en

GfA ELEKTROMATEN®

Electrical operating instructions

Door control panel TS 981

Software 1.4 (Design and functions subject to change)

TÜV CERT
DIN EN ISO 9001:2000
Zertifikat: 01 100 5118

51171314 - c 06.2008

OPERATING INSTRUCTIONS

Page

SAFETY DIRECTIONS

Basic Directions

This control has been built in accordance with **DIN EN 12453 Industrial, commercial and garage doors and gates - Safety in use of power operated doors - Requirements and DIN EN 12978 Industrial, commercial and garage doors and gates - Safety devices for power operated doors - Requirements and Test methods;** and left the factory in perfect condition from the point of view of safety. To maintain this condition and to ensure safe operation, the user must observe all the directions and warnings contained in these operating instructions.
In principle, only trained electrical craftsmen should work on electrical equipment. They must assess the work which has been assigned to them, identify potential danger sources and take suitable safety precautions.
Reconstruction of or changes to TS 981 are only permissible with the approval of the manufacturer. Original replacement parts and accessories authorised by the manufacturer guarantee safety. Liability ceases to apply if other parts are used.
The operational safety of an TS 981 is only guaranteed if it is used in accordance with the regulations. The limiting values stated in the technical data should not be exceeded under any circumstances (see corresponding sections of the operating instructions).

Safety Regulations

During the installation, initial operation, maintenance and testing of the Control Panel, it is necessary to observe the safety and accident-prevention regulations valid for the specific application.

In particular, you should observe the following regulations (this list is not exhaustive):

European normative

- DIN EN 12445
  Safety in use of power operated doors - Test methods
- DIN EN 12453
  Safety in use of power operated doors - Requirements
- DIN EN 12978
  Industrial, commercial and garage doors and gates -
  Safety devices for power operated doors - Requirements and Test methods

Please check normative´s bellow.

VDE-regulations

- DIN EN 418
  Safety machinery
  Emergency stop equipment functional aspects
  Principles for design
- DIN EN 60204-1 / VDE 0113-1
  Safety of machinery - Electrical equipment of machines - Part 1:
  Prescriptions générales
- DIN EN 60335-1 / VDE 0700-1
  Safety of household and similar electrical appliances - Part 1:
  General requirements

Regulations

- Please ensure that the local regulations relating to the Safety of Operations of Doors are followed

SAFETY DIRECTIONS

Explanation of warnings

These operating instructions contain directions which are important for using the ELEKTROMATEN® appropriately and safely.

The individual directions have the following meaning:

DANGER
This indicates danger to the life and health of the user if the appropriate precautions are not taken.

CAUTION
This warns that the ELEKTROMATEN® or other materials may be damaged if the appropriate precautions are not taken.

General warnings and safety precautions

The following warnings are to be understood as a general guideline for working with the ELEKTROMATEN® in conjunction with other devices. These directions must be observed strictly during installation and operation.

Check that all screw connections are secure before operating the control and adjusting the limit switches.

- Please observe the safety and accident prevention regulations valid for the specific application.
- The ELEKTROMATEN® must be installed with the authorised coverings and protective devices. Care should be taken that any seals are fitted correctly and screw couplings are tightened correctly.
- In the case of ELEKTROMATEN® with a permanent mains connection, an all-pole main switch with appropriate back-up fuse must be provided.
- Check live cables and conductors regularly for insulation faults or breakages. When a fault is detected in the cabling, the defective cabling should be replaced after immediately switching off the mains supply.
- Before starting operation, check whether the permissible mains voltage range of the devices corresponds to the local mains voltage.
- With three – phase motor connection it must have right phase rotation

INSTALLATION ADVICE

After the ELEKTROMATEN® is fitted we recommend the following procedure to rapidly reach a fully functioning door.

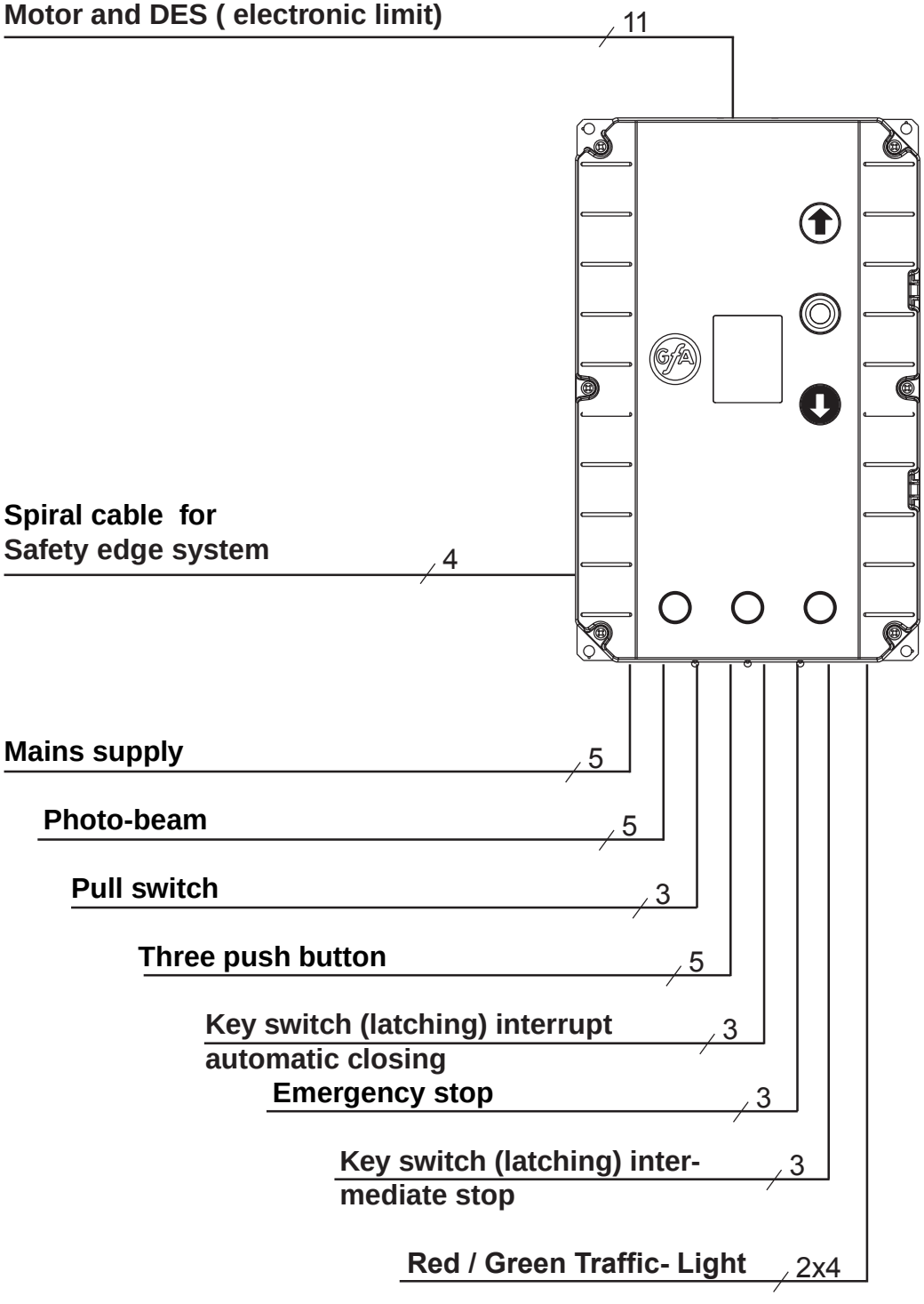
The door is ready to work in Dead man mode.

The door is ready to work in automatic mode.

Check connection of external devices e.g. push button etc.
Overview to connect external devices see diagram (page 14-17).
After the devices are connected the programming of the control panel must be finalised. (page 18).

INSTALLATION OVERVIEW

Important!
Using the connection cable out side the building is not permitted.

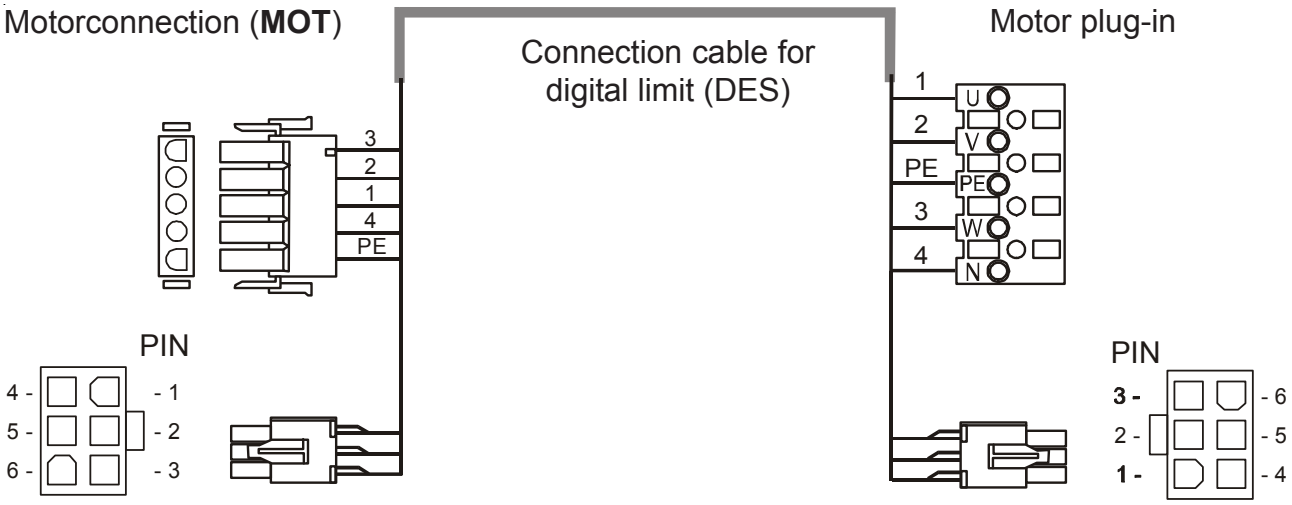


ENCLOSURE INSTALLATION

Before mounting the enclosure, the surface has to be checked for flatness, slope and freedom from vibrations. Mounting must be vertical. It is important that the door can be clearly seen from the position of the control through-out its travel.

