

FEIG

CONTROLLER

Intelligent Door Management

Assembly instructions

Installation, commissioning, utilization and maintenance



TST FUF2

Versions:

-A / -C / -F

TST FU3F

Versions:

-A / -C / -F

Attention **Important Safety** **Information**

These instructions must
be observed to ensure
personal safety.

Store these instructions
safely.

- DE **ACHTUNG! WICHTIGE SICHERHEITSANWEISUNGEN!**
Den Hinweisen auf Seite 3 dieser Montageanleitung ist Folge zu leisten.
- GB **ATTENTION! IMPORTANT SAFETY INFORMATION!**
Follow the instructions on page 3 of this manual.
- FR **ATTENTION! IMPORTANTES INDICATIONS DE SÉCURITÉ!**
Les instructions de la page 3 de cette notice de montage doivent être observées strictement,
- NL **LET OP! BELANGRIJKE VEILIGHEIDSINSTRUCTIES!**
Volg de instructies op pagina 3 van deze montagehandleiding op.
- IT **ATTENZIONE! INDICAZIONI SULLA SICUREZZA IMPORTANTI!**
Prestare attenzione alle note alla pagina 3 delle presenti istruzioni di montaggio.
- ES **ATENCIÓN INDICACIONES IMPORTANTES DE SEGURIDAD!**
Deben seguirse las indicaciones detalladas en página 3 de estas instrucciones de montaje.

1 General description and intended use

The device described below is an electronic control system for motor-driven industrial or commercial doors in accordance with EN 13241. A fully integrated frequency converter with power output stage can gently control the door with variable opening and closing speeds. The control system **TST FUF2** is designed to handle electrical induction motors with a power consumption of up to 2.2 kW and a 230 V supply. The control system **TST FU3F** is designed to handle electrical induction motors with a power consumption of up to 5 kW and a 400 V supply.

In addition to controlling the motor that drives the door, the controller can be used for the following tasks:

- Positioning the door at and between its final positions (open, close and intermediate positions)
- To control the drive to run at different speeds (integrated frequency converter)
- Evaluation of the security sensors on the door (e.g. safety edge monitoring, pull-in protection, etc.)
- Evaluation of additional safety equipment on the door (e.g. photo eyes, light curtains, etc.)
- Evaluation of control circuits at the door (e.g. pull switch, radio, inductive loops, etc.)
- Evaluation of emergency stop controls
- Electronically protected 24V low-voltage power supply for sensors and control devices
- 230 V power supply to external units
- Safe 24 V brake (with monitoring in accordance with EN 13849)
- Control of application-specific outputs (such as relays for door position reporting)
- Generation and output of diagnostic messages
- Configuration of application-specific parameters for different levels of access of the different user groups
- Control of input/output expansion modules
 - TST SFFE: plug-in module wireless remote control
 - TST FSx: wireless Security System
 - TST SURA: Safety edge evaluation board
 - TST SUVEK: plug-in module for inductive loop detection
 - TST RFUxK: universal display and input/output module
 - TST RFUxFCOM: interface module for the lock-door applications, etc.
 - TST RFUxIO-B/-E: universale input and ouput extension module
 - Evaluation of interface signals for remote control, diagnosis and configuration of the parameters of the door

1.1 Intended use

- The controller TST FUF2 is designed for the operation of an electrical induction motor with a power consumption of up to 2,2 kW at 230 V supply. The controller TST FU3F is designed for the operation of an electrical induction motor with a power consumption of up to 5 kW at 400 V supply any may only be used for the operation of motor-driven doors and gates used in an industrial or commercial context as defined by the door product standard DIN EN 13241.
- Intended use includes compliance with all the specifications made in this assembly manual pertaining to assembly, installation and commissioning, the applicable safety instructions and consideration of the technical data.
- The controller may only be operated with accessories authorized by FEIG ELECTRONIC GmbH.
- All assembly, installation, commissioning and maintenance work performed on doors or gates or on the drive units intended for the doors or gates are to be performed exclusively by qualified specialist personnel as defined by the EC Machinery Directive. In particular, the following regulations require compliance: VDE 0100, EN 50110, EN 60204, EN 60335 inc. part 103, the fire protection regulations, accident prevention regulations and the applicable regulations for industrial doors (EN12453, EN12978) and machine safety (EN ISO 13849, EN 62061).

1.2 Incorrect use

Incorrect use includes all use of the controller which is classed as non-intended use. .

This device is not intended for use by persons (including children) with limited physical, sensory or mental abilities or lacking in experience and / or knowledge, unless they are supervised by a person responsible for their safety or if they have received instructions regarding the use of the device. Children should be supervised to ensure that they do not play with the device. Keep remote controls away from such persons.

Should the controller be subject to any use other than that described, the operating company will be liable for the resulting damage. This applies to unauthorised alterations, modifications or programming to the controller and its components as well as ignoring of warnings and safety instructions.

The following points in particular are classified as incorrect:

- Use outside the specified assembly conditions and safety distances to the surroundings (place and temperature).
- Use in an explosive or easily flammable environment.
- Use with defective parts.
- Use with spare parts and extension boards, which have not been approved by FEIG ELECTRONIC GmbH.
- Use without safety devices.

1.3 Target group

This assembly manual is directed especially at persons involved with commissioning the controller **TST FUF2** or **TST FU3F** of FEIG ELECTRONIC GmbH.

The assembly and commissioning of the controller may only be carried out by officially qualified electricians familiar with the safety standards of electrical drive and automation technology.

1.3.1 Personnel qualification

The TST FUF2 or TST FU3F FEIG ELECTRONIC GmbH controller may only be operated and maintained by persons who comply with the requirements outlined here and are familiar with the safety standards of electrical drive and automation technology.

All the person groups specified here must have read and understood this assembly manual before using the controller.

2 Safety information

ATTENTION

Failure to observe the safety advisories can result in physical harm or damage to the controller.

When starting up and operating the controller, the following important safety advisories as well as the installation and wiring notes must be strictly observed:

In accordance with the EC Machinery Directive only qualified personnel shall install the device on the doors or at the drive units for doors or bring them together. The respective safety requirements for the entire door (machine) must be aligned with the possibilities to meeting these safety requirements on the controller.

Improper integration of the controller into the door complex – e.g. missing sensors, incorrect parameters, speed set excessively high, etc. – presents the risk that the door is operated without adequate safety precautions.

To comply with the safety function according to EN 13849, a position sensor certified for PL c must be used.

The commissioning of this controller is prohibited until it has been properly attached to the door that conforms with the EC Machinery Directive and for which an EC declaration of conformity according to Annex II of the Directive was obtained.

The following information describes standard applications that may not necessarily match the actual application. The actual application is provided by the manufacturer of the door as part of the overall documentation or as part of the operating instructions of the door.

Any installation, startup and maintenance work must only be performed by qualified specialists. In particular, the following regulations must be observed: VDE0100, EN 50110 (VDE0105), EN 60204 (VDE0113), EN 50178 (VDE0160), EN 60335 (VDE0700), fire protection codes, accident prevention regulations as well as the relevant regulations for industrial doors and machine safety standards (EN ISO 13849, EN 62061)(ZH1/494, EN12453, EN12978)

This device is not intended for use by persons (including children) with limited physical, sensory or mental abilities or with a lack of experience and / or knowledge, unless they are supervised by a person responsible for their safety or if they have received instructions on the use of the device. Children should be supervised to ensure that they do not play with the device. Keep remote controls away from such persons.

A device mark (nameplate with name and address of the manufacturer, serial number, model number, supply voltage and temperature range) must be applied by the user.

The example of the warning label must be attached to the motor near the motor terminal board.

3 Installation of the controller

 ATTENTION**IMPORTANT INSTRUCTIONS FOR SAFE INSTALLATION!**

Observe all instructions; incorrect installation can result in serious injuries!

- When installing the controller, the system must be turned off.
- The controller may be opened only if all the poles of the supply voltage have been turned off it is not permitted to turn on or to operate the controller when it is open.
- Disconnect all supply circuits before opening the housing for access to the terminals.
- Before the installation, check the controller for transport or other damages. Under some conditions a damaged controller may result in significant consequential damage to the controller as well as hazards to the user.
- The controller must never be operated with a damaged membrane keypad or Display window. Damaged keypads and Display windows must be replaced.

 WARNING

- Do not touch any electronic parts, in particular the components of the processor circuit. Electronic components can be damaged or destroyed by electrostatic discharge.
- Before opening the cover of the enclosure, ensure that no drilling swarf can fall into the housing from the cover.
- When installing the controller it is important to ensure that it is not subject to mechanical stresses.
- Unused cable entries must be sealed to maintain the requirements of IP65.
- Ensure that the cable entries are not subjected to mechanical stresses, in particular tensile stresses.
- The controller must never be operated without the CEE-plug except when the supply voltage can be cut all poles by an installed main switch. The main switch and the CEE-plug must be within easy reach.
- A not rotating motor is no indication of the galvanic isolation from the power grid! The line supply connection terminals, motor terminals and terminals for the brake resistor can still carry dangerous voltages, e.g. under stop or emergency stops.
- If the supply cable is damaged, it must be replaced by the manufacturer or another qualified person in order to avoid danger (like connection type Y EN 60335-1)
- When moving the door in deadman mode, ensure that the operator has an unobstructed view of the door area. In this mode, safety equipment such as safety edge and photo eye may have been defeated. If this is not possible for structural reasons, you must ensure that this mode is only accessible to appropriately trained personnel or that the feature is disabled altogether.
- To prevent damage to the keypad, do not use pointed objects to operate the keys. The keypad is only designed to be operated by human fingers.
- Depending on the type of the door it may be necessary that the door can only be operated when it is within visual range. In these cases, no remote control (e.g. wireless) may be used to issue commands.
- It is important to ensure that the controller is installed with the wall spacers that are supplied to guarantee that the power stage can dissipate heat as necessary.
- The control unit should not be mounted on flammable surfaces (e.g. wood ≤ 2 mm thickness) or in environments with highly flammable substances (e.g. carpentry).
- When the controller is installed in an additional housing, e.g. in a barrier housing, care must be taken to provide a sufficient volume of air around the controller. This must be at least 0,02 m³.
- Should cooling not be sufficient, an additional heat sink may be inserted between the controllers housing and the additional housing to dissipate the heat to the outside.

4 Electrical connection

ATTENTION

- Any wiring, testing and maintenance work on an open controller shall only be performed when power has been turned off. Pay particular attention to the points shown under "Safety information".
- The controller must never be operated while it is open.
- When the controller has been turned off, dangerous voltage levels are still present for up to 5 minutes.
- During the downtime, no isolation exists between the amplifier module and the motor terminal.
- Touching electronic components is dangerous due to residual voltages.
- Never operate the controller while the cover is removed.
- When the installation was completed, check that the system was configured correctly and that the safety system works properly.
- The controller may be opened only if all the poles of the supply voltage have been turned off. The controller must never be operated while it is open.
- Never operate the controller without having connected the protective earth conductor. The absence of a protective earth conductor will result in hazardous voltages on the controllers housing caused by terminal capacitances. The RFI filters integrated into the controller may increase the leakage current up to a max. of 7 mA (see DIN EN 60335-1 section 16.2). Prior to delivery, the manufacturer will test individual units in this respect
- Hazardous voltages remain stored in the DC-bus capacitors for up to five minutes after power has been turned off. The discharge time until voltages fall below 60VDC is a maximum of 5 minutes. Touching internal controller components within this discharge time is hazardous.
- A defective switching power supply can considerably increase the discharge time of the DC-bus capacitors before reaching a voltage less than 60VDC. In this case, discharge times of up to 10 minutes may be possible.
- The processor circuit is galvanically connected to the power line. Important: when taking measurements on the processor circuit, do not use test equipment with PE reference to the measuring circuit.
- The controller must never be operated with a damaged membrane keypad or Display window. Damaged keypads and Display window must be replaced. To prevent damage to the keypad, do not use pointed objects to operate the keys. The keypad is only designed to be operated by human fingers.

- If the potential free contacts of the output relays or other terminals are supplied by an external voltage, i.e. dangerous voltages that are still present after switching off the controller or disconnecting power, you must attach a suitable warning sign to the housing.

ATTENTION

You must disconnect all supply circuits before opening the housing to access the terminals"

- When moving the door in deadman mode, ensure that the operator has an unobstructed view of the door area, since in this mode safety equipment such as safety edge and photo eyes are defeated.
- Parameter settings and the speed as well as the operation of the safety devices must be checked. Parameter settings and the function of the safety devices must to be checked.

3.2 Version in plastic housing FUxF-xH

The plastic version of the control consists of the mounting frame incl. printed circuit board, which is inserted into the housing. The housing has the following dimensions:

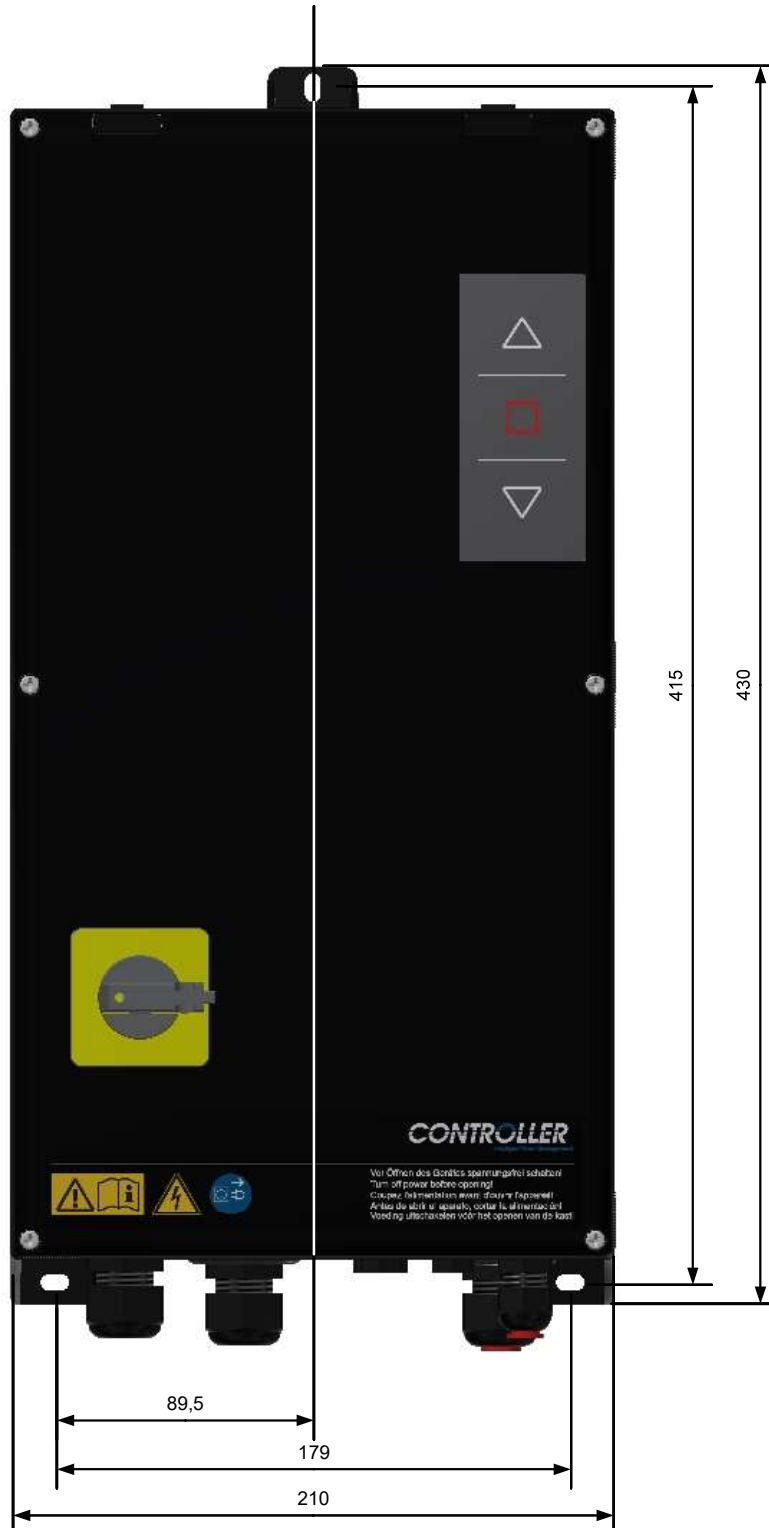


Figure 4 Dimensions and drilling plan FUxF-xH Plastic housing

3.3 Versions in steel or stainless steel housing

Steel and stainless steel housing variants are also available.
The housing has the following dimensions:

