



## ekor.stp

Programmable transfer unit

General instructions  
IG-164-EN, version 04, 06/04/2017



## 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 neither technically nor economically feasible, appropriate protection functions are incorporated in the equipment.**
- **Communication about 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 personal protective equipment.**
- **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 Standard IEC 62271-1. It must therefore only be operated by appropriately 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<sup>[1]</sup>.

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.

### Warranty

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.

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<sup>[1]</sup> For example, in Spain the "Regulation on technical conditions and guarantees for safety in high-voltage electrical installations" – Royal Decree 337/2014 is obligatory.

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

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## 1. General description

The **ekor.stp** programmable transfer unit is a solution designed to guarantee uninterrupted, safe electrical power supply. This consists of an automatic, programmable transfer between electrical supply lines, which prevents electrical power supply cuts in the outgoing line in the event of a potential fault in any of the incoming lines.

The **ekor.stp** unit has feeder or circuit-breaker cubicles, an **ekor.ccp** programmable cubicle controller, feeder voltage presence detectors and an uninterruptible power supply. Its main features are:

1. Battery supply in the event of power supply cuts via an auxiliary battery.
2. Capacitive voltage detection (without voltage transformer) from the bushing.
3. Feeder-feeder transfer, feeder-generator or in H (with busbar coupling).
4. Voltage restoration, preferred line, with or without coupling.
5. External blocking function.
6. Protection of motorised driving mechanisms.
7. Switching in the event of voltage dips:
  - a. No voltage in 2 or 3 phases
  - b. No voltage fault in 1 phase
8. Possibility of carrying out other automation:
  - a. Transfer between transformer substations
  - b. Transfer between 3 feeders
  - c. Act on other cubicles
  - d. Load shedding

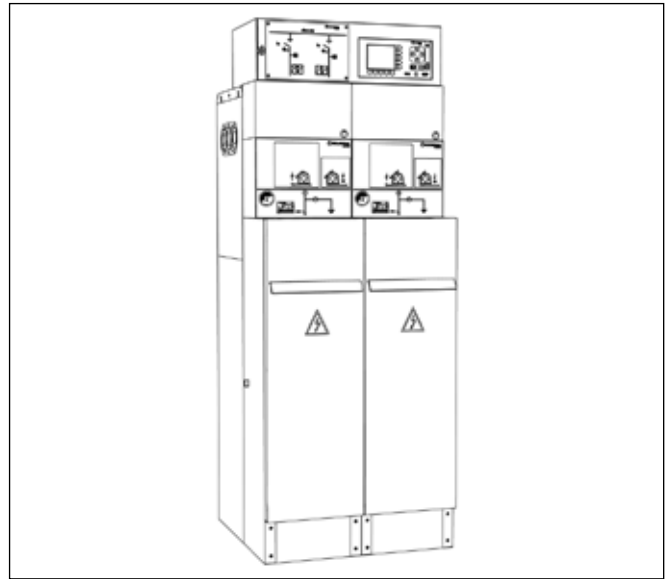


Figure 1.1. **ekor.stp** programmable transfer unit

## 2. ekor.stp equipment

### 2.1. Medium-voltage cubicles

The set is made up of switch-disconnector cubicles or circuit-breaker cubicles. Each of these provides electrical energy to the installation from a different electrical supply line, which allows of them to be used in the event of a supply fault from the other.

This solution is very popular in important facilities such as hospitals, factories or hotels where a continuous electrical current is required. In accordance with the criticality of the load, it is possible to choose to install feeder cubicles or circuit-breaker cubicles, with the main difference being the time taken for the unit to make the transfer Table 2.1.

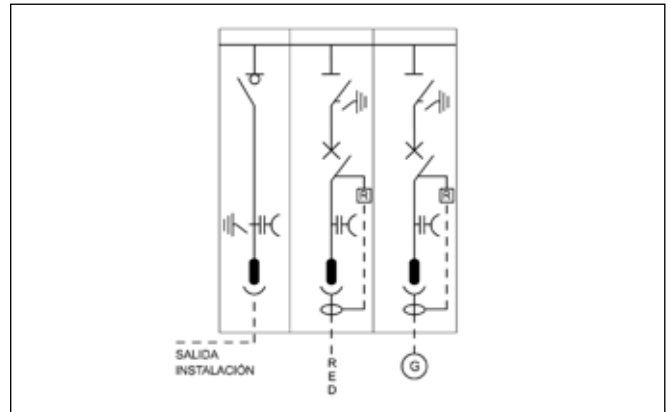
Topology	Conventional control
Line-line	< 8 s
Breaker-breaker	< 0.8 s

**Table 2.1.** Transfer times depending on the topology

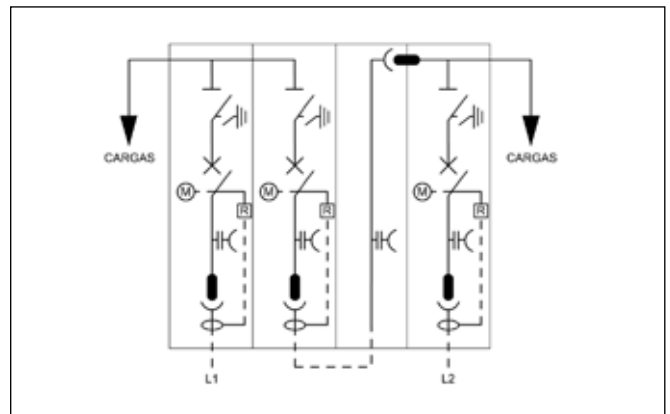
More advanced solutions are also carried out for more complex installations, which include the following:

1. Network-set transfer, if there is internal generation. Transfer between outdoor incoming feeder and generator set.
2. Transfer between busbar couplings for integrated transformer substations in ring distribution.
3. H transfer for switching substations. Transfer between incoming feeders for switching substations with split busbar topology.
4. Advanced automation to manage load shedding or management of the transfer between different switching substations such as IT servers, hospitals or tunnels.

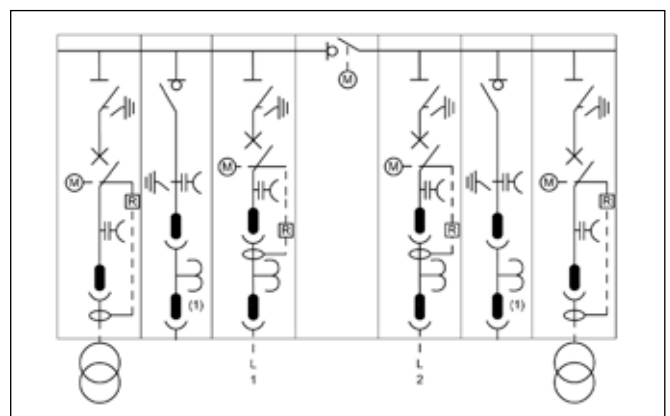
Below, electrical diagrams are displayed as an example of the proposed solutions.



