Contents

The chapter "How to use the human machine interface".

This chapter instructs the user how to use the human machine interface (HMI).

1 Introduction

The built-in human machine interface (HMI) provides local communication between the user and the terminal.

Local communication also occurs with a PC connected to the built-in HMI via a special optical interface. This communication works like the remote communication within the station monitoring system (SMS) described in the other corresponding documents.

This chapter describes the basic principles of local human-machine communication (HMC).

See the section “Human Machine interface - tree structure” for a detailed description of the tree structure.

2 Human machine communication module

The HMI module consists of three light emitting diodes (LEDs), a liquid crystal display (LCD), six membrane pushbuttons, and one optical connector that enables local human machine communication (HMC) with the aid of a personal computer (PC).

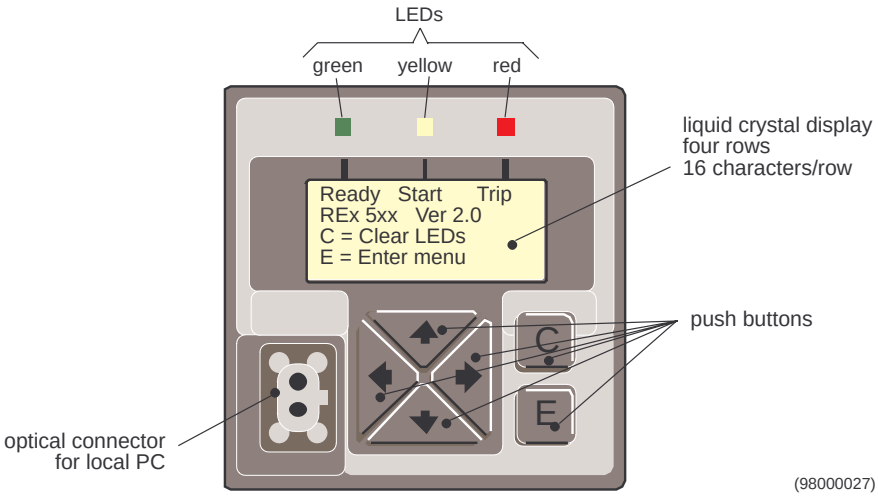

Fig. 1 Built-in human-machine interface module.

2.1 LEDs

Three LEDs provide primary information on the status of a terminal. Each LED has a special function, which also depends on whether it is off, steady on, or flashing.

Signal:	Indicates that:
Green LED, steady light	The operating condition of a terminal is normal.
Green LED, flashing light	An internal error is detected within the terminal. You can block a terminal or operate with reduced functionality, depending on the type of error and the internal configuration. See “Internal events” on page 21.
Yellow LED, steady light	One or more disturbances are recorded and stored in the terminal.
Yellow LED, flashing light	The terminal is in test mode.
Red LED, steady light	At least one of the protection functions issued a trip command.
Red LED, flashing light	The terminal is in configuration mode.

2.2 LCD display

The liquid crystal display (LCD) provides detailed information on the terminal. Normally, it is off. Select any button to turn on the current status of all LEDs and display the type of terminal with its version, together with instructions on how to continue local communication with the terminal.

The display shuts down after you exit the menu tree or if no button is selected for more than about 45 minutes.

The disturbance summary (automatic scrolling of disturbance data for the last two disturbances) is active if there is a disturbance report in a terminal, which is not yet acknowledged.

2.3 Pushbuttons

The number of buttons used on the HMI module was reduced to the minimum acceptable amount to make the communication as simple as possible for the user. The buttons normally have more than one function, depending on where they are used in the dialogue.

All buttons have one function in common: when the display is in idle (dark, non active) mode, selecting any of them results in activation of the display.

The C button has three main functions, it:

- Cancels the operation, when used together with the dialogue windows.
- Provides an Exit operation in a menu tree. This means that each selection of the C button within the menu tree results in stopping the current function or leaving the menu branch and moving one step higher in the menu tree.
- Clears LEDs when in an upper menu level.

The E button mainly provides an Enter function. It activates, for example, the selected menu tree branch, confirm settings, and different actions.

The left and right arrow buttons have two functions, to:

- Position the cursor in a horizontal direction, for instance, to move between the digits in a number during the setting procedures for real values.
- Move between the data windows within the same menu branch.

The up and down arrow buttons have three functions, to:

- Move among different menus within the menu and the dialogue windows.
- Scroll the menu tree when it contains more branches than shown on the display.
- Change the parameter values in the data windows during the setting procedure.

3 Unattended HMI

When the HMI is unattended in normal operation, two things might occur:

- No reporting of a disturbance (idle mode)
- Reporting of a disturbance (reporting mode)

3.1 Idle mode

When the terminal is in normal operation after the latest disturbance has been acknowledged or no disturbance is stored in the memory, and no one has attended the HMI for more than 45 minutes, the green LED remains active. The yellow and red LEDs are off and no text is shown on the display. The display is dark, with no light behind.

The display and LEDs will turn their status when one of the buttons is pressed, or when a new disturbance is stored in the terminal memory.

3.2 Reporting mode

When the terminal is in normal operation and a protection function has operated since the latest reset of the indications, the HMI looks like this:

Green LED Lit.

Yellow and red LEDs Lit, if conditions for their operations occurred (start for yellow, trip for red).

Disturbance summary Displayed for the last two disturbances that are automatically scrolled on the display.

3.3 Configuration mode

When the terminal is in configuration mode, the HMI looks like this:

Green LED Lit.

Red LED Flashing.

4 Menu window

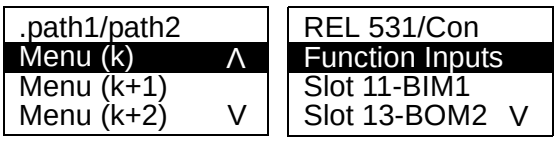

Fig. 2 Menu window, general configuration (2a) and typical example (2b)

For row one:

- A dot always appears at the beginning of the row when the selected menu window does not represent the main menu.
- path1 displays the name of the superior menu.
- path2 displays the name of the active menu window.

For rows two, three, and four:

- Menus k, k + 1 and k + 2 appear in the three bottom rows.
- When the cursor highlights one of the rows, it indicates the path that you can activate by selecting the E button.

The up arrow appears in row 2 when more menus are available before the k menu. The down arrow appears in the bottom row when more menus are available after the k+2 menu. To change the active path within the menu tree (scrolling the menu) select the up or down arrow button.

To change the menu window into a new menu window or into a data window select the E button. In same case the paths in the first row change in such a way that the old path2 now becomes a path1 and the previous menu line with the cursor then changes into path2.

Fig. 2b shows a menu window that appears during the configuration procedure on the terminal. The configuration of function inputs will become possible by selecting the E button, since this submenu appears marked as an active path by a cursor. The down arrow informs the user about the additional menus that are available for a configuration.

5 Dialogue window

The dialogue windows instruct the operator how to perform the actions defined by the text in the third and fourth rows. The first and second rows usually display a headline that provides more information to the user about the proposed action or the terminal.

RET 521 has five different dialogue windows:

- Start window (Starting the dialogue)
- Command without selection (Confirming a command)
- Command with selectio (Selecting a command)
- Command with cancellation (Cancelling a command)
- Command with selection and cancellation (Selecting and cancelling a command)

The five dialogue windows are described in the following sections.

5.1 Starting the dialogue

Fig. 3a and Fig. 3b show two typical dialogue windows to start communication with the terminal. Select the:

- C button to clear the LEDs (if required), or
- E button to enter the menu tree

The text (Ready, Start, Trip) in row one of the window in Fig. 3a and Fig. 3b describes the function of the LEDs that are at the top of the display when it is active.

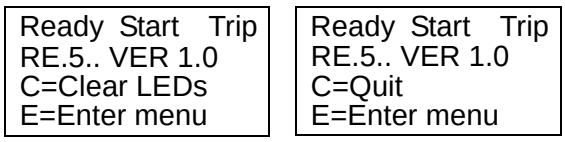

Fig. 3 Start dialogue windows, typical examples

5.2 Confirming a command

Fig. 4 shows a typical example of a dialogue window for command without selection. The instructions in the first two rows describe possible actions. YES and NO with the flashing cursor on one of them appear in the bottom row. You can move the cursor from one to another possibility by selecting the right or left arrows. The user must, after taking the decision, confirm the same one by selecting the E button.