3.3.1 300 x 400 mm



Figure 5: Housing 300 x 400

4.1 Power supply connection

4.1.1 TST FUF2

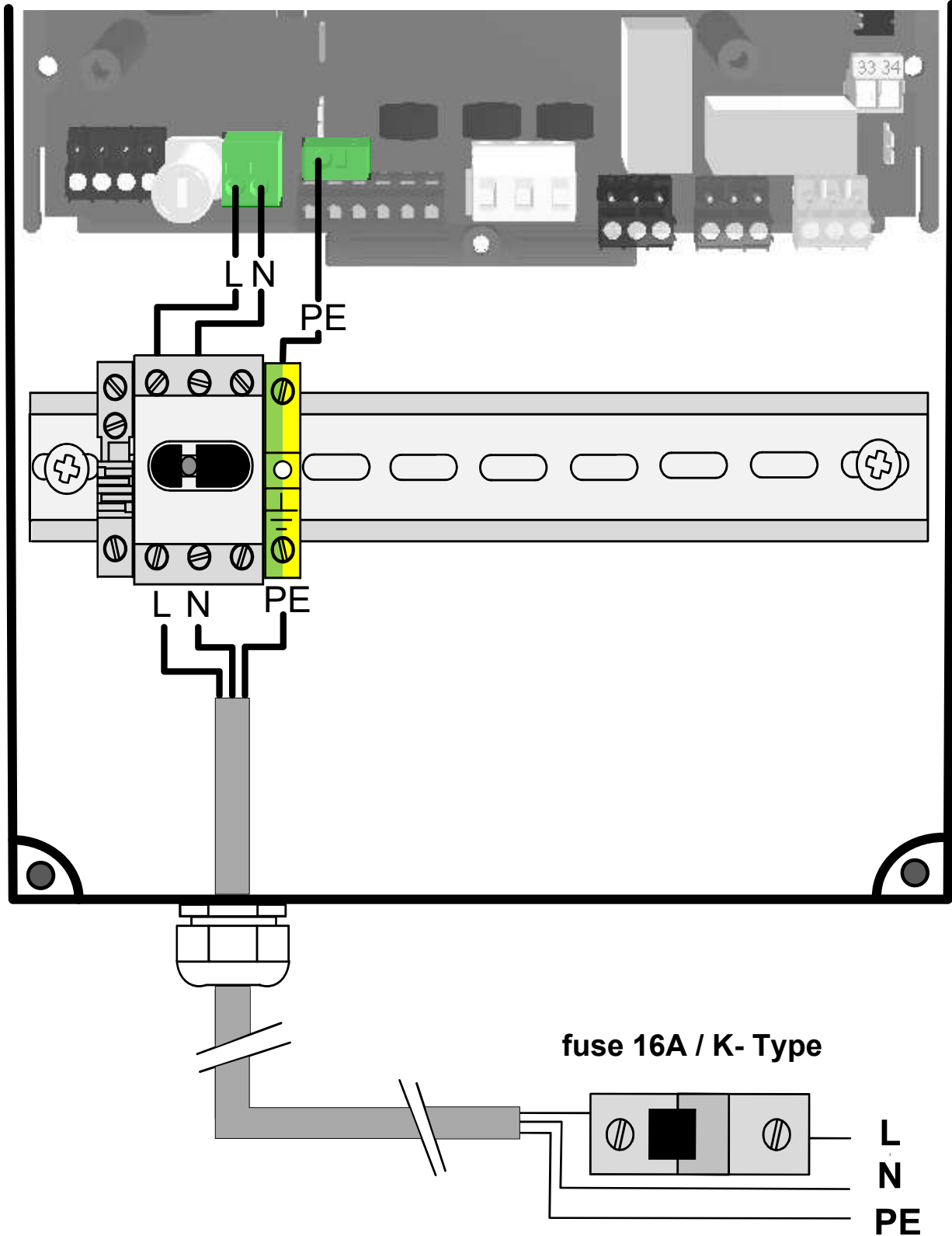


Figure 9: Connecting the power cable

4.1.2 TST FU3F

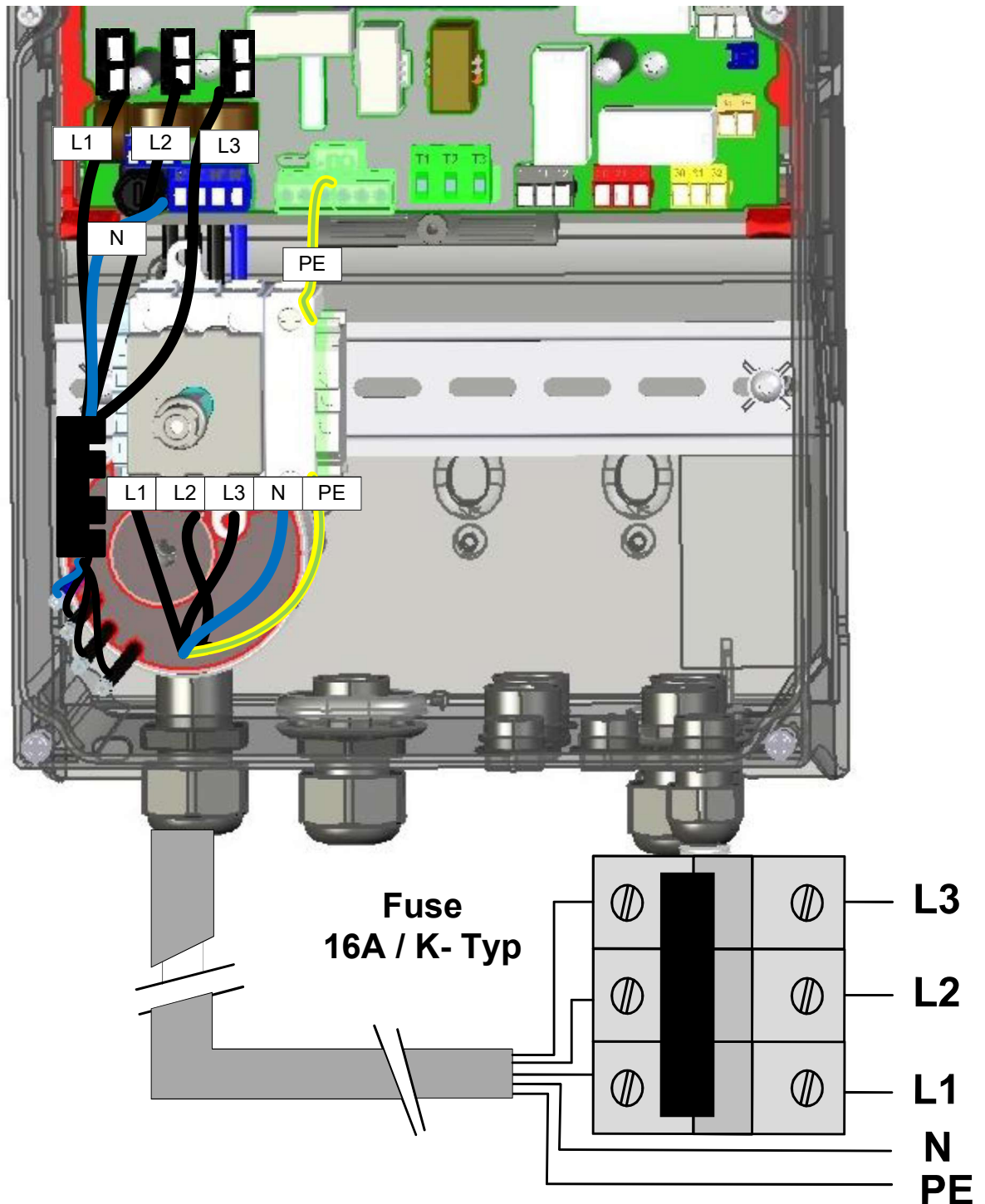


Figure 10: Connecting the power cable



There is no line choke for TST FU3F-A available.

4.2 Motor and brake connections

4.2.1 TST FUF2

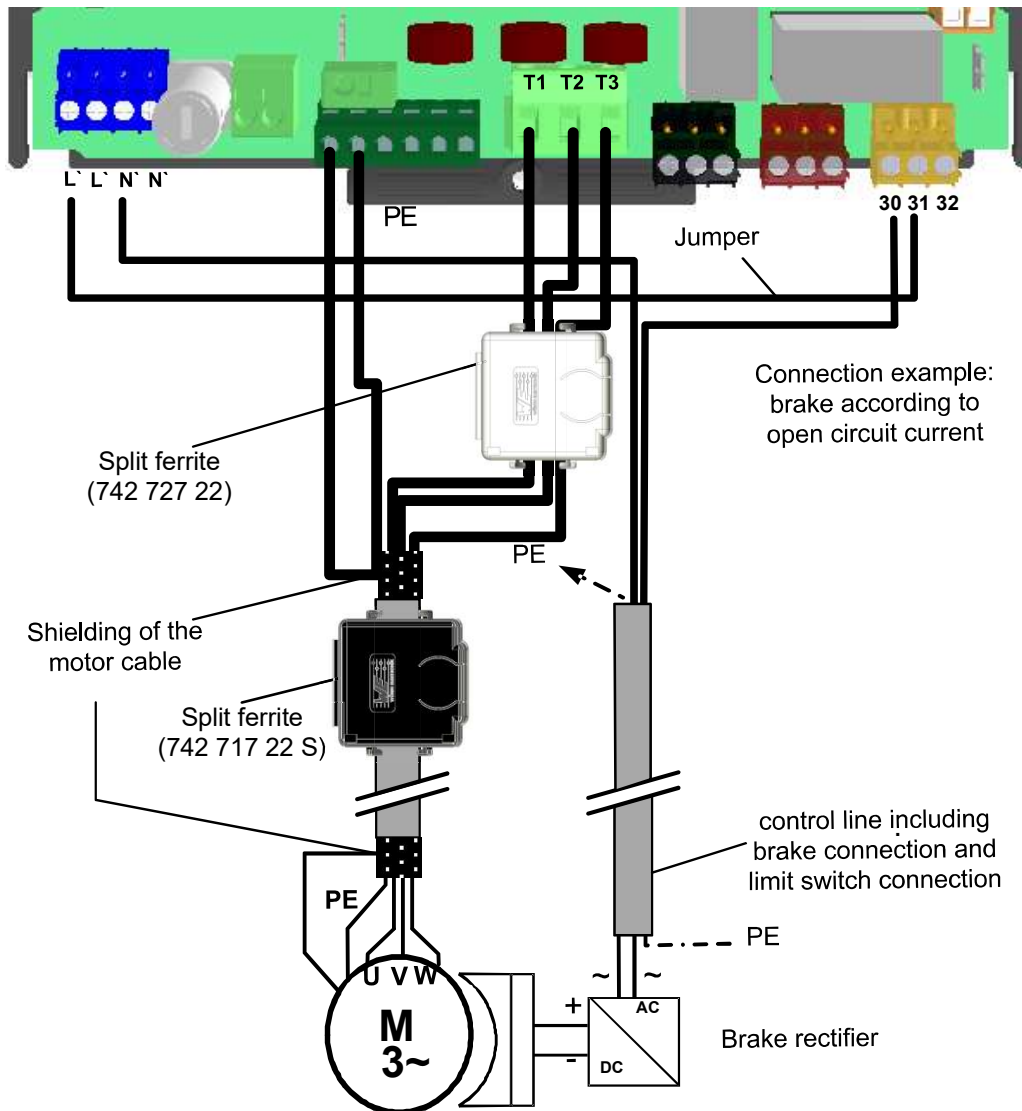


Figure 11: Motor connection

When connecting the motor cable, the enclosed split ferrite (grey, Würth number: 742 727 22) must be placed around the three wires (T1/T2/T3).



We recommend to place another split ferrite (black, Würth number: 742 717 22 S) around the complete motor cable as close as possible to the door controller. The black split ferrite is not included in the scope of delivery!

4.2.2 TST FU3F

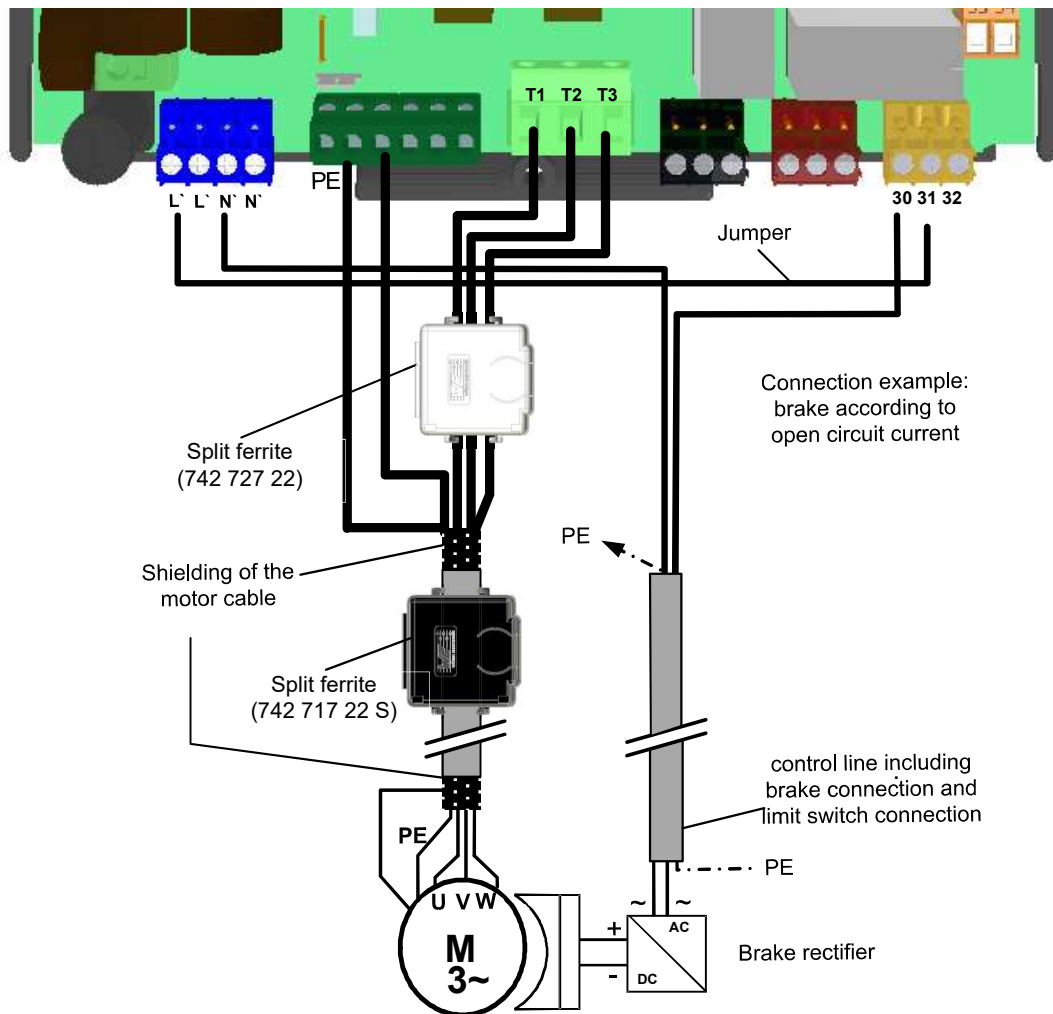


Figure 12: Motor connection

When connecting the motor cable, the enclosed split ferrite (grey, Würth number: 742 727 22) must be placed around the three wires (T1/T2/T3).

In the -A-Variant (2,2 kW) the wires T1/T2/T3 must be routed twice through the split ferrite.

In the -C- and -F-Version (4 und 5 kW) the wires must be routed one time through the split ferrite.



We recommend to place another split ferrite (black, Würth number: 742 717 22 S) around the complete motor cable as close as possible to the door controller. The black split ferrite is not included in the scope of delivery!

4.3.2 Connecting an electrical resistance - safety edge

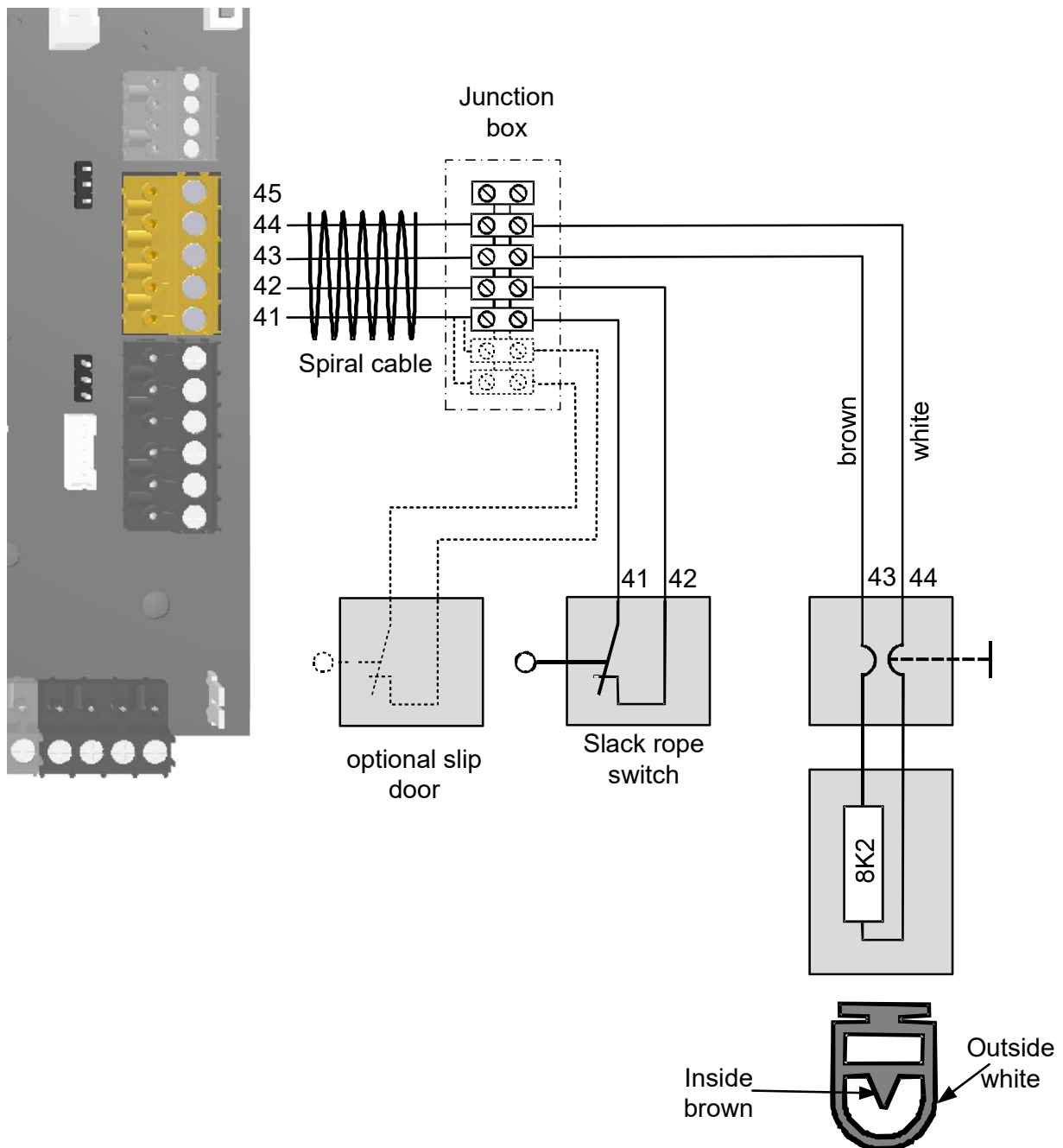


Figure 15: Connecting an electrical resistance - safety edge



If the safety edge type was not automatically detected, the resistive safety edge on this input can be activated via parameter P.460 = 1



If no safety edge is connected, automatic closing of the door is not possible.

4.4 Safety edge at the 2nd integrated evaluation (input 10)

This input is preset as digital input. Various types of safety edges can be connected, for example:

- Electrical safety edge with 1.2 k Ω or 8.2 k Ω terminating resistor.
- Dynamical optical system

Use of additional types of safety edges is possible. Please contact the door manufacturer in this respect.

4.4.1 Connect the optical safety edge at input 10

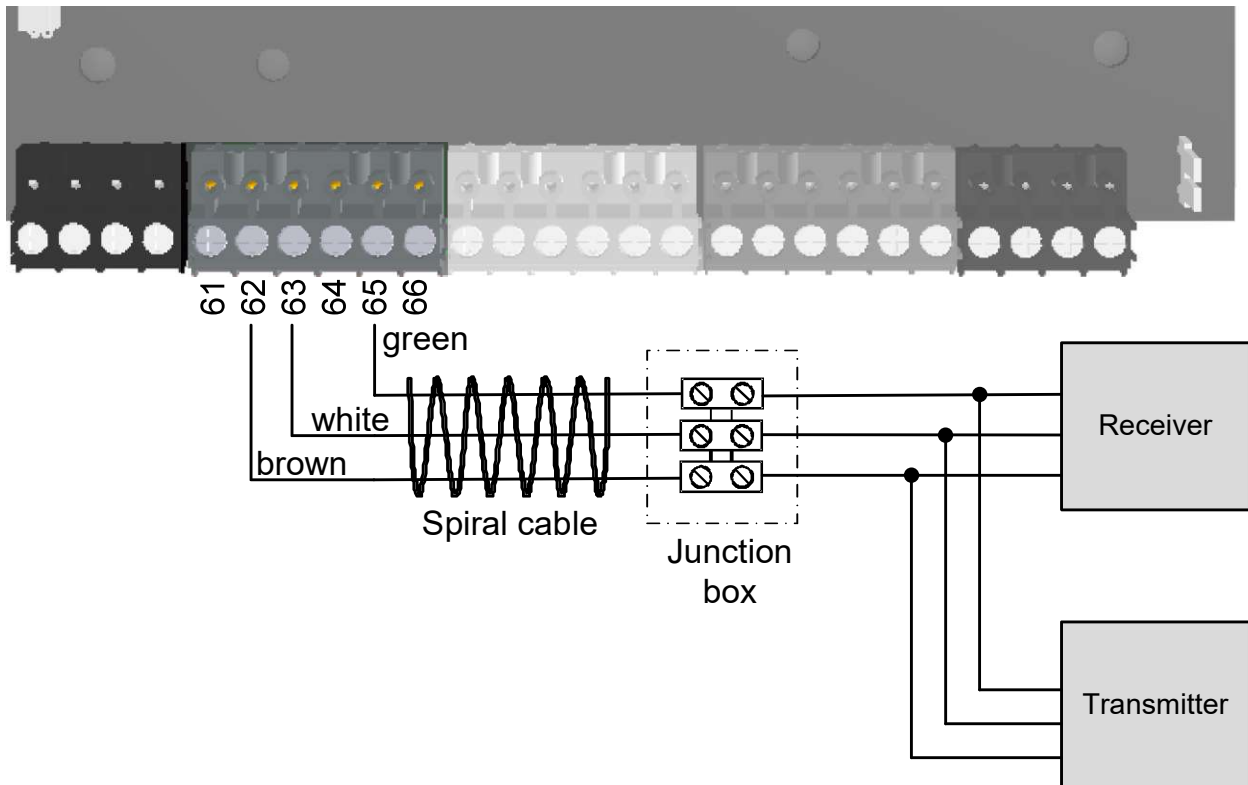


Figure 16: Connection to an optical safety edge



In order to use an optical safety edge on input 10, the function of this input must first be determined. For this purpose, parameters P.50A are used. For the setting refer to the parameter list in Chapter input profiles.

