General preventive maintenance of circuit-breaker cubicles (3G)

Operations Manual
MO-080-EN, version 01; 07/06/2013
CAUTION!

When Medium Voltage equipment is operating, certain components are live, other parts may be in movement and some may reach high temperatures. Therefore, the use of this equipment poses electrical, mechanical and thermal risks.

In order to ensure an acceptable level of protection for people and property, and in compliance with applicable environmental recommendations, Ormazabal designs and manufactures its products according to the principle of integrated safety, based on the following criteria:

- Elimination of hazards wherever possible.
- Where elimination of hazards is not technically or economically feasible, appropriate protection functions are incorporated in the equipment.
- Provision of information on remaining risks to facilitate the design of operating procedures which prevent such risks, training for the personnel in charge of the equipment, and the use of suitable measures for personal protection.
- Use of recyclable materials and establishment of procedures for the disposal of equipment and components so that once the end of their service lives is reached, they are duly processed in accordance, as far as possible, with the environmental restrictions established by the competent authorities.

Consequently, the equipment to which the present manual refers complies with the requirements of section 11.2 of the forthcoming IEC standard 62271-1. It must only be operated by qualified and supervised personnel, in accordance with the requirements of standard EN 50110-1 on the safety of electrical installations and standard EN 50110-2 on activities in or near electrical installations. Personnel must be fully familiar with the instructions and warnings contained in this manual and in other recommendations of a more general nature which are applicable to the situation according to current legislation State Gazette BOE 269, dated 10 November, and the update in accordance with R.D. 54/2003.

The above must be carefully observed, as the correct and safe operation of this equipment depends not only on its design but also on general circumstances which are in general beyond the control and responsibility of the manufacturer. More specifically:

- The equipment must be handled and transported appropriately from the factory to the place of installation.
- All intermediate storage should occur in conditions which do not alter or damage the characteristics of the equipment or its essential components.
- Service conditions must be compatible with the equipment rating.
- The equipment must be operated strictly in accordance with the instructions given in the manual, and the applicable operating and safety principles must be clearly understood.
- Maintenance should be performed properly, taking into account the actual service and environmental conditions in the place of installation.

The manufacturer declines all liability for any significant indirect damages resulting from violation of the guarantee, under any jurisdiction, including loss of income, stoppages and costs resulting from repair or replacement of parts.

Guarantee

The manufacturer guarantees this product against any defect in materials and operation during the contractual period. In the event that defects are detected, the manufacturer may opt either to repair or replace the equipment. Improper handling of this equipment and its repair by the user shall constitute a violation of the guarantee.

Registered Trademarks and Copyrights

All registered trademarks cited in this document are the property of their respective owners. The intellectual property of this manual belongs to the manufacturer.

In view of the constant evolution in standards and design, the characteristics of the elements contained in this manual are subject to change without prior notification.

These characteristics, as well as the availability of components, are subject to confirmation by Ormazabal.
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**ORMAZABAL**

MO-080-EN version 01
1 General information

1.1 Introduction
The operating sequence has been designed to ensure service operations can be performed with minimal maintenance.

1.2 Safety

DANGER
- Maintenance operations may involve risks of becoming mechanically trapped (access to moving parts).
- Maintenance personnel must be duly trained in equipment operations.

1.3 Frequency And Duration
Preventive maintenance work must be performed every 5 years, except where another frequency is established by the user in agreement with Ormazabal, meeting the corresponding conditions for use.

This maintenance inspection takes approximately 1 hr.

1.4 Prohibited
- Do not use solvents that use compressed air for general cleaning.
- Sealed adjustment parts such as the opening stop piece, damper, connections, nuts and bolted gaskets must not be touched.
- Do not handle any parameter in the case of the protection relay.
- Do not use solid lubricants.
- Do not use old or used self-locking nuts. Any self-locking nut that is not correctly adjusted must be removed and replaced.

1.5 Components required
- Loctite type A-270 (threadlocking paste - nuts).
- Torque wrench.
- “Super-Lube” sprayed oil or “WD-40” without silicone.
- “Larrarte 392” or “Castrol Safecoat DW 30” anti-corrosion spray.
- Power supply to test the motor (for the rated motor voltage).
- Necessary tools for maintenance operations.
2 Preventive maintenance

2.1 Visual inspection

Preventive maintenance must be performed on the drive under the following conditions:

► Circuit-breaker open and switch-disconnector open.
► Auxiliary circuit power supply disconnected.
► Control equipment switching overridden.
► Opening and closing springs discharged.

1) Remove the circuit-breaker cubicle’s upper box (a).
   a) Unscrew the two M8 x 15 mm screws (b).
   b) Pull it outwards.
   Tool: 13 mm spanner.

   Fig. 2.1: Removing the upper box

2) Remove the driving mechanism cover (a).
   a) Unscrew the two M8 x 15 mm screws (b).
   b) Pull it outwards.
   Tool: 13 mm spanner.

