

Protection and Control Terminals RE_54_

Operator's Manual



ABB

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1. About this manual

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1.4. General

This document, Operator's Manual for RE_ 54_, instructs how to use the graphic HMI of the REF 54_, REM 54_ and RET 54_ terminals.

Please note that the HMI views in the pictures of this manual are exemplary.

1.5. Use of symbols

This publication includes warning, caution, and information icons that point out safety related conditions or other important information. It also includes tip icons to point out useful information to the reader. The corresponding icons should be interpreted as follows:



The warning icon indicates the presence of a hazard which could result in personal injury.



The caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard which could result in corruption of software or damage to equipment or property.



The information icon alerts the reader to relevant facts and conditions.

Although warning hazards are related to personal injury, and caution hazards are associated with equipment or property damage, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

1.6. Terminology

The following is a list of terms that you should be familiar with. The list contains terms that are unique to ABB or have a usage or definition that is different from standard industry usage.

Term	Description
LON	Locally operating network, a communication protocol
MIMIC	Graphic configuration picture on the relay's LCD
SPA	Communication protocol developed by ABB

Operator's Manual



1.7. Related documents

Name of the manual	MRS number
REF 54_ Technical Reference Manual, General	1MRS750527-MUM
REM 54_ Technical Reference Manual, General	1MRS750915-MUM
RET 54_ Technical Reference Manual, General	1MRS755225
Technical Descriptions of Functions (CD-ROM)	1MRS750889-MCD

1.8. Document revisions

Version	Date	History
G	3.5.2002	Section "IRF test" added.
H	4.6.2003	Section "Emergency stop function" added. Text added to sections "Self supervision (IRF)" and "Main window".
H	25.3.2004	Layout changed.
H	25.5.2004	Layout changed.
K	15.8.2004	Text and pictures updated throughout the manual.
M	20.01.2005	RET 54_ Transformer terminal added to the manual. Pictures updated.
N	08.07.2005	User selectable language feature added. User selectable function block naming feature added. User selectable idle mode view feature added. Event view navigation updated.

2. Safety information

	Dangerous voltages can occur on the connectors, even though the auxiliary voltage has been disconnected.
	National and local electrical safety regulations must always be followed.
	The device contains components which are sensitive to electrostatic discharge. Unnecessary touching of electronic components must therefore be avoided.
	The frame of the device has to be carefully earthed.
	Only a competent electrician is allowed to carry out the electrical installation.
	Non-observance can result in death, personal injury or substantial property damage.
	Breaking the sealing tape on the rear panel of the device will result in loss of warranty and proper operation will no longer be guaranteed.
	When the plug-in unit has been detached from the case, do not touch the inside of the case. The relay case internals may contain high voltage potential and touching these may cause personal injury.

3. RE_ 54_ Terminals

The RE_ 54_ terminal is based on a multiprocessor environment that increases performance. Digital signal processing combined with a powerful CPU and distributed I/O handling facilitates parallel operations and improves response times and accuracy. The HMI including an LCD display with different views makes the local use of RE_ 54_ safe and easy. The HMI instructs the user how to proceed.

The RE_ 54_ terminal is part of the ABB substation automation system and extends the functionality and flexibility of the concept further. This is possible due to the modern technology applied both in hardware and software solutions.

4. Graphical HMI/MIMIC Features

The front panel of the terminal includes:

- Graphical LCD display, with the resolution 128 x 160 pixels, consisting of 19 rows divided into two windows:
 - Main window (17 rows) providing detailed information on MIMIC, objects, events, measurements, control alarms and parameters of the terminal.
 - Assisting window (2 rows) for terminal-dependent protection indications and alarms, and for general help messages .
- Three push-buttons for object control.
- Eight freely programmable alarm LED indicators with different colours and modes according to the configuration (off, green, yellow, red, steady, flashing).
- LED indicator for control test and interlocking.
- Three protection LED indicators .
- HMI push-button section with four arrow buttons and buttons for clear [C] and enter [E].
- Optically isolated serial communication port.
- Backlight and contrast control.
- Freely programmable button [F].
- Button for remote/local control (Control position button [R/L]).
- User selectable HMI language.
- User selectable function block naming.

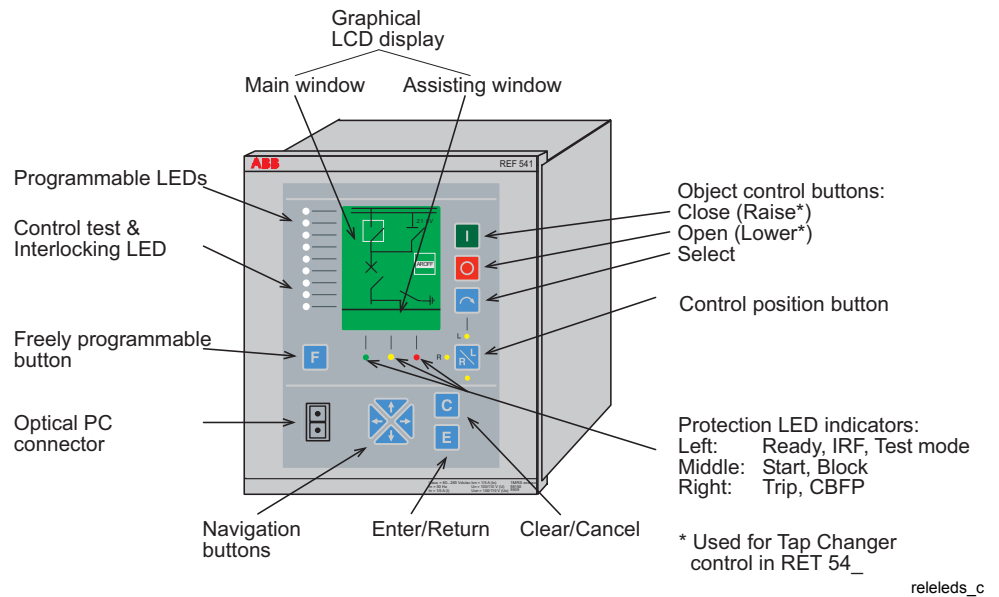


Fig. 4.-1 Front view of the terminal

4.1.**Display**

In the idle mode, the MIMIC view with the configuration picture (designed with the Relay Configuration Tool and the Relay Mimic Editor) is shown in the main window. The user can change the idle mode view in MAIN MENU/Configuration/Display mode.

To set the idle mode view

1. In the MIMIC view at user level, press [E] for 2 s and enter the password to access the technical level.
2. Press [↑] or [↓] to select Configuration (last item) in the MAIN MENU.
3. Press [→] to move to the Configuration menu.
4. Press [↑] or [↓] to select Display mode.
5. Press [→] to move to the Display mode menu.
6. Press [↑] or [↓] to select Default view.
7. Press [E] to enter the setting mode.
8. Press [↑] or [↓] to scroll to the desired idle mode view .
9. Confirm the setting by pressing [E].



Only a user level view can be selected as the idle mode view.

4.1.1.**Display backlight**

The backlight of the display is normally off.

- To turn on the backlight, press a button on the HMI.

After the preset time-out (backlight time), the backlight goes off if there has been no activity on the panel. At power up, the backlight turns on for the display test and then goes off again (delayed by time-out). The user can change the backlight time-out in MAIN MENU/Configuration/MIMIC [17].

To set the backlight time-out

1. In the MIMIC view at user level, press [E] for 2 s and enter the password to access the technical level.
2. Press [↑] or [↓] to select Configuration (last item) in the MAIN MENU.
3. Press [→] to move to the Configuration menu.
4. Press [↓] to select MIMIC [17].
5. Press [→] to move to the MIMIC [17] menu.
6. The cursor is at the first menu item, Backlight time, so you can press [E] to enter the setting mode.
7. Set the active digit (see 8. below) or press [→] to activate a digit.
8. Press [↑] or [↓] to scroll for the desired value for the digit (range: 1...20 min).
9. Confirm the setting by pressing [E].

For more information about saving the parameters, please refer to section “Saving parameters” on page 35.

