

Electrical Linear Actuators for Continuous Modulating Control LME620AI / LME620AN (Contrac)

Rated Force 4 kN
(900 lbf)



Electrical Linear Actuators for Continuous Modulating Control LME620AI / LME620AN (Contrac)

Service Instruction

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1 Important information






1.1 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.

1.2 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
	DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. (High level of risk.)
	WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. (Medium level of risk.)
	CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. (Low level of risk.)
	NOTICE	NOTICE indicates a potentially harmful situation which, if not avoided, may result in damage of the product itself or of adjacent objects. (Damage to property)
	IMPORTANT	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

**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.**

1.3 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.

2 Introduction

This service instruction refers to the ABB linear actuators LME620AI (with integrated electronic unit) and LME620AN (for separate electronic units). It amends and deepens the routine maintenance description in the standard instruction, which we strongly recommend to be also available for all maintenance work.

2.1 Safety and precautions

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

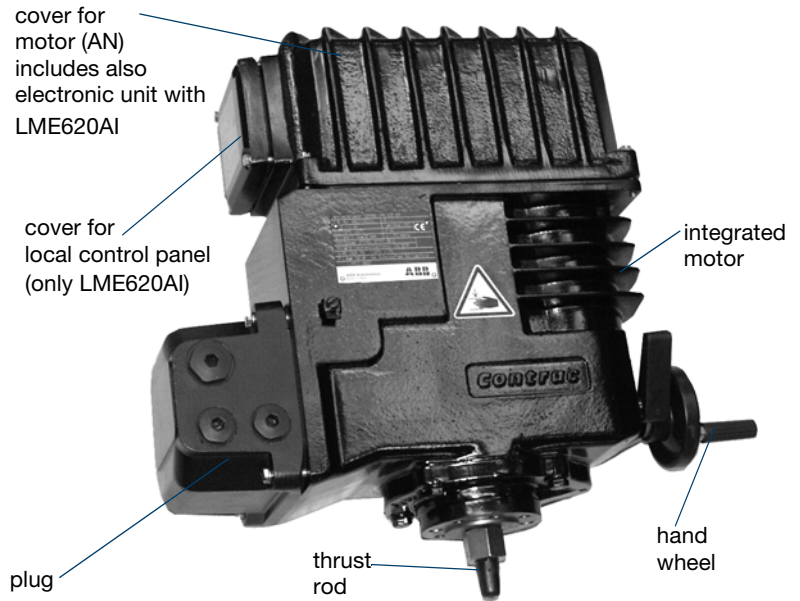


Fig. 1: LME...; main components

STOP



- The actuators perform movements for positioning vanes and valves. Handle properly and with care. Otherwise, a hazard of bruise injuries may arise.
- Only qualified specialists who have been trained, qualified and certified by ABB for these tasks are authorized to mount and adjust the actuator and to make the electrical connection. ABB will not take any responsibility for personal injuries or material damages which were caused by non-trained, non-qualified or non-certified personnel.
- When working on the actuator itself or the electronics always observe the locally valid accident prevention regulations and the regulations concerning the construction of technical installations.
- Do not lift or lower the actuator when it is mounted on a valve or similar final control element.
- Switch-off the voltage supply; make sure that unintentional switching on is not possible
- Make sure that switching off the power supply does not affect the plant process
- Make sure that the final control element is not exposed to process forces.
- Check all mechanical and electrical interfaces for proper connection once the installation, commissioning, service or maintenance work is done.

2.2 Tools

IMPORTANT



Maintenance at CONTRAC actuators requires tools which are usually available in a workshop. Please consider that all dimensions are based on the metrical system. This applies also for the wrench sizes, threads etc. Using improper tools may damage the actuator or its components.

Use appropriate sleeves for the installation of the sealing rings (see chpt. 5.2.2.2 for details).

3 Actuator versions

Linear actuators LME620 are available in two versions:

- LME620 AI (with integrated electronics)
- LME620 AN (for separate electronics)

3.1 LME620 AI

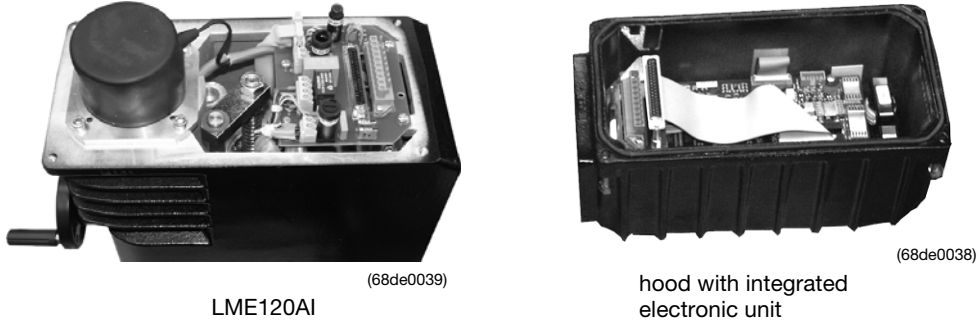


Fig. 2: LME620AI with dismantled electronic unit

3.2 LME620AN

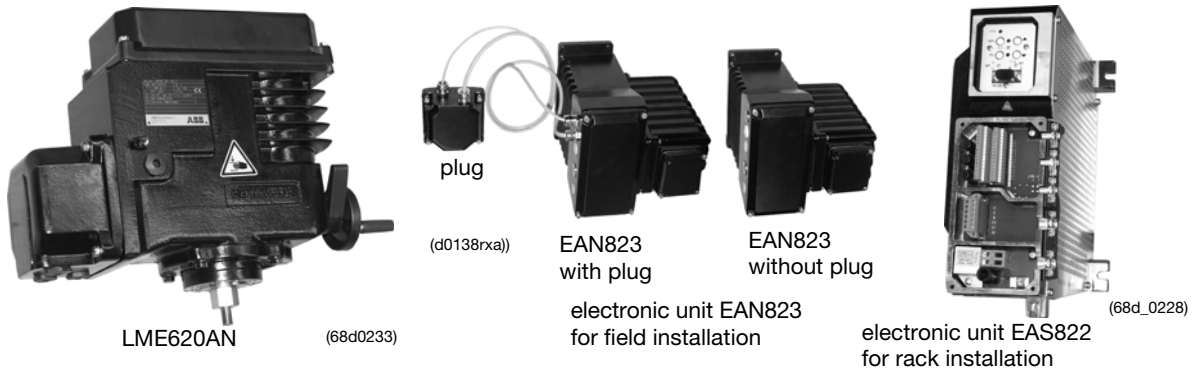


Fig. 3: LME620AN with available, separate electronic units

4 Lubrication

The spur wheel gearings of LME620AI / LME620AN are grease lubricated.

4.1 Mounting position

Any mounting orientation is permissible. To facilitate mounting and maintenance, however, it is recommended to use orientation IMV 1 (thrust rod downwards).

In all mounting orientations the actuator may not be exposed directly to rain, snow or other environmental influences.

4.2 Grease specifications

Actuator type	Grease specification
spindle	Optimol Optipit
gear wheels	ESSO Beacon 325

Table 1:

5 Maintenance

Contrac actuators feature a robust construction. As a result, they are highly reliable and require only little maintenance. The maintenance intervals depend upon the effective load.

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

CAUTION



All maintenance work must be carried out by qualified specialists who have been trained for this task. Switch-off the power supply and protect the actuator against unintentional switch-on prior to any maintenance. Make sure that disconnecting the power or any mechanical linkage does not endanger the any process or person. Make sure that the actuator is not exposed to process forces during the maintenance work.

Apart from the load dependent maintenance intervals determined by the microprocessor we recommend routine maintenance at least every 10 years.

The following description of the maintenance work provide that the actuator is disconnected from the valve and that all electrical supply is disconnected.

5.1 Sectional view

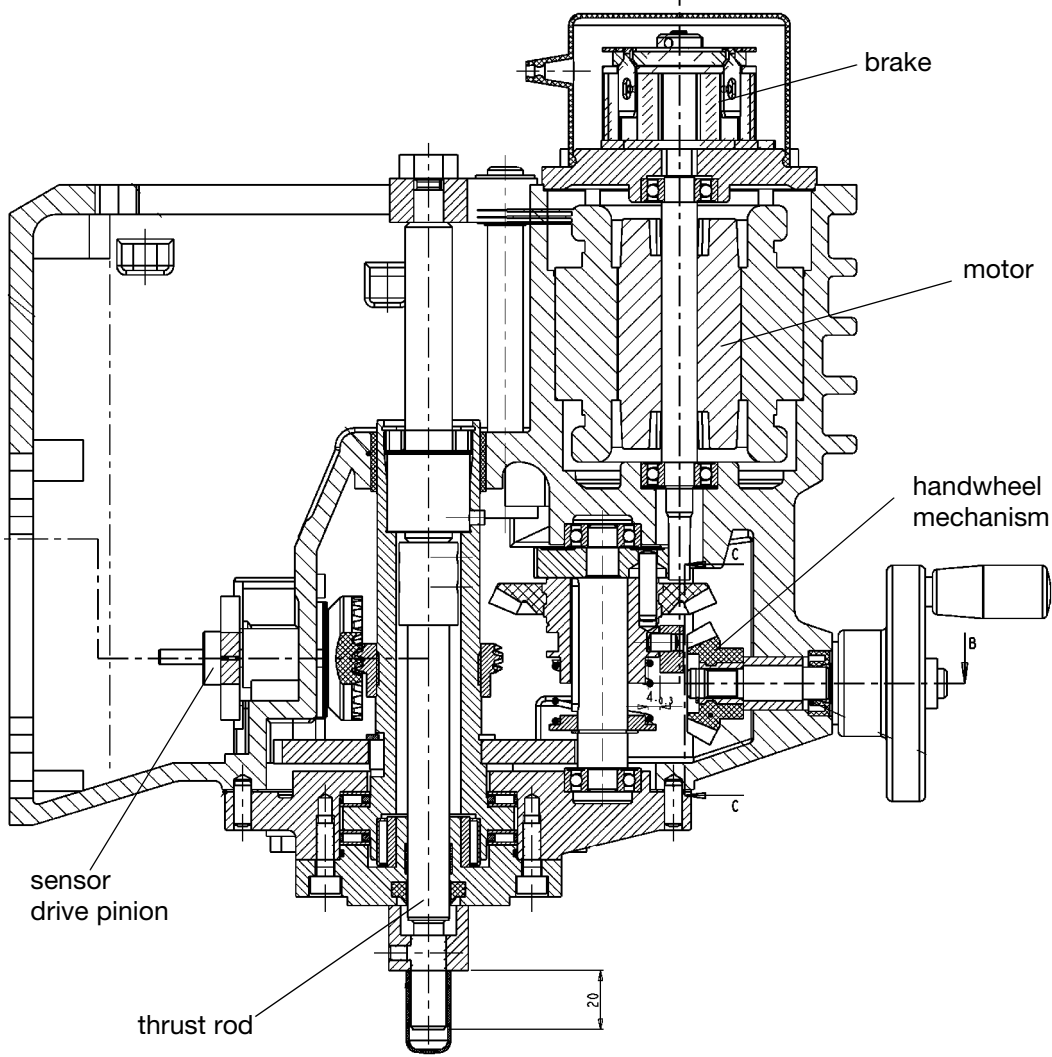


Fig. 4: Sectional view of LME620...

