

Operating Manual

Linear actuators

MLH55DLC • MLH55DLA

General information

Amendment	Version	Date	Modifications
	1.0	October 2008	Initial preparation
	1.1	March 2011	Revision

Copyright The copyright for this operating manual as well as all rights in case of patent awarding or registration of registered design remains with the manufacturer!

Subject to alteration The regulations, directives, standards etc. are compliant with the current state of information at the time of development and are not subject to modification service. They must be applied by the operator at his own responsibility in their latest valid version.

Concerning all data, information, and illustrations in this manual we reserve the right of technical modifications and improvements. No claims can be considered for alteration or rework of already delivered lift drives.

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1 Safety

Read these Operating Instructions carefully particularly the following safety instructions prior to installation and operation.



DANGER

Directly threatening hazard leading to death or serious physical injuries.



WARNING

Potentially hazardous situation which may lead to death or serious physical injuries.



CAUTION

Potentially hazardous situation which could lead to minor physical injuries. Indicates a hazard which may cause material damage.



ATTENTION

Potentially hazardous situation where the product or an object in its environment may get damaged.

Hint: Utilisation instructions and other useful information.

1.1 Proper use

Linear actuators MLH55DLC - MLH55DLA are controlled by three-point control or constant control. Linear actuators in the series described in these Operating Instructions are used for valve stroke adjustment.

Concurrence of the above type designation with the linear actuator rating plate must be checked prior to starting any operations in order to guarantee utilisation in accordance with specification. The data on the rating plate is decisive for linear actuator technical data and mains power supply requirements.

Any utilisation for tasks other than the aforementioned usage in accordance with specification and operating with mains power supply ratios other than those permitted is not deemed to be utilisation in accordance with specification. The operator bears sole liability for the risk to persons and machine and other assets in the event of utilisation not in accordance with specification.

The intended use also includes the compliance with accident preventions, DIN VDE regulations and safe working practices for all measures described in these operating instructions in due consideration of prevailing rules.

1.2 Information for the operator

Always keep the Operating Instructions available at the linear actuator deployment site.

Observe the current health and safety, accident prevention and DIN VDE standards for installation, operation and maintenance.

Take into consideration any additional regional, local or in-house safety regulations.

Ensure that every person entrusted with one of the tasks specified in these Operating Instructions has read and understood these instructions.

1.3 Personnel

Only qualified personnel may work on these linear actuators or in their vicinity. Qualified persons are those persons entrusted with installation, assembly, commissioning and operation or maintenance of the linear actuators and possessing the appropriate qualifications for their activity. The necessary and prescribed qualifications include:

- Training / instruction or authorization to turn on /off circuits and appliances / systems according to EN 60204 (DIN VDE 0100 / 0113) and the standards of safety technology.
- Training or instruction according to the standards of the safety technology concerning care and use of adequate safety and work protection equipment.
- First Aid training.

Work in a safe manner and refrain from any working practice which endangers the safety of persons or damages the linear actuator or other assets in any way whatsoever.

1.4 Prior to starting work

Prior to starting any work, check that the type designations specified here concur with the data on the linear actuator rating plate.

Linear actuators MLH55DLC, MLH55DLA.

1.5 During operation

Safe operation is only possible if transportation, storage, installation, operation and maintenance are carried out safely and materially and professionally correctly.

Transportation, installation and assembly

Observe the general set-up and safety regulations for heating, ventilation, air-conditioning and pipework design. Use tools correctly. Wear the necessary personal and other safety equipment.

Repairs and maintenance

Ensure that qualified personnel switch off the linear actuator prior to maintenance or repair work in accordance with DIN VDE.

1.6 Working environment

Read the data concerning the working environment in the Technical Data.

2 Product Specification

The linear actuator controls a stepper motor by means of a micro controller. The rotational movement of the stepper motor is converted into a linear movement by spur gears and a threaded spindle with spindle nut.

