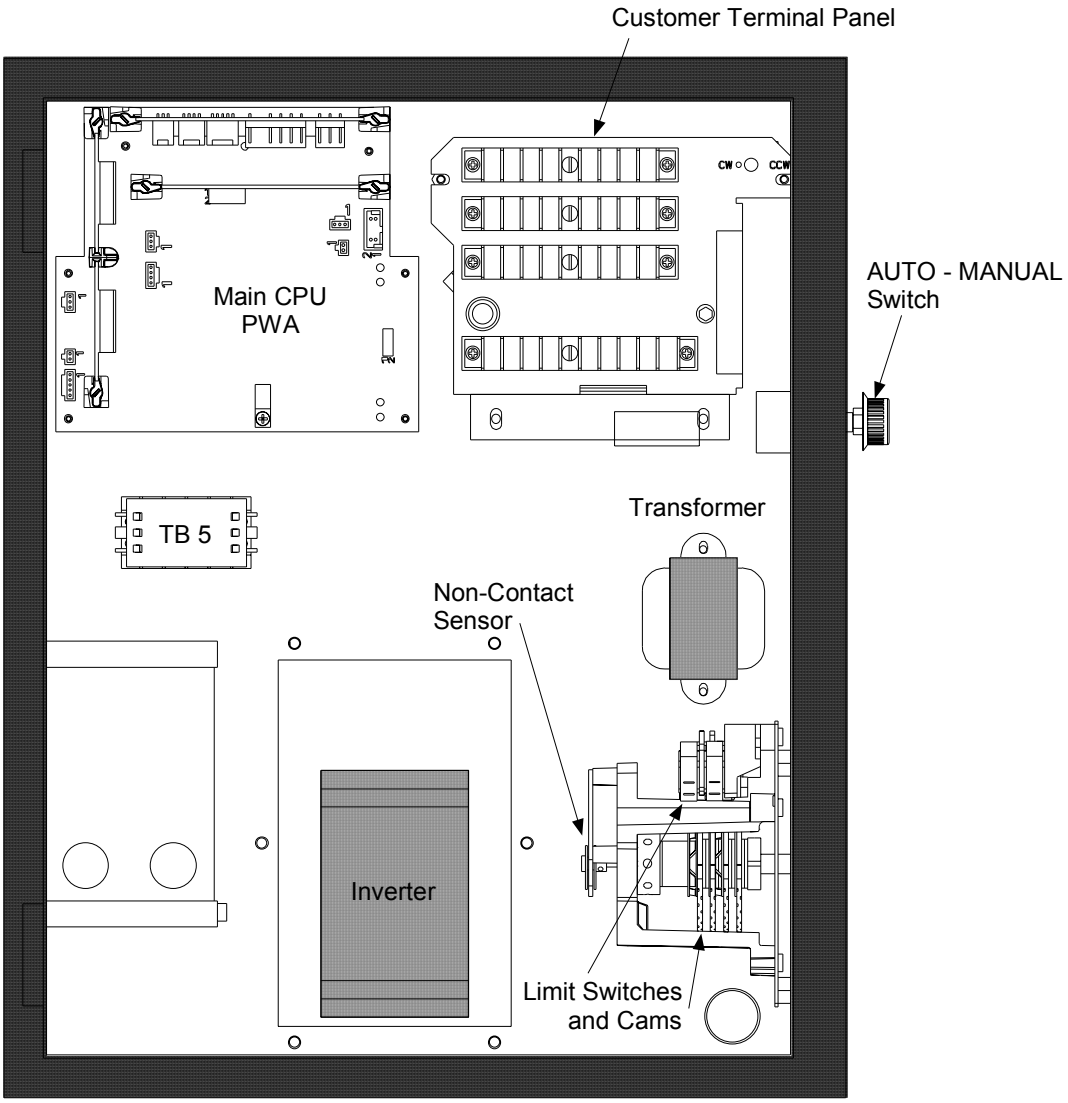


Figure 2 11280S Electronics Enclosure Internal View

11280S Smart Electronics

Enhanced Electronics Printed Wiring Assembly (Main PWA)

An enhanced electronics printed wiring assembly (PWA) provides digital control to the 11280S actuator. The Main PWA is the central interface which features a microprocessor controlled CPU with associated flash PROM and RAM. Other features of the main PWA include an optically isolated 12-bit A/D converter for the 4 to 20 mA input signal, an isolated analog output for 4 to 20 mA output or slidewire emulation voltage, and an RS485 communications channel that supports Modbus RTU protocol.

Additionally, the main PWA interfaces with:

- The local display and keypad electronics
- The local AUTO - MANUAL switch
- Digital input circuit
- Relay output PWAs
- Smart communications PWAs

Power Distribution PWA

The power distribution PWA provides power distribution of the AC input to all actuator components. Solid state switches on the PWA provide control for the motor drive. The power distribution PWA is directly connected to the enhanced electronics PWA in the actuator enclosure.

Relay PWA

Electromechanical relay circuit assemblies are available as an option. The 11280S actuator can be equipped with up to two relay boards, each containing two SPDT relay output circuits (for a total of four). Relay contacts can be programmed (set up) to indicate various operating conditions within the actuator, such as position range limits, deviation from input, high or low temperature limits, or input out of range. See *Relay Set Up Group* in Section 4 for additional information.

Display and Keypad Interface

An alphanumeric display and keypad provides the HMI for local monitoring, set up and control of the actuator. The interface consists of a four character and six character alphanumeric display, LED status indicators and keys to access all operating parameter settings and view actuator operating status.

Auto - Manual Switch

The Auto-Manual electric handswitch with auxiliary contacts indicating an "Out-of-Auto" position is available for local electric control. The switch provides manual control of the motor drive for actuator set up and calibration.

Torque Limits

Torque limits may be used to prevent damage to the actuator or externally connected apparatus. These limits may be entered or changed at any time. This permits the torque limits to be adjusted based on the application or changing conditions.

Stall Annunciators

Drive stall fault conditions may be detected and annunciated by the electronics in order to prevent damage to the drive and alarm the user concerning a possible hazardous condition in external apparatus.

Inverter

The inverter is a microprocessor-controlled adjustable frequency drive designed for reliable control of three-phase induction motors.

The drive produces a three-phase, pulse width modulated, adjustable frequency output to vary the motor speed. Drive output voltage is a function of output frequency and is adjustable to meet motor parameters so that optimum motor performance can be achieved.

Self-Locking/Releasing Gear Train

The double reduction worm gear output combination is self-locking and self-releasing and maintains position upon loss of power. This design will not backdrive (overhaul) and provides superior reliability without the maintenance associated with other self-locking and brake mechanisms.

Motor

The continuous duty, inverter rated motor is power matched for use with the inverter and is energy efficient and optimized for variable speed operation and include premium grade insulation system result in low maintenance, high reliability, and long life.

Manual Operation

A manual handwheel is provided for positioning of the actuator during power outages or initial installation. The design of the handwheel allows for positioning of the actuator safely under full load conditions.

Field Reversible

As factory shipped, the actuator is set for counter-clockwise rotation. The actuator can be set for clockwise rotation using the local keypad and display.

Customer Connections

The 11280S features dedicated wiring terminals for ease of installation. See *Customer Connections* and *Field Wiring Connections* for specific details.

Warranty Period

The 11280S actuator warranty is effective for 18 months from the date of shipment, unless otherwise noted. See full warranty statement for details.

Honeywell Linkage Kits

Honeywell pipe linkage kits are available and are recommended to provide optimal positioning performance. The rod-end bearing connections eliminate all linkage hysterisis giving accurate and repeatable positioning of the final control element. Section 8 in this manual provides listings of available linkage parts and kits.

HAL Software Application

Honeywell has designed a linkage analysis program (HAL) that is used to design linkage set-up for your particular application. HAL is a Windows-based software program that aids you in selecting the correct size Honeywell actuator, determine the start angles, linkage length and crank length, and characterize torque profiles for dampers and valves. See your Honeywell sales representative for further information.

2. Specifications

This section provides you with the technical specifications and the model selection guide for the 11280S Series Smart Actuators.

Technical and Operating Specifications

Table 1 Specifications - General

Physical							
Weight	136 kg to 224 kg (300 lb to 600 lb)—See Table below for more information.						
Enclosure	Precision-machined ductile iron with corrosion resistant paint						
Gear Train	Precision-machined double reduction worm gear						
Operating Temperature	–30 °C to +65 °C (–20 °F to +150 °F) except Model 11287S which has a range of: –20 °C to +65 °C (–4 °F to +150 °F)						
Storage Temperature	-40 °C to +93 °C (-40°F to +200 °F)						
Relative Humidity	0-99% R.H. noncondensing, over the full operating temperature range.						
Crank Arm	Adjustable radii (8” to 14”) crank arm is standard.						
Rotation	Factory set to 90 degrees, for 0% and 100% travel						
Direction of Rotation	Field programmable via local display and keypad.						
Manual Handwheel	Provides a means of positioning the actuator in the event of a power failure or set-up.						
Lubrication	Mobil Synthetic bearing and gear lubricant SHC 634 (ISO 460) or equivalent						
Model #	**Torque lb-ft/(N_M)**	**Output Shaft Size**	**Shaft Key Size**	**Output Shaft Length**	**Maximum Overhang Load**	**Handwheel Diameter**	**Net Weight**
11284S	425/575	2" (51 mm)	1/2" 13 mm)	5" (127 mm)	3700 lb. (1678 kg)	18" (457 mm)	300 lb. (136 kg)
11285S	840/1150	2" (51 mm)	1/2" (13 mm)	5" (127 mm)	3700 lb. (1678 kg)	18" (457 mm)	300 lb. (136 kg)
11286S	1500/2025	2" (51 mm)	1/2" (13 mm)	5" (127 mm)	3700 lb. (1678 kg)	18" (457 mm)	300 lb. (136 kg)
11288S	2500/3400	2-1/2" (64 mm)	5/8" (16 mm)	6" (152 mm)	7500 lb. (3402 kg)	18" (457 mm)	550 lb. (249 kg)
11289S	4000/5425	2-1/2" (64 mm)	5/8" (16 mm)	6" (152 mm)	7500 lb. (3402 kg)	18" (457 mm)	600 lb. (272 kg)
11287S	5500/7450	2-1/2" (64 mm)	5/8" (16 mm)	6" (152 mm)	7500 lb. (3402 kg)	18" (457 mm)	600 lb. (272 kg)

Specifications continued on next page ⇒

Electrical			
Mains Supply	115/220 Vac, single phase 50/60 Hz up to 1500 lb-ft 208/200 – 240/380 – 480/575 Vac, three phase 50/60 Hz		
Motor	Inverter rated, 3 phase, continuous duty, C face mounting		
Motor Current	**Motor Size**	**Full Load Amps**	
	(Horsepower)	**@ 230 Vac**	**@ 460 Vac**
	½ ¾ 1 1 ½ 2 3	1.6 2.2 2.6 4.4 5.6 7.8	0.8 1.1 1.3 2.2 2.8 3.9
Loss of Power	Stays in place		
Local Auto - Manual Switch	Allows local manual and automatic operation of the actuator		
Limit Switches	Standard - Two SPDT end-of-travel limits rated 10 A at 125 Vac, 5 A at 250 Vac.		
Auxiliary Switches/Relays	Optional – Up to 2 additional SPDT switches (or 4 relay outputs, programmable)		
Installation Category *(Overvoltage Category)*	Category II: Energy-consuming equipment supplied from the fixed installation. Local level appliances, and industrial control equipment. (EN 61010-1)		
Pollution Degree	Pollution degree 2: Normally non-conductive pollution with occasional conductivity caused by condensation. (ref. IEC 664-1)		

Specifications - Actuator with Digital Electronics

Electrical		
Input Signals	**Analog**: 0/4 to 20 mA (With supplied 250 ohm shunt resistor for current range) 0/1 to 5 Vdc 0 to 10 Vdc **Digital**: Remote Setpoint via Modbus RTU RS485	
Input Impedance	**Input** 0/4 to 20 mA 1 to 5 Vdc	**Input Impedance** 250 ohms 10 M ohms
Input Characterization	Provides characterization of the input signal. Selections are: Linear, Square Root and Custom.	
Sensitivity	0.2% to 5% of 90° span, proportional to deadband	
Hysteresis	Less than 0.4% of full scale.	
Deadband	0.2% to 5.0% of 90° span, adjustable. Shipped at 0.5% span.	
Repeatability	0.2% of 90° span	
Voltage/ Supply Stability	0.25% of span with +10/-15% voltage change	
Temperature Coefficient	Less than ±0.030% of span per degree C for 0 to 50 °C Less than ±0.05% of span per degree C for –30 to 65 °C	
Zero Suppression	90% of span	
Input Filters	Selectable spike and low pass filters.	
Solid State Motor Control	CW/CCW open collectors (opto-isolators) for use as discrete control inputs to the inverter for motor operation.	
Failsafe Operation	If input signal exceeds configured input range. Selectable and adjustable.	
Feedback Signals	0 to 20 mA, 4 to 20 mA 0 to 5 Vdc, 1 to 5 Vdc with 250 ohm resistor; (0 to 16 Vdc with 800 ohm resistor)	
Slidewire Emulation	Provides output voltage ratiometric to shaft position and potentiometric to supply voltage (1-20 Vdc) without a slidewire. Emulates a 100 to 1000 ohm slidewire. 10 mA output maximum	
Digital Input	Contact closure: 5 Vdc provided by actuator.	
Power Isolation	Input signal, output signal and power are isolated from each other.	
Load Requirement (4-20)	Current Out, 0 to 1000 Ω	
Diagnostics	Self-test diagnostics of RAM, SEE memory, Configuration and Calibration at power up. Operation statistics recorded for predictive maintenance. See Maintenance Set Up Group.	

Specifications – Local Display and Keypad

Display	
Display Design	Multi-segment LED displays that provide up to ten alphanumeric characters. Display arrangement consists of two rows: 1st row (Upper display) – four characters 2nd row (Lower display) – six characters.
LED indicators	Six single LEDs provide actuator status and alarm indications.
Display Operating Temperature	-30 °C to +50 °C (-20 °F to +122 °F) Automatically shuts off when operating temperature exceeds +50 °C. NOTE: At high temperatures, pressing the DISPLAY or SETUP keys will turn on the display. The display will remain on and then shut off again after 4 minutes if no keypad activity is detected and the temperature is still above +47° C.
Storage Temperature	-40 °C to +93 °C (-40 °F to +200 °F)
Keypad	
Keys	Six single pushbutton keys allow access to all status displays and set up group parameters.

See Section 4 – *Set Up and Calibration Procedures* for detailed information on display and keypad functions.

Specifications – Communications

Display	
Communications Option	RS 485 Serial Communication, Modbus RTU Protocol
Connection	Twisted pair cable with shield
Maximum loop length	600 meters (2000 feet)
Communication Mode	Half duplex
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19.2K

Model Selection Guide

The following 11280S Smart Actuator models are covered in this manual. You can verify the model description of your actuator by comparing the model number stamped on the top cover identification plate with the following tables in this model selection guide.

HercuLine® 11280S
Smart Actuator

Instructions

- Select the desired key number. The arrow to the right marks the selection available.
- Make the desired selections from Tables I thru VIII using the column below the arrow. A dot (•) denotes unrestricted availability.

Key Number	I	II	III	IV	V	VI	VII	VIII	IX
_ _ _ _ _ _ _	- _	- _	- _ _	- _ _ _	- _ _ _	- _	- _	- _ _ _ _ _ _	- _ _

KEY NUMBER - Electronics

Output Torque (lb. - ft.)	(N - M)		Selection	Availability	
425	(575)	**(Note 1)**	011284S	↓	
850	(1150)	**(Note 1)**	011285S	↓	
1500	(2025)		011286S	↓	
2500	(3400)		011288S	↓	
4000	(5425)		011289S	↓	
5500	(7450)		011287S		↓

TABLE I - POWER SUPPLY

Single Phase	120 Vac, 50/ 60 Hz	1	a	
	240 Vac, 60 Hz / 200 Vac, 50 Hz	2	a	
Three Phase	200 - 240 Vac, 60 Hz	4	•	•
	380 - 480 Vac, 50-/60 Hz	5	•	•
	575 Vac, 60 Hz	6	•	•

TABLE II - STROKE SPEED

Stroke Speed @ 60 Hz	10 sec/90 degrees	1	•	
	30 sec/90 degrees	2	•	•
	60 sec/90 degrees	3	•	•

TABLE III - MOTOR ORIENTATION (See specification 61-86-03-13 for diagrams)

Motor Orientation	Right-hand floor configuration, H.W. Shaft Horizontal	01	•	•
	Left-hand floor configuration, H.W. Shaft Horizontal	03	•	•

TABLE IV - ANALOG INPUT/OUTPUT SIGNALS

Input	4-20 mA, 0-20mA (1-5 Vdc, 0-5 Vdc, 1-10 Vdc, 0-10Vdc)	0 _ _	•	•
Output	No Analog Position Output	_ 00	•	•
	4-20 mA, 0-20mA (1-5 Vdc, 0-5 Vdc, 1-10 Vdc, 0-10Vdc)	_ 20	•	•
	Slidewire Emulation **(Note 2)**	_ 40	•	•

			01128_ _	4S 5S 6S 8S	
TABLE V - SWITCH AND RELAY OUTPUTS (2 mech end-of-travel limits standard)			**Selection**	**9S**	**7S**
Auxiliary Switches and	None		00 _	•	•
	2 Aux. SPDT Switches		20 _	•	•
	2 Aux. + 2 Programmable Relay Outputs		22 _	•	•
	2 Programmable Relay Outputs		02 _	•	•
	4 Programmable Relay Outputs		04 _	•	•
Auto/Manual Switch	None		_ _0	•	•
	One Auto/Manual Switch with Out-of-Auto Contact		_ _1	•	•
TABLE VI - CONFIGURATION INTERFACE					
Remote	None		0		
Local	Integrally mounted local display/keypad interface		1	•	•
TABLE VII - COMMUNICATIONS/PROTOCOL					
Modbus RTU RS485	RS-485 Modbus compliant - standard with EEU		0	•	•
Additional Communications	Future		1		
TABLE VIII - OPTIONS					
Crank Arm	Adjustable 8" to 14" Radii - Standard		0_ _ _ _ _	•	•
	None		1_ _ _ _ _	•	•
Linkage Kit	None		_0_ _ _ _	•	•
	Up to 20 ft. length - customer supplies schedule 40 pipe		_1_ _ _ _	•	•
Future Option	None		_ _0_ _ _	•	•
Future Option	None		_ _ _0_ _	•	•
Tagging	None		_ _ _ _0_	•	•
	Linen	**(Note 3)**	_ _ _ _1_	•	•
	Stainless Steel	**(Note 3)**	_ _ _ _2_	•	•
Future Option	None		_ _ _ _ _0	•	•
TABLE IX - FACTORY OPTIONS					
Motor Orientation	None		00	•	•

RESTRICTIONS

Restriction Letter	**Table**	**Available Only With Selection**	**Table**	**Not Available With Selection**
a	I	11284S, 11285S, 11286S	I	11287S, 11288S, 11289S

Note 1: Requires (2) adapters PN 51204694-501 for retrofit of existing Leeds & Northrup 011284 and 011285 actuators.

Note 2: Slidewire emulation is a solid state circuit providing a ratiometric voltage output proportional to shaft position.

Note 3: Customer must supply tagging information: Up to 3 lines (22 characters for each line)

3. Installation

Installation Overview

The procedures to install the 11280S actuator and place it in service require that you:

- Select a suitable location for installation. (See Installation Considerations below.)
- Mount the actuator securely.
- Install mechanical connections or linkage between control arm and final control element. Use HAL software application to aid in mechanical installation.
- Make all electrical connections for actuator according to local and national electrical codes.
- Power up actuator.
- Enter, verify and adjust set up parameters for proper operation.
- Adjust control arm linkage for accurate operation of final control element.

This section provides you with mechanical and electrical installation information required to mount and connect the 11280S Smart Actuator to your specific application. Unpacking instructions, installation consisderations, electrical and safety precautions also included in this section should be observed.

Before Starting

Unpacking

If there are visible signs of damage to the shipping container, notify the carrier and Honeywell immediately.

If there is no visible damage, compare the contents with the packing list. Notify the carrier and Honeywell immediately if there is equipment damage or shortage.

Please do not return goods without contacting Honeywell Applications Center in advance. The contact number is 1-800-423-9883.

Installation Considerations

Mount the actuator in a location where it will be easily accessible for maintenance and for manual operation by means of the handwheel. The exact location must be determined in accordance with the linkage used.

It is important that the actuator be mounted securely to a solid foundation commensurate with the maximum torque developed. Use studs or bolts that are as large as the foot mounting holes.

The following precautions should be taken when selecting an installation site.

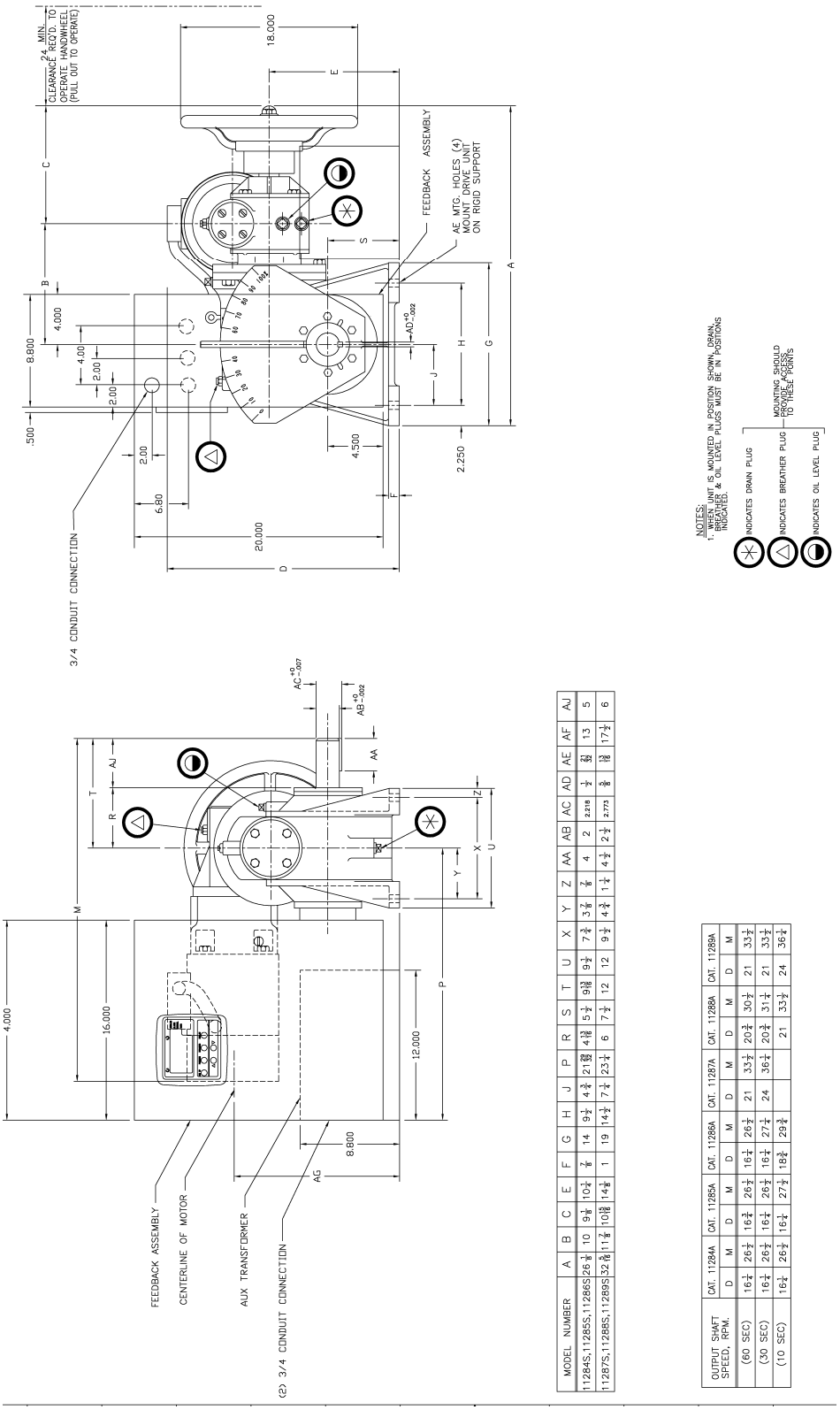
- Shield the actuator from rain or snow.
- Allocate sufficient clearance around the actuator for the removal of all covers to permit inspection of internal parts and to provide access to the handwheel.
- Use auxiliary shielding to protect the actuator from excessive heat or cold outside of the rating of the Actuator and from corrosive elements
- Ambient temperature should not exceed 65 °C (150 °F).
- The minimum low temperature limit is -30 °C (-20 °F).

Actuator Mounting

Install the 11280S actuator in a convenient location. Firmly bolt the 11280S to a mounting surface that will not distort when subjected to the torque stresses generated by the actuator. The output shaft of the actuator should be parallel to the output shaft of the driven device.

Outline Dimension Drawings

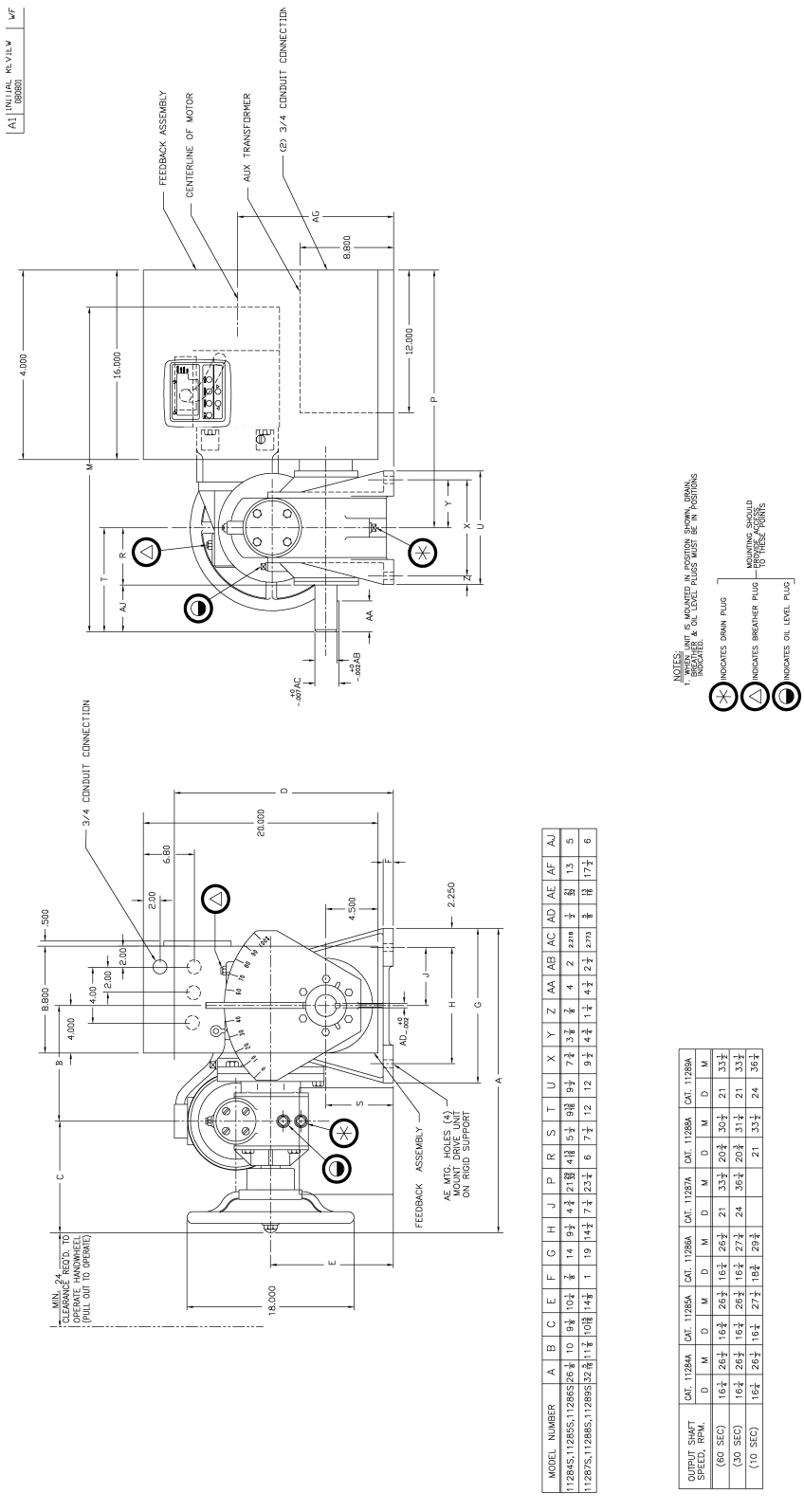
An outline and dimension drawing for actuator mounting is furnished with each unit. Figure 3 and Figure 4 are provided here for reference.



