TAVRIDA ELECTRIC

KTR series Automatic Circuit Reclosers and Intelligent Load-Break Switches

QUICK START GUIDE

TAVRIDA ELECTRIC EXPORT
TAVRIDA ELECTRIC
Version No 2 Dated 01.04.08

ISO 9001:2000 certification
ISO 14001:2004 certification

CE Low voltage devices (namely control modules of all types) meet the requirements of the EMC Directive 89/336/EEC, the Low Voltage Directive 73/23/EEC

Contents

The instructions in this guide are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate and service it.

For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

1. Unpacking

The KTR Automatic Circuit Recloser (Intelligent Load-Break Switch) parts are delivered packed in corrugated box and timber crate. The contents of the crates are specified in the packing list. Access to the crates is by panels fastened with screws and the contents can be removed without dismantling the nailed sections.

CAUTION: Inappropriate lifting of either the OSM switching module or RC (ILC) cubicle can result in personal injury or equipment damage.

2. Components

The KTR consists of the following units:

2.1. OSM Outdoor Switching Modules OSM/TEL-15,5-16/630-204 and OSM/TEL-27-12,5/630-205 are used for switching and reclosing in electrical power networks with maximum operating voltage up to 15,5 kV and 27 kV respectively.

It consists of:
2.1.1. OSM Outdoor Switching Module.
2.1.2. Manual-tripping hook.
2.1.3. Routine tests certificate.

2.2. RC Recloser Control cubicle RC/TEL-01E (RC) is a microprocessor based controller which provides OSM control, directional overcurrent, earth fault and sensitive earth fault and auto reclosing relay, instantaneous metering, event log, demand logger and remote terminal unit for remote control in a single package.

ILC Intelligent LBS Control cubicle ILC/TEL-01E (ILC) is a microprocessor based controller which provides OSM control, instantaneous metering, event log, demand logger and remote terminal unit for remote control in a single package.

It consists of:

2.2.1. RC Recloser Control cubicle (ILC Intelligent LBS Conrol cubicle).

2.2.2. Rechargeable battery HAUKER Genesis G12V26Ah10EPX.

2.2.3. IOM Input/Output modules, which are used in the discrete telecommunication systems for control and indication functions.

There are two options available:

IOM/TEL-100/250-01

(rated voltage is from 100 to 220 V).

IOM/TEL-12/60-01

(rated voltage is from 12 to 60 V).

Up to two IOM can be fitted into one RC (ILC).

NOTE:

Rated voltage and number of IOM should be specified in a product order.

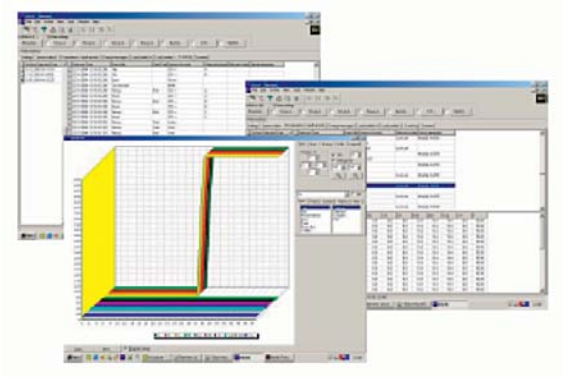
2.2.4. The TELUS Communications cable is a FARNELL 976-880 Null Modem Cable (2 m long), which is used to connect the user's PC to the RC (ILC).

2.2.5. Routine test certificate.

2.3. CC Control Cable CC/TEL-01-7 (7 m long) which connects the OSM and the RC (ILC).

2.4. TELUS Tavrida Electric User Software is designed to:

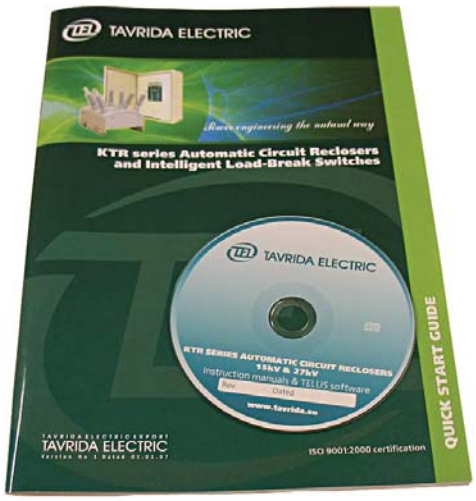
- Edit the device database and device settings.
- Prepare and edit the time-current curves (TCC).
- Analyze operating history of the devices.
- Read and replace parameter groups set up in the device.
- Read device status and protocols.
- Control of the device directly.
- Adjust the device system settings.



NOTE:
TELUS is supplied on a separate CD.

2.5. The set of manuals:

- Installation and Operation manual.
- Communication protocols User guides.
- TELUS manuals.



Options:
RMK OSM Mounting Kit is used to install the OSM on a timber or concrete pole.

RCMK RC (ILC) mounting kit is used to install the RC (ILC) on a timber or concrete pole.

VTMK Voltage transformer mounting Kit is used to mount a VT on a timber or concrete pole. Outdoor surge arrestors in silicon housing.

Outdoor phase to earth and phase-to-phase voltage transformers for the KTR auxiliary supply (200VA class 5M).

3. Control Cable Connection

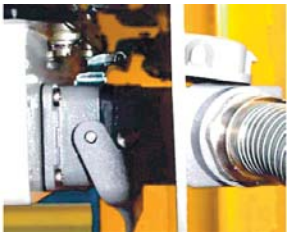
The connection between RC (ILC) and the OSM is provided by the CC. To connect the CC:

1. Remove the RC (ILC) cubicle security cover. Plug in the female connector of the CC as shown in the pictures below.



2. At the OSM side open the connector cover.

3. Plug in and fix the male connector which is at the opposite end of the CC in the working position.

4. RC (ILC) Cubicle Preparation

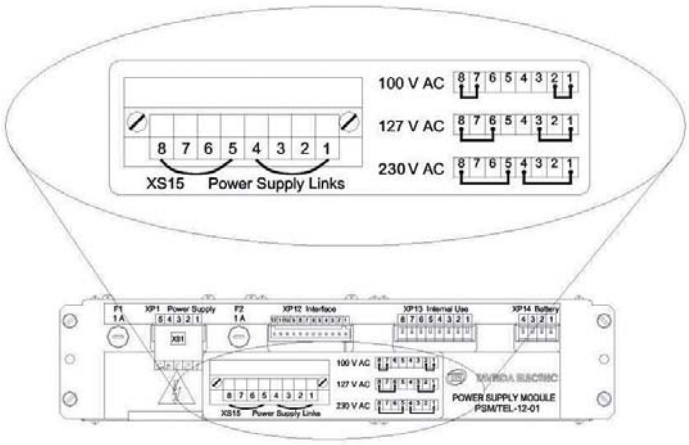
After RC (ILC) is unpacked it should be placed on a horizontal surface front side up. The cubicle should have an auxiliary supply fitted prior to carrying out any tests. This will ensure that the controller will be restored from shutdown mode if the battery has become discharged during transportation or subsequent storage.

4.1 Battery Installation

Locate a battery compartment make sure that the battery is installed as shown below.

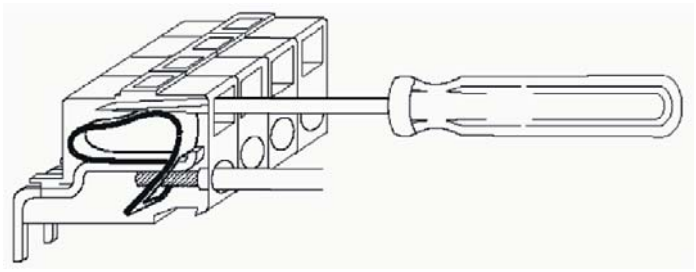
4.2 Auxiliary Supply Connections

The RC (ILC) control cubicle auxiliary supply can be configured for a supply voltage of 110 V AC, 127 V AC or 220 V AC. Each RC (ILC) is preconfigured for a single auxiliary supply of 220 V AC voltage. Configuration is carried out by means of links at the PSM Power Supply Module, these are depicted below.



The RC (ILC) control cubicle can be fitted with one or two separate AC supplies depending on the number of separate power sources (one or two voltage transformers). Standard RC (ILC) configuration is for a single phase to earth AC supply.

All RC (ILC) cubicle connections, with the exception of the auxiliary supply connector, utilises WAGO cage clamps. They can fit both solid and stranded cables with cross-section up to 1.5 mm^2. Cables are connected into the clamps using a special screwdriver, supplied with each module. The way how to install wire into a cage clamp is illustrated below.



WARNING: Incorrect wiring of the auxiliary supply connector can result in personal injury or equipment damage.

