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11

DTU

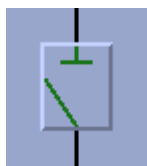


Figure 1. The DTU standard function

11.1

DTU When Used via Opera

The network topology system OPERA can also use station pictures with disconnectors installed for operating purposes. This is convenient in case of multiple switching devices in a node (see Figure 2). Then a picture (a schematic connection diagram) can be opened via Opera and the actual DTU control dialogs are opened by selecting them from the station picture.

In case of a single switching device, it is often more suitable to open the plain control dialog on an empty picture. Then it is not even necessary to make any schematic connection diagram, instead the operation dialog is presented directly. This is done by creating a picture consisting of a single picture function made specially for this purpose.

The picture function consists of a grey background covering the whole picture and of the configuration support (the base picture function is not required). The configuration is done as for the normal picture function DTU. When the disconnector is selected on the Opera display, the picture with the switching device is opened with the control dialog already open, ready to be executed.

The picture functions are found under \LIB4\LIB510\Network Topology\ in the installation tool tree. The configuration of the picture function is done as for the normal picture function.

11.1.1

Differences Compared to an Ordinary DTU

- The picture function has no state indication since it is not presented as a button.
- During configuration the questions regarding the outlook and symbol are left out.
- The Base function is not required
- The dialogs are the same, only picture function and its configuration files are different

Table 1 Files used for picture function:

Picture	Functionality
FPI_LDDTU.PIC	DTU Line disconnector picture function
FPI_LDDTU.DAT	DTU Line disconnector data file
FPI_LDDTU.POT	DTU Line disconnector Process object data file

