



Motor-drive unit

SAJAD YEGANEH

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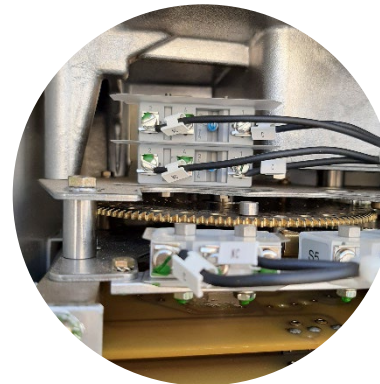
Function description Motor-drive unit

- + The MDU drives the tap changer to the selected operating position.
- + The motor drive housing contains all mechanical and electrical parts for operating the tap-changer.
- + The control follows the step-by-step principle, i.e. for operating the tap changer from one service position to the next, the motor drive operation is initiated by a single control pulse and accomplished without any possible interruption.
- + In the standard design, the next tap-change operation can only proceed once all control devices have reached their resting positions.



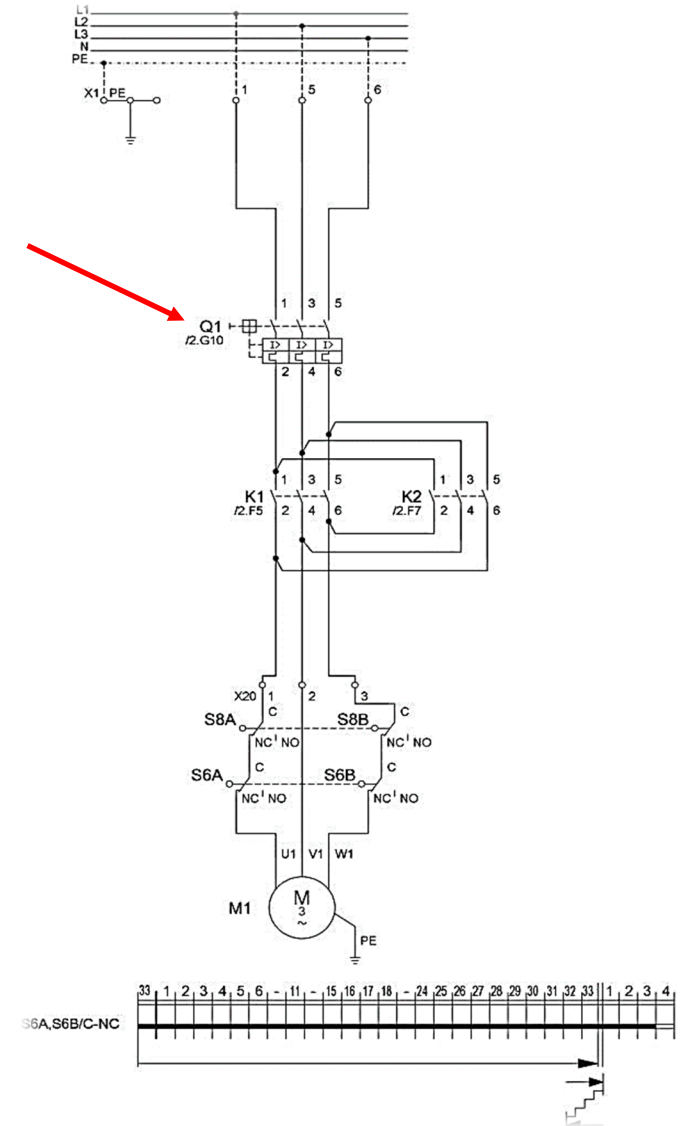
Electrical & Mechanical Parts

E1	Hand Lamp
K1	Motor Contactor
K2	Motor Contactor
K20	Auxiliary Contactor
M1	Motor
Q1	Motor Protective Switch
R1	Heater
S1	Cam-Operator Switch
S10	Door Contact
S12	Cam-Operated Directional Switch
S13A	Cam-Operated Directional Switch
S13B	Cam-Operated Directional Switch
S14	Cam-Operated Directional Switch
S2	Cam-Operated Switch
S3	Raise/Lower Control Switch
S32	Local/Remote Switch
S4	End Position Switch
S40M	Position Transmitter Module With N/O Contact Range
S40P	Position Transmitter Board
S5	End Position Switch
S61M	Module With Diode Matrix
S61P	Position Transmitter Board
S6A	End Position Switch
S6B	End Position Switch
S8A	Hand Crank Safety Switch
S8B	Hand Crank Safety Switch



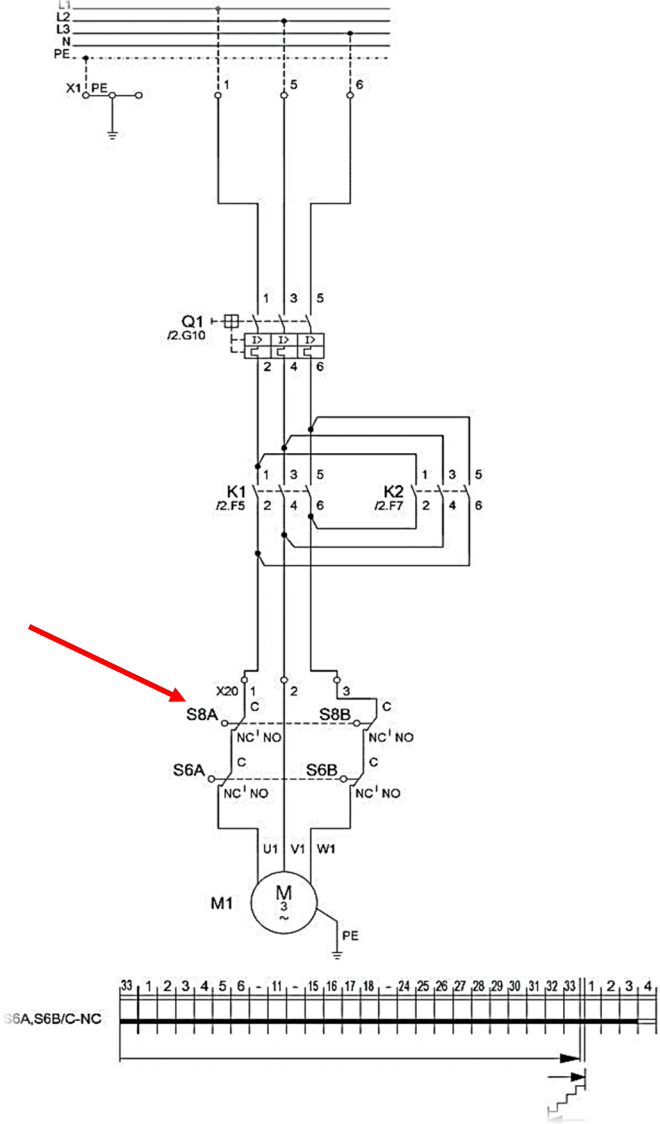
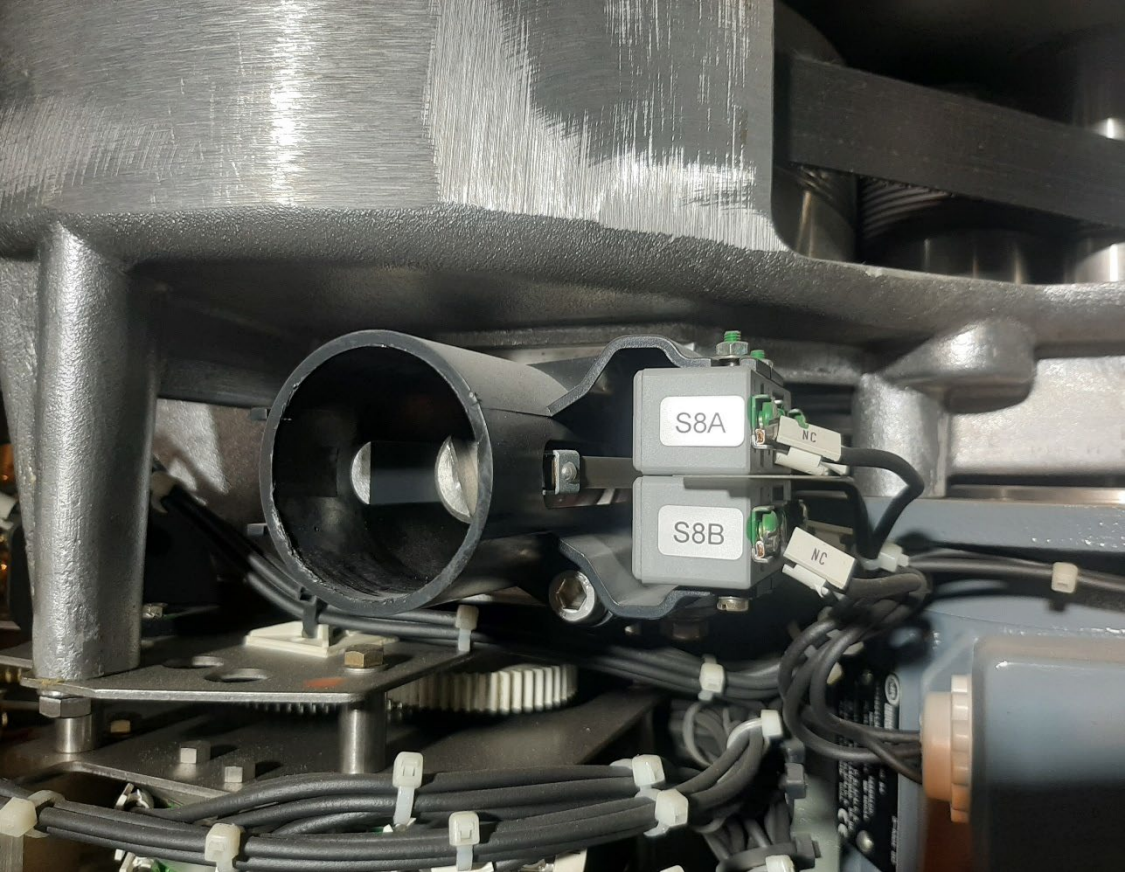
Motor Protective Switch

- + The motor is equipped with a motor protective switch which switches off the motor and the control circuit in the event of overloading or a short circuit in the motor circuit.