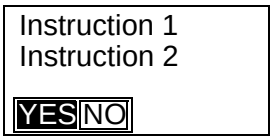

Fig. 4 Dialogue window for command with confirmation

1 Position the cursor on YES and select the E button to confirm the instructions (commands) in rows one and two.

2 Position the cursor on NO and select the E button to exit the dialogue window. without saving changes that were made during communication within the menu tree. Or select C with the same result.

5.3 Selecting a command

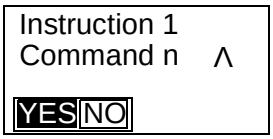

Fig. 5 Dialogue window for command with selection

Use the up or down buttons to position the cursor on a command. Select YES to execute the command. Select NO to cancel and exit the dialogue window.

5.4 Cancelling a command

Fig. 6 shows a typical dialogue window foro command with cancellation. Use the right or left arrows to move to YES, NO or CANCEL. Then select E to confirm your selection. If you select CANCEL confirmed with E, you return to the window that was shown on the display before the dialogue window appeared.

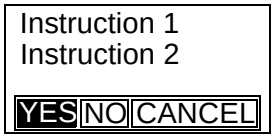

Fig. 6 Dialogue window for command with cancellation

5.5 Selecting and cancelling a command

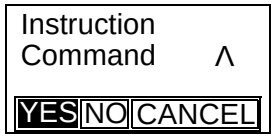

Fig. 7 Dialogue window for a command with selection and cancelling

Here you can select the command in row two, which is indicated by the up or down arrow at the end of the row.

Use the right or left arrows to position the cursor on YES, NO or CANCEL. Select YES to execute the command. Select NO or CANCEL to cancel and exit the dialogue window.

The chapter "How to use different software tools".

This chapter instructs the user how different software tools can be used for handling the protection terminal. These software products are used in a personal computer for interacting with the terminal.

Setting

1 SM/RET 521

1.1 Product overview

SM/RET 521 is intended for parameter setting and supervision of the corresponding RET 521 terminal. The SM/RET 521 software module is part of SMS 010, Station Monitoring System, hereafter simply denoted SMS.

The SMS consists of four functional parts:

- Parameter setting and supervision
- Disturbance recording evaluation
- Event handling
- Time synchronisation

Since SMS also supports communication via telephone modems this makes SMS a way to travel to the station by communication link, making physical presence in the station unnecessary.

1.2 Operating environment

The software runs on a PC system using the DOS operating system. The SMS-BASE is the platform program always required to run SM/RET 521 and other SM/... software modules.

1.3 Functionality

Terminal parameter setting and supervision, sometimes also called protection/control monitoring, lets the user display information and change settings from a PC in the same way as from the built-in HMI (Human-Machine-Interface) on the front of the terminal.

There are also information available only by using SM/RET 521, such as time tagged disturbance reports and event functions settings.

1.4 SM/RET 521 documentation

The SM/RET 521 user's manual consists of these main parts:´

Item:	Description:
Installation	Installation instruction.
Basic operation	Shows the work flow for some typical tasks when using SM/RET/521, such as: • How to communicate via the front port. • Change settings. • Read and write multiple parameters. • Setting time. • Storing of disturbance data.
Extensive operation	Presents all the possibilities that SM/RET 521 gives and the available functions. The menus that build up the product are presented with an explanation of the contents and how to operate them.

See also "Referenced publications" on page 65.

2 HV/RET 521

2.1 Product overview

HV/RET 521 is intended for parameter setting and event handling, in MicroSCADA applications, of the corresponding RET 521 terminal.

The HV/RET 521 software module is included in the LIB 520 high-voltage process package, which is a part of the Application Software Library within MicroSCADA applications. The information presented on the MicroSCADA screen is similar to the presentation of the Station Monitoring System (SMS).

The HV/RET 521 software consists of three functional parts:

- Read terminal information
- Change terminal settings
- Handling of spontaneous events for presentation in lists

2.2 Operating environment

The software runs on a PC system using operating system Windows/NT 4.0. To run the HV/RET 521 software, also the MicroSCADA packages MicroSYS rev. 8.4.1C, MicroTOOL rev. 8.4.1, LIB 500 rev. 4.0.1 and LIB 510 rev. 4.0.1 or later must be available.

2.3 Functionality

Protection parameter setting and supervision, sometimes also called protection monitoring, lets the user display information and change settings from a MicroSCADA system in the same way as from the built-in HMI (Human-Machine-Interface) on the front of the terminal.

There are also information available only by using HV/RET 521 and MicroSCADA, such as time tagged disturbance reports.

2.4 HV/RET 521 documentation

The HV/RET 521 user's manual consists of these main parts:

Item:	Description:
Installation	Installation instruction.
Tutorial	Shows the work flow for some typical tasks when using SM/RET/521, such as: • Select function on the screen. • Screen presentation • Read and change settings. • Alternate between setting groups • Change of password • Diagnosing errors
Technical description	Gives an overview of all HV/RET 521 parts including a description of the screen contents.

See also "Referenced publications" on page 65.

3 HV/Control

3.1 Product overview

The HV/Control software module is intended to be used for control functions in REx 5xx terminals. The software module includes a part regarding voltage control, which is intended to be used together with the voltage control function in RET 521. That part contains the process picture, dialogues and process database for the voltage control application in the MicroSCADA.

The HV/Control software module is included in the LIB 520 high-voltage process package, which is a part of the Application Software Library within MicroSCADA applications.

The HV/Control software consists of these functional parts:

- HV General bay
- HV Breaker, Disconnector and Earthing switch
- Overview Bay
- HV Measurement
- HV REx 5xx Supervision
- HV Voltage Control

HV Measurement, HV REx 5xx Supervision and HV Voltage Control can be used for RET 521.

3.2 Operating environment

The software runs on a PC system using operating system Windows/NT 4.0. To run the HV/Control software, also the MicroSCADA packages MicroSYS rev. 8.4.1C, MicroTOOL rev. 8.4.1, LIB 500 rev. 4.0.1 or later must be available.

3.3 Functionality

HV/Control is used to handle control and supervision functions via a process picture in MicroSCADA applications. The control function consists of open/close commands of high-voltage apparatuses or raise/lower commands of tap changers including corresponding position indications. The commands are performed from a control dialogue window, which is automatically displayed when the device to be controlled is selected. Within the control dialogue also other features are available such as e.g. blocking functions and remote/station handling.

3.4 HV/Control documentation

The HV/Control user's manual consists of these main parts:

Item:	Description:
Installation	Installation instruction.
Tutorial	Describes the general functionality and graphical representation for these functions: • HV General bay • HV Breaker, Disconnector and Earthing switch • Overview Bay • HV Measurement • HV REx 5xx Supervision • HV Voltage Control
Appendix	Files, such as format pictures, dialogue pictures, text files and help files are listed here.

See also "Referenced publications" on page 65.

The chapter "How to perform specific operations"

This chapter instructs the user how to perform specific operations, eg how to read service values, internal events, disturbance reports and terminal status.

1 How to set internal terminal time

Use the setting menu to set the internal time for a complete terminal, acc. to .

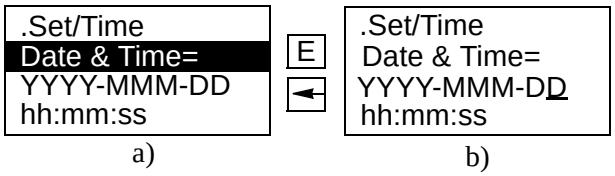

Fig. 1 Setting internal time within a terminal

After you select the E button, the data window changes from a to b. Note that the cursor is always positioned under the seconds value when you begin. Select the left arrow to move to the date value.

Real time in a terminal uses these values:

- *YYYY*, year
- *MMM*, first three letters of the month's name
- *DD*, day in the month
- *hh*, hour
- *mm*, minutes
- *ss*, seconds

Apply the rules for setting a string when you set the month value. All other values are real values.

