Honeywell

10260S HercuLine® Smart Actuator

Installation, Operation and Maintenance Manual

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1. Introduction

Product Description

Honeywell's 10260S industrially rated rotary smart actuators are precision engineered for exceptional reliability, accurate positioning, and low maintenance. (Figure 1) Designed for very precise positioning of dampers and quarter turn valves in the power and processing industries, the 10260S performs especially well in extremely demanding environments requiring continuous-duty, high reliability, and low maintenance.

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

A no-burnout synchronous induction motor is combined with a heavy-duty precision-machined output worm gear mesh providing a responsive, low maintenance, and non-backdriving actuator. Accidental stalls up to 100 hours can be withstood without damage to the gear train. End-of-travel limit switches are provided as standard equipment to prevent damage to the valve or damper and are backed up by mechanical stops.

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 10260S actuator. Crank arms can be positioned at any angle on the output shaft and an adjustable radius is provided to allow flexibility in linkage set-up.

All 10260S actuators are equipped with a manual handwheel for operation during loss of power or installation. A local auto/manual 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. 10260S actuators are designed for precision modulation of final control devices such as dampers, vanes, fluid couplings, scoop tubes, fuel/air ratio valves, windbox dampers, and coal mill dampers, and quarter turn valves. The robustness of the design serves as the basis for long-term reliability and reduced operating costs.

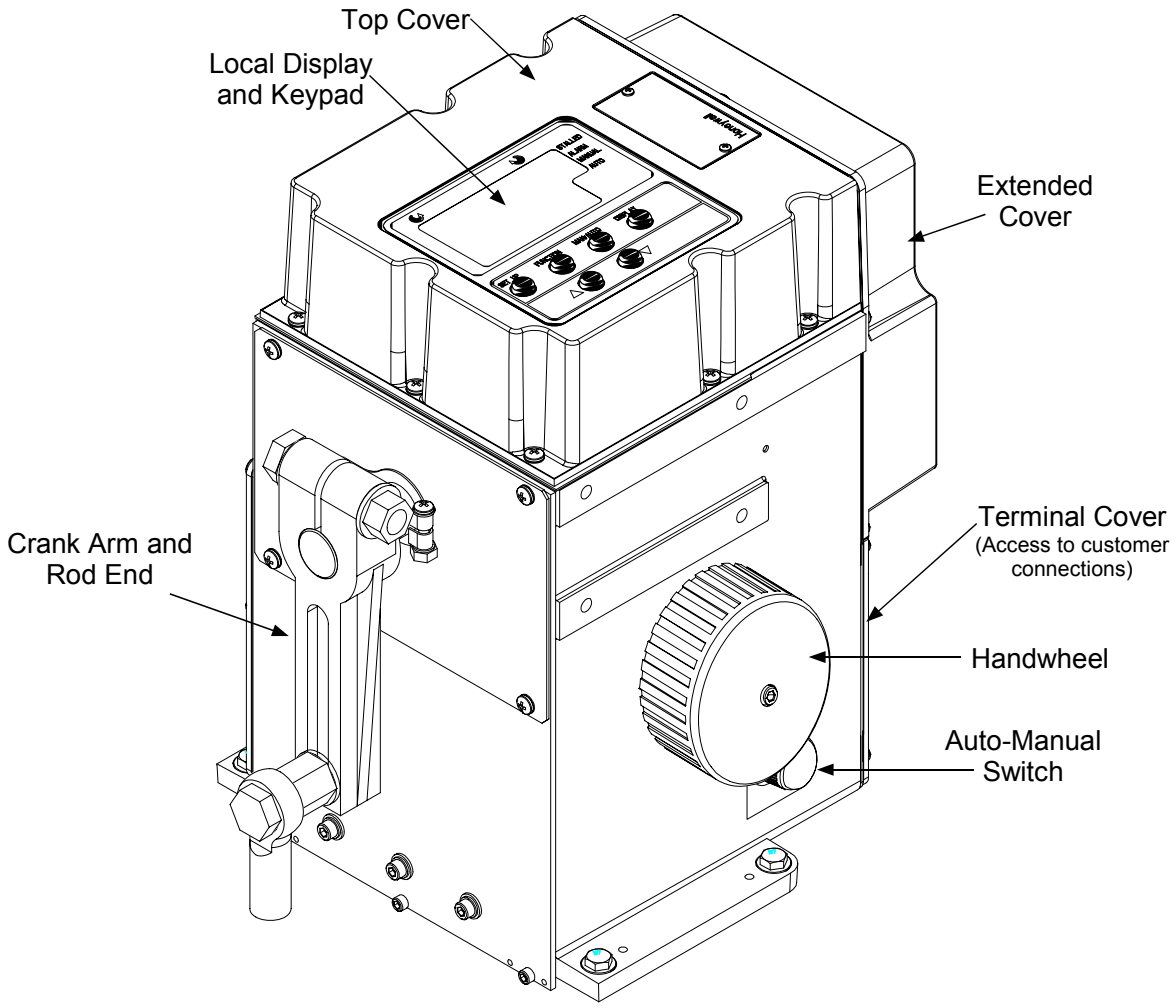


Figure 1 10260S Smart Actuator

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

The non-contact position sensing assembly consists of a position sensor 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 changing the magnetic field created by the coils in the sensing circuit board. There is no contact between circuit board and spoilers.

Slidewire Emulation

A truly unique feature, slidewire emulation allows direct replacement of existing three-wire control actuators without requiring controller changes while gaining all of the advantages of the maintenance-free non-contact sensing. This is ideal for replacement of installed actuators that cause control problems due to slidewire wear.

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 18 Vdc are accepted and this device will emulate 100 to 1000 ohm slidewires.

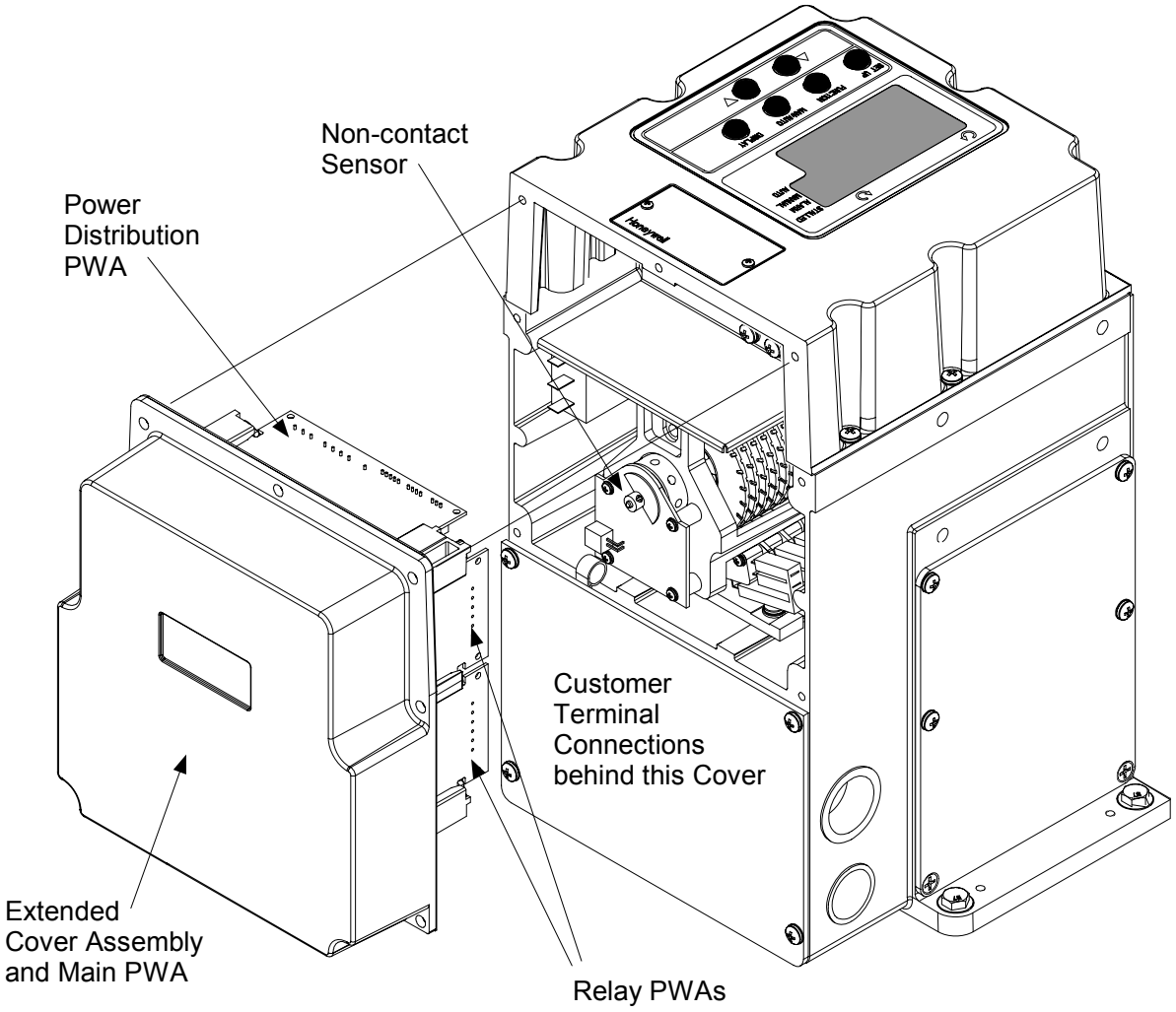


Figure 2 10260S Internal View

10260S Smart Electronics

Enhanced Electronics Printed Wiring Assembly (Main PWA)

An enhanced electronics printed wiring assembly (PWA) provides digital control to the 10260S 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. HART Communications is available as an option.

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 120/240 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 10260S 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 Relays Set Up Group (page 39) 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.

Self-Locking/Releasing Gear Train

The worm gear output combination is self-locking and self-releasing and maintains position upon loss of power. It is designed to hold greater than two times the rated output torque in a back-driving condition. This design provides superior reliability without the maintenance associated with other self-locking and brake mechanisms.

Motor

A 100% duty cycle synchronous induction motor provides crisp and responsive movement for precise and accurate positioning. The very low current draw during operation or in stall combined with the no-burnout characteristics of the motor 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.

All Position Mounting

Honeywell 10260S actuators may be mounted in any orientation making retrofit in tight locations easier.

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 10260S features dedicated wiring terminals for ease of installation. See Figure 13 for specific details.

Warranty Period

The 10260S 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 turnbuckle and 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. See 8. Replacement/Recommended Spare Parts (page 89) for 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 10260S Series Smart Actuators.

Technical and Operating Specifications

Table 1 Specifications - General

Physical				
Weight	45 lb. (20.5 kg) net			
Enclosure	Precision-machined Aluminum alloy casting, finished in light gray powder coat epoxy.			
Gear Train	Alloy steel, high efficiency steel spur gear primary train. Precision ground, self locking/self releasing worm gear final mesh.			
Mechanical Stops	To prevent over-travel.			
Operating Temperature	-30 °C to +75 °C (-20 °F to +170 °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.			
Scale	0 to 100 % corresponding to full crank arm travel.			
Crank Arm	Adjustable radii (1 7/16" to a maximum of 5"). Position adjustable through 360° rotation. Optional 12” crank arm adjustable 0 – 12” radii.			
Output Shaft	1" diameter, 1 1/2" long is standard on 10261S, 10262S, 10264S, 10266S, 10267S, and 10268S. 1" diameter, 2" long is standard on 10263S, 10265S and 10269S optional on other models.			
Output Torque/Full Travel Stroking Time	***Model #***	***Torque***		***Output Shaft Speed, sec/90°***
		Lb-ft	*N-M*	*@60Hz* / *@50Hz*
	10261S	10	15	10 / 12
	10262S	20	27	20 / 24
	10264S	40	55	40 / 48
	10266S	60	80	60 / 72
	10267S	40	55	20 / 24
	10268S	80	110	40 / 48
	10269S	150	200	60 / 72
	10263S	200	270	40 / 48
	10265S	300	400	60 / 72
Rotation	90 degrees between 0 and 100% on scale, limited by mechanical stops.			
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	Texaco Starplex 2 EP Grease			

Electrical			
Mains Supply	120 Vac single phase, 50 or 60 Hz 240 Vac single phase, 50 or 60 Hz		
Motor	Instant start/stop, non-coasting, non-burnout, continuous duty permanent magnet synchronous induction motor. Can be stalled up to 100 hours without damage.		
Motor Current	= No load = full load = locked rotor		
	Model No. 10261S, 62S, 64S, 66S 10263S, 10265S 10267S, 68S, 69S	**120 V, 50/60 Hz** 0.4 A (48 VA) 1.0 A (120 VA) 0.8 A (96 VA)	**240 V, 50/60 Hz** 0.3 A (72 VA) 1.0 A (120 VA) 0.3 A (72 VA)
Fuses *(Motor drive control)*	*Wickmann USA #373-1160-0-41:* 1.6 Amp Fast (2)		
Loss of Power	Stays in place.		
Local Auto - Manual Switch	Allows local manual and automatic operation of the actuator. (Optional Feature)		
Limit Switches	Standard - Two SPDT end of travel limits.		
Auxiliary Switches	Optional - SPDT switches rated (10 A at 125 Vac, 5 A at 250 Vac).		
Relays	Optional - Up to 4 SPDT switches rated (5 A at 125 Vac, 2.5 A at 250 Vac).		
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)		

Certifications	
CE Compliance	Optional
CSA/UL	Optional
NEMA 4	Optional
Torque Settings of Crank Arm Bolts	
Clamp Bolt	Standard Arm (p/n 087449) (1 7/16 to 5 in. adjustment): 85 lb-ft. Optional Long Arm (p/n 154007) (0-12 in. adjustment): 85 lb-ft.
Rod End Bolt	Standard and long arms: 30-35 lb./ft

Specifications - Actuator with Digital Electronics

Electrical		
Input Signals	**Analog**: 0/4 to 20 mA (With supplied shunt resistor for current range: 250 ohms ±0.1 % Part Number: 070756) 0/1 to 5 Vdc 0 to 10 Vdc **Digital**: Modbus RTU RS485 (Remote setpoint)	
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 or Custom – Equal %, Quick Opening, User Defined.	
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 °C to 50 °C Less than ±0.05% of span per degree C for –30 °C to 75 °C	
Zero Suppression	90 % of span	
Input Filters	Selectable spike and low pass filters.	
Solid State Motor Control	Two triac switches for clockwise or counterclockwise motor operation.	
Fail-safe Operation	If input signal exceeds configured input range. Selectable and adjustable.	
Feedback Ssignals	0 to 20 mA, or 4 to 20 mA 0 to 5 Vdc, or 1 to 5 Vdc with 250 ohm resistor ± 0.1 % 0 to 16 Vdc with 800 ohm resistor ± 0.1 %	
Slidewire Emulation	Provides output voltage ratiometric to shaft position and potentiometric to supply voltage (1-18 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 and output signals are isolated from power.	
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
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 4. Set Up and Calibration Procedures (page 28) for detailed information on display and keypad functions.

Specifications – Communications

Display	
Modbus 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	2400, 4800, 9600, 19.2K

HART Communications	HART 5 an HART 6

Model Selection Guide

The following 10260 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.

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
_ _ _ _ _ _	-	_	-	_ _ _	-	_ _ _	-	_	-	_	-	_ _ _ _ _	-	_ _ _	-	_ _

KEY NUMBER - Torque and Speed

Output Torque (lb. - ft.)	Output Torque (N - M)	Full Travel Stroking - Time in Seconds 60 Hz	Full Travel Stroking - Time in Seconds 50 Hz	Selection	Availability
10	(15)	10	12	10261S	↓
20	(27)	20	24	10262S	↓
40	(55)	40	48	10264S	↓
60	(80)	60	72	10266S	↓
40	(55)	20	24	10267S	↓
80	(110)	40	48	10268S	↓
150	(200)	60	72	10269S	↓
200	(270)	40	48	10263S	↓
300	(400)	60	72	10265S	↓

TABLE I - POWER SUPPLY - SINGLE PHASE

120 VAC 60 Hz	Single Phase 120 VAC 60Hz Motor	1	•
120 VAC 50 Hz	Single Phase 120 VAC 50Hz Motor	2	•
220/240 VAC 60 Hz	Single Phase 220/240 VAC 60Hz Motor	3	•
220/240 VAC 50 Hz	Single Phase 220/240 VAC 50Hz Motor	4	•

TABLE II - 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	_ 40	•

TABLE III - SWITCH AND RELAY OUTPUTS (2 mech end-of-travel limits standard)

Auxiliary Switches and Relay Outputs	None	00 _	•
	2 Aux. SPDT Switches	20 _	•
	4 Aux. SPDT Switches	40 _	•
	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 IV - CONFIGURATION INTERFACE

Remote **(Note 1)**	None - requires HercuLink ™	0	•
Local	Integrally mounted local display/keypad interface	1	•

TABLE V - COMMUNICATIONS/PROTOCOL

Modbus RTU RS485	RS-485 Modbus compliant - standard with EEU	0	•
HART	HART Communications Protocol	2	•

TABLE VI - OPTIONS

Shafts	Standard	0 _ _ _ _	•
	5 Inch Extension	1 _ _ _ _	**b**
	3 Inch Extension	3 _ _ _ _	**e**
Projecting Scale	None	_ 0 _ _ _	•
	3/4 Inch Shaft Coupling	_ 1 _ _ _	**c**
	3/4 Inch Shaft Coupling, CCW to Open	_ 2 _ _ _	**c**
	1 Inch Shaft Coupling	_ 3 _ _ _	**c**
	1 Inch Shaft Coupling, CCW to Open	_ 4 _ _ _	**c**
	CW to Open, No Coupling	_ 5 _ _ _	**d**
	CCW to Open, No Coupling	_ 6 _ _ _	**d**
Crank Arm	5 Inch Standard	_ _ 0 _ _	•
	None	_ _ 1 _ _	•
	12 Inch	_ _ 2 _ _	•
Rod Adapter	None	_ _ _ 0 _	•
	3/8 Inch	_ _ _ 1 _	•
Linkage Kits	None	_ _ _ _ 0	•
	12 to 16 Inch Turnbuckle Kit	_ _ _ _ 1	•
	16 to 20 Inch Turnbuckle Kit	_ _ _ _ 2	•
	20 to 24 Inch Turnbuckle Kit	_ _ _ _ 3	•
	1 Inch Pipe Kit	_ _ _ _ 4	•
	1.5 Inch Pipe Kit	_ _ _ _ 5	•
	2 Inch Pipe Kit	_ _ _ _ 6	•

TABLE VII- OPTIONS

Weatherproof	Weatherproof	0 _ _	•
	NEMA4/IP66	1 _ _	•
Approvals	None	_ 0 _	•
	UL / CSA	_ 1 _	•
	CE	_ 2 _	•
Tagging	None	_ _ 0	•
	Linen **(Note 2)**	_ _ 1	•
	Stainless Steel **(Note 2)**	_ _ 2	•

TABLE VIII - FACTORY OPTIONS

Special Manuals	No Special Options (US Manual Standard)	0 _	•
Other	None	_ 0	•
	Certificate of Conformance	_ 2	•

ACCESSORIES

	Description	Part Number
Handheld Configuator	HercuLink™ Palm Software	51452354-509
(Note 3)	Battery powered 232/485 converter w/cable	51452354-510
HART	Turk Cable for Handheld Connection	51452352-501
Rod Adapters	5/8 Inch	083338
	7/16 Inch	083336
	7/8 Inch	083339
Crank Arm	5 Inch Standard	51309967-501
	12 Inch	51452160-501

RESTRICTIONS

Restriction		Available Only With	Not Available With	
Letter	Table	Selection	Table	Selection
b	VI	X0XXX	Key Number	10263A, 10265A, 10269A
c	VI	0X100	Key Number	10263A, 10265A, 10269A
d	VI	050XX, 060XX, 051XX, 061XX	Key Number	10263A, 10265A, 10269A
e	VI	X0XXX	NA	NA

Note 1: HercuLink™ software (51452354-509), RS232/485 converter (51452354-510), customer supplied Palm™ PDA running OS3.5 or higher and Palm serial cable are required if no display is selected.

