



Electrical operating instructions

Reversing contactor universal

2 Contactor / 24V

for three- and single- phase motor



consisting of:

E : Electrical operating instructions

M : Mechanical operating instructions (separately enclosed)

List of Contents E	Page
SAFETY DIRECTIONS	E 2
ELECTRICAL CONNECTION	E 4
ASSEMBLY OF THE REVERSING CONTACTOR BOARD	E 5
REVERSING CONTACTOR BOARD UNIVERSAL	E 6
WIRE LINKS ON THE REVERSING CONTACTOR BOARD	E 7
PRIMARY ELECTRICAL CIRCUIT	
3 x 220/230V AC, PE	E 8
3 x 380/400V AC, N, PE	E 9
3 x 380/400V AC, PE	E 10
3 x 460V AC, PE (special execution)	E 11
3 x 500V AC, N, PE (special execution)	E 12
1 x 220/230V AC, N, PE SYMMETRIC WINDING	E 13
1 x 220/230V AC, N, PE ASYMMETRIC WINDING	E 14
ELECTRICAL CONTROL	E 15
ADDITIONAL LIMIT SWITCHES	E 16
CONTROL DEVICES - TYPES OF CONNECTION	E 17
HELP WITH CORRECTING FAULTS	E 20
LIFETIME / DOORCYKLES	E 21

Basic Directions

This control has been built in accordance with **DIN EN 12453 Industrial, commercial and garage doors and gates - Safety in use of power operated doors - Requirements**; and left the factory in perfect condition from the point of view of safety. To maintain this condition and to ensure safe operation, the user must observe all the directions and warnings contained in these operating instructions.

In principle, only trained electrical craftsmen should work on electrical equipment. They must assess the work which has been assigned to them, identify potential danger sources and take suitable safety precautions.

Reconstruction of or changes to ELEKTROMAT® are only permissible with the approval of the manufacturer. Original replacement parts and accessories authorised by the manufacturer guarantee safety. Liability ceases to apply if other parts are used.

The operational safety of an ELEKTROMATEN® is only guaranteed if it is used in accordance with the regulations. The limiting values stated in the technical data should not be exceeded under any circumstances (see corresponding sections of the operating instructions).

Safety Regulations

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

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

European normative

- DIN EN 12453
Safety in use of power operated doors - Requirements
- DIN EN 12445
Safety in use of power operated doors - Test methods

Please check normative bellow.

VDE-regulations

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



Regulations

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

Explanation of warnings

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

The individual directions have the following meaning:



DANGER

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



CAUTION

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

General warnings and safety precautions

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



- Please observe the safety and accident prevention regulations valid for the specific application. The installation of the ELEKTROMATEN®, the opening of covers or lids and electrical connection must be carried out when the supply is switched off.
- The ELEKTROMATEN® must be installed with the authorised coverings and protective devices. Care should be taken that any seals are fitted correctly and screw couplings are tightened correctly.
- In the case of ELEKTROMATEN® with a permanent mains connection, an all-pole main switch with appropriate back-up fuse must be provided.
- Check live cables and conductors regularly for insulation faults or breakages. When a fault is detected in the cabling, the defective cabling should be replaced after immediately switching off the mains supply.
- Before starting operation, check whether the permissible mains voltage range of the devices corresponds to the local mains voltage.
- Emergency stop devices in accordance with VDE 0113 (EN60204) should remain operational in all operating modes of the control. Releasing the emergency stop device should not cause any uncontrolled or undefined restart.



Warning! Danger to life through electric shock

Before starting assembly, disconnect the cables from the electricity supply and check that they are dead.



Assembling the control

The control and the wiring is for indoor use only.

Only trained electrical craftsmen should work on electrical equipment. They must assess the work which has been assigned to them, identify potential danger sources and take suitable safety precautions.

External fuse!

Control must be saved against short circuit and overload by an external fuse, max. 10A delayed, in the mains supply. An automatic cut off switch is required, regarding the supply for three-phase or single-phase. When connecting control to mains supply a mains isolator switch or (16A CEE – plug) according EN 12453 is required.

The following tools are recommended for the appropriate electrical connection of the ELEKTROMAT®:

- Multimeter (for alternating current up to at least 750 VAC)
- Electrically insulated screw driver
- Cable stripper
- Diagonal cutter
- Piercing tool to open the cable ducts
- Wire end ferrules with associated pinching tongs when using flexible cables

In order to connect the ELEKTROMAT® electrically, the lid of the reversing contactor housing must first be removed. After loosening the two lid screws, the housing lid can be swiveled about 45° (Fig.1) and removed.

The cable ducts in the reversing contactor housing must be opened with a piercing tool. The hole in the cable duct should be smaller than the cable diameter to ensure sealing.

When the cable duct is opened with a knife or a screw driver, sealing cannot be guaranteed.

The cables should be connected in accordance with the primary electrical circuit diagram.

The **3 phases** of the incoming supply are connected to the contactor K1 with the terminals L1/L2/L3, the neutral conductor is connected to terminal strips designated N.

For **single phase** the incoming supply are connected to the contactor K1, phase L1 and neutral to designated terminal N.

The PE (earth) conductor are connected to the terminal strips designated PE.

ASSEMBLY OF THE REVERSING CONTACTOR BOARD

52310068

The use of non-interchangeable connectors for the limit switch make it easy to assemble and/or change the reversing contactor board. If necessary, the complete reversing contactor housing can be removed, after loosening the two mounting screws, and mounted next to the ELEKTROMAT®.

When doing so, the following steps should be carried out:

Assembly /Disassembly::

- Mount the reversing contactor housing (**Fig. 1**)
- Insert the connecting cable with the cable duct into the gearbox housing
- Plug in 5 - pole motor socket (**Fig. 3 / 4 / 5**)
- Insert the limit switch plug whilst holding the entire limit switch board firmly with the other hand (**Fig. 2**)
- Check limit switch adjustment
- Mount limit switch cover

Realise **disassembly** by following the steps backwards.

Fig. 1: Reversing contactor housing

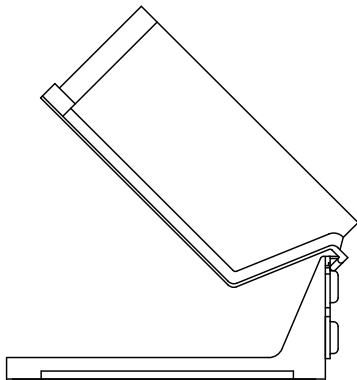


Fig. 2: Limit switch plug

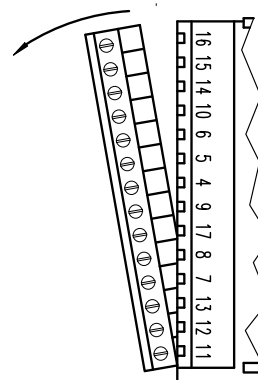


Fig. 3: Motor Terminal Rail for 3x500V/400V/230V

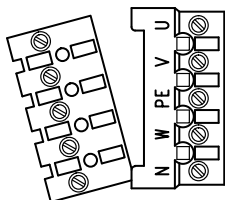


Fig. 4: Motor Terminal Rail for single-phase motor asymmetric winding

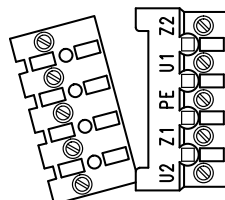
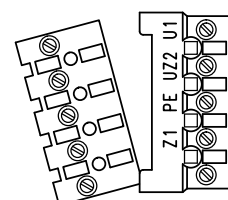


Fig. 5: Motor Terminal Rail for single-phase motor symmetric winding



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

Check incoming supply before connecting the mains supply / in terminals transformer. (X6, wire link G)

REVERSING CONTACTOR BOARD UNIVERSAL

52370099

The control consists of a printed circuit board with a pair of reversing contactors for opening (K1) and closing (K2). Different functions can be achieved by interchanging wire links.

