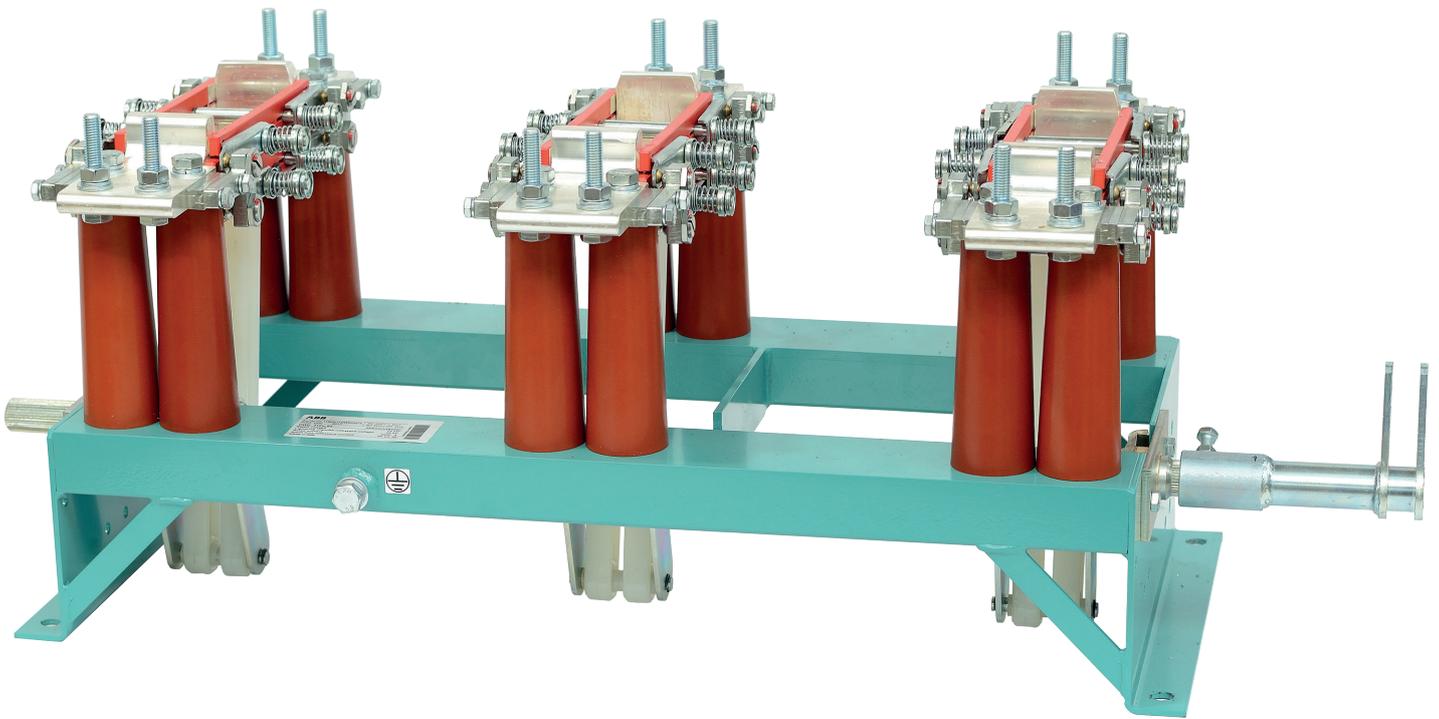


DISTRIBUTION SOLUTIONS

OWD – Indoor disconnect

Installation and operation manual



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Safety



WARNING – hazardous voltage can shock, burn or cause death. Do not attempt to handle, install, use or service this product before reading this installation guide.

Always follow the instructions given in the manual and good engineering practice.
Dangerous voltage can cause electric shock and burns.

- Do not perform any activity described in this document with the switch energized
- Always follow your company's or country's Safety procedures before performing any work on this equipment
- OWD disconnecter should be installed only within the design limitation
- All the activities listed on this document must be performed with the switch completely de energized, isolated, grounded and out of service
- Use this manual as a guide during all operations performed on the apparatus
- This product is intended to be installed, operated and maintained by qualified personnel, thoroughly trained and knowledgeable with the regards of the hazards involved. This publication is written only for such qualified persons and is not intended to be a substitute for adequate training and experience in the safety procedures for this device

Warning

Detailed descriptions of standard repair procedures safety principles and service operations are not included. It is important to note that this document contains some warnings and cautions against some specific service methods that could cause personal injury to service personnel, or could damage equipment or render it unsafe. These warnings do not cover every conceivable method in which service (whether or not recommended by ABB) may be performed. Secondly, ABB cannot predict or investigate all potential hazards resulting from all conceivable service methods.

Anyone using service procedures or tools, whether or not recommended by ABB, must satisfy himself thoroughly that neither personal safety nor equipment safety will be jeopardized by the service method or tools selected.

All information contained in this manual is based on the latest product information available at the time of printing.

2 Introduction

The subject of this document is the installation and operation of indoor disconnectors type OWD. It contains information about technical data, design and function, as well as advices for operation, maintenance, repair, etc. The manual is intended to be a help in the process of installation, maintenance and usage of these devices. Strict adherence to the requirements contained in this manual ensures proper operation of switches and is a warranty condition, therefore, familiarize with its contents is required prior to installation and operation of switches.

The manufacturer do not bear responsibility for any direct or indirect loses or damages caused by improper usage of these apparatuses.

The contents of this manual can be changed without notice.