2 Internal events

Internal events are generated by the built-in supervisory functions. The supervisory functions supervise the status of the various modules in the terminal and, in case of failure, a corresponding event is generated. Similarly, when the failure is corrected, a corresponding event is generated.

Apart from the built-in supervision of the various modules, events are also generated when these functions change status:

- Built-in real time clock (in operation/out of order)
- External time synchronization (in operation/out of order)

Events are also generated on these occasions:

- Whenever any setting in the terminal is changed
- When the content of the disturbance report is erased

Internal events can be presented at three different locations:

- At the terminal using the built-in HMI
- Remotely using front-connected PC or SMS
- Remotely using SCS

2.1 Using the built-in HMI

If an internal fault has occurred, the built-in HMI displays information under:

Terminal Status
Self Superv

Here, there are indications of internal failure (serious fault), or internal warning (minor problem).

There are also indications regarding the faulty unit, according to Table 1.

Table 1: Self-supervision signals in the built-in HMI

HMI information:	Status:	Signal name:	Activates summary signal:	Description:
InternFail	OK / FAIL	INT--FAIL		Internal fail summary. Signal activation will reset the terminal
Intern Warning	OK /WARNING	INT--WARNING		Internal warning summary
NUM-modFail	OK / FAIL	INT--NUMFAIL	INT--FAIL	Numerical module failed. Signal activation will reset the terminal
NUM-modWarning	OK /WARNING	INT--NUMWARN	INT--WARNING	Numerical module warning (failure of clock, time synch.
PCIPx-AIMn	OK / FAIL	AIMn-Error	INT--FAIL	Analogue input module n failed. Signal activation will reset the terminal
CANPx-YYYn	OK / FAIL	IOn--Error	INT--FAIL	I/O module (YYY = BIM, BOM, IOM) n failed. Signal activation will reset the terminal
CANPx-MIM1	OK / FAIL	MIM1-Error	INT--FAIL	mA input module MIM1 failed. Signal activation will reset the terminal
Real Time Clock	OK /WARNING	INT--RTC	INT--WARNING	Internal clock is reset - Set the clock
Time Sync	OK /WARNING	INT--TSYNC	INT--WARNING	No time synchronisation

You can also connect the internal signals, such as INT--FAIL and INT--WARN to binary output contacts for signalling to a control room.

In the Terminal Status information, you can view the present information from the self-supervision function. Indications of failure or warnings for each hardware module are provided, as well as information about the external time synchronization and the internal clock, according to Table 1. Recommendations are given on measures to be taken to correct the fault. Loss of time synchronisation can be considered as a warning only. The terminal has full functionality without time synchronisation.

2.2 Using front-connected PC or SMS

Here two summary signals appear, self-supervision summary and numerical module status summary. These signals can be compared to the internal signals as:

- Self-supervision summary = INT--FAIL and INT--WARNING
- CPU-module status summary = INT--NUMFAIL and INT--NUMWARN

When an internal fault has occurred, you can retrieve extensive information about the fault from the list of internal events available in the SMS part:

TRM-STAT TermStatus - Internal Events

The list of internal events provides valuable information, which can be used during commissioning and during fault tracing.

The internal events are time tagged with a resolution of 1 ms and stored in a list. The list can store up to 40 events. The list is based on the FIFO principle, when it is full, the oldest event is overwritten. The list cannot be cleared; its content cannot be erased.

The internal events in this list not only refer to faults in the terminal, but also to other activities, such as change of settings, clearing of disturbance reports, and loss of external time synchronisation.

The information can only be retrieved with the aid of the SM/RET 521 software package. The PC can be connected either to the port at the front or at the rear of the terminal.

These events are logged as internal events.

Table 2: Events available for the internal event list in the terminal

Event message:		Description:	Generating signal:
INT--FAIL	Off	Internal fail status	INT--FAIL (reset event)
INT--FAIL	■On		INT--FAIL (set event)
INT--WARNING	Off	Internal warning status	INT--WARNING (reset event)
INT--WARNING	■On		INT--WARNING (set event)
INT--NUMFAIL	Off	Numerical module fatal error status	INT--NUMFAIL (reset event)
INT--NUMFAIL	■On		INT--NUMFAIL (set event)
INT--NUMWARN	Off	Numerical module non-fatal error status	INT--NUMWARN (reset event)
INT--NUMWARN	■On		INT--NUMWARN (set event)
IOn--Error	Off	In/Out module No. n status	IOn--Error (reset event)
IOn--Error	■On		IOn--Error (set event)
AIMn-Error	Off	Analogue input module No. n status	AIMn-Error (reset event)
AIMn-Error	■On		AIMn-Error (set event)
MIM1-Error	Off	mA-input module status	MIM1-Error (reset event)
MIM1-Error	■On		MIM1-Error (set event)
INT--RTC	Off	Real Time Clock (RTC) status	INT--RTC (reset event)
INT--RTC	■On		INT--RTC (set event)
INT--TSYNC	Off	External time synchronisation status	INT--TSYNC (reset event)
INT--TSYNC	■On		INT--TSYNC (set event)
INT--SETCHGD		Any settings in terminal changed	
DRPC-CLEARED		All disturbances in Disturbance report cleared	

3 How to read service values

3.1 General

The Service report menu lets you display information about the:

- Measured values from protection functions.
- Operation conditions for protected objects in the power systems.
- Terminal.

The amount of available information depends on the number of basic and optional functions in a terminal.

A certain subgroup is displayed on the local HMI if the corresponding function is installed in the terminal. These subgroups describe possible types of information:

- Analog Input Module (AIM)
- Binary Outputs
- Differential current
- DisturbReport
- EarthFault
- Frequency Measurement
- Milliampere input module (MIM)
- OverCurrent
- Overexcitation
- OverVoltage
- Thermal Overload
- UnderVoltage
- Voltage Control
- Active Group
- Internal time

3.2 Information subgroups

3.2.1 Analog Input Module (AIM)

HMI branch:

Service Report
PCIPx-AIMy (x=3, 7; y=1, 2)

The terminal displays the values of currents and voltages connected to the analogue input board.

The appearance of analogue input quantities as they enter the terminal from the current and voltage instrument transformers, depends on the number of current and voltage inputs on the Analogue Input Module.

3.2.2 Different I/O units

HMI branch:

Service Report
CANPxx-MODULEy

(xx=9, 10, 11, 12; MODUEL=BIM, BOM, IOM, MIM; y=1, 2, 3, 4)

Different RET 521 terminals can comprise different I/O units, which serve like an interface between the terminal and external elements of the power system, such as circuit breakers, isolators, and measuring converters.

The current values of input logical signals, logical signals configured to different output elements (relays) and analogue direct current measuring inputs are available under respective CANPx- submenu.

The terminal displays analogue values of each input on each MIM and in case the MIM is used for measuring the tap changer position, a calculated value shows the position of the tap changer.

3.2.3 Transformer Differential Protection

HMI branch:

ServiceReport
Functions
TransfDiff
Measurands

Protection terminals which have differential protection displays values of the differential and bias currents:

- Bias current in A
- Differential current, phase 1, in A
- Differential current, phase 2, in A
- Differential current, phase 3, in A

3.2.4 Disturbance report

HMI branch:

ServiceReport
Functions
DisturbReport

The service report on the disturbance report function contains the:

- Percentage of the used dedicated memory capacity for purposes of the disturbance recording when it is built into the terminal.
- Sequence numbers of the disturbances recorded during the same day
- Status of built-in analogue triggers that can start the operation of the disturbance recorder
- Status of function outputs

3.2.5 Earth Fault

HMI branch:

ServiceReport
Functions
EarthFault
TEFx
Measurands

The terminal displays

- Residual current in A
- Residual voltage in kV

HMI branch:

ServiceReport
Functions
RestrictedEF
REFx

- Bias current in A
- Differential current in A

3.2.6 Frequency Measurement

HMI branch:

ServiceReport
Functions
FreqMeasurement
Measurands

The terminal displays the power system frequency in Hz. The frequency is calculated from analogue inputs of currents and voltages.