Fig. 6) : Reversing contactor board for: 3 x 380/400V AC, N, PE or 3 x 380/400V AC, PE
 3 x 460V AC, PE (special execution);
 3 x 220/230V AC, PE;
 3 x 500V AC, PE (special execution)

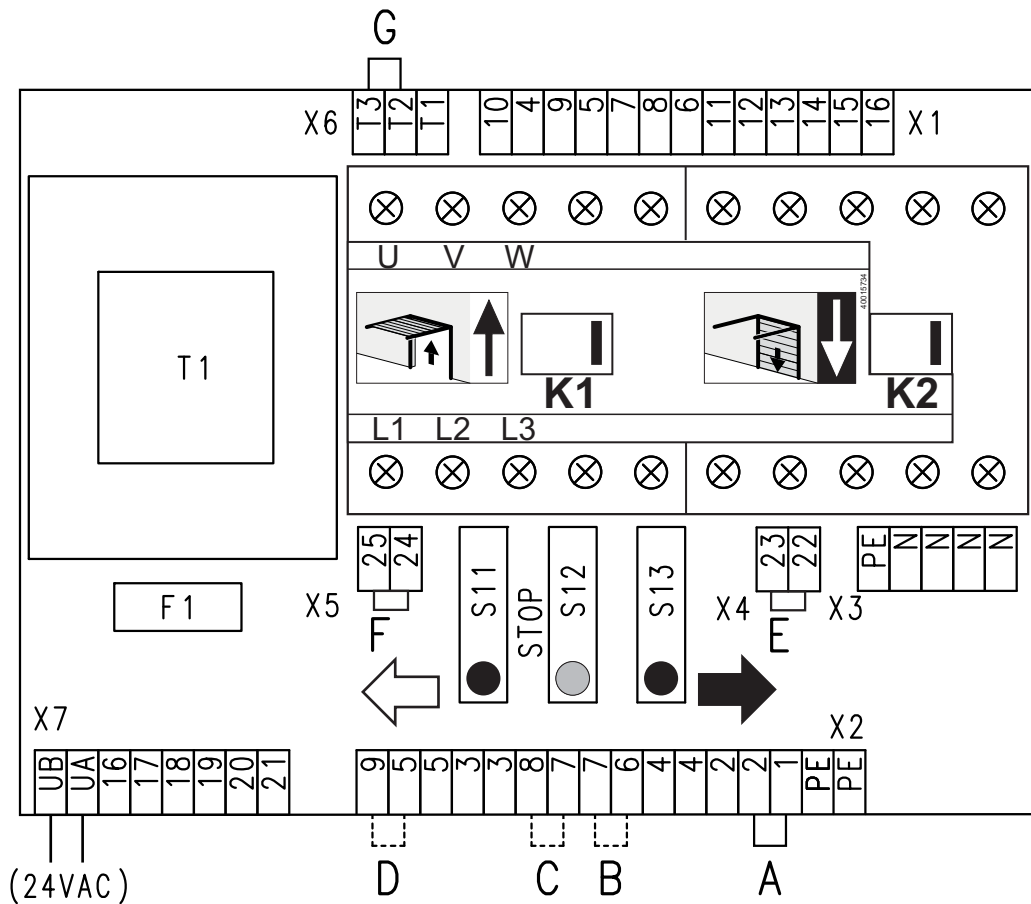


Fig. 7) : circuit board for:
 1 x 220/230V with symmetric
 winding

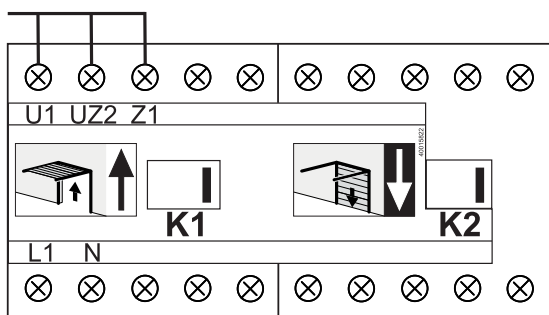
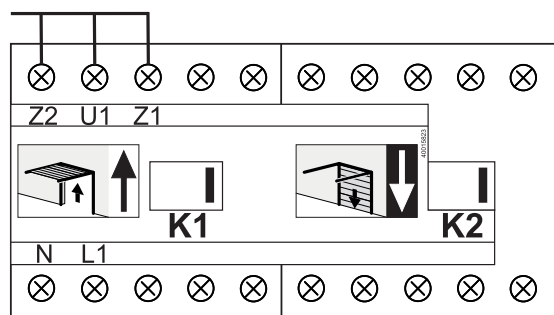


Fig. 8) : circuit board for:
 1 x 220/230V with asymmetric
 winding



Wire links A:

These wire links are absolutely necessary for the operation of the door. By removing the wire links, the control voltage is interrupted and electrical operation of the door is no longer possible. Additional safety switches, e.g. interlocking switches or slack wire switches, can be connected instead of the wire links A.

Wire link B:

This wire link is necessary for the latching function*) during the opening movement. By removing the wire link, the door can only be opened in dead man' mode*). For shutters which are able to lift a person, a high level safety device is required.

Wire link C:

By connecting a safety edge device with a relay contact (in place of the wire link), the door operation is latching during the closing operation. If no safety edge device is connected, the door can only be closed in dead man mode.

Wire link D:

This wire link is used for single-channel radio control or for operation with a pull switch. With the first command, the door opens and travels to the fully open position. If a second command is given when the door is in the fully open position, the command is re-routed via the link D and the door travels to the fully closed position.

If the door is stopped between its end positions, e.g. with a stop command, the next command causes the door to open.

Wire links E + F:

These wire links are absolutely necessary for operation of the door. Additional safety switches can be connected instead of the wire link E (which interrupts opening) and F (which interrupts closing).

Wire link G:

This wire link is requested to choose the incoming mains supply.

Wire link G terminal T1 to T2 = 1 x 220/230V AC, N, PE;
3 x 220/230V AC, PE
3 x 460V AC, PE (special execution)

Wire link G terminal T2 to T3 = 3 x 380/400V AC, N, PE;
3 x 380/400V AC, PE;
3 x 500V AC, PE (special execution)

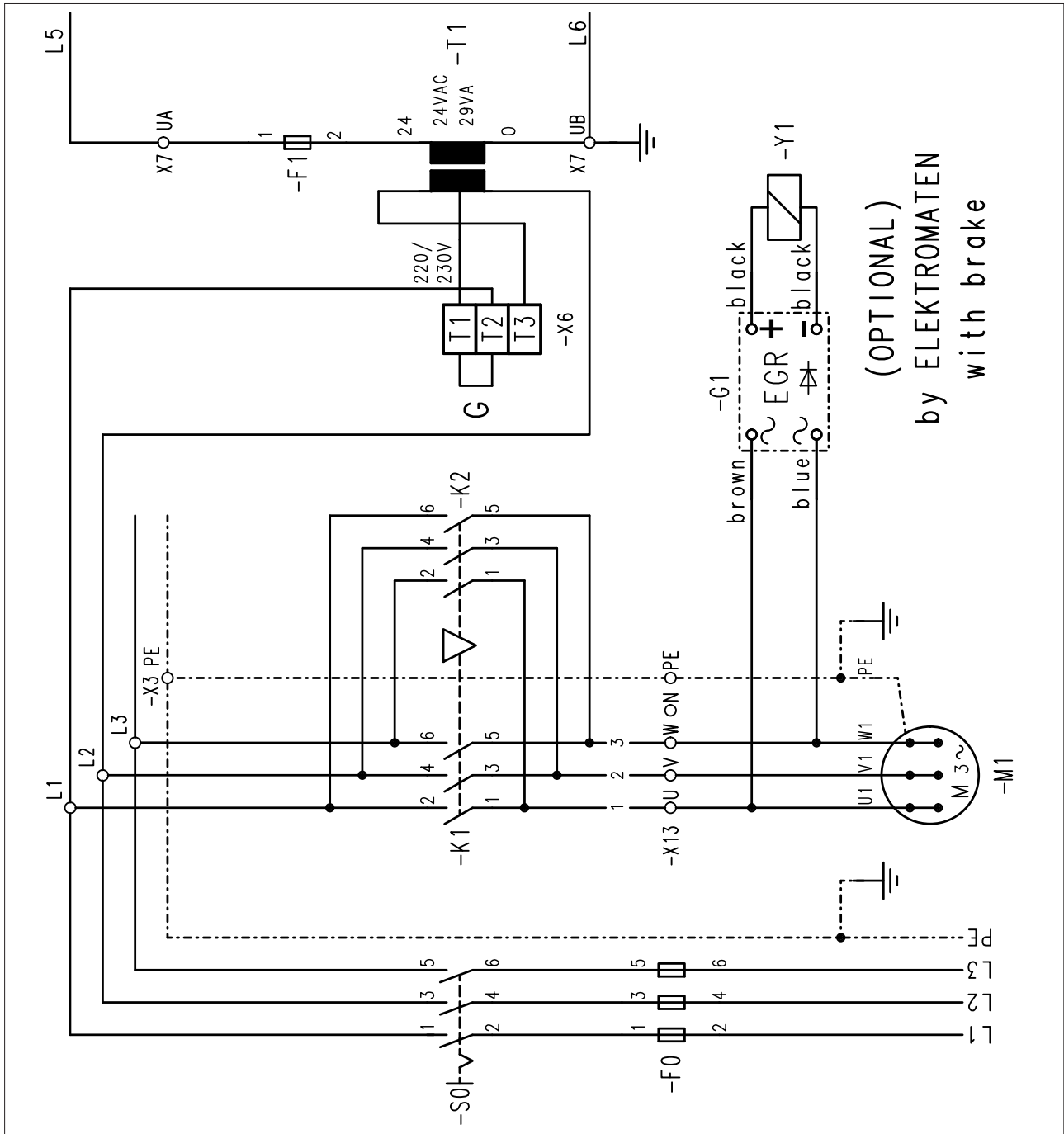
*) Latching = Once an impulse is given the door carries on moving independently
Dead man mode = Door only moves as long as an impulse is given