CONNECTING THE CONTROL AND THE ELEKTROMATEN®

After the drive and control are fitted they can be connected with a plug-in cable. The cable has plugs on each end and for easy fitting. The plugs for motor and control panel are different and cannot be interchanged.



Cable identification

Motor plug to control unit

PIN	- Wire-No.	Excution:
1	- 3	Phase W
2	- 2	Phase V
3	- 1	Phase U
4	- 4	Neutral (N) (not used)
5	- PE	Earth

Limit plug-in to control panel TS 981 (**DES**)

PIN	- Wire-No.	Excution:
1	- 5	Safety chain 24V DC
2	- 6	RS485 B
3	- 7	GND
4	- 8	RS485 A
5	- 9	Safety chain
6	- 10	8V DC

MAINS SUPPLY

DANGER! To the life and health thru electric shock.
Before mounting the mains supply must be switched OFF.

External fuse!
Control must be saved against short circuit and overload by an external fuse, max. 10A delayed, in the mains supply. An automatic cut off switch is required, regarding the supply for three-phase or single-phase.

When connecting control to mains supply a mains isolator switch or (16A CEE – plug) according EN 12453 is required. The control panel has an integrated auto controlled power unit for voltages from 230V up to 400V +/- 10%.
The supply disconnect device (Main switch or CEE plug) must be installed between 0,6m and 1,7m above floor level.

The Control panel TS 981 has a universal electric supply and works with the following supplies. (See diagram Fig.1-5)

Mains supply terminal

Fig.: 1

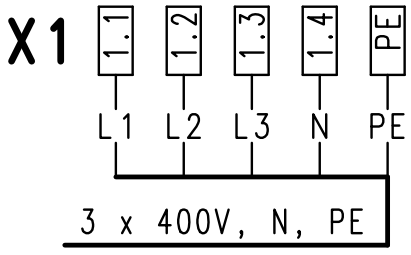


Fig.: 2

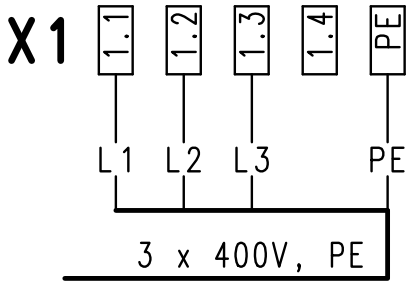


Fig.: 3

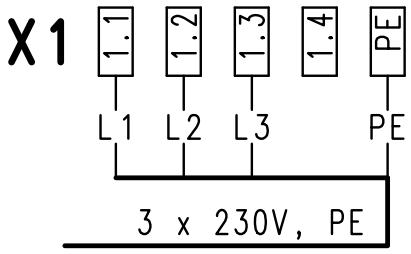
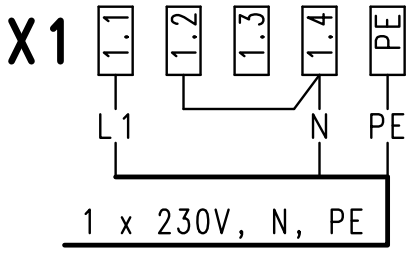
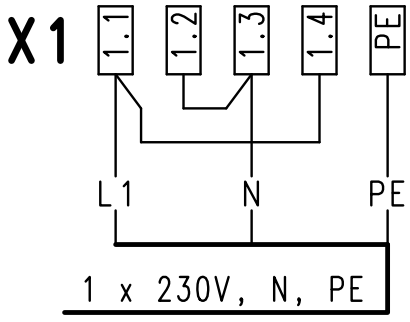


Fig.: 4



symmetric winding

Fig.: 5

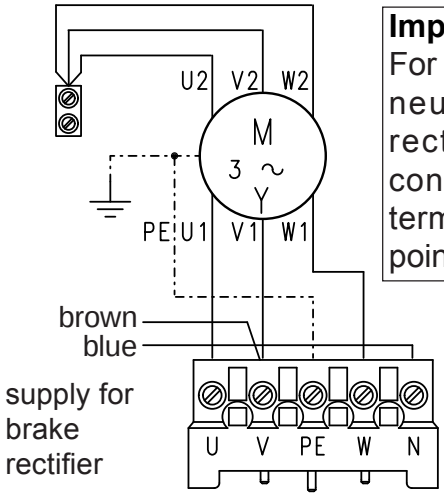


asymmetric winding

Drive unit with DU speed controller works only with 3x 400V. A supply 3x230V or 1x 230V is not allowed

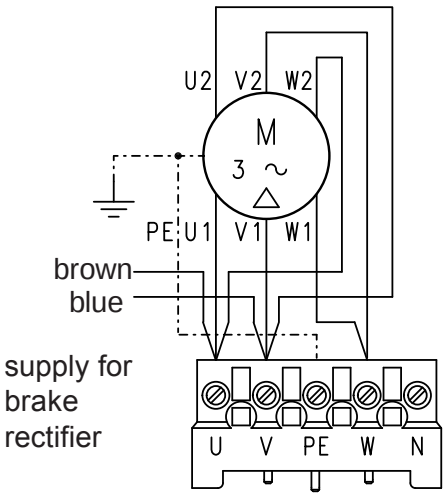
MOTOR CONNECTION (internal wiring)

Three-phase 3 x400 V AC, N, PE
Star connection

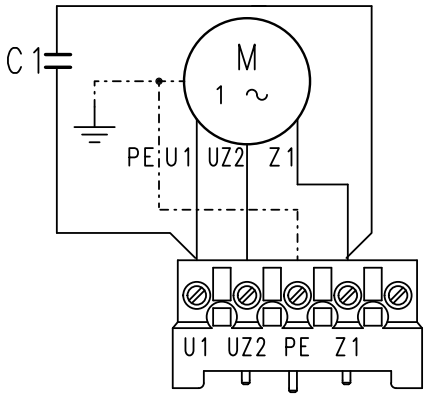


Important note!
For 3x400V AC PE no neutral, the brake rectifier must be connected between terminal V and star-point terminal.

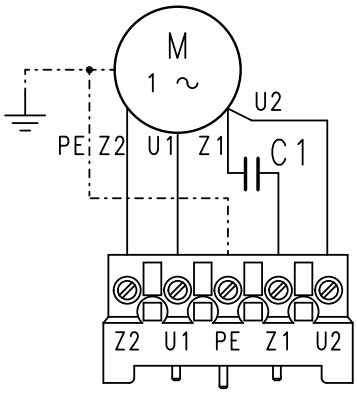
Three-phase 3 x230 V AC, PE
Delta connection



Single-phase 1x230 V AC, N, PE
symmetrical winding



Single-phase 1x230 V AC, N, PE
asymmetrical winding



On several ELEKTROMATEN® the connection U1 und V1 on the motor-plug are interchanged.

PHASE ROTATION

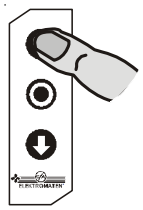
Important Notice!
After the Mains supply has been connected by inserting the CEE plug in the appropriate socket or turning on the main switch, confirm that the phase rotation is correct by checking that the door opens when the OPEN push button is operated.
If the door closes when operating the OPEN push button reverse two phases at the terminal X1.

DANGER! To the life and health through electric shock.
Before changing phase rotation the mains supply must be switched OFF.

RAPID ADJUSTMENT OF THE LIMITS

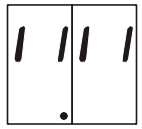
When the phase rotation has been checked the Rapid limit adjustment can be made.
The final setting can be made with the fine adjustment (Control Programming page 19).
Safety limits and pre-limits are automatically adjusted.

