

# Electrical Part Turn Actuators for Continuous Modulating Control PME120AI (Contrac)

Rated Torque 100 Nm

With integrated electronic unit and 2 mechanical contacts

---



---

# Electrical Part Turn Actuators for Continuous Modulating Control PME120AI (Contrac)

## Instructions

Document No.      A68-2005-003 EN  
Issued:             August 2005

## Manufacturer:

ABB Automation Products GmbH  
Schillerstr. 72  
32425 Minden  
Germany

Tel:    +49 800 1114411  
Fax:    +49 800 1114422  
[CCC-Support.deapr@de.abb.com](mailto:CCC-Support.deapr@de.abb.com)

© Copyright 2005 by ABB Automation Products GmbH  
We reserve the right to technical amendments

This document is protected by copyright. Information in this document is intended only to assist the user in safe and efficient operation of the equipment. Its contents are not to be reproduced in full or part without prior approval of legal owner.

<b>Content</b>	<b>Page</b>
Device Identification	4
Actuator ID label	4
ID Label of electronic unit	4
Important information	5
General	5
Symbols	5
Transport and storage	6
Proper use	6
Safety and precautions	6
Long-time storage	6
Delivery State	6
Assemblies	7
Operating mode	7
Technical Data	7
Lubrication	8
Lubricants	8
Mounting	8
Actuator check	8
Mounting orientation	8
Mounting instructions	8
Mounting the actuator to the vValve	9
Electrical Connection	10
Integrated electronic unit (standard)	10
Integrated electronic unit (bus communication)	11
Signal input and output (conventional control)	11
Mechanical Contacts	12
Fuses at the actuator with integrated electronic unit	13
Setup	15
Set-up via local control panel (LCP)	15
Adjustment using the configuration program	16
Functions and signals at the LCP	17
Maintenance	17
Motor and gears	17
Adjusting the brake	17
Replacing the position sensor	18
Troubleshooting	19
Electrical test values	19

## 1 Device Identification

### 1.1 Actuator ID label

1	<b>Antrieb / Actuator: CONTRAC ....</b>		
2	F-Nr./No	NL	
3	M =	Jahr/Year	CE
4	t =	IP 66	
5	min.....max. ....	max. ....	
6	Öl / Oil:		
7	Elektronik/Electronics		
8			
9			
10			
ABB Automation D-32425 Minden Made in Germany			

1. Actuator type
2. Device number / No. of non-standard version (if applicable)
3. Rated torque / Year of manufacture
4. Permissible ambient temperature / protection class
5. Min./max. positioning travel / max. speed / heater (if applicable)
6. Filled-in oil type
7. Associated electronics
8. Permissible voltage range / Mains frequency (only with PME120AI)
9. Power consumption / Fuse (only with PME120AI)
10. Available for customer-specific information

### 1.2 ID Label of electronic unit

The ID labels of the power electronic unit are located on the cover of the local control panel.

#### 1.2.1 ID Label for hardware description

1	<b>Elektronik / Electronics Type: ....</b>		
2	B-Nr./No. ....	NL	
3		Jahr/Year	
4			
5	t = .....°C	IP 66	CE
6			
ABB Automation Made in Germany			

1. Electronic unit type
2. Device no. / No. of non-standard version (if applicable)
3. / Year of manufacture
4. Not used
5. Permissible ambient temperature / Protection class
6. Not used

## 1.2.2 ID Label for software description

1	Für / For Antrieb / Actuator Typ / Type .....
2	Nennwerte / Rated values M=.....°/s
3	F-Nr. / No.: .....
4	NL. ....
5	SW Version .....

- 1 Associated actuator type
- 2 Rated values for torque / force / speed
- 3 Fabrication No.
- 4 No. of non-standard version
- 5 Actuator firmware release

## 2 Important information

### 2.1 General

Read and save all instructions prior to installing, operating, and servicing this product. If any of the instructions are not understood, contact your ABB representative for clarification.

### 2.2 Symbols

In order that you can make the best use of this document and to ensure safety during commissioning, operation and maintenance of the equipment, please note the following explanation of the symbols used.

Explanation of the symbols used:

Symbol	Signal Word	Definitions
	<b>DANGER</b>	DANGER indicates an <b>imminently hazardous</b> situation which, if not avoided, <b>will result</b> in death or serious injury. (High level of risk.)
	<b>WARNING</b>	WARNING indicates a <b>potentially hazardous</b> situation which, if not avoided, <b>could result</b> in death or serious injury. (Medium level of risk.)
	<b>CAUTION</b>	CAUTION indicates a <b>potentially hazardous</b> situation which, if not avoided, <b>could result</b> in minor or moderate injury. (Low level of risk.)
	<b>NOTICE</b>	NOTICE indicates a <b>potentially harmful</b> situation which, if not avoided, <b>may result</b> in damage of the product itself or of adjacent objects. (Damage to property)
	<b>IMPORTANT</b>	IMPORTANT indicates useful hints or other special information which, if not observed, could lead to a decline in operating convenience or affect the functionality. (Does not indicate a dangerous or harmful situation.)

As well as the instructions in this document, you must also follow the generally applicable accident prevention and safety regulations.

If the information in this document is insufficient in any situation, please contact our service department, who will be happy to help you.

Please read this document carefully before installation and commissioning

### IMPORTANT



To ensure proper performance, use qualified personnel who have been trained, qualified and certified by ABB to install, operate, update, tune, and maintain the actuator, the electronic units and the wiring.

ABB will not take any responsibility for personal injuries or material damages which were caused by non-trained, non-qualified or non-certified personnel.

### 2.3 Transport and storage

Carefully inspect for shipping damage. Damage to the shipping carton is usually a good indication that it has received rough handling. Report all damage immediately to the freight carrier and your ABB representative. Verify that the items on the packing list or bill of lading agree with your own.

Contrac actuators may be stored under moist and aggressive condition for a short time. The equipment is protected against external corrosive influences. However, direct exposure to rain, snow, etc. must be avoided.

Actuators, equipped with an anti condensation heater, are additionally protected by desiccant placed in the connector (and in the terminal box of the separate electronics, if present). The desiccant guarantees sufficient protection for approximately 150 days. It can be regenerated at a temperature of 90° C within 4 h.

