Operator’s manual

ProtectIT Breaker protection and control terminal
REB 551-C3*2.5

About this manual:
Document No: 1MRK 505 114-UEN
Issued: November 2003
Revision: -

© Copyright 2003 ABB. All rights reserved.
Industrial IT

Industrial IT enabled products from ABB are the building blocks for greater productivity, featuring all the tools necessary for lifecycle product support in consistent electronic form.

Manufacturer:

ABB Automation Technology Products AB
Substation Automation
SE-721 59 Västerås
Sweden
Telephone: +46 (0) 21 34 20 00
Facsimile: +46 (0) 21 14 69 18
Internet: www.abb.com/substationautomation
## Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chapter 1</strong></td>
<td><strong>Introduction</strong></td>
</tr>
<tr>
<td></td>
<td>Introduction to the operator’s manual</td>
</tr>
<tr>
<td></td>
<td>About this manual</td>
</tr>
<tr>
<td></td>
<td>Intended audience</td>
</tr>
<tr>
<td></td>
<td>Related documents</td>
</tr>
<tr>
<td></td>
<td>Revision notes</td>
</tr>
<tr>
<td></td>
<td>Acronyms and abbreviations</td>
</tr>
<tr>
<td><strong>Chapter 2</strong></td>
<td><strong>Safety information</strong></td>
</tr>
<tr>
<td></td>
<td>Warnings</td>
</tr>
<tr>
<td><strong>Chapter 3</strong></td>
<td><strong>Overview</strong></td>
</tr>
<tr>
<td></td>
<td>Operator overview</td>
</tr>
<tr>
<td><strong>Chapter 4</strong></td>
<td><strong>Understand the Human Machine Interface</strong></td>
</tr>
<tr>
<td></td>
<td>Human Machine Interface</td>
</tr>
<tr>
<td></td>
<td>Overview</td>
</tr>
<tr>
<td></td>
<td>Local LCD Human Machine Interface (LCD-HMI)</td>
</tr>
<tr>
<td></td>
<td>HMI module LED indications</td>
</tr>
<tr>
<td><strong>Chapter 5</strong></td>
<td><strong>Understand the HMI tree</strong></td>
</tr>
<tr>
<td></td>
<td>Overview</td>
</tr>
<tr>
<td></td>
<td>DisturbReport</td>
</tr>
<tr>
<td></td>
<td>General</td>
</tr>
<tr>
<td></td>
<td>Disturbance</td>
</tr>
<tr>
<td></td>
<td>CalcDistToFlt</td>
</tr>
<tr>
<td></td>
<td>ManualTrig</td>
</tr>
<tr>
<td></td>
<td>ClearDistRep</td>
</tr>
<tr>
<td></td>
<td>ServiceReport</td>
</tr>
<tr>
<td></td>
<td>General</td>
</tr>
<tr>
<td></td>
<td>ServiceValues</td>
</tr>
<tr>
<td></td>
<td>Phasors</td>
</tr>
<tr>
<td></td>
<td>Functions</td>
</tr>
<tr>
<td></td>
<td>I/O</td>
</tr>
<tr>
<td></td>
<td>DisturbReport</td>
</tr>
<tr>
<td></td>
<td>ActiveGroup</td>
</tr>
<tr>
<td></td>
<td>Time</td>
</tr>
</tbody>
</table>
## Contents

Settings ........................................................................................................... 24
  General ........................................................................................................ 24
  DisturbReport ............................................................................................. 24
  Functions ....................................................................................................... 24
  ChangeActGrp ............................................................................................. 24
  Time .............................................................................................................. 24
TerminalReport ............................................................................................... 25
  General ........................................................................................................ 25
  SelfSuperv ................................................................................................... 25
  IdentityNo .................................................................................................... 25
  Modules ........................................................................................................ 25
  AnalogInput .................................................................................................. 25
Configuration .................................................................................................... 26
  General ........................................................................................................ 26
  AnalogInput .................................................................................................. 26
  I/O-modules .................................................................................................. 26
  TerminalCom ................................................................................................ 26
  Time .............................................................................................................. 27
  DisturbReport ............................................................................................. 27
  LocalHMI ..................................................................................................... 28
  Identifiers .................................................................................................... 28
  Select language ............................................................................................ 28
Command menu ............................................................................................... 29
Test menu ........................................................................................................ 30

### Chapter 6  Handle the disturbances ............................................................. 31

Identify a disturbance ..................................................................................... 32
  View the disturbance summary ................................................................... 32
  The disturbance summary ........................................................................... 32
View disturbance trigger levels ...................................................................... 33
  Navigate the menus .................................................................................... 33
View disturbance sequence number .............................................................. 35
  Navigate the menus .................................................................................... 35
Manually trigger the disturbance report ......................................................... 36
  Navigate the menus .................................................................................... 36
View the used disturbance memory size ......................................................... 37
  Navigate the menus .................................................................................... 37
Reset the LED alarms .................................................................................... 38
  Navigate the menus .................................................................................... 38

### Chapter 7  View the service report ............................................................. 39

View the service values ................................................................................... 40
  Navigate the menus .................................................................................... 40
Available HMI service values ........................................................................ 40
View the primary and secondary phasors ...................................................... 42
  Navigate the menus .................................................................................... 42
Available primary phasors ........................................................................... 42
View the function block variables and output signals .................................... 44
Contents

Navigate the menus............................................................... 44
Contents of the Functions menu related to function outputs .... 45
Read the measured and calculated function values............ 48
View the automatic recloser counters............................. 48
Autorecloser counter values ............................................ 48
View the synchrocheck values ......................................... 49
Synchrocheck values ....................................................... 50
View the I/O function block signals ............................... 51
View the I/O module signals ............................................ 51
I/O modules ................................................................. 51
Determine the active setting group ................................. 53
Navigate the menus.......................................................... 53

Chapter 8  Clear the counters ................................................. 55

Clear the autorecloser counters ....................................... 56
Navigate the menus.......................................................... 56

Chapter 9  View the terminal unit status ............................. 57

Find the reason of an internal failure ............................... 58
Navigating the menus....................................................... 58
Self supervision HMI data .............................................. 58
Identify the terminal ....................................................... 60
Navigate the menus....................................................... 60
Available identifiers ...................................................... 60
Read the terminal time .................................................. 62
Navigate the menus....................................................... 62
Retrieve the version of installed firmware ...................... 63
Navigate the menus....................................................... 63
Determine the installed modules .................................... 64
Navigate the menus....................................................... 64
I/O modules ................................................................. 64
Retrieve the rated values of analog inputs ...................... 66
Navigate the menus....................................................... 66
Chapter 1  Introduction

About this chapter
This chapter introduces you to the operator’s manual, its purpose and usage.
1 Introduction to the operator’s manual

1.1 About this manual

Use the operator’s manual to view instructions concerning how to perform common tasks during normal service.

The operator’s manual contains the following important chapters:

- The safety information chapter reviews warnings and notes in the manual of which you should be alert.
- The human machine interface chapter describes the local human-machine interface (HMI).
- The disturbance chapter describes how to retrieve disturbance information and reset alarms.
- The protection system status chapter describes how to read service values, function values and output signals.
- The terminal unit status chapter describes how to get information about the terminal status.

The manual does not contain any instructions for commissioning or testing.