1. Setting final limit open



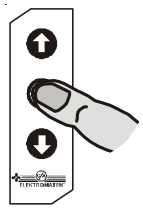
Door open

press button to reach upper limit

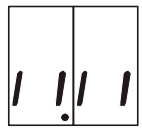


Display
blinking

2. Memorise the final limit open

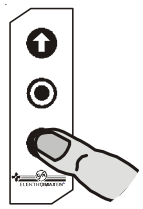


Press stop-button for 3 sec. until
the display changes



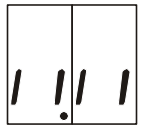
Display
changes

3.Setting the final limit close



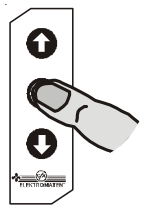
Door close

press button to reach lower limit

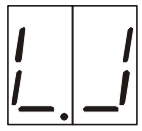


Display
blinking

4. Memorise the final limit close



Press stop-button for 3 sec. until
the display changes

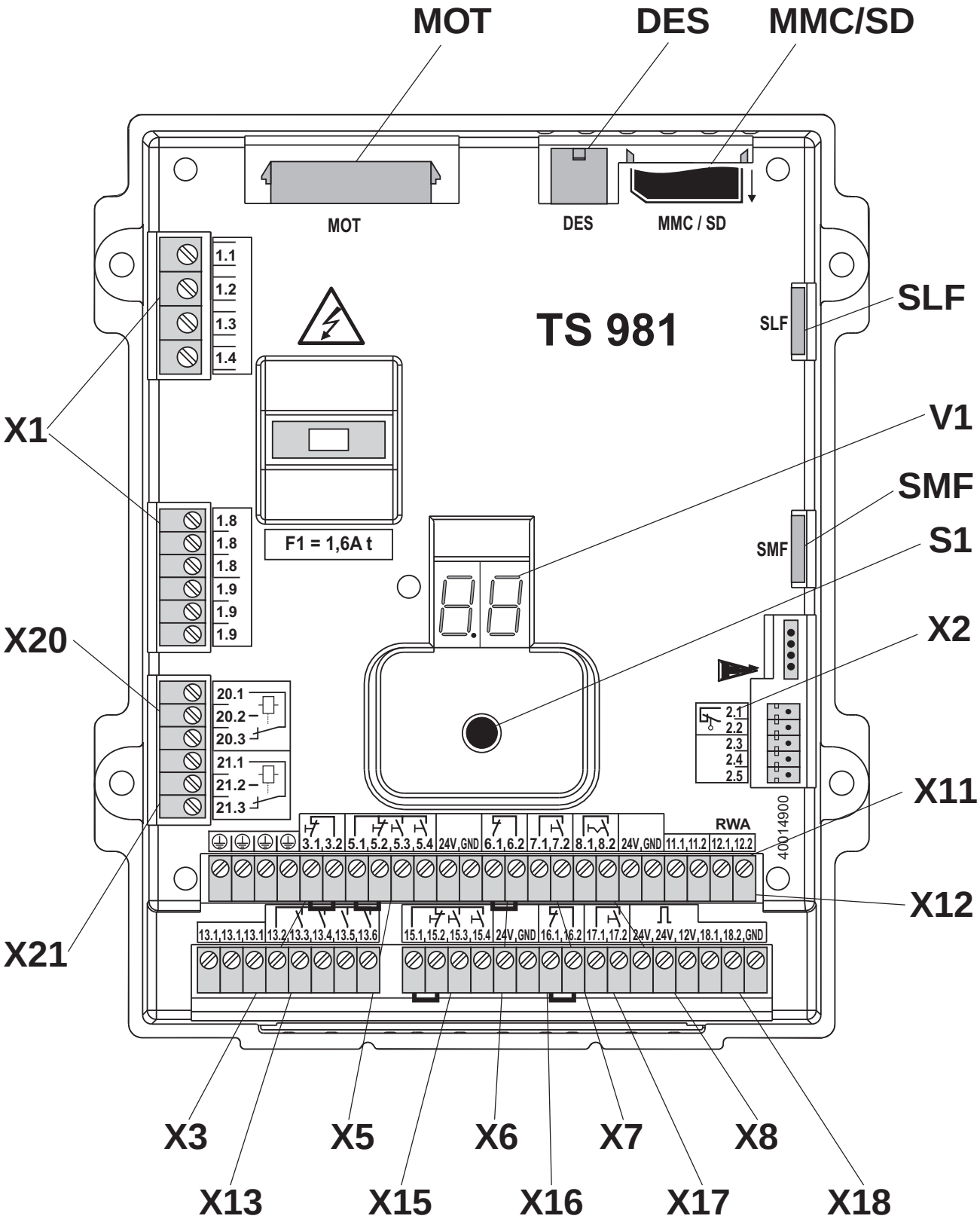


Display
changes

The Rapid adjustment is finished

The door could be moved in DEADMAN mode UP/DOWN
Further adjustments see programming mode

HARDWARE OVERVIEW



HARDWARE OVERVIEW

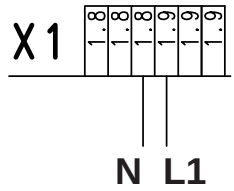
Description Print:

X1	Mains supply external supply 230V **1.9** = L1 L1 fused with F1 = 1,6A **1.8** = N (only with 3 x 400V, N, PE und 1 x 230V, N, PE)
X2	Safety edge system and pass-door plug
X3	Emergency push button
X8	Key switch for intermediate stop
X11	Key switch ON / OFF for automatic closing
X12	Smoke draining
X13	Traffic lights 2x Red / Green
X18	Entrapment safety evaluation
X20	Potential free relay contact 1
X21	Potential free relay contact 2

DES	Limit connection
MOT	Motor connection
MMC/SD	Slot for memory cards
SLF	Slot for Air-lock control function
SMF	Slot for Status / Information function
S1	Selector switch
V1	7-segment display
►	Internal push button

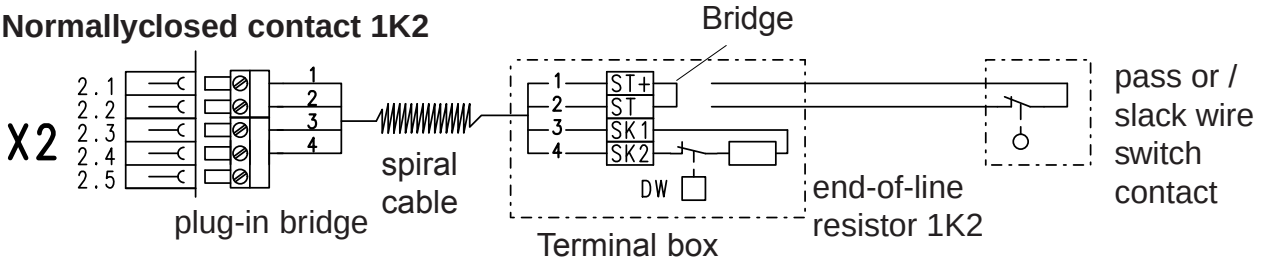
Command from inside	Command from outside
X5 Three push button / Key switch	**X15** Three push button / Key switch
X6 Reflective photo-beam / photo-beam	**X16** Reflective photo-beam / photo-beam
X7 Ceiling pull switch / Radio control	**X17** Ceiling pull switch / Radio control