**Figure 2.1.** Network-set transfer



**Figure 2.2.** H transfer using breaker.



**Figure 2.3.** H transfer using busbar switch.

## 2.2. ekor.rtk voltage presence/absence unit

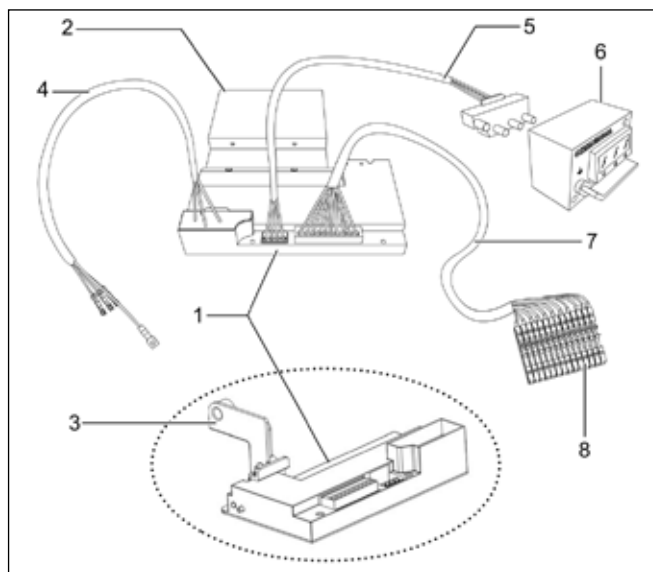
The **ekor.rtk** unit is electronic equipment developed to detect the presence and absence of voltage in medium-voltage (MV) lines.

This unit is installed in automatic transfers between two supplies equipped with a switch-disconnector or between two supplies equipped with circuit-breakers without protection relays that can perform the function of detecting voltage presence.

The unit is built into the switchgear and uses the same signals as the **ekor.vpis** voltage presence indicators to perform detection functions. Thus, conventional MV line coupling systems such as voltage transformers are not required.

The **ekor.rtk** is supplied duly installed, configured and tested at factory, and integrated in the cubicles.

For more information on the functional and technical specifications or electrical diagrams of this unit, see **IG-094**.



1	ekor.rtk to ekor.vpis relay cable
2	Support for ekor.rtk relay in circuit-breaker cubicles
3	Support for ekor.rtk relay in feeder cubicles
4	Bushing to ekor.rtk relay cable
5	User terminal block
6	ekor.vpis voltage presence indication
7	ekor.rtk relay to user terminal block cable
8	User terminal block

Figure 2.4. ekor.rtk unit detail

## 2.3. Control box

The main elements included in the **ekor.stp** control box are as follows:

1. Charger with 230 V<sub>ac</sub> input and 2.5 A output.
2. 48V<sub>dc</sub> battery with capacity for 4 Ah, for the transfer between feeder cubicles or 7 Ah for circuit-breaker cubicles.
3. Manual operation push-buttons for 2 incoming lines.
4. 3 miniature circuit-breakers: 2 of them protect the auxiliary LV elements of each feeder cubicle, while the third one protects the ekor.ccp unit's power supply.
5. ekor.ccp: Programmable cubicle controller.

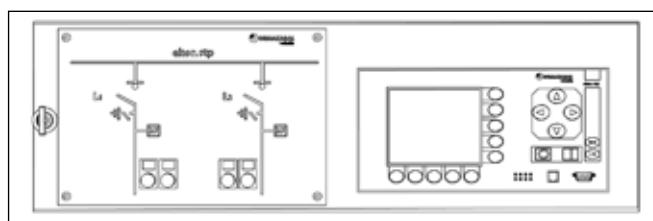


Figure 2.5. ekor.ccp unit and manual operation push-buttons.

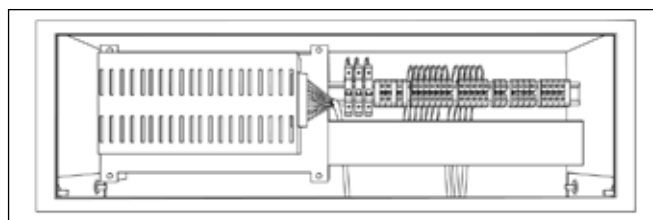


Figure 2.6. Battery and miniature circuit-breakers, and electrical connection terminals

## 2.4. ekor.rpg.ci

The **ekor.rpg.ci** protection, metering and control unit, depending on the model, may incorporate overcurrent protection functions as well as other functions such as local control, remote control, electrical parameter measurement, presence and absence of voltage, automation, recloser, phase unbalance and cumulative breaking current value, among others.

In the case of automatic transfer, its function consists of sending the voltage presence/absence signal in the incoming line, in addition to tripping the circuit-breaker in the event of an overtravel fault. The signals are sent using two physical outputs of the **ekor.rpg.ci**, leading to 2 inputs of the **ekor.ccp**.

For more information on the functional and technical specifications or electrical diagrams of this unit, see **IG-157**.

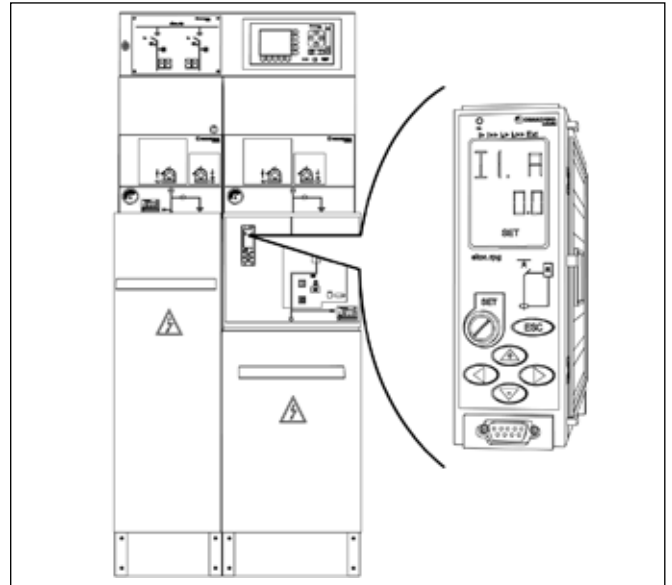


Figure 2.7. ekor.rpg.ci protection, metering and control unit

## 2.5. ekor.ccp

The programmable cubicle controller **ekor.ccp** is the unit in charge of managing the line transfer. It is a flexible, programmable microprocessor system with PC structure and Linux operating system, which enables use in remote-controlled installations, supporting a large number of protocols.

Its 320x240 graphic display allows the single-wire diagram of the installation to be displayed, along with history log data (up to 1792 events), alarms, etc., of the medium-voltage installation.

The front panel is fitted with an RS-232 port and an Ethernet port to configure the unit.

The **ekor.ccp** unit includes a Web server that is accessible in local mode and in remote mode via any of the Ethernet ports on the unit. Alarms and logs can be checked through this server. The web page can be accessed from any web browser, either locally or remotely. To enable remote access, it is necessary to install and configure communications equipment with WAN access connected to the **ekor.ccp** unit, which is not included in the **ekor.stp**.

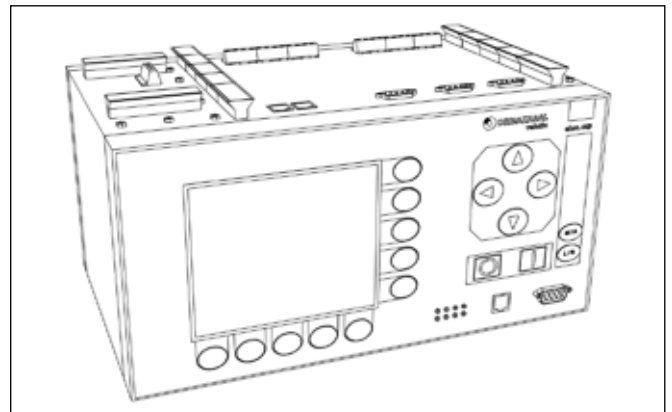


Figure 2.8. ekor.ccp controller view

The following table gives a summary of the technical specifications of the **ekor.ccp** unit.

