

# AUMA Matic Positioner Calibration Instruction



AUMA MATIC Compacts consist of motor controls, local controls and other control elements, which may be required to operate an electric actuator

## Scope

These instructions are intended to cover the AUMA MATIC compact in both the C and S configuration with an AUMA positioner board. These instructions are for general startup and basic trouble shooting.

For calibration/setting of Standard Interface Board or Pulse Timer, refer to the appropriate instructions.

The positioner is usually supplied internally mounted in the AUMA MATIC Compact (Figure 1). These instructions also apply if the positioner is remotely mounted. The positioner is programmable for several command and internal feedback signals. Additionally, the choice of fail modes on loss of these signals can be chosen. Refer to the programming section (Figure 4) for more information.

The Standard version of the positioner is supplied as a clockwise-actuator output on decreasing-command signal. Consult the AUMA factory for information on other available configurations.

The convention of clockwise actuator output to close is used throughout this instruction.

## General Description

The positioner is an electric controller, employing solid state circuitry, intended for regulating electric motor driven actuators used on valves, dampers and other devices requiring accurate positioning control. Accurate positioning is attained through the use of a precision position feedback potentiometer or current device (RWG current transmitter). The controller drives the motor reversing starters which can be electromechanical (AUMA MATIC-C) or solid state (AUMA MATIC-S). The controller utilizes a comparator circuit which senses the error between the input command signal and the internal position feedback signal. The controller then energizes the motor reversing starter control circuit to drive the actuator in the direction necessary to reduce the error signal to within the customer set deadband.

Two modes of control are available. In the first mode the motor is continuously energized until the error between the feedback signal and setpoint is zero. In the second mode (pulse mode) the motor is pulsed based on the setting of a potentiometer, Time-on (P8), until the error is 25 percent or less. Then the Time-on is reduced by a factor of 3 through the final 25 percent of error. The initial setting of "OFF" time remains constant. In the pulse mode the initial "ON" and "OFF" times are field adjustable via the potentiometers P8 and P10.

**Note:** The AUMA MATIC with positioner generally incorporates a means of remote manual operation using contact closure. This circuit, using the remote command board, is designed as a secondary input for push buttons or relay contacts. It is *not* intended for "modulating" operation when an analog signal is not available. An interface board is available for use in this case.

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# AUMA Matic Positioner Calibration Instruction

