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4 Switching Device

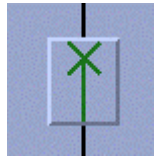


Figure 1. The switching device standard function configured as a circuit breaker

4.1 Description

The standard function of the switching device is used for controlling and monitoring the switching devices like circuit breaker, disconnector, earth switch, truck and three-state switch. The main functionality is as listed below:

- Position indication
- Operation
- Status information

The position indication of the switching device is indicated by different symbols while the status is normally shown by different colors or suffix. In addition, the abnormal status is indicated in an information message in dialogs.

The switching device 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
- Simulation

In addition to the sub-functionality listed above, the circuit breaker type of the switching device has the following sub-functionality:

- Auto-reclosing control
- Latch relay reset
- Auxiliary plug monitoring

4.2 Features/Options

- Selectable size of the standard function (1x1, 2x2 or 3x3)
- Free choice of the symbol sets for presentation of the switching device

- Motorized/ manually operable
- Picture function presented with or without a push button
- Configurable position indication type
- Configurable command type
- Versatile configuration
- A large amount of predefined information messages
- Help in all dialogs

4.3 Process Commands

- Open/close commands to the switching device
- Latch relay reset command to the protection device (*)
- Auto-reclosure ON/OFF (*)
- Auto-reclosing interrupt command (*)

(*) Command exists if Trip Tag or Reclose Tag has been installed and the switching device type is a circuit breaker.

4.4 Switching Device Dialogs

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

4.4.1 Object Presentation

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

4.4.2 Main Control Dialog

The switching device main control dialog is aimed for monitoring and controlling of the switching device e.g. circuit breaker.

Functionality

Operations can be made, if the switching device is motorized (i.e. remotely controllable), the authorization level of the operator is Control (1) or higher, the switching device state as well as the station and bay local/remote-switch allow controls. If operations are allowed, the respective button Open Switch... or Close Switch... will be active.

The main control dialog shows messages of the switching device status 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. Active messages can be seen in the Object Messages dialog, and more detailed explanations of their meaning can be found in Help.

Depending on the used control method, the selection Open Switch... or Close Switch... is either sent to the control unit or just used as an internal tag. Before the operation is carried out, the user has to verify the operation in the Control Confirmation Dialog. In case of errors e.g. in the communication, a SCIL error code is shown. The actual meaning of the code can be found in the system documentation or in the on-line help (by typing STATUS x in the command prompt window, where x stands for the error code number).

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

Access to other supported features is provided by the More... button. Help for each subdialog is found by clicking the Help button in the subdialog.

Figure 2 presents the main control dialog for the switching device (circuit breaker) which is opened by clicking the picture function.

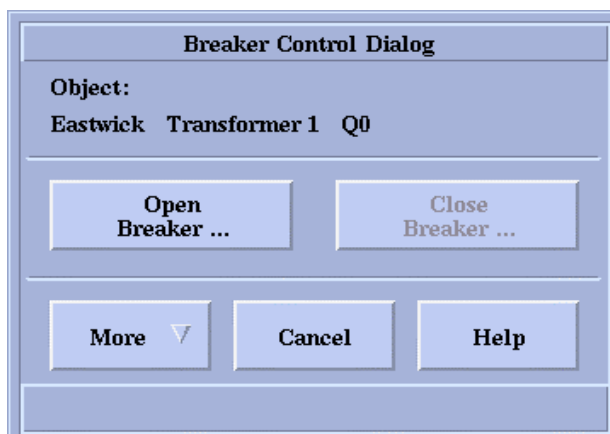


Figure 2. Main control dialog for the switching device (FPU_SSWA.PIC)

The object identification text (OI) of the selected switching device is shown in the upper part of the dialog.