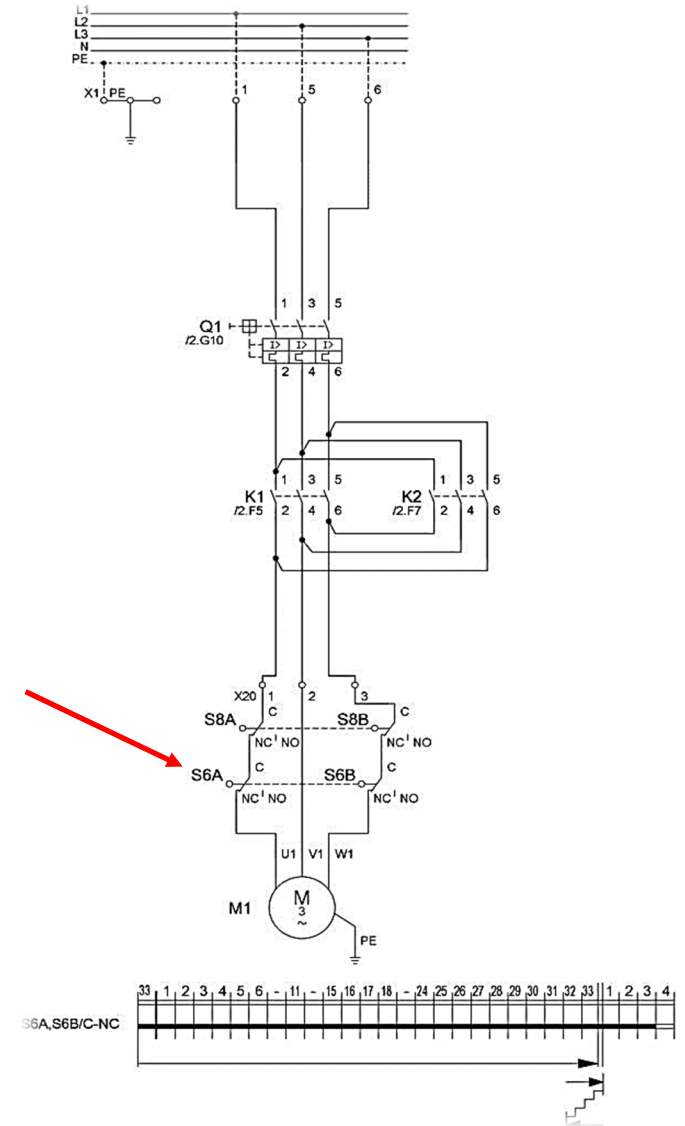
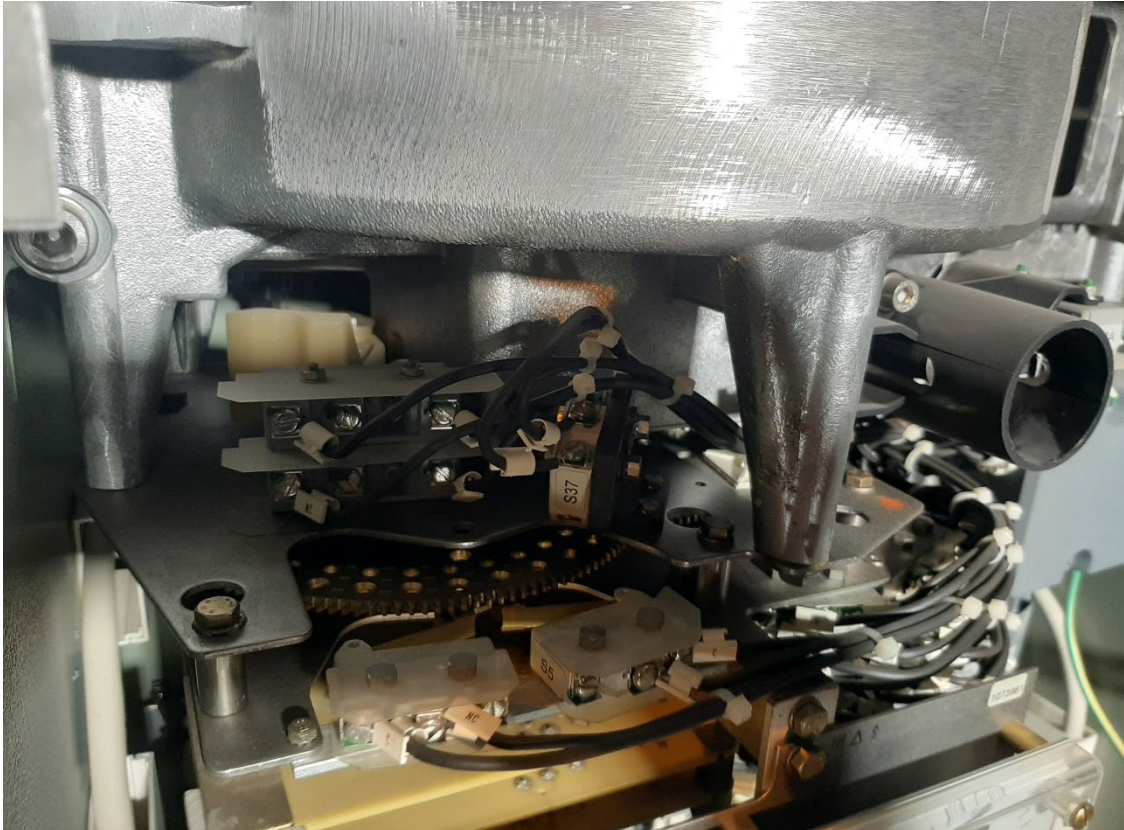
Hand Crank Safety Switch

- + The S8A/B hand crank safety switch interrupts the motor circuit when the hand crank is inserted.



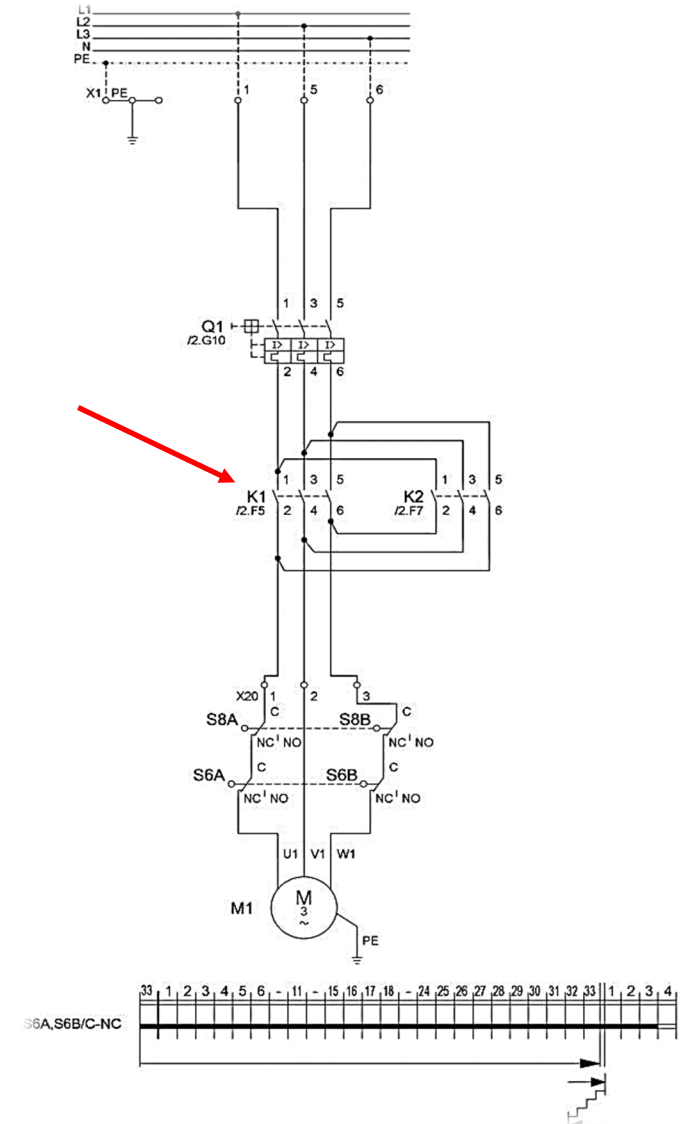
Limit Position Switch

- + Limit position switches S6A/B switch off the motor circuit when one of the two limit positions is passed over, and they prevent pulse generation beyond the end position.
- + Limit position switches S4 & S5 switch off the motor circuit when one of the two limit positions is passed over



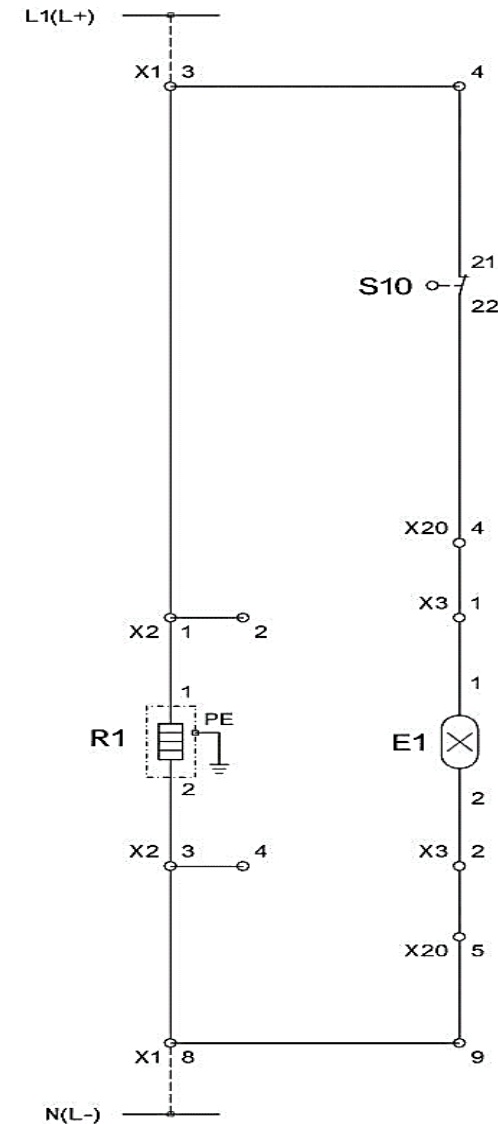
Motor Contactor & Auxiliary Contactor

- + Motor contactor K1 is assigned to the direction of rotation in flux direction of the drive shaft clockwise and K2 is assigned to the direction of rotation in flux direction of the drive shaft counterclockwise.
- + Step by step contactor K20.

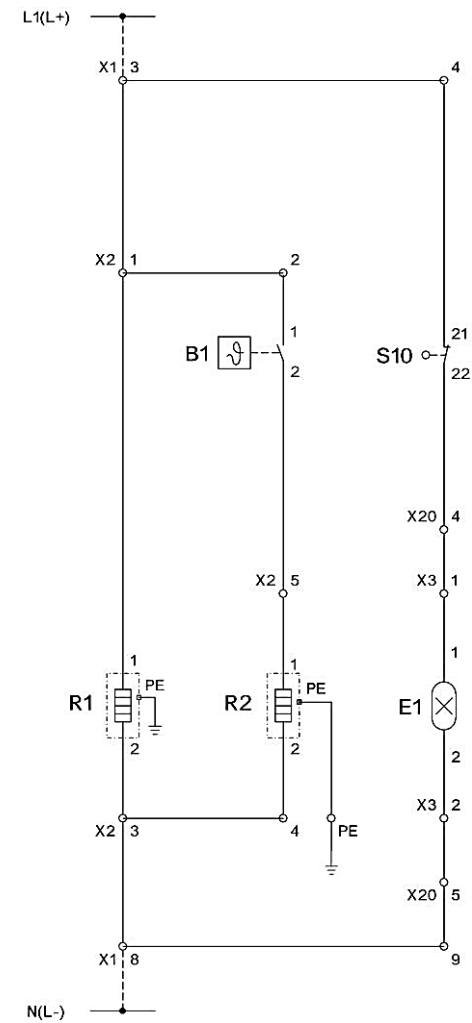
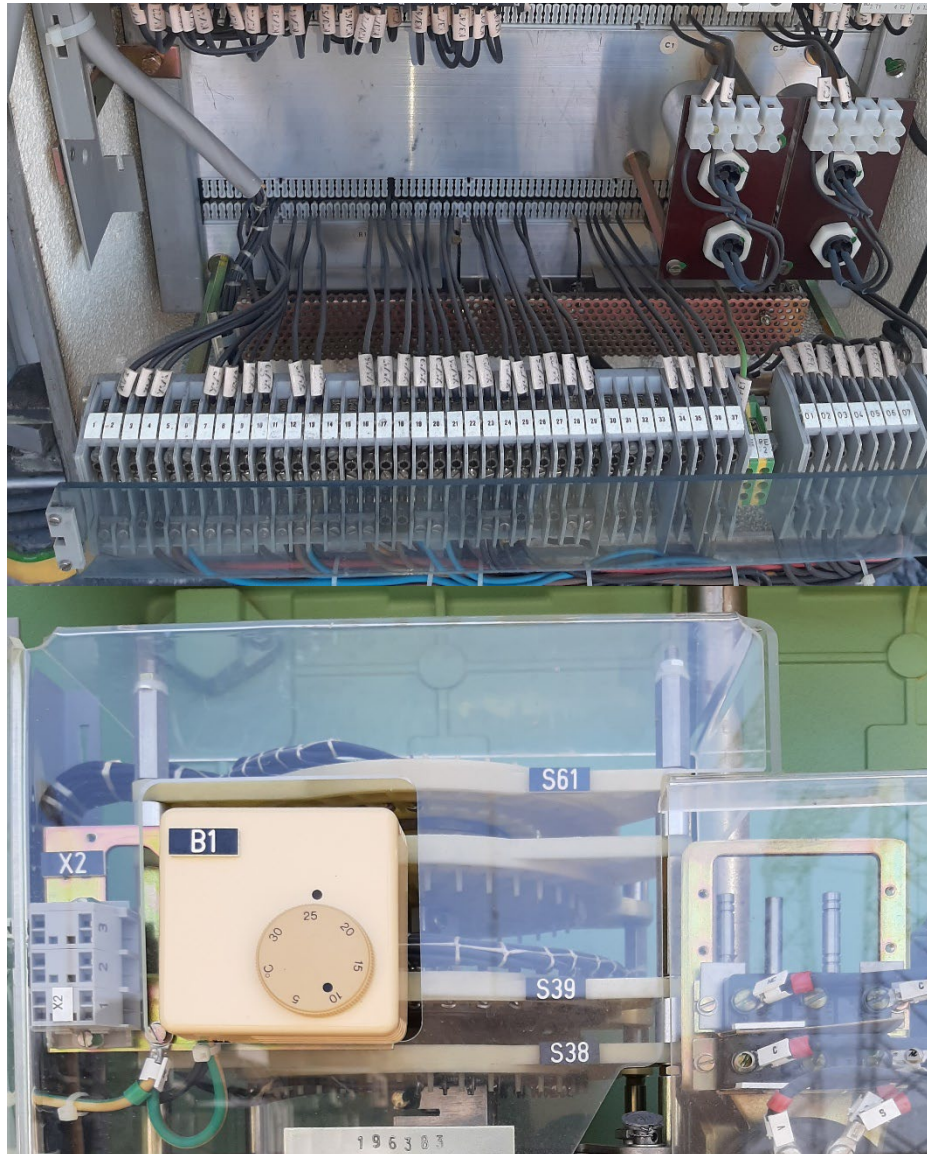