5.2 Motor

LME620 uses an integrated motor. The stator is integrated into the actuator housing which makes the motor housing a part of the actuator housing.

5.2.1 Motor removal

Note that the actuator position may be changed accidentally by the external load on the drive when the brake is released or the motor is removed

STOP

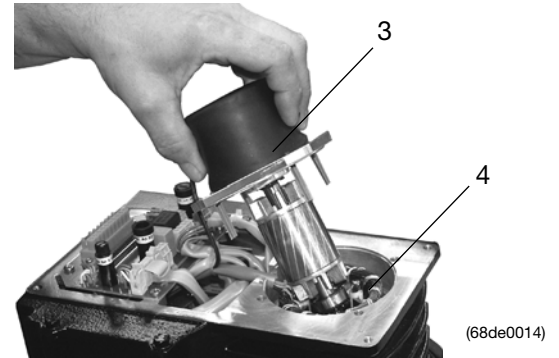
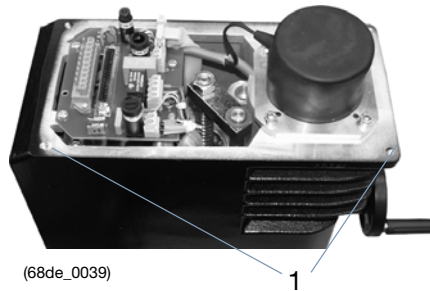


Fig. 5: Rear view of LME620 (without cover / electronic unit)

Fig. 6:

- remove the rear cover (cover with electronics at LME620 AI)
- unscrew the 4 motor fastening screws (1)
- loosen the 4 grub screws (2)
- take the brake body with rotor out (3)
- take the stator (4) out

NOTICE



The lower end of the stator shaft is supported by 2 separated disk springs. Make sure you get them out with the motor.

5.2.2 Motor shaft sealing ring

The motor shaft sealing ring prevents that debris or dirt get into the motor housing.

Once the stator is out, use two appropriate hooks (1) to pull the motor sealing ring (2) out; see fig. 7.

5.2.2.1 Removal

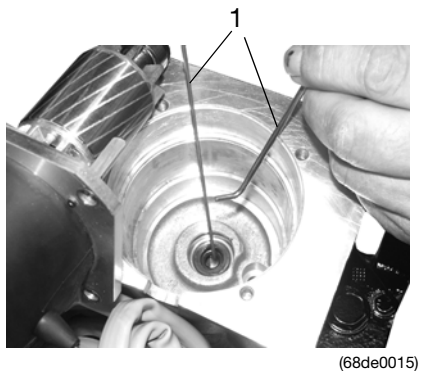


Fig. 7:

5.2.2.2 Installation

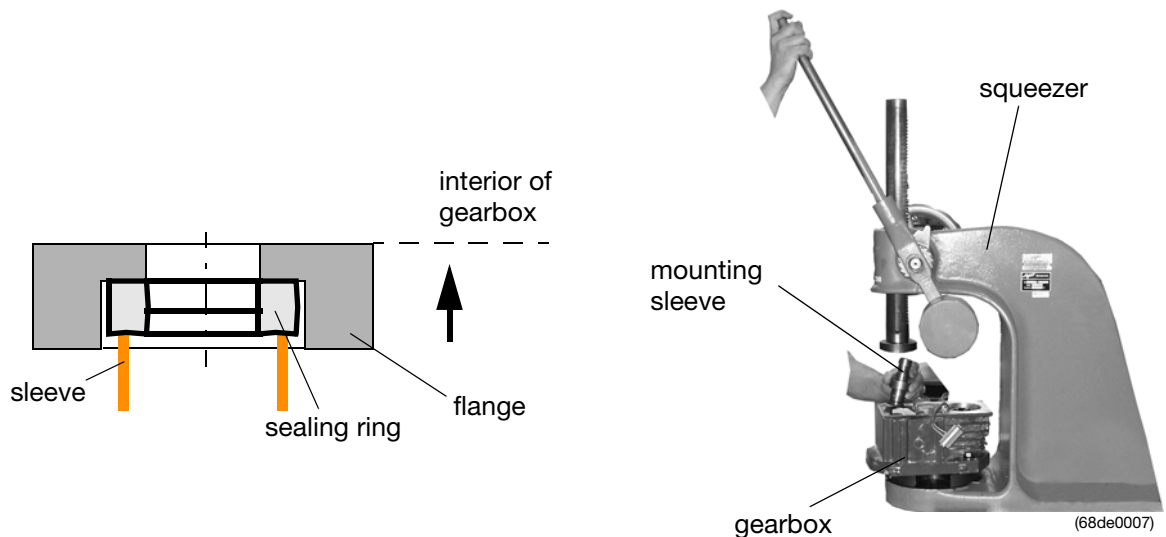


Fig. 8:

- grease the new sealing ring and press it in the flange as shown in fig. 8.
- make sure that the „open“ part of the sealing ring points towards the interior of the gearbox; see fig. 8.
- use appropriate squeezer or similar device to press the sealing ring uniformly into the flange (see right part of fig. 8)

5.2.3 Motor installation

- put the stator into the actuator housing
 - make sure, the hose protected cables are within the groove (see fig. 9)
 - put the rotor with the brake body into the stator housing
 - tighten the 4 motor screws
 - tighten the 4 grub screws to tense rotor / stator housing
 - use appropriate retainer (DELO-ML 5228 or LOCTITE 243; both medium-firm; detachable) to secure the grub screws
- (refer to fig. 5 + 6 for reference no.)

5.3 Brake adjustment

STOP



Note that the actuator position may be changed accidentally by the external load on the drive when the brake is released or the motor is removed

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

However, if you want to check the brake gap, proceed as follows

- disconnect the actuator from mains supply
- remove hood (LME620AI incl. electronic unit)
- remove the rubber cover of the motor
- unscrew the two grub screws (1)
- put two thickness gauges (0.15 mm / 0.0059") diametrically opposed between the two plates (3 + 4)
- press plate 1 down
- tighten the two grub screws (1)

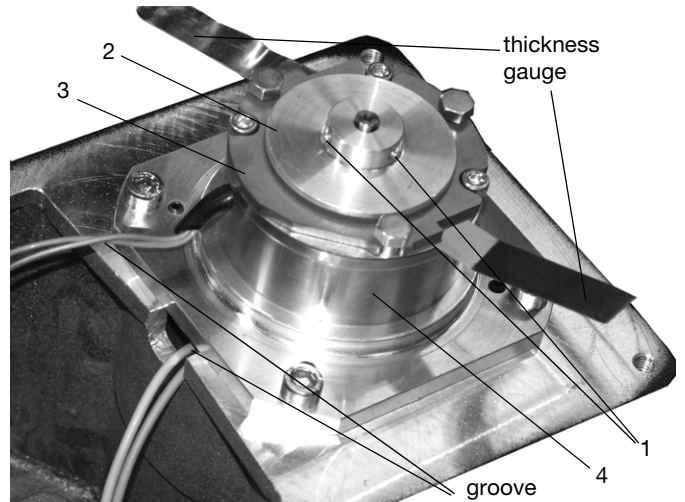


Fig. 9: Brake (rubber cap removed)

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6 Electrical Connection

6.1 General

The cable between actuator and electronic unit is connected to the electronic unit via terminals and to the actuator via a plug. The plug housing may contain a carrier for terminals or for the cable ends with crimp sockets.

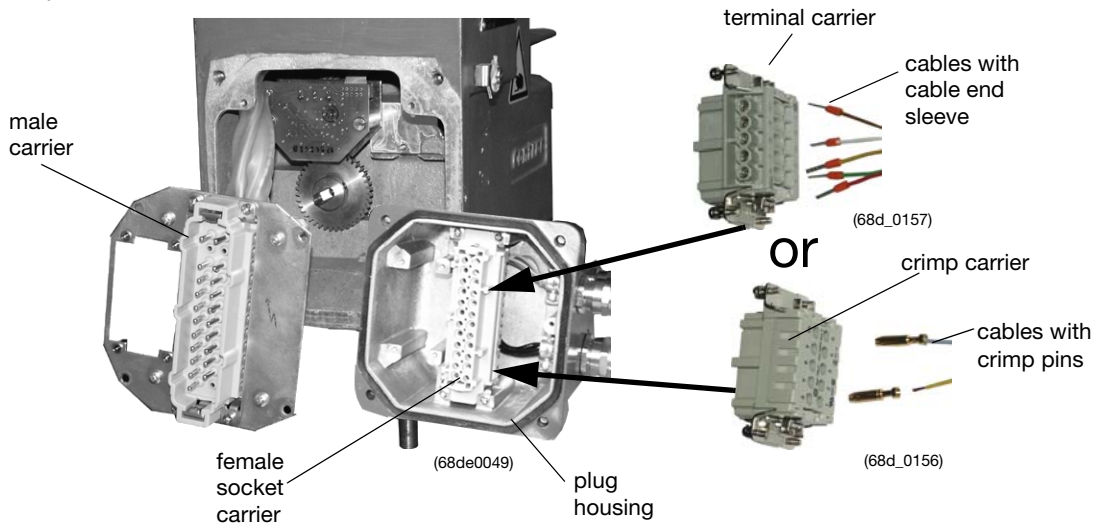


Fig. 10: Exemplary illustration of cable connection to the actuator; plug housing may contain alternatively a terminal carrier or a crimp carrier.

STOP



Disconnect the actuator and electronic unit from the mains supply before you start working at the electrical components. Make sure that switching off the actuator does not affect the process!

