

SACE Tmax XT7

User manual for use and maintenance of Ekip Touch Trip units
for Tmax XT7 low-voltage molded-case circuit breakers



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Contents

CONTENTS	2	SETTINGS	121
GLOSSARY	3	32 - Main settings	121
INTRODUCTION	4	33 - Supplemental settings	125
1 - Content	4	TEST	127
2 - Safety	5	34 - Test	127
EKIP TOUCH OVERVIEW	6	ADDITIONAL FUNCTIONS	129
3 - General characteristics	6	35 - Power Controller	129
4 - Models and versions	7	36 - Load Shedding	130
5 - Accessories and software	13	37 - Interface Protections IPS	132
6 - Operating characteristics	15	EXTERNAL ACCESSORIES	135
MANAGEMENT OPERATIONS	16	38 - Introduction and System interface	135
7 - Startup	16	39 - Rating Plug	137
8 - Maintenance and malfunction identification	18	40 - Ekip Measuring	138
INTERFACE AND MENU	23	41 - Ekip Supply	140
9 - Interface presentation	23	42 - Ekip Com Modbus RTU	141
10 - Navigation	25	43 - Ekip Com Profibus DP	144
11 - Graphic pages	27	44 - Ekip Com DeviceNet™	147
12 - Menu	30	45 - Ekip Com Modbus TCP	150
13 - Modifying parameters and commands	36	46 - Ekip Com Profinet	154
14 - Password and security	38	47 - Ekip Com EtherNet/IP™	157
PROTECTIONS	39	48 - Ekip Com IEC 61850	161
15 - Standard Protections	40	49 - Ekip Link	166
16 - Voltage Protections	51	50 - Ekip Com Hub	171
17 - Advanced Voltage Protections	55	51 - Ekip Signalling 2K	175
18 - Frequency Protections	59	52 - Ekip Synchrocheck	179
19 - Power Protections	62	53 - Ekip Signalling 3T	185
20 - ROCOF Protections	69	54 - Ekip CI	188
21 - Adaptive Protections	70	OTHERS ACCESSORIES	191
22 - Motor Protections	71	55 - Ekip Signalling 10K	191
23 - Additional functions and protections	75	56 - Ekip Signalling TCP Modbus	192
24 - Logical Selectivity	83	57 - Ekip Multimeter	193
25 - Performance tables	85	58 - Toroid and RC	194
26 - Curves	88	59 - S.G.R Sensor	194
MEASUREMENTS	103	60 - External neutral	194
27 - Standard Measure	103	61 - Ekip Com Actuator	195
28 - Measuring measure	107	62 - Ekip AUP	195
29 - Class 1 Power & Energy Metering	110	63 - Ekip RTC	195
30 - Datalogger	112	64 - Testing and Programming	196
31 - Network Analyzer	114	REVISIONS	197

Glossary

SACE Tmax XT7	New series of ABB SACE molded-case circuit breakers
CB	Circuit breaker
Trip unit	Electronic unit connected to the CB, with the functions of measurement, control and protection of the CB, following anomalous operating conditions; in the event of an alarm it triggers a TRIP
Ekip Touch	Trip unit for SACE Tmax XT7 CB, equipped with touchscreen display and available in six different versions
Trip coil	CB opening actuator, controlled directly by the Trip unit
TRIP	Final phase of a timing protection or of a test command that, except for particular configurations provided by the trip unit, coincides with the activation of the trip coil, which instantly opens the bars of each pole and interrupts the flowing power.
Vaux	Auxiliary power supply
4P / 3P / 3P + N	CB configurations: tetrapolar (4P), tripolar (3P) and tripolar with external neutral (3P + N)

Introduction

1 - Content

- Overview** This manual illustrates the characteristics of the Ekip Touch Trip units mounted on SACE Tmax XT7 CB, including:
1. Overview
 2. Management operations: installation, maintenance, malfunction identification
 3. Operating conditions
 4. Reference guide for changing parameters and measurement display
 5. Accessories

- Recipients** In accordance with IEC 60050, this manual refers to two user profiles:
- Skilled person in the electrical field (IEV 195-04-01): person with relevant education and experience to enable him or her to perceive risks and to avoid hazards which electricity can create
 - Instructed person in the electrical field (IEV 195-04-02): person adequately advised or supervised by electrically skilled persons to enable him or her to perceive risks and to avoid hazards which electricity can create
-  **IMPORTANT: This manual details the operations that can be performed by people trained in the electrical field.**
All the remaining operations described in the manual must be carried out by experts in the electrical field.
ABB will not be held responsible for damage to property or persons due to non-compliance with the instructions contained in this document.

Requirements and supporting documentation

For an optimal installation and configuration of Ekip Touch, read the information contained in this manual and in the technical product documentation available on the [ABB library](#) website:

Document	Code	Description
Technical catalog	1SDC210100D0201	General catalog CB SACE Tmax XT
Wiring diagrams	1SDM000002A1001	Wiring diagrams CB SACE Tmax XT7
Installation Instructions	1SDH002013A0001	Installation instructions CB SACE Tmax XT7

- Production notes** The information contained in this document was written in Italian and then translated into other languages to meet the legislative and/or commercial needs of the product in question.

Safety requirements



Figure 1



DANGER! RISK OF ELECTRIC SHOCK! To avoid all potential risk of electrical shock during assembly, installation, maintenance, or removal of Ekip Touch from service, personnel not authorized to work in high voltage systems under current local legislation must first fully disconnect the system from all power supplies.



CAUTION!

- Detailed descriptions of standard procedures for installation, use, maintenance and principles for safe operation are not included. It is important to note that this document contains safety and precaution indications for certain methods (installation, use and maintenance) that could cause damage to personnel, damage devices, or render them unsafe.
- These warnings and alarms do not include all modes of installation, use and maintenance recommended by ABB, or possible consequences and complications of each one, nor will ABB investigate all such modes.
- Whoever is using maintenance procedures or devices, whether recommended by ABB or otherwise, must carefully verify that neither personal safety nor safety devices are endangered by the methods of installation, use, maintenance or tools used to perform the same. For further information, clarifications or specific problems contact your nearest ABB representative.
- This manual is written only for qualified personnel and is not intended as a substitute for thorough training or experience with the safety procedures for this device.
- For products that can be connected to communication networks, the buyer, installer or end customer is responsible for ensuring security measures necessary to prevent risks deriving from connection to communication networks are followed. These risks include, among others, the use of the product by unauthorized personnel, changes to its normal operation, access to and modification of information.
- The buyer, installer or end customer is responsible for ensuring that notices and safety signs are posted and that all access points and switching devices are securely locked when the panel is left unattended, even temporarily.
- All information contained in this document is based on the most up-to-date information available at the time of printing. We reserve the right to update the document at any time and without notice.

Warnings



CAUTION! READ THE FOLLOWING MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR REPAIRING THE CIRCUIT BREAKER

- File this manual with all other available documents pertaining to the circuit breaker.
- Have this documentation available during the installation, operation and maintenance of the CB to facilitate the various operations.
- Install the unit in compliance with the environmental, electrical and mechanical limits described in the product's documentation.
- This circuit breaker has been designed to operate with voltage and power values within the rated nameplate limits: do not install in systems operating at values exceeding these nominal limits
- Follow the safety procedures specified by your company.
- Do not open covers or doors, do not work on devices before disconnecting the voltage from all circuits, and only after having checked that they are disconnected with a measuring device.

Ekip Touch Overview

3 - General characteristics

Families SACE Tmax XT7 can be configured with two trip unit families:

- Ekip Dip with dip-switch interface
- Ekip Touch with touchscreen display

Both families perform protection and measurement functions referring to system notifications and are available in different models and versions.

Ekip Touch in particular is available in four versions:

- Ekip Touch
- Ekip Touch Measuring
- Ekip Hi-Touch
- Ekip G Touch
- Ekip M Touch
- Ekip G-Hi Touch

As already mentioned, the description of Ekip Touch is included in this manual. For the description of Ekip Dip refer to the *Installation Instructions*, see page 4 for references.

Main functions The Ekip Touch Trip unit guarantees the following functions:

1. *Measurement*: measurement of different quantities including: currents, voltages, powers, energies.
2. *Protection*: based on the measurements detected and the parameters configured by the user, the Trip unit checks for an alarm and, if necessary, commands the tripping of the circuit breaker.
3. *Signaling*: management of contacts and communication networks to optimize system efficiency, communication between different CBs, and other functionalities

The Ekip Touch functions are guaranteed both by transducers and actuators in the circuit breaker and by a wide range of external accessories.

Presentation



Figure 2

Ekip Touch has a *touchscreen display* (❶, page 23) for accessing the configuration menus and checking parameters, measurements and information.

The nominal size of the *Rating plug* (❷, page 137) can be checked on the front.

All the external connections, including those of the power supply and communication modules, the external sensors and mechanical accessories, are positioned in the upper terminal box (❸, page 135 gives an overview of the electronic accessories; *Technical catalog* and circuit *Diagrams* for the other accessories).

4 - Models and versions

Defaults and extensions

Each Ekip Touch model has default protection and measurement functions that can be extended with additional software packages.

Extensions (additional software packages) can be acquired when ordering the circuit breaker, or afterwards from the ABB Ability Marketplace™.

Ekip Touch

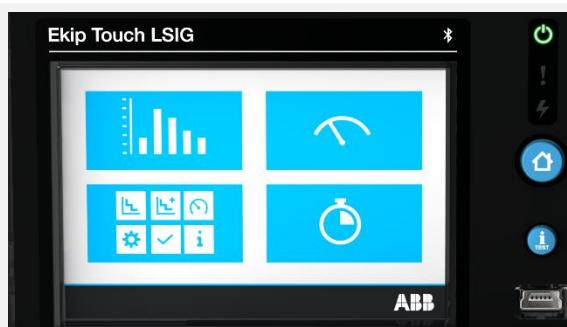


Figure 3

Ekip Touch is available in two versions: Ekip Touch LSI and Ekip Touch LSI G. Both versions have default functions and can be configured with various additional software packages (extensions).

Default

Function	Page
Standard Protections	40
Standard Sizes	103

Additional SW packages

Function	Page
Measuring	107
Voltage Protections ⁽¹⁾	51
Advanced Voltage Protections ⁽¹⁾	55
Frequency Protections ⁽¹⁾	59
Power Protections ⁽¹⁾	62
ROCOF Protections ⁽¹⁾	69
Adaptive Protections	70
Class 1 Power & Energy Metering ⁽²⁾	110
Datalogger ⁽¹⁾	112
Network Analyzer ⁽¹⁾	114



NOTES:

- (1) package configurable if the Measuring package is present
- (2) package available only when ordering the circuit breaker

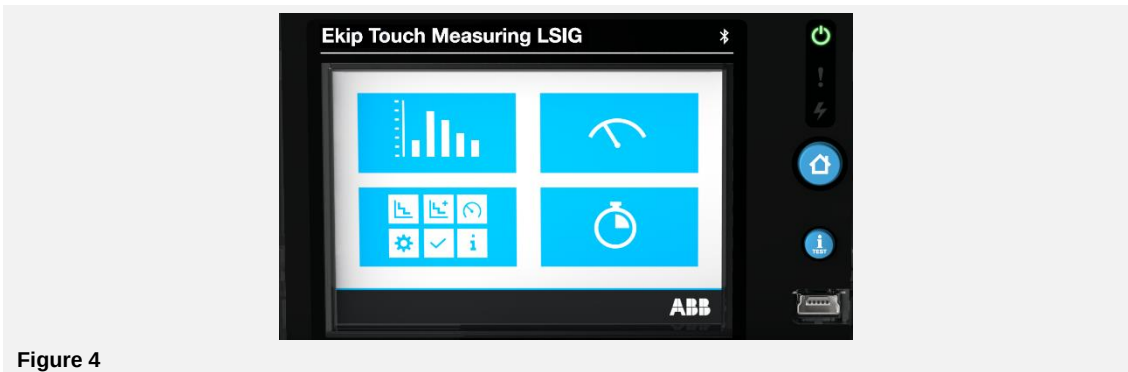


Figure 4

Ekip Touch Measuring is available in two versions: Ekip Touch Measuring LSI and Ekip Touch Measuring LSIG.

Both versions have default functions and can be configured with various additional software packages (extensions).

Default

Function	Page
Standard Protections	40
Standard Sizes	103
Measuring	107

Additional SW packages

Function	Page
Voltage Protections	51
Advanced Voltage Protections	55
Frequency Protections	59
Power Protections	62
ROCOF Protections	69
Adaptive Protections	70
Class 1 Power & Energy Metering ^(NOTE)	110
Datalogger	112
Network Analyzer	114

 **NOTE:** package available only when ordering the circuit breaker



Figure 5

Ekip Hi-Touch is available in two versions: Ekip Hi-Touch LSI and Ekip Hi-Touch LSIG. Both versions have default functions and can be configured with various additional software packages (extensions).

Default

Function	Page
Standard Protections	40
Standard Sizes	103
Measuring	107
Voltage Protections	51
Frequency Protections	59
Power Protections ^(NOTE)	62
Adaptive Protections	70
Class 1 Power & Energy Metering	110
Datalogger	112
Network Analyzer	114

Additional SW packages

Function	Page
Advanced Voltage Protections	55
Power Protections ^(NOTE)	62
ROCOF Protections	69



NOTE: By default Ekip Hi-Touch has some protections from the complete package. The remaining protections in the package can be enabled upon request.

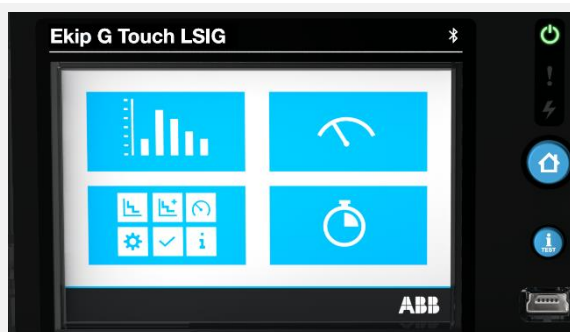


Figure 6

Ekip G Touch is available in a single version: Ekip G Touch LSIG has default functions that can be integrated by means of various different additional SW packages (extensions).

Default functions

Functions	Page
Standard protections	40
Voltage protections ^(NOTE)	51
Advanced Voltage protections ^(NOTE)	55
Frequency protections ^(NOTE)	59
Power protections ^(NOTE)	62
Standard measurements	103
Measuring measurements	107
Class 1 Power & Energy Metering	110
Datalogger	112

Additional SW packages

Functions	Page
Voltage protections ^(NOTE)	51
Advanced Voltage protections ^(NOTE)	55
Frequency protections ^(NOTE)	59
Power protections ^(NOTE)	62
ROCOF protections	69
Adaptive protections	70
Network Analyzer	114



NOTE: Ekip G Touch has certain of the protections in the complete package by default. The remaining protections in the package can be activated on request

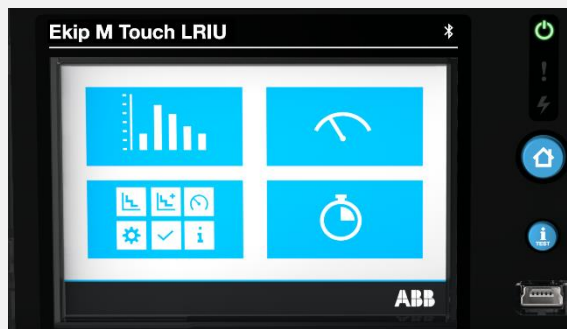


Figure 7

Ekip M Touch is available in one version: Ekip M Touch LRIU has default functions that can be expanded with additional software packages (extensions).

Default

Function	Page
Standard Protections	40
Standard Sizes	103
Measuring	107
Voltage Protections	51
Frequency Protections	59
Power Protections ⁽¹⁾	62
Adaptive Protections	70
Motor Protections	71

Additional SW packages

Function	Page
Advanced Voltage Protections	55
Power Protections ⁽¹⁾	62
ROCOF Protections	69
Class 1 Power & Energy Metering ⁽²⁾	110
Datalogger	112
Network Analyzer	114



NOTES:

- (1) By default Ekip M Touch has some protections from the complete package; the remaining protections in the package can be enabled upon request.
- (2) package available only when ordering the circuit breaker



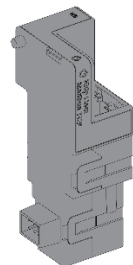
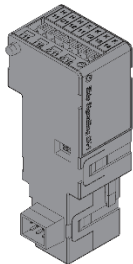
Ekip G Hi-Touch is available in a single version: Ekip G Hi-Touch LSIG, and has all the functions of the Ekip Touch family by default:

Functions	Page
Standard protections	40
Voltage protections	51
Advanced Voltage protections	55
Frequency protections	59
Power protections	62
ROCOF protections	69
Adaptive protections	70
Standard measurements	103
Measuring measurements	107
Class 1 Power & Energy Metering ⁽²⁾	110
Datalogger	112
Network Analyzer	114

5 - Accessories and software

External accessories

The functions of Ekip Touch can be expanded with additional accessories and external modules with different capabilities and installation methods.



The main external modules available in the upper terminal box are:

Name	Function	Page
<i>Ekip Supply</i>	Supply	137
<i>Ekip Com</i>	Communication (with various protocols)	140-157
<i>Ekip Link</i>	Internal network communication with proprietary ABB protocol	161
<i>Ekip Signalling 2K</i>	Signaling with input/output	171
<i>Ekip Signalling 3T</i>	Signaling with analogue inputs	179
<i>Ekip Synchrocheck</i>	Measurement of voltage and synchronization between two power sources	171
<i>Ekip CI</i>	Command module for motor applications	179

Other external modules and accessories are:

Name	Function	Page
<i>Ekip Signalling 10K</i>	Signaling with input/output	191
<i>Ekip Multimeter</i>	Display from the front of the panel	192
<i>S.G.R. Sensor</i>	Earth fault on external toroid protection	194
<i>Rc toroid</i>	Residual current protection	194
<i>External neutral</i>	Neutral protection with CB 3P	194

Supervision, configuration, and reporting functions are also guaranteed with additional modules for temporary power and communication:

Name	Function	Page
<i>Ekip TT</i>	Power supply and testing	191
<i>Ekip T&P</i>	Power supply, communication, programming, and testing	
<i>Ekip Programming</i>	Power supply, communication, and programming	
<i>Ekip Bluetooth Key</i>	Bluetooth communication and programming	

Additional functions

Ekip Touch can be equipped with additional software configurations that perform different functions:

- Power Controller
- Load Shedding
- Interface Protections (IPS)
- Synchro reclosing
- Embedded ATS

For details see the *Technical Catalog* (see page 4) or the summary documentation for each function (see page 14).

**Support software
and
documentation**



Various software and documentation are available – most of them for free - to facilitate, optimize, and extend Ekip Touch functions and configurations in your system:



NOTE: some documents referred to in the following table refer to the SACE Emax 2 device, but can also be used with SACE Tmax XT7

Name	Code	Description
<u>Ekip Connect 3</u>	--	ABB software to interface with Ekip Touch and other low-voltage devices
<u>Ekip Connect Mobile</u>	--	ABB app to interface with Ekip Touch via Bluetooth using a smartphone/tablet
<u>Ekip View</u>	1SDH001276R0001	ABB software that supervises the communication network, analyzes electrical values and monitors system conditions. NOTE: clicking on the link will start the download of a software package that requires about 1.3 GB of space.
<u>e-Design</u>	--	ABB software suite that includes the following tools: • <i>DOC</i>, to design single-circuit diagrams of low- and medium-voltage electrical systems, choose the switching and protection devices, and verify and coordinate the protections. • <i>CAT</i>, for technical/commercial estimates of ABB products. • <i>Curves</i>, to draw, calibrate, and print the tripping curves of protection devices. • <i>OTC</i>, to verify the thermal behavior of panels and to size the fans and air conditioners used therein. • <i>UniSec</i>, to configure medium-voltage panels.
<u>Front CAD</u>		Software that offers graphic block libraries for ABB panel products for use in the latest versions of AutoCAD, AutoCAD LT, and IntelliCAD. NOTE: clicking on the link will start the download of a software package that requires about 190 MB of space.
<u>Ekip Link</u>	1SDC200031L0901	Introduction to the <i>Ekip Link</i> panel control system
<u>Network Analyzer</u>	1SDC200037L0901	Introduction to measure and analysis <i>Network Analyzer</i> system
<u>Generator Protection</u>	1SDC007409G0901	White Paper on generator protection
<u>Adaptive protections</u>	1SDC007116G0201	White paper on adaptive protections
<u>Power Controller</u>	1SDC007410G0901	White Paper on the <i>Power Controller</i> function
<u>IPS</u>	1SDC007117G0201	White Paper on the Interface Protection System (IPS) and Interface Device (DDI)
<u>Load shedding</u>	1SDC007119G0201	White Paper on <i>Load Shedding</i> - Load shedding priority
<u>Synchronism and reclosing</u>	1SDC007118G0201	White paper on <i>Synchro reclosing</i> synchronization solutions
<u>Integrated ATS</u>	1SDC007115G0201	White Paper on ATS systems for applications that require continuity of service
<u>Handbook</u>	1SDC010002D0902	General overview of electrical systems

6 - Operating characteristics

Introduction Ekip Touch has been developed and certified to work in specific environmental, electrical, and mechanical conditions. All the information is available in the *Technical Catalog* (see page 4).

The following paragraphs only describe the electrical and power characteristics for correct operation of Ekip Touch and related electronic accessories.

Electrical characteristics

The correct operation of Ekip Touch is guaranteed with primary power and voltage in the designated ranges and having well-defined characteristics:

Parameter	Operation limits
Primary power	0.03 .. 16 In ⁽¹⁾
Primary voltage	0 .. 690 V AC ⁽²⁾
Rated frequency	50 / 60 Hz $\pm 10\%$
Peak factor	Compliant with IEC 60947-2



NOTES:

- (1) range refers to each phase. In refers to the rated size defined by the rating plug fitted to the Trip unit, which is available in 800 A to 1600 A models
- (2) maximum rated network phase-to-phase voltage connected directly to the Trip unit also by sockets inside the CB; for higher voltages, external transformers have to be used, see chapter dedicated to Ekip Measuring module on page 138

Ekip Touch can also be powered directly by the internal power sensors:

Parameter	Operation limits
Minimum three-phase power on startup	> 80 A

Auxiliary power supply

Ekip Touch can be connected to an external auxiliary power source, useful for enabling some functions such as communication on the Local Bus, recording of manual operations, some measurements, and the data logger.

The auxiliary power supply can be supplied by modules from the *Ekip Supply* range (see page 137 for more operational details) or be powered directly through the side terminal board.

The direct connection must guarantee the following operating conditions:

Parameter	Operation limits
Voltage	24 V DC galvanically isolated
Tolerance	$\pm 10\%$
Maximum wave	$\pm 5\%$
Maximum surge current @ 24 V	10 A for 5 ms
Maximum rated power @ 24 V	4 W
Connecting cable	Insulated with ground cable (characteristics equal to or greater than Belden 3105A/B)



IMPORTANT: if the Trip unit is connected directly the power supply must be galvanically isolated and must guarantee the insulation characteristics referred to in IEC 60950 (UL 1950) or their equivalent

Management operations

Life cycle Proper management of SACE Tmax XT involves the following operations:



Operation	Description
Receipt	Unpacking and verification of the material received
Installation	Assembly operations
Startup	General preliminary checks
Maintenance and malfunctions	Periodic checks and cleaning, management of alarms or malfunctions
Decommissioning	End of life and disposal

This document describes the operations of *Startup* and *Maintenance and malfunctions* for Ekip Touch. For other operations see the *Installation Instructions* and the *Technical Catalog*, see page 4 for references.

7 - Startup

Wizard When Ekip Touch comes on, the Wizard window is displayed. This is a guided procedure for immediately setting certain parameters: language, date, time, plant voltage and password.

When the procedure has been completed, the window will no longer appear unless Ekip Connect has been reset with the **Reset Wizard** command: in this case the Wizard will be shown when the Ekip Connect is restarted again.



NOTE: for security reasons, ABB urges you to change the password after the first access and to keep it carefully

General checks Before startup it is necessary to perform the following checks:

Points to inspect	Checks
Main connections	If present, connection and tightness of the external voltages
	Earth connections correct
	If present, connection of the power supply/ <i>Ekip Supply</i> module
Alarms	If not powered, connect the <i>Ekip TT</i> device to Ekip Touch and make sure that there are no alarms (details on page 19)
Parameters	Configure all unit parameters appropriately

Check accessories

Following are the checks to be carried out on external accessories, if any, before startup:

Accessories	Checks
External modules	1. For modules mounted in the upper terminal box: check the connection to <i>Ekip Supply</i> on the mechanical box. For <i>Ekip Signaling 10K</i> and <i>Ekip Multimeter</i> : verify the connection of the module bus (W3-W4) to the proper sockets of <i>Ekip Supply</i> or on side terminal block of the CB
	2. Power the Trip unit (and external modules if necessary and external supply) and check the turning-on
	3. Make sure that the <i>Local Bus</i> is enabled (via the menu <i>Settings-Modules-Local Bus</i>)
	4. Make sure that the Power LEDs of each module and the Trip unit are on (steady or flashing together)
	5. Check for the presence of all installed modules in the <i>Information-Modules</i> menu and the absence of alarms
External Neutral sensor, homopolar sensor (S.G.R.), residual toroid (Rc)	1. Check the connection of the sensor to the rear terminal block
	2. Power up the Trip unit and check turning on
	3. For <i>External Neutral</i> : check on <i>Settings-Circuit breaker</i> menu that <i>Configuration</i> = 3P + N; otherwise, change the parameter For homopolar and residual current sensors: set presence and size in the <i>Settings-Circuit breaker-Earth protection</i> menu; protection parameters in the <i>Protections</i> or <i>Advanced</i> menus
	4. Check absence of alarms
Zone selectivity	1. Check the selectivity connections between Ekip Touch and the other units, as per the wiring diagrams 1SDM000002A1001
	2. Provide an auxiliary power supply to Ekip Touch and make sure that the circuit breaker status is: open
	3. Make sure that the protection of the selectivity in question has been enabled (example: protection S)
	4. Select the <i>Zone Selectivity</i> menu (see page 34) and the submenu of the protection concerned; for each protection enabled perform steps 5, 6, 7, and 8
	 NOTE: for selectivity D consider submenu S for Forward connections and G for Backward connections
	Check Output :
	5. Select the <i>Force Output</i> command and make sure the status of the Trip unit connected to the Ekip Touch output is <i>Input</i> = ON . 6. Select the <i>Release Output</i> command and make sure the status of the Trip unit connected to the Ekip Touch is <i>Input</i> = OFF .
YO and Yc opening and closing actuators (with remote command) if present	Check Input :
	7. Select the <i>Force Output</i> command on the Trip unit connected to the Ekip Touch input and make sure the status of Ekip touch is <i>Input</i> = ON .
	8. Select the <i>Release Output</i> command on the Trip unit connected to the Ekip Touch input and make sure the status of Ekip Touch is <i>Input</i> = OFF .
	1. Check the correct connection of YO and YC actuator as reported on electrical diagram 1SDM000002A1001
	2. Place circuit breaker in closed position
	3. Supply the auxiliary supply to Ekip touch and rated voltage to the actuators
	4. Run an opening test from menu (<i>Test-Test Protection</i> , <i>Open Unit</i> command) and check that the controlled device has switched.
	5. Repeat the test by running the close command (<i>Close Unit</i>)

8 - Maintenance and malfunction identification

Introduction The correct maintenance of the unit and connected devices ensures proper operation over time. Maintenance operations must be carried out by expert personnel (see "Recipients" on page 4) in accordance with safety regulations (see "Safety requirements" on page 5) and the maintenance program.

If there are anomalies or malfunctions it is necessary to identify the cause and eliminate it before continuing use of the unit.



CAUTION! The identification of malfunctions must be done only by expert electricians (IEV 195-04-01: person with relevant education and experience to enable him or her to perceive risks and to avoid hazards which electricity can create). In fact, it may be necessary to carry out isolation and dielectric tests on a part or all of the installation.

Checks and general cleaning Perform the following checks:

1. Make sure Ekip Touch is clean, removing dust and any traces of other materials using dry, clean rags (if necessary use mild detergents; for excessive dirt a laminate thinner like Henkel 273471 or Chemma 18 or equivalent can be used).
2. Make sure that there are no foreign objects near connectors or terminals.

Check Ekip Touch Perform the checks listed in the chapter "Startup" on page 16, also checking the status of wiring and accessory modules:

- Alarm check
- Check for presence and connection of modules (internal and external)
- Check zone selectivity connections
- Check the opening and closing actuator



NOTE: the limitations and the notes for each point in the respective paragraphs are valid

Maintenance program The Ekip Touch maintenance program is carried out with varying frequency depending on the installation environment:

	Standard environments	Dusty environments (measured dust level > 1 mg/m3)
Maintenance frequency	One year or 2000 maneuvers or after a short circuit	Six months or 1000 maneuvers or after a short circuit

Configuration alarms and suggestions

Below is a list of anomalies that can be viewed on the Ekip Touch display and some suggestions for resolving them (in alphabetical order):

Signal	Suggestions
Numerical alarm (e.g. 30002)	Internal error. For this type of error contact ABB
Low battery	Replace the battery (see kit sheet 1SDH001000R0509)
CB status	Incorrect CB status (example: current present but CB status open)
CB undefined	check the circuit breaker status contacts
Configuration	Check: • <i>Rating plug</i> model compatible with Ekip Touch and CB size • If present, protection parameters not in conflict with the current size of the unit (see “Protections” on page 39) • Threshold I4 and/or I41 > 100 A in absence of <i>Vaux</i> • Time t4 and/or t41 > 100 ms in absence of <i>Vaux</i> • RC protection active and <i>Rating Plug</i> not RC
Configuration session	TFTP server enabled and/or configuration session open on the <i>Ekip Com IEC61850</i> or <i>Ekip Com Hub</i> module.
Contact wear	Check the status of the contacts/poles
Ekip Com Hub	Problem of the <i>Ekip Com Hub</i> module with: certificates, connected devices, missing Com modules (RTU or with Ethernet connection), API TLS device, Hub events, parser configuration
Ekip Installation	Installation error between HMi and Mainboard devices; for this type of error contact ABB
Ekip Link Bus	Malfunction of the <i>Ekip Link</i> module: check for loss of connection with one or more actors
Ekip Signalling 3T	Connection alarm of one or more analog inputs to the Ekip Signaling 3T module
Ethernet disconnected	External cable missing on one or more <i>Ekip Com</i> modules equipped with Ethernet connection
Gext sensor	Check connection and status of current sensor
Internal error	Internal error. For this type of error contact ABB
Invalid date	Incorrect date and time: set in the menus <i>Settings-System-Date</i> and <i>Settings-System-Time</i>
IEEE1588 synch	Synchronization problem of the IEEE 1588 synchronization module
Local Bus	Unit turned on with auxiliary power supply, Local Bus parameter enabled but connection to modules not present, incorrect, or communication lost (for more than five seconds). Check: • connection and startup of the terminal or external modules • that the connected modules are compatible with Ekip Touch • that the Local Bus parameter is: ON (see page 33)
MAC address	<i>Ekip Com</i> module with wrong/unacceptable MAC address detected
Maintenance	Maintenance alarm: check if the set maintenance interval has been reached
Measuring Error	Module parameter reading error, contact ABB
Measuring installation	Install the <i>Ekip Measuring</i> module (<i>Settings-Circuit breaker-Installation-Measuring-Install</i> menu)

**Configuration
alarms and
suggestions [2]**

Signal	Suggestions
Rating Plug	<i>Rating plug</i> not present or with size not compatible with the Trip unit parameters
Rating Plug installation	Install <i>Rating Plug</i> (<i>Settings- Digital Unit-Installation-Rating Plug-Install</i> menu) and if there are further glitches, check the connection
Software NotCompatible	The software versions of main board (<i>Mainboard</i>) and display (<i>Ekip Touch</i>) are not mutually compatible: to restore compatibility, please contact ABB  NOTE: <i>Modifying any of the parameters is inhibited by the display; if the protections L, I and Iinst are present they are active and operating with the parameters preceding the appearance of the alarm (if the display has been replaced, the parameters of the preceding unit are active)</i>
Sensor L1/L2/L3/Ne	Malfunction in the connection of the sensors to the Trip unit. Check the status of the power sensors and the correct connection of the external Neutral sensor
SNTP error	Malfunction with <i>Ekip Com</i> modules: synchronization problem of the SNTP synchronization module
Switchboard Actor communication Error	Verify the configuration and connection of the <i>Ekip Link</i> module
TC disconnected	Disconnection of the Trip coil disconnected, verify its operation
Zone Selectivity Diag	Error in zone selectivity connections (Selectivity Hardware)

Protections

In the event of alarms for protections or measurements the related alerts are displayed:

Signal	Alarm type
Trip Test	Alert of completed trip test; press iTEST to reset the message.
Timing Protection (example: Timing L)	Specific timing protection
Pre-alarm Protection (example: Pre-alarm G)	Specific pre-alarm protection
Protection (Trip off) [example: S (Trip off)]	Specific protection, configured with trip disabled, alarm active
2I Active	2I protection active
LC1 Load / LC2 Load	Power threshold 1 I1 / 2 I1 exceeded and alarm active
Alarm Iw1 / Alarm Iw2	Power threshold Iw1 / Iw2 exceeded and alarm active
Harmonic distort	Harmonic distortion protection alarm active
Power Factor	Power factor measurement ($\cos \varphi$) lower than the set threshold
Phase cycle	Phase sequence protection alarm active
Frequency	Measured frequency out of range ($< 30 \text{ Hz}$ or $> 80 \text{ Hz}$)
Harmonic V over Th / I over Th / THD I over Th / THD V over Th	Single or total harmonic measurement over threshold

Malfunctions, causes, and solutions

Below is a list of possible anomalous situations for Ekip Touch, their possible causes, and suggestions for resolving them.



NOTE: Check the error messages on the display before consulting the table; if the suggestions provided do not resolve the problem, contact ABB customer support, if possible providing the alert produced by the Ekip Connect software.

Malfunction	Possible causes:	Suggestions
Communication problems with terminal modules	Circuit breaker in extracted position, <i>Vaux</i> missing or modules not inserted correctly	Insert modules, set the CB to the Insert position, connect the <i>Vaux</i>
CB status not aligned with the CB position	Modules on the terminal board or the S75I contact missing	Check for modules on the terminal board and connect the S75/I contact
The circuit breaker does not react to the open/close command from Ekip Touch	The connections or power supplies for the open/close actuators are not correct	Check connections and power supplies.
	No auxiliary power supply to Ekip Touch	Check the power supplies and the status of the Power LEDs
	The circuit breaker is in a state that does not allow the selected command	Check the circuit breaker documentation and the cases that do not allow the command
Display off and/or not backlit	No auxiliary power supply or powers/voltages are lower than minimum switch-on values	Proper operating condition
	Temperature out of range	Proper operating condition
No power reading	Power below the minimum viewable threshold	Proper operating condition
Incorrect measurements (power, voltage, etc.)	Current below the minimum viewable threshold	Proper operating condition
	Frequency setting incorrect	Set frequency
	Harmonic distortion and/or peak factor out of range	Proper operating condition
	Incorrect connection between isolation transformer and <i>Ekip Measuring</i>	Check connections between the isolation transformer and <i>Ekip Measuring</i>
	Incorrect <i>RatedVoltage</i> parameter setting	Set the correct parameters
Password not required	The password has been disabled or already entered during the same programming session	Correct operating condition. See the chapter on the password (page 36)
Password error	Password incorrect or lost	Contact ABB or view the document 1SDH001501R0001
The trip test cannot be performed	The <i>Trip coil</i> is not connected correctly	Check the <i>Trip coil</i> connection and the messages on the display
	The CB alert has not been reset	Press the reset button
	The bus power is greater than zero	Proper operating condition

**Malfunctions,
causes, and
solutions [2]**

Malfunction	Possible causes:	Suggestions
The expected trip did not occur	Trip disabled	Proper operating condition; enable trip if necessary.
Reaction times different from expectations	Wrong threshold/time/curve selected	Correct the parameters
	Thermal memory enabled	Disable if not necessary
	Zone selectivity enabled	Disable if not necessary
	Neutral selection incorrect	Correct the neutral selection
Quick intervention with I3 = Off	Linst intervention	Correct operating condition with high-voltage short circuit
High ground voltage, but trip is missing	Incorrect sensor selection	Set internal or external sensor
	G function disabled for high voltage	Correct operating condition (see cases in the chapter describing the protection)
No display of opening data	Auxiliary power supply is missing and/or battery is low	Proper operating condition

Interface and menu

9 - Interface presentation

- Functions** The Ekip Touch operating interface enables:
- signals and measurements to be displayed that relate to the current functions or recorded events
 - the parameters, the present protections and other unit functions to be configured
 - parameters for connected accessories modules to be set
 - tests to be run

Components The Ekip Touch interface comprises a touchscreen display, rapid access pushbuttons, status LED and a service connector for certain external accessories:



Figure 10

Pos.	Description
A	Single-touch colour display touchscreen
B	Power LED
C	Warning LED
D	LED Alarm
E	HOME pushbutton
F	iTEST pushbutton
G	Service connector

Display



The Ekip Touch touchscreen display is a single-touch, colour display
The touchscreen function is active with the unit ON.



LED	Color	Description
Power 	Green	Indicates the state of Ekip Touch: - off: no power and unit off - on, steady (<i>Power mode</i>) or flashing (<i>Alive mode</i>): unit on and self-supplied by external <i>Vaux</i> or service connector The <i>Power mode</i> or <i>Alive mode</i> mode can be selected via Ekip Connect: if the <i>Alive mode</i> has been selected and connected external modules are present, the Power leds of Ekip Touch and the modules will flash in the synchronized mode See chapter on Ekip Connect additional functions for more details, page 126.
Warning 	Yellow	Reports the presence of some alarms: - off: no alarm - on with steady beam: prealarm of protection L active or status contacts error - on with two fast flashes every 0.5 s: parameters error - on with rapid flashing: installation error of <i>Rating Plug</i> or of the <i>Ekip Measuring module</i>
Alarm 	Red	Reports the presence of some alarms: - off: no alarm or error - on with steady beam: protection TRIP signal - on with two fast flashes every 2 seconds: <i>Rating Plug</i> error - on with fast flashing: disconnected current sensor or protection timing active

If the Warning and Alarm LEDs are on simultaneously they provide additional signals:

- LEDs on with fast flashing: no communication between display and *Mainboard*
- LEDs on with slow flashing: internal error
- LEDs on with steady beam: internal configuration error

This type of alert requires the intervention of ABB.

Buttons



Pushbutton	Description
HOME 	Enables access to different areas of the menu: - from the pages: <i>HOME</i>, <i>Histograms</i>, <i>Measuring Instruments</i>, <i>Measurements</i>, <i>Main Measurements</i> ⇒ opens: <i>main page</i> - from pages: <i>main page</i>, <i>Alarms List</i>, any point of the menu area ⇒ opens: page <i>HOME</i>
iTEST 	Enables pages giving information on the unit to be consulted rapidly; pressing the pushbutton several times in succession displays the following pages: <i>Alarms List</i>, if messages are present <i>Info</i>, if the <i>Clients Page option</i> is active (see page 126) <i>Protection Unit</i>, with information on Ekip Touch <i>Circuit breaker</i>, with information on the CB. <i>Last opening</i>, with information on the last opening, if available and envisaged. Consultation is active from the pages: <i>HOME</i>, <i>Histograms</i>, <i>Measuring Instruments</i>, <i>Measures</i>, <i>Main Measurements</i>  NOTE: with <i>Ekip Touch</i> off and the internal battery charged, press iTEST to switch on power LED temporarily and, in the event of a trip, the Alarm LED and the display with the information on the trip protection.

Service connector

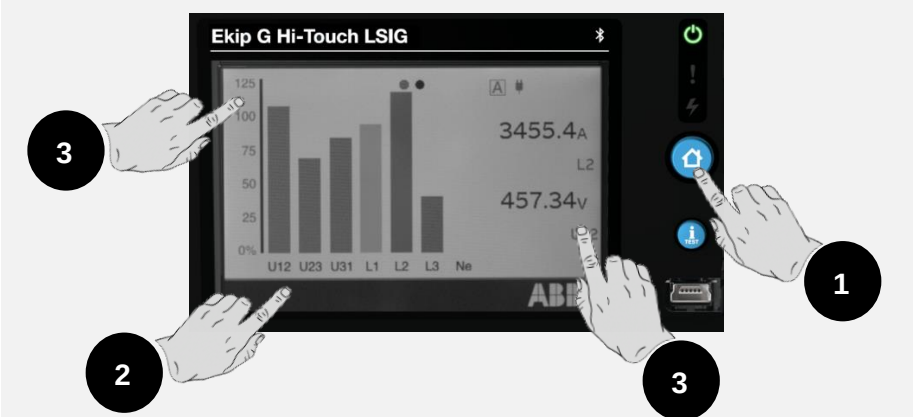


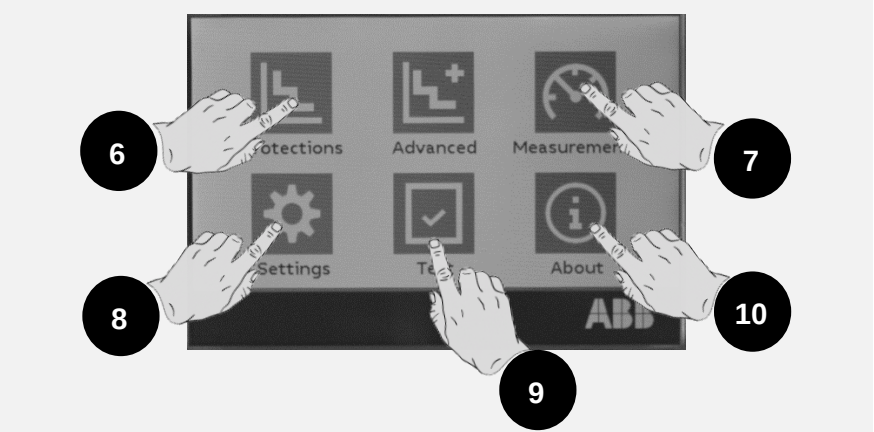
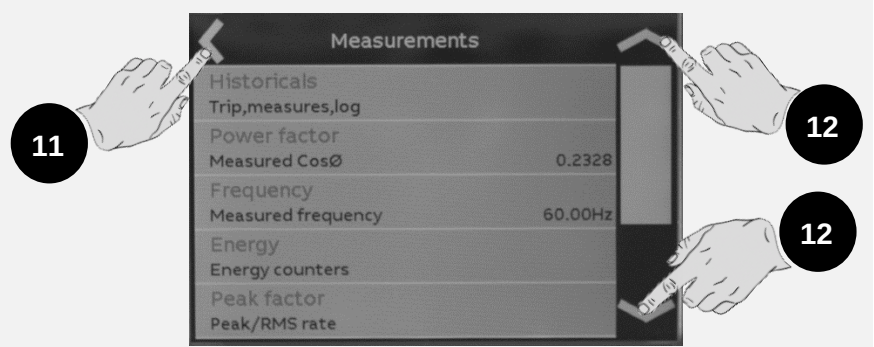
The service connector allows connecting Ekip Touch to *Ekip TT*, *Ekip T&P* and *Ekip Programming*, with the possibility of temporarily powering the unit, configuration of the parameters before startup, testing, extension of the configuration functions.



IMPORTANT: use only cables supplied by ABB or with ABB accessories

Levels and pages The Ekip Touch menu is divided into several levels, which are all accessible by using the touchscreen display and the buttons available on the units

Level and name	Description
1 HOME	This is the page that appears at startup if the Home pushbutton is pressed that is described on page 24; from which it is possible to: 1. access the <i>main page</i> (level 2), by pressing HOME 2. open the <i>Alarms List</i> page by selecting the diagnosis bar at the bottom 3. access the <i>Summary pages</i> of some of the measurements by pressing on the edges  Fig. 11 i NOTE: Ekip Touch is supplied with Histograms page configured as HOME; in the event of a different configuration, histograms can be set as a main page by keeping the HOME pushbutton pressed for 5 seconds and confirming the message on the display.
2 MAIN PAGE	On this page, it is possible: 4. open one of the graph pages: <i>Histograms</i>, <i>Measuring Instruments</i> and <i>Measurements</i> 5. access the <i>menu area</i> (level 3)  Figure 12

Level and name	Description
3 MENU AREA	On this page, it is possible access all the configuration menus and consult parameters available on the unit: 6. <i>Protections and Advanced</i> 7. <i>Measurements</i> 8. <i>Settings</i> 9. <i>Test</i> 10. <i>About</i>  Figure 13
4 MENUS and SUBMENUS	Selecting one of the level 3 menus opens a series of submenus with the list of available options, which develop at several levels up to the detail of the specific parameter. Each submenu has a control for returning to the previous menu (); if the list exceeds the 5 options, a sliding bar () is also present for complete consultation.  Figure 14 To consult a parameter, just select it. To configure and save the parameters, just see the dedicated paragraph on page 36.

11 - Graphic pages

Histograms The page shows the histograms of the currents and voltages measurements acquired in real time and some information on status:

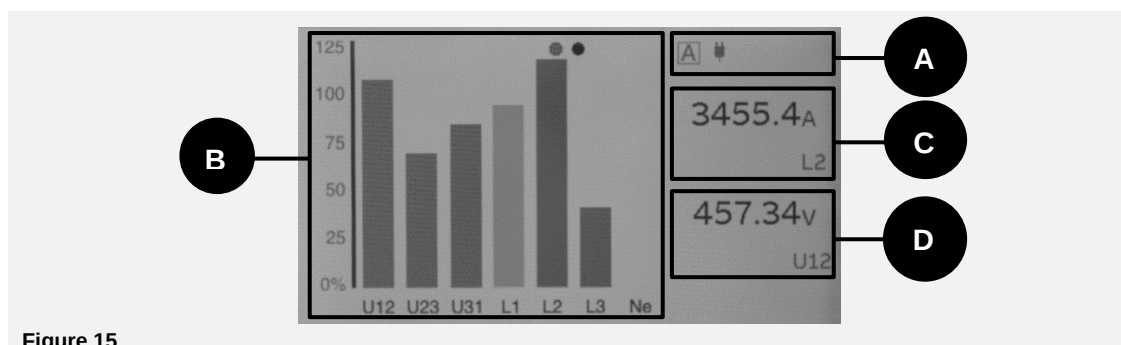


Figure 15

Pos.	Description
A	Information icons:   With the <i>Adaptive Protection</i> package available and with Double setting enabled, the letter is shown that corresponds to the active configuration; fuller details on page 70   External auxiliary supply present (<i>Vaux</i> or from service connector); first icon refer to <i>Vaux</i>  Remote parameter writing configuration active, <i>Ekip Com</i> modules connected and <i>Vaux</i> present  Bluetooth communication active
B	Histograms of the voltage and current measurements acquired in real time. The bar of each signal is on a scale from 0 to 125 % referring to the rated unit current and voltage values and can be in three colours: - blue: no protection in alarm status - yellow: one of the active protections is in prealarm status in relation to the set thresholds - red: one of the active protections is alarm in relation to the set thresholds  NOTE: the histogram <i>Ne</i> is available with 4P or 3P + N
C	current time
D	maximum phase current measured in real time

Summary Pages Press the display sides (1) to open further summary pages of measurements:

- main measurements* page: maximum phase current, maximum network voltage, power factor, total active/reactive/apparent power
- page *main measurements Ekip Synchrocheck* (in presence of the module): Int and Ext voltages and frequencies, phase difference, synchronism status (page 184 for detail)

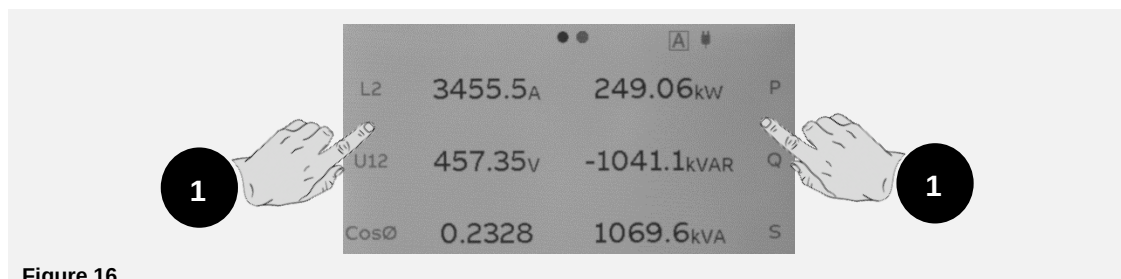


Figure 16



NOTE: both the pages can be set as a main page by keeping the **HOME** key pressed for 5 seconds and confirming the message on the display

Measuring instruments

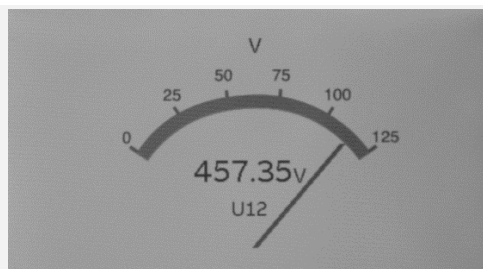


Figure 17

On these pages, if provided for by the Trip unit model, some measurements are shown that were acquired in real time using a dial representation; each page has a specific measurement:

Page	Type of measurement	Unit of measurement/Indicator
1	Maximum phase current	A
2	Maximum network voltage	V
3	Total active power	kW
4	Total reactive power	kVAR
5	Total apparent power	kVA

The display scale goes from 0 to 125 % and refers to set rated values (for power: rated current by rated voltage by $\sqrt{3}$).

To scroll through the pages, press on the sides of the display. Press **HOME** to exit the *Measuring instruments* section.

The orientation of the page (horizontal by default) can be modified by the *Settings* menu, see page 123.



NOTE: any page can be set as a main page by keeping the **HOME** button pressed for five seconds and by confirming the message on the display.

Measurements

Voltage			
U1	296.00V	U12	457.35V
U2	230.68V	U23	294.84V
U3	101.91V	U31	358.32V
U0	>50 V		

Figure 18

The *Measurements* pages show, if provided for by the Trip unit model, a list of measurements acquired in real time and expressed as an absolute value:

Page	Name	Measurements
1	<i>Current</i>	Currents: phase, earth fault, external earth fault/RC
2	<i>Voltage</i>	Voltage: network, phase, neutral
3	<i>Active Power</i>	Phase and total active power
4	<i>Reactive power</i>	Phase and total reactive power
5	<i>Apparent Power</i>	Phase and total apparent power
6	<i>Energy counters</i>	Total active, reactive and apparent energy
7	<i>Power Controller</i>	Summary of Power Controller measurements, see page 129
8	<i>Load shedding</i>	Summary of Load shedding measurements, see page 129
9	<i>Ekip Signalling 3T</i>	Summary of <i>Ekip Signalling 3T</i> module measurements, if installed

Measurements [2]

The Ekip Touch configuration involves some exceptions:

- the measurements of the current I_N is available with configurations 4P and 3P + N
- the measurements of the phase voltages are available with 4P configuration
- with 3P configuration the pages: Active Power, Reactive Power and Apparent Power are replaced from the Power page, which shows the measurements of the total active, reactive and apparent power
- Ige/RC available with external sensor activated
- *Power Controller* page available with Power Controller function active
- *Load Shedding* page available when Load Shedding function is activated

To scroll between the pages, press the sides of the display. Press **HOME** to exit.



NOTE: any page can be set as a main page by keeping the **HOME** button pressed for five seconds and by confirming the message on the display.

Diagnosis bar and Alarms List

The *diagnosis bar* shows the faults detected by the unit, showing the details of each alarm for about two seconds.

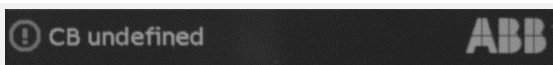


Figure 19

Select the bar to open the **Alarms List** page with the complete list of the current alarms.

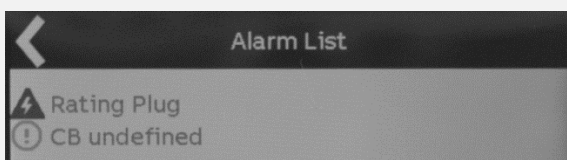


Figure 20



NOTE: the **Alarms List** page also appears when the **iTEST** button is pressed in the cases described on page 24

Each signal is followed by an icon that identifies the type of alarm:

Icon	Alarm Type
	Alarm
	Warning, error or prealarm
	Information
	Timer for active protection

The complete list of alarms is given on page 19.

12 - Menu

Introduction The menus are level 4 pages that are displayed and consist of lists of:

- submenus
- settable parameters
- information and measurements
- commands that can be run

Selecting each item of the menus enables: submenus to be accessed, information to be consulted in detail, a parameter to be configured, a command to be run.