**auma**<sup>®</sup>  
AUMA Actuators, Inc. USA

## Electrical Connections

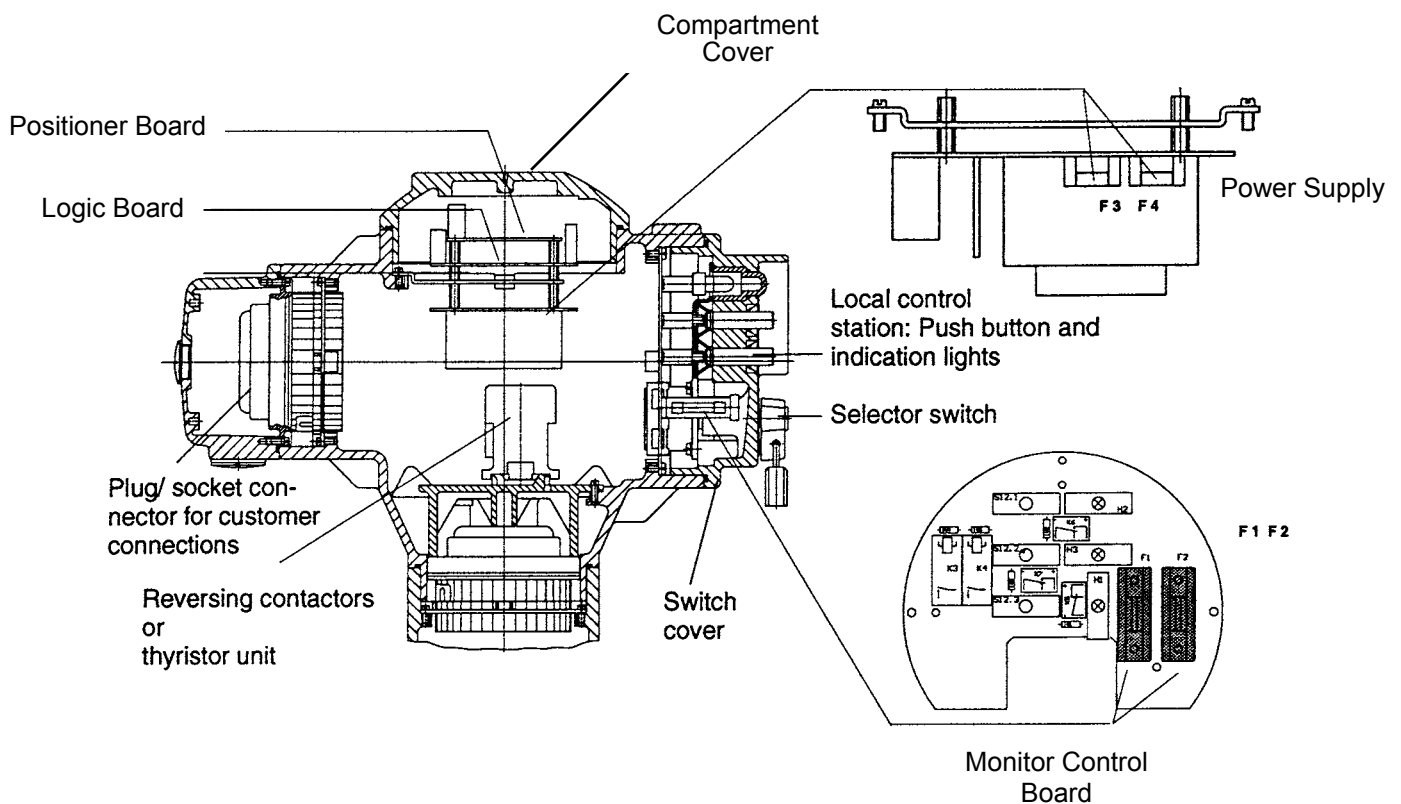
**CAUTION:** Observe safety regulations.

- Verify that the motor and control voltages correspond with equipment supplied. Refer to the nameplate on motor and/or AUMA MATIC Compact.
- Attach conduit or cables following approved practices.

**CAUTION:** Appropriate conduit and sealing methods must be followed to ensure the NEMA rating for the enclosure furnished

- Connect field wiring according to wiring diagram supplied. If drawing is not available, contact the nearest AUMA office with the Sales Order or Serial Number located on the actuator nameplate. A replacement drawing will be provided.

**NOTE:** ACTUATOR LIMIT SWITCHES MUST BE SET USING APPROPRIATE SETTING INSTRUCTIONS PRIOR TO PROCEEDING.



**Figure 1**  
**AUMA MATIC Controller**

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# AUMA Matic Positioner Calibration Instruction



## Logic Board Programming

The AUMA MATIC Compact contains a programmable logic board (Figure 2). The following DIP switch settings are made on the logic board. The factory has preset the logic board switches per the order requirements, as required/or requested, prior to shipment. Typically, no further adjustment is required for proper operation.

### Programming

- Refer to Figure 2.
- The Logic Board has 3 sets of switches S1-2, S2-2 and S3-2.
- Switches S1-2 and S3-2 allow for either limit or torque seating in closed and open positions.

### Switch S1-2

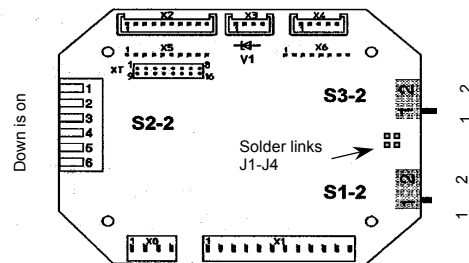
- In position 1, the actuator is set for *limit* seating in the clockwise direction.
- In position 2 the actuator is set for *torque* seating in the clockwise direction.

### Switch S3-2

- In position 1, the actuator is set for *limit* seating in the counterclockwise direction.
- In position 2 the actuator is set for *torque* seating in the counterclockwise direction.