3.2.7 OverCurrent

HMI branch:

Service Report
Functions
OverCurrent
TOCx
Measurands

The terminal displays the highest current in A.

3.2.8 Overexcitation Protection

HMI branch:

ServiceReport
Functions
Overexcitation
Measurands

The terminal displays

- Relative voltage to frequency ratio, in %
- Time to trip overexcitation in seconds.

3.2.9 Overvoltage

HMI branch:

ServiceReport
Functions
OverVoltage
TOVx
Measurands

The terminal displays the highest of measured voltages in kV.

3.2.10 Thermal overload

HMI branch:

ServiceReport
Functions
ThermOverload
Measurands

The terminal displays:

- Measured current in % of thermal overload base current
- Thermal status in % of heat content trip level
- Time to trip calc. NotActive/>1.3*TimeConst/Active
- Time to trip thermal overload, in min.
- Time to reset lockout calc. NotActive/>1.3*TimeConst/Active
- Time to reset lockout function, in min.

3.2.11 Under Voltage

HMI branch:

ServiceReport
Functions
UnderVoltage
TUVx
Measurands

The terminal displays the lowest of measured voltages in kVl

3.2.12 Voltage Control

HMI branch:

ServiceReport
Functions
Voltage Control
Measurands

The terminal displays:

- Actual busbar voltage in kV
- Calculated phase-to-phase load point voltage in kV
- Actual set voltage compensated for voltage adj. in kV
- Status of the voltage ctrl. blocking cond, None/Tot/Auto/Part
- Actual reactive circulating current in A (for parallell voltage control)
- Actual tap changer position
- Number of remaining operations for contacts, count(s)
- SPA presentation of last date of reset of the contact life counter (CL)
- Total number of operations, count(s)
- SPA presentation of last date of reset of the operation counter

3.2.13 Active group

HMI branch:

ServiceReport
Active Group

The current active setting group is displayed under this submenu.

3.2.14 Internal time

HMI branch:

ServiceReport
Time

The internal terminal time can be checked under this submenu. The data comprises information on the date and on the time down to 1 second.

The chapter "Human machine interface".

This chapter describes the tree structure of the human machine interface. Each menu is displayed with its submenues.

1 Introduction

This chapter describes the structure of the human machine interface (HMI).

The following conventions are used:

1 The table header displays the actual path of the information shown in the cells. The information in the header is displayed in an cell with a greyscale-fill.

Example:

RET 521	RET 521/ServRep	.ServRep/Func	.Func/DistRep

Is equal to:

RET 521
ServRep
Func
DistRep

2 The path to the end-nodes appear in **bold**.

3 Data nodes (parameters) appear in *italic*.

Example:

.TripVal/Fault
Input1 (*)
Input2 (*)

4 Dialogues and references to other documents are located in thicker frames.

2 Display for Disturbance menu

RET 521	RET 521/DistRep	.DistRep/Disturb	.Disturb/Dist1	.Dist1/Time	.TripVal/PreFlt
DisturbReport	**Disturbances**	**Disturbance 1**	**Time Of Disturb**	*Time Of Disturb*	*Input1 (*)*
ServiceReport	**Manual Trig**	Disturbance 2	**Trig Signal**		*Input2 (*)*
Settings	**Clear DistRep**	Disturbance 3	**Indications**	**.Dist1/TrigSig**	*Input3 (*)*
Terminal Status	**Clear LEDs**	Disturbance 4	**Trip Values**	*Trig Signal*	*Input4 (*)*
Configuration		Disturbance 5			*Input5 (*)*
Command		Disturbance 6		**.Dist1/Indic**	*Input6 (*)*
Test		Disturbance 7			*Input7 (*)*
		Disturbance 8		*Input1 (*)*	*Input8 (*)*
		Disturbance 9		.	*Input9 (*)*
		Disturbance 10		*Input48 (*)*	*Input10 (*)*
					Frequency

.Dist1/TripVal	.TripVal/Fault
PreFault	*Input1 (*)*
Fault	*Input2 (*)*
	Input3 (*)
	Input4 (*)
	Input5 (*)
	Input6 (*)
	Input7 (*)
	Input8 (*)
	Input9 (*)
	Input10 (*)

“Manual Trig, Command”
with confirmation

“Clear DistRep, Command”
with confirmation

“Clear LEDs, Command”
with confirmation

(*) User name

default name is shown

3 Display for Service report menu

RET 521	RET 521/ServRep	.ServRep/Func	.Func/DistRep	.DistRep/Memory
DisturbReport	**Functions**	**DisturbReport**	**Memory Used**	*Memory Used*
ServiceReport	**Active Group**	TransfDiff	**Sequence No**	
Settings	PCIP3-AIM1	VoltageControl	**AnalogTrigStat**	**.DistRep/SeqNo**
Terminal Status	PCIP7-AIM2 ($)	OverCurrent	**FuncOutputs**	*SequenceNo*
Configuration	CANP9-BOM1/BIM2/ IOM3/MIM1	RestrictedEF		
Command	Time	EarthFault		**.DistRep/AnaTrig**
Test		UnderVoltage		*Input1 < (*)*
		OverVoltage		*Input1 > (*)*
		Overexcitation		*Input2 < (*)*
		ThermOverload		*Input2 > (*)*
		FreqMeasurmnt		*Input3 < (*)*
	($) Visible only if			*Input3 > (*)*
	that option is installed			*Input4 < (*)*
				Input4 > (*)
				Input5 < (*)
				Input5 > (*)
				Input6 < (*)
				Input6 > (*)
				Input7 < (*)
				Input7 > (*)
				Input8 < (*)
				Input8 > (*)
				Input9 < (*)
				Input9 > (*)
				Input10 < (*)
				Input10 > (*)

.ServRep/ActGrp
Active Group

.DistRep/Outputs
DREP-ERROR
DREP-OFF
DREP-RECSTART
DREP-RECMADE
DREP-CLEARED
DREP-MEMUSED

(*) User name
default name is shown

RET 521	RET 521/ServRep	.ServRep/Func	.Func/DIFP	.DIFP/Measur
DisturbReport	**Functions**	DisturbReport	**Measurands**	*Ibias*
ServiceReport	Active Group	**TransfDiff**	**FuncOutputs**	*IdiffL1*
Settings	PCIP3-AIM1	VoltageControl		*IdiffL2*
Terminal Status	PCIP7-AIM2 ($)	OverCurrent		*IdiffL3*
Configuration	CANP9-BOM1/BIM2/ IOM3/MIM1	RestrictedEF		
Command	Time	EarthFault		
Test		UnderVoltage		
		OverVoltage		
		Overexcitation		
		ThermOverload		
		FreqMeasurmnt		

.DIFP/Outputs
DIFP-ERROR
DIFP-TRIP
DIFP-TRUNR
DIFP-TRRES
DIFP-STL1
DIFP-STL2
DIFP-STL3
DIFP-WAVBLKL1
DIFP-WAVBLKL2
DIFP-WAVBLKL3
DIFP-I2BLKL1
DIFP-I2BLKL2
DIFP-I2BLKL3
DIFP-I5BLKL1
DIFP-I5BLKL2
DIFP-I5BLKL3

RET 521	RET 521/ServRep	.ServRep/Func	.Func/VCTR	.VCTR/Measur	.VCTR/Outputs
DisturbReport	**Functions**	DisturbReport	**Measurands**	*BusbarVoltage*	*VCTR-ERROR*
ServiceReport	Active Group	TransfDiff	**FuncOutputs**	*LoadVoltage*	*VCTR-REMOTE*
Settings	PCIP3-AIM1	**VoltageControl**		*ActualUset*	*VCTR-STATION*
Terminal Status	PCIP7-AIM2 ($)	OverCurrent		*BlockCond*	*VCTR-LOCAL*
Configuration	CANP9-BOM1/BIM2/ IOM3/MIM1	RestrictedEF		*CircCurrent (*)*	*VCTR-LOCALMMI*
Command	Time	EarthFault		*TapPosition*	*VCTR-MAN*
Test		UnderVoltage		*ContactLife*	*VCTR-AUTO*
		OverVoltage		*CLResetDate*	*VCTR-SINGLE (*)*
		Overexcitation		*NoOfOperations*	*VCTR-PARALLEL (*)*
		ThermOverload		*OCResetDate*	*VCTR-ADAPT (*)*
		FreqMeasurmnt			*VCTR-TOTBLK*
					VCTR-AUTOBLK
					VCTR-IBLK
					VCTR-UBLK
					VCTR-REVACBLK
					VCTR-HUNTING
					VCTR-TRFDISC
					VCTR-POSERR
					VCTR-CMDERR
					VCTR-UMIN
					VCTR-UMAX
					VCTR-LOPOS
					VCTR-HIPOS
					VCTR-TCOPER
					VCTR-TCERR
					VCTR-COMMERR (*)
					VCTR-ICIRC (*)
					VCTR-T1PG (*)
					VCTR-T2PG (*)
					VCTR-T3PG (*)
					VCTR-T4PG (*)
					VCTR-RAISE
					VCTR-LOWER