<b>Power supply</b>	<b>Voltage range</b>	30 V <sub>dc</sub> to 80 V <sub>dc</sub>
<b>Rated</b>	<b>Consumption</b> <b>With display on and all outputs activated</b>	21 W 30 W
<b>Digital inputs</b>	<b>Via card</b> <b>Maximum capacity</b> <b>Polarisation voltage</b>	12 inputs 48 inputs 30 V <sub>dc</sub> to 80 V <sub>dc</sub>
<b>Digital outputs</b>	<b>Type</b> <b>Via card</b> <b>Maximum capacity</b> <b>Contacts</b>	Volt-free contacts 6 outputs 24 outputs 5A/250 V <sub>ac</sub> /resistive
<b>Temperature</b>	<b>Operation</b>	- 10 °C...+ 60 °C
	<b>Storage</b>	- 25 °C...+ 70 °C
<b>CPU</b>	<b>RAM</b>	16 MB
	<b>Real time clock</b>	hh: mm: ss: dd
	<b>Event log</b>	1792
	<b>Graphic capacity</b>	Up to 6 cubicles are viewed on the display

**Table 2.2.** ekor.ccp characteristics summary

For more information on the functional and technical specifications or electrical diagrams of this unit, see **IG-156**.

## 2.6. CE Conformity

This product complies with European Union Directive **2014/30/EU** on electromagnetic compatibility, and with IEC 60255 international regulations. The unit has been designed and manufactured for use in industrial areas, in accordance with EMC standards. This conformity is a result of the test carried out in accordance with article 7 of the Directive.



### 3. Application description

#### 3.1. Automatic mode

This consists of 2 separate lines with the automation in automatic mode operating normally: the line chosen as **"PREFERRED"** stays connected and the line chosen as **"RESERVE"** is disconnected. As regards the functioning of the **ekor.stp** programmable transfer unit, if there is an electrical supply voltage fault in the line configured as being **"PREFERRED"**, the **ekor.stp** opens the switch for this line and closes the switch for the line configured as being **"RESERVE"**, as long as it has stable voltage.

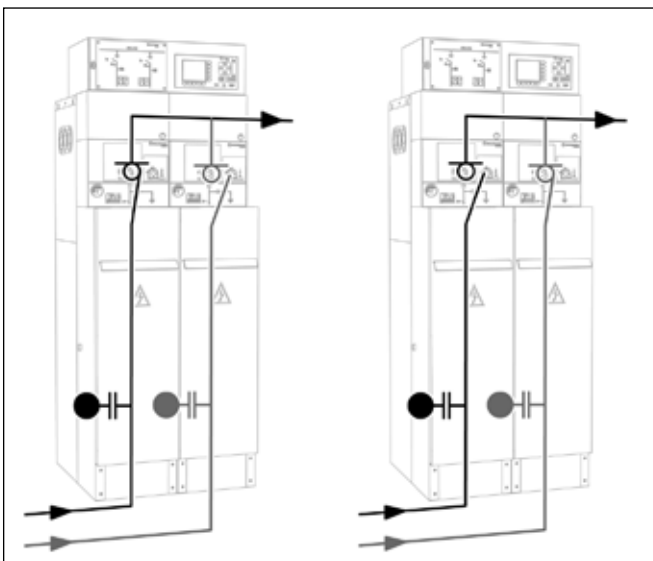


Figure 3.1. Functional diagram of **ekor.stp** in **cgmcosmos** system.

The return can be made with or without coupling, both of which are described below.

There are 2 possibilities for the return without coupling:

1. Once voltage has been recovered in the **"PREFERRED"** electrical supply line, its stability is checked for the time corresponding to parameter **"Return to normal voltage"**. If the electrical voltage does not show any variations during this time, the **"RESERVE"** switch opens. Once open, the **"PREFERRED"** electrical supply line switch closes and the installation's initial configuration is re-established.
2. If, after recovering the voltage in the **"PREFERRED"** electrical supply line, and while its stability is being checked (time corresponding to parameter **"Return to normal voltage"**), the voltage fails in the **"RESERVE"** electrical supply line for the time corresponding to the parameter **"No voltage time"**, the **"RESERVE"** electrical supply line switch opens. Once open, the **"PREFERRED"** electrical supply line switch closes and the installation's initial configuration is re-established.

The following diagram shows the first option of return without coupling (the diagram's time line is not scaled):

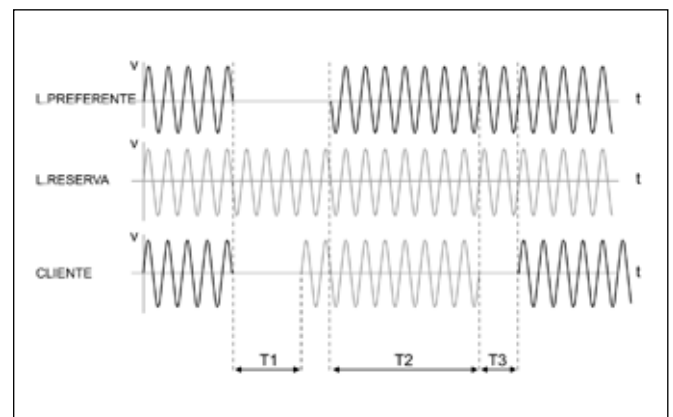


Figure 3.2. Return without coupling diagram detail

The parameters to bear in mind are as follows:

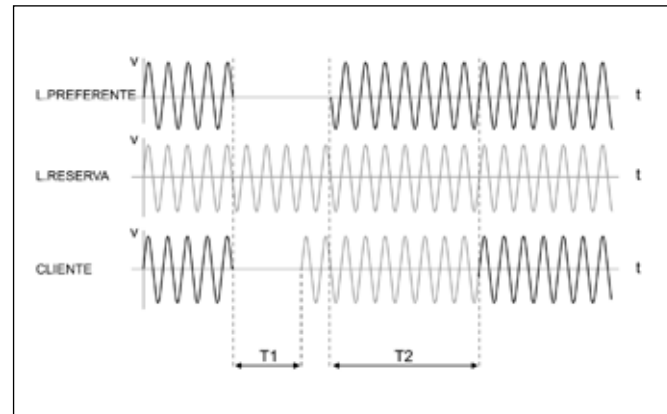
Parameter	Value for L-L	Value for V-V	Description
<b>T1</b>	10 seconds	4 seconds	Time during which voltage is absent in the user's line (Sum of the "No voltage time" (set to 3s by default) plus the preferred line opening time plus the reserve line closing time)
<b>T2</b>	3 minutes	3 minutes	"Return to normal voltage" time (set to 3s by default)
<b>T3</b>	7 seconds	1 second	Return to initial configuration time. (Sum of the reserve line opening time plus the preferred line closing time)

**Table 3.1.** Default times for automatic transfer without coupling

There are also 2 possibilities for the return with coupling:

- Once voltage has been recovered in the **"PREFERRED"** electrical supply line, its stability is checked for the time corresponding to parameter **"Return to normal voltage"**. If the electrical voltage does not show any variations during this time, the **"PREFERRED"** electrical supply line switch closes. Once closed, the **"RESERVE"** electrical supply line switch opens and the installation's initial configuration is re-established.
- If, after recovering the voltage in the **"PREFERRED"** electrical supply line, and while its stability is being checked (time corresponding to parameter **"Return to normal voltage"**), the voltage fails in the **"RESERVE"** electrical supply line for the time corresponding to the parameter **"No voltage time"**, the **"RESERVE"** electrical supply line switch opens. Once open, the **"PREFERRED"** electrical supply line switch closes and the installation's initial configuration is re-established.