MODEL NUMBER	A	B	C	E	F	G	H	J	P	R	S	T	U	X	Y	Z	AA	AB	AC	AD	AE	AF	AJ
11284S,11285S,11286S	26 1/8	10	9 3/8	10 1/2	7/8	14	9 1/2	4 3/4	21 29/32	4 13/16	5 1/2	9 13/16	9 1/2	7 3/4	3 7/8	7/8	4	2	2.218	1 1/2	8 3/32	13	5
11287S,11288S,11289S	32 5/8	11 1/8	10 1/8	14 3/8	1	19	14 1/2	7 1/4	23 1/4	6	7 1/2	12	12	9 1/2	4 3/4	1 1/4	4 1/2	2 1/2	2.775	1 5/8	8 3/8	17 1/2	6

OUTPUT SHAFT SPEED, RPM.	CAT. 11284A		CAT. 11285A		CAT. 11286A		CAT. 11287A		CAT. 11288A		CAT. 11289A	
	D	M	D	M	D	M	D	M	D	M	D	M
(60 SEC)	16 1/4	26 1/2	16 3/4	26 1/2	16 1/4	26 1/2	21	33 1/2	20 3/4	30 1/2	21	33 1/2
(30 SEC)	16 1/4	26 1/2	16 1/4	26 1/2	16 1/4	27 1/4	24	36 1/4	20 3/4	31 1/4	21	33 1/2
(10 SEC)	16 1/4	26 1/2	16 1/4	27 1/2	18 3/4	29 3/4			21	33 1/2	24	36 1/4

Figure 3 Mounting and Outline Dimensions for 11284S, 11285S, 11286S, 11288S, and 11289S Weather-Proofed Motor Actuators - Right Hand Floor Mounting, Handwheel Shaft Horizontal (D-MTG-616-200)



MODEL NUMBER	A	B	C	E	F	G	H	J	P	R	S	T	U	X	Y	Z	AA	AB	AC	AD	AE	AF	AJ
11284S,11285S,11286S	26 1/8	10	9 1/8	10 1/2	7/8	14	9 1/2	4 3/4	21 29/32	4 1/8	5 1/2	9 1/16	9 1/2	7 1/2	3 1/8	7/8	4	2	2.215	1	29/32	13	5
11287S,11288S,11289S	32 1/8	11 7/8	10 1/8	14 1/2	1	19	14 1/2	7 1/4	23 1/4	6	7 1/2	12	9 1/2	12	4 1/2	1 1/2	4 1/2	2 1/2	2.773	1 1/8	1 1/8	17 1/2	6

OUTPUT SHAFT SPEED, RPM.	CAT. 11284A		CAT. 11285A		CAT. 11286A		CAT. 11287A		CAT. 11288A		CAT. 11289A	
	D	M	D	M	D	M	D	M	D	M	D	M
(60 SEC)	16 1/2	26 1/2	16 1/2	26 3/4	16 1/2	26 1/2	21	33 1/2	20 3/4	30 1/2	21	33 1/2
(30 SEC)	16 1/2	26 1/2	16 1/2	26 3/4	16 1/2	27 1/2	24	36 1/2	20 3/4	31 1/2	21	33 1/2
(10 SEC)	16 1/2	26 1/2	16 1/2	27 1/2	18 1/2	29 1/2			21	33 1/2	24	36 1/2

Figure 4 Mounting and Outline Dimensions for 11284S, 11285S, 11286S, 11288S, and 11289S Weather-Proofed Motor Actuators - Left Hand Floor Mounting, Handwheel Shaft Horizontal (D-MTG-616-210)

Mechanical Installation

Linkage Set-up

Many applications require the use of a linkage assembly and often the final control element does not have a linear torque curve. To assist with linkage design, Honeywell offers a linkage analysis software application (HAL). The software can be ordered as P/N 51197910-001.

Constant Torque Linkage

A constant torque linkage is employed when it is desired to provide a linear torque profile throughout the full range of final control element travel. In this situation, the actuator and driven crank arms will be set-up proportionally with respect to each other. Figure 5 shows a general linkage setup to achieve a linear torque profile and Figure 6 shows the resultant profile.

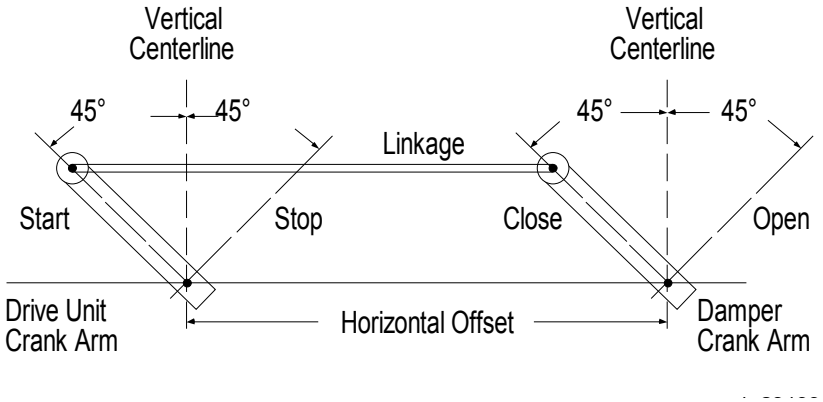


Figure 5 Constant Torque Linkage

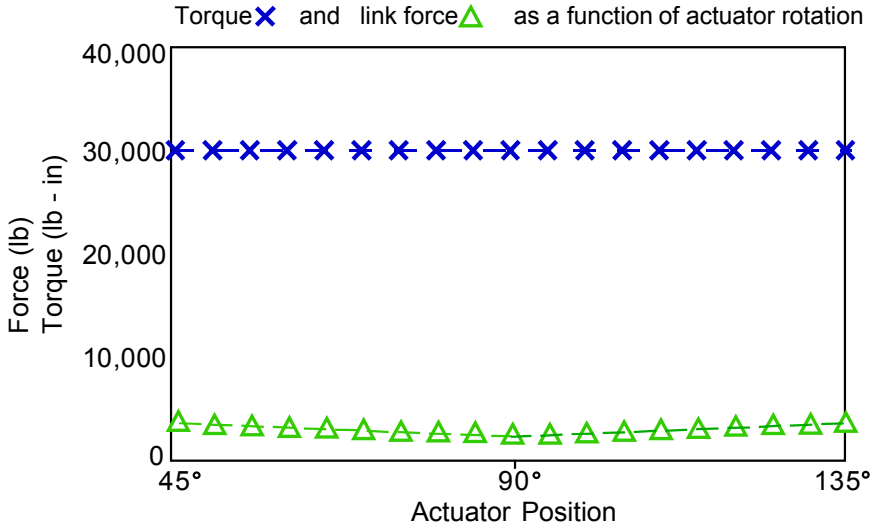


Figure 6 Constant Torque Profile for Model 11288
(Sample output from HAL Software)

Variable Torque Linkage

A variable torque linkage is employed when it is desired to provide a non-linear torque profile throughout the full range of final control element travel. In this general situation, the actuator and driven crank arms will be set up to provide a higher torque for seating or unseating the final control element. Figure 7 shows a general linkage setup to achieve a non-linear torque profile and Figure 8 shows the resultant profile. Note that this linkage can be characterized in many different ways by varying start angles and rotation requirements of both the Actuator Crank Arm and the Driven Arm.

CAUTION

It is important that the link force does not exceed the maximum overhung load of the actuator.

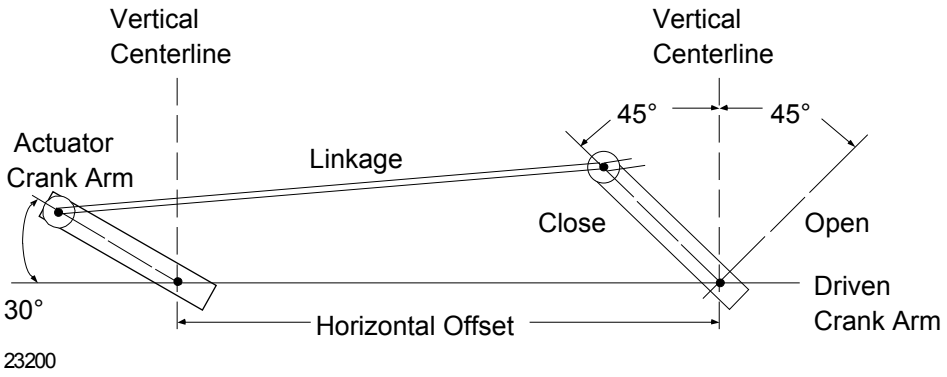


Figure 7 Variable Torque Linkage

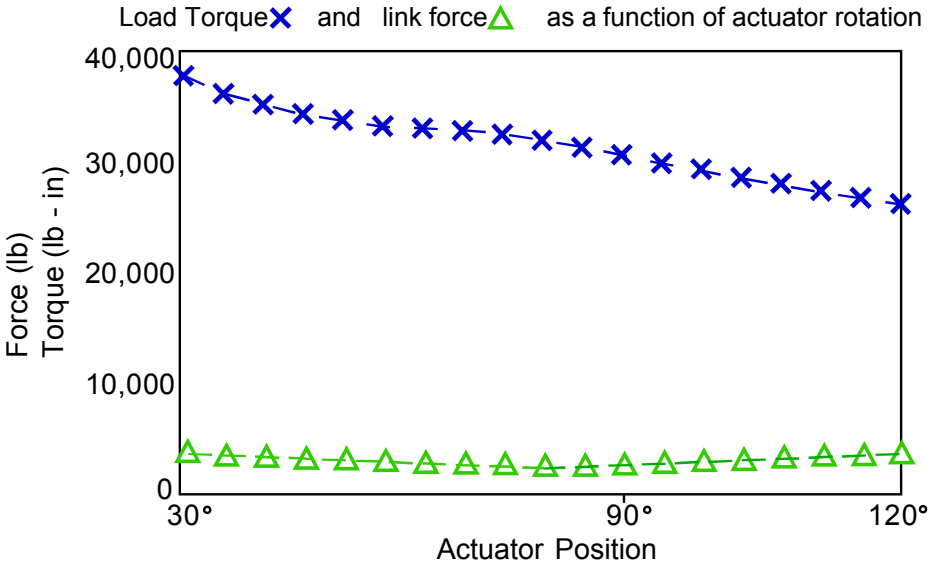
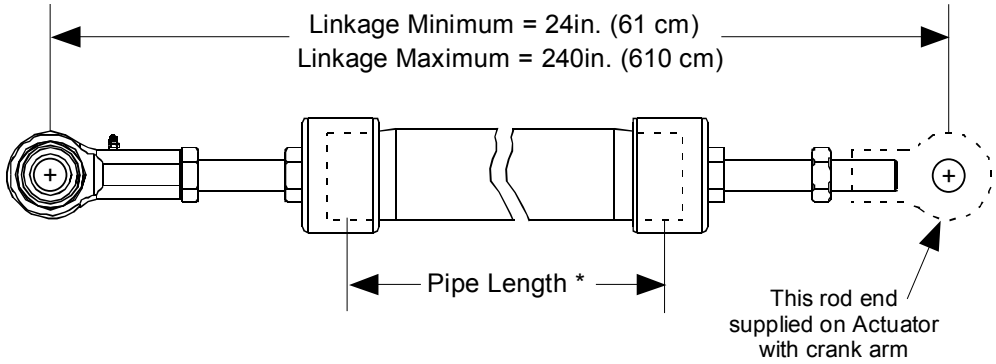


Figure 8 Variable Torque Profile for Model 11288
(Sample output from HAL software)

Pipe Linkage Kits *(See Section 8 for available Kit numbers)*

Pipe linkage kits are available from Honeywell and can be used for linkage lengths from 24 to 240 inches (61 to 610 cm). The kits include the mechanical pipe couplings, load rod end (left-hand thread), connecting rods and locking nuts. See Figure 9. The actuator rod end (right-hand thread), nut and bolt are supplied with the actuator. The customer must supply a piece of schedule 40 pipe 2 ½" * (both ends with right-hand NP threads) and a nut and bolt to connect the rod end to the load. Pipe linkage kits can be ordered with the Actuator using Table VIII of the Model Selection Guide or separately as identified in Section 8 in this manual.



*Pipe length = Overall linkage length minus (-) 20 inches (51 cm).

Figure 9 Pipe Linkage Kit

Actuator Crank Arms

The 11280S Series Actuator comes standard with an 8” to 14” adjustable radius crank arm. The crank arm uses a standard right-hand thread 1” rod end to compliment the pipe linkage kit.

The crank arm for the 11284A, 11285A and 11286A has a 2” shaft hole, while the crank arm from the 11287A, 11288A and 11289A has a 2 ½” shaft hole.

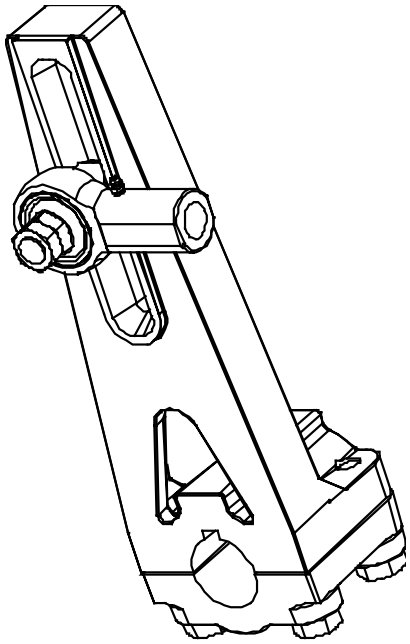


Figure 10 11280S Crank Arm

Recommended Bolt Torque

The following table lists the type of bolts to be used and the recommended torque for each bolt.

Table 2 Recommended Bolt Torque

Bolt Type	Torque
Clamp bolts	220 lb.-ft
Slider bolt	220 lb.-ft
Jam nuts	100 lb.-ft

Electrical Installation

General Wiring Recommendations

WARNING

Only qualified personnel should perform wiring.

Wiring must conform to national and local electrical codes.

In general, stranded copper wire should be used. Unless locally applicable codes dictate otherwise, the recommended minimum wire sizes in Table 3 should be observed.

Table 3 Recommended Minimum Wire Size

Gage No.	Description
14	Earth ground wire to feedback enclosure.
14	Power leads (120, 240 V, 208, 240, 480, 575 Vac, 1 and 3 phase)
18	All other wiring

Safety Precautions

ATTENTION

An external disconnect switch must be installed to break all current carrying conductors connected to the actuator.

Refer to the Allen-Bradley Drive (Inverter) User Manual that is shipped with the actuator for considerations in wiring motor branch circuits with this actuator.

WARNING

Turn off power before working on conductors. Failure to observe this precaution may result in serious personal injury.

Customer Connections

All external wiring connections to the 11280S actuator are made in the electronics enclosure. Power and field wiring are brought into the actuator through three access holes located on the side of the enclosure. See Figure 1. Power input connections are made to TB5. Field wiring (signal) connections are made to TB1, TB2, TB3 and TB4 of the customer terminal panel. See Figure 11 for the location of these terminals in the enclosure.

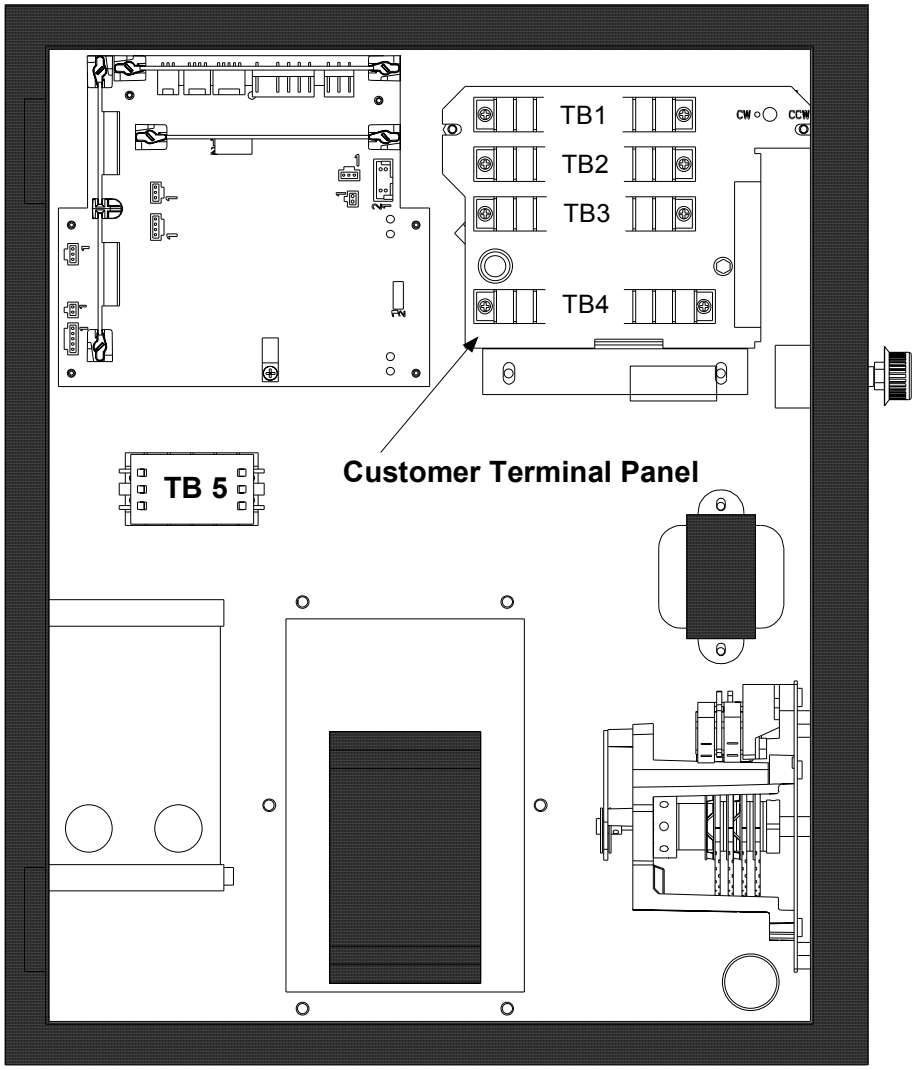


Figure 11 Customer Connections Inside Electronics Enclosure

External Transformers

When a Table I, Option 1 or Table I, Option 6 is specified (from the model selection guide), an external transformer and mounting enclosure is supplied.

120 Vac (Single Phase) *Table I, option 1*

For customer applications that furnish 120/240 Vac single phase power, a step-up transformer is supplied and is mounted in a separate enclosure. Output from the transformer is then connected to the proper terminals inside the actuator electronics enclosure. Figure 12 shows the dimensions of the transformer enclosure and the transformer mounting. See Table 4 details on the proper wiring connections to TB5, the power input terminal block inside the actuator enclosure.

575 Vac (3 Phase) *Table I, option 6*

For customer applications that furnish 575/460 Vac 3 phase power, a step-down is supplied and is mounted in a separate enclosure. Output from the transformer is then connected to the proper terminals inside the actuator electronics enclosure. Figure 12 shows the dimensions of the transformer enclosure and the transformer mounting. See Table 4 details on the proper wiring connections to TB5, the power input terminal block inside the actuator enclosure.

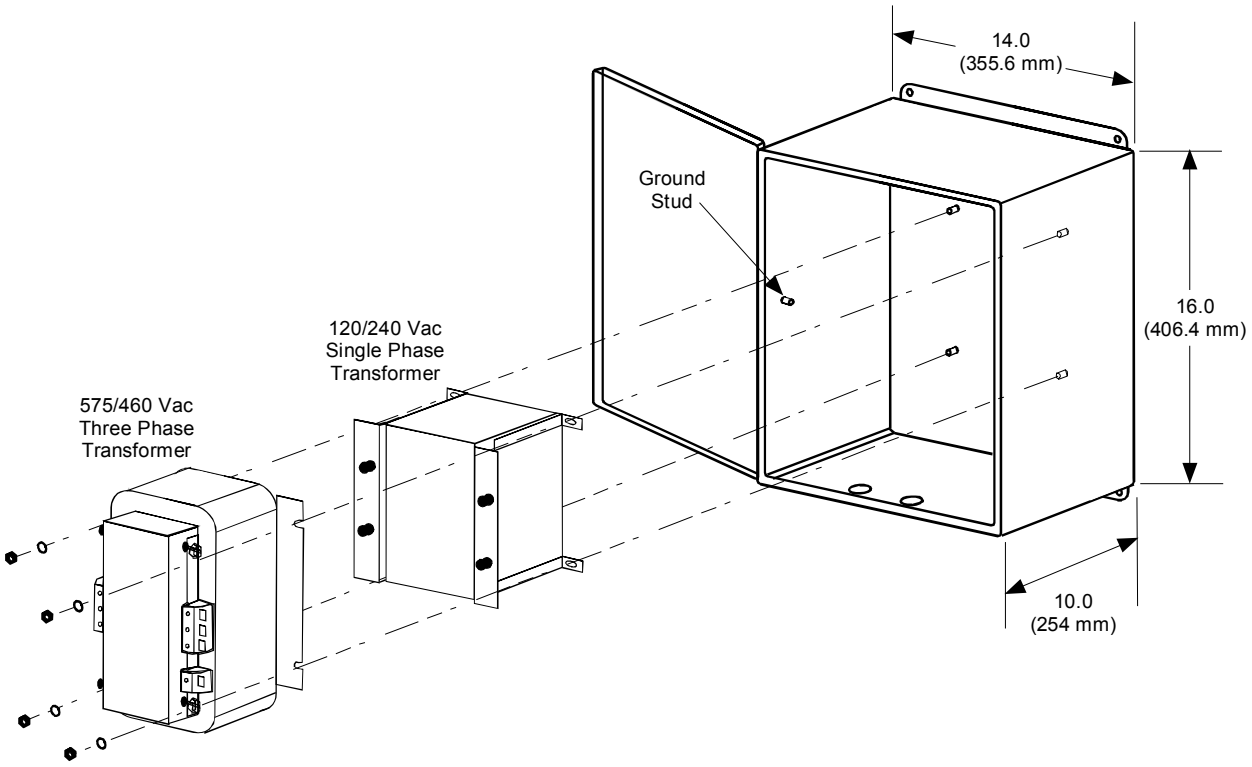


Figure 12 External Transformer Enclosure Dimension Drawing

ATTENTION

Transformer output wiring enters the 11280S through the middle conduit hole in the electronics enclosure. See Figure 1.

Power Input Connections

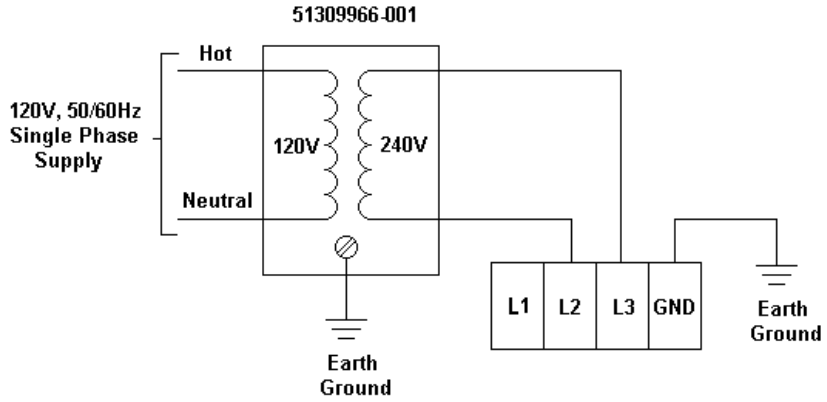
The power input wiring for the 11280S is brought in through the middle conduit access hole in the electronics enclosure. Depending upon the Table I option selection, the input voltage and phase (single phase or three phase); the power input wires are connected to TB5 according to the diagrams in Table 4.

WARNING

The ground terminal must be connected to a reliable earth ground.

Table 4 Power Input Connections to TB5

Power Supply	Table I Option (from Model Selection Guide)
120 Vac, 50/60 Hz, Single Phase	**1128XS-1-X-XX-XXX-XXX-X-X-XXXXXX-XX** (Table I, Option 1)



240 Vac, 60 Hz, Single Phase 200 Vac, 50 Hz, Single Phase	**1128XS-2-X-XX-XXX-XXX-X-X-XXXXXX-XX** (Table I, Option 2)

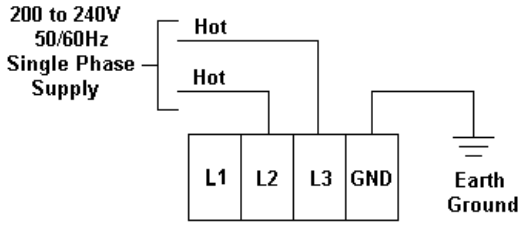
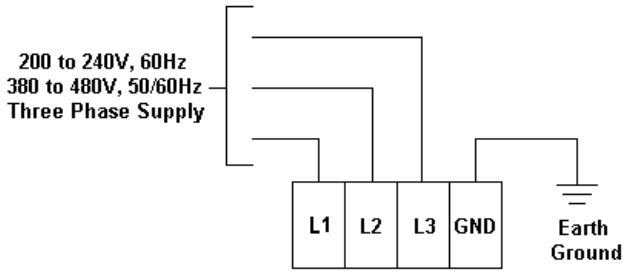
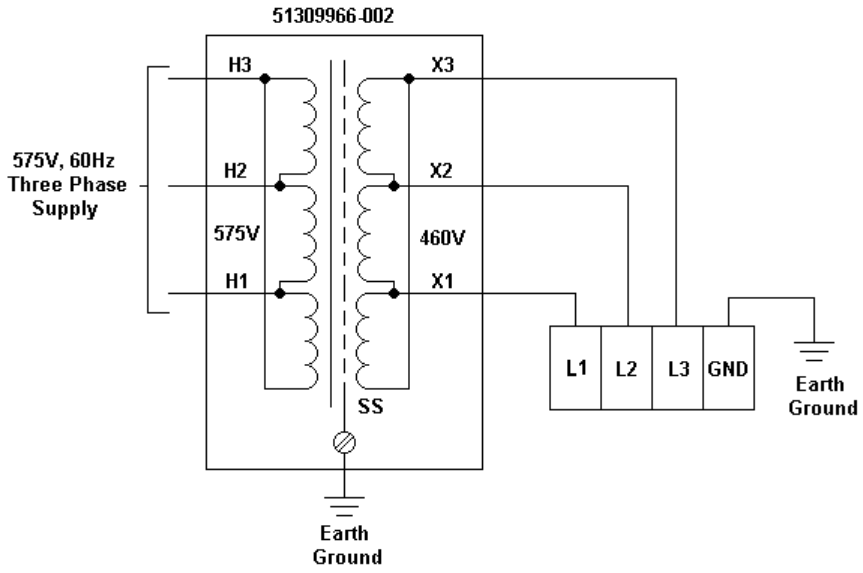


Table continued on next page ⇒

Power Supply	Table I Option (from Model Selection Guide)
208 to 240 Vac, 60 Hz, Three Phase	**1128XS-4-X-XX-XXX-XXX-X-X-XXXXXX-XX** (Table I, Option 4)
380 to 480Vac, 50/60Hz, Three Phase	**1128XS-5-X-XX-XXX-XXX-X-X-XXXXXX-XX** (Table I, Option 5)



575 Vac, 60 Hz, Three Phase	**1128XS-6-X-XX-XXX-XXX-X-X-XXXXXX-XX** (Table I, Option 6)



Field Wiring Connections

Signal connections to the actuator are made to TB1, TB2, TB3 and TB4 on the customer terminal panel located in the upper right of the electronics enclosure. See Figure 11 for location. Table 5 lists the table option selections from the actuator model number and provides diagrams for the appropriate field wiring connections to the terminal panel. Table 6 describes all wiring terminal connections on the terminal panel.