Typically, this input is used as safety input during opening movement. For this example, parameter P.50A = 1406 is set. Then the edge type of parameter P.5A2 must be set = 4.



It is important to first set parameter P.50A and then only parameter P.5A2

4.4.2 Connecting a resistive - safety edge to input 10

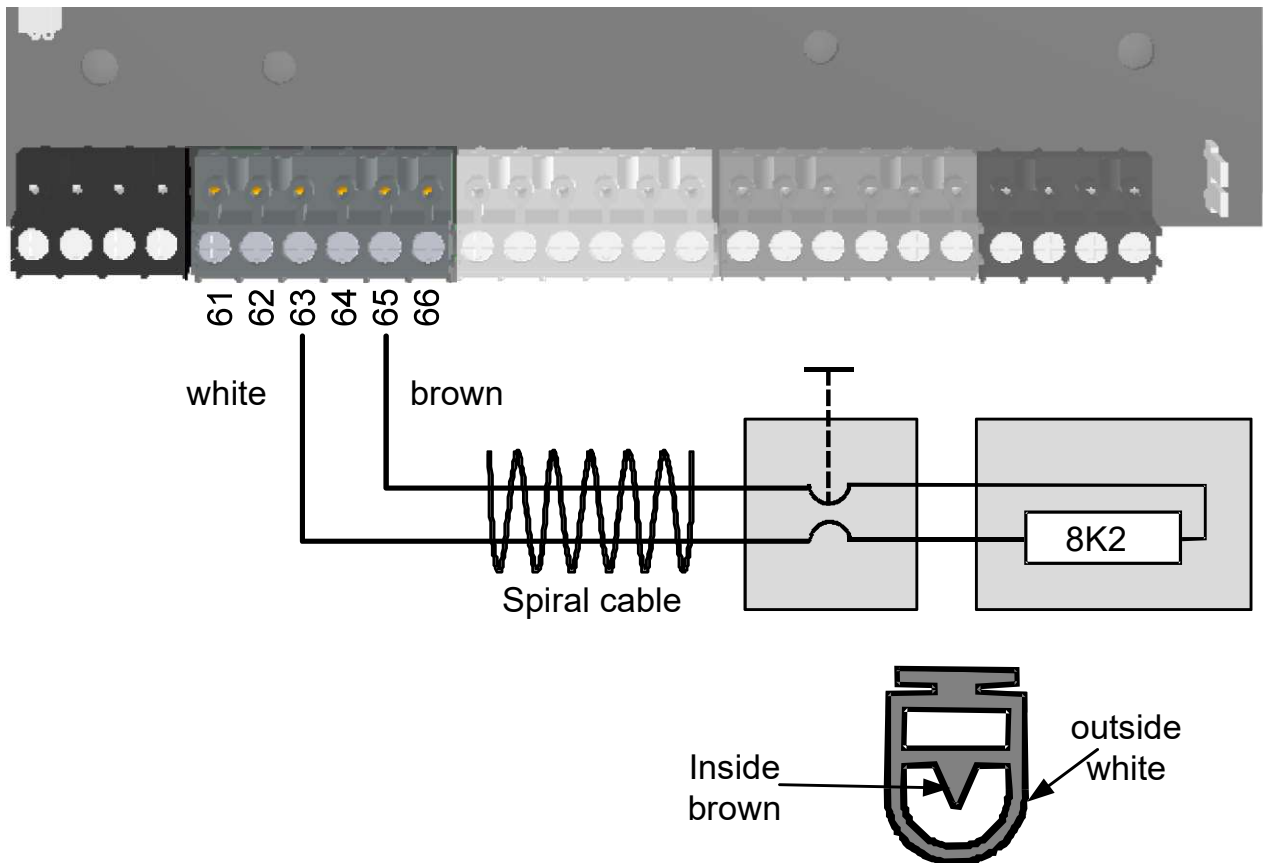


Figure 17: Connecting an electrical resistance - safety edge

In order to use to input 10 an optical safety edge first be determined the function of this input. For this purpose, parameters P.50A are used. For the setting, refer to the parameter list in chapter input profiles.

Typically, this input is used as safety input during opening movement. For example, parameter P.50A = 1406 is set.



Then the edge type of parameter P.5A2 must be set. The following settings are available.

P.5A2 = 2: 8K2 safety edge, N.O.

P.5A2 = 3: 8K2 safety edge, N.C.

P.5A2 = 6: 1K2 safety edge, N.O.

P.5A2 = 7: 1K2 safety edge, N.C.



It is important to first set parameter P.50A and then only parameter P.5A2

4.6.2 Absolute encoder TST PD

Absolute encoder TST PD is a multi-turn encoder. Due to a selectable transmission ratio, this encoder can be used for both very fast (e.g. motor shaft) as well as very slow shafts (e.g. door shaft). The driving shaft may execute more than a single revolution.

This encoder may also be equipped with the WICAB radio system to transfer the status of the safety edge without a spiral cable. For this purpose, the stationary unit TST PD FSAS and the mobile unit TST FSAM or TST FSBM are required.

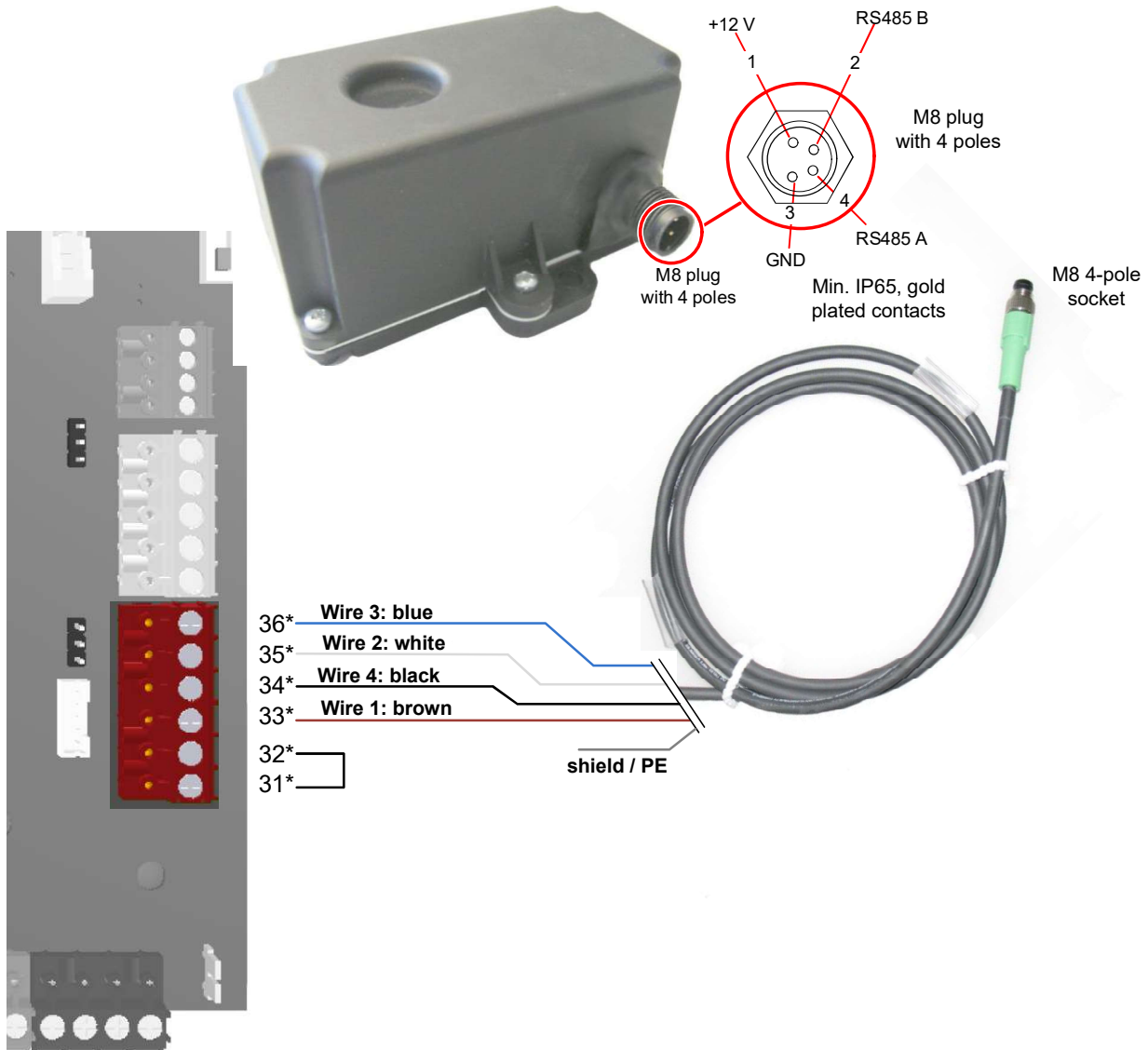


Figure 22: Absolute encoder TST PD

4.6.3 Absolute encoder DES

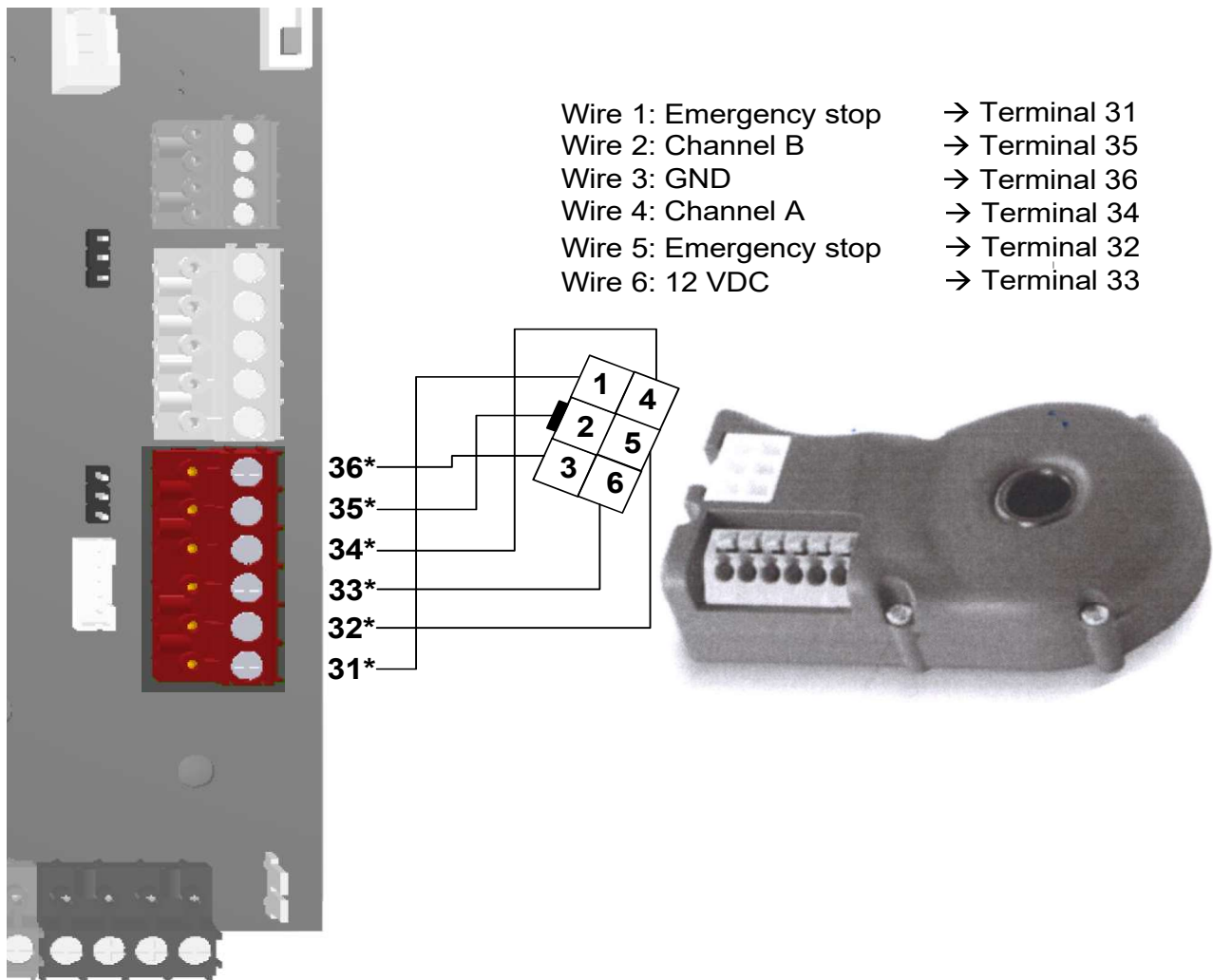


Figure 23: Connection of absolute encoder DES

4.6.5 Mechanical limit switches

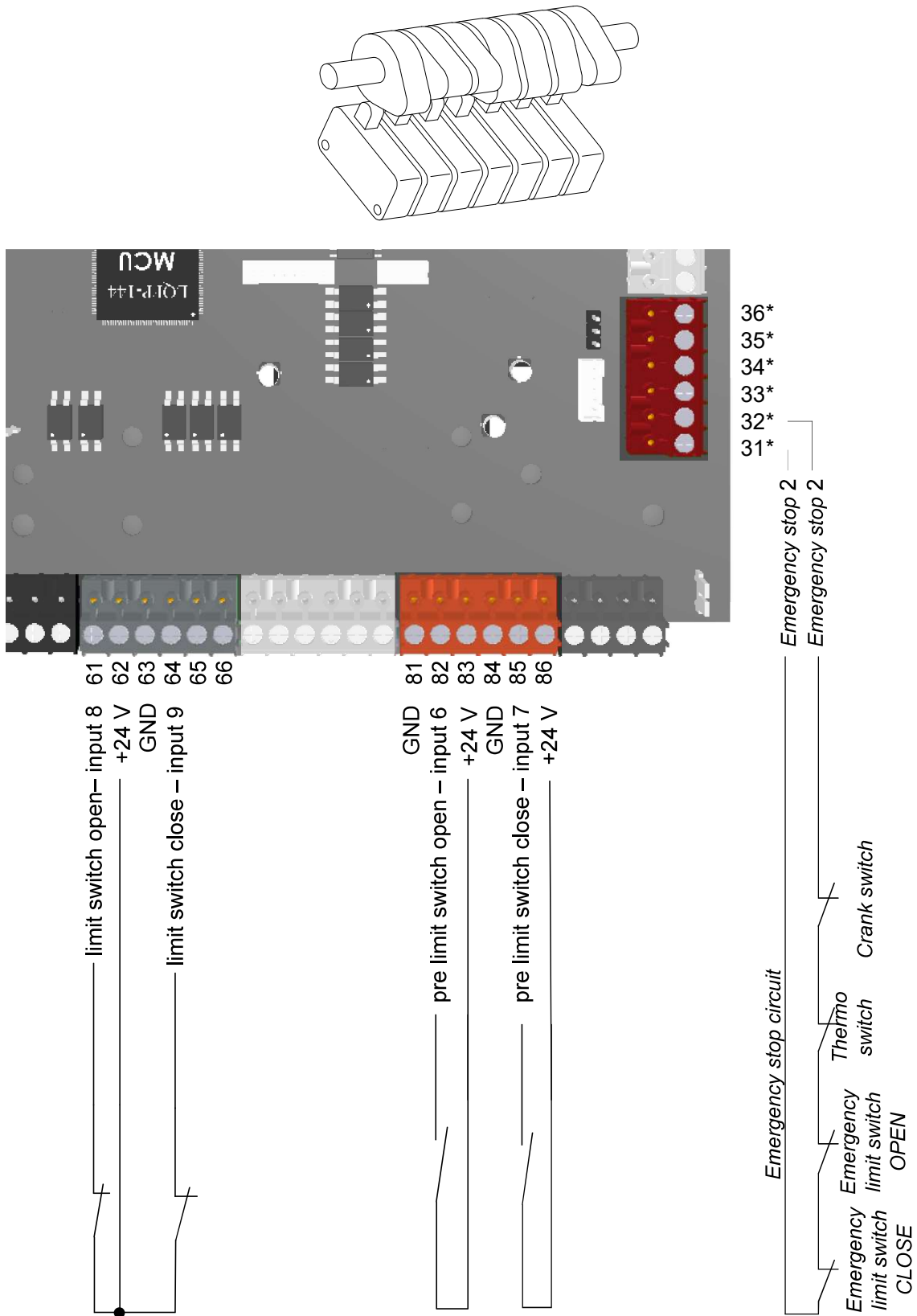


Figure 27: Connecting cam switches



Alternately, the pre-limit switches can also be connected as normally closed contacts.