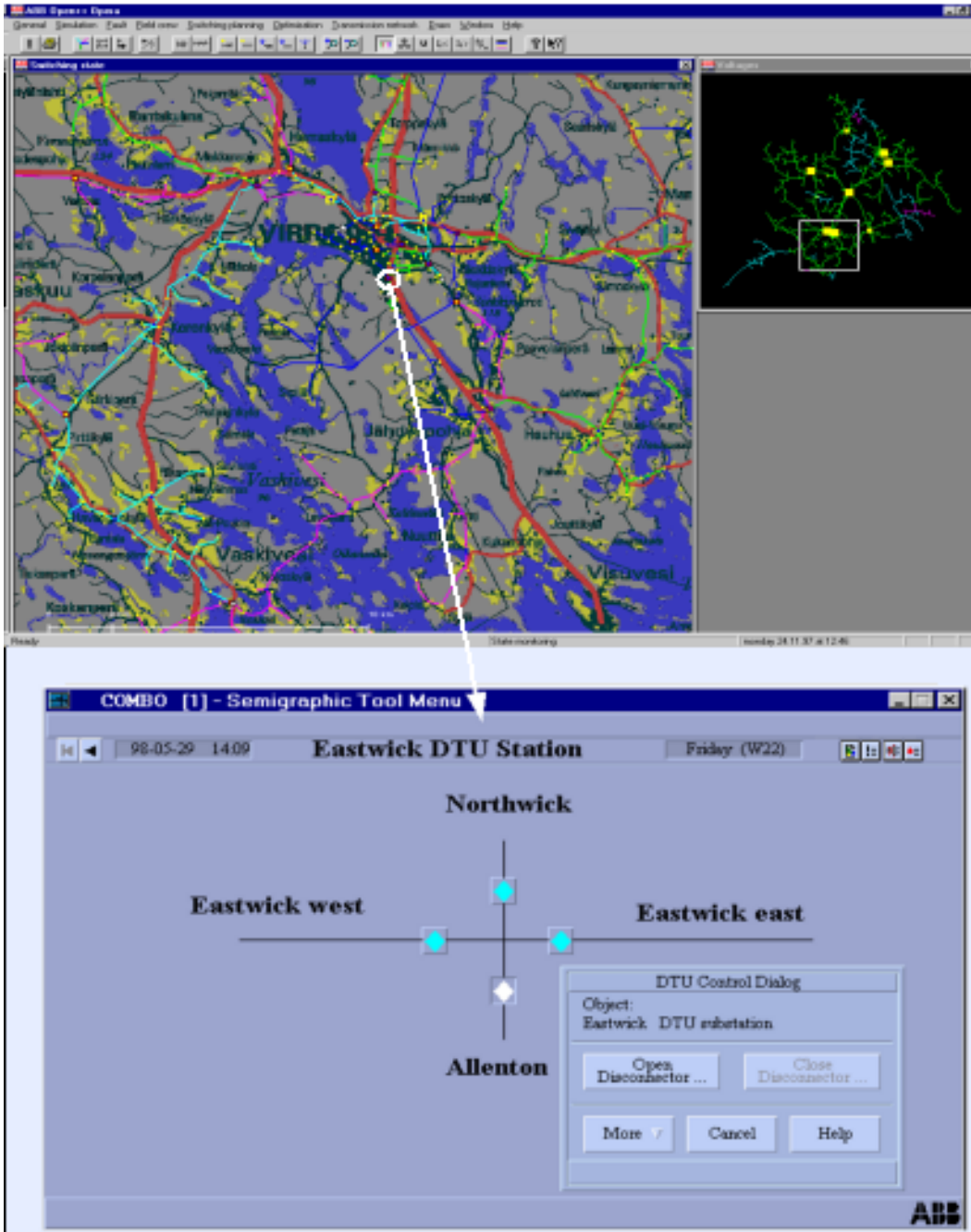


Figure 2. An example of a remotely controllable disconnector substation opened from OPERA

11.2

Description

The standard function of the DTU is used for controlling and monitoring the DTU. The main functionality is as listed below:

- Position indication
- Operation
- Status information

The position indication of the DTU is indicated by different symbols while the status is normally shown by different colors. In addition to the color coding, the abnormal status is indicated in an information message in dialogs.

The DTU has the following sub-functionality:

- Alarm state/acknowledgement
- Blocking/deblocking of update, control, alarm, event, printout and reprocessing within the database.
- Forced operation
- Normal state setting of the position indication
- Operation counting
- Program status
- Extra inputs
- Update process data

11.3

Features/Options

- Selectable size of the standard function (1x1, 2x2 or 3x3)
- Free choice of the symbol sets for presentation of the DTU
- Picture function presented with or without a push button
- Versatile configuration
- A large amount of predefined information messages
- Help in all dialogs

11.4

Process Commands

- Open/close commands to the switching device
- Reset minimum battery voltage
- Heating limit
- Hysteresis of heating
- Enable/disable spontaneous transmit of heating changes
- Enable/disable spontaneous transmit of charging changes

11.5 DTU Dialogs

This chapter describes the dialogs of the MV Process DTU. These dialogs are found in the directory LIB4/FMOD/MVPROCESS/USE and they can be opened by clicking the DTU picture function or the More... menu in the DTU main control dialog.

11.5.1 Object Presentation

The current state is presented by different symbols. The color of the symbol gives additional information about the status. Please refer to the General chapter in the MV Process Operator's Manual regarding the color and the corresponding status.

11.5.2 Main Control Dialog

The DTU main control dialog is for monitoring and controlling the DTU.

Functionality

Operations can be made, if the authorization level of the operator is Control (1) or higher and switching device and DTU state allows controls. If operations can be made, the button Open Disconnecter or Close Disconnecter will be active.

The dialog shows messages of the DTU state on the information bar. Only the most important message is shown, but all active messages can be seen in the Object messages dialog which can be found by selecting the More... button. More detailed explanations of their meaning can be found in Help.

When the button Open Disconnecter ... or Close Disconnecter ... is selected, a confirmation dialog is opened where the final execution or cancellation can be done. In case of errors, e.g. in communication, the SCIL-error code is shown. The actual meaning of the code can be found in the system documentation.

If DTU objects are not connected to the process, the dialog simulates the actual operation within the database.

Other supported features are made available by pressing the More... button. Help on each subdialog is found by clicking the Help button in the sub-dialog.

Figure 3 presents the main control dialog for the DTU which is opened by clicking the picture function.

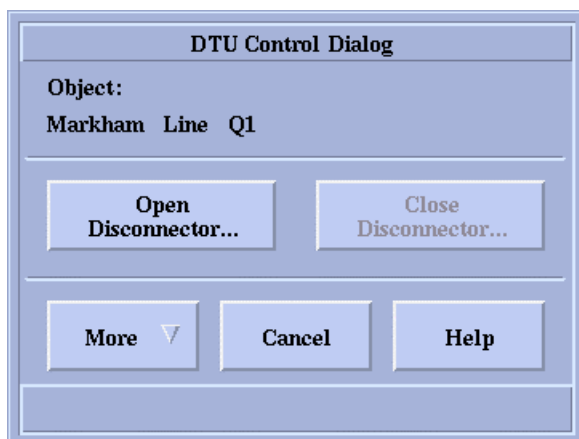


Figure 3. Main control dialog for the DTU (FPU_DTUA.PIC)

The object identification text (OI) of the selected DTU is shown on the upper part of the dialog.