3 Technical description of OWD disconnectors

3.1 Functions

Indoor disconnectors are designed for opening and closing electrical circuits in which current does not flow (they are off-load devices). In the open position they create a visible and safe isolation gap, ensuring that an electrical circuit or sections of medium voltage networks are completely de-energized for service or maintenance. They are used in indoor AC high-voltage switching systems.

Disconnectors in normal design N3 are intended to work indoor in moderate climate conditions at an ambient temperature of $-5 \div +40^{\circ}\text{C}$ and humidity not exceeding 70% in temperature 30°C .

Disconnectors in tropical design T3 are intended to work indoor in tropical climate conditions at an ambient temperature of $-5 \div +55^{\circ}\text{C}$ and humidity not exceeding 85% in temperature 30°C .

Disconnectors can be installed at the maximum height of 1000 m above sea level. Installing device in other environmental conditions must be agreed with the manufacturer.

Disconnectors type OWD fulfil the requirements of following standards:

- PN-83/E-06107,
- PN-93/E-06107,
- IEC 129:1975,
- IEC 129:1984.

3.2 Construction and principle of operation

Disconnectors type OWD can be made in single, double or three pole configuration. The basic design of mentioned models distinguished by rated voltages and rated current is identical, thus given information are valid for all of them. The base of disconnector is steel welded structure (pos. 1, Fig. 1). The bearings fixed to the sides of frame support the drive shaft (pos. 2, Fig. 1) and limiters, which ensure the proper angle of rotation. There are supporting insulators (pos. 3, Fig. 1) mounted on the frame, four pieces on each pole and M12 screw as earthing terminal.

On supporting insulators (pos. 3, Fig. 1) there is current path placed, which in each pole consist of two fixed contacts (pos. 4, Fig. 1) and movable contact (pos. 5, Fig. 1). On sides of fixed contacts there are mounted locks (pos. 6, Fig. 1) with adjustment screws (pos. 7, Fig. 1). There are pressing levers on the movable contacts (pos. 8, Fig. 1). The proper mutual contact pressure is ensured by the lock set with the adjustment screw and the pressing lever with spring (pos. 9, Fig. 1). The bars can be fixed to the terminals of the fixed contacts (pos. 4, Fig. 1) using 2 or 6 screws (depending on the rated continuous current), parallel to the base. Movable contacts (pos. 5, Fig. 1) are coupled by insulating rods (pos. 7, Fig. 1) with drive shaft (pos. 2, Fig. 1), which rotation causes the disconnector opening or closing.

Disconnectors can be mounted in both vertical and horizontal position (when operated with an insulating stick - only in vertical position). The disconnectors designed for working with manual drive type NRWO4 are equipped with a shaft extension (pos. 11, Fig. 1) for coupling the shaft (pos. 2, Fig. 1) of the disconnector with the drive rod. The position of the shaft extension can be adjusted in increments of 10° , which together with possibility of adjusting the length of the drive rod allows proper coupling the drive with the disconnector in the cells of different depths and with different positioning of the disconnector and the drive. Since both ends of the drive shaft are identical, it is possible to use these drives on both sides of the disconnector.

When driving disconnectors with UEMC 41 motor drive and manual HE type, the shaft extension is equipped with a bevel gear for coupling with the drive.

The manual or motor drive UEMC 41 is not an integral part of the disconnector and must be ordered separately.

The disconnector can also be equipped with an auxiliary switch, enabling mapping of the disconnector's moving contacts position. It should be mounted on the inside of the front wall of switchboard or cell and connected by a rod (pos. 16, Fig.10) with shaft extension (pos. 21, Fig. 10) on the drive shaft (pos. 2, Fig. 10) of the disconnector. The auxiliary switch is not an integral part of the

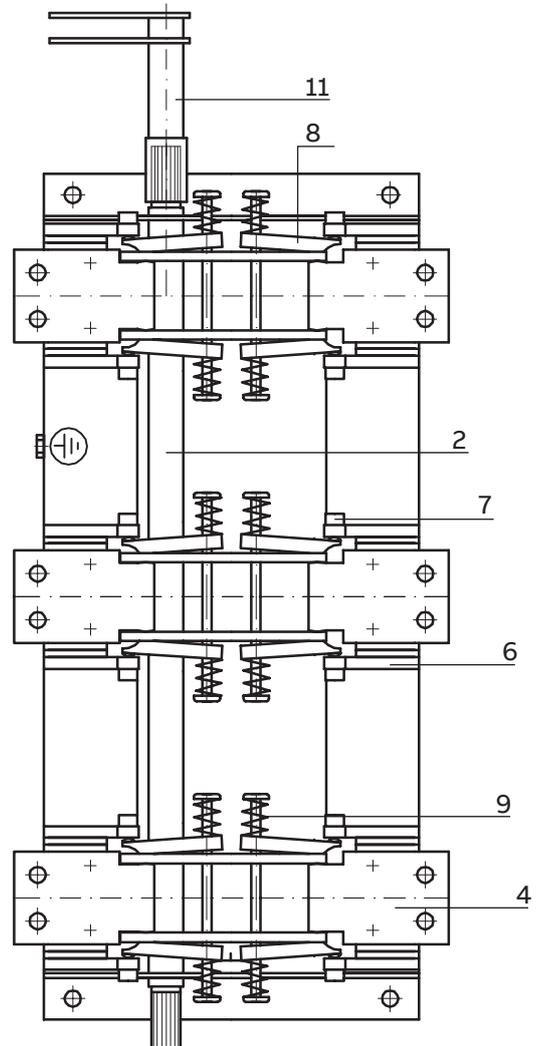
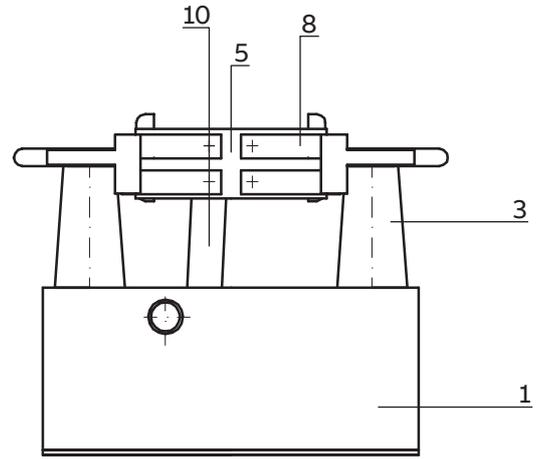
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Fig. 1.
**Construction of OWD
disconnecter**