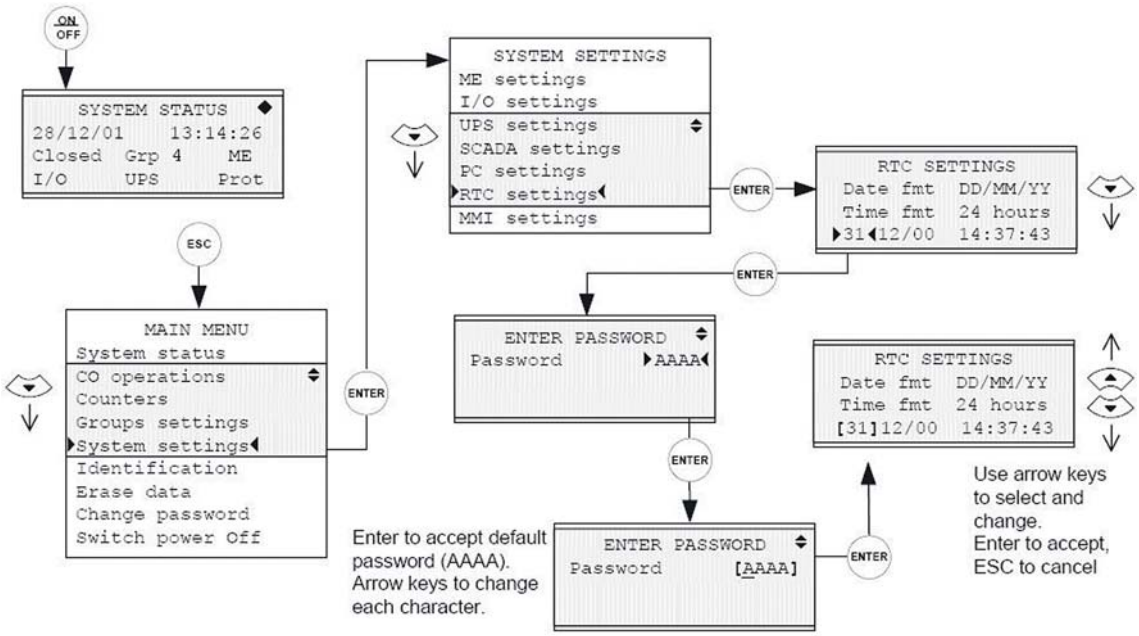
4.3 Initial Checks

Once the AC supply is connected to the RC (ILC), it is recommended that you proceed with the following initial checks.

1. Press the MMI On button to see the SYSTEM STATUS display.

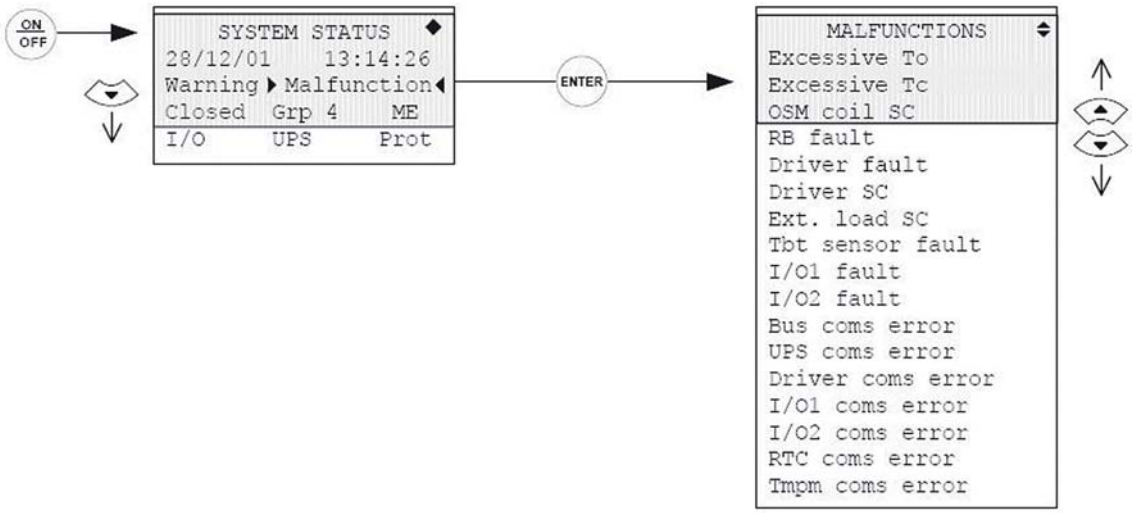
- Pressing the arrow keys will move the brackets to allow selection of any field.
- Square brackets [] indicate that the value in the field can be changed.
- Arrow brackets ►◄ indicate that more information is accessible.

2. Check date and time settings. If necessary, adjust them using the diagram below:



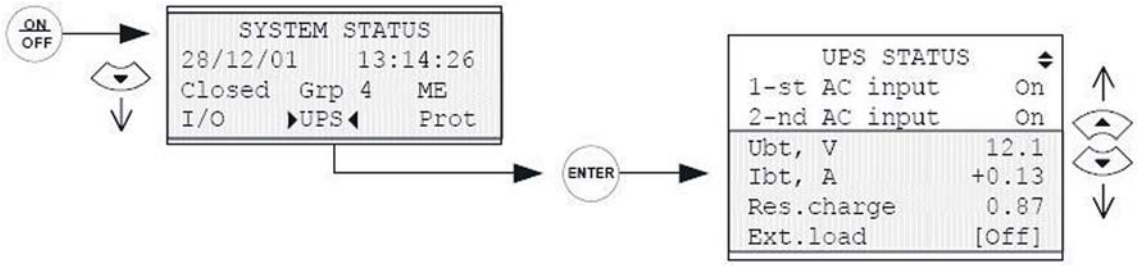
Press the ESC key to return to SYSTEM STATUS.

3. If "Malfunction" appears on the SYSTEM STATUS screen note any diagnostic messages and refer to the Troubleshooting section for their meaning:



Press the ESC key to return to SYSTEM STATUS.

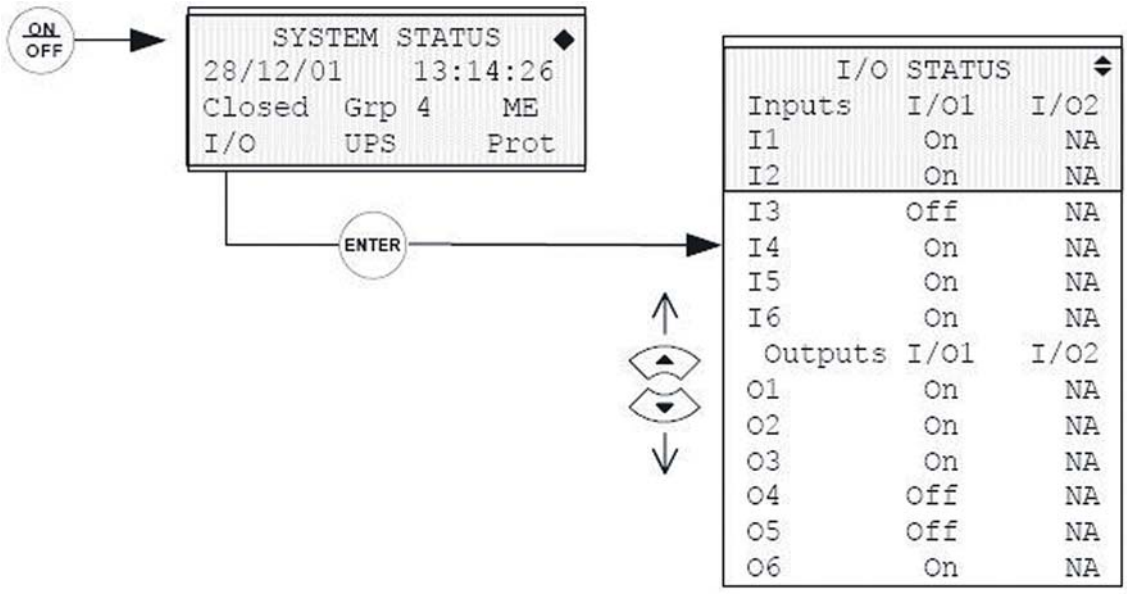
4. If it is intended to use any type of RTU, proceed with the following actions to activate the internal 12 V DC power supply. Select "UPS", select the Ext. load and change it from OFF to ON.



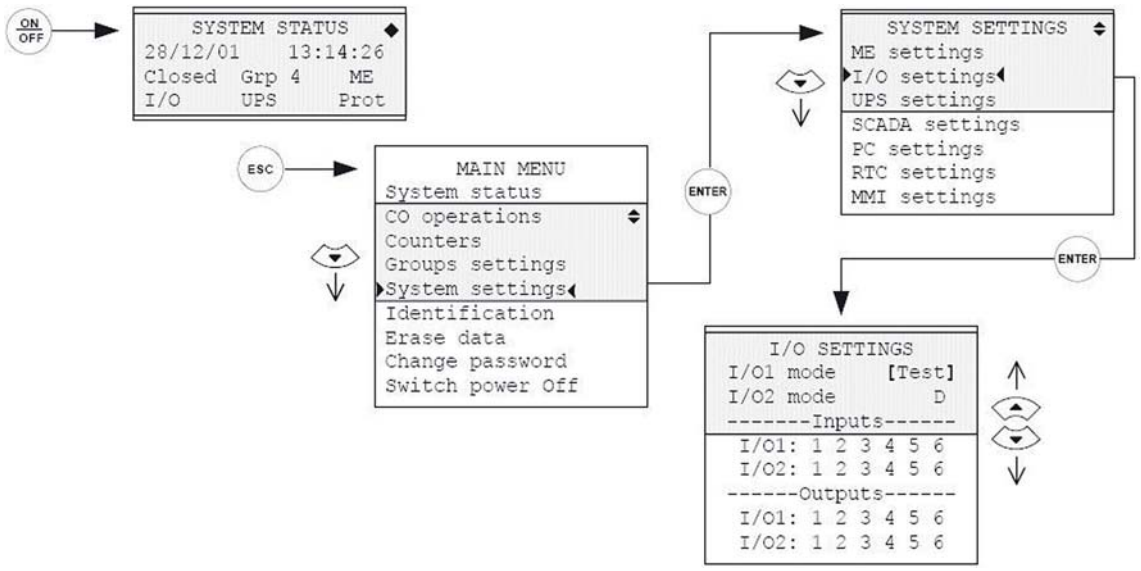
Confirm that 12 V DC appears across terminals XS-1:1 and XS-1:2 of the RS-485 connector.

