

SWITCHBOARD DIGITAL UNIT FOR MONITORING, PROTECTING AND CONTROLLING INSTALLATIONS

ABB Ekip UP⁺

Installation, configuration and maintenance operation instruction manual



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Glossary

Term	Description
Ekip UP+	Switchboard digital unit for monitoring, protecting and controlling installations
Actuators	Electromechanical devices for opening/closing the main apparatus (circuit-breaker or disconnecter): coils, motors, contactors, etc.
TRIP	Conclusive action of a protection timing; coincides with closing of an external contact for the purpose of commanding opening of main actuator
Monitor, Protect	Ekip UP+ versions available
Trip unit	Synonym indicating the Ekip UP+ digital unit

Introduction

1 - Contents

- Introduction** This manual describes the characteristics of Ekip UP⁺, among which:
1. general overview:
 2. management operations: receipt, commissioning, maintenance, disposal
 3. operating conditions
 4. consultation of menus for changing parameters and displaying measurements
 5. accessories

- recipients** This manual refers to two user profiles, as defined by standard IEC 60050:
- skilled person, in the electrical field (IEV 195-04-01): person with relevant education, training, knowledge and experience to enable him or her to perceive risks and to avoid danger 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 danger which electricity can create



IMPORTANT: operations which can be performed by persons trained on the subject of electricity are specifically indicated in this manual. All the remaining operations described in this manual must be performed by skilled persons, in the field of electricity. ABB declines all liability for damage to persons or property caused by failure to comply with the instructions in this document.

- Organization and distribution of information** To install and configure Ekip UP⁺ in your installation in an optimal way, you are advised to work through the following sequence of operations, available in the product technical documentation (operation manual, Getting Started and circuit diagrams):

Nr	Operation	Document
1	Consult the safety notes	Operation manual (page 5)
2	Check operating conditions	Operation manual (page 7 - Environmental conditions)
3	Check incoming goods	Getting Started 1SDH002004A1001 and circuit diagrams 1SDM000116R0001
4	Installation	CB SACE Tmax XT4 Installation instructions
5	Parameter configuration	Operation manual (page 5 - Changing parameters and commands)
6	Testing and putting into service	Getting Started 1SDH002004A1001 and operation manual (page 4 - Putting into service)

- Design notes** The information in this manual was written in Italian and then translated into other languages to conform to the laws and/or commercial requirements concerning the product.

2 - Safety

Safety requirements

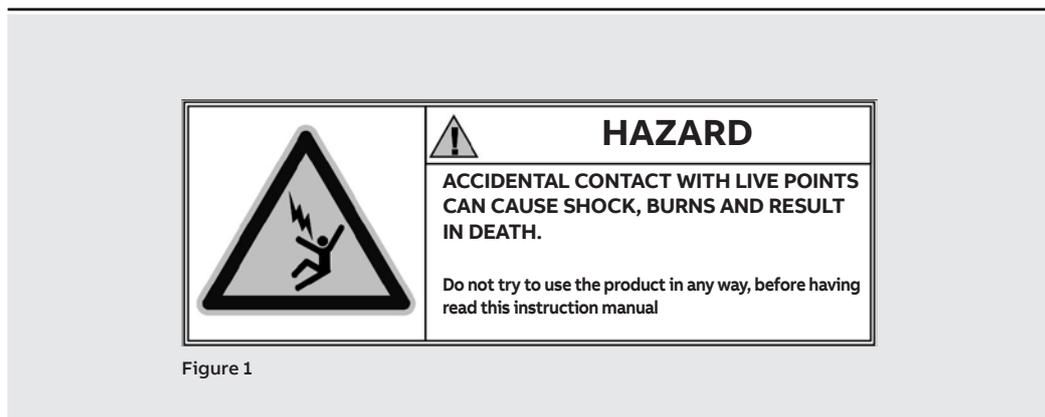


Figure 1



HAZARD! RISK OF ELECTRIC SHOCK! In the case of personnel who are not qualified to work in live installations under applicable local legislation, in order to avoid any potential electrical hazard during the assembly, installation, maintenance or removal of Ekip UP⁺ from service, disconnect or unplug all electrical power supplies.



WARNING!

- detailed descriptions of the standard installation, operation, maintenance procedures and principles for working safely are not included; it is important to note that this document contains indications about safety and caution, against certain methods (concerning installation, operation and maintenance) which could cause injuries to the personnel, damage devices or make them unsafe
- these warnings and alarms do not include all the conceivable methods of performing the installation, operation and maintenance operations recommended by ABB and others, which could be performed, or the possible consequences and complications of each conceivable method, neither will ABB investigate all those methods
- anyone who is implementing procedures or using maintenance devices recommended by ABB or not must check carefully that neither their personal safety nor the safety devices are endangered by the installation, operation, maintenance method or by the tools used; contact your nearest ABB representative for further information, explanations or specific problems
- this manual is written for qualified personnel only and is not intended to replace an adequate training course or experience concerning the safety procedures of this device
- regarding products equipped with communication systems, the purchaser, installer or end customer are responsible for applying all the IT security measures to prevent risks deriving from connection to communication networks; among others, these risks include use of the product by unauthorized persons, alteration of its normal operation, access to and modification of the information
- the purchaser, installer or end customer are responsible for ensuring that safety warnings and notices are affixed and moreover, that all points of access and operating devices are securely blocked when the switchgear is left even momentarily unattended
- all information in this document is based on the latest product data available at the time of printing. We reserve the right to make changes to the document at any time and without prior notice

Warnings

**WARNING! READ THIS MANUAL WITH CARE BEFORE INSTALLING, OPERATING OR REPAIRING THE CIRCUIT-BREAKER IN Ekip UP⁺**

- file this manual with all the other available documents, among which: Getting Started for first installation, circuit diagrams, drawings and descriptive notes
- to facilitate the individual operations, make sure that these documents are available when Ekip UP⁺ is installed, operated and serviced
- the unit must be installed in accordance with the environmental, electrical and mechanical limitations described in the product documentation
- Ekip UP⁺ has been designed to operate at voltage and current values within the rated limits: it must not be installed in systems which operate at values exceeding these rated limits
- comply with the safety procedures required by your Company.
- do not open covers or doors, do not work on devices before having disconnected all circuits from the electricity sources and having made sure of this with a measuring instrument.

Ekip UP⁺ overview

1 - General characteristics

Electrical characteristics Ekip UP⁺ is a switchboard digital unit which monitors, protects and controls installation performance. Correct operation of is guaranteed when the primary voltages and currents are within range and with clearly defined characteristics:

Parameter	Operating limits
Primary current	0,03 ÷ 16 In ⁽¹⁾
Primary voltage	0 ÷ 1150 VAC ⁽²⁾
Rated frequency	50 / 60 Hz ±10 %

⁽¹⁾ range in relation to each phase; In refers to the nominal size defined by the Rating plug installed in Ekip UP⁺, available in models from 100 A to 6300 A

⁽²⁾ up to 690 VAC, voltages can be directly connected to the device; external transformers must be used if the voltage is higher, consult the chapter dedicated to the Ekip Measurement module on page 153.

IP rating Ekip UP⁺ guarantees IP 40 protection rating: however, make sure that Ekip UP⁺ is installed in correctly ventilated switchboards with a low level of dust penetration.



NOTE: IP rating guaranteed when transparent cover is fitted on Ekip UP⁺.

Versions Ekip UP⁺ is available in two versions: Monitor and Protect.

The monitoring, protection and control functions available for each version are listed in the next table:

Function	Monitor version	Protect version
Measurements	(X)	(X)
Network Analyzer	(X)	(X)
Opening log	(X)	(X)
Basic protections		(X)
Generator protections		(O)
Motor protections		(O)
Adaptive protections		(O)
Power Controller	(O)	(O)
IPS interface protection (CEI 0-16)		(O)
Adaptive Load Shedding		(O)

(X) standard function

(O) optional function

Bundles and Packages	<p>The Monitor with Protect bundle allows Ekip UP⁺ Monitor to acquire the same functions as Ekip UP⁺ Protect listed in the previous table.</p> <p>The bundle can be purchased from the Marketplace.</p> <p>The optional functions can be purchased together with Ekip UP⁺ or afterwards, as Packages from the Marketplace.</p> <p>Visit https://eu.marketplace.ability.abb/it-IT/listing to access the ABB Marketplace. MARKETPLACE.</p>
Measurements	<p>All Ekip UP⁺ versions perform the following measurements (details in Measurements chapter on page 49):</p> <ul style="list-style-type: none">• minimum and maximum instantaneous internal earth fault and phase currents• minimum and maximum instantaneous line-to-line and phase voltages• active, reactive and apparent power (total and phase)• total active, reactive and apparent energy• network frequency• peak factor• power factor• datalogger measurements and waveforms• measurements log• events log
Standard protections	<p>The Protect version of Ekip UP⁺ is supplied with the protections described on page 66.</p> <p>The following can also be obtained using optional functions or modules:</p> <ul style="list-style-type: none">• Adaptive protections• Generator Protection• Motor protection• Synchrocheck protection, using Ekip Synchrocheck• Gext protection, using the S.G.R. sensor• Rc protection, using the Rc toroid <p>For details about all the protections that can be activated in Ekip UP⁺ consult the Protections chapter on page 65.</p>
Power Controller	<p>Power Controller is an optional function that can be activated in Ekip UP⁺ Protect for optimized management of the connectable loads and generators; consult the Control chapter on page 144 e White Paper 1SDC007410G0201 "Load management with Ekip Power Controller for SACE Emax 2".</p>

2 - Standard connections and modules

Description The basic version of Ekip UP+ comprises:

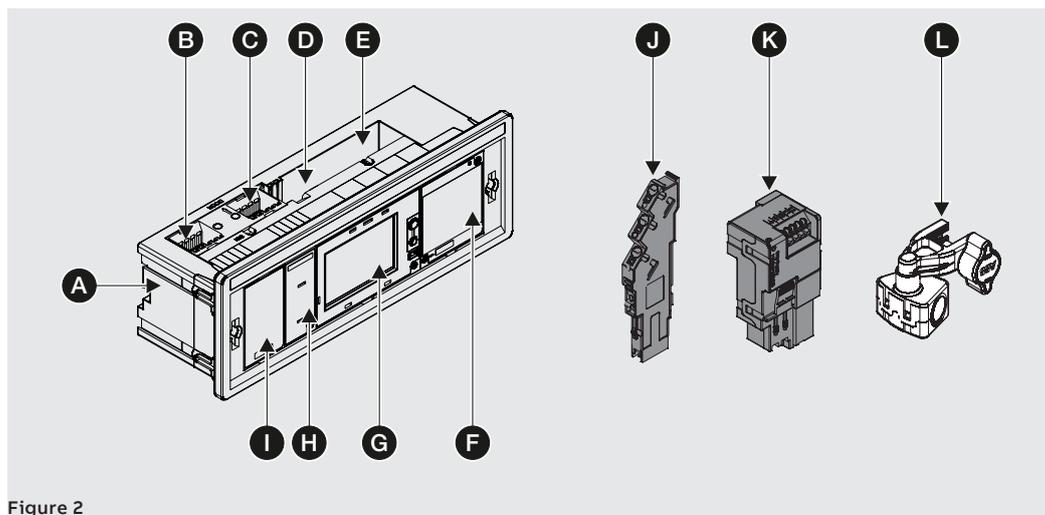


Figure 2

Pos.	Name	Description
A	Ekip UP+	Basic module
B	Housings for terminal boxes	-
C	Housings for terminal boxes	-
D	Housing for Ekip Supply	-
E	Housings for optional modules	Housings for optional modules purchased with Ekip UP+ or from MARKETPLACE
F	Ekip Measuring	Voltage measurement module.
G	Display	Touchscreen display for viewing data and programming Ekip UP+.
H	Rating plug	Module that establishes the rated current (In) of Ekip UP+.
I	Ekip Signalling 4K	Modules for managing programmable inputs/outputs. Available in 4K A and 4 K B versions.
J	Terminal boxes	-
K	Ekip Supply	Module for 24 V power supply.
L	Current sensor	-

Continued on the next page

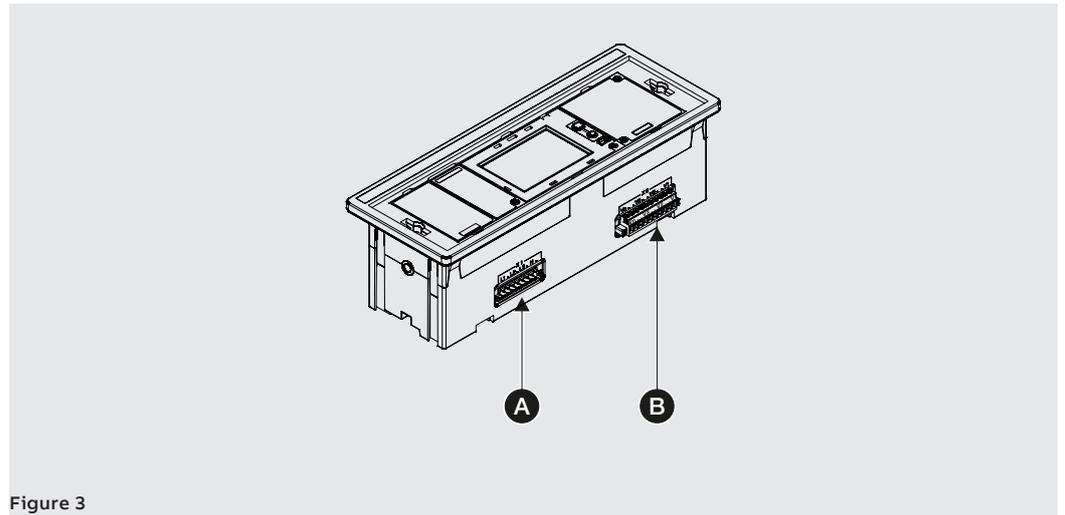


Figure 3

Pos.	Name	Description
A	Terminal box for current sensors.	Input terminals for current sensors.
B	Terminal box for voltage sensors.	Input terminals for voltage sensors.

3 - Optional modules

Modules for additional functions

Ekip UP+ functions can be extended thanks to a set of modules that can be installed directly in the terminal boxes of Ekip UP+ or by means of external connections.

The following modules are available for assembly in the upper terminal boxes of Ekip UP+:

Module	Function	Page
Ekip Com ... ⁽¹⁾	Family of modules for communication according to various protocols	162
Ekip Link	Communication via intranet with ABB proprietary protocol	188
Ekip Signalling 2K	Signalling with inputs/outputs	201
Ekip Signalling 3T	Signalling with analog inputs	211
Ekip Synchrocheck ⁽²⁾	Voltage measurement and synchronism between two supply sources	205
Ekip CI	Command module for motor applications	198

The external modules and accessories are:

Module	Function	Page
Ekip Signalling 10K	Signalling with inputs/outputs	214
Ekip Signalling Modbus TCP	Remote control and monitoring	214
S.G.R. toroid ⁽²⁾	Only in the Protect version and Monitor with Protect bundle. Earth fault current protection	215
Rc toroid ⁽²⁾	Only in the Protect version and Monitor with Protect bundle. Residual current protection	215

⁽¹⁾ the modules belonging to the Ekip Com family are described in the *Optional modules and accessories chapter (page162)*

⁽²⁾ the Ekip Synchrocheck module and S.G.R and Rc external sensors can be used with the Ekip UP+ Protect version and Monitor with Protect bundle.

Modules for testing and programming

The supervision, configuration and reporting functions can be implemented by using supply and communication modules:

Module	Function	Page
Ekip TT	Supply and tests	216
Ekip T&P	Supply, communication and testing	216
Ekip Programming	Supply, communication and programming	216

Mechanical accessories

A range of mechanical accessories is available for Ekip UP+:

Module	Function	Page
Sensor positioner	Mechanical support for type C current sensors	217
Current bridges	Jumper combs for isolating current inputs	217
Voltage bridges	Jumper combs for isolating voltage inputs	217

4 - Optional software configurations

-
- Optional software** Ekip UP + Protect and the Monitor with Protect bundle can be equipped with optional software and configurations:
- Load Shedding
 - IPS interface protections (CEI 0-16)
- For details, consult technical Catalog *1SDC001051D0201* or the documents relating to each function (see page 144).
-

5 - Supporting software and documentation

Supporting software



NOTE: Certain documents mentioned in the next table refer to the SACE Emax 2 device, of which Ekip UP⁺ shares the same electronic platform.

Ekip Connect 3

ABB software to interface with Ekip UP⁺ and other low voltage devices ([LINK](#))

EPiC

ABB APP to interface with Ekip UP⁺ via Bluetooth using a smartphone or tablet ([LINK](#))

e-Design

ABB software suite ([LINK](#)) which includes the following tools:

- DOC, to design the single-line diagrams of low and medium voltage electrical installations, choose the operating and protection devices and check and coordinate the protections
- CAT, for technical / commercial cost estimating of ABB products
- Curves, for drawing, calibrating and printing the trip curves of the protection devices
- OTC, for assessing the thermal behavior of the switchgear and sizing its fans and air conditioners
- UniSec, for configuring medium voltage switchgear

Front CAD

Software comprising libraries of block graphics for ABB panel-making products to be used with the latest versions of AutoCAD, AutoCAD LT, IntelliCAD ([LINK](#))



NOTE: the link launches the software package download, which requires about 190 MB of space.

Slide Rules

App for sizing low voltage electrical cables according to the installation methods specified by current regulations and installation practices.

Further information on the documentation is available on the Apple Store, in particular: [SLIDE RULES](#).

Further documents

Catalogue IEC

Ekip UP+ general catalog IEC ([1SDC001051D0901](#))

Technical characteristics IEC

Tmax XT Technical characteristics IEC ([1SDC210099D0204](#))

Catalogue UL

Tmax XT general catalogue UL ([1SDC210200D0204](#))

Technical characteristics UL

Tmax XT Technical characteristics IEC ([1SDC210199D0204](#))

Product notes for Network Analyzer

Introduction to the *Network Analyzer* measuring and analysis system ([1SDC210106D0201](#))

Product notes for Motor Protection

Main characteristics for Motor protection ([1SDC210112D0201](#))

Handbook

General overview of electrical installations ([1SDC010002D0206](#))

Communication functions through Ekip architecture

Overview of communication functions using Ekip architecture ([1SDC210101D0201](#))

Protection against electric arc

General characteristics for arc protection ([1SDC210104D0201](#))

Generator protection for low-voltage applications

General characteristics for the protection of generators for low voltage applications ([1SDC210108D0201](#))

Ekip Signalling 3T Temperature monitoring module

General features of Ekip Signalling 3T module ([1SDC210109D0201](#))

How to tackle Cyber Security

General overview of how to deal with Cyber Security ([1SDC210111D0201](#))

6 - Regulatory framework and Directives

Directives and standards Ekip UP⁺ and its accessories conform to the following directives:

- CE "Low Voltage Directives" (LVD) No. 2014/35/EU
- CE "Electromagnetic Compatibility Directive" (EMC) No. 2014/30/EU
- UL and cULus

And to the following standards:

- IEC 60255-26 (ECM requirement) and IEC 60255-27 (Safety requirement)
- IEC 61000-6-2 (EMC-Immunity Standard) and IEC 61000-6-4 (emission standard)
- IEC 61010-1 (General requirement)
- UL 508 (Standard for Industrial Control Equipment), excluding Ekip Synchrocheck and Ekip Signalling 2K which conform to UL1066
- UL C37.90 and C37.90.1 ⁽¹⁾
- CEI 0-16
- DNV-GL (type approval certificate)
- RINA (type approval certificate)

⁽¹⁾ Using shielded cables.

Dielectric characteristics:

Type of strength	Voltage socket	Auxiliary power supply	COM modules	I/O modules
Direct	3 kV ⁽¹⁾ / 1,5 kV ⁽²⁾	2 kV ⁽³⁾ / 500 V ⁽⁴⁾	500 V	1,5 kV
Pulse	5 kV ⁽¹⁾ / 2,2 kV ⁽²⁾	5 kV ⁽³⁾ / 1 kV ⁽⁴⁾	1 kV	

⁽¹⁾ voltage sockets with external transformer compliant with Ekip UP⁺, see page 154 for details

⁽²⁾ voltage sockets without external transformer.

⁽³⁾ with Ekip Supply connected to converter ABB CP-D 24/1.3.

⁽⁴⁾ with Ekip Supply connected to generic 24-48 VDC line.

The voltage sockets guarantee: >100 MΩ @ 500 VDC insulation (with transformer).

Electromagnetic compatibility

Use of specific devices in industrial installations may create electromagnetic disturbance in the electrical system; Ekip UP⁺ conforms to directive 2014/30/EU and to standards:

- IEC 60255-26
- IEC 61000-6-2
- IEC 61000-6-4.



WARNING! Full EMC compatibility compliant with IEC 60255-26 is guaranteed by connecting Ekip UP⁺ and Ekip Supply to an ABB feeder model CP-D 24/1,3.

7 - Environmental conditions

Temperatures of the installation environment

The operating characteristics of Ekip UP⁺ and the accessories in the terminal box are guaranteed at ambient temperatures between -25 °C and +70 °C.

depending on the type, the current sensors ensure correct operation in different ambient temperature ranges:

- type A and B: -25 °C to +70 °C
- type C: -30 °C to +105 °C

Particular weather conditions

Ekip UP⁺ can function in particularly difficult industrial environments and has been tested in accordance with:

- IEC 60068-2-1: cold dry climate
- IEC 60068-2-2: hot dry climate
- IEC 60068-2-30: hot humid climate

Vibration

Ekip UP⁺ conforms to the following standards and mechanical compatibility classes:

- IEC 60255-21 class 1 (vibrations, shocks and impact) with assembly on DIN rail
- IEC 60255-21 class 2 (vibrations, shocks and impact) with assembly on DIN rail

Altitude

Ekip UP⁺ maintains its rated operation characteristics up to an altitude of 2000 m.

At higher altitudes consider that the dielectric strength and the cooling power of the air will diminish (contact ABB for a detailed assessment).

Auxiliary power supply

Ekip Supply, supplied as standard equipment with Ekip UP⁺, enables the unit to be supplied and the terminal box modules to be connected; consult the dedicated chapter on page 152 for further details about operation.

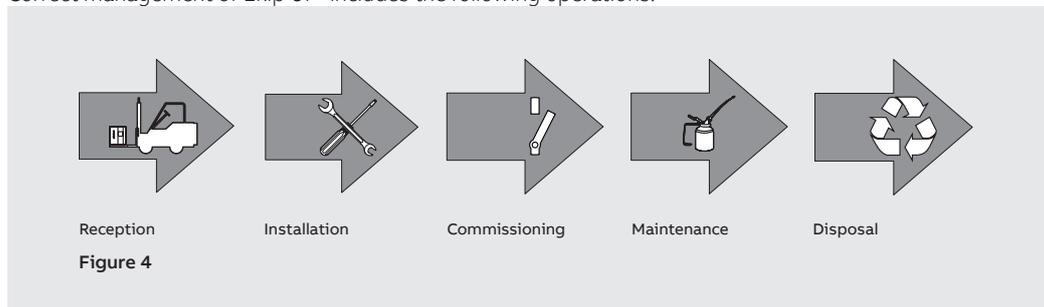
Storage Environment

Store Ekip UP⁺ and accessories in a dry, dust-free place where there are no aggressive chemical substances. The ambient temperatures in the storage facility, with Ekip UP⁺ in its original packaging, must be between -40 °C and +70 °C.

Start-up and management operations

1 - Life cycle

Description Correct management of Ekip UP+ includes the following operations:



Operation	Description	Page
Reception	Unpacking and inspection of materials received	19
Installation	Assembly operations	21
Putting into service	General pre-ignition inspections	23
Maintenance and faults	Routine inspections and cleaning, management of alarms or faults	25
Decommissioning	EOL treatment and disposal	31

2 - Reception

Packaging: number and characteristics

Each Ekip UP+ is supplied in the following packaging:

- main packaging with Ekip UP+, terminal box modules and sensors (if type B, C or D is envisaged)
- Packaging with sensors type A, if applicable
- Packaging of external accessory modules not intended for the terminal box, if included in the order.

The packages are ISTA® certified and their dimensions are given below:

- main package: 460 mm x 347 mm x 154 mm.
- package with sensors type A: 410 mm x 515 mm x 515 mm (supplied on a 515 mm x 515 mm pallet).

Package identification and inspections

When the packages arrive, check their condition and make sure that:

- the data on each package label correspond to the data in the order
- the boxes are undamaged and perfectly closed.

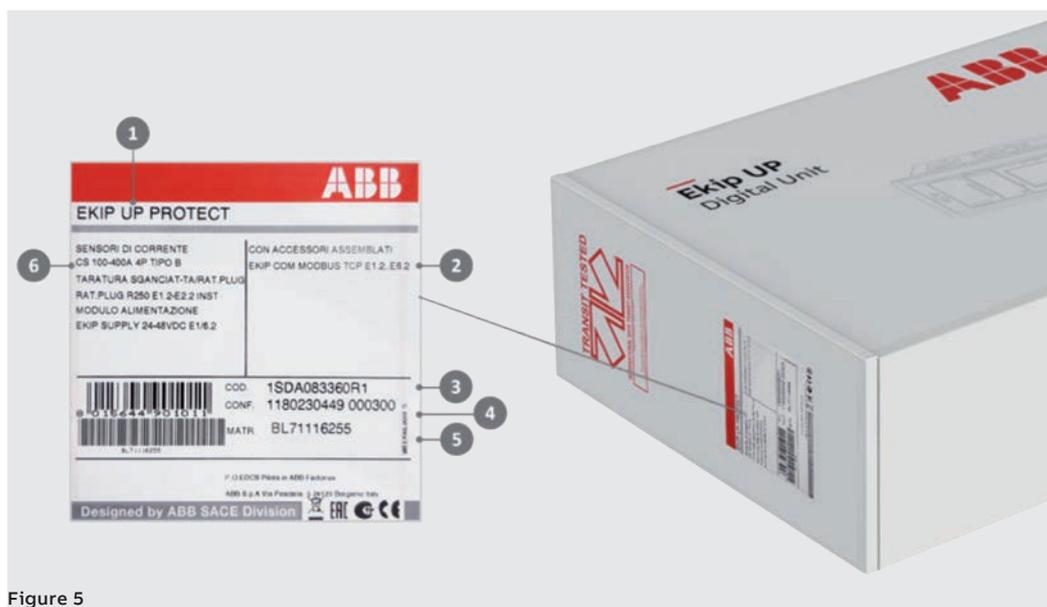


Figure 5

Pos.	Description
1	Brief description of the model
2	Description of accessories
3	Commercial code
4	Confirmation number
5	0 Serial number
6	0 Specifications

Opening the packaging

1. Open the box
2. Remove the upper protection

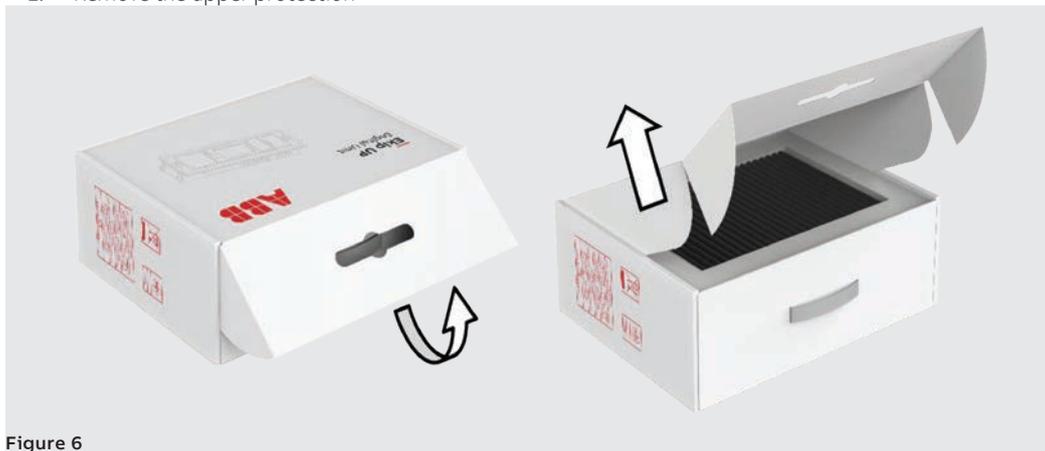


Figure 6



Figure 7



NOTE: when disposing of the packaging, consult "Decommissioning" on page 31.

Check goods

Examine the condition of the goods received. Make sure that they are consistent with the purchase order and fully intact. Pay special attention to:

- version of Ekip UP+
- Rating Plug size
- presence of terminal box modules
- model and number of current sensors.



IMPORTANT: check goods before storing.

The other accessories ordered with Ekip UP+ are supplied in their respective packages: check the documentation supplied with each product to confirm the version and content.

Damage and Discrepancy Report

Contact ABB if the packages appear to be damaged when the goods arrive or there are inconsistencies between the order and product identification labels or the product itself. Such notification must be made within and no later than seven days of receipt of the goods.



NOTE: indicate the Packing List number (on the package) and the serial number of the product.

3 - Installation

Warnings and precautions before the installation



WARNING! Before installing, make sure that:

- Ekip UP+ is disconnected from all the power sources
- the environmental, electrical and mechanical operating conditions have been complied with.



IMPORTANT: the personnel trained and tasked with installing Ekip UP+ and the accessories must use suitable safety equipment.

Dimensions and weights

Ekip UP+ can be mounted on 35 mm DIN rail or mounting platform; the overall dimensions in both configurations are given in the file available in the ABB website (LINK); the file contains the following drawings:

- drawing 1: overall dimensions of Ekip UP+ complete with terminals and modules in the case of assembly on DIN rail or mounting platform; dimensions of mounting platform
- drawing 2: overall dimensions of all applicable types of current sensors.

The overall dimensions of Ekip UP+ with modules and terminals installed are indicatively as follows:

Mounting	Overall dimensions (L x H x W)
DIN rail	~ 296 mm x ~ 135 mm x ~ 95 mm
Mounting platform	~ 296 mm x ~ 135 mm x ~ 95 mm 86.2 mm x 282.4 mm x ≥ 2 mm (dimensions of mounting platform hole)

Installation environment

Ekip UP+ must be installed in a dry place, free from dust and corrosive acids and where it will not be subject to shocks or vibrations.

If this is not possible, install Ekip UP+ with adequate protection.

Getting started The 1SDH002004A1001 Getting Started instructions and 1SDH002004A1002 Kit Sheet attached to the device and downloadable from the ABB website describe the main Ekip UP⁺ installation operations:

Operation	Description
Mechanical configuration	1. Assembly of the mechanical polarizer of the terminals, depending on the target configuration of the device (DIN rail or mounting platform front)
	2. Assemble the hooks or mounting platform locks, depending on the target configuration of the device (assembly on DIN rail or mounting platform front)
	3. Connect the terminals for external connections
Main connections	4. Connect current sensors to switchboard busbars and to Ekip UP ⁺
	5. Connect primary voltages to Ekip UP ⁺
Connect accessories	6. Connect Ekip Supply and accessory modules (Ekip Com, Ekip Signalling 2k, Ekip Synchrocheck) in the housings provided in Ekip UP ⁺
	7. Connect Ekip Signalling 4K module to circuit-breaker/disconnector if applicable
SW configuration and verifications	8. Configure the main parameters as indicated by Wizard
	9. Check alarms
Test	10. Perform trip test



NOTES:

- Consult 1SDM000116R0001 circuit diagram for all connection details.
- The external accessory connections are illustrated in the kit sheets of the respective devices.
- The Wizard window contains the main parameters: a full overview of all the available options is given in this document.
- The trip test is available for versions with external trip connection. Consult the 1SDM000116R0001 circuit diagram for details about the connections.

Putting into service is also illustrated in a multimedia video [\(LINK\)](#).

Further indications about verifying the device are given in this document in chapters “Putting into service” on page 23 and “Maintenance” on page 25.

Wizard When powered, Ekip UP⁺ displays the window of Wizard, a user-friendly procedure for immediate adjustment of certain parameters: language, date, time, installation voltage and password.

The window will not appear again once the procedure has terminated unless it is reset by Ekip Connect via command Reset Wizard: in this case, Wizard will appear when the apparatus is powered up the next time.



NOTE: for safety reasons, ABB strongly advises you to change the password right from the first access and to keep it with care.

4 - Putting into service

General checks Besides complying with the instructions in Getting Started and before putting into service perform the following checks on the device and in the place where it is installed:

Points to be checked	Checks
Switchboard	1. Sufficient change of air to avoid overtemperatures
	2. The place must be clean and free from the remains of installation work (e.g.: cables, tools, metal fragments, etc.)
	3. Ekip UP ⁺ must have been assembled correctly, as indicated in Getting Started
	4. The environmental conditions must conform to the indications in the "Environmental conditions" chapter on page 17
Main connections	1. The connections and direction of the sensors must be correct
	2. The voltage sockets must be properly connected and tightened
	3. Correct ground connections
	4. Connection of the supply/ Ekip Supply module must be correct
Ekip UP ⁺ alarms	If it is not powered, connect the Ekip TT device to Ekip UP ⁺ and check that no alarms are present (details on page 26)
Parameters	Configure all the parameters of the unit as required

Check accessories Inspect the external accessories of Ekip UP⁺ as described below:



NOTE: the inspections may vary, depending on the version of Ekip UP⁺:

- Zone selectivity: with Ekip UP⁺ Protect
- Opening and closing actuators, circuit-breaker state: with Ekip UP⁺ Protect.

Accessories	Checks
Modules (terminal box and external)	Perform the following operations: 1. Check that Ekip Supply is properly connected in the mechanical seat of the terminal box. 2. Power up Ekip UP ⁺ and the module to be checked, if a separate power supply is required. 3. Check that the local bus is enabled (<i>Settings-Modules-Local Bus</i> menu). 4. Check that the Power LED on each module is on in the same way as the Power LED of Ekip UP ⁺ (steady or synchronous flash). 5. Check that the module is present in the Ekip UP ⁺ menu (<i>About-Modules</i>) and that there are no alarms.
Single-pole and residual current sensors	Perform the following operations: 1. Make sure that each sensor is correctly connected to the terminal box. 2. Power up Ekip UP ⁺ . 3. Set size and protection parameters (<i>Settings-Digital unit</i> menu). 4. Make sure there are no alarms.
Circuit-breaker state inputs	Perform the following operations: 1. Check that the state of the circuit-breaker/disconnector connected to Ekip UP ⁺ is read correctly (<i>About-Digital unit</i> menu). 2. Switch the state of the device and check that the change of state is read properly on Ekip UP ⁺ (menu <i>About-Digital unit</i>).

Continued on the next page

Accessories	Checks
Zone selectivity	<p>Perform the following operations:</p> <ol style="list-style-type: none"> 1. Make sure that the selectivity connections (between Ekip UP⁺ and the other units) correspond to the indications on the 1SDM000116R0001 circuit diagrams. 2. Power up Ekip UP⁺ and make sure that the state of the actuator connected to the unit is OPEN. 3. Check that the protection of the selectivity concerned has been enabled (example: S protection). 4. Select the Test-Zone selectivity menu and submenu of the protection concerned; repeat points 5, 6, 7 and 8 for each protection. <p> NOTE: for selectivity D, consider submenu S for the Forward connections and G for the Backward connections.</p> <p>Check Output:</p> <ol style="list-style-type: none"> 5. Select the <i>Force Output</i> command and check, on the unit connected to the Ekip UP⁺ output, that the state of its <i>Input</i> is ON. 6. Select <i>Release Output</i> and check that the state of the Input is OFF. <p>Check Input:</p> <ol style="list-style-type: none"> 7. Select the <i>Force Output</i> command on the unit connected to the Ekip UP⁺ input; check on Ekip UP⁺ that the state of the <i>Input</i> is ON. 8. Select <i>Release Output</i> and check on Ekip UP⁺ that the Input is OFF.
Ekip Signalling 4K-A	<p> IMPORTANT: unlike the other tests, to optimize the verifications and prevent undesired activations of external apparatuses, the proposed test procedure for Ekip Signalling 4K is performed with the following test connections:</p> <p>Perform the following operations:</p> <ol style="list-style-type: none"> 1. Connect K7, K8, K9 and K10 to the three HC contacts. 2. Connect K3, K4, K5 and K6 to H1, H2, H3 and H4, respectively. 3. Power up Ekip UP⁺. 4. Select the <i>Test-Ekip Signalling 4K</i> menu and the <i>Auto Test</i> command: checking that all the pairs of outputs/inputs (O 01 and I 01; O 02 and I 02; O 03 and I 03; O 04 and I 04) power up in sequence.
Ekip Signalling 4K-B	<p> IMPORTANT: unlike the other tests, to optimize the verifications and prevent undesired activations of external apparatuses, the proposed test procedure for Ekip Signalling 4K is performed with the following test connections:</p> <p>Perform the following operations:</p> <ol style="list-style-type: none"> 1. Connect K7, K8, K9 and K10 to the three HC contacts. 2. Connect K3, K4, K5 and K6 to H1, H2, respectively. 3. Power up Ekip UP⁺. 4. Select the <i>Test-Ekip Signalling 4K</i> menu and the <i>Auto Test</i> command: checking that all the pairs of outputs/inputs (O 01 and I 01; O 02 and I 02; O 03 and I 03; O 04 and I 04) power up in sequence.
Opening and closing actuators	<p>Perform the following operations:</p> <ol style="list-style-type: none"> 1. Connect the opening and closing actuators of the circuit-breaker/disconnector to Ekip UP⁺ (see circuit diagram 1SDM000116R0001). 2. Set the circuit-breaker/disconnector to the closed position. 3. Supply rated voltage to Ekip UP⁺ and the actuators. 4. Perform an opening test from the menu (<i>Test-Protection Test, Open Unit</i> command) and check that the controlled device has switched. 5. Repeat the test by imparting a close command (<i>Close Unit</i>).
Circuit-breaker state inputs	<p>Perform the following operations:</p> <ol style="list-style-type: none"> 1. Check that the state of the circuit-breaker/disconnector connected to Ekip UP⁺ is read correctly (<i>About-Digital unit</i> menu). 2. Switch the state of the device and check that the change of state is read properly on Ekip UP⁺ (menu <i>About-Digital unit</i>).

5 - Maintenance

Introduction Correct maintenance of the unit and connected devices ensures they operate correctly over time. The maintenance operations must be performed by expert personnel, as required by the safety regulations and maintenance schedule (see recipients, Safety requirements and Maintenance schedule). If faults are discovered, find out what is causing them and eliminate them before putting the unit back into service.



WARNING! disconnect the auxiliary circuits from the voltage source before proceeding with the verifications.

Inspections and general cleaning Perform the following inspections:

- make sure that Ekip UP⁺ is clean. Remove dust and traces of other substances if necessary (use clean, dry cloths and a mild detergent where required. Use a laminate thinner such as Henkel's 273471, Chemma 018 or equivalent if there is a heavy coating of dirt)
- check that there are no foreign objects near the connectors or terminals.

Inspection of Ekip UP⁺ Perform the inspections described in chapter 4 - Putting into service, including an inspection of the state or the wiring, modules and accessories:

- verification of alarms
- check that the modules (terminal box and external modules) are present and connected
- check zone selectivity connections
- check opening and closing actuators
- check state of circuit-breaker.



NOTE: *the limitations and notes given for each point in the respective paragraphs are applicable.*

Maintenance schedule The frequency with which Ekip UP⁺ maintenance is scheduled differs, depending on the conditions in the installation site:

Version	Maintenance frequency in standard environments	Maintenance frequency in dusty environments (dust level measured > 1mg/m ³)
Monitor	One year	Six months
Protect	One year or after a short-circuit trip	Six months or after a short-circuit trip

6 - Alarms and fault finding

Faults, causes and remedies A list of possible faulty situations for Ekip UP⁺, their possible causes and suggestions about how to resolve them is given below.



NOTE: check error messages on display before consulting the table; if the suggestions given fail to resolve the problem, call the ABB assistance service and provide the report produced by the Ekip Connect software if possible

Fault	Possible causes	Suggestions
Circuit-breaker fails to react to opening/closing command from Ekip UP ⁺	The connections or supplies of the opening/closing actuators are not correct	Check connections and supplies.
	Absence of auxiliary power supply to Ekip UP ⁺	Check supplies and status of Power LEDs
	Circuit-breaker is in a condition which fails to enable the selected command	Check circuit-breaker/disconnector documentation and cases that fail to allow command
Display off	Auxiliary supply failure	Correct operating condition.
	Temperature outside range	Correct operating condition.
Current reading absent	Current below the minimum threshold that can be displayed	Correct operating condition.
Incorrect reading of voltage, power and $\cos \varphi$	Incorrect connection between isolation transformer and <i>Ekip Measuring</i>	Check connection between isolation transformer and <i>Ekip Measuring</i>
	Incorrect <i>Rated Volt.</i> parameter setting	Set the correct parameters
The PIN is not required	The PIN has been disabled or has already been entered in the same programming session	Correct operating condition; consult chapter about PIN (page 48)
PIN error	PIN wrong or lost	Contact ABB or consult document 1SDH001501R0001
Expected trip does not occur	Trip excluded	Operating condition correct; enable trip if necessary
Trip times different than expected	Wrong threshold/time/curve selected	Correct parameters
	Thermal memory enabled	Disable it if it is not necessary
	Zone selectivity enabled	Disable it if it is not necessary
	Incorrect neutral selection	Modify the neutral selection

Continued on the next page

Fault	Possible causes	Suggestions
Tripping times longer than expected	Wrong threshold or curve selected	Correct threshold and/or curve
	Incorrect neutral selection	Modify the neutral selection
Rapid trip with I3=Off	Inst trip	Correct operating condition with short circuit at high current
High earth current, but no trip occurs	Incorrect selection of the sensor	Set internal or external sensor
	Function G inhibited owing to high current	Operating condition correct (see protection description chapter)
TRIP fail signaling: <i>Trip Fail command (BF)</i>	One or more of the following conditions: - Actuator fails to function - state contacts not working - wiring problems	<ol style="list-style-type: none"> 1. If closed, command actuator opening in the manual mode and check that state has changed 2. Press iTest on Ekip UP⁺, check that signal has disappeared from display and the general state of the alarms 3. Check conditions of wiring and state contacts 4. Working in safe conditions, close the actuator and perform a trip test via Ekip UP⁺. Contact ABB if problems persist.