- 1) Frame
- 2) Shaft
- 3) Supporting insulator
- 4) Fixed contact
- 5) Movable contact
- 6) Lock
- 7) Adjustment screws
- 8) Pressing lever
- 9) Spring
- 10) Insulating rod
- 11) Shaft extension

disconnecter and is supplied based on a separate order. The equipment necessary to connect the auxiliary switch with the disconnecter is supplied by the manufacturer, whereas the coupling is carried out by the user at the installation site.

Principle of operation

Maneuvering of drive cause rotation of disconnecter shaft. The movement is carried by insulating rods onto movable contacts, causing their rotational motion in a plane perpendicular to the base. In the open position, the movable contact comes into contact with the fixed contact and closes the circuit. In this position, the rivet of the pressing levers should be located in the central part of the front surface of the adjustment screw. The pressing of the movable contact to the fixed contact is solved in such way that in case of short-circuit currents, due to the electromagnetic forces on the pressing levers, the pressing force increases. Switching the disconnecter with manual drive is done by moving the manual drive lever from one extreme position to the other.

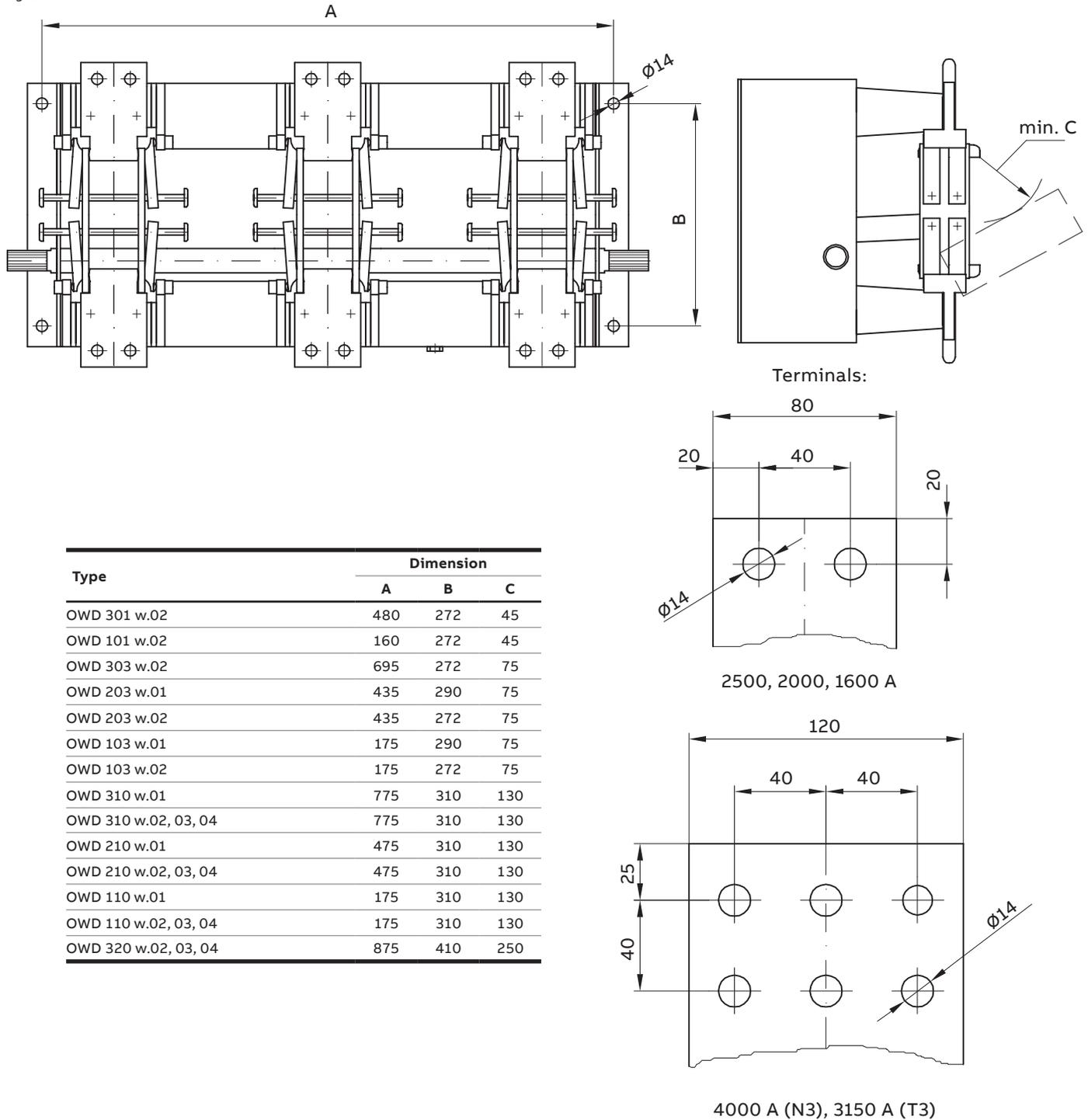


3.3 Technical data

Type		OWD 301w.02	OWD 303w.02	OWD 310w.01	OWD 310w.01/500	OWD 310w.02	OWD 310w.03	OWD 310w.04	OWD 320w.02	OWD 320w.03	OWD 320w.04
Rated voltage [kV]		1.2	3.6			12				24	
Frequency [Hz]		50									
Rated current [A]	standard model N3	2000	2500	4000	4000	2500	2000	1600	2500	2000	1600
	tropical model T3	1600	2000	3150	3150	2000	-	1600	2000	-	1600
Rated power frequency withstand voltage [kV]	to earth and between poles	3.5	10			35				50	
	between contacts	3.5	12			45				60	
Lighting impulse withstand voltage (1,2/50µs) [kV]	to earth and between poles	-	40			75				125	
	between contacts	-	46			85				145	
Rated peak withstand current [kA]		150	200	150	200	200	150	125	150	125	100
Rated short time withstand current [kA]	1s	60	80	-	80	80	60	50	60	50	40
	3s	-	-	60	-	-	-	-	-	-	-
Disconnecter mass [kg]		38	58	79	90		64			72	
Pole distance [mm]		160	260	300	500	300	300	300	350	350	350
Minimum isolating gap between contacts [mm]		45	75			130				250	
Maximum distance of first bracket at rated current [mm]		335	260	400		300				350	
Mechanical endurance (number of cycles)		1000 (M0 class)									

