

## TECHNICAL DATA SHEET

### **Multi-turn electric drive Elephant MT-N-xM-O2-x-U1 five-cam**



## 1. GENERAL INFORMATION ABOUT THE PRODUCT

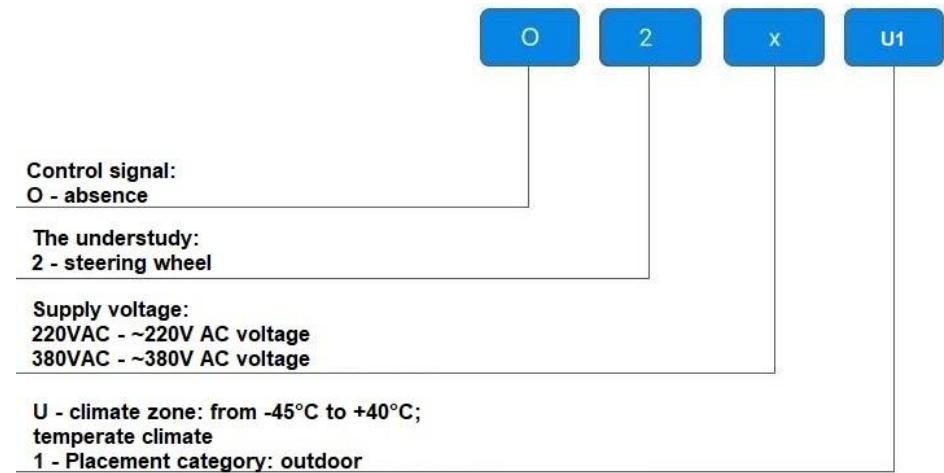
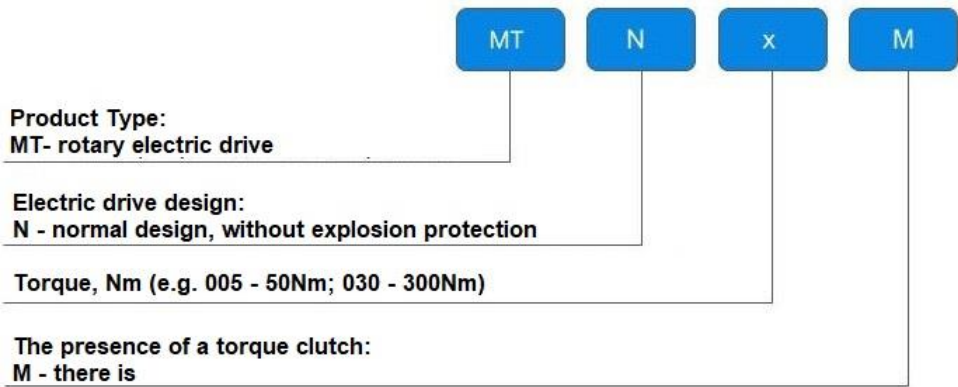
1.1. Product name: Multi-turn electric drive Elephant MT-N-xM-O2-x-U1 five-cam.

1.2. Purpose. The multi-turn electric actuator is designed to automate the control of industrial valves and to determine the position of the valve shutoff element.

1.3. Operating Principle. The electric actuator operates by converting an electrical signal from the control device into rotary motion of the output shaft.



1.4. Decoding the designation:



## 2. MAIN TECHNICAL DATA AND CHARACTERISTICS

Table 1. Main parameters

Electric drive type	multi-turn
Motor type	asynchronous
Power supply voltage	220V/AC, 50Hz, 1 phase 380V/AC, 50Hz, 3 phases Winding pattern: Y-star
Cable entry	waterproof G1/2
Connection type	ISO 5210
Automatic shut-off in the open, closed, and jammed positions	there is
Torque clutch	there is
Enclosure protection class	IP67
Winding insulation type	F
Ambient temperature, °C	from -30 to +70
Ambient humidity	≤95% (25°C)
Enclosure explosion protection	No
Average lifespan, closing/opening cycles	5 000