Table 2 The dialog buttons have the following functionality:

Button	Functionality
Open Disconnecter	Displays control action acknowledgement dialog shown later on in Figure 4.
Close Disconnecter	Displays control action acknowledgement dialog shown later on in Figure 4.
More	Opens selection list of the DTU sub-functionality.
Cancel	Closes the dialog and its sub-dialogs.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUA.HLP.

11.5.3 Control Confirmation Dialog

Figure 4 presents the control confirmation dialog which is opened in the main control dialog of the DTU. The function of this dialog is to confirm the selected action before executing it.

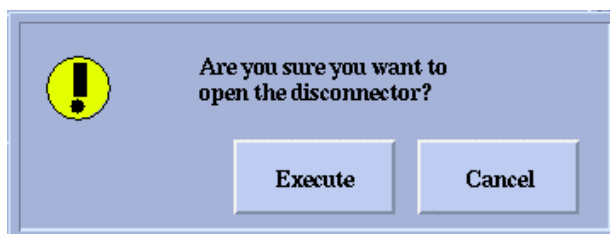


Figure 4. DTU control confirmation dialog (FPU_DTUB.PIC)

The operation to be carried out is described in the dialog for the user to verify it.

Table 3 The dialog buttons have the following functionality:

Button	Functionality
Execute	Executes the selected command. In case of a simulated process, the change in the database is simulated.
Cancel	Closes the dialog.

11.5.4 Alarm State Dialog

The alarm state dialog can be opened by selecting Alarm state... which can be found by clicking the More button in the main control dialog.

The dialog presents all persisting or fleeting alarms for the device (DTU) and the unacknowledged alarms can be acknowledged. For details, please refer to General chapter the in this MV Process Operator's Manual, which contains more detailed information about the Alarm state dialog.

11.5.5 Blockings Dialog

The blocking dialog can be opened by selecting Blockings... which can be found by clicking the More button in the main control dialog.

The DTU blockings dialog is for making blockings within the selected DTU object in MicroSCADA/SCS database. For details, please refer to the General chapter in this MV Process Operator's Manual, which contains more detailed information about the Blockings dialog.

11.5.6 Forced Operation Dialog

The forced operation dialog can be opened by selecting Forced operation... which can be found by clicking the More button in the main control dialog.

The Forced operation dialog enables controls to both operation directions regardless of the DTU state indication. If normal operations are possible, forced operations are possible, too. In addition to this, the operations can be tried even if:

- The DTU is selected on another monitor
- The DTU indication object(s) is not sampled

Operations are prevented if:

- The DTU is control blocked
- The DTU is externally control blocked
- The DTU process objects are not in the correct switch states (discrepancy in indication or command objects)
- Local/remote switch is not sampled or does not allow controls.
- The control authority for the station is not given for this application
- The personal authority level of the user is View (0)

Functionality

Operations can be made, if the authorization level of the operator is Control (1) or higher and switching device and the DTU state allows controls. If operations can be made, the buttons Force Disconnect open and Force Disconnect closed will be active.

When the button Force Disconnect open or Force Disconnect closed is clicked, a confirmation dialog is opened where the final execution or cancellation can be done. In case of errors, e.g. in communication, the SCIL error code is shown. The actual meaning of the code can be found in the system documentation.

If the DTU process objects are not connected to the process, the dialog simulates the actual operation within the MicroSCADA database. Figure 5 presents the DTU forced operation dialog.

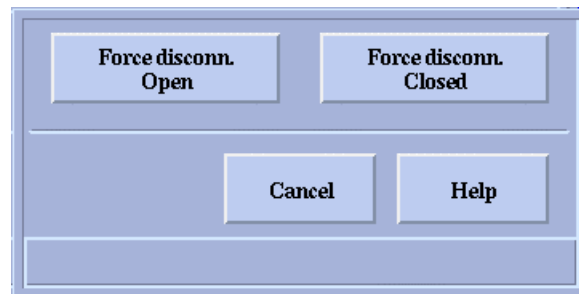


Figure 5. DTU forced operation dialog (FPU_DTUC.PIC)

The operation to be carried out is described in the dialog for the user to verify it.

