

# Operation, Installation and Service Instructions

## Slide gate opener NOVA 800 /-L /-S



Translation of original operating instructions

**002-201X00002-2201-EN**

# ELKA

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**Index of contents**

<b>1</b>	<b>General information .....</b>	<b>3</b>
1.1	Symbol explanation .....	3
1.2	Copyright .....	3
<b>2</b>	<b>Safety.....</b>	<b>4</b>
2.1	General notes on safety.....	4
2.2	Notes on safety for the operation.....	4
2.3	Notes on safety for the operation with radio remote control .....	4
2.4	Intended use of barriers.....	4
2.5	Danger that could emanate from the operation site.....	4
2.6	Personnel requirements – professional skills, knowledge and qualifications .....	4
2.7	Personal protective equipment .....	5
<b>3</b>	<b>Transportation and storing.....</b>	<b>6</b>
3.1	Transportation inspection .....	6
3.2	Storing .....	6
<b>4</b>	<b>EC / UK Declaration of conformity .....</b>	<b>7</b>
4.1	Declaration of conformity – complete system .....	8
4.2	Nameplate .....	8
<b>5</b>	<b>Function description .....</b>	<b>9</b>
<b>6</b>	<b>Technical data.....</b>	<b>10</b>
<b>7</b>	<b>Installation.....</b>	<b>11</b>
7.1	Tools.....	11
7.2	Measurements.....	12
7.2.1	Measurements NOVA 800.....	12
7.2.2	Measurements NOVA 800-L.....	13
7.2.3	Measurements NOVA 800-S .....	14
7.3	Installation NOVA 800 .....	14
7.4	Mounting the rack .....	15
7.4.1	Plastic toothed rack in an aluminium profile module 5.....	15
7.4.2	Steel toothed rack module 4 .....	17
7.5	Emergency release and height adjustment.....	20
7.5.1	Emergency release.....	20
7.5.2	Height adjustment.....	21
7.6	Base plate (optional).....	22
<b>8</b>	<b>Electrical Installation.....</b>	<b>23</b>
8.1	Connection example .....	24
8.2	Wiring diagram Controller MO 46 .....	25
<b>9</b>	<b>Controller MO 46.....</b>	<b>26</b>
9.1	Connections of the controller .....	26
9.2	Operating behaviour of the controller .....	28
9.2.1	General note.....	28
9.2.2	Opening and closing of the gate .....	28
9.2.3	Behaviour after mains switch-on and after emergency releasing .....	28
9.2.4	Operating sequence of BT and BTG .....	28
9.2.5	Operation by BA, BZ and BS .....	28
9.2.6	Automatic closure for complete opening.....	29
9.2.7	Automatic closure for partial opening .....	29
9.2.8	Dead man's mode .....	29

9.2.9	Emergency mode .....	29
9.3	Safety and special functions .....	31
9.3.1	Force detection, obstacle detection and end position detection .....	31
9.3.2	Safety contact profile for gate OPEN (SLA) and for gate CLOSED (SLZ) .....	31
9.3.3	Photo-cells .....	32
9.3.4	Timer mode .....	33
9.3.5	Pre-warning, warning light and traffic light .....	33
9.3.6	Radio remote control display .....	33
9.3.7	Multi-functional relay .....	33
9.3.8	Service counter, maintenance counter and maintenance interval .....	33
9.4	Programming MO 46 .....	35
9.4.1	Sequence P1: Learning of running distances .....	35
9.4.2	Sequence P2: Adjusting of force reserves, speeds and relief / discharge return .....	36
9.4.3	Sequence P3: Adjusting of dead man's function/impulse mode .....	37
9.4.4	Sequence P4: Adjusting of partial opening position .....	37
9.4.5	Sequence P5: radio remote control for BT, BTG and MULTI .....	37
9.4.6	Sequence P6: Automatic closure for complete opening .....	37
9.4.7	Sequence P7: Automatic closure for partial opening .....	38
9.4.8	Sequence P8: Warning prior to opening and closing .....	38
9.4.9	Sequence P9: Photo-cell function .....	38
9.4.10	Sequence PA: Photo-cell testing on/off .....	38
9.4.11	Sequence PB: Delayed closure / off .....	39
9.4.12	Sequence PC: Maintenance counter indication and deletion .....	39
9.4.13	Sequence PD: Adjusting maintenance interval .....	39
9.4.14	Sequence PE: Mode for multi-functional relay .....	39
9.4.15	Sequence PF: Return to original settings .....	40
9.4.16	Sequence PG: Emergency mode .....	40
9.5	Fault diagnosis by the controller .....	41
<b>10</b>	<b>Maintenance .....</b>	<b>42</b>
<b>11</b>	<b>Decommissioning .....</b>	<b>43</b>
11.1	Disposal .....	43
<b>12</b>	<b>Layout (exploded drawing) .....</b>	<b>44</b>

## 1 General information

These operating instructions must be available on site at all times. It should be read thoroughly by all persons who use, service or transport the units. Improper usage or servicing – or ignoring the operating instructions – can be harmful and/or result in physical damage. If the meaning of any part of these instructions isn't clear, then please contact ELKA-Torantriebe GmbH u. Co. Betriebs KG (hereinafter referred to as "ELKA") before putting the unit into operation.

This applies to all setup procedures, troubleshooting, material disposal, care and servicing of the unit. The accident prevention regulations and applicable technical regulations (e.g., safety or electrical), as well as the environmental protection regulations of the country in which the unit is used, also apply.

All repairs to the unit must be carried out by qualified persons. ELKA accepts no liability for damage which is caused by using the unit for purposes other than those for which it is intended.

ELKA cannot recognise every possible source of danger in advance. If the unit is used other than in the recommended manner, the user must ascertain that no danger to themselves or others will result from this use. They must also ascertain that the planned use will have no detrimental effect on the unit itself. The unit should only be used when all safety equipment is available and in working order. All faults which could be a source of danger to the user or to third persons must be eliminated immediately. All warning and safety notices on the unit must be kept legible.

All electrical periphery equipment which is connected to the unit must have a CE/UKCA Mark, which ensures that it conforms to the relevant EEC/UK regulations. Neither mechanical nor electrical alterations to the unit, without explicit agreement of the manufacturer, are permitted. All alterations or extensions to the unit must be carried out with parts which ELKA have defined as suitable for such alterations, and be carried out by qualified personnel. Please note that with any alteration of the product, no matter whether mechanical or electrical, the warranty expires and the conformity is revoked. Only the use of ELKA accessories and original ELKA spare parts is allowed. In case of any contravention, ELKA disclaims liability of any kind.



### INFORMATION!

The operation of the system within CEN / UK countries must also be conformant with the European / UK safety-relevant directives and standards.

*We reserve the right to make technical improvements without prior notice.*

### 1.1 Symbol explanation



#### WARNING!

Remarks regarding the safety of persons and the barrier opener itself are marked through the use of special symbols. These remarks must be absolutely observed in order to avoid accidents and physical damage.



#### DANGER!

...indicates an imminent dangerous situation, which can cause death or serious injuries if it is not avoided.



#### WARNING!

...indicates a potentially dangerous situation, which can cause death or serious injuries if it is not avoided.



#### ATTENTION!

...indicates a potentially dangerous situation, which can cause minor or slight injuries if it is not avoided.



#### ATTENTION!

...indicates a potentially dangerous situation, which can cause property damage if it is not avoided.



#### REMARK!

Important notice for installation or functioning.

### 1.2 Copyright

The operating manual and the contained text, drawings, pictures, and other depictions are protected by copyright. Reproduction of any kind – even in extracts – as well as the utilization and/or communication of the content without written release certificate are prohibited. Any violations will obligate to compensation for damages. We reserve the right to make further claims.

## 2 Safety

### 2.1 General notes on safety

The valid regulations and standards have to be observed during installation and operation, e.g. DIN EN 13241 / BS EN 13241, DIN EN 12453 BS EN 12453 etc.

Only the use of spare parts made by the original manufacturer is allowed. Do not put a defective gate opener / barrier into operation.

After set-up (installation) every user of the equipment has to be instructed about the operation and function of the gate opener / barrier.

### 2.2 Notes on safety for the operation

Children from the age of 8 years and persons with reduced physical sensory or mental capabilities or lack of experience and/or knowledge may use these devices, provided they are supervised or have been instructed in the safe use of the device, and have understood the hazards involved. Children must not play with the device.

No persons, objects, or animals are allowed within the range of the gate movement / barrier movement during opening or closing.

Never reach into moving parts of the gate operator, gate or barrier.

Drive through the gate system /barrier only after complete opening.

The gate system / barrier has to be secured depending on the type of usage, corresponding to the valid standards and regulations (e.g. safety at the main and secondary closing edges).

The safety devices have to be checked regularly for functioning according to the standards and regulations, at least once a year.

### 2.3 Notes on safety for the operation with radio remote control

The radio remote control should only be used, if the area of movement of the gate / barrier is always completely visible by the operator and thus it is assured, that no person, object, or animal is present within this range of movement.

The radio remote control transmitters have to be carefully kept, so that an unintentional use is impossible.

Radio remote controls should not be operated at radio-technical sensitive locations, like airports or hospitals. Interferences by other (properly operated) radio communication installations, which are used within the same frequency range, cannot be ruled out.

### 2.4 Intended use of barriers

The operational safety can only be ensured when the slide gate opener is used as intended.

After installation on the slide gate, the slide gate opener serves the power-operation of the gate, which controls the vehicle path.

The controller MO 46 is a component part of the product and serves to control the slide gate opener.

**Any use above and beyond the above mentioned us is prohibited and constitutes improper use.**

### 2.5 Danger that could emanate from the operation site

The slide gate opener operates with moving parts.



#### WARNING!

**Rotating and/or linear movable components can cause serious injuries.**

Do not reach into moving parts or handle any moving components during operation.

- Turn the appliance off before any maintenance work, repair work or other work and secure it against unintentional restarting.

### 2.6 Personnel requirements – professional skills, knowledge and qualifications



#### NOTE!

The following instructions and work steps are to be implemented by the executing specialist on their own responsibility.



#### WARNING!

**Risk of injury through inadequate qualification!**

Improper handling during installation, maintenance, repair work or dismantling can result in personal injury and/or property damage.

- Work during installation, maintenance, repair and dismantling must be performed by skilled personnel only.

**(Service) specialist** - is a person with suitable technical training, knowledge and experience who can recognize and avoid hazards.

**Electrician** - In German-speaking countries, a skilled electrician is the name of a person who is allowed to carry out and supervise electrotechnical work commercially. According to EN 50110-1 / BS EN 50110-1, they are defined as "a person with suitable technical training, knowledge and experience so that they can recognize and avoid hazards that may be caused by electricity".

**Instructed person** - is a person who has been instructed in operation and use.

## 2.7 Personal protective equipment

During installation, maintenance, repair work and dismantling suitable personal protective equipment must be worn.



### CAUTION!

**Bruising/jamming/driving over (e.g. by material handling equipment, industrial trucks) the feet, contusion by falling heavy objects, cutting injuries by stepping into pointed/sharp objects.**

Foot injuries

- Wearing of suitable safety shoes during the installation, maintenance, repair work and dismantling protects against serious foot injuries with long-lasting consequences.



### CAUTION!

**Falling heavy objects hitting the head**

Head injuries

- Wearing of a suitable safety helmet during the installation, maintenance, repair work and dismantling protects against serious head injuries with long-lasting consequences.



### CAUTION!

**Cutting injuries resulting from pointed/sharp objects**

Hand injuries

- Wearing of suitable safety gloves during the installation, maintenance, repair work and dismantling protects against serious hand injuries with long-lasting consequences.



### CAUTION!

**Injuries resulting from drilling chips or saw dust**

Eye injuries

- Wearing of suitable safety goggles during the installation and repair work protects against serious eye injuries with long-lasting consequences.

### 3 Transportation and storing

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#### 3.1 Transportation inspection

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The shipment has to be inspected for transportation damage immediately after receipt. In case of any damage record the type and extent on the delivery receipt or refuse acceptance.

Inform ELKA immediately in the event of damage.

In case the above points are not observed claims will be denied due to insurance regulations.

#### 3.2 Storing

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The slide gate opener has to be stored as follows:



Do not expose the slide gate opener to aggressive substances.



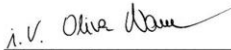


Do not expose the slide gate opener to heat sources.

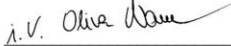


Storage temperature -20°C to +70°C.