Table 1 The dialog buttons have the following functionality:

Button	Functionality
Open Breaker	When the switching device is connected to a real process, this button sends an open selection command to the control unit or internally tags the selection and displays the control action acknowledgement, see Figure 3. If there is no connection to a real process, this dialog simulates the control selection.
Close Breaker	When the switching device is connected to a real process, this button sends a close selection command to the control unit or internally tags the selection and displays the control action acknowledgement dialog, see Figure 3. If there is no connection to a real process, this dialog simulates the control selection..
More	Opens a selection list of the switching device sub-functionality.
Cancel	Closes the dialog and its sub-dialogs.
Help	Opens the general LIB 510 help dialog with the help text file FPU_SSWA.HLP.

4.4.3

Control Confirmation Dialog

Figure 3 presents the control confirmation dialog which is opened from the main control dialog of the switching device. The function of this dialog is to confirm the selected action before executing it i.e. performing the second step of the secured control (secured control type).

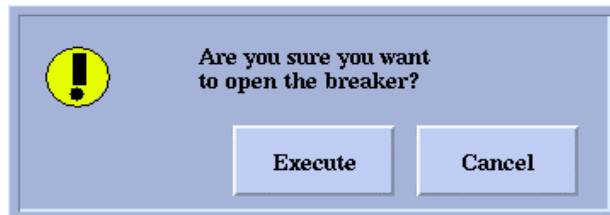


Figure 3. Switching device control confirmation dialog (FPU_SSWB.PIC)

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

Table 2 The dialog buttons have the following functionality:

Button	Functionality
Execute	Executes the selected command. In case of simulated process the change in the database is simulated.
Cancel	Deselects the object and closes the dialog.

4.4.4

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 and fleeting alarms for the switching device, and the unacknowledged alarms can be acknowledged. For details, please refer to the General

chapter in this MV Process Operator's Manual, which contains more detailed information about Alarm state dialog.

4.4.5 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 switching device blockings dialog is aimed for making blockings within the selected switching device 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.

4.4.6 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 switching device state indication. If normal operations are possible, forced operations are possible, too. In addition to this, the operations can be tried even if:

- The switching device is already under command
- The switching device is selected on another monitor
- The switching device is interlocked
- The switching device interlocking objects are not sampled
- The switching device indication object(s) is not sampled
- The bay local/remote-switch is in Local state
- The bay local/remote-switch is not sampled
- The bay interlocking objects are not sampled
- The auxiliary plug is disconnected (breaker only)
- The other section of the 3-state switch is not open/free (3-state switch only)

Operations are prevented if:

- The switching device is not motorized
- The switching device is control blocked
- The switching device is externally control blocked
- The switching device process objects are not in correct switch states (discrepancy in indication or command objects)
- Station 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)
- No database objects for commands

Functionality

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

Depending on the used control method, the selection Force Switch Open... or Force Switch Close... is either sent to the control unit or just used as an internal tag. Before the operation is carried out, the user has to verify the operation in the Control Confirmation Dialog. In case of errors e.g. in the communication, a SCIL error code is shown. The actual meaning of the code can be found in the system documentation or in the on-line help (by typing STATUS x in the command prompt window, where x stands for the error code number).

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

Figure 4 presents the switching device forced operation dialog.

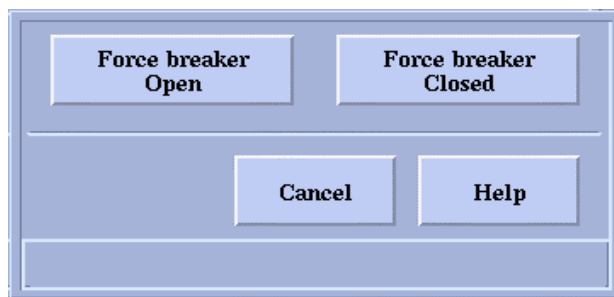


Figure 4. Switching device forced operation dialog (FPU_SSWC.PIC)

The selected action can be verified in the question shown on the upper part of the dialog.

Table 3 The buttons have the following functionality:

Button	Functionality
Force breaker Open	If the switching device is connected to a real process, this button sends Open selection command to control unit or internally tags the selection and displays control action acknowledgement dialog shown earlier in Figure 3. If there is no connection to a real process, this dialog simulates control selection.
Force breaker Closed	If the switching device is connected to a real process, this button sends Close selection command to control unit or internally tags the selection and displays control action acknowledgement dialog shown earlier in Figure 3. If there is no connection to a real process, this dialog simulates control selection.
Close	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_SSWC.HLP.