PRIMARY ELECTRICAL CIRCUIT 3 x 220/230V AC, PE

52380076

F0	Fusing on the building supply side
F1	Control Fuse 1A
F2	Faulty current fuse 0,33A
F3	Thermal protection
G1	Rectifier EGR II OPTION
K1	OPEN Contactor
K2	CLOSE Contactor
M1	Motor
S0	Main switch supply side
S1	Safety limit switch OPEN
S2	Safety limit switch CLOSE
S3	Limit switch OPEN
S4	Limit switch CLOSE
S10	Manual interlock switch
S11	Built-in OPEN push-button
S12	Built-in STOP push-button
S13	Built-in CLOSE push-button
S14	Control Button OPEN
S15	Control Button STOP
S16	Control Button CLOSE
T1	Transformer
Y1	380/400V - 220/230V / 24VAC Spring tension brake if required 103V DC OPTION
X1-7	PCB Terminal Rail
X12	Limit Switch Terminal Rail
X13	Motor Terminal Rail

1 = Wirenumber
2 = Wirenumber



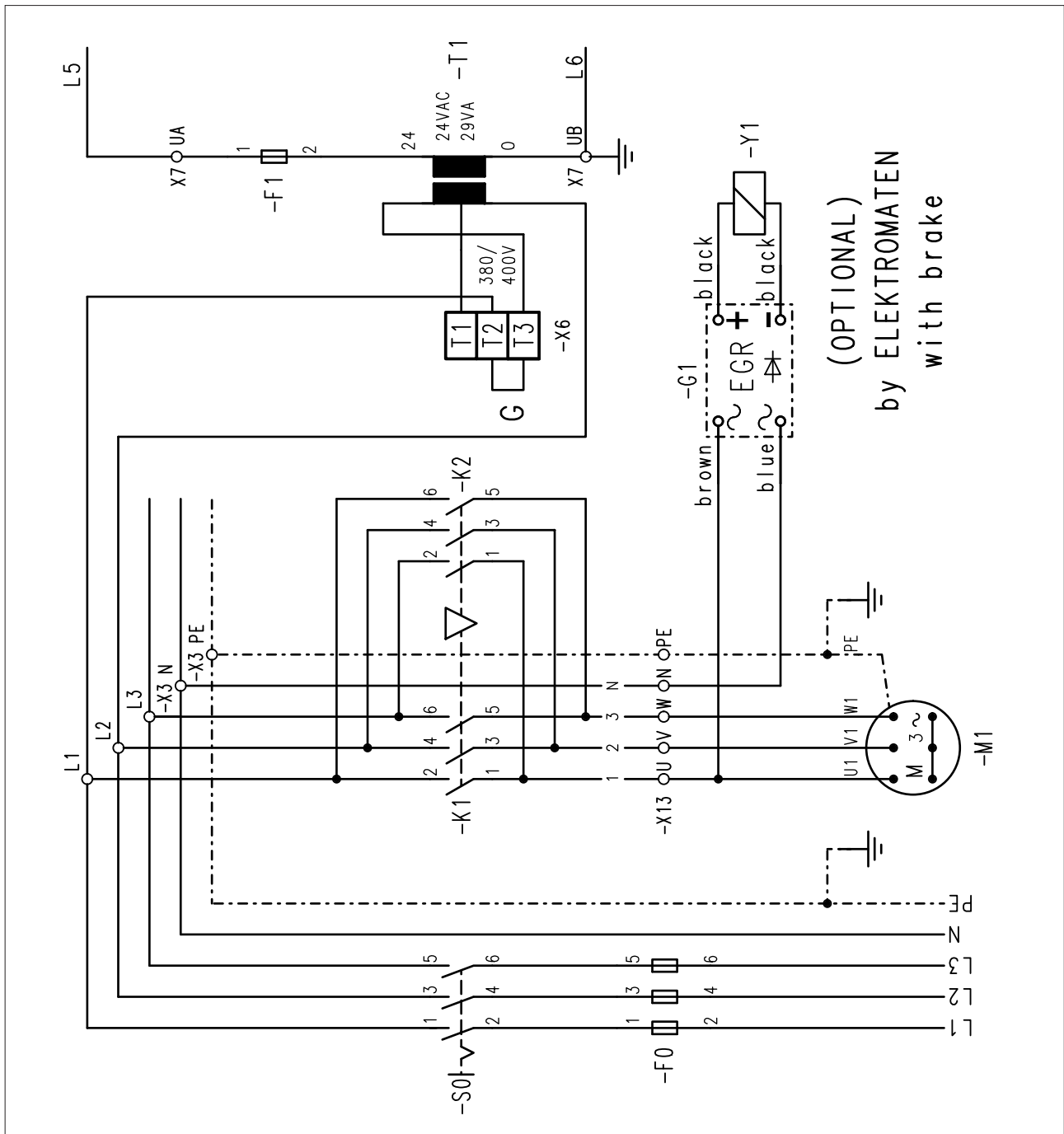
(OPTIONAL)
by ELEKTROMATEN
with brake

PRIMARY ELECTRICAL CIRCUIT 3 x 380/400V AC, N, PE

52380077

F0	Fusing on the building supply side
F1	Control Fuse 1A
F2	Faulty current fuse 0,33A
F3	Thermal protection
G1	Rectifier EGR II OPTION
K1	OPEN Contactor
K2	CLOSE Contactor
M1	Motor
S0	Main switch supply side
S1	Safety limit switch OPEN
S2	Safety limit switch CLOSE
S3	Limit switch OPEN
S4	Limit switch CLOSE
S10	Manual interlock switch
S11	Built-in OPEN push-button
S12	Built-in STOP push-button
S13	Built-in CLOSE push-button
S14	Control Button OPEN
S15	Control Button STOP
S16	Control Button CLOSE
T1	Transformer
Y1	380/400V - 220/230V / 24VAC Spring tension brake if required 103V DC OPTION
X1-7	PCB Terminal Rail
X12	Limit Switch Terminal Rail
X13	Motor Terminal Rail

