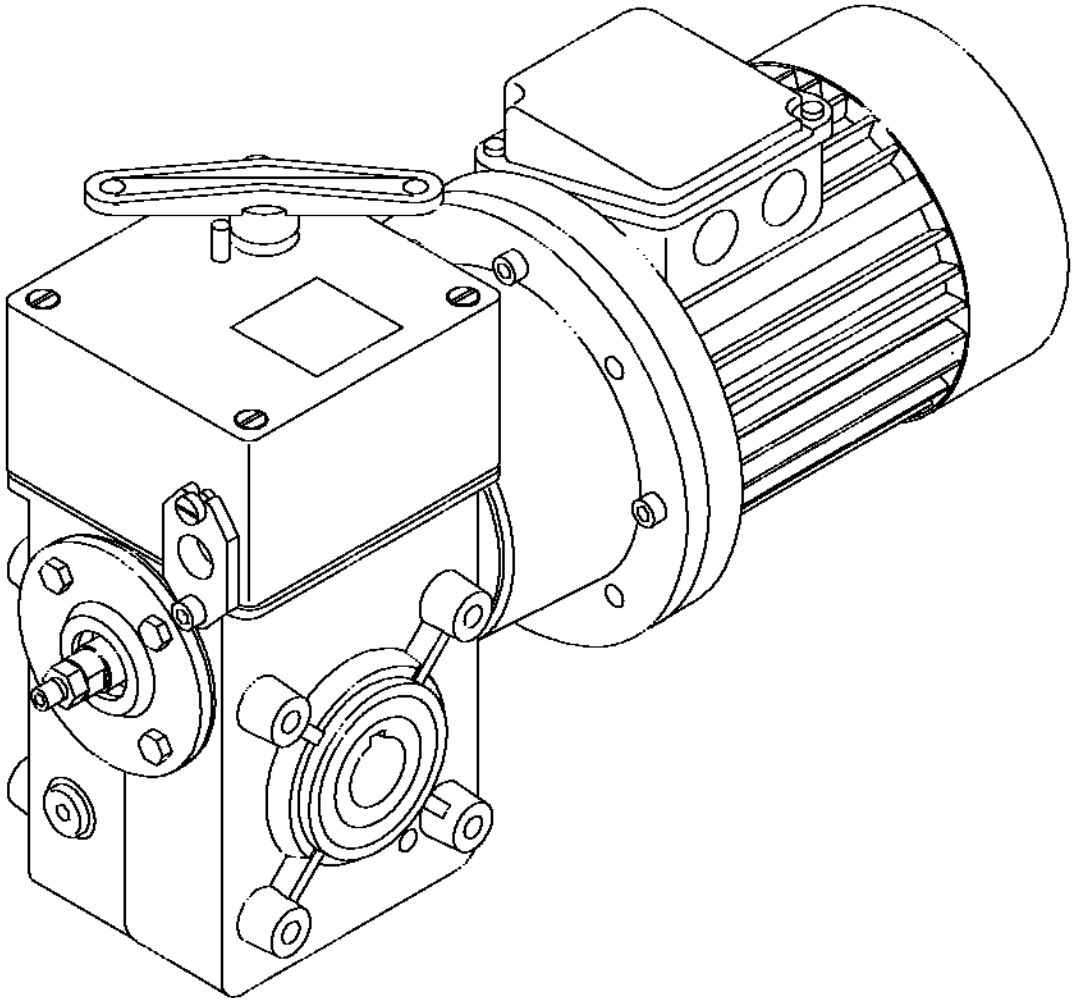
OPERATING AND MAINTENANCE INSTRUCTIONS
DOOR OPERATOR TVR(FC) 5

ENG



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MFZOVITOR

1. CONTENT

2. KEY TO SYMBOLS

Danger of personal injury!
The safety instructions must be observed

Warning! Danger to property!
The safety instructions must be observed!

Information
- *Special information*
- *Reference to other sources of information*

3. GENERAL INFORMATION

These operating instructions are part of the door operator delivery. Always store these instructions in the vicinity of the door operator, e.g. with other technical documents of the door.

Anyone involved in installing, maintaining or repairing the door operator must be familiar with this manual and observe its regulations and instructions. The manufacturer will not take responsibility for damage and operational errors that occur if the regulations and instructions contained or mentioned in this manual are neglected.

The door operator described in these operating instructions is meant to open and close a door or similar. The door operator is described here on the basis of its technical characteristics at the time of printing the manual.

The manufacturer reserved the right to modify separate basic unit assembly groups and materials if these modifications are considered appropriate for improving the capacity and safety of the door operator.