Heater

- + The heater prevents the formation of condensed water in the motor drive unit. A heater panel keeps the temperature inside the motor drive unit approximately 7-8 kelvin higher than the ambient temperature; the humidity inside the motor drive unit is therefore lower than outside.



Heater



Voltage Monitoring Relay

+ The relay monitors phase parameters such as:

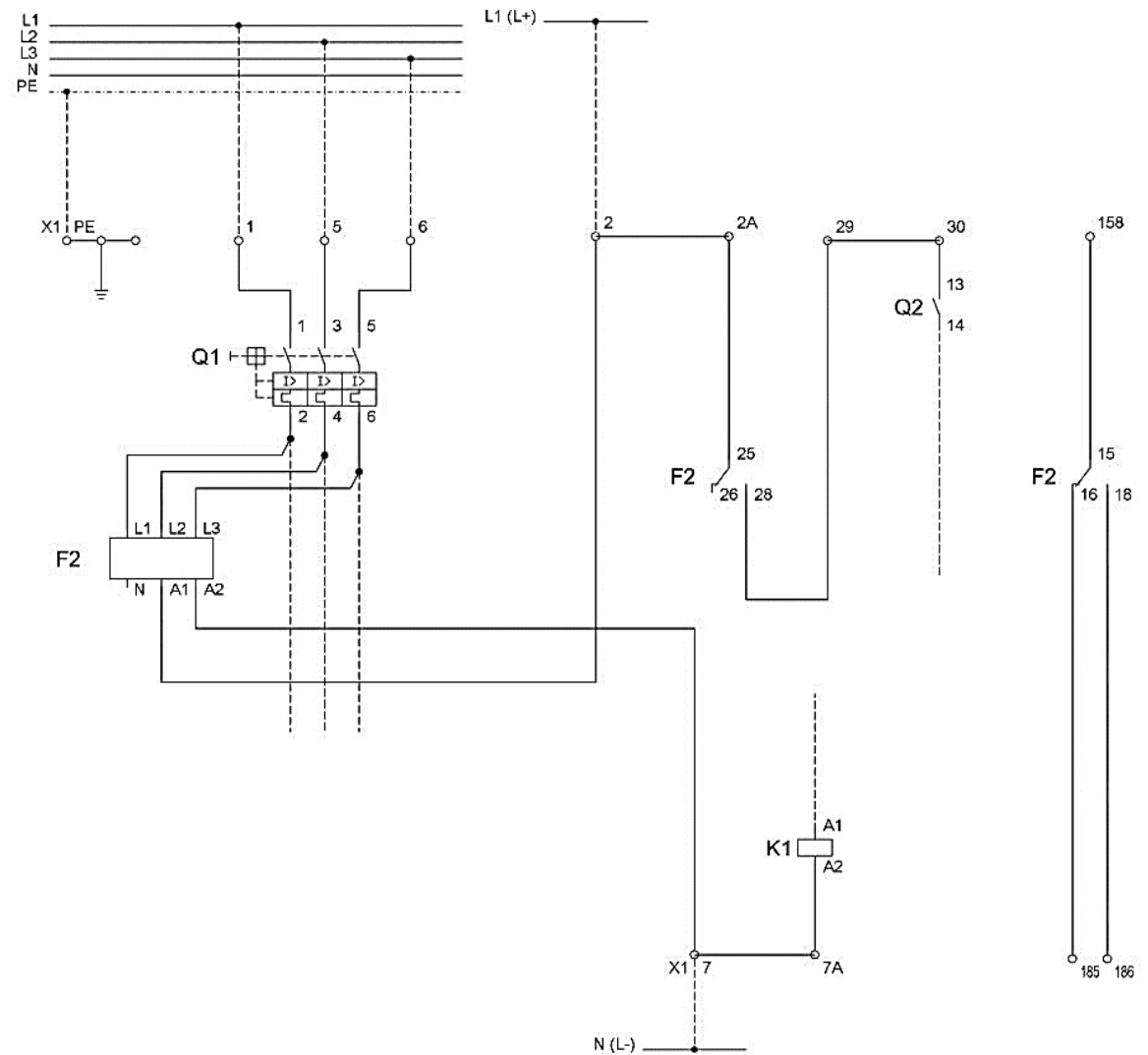
Phase sequence

Phase failure

Overvoltage

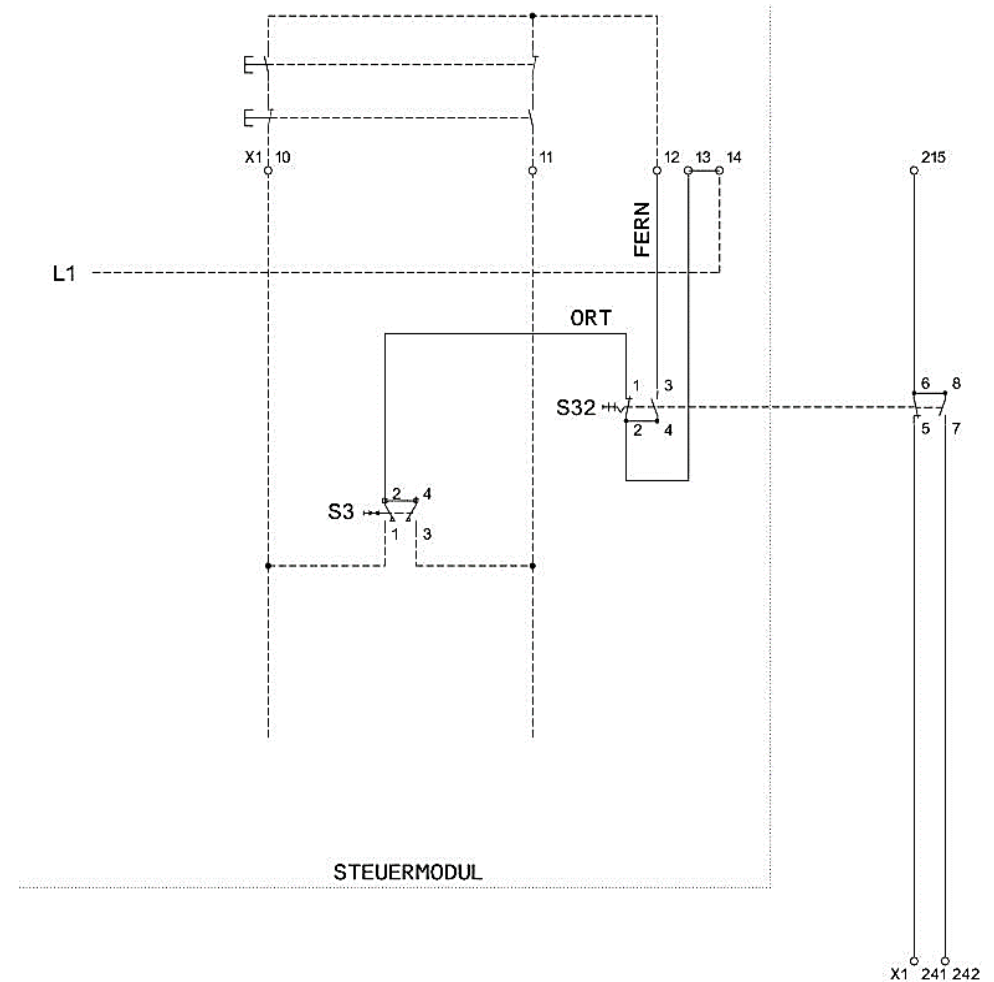
Undervoltage

Asymmetry



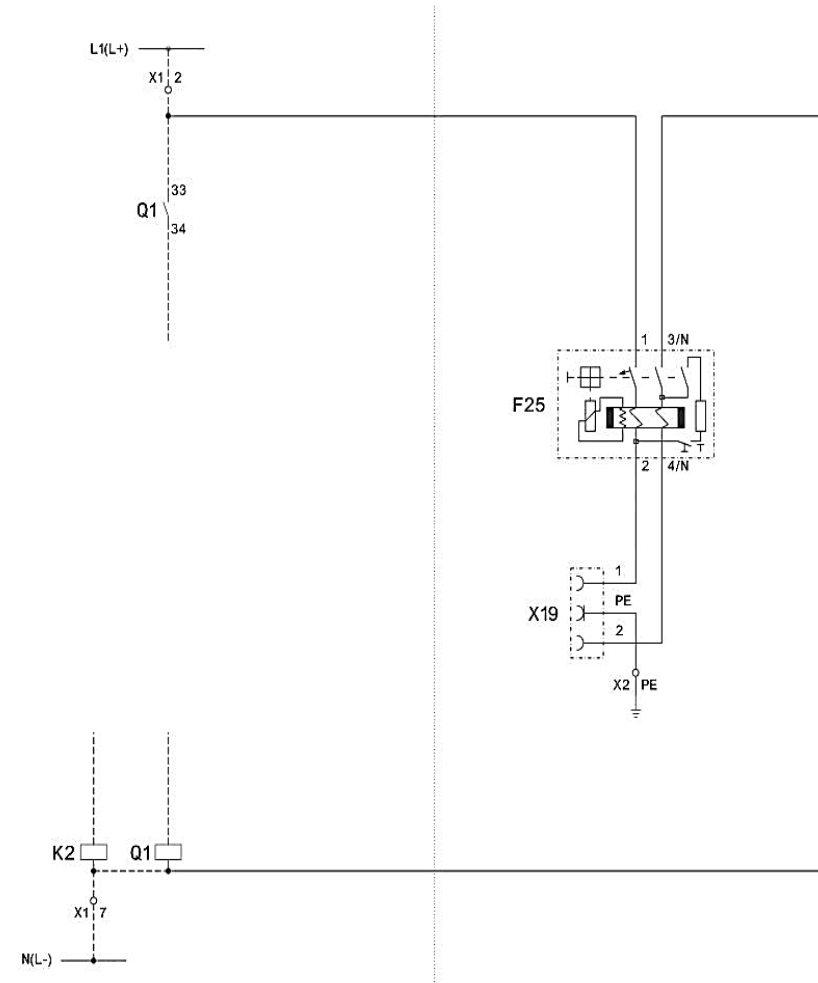
Local/Remote Switch

- + Transfer switch S32 for local or remote (control room) electrical actuation. The local/remote switch can only be operated when the door is open.
- + Selector switch S3 - raise/lower