Elements of each item Each item in the submenu consists of:

- main name (white colour)
- supplementary description or set value (blue colour)

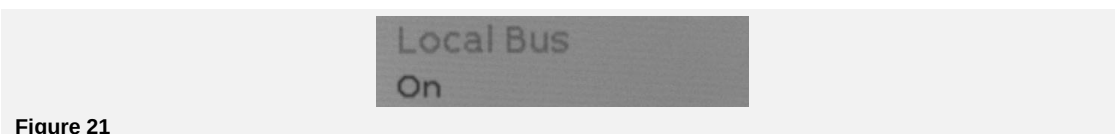


Figure 21

Protections Menu In the *Protections* menu it is possible to configure the following protections⁽¹⁾:



Name	Parameters	SW package	Page
L	List and description in the dedicated chapter	Standard Protections	41
S	List and description in the dedicated chapter		43
S2	List and description in the dedicated chapter		43
I	List and description in the dedicated chapter		43
G ⁽²⁾	List and description in the dedicated chapter		45
Gext ^(NOTE)	List and description in the dedicated chapter	NOTE 3	80



NOTES:

- (1) if the Adaptive Protections package is available (page 70) and Dual Setting has been enabled (page 70), an intermediate menu is made available before the list of protections for the selection of the setting (Set A / Set B)
- (2) available for LSI versions
- (3) available if the presence of the S.G.R. sensor has been activated previously in the Settings menu

Advanced Menu In the *Advanced* menu it is possible to configure the following protections:



Name	Parameters	SW package	Page
MCR	List in the dedicated chapter	Standard Protections	46
2I	List in the dedicated chapter		47
IU	List in the dedicated chapter		48
UV ⁽²⁾	List in the dedicated chapter	Voltage Protections	51
OV ⁽²⁾	List in the dedicated chapter		52
UV2 ⁽²⁾	List in the dedicated chapter		52
OV2 ⁽²⁾	List in the dedicated chapter		52
VU ⁽²⁾	List in the dedicated chapter		54

Advanced Menu
[2]

Name	Parameters	SW package	Page
S(V) ⁽²⁾	List in the dedicated chapter	Advanced Voltage Protections	55
S2(V) ⁽²⁾	List in the dedicated chapter		57
RV ⁽²⁾	List in the dedicated chapter		58
UF ⁽²⁾	List in the dedicated chapter	Frequency Protections	59
OF ⁽²⁾	List in the dedicated chapter		60
UF2 ⁽²⁾	List in the dedicated chapter		60
OF2 ⁽²⁾	List in the dedicated chapter		61
RP ⁽²⁾	List in the dedicated chapter	Power Protections	63
D ⁽²⁾	List in the dedicated chapter		62
RQ ⁽²⁾	List in the dedicated chapter		67
OQ ⁽²⁾	List in the dedicated chapter		65
UP ⁽²⁾	List in the dedicated chapter		65
OP ⁽²⁾	List in the dedicated chapter		66
ROCOF ⁽²⁾	List in the dedicated chapter	ROCOF Protections	69
R STALL ⁽²⁾	List in the dedicated chapter	Motor Protections	72
R JAM ⁽²⁾	List in the dedicated chapter		72
UC ⁽²⁾	List in the dedicated chapter		73
U ⁽²⁾	List in the dedicated chapter		73
PTC ⁽²⁾	List in the dedicated chapter		74
V DIR, VINV ⁽²⁾	List in the dedicated chapter	Interface Protections (IPS)	132
59 S1 ⁽²⁾	List in the dedicated chapter		132
Rc	List in the dedicated chapter	NOTE 3	
Synchrocheck	List in the dedicated chapter	NOTE 4	79
Alerts	Threshold 1 I1, Threshold 2 I1, Threshold Iw1, Threshold Iw2, Phase Sequence ⁽²⁾ , CosØ ⁽⁵⁾	Standard Protections	68
Warnings	VS Warning, FS Warning, FW1 Warning	Interface Protections (IPS)	133, 134
Functions	External Trip, Trip Reset, Enable SET B ⁽⁶⁾	Standard Protections	82



NOTES:

- (1) if the Adaptive Protections package is available (page 70) and Dual Setting has been enabled, an intermediate menu is made available before the list of protections for the selection of the setting (Set A / Set B), the only menu that is always present from Advanced is Functions
- (2) available if required by the Trip unit model or if the relative additional SW package has been enabled, where possible (see page 7 for the overview)
- (3) available with RC rating plug installed on unit and if the presence of the RC sensor has been activated previously in the Settings menu
- (4) available in the presence of the Ekip Synchrocheck module
- (5) CosØ available if required by the Trip unit model or if the Power Protections package has been enabled
- (6) SET B available with the Adaptive Protection package

Measurements Menu



Menu	Submenu	Description	Page
<i>Historicals</i>	<i>Trip</i>	Description in the dedicated chapter	104-108
	<i>Events</i>	List of the recorded events	104
	<i>Measurements</i>	List and description in the dedicated chapter	105
<i>Power factor⁽¹⁾</i>	--	Description in the dedicated chapter	109
<i>Frequency⁽¹⁾</i>	--	Frequency measured	107
<i>Energy⁽¹⁾</i>	<i>Energy Counters</i>	Description in the dedicated chapter	109
	<i>Counter Reset</i>	Counter reset command	109
	<i>Energy RESET</i>	Description in the dedicated chapter	109
<i>Peak factor⁽¹⁾</i>	--	Description in the dedicated chapter	109
<i>Harmonic distort</i>	--	Control to enable harmonic distortion of the powers	49
<i>Ekip Synchrocheck⁽²⁾</i>	--	Description in the dedicated chapter	183
<i>Network Analyzer⁽³⁾</i>	<i>V sequence</i>	Measurements associated with the <i>Network Analyzer</i> function: list and description in the dedicated chapter	114
	<i>V 3s sequence</i>		
	<i>THD Current</i>		
	<i>THD Voltage</i>		
	<i>Counters</i>		
	<i>Waveforms</i>		
<i>Maintenance</i>	<i>Contact wear</i>	Installation and maintenance dates and commands	106
	<i>LastServiceWearWith</i>		
	<i>Installation</i>		
	<i>Last maintenance</i>		
	<i>Service RESET</i>		



NOTES:

- (1) Available if required by the Trip unit model or if the Measuring package has been enabled
- (2) Available with the Ekip Synchrocheck module
- (3) Available if required by the Trip unit model or if the Network Analyzer software package has been enabled

Settings Menu



Menu	Submenu	Description and <i>parameters</i>	Page
Circuit breaker	Configuration ⁽¹⁾	Description in the dedicated chapter	121
	Hardware Trip	Description in the dedicated chapter	49
	Protection T	Description in the dedicated chapter	49
	Neutral Protection ⁽²⁾	Function parameters and commands: see the details in the dedicated chapter	46
	Ground protection ⁽²⁾	Configuration of external sensor	75-121
	Installation	<i>modules installation</i>	34
Main frequency	--	Network frequency configuration	121
Phase sequence	--	Phase sequence configuration	53
Modules	Local/Remote	Parameter save configuration	122
	Local Bus	Local bus presence configuration	122
	Module x ⁽³⁾	Details in the chapters of each module	122
	BLE	BT communication configuration	122
	Functions	<i>Switch On LOCAL, RESET alert</i>	122
Measurement range	--	Measurement interval configuration	105, 122
Bus Test	--	Enable bus test	123
Power Controller ⁽⁴⁾	Enable ⁽⁵⁾	Function enabling and parameters: see the details in the dedicated chapter	129
	-		
Load Shedding ⁽⁴⁾	Enable ⁽⁵⁾	Function enabling and parameters: see the details in the dedicated chapter	130
	-		
Network Analyzer ⁽⁶⁾	Enable ⁽⁵⁾	Function enabling and parameters: see the details in the dedicated chapter	114
	-		
Datalogger ⁽⁶⁾	Enable ⁽⁵⁾	Function enabling and parameters: see the details in the dedicated chapter	112
	-		
Dual Setting ⁽⁶⁾	Enable ⁽⁵⁾	Enable function	70
	Default setting	Default setting configuration	
System	Data	Unit date configuration	123
	Time	Unit time configuration	
	Language	Menu language configuration	
	New password	Password configuration	
View	÷	Menu representation parameters and measurements: details in dedicated chapter	123
Functions	YO Command	<i>Function, Delay</i>	82, 79
	YC Command	<i>Function, Delay</i>	
Maintenance	Alerts	Enable maintenance alerts	106, 123
MLRIU ⁽⁷⁾	-	Motor protection parameters: see the details in the dedicated chapter	71



NOTES:

- (1) Available with CB in 3P configuration
- (2) Available with CB in 4P or 3P + N configuration
- (3) The menu is populated with the list of accessory modules detected by units with Local Bus enabled and connected and powered as required
- (4) Available if the function is installed on a Trip unit
- (5) The list of the specific submenu is only populated with the function enabled (= On)
- (6) Available if required by the Trip unit model or if the relative software package has been enabled
- (7) Available with Ekip M Touch
- (8) Available with LSIG version

**Installation
module**

If Ekip Touch detects that *Rating Plug* or *Ekip Measuring* has not been installed correctly, it reports the alarm (see page 19) and completes the *Settings* menu with the specific installation section:

Menu	Submenu 1	Submenu 2	Commands
<i>Circuit breaker</i>	<i>Installation</i>	<i>Rating Plug</i>	<i>Install</i>
		<i>Ekip Measuring</i>	<i>Install</i>

Correct installation is confirmed by a display message and the disappearance of the alarm signal and the installation menu.



NOTES: the availability of the submenus depends on the module that has not been installed

Test Menu

Menu	Submenu	Description, parameters, and commands	Page
<i>Autotest</i>	--	Autotest command	127
<i>Trip Test</i>	--	TRIP command	127
<i>CB Test</i>	--	<i>Close CB, Open CB</i>	127
<i>Ekip CI</i>	--	Autotest command	127
<i>Ekip Signalling 2K⁽¹⁾</i>	<i>Ekip Signalling 2K-1⁽¹⁾</i>	Module autotest command	128
	<i>Ekip Signalling 2K-2⁽¹⁾</i>	Module autotest command	
	<i>Ekip Signalling 2K-3⁽¹⁾</i>	Module autotest command	
<i>Zone selectivity⁽²⁾</i>	<i>S Protection⁽³⁾</i>	<i>Inputs, Force Output, Release Output</i>	128
	<i>G Protection⁽⁴⁾</i>	<i>Inputs, Force Output, Release Output</i>	
<i>Test Rc⁽⁵⁾</i>	--	Test	128

**NOTES:**

- (1) available if one or more Ekip Signalling 2K modules are connected and detected by Ekip Touch
- (2) Available if Ekip Touch is switched on with auxiliary power supply
- (3) Available with S and/or S2 protection enabled and curve $t = k$
- (4) Available with G and/or Gext protection enabled and curve $t = k$
- (5) available with Rating Plug and RC sensor present

Information Menu



Menu	Submenu	Information included
<i>Protection unit</i>	--	Ekip Touch information: Mainboard serial number, Trip unit serial number, type, version, regulation, software version, date and time, language
<i>Circuit breaker</i>	--	CB Information: TAG name, CB name, rated power, number of poles, CB status and position, total operations
<i>IEC61557-12⁽¹⁾</i>	--	Measurements status 1% (from the Class 1 Power & Energy Metering package), serial numbers of the assembly and connected power sensors
<i>Feature Collection</i>	--	List of protections enabled on the Trip unit
<i>Modules</i>	<i>Module x⁽²⁾</i>	Module information: serial number, SW version, input/output/contact status (if any)
<i>Power Controller⁽³⁾</i>	<i>Load Input Status</i>	Load status (open/closed)
	<i>Active load</i>	Load configuration (active/inactive)
<i>Load shedding⁽³⁾</i>	<i>Load Input Status</i>	Load status (open/closed)
	<i>Active load</i>	Load configuration (active/inactive)



NOTES:

- (1) Available if the Class 1 Power & Energy Metering SW package is required by the Trip unit model or if it has been previously enabled
- (2) Available if one or more modules are connected and detected by the unit
- (3) Available if the function is installed and enabled on a Trip unit

13 - Modifying parameters and commands

Modifying parameters



To modify one or more parameters, follow the following procedure.

IMPORTANT: the parameters can be modified with Ekip Touch in Local mode and in the absence of timing alarms

Step	Description
1	Select the parameter and if requested, insert the password.
2	❶ Select the new desired value from the list or with the support of the page commands, if available (-, +, MIN, MAX). ❷ If present, select the <i>Confirm</i> command: Figure 22
3	When the new value has been selected/confirmed, the parameters menu opens automatically and the modified item shows the new value in blue and a confirmation tick: Figure 23 The programming can now be confirmed (Step 4) or other parameters can be accessed for further modifications (Step 1).
4	Select the arrow at the top left (❸) to open the upper menus until the <i>Programming</i> page appears❹: Figure 24
5	❹ Different commands can be run from the <i>Programming</i> page: • <i>Confirm</i> to validate the new parameters conclude programming • <i>Abort</i> to interrupt saving • <i>Modify</i> to return to the menus and change the parameter or other parameters Figure 25

Commands



Selecting a command implies running the command immediately or opening an intermediate confirmation window.

If the command has been run correctly, a confirmation window opens that disappears on its own from the display.

The exceptions are certain commands that if selected automatically activate the respective test sequences without any confirmation window:

- *Auto Test*
- *Ekip Signalling 2K*



IMPORTANT: the confirmation on the display refers to the running of the command, not to the check of the requested operation. The operation must be checked by the user regardless of the command run: reset parameters, display, open/close contacts

Exceptions



Before validating programming or running a command, Ekip Touch controls all its parameters to certify that there is no conflict or error condition:

- if the unit detects an error condition on the display and/or the bar shows the details, the modification of parameter is interrupted

Even before executing a command, the Trip unit checks all its parameters to certify that there is no conflict or incorrect condition:

- if the unit detects an error condition on the display and/or the bar shows the details, the modification of command execution is interrupted



WARNING! Cancelling programming impacts all the parameters modified during the same session

14 - Password and security

Function



The password is intended to prevent unintentionally setting incorrect parameters from the display.

However, changing parameters without entering the password is allowed from:

- Service connector, with *Ekip T&P* or *Ekip Programming* and the Ekip Connect application
- Bus, with *Ekip Com* modules and with the Trip unit configured *Remote* (page 33)



WARNING! it is suggested to set a password for the Ekip Connect and the remote control system

In order to facilitate making the unit secure, when the unit is first started up, the Wizard window proposes changing the password (page 16), which is strongly recommended by ABB.

Safety



WARNING! it is the user's responsibility to configure the security to prevent unauthorized accesses and changes

Description

The password is a five-digit number, each of which can have a value from 0 to 9. The default value is: **00001**.

The password is required when:

- Selecting a parameter to be changed (including the password itself, in the *Settings* menu)
- Selecting the *Test* menu

Entering the password allows access to all menus without having to re-enter it repeatedly if the operations are carried out within a time of two minutes. Once this time has elapsed it must be entered again, where necessary.



NOTE: the password also expires when a programming session is canceled (page 36)

Entering the password

To enter the password, you have to confirm each digit, which can be changed by the increase and decrease keys that are combined with each digit (❶); to confirm the password entered, you must thus make five confirmations (❷):

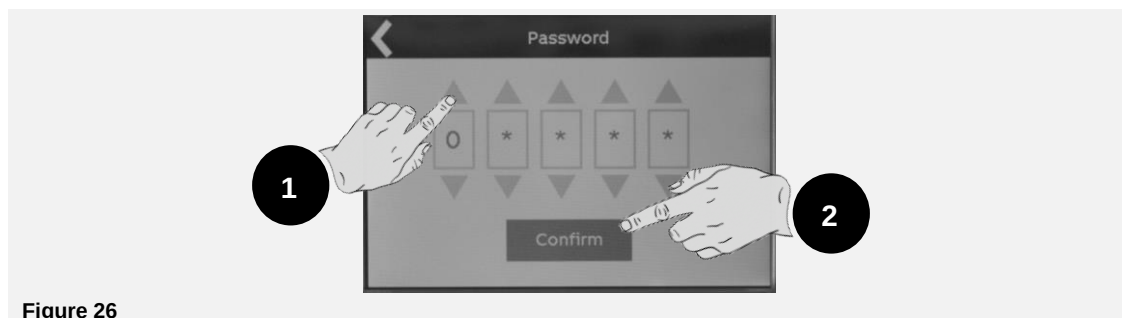


Figure 26

Disabling the password

You can disable the password by setting it to the value: 00000.

In this situation the only action that will require entering the password is changing the password itself, in the *Settings* menu.

Exceptions



NOTES:

- If the wrong password is entered, the message "Password incorrect" will appear for about three seconds and the page for entering the password will re-open
- There is no limit to the number of incorrect passwords that can be entered
- If the password is lost, see the document 1SDH001501R0001 available on the ABB website, or contact ABB directly

Protections

Principle of Operation

The protection functions are available with all models and versions of Ekip Touch.

Each protection is combined with a different signal (currents, voltages, frequencies, powers, etc.) but the operating principle is common:

1. If the measured signal exceeds the **threshold** set, the specific protection activates (pre-alarm and/or **alarm** condition).
2. The **alarm** is shown on the display, and, based on the protection parameters set, after a time interval (timing) it can be converted into an **opening command (TRIP)** to the CB's internal Trip coil.



NOTES:

- If the measured signal falls below the threshold set before the tripping time has elapsed, Ekip Touch exits the alarm and/or timing state and returns to normal operating condition
- All the protections have a default configuration: check the parameters and change them as needed for installation before startup

TRIP

With the *Ekip CI* module, Ekip M Touch allows selecting a different TRIP configuration so that, if tripped, a contact of the Ekip CI module connected to an external contactor (*Normal* mode) is triggered.



NOTE: for I and G protections, the TRIP is always managed with a Trip Coil command

For more details see the Ekip M Touch parameters (page 71)

References

Many protection thresholds are shown on the display in two different sizes: the absolute and relative values.

The relative value depends on the type of measurement:

Protection type	Reference	Description
Power	In	Rated size of the Trip unit
Voltage	Un	Line-to-line voltage set
Frequency	fn	Frequency set
Rating	Sn	$\sqrt{3} \times I_n \times U_n$

Protection packages

The protections listed in the following chapters are grouped by packages, whose availability depends on the Trip unit model and version and possible installation as an additional package:

Package	Page
Standard Protections	40
Voltage Protections	51
Advanced Voltage Protections	55
Frequency Protections	59
Power Protections	62
Adaptive Protections	70
Motor Protections	71

15 - Standard Protections

List Standard Protections, available for all Ekip Touch models and versions:

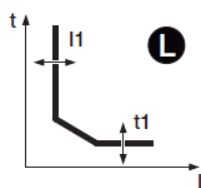
Name	Protection type	Page
L	Long overload	41
S	Selective short circuit	42
S2 ⁽¹⁾	Short circuit with adjustable delay	43
I	Instantaneous short circuit	43
G ⁽²⁾	Ground malfunction with adjustable delay	45
MCR	Instantaneous short-circuit when the circuit breaker closes	46
2I	Programmable instantaneous short circuit	47
IU	Power imbalance	48
Neutral ⁽³⁾	Different protection on the neutral phase	46
Harmonic distortion	Distorted waveforms	49
T	Abnormal temperatures	49
Hardware Trip	Internal connection errors	49
Current thresholds	Control thresholds exceeded	50



NOTES:

- (1) *Not available with Ekip G Touch*
- (2) *Not available with Ekip Touch in the LSI version*
- (3) *Not available with Ekip M Touch*

L Protection



Function

If the current of one or more phases exceeds the I1 threshold, the protection is activated and, after a time determined by the value read and the parameters set, it sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the formulas for calculations (page 85)
- Chart with tripping curve (pages 88, 89, 90)

Parameters



NOTE: the Ekip M Touch Trip unit has default constraints and parameters that are different from the other models. The details are shown after the table.

Parameter	Description	Default
Curve	Determines curve dynamic and calculation of trip time: • $t=k/I^2$ in accordance with IEC 60947-2 • IEC 60255-151 SI • IEC 60255-151 VI • IEC 60255-151 EI • $t=k/I^4$ in accordance with 60255-151	$t= k/I^2$
Threshold I1	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.4 In .. 1In with 0.001 In step.	1 In
Time t1	Contributes to calculating trip time. The value is expressed in seconds, which are settable in a range: 3 s .. 144 s, with 1 s step.	144 s
Thermal memory	Activates/deactivates the thermal memory function, see page 75 for details  NOTE: the function is always ON with Ekip M Touch trip unit and available for all the others Trip unit model with a curve $t=k/I^2$	OFF
Pre-alarm I1	Enables a warning to be sent that the measured current is near the threshold triggering the protection. The value is expressed as a percentage of the threshold I1, which is settable in a range: 50 % I1 .. 90 % I1, with 1 % step. The pre-alarm threshold is deactivated in two cases: • current below pre-alarm threshold I1 • current above threshold I1	90 % I1

Ekip M Touch

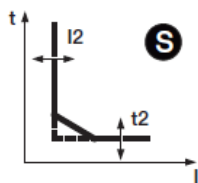
L protection of the Ekip M Touch differs with the other models in the following ways:

- *Curve*: cannot be changed and is specific for Ekip M Touch (see page 91)
- *Time t1*: cannot be changed and is determined by the *trip class* (see page 71)
- *Thermal memory*: always enabled, operating according to IEC 60255-8; thermal memory reset time set by the *trip class* (see page 71)
- Different default parameters: I1 = 0.4 In; t1 = 72 s (Class = 30E)

Constraints, limitations, and additional functions

- The I1 threshold must be less than the I2 threshold (if the S protection is active)
- The protection trip time is forced to 1 s if the calculations result in a lower theoretical value and/or if the current detected is higher than 12 In

S Protection



Function

If the current of one or more phases exceeds the I_2 threshold, the protection is activated and, after a time determined by the value read and the parameters set, it sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the formulas for calculations (page 85)
- Chart with tripping curve (page 91)

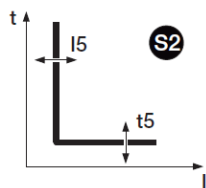
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	ON
<i>Function</i>	Determines the curve dynamic and threshold or the calculation of trip time: • $t = k$: trip at set time • $t = k/I^2$: dynamic inverse time-delay trip	$t = k$
<i>Threshold I_2</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: $0.6 I_n \dots 10 I_n$ with $0.1 I_n$ step	$2 I_n$
<i>Time t_2</i>	Depending on the type of curve selected, this is the trip time or contributes to calculating timing. The value is expressed in seconds, which are settable in a range: $0.05 \text{ s} \dots 0.8 \text{ s}$, with 0.01 s step	0.05 s
<i>Thermal memory</i>	Activates/deactivates the thermal memory function, see page 75 for details i NOTE: the function is available only with a curve $t = k/I^2$	OFF
<i>Zone Selectivity</i>	Activates/deactivates the function and the display availability of selectivity time, see page 75 for details i NOTE: the function is available only with curve $t = k$	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function active and the selectivity input not present see page 75 for details The value is expressed in seconds, which are settable in a range: $0.04 \text{ s} \dots 0.2 \text{ s}$, with 0.01 s step	0.04 s
<i>StartUp enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 78 for details	OFF
<i>StartUp threshold</i>	Protection threshold valid during Startup time, in conditions in which the function is active, see page 78 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: $0.6 I_n \dots 10 I_n$ with $0.1 I_n$ step	$0.6 I_n$
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, set details on page 78 The value is expressed in seconds, which are settable in a range: $0.1 \text{ s} \dots 30 \text{ s}$, with 0.01 s step	0.1 s

Constraints, limitations, and additional functions

- The I_2 threshold must be greater than the I_1 threshold (if the S protection is active)
- With curve $t = k/I^2$ the trip time is forced to t_2 if the calculations result in a theoretical value that is lower than t_2 itself

S2 protection



Function

S2 protection operates like S protection: if the current of one or more phases exceeds the I5 threshold for a time greater than t5, the protection is activated and sends the TRIP command.



NOTE: the S2 protection, differently from S protection, only has one trip curve with fixed time and does not have thermal memory

It is independent of S protection and it is therefore possible to program thresholds and functions of the two protections to take advantage of different system solutions (example: signaling with S and opening command with S2 or vice versa, or S and S2 both for signaling or for tripping).

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the formulas for calculations (page 85)
- Chart with tripping curve (page 92)

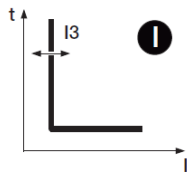
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	ON
<i>Threshold I5</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In .. 10In with 0.1 In step	2 In
<i>Time t5</i>	This is the trip time of the protection. The value is expressed in seconds, settable in a range: 0.05 s .. 0.8 s, with 0.01 s step	0.05 s
<i>Zone Selectivity</i>	Activates/deactivates the function and the display availability of selectivity time, see page 75 for details  <i>in the presence of both S and S2 active selectivity, the input and output are shared with an OR function: it is also sufficient for just one of the two to be active to stimulate inputs and outputs</i>	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function active and the selectivity input not present see page 75 for details The value is expressed in seconds, which are settable in a range: 0.04 s .. 0.2 s, with 0.01 s step	0.04 s
<i>StartUp enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 78 for details	OFF
<i>StartUp threshold</i>	Protection threshold valid during Startup time, in conditions in which the function is active, see page 78 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In .. 10In with 0.1 In step .	2 In
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, see page 78 for details The value is expressed in seconds, which are settable in a range: 0.1 s .. 30 s, with 0.01 s step.	0.1 s

Constraints, limitations, and additional functions

- The I5 threshold must be greater than the I1 threshold (if the S2 protection is active)
- From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions and the selectivity type, see page 75.

I Protection



Function

If the current of one or more phases exceeds the I3 threshold, the protection is activated and, after a fixed time that cannot be programmed, it sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 85)
- Chart with tripping curve (page 92)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Threshold I3</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 1.5 In .. 15In with 0.1 In step	4 In
<i>StartUp Enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 78 for details	OFF
<i>StartUp threshold</i>	Protection threshold valid during Startup time, in conditions in which the function is active, see page 78 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 1.5 In .. 15In with 0.1 In step	1.5 In
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, set details on page 78 The value is expressed in seconds, which are settable in a range: 0.1 s .. 30 s, with 0.01 s step	0.1 s

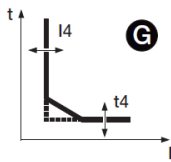
Ekip M Touch

With Ekip M Touch the I protection is inhibited for 100 ms if the currents detected by the Trip unit pass from none to at least one present (fixed control threshold at 0.25 In).

Constraints, limitations, and additional functions

- The I3 threshold must be greater than the I2 threshold (if the S and I protections are active)
- I protection can be enabled with MCR protection disabled
- From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75

G Protection



Function

Ekip Touch executes the vectorial sum of the phase currents (L1, L2, L3, Ne) obtaining the internal ground fault current (I_g): if the current I_g exceeds the I_4 threshold the protection is activated and, after a time determined by the value detected and the parameters set, it sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the formulas for calculations (page 85)
- Chart with tripping curve (page 93, 93)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	ON
<i>Function</i>	Determines the curve dynamic and threshold or the calculation of trip time: • $t = k$: trip at set time • $t = k/I^2$: dynamic inverse time-delay trip	$t = k$
<i>Threshold I_4</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.1 In .. 1In with 0.001 In step	0.2 In
<i>Time t_4</i>	On the basis of the selection of the curve type, it is the trip time and contributes to calculating timing. The value is expressed in seconds, which are settable in a range: 0.1 s .. 1 s with 0.05 s step i NOTE: with curve: $t = k$, t_4 can also be configured as: instantaneous; in this mode the trip time is comparable with the trip time declared for protection I, see page 85 for details	0.4 s
<i>Pre-alarm I_4</i>	Enables a warning to be sent that the measured current is near the threshold triggering the protection. The value is expressed as a percentage of the threshold I_1 , which is settable in a range: 50 % I_4 .. 90 % I_4 , with 1 % step The pre-alarm threshold is deactivated in two cases: • current below pre-alarm threshold I_4 • current above threshold I_4	90 % I_4
<i>Zone Selectivity</i>	Activates/deactivates the function and the display availability of selectivity time, see page 75 for details i NOTE: the function is available only with curve $t = k$	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function active and the selectivity input not present see page 75 for details The value is expressed in seconds, setting in a range: 0.04 s .. 0.2 s with 0.01 s step	0.04 s
<i>StartUp enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 78 for details	OFF
<i>StartUp threshold</i>	Protection threshold valid during Startup time, in conditions in which the function is active, see page 78 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.2 In .. 1In with 0.1 In step	0.2 In
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, set details on page 78 The value is expressed in seconds, which are settable in a range: 0.1 s .. 30 s, with 0.01 s step	0.1 s

G Protection [2] Ekip M Touch

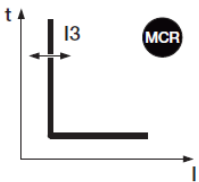
G protection of the Ekip M Touch differs with the other models in the following ways:

- *BlockOnStartUp* block enabled and cannot be changed (see page 78)
- *StartUp Time* cannot be changed and set with the value of Motor StartUp (depending on the trip class, see page 71)
- Curve set as $t = k$ not changeable

Constraints, limitations, and additional functions

- With curve $t = k/I^2$ the trip time is forced to t_4 if the calculations result in a theoretical value that is lower than t_4 itself
- Without *Vaux* and with threshold $I_4 < 100$ A, the threshold itself is forced to 100 A and the display shows the error *Configuration*
- Without *Vaux* and with time $t_4 < 100$ ms, the time itself is forced to 100 ms and the display shows the error *Configuration*
- depending on the set threshold I_4 , the protection is deactivated for I_g greater than:
8 I_n with threshold $I_4 \geq 0.8 I_n$; 6 I_n with $0.8 I_n > I_4 \geq 0.5 I_n$; 4 I_n with $0.5 I_n > I_4 \geq 0.2 I_n$; 2 I_n with $I_4 > 0.2 I_n$
- From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions and the selectivity type, see page 75.

MCR Protection Function



The protection is active for a calculated period of time starting from the change of state open $\Rightarrow$ closed, then it turns off.

If during this period the current of one or more phases exceeds the I_3 threshold, after a fixed time that cannot be programmed the protection sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 85)
- Chart with tripping curve (page 92)



NOTE: to activate MCR, the *I* protection must be disabled

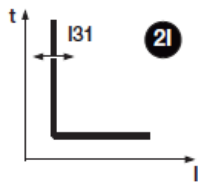
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Threshold I3</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Ampere) and as a relative value (I_n), settable in a range: 1.5 I_n .. 15 I_n with 0.1 I_n step	6 I_n
<i>Monitor time</i>	Defines the interval of time in which the MCR protection is active, calculated from the open $\Rightarrow$ closed status change The value is expressed in seconds, which are settable in a range: 0.04 s .. 0.5 s with 0.01 s step	0.04 s

Constraints, limitations, and additional functions

- From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions and the selectivity type, see page 75.

2I Protection



Function

If the current of one or more phases exceeds the I31 threshold and the activation event is triggered, after a non-programmable fixed time the protection sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 85)
- Chart with tripping curve (page 92)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activate/deactivate protection and availability of protection threshold on menu	OFF
<i>Threshold I31</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 1.5 In .. 15In with 0.1 In step	1.5 In

Enabling protection makes the *2I Mode* section available in the *Advanced - Functions* menu, where the protection activation event can be configured:

Parameter	Description	Default
<i>Activation</i>	Two modes are available that are alternatives to one another: • <i>Dependent function</i>: the protection is active if the programmed activation event has occurred; this configuration makes the function and delay parameters available. • <i>Active</i>: the protection is always active	Dependent function
<i>Function</i>	The activation event can be selected from the input contacts of <i>Ekip Signalling 2K</i> , the unit status (open/closed) and the Custom function <i>i</i> NOTE: <i>Ekip Connect enables the Custom function to be customized to combine the activation event with up to eight statuses in AND or OR configuration</i>	Disabled
<i>Delay</i>	Protection activation delay calculated from the presence of the activation event. The value is expressed in seconds, settable in a range: 0 s .. 100 s, with 0.1 s step. <i>i</i> NOTE: <i>the protection is activated if the event is present for a time greater than the set delay</i>	0 s

Remote commands

With the Trip unit connected to an Ekip Com module, two additional commands for temporarily activating/deactivating the protection remotely are available:

- **2I Mode ON**: activates the protection
- **2I Mode OFF**: deactivates the protection

Refer to the 1SDH002031A1101 unit System Interface for details.

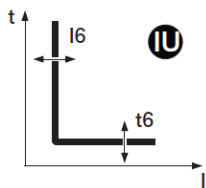


NOTE: *if the protection has been activated by command 2I Mode ON, it is deactivated with command 2I Mode OFF or when the unit is switched off*

Alerts

With the 2I protection active, the message "2I active" appears in the diagnosis bar and on the Alarm List page, and the alarm LED is lit and fixed.

IU Protection



Function

The protection is activated in the event of an imbalance between the currents detected. If the detected imbalance exceeds the I_6 threshold for a time greater than t_6 , the protection sends the TRIP command.

The protection automatically cuts out in two cases:

- The measurement of at least one current is greater than $6 I_n$
- The maximum current value of all phases is less than $0.3 I_n$

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 85)
- Chart with tripping curve (page 94)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Version</i>	Enables the unbalance calculation method to be selected: • Old: $\% S_{bil} = 100 \times (I_{max} - I_{min}) / I_{max}$ • New: $\% S_{bil} = 100 \times (\Delta_{max} I_{mi}) / I_{mi}$ i NOTE: $\Delta_{max} I_{mi}$: maximum deviation between measured currents, calculated by comparing each current with the average value; I_{mi}: average value of the read currents	Old
<i>Threshold I_6</i>	Defines the trip value that activates the protection. The unbalance is expressed as a percentage value in a range: 2 % .. 90 %, with 1 % step	50 %
<i>Time t_6</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.5 s .. 60 s with 0.5 s step	5 s

Ekip M Touch

With Ekip M Touch IU protection is inhibited if the rms value of at least one of the phase currents is less than $0.25 I_n$.

Neutral Protection

Function

The Neutral protection is used to differentiate the L, S and I protections on the Neutral phase, introducing a different control factor with respect to the other phases.

The protection is available in 4P and 3P + N configurations. The configuration parameters are accessible from the *Settings - Circuit Breaker - Configuration* menu (page 33).

Parameters

Parameter	Description	Default
<i>Enable</i>	Activate/deactivate protection	OFF
<i>Neutral Threshold</i>	Defines the multiplied factor applied to the tripping thresholds and curves of the protections for the current read on Ne phase: • 50 %: lower tripping thresholds for neutral current • 100 %: same tripping thresholds for all phases. • 150 %: higher tripping thresholds for neutral current. • 200 %: higher tripping thresholds for neutral current.  NOTE: with 150 % / 200 % configurations and Ne current is greater than 15.5 In protection is automatically adjusted to 100%	50 %

Constraints, limitations, and additional functions

Ekip Touch rejects a change of the I1 and InN thresholds if the following constraint is not respected:

$$(I1 \times InN) \leq Iu$$

- I1 is the threshold of the L protection in Amperes (ex.: In= 1000 A and I1= 0,6 $\Rightarrow$ I1= 600 A)
- InN is the neutral threshold expressed as a multiplicative factor (example: InN= 200 % $\Rightarrow$ InN= 2)
- Iu is the size of the CB

Harmonic Distortion

Allows activating an alarm in the event of distorted waveforms.

The protection can be enabled in the *Measurements* menu (page 32). If enabled an alarm is activated for peak factors greater than 2.1.



IMPORTANT: the protection just manages the alert, not the trip

Protection T

The T protection protects against abnormal temperatures detected by units.

It is always active and provides two states according to the temperature read:

Status	Temperature range	Ekip Touch actions
Warning	$-25 < t < -20$ or $70 < t < 85$	Display switched off; Warning LED ON @ 0.5 Hz
Alarm	$t < -25$ or $t > 85$	Display switched off; Alarm and Warning LED ON @ 2 Hz

The parameter Enable Trip can be enabled in the *Settings - Circuit Breaker - T Protection* menu (page 33) to manage an opening command in the event of an alarm.

Hardware Trip

Hardware Trip, available in the *Settings - Circuit Breaker - Hardware Trip* menu (page 33), protects against connection errors in Ekip Touch.

If enabled, if one or more of these events is detected:

- Current sensors disconnected (phase or external if enabled)
- *Trip coil* disconnected
- Unit internal problems

an alarm is displayed and an opening command is sent.



IMPORTANT:

- The protection is triggered if the error states persist for more than one second
- In the event of an alarm due to Trip coil disconnection, only the signal is managed

Current thresholds

Function

The current thresholds allow you to set controls on current lines, to be combined with the programmable contacts of the *Ekip Signalling* modules (in all versions).

Two pairs of programmable contacts are available:

- Threshold 1 I1 and Threshold 2 I1, with control referred to I1
- Threshold Iw1 and Threshold Iw2, with control referred to In

It is possible to enable and set the thresholds in the *Advanced - Alerts* menu (page 31).



IMPORTANT:

- The current thresholds do not manage the trip, just the alert
- The function is active if the trip unit is powered by an auxiliary power supply

Parameters

Threshold	Available parameters	Default
Threshold 1 I1	<i>Enable</i> : Activates protection and availability of protection threshold on menu	OFF
	<i>Threshold</i> : The value is expressed as a percentage of the threshold I1, which is settable in a range: 50 % I1 .. 100 % I1, with 1 % step	50 % I1
Threshold 2 I1	<i>Enable</i> : Activates protection and availability of protection threshold on menu	OFF
	<i>Threshold</i> : The value is expressed as a percentage of the threshold I1, which is settable in a range: 50 % I1 .. 100 % I1, with 1 % step	75 % I1
Threshold Iw1	<i>Enable</i> : Activate protection and availability of protection threshold on menu	OFF
	<i>Direction</i> : enables you to choose to have the signal when the current is higher (Up) or lower (Down) than the threshold.	Down
	<i>Threshold</i> : The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.1 In .. 10 In, with 0.01 step In	3 In
Threshold Iw2	<i>Enable</i> : Activate protection and availability of protection threshold on menu	OFF
	<i>Direction</i> : enables you to choose to have the signal when the current is higher (Up) or lower (Down) than the threshold.	Up
	<i>Threshold</i> : The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.1 In .. 10 In, with 0.01 step In	3 In

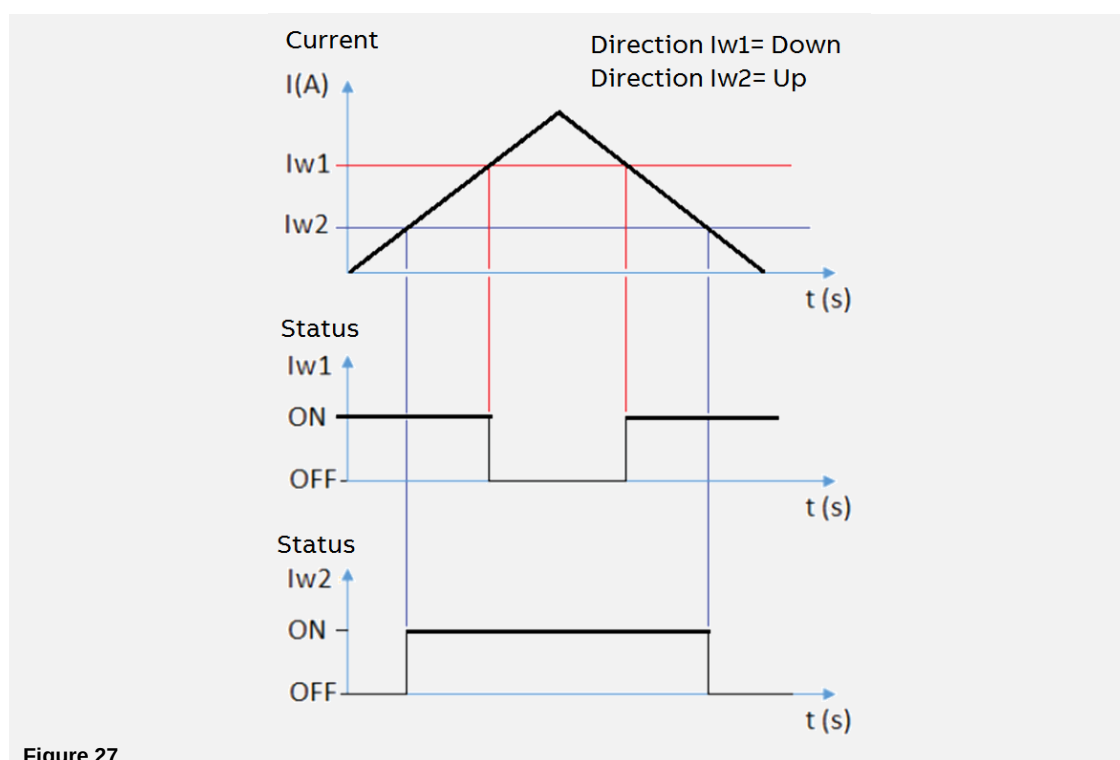


Figure 27

16 - Voltage Protections

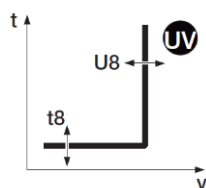
List The Voltage protections available by default for Ekip Hi-Touch and Ekip M Touch models and configurable on the remaining models as an additional software package, are:

Name	Type of protection	Page
UV	Minimum voltage	51
OV	Maximum voltage	52
UV2 ^(NOTE)	Minimum voltage	52
OV2 ^(NOTE)	Maximum voltage	53
Sequenza fasi	Incorrect phases sequence	53
VU	Voltage unbalance	54



NOTE: protections UV2 and OV2 are not available by default with Ekip G Touch. However, they can be integrated by requesting the relative SW package

UV Protection



Function

If one or more line-to-line voltages read by the unit falls below the U8 threshold for a time greater than t8, the protection sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 94)

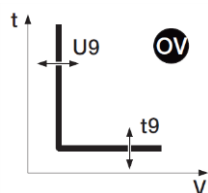
Parameters

Parameter	Description	Default
Enable	Enables/disables protection and availability on menu of the parameters	OFF
Trip Enable	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
Threshold U8	Defines the value that activates the protection. The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.05 Un .. 1 Un with 0.001 Un step	0.9 Un
Time t8	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.05 s ..120 s, with 0.01 s step	5 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus connection it is also possible to access the block functions, see page 75.

OV Protection



Function

If one or more line-to-line voltages read by the unit exceeds the U_9 threshold for a time greater than t_9 , the protection sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 95)

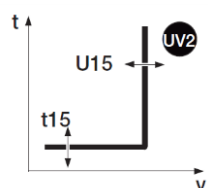
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold U_9</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Volt) and as a relative value (U_n), settable in a range: $1 U_n \dots 1.5 U_n$ with $0.001 U_n$ step	$1.05 U_n$
<i>Time t_9</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: $0.05 \text{ s} \dots 120 \text{ s}$, with 0.01 s step	5 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

UV2 Protection



Function

The UV2 Protection works like the UV Protection: if one or more line-to-line voltages read by the unit falls below the U_{15} threshold for a time greater than t_{15} , the protection sends the TRIP command.

It is independent of UV protection and it is therefore possible to program thresholds and functions of the two protections to take advantage of different system solutions (example: signaling with UV and opening command with UV2 or vice versa, or both for signaling or for tripping).

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 94)

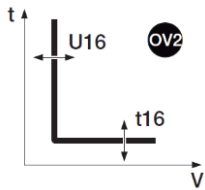
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold U_{15}</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Volt) and as a relative value (U_n), settable in a range: $0.05 U_n \dots 1 U_n$ with $0.001 U_n$ step	$0.9 U_n$
<i>Time t_{15}</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: $0.05 \text{ s} \dots 120 \text{ s}$, with 0.01 s step	5 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

OV2 Protection



Function

The OV2 Protection works like the OV Protection: if one or more line-to-line voltages read by the unit exceeds the U16 threshold for a time greater than t16, the protection sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 95)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold U16</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 1 Un .. 1.5 Un with 0.001 Un step	1.05 Un
<i>Time t16</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.05 s.. 120 s, with 0.01 s step	5 s

Constraints, limitations, and additional functions

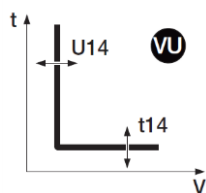
From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page75.

Phase sequence

Phase Sequence protection is triggered when the sequence of line-to-line voltages is not aligned with the sequence set by the user.

The protection can be activated in the *Advanced – Alerts – Phase sequence* menu (page 31) and the desired sequence set in the *Settings - Phase sequence* menu (page 33).

VU Protection



Function

The protection is activated in the event of an imbalance between the line-to-line voltages read by the Trip unit. If the detected imbalance exceeds the U14 threshold for a time greater than t14, the protection sends the TRIP command.

The protection automatically cuts out if the maximum line-to-line voltage value is less than 0.3 Un.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 95)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold I14</i>	Defines the unbalance value that activates the protection. The unbalance is expressed as a percentage value and is calculated as follows: $\% S_{bil} = 100 \times (\Delta_{\max} U_{mi}) / U_{mi}$ in a range: 2 % .. 90 %, with 1 % step. i NOTE: $\Delta_{\max} U_{mi}$: maximum deviation between the three voltages by comparing each network voltage with the average value; U_{mi} : average value of the network voltages	50 %
<i>Time t14</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.5 s .. 60 s, with 0.5 s step	5 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

17 - Advanced Voltage Protections

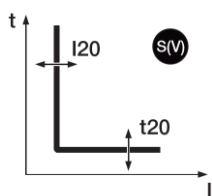
List The Advanced Voltage protections, configurable on all models as an additional software package, are:

Name	Type of protection	Page
S(V)	Short circuit with voltmeter control	55
S2(V) ^(NOTE)	Short circuit with voltmeter control	57
RV	Residual voltage	58



NOTE: protection S2(V) is not available by default with Ekip G Touch. However, it can be integrated by requesting the relative SW package

S(V) Protection



Function

The S(V) protection protects against short circuits, with a threshold sensitive to the voltage value.

If the current of one or more phases exceeds the I20 threshold for a time greater than t20, the protection is activated and sends the TRIP command.

Following a voltage drop, the I20 threshold varies according to two different modes:

- **Scal** (step) provides a step variation based on the parameters UI and Ks.
- **Lin** (linear) provides a dynamic variation based on the parameters UI, Uh, and Ks.

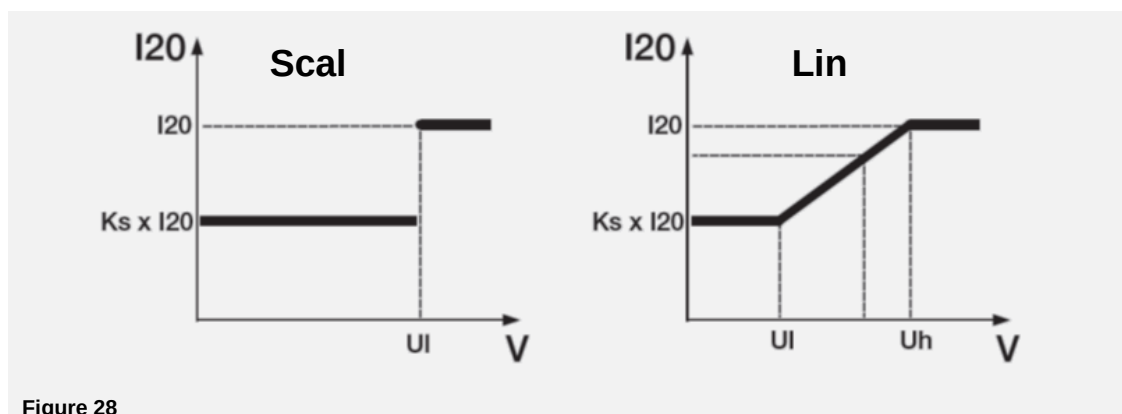


Figure 28

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the formulas for calculations (page 86)
- Chart with tripping curve (page 96)

Parameters

Parameter	Description	Default
Enable	Enables/disables protection and availability on menu of the parameters	OFF
Trip Enable	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
Function	Enables the operating mode Scal or Lin to be selected:	Scal
Threshold I20	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In .. 10In with 0.1 In step	1 In

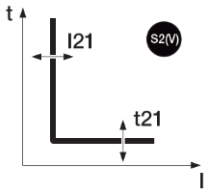
**S(V) Protection
[2]**

Parameter	Description	Default													
Threshold U_l	This voltage determines the change of the trip threshold I_{20} , with different behaviour according to selective mode:	1 Un													
	<table><tr><th>Mod</th><th>Voltage read</th><th>Trip threshold</th></tr><tr><td rowspan="2">Scal</td><td>< U_l</td><td>$K_s \times I_{20}$</td></tr><tr><td>$\geq U_l$</td><td>I_{20}</td></tr><tr><td rowspan="2">Lin</td><td>< U_l</td><td>$K_s \times I_{20}$</td></tr><tr><td>$\geq U_l$ (and < U_h)</td><td>$\frac{I_{20} \times (1 - K_s) \times (U_{mis} - U_h)}{U_h - U_l} + I_{20}$</td></tr></table>		Mod	Voltage read	Trip threshold	Scal	< U_l	$K_s \times I_{20}$	$\geq U_l$	I_{20}	Lin	< U_l	$K_s \times I_{20}$	$\geq U_l$ (and < U_h)	$\frac{I_{20} \times (1 - K_s) \times (U_{mis} - U_h)}{U_h - U_l} + I_{20}$
	Mod		Voltage read	Trip threshold											
	Scal		< U_l	$K_s \times I_{20}$											
			$\geq U_l$	I_{20}											
Lin	< U_l	$K_s \times I_{20}$													
	$\geq U_l$ (and < U_h)	$\frac{I_{20} \times (1 - K_s) \times (U_{mis} - U_h)}{U_h - U_l} + I_{20}$													
The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.2 Un .. 1 Un with 0.01 Un step															
Threshold U_h	The parameter is shown with a Lin curve and helps to calculate the trip threshold I_{21} :	1 Un													
	<table><tr><th>Mod</th><th>Voltage read</th><th>Trip threshold</th></tr><tr><td rowspan="2">Lin</td><td>< U_h (and $\geq U_l$)</td><td>The threshold varies gradually (see above)</td></tr><tr><td>$\geq U_h$</td><td>I_{20}</td></tr></table>		Mod	Voltage read	Trip threshold	Lin	< U_h (and $\geq U_l$)	The threshold varies gradually (see above)	$\geq U_h$	I_{20}					
	Mod		Voltage read	Trip threshold											
	Lin		< U_h (and $\geq U_l$)	The threshold varies gradually (see above)											
			$\geq U_h$	I_{20}											
The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.2 Un .. 1 Un with 0.01 Un step															
Threshold K_s	Threshold I_{20} calculation constant. The value is expressed as a percentage value of the threshold I_{20} , which is settable in a range: 0.1 I_{20} .. 1 I_{20} with 0.01 step	0.6 I_{20}													
Time t_{20}	This is the trip time of the protection. The value is expressed in seconds, which are settable in a range: 0.05 s .. 30 s, with 0.01 s step	0.1 s													

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page75.

S2(V) Protection



Function

Like the S(V) protection, the S2(V) Protection protects against short circuits, with a threshold sensitive to the voltage value.

It is independent of S(V) protection and it is therefore possible to program thresholds and functions of the two protections to take advantage of different system solutions (example: signaling with S(V) and opening command with S2(V) or vice versa, or S(V) and S2(V) both for signaling or for tripping).

If the current of one or more phases exceeds the I21 threshold for a time greater than t21, the protection is activated and sends the TRIP command.

Following a voltage drop, the I21 threshold varies according to two different modes:

- **Scal** (step) provides a step variation based on the parameters UI2 and Ks2.
- **Lin** (linear) provides a dynamic variation based on the parameters UI2, Uh2, and Ks2.

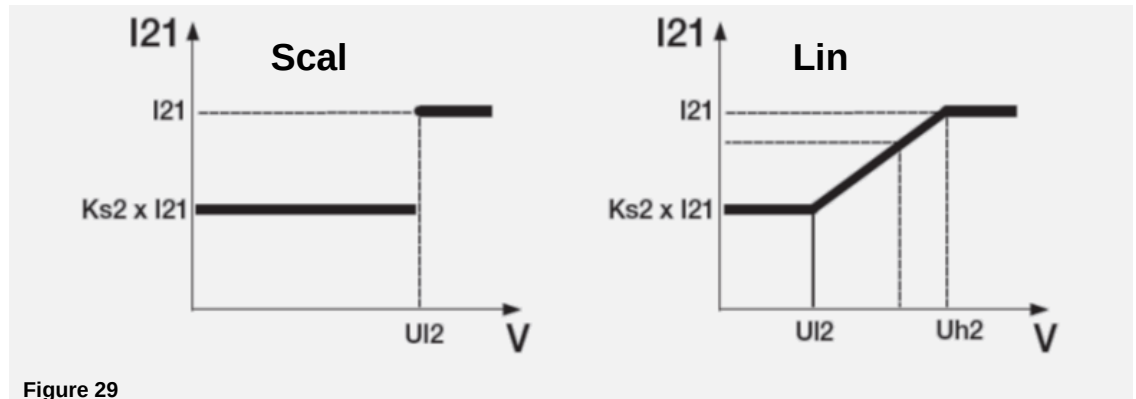


Figure 29

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the formulas for calculations (page 86)
- Chart with tripping curve (page 96)

Parameters

Parameter	Description	Default													
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF													
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF													
<i>Function</i>	Enables the operating mode Scal or Lin to be selected:	Scal													
<i>Threshold I21</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In .. 10In with 0.1 In step	1 In													
<i>Threshold UI2</i>	This voltage determines the change of the trip threshold I21, with different behaviour according to the selected mode: <table border="1"> <thead> <tr> <th>Mod</th><th>Voltage read</th><th>Trip threshold</th></tr> </thead> <tbody> <tr> <td rowspan="2">Scal</td><td>< UI2</td><td>Ks2 x I21</td></tr> <tr> <td>≥ UI2</td><td>I21</td></tr> <tr> <td rowspan="2">Lin</td><td>< UI2</td><td>Ks x I21</td></tr> <tr> <td>≥ UI2 (and < Uh2)</td><td>$\frac{I21 \times (1 - Ks2) \times (U_{mis} - Uh2)}{Uh2 - UI2} + I21$</td></tr> </tbody> </table> The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.2 Un .. 1 Un with 0.01 Un step	Mod	Voltage read	Trip threshold	Scal	< UI2	Ks2 x I21	≥ UI2	I21	Lin	< UI2	Ks x I21	≥ UI2 (and < Uh2)	$\frac{I21 \times (1 - Ks2) \times (U_{mis} - Uh2)}{Uh2 - UI2} + I21$	1 Un
Mod	Voltage read	Trip threshold													
Scal	< UI2	Ks2 x I21													
	≥ UI2	I21													
Lin	< UI2	Ks x I21													
	≥ UI2 (and < Uh2)	$\frac{I21 \times (1 - Ks2) \times (U_{mis} - Uh2)}{Uh2 - UI2} + I21$													

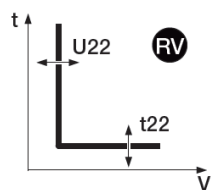
S2(V) Protection [2]

Parameter	Description	Default								
<i>Threshold Uh2</i>	The parameter is shown with a Lin curve and helps to calculate the trip threshold I21:	1 Un								
	<table><tr><th>Mod</th><th>Voltage read</th><th>Trip threshold</th></tr><tr><td rowspan="2">Lin</td><td>< Uh2 (and ≥ UI2)</td><td>The threshold varies gradually (see above)</td></tr><tr><td>≥ Uh2</td><td>I21</td></tr></table>		Mod	Voltage read	Trip threshold	Lin	< Uh2 (and ≥ UI2)	The threshold varies gradually (see above)	≥ Uh2	I21
	Mod		Voltage read	Trip threshold						
	Lin		< Uh2 (and ≥ UI2)	The threshold varies gradually (see above)						
≥ Uh2		I21								
The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.2 Un .. 1 Un with 0.01 Un step										
<i>Threshold Ks2</i>	Threshold I21 calculation constant. The value is expressed as a percentage value of the threshold I21, which is settable in a range: 0.1 I21 .. 1 I21 with 0.01 step	0.6 I21								
<i>Time t21</i>	This is the trip time of the protection. The value is expressed in seconds, which are settable in a range: 0.05 s ..30 s, with 0.01 s step	0.1 s								

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page75.

RV Protection



Function

The protection is activated in case of loss of insulation (check residual voltage U0). If the voltage U0 exceeds the threshold U22 for a time greater than t2, the protection sends the TRIP command.

The protection is always available in 4P configuration.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 96)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold U22</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.05 Un .. 0.5 Un with 0.001 Un step	0.15 Un
<i>Time t22</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.05 s .. 120 s, with 0.01 s step	15 s
<i>Reset Time</i>	This is the alarm maintenance time after the protection has left the alarm condition; this can be useful for keeping the timing active even in the presence of temporary deactivation of the protection. The value is expressed in seconds, settable in a range: 0 s .. 0.2 s, with 0.02 s step	0 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page75.

18 - Frequency Protections

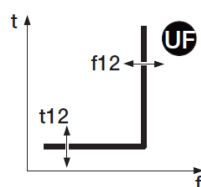
List The Frequency protections available by default for Ekip Hi-Touch and Ekip M Touch models and configurable on the remaining models as an additional software package, are:

Name	Type of protection	Page
UF	Minimum frequency	59
OF	Maximum frequency	60
UF2 ^(NOTE)	Minimum frequency	60
OF2 ^(NOTE)	Maximum frequency	61



NOTE: protections UF2 and OF2 are not available by default with Ekip G Touch. However, they can be integrated by requesting the relative SW package

UF Protection



Function

If the grid frequency read by the Trip unit falls below the f_{12} threshold for a time greater than t_{12} , the protection sends the TRIP command.

The protection automatically cuts out if the maximum line-to-line voltage value is less than 30 V.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 97)

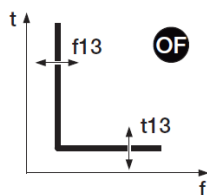
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold f_{12}</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Hertz) and as a relative value (Fn), settable in a range: 0.9 Fn .. 1 Fn with 0.001 Fn step	0.9 Fn
<i>Time t_{12}</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.06 s .. 300 s, with 0.01 s step	3 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

OF Protection



Function

If the grid frequency read by the unit exceeds the $f13$ threshold for a time greater than $t13$, the protection sends the TRIP command.