The backlight can also be switched on by using the MMIWAKE function block in the configuration. For example, a digital input of the terminal can be used to control the backlight.

4.1.2.

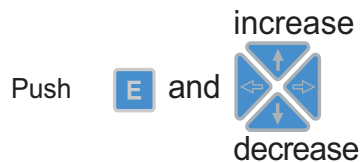
Display contrast

To obtain optimum readability, adjust the contrast in the MIMIC view at user level or in the MAIN MENU at technical level. (Refer to section “HMI Operation Levels” on page 25.)

- To increase contrast, press [E] and [↑].
- To decrease contrast, press [E] and [↓].



Press the arrow button shortly as many times as required for the desired contrast



conadj_b

Fig. 4.1.2.-1 Adjusting display contrast

The user can also adjust the contrast by setting the “Contrast” parameter in MAIN MENU/Configuration/MIMIC [17].

Provided the user stores the selected contrast tuning value in the non-volatile memory (refer to section “Saving parameters” on page 35), the contrast is automatically adjusted according to the set value after power cycling of the terminal.

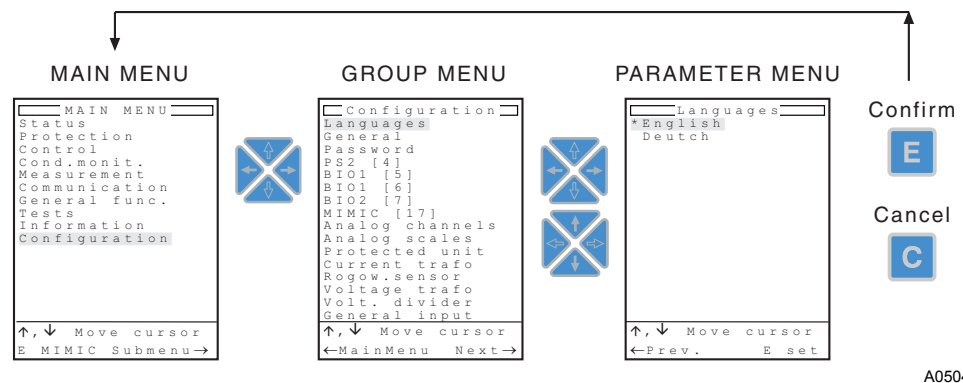
4.1.3.

Selecting language

To change the display language

1. In the MIMIC view at user level, press [E] for 2 s and enter the password to access the technical level.
2. Press [↑] or [↓] to select Configuration (last item) in the MAIN MENU.
3. Press [→] to move to the Configuration menu.
4. The cursor is at the first menu item, Languages, so you can move to the Language menu by pressing [→].
5. The active language is marked with an asterisk (*).
6. Press [↓] to move the cursor to the desired language.
7. Confirm the selection by pressing [E].
 - After confirmation, the cursor automatically returns to the MAIN MENU.

For more information about saving the parameters, please refer to section “Saving parameters” on page 35.



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Fig. 4.1.3.-1 Language selection



The terminals are delivered with two language sets pre-loaded. In the example in Fig. 4.1.3.-1, Deutsch (German) is pre-loaded as the second language. For more information on available languages, refer to the Technical Reference Manual of the terminal.

4.1.4.

Selecting function block naming

The user can select the function block naming convention. The selection can be made between three alternatives: ABB, ANSI and IEC. ABB stands for the function block names used in terminals prior to Release 3.5, ANSI follows the ANSI standard and IEC follows the IEC standard function block naming.

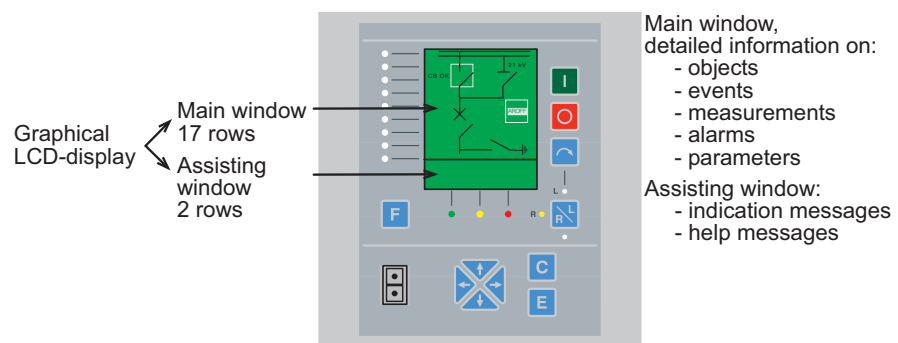
To set the function block naming view

1. In the MIMIC view at user level, press [E] for 2 s and enter the password to access the technical level.
2. Press [↑] or [↓] to select Configuration (last item) in the MAIN MENU.
3. Press [→] to move to the Configuration menu.
4. Press [↑] or [↓] to select Display mode.
5. Press [→] to move to the Display mode menu.
6. Press [↑] or [↓] to select FB naming conv.
7. Press [E] to enter the setting mode.
8. Press [↑] or [↓] to scroll for the desired value.
9. Confirm the setting by pressing [E].

4.1.5. Main window

The main window informs the user via different views and menus, for example:

- At user level:
 - MIMIC configuration, CB status, disconnector status, and so on
 - Events
 - Measurements
 - Alarms
- At technical level:
 - Parameter settings
 - Recorded data
 - Input/output data of functions



mainw_b

Fig. 4.1.5.-1 Display

In idle mode, if the MIMIC view is used as the idle mode view, the configuration picture (designed with the Relay Configuration Tool and the Relay Mimic Editor) in the MIMIC view shows the status of CB(s) and disconnectors if included in the configuration.

4.1.6. Assisting window

The assisting window provides two kinds of messages with detailed data of the terminal itself, protection functions, and so on:

- user help messages during operation
- indication messages

The assisting window is always visible, independent of the main window.

4.1.7. Display test at power up

When auxiliary voltage is connected to the terminal, the backlight goes on and a short display test is run. The test includes the LED indicators and the display:

- First, the nine alarm LED indicators are activated simultaneously with different colours (red → green → yellow - OFF). At the same time, the three protection LED indicators and the remote/local/disabled/logic LED indicators are activated for a short time (3 cycles for the LED indicators).
- The LCD display is tested by inverting the display for a short time

After the display test, the display panel turns to the normal state (MIMIC view) and the backlight turns off after the preset time-out.

4.2. Button introduction

4.2.1. Navigation, clear and enter buttons

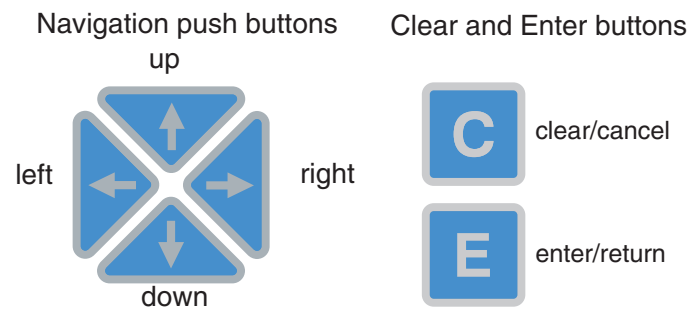
The HMI includes push-buttons for manipulating the terminal.

At technical level, a quick touch on the [↑] or [↓] button is interpreted as

- one step upwards or downwards in a menu
 - If the cursor is on the topmost row, pressing [↑] moves the cursor to the last row of the menu.
 - If the cursor is on the last row, pressing [↓] moves the cursor to the topmost row of the menu.

and

- the minimum step up or down in the setting mode of a parameter (digit, character, enumerator and so on).



navpushb_b



Fig. 4.2.1.-1 Navigation, clear and enter buttons

The next table gives short explanations of the push-buttons and their functions.