### Switch S2-2

Switch Position S2-2 "ON"	
S2.1	Remote seal in for clockwise
S2.2	Remote seal in for counter clockwise
S2.3	Local seal in for clockwise
S2.4	Local seal in for counter clockwise
S2.5	Blinker transmitter off
S2.6	Torque switch included in collective fault signal



**Figure 2**

Also provided on the Logic Board are four solder links. When the soldered link is present on pads J1 and J3, the integral open and close lights on the Monitor Control board within the AUMA Matic will both be on in an intermediate valve position. When the soldered link is present on pads J2 and J4 the integral open and close lights on the Monitor Control board will both be off in an intermediate valve position.

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# AUMA Matic Positioner Calibration Instruction



## Test Run

- Switch selector switch to local position. If local control is not supplied, refer to electrical drawing for reference to local operation.
- Turn control switch or operate push-button in either open or close direction.

If actuator fails to operate, verify the following possible conditions.

**NOTE:** 3Ø AUMA MATIC compacts incorporate a phase discriminator. If AUMA MATIC fails to respond to local and remote operation, reverse U1 and W1 at field terminals.

**NOTE:** Actuators shipped after March 2002 incorporate automatic phase correction.

- No line power.
  - Check for loose connection.
  - Check for correct voltage at terminals U1, V1 and W1.
  - Check for correct capacitor connection (1Ø only), if required.
- Field jumpers are not correct.
  - Verify the field wiring matches electrical drawing supplied by AUMA.
- Fuses are open.

 **CAUTION:** Before checking/replacing fuses, ensure all power is disconnected.

- Remove selector switch/push-button cover (Figure 1). Primary fuse(s) are located in black fuse holders.
- Secondary fuses are located on power supply board which can be accessed by removing the monitor control circuit board where the primary fuse(s) are located.

**NOTE:** Replace fuse(s) with same type and size. For fuse sizes, refer to appropriate service instruction or consult factory.

## Calibration Description and Preparation

### Technical Data

<b>Input Signals (E1):</b>	4-20 ma / 0-20 ma; 0-5v DC ( <i>for others, consult factory</i> )
<b>Feedback (E2):</b>	0-5v via precision potentiometer, typical
<b>Sensitivity:</b>	0.5 to 2.5 percent (0.25 min ≤ 19 rpm)
<b>Time Delay:</b>	0.5 to 15 seconds
<b>LED Indication:</b>	OPEN/CLOSE/PAUSE; loss of command signal.
<b>Input Resistance:</b>	249 Ω

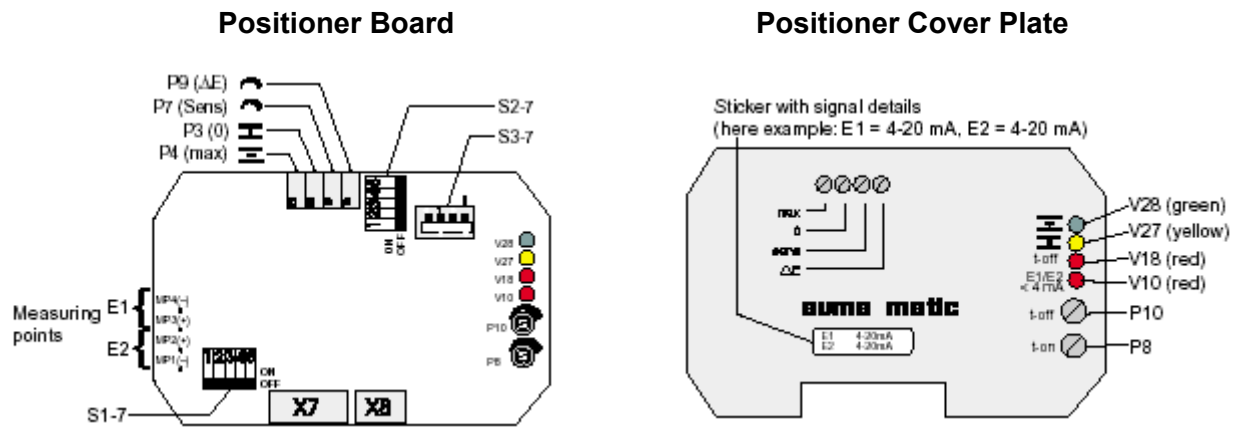
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# AUMA Matic Positioner Calibration Instruction



The AUMA Matic positioner incorporates the following features for field calibration and commissioning (Figure 3).