4.7 Photo eye

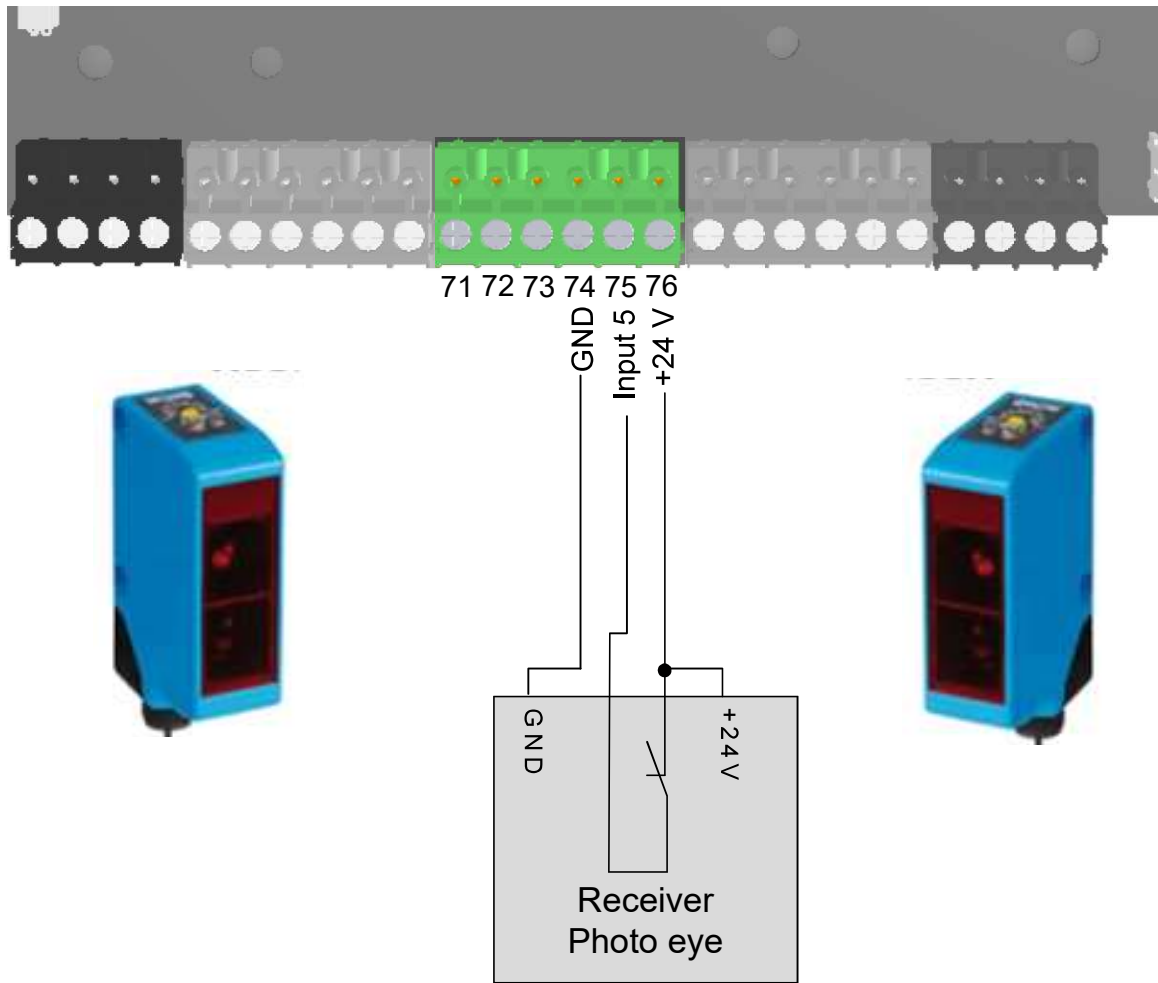


Figure 28: Photo eye connection

4.8 External triggering devices

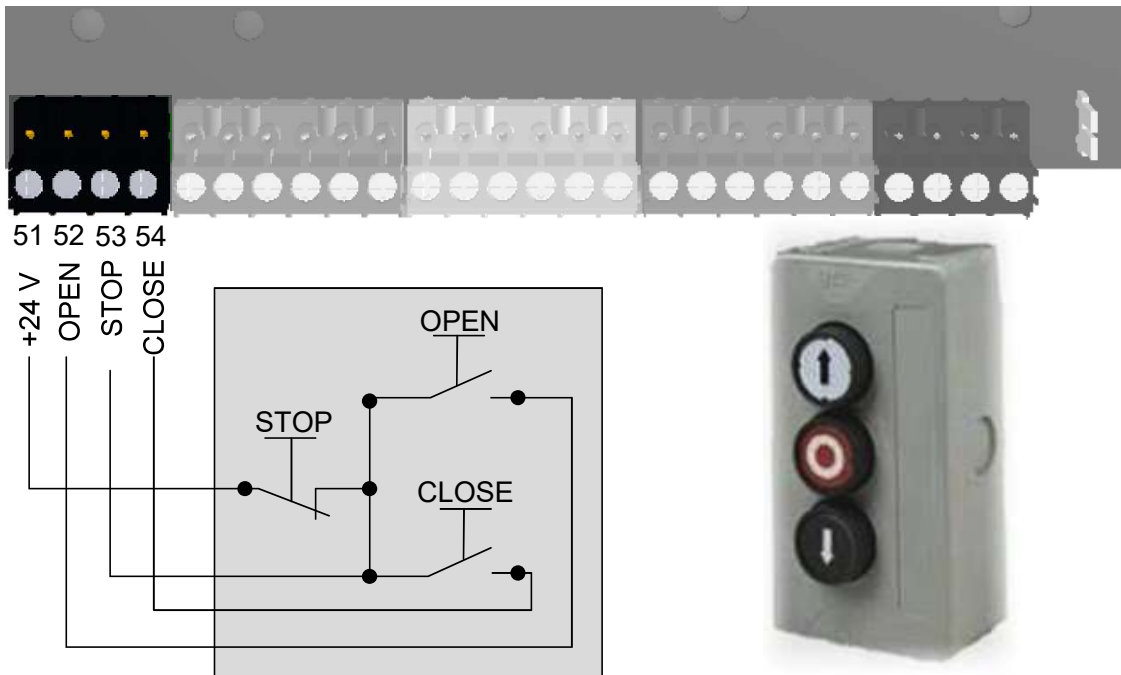


Figure 29: External triggering devices



If an external triggering device is connected, no dead man's drive is possible with the factory parameter setting. This can be activated from parameter level 3: Parameter P.511= 4 and P.531=1.

Traffic light connection

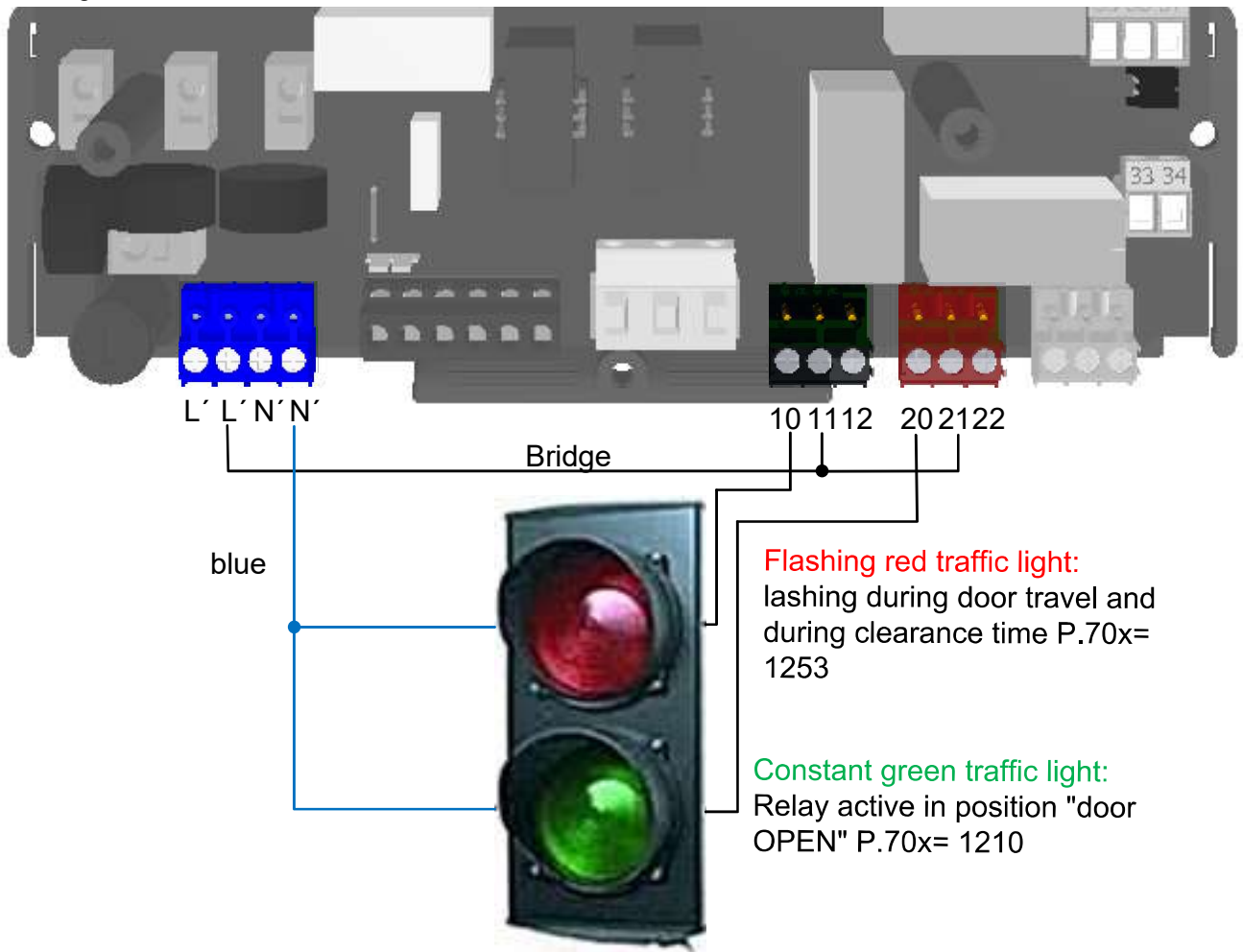


Figure 30: Traffic light connection

4.9 Overview of outputs

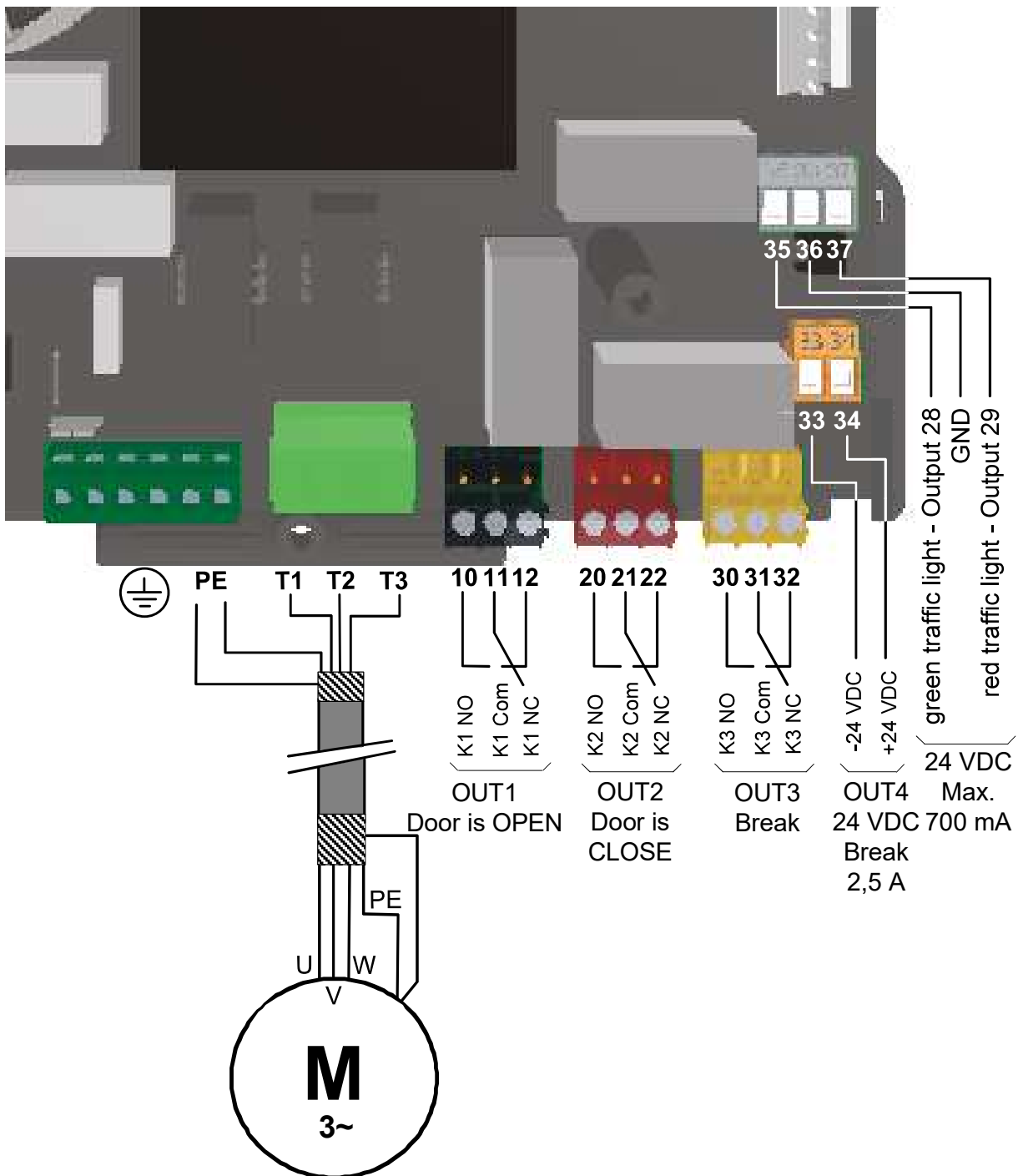


Figure 31: Overview of outputs



Observe maximum voltage and power specifications (see specifications “External supply” on page 88 and “Relay outputs Out” on page 90)!



Different to the standard mentioned here, the function of the outputs is freely selectable.

4.10 Overview of inputs

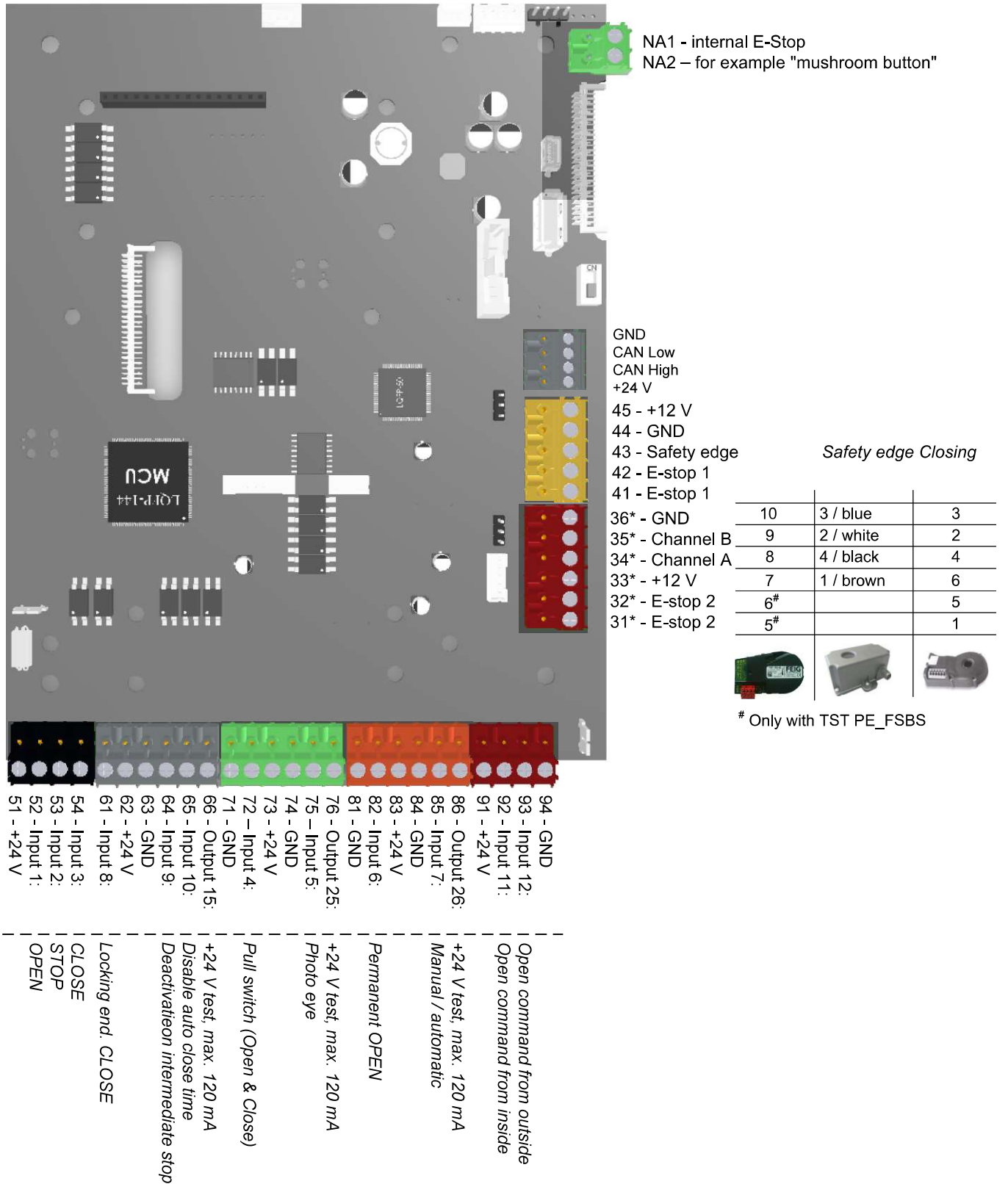


Figure 32: Overview of inputs



For the connection of mech. limit switches, please refer to section 4.5.5 Mechanical limit switches.

5.2 Induction loop detector TST SUVEK

The Induction loop monitor is available in versions TST SUVEK-1 and TST SUVEK-2
Depending on the type, 1 or 2 loops may be monitored.

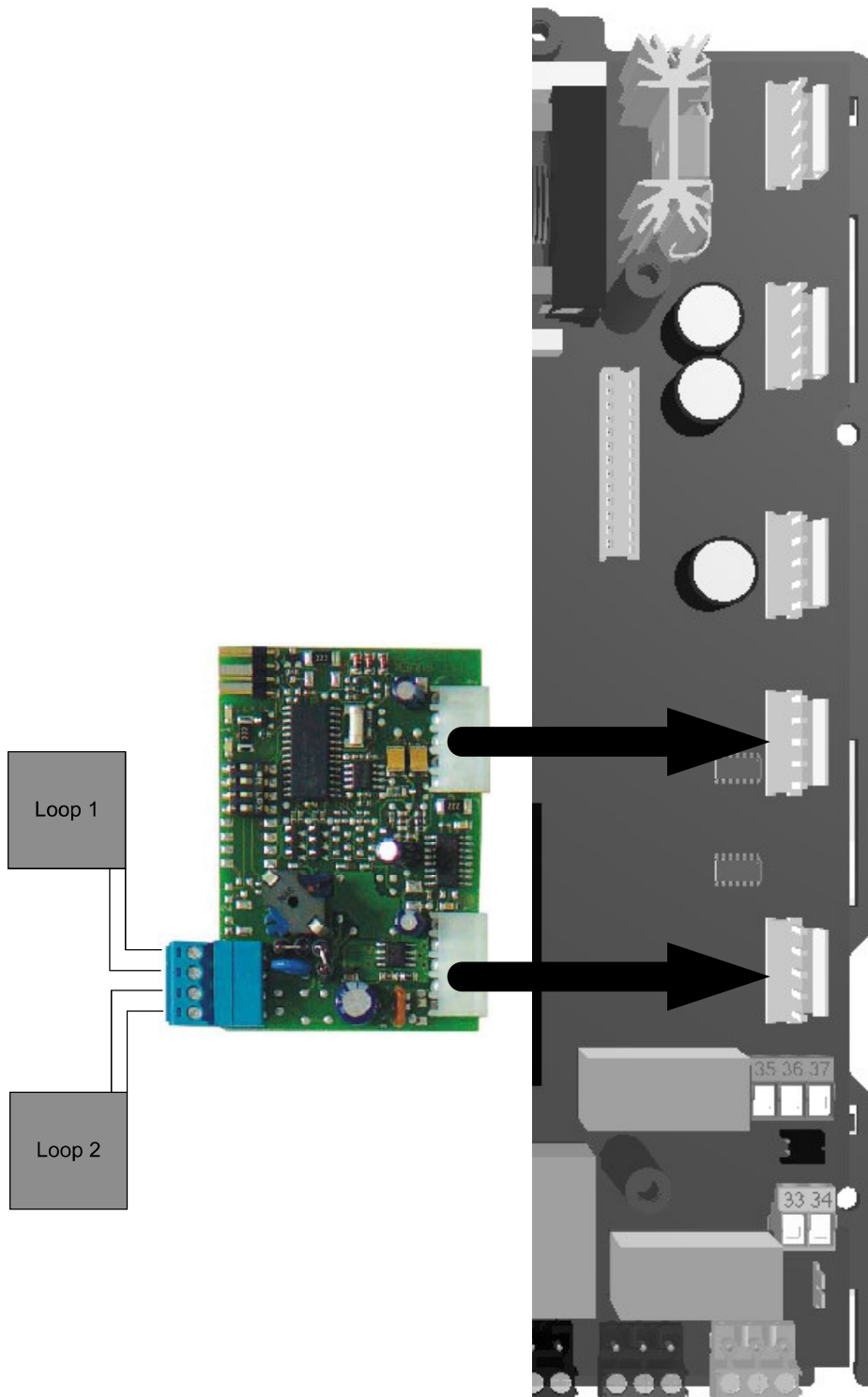




Figure 34: Detector card



To activate the slot for the detector, parameter P.802 must be set to 0302

6 General operating instructions to set parameters

6.1 Open the parameter operation mode

1.  Turn off the door controller and wait until the display has been completely extinguished.
2.  Open the cover of the enclosure and switch the DIP switch (see illustration) to ON. The service mode is activated and you can close the cover.