3.4 Mounting dimensions of OWD disconnecter

Fig. 2



4. Installing

4.1 Visual inspection before installing

Before installing the disconnecter in switchgear below points should be checked:

- rating plate content and its correspondence with the contents of the contract
- insulators condition
- protective coverings condition
- condition of the grease on the contacts

There should also be checked the correctness of

the disconnecter operation. Particular attention should be drawn to whether:

- the legs of the pressure plates (pos. 8, Fig. 3) are in the recesses of the movable contact
- in the closed position, the pressing lever rivet is located on the flat face of the adjustment screw, and the lever achieves a deviation of 4 ± 0.5 mm as measured in the manner given in Fig. 3
- the safe insulation distance is achieved in the open position (Fig. 2)

Fig. 2.
Mounting dimensions of OWD disconnecters, insulation gap between open contacts, terminals.

Fig. 3
Proper arrangement of pressing levers in close position of disconnecter

- 4) fixed contact
- 5) movable contact
- 6) lock
- 7) adjusting screw
- 8) pressing lever
- 9) spring

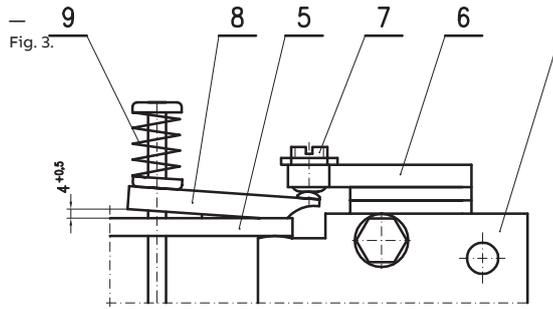


Fig. 4.
Example of coupling of the drive NRWO4-3 with disconnecter, mounting holes pattern

- 11) Shaft extension
- 14) Rod
- 15) Lever

4.2 Mounting disconnecter on supporting structure

The supporting structure for disconnecter should be rigid and the supports points must be in one plane. It is recommend that the supporting structure for the switch and accessories be constructed from steel. Disconnecter should be mounted with M12 screws on four holes. Mounting holes pattern is shown on the drawing in previous section (Fig. 2).

When installing the disconnecter, it is necessary to avoid distortion of its base, the mounting plane should be flat.

4.3 Mounting and regulation of manual drive NRWO4-3

Mounting of drive

The structure on which the drive is mounted should be rigid and the drive cannot move relative to the disconnecter cooperating with it. The location of mounting holes to be made in the switchgear wall for the fastening of drives is shown in Fig. 4. The drive should be fixed to the wall from the inside of the switchboard with four

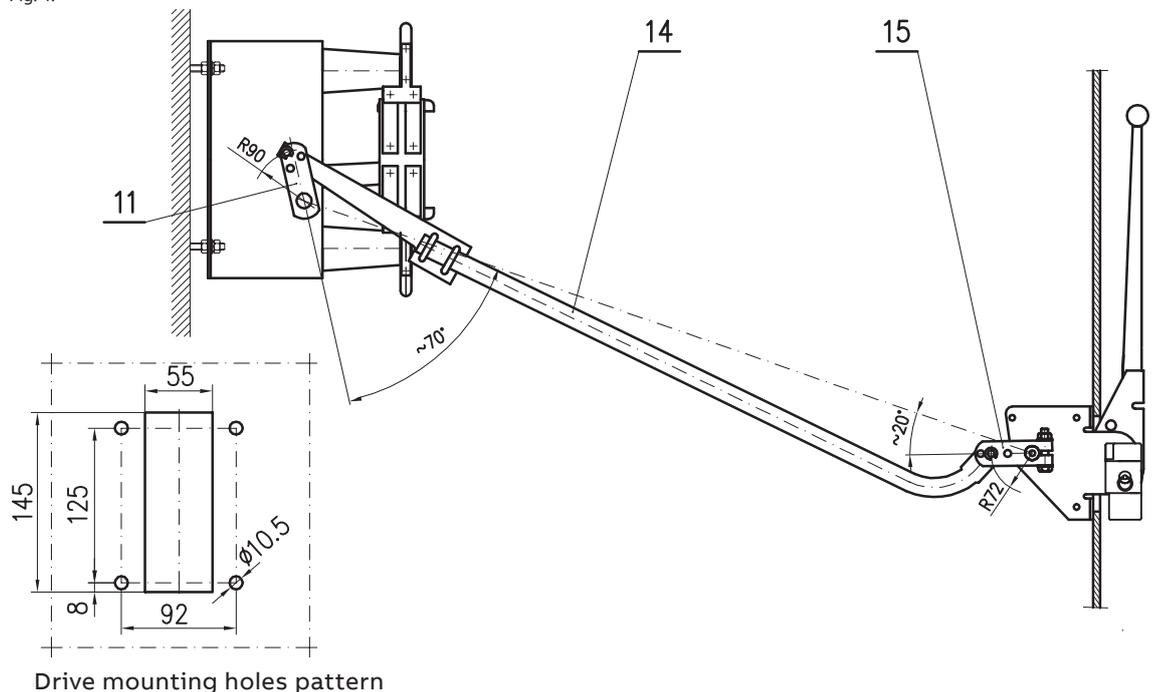
M10 screws. After fastening the drive, the blockade should be mounted. The lock can be mounted on the right or left side of the drive.