(*) Visible only if
the VCTR parallell control option is installed

RET 521	RET 521/ServRep	.ServRep/Func	.Func/TOC	.TOC/TOC1 (*)	.TOC1/Measur
DisturbReport	**Functions**	DisturbReport	**TOC1**	**Measurands**	Imax
ServiceReport	Active Group	TransfDiff	**TOC2**	**FuncOutputs**	
Settings	PCIP3-AIM1	VoltageControl	**TOC3**		
Terminal Status	PCIP7-AIM2 ($)	**OverCurrent**			**.TOC1/Out-puts**
Configuration	CANP9-BOM1/BIM2/ IOM3/MIM1	RestrictedEF			*TOC1-ERROR*
Command	Time	EarthFault			*TOC1-TRIP*
Test		UnderVoltage			*TOC1-TRLS*
		OverVoltage			*TOC1-TRHS*
		Overexcitation			*TOC1-STLSL1*
		ThermOverload			*TOC1-STLSL2*
		FreqMeasurment			*TOC1-STLSL3*
					TOC1-STHSL1
					TOC1-STHSL2
					TOC1-STHSL3

(*) Similar for TOC2 & TOC3

RET 521	RET 521/ServRep	.ServRep/Func	.Func/REF	.REF/REF1 (*)	.REF1/Measur
DisturbReport	**Functions**	DisturbReport	**REF1**	**Measurands**	*Ibias*
ServiceReport	Active Group	TransfDiff	**REF2**	**FuncOutputs**	*Idiff*
Settings	PCIP3-AIM1	VoltageControl	**REF3**		
Terminal Status	PCIP7-AIM2 ($)	OverCurrent			
Configuration	CANP9-BOM1/ BIM2/IOM3/MIM1	**RestrictedEF**			
Command	Time	EarthFault			
Test		UnderVoltage			
		OverVoltage			
		Overexcitation			
		ThermOverload			
		FreqMeasurmnt			

.REF1/Outputs
REF1-ERROR
REF1-TRIP
REF1-START

(*) Similar for REF2 & REF3

RET 521	RET 521/ServRep	.ServRep/Func	.Func/TEF	.TEF/TEF1 (*)	.TEF1/Measur	If TEF1 is Directional
DisturbReport	**Functions**	DisturbReport	**TEF1**	**Measurands**	*3Io*	
ServiceReport	Active Group	TransfDiff	**TEF2**	**FuncOutputs**	*3Uo*	
Settings	PCIP3-AIM1	VoltageControl	**TEF3**			
Terminal Status	PCIP7-AIM2 ($)	OverCurrent				
Configuration	CANP9-BOM1/ BIM2/IOM3/MIM1	RestrictedEF				
Command	Time	**EarthFault**				
Test		UnderVoltage				
		OverVoltage				
		Overexcitation				
		ThermOverload				
		FreqMeasurment				

.TEF1/Outputs
TEF1-ERROR
TEF1-TRIP
TEF1-TRLS
TEF1-TRHS
TEF1-STLS
TEF1-STHS
TEF1-I2BLK

.TEF/TEF1 (*)	.TEF1/Measur	If TEF1 is Non-Directional
Measurands	*3Io*	
FuncOutputs		

.TEF1/Outputs
TEF1-ERROR
TEF1-TRIP
TEF1-TRLS
TEF1-TRHS
TEF1-STLS
TEF1-STHS
TEF1-I2BLK

(*) Similar for TEF2 & TEF3
take care about directionality

RET 521	RET 521/ServRep	.ServRep/Func	.Func/TUV	.TUV/TUV1 (*)	.TUV1/Measur	.TUV1/Error
DisturbReport	**Functions**	DisturbReport	**TUV1**	**Measurands**	*Umin*	*TUV1-ERROR*
ServiceReport	Active Group	TransfDiff	**TUV2**	**FuncOutputs**		
Settings	PCIP3-AIM1	VoltageControl	**TUV3**		**.TUV1/Outputs**	**.TUV1/SU**
Terminal Status	PCIP7-AIM2 ($)	OverCurrent			**Error**	*TUV1-TRIP*
Configuration	CANP9-BOM1/BIM2/ IOM3/MIM1	RestrictedEF			**SU**	*TUV1-TRLS*
Command	Time	EarthFault			**G3U**	*TUV1-TRHS*
Test		**UnderVoltage**				*TUV1-STLS*
		OverVoltage				*TUV1-STHS*
		Overexcitation				
		ThermOverload				**.TUV1/G3U**
		FreqMeasurment				*TUV1-TRIPONE*
						TUV1-TRLSONE
						TUV1-TRHSONE
						TUV1-TRIPALL
						TUV1-TRLSALL
						TUV1-TRHSALL
						TUV1-STLSL1
						TUV1-STLSL2
						TUV1-STLSL3
						TUV1-STHSL1
						TUV1-STHSL2
	(*) Similar for TUV2 and TUV3					*TUV1-STHSL3*

RET 521	RET 521/ServRep	.ServRep/Func	.Func/TOV	.TOV/TOV1 (*)	.TOV1/Measur	.TOV1/Error
DisturbReport	**Functions**	DisturbReport	**TOV1**	**Measurands**	Umax	*TOV1-ERROR*
ServiceReport	Active Group	TransfDiff	**TOV2**	**FuncOutputs**		
Settings	PCIP3-AIM1	VoltageControl	**TOV3**		**.TOV1/Outputs**	**.TOV1/SU**
Terminal Status	PCIP7-AIM2 ($)	OverCurrent	**TOV4**		**Error**	*TOV1-TRIP*
Configuration	CANP9-BOM1/ BIM2/IOM3/MIM1	RestrictedEF	**TOV5**		**SU**	*TOV1-TRLS*
Command	Time	EarthFault	**TOV6**		**G3U**	*TOV1-TRHS*
Test		UnderVoltage			**G3URES**	*TOV1-STLS*
		OverVoltage				*TOV1-STHS*
		Overexcitation				
		ThermOverload				**.TOV1/G3U**
		FreqMeasurment				*TOV1-TRIPONE*
						TOV1-TRLSONE
						TOV1-TRHSONE
						TOV1-TRIPALL
						TOV1-TRLSALL
						TOV1-TRHSALL
						TOV1-STLSL1
						TOV1-STLSL2
						TOV1-STLSL3
						TOV1-STHSL1
						TOV1-STHSL2
						TOV1-STHSL3

(*) Similar for TOV2-TOV6

.TOV1/G3URES
TOV1-TRIP
TOV1-TRLS
TOV1-TRHS
TOV1-STLS
TOV1-STHS

RET 521	RET 521/ServRep	.ServRep/Func	.Func/OVEX	.OVEX/Measur
DisturbReport	**Functions**	DisturbReport	**Measurands**	*V/Hz*
ServiceReport	Active Group	TransfDiff	**FuncOutputs**	*tTRIP*
Settings	PCIP3-AIM1	VoltageControl		
Terminal Status	PCIP7-AIM2 ($)	OverCurrent		
Configuration	CANP9-BOM1/ BIM2/IOM3/MIM1	RestrictedEF		**.OVEX/Outputs**
Command	Time	EarthFault		*OVEX-ERROR*
Test		UnderVoltage		*OVEX-TRIP*
		OverVoltage		*OVEX-ALARM*
		Overexcitation		
		ThermOverload		
		FreqMeasurment		