Table 4.2.1-1 Push-button functions

Left/Right		User level:
		<ul style="list-style-type: none"> • moving between views • jumping into recorded data and back from the event view
Up/Down		Technical level:
		<ul style="list-style-type: none"> • selecting the appropriate menu level (MAIN, Group, Subgroup or Parameter) • activating a digit of a numeric parameter/character string
Up/Down		User level (MIMIC view)
		<ul style="list-style-type: none"> • selecting an event from the event view and scrolling the recorded data • adjusting the display contrast
Up/Down		Technical level:
		<ul style="list-style-type: none"> • moving the cursor up or down to select the desired item of a menu • scrolling for the desired parameter enumerator • scrolling for the desired value for an active digit/character of a numeric parameter or a character string • adjusting the display contrast

Table 4.2.1-1 Push-button functions (Continued)

<p>Clear/Cancel</p>		<p>User level:</p> <ul style="list-style-type: none"> clearing LED indicators and any active indication messages clearing events or alarms according to the selected view <p>Technical level:</p> <ul style="list-style-type: none"> cancelling the setting mode clearing all kinds of indication messages (press [C] for at least 2 s)
<p>Enter</p>		<p>User level:</p> <ul style="list-style-type: none"> entering the MAIN MENU at technical level from the MIMIC view at user level (by pressing [E] for 2 s and by entering the password if required) switching between the event view modes <p>Technical level:</p> <ul style="list-style-type: none"> entering the MIMIC view at user level from the MAIN MENU at technical level (by pressing [E] for 2 s) activating the setting mode of a parameter in the parameter menu confirming a setting

4.2.2. Control position button

The control position button [R\L] is used for selecting a control mode according to the following table. For password handling, refer to section “Passwords” on page 27.

When the control mode is changed with the [R\L] button, the selected control position is stored.

Table 4.2.2-1 Control position button






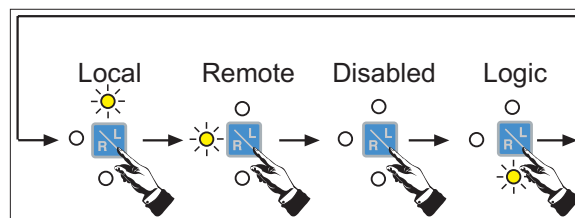
<p>LOCAL</p>		<ul style="list-style-type: none"> LOCAL mode is indicated by the yellow [L] LED indicator Objects can be controlled with the [O] and [I] buttons Any remote control signal via serial communication is inhibited Digital input and logic controls are valid
<p>REMOTE</p>		<ul style="list-style-type: none"> REMOTE mode is indicated by the yellow [R] LED indicator Objects can be controlled remotely via serial communication All local push-buttons are inhibited Digital input and logic controls are valid
<p>DISABLED</p>		<ul style="list-style-type: none"> DISABLED mode is indicated with all LED indicators being off Local and remote operations are inhibited Digital input and logic controls are valid
<p>LOGIC</p>		<ul style="list-style-type: none"> LOGIC mode is indicated with the unmarked LED indicator being lit Digital inputs of the COLOCAT function and PLC logic are used to select between the LOCAL, REMOTE and DISABLED modes Digital input and logic controls are valid
<p>DISABLED mode</p>		<ul style="list-style-type: none"> DISABLED mode is enabled

Table 4.2.2-1 Control position button (Continued)

LOCAL mode		<ul style="list-style-type: none"> • LOCAL mode is enabled • REMOTE mode is disabled
REMOTE mode		<ul style="list-style-type: none"> • REMOTE mode is enabled • LOCAL mode is disabled

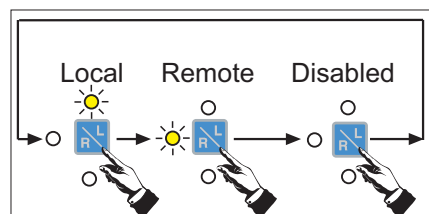


The configuration has to contain the Logic Control Position Selector function (COLOCAT) to allow LOGIC position to be selected with the [R/L] button (refer to the Technical Descriptions of Functions CD-ROM)



riconsq_b

Fig. 4.2.2.-1 Control position selection sequence when LOGIC position is selectable (COLOCAT function used in configuration)



riconsq3_b

Fig. 4.2.2.-2 Control position selection sequence when LOGIC position is not selectable (COLOCAT function not used in configuration)

4.2.3.

Delayed closing of circuit breaker

When closing the circuit breaker from the local HMI, it may sometimes be required to delay the actual close operation for safety reasons. In this way the operator has got time to step back, and the risk of injury in case of a serious fault is avoided.

The delay is optional and adjustable. The parameter `Control/General/CB close delay` is used to adjust the delay. The settable range is 0...30 seconds. The value zero means that the delay function is disabled, which is the default value of the parameter.

Only close operations are affected by the delay; open operations are always performed immediately. The parameter has no effect when the control position is set to REMOTE.

When the close [I] button is pressed, the selected CB object in the MIMIC view starts flashing and the delay commences. When the delay has elapsed, the circuit breaker is closed, and the CB object returns to a steady, non-inverted state. During the delay, the assisting window of the HMI shows the remaining delay time.

The delayed close operation can be cancelled by pressing any key, or by changing the control position. The [select], close [I], open [O] and [R\L] buttons have their normal actions disabled during the delay, but cancel the delayed close operation if they are pressed. The other keys ([F], [C], [E] and the arrow keys) have normal actions during the delay, but also cancel the delayed close operation when pressed.

If the delayed close is cancelled, the assisting window will show the text COCBx : closing cancelled for one second. The CB object also returns to a steady, non-inverted state.

4.2.4.

Object control in the MIMIC view

Objects can be controlled with the [select], open [O] and close [I] buttons (see table below). A selected object remains highlighted until a control command is given or the time-out has elapsed. The user can adjust the time-out in MAIN MENU/Control/General/Select timeout.





To adjust the timeout

1. In the MIMIC view at user level, press [E] for 2 s and enter the password to access the technical level.
2. Press [↓] to select Control in the MAIN MENU.
3. Press [→] to move to the Control menu.
4. The cursor is at the first menu item, General, so you can move to the General menu by pressing [→].
5. The cursor is at the first menu item, Select timeout, so you can press [E] to enter the setting mode.
6. Set the active digit (see 7. below) or press [→] to activate another digit (range: 10...600 s).
7. Press [↓] or [↑] to scroll for the desired value for the digit.
8. Confirm the setting by pressing [E].

The status of the corresponding object during the interlocking sequence is shown in the assisting window. Depending on the status of the interlocking function, the open or close command is either executed or the Interlocking LED indicator is lit if the command is not allowed.









The control pulse type and width can be adjusted with the parameters “Fixed pulse”, “Forced pulse”, “Open pulse” and “Close pulse” in MAIN MENU/Control/...(the control function block).../Actual setting. For more information about the open and close pulse types, please refer to the manuals of control function blocks (Technical Descriptions of Functions CD-ROM).

Table 4.2.4-1 Object control

		To control an object
Select		1. Press the button to step through the available objects until the desired object is highlighted • The object remains highlighted until a control command is given or the time-out has elapsed
Close (Raise)		2. Press [I] to close the selected object if it is open (in RET 54_, this button can also be used to raise the Tap Changer)
Open (Lower)		3. Press [O] to open the selected object if it is closed (in RET 54_, this button can also be used to lower the Tap Changer)
Freely programmable		[F] button can be programmed for different purposes

The possible operations of a three state disconnector are dependent of the current state of the disconnector. The possible operations and how to control the disconnector using open [O] and close [I] buttons are shown in Table 4.2.4-2.

Table 4.2.4-2 Object control of 3-state disconnector

Disconnector state	Button	Command to be executed
Close		Free
		Open
Open (Free)		Close
		Earth
Earth		Free
		Open
Undefined		Free
		Open

4.2.5. Emergency stop function

In emergency situations fast breaker open function is required. This is achieved by simultaneously pressing the buttons [↑] and [0] .



The emergency stop function is available through the COCBDIR function. This means that the configuration has to contain COCBDIR and that its OPEN output should be connected to the OPENDIR input of the COCB1/2 function (refer to the Technical Description of Functions CD-ROM).