Alarms displayed and suggestions

A list of faults that may appear on the display of Ekip UP⁺ is given below along with suggestions on how to resolve them (in alphabetical order):

Fault	Suggestions
Numerical alarm (e.g. 30002)	Internal error. Contact ABB
Battery low	Replace battery (see Getting Started 1SDH002004A1001) ⚠ WARNING! WARNING! The battery may explode unless it is handled correctly: do not charge, disassemble or burn. Replace battery with CR2450HR; use of another battery could lead to the risk of fire or explosion.
Local bus	Unit on with auxiliary supply, Local Bus parameter enabled but connection to modules not present, incorrect or communication lost (for more than five seconds); check: <ul style="list-style-type: none"> • connection and powering of modules in terminal box or external • that the modules connected are compatible with Ekip UP⁺ • that the Local Bus parameter is: ON (page 136).
Trip fail command (BF)	Actuator has failed to open and/or current still present after a TRIP command: check whether other alarms are present, state of the connections, actuators and state contacts
Configuration	Make sure that the following conditions are present: <ul style="list-style-type: none"> • <i>Rating plug</i> of model compatible with Ekip UP⁺ • If present, protection parameters do not conflict with size of current of unit details on page 65) • In the absence of <i>Vaux</i> threshold I4 and/or I41 > 100 A • In the absence of <i>Vaux</i> time t4 and/or t41 > 100 ms • RC protection active and <i>Rating Plug</i> not RC
Invalid Date	Wrong date and time: set in <i>Settings-System-Date</i> and <i>Settings-System-Time</i>
Ekip Com Hub	Problem of Ekip Com Hub module with: certificates, connected devices, missing Com modules (RTU or with Ethernet connection), API TLS device, Hub events, parsar configuration
Ekip Link Bus	Fault in <i>Ekip Link</i> module: check for loss of connection with one or more actors (modules) connected to Link Bus
Ekip Sign 3T connection	Alarm for connection of one or more analog inputs to <i>Ekip Signalling 3T</i> module
Internal error	Internal error; contact ABB if this type of error occurs
SNTP error	Fault with <i>Ekip Com</i> modules: synchronization problem of SNTP synchronization reference module
Measuring Error	<i>Ekip Measuring</i> module parameter reading error, contact ABB
Ethernet disconnected	No external cable on one or more <i>Ekip Com</i> modules with Ethernet connection
IEEE 1588 synch	Synchronization problem of IEEE 1588 synchronization reference module
MAC Address	<i>Ekip Com</i> module detected with incorrect / not allowed MAC address, contact ABB.
Ekip Installation	Installation error between HMI and Mainboard, contact ABB
RatingPlugInstallation	Install Rating Plug (<i>Settings - Circuit breaker - Installation - Rating Plug-Install</i> menu) and check connection if there are further faults

Continued on the next page

Fault	Suggestions
Maintenance	Maintenane alarm
PC Power exceed	The average power limit setting of the Power Controller has been exceeded
Rating plug	<i>Rating plug</i> not present, value or size incompatible with parameters of unit
Zone Selectivity Diag	Error in zone selectivity connections (Hardware Selectivity)
Gext Sensor	Check connection and state of sensor
Sensor L1/L2/L3/Ne	Check current sensors, state of terminal and cables connecting to Ekip UP+
Configuration Session	TFTP server enabled and/or configuration session open on module <i>Ekip Com IEC61850</i> or <i>Ekip Hub</i>
Software Not Compatible	Software versions between Mainboard and display (Ekip UP+) are not compatible with each other: to restore compatibility, please contact ABB  NOTE: <i>modification of all parameters is inhibited via display; if present, protections L, I and linst are active and function with the parameters prior to the alarm (parameters of previous unit are active if display has been replaced)</i>
Switchboard Actor communication Error	Check configuration and connection of <i>Ekip Link</i> module
Unit not defined	Check the circuit-breaker status signal contacts

Protections

In the next table, the signals on the display are associated with the alarms caused by the protections having tripped or with the measures they have generated (in alphabetical order):

Signal	Type of alarm
2I Protection Active	2I Protection active
Iw1 Warning / Iw2 Warning	Current threshold Iw1 / Iw2 exceeded and in alarm state
5th harmonic above Th / I sopra Th / THD I above Th / THD V above Th	Single or total harmonic measurement above threshold
Load LC1 / Load LC2	Current threshold 1 I1 / 2 I1 exceeded and in alarm state
Phase cycle	Phase sequence protection in alarm state
Harmonic dist.	Harmonic Distortion protection in alarm state
Power factor	Power factor measurement ($\cos \varphi$) less than set threshold
Frequency	Frequency measured off range (<30 Hz or >80 Hz)
Protection prealarm (for example: Prealarm G)	Specific protection in prealarm
Protection (Trip off) [for example: S (Trip off)]	Specific protection, configured with trip disabled, in alarm state
Protection timing (for example: L timing)	Specific protection in time delay mode
Trip Test	Trip test performed signal. Press iTEST to reset the message

Programming errors

If during the programming of the parameters an attempt is made to violate certain limitations, the trip unit blocks the saving procedure and signals the error:

Type of error	Error description
2I Th > 15 kA	Threshold I31 (protection 2I) > 15 kA
30006	Parameter change not completed on display within five minutes
30007	Attempt at remote control with Trip unit configuration in the local mode
30008	Attempt at local control with Trip unit configuration in the remote mode
30011	Error in Ekip Link list of actors
30012	More than one Time Sync source (IEEE 1588 or SNTP) on one single module or between different modules
30013	Network Analyzer parameter control unsuccessful
Active Power Fail	Threshold P23 (protection UP) \geq Threshold P26 (protection OP)
DLog not stopped	Modification of datalogger parameters not allowed with datalogger function not stopped
D Th \geq I Th	Threshold I7 (protection D) \geq Threshold I3 (protection I)
Zone Sel Config = On while S / S2 / I / G / Gext / MDGF = On	Zone selectivity enabling of protection D not allowed with zone selectivity already active for one among protections S, S2, I, G, Gext or MDGF
In MDGF > CB Nominal Current	The maximum value acceptable is the size of the current sensors installed in Ekip UP+
G FT time = 50 ms is not valid	Trip time I4 (protection G) = 50 ms
High priority alarm	Modification of parameters not allowed during protection times
I and MCR enabled together	Protections I and MCR are mutually exclusive
L Th \geq S Th	Threshold I1 (protection L) \geq Threshold I2 (protection S)
L Th \geq S2 Th	Threshold I1 (protection L) \geq Threshold I5 (protection S2)
Neutral configuration error	Configuration of neutral protection must conform to formula: I1 (A) \geq size of current sensors (A) x Ne config / 100
OV Threshold > 828 V	Threshold U9 (Protection OV) > 828 V (690 x1.2)
OV2 Threshold > 828 V	Threshold U16 (Protection OV2) > 828 V (690 x1.2)
RC toroid error	Activation of toroid Rc is not allowed without the presence of a model Rc rating plug
RQ Configuration	Threshold Q24 \geq Threshold Q25 (Protection RQ)
S Th \geq I Th	Threshold I2 (Protection S) \geq Threshold I3 (Protection I)
S2 Th \geq I Th	Threshold I5 (Protection S2) \geq Threshold I3 (Protection I)
S(V) or S2(V) parameters	Error in configuration of parameters of protection S (V) or S2 (V); consult user manual of Trip unit for the limits
SYNCHRO parameters error	Inconsistency of Synchrocheck protection parameters: Delta phase \geq 180 x Delta freq x [minimum correspondence time + 0.0023]
V DIR Th > 690*1.4	Protection threshold VDIR > 828 V (690 x1.2)
VS Th > 690*1.4	One of the two thresholds of protection VS Warning > 828 V (690 x1.2)

7 - Decommissioning

Introduction The decommissioning operations must be performed by expert personnel (see “Recipients” on page 4) in accordance with the safety regulations (see “Safety requirements” on page 5) and the end-of-life treatment and disposal instructions given below.



WARNING! Disconnect the auxiliary circuits from the voltage source before decommissioning.



NOTE: consult the domestic regulations in force at the time the product is decommissioned if they provide for different end-of-life treatment procedures than those indicated.

EOL treatment of materials The materials used for manufacturing Ekip UP⁺ units can be recycled and must be dealt with separately, as indicated in the table below:

TYPE	MATERIAL
A	Plastic parts ⁽¹⁾
B	Metal parts
C	Printed circuits
D	Current sensors and cables

⁽¹⁾ All the components of significant dimensions bear a mark specifying the type of material.

Disposal of packing materials The materials used for Ekip UP⁺ units can be recycled and must be dealt with separately, as indicated in the table below:

TYPE	MATERIAL
A	Plastic parts
B	Cardboard parts

Interface and menus

1 - Presentation of interface

- Functions** The operator interface of Ekip UP⁺ enables:
- display signals and measurements of the functions in progress or recorded events
 - configure the parameters, the protections present and other functions of the unit
 - set parameters concerning the accessory modules connected
 - perform tests.

Components The Ekip UP⁺ interface includes a touchscreen, short-cut push-buttons, state leds and a service connector for certain external accessories:



Figure 8

Pos.	Description
A	Single-touch color touchscreen display
B	Power led
C	Warning led
D	Alarm led
E	HOME push-button
F	iTEST push-button
G	Service connector

LEDs



LEDs	Colour	Description
Power 	Green	Indicates the on state of Ekip UP ⁺ : <ul style="list-style-type: none"> • off: no power and unit off • on, steady (<i>Power mode</i>) or flashing (<i>Alive mode</i>): unit on and supplied by Ekip Supply or by the service connector You can select the <i>Power mode</i> or <i>Alive mode</i> via Ekip Connect: if the <i>Alive mode</i> is selected and external modules are connected, the Power leds of Ekip UP ⁺ and the modules flash in the synchronized mode. More details are given in the chapter on Ekip Connect additional functions on page 140
Warnings 	Yellow	Indicates that one of the following alarms is present: <ul style="list-style-type: none"> • off: no alarm • on steady: prealarm of an active protection or status contacts error • two fast flashes every 0,5 s: Ekip UP⁺ parameter configuration error • fast flashing: installation error of <i>Rating Plug</i> or <i>Ekip Measuring</i> module
Alarm 	Red	Indicates that one of the following alarms is present: <ul style="list-style-type: none"> • off: no alarm • on steady: on steady signals a TRIP due to a protection • on flashing: protection timing tripped or alarm due to disconnection of a current sensor • two fast flashes every 2 seconds: <i>Rating Plug</i> error

If on at the same time, the Warning and Alarm leds provide further signals:

- leds on and flashing fast: absence of communication between Ekip UP⁺ and Mainboard or temperature rise alarm
- leds on with slow flashing: internal error
- leds on and steady internal configuration error

These cases need assistance from ABB.

Push-buttons



Push-button	Description
HOME 	Allows different areas of the menu to be accessed: <ul style="list-style-type: none"> • from pages: <i>HOME</i>, <i>Histograms</i>, <i>Measuring instruments</i>, <i>Measurements</i>, <i>Main measurements</i> -> open: <i>Main page</i> • from pages: <i>Main page</i>, <i>Alarm list</i>, at any point of the menu area -> open: <i>HOME</i> page
iTEST 	Allows certain pages of information about the unit to be rapidly consulted; press the button in successionj to display the following pages: <ul style="list-style-type: none"> • <i>Alarm list</i>, if messages are present • <i>Info</i>, if Customer Page option is active (page 139) • <i>Protection unit</i>, with information about Ekip UP⁺ • <i>Digital unit</i>, with information about the configuration of Ekip UP⁺ Consultation is active from pages: <i>HOME</i> , <i>Histograms</i> , <i>Measuring instruments</i> , <i>Measurements</i> , <i>Main measurements</i> <p>i NOTE: with Ekip UP⁺ off and the internal battery charged, press iTEST to turn on the Power led and, in the case of a trip, the display with information about the tripped protection and the Alarm led.</p>

Service connector



The service connector enables Ekip UP⁺ to be connected to *Ekip TT*, *Ekip T&P* and *Ekip Programming*, allowing the unit to be temporarily supplied, parameter configuration prior to putting into service, tests and extension of the configuration functions.

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

2 - Navigation

Levels and pages The Ekip UP+ menu comprises several levels, all accessible using the touchscreen display and push-buttons available on the units:

Level 1 (HOME page)

Within this page, the operator can:

1. navigate among the different *Summary pages* by pressing along the right (forward) and left (back) edges
2. view the *Alarms list* by pressing on the black strip at the bottom
3. navigable pages in section

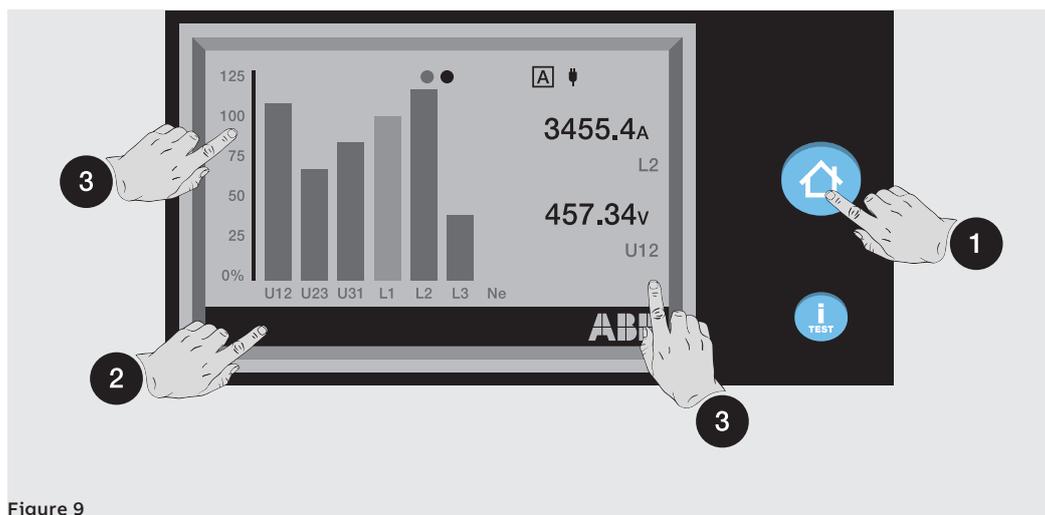


Figure 9



NOTE: Ekip UP+ is supplied with the *Histograms* page configured as HOME; if the configuration is different, the *Histograms* can be set as the main page by pressing and holding the **HOME** button for five seconds and confirming the message on the display

Level 2 (MAIN page)

Within this page, the operator can:

1. access the graphics page *Histograms*
2. access the graphics page *Measuring tools*
3. access the *Menu Area* (level 3)
4. access the graphics page *Measurements*



Figure 10

Continued on the next page

Level 3 (MENU AREA):

The configuration and consultation menus of Ekip UP+, the connected modules and the enabled functions can be accessed from this level 3 page:

1. *Protections*
2. *Advanced*
3. *Measurements*
4. *Settings*
5. *Tests*
6. *About*

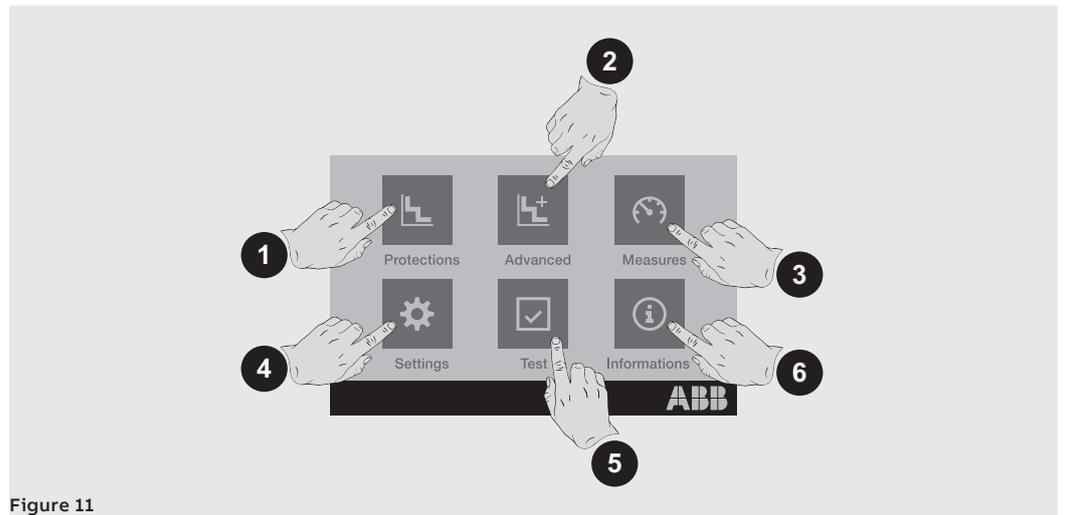


Figure 11

Level 4 (MENUS and SUBMENUS)

Selection of one of the level 3 menus accesses a set of submenus with the list of available options, which are organized into several levels through to details of the specific parameter.

Each submenu has a command for returning to the previous menu (1); if the list contains more than five options, there is also a scroll bar (2) for full consultation.

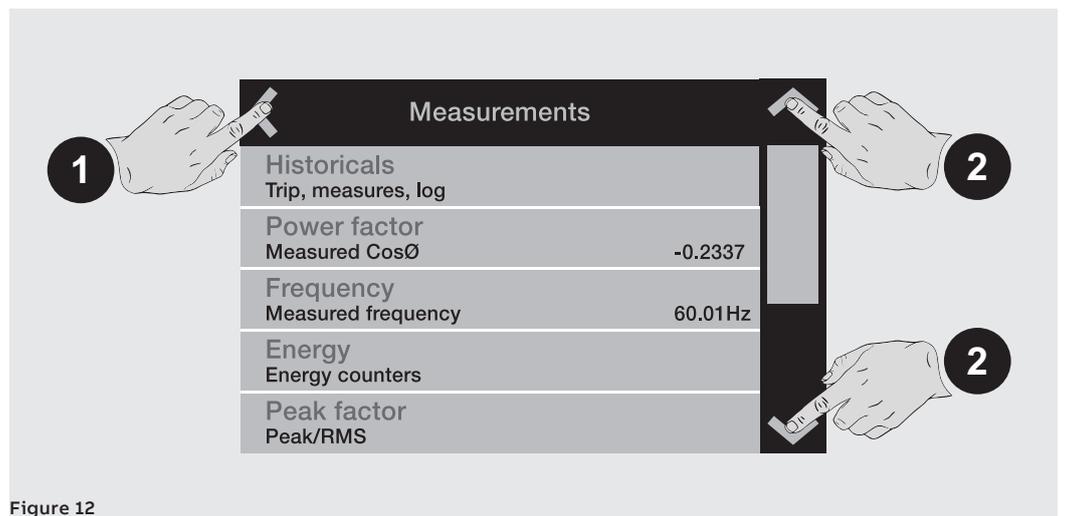


Figure 12

To consult a parameter, it just needs to be selected.

Consult the dedicated section for instructions on how to configure and save the parameters (page 46).

3 - Graphic pages

Histograms The page displays the histograms of the current and voltage measurements acquired in real time and certain status information:

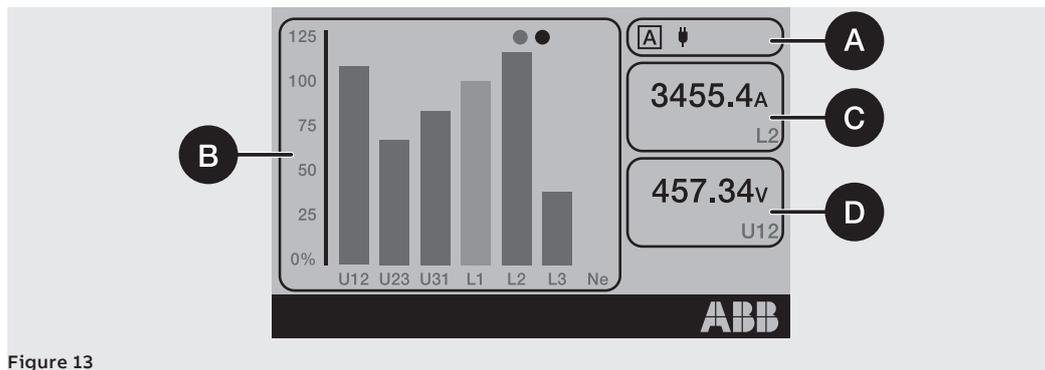


Figure 13

Pos.	Description
	Up to four information icons are available:
A	 The letter corresponding to the active configuration is displayed if <i>Adaptive Protections</i> package is present and with <i>Dual Set enabled</i> ; more details on page 90
	 External power supply present (<i>Vaux</i> or through a service connector); the plug icon indicates <i>Vaux</i>
	 Remote parameter writing configuration active, modules <i>Ekip Com</i> connected, <i>Vaux</i> present
	 Bluetooth antenna state; four options available, see next table for details
	 Datalogger active
B	Histograms of the voltage and current measurements acquired in real time. The bar of each signal is represented in scale 0 to 125 % with reference to the rated current and voltage values of the, and can be of three colors: <ul style="list-style-type: none"> • light blue: no protection in alarm status • yellow: one of the tripped protections is in prealarm status with respect to set thresholds • red: one of the tripped protections is in alarm status with respect to set thresholds NOTE: <i>Histogram Ne is available with 4P or 3P + N configurations</i>
C	Maximum phase current measured in real time
D	Maximum line-to-line voltage measured in real time

The Bluetooth icon changes, depending on the state of the antenna and the wireless communication:

Icon	Description
	Antenna off or being powered (approx. two seconds from being enabled via the menu)
	Antenna on but no device connected
	Pairing in progress (Pairing command executed via menu)
	External device connected to Ekip UP +

Summary page Press on the sides of the display (1) from the Home page to access further summary pages for certain measurements:

- *Main measurements* page: maximum phase current, maximum line-to-line voltage, power factor, total active/reactive/apparent powers
- *Ekip Synchrocheck main measurements* page (when module is present): Int and Ext frequencies and voltages, phase difference, synchronism status (page 43)
- *Ekip Signalling 3T Main measurements* page (if module is present): current loop and temperature sensors (page 211)
- *Unit State* page, described below.

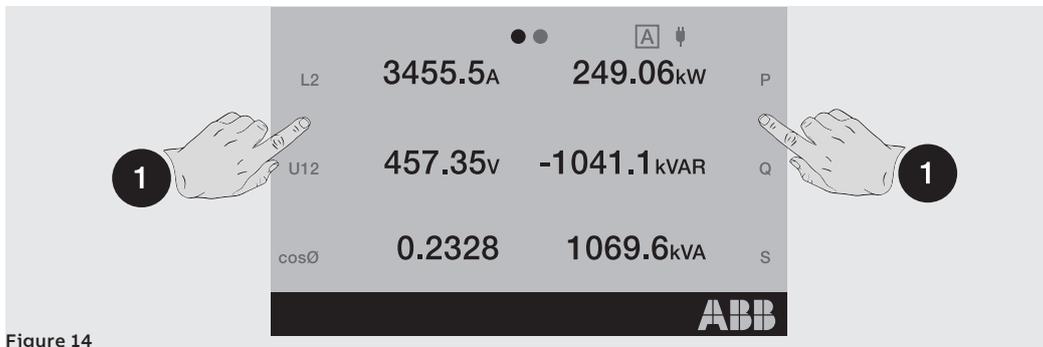


Figure 14

NOTE: all pages can be set as main page by pressing HOME button, holding it for five seconds and confirming message on display

Unit State

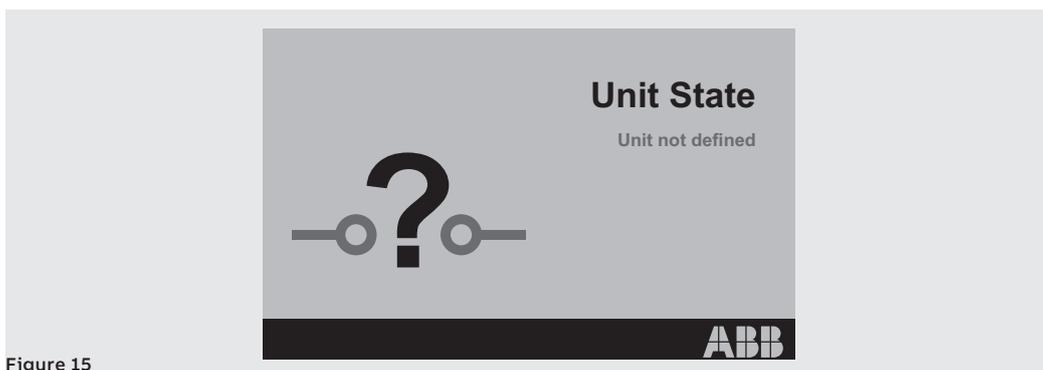


Figure 15

The **Unit State** page displays the state of the CB unit detected by Ekip UP+. This page is available with Ekip UP+ Protect and with the Monitor with Protect bundle.

Icon	State	Description
	Unit closed	Ekip UP+ detects contact closed
	Unit open	Ekip UP+ detects contact open
	Unit not defined	Ekip UP+ is unable to detect state of contact

Measuring instruments

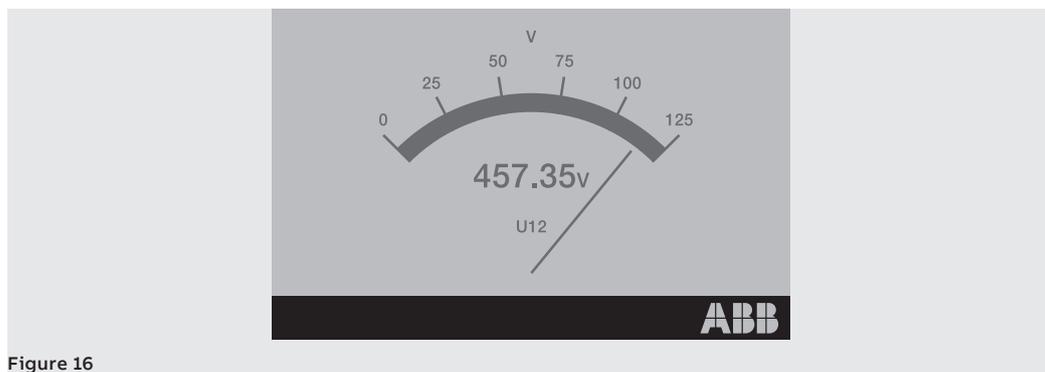


Figure 16

Depending on the Ekip UP⁺ model, certain measurements acquired in real time are shown on these pages by means of a pointer; each page displays a specific measurement:

Page	Measurement type page	Unit of measurement
1	Maximum phase current	A
2	Maximum line-to-line voltage	V
3	Total active power	kW
4	Total reactive power	kVAR
5	Total apparent power	kVA

The scale of values ranges from 0 to 125 % and refers to the rated values set (for powers: rated current x rated voltage x $\sqrt{3}$).

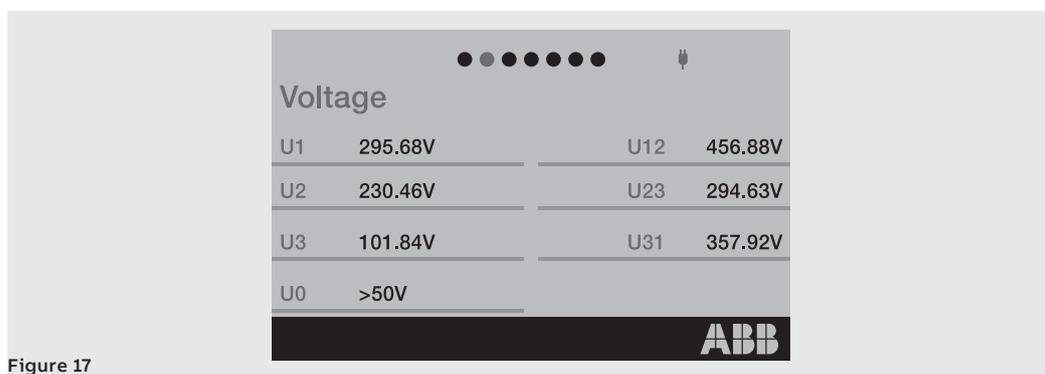
Press the sides of the display to browse the pages, press the **HOME** button to quit.

Page orientation (horizontal by default) can be changed in the *Settings* menu (page 137).



NOTE: each page can be set as the main page by pressing the HOME button, holding it for five seconds and confirming the message on the display

Measurements



If provided for by the Ekip UP+ model, the **Measurements** pages contain a list of measurements acquired in real time and expressed in absolute value:

Page	Name	Measurements
1	Current	Currents: phase, earth fault, external earth fault/Rc
2	Voltage	Voltages: line-to-line, phase, neutral
3	Active power	Phase and total active powers
4	Reactive power	Phase and total reactive powers
5	Apparent power	Phase and total apparent powers
6	Energy counters	Total active, reactive and apparent energies
7	Power Controller	Power Controller measurement summary, if installed (page 144).
8	Load shedding	Summary of Load Shedding measurements, if present (page 147).
9	Ekip Signalling 3T	Summary of <i>Ekip Signalling 3T</i> module measurements, if present (page 211).

The Ekip UP+ configuration involves certain exceptions:

- the Ne current measurements are available with 4P and 3P + N configurations
- the phase voltage measurements are available with the 4P and 3P + active external neutral voltage configuration
- with the 3P configuration, pages: *Active Power*, *Reactive Power* and *Apparent Power* are replaced by the *Powers* page with the total active, reactive and apparent power measurements
- Ige/Rc current available with external toroid activated
- *Power Controller* page available with Power Controller function activated
- *Load Shedding* available with Load Shedding function activated

Press the sides of the display to browse the pages; press the **HOME** button to quit.



NOTE: each page can be set as the main page by pressing the **HOME** button, holding it for 5 seconds and confirming the message on the display

Diagnosis bar and Alarm list

The Diagnosis bar lists the faults detected by the unit. It shows a detail of each alarm for about two seconds.



Figure 18

Select the bar to access the *Alarm List* page, with the list of alarms present.

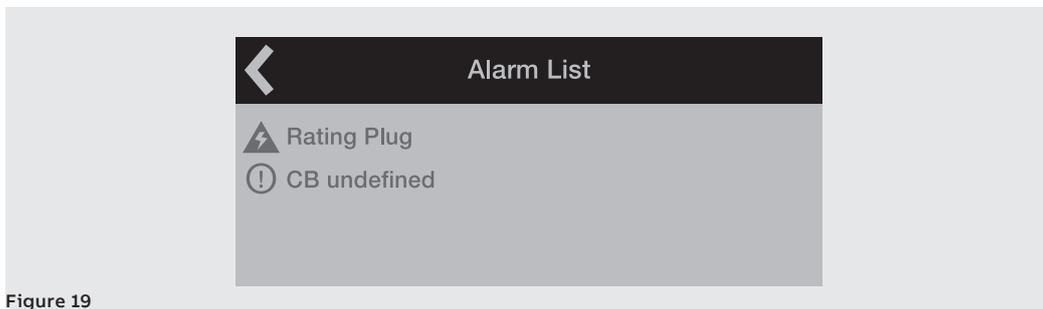


Figure 19

 **NOTE:** the *Alarm List* page also appears when the *iTEST* button is pressed in the cases provided for and described on page 33

Each indication begins with an icon that identifies the type of alarm:

Icon	Alarm type
	Alarm
	Warning, error or prealarm
	About
	Timing due to tripped protection

The complete list of alarms is given on page 28.

4 - Menu

Introduction The menus are the 4th level pages that can be displayed and comprise list of:

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

Selection of each menu item enables: access to submenus, consultation of information in detail, configuration of a parameter, execution of a command.

Elements of each item The items in each list consist of:

- main name (pale blue color)
- additional description or set value (black color)

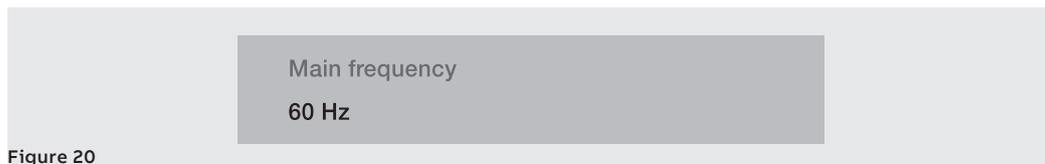


Figure 20

Protections Menu The *Protections* menu can be used to configure the following protections ⁽¹⁾:



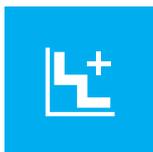
Name	SW package	Page
L	Standard Protections	67
S		68
S2		69
I		70
G		71
Gext ⁽²⁾	⁽²⁾	76
MDGF ⁽³⁾	⁽³⁾	107

⁽¹⁾ if the *Adaptive Protections* package is available and *Dual set* has been activated, an intermediate menu where the set can be selected (*Set A / Set B*) will be available before the list of protections page 90

⁽²⁾ available if the presence of toroid *S.G.R.* has been activated previously

⁽³⁾ available if the presence of the *MDGF* toroid has been previously activated

Advanced menus



The *Advanced* menu can be used to configure the following protections ⁽¹⁾:

Name	SW package	Page
2I		73
MCR		72
D		78
IU		74
Signallings		57
UV		80
UV2		81
OV		81
OV2		82
VU		82
RV	Standard Protections	83
UF		84
UF2		85
OF		85
OF2		86
RP		87
VS Warnings ⁽⁴⁾		88
FS Warnings ⁽⁴⁾		88
VS 2 Warnings ⁽⁴⁾		89
FS 2 Warnings ⁽⁴⁾		89
Functions		89
S(V)		91
RQ		93
OQ		94
UP	Generator protections	95
OP		94
ROCOF		96
S2(V)		97
R JAM		100
R STALL		100
UC	Motor protections	101
U		101
PTC		102
59.S1		149
V DIR protection	Interface protections (IPS)	149
V INV protection		150
F W1 Warnings ⁽⁴⁾		88
Synchrocheck	⁽²⁾	110
Rc	⁽³⁾	73

⁽¹⁾ the standard protections and those of the optional packages installed can be viewed in the menu

⁽²⁾ available when *Ekip Synchrocheck* is present

⁽³⁾ available when *Rating Plug* type *Rc* is installed in unit and when presence of toroid *Rc* has been previously activated in *Settings* menu

⁽⁴⁾ Available in *Warnings* submenu

Measurements Menu



Menu	Submenus	Description	Page
<i>Historicals</i>	<i>Trip</i>	Description in dedicated chapter	49
	<i>Events</i>	List of events recorded	49
	<i>Measurements</i>	List and description in dedicated chapter	49
<i>Power factor⁽¹⁾</i>	-	Power factor measurement	49
<i>Frequency⁽¹⁾</i>	-	Frequency measured	49
<i>Energy⁽¹⁾</i>	<i>Energy counters</i>	Measurement of energies	49
	<i>Reset counters</i>	Meter reset command	
	<i>Energy RESET</i>	List and description in dedicated chapter	49
<i>Peak factor⁽¹⁾</i>	-	Peak factor of each phase	49
<i>Harmonic distortion</i>	-	Activation command for current harmonic distortion monitoring	75
<i>Ekip Synchrocheck⁽²⁾</i>	-	Description in dedicated chapter	205
<i>Network Analyzer⁽³⁾</i>	<i>V Sequences</i>	Measurements associated with Network Analyzer function: list and description in dedicated chapter	57
	<i>3s V Sequences</i>		
	<i>THD Current</i>		
	<i>THD Voltages</i>		
	<i>Counters</i>		
	<i>Waveforms</i>		
<i>Maintenance</i>	<i>Contact Wear</i>	Installation and maintenance dates and commands	54
	<i>LastServiceContactWear</i>		
	<i>Installation</i>		
	<i>Last Maintenance</i>		
	<i>Service RESET</i>		

⁽¹⁾ available if provided for by the Ekip UP+ model or if SW Measuring Measurements package has been activated

⁽²⁾ available when Ekip Synchrocheck module is present

⁽³⁾ Available if SW Network Analyzer package has been activated

Settings Menu



Menu	Submenus	Description and parameters	Page
Bluetooth Low Energy	Enable ⁽⁵⁾	Enabling and configuration of Bluetooth Low Energy communication	133
	-		
Digital Unit	Configuration ⁽¹⁾	Phase number selection	135
	Hardware Trip ⁽²⁾	Protection activation command	75
	T protection ⁽²⁾	Protection activation command	75
	Neutral protection ⁽⁶⁾	Enable, Neutral threshold	74
	Earth protection ⁽²⁾	External toroid configuration	133
	Installation	Installation of modules	45
	Current sensor	Type of sensor installed	215
	Breaker connections	Configuration of commands and states	135
Main Frequency	-	Grid frequency configuration	135
Phase Sequence	-	Phase sequence configuration	82
Modules	Local/Remote	Parameter writing configuration	136
	Local Bus	Configuration of local bus presence	136
	Modul x ⁽³⁾	Details in chapters of each module	-
	Functions	Switch On LOCAL, Signalling RESET	136
Monitor time	-	Measuring range configuration	53
Test Bus	-	Test bus activation	136
Power Controller ⁽⁴⁾	Enable ⁽⁵⁾	Function enabling and parameters: see details in dedicated chapter	144
	-		144
Load Shedding ⁽⁴⁾	Enable ⁽⁵⁾	Function enabling and parameters: see details in dedicated chapter	147
	-		147
Network Analyzer	Enable ⁽⁵⁾	Function enabling and parameters: see details in dedicated chapter	57
	-		57
Datalogger	Enable ⁽⁵⁾	Function enabling and parameters: see details in dedicated chapter	55
	-		55
Double Set ⁽²⁾	Enable ⁽⁵⁾	Function enabling and parameters: see details in dedicated chapter	90
	Default set		90
System	Date	Configuration of unit date	137
	Time	Configuration of unit time	137
	Language	Configuration of menu language	137
	New PIN	PIN Configuration	137
View	-	Representation parameters of menus and measurements: see details in dedicated chapter	137
Functions	YO Command	Function, Delay	110
	YC Command		110
Maintenance	Alarms	Activation of maintenance signals	54
MLRIU ⁽⁷⁾	-	Motor protection parameters: see details in dedicated chapter	90

⁽¹⁾ available with Ekip UP+ in 3P configuration

⁽²⁾ available with Ekip UP+ in Protect configuration

⁽³⁾ the menu populates with the list of modules detected with the Local Bus activated and in the envisaged connection and supply conditions

⁽⁴⁾ available if the function has been installed in Ekip UP+

⁽⁵⁾ the list of the specific submenu populates when enabled function (=On)

⁽⁶⁾ available with Ekip UP+ in the 3P with neutral configuration

Installation menu

If Ekip UP+ detects that the *Rating Plug* or *Ekip Measuring* module have not been installed properly, it signals an alarm (page 28) and completes *Settings* menu with the specific installation section:

Menu	Submenus 1	Submenus 2	Commands
Digital Unit	Installation	Rating Plug	Install
		Ekip Measuring	Install

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



NOTE: availability of submenus depends on the module, which appears to have not been installed

Test Menu

Menu	Submenus	Description, parameters and Commands
Autotest	-	Autotest command
Test Protection	-	Close Unit, Open Unit
Ekip Signalling 4K ⁽¹⁾	-	Autotest command
Ekip Signalling 2K ⁽²⁾	Ekip Signalling 2K-1 ⁽²⁾	Module autotest command
	Ekip Signalling 2K-2 ⁽²⁾	
	Ekip Signalling 2K-3 ⁽²⁾	
ZoneSelectivity ⁽¹⁾	S Protection ⁽³⁾	Input, Force Output, Release Output
	G Protection ⁽⁴⁾	
Rc Test ⁽⁵⁾	-	Test instructions
Ekip CI	-	Autotest command

⁽¹⁾ available if Ekip UP+ is on with auxiliary supply

⁽²⁾ available if one or more Ekip Signalling modules are connected and detected by Ekip UP+

⁽³⁾ available with Ekip UP+ Protect, with S and/or S2 and/or D protection enabled; the curve set for S protection must be t=k

⁽⁴⁾ available with Ekip UP+ Protect, with G and/or Gext and/or MDGF protection enabled and curve t=k

⁽⁵⁾ available with Rating Plug and Rc toroid present

About Menu

Menu	Submenus	Information provided
Protection Unit	-	Information about Ekip UP+: Trip unit serial number, type, version, standard, SW version, date and time, language
Digital Unit	-	Unit information: TAG Name, Unit Name, Rated Current, Configuration, Unit State and Total Operations
Feature Collection	-	List of active protections in Ekip UP+
Modules	Module x ⁽¹⁾	Details in chapters of each module
Power Controller ⁽²⁾	Load Input Status	Status of loads (open/closed)
	Load Active	Load configuration (activated/not activated)
Load shedding ⁽²⁾	Load Input Status	Status of loads (open/closed)
	Load Active	Load configuration (activated/not activated)

⁽¹⁾ available if one or more modules are connected and detected by Ekip UP+

⁽²⁾ available if the function has been installed and enabled in Ekip UP+

5 - Changing parameters and commands

Changing parameters



Comply with the following procedure to change one or more parameters:

IMPORTANT: parameters can be changed with Ekip UP+ in the Local mode and in the absence of timing alarms

1. Select parameter and enter PIN, if required
2. Select new value from list or with the aid of page commands
3. Select Confirm command if present:

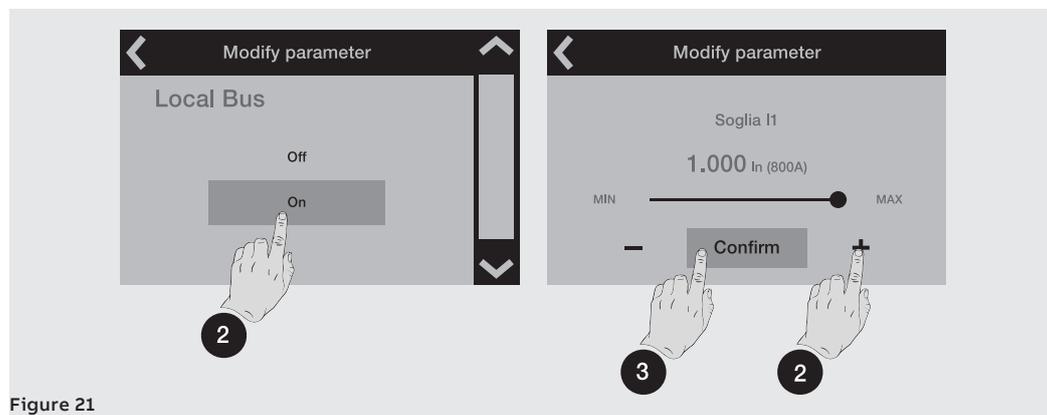


Figure 21

4. When the new value has been selected/confirmed, the menu of the parameter is accessed automatically, the changed item presents the new value in light blue and a tick to confirm:

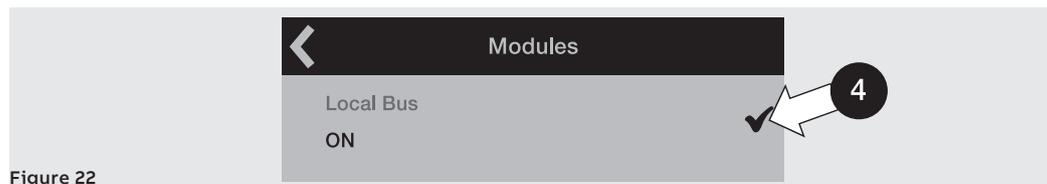


Figure 22

Now proceed by confirming the programming (Step 5) and make further changes (Step 1).

or access other parameters

Select the arrow at the top left to access the top menu until the *Programming* page appears:

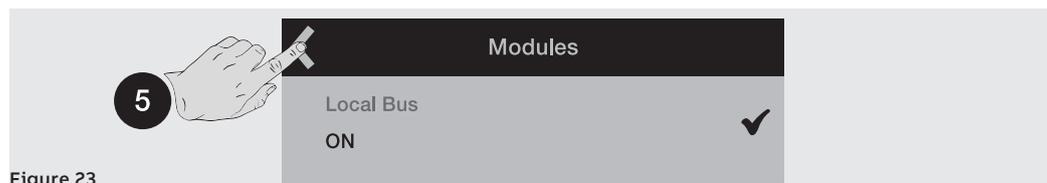


Figure 23

6. Various commands are enabled in the programming page:

- *Confirm* to validate the new parameters and conclude the programming procedure
- *Abort* to interrupt the save data process
- *Modify* to go back to the menus and change the parameter or others



Figure 24

Commands



Selection of a command implies its immediate execution or opening of an intermediate confirm window.