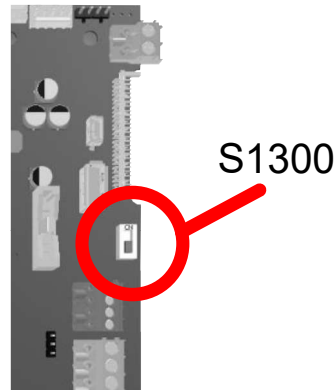




Figure 39: DIP switch position




The service mode is automatically reset after approx. 1 hour. In order to reach service mode again, the controller must be turned off for a short period and then turned on again or a reset must be performed.

3.  Close the cover of the enclosure and turn on the controller.
4.  keep these pressed simultaneously to reach the parameter selection.

P: Torzterminalen
000# 1234Zyk

+




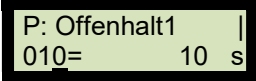

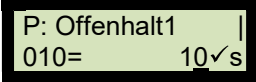


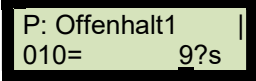

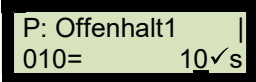
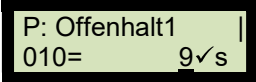

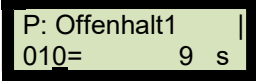
5.  Use the arrow keys to select the required parameter.
c
Not all the parameters are visible or may be changed immediately; this always depends on the password and the type of position set.

P: Offenhalt 1 |
010= 10 s


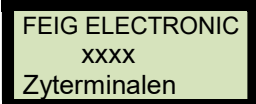
or






6.2 Editing a selected parameter

1.  By briefly pressing the STOP key on the membrane keypad, the cursor moves to the right to the stored value (the parameter is opened) or the preset value is displayed. 
2.  The parameter value is increased with the OPEN button and reduced with the CLOSE button. 
or
  *If the value has not yet been saved, a question mark is displayed after the number or the decimal point flashes.* 
3.  - If the STOP key is only pressed briefly, the set value is not saved and the value is changed to the originally stored value, i.e. the original value is displayed. 
- If you keep the STOP key pressed until the checkmark is displayed or the decimal point no longer flashes, the changed value is saved. 
4.  If you now press the STOP key briefly, you change to the display of the parameter name or the cursor jumps back to the parameterization. 

6.3 Leaving the parameter mode

-  Keep the STOP button pressed for approx. 3 seconds in order to leave the parameter mode and change to the door mode. 

6.4 Execute a reset

-  +  +  press simultaneously and keep pressed for approx. 3 seconds.

6.5 Entry into the extended parameter configuration mode

In order to reach the extended parameterization mode, a password must be entered in advance. The following parameter must be set for this:

P.999 = 2 (extended commissioning mode)

P: Passwort	
999=	0001 #

P: Passwort	
999=	0001 ✓ #

P: Passwort	
999=	0002 ? #

P: Passwort	
999=	0002 ✓ #

7 Basic settings

To put the controller into operation, please follow the steps outlined in these instructions.

7.1 Automatic query of basic data

If the controller is not already preconfigured by the door manufacturer, the following parameters are queried automatically:



The DIP switch must have been turned on (see Figure 39) so that the controller can query parameters automatically.

If DIP switch is not turned on and the basic parameters not set, error code F.090 is displayed.



The controller uses indicator "-1" or "-" in the display as a flag that the acquisition of this parameter must be queried.

The basic data does not require changes when they were previously retrieved and set automatically. See chapter 6 (General operating instructions to set parameters).

Positioning system P.205

The limit switch system in use must be set using Parameter P.205.

0000 = Mechanical limit switches Version 1 (Fig. 18: connecting cam switches)

0001 = Mechanical limit switches Version 2 (limit switches and pre-limit switches are normally closed)

0002 = Incremental encoder

0300 = Absolute encoder DES-A (GfA)

0700 = Absolute encoder DES-B (Kostal)

0800 = Absolute encoder TST PD / TST PE (FEIG)

0900 = Timer limit switch mode

Motor data P.100 – P.103

The door controller uses the following parameter setting to learn about the type of motor being used. Read the data from the nameplate and enter them into the corresponding parameters.

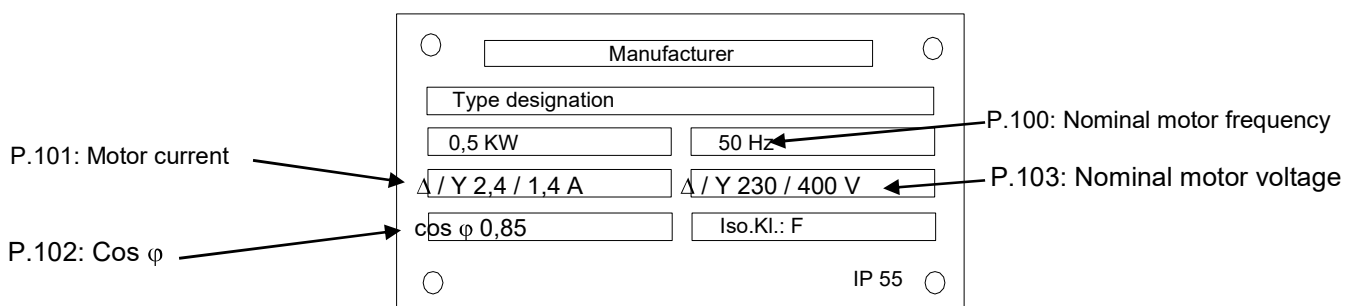


Figure 40: Typical motor nameplate (may vary)



Be sure to note the Y/D wiring of the motor. The motor data must be entered in accordance with the motor wiring. For the TST FUF2 the 400V setting is not applicable, since the controller can source a maximum motor voltage of 230V.

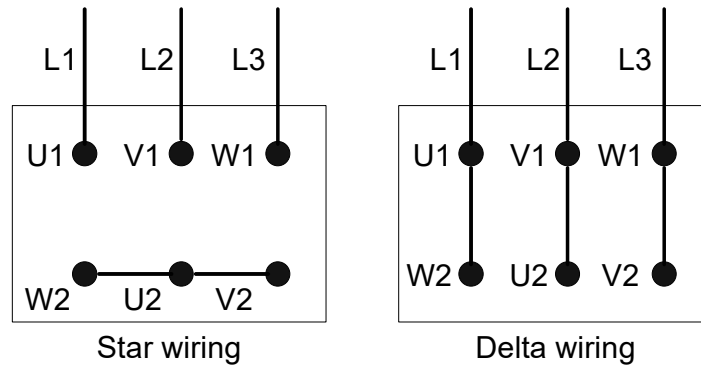



Figure 41: Star/Delta wiring



The automatic query of basic data can be interrupted by pressing the  OPEN button when the controller is being turned ON. This causes a direct jump to the parameter configuration mode.

8 Start up...

WARNING






Before starting the controller, check the electrical connections and the correct installation of the plug-in cards.


After start up, the operation of all the safety devices must be checked.





The settings are performed in dead man mode, i.e. press and hold the corresponding arrow key in the corresponding direction until the desired position is reached.

8.1 ... with absolute encoder or incremental encoder

1. Open CALIBRATE mode by briefly pressing the  STOP key.
2. Move the door to the CLOSE position with the membrane key  CLOSE
If the door moves in the incorrect direction: incorrect motor rotary field, turn off controller and reverse the 2 motor connections. If the door does not move, the motor lacks power. The power to the motor can be increased by using the Boost option (increased power at low speed) (see Chapter 8.4), if necessary, check that the brake was released.
3. Save by pressing the  STOP key for approx. 3 seconds.
4. Move the door to the OPEN position by pressing the  OPEN key on the membrane keypad.
If the door does not move, the motor lacks power. The power to the motor can be increased by using the Boost option (increased power at low speed) (see Chapter 8.4), if necessary, check that the brake was released.
5. Save by pressing the  STOP key for approx. 3 seconds.

!Eichen!
0 Start mit 

Zur Zupos. → ↑↓
0 Übern. mit 

Zur Aufpos. → ↑
xxx Übern. mit 

Auf pos. OK

Tor schließt
I.555 Lern Fahrt

Zu pos. OK


Tor öffnet
I.515 Korr. Fahrt

I.510 Korrek. OK

Tor öffnet

Tor schließt

8.2 ... with mechanical limit switches


1. Press the  CLOSE key to move the door to a distance of approx. 50cm from the closed position
If the door does not move, the motor lacks power. The power to the motor can be increased by using the Boost option (increased power at low speed) (see Chapter 8.4), if necessary, check that the brake was released.



The distance depends to a large extent on the door type and the speed; increase this value for fast moving doors.

If the door moves in the incorrect direction: incorrect motor rotary field, turn off controller and reverse the 2 motor connections.

2. Set lower pre-limit switch so that it just trips


3. Press the  CLOSE key to move the door to a distance of approx. 10cm from the closed position
The distance depends to a large extent on the door type and the speed; increase this value for fast moving doors.



4. Set lower limit switch so that it just trips




Do not travel past the limit switch at the limit positions!

5. Press the  CLOSE key to move the door to a distance of approx. 50cm from the opened position
If the door does not move, the motor lacks power. The power to the motor can be increased by using the Boost option (increased power at low speed) (see Chapter 8.4), if necessary, check that the brake was released.



The distance depends to a large extent on the door type and the speed; increase this value for fast moving doors.

6. Set upper pre-limit switch so that it just trips.

7. Press  CLOSE key to move the door to approx. 10cm from the opened position.
The distance depends to a large extent on the door type and the speed; increase this value for fast moving doors.





8. Set upper limit switch so that it just trips



Do not travel past the limit switch at the limit positions!

9. If required by the door type: adjust upper and lower EMERGENCY limit switches.
Connect the NC contacts, e.g. the safety circuit, in series with thermo switch.

10. Press  STOP and  OPEN to enter parameterization mode and select Parameter P.980 "Service Mode", open and set parameter value "2" to "0" (Automatic mode).

11. Correct limit switch positions for door OPEN and door CLOSE as needed by fine adjustment of the limit positions in automatic mode.

WARNING

To prevent the door from moving unintentionally, adjust the limit switches only when the Emergency-STOP is activated or with the controller turned off!

12. The door may now be operated in automatic mode.

8.4 Renewed request for "learning" limit positions

If the limit positions have been pre-taught when using electronic limit switches, but these are not suitable for the respective door, the learning process for limit positions can be requested again

The following parameter must be set for this:








P.210: 5 = Renewed teaching of all limit positions

8.5 Boost / increase in performance for low speeds

Boost is used to increase the power of the drives at low speed. Too much or too little boost can result in improper door operation. The boost adjustment range is 0-30%. Too much boost will result in an overcurrent fault (F.510/F.410). In this case the boost must be reduced.

If the boost is low or 0 and the motor still does not have sufficient force to move the door, the boost must be increased.

Due to the large number of door types, the correct setting for boost must be determined empirically.

1. Open parameterization mode by pressing the  STOP and  OPEN buttons simultaneously.
2. Open Boost parameter by pressing the   arrow keys. Boost can be set separately for OPEN and CLOSE.
Boost for opening: P.140.
Boost for closing: P.145.
3. Open the parameter by momentarily pressing  STOP and use the arrow keys to change it in small steps of max. 5, then save by pressing  STOP (longer).
4. After changing the boost, exit parameterization mode by pressing the  STOP button for a long time and test the setting in run mode.



You can use diagnostic parameter P.910 = 2 to display the actual motor current. The boost should be set so that the motor current remains as low as possible.

9 Movement optimisation for the door

Adjusting the pre-limit switch positions and the ramps can optimize or improve the movement of the door. The following illustrations for OPEN and CLOSE moves show the operation of the frequency converter.

9.1 Opening of the door

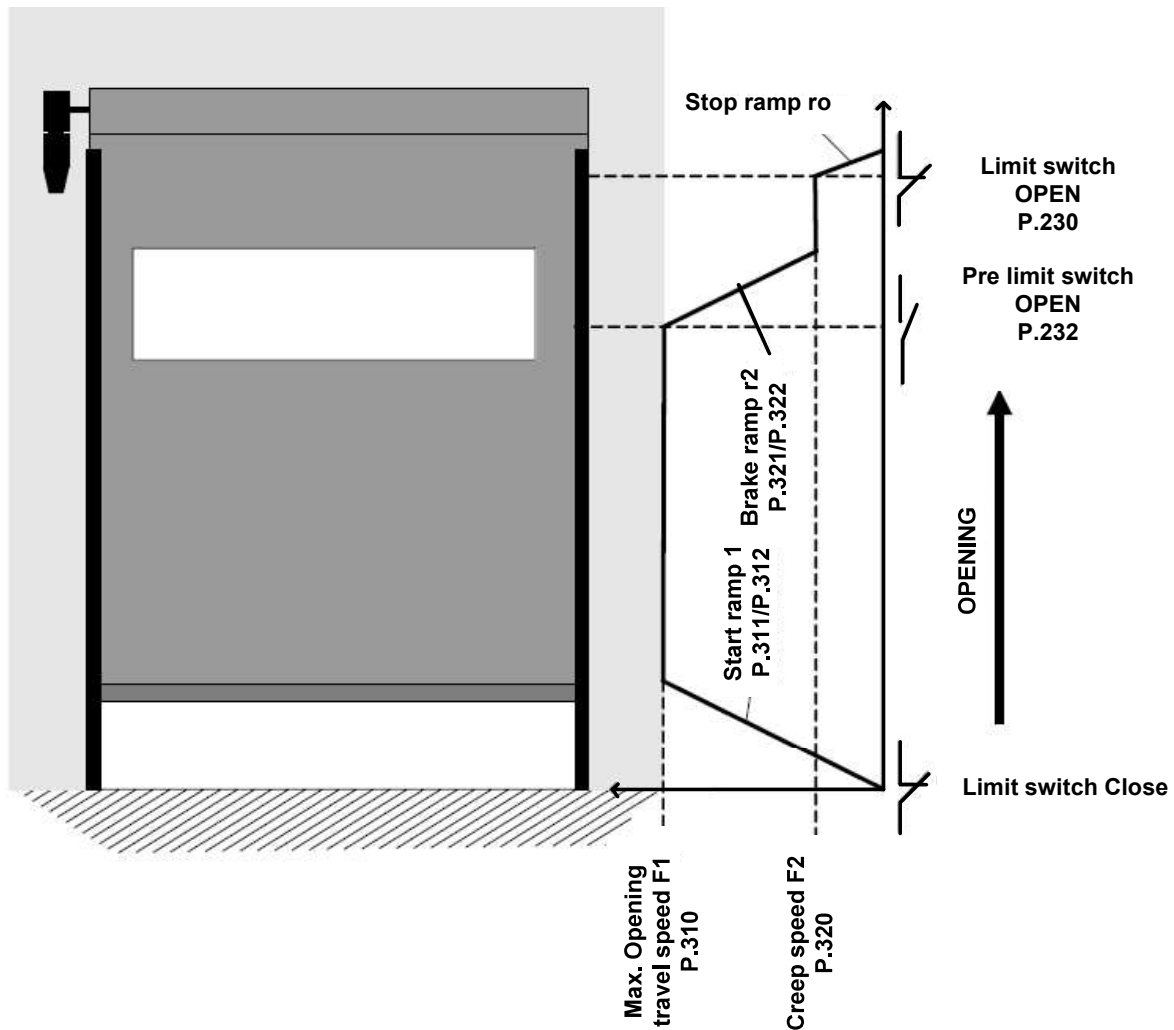


Figure 42: Opening using frequency converter

The frequency converter starts the door movement with start ramp "r1". It accelerates from 0 Hz to the max. travel speed.

The door is moved at the max. travel speed until the pre-limit switch for the limit position OPEN is reached. At this point it reduces the speed of the door to creep speed using ramp "r2". The door now moves at creep speed until the limit switch OPEN is reached. At this point the door is stopped (ro).

9.2 Closing of the door

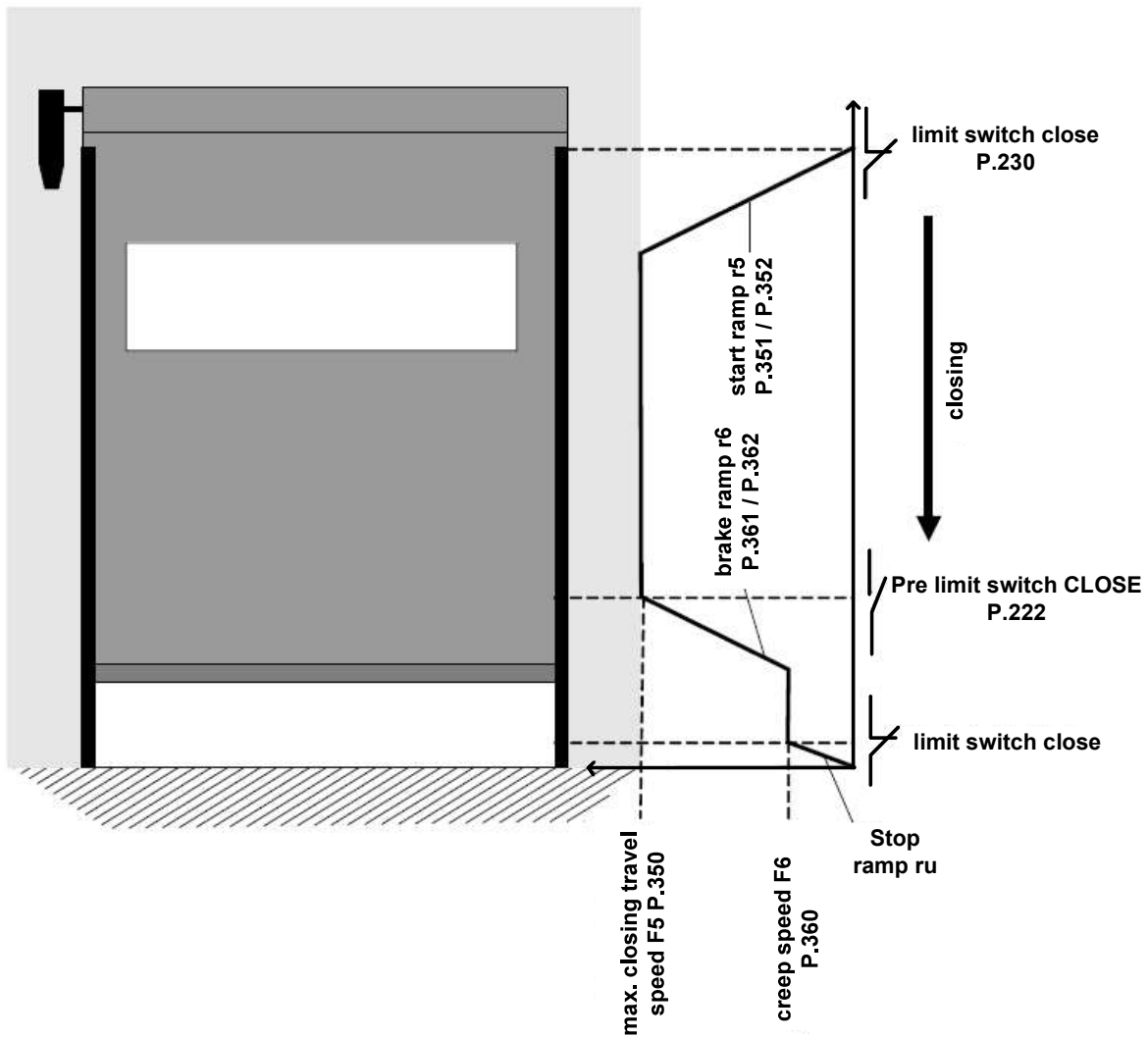


Figure 43: Closing using the frequency converter

The frequency converter starts door movement with start ramp "r5". It accelerates from 0 Hz to the max. travel speed.