6.1.1 Actuator versions

Part-turn actuators LME620 are available in two versions:

- PLME620AI (with integrated electronic unit)
- LME620AN (for separate electronic unit)

6.1.1.1 LME620 AI

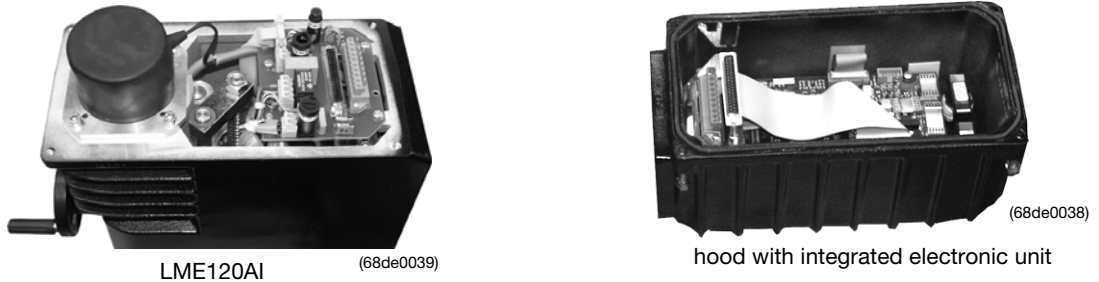


Fig. 11: LME620AI with dismantled electronic unit

6.1.1.2 LME620AN

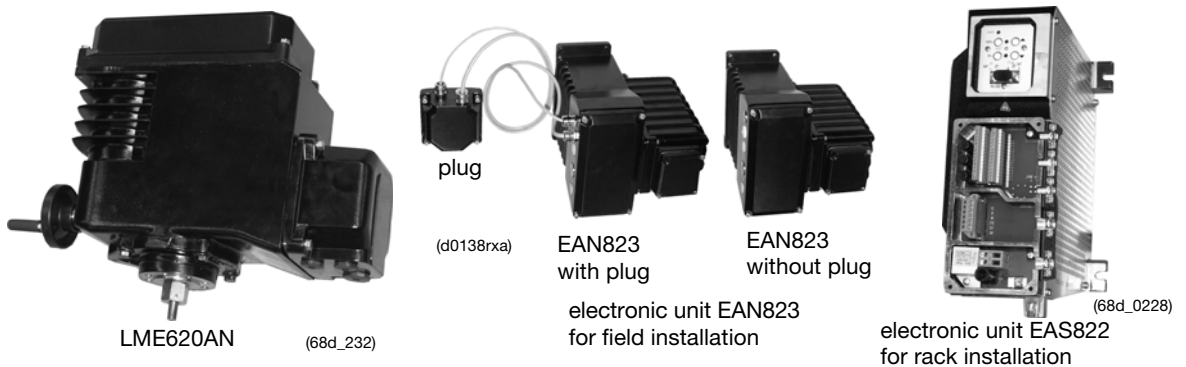


Fig. 12: LME620AN with available, separate electronic units

STOP



Disconnect the actuator and electronic unit from the mains supply before you start working at the electrical components. Make sure that switching off the actuator does not affect the process!

6.1.2 Removal of integrated electronic unit

NOTICE



If you want to use a faultless running electronic unit for another actuator, it is absolutely necessary to delete the basic settings of the operating range before you remove it. Press the drive buttons ▲ and ▼ on the LCP for at least 5 sec. until both LED flash simultaneously.

For the removal proceed as follows:

- switch-off the power supply and disconnect the plug
- loosen the 4 fastening screws (1)
- pull the electronic unit apart

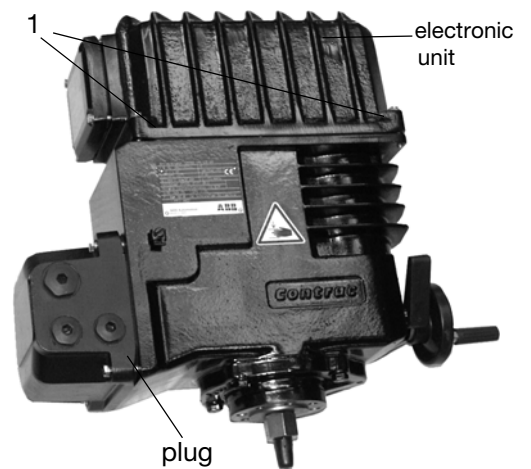
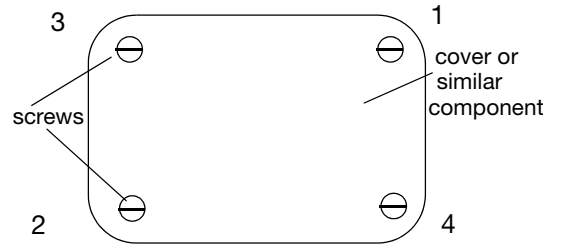


Fig. 13: LME620AI

6.2 Covers

Terminal covers and other components at the Contrac actuators and electronic units are fastened with 4 or more screws (only 2 screws for local control panel cover). In some cases they are additionally sealed with a soft rubber gasket. In order to avoid a gap between the housing and the cover (or the other component) tighten these screws evenly crosswise according to the order in the basic sketch in fig. Fig. 14: to get an even load



- Start with one screw and tighten it slightly. Then tighten the 2nd, opposite screw in the same manner. Continue with the remaining screws. Finally tighten the screws in the same order. This will ensure a tight seal.

6.3 Wiring diagrams (Integrated electronic unit)

6.3.1 HART

The electrical connection is done with a plug on the actuator.

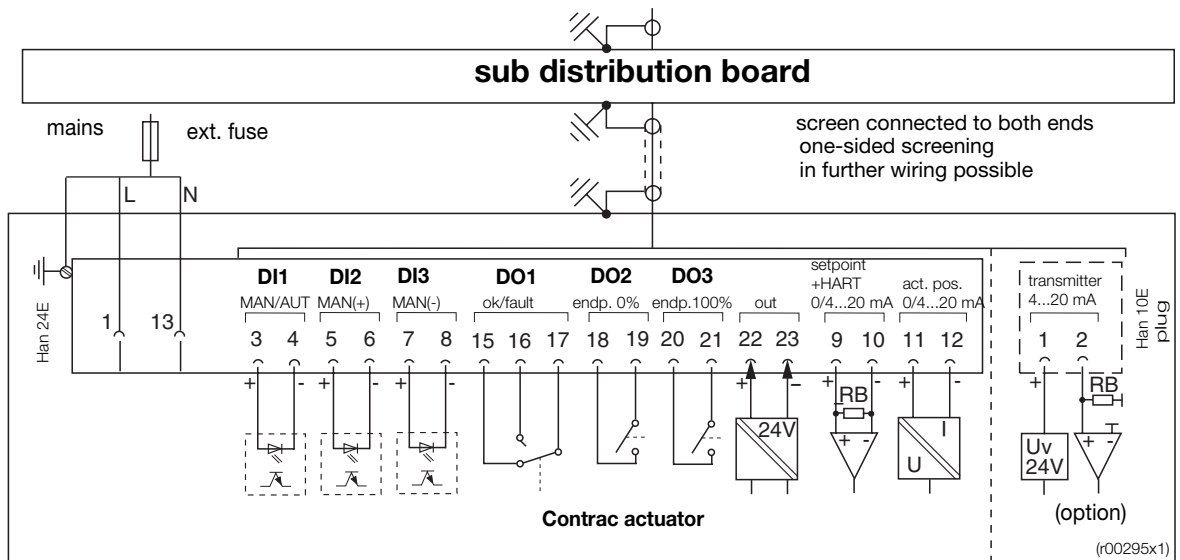


Fig. 15:

6.3.2 PROFIBUS DP

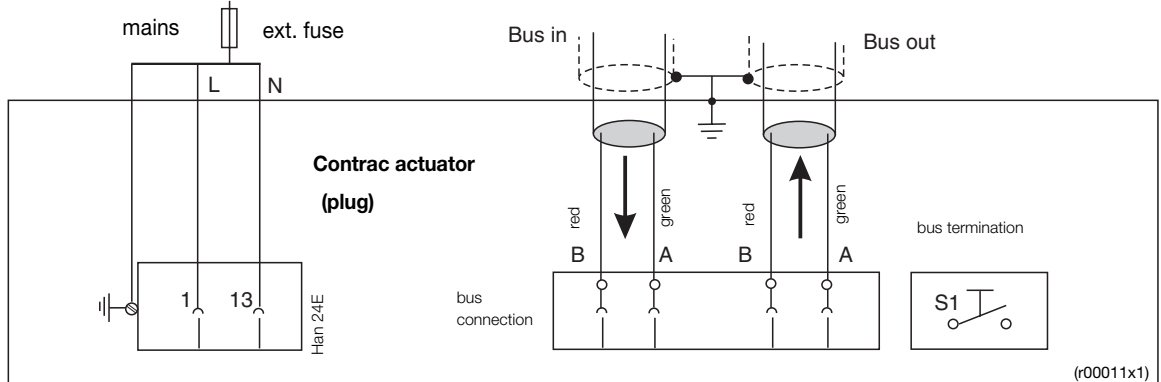


Fig. 16:

6.4 Wiring diagram
(for separate electronic unit)

6.4.1 EAN823 (HART)

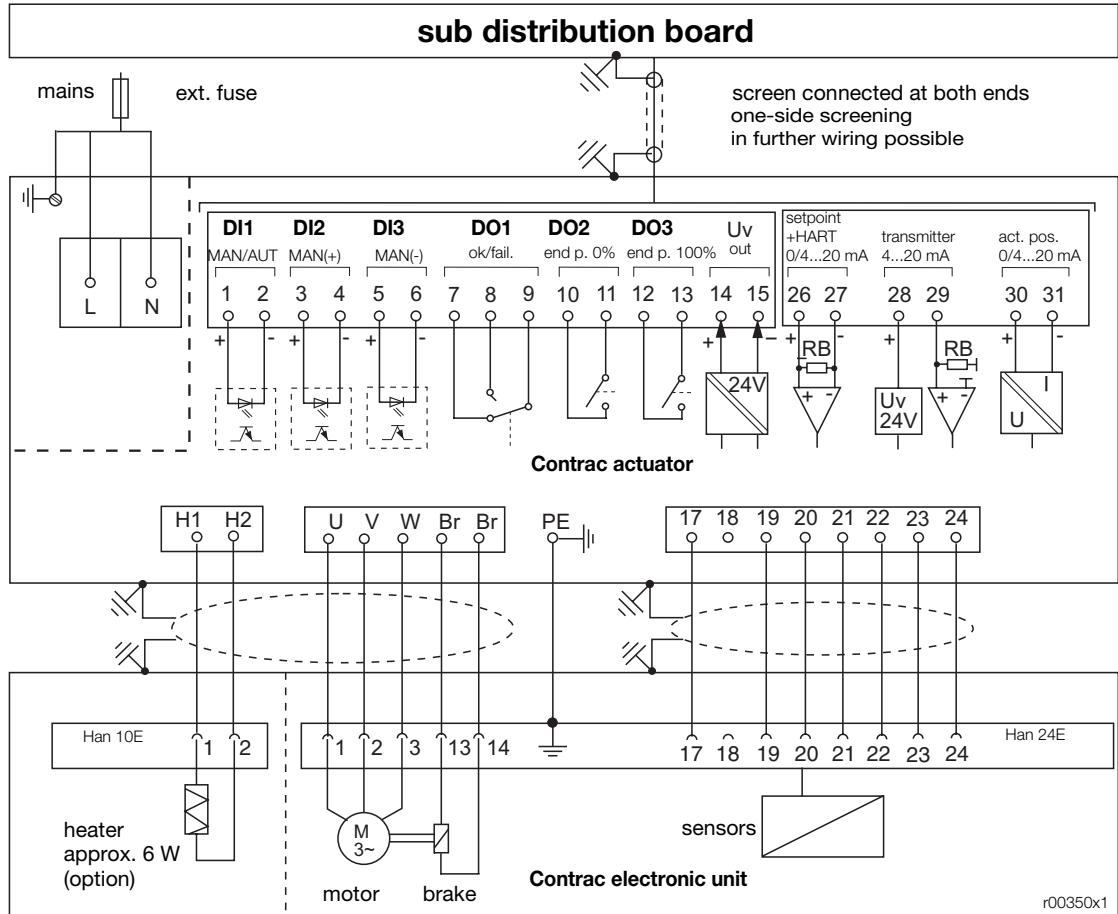
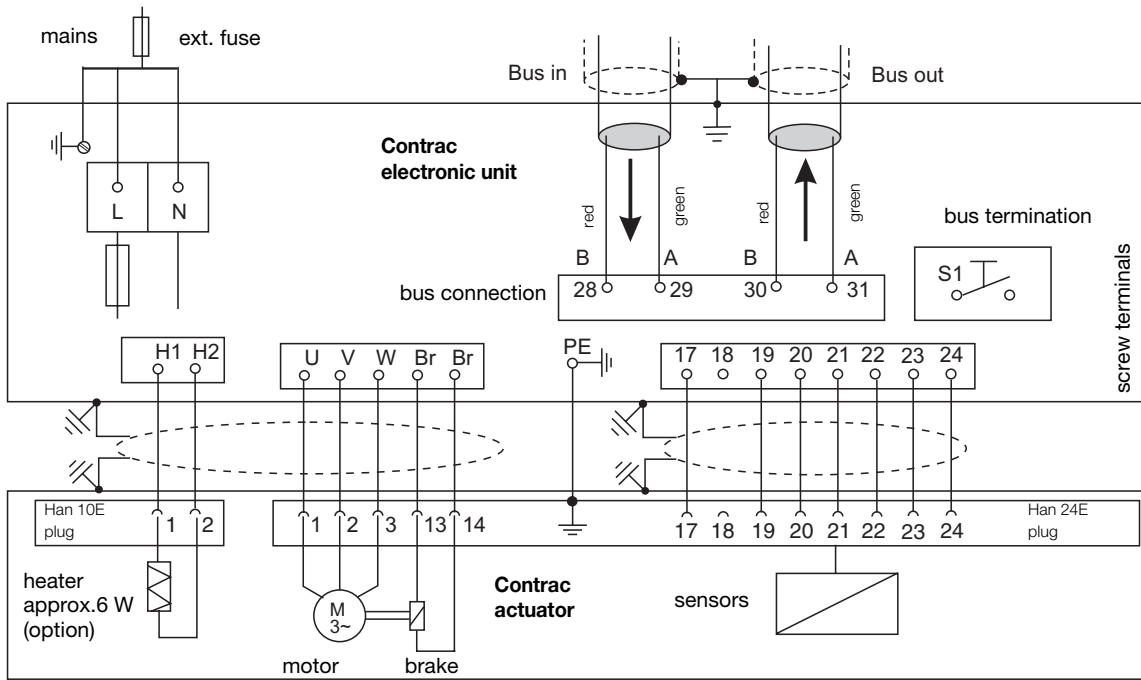


Fig. 17:

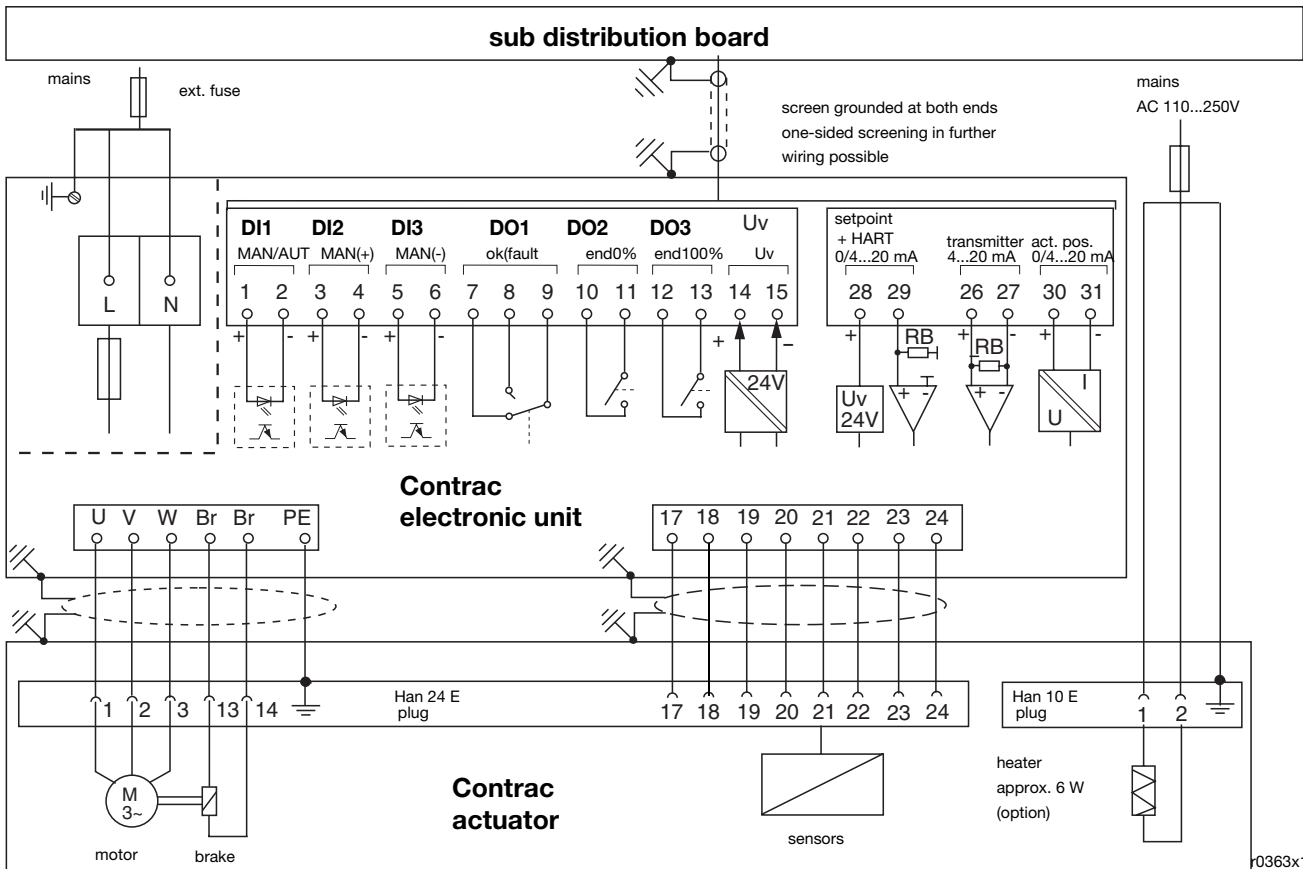
6.4.2 EAN823 (PROFIBUS DP)



r00010x1

Fig. 18:

6.4.3 EAS822



r0363x1

Fig. 19:

6.5 Fuses

Electronic Unit	Fuse type	Fuse dimens.	Location	U = 115 V	U = 230 V
integr.	External fuse	--	external	16 A, slow	
	Mains fuse	5 x 20 mm	main pcb	6.7 A, slow	3.15 A, slow
	Analog setpoint input	5 x 20 mm	main pcb	40 mA; fast	
	heater (only f. actuators f. -25°C ambient temperature)	5 x 20 mm	main pcb	2 A; slow	
EAN 823	External fuse	--	external	16 A, slow	
	Mains fuse	5 x 20 mm	in connection chamber	6.7 A, slow	3.15 A, slow
	Analog setpoint input	5 x 20 mm	in connection chamber	40 mA; fast	
	Anti condensation heater + heater (only f. actuators f. -25°C ambient temperature)	5 x 20 mm	in connection chamber	2 A; slow	
EAS822	external fuse	--	external	16 A; slow	
	mains fuse	5 x 20 mm	in connection chamber	6.7 A, slow	3.15 A, slow
	fuse for digital output DO1, DO2, DO3	5 x 20 mm	in connection chamber	3 x 0.2 A; medium time lag	

Table 2:

6.5.1 Fuse location

6.5.1.1 Integrated electronic unit

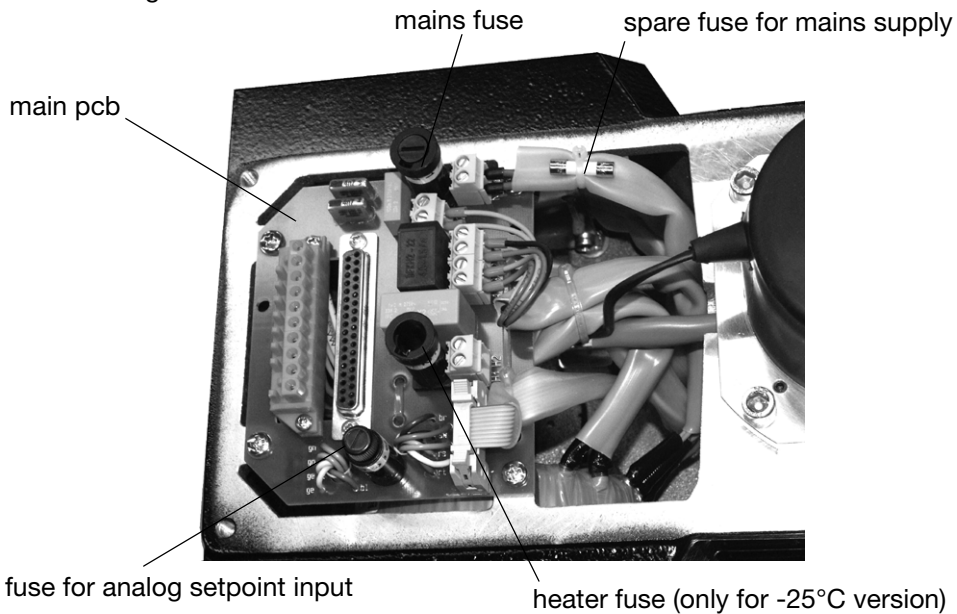


Fig. 20:

6.5.1.2 EAN823

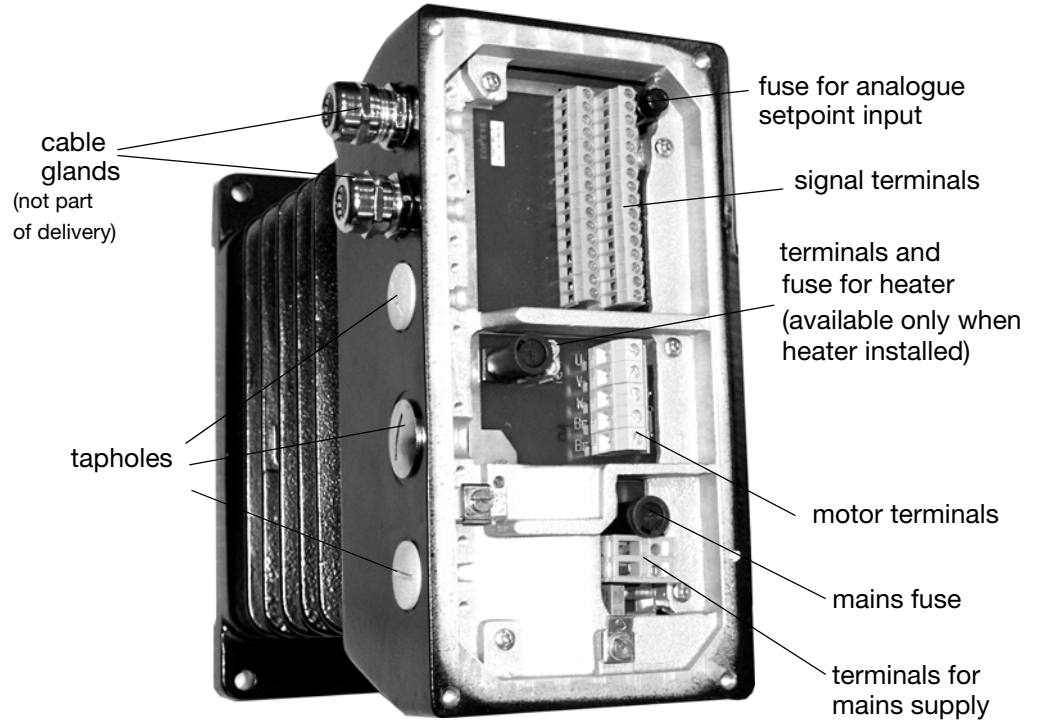


Fig. 21: Fuses in EAN823

6.5.1.3 EAS822

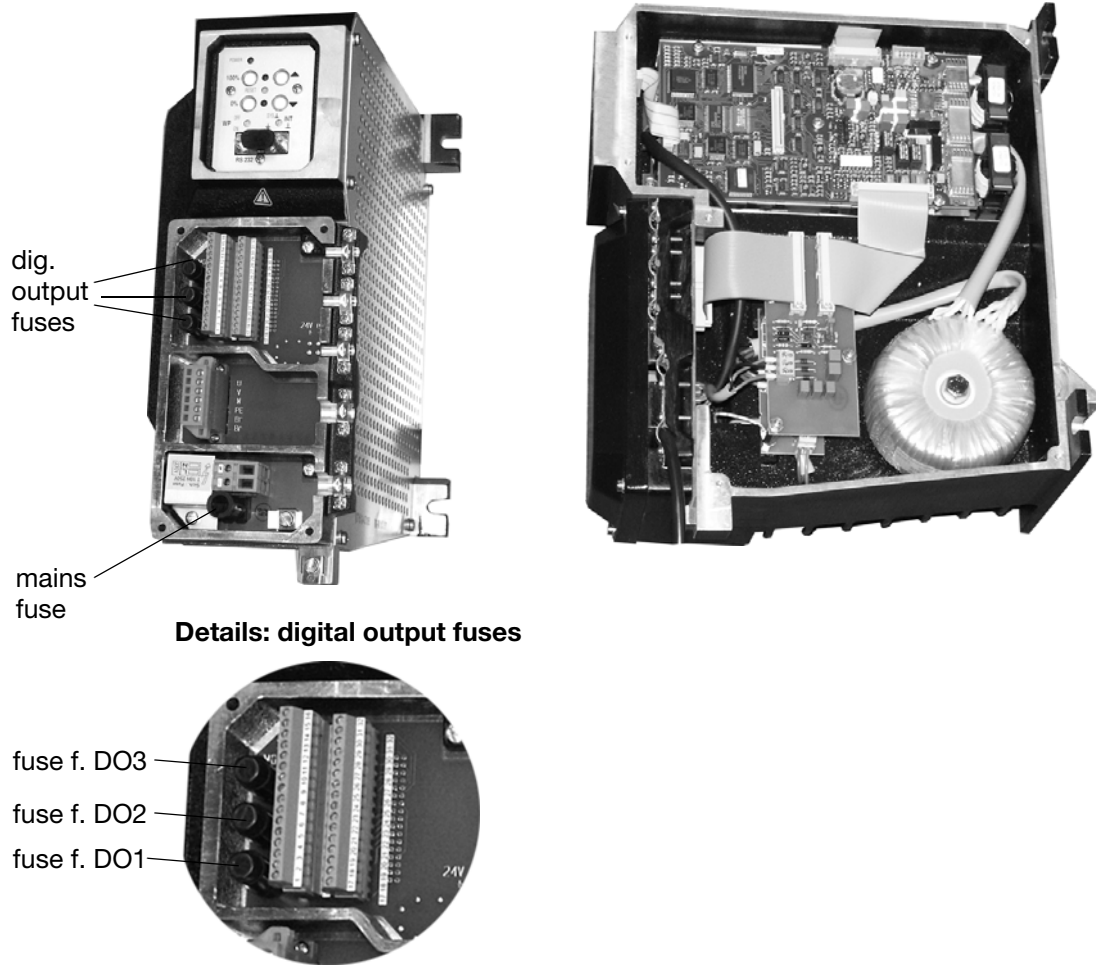


Fig. 22: Fuses in EAS822

7 Exchange of position sensor

7.1 Dismounting

- drive actuator into 50% position
- delete the current position settings by pressing the drive buttons ▲ and ▼ on the LCP for at least 5 sec.
- switch-off the voltage supply
- disconnect the main plug
- undo the four fastening screws (1) of the pin strip carrier and push the carrier aside
- undo the two fastening screws (2) of the position sensor, pull the sensor out of the gears
- disconnect the plug of the signal cable on the sensor pcb

7.2 Mounting

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

- set the stop pin to the center position, as seen in figure 23
- align the sensor and its gears with the actuator; set the first toothed gear in approx. 12:00 o'clock position (see fig. 24) onto the drive shaft gear (4)
- slightly move the sensor back and forth to pre-tension the toothed gears until the second toothed gear snaps in
- fasten the screws (2) tightly.

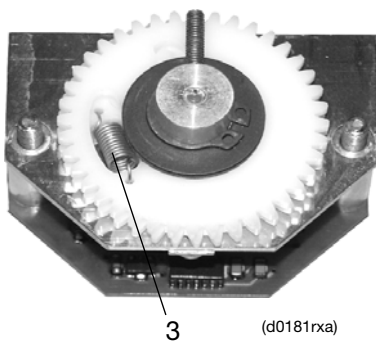


Fig. 23: Position sensor

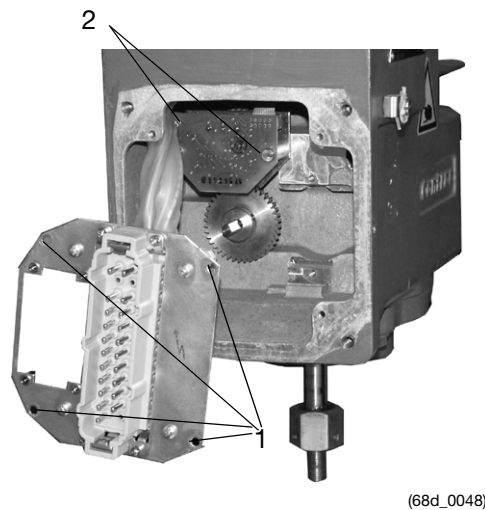


Fig. 24: Mounting position

Finally provide a new basic setting of the actuator operating range. See the Set Up chapter in the actuator and / or electronic unit manual for details.

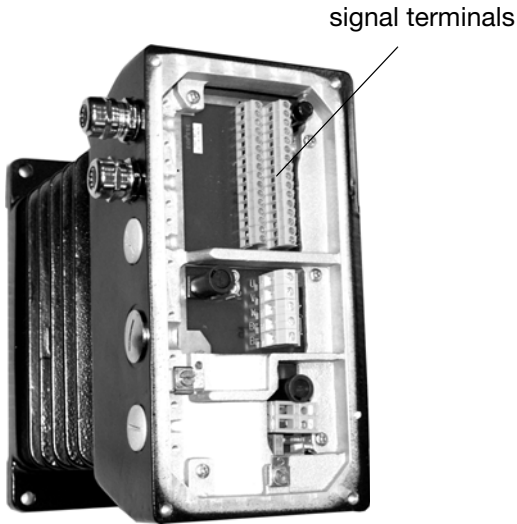
8 Electrical Test Values

NOTICE Check wiring and proper terminal connections before you start the test procedure.



8.1 Test values (position sensor)

The in- / output signals are assigned to terminals of the electronic unit as follows:



- term. 17: DC +15 V; +/- 15% (supply); refer to term 22
 - term. 18: only used for cable length detection with EAS822
 - term. 19: clock
 - term. 20: data
 - term. 21: reference potential for position signal
 - term. 22: reference potential for temp. signal and supply voltage
 - term. 23: position proportional voltage signal (0.4... 4.4 V); refer to term. 21; end positions of actuator must be adjusted
 - term. 24: temperature proportional voltage signal; refer to term. 22; (ΔV approx. 22.4 mV / °C; approx. 1.8 V at 20°C)
- (see fig. 25 for terminal position)

Fig. 25: Signal terminal location

8.2 Test values

Brake voltage: DC 135 V with AC 115/AC230 V mains supply

Motor voltage: check for currents symmetry (i. e. with clip-on ammeter)

8.3 Winding resistance (motor)

STOP



Disconnect the voltage supply and the actuator plug prior to any resistance measuring. Make sure that switching off the actuator does not affect the process.