Note 2: Customer must supply tagging information - Up to 3 lines, 22 characters per line.

Note 3: Requires PDA manufacturer's serial interface cable.

3. Installation

Installation Overview

The procedures to install the 10260S 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 10260S 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 unless the NEMA 4 option was selected.
- 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 170 °F (75 °C).
- The minimum low temperature limit is –20 °F (–30 °C).

Actuator Mounting

Install the 10260S actuator in a convenient location in any orientation. Firmly bolt the 10260S 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. The output shaft crank arm is fully adjustable through 360°.

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.

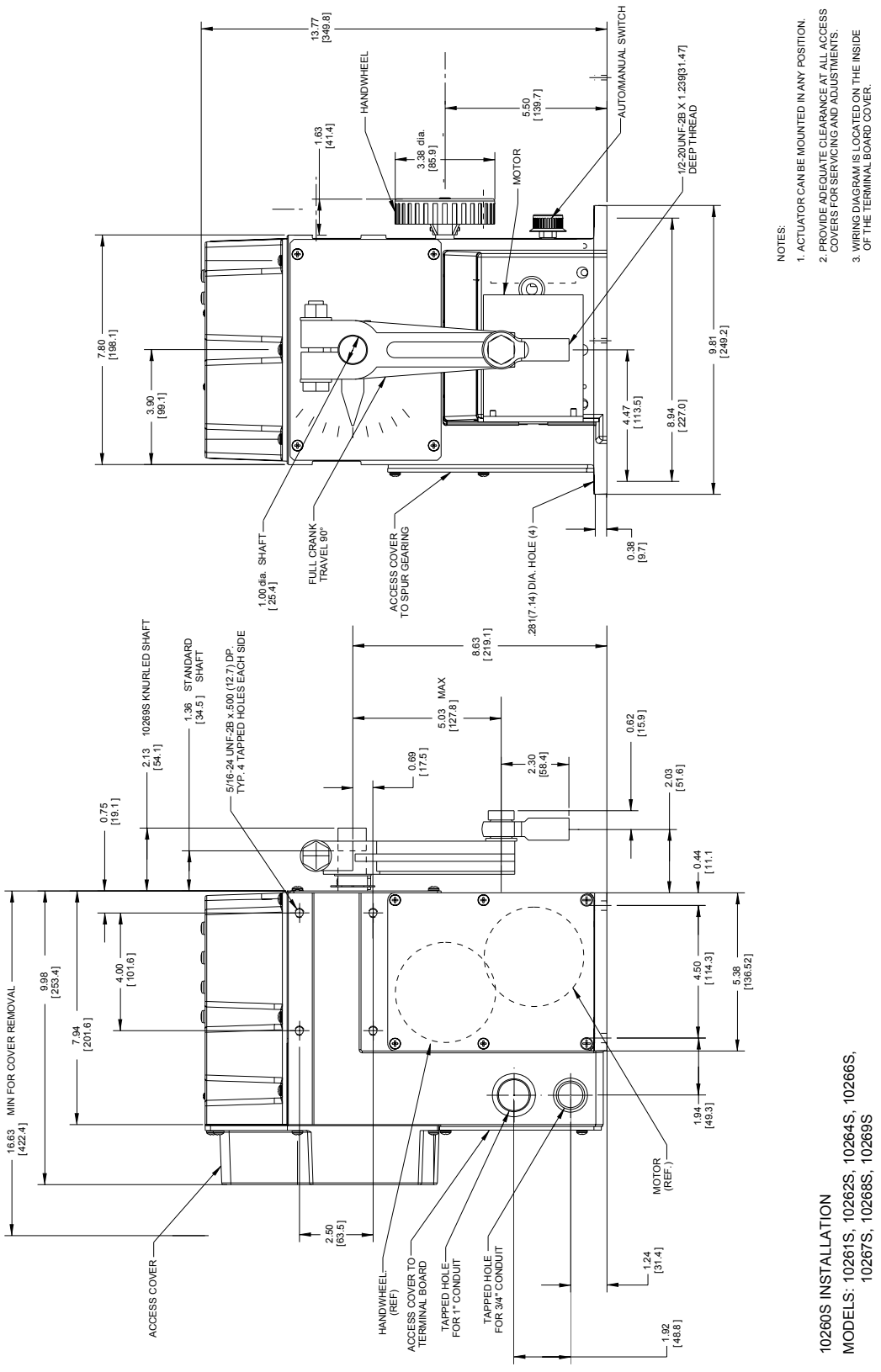


Figure 3 Outline and Dimensions of Herculine Models 10261S, -62S, -64S, -66S, -67S, -68S, and -69S Actuators

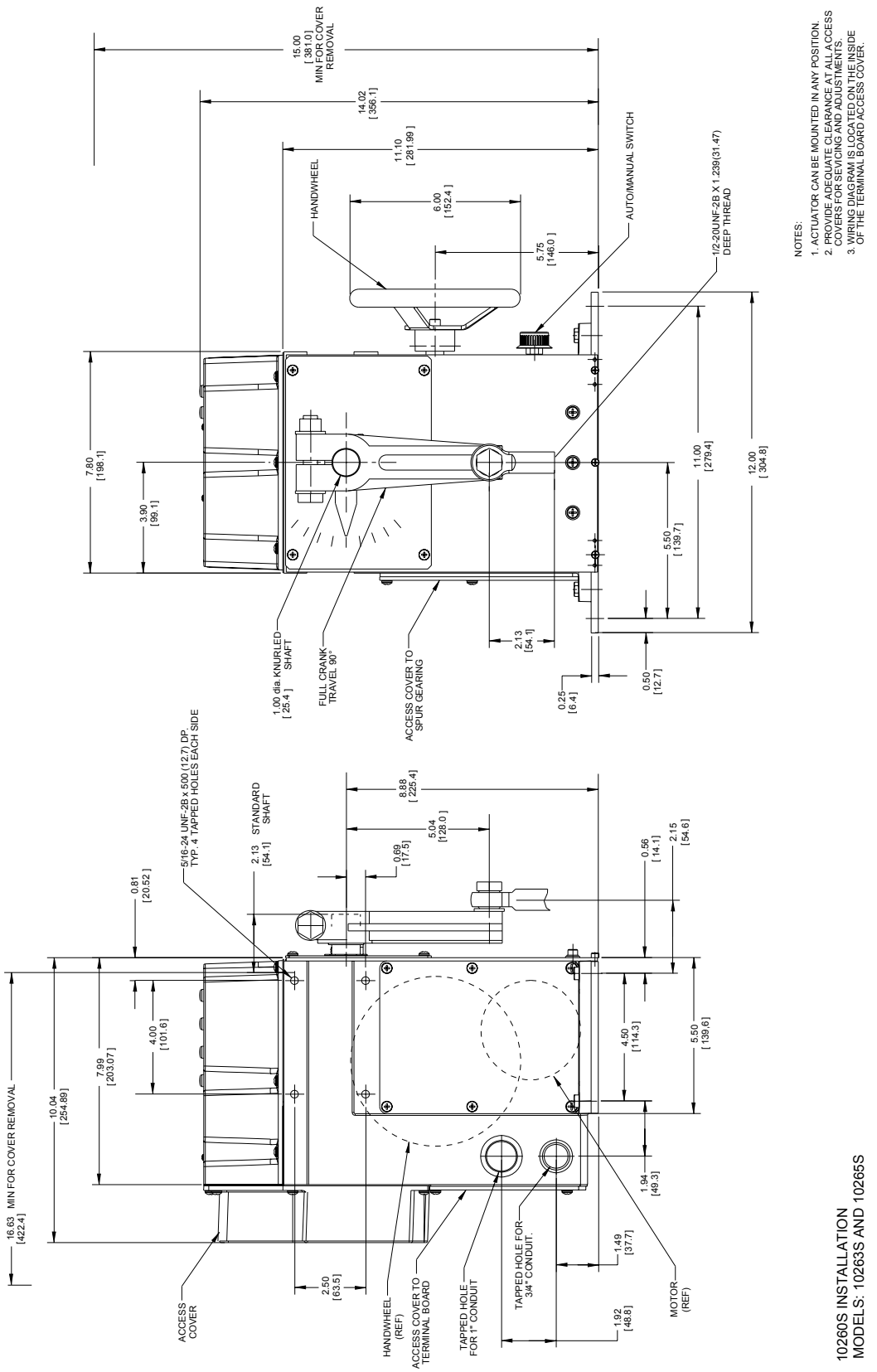


Figure 4 Outline and Dimensions of Herculine Models 10263S and 10265S Actuators

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. The 10260S Actuator linkage can be set up to achieve an optimal delivered torque distribution for specific applications. 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.

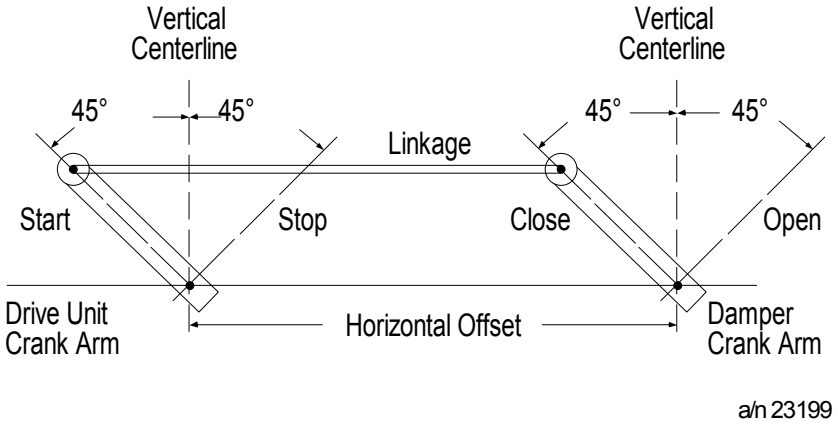


Figure 5 Constant Torque Linkage

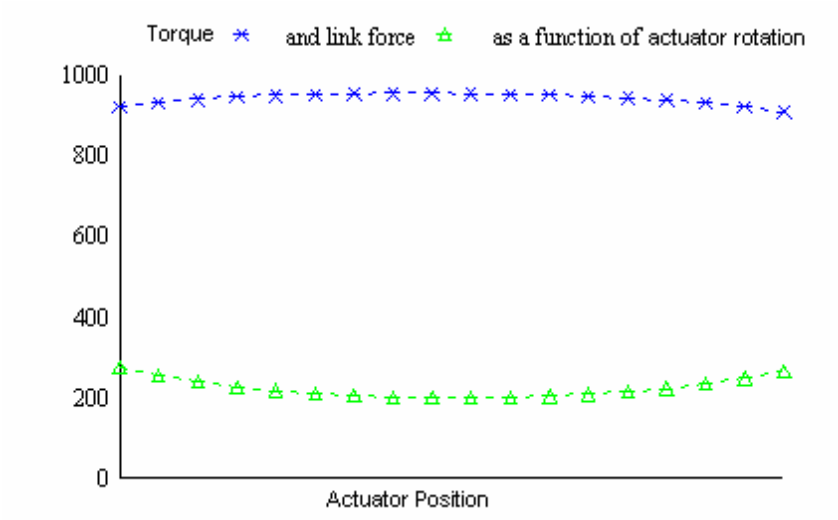


Figure 6 Constant Torque Profile

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.

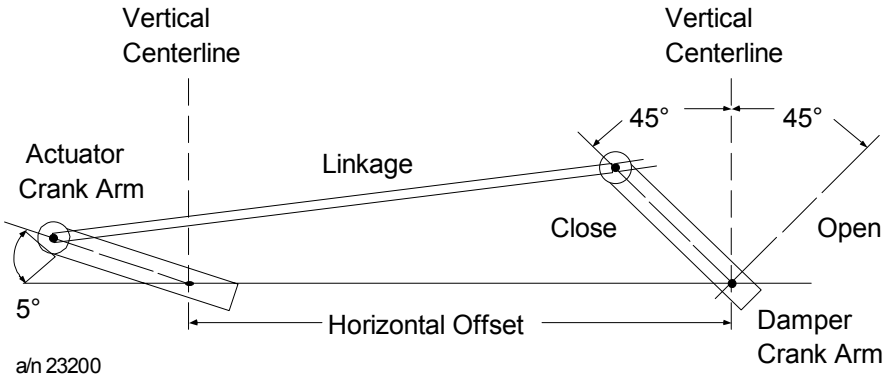


Figure 7 Variable Torque Linkage

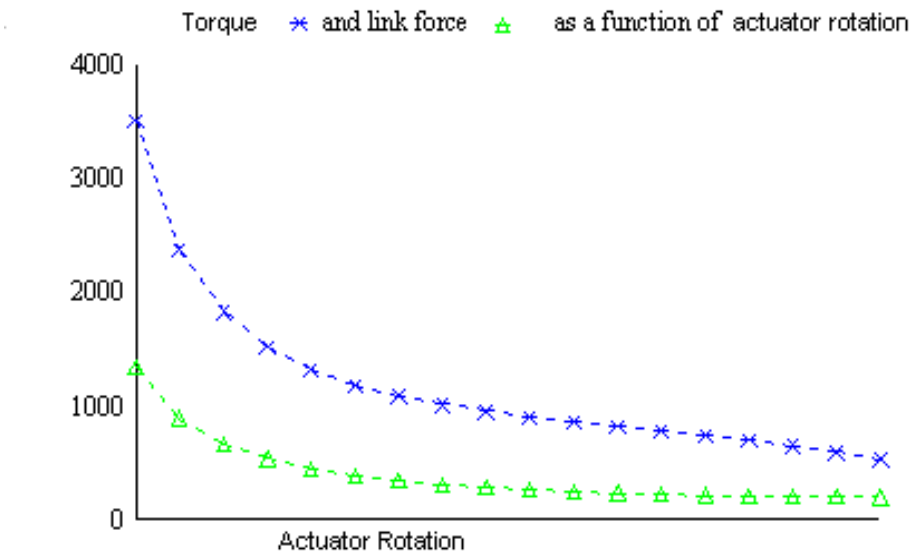


Figure 8 Variable Torque Profile

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

Turnbuckle linkage kits are available from Honeywell and are used where short lengths are required. The lengths range from 12 to 24 inches and refer to the rod end center-to-center distance. These kits include the turnbuckle, 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 nut and bolt needed to connect the rod end to the load are supplied by the customer. Kits can be ordered with the Actuator via Table VI of the Model Selection Guide or separately as identified in section 8 of this manual.

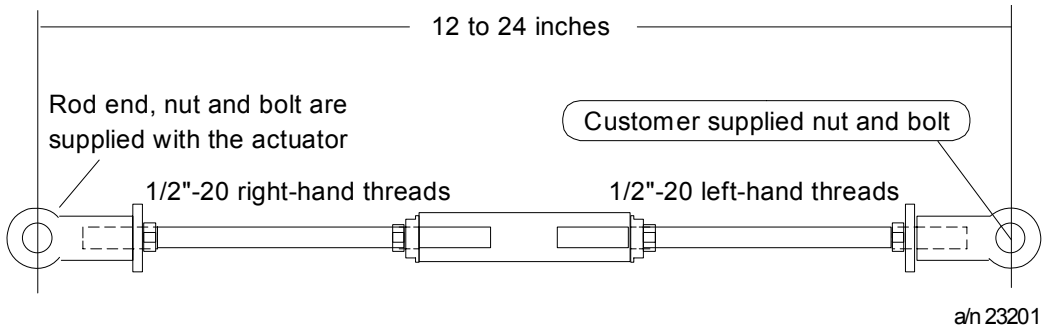
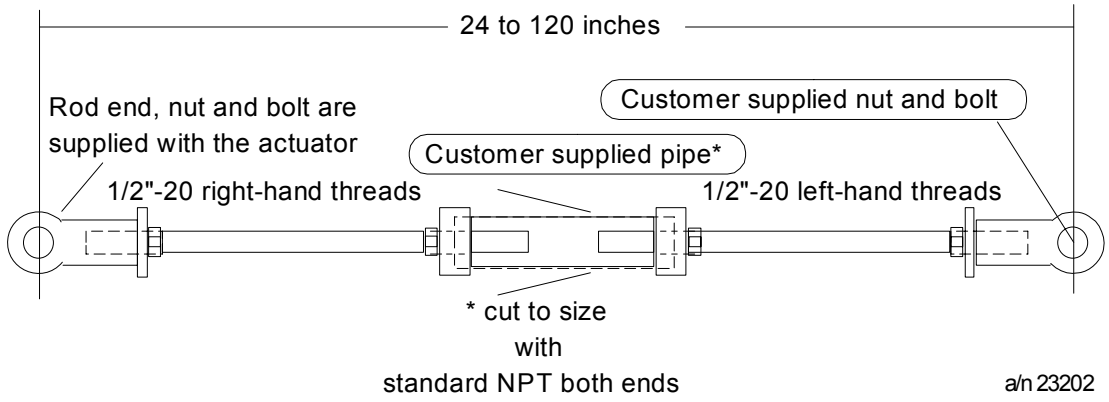


Figure 9 Turnbuckle Linkage Kit

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 120 inches (60 to 305 cm). The kits include the mechanical pipe couplings, load rod end (left-hand thread), connecting rods and locking nuts. See Figure 10 Pipe Leakage Kit

. 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 * (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 VI of the Model Selection Guide or separately as identified in Section 8 in this manual.



*****Pipe length = Overall linkage length minus (-) 17 inches (43 cm).

Figure 10 Pipe Leakage Kit

Actuator Crank Arms

The 10260S Smart Actuator comes standard with a 5-inch crank arm (adjustable 1 7/16” to 5” radius) and there is an optional 12-inch crank arm that is adjustable from 0 to 12”. Part Number 154007

The 10260S Actuator crank arm uses a standard ½ inch rod end to compliment the turnbuckle and pipe linkage kits. See Figure 11. For applications that use a link rod, a link rod adapter is available as an option in the Model Selection Guide.

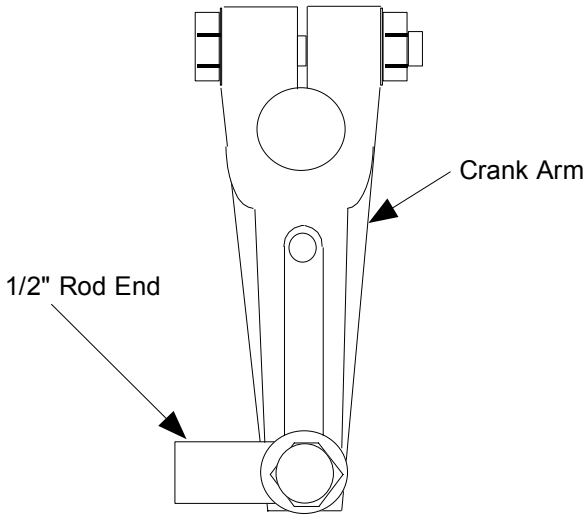


Figure 11 Standard 5-Inch Crank Arm

Projecting Scale Option

The projecting scale option is available for customers whose actuators are direct coupled so that it would be impossible to read the standard scale on the actuator. The projecting scale is attached to the side of the actuator enclosure and is readable from a distance. See Figure 12.