The protection automatically cuts out if the maximum line-to-line voltage value is less than 30 V.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 97)

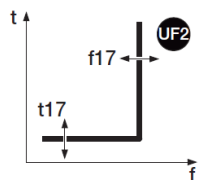
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold $f13$</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Hertz) and as a relative value (Fn), settable in a range: 1 Fn .. 1.1 Fn with 0.001 Fn step	1.1 Fn
<i>Time $t13$</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.06 s .. 300 s, with 0.01 s step	3 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

UF2 Protection



Function

The UF2 Protection works like the UF Protection: if the grid frequency read by the unit falls below the $f17$ threshold for a time greater than $t17$, the protection sends the TRIP command.

It is independent of UF protection and it is therefore possible to program thresholds and functions of the two protections to take advantage of different system solutions (example: signaling with UF and opening command with UF2 or vice versa, or both for signaling or for tripping).

The protection automatically cuts out if the maximum line-to-line voltage value is less than 30 V.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 97)

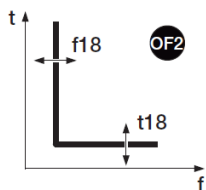
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold $f17$</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Hertz) and as a relative value (Fn), settable in a range: 0.9 Fn .. 1 Fn with 0.001 Fn step	0.9 Fn
<i>Time $t17$</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.06 s .. 300 s, with 0.01 s step	3 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

OF2 Protection



Function

The OF2 Protection works like the OF Protection: if the grid frequency read by the unit exceeds the f_{18} threshold for a time greater than t_{18} , the protection sends the TRIP command.

It is independent of OF protection and it is therefore possible to program thresholds and functions of the two protections to take advantage of different system solutions (example: signaling with OF and opening command with OF2 or vice versa, or both for signaling or for tripping).

The protection automatically cuts out if the maximum line-to-line voltage value is less than 30 V.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 97)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold f_{18}</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Hertz) and as a relative value (Fn), settable in a range: 1 Fn .. 1.1 Fn with 0.001 Fn step	1.1 Fn
<i>Time t_{18}</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.06 s .. 300 s, with 0.01 s step	3 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

19 - Power Protections

List The Power protections, partially available by default for Ekip Hi-Touch and Ekip M Touch models and configurable on the remaining models as an additional software package, are:

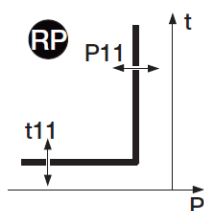
Name	Type of protection	Page
RP	Reversal of active power	62
D ⁽¹⁾	Directional short circuit with adjustable delay	63
OQ ⁽²⁾	Reactive maximum power	65
OP ⁽²⁾	Active minimum power	65
UP ⁽²⁾	Active maximum power	66
RQ ^{(1) (2)}	Reversal of reactive power	67
Cos ϕ	Minimum Cos ϕ	68



NOTES:

- (1) protection not available by default with Ekip G Touch. However, it can be integrated by requesting the relative SW package
- (2) protection not available by default with Ekip Hi-Touch and Ekip M Touch. However, it can be integrated by requesting the relative SW package

RP Protection



Function

If the total active power exceeds the P11 threshold for a time greater than t11, the protection sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 98)

Parameters

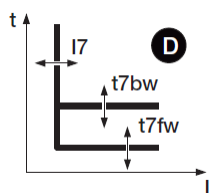
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold P11</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (kW) and as a relative value (Sn), settable in a range: -0.05 Sn .. -1 Sn with 0.001 Sn step NOTES: threshold expressed in Sn preceded by the sign "-" to indicate that it is reversed power	-0.1 Sn
<i>Time t11</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.05 s .. 120 s, with 0.01 s step	10 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

D Protection

Function



D Protection is very similar to S protection plus the ability to recognize current direction during the malfunction period.

The direction of the current allows detecting if the malfunction is upstream or downstream of the device controlled by Ekip Touch.

In ring distribution systems, D protection makes it possible to identify the distribution section where the malfunction occurred and to isolate it without affecting the rest of the system (using zone selectivity).

Depending on the direction of the malfunction, if the current of one or more phases exceeds the I7 threshold (fw or bw) for a time greater than t7 (fw or bw), the protection is activated and sends the TRIP command.

The **direction of the malfunction** is determined by comparing the **direction of the malfunction current detected** with the **direction of reference**.



NOTE: the **direction of reference** is calculated by considering the value set for the **power flow direction** and the **phase sequence** (cyclical direction of the phases):

Sequence of phases set	Power flow set	Sequence of phases detected	Reference direction (forward direction)
123	High → Low	123	High → Low
123	Low → High	123	Low → High
123	High → Low	321	Low → High
123	Low → High	321	High → Low
321	High → Low	123	Low → High
321	Low → High	123	High → Low
321	High → Low	321	High → Low
321	Low → High	321	Low → High

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the formulas for calculations (page 86)
- Chart with tripping curve (page 98)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	ON
<i>Threshold I7 Fw</i>	Defines the value that activates the protection in the event of a forward direction. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In .. 10In with 0.1 In step	2 In
<i>Threshold I7 Bw</i>	Defines the value that activates the protection in the event of backward direction. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In .. 10In with 0.1 In step	2 In
<i>Time t7 Fw</i>	This is the intervention time in the event of a forward direction. The value is expressed in seconds, which are settable in a range: 0.1 s .. 0.8 s, with 0.01 s step	0.2 s
<i>Time t7 Bw</i>	This is the trip time in a backward direction. The value is expressed in seconds, settable in a range: 0.1 s .. 0.8 s, with 0.01 s step	0.2 s

D Protection [2]

Parameter	Description	Default
<i>Zone Selectivity</i>	Activates/deactivates the function and the display availability of selectivity time, see page 76 for details  NOTE: for correct operation of selectivity D, configure OFF selectivity S, S2 and G	OFF
<i>Fw selectivity time</i>	This is the trip time of the protection with the zone selectivity function active, forward direction and selectivity input Fw not present, see page 76for details The value is expressed in seconds, which are settable in a range: 0.1 s .. 0.8 s, with 0.01 s step	0.13 s
<i>Bw selectivity time</i>	This is the trip time of the protection with the zone selectivity function active, backward direction and selectivity input Bw not present, see page 76for details The value is expressed in seconds, which are settable in a range: 0.1 s .. 0.8 s, with 0.01 s step	0.13 s
<i>StartUp enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 78 for details	OFF
<i>StartUp threshold Fw</i>	Protection threshold valid during Startup time, in the conditions in which the function is active and with forward current direction, see page 78 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In .. 10In with 0.1 In step	2 In
<i>StartUp threshold Bw</i>	Protection threshold valid during Startup time, in the conditions in which the function is active and with backward current direction, see page 78 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In .. 10In with 0.1 In step	2 In
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, set details on page 78 The value is expressed in seconds, which are settable in a range: 0.1 s .. 30 s, with 0.01 s step	0.1 s
<i>Min Angle Direction</i>	Ekip Touch calculates the phase displacement angle between measured reactive power and measured power: when the phase displacement becomes greater than the set <i>Min Angle Direction</i> parameter, the unit considers the fault direction The value is expressed in degrees, which are settable in a range of 15 values from 3.6 ° to 69.6 °	3.6 °

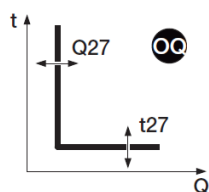
Constraints, limitations, and additional functions

- From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, the selectivity type and the parameters Trip only Forward and Trip Only Backward, see page 78.

Application notes

- Activating D directional protection automatically activates the alarm that controls the phase sequence (that can also be deactivated and activated manually). Notice that in the case of a cyclical sequence of the phases different from the value set, directional protection reverses the direction of reference in case of malfunction with respect to what was expected. The details of phase sequence protection are available on page 53.
- In the event of small over-currents the behavior of the directional protection is influenced by the type of load. To avoid the possibility of an incorrect detection of the direction of the malfunction current in the event of a capacitive load, it is suggested that the regulation of this protection be referred to real malfunctions and not to overloads

OQ Protection



Function

If one or more reactive powers read by the unit exceeds the Q27 threshold for a time greater than t27, the protection sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 99)

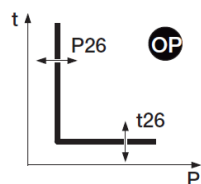
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold Q27</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (kVAR) and as a relative value (Sn), settable in a range: 0.4 Sn .. 2 Sn with 0.001 Sn step	1 Sn
<i>Time t27</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.5 s ..100 s, with 0.5 s step	1 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page75.

OP Protection



Function

If one or more active powers read by the unit exceeds the P26 threshold for a time greater than t26, the protection sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 99)

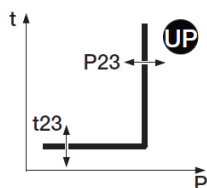
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold P26</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (kW) and as a relative value (Sn), settable in a range: 0.4 Sn .. 2 Sn with 0.001 Sn step	1 Un
<i>Time t26</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.5 s ..100 s, with 0.5 s step	1 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page75.

UP Protection



Function

If one or more active powers read by the unit falls below the P23 threshold for a time greater than t23, the protection sends the TRIP command.

Protection is also active for negative active power (inverse), but is independent of RP protection (inverse active power protection).

The protection automatically cuts out if the maximum line-to-line voltage value is still less than 30 V.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 100)

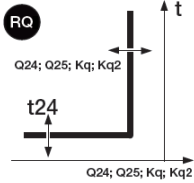
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold P23</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (kW) and as a relative value (Sn), settable in a range: 0.1 Sn .. 1 Sn with 0.001 Sn step	1 Sn
<i>Time t23</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.5 s .. 100 s, with 0.5 s step	1 s
<i>StartUp enable</i>	Activates/deactivates the function and the availability on the menu of the parameters	OFF
<i>StartUp time</i>	This is the time for which the threshold is disabled, calculated from tripping of activation threshold The value is expressed in seconds, which are settable in a range: 0.1 s .. 30 s, with 0.01 s step.	0.1 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

RQ Protection



Function

RQ protection protects against the inversion of reactive power, with threshold adjustable according to the active power.

When the reverse reactive power enters the TRIP area determined by the protection parameters and the powers read for a time greater than t_{24} the protection sends the TRIP command.

The adjustment of the K_q and K_{q2} constants makes it possible to vary the trip threshold, determined by the intersection of the two TRIP areas, whose limits are based on the parameters configured on units

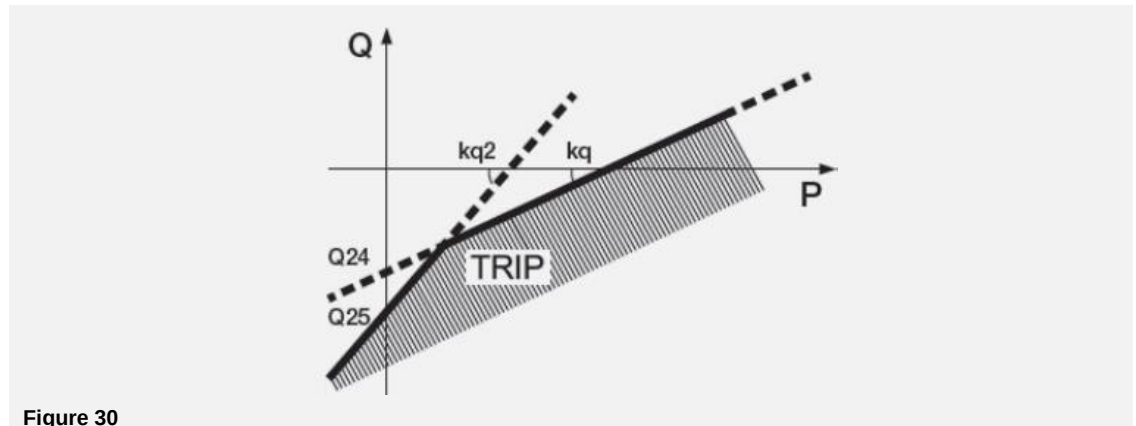


Figure 30

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 100)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>K_q Threshold</i>	Defines the slope of the straight line in relation to the threshold Q24. The value is expressed as an absolute value (angular coefficient of the straight line), settable in a range: -2 ... 2 with 0.01 step	-2
<i>-Q24 Threshold</i>	Is the reactive power that is necessary for defining the trip line and the relative TRIP area The value is expressed both as an absolute value (kVAR) and as a relative value (Sn), settable in a range: 0.1 Sn .. 1 Sn with 0.001 Sn step i NOTE: threshold expressed in Sn is not preceded by the sign “-” but must be understood to be reversed reactive power	0.1 Sn
<i>K_{q2} Threshold</i>	Defines the slope of the straight line in relation to the threshold Q24. The value is expressed as an absolute value (angular coefficient of the straight line), settable in a range: -2 ..2 with 0.01 step	2

RQ Protection [2]

Parameter	Description	Default
-Q25 Threshold	Defines the reactive power value for which the protection is activated and which is necessary for defining the relative TRIP area The value is expressed both as an absolute value (kVAR) and as a relative value (Sn), settable in a range: 0.1 Sn .. 1 Sn with 0.001 Sn step  NOTE: threshold expressed in Sn is not preceded by the sign “-” but must be understood to be reversed reactive power	0.11 Sn
Time t24	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.05 s .. 100 s, with 0.1 s step	100 s
Vmin Threshold	This is the minimum voltage for activating the protection. If at least one network voltage below the threshold Vmin is present, the protection is not active. The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.5 Un .. 1.2 Un with 0.01 Un step	0.5 Un

Constraints, limitations, and additional functions

- Ekip Touch accepts parameters with the following limitations: Q24 < Q25 and Kq < Kq2
- From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

Cos φ The trip occurs when the value of total Cos φ falls below the threshold set.
Total cos φ is calculated as the ratio of Total Active Power to Total Apparent Power.

Parameters

The parameters are available in the *Advanced - Alerts* menu (page 31):

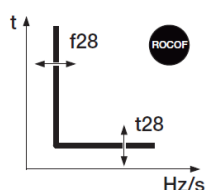
Parameter	Description	Default
Enable	Activates/deactivates protection and availability of protection threshold on menu	OFF
Threshold	Defines the value that activates the protection; it is settable in a range: 0.5 .. 0.95 with 0.01 step	0.9

20 - ROCOF Protections

- List** The ROCOF Protection package can be configured on all models as an additional software package. It includes:

Name	Type of protection	Page
ROCOF	Frequency derivative	69

ROCOF Protection



Function

ROCOF protection protects against rapid frequency variations: if the frequency varies faster than the control variation f_{28} set in the Trip unit for a time greater than t_{28} , the protection sends the TRIP command.

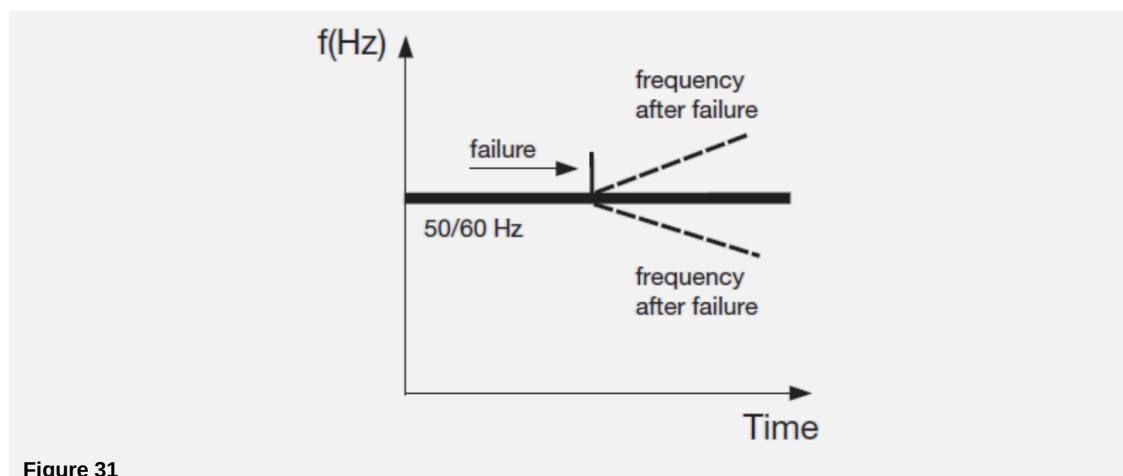


Figure 31

The protection automatically cuts out if the maximum line-to-line voltage value is less than 30 V.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 86)
- Chart with tripping curve (page 101)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold f_{28}</i>	Defines the maximum permitted frequency fluctuation rate over the time; if the limit is exceeded, protection is tripped. The value is expressed as an absolute value (Hz/s) F_n , settable in a range: 0.4 Hz/s .. 10 Hz/s with 0.2 Hz/s step	0.6 Hz/s
<i>Trip direction</i>	Defines whether the protection monitors an increase (Up), a decrease (Down) or both variations (Up or Down)	Up or Down
<i>Time t_{18}</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.06 s .. 300 s, with 0.01 s step	3 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

21 - Adaptive Protections

- List** The Adaptive Protection package, available by default for Ekip Hi-Touch and Ekip M Touch models and configurable on the remaining models as an additional software package, includes the protection:

Name	Type of protection	Page
Doppio Set	Double protection settings	70

-
- Dual Setting** The function allows having two different protection configurations, one as an alternative to the other, managing the setting changes with programmable events.

The function can be activated in the *Settings - Dual Setting* menu (page 33).

Parameter	Description	Default
Enable	Activates/deactivates the function	OFF
Default set	Defines the main set of protections and the secondary set of protections (which is activated in the presence of the programmed event).	Set A

In the *Advanced - Functions* menu it is possible to program the event that causes the settings change (from default to secondary). See the chapter *Programmable commands* (page 82).

22 - Motor Protections

- List** The Motor Protection package, available by default and only for Ekip M-Touch, includes the protections:

Name	Type of protection	Page
R JAM	rotor blockage (after startup)	72
R STALL	rotor blockage (always active)	72
UC	Undercurrent	73
U	Phase loss	73
PTC	over temperature	74

Motor Protections comply with the IEC 60947-4-1 standard and related annex 2.

Trip class and parameters

The trip class cited in the IEC 60947-4-1 standard is available in the Trip unit with *Motor Class* parameter (page 123), and its value determines:

- The trip time L (*Time t1*)
- The start-up time (*Motor start-up*, calculated from when at least one phase exceeds the fixed threshold of $0.25 \times I_1$, during which some protections are inhibited)
- The reset time from thermal memory L following a TRIP (*tmem res*)

Motor Class	t1 (s)	Motor start-up (s)	tmem res (min)
5E	12	3	5
10E	22	5	10
20E	45	10	20
30E	72	20	33

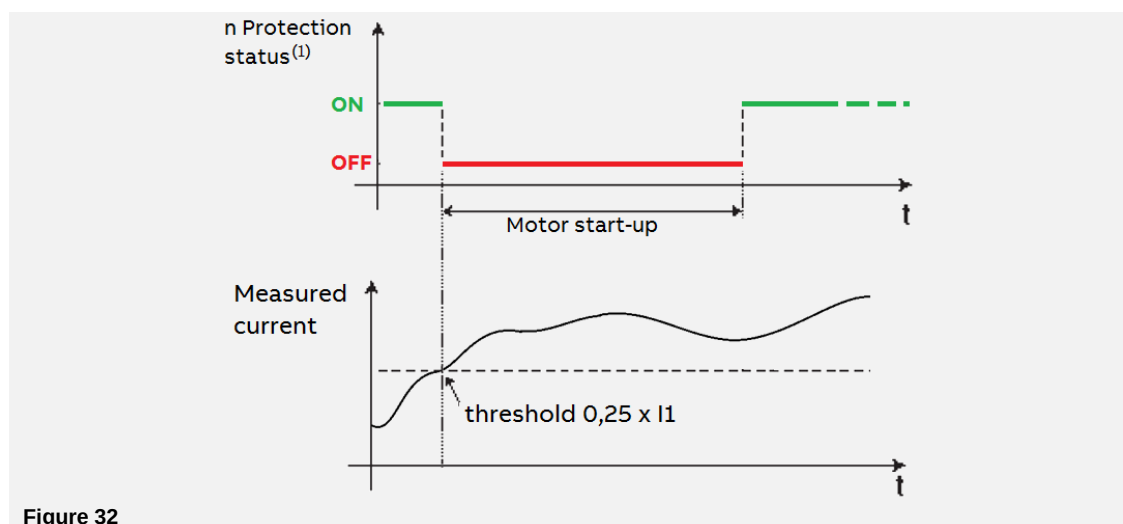


Figure 32



NOTE 1: temporary shutdown during Motor Start-up is valid and active for the G, R Jam and U protections, if enabled. If the protections are disabled, they remain off before and after Motor start-up

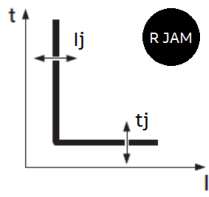
Thresholds

The thresholds of R Stall, R Jam and UC, unlike other current protections, do not refer to I_n but rather to threshold I_1 (L protection), called I_r in the respective configuration menus.

Example:

Rating Plug = 800 A, Threshold $I_1 = 0.8 I_n (\Rightarrow 640 \text{ A})$; Threshold $I_j = 2.5 I_r (\Rightarrow 2.5 \times 640 \text{ A} = 1600 \text{ A})$

R JAM Protection



Function

R Jam protects against motor blocks: if the current of one or more phases exceeds the I_j threshold for a time greater than t_j , the protection is activated and sends the TRIP command.

R Jam protection is inhibited during *Motor start-up*.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the formulas for calculations (page 87)
- Chart with tripping curve (page 101)

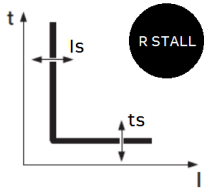
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold I_j</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (A) and as a relative value (I_r), settable in a range: $2 I_r \dots 10 I_r$, con step $0.1 I_r$	2.0 I_r
<i>Time t_j</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: $1 \text{ s} \dots 10 \text{ s}$, con step 0.5 s	2 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

R STALL Protection



Function

R Stall protects against motor blocks, but in contrast with R Jam it is not inhibited during *Motor Start-up*: if the current of one or more phases exceeds the I_r threshold for a time greater than t_r , the protection is activated and sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the formulas for calculations (page 87)
- Chart with tripping curve (page 101)

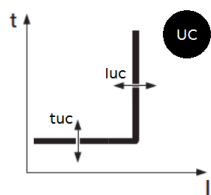
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold I_s</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (A) and as a relative value (I_r), settable in a range: $1 I_r \dots 10 I_r$, con step $0.1 I_r$	1.0 I_r
<i>Time t_s</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: $2 \text{ s} \dots 10 \text{ s}$, con step 0.5 s	2 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 75.

UC Protection



Function

UC protects the motor under reduced or no-load conditions: if all the currents read by units fall below the I_{uc} threshold for a time greater than t_{uc} , the protection sends the TRIP command.

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 87)
- Chart with tripping curve (page 102)

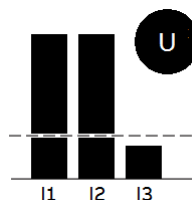
Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold I_{uc}</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (A) and as a relative value (I_r), settable in a range: $0.5 I_r \dots 0.9 I_r$, con step $0.1 I_r$	$0.5 I_r$
<i>Time t_{uc}</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: $1 \text{ s} \dots 20 \text{ s}$, con step 0.5 s	1 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus connection it is also possible to access the block functions, see page 75.

U Protection



Function

U protects the motor in case of loss of a phase: if the rms value of at least one phase falls below the threshold of $0.1 I_n$ and at the same time at least one current is greater than 0.25 for a time greater than t_u , the protection sends the TRIP command. The protection is inhibited during *Motor start-up*.

If the U protection alarm occurs during *Motor start-up*, the trip unit calculates the trip time using the lower value between t_u and half of *Motor start-up*.



IMPORTANT: in this case, if the alarm occurs at start-up and the calculated TRIP time is such that it persists even at the close of the Motor start-up window, the trip unit still considers the minimum value previously calculated as TRIP time

To verify and simulate the trip times based on all the parameters, see:

- Protection summary table with the operating characteristics (page 87)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Time t_{uc}</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: $1 \text{ s} \dots 10 \text{ s}$, con step 0.5 s	1 s

Constraints, limitations, and additional functions

From the service connector (with Ekip Connect) or with system bus connection it is also possible to access the block functions, see page 75.

PTC Function

PTC protects against engine overheating.

The alarm is supplied to the Trip unit by the *Ekip CI* module, which can be connected to a thermocouple for controlling the motor temperature. If the measured temperature exceeds the value of 120°C for more than one second the protection sends the TRIP command .

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF

23 - Additional functions and protections

Introduction

Some protections are provided with additional functions that extend their characteristics and performance:

Nome	Tipo di protezione	Pagina
Thermal memory	Overheating of the cables	75
Zone selectivity	Management of TRIPs in a network of switches	75, 76
Blocks	Protection block according to programmable events	79
Startup	Different thresholds according to control thresholds	78

Installation of accessory modules allows the respective functions to be activated:

Name	Type of protection	Page
Gext	External earth fault with adjustable delay	80
Rc	Residual current	82
Synchrocheck	Synchronism between two independent voltage sources	179

Thermal memory

The function, which can be activated for the L and S protections, prevents the overheating of cables connected to the device controlled by Ekip Touch. In the case of multiple opening commands in a short period of time the unit considers the time elapsed between the commands and the magnitude of the malfunctions to reduce the trip time.



NOTE: the function changes the trip time even in the event of overloads that do not lead to the opening command

Zone selectivity S, S2, G and Gext

Preface

The function, which can be activated for the S, S2, G and Gext protections (if available and enabled), allows connecting several devices belonging to the same system, including Ekip Touch, to better manage the trip commands in case of S, S2, G and Gext protections.

The function allows coordinating the devices so that in the event of a malfunction:

- The device closest to the malfunction is triggered
- The other devices are blocked for a programmable time



NOTE: the connection is possible between ABB devices that have the zone selectivity function

Characteristics

Ekip Touch has five selectivity links, available on the upper terminal box:

Name	Type	Description	Connection
Szi	Input	Protections S and S2 selectivity input	From devices downstream
Szo	Output	Protections S and S2 selectivity output	To device upstream
Gzi	Input	Protections G selectivity input	From devices downstream
Gzo	Output	Protections G selectivity output	To device upstream
Szc	Municipality	Municipality of selectivity network	The entire selectivity network

**Zone selectivity
S, S2, G and Gext
[2]**

Configuration

For a correct configuration of the selectivity network of one or more protections:

1. Connect the zone selectivity outputs of the same type (example: Szo) of the devices belonging to the same zone to the zone selectivity input of the device immediately upstream (example: Szi).
2. Connect all the Szcs of the devices of the same network to each other.
3. The time t2 must be configured to a value greater than or equal to t2 sel + 50 ms, excluding the device that is furthest downstream in its network.

Logical table

The table shows all cases in which – with zone selectivity enabled on the device – there is an alarm condition or a zone selectivity signal coming from another device.



NOTES:

- The table shows the case of S protection but it is also valid for the other protections – G, S2 and Gext – each with their respective connections
- If the protection selectivities that share the same connections are active at the same time (example: S and S2), the inputs/outputs are managed with OR logic. Carefully configure the parameters of the protections to avoid unwanted openings

Condition	Szi	Szo	Tripping time	Comments
If < I2	0	0	No TRIP	The device is not in alarm status
If < I2	1	1	No TRIP	The device is not in alarm status but transmits the selectivity signal received from the device upstream
If > I2	0	1	t2 sel	The device is in alarm status and is the first to detect the fault: trips in the time t2 sel
If > I2	1	1	t2	The device is in alarm status but is not the first to detect the fault: trips in the time t2

D Zone selectivity

Preface

The function, which can be activated for the D protection (if available and enabled), allows connecting several devices belonging to the same system, including Ekip Touch, to better manage the trip commands in case of D protection.

It is particularly useful in ring and grid systems where it is essential to define both the area and the direction of the flow that powers the malfunction.

The function allows coordinating the devices so that in the event of a malfunction:

- The device closest to the malfunction is triggered
- The other devices are blocked for a programmable time



NOTES:

- The connection is possible between ABB devices that have the zone selectivity function
- For correct use of the D selectivity function disable the zone selectivity of the S, S2, G and Gext protections

D Zone selectivity

[2]

Characteristics

Ekip Touch has five selectivity links:

Name	Type	Description	Name for D
Szi	Input	Selectivity input in Forward direction	DFin
Szo	Output	Selectivity output in Forward direction	DFout
Gzi	Input	Selectivity input in Backward direction	Dbin
Gzo	Output	Selectivity output in Backward direction	Dbout
Szc	Municipality	Municipality of selectivity network	SZc

Configuration

For a correct configuration of D selectivity in a ring system:

1. Connect the selectivity output of each device (example: DFin) to the selectivity input going the same direction on the device immediately following (example: DFout).
2. Connect all the Szcs of the devices of the same network to each other.

Logical table

The table shows all cases in which – with zone selectivity enabled on the device – there is an alarm condition or a zone selectivity signal coming from another device.

If the **direction of the malfunction** is the same as the **direction of reference** (see page 63 for details) then the Forward output is activated. If instead the direction is contrary, the Backward output is activated.

Fault direction	Condition	DFin	Dbin	DFout	Dbout	Tripping time	Comments
Forward	If < I7 Fw	0	x	0	x	No TRIP	The device is not in alarm status
Backward	If < I7 Bw	x	0	x	0		
Forward	If < I7 Fw	1	x	1	x	No TRIP	The device is not in alarm status but transmits the selectivity signal received on the output of the reference direction
Backward	If < I7 Bw	x	1	x	1		
Forward	If > I7 Fw	0	x	1	x	t7 Fw sel	The device is in alarm status and is the first to detect the fault: trips in the time t7 Fw sel or t7 Bw sel
Backward	If > I7 Bw	x	0	x	1	t7 Bw sel	
Forward	If > I7 Fw	1	x	1	x	t7 Fw	The device is in alarm status but is not the first to detect the fault: trips in the time t7 Fw (or t7 Bw)
Backward	If > I7 Bw	x	1	x	1	t7 Bw	



NOTE: with zone selectivity activated, if the direction of the malfunction cannot be determined the unit intervenes taking into consideration the lowest programmed time between t7 Fw and t7 Bw, without activating any output (DFout or Dbout).

Trip Only Forward and Backward

From service connector (with Ekip Connect) or with system bus communication it is possible to configure D protection (if available and enabled) with 2 further parameters:

- *Trip only Forward*: if activated, D protection manages opening commands only if a forward direction is detected
- *Trip only Backward*: if activated, D protection manages opening commands only if a backward direction is detected

A malfunction in the opposite direction is only managed for alarm information.

Type of selectivity

From service connector (with Ekip Connect) or with system bus communication, for S, S2, G, Gext, D protections (if available and enabled) it is possible to configure the zone selectivity inputs and some outputs:

- *Standard*: operation as per standard zone selectivity logic (default configuration)
- *Custom*: in this mode it is possible to select the activation event of the zone selectivity input or output.



IMPORTANT: in the Custom configuration the only event to activate zone selectivity is the one set, and therefore the standard selectivity operation is not active (change recommended only for expert technical staff)

Startup

The function, which can be activated for S, I, G, Gext, S2, D, and UP protections (if available and enabled), allows modifying the protection threshold (*Startup threshold*) for a period set by the user (*Startup time*).



NOTE: for UP protection the startup is to be understood as the during which the protection is disabled

The period is activated when a threshold is exceeded (activation threshold), programmable by the user with Ekip Connect or system bus, valid and verified for all phase currents.

The Startup condition is extinguished after the Startup time and is reactivated the next time the activation threshold is exceeded.



NOTE: startup does not reoccur while at least one current remains above the activation threshold level

Below is a graphical representation with S protection:

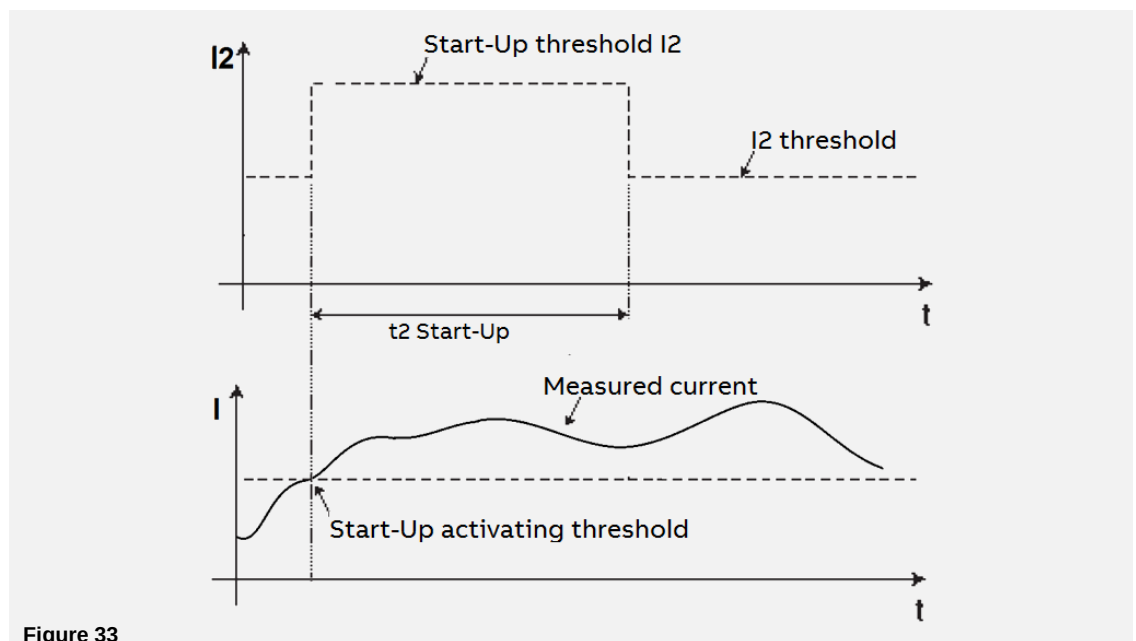


Figure 33

Block functions From the service connector (with Ekip Connect) or with system bus communication, for some protections it is possible to configure six blocks, useful for deactivating protection according to programmable events:

Block name	Description
BlockOnProgStatusA	Active block if the programmable status A is true
BlockOnProgStatusB	Active block if the programmable status B is true
BlockOnProgStatusC	Active block if the programmable status C is true
BlockOnProgStatusD	Active block if the programmable status D is true
BlockOnStartUp	Active block during StartUp time (if the StartUp for the specific protection is available and activated)
BlockOnOutOfFrequency	Active block if the measured frequency is outside the range 30 Hz-80 Hz

Each block is independent and has its own activation command (*Block On*). In any case, each protection can be configured with multiple block conditions (operation in OR logic).

The protections that have blocks are: S, I, G, MCR, Gext, S2, D, S(V), S2(V), UV, OV, VU, UV2, OV2, UP, OP, RP, RQ, OQ, RV, UF, OF, UF2, OF2, ROCOF, UC, U, R Jam, R Stall.



IMPORTANT: blocks can cause:

- Increase in trip times (max: + 30 ms), due to the verification of the event itself (example: frequency control)
- Unwanted deactivation of the protection if the block is associated with states or module signals on the local bus and the auxiliary power supply is missing. In this case it may be useful to program the event considering also the status of the auxiliary power supply (Supply from Vaux).
- Unwanted deactivation of the protection if the block is associated with frequency measurements and the voltage is lower than the minimum calculation threshold



IMPORTANT: if the function is activated, during startup the blocks are deactivated (excluding BlockOnStartup, which works during this period)

Synchrocheck The *Ekip Synchrocheck* module recognizes and signals if there are synchronism conditions between two independent voltage sources (e.g. generator + grid) for closing the interconnection switch.

The descriptions of the module, the protection function and the performance are outlined in the chapter dedicated to the modules (page 171).

Gext protection



Function

The Gext protection protects against the earth fault, detecting the fault current with the relevant *S.G.R. external toroid*

If the current from *toroid S.G.R* exceeds threshold I_{41} the protection is tripped and after a time determined by the read value and by the set parameter, it sends the TRIP command.

To check and simulate trip times in accordance with all the parameters, see:

- table summarizing the protections with the operating characteristics (page 85)
- graph with trip curve (page 93)

Parameters

The configuration of the sensor is available in the *Settings* menu (page 33):

Parameter	Description	Default
<i>External toroid</i>	Enables the presence of the <i>S.G.R. external toroid to be activated</i>	OFF
<i>Toroid size</i>	Enables the reference current of the protection to be selected from four sizes available from 100 A to 800 A  IMPORTANT: the current selected on the menu has to be consistent with the size of the external toroid S.G.R. connected to the unit	100 A

The configuration of the protection è available on the *Advanced* menu (page 31):

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	ON
<i>Function</i>	Determines the curve dynamic and threshold or the calculation of trip time: • $t = k$: trip at set time • $t = k/I^2$: dynamic inverse time-delay trip	$t = k$
<i>Threshold I_{41}</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (I_n , referring to the size of the outer toroid), settable in a range: $0.1 I_n \dots 1 I_n$ with $0.001 I_n$ step.	$0.2 I_n$
<i>Time t_{41}</i>	On the basis of the selection of the curve type, it is the trip time and contributes to calculating timing. The value is expressed in seconds, settable in a range: $0.1 \text{ s} \dots 1 \text{ s}$, with 0.1 s step.	0.4 s
<i>Pre-alarm I_{41}</i>	Enables a warning to be sent that the measured current is near the threshold triggering the protection. The value is expressed as a percentage of the threshold I_1 , which is settable in a range $50 \% I_{41} - 90 \% I_{41}$, with 1% step. The pre-alarm threshold is deactivated in two cases: • current below the prealarm threshold I_{41} • current above threshold I_{41}	$90 \% I_{41}$

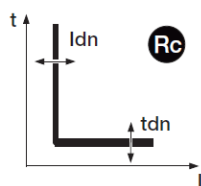
Gext protection
[2]

Parameter	Description	Default
<i>Zone Selectivity</i>	Activates/deactivates the function and the display availability of selectivity time, see page 75 for details  NOTES: - the function is available only with curve $t = k$ - in the presence of both <i>G</i> and <i>Gext</i> active selectivity, the inlet and output are shared with an OR function: it is also sufficient for just one of the two to be activated to stimulate inputs and outputs	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function active and the selectivity input not present see page 75 for details The value is expressed in seconds, settable in a range: 0.04 s .. 0.2 s, with 0.01 s step	0.04 s
<i>StartUp enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 78 for details	OFF
<i>StartUp threshold</i>	Protection threshold valid during Startup time, in conditions in which the function is active, see page 78 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.2 In .. 1In with 0.1 In step	0.2 In
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, set details on page 78 The value is expressed in seconds, settable in a range: 0.1 s .. 30 s, with 0.01 s step	0.1 s

Constraints, limits and additional functions

- with curve $t = k/I^2$, the protection trip time is forced to t_{41} if calculations show a theoretical value lower than t_{41} .
- Ekip Touch activates and shows the parameters of the Gext protection if the presence of the S.G.R sensor has been enabled on the Settings menu (page 33); the activation of the protection includes checking for the presence of the S.G.R and the indication on the diagnosis bar in the event of alarm/absence
- the protection is inhibited automatically by the unit if the absence of the S.G.R. toroid has been detected.
- from the service connector (via Ekip Connect) or with a system bus communication, also locking functions and selectivity type can be accessed, see page 75

RC Protection



Function

The RC protection protects against residual earth faults, by detecting the fault current with the relative RC external toroid.

If the current from the RC toroid exceeds threshold I_{dn} for a longer time than T_{dn} , the protection sends the TRIP command.

To check and simulate trip times in accordance with all the parameters, see:

- table summarizing the protections with the operating characteristics (page 85)
- graph with trip curve (page 102)

Parameters

Parameter	Description	Default
<i>I_{dn} threshold</i>	Defines the value that activates the protection; the value is expressed in amps, which are settable in a range of values comprised between 3 A and 30 A	3 A
<i>Time T_{dN}</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range comprised between 0.05 s and 0.8 s	0.06 s

Constraints, limits and additional functions

Ekip Touch activates and shows the parameters of the RC protection if the following constraints have been complied with:

1. *Rating Plug* RC model fitted and installed.
2. *Ekip Measuring* module fitted and installed.

Activating the protection includes checking for the presence of the RC sensor and signalling on the diagnosis bar in the event of alarm/absence.

Programmable commands

Eight commands with programmable activation are available depending on signals or events. Located in various Ekip Touch menus, the commands are:

Name	Description	Path (page)
<i>External trip</i>	Sends a TRIP command	<i>Advanced - Functions (31)</i>
<i>Trip RESET</i>	Reset of the trip signal	
<i>Switch on SET B</i>	Check protections set, from Set A to Set B	
<i>Energy RESET</i>	Reset of energy counters	<i>Measurements- Energy (32)</i>
<i>YO Command</i>	Sends an open command to YO	<i>Settings - Functions (33)</i>
<i>YC Command</i>	Sends a close command to YC	
<i>Switch On LOCAL</i>	Configuration change, from Remote to Local	<i>Settings - Modules - Functions (33)</i>
<i>Signalling RESET</i>	Reset contacts of signalling modules	

Parameters

Each command has two programmable parameters:

Parameter	Description	Default
<i>Function</i>	One or several events (up to eight, in AND or OR logic configuration) to activate command. The Custom configuration can be programmed via Ekip Connect	Deactivated
<i>Delay</i>	Is the minimum time of persistence of the event before the command is sent; the value is expressed in seconds, which are settable in a range: 0 s .. 100 s, with 0.1 s step	0 s



IMPORTANT: the commands are sent if all the operating conditions expected by the units are found (connections, power supplies, alarms, etc.).

Logical Selectivity - presentation

Zone Selectivity via Link Bus is referred to as Logical Selectivity.

Logical Selectivity can be implemented for a maximum of 12 of the 15 actors that can be associated with Ekip Touch via Link Bus (see *Ekip Link* module, page 161).

Parameters

For each protection whose zone selectivity is to be activated, the parameter to enable the function available between the parameters that can be set for the protection must be set.

Then, in addition to these parameters, the Selectivity time is also activated for the setting.

Zone Selectivity can only be set through the Ekip Connect software.



NOTE: all the parameters and configurations that follow are available with Ekip Connect with the Ekip Link module connected and switched on

Logical Selectivity - Setting

Some parameters can be configured on the *Ekip Link Configuration* page:

- Selectivity type selection: hardware or mixed (hardware and logical)
- Entry of the IP address of each actor present. Entry enables the display of the configuration parameters and the status indicators on the various pages
- For each actor associated with Ekip Touch via Link Bus and for which the logical selectivity must be implemented, the function must be enabled (the *Selectivity Actor* parameter must be set to *True*)

On the *Ekip Link advanced selectivity* page, **selectivity masks** are available for each actor. The mask allows selecting the actors' protections (S, G, D-Forward, D-Backward, S2, Gext) that activate the Ekip Touch selectivity input (e.g. actor 1, protection mask S = S2: the Ekip Touch S selectivity will be active in the presence of actor 1's S2 signals).

In this configuration, if the function is enabled for S protection and it is in an alarm state, the hardware block signal S/D-Forward and the S logical selectivity bit are activated at the output. Based on the block signals:

- If the S/D-Forward hardware block signal and the S2 or Gext logical selectivity bits of actor 1 are not active at the input, the opening command is sent according to the selectivity time set for the S protection
- If the S/D-Forward hardware block signal is active at the input or the mixed selectivity is selected and the S2 or Gext logical selectivity bits of actor 1 are active, a time equal to the S tripping time is initiated (and the opening command is sent only if the S protection is still in alarm after this time)



NOTES:

- The output and input logical selectivity bits are those in the data packets shared by the releases via Link Bus
- The S/D-Forward hardware output (G/D-Backward) is activated only if the S or D-Forward protections (G or D-Backward) are active, and the S/D-Forward hardware input (G/D-Backward) acts as a block only for the S and D-Forward protections (G and D-Backward), regardless of whether only hardware or mixed selectivity is selected



IMPORTANT: if only hardware selectivity is selected, the logical selectivity bits are ignored at the input, but they are activated at the output

Selectivity masks

Selectivity masks include the *Remote Programmable States A* and *B*: these two parameters, available on the *Ekip Link Configuration* page allow selecting the event (or the combination of multiple events) and the actor of reference that activates the selectivity input.

There are 2 additional states – *C* and *D* – but they are not configurable for Zone Selectivity. All 4 programmable states are used for the Programmable Logic function (see *Ekip Link* module, page 161).



NOTE: the Programmable Logic function is independent from the Zone Selectivity function

**Logical
Selectivity -
Repetition**

The *Ekip Link advanced selectivity* page includes the parameter **Repeat Configuration mask** that allows selecting the protections whose logical selectivity bit – if present at the input – must be propagated regardless of the protection state of the current unit.



NOTE: *the parameter acts exclusively on the selectivity bits, it does not affect the hardware outputs*

**Logical
Selectivity -
Diagnostics**

With both hardware and logical selectivity, *diagnostics* show possible wiring errors of the hardware selectivity signals, verifying their continuity.

In the *Ekip Link Diagnostics Configuration* page one can: enable diagnostics, configure the time interval between one check and the next, select the inputs to check for each active actor (S/D_Forward, G/D_Backward).

Then:

- A check of the hardware inputs is performed at regular intervals
- If the input of an actor is configured for diagnostics using Ekip Touch (e.g. input S of actor 3) and the same input is not active at the time of the test, the actor stimulates the output (e.g. actor 3 activates output S) for a short time: Ekip Touch considers the test outcome to be positive if it correctly receives the message on its input, otherwise it signals an error
- If the hw input is active the diagnostic is not performed: if the input configured for diagnostics is active at the time of the test, the diagnostic is not performed and the parameter **Detection status** in the *Ekip Link Status* page shows: Unknown

**Logical
Selectivity -
errors and
inconsistency**

Regardless of the diagnostics, if a hardware input is active and none of the logical selectivity bits of the associated actors are active, a line inconsistency is signaled on the *Ekip Link Status* page for this input.



NOTE: *to check line inconsistency all the actors associated with the unit are checked, even those for which the function has not been enabled (the Selectivity Actor parameter has not been set to the value: True)*

A line inconsistency (independent of diagnostics) is indicative of a possible configuration error (for example: a hardware input of the release and connected to the hardware output of a device not associated via Link Bus, or of an actor for which the function has not been enabled).

- To avoid a line inconsistency from being signaled, the devices whose hardware outputs are connected to the Ekip Touch hardware inputs must also be connected to the Link Bus and associated with Ekip Touch, while it is not necessary for the function to be enabled (the Selectivity Actor parameter does not have to be set to the value: *True*)

25 - Performance tables

General notes

- The performances shown in the following tables are valid with intervention time ≥ 100 ms and temperature and signals within operating limits. If these constraints are not respected, tolerances can increase.
- Ekip Touch sends the TRIP command if the signal read exceeds the threshold for a time longer than what is set (or resulting from the formula)
- With a time-dependent tripping curve the calculation refers to a signal that maintains a constant value throughout the duration. Any variation of the alarm signal will result in a different trip time
- The supplementary notes are shown after all the tables

Standard Protections

Protection [ANSI code]	Trip time $t_t^{(1)}$	Trip threshold tolerance ⁽³⁾	Trip time tolerance
L [49]	Curve $t = k/I^2 \Rightarrow t_t = \frac{t_1 \times 9}{\left(\frac{I_f}{I_1}\right)^2}$ Curves 60255-151 $\Rightarrow t_t = \frac{t_1 \times a \times b}{\left(\left(\frac{I_f}{I_1}\right)^k - 1\right)}$	Activation for I_f in the range: (1.05-1.2) $\times I_1$	$\pm 10 \%$ with $I_f \leq 6 \times I_n$ $\pm 20 \%$ with $I_f > 6 I_n$
S [50TD / 51]	Curve $t = k \Rightarrow t_t = t_2$ Curve $t = k/I^2 \Rightarrow t_t = \frac{t_2 \times 100}{I_f^2}$	$\pm 7 \%$ with $I_f \leq 6 I_n$ $\pm 10 \%$ with $I_f > 6 I_n$	The better of: $\pm 10 \%$ or ± 40 ms $\pm 15 \%$ with $I_f \leq 6 \times I_n$ $\pm 20 \%$ with $I_f > 6 I_n$
S2 [50TD]	$t_t = t_5$	$\pm 7 \%$ with $I_f \leq 6 I_n$ $\pm 10 \%$ with $I_f > 6 I_n$	The better of: $\pm 10 \%$ or ± 40 ms
I [50]	$t_t \leq 30$ ms	$\pm 10 \%$	--
G [50N TD / 51N]	Curve $t = k \Rightarrow t_t = t_4$ Curve $t = k/I^2 \Rightarrow t_t = \frac{2}{\left(\frac{I_f}{I_4}\right)^2}$	$\pm 7 \%$	The better of: $\pm 10 \%$ or ± 40 ms ⁽²⁾ $\pm 15 \%$
MCR	$t_t \leq 30$ ms	$\pm 10 \%$	--
2I [50]	$t_t \leq 30$ ms	$\pm 10 \%$	--
IU [46]	$t_t = t_6$	$\pm 10 \%$	The better of: $\pm 10 \%$ or ± 40 ms with $t_6 < 5$ s; ± 100 ms with $t_6 \geq 5$ s

Startup

Protection	Trip time t_t	Trip threshold tolerance ⁽³⁾	Trip time tolerance
S StartUp	$t_t = t_2$ startup	$\pm 7 \%$ with $I_f \leq 6 I_n$ $\pm 10 \%$ with $I_f > 6 I_n$	The better of: $\pm 10 \%$ or ± 40 ms
I StartUp	$t_t \leq 30$ ms	$\pm 10 \%$	--
G StartUp	$t_t = t_4$ startup	$\pm 7 \%$	The better of: $\pm 10 \%$ or ± 40 ms
S2 StartUp	$t_t = t_5$ startup	$\pm 7 \%$ with $I_f \leq 6 I_n$ $\pm 10 \%$ with $I_f > 6 I_n$	The better of: $\pm 10 \%$ or ± 40 ms

Voltage Protections

Protection [ANSI code]	Trip time t_t	Trip threshold tolerance ⁽³⁾	Trip time tolerance
UV [27] / UV2 [27]	$t_t = t8 (t15)$	$\pm 2 \%^{(4)}$	the better of: $\pm 10 \%$ or ± 40 ms with $t8 < 5$ s ± 100 ms with $t8 \geq 5$ s
OV [59] / OV2 [59]	$t_t = t9 (t16)$	$\pm 2 \%^{(4)}$	the better of: $\pm 10 \%$ or ± 40 ms with $t9 < 5$ s ± 100 ms with $t9 \geq 5$ s
VU [47]	$t_t = t14$	$\pm 5 \%$	the better of: $\pm 10 \%$ or ± 40 ms with $t14 < 5$ s ± 100 ms with $t14 \geq 5$ s

Advanced Voltage Protections

Protection [ANSI code]	Trip time t_t	Trip threshold tolerance ⁽³⁾	Trip time tolerance
S(V) [51V] / S2(V) [51V]	$t_t = t20 (t21)$	$\pm 10 \%$	the better of: $\pm 10 \%$ or ± 40 ms with $t20 < 5$ s ± 100 ms with $t20 \geq 5$ s
RV [59N]	$t_t = t22$	$\pm 10 \%$	the better of: $\pm 10 \%$ or ± 40 ms with $t22 < 5$ s ± 100 ms with $t22 \geq 5$ s

Frequency Protections

Protection [ANSI code]	Trip time t_t	Trip threshold tolerance ⁽³⁾	Trip time tolerance
UF [81L] / UF2 [87L]	$t_t = t12 (t17)$	$\pm 1 \%^{(5)}$	The better of: ± 100 ms with $t12 \geq 5$ s $\pm 10 \%$ (min = 30 ms) or ± 40 ms with $t12 < 5$ s
OF [81H] / OF2 [87H]	$t_t = t13 (t18)$	$\pm 1 \%^{(5)}$	The better of: $\pm 10 \%$ or ± 40 ms with $t13 < 5$ s ± 100 ms $t13 \geq 5$ s

Power Protections

Protection [ANSI code]	Trip time t_t	Trip threshold tolerance ⁽³⁾	Trip time tolerance
UP [32LF]	$t_t = t23$	$\pm 10 \%$	the better of: $\pm 10 \%$ or ± 40 ms with $t23 < 5$ s ± 100 ms with $t23 \geq 5$ s
OP [320F]	$t_t = t26$	$\pm 10 \%$	the better of: $\pm 10 \%$ or ± 40 ms with $t26 < 5$ s ± 100 ms with $t26 \geq 5$ s
RQ [40 or 32R]	$t_t = t24$	$\pm 10 \%$	the better of: $\pm 10 \%$ or ± 40 ms with $t24 < 5$ s ± 100 ms with $t24 \geq 5$ s
OQ [320F]	$t_t = t27$	$\pm 10 \%$	the better of: $\pm 10 \%$ or ± 40 ms with $t27 < 5$ s ± 100 ms with $t27 \geq 5$ s
D [67]	$t_t = t7$	$\pm 7 \%$ with $I_f \leq 6$ In $\pm 10 \%$ with $I_f > 6$ In	The better of: $\pm 10 \%$ or ± 40 ms
RP [32R]	$t_t = t11$	$\pm 10 \%$	the better of: $\pm 10 \%$ or ± 40 ms with $t11 < 5$ s ± 100 ms with $t11 \geq 5$ s

Startup

Protection	Trip time t_t	Trip threshold tolerance ⁽³⁾	Trip time tolerance
D StartUp	$t_t = t7 \text{ startup}$	$\pm 10 \%$	The better of: $\pm 10 \%$ or ± 40 ms

ROCOF Protections

Protection [ANSI code]	Trip time t_t	Trip threshold tolerance ⁽³⁾	Trip time tolerance
ROCOF [81R]	$t_t = t28$	$\pm 10 \%^{(6)}$	The better of: $\pm 20 \%$ or 200 ms

Motor Protections

Protection [ANSI code]	Trip time t_t	Trip threshold tolerance ⁽³⁾	Trip time tolerance
R JAM [51LR]	$t_t = t_j^{(7)}$	± 10 %	± 7 % with $I_f \leq 6 I_n$; ± 10 % with $I_f > 6 I_n$
R STALL [51LR]	$t_t = t_s$	± 10 %	± 10 %
UC [37]	$t_t = t_{uc}$	± 15 %	± 20 %
U	$t_t = t_u^{(8)}$	± 15 %	± 20 %

Additional Protections

Protezione [codice ANSI]	Tempo di intervento t_t ⁽¹⁾	Tolleranza soglia di intervento ⁽³⁾	Tolleranza tempo di intervento
Gext [50GTD / 51G]	Curva $t = k \Rightarrow t_t = t_{41}$	± 7 %	Il migliore tra: ± 10 % o ± 40 ms
	Curva $t = k/I^2 \Rightarrow t_t = \frac{2}{\left(\frac{I_f}{I_{41}}\right)^2}$		± 15 %
Rc [64 50N TD 87N]	$t_t = t_{dn}$	-20 % ÷ 0	140 ms @ 0,06 s ⁽⁹⁾ 950 ms @ 0,8 s ⁽⁹⁾

Startup

Protezione	Tempo di intervento t_t	Tolleranza soglia di intervento ⁽³⁾	Tolleranza tempo di intervento
Gext StartUp	$t_t = t_{41} \text{ startup}$	± 7 %	Il migliore tra: ± 10 % o ± 40 ms

Protection notes



NOTES:

- (1) for the calculation of t_t use the values of the trip and threshold currents expressed in I_n (example: $I_f = 0.8 I_n$, $I_1 = 0.6 I_n$)
- (2) with $t_4 =$ instantaneous, the maximum tolerance is 50 ms
- (3) Tolerances valid with the Trip unit in steady state or switched on with auxiliary power supply, trip time ≥ 100 ms, temperature and signals within operating limits. If conditions are not guaranteed, the tolerances in the table following the notes are valid
- (4) The trip unit considers a hysteresis of 3% for exiting the alarm condition
- (5) Tolerance valid for frequencies in the range: $f_n \pm 2\%$. For frequencies outside the range there is a tolerance of $\pm 5\%$
- (6) $\pm 20\%$ for the 0.4 Hz/s threshold
- (7) Time to be considered valid after the Motor start-up
- (8) Time to be considered valid with protection in an alarm state after the Motor start-up. If the alarm appears during the Motor start-up, the trip unit calculates and uses the lowest value between t_u and half of Motor start-up
- (9) maximum tripping time

Performance guaranteed under all operating conditions

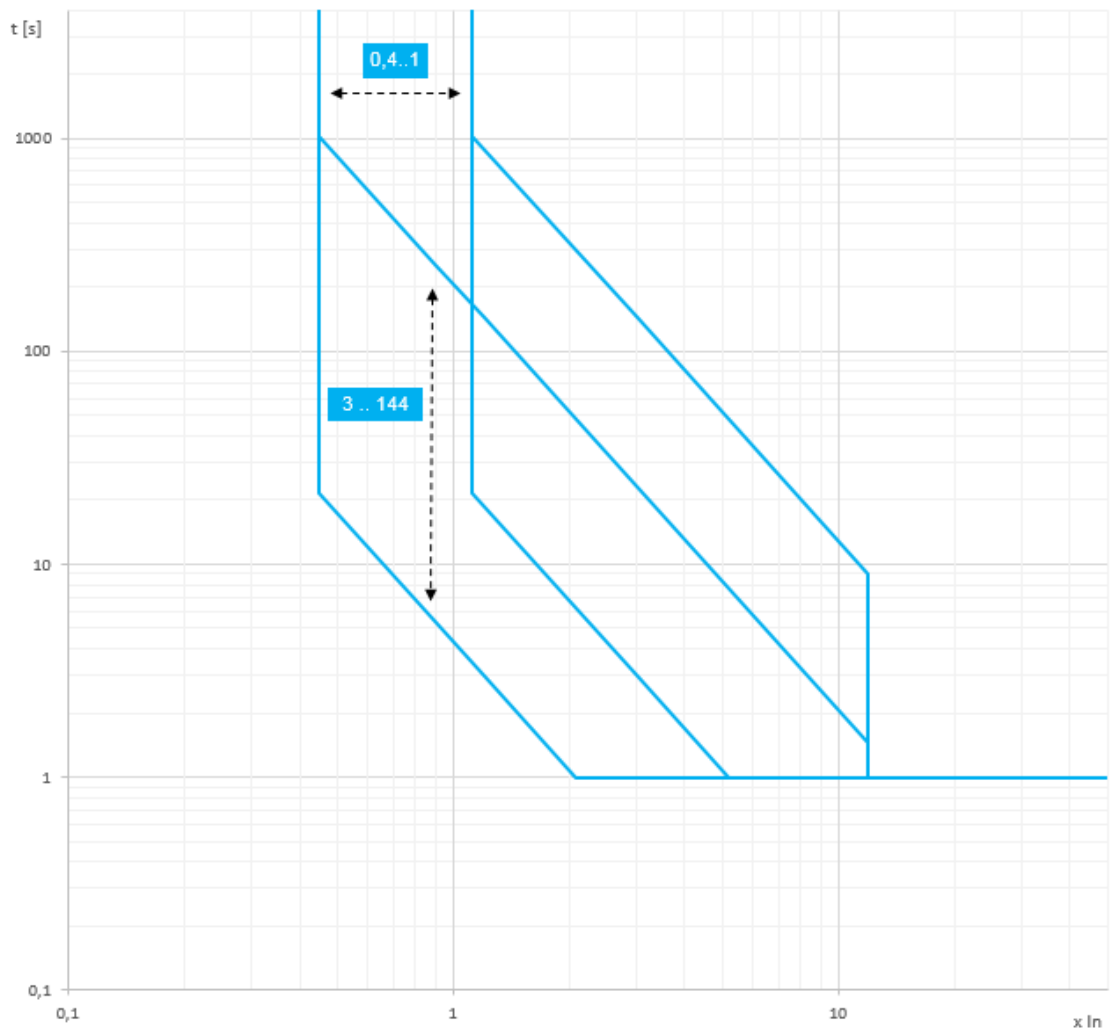
Protection	Trip threshold tolerance	Trip time tolerance
L	Activation in the range: $(1.05-1.2) \times I_1$	± 20 %
S	± 10 %	± 20 %
I / 2I	± 15 %	≤ 60 ms
G	± 10 %	± 20 % (60 ms with $t_4 =$ instant)
UF / UF2 / OF / OF2	± 2 %	± 20 %
Others	--	± 20 %

- Introduction** This chapter includes the tripping curves of the protections, represented in different point graphs:
- The curves are represented considering the maximum and minimum values of the parameters of each protection.
 - The protections that have multiple curves (e.g., protection S), are represented in multiple charts.
 - The curves do not take into account the effects of special parameters like thermal memory and startups.