5. If I/O modules are included in the delivery, note the part number on the module case. Modules with part number IOM/TEL-12/60 will accept input voltage from 12 V to 60 V. Modules with part number IOM/TEL-100/250 will accept input voltage from 100 V to 220 V.

6. From the SYSTEM STATUS screen select I/O to confirm that the I/O modules are indicating correctly. Note that if the IOM is not installed or disabled, NA appears next to the input/output status.



7. From the SYSTEM STATUS screen select and view "System settings" then select and view "I/O settings". Select "Test" mode for an I/O module. In this module, application of the correct oper-



ating voltage to any input will cause ALL outputs to change their state.
On completion of the test, set the module back to the "Enable" mode.

The above checks confirm that the RC (ILC) cubicle is functioning correctly and can be connected to the OSM switching module for further testing.

5. OSM Outdoor Switching Module Preparation

5.1 KTR Recloser (ILBS) Operation tests

It is highly recommended that the following operation test be carried out to ensure that the KTR recloser (ILBS) operates properly.

1. Remove the OSM switching module from the box and place it on a worktable or level surface.

2. Connect the control cable to the plug in the base of the OSM and secure it using the integral clamping arrangement.

3. Press the ON button on the RC (ILC) cubicle operator panel, confirm that the position LED is lit and agrees with the indicator at the base of the OSM.

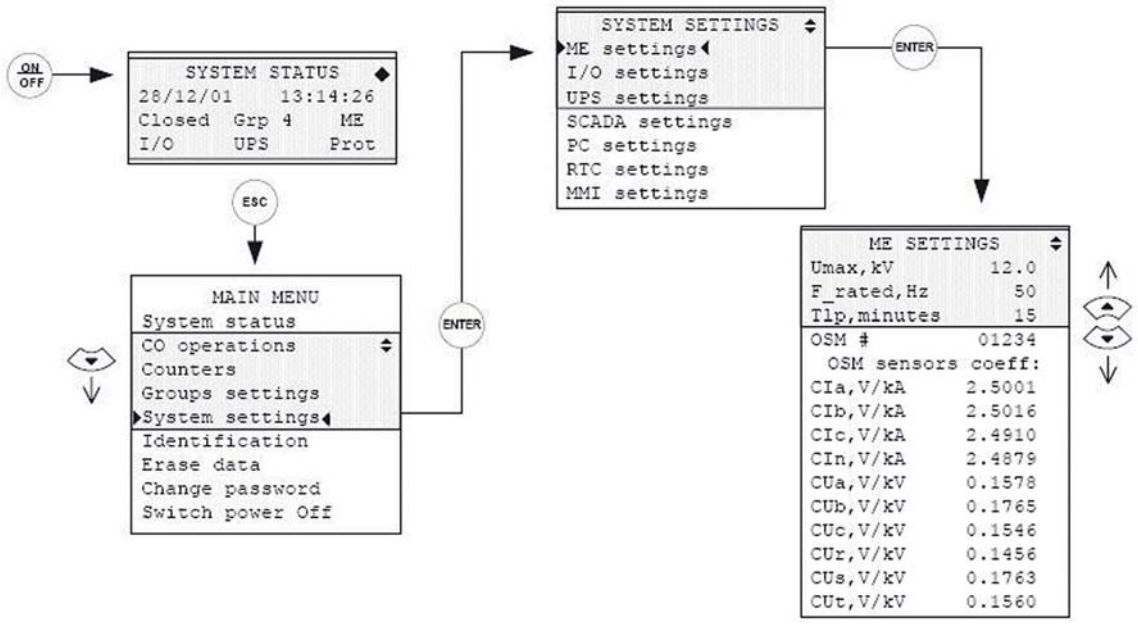
4. Press the red close button and confirm that the OSM closes and that the closed LED is lit.

5. Use the manual trip ring to affect a mechanical trip operation and ensure the mechanism is fully withdrawn.

6. View the "System Status" on the MMI, select the "Warning" and confirm that an "OSM Coil Isolated" message indicates that the OSM is unable to be closed. Confirm that pressing the close button does not cause the OSM to close. Press the ESC key to return back to the "System Status" view.

7. Push the manual trip ring back into the operating position and confirm that pressing the close pushbutton causes the OSM to close.

8. Navigate to the "ME Settings" as illustrated in the figure below and fill in the fields "OSM #" and "OSM sensors coeff".

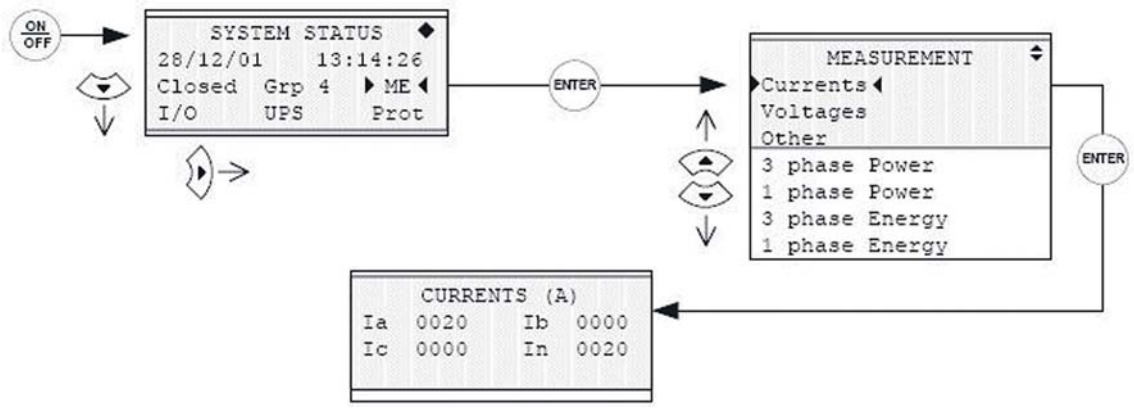


Press the ESC key to return to the "System Settings" menu.

CAUTION: Incorrect Measurement coefficients may result in performance outside of specified accuracy for voltage and current measurement.

9. Ensure that the OSM is in the closed position.

10. Select "Measurement" from the "System Status" page, then "Currents" from the measurements page. Inject 20 A primary current, one phase at a time and confirm that indicators of phase and earth current are correct in each case.



11. If high voltage testing is required refer to section 5.3.

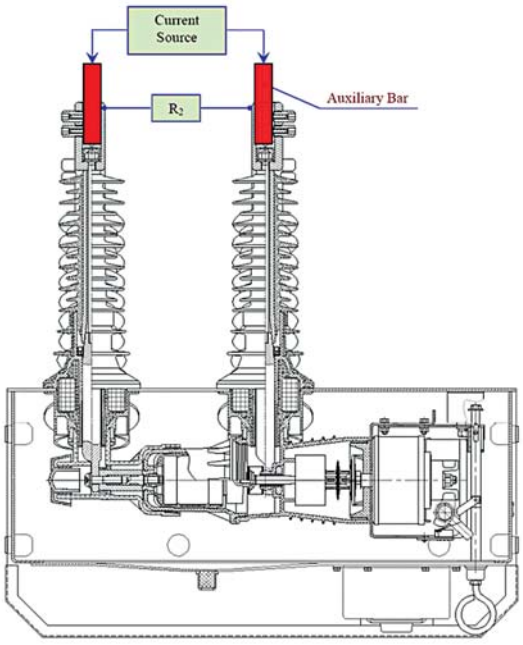
12. Press the ESC key to enter into the "Main Menu". Select "Switch power off" and press the Enter key. The RC (ILC) cubicle should turn off.

5.2 Main Contact Resistance Test

1. OSM main contacts must be in the CLOSED position.

2. Apply 100 A test current to the HV terminals.

3. Main contact resistance must not exceed the limits specified in 4.1.3 (≤85 $\mu\Omega$ for OSM/TEL-15.5-16/630-204 or ≤95 $\mu\Omega$ for OSM/TEL-27-12.5/630-205).



5.3 High Voltage Test

All Tavrida Electric outdoor switching modules meet all IEEE C.37.60-2003 (IEEE C.37.63-2005) requirements and are tested as per IEEE C.37.60-2003 (IEEE C37.63-2005) clause 7 before shipment to the customer. Where power frequency testing is required prior to installation, testing to 80% IEEE C.37.60-2003 (IEEE C.37.63-2005) Power Frequency withstand voltage is recommended to confirm insulation integrity without unduly stressing insulating components.

Equipment Rating	Recommended 1 Minute Test Voltage
15,5 kV	50 kV
27 kV	60 kV

High voltage should be applied to the OSM connectors. The OSM should be connected to the RC (ILC) cubicle with the control cable.