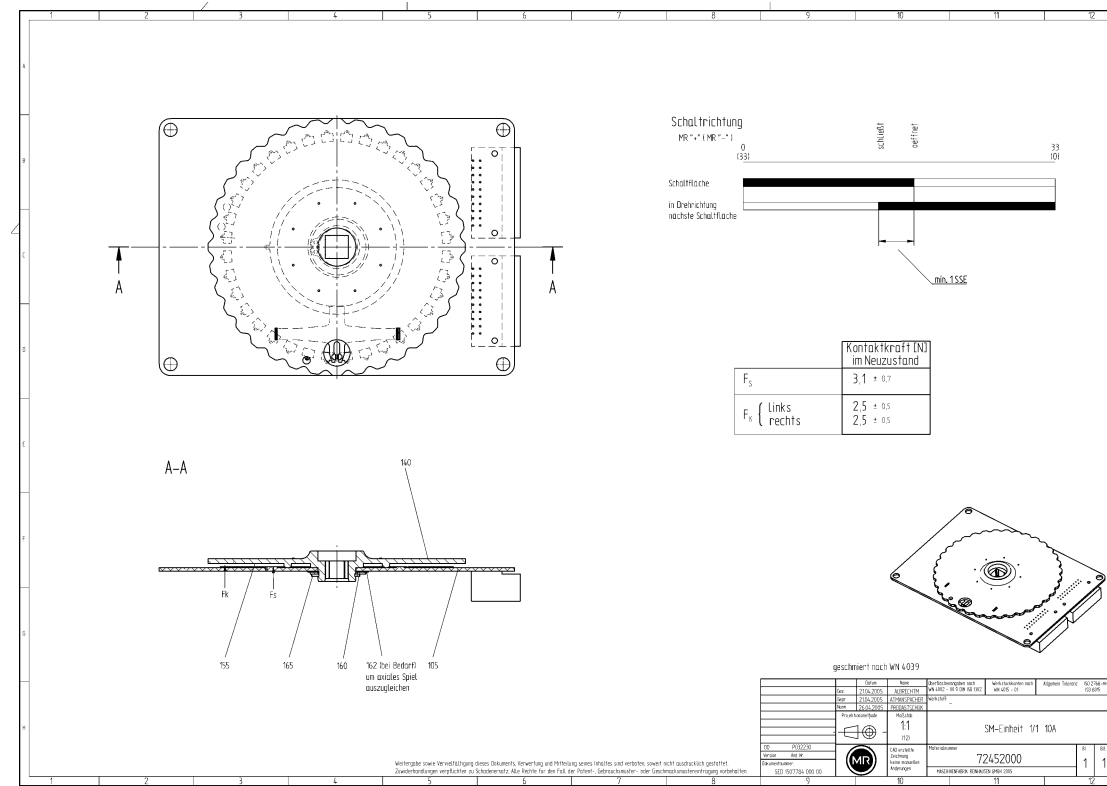
Plug Socket

- + Socket outlet X19 with fault-clearing switch F25.
- + Please note: the fault-clearing switch should be subjected to a functional test once a month.



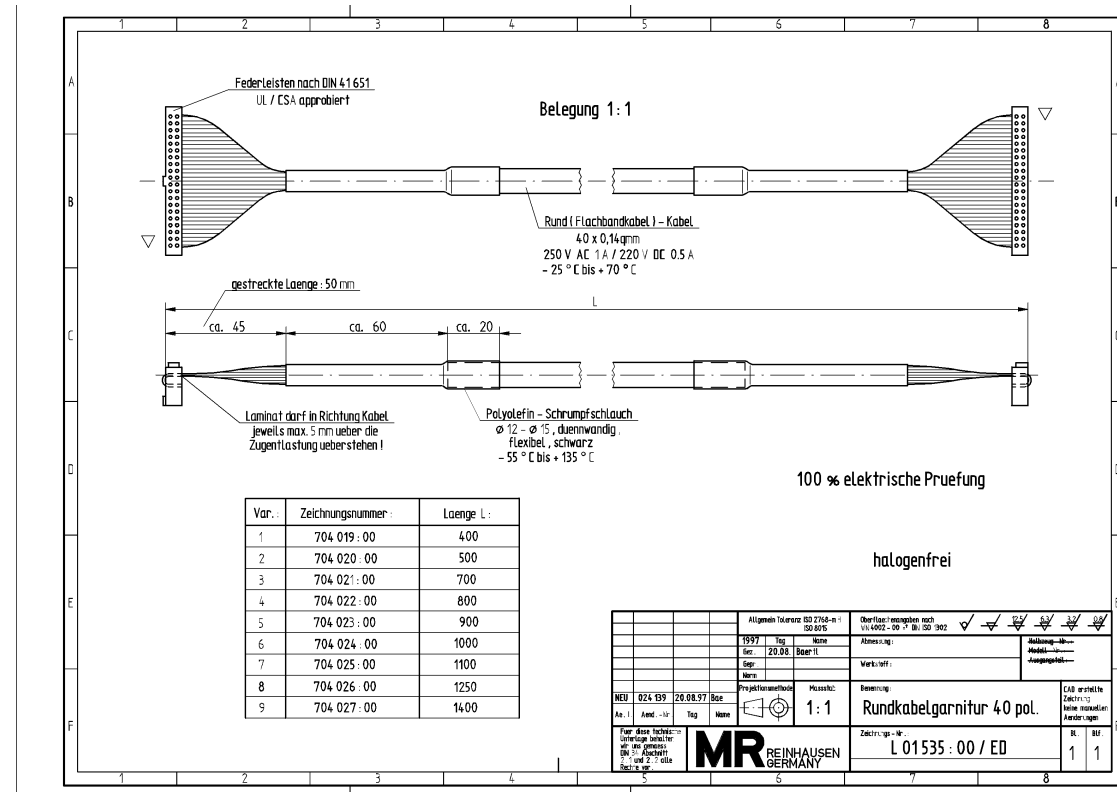
Position Transmitter Equipment

- + Position transmission equipment on the ED motor drive consists of position transmitter PCB, ...



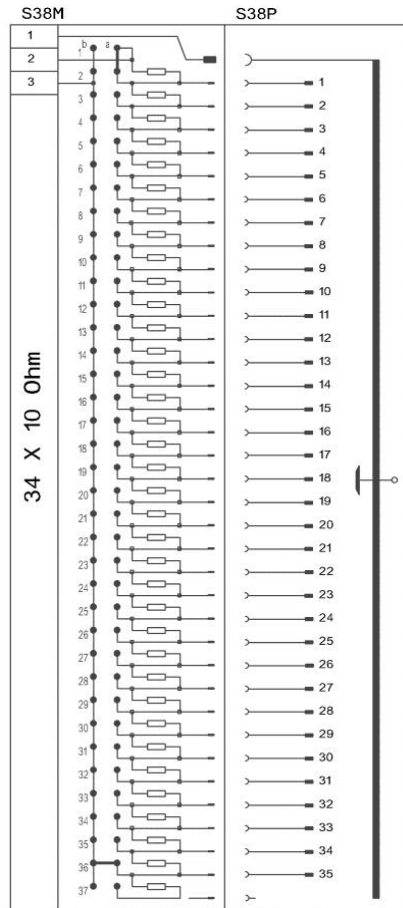
Position Transmitter Equipment

- + Position transmission equipment on the ED motor drive consists of position transmitter cables , ...

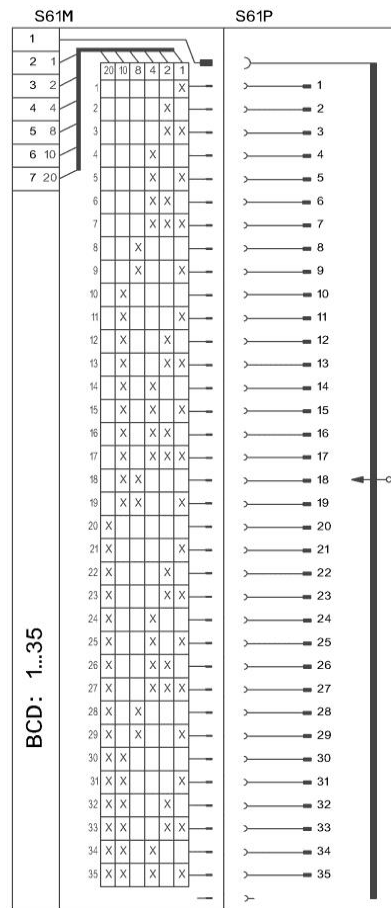


Position Transmitter Equipment

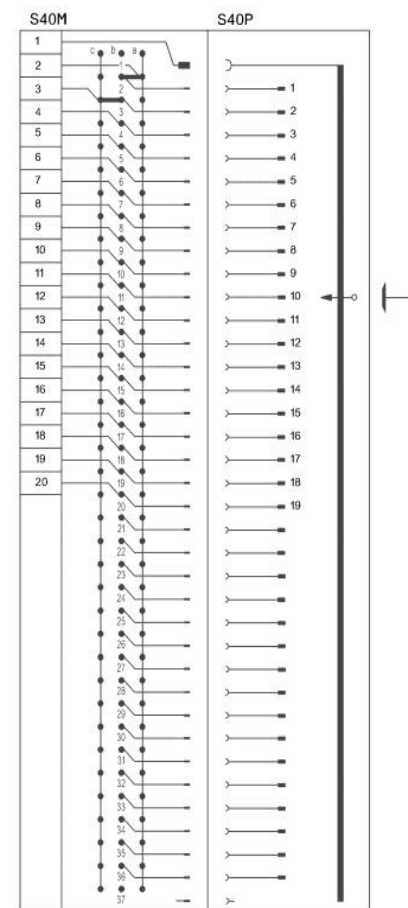
- + Position transmission equipment on the ED motor drive consists of position transmitter module , ...