Correct execution is indicated by a confirm window, which disappears automatically from the display.

Certain commands, selection of which immediately activates the respective test sequences without any confirm window, are an exception to this rule:

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



IMPORTANT: confirmation on the display refers to launching the command, not to verification of the operation required, which is at the user's charge whichever type of command is concerned: reset parameters, display, open/close contacts

Exceptions



Before validating a change to a parameter, Ekip UP+ checks all its parameters to make sure there is no conflict or incorrect condition:

- if Ekip UP+ detects an incorrect condition, the relative details appear on the display and parameter changing is annulled.

Before executing a command, Ekip UP+ checks all its parameters to ensure there is no conflict or incorrect condition:

- if Ekip UP+ detects an incorrect condition, the relative details appear on the display and command execution is interrupted.



WARNING! Programming annulment leads to annulment of all the changes made during the same session

6 - PIN and security

Safety  **WARNING! The user is responsible for security against unauthorized attempts to access and make changes: configure all the points of access to Ekip UP+ (display menu and, if present, Ekip Connect and remote communication systems) using the access PIN and controlled and authorized connection systems**

Function The PIN code enables access to certain areas of Ekip UP+ and prevents unintentional setting errors from being entered via the display.

However, parameters can still be modified without having to enter the PIN via:

- service connector, using *Ekip T&P* or *Ekip Programming* and the Ekip Connect application
- bus, in the presence of Ekip Com modules and with Ekip UP+ in the Remote configuration (page 136).

To ensure your unit is in secure conditions, the Wizard window immediately asks you to change the PIN code on first power up; this is strongly recommended by ABB.

Description The PIN code is a number formed by five digits, each of which can be given a value from 0 to 9; the default value is: **00001** and can be changed in the *Settings-New PIN* menu.

The PIN code must be entered to:

- change a parameter (including the PIN code itself)
- access the *Test* menu

Once the PIN code has been entered, all menus can be browsed for two minutes: once two minutes have elapsed, the PIN code must be entered again (depending on the case in question).



NOTE: *the PIN code must also be entered again if a programming session has been annulled (page 46).*

Entry The following page will appear when the PIN code is requested: change (1) and confirm (2) each digit to complete the entry process

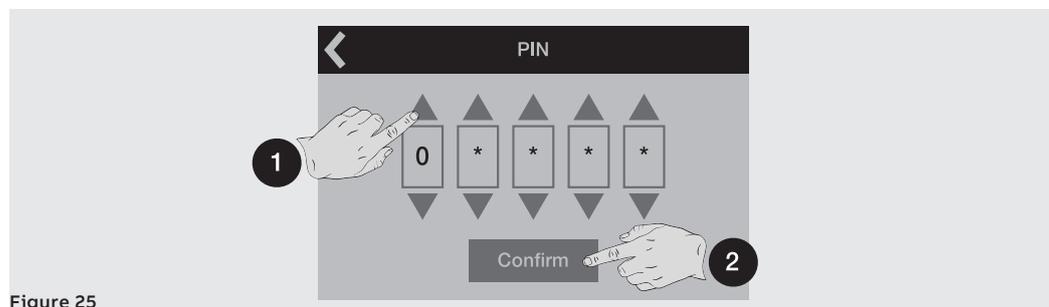


Figure 25



NOTE:

- if the PIN is wrong, "Wrong PIN" will appear for three seconds after which the entry page will be displayed again; use the command at the top left to quit
- there is no limit to the number of wrong PIN that can be entered

Disabling The PIN code can be disabled by entering its value as: 00000; In this case, the PIN is only required to change the PIN itself in the *Settings* menu.

Recovery Contact ABB directly if PIN code is lost.

Measurements

1 - Standard Measurements

List The Standard measurements are:

Name	Description	Page
<i>Instantaneous measurements</i>	Real time measurements of: currents, voltages, frequency, powers	50
<i>Events</i>	List of events, state changes, alarms, recorded by Ekip UP ⁺	49
<i>Min-Max-Med measurements</i>	Log of minimum, maximum and mean currents, voltages and powers recorded within a settable range	53
<i>Peak factors</i>	Real time measurement of the peak factor of the currents	54
<i>Power factor</i>	Real time measurement of the power factor	54
<i>Energy counters</i>	Measurement of active, reactive, apparent energy	54
<i>Maintenance</i> ⁽¹⁾	State of maintenance of unit	54

⁽¹⁾ The Maintenance menu is available after having activated the function in the Settings menu (pages 44)

The *Measurements* package includes the *Datalogger* and *Network Analyzer* described in the dedicated chapters on page 55 and 57.

The *Protect* version also has the trip log described on page 64.

The measurements described from page 205 onwards can be obtained if the *Ekip Synchrocheck* module is installed.

Instantaneous measurements

The following instantaneous measurements are available with Ekip UP*:

Measurement	Availability (Performance)	Monitor time	Normal operating range	Accuracy of digital unit ⁽⁹⁾	Accuracy of value read ⁽⁹⁾
Phase currents ⁽⁸⁾	Pagines: <i>Histograms Measurements</i> ⁽¹⁾ <i>Measuring instruments</i> ⁽¹⁾ <i>Measurement summary</i> ⁽¹⁾	0,03 ÷ 64 In	Standard IEC61557-12	Cl. 0.2	Cl. 1
Line-to-line voltages	Pagines: <i>Histograms Measurements</i> ⁽¹⁾ <i>Measuring instruments</i> ⁽¹⁾ <i>Measurement summary</i> ⁽¹⁾	5 V ÷ 1,25 Un	Standard IEC61557-12	Cl. 0.5	Cl. 0.5
Phase voltages ⁽³⁾	Page <i>Measurements</i>	5 V ÷ 1,25 Un	Standard IEC61557-12	Cl. 0.5	Cl. 0.5
Line frequency	Menu <i>Measurements</i>	30 ÷ 80 Hz ⁽⁴⁾	Standard IEC61557-12	Cl. 0.1	Cl. 0.1
Total active, reactive and apparent power	Pages: <i>Measurements Measurement synthesis Measuring tools</i>	Pmin ÷ Pmax ⁽⁶⁾	Standard IEC61557-12	Cl. 0.5	Cl. 2
Total active, reactive and apparent energy	-	1 kWh – 2 TWh 1 kVARh – 2 TVARh 1 kVAh – 2 TVAh	Standard IEC61557-12	Cl. 0.2	Cl. 2
Active, reactive and apparent phase power ⁽³⁾	Page <i>Measurements</i>	Pmin ÷ Pmax ⁽⁶⁾	Standard IEC61557-12	Cl. 0.5	Cl. 2

Protection current measurement

Measurement	Availability (Performance)	Monitor time	Normal operating range	Accuracy of value read ⁽⁹⁾
Internal earth fault current ⁽⁸⁾	Page <i>Measurements</i>	0.08 ÷ 64 In	0,2 ÷ 1,2 In	2% ⁽¹⁰⁾
External earth fault current ^{(2) (8)}	Page <i>Measurements</i>	5 V ÷ 1,25 Un	0,2 ÷ 1,2 In	2% ⁽¹⁰⁾
Residual current ^{(2) (8)}	Page <i>Measurements</i>	2 ÷ 32 A		5%

⁽¹⁾ rms value shown is higher than those measured⁽²⁾ available by activating the presence of sensor S.G.R or Rc⁽³⁾ available in the presence of 4P or 3P systems with neutral (Ekip Measuring menu)⁽⁴⁾ available for voltage values of over 30 V (with Un < 277 V) or 60 V (with Un > 277 V)⁽⁵⁾ 45 to 55 Hz with set frequency = 50Hz; 54 to 66Hz with f = 60Hz⁽⁶⁾ Pmin = 0.5 In x 5 V; without transformer Pmax= √3 x 16 x In x 690 V; with transformer Pmax= √3 x 16 x In x 690 x Vprimary / Vsecondary V⁽⁷⁾ Sn = In x Un x √3; Pn = In x Un / √3⁽⁸⁾ expressed in root mean square value⁽⁹⁾ in accordance with IEC61557-12 Annex E - Intrinsic uncertainty⁽¹⁰⁾ performance ratings applicable to entire measuring chain Ekip UP + current sensors type A, B or C.

Type of measurement	Measurement < min value	Measurement < max value	“_ _ _” displayed: (not available) due to
Phase currents	> [64 In]	Sensors disconnected
Internal earth fault current	> [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
Line-to-line and phase voltages	> [Un x 1,25]	Ekip Measuring not detected
Line frequency	30 Hz	80 Hz	Ekip Measuring not present, V < 5 V
Active, reactive and apparent total and phase power	> [Pn x 1,25]	Sensors disconnected, Ekip Measuring not present, V < 5 V, I < 0.03 In

Events Ekip UP+ can record the last 200 events, mainly concerning variations in the state and operation of the unit; in particular:

- digital unit: configuration state of bus, operating mode, active set, auxiliary supply
- connection states or alarms: *current sensors*, *Rating Plug*, *HMI*, external actuator.

The Protect version also records events concerning:

- protections: timing in progress or alarm
- trip: status of open command, signaling of trips due to protection.



NOTE: *the first event available in the list is the most recent one; having reached the 200-events threshold, the oldest events will be progressively overwritten*

The complete list is available in the *Measurements - Historicals - Events* menu, where a set of information is given for each event: icon of the type of event, name of event, date and time recorded.

There are 4 icons that identify the type of event:

Icon	Description
	Event reported for information purposes
	Timing of a protection in progress, trip expected
	Alarm referring to a non-dangerous condition
	Alarm concerning operation, a fault or connection failure

Tripping Ekip UP+ is able to record the last 30 TRIPs.

The complete list is available in the *Measurements - Logs - Openings* menu, where useful information is given for each trip:

- the protection that caused the trip
- the consecutive number of the trip
- the date and time of the trip (with reference to the internal clock)
- the measurements associated with the tripped protection



NOTE: *once the 30-TRIP threshold has been exceeded, the oldest trips are progressively overwritten*

Correlated measurements

The type of protection involved determines the measurements recorded at the moment of tripping:

Protection	Measurements recorded	Notes
Current	L1, L2, L3, Ne, Ig Currents	Ne is available in the 4P or 3P with neutral configuration. Ig is available in the case of trips due to G protection
Voltage	Currents L1, L2, L3, Ne, voltages U12, U23, U31, U0	Ne is available with CBs type 4P and 3P + N; U0 is available in the case of trips due to RV protection
Frequency	Currents L1, L2, L3, Ne and grid frequency	Ne is available with CBs type 4P and 3P + N
Power	Currents L1, L2, L3, Ne and total power	Ne is available with CBs type 4P and 3P + N; Active or apparent total power depending on which protection tripped
Temperature	L1, L2, L3, Ne Currents	The temperature cannot be displayed

Access to most recent trips

Besides being available in the *Logs* menu, information about the most recent trips can be accessed in three different ways, depending on the conditions of Ekip UP+:

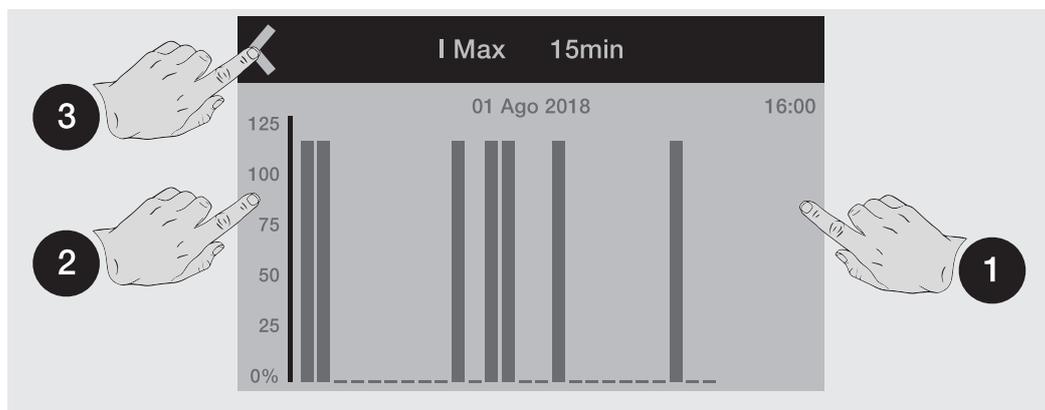
Condition	Access
Trips that have just occurred with Ekip UP+ on	The main page is temporarily replaced by a trip information page; press the iTEST button to reset and go back to the normal screen page
Trips that have just occurred with Ekip UP+ off	Press the iTEST button to display the trip information page for a few seconds
Rapid consultation in all the other conditions	Press the iTEST button four times from any page other than a menu, or a page accessed via a menu

Min-Max measurements Ekip UP+ records the maximum and minimum phase currents in the *Logs - Measurements* menu

The recording interval between one measurement and the next can be set via the Monitor time parameter, available in the *Settings* menu (page 44).

Representation

Select one of the measurements to access the graph page containing the records



Each measurement allows 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 **(1)** and before **(2)** the selected recording. The command for quitting the page **(3)** is in the top left corner.

Each recording is associated with the following information:

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



NOTES:

- if the value is less than the minimum viewable threshold, “...” is indicated instead of the value
- graphic representation is in relation to $1 I_n$, with $1.25 I_n$ as maximum value
- the trip unit immediately makes a recording when the “Monitor time” parameter is changed

Reset measurements

The Reset measurements command is available in the *Measurements - Historicals - Measurements* menu, for the purpose of resetting all the recordings

Peak factor The peak factors are real time measurements of the ratio between the peak and RMS values of the phase current; the measurement is supported by the *Harmonic distortion* protection function (page 75).

Measurement	Monitor time	Accuracy	Notes
Peak factor	0,3 ÷ 6In	1,5%	“_ _ _” (not available) is indicated for currents outside the range 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 $\cos \varphi$.

Measurement	Monitor time	Accuracy	Notes
Power factor	0,5 ÷ 1	2,5%	“_ _ _” (not available) is indicated for: active and/or reactive power not available or outside the admissible ranges

Energy counters The energy meters are measurements of total active, reactive and apparent energies updated every minute.

Measurement	Monitor time	Accuracy
Total active, reactive and apparent energy	1 kWh ÷ 2 TWh; 1 kVARh ÷ 2 TVARh; 1 kVAh ÷ 2 TVAh	2 %

Reset measurements

The *Energy RESET* command is available in the *Energy* menu for the purpose of resetting the energy counters (page 43).

Maintenance The Maintenance function, which can be activated via the *Settings* menu (page 44) enables the user to be notified by Warning alert that one year has elapsed since the last maintenance.

The following items are available in the *Measurements-Maintenance* menu:

Name	Monitor time
Installation	Information about the installation date
Last maintenance performed	Date of last maintenance performed
Service RESET	Maintenance confirming command: if pressed, the maintenance date is updated and the alarm alert disappears from the display

Operation counters Ekip UP⁺ records the operations performed on the circuit-breaker in the *About - Breaker* menu.

The following counters are also available when communication with the Trip unit is activated:

- number of mechanical operations
- number of trips due to protection trips (TRIP)
- number of trips due to failed protection trips (TRIP)
- number of trip tests performed

2 - Datalogger

Presentation



The datalogger is a function which allows data associated with a trigger event to be recorded. The following data are recorded:

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

One or two independent recordings can be configured and, via Ekip Connect, all the associated information can be downloaded, displayed and saved.

Function

When the datalogger is enabled and activated (**RESTART**), Ekip UP+ continuously acquires data by filling and emptying an internal buffer (**B**).

If a trigger event (**A**) occurs, Ekip UP+ interrupts acquisition (**STOP**) immediately or after a time that can be adjusted by the user (**C**) and stores all the data of the window (**D**), which can then be downloaded to a PC for reading and analysis.

! IMPORTANT: the function requires an auxiliary voltage supply

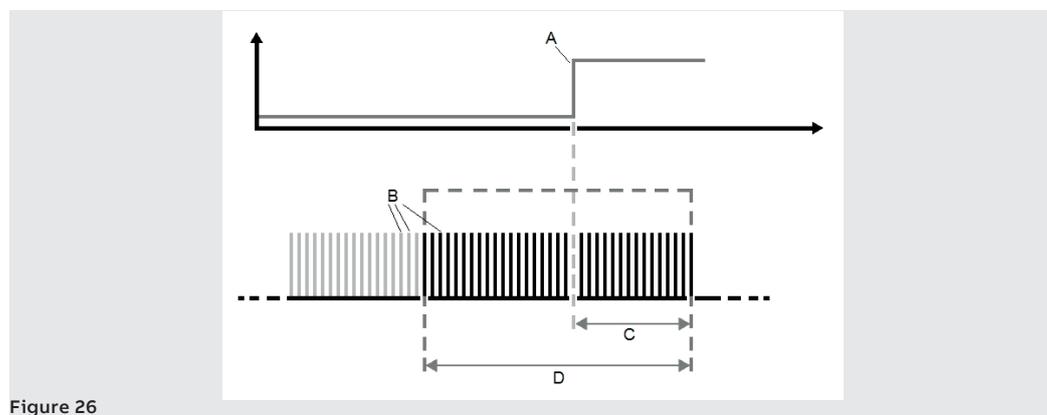


Figure 26

Parameters 1

The parameters and commands of the function are available in the *Settings* menu (page 44).

Parameter	Description	Default
Enable	Activates/deactivates the function and its availability in the parameters menu i NOTE: <i>if the enable command is hidden when at least one datalogger is activated</i>	Off
Num. of Datalogger	Determines the number of recordings (1 or 2) i NOTE: <i>the recordings share the settings of the sampling frequency and type of memory</i> ! IMPORTANT: Change the parameter with interrupted or not started recording	1
Sampling frequency	Establishes the number of samples acquired per second and the recording window. Four options are available: 1200 Hz (window= 13.6 s), 2400 Hz (6.8 s), 4800 Hz (3.4 s), 9600 Hz (1.7 s) i NOTE: • <i>A high frequency allows the data to be analyzed more accurately</i> • <i>if there are two dataloggers, the recording window of each recording is halved</i>	9600 Hz
Datalogger 1 and 2	Menu with the parameters of each Datalogger: trigger event, recording delay and Restart/Stop commands	
Restart and Stop Both	Synchronized start and stop commands of the two dataloggers, valid and available with Num. of Datalogger = 2	

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

Parameter	Description	Default
Stop Event	Trigger event at which the recording is to be interrupted; the main protection options (trips, timings, alarms) and the actuator status (open/closed) are displayed. The Custom option can be configured via Ekip Connect	None
Stop delay	Recording interruption delay, calculated from the trigger; the value is given in seconds and can be set within a range: 0 s to 10 s, in 0.01 s steps	0.01 s
Restart	Recording start command	
Stop	Manual recording stop command	

Memory Type

Ekip Connect enables the *Memory Type* (Non volatile/Volatile) to be selected:

- *Non volatile*: Ekip UP⁺ maintains the recording even when off; the life of the internal battery of the unit can be sensibly less than the declared value in the absence of auxiliary power supply.
- *Volatile*: Ekip UP⁺ loses the recording if it is switched off; when the unit is switched on again, the datalogger automatically restarts, thereby losing the previously stored data.

The parameter is configured by default as Non volatile.

Signallings If there is a recording present, Ekip UP⁺ provides the information on the diagnosis bar (DLog1 available).



NOTE: *In the configuration with two dataloggers, the specific indication of the available recording is shown (DLog1 available or DLog2 available)*

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

- **Datalogger** for configuring the recording parameters with a user-friendly interface, and for downloading the recordings
- **Data Viewer** for opening and consulting the recordings

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

Both areas are available in the Tools menu of Ekip Connect.

3 - Network Analyzer

Presentation The Network Analyzer function allows you to set voltage and current controls over a long period, in order to analyze your system.

To this purpose, voltages and currents are monitored, so as to find:

- voltage sequences (Over, Under, Pos and neg)
- unbalance between voltages (Unbalance)
- short voltage drops (Interruption) and slow sags (Sag)
- short voltage increases (Spikes) and slow swells (Swell)
- harmonic distortion of voltages and currents (THD)

Each monitoring is associated with control parameters set by the user and updated each time the set control conditions occur.

Parameters The configuration parameters of the counters are available in the *Settings - Network Analyzer* menu (page 44).

The Monitor time parameter, which defines the length of each monitoring session, can also be set in the *Settings* menu.



NOTE: the parameter is the one used for measuring the maximum currents and voltages

Main Menu

Parameter	Description	Default
Enable	Activates/deactivates the function and its availability in the parameters menu	Off
I Harmonic Analysis	Activates harmonic analysis of the currents	Off
V Harmonic Analysis	Activates harmonic analysis of the voltages	Off
V Threshold Low	Control threshold of the <i>Under V Th</i> counter The value is given as a percentage of rated voltage U_n and can be set within the range: 75% to 95%, in 5% steps.	85 % U_n
V Threshold High	Control threshold of the <i>Over V Th</i> counter The value is given as a percentage of rated voltage U_n and can be set within the range: 105, 110, 115 % U_n	110 % U_n
Unbalance V Th	Alarm threshold for the <i>Unbalance</i> counter. The value is given as a percentage of rated voltage U_n and can be set within the range: 2% to 10% U_n , in 1% steps. NOTE: 0% =symmetrical and balanced system	3 % U_n
V microinterr. Th	Control threshold of the <i>V microinterr.</i> counter. The value is given as a percentage of rated voltage U_n and can be set within the range: 10% to 95% U_n , in 5% steps	95 % U_n
V Spike Threshold	Control threshold of the <i>Spike</i> counter. The value is given as a percentage of U_n and can be set within the range: 105% to 125% U_n , in 5% steps	105 % U_n
Sags	Menu with the control parameters of the voltage sags	
Swells	Menu with the control parameters of the voltage swells	
Harmonics	The submenu, which becomes available by enabling the harmonic current and/or voltage analysis, allows the harmonic control parameters to be configured	

Continued on the next page

Sags Menu

All the thresholds are given as a percentage of rated voltage U_n and can be set from 10% to 95% U_n , in 5% steps.

All the times are given in seconds and can be set within the range: 0.04 s to 60 s, in variable steps

Parameter	Description	Default
V sag Th Short	Control threshold of <i>Sags Short</i> counter	10 % U_n
V sag dur Short	Minimum duration of sag below the Short threshold to validate the count of the <i>Sags Short</i> counter	0,8 s
V sag Th Middle	Control threshold of <i>Sags Middle</i> counter	45 % U_n
V sag dur Middle	Minimum duration of sag below the <i>Middle</i> threshold to validate the count of the <i>Sags Middle</i> counter	0,8 s
V sag Th Long	Control threshold of <i>Sags Long</i> counter	95 % U_n
V sag dur Long	Minimum duration of sag below the Long threshold to validate the count of the <i>Sags Long</i> counter	0,8 s



NOTE: Ekip UP* accepts changes to the parameters subject to compliance with the following limitations: $V \text{ sag dur Long} \geq V \text{ sag dur Middle} \geq V \text{ sag dur Short}$

Swells Menu (Swell)

All the thresholds are given as a percentage of rated voltage U_n and can be set from 105% to 125% U_n , in 5% steps.

All the times are given in seconds and can be set within the range: 0.04 s to 60 s, in variable steps

Parameter	Description	Default
V swell Th Short	Control threshold of the <i>Swell Short</i> counter	125 % U_n
V swell dur Short	Minimum duration of 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	Control threshold of the <i>Swells Long</i> counter	105 % U_n
V swell dur Long	Minimum duration of swell above the Long threshold to validate the count of the <i>Swells Long</i> counter	0,8 s



NOTE: Ekip UP* accepts changes to the parameters subject to compliance with the following limitations: $V \text{ sag dur Long} \geq V \text{ sag dur Middle} \geq V \text{ sag dur Short}$

Harmonics (Current and Voltage)

All the thresholds are given as a percentage and can be set within the range: 5% to 20% (total THD) or: 3% to 10% (single harmonics) in 1% steps.

Menu	Parameter	Description	Default
Current	THD Threshold	Control threshold of the <i>THD Voltages</i> counter	5 %
	Single harmonic th	Control threshold of the single harmonics counters of the voltages	5 %
Voltage	THD Threshold	Control threshold of the <i>THD Current</i> counter	5 %
	Single harmonic th	Control threshold of the single harmonics counters of the currents	5 %

Counters - introduction

The main counters of the function are available in the *Measurements – Network Analyzer* menu, distributed among several sections (page 43).

The extended list of all the measurements is available via Ekip Connect or by connecting to the bus system



NOTE: *the Additional List item in the following paragraphs contains the additional counters that are only present via Ekip Connect; the type of reference counter is given in the heading of the additional tables*

V Sequences and V 3s Sequences

Submenus **V Sequences** and **V 3s Sequences** have the following counters:

Menu	Parameter	Description
V Sequences	V seq pos	Positive sequence of period in progress [V]
	V seq neg	Negative sequence of period in progress [V]
	Last V pos seq	Positive sequence of period preceding the one in progress [V]
	Last V neg seq	Negative sequence of period preceding the one in progress [V]
V 3s Sequence	V seq pos	Positive sequence calculated during the last three seconds [V]
	V seq neg	Negative sequence calculated during the last three seconds [V]
	Unbalance	Voltage unbalance calculated during the last three seconds [%]

Additional List

Counters (Sequences)	Description
Last time stamp	Date and time of last recording of the sequences
Counters (Sequences)	Description
Last value	Voltage unbalance relating to the period in progress [%]
Actual unbalance value	Voltage unbalance relating to the period preceding the one in progress [%]
Last time stamp	Date and time of last recording of the unbalances
Actual number of U.	Counts the number of times that the average value of the ratio between the positive on negative sequence (with direction of rotation 3-2-1) and negative on positive sequence (1-2-3) exceeds the <i>Unbalance V Th</i> threshold; the count refers to the actual day
Actual [day -1 ... day -7] number of U.	Counters relating to the number of unbalances detected in the last seven days of activity, calculated using the internal clock of the unit
Cumulative number of U.	Cumulative counter of all the unbalances detected by the unit (sum of the other counters or to be increased also for the previous days?)



NOTE: *all measurements of unbalances (Not balanced and Unbalance value) saturate at 200%*

THD Current and THD Voltages

The *THD Current* and *THD Voltages* submenus have the following counters:

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

Over V Th and Under V Th

Certain counters relating to the sequence measurements are available in the *Counters - Day -1 and Counters - Cumulative* submenus:

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

Additional List

Counters (Over Voltage)	Description
Last time stamp	Date and time of last recording of the <i>Over V Th</i> counter
Last value	Value of the last swell above the <i>Over V Th</i> [V] threshold
Actual number of O.	<i>Over V Th</i> count for the current day
Actual [day -2 ... day -7] number of O.	<i>Over V Th</i> count of the last seven days of activity, calculated using the internal clock of the unit

Counters (Under Voltage)	Description
Last time stamp	Date and time of last recording of the <i>Under V Th</i> counter
Last value	Value of the last sag below the <i>Under V Th</i> [V] threshold
Actual number of O.	<i>Under V Th</i> count for the current day
Actual [day -2 ... day -7] number of O.	<i>Under V Th</i> count of the last seven days of activity, calculated using the internal clock of the unit

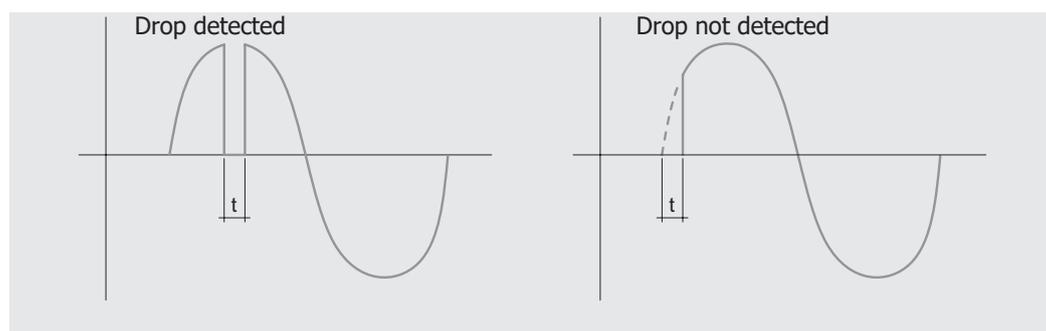
V microinterr. (Interruption)

The *V microinterr* counter should be understood as reduction of the RMS value of the line-to-line voltage below the *V microinterr. Th* set threshold for less than 40 ms (short time voltage sag).

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



NOTE: Since the counter is based on the RMS value calculation, two rapid voltage sags of equal duration may be evaluated differently, depending on when they occur:

**Additional List**

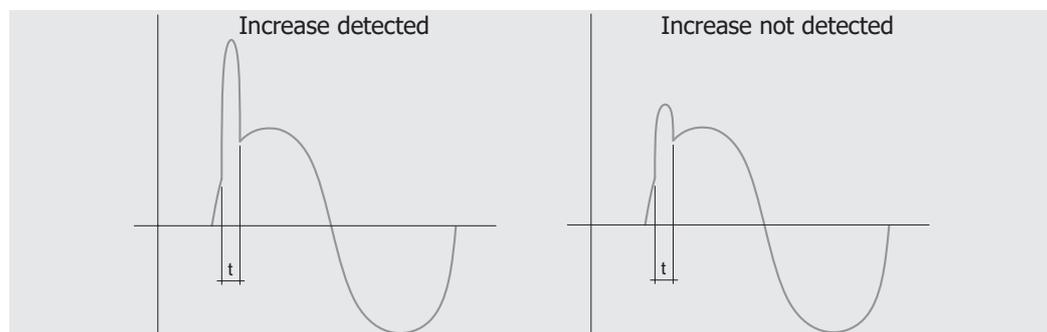
Counters (Interruptions)	Description
Last instant	Date and time of last recording of the <i>V microinterr</i> counter
Last value	Value of last sag below the <i>V microinterr</i> [V] threshold
Last duration	Value of last sag below the <i>V microinterr</i> [ms] threshold
Actual number of I.	<i>V microinterr</i> count for the current day
Actual [day -2 ... day -7] number of I.	<i>V microinterr</i> count of the last seven days of activity, calculated using the internal clock of the unit

Spikes The *Spikes* counter should be understood as increase of the RMS value of the line-to-line voltage above the set *V Spike Threshold* threshold for less than 40 ms (short time voltage spike).

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



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



Additional List

Counters (Interruptions)	Description
Last time stamp	Date and time of last recording of the <i>Spikes</i> counter
Last value	Value of last swell above <i>Spikes</i> [V] threshold
Last duration	Duration of last swell above <i>Spikes</i> [ms] threshold
Actual number of S.	<i>Spikes</i> count for the current day
Actual [day -2 ... day -7] number of S.	<i>Spikes</i> count of the last seven days of activity, calculated using the internal clock of the unit

Sags Certain counters relating to sags are available in the *Counters - Day -1* and *Counters - Cumulative* submenus:

Counters (Interruptions)	Description
Sags Short	Counts the number of times that any line-to-line voltage falls below the <i>V sag Th Short</i> threshold for longer than <i>V sag dur Short</i>
Sags Middle	Counts the number of times that any line-to-line voltage falls below the <i>V sag Th Middle</i> threshold for longer than <i>V sag dur Middle</i>
Sags Long	Counts the number of times that any line-to-line voltage falls below the <i>V sag Th Long</i> threshold for longer than <i>V sag dur Long</i>

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



NOTE: since an event may fall under more than one category, only the counter of the main type (Long > Middle > Short) is increased

Additional List

Counters (Interruptions)	Description
Last time stamp	Date and time of last recording of the <i>Sags Short</i> counter
Sags Middle	Value of last sag below the <i>Sags Short</i> [V] threshold
Sags Long	Duration of last sag below the <i>Sags Short</i> [ms] threshold
Actual number of S.	<i>Sags Short</i> count for the current day
Actual [day -2 ... day -7] number of S.	<i>Sags Short</i> count of the last seven days of activity, calculated using the internal clock of the unit

Continued on the next page

Counters (Sags Middle)	Description
Last time stamp	Date and time of last recording of the <i>Sags Middle</i> counter
Sags Middle	Value of last sag below the <i>Sags Middle [V]</i> threshold
Sags Long	Duration of last sag below the <i>Sags Middle [ms]</i> threshold
Actual number of S.	<i>Sags Middle</i> count of the current day
Actual [day -2 ... day -7] number of S.	<i>Sags Middle</i> count of the last seven days of activity, calculated using the internal clock of the unit

Counters (Sags Middle)	Description
Last time stamp	Date and time of last recording of the <i>Sags Long</i> counter
Sags Middle	Value of last sag below the <i>Sags Long[V]</i> threshold
Sags Long	Duration of last sag below the <i>Sags Long[ms]</i> threshold
Actual number of S.	<i>Sags Long</i> count of the current day
Actual [day -2 ... day -7] number of S.	<i>Sags Long</i> count of the last seven days of activity, calculated using the internal clock of the unit

Swells Certain counters relating to swells are available in the *Counters - Day-1* and *Counters - Cumulative* submenus:

Counters (Sags Middle)	Description
Swells Short	Counts the number of 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>
Swells Long	Counts the number of times that any line-to-line voltage exceeds the <i>V swell Th Long</i> threshold for longer than <i>V swell dur Long</i>

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



NOTE: since an event may fall under more than one category, only the counter of the main type (*long > short*) is increased

Additional List

Counters (Swells Short)	Description
Last time stamp	Date and time of last recording of the <i>Swells Short</i> counter
Last value	Value of last swell above <i>Swells Short [V]</i> threshold
Last duration	Duration of last swell above <i>Swells Short [ms]</i> threshold
Actual number of S.	<i>Swells Short</i> count for the current day
Actual [day -2 ... day -7] number of S.	<i>Swells Short</i> count of the last seven days of activity, calculated using the internal clock of the unit

Counters (Swells Long)	Description
Last time stamp	Date and time of last recording of the <i>Swells Long</i> counter
Last value	Value of last swell above <i>Swells Long[V]</i> threshold
Last duration	Duration of last swell above <i>Spikes[ms]</i> threshold
Actual number of S.	<i>Swells Long</i> count for the current day
Actual [day -2 ... day -7] number of S.	<i>Swells Long</i> count of the last seven days of activity, calculated using the internal clock of the unit

THD Voltages and Currents

Certain counters relating to harmonic distortion are available in the *Counters - Day-1* and *Counters - Cumulative* submenus:

Counters (Swells Long)	Description
THD Voltages	Counts the total number of minutes in which total distortion exceeds current threshold <i>THD Threshold</i>
THD Current	Counts the total number of minutes in which total distortion exceeds voltage threshold <i>THD Threshold</i>

NOTE: the counters saturate at 65535 minutes (45 days); they can be reset by a service connector command (via *Ekip Connect*) or via communication from the system bus

Additional List

Counters (Swells Long)	Description
Actual minutes	<i>THD Current</i> count for the current day [min]
Actual [day -2 ... day -7] number of THD C.	<i>THD Current</i> count of the last seven days of activity, calculated using the internal clock of the unit

Counters (Swells Long)	Description
Actual minutes	<i>THD Voltages</i> count for the current day [min]
Actual [day -2 ... day -7] number of THD C.	<i>THD Voltages</i> count of the last seven days of activity, calculated using the internal clock of the unit

Waveforms

The *Network Analyzer - Waveforms* menu provides graphic representations of:

- phase currents L1, L2, L3, Ne (for units configured with 4 phases)
- line-to-line voltages V12, V23, V31

When one of the available quantities is selected, Ekip UP+ acquires and displays the waveform

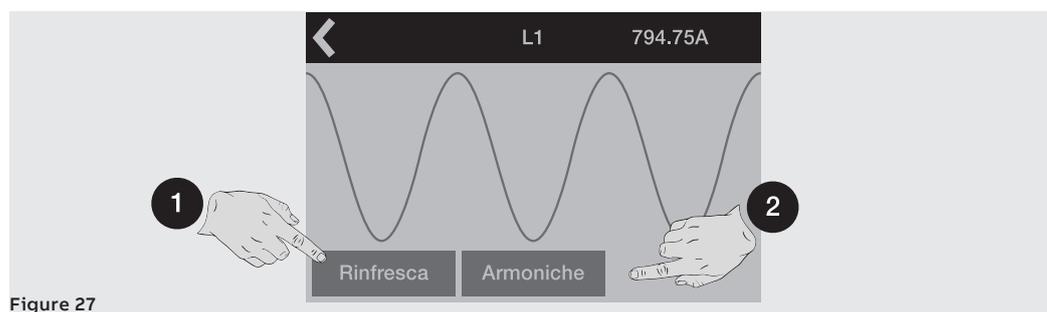


Figure 27

The detected waveform and the value at the time of selection are displayed in the window that appears. A new waveform and the relative measurement can be acquired with the Refresh command (1).

Harmonics

The waveform window will propose the *Harmonics* (2) command if harmonic analysis of currents and/or voltages has been selected. This command accesses the histogram of the harmonics (relating to the grid frequency set in the menu) that make up the waveform.



Figure 28

Touch the sides of the display to scroll the harmonics after (3) and before (4) the selected harmonic, displayed on a flashing graph with value shown in the center of the page. The command for exiting the page is at the top left (5).

4 - Trips (TRIP)

Presentation Ekip UP+ Protect is able to record the last 30 external actuator, circuit-breaker and contactor openings caused by protection trips (TRIP).

The full list of Trips that have occurred is available in the *Measurements - Logs – Openings* menu.

The following information is associated with each Trip event:

- the protection that caused the trip
- the consecutive number of the trip
- the date and time of the trip (with reference to the internal clock)
- the measurements associated with the tripped protection



NOTE: once the 30-TRIP threshold has been exceeded, the oldest trips are progressively overwritten.

Correlated measurements The type of protection involved determines the measurements recorded at the moment of tripping:

Protection	Measurements recorded	Notes
Current	Currents <i>L1, L2, L3, Ne, Ig, Ige, Irc</i>	<i>Ne</i> is available in the 4P and 3P with neutral configuration <i>Ig</i> is available in the case of trips due to G protection <i>Ige</i> is available with toroid S.G.R. and trips due to Gext protection <i>Irc</i> is available with toroid Rc
Voltage	Currents <i>L1, L2, L3, Ne</i> , voltage <i>U12, U23, U31, U0</i>	<i>U0</i> available in the case of trips due to RV protection
Frequency	Currents <i>L1, L2, L3, Ne</i> and network frequency	
Power	Currents <i>L1, L2, L3, Ne</i> , total power	Total active or apparent power depending on which protection tripped
Temperature	Currents <i>L1, L2, L3, Ne</i>	The temperature cannot be displayed

Access to most recent Trips Besides being available in the Logs menu, information about the most recent trips can be accessed in three different ways, depending on the conditions of Ekip UP+:

Condition	Access
Trips that have just occurred with Ekip UP+ on	The main page is temporarily replaced by a Trip information page; press the iTEST button to reset and go back to the main screen page
Trips that have just occurred with Ekip UP+ off	Press the iTEST button to display the trip information page for a few seconds
Rapid consultation in all the other conditions	Press the iTEST button four times from any page other than a menu, or a page accessed via a menu

Protections

1 - Protections - Introduction

Operating principle The protection functions are available with Ekip UP+ Protect and with the Monitor with Protect bundle. Each protection is associated with a different signal (current, voltages, frequencies, powers, etc) but the operating principle is the same:

1. If the signal measured exceeds the set **threshold**, the specific protection activates (prealarm and/or **alarm** condition)
2. The **alarm** appears on the display and, after a period of time (timing t_d) depending on the protection parameters set, can convert itself into an **open command (TRIP)** transmitted to the CB
3. The TRIP is associated with one or more unit contacts so that the external actuators/circuit-breakers/contactors can be commanded and the power grid interrupted.



NOTE:

- if the signal measured drops below the set threshold before the trip time has elapsed, Ekip UP+ quits the alarm and/or timing state and returns to the normal operating condition
- all protections have a default configuration: check the parameters and change to suit the installation requirements before putting into service

References Many of the protection thresholds are displayed in two different quantities: absolute value and relative value. The relative value depends on the type of measurement:

Type of protection	Reference	Description
Current	In	Nominal size of the Trip unit
Current	In	Nominal current of the <i>Rating plug</i>
Voltage	Un	Line-to-line voltage setting
Frequency	fn	Frequency setting
Power	Sn	$\sqrt{3} \times I_n \times U_n$

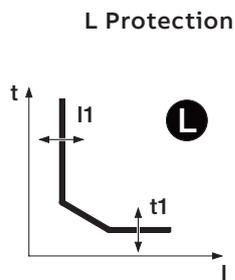
Protections packages The protections described in the next chapters are grouped into packages, which are either present in the Ekip UP+ version or can be purchased later on:

Package	Page
Standard Protections	66
Generator protections	91
Motor protections	99
Additional protections and functions	103
Adaptive protections	90

2 - Standard Protections

List The protections in the Standard package for Ekip UP+ Protect and the Monitor with Protect bundle are:

Name	Type of protection	Page
L	Overload with inverse long-time delay	67
S	Selective short-circuit	68
S2	Short-circuit with adjustable delay	69
I	Instantaneous short-circuit	70
G	Earth fault with adjustable delay	71
MCR	Instantaneous short-circuit on circuit-breaker closing	72
2I	Instantaneous short-circuit programmable	73
IU	Current unbalance	74
Neutral	Different protection on neutral phase	74
Harmonic distortion	Distorted waveforms	75
T	Abnormal temperatures	75
Hardware Trip	Internal connection errors	75
Iinst	Instantaneous short-circuit at high currents	75
Rc	Residual current	76
Gext	External earth fault with adjustable delay	76
D	Directional short-circuit with adjustable delay	78
UV	Minimum voltage	80
OV	Maximum voltage	81
UV2	Minimum voltage	81
OV2	Maximum voltage	82
Phase Sequence	Phase sequence error	82
VU	Voltage unbalance	82
RV	Residual voltage	83
UF	Minimum frequency	84
OF	Maximum frequency	85
UF2	Minimum frequency	85
OF2	Maximum frequency	86
RP	Reverse active power	87
cos φ	Minimum cos φ	87
VS Warnings	Line-to-line voltage signalling	88
FS Warnings	Line-to-line voltage frequency signalling	88
VS 2 Warnings	Line-to-line voltage signalling	89
FS 2 Warnings	Line-to-line voltage frequency signalling	89

**Function**

If the current of one or more phases exceeds threshold I_1 , the protection trips and, after a time established by the value read and by the parameter settings, transmits the TRIP command.