The door is moved at the max. travel speed until the pre-limit switch for limit position CLOSE is reached. At this point it reduces the speed of the door to creep speed using ramp "r6". The door now moves at creep speed until the limit switch CLOSE is reached. At this point the door is stopped (ru).

9.3 Pre-limit switch setting

Setting the pre-limit switch can prevent premature or late braking of the door from max. travel speed to creep speed.

The position of the pre-limit switch is given in increments. The number of increments refers to the distance between the limit switch and the pre-limit switch.

Creep too long -> reduce pre-limit switch

Creep too short -> increase pre-limit switch

P.222 = Pre-limit switch for limit position Door CLOSE. The parameter value states the distance to the door CLOSED absolute limit switch. The brake ramp "r6" is initiated with the pre-limit switch. The slope of the ramp is set with parameter P.361 or P.362.

P.232 = Pre-limit switch for limit position Door OPEN: The parameter value states the distance to the door OPEN absolute limit switch. The brake ramp "r2" is initiated with the pre-limit switch. The slope of the ramp is set with parameter P.321 or P.322.



If the automatic setting of the pre-limit switch is used (P.216 = 2), the parameters P.222 and P.232 are changed automatically.

The parameters are also changed if the travel speed or the slope of a ramp is changed as this results in a restart of the automatic limit switch correction. If these ramps are adjusted manually, P.216 must be set to less than 2!

9.4 Ramp configuration

The ramps are used by the door controller to change speed, i.e. to accelerate or decelerate.

The ramps are set in milliseconds (ms) or in Hz per second (speed change per second), i.e. the steeper the ramp, the higher the braking force or acceleration applied to the door. If the ramp is flatter the door is braked or accelerated more gently.

P.311 / P.312 = Start ramp "r1": acceleration of the door from 0Hz to opening speed.

P.321 / P.322 = Brake ramp "r2": deceleration of the door from opening speed to creep speed.

P.351 / P.352 = Start ramp "r5": acceleration of the door from 0Hz to closing speed.

P.361 / P.362 = Brake ramp "r2": deceleration of the door from closing speed to creep speed.

P.340 / P.342 = Ramp "r-STOP" for opening: deceleration of the door from opening speed to 0Hz after pressing a STOP key.

P.380 / P.382 = Ramp "r-STOP" for closing: deceleration of the door from closing speed to 0Hz after pressing a STOP key.

9.5 Correction of the final positions

Parameters P.221 and P.231 can be used to shift the limit positions together with the pre-limit switches.

Changing these parameters in the positive direction results in the limit position being shifted upward.

Changing in the negative direction causes a shift towards the bottom.

10 Functions

You will find an overview of Parameters of this assembly instruction and there description in the added document "Parameter list TST FUxF".

11 Messages

11.1 Error messages

Faults can be acknowledged provided they are not reset automatically.



The cause of the fault must be resolved first before the corresponding message is acknowledged.

Alternatively the STOP key can also be kept pressed for approx. 5 seconds.

No.	Description	Possible reason for error
F.000	Door position too far up	<ul style="list-style-type: none"> • Too small a parameter value for upper emergency limit switch → increase P.239 • Upper limit switch range (limit switch band) too small → increase P.233 • Mechanical brake defective or improperly set
F.005	Outside door position too far down	<ul style="list-style-type: none"> • Too small a parameter value for lower emergency limit switch → increase P. 229 • Lower limit switch range (limit switch band) too small → increase P. 223 • Mechanical brake defective or improperly set
F.020	Run time exceeded (during opening, closing or deadman)	<ul style="list-style-type: none"> • current motor run time has exceeded set maximum run time (P.410 (Opening), P.415 (Closing), P.419 (deadman move), door may be sticking or is blocked. • Door is blocked • If using mechanical limit switches, one may not have tripped
F.021	Emergency opening wrong testing	<ul style="list-style-type: none"> • The max. allowed run time (P.490) during testing has exceeded • Call service hotline
F.030	Lag error (position change of the door is less than expected)	<ul style="list-style-type: none"> • door or motor is blocked • insufficient power for providing necessary torque • too little speed • mechanical limit switch was not left or is defective • Incremental or absolute encoder shaft is slipping • wrong positioning system selected (P.205) • one motor phase is missing • the brake does not release • Settings of the failure detecting time are not correct (P.430 or P.450)
F.031	Detected rotational direction deviates from expected	<ul style="list-style-type: none"> • When using incremental encoders: Channel A and B reversed • Motor rotation direction reversed compared with calibration setting → teach in the limits new (P.210 = 5) • Too much „pancaking“ when starting, brake releases too soon, or too little torque, adjust boost (P.140 or P.145) as necessary.
F.033	Bad position transmitter protocol	<ul style="list-style-type: none"> • Fault on the bus of the position transmitter • No position data available over an extended period

No.	Description	Possible reason for error
F.043	Pre-limit switch fault (light barrier)	<ul style="list-style-type: none"> The pre-limit switch for the light barrier remains activated even in the middle end position or upper end position.
F.050	Reference switch position deviates from permissible range. During cyclical synchronization	<ul style="list-style-type: none"> Reference switch constantly tripped (defective) Reference switch trips too far from the selected reference. Reference switch trips in the limit switch band P270 and P280 are both at the reference switch
F.051	Reference switch position deviates from permissible range.	<ul style="list-style-type: none"> Reference switch lies in the limit switch band Reference switch is beyond 15% EO Reference switch defective
F.052	Reference switch not recognized	<ul style="list-style-type: none"> The reference switch is not recognized within 20% EO during automatic synchronization after power-on The reference switch is not recognized in the associated end position.
F.060	Breakaway recognized	<ul style="list-style-type: none"> Breakaway was detected but not fixed The automatic lead in after breakaway has failed
F.063	Balance error on loop 3	<ul style="list-style-type: none"> disturbing surrounding Loop out of tolerance range
F.064	Balance error on loop 4	<ul style="list-style-type: none"> disturbing surrounding Loop out of tolerance range
F.067	Error on loop 3	<ul style="list-style-type: none"> Shortcut or intermitted loop connection wiring
F.068	Error on loop 4	<ul style="list-style-type: none"> Shortcut or intermitted loop connection wiring
F.080	Maintenance is required	<ul style="list-style-type: none"> Service counter has expired
F.090	Controller not parameterized	<ul style="list-style-type: none"> The min. necessary basic parameters for the controller have not yet been set → Activate DIP-switch and put in the asked parameters.
F.201	Internal E-Stop „push-button“ tripped or Watchdog (computer monitor) (watchdog only for FUS, FUN, FUE, FU3E, FU3P)	<ul style="list-style-type: none"> E-Stop chain was interrupted starting at input „internal E-Stop“ without parameterizing mode having been selected Internal parameter or EEPROM checks defective, pressing the STOP button provides additional information about the cause (only valid for FUS, FUN, FUE, FU3E, FU3P)
F.211	External E-Stop 1 tripped	<ul style="list-style-type: none"> E-Stop chain was interrupted starting at Input 1
F.212	External E-Stop 2 tripped	<ul style="list-style-type: none"> E-Stop chain was interrupted starting at Input 2
F.320	Obstacle during opening	<ul style="list-style-type: none"> During opening an obstacle has recognized
F.325	Obstacle during closing	<ul style="list-style-type: none"> During closing an obstacle has recognized
F.360	Short circuit detected on edge input	<ul style="list-style-type: none"> Short circuit detected on edges with normally closed contact The light beam of the optical edge is interrupted Jumper for 1K2 / 8K2 is wrong set
F.361	Number of trips of the Safety input D, normally this is the integrated safety edge evaluation, has reached set limit (configurable in P.46E)	<ul style="list-style-type: none"> Parameterized, maximum number of trips of the safety input D during a door cycle was exceeded → To reset close the door in deadman mode Check the set number of trips in P.46E

No.	Description	Possible reason for error
F.362	Redundancy error with short circuit	<ul style="list-style-type: none"> • One of the processing channels for short circuit detection does not react identically with the second channel → Controller board defective, if no other error message F.3xx is shown • Dynamical optical safety edge connected but not set in Parameter P.460
F.363	Interruption on edge input	<ul style="list-style-type: none"> • Connection cable defective or not connected • Termination resistor incorrect or missing • Jumper 1K2 / 8K2 incorrectly set
F.364	Safety edge testing failed	<ul style="list-style-type: none"> • Safety edge was not activated as expected when requesting a test. • The time between request for testing and actual testing not in agreement • The pre-limit switch is set incorrectly
F.366	Too high a pulse frequency for optical safety edge	<ul style="list-style-type: none"> • Defective optical safety edge • Defective input for internal safety edge
F.369	Internal safety edge incorrectly parameterized	<ul style="list-style-type: none"> • An internal safety edge is connected but deactivated → set P.460 to the used edge type
F.36A	Redundancy error of the 8K2 slip door switch on the internal safety edge evaluation unit	<ul style="list-style-type: none"> • One of the contacts of the redundant 8k2 slip door switch is defective • The slip door was not fully opened or closed
F.371	Number of trips of the Safety input E, normally this is the integrated safety edge evaluation, has reached set limit (configurable in P.47E)	<ul style="list-style-type: none"> • Parameterized, maximum number of trips of the safety input E during a door cycle was exceeded → To reset close the door in deadman mode • Check the set number of trips in P.47E
F.372	Redundancy error with short circuit	<ul style="list-style-type: none"> • One of the processing channels for short circuit detection does not react identically with the second channel. • Controller board defective
F.373	Fault in the safety edge (message comes from module)	<ul style="list-style-type: none"> • Cable break to safety edge, no edge connected, edge termination resistor incorrect or defective • Jumper for termination resistor definition in wrong position. • Safety edge processing selected with Parameter P.470, but module not plugged in or wrong module.
F.374	Safety edge testing failed	<ul style="list-style-type: none"> • Pre-limit switch for safety edge incorrectly set or defective • Processing module defective • Safety edge defective
F.379	Safety edge detection defective (coding pin or parameter setting)	<ul style="list-style-type: none"> • No module plugged in but was reported as present by a parameter • The controller was started up with another module than the one currently plugged in
F.37A	Redundancy error of the 8K2 slip door switch on the internal safety edge evaluation unit channel 1	<ul style="list-style-type: none"> • One of the contacts of the redundant 8k2 slip door switch is defective • The slip door was not fully opened or closed
F.380	Short circuit detected on safety input	<ul style="list-style-type: none"> • Short circuit detected on edges with normally closed contact
F.383	Interruption on safety input	<ul style="list-style-type: none"> • Connection cable defective or not connected • Termination resistor incorrect or missing • Jumper incorrectly set

No.	Description	Possible reason for error
F.384	Safety input testing failed	<ul style="list-style-type: none"> • Safety edge was not activated as expected when requesting a test. • The time between request for testing and actual testing not in agreement
F.385	Fault in pre-limit switch for safety edge	<ul style="list-style-type: none"> • Pre-limit switch for turning off the safety edge or reversing after safety edge tripping remains tripped even in the upper end position.
F.389	Safety input incorrectly parameterized	<ul style="list-style-type: none"> • A safety edge is connected but deactivated • With FUZ2: Safety input Jumper incorrectly set (as digital input jumpered but as safety edge set)
F.38A	Redundancy error of the 8K2 slip door switch on the second internal safety edge evaluation unit	<ul style="list-style-type: none"> • One of the contacts of the redundant 8k2 slip door switch is defective • The slip door was not fully opened or closed
F.3A1	Number of trips for safety input A has reached set limit	<ul style="list-style-type: none"> • Parameterized, maximum number of safety input trips during a door cycle was exceeded
F.3B1	Number of trips for safety input B has reached set limit	<ul style="list-style-type: none"> • Parameterized, maximum number of safety input trips during a door cycle was exceeded
F.3C1	Number of trips for safety input C has reached set limit	<ul style="list-style-type: none"> • Parameterized, maximum number of safety input trips during a door cycle was exceeded
F.3F4	2. external safety edge - testing failed	<ul style="list-style-type: none"> • Pre-limit switch for safety edge incorrectly set or defective • Processing module defective • Safety edge defective
F.400	Controller hardware reset detected	<ul style="list-style-type: none"> • Excessive noise on supply voltage • Internal watchdog tripped • RAM error
F.401	Watchdog Error	<ul style="list-style-type: none"> • Internal Watchdog has released
F.409	RFUxK software incompatible	<p>Only the expansion board RFUxK-F with the software version from V1. 11 can be operated in parallel with other xpansion boards on a CAN-bus.</p> <ul style="list-style-type: none"> - The software version of the expansion board RFUxK-A/E is less than V1. 11 - the expansion boards are connected to different CAN interfaces (e.g. RFUxK-A/E to CAN1 or CAN2 and RFUxK-F to CAN2 or CAN1)
F.40A	Internal Software Reset	unplanned software reset of the processor
F.40B	Communication error expansion board	<ul style="list-style-type: none"> • The communication between main board and expansion board is disturbed
F.40C	Unknown extension board (CAN connection)	<ul style="list-style-type: none"> • Incorrect hardware coding of the extension board • Control software does not support the expansion card • Expansion card defective
F.410	Over-current (motor current or DC-bus)	<ul style="list-style-type: none"> • Wrong motor data set (P. 100 – P. 103) • Non-adjusted voltage increase / boost set (P. 140 or P. 145) • Motor not properly dimensioned for door • Door sticks
F.413	The brake chopper under heavy load	The brake chopper has to withstand heavy loads. The trip is interrupted to give the chopper an opportunity to cool down. The fault resets itself after cooling.

No.	Description	Possible reason for error
F.420	Overvoltage in DC-bus Limit 1	<ul style="list-style-type: none"> • Brake chopper interference / defective / missing • Feed voltage too high • Motor is generating excessive voltage - brake chopper cannot dissipate the re-generated energy.
F.425	Overvoltage line supply	<ul style="list-style-type: none"> • The supply voltage for the controller is to high
F.426	Undervoltage line supply	<ul style="list-style-type: none"> • The supply voltage for the controller is to low
F.430	Temperature heat sink outside of working range Limit 1	<ul style="list-style-type: none"> • Excessive load on power stage or brake chopper • Ambient temperature too low for controller operation • Clock frequency of power stage too high (Parameter P.160)
F.435	Housing temperature high	<ul style="list-style-type: none"> • The temperature inside the controller housing is to high
F.440	Overcurrent in DC-bus Limit 1	<ul style="list-style-type: none"> • Boost not adjusted • Motor incorrectly dimensioned for door • Door sticks
F.510	Motor / DC-bus overcurrent Limit 2	<ul style="list-style-type: none"> • Wrong motor data set (P.100 – P.103) • Non-adjusted voltage increase / boost set (P.140 or P.145) • Motor not properly dimensioned for door • Door sticks
F.511	No DC supply	<ul style="list-style-type: none"> • The DC voltage can not given to the motor (overcurrent error, IGBT error F.519, 24 V error or over temperature) • The emergency stop is activated
F.512	Offset motor current / link current incorrect	<ul style="list-style-type: none"> • Hardware faulty
F.513	Brake chopper overloaded, not installed or defective	<ul style="list-style-type: none"> • the continuous period of regenerative-drive was too long • the brake chopper is defective or was not properly connected
F.514	Error in inrush current limiter	The bypass relay can not be switched due to a faulty DC bus voltage
F.515	Motor protection function detected overcurrent	<ul style="list-style-type: none"> • Incorrect motor curve (motor rated current) set (P.101) • Too much boost (P.140 or P.145) • Motor incorrectly dimensioned
F.519	IGBT driver chip detected overcurrent	<ul style="list-style-type: none"> • Short circuit or ground fault on motor terminals • Motor rated current setting extremely wrong (P.100) • Extremely too much boost (P.140 or P.145) • Motor incorrectly dimensioned • Motor winding defective • Momentary interruption of the E-Stop circuit.
F.520	Overvoltage in DC-bus Limit 2	<ul style="list-style-type: none"> • Brake chopper interference / defective / missing • Incoming mains voltage much to high • Motor is generating excessive voltage - brake chopper cannot dissipate the re-generated energy
F.521	Low voltage in DC-bus	<ul style="list-style-type: none"> • Input voltage supply too low, usually at load • Load too great / final stage or brake chopper fault
F.522	Permissible DC current for a single-phase power supply is too high	On the FU3F a single-phase power supply was detected and the permissible DC current for a single-phase power supply is too high. This error always occurs in combination with F.540

No.	Description	Possible reason for error
F.524	ext. 24 V supply missing or too low	<ul style="list-style-type: none"> • Overload but no short circuit • When 24V is shorted the controller voltage does not ramp up and glow lamp V306 comes on.
F.525	Overvoltage at the incoming mains supply	<ul style="list-style-type: none"> • The incoming mains supply for the Controller is to high • The incoming mains supply fluctuates very extremely
F.530	Heatsink temperature outside of working range Limit 2	<ul style="list-style-type: none"> • Excessive load on final stages or brake chopper • Ambient temperature too low for controller operation • Clock frequency of final stage too high (Parameter P.160)
F.535	Housing temperature high	<ul style="list-style-type: none"> • The temperature inside the controller housing is to high
F.540	Overcurrent in DC-bus Limit 2	<ul style="list-style-type: none"> • Boost not adjusted • Motor incorrectly dimensioned for door • Door sticks
F.601	Bad Light curtain reception quality	<p>Poor reception quality when the light curtain is started</p> <ul style="list-style-type: none"> • Light curtain dirty • Protection foil not removed • bad aligned • wrong Range set
F.610	Light curtain light line alignment	<p>Light line alignment has not been done</p> <ul style="list-style-type: none"> • Too less increments
F.611	Light curtain light line position values not plausible	<p>Position values stored by the light curtain do not match door movement</p> <ul style="list-style-type: none"> • Objects in the door area during teach in
F.612	External RS-485	<p>RS-485 communication failure between Receiver and Door Controller</p> <ul style="list-style-type: none"> • Insufficient valid position data • A and B wires twisted • wrong connection.
F.613	Internal RS-485	<p>RS-485 communication error between Transmitter and Receiver</p> <ul style="list-style-type: none"> • A and B wires twisted • wrong connection
F.615	Internal error of the light curtain transmitter	<p>Internal transmitter error light curtain:</p> <ul style="list-style-type: none"> • RAM test has failed • ROM test has failed • Program run error • Synchronisation error • Addressing module defective • Dark test has failed • Digital/analog-converter is defective • Replace hardware!