Table 4 The buttons have the following functionality:

Button	Functionality
Force disconnect Open	Displays the control action acknowledgement dialog shown earlier on in Figure 4.
Force disconnect Closed	Displays the control action acknowledgement dialog shown earlier on in Figure 4.
Cancel	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUC.HLP.

11.5.7 Normal State Settings Dialog

The normal state settings dialog can be opened by selecting State settings... which can be found by clicking the More button in the main control dialog.

The normal value has a meaning only, if all spontaneous object state changes are defined to activate an alarm (= the LA attribute value of the indication object is 15).

The value of normal state is checked at system start-up. If the state of an object at start-up is not equal to normal state, an alarm is activated. If normal state is not defined, an alarm is not activated at start-up regardless of the object state.

For details, please refer to the Normal state settings dialog in the General chapter (in the MV Process Operator's Manual), which contains more detailed information.

11.5.8 Operation Countings Dialog

The operation countings dialog can be opened by selecting Operation countings... which can be found by clicking the More button in the main control dialog.

The number of selected switch state changes is tracked with the help of the operation countings. The counter is increased with one every time the switching device is closed (which means that the indication object in the MicroSCADA database receives value 1).

For details, please refer to the Operation countings dialog in the General chapter (in MV Process Operator's Manual), which contains more detailed information.

11.5.9 Object Messages Dialog

The object messages dialog can be opened by selecting Object messages... which can be found by clicking the More button in the main control dialog.

An overall picture of the DTU state can be seen in the dialog. The dialog shows information messages active at the moment the dialog is opened. The most important active message is also shown on the information bar in the main dialog.

Functionality

A new "snapshot" can be shown by pressing Refresh. The dialog can be closed by pressing Close. If messages do not fit into one view, they can be viewed with the scrollbar. For details, please refer to the General chapter in the MV Process Operator's Manual, which contains more detailed information about the Object messages dialog.

Information messages

Message	Explanation
NOT AUTHORIZED TO CONTROL	The personal authority level of the users is View (0) only.
OCCUPIED	The control unit is already under command.
DISCREPANCY IN DATABASE	All of the DTU database process objects are not in the same switch state.
NOT CONNECTED TO PROCESS	The DTU has no connection to the actual process. The dialog is made to simulate actual operation process.
OBJECT NOT CONTROLLABLE	The DTU state indication has connection to the process, but the commands are not.
INDICATION NOT CONNECTED TO PROCESS	The DTU commands have connection to the process, but the indication have not.
STATION LOCAL/REMOTE-SWITCH INHIBITS CONTROLS	Station local/remote-switch state does not allow controls on the station.
STATION LOCAL/REMOTE-SWITCH NOT SAMPLED	The station local/remote-switch is not updated from the process.
CONTROL BLOCKED	The control of the DTU is blocked (UB=1). The blockings can be set with the Blockings dialog.
INTERLOCKED BY CONTROL APPLICATION	The switching device operations are disabled by the interlocking code made in the DTU picture function (in U_INTERLOCKING program).
CLOSE DISABLED BY CONTROL APPLICATION	Closing of the switching device is disabled by the interlocking code made in the DTU picture function (in U_INTERLOCKING program).
OPEN DISABLED BY CONTROL APPLICATION	Opening of the switching device is disabled by the interlocking code made in the DTU picture function (in U_INTERLOCKING program).
SELECTED ON ANOTHER MONITOR	The same switching device object has been selected and the control dialog is open on another monitor.
CONTROL APPLICATION INTERLOCKING OUT OF USE	The interlocking checking code of the DTU picture function (in U_INTERLOCKING program) is out of use.
DTU INDICATION NOT UPDATED	The indication of the DTU has not been updated from the process.
UPDATE BLOCKED	The indications of the DTU is blocked (UB=1). The blockings can be set with the Blockings dialog.
ALARM BLOCKED	The alarms of the DTU is blocked (AB=1). The blockings can be set with the Blockings dialog.
EVENT BLOCKED	The events of the DTU is blocked (HB=1). The blockings can be set with the Blockings dialog.
PRINTOUT BLOCKED	The printouts of the DTU is blocked (PB=1). The blockings can be set with the Blockings dialog.
REPROCESSING BLOCKED	The event activation (reprocessing) of the DTU is blocked (XB=1). The blockings can be set with the Blockings dialog.
OPERATION COUNTER LIMIT EXCEEDED	Operation counter limit has been exceeded. See the Operation Countings dialog for further information.