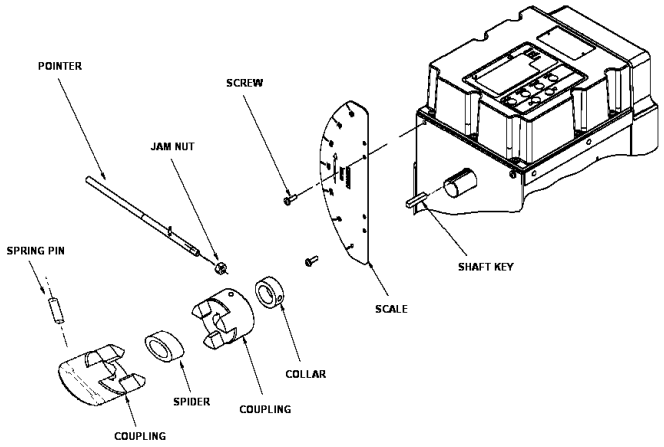


Figure 12 Projecting Scale Option Exploded View

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 2 should be observed.

Table 2 Recommended Minimum Wire Size

Gage No.	Description
14	Earth ground wire to common power supply.
18	Earth ground wire to single actuator. 120/240 V ac line leads. +24 V and common signal leads.

Safety Precautions

WARNING

An external disconnect switch must be installed to break all current carrying conductors connected to the actuator. Turn off power before working on conductors. Failure to observe this precaution may result in serious personal injury.

Actuator Connections

WARNING

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

WARNING

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

The 10260S actuator terminal connections for the field wiring are located behind the cover on the actuator case as shown in Figure 2. Power and field wiring is brought into the actuator through two access holes located on the side of the actuator case. The screw terminals for all customer connections are identified in Table 3.

Figure 13 shows the location of the terminal connections on the actuator terminal blocks. Desciptions for power input, input and output signal connections are given in Table 3.

Table 3 Actuator Terminal Connections

Connection	Terminal Numbers and LABEL See Figure 13.	Descriptions
HOT	L	Hot wire for 120/240 Vac mains supply
NEUTRAL	N - 3	Neutral wire for 120/240 Vac mains supply
PE	Ground	Ground wire connection for mains supply
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.
MODBUS COMMUNICATION	33 (-) 34 (+) 35 SHIELD	Connection for RS485 Modbus loop wires.
HART COMMUNICATION	28 (-) 29 (+)	HART communication is for 4-20 mA input only.
DIGITAL INPUT	36 COM 37 INP	Customer’s contact closure.
SW1	6 - 7 SW1 NC 9 SW1 COM 14 SW1 NO	End-of-travel limit switch 1 connections
SW2	4 - 5 SW2 NC 8 SW2 COM 15 SW2 NO	End-of-travel limit switch 2 connections.
SW3/RELAY1	16 NC 17 COM 18 NO	Auxiliary switch 3 or Relay 1 connections.
SW4/RELAY2	19 NC 20 COM 21 NO	Auxiliary switch 4 or Relay 2 connections.

Connection	Terminal Numbers and LABEL See Figure 13.	Descriptions
SW5/RELAY3	22 NC 23 COM 24 NO	Auxiliary switch 5 or Relay 3 connections.
SW6/RELAY4	25 NC 26 COM 27 NO	Auxiliary switch 6 or Relay 4 connections.

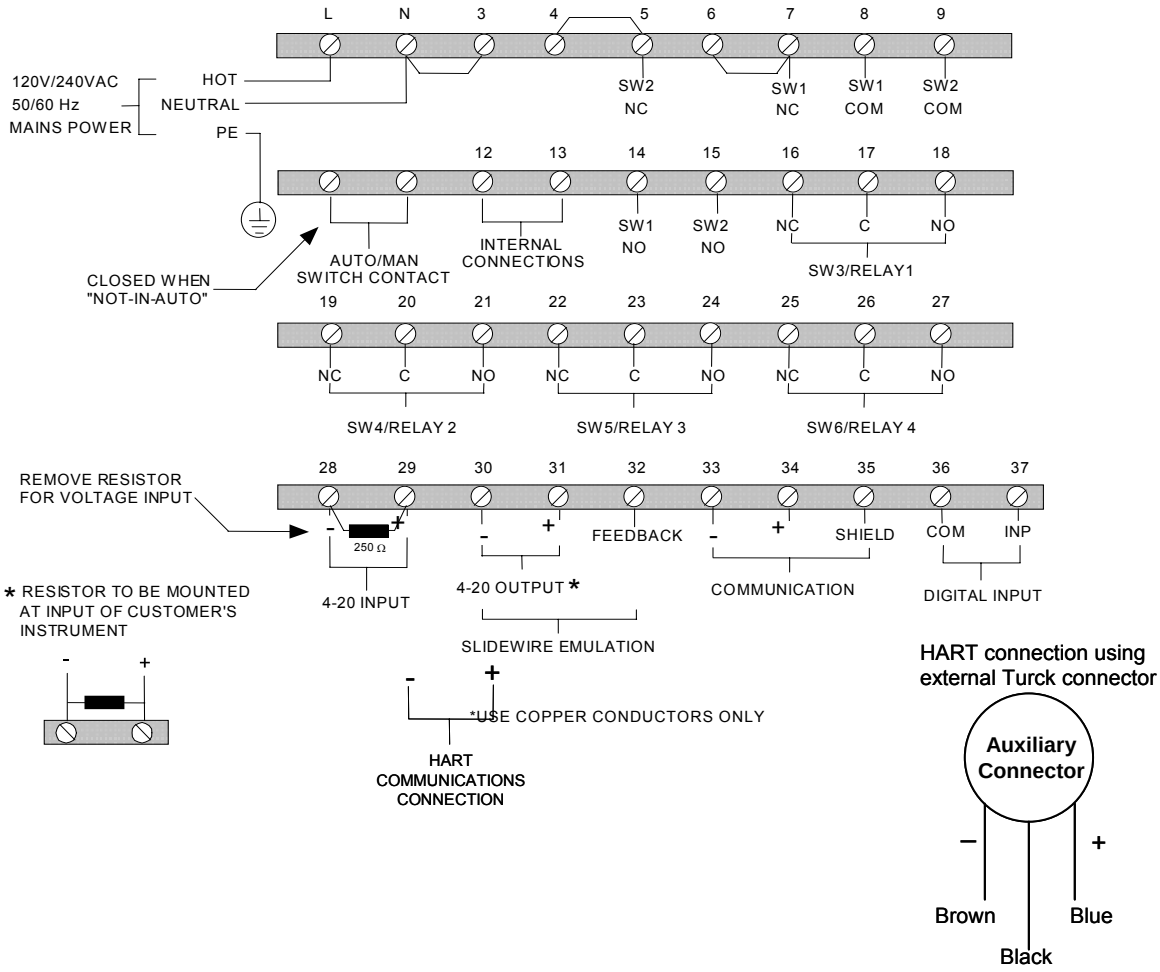
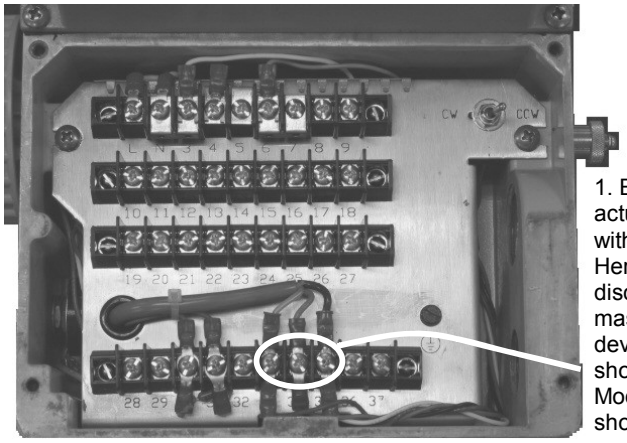


Figure 13 Actuator Terminal Connections



1. Before running actuator remotely with a PDA & HercuLink, first disconnect any master Modbus device at terminals shown (master Modbus wires not shown).

2. Ensure good connection to remaining Modbus wires (shown).

Figure 14 Modbus terminals

Power Connections

The AC power supply input option is a Table I selection in the model selection guide. Depending on which power supply selection is ordered for your actuator, wire the power input (MAINS POWER) as described in Table 3 and Figure 13. Wiring must confrom to national and local electrical codes

CE Wiring

The CE approval option is a Table IV selection in the model selection guide. When wiring the actuator power input for CE approved units, you must also install a MOV assembly to the power input. MOV assembly is ordered as a kit. See Section 8 for kit descriptions and part numbers.

Input Signal Connections

ATTENTION

Shielded and grounded cables are recommended.

0/4-20 mA Input Signals

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 13.

0/1-5 Vdc and 0 to 10 Vdc Input Signals

For voltage signal input, remove the resistor from terminals 28 and 29 on the actuator terminal block. Observing polarity, connect the signal input wires to terminals 28 and 29 of the terminal block.

Output Signal Connections

0/4-20 mA, 0/1-5 Vdc Feedback Signal Connections

ATTENTION

Shielded and grounded cables are recommended.

Actuator output is 0/4 to 20 mA analog signal. If a voltage input is required for customer devices, a range resistor is needed at the device input. See Table 3 and Figure 13 for more information.

Slidewire Emulator Connections

ATTENTION

Shielded and grounded cables are recommended.

Slidewire Emulation output option is a Table II selection in the model selection guide. If you ordered the Slidewire output option for your actuator, it is set at the factory to provide an output that emulates 100 to 1000 ohm slidewires. For terminal block connections to the actuator, refer to Table 3 and Figure 13.

4. Set Up and Calibration Procedures

Overview

Once you have installed the 10260S smart actuator, you can verify, set or change certain operating parameters. Set up is accomplished through use of the local display and keypad interface. 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.

Local Display and Keypad

The alphanumeric display and keys on the keypad are the local operator interface for control, monitoring, and configuration of the 10260S 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 15 shows the physical features of the display and keypad. Table 4 summarizes the various functions you can perform using the keys as well as descriptions of the status indicators.

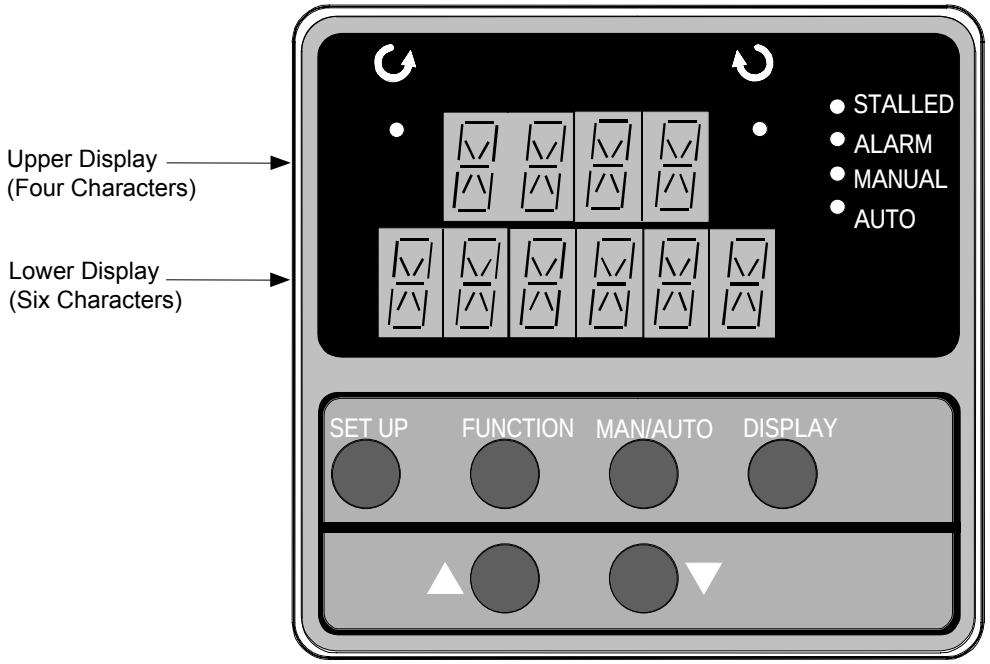


Figure 15 10260S Display and Keypad

Table 4 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. On solid when placed in manual mode from the local display mode key. Blinks at a 1 sec rate when placed in manual mode from the external drive switch.
☼ AUTO	Indicates actuator is in automatic mode.

Set Up Tips

Table 5 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 5 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 the order 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 function 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 ▼ key, and pressing the other ▲ or ▼ key 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 6 on the next page lists the set up groups that are available by using the SET UP and FUNCTION keys on the keypad.

Table 6 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 8**
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 12**
SET CUROUT	Select the output signal type of the actuator. NOTE: Set Curout will show on display only if the option was ordered.	**Table 13**
SET COMM	Select communication parameters for remote control of actuator when connected to a SCADA system.	**Table 14**
SET DIGINP	Select the parameters for external digital input states.	**Table 15**
SET DISPLA	Select and set parameters for the local display.	**Table 16**
CAL INPUT	Calibrate input zero and span values.	**Calibration Procedure, Table 23**
CAL MOTOR	Calibrate zero and span values for motor operation.	**Calibration Procedure, Table 24**
CAL CURENT	Calibrate actuator output.	**Calibration Procedure, Table 25**
SET LOCK	Set or change security password. Enable or disable security access to set up parameters and calibration set up.	**Table 17**
READ STATUS	Display operating and alarm status. Display self-test diagnostic results.	**Table 18**
SET DRVINF	Display and/or set various parameters specific to the actuator.	**Table 19**
SET MAINT	Display various operating statistics. Reset / Save accumulated operating statistics	**Table 20**
CAL POSOUT	Use the display as an indicator, (in this case a voltmeter) so you can verify the position sensor is operating properly.	**Table 21**

Set Up Procedure

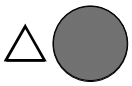
Each of the set up groups and their functions are either pre-configured at the factory or set to their default values. Tables 8 through 19 list and describe the options available in each set up group. The following procedure shows you the key press sequence to access any set up group or any associated 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 7 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 6. 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. Note: The majority of the functions in the actuator are displayed this way. Although there are several functions where the displays are reversed. The function name is in the top display and the value is in the bottom display.
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 5, *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 8 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 8 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** **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.
INP LO	**0.0 to 90.0**	**INPUT LOW RANGE VALUE** in % is displayed. NOTE: You must set Input Low range to a value that is at least 10% less than Input High range.
FILTYP	**NONE** **SPIK** **S+LP** **LPAS** *[default]*	**INPUT FILTER TYPE**—Allows selection of a software digital input filter to smooth the input signal. **Spike**—Selects spike filter to remove transients in the input signal when actuator is installed in noisy environments. **Spike plus Low Pass**—Selects spike and low pass filtering. ***** Allows setting of lag time constant for low pass filter. **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.

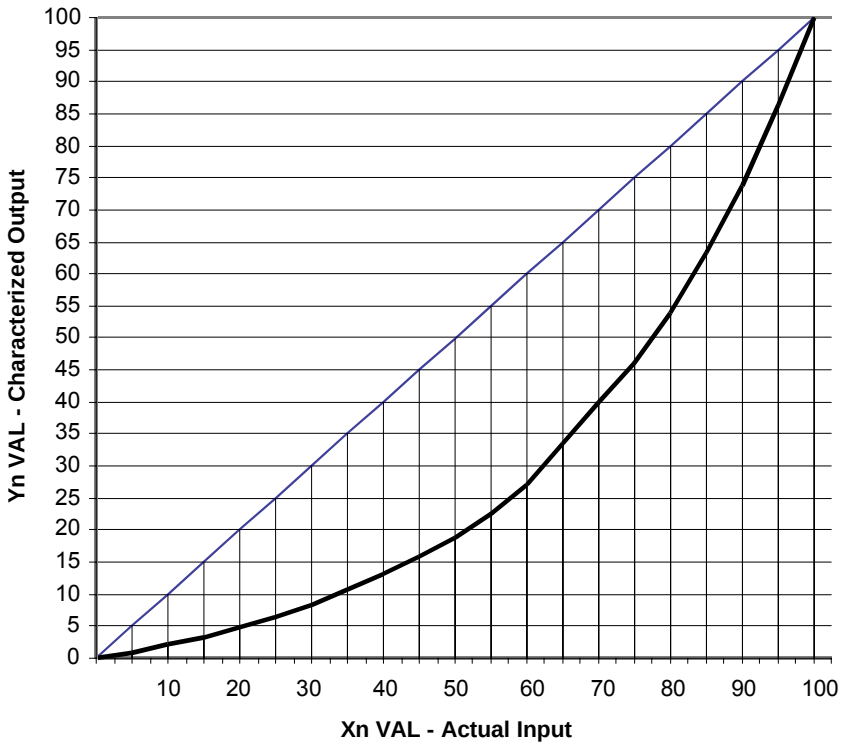
Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
Direct		**ACTUATOR ROTATION**—This selection determines the direction of rotation of the actuator shaft.
	CCW *[default]* or **CW**	**Counterclockwise** rotation **Clockwise** rotation
		NOTE: Actuator rotation is 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.
FSFTYPH		**FAILSAFEHI TYPE**—Selects the motor position you want the actuator to go to when input signal is above the high end range value.
		NOTE: Failsafe condition occurs when the input exceeds its high end range value by 3%,
	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.
	default = UP	***** Allows setting of failsafehi input value.
FsFVALH *	**0** to **100%** *default = 100*	**FAILSAFEHI INPUT VALUE**—(FailsafeHI Type USER only) Selects the motor position you want the actuator to go to when input signal is above the high end range value. Range is from 0 to 100%.
FSFTYPL		**FAILSAFELO TYPE**—Selects the motor position you want the actuator to go to when input signal is below the low end range value or on loss of input signal.
		NOTE: Failsafe condition occurs when the input exceeds its low end 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.
	default = DOWN	***** Allows setting of failsafelo input value.

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
FsFVALL *	**0** to **100%** *default = 0*	**FAILSAFELO INPUT VALUE**—(FailsafeLO Type USER only) Selects the motor position you want the actuator to go to when input signal is below the low end range value or on loss of input. Range is from 0 to 100%.
CHAR	 **LINR** *[default]* **SQRT** **CUST***	**INPUT CHARACTERIZATION**—Selects a characterization type that causes the actuator to characterize a linear input signal to represent a non-linear input. **Linear**—Provides linear characterization of the input signal. **Square Root**—Provides square root characterization of the input signal. **Custom Characterizer--** Selecting custom allows you to create a twentieth order characterization of input value (x) and associated shaft position (y). Characterization can be of equal percentage valve, quick opening valve, or user defined. See CUSTOM prompt below.
CUSTOM*	**EQUL** ***[default]*** **QUIK** **USER****	**Equal percentage –** Sets the characterization as explained in Equal Percentage Valve Characteristic on page 37. Values are read-only. **Quick opening** - Sets the characterization as explained in Quick Opening Valve Characteristic on page 38. Values are read-only. **User-configurable** – Lets you create your own characterization using the following Xn VAL and Yn VAL prompts.
X*n* VAL ** *n* = 0 to 20	**0** to **100.0**	**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 **100.0**	**SHAFT POSITION**— Allows entry of shaft position values as a percentage of range, when custom characterization is selected.

Equal Percentage Valve Characteristic

Table 9 contains values that approximate an equal percentage valve characteristic in the actuator. When the EQUL custom characterization type is selected, the values in Table 9 are automatically loaded 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.