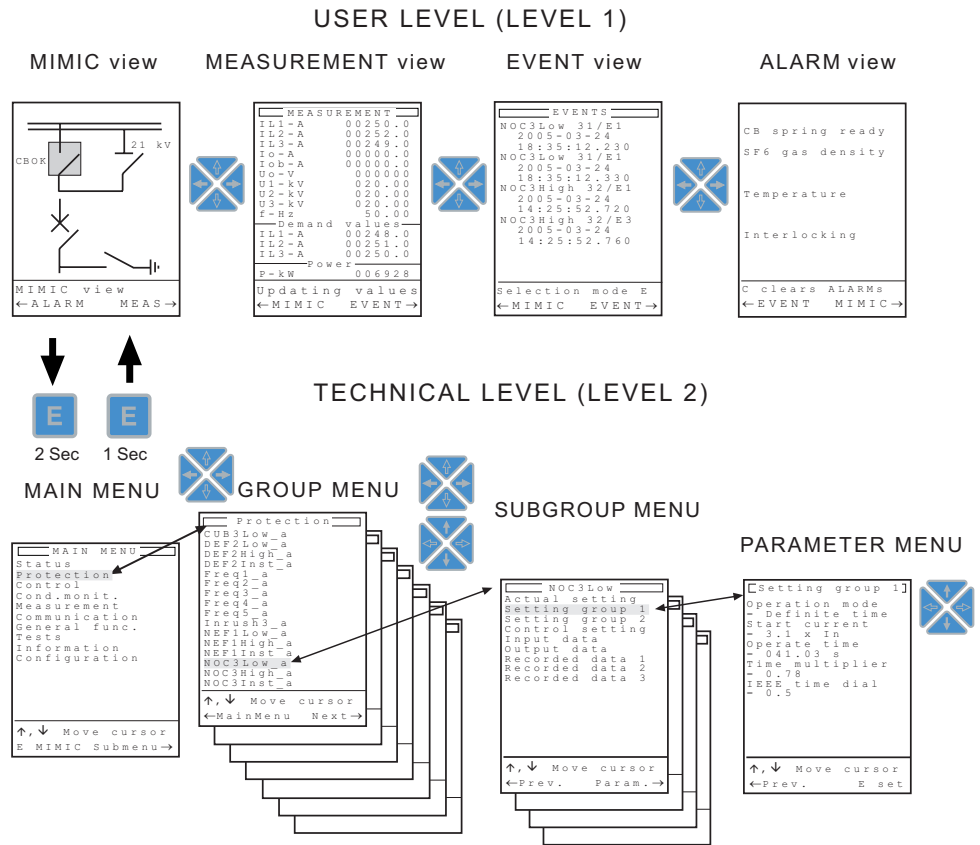
In terminals prior to Release 3.5, the emergency stop function can be executed only when the MIMIC view is active. Beginning from Release 3.5, the emergency stop function works regardless of the active view.

4.3. Programming

The front panel of the terminal is provided with an optical serial communication connector for connecting a PC to the terminal via a special RS-232 optolink cable, type 1MKC950001-2. Additionally, a special PC program is needed for communication between the PC and the terminal.

5. HMI Operation Levels

The HMI has two main levels: the user level and the technical level. The user level is for measurements and monitoring, whereas the technical level is used for terminal programming and parameterization.



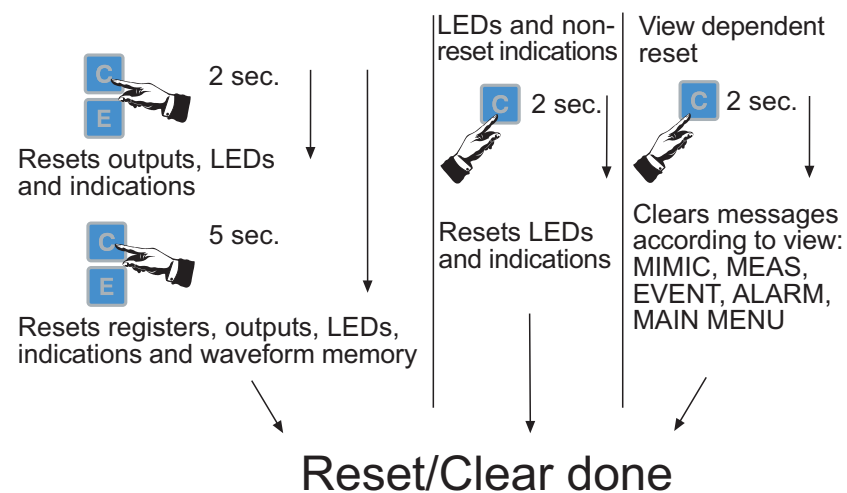
A050466

Fig. 5.-1 HMI operation levels and their structure

5.1. Acknowledgement and resetting of LED indicators, indication messages, outputs and registers

LED indicators, indication messages, outputs and registers can be acknowledged and reset regardless of the HMI operation level, view or menu.

- LED indicators, indication messages and outputs of protection functions are acknowledged by pressing [C] and [E] simultaneously for at least 2 seconds. A message in the assisting window confirms the acknowledgement.
- LED indicators, indication messages, outputs of functions and registers, including the disturbance recorder, are acknowledged by pressing [C] and [E] simultaneously for at least 5 seconds. A message in the assisting window confirms the acknowledgement.



kuitseq_b

Fig. 5.1.-1 Acknowledgement and resetting

5.2. Passwords

The HMI includes three passwords with different uses. By default, passwords 1 and 3 are disabled.¹

Table 5.2.-1 Passwords

Password	Application	Status	Default
Password 1 (MIMIC)	Local/remote/disabled/logic selection with the [R\L] button <ul style="list-style-type: none"> The password is reset after a preset time-out (backlight time) and must be re-entered before using the [R\L] button again. For more information about the preset time-out, please refer to section "Display backlight" on page 14. The password is reset when entering the technical level. 	Enabled/disabled (can be taken in use)	100000
Password 2 (parameter)	Entering the parameter setting mode at technical level <ul style="list-style-type: none"> The password applies as long as the user stays at technical level or until the backlight time-out elapses. 	Always enabled	200000
Password 3 (HMI level)	Entering the technical level from MIMIC view to MAIN MENU	Enabled/disabled (can be taken in use)	300000

The user can take the passwords 1 and 3 in use in MAIN MENU/Configuration/Password (/MIMIC or /Level).

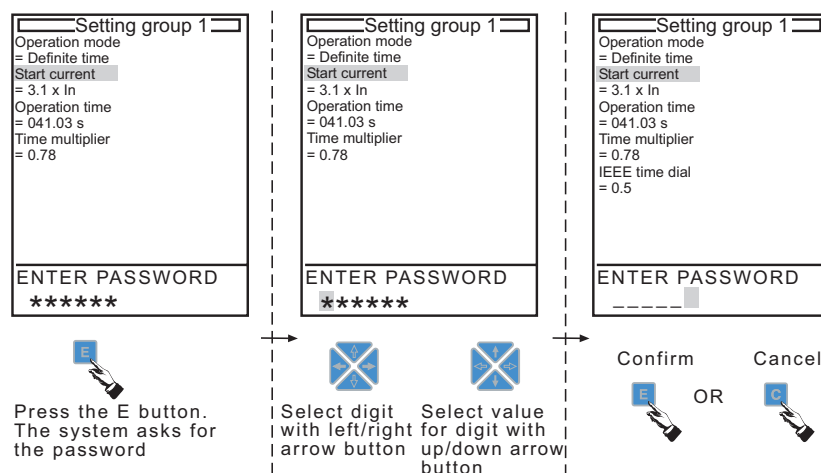
To take a password (1 or 3) in use

- In the MIMIC view at user level, press [E] for 2 s to access the technical level.
- Press [↑] or [↓] to select Configuration (last item) in the MAIN MENU.
- Press [→] to move to the Configuration menu.
- Press [↓] to select Password.
- Press [→] to move to the Password menu.
- Press [↓] or [↑] to select MIMIC (password 1) or Level (password 3).
- Press [→] to move to the selected menu.
- The cursor is at the first parameter, "Activate passw.", press [E] and enter the password to activate the setting mode.
- Press [↓] to set the parameter to "Activate".
- Confirm the setting by pressing [E].
- To disable the other password, press [←] to return to the previous menu and repeat steps 6 to 10.