R Contact



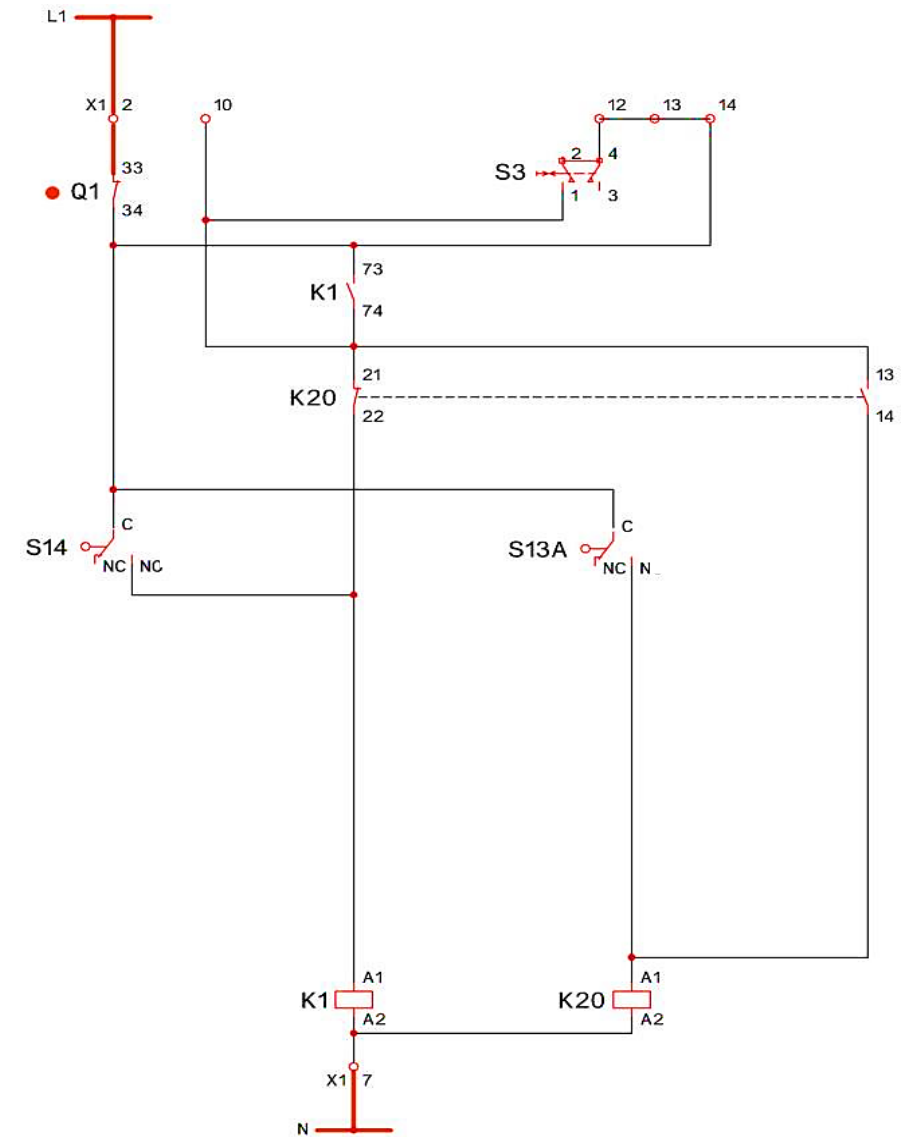
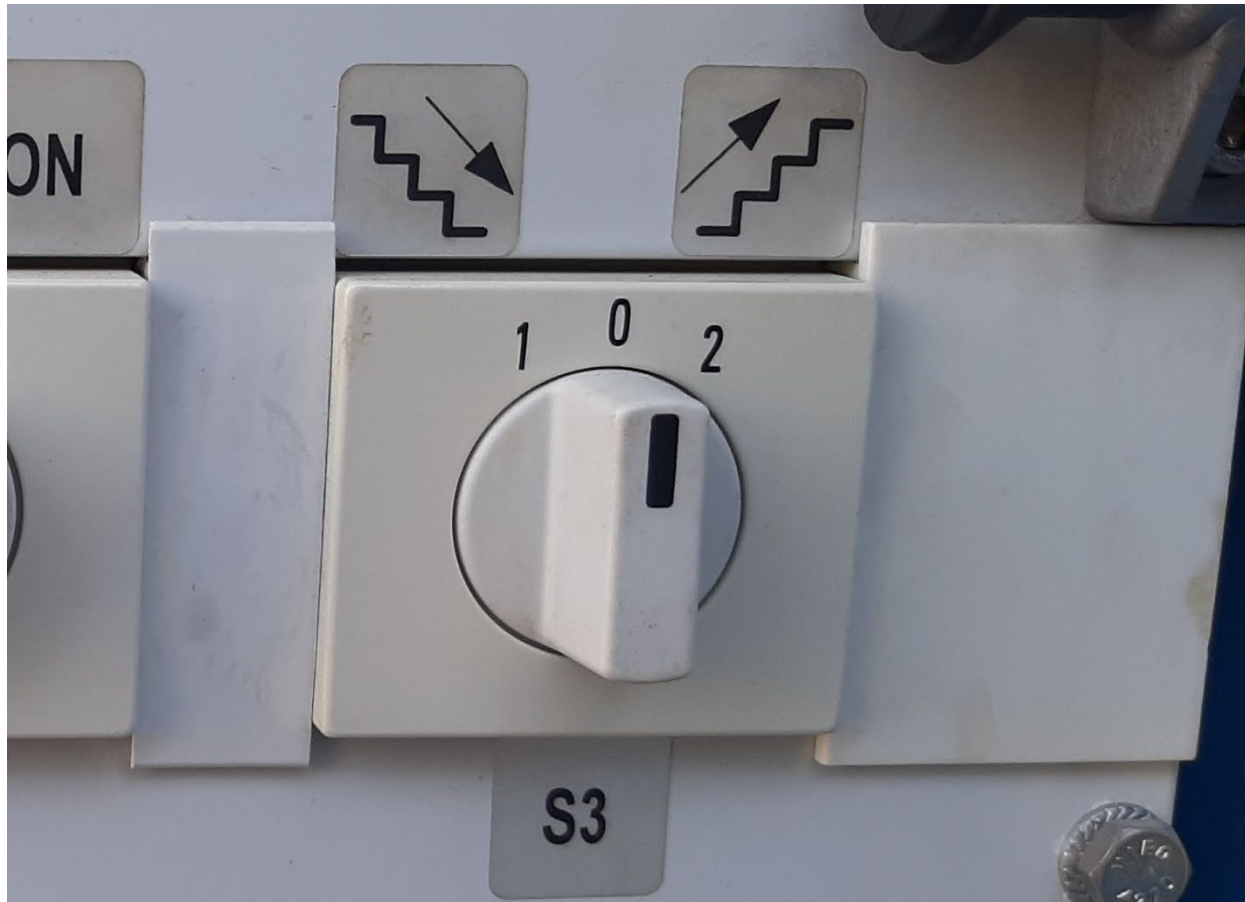
Diode Matrixes (BCD)



No Contact

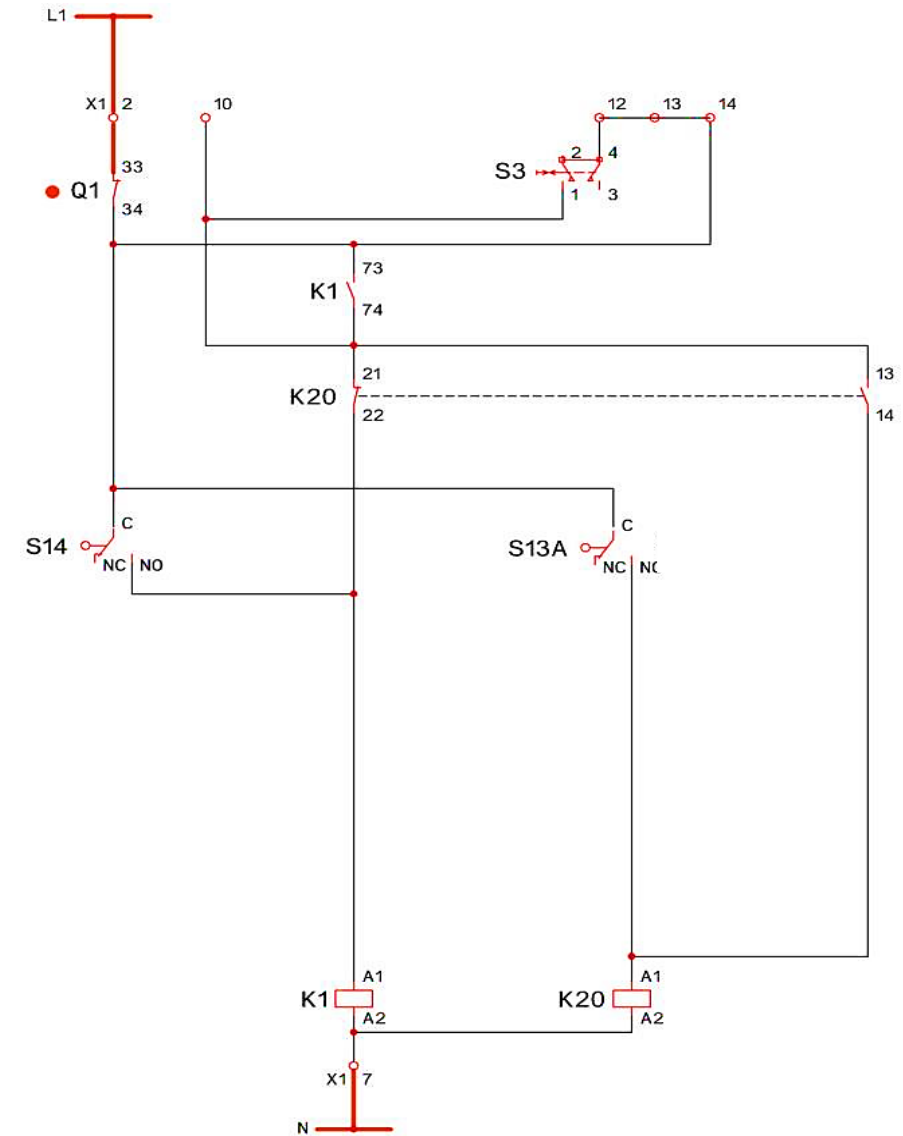
The standard control circuit - Step by step

- + Pulse emission via selector switch S3 - raise/lower - switch in direction MR- (K1)



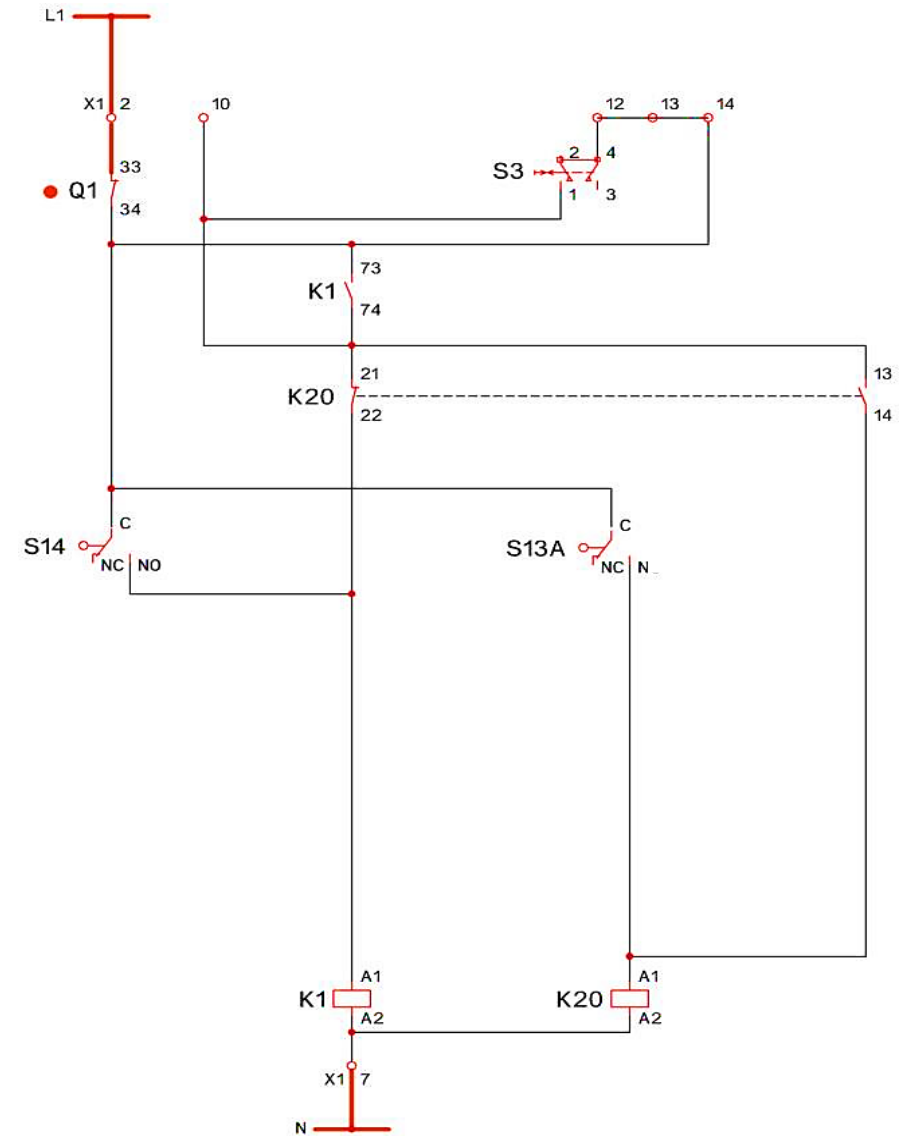
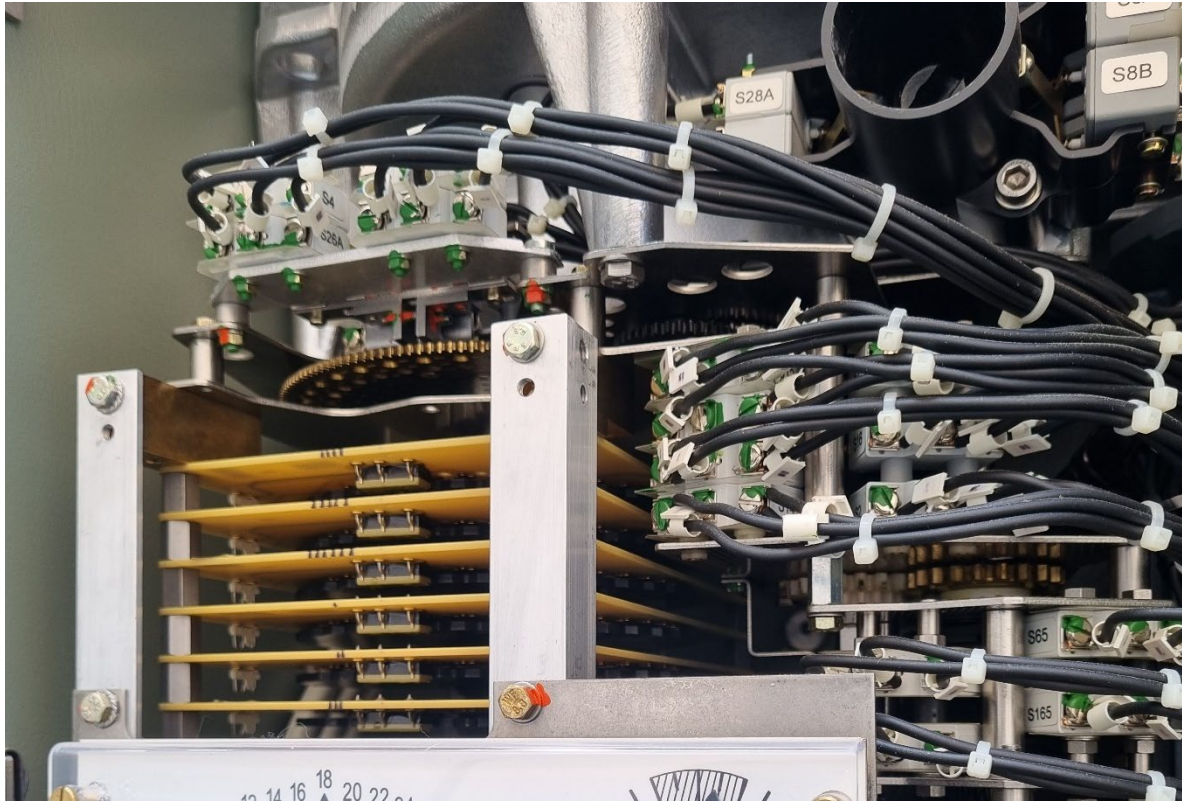
The standard control circuit - Step by step