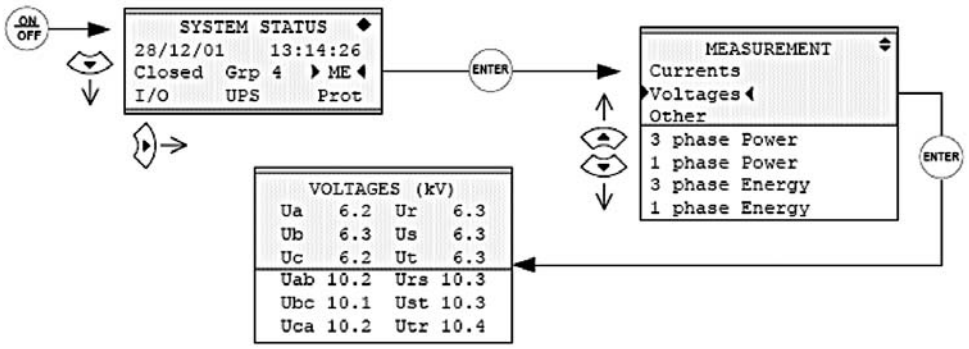
The HV test is divided in to three parts.

TEST 1. OSM main contacts must be in the CLOSED position.

1. Apply an earth (min. 4 mm^2 diameter cable) from the OSM earth point to the RC (ILC) earth point and then to the HV set earth point. Connection cable conduit must also be grounded to the HV set earth point.

2. Where a single phase HV test is being used, each phase of the OSM must be tested individually.

3. Select "System status", "ME" and then "Voltage" from the RC (ILC) operating panel. Energize the OSM connectors with system phase-to-earth voltage confirming voltage indications for each connector.



TEST 2. OSM main contacts must be in the CLOSED position.

1. Apply an earth (min. 4 mm^2 cable diameter) from the OSM earth point to the RC (ILC) earth point and then to the HV set earth point. Connection cable conduit must also be grounded to the HV set earth point.

2. Where a single phase HV test is being conducted, each phase of OSM must be tested individually.

3. Energize the OSM HV circuit to the recommended test voltage (refer to the table above) for 1 minute.

TEST 3. OSM main contacts must be in OPEN position.

1. Apply an earth (min. 4 mm^2 cable diameter) from the OSM earth point to the RC (ILC) earth point and then to the HV set earth point. Connection cable conduit must also be grounded to the HV set earth point.

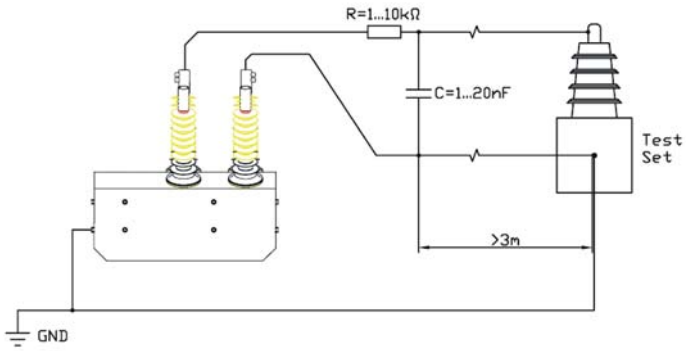
2. Where a single phase HV test is being used, each phase of OSM must be tested individually.

3. Apply a slowly rising AC voltage between each vacuum interrupter.

4. The voltage shall be increased up to the limit specified in the table above and then kept steady for 1 min.

5. During the vacuum interrupter testing, self-fading re-strikes may appear. In this case reduce the voltage until that effect disappears (for 10—15 s) and then increase the voltage back to the required level.

6. If the test set uses long connecting wires, the restrikes may cause switching surges resulting in insulation failure during the test. To avoid this effect, use the shortest possible wires. If the length of the connecting wires cannot be reduced below 3 m, correct the surge impedance of the test set by connecting an RC (ILC) circuit as illustrated below.



7. Disconnect the control cable from both the RC (ILC) and the OSM.

CAUTION: Inappropriate energization or excessive voltage may result in equipment damage.

WARNING: Inappropriate grounding of the OSM, cubicle or test equipment will apply hazardous voltages that may result in personal injury or death or equipment damage. Only personnel trained in HV testing should carry out the tests described in this section.

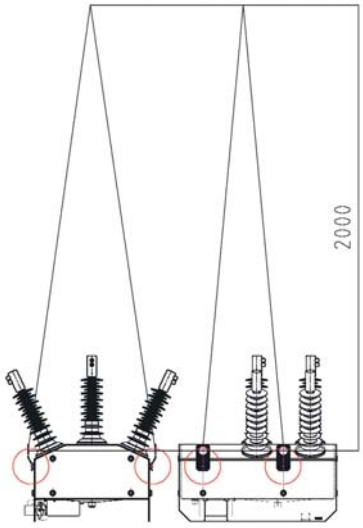
6. Installation

The recommendations given in this section are desired to maximize the effectiveness of the KTR automatic circuit recloser (Intelligent Load-Break Switch).

CAUTION: Failure to comply with installation recommendations may result in equipment damage.

WARNING: Follow all locally approved safety procedures when installing or operating this equipment. Failure to comply may result in death or severe personal injury.

6.1 OSM Installation



Open the upper lid of the box to unpack the OSM. Fit the switching module with 4 lifting lugs (included in the delivery). Lift out the switching module from the original package using lifting slings. The minimum length of the lifting slings and installation places of lifting lugs are shown in the picture at the left.

Lifting Lug

CAUTION: The lugs must be removed after installation. Failure to do so can result in degradation of the OSM impulse withstand characteristics.

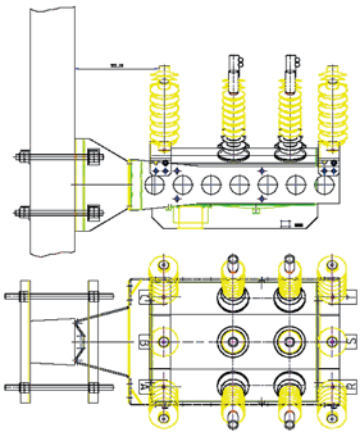
6.2 Concrete Pole Mounting

1. Drill two holes with a 26 mm diameter into the four U-channel bars. The distance between the holes should be the same as the thickness of the pole plus 30 mm.

2. Insert 2 U-channel bars into the Main Support Frame.

3. Attach the OSM to a concrete pole using U-channel bars run from the opposite pole side attaching them to the ones in the Main Support Frame.

4. 4 threatened M24 rods tightened with 8 D24 washers and 16 M24 nuts are used for this procedure as illustrated on the left.



6.3 Fitting the Manual Tripping Hook

Prior to fitting the manual tripping-hook the M8 nut from the installation kit should be screwed on the threaded end of the hook. The hook with the nut should be placed at the mounting seat. Check the correct orientation of the hook. Holding the hook in this position tighten the M8 nut with a torque of 10 Nm as shown below.

6.4 RC (ILC) Installation

The RC (ILC) cubicle has lifting lugs in the top section of the pole mounting bracket. The cubicle is secured to the pole by bolts or coach screws with a diameter of up to 22 mm. The top hole has a key shape and allows fitting over a bolt or nut. Once the top is secured the bottom bolt can be attached.

6.4.1 Auxiliary Supply

The RC (ILC) cubicle allows connection of one or two AC supplies. Refer to the section 4.2 for connection details. When the female connector is assembled it has to be connected to The RC (ILC) cubicle:

1. Remove the RC (ILC) cubicle security cover (refer to the section 3)

2. Remove the plastic cap from the RC (ILC) connector.

3. The Female connector of the cable has to be firmly screwed-in as illustrated below.

4. Install the protective cover back onto place and fasten it by four captive screws.

In order to prevent problems associated with circulated earth currents in the event that power is being supplied from a dedicated transformer, neutral conductors must be linked to earth at the PSM terminal connection block.

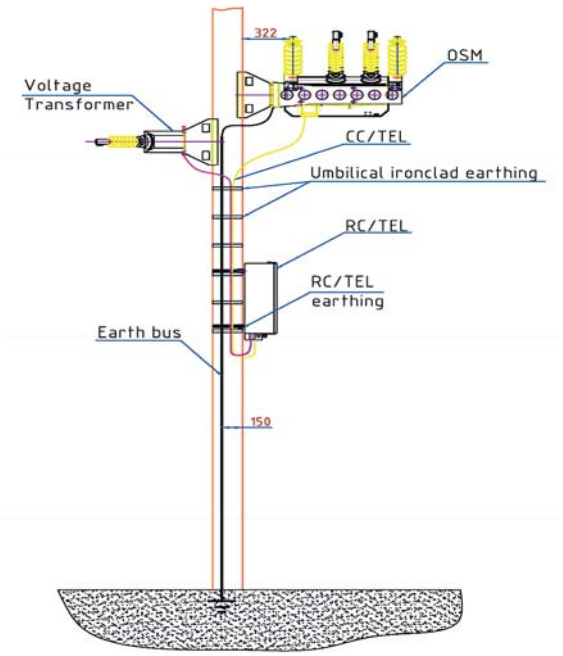
6.4.2 Earthing

Earthing wire must have TINNED COPPER terminals. Earthing studs are located on the OSM, the RC (ILC) and the Surge Arrester's mounting brackets. Earth the OSM, the RC (ILC) and the SA mounting brackets using three earth wires which have one end bolted to the studs and the others to the main earth bus on the pole, as close to each other as possible. They all should come together at one point on the main earth bus.

The outdoor switching module is earthed by means of an M12 hex head bolt (provided) threaded into a captive thread on the back wall of the tank. The RC (ILC) cubicle is earthed by means of an M12 hex head bolt (provided) threaded into a captive thread on the base of the cubicle.