1 = Wirenumber
2 =

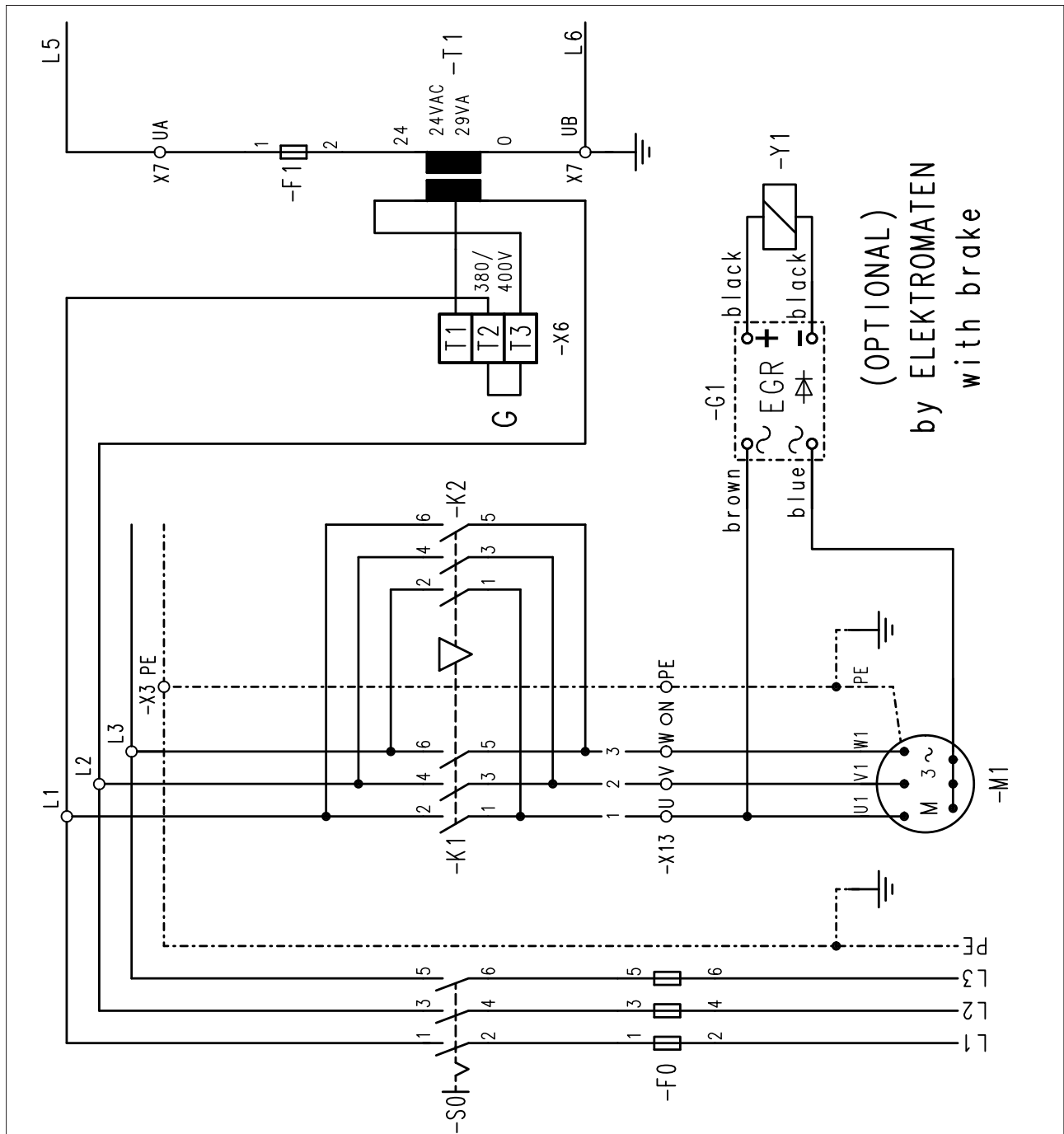


PRIMARY ELECTRICAL CIRCUIT 3 x 380/400V AC, PE

52380084

F0	Fusing on the building supply side
F1	Control Fuse 1A
F2	Faulty current fuse 0,33A
F3	Thermal protection
G1	Rectifier EGR II OPTION
K1	OPEN Contactor
K2	CLOSE Contactor
M1	Motor
S0	Main switch supply side
S1	Safety limit switch OPEN
S2	Safety limit switch CLOSE
S3	Limit switch OPEN
S4	Limit switch CLOSE
S10	Manual interlock switch
S11	Built-in OPEN push-button
S12	Built-in STOP push-button
S13	Built-in CLOSE push-button
S14	Control Button OPEN
S15	Control Button STOP
S16	Control Button CLOSE
T1	Transformer
Y1	380/400V - 220/230V / 24VAC Spring tension brake if required 103V DC OPTION
X1 - 7	PCB Terminal Rail
X12	Limit Switch Terminal Rail
X13	Motor Terminal Rail

1 = Wirenumber
2 = Wirenumber



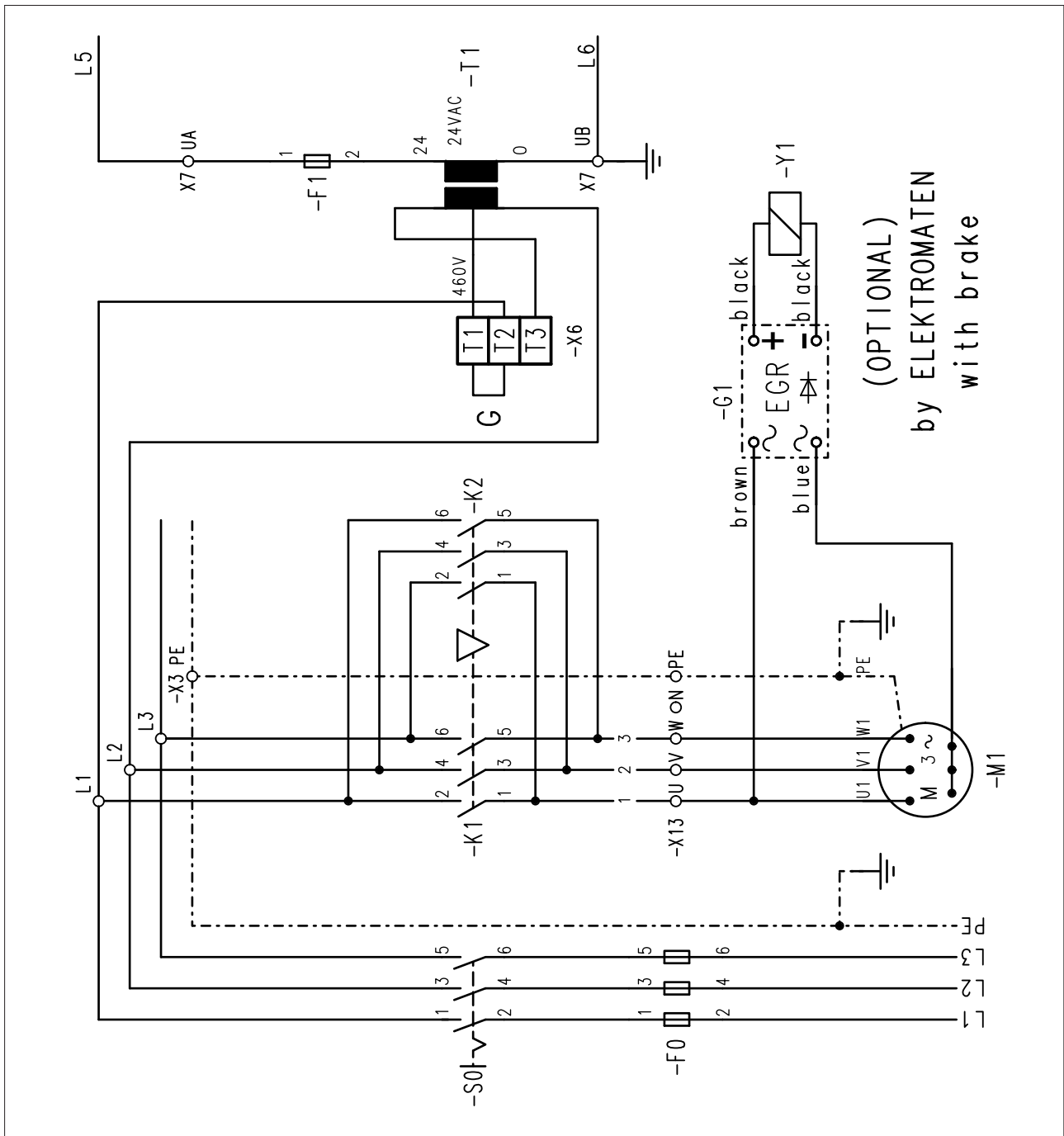
PRIMARY ELECTRICAL CIRCUIT 3 x 460V AC, PE

(special execution)

52380085

F0	Fusing on the building supply side
F1	Control Fuse 1A
F2	Faulty current fuse 0,33A
F3	Thermal protection
G1	Rectifier EGR III OPTION
K1	OPEN Contactor
K2	CLOSE Contactor
M1	Motor
S0	Main switch supply side
S1	Safety limit switch OPEN
S2	Safety limit switch CLOSE
S3	Limit switch OPEN
S4	Limit switch CLOSE
S10	Manual interlock switch
S11	Built-in OPEN push-button
S12	Built-in STOP push-button
S13	Built-in CLOSE push-button
S14	Control Button OPEN
S15	Control Button STOP
S16	Control Button CLOSE
T1	Transformer 460V - 230V / 24VAC
Y1	Spring tension brake if required
X1-7	PCB Terminal Rail
X12	Limit Switch Terminal Rail
X13	Motor Terminal Rail

1 = Wirenumber
2 = Wirenumber

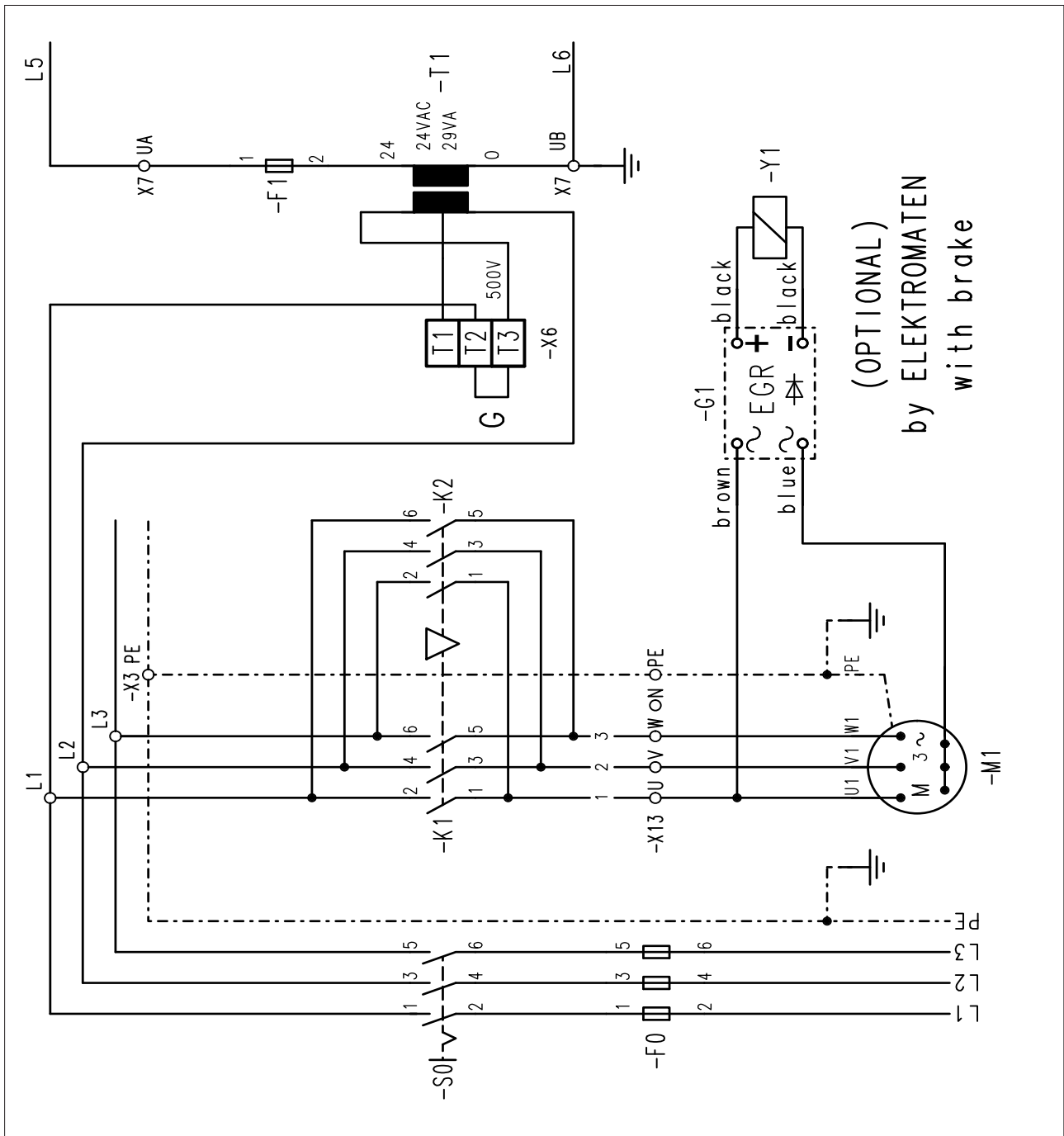


PRIMARY ELECTRICAL CIRCUIT 3 x 500V AC, N, PE (special execution)