Depending on the actuator version proceed as follows:

8.3.1 LME620AI (integrated electronic unit)

- remove the plug
- remove the actuator hood with electronic unit
- check pins at pin carrier; see fig. 20 for pin reference

8.3.2 LME620AN (separate electronic unit)

- remove plug
- measure between pins at actuator plug; see fig. 17 + 19 for pin reference

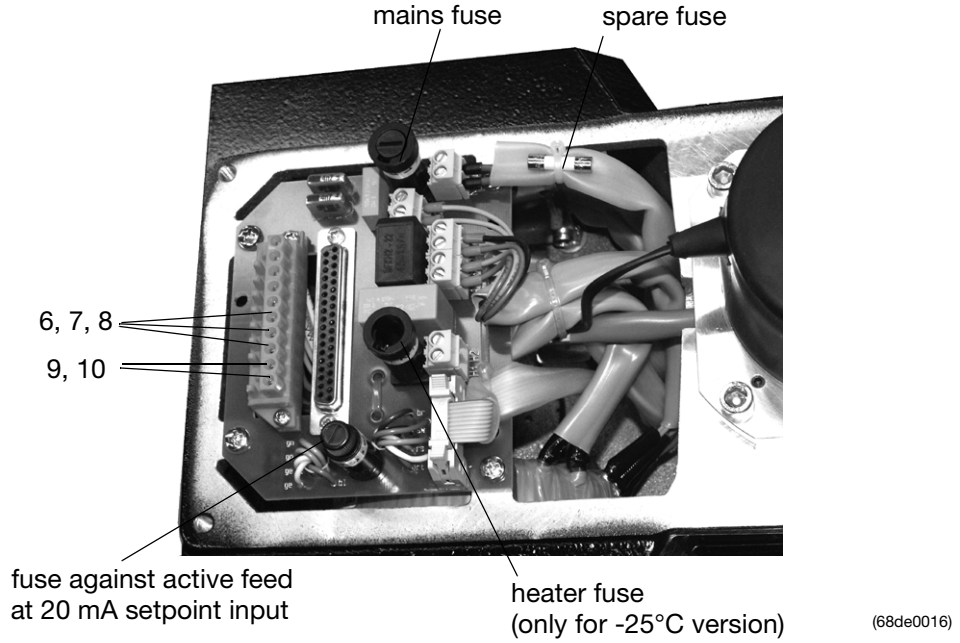


Fig. 26:

Integrated electronic unit (refer to pin carrier in fig. 20)	Separated electronic unit; refer to pin carrier of actuator plug (see fig. 17 + 19)	Resistance
Winding resistance $\pm 5\%$ at 20° C (motor); pin. 6-7 / 7-8 / 6-8	Winding resistance $\pm 5\%$ at 20° C (motor); pin. 1-2 / 2-3 / 1-3	3.4 Ohm
Winding resistance $\pm 5\%$ at 20° C (brake); term. 9 - 10	Winding resistance $\pm 5\%$ at 20° C (brake); term. 9 - 10	50 Ohm

Table 3: Winding resistance

9 Failure detection

9.1 LED signals at local control panel

Provided the electronic unit is supplied with voltage (green LED on LCP „ON“), the red LED on the local control panel provide some basic status information:

both LED are „OFF“	actuator is ok
both LED are „ON“	actuator is in bootstrap mode (e. g. during data loading procedure); in this case the actuator is not available for the positioning loop
both LED flash simultaneously	actuator end positions are not set; actuator does not accept commands to the digital inputs and can only be moved via drive buttons on the local control panel (see also electronic unit instruction)
both LED flash alternatively	actuator failure (e. g. out of adjusted range); actuator can not be moved via command buttons or commands from the process control system; reset is only possible once the failure reason is eliminated

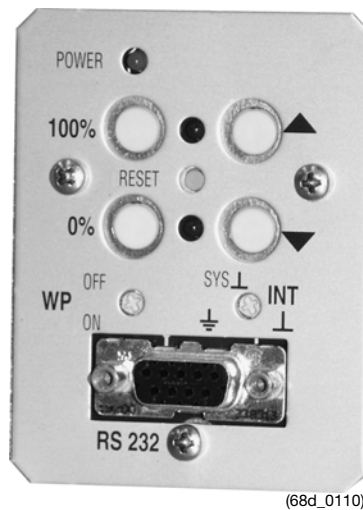


Fig. 27: Local Control Panel

10 Trouble Shooting

NOTICE Check wiring, polarity and all plug and terminal connections before you start detailed trouble shooting.

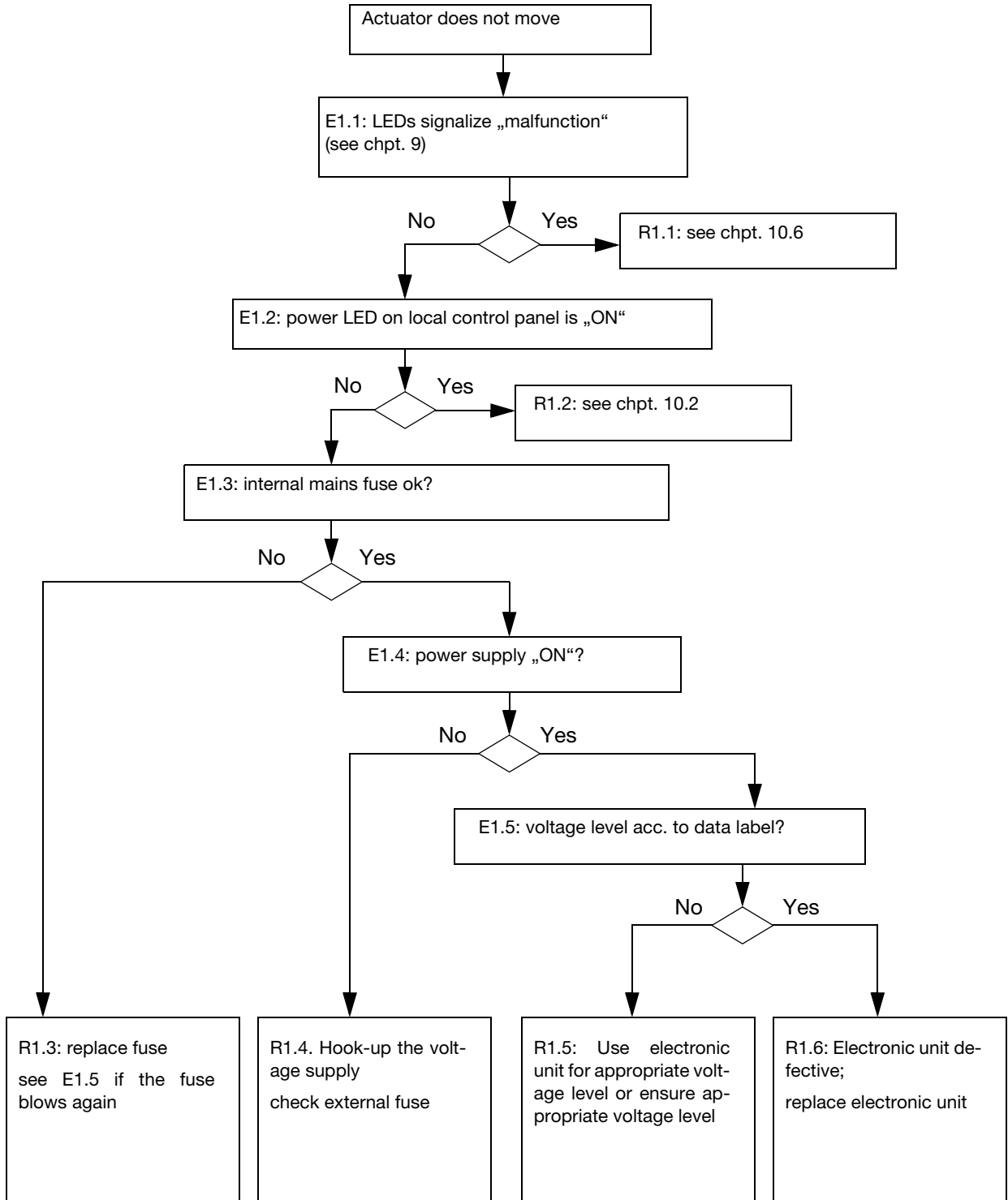


The following chapter specifies various possible failure events or conditions, which should be checked. Follow the block diagrams to find the associated reason, result or measure to solve the malfunction.

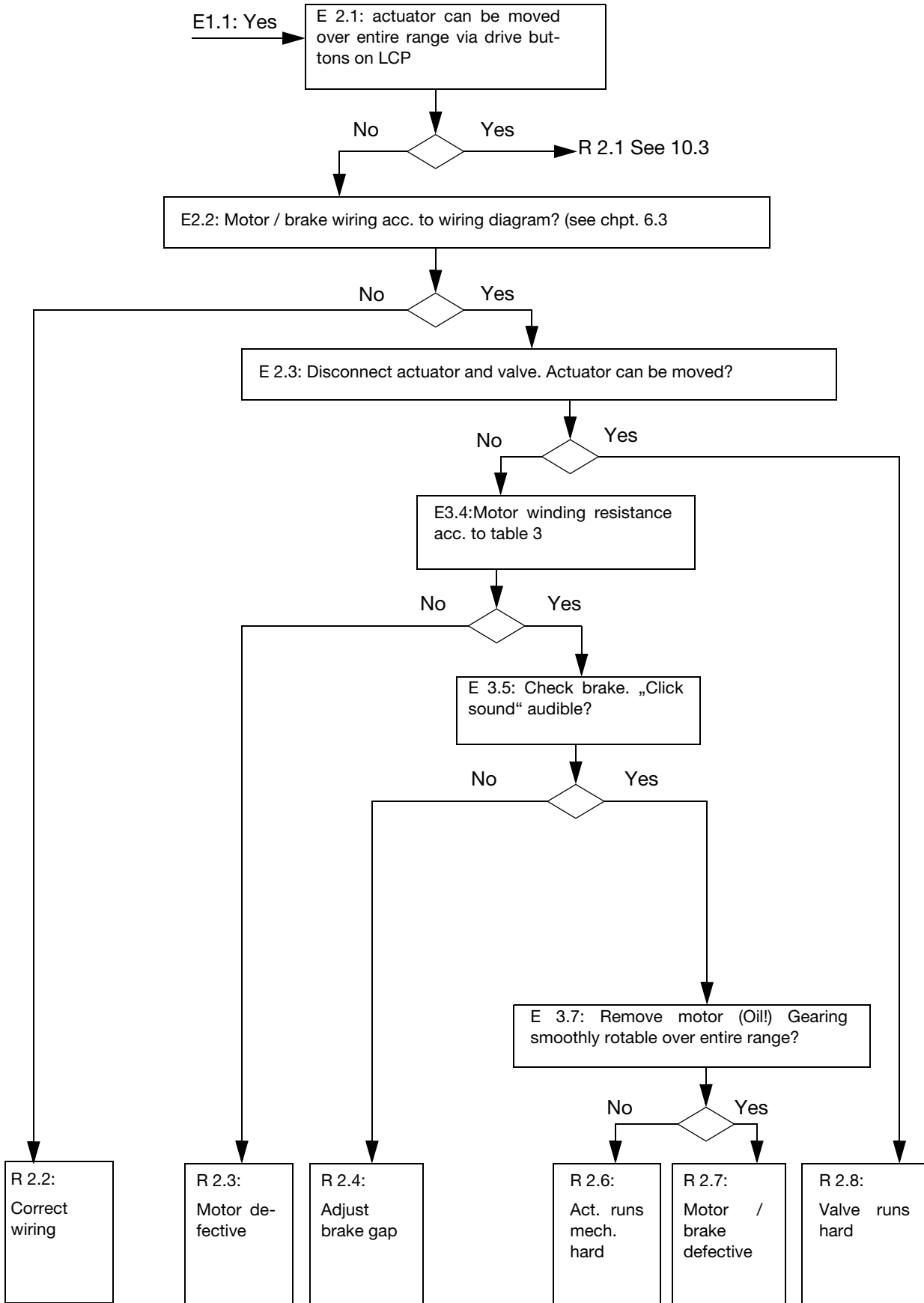
Example:

condition:	E6.1	LED signal: Failure
possible failure:	E6.3	sensor memory failure
one reason / measure to solve the malfcn.	R6.2	replace sensor; see chpt. 7 (in this case the user will find more detailed information about the sensor replacement in chapter 7)

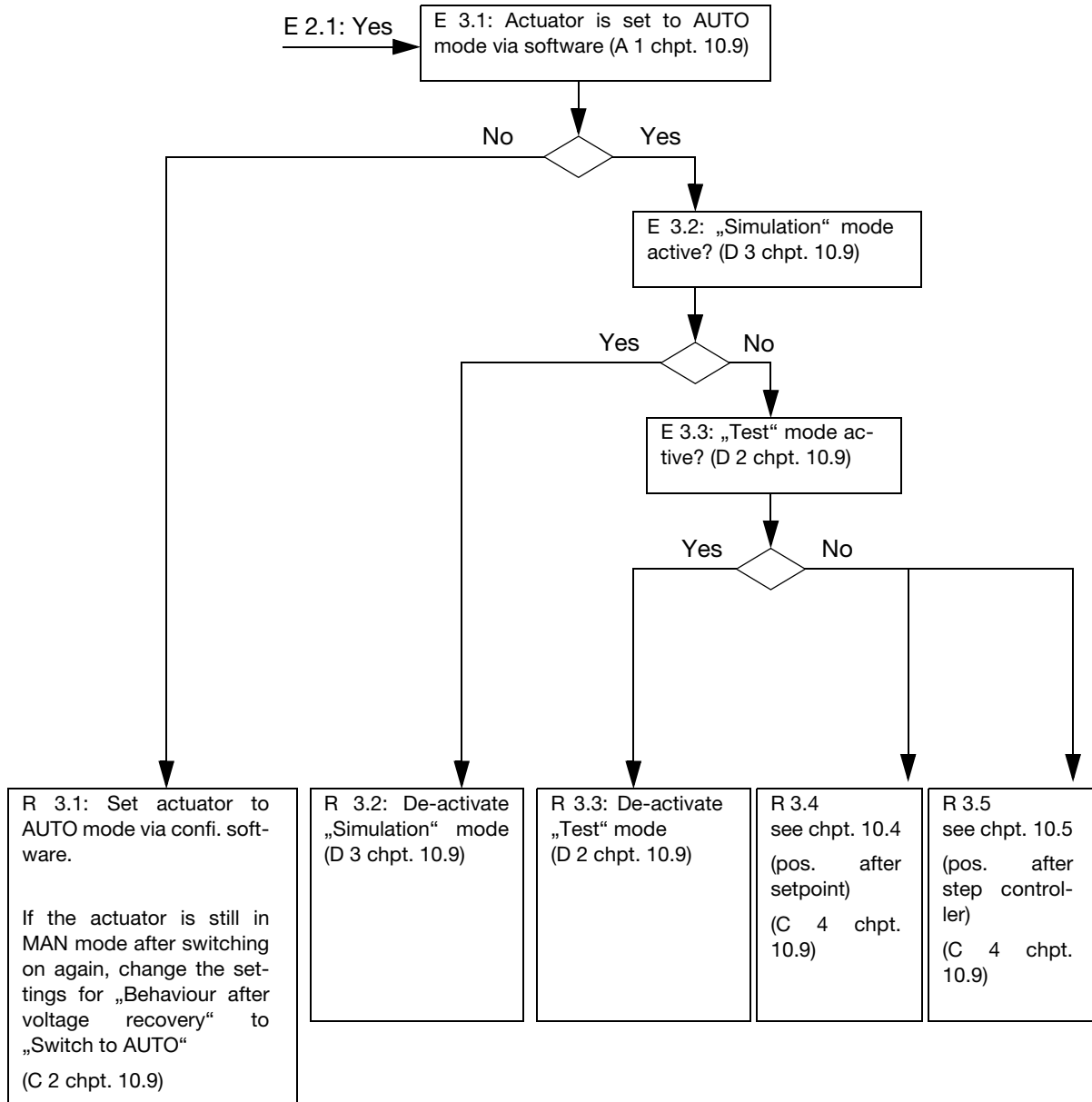
10.1 General



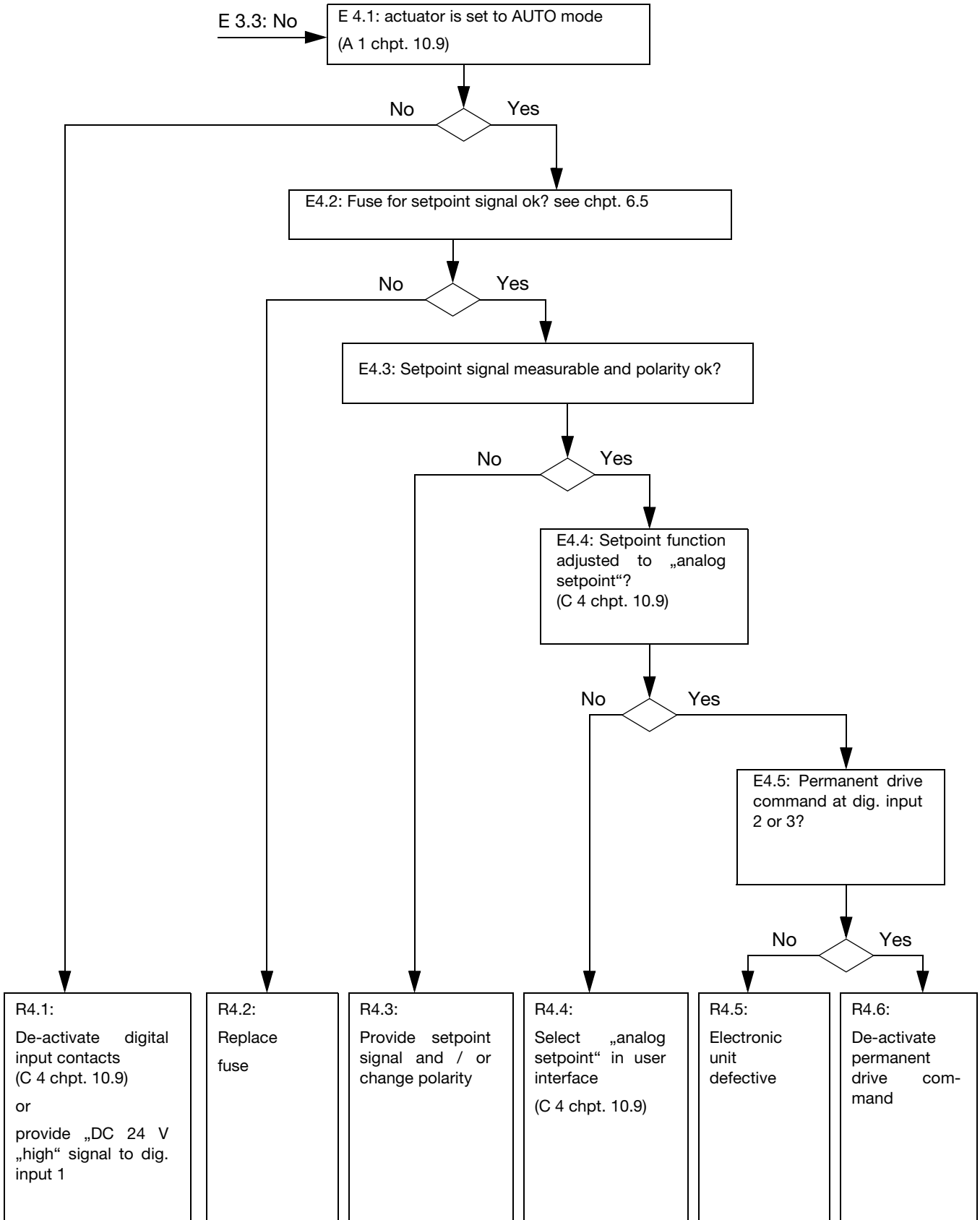
10.2 Failures at brake, fuse or wiring



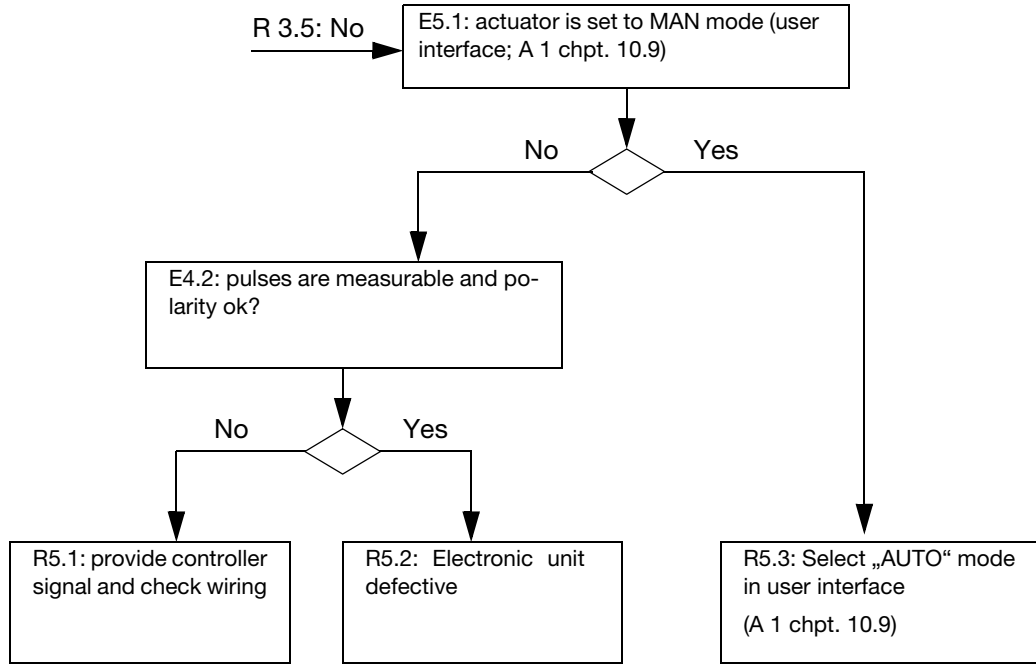
10.3 Operation mode (MAN / AUT)