- + After the pulse emission contactor K1 was excited and catches itself via its own NC contact.



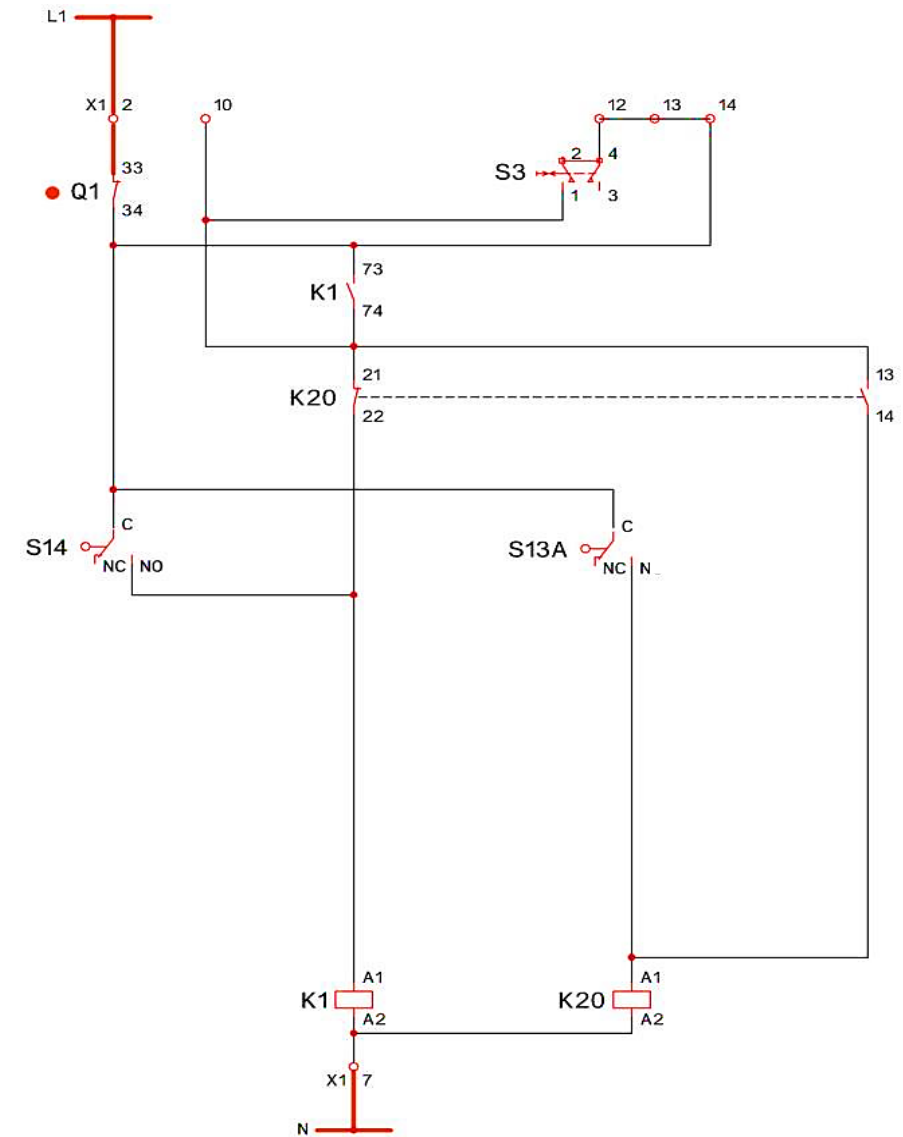
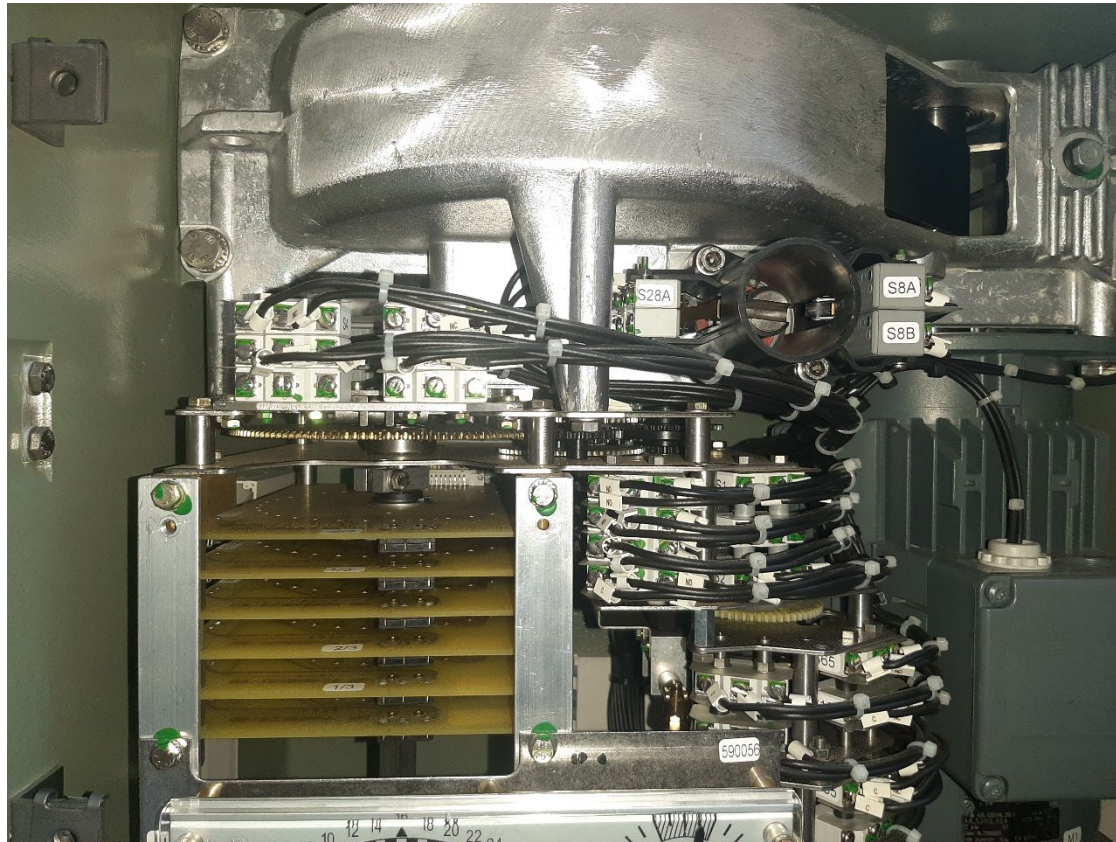
The standard control circuit - Step by step

- + Cam switch S14 is activated, and the motor contactor is now also excited for electrical catch via the mechanical catch S14.



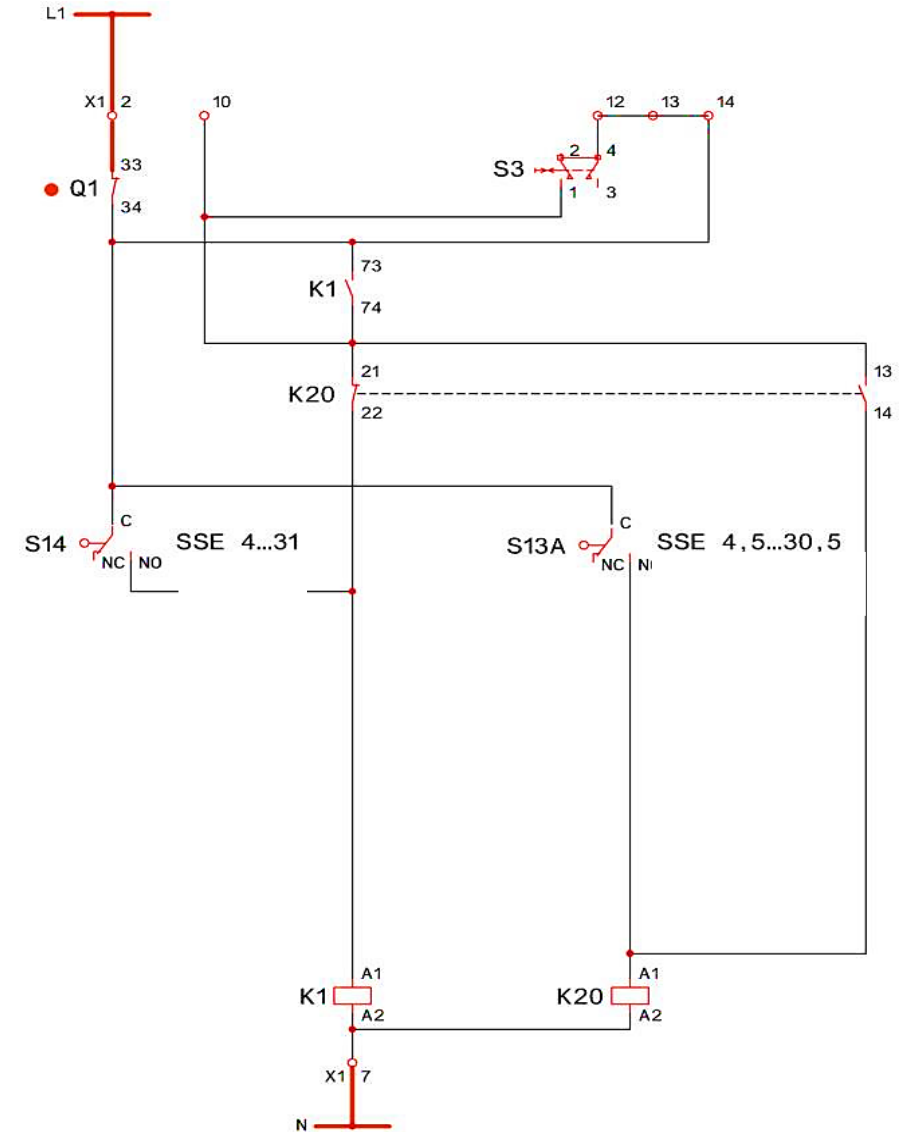
The standard control circuit - Step by step