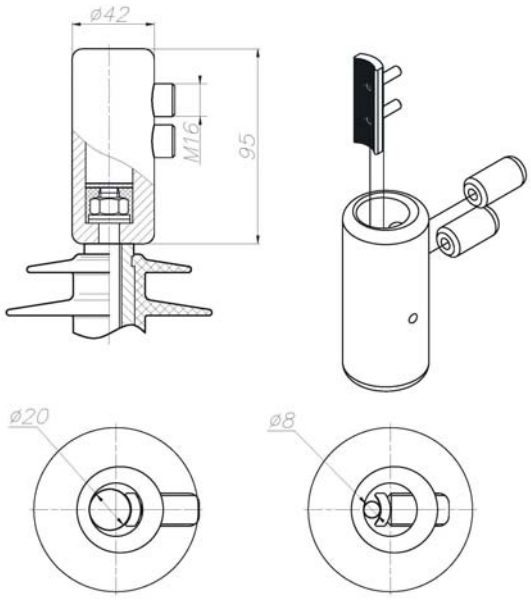
Recommended fixing torque is 30 Nm. The earth pole bus is a copper conductor with a required minimum size of 35 mm^2. The earth wire is a copper conductor with a required minimum size of 16 mm^2.

The CC shielding should be earthed using iron clamps secured to the earth pole bus. The recommended distance between the clamps is 250 mm. The distance between the CC and the earth pole bus should be about 150 mm.



6.4.3 Connection of Main Terminals

Built-in tinned copper mechanical connectors are used to provide connections to the OSM terminals. It is allowed to apply both aluminium and copper conductor cables. The connectors can be used for connection with both bare and insulated cables with conductor diameters from 8 mm to 22 mm (conductor areas approximately from 40 mm^2 to 240 mm^2). The dimensions and design of the connectors are illustrated below.



NOTE:
A thin layer of the CG60 contact lubricant, with a thickness not exceeding 1 mm, should be applied onto the connection tip.

If an insulated cable is used, the insulation of the connected tip should be stripped for the length of at least 70 mm as shown in the figure below.

CAUTION: Don't forget to use the silicon grease while making these connections to avoid corrosion and overheating.

7. Control and Indication

The RC (ILC) control and indication capabilities are handled by four independent control and indication elements:

- The MMI Man Machine Interface
- A PC Personal Computer with TELUS software installed
- A SCADA Supervisory Control and Data Acquisition
- An IOM digital Input/Output Module

The control and indication capabilities are illustrated in the table below.

	MMI	PC	SCADA	I/O
Control data	-	-	-	-
Date	✓	✓	✓	-
Time	✓	✓	✓	-
Life time counters readings	-	✓	-	-
Settings	-	-	-	-
System settings	-	-	-	-
ME settings	✓	✓	-	-
UPS settings	✓	✓	-	-
RTC settings	✓	✓	-	-
MMI settings	✓	✓	-	-
PC settings	✓	✓	-	-
SCADA settings	✓	✓	-	-
I/O settings	✓	✓	-	-
Group 1 settings	✓	✓	-	-
Group 2 settings	✓	✓	-	-
Group 3 settings	✓	✓	-	-
Group 4 settings	✓	✓	-	-
Control signals				
Remote Off	✓	-	-	-
Trip/Close	✓	✓	✓	✓
On(Prot)/Off(Prot)	✓	✓	✓	✓
On(Grp1)	✓	✓	✓	✓
On(Grp2)	✓	✓	✓	✓
On(Grp3)	✓	✓	✓	✓
On(Grp4)	✓	✓	✓	✓
On(AR)/Off(AR)	✓	✓	✓	✓
On(EF)/Off(EF)	✓	✓	✓	✓
On(SEF)/Off(SEF)	✓	✓	✓	✓
On(LL)/Off(LL)	✓	✓	✓	✓
On(CLP)/Off(CLP)	✓	✓	✓	✓
On(UV)/Off(UV)	✓	✓	✓	✓
On(ABR)/Off(ABR)	✓	✓	✓	✓
On(UF)/Off(UF)	✓	✓	✓	✓
On(Power)	✓	-	-	✓
Off(Power)	✓	✓	-	-
On(Ext)/Off(Ext)	✓	✓	-	-
Reset password	-	✓	-	-
Erase fault counters	✓	✓	✓	-
Erase energy meters	✓	✓	✓	-
Erase CO operations	✓	✓	✓	-
Erase event log	✓	✓	✓	-
Erase change messages	✓	✓	✓	-
Erase load profile	✓	✓	✓	-

Control Capabilities

Key:

ME – Measurement Elements

UPS – Uninterruptible Power Supply

RTC – Real Time Clock

MMI – Man Machine Interface

I/O – Input/Output module

Remote – Remote control mode

G_{rp} – Protection Group

AR – Auto Reclose

LL – Live Line

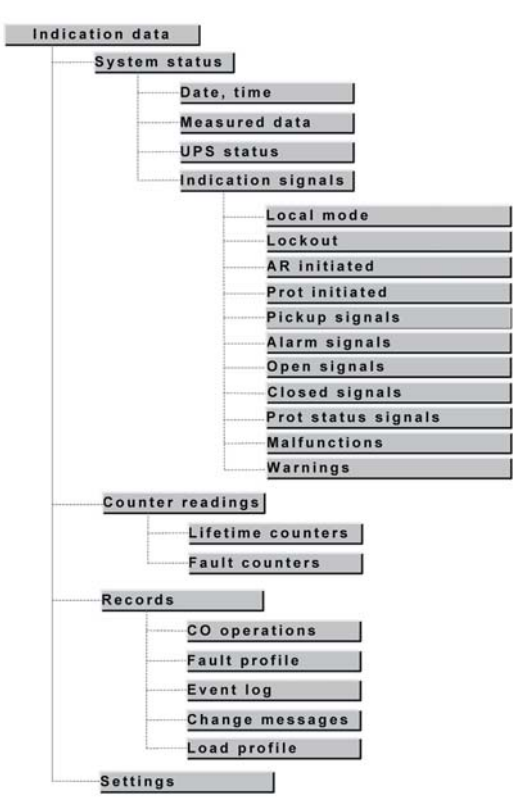
CLP – Cold Load Pickup

UV – Under Voltage protection

ABR – Automatic Backfeed Restoration

UF – Under Frequency

Ext – External load power supply



	MMI	PC	SCADA	I/O
Date, time	✓	✓	✓	-
Measured data	✓	✓	✓	-
UPS status	✓	✓	✓	-
Indication signals				
Local mode	✓	✓	✓	✓
Lockout	✓	✓	✓	✓
AR initiated	-	-	✓	✓
Prot initiated	✓	✓	✓	✓
Pickup signals	-	-	✓	✓
Alarm signals	-	-	✓	✓
Open signals	-	-	✓	✓
Closed signals	-	-	✓	✓
Prot status signals	✓	✓	✓	✓
Malfunctions	✓	✓	✓	✓
Warnings	✓	✓	✓	✓
Counter readings				
Lifetime counters	✓	✓	✓	-
Fault counters	✓	✓	✓	-
Records				
CO operations	✓	✓	-[1]	-
Fault profile	-	✓	-[1]	-
Event log	-	✓	-[1]	-
Change messages	-	✓	-[1]	-
Load profile	-	✓	-[1]	-
Settings	✓	✓	-	-

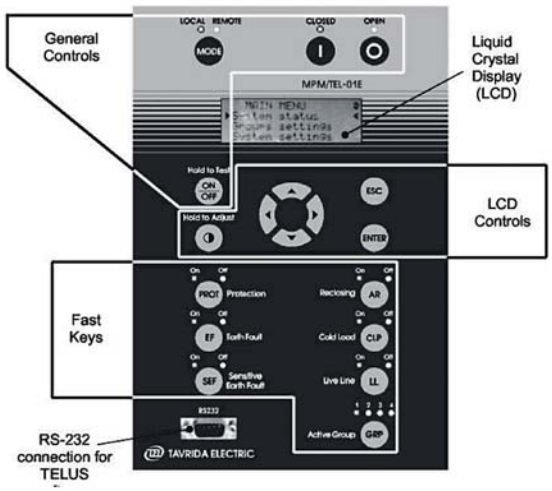
Indication Capabilities

Key:
UPS – Uninterruptible Power Supply
AR – Auto Reclose
P_{rot} – Protection

Note 1. *Depends on protocol, eg DNP3 file transfer allows Records to be available on SCADA. Please refer to the specific protocol documentation.*

8. MMI Controls

The MMI consists of a sensor keypad with Light Emitting Diode (LED) indication, a four line and a 20 character-wide Liquid Crystal Display (LCD), and navigation buttons.



LED's are used to indicate the status and status changes. The "new status" LED blinks when executing a control to indicate that the change has been accepted and is being processed. Once the change of status has been confirmed, the "old status" LED turns off and the "new status" LED becomes lit. That procedure should not take longer than one second.

General Control Buttons

General Control buttons provide the MMI On/Off control, OSM Open/Close control and indication, and Local/Remote control and indication.

ON/OFF

The MMI control and indication is only operational when the MMI is turned on as is indicated by the text displayed on the LCD. The MMI has a power saving feature, which will turn it off if idle for more then 5 minutes.

When the Uninterruptible Power Supply (UPS) is in the normal supply mode, the MMI can be turned on or off using the ON/OFF button.

When the UPS is OFF or in the shutdown mode it can be switched on using the MMI ON/OFF button.

The ON/OFF button also provides a means of testing the LCD and all indicating diodes. Pressing and holding it will cause all the LED's to blink and the message TEST to cycle through the four lines of the LCD. Holding any button and subsequently releasing ON/OFF will cause cycling of the TEST text to continue provided the button under test is healthy.