No.	Description	Possible reason for error
F.616	Internal error Light curtain Receiver	<p>Internal error of the light curtain receiver :</p> <ul style="list-style-type: none"> • RAM test fail • ROM test fail • Program run error • Sync error • Addressing module defective • Dark test fail • Digital/analog-converter defective • Watchdog not triggered or hangs • Replace hardware!
F.617	Light curtain incompatibility	<p>Transmitter and receiver are not compatible.</p> <ul style="list-style-type: none"> • modified Transmitter serial number • incompatible Hardware version / revision level • incompatible Software version
F.618	LGB - incorrect customer coding	<p>Transmitter and/or receiver are not by Efaflex. Efaflex has a function which prohibits the operation of a TLG with a customer code other than that of Efaflex. (Fault is active only in control systems with Efaflex firmware)</p>
F.621	Light curtain test error (transmitter)	test error for the internal transmitter system test
F.622	Light curtain test error (receiver)	test error for the internal receiver system test
F.626	Light curtain test error (Out 1)	Test / wiring error of output 1
F.627	Light curtain test error (Out 2)	Test / wiring error of output 2
F.628	Light curtain dark test error	<p>Dark test error</p> <ul style="list-style-type: none"> • external light source • uncontrolled transmissions • defective receiver
F.700	Position sensing defective	<p>With mechanical limit switches:</p> <ul style="list-style-type: none"> • At least one limit switch does not correspond to the configured active status. • An implausible combination of at least 2 active limit switches. <p>For electronic limit switches:</p> <ul style="list-style-type: none"> • After invoking activation of the factory parameters (Parameter P.990) the corresponding positioning system was not parameterized. • Calibration not completed or is incorrect and must be repeated. • When activating the intermediate stop the intermediate stop is implausible. • Synchronization not finished or reference switch defective.
F.701	CLOSE Position not found in timer mode	<ul style="list-style-type: none"> • The simulated end switch CLOSE was not reached at the expected position • The tolerance band for the recognition time is too small (P.229)
F.702	OPEN Position not found in timer mode	<ul style="list-style-type: none"> • The simulated end switch OPEN was not reached at the expected position • The tolerance band for the recognition time is too small (P.239)

No.	Description	Possible reason for error
F.752	Loss of communication with encoder	<ul style="list-style-type: none"> • Interface cable defective / interrupted • supply voltage 12 Volt faulty, e.g. shortcut in spiral cable • Channel A and B connected over cross • Absolute encoder processor electronics defective • Defective hardware or electrically noisy environment • Use a shielded control cable • Install a RC element (100Ω+ 100nF) at the brake
F.760	Position outside of window	<ul style="list-style-type: none"> • Position encoder drive defective • Absolute encoder processing electronics defective • Defective hardware or electrically noisy environment
F.763	DES-B Error	<ul style="list-style-type: none"> • Position encoder drive defective -> make a reset
F.766	Internal error TST PD/PE	<ul style="list-style-type: none"> • The position encoder TST PD / PE is disturbed -> make a reset
F.767	Overtemperature TST PD	<ul style="list-style-type: none"> • The temperature in the encoder housing is too high
F.768	Battery voltage	<ul style="list-style-type: none"> • The voltage of the buffer battery is too low → change battery
F.769	Rotation speed of PD shaft too high	<ul style="list-style-type: none"> • The rotation speed of the shaft where the encoder is mounted is too high → mount the encoder on another shaft
F.770	Door way is too high for the parameter set Encoder resolution	<ul style="list-style-type: none"> • The Value of the Parameter P.202 (set Encoder resolution) is too high for the combination encoder and door.
F.7A2	Time-out with protocol transmission by ASC1	<ul style="list-style-type: none"> • Interface connection wrong or not connected • defective hardware or strong disturbed surrounding • use shielded control cable
F.801	Wrong Test of input 1 of the mobile unit TST FSx	<ul style="list-style-type: none"> • Input 1 of the mobile unit was tested wrong • The device which is connected to the input does not work correctly • The mobile unit is defective
F.802	Wrong Test of input 2 of the mobile unit TST FSx	<ul style="list-style-type: none"> • Input 2 of the mobile unit was tested wrong • The device which is connected to the input does not work correctly • The mobile unit is defective
F.803	Wrong Test of input 3 of the mobile unit TST FSx	<ul style="list-style-type: none"> • Input 3 of the mobile unit was tested wrong • The device which is connected to the input does not work correctly • The mobile unit is defective
F.804	Wrong Test of input 4 of the mobile unit TST FSx	<ul style="list-style-type: none"> • Input 4 of the mobile unit was tested wrong • The device which is connected to the input does not work correctly • The mobile unit is defective
F.80A	Wrong Test of input A of the stationary unit TST FSx	<ul style="list-style-type: none"> • Input A of the stationary unit was tested wrong • The device which is connected to the input does not work correctly • The stationary unit is defective
F.80B	Wrong Test of input B of the stationary unit TST FSx	<ul style="list-style-type: none"> • Input B of the stationary unit was tested wrong • The device which is connected to the input does not work correctly • The stationary unit is defective

No.	Description	Possible reason for error
F.80C	Wrong Test of input C of the stationary unit TST FSx	<ul style="list-style-type: none"> • Input C of the stationary unit was tested wrong • The device which is connected to the input does not work correct • The stationary unit is defective
F.811	Wrong test for output 1 of the stationary unit	<ul style="list-style-type: none"> • Output 1 of the stationary unit was tested incorrectly • The cable between the stationary unit and the controller is damaged or not connected • The stationary unit is defective • Incorrect settings for parameter P.5xF, P.47b or P.465
F.812	Wrong Test for output 2 of stationary unit TST FSx	<ul style="list-style-type: none"> • Output 2 of the stationary unit was tested incorrectly • The cable between stationary unit and controller is damaged or not connected • The stationary unit is defective • Incorrect settings for parameter P.5xF, P.47b or P.465
F.813	Wrong Test of output 3 of the stationary unit TST FSx	<ul style="list-style-type: none"> • Output 3 of the stationary unit was tested incorrectly • The cable between the stationary unit and the controller is damaged or not connected • The stationary unit is defective • Incorrect settings of parameter P.5xF, P.47b or P.465
F.821	Wrong parameter setting input 1 of mobile unit	<ul style="list-style-type: none"> • The device which is connected to input 1 of the mobile unit does not fit to the settings • Check Parameter P.F1F
F.822	Wrong parameter setting input 2 of mobile unit	<ul style="list-style-type: none"> • The device which is connected to input 2 of the mobile unit does not fit to the settings • Check Parameter P.F2F
F.823	Wrong parameter setting input 3 of mobile unit	<ul style="list-style-type: none"> • The device which is connected to input 3 of the mobile unit does not fit to the settings • Check Parameter P.F3F
F.824	Wrong parameter setting input 4 of mobile unit	<ul style="list-style-type: none"> • The device which is connected to input 4 of the mobile unit does not fit to the settings • Check Parameter P.F4F
F.831	Disturbed input 1 of mobile unit TST FSx	<ul style="list-style-type: none"> • The input 1 of the mobile unit is disturbed • The connection to the device is interrupted
F.832	Disturbed input 2 of mobile unit TST FSx	<ul style="list-style-type: none"> • The input 2 of the mobile unit is disturbed • The connection to the device is interrupted
F.833	Disturbed input 3 of mobile unit TST FSx	<ul style="list-style-type: none"> • The input 3 of the mobile unit is disturbed • The connection to the device is interrupted
F.834	Disturbed input 4 of mobile unit TST FSx	<ul style="list-style-type: none"> • The input 4 of the mobile unit is disturbed • The connection to the device is interrupted
F.841	Frequency error on input 1 of mobile unit	<ul style="list-style-type: none"> • The connected optical safety edge is faulty
F.843	Frequency error on input 3 of mobile unit	<ul style="list-style-type: none"> • The connected optical safety edge is faulty
F.851	Max. Number of allowed Reversings, because of bad WiCAB radio, exceeded.	<p>The radio connection interrupts during door drive for a short time</p>

No.	Description	Possible reason for error
F.852	Communication error between TST FSx and controller	This error occurs when the controller loses RS485 communication for min. 1 second with the stationary unit of the radio strip TST FSx. Possible causes are: <ul style="list-style-type: none"> • The stationary unit is broken • The stationary unit is not or wrong connected
F.853	TST PE_FSBS operating voltage too low	The operating voltage of encoder TST PE_FSBS is too low (less than 8V) As a result, the calculation of the position must be terminated.
F.856	Communication error between mobile and stationary unit	This error occurs if the mobile unit and the stationary unit of the radio control unit could not establish radio communication for at least 1 second. Possible causes are: <ul style="list-style-type: none"> • No mobile unit in radio range • The battery of the mobile unit is empty or not connected • The antenna of the stationary unit is not connected or missing • Mobile unit or stationary unit is defective
F.857	Battery empty	<ul style="list-style-type: none"> • The battery voltage is under the limit set with Parameter P.F0B • The battery voltage of the mobile unit is too low • Use new battery and set back battery capacity to 100% by pressing the stop key for long time in P.F09. • To deactivate this error message you can set P.F09 and P.F0B to 0
F.859	Software version	The software versions of the stationary and the mobile unit are not compatible. No safe trip possible.
F.860	Internal fault stationary unit	Internal system fault on the stationary unit.
F.861	Internal fault mobile unit	Internal system fault on the mobile unit.
F.862	Internal positioning system error	Internal error of the positioning system. Presumably, the magnet is not attached properly.
F.867	Address of mobile unit not set	<ul style="list-style-type: none"> • The address of the mobile unit was not set so far • The address has to be set in Parameter P.F07 • The address is written on a sticker on the mobile unit
F.900	Internal error	<ul style="list-style-type: none"> • After several trials the ROM programming is still not successful. There is no guilty program code in the ROM.
F.910	No communication to expansion board possible	<ul style="list-style-type: none"> • The communication to the expansion board is not possible • No expansion board plugged in • CAN Connection interrupted (Broken cable or no supply voltage for extension board)
F.911	ROM error on extension board	<ul style="list-style-type: none"> • Wrong Flash-Code • Defective hardware or noise-saturated environment
F.912	RAM error on extension board	<ul style="list-style-type: none"> • Defective hardware or noise-saturated environment
F.915	Communication error between main processor and I/O processor	<ul style="list-style-type: none"> • Defective Hardware • strong disturbances in surrounding • to high temperature
F.920	Internal 2.5 V reference voltage incorrect	<ul style="list-style-type: none"> • Hardware defect
F.921	Internal 15 V voltage incorrect	<ul style="list-style-type: none"> • Hardware defect

No.	Description	Possible reason for error
F.922	Static and dynamic monitoring of the emergency stop chain against defect or external power (static monitoring is offered by each controller, dynamic monitoring does not exist in WU2/WU12/FUH/FU3R/FUZ2)	<p>Static monitoring: Interrupted emergency stop chain means: All emergency inputs from the interrupted one, including all subsequent emergency inputs, must be triggered, if one of the subsequent emergency inputs is not triggered it must be assumed that a remote supply is used</p> <p>Dynamic monitoring: During the system tests, the closed emergency chain is actively opened by an internal switch, so that all emergency inputs must be activated, if this does not occur, it must be assumed that an external supply is used or that a defect has occurred</p> <ul style="list-style-type: none"> defective hardware
F.925	Testing of the third shutdown method failed	<ul style="list-style-type: none"> The expected braking current that is defined by parameter P.183 can be set. The fault is set when the actual current was exceeded by more than +0,5 A outside the parametrized range.
F.926	Bad braking current	<ul style="list-style-type: none"> The testing of an cyclic tested input was not successful The connected device is not working The cable connection between the connected device and the controller is broken
F.928	Faulty input testing	<ul style="list-style-type: none"> min. one of the motor cables is not good or not connected. Motor cable damaged Motor damaged
F.92A	If the motor wiring test is activated by P.112 the wiring will be tested during system tests.	<ul style="list-style-type: none"> Defective hardware or noise-saturated environment
F.930	External watchdog incorrect	
F.931	ROM error	<ul style="list-style-type: none"> Wrong EPROM code Defective hardware or noise-saturated environment
F.932	RAM error	<ul style="list-style-type: none"> Defective hardware or noise-saturated environment
F.933	Wrong frequency of CPU	<ul style="list-style-type: none"> The clock frequency of the processor is wrong
F.935	Stack error	<ul style="list-style-type: none"> User-Stack or System-Stack overflowed Possible software error due to recursive invocations (e.g. profile)
F.936	Control of the power stage (first shutdown) is faulty	<p>The monitoring of the power stage has detected an error behaviour and activated the second cut-off path of the power stage. The power stage is disabled and the emergency stop is switched.</p> <ul style="list-style-type: none"> A ramp has not been driven, eg door does not slow down Power stage output has not been switched off, e.g. when the unit is at a standstill, further voltage is output
F.937	Second shutdown incorrect	<p>The second micro controller does not trigger the Watchdog of the first micro controller</p> <ul style="list-style-type: none"> Program execution not working as expected environmental interference faulty software
F.938	Logical program execution monitoring failed	
F.941	ROM Error of I/O Processor	<ul style="list-style-type: none"> ROM Error of I/O Processor
F.942	RAM Error of I/O Processor	<ul style="list-style-type: none"> RAM Error of I/O Processor
F.960	Faulty parameter checksum	<ul style="list-style-type: none"> New EPROM version with different parameters Controller not yet initialized
F.961	Checksum from calibration values etc.	<ul style="list-style-type: none"> New EPROM version with different EEPROM structure Controller not yet initialized

No.	Description	Possible reason for error
F.962	Converter parameters not plausible	<ul style="list-style-type: none"> • New EPROM version • Controller not yet initialized
F.964	Program version / manufacturer code	<ul style="list-style-type: none"> • New EPROM version • Controller not yet initialized
F.965	Faulty door cycle counter with active emergency opening	<ul style="list-style-type: none"> • The door cycle counter does not count or is faulty. Because of this no emergency opening testing can be done.
F.966	Hardware unknown	<ul style="list-style-type: none"> • A wrong software was programmed to the controller • The programmed software does not know the hardware version • The controller hardware is broken
F.968	Programming error with Real time clock	<ul style="list-style-type: none"> • The clock is not programmed plausible
F.969	Internal error Real time clock	<ul style="list-style-type: none"> • The clock has an error → Check battery, possibly empty. Make time and date settings again.
F.970	Plausibility parameter block error	<ul style="list-style-type: none"> • New EPROM version • Controller not yet initialized • Some parameter is implausible

11.2 Information messages

No.	Description
I.021	Emergency open test is running
I.080	Service counter will run off
I.100	Speed in open position to high
I.150	Speed in close position to high
I.160	Permanent open comand still active
I.161	Priority still active
I.170	Forced opening active
I.180	Wait for foil key command
I.185	Wait for reset by stop foil key
I.198	Reversion counting faulty At least one reversing counter is not plausible (EEPROM)
I.199	Door counter wrong
I.200	New reference position taken over
I.201	Reference position new initialized
I.205	Synchronisation done
I.210	Limit switch not plausible
I.211	Limit switch not plausible
I.310	Open command to door 2
I.320	Obstacle during opening
I.325	Obstacle during closing
I.360	Disturbed N.C. safety edge
I.363	Disturbed N.O. safety edge
I.380	Faulty 2nd internal N.C. safety bar
I.383	Faulty 2nd internal N.O. safety bar
I.510	Correction drive finished
I.515	Active correction drive
I.520	Target speed for opening or closing move not reached <ul style="list-style-type: none"> • Pre-limit switch reached before full speed was reached --> adjust ramps • Current limiter prevents movement at full speed --> Inverter or motor working at performance limit --> adjust ramps or limiter
I.555	Measuring rotation factor not ready
I.610	LGB light line alignment res. Light line alignment completed successfully.
I.615	LGB light line alignment start Light line alignment requested.

No.	Description
I.621	LGB position encoder resolution too low The resolution of the installed position sensor is too low to maintain robust light curtain operation. More increments are required per door move (Message only occurs when DIP ON.)
I.700	In timer limit switch operating mode (typ. after power on) the door position is not available. Deadman speed is maintained until the actual position becomes available again.
I.901	Wait for USB-stick
I.902	Update File not found on USB-stick
I.903	Can not open File
I.906	Update File has the wrong format
I.907	The boot loader can be started, the controller expects the users input
I.916	Error reading USB stick (data storage) <ul style="list-style-type: none"> • SPI or USB communication faulty • USB stick write protected, memory full or formatted with an unknown file system
I.917	Log function is being initialized. The controller is halted until the initialization is complete.
I.919	The controller will shut down after a user reset (3-finger reset)
I.941	The Paramterfile can not be written because there were no free Directories found
I.942	The Paramterfile can not be written because the storage device is full
I.943	The Paramterfile can not be written because the storage device is write protected
I.944	The Paramterfile can not be written because the file is write protected
I.945	The Paramterfile can not be loaded because there was no file founded
I.946	The Paramterfile can not be loaded because the file is faulty or the key is unknown
I.947	The Paramterfile can not be loaded because it's forbidden
I.948	The Paramterfile can not be loaded because the file is incompatible
I.949	The Paramterfile can not be loaded because there is min. one not writeable parameter included
I.94A	The Paramterfile can not be loaded because the content is invalid
I.94F	The Paramterfile can not be loaded because of an unknown problem

12 General messages

General messages	
STOP	Stop / Reset state, wait for next incoming command
<u>Eu</u>	lower limit position
≡Eu≡	ower limit position locked → raising not possible (e.g., lock-door)
ZUF@	closing active
‘Eo’	upper limit position
≡Eo≡	upper limit position locked → closing not possible (e.g., safety edge)
@AUF	opening active
-E1-	middle limit position E1 (intermediate stop position)
≡E1≡	middle limit position locked → closing not possible (e.g., safety edge)
FAIL	fault → only deadman travel is possible, automatic opening may also be possible
EICH	calibration → setting the limit positions in deadman travel mode (for absolute encoder) à Start procedure using STOP key
≡NA≡	E-stop → Travel not possible, hardware safety chain interrupted
NOTF	E-travel → Deadman travel without regard for safety facilities, etc.
‘Hd’	manual → Deadman mode
ParA	parameterization
SYNC	Synchronization (incremental encoder / limit switch à Pos.unknown)
‘Au’	automatic → indicates change from "Manual" to "Automatic" status
‘Hc’	semi-automatic → indicates change from "Manual" to "Semi-automatic"
FUF	Initial display after power up (Power Up and self-test)
LOCK	Locked -> Display after the end of the set time for the virtual key switch
Status messages during calibration	
E.i.E.u.	calibration of the lower limit position requested (in deadman travel)
E.i.E.o.	calibration of the upper limit position requested (in deadman travel)
E.i.E.1.	calibration of intermediate position E1 (in deadman travel)
Status messages during synchronization	
S.y.E.u.	Synchronization of lower limit position requested (deadman or wait for starting condition)
S.y.E.o.	Synchronization of upper limit position requested (deadman or wait for starting condition)
S.y.E.1.	Synchronization of intermediate stop position E1 (in deadman mode)
S.y.op	Automatic opening up to mechanical stop, then automatic synchronization of upper limit position
S.y.cL	Automatic closing taking into account safeties up to mechanical stop, followed by automatic synchronization of lower limit position
S.y.c≡	Automatic closing is locked due to request Å
Status messages during dead man movement	
Hd.cL	Deadman closing (membrane key: CLOSE)
Hd.oP	Deadman opening (membrane key: OPEN)
Hd.Eu	Lower limit position reached, no further deadman closing possible
Hd.Eo	Upper limit position reached, no further deadman opening possible
Hd.Ao	Outside of permitted Eo position (no deadman opening possible)
Information messages during the parameter configuration	
noEr	Error memory: no error saved
Er--	Error memory: if error but without associated message being found
Prog	Programming message while carrying out original parameter or default set