52380086

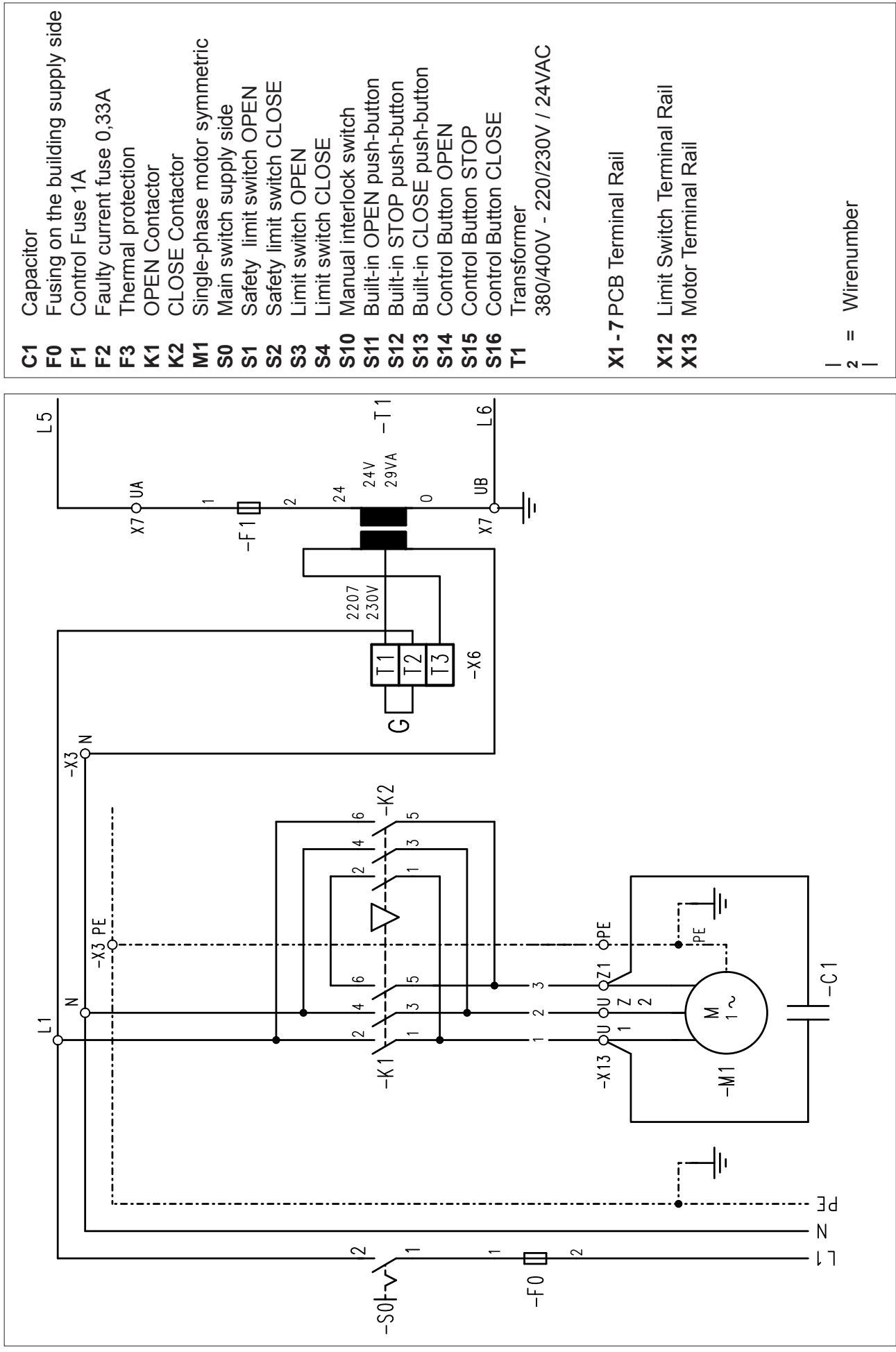
F0	Fusing on the building supply side
F1	Control Fuse 1A
F2	Faulty current fuse 0,33A
F3	Thermal protection
G1	Rectifier EGR III OPTION
K1	OPEN Contactor
K2	CLOSE Contactor
M1	Motor
S0	Main switch supply side
S1	Safety limit switch OPEN
S2	Safety limit switch CLOSE
S3	Limit switch OPEN
S4	Limit switch CLOSE
S10	Manual interlock switch
S11	Built-in OPEN push-button
S12	Built-in STOP push-button
S13	Built-in CLOSE push-button
S14	Control Button OPEN
S15	Control Button STOP
S16	Control Button CLOSE
T1	Transformer 500V - 460V / 24VAC
Y1	Spring tension brake if required 130V DC OPTION
X1-7	PCB Terminal Rail
X12	Limit Switch Terminal Rail
X13	Motor Terminal Rail