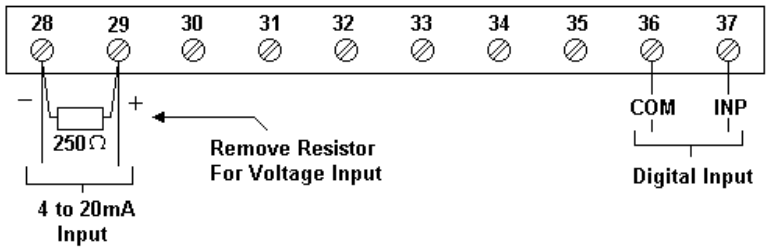
Table 5 Field Wiring Connections to Terminal Panel

Option	Table Option (from Model Selection Guide)
Stroke Speed – No Connections Required	**1128XS-X-1-XX-XXX-XXX-X-X-XXXXXX-XX** **1128XS-X-2-XX-XXX-XXX-X-X-XXXXXX-XX** **1128XS-X-3-XX-XXX-XXX-X-X-XXXXXX-XX**
Motor Orientation – No Connections Required	**1128XS-X-X-01-XXX-XXX-X-X-XXXXXX-XX** **1128XS-X-X-03-XXX-XXX-X-X-XXXXXX-XX**
Input: 4 to 20mA, 0 to 20mA (1 to 5Vdc, 0 to 5Vdc, 1 to 10Vdc, 0 to 10Vdc)	**1128XS-X-X-XX-0XX-XXX-X-X-XXXXXX-XX**

ATTENTION

Shielded and grounded cables are recommended.

For current signal input, use the 250 ohm resistor supplied across terminals 28 and 29 on the actuator terminal block connections. Observing polarity, connect the signal input wires to terminals 28 and 29 of the terminal block. See figure.



(Resistor: 250 ohm +/-0.1%, Part number 070756)

No Analog Position Output – No Connections Required	**1128XS-X-X-XX-X00-XXX-X-X-XXXXXX-XX**

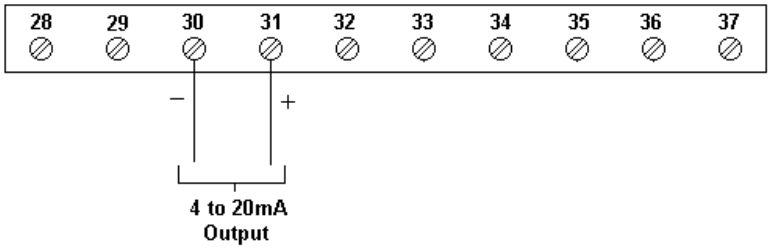
Table continued on next page ⇒

Option	Table Option (from Model Selection Guide)
Output: 4 to 20mA, 0 to 20mA (1 to 5Vdc, 0 to 5Vdc)	**1128XS-X-X-XX-X20-XXX-X-X-XXXXXX-XX**

ATTENTION

Shielded and grounded cables are recommended.

Actuator output is 4 to 20 mA analog signal. If a voltage input is required for customer devices, a range resistor is needed at the device input.

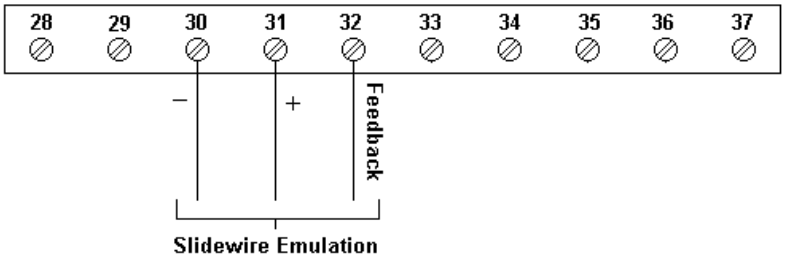


Slidewire Emulation	**1128XS-X-X-XX-X40-XXX-X-X-XXXXXX-XX**

ATTENTION

Shielded and grounded cables are recommended.

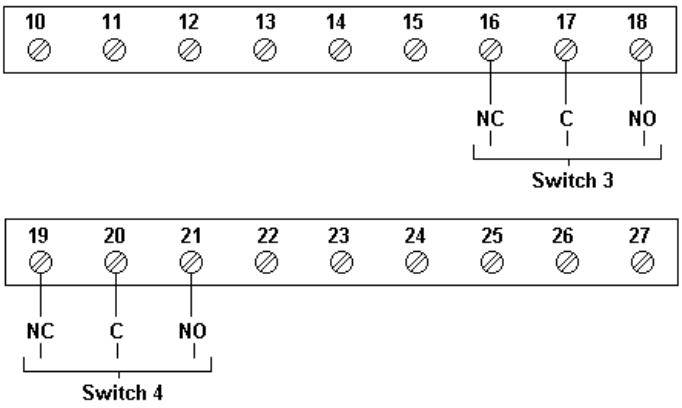
If you selected the Slidewire output option for your actuator, it is set at the factory to provide an output that emulates 100 to 1000 ohm slidewires. If it become necessary to change the actuator output from a slidewire to a current output, see Section 7, Maintenance for the procedure to set or change the actuator output.



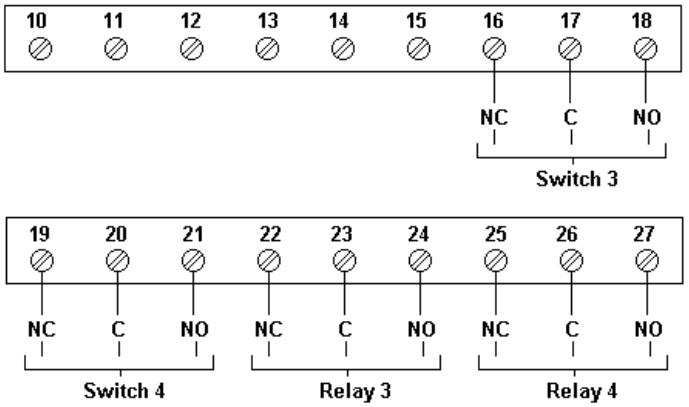
No Auxiliary Switches or Relay Outputs – No Connections Required	**1128XS-X-X-XX-XXX-00X-X-X-XXXXXX-XX**

Table continued on next page ⇒

Option	Table Option (from Model Selection Guide)
2 Auxiliary Switches	**1128XS-X-X-XX-XXX-20X-X-X-XXXXXX-XX**



2 Auxiliary Switches + 2 Programmable Relay Outputs	**1128XS-X-X-XX-XXX-22X-X-X-XXXXXX-XX**



2 Programmable Relay Outputs	**1128XS-X-X-XX-XXX-02X-X-X-XXXXXX-XX**

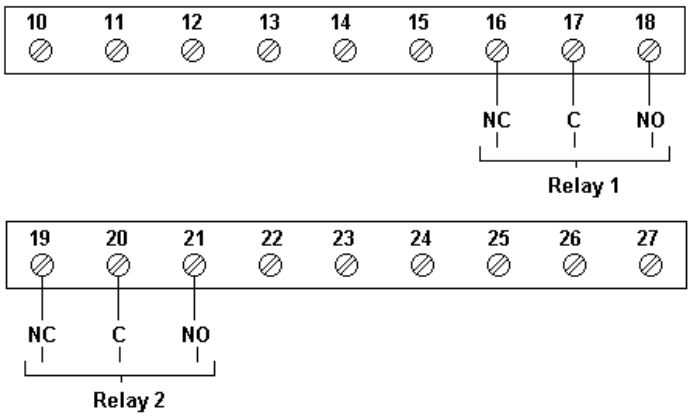
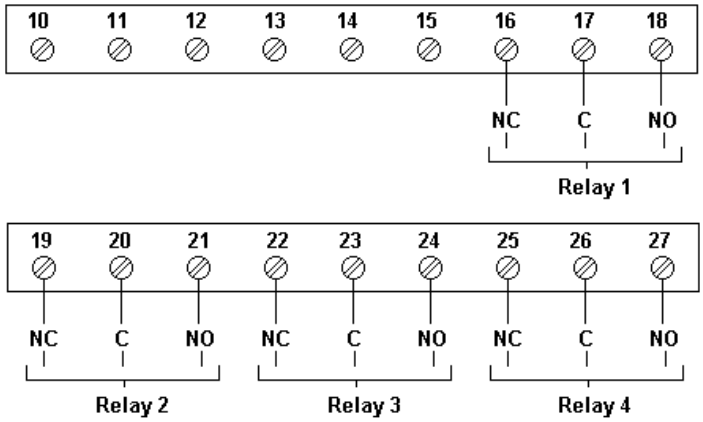


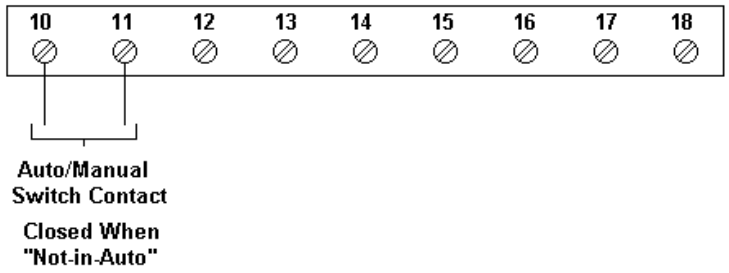
Table continued on next page ⇒

Option	Table Option (from Model Selection Guide)
4 Programmable Relay Outputs	**1128XS-X-X-XX-XXX-04X-X-X-XXXXXX-XX**



No AUTO - MANUAL Switch – **1128XS-X-X-XX-XXX-XX0-X-X-XXXXXX-XX**
No Connections Required

AUTO - MANUAL Switch **1128XS-X-X-XX-XXX-XX1-X-X-XXXXXX-XX**



Configuration Interface – **1128XS-X-X-XX-XXX-XXX-1-X-XXXXXX-XX**
No Connections Required

Modbus RTU RS485 **1128XS-X-X-XX-XXX-XXX-X-0-XXXXXX-XX**

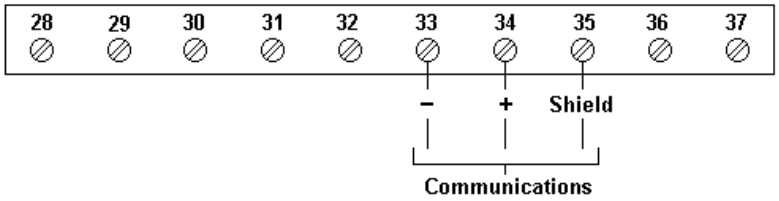


Table 6 Customer Terminal Connections

Connection	Terminal Numbers and LABEL	Descriptions
HOT	L	Hot wire from TB5 – L3
NEUTRAL	N - 3	Neutral wire from TB5 – L2
PE	Ground	Ground wire connection
AUTO/MANUAL SWITCH CONTACT	10 – 11	Switch contact to indicate setting of actuator AUTO/MANUAL switch. Switch is closed when actuator is “NOT-IN-AUTO”
4 – 20 INPUT	28 (-) 29 (+)	Analog signal input from controller.
4 – 20 OUTPUT *	30 (-) 31 (+)	Analog signal output from actuator.
FEEDBACK	32	Feedback signal used in conjuction with 4 – 20 OUTPUT voltage when using Slidewire Emulation.
COMMUNICATION	33 (-) 34 (+) 35 SHIELD	Connection for RS485 Modbus link wires.
DIGITAL INPUT	36 COM 37 INP	Customer’s contact closure.
SW3/RELAY1	16 NC 17 COM 18 NO	Switch 3 (Auxiliary) or Relay 1 connections.
SW4/RELAY2	19 NC 20 COM 21 NO	Switch 4 (Auxiliary) or Relay 2 connections.
RELAY3	22 NC 23 COM 24 NO	Relay 3 connections.
RELAY4	25 NC 26 COM 27 NO	Relay 4 connections.

4. Setup and Calibration Procedures

Overview

Once you have installed the 11280S smart actuator, you can verify, set or change certain operating parameters. Set up is accomplished through use of the local display and keypad interface, or Modbus RTU RS485 communications.

Please keep in mind that the unit is calibrated at the factory for your application and can be placed into service right out of the box. Changing operating parameters may require recalibration of the actuator. This section details the various operating parameters and functions of the actuator available using the local display and keypad interface, and calibration procedures.

For detailed information on actuator set up using Modbus RTU communications, refer to this section and document # 51-52-25-103, *Modbus® RTU Serial Communications User Manual Configuration/Remote Calibration Interfaces for Herculine® Actuators*.

Local Display and Keypad

The alphanumeric display and keys on the keypad are the local operator interface for control, monitoring, and configuration of the 11280S actuator. The display consists of a four character upper display and a six character lower display. Six LEDs of various colors indicate actuator operating status. Directly below the display are six keys that allow you to setup, monitor, and control the actuator locally, as well as call up various operating parameters and configuration values on the display. Figure 13 shows the physical features of the display and keypad. Table 7 summarizes the various functions you can perform using the keys as well as descriptions of the status indicators.

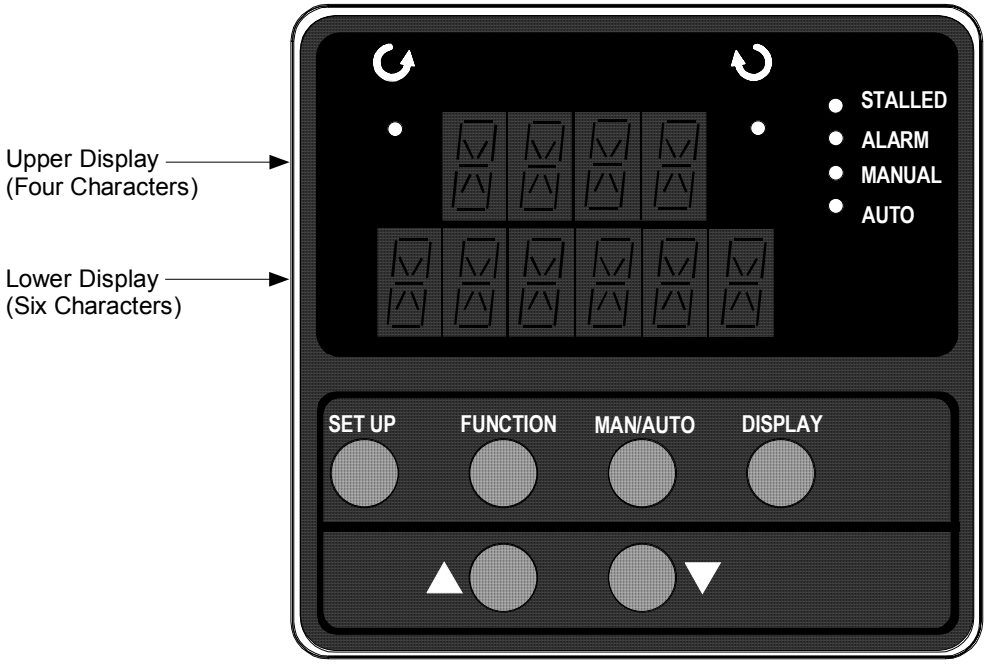
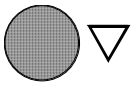


Figure 13 11280S Display and Keypad

Table 7 Keypad Description

Key or LED Indicator	Function
SET UP 	Places the actuator in the set up group select mode. Sequentially displays set up groups and allows the FUNCTION key to display function parameters within the set up group. See for descriptions of the various options available in the set up groups.
FUNCTION 	Used in conjunction with the SET UP key to select the individual functions of a selected configuration set up group. Used during field calibration procedure.
MAN/AUTO 	Alternately selects: **MAN** - Actuator is in Manual mode. **AUTO** - Actuator is in Automatic mode. NOTE: When in Manual mode the POS display is automatically selected so you can use the up and down arrow keys to drive actuator motor manually.
DISPLAY 	Pressing this key repeatedly cycles through the operating parameters that can be shown on the lower display. **INP –** Input. Shows the value of the actuator input. **OP –** Output. Shows the value of the actuator output **DE –** Deviation. Shows deviation between input value and actuator position. **POS –** Position. Shows current actuator position.
△ 	Increases the configuration values shown on the display. Also shown as ▲. In manual mode and POSition display selected, pressing this key will drive actuator motor in direction of increasing signal input.
 ▽	Decreases the configuration values shown on the display. Also shown as ▼. In manual mode and POSition display selected, pressing this key will drive actuator motor in direction of decreasing signal input.
 ☼	Indicates the movement of the actuator arm in the counterclockwise direction. NOTE: Actuator rotation is the direction of the output shaft when facing the end of the shaft and refers to the direction of rotation on increasing signal.
 ☼	Indicates the movement of the actuator arm in the clockwise direction. NOTE: Actuator rotation is the direction of the output shaft when facing the end of the shaft and refers to the direction of rotation on increasing signal.
☼ STALLED	Indicates that the actuator has detected a motor stall condition.
☼ ALARM	Indicates a programmed alarm condition exists.
☼ MANUAL	Indicates actuator is in manual mode
☼ AUTO	Indicates actuator is in automatic mode.

Set Up Tips

Table 8 contains tips that will help you view, verify and enter the operating parameters more quickly. If you can not change the parameters, check the status of the " SET LOCK" parameter. Also some parameters require that you enter a security password before you access or change the parameter value.

Table 8 Set Up Tips

Function	Tip
Displaying Groups	Use the SET UP key to display and scroll through the set up groups. The group titles are listed in in the order that they appear on the actuator display.
Displaying Functions	Use the FUNCTION key to display the individual function parameters under each set up group. The prompts are listed in the order of their appearance in each group. See Tables 8 through 19.
Scrolling	Pressing and holding the SET UP key will scroll through the set up groups. However, when any set up group is displayed, you can scroll through the set up groups twice as fast using the ▲ or ▼ key. When in any set up group, hold the FUNCTION key in to scroll through the prompts within that group.
Changing values quickly	When changing the value of a parameter, you can adjust a more significant digit in the upper display by holding in one key ▲ or ▼, and pressing the other ▲ or ▼ at the same time. • The adjustment will move one digit to the left. • Press the key again and you will move one more digit to the left.
Exiting Set Up mode	To exit Set Up mode, press the DISPLAY key. This returns the display to the same state it was in immediately preceding entry into the Set Up mode.
Timing out from Set Up mode	If you are in Set Up (configuration) mode and do not press any keys for thirty seconds, the actuator display will time out and revert to the mode and display that was being used prior to entry into Set Up mode.

Set Up Groups

Pressing the SET UP key on the keypad provides access to the various set up groups and allows you to set up operating parameters, (such as input types and alarms), calibrate the actuator's inputs and outputs, set communications, and check actuator status. Table 9 on the next page lists the set up groups that are available by using the SET UP and FUNCTION keys on the keypad.

Table 9 Set Up Groups

Set Up Group Title	Pressing the FUNCTION Key Allows You to…	For Details, See
SET INPUT	Select and set various parameters associated with the input signal to the actuator.	**Table 11**
SET RELAY*n* *n* = 1, 2, 3, or 4	Select relay functions. NOTE: Set Relay groups will show on display only if relays are installed in the actuator.	**Table 14**
SET CUROUT	Select the output signal type of the actuator.	**Table 16**
SET COMM	Select communication parameters for remote control of actuator when connected to a SCADA system.	**Table 17**
SET DIGINP	Select the parameters for external digital input states.	**Table 18**
SET DISPLA	Select and set parameters for the local display.	**Table 19**
CAL INPUT	Calibrate input zero and span values.	**Calibration Procedure, Table 26**
CAL MOTOR	Calibrate zero and span values for motor operation.	**Calibration Procedure, Table 27**
CAL CURENT	Calibrate actuator output.	**Calibration Procedure, Table 28**
SET LOCK	Set or change security password. Enable or disable security access to set up parameters and calibration set up.	**Table 20**
READ STATUS	Display operating and alarm status. Display self-test diagnostic results.	**Table 21**
SET DRVINF	Display and/or set various parameters specific to the actuator.	**Table 22**
SET MAINT	Display various operating statistics. Reset accumulated operating statistics	**Table 23**
CAL NCSOUT	Use the display as an indicator, (in this case a voltmeter) so you can verify that the non-contact sensor is operating properly.	**Table 24**

Set Up Procedure

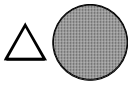
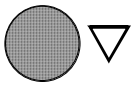
Each of the set up groups and their functions are either pre-configured at the factory or set to their default values. Tables 8 through 19 list and describe the options available in each set up group. The following procedure shows you the key press sequence to access any set up group or any associated Function parameter. Make sure lock set up group "LOCK" function is set to "NONE" or "CAL." Also some parameters require that you enter a security password before you access or change the parameter.

You can use this procedure to access the set up groups and select all parameters.

Table 10 Set Up Procedure Using Display and Keypad

Step	Operation	Press	Result
1	Enter Set Up Mode	**SET UP** 	*Upper Display* = **SET** Lets you know you are in the set up mode and a set up group title is being displayed in the lower display. *Lower Display* = **INPUT** This is the first set up group you see when you press SET UP.
2	Select any Set Up Group	**SET UP** 	Successive presses of the SET UP key will display the other set up group titles as listed in Table 9. You can also use the ▲ or ▼ keys to scroll through the set up groups in both directions. Stop at the set up group title that describes the group of parameters you want to configure. Then proceed to the next step.
3	Select a Function Parameter	**FUNCTION** 	Upper Display 4-20 Shows the current value or selection for the function prompt in the selected set up group. Lower Display IN TYP Shows the first function prompt within the selected set up group. Example display shows Input group function prompt "IN TYP" and the selection.
4	Select other function parameters	**FUNCTION** 	Successive presses of the FUNCTION key will sequentially display the other function prompts of the selected set up group. Stop at the function prompt that you want to change, then proceed to the next step.

Table continued on next page ⇒

Step	Operation	Press	Result
5	Change the Value or Selection	 or 	These keys increase or decrease the value, or display the next available selection for the selected function prompt. See Table 8, *Set Up Tips* for instructions to increase or decrease a value quickly. Change the value or selection to meet your needs. NOTE: If the display flashes, you are trying to make an unacceptable entry, or the value on the display is at its range limit. The display may also show "KEYERR" (Key error).
6	Enter Value or Selection	**FUNCTION**  or **SET UP** 	This key selects another function prompt. This key selects another set up group. NOTE: Pressing either key will cause the previously selected value or selection to be entered into memory.
7	Exit Set Up mode	**DISPLAY** 	Exits set up mode and returns actuator to the same state it was in immediately preceding entry into the set up mode. Any changes you have made are stored in memory. If you do not press any keys for 30 seconds, the display times out and reverts to the mode and display shown prior to entering the set up mode.

Input Set Up Group

Table 11 lists the parameters and selections available when the SET INPUT group is selected.

On the keypad and local display:

- Press the SET UP key to enter the Input Set Up group.
- Press the FUNCTION key to scroll through the prompts listed in the set up group.
- Press the ▲ or ▼ keys to view selections or change range settings.

Table 11 Input Set Up Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
IN TYP	**4-20** **0-20** **1-5V** **0-5V** **0-10** **R_SP**	**INPUT ACTUATION TYPE**— This selection specifies the signal type and range you are going to use for the actuator input. Be sure that the values configured for the high and low range, alarm setpoint, etc. are within the measuring range for the selected signal range. **4 to 20 mA** *[default]* **0 to 20 mA** **1 to 5 Volts dc** **0 to 5 Volts dc** **0 to 10 Volts dc** **Remote Setpoint** (via communications) NOTE: Changing the Input Actuation Type will restore the actuator calibration to its factory values.
INP HI	**10.0 to 100**	**INPUT HIGH RANGE VALUE** in % is displayed. NOTE: Input High range must be set to a value that is at least 10% more than Input Low range value. To set actuator for a reduced input range, see Section 6, *Control Applications*.
INP LO	**0.0 to 90.0**	**INPUT LOW RANGE VALUE** in % is displayed. NOTE: Input Low range must be set to a value that is at least 10% less than Input High range value. To set actuator for a reduced input range, see Section 6, *Control Applications*.

Continued on next page ⇒

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
FILTYP	**NONE** *[default]*	**INPUT FILTER TYPE**— Allows selection of a software digital input filter to smooth the input signal.
	SPIK	**Spike**— Selects spike filter to remove transients in the input signal when actuator is installed in noisy environments.
	S+LP	**Spike plus Low Pass**— Selects spike and low pass filtering. * Allows setting of lag time constant for low pass filter.
	LPAS	**Low Pass**— Selects low pass filter. * Allows setting of lag time constant. NOTE: When Remote Setpoint input type (R_SP) is selected, Input Filter Type = NONE.
LPFILT *	**0 to 50.00** (in seconds)	**LAG TIME CONSTANT**— (Filter Type S+LP or LPAS only) Allows you to set the first order lag time constant of the low pass filter when selected. Range is from 0 to 50 seconds.
Direct		**ACTUATOR ROTATION**—This selection determines the direction of rotation of the actuator shaft.
	CCW *[default]* or **CW**	**Counterclockwise** rotation **Clockwise** rotation NOTE: Actuator rotation is the direction of the output shaft when facing the end of the shaft and refers to the direction of rotation on increasing signal.
Dband	**0.2** to **5.0** (in percent of span) *default = 0.5*	**INPUT DEADBAND**— Specifies an adjustable gap that is the difference between the setpoint value and the value at which the motor energizes. Deadband is set in percent of full span.
FsFTYP		**FAILSAFE TYPE**— Selects the motor position you want the actuator to go to when input signal is out of range (failsafe). NOTE: Failsafe condition occurs when the input exceeds its range value by 3%, or when the input signal goes to zero. For input types 0 to 20mA, 0 to 5 V, and 0 to 10 V there is no failsafe condition at the zero value.
	LAST	**Last Position**— Actuator motor remains at last position.
	UP	**Up**— Actuator motor moves to full scale value.
	DOWN	**Down**— Actuator motor moves to zero value.
	USER	**User selected value**— Actuator motor moves to a customer-defined value. † Allows setting of failsafe input value (FsVAL).
FsFVAL †	**0** to **100** (in percent) *default = 0*	**FAILSAFE INPUT VALUE**— (Failsafe Type USER only) Selects the motor position you want the actuator to go to when input signal is interrupted. Range is from 0 to 100%.