WIRING DIAGRAM

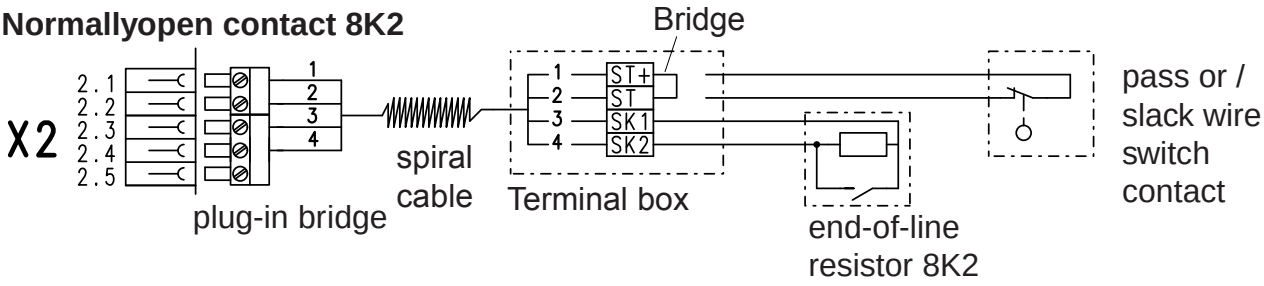


L1 fused
via F1 = 1,6At

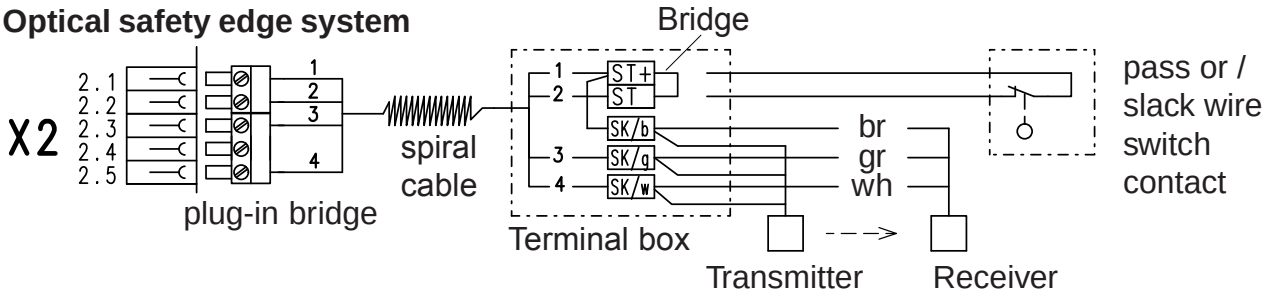
Normallyclosed contact 1K2

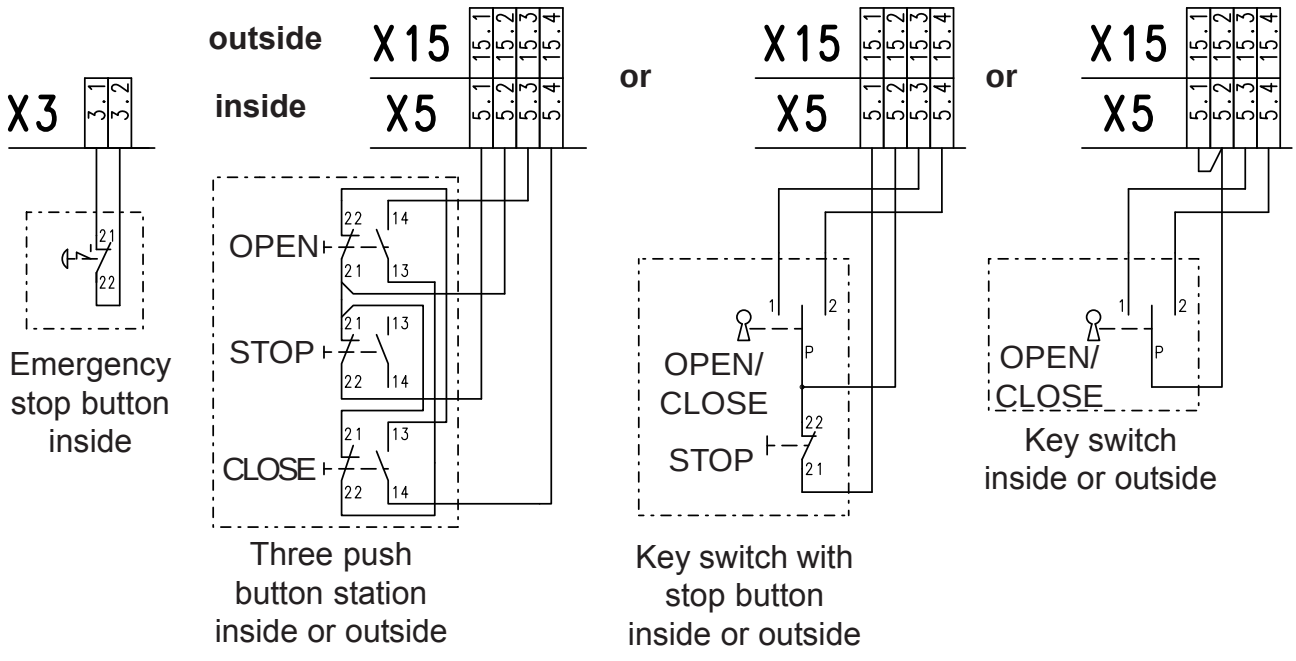


Normallyopen contact 8K2

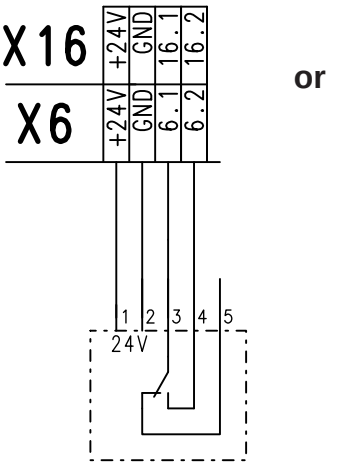


Optical safety edge system



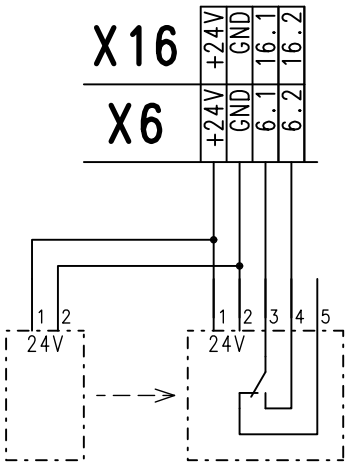


WIRING DIAGRAM



Reflective photo-beam
inside or outside

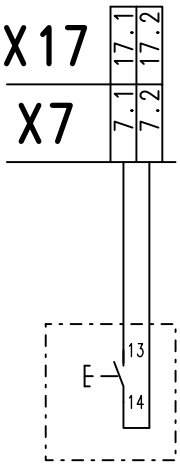
or



outside

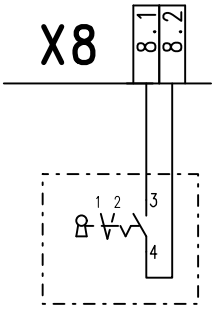
inside

Transmitter- Receiver
photo-beam
inside or outside

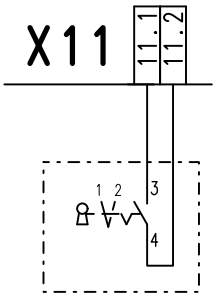


Ceiling pull switch /
Radio control
inside or outside

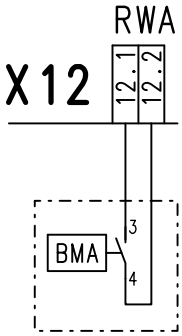
for closing direction



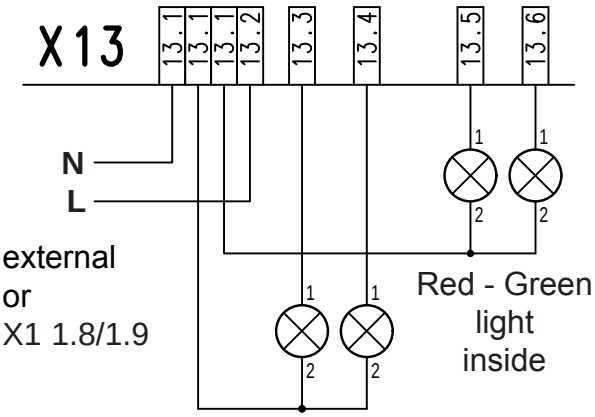
Key switch ON / OFF
Intermediate stop



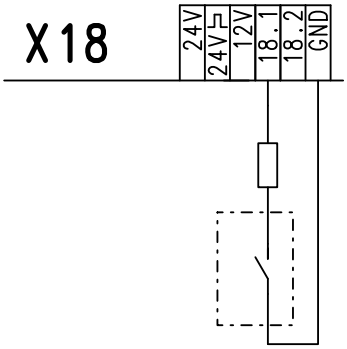
Key switch ON / OFF
automatic closing



Smoke draining
contact RWA

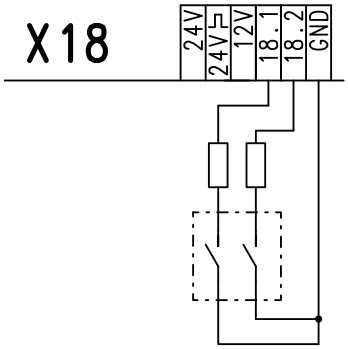


WIRING DIAGRAM

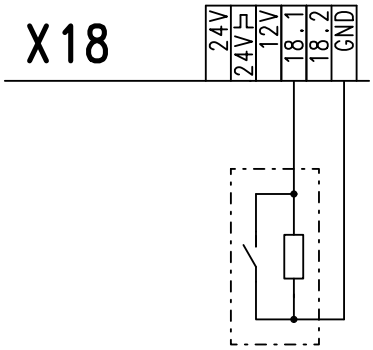


Input for external entrapment
safety device 1K2
single

or

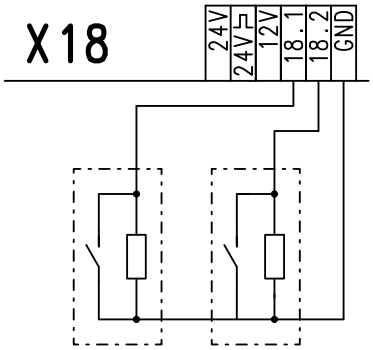


Input for external entrapment
safety device 1K2
double

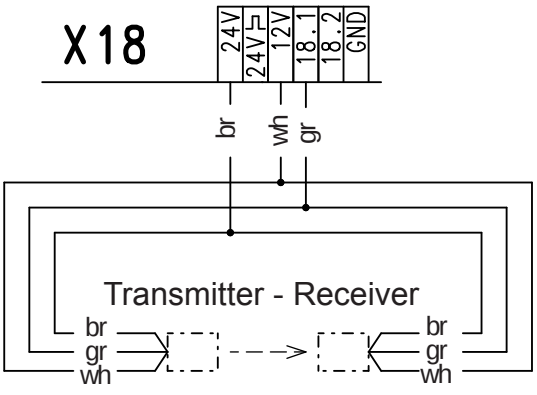


Input for safety edge 8K2
against entrapment
single

or

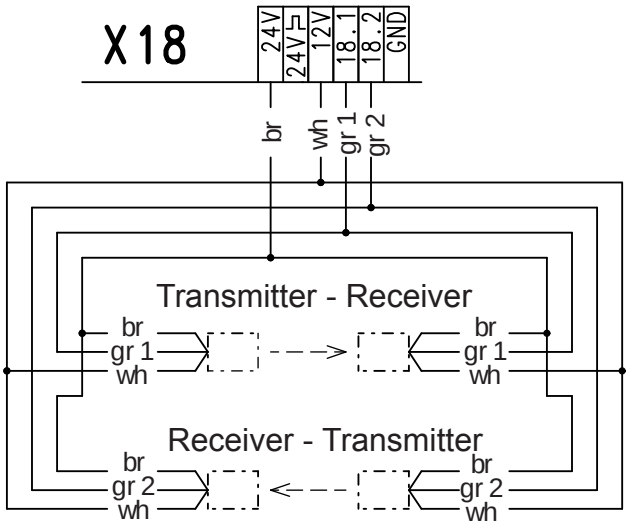


Input for safety edge 8K2
against entrapment
double



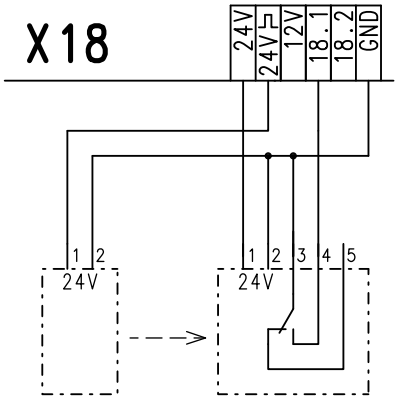
Raytector photo-beam or
Optical safety edge
against entrapment
single

or



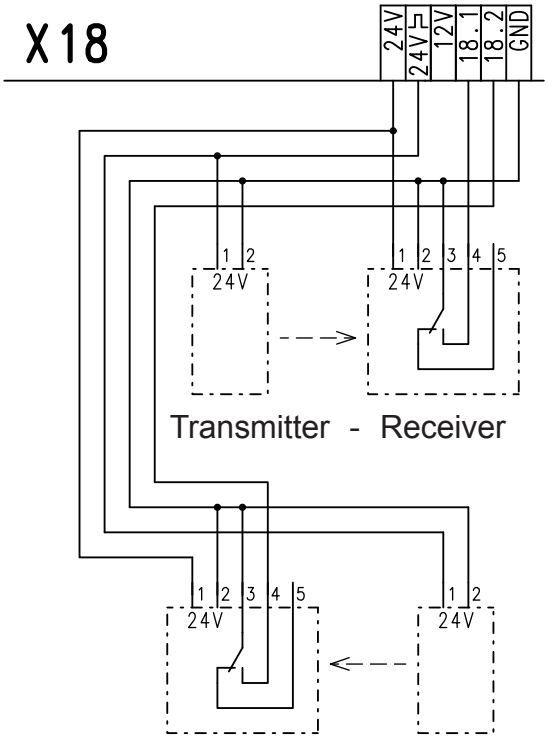
Raytector photo-beam or
Optical safety edge
against entrapment
double (inside - outside)