2.1 Component parts

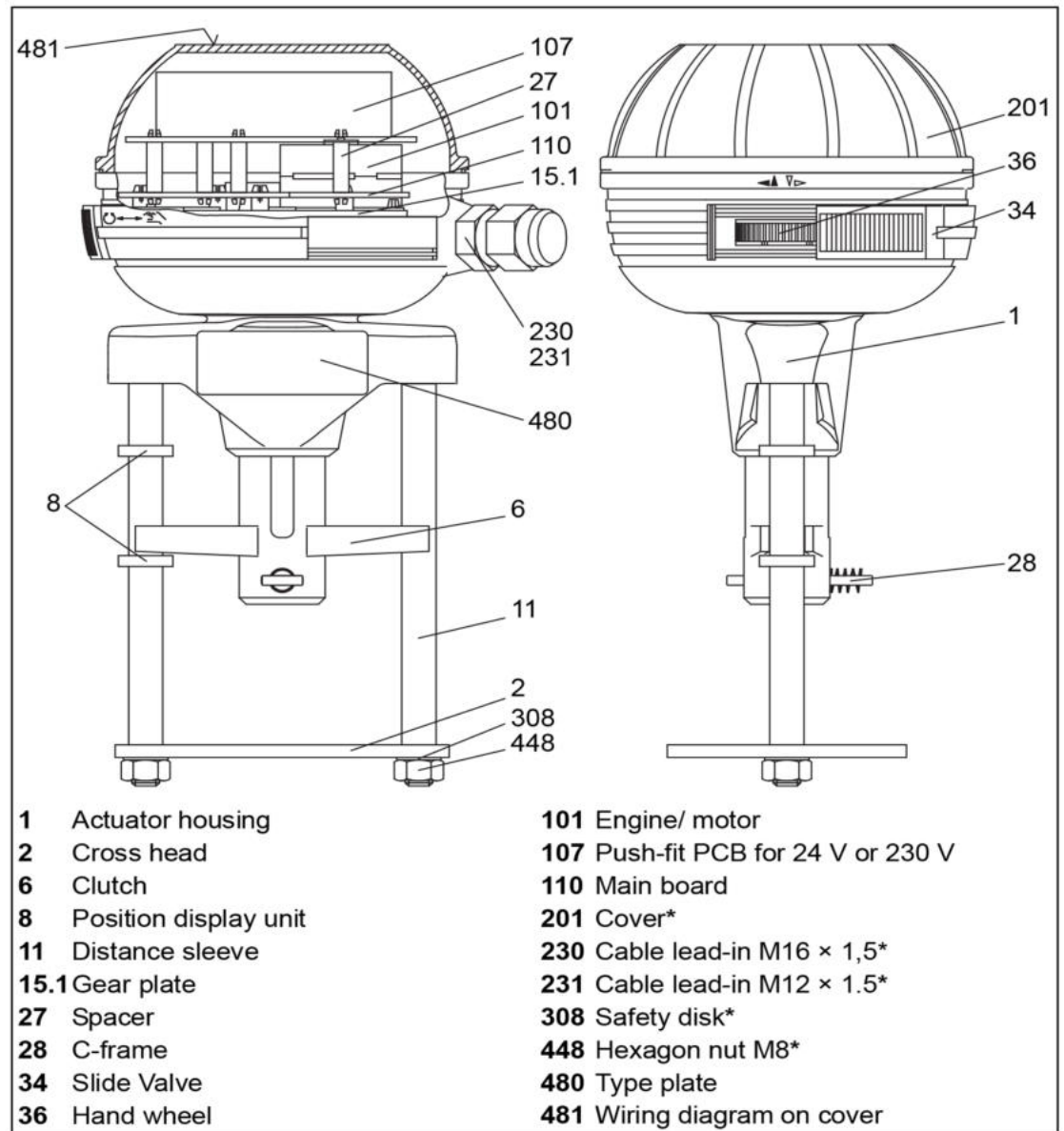


diagram 1 Component part denominations

* This component part is available as a spare part.

2.2 Operating modes

The linear actuator can be operated manually or automatically.

- In manual mode stroke is adjusted via the hand wheel.
- In automatic mode stroke is controlled electrically.

2.2.1 Three-point mode

The direction of rotation is set via the control voltage at terminal 2 and terminal 3 on the main PCB:

- When the control voltage is applied to terminal 2, the spindle nut will be extended.
- When the control voltage is applied to terminal 3, the spindle nut will be retracted.

2.3 Functions

2.3.1 Actuating time

The time required for the spindle nut to travel a defined distance is called actuating time. Actuating time is specified in s/mm. Jumper JP3 is used to set the setting time.

⇒ *5.2 Commissioning on page 16*

2.3.2 Manual operation

In manual mode it is possible to change the stroke without supply voltage.

- Motor and control electronics are turned off in manual mode to make hoisting movements of the control impossible.

⇒ *6.1 Changing between manual and automatic mode on page 17*

2.4 Technical data

Type	MLH55DLC	MLH55DLA
Supply voltage	24 V AC \pm 10% 24 V DC \pm 10%	230 V AC + 6% -10% 115 V AC \pm 10%
Power consumption	3,5 VA	7 VA
Weight	1.5 kg	1.5 kg
Dimensions	See technical data sheets	
Stroke	max. 14 mm	max. 14 mm
Frequency	50/60 Hz \pm 5%	50/60 Hz \pm 5%
Ambient temperature	0 to +60°C	0 to +60°C
Enclosure protection	IP 54 IP 30 in manual mode	IP 54 IP 30 in manual mode
Operating mode	S3-50% ED	S3-50% ED
Actuating time	9 or 5 s/mm	9 or 5 s/mm
Actuating force	0.6 kN During 24 V DC the specified actuating force can only be reached with help of an aligned AC voltage.	0.6 kN

table 1 Technical data

2.5 Type plate

The type plate is attached to the housing of the linear actuator.