The speed and travel of the door determine which gear and limit transmission values should be used. Different possible transmission ratios are not explained in this manual. The transmissions for each specific case can be found in the production information, by the serial number.

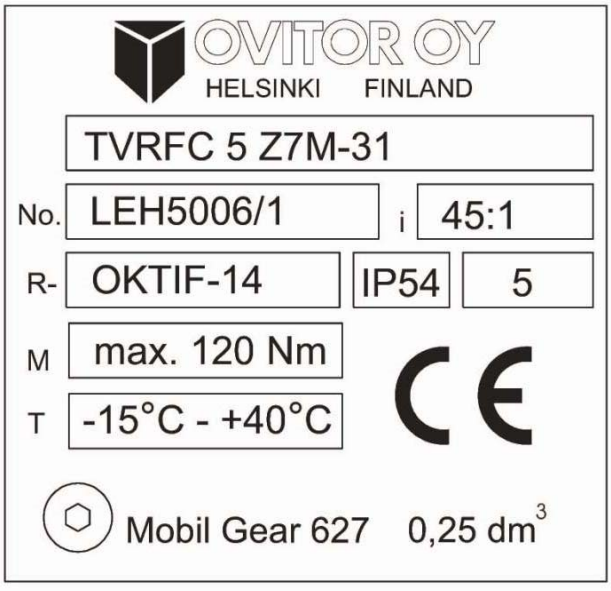


Fig. 1.

Serial number:

3.1 SAFETY INSTRUCTIONS

- *Only authorised and properly trained personnel may install, maintain or repair the door operator. In cases of more demanding repairs, always deliver the door operator to the manufacturer for maintenance.*
- *Ensure that the persons responsible for installation, preparation for utilisation and maintenance of the door operator have read this manual and that they understand and observe the regulations and instructions contained and mentioned therein.*

This door operator meets the requirements of 2006/42/EY, EMC-directive 2004/108/EY, LVD 2006/108/EY and standard EN 13241-1 and is delivered in safe operation mode. Self-made modifications that could affect the operational safety of the door operator are not allowed.

Observing the instructions will improve your safety and that of your operating environment. It also ensures the operational safety of the door and its drive unit and prevents interruptions in use caused by faulty handling, along with burdens to the environment.

Observe occupational safety and environmental protection regulations, when transporting, setting-up, installing, operating, maintaining and dismantling the door operator.

To ensure operational safety, only original components or parts that have been specifically approved by the manufacturer may be used in or connected to the door operator. All components of the device have been selected, protected and constructed so that they are durable and meet the environmental and operational requirements specified in this manual.

Perform maintenance on the door and the door operator only when the door is not moving. To prevent unintentional starting of the door operator, you must e.g. lock the main switch of the door operator control system in the **0** position.

3.2 RATING PLATE

Every complete drive unit has two (2) rating plates, one on the gear box and the other one on the electric motor (fig. 2). The plate on the gear box shows (fig. 1), in addition to the technical information, also the production serial number (e.g. MLN9878/1), on the basis of which all original production information can be traced later.

In all questions related to service, spare part deliveries or claims it is extremely important to refer to the serial number. With reference to this number it will be possible to clear up in detail important matters related to production, quality control and deliveries. Record the serial number of the GEAR box e.g. on the second page of this manual.

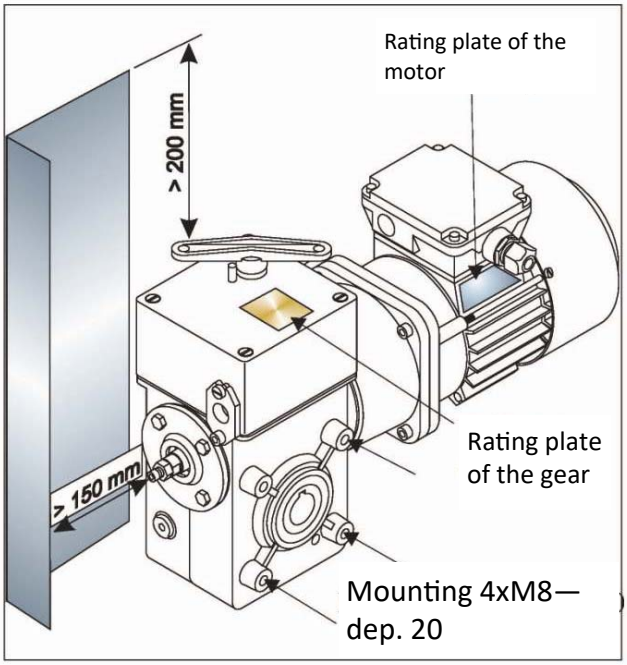


Fig. 2.