The desiccant must be removed prior to commissioning the actuator or the electronics

### 2.4 Proper use

Control actuators are intended to be used exclusively for actuating final control elements (valves, vanes, etc.). Do not use these actuators for any other purpose. Otherwise, a hazard of personal injury or of damage to or impairment of the operational reliability of the device may arise.

### 2.5 Safety and precautions

When mounting the actuator in areas which may be accessed by unauthorized persons, take the required protective measures.

- Control actuators perform movements for positioning vanes and valves. Handle properly and with care. Otherwise, a hazard of bruise injuries may arise.
- When changing the oil of the actuator, thoroughly remove any oil that may have run down on the floor during the procedure to avoid accidents.
- Dispose of the waste oil in compliance with the respective local regulations. Make sure that no waste oil reaches the water cycle.
- Only qualified specialists who have been trained for these tasks are authorized to mount and adjust the control actuator, and to make the electrical connection.

When working on the actuator itself or its electronics always observe the locally valid accident prevention regulations and the regulations concerning the construction of technical installations.

### 2.6 Long-time storage

If you intend to store or transport the device for a longer time, we recommend to wrap it in plastic foil and add desiccant. Regularly check if the desiccant is still active.

## 3 Delivery State

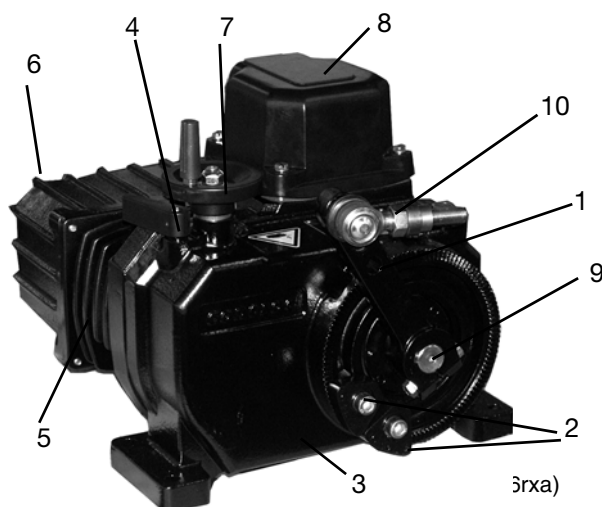
If not otherwise specified by the customer, Contrac actuators are delivered with the following standard configuration:

Behavior in 0/100% position:	Shut-off with rated torque
Setpoint function:	Linear; setpoint = positioning value
Input (setpoint):	4 ... 20 mA <sup>1)</sup>
Function:	Positioner, parameter: setpoint
Output (actual value):	4 ... 20 mA <sup>1)</sup>
Digital inputs : <sup>1)</sup>	DI 1 switch-over manual/automatic and v.v. DI 2 / DI 3 manual control +/-
Digital outputs: <sup>1)</sup>	DO 1 ready to operate, DO 2/3 end position signalling
Range:	Not adjusted

The configuration of your actuator may differ from the standard configuration specified above. It can be called up for display using the configuration program.

<sup>1)</sup> Not available for bus communication

## 4 Assemblies



- 1: Lever
- 2: Mechanical stops
- 3: Gearbox
- 4: Lock lever
- 5: Motor
- 6: Cover (incl. electronic unit for PME 120 AI)
- 7: Handwheel
- 8: Connector
- 9: Output shaft
- 10: Ball-and-socket joint

Table 1: PME 120

### 4.1 Operating mode

#### 4.1.1 Common mode

The motor triggered by the power electronics drives the output shaft (9) via oil-lubricated spur gears. The drive lever mounted on the shaft transmits rotary motion to the valve.

The brake, which is integrated in the motor (5), acts as a retainer when the power is off.

#### 4.1.2 Handwheel mode

- Allows you to move the actuator manually when the electrical power is off.
- Turn the lock lever (4) clockwise
- Turn the handwheel (7) to move the lever to the wanted position.
- Release the lock lever.

#### CAUTION



*The friction clutch is designed so that a handwheel force of approx. 11 N provides the rated torque on the actuator. If you should feel a considerable counter-force when moving the actuator by hand, do not increase the force you apply to the handwheel. Otherwise, you might damage the actuator or valve.*

## 5 Technical Data

	PME 120 AI
Rated torque [Nm]	40 ... 100
Starting torque [Nm]	appr. 1.2 x rated torque (break-away torque in end positions 2 x rated torque for short time)
Rated speed [°/s]	1.5 ... 4.5
Weight	approx. 45 kg
Ambient temperature	(-25) 1) -10 ... +55°C
Associated electronic unit	integrated in actuator
Power supply (on electronic unit)	115 V AC (94 V ... 130 V) or 230 V AC (190 V ... 260 V); 47.5 ... 63 Hz
Max. power consumption with 115 / 230 V AC [A]	1.0 / 0.5
Current consumption in positioning mode:	approx. 40 ... 50% of $I_{max.}$ , each

Table 2: 1) actuator is equipped with additional electrical heater

## 6 Lubrication

Prior to delivery the actuator is filled with 2.5 l oil in factory.

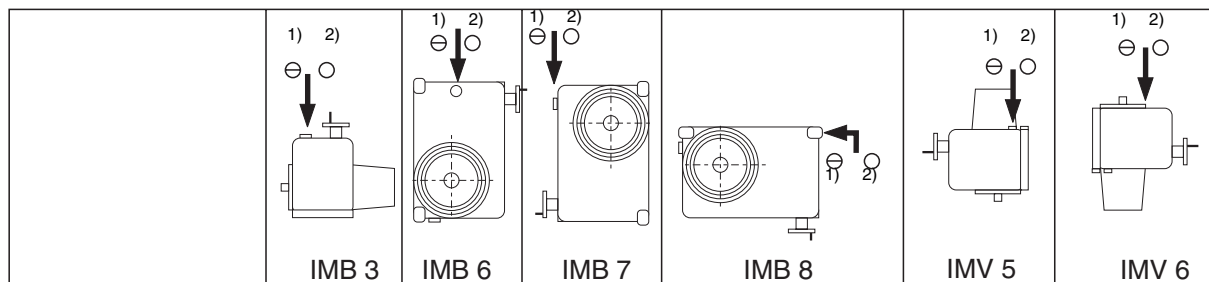


Fig. 1:

Min. oil quantity; approx. [l]	2.2	2.5	2.2	2.2	2.5	2.5
Min. oil level [mm] under inspection screw	45	2	42	20	23	17

Table 3: The arrow indicates the position of the inspection screw <sup>1)</sup> and the vent screw <sup>2)</sup>. After having mounted the actuator, replace the highest inspection screw with the separately delivered vent screw.