1.2 Intended audience

1.2.1 General

The operator’s manual addresses the operator, who operates the terminal on a daily basis.

1.2.2 Requirement

The operator must be trained and possess a basic knowledge in how to operate protection equipment. The manual contains terms and expressions commonly used to describe this kind of equipment.

1.3 Related documents

<table>
<thead>
<tr>
<th>Documents related to REB 551-C3’2.5</th>
<th>Identity number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator’s manual</td>
<td>1MRK 505 114-UEEN</td>
</tr>
<tr>
<td>Installation and commissioning manual</td>
<td>1MRK 505 116-UEEN</td>
</tr>
</tbody>
</table>
1.4 Revision notes

<table>
<thead>
<tr>
<th>Revision</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>First release</td>
</tr>
</tbody>
</table>

1.5 Acronyms and abbreviations

<table>
<thead>
<tr>
<th>A/D converter</th>
<th>Analog to Digital converter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADBS</td>
<td>Amplitude dead-band supervision</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>ASD</td>
<td>Adaptive Signal Detection</td>
</tr>
<tr>
<td>BS</td>
<td>British Standard</td>
</tr>
<tr>
<td>CAN</td>
<td>Controller Area Network. ISO standard (ISO 11898) for serial communication</td>
</tr>
<tr>
<td>CAP 531</td>
<td>Configuration and programming tool</td>
</tr>
<tr>
<td>CB</td>
<td>Circuit breaker</td>
</tr>
<tr>
<td>CMPPS</td>
<td>Combined Mega Pulses Per Second</td>
</tr>
<tr>
<td>Co-directional</td>
<td>Way of transmitting G.703 over a balanced line. Involves two twisted pairs making it possible to transmit information in both directions</td>
</tr>
<tr>
<td>Contra-directional</td>
<td>Way of transmitting G.703 over a balanced line. Involves four twisted pairs of with two are used for transmitting data in both directions, and two pairs for transmitting clock signals</td>
</tr>
<tr>
<td>CPU</td>
<td>Central Processor Unit</td>
</tr>
<tr>
<td>CR</td>
<td>Carrier Receive</td>
</tr>
<tr>
<td>CRC</td>
<td>Cyclic Redundancy Check</td>
</tr>
<tr>
<td>CS</td>
<td>Carrier send</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>CT</td>
<td>Current transformer</td>
</tr>
<tr>
<td>CVT</td>
<td>Capacitive voltage transformer</td>
</tr>
<tr>
<td>DAR</td>
<td>Delayed auto-reclosing</td>
</tr>
<tr>
<td>DSP</td>
<td>Digital signal processor</td>
</tr>
<tr>
<td>DIP-switch</td>
<td>Small switch mounted on a printed circuit board</td>
</tr>
<tr>
<td>DTT</td>
<td>Direct transfer trip scheme</td>
</tr>
<tr>
<td>EHV network</td>
<td>Extra high voltage network</td>
</tr>
<tr>
<td>EIA</td>
<td>Electronic Industries Association</td>
</tr>
<tr>
<td>EMC</td>
<td>Electro magnetic compatibility</td>
</tr>
<tr>
<td>EMI</td>
<td>Electro magnetic interference</td>
</tr>
<tr>
<td>ESD</td>
<td>Electrostatic discharge</td>
</tr>
<tr>
<td>FOX 20</td>
<td>Modular 20 channel telecommunication system for speech, data and protection signals</td>
</tr>
<tr>
<td>FOX 512/515</td>
<td>Access multiplexer</td>
</tr>
<tr>
<td>FOX 6Plus</td>
<td>Compact, time-division multiplexer for the transmission of up to seven duplex channels of digital data over optical fibers</td>
</tr>
<tr>
<td>G.703</td>
<td>Electrical and functional description for digital lines used by local telephone companies. Can be transported over balanced and unbalanced lines</td>
</tr>
<tr>
<td>G.711</td>
<td>Standard for pulse code modulation of analog signals on digital lines</td>
</tr>
<tr>
<td>GI</td>
<td>General interrogation command</td>
</tr>
<tr>
<td>GIS</td>
<td>Gas insulated switchgear.</td>
</tr>
<tr>
<td>GPS</td>
<td>Global positioning system</td>
</tr>
<tr>
<td>HDLC protocol</td>
<td>High level data link control, protocol based on the HDLC standard</td>
</tr>
<tr>
<td>HMI</td>
<td>Human-Machine Interface</td>
</tr>
<tr>
<td>HSAR</td>
<td>High-Speed Auto-Reclosing</td>
</tr>
<tr>
<td>HVDC</td>
<td>High voltage direct current</td>
</tr>
<tr>
<td>IDBS</td>
<td>Integrating dead-band supervision</td>
</tr>
<tr>
<td>IEC</td>
<td>International Electrical Committee</td>
</tr>
<tr>
<td>IEC 60044-6</td>
<td>IEC Standard, Instrument transformers – Part 6: Requirements for protective current transformers for transient performance</td>
</tr>
<tr>
<td>IEC 60870-5-103</td>
<td>Communication standard for protective equipment. A serial master/slave protocol for point-to-point communication</td>
</tr>
</tbody>
</table>
Introduction to the operator’s manual

IEEE
Institute of Electrical and Electronics Engineers

IEEE 802.12
A network technology standard that provides 100 Mbits/s on twisted-pair or optical fiber cable

IEEE P1386.1
PCI Mezzanine Card (PMC) standard for local bus modules. References the CMC (IEEE P1386, also known as Common Mezzanine Card) standard for the mechanics and the PCI specifications from the PCI SIG (Special Interest Group) for the electrical

EMF
Electro magnetic force

I-GIS
Intelligent gas insulated switchgear

IP 54
Degrees of protection provided by enclosures (IP code) according to IEC 60529

ITU
International Telecommunications Union

LAN
Local area network

LCD
Liquid crystal display

LDD
Local detection device

LED
Light emitting diode

LNT
LON network tool

LON
Local operating network

MCB
Miniature circuit breaker

MPM
Main processing module

MVB
Multifunction vehicle bus. Standardized serial bus originally developed for use in trains

PCM
Pulse code modulation

PISA
Process interface for sensors & actuators

POTT
Permissive overreach transfer trip

Process bus
Bus or LAN used at the process level, that is, in near proximity to the measured and/or controlled components