To check and simulate the trip times in relation to all the parameters, please consult:

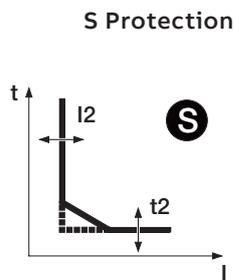
- the summary table of the protections with the calculation formulas (page 113)
- the graph with trip curve (from page 116)

Parameters

Parameter	Description	Default
<i>Curve</i>	Establishes curve dynamics and trip time calculation: <ul style="list-style-type: none"> • $t = k / I^2$ according to IEC 60947-2. • IEC 60255-151 SI • IEC 60255-151 VI • IEC 60255-151 EI • $t = k / I^4$ according to 60255-151 	$t = k/I^2$
<i>Threshold I_1</i>	Establishes the value that activates the protection and contributes towards calculating the trip time. The value is given as both absolute value (A) and relative value (In) and can be set within the range: 0.4 In to 1 In, in 0.001 In steps	1 In
<i>Time t_1</i>	Contributes towards calculating the trip time. The value is given in seconds and can be set within the range: 3 s .. 60 s (for curve $t = k / I^2$) or 3 s .. 9 s (for the other curves), in 1 s steps	60 s
	Contributes towards calculating the trip time. The value is given in seconds and can be set within the range: 3 s .. 48 s (for curve $t = k / I^2$) or 3 s .. 9 s (for the other curves), in 1 s steps	48 s
	Contributes towards calculating the trip time. The value is given in seconds and can be set within the range: 3 s .. 144 s, in 1 s steps	144 s
<i>Thermal memory</i>	Activates/deactivates the thermal memory function (page 103) i NOTE: the function is always ON with Ekip M Touch and available with curve $t = k / I^2$ for all the other trip unit models	OFF
<i>Prealarm I_1</i>	Warns that the measured current is near to protection activation threshold I_1 . The value is given in percentage of threshold I_1 and can be set within the range: 50% I_1 to 90% I_1 , in 1% steps. i NOTA: the prealarm condition deactivates in two cases: <ul style="list-style-type: none"> • current lower than prealarm threshold I_1 • current higher than threshold I_1 	90 % I_1

Limitations and additional functions

- threshold I_1 must be lower than threshold I_2 (if S protection is activated)
- the trip time of the protection is forcibly set at 0.5 s if the calculation results give a lower theoretical value and/or if the current reading is more than 12 In

**Function**

If the current of one or more phases exceeds threshold I_2 , the protection trips and, after a time established by the value read and by the parameter settings, transmits the TRIP command.

To check and simulate the trip times in relation to all the parameters, please consult:

- the summary table of the protections with the calculation formulas (page 113)
- the graph with trip curve (page 118 119)

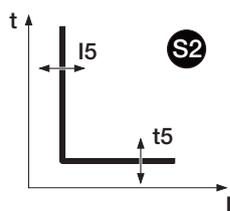
Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu.	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command. if disabled, the alarm and exceedance of protection time are only managed as information.	ON
<i>Curve</i>	Establishes curve dynamics and the threshold or trip time calculation: <ul style="list-style-type: none"> • $t = k$: fixed time trip • $t = k/I^2$: inverse time-delay dynamic trip 	$t = k$
<i>Threshold I_2</i>	Establishes the value that activates the protection and contributes towards calculating the trip time. The value is given as both absolute value (A) and relative value (In) and can be set within the range: 0.6 In to 10 In, in 0.1 In steps	4 In
<i>Time t_2</i>	It is the trip time or contributes towards timing calculation, depending on the type of curve selected. The value is given in seconds and can be set within the range: 0.05 s to 0.4 s, in 0.01 s steps	0,05 s
<i>Time t_2</i>	It is the trip time or contributes towards timing calculation, depending on the type of curve selected. The value is given in seconds and can be set within the range: 0.05 s to 0.8 s, in 0.01 s steps	0,05 s
<i>Thermal memory</i>	Activates/deactivates the thermal memory function (page 103) i NOTE: the function is only available with curve $t=k/I^2$	OFF
<i>ZoneSelectivity</i>	Activates/deactivates the function and selectivity time availability on the display (page 104) i NOTE: the function is only available with curve $t=k$	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function activated and selectivity input not present (page 113) The value is given in seconds and can be set within the range: 0.04 s to 0.2 s, in 0.01 s steps	0,04 s
<i>Startup enable</i>	Activates/deactivates the function and availability of the associated parameters on the display (page 98)	OFF
<i>Startup Threshold</i>	Protection threshold valid during Startup time, in the conditions in which the function is activated (page 98) The value is given as both absolute value (A) and relative value (In) and can be set within the range: 0.6 In to 10 In, in 0.1 In steps	0,6 In
<i>Startup Time</i>	This is the time for which the Startup threshold remains activated and is calculated from the moment the activation Threshold is exceeded (page 98) The value is given in seconds and can be set within the range: 0.1 s to 30 s, in 0.01 s steps	0.1 s

Limitations and additional functions

- threshold I_2 must be higher than threshold I_1 (if S protection is activated)
- in the presence of curve $t = k/I^2$, the protection trip time is forced to t_2 if the calculation results give a theoretical value lower than t_2 itself
- the block functions and type of selectivity can also be accessed by means of the service connector (via Ekip Connect) or communication via system bus (page 106)

S2 Protection Function



S2 protection functions in the same way as S protection: if the current of one or more phases exceeds threshold I_5 for longer than time t_5 , the protection activates and sends a TRIP command.



NOTE: unlike S protection, S2 protection only has one fixed time trip curve and has no thermal memory

It is independent of S protection, thus thresholds and functions of the two protections can be programmed so as to take advantage of different plant solutions (example: signaling with S and open command with S2 or vice versa, or both S and S2 for signaling or tripping).

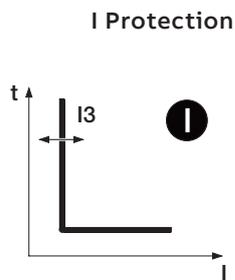
To check and simulate the trip times in relation to all the parameters, please consult:

- the summary table of the protections with the calculation formulas (page 113)
- the graph with trip curve (page 119)

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu.	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command. if disabled, the alarm and exceedance of protection time are only managed as information.	ON
<i>Threshold I5</i>	Establishes the value that activates the protection and contributes towards calculating the trip time. The value is given as both absolute value (A) and relative value (In) and can be set within the range: 0.6 In to 10 In, in 0.1 In steps	4 In
<i>Time t5</i>	This is the trip time of the protection. The value is given in seconds and can be set within the range: 0.05 s to 0.4 s, in 0.01 s steps	0,05 s
<i>Time t5</i>	This is the trip time of the protection. The value is given in seconds and can be set within the range: 0.05 s to 0.8 s, in 0.01 s steps	0,05 s
<i>ZoneSelectivity</i>	Activates/deactivates the function and selectivity time availability on the display (page 104) NOTE: if at least two of the selectivity S, S2, I, 2I and MCR are enabled, the input and output are shared with the OR function; it is sufficient that even a selectivity is activated to stimulate inputs and outputs	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function activated and selectivity input not present (page 113) The value is given in seconds and can be set within the range: 0.04 s to 0.2 s, in 0.01 s steps	0,04 s
<i>StartUp enable</i>	Activates/deactivates the function and availability of the associated parameters on the display (page 98)	OFF
<i>StartUp Threshold</i>	Protection threshold valid during Startup time, in the conditions in which the function is activated (page 98) The value is given as both absolute value (A) and relative value (In) and can be set within the range: 0.6 In to 10 In, in 0.1 In steps	4 In
<i>StartUp Time</i>	This is the time for which the StartUp threshold remains activated and is calculated from the moment the activation Threshold is exceeded (page 98) The value is given in seconds and can be set within the range: 0.1 s to 30 s, in 0.01 s steps	0.1 s

Limitations and additional functions

- threshold I_5 must be higher than threshold I_1 (if S2 protection is activated)
- the block functions and type of selectivity can also be accessed by means of the service connector (via Ekip Connect) or communication via system bus (page 106)

**Function**

If the current of one or more phases exceeds threshold I_3 , the protection trips and, after a non-programmable fixed time, transmits the TRIP command.

To check and simulate the trip times in relation to all the parameters, please consult:

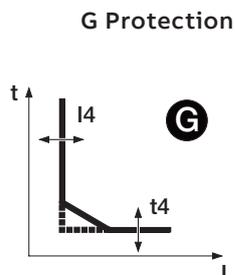
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 120)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu.	OFF
<i>Threshold I3</i>	Establishes the value that activates the protection. The value is given as both absolute value (A) and relative value (I_n) and can be set within the range: $1.5 I_n$ to $15 I_n$, in $0.1 I_n$ steps	$4 I_n$
<i>ZoneSelectivity</i>	Activates/deactivates the function i NOTE: if at least two of the selectivity S, S2, I, 2I and MCR are enabled, the input and output are shared with the OR function; it is sufficient that even a selectivity is activated to stimulate inputs and outputs	OFF
<i>Startup enable</i>	Activates/deactivates the function and availability of the associated parameters on the display (page 106)	OFF
<i>Startup Threshold</i>	Protection threshold valid during Startup time, in the conditions in which the function is activated (page 106) The value is given as both absolute value (A) and relative value (I_n) and can be set within the range: $1.5 I_n$ to $15 I_n$, in $0.1 I_n$ steps	$1,5 I_n$
<i>Startup Time</i>	This is the time for which the Startup threshold remains activated and is calculated from the moment the activation Threshold is exceeded (page 106) The value is given in seconds and can be set within the range: 0.1 s to 30 s, in 0.01 s steps	0.1 s

Limitations and additional functions

- threshold I_3 must be higher than threshold I_2 (if S and I protections are activated)
- I protection can be activated with MCR protection disabled
- *Startup Time* is set at 100 ms and cannot be edited when Motor Protection package is activated
- the block functions can also be accessed by means of the service connector (via Ekip Connect) or communication via system bus (page 106)

**Function**

Ekip UP⁺ calculates the vector sum of the phase currents (L1, L2, L3, Ne) and obtains the internal earth fault current (I_g): if current I_g exceeds threshold I_4 the protection activates and, after a time established by the read value and the set parameters, transmits a TRIP command.

To check and simulate the trip times in relation to all the parameters, please consult:

- the summary table of the protections with the calculation formulas (page 113)
- the graph with trip curve (page 121)

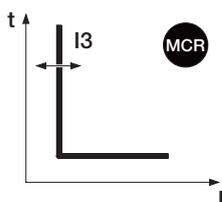
Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu.	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command. if disabled, the alarm and exceedance of protection time are only managed as information.	ON
<i>Curve</i>	Establishes curve dynamics and the threshold or trip time calculation: <ul style="list-style-type: none"> • $t = k$: fixed time trip • $t = k/I^2$: inverse time-delay dynamic trip 	$t = k$
<i>Threshold I_4</i>	Establishes the value that activates the protection and contributes towards calculating the trip time. The value is given as both absolute value (A) and relative value (I_n) and can be set within the range: 0.1 I_n to 1 I_n , in 0.001 I_n steps	0,2 I_n
<i>Time t_4</i>	It is the trip time or contributes towards timing calculation, depending on the type of curve selected. The value is given in seconds and can be set within the range: 0.1 s to 1 s, in 0.05 s steps <i>i</i> NOTE: in the presence of curve: $t = k$, t_4 can also be configured as: instantaneous; in this mode, the trip time is comparable to that given for I protection (page 113)	0,4 s
<i>Prealarm I_4</i>	Warns that the measured current is near to the protection activation threshold. The value is given in percentage of threshold I_1 and can be set within the range 50% I_4 to 90% I_4 , in 1% steps. The prealarm condition deactivates in two cases: <ul style="list-style-type: none"> • current lower than prealarm threshold I_4 • current higher than threshold I_4 	90 % I_4
<i>ZoneSelectivity</i>	Activates/deactivates the function and selectivity time availability on the display (page 104) <i>i</i> NOTE: the function is only available with curve $t = k$	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function activated and selectivity input not present (page 113) The value is given in seconds and can be set within the range: 0.04 s to 0.2 s, in 0.01 s steps	0,04 s
<i>StartUp enable</i>	Activates/deactivates the function and availability of the associated parameters on the display (page 98)	OFF
<i>StartUp Threshold</i>	Protection threshold valid during Startup time, in the conditions in which the function is activated (page 98) The value is given as both absolute value (A) and relative value (I_n) and can be set within the range: 0.2 I_n to 1 I_n , in 0.1 I_n steps	0,2 I_n
<i>StartUp Time</i>	This is the time for which the StartUp threshold remains activated, as calculated from the moment the activation Threshold is exceeded (page 98) The value is given in seconds and can be set within the range: 0.1 s to 30 s, in 0.01 s steps	0.1 s

Continued on the next page

Limitations and additional functions

- in the presence of curve $t = k/I^2$, the protection trip time is forced to t_4 if the calculation results give a theoretical value lower than t_4 itself
- in the absence of Vaux, the minimum threshold is $0.3 I_n$ (for $I_n \leq 100$ A) or $0.2 I_n$ (for all the other sizes); if lower values are set, the Trip unit forces the threshold to the minimum admissible value and the "Configuration" error appears
- depending on the I_4 threshold setting, the protection deactivates for an I_g higher 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 $I_4 > 0.2 I_n$
- operation with $t_4 =$ instantaneous requires the presence of Vaux; in self-supply, the Trip unit forces the time to 100 ms and the "Configuration" error appears
- the block functions and type of selectivity can also be accessed by means of the service connector (via Ekip Connect) or communication via system bus (page 103)

Protection MCR Function

The protection remains activated for a time interval running from the open - closed change of status of the CB, after which it deactivates.

If, during this time interval, the current of one or more phases exceeds threshold I_3 , the protection transmits the TRIP command after a non-programmable fixed time.

MCR protection only functions with Vaux or with supply via the *Ekip Measuring enabler with voltage sockets* module.

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 120)

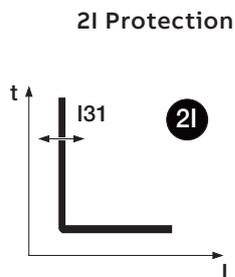


NOTE: to activate MCR, protection I must be disabled

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu.	OFF
<i>Threshold I3</i>	Establishes the value that activates the protection. The value is given as both absolute value (A) and relative value (I_n) and can be set within the range: $1.5 I_n$ to $15 I_n$, in $0.1 I_n$ steps	$6 I_n$
<i>Monitor Time</i>	Defines the time interval in which the MCR protection remains activated, as calculated from the open - closed change of status The value is given in seconds and can be set within the range: 0.04 s to 0.5 s, in 0.01 s steps	0,04 s
<i>ZoneSelectivity</i>	Activates/deactivates the function NOTE: if at least two of the selectivity S, S2, I, 2I and MCR are enabled, the input and output are shared with the OR function; it is sufficient that even a selectivity is activated to stimulate inputs and outputs	OFF

Limitations and additional functions

- MCR protection can be activated with I protection disabled
- the block functions can also be accessed by means of the service connector (via Ekip Connect) or communication via system bus (page 103)



Function

If the current of one or more phases exceeds threshold I_{31} and a trip event is present, the protection transmits the TRIP command after a non-programmable fixed time.

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 120)

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu.	OFF
<i>Threshold I31</i>	Establishes the value that activates the protection. The value is given as both absolute value (A) and relative value (In) and can be set within the range: 1.5 In to 15 In, in 0.1 In steps	1,5 In
<i>ZoneSelectivity</i>	Activates/deactivates the function i NOTE: if at least two of the selectivity S, S2, I, 2I and MCR are enabled, the input and output are shared with the OR function; it is sufficient that even a selectivity is activated to stimulate inputs and outputs	OFF

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

Parameter	Description	Default
<i>Activation</i>	Two alternative modes are available: <ul style="list-style-type: none"> • Dependent function: the protection is activated if the programmed activation event has occurred; this configuration makes the function and delay parameters available • Activated: the protection is always activated 	Dependent function
<i>Function</i>	The activation event between the input contacts of Ekip Signalling 4K and Ekip Signalling 2K, the states of the unit (open/closed) and the Custom function can be selected i NOTE: Ekip Connect allows the Custom function to be customized so as to associate the activation event with up to eight statuses in AND or OR configuration	Disabled
<i>Delay ON</i>	Protection activation delay calculated from the presence of the activation event onwards. The value is given in seconds and can be set within range: 0 s to 100 s, in 0.01 s steps i NOTE: the protection trips if the event is present for longer than the set time lag	0 s
<i>Delay OFF</i>	Protection deactivation delay calculated from disappearance of activation event onwards. The value is given in seconds and can be set within range: 0 s to 100 s, in 0.01 s steps i NOTE: protection deactivates if event is not present for longer than set delay	0 s

RELT - Ekip signalling 2K-3

If the RELT module is present a dedicated command (RELT Wizard) will be displayed. This will program the 2I protection and other related parameters; for details see page 201.

Commands by remote control

Two further temporary protection activation/deactivation commands are available when the unit is connected to one or more Ekip Com modules:

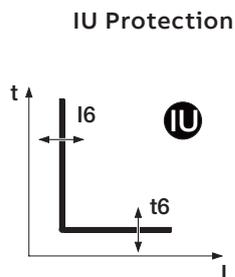
- **2I ON Mode:** activates the protection
- **2I OFF Mode:** deactivates the protection

For further details consult document [1SDH001140R0001](#) and [1SDH002031A1101](#).

i **NOTE:** if the protection has been activated by command *2I ON Mode*, it is deactivated by command *2I OFF Mode* or when the unit shuts down

Signalings

When protection 2I is activated, the message “2I active” appears in the diagnostic bar and in the Alarm List page, and the alarm led will be on steady.

**Function**

The protection trips if the current readings are unbalanced; the protection sends a TRIP command if the detected unbalance exceeds threshold I_6 for longer than t_6 .

The protection is automatically self-excluding in two cases:

- the measurement of at least one current exceeds $6 I_n$
- the maximum current among all the phases is less than $0.3 I_n$

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 123)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Version</i>	Allows the unbalance calculation mode to be selected: <ul style="list-style-type: none"> • Old: % Sbil = $100 \times (I_{\max} - I_{\min}) / I_{\max}$ • New: % Unbal = $100 \times (\max I_{mi}) / I_{mi}$ NOTE: $\max I_{mi}$: maximum deviation among measured currents, calculated by comparing each current with the mean value; I_{mi} : mean value of the current readings	With respect to I_{\max}
<i>Threshold I_6</i>	Establishes the unbalance value that trips the protection. Unbalance is given in percentage value within the range: 2% to 90% with 1% steps.	50 %
<i>Time t_6</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.5 s to 60 s, in 0.5 s steps	5 s

Neutral Protection**Function**

Neutral protection characterizes protections L, S and I differently on the neutral phase by introducing a different control factor from the other phases.

The protection is available with the 4P and 3P + N configuration; the configuration parameters can be accessed via the Settings menu (page 44).

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection	OFF
<i>Neutral threshold</i>	Defines the multiplicative factor applied to the trip thresholds and curves of the protections for the current read on phase Ne: <ul style="list-style-type: none"> • 50 %: lowest trip thresholds for the neutral current • 100 %: same trip thresholds for all phases • 150 %: highest trip thresholds for the neutral current • 200 %: highest trip thresholds for the neutral current 	50 %

Limitations and additional functions

Ekip UP+ rejects changes to thresholds I_1 and I_nN in the event of non-compliance with the following limitation: $(I_1 \times I_nN) \leq I_u$

- I_1 is the threshold of L protection in amperes (example: $I_n = 100$ A and $I_1 = 0.6$ becomes $I_1 = 60$ A)
- I_1 is the threshold of L protection in amperes (example: $I_n = 400$ A and $I_1 = 0.6$ becomes $I_1 = 240$ A)
- I_nN is the neutral threshold expressed as multiplicative factor (example: $I_nN = 200\%$ becomes $I_nN = 2$)
- I_u is the size of the CB



WARNING! With 150% and 200% threshold; if the measured neutral current exceeds $16I_n$, the Trip unit resets the protection to 100% by itself

Harmonic Distortion Protection

Allows an alarm to be activated in the case of distorted waveforms.

The protection can be enabled in the *Measurements* menu; if enabled an alarm is activated (page 43).



IMPORTANT: the protection does not handle the trip, just the signal

T Protection

T protection protects against abnormal temperatures measured and transmitted to the sensor inside the unit; temperature verification is always active and includes three operating states:

State	Temperature range [°C]	Ekip UP+ actions
Standard	$-25 < t < 70$	Normal operation; display on ⁽¹⁾
Warnings	$-40 < t < -25$ or $70 < t < 85$	Warning led @ 0.5 Hz; display on ⁽¹⁾
Alarm	$t < -40$ or $t > 85$	Display off; Alarm and Warning leds @ 2 Hz; TRIP if Trip enable is activated

⁽¹⁾ the display remains on within range: $-20\text{ °C} / +70\text{ °C}$

All protections enabled in the unit are active in all operating states.

The Trip Enabling parameter can be enabled in the *Settings - Circuit breaker* menu in order to handle an open command if an alarm occurs (page 44).

Hardware Trip Protection

Hardware Trip protects against connection errors in Ekip UP+ and is available in the *Settings - Circuit breaker - Hardware Trip* menu (page 44).

If enabled, with the CB closed, if one or more of these events are detected:

- current sensors disconnected (phase or external if enabled)
- *Rating Plug* disconnected.
- *Trip Coil* disconnected
- faults inside the unit

the alarm is signaled and a TRIP command is transmitted.

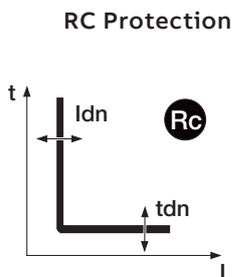


NOTE: protection trips if error states persist for more than one second.

Inst

The purpose of this protection is to maintain the integrity of the circuit-breaker and installation in the case of particularly high current values requiring shorter reaction times than those provided by the instantaneous short-circuit-protection.

Protection cannot be disabled and trip threshold and time are defined by ABB.

**Function**

Rc protection protects against the residual current earth faults by detecting the fault current with the appropriate external Rc toroid.

The protection sends a TRIP command if the current from toroid Rc exceeds threshold I_{dn} for longer than T_{dn} .

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 130)

Parameters

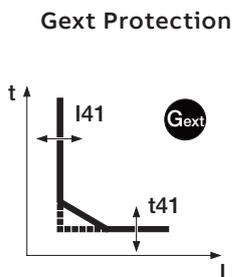
Parameter	Description	Default
<i>Threshold I_{dn}</i>	Defines the value that activates the protection; the value is given in amperes and can be set within a range of values from 3 A to 30 A	5 A
<i>Time T_{dn}</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range of values from 0.05 s to 0.8 s	0,06 s

Limitations and additional functions

Ekip UP+ activates and displays the Rc protection parameters if the following conditions are observed:

- *Rating Plug Rc* model assembled and installed
- *Ekip Measuring* module assembled and installed

protection activation includes checking for the presence of toroid Rc and signaling on the diagnosis bar in the event of alarm/absence

**Function**

Gext protection protects against earth faults and detects the fault current with a dedicated external toroid S.G.R.

if S.G.R. toroid current exceeds threshold I_{41} , the protection trips and, after a time established by the value read and by the parameter settings, transmits the TRIP command.

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 121)

Parameters

Toroid configuration is available in the Settings menu (page 44)

Parameter	Description	Default
<i>External Toroid</i>	It allows the presence of <i>external toroid S.G.R.</i> to be activated	OFF
<i>Toroid size</i>	Allows the reference current of the protection to be selected from among four available quantities, from 100 A to 800 A ! IMPORTANT: the current selected from the menu must be consistent with the size of the external toroid S.G.R. connected to the unit	100 A

Continued on the next page

The protection configuration is available in the Advanced menu (page 42)

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	ON
<i>Curve</i>	Establishes curve dynamics and the threshold or trip time calculation: <ul style="list-style-type: none"> • $t = k$: fixed time trip • $t = k/I^2$: inverse time-delay dynamic trip 	$t = k$
<i>Threshold I41</i>	Establishes the value that activates the protection and contributes towards calculating the trip time. The value is given as both absolute value (amperes) and relative value (I_n) and can be set within the range: $0.1 I_n$ to $1 I_n$, in $0.001 I_n$ steps	$0,2 I_n$
<i>Time t41</i>	It is the trip time or contributes towards timing calculation, depending on the type of curve selected. The value is given in seconds and can be set within the range: $0.1 s$ to $1 s$, in $0.05 s$ steps	$0,4 s$
<i>Threshold I41</i>	Warns that the measured current is near to the protection activation threshold. The value is given in percentage of threshold $I1$ and can be set within the range $50\% I41$ to $90\% I41$, in 1% steps. The prealarm condition deactivates in two cases: <ul style="list-style-type: none"> • current lower than prealarm threshold $I41$ • current higher than threshold $I41$ 	$90\% I41$
<i>ZoneSelectivity</i>	Activates/deactivates the function and selectivity time availability on the display ⁽¹⁾  NOTES : <ul style="list-style-type: none"> • the function is only available with curve $t = k$ • if at least two of the selectivity G, Gext and MDGF are enabled, the input and output are shared with the OR function; it is sufficient that even a selectivity is activated to stimulate inputs and outputs 	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function activated and selectivity input not present ⁽¹⁾ The value is given in seconds and can be set within the range: $0.04 s$ to $0.2 s$, in $0.01 s$ steps	$0,04 s$
<i>StartUp enable</i>	Activates/deactivates the function and availability of the associated parameters on the display ⁽²⁾	OFF
<i>StartUp Threshold</i>	Protection threshold valid during Startup time, in the conditions in which the function is activated ⁽²⁾ Value is given as both absolute value (Amperes) and relative value (I_n) and can be set within range: $0.2 I_n$ to $1 I_n$, in $0.02 I_n$ steps	$0,2 I_n$
<i>StartUp Time</i>	This is the time for which the StartUp threshold remains activated and is calculated from the moment the activation Threshold is exceeded ⁽²⁾ The value is given in seconds and can be set within the range: $0.1 s$ to $30 s$, in $0.01 s$ steps	$0.1 s$

⁽¹⁾ details on page 104

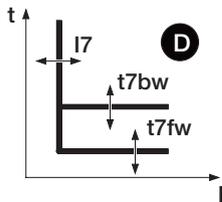
⁽²⁾ details on page 113

Continued on the next page

Limitations and additional functions

- in the presence of curve $t = k/I^2$, the protection trip time is forced to t_{41} if the calculation results give a theoretical value lower than t_{41} itself
- Ekip UP+ activates and displays the Gext protection parameters if the presence of toroid S.G.R has been enabled in the Settings menu (page 44); protection activation includes checking for the presence of toroid S.G.R and signaling on the diagnosis bar in the event of alarm/absence
- the protection is automatically inhibited by the unit if absence of toroid S.G.R is detected
- the block functions and type of selectivity can also be accessed by means of the service connector (via Ekip Connect) or communication via system bus (page 106)

D Protection Function



D protection is very similar to S protection, with the additional capability of recognizing the direction of the current during a fault.

The current direction allows the user to find out whether the fault is on the supply side or load side of the device controlled by Ekip UP+.

In ring type distribution systems, D protection allows the distribution section in which the fault has occurred to be identified and disconnected without affecting the rest of the installation (using zone selectivity).

Depending on the direction of the fault, if the current of one or more phases exceeds threshold I_7 (Fw or Bw) for longer than time t_7 (Fw or Bw), the protection activates and sends a TRIP command.

The **fault direction** is established by comparing the **detected fault current** with the **reference direction**.

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

Phase sequence (set)	Power flow (set)	Phase sequence (detected)	Reference direction (forward direction)
123	High-->Low	123	High-->Low
123	Bottom --> Top	123	Bottom --> Top
123	High-->Low	321	Bottom --> Top
123	Bottom --> Top	321	High-->Low
321	High-->Low	123	Bottom --> Top
321	Bottom --> Top	123	High-->Low
321	High-->Low	321	High-->Low
321	Bottom --> Top	321	Bottom --> Top

To check and simulate the trip times in relation to all the parameters, please consult:

- the summary table of the protections with the calculation formulas (page 113)
- the graph with trip curve (page 127)

Continued on the next page

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	ON
<i>Threshold I7 Fw</i>	Establishes the value that activates the protection with forward direction. The value is given as both absolute value (amperes) and relative value (In) and can be set within the range: 0.6 In to 10 In, in 0.1 In steps	4 In
<i>Threshold i7 Bw</i>	Establishes the value that activates the protection with backward direction. The value is given as both absolute value (amperes) and relative value (In) and can be set within the range: 0.6 In to 10 In, in 0.1 In steps	4 In
<i>Time t7 Fw</i>	This is the trip time in the case of forward direction. The value is given in seconds and can be set within the range: 0.1 s to 0.8 s, in 0.01 s steps	0,2 s
<i>Time t7 Bw</i>	This is the trip time in the case of backward direction. The value is given in seconds and can be set within the range: 0.1 s to 0.8 s, in 0.01 s steps	0,2 s
<i>ZoneSelectivity</i> ⁽¹⁾	Activates/deactivates the function and selectivity time availability on the display.  NOTE: configure selectivities S, S2, I, 2I, MCR, G, Gext and MDGF OFF to ensure that selectivity D functions correctly	OFF
<i>Selectivity time Fw</i> ⁽¹⁾	This is the trip time of the protection with the zone selectivity function activated, forward direction and selectivity input Fw not present. The value is given in seconds and can be set within the range: 0.1 s to 0.8 s, in 0.01 s steps	0,13 s
<i>Selectivity time Bw</i> ⁽¹⁾	This is the trip time of the protection with the zone selectivity function activated, backward direction and selectivity input Bw not present. The value is given in seconds and can be set within the range: 0.1 s to 0.8 s, in 0.01 s steps	0,13 s
<i>StartUp enable</i>	Activates/deactivates the function and availability of the associated parameters on the display	OFF
<i>StartUp Threshold Fw</i> ⁽²⁾	Protection threshold valid during Startup time, in the conditions in which the function is activated and with forward current direction ⁽²⁾ . The value is given as both absolute value (amperes) and relative value (In) and can be set within the range: 0.6 In to 10 In, in 0.1 In steps	4 In
<i>StartUp Threshold Bw</i> ⁽²⁾	Protection threshold valid during Startup time, in the conditions in which the function is activated and with backward current direction. The value is given as both absolute value (amperes) and relative value (In) and can be set within the range: 0.6 In to 10 In, in 0.1 In steps	4 In
<i>StartUp Time</i> ⁽²⁾	This is the time for which the StartUp threshold remains activated and is calculated from the moment the activation Threshold is exceeded The value is given in seconds and can be set within the range: 0.1 s to 30 s, in 0.01 s steps	0.1 s
<i>Direction Min Angle</i>	Ekip UP+ calculates the displacement angle between the measured active and apparent power: when phase displacement exceeds the set Direction Min Angle parameter, the unit considers the fault direction to have been identified. The value is given in degrees and can be set within a range of 15 values from 3.6° to 69.6°	3,6 °

⁽¹⁾ details on page 105⁽²⁾ details on page 98

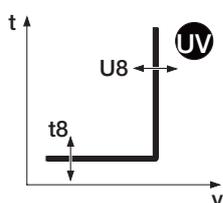
Limitations and additional functions

the functions blocking the type of selectivity and the *Trip only Forward* and *Trip Only Backward* parameters can also be accessed by means of the service connector (via Ekip Connect) or communication via system bus (page 106).

Notes

- activation of D directional protection automatically activates the alarm that monitors phase sequence (which can also be excluded and activated in the manual mode): note how, in the case of a cyclic sequence of phases that differs from the set value, in the event of a fault the directional protection inverts the reference direction with respect to the expected direction; details of the phase sequence protection are available on page 82
- in the case of small overcurrents, the behavior of the directional protection is influenced by the type of load: to prevent the direction of the fault current from being incorrectly interpreted in the case of capacitive loads, it is advisable for the setting of that protection to be made on the basis of real fault conditions and not overloads

UV Protection Function



The protection sends a TRIP command if one or more line-to-line voltages detected by the unit drop below threshold $U8$ for longer than $t8$.

To check and simulate the trip times in relation to all the parameters, please consult:

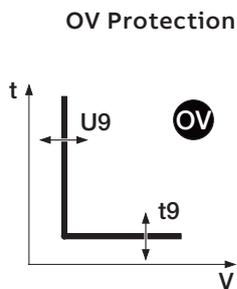
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 123)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold $U8$</i>	Establishes the value that activates the protection. Value is given as both absolute value (Volts) and relative value (U_n) and can be set within range: $0.5 U_n$ to $1 U_n$ in $0.001 U_n$ steps	$0,9 U_n$
<i>Time $t8$</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: $0.05 s$ to $120 s$, in $0.01 s$ steps	$5 s$

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

**Function**

The protection sends a TRIP command if one or more line-to-line voltages detected by the unit exceed threshold U_9 for longer than t_9 .

To check and simulate the trip times in relation to all the parameters, please consult:

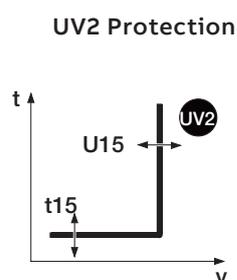
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 124)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold U_9</i>	Establishes the value that activates the protection. The value is given as both absolute value (Volts) and relative value (U_n) and can be set within the range: 1 U_n to 1.5 U_n in 0.001 U_n steps	1,05 U_n
<i>Time t_9</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.05 s to 120 s, in 0.01 s steps	5 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

**Function**

UV2 protection functions in the same way as UV protection: the protection sends a TRIP command if one or more line-to-line voltages detected by the unit drop below threshold U_{15} for longer than t_{15} .

It is independent of UV protection, thus thresholds and functions of the two protections can be programmed so as to take advantage of different plant solutions (example: signaling with UV and open command with UV2 or vice versa, or both for signaling or tripping).

To check and simulate the trip times in relation to all the parameters, please consult:

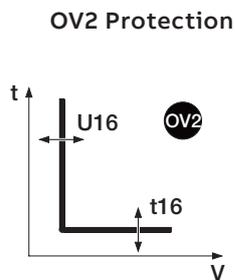
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 123)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold U_{15}</i>	Establishes the value that activates the protection. Value is given as both absolute value (Volts) and relative value (U_n) and can be set within range: 0.5 U_n to 1 U_n in 0.001 U_n steps	0,9 U_n
<i>Time t_{15}</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.05 s to 120 s, in 0.01 s steps	5 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

**Function**

OV2 protection functions in the same way as OV protection: the protection sends a TRIP command if one or more line-to-line voltages detected by the unit exceed threshold U16 for longer than t16.

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 124)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold U16</i>	Establishes the value that activates the protection. The value is given as both absolute value (Volts) and relative value (Un) and can be set within the range: 1 Un to 1.5 Un in 0.001 Un steps	1,05 Un
<i>Time t16</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.05 s to 120 s, in 0.01 s steps	5 s

Limitations and additional functions

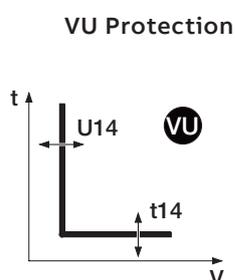
The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

Phase sequence protection

The *Phase Sequence* protection enables an alarm to be activated 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 – Signaling – Phase Sequence* menu, while the required sequence can be set in the *Settings - Phase Sequence* menu (page 44).

The required sequence can be set in the *Settings* menu and the protection activated in the *Advanced* menu (page 44).

**Function**

The protection trips if the line-to-line voltages read by the unit are unbalanced; the protection sends a TRIP command if the detected unbalance exceeds threshold U14 for longer than t14.

The protection excludes itself if the maximum value of the line-to-line voltage is less than 0.3 Un

To check and simulate the trip times in relation to all the parameters, please consult:

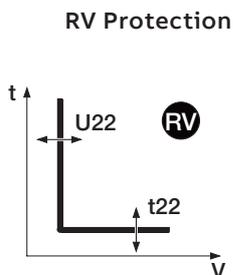
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 124)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold U14</i>	Establishes the unbalance value that trips the protection. Unbalance is expressed in percentage value and is calculated in the following way: % Unba = 100 x ($\Delta\max U_{mi}$) / U_{mi} in range: 2% to 90% in 1% steps. i NOTE: $\Delta\max U_{mi}$: maximum deviation among the three voltages calculated by comparing each line-to-line voltage with the mean value; U_{mi} : mean value of the line-to-line voltages	50 %
<i>Time t14</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.5 s to 60 s, in 0.5 s steps	5 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).



Function

The protection trips if loss of insulation occurs (verification of residual voltage U_0); the protection sends a TRIP command if voltage U_0 exceeds threshold U_{22} for longer than t_2 .

Protection is available in 3P and 3P + N configuration by activating the presence of neutral voltage in *Ekip Measuring* module or in external V0 configuration if *Ekip Synchrocheck* is present (page 153).

To check and simulate the trip times in relation to all the parameters, please consult:

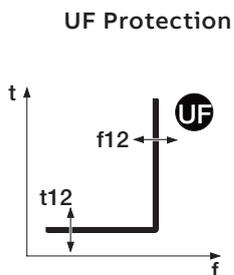
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 125)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold U_{22}</i>	Establishes the value that activates the protection. The value is given as both absolute value (V) and relative value (U_n) and can be set within the range: $0.05 U_n$ to $0.5 U_n$ in $0.001 U_n$ steps	$0,15 U_n$
<i>Time t_{22}</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.05 s to 120 s, in 0.01 s steps	15 s
<i>Reset Time</i>	This is the time the alarm is retained after the protection has quit the alarm condition; it can be useful for keeping the timing activated when the protection is temporarily deactivated. The value is given in seconds and can be set within the range: 0 s to 0.2 s, in 0.02 s steps	0 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).



Function

The protection sends a TRIP command if the grid frequency read by the unit drops below threshold f_{12} for longer than t_{12} .

The protection excludes itself if the maximum value of the line-to-line voltage is less than 30 V.

To check and simulate the trip times in relation to all the parameters, please consult:

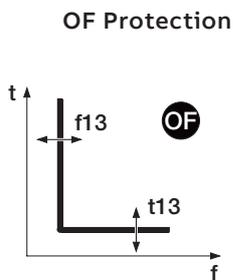
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 126)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold f_{12}</i>	Establishes the value that activates the protection. The value is given as both absolute value (Hertz) and relative value (F_n) and can be set within the range: 0.9 F_n to 1 F_n in 0.001 F_n steps	0,9 F_n
<i>Time t_{12}</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.06 s to 300 s, in 0.01 s steps	3 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

**Function**

The protection sends a TRIP command if the grid frequency read by the unit exceeds threshold f_{13} for longer than t_{13} .

The protection excludes itself if the maximum value of the line-to-line voltage is less than 30 V.

To check and simulate the trip times in relation to all the parameters, please consult:

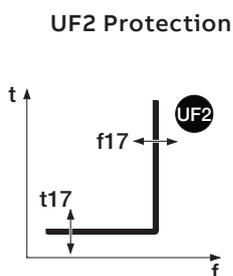
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 126)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold f_{13}</i>	Establishes the value that activates the protection. The value is given as both absolute value (Hertz) and relative value (Fn) and can be set within the range: 1 Fn to 1.1 Fn in 0.001 Fn steps	1,1 Fn
<i>Time t_{13}</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.06 s to 300 s, in 0.01 s steps	3 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

**Function**

UF2 protection functions in the same way as UF protection: the protection sends a TRIP command if the grid frequency read by the unit drops below threshold f_{17} for longer than t_{17} .

It is independent of UF protection, thus thresholds and functions of the two protections can be programmed so as to take advantage of different plant solutions (example: signaling with UF and open command with UF2 or vice versa, or both for signaling or tripping).

The protection excludes itself if the maximum value of the line-to-line voltage is less than 30 V.

To check and simulate the trip times in relation to all the parameters, please consult:

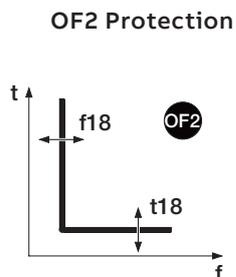
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 126)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold f_{17}</i>	Establishes the value that activates the protection. The value is given as both absolute value (Hertz) and relative value (Fn) and can be set within the range: 0.9 Fn to 1 Fn in 0.001 Fn steps	0,9 Fn
<i>Time t_{17}</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.06 s to 300 s, in 0.01 s steps	3 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).



Function

OF2 protection functions in the same way as OF protection: the protection sends a TRIP command if the grid frequency read by the unit exceeds threshold f_{18} for longer than t_{18} .

It is independent of OF protection, thus thresholds and functions of the two protections can be programmed so as to take advantage of different plant solutions (example: signaling with OF and open command with OF2 or vice versa, or both for signaling or tripping).

The protection excludes itself if the maximum value of the line-to-line voltage is less than 30 V.

To check and simulate the trip times in relation to all the parameters, please consult:

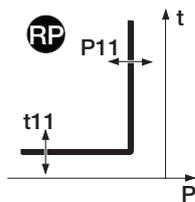
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 126)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold f_{18}</i>	Establishes the value that activates the protection. The value is given as both absolute value (Hertz) and relative value (Fn) and can be set within the range: 1 Fn to 1.1 Fn in 0.001 Fn steps	1,1 Fn
<i>Time t_{18}</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.06 s to 300 s, in 0.01 s steps	3 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

RP Protection**Function**

The protection sends a TRIP command if the reverse total active power exceeds threshold P11 for longer than t1.

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 127)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold f11</i>	Establishes the value that activates the protection. The value is given as both absolute value (kW) and relative value (Sn) and can be set within the range: -0.05 Sn to -1 Sn in 0.001 Sn steps i NOTE: the threshold expressed in Sn is preceded by the “-” sign to indicate that inverse power is involved	-0,1 Sn
<i>Time t11</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.05 s to 120 s, in 0.01 s steps	10 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

Cos ϕ Protection

The protection activates an alarm when the total Cos ϕ value drops below the set threshold.

Total cos ϕ is calculated as ratio between total active power and total apparent power.

Parameters

The parameters are available in the *Advanced - Signaling menu* (page 42)

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and availability of the threshold in the menu	OFF
<i>Threshold</i>	Defines the value that activates the protection; can be set within the range: 0.5 to 0.95 in 0.01 steps	0,95

VS Warning The *VS Warning* function activates the warning signal if all three of the line-to-line voltages measured by Ekip UP⁺ are within the window defined by the monitoring thresholds for the set time.

The *Advanced-Warnings* menu includes the *VS Warning* submenu from which the following parameters can be configured:

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates monitoring of the parameters and their availability in the menu	Off
<i>Signal source</i>	Defines whether the line-to-line voltages to be verified are those from the internal sockets (<i>Ekip Measuring</i> module) or from <i>Ekip Synchrocheck</i> , if present.  NOTE: if <i>Ekip Synchrocheck</i> is set, monitoring will refer to one single voltage	Meas.
<i>Threshold DOWN</i>	Establishes the lower value of the control band, given as both absolute value (V) and relative value (Un), which can be set within the range: 0.5 Un to 1 Un in 0.001 Un steps	0,9 Un
<i>Threshold UP</i>	Establishes the upper value of the control band, given as both absolute value (V) and relative value (Un), which can be set within the range: 1 Un to 1.5 Un in 0.001 Un steps	1,1 Un
<i>Time</i>	This is the monitoring time that activates the signal; the value is given in seconds and can be set within a range: 0.1 s to 900 s, in 0.1 s steps	30 s

FS Warning The *FS Warning* function activates the warning signal if the frequency measured by Ekip UP⁺ is within the window defined by the monitoring thresholds for the set time.