+ Cam switch S13A is activated



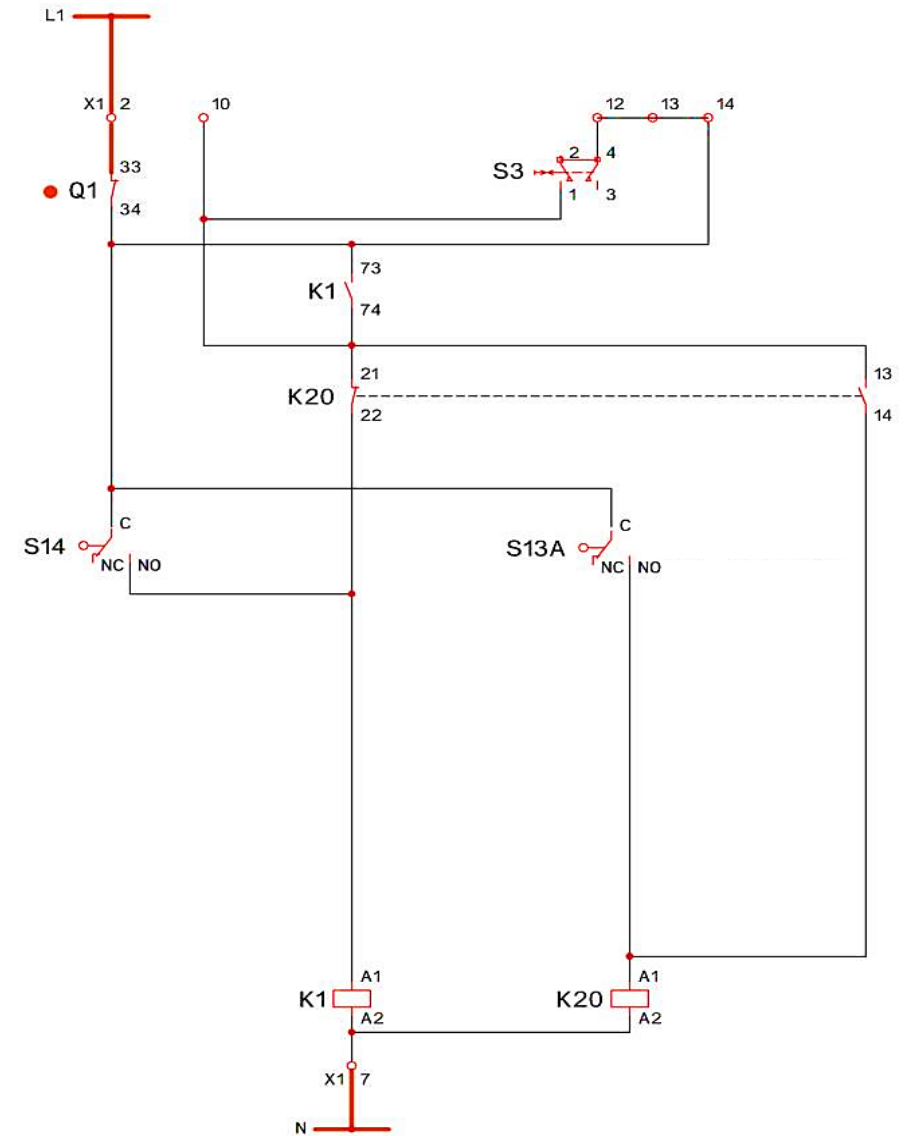
The standard control circuit - Step by step

- + After cam switch S13A makes contact, the Step-by-step contactor K20 catches itself.



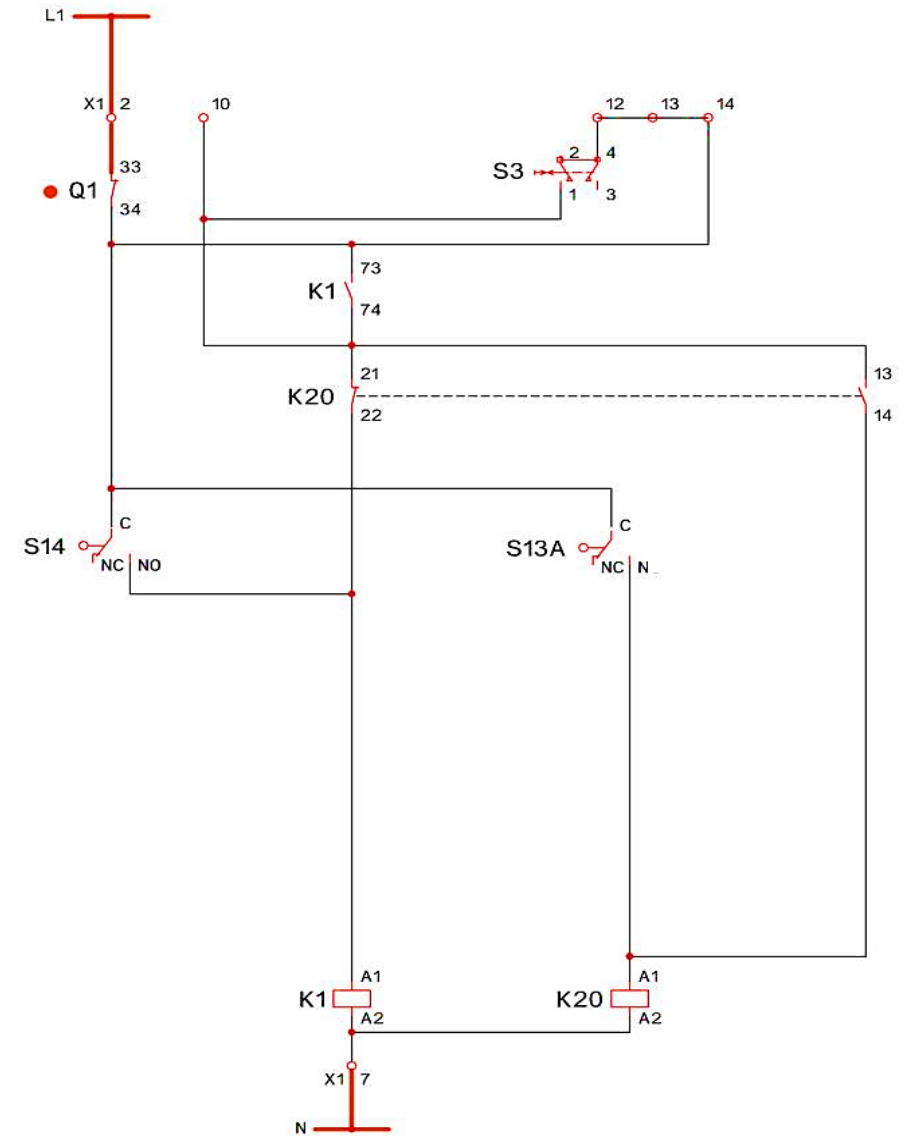
The standard control circuit - Step by step

- + Cam switch S13A returns to its original position and opens the current path of the mechanical catch for step-by-step contactor K20.



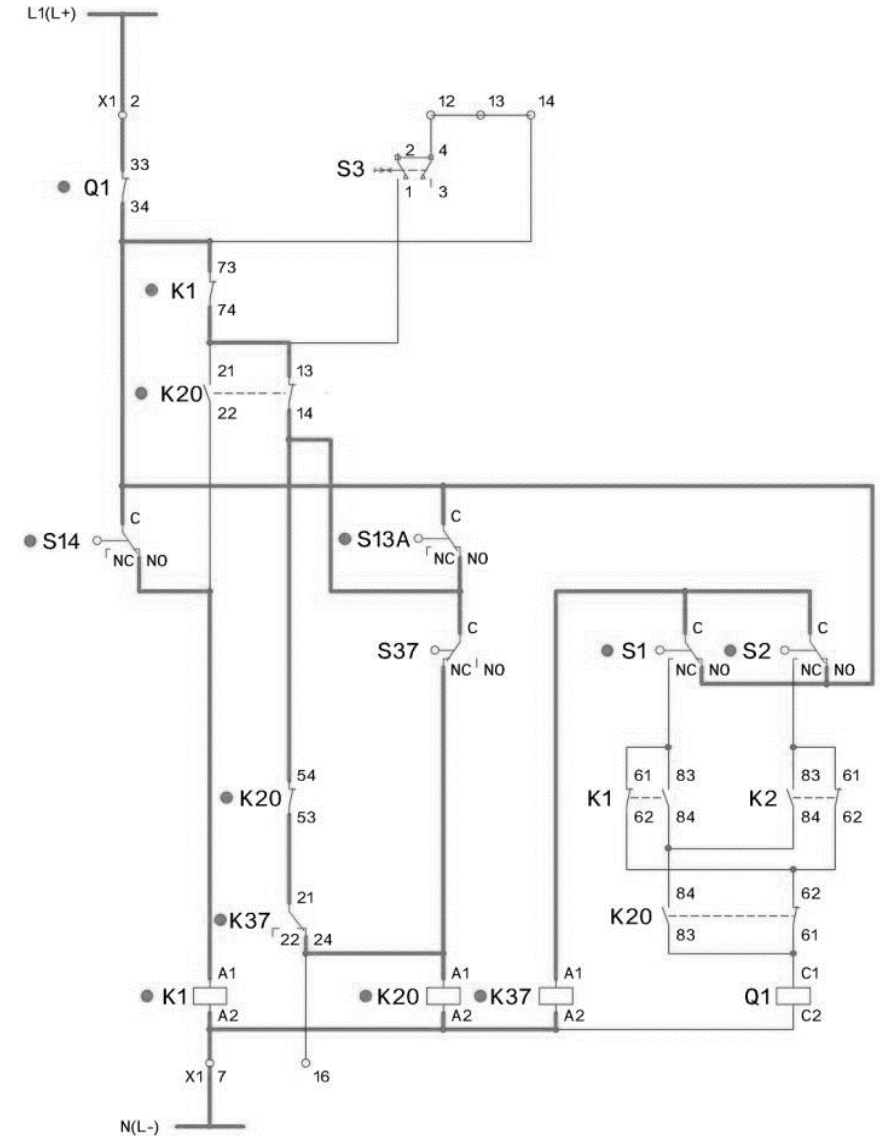
The standard control circuit - Step by step

- + Cam switch S14 returns to its original position and opens the current path of the mechanical catch.
- + Motor contactor K1 is deactivated and the motor is at a standstill