To take a password out of use, set the parameter "Activate passw." to "Do not activate".

1. In terminals prior to Release 3.0, all passwords are enabled by default.

Operator's Manual



password_c

Fig. 5.2.-1 Entering a password



If the user is entering a password in the assisting window when an IRF indication message (see “Indication messages” on page 38.) appears, the password programming is automatically cancelled and the message is displayed. Then a new attempt to open the password has to be done. When the password has been opened (or failed), the message reappears in the assisting window. Messages are cleared by pressing [C] for 2 s.

If [C] is pressed while entering a password, the password entering will be cancelled. In other situations, [C] is used to clear the assisting window.

The user is able to change all three passwords or just one of them in MAIN MENU/Configuration/Password (/Level, /MIMIC or /Parameter). The maximum length of a password is six characters and both numbers and characters can be selected the [↑] and [↓] buttons.

To change a password

1. In the MIMIC view at user level, press [E] for 2 s and enter the password to access the technical level.
2. Press [↑] or [↓] to select Configuration (last item) in the MAIN MENU.
3. Press [→] to move to the Configuration menu.
4. Press [↓] to select Password.
5. Press [→] to move to the Password menu.
6. Press [↑] or [↓] to select MIMIC (password 1), Parameter (password 2) or Level (password 3).
7. Press [→] to move to the selected menu.
8. Press [↓] to select “Change password” (in case of the Parameter password, there are no other parameters, so the cursor is already at the correct parameter).
9. Press [E] and enter the password to activate the setting mode.
10. The text NEW PASSWORD appears in the assisting window.
Use the arrow buttons to enter the new password as you would normally enter a password (see Fig. 5.2.-1) and press [E].
11. Verify the new password by re-entering it as asked in the assisting window and press [E].

5.3. User level

At user level, data is received in four different views that are displayed in the main window:

1. MIMIC view
2. MEASUREMENT view
3. EVENT view
4. ALARM view

The assisting window gives general information on how to scroll the display. Use the arrow buttons at user level as follows:

- Press [→] or [←] to move between the views in the main window.
- Press [↑] or [↓] to scroll the event and measurement lists when there are more items than fit to the display at a time.

Manipulation of the arrow buttons does not affect indications, control of objects or panel status.

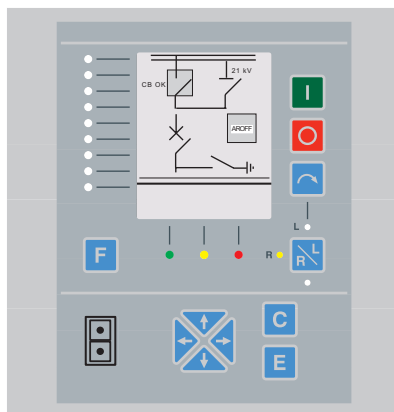
The default view of the terminal (at power up, after time-out, and so on) is configurable with the parameter “Default view” in the /MAIN MENU/ Configuration/Display mode/ menu.



In terminals prior to Release 3.5, the MIMIC view is the default view of the terminal.

5.3.1. MIMIC view

When the MIMIC view is opened in the main window, the configuration picture of the control unit is shown on the display. The MIMIC view gives the real-time status of objects (disconnectors, circuit breakers, and so forth) according to the status of the predetermined digital inputs.



[C] button functions in the MIMIC view

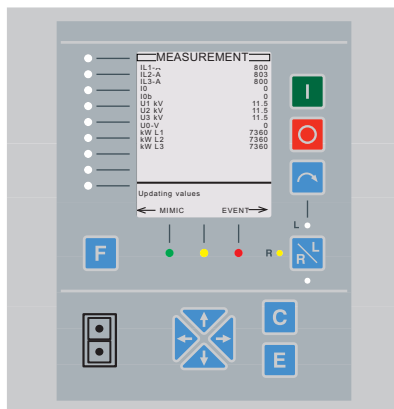
- Press [C] for 2 s to reset indications
- Press [C] to cancel password inquiry

mimicvie_b

Fig. 5.3.1.-1 MIMIC view

5.3.2. MEASUREMENT view

When the MEASUREMENT view is opened to the main window, the values measured by the terminal will be shown on the display. The [↑] and [↓] buttons are used for scrolling up and down the list in the window.



[C] button functions in the MEASUREMENT view

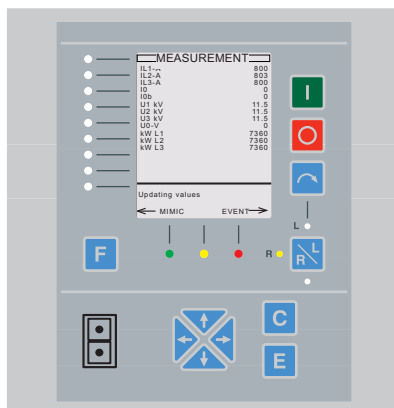
- If there are active indications, press [C] for 2 s to reset
- When there are no active indications, press [C] for 2 s to reset the accumulated energy measurements

loadview_b

Fig. 5.3.2.-1 MEASUREMENT view

5.3.3. EVENT view

The event view contains the application name, channel number, code, date and time of the last 100 operations. The most recent recorded event is stored on top of the event list.



[C] button functions in the EVENT view

- If there are active indications, press [C] for 2 s to reset
- When there are no active indications, press [C] for 2 s to reset the recorded events

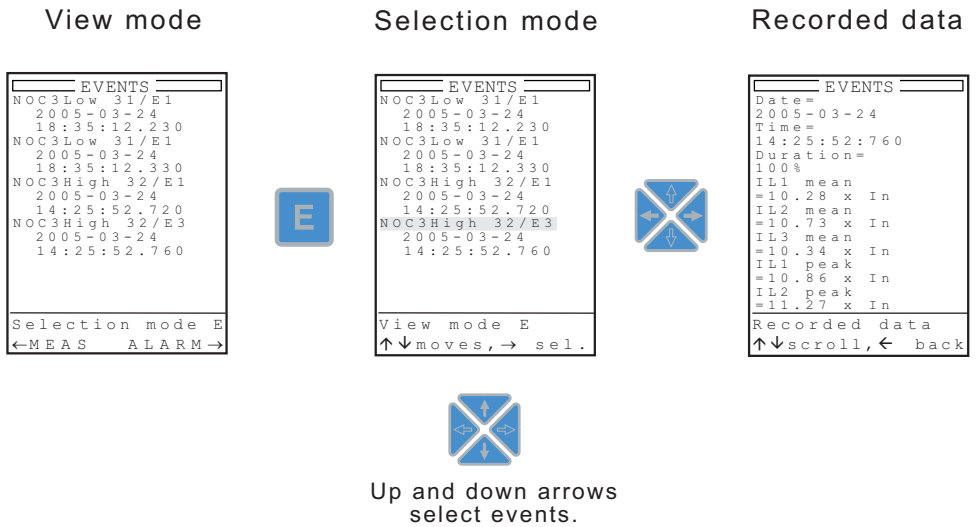
The [E] button changes between EVENT view modes

eventvie_b

Fig. 5.3.3.-1 EVENT view

The EVENT view menu navigation works as in the following picture, that is, it is possible to jump from a trip¹ event in the EVENT view to the Recorded data menu², which contains the recorded data² of the trip event in question.

1. In some function blocks, jumps may exist for other events than trip events as well.
2. Not all events contain recorded data.