4.4.7 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 position indication changes are defined to activate an alarm (when the LA attribute value of the indication object is 15).

The value of the normal state is checked at system start-up. If the position indication at start-up is not equal to the normal state, an alarm is activated. If a normal state is not defined, no alarm is activated at start-up regardless of the object state.

For details, please refer to the Normal state settings dialog in the General chapter in this MV Process Operator's Manual.

4.4.8 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 operation countings counts the number of switching device state changes. The counter is increased with one every time the switching device is closed or earthed (which means that the position indication object in the MicroSCADA database gets value 1). In case of a three-state switch, there is a separate counter for both switch sections (disconnecter and earth switch).

For details, please refer to the Operation countings dialog in the General chapter in this MV Process Operator's Manual.

4.4.9 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 switching device state can be seen in this dialog. The dialog shows information messages active at the moment the dialog is opened. The most important active message is also shown on information bar in the main dialog.

Functionality

A new "snapshot" can be taken 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 help of the scrollbar.

Information Messages

Message	Explanation
STATION LOCAL/REMOTE-SWITCH MISSING	The database object for the station local/remote switch does not exist (or there is a configuration error).
BAY LOCAL/REMOTE-SWITCH MISSING	The database object for the bay local/remote-switch does not exist (or there is a configuration error).
POSITION INDICATION MISSING	The database object(s) for the switching device position indication does not exist
CONTROL OBJECTS MISSING	The database object(s) for the switching device control does not exist.
AUXILIARY PLUG DISCONNECTED	The auxiliary plug between the truck and the cubicle has been disconnected. The switching device cannot be operated.
NOT AUTHORIZED CONTROL CENTER	The control center is not included in the list of authorized control centers for the station. The currently authorized centers can be viewed by selecting the option Station authority which can be found in the Station menu.
NOT AUTHORIZED TO CONTROL	The personal authority level of the user is View (0) only.
OCCUPIED	The control unit is already under command.
VALUES SUBSTITUTED BY CONTROL DEVICE	The control device has substituted actual information from process with another values i.e. it is in the simulation mode.
DISCREPANCY IN POSITION INDICATION OBJECTS	Not all of the database process objects for the position indication are in the same switch state.
DISCREPANCY IN COMMAND OBJECTS	Not all of the database process objects for the commands are in the same switch state.
NOT CONNECTED TO PROCESS	The switching device has no connection to the actual process. The dialogs are made to simulate the actual operation within the database.
DEVICE NOT CONTROLLABLE	The switching device is not motorized (remotely controllable) or the position indication is connected to the process, but the commands are not.
INDICATION NOT CONNECTED TO PROCESS	The switching device command objects are connected to the process, but the position indication is not.
COMMAND OBJECT(S) NOT CONNECTED TO PROCESS	The switching device position indication is connected to the process, but the command objects are not.
STATION LOCAL/REMOTE-SWITCH INHIBITS CONTROLS	The station local/remote-switch does not allow controls within the station.
STATION LOCAL/REMOTE-SWITCH NOT UPDATED	The station local/remote-switch is not updated from the process.
BAY IN LOCAL USE ONLY	The local/remote-switch in the control unit is in Local state.
CONTROL DISABLED WITHIN BAY	The local/remote-switch in the control unit is in Disabled state.
BAY LOCAL/REMOTE-SWITCH NOT UPDATED	The bay local/remote-switch is not updated from the process.
CONTROL BLOCKED	The control of the switching device is blocked (UB=1). The