**4 EC / UK Declaration of conformity**

		
<b>EC-Declaration of conformity</b> According to EC Machinery Directive 2006/42/EC		
The manufacturer	ELKA-Torantriebe GmbH u. Co. Betriebs KG Dithmarscher Str. 9 25832 Tönning, Germany	
herewith declares, that for the following product		
Product description:	Slide gate opener	
Function:	Slide gate opener for passage control of traffic ways	
Type designation:	NOVA 800 NOVA 800-L NOVA 800-S	
From serial number:	8120002002226001 for NOVA 800 8120003002226001 for NOVA 800-L 8120004002226001 for NOVA 800-S	
complies with the essential requirements of the following directive, as far as possible with the scope of delivery:		
2014/30/EU	EMC directive	
2011/65/EU	RoHS directive	
2014/35/EU	Low voltage directive	
2006/42/EC	Machine directive	
The following harmonized standards are applied or parts of them:		
EN 12453: 2005	Industrial, commercial and garage doors and gates – Safety in use of power operated doors – Requirements, Section 5.2 Drive units and power supply	
EN 60335-1: 2020-08	Safety of household and similar electrical appliances, part 1 General requirements	
EN 60335-2-103:2016	Household and similar electrical appliances - Safety - Part 2-103: Particular requirements for drives for gates, doors and windows	
EN ISO 13849-1:2016-06	Safety of machinery. Safety related parts of control systems	
Empowered to draw up the declaration: ELKA-Torantriebe GmbH u. Co. Betriebs KG, Dithmarscher Str. 9, 25832 Tönning, Germany		
This declaration is not a guarantee of characteristics in the sense of product liability law. The safety regulations of the operating instructions have to be observed.		
Tönning, 27.06.2022	 i.V. Oliver Nave Dipl.-Ing. (FH) Maschinenbau Head of Research and Development	

Drawing 1

<b>UK CA</b>	<b>ELKA</b>
<b>UK-Declaration of conformity According to Supply of Machinery (Safety) Regulations 2008</b>	
The manufacturer	ELKA-Torantriebe GmbH u. Co. Betriebs KG Dithmarscher Str. 9 25832 Tönning, Germany
herewith declares, that for the following product	
Product description:	Slide gate opener
Function:	Slide gate opener for passage control of traffic ways
Type designation:	NOVA 800 NOVA 800-L NOVA 800-S
From serial number:	8120002002244001 for NOVA 800 8120003002244001 for NOVA 800-L 8120004002244001 for NOVA 800-S
complies with the essential requirements of the following directive, as far as possible with the scope of delivery:	
Supply of Machinery (Safety) Regulations 2008	
Electrical Equipment (Safety) Regulations 2016	
Electromagnetic Compatibility Regulations 2016	
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012	
The following harmonized standards are applied or parts of them:	
BS EN 12453: 2005	Industrial, commercial and garage doors and gates – Safety in use of power operated doors – Requirements, Section 5.2 Drive units and power supply
BS EN 60335-1: 2020-08	Safety of household and similar electrical appliances, part 1 General requirements
BS EN 60335-2-103:2016	Household and similar electrical appliances - Safety - Part 2-103: Particular requirements for drives for gates, doors and windows
BS EN ISO 13849-1:2016-06	Safety of machinery. Safety related parts of control systems
Empowered to draw up the declaration: ELKA-Torantriebe GmbH u. Co. Betriebs KG, Dithmarscher Str. 9, 25832 Tönning, Germany	
This declaration is not a guarantee of characteristics in the sense of product liability law. The safety regulations of the operating instructions have to be observed.	
Tönning, 01.11.2022	 i.V. Oliver Nave Graduate Engineer (FH) Mechanical Engineering Head of Development / Design

*Drawing 2*

#### 4.1 Declaration of conformity – complete system

After the installation an EG / UK-declaration of conformity according to EC-machinery directive 2006/42/EG / Supply of Machinery (Safety) Regulations 2008 for the complete system has to be issued by the person responsible for the integration.

This also includes a risk assessment and the measures thereof resulting.

In regards to this purpose, the warning in Section 9.3 must be strictly observed.

The person responsible for the integration must check whether, in addition to the Machinery Directive, other directives and ordinances must be considered for the complete system and must adhere to these rules and regulations.

#### 4.2 Nameplate

The name plate of the slide gate opener series NOVA 800 / NOVA 800-L / NOVA 800-S is attached on the left side of the base carrier.

**5 Function description**

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The slide gate openers of these series are for horizontally moving sliding gates, either on rails or cantilever type. For max. dimensions and weights please look at the technical data.



In case of deviation from the a. m. application range, please check with your supplier.

**6 Technical data**



Weight of gate (max.)	NOVA 800: 800kg NOVA 800-L: 600kg NOVA 800-S: 300kg
Length of gate (max.)	14,000mm
Torque toothed wheel (max.)	29Nm
Power supply	230Vac, 50Hz
Motor voltage	24Vdc
Velocity (max. *)	NOVA 800: 12.6m/min NOVA 800-L: 12.6m/min NOVA 800-S: 16.8m/min
Self blocking, when gate open and closed	yes
Max. cycles per hour	NOVA 800: 13 NOVA 800-L: 13 NOVA 800-S: 18
Brake function	yes
Limit switches	not required
Emergency release	yes
Adjustable height toothed wheel	75mm
Toothed wheels	NOVA 800 + NOVA 800-L: Toothed wheel plastic module 5 or toothed wheel plastic module 4 or toothed wheel steel module 4 NOVA 800-S: toothed wheel steel module 4
Dimensions (w x l x h), mm	NOVA 800: 420x304x314 NOVA 800-L: 420x304x343 NOVA 800-S: 420x304x314
Weight, approx.	NOVA 800: 17kg NOVA 800-L: 17kg NOVA 800-S: 18kg
Controller	MO 46
Evaluation of safety contact stripes	OPEN and CLOSE separately
Degree of protection (opener/controller)	IP44
Maintenance interval	According to the applicable rules and standards (at least a year)
Temperature range	 -20°C to  +50°C

Table 1

\* Depending on the speed stage selected

## 7 Installation



### IMPORTANT!

Running time limitation (end stops) for position "gate OPEN" and "gate CLOSED" are mandatory. The running time limitation for "gate CLOSED" must be mounted in such a way that an existing safety contact profile is not activated when the gate is closed.



### CAUTION!

During welding work at the gate, always ensure that the controller does not have any electrically conductive connections to the gate.

- Switch off power supply.
- Ensure absence of power.
- Secure against reactivation.
- Remove electrical connections.

### 7.1 Tools

Quantity	Description	
1	Open-end wrench	17mm
1	Torque wrench (1-25Nm)	1/4"-square head
1	Bit	1/4", 10mm, Length 100mm
1	Torque wrench (40-200Nm)	3/4"-square head
1	Bit	3/4", 17mm, Length 100mm
1	Screwdriver	0,6 x 3,5mm
1	Screwdriver	PH2 x 100
1	Level	

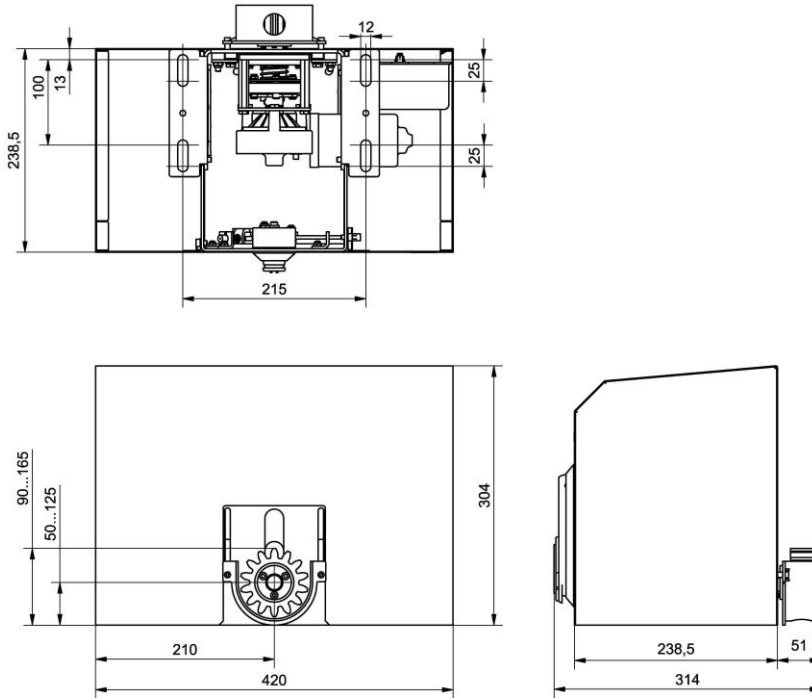
Table 2

**7.2 Measurements**

**7.2.1 Measurements NOVA 800**



All measurements are stated in millimetres.

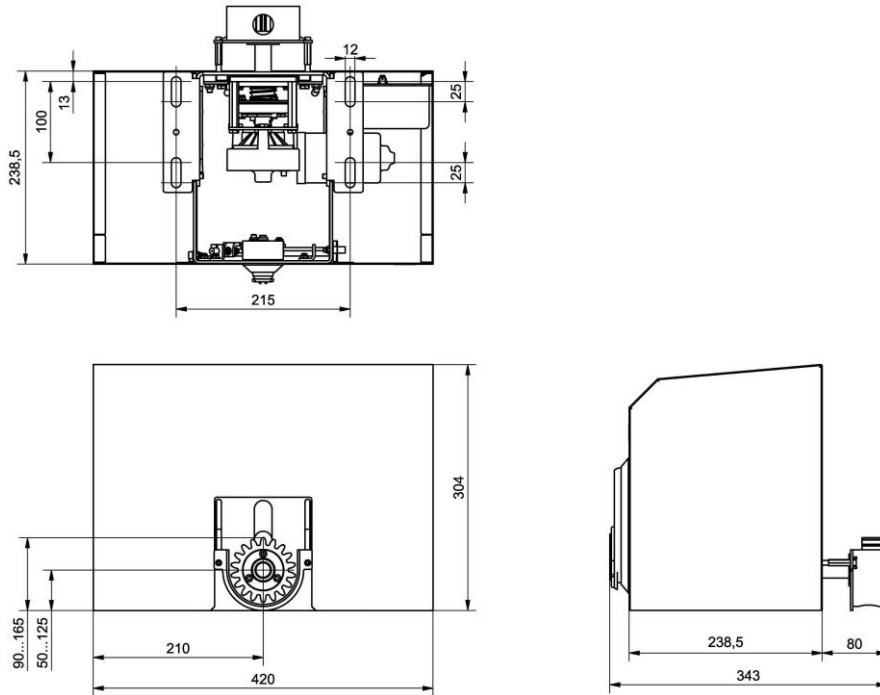


*Drawing 3*

**7.2.2 Measurements NOVA 800-L**



All measurements are stated in millimetres.

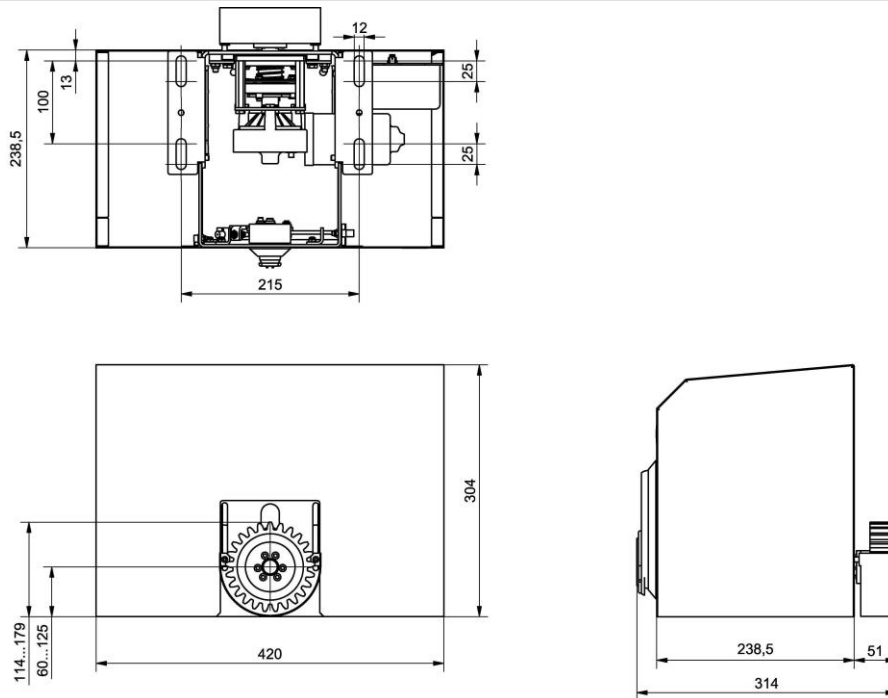


*Drawing 4*

### 7.2.3 Measurements NOVA 800-S



All measurements are stated in millimetres.



Drawing 5

### 7.3 Installation NOVA 800

1. The foundations of gate and gate opener must be free from frost. The opener must stand at least 30mm higher than the surrounding terrain and at least 100mm from the gate opening. Make sure sufficient cable or cable conduit is laid before the foundation is cast.
2. Remove the hood.
3. You now have access to all holes for cables and ground fixation.
4. Place the opener with the back parallel to the gate.
5. Mark the middle of the elongated holes on the foundation.
6. Take the opener from the foundation and drill holes for  $\varnothing$  8-10mm fixing screws.
7. Now secure the opener on the foundation. Tighten the fixing screws. Please note that you might have to loosen these screws again for adjustment of the toothed rack.