3. DEVICE

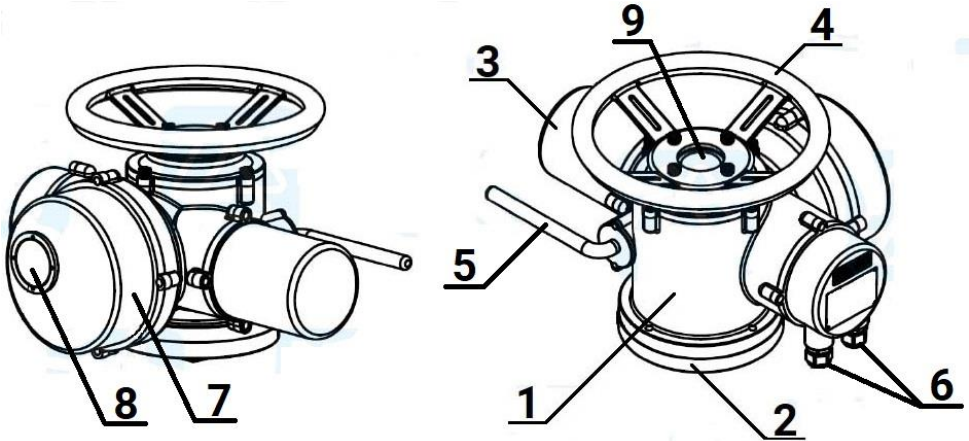


Figure 1 - General view

Table 2. Main details

№	Name
1	Housing
2	Mounting Flange
3	Electric Motor
4	Steering Wheel
5	Manual Mode Switch Lever
6	Cable Entries
7	Control Gear Cover
8	Position Indicator Window
9	Blank Cap

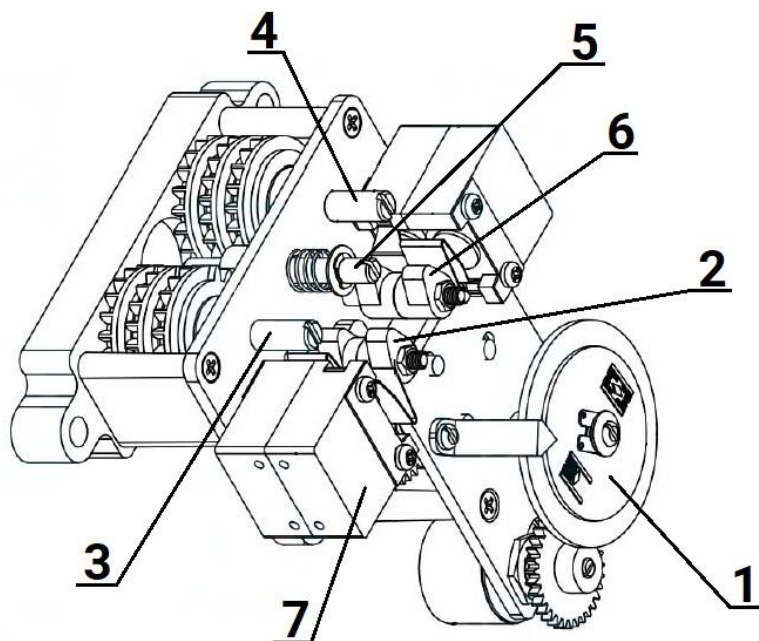


Рисунок 2 — Control mechanism

Table 3. Elements of the control mechanism

№	Name
1	Position indicator
2	Closing cam
3	Closing adjusting screw
4	Opening adjusting screw
5	Idler gear sleeve
6	Opening cam
7	Limit switch



3.1. The electric drive consists of six main units:

- Electric motor;
- Gearbox, which transmits force from the electric motor to the output shaft;
- Torque, stroke, and adjustment control mechanism;
- Electric-to-manual control switching mechanism (to switch from electric to manual control, pull the switching lever);
- Flywheel, which opens and closes the valve when switching to manual control;
- Electrical part.

3.2. Electric drive device diagram:

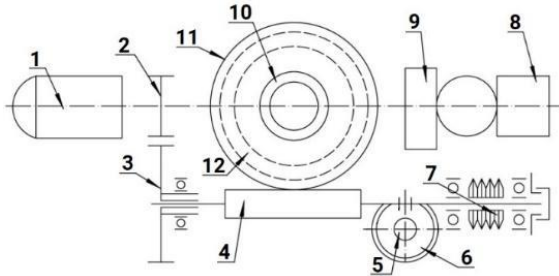


Figure 3 — Electric drive elements

Table 4. Electric drive elements

№	Name
1	Electric motor
2	Gear motor
3	Worm gear
4	Worm
5	Handle
6	Torque mechanism
7	Set of disc springs
8	Opening indicator
9	Movement mechanism
10	Output shaft
11	Worm gear
12	Bevel gear



3.3. Torque control mechanism:

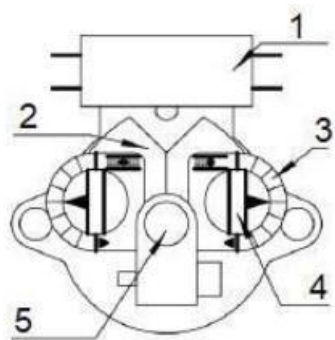


Figure 4 — Elements of the torque control mechanism

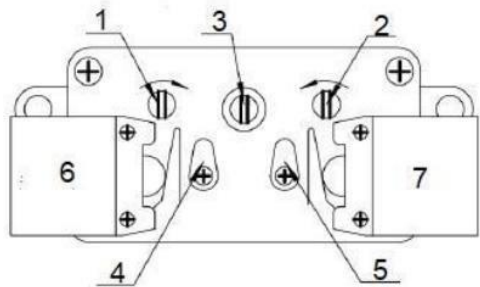
Table 5. Elements of the torque control mechanism