WIRING DIAGRAM



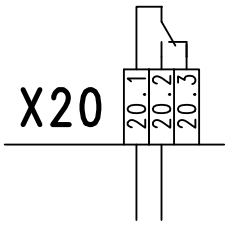
Transmitter - Receiver

photo-beam
single,
against entrapment
comply EN 12978

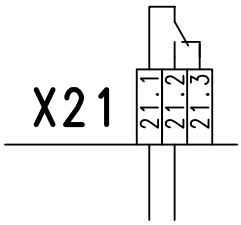


Transmitter - Receiver

Receiver - Transmitter
photo-beam
double,
against entrapment
comply EN 12978



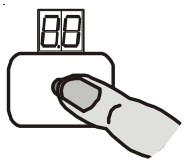
Potential free
relay contact



Potential free
relay contact

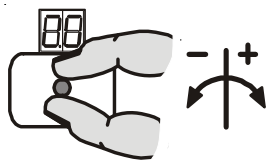
CONTROL PROGRAMMING

1. Enter programming Mode



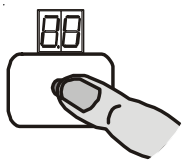
Press selector switch for 3 sec. until **display = 00**

2. Chose program and confirm



Turn selector

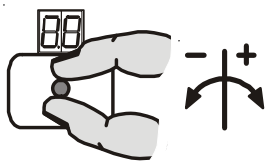
and



Press selector

3. Adjustment

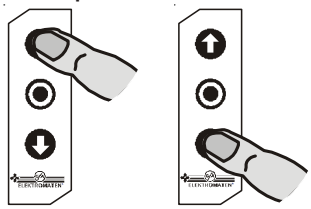
Functionen



Turn selector

or

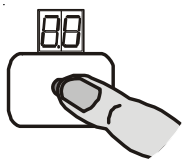
Door position



Press foil buttons

4. Memorise

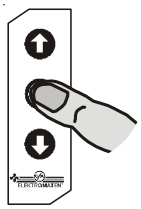
Functionen



Press selector

or

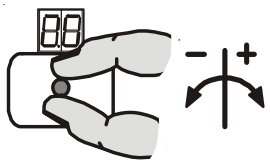
Door position



Press stop-button

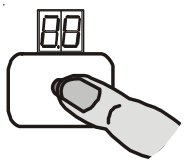
further adjustments

5. Exit programming



Turn selector until display = 00

and



Press selector

CONTROL PROGRAMMING

2. Choose program and confirm	**3.** Adjustment	**4.** Memorise
Operating mode		
01 **Door function**	**Dead man OPEN** **Dead man CLOSE**	**Press selector**
	02 **Self-hold OPEN** **Dead man CLOSE**	
	03 **Self-hold OPEN** **Self-hold CLOSE**	
	04 **Self - hold OPEN, CLOSE** **(X5/X15) release for external pushbutton function only dead man close**	
Door position		
11 **Final limit open coarse adjustment**	**Move door upwards or downwards**	**Press stop Button**
12 **Final limit close coarse adjustment**	**Move door upwards or downwards**	**Press stop Button**
13 **Final limit open fine adjustment**	01 **Final limit open can change without door movement using +/-**	**Press selector**
14 **Final limit close fine adjustment**	01 **Final limit close can change without door movement using +/-**	**Press selector**
15 **Pre-limit safety edge fine adjustment**	01 **Pre-limit safety edge can change using +/-**	**Press selector**
16 **Intermediate stop**	**Move to intermediate stop**	**Press stop Button**
17 **Switching position Relay 1**	**Move to switching position relay 1**	**Press stop Button**
18 **Switching position Relay 2**	**Move to switching position relay 2**	**Press stop Button**

CONTROL PROGRAMMING

2. Choose program and confirm	**3.** Adjustment	**4.** Memorise
Functions		
1.1 **Safety edge function in Pre - limit area**	1 **Safety edge is activated**	**Press selector**
	2 **Safety edge is deactivated**	
	3 **Safety edge is activated + automatic ground adjustment**	
1.2 **Overrun correction**	0 **OFF**	**Press selector**
	1 **ON**	
1.3 **Automatic closing feature**	00 **time can be set between 1 - 240 sec. 0 = OFF**	**Press selector**
1.4 **Automatic closing after photo-beam is interrupted and re-made**	0 **OFF**	**Press selector**
	1 **ON**	
1.6 **Step by Step function (X7 / X17): only Ceiling pull switch / Radio remote control**	1 **X7 / X17 = Command 1**	**Press selector**
	2 **X7 = Command 1, X17 = Command 2**	
	3 **X7 = Command 2, X17 = Command 1**	
	4 **X7 / X17 = Command 3**	
	5 **X7 / X17 = Command 3**	
1.7 **Function Relay 1**	0 **OFF**	**Press selector**
	1 **Switch contact impulse: 1sec. only available with menu 1.7**	
	2 **Switch contact continuous only available with menu 1.7**	
	3 **Switch contact impulse: 1sec. by open - commands**	

CONTROL PROGRAMMING

2. Chose program and confirm		**3.** Adjustment	**4.** Memorise
Functions			
 **Function Relay 2**		 **OFF**  **Switch contact impulse: 1sec. only available with menu 1.8**  **Switch contact continuous only available with menu 1.8**  **Switch contact impulse: 1sec. by open - commands**	 **Press selector**
Safety functions			
 **Door overload monitor**		 **OFF**  **sensitive**  **insensitive**	 **Press selector**
 **Photo beam interrupt function**		 **OFF**  **ON**	 **Press selector**
 **RWA smoke draining – position**		 **Move to RWA position, up to a minimum height of 2,5m**	 **Press stop Button**
 **Selection of external safety against entrapment devices**		 **OFF**  **NC contact evaluation 1 K2 without testing single**  **NC contact evaluation 1 K2 without testing double**  **NO contact evaluation 8K2 single**  **NO contact evaluation 8K2 double**  **Impulse-evaluation 1 kHz (Raytector or OSE) single**  **Impulse-evaluation 1 kHz (Raytector or OSE) double**  **Impulse-evaluation testing signal (Transmitter – Receiver photo-beam) single**  **Impulse-evaluation testing signal (Transmitter – Receiver photo-beam) double**	 **Press selector**

CONTROL PROGRAMMING

2. Choose program and confirm	**3.** Adjustment	**4.** Memorise
Adjustment only for ELEKTROMATEN® with speed changer DU		
41 **OPENING speed**	60 **Output speed OPEN - rpm (30 - 65)**	**Press selector**
42 **CLOSING speed**	20 **Output speed CLOSE - rpm (20 - 30)**	**Press selector**
43 **HIGHER CLOSING speed**	20 **Increased closing speed to a height of 2,5m 0=OFF (20 - 30)**	**Press selector**
44 **Changeover position CLOSING speed**	– – **Changeover position higher/lower closing speed**	**Press stop Button**
45 **UPWARD acceleration**	1 **rapid** 2 **normal** 3 **slow**	**Press selector**
46 **DOWNWARD acceleration**	1 **rapid** 2 **normal** 3 **slow**	**Press selector**
47 **UPWARD deceleration**	1 **rapid** 2 **normal** 3 **slow**	**Press selector**
48 **DOWNWARD deceleration**	1 **rapid** 2 **normal** 3 **slow**	**Press selector**

The appeared numbers for output speed open and close corresponding to the real RPM of the drive unit.
The speed has a direct influence into operating forces.
Check again the adjustment and drive unit's speed.

Programming: **SE 6.65 DU**
P 41 rpm open → min. 20 rpm – max. 65 rpm
P 42 rpm close → min. 20 rpm – max. 30 rpm
P 43 the same as P42

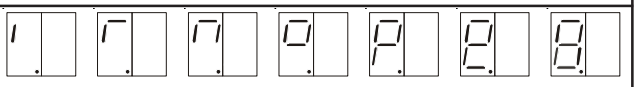
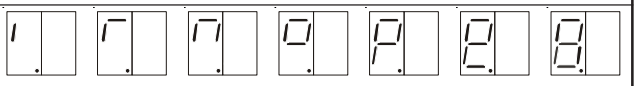
CONTROL PROGRAMMING

2. Choose program and confirm	**3.** Adjustment	**4.** Memorise
Extended door functions		
 **Traffic light management selection**	  **OFF**  **One-way traffic**  **Two-way traffic - priority OFF**  **Two-way traffic - priority inside**  **Two-way traffic - priority outside**	 **Press selector**
 **Extended green light period**	  **Adjustment 0 - 90 seconds**	 **Press selector**
 **Fore-warning period**	  **Adjustment 0 - 10 second**	 **Press selector**
 **Gateway evacuation period**	  **Adjustment 0 - 90 seconds**	 **Press selector**
 **Red light function if the door is CLOSED**	  **Red lights OFF**  **Red light inside ON**  **Red light outside ON**  **Red light inside/outside ON**	 **Press selector**
 **Air-lock function**	  **OFF**  **ON**	 **Press selector**
 **Door OPEN command transmission if the Air-lock function is ON**	  **Time adjustment between 0 – 10 seconds. Delayed opening door 2 starts if door 1 is closed**	 **Press selector**

CONTROL PROGRAMMING

2. Chose program and confirm		**3.** Adjustment	**4.** Memorise
Maintenance cycle counter			
05 **Counter adjustment**	±	01 **01-99 correspond from 1.000 up to 99.000 Count down cycles**	**Press selector**
06 **Reaction when reaching 0**	±	01 **Display appears „CS“ and adjusted number of cycles** 02 **Changing to DEADMAN display appears „CS“ and adjusted number of cycles** 03 **Changing to DEADMAN same as 0.2 reset to about 500 cycles possible, press 3 sec. Stop – Button** 04 **Display appears „CS“ and adjusted number of cycles and Relay contact is activated**	**Press selector**

MEMORY CHECK

2. Chose program and confirm		Displayed
01 **Info Cycle counter 7- digit**	**Press selector**	 **M HT ZT T H Z E** **The cycles would be displayed as follow.** **M = 1.000.000 H = 100** **HT = 100.000 Z = 10** **ZT = 10.000 E = 1** **T = 1.000**
02 **Info last 2 faults**	**Press selector**	**Last 2 faults would be alternately displayed.**
03 **Info Program changes 7- digit**	**Press selector**	 **M HT ZT T H Z E** **The Number of program changes would be displayed as follow.** **M = 1.000.000 H = 100** **HT = 100.000 Z = 10** **ZT = 10.000 E = 1** **T = 1.000**
04 **Info Program version**	**Press selector**	**Program version will be displayed**

RESET

2. Chose program and confirm	3. Adjustment		4. Memorise
 RESET except cycle- and Program change counter		 Reset	Press stop button 3 sec.