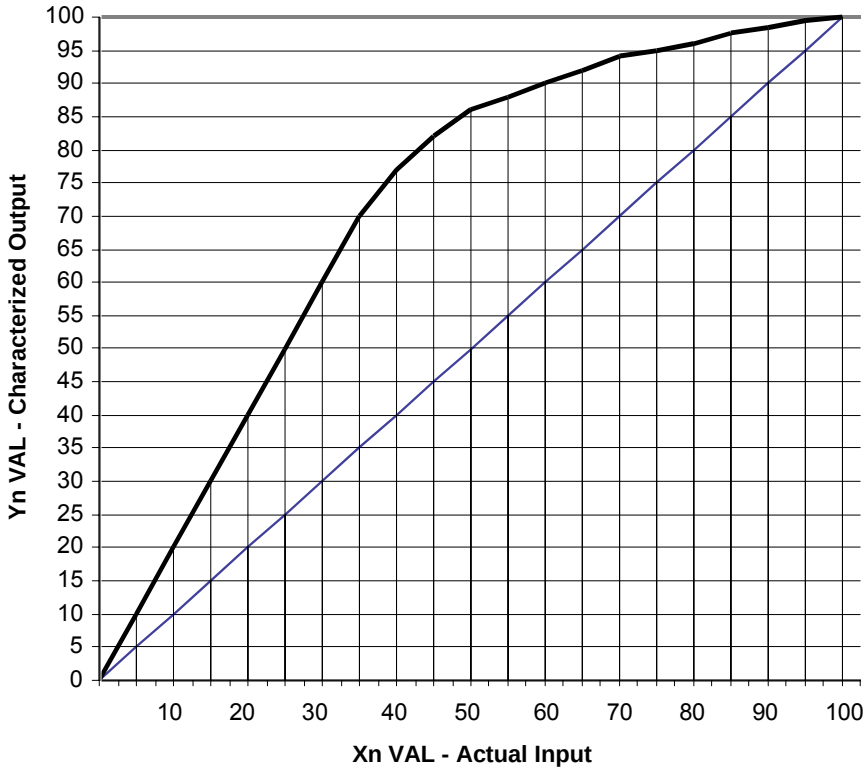
Table 9 Equal Percentage Valve Characteristic Table

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 10 contains values that approximate the characteristic of a quick opening control valve. When the QUIK custom characterization type is selected, the values in Table 10 are automatically loaded 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 10 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. 10260S 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 11lists the parameters and selections available when the SET RELAY*n* group is selected.

Table 11 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** **TDEG**	**RELAY TYPE**—Selects the relay number and the relay activation type. See Table 12 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 **Total Degrees**— total degrees traveled.
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 12 Relay Type Descriptions for units.
R*ny* HL*n*** = 1, 2, 3, or 4 *y* = 1 or 2	**HILO**	**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 12 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 +75 °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 +75 °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 sensor output is out of range or has failed.
Digital Input	The digital input closure.
Total Degrees	The total degrees traveled. Range is from 10 to 99,990,000.

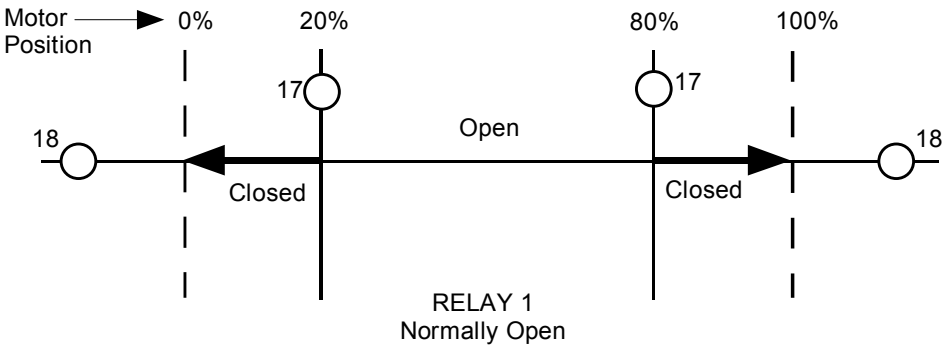
Relay Examples

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.



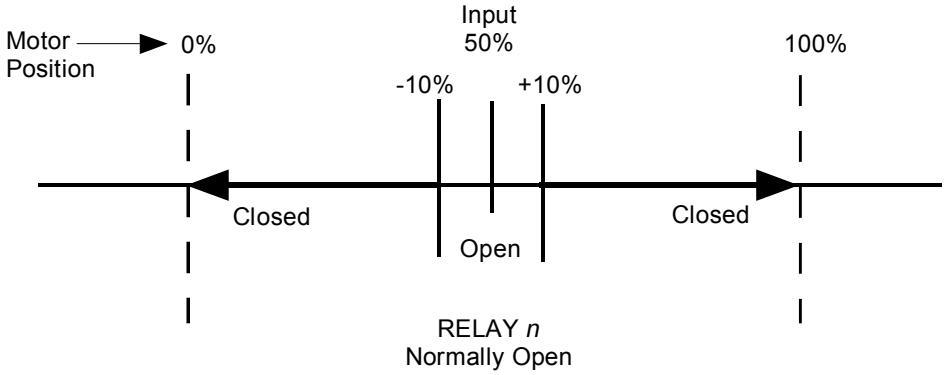
Relay Type - Deviation

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.

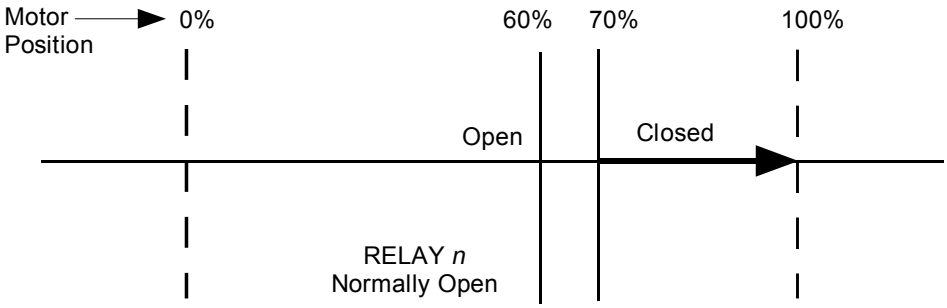
Relay Type – Deviation, continued

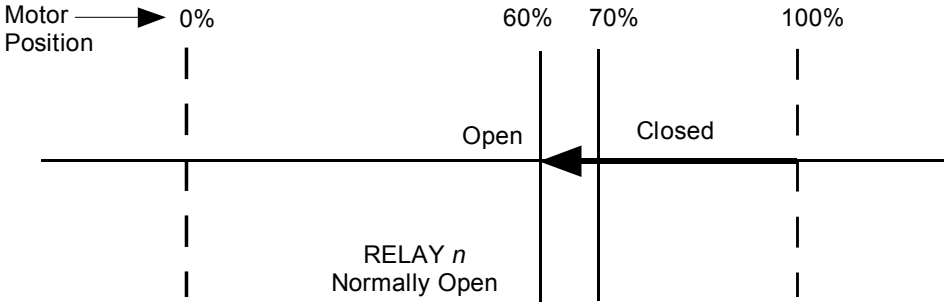


Relay Type – Upper Limit Travel with Hysteresis

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 (RLY1HY) 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 13 lists the parameters and selections available for the SET CUROUT group.

ATTENTION

If you change the output signal range of the actuator, you must perform an output calibration. See *Calibrating 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.

Table 13 Current Out Set Up Group Parameters

Lower Display Prompt	Upper Display Selections	Parameter Definition
CUROUT **Note**: If output type from model selection guide is: 0/4-20mA, 0/1-5Vdc	 **4 – 20** **0 – 20** **1 – 5V** **0 – 5V**	**OUTPUT SIGNAL RANGE**—Selects the signal output range. **4 to 20 mA** **0 to 20 mA** **1 to 5 Volts** **0 to 5 Volts**

Lower Display Prompt	Upper Display Selections	Parameter Definition
CUROUT **Note**: If output type from model selection guide is: Slidewire Emulation	**SW E**	**Slidewire Emulation**
CUROUT **Note**: If output type from model selection guide is: None	**NONE**	**No current output configured.**

Communications Set Up Group

Table 14 lists the parameters and selections available for the SET COMM group.

Table 14 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.
	HART	**HART - Selects HART as the Communications Protocol**.
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	**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 15 lists the parameters and selections availible for the SET DIGINP group.

Table 15 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 16 lists the parameters and selections availible for the SET DISPLA group.

Table 16 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°). Note: Not accessible when characterizer = CUST.

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 17 lists the parameters and selections available for the SET LOCK group.

Table 17 Lock Set Up Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
LOCKID	***Nnnn*** *n* = 1 to 9 (Up 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*" below.
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.
MAENAB	**DIS**	**AUTO / MANUAL MODE LOCKOUT --**
	[default]	**DIS**—disables the mode key on the keypad.
	ENAB	**ENAB**—enables the mode key on the keypad.

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 18 lists the parameters and selections available for the READ STATUS group.

Table 18 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 in failsafe.
	NO	**No**—Actuator not in failsafe.
	YES	**Yes**—Actuator in failsafe, see Troubleshooting section
RAMTST		**RAM TEST DIAGNOSTIC**—*Read Only.* Shows status of RAM test diagnostic.
	PASS	**Pass**—Test passed, no errors
	FAIL	**Fail**—Test failed, see Troubleshooting section.
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 Troubleshooting section.
CFGTST		**CONFIGURATION TEST DIAGNOSTIC**—*Read Only.* Shows status of Configuration test diagnostic.
	PASS	**Pass**—Test passed, no errors
	FAIL	**Fail**—Test failed, see Troubleshooting section.
CALTST		**CALIBRATION TEST DIAGNOSTIC**—*Read Only.* Shows status of Calibration test diagnostic.
	PASS	**Pass**—Test passed, no errors
	FAIL	**Fail**—Test failed, see Troubleshooting section.

Drive Set Up Group

Table 19 lists the parameters and selections available for the SET DRVINF group.

Table 19 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 (90° @ 60hz)	**10s** **20s** **40s** **60s** **20s** **40s** **60s** **40s** **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.
SPEED (90° @ 50hz)	**12s** **24s** **48s** **72s** **24s** **48s** **72s** **48s** **72s**	**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	 **1206** **1205** **2206** **2205**	**POWER INPUT VOLTAGE AND FREQUENCY**—*Read Only.* Selects the power input voltage and line frequency of the actuator. **1206**—120Volts, 60Hz **1205**—120Volts, 50Hz **2206**—220Volts, 60Hz **2205**—220Volts, 50Hz
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.
ROTATE	 **90**	**ROTATION**— Indicates the factory calibrated degrees of rotation. **90**— Factory calibrated for 90 degrees of rotation.
TORQUE	**10 lb-ft / 15 N-M** **20 lb-ft / 27 N-M** **40 lb-ft / 55 N-M** **60 lb-ft / 80 N-M** **40 lb-ft / 55 N-M** **80 lb-ft / 110 N-M** **150 lb-ft / 200 N-M** **200 lb-ft / 270 N-M** **300 lb-ft / 400 N-M**	**Motor Torque value**

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
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 20 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 20 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.
DATSAV	***DIS*** ***ENAB***	**MAINTENANCE DATA FORCED SAVE**— Allows you to manually force a save of the current maintenance data values. **DISABLE**— Forced data save is disabled. **ENABLE**— Forced data save is enabled.
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.

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.
	SYST	**System Restart--Enables the system restart function**
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 factory calibration. For 4-20 mA output only; all other CUROUT selections require output calibration.
	ALL	**All**—Restores input, motor and output calibration to the factory calibrations.
	POS	**Position Sensor**—Restores position sensor calibration to the factory calibration. NOTE: Allows a position sensor field calibration to be stored as a factory calibration. This is to be used after replacement of the sensor in the field. See "*Calibrate POS Output*".
LD CFG	**DIS** **ENAB**	**RESTORE DEFAULT FACTORY CONFIGURATION**--- Allows you to restore the factory default configuration values. **DIS** --- Restore disabled. **ENAB** --- Restore enabled.
RESTRT	**DIS** **ENAB**	**SYSTEM RESTART** --- Allows you to force the system to go thru a restart. **DIS** --- Restart disabled. **ENAB** --- Restart enabled. Note: The **MANRST** function must be set to **SYST.**

* 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.

CAL POSOUT Group

The CAL POSOUT group is used to verify that the position sensor is operating and adjusted properly. This group allows the local display to indicate the output voltage of the position sensor PWA. This display is used when verifying that the sensor is operating and that it is properly calibrated. Table 21 shows the selections available for the CAL POSOUT group.

Table 21 CAL POSOUT Group Parameters

Lower Display Prompt	Upper Display Selections or Range of Setting	Parameter Definition
CALPOS	***n.nnn* ***	**POSITION SENSOR OUTPUT**—*Read Only.* Displays the output voltage of the position sensor PWA

To access the display…

Press		Result
SETUP until you see	*Upper Display* = *Lower Display* =	**CAL** **POSOUT**
FUNCTION	*Upper Display* = *Lower Display* =	**DIS** **CALPOS**
▲ or ▼ key	*Upper Display* = *Lower Display* =	**BEGN** **CALPOS**
FUNCTION	*Upper Display* = *Lower Display* =	***n.nnn*** (Sensor output in volts) **POSOUT**

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 16 shows an illustration of the Auto - Manual switch and Table 22 describes the switch settings. The Auto - Manual Drive switch setting overrides all input signals (analog signal and remote setpoint) and local display mode settings.

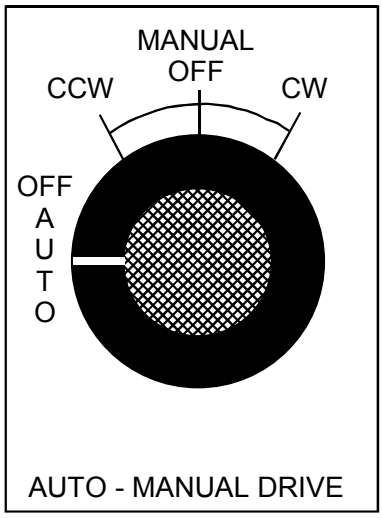


Figure 16 Auto - Manual Switch

Table 22 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 10260S Series Actuator may consist of calibrating the position sensor, calibrating the motor circuit that positions the actuator with 0/4-20mA input signal, or 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 10260S input and output circuits.

Procedure	Equipment Needed
Input Calibration	• A calibrated signal source which can provide current (0/4 mA to 20 mA) or voltage (0 V 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 17 or Figure 18.
2	Place signal source output to low end of input signal and switch power on.
3	*Skip this step for slidewire emulation.* Connect a 250-ohm resistor across the Output terminals of the actuator and connect the DVM leads to the terminals.

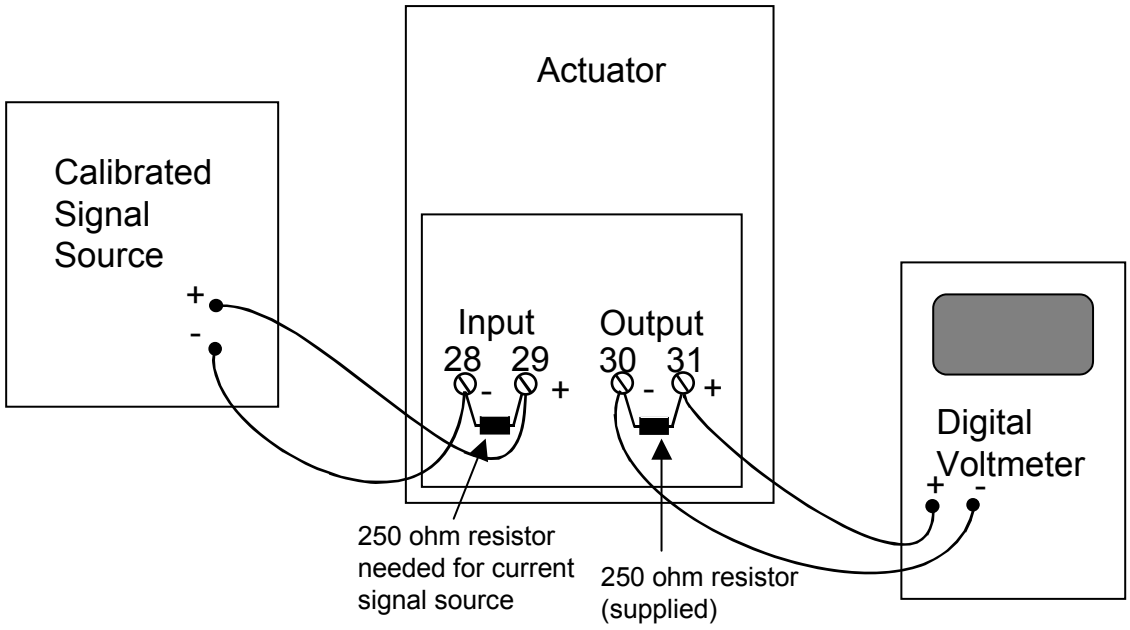


Figure 17 Calibration Wiring Connections (except slidewire emulation)

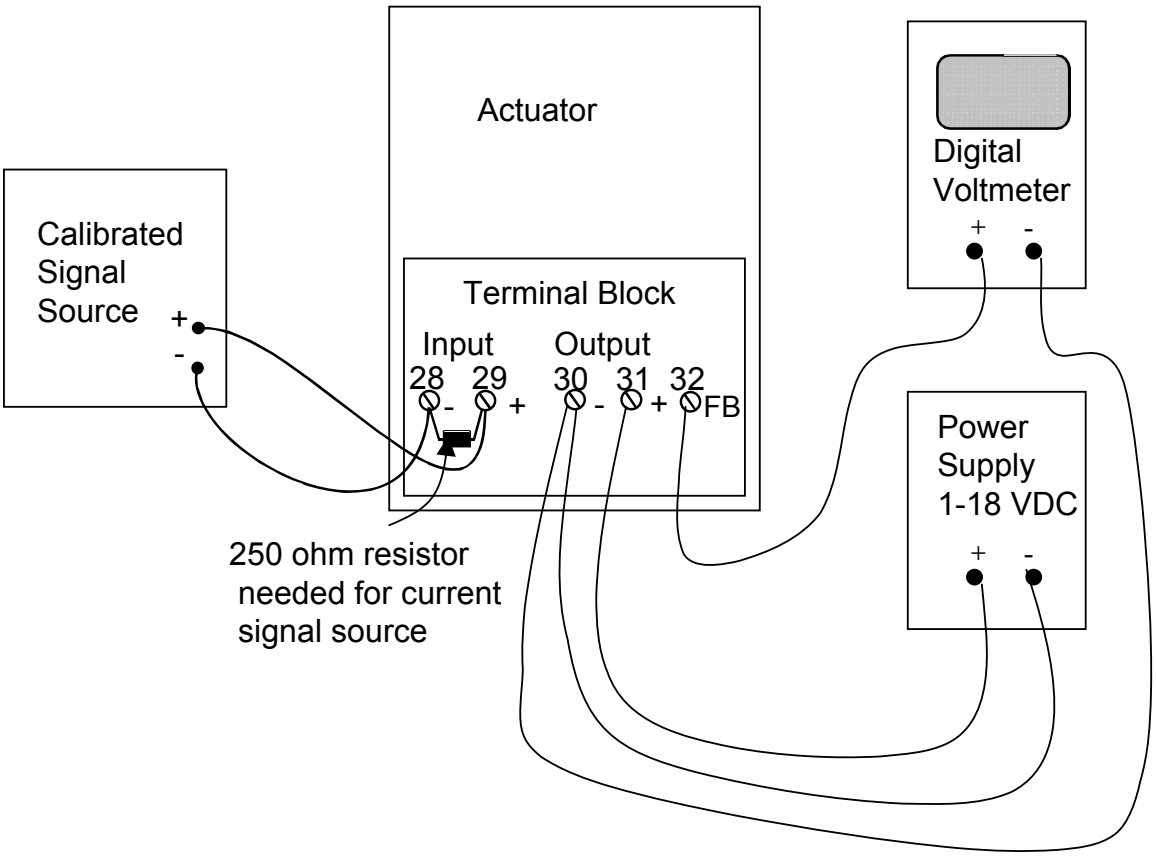


Figure 18 Calibration Wiring Connections (slidewire emulation)

Calibrate Input

The 10260S actuator accepts a variety of signal inputs.

