

# NR-5

## Manual Rotary Operating Mechanism

Manual No. DTR.05.09.06.EN

## .....○ **WARNING!**

During the operation of electrical equipment, certain parts of these devices are normally under dangerous voltage, and mechanical parts, also remotely controlled, can move quickly.

Failure to follow the warning instructions can result in serious personal injury or material damage.

Only suitably qualified personnel can work on or near the device. This personnel must know exactly all safety rules and rules for maintaining the device in accordance with these instructions. The problem-free and safe operation of this device requires proper transport, proper storage, construction and assembly as well as careful service and maintenance.

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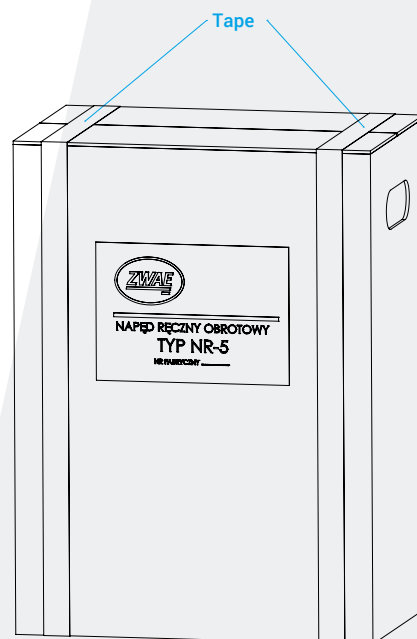
## 1. TRANSPORT

### 1.1. Unpacking and inspection

Immediately after receiving the operating mechanism, the delivery's compliance with the packing list should be checked. Then one should check whether the operating mechanism has not been mechanically damaged during transport and the data on the nameplate match the order. The operating mechanism is delivered in a cardboard box. The operating mechanisms are delivered to the recipient in completely assembled condition.

Operating mechanisms are delivered to the customer on a pallet (drawing below). We suggest moving cartons by grabbing the tapes used to pack the operating mechanism.

Upon receipt of delivery, the stretch film must be removed to ensure adequate ventilation to counteract the formation corrosion.



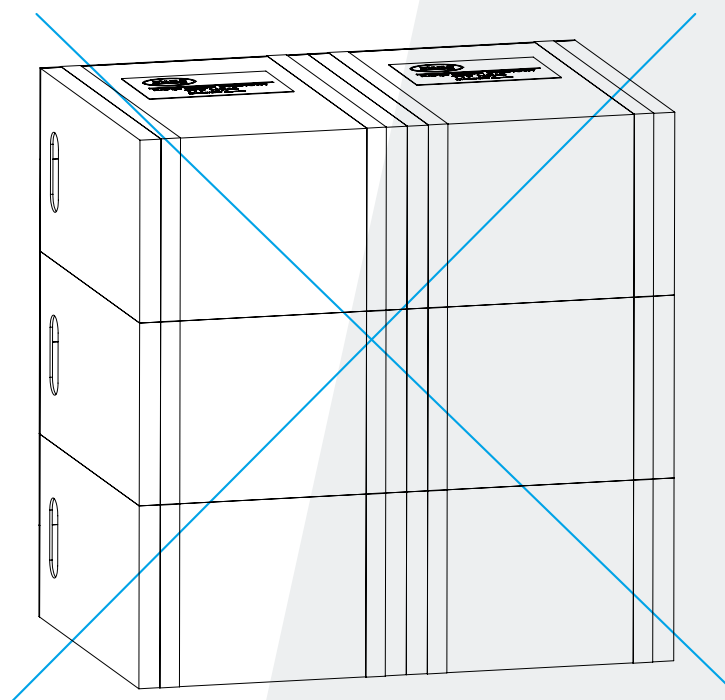
## 1.2. Storage and transport

The operating mechanisms can be transported to the place of storage and installation by any means of transport, provided that they are protected against moisture.