Control Mode

The Control mode button allows the OSM Control to be set to either the Local Control or the Remote Control mode. The LEDs labeled LOCAL and REMOTE provide indication of which mode is set.

When in the Local control mode, indication is available to both local and remote applications but controls can only be executed locally. When in the Remote control mode, indication is available

to both local and remote applications but controls can only be executed by Remote applications. The exception to this is an Open control, which can be executed locally or remotely, independent of the Control mode.

"I" (Close)

The red button labeled "I" is used to close the OSM contacts. The button works only if the MMI is set to the Local control mode. If the MMI is set to the Remote control mode, then the LED marked CLOSED will not blink indicating that the operation has not been accepted.

"O" (Open)

The green button labeled "O" is used to open the OSM contacts. An MMI Open operation can be executed in any control mode.

LCD Control Buttons

Liquid Crystal Display control buttons are used to adjust the LCD contrast, to navigate through the menu structure and to select/change values.

LCD Contrast pushbutton

Holding or repeatedly pressing this button will adjust the LCD contrast by cycling through all available contrast settings.

Navigation pushbuttons

These buttons allow moving through the MMI menu items and changing setting values.

Each screen that appears has one of two navigation symbols in the top right hand corner; "▲▼" indicates vertical scrolling, i.e. the up and down buttons can be used to scroll between items, "◆" indicates four way scrolling, i.e. up, down, right and left buttons can be used for operating the menu.

Once a field has been selected for editing, the up and down buttons are used to change the value. If the value to be changed is numeric, right and left arrow are used to select each digit, up and down arrows are used to change the value of that digit only.

ENTER

The ENTER button is used to access a menu item being selected; (read-only fields which cannot be edited are bracketed by arrows, →←).

When ENTER is pressed the next level screen will be displayed or the selected field will become surrounded by brackets. Triangular brackets ►◄ indicate that when ENTER will be pressed another screen will appear. Square brackets "[]" indicate that the value is editable by the arrow buttons.

All the settings that can be edited are password protected except for those accessible by the Fast Keys. The system automatically prompts for the password when password protected settings are being edited for the first time after switching the MMI on. The correct password has to be entered to be granted access to change the values. MMI passwords have AAAA alpha-numerical format, where A can be a digit (from 1 to 9) or a letter (from A to Z).

ESC

The ESC button reverses the navigation in the menu. Upon pressing, the previous screen will be displayed or the value will be deselected.

LCD control buttons allow an operator access to the following functions within the MMI menu:

- viewing system status: date, time, OSM state (Open/Closed/Lockout), malfunction and warn ings signals, "protection initiated" indication signals, measurements, I/O status, UPS status, Prot status
- viewing CO operations record, lifetime and fault counters, protection group settings, system settings
- changing protection status, all settings except for protection Group names and PC baud rate
- viewing MPM identification: serial number & software version
- testing operability of digital input/output (I/O) relays
- switching external load voltage On/Off, MMI power Off
- erasing records, energy meter and fault counters readings

Fast Keys

Fast keys allow an operator to set the status of protection elements and the active protection group by a single push of the button.

Each fast key can be enabled or disabled in the MMI settings When enabled, they can only be used when the MMI is set to the Local control mode. Any Fast Key pressed repeatedly will cycle through the available options; the last option selected will become active (with the exception of the GRP key, see below).

Fast keys operate by accessing the Protection Status Control (PSC) element.

The Protection Fast Key turns Protection ON or OFF.
When it is set to OFF, all protection elements for all groups are disabled.

The Earth Fault Fast Key disables or enables all Earth Fault over-current elements for all groups.
When it is set to OFF, all EF elements are disabled.

The Sensitive Earth Fault Fast Key disables or enables all Sensitive Earth Fault over-current elements for all groups.
When it is set to OFF, all SEF elements are disabled.

The Auto Reclosing Fast Key disables or enables all Auto Reclose elements for all groups.
When it is set to OFF, all AR elements are disabled.

The Cold Load Fast Key disables or enables Cold Load Pickup for all groups.
When it is set to OFF, all CLP elements are disabled.

The Live Line Fast Key enables or disables all Live Line elements for all groups.
When it is set to OFF, all LL elements are disabled.

The Active Group Fast Key selects the one of the four Protection Groups.
When the appropriate group has been chosen (the group number is indicated by LED), ENTER button will make this group active.
The Active Protection group cannot be changed if a protection element is activated. The new group will become active upon pressing ENTER and all protection elements will be reset.

9. MMI Menu Layout

This chapter illustrates layout of the MMI menus and how to navigate within the menus to access information.

Each menu generally contains the following information:

- menu title;
- navigation symbols ("▲▼", "◆" indicating applicability of vertical or four directional scrolling respectively. Absence of these symbols means that scrolling is not applicable for a particular screen);
- permanent information which always exist and has the same appearance;
- transient information which appears only if relevant conditions are met;
- parameter values which always exist in the designated space but are generally different.

Permanent information, transient information and parameter values may be used for indication only or for transition to another menu. Parameter values may be subject to editing.

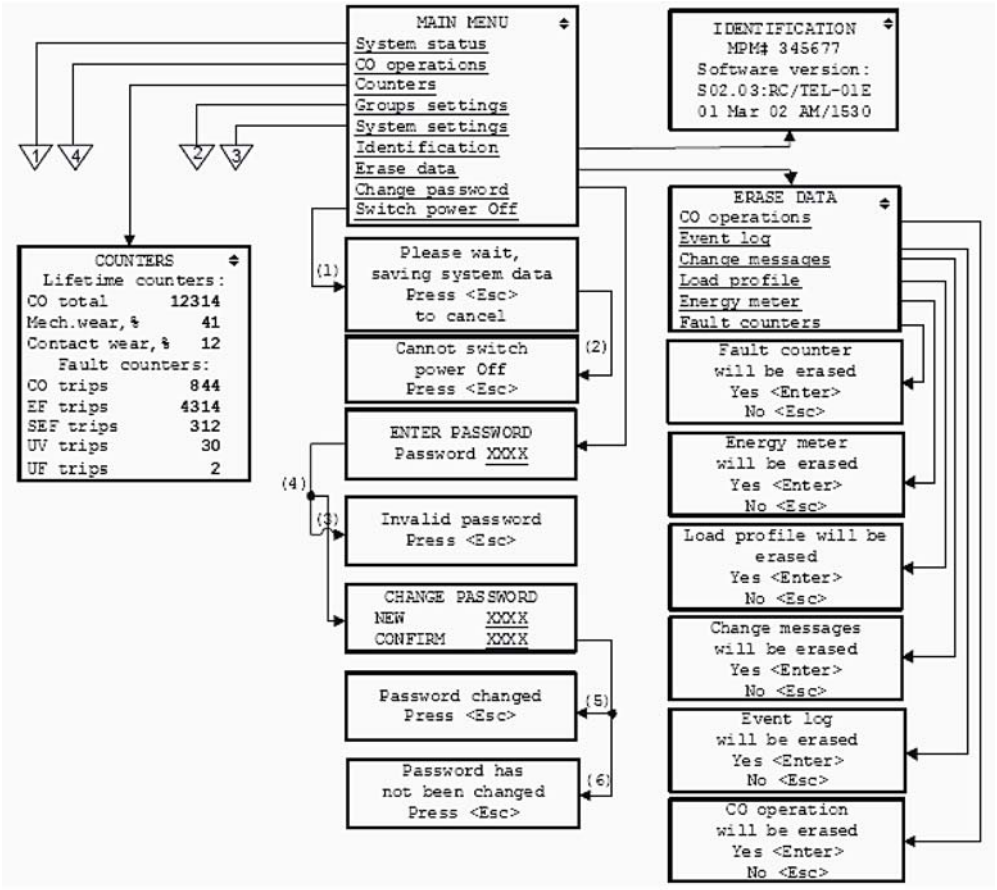
Permanent information is printed in normal type.

Transient information is printed in *italic* type.

Parameter values are printed in **bold** type.

Active information (intended for transition to another menu or editing) is printed in underlined type. Where the information provides a transition to another menu, a transition arrow (→) is shown; pressing the ENTER pushbutton will transition to the next menu.

A transition to/from another page of the diagram is marked with  , where n is the transition number.



MAIN MENU, COUNTERS, INDETIFICATION, ERASE DATA, CHANGE PASSWORD menus

Notes:

(1) This menu appears during the data saving process initiated by switching power OFF.