PST
Parameter setting tool

PT ratio
Potential transformer or voltage transformer ratio

PUTT
Permissive underreach transfer trip

RASCB
Synchrocheck relay, COMBIFLEX

RCA
Relay characteristic angle

REVAL
Evaluation software

RFPP
Resistance for phase-to-phase faults

RFPE
Resistance for phase-to-earth faults
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RISC</td>
<td>Reduced instruction set computer</td>
</tr>
<tr>
<td>RMS value</td>
<td>Root mean square value</td>
</tr>
<tr>
<td>RS422</td>
<td>A balanced serial interface for the transmission of digital data in point-to-point connections</td>
</tr>
<tr>
<td>RS485</td>
<td>Serial link according to EIA standard RS485</td>
</tr>
<tr>
<td>RS530</td>
<td>A generic connector specification that can be used to support RS422, V.35 and X.21 and others</td>
</tr>
<tr>
<td>RTU</td>
<td>Remote terminal unit</td>
</tr>
<tr>
<td>SA</td>
<td>Substation Automation</td>
</tr>
<tr>
<td>SCS</td>
<td>Station control system</td>
</tr>
<tr>
<td>SMS</td>
<td>Station monitoring system</td>
</tr>
<tr>
<td>SPA</td>
<td>Strömberg Protection Acquisition, a serial master/slave protocol for point-to-point communication</td>
</tr>
<tr>
<td>SVC</td>
<td>Static VAr compensation</td>
</tr>
<tr>
<td>TPZ, TPY, TPX, TPS</td>
<td>Current transformer class according to IEC</td>
</tr>
<tr>
<td>UI-PISA</td>
<td>Process interface components that delivers measured voltage and current values</td>
</tr>
<tr>
<td>UTC</td>
<td>Coordinated Universal Time. A coordinated time scale, maintained by the Bureau International des Poids et Mesures (BIPM), which forms the basis of a coordinated dissemination of standard frequencies and time signals</td>
</tr>
<tr>
<td>V.36</td>
<td>Same as RS449. A generic connector specification that can be used to support RS422 and others</td>
</tr>
<tr>
<td>WEI</td>
<td>Week-end infeed logic</td>
</tr>
<tr>
<td>VT</td>
<td>Voltage transformer</td>
</tr>
<tr>
<td>X.21</td>
<td>A digital signalling interface primarily used for telecom equipment</td>
</tr>
</tbody>
</table>
Chapter 2  Safety information

About this chapter
This chapter lists warnings and cautions that must be followed when handling the terminal.
1 Warnings

Warning!
Do not touch circuitry during operation. Potentially lethal voltages and currents are present.

Warning!
Always connect the terminal to protective earth, regardless of the operating conditions. This also applies to special occasions such as bench testing, demonstrations and off-site configuration. Operating the terminal without proper earthing may damage both terminal and measuring circuitry and may cause injuries in case of an accident.

Warning!
Never remove any screw from a powered terminal or from a terminal connected to powered circuitry. Potentially lethal voltages and currents are present.

Warning!
Always avoid to touch the circuitry when the cover is removed. The product contains electronic circuitries which can be damaged if exposed to static electricity (ESD). The electronic circuitries also contain high voltage which is lethal to humans.
Chapter 3  Overview

About this chapter
This chapter describes operations an operator may perform on a daily basis or when the need arises.
1 Operator overview

If a disturbance occurs the operator has a possibility to document it so that the fault that caused the disturbance can be analyzed, evaluated and documented for future reference. The operator can identify the disturbance and, for example, document the fault currents and voltages at the time of the fault. The operator also has a possibility to retrieve data about the protected object, which will give further information when analyzing a fault. This implies viewing the mean current, voltage, power and frequency or primary and secondary measured phasors. The operator can check the terminal status at any time.

In some cases the operator needs to change the way the terminal operates. This could be changing the active setting group or a setting parameter value. This must be done in strict accordance with the company regulations due to that a non-authorized change can cause severe damage to the protected object if a fault is not properly disconnected.
Chapter 4  Understand the Human Machine Interface

About this chapter
This chapter describes how the human-machine interface works from an operator’s view.
## Human Machine Interface

### 1.1 Overview

#### 1.1.1 Application

The human machine interface is used to monitor and in certain aspects affect the way the product operates. The configuration designer can add functions for alerting in case of important events that needs special attention from you as an operator.

#### 1.1.2 Design

The human-machine interface consists of:

- the human-machine interface (LCD-HMI) module.

![Image of LCD-HMI module](image)

*Figure 1: The figure shows the LCD-HMI module.*

### 1.2 Local LCD Human Machine Interface (LCD-HMI)

The HMI module is a bidirectional means of communicating. This means that:

- events may occur that activates for instance a LED, in purpose to draw your attention to something that has occured and needs some sort of action.
- you as the operator may of own interest view a certain data.

Use *menus* to navigate through menu *commands* and to locate the data of interest.
The number of buttons used on the HMI module is reduced to a minimum to allow a communication as simple as possible for the user. The buttons normally have more than one function, depending on actual dialogue.

Pressing any button in idle mode will activate the HMI display.

The C button has three main functions:

- **Cancel** any operation in a dialogue window.
• **Exit** the present level in the menu tree. This means, it cancels the present function or the present menu selection and moves one step higher (back) in the menu tree.

• **Clear** the LEDs when the start window is displayed.

• Bring the HMI display into idle mode if pressed when the idle window is displayed (**Quit** function).

The E button mainly provides an **Enter/Execute** function. It activates, for example, the selected menu tree branch. Further it is used to confirm settings and to acknowledge different actions.

The left and right arrow buttons have three functions:

• Position the cursor in a horizontal direction, for instance, to move between digits in a number during the parameter setting.

• Move between leaves within the same menu branch.

• Move between the confirmation alternatives (yes, no and cancel) in a command window.

The up and down arrow buttons have three functions:

• Move between selectable branches of the menu tree. This function also scrolls the menu tree when it contains more branches than shown on the display.

• Move between the confirmation alternatives in a command window.

• Change parameter values in a data window
2 HMI module LED indications

The LEDs above the LCD indicates the terminal’s status.

![Diagram of HMI module LED indications](en00000422.vsd)

**Figure 3:** Example of the HMI module

**Table 1: LED indications**

<table>
<thead>
<tr>
<th>Display</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off (no LED is lit)</td>
<td>No power or defect terminal.</td>
</tr>
<tr>
<td>Steady green LED</td>
<td>The terminal is ready for operation.</td>
</tr>
<tr>
<td>Flashing green LED</td>
<td>Internal failure, startup is in progress</td>
</tr>
<tr>
<td>Flashing yellow LED</td>
<td>Terminal in test mode.</td>
</tr>
<tr>
<td>Steady yellow LED</td>
<td>Disturbance report trigged.</td>
</tr>
<tr>
<td>Steady red LED</td>
<td>A binary signal, normally a TRIP command, has been activated. Which binary signal(s) that are supposed to activate the red LED is defined in the disturbance report.</td>
</tr>
<tr>
<td>Flashing red LED</td>
<td>Terminal blocked or in configuration mode.</td>
</tr>
</tbody>
</table>
HMI module LED indications

Chapter 4
Understand the Human Machine Interface
Chapter 5  Understand the HMI tree

About this chapter
This chapter describes the different Menu trees.
1

Overview

This chapter presents the main layout of the menu tree for the local human-machine interface (HMI). The menu tree includes menus for:

- Disturbance report
- Service report
- Settings
- Terminal report
- Configuration
- Command
- Test

Use SMS or SCS to activate or deactivate menus on the local human-machine interface (HMI).

**Note!**

*It is only possible to completely turn off parts of the menu tree by using SMS or SCS!*
Figure 4: Menu tree for REx5xx.
2 

DisturbReport

2.1 General

Use this menu to display the information recorded by the REx 5xx terminal for the 10 latest disturbances, these commands are available:

- Display information of a disturbance.
- Calculate the distance to fault.
- Manually trigger the disturbance reporting unit.
- Clear the disturbance report memory.
- To view the complete disturbance report, including the result of the event recorder and the disturbance recorder, use a front-connected PC or the SMS or SCS.