.Func/THOL	.THOL/Measur
Measurands	*Imeasured*
FuncOutputs	*ThermalStatus*
	TimeToTrCalc
	TimeToTrip
	TimeToRstCalc
	TimeToReset

.THOL/Outputs
THOL-ERROR
THOL-TRIP
THOL-ALARM1
THOL-ALARM2
THOL-LOCKOUT

RET 521	RET 521/ServRep	.ServRep/Func	.Func/FRME	.FRME/Measur
DisturbReport	**Functions**	DisturbReport	**Measurands**	f
ServiceReport	Active Group	TransfDiff	**FuncOutputs**	
Settings	PCIP3-AIM1	VoltageControl		
Terminal Status	PCIP7-AIM2 ($)	OverCurrent		**.FRME/Outputs**
Configuration	CANP9-BOM1/ BIM2/IOM3/MIM1	RestrictedEF		FRME-ERROR
Command	Time	EarthFault		
Test		UnderVoltage		
		OverVoltage		
		Overexcitation		
		ThermOverload		
		FreqMeasurment		

RET 521	RET 521/ServRep	.ServRep/AIM1	.AIM1/CH01(**)	If channel one in AIM1 is Current Channel
DisturbReport	Functions	*AIM1-CH01 (*)*	*MagCI01*	
ServiceReport	Active Group	*AIM1-CH02 (*)*	*AngleCI01*	
Settings	**PCIP3-AIM1**	*AIM1-CH03 (*)*		
Terminal Status	**PCIP7-AIM2 ($)**	*AIM1-CH04 (*)*		
Configuration	CANP9-BOM1/ BIM2/IOM3/MIM1	*AIM1-CH05 (*)*		
Command	Time	*AIM1-CH06 (*)*		
Test		*AIM1-CH07 (*)*		
		AIM1-CH08 (*)		
		AIM1-CH09 (*)		
		AIM1-CH10 (*)		
		AIM1-ERROR		

($) Visible only if	.ServRep/AIM2		
that option is installed	*AIM2-CH01 (*)*		
	AIM2-CH02 (*)		
(**) User name will not be shown	*AIM2-CH03 (*)*		
	AIM2-CH04 (*)		
	AIM2-CH05 (*)		
	AIM2-CH06 (*)		
	AIM2-CH07 (*)		
	AIM2-CH08 (*)		
	AIM2-CH09 (*)	**.AIM2/CH09(**)**	**If channel nine in AIM2 is Voltage Channel**
	AIM2-CH10 (*)	*MagVI09*	
	AIM2-ERROR	*AngleVI09*	

(*) User name
default name is shown

RET 521	RET 521/ServRep	.ServRep/BIM1 (**)
DisturbReport	Functions	IO01-BI1 (*)
ServiceReport	Active Group	IO01-BI2 (*)
Settings	PCIP3-AIM1	.....
Terminal Status	PCIP7-AIM2 ($)	.....
Configuration	**CANP9-BOM1/BIM2/ IOM3/MIM1**	IO01-BI15 (*)
Command	**Time**	IO01-BI16 (*)
Test		IO1--Error

.ServRep/IOM2 (**)
IO02-BI1 (*)
.....
IO02-BI8 (*)
IO02-BO1 (*)
.....
IO02-BO12 (*)
IO2--Error

($) Visible only if	.ServRep/BOM3 (**)
that option is installed	*IO03-BO1 (*)*
	IO03-BO2 (*)
	.....
	.....
(*) User name	*IO03-BO23 (*)*
default name is shown	*IO03-BO24 (*)*
	IO3--Error
(**) This is an example of a	
full framework	**.ServRep/MIM1 (**)**
	MI11-Value
	MI11-Oltc
	MI12-Value
	MI13-Value
	MI14-Value
	MI15-Value
	MI16-Value

.ServRep/Time
Date & Time

4 Display for the settings menu

RET 521	RET 521/Set	.Set/DistRep	.DistRep/Oper	.Binary/Input1
DisturbReport	**DisturbReport**	**Operation**	*Operation*	*TrigOperation*
ServiceReport	Functions	**SequenceNo**	*PostRetrig*	*TrigLevel*
Settings	ChangeAct Grp	**Sampling Rate**		*IndicationMask*
Terminal Status	Time	**RecordingTimes**	**.DistRep/SeqNo**	*SetLED*
Configuration		**BinarySignals**	*SequenceNo*	
Command		**AnalogSignals**		
Test		**FreqSource**	**.DistRep/SamRate**	
			SamplingRate	

.DistRep/RecTime
tPre
tPost
tLim

.DistRep/Binary
Input1 (*)
Input2 (*)
-
-
Input47 (*)
Input48 (*)

.DistRep/FreqSrc
FreqSource

.DistRep/Analog	.Analog/Input1 (**)
Input1 (*)	*Operation*
Input2 (*)	*NominalValue*
Input3 (*)	*<TrigOperation*
Input4 (*)	*>TrigOperation*
Input5 (*)	*<TrigLevel*
Input6 (*)	*>TrigLevel*
Input7 (*)	
Input8 (*)	
Input9 (*)	
Input10 (*)	

(*) User name shown by default	(**) User name will not be shown

RET 521	RET 521/Set	.Set/Func	.Func/Grp1	.Grp1/TfrData (*)	.TfrData/Basic
DisturbReport	DisturbReport	**Group 1**	**TransfData**	**Basic Data**	*VectorGroup 2W (***)*
ServiceReport	**Functions**	Group 2	TransfDiff	**Winding 1**	*Sr*
Settings	**ChangeAct Grp**	Group 3	VoltageControl	**Winding 2**	
Terminal Status	Time	Group 4	OverCurrent		
Configuration			RestrictedEF		**.TfrData/Wind1**
Command			EarthFault		Ir1
Test			UnderVoltage		Ur1
		Save as Grp 1	OverVoltage		
		Save as Grp 2	Overexcitation		**.TfrData/Wind2**
		Save as Grp 3	ThermOverload		*Ir2*
		Save as Grp 4	FreqMeasurment		*Ur2*
		Command with Confirmation			
		According to ref. 2			

.Grp1/TfrData (**)	.TfrData/Basic
Basic Data	VectorGroup 3W (***)
Winding 1	
Winding 2	
Winding 3	**.TfrData/Wind1**
	Sr1
	Ir1
	Ur1

.TfrData/Wind2
Sr2
Ir2
Ur2

.TfrData/Wind3
Sr3
Ir3
Ur3

“ChangeAct Grp, Command”
with confirmation
According to ref. 2

(*) 2-winding transformer
(**) 3-winding transformer
(***) Both string and value are shown

RET 521	RET 521/Set	.Set/Func	.Func/Grp1	.Grp1/DIFP	.DIFP/Basic
DisturbReport	DisturbReport	**Group 1**	TransfData	**BasicSettings**	*Operation*
ServiceReport	**Functions**	Group 2	**TransfDiff**	**TapChanger**	*CharactNo*
Settings	ChangeAct Grp	Group 3	VoltageControl		*Idmin*
Terminal Status	Time	Group 4	OverCurrent		*Idunre*
Configuration			RestrictedEF		*StabByOption*
Command			EarthFault		*I2/I1ratio*
Test			UnderVoltage		*I5/I1ratio*
			OverVoltage		
			Overexcitation		
			ThermOverload		
			FreqMeasurment		