It bears the type denomination, serial number (s/no) and date of manufacture (last four digits).

⇒ 2.1 Component parts on page 6


	
MLH55DL	08203017/01/0408
AC 50/60 Hz	24 V
max 3.5 VA	IP 54/30

diagram 2 Example of type plate

3 Transportation & Storage



Non-compliance with safety regulations may result in injury!

- Wear the required personal and other safety equipment.
- Avoid impacts, blows, vibrations etc. to the linear actuator.
- Store the linear actuator (and, where appropriate, the entire controlling device) in a dry place.
- Keep to the specified transport and storage temperatures between -20 to +65°C.

4 Assembly

Prior to assembling the linear actuator:

⇒ 4.1 *Checking the scope of delivery* on page 9

⇒ 4.2 *Preparing assembly* on page 9

The following sequence of operations is part of the linear actuator assembly:

⇒ 4.3 *Mounting the linear actuator on the valve* on page 10

⇒ 4.4 *Assembling/disassembling the cover* on page 11

⇒ 4.5 *Electrical connection* on page 12

4.1 Checking the scope of delivery

- 1 Check the packaging for damage.
- 2 Dispose of packaging in an environmentally friendly manner.
- 3 Check the delivered items against the delivery note in order to see whether the delivery is complete.
- 4 Report any missing or damaged products to the manufacturer.

4.2 Preparing assembly



A non-attached valve causes damage!

If you operate the linear actuator without valve, the spindle nut may fall off due to the missing stop.

- Always operate the linear actuator with a valve attached.

- 1 Allow for about 140 mm space above the cover at the site of installation.
- 2 Check the working environment before assembling and commissioning the linear actuator:
- 3 Ensure that the valve is correctly fitted. For details please see assembly instructions for valve.
- 4 Determine the assembly position of the linear actuator. Do not arrange linear actuators in a hanging position.

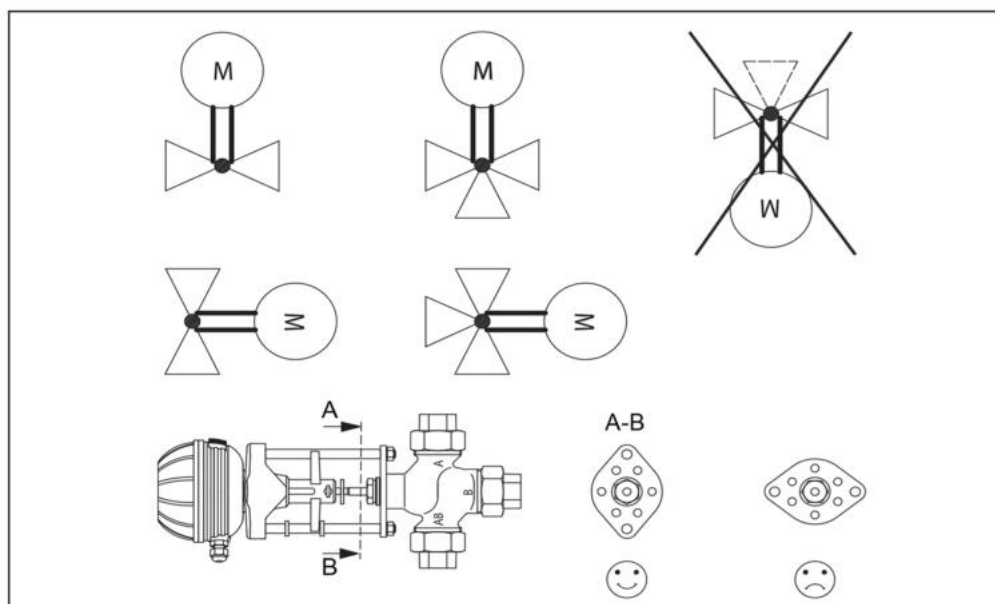


diagram 3 Assembly positions for linear actuator and valve

4.3 Mounting the linear actuator on the valve

If the linear actuator and the valve are supplied separately you will have to mount the linear actuator on the valve.

