FEIG ELECTRONIC

CONTROLLER
Intelligent Door Management

Assembly instructions

Installation, commissioning, utilization and maintenance

TST FUZ

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.

Notes

Version: 2013-04-11

This edition replaces all earlier versions.
The specifications in this document are subject to change without notice.

This Manual is directed especially at persons involved with starting up / commissioning the **TST FUZ** door controller of FEIG ELECTRONIC GmbH. The installation and commissioning of the controller shall only be carried out by officially trained electrical experts who are familiar with the safety standards of electrical drive and automation technology.

The distributor of the machine is solely responsible for the completeness of the operating instructions for the machine (in this case the door). The installation instructions for the door controller that is installed by the manufacturer of the gate shall be supplied in one of the languages of the European Community that is accepted by the manufacturer of the machine.

This Manual shows only a small range of the controllers functions and provides no warranty of properties. Additional functions and descriptions for individual door functions as well as more precise specifications for the controller and hazard warnings are available in the main description.

The compilation of the information in this document has been done to the best of our knowledge and with due diligence. FEIG ELECTRONIC GmbH does not warrant the correctness and completeness of the information in this document. In particular, FEIG ELECTRONIC GmbH cannot be held liable for consequential damages due to incorrect or incomplete information.

In spite of the best efforts, mistakes cannot be avoided completely and we will always gratefully accept any information in this respect.

The installation recommendations contained in this document presume favorable general conditions. FEIG ELECTRONIC GmbH assumes no liability for the proper operation of the equipment in third-party environments.

FEIG ELECTRONIC GmbH provides no warranty that the information in this document is not subject to foreign copyrights. By furnishing this document, FEIG ELECTRONIC GmbH does not grant any licenses to its own or foreign patents or any other intellectual property rights.

Only the direct contracting parties shall be entitled to warranty claims against FEIG ELECTRONIC GmbH; warranty claims are non-transferable. The warranty covers only products supplied by FEIG ELECTRONIC GmbH. There are no express warranties except as listed above.

The description of the products, their utilization, capabilities and performance specifications shall not be considered as warranted properties and are subject to technical change.

General information about this document

Language of the original operating instructions: German

The functional description employs the following characters to indicate the different danger areas and useful tips.

⚠ **Attention!**
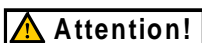
indicates a risk to persons if the procedure is not carried out as described.

⚠ **Warning!**

indicates that the controller is at risk.

⚠
points out information which is IMPORTANT to the operation of the gate controller and/or the gate.

ℹ
points out information which is useful but not essential for the use of the gate controller.

DE   ACHTUNG! WICHTIGE SICHERHEITSANWEISUNGEN!
      Für die Sicherheit von Personen ist es wichtig diesen Anweisungen Folge zu leisten. Diese Anweisungen
      sind aufzubewahren.
      Diese Montageanleitung finden Sie im Downloadbereich unter www.feig.de. Bitte loggen Sie sich mit
      folgenden Zugangsdaten ein: Username: Download / Password: feig

GB   ATTENTION! IMPORTANT SAFETY INFORMATION!
      These instructions must be observed to ensure personal safety. Store these instructions safely.
      These installation instructions are available from the download area at www.feig.de. Please sign in with the
      following details: Username: Download / Password: feig

FR   ATTENTION! IMPORTANTES INDICATIONS DE SÉCURITÉ!
      Pour la sécurité des personnes, il est important de respecter les consignes en question. Les présentes
      consignes doivent être conservées en lieu sûr.
      Les instructions de montage sont téléchargeables dans la zone téléchargements de www.feig.de. Prière de
      vous logger avec les données suivantes: Nom d'utilisateur : Download / Mot de passe: feig

IT   ATTENZIONE! INDICAZIONI SULLA SICUREZZA IMPORTANTI!
      Per la sicurezza personale è importante attenersi scrupolosamente a queste indicazioni. Queste indicazioni
      vanno conservate.
      Le presenti istruzioni di montaggio sono disponibili nell'area download del sito www.feig.de. Effettuare il login
      con i seguenti dati d'accesso: Nome utente: Download / Password: feig

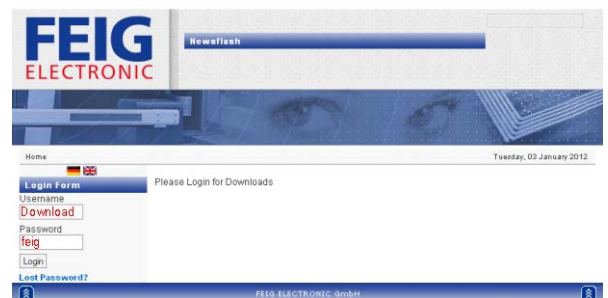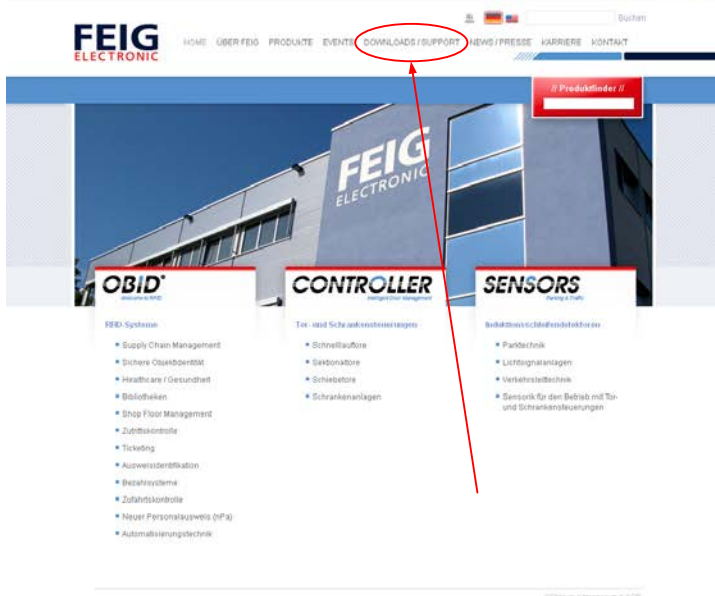ES   ATENCIÓN INDICACIONES IMPORTANTES DE SEGURIDAD
      Para la seguridad de las personas es importante seguir estas indicaciones. Deben guardarse estas
      indicaciones.
      Puede encontrar estas instrucciones de montaje en el área de descarga en www.feig.de. Se ruega iniciar
      sesión con los siguientes datos de acceso: Nombre de usuario: Download / Password: feig

NL   LET OP! BELANGRIJKE VEILIGHEIDSINSTRUCTIES!
      Voor de veiligheid van personen is het belangrijk om deze aanwijzingen op te volgen. Deze aanwijzingen
      dienen bewaard te worden.
      Deze montagehandleiding kunt u vinden als download op www.feig.de. Gelieve de volgende
      toegangsgegevens te gebruiken: gebruikersnaam: Download / wachtwoord: feig

Contents

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 FUZ** is designed to handle electrical induction motors with a power consumption of up to 0,75 kW and a 230 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, induction loops, etc.)

- Evaluation of emergency stop controls

- Electronically protected 24 V low-voltage power supply for sensors and control devices

- 230 V power supply to external units

- 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

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.

The commissioning of this controller is prohibited until it was 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.
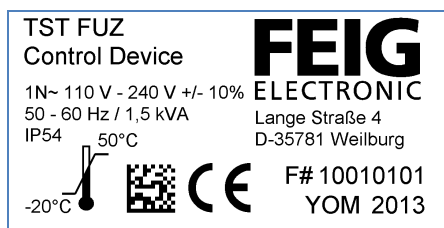
Any installation, startup and maintenance work must be performed only by qualified specialists. In particular the following regulations must be observed: VDE0100, EN 50110 (VDE0105), EN 60204 (VDE0113), EN 50178 (VDE0160), EN 60335 (VDE0700), fire protection codes, accident prevention regulations as well as the relevant regulations for industrial doors (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 affixed to the motor near the motors terminal board.

Type label:

TST FUZ
Control Device

1N~ 110 V - 240 V +/- 10%
50 - 60 Hz / 1,5 kVA
IP54   50°C

-20°C

FEIG ELECTRONIC
Lange Straße 4
D-35781 Weilburg

F# 10010101
YOM 2013

F# [Serial No.]
YOM [Year of manufacture]

Warning notice label (example):

The safety advisories mentioned in this document make no claim to completeness. If you have questions about the product, contact your vendor.

The manufacturer has carefully checked and inspected the device hardware and software, but no warranty is given for a complete absence of errors

Dispose of the product at the end of its life cycle in accordance with the applicable statutory provisions.

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 sight glass. Damaged keypads and sight glasses 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 chips 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 IP54.
- 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.
- 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 actuate 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 pulses.
- 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.
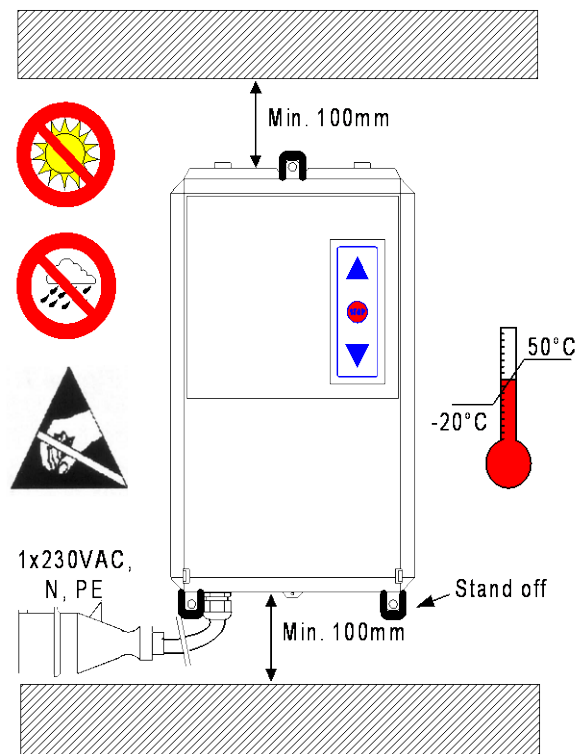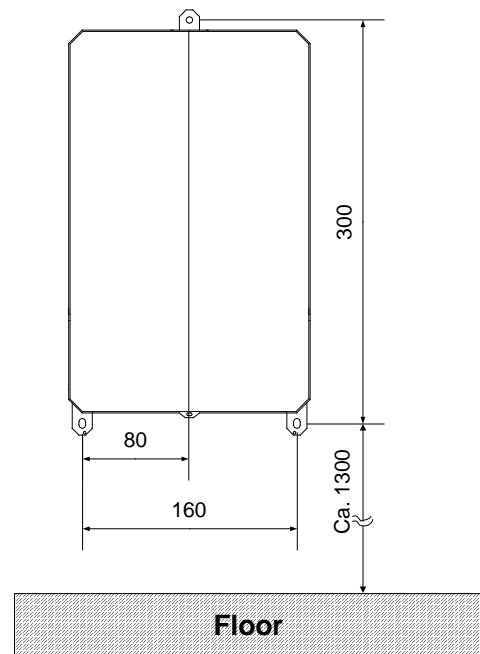

Figure 1: Installing the controller

Figure 2: Hole pattern

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 motors 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. It is not permitted to turn on or to operate the controller when 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 sight glass. Damaged keypads and sight glasses must be replaced. To prevent damage to the keypad, do not use pointed objects to actuate 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 insertion of jumpers shall only be performed by properly trained persons.