- ZERO (0/P3)** This control adjustment calibrates the positioner to correspond to the lowest command signal.
- SPAN (max/P4)** This control adjustment calibrates the positioner to the full 100 percent range of the command signal.
- TIME DELAY (t-off/P10)** This control adjustment is designed to eliminate the positioner from reacting to transient signals. Adjustable delay from 0.5 seconds to 15 seconds.
- COARSE SENSITIVITY ( $\Delta E$ /P9)** This control adjustment determines the amount of error signal that occurs before the motor is energized in the direction determined by the input signal, 0.5 to 2.5 percent.
- FINE SENSITIVITY (Sens/P7)** This control adjustment determines the amount of error signal that occurs before the motor is energized in the direction determined by the input signal. This is only used for actuator speeds of 19 RPM and below, where less than 0.5 percent accuracy is required (0.25 percent minimum).
- DIP SWITCH S1-7** Allows command signal (E1) and feedback signal (E2) to be selected.
- DIP SWITCH S2-7** Allows controller to position the actuator on loss of command or feedback signal. In addition, variable pulse width modulation can be selected.
- DIP SWITCH S3-7** Selects standard or inverse operation.
- TIME-ON (t-on/P8)** Allows calibration of initial "ON" times in the pulsing mode.
- V10** LED - loss of E1, or wrong polarity
- V18** LED - pause mode (pulse width modulation).
- V27** LED - closing circuit energized
- V28** LED - opening circuit energized
- MP1,MP2,MP3,MP4** Test points - MP1 = common; MP2 = feedback (E2); MP3 = input (E1); MP4 = common (E1)
- E1** Input signal
- E2** Feedback signal



**Figure 3**

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# AUMA Matic Positioner Calibration Instruction




- The optional RWG 4-20ma feedback transmitter, if supplied, must be calibrated prior to positioner calibration. Refer to the AUMA SA or SG.1 Operation Instruction Manual for calibration instructions.

**NOTE:** Verify proper limit switch setting prior to positioner calibration.








## Calibration Procedure

### Positioner adjustment end position CLOSED (standard version)


**NOTE:** Prior to the positioner setting it has to be ensured that the limit and torque switching of the actuator as well as the position feedback have been set.








- Set selector switch (local controls) to position LOCAL.
- Run actuator by pressing push-button  to end position CLOSED.
- Supply nominal value E1 of 0 or 4 mA (see wiring diagram).
- Turn potentiometer P10 ( $t_{off}$ ) counter-clockwise to the stop (Figure 3).

**NOTE:** Missing signals E1/E2 or wrong polarity are indicated by LED V10 "E1/E2 < 4 mA" (Figure 3)

	Possible LED indication: (refer to Figure 3)		Required setting in end position CLOSED (refer to Figure 3)
<b>If</b>	LEDs are not illuminated	<b>Then</b>	Turn potentiometer "0" (P3) slightly clockwise until LED  (V27 yellow) lights up.
	LED  (V28 green) is illuminated		Turn potentiometer "0" (P3) slightly clockwise until LED  (V28 green) goes out and LED  (V27 yellow) lights up.
	LED  (V27 yellow) is illuminated		Turn potentiometer "0" (P3) counter-clockwise until LED  (V27 yellow) goes out. Then turn potentiometer "0" (P3) slightly clockwise until LED  (V27 yellow) lights up again.

### Positioner adjustment end position OPEN (standard version)

- Run actuator by pressing push-button  (local controls) to end position OPEN.
- Connect max. command signal (nominal value E1) = 20 mA.

	Possible LED indication: (refer to Figure 3)		Required setting in end position OPEN (refer to Figure 3)
<b>If</b>	LEDs are not illuminated	<b>Then</b>	Turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V28 green) lights up.
	LED  (V28 green) is illuminated		Turn potentiometer "max" (P4) clockwise until LED  (V28 green) goes out. Then turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V28 green) lights up again.
	LED  (V27 yellow) is illuminated		Turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V27 yellow) goes out and LED  (V28 green) lights up.