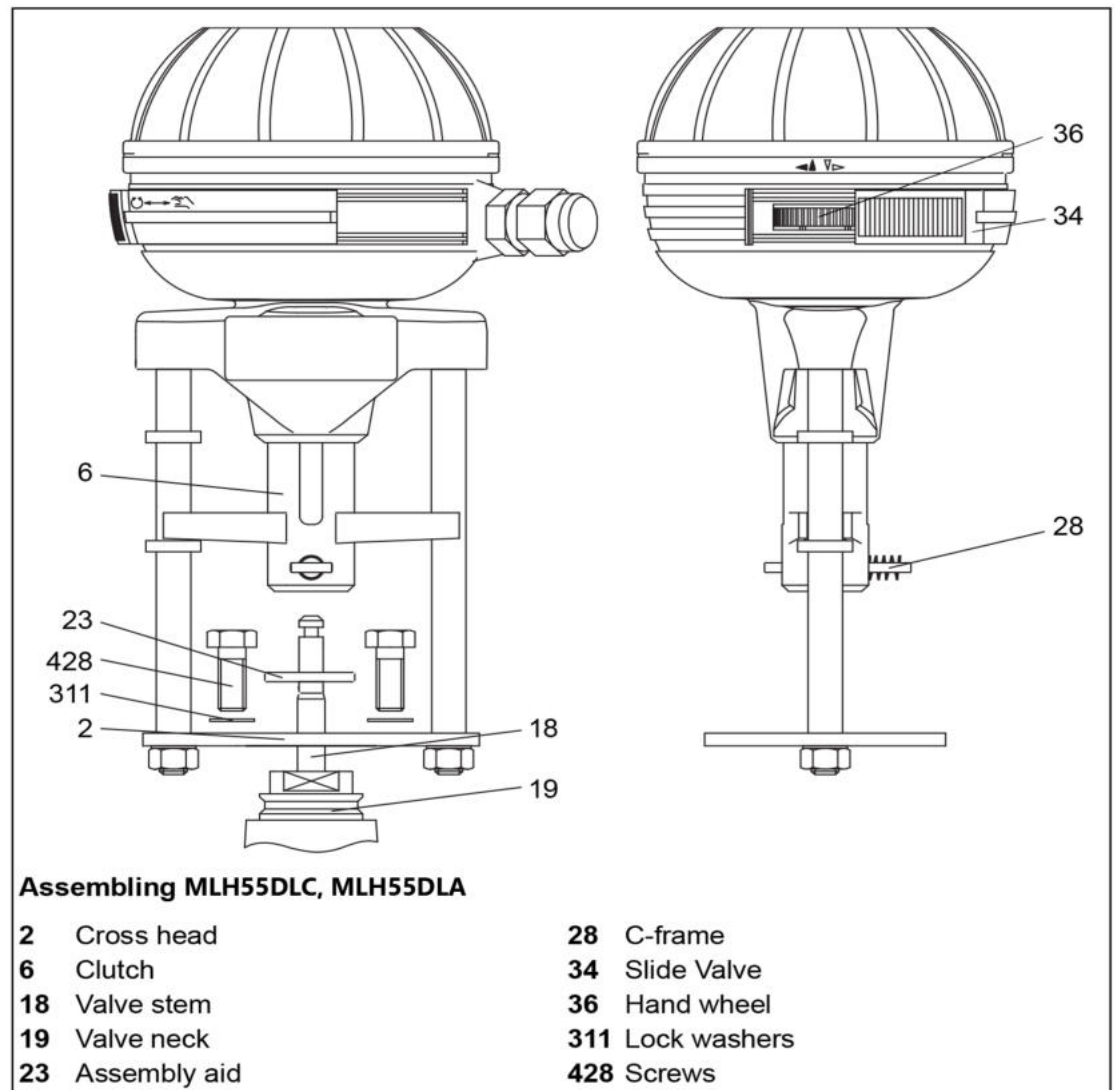


diagram 4 Mounting the linear actuator on the valve

■ **How to assemble linear actuator type MLH55 :**

- 1 Place actuator with crossbeam (2) on valve neck (19).
⇒ *diagram 4* on page 10
- 2 Insert the C-frame (28) and, using a mounting aid (23), pull the valve stem upwards until the valve stem (18) locks inside the clutch (6).
- 3 Fix the crossbeam (2) of the actuator with the help of screws (428) spanner width 13 and lock washers (311) on the valve neck (19).

■ **How to disassemble the linear actuator**

- 1 Follow the sequence of operation in reverse order.

4.4 Assembling/disassembling the cover



Risk of injury from electric shock by live parts!

When the power supply is on there is a danger of electric shock due to live parts.

- Prior to commencing any work, ensure that the actuator is safely disconnected from the power supply system.
- Secure against unauthorised restarting.
- Remove the cover only momentarily.

■ **How to remove the cover**

- 1 Insert a screwdriver in the notch of the cover and lift the cover **(201)**.