№	Name
1	Microswitch
2	Base plate
3	Crank
4	Separator disc
5	Adjusting shaft





3.4. Travel control mechanism:



Drawing 5 — Elements of the control mechanism

Table 6. Elements of the travel control mechanism

№	Name
1	Closing Adjustment Screw
2	Opening Adjustment Screw
3	Idler Gear Sleeve
4	Closing Cam
5	Opening Cam
6	Closing Limit Switch
7	Opening Limit Switch



4. TECHNICAL CHARACTERISTICS

Table 7.1. Technical characteristics

Model	Maximum torque on the output shaft, Nm	Output shaft speed, rpm	Manual transmission ratio	Weight, kg
MT-N-005M-O2-220VAC-U1	50	18	1:1	15,2
MT-N-010M-O2-220VAC-U1	100			15,8
MT-N-015M-O2-220VAC-U1	150			16,2
MT-N-020M-O2-220VAC-U1	200			24,2
MT-N-030M-O2-220VAC-U1	300			25,8
MT-N-005M-O2-380VAC-U1	50			15,2
MT-N-010M-O2-380VAC-U1	100			15,8
MT-N-015M-O2-380VAC-U1	150			16,2
MT-N-020M-O2-380VAC-U1	200			24,2
MT-N-030M-O2-380VAC-U1	300			25,8
MT-N-045M-O2-380VAC-U1	450			63,0
MT-N-060M-O2-380VAC-U1	600			65,2
MT-N-090M-O2-380VAC-U1	900			67,5



Table 7.2. Technical characteristics

<b>Model</b>	<b>Rated current, A</b>	<b>Power, kW</b>	<b>Voltage, V</b>
MT-N-005M-O2-220VAC-U1	0,82	0,18	220
MT-N-010M-O2-220VAC-U1	1,14	0,25	220
MT-N-015M-O2-220VAC-U1	1,68	0,37	220
MT-N-020M-O2-220VAC-U1	1,68	0,37	220
MT-N-030M-O2-220VAC-U1	2,5	0,55	220
MT-N-005M-O2-380VAC-U1	0,45	0,12	380
MT-N-010M-O2-380VAC-U1	0,6	0,18	380
MT-N-015M-O2-380VAC-U1	0,85	0,25	380
MT-N-020M-O2-380VAC-U1	1,05	0,37	380
MT-N-030M-O2-380VAC-U1	1,3	0,55	380
MT-N-045M-O2-380VAC-U1	2,5	1,1	380
MT-N-060M-O2-380VAC-U1	3,2	1,5	380
MT-N-090M-O2-380VAC-U1	3,2	1,5	380