⚠ Warning!

- Before turning on the controller for the first time and after completion of the wiring, check whether all motor connections are tight on the controller and the motor side and whether the motor is correctly wired in star or delta configuration. Loose connections to the motor usually result in damage to the inverter.

- If the 24V controller voltage is short circuited or overloaded, the switching power supply will not start up even though the intermediate circuit capacitors are charged. The displays remain turned off. The power supply can only be restarted after eliminating the short circuit or the overload condition.

- To fulfill the conditions of the EMC Directives, only shielded and separate motor conductors must be used, with the shield connected on both ends (motor and controller side) and without any additional connections in the line. Maximum cable length: 30 m.

- Fast running plastic foil doors may produce very high electrostatic charges. A discharge of these voltages may damage the controller. Therefore suitable measures must be taken to prevent electrostatic discharge.

- Turning on or operating the controller in the presence of condensation is not permitted. This can result in the destruction of the controller.

- Before turning on the controllers supply for the first time, ensure that the detector/sensor cards (plug-in modules) have been inserted in the correct locations. Incorrect insertion of the cards can result in damage to the controller, likewise the installation of non-approved third-party equipment.

- Maximum connection diameters for the terminals on printed circuit boards:

	Single wire (rigid)	Fine wire (with/without wire end ferrule)	Max. tightening torque [NM]
Motor terminals	2,5	2,5	0,5
Line supplies	2,5	1,5	0,5
Screw terminals (catch 5 mm)	2,5	1,5	0,5
Plug in terminals (catch 5 mm)	1,5	1,0	0,4
Plug in terminals (catch 3,5 mm)	1,5	1,0	0,25

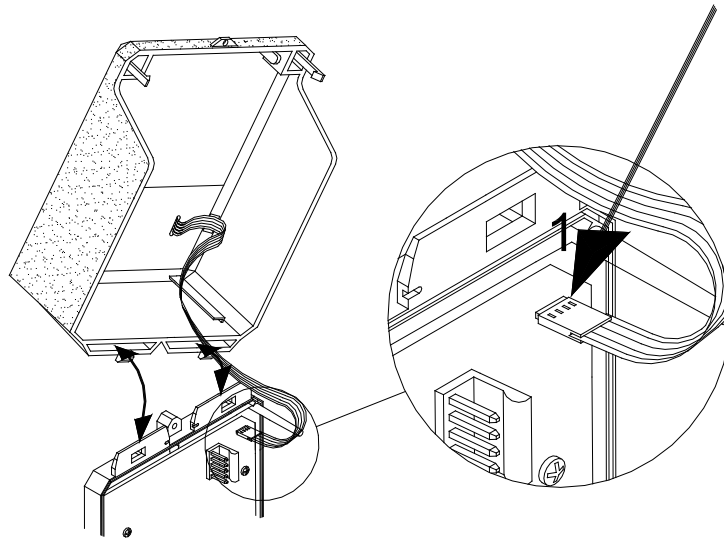## 4.1   Installation position of the cover

Figure 1: Foil key pad connection
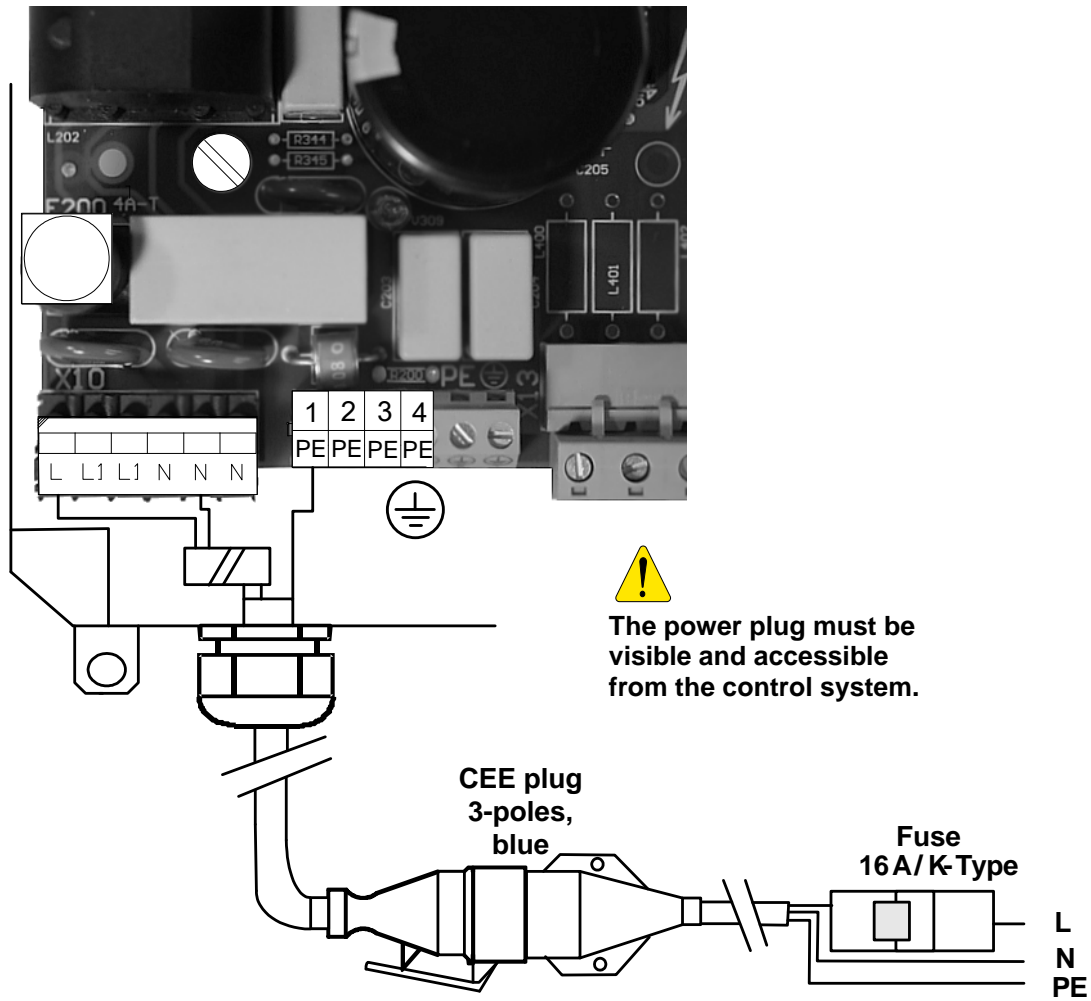
4.2   Power supply connection

Figure 2: Connecting the power cable

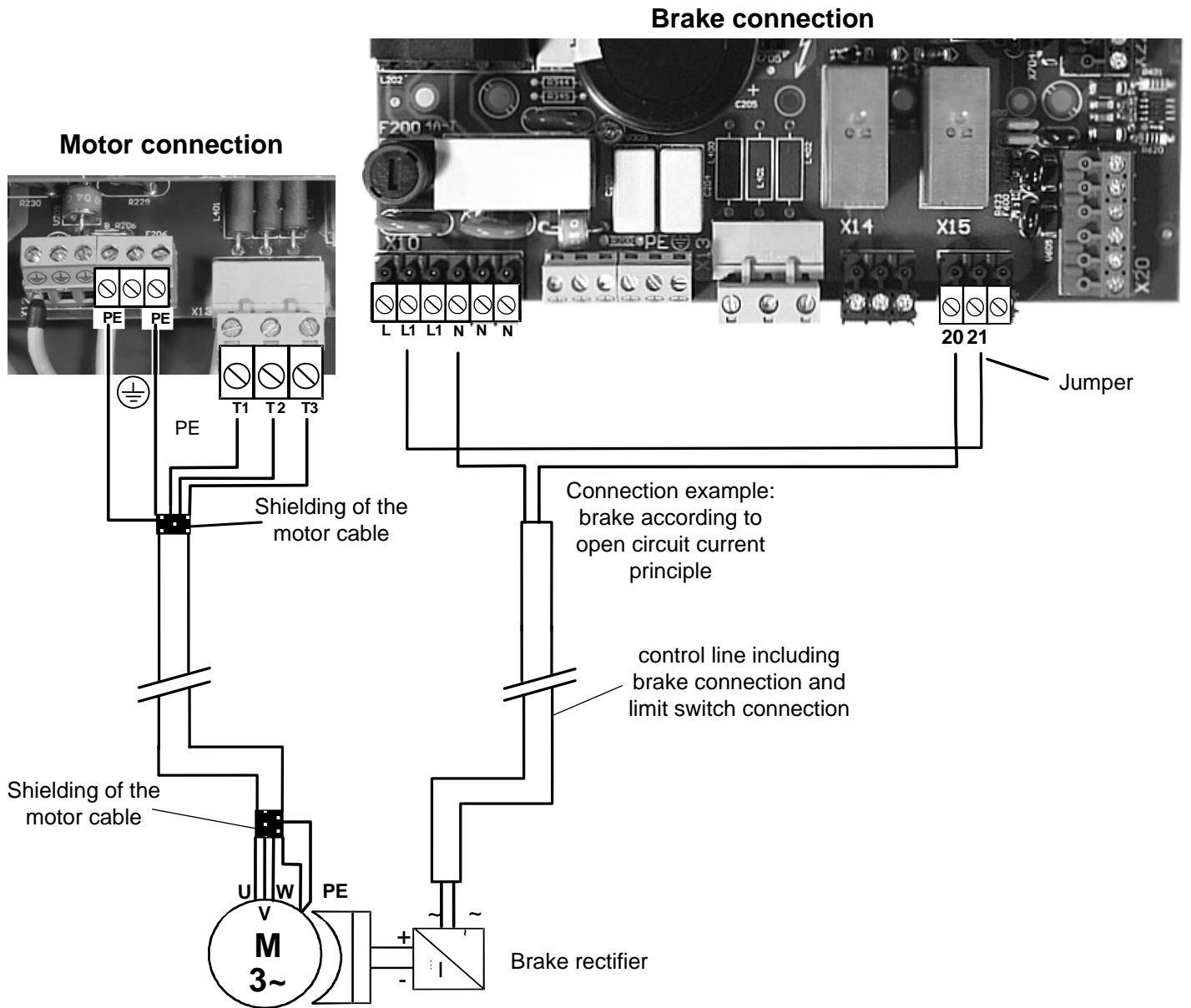## 4.3   Motor and brake connections

Figure 3: Motor connection

Use a shielded motor cable in order to guarantee error-free operation of the controller. In addition, no other conductors except the motor connection may be included in this line.