The *Advanced-Warnings* menu includes the *FS Warning* submenu from which the following parameters can be configured:

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates monitoring of the parameters and their availability in the menu	Off
<i>Signal source</i>	Defines whether the line-to-line voltages to be verified are those from the internal sockets (<i>Ekip Measuring</i> module) or from <i>Ekip Synchrocheck</i> , if present.  NOTE: if <i>Ekip Synchrocheck</i> is set, monitoring will refer to one single voltage	Meas.
<i>Threshold DOWN</i>	Establishes the lower limit value of the control band, given as both absolute value (Hertz) and relative value (Fn), which can be set within the range: 0.9 Fn to 1 Fn in 0.001 Fn steps	0,998 Fn
<i>Threshold UP</i>	Establishes the higher value of the control band, given as both absolute value (Hertz) and relative value (Fn), which can be set within range: 1 Fn to 1.1 Fn in 0.001 Fn steps	1,002 Fn
<i>Time</i>	This is the monitoring time that activates the signal; the value is given in seconds and can be set within the range: 0.1 s to 900 s, in 0.1 s steps	30 s

VS 2 Warning The *VS 2 Warning* function activates the warning signal if all three of the line-to-line voltages measured by Ekip UP⁺ are within the window defined by the monitoring thresholds for the set time.

The *Advanced-Warnings* menu includes the *VS 2 Warning* submenu from which the following parameters can be configured:

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates monitoring of the parameters and their availability in the menu	Off
<i>Signal source</i>	Defines whether the line-to-line voltages to be verified are those from the internal sockets (<i>Ekip Measuring</i> module) or from <i>Ekip Synchrocheck</i> , if present.  NOTE: if <i>Ekip Synchrocheck</i> is set, monitoring will refer to one single voltage	Meas.
<i>Threshold DOWN</i>	Establishes the lower value of the control band, given as both absolute value (V) and relative value (Un), which can be set within the range: 0.5 Un to 1 Un in 0.001 Un steps	0,9 Fn
<i>Threshold UP</i>	Establishes the upper value of the control band, given as both absolute value (V) and relative value (Un), which can be set within the range: 1 Un to 1.5 Un in 0.001 Un steps	1,1 Fn
<i>Time</i>	This is the monitoring time that activates the signal; the value is given in seconds and can be set within a range: 0.1 s to 900 s, in 0.1 s steps	30 s

FS 2 Warning The *FS 2 Warning* function activates the warning signal if the frequency measured by Ekip UP⁺ is within the window defined by the monitoring thresholds for the set time.

The *Advanced-Warnings* menu includes the *FS 2 Warning* submenu from which the following parameters can be configured:

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates monitoring of the parameters and their availability in the menu	Off
<i>Signal source</i>	Defines whether the line-to-line voltages to be verified are those from the internal sockets (<i>Ekip Measuring</i> module) or from <i>Ekip Synchrocheck</i> , if present.  NOTE: if <i>Ekip Synchrocheck</i> is set, monitoring will refer to one single voltage	Meas.
<i>Threshold DOWN</i>	Establishes the lower limit value of the control band, given as both absolute value (Hertz) and relative value (Fn), which can be set within the range: 0.9 Fn to 1 Fn in 0.001 Fn steps	0,998 Fn
<i>Threshold UP</i>	Establishes the higher value of the control band, given as both absolute value (Hertz) and relative value (Fn), which can be set within range: 1 Fn to 1.1 Fn in 0.001 Fn steps	1,002 Fn
<i>Time</i>	This is the monitoring time that activates the signal; the value is given in seconds and can be set within the range: 0.1 s to 900 s, in 0.1 s steps	30 s

3 - Protection Adaptive

The protections in the Standard package for Ekip UP+ Protect and the Monitor with Protect bundle are:
The protection is described below:

Dual Set The function enables two different protection configurations to be made, one as an alternative to the other, by means of a set change with programmable events.

The function can be activated in the *Settings-Dual Set* menu (page 44)

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the function	OFF
<i>Default Set</i>	Defines the sets of main and secondary protections (which activate in the presence of the programmed event)	Set A

The event that determines set change (from default to secondary) can be programmed in the *Advanced - Functions* menu, see the paragraph Programmable Functions and Commands (page 110).

4 - Generator protections

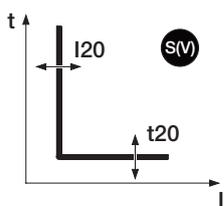
List The protections in the Standard package for Ekip UP+ Protect and the Monitor with Protect bundle are:

Name	Type of protection	Page
S(V)	Voltage control short-circuit	91
RQ	Reverse reactive power	93
OQ	Maximum reactive power	94
OP	Active overpower	94
UP	Active underpower	95
ROCOF	Rate of change of frequency	96
S2(V)	Voltage control short-circuit	97
Startup	Temporary exclusion of the trip thresholds	98



WARNING! The *Power flow* parameters effect the sign of the power and power factor values measured by the unit. *Power flow* must be configured and verified on the basis of your installation to ensure that all the protections of the *Power Protections* package function correctly.

S(V) Protection Function



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

If the current of one or more phases exceeds threshold I_{20} for longer than time t_{20} , the protection activates and sends a TRIP command.

Following a voltage drop, the I_{20} threshold varies according to two different modes:

- **Step** provides for a stepped variation, depending on parameters U_I and K_s .
- **Lin** (linear) provides for a dynamic variation, depending on parameters U_I , U_h and K_s .

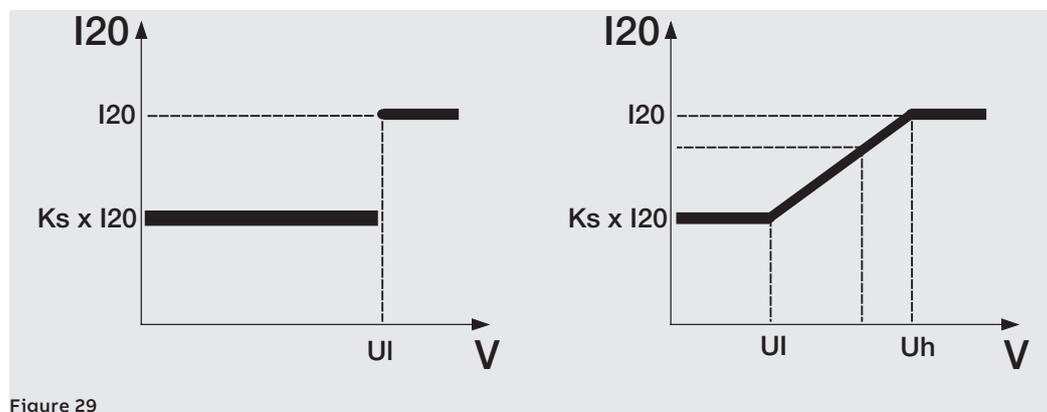


Figure 29

Continued on the next page

To check and simulate the trip times in relation to all the parameters, please consult:

- the summary table of the protections with the calculation formulas (page 113)
- the graph with trip curve (page 125)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Curve</i>	Allows the operating mode, Step or Lin, to be selected	Scal
<i>Threshold I20</i>	Establishes the value that activates the protection and contributes towards calculating the trip time. The value is given as both absolute value (amperes) and relative value (In) and can be set within the range: 0.6 In to 10 In, in 0.1 In steps	1 In
<i>Threshold UI</i>	This is the voltage that determines the change in trip threshold I20; the behavior differs, depending on the mode selected ⁽¹⁾ The value is given as both absolute value (V) and relative value (Un) and can be set within the range: 0.2 Un to 1 Un in 0.01 Un steps	1 Un
<i>Threshold Uh</i>	The parameter is shown by the Lin curve and contributes towards I20 trip threshold calculation: • with voltage reading < Uh (and ≥ UI), the threshold changes gradually ⁽¹⁾ • with voltage reading ≥ Uh, the threshold is I20 The value is given as both absolute value (V) and relative value (Un) and can be set within the range: 0.2 Un to 1 Un in 0.01 Un steps	1 Un
<i>Threshold Ks</i>	I20 threshold calculation constant. The value is given as percentage of threshold I20 and can be set within the range: 0.1 I20 to 1 I20, in 0.01 steps	0,6 I20
<i>Time t20</i>	This is the trip time of the protection. The value is given in seconds and can be set within the range: 0.05 s to 30 s, in 0.01 s steps	0.1 s

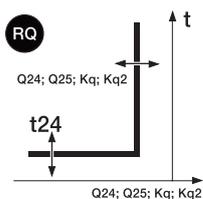
(1) Trip threshold (depending on the operating curve)

Mode	Voltage reading	Trip threshold
Scal	< UI	$Ks \times I20$
	≥ UI	I20
Lin	< UI	$Ks \times I20$
	≥ UI (e < Uh)	$((I20 \times (1 - Ks) \times (U_{mis} - Uh)) / (Uh - UI)) + I20$

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

RQ Protection Function



RQ protection protects against reactive power reversal; the threshold can be adjusted on the basis of the active power.

The protection sends a TRIP command when inverse reactive power enters the TRIP area, determined by the protection parameters and power value readings, for longer than t_{24} .

Adjustment of constants K_q and K_{q2} allows the trip threshold of the protection (determined by the intersection of the two TRIP areas, whose limits depend on the parameters configured in the unit) to be changed.

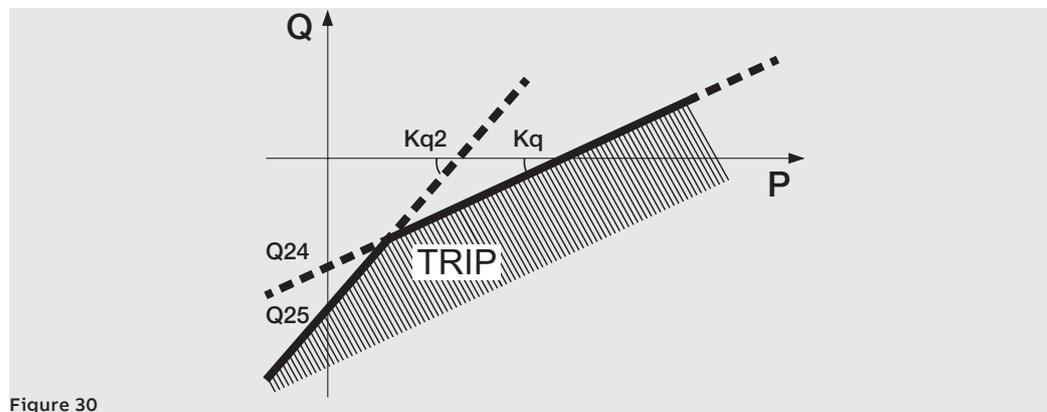


Figure 30

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 129)

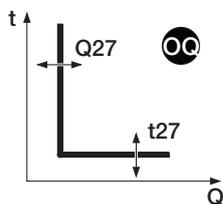
Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold Kq</i>	Defines the gradient of the line relating to threshold Q24. The value is given as absolute value (slope of the line) and can be set within the range: -2 to 2 in 0.01 steps	-2
<i>Threshold -Q24</i>	This is the reactive power required to define the trip line and relative TRIP area. The value is given as both absolute value (kVAR) and relative value (S_n) and can be set within the range: 0.1 S_n to 1 S_n in 0.001 S_n steps i NOTE: the threshold expressed in S_n is not preceded by the "-" sign, but should still be understood as inverse reactive power	0,1 S_n
<i>Threshold Kq2</i>	Defines the gradient of the line relating to threshold Q25. The value is given as absolute value (slope of the line) and can be set within the range: -2 to 2 in 0.01 steps	2
<i>Threshold -Q25</i>	Defines the reactive power value at which the protection trips and is required for the purpose of defining the relative TRIP area. The value is given as both absolute value (kVAR) and relative value (S_n) and can be set within the range: 0.1 S_n to 1 S_n in 0.001 S_n steps i NOTE: the threshold expressed in S_n is not preceded by the "-" sign, but should still be understood as inverse reactive power	0,11 S_n
<i>Time t24</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.5 s to 100 s, in 0.1 s steps	100 s
<i>Threshold Vmin</i>	It is the minimum voltage for activation of the protection. If a there is at least one line-to-line voltage present below the V_{min} threshold, the protection is not active. The value is given as both absolute value (V) and relative value (U_n) and can be set within the range: 0.5 U_n to 1.2 U_n in 0.01 U_n steps	0.5 U_n

Continued on the next page

Limitations and additional functions

- Ekip UP+ accepts parameters in accordance with the following limitations: $Q24 < Q25$ and $Kq < Kq2$
- the block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

OQ Protection Function

The protection sends a TRIP command if one or more of the reactive power values detected by the unit exceed threshold $Q27$ for longer than $t27$.

To check and simulate the trip times in relation to all the parameters, please consult:

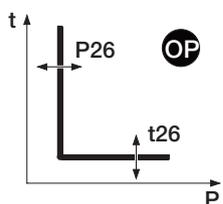
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 128)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold Q27</i>	Establishes the value that activates the protection. The value is given as both absolute value (kVAR) and relative value (S_n) and can be set within the range: $0.4 S_n$ to $2 S_n$ in $0.001 S_n$ steps	$1 S_n$
<i>Time t27</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: $0.5 s$ to $100 s$, in $0.5 s$ steps	$1 s$

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

OP Protection Function

The protection sends a TRIP command if one or more of the active power values detected by the unit exceed threshold $P26$ for longer than $t26$.

To check and simulate the trip times in relation to all the parameters, please consult:

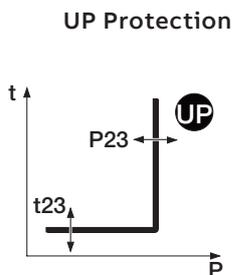
- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 128)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold P26</i>	Establishes the value that activates the protection. The value is given as both absolute value (kW) and relative value (S_n) and can be set within the range: $0.4 S_n$ to $2 S_n$ in $0.001 S_n$ steps	$1 U_n$
<i>Time t26</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: $0.5 s$ to $100 s$, in $0.5 s$ steps	$1 s$

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).



Function

The protection sends a TRIP command if one or more of the active power values detected by the unit drop below threshold P23 for longer than t23.

The protection is active also for negative (reverse) active power, but is independent from the RP protection (Reverse active power protection).

The protection excludes itself if the maximum value of the line-to-line voltage is less than 30 V.

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 129)

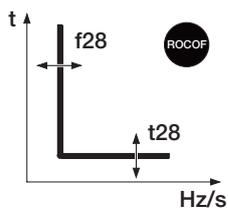
Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold P23</i>	Establishes the value that activates the protection. The value is given as both absolute value (kW) and relative value (Sn) and can be set within the range: 0.1 Sn to 1 Sn in 0.001 Sn steps	1 Sn
<i>Time t23</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.5 s to 100 s, in 0.5 s steps	1 s
<i>StartUp enable</i>	Activates/deactivates the function and availability of the StartUp Time parameter in the menu	OFF
<i>StartUp Time</i>	This is the time for which the threshold remains disabled and is calculated from the moment the activation Threshold is exceeded. The value is given in seconds and can be set within the range: 0.1 s to 30 s, in 0.01 s steps	0.1 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

ROCOF Protection



Function

ROCOF protection protects against rapid frequency changes: the protection sends an opening command if the frequency measured by the unit (f_{mis} in the next example) changes faster than threshold f_{28} set for longer than t_{28} .

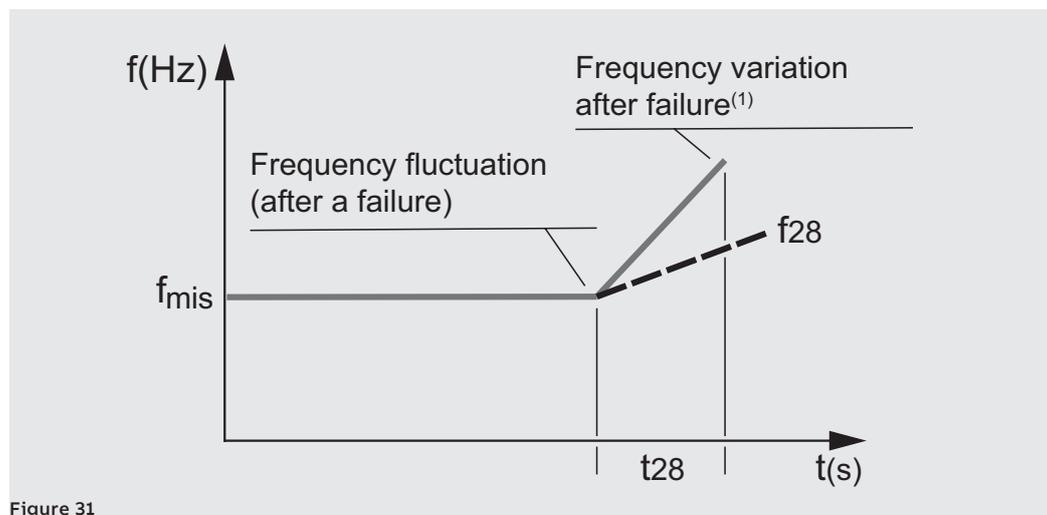


Figure 31

⁽¹⁾ example with positive linear variation of the higher frequency of the set f_{28} value; the protection also manages negative variations

The protection excludes itself if the maximum value of the line-to-line voltage is less than 30 V.

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 114)
- the graph with trip curve (page 130)

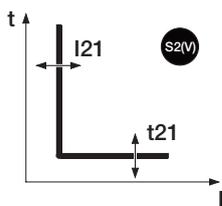
Parameters

Parameter	Description	Default
Enable	Activates/deactivates the protection and its availability in the parameters menu	OFF
Trip Enable	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
Threshold f_{28}	establishes the maximum admissible frequency variation rate over time; the protection trips if this rate is exceeded. The value is given as absolute value (Hz/s) F_n and can be set within the range: 0.4 Hz/s to 10 Hz/s in 0.2 Hz/s steps	0,6 Hz/s
Trip Direction	Establishes whether the protection monitors an increase (Up), a decrease (Down) or both variations (Up and Down)	Up or Down
Time f_{28}	This is the trip time of the protection; the value is given in seconds and can be set within a range: 0.06 s to 300 s, in 0.01 s steps	0,5 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

S(V) Protection Function



S2(V) protection functions in the same way as S(V) protection and protects against short-circuits, with threshold sensitive to the voltage value.

It is independent of S(V) protection, thus thresholds and functions of the two protections can be programmed so as to take advantage of different plant solutions (example: signaling with S(V) and open command with S2(V) or vice versa, or both S(V) and S2(V) for signaling or tripping).

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

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

- **Step** provides for a stepped variation, depending on parameters UI2 and Ks2.
- **Lin** (linear) provides for a dynamic variation, depending on parameters UI2, Uh2 and Ks2.

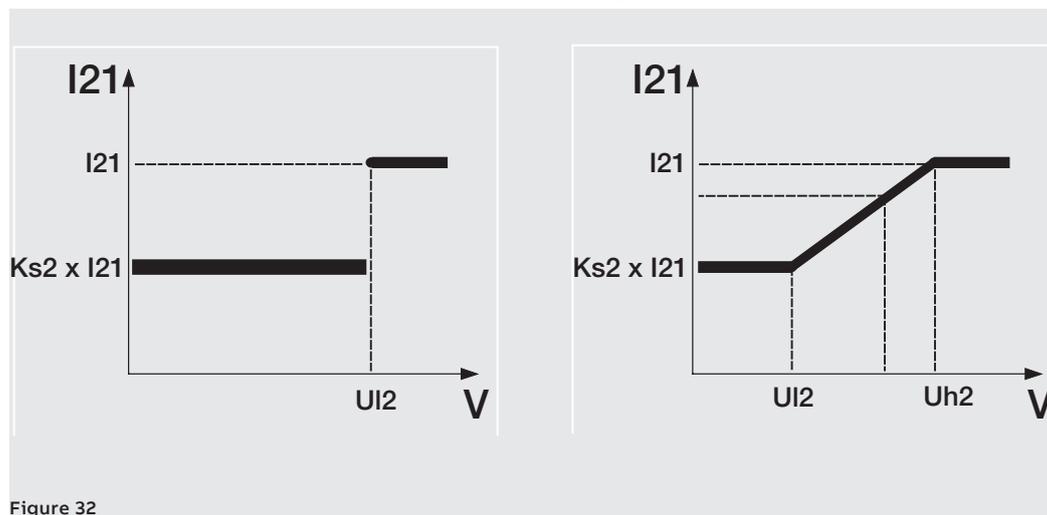


Figure 32

To check and simulate the trip times in relation to all the parameters, please consult:

- the summary table of the protections with the calculation formulas (page 114)
- the graph with trip curve (page 125)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Curve</i>	Allows the operating mode, Step or Lin, to be selected	Scal
<i>Threshold I21</i>	Establishes the value that activates the protection and contributes towards calculating the trip time. The value is given as both absolute value (amperes) and relative value (In) and can be set within the range: 0.6 In to 10 In, in 0.1 In steps	1 In
<i>Threshold UI2</i>	It is the voltage that determines the change in trip threshold I21; the behavior differs, depending on the mode selected ⁽¹⁾ The value is given as both absolute value (V) and relative value (Un) and can be set within the range: 0.2 Un to 1 Un in 0.01 Un steps	1 Un

Continued on the next page

Parameter	Description	Default
Threshold U_{h2}	The parameter is shown by the Lin curve and contributes towards I21 trip threshold calculation: <ul style="list-style-type: none"> with voltage reading $< U_{h2}$ (and $\geq U_{l2}$), the threshold changes gradually⁽¹⁾ with voltage reading $\geq U_{h2}$, the threshold is I21 The value is given as both absolute value (V) and relative value (Un) and can be set within the range: 0.2 Un to 1 Un in 0.01 Un steps	1 Un
Threshold K_{s2}	I21 threshold calculation constant. The value is given as percentage of threshold I21 and can be set within the range: 0.1 I21 to 1 I21, in 0.01 steps	0,6 I21
Time t_{21}	This is the trip time of the protection. The value is given in seconds and can be set within the range: 0.05 s to 30 s, in 0.01 s steps	0.1 s

(1) Trip threshold (depending on the operating curve)

Mode	Voltage reading	Trip threshold
Scal	$< U_{l2}$	$K_{s2} \times I_{21}$
	$\geq U_{l2}$	I21
Lin	$< U_{l2}$	$K_{s2} \times I_{21}$
	$\geq U_{l2}$ (e $< U_{h2}$)	$((I_{21} \times (1 - K_{s2}) \times (U_{mis} - U_{h2})) / (U_{h2} - U_{l2})) + I_{21}$

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

Startup Protection

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

i **NOTE:** for UP protection, startup means the time for which the protection is disabled

The period begins after a threshold has been exceeded (activation threshold), user-programmable via Ekip Connect or system bus, valid and verified for all phase currents.

The Startup condition elapses after Startup time and re-activates the next time the activation threshold is exceeded

i **NOTE:** startup does not occur again until at least one current remains above activation threshold level

A graphic representation with S protection follows:

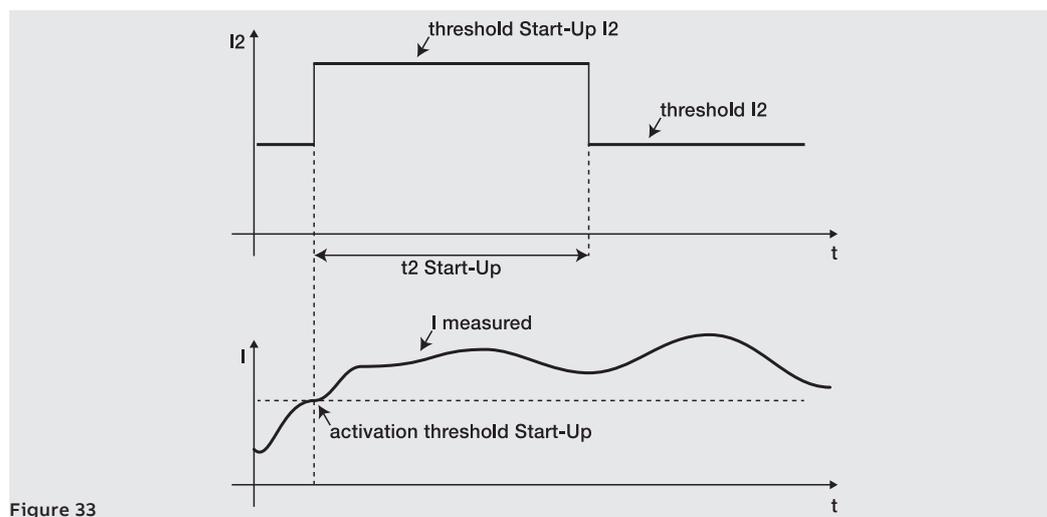


Figure 33

5 - Motor protections

List The protections in the Motor protection package for Ekip UP+ Protect and the Monitor with Protect bundle are:

Name	Type of protection	Page
R JAM	Motor block (post startup)	100
R STALL	Motor block (always activated)	100
UC	Under-current	101
U	Phase loss	101
PTC	Maximum temperature	102

The Motor protections conform to standard IEC 60947-4-1 and relative annex 2.

Trip class and parameters The trip class mentioned in standard IEC 60947-4-1 is available in Trip units with Motor Class parameter.

Its value establishes:

- the trip time of L protection (*Time t_l*)
- the start-up time (*Motor start-up*), calculated from the moment that at least one phase exceeds the fixed threshold of $0,25 \times I_1$, during which some protections are inhibited
- the thermal memory L reset time after a TRIP (*t_{mem res}*).

Motor Class	t ₁ (s)	Motor start-up (s)	t _{mem res} (min)
5E	12	3	5
10E	22	5	10
20E	45	10	20
30E	72	20	33

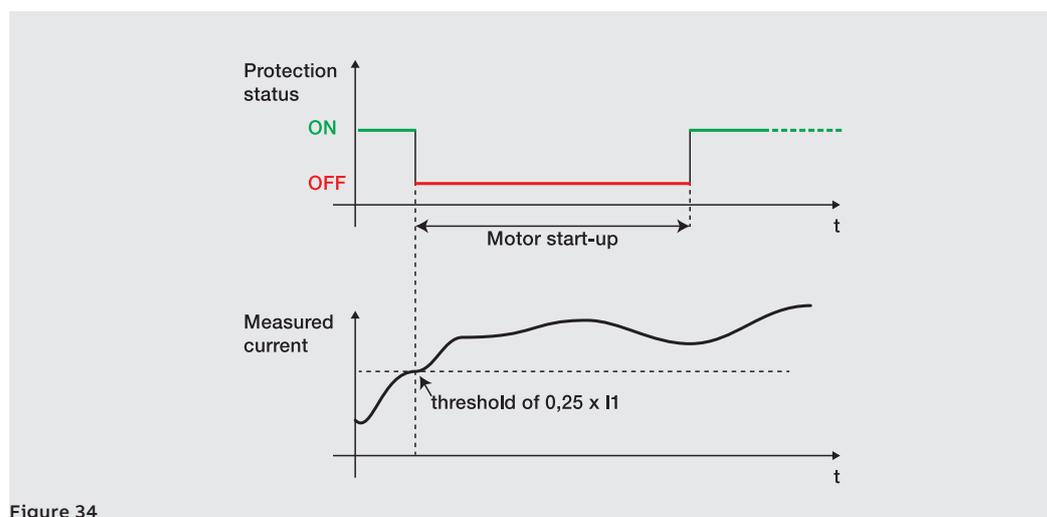


Figure 34



NOTE: temporary switch-off during Motor Start-up is valid and activated for protections G, R Jam and U if enabled; if the protections are disabled they remain off before and after Motor Start-up.

Continued on the next page

Thresholds Unlike the other current protections, the R Stall, R Jam and UC thresholds are not related to I_n , but to threshold I_1 (L protection), given as I_r in the respective configuration menus;

Example

Rating plug = 400 A, Threshold $I_1 = 0.8 I_n$ (→ 320 A); Threshold $I_j = 2.5 I_r$ (→ $2.5 \times 320 \text{ A} = 800 \text{ A}$)

Protection R JAM

Function

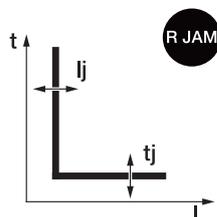
R Jam is a protection against motor block: if the current of one or more phases exceeds threshold I_j for longer than time t_j , the protection activates and sends a TRIP command.

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

To check and simulate the trip times in relation to all the parameters, please consult:

- the summary table of the protections with the calculation formulas (page 114)
- the graph with trip curve (page 131)

Parameters



Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold I_j</i>	Establishes the value that activates the protection. The value is given as both absolute value (amperes) and relative value (I_r) and can be set within the range: $1 I_r$ to $10 I_r$ in $0.1 I_r$ steps	$1,0 I_r$
<i>Time t_j</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 2 s to 10 s, in 0.5 s steps	2 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

Protection R STALL

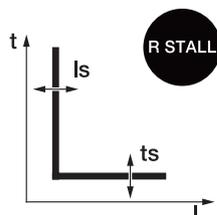
Function

R Stall protects against motor block, but unlike R Jam, it is not inhibited during *Motor startup-up*: if the current of one or more phases exceeds threshold I_r for longer than time t_r , the protection activates and sends a TRIP command.

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of performance with the calculation formulas (page 115)
- the graph with trip curve (page 131)

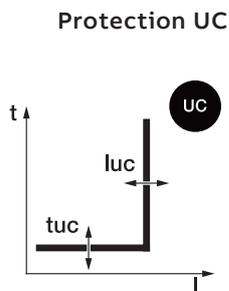
Parameters



Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold I_s</i>	Establishes the value that activates the protection. The value is given as both absolute value (amperes) and relative value (I_r) and can be set within the range: $2 I_r$ to $10 I_r$ in $0.1 I_r$ steps	$2,0 I_r$
<i>Time t_s</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 1 s to 10 s, in 0.5 s steps	1 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

**Function**

UC protects the motor in reduced or no load conditions: the protection sends a TRIP command if all the current values detected by the unit drop below threshold l_{uc} for longer than time t_{uc} .

To check and simulate the trip times in relation to all the parameters, please consult:

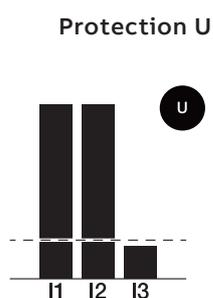
- summary table of performance with the operating characteristics (page 115)
- the graph with trip curve (page 132)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Threshold l_{uc}</i>	Establishes the value that activates the protection. The value is given as both absolute value (amperes) and relative value (I_r) and can be set within the range: 0.5 I_r to 0.9 I_r in 0.1 I_r steps	0,5 I_r
<i>Time t_{uc}</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 1 s to 20 s, in 0.5 s steps	1 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

**Function**

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

If an alarm due to U protection occurs during *Motor start-up*, the trip unit calculates the trip time of the protection using whichever is the lowest value between: t_u and half of *Motor start-up*



IMPORTANT: in this case, if the alarm occurs on start-up and the calculated TRIP time is sufficiently long to last even until the Motor start-up window closes, the trip unit still considers the previously calculated minimum value as TRIP time

To check and simulate the trip times in relation to all the parameters, please consult the summary table of performance with the operating characteristics (page 115)

Parameters

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	OFF
<i>Time t_u</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 1 s to 10 s, in 0.5 s steps	1 s

Limitations and additional functions

The block functions can also be accessed by means of the service connector (via Ekip Connect) or by connection to the system bus (page 106).

PTC Protection Function

PTC protects the motor against overtemperatures.

The Trip unit receives the alarm from the *Ekip CI* module to which a thermocouple can be connected for the purpose of monitoring the temperature of the motor: the protection sends a TRIP command if the temperature measured exceeds 120 °C for more than one second.

Parameters

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

6 - Additional protections and functions

Introduction Some protections have additional functions which extend their characteristics and performance:

Name	Type of protection	Page
Thermal Memory	overheating of the cables	103
Zone selectivity	management of trip commands in a network of circuit-breakers	104
Blocks	blocking of protection on the basis of programmable events	106
Startup	different thresholds on the basis of monitoring thresholds	98
Current thresholds	Current control with programmable thresholds	109
Programmable Commands	Programmable commands with trip unit events or statuses	110

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

Name	Type of protection	Page
Gext	External earth fault with adjustable delay	76
Rc	Residual current	76
Synchrocheck	Synchronism between two independent voltage sources	110
MDGF	Modified differential ground fault	107



NOTE: These functions are available with Ekip UP⁺ in the Protect version and in the Monitor with Protect bundle. Some of the functions described in Programmable functions and commands are available in the Monitor version, (page 110)

Thermal Memory Protection The function, which is available for L and S protections, prevents the cables connected to the devices controlled by Ekip UP⁺ from overheating: if a series of trips occurs one after the other, the unit considers the time that elapses between commands and entity of the faults so as to reduce the opening time.



IMPORTANT: for the S protection the function can be activated if the selected curve is time-dependent.



NOTE: the function also reduces the trip time in the case of overloads which have not led to the open command (longer than 100 ms)

S, S2, I, 2I, MCR, G, Gext, MDGF zone selectivity Protection

The function, which can be activated for S, S2, I, 2I, MCR, G, Gext and MDGF protections (if available and enabled), allows several devices belonging to the same installation (including Ekip UP⁺) to be connected to each other, so as to handle trip commands in the best possible way in the case of S, S2, I, 2I, MCR, G, Gext and MDGF protections.

The function allows the devices to be coordinated so that, if a fault occurs:

- the device nearest to the fault trips
- the other devices are blocked for a programmable time



NOTE: connection can be made between ABB devices that have the zone selectivity function

Characteristics

Ekip UP⁺ has five selectivity connections, located on the rear connectors of the CB:

Name	Type	Description	Connection
Szi	Input	S, S2, I, 2I and MCR protection selectivity input	From devices on the load side
Szo	Output	S, S2, I, 2I and MCR protection selectivity output	To devices on the supply side
Gzi	Input	G protection selectivity input	From devices on the load side
		G, Gext and MDGF protection selectivity input	
Gzo	Output	G protection selectivity output	To devices on the supply side
		G, Gext and MDGF protection selectivity output	
Szc	Common	Common connection of selectivity network	The entire selectivity network

Configuration

To correctly configure the selectivity network of one or more protections:

1. Connect zone selectivity outputs of the same type (example: Szo) of devices belonging to the same zone, to the zone selectivity input of the device immediately upstream (example: Szi).
2. Connect all the Szc of devices in the same network together.
3. Time t₂ must be configured at t_{2 sel} + 50 ms or more, with the exclusion of the device further along its network.

Logic table

The table includes all cases in which, with zone selectivity enabled in the device, an alarm condition occurs or a zone selectivity signal is received from another device.



NOTES:

- the table gives the S protection cases, but is also valid for the other protections: G, S2, I, 2I, MCR, Gext and MDGF, each with its respective connections
- if the selectivities of protections that share the same connections are active at the same time (example: S, S2, I, 2I and MCR), the inputs/outputs are managed with OR logic

Condition	Szi	Szo	Tripping time	Remarks
If < I ₂	0	0	No TRIP	TRIP II device not in alarm status
If < I ₂	1	1	No TRIP	The device is not in the alarm status, but sends the selectivity signal received from the device upstream
If > I ₂	0	1	t _{2 sel} ⁽¹⁾	The device is in the alarm status and is the first to detect the fault: trips within time t _{2 sel} ⁽¹⁾
If > I ₂	1	1	t ₂ ⁽²⁾	The device is in the alarm status but is not the first to detect the fault: trips within time t ₂ ⁽²⁾

⁽¹⁾ the trip time of protection I is that of protection

⁽²⁾ for I protection tripping time is 100ms

D zone selectivity Protection Foreword

This function, which can be activated for D protection (if available and enabled), enables devices belonging to the same installation (including Ekip UP⁺) to be connected to each other so as to handle the trip commands in a better way in the case of D protection.

It is especially useful in ring and grid type systems where, besides the zone, it is essential to also define the direction of the power flow that supplies the fault.

The function allows the devices to be coordinated so that, if a fault occurs:

- The device nearest to the fault trips
- The other devices are blocked for a programmable time



NOTES:

- connection can be made between ABB devices that have the zone selectivity function
- disable the zone selectivities of protections S, S2, I, 2I, MCR, G, Gext and MDGF to correctly use the selectivity D function

Characteristics

Ekip UP⁺ has five selectivity connections, located on the upper terminal box of the CB:

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

Configuration

To correctly configure selectivity D in a ring system:

1. Connect the zone selectivity outputs of each device (example: DFin) to the selectivity input of the same direction as the device immediately after (example: DFout).
2. Connect all the Szc of devices in the same network together.

Logic table

The table includes all cases in which, with zone selectivity enabled in the device, an alarm condition occurs or a zone selectivity signal is received from another device.

The Forward output is activated if the **fault direction** coincides with the **reference direction** otherwise, if it is in the opposite direction, the Backward output is activated (page 78)

Fault direction	Condition	DFin	Dbin	Dfout	Dbout	Tripping time	Remarks
Forward	If < I7 Fw	0	x	0	x	No TRIP	Device 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 the alarm status, but sends the selectivity signal received to 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 the alarm status and is the first to detect the fault: trips within 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 the alarm status but is not the first to detect the fault: trips within time t7 Fw (or t7 Bw)
Backward	If > I7 Bw	x	1	x	1	t7 Bw	



NOTE: when zone selectivity is active and the direction of the fault cannot be established, the unit trips by considering the first threshold to be exceeded between I7 Fw and I7 Bw, without activating any output (DFout or Dbout); if both the thresholds have been exceeded (for example, if they have been set with the same value), the unit trips after the shortest time between t7 Fw and t7 Bw.

Trip Only Forward and Backward

D protection can be configured (if available and enabled) with 2 additional parameters via the service connector (via Ekip Connect) or via system bus communication:

- *Trip only Forward*: if activated, D protection only controls open commands if forward direction is detected
- *Trip only Backward*: if activated, D protection only controls open commands if backward direction is detected

faults in the opposite direction are only handled as alarm information.

Type of selectivity

The zone selectivity inputs and certain of the outputs can be configured via service connector (via Ekip Connect) or via system bus communication for protections S, S2, I, 2I, MCR, G, Gext, MDGF and D (if available and enabled):

- *Standard*: operation as by zone selectivity standard logic (default configuration)
- *Customized*: the event that activates the zone selectivity input or output can be selected in this mode.



IMPORTANT: in the Customized configuration, the only zone selectivity activation event is the one set and standard selectivity operation is therefore not active (changes should only be made by expert technical personnel).

Block functions

Six blocks can be configured for certain protections by means of the service connector (via Ekip Connect) or communication via system bus. These blocks are useful for deactivating the protections relating to programmable events:

Block name	Description
BlockOnProgStatusA	Block active if programmable status A is true
BlockOnProgStatusB	Block active if programmable status B is true
BlockOnProgStatusC	Block active if programmable status C is true
BlockOnProgStatusD	Block active if programmable status D is true
BlockOnStartUp	Block active during StartUp time (if StartUp for the specific protection is available and activated)
BlockOnOutOfFrequency	Block active if frequency measured is not within 30 Hz to 80 Hz range

Each block is independent and has its own activation command (Block On); however, each protection can be configured with several block conditions (operation in OR logic condition).

The protections which have blocks are: S, I, G, Gext, MDGF, MCR, 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: the blocks can cause:

- **increase of protection trip times (max: + 30 ms), owing to verification of the event itself (example: (frequency check))**
- **undesired deactivation of the protection, if the block is associated with statuses or signals to modules via local bus and auxiliary power supply is absent. In this case, it may be useful to also consider the status of the auxiliary power supply (Supply from Vaux) when programming the event**
- **undesired deactivation of the protection, if the block is associated with frequency measurements and the voltage is less than the minimum calculation threshold**



IMPORTANT: if the function is activated, the blocks are deactivated during startup (except for BlockOnStartup, which functions during this period)

MDGF Protection Function



MDGF protection protects against earth faults and detects the fault current with a dedicated toroid MDGF. If the MDGF toroid current exceeds threshold I41, the protection trips and, after a time established by the value read and by the parameter settings, transmits the TRIP command.

To check and simulate the trip times in relation to all the parameters, please consult:

- summary table of the protections with the operating characteristics (page 113)
- the graph with trip curve (page 122)

Parameters

Toroid configuration is available in the Settings menu (page 44)

Parameter	Description	Default
<i>External Toroid</i>	It allows the presence of <i>toroid MDGF</i> to be activated	OFF
<i>MDGF In Size</i>	Visible if External Toroid parameter setting is ON. Sets rated current size for MDGF protection. The value can be set within the 100 A – 1200 A range in 1 A steps	100 A

Continued on the next page

Protection configuration is available in the Advanced menu (page 42)

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	OFF
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	ON
<i>Curve</i>	Establishes curve dynamics and the threshold or trip time calculation: <ul style="list-style-type: none"> • $t = k$: fixed time trip • $t = k/I^2$: inverse time-delay dynamic trip 	$t = k$
<i>Threshold I41</i>	Establishes the value that activates the protection and contributes towards calculating the trip time. The value is given as both absolute value (amperes) and relative value (In) and can be set within the range: 0.1 In to 1 In, in 0.001 In steps	0,2 In
<i>Time t41</i>	It is the trip time or contributes towards timing calculation, depending on the type of curve selected. The value is given in seconds and can be set within the range: <ul style="list-style-type: none"> • 0.05 s to 1 s, in 0.05 s steps for $t=k$ • 0.1 s to 1 s, in 0.05 s steps for $t=k/I^2$  NOTE: with CB in UL configuration, the maximum settable value of t41 is 0.4 s	0,4 s
<i>Threshold I41</i>	Warns that the measured current is near to the protection activation threshold. The value is given in percentage of threshold I1 and can be set within the range 50% I41 to 90% I41, in 1% steps. The prealarm condition deactivates in two cases: <ul style="list-style-type: none"> • current lower than prealarm threshold I41 • current higher than threshold I41 	90 % I41
<i>ZoneSelectivity</i>	Activates/deactivates the function and selectivity time availability on the display ⁽¹⁾  NOTES : <ul style="list-style-type: none"> • the function is only available with curve $t = k$ • if at least two of the selectivity G, Gext and MDGF are enabled, the input and output are shared with the OR function; it is sufficient that even a selectivity is activated to stimulate inputs and outputs 	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function activated and selectivity input not present ⁽¹⁾ The value is given in seconds and can be set within the range: 0.04 s to 0.2 s, in 0.01 s steps	0,04 s
<i>StartUp enable</i>	Activates/deactivates the function and availability of the associated parameters on the display ⁽²⁾	OFF
<i>StartUp Threshold</i>	Protection threshold valid during Startup time, in the conditions in which the function is activated ⁽²⁾ The value is given as both absolute value (amperes) and relative value (In) and can be set within the range: 0.2 In to 1 In, in 0.1 In steps	0,2 In
<i>StartUp Time</i>	This is the time for which the StartUp threshold remains activated and is calculated from the moment the activation Threshold is exceeded ⁽²⁾ The value is given in seconds and can be set within the range: 0.1 s to 30 s, in 0.01 s steps	0.1 s

⁽¹⁾ details on page 113⁽²⁾ details on page 98**Limitations and additional functions**

- in the presence of curve $t = k/I^2$, the protection trip time is forced to t41 if the calculation results give a theoretical value lower than t41 itself
- Ekip UP + activates and displays the MDGF protection parameters if the presence of toroid MDGF has been enabled in the Settings menu (page 44);
- the block functions and type of selectivity can also be accessed by means of the service connector (via Ekip Connect) or communication via system bus (page 106)

Current thresholds Function

The Current thresholds allow checks to be set along the current lines, to be associated 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 relating to I1
- Threshold Iw1 and Threshold Iw2, with control relating to In

The thresholds can be enabled and set in the Advanced - Signaling menu (page 42).