4. PRODUCT RANGE

4.1 OPTIONS

TVR 5 door operator is delivered in following options:

F = Disengagement clutch for manual operation

C = Slipping clutch, dry, on the input shaft between motor and the gear box

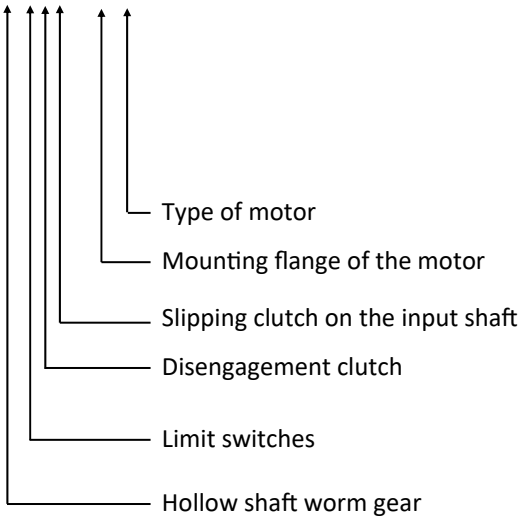
Type of the mounting flange:

Z6 = flange IEC 63 B5
Z7 = Flange IEC 71 B5
Z8 = Flange IEC 80 B5
Z9 = Flange IEC 90 B5
X = Flange for Ovitor brake motor, not IEC standard

Type of motor:

M = 3~ electric motor
MY = 1~ electric motor
MD = Dahlander 2-speed motor
MJ = Motor with built-in magnetic brake (Brake motor)
MDJ = Dahlander 2-speed brake motor
MT = DC-motor

E.g. TVRFC 5 Z7M



5. MECHANICAL INSTALLATION

- *Only properly authorised and trained personnel may dismantle or repair the door operator.*

Before installation, inspect the drive unit visually for possible damage sustained during transport. Additionally, the drive unit must stand on each of its four sides for about one minute to make sure that no damage to rotary shaft seals or the housing has been sustained during transport. No oil leaks are allowed. If oil is leaking out, remove it immediately with an oil-absorbing substance. Installation of a drive unit with oil leaks is forbidden. Deliver a faulty unit to the manufacturer for repair.

The drive unit must be mounted carefully on a solid and even surface and bolted firmly to the base. If the drive unit is to be mounted on a steel structure, make sure that this structure will not bend. If the mounting base is not perfectly even, the fixing lugs of the drive unit could break when the fixing screws are tightened. Do not bend gear when tightening the fixing screws. Use fixing screws with a min. strength class of **8.8**. Install the drive unit so that no resonance vibration will occur and no vibration can be transferred from adjacent structures. Do not perform welding on the drive unit or connect it to welding circuit.

When mounting the drive unit, note the access required for adjustment of the limit switches, as shown in the adjacent fig. 2. The dimensions of the drive unit are shown in type specific drawings 62XX/7XXX (e.g. 6225/7076).

If a chain transmission is used, sprockets should be perfectly aligned. The fixing of the drive unit must be able to support min. **5000** N chain tension.

Drive unit must be sheltered against falling objects.

If the drive unit has been detached, e.g. for maintenance, it must be mounted again using instructions given above. The drive unit must be detached, together with its motor. In cases where more demanding repairs are required, always deliver the door operator to the manufacturer for maintenance. An exploded view of the drive unit and the part numbers can be found later in this manual.

6. ELECTRICAL INSTALLATION

STOP

- *Only properly authorised and trained personnel is allowed to carry out electrical installation.*

Perform the installation and make the connections according to the wiring and circuit diagrams provided specifically for this case by control system supplier.

The temperature detectors of the gear unit, the possible micro switch of the disengagement clutch and the micro switches of the limits are already connected to the connectors in the limit switch box according to the fig. 3. Do not modify these connections without first consulting the manufacturer.

Open and close the cover of the limit switch box carefully so that its enclosure class will not decrease in installation. First loosen the fixing bolt of the cable gland lead-through (part number 569) on the side of the limit switch box. Then loosen all fixing bolts of the cover (1/2 turn) crosswise. After that loosen the bolts completely and take off the cover. Install the limit cable in the cable gland and tighten it. Check the cable's sealing. Make the necessary connections.

