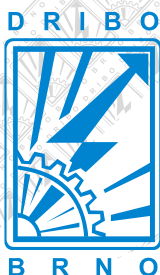


Instructions for assembly, operation and maintenance of indoor disconnectors and earthing switches

with motor operated drives NM10
single- and more-pole design
rated voltage 12, 25 and 38.5 kV
rated current 630 – 6300 A

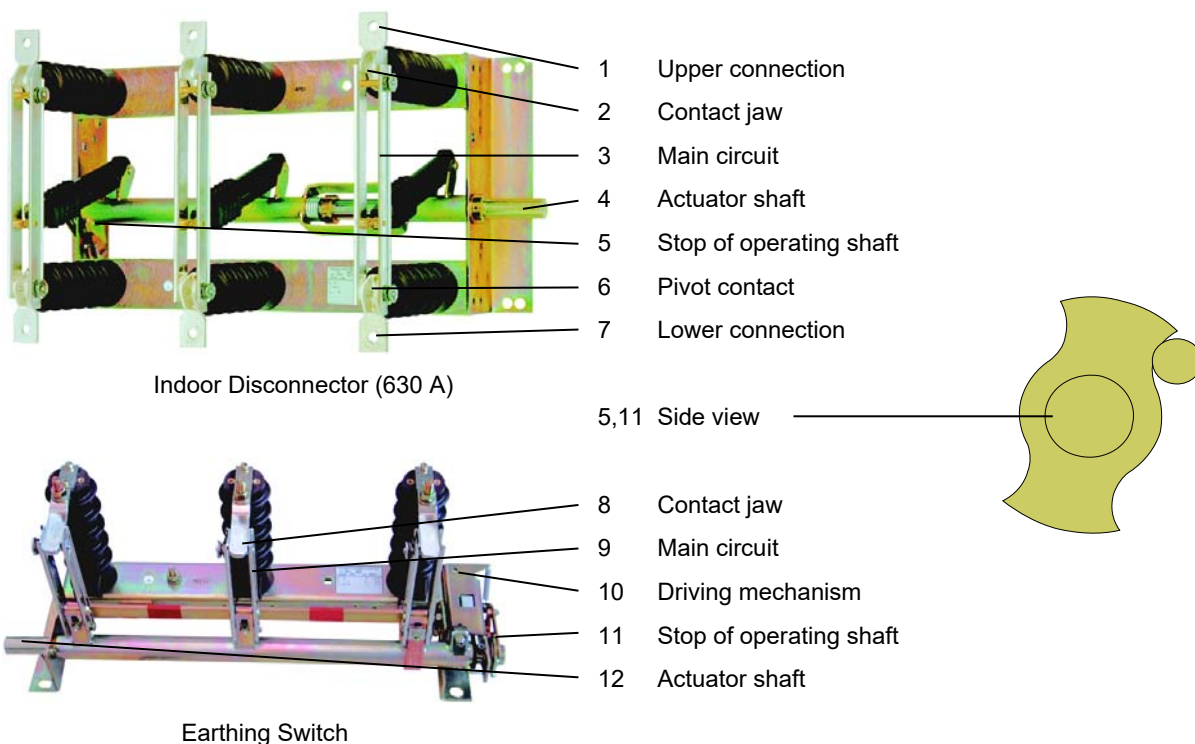


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Indoor disconnectors and earthing switches



Handling and storage

Unpack the disconnector upon arrival. Check for damages caused during the transport. Any damage should be reported immediately to the supplier. After unpacking remove all remaining packaging material from the switching device and accessories.

Lift the disconnector by holding it at the base frame, only. Never use the current-carrying path as a component for lifting up the switching device. During the storage protect the device from damages, humidity and dirt.

Operating conditions

The disconnectors and earthing switches are intended for operation under normal conditions as defined by the EN 62271-1 standard, class „minus 15, indoor use“. Highest ambient temperature: 40°C; average temperature during 24 hours is not allowed to exceed 35 °C.

Assembly

The switching devices are designed for vertical mounting. Devices for horizontal mounting are modified and identified accordingly.