IMPORTANT:

- the current thresholds do not handle the trip, just the signal
- the function is activated if the unit is powered by auxiliary voltage

Parameters

Threshold	Available parameters	Default
Threshold 1 I1	<i>Enable</i> : Activates the protection and availability of the threshold in the menu	OFF
	<i>Threshold</i> : The value is given in percentage of threshold I1 and can be set within the range: 50% I1 to 100% I1, in 1% steps.	50 % I1
Threshold 2 I1	<i>Enable</i> : Activates the protection and availability of the threshold in the menu	OFF
	<i>Threshold</i> : The value is given in percentage of threshold I1 and can be set within the range: 50% I1 to 100% I1, in 1% steps.	75 % I1
Threshold Iw1	<i>Enable</i> : Activates the protection and availability of the threshold in the menu	OFF
	<i>Direction</i> : allows the user to choose whether to have the signal when the current is higher (Up) or lower (Down) than the threshold.	Down
	<i>Threshold</i> : The value is given as both absolute value (amperes) and relative value (In) and can be set within the range: 0.1 In to 10 In, in 0.01 In steps	3 In
Threshold Iw2	<i>Enable</i> : Activates the protection and availability of the threshold in the menu	OFF
	<i>Direction</i> : allows the user to choose whether to have the signal when the current is higher (Up) or lower (Down) than the threshold.	Up
	<i>Threshold</i> : The value is given as both absolute value (amperes) and relative value (In) and can be set within the range: 0.1 In to 10 In, in 0.01 In steps	3 In

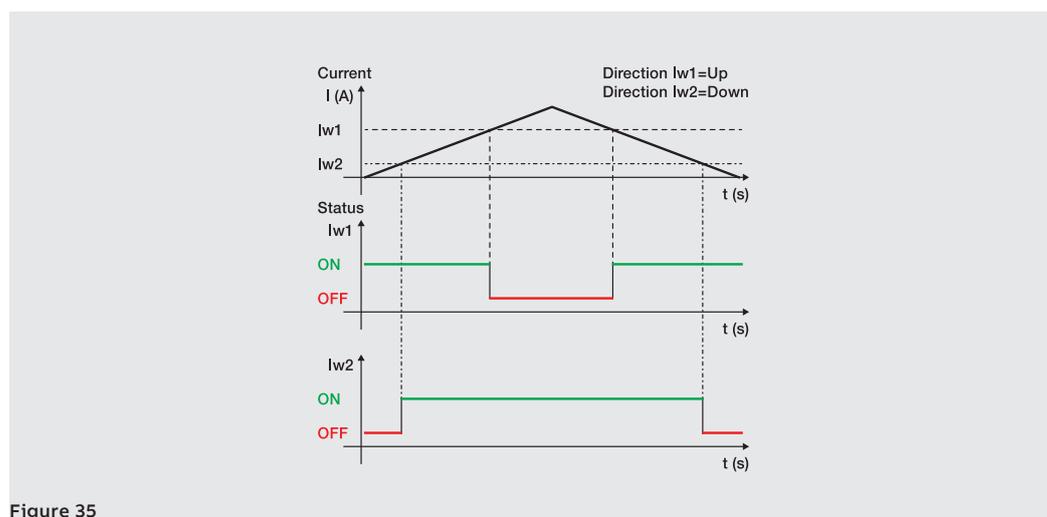


Figure 35

Synchrocheck With regard to closing the interconnection switch, the *Ekip Synchrocheck* module recognizes and reports whether there are synchronism conditions between two independent voltage sources (example: generator + grid).

A description of the module, the protection function and performance is given in the chapter dedicated to the modules (page 205).

Programmable Functions and Commands Nine commands are available, with activation that can be programmed on the basis of signals or events. Distributed among different Ekip UP⁺ menus, the commands are:

Name	Description	Path (page)
External Trip	Sends a TRIP command	<i>Advanced - Functions</i> (42)
Trip RESET	Reset of the trip signal	
Turn on SET B	Changes the protections set, from Set A to Set B	
2I Mode	Configure protection 2I	<i>Advanced - Functions - 2I Menu</i> (73)
RESET Energy	Resets the energy meters	<i>Measurements - Energy</i> (43)
YO Command	Sends an open command to YO	<i>Settings - Functions</i> (44)
YC Command	Sends a close command to YC	
LOCAL Switch On	Changes the configuration, from Remote to Local	<i>Settings - Modules - Functions</i> (44)
Signaling RESET	Reset the contacts of the signalling modules	

Parameters

Each command provides two programming parameters:

Parameter	Description	Default
<i>Function</i>	Event or several command activation events (up to eight, in AND or OR logic configuration). The Custom configuration can be programmed via Ekip Connect.	Deactivated
<i>Delay</i>	This is the minimum time the expected event must be present in order to activate the command; the value is given in seconds and can be set within a range: 0 s to 100 s, in 0.1 s steps	0 s



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

7 - Logic selectivity

Presentation Zone Selectivity via Link Bus is indicated as Logic Selectivity.

Logic Selectivity can be actuated for up to 12 of the 15 actors that can be associated with Ekip UP⁺ via Link Bus (see *Ekip Link* module, page 188).

Parameters

The function enabling parameter, available from among the parameters that can be set for the protection, must be set for each protection for which Zone Selectivity must be activated.

In this case, in addition to these parameters, Selectivity time is also activated for the setting.

Otherwise, Zone Selectivity can only be set up via the Ekip Connect software.



NOTE: *all the following parameters and configurations are available via Ekip Connect, with Ekip Link connected and on*

Setting Certain parameters can be configured in the *Ekip Link configuration* page:

- selection of selectivity type: hardware or mixed (hardware and logic)
- entry of the IP address of each actor present; entry of the address enables the configuration parameters and status indicators to be displayed in the various pages
- the function must be enabled for each actor associated with Ekip UP⁺ via Link Bus and for which logic selectivity must be actuated (the *Actor Selectivity* parameter must be given value: *True*)

selectivity masks are available in the Ekip UP⁺ *Advanced selectivity* page for each actor present: the mask enables selection of the protections of the actors (S, I, 2I, MCR, G, D-Forward, D-Backward, S2), which activate the selectivity input of Ekip UP⁺ (example: actor 1, mask of S protection S = S2: means that S selectivity of Ekip UP⁺ will be activated in the presence of the S2 signals of actor 1).

selectivity masks are available in the Ekip UP⁺ *Advanced selectivity* page for each actor present: the mask enables selection of the protections of the actors (S, I, 2I, MCR, G, D-Forward, D-Backward, S2, Gext, MDGF), which activate the selectivity input of Ekip UP⁺ (example: actor 1, mask of S protection S = S2: means that S selectivity of Ekip UP⁺ will be activated in the presence of the S2 signals of actor 1).

In this configuration, if the function is enabled for S protection and is in the alarm status, the S/D-Forward hardware block signal and the logic selectivity S bit are activated on the output; depending on the block signals:

- if, on the input, the S/D-Forward hardware block signal and the logic selectivity S2 bit of actor 1 is not activated, the open command is sent in accordance with the selectivity time set for S protection
- a time equal to the trip time of S protection is waited if, on the input, the S/D-Forward hardware block signal is activated or if mixed selectivity has been selected and the S2 logic selectivity bit of actor 1 is activated (and the open command is only sent if S protection is still in the alarm state once this time has elapsed)



NOTES:

- *the logic selectivity bits on the output and on the input are those in the data packages shared by the releases via Link Bus*
- *the S/D-Forward (G/D-Backward) hardware output is only activated if the S or D-Forward (G or D-Backward) protections are in the alarm status, and the S/D-Forward (G/D-Backward) hardware input only acts as a block for the S and D-Forward (G and D-Backward) protections, regardless of whether solely hardware or mixed selectivity has been selected*



IMPORTANT: if solely hardware selectivity has been selected, the logic selectivity bits are ignored on the input, but are still activated on the output

Selectivity masks

Remote Programmable States A and B are also included in the **selectivity masks**: these 2 parameters, which are available in the *Ekip Link configuration* page, enable the event (or combination of several events) and reference actor that activates the selectivity input to be selected.

2 further states are available, *C* and *D*, but they cannot be configured for Zone Selectivity. All 4 programmable states are used for the Programmable Logic function (see *Ekip Link* module on page 188).



NOTE: *the Programmable Logic function is independent from that of Zone Selectivity*

Repetition The **Repeat Configuration mask** parameter is available in the *Ekip Link advanced selectivity* page. It enables the selection of protections whose logic selectivity bit, if present on the input, must be propagated regardless of the status of the protection on the current unit.



NOTE: *the parameter only acts on the selectivity bits. It does not involve the outputs*

Diagnostic In the presence of both hardware and logic *Selectivity*, the *diagnosis* highlights any errors in the hardware *Selectivity* cabling by checking its continuity.

The *Ekip Link diagnosis configuration* page allows you to: enable diagnosis, configure the interval of time between one inspection and the next, select the inputs to be checked for each active actor (S/D_Forward, G/D_Backward).

Then:

- the hardware inputs are checked at regular intervals
- if, in Ekip UP⁺, the input of an actor is configured for diagnosis (e.g. input S of actor 3) and this input is not active when the test is performed, the actor stimulates its output (e.g. actor 3 activates output S) for a short time: Ekip UP⁺ considers the test result to be positive if it receives the signal correctly at its input, otherwise it will signal error
- the diagnosis check will not be performed if the hw input is active: if the input configured for diagnosis is active when the test is performed, diagnosis check will not be performed and the **Detection state** parameter in the *Ekip Link state* page will indicate: Unknown

Errors and inconsistencies Regardless of the diagnosis, if a hardware input is active and none of the logic selectivity bits of the associated actors is active, a line inconsistency for this input is reported in the *Ekip Link state* page.



NOTE: *line inconsistency is ascertained by checking all the actors associated with the unit, even those for which the function has not been enabled (the Selectivity Actor parameter has not been assigned value: True)*

A line inconsistency (independent of diagnosis) is indicative of a possible configuration error (example: a hardware input of the release is 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 prevent a line inconsistency from being signalled, devices with hardware outputs connected to the hardware inputs of Ekip UP⁺ must also be connected to the Link Bus and associated with Ekip UP⁺, while the function need not be enabled for them (Selectivity Actor parameter need not be assigned value: True)

8 - Performance table

- General notes:**
- The performance values given in the next table are valid with $\Delta 100$ ms trip time, temperature and signals within the operating limits; failure to comply with these limitations could lead to an increase in the tolerances.
 - Ekip UP+ sends the TRIP command if the signal read exceeds the threshold for longer than the set time (or the time resulting from the calculation formula)
 - With an inverse time-delay trip curve, the calculation refers to a signal with a constant value throughout the timing; variation of the alarm signal causes a different trip time

Standard Protections

Protection [ANSI code]	Trip time t_t ⁽¹⁾	Trip threshold tolerance ⁽³⁾	Trip time tolerance
L [49]	$t_t = \frac{t1 \times 9}{\left(\frac{If}{I1}\right)^2}$ (with curve $t = k / I^2$)	Activation for If within range: (1.05 to 1.2) x I1	with $If \leq 6 I_n$: $\pm 10\%$ / with $If > 6 I_n$: $\pm 20\%$
	$t_t = \frac{t1 \times a \times b}{\left(\left(\frac{If}{I1}\right)^k - 1\right)}$ (with curves 60255-151)		
S [50TD / 51]	$t_t = t2$ (with curve $t = k$)	with $If \leq 6 I_n$: $\pm 7\%$ / with $If > 6 I_n$: $\pm 10\%$	The best between $\pm 10\%$ and 40 ms
	$t_t = \frac{t2 \times 100}{If^2}$ (with curve $t = k / I^2$)		with $If \leq 6 I_n$: $\pm 15\%$ / with $If > 6 I_n$: $\pm 20\%$
S2 [50TD]	$t_t = t5$	with $If \leq 6 I_n$: $\pm 7\%$ / with $If > 6 I_n$: $\pm 10\%$	The best between $\pm 10\%$ and 40 ms
I [50]	$t_t \leq 30$ ms	$\pm 10\%$	--
G [50N TD / 51N]	$t_t = t4$ (with curve $t = k$) ⁽⁴⁾	$\pm 7\%$	The best between $\pm 10\%$ and 40 ms ⁽²⁾
	$t_t = \frac{2}{\left(\frac{If}{I4}\right)^2}$ (with curve $t = k / I^2$) ⁽⁴⁾		$\pm 15\%$
MCR	$t_t \leq 30$ ms ⁽⁴⁾	$\pm 10\%$	--
2I [50]	$t_t \leq 30$ ms ⁽⁴⁾	$\pm 10\%$	--
IU [46]	$t_t = t6$	$\pm 10\%$	with $t6 \geq 5$ s: ± 100 ms / with $t6 < 5$ s: the best between $\pm 10\%$ and ± 40 ms
Rc [64 50N TD 87N]	$t_t = tdn$	-20 % ÷ 0	140 ms @ 0,06 s ⁽³⁾ 950 ms @ 0,8 s ⁽³⁾
Gext [50GTD / 51G]	$t_t = t41$ (with curve $t = k$)	$\pm 7\%$	The best between $\pm 10\%$ and 40 ms
	$t_t = \frac{2}{\left(\frac{If}{I41}\right)^2}$ (with curve $t = k / I^2$)		$\pm 15\%$
D [67]	$t_t = t7$	with $If \leq 6 I_n$: $\pm 7\%$ / with $If > 6 I_n$: $\pm 10\%$	The best between $\pm 10\%$ and 40 ms
UV [27] / UV2 [27]	$t_t = t8$ (t15)	$\pm 2\%$	with $t8 \geq 5$ s: ± 100 ms / with $t8 < 5$ s: the best between $\pm 10\%$ and ± 40 ms / $\pm 20\%$ below 100 ms
OV [59] / OV2 [59]	$t_t = t9$ (t16)	$\pm 2\%$	with $t9 \geq 5$ s: ± 100 ms / with $t9 < 5$ s: the best between $\pm 10\%$ and ± 40 ms / $\pm 20\%$ below 100 ms
VU [47]	$t_t = t14$	$\pm 5\%$	with $t14 \geq 5$ s: ± 100 ms / with $t14 < 5$ s: the best between $\pm 10\%$ and ± 40 ms / $\pm 20\%$ below 100 ms

Continued on the next page

Protection [ANSI code]	Trip time t_t ⁽¹⁾	Trip threshold tolerance ⁽³⁾	Trip time tolerance
RV [59N]	$t_t = t_{22}$	$\pm 10 \%$	with $t_{22} \geq 5$ s: ± 100 ms / with $t_{22} < 5$ s: the best between $\pm 10 \%$ and ± 40 ms
UF [81L] / UF2 [87L]	$t_t = t_{12}$ (t17)	$\pm 1 \%$ ⁽¹⁾	with $t_{12} \leq 5$ s: ± 100 ms / with $t_{12} < 5$ s: the best between $\pm 10 \%$ (min = 30 ms) and ± 40 ms
OF [81H] / OF2 [87H]	$t_t = t_{13}$ (t18)	$\pm 1 \%$ ⁽¹⁾	with $t_{13} \geq 5$ s: ± 100 ms / with $t_{13} < 5$ s: the best between $\pm 10 \%$ and ± 40 ms
RP [32R]	$t_t = t_{11}$	$\pm 10 \%$	with $t_{11} \geq 5$ s: ± 100 ms / with $t_{11} < 5$ s: the best between $\pm 10 \%$ and ± 40 ms / $\pm 20\%$ below 100 ms

⁽¹⁾ use trip and threshold current values expressed in I_n for calculating t_t (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⁾ maximum trip time

⁽⁴⁾ The trip time increases by 5 ms if the command is managed by the Ekip Signalling 4K-B module

⁽⁵⁾ tolerance valid for frequencies within range: $f_n \pm 2\%$. A $\pm 5\%$ tolerance is applicable for off range frequencies.

Generator protections

Protection [ANSI code]	Trip time t_t	Trip threshold tolerance	Trip time tolerance
S(V) [51V] / S2(V) [51V]	$t_t = t_{20}$ (t21)	$\pm 10 \%$	with $t_{20} \geq 5$ s: ± 100 ms / with $t_{20} < 5$ s: the best between $\pm 10 \%$ and ± 40 ms
RQ [40 o 32R]	$t_t = t_{24}$	$\pm 10 \%$	with $t_{20} \geq 5$ s: ± 100 ms / with $t_{20} < 5$ s: the best between $\pm 10 \%$ and ± 40 ms
OQ [320F]	$t_t = t_{27}$	$\pm 10 \%$	with $t_{27} \geq 5$ s: ± 100 ms / with $t_{27} < 5$ s: the best between $\pm 10 \%$ and ± 40 ms
OP [320F]	$t_t = t_{26}$	$\pm 10 \%$	with $t_{26} \geq 5$ s: ± 100 ms / with $t_{26} < 5$ s: the best between $\pm 10 \%$ and ± 40 ms
UP [32LF]	$t_t = t_{23}$	$\pm 10 \%$	with $t_{23} \geq 5$ s: ± 100 ms / with $t_{23} < 5$ s: the best between $\pm 10 \%$ and ± 40 ms
ROCOF [81R]	$t_t = t_{28}$	$\pm 10 \%$ ⁽⁶⁾	the best between $\pm 20\%$ and 200 ms

Startup

Protection [ANSI code]	Trip time t_t	Trip threshold tolerance ⁽³⁾	Trip time tolerance
S StartUp	$t_t = t_2$ startup	with $I_f \leq 6 I_n$: $\pm 7\%$ / with $I_f > 6 I_n$: $\pm 10 \%$	The best between $\pm 10\%$ and 40 ms
I StartUp	$t_t = \leq 30$ ms	$\pm 10 \%$	--
G StartUp	$t_t = t_4$ startup	$\pm 7 \%$	The best between $\pm 10\%$ and 40 ms
Gext StartUp $t_t = t_{41}$ startup	$t_t = t_{41}$ startup	$\pm 7 \%$	The best between $\pm 10\%$ and 40 ms
S2 StartUp	$t_t = t_5$ startup	with $I_f \leq 6 I_n$: $\pm 7\%$ / with $I_f > 6 I_n$: $\pm 10 \%$	The best between $\pm 10\%$ and 40 ms
D StartUp	$t_t = t_7$ startup	$\pm 10 \%$	The best between $\pm 10\%$ and 40 ms

Motor protections

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

Additional protections

Protection [ANSI code]	Trip time t_t ⁽¹⁾	Trip threshold tolerance	Trip time tolerance
MDGF	$t = k$	$\pm 7 \%$	the best between: $\pm 10 \%$ or $\pm 40 \text{ ms}$
	$t = k/I^2$		$\pm 15 \%$

⁽¹⁾ use trip and threshold current values expressed in I_n for calculating tt (example: $I_f = 0.8 I_n$, $I_1 = 0.6 I_n$)

⁽²⁾ with $t_4 = \text{instantaneous}$, the maximum tolerance is 50 ms

⁽³⁾ maximum trip time

⁽⁴⁾ the trip time increases by 5 ms if the command is managed by the Ekip Signalling 4K-B module

⁽⁵⁾ tolerance valid for frequencies within range: $f_n \pm 2 \%$. A $\pm 5 \%$ tolerance is applicable for off range frequencies

9 - Functions

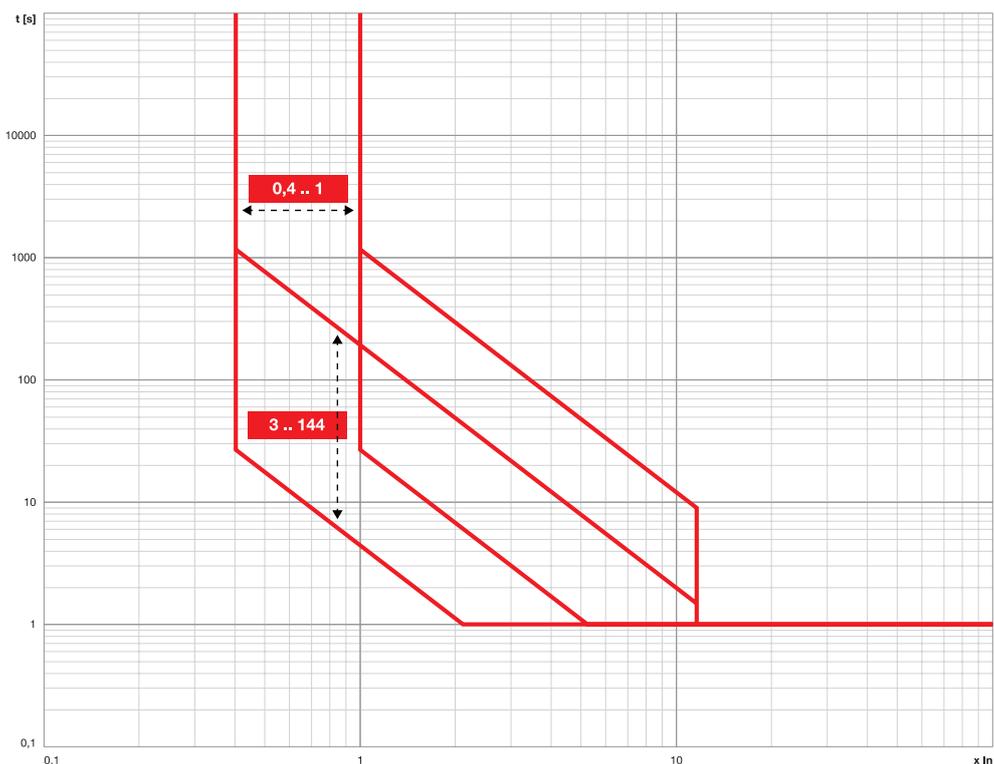
Introduction This chapter includes the trip curves of the protections, which are shown in different point charts:

- The curves are represented considering the maximum and minimum values of the parameters of each protection, including the TRIP functions provided (current, time).
- Protections with several curves (example: S protection), are shown in several graphs.
- The curves do not take account of the effects of special parameters, such as thermal memory and startups.

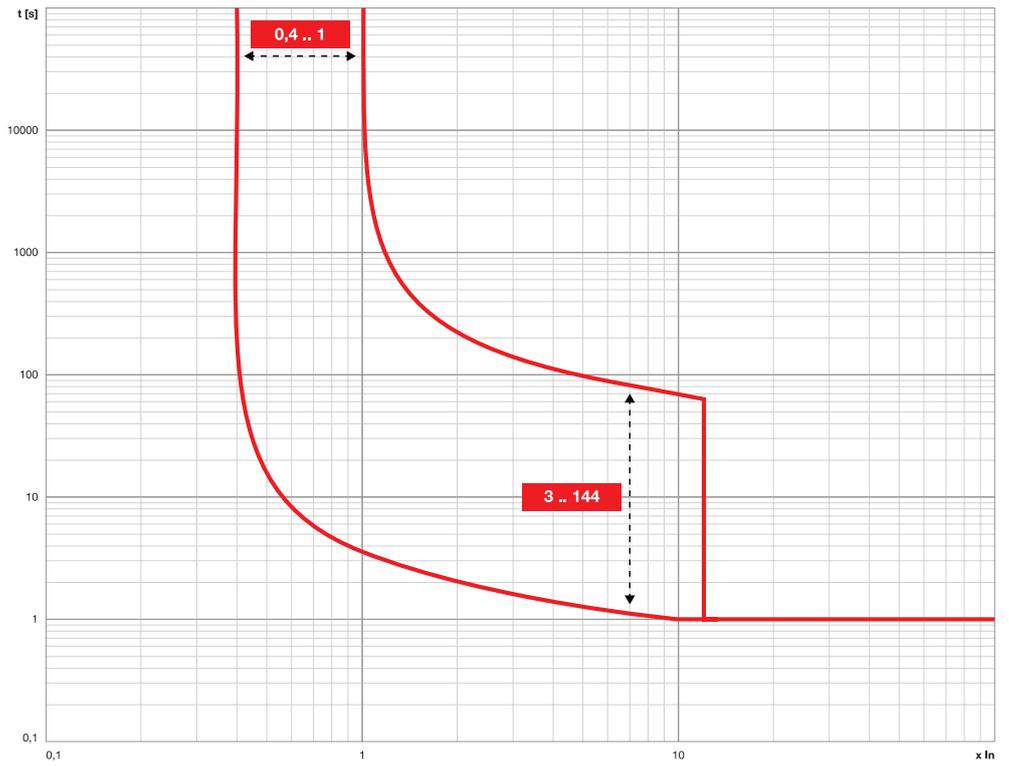


NOTE: it is advisable to always use the mathematical function in the summary table of the protections to calculate the trip time (page 113)

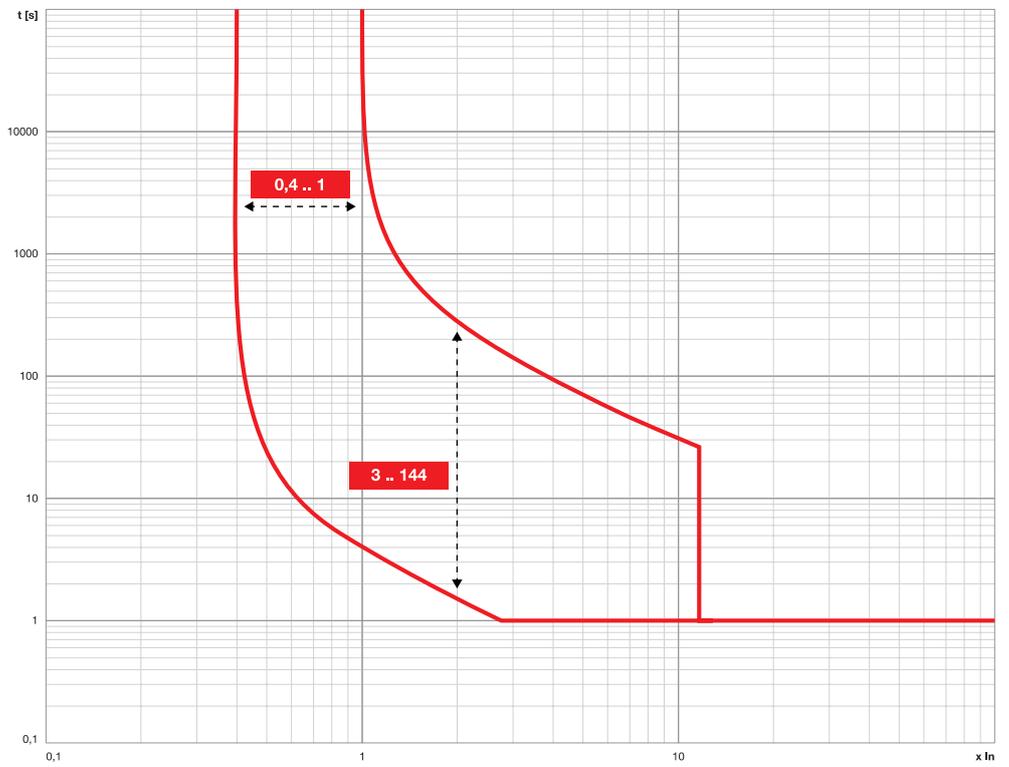
Function L ($t = k/I^2$)



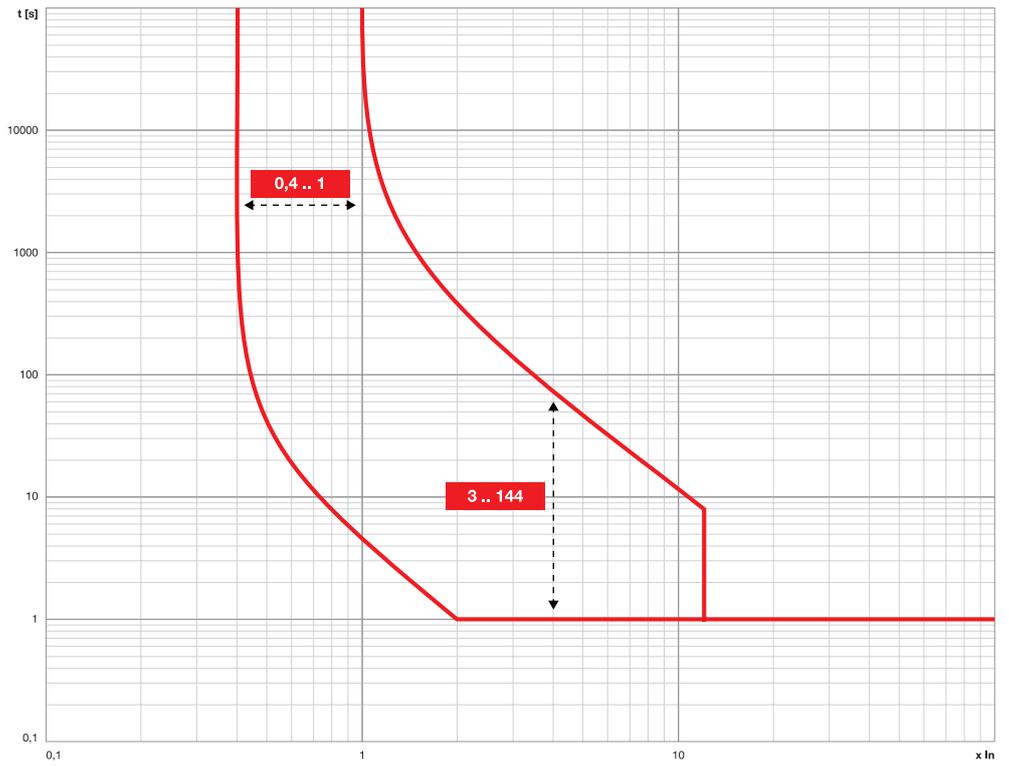
Function L (IEC 60255-151 SI)



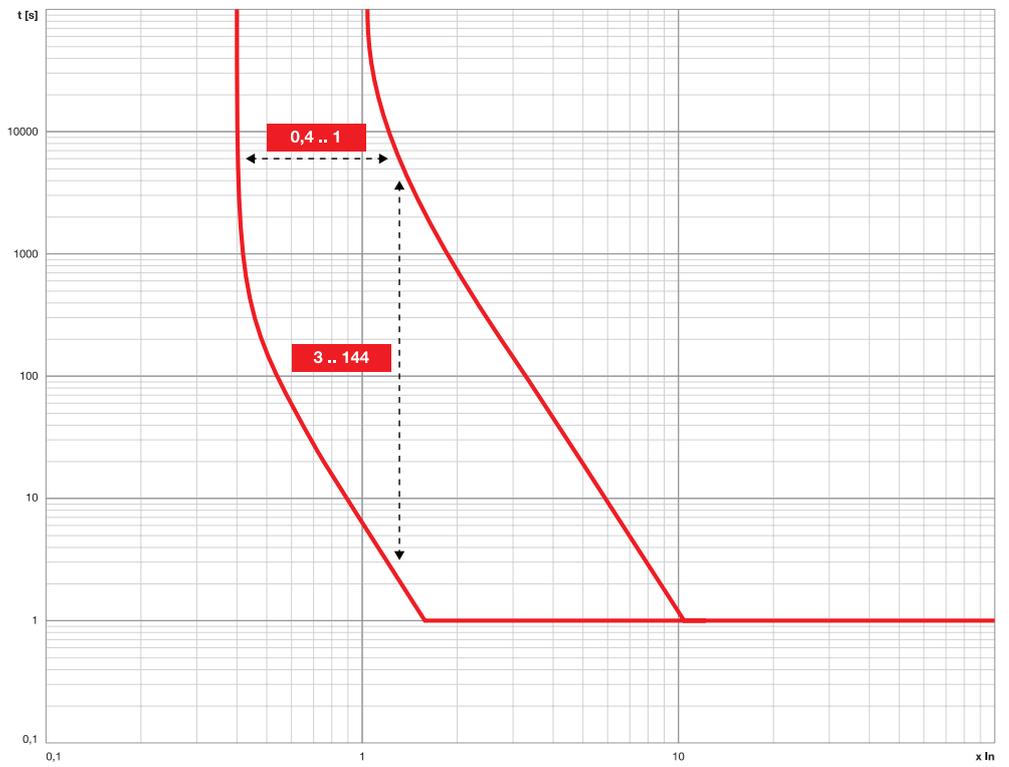
Function L (IEC 60255-151 VI)



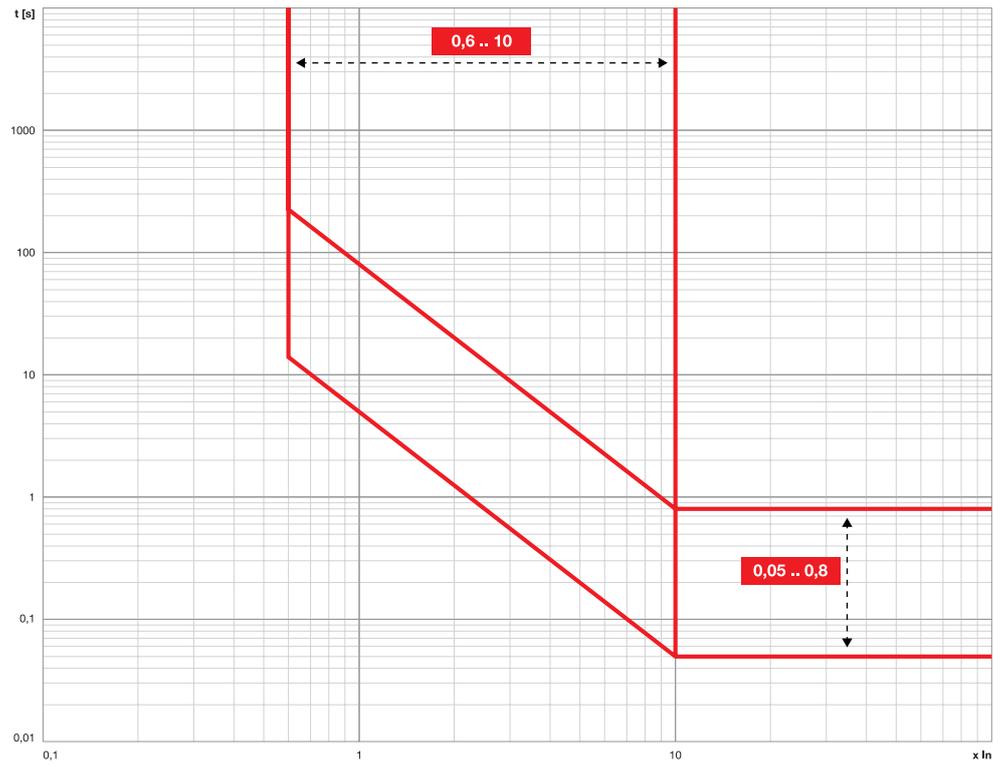
Function L (IEC 60255-151 EI)



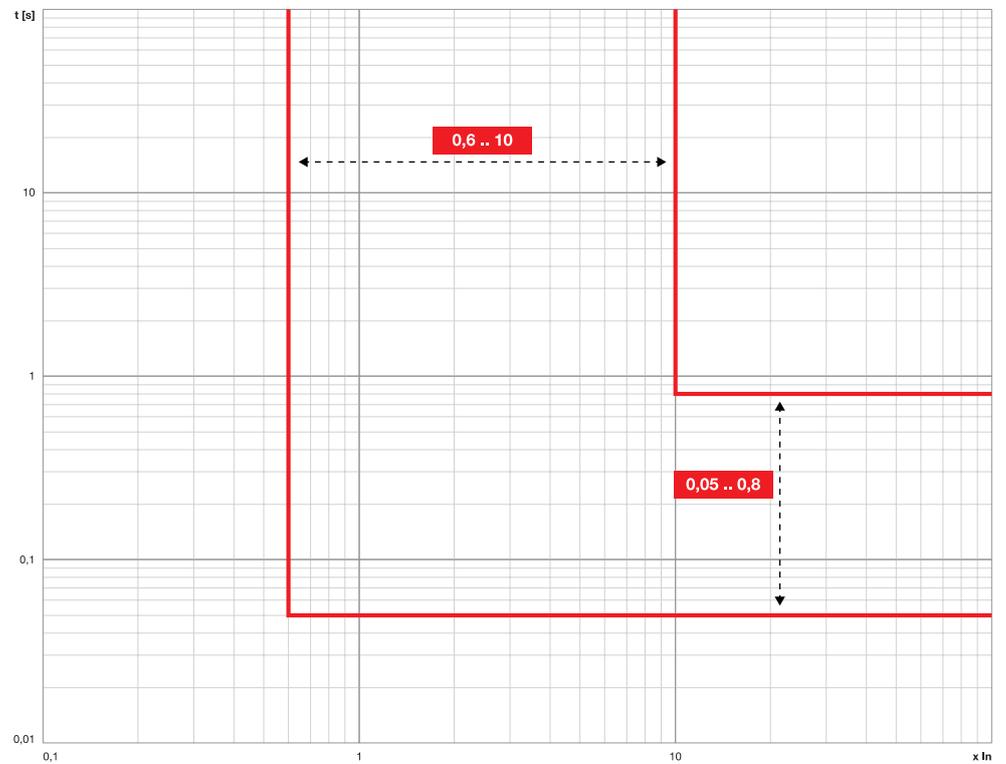
Function S ($t = k/I^2$)



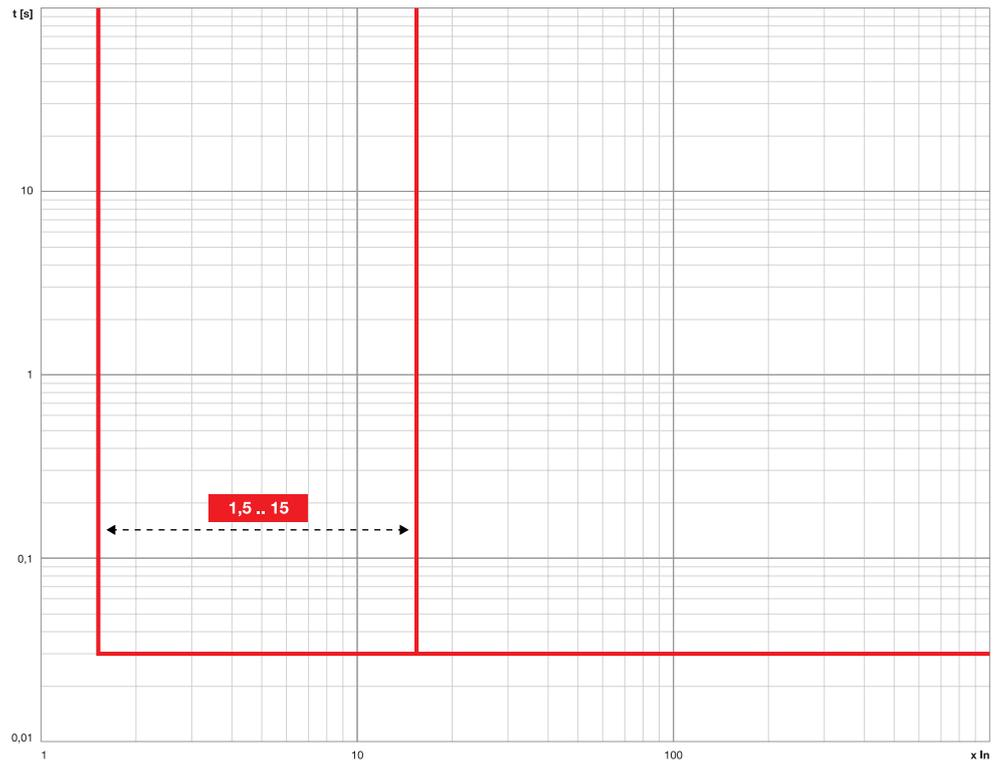
Function S ($t = k/I^2$)