- The following diagram shows the first option of return with coupling (the diagram's time line is not scaled):



**Figure 3.3.** Return with coupling diagram detail

The parameters to bear in mind are as follows:

Parameter	Value for L-L	Value for V-V	Description
<b>T1</b>	10 seconds	4 seconds	Time during which voltage is absent in the user's line. (Sum of the "No voltage time" (set to 3s by default) plus the preferred line opening time plus the reserve line closing time)
<b>T2</b>	3 minutes	3 minutes	"Return to normal voltage" time

**Table 3.2.** Times for automatic transfer with coupling

There is a backup system that minimises the effects on the electrical system in the event of a permanent internal fault in the customer installation. This fault, due to a non-isolated fault in the installation itself, causes constant switching between both power feeders. Detection is not performed for the following reasons:

- Fault in detection failure due to no action by the protection system:
  - Erroneous protection unit setting without selectivity with main circuit-breaker.
  - Failure in the trip chain or protection unit shut down.
- The protection unit does not clear the fault due to an electrical power supply failure or to an internal problem.

This fault causes an upstream trip in the power feeder of the installation, which results in the absence of electrical voltage due to the opening of the main circuit-breaker, meaning the "Transfer operation" is carried out. Since the fault remains in the installation, it will cause another voltage absence in the electrical supply line on which it has switched. In this situation, conditions exist for return to the initial configuration, meaning the system finds itself in a switching cycle.

The installation will successively change electrical supply lines until the main reclosers are definitively tripped (a double zero voltage), caused by the opening of the 2 main circuit-breakers.

In order to avoid this situation, the backup system monitors the stability of the voltage of the electrical supply line on which it has switched, during the period of time corresponding to parameter **"No fault detec. time"**. If a voltage absence is detected in the recently switched electrical supply line, this means that there is a fault in the installation, as described previously. The backup system opens the power supply switch and blocks the transfer operation with a return to the **"Manual"** mode. To re-establish the transfer automation system, the undetected

fault **"Alarm"** must be reset. Consequently, the following occurs:

1. The permanent opening of the main circuit-breaker is prevented, since the main recloser does not definitively trip. If the main circuit-breaker does not have a recloser, when it closes again, the installation's protection device will not be allowed to act due to the fault, since the fault is not in the line.
2. It permits recognition (using the **ekor.ccp** unit's alarm system) of incorrect functioning in the installation's protection systems, enabling the anomaly which caused the electrical supply fault to be located. Once it has been isolated, the service is re-established in the installation.

### 3.2. Manual mode

There are 4 ways to manually operate the switches:

1. Remote operation (if there is remote control)
2. Manual operation from the control box push-buttons

3. Lever operation from the cubicle control or push-buttons in the case of circuit-breaker cubicles
4. Operation from the front panel of the **ekor.ccp** unit.

In order to be able to operate the switchgear in graphic mode, the **ekor.ccp** must be in **"Manual"** mode.

#### 3.2.1. Remote operation

Remote operation consists of operation using the selected cubicle. This can only be carried out in transfers that have a remote-controlled dispatching station and have been programmed for this function. The remote control function is NOT available by default.

Remote operation can only be performed while the transformer substation is in **"Manual"** and **"Remote"** (**"Remote"** LED on) functioning modes.

#### 3.2.2. Operation using push-buttons

The **ekor.stp** models on feeder cubicles have 4 manual push-buttons at the front of the control box, which make it possible to perform opening and closing operations in the 2 incoming electrical supply lines.

In the case of transfers made on circuit-breakers, the push-buttons are on the front of the cubicle.

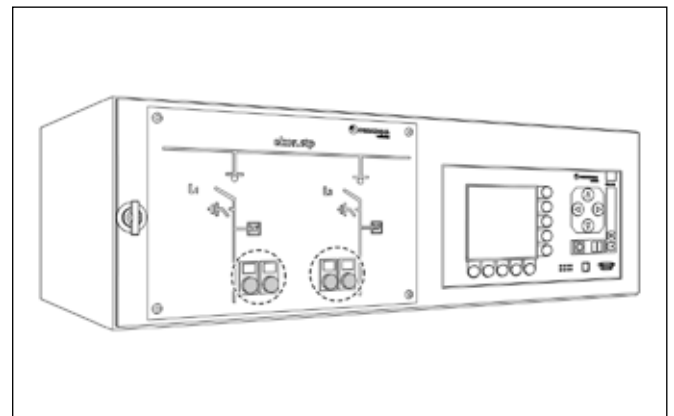


Figure 3.4. Operation from front push-buttons on the **ekor.stp**.

The 2 incoming electrical supply lines can never be coupled under any circumstances. Hence, if an attempt is made to close one of the electrical supply line switches while the other is connected, the operation cannot be carried out. This interlock can be removed if specifically requested.

Operations from the control box push-buttons must only be carried out while the transformer substation is in "**Manual**" and "**Local**" mode ("**Manual**" and "**Local**" LEDs on). If they are carried out in "**Automatic**" mode, an alarm is triggered for exterior operation and the system switches to "**Manual**" mode.

### 3.2.3. Direct operation from the cubicle

**cgmcosmos** feeder cubicles permit manual operation using an actuating lever which is supplied with the equipment. The circuit-breaker cubicles allow the manual operation of the circuit-breaker using opening and closing push-buttons and of the disconnecter using an actuating lever which is supplied with the equipment.

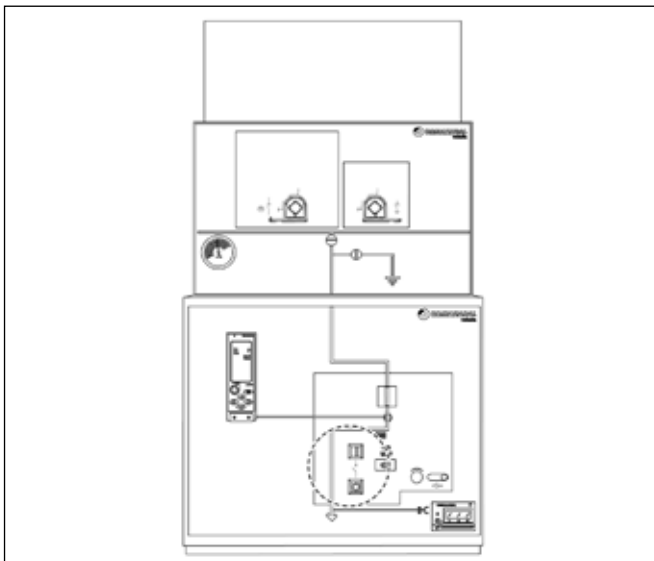


Figure 3.5. Push-buttons for opening and closing in circuit-breaker cubicles

This method of operation permits the coupling of both power supply lines. However, if this were to occur, the transformer substation would show an alarm situation without being able to switch to "**Automatic**" mode until the situation becomes normal again in the incoming electrical supply lines and the alarm generated has been reset.

The circuit-breaker cubicles have 2 push-buttons for local opening and closing.

### 3.2.4. Operation from the ekor.ccp unit

The **ekor.stp** unit cubicles can be manually operated using the **ekor.ccp** unit push-buttons. This operation can only be performed while the **ekor.ccp** unit is in "**Local**" and "**Manual**" mode.

As regards circuit-breaker cubicles, the disconnecter of the feeder cubicle to be operated must be connected, in addition to this condition. Otherwise the system cannot switch to automatic mode.

Operation from the **ekor.ccp** unit does not allow coupling the incoming electrical supply lines.

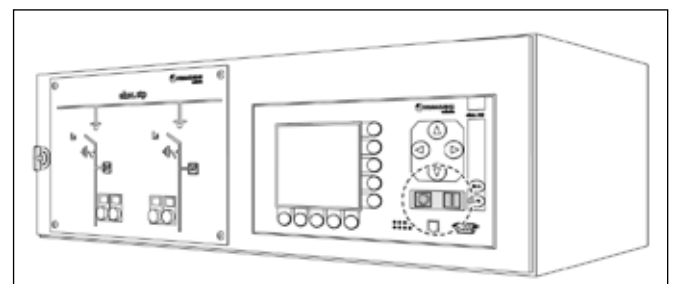


Figure 3.6. Push-buttons in the ekor.ccp unit for manual operation.