2.2 Disturbance

A disturbance will show:

- **The time of disturbance**, which is defined as the local terminal date and time when the first triggering signal started the disturbance recording.
- **The trig signal**, which started the recording.
- **Indications**, activated during the fault duration. Indications to be recorded are selected during the terminal configuration procedure.

The fault locator will also report:

- **Fault location**, provides information about the distance to the fault and the fault loop used for the calculation.
- **Trip values**, are displayed as phasors (RMS value and phase angle) of the currents and voltages, before and during the fault.

2.3 CalcDistToFlt

Possible to recalculate the distance to fault with a different fault loop or with different fault locator setting parameters. The recalculation is enabled since trip values are available for each disturbance that caused a phase-selective trip of the distance protection function.
2.4 ManualTrig

Using the manual trigger creates an instant disturbance report. Use this function to get a snapshot of the monitored line.

2.5 ClearDistRep

The disturbance report has a dedicated storage memory, sufficient enough to save the ten latest disturbances. The memory operates by the first-in – first-out principle (FIFO). This means that when the memory is full, the oldest recorded disturbance will be deleted from memory when a new disturbance occurs. After clearing, the entire disturbance memory will be empty.
3  

ServiceReport

3.1  

General
The Service report menu displays the operating conditions of the terminal as well as measured and calculated values and internal signal status.

3.2  

ServiceValues
Presents the average values of measured current, voltage, active, reactive and apparent power, frequency and negative sequence current.

3.3  

Phasors
Presents the primary and secondary phasors of measured currents and voltages.

3.4  

Functions
Presents the presently measured values and other information of the different parameters for included functions.

3.5  

I/O
Displays present logical values of all binary inputs and outputs of all installed I/O modules in the REx 5xx terminal.

3.6  

DisturbReport
Provides information about the below listed items concerning the disturbance recording.

- Used memory for disturbance recording.
- The sequence number for the next possibly recorded disturbance (can be viewed or set).
- The present status of analog triggers that can start the disturbance recorder.

3.7  

ActiveGroup
The present setting of active groups can be viewed here.
3.8 Time

The current internal time for the REx 5xx terminal can be viewed here. The time is displayed in the form YYYY-MMM-DD and hh:mm:ss. All values but the month are presented with digits. The month is presented with the first three letters in current month.
4

**Settings**

4.1 **General**

Use this menu to select and set the different parameters for included protection and control functions in the REx 5xx terminal. There are four selectable and editable settings group, each independent of the other, to structure desired functions and applications.

4.2 **DisturbReport**

This menu includes all setting parameters for the disturbance report. The following features are available:

- **Sequence number** can be set for each recorded disturbance.
- **Sampling rate** is fixed at 1000 Hz.
- **Recording times** for pre-fault, post-fault and time limit shall be set.
- **Fault locator settings** shall be done here. It includes measurement duration and presentation of the result.

4.3 **Functions**

Settings of the parameters for the included protection and control functions are done here. Four separate setting groups are available. First select desired group and then desired function.

4.4 **ChangeActGrp**

To set the internal time in the REx 5xx terminal. The time is set in the form of YYYY-MM-DD and hh:mm:ss. All values but the month are presented with digits. The month are presented with the first three letters in current month.

4.5 **Time**

To set the internal time in the REx 5xx terminal. The time is set in the form of YYYY-MM-DD and hh:mm:ss. All values but the month are presented with digits. The month are presented with the first three letters in current month.
5 TerminalReport

5.1 General

Use this menu to display information of the self supervision, terminal identity, software version, modules and the analogue inputs.

5.2 SelfSuperv

The REx 5xx terminal has extensive built-in self-supervision functions to detect if internal faults occurs. If an error occurs, the green LED on the front panel will flash and a warning signal will be activated. Use the self-supervision report to get information about detected faults.

The self-supervision report can also be used to check the status of each installed module as well as CPU, memory and clock operation.

5.3 IdentityNo

The terminal identity feature contains information as serial number and the software version installed in the terminal.

5.4 Modules

This menu includes information about all included modules, such as I/O-modules and MPM-module (CPU).

5.5 AnalogInput

Includes information about the analogue inputs, voltage and current, concerning nominal and rated values.
6 Configuration

6.1 General
Use this menu to make a general configuration of the REx 5xx terminal. The CAP 531 configuration tool must be used to configure protection and control functions and the I/O modules.

6.2 AnalogInput
Use this menu to configure general analog input settings, such as:

- general data about the power network, such as rated voltage, current, frequency and the position of the earthing point of the CT.
- CT and VT ratio.
- user-defined labels for the analog inputs and for the measured current, voltage, active, reactive and apparent power and frequency.

6.3 I/O-modules
In this menu it is possible to:

- reconfigure added or replaced I/O modules.
- set the level for blocking of oscillating binary inputs.

6.4 TerminalCom
6.4.1 General
Use this menu to configure the REx 5xx terminal communication buses, if any connected.

Choose between available communication protocols in respectively port.

Note!
Changes in configuration of communication protocols will result in a terminal restart.

6.4.2 SPA communication
Use this menu to set the parameters for the front and rear ports used for SPA communication. Each communication channel must be set separately.
Slave number and baud rate (communication speed) must be set for both the ports. These settings must correspond with the settings in the used PC-program. For the rear port it is possible to set permission of changes between active setting groups, ActGrpRestrict, and the setting restrictions, SettingRestrict, as well.

6.4.3 **IEC communication**

Use this menu to set slave number and baud rate when to communicate on the IEC 870–5–103 communications bus, also known as Schnittstelle 6 or VDEW 6. The IEC bus uses the same rear optic port as the SPA bus, but the settings must be done separately.

6.4.4 **LON communication**

Use this menu to view node information as address and location, (set from the LON Network Tool), as well as the Neuron identity. Functions for address setting during installation (ServicePinMSG), LON configuration reset (LONDefault) and session timers are also available.

*Note!*

Session timers are for advanced usage and should only be changed upon recommendation from ABB.

6.4.5 **Remote terminal communication**

Use this menu to configure the 56/64 kbit data communication to remote terminal. This communication requires a certain data communication module. The parameters to set are:

- the local terminal identity
- the remote terminal identity
- the bit rate
- the fiber optics transmitter output power (not applicable for galvanic interface)
- the terminal master/slave operation.

6.5 **Time**

The internal terminal time can be synchronised with an external unit connected to the SPA/IEC 60870-5-103 port or the LON port. It is also possible to use a minute pulse synchronisation signal connected to a digital input.

6.6 **DisturbReport**

This menu includes all setting parameters for the disturbance report. The following feature is available:
• Clear the LEDs.

6.7 LocalHMI
Use this menu to block the possibility to change settings via remote communication.

6.8 Identifiers
Use the identifiers to define and specify the location of and to define a terminal within the power system. All identifier names are typed as strings, maximum 16 characters, and the identity numbers are typed with digits. Typical usage are:

• name and number of the station.
• name and number of the bay or object.
• name and number of the actual REx 5xx terminal.

6.9 Select language
Use this menu to select language on the local HMI, if a second language beside English is ordered.
7 Command menu

Use this menu to manually select and execute any single or multiple signal command, as defined from the configuration menu or the CAP configuration tool. The signal(s) can be connected to any internal function or to a binary output of the terminal. It is possible to assign a user-defined name to these binary signals.
8 Test menu

Use this menu to enable easier secondary injection tests of the REx 5xx terminal. It is possible to block functions to prevent trip of circuit breakers and activation of alarm signals etc. to the control room during the testing activities.