SOFTWARE

2. Chose program and confirm	3. Adjustment		4. Loading
 Software loading		Select required software version from S-D card 	Press stop button 3 sec.

2. Chose program and confirm	
 Software saving	 Press selector

SAFETY DEVICES

Safety edge system with optional connection for shutter pass - door or slack wire switch contact. X2

The control recognizes and works with 3 different safety edges.
Each one needs a special 4 core spiral cable and includes an optional shutter pass - door or slack wire switch contact.
The spiral cable connection must be made on the print with the plug provided. The opposite side of the cable is connected to a terminal box or a signal (pressure switch) emitter.

Typ 1: Resistance evaluation 1K2 with normally closed safety edge contact
(safety edge with pressure wave switch and "Testing")

Typ 2: Resistance evaluation 8K2 with normally open safety edge contact

Typ 3: Optical safety edge (Fraba Brand)

Important note!
When connecting a safety edge, take account of DIN EN 12978 for Industrial, commercial and garage doors and gates - Safety devices for power operated doors - Requirements and Test methods.

Mounting the spiral cable

A bush is provided on both sides of the control box for mounting the spiral cable.
Push the plugs through into the enclosure until there is sufficient cable to allow the (2 and 3 pole) plugs to be connected to the board. The plug with two cores must be connected to the passdoor or slack wire switch terminals. The three core plug must be connected to the safety edge terminal.
The control panel TS 981 recognizes on first installation the safety edge system being used.
If passdoor / slack wire switch contact exists, remove bridge at terminal ST and ST+ in the terminal box. The plug at terminal X2 must be removed.

Important note!
When using a safety edge system the automatic pre-limit adjustment (5cm) must be checked. When the safety edge is activated the door should stop and reverse to the open position.

SAFETY DEVICES

Typ 1: Resistance evaluation 1K2 with normally closed safety edge contact

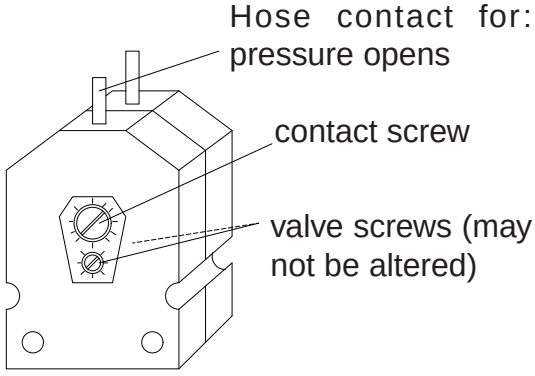
This evaluation system is made for pressure-wave switches (N/C) within an end-of-line resistor of 1K2 +/- 5% 0,25W.
A pressure wave is generated by compressing the rubber profile, which is conducted to the pressure-wave switch through the plastic hose. The system should be tested in the CLOSE position. The pre-limit would be set automatically and activate the "Testing function".

When the shutter runs over the pre-limit door position, a timer of two seconds starts to countdown at once. If a pressure wave activates the pressure switch in this time the TS 970 recognizes the function of the safety edge. If the pressure switch has not been activated, the control goes into fault mode and the system works only in DEAD MAN function in downwards direction. Fault information F 2.8 would be displayed.

Pressure-wave switch - function

The contact between the contact screw and diaphragm is opened (opening contact). The pressure-wave switch is set to a release pressure of approx. 1,5 mbar.

The valve screws are set to a throughput of 110 ml/min with a static admission pressure of 5 mbar. This warrants that a maximum temperature increase of 30° is compensated for in 20 minutes.



Pressure-wave switch

The setting of the valve screws may not be altered. Should the release pressure be insufficient (pressure wave too insensitive), the contact screw may be turned counterclockwise to the left by 1-2 graduation marks. The switch's sensitivity is thus increased.

In case of excessive sensitivity, the contact screw is set clockwise by 1-2 graduation marks (decreased sensitivity).

Typ 2: Resistance evaluation 8K2 with normally open safety edge contact

This evaluation system is made for electrical safety edges within an end-of-line resistor of 8K2 +/- 5% 0,25W. The resistor must be connected in series with the switch in the safety edge.

Typ 3: Optical safety edge (Fraba Brand)

The principle of operation is as a one way light barrier. By activating the safety edge, the photo-beam will be interrupted.

SAFETY DEVICES

Function of the safety edge system

With **Menu 2.1** the function of the safety edge system can be chosen.

Function	Reaction following the activation
Active safety edge	stop
De-activated safety edge	no reaction, door moves until final limit close only for folding doors
Active safety edge+ downward automatic floor adjustment	stops and automatically re-adjusts the final limit with the next movement

The function 'Auto ground adjustment' is used for doors with a cable e.g. Sectional doors or vertical lift-gate. An automatic correction of slackness or change of ground height up to 2-5 cm is possible. The slack wire switch is be still recognised.

Important note!
To use the automatic floor adjustment, the safety edge must be operated in the door closed position by an auxiliary puffer switch.

Important !
The automatic ground adjustment works only when the following safety edge systems are connected:
Typ 2: electrical system resistance evaluation 8K2 or **Typ 3:** optical safety edge (FRABA Brand)

Important note!
When the safety edge has been operated twice the automatic closing feature will be interrupted and fault F2.2 will be displayed.
To reset the fault press the internal push button ⏷ so that the door travels down until the final limit is reached.

Emergency stop X3

These terminals are to connect an emergency stop button according to DIN EN 418. Alternatively the terminals can be used to connect a safety device against entrapment (e.g. self-testing light barrier).

FUNCTION DESCRIPTION

Internal push button / Three push button / Key switch X5 / X15

Internal and external push button
Internal and external push button working seperately from each other. Pushing at the same time, the internal push button has priority.

Important note!
Dead man mode UP and DOWN with internal push button.
Dead man mode DOWN with external push button. (**Menu 0.1 Adjustment .4**)
In Dead man mode the user shall be in full view of the door throughout its travel.

Automatic closing

Menu 2.3 the timer works between 1 - 240 sec. If the automatic closing is active, the shutter will close, from each limit position after the pre-adjusted time.

Important note!
The timer can be interrupted by pressing the internal pushbutton stop when the shutter has reached a limit position. With a new command UP / DOWN the timer is re-set.

Automatic closing interruption

Menu 2.4 can be used if the timer operation is required after interrupting and re-making the photo-beam. The door closes after 3 seconds.

Photo-beam for Closing Direction X6 / X16

Control works with reflexive and through photo-beams connected on terminal X6 / X16. A 24V DC supply for the photo-beam is available.

Important!
At connection to 24V DC consumes of external devices shall not exceed 1000 mA

FUNCTION DESCRIPTION

The light barrier is used in a normally closed operating mode.
In case the light barrier is activated or it malfunctions the contact will open and cause following reactions.

Door Position	Reaction when Photo-beam is Interrupted
Door closed	no reaction
Door opening	no reaction
End position open *) without timer active	no reaction
End position open *) with timer active	resets open timer for automatic closing mode
End position open *) with timer active and time interruption	With the photo-beam connected the shutter closes after 3 sec. when the beam has been interrupted and remade The time delay is cancelled and re made.
Closing Door	Stops and re-opens fully *)

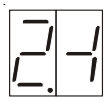
*) or to the intermediate stop position when the key switch is in the ON position

These terminals could also be used to connect other devices e. g. radar, etc.

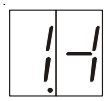
Interruption of the photo beam function - Menu 3.2

To learn the switching position the door should travel 2 full OPEN and CLOSE cycles.
During the closing travel the photo beam shall be switched (interrupted) two times consecutively at the same switching position. If that was happen the position is memorised. Thereafter the photo beam is without function bellows this switching position.

After the program was selected and left a 2 appears into the display (see fig.)



With the first interruption of the photo beam the display changes to 1



and after the second interruption it changes to CLOSE (see fig.); the function is activated.

If the **adjustment was not successful** a 2 will be displayed for short. If so the last switching position will be the new first position and the display appears a 1. The door must travel a new cycle that the second position will be memorised.
After programming, proper function must be checked.

Important note!
While programming, the functions re-open and automatic closing interruption are not in work.

FUNCTION DESCRIPTION

Ceiling pull switch / Radio control X7 / X17

It is possible to connect a ceiling pull switch or a radio receiver.
The radio receiver's switching contact must be potential free. **Menu 2.6: Several types of commands can be adjusted.** With each command (impulse) the shutter operates in the following sequences.
With each command (contact) the shutter operates in the following sequence:

Command 1: Without stop

Shutter position	Shutter operation
Shutter closed	Shutter travels to fully OPEN*-position
Shutter moving upwards	No reaction
Shutter open	Shutter moves to fully closed position
Shutter intermediate position open	Shutter moves to fully closed position
Shutter moving downwards	Shutter will STOP and moves BACK UP to final open Position*)

*) or to the intermediate stop position when the key switch is in the ON position

Command 2: With stop

Shutter position	Shutter operation
Shutter closed	Shutter moves to fully open or intermediate position
Shutter moving upwards	Door closed
Shutter open	Shutter moves to fully closed position
Shutter intermediate position open	Shutter moves to fully closed position
Shutter somewhere in between position	Shutter moves in opposite direction
Shutter moving downwards	Door closed

*) or to the intermediate stop position when the key switch is in the ON position

Command 3: Open

With each impulse the door travels to the final open position

Key switch – intermediate stop X8

Intermediate stop can be activated / de-activated by connecting a key switch (latching ON-OFF). The intermediate shutter position „ PART OPEN“ is only in effect in the upwards direction and is the new open position.
In **Menu 1.6** the position can be adjusted. This is the new final position.
By turning the key switch to the OFF position, the shutter works in standard mode.

FUNCTION DESCRIPTION

Key switch (latching) interrupt automatic closing X11

The automatic closing time can be interrupted with a normally open switch (latching)

Smoke draining - Function (RWA) X12

With this special function the door may be used for smoke and heat draining (RWA) according to an industrial buildings directive for buildings up to 1600sqm.
Menu 3.5 here the height may be adjusted, to where the shutter shall move when Alarm is given.