During transport, the operating mechanisms should be secured against shifting and colliding with each other or with vehicle parts. An additional protection for longer transport is a bag with moisture absorbing substance. It should be removed from the operating mechanism before energizing the heater.

It is forbidden to store the operating mechanisms on their backs in a stacked manner. The operating mechanisms should be positioned vertically as shown in the drawing in section 1.1. This is the only acceptable drive storage system.

..... **CAUTION!** When storing the operating mechanisms, protect against moisture until the heater will be energized.



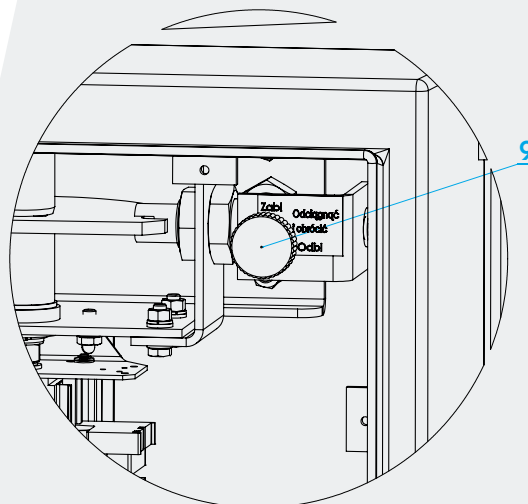
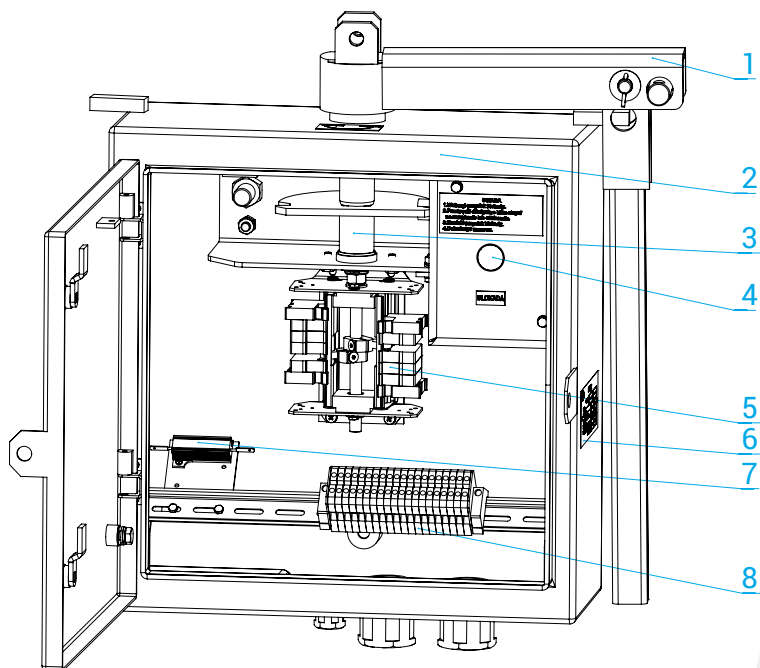
## 2. DESCRIPTION

Manual operating mechanisms type NR-5 are intended for cooperation with disconnectors, switch disconnectors and earthing switches of outdoor distribution network with rotary movement of the coupling/driving shaft. Application of the operating mechanism enables local manual control of the apparatus. It is dedicated for cooperation with every switch activated by a shaft placed along the supporting structure with a rotation angle of up to 190 degrees, which torque does not exceed 300 Nm. It is possible to mount an additional cardan module that allows the operating mechanism to work at an angle to the apparatus. The operating mechanism is equipped with an auxiliary switch contact for control and signaling circuits as well as a manual blockade or electromagnetic blockade ensuring the correct sequence of connections.

### 2.1. Construction

The manual operating mechanism includes:

1. driving shaft with manual operating lever,
2. housing,
3. driving mechanism,
4. locking electromagnet's release button (standard equipment),
5. auxiliary contact switch,
6. nameplate,
7. heater,
8. terminal strip,
- \*9. mechanical locking's release lever (an option – a replacement for locking electromagnet).