11.5.10 Data Dialog

The data dialog presents the connection state of auxiliary supply, battery voltage, minimum battery voltage, heating state and the temperature within the enclosure.

Functionality

Operations can be made, if the authorization level of the operator is Control (1) or higher. The minimum voltage is reset by pressing the Reset button. Settings dialog is made available by pressing the Settings button.

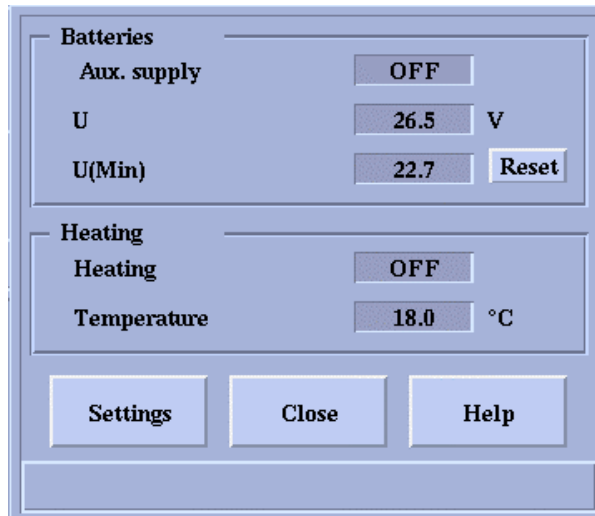


Figure 6. Data dialog (FPU_DTUI.PIC)

Table 5 The buttons have the following functionality:

Button	Functionality
Reset	Sends reset minimum battery voltage-command directly to DTU unit.
Settings	Opens settings dialog.
Close	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUI.HLP.

11.5.11 Settings Dialog

A dialog for setting heating, hysteresis and the spontaneous transmit of heating and charging changes. The heating value can be set from -40 to +60 degrees of Celsius. The hysteresis means how much the temperature can differ from the set value before activating and deactivating the heating.

Functionality

Operations can be made, if the authorization level of the operator is Control (1) or higher. The heating and hysteresis values can be changed by clicking the field and entering the new value. The spontaneous transmit of changes is handled with the radio-buttons. Each operation will open a confirmation dialog, where the operation can be executed or cancelled.

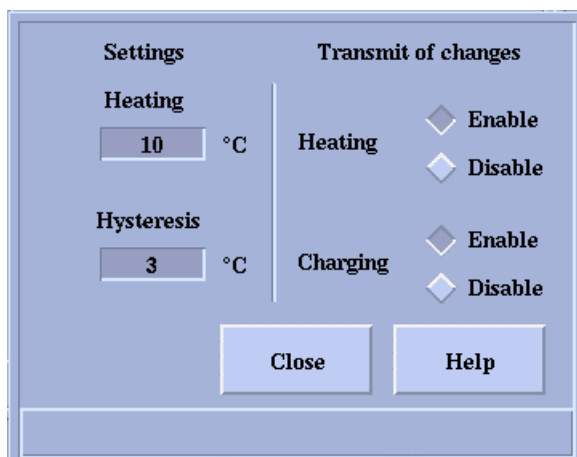


Figure 7. Settings dialog (FPU_DTUJ.PIC)

Table 6 The buttons have the following functionality:

Button	Functionality
Enable heating	Enables spontaneous transmit of heating changes.
Disable heating	Disables spontaneous transmit of heating changes.
Enable charging	Enables spontaneous transmit of charging changes.
Disable charging	Disables spontaneous transmit of charging changes.
Close	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUJ.HLP.

11.5.12 Program Status Dialog

Status dialog is for presenting internal faults of DTU station to the operator. The version number of DTU is presented, too. The current status are available for cold reset, hot reset, ROM error and RAM error.

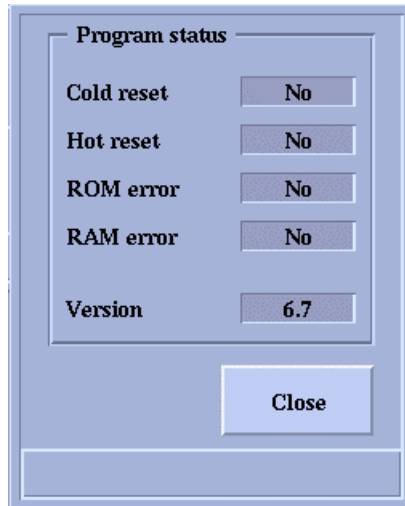


Figure 8. Program status dialog (FPU_DTUK.PIC)

Table 7 The buttons have the following functionality:

Button	Functionality
Close	Closes the dialog.