## 4. Navigating the ekor.ccp menu

This section enables familiarisation with the **ekor.ccp** programmable cubicle controller. A general introduction to the interface is presented, followed by a description

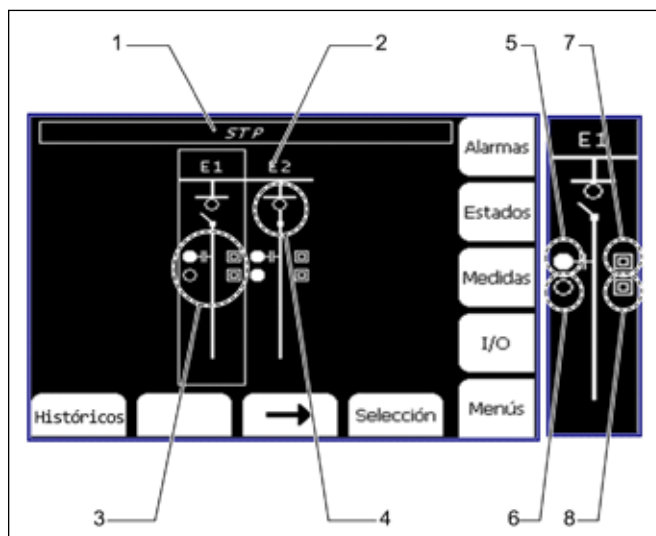
of the functions that the **ekor.ccp** brings to the **ekor.stp** automatic transfer unit.

### 4.1. Introduction to the ekor.ccp interface

When on standby, the display in the **ekor.ccp** unit remains switched off. To activate the display, press any of the buttons, accessing the general information screen.

#### 1. General information

The first screen shows the following information:



1	Substation name
2	Cubicle name
3	Cubicle indications
4	Cubicle driving mechanism status
5	Voltage indication
6	Preferred line indication
7	Switch error indication
8	Indication error

Figure 4.1. General information screen

This screen indicates the general status of the substation: status of the switches, absence/presence of voltage, tripping of protection relays, etc. Additionally, it is possible to access the remaining information on the installation using the display option selection keypad on this screen: alarms, statuses.

#### 2. Selected cubicle

Operations are carried out using the "Cubicle Screen", which is accessed from the main screen by pressing the "Selection" button. Once the cubicle's status is known, it can be operated by pressing the "Open" button or the "Close" button on the front of the **ekor.ccp** unit.

After choosing the operation to perform, the **ekor.ccp** unit requests that you confirm it, the options are "OK" or "Cancel".

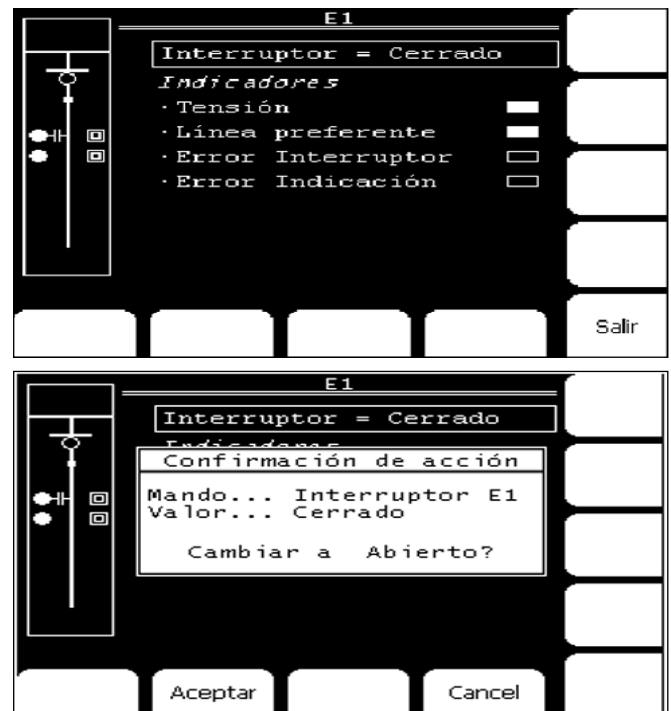


Figure 4.2. Selected cubicle screen and operation confirmation

### 3. Alarms

The alarm screen is accessed from the general information screen by pressing the *Alarms* button.

The status of all of the alarms in the installation is displayed on this screen. The alarms can be reset on this screen by pressing the *Reset Alarms* button and overriding the alarm buzzer by pressing the *Sound Off* button.



Figure 4.3. Alarm screen

### 4. Status

The status screen is accessed from the general information screen by pressing the *Status* button.

This screen indicates the statuses that are currently active (manual, local, preferred line, etc.). Those currently inactive can also be activated.

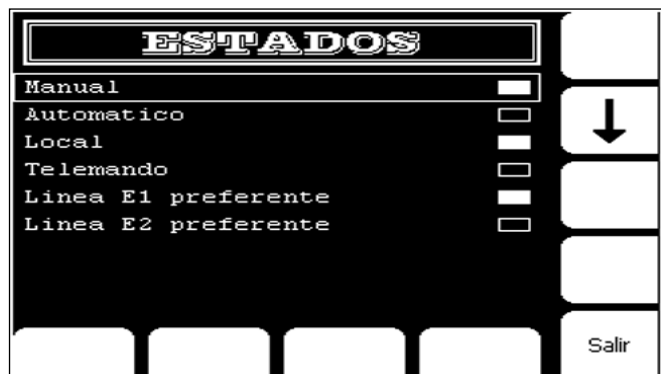


Figure 4.4. Status screen

### 5. Logs

The history log screen is accessed from the general information screen by pressing the *History Logs* button.

This screen displays all the events that have occurred in the substation (up to a maximum of 1792), sorted in chronological order starting with the latest event. The date and time when the event occurred are displayed on this screen by pressing the *Date* button, along with a description of the type of event by pressing the *Text* button.



Figure 4.5. History log screens

## 6. Inputs/Outputs

These screens display the status (active or inactive) of the physical inputs and outputs of the automaton. Active inputs/outputs (contact closed in the case of outputs) are displayed by a filled rectangle and inactive inputs/outputs by an empty one.

The input screen is accessed from the general information screen by pressing the *I/O* button. The output screen is accessed from the input screen by pressing the *Outputs* button.

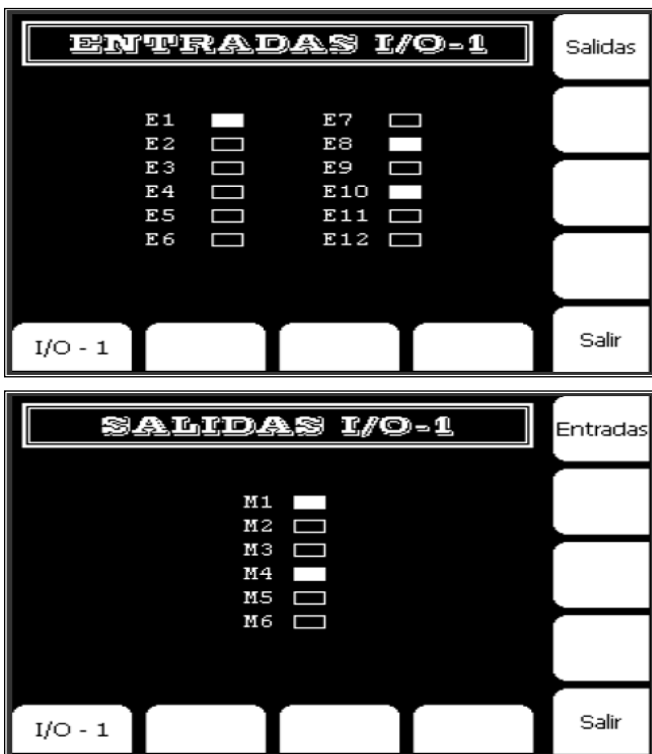


Figure 4.6. Input and output screens

## 4.2. Menus system

The menus system is a tree with the following structure:

PARAMETERS	Change TIMES	No voltage time Return to normal voltage No fault detec. time Display off time
	See No. OPERATIONS	E1 switching operations E2 switching operations
	TIME set	
SOFTWARE VERSION		

## 4.3. Parameters

Parameters are displayed and adjusted using the **"Menus Mode"** and never the **"Graphics Mode"**.