In the case of drive units with an electronic brake, ensure that the brake is equipped with adequate suppression. We recommend the use of RC-elements for interference suppression purposes.
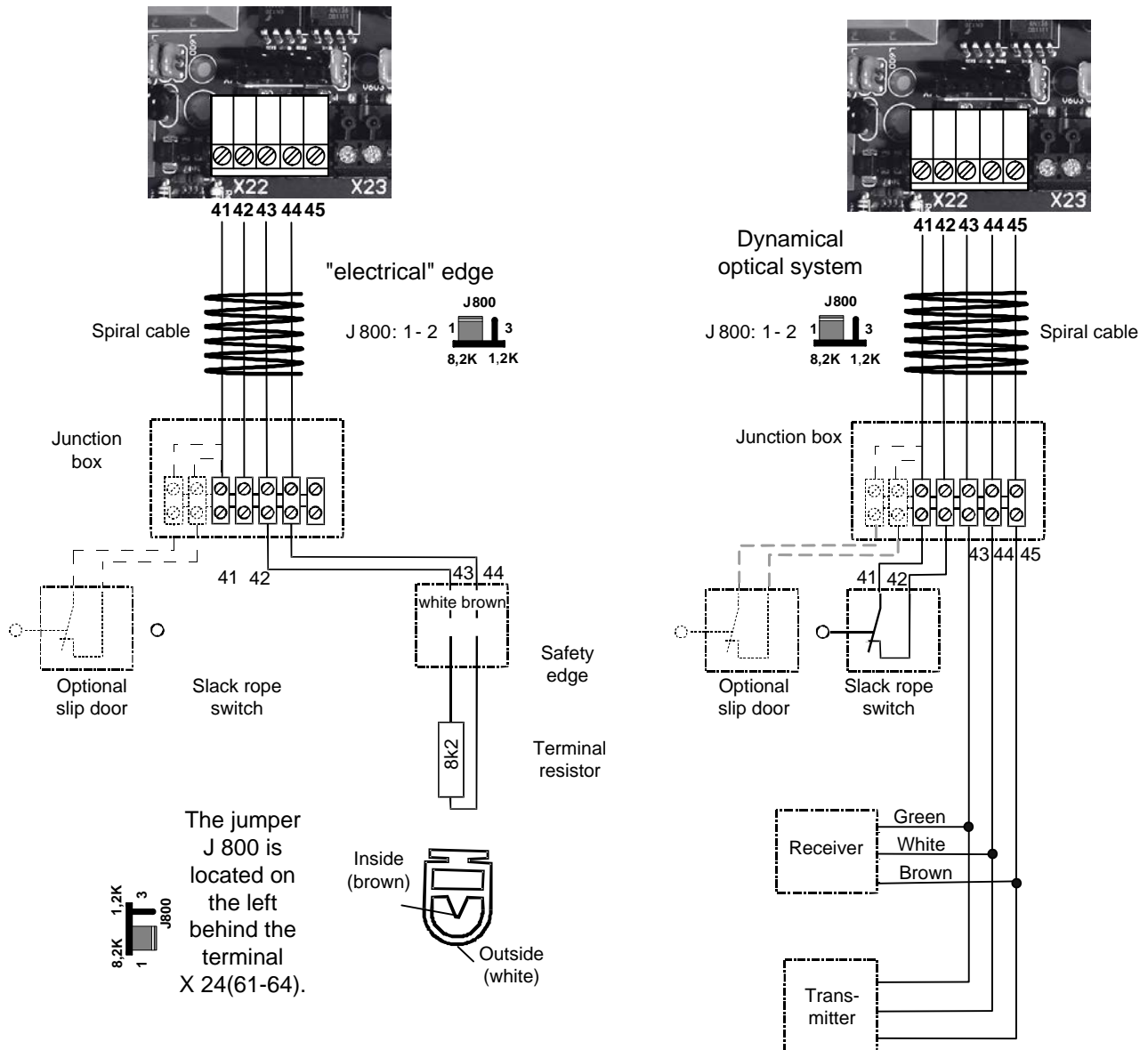
4.4   Connection of safety edge

Figure 4: Connection of safety edge

Various types of safety edges can be connected, for example :

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

If one of these types of safety edges is connected when the gate control system is switched on it will be recognized automatically.

⚠️

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

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

4.5   Limit switch connection

Different limit switch systems can be used with the TST FUZ gate control system. The default setting uses an absolute encoder as the limit switch. In addition, mechanical cam limit switches may be used.

4.5.1   Absolute encoder TST PE FSB with WICAB system

Absolute encoder TST PE FSB is a single-turn encoder which is equipped with the WICAB radio system. The driving shaft must not execute more than a single revolution over the entire path of the gate.

The WICAB system can be employed to replace the spiral cable with a wireless link. For this purpose, a mobile unit TST FSBM must be mounted on the door leaf.
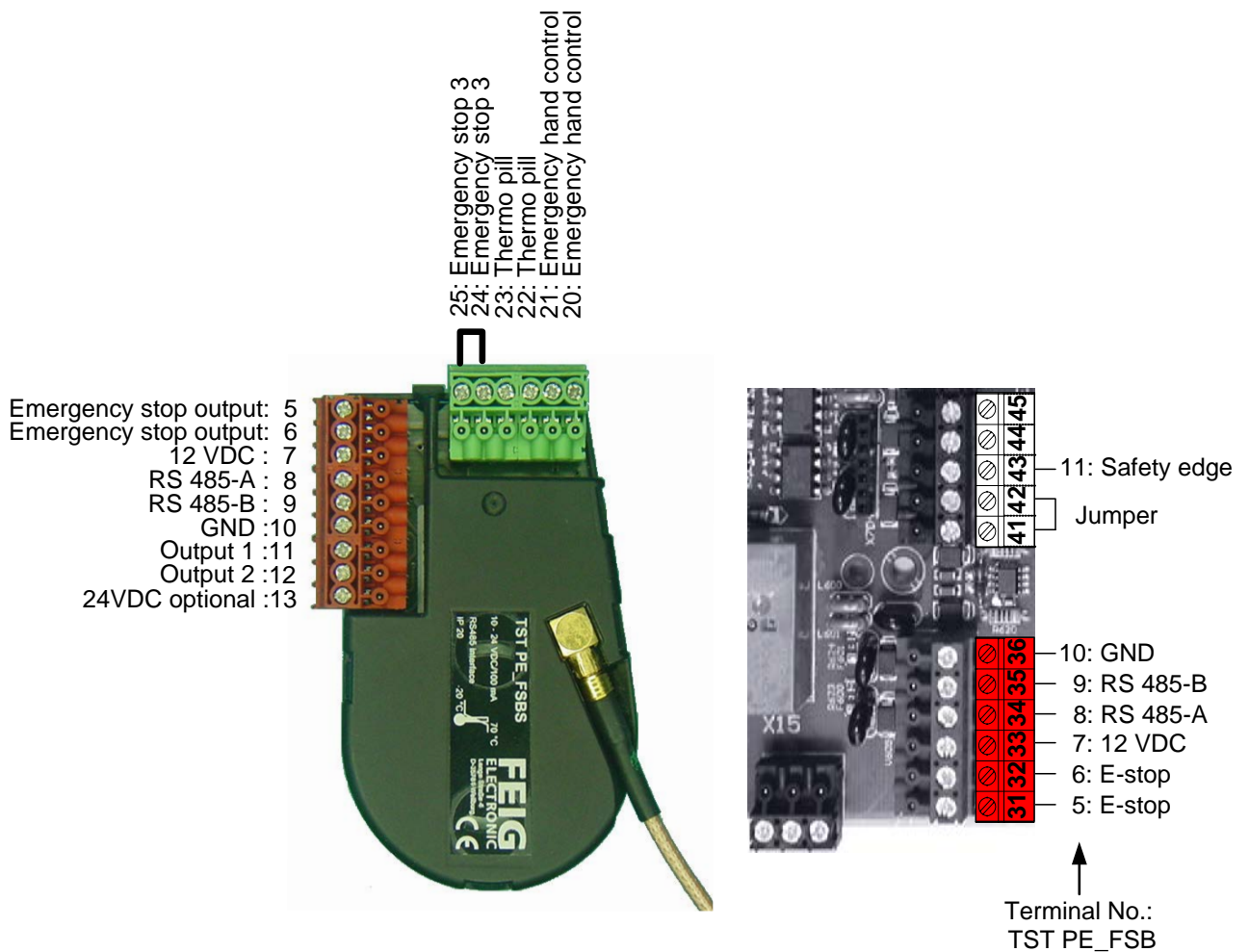

Figure 7:Absolute encoder TST PE FSP

4.5.2   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 TSTPD FSAS and the mobile unit FSAM TST are required.
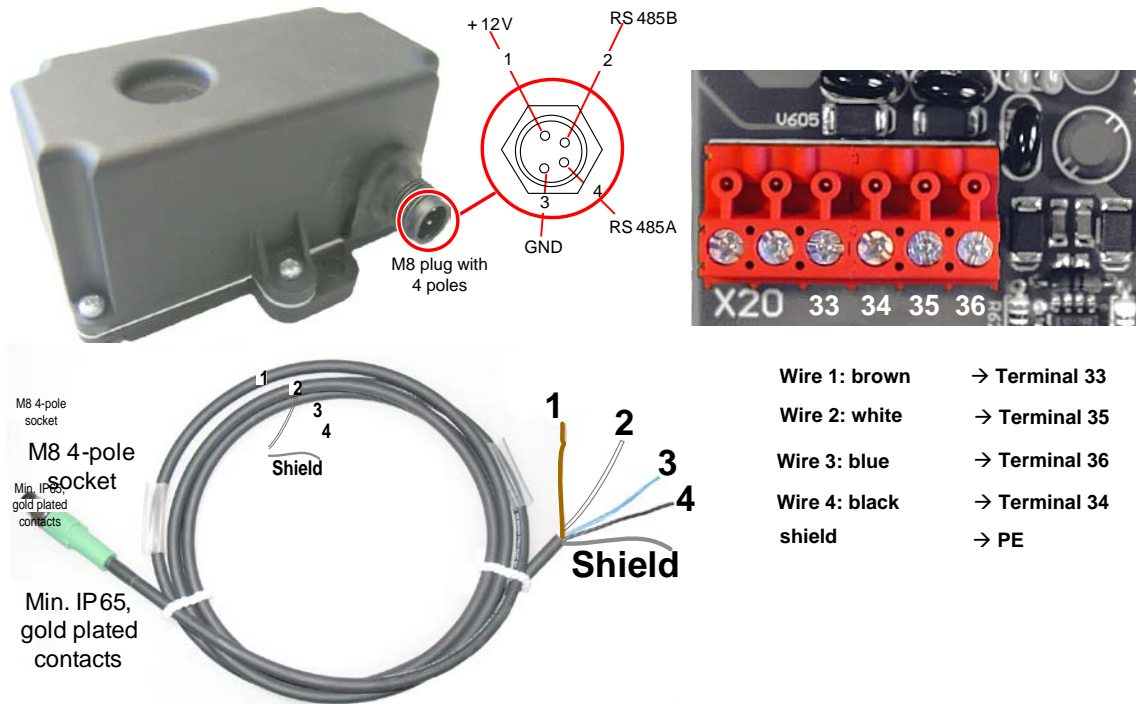

Wire 1: brown	→ **Terminal 33**
Wire 2: white	→ **Terminal 35**
Wire 3: blue	→ **Terminal 36**
Wire 4: black	→ **Terminal 34**
shield	→ **PE**