Fixing the disconnector

Screws are to be tightened up in a way to prevent the occurrence of deformation or stress in the disconnector base frame (use shim blocks if needed).

Connection of busbars or cable terminals

When making connections take care of incoming terminals of the disconnector (1,7) which have to be kept away from stresses. Fix the connecting bolts with 70 Nm torque (using another key in opposite position).

Putting the interlocking system into operation (disconnectors with earthing switch)

In order to reduce the probability of damage to the switching knife contacts both the disconnectors and the earthing switches are transported in ON switching position. Consequently, the blocking system is not operative during the transport.

Prior putting the device into operation the blocking system is to be enabled. This is done using the following steps:

1. Switch the earthing switch OFF
2. turn the locking disc on the shaft of the earthing switch through the cutout against the arbor of the locking segment
3. Using a torque wrench, tighten special cut-in M10x25 bolt in the blocking segment of the earthing switch with a torque of 55 Nm
4. Check the proper function of the blocking mechanism

Operation test before putting the device in operation

Checking the end position of the disconnecter and the earthing switch

In the course of handling with both the manual and motor operated drive the switching shaft (4) must abut against the end block (5). If the disconnecter is equipped with earthing switch also the earthing switch shaft (12) must reach the end positions.

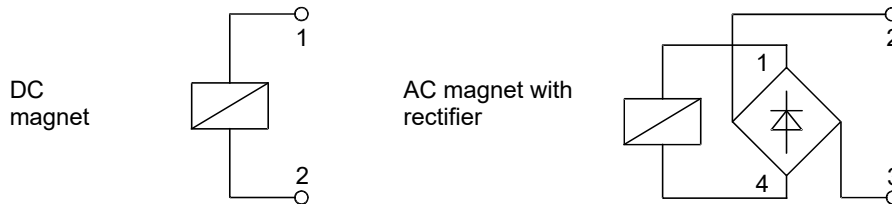
Checking the current-carrying path

The knife contacts (3) must approach the fixed contact in a symmetrical way.

Checking the blocking magnets

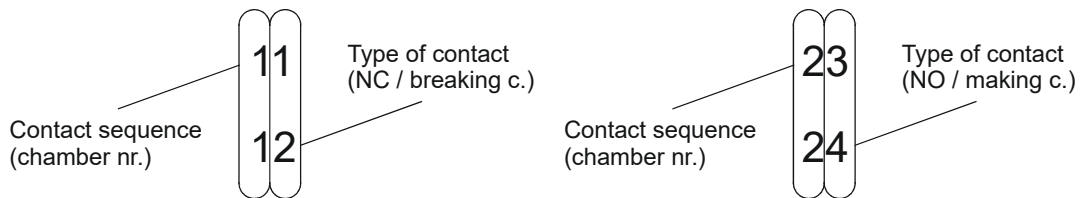
Switching of devices equipped with blocking magnets can take place only if voltage is connected to the magnet. In no-voltage state the switching device is blocked by magnet. The magnet is designed for 100 % of load capacity.

Connecting the blocking magnets to the power:

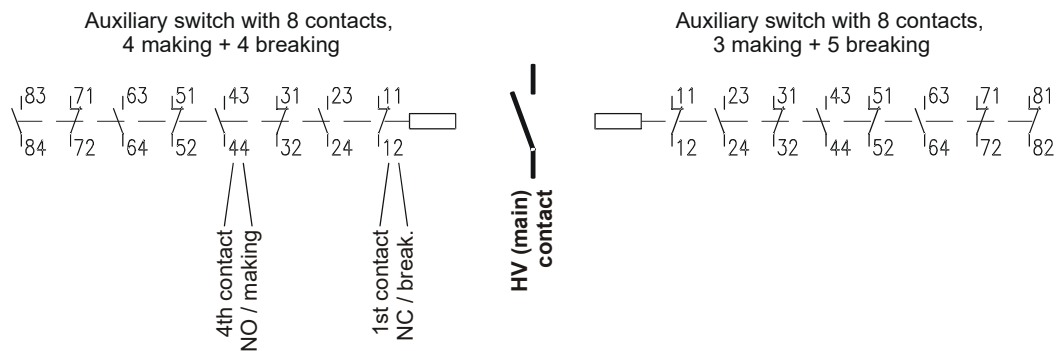


Checking the auxiliary switches

The adjustment of auxiliary switches takes place at the manufacturer's, in accordance with the stipulations of standards, and has not be changed without the consent of the suppliers. Contact terminals of auxiliary switches are marked with numbers, depending on the sequence and type of contact:



The numbering starts always from the shaft (see the following example of contact description). The first contact is a NC contact followed with NO contact. In such a way the contacts are alternating until the required number of one specific type of contact runs out. The remaining contacts of one specific type are grouped at the end. Switching devices are equipped with auxiliary switches containing always even number of contacts. Examples of description and the arrangement of contacts:



Connection and checking of the NM10 motor operated drives

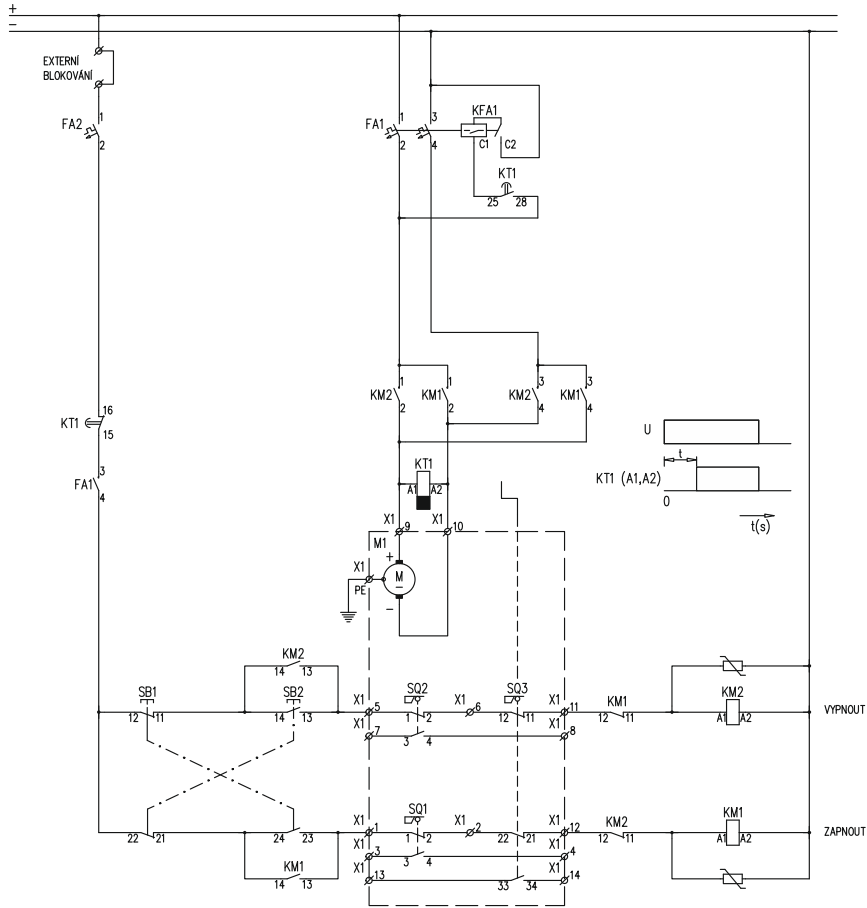
The connection of the NM10 drives takes place using two cables fed into the drive's input terminal block. The terminal block holder is adapted for fixing the cables with cable ties.

The NM10 motor drives do not include the control electronics. The drives connection is to correspond with the hereunder shown wiring diagrams. The connection terminals are identified with the letter X1 on the diagrams. The drive mechanism is able to operate reliably within 85-110% of the rated control voltage.