### 6.1 Lubricants

Actuator type	Ambient temperature	Oil type	Motorbearing (grease)
PME 120AI (with integrated electronic unit)	(-25) <sup>1)</sup> - 10°C ... + 55°C	Mobil SHC 629	ESSO Beacon 325

Table 4:

## 7 Mounting

### 7.1 Actuator check

- Is the actuator filled with the appropriate oil type?
- Is enough oil in the actuator?
- Did you fasten the separately delivered vent screw in the highest bore (depending on the mounting orientation)?
- Has the actuator integrated or separate electronic unit?

### 7.2 Mounting orientation

All mounting orientations seen in Figure 2 are permissible. To facilitate mounting and maintenance, however, it is recommended to use orientation IMB 3.

### 7.3 Mounting instructions

- Make sure that the actuator is accessible from all sides to ensure convenient handwheel operation, electrical connection, and replacement of assemblies.
- Avoid direct exposure to rain, snow and other environmental influences. Select the mounting site accordingly.
- Exclusively mount the actuator on a rigid, non-vibrating support to avoid relative motion between the actuator and the valve.
- When mounting the actuator close to heat sources use an insulating layer or shielding.



## 7.4 Mounting the actuator to the valve

### 7.4.1 Preparing the equipment

#### IMPORTANT



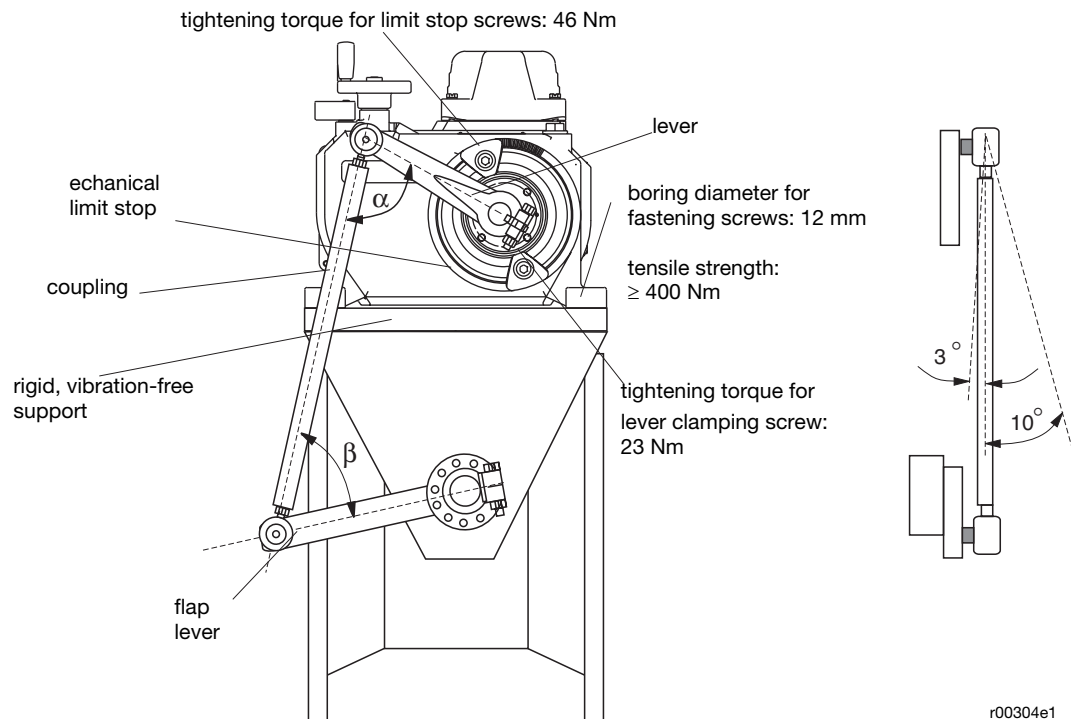
- Make sure that the shaft and lever bore surface are clean and free of grease.
- Determine the length of the stay tube (not included in the scope of delivery).
- Move the valve to the "CLOSED" position.
- Move the actuator to the corresponding end position using the handwheel. Observe the permissible angle.
- Spacing "L" minus 140 mm yields the required length of the link tube.
- Drill a cone bore into the valve lever for mounting the second ball-and-socket joint, as shown in Figure 4.
- Insert the ball-and-socket joint, secure with crown nut and split-pin.
- Remove the welding bushings and weld them to the stay tube (C 15 to DIN 17210)
- Insert the link rod between the two ball-and-socket joints and screw it in.
- If required adjust "L" by turning the link rod.
- When all adjustment steps are finished, fasten the counter nuts.

### 7.4.2 Adjusting the stops in dependence of the travel

- Move the output lever / valve to the position requiring fine adjustment.
- Put the stop onto the tothing as close to the output lever as possible and fasten with screws.
- Move the output lever towards the stop using the handwheel; turn the coupling rod for fine adjustment.
- Fasten the counter nuts.
- Fasten the stop in the other mounting position close to the end position, depending on the tothing.