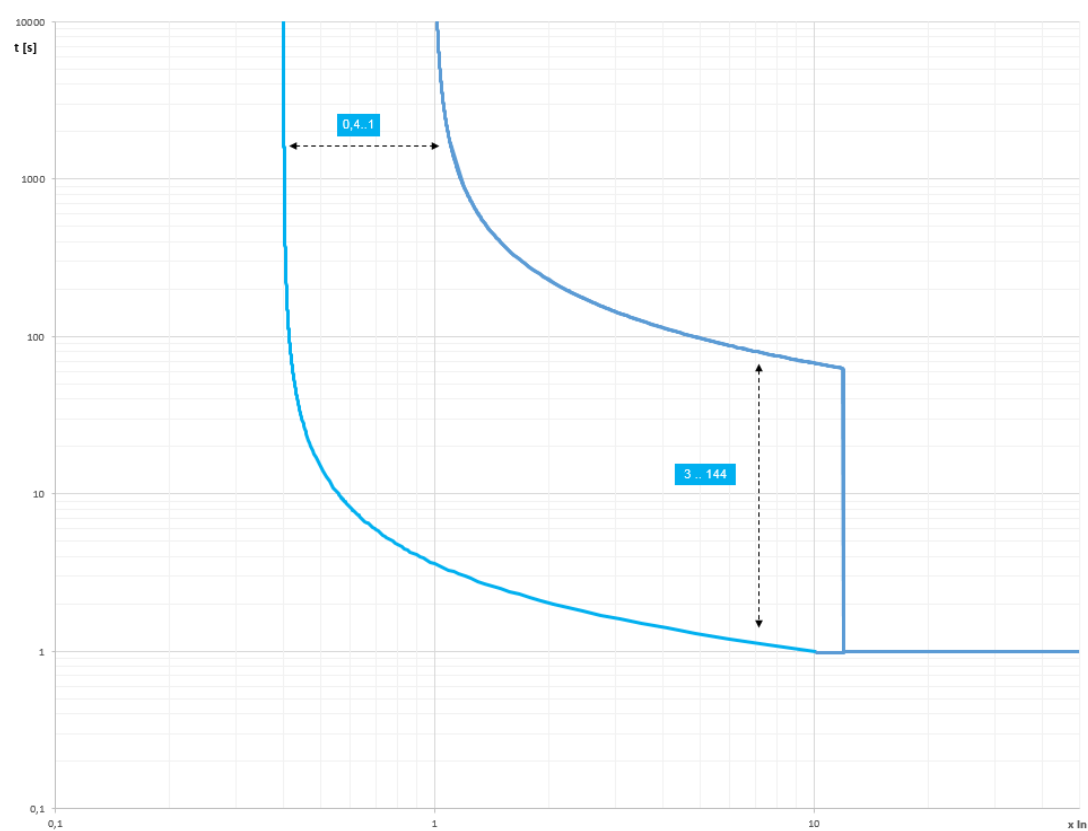


NOTES: to calculate the trip time it is recommended to always use the mathematical function in the protections summary table (page 85)

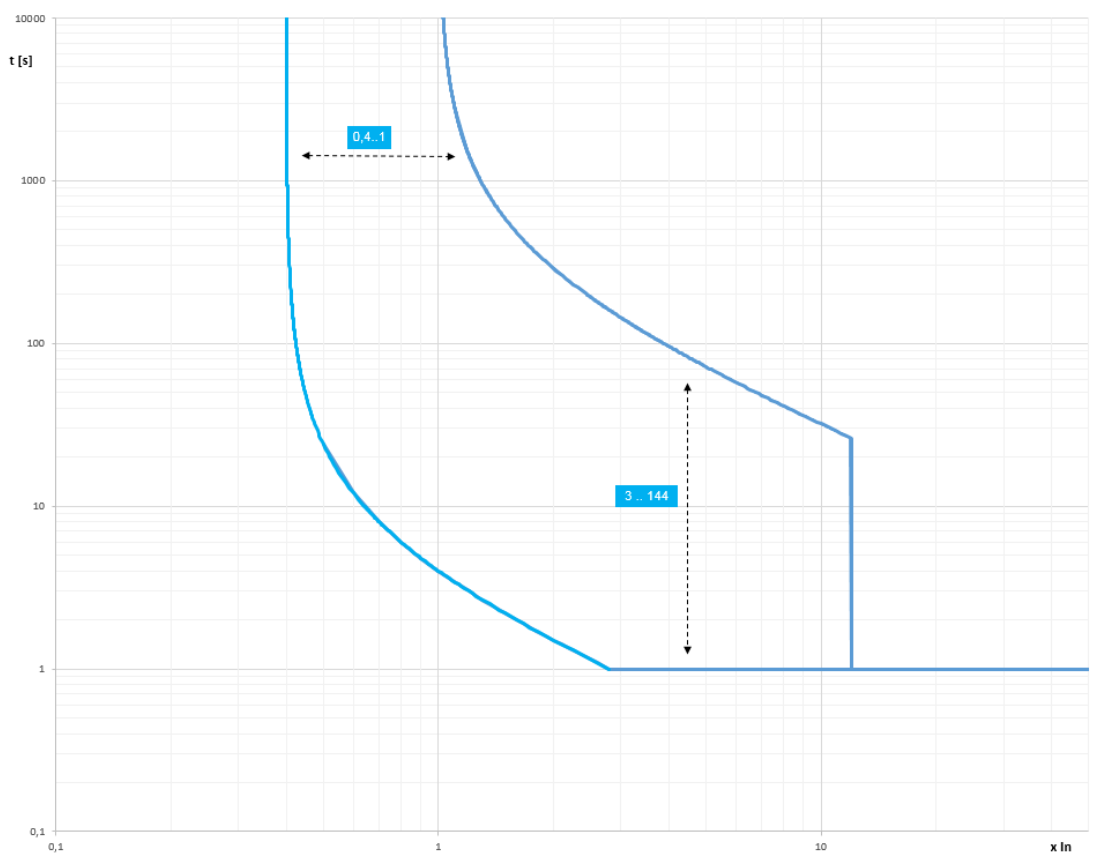
L curve ($t = k/I^2$)



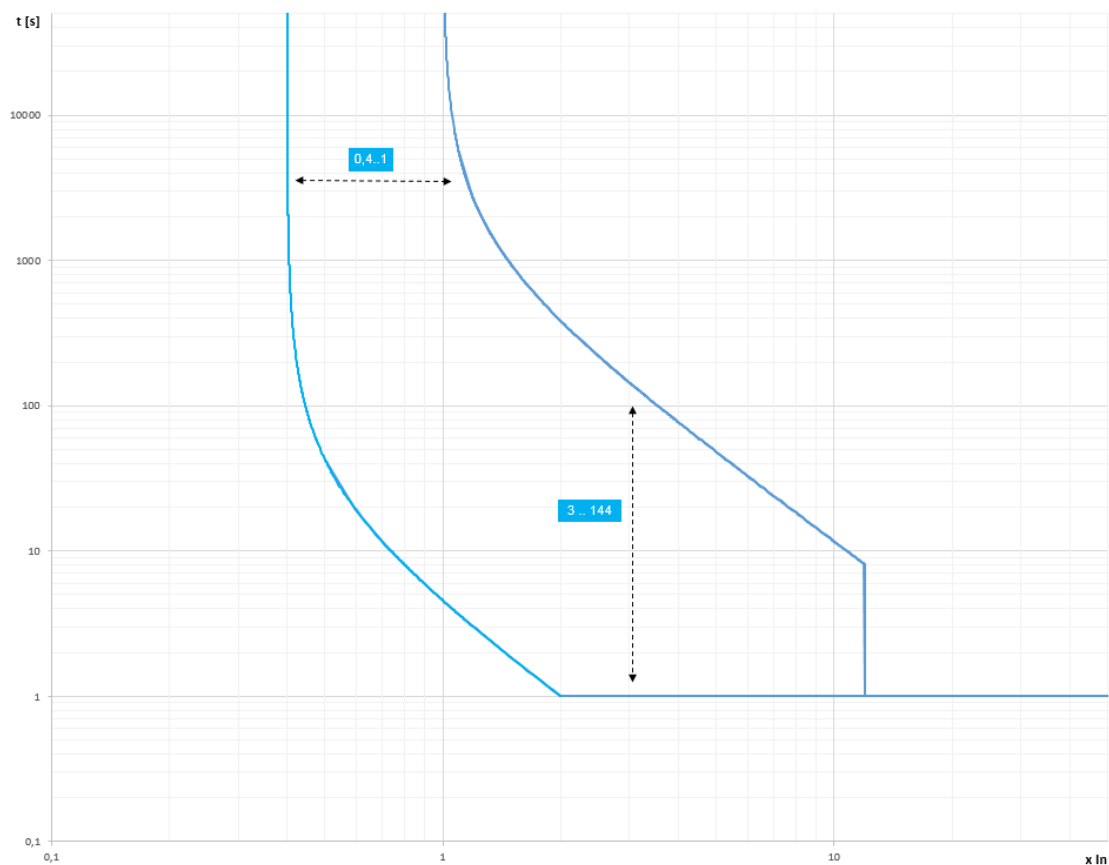
L curve (IEC
60255-151 SI)



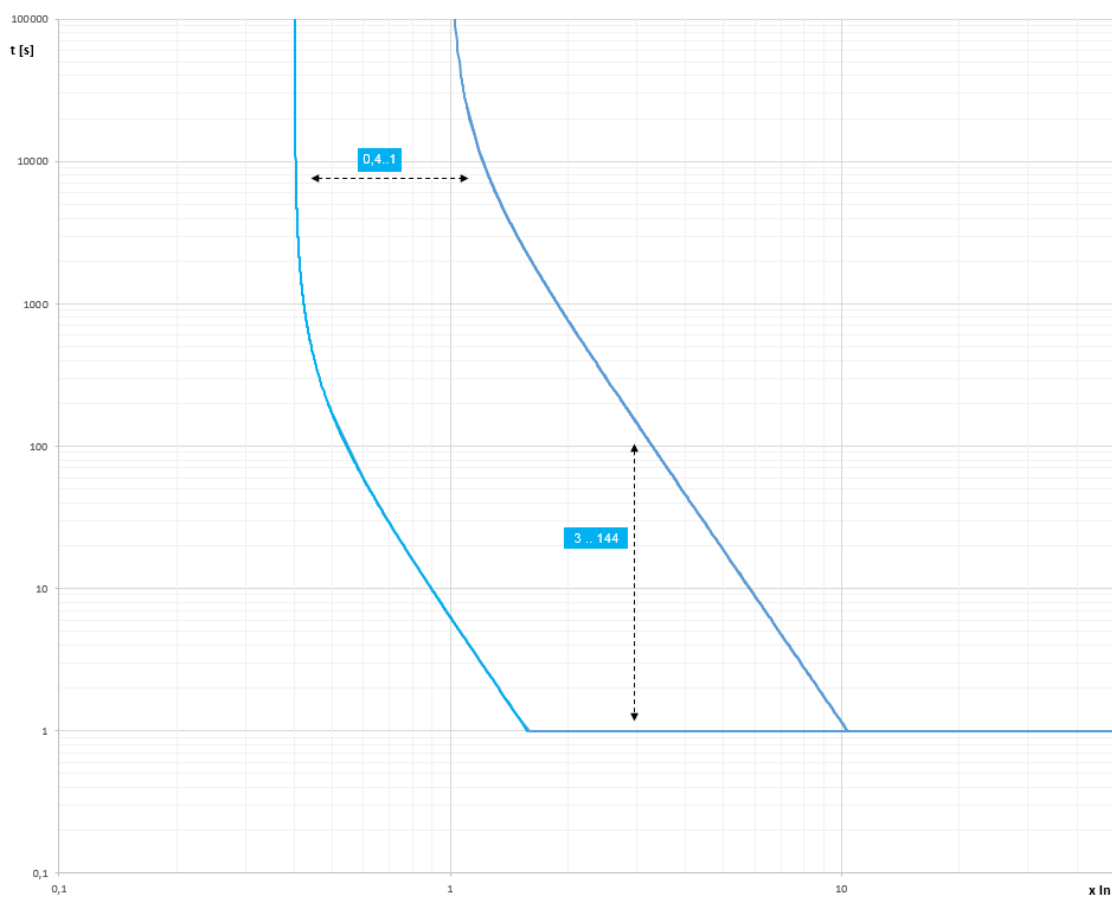
L curve (IEC
60255-151 VI)



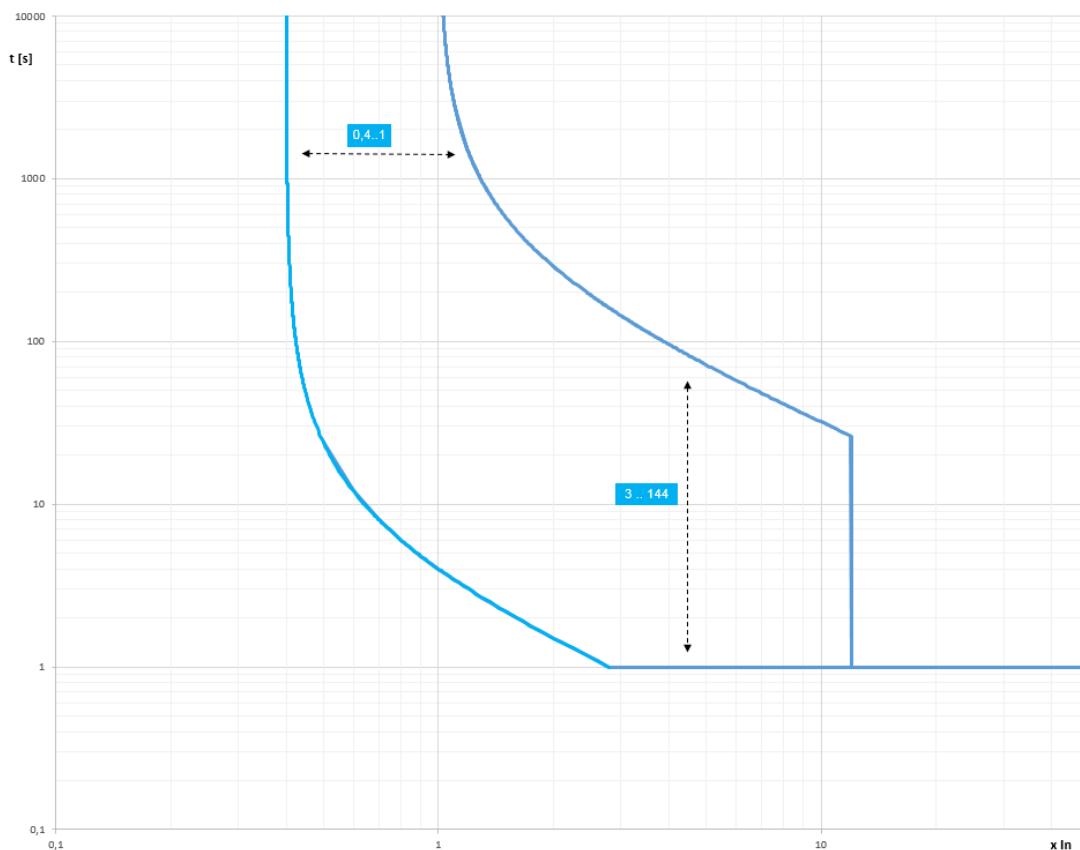
L curve (IEC 60255-151 EI)



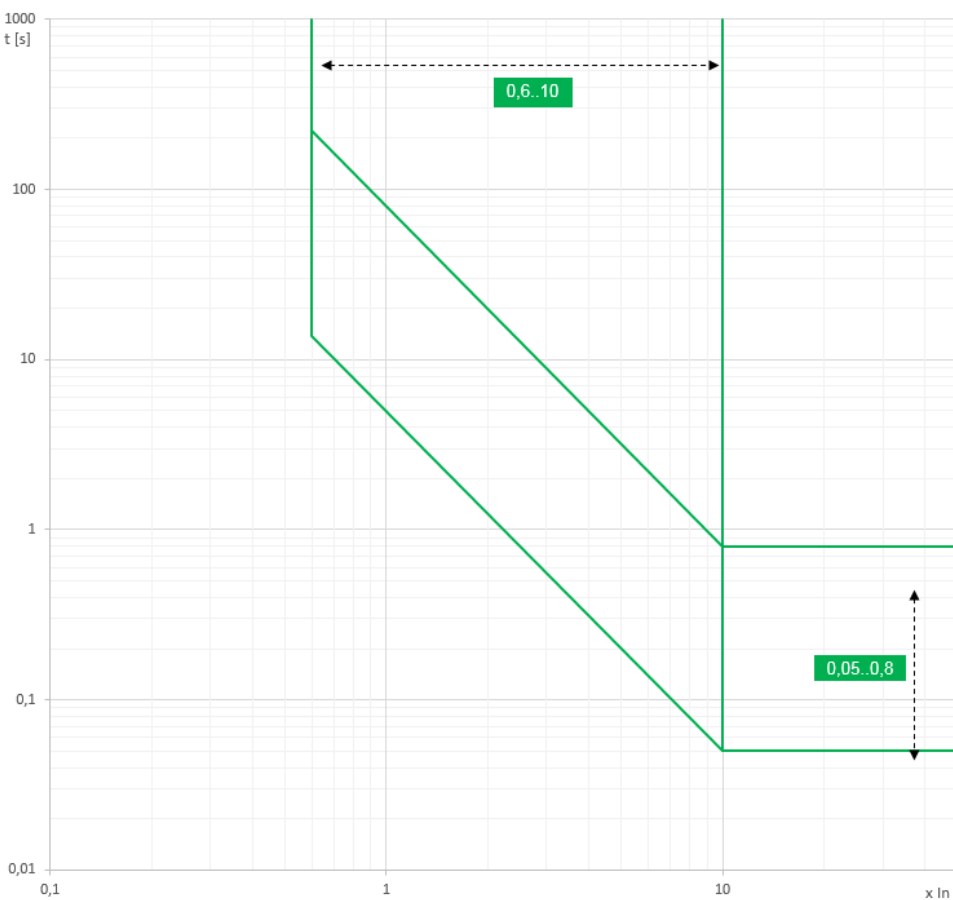
L curve ($t = k/l^4$)



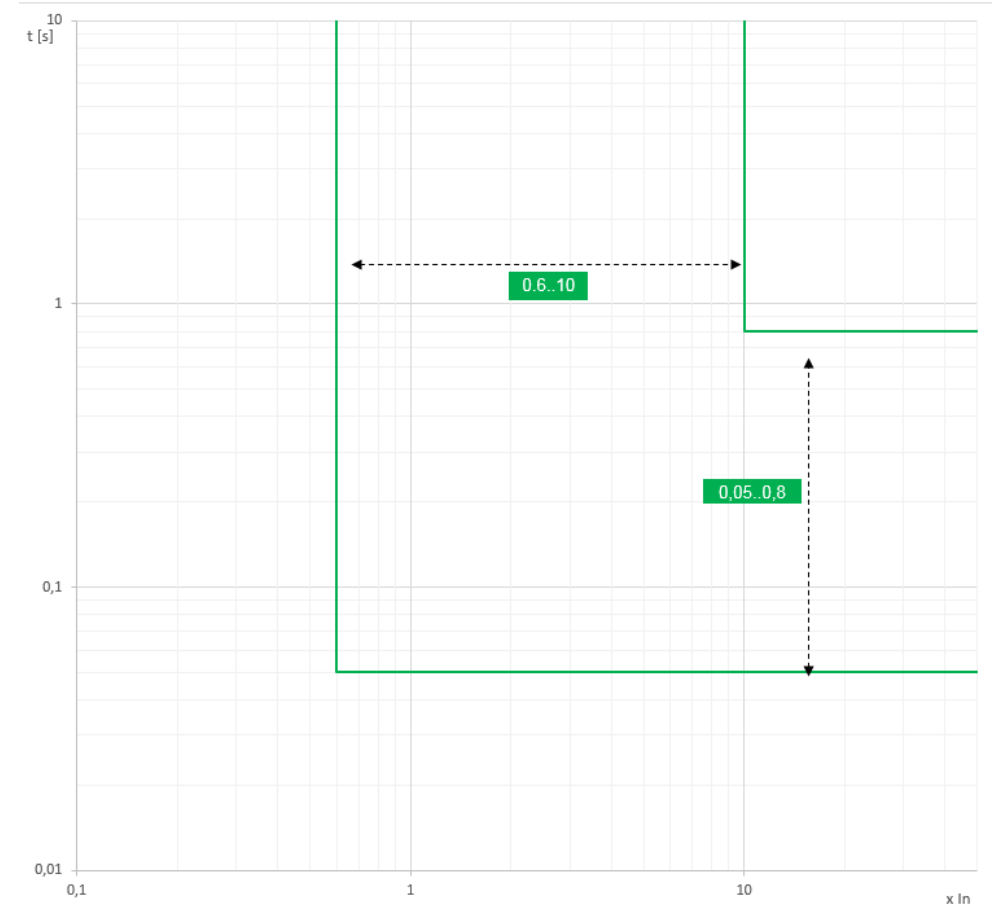
L curve (*Ekip M Touch*)



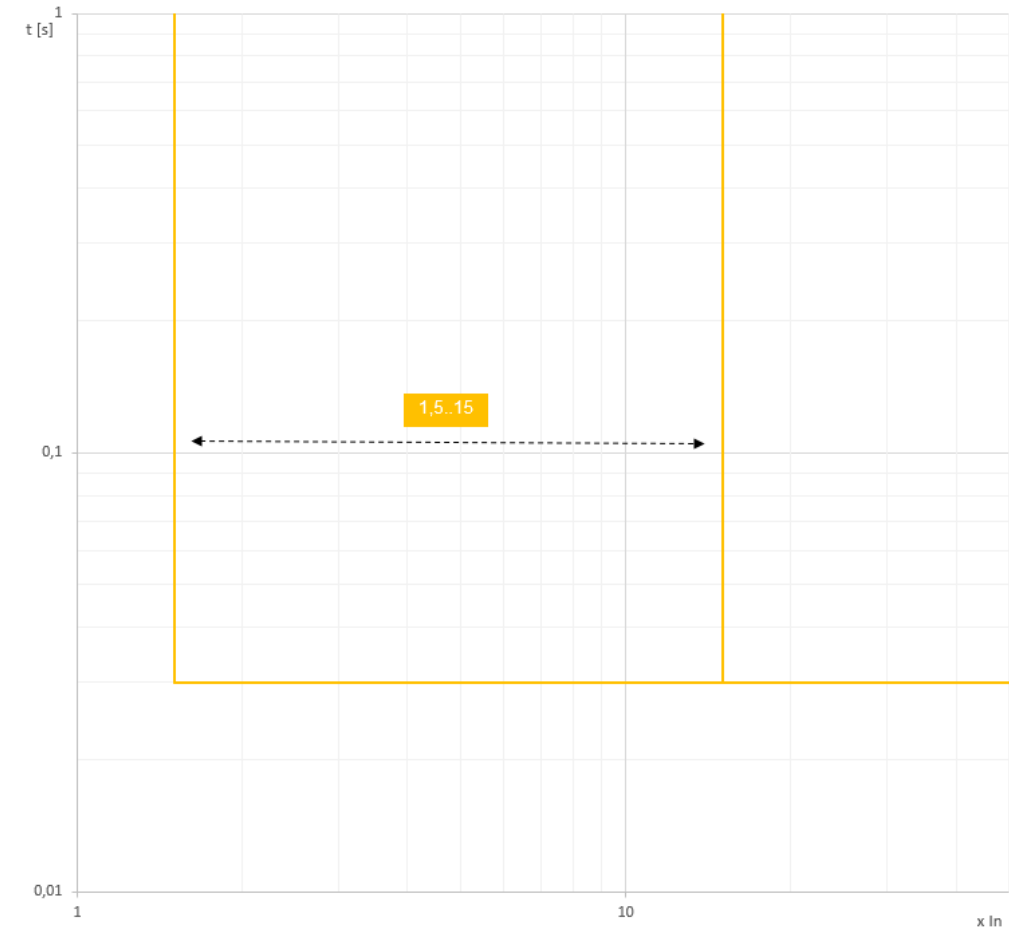
S curve ($t = k/l^2$)



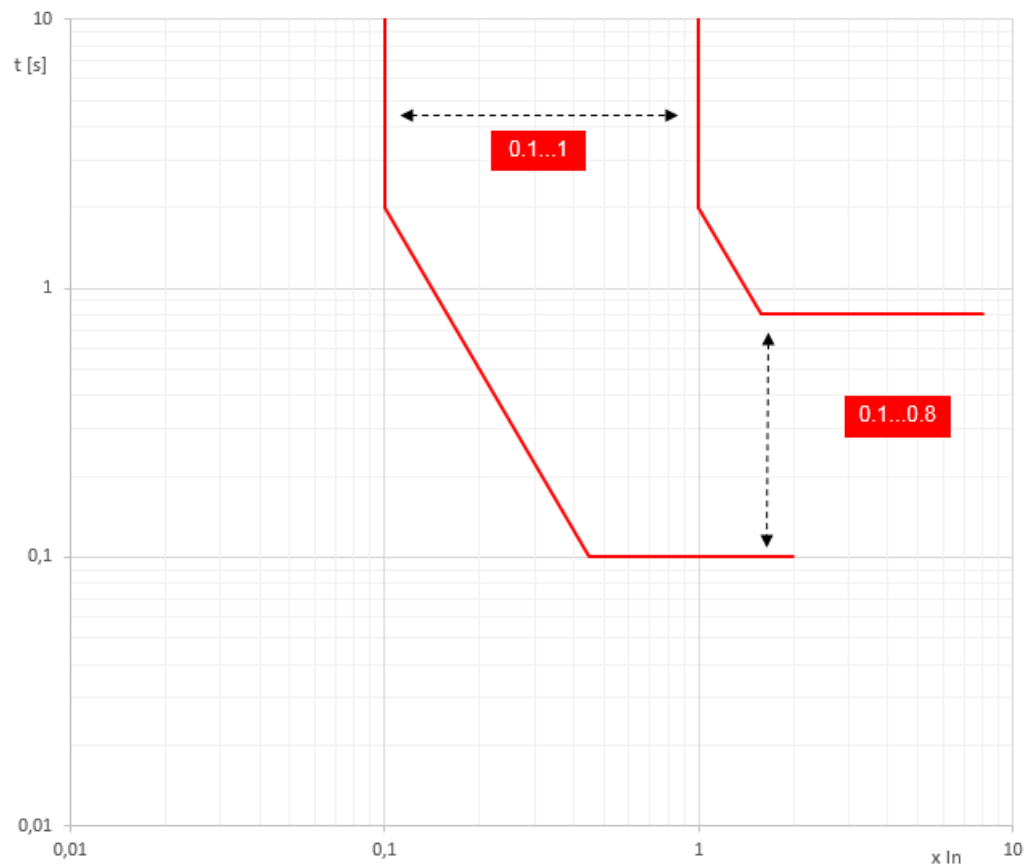
S curve (t= k)
Curve S2



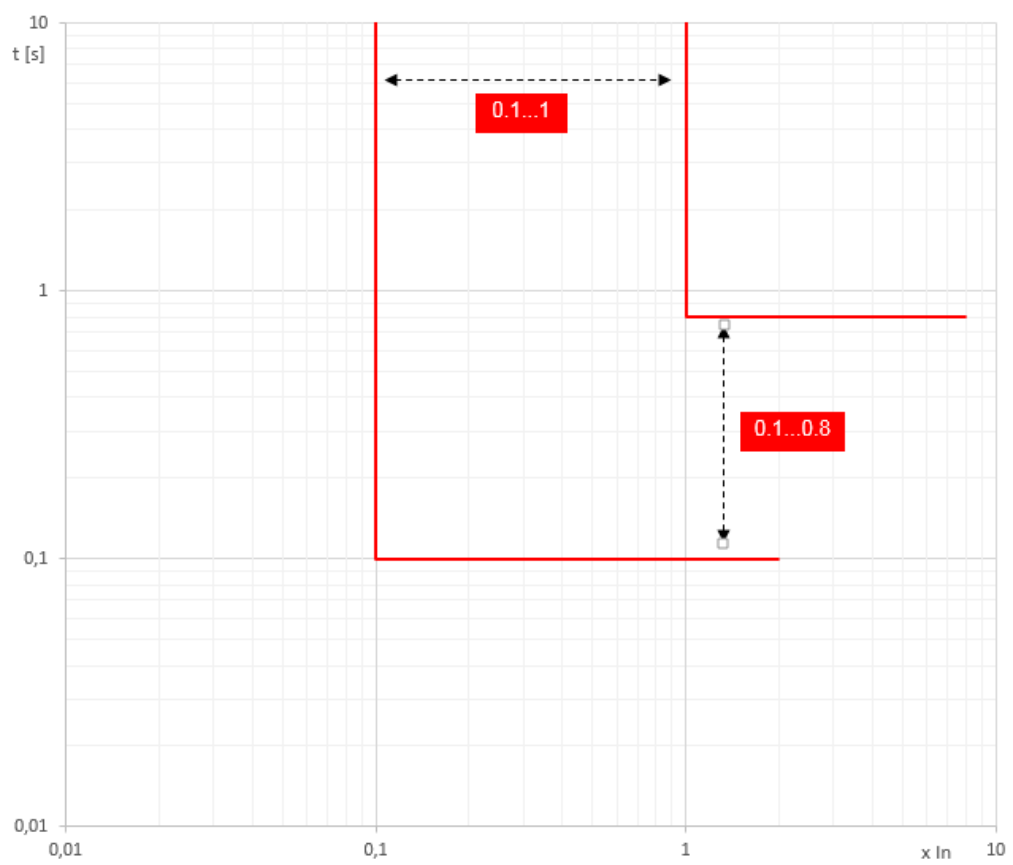
I curve
MCR curve
2I curve



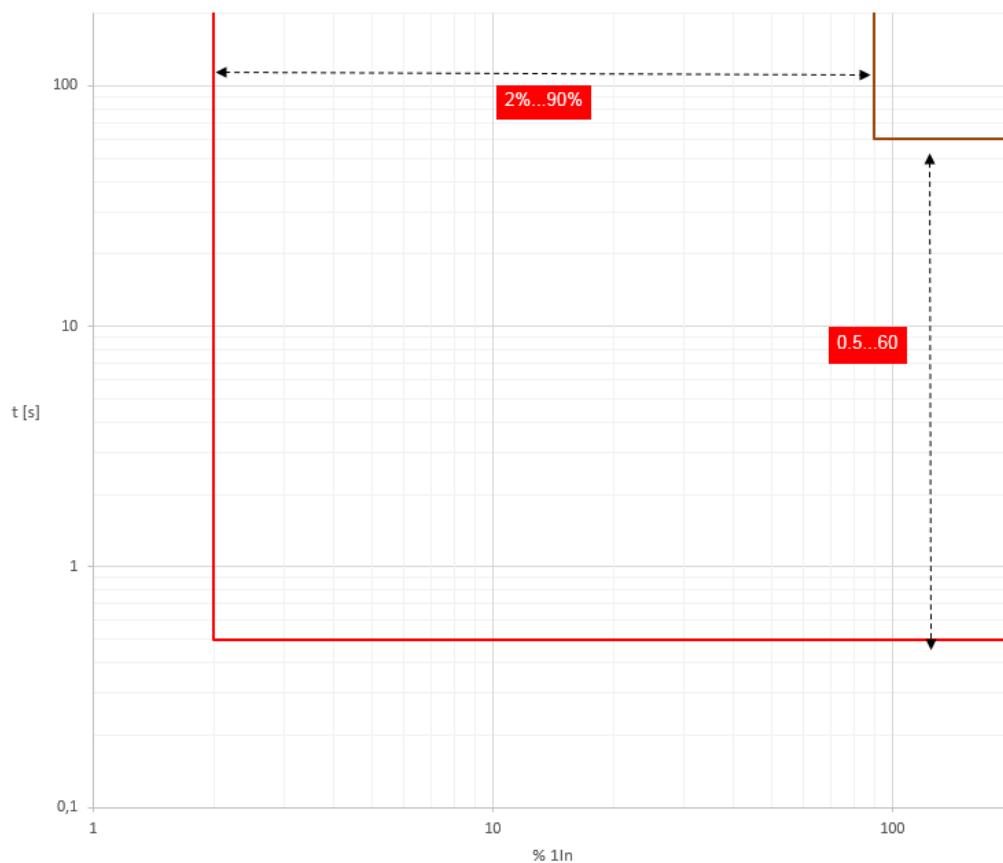
G curve ($t = k/l^2$)
 Gext curve ($t = k/l^2$)



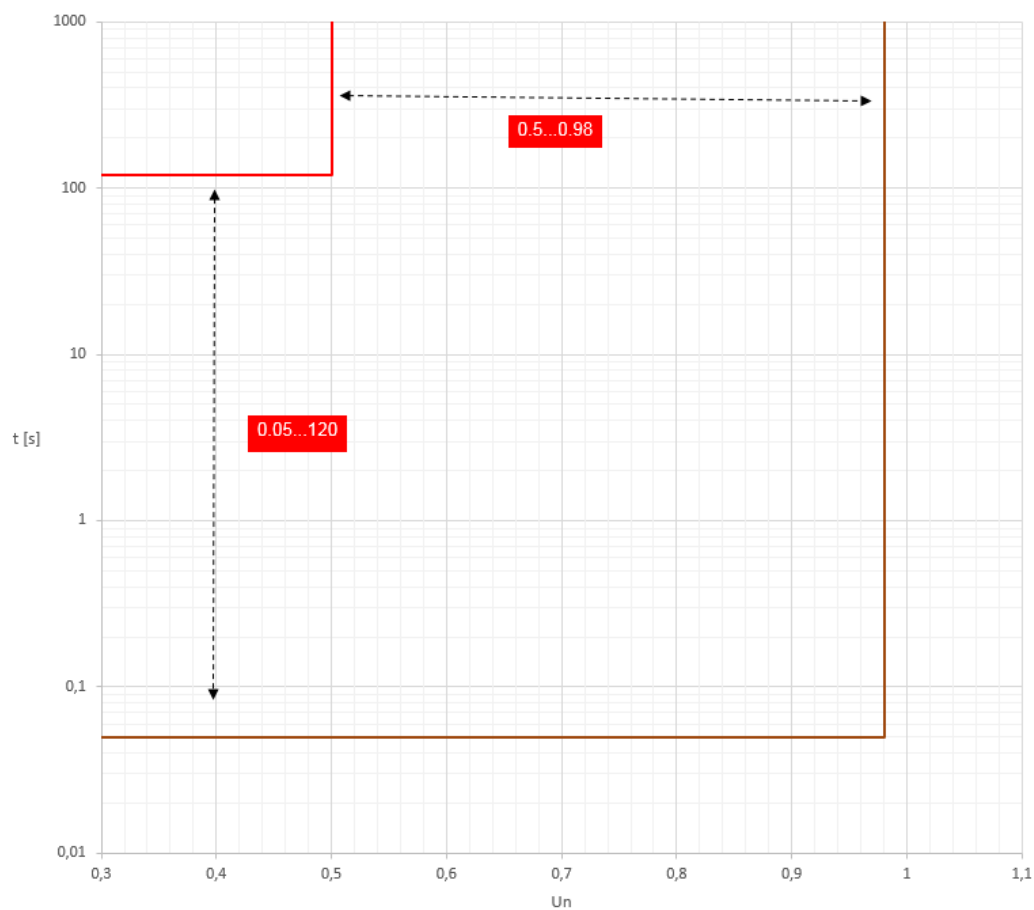
G curve ($t = k$)
 Gext curve ($t = k$)