Note: For safety reasons, each drive should have a lock.

Coupling the drive with disconnecter

NRWO4-3 manual drive coupling is done with rod (pos. 14, Fig. 4) of adjustable length, which need to be connected by pins with a drive lever (pos. 15, Fig. 4) and extension shaft (pos. 11, Fig. 4) that is mounted on the disconnecter shaft and that can be adjusted every 10° of full angle range. The length of the rod must be such that it guarantees the correct position of the movable contacts in both of their end positions. This will be reached when the disconnecter shaft coupled to the drive will rotate 90° (change of rotation angle from 115° on drive shaft to 90° on the apparatus shaft). The approximate position of the coupling rod and lever on the disconnecter shaft is shown in Fig. 4. For horizontally installed disconnecters, there is need to exceed the dead center in drive in open state of the disconnecter, so the self-acting closing of switch is impossible. In the closed state of the disconnecter (hand lever in the up position), the movable contacts should reach the position corresponding to the switched on state. In the open position of the disconnecter (hand lever at the bottom), the movable contacts of the apparatus should reach the correct position defined by bumpers located on the shaft of the apparatus and in the frame. The length of the rod is adjusted by setting the disconnecter and the drive in the closed position. After adjustment the rod must be tighten by clamps.

Fig. 4.



—
Fig. 5.
**Manual drive HE,
mounting holes**

- 1) Drive's shaft
- 2) Lock ring
- 3) Cardan joint
- 4) Hand lever
(demountable)

4.4 Coupling with HE manual drive

The complete manual drive HE consists of a front part of the drive (body) with a cardan joint (pos.3, Fig. 5) and a hand lever (pos. 4, Fig. 5). For coupling with the disconnecter there are additionally needed: coupling rod and bevel gear on the disconnect shaft.

The drive HE has to be mounted on front panel of switchgear with two M10 screws, in such position that the axis of drive's shaft (pos. 1, Fig. 5) is as close as possible to the axis of the smaller wheel of bevel gear.

The coupling rod require to be cut to the proper length and then hole $\varnothing 10$ for fastening into the cardan joint need to be drilled.

Regulation of drive:

- 1) Remove the Seeger Ring securing the lock ring (pos. 2, Fig. 5) (using the Seeger rings pliers)
- 2) Insert the hand lever into the shaft end (pos. 1, Fig. 5) of the drive and turn counter-clockwise to open the disconnecter. Observe that the lock ring has reached the correct position in the open state. If not, remove the ring from the shaft (pos. 1, Fig. 5) and rotate 1-2 teeth on the shaft and mount it again
- 3) Turning the hand lever clockwise close the disconnecter. If necessary, change the position of the ring (pos. 2, Fig. 5) on the shaft again

- 4) The regulation procedure should be completed by several closing and opening operations, and then the Seeger ring should be mounted on its place

4.5 Coupling with motor drive UEMC 41

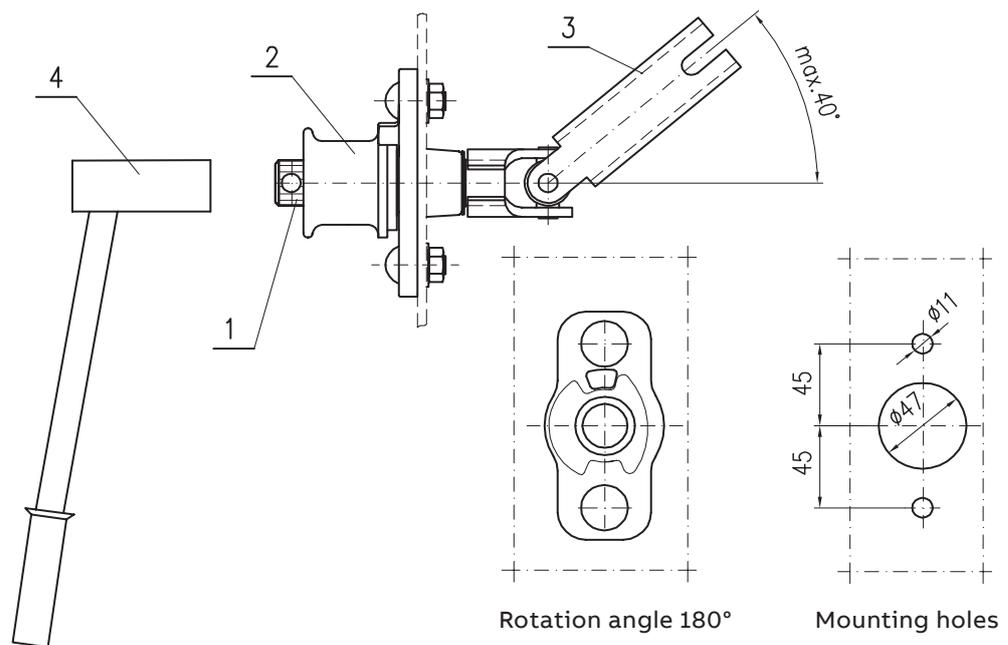
Description of drive, coupling and adjustment can be found in a separate manual enclosed to the UEMC 41 drive.