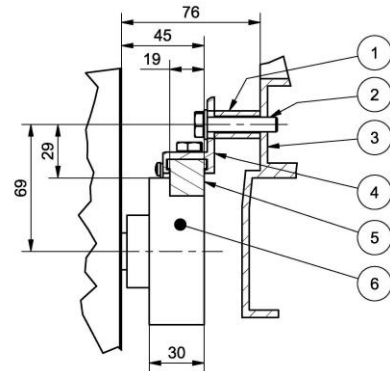
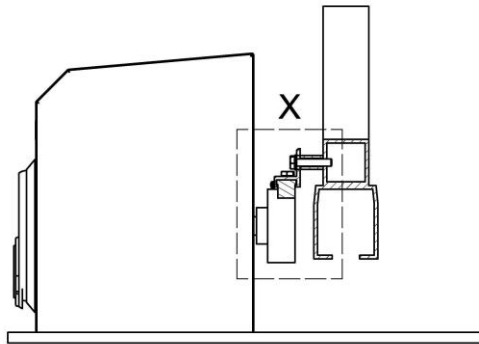
**7.4 Mounting the rack**



The following described racks are not included in the slide gate opener scope of delivery.

**7.4.1 Plastic toothed rack in an aluminium profile module 5**

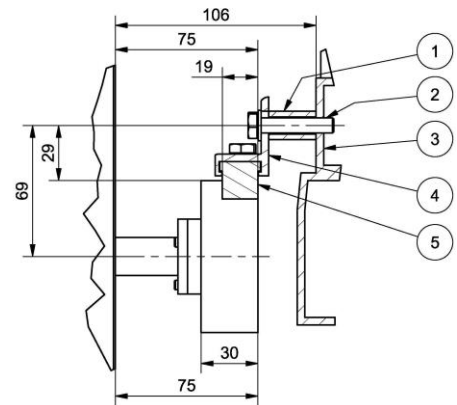
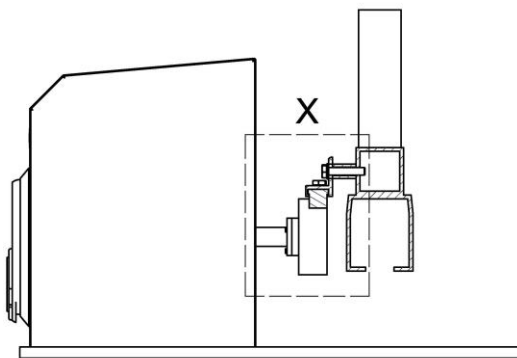
**7.4.1.1 Measurements rack NOVA 800**



*Drawing 6*

- 1 Distance piece
- 2 Hexagon head screws DIN931 M8x40 vz
- 3 Gate profile
- 4 Aluminium profile for rack segment
- 5 Toothed rack, plastic (segment)
- 6 Toothed wheel

**7.4.1.2 Measurements rack NOVA 800-L**

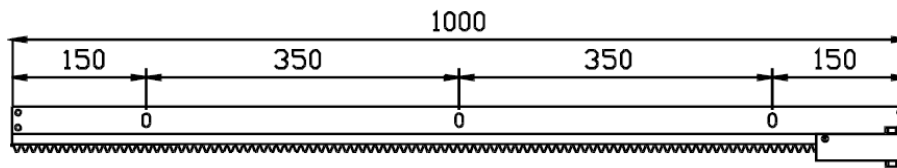


*Drawing 7*

- 1 Distance piece
- 2 Hexagon head screws DIN931 M8x40 vz
- 3 Gate profile
- 4 Aluminium profile for rack segment
- 5 Toothed rack, plastic (segment)
- 6 Toothed wheel

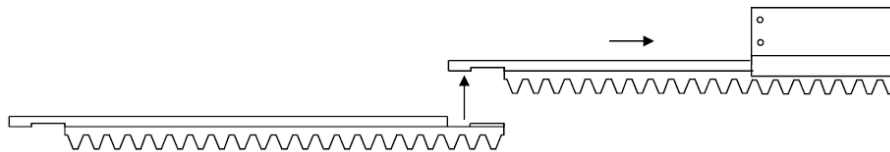
**7.4.1.3 Mounting the rack**

1. The aluminum profile is delivered in lengths of 1 meter. The two aluminium profiles with includes springs shall from the end of the rack on the left and on the right.
2. Disengage the opener. Close the gate manually and during closing draw a line approx. 69mm above coupling middle.



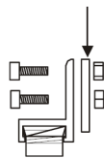
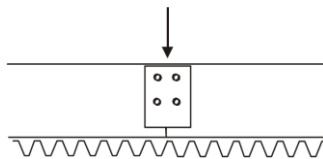
*Drawing 8*

3. Drill holes  $\varnothing$  6.5mm in the intervals shown and tap M8 threads.
4. Fix the first length of the aluminum profile, using the distance pieces and ensure that the spring is fitted inside. Tighten the securing screws only slightly.
5. Push five plastic rack segments into the profile, hooked together as shown below until they push against the spring. The fifth segment will protrude.



*Drawing 9*

6. Hook six segments of rack together and insert into the next length of profile so that they protrude at both ends.
7. Hook the aluminum profile into the one already mounted to the gate and push the aluminium profile against the one already mounted.
8. Connect this length also, using the distance pieces.
9. Connect the butt joint of the two lengths of profile using the connecting pieces (included).



*Drawing 10*

10. Carry on in this way until the toothed rack is mounted completely.
11. The last segment of plastic rack must be cut off so that it fits flush against the spring inside the Uprofile.
12. Re-engage the opener.
13. Check that all teeth interconnect completely (make any necessary corrections) and tighten the screws of the rail.
14. Disengage the opener and push the gate until the next joint in the rail is above the toothed wheel. Re-engage the opener and carry on.
15. Repeat this procedure until the rail has been checked in its entire length.
16. Check the fixing screws of the opener and tighten the screws firmly.
17. A test run of the gate and a check of the rail will be done during the setup of the controller.

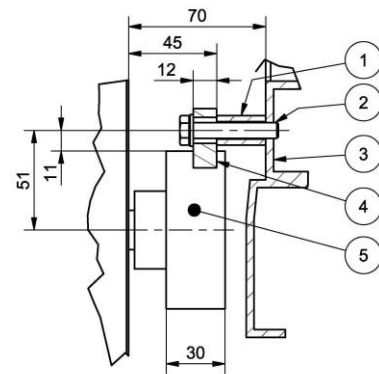
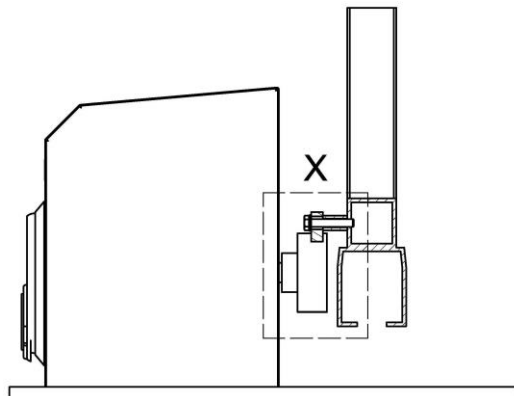


**IMPORTANT!**

**Make sure that the gate does not rest with the rail on the toothed wheel of the opener. A minimum distance between toothed wheel and rail is absolutely necessary. This distance must not be so large that the toothed wheel could “over jump” (skip a tooth). This must be ensured during the complete running distance.**

**7.4.2 Steel toothed rack module 4**

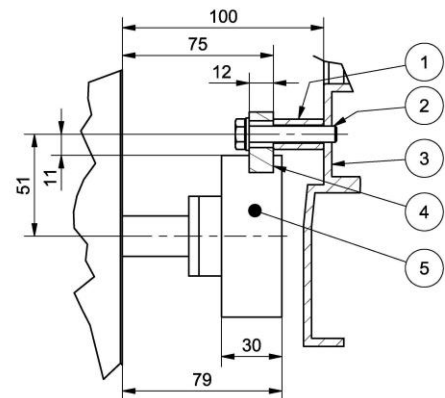
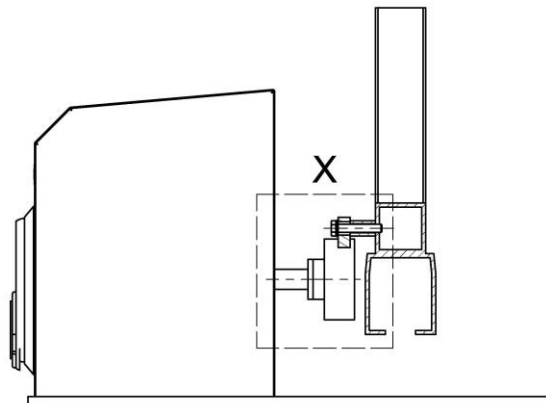
**7.4.2.1 Measurements rack NOVA 800**



Drawing 11

- 1 Distance piece
- 2 Hexagon head screws DIN931 M8x45 vz
- 3 Gate profile
- 4 Toothed rack, steel
- 5 Toothed wheel

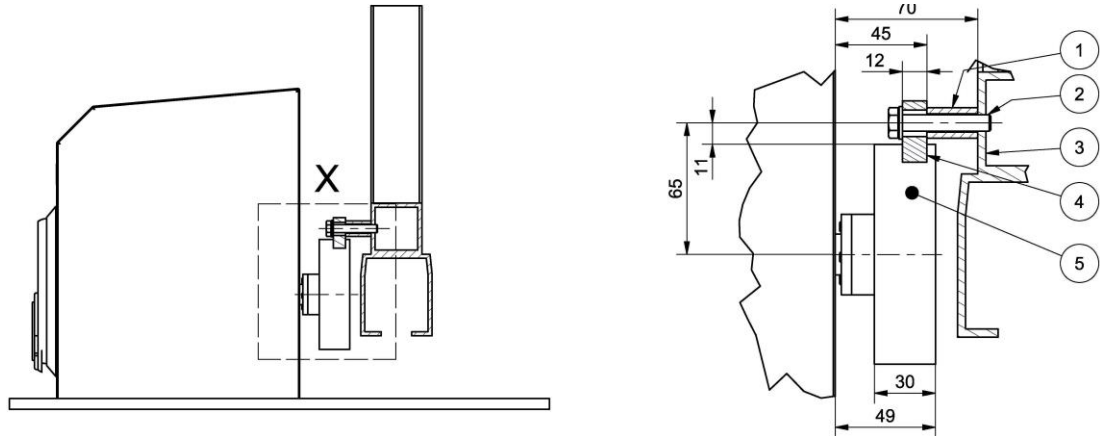
**7.4.2.2 Measurements rack NOVA 800-L**



Drawing 12

- 1 Distance piece
- 2 Hexagon head screws DIN931 M8x45 vz
- 3 Gate profile
- 4 Toothed rack, steel
- 5 Toothed wheel

**7.4.2.3 Measurements rack NOVA 800-S**

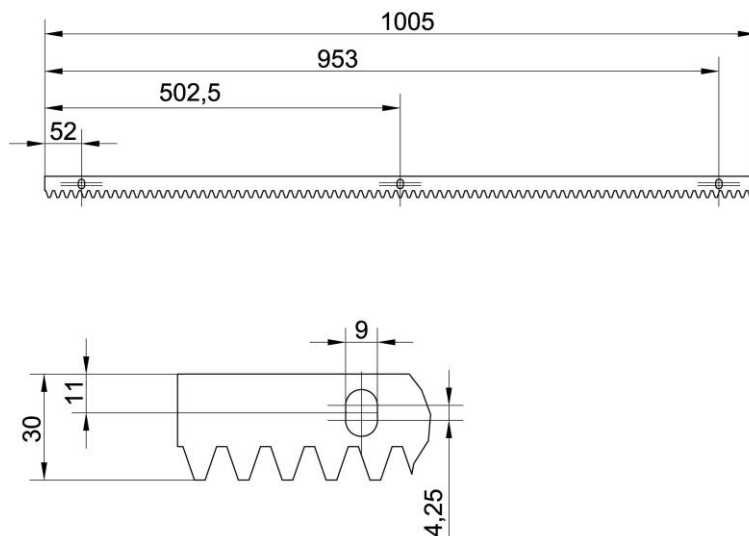


Drawing 13

- 1 Distance piece
- 2 Hexagon head screws DIN931 M8x45 vz
- 3 Gate profile
- 4 Toothed rack, steel
- 5 Toothed wheel

**7.4.2.4 Mounting the rack**

Dimension:



Drawing 14

1. The steel toothed rack is delivered in lengths of 1 meter.
2. Disengage the opener. Close the gate manually and during closing draw a line approx. 51mm above coupling middle.
3. Drill holes  $\varnothing 6.5\text{mm}$   $\varnothing$  in the intervals shown and tap M8 threads.
4. Fix the first length of the rack. Tighten the securing screws only slightly.
5. Take the next length of the rack.
6. Connect the length also, using the distance pieces.
7. Carry on in this way until the toothed rack is mounted completely.
8. Re-engage the opener.
9. Check that all teeth interconnect completely (make any necessary corrections) and tighten the screws of the rail.
10. Disengage the opener and push the gate until next joint in the rail is above the toothed wheel. Reengage the opener and carry on.