After checking the adjustment and operation of the limit switches, install the cover of the limit switch box in its place. Check that the sealing on the gear unit's side has not suffered damage during the installation. Check that no dirt remains between the cover and the gear unit. If there is a disengagement mechanism (F) in the gear unit, check that the slot in the end of the disengagement shaft is in the correct position with respect to the shoulder inside the disengagement lever. If the parts do not match, the cover cannot be positioned correctly and could be damaged when the fixing bolts are tightened. When the cover is correctly in place, tighten the fixing bolts evenly. Also tighten the fixing bolt in the cable gland lead-through. After tightening the bolts, check that the lever of the disengagement clutch functions properly. The lever must turn 90 degrees.

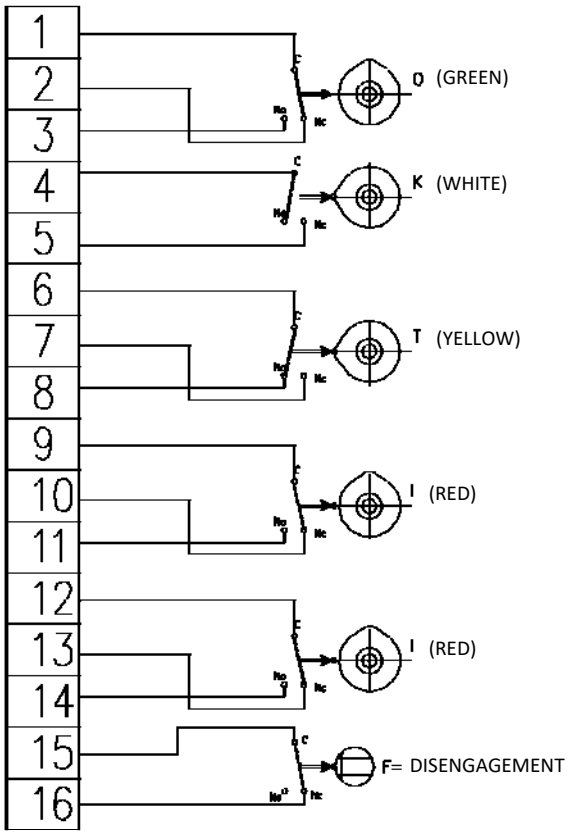


Fig. 3. Connection example OKTIIF

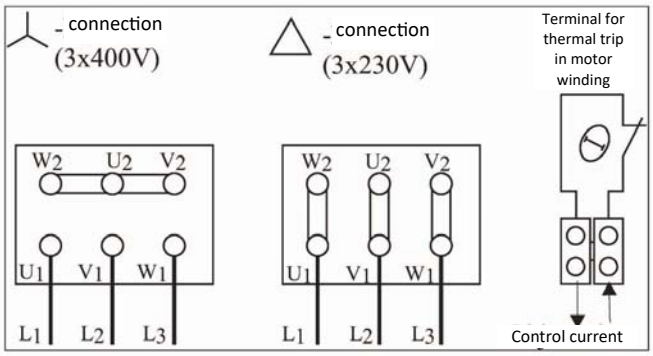


Fig. 4.

7. SET UP

7.1 ADJUSTMENT OF THE SLIPPING CLUTCH

The torque transmitted by the drive unit must always be adjusted in due consideration of the safety requirements of the door operation. The limitation of the torque is done by adjusting the slipping clutch situated between the electric motor and the gear box. When delivered from the factory the slipping clutch is left loose so that no torque can be transmitted from the electric motor.

Adjustment:

1. Loosen the M8 lock nut at the end of the worm shaft.
2. Hold the worm shaft with a spanner.
3. Start turning the adjustment screw inwards (= clockwise) until the required torque has been obtained.

The torque should be adjusted so that it is just high enough to move the door over its complete travel and low enough to permit the clutch to slip as soon as the door is obstructed in its movement. A direct safety risk is produced if the torque is set to a considerably higher level than required for the door operation.

- Safety regulations state that the door movement must not produce a pressing force exceeding 800 N. If the door cannot be moved by hand, due to a fault in the counterbalancing or for some other reason, it is not permitted to adjust the slipping clutch to a higher torque. The reason for the incorrect operation must be removed or corrected.
- Before starting to adjust the slipping clutch, check and make sure that the door can easily be moved manually in every part of its travel.