The selectable modes, from the HMI, is the TestMode and ConfigMode.

TestMode:

- Setting the terminal in test mode operation
- Blocking of one or several protection and control functions (selectable) during test operation.
- Blocking of one or several event functions (selectable) during test operation.
- Setting the disturbance report and the disturbance summary to On or Off during test operation.

ConfigMode:

- Setting the terminal in configuration mode operation. This will automatically be done when down-loading a configuration from the CAP configuration tool. When the down-loading is completed, the terminal automatically enters the normal mode.
Chapter 6   Handle the disturbances

About this chapter
This chapter describes how to handle disturbances.
Identify a disturbance

1. View the disturbance summary

View the disturbance summary when a disturbance occurrence is indicated by the lit yellow LED of the HMI module.

The disturbance summary is automatically displayed and scrolled on the display. No manual intervention is necessary.

1.2 The disturbance summary

The disturbance summary lists data about the two most recent disturbances:

- The date and time of occurrence.
- The indications list.
- The fault loop and distance to fault.

The summaries of the two most recent disturbances are automatically scrolled on the display in the following manner:

1. The most recent disturbance is summarized. The heading DistSummary1 is displayed. The heading remains on the second display row while related data are displayed.
2. The date and time the disturbance occurred are displayed.
3. The indications list is automatically scrolled signal by signal.
4. The fault loop and distance to fault are displayed.
5. The second most recent sequence disturbance is summarized according to steps 2-4 above. The heading DistSummary2 is displayed. The heading remains on the second display row while related data are displayed.
6. The most recent disturbance summary is repeated.
7. The second most recent disturbance summary is repeated.
2 View disturbance trigger levels

2.1 Navigate the menus

This procedure describes how to view the disturbance trigger levels.

1. View the list of trigger levels.
   Navigate the menus to:
   
   ServiceReport
   DisturbReport
   AnalogTrigStat

2. Scroll the list.
   Use the Left and Right arrow buttons to scroll the list of trigger levels.

<table>
<thead>
<tr>
<th>Viewed data (default labels used)</th>
<th>Description of trigger</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1&gt;</td>
<td>Overvoltage trigger level in voltage input U1</td>
</tr>
<tr>
<td>U1&lt;</td>
<td>Undervoltage trigger level in voltage input U1</td>
</tr>
<tr>
<td>U2&gt;</td>
<td>Overvoltage trigger level in voltage input U2</td>
</tr>
<tr>
<td>U2&lt;</td>
<td>Undervoltage trigger level in voltage input U2</td>
</tr>
<tr>
<td>U3&gt;</td>
<td>Overvoltage trigger level in voltage input U3</td>
</tr>
<tr>
<td>U3&lt;</td>
<td>Undervoltage trigger level in voltage input U3</td>
</tr>
<tr>
<td>U4&gt;</td>
<td>Overvoltage trigger level in voltage input U4</td>
</tr>
<tr>
<td>U4&lt;</td>
<td>Undervoltage trigger level in voltage input U4</td>
</tr>
<tr>
<td>U5&gt;</td>
<td>Overvoltage trigger level in voltage input U5</td>
</tr>
<tr>
<td>U5&lt;</td>
<td>Undervoltage trigger level in voltage input U5</td>
</tr>
<tr>
<td>I1&gt;</td>
<td>Overcurrent trigger level in current input I1</td>
</tr>
<tr>
<td>I1&lt;</td>
<td>Undercurrent trigger level in current input I1</td>
</tr>
<tr>
<td>I2&gt;</td>
<td>Overcurrent trigger level in current input I2</td>
</tr>
<tr>
<td>I2&lt;</td>
<td>Undercurrent trigger level in current input I2</td>
</tr>
<tr>
<td>Viewed data (default labels used)</td>
<td>Description of trigger</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>I3&gt;</td>
<td>Overcurrent trigger level in current input I3</td>
</tr>
<tr>
<td>I3&lt;</td>
<td>Undercurrent trigger level in current input I3</td>
</tr>
<tr>
<td>I4&gt;</td>
<td>Overcurrent trigger level in current input I4</td>
</tr>
<tr>
<td>I4&lt;</td>
<td>Undercurrent trigger level in current input I4</td>
</tr>
<tr>
<td>I5&gt;</td>
<td>Overcurrent trigger level in current input I5</td>
</tr>
<tr>
<td>I5&lt;</td>
<td>Undercurrent trigger level in current input I5</td>
</tr>
</tbody>
</table>
3 View disturbance sequence number

3.1 Navigate the menus

This procedure describes how to view in consecutive order disturbance sequence number.

1. View the sequence number.
   Navigate the menus to:

   ServiceReport
   DisturbReport
   SequenceNo
4 Manually trigger the disturbance report

4.1 Navigate the menus

This procedure describes how to manually trigger the disturbance recording.

1. Display the manual trigger dialog.
   Navigate the menus to:

   DisturbReport
   ManualTrig

2. Confirm the manual trigger.
   Select Yes by using the Left and/or Right arrow buttons, of not already highlighted. Press the E button to assert the manual trigger.

   Select No and press the E button to avoid asserting a manual trigger.
5 View the used disturbance memory size

5.1 Navigate the menus

This procedure describes how to read the used disturbance memory size.

1. View the size.
   Navigate the menus to:

   ServiceReport
   DisturbReport
   MemoryUsed
6 Reset the LED alarms

6.1 Navigate the menus

This procedure describes how to reset LED’s after evaluating the reasons of an indication in order to prepare for new indications.

1. Make sure the basic terminal dialog is displayed.
   You may need to press the C button repeatedly to return to the basic terminal dialog from the displayed menu branch or leaf.

2. Press the C button to reset LED indications.
   All LED’s are reset.
Chapter 7  View the service report

About this chapter
This chapter describes operations an operator may perform on a daily basis or when the need arises.
1 View the service values

1.1 Navigate the menus

This procedure describes how to navigate the menus to view line voltage, phase current, neg. seq. current, active power, reactive power and frequency. Such values are called service values.

Procedure

1. Display the Service values menu.
   Navigate the menus to:

   - ServiceReport
   - ServiceValues

2. Scroll the available service values to read mean values.
   Use the Left and/or Right arrow buttons to scroll between values.

1.2 Available HMI service values

Each service value may be displayed using custom labels.

Table 3: Available service values

<table>
<thead>
<tr>
<th>Viewed data (default labels used, data is example values)</th>
<th>Service value</th>
</tr>
</thead>
<tbody>
<tr>
<td>U = 0.000 kV</td>
<td>Mean RMS voltage of voltage input channels 1-3</td>
</tr>
<tr>
<td>I = 0.000 A</td>
<td>Mean RMS current of current input channels 1-3</td>
</tr>
<tr>
<td>P = 0.000 MW</td>
<td>Mean active power of voltage and current channels 1-3</td>
</tr>
<tr>
<td>Q = 0.000 MVAr</td>
<td>Mean reactive power of voltage and current channels 1-3</td>
</tr>
</tbody>
</table>
Viewed data (default labels used, data is example values) | Service value
--- | ---
S = 0.000 MVA | Mean apparent power of voltage and current channels 1-3
f = 50.00 Hz | Mean frequency of voltage input channels 1-3
INegSeq = 0.000 A | Mean RMS negative sequence current of current input channels 1-3
2 View the primary and secondary phasors

2.1 Navigate the menus

This procedure describes how to navigate the menus to view primary and secondary measured analog values. Such values are called phasors.