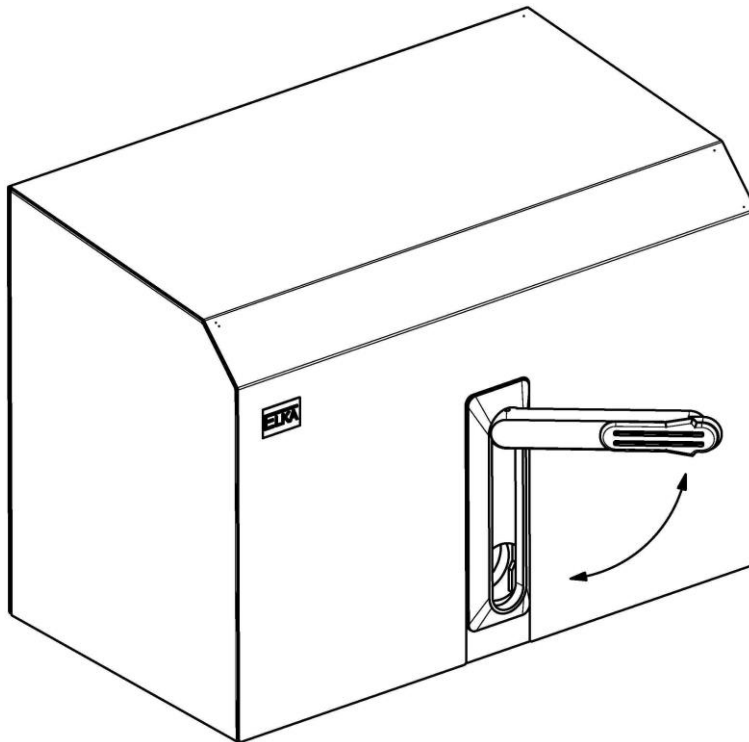
11. Repeat this procedure until the rail has been checked in its entire length.
12. Check the fixing screws of the opener and tighten the screws firmly.
13. A test run of the gate and a check of the rail will be done during the setup of the controller.

**IMPORTANT!**

**Make sure that the gate does not rest with the rail on the toothed wheel of the opener. A minimum distance between toothed wheel and rail is absolutely necessary. The distance must not be so large that the toothed wheel could “over jump” (skip a tooth). This must be ensured during the complete running distance.**

## 7.5 Emergency release and height adjustment

### 7.5.1 Emergency release



Drawing 15

#### Disengaging the emergency release

To disengage the opener, use the profile wrench to open the swivel handle lock of the hood. Swivel the handle of swivel handle lock to the right (approx. 90°). The toothed wheel is now decoupled from the motor / gearbox-unit. The hood does not have to be removed. Now the gate can be moved manually.



The controller displays **E 7** - "the gate is released" (only visible, when the hood has been removed).

#### Re-engaging the emergency release

To re-engage the opener, turn the lever of the swivel handle lock to the lower, vertical position. On the controller the display „E7 – the gate is released“ goes out. When the opener is re-engaged, initially the gate position is not known. Therefore at first only the gate movement into the direction CLOSE with speed level 1 is allowed. The gate position is not known before the gate is closed completely and has switched off by force detection in the end position CLOSED. The controller now switches over to normal mode.



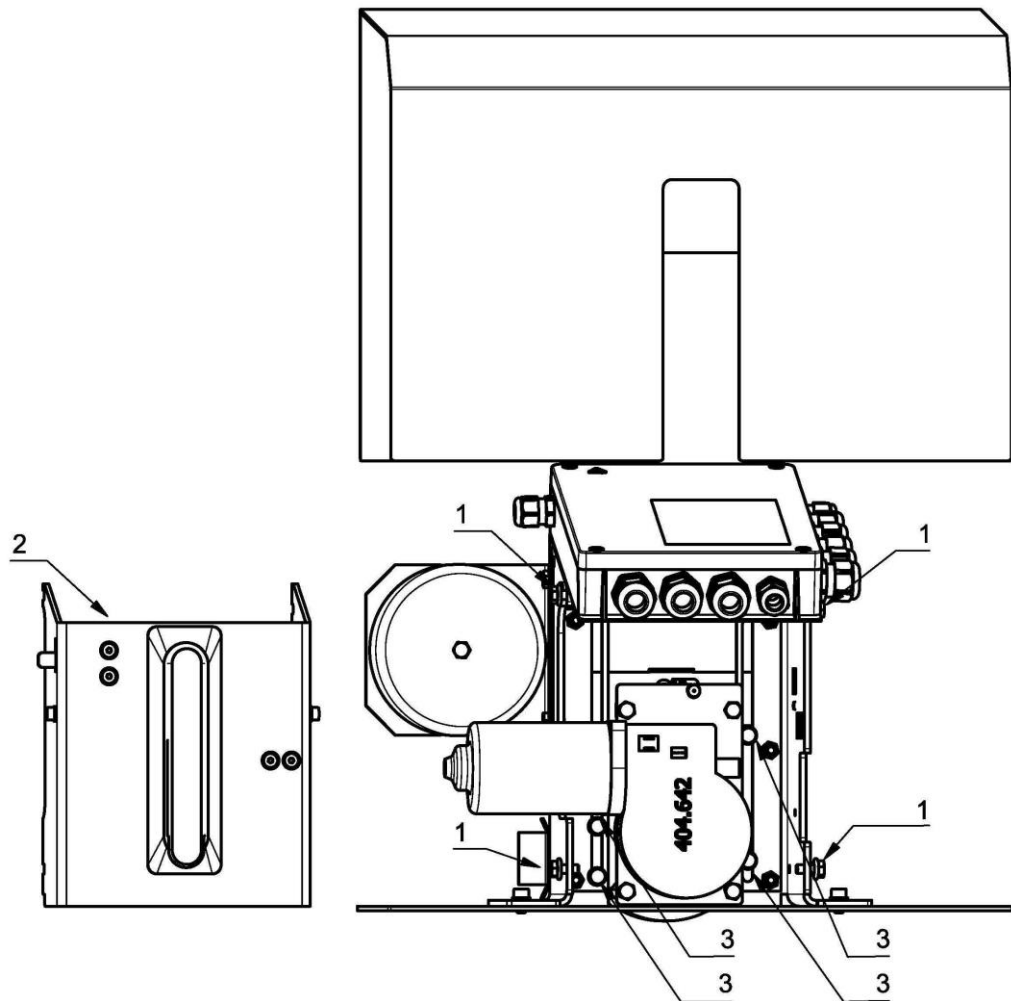
When after power failure / emergency releasing an obstacle is present in the gate, the controller identifies the obstacle as end position CLOSED. If the gate is now opened then it will pass over the end position OPEN. Therefore an end stopper is needed at the end position OPEN. It is now necessary to switch power off and on and another closing procedure has to be executed.



There is no automatic closure after emergency releasing.

**7.5.2 Height adjustment**

The height of the pinion axis is approx. 50mm and can be altered approx. +75mm (upwards) if required.



Drawing16

- 1 Fixing screws for front panel (SW10)
- 2 Front panel
- 3 Fixing screws height adjustment (SW10)

1. Unlock and remove the hood. For the following steps, the mechanics must be left in the "emergency release" function.



**WARNING!**

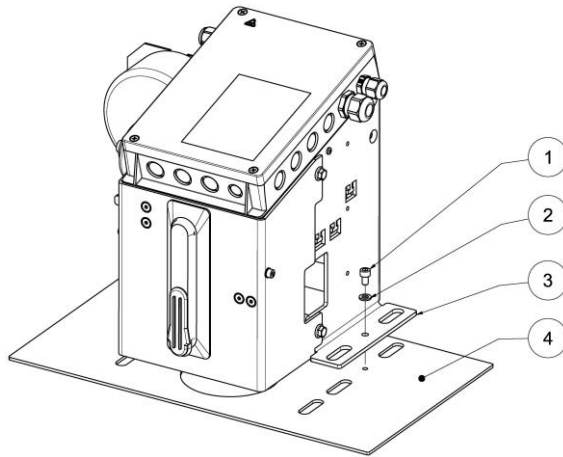
**Risk of crushing!**

During the sliding gate movement, squeezing points occur between the toothed wheel and the rack.

- Before installation-, maintenance- or repair work at the mechanics is carried out, turn off the power supply and secure it against unintentional restarting.

2. Loosen the fixing screws (1) of the front panel (2).
3. Remove the front panel (2).
4. Loosen the fixing screws (3).
5. Move the motor / gearbox-unit in vertical direction. The toothed wheel must completely interconnect with the toothed rack. Make sure that the gate does not rest on the toothed wheel. Tighten the fixing screws (3) with 10Nm.
6. Mount the front plate (2) and tighten the fixing screws of the front plate (1) with (ca. 10Nm).
7. Mount the hood and lock the opener.

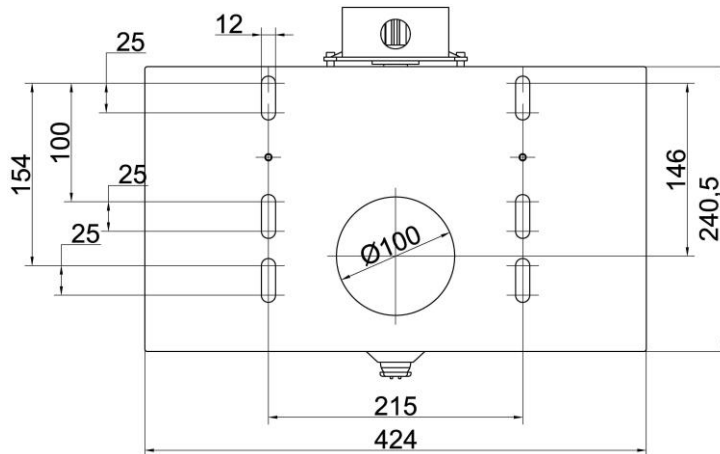
**7.6 Base plate (optional)**



*Drawing 17*

- 1 Cylinder head screw DIN912 M6x10
- 2 Washer DIN125 6,4
- 3 Base support
- 4 Base plate (optional)

**Measurements:**



*Drawing18*



Measurements:  
Drawing - bottom view

**8 Electrical Installation**



**DANGER!**

**Mortal danger by electric voltage!**

Touching live parts can be lethal.

- Switch off power supply and secure against reactivation before performing any work.
- Test for absence of voltage!

**Power supply of the controller:**

230Vac, 50Hz, single phase

**Connection:**

By fixed wiring and main switch (on site) or flexible wiring with cable stress relief device according to the European standards.

Supply circuit disconnection devices, which need to be installed according the local applicable installations, must to be installed by the customer. Usually the following devices must be installed:

- Switch disconnector (with or without fuse, according to IEC 60947-3 / BS EN IEC 60947-3)
- Circuit breakers (suitable for separating, according to IEC 60947-2 / BS EN IEC 60947-2)
- A switch/socket combination for power supply with flexible wires (IEC 60204-1 / BS EN IEC 60204-1)

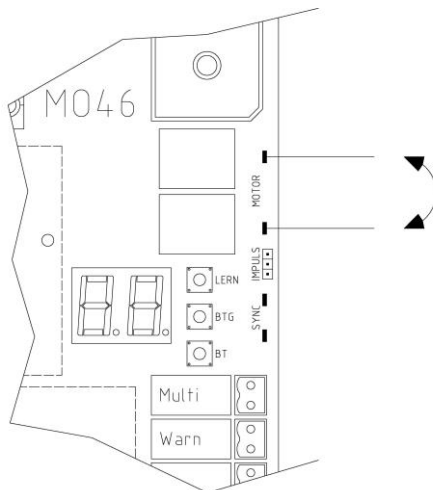


The supply circuit disconnector (1.+ 2.) must have a 2-pole disconnecting device and a lockable OFF/disconnection position.

**Motor connection – factory setting**

In delivered condition, the slide gate opener closes to the right (gate CLOSED), seen from the opener position.

When the actual installation situation requires the position (CLOSED) to the left, the connections for the motor must be swapped on the motor control unit.



*Drawing 19*

If the gate closes to the right as seen from the opener:

Motor connection "M-"  
Motor connection "M+"

Red motor cable  
Green motor cable

If the gate closes to the left as seen from the opener:

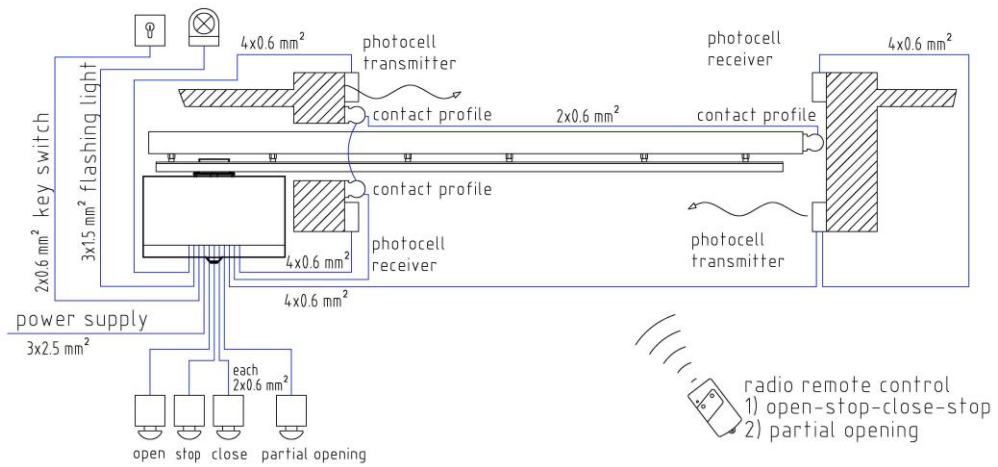
Motor connection "M-"  
Motor connection "M+"

Green motor cable  
Red motor cable

8.1 Connection example



The number of conductors and wire cross-sections shown in the drawing are exemplary. Depending on the installation situation and used accessories, the actual required values may differ.