### 2.2. Housing

The housing is made of aluminum sheet, grade PA4, covered with a layer of epoxy powder paint. The door is sealed with a silicone gasket. The housing construction provides a interior protection at IP55 level with simultaneous ventilation of the interior. It has been achieved by applying labyrinth seal of drive shaft's output on the top of housing and using net-protected gland hole in the bottom of housing.

### 2.3. Principle of operations


Maneuvering the operating mechanism is carried out by using a lever, which is blocked in the limit positions and secured with a padlock. Anytime throughout the operation of operating mechanism, the shaft movement is transferred to the auxiliary contact switch, opening its normally-closed contacts, and then, when the main shaft reaches the limit position, the contacts normally open are closed.

### 2.4. Climatic conditions

Operating mechanisms are dedicated for use in outdoor switchgears in the following conditions:

- a) temperature (from - 50°C to + 40°C)
- b) air humidity (up to 100% at 20°C)
- c) altitude (up to 1000 m)
- d) wind speed (up to 30 m/s)

### 2.5. Nameplate

	<b>MANUAL OPERATING MECHANISM</b>	
	SYMBOL	<input type="text"/>
	INDEX	<input type="text"/>
○	CONTROL VOLTAGE	<input type="text"/>
	HEATER VOLTAGE	<input type="text"/>
	HEATER POWER	<input type="text"/>
	NO.	<input type="text"/>
	YEAR	<input type="text"/>
		<a href="http://www.zwae.com.pl">www.zwae.com.pl</a>

## 2.6. Basic technical parameters

No.	Parameter	Value
1.	Rated voltage - electromagnetic lock	230 VAC 220 VDC 110 VDC
	- heater	230 VAC 220 VDC
2.	Rated power: - electromagnet coil	7 W
	- heater	25W
3.	Main shaft angular displacement	192°
4.	Auxiliary contact switch's rated switching capability	AC-15; 230V, 2,5A DC-13; 220V, 0,25A
5.	Maximum conductor cross section	4 mm <sup>2</sup>
6.	Manual operating mechanism's weight	ca. 18 kg
7.	Rated mechanical strength	2000 cycles

## 3. INSTALLATION AND ADJUSTMENT

### 3.1. Coupling with disconnectors HV

For coupling operating mechanism to disconnectors a coupling shaft with a joint is used. The end of the shaft is adapted to a particular type of apparatus. The operating mechanism is attached to the lattice structures which are adapted to the customer's needs.

### 3.2. Protective earthing connection

The operating mechanism's grounding is achieved by using the earthing point placed on the back of the operating mechanism, shown on the dimensional sketch, consisting of an M12 screw and a washer. The cross-section of the rail connecting the operating mechanism to the switchgear's groundings should be selected in accordance with applicable regulations. Prior to connecting protective grounding to the housing of the operating



mechanism, the surface of the earthing point has to be precisely cleaned. At the end of the earthing rail, a Ø13 mm hole has to be made for the fastening screw. After leveling the surface and lubricating it with the below mentioned vaseline, the rail has to be attached to the earthing point, paying attention to precise tightening of the screw.

### 3.3. Connection of control and power circuits.

The cables should be inserted into the housing of the operating mechanism through the gland at the bottom of operating mechanism. The connection of the control cable's wires with the terminal strip of the operating mechanism should be made in accordance with the switchgear's proper plan. The maximum cross-section of wires connected to the terminal strip can be 4.0 mm<sup>2</sup>.

The electrical scheme is set individually, its paper version is supplied with the operating mechanism and its number is indicated on the nameplate.

### 3.4. Test before first run

Before putting the operating mechanism into service, the quality of its assembly and the correct interaction with the apparatus must be checked. For that purpose, 5-10 shifts should be made using manual operating lever, carefully observing the interaction of the parts. In a case of any irregularities in the operation of the operating mechanism or the apparatus cooperating with it, a re-adjustment of the respective assemblies should be carried out and the tests should be repeated.