Continued on next page ⇒

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
CHAR		**INPUT CHARACTERIZATION**— Selects a characterization type that causes the actuator to characterize a linear input signal to represent a non-linear input.
	LINR *[default]*	**Linear**— Provides linear characterization of the input signal.
	SQRT	**Square Root**— Provides square root characterization of the input signal.
	CUST	**Custom Characterization**— Selecting custom characterization allows you to create a twenty-first order characterization of input value (x) and associated shaft position (y). ‡ Allows setting of Input Value (XnVAL) and Shaft Position (YnVAL). Two custom characterization examples are presented on the following pages.
X*n* VAL ‡ *n* = 0 to 20	**0** to **99.99**	**INPUT VALUE**— Allows entry of input values as a percentage of range, when custom characterization is selected.
Y*n* VAL ‡ *n* = 0 to 20	**0** to **99.99**	**SHAFT POSITION**— Allows entry of shaft position values as a percentage of range, when custom characterization is selected.
PASSWD	**nnnn** *n* = 1 to 9	**PASSWORD**— 4-digit password is needed for access to LD CAL parameter. Password can be up to four numbers. NOTE: Password is set (or changed) from the Lock set up group.
LD CAL	**NONE** *[default]*	**RESTORE CALIBRATION TYPE**— Allows you to restore a calbration value to its factory calibration.
	INP	**Input**— Restores input calibration to the factory calibration.
	MTR	**Motor**— Restores motor calibration to the factory calibration.
	COUT **	**Output**— Restores actuator output calibration to the 4 – 20mA factory calibration.
	ALL	**All**— Restores input, motor and output calibration to the factory calibration.
	NCS	**Non-Contact Sensor**— Restores non-contact sensor calibration to the factory calibration. NOTE: Selecting the NCS setting allows you perform a factory calibration of the Non-contact sensor after replacement in the field. See "*Calibrate Non-Contact Sensor*", page 64.

** Selecting COUT will restore the actuator output calibration to factory values **only** for the 4 – 20 mA output selection. Any other CUROUT selection will require you to perform an output calibration as described on page 62.

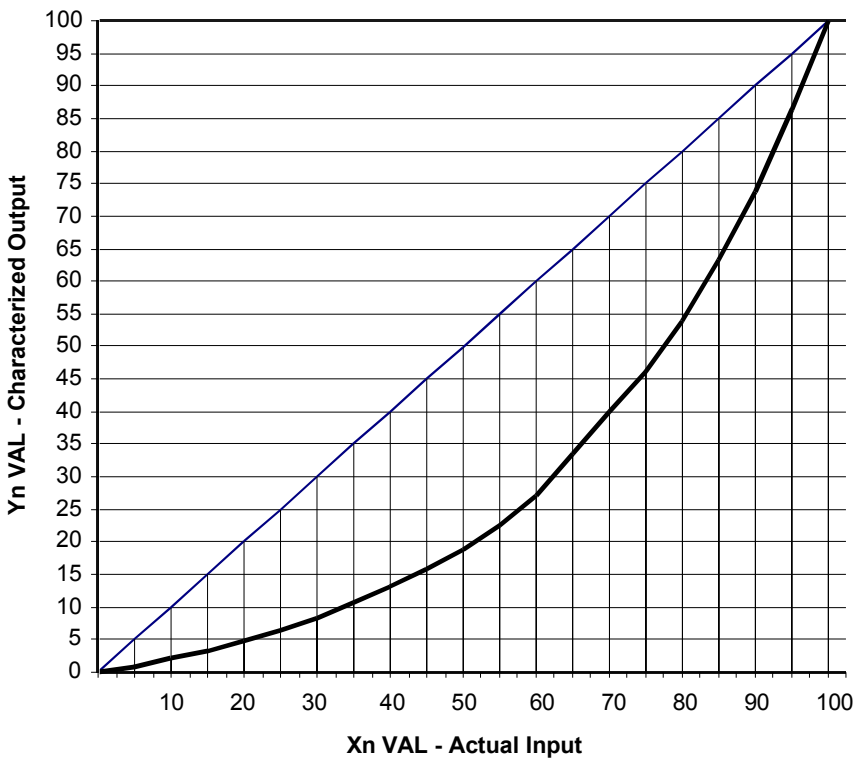
Custom Input Characterization Examples

Equal Percentage Valve Characteristic

Table 12 contains sample values that approximate an equal percentage valve characteristic in the actuator. When CUST input characterization is selected, the values in Table 12 can be entered into the actuator configuration to produce the characteristic as presented in the graph, (see NOTE). The Xn VAL is the input value as a percentage of range and Yn VAL is the characterized output (actuator shaft position) as a percentage of range.

NOTE: The values in Table 12 are entered automatically when CUST input characterization is selected for the first time.

Table 12 Equal Percentage Valve Characteristic Table

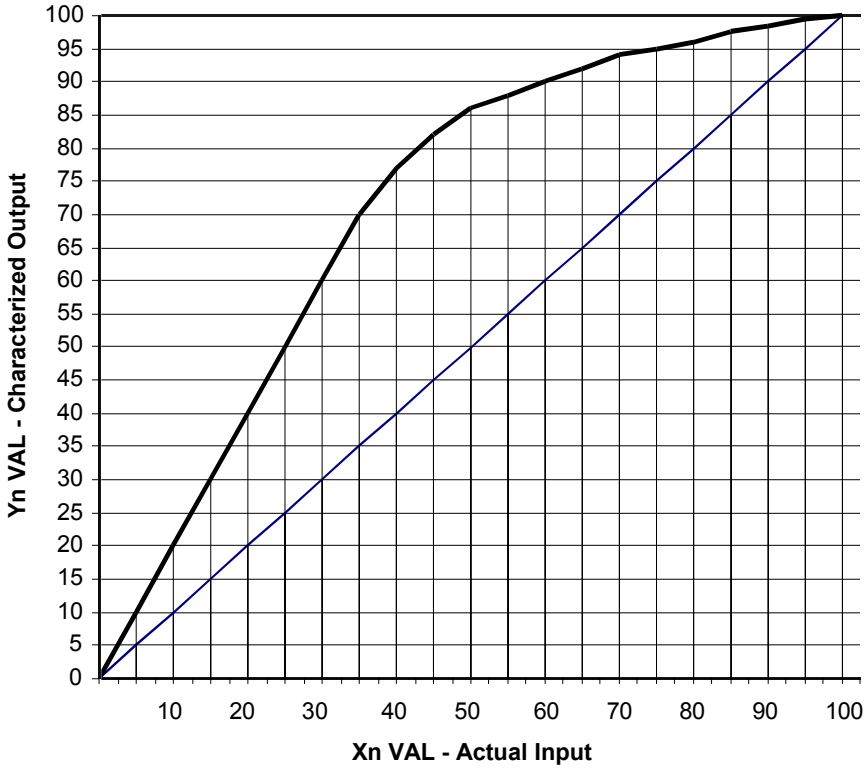
Order	Xn VAL % of Range	Yn Val % of Range	Equal Percentage Valve Characterization
0	0	0	
1	5	0.8	
2	10	2.1	
3	15	3.2	
4	20	4.9	
5	25	6.5	
6	30	8.4	
7	35	10.7	
8	40	13.2	
9	45	15.7	
10	50	18.7	
11	55	22.6	
12	60	27.2	
13	65	33.4	
14	70	40	
15	75	46	
16	80	53.8	
17	85	63.2	
18	90	73.7	
19	95	86.2	
20	100	100	

Quick Opening Valve Characteristic

Table 13 contains sample values that approximate the characteristic of a quick opening control valve. When CUST input characterization is selected, the values in Table 13 can be entered into the actuator configuration to produce the characteristic as presented in the graph. The Xn VAL is the input value as a percentage of range and Yn VAL is the characterized output (actuator shaft position) as a percentage of range.

Table 13 Quick Opening Valve Characteristic Table

Order	Xn VAL % of Range	Yn Val % of Range	Quick Opening Valve Characteristic
0	0	0	
1	5	10	
2	10	20	
3	15	30	
4	20	40	
5	25	50	
6	30	60	
7	35	70	
8	40	77	
9	45	82	
10	50	86	
11	55	88	
12	60	90	
13	65	92	
14	70	94	
15	75	95	
16	80	96	
17	85	97.5	
18	90	98.5	
19	95	99.5	
20	100	100	



Relays Set Up Group

ATTENTION

The Relay set up group parameters are accessible only if relay PWAs are installed in the actuator. 11280S series actuators can be equipped with up to two relay PWAs– for a total of four SPDT relays. Using the Relay set up groups you can program the installed relays to operate in response to various operating conditions.

Table 14 lists the parameters and selections available when the SET RELAY*n* group is selected.

Table 14 Relay Set Up Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
RTYP*ny* *n* = 1, 2, 3, or 4 *y* = 1 or 2	**NONE** *[default]* or **InPR** **PosR** **DEV** **ULim** **LLim** **T Hi** **T Lo** **STRT** **STAL** **MAN** **PWRF** **FsFA** **PosF** **DiGI**	**RELAY TYPE**— Selects the relay number and the relay activation type. See Table 15 Relay Type Descriptions. **Input Range**— Upper / lower limits of input signal exceeded **Position Range**— Upper / lower limits of motor position exceeded **Deviation**— Deviation from input exceeded **Upper Limit Travel**— Same as PosR for upper limit **Lower Limit Travel**— Same as PosR for lower limit **Temperature High**— High temperature limit exceeded **Temperature Low**— Low temperature limit exceeded **Starts**— Motor starts limit exceeded † Allows setting of multiplier value. **Stalled**— Motor position does not follow input **Manual**— Actuator is set to manual mode **Power Up Test Failure**— Failure of any power up diagnostic **Failsafe Alarm**— Failsafe condition detected **Position Sensor Signal Failure**— NCS output out of valid range **Digital Input**— Digital input closure
R*ny*E ∗ †	**X1** or **X10k**	**MULTIPLIER**— (Relay Type STRTS only) Selects the multiplier for the number limit of motor starts before the relay is activated. Multiplier specifies the value on display as times one (X1) or times ten thousand (X10k).
R*ny*VAL *n* = 1, 2, 3, or 4 *y* = 1 or 2	**0.0 to 100.0**	**RELAY VALUE**— Sets numerical value of limit where relay trips (energizes). Units are determined by the relay type selection. See Table 15 Relay Type Descriptions for units.
R*ny* HL *n* = 1, 2, 3, or 4 *y* = 1 or 2	**HI** or **LO**	**RELAY HIGH/LOW**— Sets relay trip point to high or low limit.
RLY*n*HY *n* = 1, 2, 3, or 4	**0.0 to 100.0** (in percent)	**RELAY HYSTERESIS**— 0.0 to 100.0% of span or full output. NOTE: Relay Hysteresis parameter is accessible only if appropriate relay type is selected.

n is the relay number, *y* is the relay contact.

Table 15 Relay Type Descriptions

When this Relay Type is selected… (RTYP)	The Relay can be set up to indicate …
Input Range	The upper / lower limits of the input signal have been exceeded. Relay value parameter defines range limits and units are in percent of full span.
Position Range	Upper / lower limits of motor position have been exceeded. Relay value parameter defines range limits and units are in either percent of span or degrees of rotation. See "*Relay Examples* "for setting range limits.
Deviation	Motor position has exceeded deviation limit from input. (Deviation is defined as: setpoint – motor position = Deviation) Relay value parameter defines limits and units are in percent of span. See "*Relay Examples"* for setting deviation limit.
Upper Limit Travel	The motor position has exceeded the upper limit of travel. (Same as Position Range.) Relay value parameter defines limits and units are in degrees of rotation or percent of span. See "*Relay Examples"* for setting upper limit with hysteresis.
Lower Limit Travel	The motor position has exceeded the lower limit of travel. (Same as Position Range.) Relay value parameter defines limits and units are in degrees of rotation or percent of span.
Temperature High	The high temperature limit of the actuator has been exceeded. Range is -30 to +65 °C. Relay value parameter defines temperature limits and units are in either degrees C or degrees F. (Temperature units are defined in the UNITS setting of the DISPLA set up group.)
Temperature Low	The low temperature limit of the actuator has been exceeded. Range is -30 to +65 °C. Relay value parameter defines temperature limits and units are in either degrees C or degrees F. (Temperature units are defined in the UNITS setting of the DISPLA set up group.)
Starts	The accumulated motor starts have exceeded the limit. Relay value parameter defines the limit. See "*Relay Examples"* for setting motor starts limit. Range is from 10 to 99,990,000.
Stall	The motor is in a stall condition.
Manual Mode	The actuator in in manual mode.
Power Up Test Failure	A failure of any one of the power up test diagnostics. See READ STATUS set up group.
Failsafe	The actuator is in failsafe. (input signal loss or input signal out of valid range)
Position Sensor Failure	The non-contact sensor output is out of range or has failed.
Digital Input	The digital input closure.

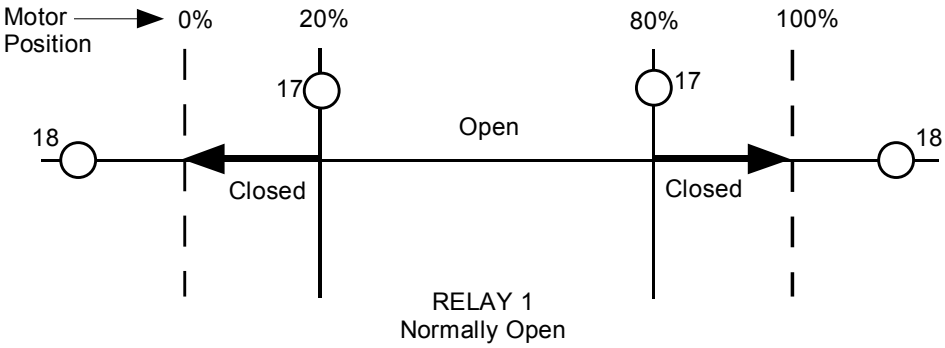
Relay Examples

Relay Type - Position Range

Selecting PosR relay type, you can cause the relay to energize when the actuator motor travels below 20% of range and above 80% of range. Note in the example below that Relay 1 is set up to provide two trip points. The first trip point (R11VAL) causes the relay to energize when the motor travels above 80%, the second trip point (R12VAL) is set so the relay energizes when the motor travels below 20%.

Set Up Group	Parameter	Value
SET RELAY1	RTYP11	PosR
	R11VAL	80.0
	R11HL	HI
	RTYP12	PosR
	R12VAL	20.0
	R12HL	LO
	RLY1HY	0.0

The figure below shows the resulting action.



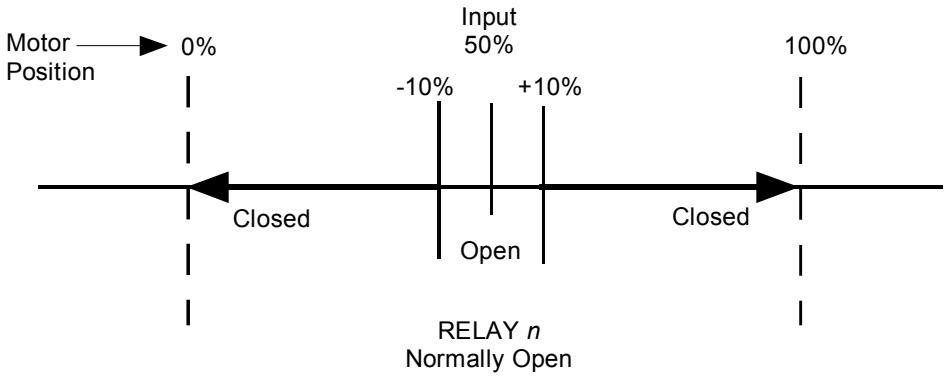
Relay Type - Deviation

Setting up a relay to alarm (energize) when the motor position deviates 10% (+ or -) from the actuator setpoint can be set up as follows.

Set Up Group	Parameter	Value
SET RELAY1	RTYP11	DEV
	R11VAL	10.00
	R11HL	HI
	RTYP12	DEV
	R12VAL	-10.00
	R12HL	LO
	RLY1HY	0.0

The resulting action is shown below.

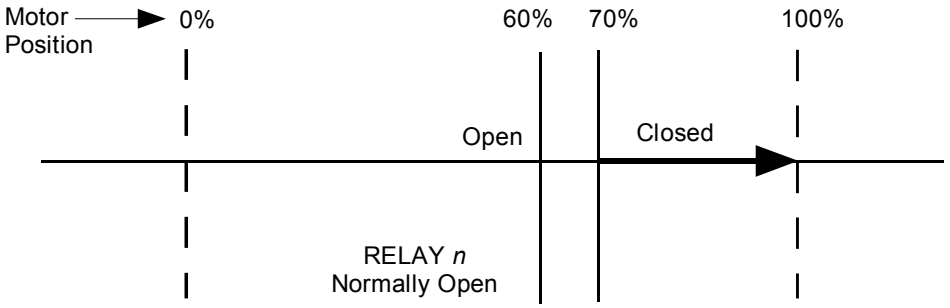
Relay Type – Deviation, continued

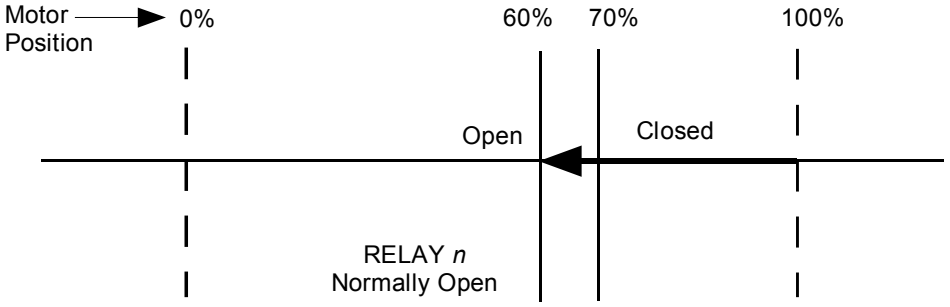


Relay Type – Upper Limit Travel with Hysteresis

Selecting relay type ULim will cause the relay to energize when the motor position exceeds the upper limit trip point, and can be set up as follows. Note that relay hysteresis parameter (RLY2HY) value is set to 10, which is 10% of range. This means that when the relay is energized, due to the motor position exceeding the upper limit value, the relay will not de-energize until the motor moves to 10% below the trip point.

Set Up Group	Parameter	Value
SET RELAY2	RTYP21	ULim
	R21VAL	70.0
	R21HL	HI
	RTYP22	NONE
	RLY2HY	10.0





Relay Type – Motor Starts

Selecting relay type STRT will cause the relay to trip when the number of motor starts exceeds the selected limit. The motor starts value is stored as one of the maintenance group statistics. This example sets the motor starts limit at 200,000 for Relay 1.

Set Up Group	Parameter	Value
SET RELAY1	RTYP11	STRT
	R11 E∗	X10K
	R11VAL	20
	R11HL	HI
	RTYP12	NONE

The resulting action is that Relay 1 will trip when the number of accumulated motor starts in the maintenance group exceeds 200,000.

Current Out Set Up Group

Table 16 lists the parameters and selections available for the SET CUROUT group.

Table 16 Current Out Set Up Group Parameters

Lower Display Prompt	Upper Display Selections	Parameter Definition
CUROUT		**OUTPUT SIGNAL RANGE**— Selects the signal output range.
	4 – 20 **0 – 20** **1 – 5V** **0 – 5V** **SW E**	**4 to 20 mA** *[default]* **0 to 20 mA** **1 to 5 Volts** **0 to 5 Volts** **Slidewire Emulation**

ATTENTION

If you change the output signal range of the actuator, you must perform an output calibration. See *Calibrate Output*, page 62.

When selecting the output range of the actuator, the 4 – 20 mA selection is factory calibrated, therefore no calibration is necessary. If you change the CUROUT selection, you must perform an output calibration so that the values at the actuator output terminals agree with the CUROUT selection.

Additionally, if you change the CUROUT selection back to 4 – 20 mA from another selection, you must either perform an output calibration or perform a LD CAL function to the output (COUT) to restore the factory calibration values to the 4 – to 20 mA selection. The LD CAL function is in the INPUT set up group.

Communications Set Up Group

Table 17 lists the parameters and selections available for the SET COMM group.

Table 17 Communications Set Up Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
COMM		**COMMUNICATONS PARAMETERS**— Disables or enables parameter displays for Modbus communciations set up.
	DIS	**Disabled**— Locks out access to communications displays and parameters.
	MODB	**Modbus**— Allows access to the communication displays and settings for the parameters listed below.
ADDRES	**1 to 99**	**DEVICE ADDRESS**— Selects device address when used in a Modbus communications loop. Select an address that is unique to other devices on the communications link.
BAUD	**300** **600** **1200** **2400** **4800** **9600** **19.2k**	**BAUD RATE**— Selects the speed of data transfer. All equipment on the link must be set to match the host setting.
XmtDLY	**NONE** **10ms** **20ms** **30ms** **40ms** **50ms**	**RESPONSE DELAY**— Selects the time delay (in milliseconds) before a response to a query is transmitted.
DBLBYT		**FLOATING POINT DATA FORMAT**— Selects the format for transferring floating point data.
		Byte Order
	FP B **FPBB**	**Floating Point Big Endian format**— 0 1 2 3 **Floating Point Big Endian format** with byte-swapped— 1 0 3 2
	FP L **FPLB**	**Floating Point Little Endian format**— 3 2 1 0 **Floating Point Little Endian format** with byte-swapped— 2 3 0 1

Digital Input Set Up Group

Table 18 lists the parameters and selections availible for the SET DIGINP group.

Table 18 Digital Input Set Up Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
DIGINP		**Digital Input State**— Selects the position of the actuator in response to a digital input signal (contact closure).
	NONE	**None**— No action by the actuator.
	UP	**Up**— Actuator motor moves to full scale value.
	DOWN	**Down**— Actuator motor moves to zero value.
	USER	**User selected value**— Actuator motor moves to a customer-selected value. * Allows setting of End Position Value.
EndPos *	**0 – 100.** (in percent)	**END POSITION VALUE**— (DIGINP USER only) Selects the motor position you want the actuator to go to when digital input signal present (contact closure).

Display Set Up Group

Table 19 lists the parameters and selections availible for the SET DISPLA group.

Table 19 Display Set Up Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
DECMAL		**DECIMAL POINT LOCATION**— This selection determines where the decimal point appears in the display.
	8888 *[default]* or **888.8**	**None** **One Place** Note: Be sure the selection agrees with the value to be displayed. If display value requires 4 whole digits, the decimal will not show.
EUNITS		**UNITS DISPLAY**— Selects the units of the position display.
	PCNT	**Percent**— Shows actuator position as a percentage of span. (0 to 100%)
	DEG	**Degrees**— Shows the actuator position in degrees of rotation. (0 to 90°)

Continued on next page ⇒

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
UNITS		**DISPLAY UNITS**— Selects standard for unit values for the local display.
	SI	**SI**— Display will show unit values in international (metric) units. (Temperature in degrees C, Date format: *ddmmyy*)
	ENGL	**English**— Display will show unit values in U.S. units. (Temperature in degrees F, Date format: *mmddyy*)

Lock Set Up Group

Table 20 lists the parameters and selections available for the SET LOCK group.

Table 20 Lock Set Up Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
LOCKID	***nnnn*** *n* = 1 to 9 (Up to a limit of 4095)	**PASSWORD LOCK**— 4-digit password can be selected to provide security access to calibration information, set up parameters and supervisory functions. Password can be a number from 0 to 4095. A password is required in order to change the lock parameter. See *Set/Change Password* on next page.
LOCK		**LOCK OUT FEATURE**— Selects lockout security for calibration and supervisory functions, and set up groups.
	NONE *[default]*	**None**— No lockout of any calibration or set up groups. You select and change set up group values, and perform field calibration.
	CAL	**Calibration**— Lockout for calibration groups SET CALIN, SET CALMTR, SET CALOUT and CAL NCSOUT only. You can select and change set up group values.
	CONF	**Configuration**— Lockout for calibration groups and set up group configuration. You can only scroll through and view set up group values.
	FULL	**Full**— Lockout for calibration and all set up group values. Only SET LOCK and READ STATUS groups are accessible.

Set/Change Password

A password is required to enable and disable lockout features of the actuator. Lock out of calibration information and other supervisory functions are controlled using the password. The password can be any number from 0 to 4095. The password is set and/or changed by using the keys on the kepad and the local display. Follow the steps below to change the password.

NOTE: The LOCK parameter must be set to NONE in order to change the password.

Step	Action
1	Press SET UP key until the display reads SET LOCK.
2	Press the FUNCTION key until the lower display reads LOCKID.
3	The upper display will show 0 (zero). Use the ▲ or ▼ keys to increment the number to the correct password. The default password can also be used. See NOTE below.
4	Press the FUNCTION key so that the lower display reads LOCK.
5	Use the ▲ or ▼ keys so that display reads NONE and LOCK. If the LOCK parameter is not set to NONE, a password must be entered to change the parameter.
6	Press the FUNCTION key until the lower display reads LOCKID.
7	The upper display will show 0 (zero). Use the ▲ or ▼ keys to increment the number to the new password. See NOTE below.
8	Press FUNCTION key to view next parameter, or press DISPLAY to exit set up mode. Password is now set to new value.

NOTE: When changing the value of the number, you can adjust a more significant digit in the upper display by holding in one key ▲ or ▼, and pressing the other ▲ or ▼ at the same time.

The adjustment will move one digit to the left.

Press the key again and you will move one more digit to the left.

Read Status Set Up Group

Table 21 lists the parameters and selections available for the READ STATUS group.

Table 21 Read Status Set Up Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
FAILSF		**FAILSAFE**— *Read Only.* Shows whether actuator is in failsafe.
	NO	**No**— Actuator not in failsafe.
	YES	**Yes**— Actuator in failsafe, see Section 9, *Troubleshooting*.
RAMTST		**RAM TEST DIAGNOSTIC**— *Read Only.* Shows status of RAM test diagnostic.
	PASS	**Pass**— Test passed, no errors
	FAIL	**Fail**— Test failed, see Section 9, *Troubleshooting*.
SEETST		**SERIAL EEPROM TEST DIAGNOSTIC**— *Read Only.* Shows status of serial electrically eraseable PROM test diagnostic.
	PASS	**Pass**— Test passed, no errors
	FAIL	**Fail**— Test failed, see Section 9, *Troubleshooting*.
CFGTST		**CONFIGURATION TEST DIAGNOSTIC**— *Read Only.* Shows status of Configuration test diagnostic.
	PASS	**Pass**— Test passed, no errors
	FAIL	**Fail**— Test failed, see Section 9, *Troubleshooting*.
CALTST		**CALIBRATION TEST DIAGNOSTIC**— *Read Only.* Shows status of Calibration test diagnostic.
	PASS	**Pass**— Test passed, no errors
	FAIL	**Fail**— Test failed, see Section 9, *Troubleshooting*.

Drive Set Up Group

Table 22 lists the parameters and selections available for the SET DRVINF group.