Drawing 20

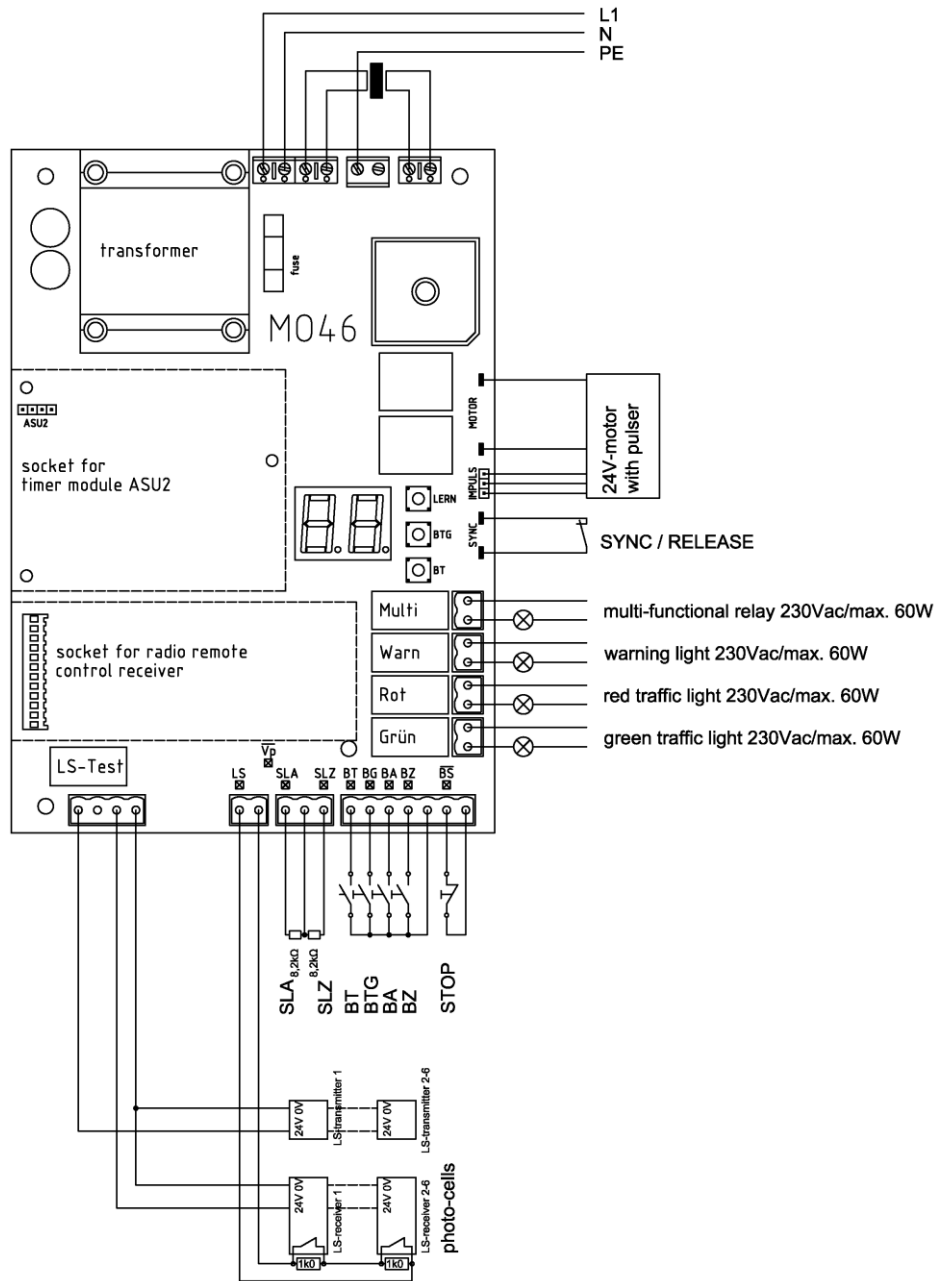


**Caution!**

The maximum cable length for inputs and outputs is limited.

- The maximum permissible cable length for the inputs **BT, BTG, BS, BA, BZ, LS, SLA** and **SLZ** is **30m**.
- The maximum permissible cable length for the outputs **Uext 12V, Uext 24V** and **LS-Test** is **15m**.

8.2 Wiring diagram Controller MO 46



Drawing 21



Safety contact profiles (SLA und SLZ), which are not used, have to be bridged using 8.2kOhm resistors (delivery state).



In case the inputs (LS) for photoelectric barriers and (BS) stop button (BS) are not used, they have to be bridged (delivery status).



The controller unit MO 46 is protected by Microfuse 3.15A (T3A1) time-lag, type (5 x 20mm).



**Caution!**

The maximum cable length for inputs and outputs is limited.

- The maximum permissible cable length for the inputs **BT, BTG, BS, BA, BZ, LS, SLA** and **SLZ** is **30m**.
- The maximum permissible cable length for the outputs **Uext 12V, Uext 24V** and **LS-Test** is **15m**.

## 9 Controller MO 46

### 9.1 Connections of the controller

#### Controller input terminals

Input	Version	Connection	Function
BT	n.o. contact	1 pin screw-plug terminal	Push button for complete opening
BTG	n.o. contact	1 pin screw-plug terminal	Push button for partial opening
BA	n.o. contact	1 pin screw-plug terminal	Push button OPEN
BZ	n.o. contact	1 pin screw-plug terminal	Push button CLOSE
Masse	-	1 pin screw-plug terminal	Mutual ground for BT, BTG, BA, BZ
BS	n.c. contact	2 pin screw-plug terminal	Push button STOP. Redundant detection on the controller according to EN ISO 13849-1:2008(BS EN ISO 13849-1:2008) Kat. 3 PL d.
Masse	-	1 pin screw-plug terminal	Mutual ground for BS
LS	Max. 6 photo-cells with n.c. contact and terminating resistor 1kΩ	2 pin screw-plug terminal	Photo-cells according to EN ISO 13849-1:2008 (BS EN ISO 13849-1:2008) Kat. 2 PL c.
SLA SLZ	Resistor detection: n.c. contact with 8,2kΩ resistor serial	2 pin screw-plug terminal	Integrated detectors with testing function (according to EN ISO 13849-1:2008 / BS EN ISO 13849-1:2008 Kat. 2 PL c) for safety contact profile for gate OPEN (SLA) and CLOSE (SLZ).
Masse	-	1 pin screw-plug terminal	Mutual ground for SLA and SLZ
IMP	Pulser	3 pin screw-plug terminal	Pulser
SYNC	Emergency release	2 blade terminals	Synchronising switch for emergency release
ASU2		Plug socket	Connection for timer ASU2
Funk		Plug socket for receiver EKX1OF or receiver with decoder	integrated radio remote control decoder: BT, BTG, Multi
Netz L1, N, PE		3 pin screw-plug terminal	Power supply for the controller 230Vac L1, N, PE
Trafo 24V		2 pin screw-plug terminal	Connection for the secondary winding of the main transformer

Table 3

#### Controller output terminals

Output	Version	Specification
Motor	2 blade terminals	Connection for 24Vdc motor
WARN	2 pin screw plug-terminal	Potential free contact for warning light. max. 230V /max. 60W
ROT	2 pin screw plug-terminal	Potential free contact for red traffic light, max. 230V /max. 60W
GRÜN	2 pin screw plug-terminal	Potential free contact for green traffic light, max. 230V/ max. 60W
MULTI	2 pin screw plug-terminal	Multi-functional relays, potential-free relay-contact, max. 230V / max. 60W
Uext	3 pin screw plug-terminal	24Vdc and 12Vdc, mutual ground terminal, stabilised direct voltage, together max. 200mA, ground terminal is connected with controller ground
LS-TEST	1 pin screw plug-terminal	24Vdc for photo-cell transmitter
PE	1 pin screw plug-terminal	Connection for earth PE

Output	Version	Specification
TRAFO 230V	1 pin screw plug-terminal	Connection for the primary winding of the main transformer

Table 4

**Buttons on the controller**

Mark	Function
BT	Same function as external button BT
BTG	Same function as external button BTG
LERN	Starting the learning mode

Table 5

**Light display on the controller**

Mark	Colour	Function
Vp	Yellow	Lights when connected to main power
SLA	Red	Lights, when safety contact profile SLA active
SLZ	Red	Lights, when safety contact profile SLZ active
BT	green	Lights, when the contact is closed
BTG	Green	Lights, when the contact is closed
BA	Green	Lights, when the contact is closed
BZ	Green	Lights, when the contact is closed
BS	Green	Lights, when the contact BS is closed
LS	Green	Lights, when LS is interrupted
Display	red	2-digit 7-segment-display

Table 6

**Supply for external equipment Uext**

The controller provides 24Vdc and 12Vdc as supply for photo-cells, induction loops etc.

The voltage is stabilised and short-circuit proof (together maximum 200mA).



## 9.2 Operating behaviour of the controller

### 9.2.1 General note

In case one of the safety devices SLA, SLZ, or LS is faulty or constantly signals that an obstacle is present, the controller is still operable in emergency mode. The normal mode is divided into self-holding function and dead man's mode. In self-holding function an automatic closure for full or partial opening can be selected.

### 9.2.2 Opening and closing of the gate

#### Opening the gate

The gate accelerates (ramp function) up to the selected speed stage. The gate then opens with this speed until shortly before the end position OPEN is reached. Then the speed is reduced continuously to speed stage 1. The gate continues to move with this speed until it reaches the end position OPEN. There the motor switches off. The reaching of the end position OPEN is recognized through counting of the motor impulses.

#### Closing the gates

The gate accelerates (ramp function) up to the selected speed stage. The gate then closes with this speed until shortly before the end position CLOSED is reached. Then the speed is reduced continuously to speed stage 1. The gate continues to move with this speed until it switches off at the end position CLOSED by force detection. Thereby the internal position-counter is being newly synchronised.

#### Stopping the gate in an in-between position

When the gate stops through an operation command, a soft-stop takes place.

### 9.2.3 Behaviour after mains switch-on and after emergency releasing

When the controller is switched on, initially the gate position is not known. Therefore at first only the running direction CLOSE with speed stage 1 is allowed. The gate position is not known before the gate is closed completely and has switched off by force detection in the end position CLOSED. The controller now switches over to normal mode.



#### ATTENTION!

**When after power failure / emergency releasing an obstacle is present in the gate; the controller identifies the obstacle as end position CLOSED.**

Is the gate now opened then it will pass over the end position OPEN.

- Therefore an (emergency) end stopper is needed at the end position OPEN. It is now necessary to switch off and on and another closing procedure has to be executed.

When automatic closure for complete and/or partial opening is selected, automatic closure follows after mains switch-on. With automatic closure for complete opening the stay-open time for complete opening is used, otherwise the stay-open time for partial opening. There is no automatic closure after emergency releasing.

### 9.2.4 Operating sequence of BT and BTG

*Serial switching by BT and the associated radio remote control channel*

**Without automatic closure for complete opening:** The gate can be operated through BT in serial switching OPEN-STOP-CLOSE-STOP. In case the gate is in the partial opening position BT is used for closing.

**With automatic closure for complete opening:** When the gate is not in the end position OPEN, then BT is used to open the gate. When the gate is in the end position OPEN, BT is used for closing.

*Partial opening by BTG and the associated radio remote control channel*

**Without automatic closure for partial opening:** Is the gate not in the selected partial opening position, use BTG to move it into the partial opening position. When the gate is moving use BTG for stopping.

**Priority sequence:** Opening up to the end position has priority over stopping through BTG. Is the gate in the partial opening position use BTG for closing.

**With automatic closure for partial opening:** Is the gate not in the selected partial opening position, use BTG to move it into the partial opening position. Is the gate in the partial opening position use BTG for closing.

### 9.2.5 Operation by BA, BZ and BS

BA has the function OPEN, BZ has the function CLOSE and BS has the function STOP. As long as BS is pressed, no gate movement is possible. The automatic closure is blocked by BS. When BS is released, a new operation command must be given. As long as BA is pressed, the gate cannot close.

#### Priority sequence

BA has priority over BT, BTG and BZ. When BA is pressed and the gate opens, it cannot be stopped using BT or BTG or closed using BZ. The opening into the end position OPEN has priority over partial opening. Stopping by BTG is not possible when opening into the end position OPEN.

### 9.2.6 Automatic closure for complete opening

---

Automatic closure for complete opening can be selected in the learning sequence.