### 7.4.3 Adjusting the stops in dependence of the torque

- First proceed as described above for travel-dependent adjustment.
- Prior to re-fastening the counter-nut lock the handwheel and then turn the coupling rod in such a way that an initial tension occurs in the valve's closing position.
- Fasten the counter-nuts.



r00304e1

Fig. 2: Mounting PME 120, example

$\alpha \geq 15^\circ$ ;  $\beta$  according to dimensions specified by the valve manufacturer

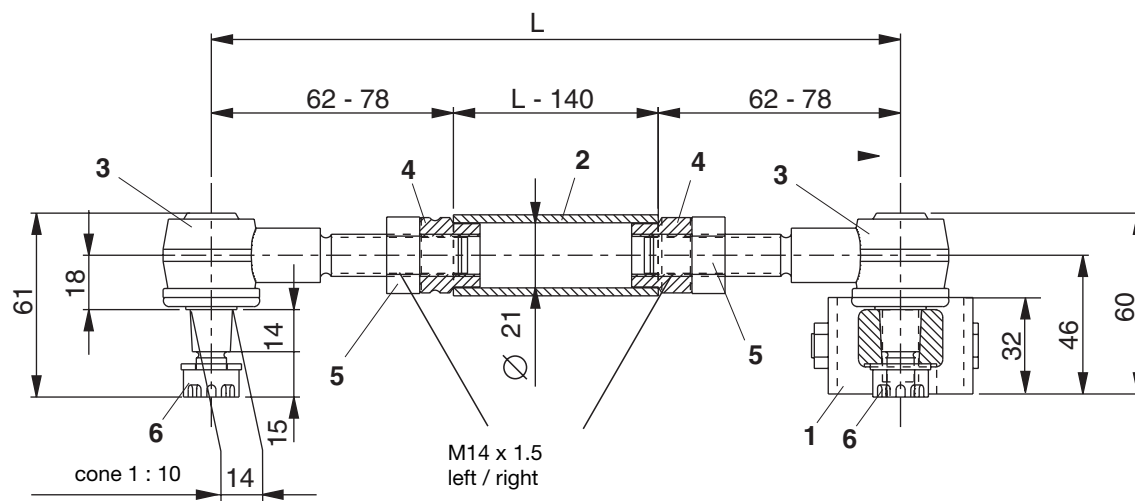


Fig. 3: Dimensional drawing

r00305x1

1. Output lever
2. Link tube
3. Ball-and-socket joint
4. Welding bushings (C15 to DIN 17210)
5. Counter nuts
6. Crown nuts

## 8 Electrical Connection

Proper actuator operation requires an actuator specific software loaded in this associated electronic unit. Compare the data labels on both, electronic unit and actuator, in order to ensure a correct hardware and software assignment.

### 8.1 Integrated electronic unit (standard)

Power and signal cables are connected to the integrated electronic unit via a plug.

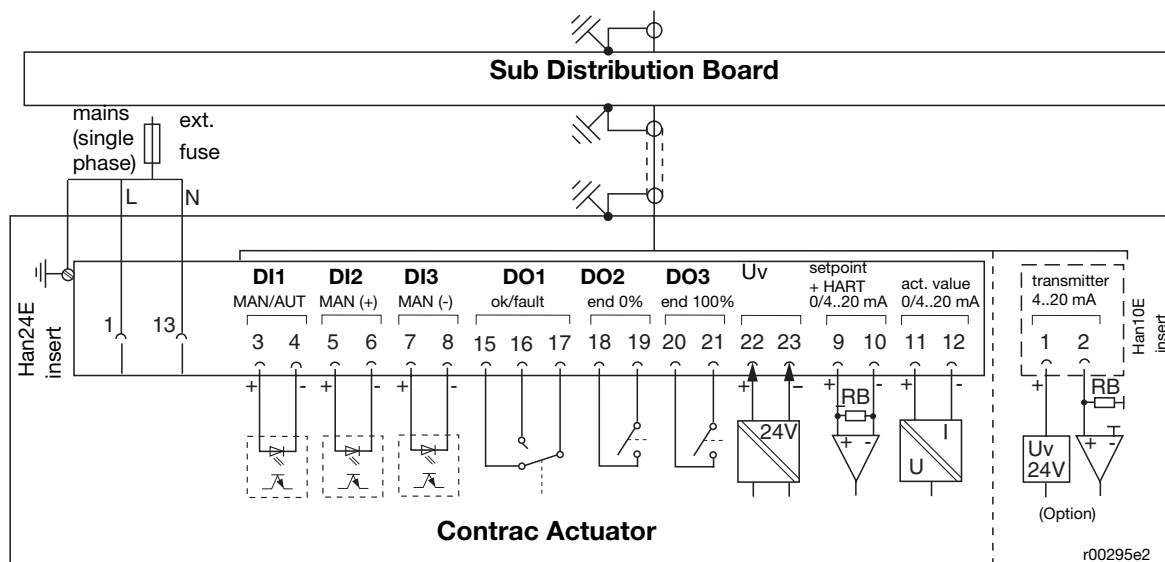


Fig. 4: Electrical connection, standard

The following steps must be performed to switch the actuator to automatic mode (AUT):

- Activate digital inputs DI 1, DI 2 and DI 3 via the configuration program.
- Make sure that the supply voltage is present on digital input 1 (DI 1).
- Activate AUT mode via the configuration program.