Table 22 Drive Set Up Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
VERSON	***nnnn***	**FIRMWARE VERSION**— *Read Only.* Displays the firmware version currently in use by the actuator's CPU.
SPEED	**10s** **30s** **60s**	**STROKE SPEED**— *Read Only.* The speed is the number of seconds it takes for the actuator shaft to move its full range of travel.
POWER	 **120S** **240S** **240T** **480T** **575T**	**POWER INPUT VOLTAGE AND LINE FREQUENCY**— *Read Only.* Selects the power input voltage and line frequency of the actuator. **120S**— 120 Volts, single phase, 50/60 Hz **240S**— 240 Volts, single phase, 50/60 Hz **240T**— 240 Volts, three phase, 50/60 Hz **480T**— 480 Volts, three phase, 50/60 Hz **575T**— 575 Volts, three phase, 50/60 Hz
TAG	***nnnnnn***	**TAG NAME**— Selects the tag name or identifier of the actuator. Up to 6 alphanumeric characters. See *Set Tag Name* on next page.
MFGDAT	***mmddyy*** ***** *or* ***ddmmyy***	**MANUFACTURING DATE**— *Read Only.* Displays datecode of manufacture for actuator.
LREP	***mmddyy*** ***** *or* ***ddmmyy***	**DATE OF LAST REPAIR**— *Factory set only.* Displays date of last repair.
LCAL	***mmddyy*** ***** *or* ***ddmmyy***	**DATE OF LAST FACTORY CALIBRATION**— *Factory set only.* Displays date of last factory calibration
REPTYP	 **NONE** **01** **02** **03** **04** **05** **06** **07** **08** **09** **10** **11** **12** **13**	**REPAIR TYPE**— *Factory set only.* Displays a repair code to identify the type of repair service previously performed. **None** *Future* **Non-contact Sensor** **Main CPU PWA repair** **Motor service** **Power Distribution PWA service** **Switch repair** **Relay service** **Gear service** **Service to repair water damage** **Service to repair damage caused by heat** **Service to repair due to over-voltage damage** **Actuator reconfigured** **Warranty Repair**

***** NOTE: Date format is set by the UNITS parameter. See SET DISPLA set up group.

Set Tag Name

The actuator tag name can be an alphanumeric name up to six characters. The tag name is set by using the keys on the keypad and the local display. Follow the steps below to set the tag name.

Step	Action
1	Press SET UP key until the display reads SET DRVINF.
2	Press the FUNCTION key until the upper display reads TAG.
3	The lower display contains six digits. A decimal point will be flashing at the leftmost digit for approximately three seconds. Then the decimal point shifts to the right and flashes for three seconds before shifting again to the right. This pattern repeats continuously.
4	Set the digit to the left of the flashing decimal point. Use the ▲ or ▼ keys to scroll through the character set of 0 through 9 and the letters A through Z. Scroll through until the desired character is displayed.
5	Wait for the decimal point to shift to the right and then scroll through using the ▲ or ▼ keys until the next character is displayed.
6	Repeat for each character of the tag until the complete tag name is displayed.
7	Press the FUNCTION key to go to the next parameter, or press DISPLAY to exit set up mode.

Maintenance Set Up Group

The Maintenance set up group consists of information about actuator operation accumulated through time. This information (or maintenance statistics) can be used to evaluate actuator operation and determine predicted or scheduled maintenance periods. Table 23 lists the parameters and selections available for the SET MAINTENANCE group.

Please note that maintenance statistics are written to the EEPROM every 8 hours. Therefore the statistics are saved in the event of a power interruption.

Table 23 Maintenance Set Up Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
TEMP	***nnnn* F ***	**ACTUATOR TEMPERATURE**— *Read Only.* Displays the current internal temperature of the actuator.
TEMPHI	***nnnn* F ***	**HIGH TEMPERATURE LIMIT**— Displays the high temperature limit of the internal actuator temperature since it was last reset.
TEMPLO	***nnnn* F ***	**LOW TEMPERATURE LIMIT**— Displays the low temperature limit of the internal actuator temperature since it was last reset.
hh:mm:ss †	**ACST** †	**ACCUMULATED STALL TIME**— Displays the accumulated stall time of the actuator motor since it was last reset.
STARTS	***nnnn***	**ACCUMULATED MOTOR STARTS**— Displays the accumulated motor starts since it was last reset.
RL*n*CNT *n* = 1, 2, 3 or 4	***nnnn***	**RELAY CYCLE COUNTS**— Displays the accumulated cycle counts of a relay since it was last reset. One relay cycle is when a relay is energized and deenergized.
REGNn *nx* = 0 to 9	***nnnn***	**ACCUMULATED MOTOR STARTS**— Displays the accumulated motor starts in the 1st 10% of motor span since it was last reset. See "*Regions of Motor Travel*" in Section 5
TOTDEG	***nnnn***	**TOTAL DEGREES OF MOTOR TRAVEL**— Displays the total number of degrees of motor travel since it was last reset.
PASSWRD	***nnnn***	**PASSWORD**— 4-digit password is required to enable maintenance reset function. NOTE: Password is set (or changed) from the Lock set up group.

* Temperature units are displayed in degrees C or F, and are set by the UNITS parameter. See SET DISPLA set up group.

† Note that the upper display contains the parameter name and the lower display contains the value. This is to allow for the display of hours: minutes: seconds.

Continued on next page ⇒

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
MANRST		**MAINTENANCE STATISTIC RESET**— Allows reset of the following maintenance statistics:
	NONE	**None**— No reset of maintenance statisitics
	STAL	**Stall**— Resets accumulated stall time to zero.
	STRT	**Motor Starts**— Resets accumulated motor start counts to zero.
	REGN*n* *n* = 0 to 9	**Motor Starts in the Region**— Resets to zero the accumulated motor starts for n^{th} 10% of motor span.
	TEMP	**Temperature Statistics**— Resets the high / low temperature limit statistics to zero.
	TDEG	**Total Degrees**— Resets the total degrees of motor travel to zero.
	REL*n* *n* = 1, 2, 3 or 4	**Relay Counts**— Resets accumulated relay cycle counts to zero for the relay option number displayed.
	ALL	**All**— Resets all maintenance statistics to zero.

CAL NCSOUT Group

The CAL NCSOUT group allows the local display to indicate the output voltage of the non-contact sensor PWA. This group is used for two purposes:

1. To read the NCS output during calibration of the non-contact sensor. Calibration should be performed after the non-contact sensor is replaced or is found to be out of adjustment.
2. To verify that the non-contact sensor is operating and is adjusted properly.

Table 24 shows the selections available for the CAL NCSOUT group.

Table 24 CAL NCSOUT Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
CALNCS	***n.nnn*** *	**NON-CONTACT SENSOR OUTPUT**— *Read Only.* Displays the output voltage of the non-contact sensor PWA

To access the display…

Press		Result
SETUP until you see	*Upper Display* = *Lower Display* =	**CAL** **NCSOUT**
FUNCTION	*Upper Display* = *Lower Display* =	**DIS** **CALNCS**
▲ or ▼ key	*Upper Display* = *Lower Display* =	**BEGN** **CALNCS**
FUNCTION	*Upper Display* = *Lower Display* =	***n.nnn*** (NCS PWA output in volts) **NCSOUT**

Auto - Manual Drive Switch

The Auto - Manual switch is located on the side of the actuator case below the handwheel. The switch allows manual mode control of the actuator motor for set up, calibration and troubleshooting. Figure 14 shows an illustration of the Auto - Manual switch and Table 25 describes the switch settings. The Auto - Manual Drive switch setting overrides all input signals (analog signal and remote setpoint) and local display mode settings.

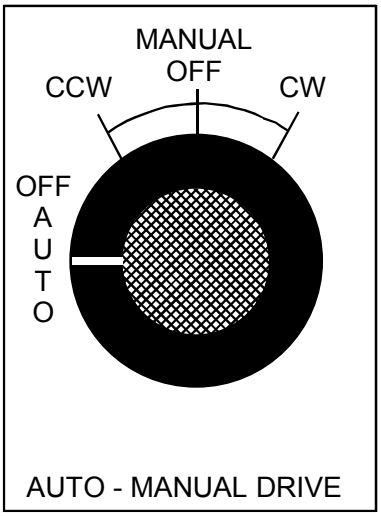


Figure 14 Auto - Manual Switch

Table 25 Auto - Manual Switch Functions

Switch Setting	Motor Drive Control
AUTO	Actuator moves according to signal input and set up configuration.
CCW	Actuator moves to the fully counterclockwise position.
CW	Actuator moves to the fully clockwise position.
OFF	Actuator is idle.

Calibration

Calibration of the 11280S Series Actuator may consist of calibrating the non-contact sensor, calibrating the motor circuit that positions the actuator with 0/4-20mA input signal, and calibrating the slidewire emulation output or the 0/4-20mA output signal.

Calibration is performed by connecting test equipment to the input terminals or output terminals and then using the keypad and display to step through the calibration group functions.

ATTENTION

Input calibraton and output calibrations are performed at the factory and may not be necessary. Normally, you may only need to perform Calibrate Motor.

Only qualified personnel should perform calibration.

Equipment Needed

The table below lists the equipment you will need to calibrate the 11280S input and output circuits.

Procedure	Equipment Needed
Input Calibration	• A calibrated signal source which can provide current (4 to 20 mA) or voltage (0 to 10 V) with an accuracy of 0.02% or better. • Two insulated copper leads for connecting the current source to the actuator.
Output Calibration	• A digital voltmeter with an accuracy of 0.01% or better. • A 250 ohm resistor 0.01% tolerance.

Calibration Set up

Follow the steps below to set up the test equipment and actuator to verify calibration or perform calibration procedures.

Step	Action
1	Connect the copper leads from the signal source to the input terminals of the actuator as shown in Figure 15.
2	Place signal source output at zero and switch power on.
3	Connect a 250 ohm resistor across the Output terminals of the actuator and connect the DVM leads to the terminals.

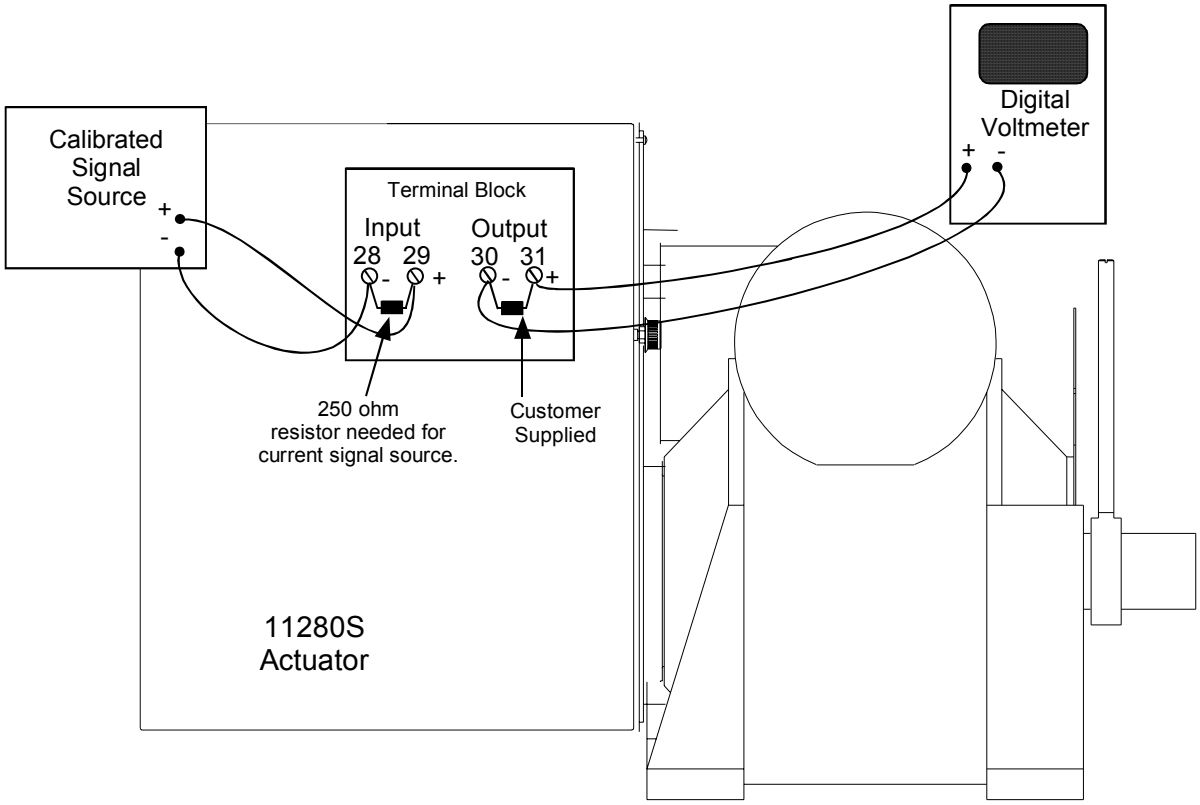


Figure 15 Calibration Wiring Connections

Calibrate Input

The 11280S actuator accepts a variety of signal inputs.

1. 0 to 20 mA, or 4 to 20 mA
2. 0 to 5 Volts,1 to 5 Volts, or 0 to 10 Volts

The input type is selected through the Input set up group using the local keypad.

Refer to Figure 15 for the wiring connections and follow the procedure in Table 26 to calibrate the input circuit of the 11280S actuator.

ATTENTION

For an input calibration to be saved, you must complete the procedure. The calibration will not be saved if you exit without completing the steps of the procedure.

To exit calibation mode, press DISPLAY or SETUP keys.

Table 26 Input Calibration Procedure

Step	Operation	Press	Result
1	Enter Calibration Mode	SETUP until you see	*Upper Display* = **CAL** *Lower Display* = **INPUT**
		FUNCTION	*Upper Display* = **DIS** *Lower Display* = **CAL IN**
		▲ or ▼ key	*Upper Display* = **BEGN** *Lower Display* = **CAL IN**
2	Calibrate Zero (0%)	FUNCTION	*Upper Display* = **APLY** *Lower Display* = **INZERO** • Adjust the signal source to an output value equal to 0% range value. • Wait 5 seconds, then go to step 3.
3	Calibrate Span (100%)	FUNCTION	*Upper Display* = **APLY** *Lower Display* = **INSPAN** • Adjust the signal source to an output value equal to 100% range value. • Wait 5 seconds, then go to step 4.
4		FUNCTION	*Calibration for zero and span input values are now saved. Input calibration is complete.* NOTE: The display will automatically go to the CAL MOTOR set up display. See Table 27. You may also exit calibation mode by pressing the DISPLAY or SETUP keys.

Calibrate Motor

Use the procedure in Table 27 to calibrate the actuator motor for 0% and 100% input signal

ATTENTION

For a motor calibration to be saved, you must complete the procedure. The calibration will not be saved if you exit without completing the steps of the procedure.

Table 27 Motor Calibration Procedure

Step	Operation	Press	Result
1	Enter Calibration Mode	SETUP until you see	*Upper Display* = **CAL** *Lower Display* = **MOTOR**
		FUNCTION	*Upper Display* = **DIS** *Lower Display* = **CALMTR**
		▲ or ▼ key	*Upper Display* = **BEGN** *Lower Display* = **CALMTR**
2	Calibrate Zero (0%)	FUNCTION	*Upper Display* = **APLY** *Lower Display* = **MTR LO** • Use the Handwheeel or AUTO/MANUAL switch to manually drive the actuator motor to its low position. • Wait 5 seconds, then go to step 3.
3	Calibrate Span (100%)	FUNCTION	*Upper Display* = **APLY** *Lower Display* = **MTR HI** • Use the Handwheeel or AUTO/MANUAL switch to manually drive the actuator motor to its high position. • Wait 5 seconds, then go to step 4.
4		FUNCTION	*Calibration for zero and span motor positions are now saved. Motor calibration is complete.* NOTE: The display will automatically go to the CAL CURENT set up display. See Table 28. You may also exit calibation mode by pressing the DISPLAY or SETUP keys.

NOTE: If you are calibrating the motor to a short stroke range, the procedure is the same. See Section 6, *Control Applications*.

ATTENTION

When calibrating the motor to a short stroke range, you must reset the end-of-travel limit switches. See *Setting End-of-Travel Limit Switches*.

Calibrate Output

11280S actuator can be one of three output types:

1. 0 to 20 mA, or 4 to 20 mA output
2. 0 to 5 Volts, or 1 to 5 Volts with 250 ohm range resistor
3. Slidewire emulation.

The output signal range is selected through the Current Out set up group using the keypad and local display.

ATTENTION

Please note that the actuator output is factory calibrated for **only** the 4 – 20 mA output selection. Any other output selection will require you to perform an output calibration. See *Current Out Set Up Group,* page 46.

0/4-20 mA Output

The 11280S actuator is factory calibrated to provide 4 – 20 mA output. If it becomes necessary to do a calibration in the field, adjust the output using the procedure in Table 28. Refer to Figure 15 for a diagram to connect a signal source to the actuator input and a DVM to measure actuator output signal.

This procedure provides the steps to calibrate the actuator for a 4 to 20mA output. If you are using another output type, change the procedure accordingly.

ATTENTION

For an output calibration to be saved, you must complete the procedure. The calibration will not be saved if you exit without completing the steps of the procedure.

To exit calibation mode, press DISPLAY or SETUP keys.

Table 28 Output Calibration Procedure

Step	Operation	Press	Result	
1	Enter Calibration Mode	SETUP until you see	*Upper Display* = **CAL** *Lower Display* = **OUTPUT**	
		FUNCTION	*Upper Display* = **DIS** *Lower Display* = **CALOUT**	
		▲ or ▼ key	*Upper Display* = **BEGN** *Lower Display* = **CALOUT**	
2	Calibrate Zero (0%)	FUNCTION	Upper Display = **xxx** Lower Display = **ZERO** • Read meter connected to actuator output.	

Procedure continued on next page ⇒

Step	Operation	Press	Result
2, cont'd		▲ or ▼ key	• Adjust actuator output to a value equal to 0% output as read from the DVM. NOTE: Typically for a 4 mA output, the display will show a value of approximately 381. A lower limit value is imposed on the zero output. If the value is 357 or lower, the actuator will not allow you to calibrate the zero output. The value must be larger than 357 for a valid calibration.
3	Calibrate Span (100%)	FUNCTION	*Upper Display* = **xxxx** *Lower Display* = **SPAN** • Read meter connected to actuator output.
		▲ or ▼ key	• Adjust actuator output to a value equal to 100% output as read from the DVM. • NOTE: Typically for a 20 mA output, the display will show a value of approximately 1889.
4		FUNCTION	*Calibration for zero and span output values are now stored. Output calibration is complete.*

Calibrate Non-Contact Sensor

ATTENTION

The Non-Contact Position Sensor (NCS) is factory calibrated to a full span, 90 degree rotation. Under normal operation, the NCS does not require calibration.

In calibrating the non-contact position sensor assembly, it is necessary to determine whether the actuator is rotating in a clockwise or counterclockwise direction with increasing control signal. Clockwise and counterclockwise rotation is the direction of the output shaft when facing the end of the shaft and refers to the direction of rotation on increasing signal. Right-hand floor actuators are shipped for counterclockwise configuration and Left-hand floor actuators are shipped for clockwise configuration. Counterclockwise operation moves the shaft in a counterclockwise direction on increasing signal and clockwise on decreasing signal.

NOTE: Before you perform a calibration of the NCS, it is recommended that you first verify the voltage output from the NCS PWA. See "*Non-Contact Sensor Operation*" in section 5 for the procedure.

NCS calibration may be necessary due to any of the following conditions:

- The NCS PWA output is incorrect,
- The NCS PWA in the actuator has been replaced,
- The NCS spoiler adjustment has been disturbed.

When the non-contact sensor PWA has been replaced (or serviced), you should perform a calibration of the NCS circuit and then store it as the motor factory calibration. Please note that performing this procedure will destroy any previously stored motor factory calibration values. Table 29 outlines the steps to perform a calibration to the NCS circuit.

WARNING

While the unit is powered, a potentially lethal shock hazard exists inside the enclosure.

Table 29 Non-Contact Sensor Calibration Procedure

Step	Action
1	Remove AC power to the actuator.
2	Open the electronics enclosure door of the actuator. See Figure 2.
3	Reapply AC power to the actuator.

WARNING

While the unit is powered, a potentially lethal shock hazard exists inside the enclosure.

Procedure continued on next page ⇒

Step	Action
4	Press SET UP key to access the INPUT set up group. Press FUNCTION key until the lower display reads Direct. Press the ▲ or ▼ keys to set Actuator Rotation direction to CCW. NOTE: Actuator direction must be set to CCW for this procedure. Direction can be changed after calibration is complete.
5	Drive the actuator to the 50% position (this refers to the position on the actuator scale for CCW rotation). This should be done manually with the handwheel or with the AUTO - MANUAL switch.
6	Press SET UP key until the display reads CAL NCSOUT. Press the FUNCTION key until the dispaly reads DIS CALNCS. Press the ▲ or ▼ keys until the lower display reads BEGN CALNCS. Press FUNCTION key. The upper display now shows the output of the non-contact sensor PWA in Volts.
7	Loosen the allen screw in the hub of the NCS spoiler just enough to be able to rotate the spoiler. See Figure 16.
8	Adjust the NCS spoiler so that the voltage in the local display is 2.500 + or – 0.020 volts dc. The allen screw should be almost in a vertical position. The bottom edge of the spoiler should almost be horizontal in relation to the NCS PWA. See Figure 16.
9	Tighten NCS spoiler set screw with an allen wrench, holding spoilers located on each side of the NCS PWA in position. **IMPORTANT**: Spoilers need to be held in position both rotationally and longitudinally along the drive shaft extension. An air gap must be maintained between the surface of the PWA and each spoiler. (Any plastic or paper insulating material may be used to create this gap while positioning the spoilers). Make sure that neither spoiler is touching the sensor PWA when the adjustment is complete.
10	Press DISPLAY key to exit calibration mode.
11	Remove AC power to the actuator.
12	Close the enclosure door and secure.
13	Continue with calibration procedure in Table 30.

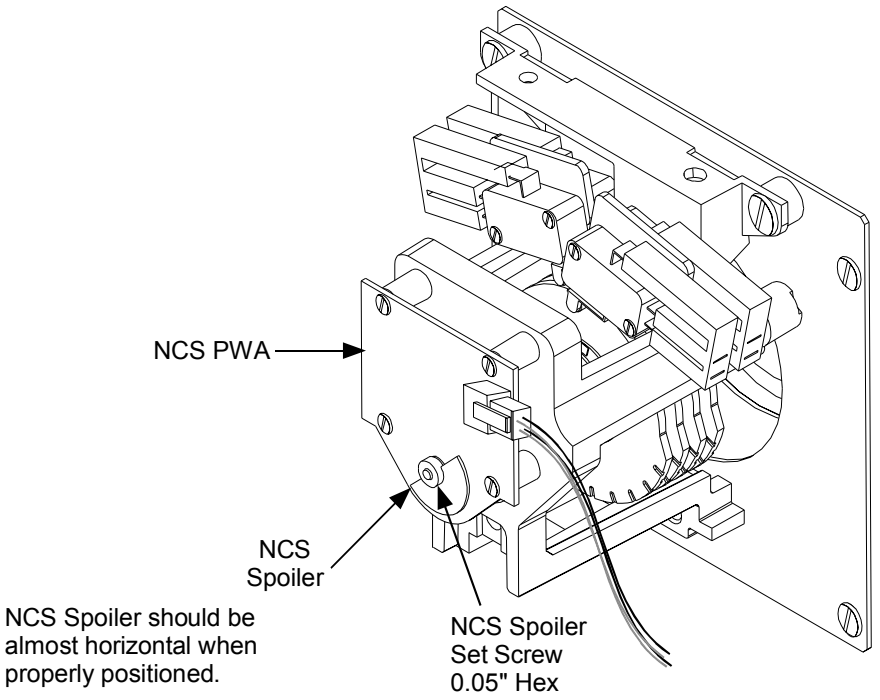


Figure 16 Location of NCS Assembly

Table 30 Load NCS Factory Calibration

Step	Action
1	Reapply AC power to the actuator.
2	Press SET UP key to access the INPUT set up group. Press the FUNCTION key until the display reads LD CAL. Press the ▲ or ▼ keys until the display reads NCS.
3	Perform the Calibrate Motor procedure exactly as in Table 27. Motor calibration must be performed for full span range.
4	When motor calibration is complete, the calibration is now stored as the factory calibration of the actuator motor.

Setting End-of-Travel Limit Switches

ATTENTION

Referring to Figure 17. The first two cams (starting from the back) are for the 0% and 100% limit switches (Switch #1 and Switch #2) and should not need any adjustments as they are factory set to stop the drive precisely at 0% and 100%. The actuator shaft factory settings are shown in Figure 18. See Figure 19 for limit switch settings.

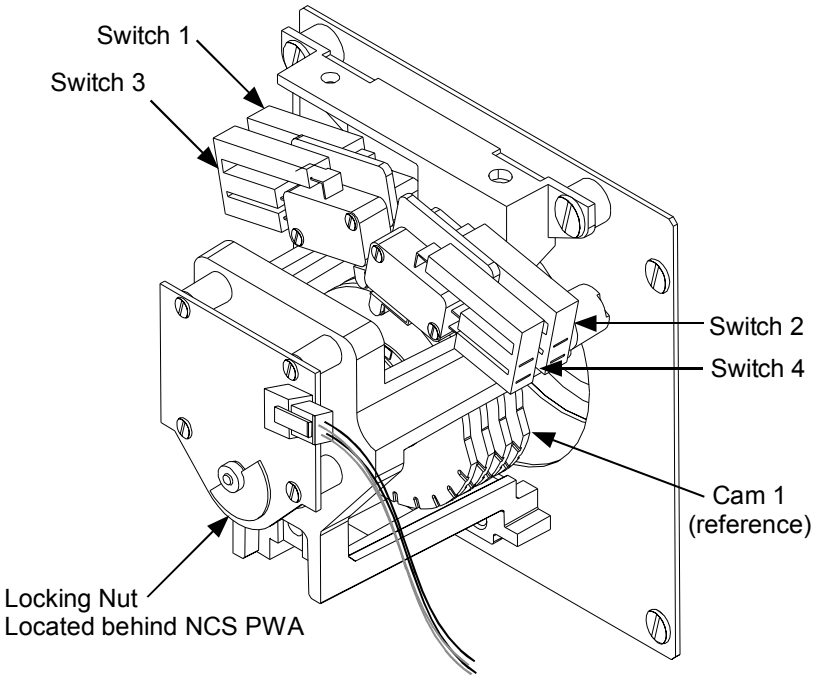


Figure 17 Location of End-of-Travel Limit and Auxiliary Switches

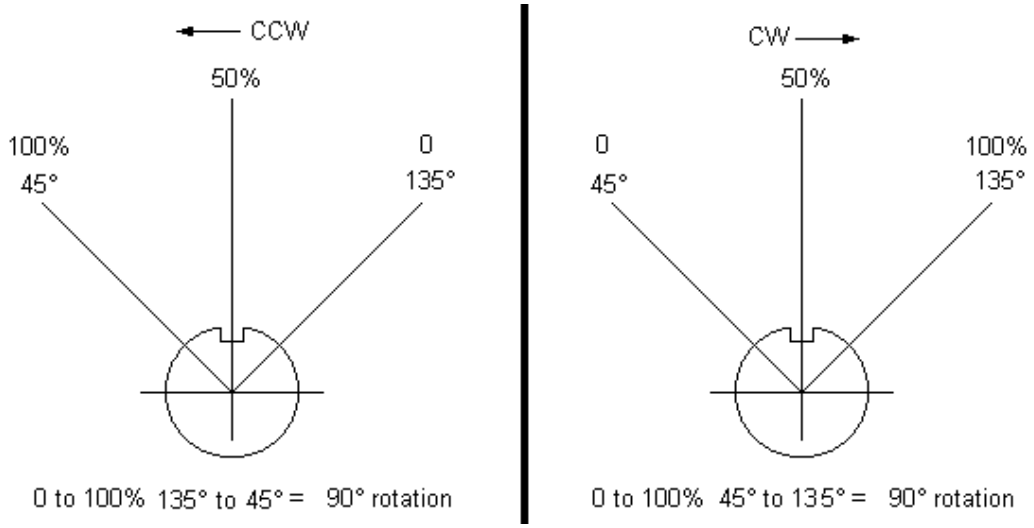
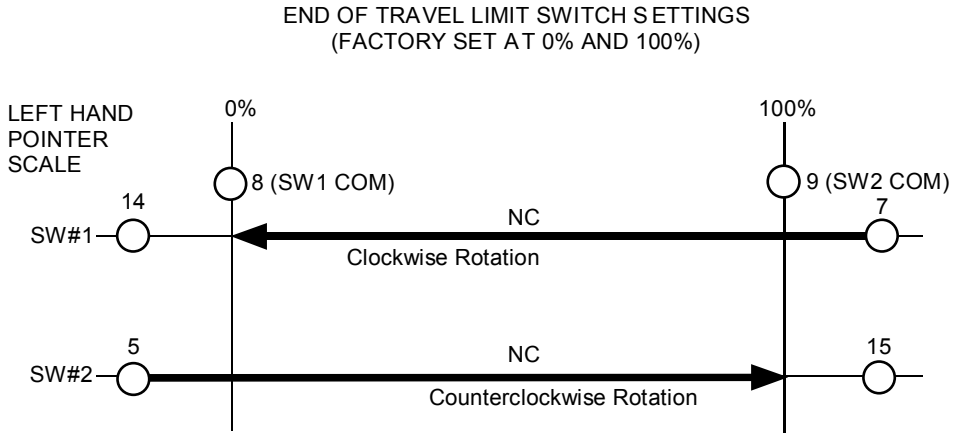


Figure 18 Actuator Shaft Factory Settings



Clockwise and counterclockwise rotation is the direction of the output shaft when facing the end of the shaft. As shown, clockwise rotation of the output shaft activates SW 1 (at 0% on the left hand pointer scale) and CCW rotation activates SW 2 (at 100% on the left hand pointer scale). Terminal numbers are next to the circles.