A050288

Fig. 5.3.3.-2 EVENT view navigation principle

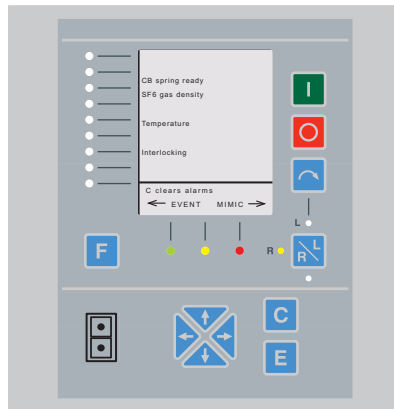
In the View mode, the EVENT view behaves normally, that is, the view is scrolled by the [↑] and [↓] buttons. There is no cursor for selection of a specific event present. When the [→] or [←] buttons are pressed, the view is changed. The event list is cleared by pressing [C]. Clearing is possible only in View mode.

In the Selection mode, a cursor allows the selection of a specific event. When the cursor reaches the bottom of the view and there are more events to display, then the next (maximum 5) event(s) are displayed and the cursor is placed on the first event in the view. When an event is selected and the right arrow is pressed, the recorded data, if available, is shown. To return from the Recorded data to the EVENT view, press the [←] button. When the Recorded data is active there is no cursor present, but the view can be scrolled.

5.3.4.

ALARM view

The ALARM view shows all the configured alarms with alarm texts. Active (not acknowledged) control alarms are distinguished from non-active alarms by LED indicators and user-defined alarm texts.



[C] button functions in the ALARM view

- If there are active indications, press [C] for 2 s to reset
- When there are no active indications, press [C] for 2 s to acknowledge alarms
- The acknowledgement proceeds according to the configuration

alarmvie_b

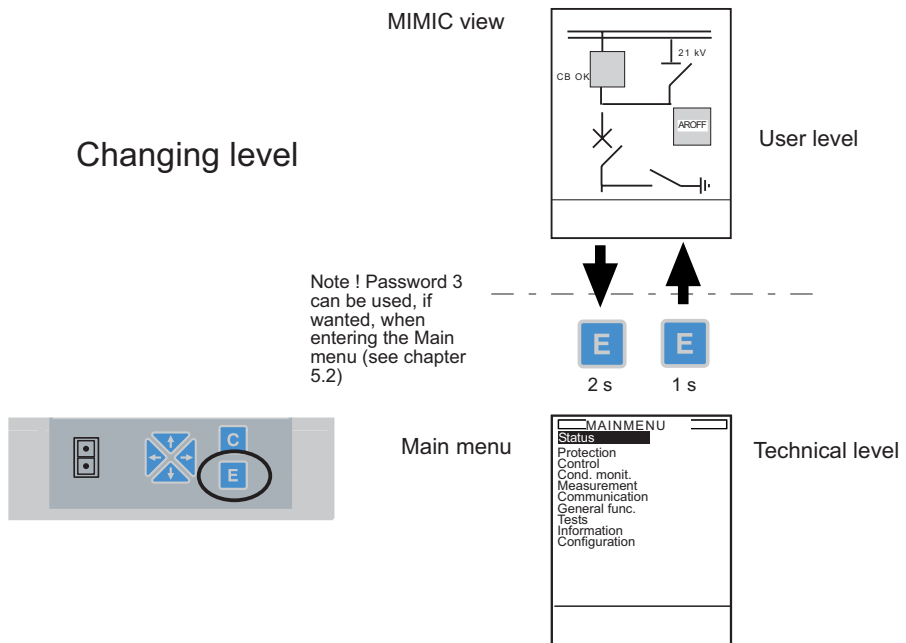
Fig. 5.3.4.-1 ALARM view

5.4.

Technical level

The interactive communication between the user and the HMI at technical level is based on menus that contain information for programming the terminal.

- To enter the MAIN MENU at technical level, press [E] for 2 s in the MIMIC view at user level and enter the password if required.
- To return to the user level, press [E] for 1 s in the MAIN MENU.



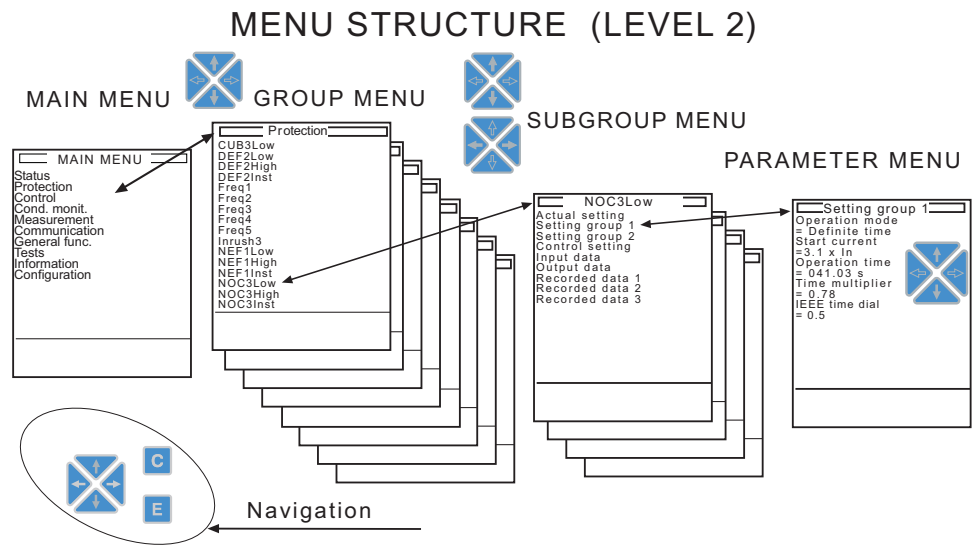
levelcha_b

Fig. 5.4.-1 Moving between user level and technical level

5.4.1. Menu system

The menus of the technical level are used for reading and setting the parameters, reading recorded values, and so forth. The menu system is divided into three or four levels (depending on the access level):

- MAIN MENU
- Group menu
- Subgroup menu
- Parameter menu



techlev_c

Fig. 5.4.1.-1 Menu structure at technical level

The main view of the technical level is the MAIN MENU, which is followed by the hierarchical structure of group, subgroup and parameter menus. In all menu levels, the first row of the display is dedicated for the header text that shows the name of the current menu.

The arrow, [C] and [E] buttons are used at technical level. The control position and object control buttons have no function in the menu system.

- Press [→] or [←] to navigate between the menus.
- Press [↑] or [↓] to select the desired menu item.

5.4.2. Setting a parameter

Parameters can be set on the last menu level, the parameter menu. One parameter consists of 2 rows:

1. row: parameter text
2. row: the setting value
(numeric value, character string, enumerator).

Table 5.4.2-1 Parameter setting types

Type	Description	Example
Numeric value	One digit is flashing and can be changed at a time	"Start current" parameter: e.g. 001.0 % In
Character string	One character (or digit) is flashing and can be changed at a time	"Main header" parameter (MEDREC16 function block): e.g. Default header
Enumerator	The whole text is flashing: select one of the predetermined alternatives	"Operation mode" parameter: • Not in use • Definite time • Instantaneous

To set a parameter

1. In the parameter menu, press [↓] or [↑] to select a parameter (the cursor moves two rows at a time) .
2. When the appropriate parameter is highlighted, press [E] for 2 seconds.
3. Enter the password (see Fig. 5.2.-1) and press [E].
(the password is only required for the first parameter setting and will apply as long as the user stays at technical level or the backlight time-out elapses).
4. Set the parameter:
 - In case of an enumerator (the entire text is flashing), press [↓] or [↑] to scroll for the desired item
 - In case of a numeric value or a character string (the first digit/character is flashing):
 - I Press [→] or [←] to select a digit/character.
 - II Press [↓] or [↑] to scroll for the desired digit/character.
 - III Repeat I and II to define other digits/characters.
5. Press [E] to confirm the new setting or [C] to restore the previous setting.
 - When a parameter change is confirmed with [E], the new setting takes effect immediately. However, all parameter changes need to be saved in the non-volatile memory as described in section "Saving parameters" on page 35.
 - If an illegal setting value is confirmed, a message in the assisting window tells the user that the setting is out of range, and the previous parameter value remains unchanged.



The special parameters for measuring devices in MAIN MENU/Configuration/Current trafo, .../Rogow.sensor, .../Voltage trafo and .../Volt. divider become valid only after they have been stored via the parameter "Store" and the terminal has been reset via the parameter "Software reset" in MAIN MENU/Configuration/General.