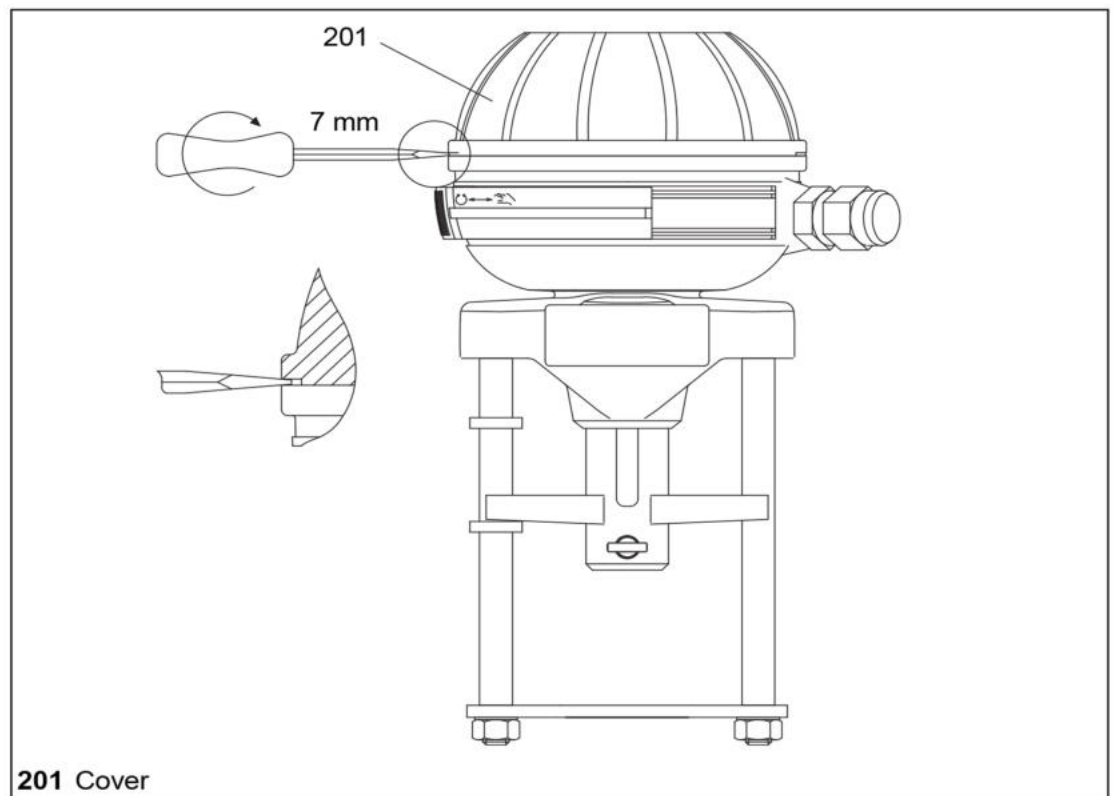


diagram 5 Removing the cover

- 2 Remove the cover **(201)** carefully.

■ **How to attach the cover**

Hint: The cover may be mounted in any position.

- 1 Place the cover **(201)** on top and push it down to make it fit by applying moderate force.
- 2 Check the cover for correct fit to ensure air-tightness for the actuator housing.

4.5 Electrical connection



Danger of life caused by incompetent staff!

Electrical connections carried out by unqualified staff may result in death, severe bodily injury or considerable material damage.

- Make sure that such all work is carried out by qualified staff.

⇒ 1.3 *Personnel* on page 5



Risk of injury from electric shock by live parts!

When the supply voltage is turned on there is a risk of electric shock from live parts.

- Prior to commencing any work, ensure that the actuator is safely disconnected from the power supply system.
- Secure against unauthorised restarting.

■ How to prepare the electric connection

- 1 Ensure that the supply voltage matches the specifications on the type plate of the linear actuator.
- 2 To avoid breakdown, construct the line diameter according to actuating performance and required line length.
- 3 Lay the mains for a supply voltage of > 48 V separate from the signal and control wires.

When laying cables in a joint cable duct, use shielded control wires.

- 4 Check the supply voltage.

If the required tolerance is not achieved by a power transformer you will have to use an AC voltage stabilizer.

⇒ 2.4 *Technical data* on page 8

■ **How to establish electrical connection**

- 1 Remove the cover (201).
⇒ *How to remove the cover on page 11*
- 2 Run the cable through the screw joint to the terminal strip.
- 3 Connect the power supply according to the wiring diagram.
⇒ *diagram 6 on page 13*

Hint: The wiring diagram (481) is on the cover (201).