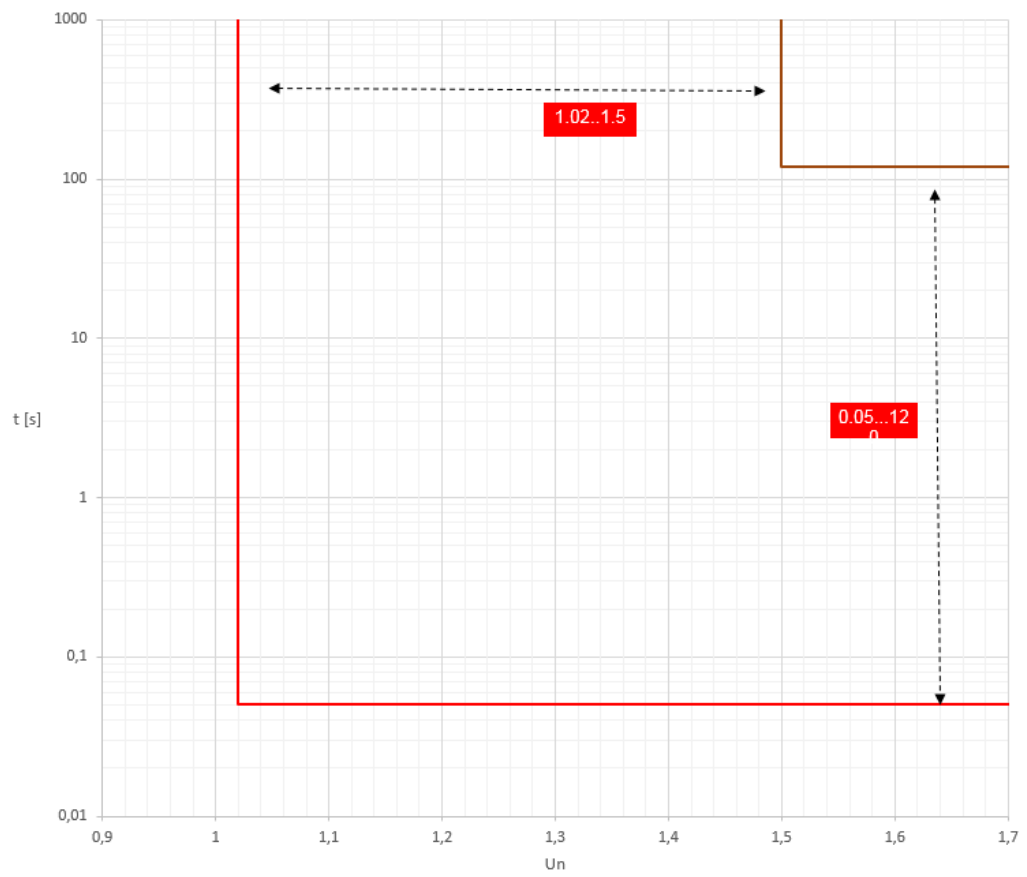
IU curve



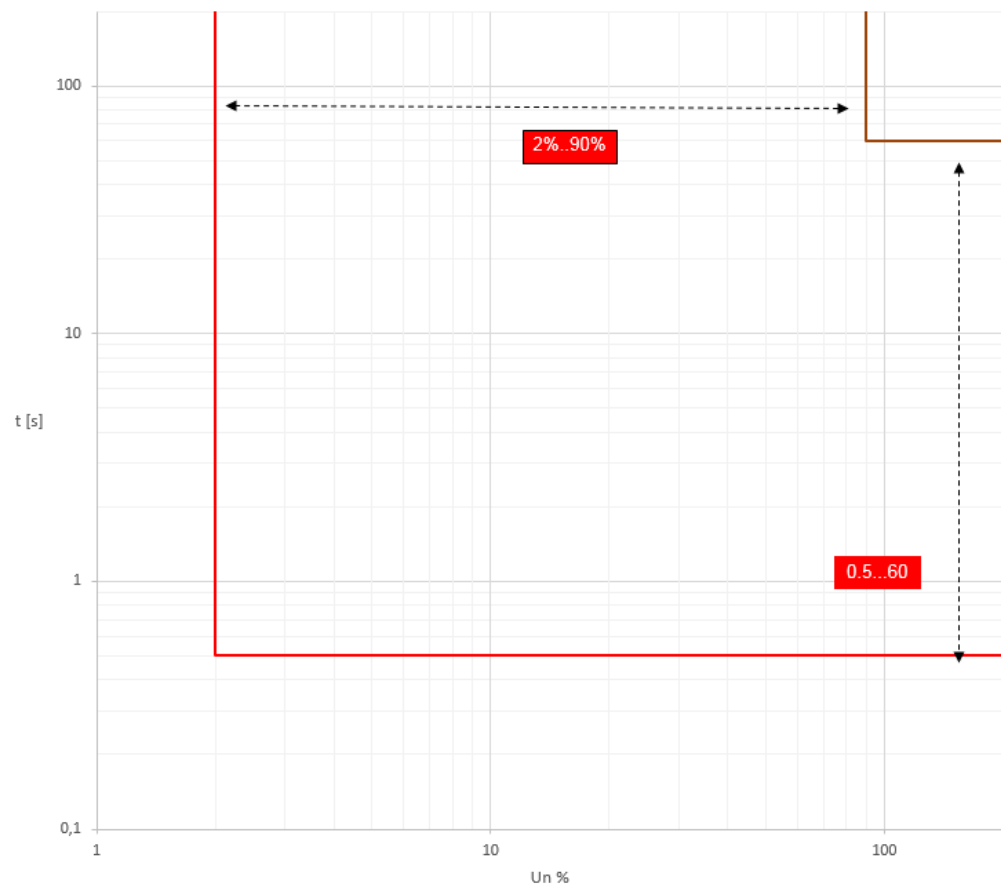
UV curve UV2 curve



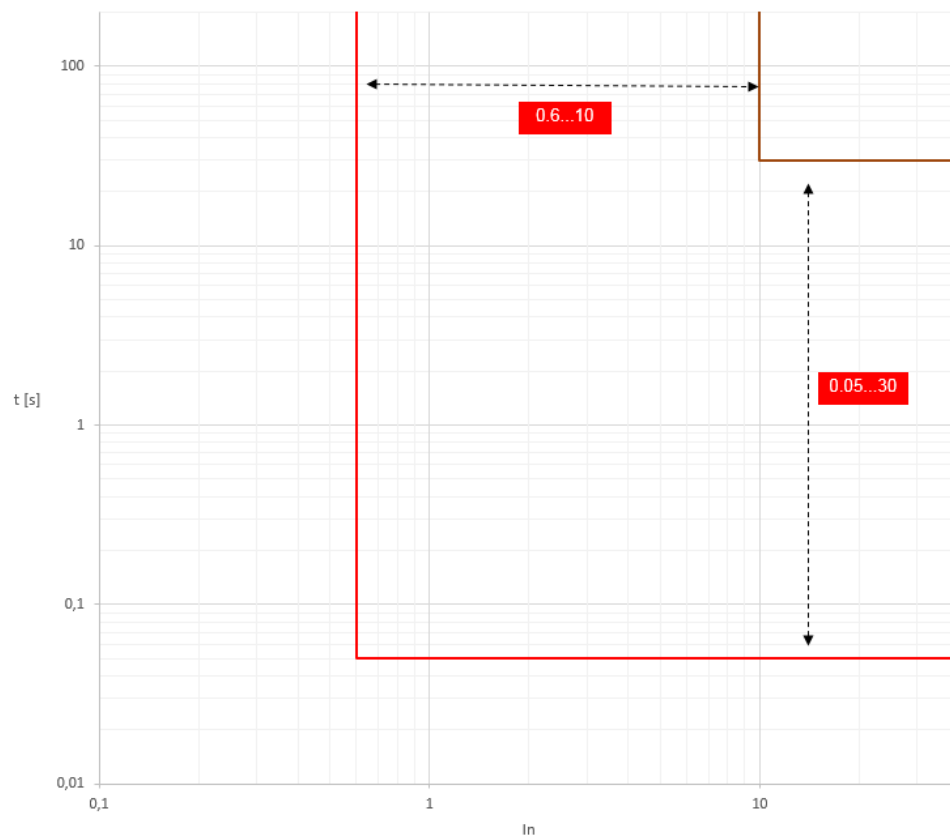
OV curve
OV2 curve



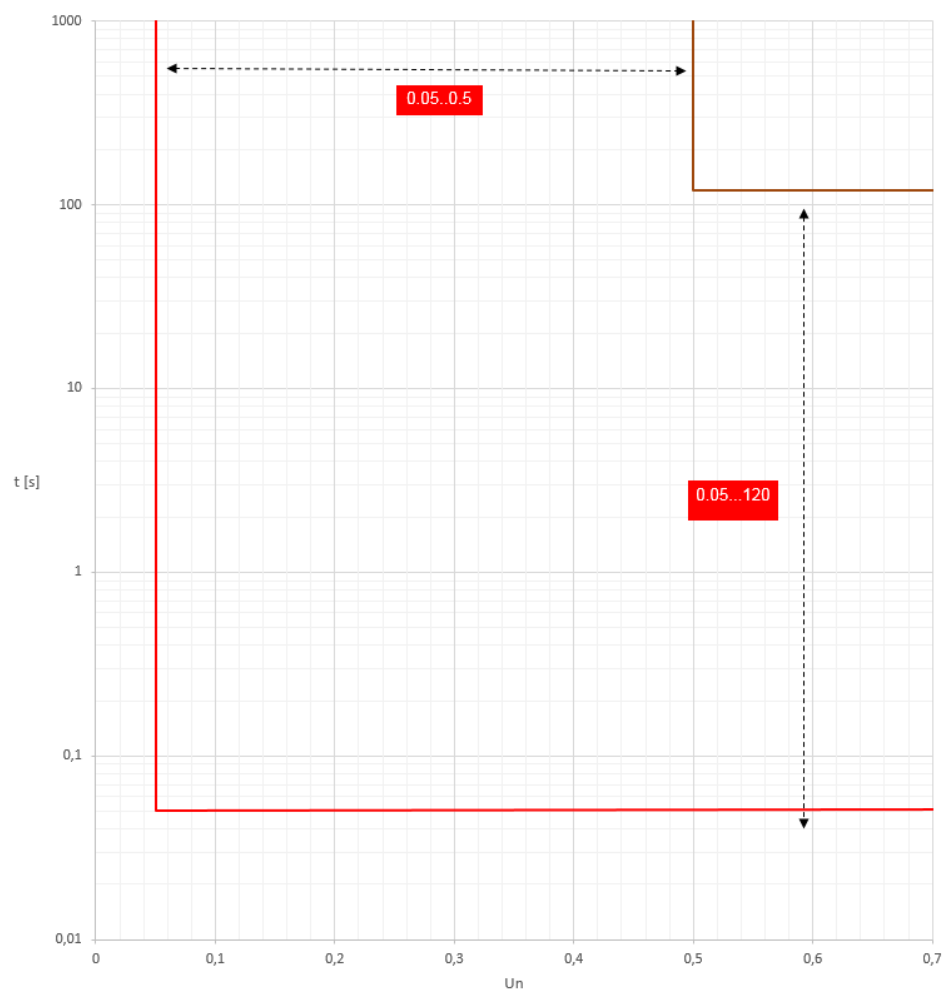
VU curve



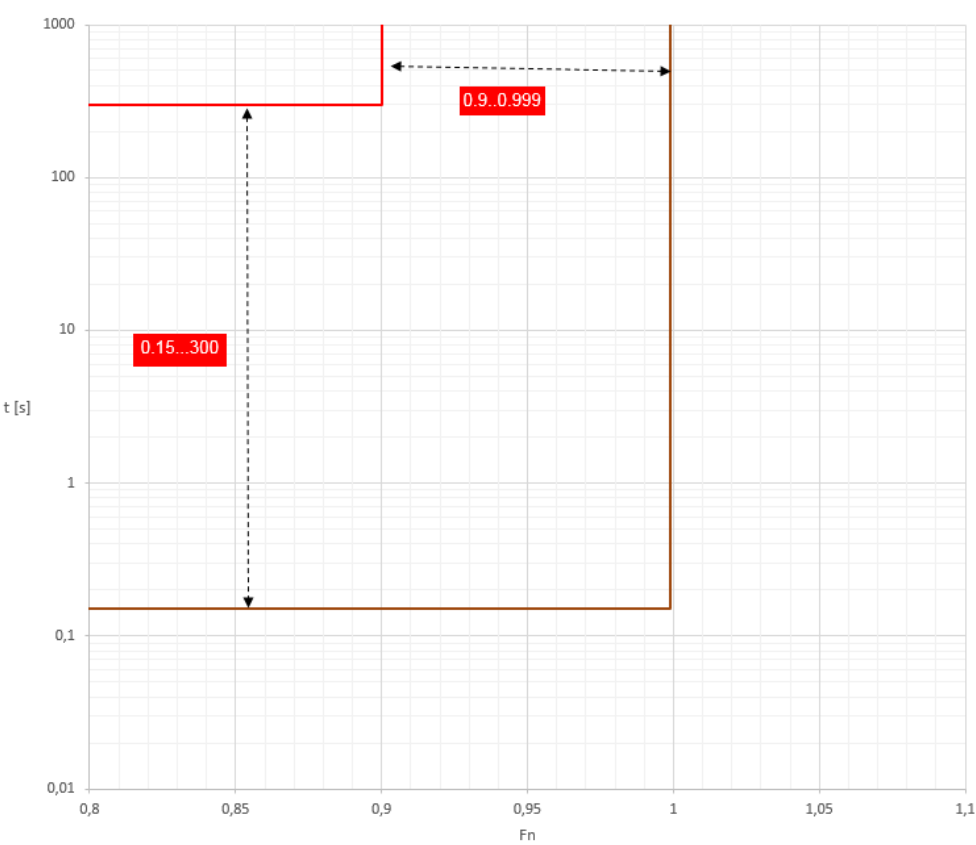
S(V) curve
S2(V) curve



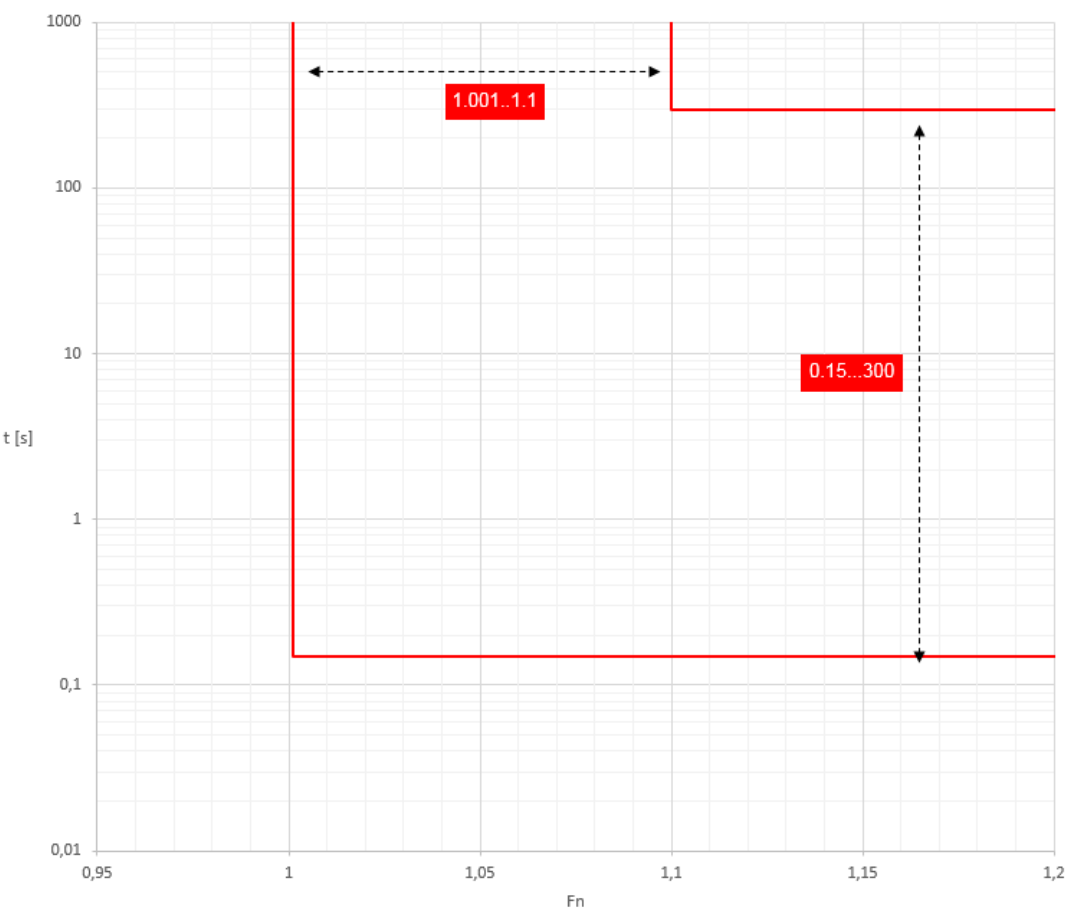
RV curve



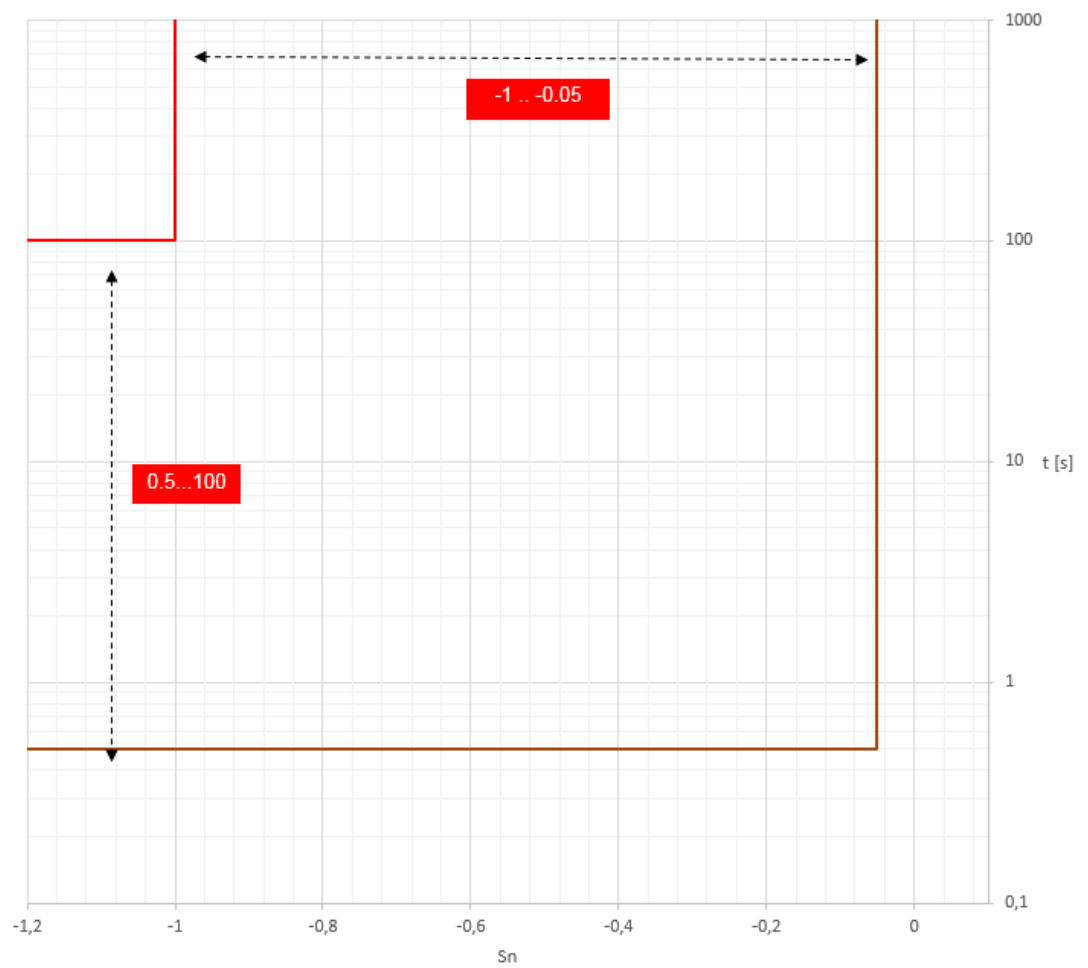
UF curve
UF2 curve



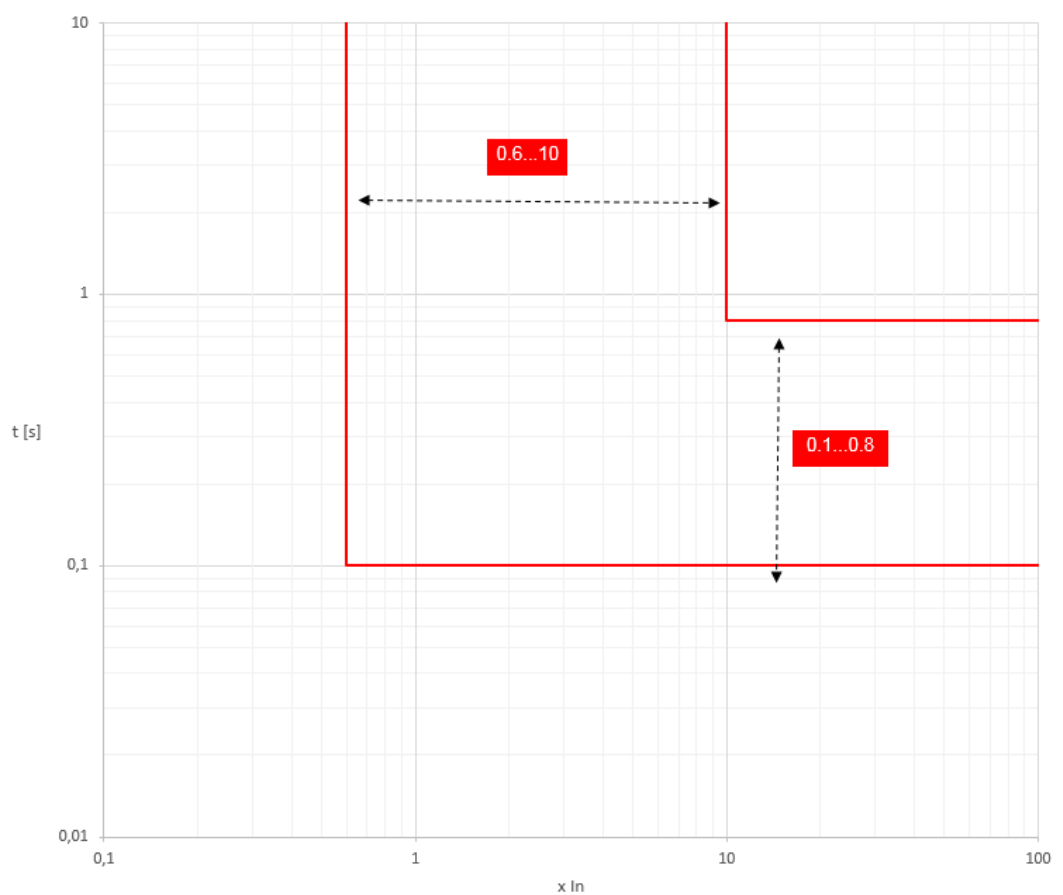
OF curve
OF2 curve



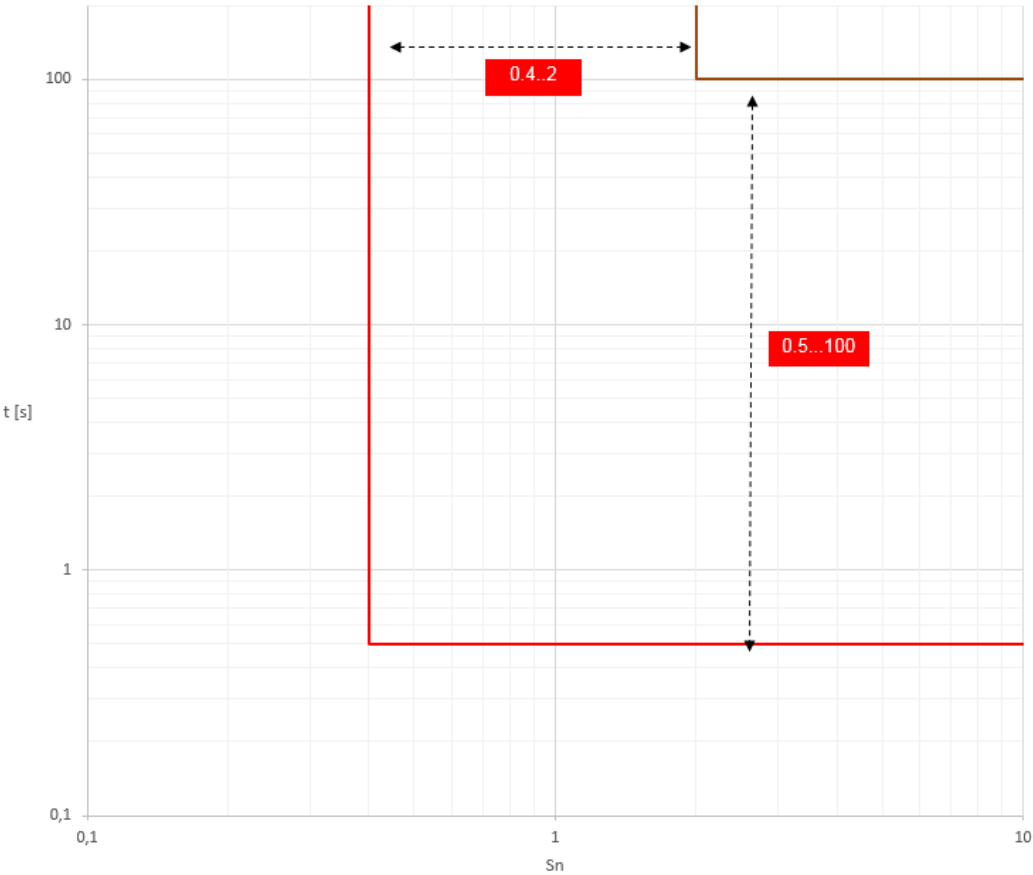
RP curve



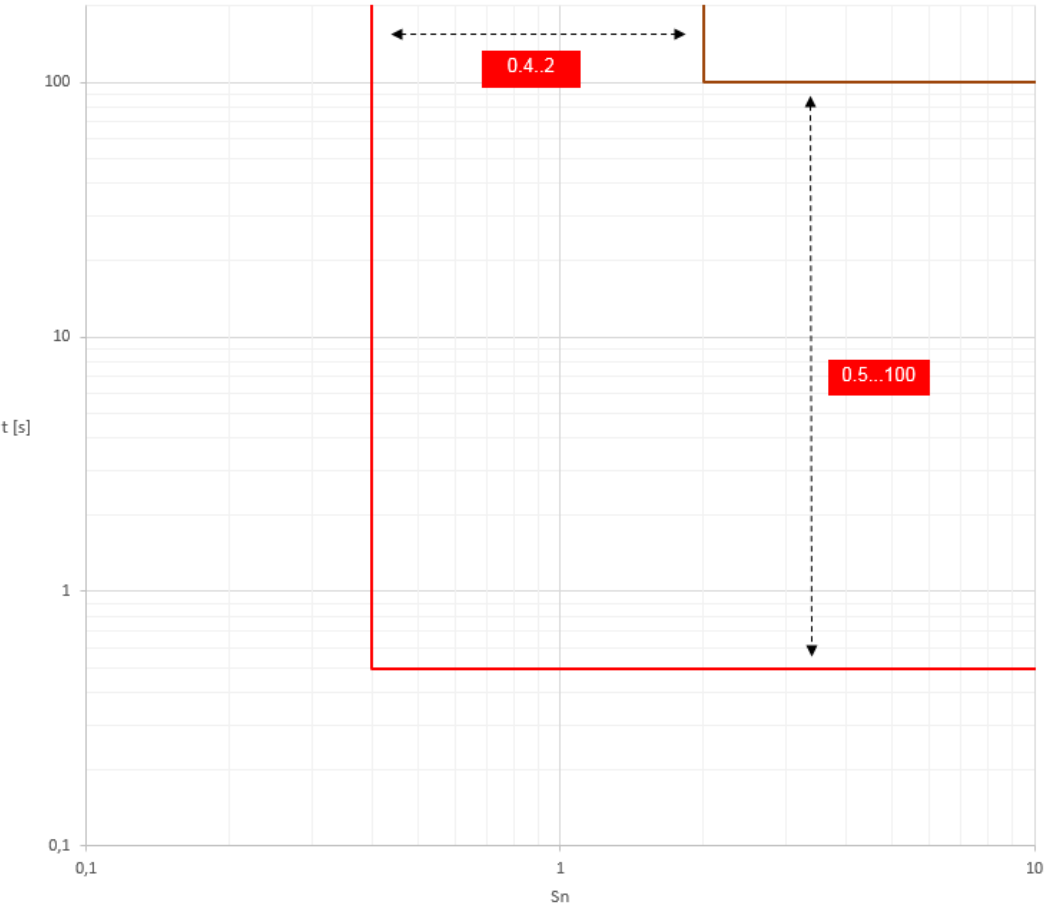
D curve



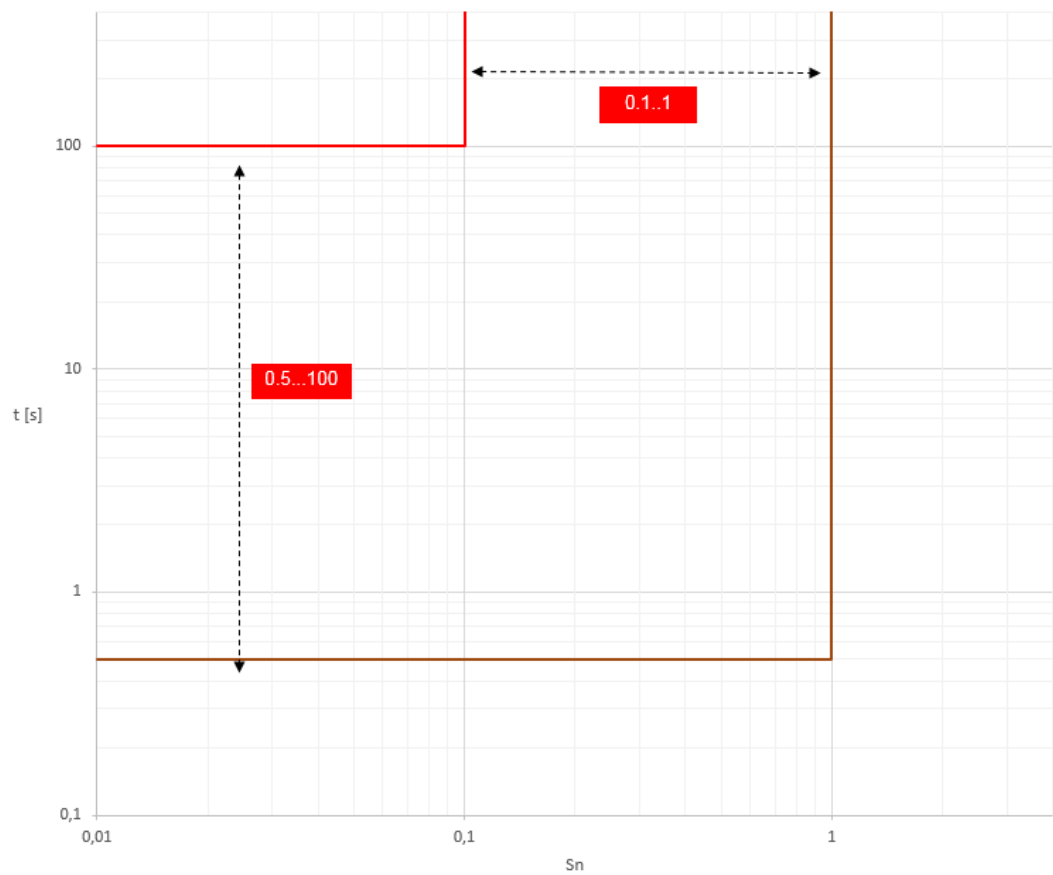
OQ curve



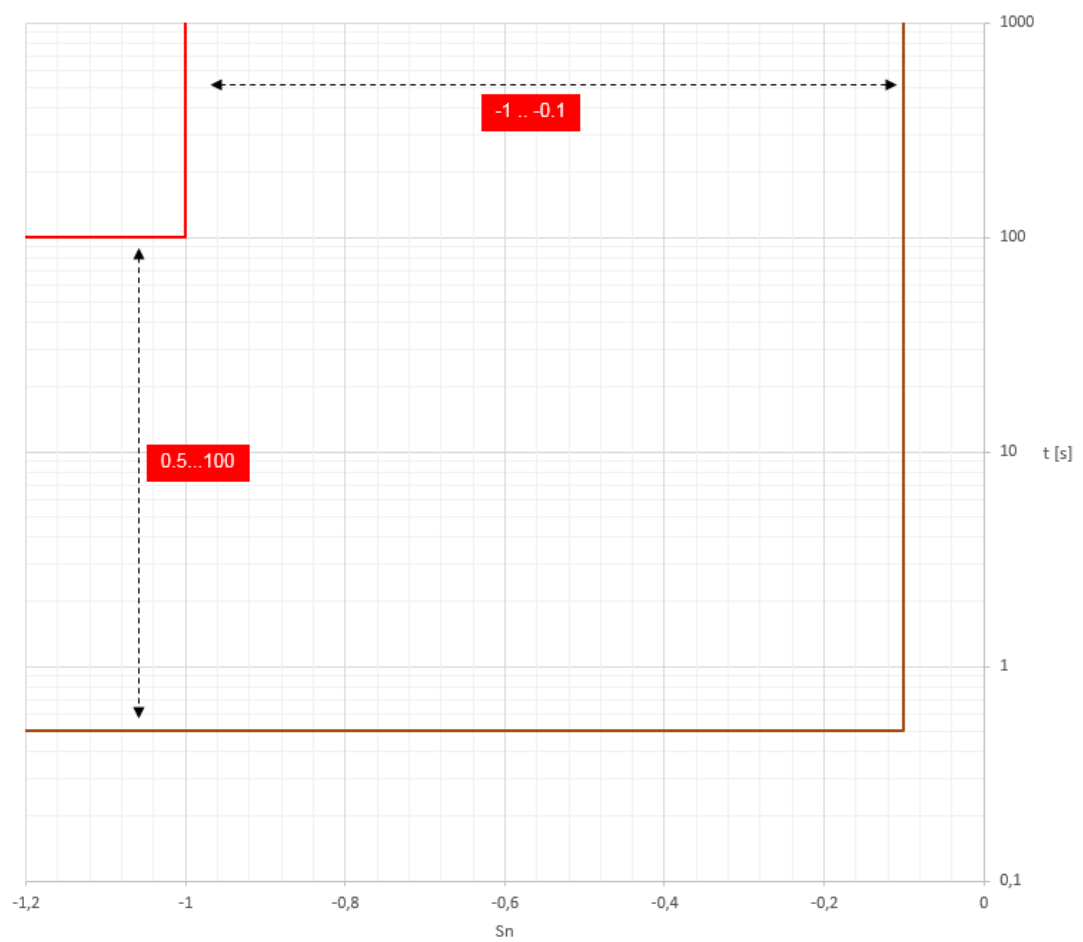
OP curve



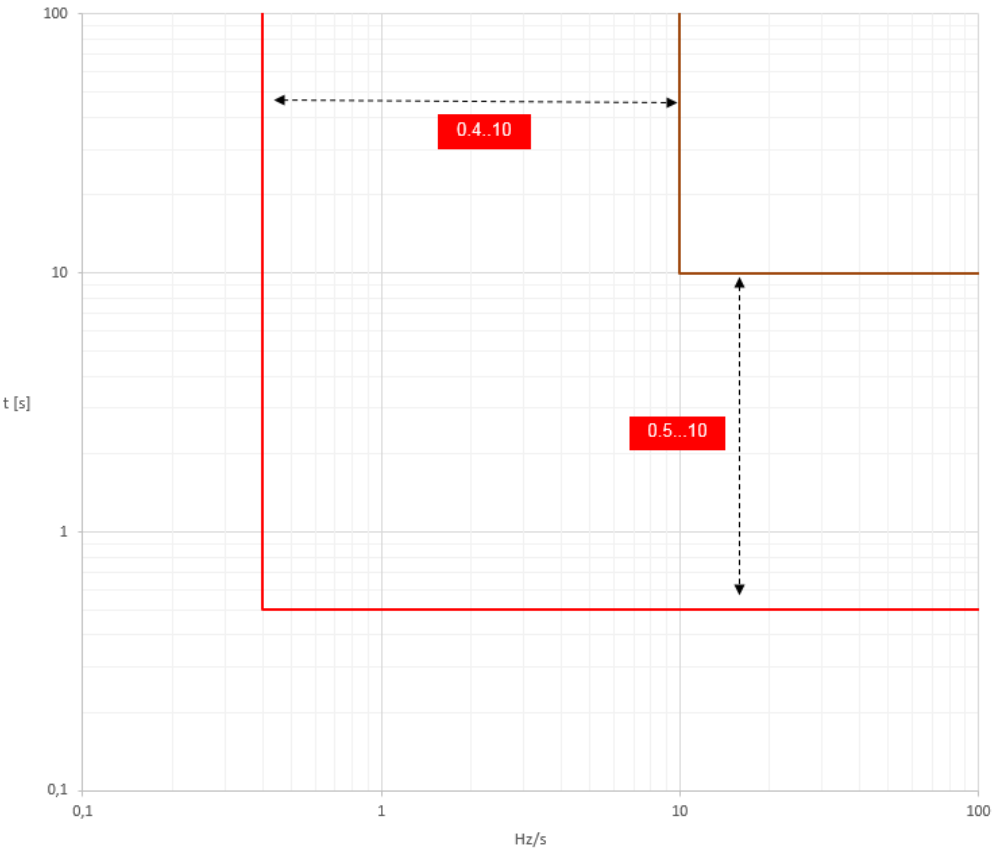
UP curve



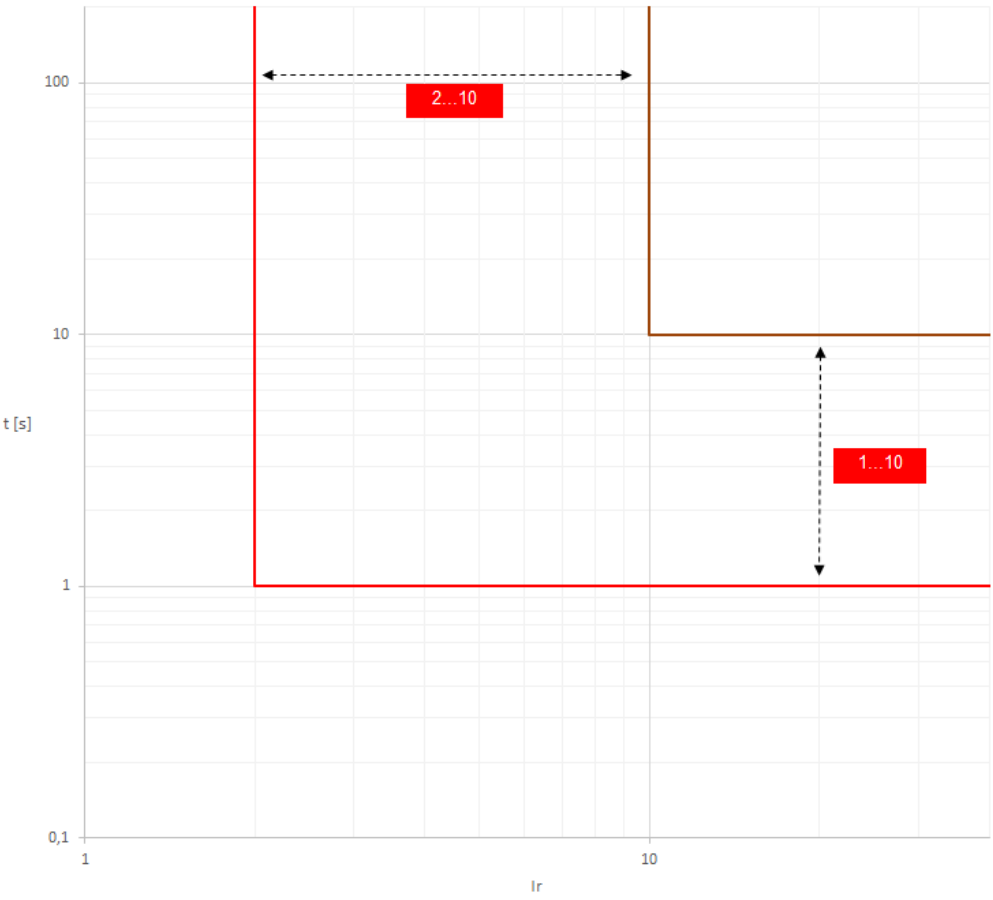
RQ curve



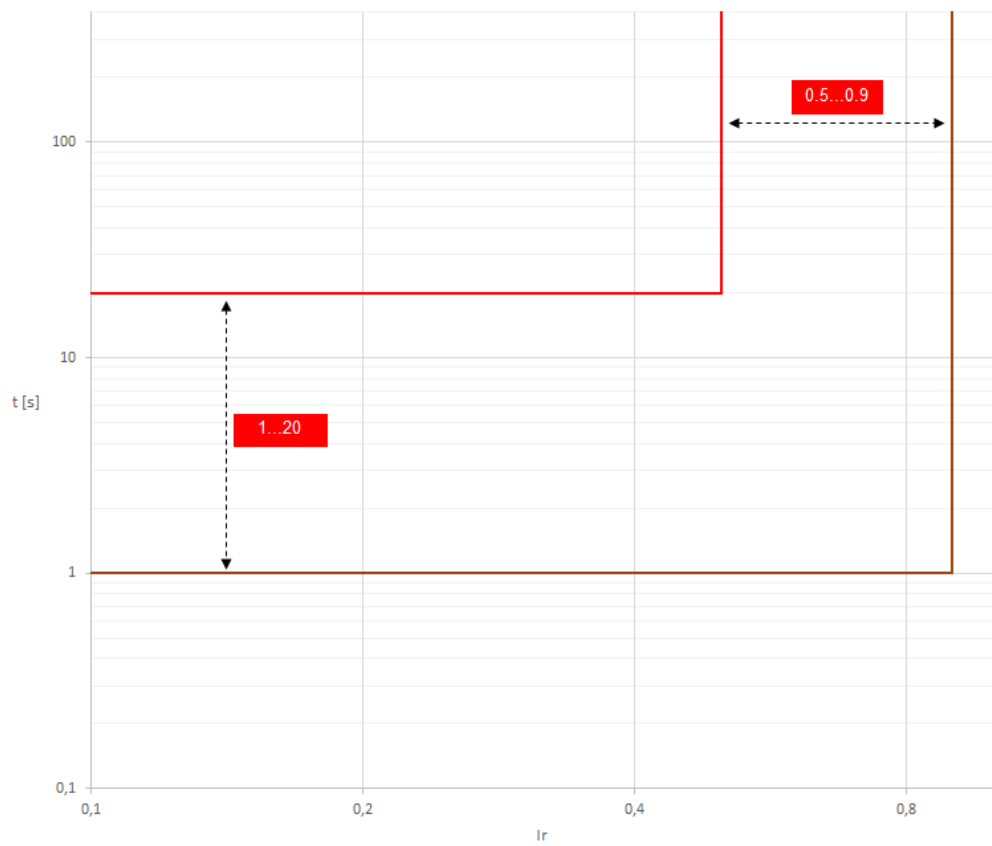
ROCOF curve



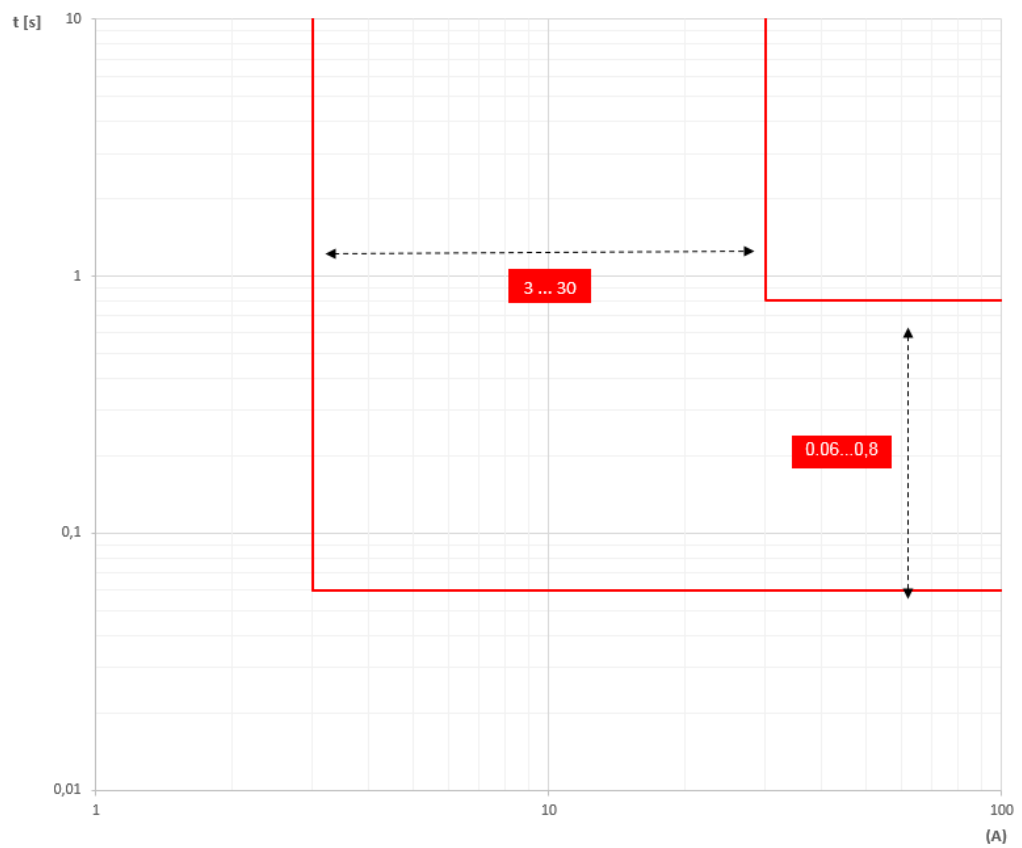
R JAM curve
R STALL



UC curve



Rc curve



Measurements

27 - Standard Measure

List Standard measurements are:

Name	Description	Page
<i>Real-time currents</i>	Real-time measurements of phase currents	103
<i>Events</i>	List of events, status changes, alarms, recorded by the Trip unit	104
<i>TRIPs</i>	List of trips (TRIP) for current protections	104
<i>Min-Max measurements</i>	Log of minimum and maximum currents, recorded with adjustable interval	105
<i>Maintenance</i>	CB status: contact wear and last maintenance	106
<i>Counter operations</i>	Number of mechanical and electrical operations	106

Real-time currents

The real-time currents, available on the *Main page* and the *Summary pages*, are the real-time measurements of phase and ground fault currents expressed in effective value. The measurement range and the performance depend on the rated current defined by *Rating plug*:

Measurement	Measurement range (min-max)	Normal operating range	Accuracy of detected value ⁽¹⁾
Phase currents ⁽⁵⁾	0.03 .. 64 In	0.2 .. 1.2 In	1% ⁽³⁾
Ground fault current ⁽²⁾	0.08 .. 64 In	0.2 .. 1.2 In	2% ⁽³⁾
External earth fault current ^{(2) (4)}	0,08 ÷ 4 In	0,2 ÷ 1,2 In	2 %
Residual current ^{(2) (4)}	2 ÷ 32 A		5 %



NOTES:

- (1) Accuracy referring to normal operating ranges according to IEC 61557-12
- (2) Available with LSIG versions
- (3) Accuracy referring to Ekip Touch and Ekip Touch Measuring without Class 1 Power & Energy Metering package. If the Class 1 Power & Energy Metering package is present, and for all other trip unit models, check the performance shown on page 110
- (4) Available activating the presence of S.G.R. or Rc sensor
- (5) Higher phase currents are also available on the Histograms, Measuring Instruments, Measurement Summary pages

Special representations

Type of measurement	Measurement < min value	Measurement > max value	Display: "___" (not available) for
Phase currents ground fault currents		> [64 In]	Sensors disconnected
External earth fault current		> [4 In sensor]	Sensor not activated and/or disconnected
Residual current		> 32 A	Sensor not activated and/or disconnected

Events Ekip Touch can log the last 200 events, mainly related to changes in status and operation of the unit, specifically:

- Status of the bus configuration, operating mode, active setting, auxiliary power supply
- States or connection alarms: *Current sensors, Rating Plug, HMI, Trip Coil*
- Protections: timing in progress or alarm
- Trip: status of the opening command, trip signal



NOTE: *in the log the first entry is the most recent. Once the 200-event threshold is exceeded, the oldest ones are progressively overwritten*

The complete list is available in the *Measurements - Log - Events* menu, where each event is accompanied by a series of information: icon representing the type of event, event name, and event date and time.

There are four icons that identify the type of event:

Icon	Description
	Event reported for informational purposes
	Timing of a protection in progress, trip pending
	Alarm referring to a non-dangerous condition
	Operating alarm, malfunction, or connection error

TRIPs Ekip Touch is able to log the last 30 TRIPs.

The complete list is available in the *Measurements - Log - Trips* menu, where each trip includes the following useful information:

- The protection that triggered the opening
- The progressive count of the opening
- The date and time of the opening (referring to the internal clock)
- The measurements associated with the protection that was triggered



NOTE: *if the 30-TRIP threshold is exceeded, the oldest events are progressively overwritten*

Related measurements

The protection that trips determines the measurements recorded at the time of opening:

Protection	Measurements recorded	Remarks
Power	Currents L1, L2, L3, Ne, Ig	Ne is available with CB 4P and 3P + N Ig is available in the event of trips for G protection
Temperature	Currents L1, L2, L3, Ne	The temperature cannot be seen on the display

TRIPs [2] Access to most recent trip

The information relating to the most recent trip, as well as in the *Logs* menu, can be accessed in three different ways, depending on the Ekip Touch conditions:

Condition	Access
Trip just occurred with Ekip Touch - access	The main page is temporarily replaced by the trip information page. Press the iTEST button to reset and return to the normal page
Trip just happened with Ekip Touch - turned off	Pressing the iTEST button shows the trip information page for a few seconds
Quick consultation in all other conditions	From any page other than a menu or a page opened from a menu, press the iTEST button four times

Min-Max measurements

Ekip Touch stores in the *Historical-Measurements* menu the measurements of maximum and minimum phase currents

The recording interval between one measurement and the other can be set by the *Monitor time* parameter, which is available in the *Settings* menu (page 33).

Show

Select one of the measurements to open the graph page containing the records.

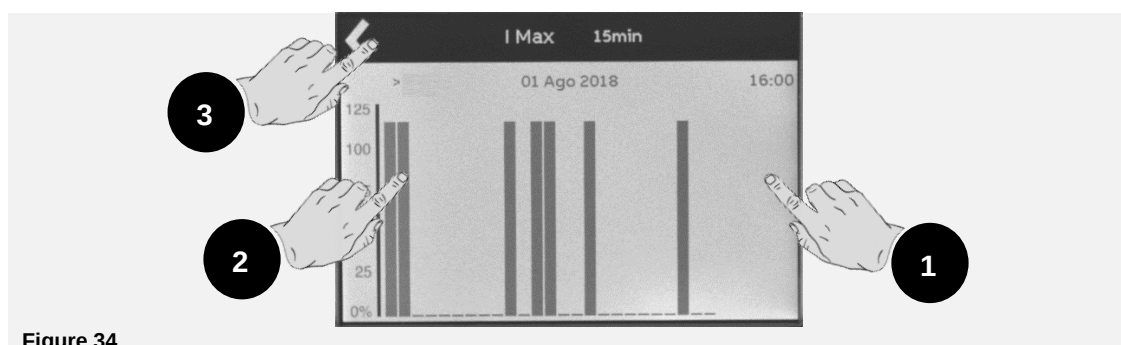


Figure 34

Each measurement permits up to 25 recordings, each shown in a bar chart (graphic full scale equal to 125% of the rated value).

The selected recording flashes to distinguish it from the others.

Touch the sides of the display to select the recordings after (➡) and before (⬅) the selected recording; in the top left corner (ⓘ) there is the command for exiting the page.

Each recording is correlated with the following information:

- time elapsed from previous measurement
- phase and value of the measurement
- date and time of the recording.



NOTE:

- If the value is less than the minimum viewable threshold, “...” is shown instead of the value in Amperes.
- The graphical representation is referred to 1 In, with a maximum value of 1.25 In
- When the parameter “Monitor time” is modified, the Trip unit performs an immediate recording.

Reset measurements

In the *Measurements-Historical* menu the *Reset Measurements* command is available to reset all the records

Maintenance The *Measurements-Maintenance* menu includes some information on the status of the CB.

Contact wear

Contact wear indicates an estimate of the state of deterioration of the main contacts of the circuit breaker. The value is expressed in percentage value, and is 0% in the event of no wear and 100% in the event of complete wear.

It is automatically calculated by the Trip unit at each opening due to protection, or, if there is an auxiliary power supply, also at each manual opening of the circuit breaker.



NOTES:

- Upon reaching 100%, the percentage does not increase any further
- The achievement of 80% is signaled with a pre-alarm, while the achievement of 100% is signaled with an alarm



IMPORTANT: 100% wear does not imply any functional limit on the Trip unit, but it is necessary to check the status of the circuit breaker as soon as possible

Maintenance

The *Maintenance* function allows notifying the user with a Warning alarm that:

- One year has passed since the last maintenance
- Contact wear increased by more than 10% compared to the last maintenance value

Two areas are available in Trip unit menus:

- Activation area (*Settings - Maintenance* menu): allows activating the *Maintenance* function
- Measurements and reset area (*Measurements - Maintenance* menu): appears only if the *Maintenance* function is activated. Provides information on the maintenance (contact wear and dates) and the command to confirm the maintenance (confirming the current date and contact wear values are recorded, and the alarm signal is reset).

The date of reference is that of the internal clock, and the elapsed time is calculated whether the trip unit is on or off (as long as the internal battery is working).



NOTE: manually changing the date may cause changes in the calculation of the elapsed time, and therefore also of the next maintenance date



NOTE: the indication of maintenance due to increased contact wear is active for values exceeding 20%

Counter operations

CB operations (total of manual operations and TRIPs) are recorded by the Trip unit with an auxiliary power supply and available in the *Information-Circuit Breaker* menu.

By activating communication with the Trip unit the following counters are also available:

- Number of manual operations
 - Number of openings due to trips (TRIP)
 - Number of openings due to failed trips
 - Number of opening tests performed
-

List The Measuring measurements are:

Name	Description	Page
<i>Real-time voltages</i>	Real-time measurements of phase and line-to-line voltages	107
<i>Real-time powers</i>	Real-time measurements of active, reactive, apparent phase and total powers	107
<i>Real-time frequency</i>	Measurement of the grid frequency	107
<i>TRIPs</i>	List of trips (TRIP) for voltage, frequency, and power protections	108
<i>Min-Max-Avg measurements</i>	Log of minimum, maximum and average voltages and powers, recorded with an range that can be set	108
<i>Peak factor</i>	Real-time measurement of the current peak factor	109
<i>Power Factor</i>	Real-time measurement of the power factor	109
<i>Energy counters</i>	Measurement of active, reactive, apparent energies	109

With the *Ekip Synchrocheck* module, the related associated measures are activated (page 171).

Real-time measurements

Real-time voltages, available in the *Summary pages*, are the real-time measurements of line-to-line and phase voltages expressed in effective value.

The display, measurement range and performance depend on the rated voltage set (U_n).

Real-time powers, available in the *Summary pages*, are the real-time measurements of the total and phase active powers.

The display, measurement range and performances depend on rated voltage set (U_n) and on the rated current defined by the rated size of the Trip unit (I_n). Moreover, the reference changes based on the type of measurement:

- S_n for total powers ($S_n = I_n \cdot U_n \cdot \sqrt{3}$).
- P_n for phase powers ($P_n = I_n \cdot U_n / \sqrt{3}$).



NOTE: phase voltages and powers are available with CB 4P and 3P + N

Measurement	Measurement range (min-max)	Normal operating range	Accuracy of detected value ⁽¹⁾
Line-to-line voltages ⁽⁵⁾	5 V .. 1.25 U_n	100 .. 690 V	0.5 %
Phase voltages	5 V .. 1.25 U_n	50 .. 400 V	0.5 %
Grid frequency	30 .. 80 Hz ⁽²⁾	$f - 10\% \dots f + 10\%$ ⁽⁴⁾	0.1 % ⁽³⁾
Total active, reactive and apparent power ⁽⁶⁾	$ P_{min} \dots P_{max} $ ⁽⁷⁾	$ 0.3 \dots 1.2 S_n $	2 % ⁽³⁾
Active, reactive and apparent phase power	$ P_{min} \dots P_{max} $ ⁽⁷⁾	$ 0.3 \dots 1.2 P_n $	2 % ⁽³⁾

Measurements instant [2]



NOTES:

- (1) Accuracy referring to normal operating ranges according to IEC 61557-12
- (2) Available for voltages greater than 30 V (with $U_n < 277$ V) or 60 V (with $U_n > 277$ V)
- (3) Accuracy referring to Ekip Touch and Ekip Touch Measuring without Class 1 Power & Energy Metering package. If the Class 1 Power & Energy Metering package is present, and for all other trip unit models, check the performance shown on page 110
- (4) 45-55 Hz with setting of frequency = 50 Hz; 54-66 Hz with $f = 60$ Hz
- (5) Higher line-to-line voltages are also available on the Histograms, Measuring Instruments, Measurement Summary pages
- (6) Higher powers are also available on the Histograms, Measuring Instruments, Measurement Summary pages
- (7) $P_{min} = 0.5 I_n \times 5$ V; $P_{max} = 3 \times 16 I_n \times 690$ V
- (8) Without external trafo; 0,7 % with external trafo 0,2 class

Special representations

Type of measurement	Measurement < min value	Measurement > max value	Display: " _ _ _ " (not available) for
Line-to-line and phase voltages		> [$U_n \times 1.25$]	N/A
Grid frequency	30 Hz	80 Hz	$V < 5$ V
Active, reactive and apparent total and phase power		> [$P_n \times 1.25$]	Sensors disconnected, $V < 5$ V, $I < 0.03 I_n$

TRIPs The *Measuring Measurements* package extends the range of TRIPs that Ekip Touch is able to record (described on page 104 for current protections).

The voltage, frequency or power protection that trips determines the measurements recorded at the time of opening:

Protection	Measurements recorded	Remarks
Voltage	Currents L1, L2, L3, Ne, voltages U12, U23, U31, U0	Ne is available with CB 4P and 3P + N U0 is available in the event of trips for RV protection
Frequency	L1, L2, L3, Ne currents and grid frequency	Ne is available with CB 4P and 3P + N
Rating	L1, L2, L3, Ne currents, total power	Ne is available with CB 4P and 3P + N Total active or apparent power depending on the protection tripped

Measurements Min-Max-Avg

The *Measuring Measurements* package extends the range of measurements that Ekip Touch is able to record (described on page 105 for current measurements).

- Maximum and average voltage
- Active, reactive and apparent maximum and average power

The type of information displayed, the commands available and the notes are the same as described for current measurements.



NOTES:

- compared to current measurements, the graphical representation is compared to 1 U_n (with a maximum value of 1.25 U_n) for voltage records and compared to 1 S_n (with a maximum value of 1.25 S_n) for power records
- if the power measurement is negative, the corresponding bar is shown in a color different from those with a positive value

Peak factor Peak factors are the real-time measurements of the ratio between peak values and RMS values of phase currents. The measurement is supported by the *Harmonic Distortion* protection function (page 49).

Measure ment	Measurement range	Precision	Application notes
Peak factor	0.3 .. 6 In (currents)	1.5%	Displays " _ _ _ " (not available) for out-of-range currents and disconnected sensors

Power Factor The power factor is the real-time measurement of the ratio between total active power and total apparent power, expressed as $\cos \varphi$.

Measure ment	Measurement range	Precision	Application notes
Power Factor	0.5 .. 1	2,5% ^(NOTE)	Display " _ _ _ " (not available) for: active and/or reactive power not available or outside the permitted ranges



NOTE: Accuracy referring to Ekip Touch and Ekip Touch Measuring without Class 1 Power & Energy Metering package. If the Class 1 Power & Energy Metering package is present, and for all other Trip unit models, check the performance shown on page 110

Energy counters Energy counters are the total active, reactive and apparent energy measurements, updated every minute.

Measurement	Measurement range	Precision
Total active, reactive and apparent energy	1 kWh .. 2 TWh; 1 kVARh ..2 TVARh; 1 kVAh .. 2 TVAh	2% ^(NOTE)



NOTE: Accuracy referring to Ekip Touch and Ekip Touch Measuring without Class 1 Power & Energy Metering package. If the Class 1 Power & Energy Metering package is present, and for all other Trip unit models, check the performance shown on page 110

Reset measurements

The *Energy RESET* command (page 32) is available in the *Energy* menu to reset the energy counters.

29 - Class 1 Power & Energy Metering

List and actions The *Class 1 Power & Energy Metering* package allows obtaining higher measurement accuracy for the following dimensions:

Measurement	Measurement range (min-max)	Normal operating range	Accuracy of detected value
Phase currents ⁽⁵⁾	0.03 .. 64 In	IEC61557-12 standard, tables 20-22	0.5% ⁽¹⁾
Ground fault current ⁽²⁾	0.08 .. 64 In	IEC61557-12 standard, table 20	0.5% ⁽¹⁾
Grid frequency	30 .. 80 Hz ⁽³⁾	$f_n \pm 10\%$ ⁽⁴⁾	± 0.02 Hz
Total active and apparent power ⁽⁶⁾	$ P_{min} .. P_{max} $ ⁽⁷⁾	IEC61557-12 standard, tables 8-11-14	1% ⁽¹⁾
Active and apparent phase power ⁽⁶⁾	$ P_{min} .. P_{max} $ ⁽⁷⁾	IEC61557-12 standard, tables 8-11-14	1% ⁽¹⁾
Total active and apparent energy	1 kWh .. 2 TWh; 1 kVARh .. 2 TVARh; 1 kVAh .. 2 TVAh	IEC61557-12 standard, tables 8-11-14	1% ⁽¹⁾
Power Factor	0.5 .. 1	IEC61557-12 standard, table 27	1% ⁽¹⁾



NOTES:

- (1) accuracy refers to normal operating ranges and conditions according to IEC 61557-12, for each declared dimension and class
- (2) Available with L SIG versions
- (3) Available for voltages greater than 30 V (with $U_n < 277$ V) or 60 V (with $U_n \geq 277$ V)
- (4) 45 .. 55 Hz with $f_n = 50$ Hz; 54 .. 66 Hz with $f_n = 60$ Hz
- (5) Higher phase currents are also available on the Histograms, Measuring Instruments, Measurement Summary pages
- (6) $P_{min} = 0.5 I_n \times 5$ V; $P_{max} = 3 \times 16 I_n \times 690$ V
- (7) Higher total powers are also available on the Histograms, Measuring Instruments, Measurement Summary pages

Functional characteristics

The measurement performance of the *Class 1 Power & Energy Metering* package are guaranteed in the following conditions (from table 43 of the IEC61557-12 standard):

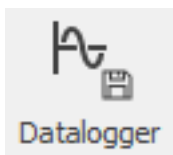
Feature	Value
Measurement device classification (PMD) according to chapter 4.3 of the standard	PMD-DD
Temperature	Operating: $T = -25\text{ °C} .. +70\text{ °C}$; Storage: $T = -30\text{ °C} .. +70\text{ °C}$; Class: K70
Humidity and altitude	Relative humidity up to 90% without condensation; from 0 to 2000 meters
Performance class for power and active energy	1

Information page The *Class 1 Power & Energy Metering* package activates the information page *IEC61557-12*, which can be viewed in the *Information* menu (page 35).



Figura 35

The page shows the activation status of the *Class 1 Power & Energy Metering* package (*Active/Inactive*) and the serial numbers of some accessories mounted on the CB specifically to respond to the characteristics of the package (assembly of electronic units and internal current sensors)

Presentation

The datalogger is a function that allows the logging of data associated with a trigger event. The recorded data are:

- Analog measurements: phase currents and line-to-line voltages
- Digital events: alarms or protection events, status signals of the circuit breaker, trips

One or two independent logs can be configured, and all the information can be downloaded, viewed and saved via Ekip Connect.

Function

With datalogger enabled and activated (START), Ekip Touch continuously acquires data, filling and emptying an internal buffer (B).

In the case of a trigger event (A), Ekip Touch stops acquisition (STOP) immediately or after a user-adjustable time (C) and stores all the window data (D), which then becomes downloadable on the PC for reading and analysis.



IMPORTANT: the function requires the presence of auxiliary voltage

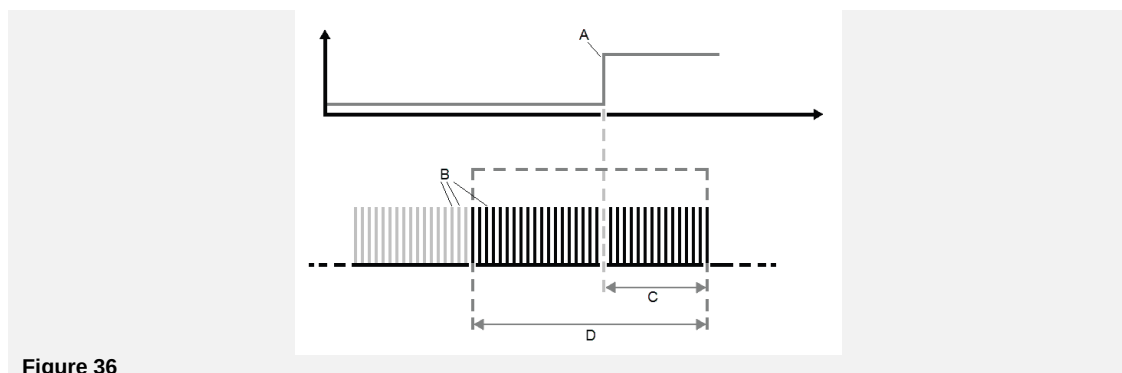


Figure 36

Parameters 1

The function parameters and commands are available in the *Settings - Datalogger* menu (page 33).

Parameter	Description	Default
Enable	Enable/disable the function and the availability of the parameters in the menu i NOTE: the enable command is hidden with at least one datalogger activated	OFF
Datalogger Num.	Determines the number of logs (1 or 2) i NOTE: the logs share the sampling frequency and memory type settings	1
Sample.Freq uency	Determines the number of samples acquired per second and the log window. There are four options available: 1200 Hz (window = 13.6 s), 2400 Hz (6.8 s), 4800 Hz (3.4 s), 9600 Hz (1.7 s) i NOTES: • A high frequency allows a more accurate analysis of the data • With two dataloggers the window of each log is halved	9600 Hz
Datalogger 1 and 2	Menu with the parameters of each Datalogger: trigger event, record delay and Restart/Stop commands	
Restart and Stop Both	Synchronized start and stop commands of the two data loggers, valid and available with Datalogger Num. = 2	

Parameters 2 The submenus *Datalogger 1* and *Datalogger 2* (available if the selected number of data loggers is: 2) contain the following options:

Option	Description	Default
Source Stop	Trigger event that stops the logging. The display shows the main protection options (openings, timings, alarms) and actuator status (open/closed). It is possible to configure the Custom option via Ekip Connect.	None
Stop Delay	Delay in stopping the logging, calculated starting from the trigger. The value is expressed in seconds, and can be set in a range: 0 s .. 10 s, with 0.01 s steps.	0.01 s
Restart	Log start command (START)	
Stop	Manual log stop command (STOP)	

Memory Type

With Ekip Connect it is possible to select the *Memory Type* parameter (Non-volatile/Volatile):

- *Non-volatile*: Ekip Touch maintains the log even if switched off. The internal battery life of the unit may decrease considerably with respect to the declared value in cases where there is a log in the memory and there is no auxiliary power supply.
- *Volatile*: Ekip Touch loses the log if switched off. When the unit is switched back on the data logger automatically restarts, having lost the previously stored data.

The parameter is set to Non-volatile by default.

Alerts If there is a log, Ekip Touch displays the information on the diagnosis bar (DataLog available).



NOTE: *Ekip Touch also shows the general indication that a log is available in the configuration with two dataloggers. Use Ekip Connect to identify which of the two logs (or both) is available*

Ekip Connect Ekip Connect 3 has two specific areas for the Datalogger function:

1. **Datalogger** to configure the log parameters with a simplified graphical interface and to download the logs
2. **Data Viewer** to open and view logs

Both areas are available in Ekip Connect's Tools menu and described in the Help section of the application.

Presentation

The Network Analyzer function allows setting voltage and current checks for a long time, to analyze the system's operation.

For this purpose, voltages and currents are monitored to detect:

- Voltage sequences (Over, Under, Pos and neg)
- Voltage imbalance (Unbalanced)
- Voltage drops, of a short duration (Interruptions) and slow (Sag)
- Voltage increases, of a short duration (Spike) and slow (Swell)
- Harmonic distortion of voltages and currents (THD)

Each monitor is associated with control parameters that can be set by the user and to counters that are incremented each time the control condition settings are reached.

Parameters

The counter configuration parameters are available in the *Settings - Network Analyzer* menu (page 33).

In the *Settings* menu it is also possible to set the *Measurement interval* parameter, which defines the period of each control session.



NOTE: the parameter is the same used for current measurements and maximum voltages

Main Menu

Parameter	Description	Default
Enable	Enable/disable the function and the availability of the parameters in the menu	OFF
I Harmonic Analysis	Activates the harmonic analysis of the currents	OFF
V Harmonic Analysis	Activates the harmonic analysis of the voltages	OFF
V Low Threshold	Counter control threshold <i>Under V Th</i> The value is expressed as a percentage of the rated voltage U_n , which can be set in a range of: 75% .. 95% U_n , with 5% steps	85 % U_n
V High Threshold	Counter control threshold <i>Over V Th</i> The value is expressed as a percentage of the rated voltage U_n , which can be set in a range between: 105, 110, 115% U_n	110 % U_n
Imbalance V Th	Counter control threshold <i>Unbalanced</i> . The value is expressed as a percentage of the rated voltage U_n , which can be set in a range of: 2% .. 10% U_n , with 1% steps  NOTE: 0% = symmetrical and balanced system	3 % U_n
V Interruption Th	Counter control threshold <i>V interruption</i> . The value is expressed as a percentage of the rated voltage U_n , which can be set in a range of: 10% .. 95% U_n , with 5% steps	95 % U_n
V Spike Threshold	Counter control threshold <i>Spikes</i> . The value is expressed as a percentage of U_n , which can be set in a range of: 105% .. 125% U_n , with 5% steps	105 % U_n
Sags	Menu with the control parameters for voltage sags	
Surges	Menu with the control parameters for voltage surges	
Harmonics	Available by enabling the harmonic analysis of currents and/or voltages, the menu allows configuring the harmonic control parameters	

Parameters [2] Sag Menu

All the thresholds are expressed as a percentage of the rated voltage U_n , which can be set in a range of : 10% .. 95% U_n , with 5% steps

All times are expressed in seconds, settable in a range of: 0.04 s to 60 s with variable steps.