Figure 5: Absolute encoder TST PD

4.5.3   Absolute encoder DES

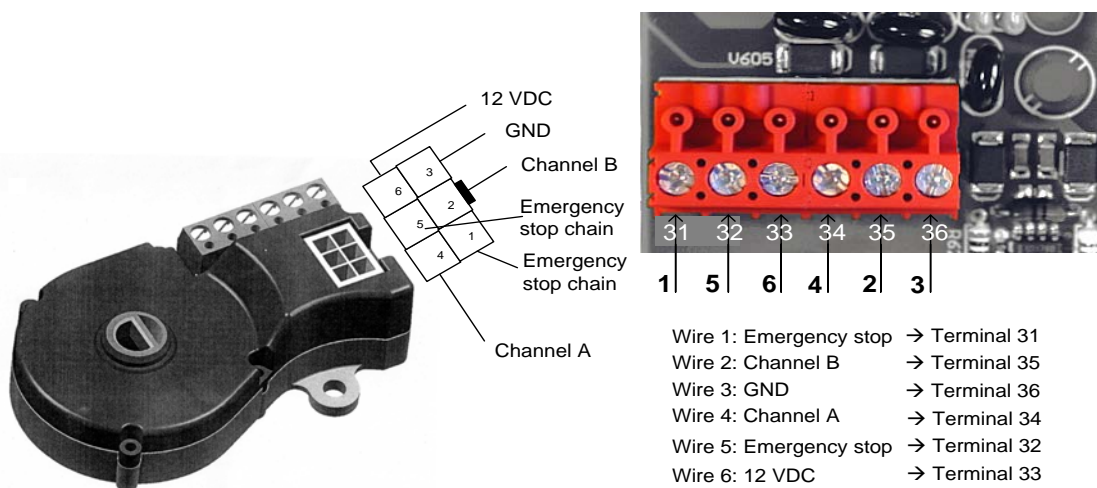|		
Wire 1: Emergency stop	→	Terminal 31
Wire 2: Channel B	→	Terminal 35
Wire 3: GND	→	Terminal 36
Wire 4: Channel A	→	Terminal 34
Wire 5: Emergency stop	→	Terminal 32
Wire 6: 12 VDC	→	Terminal 33

Figure 6: Connection absolute encoder DES
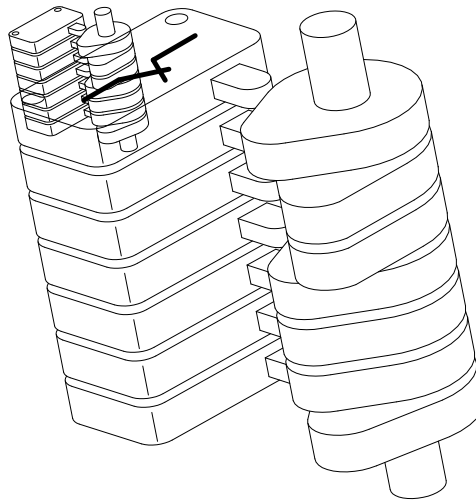
4.5.4   Mechanical limit switches
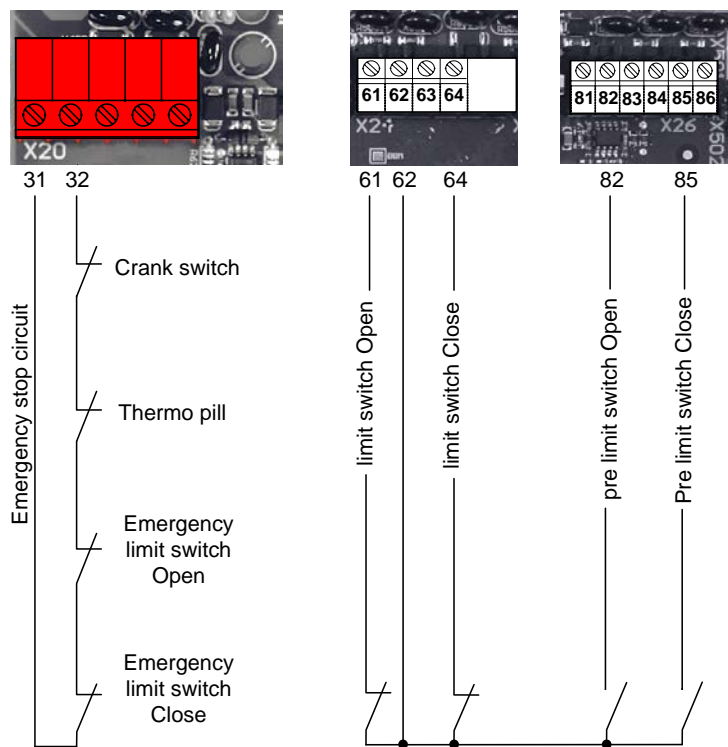

Figure 7: Cam switch

Figure 8: Connecting cam switches

ℹ️   *Alternately the pre-limit switches can also be connected as normally closed contacts.*
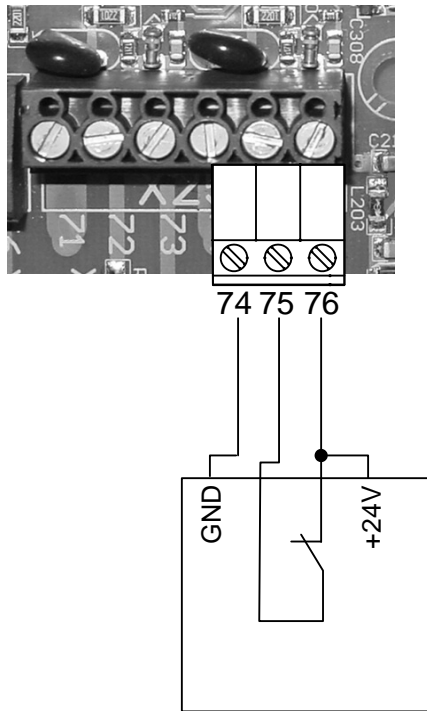
4.6   Photo eye

Figure 9: Photo eye connection

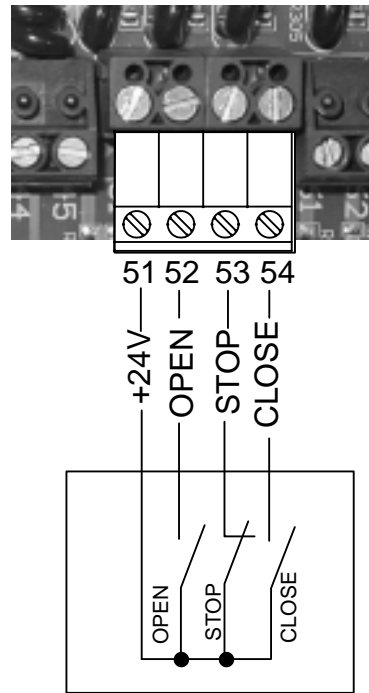## 4.7   External triggering devices

Figure 10: External triggering devices
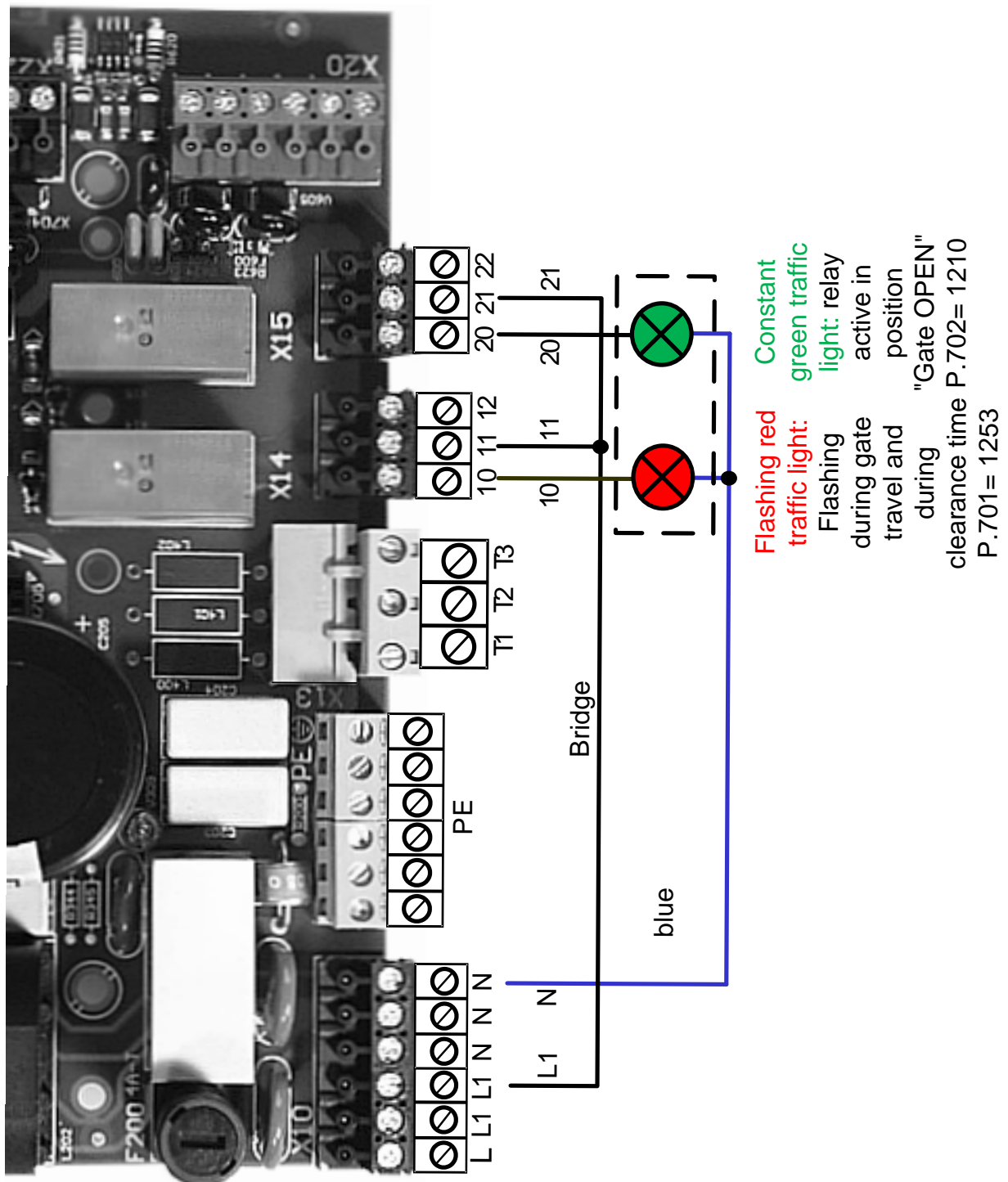
4.8   Traffic light connection

Figure 11: Traffic light connector

ℹ️ *When a motor brake is being used, relay K2 is already occupied and it can not be used to control a traffic light.genutzt werden.*