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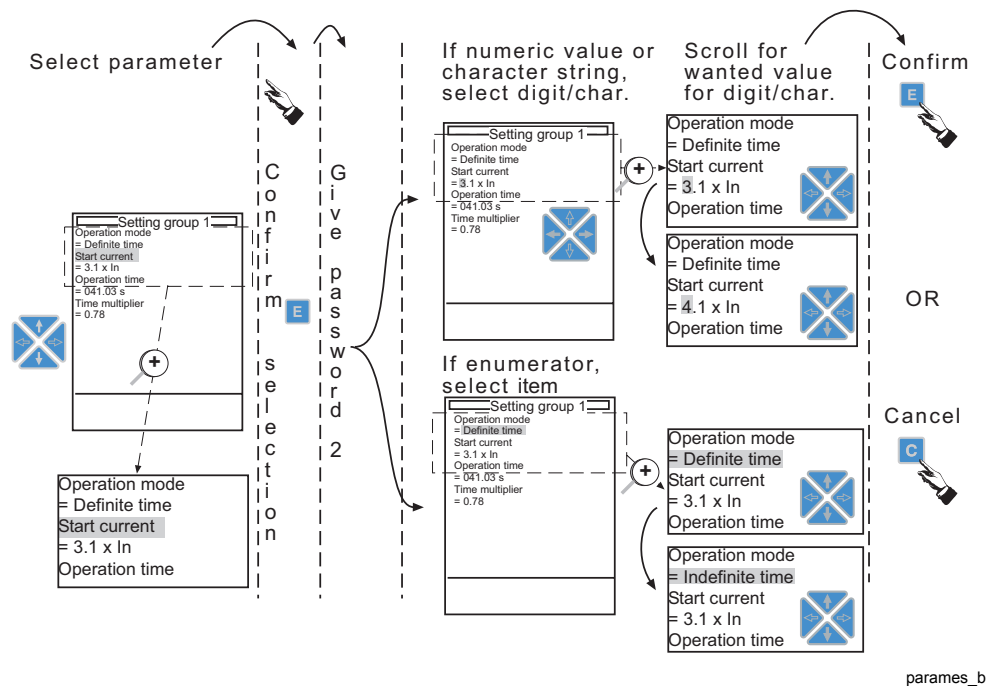


Fig. 5.4.2.-1 Parameter setting

5.4.3.

Saving parameters

When parameter values are changed, the new values take effect immediately, except for the special parameters for measuring devices (refer to section “Setting a parameter” on page 34). However, the new parameter values must be saved in the non-volatile memory as follows:

I By executing the following sequence

1. At technical level, select MAIN MENU/Configuration/General/Store.
2. Set the “Store” parameter to “Start/Progress”.
3. Press [E] to confirm, the assisting window confirms the storage.

OR**II By moving from the MAIN MENU to the MIMIC view**

- When [E] is pressed in the MAIN MENU to exit the technical level, the text “Save parameters E = Yes, C = No” will appear in the assisting window if a parameter has been changed.
 - Press [E] to save the changes in the non-volatile memory.
 - If [C] is pressed, parameters will not be saved in the non-volatile memory until storing is initiated next time.
 - If neither [C] nor [E] is pressed, the changes will be saved when the backlight time-out elapses.
 - If a parameter has been changed and confirmed with [E] as described in section “Setting a parameter” but the technical level is not exited as described above, the changes will be saved when the backlight time-out elapses.

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Storage of data in the non-volatile memory is indicated by the text "--Storing--" in the assisting window. Note that storing can be initiated also for example via serial communication.



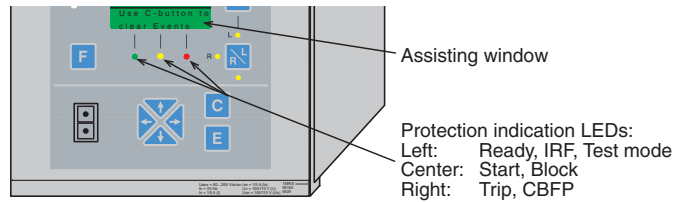
The auxiliary power supply may not be switched off during storing; the stored data are only preserved in the non-volatile memory provided the storing was completed successfully.

6. Assisting window messages

There are two kinds of messages that are displayed in the assisting window:

1. Indication messages that are further divided to
 - information about the terminal functions and the condition of the terminal (self-diagnosis) together with a LED indicator
 - text messages without a LED indicator, generally related to for example condition monitoring, alarms and warnings.
2. Help messages .

All messages are latching, that is, they remain on the display until acknowledged or overrun by another message of higher priority.



readtrip_b

Fig. 6.-1 Protection indicators

6.1. Priority of indication and help messages

The messages in the assisting window have a certain priority. If different type of indications are activated simultaneously, the message with the highest priority appears on the display. The priority of the messages is the following:

1. Internal fault
2. Trip, CBFP
3. Start, Block, Supervision (condition monitoring)
4. Help messages

As concerns the messages 1 and 2, the first active indication is shown in the assisting window, whereas for the messages 3 and 4, the latest active indication is shown.

6.2. Help messages

Help messages (priority 4) assist the user by displaying hints on how to proceed, see the example below.



assistvi_b

6.3. Indication messages

Indication messages (priorities 1-3) automatically give an overview of protection and condition monitoring operations and internal relay faults. The indications are shown in a priority order in the assisting window and will remain active until acknowledged by pressing [C] for two seconds.



When an indication message is displayed in the assisting window, no help messages are displayed until the window has been cleared.

6.3.1. Protection indications

When one of the protection functions of the terminal starts, the name of the corresponding protection function block and the text “:START” are displayed in the assisting window and the yellow LED indicator is lit. In the case of three-phase and two-phase protection functions, the faulted phases are also displayed.

NOC3Low: START L1, L2, L3

assistar_b

When the started protection function is blocked, the name of the corresponding function block and the text “:BLOCK” are displayed in the assisting window and the yellow LED indicator is flashing.

NOC3Low: BLOCK

assiblok_b

When the protection function trips, the name of the function block and the text “:TRIP” are displayed in the assisting window and the red LED indicator is lit. In the case of three-phase and two-phase protection functions, the faulted phases are also displayed.

NOC3Low: TRIP L1, L2, L3

assitrip_b

When the protection function has tripped but the fault has not disappeared, the protection function delivers a delayed trip signal for CBFP, circuit-breaker failure protection. CBFP is indicated by the red, flashing LED indicator. The name of the tripped function block and the text “:TRIP” also remain in the assisting window.

NOC3Low: TRIP L1, L2, L3

assitrip_b

6.3.2. Self supervision (IRF)

The RE_ 54_ terminal is provided with an extensive self-supervision system. The system handles run-time fault situations in RE_ 54_ and informs the user about an existing fault via the HMI and LON/SPA communication.

The green Ready LED indicator starts flashing when a fault has been detected. At the same time, the terminal delivers a fault signal to the self-supervision output relay of RE_ 54_. Additionally, a fault indication text appears on the HMI and an event E57 is generated to serial communication (channel 0).

The fault indication text on the HMI consists of two constant rows as shown below.

SELF SUPERVISION
INTERNAL FAULT

assisupv_b

Fault indication has the highest priority on the HMI. Other HMI indications cannot overrun the IRF indication. When the display panel has received a fault indication, the fault indication text remains on the HMI. The fault indication text can be cleared from the display by pressing [C] for 2 seconds, but the green LED indicator remains flashing. Flashing of the green Ready LED indicator cannot be stopped.

In case an internal fault disappears, the fault indication text stays on the display unless it has been cleared by pressing [C]. The green Ready LED indicator stops flashing and an alarm output IRF is released to normal service state. Moreover, an event E56 is generated to serial communication (channel 0).

Fault code

When an internal fault appears in RE_ 54_, the self-supervision system generates an IRF code that indicates the type of the fault. The fault code can be read from MAIN MENU/Status/General/IRF code. The code indicates the first internal fault detected by the self-supervision system.