	blockings can be set with the help of Blockings dialog.
DISCONNECTOR SECTION NOT OPEN	In order to operate earth switch section closed (earthed), the disconnecter section has to be in open position.
EARTH SWITCH SECTION NOT OPEN (FREE)	In order to operate disconnecter section closed, the earth switch section has to be in open (free) position.
CONTROL BLOCKED BY CONTROL DEVICE	The switching device control is blocked by the control unit.
INTERLOCKED BY CONTROL DEVICE	The switching device control is interlocked by the control unit.
CLOSE DISABLED BY CONTROL DEVICE	Closing of the switching device is interlocked by the control unit.
OPEN DISABLED BY CONTROL DEVICE	Opening of the switching device is interlocked by the control unit.
INTERLOCKING OBJECTS NOT UPDATED	The interlocking objects are not updated from the process.
INTERLOCKED BY CONTROL APPLICATION	The switching device control is disabled by the interlocking code stored in the picture function (in .U_INTERLOCKING program).
CLOSE DISABLED BY CONTROL APPLICATION	Closing the switching device is disabled by the interlocking code stored in the picture function (in .U_INTERLOCKING program).
OPEN DISABLED BY CONTROL APPLICATION	Opening the switching device is disabled by the interlocking code stored in the picture function (in .U_INTERLOCKING program).
AUTO-RECLOSING IN PROGRESS	The auto-reclosing sequence is running in the control unit.
LATCHED OUTPUT RELAYS ACTIVE	The protection device has latched the output relay active, that has to be reset before operations can be made. Resetting can be made by the Latch reset dialog.
SELECTED ON ANOTHER MONITOR	The same switching device object has been selected and the control dialog is open on another monitor.
CONTROL DEVICE INTERLOCKING OUT OF USE	The interlocking checking in the control unit is out of use.
BAY INTERLOCKING OBJECTS NOT UPDATED	One or more of bay interlocking objects has not been updated from the process.
CONTROL APPLICATION INTERLOCKING OUT OF USE	The internal interlocking checking code of the picture function (in U_INTERLOCKING program) is out of use.
POSITION INDICATION NOT UPDATED	The position indication of the switching device has not been updated from the process.
CONTROL DEVICE NOT PROPERLY SYNCHRONIZED	The control device has not received a synchronization signal for a while and therefore the time stamp is unreliable.
POSITION INDICATION OBSOLETE	The position indication of the switching device is obsolete i.e. it is no more reliable information.
POSITION INDICATION INVALID	The position indication of the switching device is invalid i.e. it is unreliable due to the malfunction of the control device.
SIGNALS BLOCKED BY CONTROL DEVICE	The control device has blocked its signals.
UPDATE BLOCKED	The indication of the switching device is blocked (UB=1). The blockings can be set with the help of Blockings dialog.

ALARM BLOCKED	The alarms of the switching device are blocked (AB=1). The blockings can be set with the help of Blockings dialog.
EVENT BLOCKED	The events of the switching device are blocked (HB=1). The blockings can be set with the help of Blockings dialog.
PRINTOUT BLOCKED	The printouts of the switching device are blocked (PB=1). The blockings can be set with the help of Blockings dialog.
REPROCESSING BLOCKED	The event activation (reprocessing) of the switching device is blocked (XB=1). The blockings can be set with the help of Blockings dialog.
OPERATION COUNTER LIMIT EXCEEDED	Operation counter limit has been exceeded. See the Operation Countings dialog for further information.

4.4.10 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 Position simulation dialog in the General chapter in this MV Process Operator's Manual.

4.4.11 Auto-Reclosing Control Dialog

The auto-reclosings control dialog may be used to interrupt and to set the auto-reclosing sequence in the protection device out of use.

Functionality

The auto-reclosing control dialog uses database objects that are generated mainly by the picture function for the auto-reclosing tag. If some database objects have been deliberately left out, the functionality differs from the description below.

Operations can be made, if the authorization level of the operator is Control (1) or higher. The dialog shows the state of the hardware switch Auto-reclosing in use (when the box is crossed, the auto-reclosing is in use). The hardware switch overrides the software switch. If the hardware switch state is out of use, the software switch is ignored. The software switch Auto-reclosing in use can be set with the help of the dialog (when the button is pressed down, auto-reclosing is set in use). The selection is sent to the device by pressing OK. The auto-reclosing sequence interruption command is sent to the device by pressing Interrupt AR sequence.