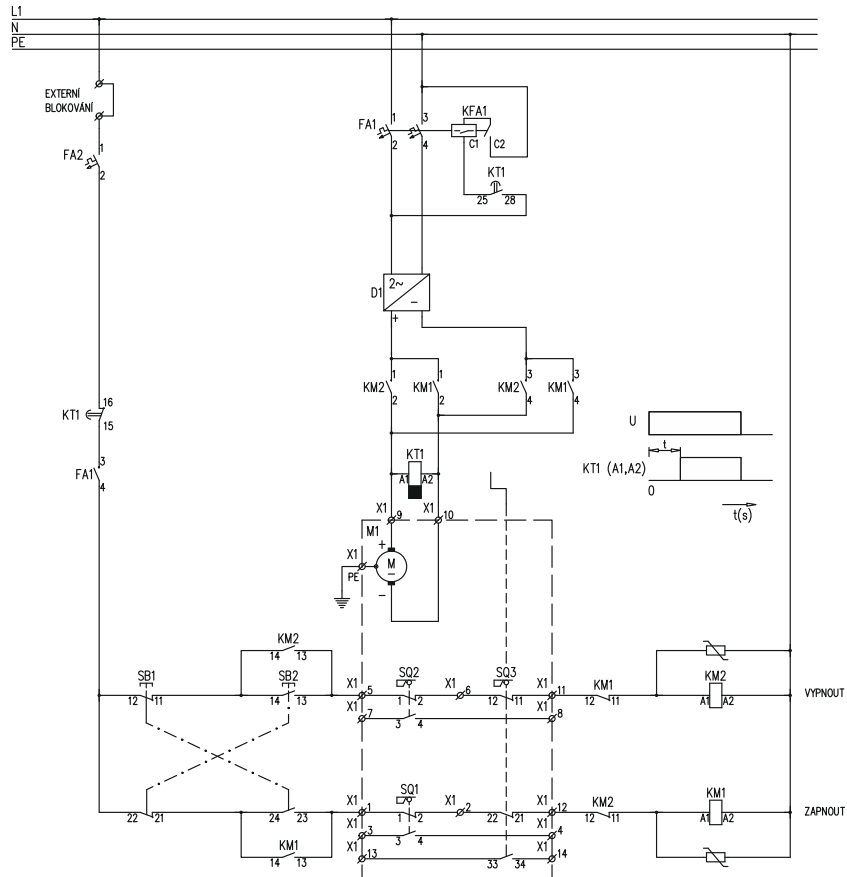
In case the motor operated drives are used to operate both the switching device and, simultaneously, an earthing switch, provisions have to be taken to ensure electrical interlocking. The built-in mechanical blocking is used only for emergency control. Starting the motor-operated drive into a condition in which the drive is mechanically blocked may cause damage to the drive.

Before putting the NM10 motor into operation, it is necessary to check the incoming cable connections according to the diagrams. To check the direction of rotation of the shaft, by putting the device into the intermediate position by means of a manual drive and following the impulse of the control button to monitor the direction of rotation. In case of incorrect operation, it is necessary to switch the polarity (phase) at the motor terminal and also check the correct switching of the end switches

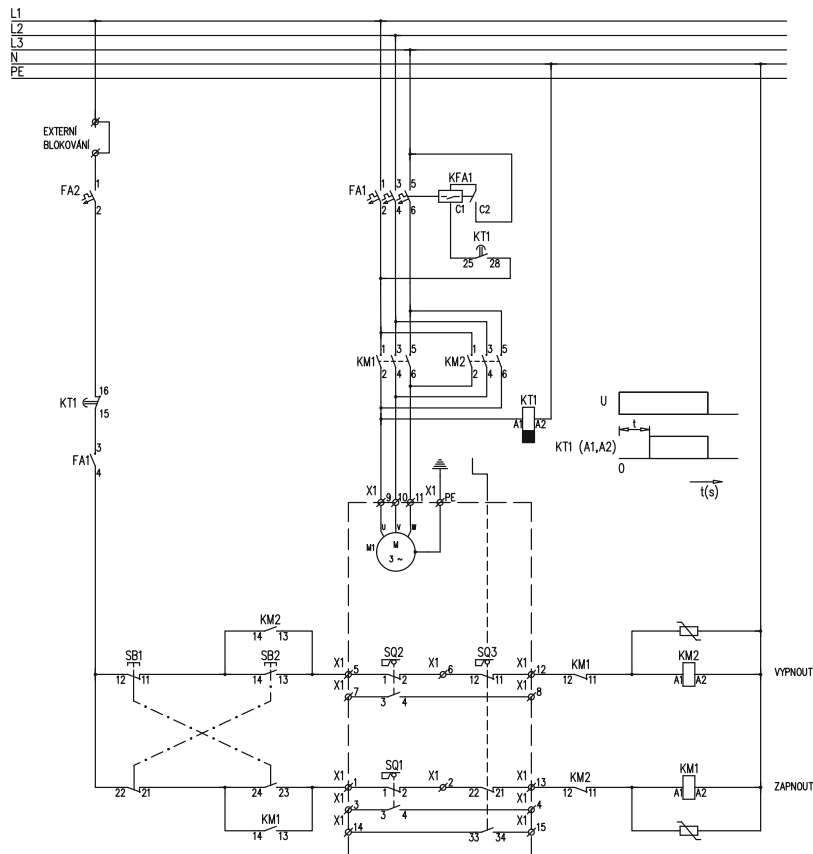
Recommended wiring diagram of the drive NM10 110V DC a 220 V DC