## 8.2 Integrated electronic unit (bus communication)

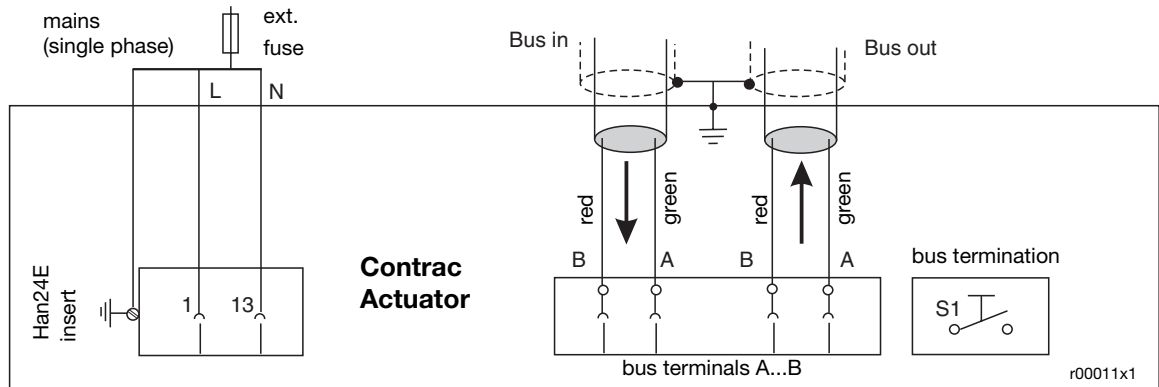


Fig. 5: Electrical connection, PROFIBUS DP

## 8.3 Signal input and output (conventional control)

### 8.3.1 Standard

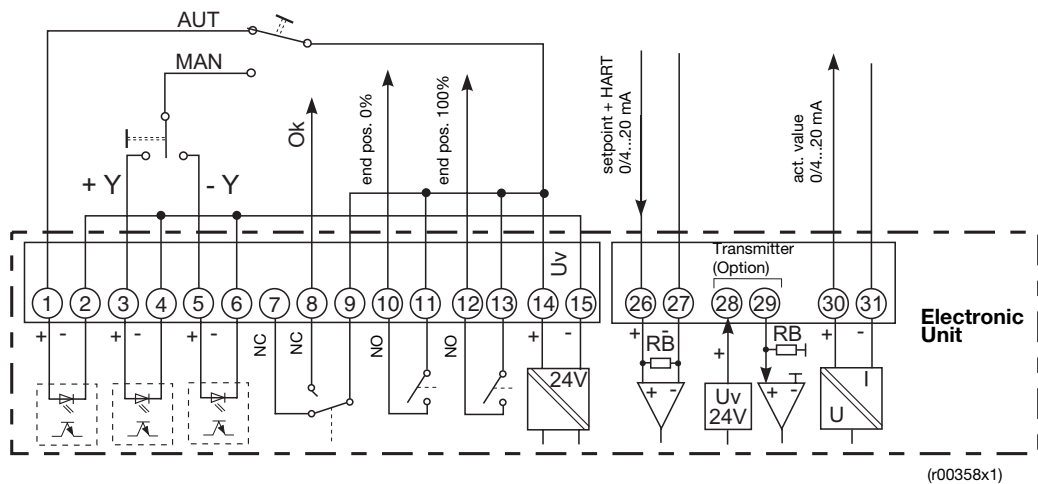


Fig. 6:

\*\* Write-protected when applying +24 V DC to DI 1.

### 8.3.2 Behind a step controller

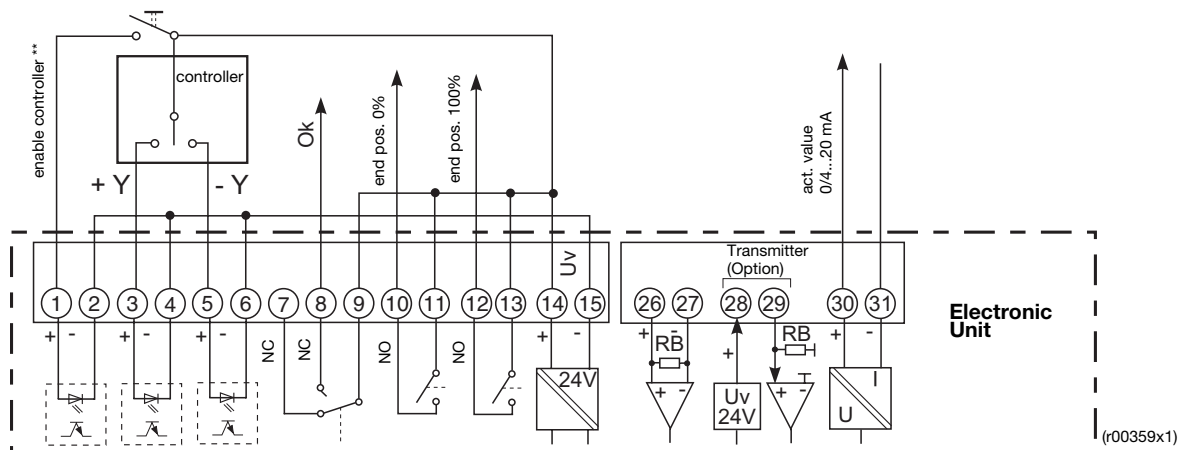


Fig. 7:

\*\* Write-protected when applying +24 V DC to DI 1.

## 8.4 Mechanical Contacts

### 8.4.1 Wiring Diagram

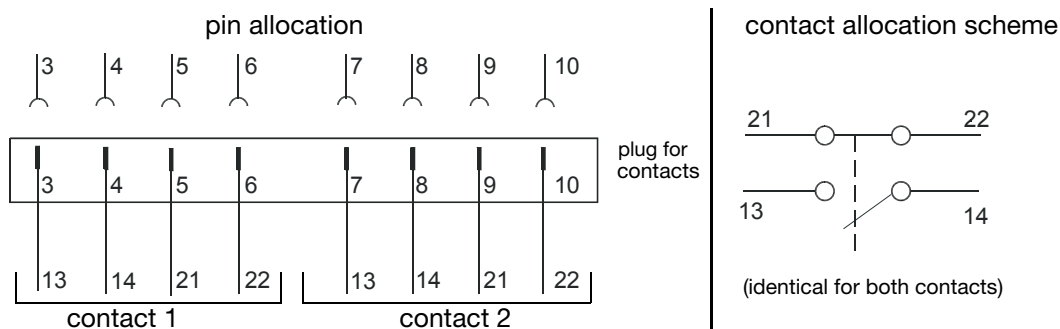


Fig. 8: Wiring scheme for mechanical contacts

### 8.4.2 General Contact Data

(acc. to DIN / VDE 0660)

Rated current:	AC	2 A	400 V
	AC	7 A	250 V
	DC	0.5A	250 V

ohmic load		inductive load cos phi 0.6
400V	3 A	2 A
250 V	5 A	3 A
30 V	7 A	5 A

Table 5:

ohmic load		inductive load; cos phi 0.6
250V	0.4 A	0.03 A
30 V	7 A	5 A

Table 6:

#### 8.4.2.1 Electrical Contact Data

(Gold plated contacts)

voltage:	min. 5 V / max. 30 V
current:	min. 4 mA / max. 400 mA
load:	< 0.12 VA

Values are peak values for AC voltage.