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

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

Refer to Figure 17 for the wiring connections and follow the procedure in Table 23 to calibrate the input circuit of the 10260 S 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 23 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: . You may also exit calibration mode by pressing the DISPLAY or SETUP keys.

Calibrate Motor

Use the procedure in Table 24 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 24 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: See Table 25. You may also exit calibration 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.

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

10260S actuator can be one of three output types:

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

0/4-20 mAor 0/1-5 Volts Output

The 10260S Actuator comes already calibrated from the factory. If it becomes necessary to do a calibration in the field, adjust the output using the procedure in Table 25. Refer to Figure 17 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 0/4 to 20mA output. If you are using another output type, change the procedure accordingly. 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.

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 25 Output Calibration Procedure

Step	Operation	Press	Result	
1	Enter Calibration Mode	SETUP until you see	*Upper Display* = *Lower Display* =	**CAL** **OUTPUT**
		FUNCTION	*Upper Display* = *Lower Display* =	**DIS** **CALOUT**
		▲ or ▼ key	*Upper Display* = *Lower Display* =	**BEGN** **CALOUT**
2	Calibrate Zero (0%)	FUNCTION	Upper Display = Lower Display =	**xxx** **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 1981.
4		FUNCTION	*Calibration for zero and span output values are now stored. Output calibration is complete.*

Slidewire Emulation

The 10260S Actuator comes already calibrated from the factory. If it becomes necessary to do a calibration in the field, adjust the output using the procedure in Table 26. Refer to Figure 18 for a diagram to connect a signal source to the actuator input and a DVM to measure actuator output signal.

ATTENTION

For a slidewire emulation 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 calibration mode, press DISPLAY or SETUP keys.

Table 26 Slidewire Emulation 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**

Step	Operation	Press	Result
2	Calibrate Zero (0%)	FUNCTION	Upper Display = **xxx** Lower Display = **ZERO** xxx = arbitrary number assigned by software
		▲ or ▼ key	Adjust actuator output voltage using down key until value on DVM ceases to change, then press up key until value on DVM moves up one digit
3	Calibrate Span (100%)	FUNCTION	*Upper Display* = **xxxx** *Lower Display* = **SPAN** xxx = arbitrary number assigned by software
		▲ or ▼ key	Adjust actuator output voltage using up key until value on DVM ceases to change, then press down key until value on DVM moves down one digit
		FUNCTION	Calibration for zero and span output values are now stored. Slidewire Emulation Output Calibration is complete. Read meter connected to actuator output.

Calibrate Position Sensor

ATTENTION

The Position Sensor is factory calibrated to a full span, 90 degree rotation. Under normal operation, the position sensor does not require calibration.

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

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

- The sensor PWA output is incorrect,
- The sensor Printed Wiring Assembly (PWA) in the actuator has been replaced,
- The sensor spoiler adjustment has been disturbed.

When the position sensor PWA has been replaced (or serviced), you should perform a calibration of the sensor 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 27 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 case.

Table 27 Non Contact Sensor Calibration Procedure

Step	Action
1	Remove AC power to the actuator.
2	Remove the seven screws and the extended cover from the actuator case. See Figure 2. Lay extended cover assembly on a flat surface.
3	Reapply AC power to the actuator.
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 POSOUT. Press the FUNCTION key until the dispaly reads DIS CALPOS. Press the ▲ or ▼ keys until the lower display reads BEGN CALPOS. 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 19.
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 19.
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.

Step	Action
12	Install a new gasket and replace extended cover. Secure to actuator with screws.
13	Continue with calibration procedure in Table 28.

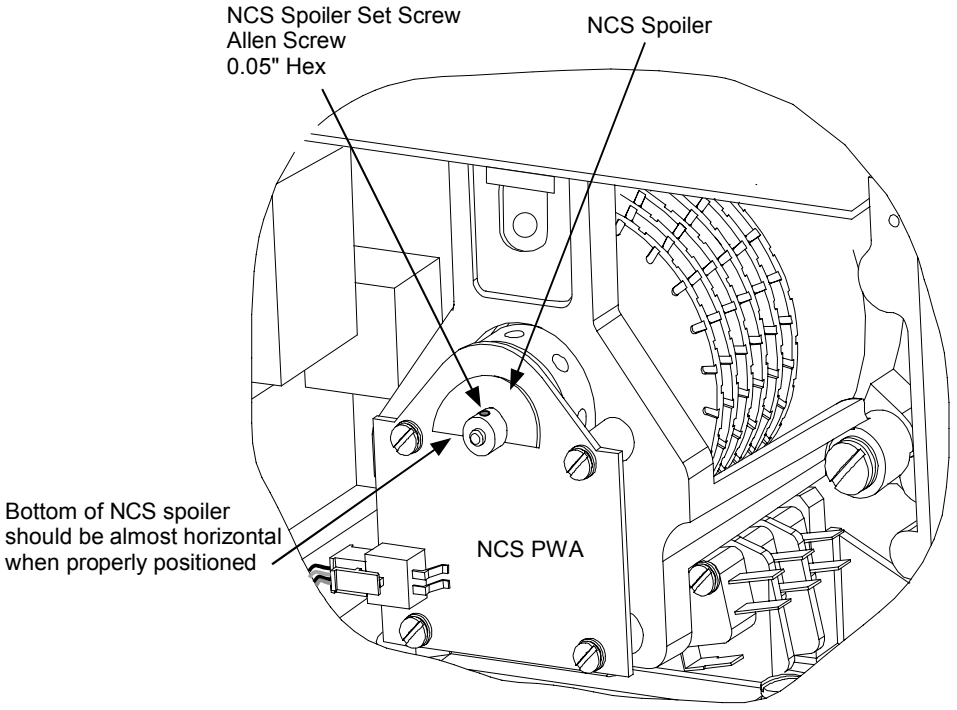


Figure 19 Location of NCS Assembly

Table 28 Load NCS Factory Calibration

Step	Action
1	Reapply AC power to the actuator.
2	Press SET UP key to access the MAINT set up group. Press the FUNCTION key until the display reads LD CAL. Press the ▲ or ▼ keys until the display reads POS.
3	Perform the Calibrate Motor procedure exactly as in Table 24. 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 (actuators mfd. pre-1/1/03)

WARNING

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

ATTENTION

The first two cams (starting from the back) are for the 0 % and 100 % limit switches and should not need any adjustments as they are factory set to stop the drive at 0 % and 100 %.

To adjust the limit switch cams (see Figure 20):

1. Remove the cover. (Non-contact sensor and terminal cover, see Figure 1.)
2. Turn the locking nut, found behind the sensor, 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.
3. Using a slotted screwdriver on the slots at the edge of the cams, or your finger, rotate the cams until the switches are set. (See Figure 21 .)
    - 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 Figure 13 page 26).
    - 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 Figure 13 page 26).
    - If optional auxiliary switches were ordered, these switches may also be set at this time. (See page 70 for details of setting auxiliary switches.)
4. 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).
5. 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.

ATTENTION

Make sure not to set the switch too close to the hard stop.

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 to the customer on the terminal board (see Figure 13 page 26).

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

Setting End-of-Travel Limit Switches (actuators mfd. after 1/1/03)

WARNING

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

ATTENTION

The first two cams (starting from the back) are for the 0 % and 100 % limit switches and should not need any adjustments as they are factory set to stop the drive at 0 % and 100 %.

To adjust the limit switch cams (see Figure 20):

1. Remove the cover (terminal cover, see Figure 1).
2. Using a slotted screwdriver on the slots at the edge of the cams, or your finger, rotate the cams until the switches are set (see Figure 20).
    - 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 Figure 13 page 26).
    - 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 Figure 13 page 26).
- If optional auxiliary switches were ordered, these switches may also be set at this time. (See page 73 for details of setting auxiliary switches.)

3. No additional adjustments are required.
4. 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 (actuators mfd. pre-1/1/03)

WARNING

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

ATTENTION

The first two cams (starting from the back) are for the 0 % and 100 % end of travel limit switches and should not need any adjustments as they are factory set to stop the actuator at 0 % and 100 %. See page 67 for setting end of travel limit switches (Switches #1 and #2)

If optional auxiliary switches were ordered, these switches are factory set to 10 % and 90 % for switches #3 and #4 and to 20 % and 80 % for switches #5 and #6. 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.

To adjust the next auxiliary switch cams (see Figure 22):

1. Remove the cover. (Non-contact sensor and terminal cover, see Figure 1.)
2. Turn the locking nut, found behind the sensor, counter-clockwise using a 1/8” allen wrench or equivalent inserted into the radial holes in the locking nut until it is possible to turn the cams with your fingers.
3. Using a slotted screwdriver on the slots on edge of cams, or your fingers, rotate the cams until the switches are set. (See Figure 20.)
    - The auxiliary switches should be set so switches #3 and #5 operate in synchronism with switch #1 (i.e., both activating when the drive is going in the same direction) and set switches #4 and #6 to operate in synchronism with switch #2.

For Switches #3 and #5:

- 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 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 Figure 13 page 26).
- Repeat for Switch #5 if applicable.

For Switches #4 and #6:

- 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 when the switch activates. Both the NC and NO contact states are available to the customer at the terminals (see Figure 13 page 26).
- Repeat for Switch #6 if applicable.

4. 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).
5. 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.

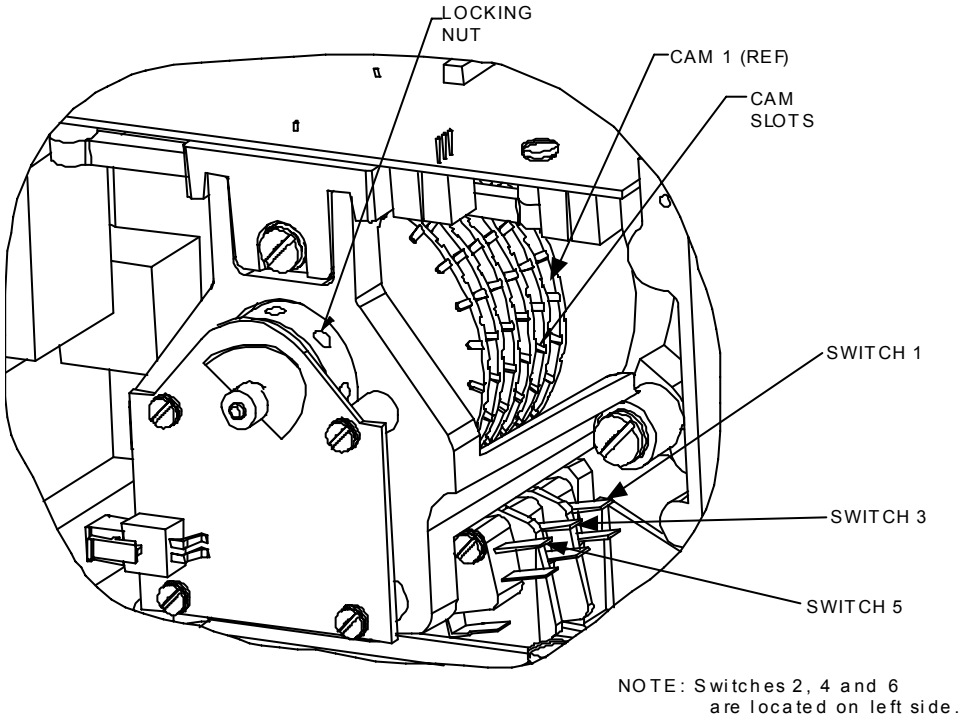
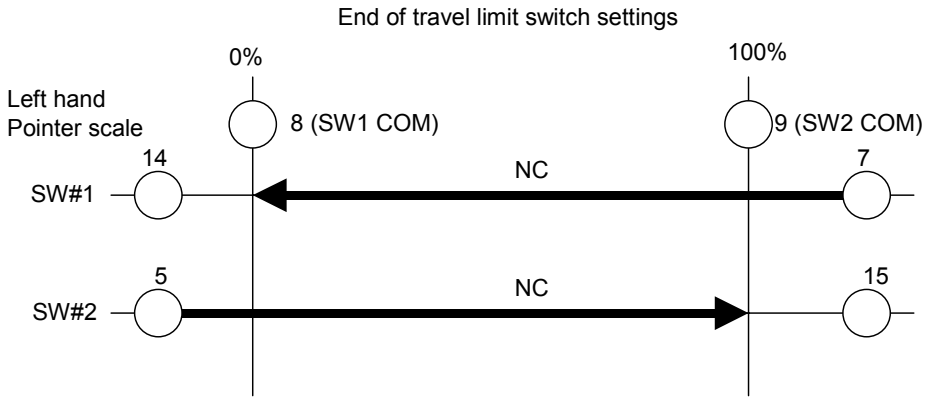


Figure 20 Location of Auxiliary Switches



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 left hand pointer scale) and CCW rotation activates SW#2 (at 100% on left hand pointer scale). Terminal numbers are next to circles (see Figure 13 page 26).

Figure 21 End of Travel Limit Switch Settings

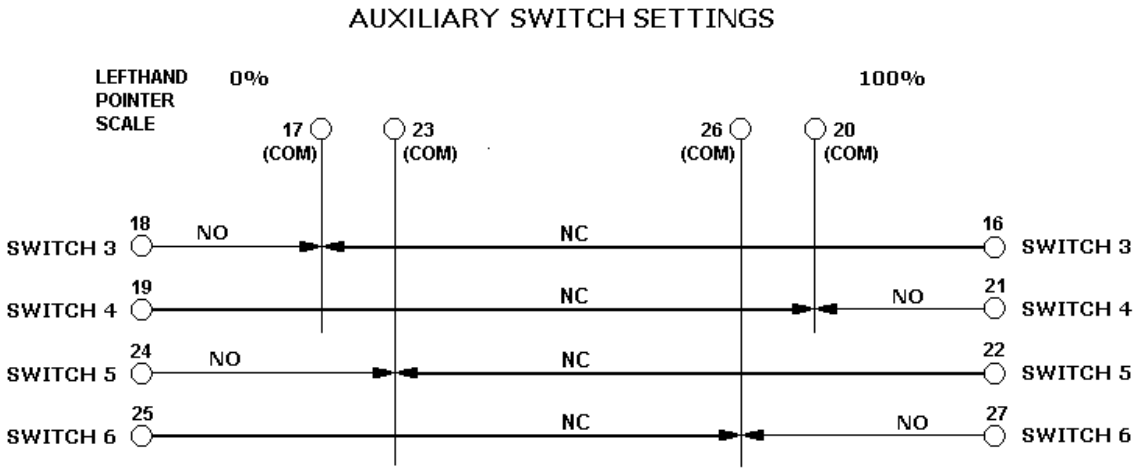


Figure 22 Auxiliary Switch Settings

Setting Auxiliary Switches (actuators mfd. after 1/1/03)

WARNING

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

ATTENTION

The first two cams (starting from the back) are for the 0 % and 100 % end of travel limit switches and should not need any adjustments as they are factory set to stop the actuator at 0 % and 100%. See page 68 for setting end of travel limit switches (Switches #1 and #2).

If optional auxiliary switches were ordered, these switches are not set by the factory. 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.

To adjust the next auxiliary switch cams (see Figure 22):

1. Remove the terminal cover (see Figure 1).
2. Using a slotted screwdriver on the slots at the edge of the cams, or your finger, rotate the cams until the switches are set (see Figure 20).
3. The auxiliary switches should be set so switches #3 and #5 operate in synchronism with switch #1 (i.e., both activating when the drive is going in the same direction) and set switches #4 and #6 to operate in synchronism with switch #2.

For Switches #3 and #5:

4. Rotate the actuator shaft, using the manual handwheel or the auto/manual switch, to the desired low scale position.
5. 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 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 Figure 13 page 26).

For Switches #4 and #6:

6. Rotate the actuator shaft, using the manual handwheel or the auto/manual switch, to the desired up scale position.
7. 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 when the switch activates. Both the NC and NO contact states are available to the customer at the terminals (see Figure 13 page 26).
8. No additional adjustments are required.
9. 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.

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 Switch 3 and Switch 5 similar to Limit Switch 1. Counterclockwise rotation of the output shaft activates Switch 4 and Switch 6 similar to Limit Switch 2.

Terminal numbers are next to circles (see Figure 13 page 26).

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 in 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 18 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 indicate the actuator is in manual mode by the LED blinking at approximately a 1 second rate.

Operating the Local Display at High Temperatures

The temperature limits for the actuator local display are listed as -30° C to +50° C (-20° F to +122°F). The display is programmed to shut off automatically at operating temperatures above +50° C.

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.

Operating Displays

Pressing the DISPLAY key cycles the display through a number of operating parameters. Table 29 shows a number of sample displays that can be shown during operation.

Table 29 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, the Position display (POS) becomes the current local display.

Motor Stall

The actuator is equipped with a low current motor that prevents against burnout if the motor becomes stalled. A stall condition occurs when the motor position does not follow the input, or if the motor does not reach setpoint within a given period of time. The actuator sets the STALLED LED indicator on, along with any other alarms or relay contacts that are programmed to close 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.

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 can verify that the sensor 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 allows the NCS output voltage to be read from the local display.

Step	Action
1	Drive the motor to 50% position.
2	Press SET UP key on the keyboard until the display reads CAL POSOUT. Press FUNCTION key until the display reads DIS CALPOS. Press the ▲ or ▼ keys until the display reads BEGN CALPOS. Press the FUNCTION key. *Upper Display* = ***n.nnn*** (Output voltage of the non-contact sensor) *Lower Display* = **POSOUT**
3	The display should read 2.500 + or – 0.012 Volts.
4	Press DISPLAY key and then drive the motor to zero position. Repeat Step 2. The display should read 1.600 + or – 0.060 Volts.
5	Press DISPLAY key and then drive the motor to 100% position. Repeat Step 2. The display should read 3.400 + or – 0.060 Volts
6	If the NCS needs adjustment, refer to the “Calibrate Non-Contact Sensor” procedure in Table 27 in Section 4.

Remote Setpoint Operation

The 10260S actuator can be set up to receive a digital input from a remote source. The actuator uses RS485 communications that supports digital Modbus RTU protocol. Press the SET UP key to select the Input set up group. Change the Input Type to Remote Setpoint (R_SP). Make the necessary connections to terminals 33, 34 and 35 on the actuator terminal block. See Figure 23. Communicaton parameters should be set to the same values as the host device. The actuator communication parameters are accessed in the Communications Set Up group.

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.

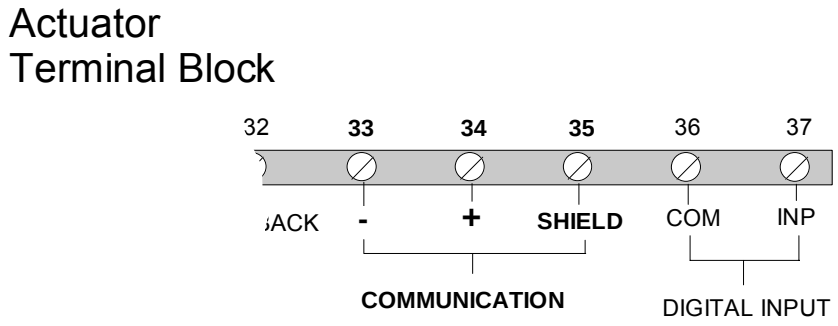


Figure 23 Terminal Block Connections for Modbus Communications

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 24 (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. The statistics can be accessed in the maintenance set up group. The counts can also be reset to zero if desired or saved manually to memory. See Maintenance Set Up Group 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.