Parameter	Description	Default
V sag Th Short	Counter control threshold <i>Short Sag</i>	10 % U_n
V sag dur Short	Minimum duration of the sag below the <i>Short</i> threshold to validate the count of the <i>Short Sag</i> counter	0.8 s
V sag Th Middle	Counter control threshold <i>Middle Sag</i>	45 % U_n
V sag dur Middle	Minimum duration of the sag below the <i>Middle</i> threshold to validate the count of the <i>Sag</i> counter <i>Middle</i>	0.8 s
V sag Th Long	Counter control threshold <i>Long Sag</i>	95 % U_n
V sag dur Long	Minimum duration of the sag below the <i>Long</i> threshold to validate the count of the <i>Sag</i> counter <i>Long</i>	0.8 s



NOTE: *Ekip Touch* accepts parameter changes if the following constraints are respected:

$V \text{ sag dur Long} \geq V \text{ sag dur Middle} \geq V \text{ sag dur Short}$

Swell Menu

All the thresholds are expressed as a percentage of the rated voltage U_n , which can be set in a range of: 105% .. 125% U_n , with 5% steps

All times are expressed in seconds, settable in a range of: 0.04 s to 60 s with variable steps.

Parameter	Description	Default
V swell Th Short	Counter control threshold <i>Swell.Short</i>	125 % U_n
V swell dur Short	Minimum duration of the swell above the <i>Short</i> threshold to validate the count of the <i>Swell.Short</i> counter	0.8 s
V swell Th Long	Counter control threshold <i>Swell.Long</i> .	105 % U_n
V swell dur Long	Minimum duration of the swell above the <i>Long</i> threshold to validate the count of the <i>Swell</i> counter <i>Long</i>	0.8 s



NOTE: *Ekip Touch* accepts parameter changes if the following constraints are respected: $V \text{ swell dur Long} \geq V \text{ swell dur Short}$

Harmonics (Current and Voltages)

All thresholds are expressed in percentage value, settable in a range of: 5% .. 20% (total THD) or: 3% .. 10% (single harmonics) with 1% steps.

Menu	Parameter	Description	Default
Power	THD Threshold	Counter control threshold <i>THD Voltages</i> .	5 %
	Single harmonic th	Counter control threshold of the individual voltage harmonics	5 %
Voltage	THD Threshold	Counter control threshold <i>THD Current</i> .	5 %
	Single harmonic th	Counter control threshold of the individual current harmonics	5 %

Counters - preface The main function counters are available in the *Measurements - Network Analyzer* menu (page 33), distributed across several sections.

The extended list of all measurements is available via Ekip Connect or with system bus connection.



NOTE: in the following paragraphs, the Supplemental List item shows the additional counters present only via Ekip Connect. The counter type of reference is shown in the header of the supplementary tables

Sequence V and Sequence V 3s

The **Sequence V** and **Sequence V 3s** submenus have the following counters:

Menu	Counters	Description
V sequence	V seq pos	Positive sequence relative to the current period [V]
	V seq neg	Negative sequence relative to the current period [V]
	Last V pos	Positive sequence relative to the previous period [V]
	Last V neg	Negative sequence relative to the previous period [V]
V 3s sequence	V seq pos	Positive sequence calculated in the last three seconds [V]
	V seq neg	Negative sequence calculated in the last three seconds [V]
	Unbalanced	Voltage imbalance calculated in the last three seconds [%]

Supplemental list

Counters (Sequences)	Description
Last time stamp	Date and time referred to the last record of the sequences

Counters (Unbalance)	Description
Last value	Voltage imbalance related to the current period [%]
Actual unbalance value	Voltage imbalance related to the previous period [%]
Last time stamp	Date and time referred to the last record of imbalances
Actual number of U.	Counts the times when the mean value of the ratio of positive to negative sequences (with the sense of rotation 3-2-1) and negative to positive sequences (1-2-3) exceeds the threshold <i>Unbalance V Th</i> . The count refers to the current day.
Actual [day -1 ... day -7] number of U.	Counters referred to the number of imbalances detected in the last seven days of activity, calculated using the unit's internal clock
Cumulative number of U.	Cumulative counter of all imbalances detected by the unit (sum of the other counters or also added to the previous days?)



NOTE: all imbalance measurements (not balanced and Unbalance value) saturate when it reaches 200%

THD Current and THD Voltages

The *THD Current* and *THD Voltages* sub-menus have the following counters:

Menu	Counters	Description
THD Current	L1, L2, L3, Ne	Real-time value of the harmonic distortion of each current phase
THD Voltage	U12, U23, U31	Real-time value of the harmonic distortion of each line-to-line voltage

Above V Th and Below V Th

In the *Counters - Day -1* and *Counters - Cumulative* submenus some counters are available for sequence measurements:

Counters	Description
Over V Th	Counts the times when the average value of the positive sequence (with the sense of rotation of the phases set: 1-2-3) or negative sequence (with the rotation direction of the phases set: 3-2-1) exceeds <i>V Threshold High</i> . The count refers to the interval of the menu of reference (previous day or cumulative)
Under V Th	Counts the times when the average value of the positive sequence (with the sense of rotation of the phases set: 1-2-3) or negative sequence (with the rotation direction of the phases set: 3-2-1) falls below <i>V Threshold Low</i> . The count refers to the interval of the menu of reference (previous day or cumulative)

Supplemental list

Counters (Overvoltage)	Description
Last time stamp	Date and time referred to the last <i>Over V Th</i> counter record
Last value	Value of the last breach of the <i>Over V Th</i> threshold [V]
Actual number of O.	Count of <i>Over V Th</i> referring to the current day
Actual [day -2 ... day -7] number of O.	Count of <i>Over V Th</i> detected in the last seven days of activity, calculated using the unit's internal clock

Counters (Undervoltage)	Description
Last time stamp	Date and time referred to the last <i>Under V Th</i> counter record
Last value	Value of the last sag below the <i>Under V Th</i> threshold [V]
Actual number of O.	Count of <i>Under V Th</i> referring to the current day
Actual [day -2 ... day -7] number of O.	Count of <i>Under V Th</i> detected in the last seven days of activity, calculated using the unit's internal clock

V Interruption (Interruption)

The counter *V Interruption* is to be understood as the reduction of the RMS value of the line-to-line voltage below the *V Interruption* threshold. *Th* set, for a duration of less than 40 ms (short voltage sag).

The counter is available in the two sub-menus *Counters - Day -1* and *Counters - Cumulative* (previous day or cumulative)



NOTE: Since the counter is based on the calculation of the RMS value, it is possible that two interruption of equal duration may be evaluated differently depending on the moment in which they occur:

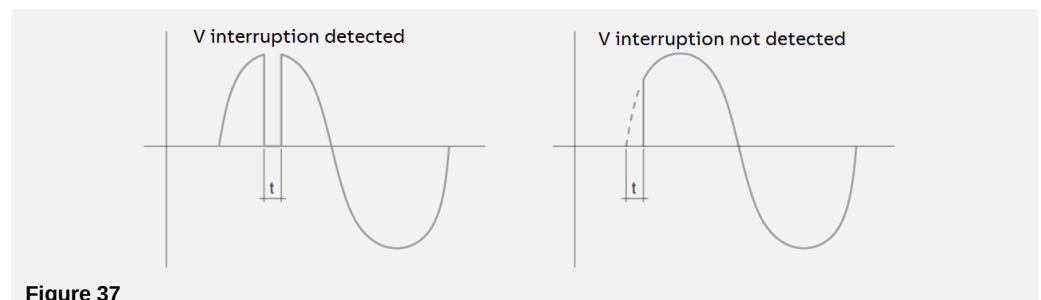


Figure 37

Supplemental list

Counters (Interruptions)	Description
Last record	Date and time referred to the last <i>V Interruption</i> counter record
Last value	Value of the last sag below the <i>V Interruption</i> threshold [V]
Last Duration	Duration of the last sag below the <i>V Interruption</i> threshold [ms]
Actual number of I.	Count of <i>V Interruption</i> referring to the current day
Actual [day -2 ... day -7] number of I.	Count of <i>V Interruption</i> detected in the last seven days of activity, calculated using the unit's internal clock

Spikes The Spikes counter is to be understood as the increase of the RMS value of the line-to-line voltage above the set *V Spike Threshold* for a duration of less than 40 ms (increase in voltage of short duration).

The counter is available in the two sub-menus *Counters - Day -1* and *Counters - Cumulative* (previous day or cumulative)



NOTE: Since the counter is based on the calculation of the RMS value, it is possible that two rapid voltage increases of equal duration may be evaluated differently depending on their amplitude:

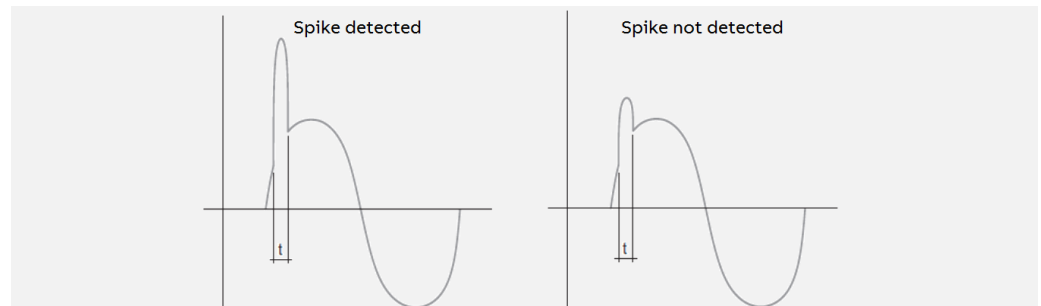


Figure 38

Supplemental list

Counters (Spikes)	Description
Last time stamp	Date and time referred to the last <i>Spikes</i> counter record
Last value	Value of the last increase above the <i>Spikes</i> threshold [V]
Last duration	Duration of the last increase above the <i>Spikes</i> threshold [ms]
Actual number of S.	Count of <i>Spikes</i> referring to the current day
Actual [day -2 ... day -7] number of S.	Count of <i>Spikes</i> detected in the last seven days of activity, calculated using the unit's internal clock

Sags In the *Counters - Day -1* and *Counters - Cumulative* submenus some counters for sags are available:

Counters	Description
Sag.Short	Counts the times that any line-to-line voltage drops below the <i>V sag Th Short</i> threshold for longer than <i>V sag dur Short</i>
Sag.Middle	Counts the times that any line-to-line voltage drops below the <i>V sag Th Middle</i> threshold for longer than <i>V sag dur Middle</i>
Sag.Long	Counts the times in which any line-to-line voltage drops below the threshold <i>V sag Th Long</i> for longer than <i>V sag dur Long</i>

The count refers to the interval of the menu of reference (previous day or cumulative)



NOTE: since it is possible for an event to fall within more than one type, only the counter related to the highest applicable type is increased (*Long > Middle > Short*)

Supplemental list

Counters (Sag -short-)	Description
Last time stamp	Date and time referred to the last <i>Sag.Short</i> counter record
Last value	Value of the last sag below the <i>Sag.Short</i> threshold [V]
Last duration	Duration of the last sag below the <i>Sag.Short</i> threshold [ms]
Actual number of S.	Count of <i>Sag.Short</i> referring to the current day
Actual [day -2 ... day -7] number of S.	Count of <i>Sag.Short</i> detected in the last seven days of activity, calculated using the unit's internal clock

Sags [2]

Counters (Sag -middle-)	Description
Last time stamp	Date and time referred to the last <i>Sag.Middle</i> counter record
Last value	Value of the last sag below the <i>Sag.Middle</i> threshold [V]
Last duration	Duration of the last sag below the <i>Sag. Middle</i> threshold [ms]
Actual number of S.	Count of <i>Sag. Middle</i> referred to the current day
Actual [day -2 ... day -7] number of S.	Count of <i>Sag. Middle</i> detected in the last seven days of activity, calculated using the unit's internal clock
Counters (Sag -long-)	Description
Last time stamp	Date and time referred to the last <i>Sag.Long</i> counter record
Last value	Value of the last sag below the <i>Sag. Long</i> threshold [V]
Last duration	Duration of the last sag below the <i>Sag. Long</i> threshold [ms]
Actual number of S.	Count of <i>Sag. Long</i> referred to the current day
Actual [day -2 ... day -7] number of S.	Count of <i>Sag. Long</i> detected in the last seven days of activity, calculated using the unit's internal clock

Swells In the *Counters - Day -1* and *Counters - Cumulative* submenus some counters for swells are available:

Counters	Description
Swell.Short	Counts the times that any line-to-line voltage exceeds the <i>V swell Th Short</i> threshold for longer than <i>V swell dur Short</i>
Swell.Long	Counts the times in which any line-to-line voltage exceeds the threshold <i>V swell Th Long</i> for longer than <i>V swell dur Long</i>

The count refers to the interval of the menu of reference (previous day or cumulative)



NOTE: since it is possible for an event to fall within more than one type, only the counter related to the highest applicable type is increased (*Long* > *Short*)

Supplemental list

Counters (Swell -short-)	Description
Last time stamp	Date and time referred to the last <i>Swell.Short</i> counter record
Last value	Value of the last increase above the <i>Swell.Short</i> threshold [V]
Last duration	Duration of the last increase above the <i>Swell.Short</i> threshold [ms]
Actual number of S.	Count of <i>Swell.Short</i> referring to the current day
Actual [day -2 ... day -7] number of S.	Count of <i>Swell.Short</i> detected in the last seven days of activity, calculated using the unit's internal clock
Counters (Swell -long-)	Description
Last time stamp	Date and time referred to the last <i>Swell.Long</i> counter record
Last value	Value of the last increase above the <i>Swell. Long</i> threshold [V]
Last duration	Duration of the last increase above the <i>Swell. Long</i> threshold [ms]
Actual number of S.	Count of <i>Swell. Long</i> referred to the current day
Actual [day -2 ... day -7] number of S.	Count of <i>Swell. Long</i> detected in the last seven days of activity, calculated using the unit's internal clock

THD Voltages and currents

In the *Counters - Day -1* and *Counters - Cumulative* submenus some counters for harmonic distortion are available:

Counters	Description
THD Voltage	Counts the total minutes that the total distortion exceeds the <i>THD Threshold</i> of the currents
THD Current	Counts the total minutes that the total distortion exceeds the <i>THD threshold</i> of the voltages



NOTE: the counters saturate at 65535 minutes (45 days). It is possible to reset them with a command from the service connector (via Ekip Connect) or with a communication from the system bus

Supplemental list

Counters (THD Current)	Description
Actual minutes	Count of <i>THD Current</i> referring to the current day [min]
Actual [day -2 ... day -7] number of THD C.	Count of <i>THD Current</i> referred to the last seven days of activity, calculated using the unit's internal clock
Counters (THD Voltages)	Description
Actual minutes	Count of <i>THD Voltages</i> referring to the current day [min]
Actual [day -2 ... day -7] number of THD T.	Count of <i>THD Voltages</i> referred to the last seven days of activity, calculated using the unit's internal clock

Waveforms

In the *Network Analyzer-Waveforms* menu, the graphic messages are available of:

- phase currents L1, L2, L3, Ne (with units configured with 4 phases)
- network voltage V12, V23, V31

By selecting one of the available parameters, Ekip Touch acquires and shows the waveform

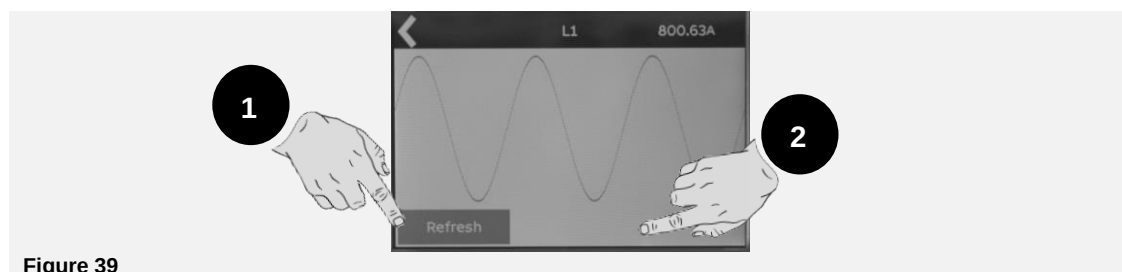


Figure 39

The window that opens shows the detected waveform and the value at the moment of the selection; a new waveform and the relative measurement measurement can be acquired by the command *Refresh* (1).

Harmonics

If the harmonic analysis of currents and/or voltages (page 114) has been activated, in the waveform window, the *Harmonics* (2) command is available that opens the histogram of the harmonics that make up the waveform of the network frequency set on the menu.

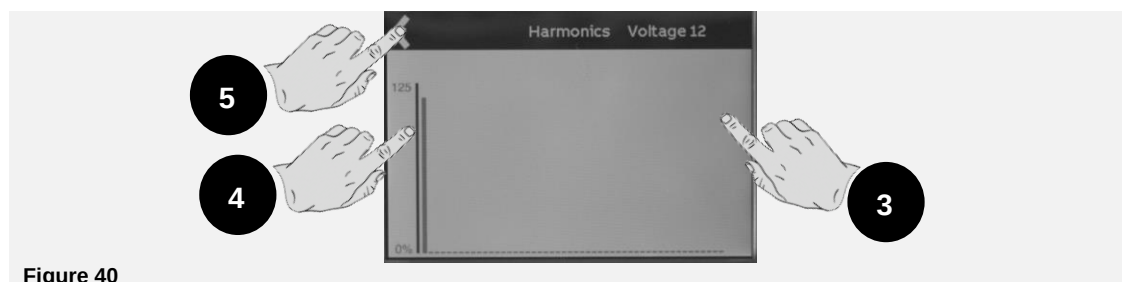


Figure 40

Touch the sides of the display to scroll through the harmonics before (3) and after (4) the selected harmonic, which is shown by a flashing graph and the value of which is shown in the centre of the page; in the top left corner (5) there is the command for exiting the page.

32 - Main settings

Introduction All the following parameters are available directly or from the *Settings* menu in the conditions envisaged by Ekip Touch based on the version and configuration described.

Please refer to the overview of the *Settings* menu on page 33 for a discussion of the parameters in the menu but not described below:

- Circuit breaker: Hardware Trip, T Protection, Neutral Protection
- Phase sequence
- Measurement range
- Power Controller,
- Load Shedding,
- Network Analyzer
- Datalogger
- Dual Setting
- Functions



WARNING! changes to the settings must be made without protection alarms

Configuration The *Circuit breaker-Configuration* menu is available with CB 3P, which allows activating the presence of the external neutral sensor (described on page 194).

Activation of the configuration with external neutral (3P + N) enables:

- Histogram of the Ne phase on the *Histograms* page
- Neutral current measurements
- Submenu for configuring the Neutral protection
- Logging of neutral current in case of TRIP

With CB 3P by default the parameter is set as: **3P**.

Ground protection With Ekip Touch LSIG version in the *Circuit breaker-Ground protection* menu it is possible to:

- Activate / deactivate the presence of the external sensor S.G.R (page 191) and its protection (page 79)
- activate the presence of the Rc sensor (page 191) and its protection (page 81)



NOTA: the Rc sensor can be activated if the Measuring Measures package is present and the Rating Plug is Rc version; the presence of the menu sensor can then be deactivated only by replacing the installed Rating Plug

With Ekip Touch LSIG, the parameter is set by default as: Absent.

Main frequency Sets the system's grid frequency. Possible choices are 50 Hz and 60 Hz.



NOTE: measurements are performed according to the grid frequency set. An incorrect parameter configuration can cause measurement and protection malfunctions

Ekip Touch is supplied with the parameter set according to the configuration ordered.

Modules The *Modules* menu has several options:

Parameter	Description	Default
Local / Remote	The parameter defines how parameters can be set for units: <i>Local</i>: changes parameters only from the display or from the service connector <i>Remote</i>: change parameters only remotely (<i>Ekip Com</i> modules)  NOTES: - The Remote mode requires the presence of an auxiliary power supply and <i>Ekip Com</i> modules, otherwise it is automatically disabled - In Remote mode it is still possible to change the Local/Remote parameter	Local
Local Bus	The parameter allows activation of the communication between the Trip unit and the modules mounted on the terminal board or externally to the unit. Correct communication between units and modules is confirmed by: - Addition of all the connected modules to the <i>Modules</i> menu - LED Power of the modules turned on and synchronized like the <i>Ekip Touch</i> power LED - No Local Bus alarm in the diagnosis bar	OFF
Ekip Measuring	Menu with voltages parameters, see page 138	
BLE	BLE activation parameters, see next chapter	Off
-	Menu of each module detected and connected, details from 135	
Functions	Access to the functions <i>Switch On LOCAL</i> and <i>RESET signal</i> , see page 82	

BLE The menu in *Settings-Modules* allows activating the Bluetooth antenna on the Trip unit, useful for communicating with an external device (tablet, smartphone) using the BLE protocol, through the *Ekip Connect Mobile* app (page 14).

These are the available parameters

Parameter	Description	Default						
<i>Enable</i>	Enables/disables the activation of the BT antenna and the availability of the <i>Battery mode</i> parameter in the menu: - If <i>On</i>, the BT antenna turns on according to the configuration of the <i>Battery Mode</i> parameter - If <i>Off</i>, the antenna is off	Off						
<i>Battery mode</i>	Defines the mode for switching on the BT antenna, based on the presence of devices on the service connector (Ekip T&P, Ekip Programming, Ekip TT): <table><tr><th>Value</th><th>BT antenna characteristics</th></tr><tr><td>---</td><td>On if there are no devices Off if there are devices</td></tr><tr><td>ON</td><td>When a device is connected, the antenna is switched off for 15 seconds and then: - The antenna remains off if communication with the device has been activated - The antenna switches on if communication with the device has not been activated </td></tr></table>  IMPORTANT: <i>the typical scenario for configuring Battery mode = On is: Ekip Touch + Ekip TT + communication with smartphone active. In all other cases, including System Update, Battery mode = ---</i>	Value	BT antenna characteristics	---	On if there are no devices Off if there are devices	ON	When a device is connected, the antenna is switched off for 15 seconds and then: - The antenna remains off if communication with the device has been activated - The antenna switches on if communication with the device has not been activated	---
Value	BT antenna characteristics							
---	On if there are no devices Off if there are devices							
ON	When a device is connected, the antenna is switched off for 15 seconds and then: - The antenna remains off if communication with the device has been activated - The antenna switches on if communication with the device has not been activated							

Bus Test The parameter allows enabling/disabling the changing of parameters from the service connector, limiting the possibility of configuring all the options on the display (in Local mode) or from *Ekip Com* modules (in Remote mode).

If the parameter is disabled, Local mode and use of the password provide security against unwanted changes by unauthorized personnel.



NOTE: with *Test Bus = Off* the communication from the service connector is still guaranteed (reading is allowed)

Ekip Touch is supplied with the parameter set to: [On](#).

System The *System* menu has several options:

Parameter	Description	Default
<i>Data</i>	Set the current date	
<i>Time</i>	Set the current time	
<i>Language</i>	Set the language in the display menus	English
<i>Password</i>	Set the password, see page 36 for details	00001



IMPORTANT: setting and checking the **Date and Time** is important for all logging functions (trip or measurements). If there is a malfunction with the date and time reset and if necessary replace the Ekip Touch battery (see 1SDH001000R0509)

View The *View* menu allows access to the configuration of the *Client Page*:

Parameter	Description	Default
<i>TFT orientation</i>	Enables the orientation of the pages <i>Alarms List</i> , <i>Measuring Instruments</i> and <i>Main Measurements</i> to be set. The options are: Horizontal, Vertical clockwise, Vertical anticlockwise	Horizontal
<i>Client page</i>	Enables a supplementary information page to be activated, which is accessible by pressing the iTEST button twice on any page that has a diagnosis bar. The configuration of the information on the new page is permitted via Ekip Connect (page 126)	Off
<i>Ammeter phase</i>	Enables the current that is to be displayed on the <i>Measuring instruments</i> page to be set and selected from: I _{max} , I ₁ , I ₂ , I ₃ , Ne (only in 4P or 3P + N)	I_{max}
<i>Voltmeter phase</i>	Enables the voltage that is to be displayed on the <i>Measuring instruments</i> page to be set and selected from: V _{max} , V ₁₂ , V ₂₃ , V ₃₁	V_{max}

Maintenance The parameter allows enabling/disabling an alarm related to unit maintenance, described on page 106.

Ekip Touch is supplied with the parameter set to: [On](#).

MLRIU The *MLRIU* parameters are available with Ekip M Touch for *Motor Protection* functions (page 71).



NOTE: for correct operation, where present check the status of the external connections and to the Trip unit of Ekip CI and its output contact (O61)

Parameters

Parameter	Description	Default
Open Mode	Allows setting the TRIP mode (page 39): • <i>Heavy</i>: in the event of a TRIP the Trip coil of the CB is controlled • <i>Normal</i>: in the event of a TRIP contact O61 of the <i>Ekip CI</i> module is opened  NOTES: • The TRIP for protections G or I always controls the Trip coil, regardless of the Open Mode configuration • In Normal mode, if the Trip unit detects a malfunction even after the opening command at O61, a command is also sent to the CB Trip coil	Normal
Autoreclosure Activated	With Open Mode = Normal, allows reclosing of contact O61 following a TRIP for L (On) protection	Off
Motor Class	Allows selecting the motor trip class (page 71 for operating details) between: 5E, 10E, 20 E, 30 E	30E
Contactor Delay	Defines the wait time after the opening command of the O61 contact before considering the malfunction still present and sending a command to the CB Trip coil. The value is expressed in seconds, which can be set in a range: 0.1 s .. 1 s, with 0.1 s steps	0.1
Autoreclosure Time	Defines the wait time after the opening command of the O61 contact before closing it again. The value is expressed in seconds, which can be set in a range: 1 s .. 1000 s, with 1 s steps	60

33 - Supplemental settings

Presentation From the service connector (with Ekip Connect) or with system bus communication it is also possible to access parameters and commands that are not available directly from the display. Below is a list and description of the various functions.

Programmable States Sixteen independent programmable states are available, distinguished by the letters A, B, C, D, E, F, G, H, I, L, M, N, O, P, Q, R, which allow different event control solutions.

Each programmable state can have two values: *True* or *False*, and several configuration parameters are available:

- *Trigger*: event or combination of multiple events (up to 24, in logical AND or OR configuration) of state activation
- *On Delay*: state activation delay, calculated starting from the presence of the trigger
- *Off Delay*: state deactivation delay, calculated from when the trigger no longer exists

 **NOTE:** the status is activated if the trigger is present for a time set in On Delay and is deactivated if the trigger is absent for a time longer than the Off Delay setting

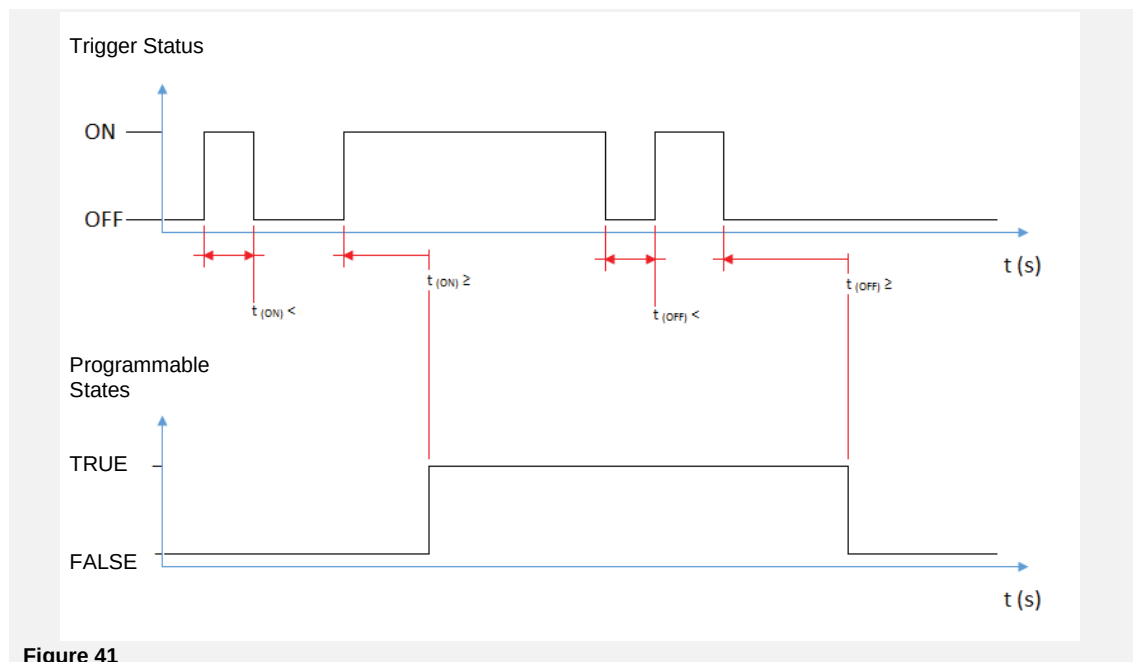


Figure 41

The states can be used with the external Ekip Signaling 10K module, on Link Bus or with the programmable functions to return the desired signal combination to contacts.

Filters Measuring filters can be activated on the channels S.G.R. / RC and V0:

- *GTE filter*: available if the external toroid is present (S.G.R. or RC).
- *V0 filter*: available with active neutral connection

If the filter is activated, the measurements and the specific protections (Gext and RC for *GTE filter*, and V0 for *V0 filter*) are treated differently: Ekip Touch applies a pass-band filter on the signal to measure only the basic component (50 or 60 Hz).

TAG Name, User data User-programmable labels useful for facilitating the remote identification of units;

 **NOTE:** the TAG Name label and the communication address make up the identifier used by Ekip Connect for the connected devices

Client Page	Enabling and fields to edit the Clients page (5 information lines) that can be viewed from the unit display.
Installation	Date of CB installation
Load Profile Time	The counter indicates the elapsed time since the last reset of the energy measurements. It is active and updated if there is either an auxiliary power supply or a power supply from Ekip T&P.
Alive LED	The parameter allows changing the behavior of the Trip unit's Power LED and all connected modules. If activated (<i>Alive Mode</i> on), the Power LEDs behave as follows: • <i>Ekip Touch</i>: flashes with 0.5 Hz frequency • <i>Modules</i>: if there are no communication errors, they synchronize with the Ekip Touch LED If deactivated, the Power LEDs on the respective devices are on and fixed.
Open/Close Remote Direct Command	The parameter manages two different command packages for remote opening and closing: • <i>Enabled</i>: direct <i>Open</i> and <i>Close</i> commands are valid. • <i>Disabled</i>: direct commands not valid. In this case, remote opening and closing are possible using the <i>YC COMMAND</i> and <i>YO COMMAND</i> programmable functions and the commands <i>Request circuit breaker open</i> and <i>Request circuit breaker close</i>.
Change Dual Setting of parameters always	If activated, it allows changing the parameter settings (<i>Adaptive Protections</i>) also with timing alarms in progress. Disabled by default.
Repeat zone selectivity S/G HW	If Enabled, the propagation logic of the zone selectivity HW signals is valid according to the table in the technical notebook QT1 1SDC007100G0205. If Disabled, the HW selectivity signal is not propagated by Ekip Touch
Zone selectivity input functions	In this section it is possible to configure the zone selectivity inputs and some outputs: • <i>Standard</i>: operation of the input or output as per standard zone selectivity logic (see 1SDC007100G0205 or 1SDC007401G0201). All the selectivity functions are set with Standard. • <i>Custom</i>: it is possible to select the activation event of the zone selectivity input or output.  IMPORTANT: in the Custom configuration the only event to activate zone selectivity is the one set, and therefore the standard selectivity operation is not active (change recommended only for expert technical staff)
Glitch	The Glitch commands from 16 to 23 activate the respective glitch registers, useful for customizing any programmable functions or output contacts.
Reset Wizard	Reset Wizard: at first startup Ekip Touch will show the Wizard window for setting certain unit parameters

34 - Test

Presentation From the display it is possible to access the test area, where commands are available to check certain functions of the Trip unit. Below are the details of all the commands available in the *Test* menu (page 34).

Ekip T&P with Ekip Connect has a *Protection test* section to simulate the presence of current signals or alarm voltages and verify times and reactions.

Autotest The Auto Test command starts an automatic startup sequence of the display and the LEDs to enable the operation of the display and LEDs to be checked.

The sequence consists of the following test phases:

1. Screen with message "www.abb.com".
2. Display dimming
3. Sequence of colouring in red, green, and blue bands with gradual increase of backlighting.
4. Warning LED and Alarm come on for a second.



NOTE: an auxiliary supply is necessary to check the gradual increase of backlighting

Trip Test Selecting the *Trip test* command opens a page that asks for confirmation to run the test operation by pressing the **iTEST** button.

Once the button is released, an opening command is sent to the CB Trip coil.



IMPORTANT:

- the opening command is sent with the circuit breaker closed and no current flowing
- following a command, the verification of the effective change of the actuator status and of the information on the display are delegated to the user: make sure that no alarms are noted on the diagnostic bar before performing the test



NOTE: to reset the TRIP signal press the **iTEST** button or send a TRIP RESET command (via Ekip Connect or remotely)

CB Test Selecting the *CB Test* command opens a submenu with the commands *Open CB* and *Close CB*. The commands activate the YO opening coils and YC closing coils respectively. The correct transmission of the command is confirmed by the window with the word "Test Executed."

The correct operation of the entire control system (Trip unit and opening and closing coils) is verified by opening and/or closing the circuit breaker.



IMPORTANT: coil opening and closing commands work only with the Trip unit switched on by an auxiliary power supply.

- Make sure the coils are connected to the power source
- The commands check the Trip unit's operation. Any malfunctions of the coils are not detected by the test

Ekip CI This menu is activated with the *Ekip CI* module and an auxiliary power supply and local bus enabled.

The *Autotest* command is available in the menu, and its selection activates a test of the LEDs and output contact O61 in sequence:

1. Reset LED and contact closure of O61 (if open)
2. Turn on all the LEDs in sequence and then switch them off again
3. Opening of the O61 contact, lighting of the O61 led and subsequent reset
4. Restore initial conditions.



IMPORTANT: the utotest sequence involves sending the command to open the output contact: verification of correct opening is the responsibility of the user.

Ekip Signalling 2K This menu is activated with the *Ekip Signalling 2K* module and an auxiliary power supply and local bus enabled.



NOTE: a menu is available for each Ekip Signaling 2K module, up to a maximum of three

Within each submenu there is a *Autotest* command that activates the automatic sequence of output tests (contacts and LEDs) and input test (LED), and includes the following operations:

1. Reset output contacts (= open) and LEDs (= off).
2. Turn on all the LEDs in sequence (output and input)
3. Closure and shutdown of the two output contacts in sequence, switching on the relative LEDs.
4. Restore initial conditions



IMPORTANT: the Autotest command closes the contacts regardless of the configuration set by the user: the safety of the devices connected to the Ekip Signalling 2K modules, the verification of the correct closing of the contacts and the lighting of the LEDs is the responsibility of the user

Zone selectivity The menu has one or two sections that are visible depending on the available and enabled protections:

Submenu	Reference selectivity	Inputs/Outputs managed
<i>S Selectivity</i>	S, S2, D (Forward)	SZi (DFi), SZo (DFo)
<i>G Selectivity</i>	G, Gwxt, D (Backward)	GZi (DBi), GZo (DBo)

In each submenu there are three fields useful for checking selectivity inputs and outputs:

Field	Description
<i>Input</i>	Provides the status of the selectivity input (On/Off)
<i>Force Output</i>	The selectivity output is activated
<i>Release Output</i>	The selectivity output is deactivated

To check the selectivity contacts refer to the commissioning procedure (page 16).

RC Test The command is available in the presence of the *RC Toroid* and *Rating Plug*.

Selecting the command opens a window showing the protection settings and test instructions:

1. press the **iTEST** button to send a test signal to the toroid.
2. The toroid sends Ekip Touch a signal as if it was an alarm current measurement.
3. Ekip Touch sends the TRIP command.

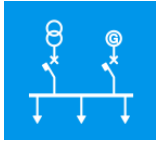


IMPORTANT: the command sends a signal to the RC toroid and ends with a TRIP command: it is the user's responsibility to check that the initial connection (of the toroid and unit supplies) are correct and that the TRIP command is run

Additional functions

35 - Power Controller

Description



The *Power Controller* function allows managing the loads of a system according to the power absorbed to reduce consumption and optimize energy efficiency.

All the parameters and measurements of the function are available via Ekip Connect, while the Trip unit allows setting and viewing some of them, as noted below.



IMPORTANT: for full details see the *Technical Catalog* (see page 4) or the function's *White Paper* (see page 13).

Ekip Touch Parameters

Some function configuration parameters are available In the *Settings - Power Controller* menu (page 33).

Parameter	Description	Default
<i>Enable</i>	Enable/disable the function and the availability of the parameters in the menu	OFF
<i>Load Operating Mode</i>	Allows setting the configuration of each of the 15 programmable loads (from Load 1 to Load 15). It is possible to choose between Automatic or Manual configuration	Manual
<i>Powers Limits</i>	Allows setting the 10 power limits (from Power Limit 1 to Power Limit 10). The value is expressed in kW and can be set in a range of: 10 kW .. 10000 kW with 10 kW steps.	10 kW



NOTE: to set all the parameters of the function it is recommended to first configure the parameters via Ekip Connect, and only then work on the Trip unit to enable or change loads and power limits

Ekip Touch Measurements

In the *Measurements* page, with Power Controller activated, the specific page with the main measurements is available:

Measurement	Description
<i>Ea</i>	Expected energy
ΔT	Time spent within the evaluation window
<i>LOADS</i>	Number of controlled loads
<i>LOADS Shed</i>	Number of loads shed
<i>Sp</i>	shed load priority
<i>T</i>	evaluation window

With *Power Controller* activated, the *Power Controller* menu is available in the *Information* page (page 35), and it provides information on the 15 loads in two submenus:

Submenu	Information included
<i>Load Input Status</i>	Load status (from Load 1 to Load 15): open or closed
<i>Active load</i>	Load configuration (from Load 1 to Load 15): active or inactive

Description

The *Load Shedding* function allows you to manage malfunctions on systems that can work thanks to the energy produced by renewable and local energy sources, in particular a lack of power, e.g. due to a malfunction on the MV voltage side.

The function is available in two versions:

- *Basic* is supplied with all Ekip Touch Trip units
- *Adaptive* can be purchased with the relative additional package that is available for all Trip units equipped with the *Measuring Measurement* package, excluding Ekip M Touch

All the parameters and measurements of the function are available via Ekip Connect, while the Trip unit allows setting and viewing some of them, as noted below.



IMPORTANT: for full details see the *Technical Catalog* (see page 4) or the function's *White Paper* (see page 14).

Ekip Touch Parameters

Some function configuration parameters are available In the *Settings - Load Shedding* menu (page 33).



NOTE: it is advisable to first configure the parameters via Ekip Connect, and only then operate on the Trip unit

Parameter	Description	Default
<i>Enable</i>	Enable/disable the function and the availability of the parameters in the menu	OFF
<i>Version</i>	Display of the function version, Basic or Adaptive  NOTE: with the Basic version the only parameter available is Reconnection Timeout	--
<i>Solar System Present</i>	Defines if the microgrid includes a solar system (Off/On)	Off
<i>Solar rated power</i>	Available with Solar System Present = On, defines the rated power of your solar system. The value is expressed in kW, which can be set in a range: 100 kW .. 65535 kW with 1 kW steps	100 kW
<i>ATS</i>	Defines if the system has an ATS system (Off/On)	Off
<i>Generator power</i>	Available with ATS = On, it defines the power received from the ATS branch, which can be set in a range: 0 kW (. . .) .. 10000 kW with 1 kW steps	
<i>Frequency slope</i> (NOTE)	Defines the variation of real-time frequency that triggers <i>Load shedding</i> The value is expressed in (Hz/s), which can be set in a range: 0.6 Hz/s .. 10 Hz/s with 0.2 Hz/s steps	0.6 Hz/s
<i>FW Warning</i> (NOTE)	Minimum frequency control threshold that activates Load shedding The value is expressed in an absolute value (Hertz), which can be set in a range: 0.9 Fn .. 1.1 Fn with 0.001 Fn steps	1 Fn
<i>Reconnection Timeout</i>	Defines the time used by the Trip unit between the one load and the next, following the re-closure of the main CB. The value is expressed in (s), which can be set in a range: 10 s ..1800 s with 1 s steps	10 s



NOTE: Load shedding is activated if the control conditions defined by the Frequency slope and FW Warning parameters are simultaneously present

**Ekip Touch
Measurements**

In the *Measurements* page, with *Load Shedding* activated, the specific page with the main measurements is available:

Measurement	Description
<i>F</i>	Frequency measured
<i>F_n</i>	Rated frequency of the Trip unit
<i>LOADS</i>	Number of controlled loads
<i>LOADS Shed</i>	Number of loads shed

With *Power Controller* activated, the *Load Shedding* menu is available in the *Information* page (page 35), and it provides information on the 15 loads in 2 submenus:

Submenu	Information included
<i>Load Input Status</i>	Load status (from Load 1 to Load 15): open or closed
<i>Active load</i>	Load configuration (from Load 1 to Load 15): active or inactive

37 - Interface Protections IPS

Description



The *Interface Protections IPS* function allows you to manage malfunctions on systems that can work thanks to the energy produced by renewable and local energy sources, in particular a lack of power, e.g. due to a malfunction on the MV voltage side.

The function is available for all Ekip Hi-Touch Trip units and meets the CEI 0-16 standard.

All the parameters and measurements of the function are available via Ekip Connect. In any case, the Trip unit allows setting the protection 59 S1, V DIR, V INV and the control thresholds *Voltage stability*, *Frequency stability* and *F W1* presented below.



IMPORTANT: for full details see the *Technical Catalog* (see page 4) or the function's *White Paper* (see page 14).

59.S1 Protection [ANSI 59S1]

If the maximum average value of the three line-to-line voltages calculated in a 10-minute moving window exceeds the threshold for a time longer than the one set, the protection sends the TRIP command.

The protection submenu is available in the *Protections-Advanced* menu, where the following parameters can be set:

Parameter	Description	Default
<i>Enable</i>	Enable/disable the protection and the availability of the parameters in the menu	OFF
<i>Trip enabling</i>	Activate/deactivate the sending of the opening command. If disabled, the alarm and the exceeding of the protection time are managed only as information	OFF
<i>Threshold</i>	Defines the value that triggers the protection. The value is expressed both in an absolute value (Volt) and a relative value (Un), which can be set in a range: 1 Un .. 1.3 Un with 0.05 Un steps	1.1 Un
<i>Time</i>	The trip time. The value is expressed in seconds, which can be set in a range: 3 s .. 999 s, with 3 s steps	3 s

Constraints, limitations, and additional functions

From the service connector (via Ekip Connect) or with system bus communication it is also possible to access the block functions, see page 79.

Protection V DIR [ANSI 27VD]

If the direct sequence measured by the Trip unit exceeds or falls below the Udir threshold (depending on the direction set), the corresponding alarm is activated (TRIP not envisaged).

The protection submenu is available in the *Protections-Advanced* menu, where the following parameters can be set:

Parameter	Description	Default
<i>Enable</i>	Enable/disable the control threshold and the availability of the parameters in the menu	OFF
<i>Direction</i>	Defines whether the sequence control is performed as a result of drops (Down) or increases (Up) of the measured sequence	Down
<i>Threshold</i>	Defines the value that triggers the alarm. The value is expressed both in an absolute value (Volt) and a relative value (Un), which can be set in a range: 0.1 Un .. 1.5 Un with 0.05 Un steps	0.8 Un

**Protection
V INV
[ANSI 59VI]**

If the reverse sequence measured by the Trip unit falls below the Uinv threshold, the corresponding alarm is activated (TRIP not envisaged).

The protection submenu is available in the *Protections-Advanced* menu, where the following parameters can be set:

Parameter	Description	Default
<i>Enable</i>	Enable/disable the control and the availability of the parameters in the menu	OFF
<i>Threshold</i>	Defines the value that triggers the alarm. The value is expressed both in an absolute value (Volt) and a relative value (Un), which can be set in a range: 0.05 Un .. 0.5 Un with 0.05 Un steps	0.05 Un

VS Warning

If all the three line-to-line voltages measured by the Trip unit are within the window defined by the control thresholds for the time set, the warning signal is activated.

The control threshold submenu is available in the *Protections-Advanced-Warnings* menu, where the following parameters can be set:

Parameter	Description	Default
<i>Enable</i>	Enable/disable the control and the availability of the parameters in the menu	OFF
<i>Signal source</i>	Defines whether the line-to-line voltages to be checked are those from the internal sockets (Measuring) or from the Ekip Synchrocheck, if present.  NOTE: by setting Ekip Synchrocheck the control refers to a single voltage	Meas.
<i>DOWN Threshold</i>	Defines the lower value of the control band, expressed both in an absolute value (Volt) and a relative value (Un), which can be set in a range: 0.5 Un .. 1 Un with 0.001 Un steps	0.9 Un
<i>UP Threshold</i>	Defines the upper value of the control band, expressed both in an absolute value (Volt) and a relative value (Un), which can be set in a range: 1 Un .. 1.5 Un with 0.001 Un steps	1.1 Un
<i>Time</i>	The control time that activates the signal. The value is expressed in seconds, which can be set in a range: 0.1 s .. 900 s, with 0.1 s steps	30 s

FS Warning If the frequency measured by the Trip unit is within the window defined by the control thresholds for the time set, the warning signal is activated.

The control threshold submenu is available in the *Protections-Advanced-Warnings* menu, where the following parameters can be set:

Parameter	Description	Default
<i>Enable</i>	Enable/disable the control and the availability of the parameters in the menu	OFF
<i>Signal source</i>	Defines whether the line-to-line voltages to be checked are those from the internal sockets (Measuring) or from the Ekip Synchrocheck, if present.  NOTE: by setting Ekip Synchrocheck the control refers to a single voltage	Meas.
<i>DOWN Threshold</i>	Defines the lower value of the control band, expressed both in an absolute value (Hertz) and a relative value (Fn), which can be set in a range: 0.9 Fn .. 1 Fn with 0.001 Fn steps	0.998 Fn
<i>UP Threshold</i>	Defines the lower value of the control band, expressed both in an absolute value (Hertz) and a relative value (Fn), which can be set in a range: 1 Fn .. 1.1 Fn with 0.001 Fn steps	1.002 Fn
<i>Time</i>	The voltage control time to activate the signal. The value is expressed in seconds, which can be set in a range: 0.1 s .. 900 s, with 0.1 s steps	30 s

F W1 Warning If the frequency measured by the Trip unit exceeds or falls below the threshold (depending on the direction set), the corresponding alarm is activated (TRIP not envisaged).

The control threshold submenu is available in the *Protections-Advanced-Warnings-F W Warning* menu, where the following parameters can be set:

Parameter	Description	Default
<i>Enable</i>	Enable/disable the control threshold and the availability of the parameters in the menu	OFF
<i>Direction</i>	Defines whether the frequency control is performed as a result of drops (Down) or increases (Up) of the measured sequence	Down
<i>Threshold</i>	Defines the value that triggers the alarm. The value is expressed both in an absolute value (Hertz) and a relative value (Fn), which can be set in a range: 0.9 Fn .. 1.1 Fn with 0.001 Fn steps	1 Fn

38 - Introduction and System interface

Operating conditions

The *Ekip Synchrocheck*, *Ekip Com*, *Ekip Signalling* and *Ekip CI* modules function correctly:

1. In the presence of auxiliary power supply.
2. With the circuit-breaker in racked-in position (if the model is withdrawable).

The limitations listed below apply in all the other cases:

Module / Condition	Ekip Synchrocheck	Ekip Com	Ekip Signalling	Ekip CI
<i>Module power supply absent</i>	Synchronism contact open	Communication: absent	Output contacts: open	Output contact: previous position maintained
<i>CB in Test position ⁽¹⁾ ⁽²⁾</i>	Synchronism: not available ⁽⁴⁾	Communication: active	Inputs and output contacts: available	Inputs and output contact: working
<i>CB in disconnected position ⁽¹⁾ ⁽³⁾</i>	Synchronism: not available ⁽⁴⁾	Communication: partially active ⁽⁵⁾	Inputs and output contacts: partial available ⁽⁶⁾	Output contact: mantiene la posizione precedente



NOTE:

- (1) The description refers to the module when correctly on and with the CB in the indicated position.
- (2) In the Test position, the trip unit is connected to the modules and all information is available on the display or via external communication.
- (3) In the disconnected position, the connection between Trip unit and modules is interrupted.
- (4) Owing to internal voltage not connected to Ekip Measuring
- (5) See the system interface, section INFORMATION WITH PROTECTION TRIP UNIT DISCONNECTED (following page)
- (6) Outputs only function correctly if configured as: input state (of module itself) or non-communication with trip unit. For all other configurations, the module forces the Outputs as per Contact Type parameter (NO, NC).

System Interface

The document 1SDH002031A1101, in .zip format, is available in the ABB library in order to ensure that the Ekip Com communication modules are used correctly; the file contains:

Document	Description
1SDH002031A1101.pdf	Guidelines with details for commissioning the communication modules, with reference to protocols and to support documents
1SDH002031A1101.xlsx	Table with references of all the registers for the parameters, the controls, the measurements, etc

The zip file contains the files for supplementing Ekip Touch in the communication networks that are available with the specific Ekip Com module and an IMPORTANT file with notes on the use of the files:

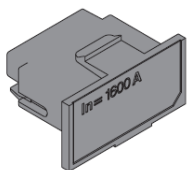
File	Ekip Com Protocol/Module
ABBS0E7F.gsd + EkiDPB.bmp	File .gsd and picture for configuring Ekip Com Profibus DP
Ekip_COM_EtherNetIP_M4_v03_06.eds	File .eds for configuring Ekip Com EtherNet/IP™
Ekip_COM_DeviceNet_v02_08.eds	File .eds for configuring Ekip Com DeviceNet™
ABBEC0304_Ed1.icd ABBEC0304_Ed2.icd	File .icd for configuring Ekip Com IEC 61850
GSDML-V2.3-ABB S.p.A.-Ekip Com Profinet-20180823.xml	File .xml for configuring Ekip Com Profinet



NOTES:

- the file are also valid for the respective Redundant versions
- see the firmware version of the module to choose the correct configuration file

39 - Rating Plug



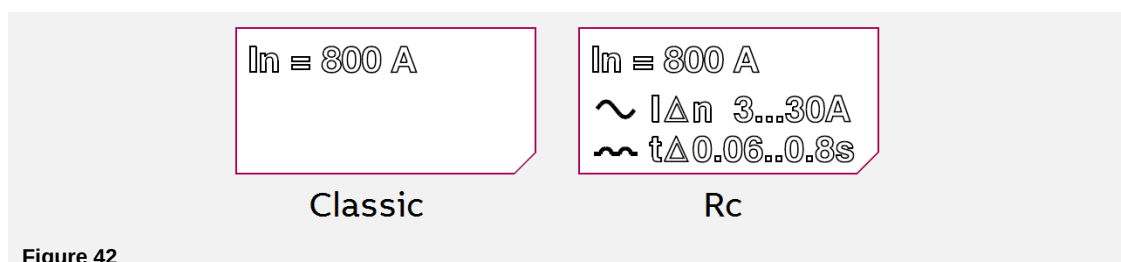
The *Rating Plug* that is supplied with Ekip Touch defines the rated current I_n , which is necessary for the measurement ranges and for setting the current protections (for I_n). It is fitted to a dedicated frontal connector that the user can access.

The Trip unit continuously monitors the presence of the *Rating Plug*, and reports its absence and any fitting or installation errors.

If a new model is fitted, upon startup, Ekip Touch shows the installation request.

In the *About - Circuit breaker* menu, the *Rated Current* field is available that shows the I_n current read by the user.

Versions Different models, available on few sizes, can be ordered in two version: one classic and one that activate the Rc protection; the two versions use different label



Replacement The module can be replaced by the user; any *Rating Plug* can be fitted that has a maximum rated current that is equal to the CB nominal size (I_u).

More information on fitting and the *Rating Plug* installation procedure is available from <http://www.abb.com/abblibrary/DownloadCenter/>, in particular in Getting Started 1SDH001000R0510.



IMPORTANT: in order to avoid undesired alarms or tripping, before changing the *Rating Plug*: switch off and disconnect main power supply, open CB, check no currents and voltages are present

Ekip Measuring allows to measure:

- Voltage (RMS measurement of the network and voltage phases in the specified cases)
- Frequency of the voltages
- Power and energy, using all the measurements of the phase currents

The measurements performances are higher if the *Class 1 Power & Energy Metering* package is present



NOTE: the measurement performance levels are disclosed at page 107 and 110

The module, if combined with *Ekip Synchrocheck*, also enables it to be established whether the synchronism conditions exist between external sockets and external contacts that are necessary for closing the synchronism contact (see chapter dedicated to *Ekip Synchrocheck*, page 179).

Electrical specifications

The *Ekip Measuring* operates in the following ranges:

Component	Range
Input network voltage	0 .. 760 VAC (692 VAC + 10 %)
Input frequency	30 .. 80 Hz

Connection configuration

The module can be connected with internal (connected to internal phases) or external (connected to upper terminal box) sockets:

- With internal sockets the maximum line-to-line voltage is 690 VAC
- With external sockets (mandatory the presence of the isolation transformer) is possible to connect a maximum line-to-line voltage of 1150 VAC

Isolation transformer

For connecting at a network voltage above a rated value of 690 VAC (760 VAC maximum) is mandatory the usage of external sockets

With connection to external sockets, an isolation transformer must be used that complies with IEC 60255-27 and has the following characteristics:

Characteristics	Description
Mechanical	• fixing: EN 50022 DIN43880 guide • material: self-extinguishing plastic • protection level: IP30 • electrostatic protection: with screen to be earthed
Electrical	• accuracy class: ≤ 0.2 • performance: ≥ 10 VA • overload: 20 % permanent • insulation: 4 kV between inputs and outputs, 4 kV between screen and 4 kV outputs between screen and inputs. • frequency: 45 .. 66 Hz

Connections

Refer to the electrical diagrams for 1SDM000002A1001 for connecting the external voltage sockets, in all the possible configurations:

- three-phase system (with or without transformer)
- three-phase system with neutral (with or without transformer)
- three-phase system and residual voltage control
- three-phase system with transformer and residual voltage control

Menu If the *Ekip Synchrocheck* module is detected correctly by Ekip Touch the specific configuration area is activated in the *Modules - Settings* menu.