11.5.13 Extra Inputs Dialog

Extra inputs dialog shows the values of extra analog and binary inputs. The field texts for the dialog can be defined during the installation phase in the user program U_EXTRA_INPUT_TEXTS.

Functionality

Operations can be made, if the authorization level of the operator is Control (1) or higher. The resetting of the maximum values of analog inputs are executed directly with the Reset buttons.

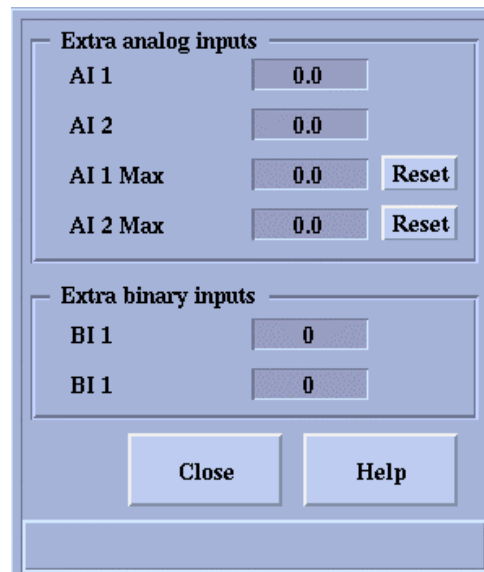


Figure 9. Extra inputs dialog (FPU_DTUL.PIC)

Button	Functionality
Reset	Sends reset maximum analog input command to DTU unit.
Close	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUL.HLP.

11.5.14

Update Process Data

The update process data dialog can be opened by selecting Update process data... which can be found by clicking the More button in the main dialog.

The update process data dialog is for updating the database from the actual process within the selected DTU. The dialog can be used to initialize the substation after the system restart or to verify the database consistency.

Functionality

Data fetching is performed in the background and therefore, the system can be used during the updating. The duration of data fetching depends on the speed of the communication line and the communication protocol.

The possible error messages during the execution will appear onto MicroSCADA notification window on the console.

To activate data fetching, press the YES button. To exit the dialog without updating the database, press the NO button.

Figure 10 presents the update process data dialog.

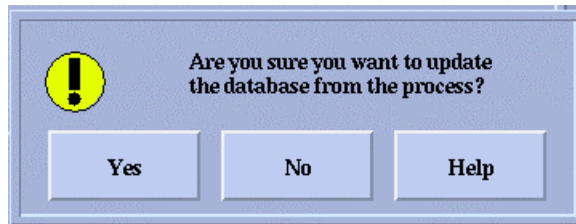


Figure 10. Update process data dialog (FPU_DTUU.PIC)

Table 8 The buttons have the following functionality:

Button	Functionality
Yes	Starts the data fetch and closes the dialog
No	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUU.HLP.

11.5.15

Fault Indicator

The dialog shows the measured line current of the phases L1, L2, L3, measured neutral current and actual unbalance level.

Functionality

The following sub-dialogs can be found by clicking the More button:

- Settings
- Measured data
- Clock synchronization

More specific help for these items is available in the dialog itself. "Upd. measured" data updates the indications of the fields from the process.

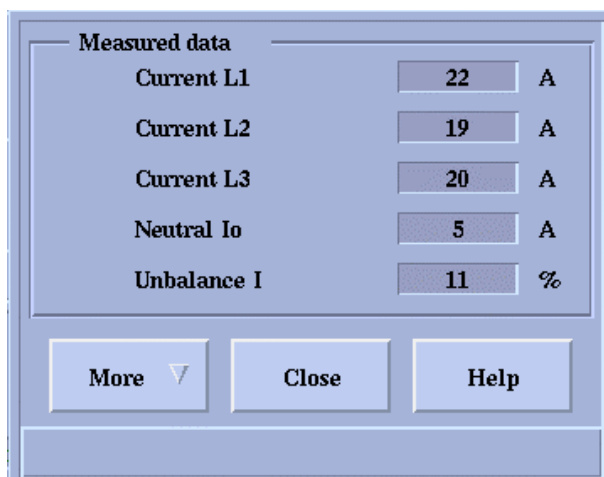


Figure 11. Measured data dialog (FPU_DTUR.PIC)

Table 9 The buttons have the following functionality:

Button	Functionality
More	Opens the subfunctionality.
Close	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUR.HLP.