To view the value of the parameter selected, press the **"Enter"** key. Once viewed, return to the parameter selection menu by clicking on **"Cancel"**.

The parameters are always numerical. Place the cursor on the required parameter using the arrows ▲ ▼.

Parameter	Default value	Description
<b>No voltage time</b>	3 seconds	Time needed without electrical voltage in one of the 2 power supply lines to start the automatic transfer operation
<b>Return to normal voltage</b>	3 minutes	Time during which the volt-free line's electrical voltage remains uninterruptedly stable, this being the time needed for automatically returning to the transformer substation's initial configuration
<b>Fault undetected time</b>	10 seconds	Time during which the transformer substation's supply is monitored. This monitoring is carried out after a supply switch has been closed, after the automatic line transfer
<b>Display time off</b>	1 minute	Time that elapses until the ekor.ccp unit's screen goes into standby mode
<b>E1 switching operations</b>	Number of operations performed by the E1 cubicle switch	
<b>E2 switching operations</b>	Number of operations performed by the E2 cubicle switch	
<b>Time Set</b>	Allows the user to adjust the day, month, year and local time	

Table 4.1. Programmable parameters

In order to save modifications made to a parameter, you must press the **"Enter"** key after making them.

### 4.3.1. Date and time setting

To adjust the date and time, follow the steps below:

1. Starting from the main screen, choose the **"Parameters"** option using the ▲ ▼ keys and press **"Enter"**.
2. Choose **"Time Set"** and press **"Enter"**.
3. To make any modifications, move the '^' cursor through the digits using the ▲ and ▼ keys.
4. Change the settings value by pressing the ▼ key to take 1 unit away from the number, or the ▲ key to increase the number by 1 unit.



### 4.3.2. Adjusting timings

To adjust or modify the necessary parametrization times, adjust a minimum of 000001 tenths, bearing in mind that

the time must be mathematically converted into tenths of a second in accordance with the following table.

Unit of time	1 hour	1 minute	1 second	1 tenth of a second
Tenths of second (Setting ekor.ccp)	36,000	00600	00010	00001

Table 4.2. Adjusting timings

To easily convert times to ekor.ccp units, proceed as in the following example:

Example: Adjust time to 1 hour, 12 minutes and 16 seconds

$\text{ekor.ccp} = n^{\circ} \text{ hours} \times 36,000 + n^{\circ} \text{ minutes} \times 600 + n^{\circ} \text{ seconds} \times 10 + n^{\circ} \text{ tenths}$

Example adjustment = 1 h x 36,000 + 12 min x 600 + 16 s x 10 + 0 ds

Example adjustment = 36,000 + 7200 + 160 + 0

Example adjustment = 43,360

### 4.4. Alarms

If an alarm occurs, the ((A)) alarm LED on the ekor.ccp front panel will light up, activating an acoustic alarm (if enabled).

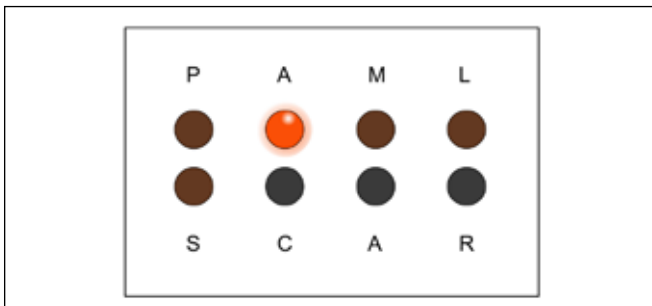


Figure 4.7. Detail of ekor.ccp

If the alarm indication LED is activated, the automation system will be blocked and the ekor.ccp unit will be in "Manual" mode.

Alarms are displayed and reset using the "Alarms" screen, where the "Reset Alarms" key allows you to reset all of the alarms that have occurred. After resetting an alarm, if the ((A)) LED is still on, it means that the cause of the alarm has not been re-established.

Alarms	Description
<b>Line coupling</b>	This occurs after 2 supply lines have been coupled, preventing the transformer substation from going into "automatic" mode until the line status is re-established as being normal and the alarm generated has been reset.
<b>External block</b>	If fault sensors are installed and the fault signalling is wired to the ekor.ccp, this alarm is generated after they have been activated
<b>Indication error</b>	The signal that indicates the switch's position is incorrect
<b>Switch error</b>	The switch has an anomaly which prevents it from fulfilling the operation order given by the ekor.ccp unit in the correct length of time, namely 10 s. Its operation is blocked automatically until the alarms have been reset
<b>Fault undetected</b>	This appears after the backup system has acted, indicating the existence of some kind of anomaly in the transformer substation, which has prevented the transformer substation's protection devices from acting correctly.
<b>Standalone limit</b>	The energy in the batteries has been totally consumed. The automatic system is blocked in order to prevent damage to the power supply equipment and motorised controls
<b>Outdoor switching</b>	Operation of any switch performed in "Automatic" mode with the cubicle's own controls, except for the operation of automatic switches by devices external to the ekor.ccp unit.

Table 4.3. List of alarms that may be activated in the ekor.stp unit.

### 4.5. Definition of events log texts

The history log texts and their descriptions are as follows:

History log text	Description
<b>== E1 preferred ==</b>	Line E1 has been selected as the <b>"PREFERRED"</b> line
<b>== E2 preferred ==</b>	Line E2 has been selected as the <b>"PREFERRED"</b> line
<b>=== Connection ekor.ccp ===</b>	The <b>ekor.ccp</b> cubicle controller has been connected to the auxiliary voltage.
<b>Automatic</b>	Automation in <b>"Automatic"</b> mode
<b>Automation block</b>	Transfer automation is blocked
<b>Ext. block enabled</b>	The external blocking signal has been activated and therefore the system is forced into <b>"Manual"</b> mode, blocking the automation system
<b>Ext. block disabled</b>	The external blocking signal has been disabled
<b>Fault undetected</b>	After cutting off a power supply, electrical voltage has been lost during the monitoring period "Fault undetected"
<b>No voltage E1</b>	No electrical voltage in the 3 phases of the E1 supply feeder cubicle for time <b>"No voltage time"</b> .
<b>No voltage E2</b>	No electrical voltage in the 3 phases of the E2 supply feeder cubicle for time <b>"No voltage time"</b> .
<b>Charger Fault -&gt; NO</b>	The self-powered equipment's charger does not detect any errors
<b>Charger Fault -&gt; YES</b>	The self-powered equipment's charger has detected an error and switches the automation system into <b>"Manual"</b> mode
<b>Rectif. fault/NETWORK</b>	The self-powered equipment's AC power supply has been interrupted or there is a fault in the rectifier
<b>E1 error indication</b>	Error in the E1 cubicle's switch status indication
<b>E2 error indication</b>	Error in the E2 cubicle's switch status indication
<b>E1 Switch error</b>	E1 cubicle switch operation error
<b>E2 Switch error</b>	E2 cubicle switch operation error
<b>E1 Switch open</b>	The E1 cubicle's switch has changed to open position
<b>E1 Switch closed</b>	The E1 cubicle's switch has changed to closed position
<b>E2 Switch open</b>	The E2 cubicle's switch has changed to open position
<b>E2 Switch closed</b>	The E2 cubicle's switch has changed to closed position
<b>Standalone limit</b>	The energy in the batteries has been totally consumed. The automatic system is blocked in order to prevent damage to the power supply equipment and motorised controls
<b>E1 Outdoor switching</b>	E1 cubicle switch operation not performed from the controller in automatic mode
<b>E2 Outdoor switching</b>	E2 cubicle switch operation not performed from the controller in automatic mode
<b>Manual-local</b>	Automation system set to "Manual-local" mode
<b>Manual-tele</b>	Automation system remotely switched from <b>"Automatic"</b> mode to <b>"Manual"</b> mode by means of remote control
<b>RECTIF./NETWORK =&gt; OK</b>	The self-powered equipment's AC power supply has been re-established or a fault in the rectifier has been corrected
<b>Alarms reset</b>	The "Alarms reset" option has been selected in the controller
<b>E1 feeder voltage → NO</b>	Electrical voltage has been lost in one of the 3 phases of the E1 power supply feeder cubicle
<b>E2 feeder voltage → NO</b>	Electrical voltage has been lost in one of the 3 phases of the E2 power supply feeder cubicle
<b>E1 feeder voltage → YES</b>	The electrical voltage has been recovered in all of the phases of the E1 power supply line
<b>E2 feeder voltage → YES</b>	The electrical voltage has been recovered in all of the phases of the E2 power supply line
<b>Voltage OK E1</b>	All of the E1 power supply line phases have recovered electrical voltage, which has remained stable for time <b>"Return to normal volt"</b>
<b>Voltage OK E2</b>	All of the E2 power supply phases have recovered electrical voltage, which has remained stable for time "Return to Normal".

Table 4.4. List of events log texts

## 5. Commissioning instructions

### 5.1. Control equipment power supply

To feed to the control equipment, proceed as follows:

1. Check that all of the power supply and control equipment's miniature circuit-breakers and fuses are open.
2. Reach 230 V<sub>ac</sub> for feeding the control box using a sheath with 3 conductors or 3 separate connection cables with a 1.5 mm<sup>2</sup> cross-section.
3. Connect the AC power supply to the corresponding terminals, following the self-powered equipment user manual (if it is not integrated into the control system). If the **ekor.stp** has integrated self-powered equipment, connect the power supply cables to the terminals labelled "**230**", "**0**" and "**⊥**".

#### 5.1.1. Activating the equipment

To activate the equipment, proceed as follows:

1. Close the miniature circuit-breaker identified as "**CP**" for activating **ekor.ccp**, which must show its status by the LEDs "**Auxiliary**", "**Local**", "**Manual**" being on and "Service" flashing.
2. Press any **ekor.ccp** key to switch on the display, thus activating "**Graphic mode**".
3. Close the miniature circuit-breakers "**L1**" and "**L2**", corresponding to the power supplies of the feeder cubicles L1 and L2, respectively.

#### 5.1.2. Precautions during commissioning

It is recommended that you connect the self-powered equipment 24 hours before commissioning the installation. To do this, feed it with an AC current, keeping the miniature circuit-breakers identified as "**CP**", "**L1**" and "**L2**" open until the battery is charged to the correct level.

In terms of the feeder cubicle's operability, the following should be taken into consideration:

1. When switching from "**Manual**" to "**Automatic**" mode, automatic operations can be performed if any of the conditions described in section 5 of this document, "Description of the application of the programmable transfer system (**ekor.stp**)" are met.
2. If the switch in the feeder cubicle is in earthing position, its operation cannot be motorised.

### 5.2. Checking information on the main screen

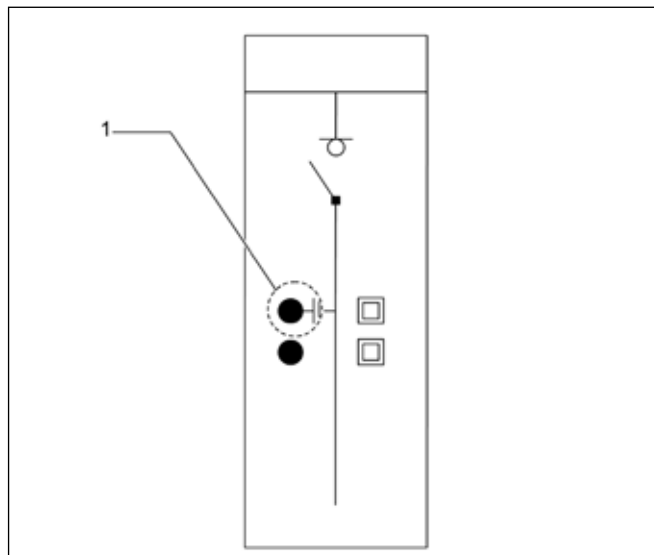
#### 5.2.1. Presence of electrical voltage

Correspondence between the feeder cubicles and the **ekor.ccp** must be checked in accordance with the following table:

Cubicle E1		Cubicle E2	
Voltage presence indication lights	Display indication <b>ekor.ccp</b>	Voltage presence indication lights	Display indication <b>ekor.ccp</b>
All 3 light up (presence)	Filled circle	All 3 light up (presence)	Filled circle
No lights are on (absence)	Empty circle	No lights are on (absence)	Empty circle

**Table 5.1.** Correspondence between the feeder cubicles and the **ekor.ccp**

While the **ekor.rtk** or the **ekor.rpg.ci** is fed and with no electrical voltage in the electrical supply line, **ekor.ccp** shows the absence of voltage on screen.



1 Voltage presence graphic indication

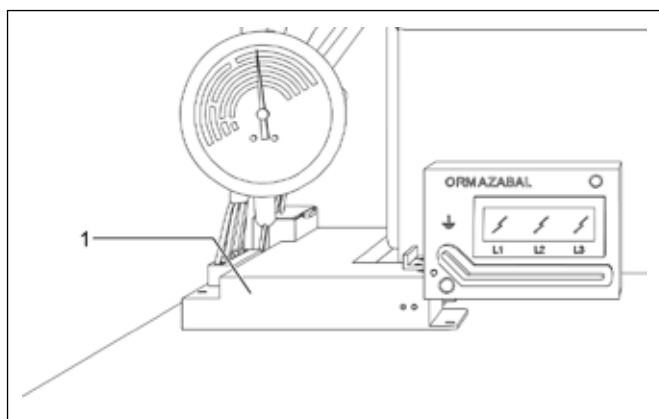
**Figure 5.1.** Correspondence between the feeder cubicles and the **ekor.ccp**

### 5.2.2. Voltage presence simulation

#### With **ekor.rtk**

To simulate the presence of voltage, press the test button on the side of the **ekor.rtk** while pressing the test button, **ekor.ccp** shows the presence of voltage on screen (both in menu mode and in graphic mode). Stopping pressing the test button, **ekor.ccp**, shows absence of voltage.

This test button changes the status of the output contacts of the **ekor.rtk**.



1 Test push-button

**Figure 5.2.** Voltage presence simulation

#### With **ekor.rpg.ci**

To simulate the presence of voltage, disconnect the output cable of the **ekor.rpg.ci** corresponding to "Voltage presence". To simulate the presence of voltage, apply a positive impulse to the terminal of terminal block A corresponding to the "Voltage presence" output. Voltage presence/absence signalling in the **ekor.ccp** is modified by applying a positive impulse to the terminal or disconnecting the cable. See the project diagrams to confirm which **ekor.rpg.ci** output to use for this signalling.