In this menu, the following parameters can be configured:

Parameter	Description	Default
<i>Voltmeter transf.</i>	Selects the presence or absence of the external transformer	Absent
<i>Rated voltage</i>	Available in absence of transformer, defines rated voltage U_n . The value is expressed as an absolute value (Volt), settable in a range: 100 V .. 690 V with variable step	400 V
<i>Primary voltage</i>	Available in presence of transformer, defines rated plant voltage. The value is expressed as an absolute value (Volt), settable in a range: 100 V .. 1150 V with variable step	400 V
<i>Secondary voltage</i>	Available in presence of transformer, defines the secondary voltage of the transformer. The value is expressed as an absolute value (Volt), settable in a range: 100 V .. 230 V with variable step	100 V
<i>Positive Power Flow</i>	Defines the power flow required for protection D (page 63); 2 selections available: - High $\Rightarrow$ Low: the power flow of the actuator connected to Ekip Touch goes from the low to the high terminals (load connected low) - Low $\Rightarrow$ High: opposite power flow (high connected load)	High $\Rightarrow$ Low
<i>Neutral connection</i>	Available with 3P CB, enables the presence of external neutral to be enabled.  NOTE: the presence of the active neutral activates the measurement of the phase voltages	Absent

Information In the *About-Modules* menu, the specific menu of the module is available in which the serial number and the embodiment of the module are present.

Test For the dielectric test of the module, refer to Installation instruction 1SDH002013A0001.

Replacement in the event of replacement of the *Ekip Measuring* module, when the module is first started up, the display shows the module change and reports it by an alarm on the diagnosis bar.

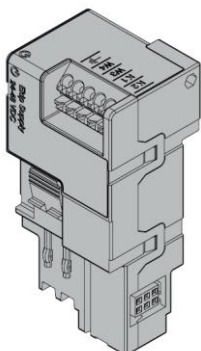
To install the new module:

- Confirm the operation in the installation window that appears automatically in the display.
- Run the manual command, available in the *Settings* menu (page 34)



ATTENZIONE! In the presence of the *Class 1 Power & Energy Metering* package, replacing the module could compromise the performances declared at page 110; consult ABB to evaluate solutions that meet your needs

41 - Ekip Supply



Ekip Supply is an accessory supply module, available in two different version depending by supply voltage type and range.

Performs three functions:

- supplies auxiliary supply to Ekip Touch
- allows connection to Trip unit and supply of external terminal box modules
- acts as a bridge for the Local Bus between Ekip Touch and the external electronic accessories (es. *Ekip Signalling 10K* e *Ekip Multimeter*)

The module has a power LED to signal the presence of an input supply:

- Off: no power supply
- On (steady beam): powered up

Electrical specifications

Model	Ekip Supply 24-48VDC	Ekip Supply 110-240 VAC/DC
Supply voltage	21,5 .. 53 VDC	105 .. 265 VAC/DC
Frequency	--	45 .. 66Hz
Maximum power consumption without accessories(1)	3 W	3 VAW
Maximum power consumption with accessories(2)	10 W	10 VAW
Maximum inrush current	2 A for 20 ms	2 A for 20 ms



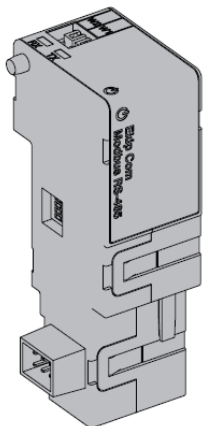
NOTE:

- (1) *Ekip Touch with Ekip Supply only*
- (2) *Ekip Touch with two modules on terminal board*

Connections *Ekip Supply* must be mounted in the first slot on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult:

- the electrical diagrams for 1SDM000002A1001 for terminal references.
For external cabling, use AWG22-16 cables with a maximum external diameter of 1.4 mm
- the instruction sheets 1SDH001000R0511 to connect the module to Ekip Touch.



Ekip Com Modbus RTU is a communication accessory that enables Ekip Touch to be integrated into a RS-485 network with Modbus RTU communication protocol, with remote supervision and control functions, in two different modes, master and slave.

From remote it is possible to:

- read information and Ekip Touch measurements
- manage certain commands, including opening and closing actuator
- access to information and parameters that are not available on the display
- if connected to a withdrawable circuit-breaker, check the status of inserted / extracted



NOTE: the remote open and close commands to the switch can be run only if:

- *Ekip Touch* is in Remote configuration
- The CB is configured with Ekip Com Actuator module (see page 195)

Ekip Com Modbus RTU is always supplied with *Ekip AUP* and *Ekip RTC* contacts (see page 195).

To map the module in its own communication network, the document System Interface is available (page 136), in which all the necessary communication and command details are listed.

Models

Ekip Touch can be configured with two different modules that are compatible with the Modbus RTU protocol: *Ekip Com Modbus RTU* and *Ekip Com Modbus RTU Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.



NOTE: if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip Touch to increase the potential of unit (for example: for applications in which great network reliability is necessary).



IMPORTANT: in each Ekip Touch can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com Modbus RTU Redundant*)

Connections

Ekip Com Modbus RTU must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult:

- the electrical diagrams for 1SDM000002A1001 to connect the module to its communication network and for terminal references.
The connections must be made with Belden 3105A or equivalent cables
- the instruction sheets 1SDH002009A1505 to connect the module to Ekip Touch

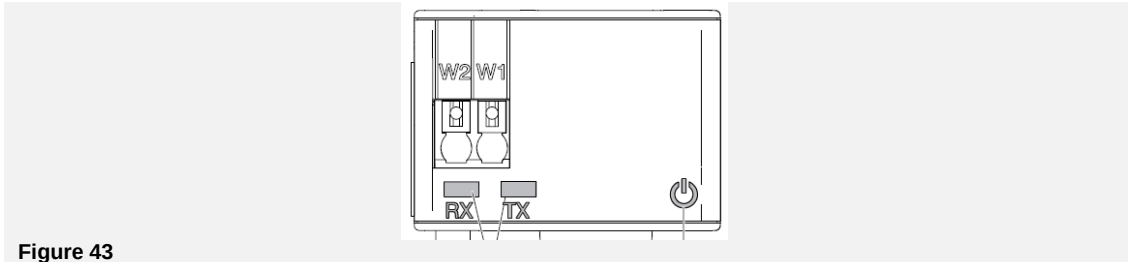
Supply

Ekip Com Modbus RTU is supplied directly by the *Ekip Supply* module to which it is connected.



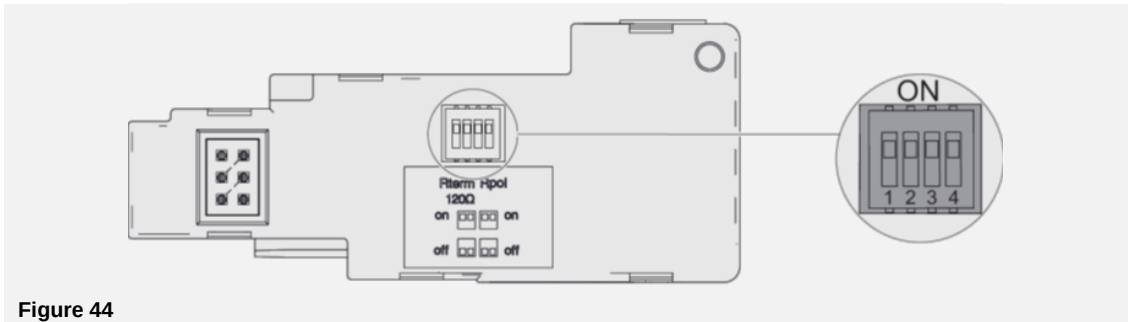
NOTE: in the absence of an auxiliary supply, the communication between Ekip Touch and module is interrupted

Interface The module has three signalling LEDs:



LED	Description
Power	Reports ON status and correct communication with Ekip Touch: - off: module off - fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Ekip Touch present - flashing not synchronized with power LED of Ekip Touch (two fast flashes per second): module ON and communication with Ekip Touch absent
Rx	Indicates the status of the communication between the network master and the module (slave): - off: Modbus RTU communication not active - on with fast flashing: Modbus RTU communication active
Tx	Indicates the status of the communication between the network master and the module (slave): - off: communication between Modbus RTU not active - on with fast flashing: Modbus RTU communication active

Configurations Resistances can be linked to bus RS-485, configuring dip switches located on the side of the module:



Resistances	Dip switch	Description	Default
Rterm	1 and 2	Termination resistance 120 Ω Move dip switches 1 and 2 to ON position to connect Rterm	Off
Rpol	3 and 4	200 pull-up or pull-down resistance Ω Move dip switches 3 and 4 to ON position to connect Rpol	Off

! **IMPORTANT:** move the dip-switches before connecting to *Ekip Supply* module and to the communication network

Menu Activating the local bus is required to start communication between the module and Ekip Touch and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip Touch two areas are activated:

- information area in the *About-Modules* menu containing the software version and the serial number of the module
- area of specific configuration in the *Modules Settings* menu, in which the following communication parameters can be configured:

Parameter	Description	Default
<i>Serial address</i>	Module address; range from 1 to 247 available  IMPORTANT: devices connected to the same network must have different directions	247 / 246 ^(NOTE)
<i>Baudrate</i>	Data transmission speeds: 3 options available: 9600 bit/s, 19200 bit/s, 38400 bit/s	19200 bit/s
<i>Physical protocol</i>	Define the stop and parity bit; 4 options available: • 8,E,1 = 8 bit datum, 1 EVEN parity bit, 1 STOP bit • 8,O,1 = 8 bit datum, 1 ODD parity bit, 1 STOP bit • 8,N,2 = 8 bit datum, no parity bit, 2 STOP bits • 8,N,1 = 8 bit datum, no parity bit, 1 STOP bit	8,E,1



NOTE: 247 default of the module Ekip Com Modbus RTU; 246 default of the module Ekip Com Modbus RTU Redundant

Remote configurations

From the service connector (via Ekip Connect) or with a system bus communication, it is possible to change the operating configuration from slave to master, to integrate the module into an interactive data exchange network (see description of *Ekip Com Hub*, page 166).

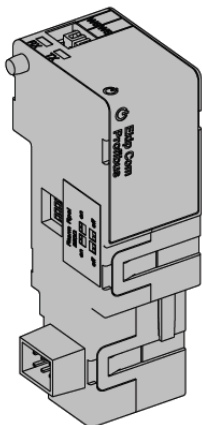


IMPORTANT:

- In Master configuration, the module does not allow data to be exchanged as in normal Slave mode
- the presence of several masters on the same network can cause malfunctions

Remote information

From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).



Ekip Com Profibus DP is a communication accessory that enables Ekip Touch to be integrated into a RS-485 network with Profibus communication protocol, with remote supervision and control functions.

The module is configured as Slave and from remote it is possible to:

- read information and Ekip Touch measurements
- manage certain commands, including opening and closing actuator
- access to information that is not available on the display
- if connected to a withdrawable circuit-breaker, check the status of inserted / extracted



NOTE: the remote open and close commands to the switch can be run only if:

- Ekip Touch is in Remote configuration
- The CB is configured with Ekip Com Actuator module (see page 195)

Ekip Com Profibus DP is always supplied with *Ekip AUP* and *Ekip RTC* contacts (see page 195).

To map the module in its communication network, the document System Interface is available (page 136) that lists the necessary communication and command details.

Models

Ekip Touch can be configured with two different modules that are compatible with the Profibus protocol: *Ekip Com Profibus DP* and *Ekip Com Profibus DP Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.



NOTE: if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip Touch to increase the potential of unit (for example: for applications in which great network reliability is necessary).



IMPORTANT: in each Ekip Touch can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com Profibus DP Redundant*)

Connections

Ekip Com Profibus DP must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult:

- the electrical diagrams for 1SDM000002A1001 to connect the module to its communication network and for terminal references.
The connections must be made with Belden 3079A or equivalent cables
- the instruction sheets 1SDH002009A1505 to connect the module to Ekip Touch

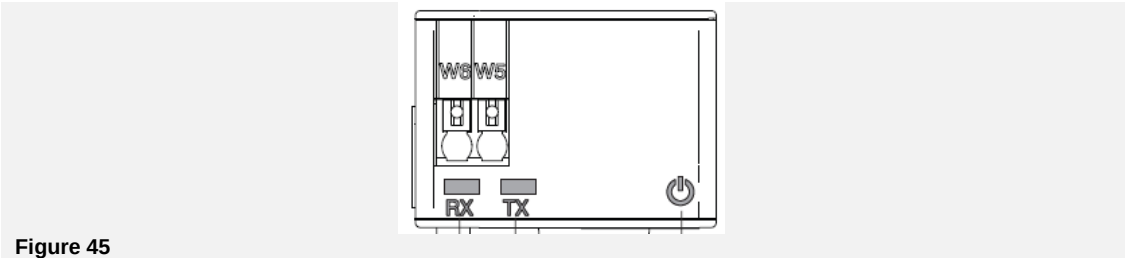
Supply

Ekip Com Profibus DP is supplied directly by the *Ekip Supply* module, to which it is connected.



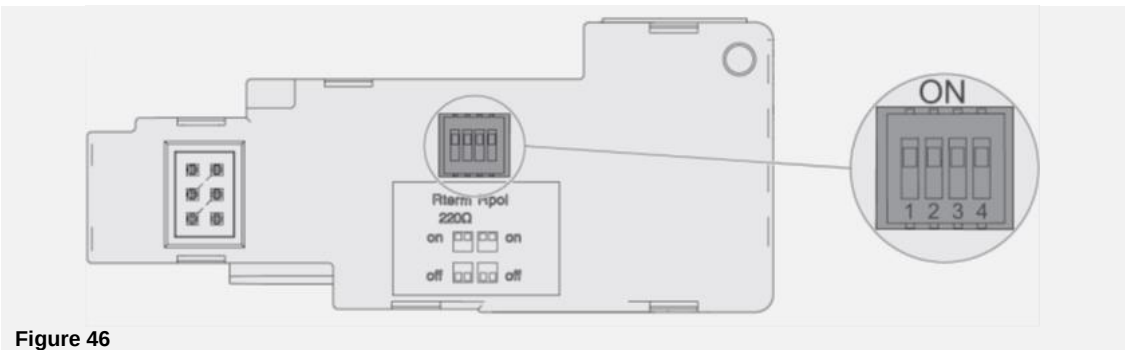
NOTE: in the absence of an auxiliary supply, the communication between Ekip Touch and module is interrupted

Interface The module has three signalling LEDs:



LED	Description
Power	Reports ON status and correct communication with Ekip Touch: - off: module off - fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Ekip Touch present - flashing not synchronized with power LED of Ekip Touch (two rapid flashes per second): module ON and communication with Trip unit absent
Rx	Indicates the status of the communication between the network master and the module (slave): - off: communication between master and module not active - fixed light: communication between master and module active
Tx	Indicates the status of the communication between the network master and the module (slave): - off: communication between master and module not active - flashing light: communication between master and module active

Configurations Resistances can be linked to bus RS-485, configuring dip switches located on the side of the module:



Resistances	Dip switch	Description	Default
Rterm	1 and 2	Termination resistance 220 Ω Move dip switches 1 and 2 to ON position to connect Rterm	Off
Rpol	3 and 4	390 pull-up or pull-down resistance Ω Move dip switches 3 and 4 to ON position to connect Rpol	Off

! **IMPORTANT:** move the dip-switches before connecting to *Ekip Supply* module and to the communication network

Menu Activating the local bus is required to start communication between the module and Ekip Touch and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip Touch two areas are activated:

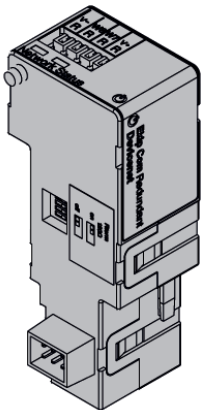
- information area in the *About-Modules* menu containing the software version and the serial number of the module
- area of specific configuration in the *Modules Settings* menu, in which the following communication parameters can be configured:

Parameter	Description	Default
<i>Serial address</i>	Module address; range from 1 to 125 available  IMPORTANT: devices connected to the same network must have different directions	125 / 124 (NOTE)



NOTE: 125 default of the module Ekip Com Profibus DP; 124 default of the module Ekip Com Profibus DP Redundant

Remote information From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).



Ekip Com DeviceNet™ is a communication accessory that enables Ekip Touch to be integrated into a CAN network with communication protocol DeviceNet™, with supervision and remote control functions.

The module is configured as Slave and from remote it is possible to:

- read Ekip Touch information and measurements
- manage certain commands, including opening and closing actuator
- access information and parameters that are not available on the display
- if connected to a withdrawable circuit-breaker, check the status of inserted / extracted



NOTE: the remote open and close commands to the switch can be run only if:

- *Ekip Touch* is in Remote configuration
- The CB is configured with Ekip Com Actuator module (see page 195)

Ekip Com DeviceNet™ is always supplied with *Ekip AUP* and *Ekip RTC* contacts (see page 195).

To map the module in its communication network, the document System Interface is available (page 136) that lists the necessary communication and command details.

Models

Ekip Touch can be configured with two different modules that are compatible with the DeviceNet™ protocol: *Ekip Com DeviceNet™* and *Ekip Com DeviceNet™ Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.



NOTE: if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip Touch to increase the potential of unit (for example: for applications in which great network reliability is necessary).



IMPORTANT: in each Ekip Touch can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com DeviceNet™ Redundant*)

Connections

Ekip Com DeviceNet™ must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult:

- the electrical diagrams for 1SDM000002A1001 to connect the module to its communication network and for terminal references.
The connections must be made with Belden 3084A or equivalent cables
- the instruction sheets 1SDH002009A1505 to connect the module to Ekip Touch

Supply

Ekip Com DeviceNet™ is supplied directly by the *Ekip Supply* module to which it is connected.

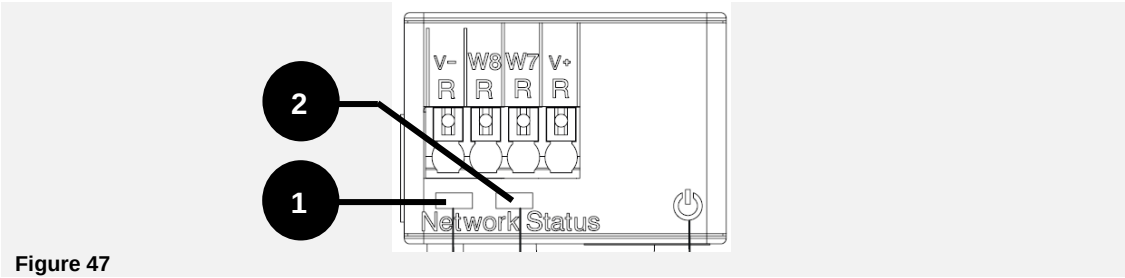
In order to ensure correct operation, the DeviceNet™ bus must be supplied on the V+ and V- terminals with a signal greater than 12 VDC.



NOTE:

- the PLC ABB with DeviceNet (CM575-DN) communication module already supplies the V+ V- supply
- in the absence of the supplies from Ekip Supply and on the supply terminals of the bus, the communication between Ekip Touch and module is interrupted.

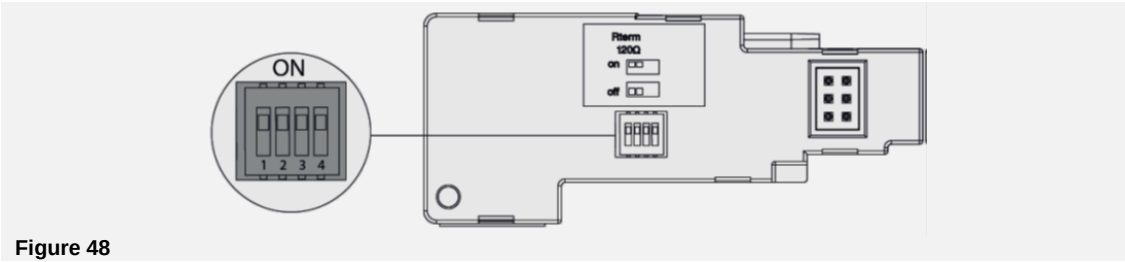
Interface The module has three signalling LEDs:



LED	Description
Power	Reports ON status and correct communication with Ekip Touch: - off: module off - fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Ekip Touch present - flashing not synchronized with power LED of Ekip Touch (two fast flashes per second): module ON and communication with Trip unit absent
Network Status ❶	Indicates status of the communication on bus: - off: device off line (with status LED OFF) ^(NOTE), or in error condition (with status LED ON) - Fixed light: device on line, and assigned to a master (operating condition) - flashing light: device on line, but assigned to a master (device ready to communicate)
Network Status ❷	Indicates status of the communication on bus: - Off: no error. - Fixed light: device in bus off, or Network Power absent condition. - Flashing light: I/O connection (cyclical data) in timeout.

NOTE: the device has not yet sent the in-line Duplicate ID sequence

Configurations Resistances can be linked to the CAN bus, configuring dip switches located on the side of the module:



Resistances	Dip	Description	Default
Rterm	1 and 2	Termination resistance 120 Ω Move dip switches 1 and 2 to ON position to connect Rterm	Off

IMPORTANT:

- move the dip-switches before connecting to *Ekip Supply* and to the network
- the termination resistances must not be included in the nodes; including this capacity could easily lead to a network with incorrect termination (impedance too high or too low), which might cause a failure. For example, removing a node that includes a termination resistance could lead to a network failure
- the termination resistances must not be installed at the end of a drop line but only at the two ends of the main trunk line

Menu Activating the local bus is required to start communication between the module and Ekip Touch and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip Touch two areas are activated:

- information area in the *About-Modules* menu containing the software version and the serial number of the module
- area of specific configuration in the *Modules Settings* menu, in which it is possible to configure the following communication parameters:

Parameter	Description	Default
<i>MAC Address</i>	Module address; range from 1 to 63 available  IMPORTANT: devices connected to the same network must have different directions	63 / 62 ^(NOTE)
<i>Baudrate</i>	Data transmission speeds: 3 options available: 125 kbit/s, 250 kbit/s, 500 kbit/s	125 kbit/s



NOTE: 63 default of module Ekip Com DeviceNet™; 62 default of module Ekip Com DeviceNet™ Redundant

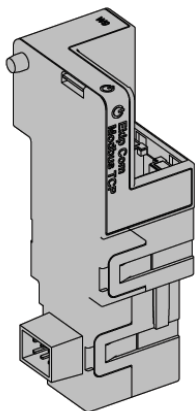
Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>Class ID</i>	Defines the addressing class of the module, between 8 and 16 bit	8-bit Class ID
<i>Bus-Off behaviour</i>	Defines the behaviour of the module following loss of communication(Bus-Off), available between Standard (if the communication is lost, a supply reset is awaited) and Advanced (the module tries to reset and detects the error status)	DeviceNet standard

Remote information

From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).



Ekip Com Modbus TCP is a communication accessory that enables Ekip Touch to be integrated into an Ethernet network with Modbus TCP communication protocol, with remote supervision and control functions, in two different modes, standard and HTTP server.

The module is configured as master and from remote it is possible to

- read Ekip Touch information and measurements
- manage certain commands, including opening and closing actuator
- access information and parameters that are not available on the display
- if connected to a withdrawable circuit-breaker, check the status of inserted / extracted



NOTE: the remote open and close commands to the switch can be run only if:

- Ekip Touch is in Remote configuration
- The CB is configured with Ekip Com Actuator module (see page 195)

Ekip Com Modbus TCP is always supplied with *Ekip AUP* and *Ekip RTC* contacts (see page 195).

To map the module in its communication network, the document System Interface is available (page 136) that lists the necessary communication and command details.

Depending on the parameters set, which are illustrated on subsequent pages, the following module ports are used:

Port	Service	Notes
502/tcp	TCP Modbus	Valid for TCP Modbus modes
80/tcp	Server HTTP	Valid for Server HTTP modes
319/udp	IEEE 1588	Valid with IEEE 1588 protocol enabled
320/udp		
68/udp	DHCP client	DHCP client enables alternatively to: <i>static address = On</i>

Safety

As the module enables the actuator to be controlled that is connected to Ekip Touch and enables unit data to be accessed, it can be connected only to networks meeting all the necessary security and unauthorized-access prevention requirements (e.g. the control system network of a plant).



IMPORTANT:

- It is customer's sole responsibility to provide and continuously ensure a secure connection between the module and customer network or any other network (as the case may be); customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.
ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
- The module cannot be connected directly to the Internet; connect only to dedicated Ethernet networks, with Modbus TCP communication protocol

Models Ekip Touch can be configured with two different modules that are compatible with the Modbus TCP protocol: *Ekip Com Modbus TCP* and *Ekip Com Modbus TCP Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.

 **NOTE:** if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip Touch to increase the potential of unit (for example: for applications in which great network reliability is necessary).

 **IMPORTANT:** in each Ekip Touch can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com Modbus TCP Redundant*)

Connections *Ekip Com Modbus TCP* must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult

- the electrical diagrams for 1SDM000002A1001 to connect the module to its communication network and for terminal references.
For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield).
- the instruction sheets 1SDH002009A1506 to connect the module to Ekip Touch

Supply *Ekip Com Modbus TCP* is supplied directly by the *Ekip Supply* module to which it is connected.

 **NOTE:** in the absence of an auxiliary supply, the communication between Ekip Touch and module is interrupted

Interface The module has three signalling LEDs:

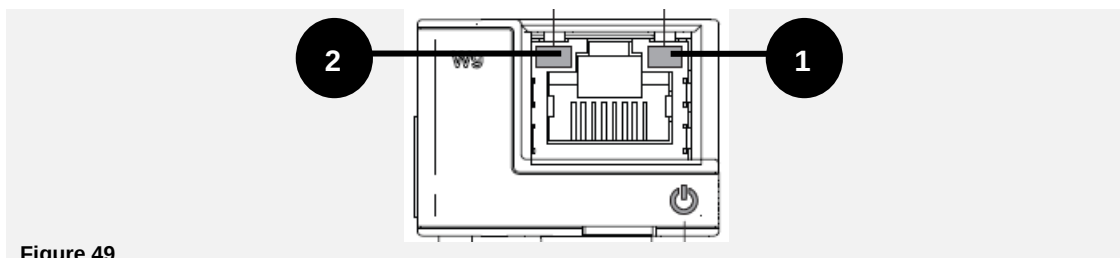


Figure 49

LED	Description
Power	Reports ON status and correct communication with Ekip Touch: - off: module off - fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Ekip Touch present - flashing not synchronized with the power LED of Ekip Touch (two rapid flashes a second): module ON and communication with Trip unit absent
Link ①	Indicates status of the communication: - off: incorrect connection, signal absent - fixed light: correct connection
Activity ②	Indicates status of the communication: - off: activity on line absent - flashing: activity on line present (receiving and/or transmitting)

Modes Two operating modes are available, which can be configured from the menu:

Modes	Description
TCP Modbus	Information and commands managed by single requests/questions, according to mapping and rules of TCP Modbus protocol (see System Interface)
Server HTTP	Information and commands available on a web page, which can be accessed by a browser by inserting the IP Address of the module as the address. The page has a login window requesting the user password to be entered that is the same as the password required on the display to modify parameters.

Configurations on menu Activating the local bus is required to start communication between the module and Ekip Touch and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip Touch in the *Modules Settings* menu, the following communication parameters can be configured:

Parameter	Description	Default
<i>Function</i>	Defines the mode between TCP Modbus and Server HTTP	TCP Modbus
<i>Static IP address ON</i>	Defines whether the module has a dynamic IP (Off) address or static (On) IP address If = On all the associated parameters are enabled	Off
<i>Static IP address</i>	Enables static IP to be selected	0.0.0.0
<i>Static Network Mask</i>	Enables the subnet mask to be selected	0.0.0.0
<i>Static Gateway address</i>	Enables, in the presence of several subnets the IP address of the node to which the module is connected to be selected	0.0.0.0

Information on menu If the module is detected correctly by Ekip Touch, the following information is available on the *About-Modules* menu:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the moment of the connection to the network in the event of configuration with dynamic IP or can be set by menu in the case of a static IP  NOTE: without a DHCP server, the module automatically adopts a causal IP address in the interval 169.254.xxx.xxx
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients
<i>Gateway address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>TCP Client 1, 2, 3</i>	IP addresses of the client devices connected to the module (in Server mode)
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters

Parameter	Description	Default
<i>Client/Server</i>	Parameter for changing the configuration of the module from Server Only to Client and Server and integrating the module into an interactive data exchange network (see <i>Ekip Com Hub</i> on page 166)  IMPORTANT: if Client/Server, the module enables the data to be exchanged as a normal Server function	Server only
<i>Enable IEEE 1588</i>	Permits the IEEE 1588 protocol for distributing the clock and synchronization signal to be enabled ⁽¹⁾	OFF
<i>IEEE 1588 Master</i>	Enables the module to be set as a master in the network segment to which it belongs (synchronization clock)	OFF
<i>IEEE 1588 Delay mechanism</i>	Enables the data exchange mode between module and master, between Peer-to-Peer and End-to-End to be chosen	End-to-End
<i>Enable SNTP client</i>	Permits enabling of SNTP distribution protocol of the clock and synchronization signal ⁽¹⁾	OFF
<i>SNTP Server Address</i>	Enables the network server to be set that supplies SNTP	0.0.0.0
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Enables it to be selected whether there is daylight saving time (ON) or not (OFF) in the country to which the synchronization time refers.	OFF
<i>Disable Gratuitous ARP</i>	Permits (Enabled ARP) the periodic generation of a Gratuitous ARP message to be enabled that is used by Ekip Connect to find rapidly the modules with Ethernet scanning without its IP address being known beforehand	ARP enabled
<i>Access protected by password</i>	Enables the writing operations conducted by the network to be protected by a password (password request)	Standard mode
<i>TCP Modbus password</i>	With <i>access protected by enabled password</i> , this is the password to use before each writing session ⁽²⁾	Local access



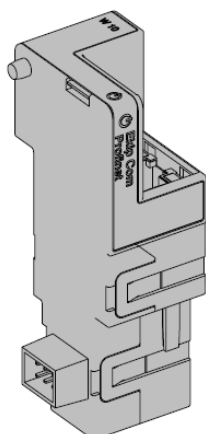
NOTES:

- (1) Enable IEEE 1588 and Enable SNTP client *must not be enabled simultaneously*
- (2) *the parameter can be modified only by system bus in remote configuration*

Remote information

From the service connector (via Ekip Connect) or with a system bus communication, additional information can be accessed:

Information	Description
<i>HW and Boot version</i>	general module information
<i>Flash CRC status and result</i>	information on the correctness of the SW in the module
<i>Ekip Link status</i>	Signals connection errors of the Ethernet cable
<i>SNTP Server Error</i>	Communication error with the SNTP server
<i>SNTP Server Synchronisation</i>	Synchronism status with SNTP server
<i>IEEE 1588 status</i>	Valid with IEEE 1588 Master = ON, communicates the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master



Ekip Com Profibus is a communication accessory that enables Ekip Touch to be integrated into an Ethernet network with Profinet communication protocol, with remote supervision and control functions.

The module is configured as master and from remote it is possible to

- read information and Ekip Touch measurements
- manage certain commands, including opening and closing actuator
- access to information that is not available on the display
- if connected to a withdrawable circuit-breaker, check the status of inserted / extracted



NOTE: the remote open and close commands to the switch can be run only if:

- *Ekip Touch* is in Remote configuration
- The CB is configured with Ekip Com Actuator module (see page 195)

Ekip Com Profinet is always supplied with *Ekip AUP* and *Ekip RTC* contacts (see page 195).

To map the module in its own communication network, the document System Interface is available (page 136), in which all the necessary communication and command details are listed.

The following ports are used by the module:

Ethertype	Port	Service	Notes
0x88CC	-	LLDP	Link Layer Discovery Protocol
0x8892 (Profinet)	-	Profnite IO	Specific for communications in real time (RT)
0x0800	34964/udp	Profinet-cm (Context manager)	DCE/RPC

Safety

As the module enables the actuator to be controlled that is connected to Ekip Touch and enables unit data to be accessed, it can be connected only to networks meeting all the necessary security and unauthorized-access prevention requirements (e.g. the control system network of a plant).



IMPORTANT:

- It is customer's sole responsibility to provide and continuously ensure a secure connection between the module and customer network or any other network (as the case may be); customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.
ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
- The module cannot be connected directly to the Internet; connect only to dedicated Ethernet networks, with Profinet communication protocol

Models Ekip Touch can be configured with two different modules that are compatible with the Profinet protocol: *Ekip Com Profinet* and *Ekip Com Profinet Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.

 **NOTE:** if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip Touch to increase the potential of unit (for example: for applications in which great network reliability is necessary).

 **IMPORTANT:** in each Ekip Touch can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com Profinet Redundant*)

Connections *Ekip Com Profinet* must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult

- the electrical diagrams for 1SDM000002A1001 to connect the module to its communication network and for terminal references.
For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield).
- the instruction sheets 1SDH002009A1506 to connect the module to Ekip Touch

Supply *Ekip Com Profinet* is supplied directly by the *Ekip Supply* module to which it is connected.

 **NOTE:** in the absence of an auxiliary supply, the communication between Ekip Touch and module is interrupted

Interface The module has three signalling LEDs:

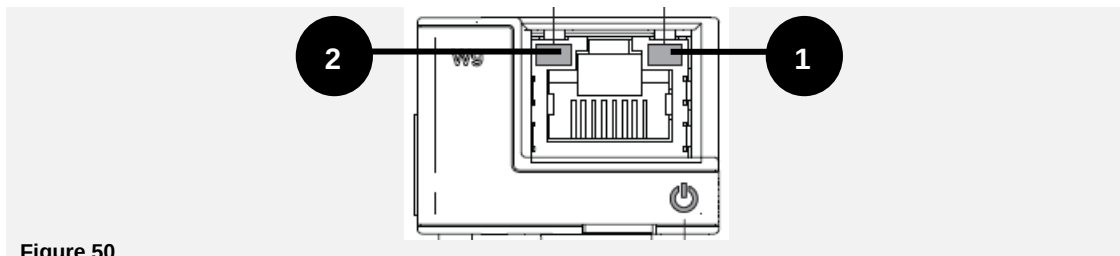


Figure 50

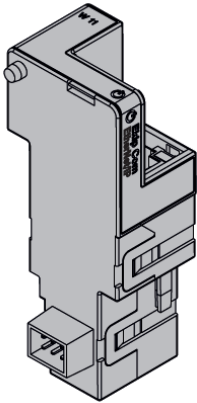
LED	Description
Power	Reports ON status and correct communication with Ekip Touch: - off: module off - fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Ekip Touch present - flashing not synchronized with power LED of Ekip Touch (2 fast flashes per second): module ON and communication with Trip unit absent
Link ①	Indicates status of the communication: - off: incorrect connection, signal absent - fixed light: correct connection
Activity ②	Indicates status of the communication: - off: activity on line absent - flashing: activity on line present (receiving and/or transmitting)

Menu Activating the local bus is required to start communication between the module and Ekip Touch and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip Touch, the following information is available in the *About-Modules* menu:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device

Remote information From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).



Ekip Com EtherNet/IP™ is a communication accessory that enables Ekip Touch to be integrated into an Ethernet network with communication protocol EtherNet/IP™, with supervision and remote control functions.

The module is configured as master and from remote it is possible to

- read information and Ekip Touch measurements
- manage certain commands, including opening and closing actuator
- access to information and parameters that are not available on the display
- if connected to a withdrawable circuit-breaker, check the status of inserted / extracted



NOTE: the remote open and close commands to the switch can be run only if:

- *Ekip Touch is in Remote configuration*
- *The CB is configured with Ekip Com Actuator module (see page 195)*

Ekip Com EtherNet/IP™ is always supplied with *Ekip AUP* and *Ekip RTC* contacts (see page 195).

To map the module in its communication network, the document System Interface is available (page 136) that lists the necessary communication and command details.

Depending on the parameters set, which are illustrated on subsequent pages, the following module ports are used:

Port	Protocol	Notes
44818	TCP	Encapsulation Protocol (e.g.: ListIdentity, UCMM, CIP Transport Class 3)
44818	UDP	44818 UDP Encapsulation Protocol (e.g.: ListIdentity)
2222	UDP	2222 UDP CIP Transport Class 0 or 1
68/udp	DHCP Client	DHCP client enables alternatively to <i>static address = On</i>

Safety

As the module enables the actuator to be controlled that is connected to Ekip Touch and enables unit data to be accessed, it can be connected only to networks meeting all the necessary security and unauthorized-access prevention requirements (e.g. the control system network of a plant).



IMPORTANT:

- It is customer's sole responsibility to provide and continuously ensure a secure connection between the module and customer network or any other network (as the case may be); customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.
ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
- The module cannot be connected directly to the Internet; connect only to dedicated Ethernet networks, with EtherNet/IP™ communication protocol

Models Ekip Touch can be configured with two different modules that are compatible with the EtherNet/IP™ protocol: *Ekip Com EtherNet/IP™* and *Ekip Com EtherNet/IP™ Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.

 **NOTE:** if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip Touch to increase the potential of unit (for example: for applications in which great network reliability is necessary).

 **IMPORTANT:** in each Ekip Touch can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com EtherNet/IP™ Redundant*)

Connections *Ekip Com EtherNet/IP™* must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult

- the electrical diagrams for 1SDM000002A1001 to connect the module to its communication network and for terminal references.
For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield)
- the instruction sheets 1SDH002009A1506 to connect the module to Ekip Touch

Supply Ekip Com EtherNet/IP™ is supplied directly by the Ekip Supply module to which it is connected .

 **NOTE:** in the absence of an auxiliary supply, the communication between Ekip Touch and module is interrupted

Interface The module has three signalling LEDs:

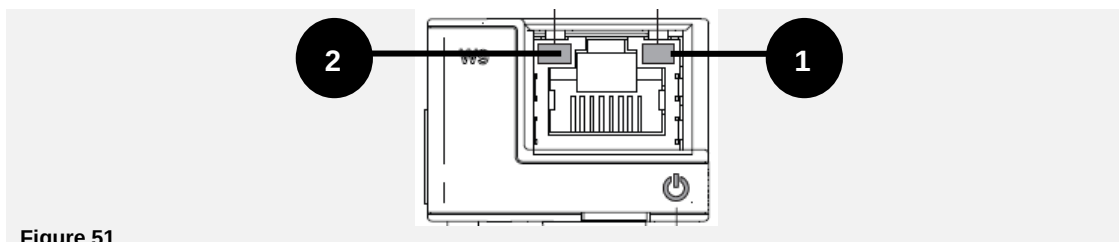


Figure 51

LED	Description
Power	Reports ON status and correct communication with Ekip Touch: - off: module off - fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Trip unit present - flashing not synchronized with the power LED of Ekip Touch (two rapid flashes a second): module ON and communication with Trip unit absent
Link ①	Indicates status of the communication: - off: incorrect connection, signal absent - fixed light: correct connection
Activity ②	Indicates status of the communication: - off: activity on line absent - flashing: activity on line present (receiving and/or transmitting)

Configurations on menu

Activating the local bus is required to start communication between the module and Ekip Touch and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip Touch the following communication parameters can be configured in the Settings Modules menu:

Parameter	Description	Default
<i>Static IP address ON</i>	Defines whether the module has the dynamic IP address (Off) or static IP address (On) If = On all associated parameters are enabled	Off
<i>Static IP address</i>	Enables the static IP to be selected	0.0.0.0
<i>Static Network Mask</i>	Enables the subnet mask to be selected	0.0.0.0
<i>Static Gateway address</i>	In the presence of several subnets it enables the IP address to be selected of the node to which the module is connected	0.0.0.0

Information on menu

If the module is detected correctly by Ekip Touch in the *About-Modules* menu the following information is available:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the moment of the connection to the network in the event of configuration with dynamic IP or can be set by menu in the case of a static IP  NOTE: without a DHCP server, the module automatically adopts a causal IP address in the interval 169.254.xxx.xxx
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients
<i>Gateway address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>Enable IEEE 1588</i>	Permits the IEEE 1588 protocol for distributing the clock and synchronization signal to be enabled ^(NOTE)	OFF
<i>IEEE 1588 Master</i>	Enables the module to be set as a master in the network segment to which it belongs (synchronization clock)	OFF
<i>IEEE 1588 Delay mechanism</i>	Enables the data exchange mode between module and master, between Peer-to-Peer and End-to-End to be chosen	End-to-End
<i>Enable client SNTP</i>	Permits enabling of SNTP distribution protocol of the clock and synchronization signal ^(NOTE)	OFF
<i>SNTP Server Address</i>	Enables the network server to be set that supplies SNTP	0.0.0.0
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Enables it to be selected whether there is daylight saving time(ON) or not (OFF) in the country to which the synchronization time refers.	OFF

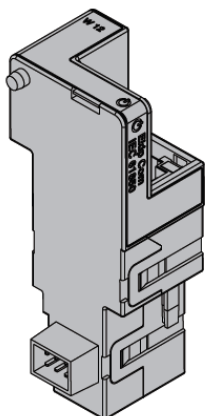


NOTE: Enable IEEE 1588 and Enable SNTP client *must not be enabled simultaneously*

Remote information

From the service connector (via Ekip Connect) or with a system bus communication, additional information can be accessed:

Information	Description
<i>HW and Boot version</i>	general module information
<i>Flash CRC status and result</i>	information on the correctness of the SW in the module
<i>Ekip Link status</i>	Signals connection errors of the Ethernet cable
<i>SNTP Server Error</i>	Communication error with the SNTP server
<i>SNTP Server Synchronisation</i>	Synchronism status with SNTP server
<i>IEEE 1588 status</i>	Valid with IEEE 1588 Master = ON, communicates the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master



Ekip Com IEC 61850 is a communication accessory that enables Ekip Touch to be integrated into an Ethernet network with IEC 61850 communication protocol, with remote supervision and control functions.

The module is configured as master and from remote it is possible to

- read information and Ekip Touch measurements
- manage certain commands, including opening and closing actuator
- access to information and parameters that are not available on the display
- supply vertical communication (reports) to higher supervision systems (SCADA), with statuses and measurements (retransmitted each time and only if they are different from the previous report)
- supply horizontal communication (GOOSE) to other actuator devices (e.g.: medium voltage switches), with all information on status and measurements normally shared by Ekip Com communication modules on bus.
- if connected to a withdrawable circuit-breaker, check the status of inserted / extracted



NOTE: the remote open and close commands to the switch can be run only if:

- Ekip Touch is in Remote configuration
- The CB is configured with Ekip Com Actuator module (see page 195)

Ekip Com IEC 61850 is always supplied with *Ekip AUP* and *Ekip RTC* contacts (see page 195).

To map the module in its communication network, the document System Interface is available (page 136) that lists the necessary communication and command details.

The document also describes configuration files for protocol IEC 61850 and relative loading procedure for assigning the Technical Name and any GOOSE enabling (by setting relative MAC Addresses)

Depending on the parameters set, which are illustrated on subsequent pages, the following module ports are used:

Ethertype	Port	Protocol
0x0800-IP	102	ISO Transport Service on top of the TCP (RFC 1006)
0x88B8	-	GOOSE Messages
0x0800-IP	123 UDP	NTP - Network Time Protocol
0x0800-IP	69 UDP	TFTP - Trivial File Transfer Protocol

Safety

As the module enables the actuator to be controlled that is connected to Ekip Touch and enables unit data to be accessed, it can be connected only to networks meeting all the necessary security and unauthorized-access prevention requirements (e.g. the control system network of a plant).



IMPORTANT:

- It is customer's sole responsibility to provide and continuously ensure a secure connection between the module and customer network or any other network (as the case may be); customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.
ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
- The module cannot be connected directly to the Internet; connect only to dedicated Ethernet networks, with IEC 61850 communication protocol

Models Ekip Touch can be configured with two different modules that are compatible with the IEC 61850 protocol: *Ekip Com IEC 61850* and *Ekip Com IEC 61850 Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.

 **NOTE:** if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip Touch to increase the potential of unit (for example: for applications in which great network reliability is necessary).

 **IMPORTANT:** in each Ekip Touch can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com IEC 61850 Redundant*)

Connections *Ekip Com IEC 61850* must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult

- the electrical diagrams for 1SDM000002A1001 to connect the module to its communication network and for the terminals references.
For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield)
- the instruction sheets 1SDH002009A1506 to connect the module to Ekip Touch.

Supply Ekip Com IEC 61850 is supplied directly by the Ekip Supply module to which it is connected .

 **NOTE:** in the absence of an auxiliary supply, the communication between Ekip Touch and module is interrupted

Interface The module has three signalling LEDs:

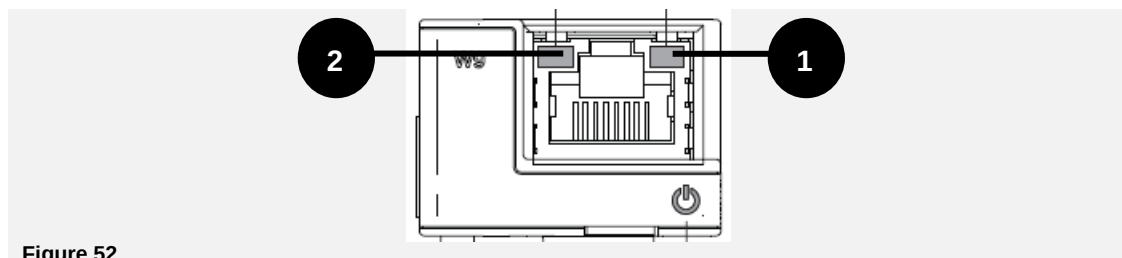


Figure 52

LED	Description
Power	Reports ON status and correct communication with Ekip Touch: - off: module off - fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Trip unit present - flashing not synchronized with the power LED of Ekip Touch (two rapid flashes a second): module ON and communication with Trip unit absent
Link ①	Indicates status of the communication: - off: incorrect connection, signal absent - fixed light: correct connection
Activity ②	Indicates status of the communication: - off: activity on line absent - flashing: activity on line present (receiving and/or transmitting)

Configurations on menu

Activating the local bus is required to start communication between the module and Ekip Touch and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip Touch, in the Settings Modules menu, the following communication parameters can be configured:

Parameter	Description	Default
<i>Static IP address ON</i>	Defines whether the module has the dynamic IP address (Off) or static IP address (On) If = On all associated parameters are enabled	Off
<i>Static IP address</i>	Enables the static IP to be selected	0.0.0.0
<i>Static Network Mask</i>	Enables the subnet mask to be selected	0.0.0.0
<i>Static Gateway address</i>	In the presence of several subnets it enables the IP address to be selected of the node to which the module is connected	0.0.0.0
<i>SNTP client enabled</i>	Permits enabling of SNTP distribution protocol of the clock and synchronization signal	OFF
<i>SNTP address Server</i>	Enables the network server to be set that supplies SNTP	0.0.0.0

Information on menu

If the module is detected correctly by Ekip Touch in the *About-Modules* menu the following information is available:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the moment of the connection to the network in the event of configuration with dynamic IP or can be set by menu in the case of a static IP  NOTE: without a DHCP server, the module automatically adopts a causal IP address in the interval 169.254.xxx.xxx
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients
<i>Gateway address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device
<i>Cfg file</i>	Name of the configuration file loaded in the modules
<i>Error Cfg file</i>	Error code of the configuration file (0 = no error)

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>Preferred configuration file</i>	If several configuration files are present, it enables the file hierarchy to be defined between .cid and .iid	.cid
<i>Enable IEEE 1588</i>	Permits the IEEE 1588 protocol for distributing the clock and synchronization signal to be enabled ⁽¹⁾	OFF
<i>IEEE 1588 Master</i>	Enables the module to be set as a master in the network segment to which it belongs (synchronization clock)	OFF
<i>IEEE 1588 Delay mechanism</i>	Enables the data exchange mode between module and master, between Peer-to-Peer and End-to-End to be chosen	End-to-End
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Enables it to be selected whether there is daylight saving time(ON) or not (OFF) in the country to which the synchronization time refers.	OFF
<i>TFTP Security level</i>	Defines the file loading procedure: • <i>TFTP always On</i>= port open, loading still possible • <i>TFTP enable required</i>= port normally closed; to start loading, the <i>Enable TFTP</i> command must be run at the start of the procedure and the disable TFTP command must be run at the end of the procedure (disable not necessary, security command)	TFTP always On
<i>CB Open/CB Close command</i>	Defines the constraints for running remote open and close commands: • <i>standard commands</i> = standard commands (without constraints) active • <i>CB operate request</i>= standard commands not active; use the programmable functions YC COMMAND and YO COMMAND and the commands Request open switch (28) and Request close switch (29)	Standard commands
<i>Flag word hex</i>	set a filter on the selectivity status	0

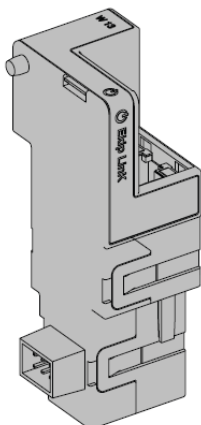


NOTE: Enable IEEE 1588 and Enable SNTP client *must not be enabled simultaneously*

**Remote
information**

From the service connector (via Ekip Connect) or with communication by system bus, it is possible to access additional information:

Information	Description
<i>HW and Boot version</i>	general module information
<i>Flash CRC status and result</i>	information on the correctness of the SW in the module
<i>Ekip Link status</i>	Signals connection errors of the Ethernet cable
<i>SNTP Server Error</i>	Communication error with the SNTP server
<i>SNTP Server Synchronisation</i>	Synchronism status with SNTP server
<i>IEEE 1588 status</i>	Valid with IEEE 1588 Master = ON, communicates the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master
<i>GOOSE Missing</i>	Signals whether an expected GOOSE has been received
<i>Configure Mismatch</i>	A received GOOSE does not comply with the expected structure
<i>Decode Error</i>	
<i>Sequence number error</i>	
<i>Remote programmable statuses (from E to R)</i>	Condition (true/false) of the programmable statuses and information on selectivity arising from logics defined in the configuration files loaded on module IEC 61850
<i>Remote inputs of zone selectivity</i>	



Ekip Link is a communication accessory that enables Ekip Touch to be integrated into an internal Ethernet with ABB proprietary protocol.

With the remote module, the following functions can be performed:

- Programmable logic
- Power Controller
- Zone selectivity

For these functions, the system units involved can have their own *Ekip Link* and for each of them the IP addresses of all the other connected *Ekip Links* must be inserted.

In the Link network, each device is defined as an Actor.

Each *Ekip Link* can interface with at most 15 actors, with a maximum of 12 for the Zone Selectivity function.

The following ports are used by the module:

Port	Service	Notes
18/udp	ABB Proprietor	In the event of fast information exchange between ABB devices
319/udp	IEEE 1588	Valid with IEEE 1588 protocol enabled
320/udp		
68/udp	DHCP client	DHCP client enables alternatively to <i>static address = On</i>

Ekip Link is always supplied with *Ekip AUP* and *Ekip RTC* contacts (see page 195).

Network The *Ekip Links* must be connected to a dedicated network, comprising only *Ekip Links* and Ethernet switches that declare on the data sheet the support to the level L2 multicast.

If the network also comprises routers, the multicast must be enabled and configured on all the level L3 VLAN interfaces.

Programmable logic With the Programmable Logic function, it is possible to program the activation up to four bits of the *Ekip Link*, each bit according to any combination of the status bits of an actor whose IP address has been entered.

These four bits are indicated as statuses A B C and D that are programmable remotely and their value is transmitted to the device to which *Ekip Link* is connected

Power Controller With the *Power Controller* function, each actor can:

- acquire the status and control the loads
- act as master and gather the energy measurements of the actors inserted as energy meters
- Supply the energy measurements to the actors inserted as masters

The Loads status can be acquired by checking the status of the inputs of the signalling modules connected to the actors whose IP addresses have been entered, whereas the loads can be controlled by programming their outputs.

The remote acquisition of the loads status and control of loads status can also be achieved with *Ekip Signalling 10K* connected to the network.

More information on the potential of the function are available in the White Paper 1SDC007410G0201 "Managing loads with Ekip Power Controller for SACE Emax 2".

- Zone selectivity** With the Zone Selectivity function:
- the inserted IP addresses refer to the actors with an interlock role with respect to the current role
 - For each interlock actor inserted, the protections have to be selected for which to actuate selectivity by setting a mask. The function that is thus set is indicated as a logic hereinafter to distinguish it from the standard function, which is indicated hereinafter as the hardware
 - the thus selected protections are added to the hardware protections S, G, D-Backward and D-Forward
 - it is possible to choose between only hardware selectivity or both hardware and logic hardware
 - it is possible to set the diagnosis, to check for each interlock release whether there is consistency between the information on hardware and logic selectivity
 - it is possible to set a mask that identifies the protections with which to retransmit the information on received selectivity, regardless of whether the actor is in alarm status. The information to which the mask can be applied is only the logic selectivity information

For more information on the Zone Selectivity function with *Ekip Link* see page 83.

Connections *Ekip Link* must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult

- the electrical diagrams for 1SDM000002A1001 to connect the module to its communication network and for the terminals references.
For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield)
- the instruction sheets 1SDH002009A1506 to connect the module to Ekip Touch

Supply Ekip Link is supplied directly by the *Ekip Supply* module to which it is connected.

 **NOTE:** in the absence of auxiliary power, the communication between Ekip Touch and module is interrupted.

Interface The module has three signalling LEDs:

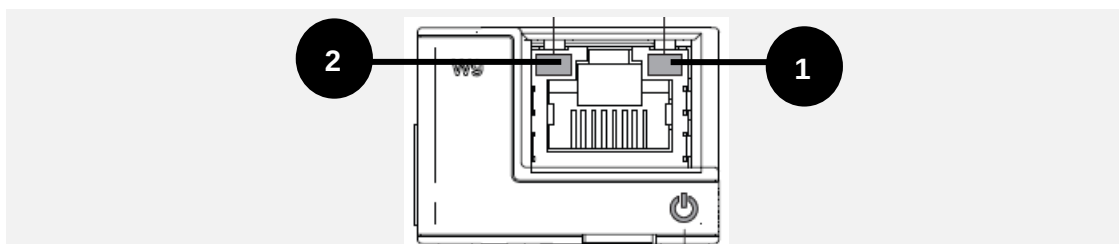


Figure 53

LED	Description
Power	Reports ON status and correct communication with Ekip Touch: • off: module off • fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Trip unit present • flashing not synchronized with the power LED of Ekip Touch (two rapid flashes a second): module ON and communication with Trip unit absent
Link ①	Indicates status of the communication: • off: incorrect connection, signal absent • fixed light: correct connection
Activity ②	Indicates status of the communication: • off: activity on line absent • flashing: activity on line present (receiving and/or transmitting)

Configurations on menu

Activating the local bus is required to start communication between the module and Ekip Touch and is available in the *Settings menu* (page 136).