Additional information:

Depend on application and version of drive one of the following exemplary coupling need to be done. General requirements for assembly:

- the disconnecter must be correctly installed on the supporting structure on the wall
- the NRK2 bevel gear must be mounted on the shaft extension and fixed by tightening screws on its housing
- connection rods need to be cut to the appropriate length and a hole $\varnothing 10$ must be drilled for fixing in the cardan joint, rod connectors or bevel gears
- all connections should be secured with $\varnothing 10$ bolts and cotters or by tightening the screws

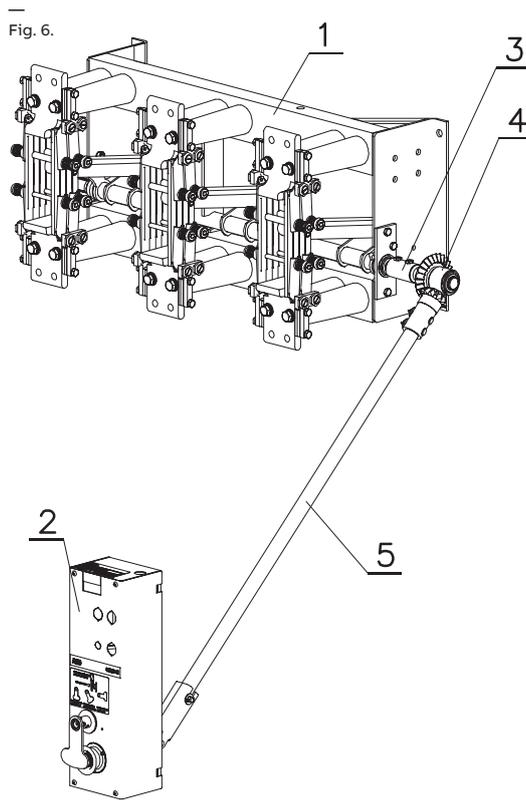
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Fig. 5.



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Fig. 6.
The drive mounted on the front door of the switchgear

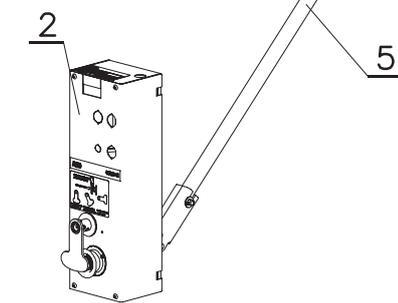
- 1) OWD disconnector
- 2) UEMC 41 drive with cardan joint
- 3) Shaft extension
- 4) Bevel gear NRK2/2
- 5) Connecting rod

Examples of installations:



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Fig. 7.
Drive on the front door, connection at 90° angle

- 1) UEMC 41 drive
- 2) Hand lever
- 3) Connecting sleeve
- 4) Rod connector
- 5) Connecting rod
- 6) Bevel gear
- 7) Bevel gear support
- 8) Bevel gear NRK2/2
- 9) Shaft extension

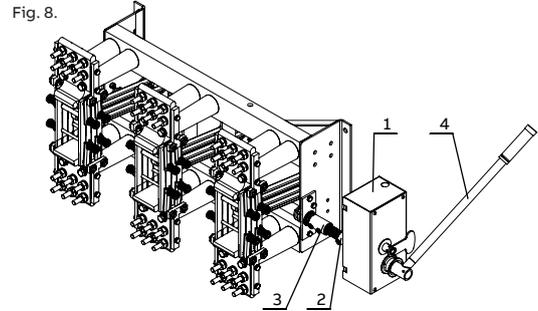


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Fig. 8.
Motor drive mounted directly on the disconnector shaft

- 1) UEMC 41 drive
- 2) Connecting rod
- 3) Extension shaft
- 4) Hand lever

Drive on the front door, connection at 90° angle

The support (pos. 7, Fig. 7) together with fixed inside bevel gear (pos. 6, Fig. 7) should be mounted in a way that the axis of the smaller wheel coincides with the axis of the smaller gear on the disconnector shaft. The axis of the output shaft of the drive should lie in the axis of the larger wheel of the bevel gear (pos. 6, Fig. 7).



Motor drive mounted directly on the disconnector shaft

The drive should be mounted on the right side of the disconnector so that closing the disconnector is clockwise. Coupling the drive shaft with the disconnector is done with two intermediate elements.