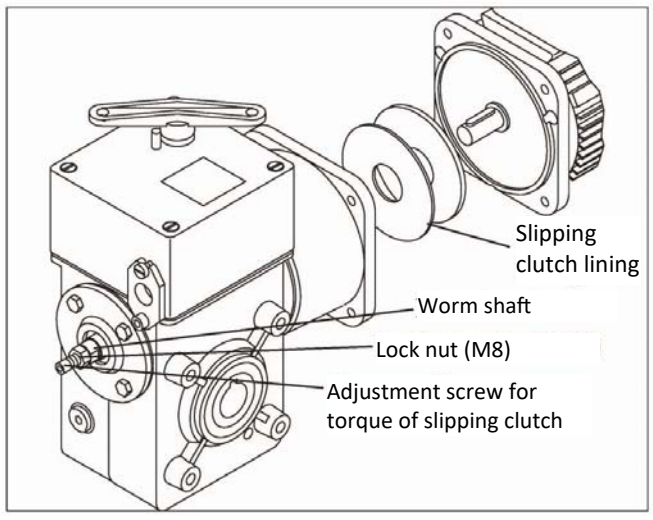


Fig. 5. Slipping clutch

7.2 ADJUSTMENT OF THE LIMIT SWITCHES

To ensure correct adjustment, familiarise yourself with the functioning of the limits in the control system. For further information of the limit switches, check the documentation of the control system.

Limit switches are adjusted as shown in fig. 6.

1. The limit switches are adjusted with the locking screw **(N)** and fine adjustment screw **(M)** (Allen key size:2.5 mm).
2. First turn the cam wheel near to the right position and tighten the locking screw **(N).**
3. Fine adjustment can be done by screwing the adjustment screw **(M)**.

Adjustment of the doors limit positions.

1. Move the door manually to the position that corresponds the activation position of the limit switch.
2. Adjust the cam wheel to its correct position (micro switch is near to activation). Note the rotation direction of the limit shaft!
3. It is recommended to perform the final fine adjustment by operating the door with the drive unit.
4. Check the proper operation of all protective and external devices.

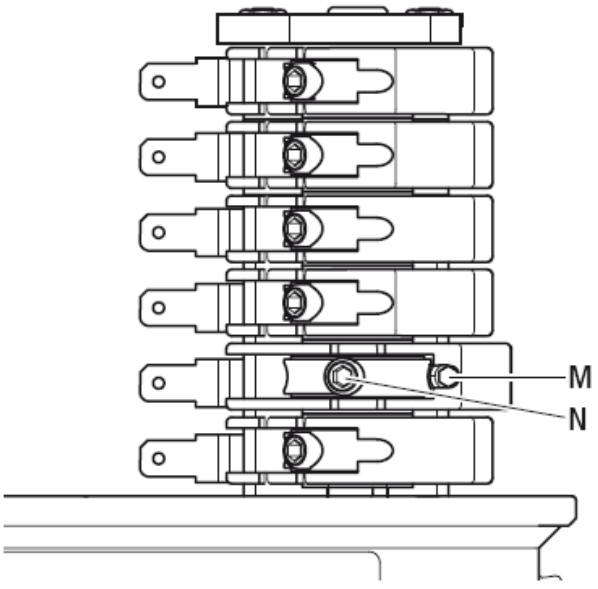
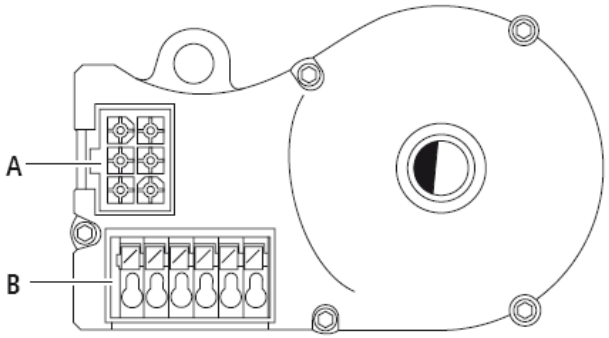


Fig. 6. Adjustment of the limit switches

At the initial installation phase, the rotation direction of the electric motor can be wrong.
Be prepared to stop the movement to wrong direction immediately by using the STOP button.
Interchange two phase conductors to change the rotation direction. It is recommended to make the change in the control unit.