IMPORTENT
before you start the controller, check the electrical connection once more. Incorrect connections may damage the unit.
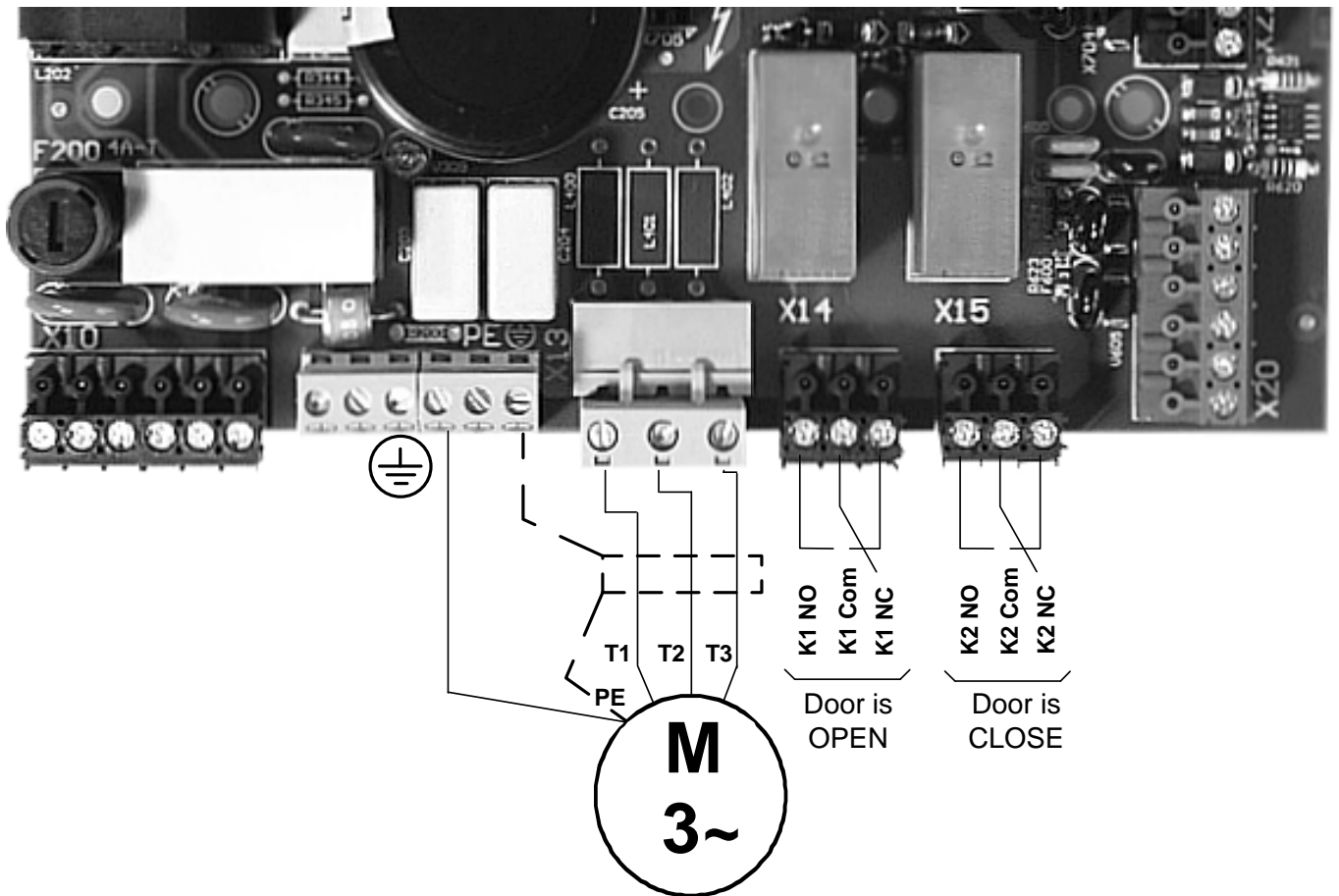
5   Overview of outputs

Figure 12: Overview of the relay outputs

ℹ   Contrary to the mentioned standard settings, the relay function is selectable
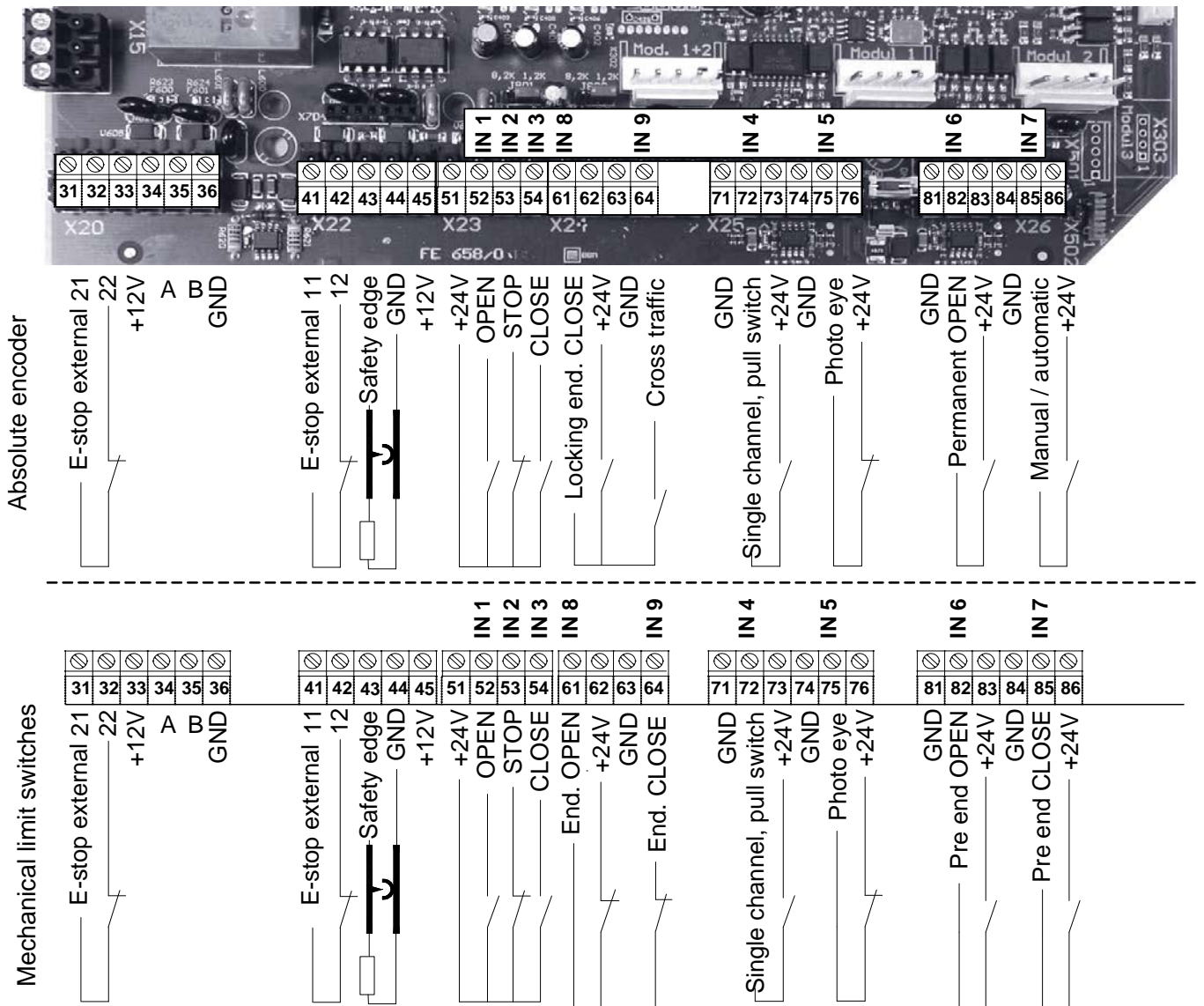
6 Overview of inputs

Figure 13: Overview of inputs

7   General operating instructions to set parameters

7.1   Open the parameter operation mode

1. Turn off the gate controller and wait until the display has been completely extinguished.

2. Open the cover of the enclosure and switch the DIP switch S500 (see illustration) to ON. The service mode is activated and you can close the cover.
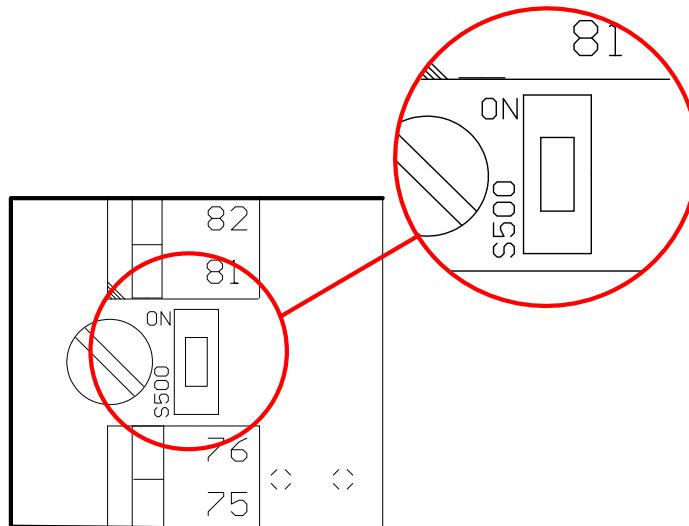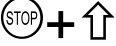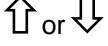
Figure 14: DIP switch position

⚠ **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. (STOP) ➕ ⇧   keep these pressed simultaneously to reach the parameter selection. (the display will either show **1: real text display** or **2: 7-segment display**)

| P: Gate cycles | | P. 0 0 0 |
| 000# | 1234Zyk | |

5. ⇧ or ⇩   Use the arrow keys to select the required parameter.

⚠ **ATTENTION**

Not all the parameters are visible or may be changed immediately; this always depends on the password and the type of position set.

| P: Keep open1 | | P. 0 1 0 |
| 010= | 10 s | |

7.2   Editing a selected parameter

1. (STOP) By briefly pressing the STOP key on the membrane keypad, the cursor moves right to the stored value (the parameter is opened) or the set value is displayed.

| P: Keep open1 | | P. 0 1 0 |
| 010=   10   s | |

| P: Keep open1 | | 1 0 |
| 010=   10✓s | |

2. ⇧ ⇩   The parameter value is increased with the OPEN button and reduced with the CLOSE button.

(i)   *If the value has not yet been saved, a question mark is displayed after the number or the decimal point flashes.*

| P: Keep open1 | | 9٭ |
| 010=   9?s | |

3. (STOP) - If the STOP key is pressed briefly, the set value is not saved and the value changes to the originally stored value, i.e. the original value is displayed.

| P: Keep open1 | | 1 0 |
| 010=   10✓s | |

- If you keep the STOP key pressed until the checkmark is displayed or the decimal point no longer flashes, the changed value is saved.

| P: Keep open1 | | 9 |
| 010=   9✓s | |

4. (STOP) If you now press the STOP key briefly, you change to the display of the parameter name or the cursor jumps back to the parameterisation.

| P: Keep open1 | | P. 0 1 0 |
| 010=   9   s | |

7.3   Exit parameter operation mode

(STOP) Keep the STOP button pressed for approx. 3 seconds in order to leave the parameter mode and change to the gate mode:

| FEIG ELECTRONIC | _٭E u _ |
| xxxx Cycle | |

7.4   Execute a reset
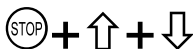
(STOP) + ⇧ + ⇩ press simultaneously and keep pressed for approx. 3 seconds.

7.5   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: Password | | P. 9 9 9 |
| 999=   0001 # | |

P.999 = 2 (extended commissioning mode)

| P: Password | | 0 0 0 1 |
| 999=   0001✓# | |

| P: Password | | 0٭ 0٭ 0٭ 2٭ |
| 999=   0002?# | |

| P: Password | | P. 9 9 9 |
| 999=   0002✓# | |

8   Basic settings

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

8.1   Automatic query of basic data

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

⚠️   **The DIP switch S500 must have been turned on (see Figure 17 at 7.1 for DIP switch position) so that the controller can query the parameters automatically.**

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

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

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

For the operation of the controller, see chapter: 7 General operating instructions for the parameterization

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

  P.205: 0000 = Mechanical limit switches Version 1 (Fig. 11: Connecting cam switches)
  P.205: 0001 = Mechanical limit switches Version 2
                      (limit switches and pre-limit switches are normally closed)
  P.205: 0300 = Absolute encoder DES-A (GfA)
  P.205: 0700 = Absolute encoder DES-B (Kostal)
  P.205: 0800 = Absolute encoder TST PD / TST PE

- **Motor data P.100 – P.103**
  The gate controller uses the following parameter setting to the learn about the type of motor being used. Read the data from the nameplate and enter them into the corresponding parameters.