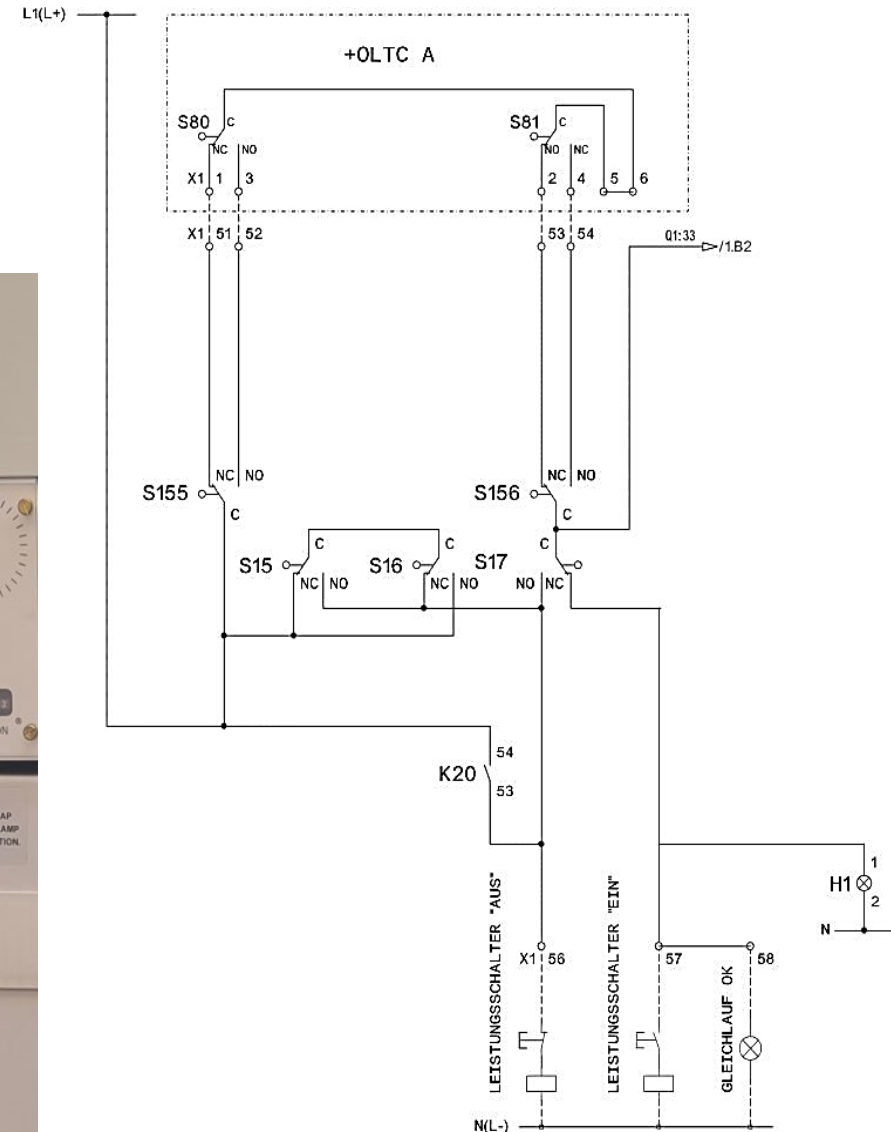
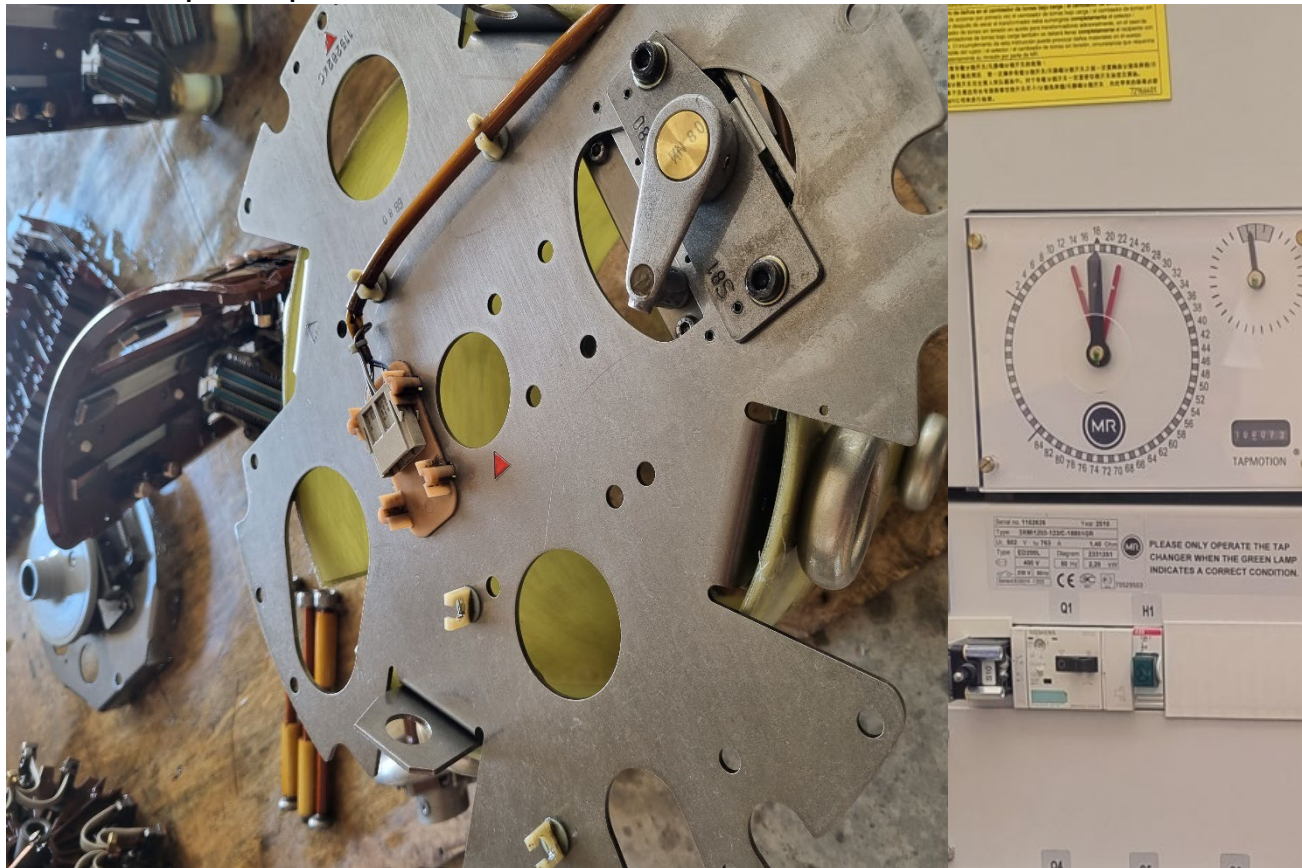
The standard control circuit - Automatic Pass

- + The switching sequence of the automatic pass
- + Step-by-step contactor K20 is excited.



The Standard Control Circuit - Monitoring Switching

- + Simplified representation with only one on-load tap-changer column. With three columns, these are only electrically connected in series one behind the other. Monitoring of switching and related circuit breaker tripping works on static current principle.



Inspection

Interval	Action	Detail
For checking operation on the transformer	Visual checks	<ul style="list-style-type: none">▪ Check the gaskets of the protective housing of the motor drive unit.▪ Check the function of the electrical heater in the protective housing of the motor drive unit.
Annually	Checking the motor protective switch	<ul style="list-style-type: none">✓ The motor protective switch Q1 is switched on (Position I).<ol style="list-style-type: none">1. Trip the motor protective switch from the control room.⇒ The motor protective switch is tripped (position O). if the motor protective switch is not tripped, check the switch's connection to the control room and if necessary contact Maschinenfabrik Reinhausen GmbH.1. Switch on the motor protective switch again (position I).<ol style="list-style-type: none">⇒ The tripping of the motor protective switch from the control room is checked.

Questionnaire for tripping of motor protective switch

- + Mark the position of the pointer of the tap-change indicator after the tripping of the motor protective switch. (ED MDU)

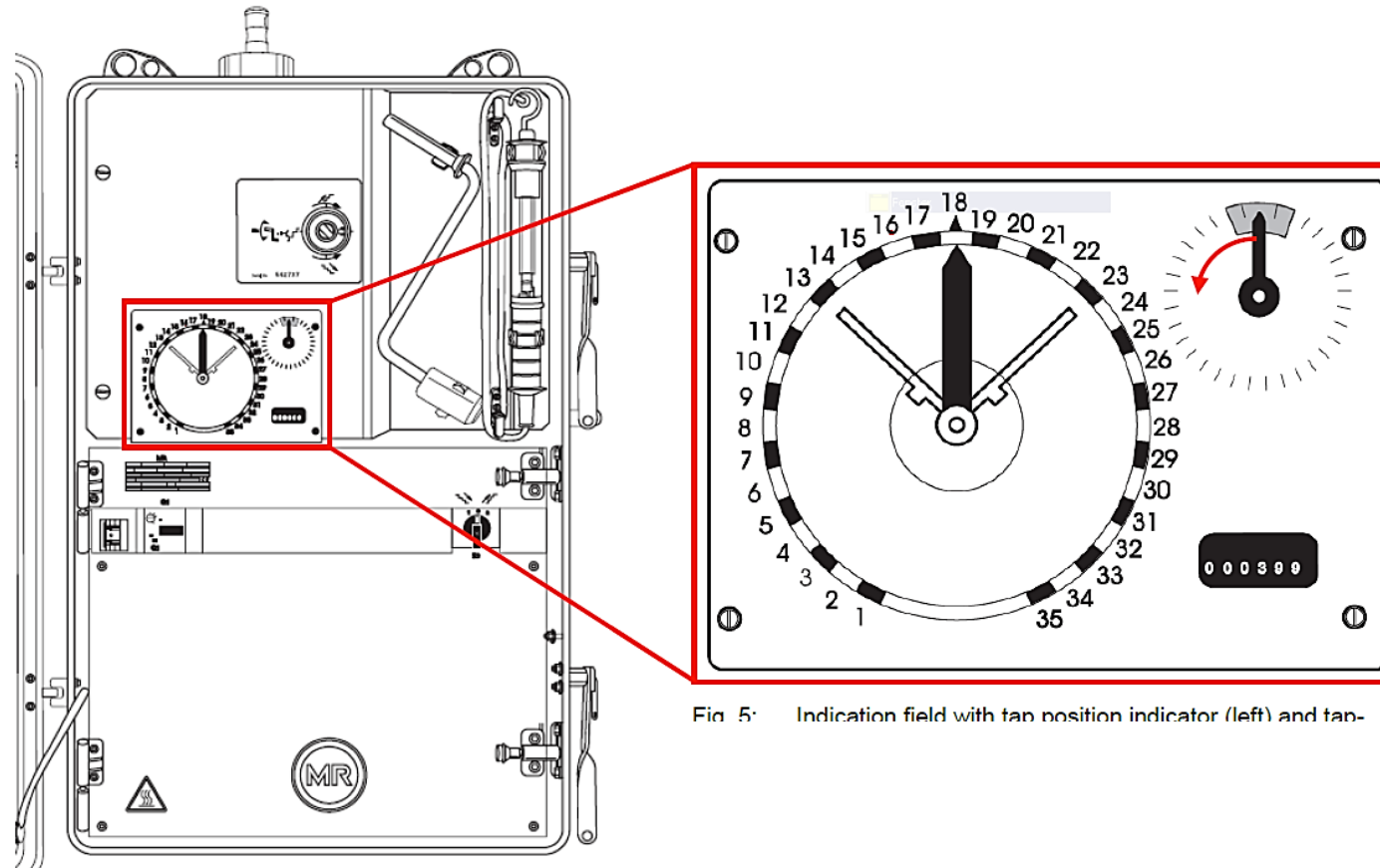


Fig. 5: Indication field with tap position indicator (left) and tap-

Questionnaire for tripping of motor protective switch

When did the tripping of the motor protective switch occur?

- + during an electrical tap-change operation
- + hand crank operation
- + standstill of motor-drive unit

In which operating position does the motor protective switch trip?

- + in all operating positions

If yes, in which switching direction does the tripping occur?

- + Both switching directions
- + switching direction 1 → n
- + switching direction n → 1

MR Drives

+ MA2, MA3, MA4, MA7, MA7/8, MA9, ED, ETOS ED ...



MA4



MA9



MA7



TAPMOTION® ED



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