Figure 19 End of Travel Limit Switch Settings

REFERENCE

An unactuated switch will have its normally closed (NC) contacts closed and its normally open (NO) contacts open.

An actuated switch will have its NC contacts become open and its NO contacts become closed. Both NC and NO contacts are available at the terminal block. (See Table 6.)

An unactuated switch has its roller arm in the up position when adjacent to the reduced diameter portion of the cam.

If it becomes necessary to do adjust the limit switch cams in the field, use the procedure given in Table 31.

WARNING

While the unit is powered, a potentially lethal shock hazard exists inside the electronics enclosure.

Table 31 End-of-Travel Limit Switch Setting Procedure

Step	Action
1	Remove AC power to the actuator.
2	Open the electronics enclosure door of the actuator. See Figure 2.

Procedure continued on next page ⇒

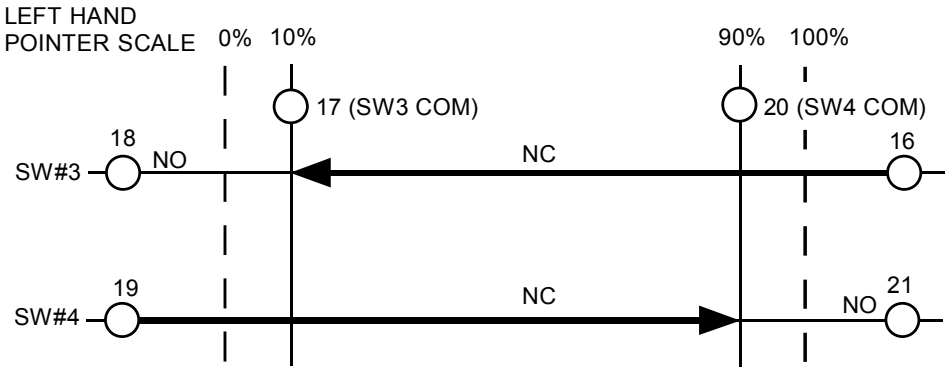
Step	Action
	WARNING While the unit is powered, a potentially lethal shock hazard exists inside the electronics enclosure.
3	Turn the locking nut, found behind the NCS PWA, counter-clockwise using a 1/8" allen wrench or the equivalent inserted into the radial holes in the locking nut until it is possible to turn the cams with your fingers.
4	Using a flat blade screwdriver on the slots at the edge of the cams, or your finger, rotate the cams until the switches are set. (See Figure 17). • Rotate the actuator shaft, using the manual handwheel or the auto-manual switch, to the 0% position (this is the 0% for CCW operation using the left-hand scale or 100% for CW operation using the right hand scale). If the actuator is installed on a damper or valve, also make sure that this position is synchronized with the travel of the final control element. • Rotate the #1 limit switch operating cam to activate at this position. The switch roller arm should go from being in an up, not depressed state, to a depressed state as the cam is rotated in the direction of the shaft rotation going toward the limit position. This will cause the switch to go from NC to NO and turn off the power to the motor when the switch activates. Switch activation may be detected by the clicking sound or with a continuity tester connected to the terminals. Both the NC and NO contact states are available to the customer at the terminals (see Table 6). • Rotate the actuator shaft, using the manual handwheel or the auto-manual switch, to the 100% position (this is 100% for CCW operation using the left-hand scale or 0% for CW operation using the right hand scale). If the actuator is installed on a damper or valve, also make sure that this position is synchronized with the travel of the final control element. • Rotate the #2 limit switch operating cam to activate at this position. The switch roller arm should go from being in an up, not depressed state, to a depressed state as the cam is rotated in the direction of the shaft rotation going toward the limit position. This will cause the switch to go from NC to NO and turn off the power to the motor when the switch activates. Both the NC and NO contact states are available to the customer at the terminals (see Table 6). • If optional auxiliary switches were ordered, these switches may also be set at this time. (See *Setting Auxiliary Switches* in this section.)
5	Once the cams are set in the correct positions, turn the locking nut clockwise until snug tight (it does not have to be "hard" tight and does not have to completely flatten the spring washer).
6	Double check limit switch actuation by first manually driving the actuator to each end of travel and hearing the switch click or by detecting it with a continuity tester. Secondly, drive the actuator to both ends of travel (using the auto/manual switch or by providing minimum and full input signal) and make sure the switches activate and turn off the motor.

Setting Auxiliary Switches

ATTENTION

Referring to Figure 17. The first two cams (starting from the back) are for the 0% and 100% end of travel limit switches (*Switches #1 and #2*) and should not need any adjustments as they are factory set to stop the actuator precisely at 0% and 100%. See *Setting End-of-Travel Limit* in this section.

If optional auxiliary switches were ordered, these switches are factory set to 10% and 90% for switches #3 and #4. Additional switch settings should be set so that switch #3 operates in synchronism with switch #1 (i.e., both activating when the actuator is going in the same direction) and switch #4 to operates in synchronism with switch #2, etc. See Figure 20 for auxiliary switch settings.



Clockwise and counterclockwise rotation is the direction of the output shaft when facing the end of the shaft.
As shown, clockwise rotation of the output shaft activates SW 3 (at 10% on the left hand pointer scale) and CCW rotation activates SW 4 (at 90% on the left hand pointer scale).
Terminal numbers are next to the circles.

Figure 20 Auxiliary Switch Settings

If it becomes necessary to do adjust the auxiliary switch cams in the field, use the procedure given in Table 32.

WARNING

While the unit is powered, a potentially lethal shock hazard exists inside the electronics enclosure.

Table 32 Auxiliary Switch Setting Procedure

Step	Action
1	Remove AC power to the actuator.
2	Open the electronics enclosure door of the actuator. See Figure 2.
	**WARNING** While the unit is powered, a potentially lethal shock hazard exists inside the electronics enclosure.
3	Turn the locking nut, found behind the NCS PWA, counter-clockwise using a 1/8” allen wrench or the equivalent inserted into the radial holes in the locking nut until it is possible to turn the cams with your fingers.
4	Using a flat blade screwdriver on the slots on edge of cams, or your fingers, rotate the cams until the switches are set. (See Figure 17) • The auxiliary switches should be set so switch #3 operates in synchronism with switch #1 (i.e., both activating when the drive is going in the same direction) and set switch #4 to operate in synchronism with switch #2. See Figure 20 for auxiliary switch settings.
5	For Switch #3: • Rotate the actuator shaft, using the manual handwheel or the auto-manual switch, to the desired low scale position. • Rotate the #3 switch operating cam to activate at this position. The switch roller arm should go from being in an up, not depressed state, to a depressed state as the cam is rotated in the direction of the shaft rotation going toward the limit position. This will cause the switch to go from NC to NO and turn off the power to the motor when the switch activates. Switch activation may be detected by the clicking sound or with a continuity tester connected to the terminals. Both the NC and NO contact states are available to the customer at the terminals (see Table 6).
6	For Switch #4: • Rotate the actuator shaft, using the manual handwheel or the auto-manual switch, to the desired up scale position. • Rotate the #4 switch operating cam to activate at this position. The switch roller arm should go from being in an up, not depressed state, to a depressed state as the cam is rotated in the direction of the shaft rotation going toward the limit position. This will cause the switch to go from NC to NO and turn off the power to the motor when the switch activates. Both the NC and NO contact states are available to the customer at the terminals (see Table 6).
7	Once the cams are set in the correct positions, turn the locking nut clockwise until snug tight (it does not have to be “hard” tight and does not have to completely flatten the spring washer).
8	Double check limit switch actuation by first manually driving the actuator to each end of travel and hearing the switch click or by detecting it with a continuity tester. Secondly, drive the actuator to both ends of travel (using the auto/manual switch or by providing minimum and full input signal) and make sure the switches activate and turn off the motor.

Inverter Settings

The motor drive inverter is set up at the factory to optimize 11280S actuator operation and, under normal conditions, does not need to be changed. Provided here for reference, Table 33 lists the inverter settings that have been changed from the Allen-Bradley factory default for 11280S operation.

Table 33 As Shipped Inverter Parameter Settings for 11280S Operation

Parameter	Value	Description
30 (Accel time)	2.0	Change acceleration time from 10 to 2 seconds
31 (Decel time)	0.1 0.2 0.6	Change deceleration time from 10 to 0.1 seconds for ½ HP, ¾ HP and 1 HP Change deceleration time from 10 to 0.2 seconds for 1½ HP & 2 HP Change deceleration time from 10 to 0.6 seconds for 3 HP (Do not set Parameter 31 below the minimum value listed above)
43 (Motor Overload Current)	Varies	Refer to Table 34.
46 (Input mode)	1	Change to 2 wire control
59 (Frequency select)	1	Change to internal frequency command Parameter 58

Depending upon the motor size (HP) your actuator is equipped, set parameter 43, Motor Overload Current, to Full Load Amps (FLA) specified in Table 34 or the motor nameplate.

Table 34 Parameter 43 (Motor Overload Current)

HP	230 Vac – Typical FLA *	460 Vac – Typical FLA *
½	1.6	0.8
¾	2.2	1.1
1	2.6	1.3
1 ½	4.4	2.2
2	5.6	2.8
3	7.8	3.9

*If motor nameplate FLA is different from Table 34, use the motor nameplate FLA.

To Change Inverter Parameters to Allen-Bradley Factory Defaults

1. To change the value of a program group parameter, enter the Program Group by pressing the ESCape key. The “program mode indicator” will illuminate.
2. Press up/down keys until the desired parameter is displayed. In this case press the up key until parameter 56, (Reset Functions) is displayed.
3. Press SELect key. The program mode indicator flashes indicating you can use up/down keys to change the parameter value.
4. Change the function from the idle state of “0” to “1” by pressing the up key.
5. When the desired value displays press the ENTER key. This restores all inverter parameter settings to factory defaults. After the reset update function is complete, this parameter will set itself back to a “0”.

ATTENTION

Revise the inverter parameter settings per Table 33.

Limiting Torque

The torque is limited by setting the following inverter parameters:

- Parameter 42, Motor Overload Select
- Parameter 43, Current Limit

Allen-Bradley User Manual

Allen-Bradley 160 SSC™ Variable Speed Controller (Series C) User Manual is shipped with the actuator. If it is lost or misplaced the user manual can be downloaded from

http://www.allenbradley.com/manuals/dr/index.html#160 .
Document number 0160-5.17ML-EN, May 2000.

5. Start-Up/Operation

Introduction

After the actuator is completely installed, wired, and the preliminary adjustments made, it is advisable to check the operation of the actuator and controlled device before placing it into service. In other words, operate the controlled device and check its direction of travel in response to an increase of the input signal and make sure it is correct for the process. Actuators having the optional auto-manual switch must have the knob set in the AUTO position.

This section provides a checklist that can be used to do a walk-through with the actuator before it is actually used for control. Other features which may be helpful in understanding actuator operation are also provided.

Power Up Diagnostics

When power is applied to the actuator, the actuator electronics performs a diagnostic routine on various device components. These tests include a:

- RAM diagnostic (RAMTST),
- Check of the electrically eraseable PROM (SEETST),
- Verification that valid parameter values are in the actuator configuration (CFGTST),
- Verification of valid calibration values (CALTST)
- Test of the local display and LED indicators (all display segments and LED indicators light simultaneously).

The local display shows the status of the diagnostics as they are completed during power up. TEST DONE is shown on the display when diagnostics are complete and actuator should be in AUTO mode. See Table 21 for more information on the power up diagnostics.

Operations Checklist

To make sure that the actuator is properly installed and set up for your particular application, you should check and verify the following:

- Verify that the configuration is correct for your application by stepping through all set up groups and checking the setting of all set up parameters.
- Verify operation of end-of-travel limit switches.
- Verify operation of auxiliary switches or relay function (if installed).
- Check operation of AUTO - MANUAL DRIVE switch (if present), by setting the knob to the CW and CCW - MANUAL positions. The output shaft should rotate in the direction indicated by the knob. The LED indicator on the local display should also indicate the actuator is in manual mode.

Operating Displays

Pressing the DISPLAY key cycles the display through a number of operating parameters. Table 35 shows a number of sample displays that can be shown during operation.

Table 35 Typical Operating Displays

Display	Description
0.0 **INP**	**Input—** *Upper Display = Shows input value* *Lower Display = prompt*
00 **OP 0.5**	**Output—** *Upper Display = Shows input value* *Lower Display = Shows output value*
100.0 **DE 99.9**	**Deviation—** *Upper Display = Shows input value* *Lower Display = Shows value of deviation of sensor from input.*
0.6 **POS**	**Position—** *Upper Display = Shows value of position sensor.* *Lower Display = prompt* NOTE: Position display will show negative values, if appropriate.

NOTE: When the AUTO/MANUAL key is pressed, placing the actuator in manual mode, only the Position display (POS) is available on the local display. The DISPLAY key is locked out. Set up parameters can be accessed.

Motor Stall

Motor stall conditions may be detected by the actuator electronics and/or the inverter electronics.

Actuator

A stall condition occurs when the motor position does not follow the input, or if the motor does not reach 0.5% of setpoint within a given period of time. The actuator sets the STALLED LED indicator on, along with any other alarms or relays that are programmed to operate when a stall condition is detected. The maintenance statistic for accumulated stall time is incremented.

A stall condition is NOT detected if a limit switch is set while the motor is moving toward setpoint, or if the motor position is within 0.5% of setpoint.

Inverter

Motor stall fault conditions may be detected and annunciated by the inverter electronics to prevent damage to the drive and alarm the operator concerning a possible hazardous condition in external devices.

Stall faults are detected as part of the inverter's active fault system. Active faults are annunciated using parameter 47 (Output Configuration). This parameter configures the TB3 relay function. In addition, the stall fault time may be set using parameter 80 (Stall Fault Time). See the Allen-Bradley Inverter user manual for a full description of the fault parameters.

Non-Contact Sensor Operation

The non-contact sensor (NCS) is magnetically coupled to the output shaft of the actuator so that the sensor detects shaft position. The sensor is adjusted at the factory and under normal conditions, the NCS requires no adjustment. A simple check, using the procedure in Table 36, can verify that the sensor is working properly and that it is in adjustment. Verification of the NCS output is performed by setting the drive motor to its zero, midpoint and 100% positions and observing the output voltage of the non-contact sensor PWA. The actuator has a feature that the NCS output voltage can be read from the local display.

Table 36 Verifying Non-Contact Sensor Output

Step	Action
1	Drive the motor to 50% position.
2	Press SET UP key on the keyboard until the display reads CAL NCSOUT. Press FUNCTION key until the display reads DIS CALNCS. Press the ▲ or ▼ keys until the display reads BEGN CALNCS. Press the FUNCTION key. *Upper Display* = ***n.nnn*** (Output voltage of the non-contact sensor) *Lower Display* = **NCSOUT**
3	The display should read 2.500 + or – 0.100 Volts. *
4	Press DISPLAY key and then drive the motor to zero position. Repeat Step 2. The display should read 1.600 + or – 0.100 Volts. *
5	Press DISPLAY key and then drive the motor to 100% position. Repeat Step 2. The display should read 3.400 + or – 0.100 Volts. *
6	If the NCS needs adjustment, refer to the “Calibrate Non-Contact Sensor” procedure in Table 29 in Section 4.

* The NCS is calibrated at the factory using a precision DVM. The voltage reading on the actuator local display shows an approximate value of the non-contact sensor output. Therefore, when checking the NCS output, a voltage reading on the display of + or – 0.100V is within acceptable operating values.

Remote Setpoint Operation

The 11280S actuator can be set up to receive a digital input through Modbus communications. The actuator uses RS485 communications that supports digital Modbus RTU protocol. To set the actuator so that it can communicate as a slave device on a Modbus data link:

- Make the necessary connections to terminals 33, 34 and 35 on the actuator terminal block. See Figure 21.
- Press the SET UP key on the actuator local keypad to select the Input set up group. Change the Input Type to Remote Setpoint (R_SP).
- Access the Communications Set Up group using the actuator keypad and set the accordingly. See Table 17 in Section 4 for details. Note that actuator communications parameters should be set to the same values as the host device.

There are some restrictions to actuator operation when remote setpoint input is active. In order to provide a bumpless transfer when switching from one input signal type to remote setpoint, the actuator will use the last known analog input value as its setpoint when swtiching to remote setpoint input operation. The actuator motor can only be set to full span (90 degrees of rotation). It cannot be set to a reduced range of rotation. No input filtering is active on the input signal to the actuator.

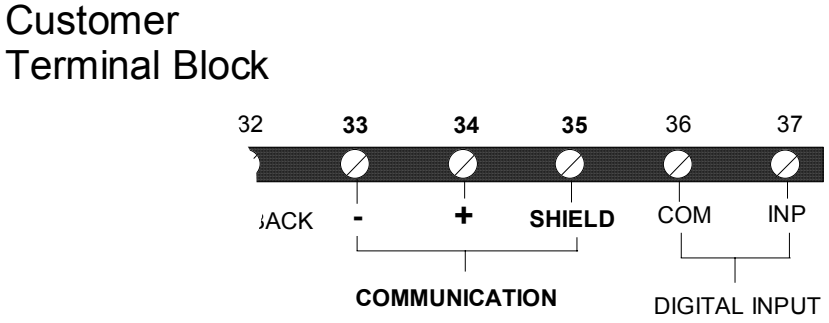


Figure 21 Terminal Block Connections for Modbus Communications

Regions of Motor Travel

The full span of motor travel is 90° rotation. The span is divided into 10 regions of motor travel as shown in Figure 22 (regions are numbered 0 through 9). Maintenance statistics are accumulated on the total number of motor starts, as well as the total number of motor starts that occur in each region of travel during actautor operation. The statistics can be accessed in the maintenance set up group. These statistics can be reset to zero if desired. See Maintenance Set Up Group in Section 4 for more information. The regions of travel are set for full span motor travel (90° rotation). If the actuator is set up to operate in a smaller range, for example between 40% and 80% of full span, the maintenance statistics will show motor starts only in regions 4 through 7.

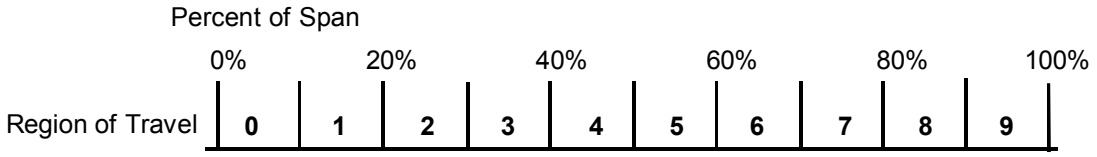


Figure 22 Regions of Motor Travel

6. Control Applications

Introduction

The 11280S Smart Actuator can operate in a variety of control applications. Examples in this section provide procedures for setting up the actuator to operate with a reduced input range and reduced output range. Diagrams show a simple flow application using a single actuator and a proportional flow application using multiple actuators. Connection diagrams are also provieded for these applications.

Reduced Input Range

The 11280S actuator can be set up to operate in a reduced input range for a full span (90º) of motor travel. For example, the actuator can be set up so that an input range of 4 to 16 mA will produce a full span travel of the actuator control arm. Input range can be set to any values within the input type (IN TYP) selections available in the input set up group on page 37.

Split Range Example

The first part of the procedure in Table 37 describes the steps to set up the actuator so that an input current of 4 to 12 mA will produce full span travel of the actuator control arm. The second part of the procedure describes the set up for the actuator to operate with a 12 to 20 mA input to produce a full span travel of the control arm.

Table 37 Split Range Set Up Procedure

Step	Action
To Set Actuator span to operate from 4 to 12 mA input.	
1	Enter Set Up mode by pressing SET UP key
2	Select SET INPUT group
3	Press FUNCTION key until INP HI (on lower display) is selected.
4	Set INP HI value to 50.0
5	Press FUNCTION key to select INP LO and set value to 0.0
6	Press DISPLAY key to exit Set Up mode.
To Set Actuator span to operate from 12 to 20 mA input.	
1	Enter Set Up mode by pressing SET UP key
2	Select SET INPUT group
3	Press FUNCTION key until INP HI (on lower display) is selected.
4	Set INP HI value to 100.0
5	Press FUNCTION key to select INP LO and set value to 50.0
6	Press DISPLAY key to exit Set Up mode.

ATTENTION

Be sure to review failsafe strategy for your process application.

Reduced Output Range

The 11280S actuator can be set to operate in a reduced output range (short stroke). The actuator control arm will operate at a reduced range (less than 90º)of travel in response to a full range input signal. To set up the actuator for short stroke operation, see Calibrate Motor on page 61 for the procedure.

Master/Slave Arrangement

With the motor positioner, the input signal to the actuator is a 4 to 20mA from a current output controller as shown in the flow diagram in Figure 23.

Unlike the position output controller, the current output controller must provide a continuous analog signal to the actuator otherwise the actuator will revert to one of its failsafe states. Signal failure is not a problem since the available failsafe settings allow you to set the actuator position on signal loss.

Basic Flow Control

When the process variable signal is below set point, the controller increases current (4 to 20mA) to the actuator input and opens the valve. Controller set point governs valve position to obtain desired flow rate.

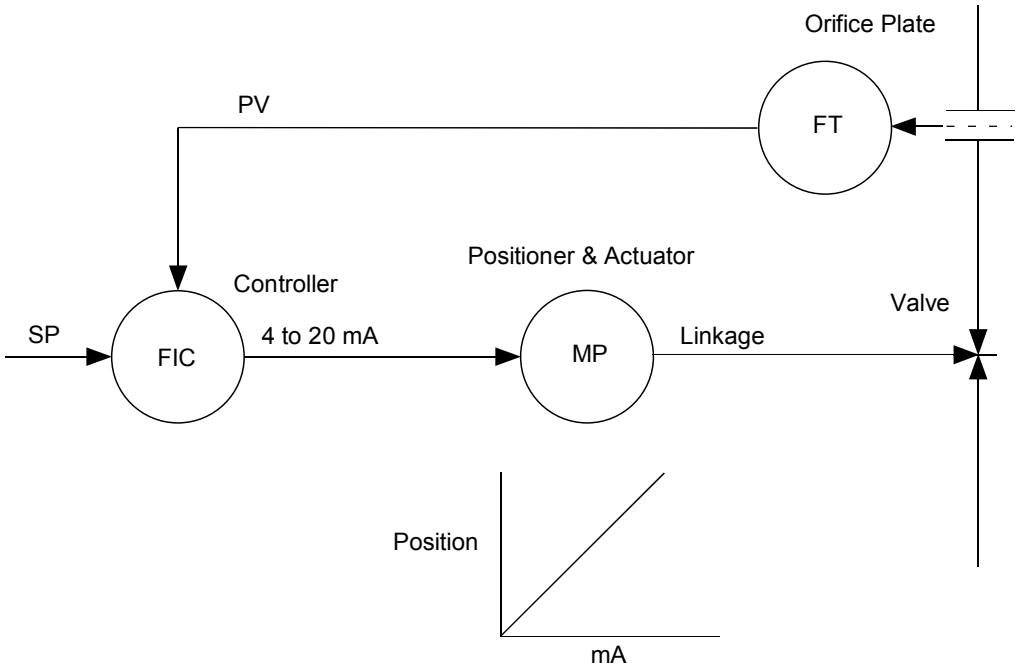


Figure 23 Flow Diagram

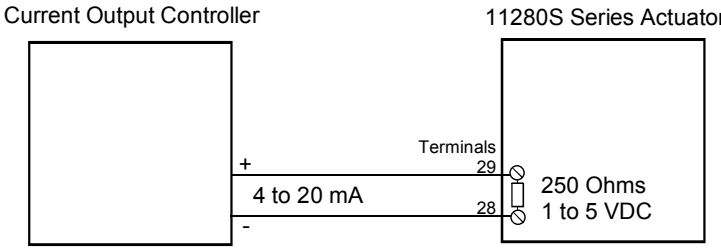


Figure 24 Interconnection Diagram for a Single Actautor

Proportional Flow using Multiple Actuators

Refer to flow diagram in Figure 25 and interconnection diagrams in Figure 26. The controller governs the fuel flow rate to one burner. Only that flow is measured. Since #2 and #3 motor positioners receive the same signal as #1 motor positioner, valves #2 and #3 will deliver the same amount of fuel. This is true when the span and zero adjustment are all set the same as in curve 2 of the graph. Other relationships between units exist if the span adjustment (3) for ratio or if the zero adjustment is changed (1) for bias.