5. OVERALL AND CONNECTION DIMENSIONS

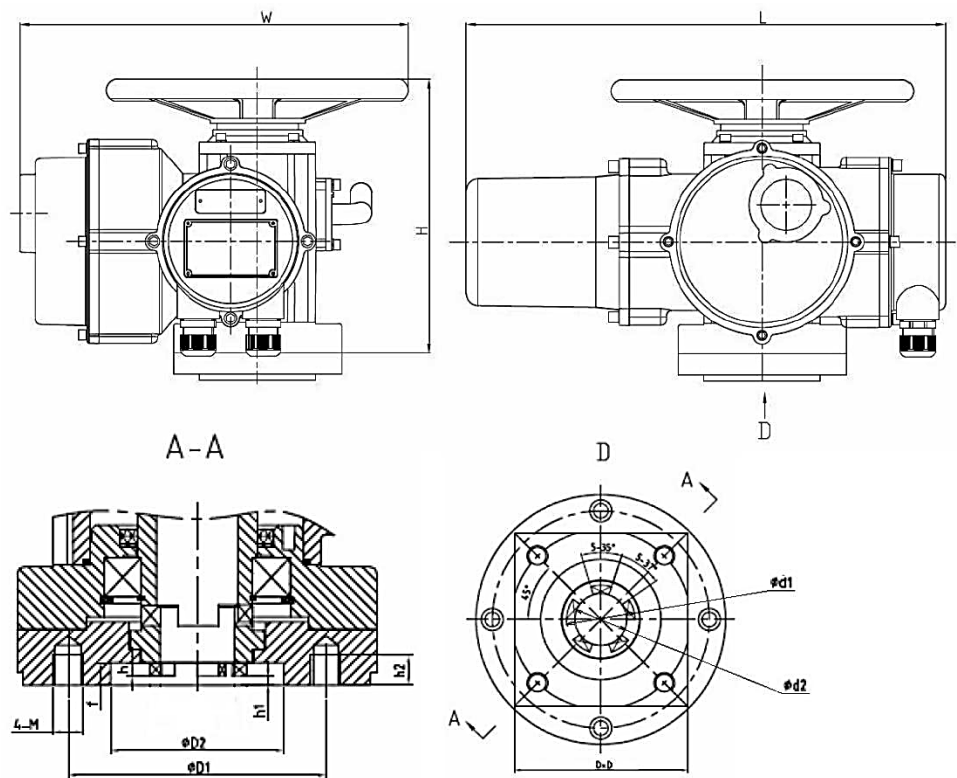


Figure 6 - Dimensions



Table 8.1. Dimensional characteristics

Model	W, mm	H, mm	L, mm	DxD, mm	D1, mm	D2, mm
MT-N-005M-O2-220VAC-U1	334	258	411	100x100	104	70
MT-N-010M-O2-220VAC-U1	334	258	411	100x100	104	70
MT-N-015M-O2-220VAC-U1	334	258	411	100x100	104	70
MT-N-020M-O2-220VAC-U1	365	290	470	122x122	135	108
MT-N-030M-O2-220VAC-U1	365	290	470	122x122	135	108
MT-N-005M-O2-380VAC-U1	334	258	411	100x100	104	70
MT-N-010M-O2-380VAC-U1	334	258	411	100x100	104	70
MT-N-015M-O2-380VAC-U1	334	258	411	100x100	104	70
MT-N-020M-O2-380VAC-U1	365	290	470	122x122	135	108
MT-N-030M-O2-380VAC-U1	365	290	470	122x122	135	108
MT-N-045M-O2-380VAC-U1	433	337	564	200x200	220	155
MT-N-060M-O2-380VAC-U1	433	337	564	200x200	220	155
MT-N-090M-O2-380VAC-U1	587	352	637	200x200	220	155

Table 8.2. Dimensional characteristics

Model	d1, mm	d2, mm	f, mm	h, mm	h1, mm	h2, mm	4-M
MT-N-005M-O2-220VAC-U1	32	44	8	5	3	18	4-M12
MT-N-010M-O2-220VAC-U1	32	44	8	5	3	18	4-M12
MT-N-015M-O2-220VAC-U1	32	44	8	5	3	18	4-M12
MT-N-020M-O2-220VAC-U1	45	57	15	8	7	22	4-M12
MT-N-030M-O2-220VAC-U1	45	57	15	8	7	22	4-M12
MT-N-005M-O2-380VAC-U1	32	44	8	5	3	18	4-M12
MT-N-010M-O2-380VAC-U1	32	44	8	5	3	18	4-M12
MT-N-015M-O2-380VAC-U1	32	44	8	5	3	18	4-M12
MT-N-020M-O2-380VAC-U1	45	57	15	8	7	22	4-M12
MT-N-030M-O2-380VAC-U1	45	57	15	8	7	22	4-M12
MT-N-045M-O2-380VAC-U1	70	84	22	11	11	28	4-M20
MT-N-060M-O2-380VAC-U1	70	84	22	11	11	28	4-M20
MT-N-090M-O2-380VAC-U1	70	84	22	11	11	28	4-M20