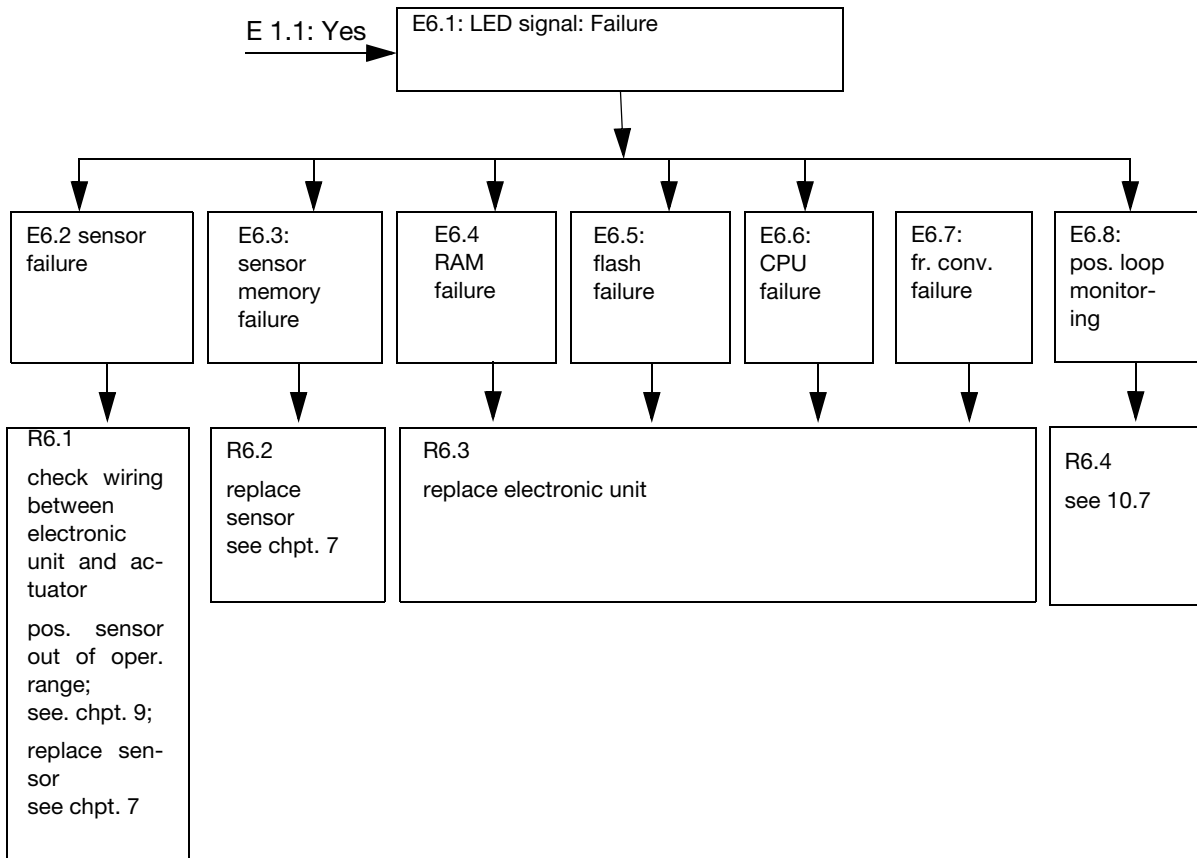
10.4 Input configuration



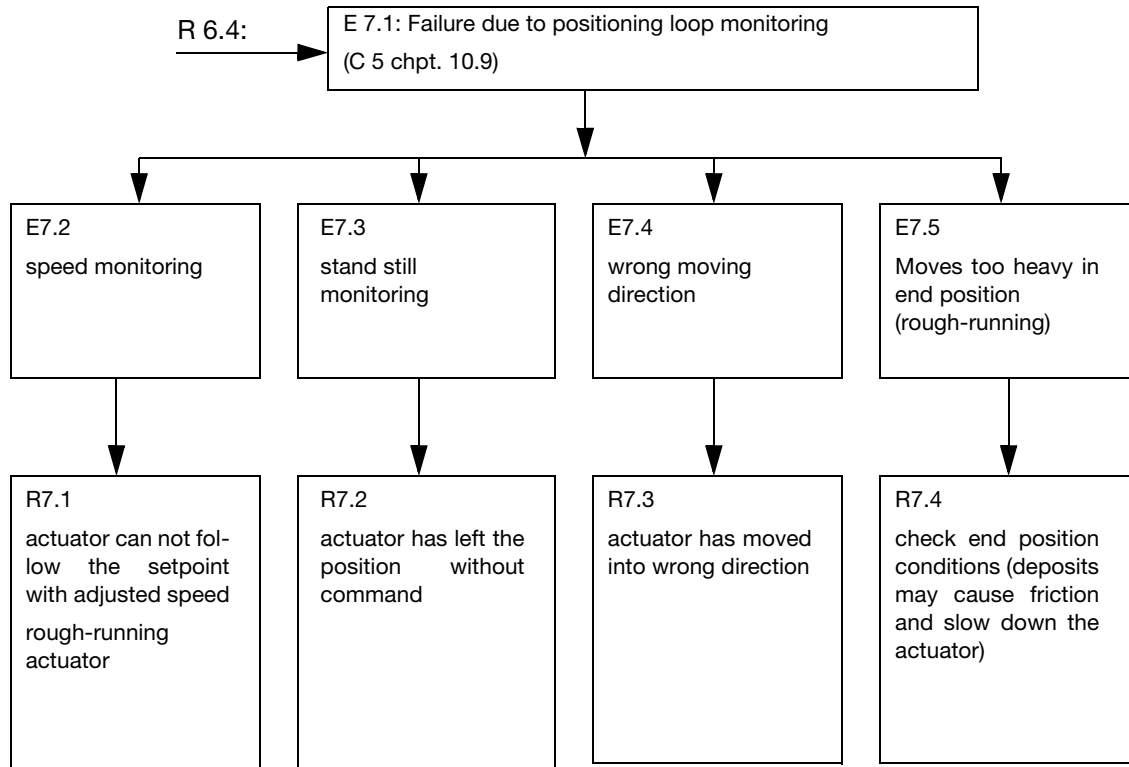
10.5 Operation behind step controller



10.6 Failure Diagram



10.7 Failure due to response of positioning loop monitoring



10.8 General

Actuator runs with creeping speed in one or both end positions

- check the software settings for leaving the end position; if „break-away“ is activated, the actuator moves with increased torque / force but with reduced speed

Imprecise behaviour in step-control mode

- use graphical user interface to check function assignment of digital input settings; select „step controller“

Actuator over-runs end position(s)

- change the software settings for the end position behaviour to „Position-dependent switch-off“ and enter the associated switch-off position
- adjust the mechanical limit stops in order to avoid an end position over-run

Actuator moves into an end position once it reaches a setpoint

- de-activate „close tight“ in the software settings for modulating control near the end position

Actuator position does not correspond to setpoint although the position signal corresponds to the setpoint

- de-activate the programmable setpoint in the software settings for the setpoint characteristic

Actuator follows the setpoint only within a limited range

- de-activate „split range“ in the software settings for the setpoint characteristic

10.9 User Interface Menus

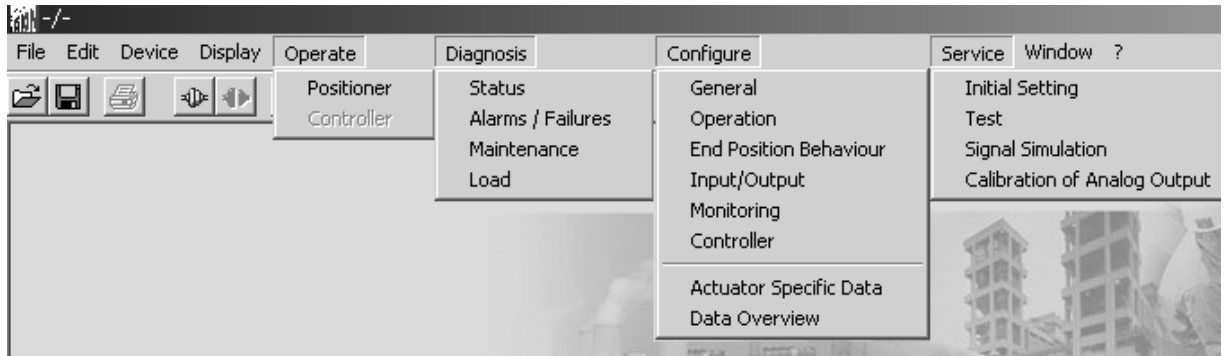


Fig. 28: Trouble shooting related menus in the user interface (digitally manipulated screen shot)

The following table represents the first 2 menu levels (see also fig. 28) of the graphical user interface as far as the trouble shooting is concerned. Some of the subjects in chpt. 10 refer to the user interface. Use the numbering in table 4 to facilitate the navigation. The user interface software does not use any numbering in the menus.

A Operate	B Diagnosis	C Configure	D Service
A 1 Positioner	B 1 Status	C 1 General	D 1 Initial setting
A 2 Controller	B 2 Alarms / Failures	C 2 Operation	D 2 Test
	B 3 Maintenance	C 3 End position behaviour	D 3 Signal Simulation
	B 4 Load	C 4 Input / Output	D 4 Calibration of anal. output
		C 5 Monitoring	
		C 6 Controller	
		C 7 Actuator specific data	
		C 8 Data overview	

Table 4: Trouble shooting related menus of the user interface

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