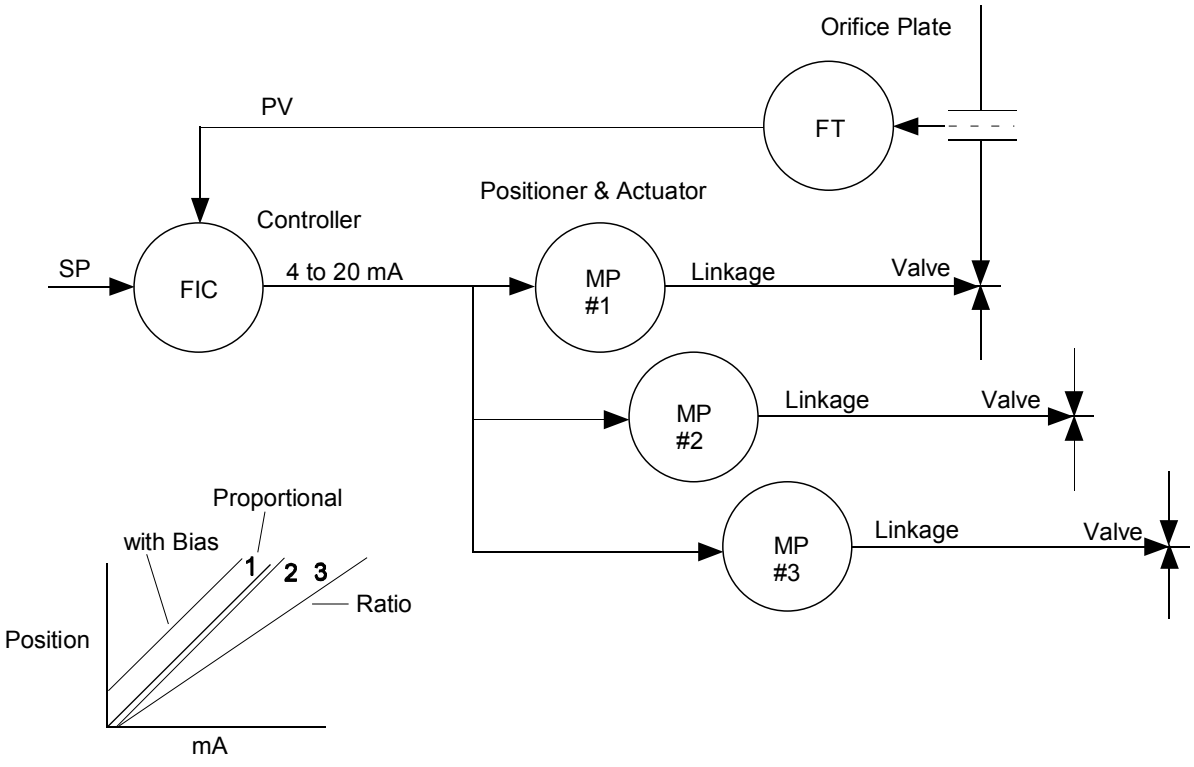
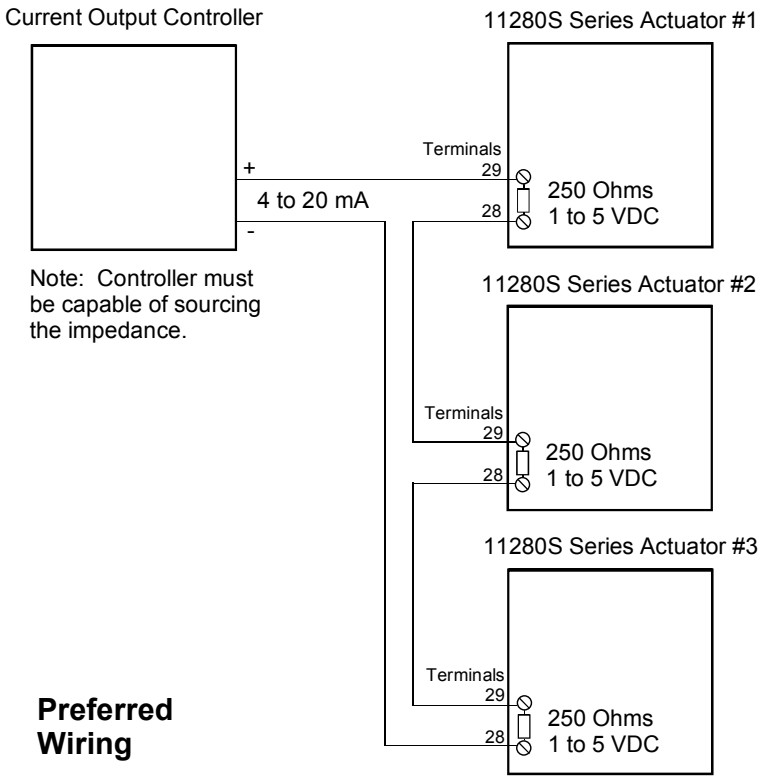


Figure 25 Proportional Flow Using Multiple Actuators



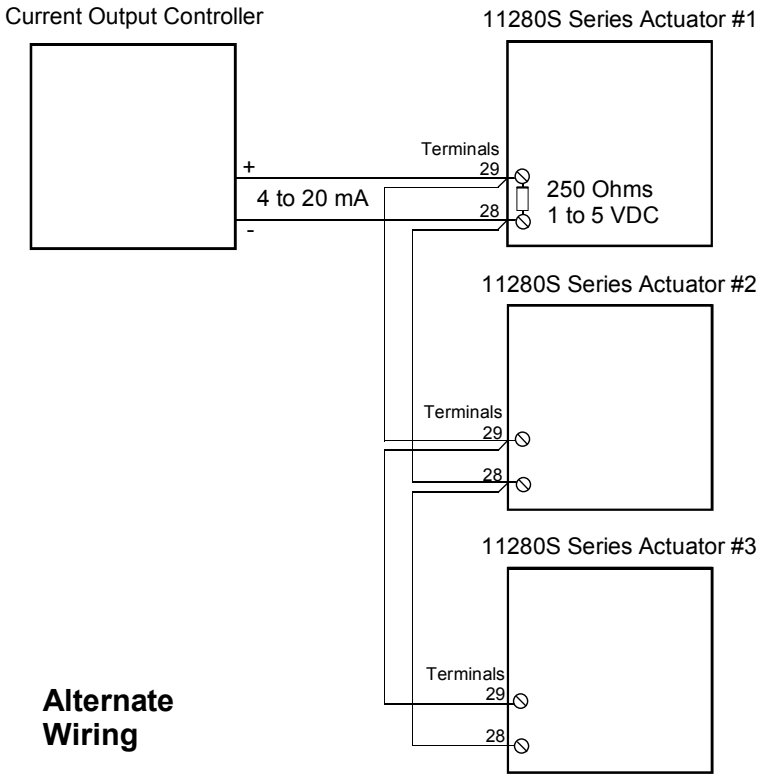
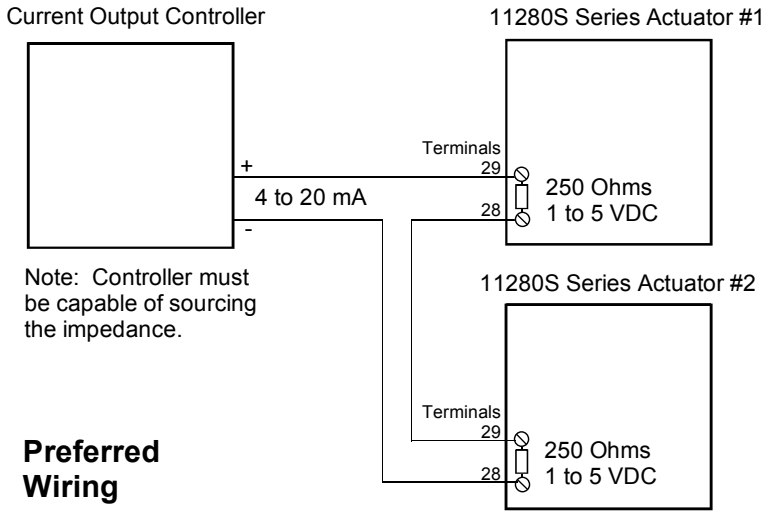


Figure 26 Multiple Actuator Interconnection Diagrams

Split Valve Configuration

A common heat or cool type process requires two valves. In this case the controller has only one output. The two actuators are set up according to the split range procedure on page 79, Actuator #1 is connected to one valve and responds to a 4 to 12mA input. Actuator #2 is connected to the second valve and responds to 12 to a 20mA input. At 12mA both valves are closed, one valve opens below 12mA and the other valve opens above 12mA. Refer to Figure 27 for an interconnection diagram for split valve operation using two actualtors.



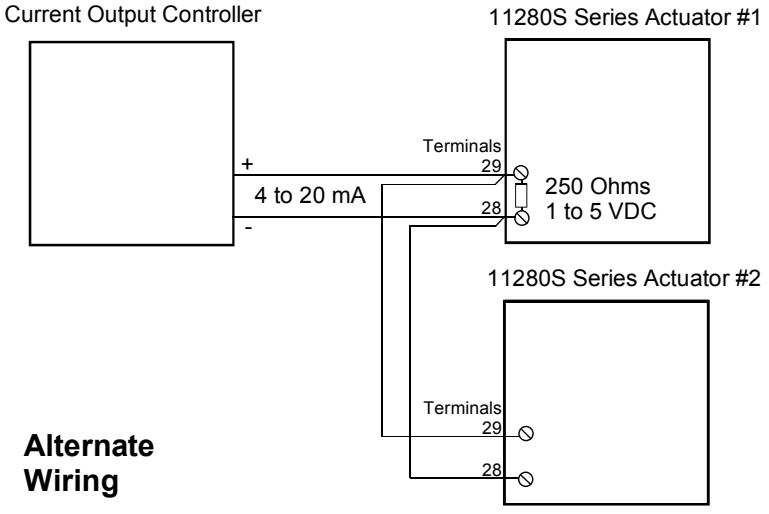


Figure 27 Interconnection Diagrams

7. Maintenance

Introduction

There is some basic maintenance that is recommended for the 11280S Series Smart Actuators. The electronic PWAs within the actuator require no maintenance or servicing under normal conditions.

If there is a problem, refer to information in this section as well as Section 9 – Troubleshooting.

Basic Maintenance

Non-Contact Sensor

Under normal conditions the non-contact sensor PWA does not require maintenance.

Gear Box Lubrication

At 3-month intervals, check the oil level in the gear box. See outline dimension drawings Figure 3 and Figure 4 in Section 3 for the location of the oil level plug and breather plug. Remove the plug tagged OIL LEVEL and verify that the gear box is filled up to this hole. If it is not, remove the breather plug on the top of the gear box and add oil to bring the level up to the proper point.

CAUTION

Too much oil will cause excessive heating and oil leakage at the shaft openings, while insufficient oil will cause undue wear of gears or bearings.

Always replace the oil when it becomes dirty. The oil should be free from moisture, as moisture will cause foaming and will result in oil leakage. The gear box should be drained and refilled annually.

The recommended lubricant for operation in ambient temperatures between –28 °C (–20 °F) and +65 °C (+150 °F) is Mobil Synthetic bearing and gear lubricant SHC 634 (ISO 460) or equivalent.

Replacement Procedures

Relay PWA Replacement

Up to two Relay PWAs can be installed in the electronics enclosure. If a relay PWA needs to be replaced, follow the procedure in Table 38 to access and replace the PWA.

WARNING

Disconnect power to the actuator before opening the actuator electronics enclosure. More than one switch may be required to disconnect all power. A potentially lethal shock hazard exists inside the enclosure if the unit is opened while powered.

Table 38 Relay PWA Replacement Procedure

Step	Action
1	Remove AC power from actuator and any relay contacts.
2	Open the electronics enclosure door of the actuator.
3	Locate the defective relay PWA that needs replacement. NOTE: Each Relay PWA contains two relay circuits. Relay circuits #1 and #2 are located on one relay PWA, (Position “A” in Figure 28); and relay circuits #3 and #4 are located on the other PWA (Position “B” in Figure 28).
4	Disconnect the wire connector from the relay PWA.
5	Carefully remove the relay PWA. Turn the locking tabs of the card guides away to unlock the PWA and slide it out from the card guides.
6	Install the replacement relay PWA by sliding it into the card guides until it mates with the Main CPU. Turn the locking tabs on the card guides to secure the PWA in place.
7	Plug in wire connector to relay PWA.
8	Close the enclosure door and secure.

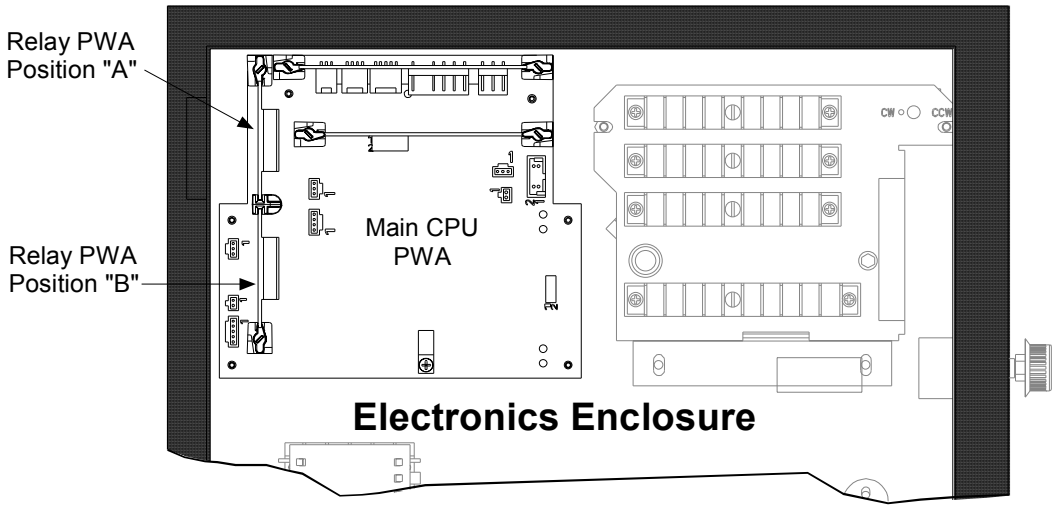


Figure 28 Relay PWA Locations

Changing Actuator Output

There are mechanical jumpers located on the CPU PWA that determine the actuator output signal type (4 to 20 mA or slidewire emulation). If it becomes necessary to change the output of the actuator from a 4 to 20 mA analog output to a slidewire emulation, or vise versa, follow the procedure in Table 39.

WARNING

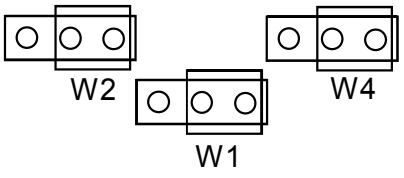
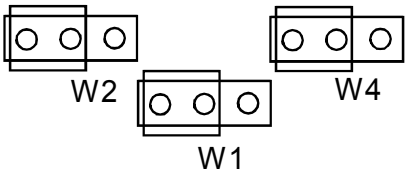
Disconnect power to the actuator before opening the actuator electronics enclosure. More than one switch may be required to disconnect all power. A potentially lethal shock hazard exists inside the enclosure if the unit is opened while powered.

Table 39 Changing Actuator Output Type

Step	Action
1	Remove AC power from actuator and any relay contacts.
2	Open the electronics enclosure door of the actuator.
3	Locate the Main CPU PWA inside the enclosure. See Figure 28.
4	Locate the mechanical jumpers W1, W2, and W4 on the CPU PWA. See Figure 29.

Procedure continued on next page ⇒

Step	Action
5	Set the jumpers according to the desired output type. See Figures.

Jumper settings for Slidewire Emulation output	**Jumper settings for 0/4 to 20 mA output**
	

6	Close the enclosure door and secure.
7	Perform Output Calibration procedure, Table 28 in Section 4.

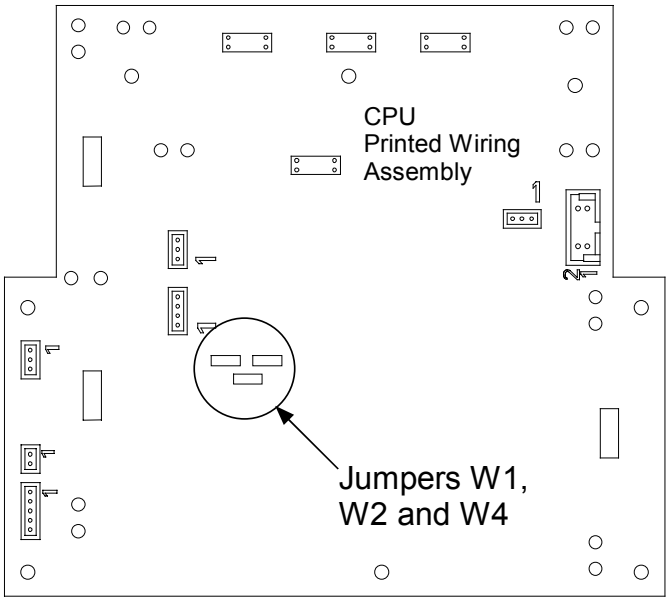


Figure 29 Jumper Location on CPU PWA

Motor Replacement

WARNING

Disconnect power to the actuator before opening the actuator electronics enclosure. More than one switch may be required to disconnect all power. A potentially lethal shock hazard exists inside the enclosure if the unit is opened while powered.

Failure to do so may result in personal injury or death.

Step	Action
1	Remove AC power from actuator and any relay contacts. Wait 3 minutes for the capacitors in the inverter to discharge to safe voltage levels.
2	Locate and open motor junction box cover located on top of the motor housing. See Figure 30.
3	Write down the motor wire number(s) connected to the Black, White and Red wires inside the motor junction box. Write down other motor wire numbers that are connected together. Disconnect the Black, White and Red wires from the motor wires. Disconnect the ground wire (green) from the motor.
4	Disconnect the conduit fitting from the motor junction box. Remove the wires in the conduit from the motor junction box.
5	Unbolt the motor from the adapter. Save the 4 bolts to mount the replacement motor. **Be careful, the motor is heavy!**
6	Align the coupling on the replacement motor to mate with the coupling in the adapter. Make sure the spider is in the adapter coupling.
7	Mount the motor using the 4 bolts saved from the removal of the old motor.
8	Open the motor junction box and knock out the appropriate hole in junction box to accommodate the conduit connection.
9	Feed the wires from conduit into motor via the hole in the motor junction box. Connect the conduit fitting to the junction box.
10	Connect the ground wire (green) to the motor. Connect the numbered motor wires to the Black, White and Red wires according to the wiring list written down in step 3. Connect motor wire numbers that were previously connected together according to the wiring list. Use Table 40 as a reference for wiring the motor.

Procedure continued on next page ⇒

Step	Action
11	Close and secure the motor junction box cover.
12	Apply power to actuator.
13	If motor runs backwards, interchange L1 and L3 connections in the motor junction box.

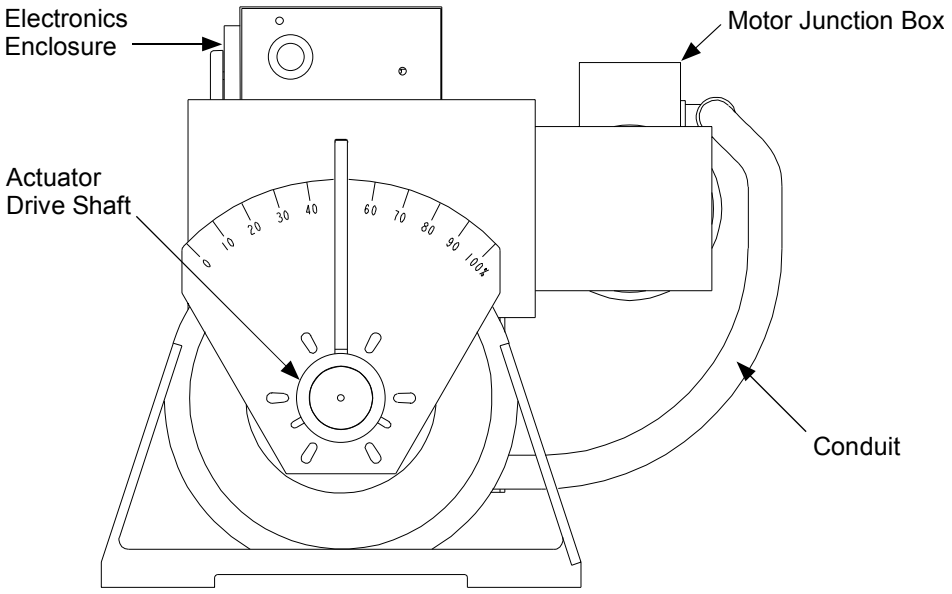


Figure 30 Motor Junction Box Location

Table 40 Motor Wire Connections

Actuator Model Number	120 – 240 Vac	High Voltage 380 Vac – 575 Vac
1128XS-1 1128XS-2 1128XS-4	Black to motor wires 3 & 9 Red to motor wires 2 & 8 White to motor wires 1 & 7 Motor wires 4, 5 & 6 tied together	
1128XS-5 1128XS-6		Black to motor wire 3 Red to motor wire 2 White to motor wire 1 Motor wires 4 & 7 tied together Motor wires 5 & 8 tied together Motor wires 6 & 9 tied together

8. Replacement/Recommended Spare Parts

Introduction

This section provides you with a complete list of all the spare parts that may be needed for the 11280S Series Actuators and optional equipment. Each kit contains replacement parts accessories and instructions for component replacement. The numbers in Figure 31 identify the location of various actuator replacement components and are keyed to parts kits listed in this section.

Actuator Electronics Enclosure

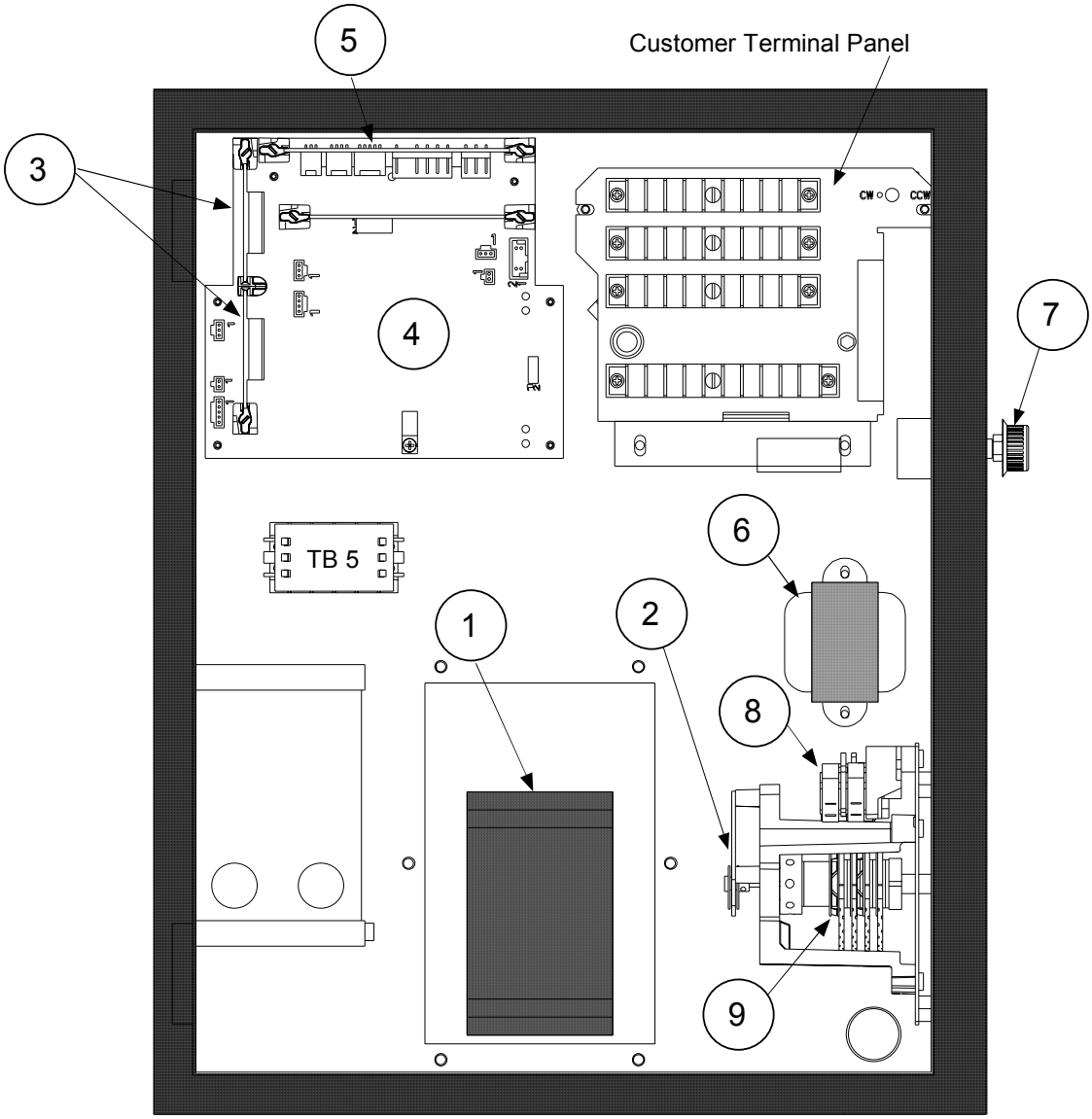


Figure 31 Location of 11280S Actuator Parts

Replacement Motors

51500272-50x

HercuLine Actuators	Description Motor Size	Honeywell Part Number	Allen-Bradley	Leeson
11284S-X-1	3/4 HP Motor	51500272-502	1329RS-HAF7518MVF Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway	114213 Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway
11284S-X-2	1/2 HP Motor	51500272-501	1329RS-HA0F518MVF Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway	101780 Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway
11284S-X-3	1/2 HP Motor	51500272-501	1329RS-HA0F518MVF Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway	101780 Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway
11285S-X-1	1 HP Motor	51500272-503	1329RS-HA00118HAV Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway	121066 Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway
11285S-X-2	3/4 HP Motor	51500272-502	1329RS-HAF7518MVF Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway	114213 Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway
11285S-X-3	1/2 HP Motor	51500272-501	1329RS-HA0F518MVF Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway	101780 Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway
11286S-X-1	2 HP Motor	51500272-505	1329RS-KA00218MCF Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway	121065 Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway
11286S-X-2	1 HP Motor	51500272-503	1329RS-HA00118HAV Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway	121066 Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway
11286S-X-3	3/4 HP Motor	51500272-502	1329RS-HAF7518MVF Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway	114213 Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway
11287S-X-2	3 HP Motor	51500272-506	1329RS-VA00318MCF Motor Lovejoy coupling L095 1 1/8 Bore, 1/4 x 1/8 Keyway	131257 Motor Lovejoy coupling L095 1 1/8 Bore, 1/4 x 1/8 Keyway
11287S-X-3	2 HP Motor	51500272-505	1329RS-KA00218MCF Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway	121065 Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway
11288S-X-1	2 HP Motor	51500272-505	1329RS-KA00218MCF Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway	121065 Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway
11288S-X-2	1 HP Motor	51500272-503	1329RS-HA00118HAV Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway	121066 Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway
11288S-X-3	3/4 HP Motor	51500272-502	1329RS-HAF7518MVF Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway	114213 Motor Lovejoy coupling L095 5/8 Bore, 3/16 x 3/32 Keyway
11289S-X-1	3 HP Motor	51500272-506	1329RS-VA00318MCF Motor Lovejoy coupling L095 1 1/8 Bore, 1/4 x 1/8 Keyway	131257 Motor Lovejoy coupling L095 1 1/8 Bore, 1/4 x 1/8 Keyway
11289S-X-2	2 HP Motor	51500272-505	1329RS-KA00218MCF Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway	121065 Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway
11289S-X-3	1 1/2 HP Motor	51500272-504	1329RS-KA1F518MCF Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway	121066 Motor Lovejoy coupling L095 7/8 Bore, 3/16 x 3/32 Keyway

Replacement Parts

① Inverters and External Transformers

HercuLine Actuator Model	Honeywell Part Number	Description
11284, 5, 6, 8, 9S-1-X	51204882-501	200-240V , 50/60 Hz Single Phase Variable Speed Drive (Inverter)
	51205561-501	120/240 Vac 1 Phase Transformer (Step-up transformer)
11284, 5, 6, 8, 9S-2-X	51204882-501	200-240 V, 50/60 Hz Single Phase Variable Speed Drive (Inverter)
1128XS-3,4-X	51204882-502	200-240 V, 50/60 Hz 3 Phase Variable Speed Drive (Inverter)
1128XS-5-X	51204882-503	380-460 V, 50/60 Hz 3 Phase Variable Speed Drive (Inverter)
1128XS-6-X	51204882-503	380-460 V, 50/60 Hz 3 Phase Variable Speed Drive (Inverter)
	51204954-501	575/460 Vac 3 Phase Transformer (Step-down transformer)

Crank Arm

Kit #51204679-50x

HercuLine Actuator Model	Honeywell Part Number	Description
11284, 5, 6S	51204679-501	11284, 85 and 86S Crank Arm, 2” shaft hole
11287, 8, 9S	51204679-502	11287, 88 and 89S Crank Arm, 2 ½” shaft hole

② Non-Contact Sensor Kit

Kit #51500657-501

Part Description
Non-Contact Sensor PWA
NCS Set Up Gauge
Screws, #4-40 X 5/16”
NCS Wire Assy
Kit Instruction

③ Relay PWA Replacement Kit

Kit #51450802-501

Part Description
Relay PWA
Kit Instruction

④ Main CPU PWA Assembly

Kit #51500163-502

Part Description
Assembly Drawing
Screws, #6-32 X ¼”
Main CPU PWA
Card Guide Assy.
Card Guide Middle
Screws, #6-32 X 3/8”
Screw Tap 6-32 X 3/8”
Kit Instruction

⑤ Power Distribution PWA

Kit #51500166-502

Part Description
Power Distribution PWA
Kit Instruction

⑥ Transformer Kit

Kit #51500457-501

Part Description
Transformer
Cable Ties
Screws, #6-32 X 3/8”
Kit Instruction

Display PWA

Kit #51451231-501

Part Description
Display PWA
Screws #4-40 X 3/8”
Kit Instruction

⑦ Auto/Manual Switch Kit

Kit #51500581-502 Auto/Manual Switch Kit

Part Description
Auto/Manual Switch/Wire Assy (11280S)
Auto/Manual Label
Knob
Shrink Tubing
Kit Instruction

⑧ Limit/Auxiliary Switch Kits

Kit #51205550-502 Switch Kit

Part Description
Switch Bracket
Screws, #10-32 X ½”
Lockwasher, #10
Washer (N) #10
Switch Support Bracket
Switches
Switch Insulator
Screw, #4-40 X .75”
Lockwasher, #4
Washer (N) #4
Screw, #4-40 X 1.25”
Screw, #4-40 X 1.75”
Cable Assy, Switch
Kit Instruction

⑨ Cam Kits

Kit #51205553-501 Cam Assembly Kit

Part Description
Bushing, Cam
Screw, Soc Set #10-32 X ¼"
Locking Nut
Washer, Toothed
Washer, Cam
Spacer, Cam
Cam
Kit Instruction

Relay PWA Upgrade Kit

Kit #51450802-502

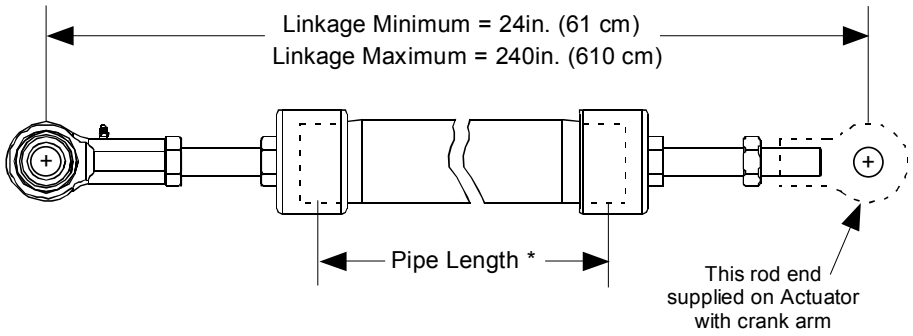
Part Description
Relay PWA Replacement Kit
Relay Wire Assembly
Plug, 3-Position
Labels
Kit Instruction

Honeywell Actuator Linkage Analysis Software (HAL)

Part Number: 51197910-001

Linkage Parts/Kits

Pipe Kit			
*Overall linkage length, inches (cm)**			
Min.	**Max.**	**Pipe Size**	**Kit Number**
24 (60.96)	240 (609.60)	2 ½ (6.35)	51204875-501

Pipe Kit	

***** Pipe length = Overall linkage length minus (-) 20 inches (51 cm).

9. Troubleshooting

Introduction

Troubleshooting procedures can be followed when inaccurate or faulty actuator operation is detected. In this section, troubleshooting procedures consist of a few simple flow charts to test for proper function of various actuator components. Component replacement is at the PWA or assembly level.