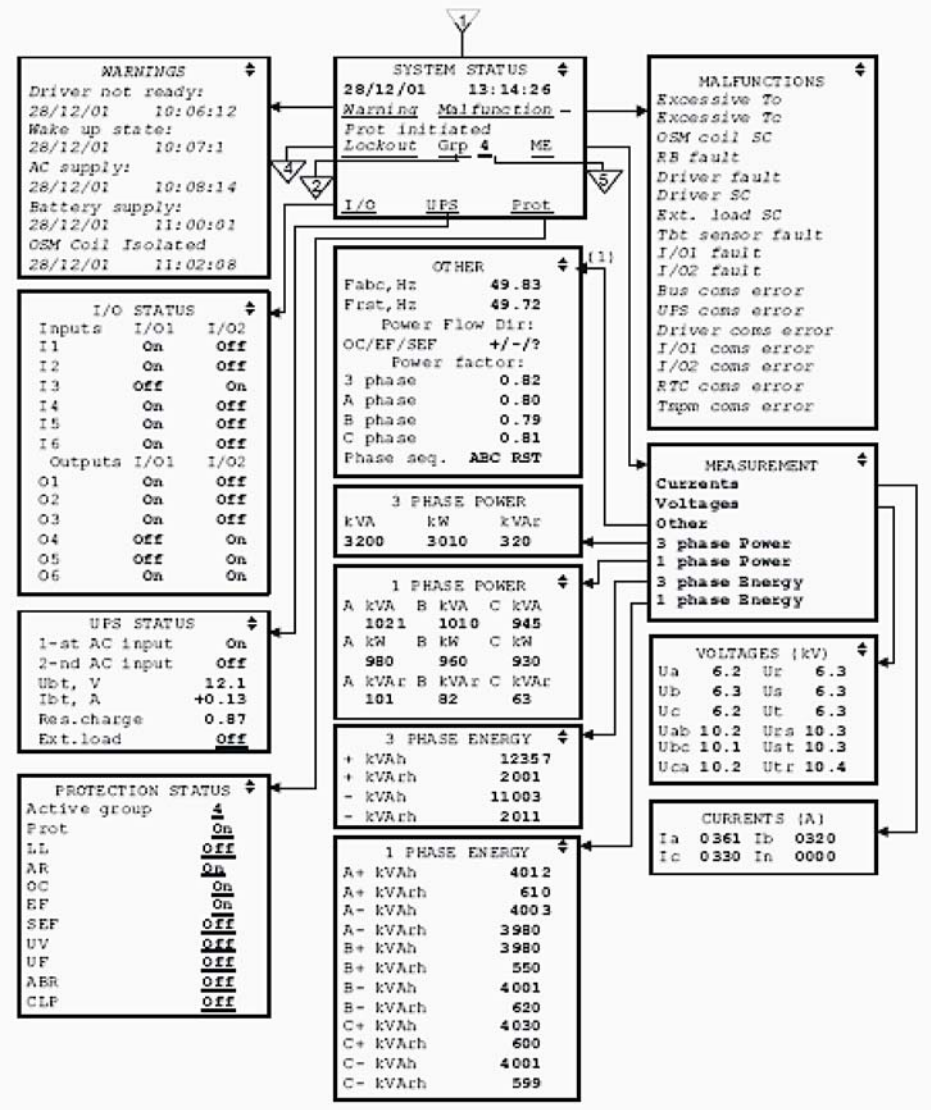
(2) This menu appears when power cannot be switched off (e.g. due to UPS comms error).

(3) This menu appears when an incorrect password has been entered.

(4) This menu appears when a correct password has been entered.

(5) This menu appears when the password entered at NEW and CONFIRM are the same.

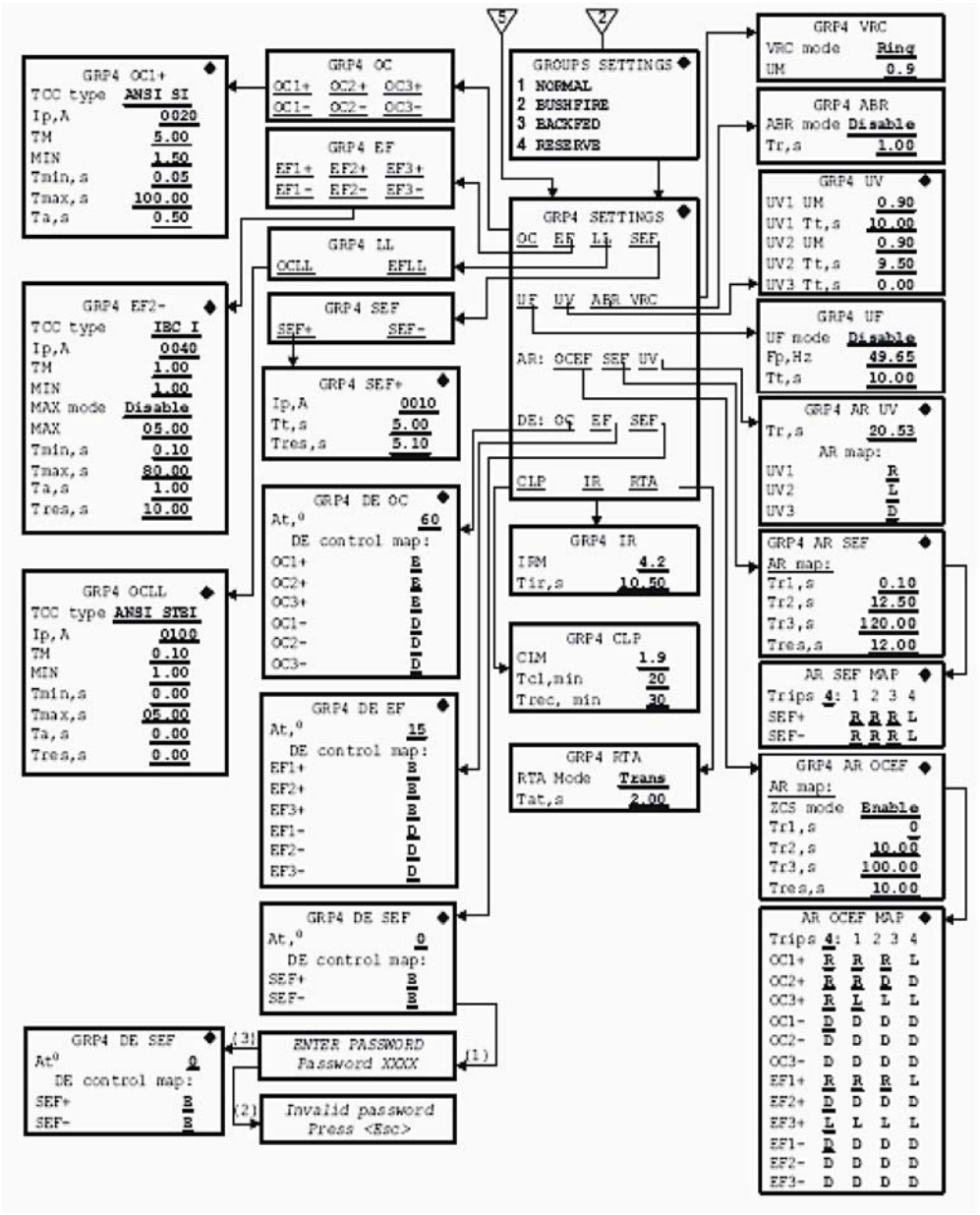
(6) This menu appears when the password entered at NEW and CONFIRM are different.



SYSTEM STATUS menu

Notes:

(1) Power flow direction indication is based on the state readings of relevant directional elements (DE OC/DE EF/DE SEF). Refer to description of the elements for details.



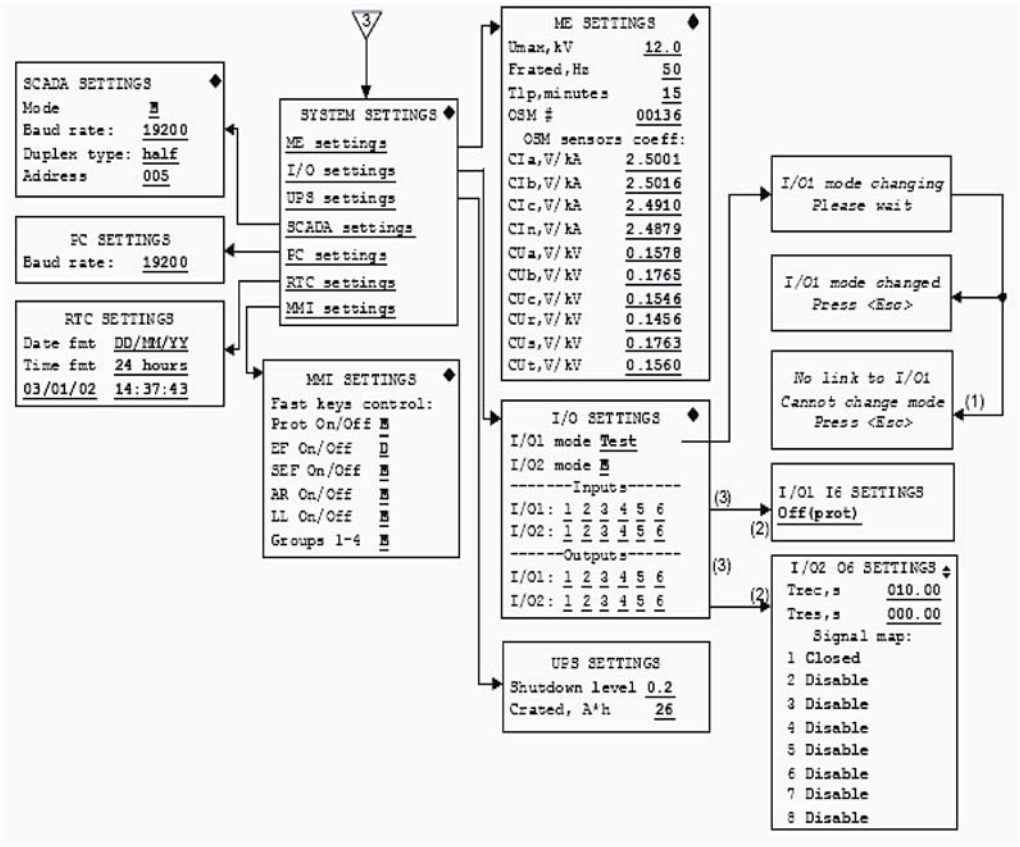
GROUP SETTINGS menu

Notes:

(1) This menu appears when user tries to edit password protected parameter.