11.5.16

SPEF Settings

From this dialog, the following setting values can be changed:

- Start value for stage I>
- Operate time for stage I> (T>)
- Start value for stage Io>
- Operate time for stage Io> (To)
- Start value for stage delta I>
- Operate time for stage t delta >

Functionality

Operations can be made, if the authorization level of the operator is Control (1) or higher. The setting value is changed by clicking the field and entering the new value. Several values can be changed at the same time. By pressing the Apply button, the new values may be sent to the process.

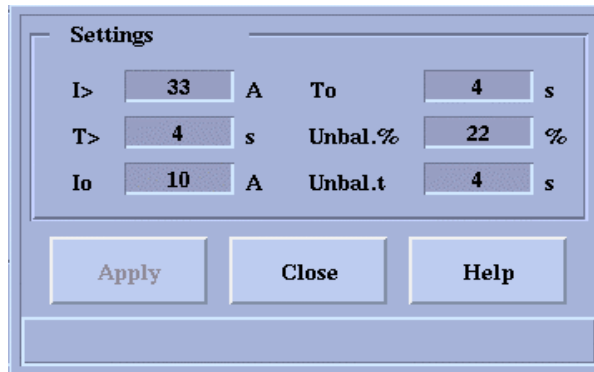


Figure 12. SPEF settings dialog (FPU_DTUS.PIC)

Table 10 The buttons have the following functionality:

Button	Functionality
Apply	Sends changes to fault indicator.
Close	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUS.HLP.

11.5.17

Recorded Data

A dialog for studying the history of the alarms. The five last alarm situations are presented with the following values.

- line current on phase L1 at alarm
- line current on phase L2 at alarm
- line current on phase L3 at alarm
- neutral current Io at the start or alarm
- phase unbalance delta I at start or alarm
- duration of start of stage I>
- duration of start of stage Io
- duration of start of stage delta I>
- time stamp of alarm
- the number of start of stages I>, Io> and delta I>

Furthermore, the alarming status of the phases L1, L2, L3, Io>, and delta I from the last detected alarm is presented on the table.

Updating of previous recordings is activated by the buttons Upd..

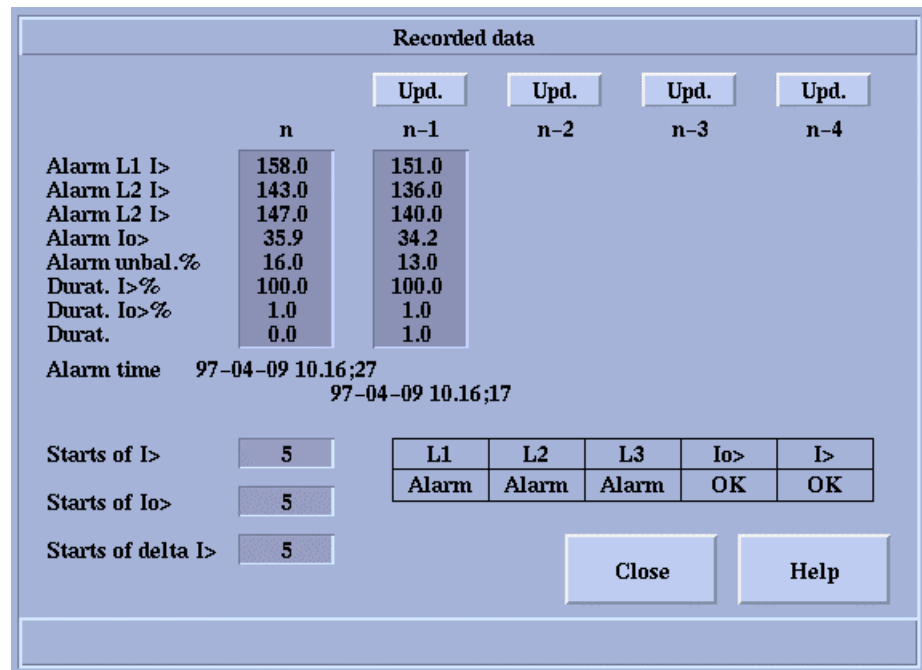


Figure 13. Recorded data dialog (FPU_DTUV.PIC)

Table 11 The buttons have the following functionality:

Button	Functionality
Upd	Updates recorded values.
Close	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUV.HLP.