- The stay-open time starts as soon as the gate has reached the end position OPEN.
- Is LS or SLZ or BA active during the stay-open time, the stay-open time elapses but the gate remains open.
- Is BA pressed in the end position OPEN, then the stay-open time starts anew.
- Is channel 1 of the timer (ASU2) activated, the stay-open time elapses but the gate remains open.
- Automatic closure is blocked when BS is pressed.
- The blocked automatic closure is released by a BA-command and the stay-open time is started anew.
- The gate closes automatically when the stay-open time has elapsed provided the automatic closure is not blocked and no safety device or BA-command prevent the closing.
- The gate closes immediately when BT or BZ pressed in the position OPEN.
- When delayed closure is activated and a CLOSE-command is stored then the gate closes immediately after reaching the end position OPEN.
- When BT is pressed during automatic closure, stop and reversing in direction OPEN occur.
- After mains switch-on automatic closure is possible.

### 9.2.7 Automatic closure for partial opening

---

Automatic closure for partial opening can be selected in the learning sequence.

- When the gate does not stand in the partial opening position and the BTG-button is pressed, the gate is moved into the partial opening position.
- When the partial opening position is reached the selected stay-open time for the partial opening starts to elapse.
- Is the gate in the partial opening position use BTG for closing.
- Is LS or SLZ active during stay-open time, the stay-open time still elapses further.
- The gate closes when the time has elapsed and neither LS nor SLZ are active.
- Automatic closure is blocked when BS is pressed.
- The gate opens completely when BA is pressed.
- The gate closes completely when BZ is pressed.
- After mains switch-on automatic closure is possible.

### 9.2.8 Dead man's mode

---

#### Dead man's mode

Dead man's mode can be selected in the learning sequence. The buttons BA and BZ give no maintained command during dead man's mode. The gate can be opened and closed manually using BA and BZ. The gate moves as long as the button is pressed and stops when the button is released.

- When BS is activated, no gate movement is possible.
- Photo-cells are monitored and cause STOP.
- SLA, SLZ and Force are monitored and cause STOP und reversing for a short distance.
- When LS, SLA or SLZ report or when their testing is negative, operation in emergency mode is possible.
- BT and BTG and the matching radio remote control have no function during dead man's mode.

### 9.2.9 Emergency mode

---

The emergency mode can be activated or deactivated in the learning sequence under sequence **PG**. The factory setting is deactivated.

#### Emergency mode

When BT, BTG, BA or BZ are pressed and the gate movement is prevented by a reporting or faulty LS or SLA or SLZ, then the controller changes into emergency mode. Here the warning light flashes for 10s. Then the gate can be moved by BT, BTG, BA or BZ in dead man's mode even though the safety device reports.

- Failure of a safety device means, that the photo-cell test or the safety contact profile test failed or that either one reports an obstacle.
- The operating buttons have to be installed at a location from which the gate can be seen during operation.
- Emergency mode by internal radio remote control is not possible.
- Force detection, reaching of the end positions, impulse failure detection and BS are still monitored and cause STOP.

**CAUTION!**

The use of signal generators, which are issuing a signal of more than 2 seconds duration (e.g. timers, induction loop detectors, key switches, radio remote control receivers) is prohibited. Otherwise the installation works in dangerous operation, when a safety device fails.

**ATTENTION!**

External equipment which gives a constant signal and is connected to BA or BZ can trigger the emergency mode and move the gate when a safety device failed or is activated.

**ATTENTION!**

When the multi-functional relay is used for an additional radio remote control channel and this is connected to BA or BZ, the emergency mode can be triggered by radio remote control. In this case only stationary transmitters are allowed from which location the gate can be seen.

**Emergency mode with automatic closure for complete opening by BT**

When the gate is not open it shall be opened by BT. When however a safety device for direction OPEN failed, then pre-warning before emergency mode is started and the gate is opened in emergency mode until push button BT is released. Closing by BT in emergency mode with selected automatic closure is only possible from end position OPEN!

**Emergency mode after power switch-on and after emergency release**

When the controller is switched on, initially the gate position is not known and only the running direction CLOSE is allowed. When a safety device for direction CLOSE failed then pre-warning before emergency mode is started and the gate is closed in emergency mode until BT, BTG or BZ is released. When the end position CLOSED is reached and the gate is stopped by force detection, then the controller changes into normal mode. Opening in emergency mode before reaching of end position CLOSED is not possible.

### 9.3 Safety and special functions



**CAUTION!**

**Risk of crushing, shearing and impacts**

During the reversing for a short distance (duration approx. 2s) triggered by an active safety contact profile or force detection, there is no reaction to any further obstacles in the reverse running direction.

- Consider this fact in your risk assessment (crushing, shearing, impacts, etc.) for the complete system of the slide gate system and, if necessary, take the necessary safety measures.

#### 9.3.1 Force detection, obstacle detection and end position detection

During learning function via running distance for opening and closing the controller has determined and saved the force required. During operation the actual force is compared with the learned force. When the actual force is higher than the learned force by more than one selected force reserve, then stop by force detection occurs.

Force detection during opening	Force detection during closing
Stop and reversing for a short distance	With automatic closure in the OPEN position result is stop and opening. After two attempts to close by automatic closure or without automatic closure at the OPEN position or during dead man's mode, only stop and reversing for a short distance.

Table 7

**Force detection after mains switch-on and after emergency releasing**

Since after mains switch-on the gate position is not known, the maximum value of the learned force during closing is used as value for force detection.

**Pulser control**

When the pulser fails, the controller reaction is the same as with force detection. Additionally an error code is issued and the controller is blocked.

**Synchronising to end position CLOSED**

The force detection normally causes short reversal. However, within the synchronizing area (short distance before end position CLOSED) the controller evaluates the force detection correctly not as an obstacle but as end stopper. Only STOP occurs but no short reversal follows. The internal position counter is being synchronised to the end position.

**Running time limit**

The end position OPEN is reached by impulse counting. A running time limit is not necessary. The controller always stops at the calculated position. In the end position CLOSED synchronisation occurs by force detection. In case of no force detection at the calculated position, automatic stopping after a running time reserve follows. The controller issues an error code (**E 4**) and then it blocks.

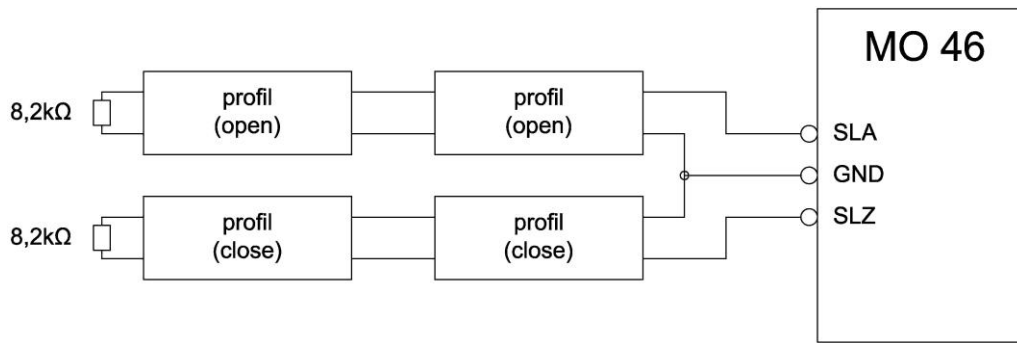
#### 9.3.2 Safety contact profile for gate OPEN (SLA) and for gate CLOSED (SLZ)

The controller has two integrated detectors with testing function according to EN ISO 13849-1:2008 (BS EN ISO 13849-1:2008) Kat. 2 PL c for safety contact profiles, with resistor detection for safety at the closing edge in direction OPEN and CLOSE. During learning function of the controller it recognises the type of safety contact profile connected. The status of the safety contact profiles is displayed by the red LEDs SLA and SLZ. During actuation of a safety contact profile the corresponding LED is lit.

- The safety contact profile SLA protects the running direction OPEN. When SLA reports only emergency mode is possible for opening.
- When SLA reports during opening, stop and short reversal occur.
- The safety contact profile SLZ protects the running direction CLOSE. When SLZ reports only emergency mode is possible for closing.
- When SLZ reports during opening, the following applies: With automatic closing stop and opening occur. After two attempts to close by automatic closure or without automatic closure or during dead man's mode, only stop and reversing for a short distance occur.

**Safety contact profiles with 8,2kΩ terminating resistor**

Closing contacts with 8,2kΩ ±5% parallel resistor or opening contacts with 8.2kΩ ±5% serial resistor can be connected. If safety contact profiles shall not be used, the corresponding terminal has to be connected to ground by an 8.2kΩ ±5% resistor. More than one safety contact profiles with 8.2kΩ terminating resistor can be switched in series as shown in the drawing below. The safety category remains the same.



Drawing 22

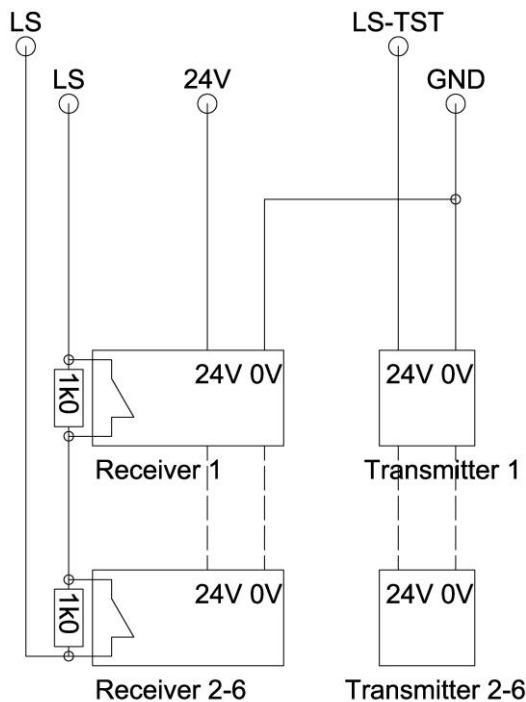
### 9.3.3 Photo-cells

A system of up to 6 photo-cells can be connected to the controller. The functions of the photo-cells depend on their selected mode (see learning sequence).

#### The photo-cell testing

Before each gate movement, for which the photo-cell is monitored, a photo-cell testing is performed. It consists of two parts. During the first part the transmitter of the photo-cell is switched off (S1 – S6) and it is waited for the receiver (E1 – E6) to report an obstacle within max. 2.5s. Then the second part starts. Here the transmitter is switched on and it is waited for the receiver to report no obstacle present. After this the gate starts moving. If there is a failure during the first part, the photo-cell is faulty. Error code **E 1** is displayed. In case of a failure during the second part, it is assumed that an obstacle is present within the photo-cell range and the gate will not move. No error code is issued.

Up to 6 photo-cells can be connected to the controller and can be tested. For this purpose the relay outputs of the receivers are switched in sequence. Parallel to the relay contacts of each receiver a resistor of **1kOhm +/- 5%** must be connected.



### Photoelectric barrier

Drawing 23



During learning of the running distance the controller executes a photocell testing and learns if and how many photo-cells are connected. When the photocell testing during learning was successful, a photo-cell testing can also be executed later during normal operation. In case the photo-cell testing during learning was not successful, no photo-cell testing will be executed later during normal operation.



After learning the installing technician has to check every single photo-cell for functioning!

**9.3.4 Timer mode**

The timer ASU2 can be plugged onto the controller. The timer has two channels with the following functions: When channel one of the ASU2 is switched on this is equal to an OPEN-command. As long as channel 1 of the ASU2 is on, the gate cannot be closed. When channel 1 of the ASU2 switches off, this is equal to a CLOSE-command. When automatic closure is selected, the gate closes immediately when channel 1 of the ASU2 is switched off and does not wait for automatic closure.

The channel 2 of the ASU2 can be displayed on the multi-functional relay. The potential free relay may then be wired e.g. to any operation inputs.

**9.3.5 Pre-warning, warning light and traffic light**

The controller has potential free relay outputs for warning light , red and green traffic light (no one-way-control).

A pre-warning time of 4 seconds duration prior to opening and closing can be selected.

Gate status	Red light	Warning light	Green light
Gate closed	on	off	off
Gate opened	off	off	on
Pre-warning or gate moving	off	on	off
Gate stopped in intermediate position	off	off	off
Gate stopped in partial opening position	off	off	off

Table 8

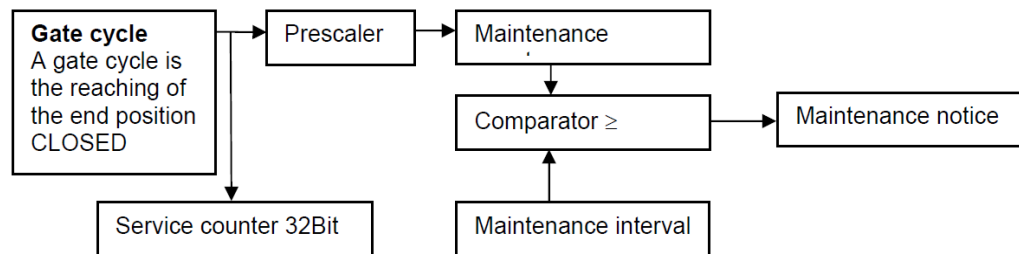
**9.3.6 Radio remote control display**

The decimal point at the single digit on the display is lit when one of the learned radio remote control codes is received.

**9.3.7 Multi-functional relay**

On the controller you find the relay MULTI, which may be used for different application purposes. During learning of the controller the relay is switched off.