1 = Wirenumber
2 =



PRIMARY ELECTRICAL CIRCUIT 1 x 220/230V AC, N, PE SYMMETRIC WINDING

52380078

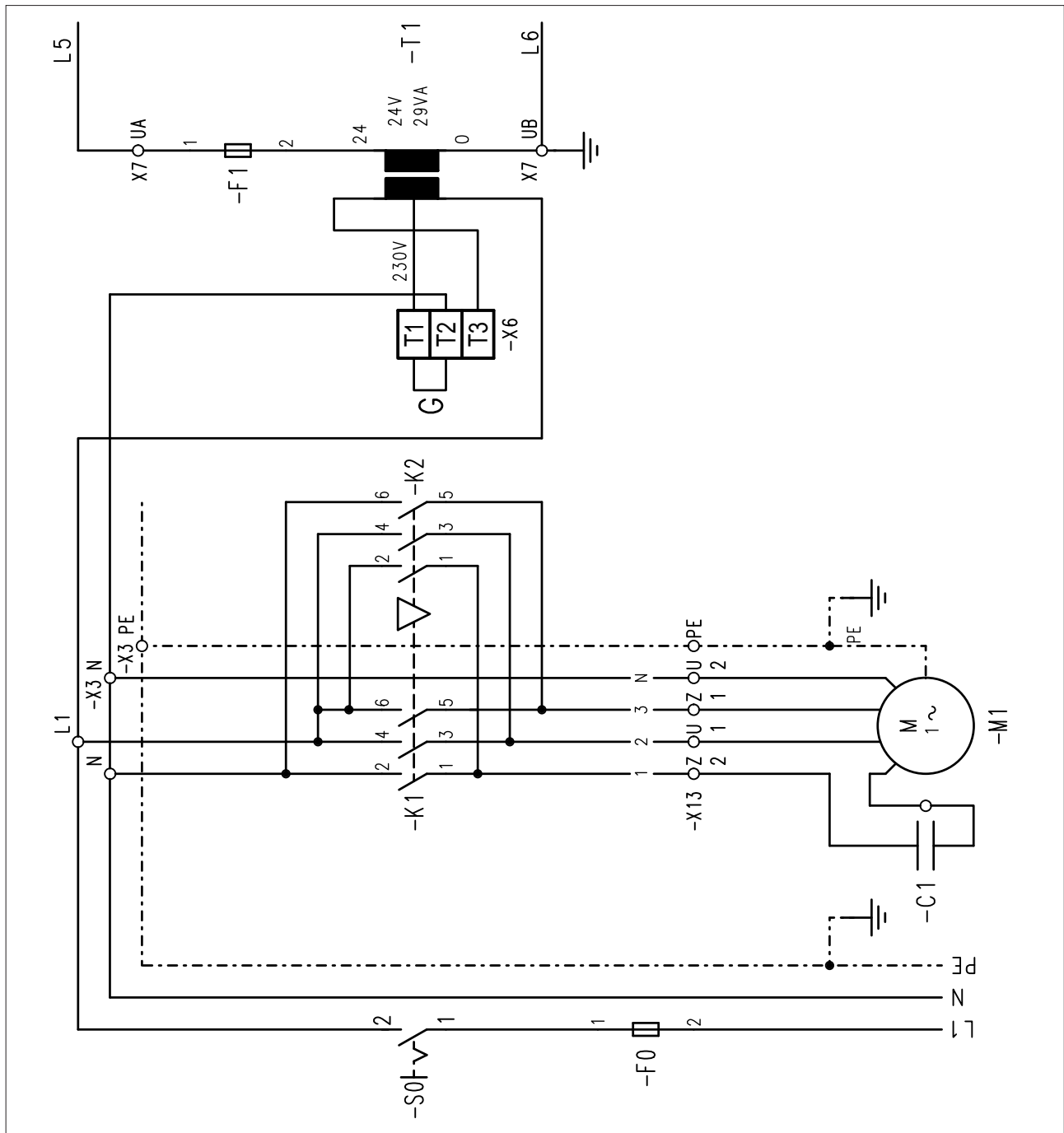


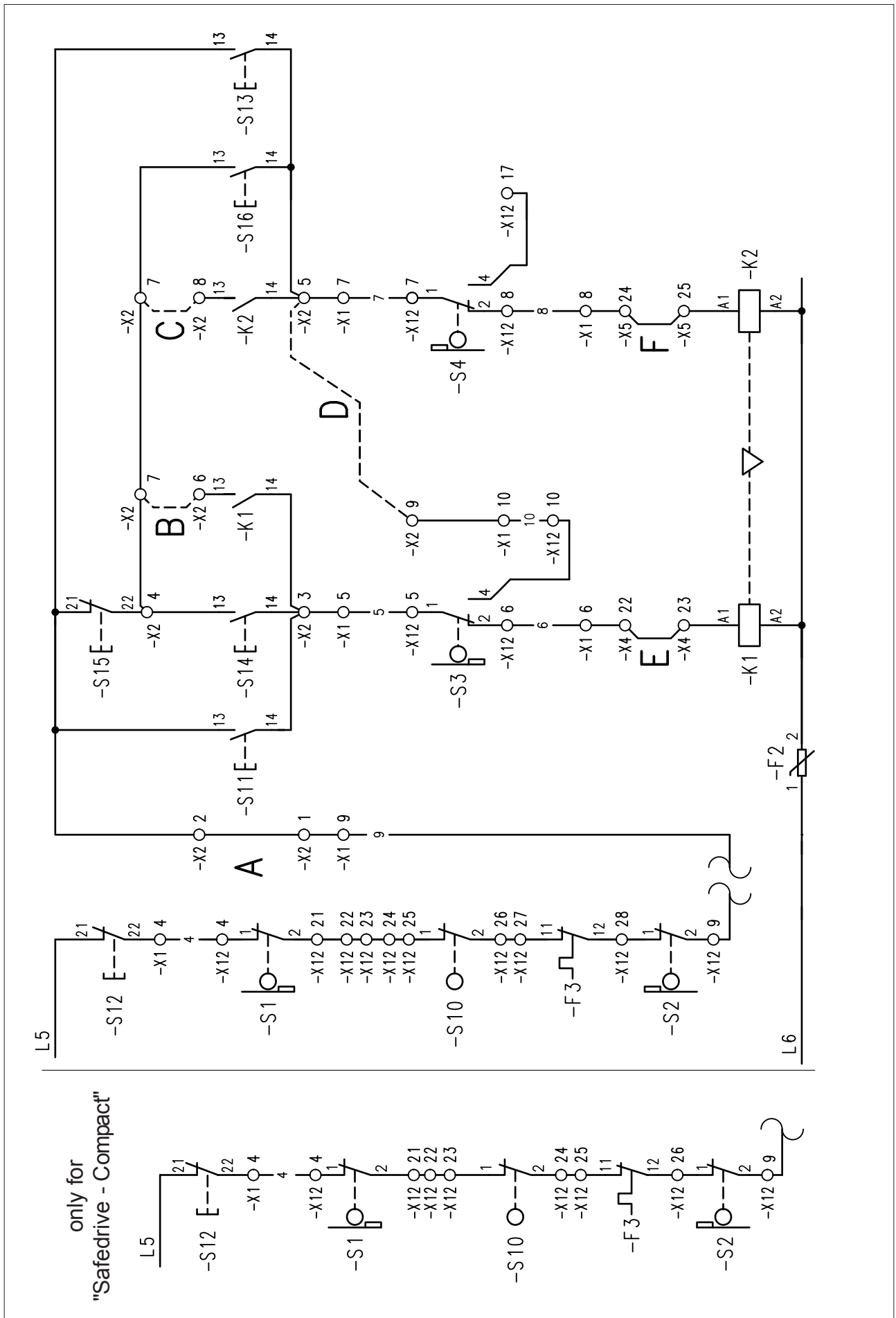
- | | |
|---------------|--|
| C1 | Capacitor |
| F0 | Fusing on the building supply side |
| F1 | Control Fuse 1A |
| F2 | Faulty current fuse 0,33A |
| F3 | Thermal protection |
| K1 | OPEN Contactor |
| K2 | CLOSE Contactor |
| M1 | Single-phase motor symmetric |
| S0 | Main switch supply side |
| S1 | Safety limit switch OPEN |
| S2 | Safety limit switch CLOSE |
| S3 | Limit switch OPEN |
| S4 | Limit switch CLOSE |
| S10 | Manual interlock switch |
| S11 | Built-in OPEN push-button |
| S12 | Built-in STOP push-button |
| S13 | Built-in CLOSE push-button |
| S14 | Control Button OPEN |
| S15 | Control Button STOP |
| S16 | Control Button CLOSE |
| T1 | Transformer
380/400V - 220/230V / 24VAC |
| X1 - 7 | PCB Terminal Rail |
| X12 | Limit Switch Terminal Rail |
| X13 | Motor Terminal Rail |
| 1 | = Wirenumber |
| 2 | |

PRIMARY ELECTRICAL CIRCUIT 1 x 220/230V AC, N, PE ASYMMETRIC WINDING

52380079

C1	Capacitor
F0	Fusing on the building supply side
F1	Control Fuse 1A
F2	Faulty current fuse 0,33A
F3	Thermal protection
K1	OPEN Contactor
K2	CLOSE Contactor
M1	Single-phase motor asymmetric
S0	Main switch supply side
S1	Safety limit switch OPEN
S2	Safety limit switch CLOSE
S3	Limit switch OPEN
S4	Limit switch CLOSE
S10	Manual interlock switch
S11	Built-in OPEN push-button
S12	Built-in STOP push-button
S13	Built-in CLOSE push-button
S14	Control Button OPEN
S15	Control Button STOP
S16	Control Button CLOSE
T1	Transformer
	380/400V - 220/230V / 24VAC
X1 - 7	PCB Terminal Rail
X12	Limit Switch Terminal Rail
X13	Motor Terminal Rail
1	= Wirenumber
2	





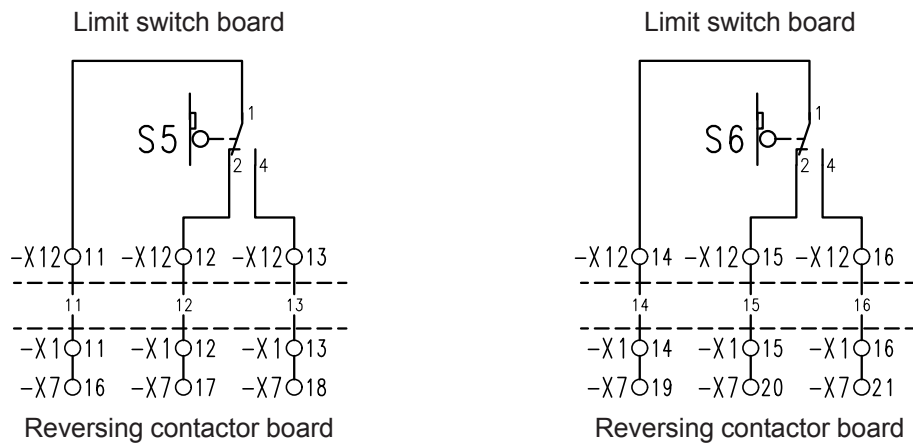
ADDITIONAL LIMIT SWITCHES

52345012

The switching cams of the additional limit switches are adjusted as described for the operational limit switches (Mechanical operating instructions). After tightening the coarse adjustment screw, the switching point can be corrected with the fine adjustment screw.

5th and 6th Additional limit switches (available for "Safedrive - Compact")

The ELEKTROMATEN® is equipped with two additional limit switches (S5 / S6). Both additional limit switches are designed as volt-free changeover contacts and can be used in both directions of movement of the door.