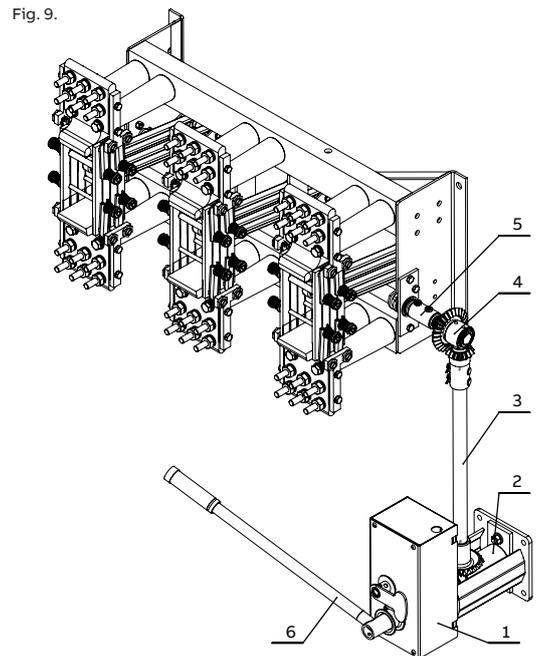
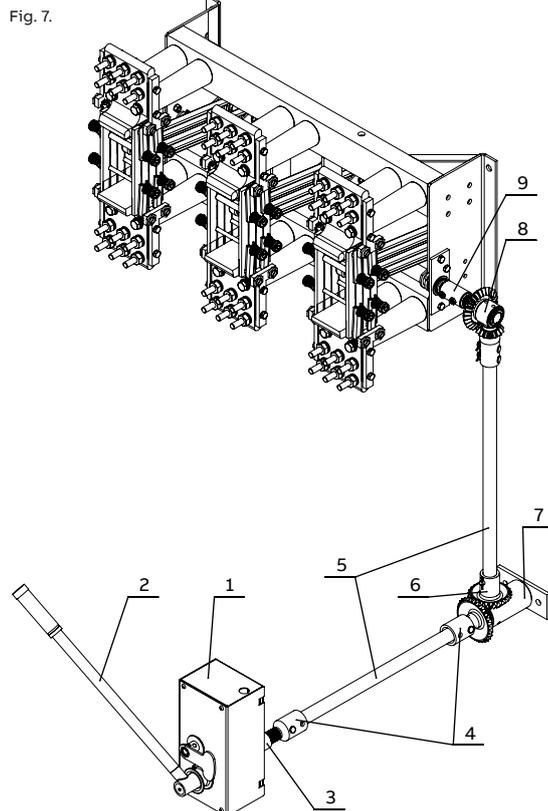
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Fig. 9.

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Fig. 9.
Drive mounted on the wall

- 1) UEMC 41 drive
- 2) Drive support with gear
- 3) Connecting rod
- 4) Bevel gear NRK2/2
- 5) Shaft extension
- 6) Manual lever

The drive mounted on the front door of the switchgear

The drive can be mounted at a different height than the disconnector. The axis of the output shaft of the drive should be in the same vertical plane as the axis of the smaller wheel of the bevel gear. The angle of tilt of the connecting rod must not be greater than 40° (up or down in relation to the horizontal position)



Wall mount drive

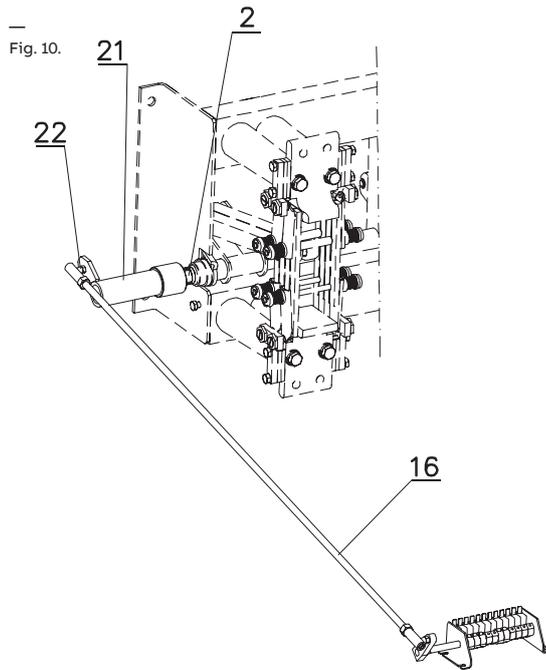
The drive support (pos. 2, Fig. 9) together with fixed bevel gear must be mounted in a way that the axis of the smaller wheel from drive side coincides with the axis of the smaller wheel on disconnector shaft.

4.6 Mounting and regulation of auxiliary switch

When the disconnector is delivered with an auxiliary switch, after coupling the disconnector with the drive in the switchgear, coupling the disconnector shaft with auxiliary switch must be done using rod (pos. 16, Fig. 10) and shaft extension (pos. 21, Fig. 10). The lever has to be fixed on shaft on opposite site to the drive.

Fig. 10.
The way of connecting
the auxiliary switch with
the disconnector

- 2) disconnector shaft
- 16) rod
- 21) shaft extension
for auxiliary switch
- 22) joint in lever



4.7 Connecting in switchgear and earthing connection

Before connecting the bars or cables to the disconnector terminals, terminals have to be thoroughly cleaned from the oxidation (without surface damage) and covered with the layer of grease. The bars should be adapted to the disconnector connection terminals. The cross-section of the conductive bars should be matched to the rated current of the disconnector. There has to be used two connection bars screwed from the top and bottom of the fixed terminals. In case of using aluminum bars, Cu-Al plates has to be used. The connection screws should be screwed on using two wrenches, so that the fixed contacts (pos. 4, Fig. 1) remain not bent. After installation, there has to be checked that the connections do not cause stresses in the disconnector structure, causing twisting of the contacts.

The apparatus and drive frame must be earthed. Before connecting the protective earthing connection to the earthing terminal, it should be cleaned and greased with acid-free grease.