### 8.4.3 Adjustment

- loosen electronic fastening screws
- disconnect the internal cable connectors and put electronic unit aside
- loosen screws (1) of connector pcb (2) and push pcb aside to get access to the contacts (refer to fig. 9)
- connect a measuring instrument to the appropriate plug pins of the 10-pole plug socket (see fig. 8 for pin allocation)
- shift the cams (see fig. 10) until the relevant contact is open / closed

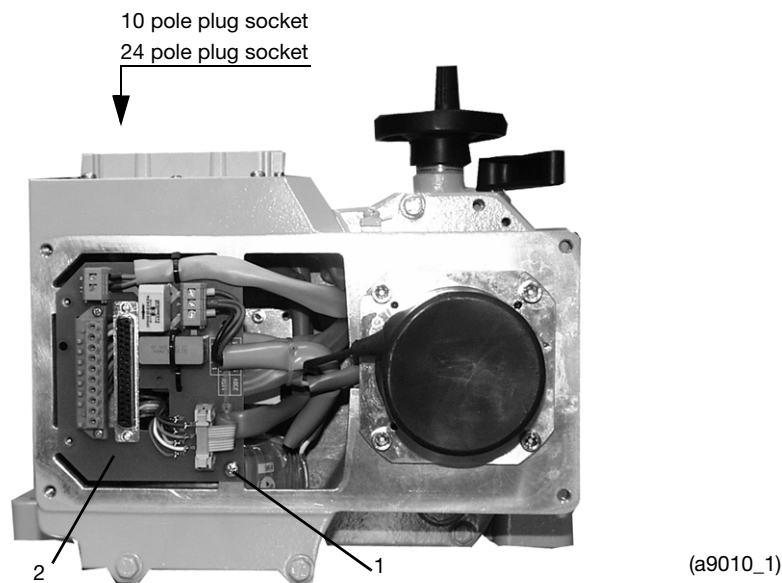


Fig. 9: Back of actuator with dismantled electronics

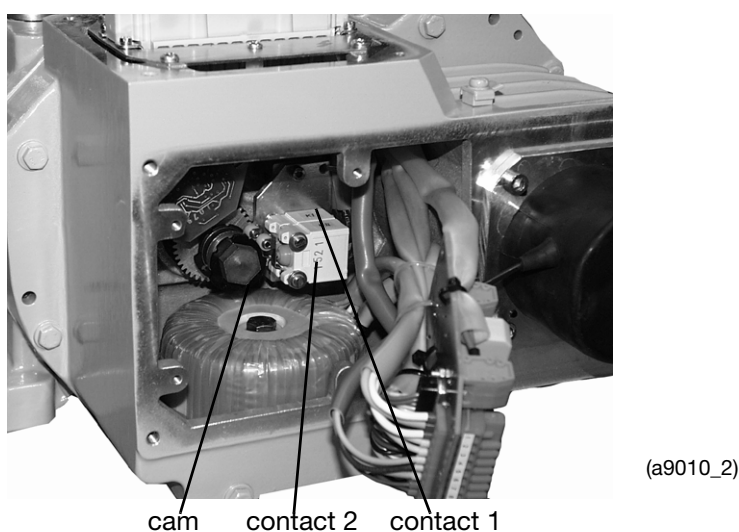


Fig. 10:

### 8.5 Fuses at the actuator with integrated electronic unit

Fuse type	U = 115 V	U = 230 V
External fuse(extern)	16 A, slow	
Mains fuse	6.3 A slow	3.15 A slow
Low temperature heater (only for low temperature version)	2 A	2 A
Fuse for protection against active 20 mA current feed at set-point input	0.04 A (fast)	0.04 A (fast)
Relay fuse for DO 1, DO 2, DO3 (not changeable)	3 x 0.5 A; medium	

Table 7:

### 8.5.1 Fuse arrangement

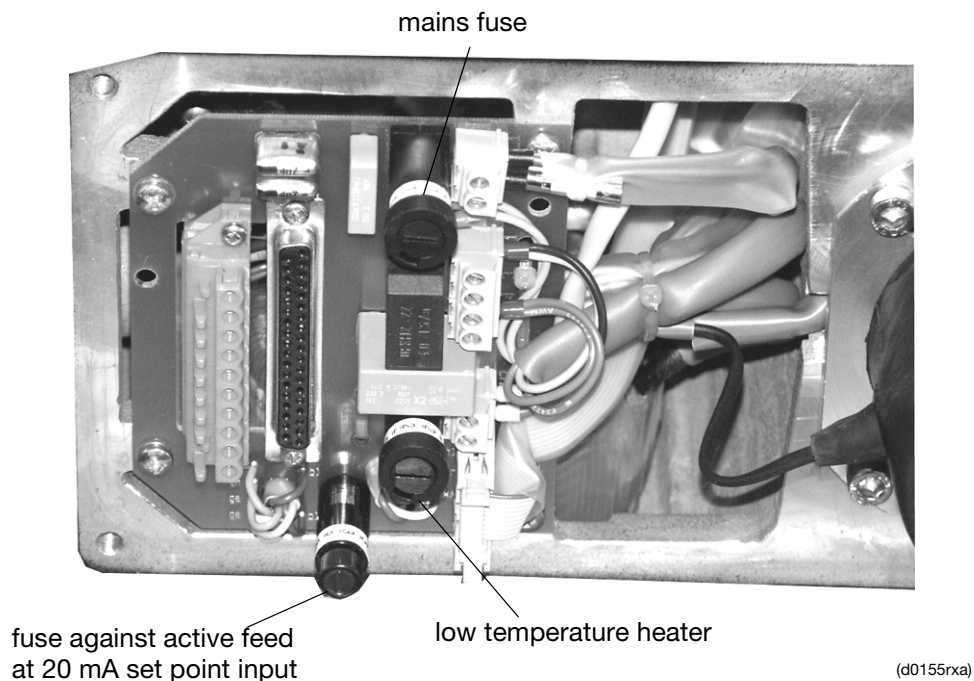


Fig. 11: Fuse arrangement

## 9 Setup

The actuator only requires the basic settings (adaptation to the operating range) in order to be operated with the standard or customer specific configuration. Use the **Local Control Panel (LCP)** for these settings. Use the appropriate configuration software for more detailed parameter changes or diagnosis functions.