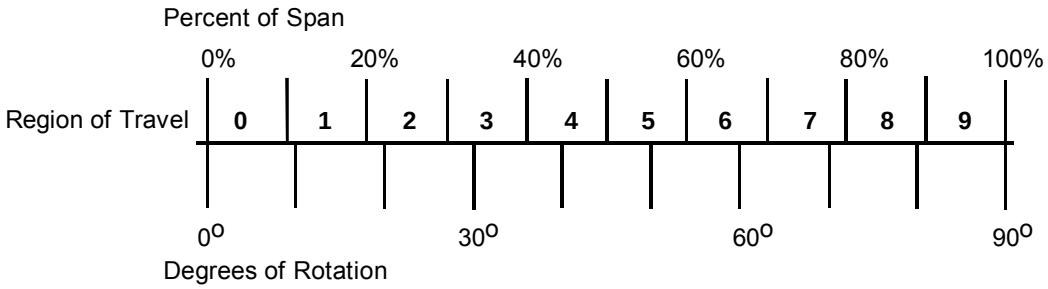


Figure 24 Regions of Motor Travel

6. Control Applications

Introduction

The 10260S Smart Actuator can operate in a variety of control applications. Examples are given in this section for the actuator to operate in:

- A basic flow control application
- Proportional flow application using multiple actuators
- A split valve configuration.

Split Range

The 10260S actuator can be set up to operate within a narrow input range (for example, 4 to 12mA input) in certain applications. The procedure in Table 30 describes how to set up an actuator to operate as part of a split valve configuration.

Table 30 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.

Master/Slave Arrangement

Introduction

With the motor positioner, the controlling signal for the actuator is a 4 mA to 20 mA from a current output controller as shown in the flow diagram in Figure 25.

Unlike the position output controller, the current output controller must produce a continuous analog signal or 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 mA to 20 mA) to the actuator input and opens the valve. Controller set point governs valve position to obtain desired flow rate.

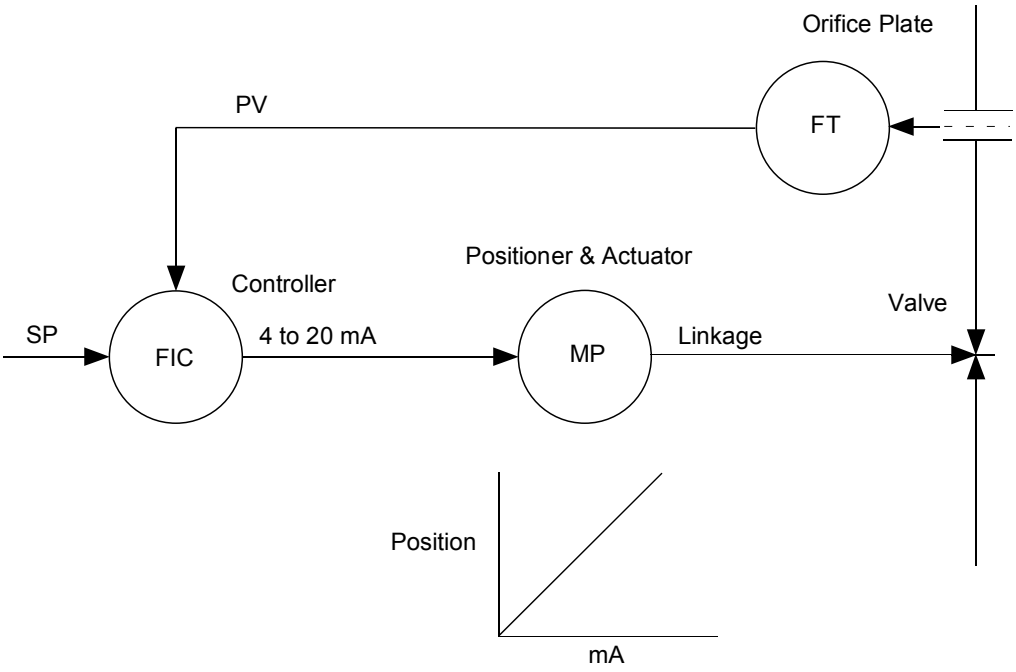


Figure 25 Flow Diagram

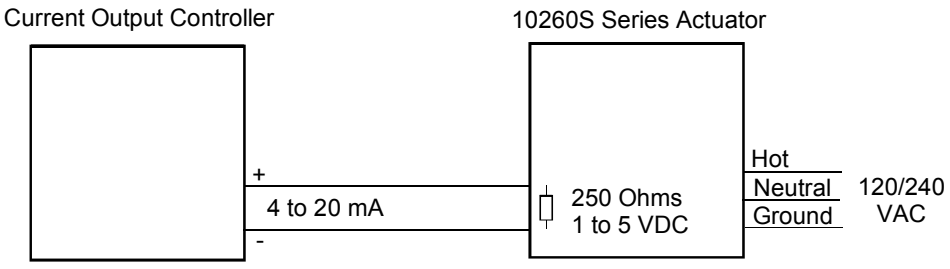


Figure 26 Interconnection Diagram

Proportional Flow using Multiple Actuators

Refer to flow diagram in Figure 27 and interconnection diagrams in Figure 28. The controller governs flow rate in one burner. Only that flow is measured. Since #2 and #3 motor positions receive the same signal as #1 motor positioned, 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.

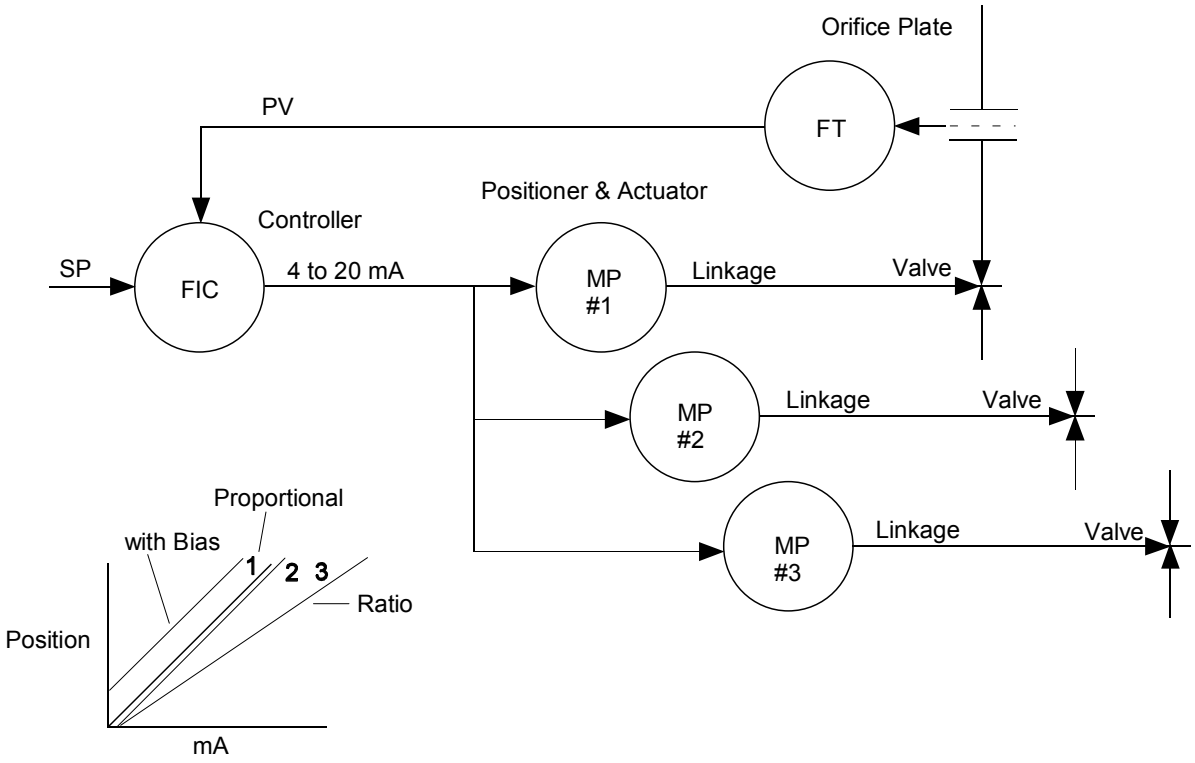
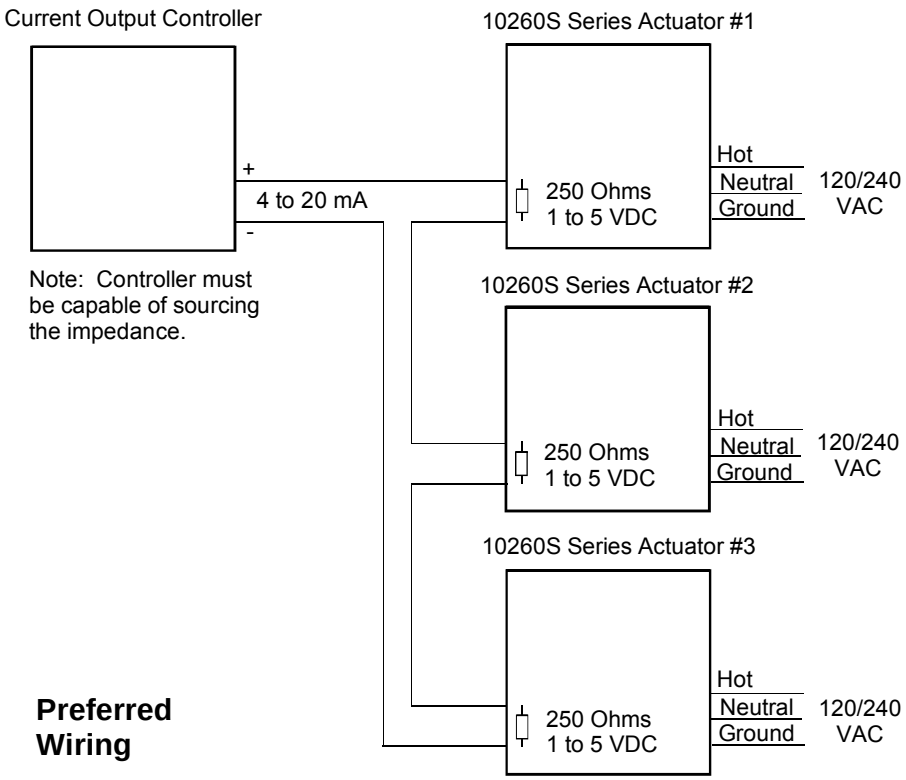
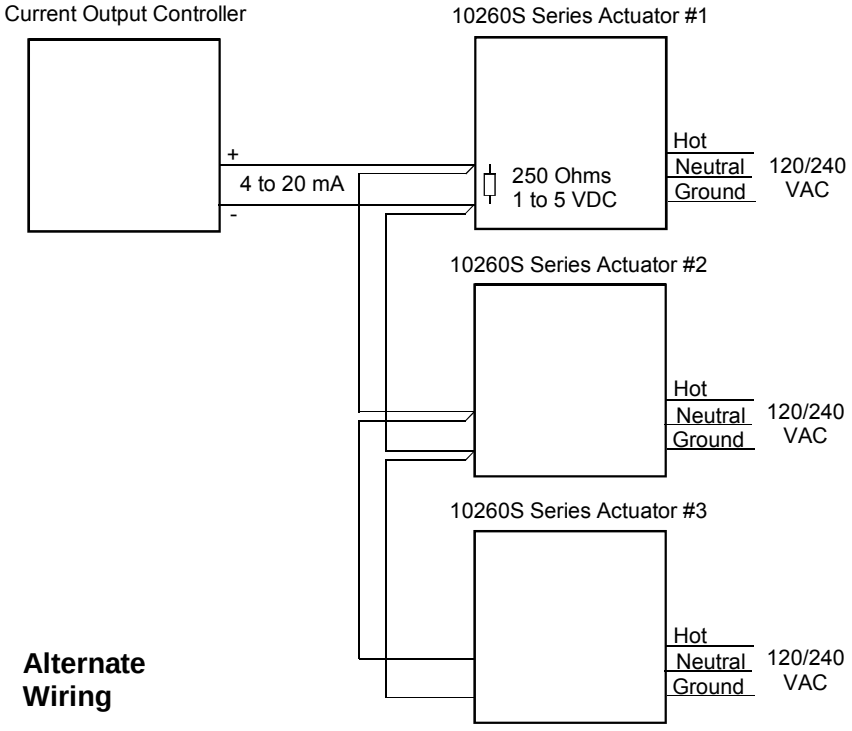


Figure 27 Proportional Flow Using Multiple Actuators



NOTE: If using HART communications, for this application HART must be configured for Multi-drop operation.

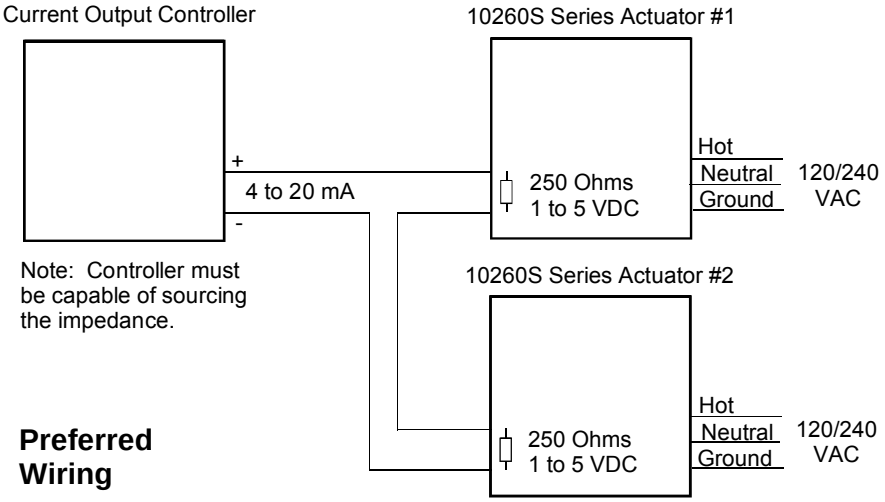


NOTE: If using HART communications, for this application HART must be configured for Multi-drop operation.

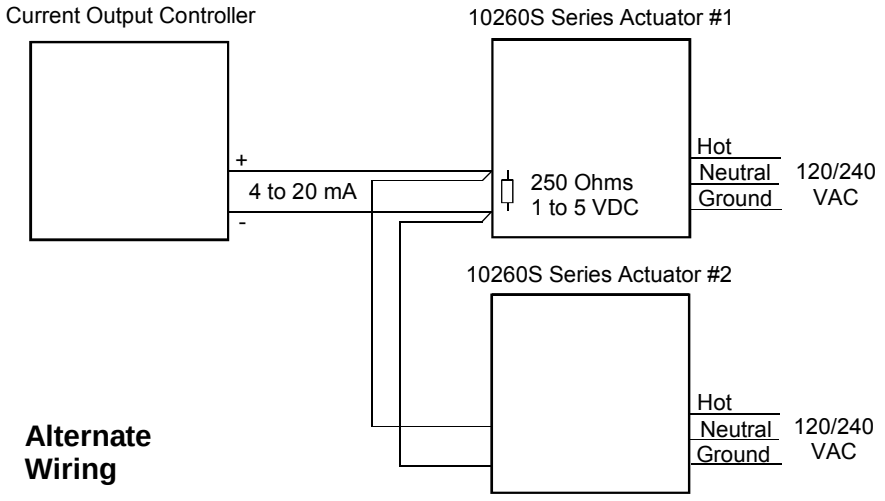
Figure 28 Multiple Actuator Interconnection Diagrams

Split Valve Configuration

A common heat or cool type process requires two valves. In this case the controller has only one output. The two motor positioners are calibrated differently, one responds to 4 mA to 12 mA and the other responds to 12 mA to 20 mA. At 12 mA both valves are closed, one opening below 12 mA and the other above 12 mA. Refer to Figure 29 for an interconnection diagram for split valve operation using two actualtors.



NOTE: If using HART communications, for this application HART must be configured for Multi-drop operation.



NOTE: If using HART communications, for this application HART must be configured for Multi-drop operation.

Figure 29 Interconnection Diagrams

7. Maintenance

Introduction

There is some basic maintenance that is recommended for the 10260S 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.

Main Gear Lubrication

Under normal operating conditions, the main worm gear should not require maintenance.

Spur Gear Lubrication

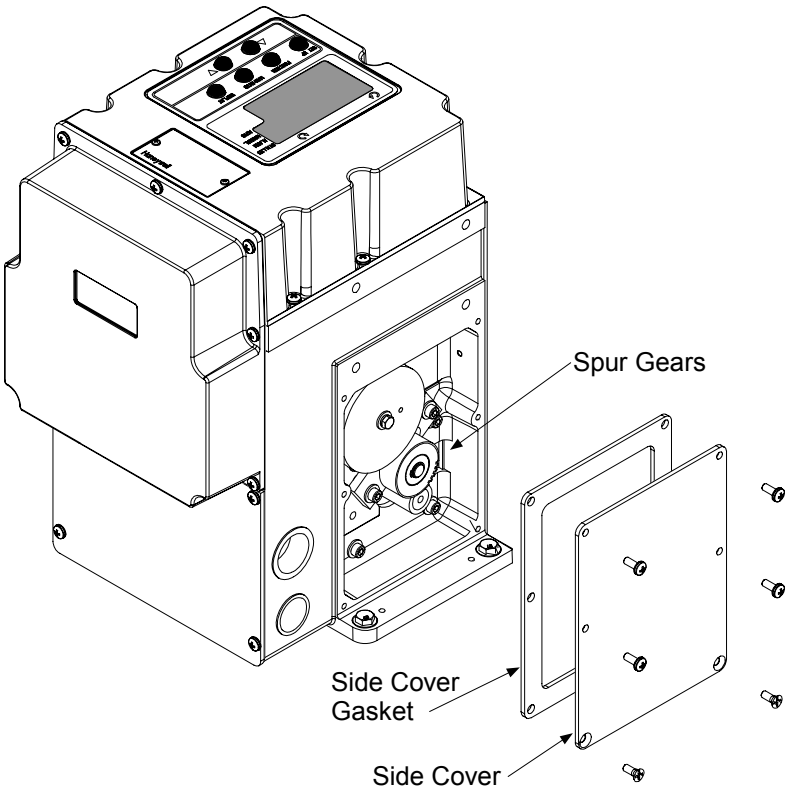
Honeywell recommends that during major shutdown periods the spur gears should be inspected and lubricated. Follow the steps in Table 31 to access the spur gear compartment and lubricate the gears if necessary.

WARNING

Disconnect power before opening the actuator case to inspect the actuator gears. A potentially dangerous pinch hazard exists inside the case if the unit is opened while powered.

Table 31 Spur Gear Lubrication Procedure

Step	Action
1	Remove AC power from actuator.
2	Remove the six screws and the side cover of the actuator case. See Figure 30.
3	Inspect the final spur gear, the idler gear and motor pinion for excessive wear and adequate lubrication. See Figure 30.
4	If needed, use Texaco Starplex 2 EP grease, or equivalent and apply lubricant to assure that the gears are adequately protected.
5	Install a new gasket and replace side cover. Secure to actuator with screws.
6	Restore actuator to service.



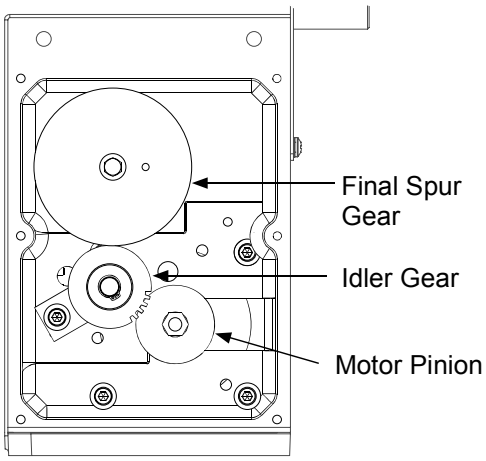


Figure 30 Spur Gear Location

Replacement Procedures

Fuse Replacement

The motor drive circuit contains two fuses. They are located on the power distribution PWA. If it becomes necessary to replace these fuses, follow the procedure in Table 32 and refer to Figure 32 for fuse location.