Attention!
The adjusted height fort his RWA- requirement must be a minimum height of 2,5m and works only if (RWA-function) adjusted.

If the contact which is related to X12.1 / 12.2 will be triggered (closed) by a signal supplied by the central fire detector (BMA) the shutter will travel up to the adjusted height (RWA position).The contact must be kept continuously close at all the time when the shutter travels. When the door travels in RWA function the control sets all safety devices (safety edge, photo-beam, etc.) and pushbutton signals (OPEN-STOP-CLOSE) out of order. External safety switches as emergency stop, pass-door or slack cable switch are further in function. If the contact related to X12.1 / 12.2 would be interrupted (opened) all shutter and control functions going back in work.

Attention!
If Display appears indication as follows  , RWA-function activated.

Light indicator for traffic control X13

TS 981 control have a complete one-way and two-way traffic light management integrated. Two pairs of red/green light indicators may be connected on terminal X13. Supply voltage for these light indicators is selectable and could be provided from external or directly from internal terminals X1 1.8 / 1.9. A neutral is always required.

Attention !
Light indicators with 230V **LED**-bulbs are recommended. They have a big luminosity, low requirement of energy, and they are maintenance free.
If conventional bulbs in use the maximum power for each indicator light shall not exceed 40W.

FUNCTION DESCRIPTION

Menu 6.1 Traffic light management

The integrated traffic light management of TS 981 supplies two traffic modes

One-Way

Two-Way

One-Way mode: This could be selected if the shutter width delivers enough space for two cars driving through the door. The lights indicating only when the shutter is fully OPEN. Additionally the lights supplying fore - warning signal when the shutter travels downwards.

Two-way mode: This could be selected if the shutter gateway does not deliver enough space for two cars and sequence must be controlled. Priority for inside or outside could be adjusted.

Menu 6.2 Extended green light period

Timer could be selected from 3 seconds up to 90 seconds. This works only if the shutter is OPEN and the green light is illuminated. Timer counts down after a CLOSE command or if two-way traffic mode is selected, and a command from opposite side is given. The indicator keeps green light during the whole time. This function could be used for green light activation only, and without automatic closing function.

Menu 6.3 Fore – warning period

Fore - warning supplies an additional signal before the shutter closes; red lights flushing hereby with a frequency of 1 Hz. Selectable time is 10 seconds and the function starts when green light period has finished.

Menu 6.4 Doorway evacuation period

The selected mode supplies the possibility to keep the gateway free from present car, before a new car drives into the doorway.
Timer counts down if green period has finished, respectively after adjuster pre-warning time; during this time the red light is indicated.

Menu 6.7 Red light function if door closed

On requirement continuous red light function ON or OFF may be selected.

Attention:
Traffic light management works independent of automatic closing or continuously Open command.

FUNCTION DESCRIPTION

Safety against entrampment X18

At terminals X18/ 18.1 and 18.2 two of safety devices against entrapment could be connected. This function works only when the shutter moves upwards. If safety devices would be activated the shutter stops and reverses to downwards direction for 2 seconds. With **Menu 3.7** can be selected whether one ore two entrees shall be activated.

The TS 981 works with four several evaluating principles.

Principle	**To be used**
NC contact 1 k2 with out testing	NC contact for one external evaluator
NO contact 8k2	Electrical safety edge with 8k2 resistor
Impulse evaluation1 kHz	Raytector optical safety edge impulse signal 1 kHz12 / 24 V supply
NC contact with testing	Photo beams, with a separate testing before each Upwards movement.

Attention!
All safety devices in use respectively their directly connected sensors must comply with EN 12978 safety devices entrapment protective.

Potential free changeover contact X20 / X21

In **Menu 2.7 / 2.8** this contact is able to work for several functions.

Important note!
It is only possible to work with one adjusted function.

When activating the switching point the shutter must be moved to the point. **Menu 1.7 / 1.8** must be activated.

Overrun correction

The stopping position of the door can be influenced by various factors e.g. temperature, cable extension etc.
To always have the same door stopping position the overrun correction can be activated.
Using **Menu 2.2** the overrun correction can be switched ON or OFF

Important!
Great variations of temperature during a time when the door is not in use, could cause a position variation of about 1cm. This will be reset automatically after reaching the final close limit.

FUNCTION DESCRIPTION

Door overload monitor

The door overload monitor recognises that a person is being lifted by the door (hanging on a handle, etc.) and could be adjusted within **Menu 3.1** with a possibility of two steps of sensitivity. Adjustment 0.1 sensitive reaction and adjustment 0.2 insensitive reaction

Important!
After programming the force monitoring the door must perform a complete opening and closing cycle in automatic mode, during which the system reads the increments to calculate the way.

Important Note!
To have a trouble-free service the following points must be checked:
- The door must be correctly balanced
- The cable drum diameter should not be less then 160mm

Environmental influences e.g. temperature or wind load can cause the overload monitor to be activated.

The overload monitor is a self-learning system, and checks the system from 5 cm up to ca. 2,0 m, slow-occurring changes e.g. spring tension will be automatically recognised and equalized.

Important Note!
The overload monitor does not take place against other safety devices e.g. (safety against entrapment)

When an overload is detected the door works only Dead man Mode in the UP and DOWN direction.
The control unit automatically resets to impulse control when a final limit position has been reached.

FUNCTION DESCRIPTION

AIR look SLF

Air-lock management could be realised by means an easy electrical cable connection between two shutters with TS 981.
The required module with cable should be connected into SLF plug-in. This module would be delivered complete within a manual.
When cable connection is finalized select **AIR-LOCK ON** in **Menu 7.1 in both control panels.**

Automatic OPEN - Transmission
To realise Air-lock operation a push button is not required. An automatic open impulse about timer adjustment could be selected in **Menu 7.2,** thereafter the present closed shutter OPENS when acting shutter has CLOSED.

Status monitoring function SMF

When in use a port supplies status or error information's to a central monitoring unit. To realise a lot of different uses the control has a socket to be used with external modules that supplies relay contacts or BUS-gateway.
Users manual would be delivered with the module. The following in-and output signals are available.

1 = 24V

2 = Output signal Shutter CLOSED

3 = Output signal Shutter OPEN

4 = Output signal photo-beam

5 = Output multiple indication stop

6 = Output multiple indication safety edge

7 = Input command inside shutter OPEN

8 = Input command outside shutter OPEN

9 = Input command shutter CLOSED

10 = GND

Maintenance cycle counter

Free adjustable maintenance cycle counter **Menu 8.5** makes it possible to pre-adjust a max. No of cycles until a maintenance is agreed.

The no of cycles can be adjusted from 1.000 up to 99.000; the adjustment is possible in steps of 1.000 cycles.

Three different reactions can be chosen if the point of pre- adjusted maintenance cycles has been reached, see **Menu 8.6**

Whenever the final open limit has been contacted the pre-adjusted number will be reduced with 1 until 0 is reached.

When maintenance was done the cycle counter could be re-adjusted to a new maintenance period and count down starts again.

Software Update

For software updates TS 981 have a MMC/SD card slot available. With this function the software can be updated respectively in external places saved. For that purpose the new program can be taken from a PC with special card reader function for GFA cards, following the card could be guided into the control panel existing slot.

Attention!
Before loading the new program check the existing program is saved.

Menu 9.7 MMC/SD card program can be uploaded. If this function is selected the display appears 0.
When pushing the integrated open and close button the display appears all existing software versions on MMC/SD card. To start the uploading mode the stop-button shall be pushed for three seconds. As long the loading has not started the mode may be interrupted if pushing the selector switch.

With **Menu 9.8** present up to date programs could be saved onto MMC/SD card.
Down load initialising: Insert MMC/CD card, select menu 9.8 and push selector switch.

Short circuit / overload monitor

The TS 981control panel delivers 2 supplies for external devices.

230V AC; max. 1,6 A
24V DC; max. 1000mA

If the 24V DC supply is short-circuited or overloaded, the red point in the display goes out.
If the display is out, fuse F1 must be checked.

OPERATING STATUS DISPLAY

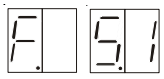
The control TS981 can display up to three different status conditions one after another. Each status is displayed with a letter and a number. The letter and the number are flashing alternately, thereby the control differentiates between a FAULT = **F** and a command = **E.**

Report	Description	Measure to solve the problem
	**Pass door contact open**	**Check the proper operation of pass door contact, or whether the supply cable is broken**
	**Emergency operator or motor-winding thermal protection operated**	**Check emergency operator or whether the drive unit is overloaded.**
	**Emergency stop activated**	**Check the emergency stop is activated, or whether the supply cable is broken**
	**Error AIR-LOCK function**	**Check, whether opposite control panel is ON and Air-lock function is adjusted or possibly the cable connection is interrupted**
	**Failure pass door contact X 2.1- X 2.2 or control voltage circuit less than 24V**	**Check pass door circuit's transition resistance and weather pass door switch works; verify the voltage is OK at 24V terminal to GND**
	**Failure input pass door X 2.1- X 2.2**	**For reset switch control panel OFF-ON**
	**Safety edge not recognised**	**Check the safety edge is connected correctly or the wrong type has been selected in the program**
	**Light barrier activated**	**Check the light barrier has been fitted properly, or whether the connecting cable is broken**
	**Safety edge operated in two consecutive cycles**	**Check if there is an obstacle in the shutter area, or the connecting cable is broken or there is a short circuit in the cable**
	**Safety edge 8K2 activated**	**Check the safety edge is activated or there is a short circuit in the connecting cable**