### 9.1 Set-up via local control panel (LCP)

#### 9.1.1 Operating elements

**IMPORTANT**



- |                            |  |
|----------------------------|--|
| 1. Write-protect switch    | (Default setting: OFF)   |
| 2. LED for 100% position   | Indication if adjustment procedure, saved position, or fault by different flash frequencies.                           |
| 3. Drive buttons           | Press to cause drive motion  |
| 4. Reset button            | Press to restart processor   |
| 5. Power LED               | Indicates available mains supply   |
| 6. RS 232 socket           | Connection socket to PC  |
| 7. Potential toggle switch | Connection of reference potential to the system or protective earth (by default set to system) of electronic unit      |
| 8. LED for 0% position     | Indication if adjustment procedure, saved position, or fault by different flash frequencies..                          |
| 9. Accept button (0%)      | Press to define current position as 0%; simultaneously press push button 9 + 10 to complete the adjustment procedure.  |
| 10. Accept button (100%)   | Press to define current position as 100%; simultaneously press push button 9 + 10 to complete the adjustment procedure |

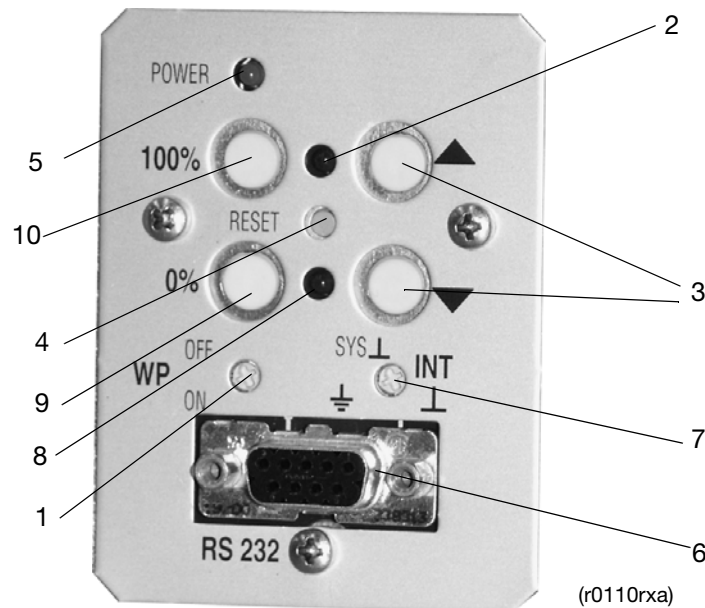


Fig. 12: Local Control Panel (LCP)

**WARNING**



*The actuator operating range is not preset when it leaves the factory!*

#### 9.1.2 Setup procedure

- Undo the screws of the LCP cover
- Swing the cover to the side

#### 9.1.3 Initial situation

- Electronics connected to power supply and actuator
- Write-protect switch (1) set to "OFF" position
- Electronics in operating mode "MAN" (no signal on DI 1)
- No fault (if a fault occurs, both LEDs flash alternately at 4 Hz)

### 9.1.4 Setting

#### 9.1.4.1 "Setting" mode

- Set electronics to "setting" mode by pressing both push buttons (3) simultaneously for approx. 5 seconds, until both LEDs (2 + 8) are flashing synchronously at approx. 4Hz. („setting mode“ is the standard electronic unit status after passing the final factory test)

#### 9.1.4.2 Defining first position (0% or 100%)

**IMPORTANT** *(Higher precision in 2nd position)*



- Move to desired position by pressing one of the push buttons (3).
- To accept the position for 0% or 100%, press push button (10) or (9); the associated LED flashes at approx. 2 Hz when value is correctly accepted, the other one continues to flash at approx. 4Hz

#### 9.1.4.3 Defining second position (0% or 100%)

- Move to second position by pressing the other of the push buttons (3).
- To accept the position, press push button (10) or (9); both LEDs (2) and (8) are flashing at approx. 2 Hz when values are accepted correctly.

#### 9.1.4.4 Saving the settings

- Save the settings by simultaneously and shortly pressing the push buttons (10 + 9); the LEDs (2 + 8) are „ON“ (without flashing) for approx. 5 sec before they extinguish and the setting procedure is completed.
- If the selected range is too small for the actuator, both LEDs will flash again at 4Hz. Repeat the adjustment procedure with a wider range (min. positioning travel).  
(See positioning travel specification on actuator ID label)

#### 9.1.4.5 Correction after setup

- If the setting is to be corrected after accepting the first value, first press the Reset button (4) and then repeat the setting.
- If the correction is to be re-done after saving the settings, the entire adjustment procedure must be repeated.

### 9.2 Adjustment using the configuration program

Context-sensitive help information is available in the configuration program at all times. For basic handling and installation instructions refer to the associated manual, number 41/68-001.

**WARNING**



*A conductive ground connection is established between the PC and the CONTRAC electronic unit with the RS 232 communication cable. If the PC is grounded, this may cause a ground loop within the installation.*



## 9.3 Functions and signals at the LCP

Function	Indication
Adjustment	
<b>Change-over to adjustment mode:</b> Press and hold both drive buttons for approx. 5 seconds	Both LEDs flash synchronously at approx 4Hz after time has expired.
<b>Moving to an end position</b> Use associated drive button on LCP	Both LEDs continue to flash at 4Hz while driving.
<b>Saving the first end position</b> Press button 0% or 100%	The associated LED flashes at approx. 2Hz, the other continues at 4Hz.
<b>Saving the second end position</b> Press button 0% or 100%	The associated LED flashes at approx. 2Hz synchronously to the first one.
<b>Confirm settings</b> Press 0% and 100% buttons simultaneously	Both LEDs are briefly „ON“ together and then extinguish.
Operation	
Normal operation: MAN / AUT	LED off
<b>Driving with button on CSF</b> Priority over control system	LED off
Bootstrap mode	
Electronic is in bootstrap mode during the data transfer of e. g. firmware, objects or motor characteristics; use ECOM688 software for this procedure.	Both LED are „ON“; actuator is not available
Fault (both LEDs flash alternately at 4Hz)	
<b>Reset:</b> Resets fault indications	If no „Failure“ conditions exist, both LEDs extinguish (if the actuator had been moved out of its operating range, drive it back prior to the reset).

Table 8:

## 10 Maintenance

Contrac actuators have a robust construction. As a result, they are highly reliable and require only little maintenance. The maintenance intervals depend upon the effective load and are therefore not specified here.

The built-in microprocessor evaluates the actual load factors (e.g. torques, temperatures, etc.) and derives the remaining operating time until the next routine maintenance is required. Use the configuration program for viewing this information.