11.5.18 Alarms Dialog

Alarms dialog presents the alarming state of stages I>, Io> and delta I>.

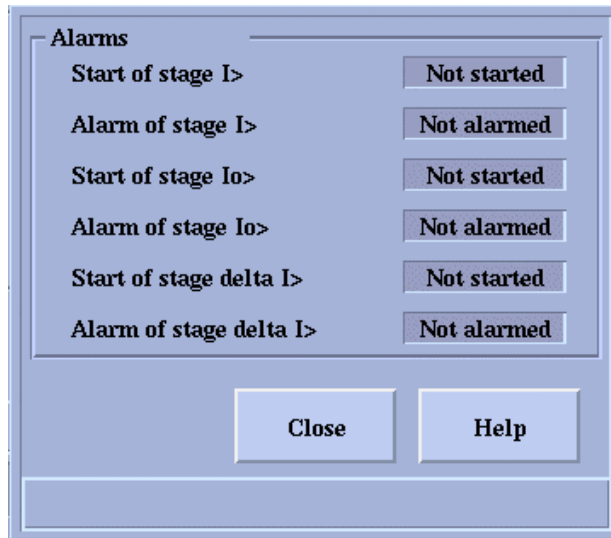


Figure 14. Alarms dialog (FPU_DTUW.PIC)

Table 12 The buttons have the following functionality:

Button	Functionality
Close	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUW.HLP.

11.5.19

Time Synchronization Dialog

A common dialog for synchronizing the clock of the DTU and SPEF stations. Execution time is the first time when the synchronization is executed. The synchronization is made in a cycle defined by the time interval combo box. Normally, the time does not need to be synchronized more than once a day, so a 24 hour cycle is recommended to be used.

The station numbers of the selected DTU station and the corresponding SPEF station are in the field on the right-hand side. If these stations are included in the time synchronization, the toggle-button Include stations in time sync. is pressed down. The list of stations within time synchronization is written into the file /lib4/fmod/mvprocess/use/fpu_dtus.txt. Execution time and time interval are the same for all stations included in time synchronization by this dialog!

Functionality

Operations can be made, if the authorization level of the operator is Control (1) or higher. The execution time is set with the arrow buttons or the value is directly entered into the field. Time interval is selected from the combo box. The selected DTU station and SPEF station are included or removed from the list with the toggle

button Include stations in time sync. The operations are applied by pressing OK. By pressing the Cancel button, the dialog may be closed without making any changes.

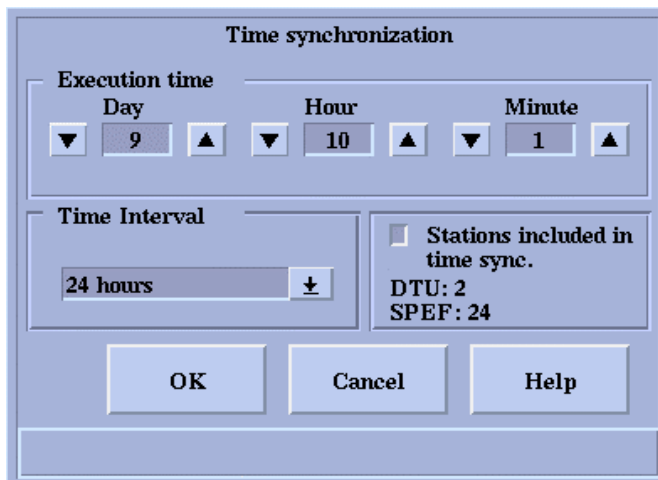


Figure 15. Time synchronization dialog (FPU_DTUT.PIC)

Table 13 The buttons have the following functionality:

Button	Functionality
OK	Applies changes and closes the dialog.
Cancel	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_DTUT.HLP.

11.5.20

Position Simulation Dialog

The position simulation dialog can be opened by selecting Simulation... which can be found by clicking the More button in the main control dialog.

During some communication problems or field device failure, the position of the switching device is not automatically known by the system. This dialog has been designed for operators to maintain the consistency of the database in case of an abnormal situation.

For details, please refer to the General chapter Position simulation dialog (in this MV Process Operator's Manual), which contains more detailed information.

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