   Fig. 2.2: Removing the driving mechanism cover

3) Remove the front cover (a) of the circuit-breaker's driving mechanism.
   a) Unscrew the four M5 x 20 mm Phillips bolts.
   b) Pull it outwards.
   Tool: Phillips screwdriver.

   Fig. 2.3: Removing the front cover
4) Finally, remove the top cover (a) of the circuit-breaker driving mechanism enclosure.
   a) Unscrew the four M5 x 20 mm Phillips bolts.
   b) Pull the box outwards.

   Tool: Phillips screwdriver.

5) Check that the adjustments / regulations of the mechanism are duly sealed and tight and that no part is loose out of position.
   a) Ends of Clevis fastener:
      i) Check that the lock nuts are tight without breaking the sealer.

   b) End stop piece.

   c) Damper.

Fig. 2.4: Removing the Circuit-Breaker’s top cover
Fig. 2.5: End of Clevis fastener
Fig. 2.6: End stop piece
Fig. 2.7: Damper
Fig. 2.8: Actuating shaft
7) Check that the connection cables are nowhere near the moving areas.

8) Check the pins of the closing springs on both sides of the mechanism.

9) If the surface protections are rusty or covered with dust, use the products indicated in the section, 2.5. Lubrication. This particularly refers to all parts located inside the frame, pawls and cams, considering their functional and aesthetic appearance.

Take account of the number of operations registered in the counter, the date of installation and location characteristics, whether it is the first service or an inspection and any previous corrective maintenance.

Visual inspection time: 10 minutes.

2.2 Prior checking operations

Objective: To check the condition before preventive maintenance.

Take into account the disconnector position. It must be open.
Carry out the following operations:

1) Two manual operations.
   □ First:
   ¬ Charge the springs manually, leaving them ready to close the circuit-breaker.
   ¬ Close the circuit-breaker using the green button on the keypad.
   ¬ Check closing shaft position (a).

   □ Second:
   With the same observations and checks as in the first operation, perform the following sequence.
   ¬ Charge the closing spring.
   ¬ Close.
   ¬ Open.
   ¬ Check the electrical connections on all auxiliary contacts according to the electrical diagram.

2) Carry out the opening and closing using the coils.
   □ First:
   ¬ Check that microswitches M1, M6, M7 and M8 remain pressed down when the spring is discharged.

   □ Second:
   ¬ Check that the motor is truly secure.
   ¬ Start the motor (springs are charged, 15 s max.).
   ¬ Close using the coil (the motor starts to charge the springs automatically).
   ¬ Open-Close and Open with coils observing the required sequence and time.

3) Check of the bistable trip device by the relay (where ekorRPG is fitted).
   □ Follow “Maintenance and Checking the Relay”, according to Ormazabal’s General Instructions document IG-159.

   Visual inspection time: 20 minutes.

2.3 Bolted seal adjustment check

Make sure the circuit-breaker is open and the springs discharged.

Check that the nuts and bolts are suitably tight, carefully checking the interlocks between both driving mechanisms and that of the door.

This particularly refers to the bolted seals on the support joining the frame to the cubicle structure and those forming the control support.
If you detect any loose connections, use Loctite A-270 and apply the rated torque corresponding to specifications.

The following tightening torques correspond to standard 8.8 quality bolts:

- M4: 3 Nm
- M4 DIN912 12.9 (Allen): 5 Nm
- M5: 6 Nm
- M5 DIN912 12.9 (Allen): 8 Nm
- M6: 10 Nm
- M8: 25 Nm
- M10: 55 Nm
- M12: 75 Nm

**Approximate time required:** 10 minutes.

### 2.4 Adjustment inspection

Only Ormazabal can adjust the sealed parts where required.

#### 2.4.1 Main adjustment of the opening stop piece

Check that the joint is not loose and that the sealant is in one piece. Do not touch unless Ormazabal technicians are present.

#### 2.4.2 Adjusting the damper

Check that it is sealed.

#### 2.4.3 Phase transmission

This must never be handled. Only check that the sealant conditions are correct.

### 2.5 Lubrication

Lubricate all the turning points: shafts, bearings, bushings, rollers and any sliding elements in general.

Fig. 2.15: *Locking mechanisms*

Fig. 2.16: *Sliding shaft*

Fig. 2.17: *End stop piece*
Use Super-Lube Teflon-based spray or silicone-free WD-40 with an applicator to apply the product only where it is of use.

If you notice slight non-functional rusting on any component, apply Larrarte 392-type aerosol antioxidant.

Do not use harsh liquids such as solvents, etc. or apply compressed air to get rid of small particles or accumulated dust.

Visual inspection time: 10 minutes.

### 2.6 Checking operations

2 full sequences must be completed after any equipment maintenance operation.

If lubricant is applied, several operations must be completed to distribute it.

### 2.7 Report

Where any corrections have been made, a report must be sent to Ormazabal.
Subject to changes without prior notice.

For more information, contact Ormazabal.

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