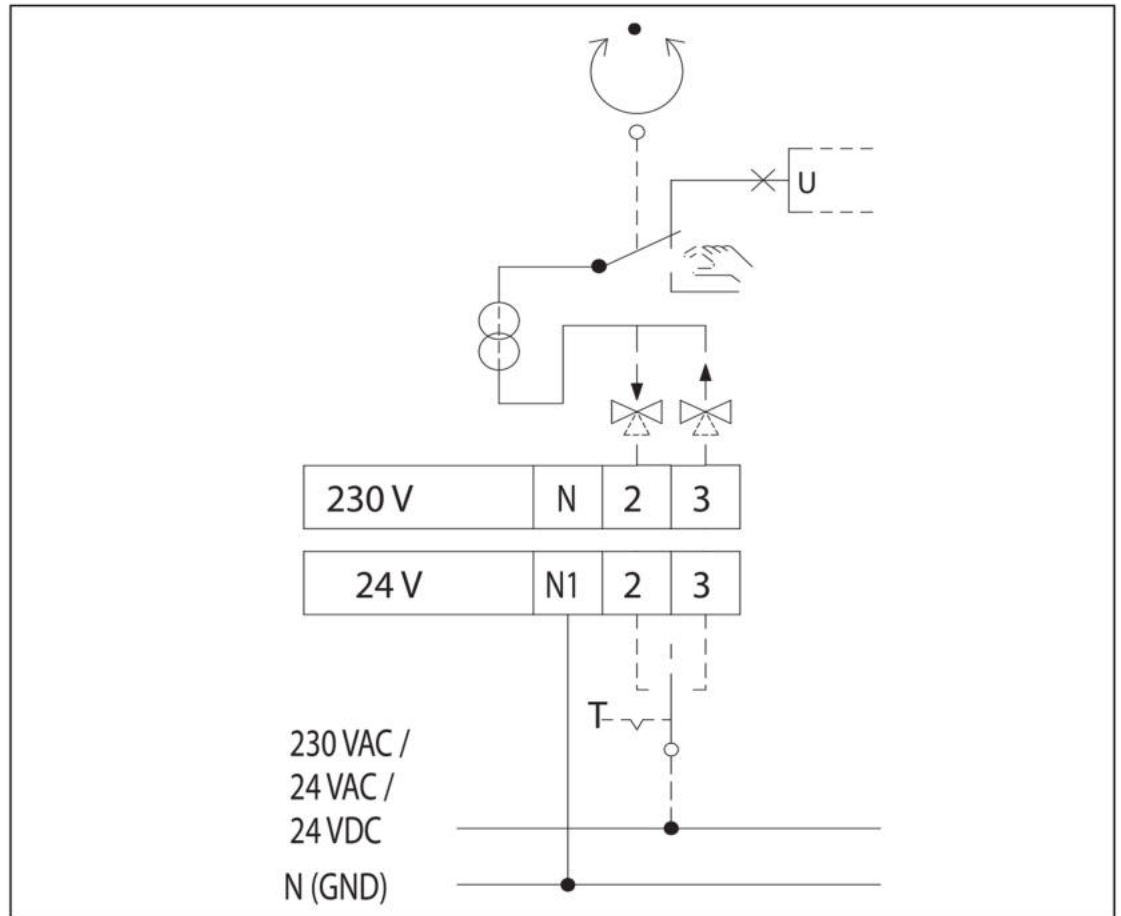


diagram 6 Circuit diagram

Terminal	Description
N / N1	Zero potential
2	Control voltage for downward movement
3	Control voltage for upward movement

table 2 Key to wiring diagram

4.5.1 Remove push-fit PCB and transformer MLH55DLA

To change settings you have to remove the push-fit PCB (107) on the 230 V model.



Risk of injury from electric shock by live parts!

When the power supply is on there is a danger of electric shock due to live parts.

- Prior to commencing any work, ensure that the actuator is safely disconnected from the power supply system.
- Secure against unauthorised restarting.

- 1 Detach the two screws (367)
- 2 Pull off the push-fit PCB (107) in a straight movement from the spacers (27) and hold the gear plate by pressing it against the motor.
- 3 Access to plug-in jumpers (113) JP2 to JP5 is now established.
- 4 After making changes to the setting carefully put the PCB back on.

Hint: When doing so, make sure that the socket strip fits correctly on the pin strip (124).

- 5 Tighten both screws (367).

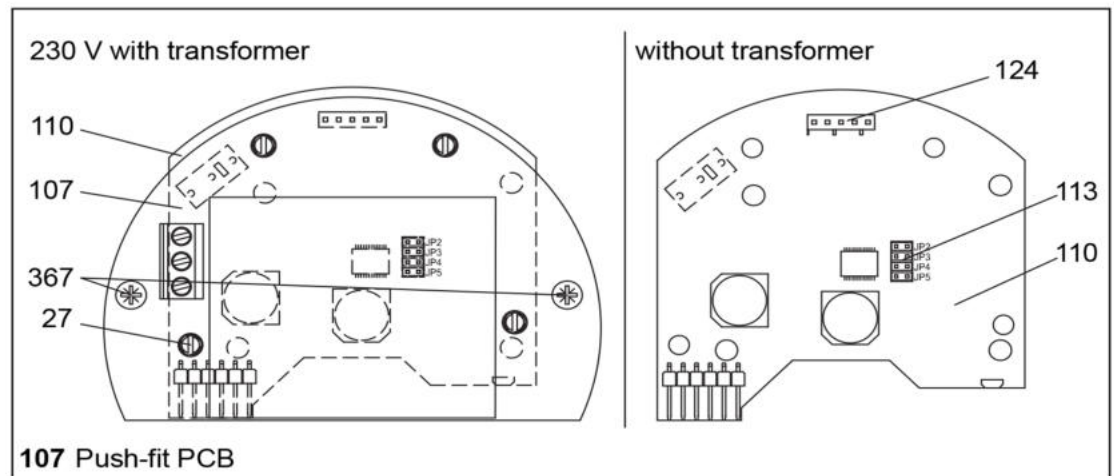


diagram 7 Remove push-fit CB and transformer

5 Commissioning



Risk of injury from electric shock by live parts!