Do not reset the terminal before reading the IRF code. The code should be noted and reported when overhaul is ordered.

Fault recovery (REF 54_, Release 2.5 and later, RET 54_)

The relay will try to recover from a fault either by restarting the module (I/O module or HMI) that reported the fault, or by restarting the whole relay. During restarting the IRF state will remain active until the internal selfsupervision program has determined that the relay is operating normally. If the fault is still persistent after restarting three times, the relay will be in permanent IRF state.

When returning to normal operation, the indication text will be replaced by this text: 'internal fault *CLEARED*', and the green READY indicator will return to steady state. In addition, an event 0/E56 is generated over the serial communication.

Operator's Manual

In addition, the fault indication text has been replaced by a more informative text, that will also show the IRF code.

Internal fault IRF code 406

irf_fi_b

6.3.3.**Condition monitoring indication**

If the terminal includes condition monitoring functions that are not directly related to any protection functions of the terminal or to the internal condition of the terminal, they are indicated in the assisting window by the message SUPERV and an explanatory text, see the example below.

CMTCS1: SUPERV Trip circuit sup

assisupi_b

7. LED indicators

The HMI includes three protection LED indicators. The basic functionality of the LED indicators is described below. In addition, there are function block -specific LED indicator operations that are described in more detail in the function block manuals (refer to the Technical Descriptions of Functions CD-ROM).




LED indicators can be latching or non-latching:

- Non-latching type of LED indicator goes automatically out when the fault disappears (the protection stage resets)
- Latching type of LED indicator remains lit, although the fault disappears, until cleared by pressing [C] for two seconds

7.1. Green LED indicator




Three different functions are embedded in the Ready LED indicator.

Table 7.1.-1 Green LED indicator functions

<p>Steady LED: READY</p> 	<p>Normal operation</p> <ul style="list-style-type: none"> • No internal faults • Auxiliary voltage is available
<p>Flashing LED: IRF</p> 	<p>An internal relay fault (IRF) has occurred but the auxiliary voltage is connected</p> <ul style="list-style-type: none"> • When an internal fault occurs, a message is received in the assisting window, provided the HMI/MIMIC panel is operative • The IRF LED indicator is latching <p>OR</p> <p>The terminal is in test mode</p>
<p>Non-active LED: OFF</p> 	<p>The auxiliary voltage supply to the terminal has been disconnected.</p> <p>Check that the auxiliary voltage is disconnected before taking any further action</p>




7.2. Yellow LED indicator

Table 7.2.-1 Yellow LED indicator functions

<p>Non-active LED: OFF</p> 	<p>Normal operation</p> <ul style="list-style-type: none"> • No function has started
<p>Steady LED: START</p> 	<p>A protection function is activated and the display shows the reason for starting. The Start LED indicator can be selected to be latching or non-latching. Should several protection functions start within a short time, the last start is indicated on the display.</p>
<p>Flashing LED: BLOCK</p> 	<p>The LED indicator goes on flashing as long as a protection function of the terminal is blocked.</p> <ul style="list-style-type: none"> • The Block indicator is non-latching i.e. it disappears when the blocking is removed or when the protection function in question is no longer started • Should the function still be started when the blocking signal is eliminated, the Start LED indicator will be activated <p>A message telling which function has been blocked appears on the display.</p> <ul style="list-style-type: none"> • If several protection functions are blocked at the same time, the most recent blocking is indicated on the display • If a protection function is blocked while other protection functions are started, the LED indicator remains flashing (BLOCK has higher priority than START)

7.3. Red LED indicator

Table 7.3.-1 Red LED indicator functions

<p>Non-active LED: OFF</p> 	<p>Normal operation</p> <ul style="list-style-type: none"> • No function has tripped
<p>Steady LED: TRIP</p> 	<p>A protection function has tripped. The trip indicator is latching, i.e. it must be reset by pressing [C] (or via serial communication). If several protection stages/functions trip in a short time, the first tripping remains on the display.</p>
<p>Flashing LED: TRIP (CBFP)</p> 	<p>If the tripping is due to CBFP (circuit breaker failure protection), the red LED indicator is flashing. The trip (CBFP) indicator is latching. The indicator is reset by pressing the C button for 2 seconds.</p>

7.4. Interlocking

Interlocking is used to inhibit the close or open command to a controllable object in certain situations. The interlocking program of RE_ 54_ operates according to the permission principle, that is, any control operations not enabled by interlocking are inhibited.

When an object is selected with the [select] button, the assisting window shows the status of the interlocking program. The downmost LED of the programmable LED indicators is reserved for the interlocking function.

Table 7.4.-1 LED indicator functions

Non-active LED: OFF	Neither interlockings nor active control test mode
Flashing LED: red	Control test mode active (interlocking bypass)
Steady LED: yellow	Control command has been inhibited (interlocked or blocked)

8. Test modes

There are various test modes for each of the following four categories:

- Function
- Control
- MIMIC
- I/O test
- IRF test

8.1. Function test

The outputs of a function block can be activated locally via the HMI or externally via serial communication. The outputs are activated by using control parameters of the function.

For further details of functions, refer to the Technical Descriptions of Functions CD-ROM.

8.2. Control test

The system provides a general interlocking bypass mode (parameter “Interl bypass” in MAIN MENU/Control/General) that overrides all interlocking signals. Activation of the interlocking bypass mode activates the interlocking enable signals of all control objects. Thus, all control actions are possible, and the enable signals of controllable objects are not checked while the objects are commanded. As long as the mode is active, the Interlocking LED indicator on the HMI is red and flashing. Additionally, the assisting window of the MIMIC view will indicate the special condition.

8.3. MIMIC test

The test mode for MIMIC is entered by setting the “Panel test” parameter to “Start” in MAIN MENU/Tests/Mimic [17]. The test can be interrupted by pressing any button. Otherwise the test is the same as the one run at power up (refer to section “Display test at power up” on page 17).

8.4. I/O test

The test mode is for testing digital I/O, LON virtual I/O and RTD1 analog I/O and their effect on the function of the terminal and the remote communication. The user has to enter the test mode (MAIN MENU/Tests/General/Test mode) before testing or else the changes will not be valid. When the test mode is active, status changes of the objects in the MIMIC view will not take place. The test mode is cancelled by setting the “Test mode” parameter to “Not active” or by power up.



If the user forgets to cancel the test mode, it remains on and the Ready LED indicator remains flashing.

To test inputs or outputs

1. At technical level, select MAIN MENU/Tests/General/Test mode .
2. Set the “Test mode” parameter to “Active” and press [E] to confirm.
3. Return to the previous menu (Tests), select the input/output card to be tested and move to the selected card menu.
4. Select the parameter and enter the setting mode.
5. Change the state of one or more inputs/outputs.
6. Press [E] to confirm.
7. When the testing is done, deactivate the test mode by setting the “Test mode” parameter to “Not Active”.

Note, that when the test mode is active, physical input changes are blocked and the configuration program only reacts to user input from the test menu. Digital output changes from the configuration program are combined with user changes from the test menu by using the OR function. In this way, the output contact will be activated if one or both of the sources are set to '1', otherwise it will remain deactivated. This means that if an output contact is activated by the relay configuration program, it cannot be deactivated from the test menu. The LON virtual outputs and the RTD1 analog outputs are written directly by user changes from the test menu, they do not react to changes in the relay configuration program.

When the test mode is deactivated, all inputs and outputs are updated to reflect the true state of the physical inputs and the relay configuration outputs. Events are generated when any input or output state is changed while the test mode is active, not active and when test mode is deactivated.

8.5.**IRF test**

The user has to enter the test mode (MAIN MENU/Tests/General/Test mode) before testing the IRF state. IRF is activated by setting the parameter “Activate IRF” (MAIN MENU/Test/General/Activate IRF) to “Activate IRF”. This will release the IRF relay contact and send the IRF error activated event (E57).

The test mode is cancelled by setting the “Test mode” parameter to “Not active” or by powering up the relay. If the user does not cancel the test mode, it remains on and the Ready LED indicator remains flashing.



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