6. 220V CONNECTION DIAGRAM

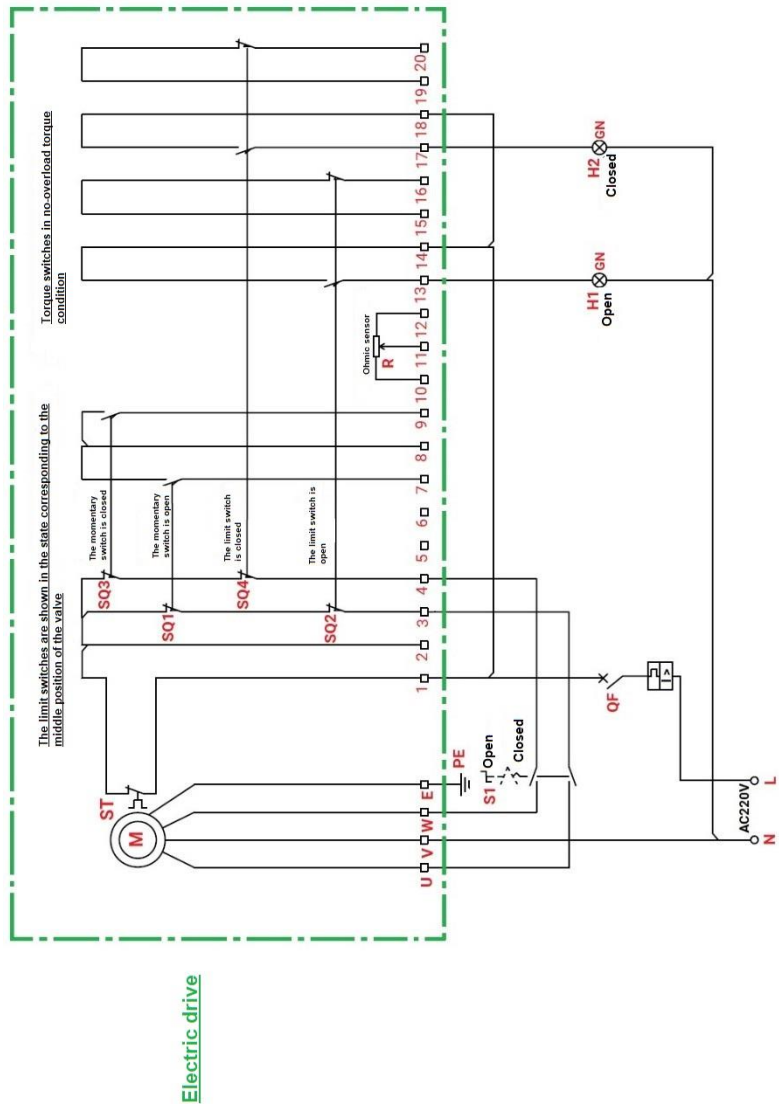


Figure 7 — Schematic diagram of connecting an electric drive with a single-phase 220V electric motor



# 7. 380V CONNECTION DIAGRAM

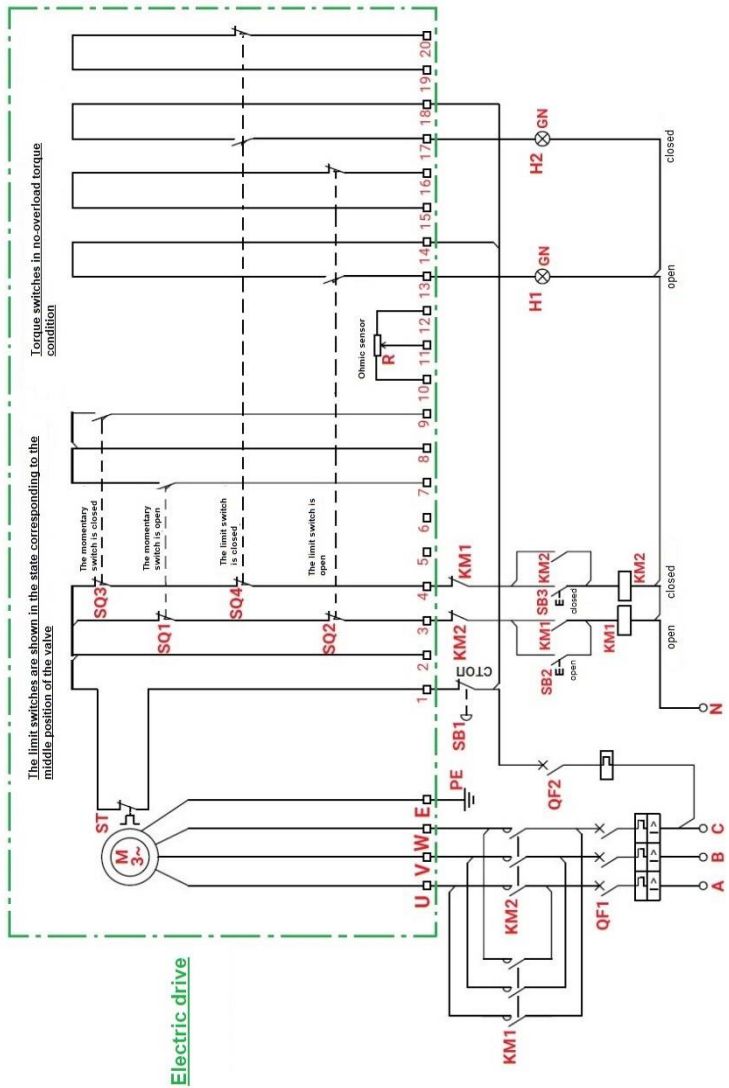


Figure 8 — Schematic diagram of connecting an electric drive with a three-phase 380V electric motor



## Conventional designations:

- W1 – connecting cable;
- PE – terminal «PE»;
- H3 – lamp «CLOSED»;
- H2 – lamp «OPEN»;
- H1 – lamp «NET»;
- KM2 – contactor «CLOSING»;
- SB1 – control button «STOP»;
- QF1 – circuit breaker 3P;
- QF2 – circuit breaker 1P;
- SB2 – backlit control button « OPENING»;
- SB3 – backlit control button « CLOSING»;
- KM1 – contactor «OPENING»;
- SQ1 – torque switch «OPEN»;
- SQ2 – limit switch «OPEN»;
- SQ3 – torque switch «CLOSED»;
- SQ4 – limit switch «CLOSED»;
- R – ohmic sensor;
- M – electric motor;
- ST – electric motor thermal relay.





## 8. INSTALLATION INSTRUCTIONS

8.1. Safety precautions during installation and operation of electric drives must be observed in accordance with established company procedures.

8.2. Only personnel familiar with the design of electric drives, safety regulations, and the requirements of this data sheet are permitted to install, operate, and maintain electric drives.

8.3. De-preservation of the electric drive should be performed immediately before its installation on the valve. The electric drive can be installed in any position.

8.4. Before installation, inspect the appearance of the electric drive, as well as the ease of movement of its moving parts from the mode selection lever (in manual mode).