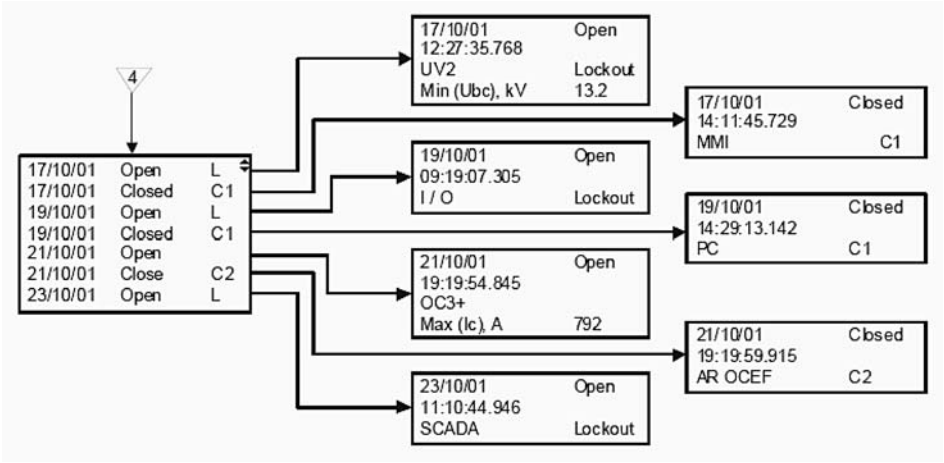
(2) This menu appears when password has been entered.

(3) This menu appears when correct password has been entered.



SYSTEM SETTINGS MENU

Notes:
(1) This menu appears when I/O comms error is discovered.
(2) These menus contain mapped control and indication signals.
(3) A similar transition is possible through any digital input/output.



CLOSE/OPEN (CO) OPERATIONS MENU

10. Configuration of Settings

Configure settings with the MMI controls or the TELUS software using software description and the following recommendations.

Configuration of system settings

Table 8-1

N	Setting	Range	Factory default	Recommendations
Measurement element				
1	U_rated	6-27kV phase to phase voltage, step size 0.1 kV	11 kV for OSM15, 22 kV for OSM27	Set the average value for a particular network. Note that settings of undervoltage and voltage reclosing control elements are set as multiples of this setting.
2	F_rated	50/60 Hz	50 Hz	Select applicable frequency.
3	Tl_p	5/10/30/60 min	10 min	Select load profile time. Note that only 3840 load profile readings can be recorded covering an interval from 13.3 to 160 days.
4	OSM N	1–999999	1	Set OSM serial number.
5	CI_a	1.8–2.2 V/kA, step size 0.0001 V/kA	2.0 V/kA	Set value taken from production certificate of relevant OSM.
6	CI_b			
7	CI_c			
8	CI_n			
9	CU_a	0.1–0.2 V/kV, step size 0.0001 V/kV	0.135 V/kV	Set value taken from production certificate of relevant OSM.
10	CU_b			
11	CU_c			
12	CU_r			
13	CU_s			
14	CU_t			
Uninterruptable power supply element				
15	Shutdown level	0.1–0.8, step size 0.1	0.2	Set value providing recloser (ILBS) operation longer than typical outage duration. Use the following formula to calculate RC/TEL (ILC/TEL) operation time after AC supply interruption: T, h=12*R*Crated (1-Shutdown level)/(P+5), where P – RTU consumption in W, R – reduction factor taking into account temperature effect: R=1 when external temperature exceeds 20°C; when external temperature is below 20°C R linier decreases to 0.25 at –40°C.
16	C_rated	10–50 Ah, step size 1	26 Ah	Set rated battery capacity in Ah
17	T_ext	1–720 min	60 min	Set operating time of the RTU in minutes after switching the UPS to the Battery Supply mode.

N	Setting	Range	Factory default	Recommendations
Real time clock				
18	Date fmt	DD/MM/YY or MM/DD/YY	DD/MM/YY	Follow local practice.
19	Time format	12 hours/ 24 hours	12 hours	Follow local practice.
MMI				
20	Prot On/Off control	Enable/ Disable	Enable	Follow local practice to make this key available or not available for linesmen.
21	EF On/Off control	Enable/ Disable	Enable	Follow local practice to make this key available or not available for linesmen.
22	SEF On/Off control	Enable/ Disable	Enable	Follow local practice to make this key available or not available for linesmen.
23	AR On/Off control	Enable/ Disable	Enable	Follow local practice to make this key available or not available for linesmen.
24	LL On/Off control	Enable/ Disable	Enable	Follow local practice to make this key available or not available for linesmen.
25	GRP1-4 control	Enable/ Disable	Enable	Follow local practice to make this key available or not available for linesmen.
26	CLP On/Off control	Enable/ Disable	Enable	Follow local practice to make this key available or not available for linesmen.
PC				
27	Baud rate	1200/2400/ 4800/9600/ 19200	19200	Set baud rate applicable for control computer.
SCADA				
28	Mode	Enable/ Disable	Disable	Select Recloser (ILBS) Modbus parameters according to **"Recloser Control Cubicle RC/TEL-01E(S) (ILBS Control Cubicle ILC/TEL-01E(S)). Modicon Modbus Protocol Implementation"**.
29	Duplex type	Full/Half	Full	
30	Baud rate	300/600/ 1200/2400/ 4800/9600/ 19200	19200	
31	Address	1–247	1	
I/O				
32	I/O1 mode	Enable/ Disable/ Test	Disable	If an I/O1 module is not included in the particular RC/TEL (ILC/TEL) configuration, select the Disable (D) mode. Otherwise select the Test mode for preliminary testing of digital outputs. Return to the Enable (E) mode when testing is completed.
33	I/O2 mode	Enable/ Disable/ Test	Disable	If an I/O2 module is not included in the particular RC/TEL (ILC/TEL) configuration, select the Disable (D) mode. Otherwise select the Test mode for preliminary testing of digital outputs. Return to the Enable (E) mode when testing is completed.

N	Setting	Range	Factory default	Recommendations
34	T_{rec}*	0–120 s, step size 0.1 s	0 s	Select an appropriate recognition time to filter short events. This setting can be used (for example) to discriminate between lockout and open to reclose states: if an Open signal is mapped for i-th output and its recognition time exceeds reclose time then this output will essentially indicate lockout state.
35	T_{res}*	0–120 s, step size 0.1 s	0 s	Select an appropriate reset time to filter short dropouts.
36	I/O1 input 1 setting	Refer to section "Operation – *Control and indication element*"	Trip	Select setting to be executed via i-th digital input.
37	I/O1 input 2 setting		Close	Select setting to be executed via i-th digital input.
38	I/O1 input 3 setting		On (AR)	Select setting to be executed via i-th digital input.
39	I/O1 input 4 setting		Off (AR)	Select setting to be executed via i-th digital input.
40	I/O1 input 5 setting		On (SEF)	Select setting to be executed via i-th digital input.
41	I/O1 input 6 setting		Off (SEF)	Select setting to be executed via i-th digital input.
42	I/O2 input 1 setting		On ($G_{rp}1$)	Select setting to be executed via i-th digital input.
43	I/O2 input 2 setting		On ($G_{rp}2$)	Select setting to be executed via i-th digital input.
44	I/O2 input 3 setting		On (P_{rot})	Select setting to be executed via i-th digital input.
45	I/O2 input 4 setting		Off (P_{rot})	Select setting to be executed via i-th digital input.
46	I/O2 input 5 setting		On (EF)	Select setting to be executed via i-th digital input.
47	I/O2 input 6 setting		Off (EF)	Select setting to be executed via i-th digital input.
48	I/O1 output 1 signal map	Refer to section "Operation – *Control and indication element*"	Output type: OPEN Signal map: Open Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.

N	Setting	Range	Factory default	Recommendations
49	I/O1 output 2 signal map	Refer to section "Operation – *Control and indication element*"	Output type: CLOSED Signal map: Closed Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.
50	I/O1 output 3 signal map		Output type: STATUS Signal map: AR Off Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.
51	I/O1 output 4 signal map		Output type: STATUS Signal map: EF Off Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.
52	I/O1 output 5 signal map		Output type: GENERAL Signal map: Lockout Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.

N	Setting	Range	Factory default	Recommendations
53	I/O1 output 6 signal map	Refer to section "Operation – *Control and indication element*"	Output type: GENERAL Signal map: Local mode Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.
54	I/O2 output 1 signal map		Output type: ALARM Signal map: Alarm Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.
55	I/O2 output 2 signal map		Output type: GENERAL Signal map: AR initiated Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.
56	I/O2 output 3 signal map		Output type: MALFUNC-TION Signal map: Malfunction Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.

N	Setting	Range	Factory default	Recommendations
57	I/O2 output 4 signal map	Refer to section "Operation – *Control and indication element*"	Output type: WARNING Signal map: Warning Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.
58	I/O2 output 5 signal map		Output type: STATUS Signal map: Prot Off Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.
59	I/O2 output 6 signal map		Output type: PICKUP Signal map: Pickup Disable Disable Disable Disable Disable Disable Disable	Select signal to be indicated via i-th digital output.

- applicable for all digital outputs

AMENDMENT SHEET

Installation and Operation manual		Tavrida Electric Export		No 2
Amendment number	**Page number**	**Date of correction**	**Author**	**Comments**
No 1	3-5	01.04.08	TEE	Pictures of OSM were amended in response to OSM design and packaging changing
No 2	12, 13, 25	01.04.08	TEE	Errors correction

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