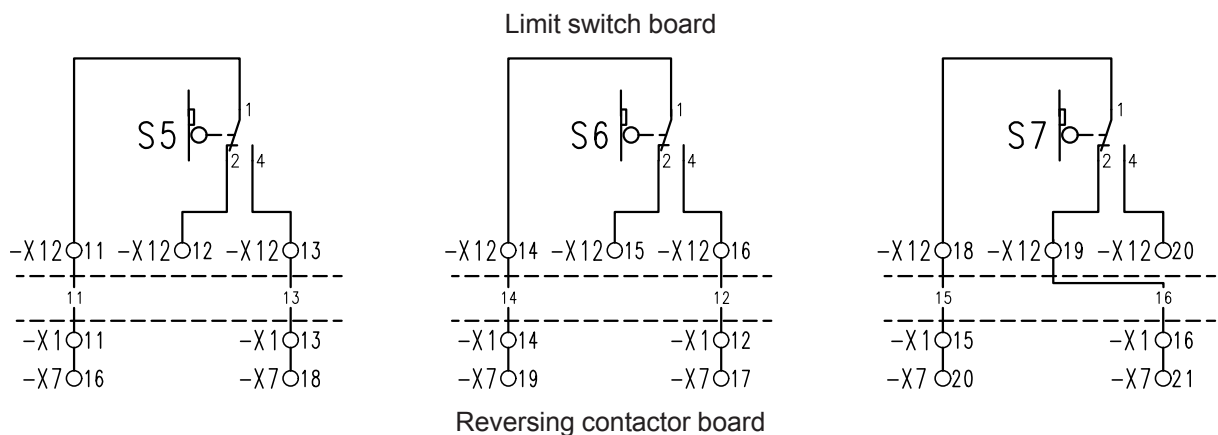


5th and 6th + 7th Additional limit switches (on request)

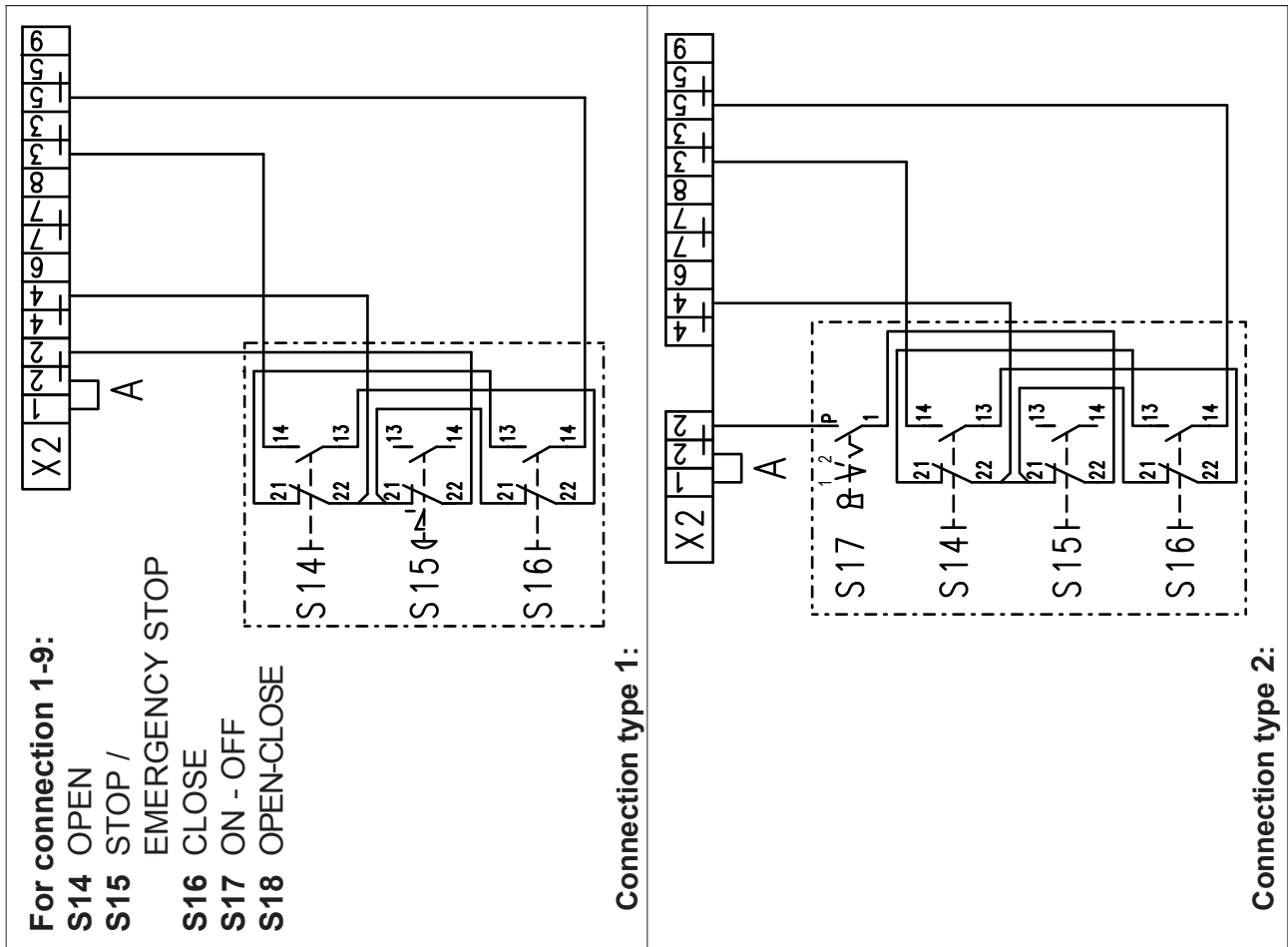
(7th limit not available with "Safedrive - Compact")

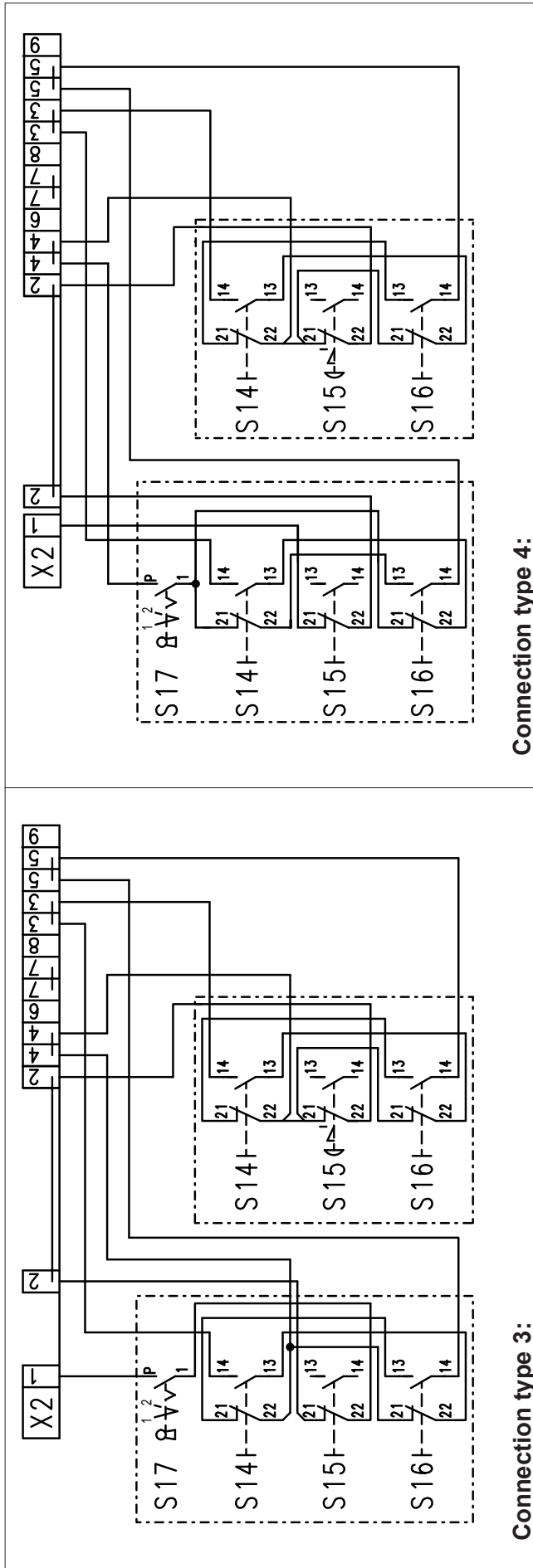
The ELEKTROMATEN® is equipped with three additional limit switches (S5/S6/S7). These additional limit switches can be used as volt-free make and / or break contacts in both directions of movement of the door. For example, the diagram shows the connection wiring for two make contacts and one break contact.

The desired function (make or break contact) of the respective limit switch can be determined by interchanging the connection cables.