8.5. The electric drive is mounted directly on the shut-off valve. During installation, ensure proper alignment of the electric drive mounting flange and the mating mounting flange on the actuator. A tight fit, play, or gaps when mating the electric drive and the shut-off valve are not permitted. This leads to increased stress on the electric drive components, accelerated wear, and rapid failure of the electric drive.

8.6. Care should be taken to ensure that the output shaft of the shut-off valve matches the mounting hole in the output shaft of the electric drive. Backlash is not allowed, as this leads to rapid wear of the electric drive components and shut-off valves.

**ATTENTION!** Connecting the electric motor directly to the power grid without an external control unit is prohibited.

8.7. Check after installation:

- the insulation resistance of electrical circuits relative to the housing at a temperature of 20° C and humidity up to 80% must be at least 20 M  $\Omega$  ;
- grounding resistance, which should be no more than 0.1 Ohm;
- operation of the electric drive in manual mode: by rotating the handle of the mode switching lever, make sure that the valve valve moves smoothly;
- operation of the drive from the electric motor: adjustment for opening, closing and precision of operation of the output shaft stroke limiter (for which 2 – 3 OPEN – CLOSED cycles are performed).



# 9. COMMISSIONING

## 9. 1. Setting up the torque control mechanism

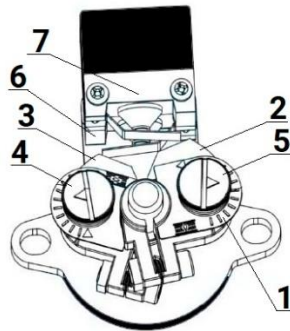


Figure 9 — Torque limiting clutch

Table 9. Elements of the torque limiting clutch

Nº	Name
1	Scale
2	Support Plate
3	Support Plate
4	Adjusting Cam (Opening)
5	Adjusting Cam (Closing)
6	Torque Switch SQ1(TC) - Opening
7	Torque Switch SQ3(TO) - Closing

9.1.1. The torque control mechanism should be adjusted with no pressure in the system and after checking the potentiometer is disengaged on the position indicator (this is done by loosening the set screw of the gear on the potentiometer shaft until it is disengaged):

- Adjust the closing torque (starting with a small torque value, gradually increase the torque value until the valve is tightly closed;
- After applying pressure to the system, check the tightness of the valve closure (if there is no tightness, increase the torque value to a value that ensures full opening and tightness when closing the valve shutter).



## 9.2. Adjusting the travel control mechanism

### 9.2.1. Adjusting the closing stroke:

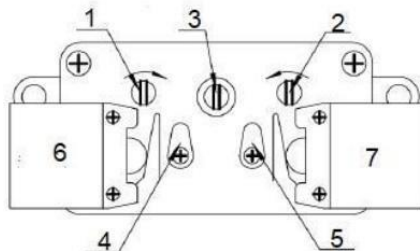
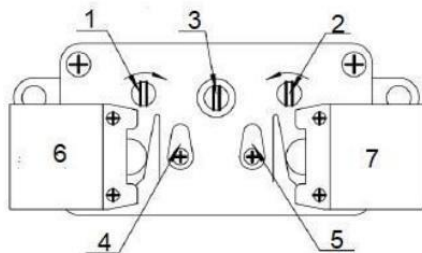


Figure 10 - Adjusting the closing stroke

- close the valve manually;
- disconnect the travel control mechanism (use a screwdriver to press on the intermediate gear sleeve (3) in the travel control mechanism and turn it 90 degrees to separate the drive gear from the counter gear;
- pre-adjust the closing stroke (use a screwdriver to turn the closing adjusting shaft (1) in the direction of the arrow until the closing cam (4) presses on the spring pressure plate so that the closing limit switch (6) is triggered;
- press and turn the intermediate gear sleeve (3) so that the drive gear and gears on both sides engage correctly (use a screwdriver to turn the adjusting shaft slightly left and right);
- open the valve a few turns and then close it and, depending on whether the closing stroke meets the requirements, adjust the closing stroke.



### 9.2.2. Adjusting the opening stroke:



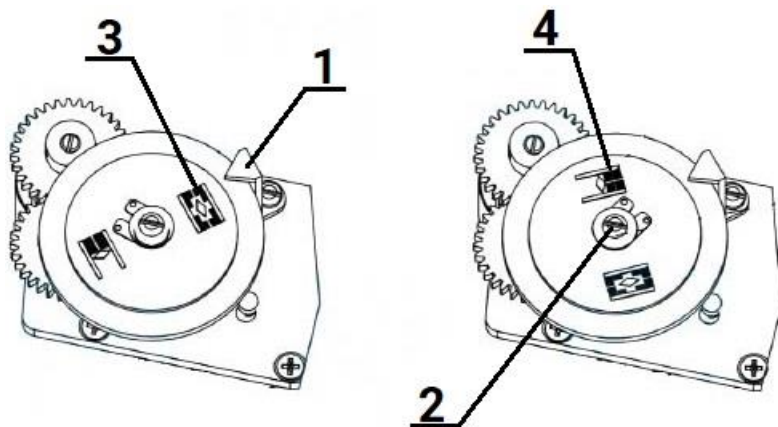
Drawing 11 — Adjusting the opening stroke