When the power supply is on there is a danger of electric shock due to live parts.

- Prior to commencing any work, ensure that the actuator is safely disconnected from the power supply system.
- Secure against unauthorised restarting.

Jumper JP3 is used to set the setting time. The jumper is provided at the main circuit board.

⇒ 4.4 Assembling/disassembling the cover on page 11

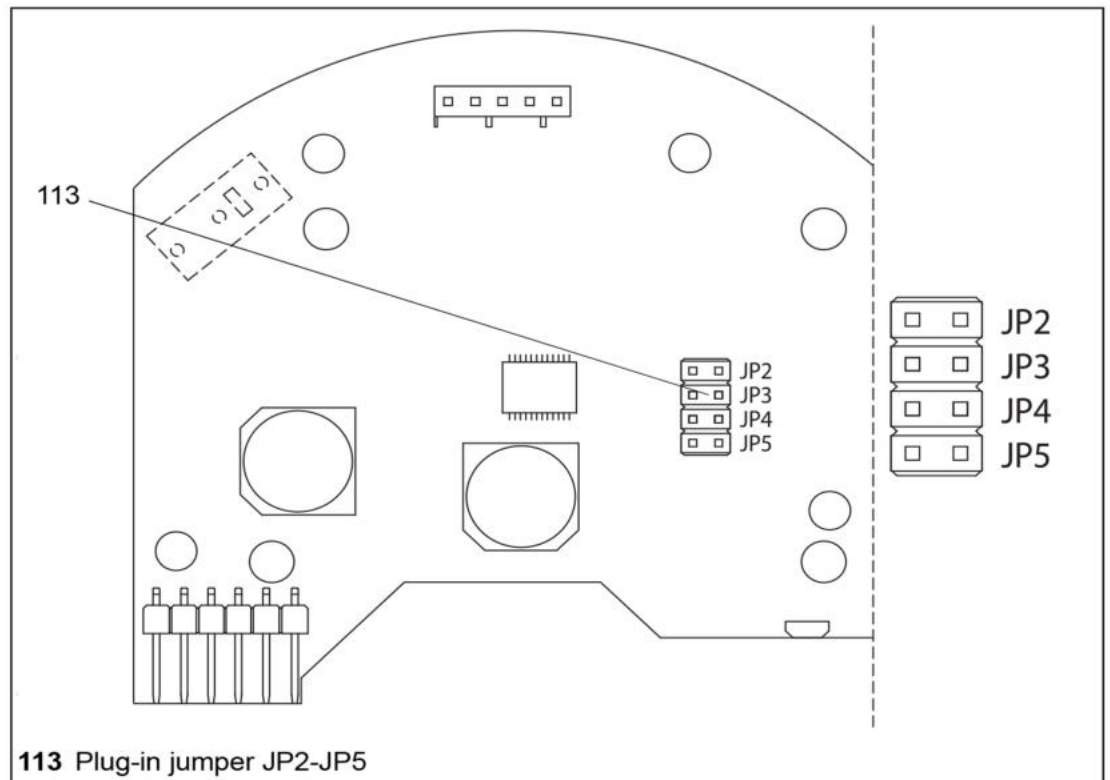


diagram 8 Plug-in jumper position on the main PCB

5.1 Operating parameters and jumper settings

Before starting to operate the linear actuator you will have to set the operating parameters with the help of the plug-in jumper and jumpers.



Mal-function due to wrong jumper position JP4

Jumper JP4 must always be plugged to „on“.

- Make sure that jumper JP4 has been plugged to „on“



Jumper	on 	off 
JP2	No function	No function
JP3	Actuating time 9 s/mm	Actuating time 5 s/mm
JP4	Ready for operation	-
JP5	No function	No function

table 3 Jumper positions

5.2 Commissioning

- 1 Check whether all fitting and assembly work has been competently finished.
⇒ 4 *Assembly* on page 9
 - 2 Ensure that the electrical actuation of the linear actuator can take place safely without putting people or devices at risk.
 - 3 Ensure that the linear actuator is attached correctly and that the cover of the linear actuator is closed.
⇒ 4.4 *Assembling/disassembling the cover* on page 11
 - 4 Ensure that the linear actuator is set to automatic mode.
⇒ 6.1 *Changing between manual and automatic mode* on page 17
 - 5 Ensure that the operating parameters are set correctly.
⇒ 5.1 *Operating parameters and jumper settings* on page 16
- The linear actuator is ready for operation.

6 Operation

6.1 Changing between manual and automatic mode

It is possible to run the linear actuator in automatic mode or manual mode (manual adjustment).

- In automatic mode the spindle nut moves to the position set by the controller.
- In manual mode it is possible to set the spindle manually, e. g. for control purposes.