## 4. OPERATING MANUAL

### 4.1. Maneuvering

In order to operate the operating mechanism manually the following steps should be done:

1. Applying voltage to the coil of electromagnetic lock by holding down the button \* [4] (locking the electromagnet in a voltage free condition prevents the operating mechanism from switching).

*\*If there is no locking electromagnet, one should pull and turn the tie rod of electromagnetic lock [9] from the "Locked" position to the "Unlocked" position.*

2. Raise the manual operating lever to place it parallelly [1].
3. Rotate the shaft causing the apparatus to switch

## 5. INSPECTIONS AND MAINTENANCE

### 5.1. Visual inspection

It is recommended to carry out visual inspections once a year and after each failure or short circuit in the switchgear. These should be checked in particular:

- a) condition of the earthing point,
- b) condition of the coupling mechanisms,
- c) condition of the external parts (housing),
- d) connection of the wires with the terminal strip.

### 5.2. Spare parts and recommended maintenance materials

The use of high-quality components and operational experience indicate the long service life of operating mechanisms (not less than 40 years). In case of damage to the operating mechanism due to improper assembly or improper operating, there is a possibility of paid repair carried out by the manufacturer.

**MOLYKOTE 111 COMPOUND** used for lubrication of electric contacts (earthings),

**PROTECTIVE LUBRICANT TDM**, in accordance with PN-64 / C-96146 used for maintenance of metal surfaces (articulated elements of the shaft and coupling mechanism).