Recommended wiring diagram of the drive NM10 230 V AC (motor 220 V DC + rectifier)



Recommended wiring diagram of the drive NM10 400 V AC



Protection of motor operated drives

NM10 motor operated drives need for their protection circuit breakers with the M characteristics.

When operating the drives with 230V AC (220V DC + rectifier) and 400V AC supply control voltages it is recommended to use three-phase AC motor starters to start the drive. For example:

Type	Manufacturer
GZ1 M	Schneider Electric
GV2-M	Telemecanique
PKZM0	Moeller
140M-C2E	Allen-Bradley
SM1-B	Lovato
SM1E	OEZ Letohrad
MIS	SEZ Krompachy

However, voltages of 110 V DC and 220 DC need to have circuit breakers capable of interrupting DC short-circuit current. For this purpose, the following circuit breakers have been tested:

Type	Manufacturer
140-MN	Allen-Bradley
S 282 UC-K	ABB
RI 5 J2 M	SEZ Krompachy

The use of another types of circuit breakers, for 110 V DC and 220 V DC voltages, needs to be discussed with the DRIBO company.

Each such circuit breaker has to be completed with auxiliary contact that opens the control circuits in case it starts to operate.

When connecting the circuit breaker into power circuit recommendations of the manufacturer have to be adhered to, especially concerning the polarity.

Power supply	Rated input power [W]	Rated current [A]	Recommended protection [A]
110 V DC	300	3,4	16
220 V DC	300	2	10
230 / 400 V AC 3f	370	1,06	6

Operation

The NM10 drive is equipped with an outlet from the motor for crank operation (manipulation rod with crank). The direction of rotation of the emergency control handle is determined by the arrows located on the actuator.

On request, the drive can be supplemented with an auxiliary switch that automatically disconnects the drive's electrical circuit. The switch contacts can also be wired to the motor terminal block.

Maintenance

Under normal working conditions according to ČSN EN 62271-1 the following operations are carried out on the devices:

- **Visual inspection:** once a year without switching off the device to detect possible abnormal contamination or wear
- **Maintenance:** after 1000 switchings, at the latest after 10 years, shortening of the maintenance interval can be caused by using the devices in damp or dusty environments, short-circuit switching and by short-circuit currents.

Maintenance operations include

Cleaning

- insulators
- insulated switching pull rod
- switching knife-type contacts (in OFF position)
- earthing contacts

Lubrication

- **surfaces of the main contacts may be greased with specified greasing agent, only, with a very thin layer of grease applied**
- all bearings, friction lodgement and hinges (on mechanical parts of the base frame) shall be treated with oil applied by spraying (see table below)
- after having been cleaned the earthing switch contacts are treated with grease

To be applied to	Lubricating means prescribed
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main contact surfaces	disconnectors up to 630 A grease Rivolta S.K.D. 4002 – Bremer & Lequil disconnectors 1250A – 6300A grease Barrierta L55/1 – Klüber
all bearings	Omni-gliss spray or other spray containing Molykote
earthing switch contacts	Barrierta L55/1 – Klüber

Make a few switching operations after the termination of maintenance works.