7.3. DIGITAL SETTINGS -LIMIT SWITCH AND SAFETY CIRCUIT FOR DRIVE

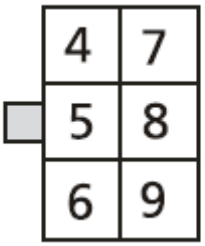


Electric interface

A: AVE plug (absolute value encoder plug)
B: AVE plug terminal (absolute value encoder plug terminal)

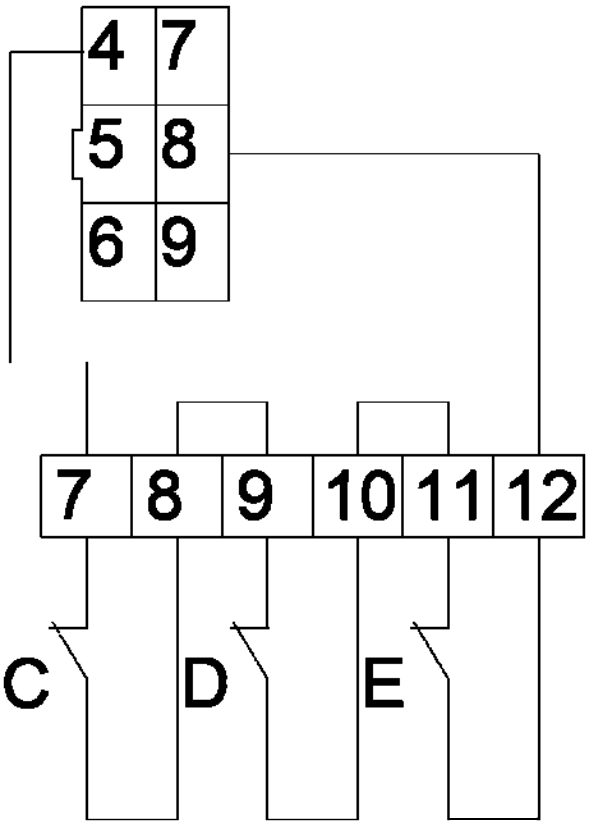
Information!
Please refer to the control unit's operating manual for instructions on setting the end positions.

Wiring allocation



The numbers on the plug are also the wire numbers:
4: Safety circuit input
5: RS485B
6: GND
7: RS485A
8: Safety circuit output
9: 7...18 VDC

AVE (absolute value encoder) plug terminal (7-12)



C. Thermal element in the drive
D. Manual emergency control (crank or chain)
E. Disengagement

8. OPERATION

Observe the regulations and instructions given in this manual when operating the door.

Conduct weekly inspections to determine changes in the sounds of the gear unit or oil leaks from the gear unit. If you note oil leaks or unusual sounds during drive unit operation, stop the drive immediately and make sure that it cannot be used. If you cannot determine the cause of the problem, deliver the drive unit to the manufacturer for repair.

Note that dust may accumulate on the drive unit during its operation. If necessary, clean the drive unit regularly. The dust layer must not be thicker than 5 mm. Do not use high-pressure cleaning machines to clean the drive unit.

8.1 DISENGAGEMENT CLUTCH (NOT TVR TYPE)

Disconnection of the drive unit is done by turning the disengagement lever. This enables the manual operation of the door. To disengage, turn the lever of the clutch 90 degrees, as shown in fig. 7. For operation of the lever from floor level, attach ropes to the holes at the ends of the lever.

The movement of the lever affects a micro switch. While affected, the micro switch disconnects the control current. For normal electric operation, move the lever back to its original position.

Note! Switching back to electric operation is allowed only by turning the disengagement lever to its position for electric operation and by moving the door manually until the clutch dogs are engaged perfectly (→click).

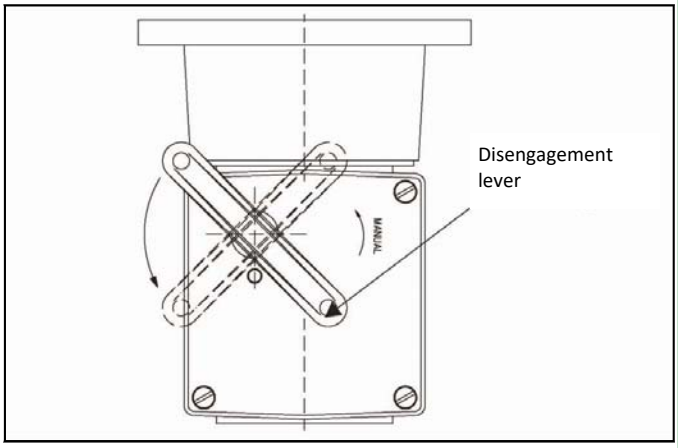


Fig. 7. Disengagement clutch

9. SERVICE AND MAINTENANCE

Please note the instructions in the "Operation" section for observing gear unit condition.

All service and maintenance work must be carried out carefully and only by thoroughly trained personnel. Perform maintenance of the door and the door operator only when the door is not moving. To prevent unintentional staring of the door operator, lock the main switch of the control system in the 0 position.