- open the valve manually (note that at this time the stroke control mechanism must be engaged, otherwise the adjustment of the closing stroke will be disrupted);
- disconnect the stroke control mechanism (use a screwdriver to press on the intermediate gear sleeve (3) in the stroke control mechanism and turn it 90 degrees to separate the drive gear from the counter gear);
- preliminary adjust the opening stroke (use a screwdriver to turn the opening adjusting shaft (2) in the direction of the arrow until the opening cam (5) presses the spring pressure plate to activate the opening limit switch (7));
- press and turn the intermediate gear sleeve (3) until the drive gear and gears on both sides mesh correctly (use a screwdriver to turn the adjusting shaft slightly left and right);
- close the shutter a few turns and then open it and adjust the opening stroke depending on whether the opening stroke meets the requirements.



### 9.3. Setting up the position indicator

9.3.1. Adjustment of the valve position indicator should be performed after completing the adjustment of the limit switches.



Drawing 12 — Setting up the position indicator

9.3.2. Depending on the required number of output shaft revolutions, engage the pinion with the locking pinion and secure it.

9.3.3. Using the handwheel, set the valve to the "Closed" position.

9.3.4. Loosen the screw (2) and, by turning the "Closed" position disc (4), align the mark with the pointer (1) located on the electric drive cover. Tighten the screw (2).

9.3.5. Using the handwheel, set the valve to the "Open" position.

9.3.6. Loosen the screw (2). While holding the "Closed" position disc (4) from turning, align the mark on the "Open" position disc (3) with the pointer (1). Tighten the screw (2).



## 9.4. Test launch

9.4.1. A test run of the electric drive should be carried out only after fulfilling points 9.1 – 9.3. of this passport.

**ATTENTION!** Incorrect rotation direction will result in damage to the valve. If the rotation direction is incorrect, turn off the electric drive immediately.

9.4.2. The direction of rotation is checked in the following order:

9.4.2.1. Set the valve to the middle position in manual control mode.

9.4.2.2. Briefly run the electric drive in the "Close" direction and monitor the direction of rotation using the position indicator. Upon reaching the end position, turn off the electric drive.

9.4.3. The direction of rotation is correct if the output shaft moves in the closing direction and the position indicator rotates clockwise.

9.4.4. If the direction of rotation is incorrect, turn off the electric drive immediately. For electric drives with a single-phase motor, check that the power supply circuits are connected correctly. For electric drives with a three-phase motor, swap any two conductors on the U, V, and W terminals of the electric drive's terminal block.

## 9.5. Checking limit switches

9.5.1. Bring the electric drive to the end positions in manual mode one by one.

9.5.2. The limit switches are set correctly if:

- switch SQ2(PO) is activated in the end position «Open»;
- switch SQ4(PC) is activated in the end position «Closed»;
- after turning the steering wheel back, the switch unlocks the contacts again.



## 10. OPERATING INSTRUCTIONS

10.1. Maintenance personnel are allowed to service the electric drive only after completing the appropriate safety training.

10.2. When servicing the electric drive, the following rules must be observed:

- electric drive maintenance must be carried out in accordance with the established "Rules for the Technical Operation of Consumer Electrical Installations";
- the location where the electric drive is installed must be adequately illuminated;
- the electric drive housing must be grounded;
- installation work on electric drives must be carried out only with serviceable tools;
- when beginning maintenance, ensure that the electric drive is disconnected from the power supply.

10.3. During operation, periodic inspections of the electric drive must be performed at intervals established by the schedule, depending on the drive operating mode, but at least once every three months. During inspection, pay attention to the integrity of the housing, the presence of all fasteners and their components, warning signs, grounding devices, plugs in unused input devices, and the sealing of input cables. During routine inspection, measure the insulation resistance.

10.4. The gearbox lubricant should be replaced every 4-6 years (depending on the intensity of use). When changing the lubricant, the rubber sealing rings should also be replaced.