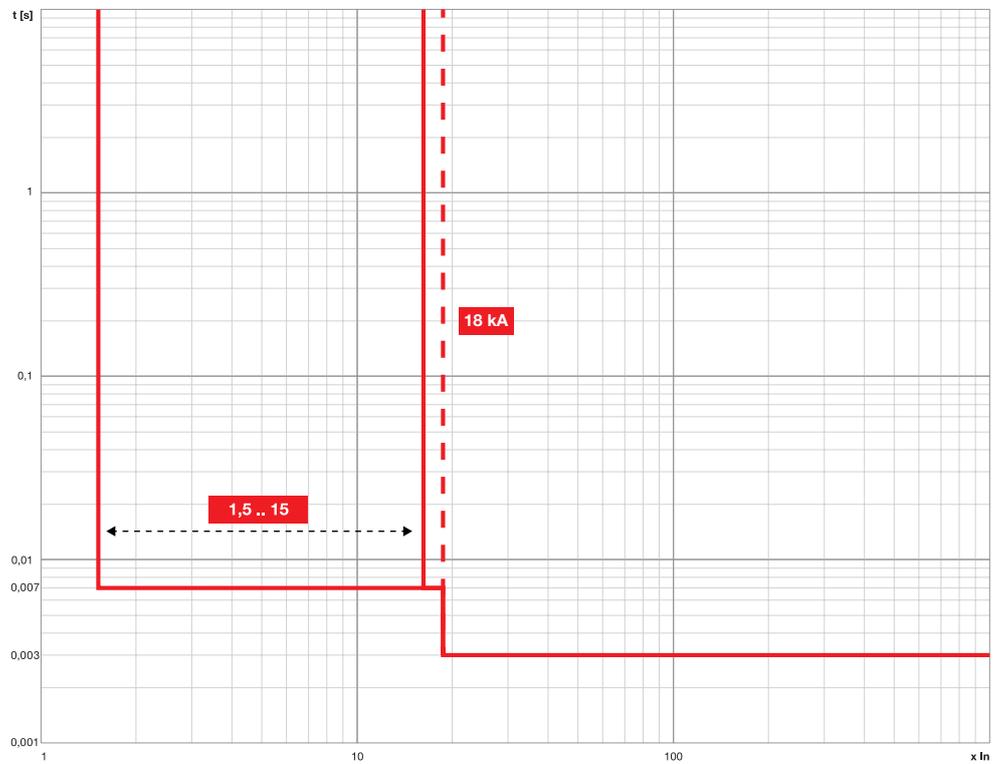
Function S ($t = k$) \ Function S2



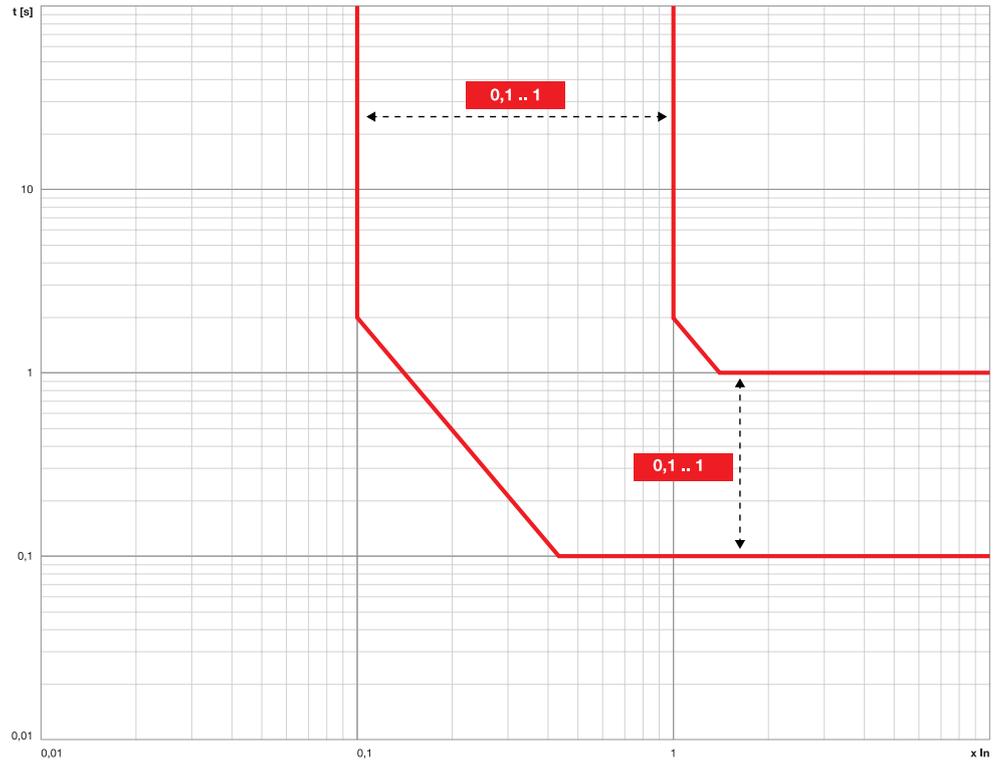
Function I \ Function MCR



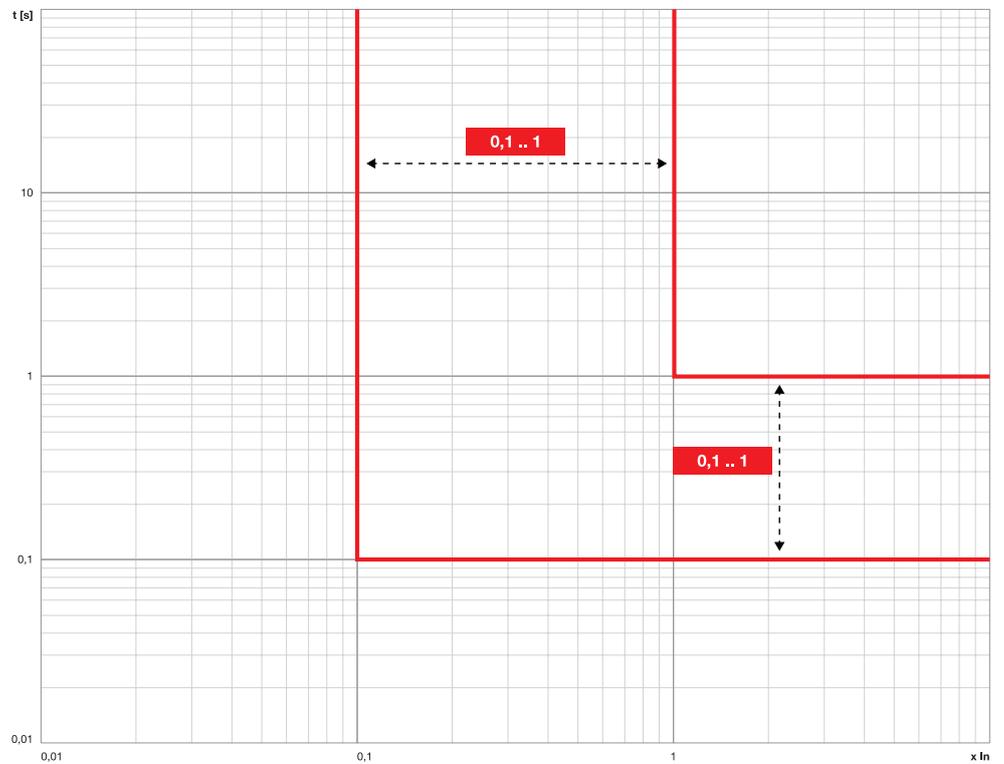
Function 2I



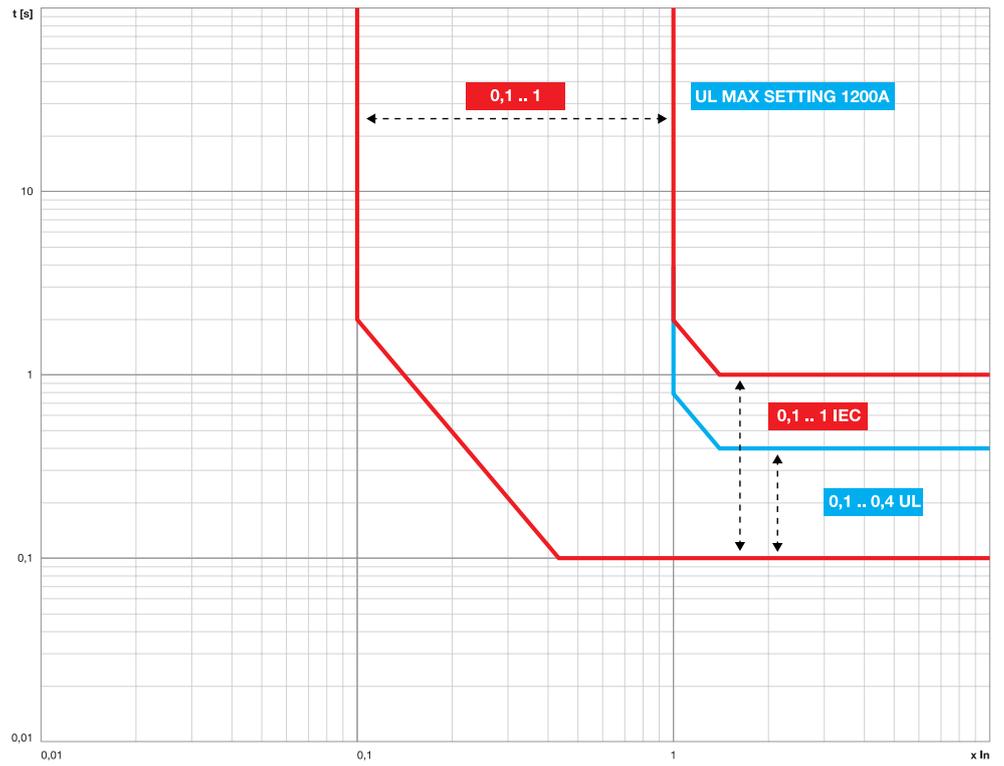
Function G ($t = k/l^2$) \ Function
 Gext ($t = k/l^2$)



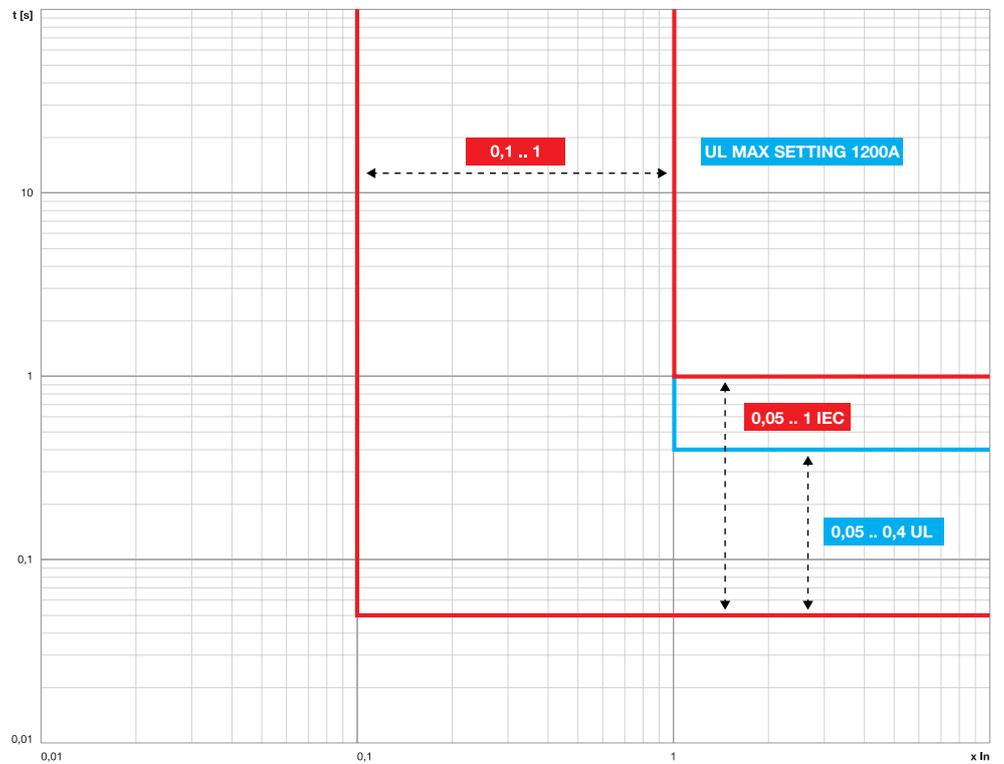
Function G ($t = k$) \ Function
 Gext ($t = k$)



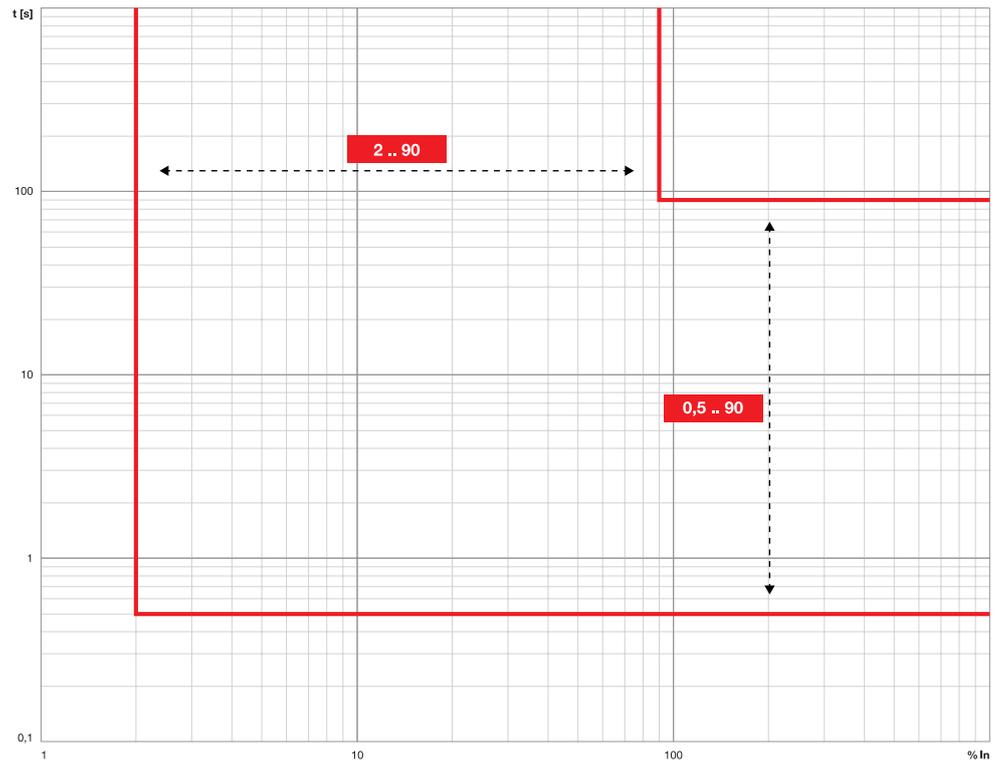
Function MDGF ($t = k/I^2$)



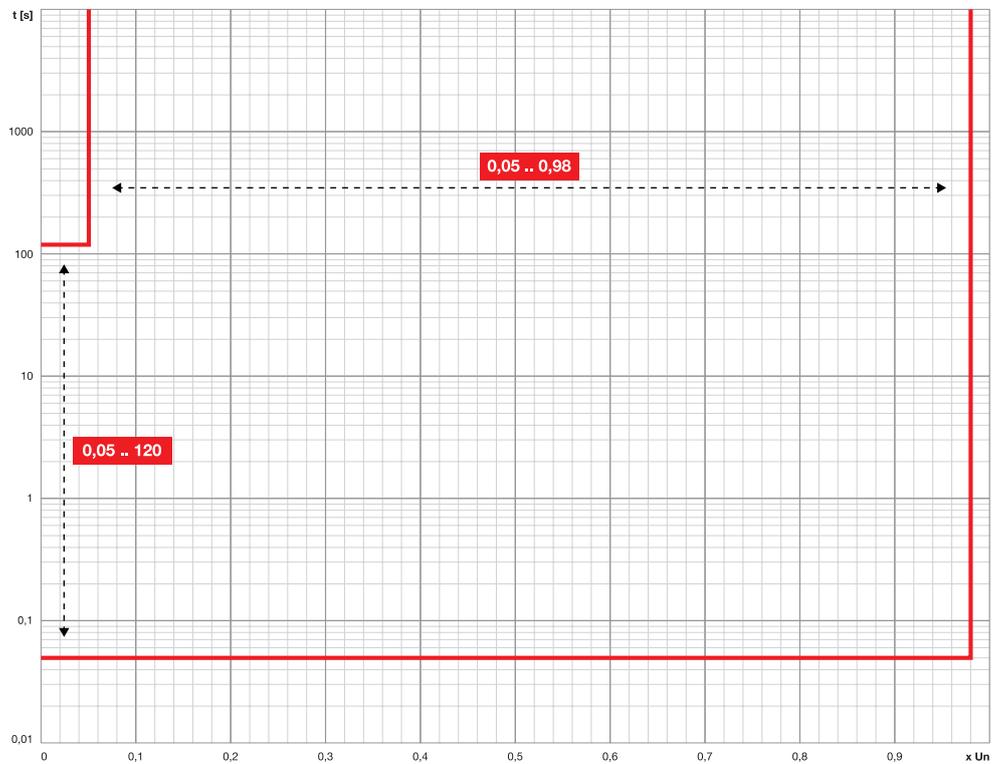
Function MDGF ($t = k$)



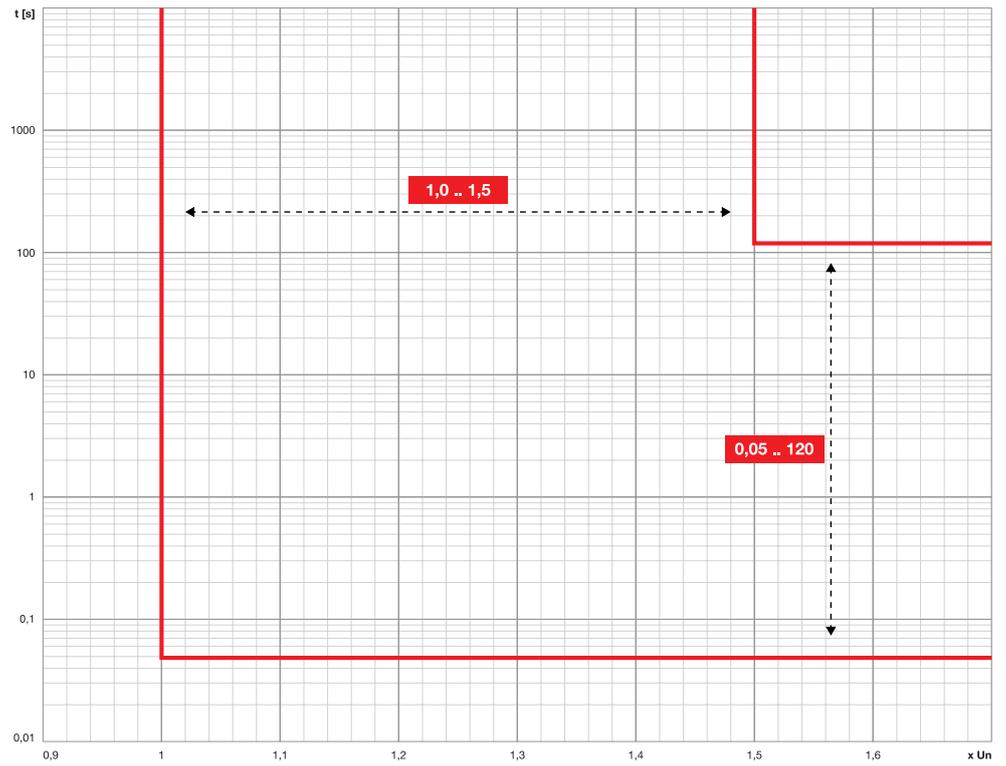
Function IU



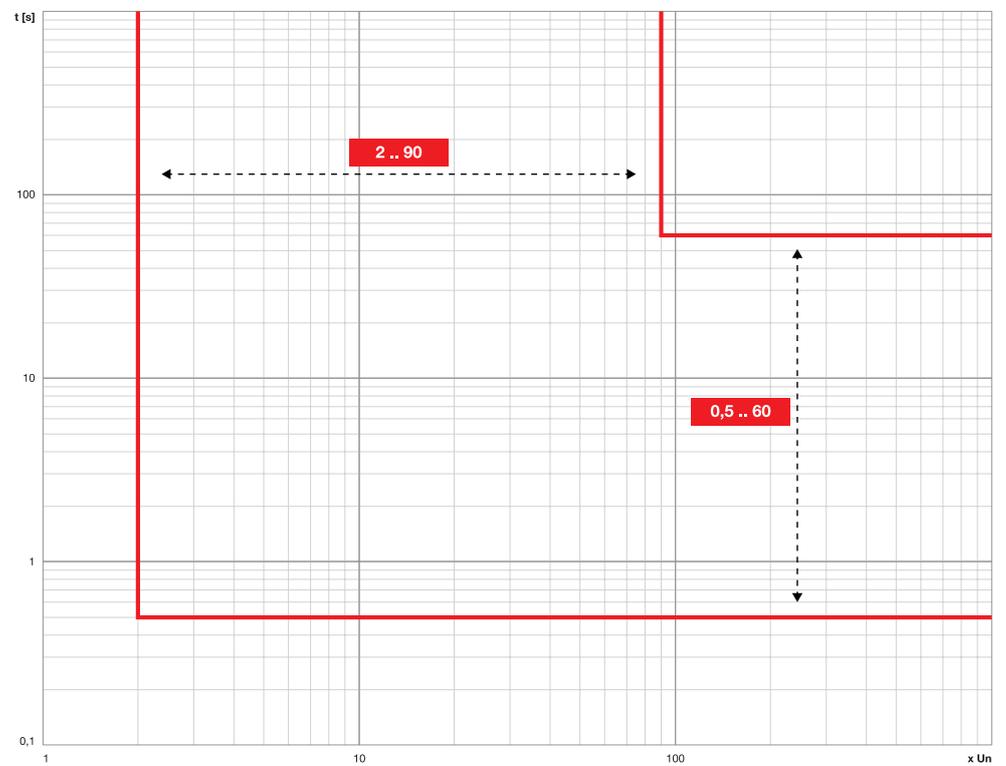
Function UV \ Function UV2



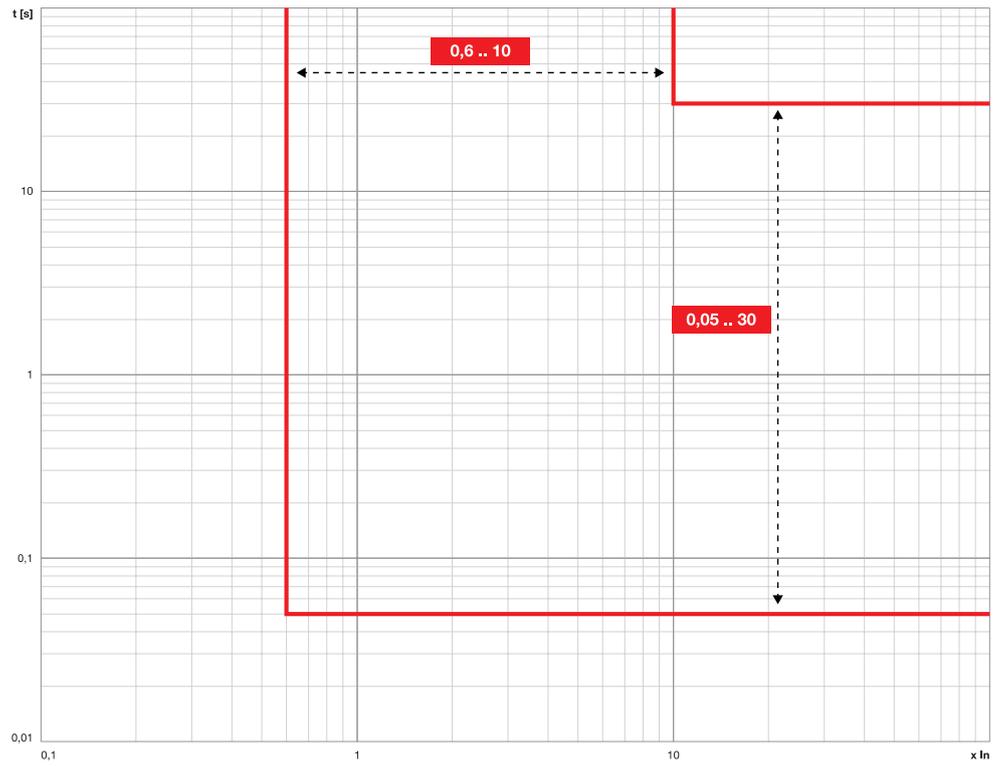
Function OV \ Function OV2



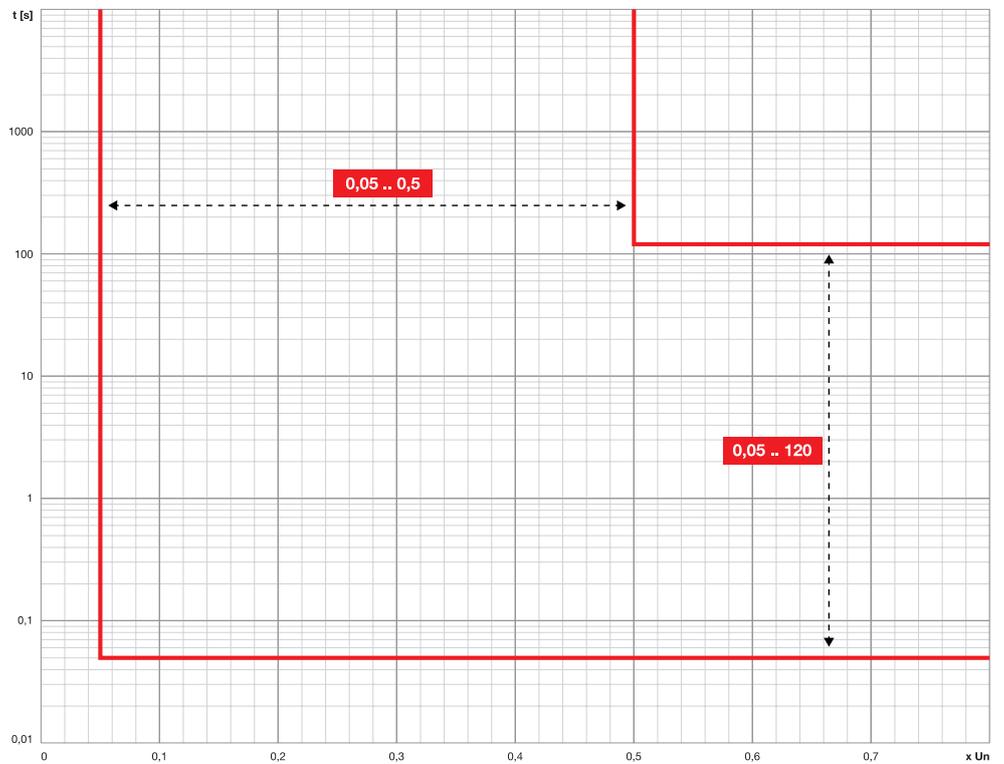
Function VU



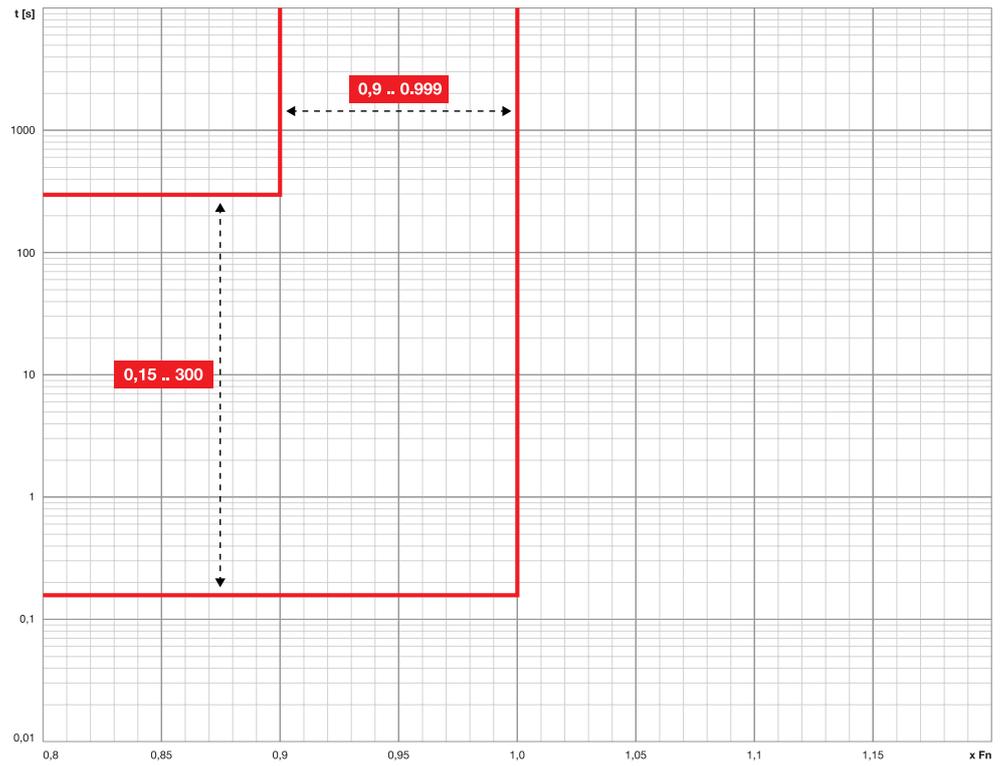
Function S(V) \ Function S2(V)