Table 41 indicates some of the observable symptoms of failure that can be identified by noting the faulty actuator operation.

Table 41 Observable Symptoms of Failure

Symptom	Procedure
No Actuator current output.	Replace CPU PWA Assembly
No Actuator slidewire output.	Replace CPU PWA Assembly
Local display does not light.	See Figure 32
Actuator fails one or more power up diagnostics.	See Figure 33
Actuator motor does not drive in response to input signal.	Perform input calibration. See Figure 32
Actuator motor does not run.	Refer to Inverter user manual
Actuator motor does not drive to proper position.	Perform motor calibration. See Table 27.
Non-contact sensor position is not correct.	See “Non-Contact Sensor Operation” in Section 5.
Auto/Manual Switch does not operate correctly.	See Figure 35
Relay(s) does not operate.	See Figure 36

Troubleshooting Procedures

Overview

Follow the procedure or flow chart to test for and determine actuator component operation. When using the flow charts for troubleshooting, you may be instructed to go to another flow chart in order to identify the faulty component. Instructions for replacing actuator components can be found either in Section 7, Maintenance or in the kit with the replacement components.

Equipment needed

You will need the following equipment in order to troubleshoot the symptoms listed in the tables that follow:

DC Milliammeter – mA DC

Calibration source – Volt, mA, etc.

Digital Voltmeter

Safety precautions

Exercise appropriate safety precautions when troubleshooting the actuator operation.

WARNING

While the unit is powered, a potentially lethal shock hazard exists inside the electronics enclosure. Do not open the enclosure while the unit is powered. Do not access the terminals while the unit is powered.

Test for Actuator Operation

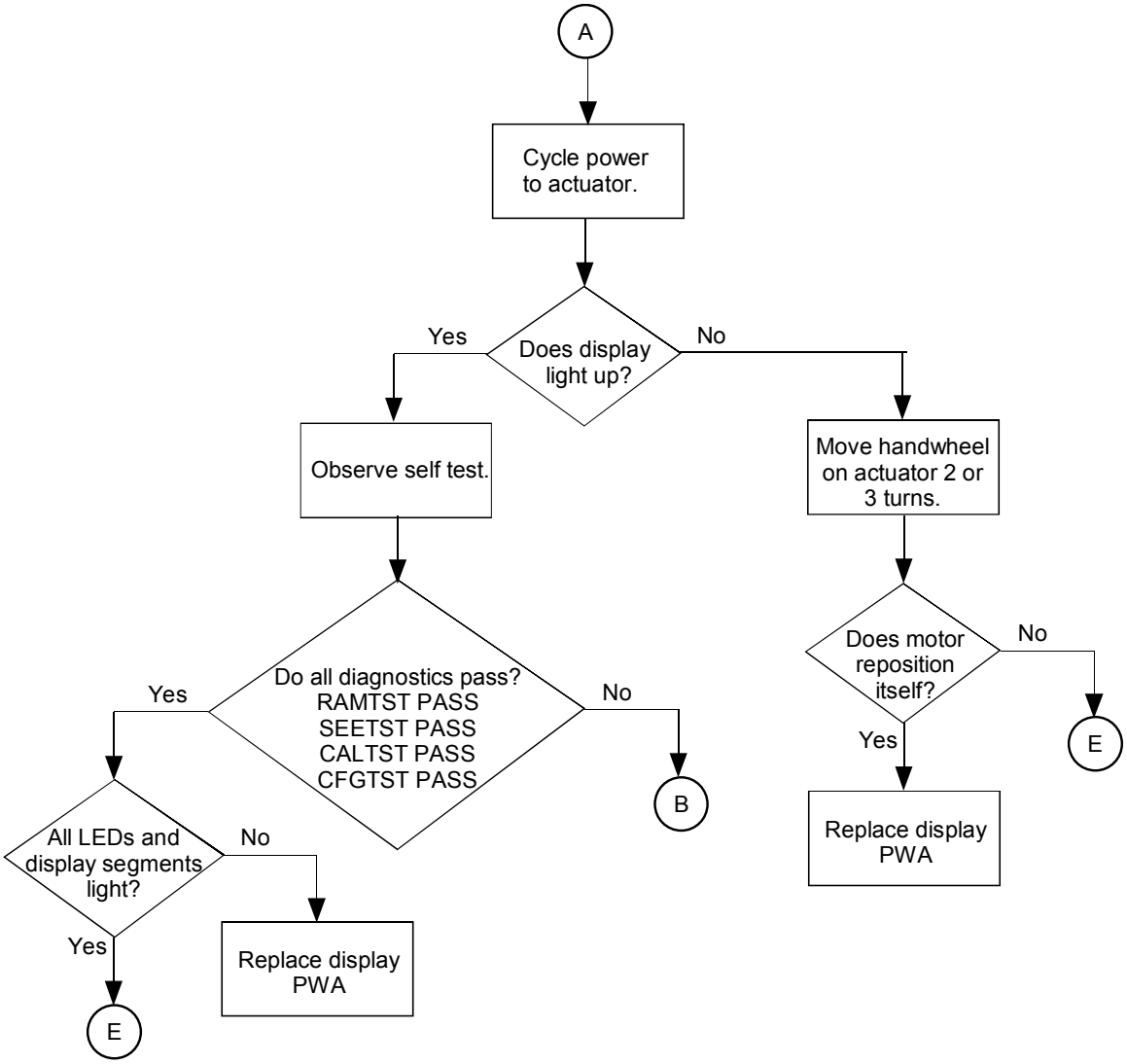


Figure 32 Test for Actuator Operation

Power Up Self Test Diagnostics

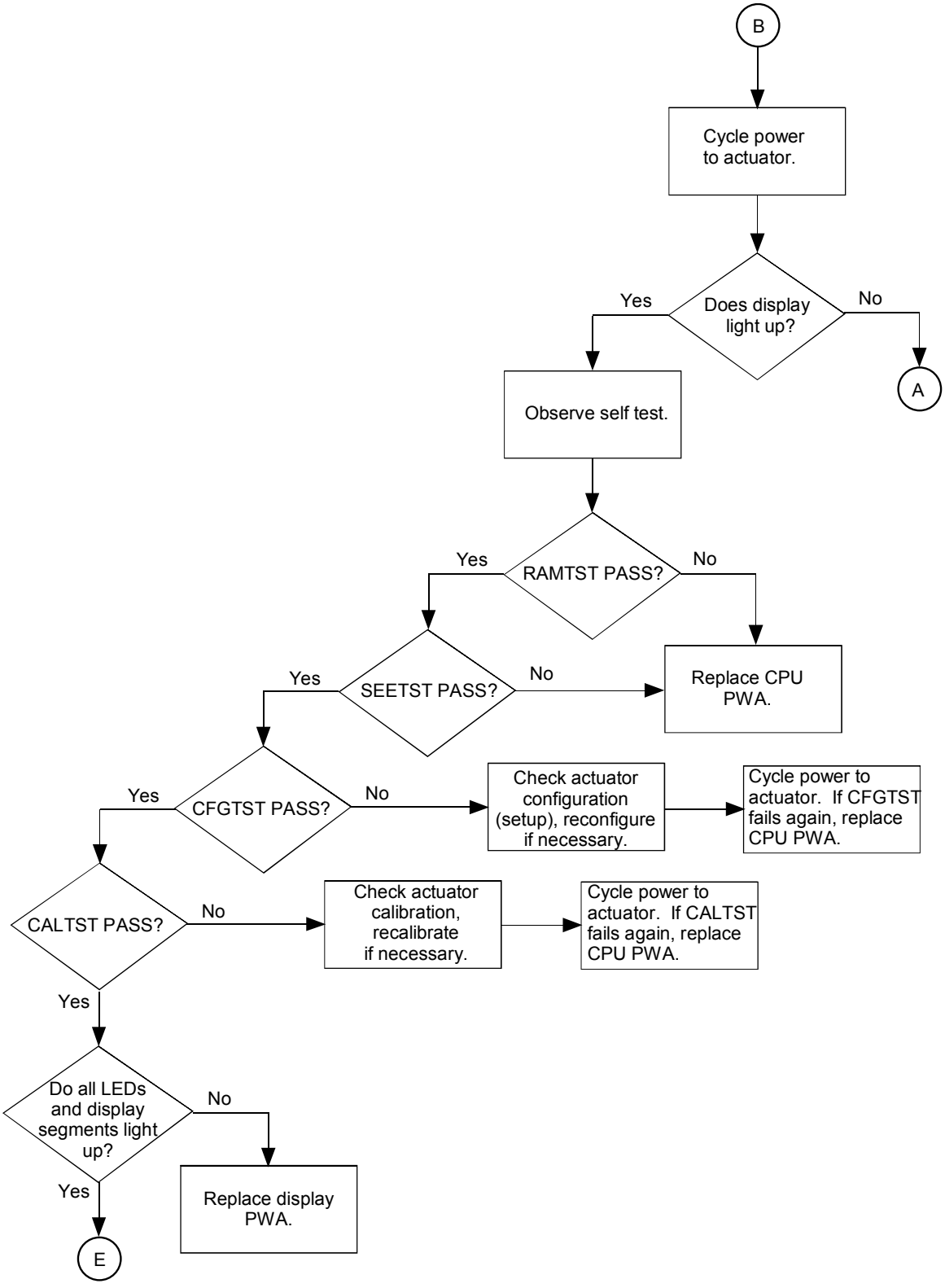


Figure 33 Power Up Diagnostics

Test Power Distribution PWA

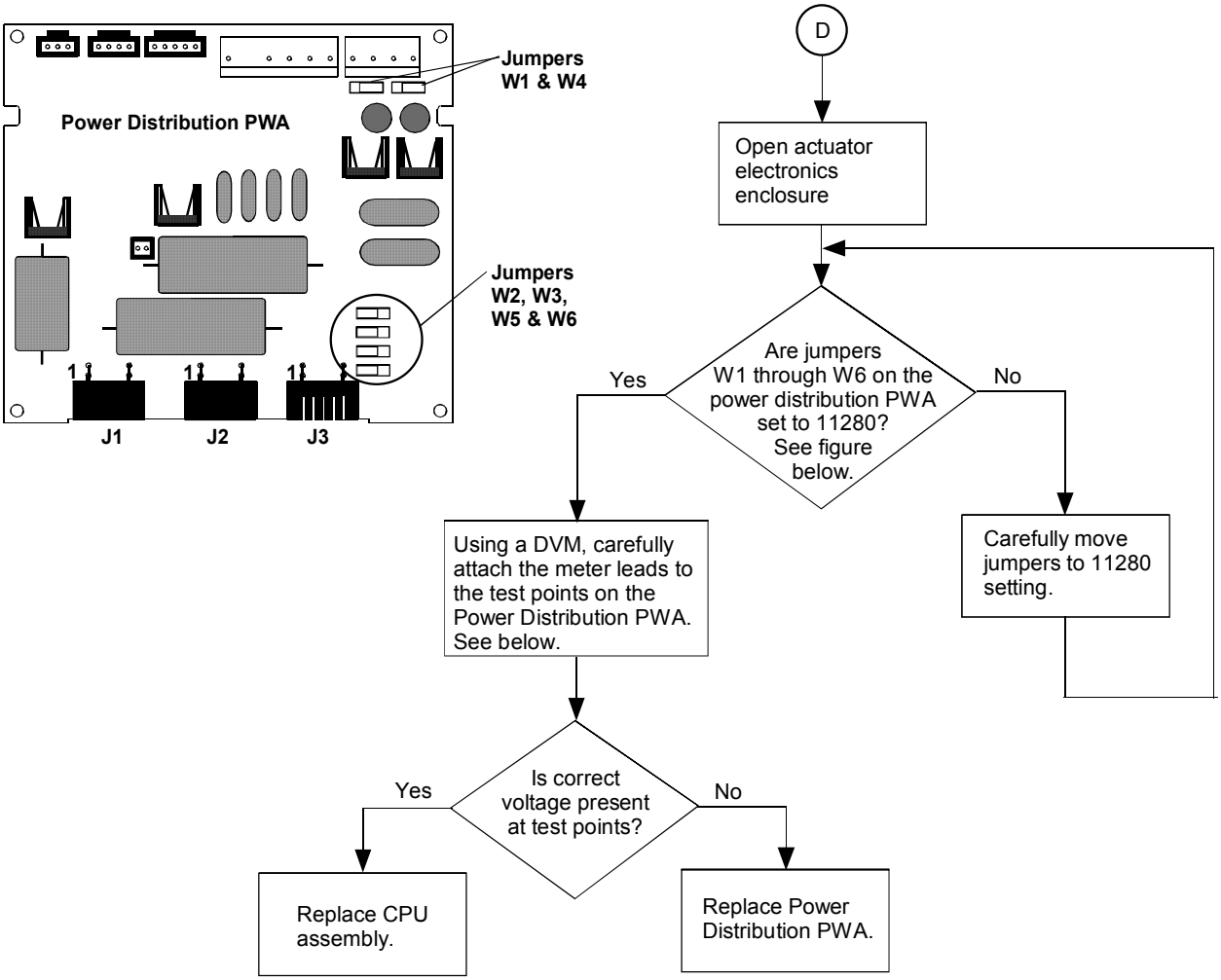


Figure 34 Test Power Distribution PWA

Power Distribution PWA Test Points

Connector	Test Points - Pins	Voltage
J2	Pin 1 to pin 7	5 V
J3	Pins 1,2 to pins 3, 4, 8	5 V
	Pins 3, 4 to pin 7	9 V
J1	Pins 5, 6 to pins 7, 8	24 V
	Pins 1, 2 to pins 7, 8	28 V $\pm$ 3V

Test AUTO - MANUAL DRIVE Switch

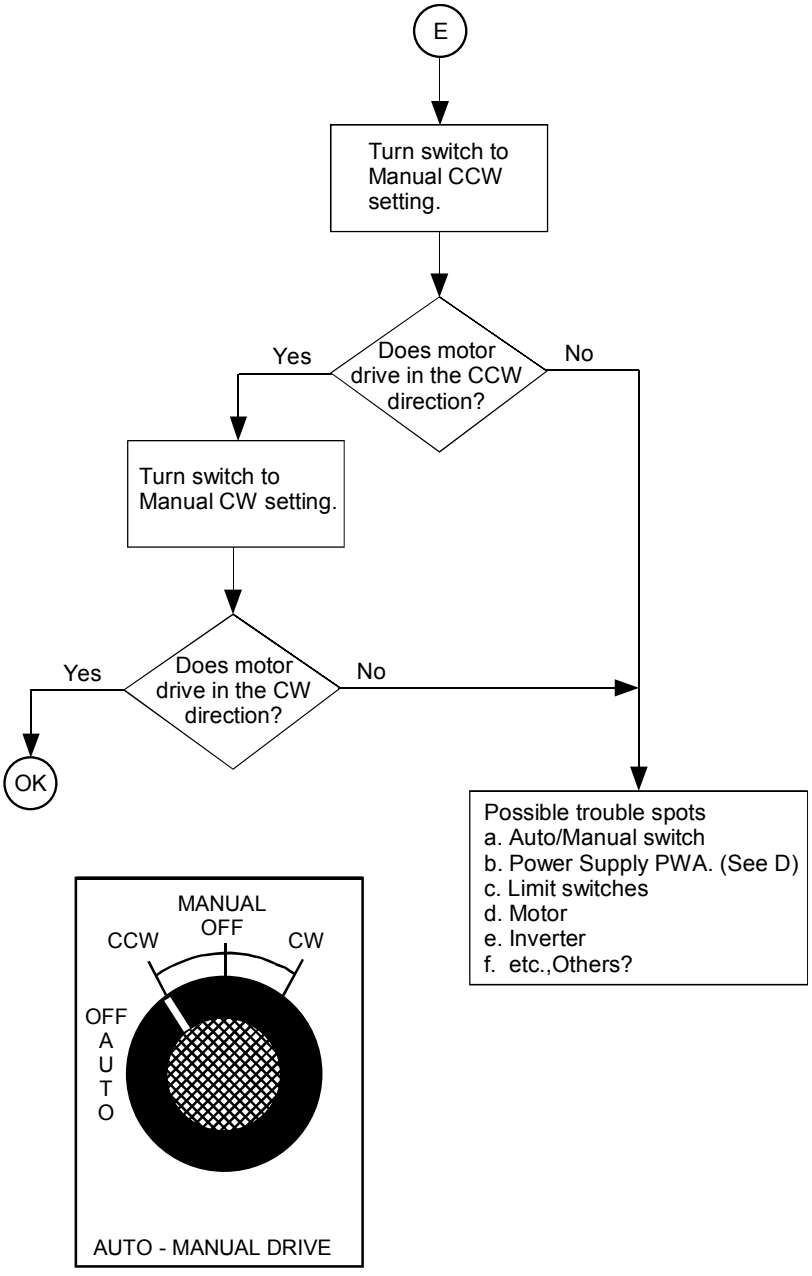


Figure 35 Test AUTO - MANUAL Switch

Test Relay Function

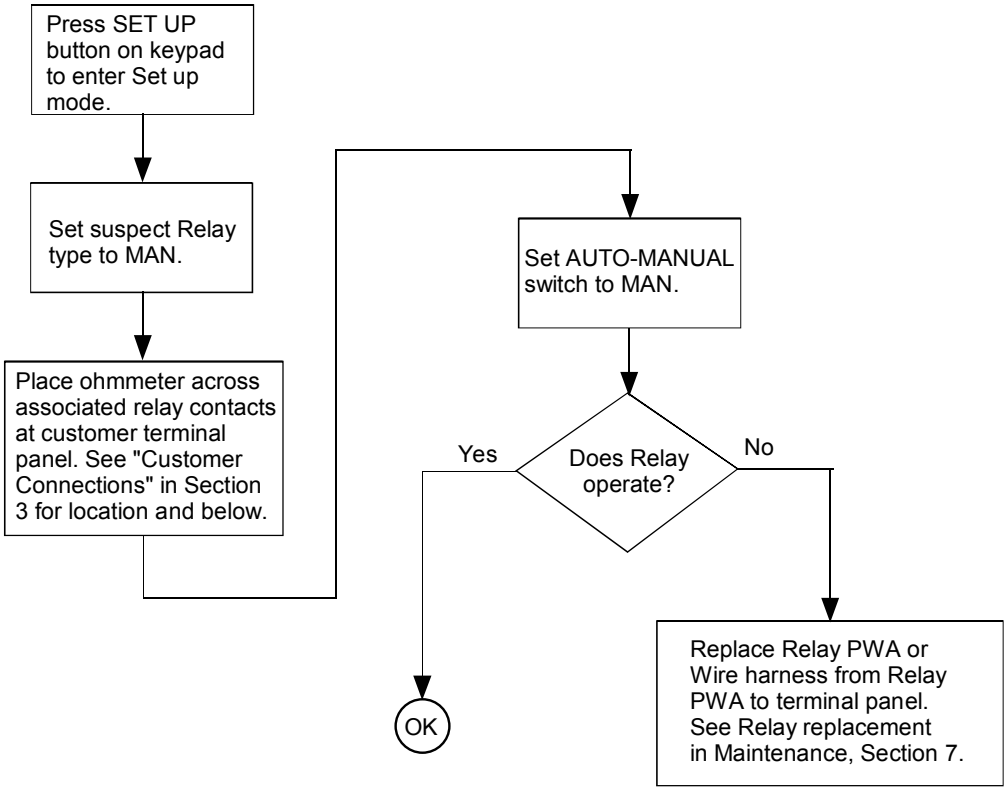


Figure 36 Test Relay Function

Relay	Associated Contacts at Terminal Block
RELAY1	16 NC 17 COM 18 NO
RELAY2	19 NC 20 COM 21 NO
RELAY3	22 NC 23 COM 24 NO
RELAY4	25 NC 26 COM 27 NO

Appendix A - 11280S Configuration Record Sheet

Enter the value or selection for each set up parameter on this sheet so you will have a record of how your actuator is configured.

Set Up Group Prompt	Parameter	Setting	Default
SET INPUT	IN TYP - Input Actuation Type		4-20
	INP HI – Input High Range Value		100
	INP LO – Input Low Range Value		0.0
	FILTYP – Input Filter Type		NONE
	LPFILT – Low Pass Filter Time Constant		0
	Direct – Actuator Rotation		CCW
	Dband – Input Deadband		0.5
	FsTYP – Failsafe Type		
	FsVAL – Failsafe Input Value		
	CHAR – Input Characterization		LINR
	LD CAL – Restore Calibration Type		NONE
SET RELAY	RTYP11 – Relay Type		NONE
	R11VAL – Relay Value		0
	R11 HL – Relay High/Low		
	RTYP12 – Relay Type		NONE
	R12VAL – Relay Value		0
	R12 HL – Relay High/Low		
	RLY1HY – Relay Hysteresis		0
	RTYP21 – Relay Type		NONE
	R21VAL – Relay Value		0
	R22 HL – Relay High/Low		
	RTYP22 – Relay Type		NONE
	RLY2HY – Relay Hysteresis		0
	RTYP31 – Relay Type		NONE
	R31VAL – Relay Value		0
	R31 HL – Relay High/Low		
	RTYP32 – Relay Type		NONE
	RLY3HY – Relay Hysteresis		0
	RTYP41 – Relay Type		NONE
	R41VAL – Relay Value		0
	R41 HL – Relay High/Low		
	RTYP42 – Relay Type		NONE
	RLY4HY – Relay Hysteresis		0
SET CUROUT	CUROUT - Output Signal Range		4-20

Continued on next page ⇒

Set Up Group Prompt	Parameter	Setting	Default
SET COMM	COMM – Communications Parameters		DIS
	ADDRES – Device Address		1
	BAUD – Baud Rate		
	XmtDLY – Response Delay		NONE
	DBLBYT – Floating Point Data Format		FP B
SET DIGINP	DIGINP – Digital Input State		NONE
	Endpos – End Position Value		
SET DISPLA	DECMAL – Decimal Point Location		8888
	EUNITS – Units Display		PCNT
	UNITS – Display Units		ENGL
SET LOCK	LOCKID – Password Lock		1026
	LOCK – Lock Out		NONE
READ STATUS	FAILSF – Failsafe		Read Only
	RAMTST – RAM Test Diagnostic		Read Only
	SEETST – Serial EEPROM Test Diagnostic		Read Only
	CFGTST – Configuration Test Diagnostic		Read Only
	CALTST – Calibration Test Diagnostic		Read Only
SET DRVINF	VERSON – Firmware Version		Read Only
	SPEED – Stroke Speed		Factory Set
	POWER – Power Input Voltage/Line Frequency		Factory Set
	TAG – Tag Name		
	MFGDAT – Manufacturing Date		Factory Set
	LREP – Date of Last Repair		Factory Set
	LCAL – Date of Last Factory Calibration		Factory Set
	REPTYP – Repair Type		Factory Set
SET MAIN	TEMP – Actuator Temperature		Read Only
	TEMPHI – High Temperature Limit		Read Only
	TEMPLO – Low Temperature Limit		Read Only
	ACST – Accumulated Stall Time		Read Only
	STARTS – Accumulated Motor Starts		Read Only
	RLnCNTS – Relay Cycle Counts		Read Only
	n = 1, 2, 3, or 4		Read Only
	REGNy – Accumulated Motor Starts for regions of motor travel.		Read Only
	y = 0 through 9		
	MANRST – Maintenance Statistic Reset		
CAL NCSOUT	NCSOUT – Non-contact sensor circuit output		Read Only

Index

Honeywell

Sensing and Control
Honeywell
11 West Spring Street
Freeport, IL 61032

61-86-25-09 10/01 Printed in USA

www.honeywell.com/sensing