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# AUMA Matic Positioner Calibration Instruction



## Setting of the Sensitivity

- Set selector switch at local controls (Figure 1, Page 2) to position REMOTE.
- Input a random command signal E1. The sensitivity ( $\Delta E$  / dead band) is set to maximum value (2,5 %) in the factory.
- The sensitivity can be improved or the dead band reduced by turning potentiometer  $\Delta E$  (P9) clockwise. For a precise setting of the sensitivity, a set point device with accuracy in the 0,1 mA range is required.
- For actuators with a speed of 19 rpm or less, a better sensitivity ( $\Delta E_{\min} = 0.25 \%$ ) can be achieved by turning the potentiometer P7 (sens) clockwise.

**NOTE: When setting  $\Delta E$  the following must be observed: If the number of starts is too high, this will lead to unnecessary wear at the valve and actuator. Therefore, the maximum possible dead band acceptable for the process must be set. .**

- To prevent exceeding the max. permissible number of starts (refer to Technical data sheet SG,SAR or consult factory) in extreme cases, a time delay between 0.5s (left stop) and 10s (right stop) may be set with potentiometer t-off.

## Positioner Adjustment End Position OPEN (inverse operation)

In standard version the maximum input signal (E1 = 20 mA) results in operation to end position OPEN.

- By switching the code switch S3-7 (Figure 4) to position "1" an inversion of this signal definition (inverse operation) can be achieved.
- Additionally, the potentiometer wiring at actuator terminals TA 20 and 21 must be reversed.

**NOTE: Prior to the positioner setting it has to be ensured that the limit and torque switching of the actuator as well as the position feedback have been set.**








- Set selector switch (local controls) to position LOCAL.
- Run actuator with push-button to **end position OPEN**.
- Supply nominal value E1 of 0 or 4 mA (see wiring diagram).
- Turn potentiometer P10 ( $t_{\text{off}}$ ) counter-clockwise up to the stop (Figure 3).

**NOTE: Missing signals E1/ E2 or wrong polarity are indicated by LED V10 "E1/E2 < 4 mA" (Figure 3).**


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






# AUMA Matic Positioner Calibration Instruction



If	Possible LED indication: (refer to Figure 3)	Then	Required setting in end position OPEN (refer to Figure 3)
	LEDs are not illuminated		Turn potentiometer "0" (P3) slightly clockwise until LED  (V28 green) lights up.
	LED  (V27 yellow) is illuminated		Turn potentiometer "0" (P3) slightly clockwise until LED  (V27 yellow) goes out and LED  (V28 green) lights up.
	LED  (V28 green) is illuminated		Turn potentiometer "0" (P3) counter-clockwise until LED  (V28 green) goes out. Then turn potentiometer "0" (P3) slightly clockwise until LED  (V28 green) lights up again.

## Positioner Adjustment End Position CLOSED (inverse operation)

- Run actuator with push-button  (local controls) to **end position CLOSED**.
- Connect max. command signal (nominal value E1) = 20 mA.

If	Possible LED indication: (refer to Figure 3)	Then	Required setting in end position CLOSED (refer to Figure 3)
	LEDs are not illuminated		Turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V27 yellow) lights up.
	LED  (V27 yellow) is illuminated		Turn potentiometer "max" (P4) clockwise until LED  (V27 yellow) goes out. Then turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V27 yellow) lights up again.
	LED  (V28 green) is illuminated		Turn potentiometer "max" (P4) slightly counter-clockwise until LED  (V28 green) goes out and LED  (V27 yellow) lights up.

## Positioner in Split Range version (option)

For Split Range a modified version of the positioner is used. The standard version is not suitable for Split Range operation.

### Split Range: description of functions

Split Range allows the adaptation of the positioner to nominal value ranges which are for example necessary to individually control several actuators (up to four actuators) with the same nominal value signal. Typical values for two actuators are 0 - 10 mA and 10 - 20 mA or 4 - 12 mA and 12 - 20 mA. But all other values between 0/4 - 20 mA can also be set and adjusted.

### Split Range Programming

Programming of the positioner at the code switches S1-7, S2-7, S3-7 can, with the exception indicated below, be performed in the same manner as for normal operation.