5. Commissioning of disconnector

After completing all assembly operations related to the installation of the disconnector in the switchgear, 10 switches should be performed for checking the cooperation of the mechanisms, and then inspected to check if any faults did not appear and the assembly requirements specified in chapter 4 are fulfilled. Particular attention should be drawn to the correct achievement of the fixed (closed and open) positions and the signaling of these positions by auxiliary switch. The condition of protective covers need to be checked as well as condition of insulators and correct tightening of screw connections - especially terminals. In case of noticing any irregularities that can not be removed, the repair should be ordered to the manufacturer.

Before switching on the supply voltage, it is necessary to perform measurements and electrical tests in the range prescribed in the instructions for commissioning power equipment.

6 Operating procedure

Warning: During carrying out all kind of works nearby live high voltage apparatuses one must strictly follow all relevant safety regulations. Not following these regulations may lead to serious injuries or death.

6.1 Disconnector equipped with NRWO4-3 manual drive

In close state of disconnector the drive lever should be directed upwards. If the drive is equipped with an electromagnetic or manual interlock, it must be unlocked before operating. After unlocking, the drive lever should be turned down about 170° to the stop, causing opening of the disconnector. When closing the procedure is similar, with the movement of the lever in the opposite direction. After each operation of switching, it is necessary to lock the drive and only then the next steps related with operating the switchgear can be started. Pay attention to ensure that the switching is done with firm movement. If the hand lever can not be moved from the end position, this indicates the drive is locked by electromagnetic interlock.

6.2 Disconnector equipped with HE manual drive

Insert the maneuver lever onto the end of the drive shaft and pull back the locking ring. Turn counter-clockwise to open the disconnector. By turning the lever clockwise, close the disconnector.

6.3 Disconnector equipped with motor drive UEMC 41

Electric drives enables electrical operation of disconnectors remotely and locally as well as manually by hand lever. Detailed rules for handling drives are described in the separate assembly and operating instructions supplied with the drives.

7 Maintenance *

Warning: During carrying out all kind of works nearby live high voltage apparatuses one must strictly follow all relevant safety regulations. Not following these regulations may lead to serious injuries or death.

*Please refer to BS EN 13306:2010, clause 8, for maintenance types definitions.

Warning: In order to proceed to the following activities operating personnel must:

- Follow relevant safety regulations when working nearby live high voltage equipment and carry out the required preparatory actions
- Switch off the electrical supply, disconnect the control voltage and take steps to safe-guard the site of work against accidental switching on the supply voltage

7.1 Visual inspection

The visual inspection must be carried out within the scope and dates specified in the Energy Equipment Exploitation Regulations and the internal regulations of the user. In addition, inspection should be carried out after each failure of the disconnecter or short circuit in the network where the earthing switch is installed.

During inspection special attention should be drawn to:

- a) condition of insulators, insulation rods
- b) condition of the current leading parts
- c) correct contact in closed position of the disconnecter
- d) surface quality of the contact parts, correctness of reaching end positions

7.2 Periodical inspection

Periodic maintenance checks have to be carried out once every five years. During the review there should be checked:

- a) insulator conditions with particular attention to the quality of surface of insulators and rods
- b) the condition of terminals and the earthing terminal, with checking whether the screws are not loosed and they have no signs of corrosion
- c) the condition of contacts with attention to their cooperating surfaces, checking whether they do not show traces of melting, silver coating defects and whether the contact is correct between fixed and movable knife
- d) condition of pressure springs and their protective covers
- e) cooperation of disconnecter with drive and auxiliary switch
- f) that all phases of the switch fully close and open when operated
- g) condition of protective coatings
- h) operation of the mechanical or electromagnetic lock of the drive
- i) signaling the status of the contacts of apparatus by the auxiliary switch

In case of significant defects, such as damaging the disconnecter or the drive, or endangering the safety of operating personnel, immediately turn off the drive and apparatus from use and remove the defects or contact the manufacturer of the device.

7.3 Maintenance activities

The purpose of maintenance work is to remove possible defects detected during periodic inspection. In addition, during maintenance the following activities should be conducted:

- a) cleaning surfaces of insulators and insulation rods
- b) cleaning cooperating surfaces of fixed contacts and movable contacts and covering them with acid-free grease (recommended grease: Isoflex Topas NB52)
- c) renovation of damaged covers and lubrication of all bearings
- d) removal of other defects detected during the periodic inspection
- e) possible replacement of pressing levers with excessively worn rivets or adjustment screws
- f) correction of pressing levers deviation (pos. 8, Fig. 3) in the closed position by tightening the adjusting screw (pos. 7, Fig. 3)

Warning: Do not unscrew the adjusting screw unnecessarily. If it is necessary to adjust, make sure that from the disconnectable side of movable contact, the rivet of the lower pressure plate do not enter into collision with the upper adjustment screw.

7.4 Repairs

Repair of disconnectors can be done by ABB service or by technicians trained by the manufacturer.

8 Packing, transport, storage

Disconnectors are delivered to the consumer in a package that protects the apparatus from dust and light impacts. To place of storage or installation disconnectors should be transported by covered means of transport. The units should be stored in closed and dry places in the package.

Transport and storage and handling should be in accordance with the operating marks on the packaging.

9 Withdraw from use

The OWD indoor disconnectors are environment friendly devices. If the described in this instruction device is withdrawn from further use, all materials used in its production process can be reused. This means that all components of the disconnecter can be scrapped in an environmentally friendly manner, based on valid legal regulations.

10 Spare parts

Disconnecter, for its lifetime 1000 switching operation do not require spare parts. On request spare parts can be delivered to the customer. Ordered parts can be mounted only with knowledge and acceptance of ABB.



Notebook

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