WARNING

Disconnect power before opening the actuator case to replace the fuse(s). A potentially lethal shock hazard exists inside the case if the unit is opened while powered.

Table 32 Motor Drive Fuse Replacment Procedure

Step	Action
1	Remove AC power from actuator.
2	Remove the seven screws and the extended cover of the actuator case. See Figure 31.
3	Lay assembly down on a flat surface and remove old gasket.
4	Locate the two fuses on the power distribution PWA. See Figure 32. Carefully remove and replace fuse(s) with Wickmann T1 type 6A 250V, or equivalent.
5	Install a new gasket and replace extended cover. Secure to actuator with screws.

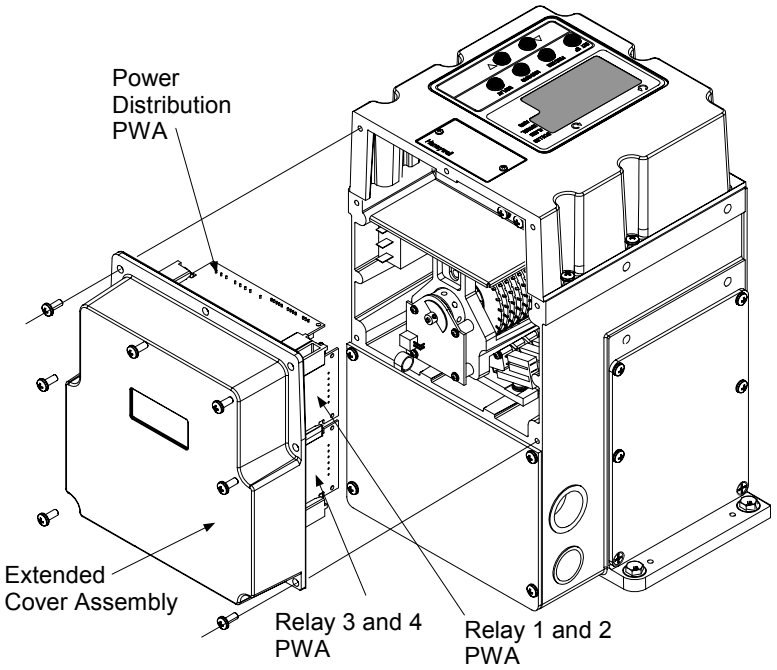


Figure 31 Power Distribution PWA and Relay PWA Locations

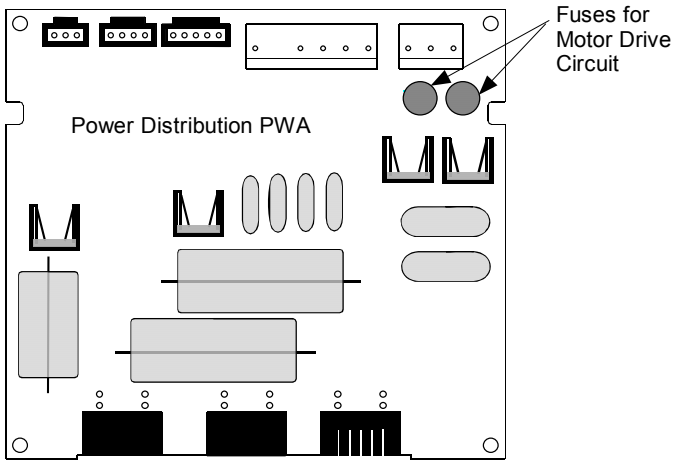


Figure 32 Motor Drive Circuit Fuses

Relay PWA Replacement

If a relay PWA needs to be replaced, follow the procedure in Table 33 to access and replace the PWA.

WARNING

Disconnect power before opening the actuator case. A potentially lethal shock hazard exists inside the case if the unit is opened while powered.

Table 33 Relay PWA Replacement Procedure

Step	Action
1	Remove AC power from actuator.
2	Remove the seven screws and the extended cover of the actuator case. See Figure 31.
3	Lay assembly down on a flat surface and remove old gasket.
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	Install a new gasket and replace extended cover. Secure to actuator with screws.

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 10260S Series Actuators and optional equipment. Each kit contains replacement parts accessories and instructions for component replacement. The numbers in Figure 33 identify the location of various actuator replacement components and are keyed to parts kits listed in this section.

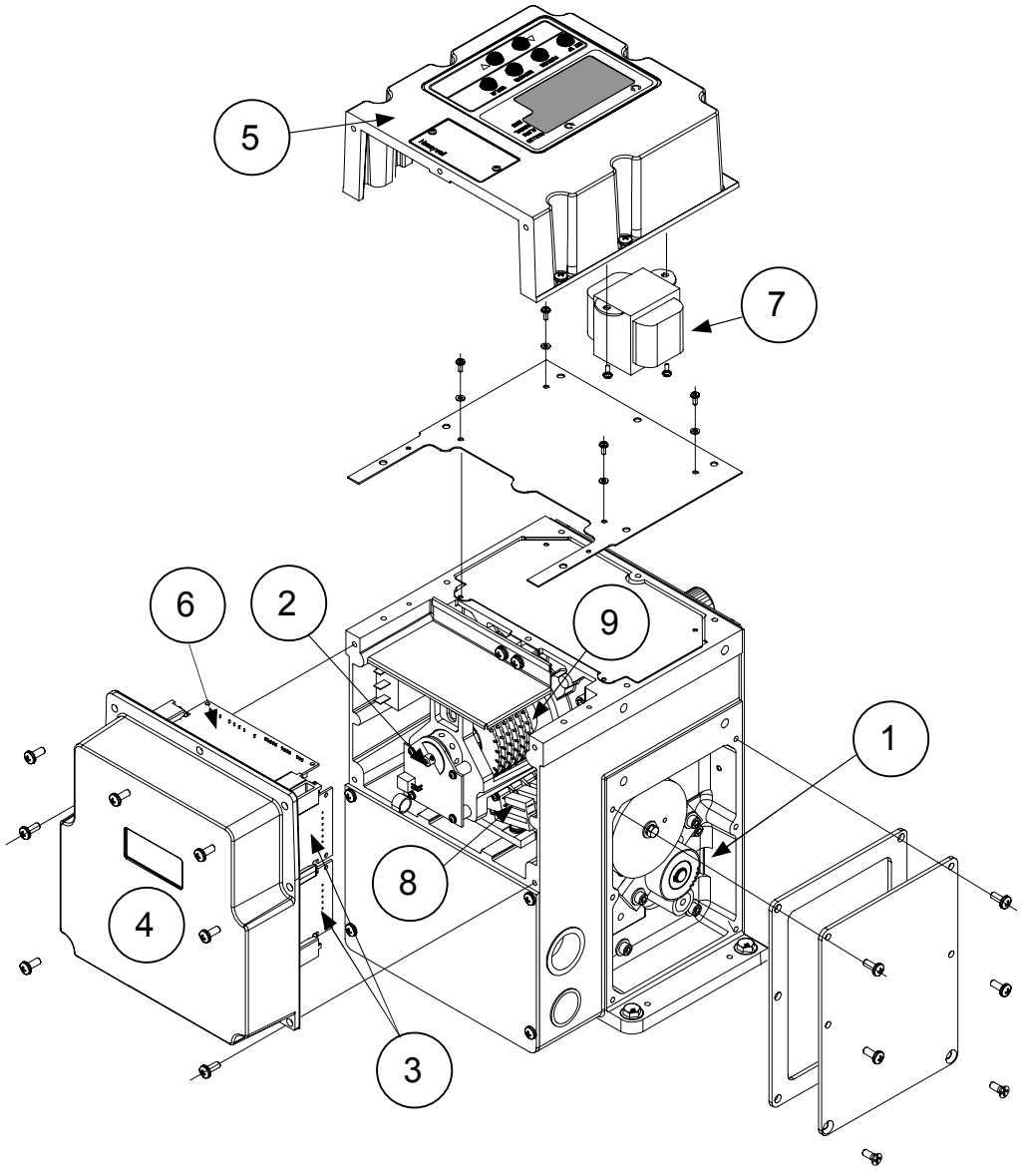


Figure 33 10260S Actuator Components

Motor Kits

Kit #51205551-501 Motor 1026(1, 2, 4, 6) 120 V 50/60 Kit

Part Description
Motor
Capacitor, Motor 7.5uf
Gasket Set (10260S)
Kit Instruction

Kit #51205551-502 Motor 10263 120 V 50/60 Kit

Part Description
Motor
Capacitor, Motor 11uf - 60 Hz
Capacitor, Motor 13uf - 50 Hz
Gasket Set (10260S)
Kit Instruction

Kit #51205551-503 Motor 1026(7, 8, 9) 120 V 50/60 Kit

Part Description
Motor
Capacitor, Motor 14uf
Gasket Set (10260S)
Kit Instruction

Kit #51205551-504 Motor 1026(1, 2, 4, 6, 7, 8, 9) 240 V 50/60 Kit

Part Description
Motor
Capacitor, Motor
Capacitor, Motor
Gasket Set (10260S)
Kit Instruction

Kit #51205551-505 Motor 10263 240 V 50/60 Kit

Part Description
Motor
Capacitor, Motor
Capacitor, Motor
Gasket Set (10260S)
Kit Instruction

Kit #51205551-506 Motor 10265 120 V 50/60 Kit

Part Description
Motor
Capacitor, Motor 11uf - 60 Hz
Capacitor, Motor 13uf - 50 Hz
Gasket Set (10260S)
Kit Instruction

Kit #51205551-507 Motor 10265 240 V 50/60 Kit

Part Description
Motor
Capacitor, Motor
Capacitor, Motor
Gasket Set (10260S)
Kit Instruction

① Idler Gear Kits

Kit #51205552-501 Idler Gear 1026(1, 2, 4, 6, 7) Fiber (2) Kit

Part Description
Idler Gear Assy (Fiber)
Gasket Set (10260S)
Kit Instruction

Kit #51205552-502 Idler Gear 1026(8, 9) Steel (2) Kit

Part Description
Idler Gear Assy (Steel)
Gasket Set (10260S)
Kit Instruction

Kit #51205552-503 Idler Gear 1026(3, 5) Steel (2) Kit

Part Description
Idler Gear Assy (Steel)
Gasket Set (10260S)
Kit Instruction

② Non-Contact Sensor Kit

Kit #51500523-501 Non-Contact Sensor (NCS) Replacement

Part Description
Non-Contact Sensor PWA
NCS Set Up Gage
Screws, #4-40 X 5/16”
Gasket Set (10260S)
NCS Wire Assy
Kit Instruction

Replacement PWAs

③ *Kit #51450802-501 Relay PWA*

Part Description
Relay PWA
Gasket Set (10260S)
Kit Instruction

④ *Kit #51500163-501 Main CPU PWA Assembly*

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”
Gasket Set (10260S)
Kit Instruction

⑤ *Kit #51451231-501 Display PWA Assembly*

Part Description
Assembly Drawing
Top Cover
Cable Ties
Display/keypad Cable
Display PWA
Keypad
Support Plate, Keypad
Display Lens
Display Overlay
Transformer
Screws #4-40 X 3/8”
Screws #6-32 X 3/8”
Sleeve, Keypad
Gasket
Kit Instruction

Kit# 51500324-501 Display Upgrade Kit Complete Display and Cover Assembly

⑥ *Kit #51500166-501 Power Distribution PWA*

Part Description
Power Distribution PWA
Gasket Set (10260S)
Kit Instruction

Relay Upgrade Kit

Kit #51450802-502 Relay PWA Upgrade Kit

Part Description
Relay PWA Replacement Kit
Relay Wire Assembly
Plug, 3-Position
Labels
Gasket Set (10260S)

Kit Instruction

⑦ Transformer Kit

Kit #51500457-501 Transformer Kit

Part Description
Transformer
Gasket Set (10260S)
Cable Ties
Kit Instruction

Auto/Manual Switch Kit

Kit #51500581-501 Auto/Manual Switch Kit

Part Description
Auto/Manual Switch/Wire Assy (10260S)
Auto/Manual Label
Knob
Shrink Tubing
Gasket Set (10260S)
Kit Instruction

MOV Assembly Kits

Kit #51500671-503 MOV Assembly Kit, 130 Vac

Part Description
MOV Assembly, 130 Vac
Gasket Set (10260S)
Kit Instruction

Kit #51500671-504 MOV Assembly Kit, 275 Vac

Part Description
MOV Assembly, 275 Vac
Gasket Set (10260S)
Kit Instruction

⑧ Limit/Auxiliary Switch Kits

Kit #51205550-501 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
Gasket Set (10260S)
Kit Instruction

⑨ Cam Kits

Kit #51205553-501 Cam Assembly Kit

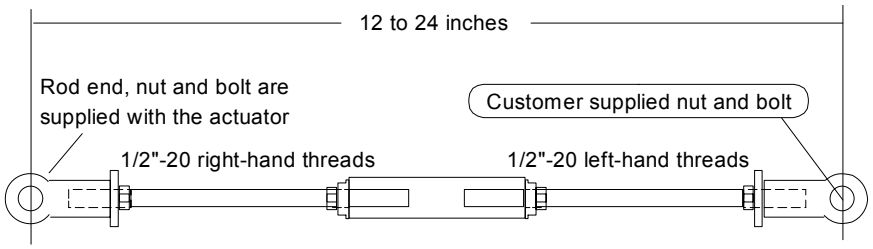
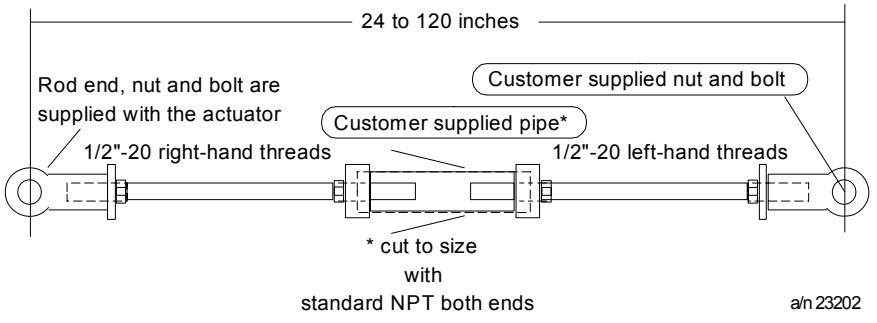
Part Description
Bushing, Cam
Screw, Soc Set #10-32 X ¼”
Locking Nut
Washer, Toothed
Washer, Cam
Spacer, Cam
Cam
Kit Instruction

Accessories

Part	Number
5” Crankarm Kit	51309967-501
12” Crankarm Kit	51452160-501
Turk Cable for Handheld HART Connection	51452352-501

Linkage Parts/Kits

	Turnbuckle Kit			Pipe Kit			
Up to 75 lb-ft (100 Nm)	***Overall linkage length, inches (cm)***			***Overall linkage length, inches (cm)****			
	Min.	**Max.**	**Kit Number**	**Min.**	**Max.**	**Pipe Size**	**Kit Number**
	12 (30.48)	16 (40.64)	083381	24 (60.96)	72 (182.88)	1 (2.54)	083384
	16 (40.64)	20 (50.8)	083382	24 (60.96)	120 (304.8)	1 ½ (3.81)	083385
	20 (50.8)	24 (60.96)	083383	-	-	-	-
150 to 300 lb-ft (200 to 410 Nm)	***Overall linkage length, inches***			***Overall linkage length, inches ****			
	Min.	**Max.**	**Kit Number**	**Min.**	**Max.**	**Pipe Size**	**Kit Number**
	12	16	083381	24	28	1”	083384
	16	20	083382	24	84	1 ½”	083385
	20	24	083383	24	120	2”	083386

Turnbuckle Kit	
Pipe Kit	

Honeywell Actuator Linkage Analysis Software (HAL)

Part Number: 51197910-001

Replacement Fuses

Wickmann T1: 6A 250V

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

Table 34 Observable Symptoms of Failure

Symptom	Procedure
No Actuator current output.	Replace CPU Assembly
No Actuator slidewire output.	Replace CPU Assembly
Local display does not light.	See Figure 34
Actuator fails one or more power up diagnostics.	See Figure 35
Actuator motor does not drive in response to input signal.	Perform input calibration. See Figure 34
Actuator motor does not drive to proper position.	Perform motor calibration.
Non-contact sensor position is not correct.	See “Non-Contact Sensor Operation” in Section 5.
Auto/Manual Switch does not operate correctly.	See Figure 37
Relay(s) does not operate.	See Figure 38

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. Instruction 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 case. Do not open the case while the unit is powered. Do not access the terminals while the unit is powered.