**9.3.8 Service counter, maintenance counter and maintenance interval**



Drawing 24

Each time the gate reaches the end position CLOSED and synchronises, the gate cycle is counted. The maintenance counter is compared to the selected maintenance interval. When the counter is higher than the interval a maintenance notice is issued. The prescaler for slide gates is 1:1000. The prescaler is set automatically during learning of the maintenance counter. The maintenance notice can be displayed on the multi-functional relay.

**Functions:**

- Maintenance counter display and set to zero
- Maintenance interval display and setting
- Service counter display: Start the controller while the LERN button is pressed. After display of the program version the current service counter is shown as a sequence of 4 bytes in hexadecimal mode (highest value first) on the display.

**Examples:**

- 00 00 00 15 = 21 gate cycles
- 00 10 0b ac = 1.051.564 gate cycles

The setting range for the maintenance interval is 0 = no maintenance notice till 299. On the 2-digit display the numbers 0 to 299 can be displayed by using one decimal point for 100 and two decimal points for 200.

Example:

- The maintenance counter shows **23**. This is equal to 123. Thus the slide gate has moved  $123 \times 1,000 = 123,000$  cycles since the last maintenance.
- For the maintenance interval **0.3** is displayed: This is equal to 203. The maintenance notice is issued when a slide gate has moved  $203 \times 1,000 = 203,000$  cycles.

**In order to create the desired maintenance notice, the following has to be selected during learning sequence:**

1. The maintenance interval has to be set to the desired value.
2. The multi-functional relay has to be set to the mode maintenance notice.
3. The maintenance counter has to be set to zero (see learning sequence **P**).

9.4 Programming MO 46



Check again that the rack is mounted correctly and that all screws of the rack and the gate opener are tight. During setup check also the positioning of the rack; adjust the rack and/or height adjustment of the opener if necessary.

For programming and to set operating parameters, use the two-digit 7-segment display and the buttons BT, BTG and LERN.

During normal operation the display is off.

The learning sequence is activated by pushing the button LERN for approx. 2-3s. The display shows **P 1**. The sequence 1 is pre-set. With the button BT you can move on to the next sequence **P 2**, **P 3** etc. With the button BTG you can move back to the last sequence. When the required sequence is displayed it has to be activated with the button LERN.

Learning sequence

Sequence	Function
<b>P 1</b>	Setting the mode: Standard mode / Special mode. Learning of safety contact profiles and photo-cells connected Learning of running distance and force.
<b>P 2</b>	Adjusting of force reserves and speeds. Adjusting of relief / discharge return.
<b>P 3</b>	Adjusting of dad man's function / impulse mode
<b>P 4</b>	Adjusting of partial opening position
<b>P 5</b>	Learning and deleting the radio remote control codes and deleting the radio remote control codes for BT, BTG and MULTI.
<b>P 6</b>	Adjusting of automatic closure activating/deactivating and stay-open time for complete opening.
<b>P 7</b>	Adjusting of automatic closure activating/deactivating and stay-open time for partial opening.
<b>P 8</b>	Selecting of warning prior to opening and closing
<b>P 9</b>	Selecting photo-cell function
<b>P R</b>	Activating / deactivating photo-cell testing
<b>P b</b>	Delayed closure activating / deactivating
<b>P C</b>	Maintenance counter displaying and deleting
<b>P d</b>	Selecting of maintenance interval
<b>P E</b>	Setting mode of multi-functional relay
<b>P F</b>	Return to original settings
<b>P G</b>	Adjusting emergency mode
<b>P P</b>	Saving of data and returning to regular mode

Table 9

9.4.1 Sequence P1: Learning of running distances

When sequence **P 1** has been selected and activated using the button LERN, the display Shows **nn** (standard mode). Using the button BT you may switch between the two operating modes as shown (**nn** and **!!!!**). After selecting the required operating mode, confirm it using the button LERN.

Display	Effect / Function
<b>nn</b>	Operating mode: STANDARD MODE (factory setting) Using this mode, the max. speed of the gate is reduced only a short distance before reaching the end positions. The force limitation at the main and secondary closing edges has to be effected through suitably designed safety contact profiles.
<b>!!!!</b>	Operating mode: SPECIAL MODE Using this mode, the max. speed of the gate is reduced at a considerable distance before reaching the end positions. The force limitation at the main and secondary closing edges has to be effected through suitably designed safety contact profiles.

Table 10

**ATTENTION!**

When choosing the operating mode and the type of safety contact profile, the constructor of the installation must ensure that the valid norms are observed.

After confirming the operating mode with the button LERN, **HA** is displayed. Now move the gate in dead man's operation using button BT into the OPEN-position, (distance to end stopper OPEN approx. 5cm). Then push the button LERN to continue learning the distance and force. The display now shows **AU**.

The controller performs a test of the safety contact profiles and photo-cells and learns the type of safety contact profiles and the quantity of photo-cells connected. Only when the photo-cell testing was successful, it can be performed later during normal operation. See sequence **PA** – Photo-cell testing. Now the gate closes in slow mode and shuts down at the end stopper CLOSED via force detection of the controller. The maximum breaking current for the motor in use is determined in the process. The running distance in impulses is also learned.



Since the gate hit the end stopper CLOSED harder than in normal operation, a correction value is deducted from the running time.

Now the gate opens and the force for opening is learned. Then the gate closes and the force for closing is learned. After this you return automatically to the learning sequence.



After learning of the running distance the force reserve is automatically adjusted. See sequence **P2** – Adjusting of force reserves and speed.

### 9.4.2 Sequence P2: Adjusting of force reserves, speeds and relief / discharge return

When sequence **P2** is activated by button LERN an additional selection menu for force and speed opens. With button BT you may move to different points of the selection menu, with BTG you return to the previous subsequence.

Sub-sequence	Function
<b>F1</b>	Force reserve for opening
<b>F2</b>	Force reserve for closing
<b>S1</b>	Speed for opening
<b>S2</b>	Speed for closing
<b>En</b>	Relief / discharge return
next	Return to main sequence

Table 11

With the button LERN the selected point can be activated. The present value for force (F = force) or speed (S = speed) is displayed. Possible values are 01 (for minimum force reserve) up to 13 (for maximum force reserve) or 01 (for minimum speed stage) up to 08 (for maximum speed stage). With button BT the values may be increased, with the button BTG they can be decreased.

The type of relief / discharge return can be adjusted and displayed under sequence **En**. With the button LERN the selected point can be activated. With button BT you can choose between **LE** for slight relief / discharge return and **SE** for strong relief / discharge return.

Return to the learning sequence using button LERN



Remark regarding the force reserve: The force detection of the controller has a maximum value which must not be exceeded. During learning of the running distance the controller determines the maximum motor current of the motor connected. This also must not be exceeded.

The maximum force limit is the lowest value of force learned plus force reserve and the maximum force of the controller and the maximum force of the motor.



Is the selected force reserve so high, that the maximum of the learning force value plus force reserve is higher than the maximum force of the controller or the maximum force of the motor, then the display shows a decimal point in addition to the force reserve stage. This indicates that the selected force reserve cannot be reached anymore and is in fact lower.



When the gate is switched off by force at the end stop CLOSE during closing and the position counter is synchronized, a relief / discharge return occurs in order to relieve the mechanics and to enable the gate to be released by emergency release. During learning it is defined, whether the gate should operate with a slight relief / discharge return or with a strong relief / discharge return.

- Slight relief / discharge return: Duration approx. 0.1 seconds.
- Strong relief / discharge return: Duration approx. 0.2 seconds.
- When using a spring-damped plastic rack the strong relief / discharge return is recommended.

### 9.4.3 Sequence P3: Adjusting of dead man's function/impulse mode

When sequence **P3** is activated by button LERN, the present value displayed. The desired value can be selected using button BT. Return to the learning sequence using button LERN.

Display	Corresponds to:
<b>LO</b>	The controller operates in dead man's function.
<b>5H</b>	The controller operates in impulse mode.

Table 12



Remark: It is possible to select dead man's function and automatic closure together, or dead man's function and delayed closure etc., but automatic closure / delayed closure etc. are not active during dead man's function, even when they are selected.

### 9.4.4 Sequence P4: Adjusting of partial opening position

Sequence **P4** can only be activated, when the gate position is known. After switching on the power supply the gate must first be closed.

After activating sequence **P4**, **HA** is displayed. Now the gate can be moved in dead man's function using BT, first slowly then fast, towards the desired partial opening position. Then press the LERN button. The current position is saved for partial opening. After this you return automatically to the learning sequence **P5**.

### 9.4.5 Sequence P5: radio remote control for BT, BTG and MULTI

When sequence **P5** is activated with the button LERN, an additional selection menu is displayed for selecting the code. With button BT you may move to the next points of the selection menu, with BTG you return to the previous sub-sequence.

Sub-sequence	Function
<b>L1</b>	Radio remote control code for BT can be learned or deleted
<b>L2</b>	Radio remote control code for BTG can be learned or deleted
<b>L3</b>	Radio remote control code for MULTI can be learned or deleted
next	Return to main sequence

Table 13

Sub-sequence is activated with button LERN. The display shows:

Display	Corresponds to:
- -	The selected radio remote control code is deleted and another can be learned.
<b>oo</b>	The selected radio remote control code is already stored and can be overwritten or deleted.

Table 14

To learn a code the transmitter has to be operated. The code will then be stored and you will return to the sub-sequence.

To erase the radio remote control code, press and hold the button BT and additionally push the button LERN. The radio remote control code is erased. Return to the subsequence follows automatically.

If only the button LERN is pushed, then return to the subsequence follows immediately without erasing the code.



Remark: The stored codes have to be different from each other.

### 9.4.6 Sequence P6: Automatic closure for complete opening

When sequence **P6** is activated by button LERN, the present value for stay-open time for complete opening is displayed or - -, when automatic closure for complete opening is not active. The automatic closure can be activated using the button BT and the value can be increased. Using button BTG the value can be decreased and automatic closure can be deactivated. The stay-open time can be selected from 01s to 299s. The decimal dots of the display are each equal to 100s.

Display (example)	Corresponds to:
- -	Automatic closure is deactivated.
<b>23</b>	Stay-open time 23 seconds. Automatic closure is activated.
<b>23.</b>	Stay-open time 123 seconds. Automatic closure is activated.

<b>2.3.</b>	Stay-open time 223 seconds. Automatic closure is activated.
-------------	---

Table 15

After the desired time is selected push the LERN button to return to the learning sequence.

### 9.4.7 Sequence P7: Automatic closure for partial opening

When sequence **P7** is activated by button LERN, the present value for stay-open time for partial opening is displayed or - - when automatic closure for partial opening is not active. The automatic closure can be activated using the button BT and the value can be increased. Using button BTG the value can be decreased and automatic closure can be deactivated. The stay-open time can be selected from 01s to 299s. The decimal dots of the display are each equal to 100s.

Display (example)	Corresponds to:
- -	Automatic closure is deactivated.
<b>23</b>	Stay-open time 23 seconds. Automatic closure is activated.
<b>23.</b>	Stay-open time 123 seconds. Automatic closure is activated.
<b>2.3.</b>	Stay-open time 223 seconds. Automatic closure is activated.

Table 16

After the desired time is selected push the LERN button to return to the learning sequence.

### 9.4.8 Sequence P8: Warning prior to opening and closing

When sequence **P8** is activated by button LERN, the present value for warning time is displayed. With the button BT the value can be selected. Return to the learning sequence using button LERN.

Display	Warning time before opening	Warning time before closing
<b>00</b>	No warning time	No warning time
<b>04</b>	No warning time	4 seconds warning time
<b>40</b>	4 seconds warning time	No warning time
<b>44</b>	4 seconds warning time	4 seconds warning time

Table 17

### 9.4.9 Sequence P9: Photo-cell function

When sequence **P9** is activated by button LERN, the present selection for the photo-cell function is displayed. With the buttons BT and BTG the desired function can be selected. Return to the learning sequence using button LERN.

Display	Gate not moving	Gate opens	Gate closes
<b>L1</b>	Remains not moving	Stops, opens when free again	Stops, opens when free again
<b>L2</b>	Remains not moving	Stops, opens when free again	Stops, closes when free again
<b>L3</b>	Only opening allowed	No effect	Stops, opens when free again
<b>L4</b>	Only opening allowed	No effect	Stops, closes when free again
<b>L5</b>	Only opening allowed	No effect	Stops and opens immediately

Table 18

### 9.4.10 Sequence PA: Photo-cell testing on/off

When sequence **PA** is activated by button LERN, the present selection for the photo-cell testing is displayed. With the button BT the mode can be selected. Return to the learning sequence using button LERN.

Display	Corresponds to:
<b>oF</b>	Photo-cell testing is deactivated.
<b>on</b>	Photo-cell testing is activated. This function is only possible when the photocells have passed the LS-Test during the learning sequence.

Table 19

**9.4.11 Sequence PB: Delayed closure / off**

When sequence **Pb** is activated by button LERN, the present selection is displayed. With the button BT the mode can be selected. Return to the learning sequence using button LERN.

Display	Corresponds to:
<b>oF</b>	A close command by BZ is executed immediately.
<b>on</b>	A close command by BZ is stored and will be executed when the end position OPEN or partial opening is reached.

Table 20



Remark: This function is not possible with dead man's mode.