2.1.1 Procedure

View the primary phasors

1. Display the primary phasors menu.
   Navigate the menus to:

   ServiceReport
     Phasors
       Primary

2. Scroll through the available values to read phasors.
   Use the Left and/or Right arrow buttons to scroll between values.

2.1.2 Procedure

View the secondary phasors

1. Display the secondary phasors menu.
   Navigate the menus to:

   ServiceReport
     Phasors
       Secondary

2. Scroll the available values to read phasors.
   Use the Left and/or Right arrow buttons to scroll between values.

2.2 Available primary phasors

Primary and secondary phasors are available for all voltage and current input channels, as well as the primary phasors for phase-to-phase voltages between voltage channels 1 and 2, 2 and 3 or 3 and 1.
Each phasor may be displayed using custom labels. Consult the station documentation to find the configured labels.

Table 4: Example of primary phasor (explanation of viewed data)

<table>
<thead>
<tr>
<th>Viewed data (default labels are used, data is example values)</th>
<th>Phasor</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1 = 0.000 kV 0.0 deg</td>
<td>Measured analog quantity (phasor)</td>
</tr>
<tr>
<td></td>
<td>Magnitude of a measured phasor</td>
</tr>
<tr>
<td></td>
<td>Phase angle of a measured phasor</td>
</tr>
<tr>
<td></td>
<td>Phasor U2 and U3 utilize phasor U1 as reference</td>
</tr>
</tbody>
</table>
3 View the function block variables and output signals

3.1 Navigate the menus

This procedure describes how to navigate the menus to view function output signals.

3.1.1 View the status of function block binary outputs

Procedure

1. Identify the function block to view.
   Use table of the following section to find the function block to view.

2. Display the list of outputs.
   Navigate the menus to:
   
   ServiceReport
   Functions
   <name of function block>
   FuncOutputs

3. Scroll the output values.
   Use the Left and/or Right arrow buttons to scroll between values.

3.1.2 View the values of function block variables

Procedure

1. Identify the function block and variable to view.
   Use table of the following section to find the function block and variable to view.

2. Display the list of outputs.
   Navigate the menus to:
ServiceReport  
Functions  

<name of function block>

<function block variable>

3. Scroll the output values.

Use the Left and/or Right arrow buttons to scroll between values.

3.2 Contents of the Functions menu related to function outputs

Please note that the Functions menu contains more than what is described here. Other functions such as clearing of counters and calculated function data are also part of the service report, but described separately.

Table 5:  Functions that may be viewed directly

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BreakerFailure</td>
<td>BFP</td>
<td>Breake failure protection</td>
</tr>
<tr>
<td>FuseFailure</td>
<td>FUSE</td>
<td>Fuse failure</td>
</tr>
<tr>
<td>Trip</td>
<td>TR</td>
<td>Trip logic</td>
</tr>
<tr>
<td>ActiveGroup</td>
<td>GRP</td>
<td>Activation of setting groups</td>
</tr>
<tr>
<td>IEC103Command</td>
<td>ICOM</td>
<td>Serial communication</td>
</tr>
<tr>
<td>DisturbReport</td>
<td>DREP</td>
<td>Disturbance report</td>
</tr>
<tr>
<td>InternSignals</td>
<td>INT</td>
<td>Internal events</td>
</tr>
<tr>
<td>Test</td>
<td>TEST</td>
<td>Test mode</td>
</tr>
<tr>
<td>Time</td>
<td>TIME</td>
<td>Time synchronisation</td>
</tr>
</tbody>
</table>

Table 6:  The Impedance group (Group designation: Impedance)  

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
</table>

Table 7:  The Earth Fault group (Group designation: Earth Fault)  

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
</table>
Table 8: System protection and control group (Group designation: System Protec)

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9: The Autorecloser group (Group designation: Auto Recloser)

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutoRecloser 1</td>
<td>AR01</td>
<td>AutoRecloser</td>
</tr>
</tbody>
</table>

Table 10: The Synchrocheck group (Group designation: SynchroCheck)

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SynchroCheck1</td>
<td>SYN1</td>
<td>SynchroCheck</td>
</tr>
</tbody>
</table>

Table 11: The DC monitor group (Group designation: DC monitor)

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI11-Error</td>
<td></td>
<td>Error signal for input 1 on module 1 if present</td>
</tr>
<tr>
<td>MI21-Error</td>
<td></td>
<td>Error signal for input 1 on module 2 if present</td>
</tr>
<tr>
<td>MI31-Error</td>
<td></td>
<td>Error signal for input 1 on module 3 if present</td>
</tr>
<tr>
<td>MI41-Error</td>
<td></td>
<td>Error signal for input 1 on module 4 if present</td>
</tr>
<tr>
<td>MI51-Error</td>
<td></td>
<td>Error signal for input 1 on module 5 if present</td>
</tr>
<tr>
<td>MI61-Error</td>
<td></td>
<td>Error signal for input 1 on module 6 if present</td>
</tr>
</tbody>
</table>

Table 12: The Command function group (Group designation: Command function)

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD01</td>
<td></td>
<td>Single command function (16 signals)</td>
</tr>
<tr>
<td>CD02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
View the function block variables and output signals

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 13: Basic logic group (Group designation: Basic logic)**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND1A</td>
<td>Annn</td>
<td>AND gates part 1</td>
</tr>
<tr>
<td>AND1B</td>
<td>Annn</td>
<td>AND gates part 2</td>
</tr>
<tr>
<td>OR1A</td>
<td>Onnn</td>
<td>OR gates part 1</td>
</tr>
<tr>
<td>OR2A</td>
<td>Onnn</td>
<td>OR gates part 2</td>
</tr>
<tr>
<td>XOR1</td>
<td>XOOnn</td>
<td>Exclusive OR gates</td>
</tr>
<tr>
<td>INV</td>
<td>IVnn</td>
<td>Inverters</td>
</tr>
<tr>
<td>SR</td>
<td>SRnn</td>
<td>Set-reset flip-flops</td>
</tr>
<tr>
<td>Timer</td>
<td>TMnn</td>
<td>Timers</td>
</tr>
<tr>
<td>TimerLong</td>
<td>TLnn</td>
<td>Timers, long delay</td>
</tr>
<tr>
<td>Pulse</td>
<td>TPnn</td>
<td>Pulse timers, part 1</td>
</tr>
<tr>
<td>Pulse2</td>
<td>TPnn</td>
<td>Pulse timers, part 2</td>
</tr>
<tr>
<td>PulseLong1</td>
<td>TQnn</td>
<td>Pulse timers, long pulse, part 1</td>
</tr>
<tr>
<td>PulseLong2</td>
<td>TQnn</td>
<td>Pulse timers, long pulse, part 2</td>
</tr>
<tr>
<td>ContrGates1</td>
<td>GTnn</td>
<td>Controllable gates</td>
</tr>
<tr>
<td>TimerSet1</td>
<td>TSnn</td>
<td>Settable timers</td>
</tr>
<tr>
<td>SRWithMem1</td>
<td>SMnn</td>
<td>Set-reset flip-flops with memory</td>
</tr>
</tbody>
</table>
4 Read the measured and calculated function values

4.1 View the automatic recloser counters

This procedure describes how to read automatic recloser counters.