Manufacturer

Type designation

P.101: Motor current — Δ / Y 2,4 / 1,4 A

0,5 KW   50 Hz ← P.100: Nominal motor frequency

Δ / Y 230 / 400 V ← P.103: Nominal motor voltage

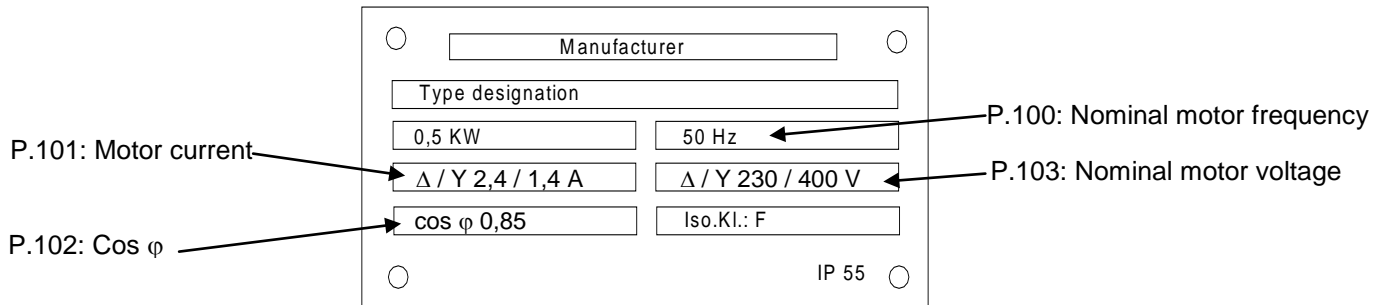P.102: Cos φ — cos φ 0,85   Iso.Kl.: F

IP 55

Figure 15: Typical motor nameplate (may vary)

⚠ **Be sure to note the Y/Δ wiring of the motor. The motor data must be entered in accordance with the motors wiring. 400V setting is not applicable, since the controller can source a maximum motor voltage of 230V**
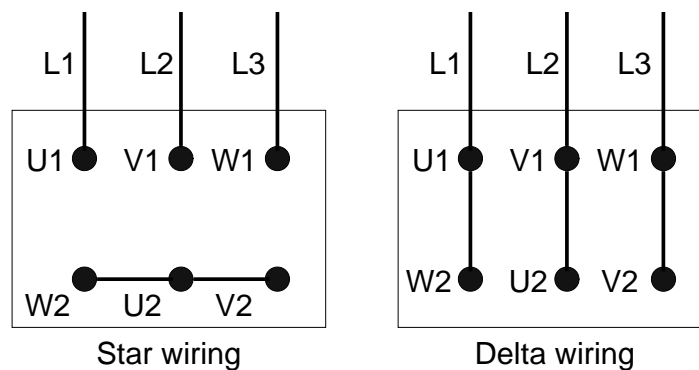
L1   L2   L3   L1   L2   L3

U1   V1   W1   U1   V1   W1

W2   U2   V2   W2   U2   V2

Star wiring   Delta wiring

Figure 16: Star/Delta wiring

ℹ *The automatic retrieval 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.*

9   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.

ℹ *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.*

## 9.1   … with absolute encoder or incremental encoder

1.	Open CALIBRATE mode by briefly pressing the (STOP) STOP key.	!Calibration! 0 Start with ⬒ — E!CH
2.	Move the gate to the CLOSE position with the membrane keypad CLOSE and	

⚠ **If the gate moves in the incorrect direction: incorrect motor rotary field, turn off controller and reverse the 2 motor connections. If the gate 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 9.4), if necessary, check that the brake was released.**

3.	save by pressing the (STOP) STOP key for approx. 3 seconds.	To Closed Pos. → ⇧⇩ 0 Hold ⬒ if OK — E*ı*E*u*
4.	Move the gate to the OPEN position by means of membrane keypad ⇧ OPEN and by	To Open Pos. → ⇧ xxx Hold ⬒ if OK — E*ı*E*o*

⚠ **If the gate does not move, the motor lacks power. The power to the motor can be increased by using the Boost option (see chapter 9.4), if necessary, check that the brake was released.**

5.   Save by pressing the (STOP) STOP key for approx. 3 seconds.

ℹ *The pre-limit switches and ramps are automatically adjusted by the subsequent travel of the gate in automatic mode.*

Open Limit Set	⁻* E o ⁻
6. press ⬇ briefly, the gate moves down and is now taught in its position.	Door is Closing I.555 Calib.Run — I.555
	Close Limit Set	_*E u _
7. Now press ⇧ ☐ repeat the process until the correction travel is completed. (Display I.510 = OK)	Door is Opening I.515 Calib.Run — I.515
	I.510 Correc. OK	I.510
	Door is Opening	ºAUF
	Door is Closing	2*UFº

9.2 … with mechanical limit switches

1. Press the CLOSE-key ⇩ to move the gate to a distance of approx. 50cm from the closed position

   If the gate does not move, the motor lacks power. The power to the motor can be increased by using the Boost option (see chapter 9.4), 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 gate 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 gate 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 OPEN-key ⇧ to move the gate to a distance of approx. 50cm from the opened position

   ⚠ **If the gate does not move, the motor lacks power. The power to the motor can be increased by using the Boost option (see chapter 9.4), 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 OPEN-key ⇧ to move the gate 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 pill.

10. Press (STOP) 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.

9.3   Renewed request for "learning" end 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)

9.4   Boost / increase in performance for low speeds

Boost is used to increase the power of the drives at lower 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 parameterizing mode by pressing ⊚ 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.*

10 Movement optimization for the gate

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.

10.1 Opening of the door
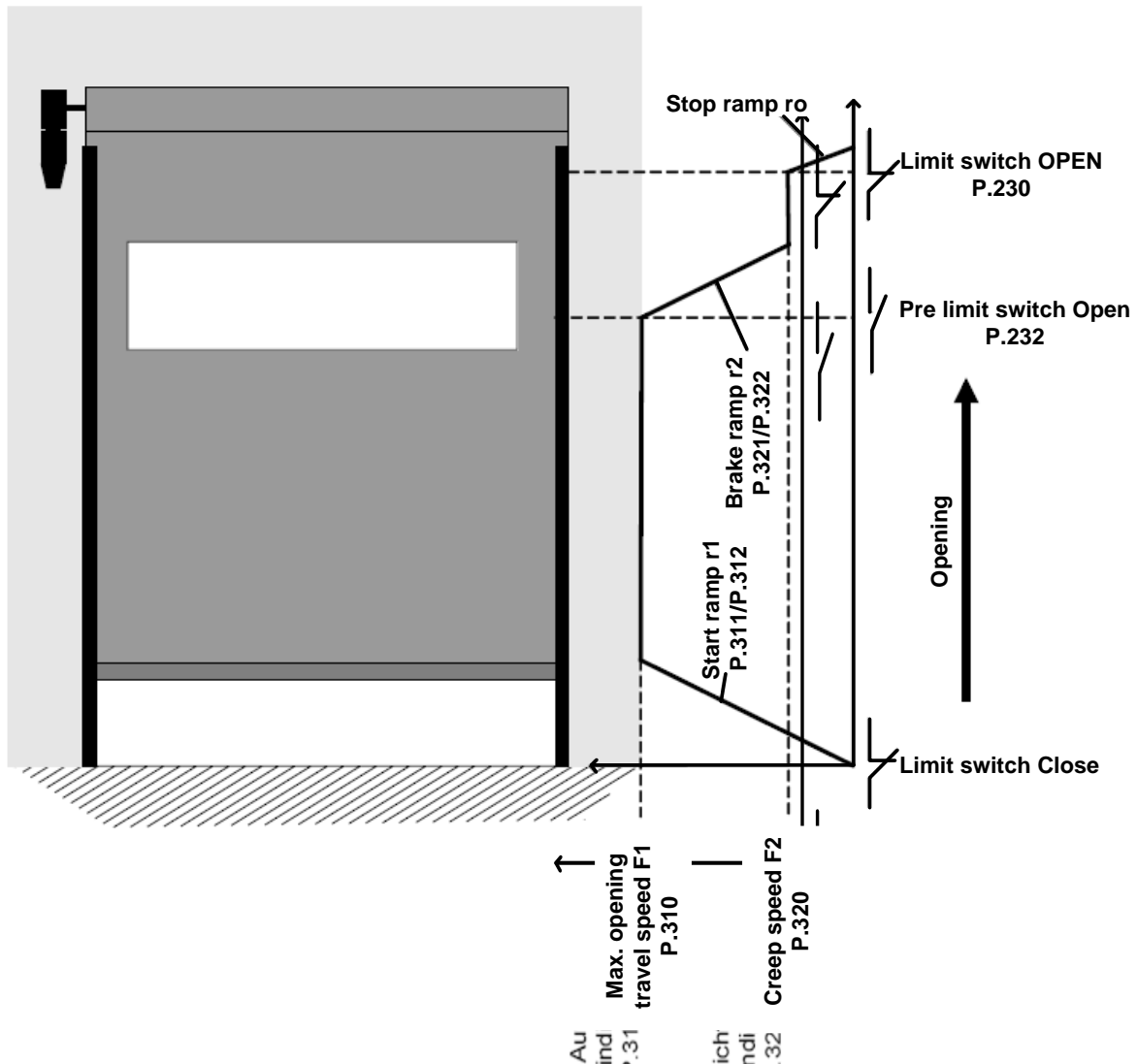
Figure 17: Opening using frequency converter

The frequency converter starts 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).