Figure 5 presents the auto-reclosure control dialog.

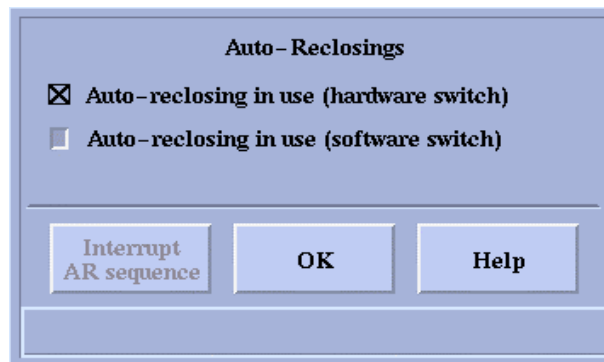


Figure 5. The auto-reclosing control dialog (FPU_SSWL.PIC)

Button	Functionality
Auto-reclosing in use (hardware switch)	Auto-reclosure ON/OFF indication (hardware switch).
Auto-reclosing in use (software switch)	Auto-reclosure ON/OFF indication and setting (software switch).
Interrupt AR sequence	Interrupts the auto-reclosing sequence if in progress.
OK	Sends the selected state of auto-reclosing operation mode to the field device and closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_SSWL.HLP.

4.4.12

Latched Relay Reset Dialog

If the protection device has latching output relays active, they have to be reset before operations can be made. Resetting can be made with the help of the Latch reset dialog.

Functionality

Operations can be made, if the authorization level of the operator is Control (1) or higher. If latched output relays are active, they can be reset by Reset output relays.

Figure 6 presents the latched relay reset dialog.

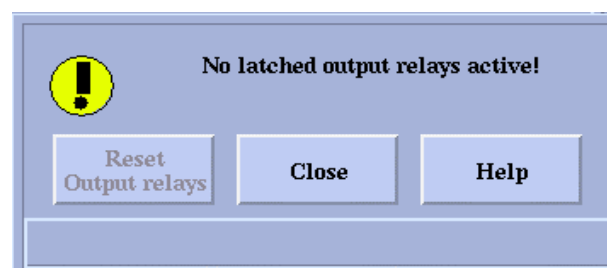


Figure 6. The latched relay reset dialog (FPU_SSWM.PIC)

Button	Functionality
Reset Output relays	Sends the command to reset latched relay on protection device.
Close	Closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_SSWM.HLP.

4.4.13

Auxiliary Plug Dialog

For most of the switching device that have been installed into the truck, there is also an indication available to inform if the auxiliary plug between the truck and cubicle is connected. If the indication object in the database is not connected to the process, the auxiliary plug state is asked with the help of this dialog.

Functionality

The dialog is only shown when the auxiliary plug object is not connected to the process.

The dialog will pop up when the object state changes into intermediate state, and the auxiliary plug database object states that the auxiliary plug of the switching device is connected. It also appears when the auxiliary plug database object states that the auxiliary plug is not connected.

When Yes or No is clicked, the corresponding auxiliary plug state is set to the database.

Figure 7 presents the auxiliary plug dialog.

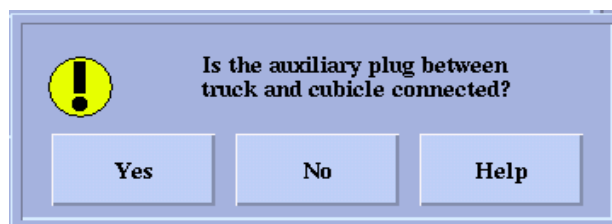


Figure 7. The auxiliary plug dialog (FPU_SSWO.PIC)

Button	Functionality
Yes	Sets the indication for auxiliary plug as connected (=1) and closes the dialog.
No	Sets the indication for auxiliary plug as disconnected (=0) and closes the dialog.
Help	Opens the general LIB 510 help dialog with the help text file FPU_SSWO.HLP.

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