## 10.1 Motor and gears

All maintenance work must be carried out by qualified specialists who have been trained for this task. As a rule, perform the following routine maintenance works:

- Check the shafts and gears.
- Check the motor pinion gear and the respective mating gear.
- Replace the motor's rotary shaft seal and ball bearings.
- Check the position sensor.
- Change the oil; then make a visual check and check for proper operation.

## 10.2 Adjusting the brake

## CAUTION



*The actuator setting may be changed accidentally by the repelling power of the valve when the brake is released!*

In automatic mode the brake is permanently released. Therefore, it is not exposed to wear and does not require any re-adjustment.

### 10.3 Replacing the position sensor

#### 10.3.1 Dismounting

- drive actuator into 50% position
- delete the current position setting by pressing the drive buttons on the LCP for at least 5 sec.
- switch-off the voltage supply
- disconnect the connector plug from pcb
- undo the two fastening screws (1) of the position sensor and pull the sensor out of the gears.

#### 10.3.2 Mounting

The toothed gear pair of the position sensor is held in place by a tension spring (3), to ensure sufficient free motion when the direction of rotation is reversed

- set the stop pin to the center position, as seen in Figure 13
- connect the plug (5) to the PCB
- align the sensor and its gears with the actuator; set the first toothed gear in 11:00 o'clock position (see Figure 14) onto the drive shaft gear (4)
- slightly move the sensor back and forth to pre-tension the toothed gears with the difference "z" until the second toothed gear snaps in
- fasten the screws (1) tightly.

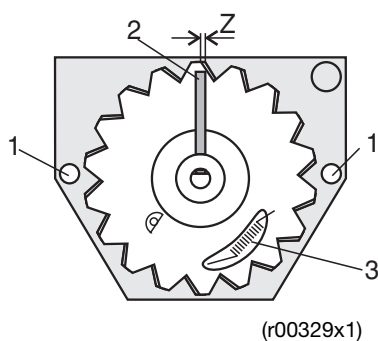


Fig. 13: Position sensor

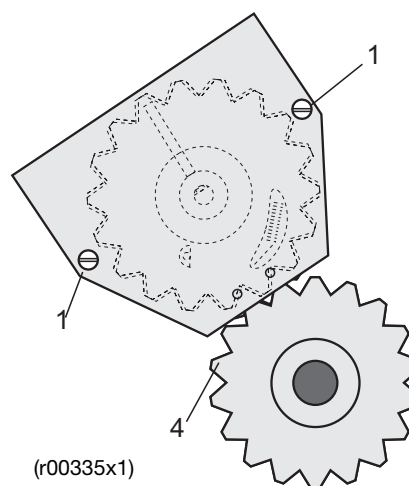


Fig. 14: Mounting position

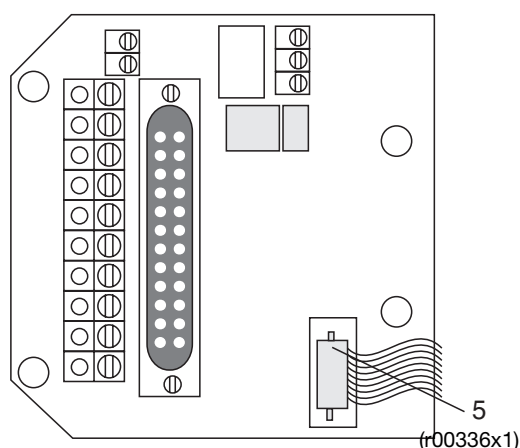


Fig. 15: Connecting the ribbon cable plug to the PCB

After mounting is completed readjust the actuator range as described in section 10 of this manual.

## 11 Troubleshooting

This section only describes how to handle hardware errors. Refer to the configuration program's on-line help for errors related to the software.

Error	Possible reason	Measures to be taken
Valve cannot be moved by actuator	Malfunction of actuator or valve (e.g. cable gland fastened too tightly)	Disconnect the actuator from the valve. If the actuator is working properly then, the valve is likely to be defective. Otherwise, the actuator seems to be the error source.
Actuator does not react	No communication	Set up communication using the configuration program
	Motor / brake is defective	Check the winding resistances of the motor and brake.
	Digital inputs of electronics are not connected	Connect
	Brake does not release (no audible "click" noise)	Check the air gap (should be around 0.25 mm) and the electrical connection of the brake. Check the winding resistance of the brake coil.
Actuator does not work in automatic mode, although "AUT" has been selected in the configuration program	Digital input 1 (DI 1) has not been connected.	Connect DI 1.
LEDs on the commissioning and service field are flashing simultaneously	Actuator has not been adjusted properly	Adjust the actuator.

Table 9:

### 11.1 Electrical test values

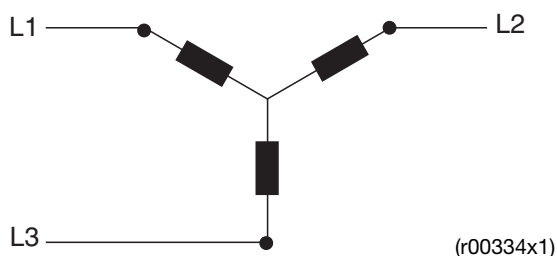


Fig. 16: Motor block diagram

Winding resistance $\pm 5\%$ at 20° C (motor)	L1 (blue) - L2 (black):3,4 $\Omega$ L1 (blue) - L3 (violet):3,4 $\Omega$
Winding resistance $\pm 5\%$ at 20° C (brake)	50 $\Omega$

Table 10:



---

ABB has Sales & Customer Support  
expertise in over 100 countries worldwide.

**[www.abb.com/instrumentation](http://www.abb.com/instrumentation)**

The Company's policy is one of continuous product  
improvement and the right is reserved to modify the  
information contained herein without notice.

Printed in the Fed. Rep. of Germany (08.05)

© ABB 2005



**ABB Ltd.**

Salterbeck Trading Estate  
Workington, Cumbria  
CA14 5DS  
UK  
Tel: +44 (0)1946 830 611  
Fax: +44 (0)1946 832 661

**ABB Inc.**

125 E. County Line Road  
Warminster, PA 18974  
USA  
Tel: +1 215 674 6000  
Fax: +1 215 674 7183

**ABB Automation Products GmbH**

Schillerstr. 72  
32425 Minden  
Germany  
Tel: +49 551 905-534  
Fax: +49 551 905-555