**9.4.12 Sequence PC: Maintenance counter indication and deletion**

When sequence **PC** is activated by button LERN, the current maintenance counter reading is displayed. The maintenance counter reading is deleted by pressing the BT button and additionally the LERN button. Then return to the learning sequence using button LERN. If only the LERN button is pushed, you return to the learning sequence without changing the maintenance counter reading.

The decimal dots of the display are each equal to 100.

Display(example)	Cycles for a slide gate Prescaler 1: 1000
<b>23</b>	23 x 1000 = 23.000 cycles
<b>23.</b>	123 x 1000 = 123.000 cycles
<b>2.3.</b>	223 x 1000 = 223.000 cycles

Table 21

**9.4.13 Sequence PD: Adjusting maintenance interval**

When sequence **Pd** is activated by button LERN, the maintenance interval is displayed or - - when no maintenance notice shall be given. Using BT the monitoring can be switched on and the maintenance interval can be increased. Using BTG the maintenance interval can be decreased and the monitoring can be switched off.

The decimal dots of the display are each equal to 100.

Display(example)	Cycles for a slide gate Prescaler 1: 1000
<b>- -</b>	No maintenance notice
<b>23</b>	Maintenance notice when counter displays >= 23 thus after 23 x 1000 = 23.000 cycles
<b>23.</b>	Maintenance notice when counter displays >= 23. thus after 123 x 1000 = 123.000 cycles
<b>2.3.</b>	Maintenance notice when counter displays >= 2.3. thus after 223 x 1000 = 223.000 cycles

Table 22



Attention: Adjusting the maintenance interval is also possible, when the multifunctional relay is set up to not release maintenance notice.

In order for the controller to generate the maintenance notice, the following has to be selected in the learning sequence:

1. The mode slide gate has to be selected.
2. The maintenance interval has to be set to the desired value.
3. The multi-functional relay has to be set up to release maintenance notice.
4. The maintenance counter has to be reset to zero (if applicable).

**9.4.14 Sequence PE: Mode for multi-functional relay**

When sequence **PE** is activated by button LERN, the present selection is displayed. Using BT and BTG the required mode can be selected. Return to the learning sequence using button LERN. During programming of the controller the relay is shut off.

Display	Function	Corresponds to:
---------	----------	-----------------

<i>r 1</i>	Remote control –push button mode	The relay is active as long as the controller receives the radio remote control code MULTI.
<i>r 2</i>	Remote control–toggle mode	The relay alternates between active and de-active with each radio remote control code MULTI.
<i>r 3</i>	Light pulse mode	The relay is active for 1 second, when BT, Funk BT, BTG, Funk BTG, BA or BZ are pushed.
<i>r 4</i>	3-minute-light	The relay is active for 180 seconds, when BT, Funk BT, BTG, Funk BTG, BA or BZ are pushed.
<i>r 5</i>	Timer channel 2	When channel 2 of ASU2 is switched on the relay is active.
<i>r 6</i>	Maintenance/errors	When maintenance is required the relay is activated. When certain error codes occur, for which maintenance or repair is required, the relay alternates between active and de-active in one-second-intervals.

Table 23

### 9.4.15 Sequence PF: Return to original settings

When sequence **PE** is activated by button LERN, the present selection is displayed. Using BT and BTG the required mode can be selected. Return to the learning sequence using button LERN. During programming of the controller the relay is shut off.

Display	Function	Corresponds to:
<i>r 1</i>	Remote control –push button mode	The relay is active as long as the controller receives the radio remote control code MULTI.
<i>r 2</i>	Remote control–toggle mode	The relay alternates between active and de-active with each radio remote control code MULTI.
<i>r 3</i>	Light pulse mode	The relay is active for 1 second, when BT, Funk BT, BTG, Funk BTG, BA or BZ are pushed.
<i>r 4</i>	3-minute-light	The relay is active for 180 seconds, when BT, Funk BT, BTG, Funk BTG, BA or BZ are pushed.
<i>r 5</i>	Timer channel 2	When channel 2 of ASU2 is switched on the relay is active.
<i>r 6</i>	Maintenance/errors	When maintenance is required the relay is activated. When certain error codes occur, for which maintenance or repair is required, the relay alternates between active and de-active in one-second-intervals.

Table 24

### 9.4.16 Sequence PG: Emergency mode

When sequence **PG** is activated by button LERN, the present value is displayed. With the button BT the value can be selected. Return to the learning sequence using button LERN.

Display	Corresponds to
<i>o F</i>	The emergency mode is deactivated. In the case of a safety device, emergency mode is not possible.
<i>o n</i>	The emergency mode is activated. In case of a defective safety device, the gate can be operated in emergency mode.

Table 25



For emergency mode, it is essential that you observe the notes under point -

**9.5 Fault diagnosis by the controller**

An error is shown on the display as a code and also on the multi-functional relay (if applicable), when detected by the controller. The following errors are recognised and displayed.

Code on the display	Error code on the multifunctional relay	Error description
<i>E 1</i>	yes	Photo-cell testing failed
<i>E 2</i>	yes	Testing SLA failed
<i>E 3</i>	yes	Testing SLZ failed
<i>E 4</i>	yes	Running distance control stopped the gate. Check end stoppers and re-learn the running distance.
<i>E 5</i>	yes	The power supply Uext 12V exceeds the permitted limit. Too much power is withdrawn. The controller is blocked.
<i>E 6</i>	yes	The power supply Uext 24V exceeds the permitted limit. Too much power is withdrawn. The controller is blocked.
<i>E 7</i>	yes	The gate is released.
<i>E 8</i>	yes	Data on memory is faulty. The controller must be relearned. Select learning sequence and program the controller again.
<i>E 9</i>	yes	1. The pulser is faulty. Check the wiring of the gate opener. or 2. The motor is blocked. Check the installation.
<i>E A</i>	yes	Return controller for repair. Possible cause: 1. Error in storing of data on controller memory. 2. Error found in the redundant detection of BS. 3. Error found in the power element. Either a motor relay or a semi-conductor or a measuring amplifier is faulty.

Table 26



The error codes are not stored in a power failure safe manner.



Press the button LERN on the controller unit to acknowledge error messages.

**10 Maintenance**

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The maintenance intervals depend on the application and on the frequency of operation. Recommended is a maintenance interval of 6 months.

1. Check the operator housing and the toothed rack / gate for signs of an accident or damage. Replace if necessary.
2. Visual inspection and – if applicable – tightening of the screw connections (motor / gearbox / ...).
3. Check the anchoring of the gate opener at the foundation.
4. Check the end positions of the gate. If necessary adjust the mechanical stops.
5. Disengage and engage the emergency release a few times and check for correct functioning.
6. Check all safety devices (photoelectric barrier, safety contact profile, ...) for correct functioning.
7. Make sure that the installation and operating instructions are complete.

## 11 Decommissioning

A product that is no longer usable should not be recycled as complete unit, but recycled according to material types. Non-recyclable materials have to be disposed of in an environmentally compatible manner.

- The decommissioning, disassembly and disposal of the product must be carried out by qualified persons.
- The disassembly has to be carried out in reverse order to the assembly.
- The product has to be disposed of according with respective country-specific regulations.

### 11.1 Disposal



For any related questions to proper disposal of the electrical and electronic components contact ELKA or competent specialist dealer.



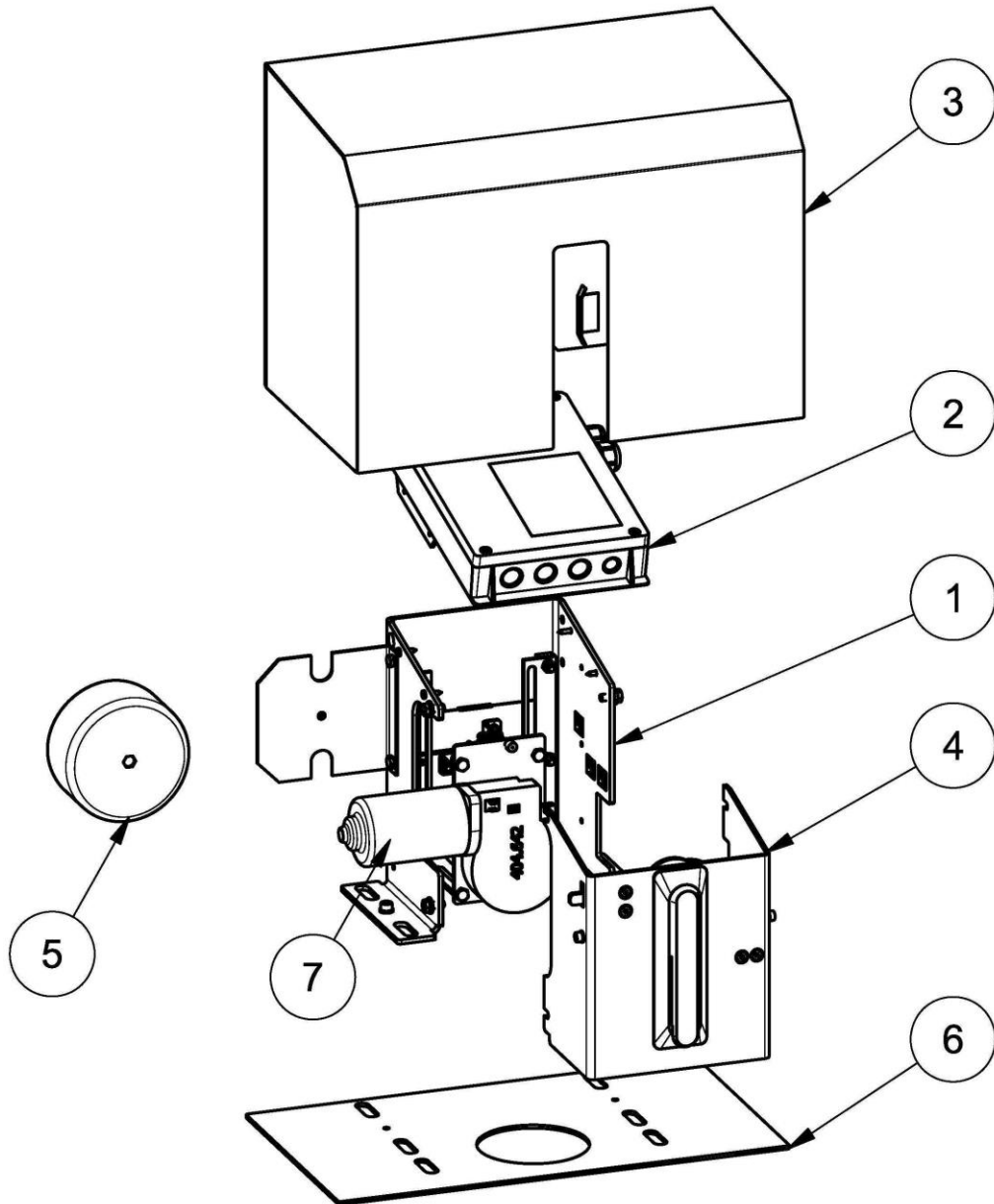
#### **INFORMATION!**

#### **Environmental hazard due to inappropriate disposal of the product (or parts thereof)!**

Incorrect disposal can cause damage to the environment.

- The applicable environmental standards must always be observed.
- After appropriate dismantling and disassembly, use the dismantled components for recycling.
- Separate the valuable substances and recycle the relevant material.

12 Layout (exploded drawing)



Drawing 25

- |   |                  |   |                       |
|---|------------------|---|-----------------------|
| 1 | Basis carrier    | 5 | Transformer           |
| 2 | Controller MO 46 | 6 | Base plate (optional) |
| 3 | Hood             | 7 | Motor                 |
| 4 | Front panel      |   |                       |

## Index

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<b>A</b>	
Automatic closure .....	37
<b>C</b>	
Connection example .....	24
<b>D</b>	
Dead man's function .....	37
Declaration of conformity .....	7
Decommissioning.....	43
Degree of protection .....	10
Disposal .....	43
<b>E</b>	
Electrician .....	5
Emergency mode.....	40
Emergency release .....	20
<b>F</b>	
Force detection .....	31
Force reserves .....	36
foundation .....	14
Function description.....	9
<b>G</b>	
General information .....	3
General notes on safety .....	4
<b>H</b>	
Height adjustment .....	21
<b>I</b>	
Installation.....	11
Instructed person .....	5
Intended use of barriers .....	4
<b>L</b>	
Layout (exploded drawing).....	44
<b>M</b>	
Maintenance counter .....	33
Motor connection .....	23
<b>O</b>	
Operating behaviour .....	28
<b>P</b>	
Personal protective equipment .....	5
Photo-cells.....	32
Programming.....	35
<b>R</b>	
Rack .....	16, 18
radio remote control.....	4
Radio remote control .....	4
Radio remote control display .....	33
Relief / discharge return.....	36
Running time limit .....	31
<b>S</b>	
Service counter.....	33
Specialist .....	4
Speed .....	36
Storing .....	6
Symbol explanation .....	3
Synchronizing area .....	31
<b>T</b>	
Technical data .....	10
Timer mode .....	33
Tools.....	11
Toothed wheels .....	10
Traffic light .....	33
Transportation and storing.....	6
<b>W</b>	
Warning light.....	33
Wiring diagram .....	25