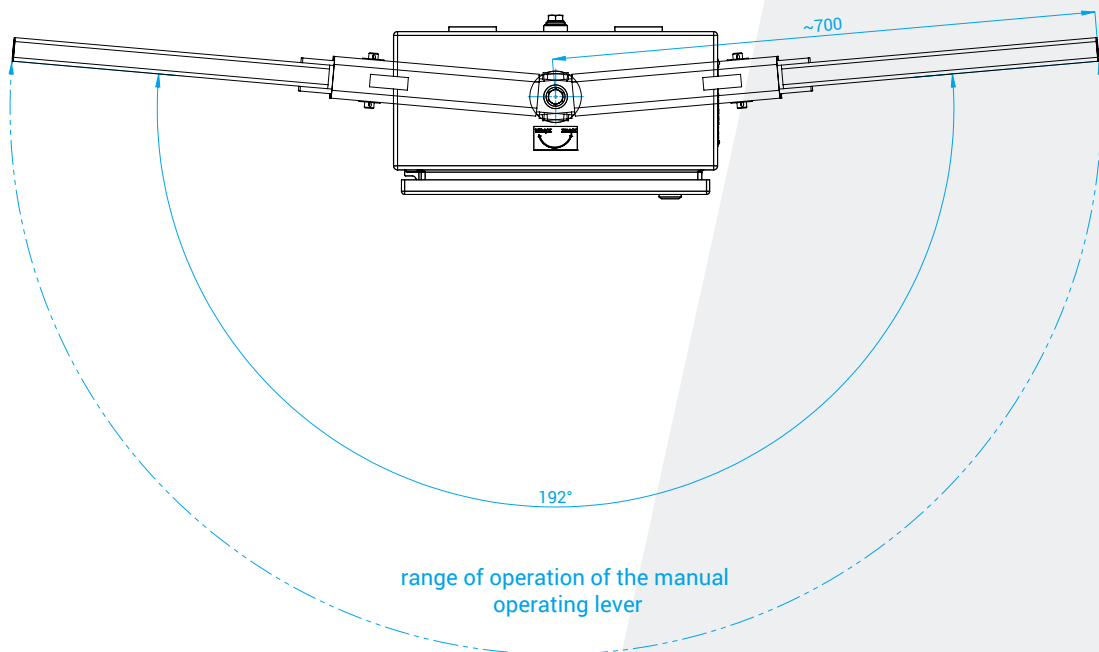
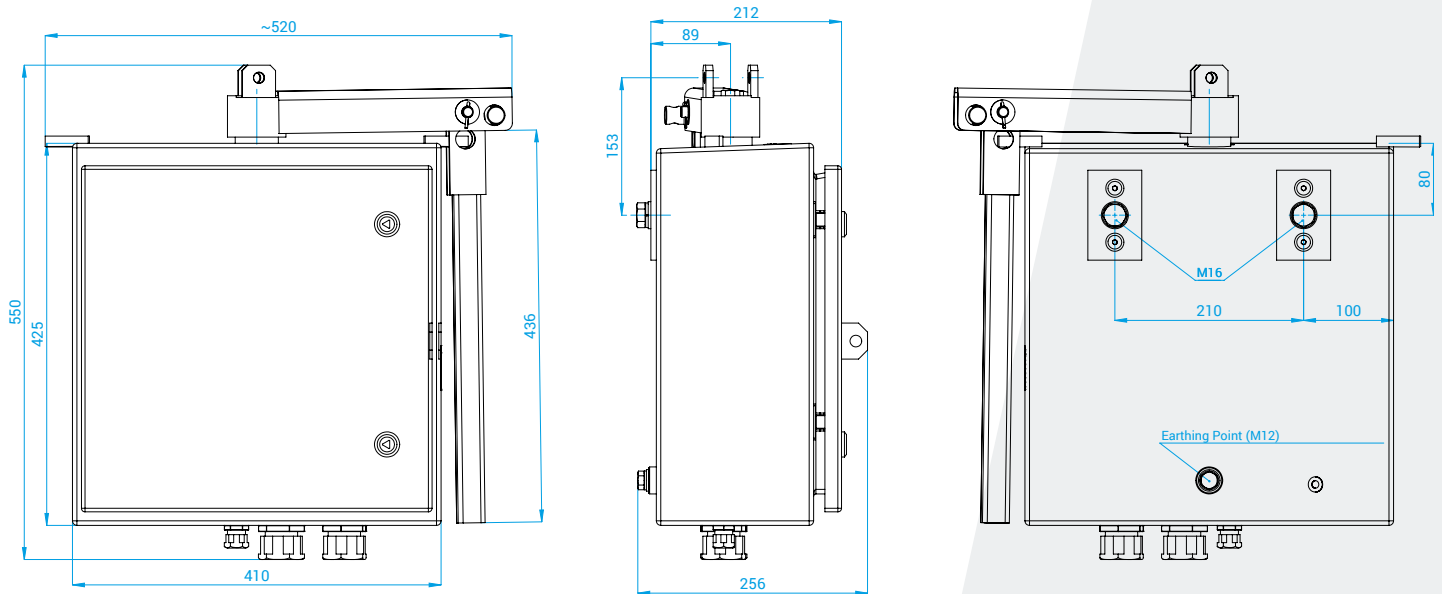
### 5.3. Periodic inspections

Periodic and maintenance inspections should be carried out once every 5 years. During inspections and maintenance, the applicable regulations for the operation of power equipment and the requirements for the safety of the work of people carrying out inspections must be observed.

These should be checked in particular:

- condition of the earthing point and earthing installation,
- condition of the mechanisms, bearings and connection components,
- correctness of the reaching limit positions,
- condition of the auxiliary contact switches contacts,
- condition of the anti-corrosion protective coatings,
- adhesion of the door cover seal to the housing edge,
- heater unit.

## 6. DIMENSIONAL DRAWING OF THE OPERATING MECHANISM





## 7. UTILIZATION

NR-5 type operating mechanisms are made of materials that are recyclable.

The main materials from which the operating mechanisms are built are :

- steel (painted, galvanized);
- aluminum (powder coated);
- plastics (epoxy mix, polyamide).

The operating mechanisms do not contain any dangerous substances. In accordance with applicable regulations, it is possible to return a worn out, complete operating mechanism to the manufacturer.

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