.DIFP/TapCh
NoOfTaps
RatedTap
MinTapVoltage
MaxTapVoltage

RET 521	RET 521/Set	.Set/Func	.Func/Grp1	.Grp1/VCTR	.VCTR/Oper
DisturbReport	DisturbReport	**Group 1**	TransfData	**Operation**	*Operation*
ServiceReport	**Functions**	Group 2	TransfDiff	**Voltages**	*FSDMode*
Settings	ChangeAct Grp	Group 3	**VoltageControl**	**Time Charact**	
Terminal Status	Time	Group 4	OverCurrent	**Load Drop Comp**	**.VCTR/Volt**
Configuration			RestrictedEF	**Load Volt Adj**	*Uset*
Command			EarthFault	**Manual Control**	*Udeadband*
Test			UnderVoltage	**Rev Action Blk**	*Umax*
		Save as Grp 1	OverVoltage	**TapChangerCtrl**	*Umin*
		Save as Grp 2	Overexcitation	**Parallel Ctrl (*)**	*Ublock*
		Save as Grp 3	ThermOverload		
		Save as Grp 4	FreqMeasurment		**.VCTR/Time**
		Command with Confirmation			*t1Use*
		According to ref. 2			*t1*
					t2Use
	(*) visible only if corresponding				*t2*
	flag is set to 1				*tMin*

VCTR/Oper .VCTR/TCCtrl	.VCTR/LDC
Iblock	*OperationLDC*
LowVoltTap	*Rline*
HighVoltTap	*Xline*
tPulseDur	
tTCTimeout	**.VCTR/LVA**
CLFactor	*LVAConst1*
InitCLCounter	*LVAConst2*
DayHuntDetect	*LVAConst3*
HourHuntDetect	*LVAConst4*
	VRAuto

.VCTR/PCtrl	.VCTR/ManCtrl
OperationPAR	*ExtMMIPrio*
Sbase	*AutoBlock*
T1Xr2	*TotalBlock*
T2Xr2	
T3Xr2	**.VCTR/RevAct**
T4Xr2	*OperationRA*
OperationCC	*tRevAct*
CircCurrLimit	

RET 521	RET 521/Set	.Set/Func	.Func/Grp1	.Grp1/TOC	.TOC/TOC1 (*)	If TOC1 is directional
DisturbReport	DisturbReport	**Group 1**	TransfData	**TOC1**	*Operation*	
ServiceReport	**Functions**	Group 2	TransfDiff	**TOC2**	*IrUserDef*	
Settings	ChangeAct Grp	Group 3	VoltageControl	**TOC3**	*BlockLow*	
Terminal Status	Time	Group 4	**OverCurrent**		*IsetLow*	
Configuration			RestrictedEF		*CurveType*	
Command			EarthFault		*tDefLow*	
Test			UnderVoltage		*k*	
		Save as Grp 1	OverVoltage		*tMin*	
		Save as Grp 2	Overexcitation		*BlockHigh*	
		Save as Grp 3	ThermOverload		*IsetHigh*	
		Save as Grp 4	FreqMeasurment		*tDefHigh*	
		Command with Confirmation			*DirectionLow*	
		According to ref. 2			*DirectionHigh*	
					rca	
					roa	
					UrUserDef	
					UActionLow	
					UActionHigh	

.TOC/TOC1 (*)	If TOC1 is Non-Directional
Operation	
IrUserDef	
BlockLow	
IsetLow	
CurveType	
tDefLow	
k	
tMin	
BlockHigh	
IsetHigh	
tDefHigh	

(*) Similar for TOC2 & TOC3
take care about directionality

RET 521	RET 521/Set	.Set/Func	.Func/Grp1	.Grp1/REF	.REF/REF1 (*)
DisturbReport	DisturbReport	**Group 1**	TransfData	**REF1**	*Operation*
ServiceReport	**Functions**	Group 2	TransfDiff	**REF2**	*Idmin*
Settings	ChangeAct Grp	Group 3	VoltageControl	**REF3**	*roa*
Terminal Status	Time	Group 4	OverCurrent		
Configuration			**RestrictedEF**		
Command			EarthFault		
Test			UnderVoltage		
		Save as Grp 1	OverVoltage		
		Save as Grp 2	Overexcitation		
		Save as Grp 3	ThermOverload		
		Save as Grp 4	FreqMeasurment		
		Command with Confirmation			
		According to ref. 2			

(*) Similar for REF2 & REF3

RET 521	RET 521/Set	.Set/Func	.Func/Grp1	.Grp1/TEF	.TEF/TEF1 (*)	If TEF1 is Directional
DisturbReport	DisturbReport	**Group 1**	TransfData	**TEF1**	*Operation*	
ServiceReport	**Functions**	Group 2	TransfDiff	**TEF2**	*IrUserDef*	
Settings	ChangeAct Grp	Group 3	VoltageControl	**TEF3**	*BlockLow*	
Terminal Status	Time	Group 4	OverCurrent		*IsetLow*	
Configuration			RestrictedEF		*CurveType*	
Command			**EarthFault**		*tDefLow*	
Test			UnderVoltage		*k*	
		Save as Grp 1	OverVoltage		*tMin*	
		Save as Grp 2	Overexcitation		*IStart*	
		Save as Grp 3	ThermOverload		*tLog*	
		Save as Grp 4	FreqMeasurment		*I2/I1ratio*	
		Command with Confirmation			*2harLow*	
		According to ref. 2			*2harHigh*	
					BlockHigh	
					IsetHigh	
					tDefHigh	
					DirectionLow	
					DirectionHigh	
					rca	
					roa	
					UrUserDef	

(*) Similar for TEF2 & TEF3
take care about directionality

.TEF/TEF1 (*)	If TEF1 is Non-Directional
Operation	
IrUserDef	
BlockLow	
IsetLow	
CurveType	
tDefLow	
k	
tMin	
IStart	
tLog	
I2/I1ratio	
2harLow	
2harHigh	
BlockHigh	
IsetHigh	
tDefHigh	

RET 521	RET 521/Set	.Set/Func	.Func/Grp1	.Grp1/TUV	.TUV/TUV1 (*)
DisturbReport	DisturbReport	**Group 1**	TransfData	**TUV1**	*Operation*
ServiceReport	**Functions**	Group 2	TransfDiff	**TUV2**	*BlockLow*
Settings	ChangeAct Grp	Group 3	VoltageControl	**TUV3**	*UsetLow*
Terminal Status	Time	Group 4	OverCurrent		*tDefLow*
Configuration			RestrictedEF		*BlockHigh*
Command			EarthFault		*UsetHigh*
Test		**Save as Grp 1**	**UnderVoltage**		*tDefHigh*
		Save as Grp 2	**OverVoltage**		
		Save as Grp 3	Overexcitation		
		Save as Grp 4	ThermOverload		
		Command with Confirmation	FreqMeasurment		
		According to ref. 2			

.Grp1/TOV	.TOV/TOV1 (*)
TOV1	*Operation*
TOV2	*BlockLow*
TOV3	*UsetLow*
TOV4	*CurveType*
TOV5	*tDefLow*
TOV6	*k*
	tMin
	BlockHigh
	UsetHigh
	tDefHigh

(*) Similar for TUV2 & TUV3 and TOV2-TOV6

RET 521	RET 521/Set	.Set/Func	.Func/Grp1	.Grp1/OVEX
DisturbReport	DisturbReport	**Group 1**	TransfData	*Operation*
ServiceReport	**Functions**	Group 2	TransfDiff	*Emaxcont*
Settings	ChangeAct Grp	Group 3	VoltageControl	*Emax*
Terminal Status	**Time**	Group 4	OverCurrent	*Xleak*
Configuration			RestrictedEF	*Tcool*
Command			EarthFault	*tAlarm*
Test		**Save as Grp 1**	UnderVoltage	*CurveType*
		Save as Grp 2	OverVoltage	*k*
		Save as Grp 3	**Overexcitation**	*tMin*
		Save as Grp 4	**ThermOverload**	*tMax*
		Command with Confirmation	**FreqMeasurment**	*t1*
		According to ref. 2		*t2*
				t3
				t4
				t5
				t6

.Set/Time
Date & Time

.Grp1/THOL
Operation
Ib1
Ib2
Itr
ThetaInit
TimeConstant1
TimeConstant2
Alarm1
Alarm2
ResetLockOut