### 5.2.3. Switch positions

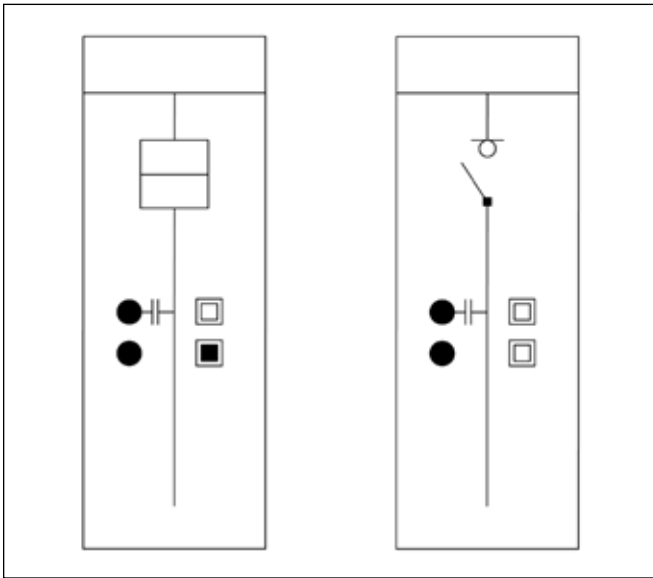


Figure 5.3. Open switch position for circuit-breaker cubicle and feeder cubicle

## 5.3. Entering and leaving the transformer substation

The status of the **ekor.ccp** LEDs in normal operations must be as follows:

Alarm	Aux. V.	Service	Communic.	Local	Remote	Manual	Automatic
?	ON	Flashing	OFF	ON	OFF	OFF	ON

Table 5.2. Initial status of the **ekor.ccp** LEDs

1. "Aux. V." LED (**P**), on
2. "Local" LED (**L**) on
3. "Service" LED (**S**) flashing
4. If there is an alarm in the transformer substation, alarm LED (**A**) will be on
5. "Communication" LED (**C**) on if **ekor.ccp** is communicating (with another **ekor.ccp**, dispatching station, etc.)
6. "Automatic" LED (**A**) on if the transformer substation is in "Automatic" mode.

In the event of any kind of problem, check the sequence followed while commissioning the equipment according to the procedure described previously.

The first operation to perform when arriving at the transformer substation should be to press any key on the keyboard. Hence, after an on-screen user greeting, the first screen will be displayed where you will be able to perform the operations or checks that you require.

When leaving the transformer substation, choose "Automatic" mode by pressing the "M/A" key on the **ekor.ccp** functional keyboard.

Check that there are no alarms in the transformer substation. If there are any alarms, reset them using the keypad. If, after pressing "Reset", an alarm's status is not reset, it means that the cause of the alarm continues to be active.

## 6. Anomalies

Anomaly	Possible cause	Solution
<b>The ekor.ccp LEDs are off.</b>	ekor.ccp does not receive power	Check that the battery is working
		Check that the "CP" miniature circuit-breaker is in the off position
<b>Cubicle L1 does not switch</b>	The automation system is in automatic mode	Switch to manual.
	An alarm is active.	Open the earth connection
	There is an anomaly in the battery	Remove the operation lever.
	It is in earthing position.	If there are any alarms, reset them.
	Operation lever inserted in the medium-voltage cubicle.	If the alarm is "battery fault", proceed as mentioned above
	The motor is not being fed.	Check that the "CP" and "L1" miniature circuit-breakers are closed.
	One of the motorised kit terminals is loose.	Open cubicle L2 if it is closed and L1 is to be closed
<b>Cubicle L2 does not switch</b>	The automation system is in automatic mode	Switch to manual.
	An alarm is active.	Open the earth connection
	There is an anomaly in the battery	Remove the operation lever.
	It is in earthing position.	If there are any alarms, reset them.
	Operation lever inserted in the medium-voltage cubicle.	If the alarm is "battery fault", proceed as mentioned above
	The motor is not being fed.	Check that the "CP" and "L2" miniature circuit-breakers are closed.
	One of the motorised kit terminals is loose.	Open cubicle L1 if it is closed and L2 is to be closed
	Cubicle L1 is closed	If there are any loose terminals, reconnect them in their appropriate places
<b>E1 switch error</b>	The cubicle does not switch.	Follow the instructions for "Cubicle L1 does not switch".
	The cubicle does not start or finish the operation.	Check that there is no battery alarm. If there is, proceed as described in "Battery fault alarm"
<b>E2 switch error</b>	The cubicle does not switch.	Follow the instructions for "Cubicle L2 does not switch".
	The cubicle does not start or finish the operation.	Check that there is no battery alarm. If there is, proceed as described in "Battery fault alarm"
<b>E1 error indication</b>	The E1 switch status indication is not correct.	If there are any loose terminals, reconnect them in their appropriate number.
		Check that there are no cut or short-circuited cables
<b>E2 error indication</b>	The E2 switch status indication is not correct.	If there are any loose terminals, reconnect them in their appropriate number.
		Check that there are no cut or short-circuited cables
<b>Charger alarm</b>	There is a charger fault which is preventing the battery from charging correctly	Please contact <b>Ormazabal's</b> Technical - Commercial Department
<b>Standalone end alarm</b>	Prolonged $V_{ac}$ fault.	Check for the presence of $V_{ac}$ voltage
	The power supply equipment is not receiving $V_{ac}$ power supply	Check the power supply equipment's fuses Check the "History Log" for messages regarding voltage failure in both lines and $V_{ac}$ fault.
<b>The equipment does not transfer lines automatically</b>	There is an alarm.	Reset the alarms
	The automation system is in manual mode.	Switch to automatic mode as indicated in the user manual.

Continues on the next page

Continuation

Anomaly	Possible cause	Solution
<b>The voltage indication on the ekor.ccp screen is incorrect</b>	ekor.rtk/ekor.rpg.ci does not have power	Check that the voltage in the ekor.rtk/ekor.rpg.ci terminal blocks is 48 V <sub>dc</sub>
	The ekor.rtk/ekor.rpg.ci connector is not closed in the correct position	Check that the ekor.rtk/ekor.rpg.ci connections are correctly inserted
	Poor detection of ekor.rtk/ekor.rpg.ci	Check the voltage presence in the medium-voltage cubicle with a different voltage indication light and check the phase correspondence
	The cubicle's voltage presence indication light is erroneous	
<b>Both incoming switches are open and the ALARM LED is activated</b>	There is a problem in the installation which causes a fault in the earthing, between phases or both cases	If the "Fault undetected" alarm is active, check the installation, as well as the setting and functioning of the transformer substation's protection devices
		If the "Ext. block active" alarm is active, check the electrical installation
		After correcting the problem, reset the alarms

Table 6.1. Possible causes and solutions to anomalies

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## 7. Associated documentation

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The following documentation references correspond to the General Instructions documents of the various models of units mentioned in this document:

1. **IG-094: ekor.rtk** Voltage detection unit
2. **IG-156: ekor.ccp** Programmable cubicle controller
3. **IG-157: ekor.rpg.ci** Protection unit
4. **ekor.ccp-evt Software: Ormazabal's IG-156** document describes how this software works
5. If there is no advanced automation or non-standard topology, this **IG** will have a specific annex for the particular project with specific descriptions of the automation, in addition to necessary guidelines on verification and commissioning.



# Notes

# Notes

# Notes

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without prior notice.

For further information,  
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