If the module is detected correctly by Ekip Touch, in the Settings Modules menu, the following communication parameters can be configured:

Parameter	Description	Default
<i>Static IP address ON</i>	Defines whether the module has the dynamic IP address (Off) or static IP address (On); if = On all the associated parameters are enabled	Off
<i>Static IP address</i>	Enables the static IP to be selected	0.0.0.0
<i>Static Network Mask</i>	Enables the subnet mask to be selected	0.0.0.0
<i>Static Gateway address</i>	In the presence of several subnets it enables the IP address to be selected of the node to which the module is connected	0.0.0.0

Information on menu

If the module is detected correctly by Ekip Touch in the *About-Modules* menu the following information is available:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the moment of connection to the network in the event of configuration with dynamic or settable IP that can be set by the menu in the event of a static IP  NOTE: without a DHCP server, the module automatically adopts a causal IP address in the interval 169.254.xxx.xxx
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients
<i>Gateway address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>Client/Server</i>	Parameter for changing the configuration of the module from Server Only to Client and Server and integrating it into an interactive data exchange network (see <i>Ekip Com Hubon</i> page166)  IMPORTANT: if Client/Server, the module enables the data to be exchanged as a normal Server function	Server only
<i>Enable IEEE 1588</i>	Permits the IEEE 1588 protocol for distributing the clock and synchronization signal to be enabled ⁽¹⁾	OFF
<i>IEEE 1588 Master</i>	Enables the module to be set as a master in the network segment to which it belongs (synchronization clock)	OFF
<i>IEEE 1588 Delay mechanism</i>	Enables the data exchange mode between module and master, between Peer-to-Peer and End-to-End to be chosen	End-to-End
<i>Enable SNTP client</i>	Permits enabling of SNTP distribution protocol of the clock and synchronization signal ⁽¹⁾	OFF
<i>SNTP Server Address</i>	Enables the network server to be set that supplies SNTP	0.0.0.0
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Enables it to be selected whether there is daylight saving time(ON) or not (OFF) in the country to which the synchronization time refers.	OFF
<i>Disable Gratuitos ARP</i>	Permits (Enabled ARP) the periodic generation of a Gratuitos ARP message to be enabled that is used by Ekip Connect to find rapidly the modules with Ethernet scanning without its IP address being known beforehand	ARP enabled
<i>Access protected by password</i>	Enables the writing operations conducted by the network to be protected by a password (password request)	Standard mode
<i>TCP Modbus password</i>	With <i>access protected by enabled</i> password, this is the password to use before each writing session ⁽²⁾	Local access



NOTES:

- (1) Enable IEEE 1588 and Enable SNTP client *must not be enabled simultaneously*
- (2) *the parameter can be modified only by system bus in remote configuration*

Remote link configurations

Further link function parameters are available:

Parameter	Description	Default
<i>Actor link (1-15)</i>	IP address of each actor (1 to15)	0.0.0.0
<i>Remote programmable status (A-D)</i>	Configuration parameters of programmable statuses - actor selection (actor from 1 to 15) that activates programmable status - event of the actor that determines the change of programmable status	Actor 1 None
<i>Word status (A-D)</i>	Word configuration parameters: - actor selection (actor from 1 to 15) from which the word status is taken - selection of the taken word	None 1 global
<i>Diagnosis</i>	Active (passive diagnosis) or deactivated diagnosis (no diagnosis) of the diagnosis of cabled selectivity	No diagnosis
<i>Timeout diagnosis control</i>	Diagnosis checking interval, if active available between 30 s, 1 min, 10 min, 60 min	30 seconds
<i>Zone selectivity type</i>	Configuration of hardware selectivity (only HW) or hardware and logic selectivity (mixed)	Only HW
<i>Repeat Configuration Mask</i>	interactive mask for selecting selectivity do be sent also to the upper levels (even if not active on the programmed device)	0x0000

Remote information

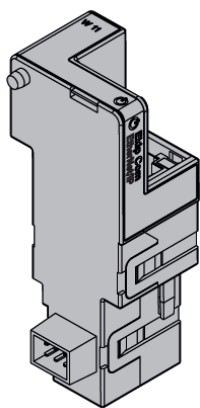
From the service connector (via Ekip Connect) or with communication by system bus, it is possible to access additional information:

Information	Description
<i>HW and Boot version</i>	general module information
<i>Flash CRC status and result</i>	information on the correctness of the SW in the module
<i>Ekip Link status</i>	Signals connection errors of the Ethernet cable
<i>SNTP Server Error</i>	Communication error with the SNTP server
<i>SNTP Server Synchronisation</i>	Synchronism status with SNTP server
<i>IEEE 1588 status</i>	Valid with IEEE 1588 Master = ON, communicates the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master

Remote Link information

Further link function parameters are available:

Information	Description
<i>Line Congruency detection</i>	Information on status and unsuitability of HW and logic selectivity (status and unsuitable selectivity type)
<i>Remote programmable statuses</i>	(True/false) status of the remote programmable statuses A, B, C and D
<i>Remote programmable Word status</i>	value of the remote programmable Word A, B, C, D
<i>Zone logic selectivity</i>	Statuses of the logic selectivity (inputs and outputs)



Ekip Com Hub è a communication accessory that enables the data and measurements of Ekip Touch and other devices to be gathered that are connected to the same plant and then be made available on the server through an Ethernet network.

The configuration of the module is available via Ekip Connect or with the System Interface document (page 122) in which all the details are listed.

The following ports are used by the module:

Port	Service	Notes
67/udp 68/udp	DHCP client	DHCP client enables alternatively to <i>static address = On</i>
443/tcp	HTTPS	always active with enabled module
123/udp	SNTP	active with SNTP client enabled
53/udp	DNS	always active

The Ekip Com Modbus RTU and Ekip Com TCP Modbus modules can be configured to support *Ekip Com Hub* in gathering data to be sent to Cloud. See Getting Started 1SDC200063B0201.

Ekip Com Hub is always supplied with *Ekip AUP* and *Ekip RTC* contacts (see page 195).

Safety The module uses the HTTPS protocol and can be connected to the Internet.

IMPORTANT: it is customer's sole responsibility to provide and continuously ensure a secure connection between the module and customer network or any other network (as the case may be); customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches,any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

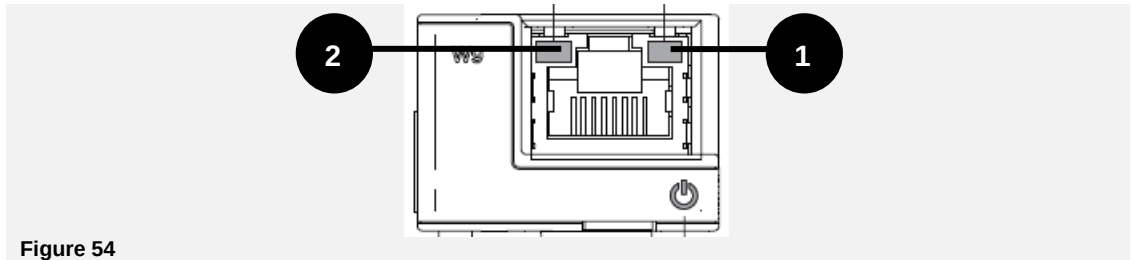
Connections *Ekip Com Hub* must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

- Consult
- the electrical diagrams for 1SDM000002A1001 to connect the module to its communication network and for the terminals references.
For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield)
 - the instruction sheets 1SDH002009A1506 to connect the module to Ekip Touch

Supply Ekip Com Hub is supplied directly by the *Ekip Supply module* to which it is connected.

NOTE: in the absence of an auxiliary supply, the communication between Ekip Touch and module is interrupted

Interface The module has three signalling LEDs:



LED	Description
Power	Reports ON status and correct communication with Ekip Touch: • off: module off • fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Trip unit present • flashing not synchronized with the power LED of Ekip Touch (2 rapid flashes a second): module ON and communication with Trip unit absent
Link ①	Indicates status of the communication: • off: incorrect connection, signal absent • fixed light: correct connection
Activity ②	Indicates status of the communication: • off: activity on line absent • flashing: activity on line present (receiving and/or transmitting)

Configurations on menu

Activating the local bus is required to start communication between the module and Ekip Touch and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip Touch, in the Settings Modules menu, the following communication parameters can be configured:

Parameter	Description	Default
<i>Enable</i>	Switches on/switches off the communication between module and server	
<i>Static IP address ON</i>	Defines whether the module has the dynamic IP address (Off) or static IP address (On) If = On all associated parameters are enabled	Off
<i>Static IP address</i>	Enables the static IP to be selected	0.0.0.0
<i>Static Network Mask</i>	Enables the subnet mask to be selected	0.0.0.0
<i>Static Gateway address</i>	Enables, in the presence of several subnets, the IP address of the node to be selected to which the module is connected	0.0.0.0
<i>SNTP client enabled</i>	Permits enabling of SNTP distribution protocol of the clock and synchronization signal	OFF
<i>SNTP address Server</i>	Enables the network server to be set that supplies SNTP	0.0.0.0
<i>Password</i>	Code required to record the module on Cloud	---
<i>Remote firmware update</i>	Enables the module's firmware to be updated. Two parameters are available: • <i>Enable</i>, to configure the firmware download • <i>Automatic</i>, to automate updating the module	OFF Automatic

Information on menu

If the module is detected correctly by Ekip Touch in the *About-Modules* menu the following information is available:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the moment of connection to the network in the event of configuration with dynamic or settable IP that can be set by the menu in the event of a static IP  NOTE: without a DHCP server, the module automatically adopts a causal IP address in the interval 169.254.xxx.xxx
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients
<i>Gateway address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device

Remote configurations

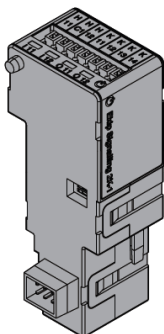
From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>CRL Enable</i>	Enables the CRL (Certificate Revocation List) to check the validity of the server certificate	
<i>Clock update hardening enable</i>	Enables control of the time reference transmitted by the SNTP server	
<i>SNTP Server Location</i>	Enables the position of the SNTP server to be set with respect to the network in which the module is installed	
<i>SNTP Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>SNTP Daylight Saving Time</i>	Enables it to be selected whether there is daylight saving time(ON) or not (OFF) in the country to which the synchronization time refers.	OFF
<i>Disable Gratuitous ARP</i>	Permits (Enabled ARP) the periodic generation of a Gratuitous ARP message to be enabled that is used by Ekip Connect to find rapidly the modules with Ethernet scanning without its IP address being known beforehand	ARP enabled

**Remote
information**

From the service connector (via Ekip Connect) or with communication by system bus, it is possible to access additional information:

Information	Description
<i>HW and Boot version</i>	general module information
<i>Flash CRC status and result</i>	information on the correctness of the SW in the module
<i>Publish enable configuration</i>	Publish enable status contained in <i>Security File</i>
<i>Configuration file</i>	Name of the file dedicated to the information to be transmitted (measurements, etc)
<i>Security file</i>	Name of the file dedicated to the information required by the module for the transmission (addresses, certificates, etc)
<i>Certifying Revocation List</i>	name of file containing revoked certificates
<i>Executable file</i>	name of the executable firmware executable file
<i>Configuration error</i>	error status of the module configuration
<i>Sample time</i>	period of acquisition of data from the connected devices
<i>Log time</i>	period within which the acquired data are saved inside the log
<i>Upload time</i>	period (calculated by module) that occurs between each data transmission
<i>Configured device</i>	Number of modules involved in the network with <i>Hub module</i>
<i>API events polling period</i>	period with which the module communicates with the API device
<i>Connection client 1, 2, 3</i>	Addresses of the TCP Modbus clients connected to the module
<i>Statistics</i>	Recordings of the last saving operations and percentage of resources being used
<i>Plant side status</i>	information on quality of the communication with the other devices
<i>Status Cloud side</i>	Status of errors linked to the TLS session installed between the module and the server
<i>Application status</i>	indicators of progress of the operations
<i>Status</i>	general module indicators: SNTP status, flash, cable connection, FW availability, file errors, etc



Ekip Signalling 2K is an external accessory signalling module that enables programmable inputs/outputs to be managed.

The module has:

- two contacts for output signals and relative status LED
- two digital inputs and relative status LED
- a power LED with the startup status of the module

Models *Ekip Touch* can be configured with three different Signalling 2K modules: *Ekip Signalling 2K-1*, *Ekip Signalling 2K-2* and *Ekip Signalling 2K-3*.

The three modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.



NOTE: if not specified, the information in the following chapter applies to all models

All the modules can be connected simultaneously to *Ekip Touch* to increase the potential of unit (for example: to increase number of input and output).



IMPORTANT: in each *Ekip Touch* can be installed only one module per type; it is not admitted the connection of two or three equal modules (for example: two *Ekip Signalling 2K-3*)

Connections *Ekip Signalling 2K* must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult

- the electrical diagrams for 1SDM000002A1001 for terminal references; for external cabling, AWG 22-16 cables with a maximum external diameter of 1.4 mm must be used
- the instruction sheets 1SDH002004A1002 to connect the module to *Ekip Touch*.

Supply *Ekip Com Signalling 2K* is supplied directly by the *Ekip Supply* module to which it is connected .



NOTE: in the absence of an auxiliary supply, the communication between *Ekip Touch* and module is interrupted

Input *Ekip Touch* can be configured in such a way that the status of the inputs corresponds to actions or signals, with different programming options (see *Menu* on page 176)

The connection of each input (H11 and H12 for model 2K-1, H21 and H22 for model 2K-2, H31 and H32 for model 2K-3) must be carried out in reference with the common contacts (HC). The module permits two logic statuses, interpreted by *Ekip Touch* according to the configuration selected for each contact:

Status	Electrical condition	Configuration of contact	Status detected by Ekip Touch
Open	Circuit open	Active open	ON
		Active closed	OFF
Closed	Short circuit	Active open	OFF
		active closed	ON

Output Ekip Touch can be configured in such a manner that the contacts of each output are closed or open according to one or more events, with different programming options (see *Menu* on page 176)).

The output of each module consists of 2 contacts (K11-K12 and K13-K14 for model 2K-1; K21-K22 and K23-K24 for model 2K-2; K31-K32 and K33-K34 for model 2K-3), insulated from unit and from the other outputs, which have the following electrical characteristics:

Characteristics	Maximum limit ^(NOTE)
Maximum switchable voltage	150 VDC / 250 VAC.
Switching power	2 A @ 30 VDC, 0.8 A @ 50 VDC, 0.2 A @ 150 VDC, 4A @ 250 VAC
Dielectric strength between open contacts	1000 VAC (1 minute @ 50 Hz)
Dielectric strength between each contact and coil	1000 VAC (1 minute @ 50 Hz)



NOTE: data on a resistive load

Interface The module has three signalling LEDs:

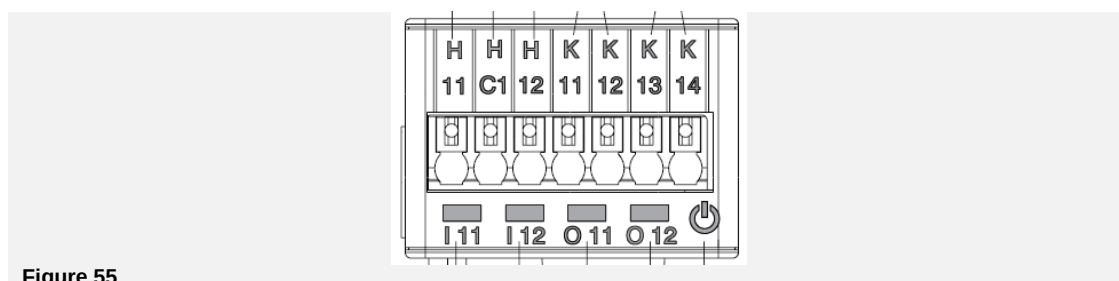


Figure 55

LED	Description
Power	Reports ON status and correct communication with Ekip Touch: - off: module off - fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Trip unit present - flashing not synchronized with power LED of Ekip Touch (two fast flashes per second): module ON and communication with Trip unit absent
I 11, I 12	Indicate status of the contacts of each output: - off: open contact - on: closed contact
O 11, O 12	Indicate status of the contacts of each input: - off: circuit open - on: short circuit

Menu If the Ekip Signalling 2K module is detected correctly by Ekip Touch the specific configuration area in the *Modules Settings menu* is activated.

For each Ekip Signalling 2K module detected by Ekip Touch, a specific menu is available containing the submenus of all the available and configurable inputs and outputs.

Input Parameters

All the available inputs enable the following parameters to be configured:

Parameter	Description	Default
<i>Polarity</i>	Defines whether the input is defined as ON by Ekip Touch when it is open (<i>Active open</i>) or when it is closed (<i>Active Closed</i>)	Active closed
<i>Delay</i>	Minimum duration of activation of the input before the status change is recognized; the delay is expressed in seconds, which are settable in a range: 0 s .. 100 s with 0.01 s step  NOTES: - if the source is deactivated before this time has elapsed the status change is not recognized - with delay = 0 s the status change must be anyway greater than 300 μS	0.1 s

Parameters Output

Parameter	Description	Default
<i>Signal source</i>	Event that activates the output and switches the contact. On the display, different protection proposals, statuses and thresholds are available; via Ekip Connect the Custom mode can be configured to extend the solutions and combine several events.	None
<i>Delay</i>	Minimum duration of presence of the source before the output is activated; the delay is expressed in seconds, which are settable in a range: 0 s .. 100 s with 0.01 s step  NOTES: - if the source is deactivated before this time the output is not switched - with delay = 0 s the source must be anyway present for more than 300 μS	0 s
<i>Contact type</i>	Defines the rest status of the contact with a non-present source between: open (NO) and closed (NC)	NO
<i>Latched^(NOTE)</i>	Enables the output (and relative status LED) to be maintained active (ON) or be deactivated (OFF) until the event disappears.	Off
<i>Activation time Minimum^(NOTE)</i>	Defines the minimum closure time of the contact following the rapid presence of sources: - Source duration < min. activation= the contact is activated for the minimum activation time - Source duration $\geq$ min. activation=the contact is activated for as long as the source persists It is possible to choose between: 0 ms, 100 ms, 200 ms	0 ms



NOTE: if Power Controller function is active, the following considerations apply:

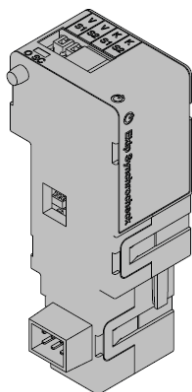
- Latched:* deactivate all the Latched configuration of the outputs used for Power Controller
- Minimum activation time:* the Power Controller option is available in addition to those that have already been described: if selected, the output and active latching is active for a set time that depends on the function, regardless of the persistence of the event that activated it.

Information In the *About-Modules* menu the specific menu of the module is available that contains:

- the serial number and the version of the module
- the status of the inputs (On/Off) and of the outputs (Open/Closed)

Test If the *Ekip Signalling 2K* module is detected correctly, the test area in the Test menu is activated.
For details of test characteristics, see page 128.

Remote information From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).



Ekip Synchrocheck is an accessory module that is used to control closing of an actuator if there are synchronism conditions that are programmable by the user.

In order to actuate the synchronism:

- *Ekip Synchrocheck* and *Ekip Measuring* measure respectively the voltage on the external contacts (external voltage) and on the inner contacts (internal voltage) of the actuator
- *Ekip Synchrocheck* manages a closed contact



NOTES:

- *in the following description and in the menus the actuator is specified as a switch or CB*
- *with a generator and the actuator being configured: Normally, the external voltage is the network voltage and the internal voltage is the generator voltage*



IMPORTANT: Only one *Ekip Synchrocheck* can be installed on each *CB*

Modes The module operates in two modes, configurable by user (in manual configuration) or managed automatically by unit (in automatic configuration)

Conditions	Description
Busbar active	Operation with external voltage other than zero: • the synchronism search is started up if the external voltage is less than or the same as a maximum (0.5 U_n default), for a minimum time (1 s default). • the synchronism is considered to be reached if the differences between the RMS values, the frequencies and the voltage phases are less than or the same as a maximum (0.12 U_n, 0.1 Hz, and 50 ° default)
Dead busbar and configuration: <i>Normal</i>	Operation with one of the voltages nil: • the synchronism search is started up if the internal voltage is less than or the same as a minimum (0.5 U_n default), for a minimum time (1 s default). • the synchronism is considered to be reached if the external voltage is less than or the same as a maximum (0.2 U_n default), for a minimum time (1 s default).



NOTE: *with dead busbar and configuration:* reverses the roles of internal and external voltages, which are reversed

Synchronism signal:

- is activated and maintained after synchronism is reached and is kept active for at least 2 s
- is deactivated when the synchronism falls or the switch is open (with condition: *Evaluate CB status*= enabled) or the interrupted communication with *Ekip Touch*

Additional functions

In the above remote synchronism conditions, certain options can be configured:

- adding open switch condition (disabled by default)
- removing the frequency and phase controls can be disabled



IMPORTANT: in order to be able to disable the frequency and phase controls, make sure that there is already the desired frequency and phase correspondence between external and internal contacts

Connections *Ekip Synchrocheck* must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult

- the electrical diagrams for 1SDM000002A1001 to connect the module to its communication network and for terminal references.
For external cabling, AWG 22-16 cables with a maximum external diameter of 1.4 mm must be used
- the instruction sheets 1SDH002004A1002 to connect the module to *Ekip Touch*

Supply *Ekip Com Synchrocheck* is supplied directly by the *Ekip Supply* module to which it is connected .



NOTE: in the absence of an auxiliary supply, the communication between *Ekip Touch* and module is interrupted

Input *Ekip Synchrocheck* has an input (V S1 - V S2) for reading voltage, the operation of which is ensured in the following ranges and with the following performance:

Component	Operating range	Normal operating interval	Accuracy ⁽⁵⁾
Voltage	0 .. 120 VAC	10 .. 120 VAC	1 % ⁽¹⁾
Frequency ⁽²⁾	30 .. 80 Hz	30 .. 80 Hz	0.1 % ⁽³⁾
Phase ⁽⁴⁾	-	-180 ..+180 °	1 °



NOTES:

- with busbar active
- with busbar active, the measurement of the frequency starts with ≥ 36 VAC measured voltage and stops with ≤ 32 VAC measured voltage
- in the absence of harmonic distortion
- measurement of the phase refers to the phase difference between internal and external voltage
- The accuracy values refer to normal operating intervals according to IEC 61557-12

Isolation transformer

Between the external contacts of the switch and the input of the module, an isolation transformer must always be installed that has the following characteristics:

Characteristics	Description
Mechanical	- fixing: EN 50022 DIN43880 guide - material: self-extinguishing plastic - protection level: IP30 - electrostatic protection: with screen to be earthed
Electrical	- accuracy class: ≤ 0.2 - performance ≥ 4 VA - overload: 20 % permanent - insulation: 4 kV between inputs and outputs, 4 kV between screen and 4 kV outputs between screen and inputs. - frequency: 45-66 Hz

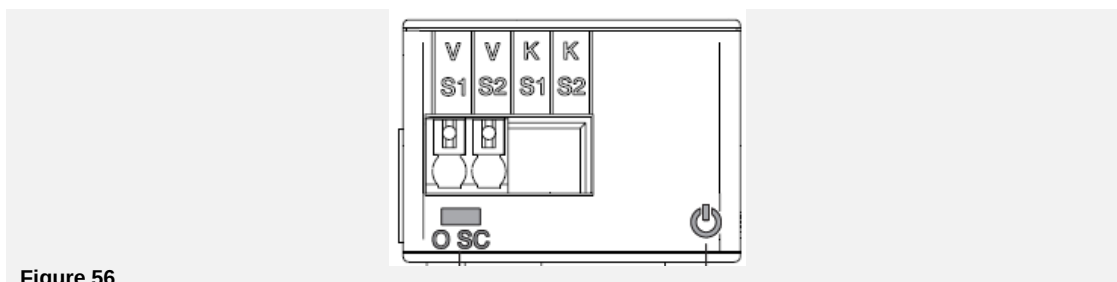
Output Ekip Synchrocheck has an output (K S1 - K S2) used as synchronism contact.

The output is insulated from the unit and the input and has the following electrical characteristics:

Characteristics	Maximum limit ^(NOTE)
Maximum switchable voltage	150 VDC / 250 VAC.
Switching power	2 A @ 30 VDC, 0.8 A @ 50 VDC, 0.2 A @ 150 VDC, 4A @ 250 VAC
Dielectric strength between open contacts	1000 VAC (1 minute @ 50 Hz)
Dielectric strength between each contact and coil	1000 VAC (1 minute @ 50 Hz)

 **NOTE:** data on a resistive load

Interface The module has two signalling LEDs:



LED	Description
Power	Reports ON status and correct communication with Ekip Touch: • off: module off • fixed or flashing light synchronized on power LED of Ekip Touch: module ON and communication with Trip unit present • flashing not synchronized with power LED of Ekip Touch (two fast flashes per second): module ON and communication with Trip unit absent
O SC	Indicate status of the contact of each output: • off: open contact • on: closed contact  NOTE: The LED shows output status: depending on the rest configuration of the contact (normally open or closed), it can indicate synchronization OK or Not OK

Configurations on menu

If the *Ekip Synchrocheck* module is detected correctly by Ekip Touch the specific configuration area is activated in the *Advanced-Synchrocheck menu*.

Parameter	Description	Default
<i>Activate</i>	Enables/disables protection and availability on menu of the parameters	Off
<i>Dead bar option</i>	On= busbar active; Off= dead busbar present	Off
<i>Udead Threshold</i> (1) (2)	Maximum external voltage (with dead busbar and configuration : <i>Normal</i> ⁽²⁾ is the first synchronism condition) The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.02 Un .. 2 Un with 0.001 Un step	0.2 Un
<i>Threshold Ulive</i> (2) (3)	Minimum voltage for starting monitoring of external voltage (with busbar active) or internal voltage (with dead busbar and <i>Normal</i> configuration) The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.5 Un .. 1.1 Un with 0.001 Un step	0.5 Un
<i>Stability time</i>	Minimum time within which the <i>Ulive Threshold</i> condition must be fulfilled to start up voltage monitoring. The value is expressed in seconds, settable in a range: 100 ms - 30 s with 1 ms step	1 s
<i>Delta Voltage</i>	Maximum difference between internal and external voltage (first synchronism condition) The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.02 Un .. 0.12 Un with 0.001 Un step	0.12 Un
<i>Delta Frequency</i> ⁽⁴⁾	Maximum difference between internal and external frequency (second synchronism condition) The value is expressed in Hertz, which is settable in a range: 0.1 Hz .. 1 Hz with 0.1 Hz step	0.1 Hz
<i>Delta Phase</i> ⁽⁴⁾	Maximum difference between internal and external phase (third synchronism condition) The value is expressed in degrees, which are settable in a range: 5 ° .. 50 ° with 5 ° step	50 °
<i>Dead bar configuration</i>	With dead busbar and generator: - Reversed = <i>Ekip Synchrocheck</i>/external contacts connected to the generator - Normal= <i>Ekip Synchrocheck</i>/external contacts connected to the network	Normal
<i>Auto Live-dead detect</i>	Enables automatic synchronism control to be activated: - Manual = Ekip Touch considers the parameter <i>Dead bar option</i> - Automatic = Ekip Touch automatically evaluates the configuration to be actuated between the dead busbar and the active busbar	Manual
<i>Auto Deadbar detect</i>	Configuration for detecting dead busbar: - Manual = Trip unit considers the <i>Dead Bar Configuration</i> parameter - Automatic = Ekip Touch automatically evaluates the configuration to be actuated between: <i>Reversed</i> and <i>Normal</i>	Manual
<i>Primary voltage</i>	Rated voltage Un of plant; the value is expressed as an absolute value (Volt), settable in a range: 100 V .. 1150 V with variable step	100 V
<i>Secondary voltage</i>	Secondary voltage of the transformer; the value is expressed as an absolute value (Volt), settable in a range: 100 V .. 120 V with variable step	100 V
<i>Concatenated Ref</i>	Network voltage entering module between the 3 plant voltages	U12
<i>Contact Type</i>	Defines the rest status of the contact with non-present synchronism between: open (NO) and closed (NC)	NO



NOTES:

- (1) parameter not available with busbar active and Auto Live-dead detect = Manual
- (2) with dead busbar and configuration= Reversed, reverses the roles of internal and external voltages
- (3) to the minimum voltage condition, 10% hysteresis is applied: once it is reached, the condition is lost if voltage falls below 90% of the set limit
- (4) parameter not available with dead busbar and Auto Live-dead detect = Manual

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>Frequency check</i>	Activate (ON) or deactivate(OFF) the frequency control for synchronism evaluation	ON
<i>Phase control</i>	Activate (ON) or deactivate (OFF) the phase control for synchronism evaluation	ON
<i>Evaluate switch status</i>	Activate (YES) or deactivate (NO) the open switch status control for synchronism evaluation  NOTE: fourth synchronism condition with busbar active; second synchronism condition with dead busbar	NO
<i>Minimum matching time</i>	With active busbar, minimum time within which the <i>Delta Phase</i> time has to be fulfilled The value is expressed in seconds, settable in a range: 100 ms .. 3 s with 10 ms step  NOTE: this is not a synchronism condition, but a parameter that enables correct and incorrect combinations of the Delta frequency and Delta Phase conditions to be made. Owing to the worst-case latency, the time that elapses before the synchronism is recognized may be greater than the set time (circa 20 ms)	100 ms

Measurements

If the Ekip Synchrocheck module is detected correctly by Ekip Touch the specific area of measurement in the *Measurements-Synchrocheck* menu is activated

Measurement	Description
<i>Module</i>	- OK = synchronism conditions fulfilled - Not OK = synchronism conditions not fulfilled or function disabled
<i>Frequency</i>	- OK = frequency synchronism condition fulfilled - Not OK = frequency synchronism condition not fulfilled or synchronism function disabled or frequencies outside measurement range --- = Synchronism condition for frequencies is not available (e.g.: for operation with dead busbar)
<i>Voltage</i>	- OK = Voltage synchronism conditions fulfilled - Not OK = Voltage synchronism conditions not fulfilled or function disabled
<i>Phase</i>	- OK = Phase-difference synchronism condition fulfilled - Not OK = Phase-difference synchronism condition not fulfilled or synchronism function disabled or frequencies outside measurement range --- = Phase-difference synchronism condition is not available (e.g.: for operation with dead busbar)
<i>Ext Side Voltage⁽¹⁾</i>	Voltage measured by <i>Ekip Synchrocheck</i> , expressed in Volt = DC measurement DC or less than 1 VAC --- = measurement not available (e.g.: because synchronism function disabled)
<i>Int Side Voltage⁽²⁾</i>	Voltage measured on the inside outlets, expressed in Volt. = measurement less than 1 VAC
<i>Ext Side frequency⁽¹⁾</i>	Frequency measured by <i>Ekip Synchrocheck</i> --- = measurement not available (e.g.: because of disabled synchronism or operation with dead busbar or frequencies outside measurement range)
<i>Int Side frequency⁽²⁾</i>	Frequency measured on the inside outlets --- = measurement not available (e.g.: because of disabled synchronism or operation with dead busbar or frequencies outside measurement range)
<i>Phase difference⁽¹⁾</i>	Phase difference between voltages, expressed in degrees --- = measurement not available (e.g.: because of disabled synchronism or operation with dead busbar or frequencies outside measurement range)

Measurements [2]

Measurement	Description
<i>Auto detection</i>	• Busbar active = with automatic detection of the operating mode and operation with busbar active, or with synchronism function not enabled • Dead busbar = with automatic detection of the operating mode and operation with dead busbar • --- = Measurement not available (e.g.: because of manual detection of operating mode)
<i>Voltage relation</i>	• $V_{int} \leq V_{ext}$ = Internal voltage less than or the same as the external voltage • $V_{int} > V_{ext}$ = Internal voltage greater than the external voltage • --- = Measurement not available (e.g.: because of disabled synchronism or direct voltage or less than 1 V)
<i>frequency relation</i>	• $f_{int} \leq f_{ext}$ = Internal frequency less than or the same as the external frequency • $f_{int} > f_{ext}$ = internal frequency greater than the external frequency • --- = Measurement not available (e.g.: because of disabled synchronism, or operation with dead busbar, or frequencies outside measurement range)



NOTES:

- (1) the measurement accuracy of the voltage difference is $\pm 10\%$, unless the parameter value is $0.02 U_n$, in which case accuracy is $\pm 20\%$
- (2) the characteristics of voltage and frequency measurements coincide with those declared on internal inputs (page 103)

Summary Page

The summary page is activated in the presence of the module *Ekip Synchrocheck*; access is possible as for the other summary pages (page 27).

In this page, the measures are:

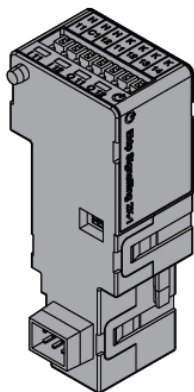
- V_{int} : voltage read by Ekip Touch
- f_{int} : frequency read by Ekip Touch
- $\Delta\phi$: phase difference
- SYNC: synchronization status

Information

In the *About-Modules* menu, the specific menu of the module is available, which contains the serial number and the version of the module

Remote information

From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).



Ekip Signalling 3T is a signalling accessory that enables:

- three analogue inputs for temperature sensors PT1000 (2-wire) to be enabled
- one analogue input for 4-20mA current loops to be enabled

The measurements supplied by the module can be combined with different control thresholds, which are useful for configuring alarm and status signals and programmable commands.

Models *Ekip Touch 2* can be configured with two different 3T modules: *Ekip Signalling 3T-1* and *Ekip Signalling 3T-2*.

The modules are identical in terms of characteristics and installation methods, except for: display menus, cabling and addresses for system communication that are specific to each model.



NOTE: unless specified, the information shown in the following chapter is valid for both the models

The two modules can be fitted simultaneously on the same circuit-breaker to increase the possibility of measuring and controlling the plant.



IMPORTANT: Each circuit-breaker can fit just one module by type; configuration with two modules of the same model is not permitted (e.g.: two *Ekip Signalling 3T-1* modules)

Connections - Inputs *Ekip Signalling 3T* must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult

- the electrical diagrams for 1SDM000002A1001 for terminal references.
- the instruction sheets 1SDH001000R0527 to connect the module to *Ekip Touch*.

For the PT1000 sensors, use insulated cables for temperature sensors like PENTRONIC TEC/SITW-24F (TX type) or the like, with maximum length of three metres.

For 4-20mA current loops sensor, use cables that are suitable and compatible with the work environment in which the 4-20mA current sensor is used, with a maximum length of three metres.



IMPORTANT: The inputs are not insulated: regardless of the plant voltage, the customer must ensure the insulation between each input and between inputs and supply of the *Ekip Supply* module on the basis of the application and network.

For applications in low voltage plants, ABB suggests using a dedicated external insulated PT1000 sensor. This can be ordered using the 1SDA085695R1 code and is provided with a nut and screw for use on a bar and is compatible with the dielectric strength and insulation levels specified in standard IEC 60947-2 ($U_i = 1000$ V, $U_{imp} = 12$ kV).

Supply *Ekip Signalling 3T* is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: in case of absence of an auxiliary supply the communication between the trip unit and the module is interrupted

Input The module enables the following parameters to be measured

Input	Measurement	Range	Resolution	Accuracy ⁽¹⁾
PT1000	Temperature	-50 .. 250 °C	0.01 °C	± 0.25 °C ⁽²⁾
4-20mA current loop	DC current	0 .. 100 % ⁽³⁾	0.1 %	± 0.5 % ⁽⁴⁾



NOTES:

- (1) accuracy refers to the 3T module without sensors; for complete accuracy, consider the characteristics of the sensors and cabling used
- (2) accurate within the range -25 .. 250 °C; in the complete range it is: ± 0.5°C
- (3) the measurement is expressed as a percentage, in which: 0 % = 4 mA and 100 % = 20 mA
- (4) accuracy refers to the full scale: 0.5 % = 0.1 mA

Interface Five signalling LEDs are available:

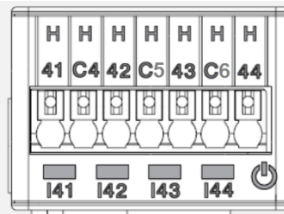


Figure 57

LED	Description
Power	Reports ON status and correct communication with trip unit: • off: module off • fixed or flashing light synchronized with power LED of Ekip Touch: module ON and communication with Trip unit present • flashing not synchronized with power LED of Ekip Touch (two rapid flashes per second): module ON and communication with Trip unit absent
I 41, I 42, I 43, I 44	Indicate status of the input contacts: • off: input disabled • fixed on: input enabled, sensor connected and measurement valid • flashing: input enabled, sensor not connected and/or measurement not valid

Access from display If the *Ekip Signalling 3T* module is detected correctly, the following areas became available on the trip unit:

- *Measurements* page, accessible from *Home* (see page xx), containing the measurements of all the PT1000 inputs and 4-20mA current loops of both 3T-1 and 3T-2 modules
- information submenu in the *Modules-Information* menu containing: serial number, module version and sensors status (Present/Alarm)



IMPORTANT:

- if one or more sensors are in alarm status, this signal is activated on the diagnosis bar: **Ekip Signalling 3T**
- if a sensor is not enabled, the reported state is: **Present**

Remote configurations

The module configuration is available:

- via Ekip Connect, with communication accessories from service connector or with communication from system bus
- with its own communication system and Ekip Com modules fitted to the circuit-breaker in the conditions prescribed for the trip unit (use the System Interface for the details)

In both the conditions, also all the measurements, statuses and alarms of the module are available.



NOTE: parameters and measurements are distributed on Ekip Connect pages and communication addresses that are sometimes not consequential; the following tables show the page references to Ekip Connect 2

Enabling and measurements

On the *Ekip Signalling 3T* page, it is possible to enable the individual inputs of the modules: PT1000 1, PT1000 2, PT1000 3 and 4-20mA current loop.

Parameter	Description	Default
<i>Enable</i>	It enables the specific input and the relative checks of alarm statuses and messages to be checked.	Enabled

The page also shows the status alarms and measurements detected for each input.

Alarm signals

On the page *Protection Parameters - Other parameters A* (and *B*, if the dual set is activated) it is possible to activate and configure up to three alarm thresholds for each inputs, which are independent of one another: THR 1, THR2, TH3.

Each alarm threshold provides the following configuration parameters:

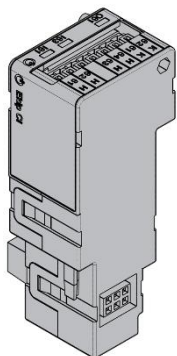


NOTE: the table shows the threshold 1 parameters of the input PT1000 1; for all the other thresholds and inputs, the names and the references to be considered change

Parameter	Description	Default
<i>PT1000 1 THR 1 Protection</i>	Activates the PT1000 1 input test with alarm threshold THR 1	Disabled
<i>PT1000 1 THR 1 Config</i>	Defines whether the alarm is triggered by the measured value exceeding (<i>up</i>) or falling below (<i>down</i>) the set THR 1 threshold.	Down
<i>PT1000 1 THR 1</i>	Alarm threshold THR 1 of the PT1000 1 input. The value is expressed in degrees Celsius (°C), which are settable in a range: -40 °C .. 240 °C with 0.1 °C step. NOTE: the Current Loop 4-20mA input thresholds are expressed as a percentage settable in a range: 0 % - 100 % with 0.1 % step (each step equivalent to 0.016µA)	200 °C (PT1000) / 50 % (4-20mA)
<i>PT1000 1 THR 1 hysteresis</i>	Hysteresis value valid for leaving the alarm condition if the set alarm threshold THR 1 is exceeded. The hysteresis parameter permits only positive values, the trip unit decides whether to add or subtract this value to the alarm threshold on the basis of the ConFigure parameter. For example: • <i>Config= Up, THR 1= 200 °C, hysteresis= 10 °C</i> the alarm is activated when 200 ° C is exceeded and is deactivated when it falls below 190 ° C The value is expressed in degrees Celsius (°C), which are settable in a range: 0 °C - 50 °C with 0.1 °C step. NOTE: the thresholds combined with the 4-20mA current loop input are expressed as a percentage settable in a range: 0 % .. 30 % with 0.1 % step (each step equivalent to 0.016µA)	1 °C (PT1000) / 1 % (4-20mA)

Statuses and alarms

On the *Warnings/Alarms* page, the status of all the control thresholds can be checked.



Ekip CI is an accessory module that can be configured with *Ekip M Touch* that allows the management of a contactor in *Normal* configuration (see page 123)

The module has:

- A contact for controlling a contactor
- An input for a PT100 temperature probe (2 wires)
- A digital input for the Trip Reset function
- LED indicating the module's power on status and the operation of the module

Connections *Ekip CI* must be mounted in the first free slot after *Ekip Supply*, on CB terminal box (with fixed execution) or on fixed part (on withdrawable version).

Consult:

- The 1SDM000002A1001 wiring diagrams for connection and terminal references. For the I61 input use insulated cables for resistance thermometers like PENTRONIC TEC/SITW-24F (TX type) or similar, with a maximum length of three meters
- The kit sheet 1SDH002009A1507 to connect the module to *Ekip M Touch*



IMPORTANT: the I61 input is not isolated: regardless of the system voltage, the customer must ensure the insulation between the input and power supply of the *Ekip Supply* module according to the application and grid

Supply *Ekip CI* is powered directly by the *Ekip Supply* module it is connected to.



NOTE: without an auxiliary power supply the communication between *Ekip M Touch* and module will be interrupted, the output contact maintains the status, the input signals are no longer valid.

Output The O61 output contact (K61 and K62), normally closed, is opened in case of a TRIP.

Re-closure is possible following a command to the *Trip Reset* input or, if the *Autoreclosure* function is active, after the time defined by the user (*Autoreclosure Time*).

The contact has the following electrical characteristics:

Characteristics	Maximum limit ^(NOTE)
Rated breaking capacity	8A @ 250 VAC / 5A @ 30 VDC
Minimum breaking power	10 mA @ 5 VDC
Insulation resistance between contact and Trip unit	1000 MΩ, 50 VDC



NOTE: data related to a resistive load

Input PT100 The I61 analog input (H61 and H62) allows connecting a thermocouple (PT100 model) to monitor the temperature and, in case of activation of the *PTC protection* (page 74), to manage a TRIP in case of alarm (fixed threshold at 120°C)

The contact guarantees the following measurement characteristics:

Input	Measurement	Range	Resolution	Accuracy ⁽¹⁾
PT100	Temperature	-50 .. 250 °C	0.01 °C	± 0.25 °C ⁽²⁾

- 
- NOTES:**
(1) Accuracy referred to the Ekip CI module without sensor. For complete accuracy, consider the characteristics of the sensor and the wiring used
(2) Accuracy valid in the range: -25°C .. 250°C. In the full range it is: ± 0.5°C

Input Trip reset The I63 digital input (H63 and H64) allows commanding the reopening of the O61 contact following a TRIP.

The module has two logical states, interpreted differently by the Trip unit according to the polarity configured by the user:

State	Electrical condition	Polarity	Status detected (and command)
Open	Circuit open	Active open	On (O61 open command)
		Active closed	Off
Closed	Short circuit	Active open	Off
		Active closed	On (O61 open command)

The re-closing command is activated on the front.

Interface The module has four signaling LEDs:

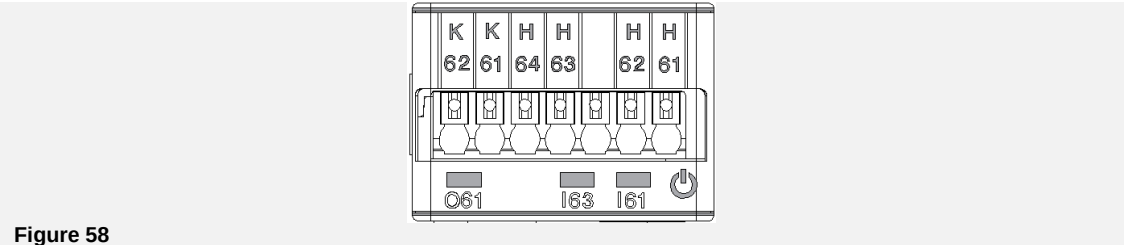


Figure 58

LED	Description
Power	Signals the status of power on and correct communication with Ekip Touch: - Off: module off - On, fixed or with flashing synchronized with the Ekip Touch Power LED: module on and in communication with trip unit - Blinking, not synchronized with the Ekip Touch Power LED (2 fast flashes per second): module on and not in communication with a trip unit
I 61	Indicates the status of the PT100 I61 temperature probe: - Off: input disabled - On: input enabled and sensor present - Blinking: input enabled and sensor disconnected or invalid signal
I 63	Indicates the status of the digital input for the Trip Reset I63: - Off: input open - On: input closed
O 61	Indicates the status of the command contact for the O61 contactor: - Off: contact closed - On: contact open

Menu The activation of the local bus – essential to start the communication between the module and the Trip unit – is available in the *Settings* menu (page 33).

If the *Ekip CI* module is correctly detected by Ekip Touch, the corresponding configuration, measurement, test, and information areas are activated in the respective menus.

Configuration In the *Settings-Modules-Ekip CI* menu it is possible to configure the parameters of the module:

Parameter	Description	Default
<i>Enable</i>	Enable/disable some functions and the availability of the parameters in the menu • If On: all the inputs and outputs are active, as are their functions • If Off: only input I61 is active. The O61 control function is off	Off
<i>Polarity</i>	Defines if input I63 is interpreted as On by Ekip Touch when it is open (Active open) or when it is closed (Active closed)	Active closed
<i>Delay</i>	Minimum duration of activation of input I63 before sending the reopening command for contact O61. The delay is expressed in seconds, which can be set in a range: 0 s .. 100 s with 0.01 s steps  NOTES: • If the input is deactivated before this time has elapsed, the re-opening command is not sent • With delay = 0 s, the input must still be present for more than 300 μS	0.1 s

Measurements If *Ekip CI* is correctly detected by Ekip Touch, the specific area for the module is made available in the *Measurements* menu, where the temperature measurement of the PT100 probe is displayed if connected and active.



NOTE: if no probe is detected the value "- - -" is displayed

Test If the *Ekip CI* module is correctly detected, the test area is activated in the *Test* menu.

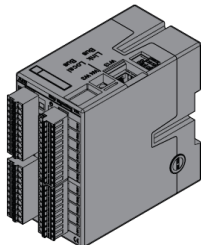
For more on the test see page 34.

Information If *Ekip CI* is correctly detected by Ekip Touch, the specific area for the module is made available in the *Information-Modules* menu, displaying:

- The module's serial number and version
- The activation state for the PT100 temperature probe input

Remote information Some additional information regarding the version and status of the module are available from the service connector (via Ekip Connect) or the system bus communication: HW and Boot version, CRC status (correctness of the SW on the module).

55 - Ekip Signalling 10K



Ekip Signalling 10K is an external accessory signalling module, which can be installed on a standard 35 mm DIN guide (DIN EN 50022, type TS 35x15 mm).

The module has:

- Ten programmable output contacts.
- Ten or eleven programmable digital inputs.
- One startup LED and twenty or twenty-one signalling LEDs (one for each output/input).

The module can be set in four different configurations

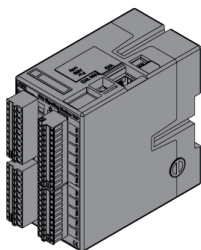
- One in the case of a connection to a bus link network.
- Three configurations in the event of connection via Local Bus (to enable up to three modules to be connected to the same release)

The module can be supplied at 110 .. 240 VAC / DC or 24 .. 48 VDC.

More information on *Ekip Signalling 10K* is available on the website <http://www.abb.com/abblibrary/DownloadCenter/>, document 1SDH001318R0002.



IMPORTANT: make sure that you have read the safety requirements and requirements regarding prevention of unauthorized accesses.



Ekip Signalling Modbus TCP is an external accessory module, which can be installed on a standard 35 mm DIN guide (DIN EN 50022, type TS 35x15 mm).

Its function is to share on another Ethernet network with a TCP communication protocol TCP Modbus information on the status of actuators/switches even if they are unable to supply this information via Ethernet, and to enable these devices to be remote-controlled.

The module has 11 digital inputs and 10 output contacts:

- The inputs enable the status of the devices and other information to be monitored.
- The outputs enable the switches to be controlled.

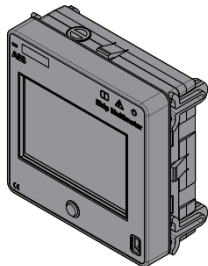
Each input and output is combined with a status LED.

The module can operate in three modes:

Modes	Characteristics
CB Supervisor	The module can be associated with a single switch, which is selectable from a list, and the inputs and outputs configuration is preset
Multi MCCB Supervisor	The module can be associated with up to five switches, and the inputs and outputs configuration is preset  NOTE: mode available with boxed switches
Free I/O	The inputs and outputs can be configured completed by the user

The module can be supplied to 110 .. 240 VAC / DC or 24 .. 48 VDC.

More information on Ekip Signalling TCP Modbus can be found at <http://www.abb.com/abblibrary/DownloadCenter/>, document 1SDH001456R0002.



Ekip Multimeter is a module for remote viewing equipped with a touchscreen display that makes it possible to view and change parameters of the Trip unit it is connected to via the local bus.

Up to four *Ekip Multimeters* can be connected to the same Trip unit. In contrast, the module can be connected to only one Trip unit.

Electrical characteristics

The rear connector allows powering the unit with two different electrical solutions:

Terminals / supply voltage	Frequency	Power absorption	Inrush current
21.5 .. 53 VDC	-	10 W max	2 A max for 20 ms
105 .. 265 VAC/DC	45 .. 66 Hz	10 VA/W max	2 A max for 20 ms



IMPORTANT: AC and DC power supplies cannot be present at the same time

The module offers an auxiliary voltage of 24 VDC (terminals 24Vout L+ and L-) that can be used to directly supply the Trip unit.



CAUTION! Ekip Multimeter is sized to power only the Trip unit without additional modules. If the auxiliary module voltage is used, it must be connected directly to the CB terminal board, without the possibility of using *Ekip Supply* or other modules

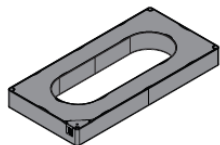
Connections

For the local bus and the auxiliary power supply, Belden 3105A or equivalent cables with a maximum length of 15 m must be used. The cable shield must be grounded on both sides of the connection.

Documentation

More information is available at <http://www.abb.com/abblibrary/DownloadCenter/>, in kit sheet 1SDH001000R0520.

58 - Toroid and RC



RC is the external residual current sensor that can be installed in the Ekip Touch provided with *RC rating plugs*.

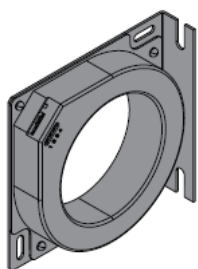
During Ekip Touch programming, the presence of the sensor in the *Settings* menu must be checked (page 33). This is necessary for activating the configuration menu of the RC protection parameters in the *Advanced* menu (page 31).



IMPORTANT: the RC toroid and relative protection can be selected as an alternative to the Gext toroid; the Gext and RC protections are alternative

More information on the RC toroid connection can be found at <http://www.abb.com/abblibrary/DownloadCenter/>, kit sheet 1SDH001000R0521 (document compatible with Ekip Touch on SACE Tmax XT7).

59 - S.G.R Sensor



S.G.R. or Source Ground Return is the external homopolar current sensor, available for the Ekip Touch LSIG version.

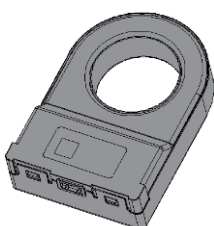
During programming of Ekip Touch, its presence must be selected (see the *Settings-Circuit breaker-Ground Protection* menu), which activates the protection against the earth fault Gext (see *Advanced* menu).



IMPORTANT: the S.G.R sensor and relative protection can be selected as an alternative to the RC sensor; the Gext and RC protections are alternative

More information on the S.G.R. toroid connection can be found at <http://www.abb.com/abblibrary/DownloadCenter/>, kit sheet 1SDH001000R0521 (document compatible with Ekip Touch on SACE Tmax XT7).

60 - External neutral

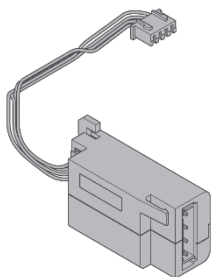


It is a current sensor for the neutral pole outside the circuit breaker for CB 3P to establish neutral protection by connecting to the Trip unit.

To configure the sensor presence and the protection see pages 33 e 49.

More information on the connection of the external neutral can be found at <http://www.abb.com/abblibrary/DownloadCenter/>.

61 - Ekip Com Actuator



Ekip Com Actuator is an accessory module that allows SACE Tmax XT7 circuit-breakers to be opened and closed from remote.

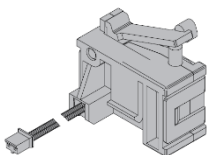
Ekip Com Actuator is installed on the front of the circuit-breaker in the accessories area.

Consult the 1SDM000002A1001 wiring diagrams and the kit sheet 1SDH002009A1505 to connect the module to Ekip Touch

Compatibility

Ekip Com Actuator module is supplied on request and is compatible with all Ekip trip units equipped with *Ekip Com* or *Ekip Link* modules.

62 - Ekip AUP



The communication modules are always supplied with dedicated *Ekip AUP* auxiliary position contacts. In case of a withdrawable circuit-breaker, the *Ekip AUP* contacts give the signal of moving part racked-in/out from the fixed part.

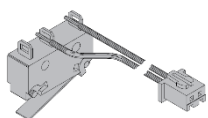
The assembly assures that the position signalling is given also with the moving part withdrawn.



! IMPORTANT: in case of multiple communication modules, only one can be connected to the *Ekip AUP* contacts

Further information on assembling *Ekip AUP* modules and contacts is available on the web site <http://www.abb.com/abblibrary/DownloadCenter/>, in particular in the kit sheet 1SDH001000R0811.

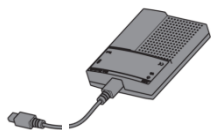
63 - Ekip RTC



The communication modules are always supplied with an *Ekip RTC* auxiliary contact, which gives to the trip unit the signal indicating that the circuit-breaker is ready to receive a close command.

Further information on the assembly of the *Ekip RTC* contact is available on the website <http://www.abb.com/abblibrary/DownloadCenter/>, in particular in the kit sheet 1SDH000999R0604

Ekip TT



Ekip TT is a power supply accessory that is useful for accessing Ekip Touch when there is no auxiliary power supply. With this unit it is possible to:

- Power Ekip Touch and display the protection that was triggered in the event of a TRIP without auxiliary voltage
- Set the protections and some parameters before installation in the system



IMPORTANT:

- ***Ekip TT* can be connected to Ekip Touch even when in use.**
- ***Ekip TT* only powers the display: to configure and display the information of the electronic accessories an auxiliary power supply is needed**

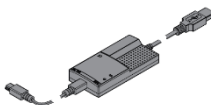
Ekip TT connects to the Ekip Touch service connector with the cable supplied.

To turn the module on, move the side switch to the ON position and check the status of the LED:

- If green, proceed with the desired read and configuration operations
- If red, replace the device's batteries (three 1.5 V AA batteries)

Further information can be found at <http://www.abb.com/abblibrary/DownloadCenter/>, kit sheet 1SDH001000R0519 (compatible with Ekip Touch and with SACE Tmax XT7).

Ekip Programming and Ekip T&P



IMPORTANT:

- ***Ekip Programming* can be connected to Ekip Touch even when in use.**
- ***Ekip Programming* only powers the display: to configure and display the information of the electronic accessories an auxiliary power supply is needed**

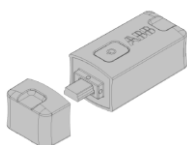
Ekip Programming connects from the PC USB port, from which it receives the energy to turn on and supply Ekip Touch. Connection to the Ekip Touch service connector must be done with the cable supplied.

Ekip Programming is equipped with two LEDs, one green that indicates an active module, and one yellow that indicates active communication.

Ekip T&P is a power supply and communication accessory that has the same characteristics as *Ekip Programming* but with an additional function:

- With the Ekip Connect software you can access the test pages

Ekip Bluetooth Key



The Ekip Bluetooth Key device allows activating a temporary connection between the circuit breaker and a smartphone/tablet, using the Ekip Connect Mobile application to configure parameters, read measurements, view information. The communication protocol used for communication is Bluetooth Low Energy (Bluetooth 4.1).

Ekip Bluetooth Key is compatible with all the trip units installed on ABB low voltage circuit breakers of the Tmax XT and Emax 2 series. For more information, refer to the instruction manual 1SDH002023A1001

Revisions

Overhaul	ECN	Description
B	ECN000092127	Second version

1SDH001821A1002 ECN0000092127 Rev. B