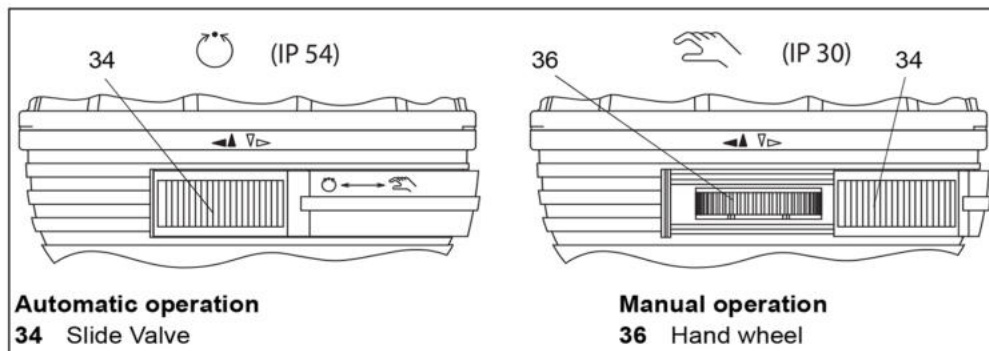


diagram 9 Selecting automatic mode

■ How to change-over in manual mode

- 1 Push the slide bar (**34**) into manual position until you hear an audible locking sound.



Risk of damage to valve and actuator during manual mode!

The valve may get damaged if it is pushed too hard into its receptacle during manual mode.

- Do not try and keep turning the hand wheel when you realise that the required effort increases noticeably!
- Never use force !

- 2 Use the hand wheel to turn the spindle nut to the desired position. Turn the hand wheel until the preset potentiometer increases. Do not use force!

■ How to change-over in automatic mode

- 1 Push the slide bar to (**34**) position automatic mode.

7 Maintenance, care and repairs

The linear actuator requires little maintenance. You do not have to carry out continuous or periodical maintenance.

8 Spare parts

When ordering accessories and spare parts please quote the specifications engraved on the type plate of your linear actuator. The specifications on the type plate are standard for the technical data of linear actuators as well as the requirements for the public power supply.



Damage to device caused by faulty spare parts!

Spare parts must match the technical data specified by the manufacturer.

- Use genuine spare parts at all times.
-

⇒ 2.1 *Component parts* on page 6

9 Decommissioning and disposal

Dispose of the linear actuator according to national regulations and laws.

10 Removal of faults

10.1 How to remedy faults

If the linear actuator does not work properly follow the sequence of operations described below in order to remedy the fault:

- 1** Check whether the linear actuator was correctly assembled.
- 2** Check the settings for the linear actuator against the specifications on the type plate.
- 3** Remedy the fault by following the check list.
⇒ 10.2 *Check list for breakdown* on page 19
- 4** If you are unable to remedy the fault contact the manufacturer.
- 5** For all queries at the manufacturer's and when sending back the device please quote the following :
 - SN (serial number = order number)
 - Type denomination
 - Supply voltage and frequency
 - Accessory equipment
 - Error report
- 6** If you are unable to remedy the fault despite inquiry you can send the device to the manufacturer.

10.2 Check list for breakdown

Fault	Cause/reason	Remedy
1. Linear actuator is not working.	Hand wheel (36) is in position manual mode	<input type="checkbox"/> Switch hand wheel to position automatic mode.
	Power cut	<input type="checkbox"/> Determine cause and remedy.
	Fuse defective (in control cabinet)	<input type="checkbox"/> Determine cause and remedy, replace fuse.
	Linear actuator incorrectly connected	<input type="checkbox"/> Correct connection according to wiring diagram.
	Short circuit due to humidity	<input type="checkbox"/> Determine cause, dry the linear actuator; replace cover seal or screw joints and/or attach protective cover, as required.
	Short circuit due to incorrect connection	<input type="checkbox"/> Correct setting for connection
2. Linear actuator running unsteadily, i. e. veering between clockwise and anti-clockwise rotation.	Motor has winding damage (burnt-out) <ul style="list-style-type: none"> • e.g. voltage too high • Electronic system defective 	<input type="checkbox"/> Determine cause, measure current data, Compare to type plate and table, Disassemble linear actuator and send it in for repairs.
	Drop of voltage due to excessively long connecting cables and / or insufficient diameter.	<input type="checkbox"/> Measure the current data; if required, recalculate and replace connecting cables!
3. Linear actuator interrupts occasionally.	Public power supply fluctuations greater than admissible tolerance ⇒ 2.4 <i>Technical data</i> on page 8	<input type="checkbox"/> Improve public power supply conditions
	Slack contact in feeder line	<input type="checkbox"/> Check and tighten connections
4. Linear actuator does not move to limit position. Valve does not open/close.	Valve is stuck	<input type="checkbox"/> Provide smooth-running valve
	Excessive system pressure	<input type="checkbox"/> Adjust system pressure
5. LED flashes in short - short rhythm	Relay contact sticking	<input type="checkbox"/> Check controller

table 4 Check list breakdown