1. View the available counter data.
   Navigate the menus to:

   ServiceReport
   Functions
   Autorecloser
   AutoRecloser
   Counters

   where $n$ is the number of the autorecloser to be viewed, numbers 1-6.

2. Scroll the list to view each counter value.
   Use the Left and/or Right arrow buttons to scroll between values.

4.2 Autorecloser counter values

Table 14: Autorecloser counter values AR (AR---)

<table>
<thead>
<tr>
<th>Viewed data (default labels used, data is example values)</th>
<th>Counter value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3ph-Shot1= 331</td>
<td>Recorded number of first three-pole reclosing attempts</td>
</tr>
<tr>
<td>3ph-Shot2= 124</td>
<td>Recorded number of second three-pole reclosing attempts</td>
</tr>
</tbody>
</table>
Read the measured and calculated function values

This procedure describes how to read synchrocheck values.

1. **View the available synchrocheck values.**

   Navigate the menus to:

   ```
   ServiceReport
   Functions
   SynchroCheck
   SynchroCheckn
   SyncValues
   ```

   where \( n \) is the number of the synchrocheck to be viewed, numbers 1-4.

2. **Scroll the list to view each value.**

   Use the *Left* and/or *Right* arrow buttons to scroll between values.

---

### Viewed data (default labels used, data is example values) | Counter value

<table>
<thead>
<tr>
<th>Viewed data</th>
<th>Counter value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3ph-Shot3=</td>
<td>Recorded number of third three-pole reclosing attempts</td>
</tr>
<tr>
<td>55</td>
<td></td>
</tr>
<tr>
<td>3ph-Shot4=</td>
<td>Recorded number of fourth three-pole reclosing attempts</td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>NoOfReclosings=</td>
<td>Recorded number of all reclosing attempts</td>
</tr>
<tr>
<td>534</td>
<td></td>
</tr>
</tbody>
</table>

---

4.3 View the synchrocheck values
4.4 Synchrocheck values

Table 15: Synchrocheck values

<table>
<thead>
<tr>
<th>Viewed data (default labels used, data is example values)</th>
<th>Synchrocheck data</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDiff= 0.3455 % of U1b</td>
<td>Measured voltage difference between measured and reference voltage</td>
</tr>
<tr>
<td>FreqDiff= 0.0231 Hz</td>
<td>Measured frequency difference between measured and reference voltage</td>
</tr>
<tr>
<td>PhaseDiff= 0.0215 deg</td>
<td>Measured phase difference between measured and reference voltage</td>
</tr>
</tbody>
</table>
5 View the I/O function block signals

5.1 View the I/O module signals

This procedure describes how to navigate the menus to view binary I/O signals.

1. Identify the slot and module to view.

   Use table of the following section to find the slot and module to view.

2. Display the list of signals.

   Navigate the menus to:

   ServiceReport
   I/O
   <Slot and module name>
   FuncOutputs

3. Scroll the list to view each individual signal.

   Use the Left and/or Right arrow buttons to scroll between values.

5.2 I/O modules

I/O modules are always addressed by references to the slot in which the module resides, the module type and its order number, that is, which one of several modules of the same kind is to be addressed. The names are constructed in the following way:

\[
\text{Slot<slot number>-<module type>=<article number>}
\]

For the first binary input module mounted in slot 14 the name will be:

\[
\text{Slot14-BIM1}
\]

Consequently, for the second BIM module mounted in slot 16 the name will be:

\[
\text{Slot16-BIM2}
\]
Table 16: I/O module shorthands

<table>
<thead>
<tr>
<th>Module</th>
<th>Module shorthand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary input module</td>
<td>BIM</td>
</tr>
<tr>
<td>Binary output module</td>
<td>BOM</td>
</tr>
<tr>
<td>Binary I/O module</td>
<td>IOM</td>
</tr>
<tr>
<td>Milliampere module</td>
<td>MIM</td>
</tr>
</tbody>
</table>
6 Determine the active setting group

6.1 Navigate the menus

This procedure describes how to determine the active setting group.

Procedure
1. Determine the active group.
   Navigate the menus to:
   
   ServiceReport
   ActiveGroup
Determine the active setting group
Chapter 8  Clear the counters

About this chapter
This chapter describes operations an operator may perform on a daily basis or when the need arises.
Clear the autorecloser counters

1. **Navigate the menus**
   
   This procedure describes how to clear the automatic reclosing counters.

   1. **Display the clear counters dialog.**
      
      Navigate the menus to:

      ```
      ServiceReport
      Functions
      AutoRecloser
      AutoReclosern
      Counters
      ClearCounters
      ```
      
      where \( n \) is the number of the autorecloser to be viewed, numbers 1-6.

   2. **Confirm clearing the counters.**
      
      Select *Yes* by using the *Left* and/or *Right* arrow buttons, if not already highlighted. Press the E button to confirm. Counters are cleared.

      Select *No* and press the E button to leave the counters at their present value.
Chapter 9  View the terminal unit status

About this chapter
This chapter describes operations an operator may perform on a daily basis or when the need arises.
1 Find the reason of an internal failure

1.1 Navigating the menus

This procedure describes how to navigate the menus in order to find the reason of an internal failure when indicated by the flashing green LED of the HMI module.

Procedure

1. Display the self supervision menu.
   Navigate the menus to:

   TerminalReport
   SelfSuperv

2. Scroll the supervision values to identify the reason of the failure.
   Use the Left and/or Right arrow buttons to scroll between values.