OPERATING STATUS DISPLAY

Report	Description	Measure to solve the problem
	Safety edge 8k2 defect	Check safety edge and connecting cable are not broken
	Safety edge 1K2 activated	Check safety edge and connecting cable are not broken
	Safety edge 1k2 defect	Check safety edge and connecting cable do not have a short circuit
	Safety edge 1k2 pneumatic system TESTING negative	Check the proper safety edge function and that testing in the lower door position is correct
	Optical safety edge activated or defect	Check the proper safety edge function or whether the supply cable is interrupted
	Limits not adjusted	Adjust limits
	Safety open limit operated	Turn mains supply OFF and move the shutter downwards - with the manual operator- until the safety limit is free or the open limit should be re-adjusted.
	Safety close limit operated	Turn mains supply OFF and move the shutter upwards - with the manual operator- until the safety limit is free or the close limit should be re-adjusted.
	Door load monitor has activated	Check the door mechanism for tightness
	Entrapment safety device actuated	Check all connected sensors (e.g. re-adjust photo – beam)
	Entrapment safety device defective	Check all connected sensors

OPERATING STATUS DISPLAY

Report	Description	Measure to solve the problem
	ROM - Fault	Reset by switching OFF or change the control
	Internal fault report	Reset by switching OFF or change the control
	RAM - Fault	Reset by switching OFF or change the control
	Internal control fault	Reset by switching OFF or change the control
	DES – no response	Check electronic limit DES connection. Reset by switching OFF or change the control or the electronic limit.
	Drive unit does not work	Check the shutter mechanics. Check the limit shaft for function (turning) Check phase rotation.
	Phase rotation failure	Check main supply phase rotation turns right
	Closing rpm over speeded at DU Speed Changer	Switch supply ON-OFF If again and again, replace drive unit

Report	Command description
	open command being given
	stop command being given
	close command being given

	adjusted cycles for maintainance reached

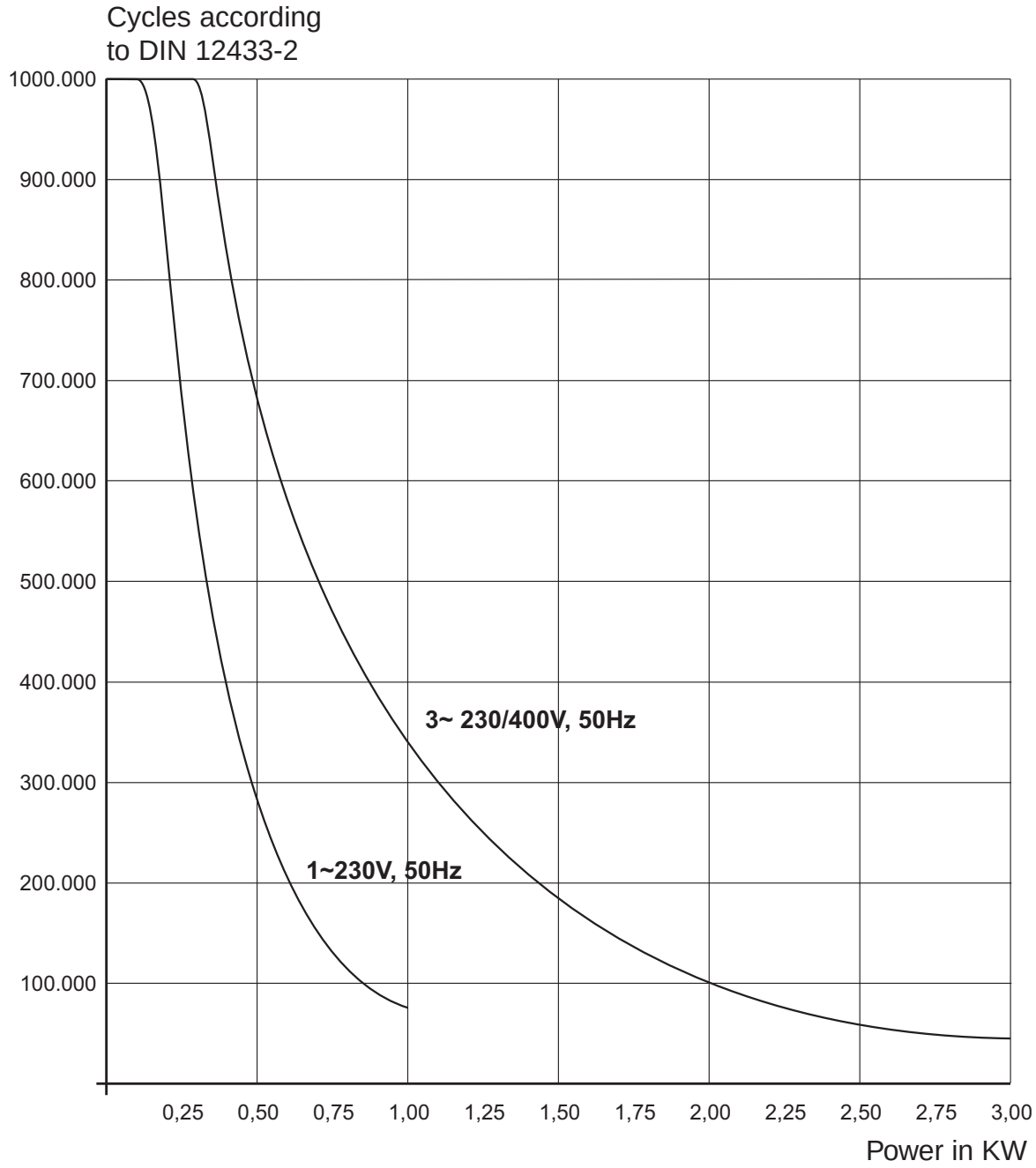
	If the normally displayed red spot is out = Short circuit or overload on the 24V supply

TECHNICAL DATA

Housing Dimensions	190mm x 300mm x 115mm (W x H x D)
Mounting	vertical
ELEKTROMATEN® Supply	Three-phase 3 x 230 / 400V AC ± 5%, 50...60Hz Single-phase 1 x 230V ± 5%, 50...60Hz Power max. at 3 x 400V AC, max. 3kW
Control supply via L1,L2	400V AC or 230V AC + - 10%, 50-...60Hz, voltage changing with bridge to 3- pole terminal, safety fuse F1 (1,6A t)
External supply fuse	10A delayed
Permitted Load	ca. 40 VA (without motor and ext. 230V)
External supply 1	230V via L1 and N, safety fuse F1 (1,6A t)
External supply 2	24V DC uncontrolled, max. Load 150mA, Protected via electronic fase
Inputs	24V DC / typ. 10mA signal length must be more than 100ms
Relay output	If inductive loads are to be switched (e.g. other relays) those have to be protected with free-wheeling Diodes contact load at 230V max. 1A
Traffic light contacts	LED - bulb 230V or Normal bulb 230V shock resistant max. 40W
Temperature	Working: -5.... +40°C Storage: +0....+50°C
Humidity:	To 93% not condensing
Vibration:	Vibration free mounting, e.g. on flat built wall
Protection class	IP54 (CEE Plug), IP65 available

LIFETIME / DOORCYKLES

The GfA control panels working with electro mechanical contactor boards.
Contactor boards having generally a limited life time; this depends on the switched power of ELEKTROMATEN® in use and the amount of switching cycles. Therefore we recommend a replacement for control boards in use after doors having reached their confirmed lifetime cycles. Coherence between power and amount of cycles for ELEKTROMATEN® describes diagram bellow.



DECLARATION OF INCORPORATION

according to
EC guidelines 98/37/EC
Low voltage guideline 73/23/EEC
with amendments
Electromagnetic compatibility 89/336/EEC
with amendments

ELEKTROMATEN®
GfA - Gesellschaft für Antriebstechnik
Dr.-Ing. Hammann GmbH & Co. KG
Wiesenstr. 81

40 549 Düsseldorf (Heerdt)

We, the

GfA - Gesellschaft für Antriebstechnik

Wiesenstr. 81, 40549 Düsseldorf (Heerdt), Germany

hereby declare that the following products conform with the above EC guidelines and are only intended for installation in door equipment.

Product description: **Door Control Panel TS 981**

Harmonised norms applied

- **DIN EN 12543**
  Safety in use of power operated doors
  - Requirements

- **DIN EN 12978**
  Industrial, commercial and garage doors and gates -
  Safety devices for power operated doors
  - Requirements and Test methods

The machinery to which this Declaration of Incorporation relates must not be put in to service until the relevant machinery into which is to be incorporated has been declared in conformity with the provisions of the Machinery Directive.

Düsseldorf, 11.10. 2006

(GL, Müller) (QMS, U. Hohns)

FUNCTION OVERVIEW

- **Control panel for ELEKTROMATEN®** up to. 3 kW at 400V / 3~ with electronic limit **DES** designed for only low-level adjustment
- **7- Segment led display showing**
  - Programming the control panel
  - Displays Command - / Info- / Fault
- **Software release loading and saving**
- **Mains supply**
  - 400V / 3~ with and without Neutral
  - 230V / 3~
  - 230V / 1~ (for single-phase motors)
- **Door operating modes**
  - Dead-man open- and close
  - Self-hold open- and dead-man mode close (without safety edge)
  - Automatic open- and close (with safety edge connected)
- **Integrated safety edge systems**
  - 8K2 normally open contact
  - 1K2 normally close contact
  - optical safety edge system (System Fraba)
- **automatic close feature**
  - free programmable from 1 up to max. 240 Sec.
  - on interrupting and re-making light barrier closing after 3 sec..
  - Can be interrupted by a separate switch
- **supply for external devices**
  - 230V (at 400V / 3~ with N), up to 1,6A load
  - 24V DC, up to 1000mA load
- **Plug for 5 pole motor connector 6 pole for electronic limit DES**
- **Plug for spiral cable (safety edge and pass-door contact)**
- **integrated internal pushbutton OPEN / STOP / CLOSE**
- **Additional terminals for different control equipment**
  - Emergency stop (LATCHING)
  - additional safety stops
  - external three push button OPEN / STOP / CLOSE
  - Light barrier activated Stop and Reverse function, time reset, time interruption 3 sec.
  - One channel - impulse functions e. g. Ceiling pull switch for OPEN / CLOSE / STOP – sequencing or radio control
  - Key switch (latching) for intermediate Stop
  - 2x potential free relay output (NC / NO), output signal from aux. limit
    If a signal lamp is in use, the potential free limit is not available
- **Integrated traffic light management**
  - One-way
  - Two-way