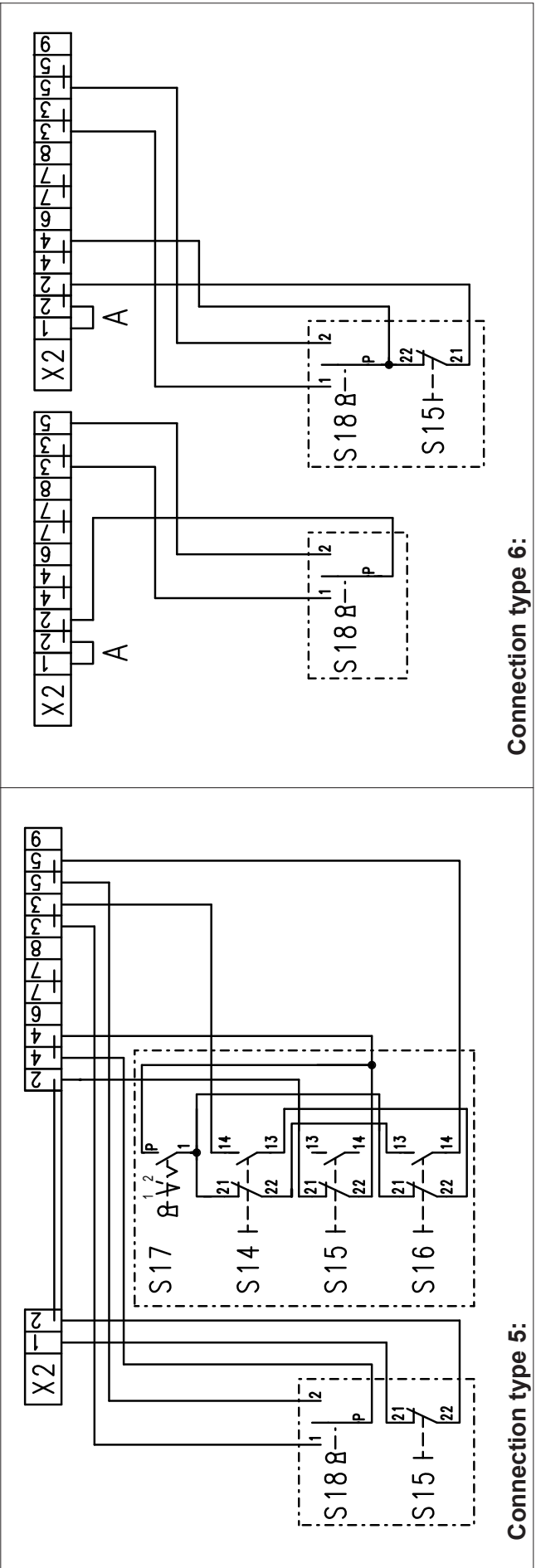


- Connection type 1:** Operation of the door by a 3- push-button station with a latching emergency stop button
- Connection type 2:** Operation of the door by a 3- push-button station with an integrated key-switch
- Connection type 3:** Operation of the door by a 3- push-button station with latching emergency stop button and a 3- pushbutton station with an integrated key-witch for switching off all control devices.
- Connection type 4:** Operation of the door by a 3- push-button station with a latching emergency stop button and a 3- pushbutton station with an integrated key-switch to isolate the latter push-buttons.
- Connection type 5:** Operation of the door OPEN/CLOSE by a key-witch with a stop button and a 3- push-button station with an integrated key-switch.
- Connection type 6:** Operation of the door OPEN/CLOSE by a key-witch with a stop button.
- Connection type 7:** Operation of the door OPEN/CLOSE by a key-witch with a stop button and a 3- push-button station.
- Connection type 8:** Operation of the door by a 3- push-button station and a single-channel radio control (safety-edge necessary)
- Connection type 9:** Operation of the door by a 3- push-button station and a cord-operated ceiling switch (safety-edge necessary)
- Connection type 10:** Connection of a reflex photo-beam in the self-holding closing circuit (safety-edge necessary)





Connection type 3:



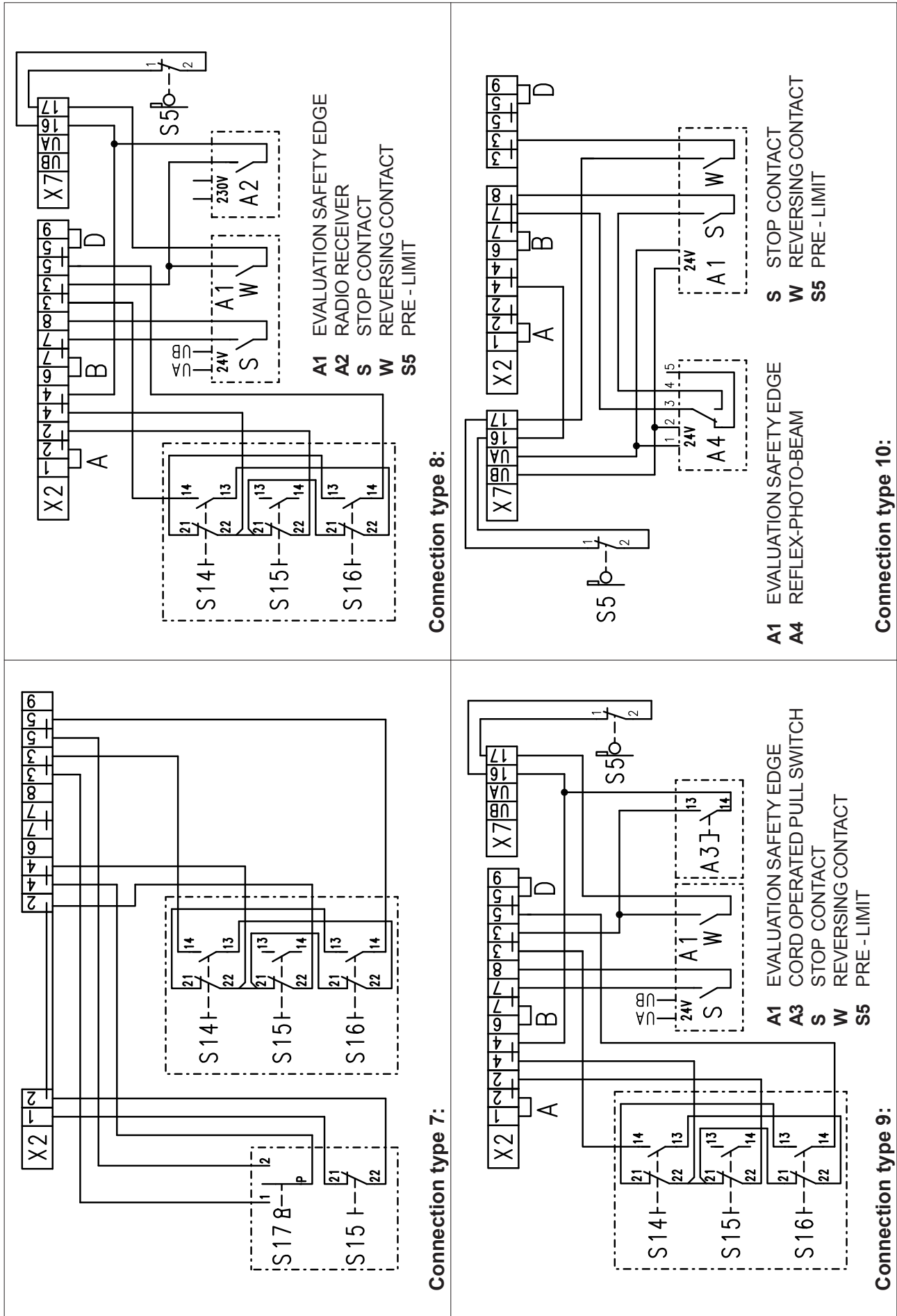
Connection type 5:



Connection type 4:



Connection type 6:



HELP WITH CORRECTING FAULTS

52392009

Fault Drive motor will not run and the contactors K1 or K2 will not pull in									
Possible cause	Correction								
No voltage at the connecting terminals L1 / L2 / L3 three-phase motor L1 / N single-phase motor	Measure the voltage. Compare: <table border="0"> <tr> <td>three-phase motor</td> <td>single-phase motor</td> </tr> <tr> <td>L1 with N</td> <td>L1 with N</td> </tr> <tr> <td>L2 with N</td> <td></td> </tr> <tr> <td>L3 with N</td> <td></td> </tr> </table> <p>Where there is no voltage, check the fusing and the power supply on the attachment side check all screw connections on contactor keep attention the mains supply is disconnected.</p>	three-phase motor	single-phase motor	L1 with N	L1 with N	L2 with N		L3 with N	
three-phase motor	single-phase motor								
L1 with N	L1 with N								
L2 with N									
L3 with N									
Control fuse F1 defective	Check connected control devices (e.g. key-operated push-buttons) for earth faults and short circuits. After correcting faults, insert replacement fuse supplied.								
F2 Faulty current fuse	Control has received an open and close command simultaneously, please check, all inputs are operating correctly.								
Motor protection (thermal switch) in the motor actuated by overloading or exceeding the starting duty.	After the motor winding has cooled, operation is once again possible through the operation of a control device.								
Safety limit switch has interrupted the control circuit	Release the Safety limit switch again using emergency manual operation. Check adjustment of operating clearance from the working limit switch to the Safety limit switch and correct where necessary.								
External safety switches (slack wire switches or pass door switches) have interrupted the control circuit	Check safety switches and replace where necessary.								
Switch for emergency manual operation has interrupted the control circuit	Check the emergency manual operation switch by operating several times.								
Connecting screws on the connector or the terminal strips have become loose.	With the current switched off, check all connecting screws are tight and tighten where necessary.								
Defect in the door mechanism	Check door mechanism								
Fault Door no longer closes in latching mode									
Possible cause	Correction								
Safety edge has been actuated, photo-beam has been interrupted	Check safety edge and its evaluation unit. Check photo-beam and re-align where necessary.								

LIFETIME / DOORCYKLES

52396005

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