1.2 Self supervision HMI data

Table 17: Output signals for the self supervision function

<table>
<thead>
<tr>
<th>Indicated result</th>
<th>Possible reason</th>
<th>Proposed action</th>
</tr>
</thead>
<tbody>
<tr>
<td>InternFail = OK</td>
<td>No problem detected.</td>
<td>None.</td>
</tr>
<tr>
<td>InternFail = Fail</td>
<td>A failure has occurred.</td>
<td>Check the rest of the indicated results to find the fault.</td>
</tr>
<tr>
<td>InternWarning = OK</td>
<td>No problem detected.</td>
<td>None.</td>
</tr>
<tr>
<td>InternWarning = Warning</td>
<td>A warning has been issued.</td>
<td>Check the rest of the indicated results to find the fault.</td>
</tr>
<tr>
<td>MPM-modFail = OK</td>
<td>No problem detected.</td>
<td>None.</td>
</tr>
<tr>
<td>MPM-modFail = Fail</td>
<td>The main processing module has failed.</td>
<td>Contact your ABB representative for service.</td>
</tr>
<tr>
<td>MPM-modWarning = OK</td>
<td>No problem detected.</td>
<td>None.</td>
</tr>
<tr>
<td>Indicated result</td>
<td>Possible reason</td>
<td>Proposed action</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>MPM-modWarning = Warning</td>
<td>There is a problem with:</td>
<td>Set the clock.</td>
</tr>
<tr>
<td></td>
<td>• the real time clock.</td>
<td>If the problem persists, contact your ABB representative for service.</td>
</tr>
<tr>
<td></td>
<td>• the time synchronization.</td>
<td></td>
</tr>
<tr>
<td>ADC-module = OK</td>
<td>No problem detected.</td>
<td>None.</td>
</tr>
<tr>
<td>ADC-module = Fail</td>
<td>The A/D conversion module has failed.</td>
<td>Contact your ABB representative for service.</td>
</tr>
<tr>
<td>Slot04BIM1 = Fail</td>
<td>I/O module has failed.</td>
<td>Check that the I/O module has been configured and connected to the IOP1-block.</td>
</tr>
<tr>
<td>(Example data, see</td>
<td></td>
<td>If the problem persists, contact your ABB representative for service.</td>
</tr>
<tr>
<td>following section for</td>
<td></td>
<td></td>
</tr>
<tr>
<td>details)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RealTimeClock = OK</td>
<td>No problem detected.</td>
<td>None.</td>
</tr>
<tr>
<td>RealTimeClock = Warning</td>
<td>The real time clock has been reset.</td>
<td>Set the clock.</td>
</tr>
<tr>
<td>TimeSync = OK</td>
<td>No problem detected.</td>
<td>None.</td>
</tr>
<tr>
<td>TimeSync = Warning</td>
<td>No time synchronization.</td>
<td>Check the synchronization source for problems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the problem persists, contact your ABB representative for service.</td>
</tr>
</tbody>
</table>
2 Identify the terminal

2.1 Navigate the menus

2.1.1 Retrieve the terminal's serial number

1. View the serial number from the terminal report.
   Navigate the menus to:
   
   TerminalReport
   IdentityNo

2.1.2 Retrieve the terminal's identity

1. View the identifiers from the configuration menu.
   Navigate the menus to:
   
   Configuration
   Identifiers

2. Scroll the available identifiers.
   Use the Left and/or Right arrow buttons to scroll between values.

2.2 Available identifiers

Path in local HMI: Configurations/Identifiers

Table 18: Set parameters for the general terminal parameters function

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Default</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station Name</td>
<td>0-16</td>
<td>Station Name</td>
<td>char</td>
<td>Identity name for the station</td>
</tr>
<tr>
<td>Station No</td>
<td>0-99999</td>
<td>0</td>
<td>-</td>
<td>Identity number for the station</td>
</tr>
<tr>
<td>Object Name</td>
<td>0-16</td>
<td>Object Name</td>
<td>char</td>
<td>Identity name for the protected object</td>
</tr>
<tr>
<td>Parameter</td>
<td>Range</td>
<td>Default</td>
<td>Unit</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>---------</td>
<td>------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Object No</td>
<td>0-99999</td>
<td>0</td>
<td>-</td>
<td>Identity number for the protected object</td>
</tr>
<tr>
<td>Unit Name</td>
<td>0-16</td>
<td>Unit Name</td>
<td>char</td>
<td>Identity name for the terminal</td>
</tr>
<tr>
<td>Unit No</td>
<td>0-99999</td>
<td>0</td>
<td>-</td>
<td>Identity number for the terminal</td>
</tr>
</tbody>
</table>
3 Read the terminal time

3.1 Navigate the menus

This procedure describes how to read the terminal time.

1. View the date and time.

   Navigate the menus to:

   ServiceReport
   Time
4 Retrieve the version of installed firmware

4.1 Navigate the menus

Procedure
1. View the firmware version from the terminal report.
   Navigate the menus to:
   
   TerminalReport
   Identity/No
5 Determine the installed modules

5.1 Navigate the menus

This procedure describes how to determine which modules are installed.

Procedure
1. View the list of modules.
   Navigate the menus to:

   TerminalReport
   Modules

2. Scroll the list of installed modules to view what is installed in each slot.
   Use the Left and/or Right arrow buttons to scroll the list.

5.2 I/O modules

I/O modules are always addressed by references to the slot in which the module resides, the module type and its order number, that is, which one of several modules of the same kind is to be addressed. The name is constructed in the following way:

\[ \text{Slot<slot number>-<module type>=<article number>} \]

For the first binary input module, BIM, mounted in slot 14 the name will be:

\[ \text{Slot14-BIM1}=1MRK000508-xx \]

where xx varies depending on the installed BIM variant.

Consequently, for the second BIM module mounted in slot 16 the name will be:

\[ \text{Slot16-BIM2}=1MRK000508-xx \]

Table 19: I/O module type abbreviations

<table>
<thead>
<tr>
<th>Module type</th>
<th>Module type abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary input module</td>
<td>BIM</td>
</tr>
</tbody>
</table>
### Determine the installed modules

/G38/G75/G68/G83/G87/G72/G85/G3/G28


### Binary output module

**BOM**

### Binary I/O module

**IOM**

### Milliampere module

**MIM**

<table>
<thead>
<tr>
<th>Module type</th>
<th>Module type abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary output module</td>
<td>BOM</td>
</tr>
<tr>
<td>Binary I/O module</td>
<td>IOM</td>
</tr>
<tr>
<td>Milliampere module</td>
<td>MIM</td>
</tr>
</tbody>
</table>
6 Retrieve the rated values of analog inputs

6.1 Navigate the menus

This procedure describes how to determine the rated values of analog inputs.

Procedure

1. View the list of available analog input values.

   Navigate the menus to:

   TerminalReport
   AnalogInputs

2. Scroll the list to view values.

   Use the Left and/or Right arrow buttons to scroll between values.

Table 20: Rated input values

<table>
<thead>
<tr>
<th>Viewed data (default labels used, data is example values)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ur= 110.000 V</td>
<td>Rated AC voltage of a terminal</td>
</tr>
<tr>
<td>Ir= 5.0000 A</td>
<td>Rated AC current of a terminal</td>
</tr>
<tr>
<td>U1r= 63.509 V</td>
<td>Rated phase voltage of a channel U1</td>
</tr>
<tr>
<td>U2r= 63.509 V</td>
<td>Rated phase voltage of a channel U2</td>
</tr>
<tr>
<td>U3r= 63.509 V</td>
<td>Rated phase voltage of a channel U3</td>
</tr>
<tr>
<td>U4r= 63.509 V</td>
<td>Rated phase voltage of a channel U4</td>
</tr>
<tr>
<td>U5r= 63.509 V</td>
<td>Rated phase voltage of a channel U5</td>
</tr>
</tbody>
</table>
Retrieve the rated values of analog inputs

**Chapter 9**

View the terminal unit status

---

<table>
<thead>
<tr>
<th>Viewed data (default labels used, data is example values)</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1r= 5.0000 A</td>
<td>Rated phase current of a channel I1</td>
</tr>
<tr>
<td>I2r= 5.0000 A</td>
<td>Rated phase current of a channel I2</td>
</tr>
<tr>
<td>I3r= 5.0000 A</td>
<td>Rated phase current of a channel I3</td>
</tr>
<tr>
<td>I4r= 5.0000 A</td>
<td>Rated phase current of a channel I4</td>
</tr>
<tr>
<td>I5r= 5.0000 A</td>
<td>Rated phase current of a channel I5</td>
</tr>
</tbody>
</table>
Retrieve the rated values of analog inputs

Chapter 9

View the terminal unit status