**NOTE: Switch S1-7 DIP 5 at code switch S1-7 must always be in position ON for Split Range version.**

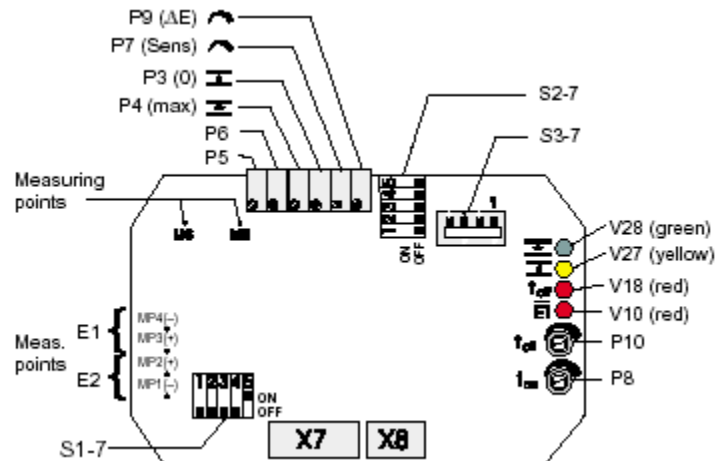
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# AUMA Matic Positioner Calibration Instruction

## Positioner adjustment for Split Range (See also example below)

- Supply the specified minimum input signal (nominal value E1) for the positioner and check by measuring with Voltmeter at the measuring points MP3 and MP4 (Figure 5).
- Connect voltmeter to measuring points M3 and MP1.  
Calculate setting value:  
Initial value =  $E_{1\min}$  [in Ampere] x 250 Ohm  
Set initial value with potentiometer P5.
- Supply specified maximum command signal (nominal value E1) and check by measuring at the measuring points MP3 and MP4.
- Connect voltmeter between measuring point M9 and measuring point MP1. Set 5 V with potentiometer P6.
- Supply input signal E1 from minimum to maximum value and check the set range 0 - 5 V at measuring point M9. If necessary, readjust with P5 or P6.
- Apply the same procedure to the second actuator's positioner and set according to the specified nominal value E1.
- After setting for Split Range operation, perform further readjustment as described in Calibration section, Page 6.



**Figure 4**  
**Positioner board A7, Split Range version**

Example – Two actuators are to be operated in Split Range version. Actuator 1 must be in position CLOSED with a nominal value signal E1 of 0 mA, and in position OPEN with a signal of 10 mA.

Actuator 2 must be in position CLOSED with a nominal value signal of 10 mA, and in position OPEN with a signal of 20 mA. .

- Positioner actuator 1:  
Supply E1 = 0 mA, set with P5 = 0 V at M3, supply E1 = 10 mA, set with P6 = 5V at M9.
- Positioner actuator 2:  
Supply E1 = 10 mA, set with P5 = 2,5 V at M3, supply E1 = 20 mA, set with P6 = 5V at M9.
- Perform adjustments and settings for E2, as previously described. Afterwards the nominal value E1 can be transmitted through both actuators (can be connected in series). When operating within range E1 = 0 - 10 mA the actuator 1 moves, actuator 2 remains in end position CLOSED. When operating within range E1 = 10 - 20 mA, the actuator 2 moves, actuator 1 remains in end position OPEN.

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# AUMA Matic Positioner Calibration Instruction



Function at <sup>1)</sup> Loss of Signal E1	Condition		Programming																																									
	Command Signal (Reference input E1)	Feedback <sup>2)</sup> (Actual Value) E2	S1-7	S2-7																																								
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**Figure 5**  
**Programming of Positioner**

*All information in this document is subject to change without notice.*

# AUMA Matic Positioner Calibration Instruction



## 1) Function at loss of signal E1

**Fail as is**      Actuator stops immediately after loss of E1 and remains in this position  
**Fail close**     Actuator runs to the closed position after loss of E1  
**Fail open**      Actuator runs to the open position after loss of E1

## 2) Signals from internal feedback

**0/4-20ma**      From optional RWG electronic feedback  
**0-5 VDC**        From standard precision potentiometer (4.7 or 5K $\Omega$ )

## 3) Fail function not possible at loss of E2

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