.Grp1/FRME
Operation

5 Display for terminal status menu

RET 521	RET 521/TermSt	.TermSt/SelfSup	.IdentNo/Observe	.Observe/General
DisturbReport	**Self Superv**	*InternFail*	**General**	*OrderingNo*
ServiceReport	**Identity No**	*InternWarning*	**IO-modules**	*SerialNo*
Settings		*NUM-modFail*		*SW Version*
Terminal Status		*NUM-modWarning*		*NUM-module*
Configuration		*PCIP3-AIM1*		
Command		*PCIP7-AIM2 ($)*		**.Observe/IO-mod**
Test		*CANP9-BOM1/ BIM2/IOM3/MIM1*		*PCIP3-AIM1*
		Real Time Clock		*PCIP7-AIM2 ($)*
		Time Sync		*CANP9-BOM1/ BIM2/IOM3/MIM1*

.TermSt/IdentNo	.IdentNo/Note
Observed	*MMI-module*
Noted	*Casing*
	PSM-module
	SLM-module

6 Display for Configuration menu

RET 521	RET 521/Config	.Config/Ident		
DisturbReport	**Identifiers**	*Station Name*		
ServiceReport	**Frequency**	*Station No*		
Settings	**AnalogIn**	*Object Name*		
Terminal Status	**PCIP3-AIM1**	*Object No*		
Configuration	**PCIP7-AIM2 ($)**	*Unit Name*		
Command	CANP9-BOM1/BIM2/ IOM3/MIM1	*Unit No*		
Test	Time			
	BuiltInMMI	**.Config/Freq**		
	SPAComm	*fr*		
	LONComm ($)			
		.Config/AIM1	**.Config/AIM1**	
		AIM1-CH01 (*)	*RefCh*	
		AIM1-CH02 (*)		
		AIM1-CH03 (*)	**.AIM1/CH01 (**)**	
	(*) User name	**AIM1-CH04 (*)**	*InputCTTap*	
	default name is shown	**AIM1-CH05 (*)**	*CTprim*	
		AIM1-CH06 (*)	*CTsec*	
		AIM1-CH07 (*)	*CTearth*	
	(**) User name will not be	**AIM1-CH08 (*)**		
	shown	**AIM1-CH09 (*)**		
		AIM1-CH10 (*)		
	($) Visible only if			
	that option is installed	**.Config/AIM2**		
		AIM2-CH01 (*)		
		AIM2-CH02 (*)		
		AIM2-CH03 (*)		
		AIM2-CH04 (*)		
		AIM2-CH05 (*)		
		AIM2-CH06 (*)		
		AIM2-CH07 (*)	**.AIM2/CH08 (**)**	**If channel eight in AIM2 is Voltage Channel**
		AIM2-CH08 (*)	*VTprim*	
		AIM2-CH09 (*)	*VTsec*	
		AIM2-CH10 (*)		

RET 521	RET 521/Config	.Config/BIM1
DisturbReport	Identifiers	*Operation*
ServiceReport	AnalogIn	*Oscil Block*
Settings	PCIP3-AIM1	*Oscil Release*
Terminal Status	PCIP7-AIM2 ($)	
Configuration	**CANP9-BOM1/ BIM2/IOM3/MIM1**	
Command	Time	
Test	BuiltInMMI	**.Config/BOM2**
	SPAComm	*Operation*
	LONComm	

.Config/IOM3
Operation

.Config/MIM1
Operation

($) Visible only if
that option is installed

RET 521	RET 521/Config	.Config/Time	.Time/Source	.NodeInf/AdrInfo
DisturbReport	Identifiers	**FineTimeSrc**	*TIME-MINSYNC (**)*	*DomainID*
ServiceReport	AnalogIn	**CoarseTimeSrc**	*TimeSyncSource*	*SubnetID*
Settings	PCIP3-AIM1			*NodeID*
Terminal Status	PCIP7-AIM2 ($)	**.Config/MMI**	**.Time/Coarse**	
Configuration	CANP9-BOM1/BIM2/ IOM3/MIM1	*MMI--BLOCKSET (*)*	*CoarseTimeSourc*	
Command	**Time**	*SettingRestrict*		
Test	**BuiltInMMI**			
	SPAComm	**.Config/SPAComm**	**.SPAComm/Rear**	**.NodeInf/NeurID**
	LONComm	**Rear**	*SlaveNo*	*NeuronID*
		Front	*BaudRate*	
			ActGrpRestrict	
			SettingRestrict	**.NodeInf/Locat**
				Location
			.SPAComm/Front	
			SlaveNo	
			BaudRate	
	($) Visible only if			
	that option is installed	**.Config/LONComm**	**.LONComm/NodeInf**	(*)
		NodeInformation	***AdressInfo***	Functions according
	(%) Only in local MMI	**ServicePinMsg**	***NeuronID***	to
		LONDefault	***Location***	SIGNAL LIST A
		SessionTimers (%)		
		Enable Flash (%)		
		Disable Flash (%)	**.LONComm/Session**	(**)
			SessionTmo	Functions according
		“ServicePinMsg,”	*RetryTmo*	to
		“LONDefault, Enable Flash,”	*IdleAckCycle*	SIGNAL LIST B
		“Disable Flash, Command”	*BusyAckTmo*	
		with confirmation	*ErrNackCycle*	
		According to ref. 2		

7 Display for Command menu

RET 521	RET 521/Cmd	.Cmd/CD01	CD01-CMDOUT1
DisturbReport	**CD01**	*CD01-CMDOUT1 (*)*	Command with status and confirmation
ServiceReport	VoltageControl	...	According to ref. 2
Settings		...	
Terminal Status		*CD01-CMDOUT16 (*)*	
Configuration			
Command			
Test			

(*) User name
default name is shown

RET 521/Cmd	.Cmd/VoltCtr
CD01	**Set Int/Ext**
VoltageControl	**Set Manual/Auto**
	RaiseVoltage
	LowerVoltage
	ResetOpCnt
	ResetCLCnt

```
OprMode=  Int
Chng to Ext?
==========
||YES||NO||
```

after ENTER

```
OprMode=  Ext
Chng to Int?
==========
||YES||NO||
```

OR

```
OprMode=  Ext
Chng to Int?
==========
||YES||NO||
```

after ENTER

```
OprMode=  Int
Chng to Ext?
==========
||YES||NO||
```

Depends on actual state of VC function

ResetOpCnt and “ResetCLCnt, Command” with confirmation According to ref. 2

```
Control=  Manual
Chng to Auto?
==========
||YES||NO||
```

after ENTER

```
Control=  Auto
Chng to Manual?
==========
||YES||NO||
```

OR

```
Control=  Auto
Chng to Manual?
==========
||YES||NO||
```

after ENTER

```
Control=  Manual
Chng to Auto?
==========
||YES||NO||
```

Depends on actual state of VC function

```
U=131,7kV  Tap=12
Raise Voltage?
==========
||YES||NO||
```

after ENTER

```
U=131,7kV  Tap=11
Raise Voltage?
==========
||YES||NO||
```

```
U=10,56kV  Tap=05
Lower Voltage?
==========
||YES||NO||
```

after ENTER

```
U=10,56kV  Tap=04
Lower Voltage?
==========
||YES||NO||
```

8 Display for Test menu

RET 521	RET 521/ Test	.Test/Mode	.Mode/TestOp
DisturbReport	**TestMode**	**Operation**	*Operation*
ServiceReport	**ConfigMode**	**BlockFunctions**	
Settings		**DisturbReport**	
Terminal Status			**.Mode/BlkFnc**
Configuration			*BlockDIFP*
Command			*BlockOVEX*
Test		**.Test/CnfMode**	*BlockREF1*
		ConfigMode	*BlockREF2*
			BlockREF3
			BlockTEF1
			BlockTEF2
			BlockTEF3
			BlockTHOL
			BlockTOC1
			BlockTOC2
			BlockTOC3
			BlockTOV1
			BlockTOV2
			BlockTOV3
			BlockTOV4
			BlockTOV5
			BlockTOV6
			BlockTUV1
			BlockTUV2
			BlockTUV3
			BlockVCTR

.Mode/DistRep
Operation
DisturbSummary

Referenced publications

User’s manual HV/Control*2.1 1MRK 511 061-UEN*2.1-00

User’s manual HV/RET 521*2.1 1MRK 511 062-UEN*2.1-00

User’s manual SM/RET 521*2.1 1MRK 511 063-UEN*2.1-00

User’s Guide SMS BASE 1MRS 750 146-ESD

References

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