10.2 Closing of the door
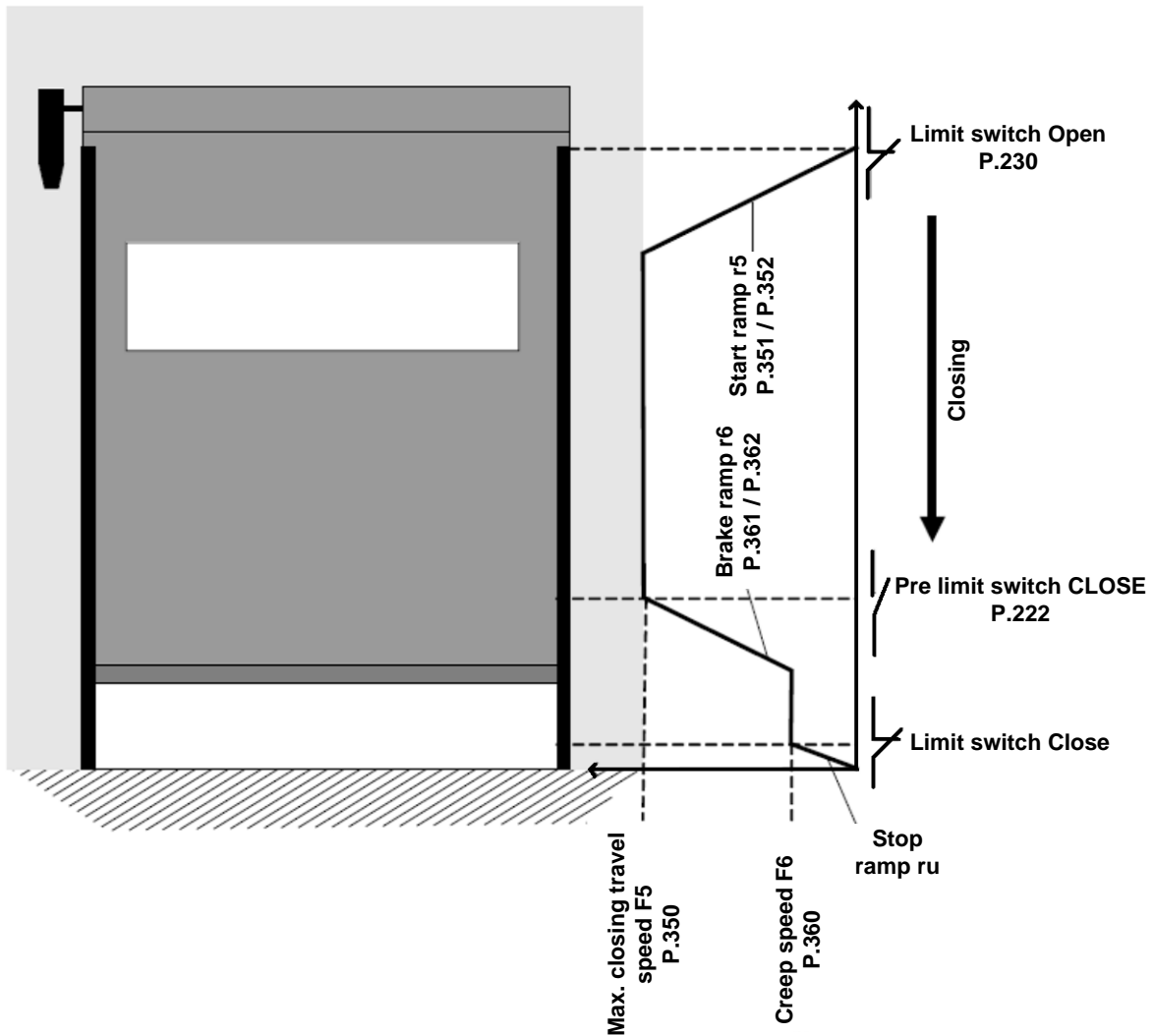
Figure 18: Closing using the frequency converter

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 the door is braked to the creep speed frequency 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).

10.3 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 gate CLOSED absolute limit switch.The brake ramp "r6" is initiated with the prelimit 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 gate OPEN absolute limit switch. The brake ramp "r2" is initiated with the prelimit switch. The safety of the ramp is set with parameter P.321 or P.322.

If the automatic setting of the prelimit 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!

10.4 Ramp configuration

The ramps are used by the gate 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 gate. If the ramp is flatter the gate 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.

10.5 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.

10.6 Speed-distance profile

Parameter P.39F can be used to select profiles that pre-set the acceleration of the door. The parameter sets both the acceleration of the start ramp and of the brake ramp.

P.39F = 0: deactivated
P.39F = 1: slow acceleration of the door
P.39F = 2: medium acceleration of the door
P.39F = 3: fast acceleration of the door

11 Overview of 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.
Press the STOP button and keep it pressed, then press the EMERGENCY STOP button.
Alternatively, the STOP button can also be kept pressed for approx. 5 seconds.

Fehler Nr.	Beschreibung	Ursache
F.000	Door position too far up	• Too small a parameter value for upper emergency limit switch → enlarge P.239 • Upper limit switch range (limit switch band) too small → enlarge P.233 • Mechanical brake defective or improperly set
F.005	Door position too far down	• Too small a parameter value for lower emergency limit switch → enlarge P. 229 • Lower limit switch range (limit switch band) too small → enlarge P. 223 • Mechanical brake defective or improperly set
F.020	Run time exceeded (during opening, closing or deadman)	• 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	• The max. allowed run time (P.490) during testing has exceeded • Call Service
F.030	Lag error (position change of the door is less than expected)	• gate 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	• 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.043	Pre-limit switch fault (light barrier)	• The pre-limit switch for the light barrier remains activated even in the middle end position or upper end position.
F.060	Breakaway recognized	• Breakaway was detected but not fixed • The automatic lead in after breakaway has failed
F.080	Fault: Maintenance is required	• Service counter has expired

Fehler Nr.	Beschreibung	Ursache
F.090	Controller not parameterized	• The min. neseccary 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)	• E-Stop chain was interrupted starting at input „internal EStop" without parameterizing mode having been selected • Internal parameter or EEPROM checks defective, pressing the STOP key provides additional information about the cause
F.211	External E-Stop 1 tripped	• E-Stop chain was interrupted starting at Input 1
F.212	External E-Stop 2 tripped	• E-Stop chain was interrupted starting at Input 2
F.320	Obstacle during opening	• During opening an obstacle has recognized
F.325	Obstacle during closing	• During closing an obstacle has recognized
F.360	Short circuit detected on edge input	• 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 edge trips for closing has reached set limit	• Parameterized, maximum number of safety edge trips during a door cycle was exceeded → To reset close the door in deadman mode
F.362	Redundancy error with short circuit	• 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	• Connection cable defective or not connected • Termination resistor incorrect or missing • Jumper 1K2 / 8K2 incorrectly set
F.364	Safety edge testing failed	• Safety edge was not activated as expected when requesting a test. • The time between request for testing and actual testing not in agreement
F.365	Redundancy error with interruption	• One of the processing channels for interruption detection does not react identically with the second channel → Controller board defective, if no other error message F.3xx is shown • Dynamic optical system connected but not set in Parameter P.460
F.366	Too high a pulse frequency for optical safety edge	• Defective optical safety edge • Defective input for internal safety edge
F.369	Internal safety edge incorrectly parameterized	• 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	• One of the contacts of the redundant 8k2-wicket door switch is defective • The slip door was not fully opened or closed
F.379	Safety edge detection defective (coding pin or parameter setting)	• 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

Fehler Nr.	Beschreibung	Ursache
F.37A	Redundancy error of the 8K2 slip door switch on the internal safety edge evaluation unit channel 1	• One of the contacts of the redundant 8k2-wicket door switch is defective • The slip door was not fully opened or closed
F.385	Fault in pre-limit switch for safety edge	• 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	• An safety edge is connected but deactivated • Safety input wron jumperd (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	• 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	• 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	• 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	• Parameterized, maximum number of safety input trips during a door cycle was exceeded
F.400	Controller hardware reset detected	• Excessive noise on supply voltage • Internal watchdog tripped • RAM error
F.401	Watchdog Error	• Internal Watchdog has released
F.40A	Software Exeption	• Internal Errror
F.410	Over-current (motor current or DC-bus)	• 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.420	Overvoltage in DC-bus Limit 1	• Brake chopper interference / defective / missing • Feed voltage much to high • Motor feeds back too much energy in generator mode, door motion energy cannot be sufficiently brought down
F.425	Overvoltage line supply	• The supply voltage for the controller is to high
F.426	Undervoltage line supply	• The supply voltage for the controller is to low
F.430	Temperature cooler outside of working range Limit 1	• 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.435	Housing temperature high	• The temperature inside the controller housing is to high

Fehler Nr.	Beschreibung	Ursache
F.440	Overcurrent in DC-bus Limit 1	• Boost not adjusted • Motor incorrectly dimensioned for door • Door sticks
F.510	Motor / DC-bus overcurrent Limit 2	• 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.512	Offset motor current / DC-bus current faulty	• The controller hardware is broken
F.515	Motor protection function detected overcurrent	• 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	• 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	• Brake chopper interference / defective / missing • Feed voltage much to high • Motor feeds back too much energy in generator mode, door motion energy cannot be sufficiently brought down.
F.521	Overvoltage in DC-bus	• Input voltage supply too low, usually at load • Load too great / final stage or brake chopper fault
F.524	Ext. 24 V supply missing or too low	• 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 line supply input	• The line supply for the Controller is to high • The line supply fluctuates very extremly
F.530	Heatsink temperature outside of working range Limit 1	• 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	• The temperature inside the controller housing is to high
F.540	Overcurrent in DC-bus Limit 2	• Boost not adjusted • Motor incorrectly dimensioned for door • Door sticks

Fehler Nr.	Beschreibung	Ursache
F.700	Position sensing defective	For mechanical limit switches: • At least one limit switch does not correspond to the configured active status. • An implausible combination of at least 2 active limit switches For electronic limit switches: • 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	• The simulated end switch CLOSE was not reached at the expected position • The tolerance band for the recognition time is to small (P.229)
F.702	OPEN Position not found in timer mode	• The simulated end switch OPEN was not reached at the expected position • The tolerance band for the recognition time is to small (P.239)
F.752	Timeout with protocol transmission	• Interface cable defective / interrupted • Channel A and B connected over cross • Absolute encoder processor electronics defective • Defective hardware or electrically noisy environment • Take a controlcable with shield • Adjust a RC element (100Ω+100nF) at the brake
F.760	Position outside of window	• Position encoder drive defective • Absolute encoder processing electronics defective • Defective hardware or electrically noisy environment
F.763	DES-B Error	• Position encoder drive defective -> make a reset
F.766	Internal error TST PD/PE	• The position encoder TST PD / PE is disturbed -> make a reset
F.767	Overtemperature TST PD	• The temperature in the encoder housing is to high
F.768	Battery voltage	• The voltage of the buffer battery is to low → change battery
F.769	Rotation speed of PD shaft to high	• The rotation speed of the shaft where the encoder is mounted is to high → mount the encoder on another shaft
F.770	Door way is to high for the parameter set Encoder resolution	• The Value of the Parameter P.202 (set Encoder resolution) is to high for the combination Encoder and Door.
F.801	Wrong Test of input 1 of the mobile unit TST FSx	• Input 1 of the mobile unit was tested wrong • The device which is connected to the input does not work correct • The mobile unit is defective

Fehler Nr.	Beschreibung	Ursache
F.802	Wrong Test of input 2 of the mobile unit TST FSx	• Input 2 of the mobile unit was tested wrong • The device which is connected to the input does not work correct • The mobile unit is defective
F.803	Wrong Test of input 3 of the mobile unit TST FSx	• Input 3 of the mobile unit was tested wrong • The device which is connected to the input does not work correct • The mobile unit is defective
F.804	Wrong Test of input 4 of the mobile unit TST FSx	• Input 4 of the mobile unit was tested wrong • The device which is connected to the input does not work correct • The mobile unit is defective
F.80A	Wrong Test of input A of the stationary unit TST FSx	• Input A 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.80B	Wrong Test of input B of the stationary unit TST FSx	• Input B 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.80C	Wrong Test of input C of the stationary unit TST FSx	• 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 of output 1 of the stationary unit TST FSx	• The output 1 of the stationary unit was tested wrong • The cable between stationary unit and controller is broken or not connected • The stationary unit is defective • Parameter P.Fxb, P.47b or P.465 wrong adjusted
F.812	Wrong Test of output 2 of the stationary unit TST FSx	• The output 2 of the stationary unit was tested wrong • The cable between stationary unit and controller is broken or not connected • The stationary unit is defective • Parameter P.Fxb, P.47b or P.465 wrong adjusted
F.813	Wrong Test of output 3 of the stationary unit TST FSx	• The output 3 of the stationary unit was tested wrong • The cable between stationary unit and controller is broken or not connected • The stationary unit is defective • Parameter P.Fxb, P.47b or P.465 wrong adjusted
F.821	Wrong parameter setting input 1 of mobile unit	• 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	• 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	• The device which is connected to input 3 of the mobile unit does not fit to the settings • Check Parameter P.F3F

Fehler Nr.	Beschreibung	Ursache
F.824	Wrong parameter setting input 4 of mobile unit	• 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	• 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	• 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	• 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	• 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	• The connected optical safety sdge is faulty
F.843	Frequency error on input 3 of mobile unit	• The connected optical safety sdge is faulty
F.851	Max. Number of allowed Reversings, because of bad WiCAB radio, exceeded.	• The radio connection interrupts during door drive for a short time
F.852	Communication error between TST FSx and controller	This error is shown when the controller don`t have RS485 communication for min. 1 second with the stationary unit of TST FSx. Possible causes are: • 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 is shown when the stationary unit don`t have communication for min. 1 second with the mobile unit of TST FSx. Possible causes are: • 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 connecteed or missing • Moile unit or stationary unit is defective
F.857	Battery empty	• The battery voltage is under the limit set with Parameter P.F0B • The battery voltage of the mobile unit is to low • 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.