Test for Actuator Operation

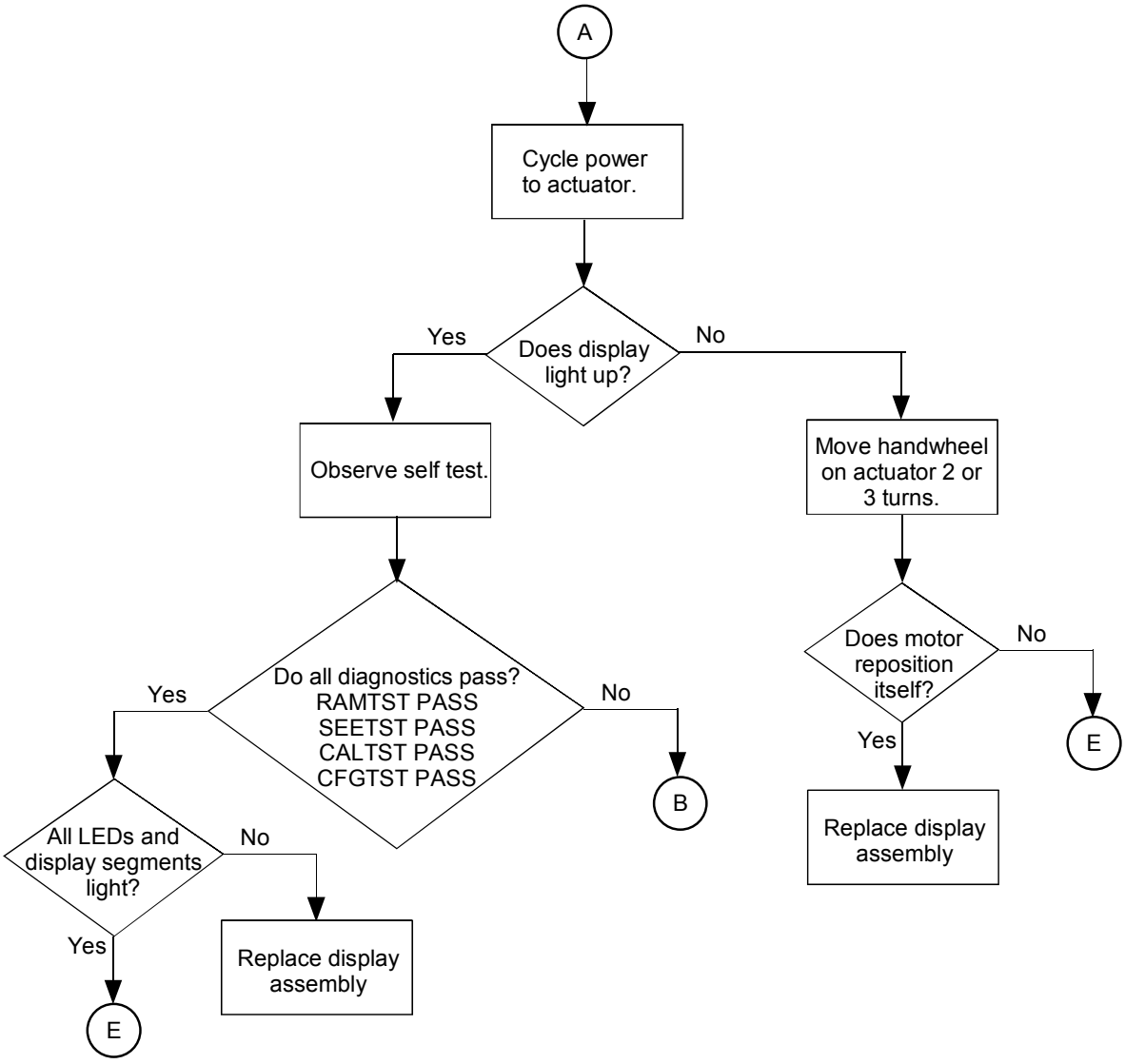


Figure 34 Test for Actuator Operation

Power Up Self Test Diagnostics

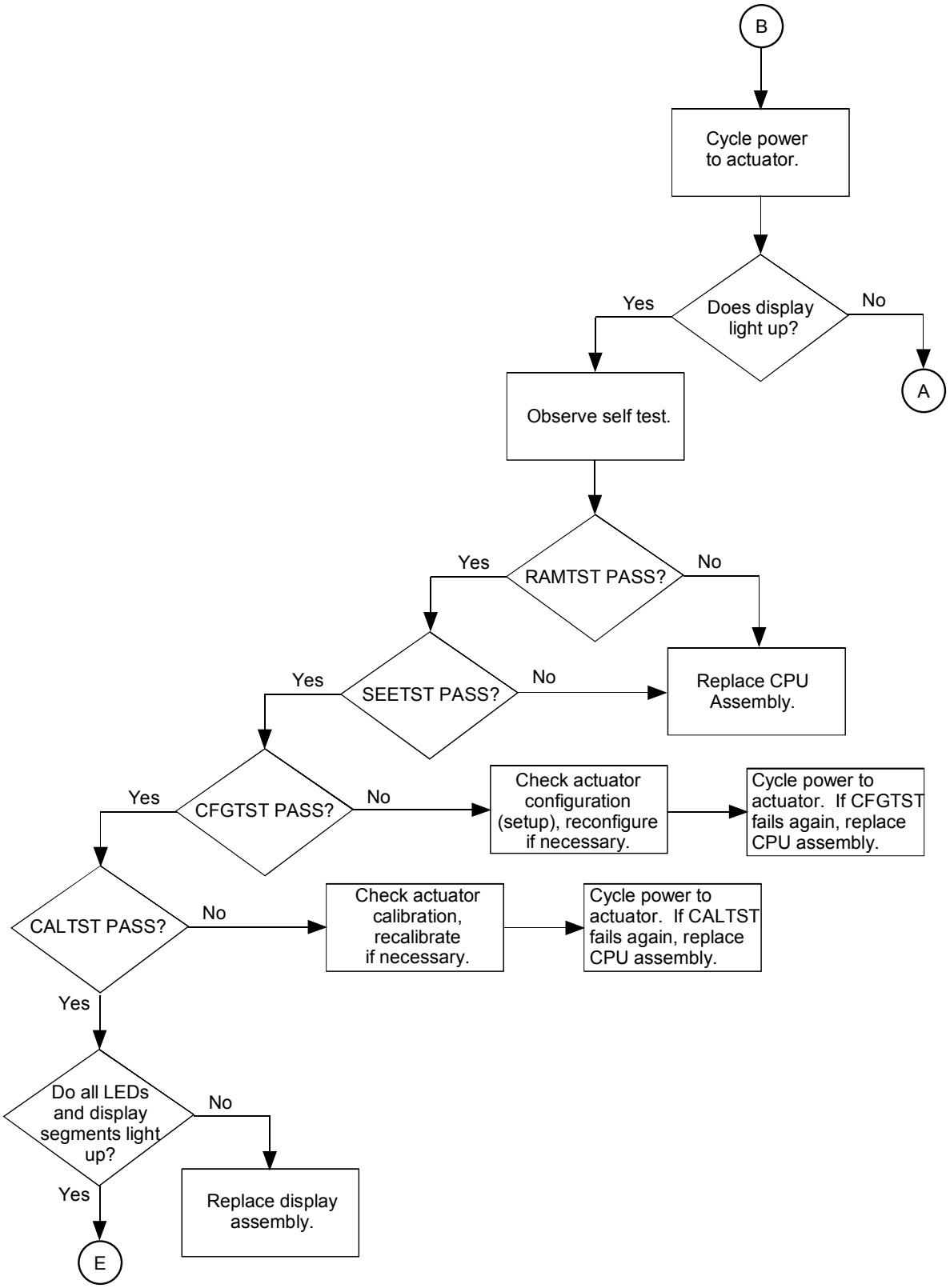


Figure 35 Power Up Diagnostics

Test Non-Contact Sensor PWA

See "Non-Contact Sensor Operation" in Section 5 for procedure in testing NCS PWA output.

Test Power Distribution PWA

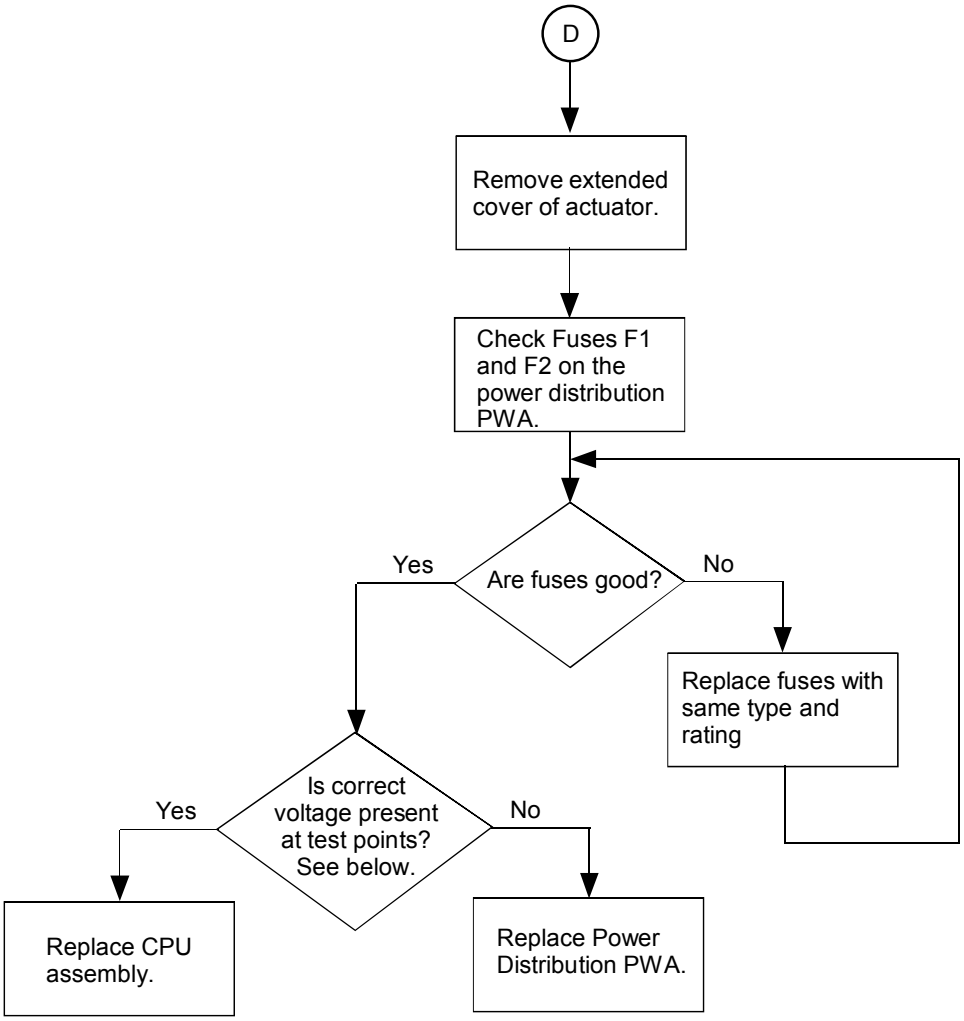


Figure 36 Test Power Distribution PWA

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 + or – 3V

Test AUTO - MANUAL DRIVE Switch

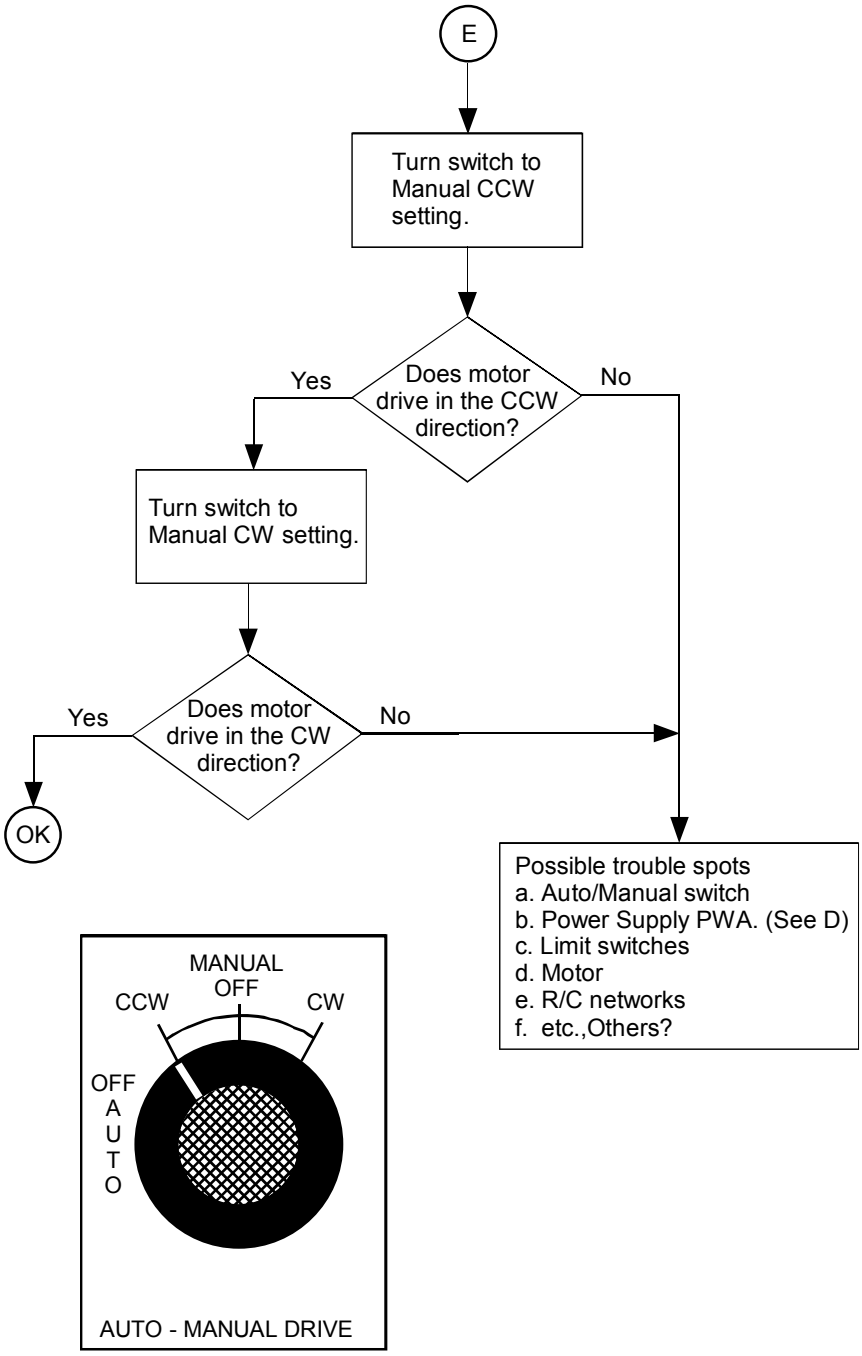


Figure 37 Test AUTO - MANUAL Switch

Test Relay Function

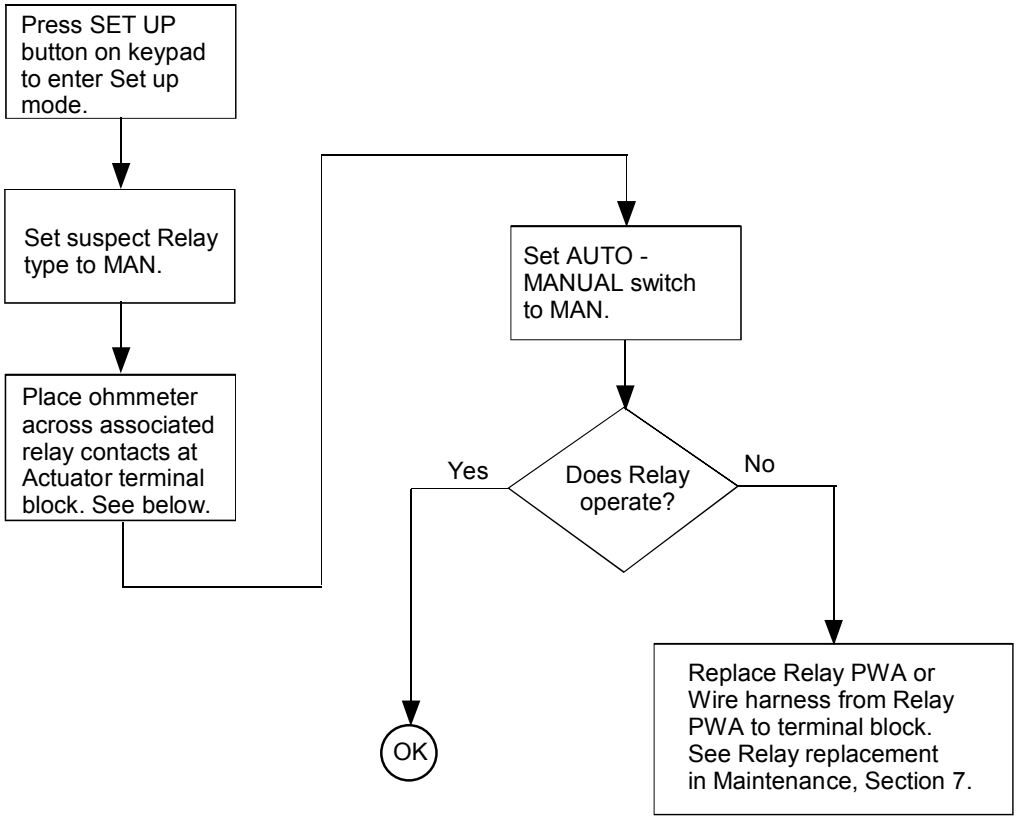


Figure 38 Test Relay Function

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 - 10260S 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		LPASS
	LPFILT – Low Pass Filter Time Constant *		0
	Direct – Actuator Rotation		CCW
	Dband – Input Deadband		0.5
	FSTYPH – FailsafeHI Type		UP
	FSVALH – FailsafeHI Input Value		100
	FSTYPL – FailsafeLO Type		DOWN
	FSVALL – FailsafeLO Input Value		0
	CHAR – Input Characterization		LINR
	Custom -- Custom Characterization Type		EQUL
	X0 VAL --		0
	X1 VAL --		5
	X2 VAL --		10
	X3 VAL --		15
	X4 VAL --		20
	X5 VAL --		25
	X6 VAL --		30
	X7 VAL --		35
	X8 VAL --		40
	X9 VAL --		45
	X10VAL --		50
	X11VAL --		55
	X12VAL --		60
	X13VAL --		65
	X14VAL --		70
	X15VAL --		75
	X16VAL --		80
	X17VAL --		85
	X18VAL --		90
	X19VAL --		95
	X20VAL --		100
	Y0 VAL --		0
	Y1 VAL --		0.8
	Y2 VAL --		2.1

Set Up Group Prompt	Parameter	Setting	Default
	Y3 VAL --		3.2
	Y4 VAL --		4.9
	Y5 VAL --		6.5
	Y6 VAL --		8.4
	Y7 VAL --		10.7
	Y8 VAL --		13.2
	Y9 VAL --		15.7
	Y10VAL --		18.7
	Y11VAL --		22.6
	Y12VAL --		27.2
	Y13VAL --		33.4
	Y14VAL --		40
	Y15VAL --		46
	Y16VAL --		53.8
	Y17VAL --		63.2
	Y18VAL --		73.7
	Y19VAL --		86.2
	Y20VAL --		100
SET RELAY	RTYP11 – Relay Type		NONE
	R11VAL – Relay Value		0
	R11 HL – Relay High/Low		LO
	R11SCALE– Relay Scale		X1
	RTYP12 – Relay Type		NONE
	R12VAL – Relay Value		0
	R12 HL – Relay High/Low		LO
	R12SCALE– Relay ScaleRLY1HY – Relay Hysteresis		X1 0
	RTYP21 – Relay Type		NONE
	R21VAL – Relay Value		0
	R21 HL – Relay High/Low		LO
	R21SCALE– Relay Scale		X1
	RTYP22 – Relay Type		NONE
	R22VAL – Relay Value		0
	R22 HL – Relay High/Low		LO
	R22SCALE– Relay Scale		X1
	RLY2HY – Relay Hysteresis		0
	RTYP31 – Relay Type		NONE
	R31VAL – Relay Value		0
	R31 HL – Relay High/Low		LO
	R31SCALE– Relay Scale		X1
	RTYP32 – Relay Type		NONE

Set Up Group Prompt	Parameter	Setting	Default
	R32VAL – Relay Value		0
	R32 HL – Relay High/Low		LO
	R32SCALE– Relay Scale		X1
	RLY3HY – Relay Hysteresis		0
	RTYP41 – Relay Type		NONE
	R41VAL – Relay Value		0
	R41 HL – Relay High/Low		LO
	R41SCALE– Relay Scale RTYP42 – Relay Type		X1 NONE
	R41VAL – Relay Value		0
	R41 HL – Relay High/Low		LO
	R41SCALE– Relay Scale		X1
	RLY4HY – Relay Hysteresis		0
SET CUROUT	CUROUT - Output Signal Range		4-20
SET COMM	COMM – Communications Parameters		MODBUS
	ADDRES – Device Address		
	BAUD – Baud Rate		119.2K20MS
	XmtDLY – Response Delay		FP B
	DBLBYT – Floating Point Data Format		
SET DIGINP	DIGINP – Digital Input State		UP
	Endpos – End Position Value		0
SET DISPLA	DECMAL – Decimal Point Location		8888
	EUNITS – Units Display		Pcnt
	UNITS – Display Units		ENG
SET LOCK	LOCKID – Password Lock		0
	LOCK – Lock Out		NONE
	MAENAB – Local Mode Change Enable		ENAB
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
	ROTATE -- Degrees of Rotation		Factory Set
	TORQ -- Torque Rating		Factory Set
	TAG – Tag Name		Factory Set
	MFGDAT – Manufacturing Date		Factory Set
	LREP – Date of Last Repair		Factory Set

Set Up Group Prompt	Parameter	Setting	Default
	LCAL – Date of Last Field 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		
	REGNy – Accumulated Motor Starts for regions of motor travel.	_____	Read Only
	y = 0 through 9		
	TOTDEG -- Accumulated total degrees traveled	_____	Read Only
	DATSAV-- Forced Manual Maintenance Data Save	_____	DIS
	PASSWD-- User Password	_____	0
	MANRST – Maintenance Statistic Reset	_____	NONE
	LD CAL – Restore Calibration Type	_____	NONE
	LD CFG -- Restore Factory Default Configuration	_____	DIS
CAL POSOUT	POSOUT – Position sensor circuit output.	_____	Read Only

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