Semi-annual service and maintenance:

- Check the condition and adjustment of the slipping clutch
- Check the tightness of all fixing bolts in the gear unit and the electric motor.
- If a chain is used in power transmission, check the alignment of the sprockets.
- Check the condition of the chain and the sprockets.
- Examine the condition of the gear unit visually.
- Check the sounds of the gear unit.
- Check the tightness of the gear unit.
- Remove the dust that has accumulated on the gear unit and the motor.

In addition to this, check the condition of the entire gear every three years.

Correct lubrication is of primary importance for the functioning of a worm gear. The oil grade for the initial filling is shown on the rating plate. In the specified operating conditions, oil changes are not necessary. The oil quantity should, however, be checked at the time of installation and at least once a year during normal maintenance of the door.

The initial filling oil used is suitable for an environment with temperature variations from –20 °C to +40 °C. For drive units that are run with an especially high operating frequency such that the surface temperature of the unit is constantly above +40°C, oil changes are recommended. In such operating conditions, the first oil change should occur after approx. six months of operation and subsequently at three year intervals.

When changing the oil, always use the same type of oil used previously. It is not allowed to mix oils of different types or from different manufacturers. Mixing oil types may damage the rotary shaft seals and cause oil leaks
When changing the oil, please note that hot oil may cause burns. Always use protective gloves and remove leaking oil immediately with an oil-absorbing substance.

9. SERVICE AND MAINTENANCE

9.1 CHANGING THE FRICTION LINING OF THE SLIPPING CLUTCH

Changing the friction lining of the slipping clutch is the only special service operation required. The operation is done as follows:

1. Check the thickness of the friction lining of the slipping clutch through inspection hole in the side of the mounting flange between the gear box and the electric motor. The inspection hole is covered with a detachable plastic plug. If the friction lining is worn out, carry out points 2-6.
2. Unscrew the adjustment screw fully (fig. 5)
3. Detach the motor from the gear
4. The gear side of the clutch has a guide for the correct alignment of the friction lining. Make sure the new friction lining is aligned correctly.
5. Attach the motor with the gear
6. Adjust the slipping clutch according to chapter 7.1

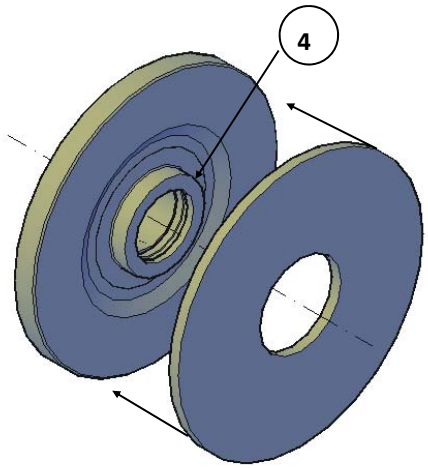


Fig. 8. Gear side of the clutch and the friction lining

9.2 PERMITTED LOAD

The door operator's maximum permitted torque has been informed in the rating plate. It is not allowed to connect the door operator to drive a mechanism, the operation of which would, e.g. through inertial forces, exert on the output shaft of the gear a torque exceeding the permitted maximum torque.

The permitted service life of the door operator is **12 000** operating hours with the maximum permitted nominal output of the electric motor.

9.3 SPARE PARTS

Every separate component manufactured by Ovitor Oy has a part number composed of three or dour digits. When ordering spare parts, always mention the serial number of the drive unit (on the gear unit rating plate) and the part number shown in the drawing. With the help of the serial number, it is possible to determine the correct part from the production information of the gear unit.

9.4 FAULT TRACING

Very often, faults in electric door operation originate from devices connected to the control system (e.g. from alignment of photo cells). First find out whether the fault is in the door's construction, in the control systems or in the drive unit.
Turn the disengagement lever of the gear unit to manual position and check that the door can be easily moved manually in both directions over the complete travel of the door. If the door cannot be moved at all, the fault may be in the disengagement mechanism. If the door moves only heavily, the fault is in the door's construction or in its balancing arrangements. In this case, the door itself must be repaired

If the door can be moved manually, move it to half-open position and turn the lever of the disengagement mechanism to its electric operation position. Move the door manually so that the clutch dogs are perfectly engaged. Drive the door in the opening and closing directions. If the door does not move in one or both directions, the fault is probably in the control system. However, if the electric motor is running but the output shaft of the gear unit is not rotating, the fault is in the disengagement mechanism of the gear unit.
If the drive unit is not equipped with a disengagement clutch (type TVR), the door must be released for manual operation by some other means so that the movement of the door can be checked.
If the fault is in the control system, please refer to the control system documentation.
If the fault is in the drive unit, please refer to the following table.