Fehler Nr.	Beschreibung	Ursache
F.862	Internal positioning system error	Internal error of the positioning system. Presumably, the magnet is not attached properly.
F.867	Adresse of mobile unit not set	• The adresse of the mobile unit was not set so far • The adresse has to be set in Parameter P.F07 • The adresse is written on a sticker on the mobile unit
F.920	Internal 2.5 V reference voltage incorrect	• Hardware defect
F.921	Internal 15 V voltage incorrect	• Hardware defect
F.922	E-Stop chain not complete	• Not all E-STOP inputs are separately jumpered although the entire E-Stop chain is jumpered • Redundant checking of the E-Stop chain tripped
F.925	Testing of the third shutdown method failed	• defective hardware
F.928	Faulty input testing	• 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.930	External watchdog incorrect	• Defective hardware or noise-saturated environment
F.931	ROM error	• Wrong EPROM code • Defective hardware or noise-saturated environment
F.932	RAM error	• Defective hardware or noise-saturated environment
F.933	Wrong frequency of CPU	• The clock frequency of the processor is wrong
F.935	Stack error	• UserSTack or SystemStack overflowed • Possible software error due to recursive invocations (e.g. profile)
F.960	Wrong parameter checksum	• New EPROM version with different parameters • Controller not yet initialized
F.961	Checksum from calibration values etc.	• New EPROM version with different EEPROM structure • Controller not yet initialized
F.962	Converter parameters not plausible	• New EPROM version • Controller not yet initialized
F.964	Program version / manufacturer code	• New EPROM version • Controller not yet initialized
F.966	Hardware unknown	• A wrong software was programmed to the controller • The programmed software does not know the hardware version • The controller hardware is broken
F.970	Plausibility Param.block error	• New EPROM version • Controller not yet initialized • Some parameter is implausible

Fehler Nr.	Beschreibung	Ursache
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 aktiv	
I.161	Priority not active	
I.170	Forced opening active	
I.180	Wait for foil key command	
I.185	Wait for reset by stop foil key	
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.200	Reference corrected	
I.205	Reference position encoder	
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.510	Correction drive finished	
I.515	Active correction drive	
I.520	Pre set speed for open or close drive not reached	
I.555	Measuring rotation factor not ready	
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.	

12 Information messages

General messages	
STOP	**Stop** / Reset state, wait for next incoming command
_Ec_	**Lower limit position**
≡Ec≡	**lower limit position locked** → raising not possible (e.g., lock-door)
CLO ▫	**closing active**
‾Eo‾	**upper limit position**
≡Eo≡	**upper limit position locked** → closing not possible (e.g., safety edge)
▫OPE	**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
CALI	**Calibration** → setting the limit positions in deadman travel mode (for absolute encoder) à Start procedure using STOP key
≡ES≡	**E-stop** → Travel not possible, hardware safety chain interrupted
HdSA	**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"
FUZ	Initial display after power up **(Power Up and self-test)**

Status messages during calibration	
E.i.E.c.	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.c.	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 ⊛

Status messages during dead man movement	
Hd.cL	Deadman closing (membrane key: CLOSE)
Hd.oP	Deadman opening (membrane key: OPEN)
Hd.Ec	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.121	Input 21
E.128	Input 28

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
E.363	internal safety edge fault
E.370	activation of external safety edge
E.373	external safety edge fault
E.379	external safety edge activated but not yet plugged in

Wireless plug-in module

E.401	Wireless Channel 1
E.402	Wireless Channel 2

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

Housing dimensions (W x H x D):	182 x 320 x 102 mm with the wall bracket
Installation:	Vertical using wall bracket on housing bottom
Supply voltage over L, N, PE:	230 V$_{AC}$ $\pm$10%, 50...60 Hz permissible range: 110...240 V $\pm$ 10% / 50...60 Hz Fuse: 16A fast blowing K characteristics
Controller idling current:	max. 30W when fully configured (fused on the circuit board via F201: 250 mAT fine-wire fuse 5 x 20 mm)
External supply 1 (depending on supply):	terminal L1: corresponds to terminal voltage at terminal L (fused on the circuit board: F200 / 4 AT)
Controller voltage / external supply 2	24 VDC regulated ($\pm$10% at nominal voltage 230 V) max. 250 mA incl. optional plug-in modules. Protected by means of self-resetting semiconductor fuse, short-circuit protected by central switching regulator.
Control voltage / external supply 3	For electronic limit switches and safety edge Nominal value 11.3V / max. 130mA
Control inputs 1-9	24 VDC / typ.20 mA all inputs must have potential-free connections or: < 2 V: inactive □logical 0 > 17 V: active □logical 1 min. signal duration for input control commands: > 100 ms galvanic isolated by Optocoupler on PCB
Serial interface RS485 A and B	only for electronic limit switches RS485 level, terminated in 100Ω
Safety chain / emergency stop (terminals: emergency stop ext. 31/32 and 41/42):	all inputs must be connected potential-free Contact load capacity ≤ 26 VDC / ≤ 120 mA when safety chain is interrupted, no movement of the drive is possible, not even in deadman mode Factory setting: not jumpered
Safety edge input:	for electrical safety edges with 1.2kΩ or 8.2kΩ termination resistor and for dynamic optical systems.
Relay outputs:	when inductive loads are being controlled (e.g. additional relays or brakes) they must be equipped with appropriate suppressors (free-wheeling diodes, varistors, RC elements)
Relays K1 and K2:	Changeover contact, potential-free min. 10mA max. 230VAC / 3A	⚠ Attention! **Contacts used once for power switching are no longer capable of switching small currents.**
Drive output:	for drives up to 0.75KW at 230 V Motor constant current =3A at 100% duty factor and 40°C ambient temperature Motor constant current =5A at 40% duty factor and 50°C ambient temperature Max. length of motor cable: 30m
Temperature range Operating Storage	-20...+50°C -20...+70°C
Relativ humidity	up to 95% non condensing
Noise emission	< 20 dB (A)
Vibration	low-vibration installation, e.g. on a concrete wall
Protection class	IP54 (only in respect of enclosure)
Weight	approx. 5 kg

Equipment mobility:	stationary
Equipment type:	motor appliance, external motor is not part of the delivery from FEIG ELECTRONIC GMBH
Protection Class	Protection Class I

Type tested to:	**Standards:**
Machinery Directive	device complies with Annex IV categories of machinery - Section 21: "logic unit for safety functions"

	"EN ISO 13849-1:2008 Safety of machinery – safety-related parts of control systems – part 1: General design principles
	• Category: 2
	• Performance Level (PL): d
	• Safe functions:
	  o Endpoint detection
	  o Contacting edge evaluation (8,2/1,2 kΩ or optical)
	  o photo eye incl. pull-in protection (comp. EN 12453 table 1: type D or type E with test)
	  o Slip door switch
	  o Slack rope switch

	EN 62061:2005 Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005) • Safety integrity levels (SIL): 1
Low-Voltage Directive: 2006/95/EEC	EN 60335-1:2007 Safety of electrical appliances for household and similar use / Part 1: general requirements • Type: stationary motor-driven machines • Protection class 1 EN 60335-2-103:2003 Safety of household and similar electrical appliances - part 2-103: Special requirements for drives for industrial gates, doors and windows
EMC Directive: 2004/108/EEC	Electromagnetic compatibility – basic technical standards: EN 61000-6-1:2007 interference immunity, living area EN 61000-6-2:2006 interference immunity, industrial area EN 61000-6-3:2007 Electromagnetic radiation, living area EN 61000-6-4:2007 Electromagnetic radiation, industrial area
Applied national specifications regarding the above directives:	EN 12453:2001 Safety in use of power operated doors - Requirements • Chapter 5.2 Drive Systems and Power Supply

14 EC- Declaration of conformity

FEIG ELECTRONIC GmbH
Lange Straße 4
D- 35781 Weilburg

EC Declaration of conformity
in accordance with the EC Machinery Directive 2006/42/EC, Annexe II A

We declare that the machine
Description   **Gate controller with integrated frequency converter**
Type / trade name   **TST FUZ**

complies with the relevant provisions of the following directive:

Machinery Directive	2006/42/EG
EMC Directive	2004/108/EG
Low-Voltage Directive	2006/95/EG

Applicable harmonized standards:
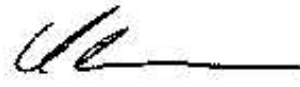
EN ISO 13849-1: 2008	Safety of machinery – safety-related parts of control systems
EN 62061:2005	Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems
DIN EN 60335-1:2007	Safety of household and similar electrical appliances
EN 60335-2-103:2003	Safety of household and similar electrical appliances – Special requirements for drives for industrial gates, doors and windows
EN 61000-6-1:2007	EMC: Minimum Technical Standard – immunity to interference (living quarters)
EN 61000-6-2:2006	EMC: Minimum Technical Standard – immunity to interference (industrial sector)
EN 61000-6-3:2007	EMC: Minimum Technical Standard – electromagnetic radiation (living quarters)
EN 61000-6-4:2007	EMC: Minimum Technical Standard – electromagnetic radiation (industrial sector)

Applied national technical standards and specifications:

EN 12453:2001	Safety in use of power operated doors - Requirements Chapter 5.2 drive systems and and power supply

Authorized representative for the compilation of the relevant technical documentation:

Weilburg, 24.September 2010

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Eldor Walk, Technical manager

The examination of the type of machine for compliance with the requirements of the EC Machinery Directive was carried out by the

TÜV NORD CERT GmbH
Langemarckstraße 20, D-45141 Essen, Notified Body ID. No.: 0044
Reg.-No.: 44 780 10 384294

This test laboratory is responsible in accordance with Annex XI of the EC Machinery Directive!

This declaration certifies compliance with these regulations, however, it does not entail any warranted qualities. The accompanying product documentation and in particular the safety instructions must be observed.

Commissioning of the gate controller is prohibited until it has been installed on a gate and this gate complies with the provisions of the EC Machinery Directive.