## 11. POSSIBLE MALFUNCTIONS AND HOW TO ELIMINATE THEM

Table 10. Malfunctions and troubleshooting methods

Malfunction	Возможная причина	Меры по устранению
When the start buttons are pressed, the electric drive does not work.	<ol style="list-style-type: none"> <li>1. The power circuit or magnetic starter is faulty.</li> <li>2. There is no power to the control panel.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the power circuit and magnetic starter and troubleshoot.</li> <li>2. Apply power to the control panel.</li> </ol>
When the valve gate reaches the CLOSED or OPEN position, the electric motor does not switch off.	<ol style="list-style-type: none"> <li>1. The set positions of the closing (opening) limit switches or clutch microswitches are out of adjustment.</li> <li>2. The closing (opening) limit switch or clutch microswitch has failed.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust the positions of the closing (opening) limit switches or clutch microswitches and securely fasten them.</li> <li>2. Replace the closing (opening) limit switch or clutch microswitch.</li> </ol>
During the closing/opening of the valve, the electric drive stopped and the “Overload” lamp came on.	Jamming of the valve stem or moving parts of the electric drive.	<p>Turn off the electric drive and check that it starts in the direction in which the jam occurred.</p> <p>If the electric drive stalls upon restarting, identify and correct the problem.</p>
In the extreme positions of the valve shutter, the CLOSED or OPEN lamps do not light.	<ol style="list-style-type: none"> <li>1. The lamps are burned out.</li> <li>2. The limit switches are out of adjustment.</li> <li>3. There is no power to the electric drive indicator circuit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the lamps.</li> <li>2. Adjust the contacts of the limit switches and secure them securely.</li> <li>3. Check the indicator circuit with the electric drive, troubleshoot any faults, and apply power to the indicator circuit.</li> </ol>
The CLOSED and OPEN lights are on at the same time.	<ol style="list-style-type: none"> <li>1. Short circuit between the limit switch wires.</li> <li>2. Incorrect setting of the limit switch.</li> </ol>	<ol style="list-style-type: none"> <li>1. Locate the short circuit in the electric drive and rectify the fault.</li> <li>2. Fine-tune the limit switches.</li> </ol>
Incomplete closing of the valve gate.	<ol style="list-style-type: none"> <li>1. Insufficient torque.</li> <li>2. Solid particles have gotten between the valve sealing surfaces.</li> <li>3. Limit switches are not set correctly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Select a suitable electric actuator.</li> <li>2. Clean the inside of the valve.</li> <li>3. Adjust the limit switches.</li> </ol>





## **12. TRANSPORTATION AND STORAGE CONDITIONS**

- 12.1. Electric drives must be stored in accordance with established enterprise procedures.
- 12.2. Electric drives must be transported in accordance with established enterprise procedures.

## **13. DISPOSAL**

- 13.1 Disposal of the product (remelting, burial, resale) is carried out in accordance with the procedures established at the enterprise.



## 14. WARRANTY OBLIGATIONS

14.1. Warranty period - 12 months from the date of commissioning, but not more than 18 months from the date of sale.

14.2. The warranty applies to equipment installed and used in accordance with the installation instructions and product specifications described in this data sheet.

14.3. The manufacturer guarantees compliance of the product with safety requirements, provided that the consumer complies with the rules of transport, storage, installation and operation.

14.4. The warranty covers all defects caused by the fault of the manufacturer.

14.5. The warranty does not apply:

- parts and materials of the product subject to wear and tear;
- for cases of damage caused by:
  - modifications to the original design of the product;
  - violation of general installation recommendations;
  - faults caused by improper maintenance and storage; improper operation and use of the equipment.

## 15. WARRANTY TERMS

15.1. Claims to the quality of the goods may be made during the warranty period.

15.2. Defective products are repaired or exchanged for new ones free of charge during the warranty period. ELEPHANT decides whether to replace or repair the product. The replaced product or its parts resulting from the repair shall become the property of 'ELEPHANT'.

15.3. Costs related to dismantling, installation and transport of the defective product during the warranty period shall not be reimbursed to the Buyer.

15.4. If the claim is unfounded, the Buyer shall pay the costs of diagnostics and expertise of the product.

15.5. Products are accepted for warranty repair (as well as for return) fully assembled.



## WARRANTY CARD № \_\_\_\_\_

№	Product Name	Packs

Name and address of the trading organisation \_\_\_\_\_

Date of sale \_\_\_\_\_ Seller's signature \_\_\_\_\_

Stamp or seal of the trading organisation \_\_\_\_\_

Acceptance stamp \_\_\_\_\_

I agree with the terms and conditions of the warranty:

Buyer \_\_\_\_\_ (signature)

Warranty period - 12 months from the date of commissioning, but not more than 18 months from the date of sale.

For warranty repairs, complaints and product quality claims, please contact ELEPHANT at: Carrer d'Aragó, 264, 3-1, 08007 Barcelona, Spain. E-mail address: sales@valveelephant.com.

When making a complaint about the quality of goods, the buyer shall present the following documents:

1. A free-form application, which shall specify:

- name of the organisation or full name of the buyer, actual address, contact telephone numbers;
- name and address of the organisation that carried out the installation;
- basic parameters of the system in which the product was used;
- a brief description of the defect.

2. Document confirming the purchase of the product (delivery note, receipt)..

3. Act of hydraulic test of the system in which the product was installed.

4. This completed warranty card.

A note on the return or exchange of goods \_\_\_\_\_

Date: « \_\_\_\_ » \_\_\_\_\_ 202\_\_ yr. Caption \_\_\_\_\_