General inputs	
E.000	Open key on membrane keypad
E.050	STOP key on membrane keypad
E.090	CLOSE key on membrane keypad
E.101	Input 1
E.102	Input 2
E.103	Input 3
E.104	Input 4
E.105	Input 5
E.106	Input 6
E.107	Input 7
E.108	Input 8
E.109	Input 9
E.110	Input 10
E.111	Input 11
E.112	Input 12
E.113	Input 13
E.114	Input 14
E.115	Input 15
E.121	Input 21
E.122	Input 22
E.123	Input 23
E.124	Input 24
E.125	Input 25
E.126	Input 26
E.127	Input 27
E.128	Input 28
E.13A	Input 3A
E.13B	Input 3B
E.13C	Input 3C
E.13D	Input 3D
E.13E	Input 3E
E.13F	Input 3F
Safety- / emergency stop chain	
E.201	internal E-Stop "mushroom button" tripped
E.211	external E-Stop 1 tripped
E.212	external E-Stop 2 tripped
Safety edge in general	
E.360	activation of internal safety edge 1
E.363	internal safety edge 1 faulty
E.370	activation of external safety edge
E.373	external safety edge fault
E.379	external safety edge activated but not yet plugged in
E.380	Triggering of the 2nd internal safety edge
E.383	Interruption of the 2nd internal safety edge
E.3F0	Triggering of the 2nd external safety edge
E.3F3	Interruption of the 2nd external safety edge
Wireless plug-in module	
E.401	Wireless Channel 1
E.402	Wireless Channel 2
Inductive loop detection	
E.501	Detector channel 1
E.502	Detector channel 2
E.503	Detector channel 3
E.504	Detector channel 4
Internal inputs	
E.900	Controller chip fault signal

WiCab-Inputs	
E.F01	Input 1 of mobile unit
E.F02	Input 2 of mobile unit
E.F03	Input 3 of mobile unit
E.F04	Input 4 of mobile unit
E.F0A	Input A of stationary unit
E.F0B	Input B of stationary unit
E.F0C	Input C of stationary unit

13 Specifications

Dimensions in the housing (L x W x H)	approx. 430 x 210 x 200 mm incl. interterminal heatsink, brake resistor & all mounts excl. external cable entries (L + 20 mm) and main switch (H + 35 mm)	
Dimensions board set (L x W x H):	approx. 270 x 195 x 150 mm to frame with quick release interterminal Heatsink external extension boards as TST RFUxK or TST RFUxCom	
Installation	Electronics and cooling as are assembled for low-vibration and vertical mounting, e.g. on a suitable masonry wall.	
Heatsink	aluminum, natural - mounted on the back side	
Screws on housing cover:	6x Torx T15 stainless steel (A2) Torque: max 1 Nm	
Foil keypad (X400C):	3 keys "Open-Stop-Close"	
Main Switch:	Yellow-red knob, lockable assembled on DIN rail	
	FUF2	FU3F
Rated voltage	1N~ 230 V	3(N)~ 400 V
Voltage range	110...240 V $\pm 10\%$	200...480 V $\pm 10\%$
Rated frequency	50...60 Hz	
Protection K-characteristic	16 A	3x 16 A
Power consumption controller without drive	max. 140 W with full utilization of 24 V supply	
External supply 1 (X10: L ' / N'):	transmission of phase L1 and N. L' is protected on the circuit board: 4 AT	
"Control voltage / external supply 2": (a.o. terminal " + 24V ": 51, 61, 73, 83, 91. "GND": 35, 63, 71, 74, 81, 84, 94, 36 *, 44):	24 VDC $\pm 5\%$ max. 3.500 mA protected extra low voltage according to EN 60335-1 <ul style="list-style-type: none"> • interterminal All external loads such as plug-in modules, I/O modules, 24 V brake, switched transistor outputs and more control voltages • Short-circuit protected by central switching regulator. • GND potential internally grounded to PE. • If the FU3F is supplied with mains voltages below 300 V, the max. load of the 24 V supply is only 2.5 A. 	
Control voltage / external supply 3 (Terminal 33, 45 - Attention jumper)	for electronic limit switches and Safety edge Nominal value 11.5 V / max. 130 mA	
"Control inputs" Digital "IN 1 ... 7 (Terminal 52, 53, 54, 72, 75, 82, 85.):	24 VDC / typ. 15 mA, max 26 VDC / 20 mA. all inputs are potential free to join or: <5V: inactive \rightarrow logical 0 > 7 V: active \rightarrow logical 1 min. Duration of input control commands: > 100 ms	
"Control inputs" Digital "IN 8, 9, 11, 12 (Terminal 61, 64, 92, 93):	24 VDC / typ. 15 mA, max 26 VDC / 20 mA. all inputs are potential free to join or: < 5 V: inactive logical 0 \rightarrow > 7 V: active \rightarrow logical 1 min. Duration of input control commands: > 100 ms Used for 2-channel incremental position encoder <ul style="list-style-type: none"> • Max 1 kHz symmetric square (50% duty cycle) • 90 ° offset between input signals 	

Communication interfaces	
Serial Port 1 "DoorCom" RS485 A and B (X20 / 20a / M1a / M1b)	for electronic limit switch TST PD / PE or DES, light curtain TST LGB or other communication partner approved by FEIG RS485 level (A, B), terminated in 120 Ω Max. Cable length: 30 m Recommended cable: shielded "twisted pair" cable in noisy environments, "twisted-pair" in "normal" environments Using FEIG limit switches TST PD / PE parallel and e.g. for future I / O expansions
Serial port 2 "Adv DoorCom" CAN 2 (X200):	external operation of the extension board TST RFUxK or other communication partner approved by FEIG CAN level (CH, CL), terminated in 120 Ω Max. Cable length: 30 m Recommended cable: shielded "twisted pair" cable in noisy environments, "twisted-pair" in "normal" environments
Serial interface 3 CAN 1 communications module:	for TST RUFCom or other communication partner approved by FEIG TTL level (Tx, Rx) Max. Cable length: 10 cm for internal wiring to the module
"Serial Interface 4 RS485-1 for communication module:	for TST RUFCom or other communication partner approved by FEIG Type. for communications between two gates (sluice / lock) TTL level (Tx, Rx, DDR) Max. Cable length: 10 cm for internal wiring to the module
Serial Interface 5 CAN 0 for expansion board:	approved for housing internal operation of the TST RFUxK or other communication partner that is suitable! For FEIG TTL level (Cx, Rx) Max. Cable length: 10 cm for internal wiring to the module
USB Host (X403)	low-power USB memory stick with FAT32 file structure. USB Profiles "Mass Storage Device" (8), Sub Class Code "SCSI transparent command set" (6) Interface Protocol "Bulk-only transfer" (0x50), Logical Unit Number (LUN 0), SCSI 'Request Sense' <2.5 s, USB-Request Time <2.5 s, USB NAK <36684x, no hubs / compounds possible! Connector: USB Type A Max power: 500 mA Max. cable length: 2 m Type. record size per door cycle (log storage function): about 2 KByte In case of permanent use of USB flash drives within the controller, z. B. as log storage must be observed temperature range. Recommendation: • "Industrial grade" "(typ.): 0 ° C ... + 70 ° C • " Extended industrial grade " (typ.): - 40 ° C ... + 85 ° C "
for not logging function: for logging function:	Due to the large number of USB sticks available, the functionality of each of these sticks cannot be guaranteed. FEIG ELECTRONIC GmbH recommends the USB sticks listed below: AF8GUFNDNC-AADXX USB-Stick, 8GB, USB 2, MLC, 0°C to 70°C Manufacturer: Atp Electronics AF4GUFNDNC(I)-AACXX USB-Stick, 4GB, USB 2, SLC, -40°C to 85°C Manufacturer: Atp Electronics
"Alternatively, as a USB Device (X401):	PC communication with FEIG service protocol "Communication Device → virtual serial port" Plug USB Type B (mini-USB) Max. Cable length: 2 m Only one USB devices are connected to the interface!

Safety chain / emergency off	all inputs must be connect free of potential Contact rating: ≤ 26 VDC / ≤ 120 mA in case the safety chain is interrupted, the drive cannot be moved, not even under Deadman conditions
Safety edge input 1 - "Si-Lei" (terminal 43):	for electrical safety edges with 8.2 / 1.2 kOhm terminating resistor and for dynamic optical systems (Fraba)
Safety edge input 2 -" IN10 "(terminal 65)	for electrical safety edges with 8.2 / 1.2 kOhm terminating resistor and for dynamic optical systems (Fraba) Shopfloor as a digital control input
Real-time clock:	24 hour clock with calendar function 4 channel evaluation Accuracy: less than 5 seconds per day over the entire temperature range
Backup Battery:	older prepared for lithium coin cell BR2032 (3 V) Typical life: 5 years ⚠ WARNING Battery not rechargeable, exclusive disposal via lithium battery disposal method (regional differences apply)
Transistorized outputs - out 15, 25, 26 (terminal 66, 76, 86)	Main function: "Test" 24 VDC / min. 10 mA / max. 120 mA Normally open, +24 V controlled! resistive loads only! Electronically protected!
Transistorized outputs - out 12, 13, 14 (X400C-1 ... 3 - keypad)	3x power supply with 20 mA \pm 2 mA Max. Voltage 19 V \pm 10% Normally open, GND controlled! resistive loads only! Electronically protected, short-circuit proof compared to +24 V and GND!
Transistorized outputs - Out 28/29 (X 18 - terminal 35/37.)	Transistorized outputs - out 15, 25, 26 (TERMINAL 66, 76, 86).: Main function: "Test" 24 VDC / min. 10 mA / max. 0,7A Normally open, +24 V controlled! resistive loads only! Electronically protected! Overload for 0.5 s 800 mA
Brake 24V - Out 4 (X 17-33 / 34):	24VDC / 100mA min / max 2500 mA.. electronically protected! Interterminal Monitoring of switching behavior! NOTE: in case of interruption of the safety chain output is de-energized!
Relay outputs Out 1 ... 3 (X 14 ... 16):	„Fault / gate position reports / traffic light functions" If inductive loads are connected (for example, additional relays or brakes), these must be quipped with the appropriate suppression measures (freewheeling diode, varistors, RC elements)! Changeover contact free of potential • min. 10 mA • Max. 230 VAC / 3 A ('Use fused phase L' and N') ⚠ Contacts used once for circuit breakers cannot switch further low currents. NOTE: flashing function limits mechanical life!
Alternative use as a braking relay (Out 3 / X16):	Changeover contact to enable electromechanical brakes with upstream brake rectifier. ⚠ no safety function. Max. 230 VAC / 3 A (Use secure phase of L')

Drive output (X13)				
⚠ at the motor terminals may touch voltage even at standstill or when operated n emergency. Warning label on the drive Note!				
		FUF2		
		-A	-C	-F
1~230V	Max. rated motor current	0.75 kW	1.5 kW	2.2 kW
	Max. rated motor current			
	100% ED ¹ (40°C)	5 A	8 A	10 A
	60% ED ² (40°C)	5 A	8 A	10 A
	40% ED ³ (50°C)	5 A	8 A	10 A
	40% ED ³ (40°C)	5 A	10 A	12 A
1~110V	Max. rated motor current	0.25 kW	0.50 kW	0.75 kW
	Max. rated motor current			
	100% ED ¹ (40°C)	3.5 A	6 A	7 A
	60% ED ² (50°C)	3.5 A	6 A	7 A
	40% ED ³ (50°C)	3.5 A	6 A	7 A
Max. length of motor cable	30 m			
frequency	6...200 Hz			
Overload for 0.5 s	2-fold rated motor current (depending on input voltage)			
<u>Observe duty cycle and temperature range:</u>				
¹ Continuous travel with rated current for max. 60 minutes				
² for example 6 seconds drive and 4 seconds break				
³ for example 8 seconds drive and 12 seconds break				
		FU3F		
		-A	-C	-F
3~400V	Max. rated motor current	2.2 kW	4.0 kW	5.0 kW
	Max. rated motor current			
	100% ED ¹ (40°C)	5 A	10 A	12 A
	60% ED ² (40°C)	5 A	10 A	12 A
	40% ED ³ (50°C)	5 A	10 A	12 A
Max. length of motor cable	20 m	30 m		
frequency	6...200 Hz			
Overload for 0.5 s	2-fold rated motor current (depending on input voltage)			
<u>Observe duty cycle and temperature range:</u>				
¹ Continuous travel with rated current for max. 20 minutes				
² for example 6 seconds drive and 4 seconds break				
³ for example 8 seconds drive and 12 seconds break				

Braking resistor load	<p>Integrated braking resistor Max. 1.5 kW for max. 0.5 seconds Repetition rate > 20 seconds</p> <p>NOTE: Electronic monitoring! Thermal breaking point in overload!</p>	<p>⚠️ ACHTUNG The heatsink / brake resistor on the back of the housing can reach temperatures up to 85° C. In case of failure this may briefly reach 280 ° C (<5 min.)!</p>
<p>Temperature range Operating-board set without housing:</p> <p>operating in the housing Storage</p>	<p>Ambient air temperature</p> <p>-20...+65 °C</p> <p>-20... +50 °C -25...+70 °C / +50 °C</p> <p>Observe the ventilation around the housing and the self-heating inside the housing!</p> <p>⚠️ Before selecting the installation site, observe the requirements in the installation instructions (see chapter Installation of the controller)! Temperature-dependent reduction in the duty cycle of the drive note (s. "Drive output")</p>	
Equipment mobility:	Stationary	
Equipment type:	Motor type external motor is not part of the delivery from FEIG ELECTRONIC GMBH	
Protection class	IP 65 (only in connection with a plastic housing and with sealed cable glands).	
Protection class:	Protection class I	
Weight	approx. 5 kg	
Height	<2000 m	
Standards & directives	For details, see chapter Standards & directives	
Machinery Directive	Europe, type examination	
Low-Voltage Directive	Europe (special versions for the American market with UL certification)	
EMC Directive	Europe	
RoHS/WEEE/REACH	Europe	

14 Standards & directives

Type tested to:	Standards:
Machinery Directive: 2006/42EG	<p>→ Device complies with Annex IV categories of machinery - Section 21: "logic unit for safety functions"</p> <p>EN ISO 13849-1:2015 Safety of machinery – safety-related parts of control systems – part 1: General design principles</p> <ul style="list-style-type: none"> • Category: 2 • Performance Level (PL): d • Safe functions: • Endpoint detection • Contacting edge evaluation (8,2/1,2 kΩ or optical) • photo eye interterminal pull-in protection (comp. EN 12453 table 1: type D or type E with test) • Slip door switch • Slack rope switch • Wireless safety system TST FSx <p>EN 62061:2005 + Cor.:2010 + A1:2013 + A2:2015 Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005)</p> <ul style="list-style-type: none"> • Safety integrity levels (SIL): 1
Low-Voltage Directive: 2006/95/EEC	<p>EN 60335-1:2012 / AC:2014</p> <p>Safety of electrical appliances for household and similar use/Part 1: general requirements</p> <ul style="list-style-type: none"> • Type: stationary motor-driven machines • Protection class 1 <p>60335-2-103:2015</p> <p>Safety of household and similar electrical appliances - part 2-103: Special requirements for drives for industrial doors, doors and windows</p>
EMC Directive 2014/30/EU	<p>Electromagnetic compatibility – basic technical standards:</p> <p>EN 61000-6-1:2007 interference immunity, living area</p> <p>EN 61000-6-2:2005 / AC 2005 Interference immunity, industrial area</p> <p>EN 61000-6-3:2007 / A1:2011 / AC:2012 Electromagnetic radiation, living area</p> <p>EN 61000-6-4: 2007 / A1:2011 Electromagnetic radiation, industrial area</p>
Applied national specifications regarding the above directives:	<p>EN 12453:2000 Safety in use of power operated doors - Requirements</p> <ul style="list-style-type: none"> • Chapter 5.2 Drive Systems and Power Supply



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EG-Konformitätserklärung

nach EG-Maschinenrichtlinie 2006/42/EG, Anhang II A

Hiermit erklären wir, dass die nachstehende Maschine:

Bezeichnung Typen Handelsbezeichnungen	Torststeuerung TST FUF2-xxx / TST FU3F-xxx TST FUF2-AH, -APR, -CH, -CPR, -FH, -FPR, TST FU3F-AH, -APR, -CH, -CPR, -FH, -FPR
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den einschlägigen Bestimmungen folgender Richtlinien entspricht:

Maschinenrichtlinie	2006/42/EG
Niederspannungsrichtlinie	2014/35/EU
ROHS2	2011/65/EU
EMV	2014/30/EU

Angewandte harmonisierte Normen:

EN ISO 13849-1:2015	Sicherheit von Maschinen – Sicherheitsbezogene Teile von Steuerungen
EN 60335-1:2012 / AC:2014	Sicherheit elektrische Geräte für den Hausgebrauch und ähnliche Zwecke
EN 60335-2-103:2015	Sicherheit elektrischer Geräte für den Hausgebrauch und ähnliche Zwecke – Besondere Anforderungen für Antriebe für Tore, Türen und Fenster
EN 62061:2005 + Cor.:2010 + A1:2013 + A2:2015	Sicherheit von Maschinen – Funktionale Sicherheit sicherheitsbezogener elektrischer, elektronischer und programmierbarer elektronischer Steuerungssysteme
EN 61000-6-1:2007	EMV Fachgrundnorm – Störfestigkeit (Wohnbereich)
EN 61000-6-2:2005 / AC:2005	EMV Fachgrundnorm – Störfestigkeit (Industriebereich)
EN 61000-6-3:2007 / A1:2011 / AC:2012	EMV Fachgrundnorm – Störaussendung (Wohnbereich)
EN 61000-6-4:2007 / A1:2011	EMV Fachgrundnorm – Störaussendung (Industriebereich)

Angewandte nationale technische Spezifikationen:

EN 12453:2000 Abschn. 5.2	Nutzungssicherheit kraftbetätigter Tore – Anforderungen Kapitel 5.2 Antriebssysteme und Energieversorgung
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Bevollmächtigter für die Zusammenstellung der relevanten technischen Unterlagen:

Weilburg, den 30.01.2017

Dirk Schäfer
 Technischer Leiter / Technical Director
 CONTROLLER & SENSORS (VTM)

Eine Prüfung des Maschinentyps auf Übereinstimmung mit den Anforderungen der EG-Maschinenrichtlinie erfolgte durch die

TÜV NORD CERT GmbH Essen,
 Zertifizierungsstelle Maschinen / Certification Body Machinery
 Langermarkstraße 20, D-45141 Essen, Notified Body ID. No.: 0044 205 13 132614

Diese Prüfstelle ist zuständig im Sinne von Anhang XI der EG-Maschinenrichtlinie.

Die technische Dokumentation ist am Firmenstandort Weilburg archiviert.

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die mitgelieferte Produktdokumentation und insbesondere die darin enthaltenen Sicherheitshinweise sind zu beachten.

Die Inbetriebnahme der Torsteuerung wird so lange untersagt, bis diese an ein Tor angebaut wurde und dieses Tor den Bestimmungen der EG-Maschinenrichtlinie entspricht.