9. SERVICE AND MAINTENANCE

Manifestation	Fault	Action
Loud sounds from the fixing point of the gear unit	Fixing of the gear unit is loose	Tighten the fixing bolts; if they are damaged, replace
Unusual sounds from the gear unit	Damage to the worm shaft or wheel	Contact the manufacturer
Unusual sounds from the gear unit	Damage to the bearings	Contact the manufacturer or replace the bearing
Unusual sounds from the gear unit	Not enough oil	Check the oil quantity, add more if necessary; find out the reason for diminished oil quantity, check for possible oil leaks
Vibration of input shaft at the bearing point	Damage to the bearing	Contact the manufacturer or replace the bearing
Unusual sounds from the drive motor		Refer to the documentation provided by the drive motor supplier
Thermal protection of the gear unit stops the drive unit	Door's resistance to motion has increased	Check the condition of the door and its fixings
Thermal protection of the gear unit stops the drive unit	Not enough oil	Check the oil quantity, add more if necessary; find out the reason for diminished oil quantity, check for possible oil leaks
Thermal protection of the gear unit stops the drive unit	Damage to the worm shaft or wheel	Contact the manufacturer
Oil leak from the gear unit frame	Mechanical damage in the gear housing	Contact the manufacturer
Oil leak from the gear unit frame	Fixing bolts of the gear unit halves are loose	Check and tighten the fixing bolts
Oil leak from the rotary shaft seal	Seal has worn out or there is dirt between the seal and the shaft	Contact the manufacturer or check the rotary shaft seal and replace it if necessary
Disengagement mechanism doesn't work	Gear locked when the door was driven with force against an inelastic obstacle	Rotate the input shaft of the gear unit e.g. from the side of the electric motor
Disengagement mechanism doesn't work	Disengagement mechanism has been damaged	Contact the manufacturer
Place where door travel stops has changed	Adjustment of the limit switches has changed	Check that the adjustment tightness of the limit cams has not decreased. Tighten and adjust the limits again.
Limit switches do not stop the door	Limit shaft is damaged or does not rotate	Contact the manufacturer
Limit switches do not stop the door	Micro switch for the limit does not function	Replace the limit switch
The motor runs, but gear shaft is not turning	Slipping clutch is slipping	Adjust or replace the slipping clutch
Clack between the gear and motor	Flexible clutch worn out	Replace the clutch

DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY

Ovitor Oy
Sienitie 24
00760 Helsinki
Finland

Description and identification of the partly completed machinery:

Door operator TVR(FC) 5 with various limit and gear transmissions

The essential requirements of EC Machinery Directive 2006/42/EC have been applied and fulfilled for the above mentioned machinery to be used with industrial doors, gates and barriers. The relevant technical documentation has been compiled in accordance with Annex VII, Part B of EC Machinery Directive 2006/42/EC.

In addition the partly completed machinery is in conformity with the EC 2006/95/EC Low Voltage Directive LVD, 2004/108/EC Electromagnetic Compatibility EMC and 2002/95/EC the Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment RoHS.

The above listed products are delivered according to the following standards to the extent to which they may be applicable:

EN ISO 12100:2010, EN 60204-1+A1+AC, EN 60335-1+A11+AC, EN-55014-1+A1, EN 61000-3-2+A1+A2, EN 61000-3-3, EN 61000-6-2, EN61000-6-3+A1, EN 61439-1, EN 61439-3, EN 60529+A1, EN 13241-1+A1, EN 60335-2-103, EN 13241+A1, EN 12453, EN 12445, EN 12604, EN 12605, EN 12978+A1

SFS-Inspecta Sertifiointi OY has issued a certificate ascertaining that the manufacturer's quality system meets the requirements of standard SFS-EN ISO 9001:2008 and the general guidelines ABC 200, certificate 1229-06.

We undertake, in response to a reasoned request, to supply it *in electronic form* to the market surveillance authorities within a reasonable period.

The party authorized to compile the technical documentation is:

Ovitor Oy / Engineering Manager
Sienitie 24
00760 Helsinki
Finland

The devices are not intended to function independently but as a part of an electrically operated machine. In the design, construction and servicing of the machinery, it must be ensured that the loads to which the door mechanism is subjected do not exceed the values given in the instruction manual of the mechanism, and that the permitted service life of a door mechanism is no more than 12 000 operating hours. As regards the installation, settings and servicing of the machinery, the instructions issued by us for the type of installation in question must be observed.

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive.

Helsinki, 14th of September 2016

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Juha-Matti Lyhykäinen
Production Manager
Ovitor Oy