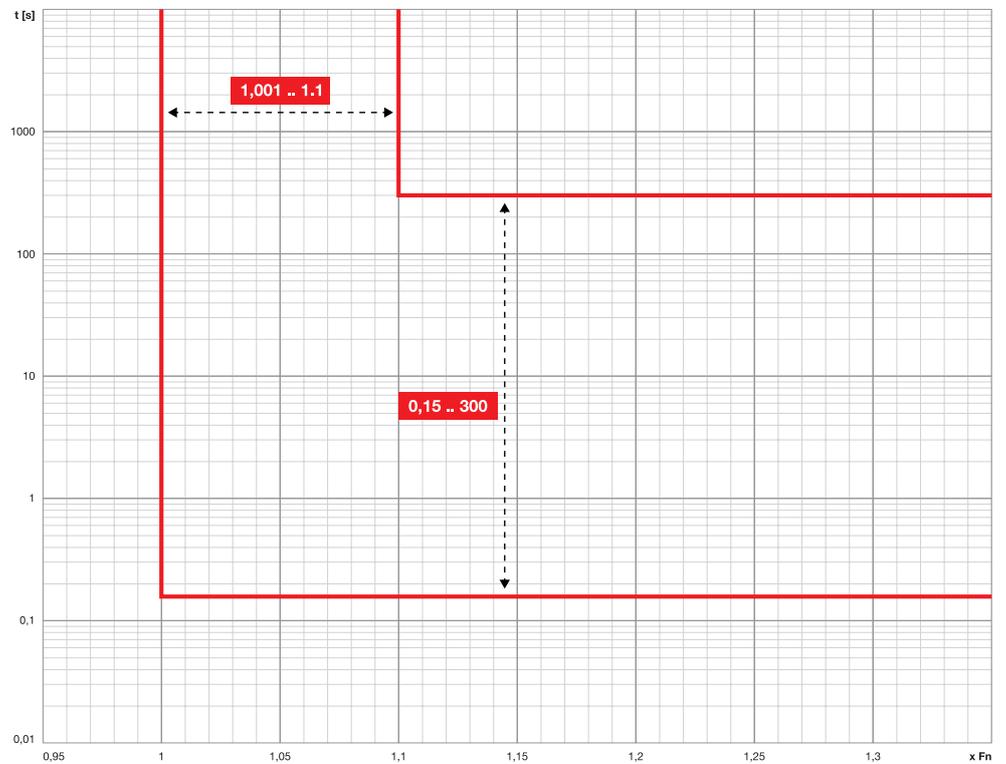
Function RV



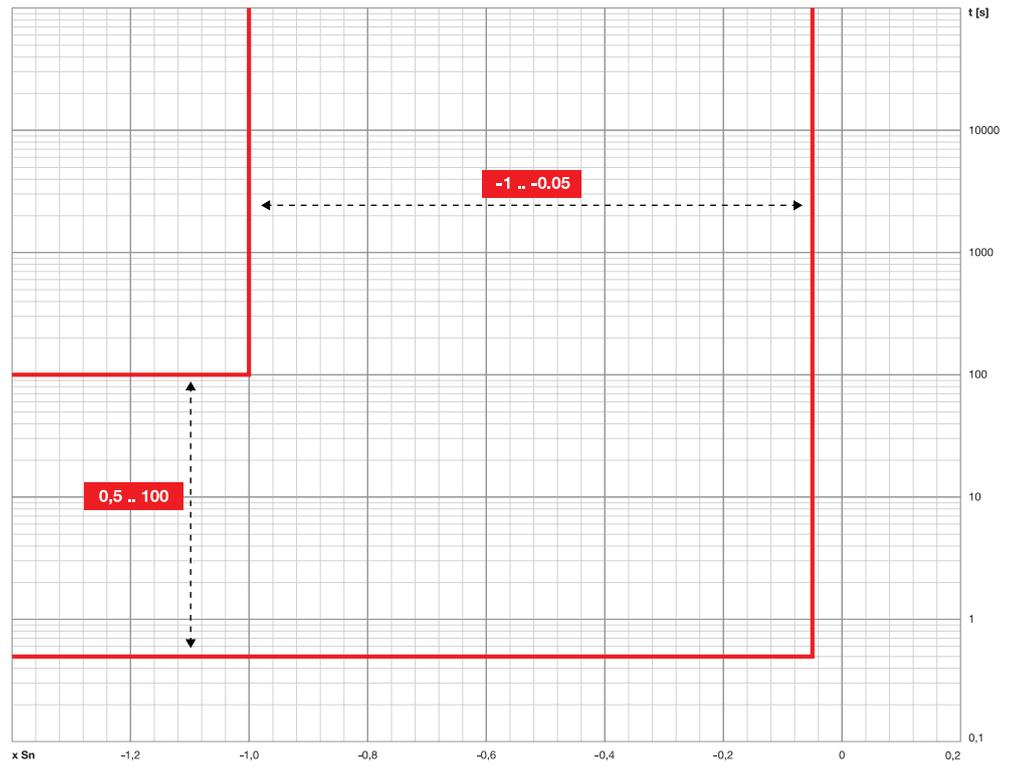
Function UF \ Function UF2



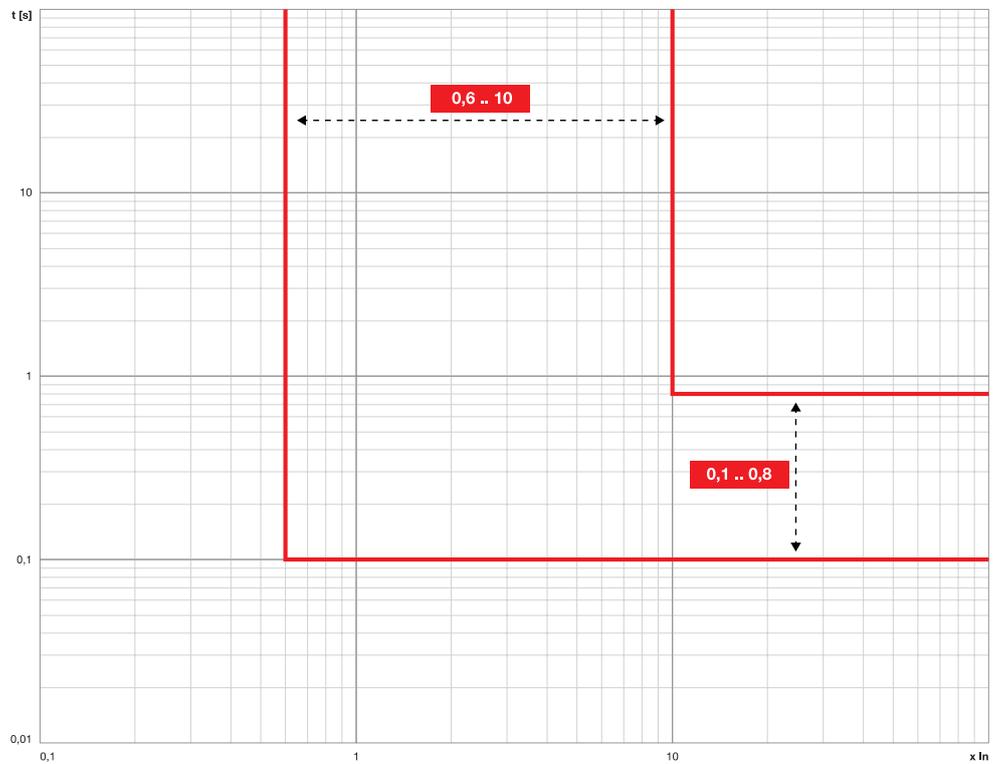
Function OF \ Function OF2



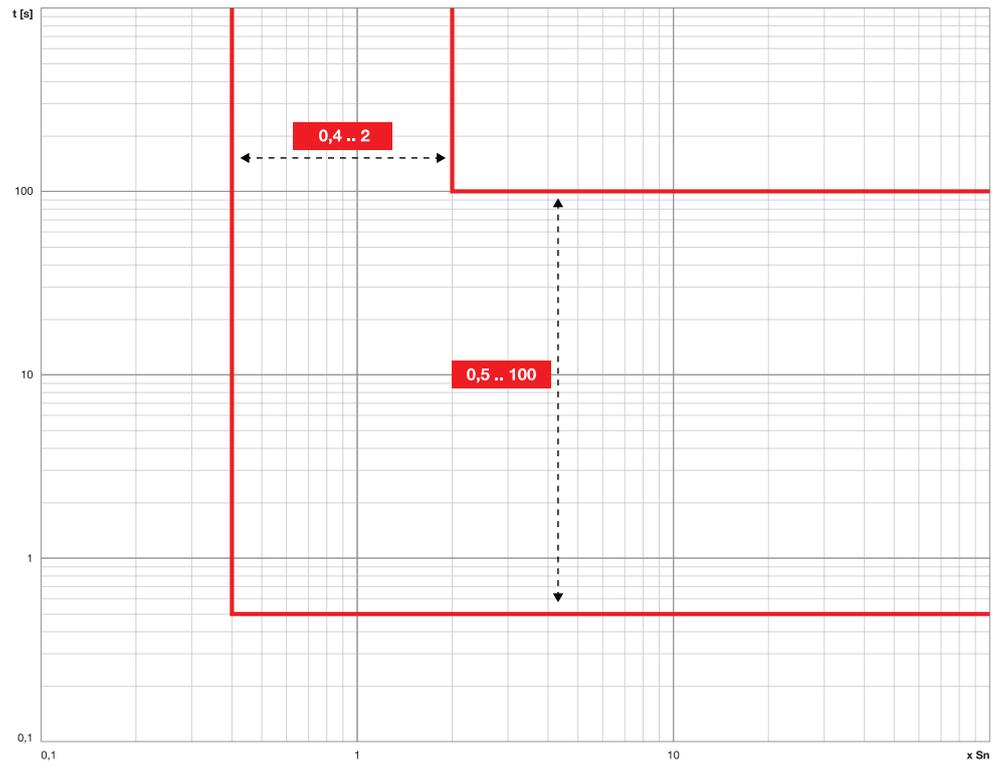
Function RP



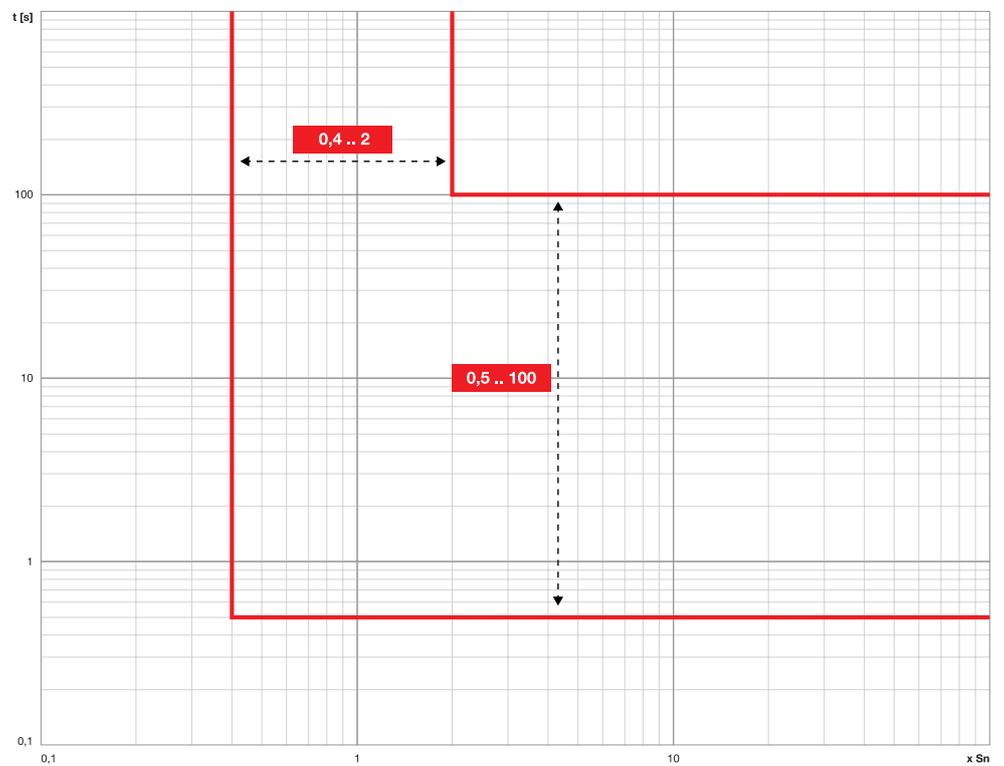
Function D



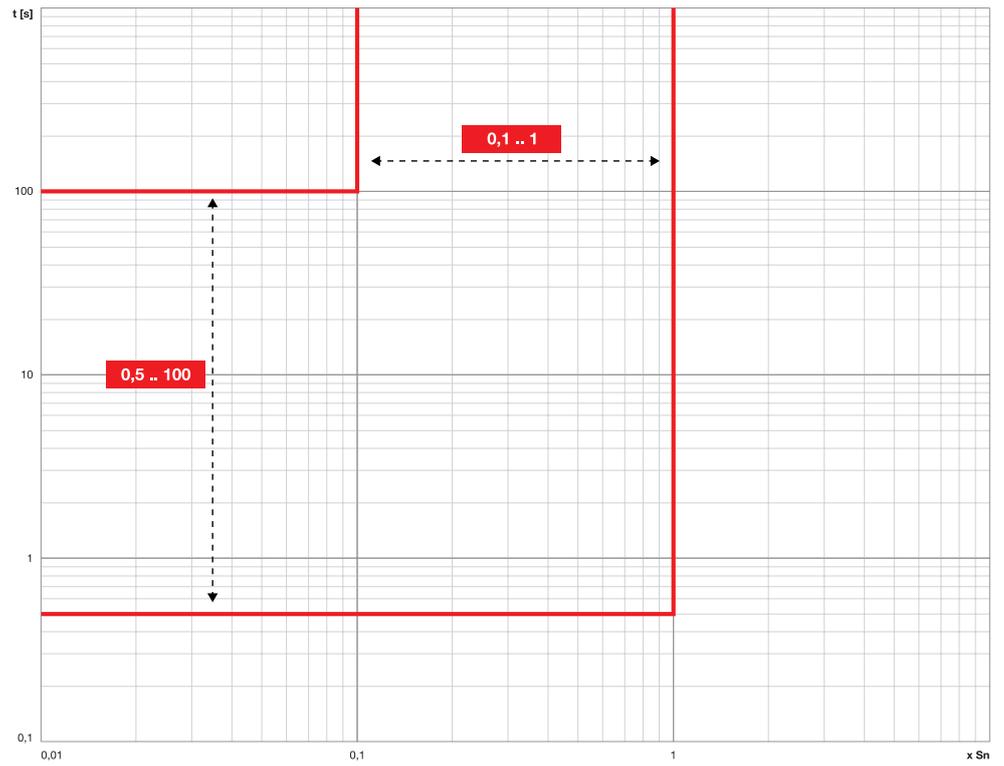
Function OQ



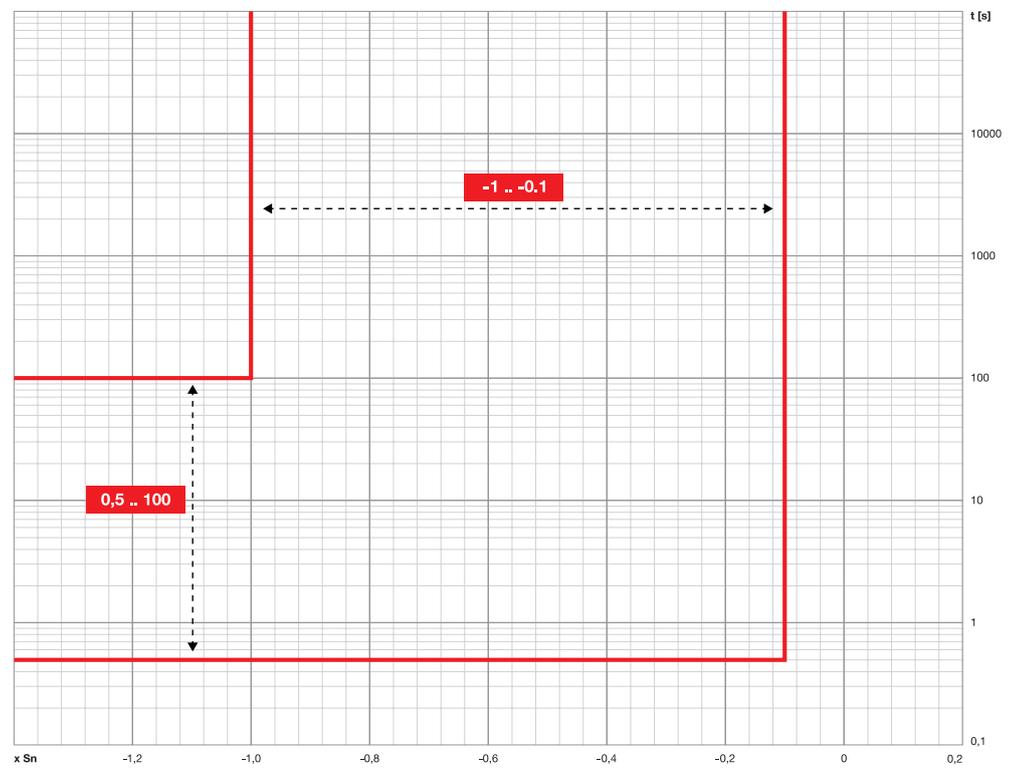
Function OP



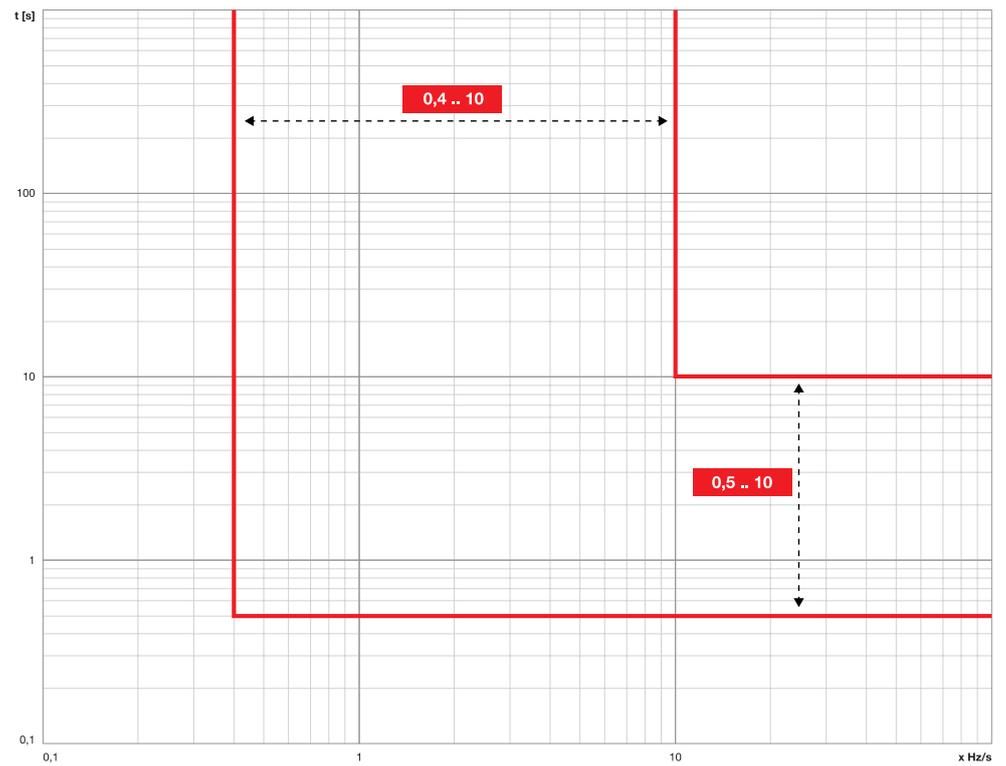
Function UP



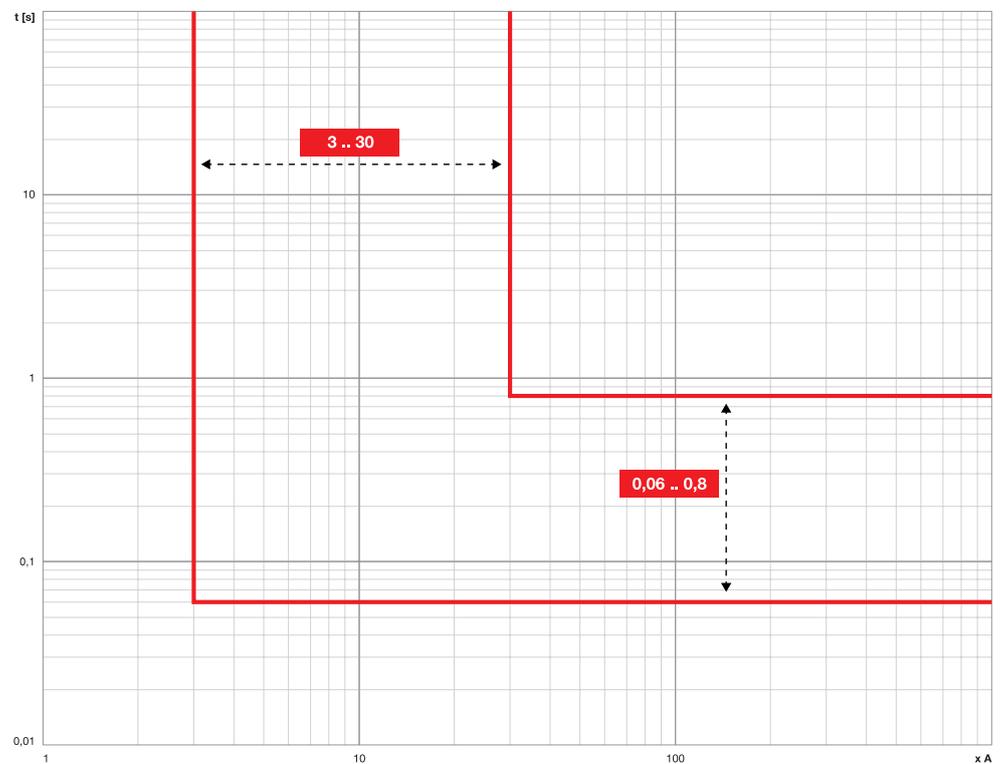
Function RQ



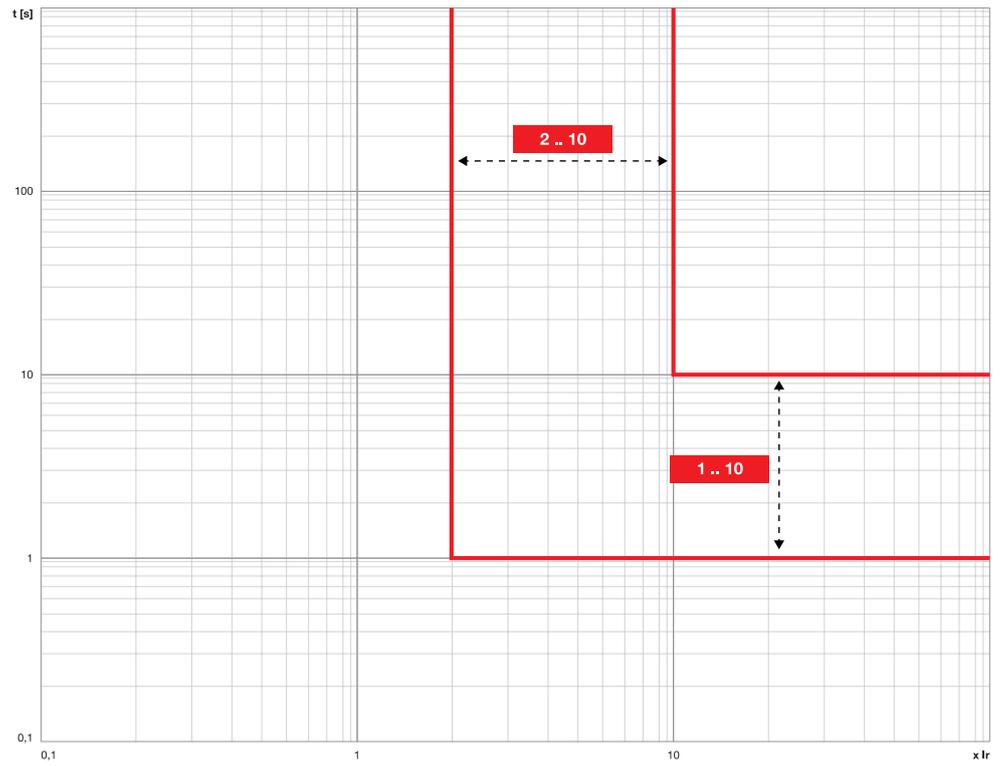
Function ROCOF



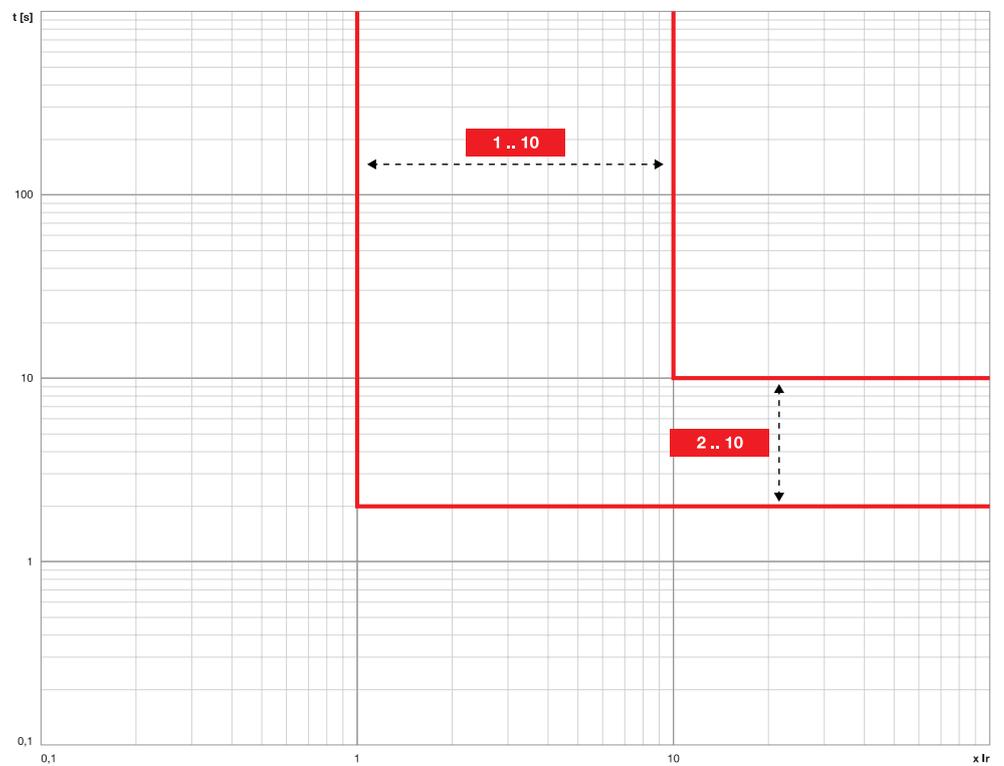
Function RC



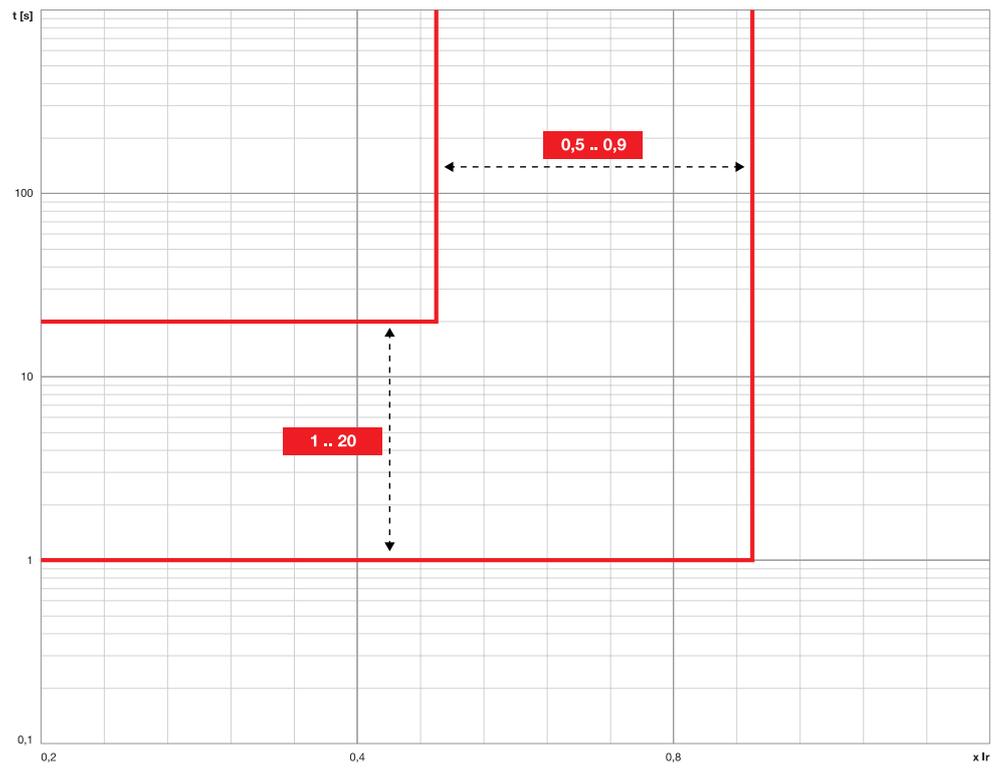
Function R JAM



Function R STALL



Function UC



Settings

1 - Settings menu on display

Foreword The parameters in the *Settings* menu viewable on the Ekip UP+ display are given below: Connection of modules and activation of optional functions changes the menu by adding submenus and dedicated additional parameters.

Only the main parameters present are given below. The full list can be consulted on page 41.

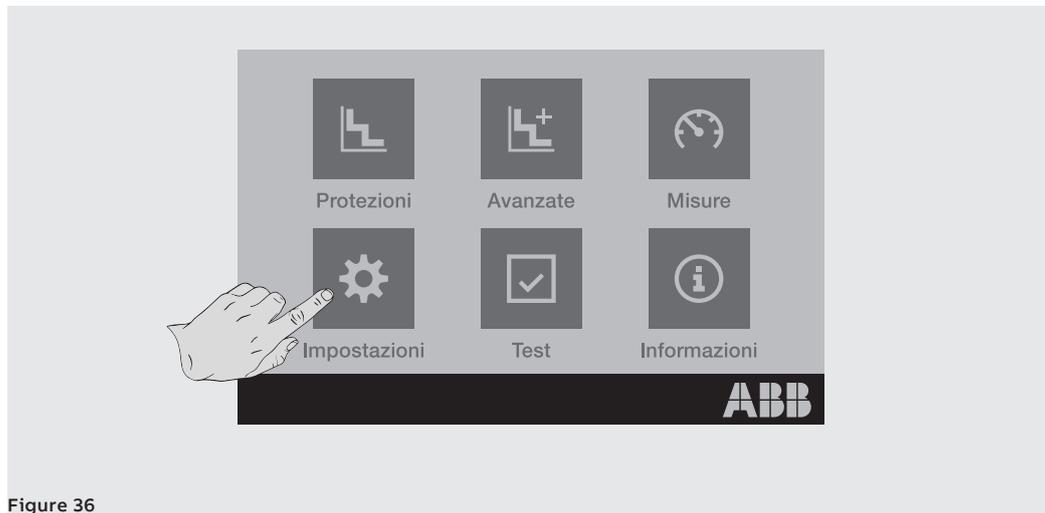


Figure 36



WARNING! In the case of the Protect version, change the settings in the absence of timing signals.

Bluetooth Low Energy - Connection security

The Bluetooth antenna on the Trip unit can be activated in the *Bluetooth Low Energy* menu. This is useful for launching a communication with an external device (tablet, smartphone) according to the Bluetooth Low Energy protocol, via the *EPiC* APP (page 14).

Activation of Bluetooth Low Energy communication requires the Trip unit to be pre-engineered for a wireless connection: security of the data and Bluetooth Low Energy connection between the Trip unit and its device is guaranteed thanks to the *ABB EPiC* application and the pairing configuration described in the next paragraph.



WARNING! It is your sole responsibility to provide and continuously ensure a secure connection between your device and the Trip unit. The installation manager must establish and maintain appropriate measures (such as but not limited to the installation of malware prevention systems, application of authentication measures, data encryption, installation of antivirus programs, etc.) to protect the product, network, your system and interface against any kind of security breach, unauthorized access, interference, intrusion, loss and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized accesses, interference, intrusion, loss and/or theft of data or information, use of APPs other than those allowed.

Continued on the next page

ABB recommends a few general configurations to strengthen the access of data into the Trip unit:

- activate the access PIN code in the Trip unit configure it with a value differing from the default value
- if parameters need not be written, configure the Trip unit only for parameter readout via bus (Test bus parameter =Off)
- switch off the Bluetooth Low Energy antenna (Bluetooth Low Energy-Enable parameter=Off) after use.

! **IMPORTANT: communications via wireless and via service connector function alternatively: if Bluetooth Low Energy is activated there can be no communication with other accessories via the service connector.**

Bluetooth Low Energy - Parameters

Parameter	Description	Default
Enable	Enables/disables Bluetooth Low Energy antenna switch-on and availability of the other parameters in the menu: <ul style="list-style-type: none"> • if <i>On</i>, the antenna comes on, on the basis of the <i>Battery Mode</i> parameter configuration • if <i>Off</i>, the antenna is off 	Off
Battery mode	Defines the switch-on mode of the Bluetooth Low Energy antenna, based on the presence of the devices on the service connector (Ekip T&P, Ekip Programming, Ekip TT); can have two values: <ul style="list-style-type: none"> • ---; with this option, the state of the antenna depends exclusively on the presence of devices: on if not present; off if present • ON; with this option, the antenna is switched off for 15 seconds when a device is connected. After this: it remains off if communication with the device has been activated; it comes on if no communication has been activated. <p>! IMPORTANT:</p> <ul style="list-style-type: none"> • the typical scenario in which Battery mode should be configured = On is: Ekip Touch + Ekip TT + communication with smartphone activated; in all other cases, including System Update, configure Battery mode = ---. 	---
Start Pairing	Command which starts Pairing between Trip unit and external device. To perform the operation correctly: <ol style="list-style-type: none"> 1. Press Connect on EPiC APP, select the Trip Unit from among the units in the list and then select Connect again 2. Press Start Pairing in the Trip unit menu, enter the PIN, then press Start Pairing again 3. Press Start Pairing on EPiC APP and confirm the operations until the code request appears 4. Check that the pop up with the Passkey appears on the display of the Trip unit (about 20 seconds) and enter it in EPiC APP 5. The Trip unit will be connected to the external device from this moment on; for the successive re-connections, it will be sufficient to just repeat point 1. <p>i NOTES:</p> <ul style="list-style-type: none"> • execute the procedure within 120 seconds • the command is not available if communication with a device is activated. 	---
Decouple devices	Command that deletes the list of devices coupled to the Trip unit <p>i NOTE:</p> <ul style="list-style-type: none"> • the command is not available if communication with a device is activated. 	---
Version	FW version of the Bluetooth Low Energy module installed on board.	---

! **IMPORTANT: when Bluetooth Low Energy antenna is on, communication on the service connector is not available.**

! **IMPORTANT: if Bluetooth is disabled during the order (with the extracode) or disabled by a Service L3 authorized person, the dedicated menu will neither be present, nor visible nor usable. The icons will not be shown on the screen if Bluetooth is disabled.**

Digital unit-Configuration

The *Configuration* parameter indicates the number of phases monitored by Ekip UP⁺.

Parameter	Option	Description	Default
Configuration	3 P	Monitoring of the 3 phases	3P
	3 P + N	Monitoring of the 3 phases+ neutral	

Activation of the configuration with four sensors((3P + N) enables:

- histograms of phase Ne to be displayed in the *Histograms* page
- neutral current measurement
- The menu item regarding configuration of the Neutral protection, for the Protect version
- neutral current storing in the case of Trip, for the Protect version.

Digital unit-Breaker Connections

The parameters in *Settings-Digital Unit-Breaker Connections* allow the contacts of the Ekip Signalling 4K module to be configured by setting the state command and readout functions of the the external actuators.

Parameter	Option	Description	Default
Open output ⁽²⁾	Not available	O 01 available ⁽¹⁾	4K-O01
	4K-O01	O 01 configured as: open command (YO Command)	
Close output	Not available	O 02 available ⁽¹⁾	Not available
	4K-O02	O 02 configured as: closing command (YC Command)	
Output pulse duration ⁽³⁾	--	Defines the values of the Open output and Close output commands. The value is given in milliseconds and can be set within range: 200 ms to 1000, in 10 ms steps	500 ms
OC status-Cn pos input	Not available	I 01 available ⁽¹⁾ I 02 available ⁽¹⁾	Not available
	4K-I01 O/4K-I02 C	I 01 for circuit-breaker state readout: Open	
		I 02 for circuit-breaker state readout: Closed	
	4K-I01 O	I 01 for circuit-breaker state readout: Open	
I 02 available ⁽¹⁾			
4K-I01 O/4K-I02 Cn	I 01 for circuit-breaker state readout: Open	I 02 for circuit-breaker position reading in the withdrawable version: CB Connected	
	I 02 for circuit-breaker position reading in the withdrawable version: CB Connected		

⁽¹⁾ available means that the specific input or output functions as described in the chapter of the Ekip Signalling 4K module (page 156).

⁽²⁾ Available with Ekip UP⁺ in Monitor configuration, non-editable parameter in Protect configuration.

⁽³⁾ available with Ekip UP⁺ in Protect configuration.

Ground protection

The *Settings Menu* allows you to:

- activate/deactivate the presence of external toroid S.G.R and relative Gext protection (pages 215 and 76)
- activate/deactivate the presence of Toroid Rc and relative protection (pages 215 and 76)
- activate/deactivate the presence of external toroids for MDGF and relative protection.

Main frequency

The *Grid Frequency* parameter sets the grid frequency value used by Ekip UP⁺ to monitor installation operation.



NOTE: the measurements are taken on the basis of the set grid frequency: incorrect configuration of the parameter may lead to abnormal measurements and protection.

Parameter	Option	Description	Default
Main frequency	50 Hz	-	50 Hz
	60 Hz	-	

Modules The *Settings-Modules* menu contains submenus and parameters enabling Ekip UP⁺ to handle the standard modules and optionals connected.

The menu populates on the basis of the modules installed.

If the only modules in Ekip UP⁺ are standard modules, the menu is structured in the following way:

Parameter	Description	Default
Local/Remote	<p>The parameter defines the mode in which the parameters are written in the unit:</p> <ul style="list-style-type: none"> • <i>Local</i>: parameter editing only via the display or service connector • <i>Remote</i>: parameter editing only remotely (Ekip Com modules) <p>i NOTES:</p> <ul style="list-style-type: none"> • <i>the Remote mode requires the presence of auxiliary power supply and Ekip Com modules, otherwise it disables automatically</i> • <i>However, the Local/Remote parameter can still be edited in the Remote mode</i> 	Local
Local bus	<p>The parameter enables communication between Ekip UP⁺ and the modules installed in the terminal box or outside the unit to be activated. Correct communication between unit and modules is confirmed by:</p> <ul style="list-style-type: none"> • population of the <i>Modules</i> menu with all the modules connected • Power Leds of the modules on and synchronized like the power led of Ekip UP⁺ • absence of Local Bus alarm in the diagnosis bar 	ON
Ekip Signalling 4K	Menu with the parameters of the Ekip Signalling 4K module, if present	
Ekip Measuring	Menu with the parameters of the module <i>Ekip Measuring</i> (page 153)	
Functions	Access to the <i>LOCAL Switch On</i> and <i>RESET signaling</i> functions (from page 110)	

If Ekip UP⁺ is equipped with one or more optional modules, these are displayed after Ekip Measuring. The submenus with the parameters of each optional module are described in this manual, in the part dedicated to optional modules.

Test Bus The parameter allows parameter editing via the service connector to be enabled/disabled, thereby limiting the possibility of configuring all the options on the display (in the Local mode) or via modules *Ekip Com* (in the Remote mode).

Disabling the parameter, Local mode and using the PIN allow security against undesired modification by unauthorized persons to be increased.

i **NOTE:** with *Test Bus= Off*, communication via service connector is still guaranteed (reading enabled)

Parameter	Option	Description	Default
Test Bus	On	Enables the parameters to be changed via service connector.	On
	Off	Disables access to parameter changing via service connector. The parameters remain displayed.	

System The *System* menu enables the general system parameters to be set:

Parameter	Description	Default
Date	Setting the current date	
Time	Setting the current time	
Language	Setting the language in display menus	English
PIN	PIN setting (page 48)	00001



IMPORTANT: setting and checking Date and Time is important for all the recording functions (trips or measurements); in the event of date and time glitches, reset and if necessary replace the battery inside Ekip UP+ (page 28).

View The *Settings-View* allows the following parameters to be accessed:

Parameter	Description	Default
<i>TFT orientation</i>	Enables the orientation of the <i>Alarms List</i> , <i>Measuring Instruments</i> and <i>Main Measurements</i> pages to be set. The options are: Horizontal, Vertical clockwise, Vertical counter-clockwise	Horizontal
<i>Customer page</i>	Allows you to activate a supplementary information page, which can be accessed by pressing the iTEST button twice from any page with a diagnosis bar. The information on the new page can be configured via Ekip Connect (page 139)	Off
<i>Ammeter Phase</i>	Allows the current to be displayed in the <i>Measuring tools</i> page to be set from among the following options: I _{max} , I ₁ , I ₂ , I ₃ , N _e (only in the 3P + N configuration)	I _{max}
<i>Voltmeter Phase</i>	Allows the voltage to be displayed in the <i>Measuring instruments</i> page to be set from among the following options: V _{max} , V ₁₂ , V ₂₃ , V ₃₁	V _{max}

Maintenance The parameter allows an alarm, concerning maintenance of the unit, to be enabled/disabled. (page 54). Ekip UP+ is supplied with the parameter set to: On.

MLRIU MLRIU parameters are available with Ekip UP+ for Motor Protections functions (page 99).



NOTE: to ensure correct operation, check where applicable: presence, state of the outgoing connections and those towards the Trip unit of Ekip CI, and the relative output contact (O61).

Parameters

Parameter	Description	Default
Open Mode	<p>Allows the TRIP mode to be set (page 70):</p> <ul style="list-style-type: none"> • Heavy: if TRIP occurs, it is controlled by the Open Output of the CB • Normal: contact O61 of the Ekip CI module is opened in the event of a TRIP <p>NOTES:</p> <ul style="list-style-type: none"> • the TRIP for G or I protections always involves the Open Output command, regardless of the Open Mode configuration • in the Normal mode, if the Trip unit detects the presence of a fault even after the open command sent to O61, a command is also sent to the Open Output of the CB 	Standard
Autoreclosure Activated	When Open Mode= Normal, allows re-closing of contact O61 to be activated after a TRIP due to protection L (On)	Off
Motor Class	Allows the trip class of the motor to be selected from among: 5E, 10E, 20 E, 30E	30E
Contactor Delay	Defines the time waited, after the open command of contact O61, before the fault is considered to be still present and action is taken by sending an Open Output command to the CB. The value is given in seconds and can be set within range: 0.1 s to 1 s, in 0.1 s steps	0,1
Autoreclosure Time	Defines the time waited after the open command of contact O61, before this latter is closed. The value is given in seconds and can be set within the range: 1 s to 1000 s, in 1 s steps	160

2 - Settings menu via Ekip Connect

Presentation Parameters and commands not directly available on the display can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

The list and description of the menus and parameters which can be accessed via Ekip Connect are given below.

Programmable States There are sixteen independent programmable states identified by the letters A, B, C, D, E, F, G, H, I, L, M, N, O, P, Q, R, offering different solutions for event control.

Each programmable status can have two values: True or False. There are also various configuration parameters available:

- *Trigger*: event or combination of several status activation events (up to 24, in AND or OR logic configuration).
- *On Delay*: status activation delay calculated from trigger presence onwards.
- *Off Delay*: status de-activation delay calculated from trigger absence onwards.



NOTE: the status activates if the trigger is present for longer than the On delay setting and de-activates if the trigger is absent for longer than the Off delay setting

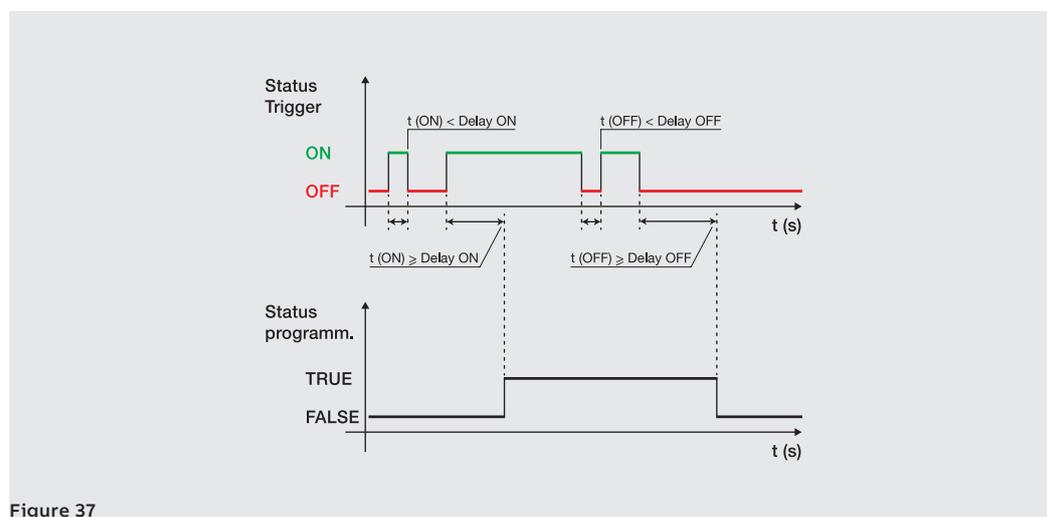


Figure 37

The statuses can be used with external module *Ekip Signalling 10K*, on Link Bus or with the programmable functions, so as to convey the required signaling combination to the contacts.

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

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

If the filter is activated, the measurements and specific protections (G, Gext and Rc for GTE filter, and V0 for V0 filter) are dealt with differently: Ekip UP⁺ applies a pass-band filter to the signal so as to measure the fundamental component only (50 or 60 Hz).

TAG Name, User data Tags that can be programmed by the user to facilitate remote identification of units.



NOTE: the Name TAG and communication address form the identification used by Ekip Connect for the connected devices

Customers Page The user can enter an explanation, up to five lines in length, in the info page.

This page can be viewed by pressing the **ITEST** button twice if the *Client page* parameter is set to *On* in the *Settings-View* menu.

Installation	Date of installation of unit
Load Profile Time	The counter indicates the time that has elapsed since the last reset of the energy measurements. It is active and updated in the presence of at least one of the following: auxiliary supply or supply by Ekip T&P.
Led Alive	<p>The parameter enables the behaviour of the Power led of Ekip UP⁺ and of all the connected modules to be changed; if activated (<i>Alive Mode on</i>), the Power leds act in the following way:</p> <ul style="list-style-type: none"> • Ekip UP⁺: flashes at 0.5 Hz frequency • <i>Modules</i>: if there are no communication errors, they synchronize with the led of Ekip UP⁺. <p>If deactivated, the Power leds on the respective devices come on with a steady light.</p>
Open/Close Remote Direct Command	<p>The parameter controls 2 different command packages for remote opening and closing:</p> <ul style="list-style-type: none"> • <i>Enabled</i>: command 7 and 8 valid (direct Open and Close commands). • <i>Disabled</i>: commands 7 and 8 not valid: in this case, remote opening and closing can still be obtained using the programmable YC COMMAND and YO COMMAND functions and the <i>Request circuit-breaker opening</i> and <i>Request circuit-breaker closing</i> commands
Change Double Set of parameters always	<p>If activated, enables the set of parameters (<i>Adaptive Protections</i>) to be changed even when timing alarms are in progress.</p> <p>Disabled by default.</p> <p>If Enabled, zone selectivity HW signals propagation logic applies in accordance with the table in the QT1 technical application notes. 1SDC007100G0205</p> <p>If Disabled, the HW selectivity signal is not propagated by Ekip UP⁺.</p>
Zone selectivity input functions	<p>The zone selectivity inputs and certain of the outputs can be configured in this section:</p> <ul style="list-style-type: none"> • <i>Standard</i>: input or output operation as per standard zone selectivity logic; all selectivity functions are set as Standard. (1SDC007100G0205 or 1SDC007401G0201) • <i>Customized</i>: the event that activates the zone selectivity input or output can be selected. <p> IMPORTANT: in the Customized configuration, the only zone selectivity activation event is the one set and standard selectivity operation is therefore not active (changes should only be made by expert technical personnel).</p>
Glitch	The commands of Glitches 16 to 23 activate the respective glitch registers, which can be used for customizing programmable functions or output contacts.
Wizard Reset	Reset Wizard: the Wizard window appears on Ekip UP ⁺ when powered-up the next time and allows some of the parameters of the unit to be entered.

1 - Test

Presentation Commands for checking some of the functions of Ekip UP+ are accessed in the *Test* menu. The available commands are listed below.



Figure 38

If Ekip UP+ is equipped with optional module Ekip T&P, *Test Protections* can be accessed using Ekip Connect so as to test the system by simulating the presence of alarm voltages or current signals.

Autotest The Autotest command starts an automatic sequence of the display and leds so as to enable their operation to be checked.

The sequence comprises the following test phases:

1. Screen with message "www.abb.com".
2. Gradual fade-out of the words on the display.
3. Darkening of the display.
4. Color sequence with red, green, blue bands, with gradual increase of backlighting
5. Lighting up, for one second, of the Warning and Alarm leds.



NOTE: auxiliary power supply must be present in order to check the gradual increase of backlighting

Test Protection The *Test Protection* menu can include two commands:

Command	Description	Conditions for a correct test
<i>Close Unit</i>	Close contact 4K O 02 for 0.2 s	Auxiliary supply present; State=Open Contact 4K O 02 configured as Close Output (page 135)
<i>Open Unit</i>	Close contact 4K O 01 for 0.2 s	Vaux present Contact 4K O 01 configured as Open Output (page 135)

Ekip UP+ checks that the command has been transmitted correctly, confirmed by the display window by the words "Test made"; the word "Busy" appears if incorrect conditions are present.



IMPORTANT:

- **Test Protection menu is visible if Ekip Signalling 4K module is present and if at least one of the commands is configured**
- Make sure that the devices are connected to Ekip UP+, **supplied correctly and functional before performing the test.**

Ekip Signalling 4K

The *Test-Ekip Signalling 4K* menu activates in the presence of the *Ekip Signalling 4K* module (version 4K-A or 4K-B, depending on the module installed) and the auxiliary power supply.

The *Autotest* command is available in the menu; it activates the automatic output test sequence (contacts and leds) and provides for the following operations:

1. Resetting of output contacts (= open) and leds (= off).
2. All the output contacts close in sequence and the relative leds light up
3. Reset initial conditions



IMPORTANT: in the Protect version, the sequence does not include output O 01; output O 02 is also excluded if configured as closing command (page 135)



IMPORTANT: the Autotest command closes the contacts regardless of the configuration set by the user: the user is responsible for ensuring that the devices connected to the Ekip Signalling 4K-A or 4K-B modules are secure, for checking that the contacts have closed properly and that the leds have come on

Ekip Signalling 2K

The *Test-Ekip Signalling 2K* menu activates in the presence of module *Ekip Signalling 2K*, the auxiliary power supply and local bus enabled.



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

The *Autotest* command is available in each submenu; it activates the automatic output test (Contacts and leds), input test (leds) and provides for the following operations:

1. Resetting of output contacts (= open) and leds (= off).
2. Lighting up of all leds in sequence (output and input)
3. Closing and switch-off in sequence of the two output contacts while the relative leds come on.
4. Reset initial conditions



IMPORTANT: the Autotest command closes the contacts regardless of the configuration set by the user: the user is responsible for ensuring that the devices connected to the Ekip Signalling 2K modules are secure, for checking that the contacts have closed properly and that the leds have come on

ZoneSelectivity

The *Test-Zone Selectivity* menu, available for the Ekip UP+ Protect version, includes submenus *Selectivity S* and *Selectivity G*, if the respective functions are activated:

Submenus	Reference selectivity	Outputs/Inputs managed
S Selectivity	S, S2, D (Forward)	SZi (DFi), SZo (DFo)
G Selectivity	G, Gext, D (Backward)	GZi (DBi), GZo (DBo)

Each submenu has three fields for checking selectivity inputs and outputs:

Field	Description
Input	Provides the status of the selectivity input (On/Off)
Force output	Selectivity output activated
Force Output	Selectivity output deactivated

Consult the description of the putting into service procedure when checking the selectivity contacts (page 23).

RC test Submenu *Test-Test Rc* is available for the Ekip UP+ Protect version if equipped with model *RC* of the *Rating plug* module.

Selection of submenu *Test Rc* displays the protection settings and instructions on how to perform the test (given below):

1. Press the **iTEST** button to send a test signal to the toroid.
2. The toroid sends Ekip UP+ a signal as though it had measured an alarm current.
3. Ekip UP+ sends the TRIP command.



IMPORTANT: the command sends a signal to toroid Rc and concludes with a Trip: the user is responsible for checking the connections (of the toroid and power supplies to the unit) and for transmitting the opening command.

Ekip CI The menu activates in the presence of module *Ekip CI*, the auxiliary power supply and local bus enabled.

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

1. Led reset and closing of contact O61 (if open)
2. Lighting up of all leds in sequence and successive switch-off
3. Opening of the O61 contact, switching on and off of the O61 led
4. Re-closing of O61 contact.



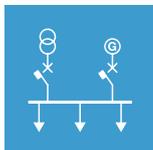
IMPORTANT:

- **the autotest sequence includes transmission of the opening command of the output contact; the user is responsible for making sure that opening has taken place correctly**
 - **the test sequence always ends with the closing of the O61 contact, regardless of the starting condition: verify that the change of status following the test does not create problems in your installation..**
-

Additional functions

1 - Power Controller

Presentation



The *Power Controller* function allows the loads of an installation to be managed according to power consumption, for the purpose of reducing consumption and optimizing energy efficiency.

This function prevents the contractual power consumption limit from being exceeded by using, as factors of assessment:

- the cumulative measurement of the energy consumed by the installation
- estimation of the energy consumed at the end of the monitoring periods into which the electric power billing period is divided
- automatic load monitoring: temporary disconnection of lower priority loads if the power exceeds the monitoring thresholds derived from the set parameters (power limit and monitoring period)
- automatic recognition of the monitoring periods on the basis of the internal clock of the unit or of an external synchronization signal, with reset and restart of the power meters at the end of each period.

Further information on the potential of the function is available in the White Paper [1SDC007410G0201](#) "Load management with Ekip Power Controller for SACE Emax 2" and in the product note [1SDC210110D0201](#).

Advantages

Use of the Power Controller function enables the user to:

- avoid exceeding the contractual power limit established with the electricity provider and, should possible consumption peaks be forecast, having to increase the contractual power and fixed costs to avoid penalties
- avoid oversizing the installation to prevent the protection from tripping in the event of an overload
- optimize load management in real time to cope with effective consumption demands

Load monitoring based on measuring energy instead of instantaneous power enables the power with which the loads are supplied to be maintained even in the presence of power consumption peaks, if the average power during the monitoring period does not exceed the contractual limit.

Since overshooting the power consumption limit is calculated by the public utility company on the basis of the mean power values measured over pre-defined intervals of time, Power Controller ensures compliance with the mean values over the period.

Operating principle

Ekip UP⁺ can pilot connection or disconnection of auxiliary generators or loads in view of the power consumption of the installation. The power demand received by the provider can be optimized in this way.

The operating principle is that of Master (Ekip UP⁺) – Slave (auxiliary generators or loads).

The Master is either wired or connected via dedicated bus (Link bus) to the apparatuses on the supply side of the connection circuits of the Slaves.

The Master quantifies the power consumption at regular intervals (monitoring period) and performs the following actions at the end of each period:

1. disconnection of a load (or connection of a generator) is commanded if the quantified value exceeds the set high consumption threshold
2. connection of a load (or disconnection of a generator) is commanded if the quantified value is below the set reduced consumption threshold
3. no action is performed if the estimation is within the acceptable consumption limits.

- Regulations** As Master, Ekip UP⁺ complies with the following Slave management regulations:
- up to 15 Slaves can be controlled
 - the priority levels assigned to the Slaves establish the order by which they are connected or disconnected; the first to be controlled are those with the lowest priority level
 - the same priority level can be assigned to several Slaves in the case of actions involving Slaves with the same priority level; the Master commands the action on the Slave whose state has remained unchanged for the longest time
 - each Slave can be assigned a time limit within which it cannot undergo further changes of state regardless of the priority level it has been given
 - a time limit can be entered within which a Slave must be forcibly reconnected, regardless of the priority level it has been given
 - when the Master commands a Slave to change state it is classified as not available and is excluded from the list of controllable Slaves until its state has been restored.

- Connections** The Master can command actions involving Slaves by means of:
1. wiring and opening/closing coils or motor operating mechanisms (if the Slaves are circuit-breakers)
 2. Bus Link on *Ekip Link*
 3. Bus Link with *Ekip Signalling 10K* modules.



NOTE: if Ekip UP⁺ in the Master configuration is equipped with Ekip Link module and the Bus Link can provide the clock signal and synchronization in accordance with the IEEE 1588 protocol, synchronization can be performed on the basis of this signal; further details on page 188.

Configuration Full configuration of Ekip UP⁺ in the Master mode is obtained by using Ekip Connect.

Parameters on the display The parameters indicated below can be configured via the display in the *Settings - Power Controller* menu (page 44) when Power Controller is activated:

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the function and its availability in the parameters menu	OFF
<i>Load Operating Mode</i>	Enables the configuration of each of the 15 programmable Slaves to be set (from Load 1 to Load 15); either the Automatic or Manual configuration can be selected	Manual
<i>Power Limits</i>	Enables 10 power limits to be set (from Power Limit 1 to Power Limit 10); the value is given in kW and can be set within range: 10 kW to 10000 kW, in 10 kW steps	10 kW



NOTE: it is advisable to configure the parameters for the first time using Ekip Connect; only use Ekip UP⁺ afterwards to enable or change the parameters of the Slaves and power limits.

Measurements on the display

The following information can be viewed on Ekip UP⁺ in the *Measurements-Power Controller* menu when Power Controller is activated:

Measurement	Description
<i>Ea</i>	Expected energy
ΔT	Time elapsed in the evaluation window
<i>LOADS</i>	Number of Slaves controlled
<i>LOADS Shed</i>	Number of Slaves disconnected
<i>Sp</i>	Load shedding priority setting
<i>T</i>	Evaluation window

Information displayed

When Power Controller is activated, the information section of the Ekip UP⁺ menu (page 45) contains the *Power Controller* menu with two submenus giving details about the Slaves connected:

Submenus	Information provided
<i>Load Input Status</i>	State of the Slaves (from Load 1 to Load 15): open or closed
<i>Load Active</i>	Configuration of the Slaves (from Load 1 to Load 15): activated or deactivated

2 - Load Shedding

Description



The *Load Shedding* function allows faults to be managed in installations which are able to function thanks to the energy produced by renewable and local energy sources, especially the absence of power supply caused, for example, by a fault on the MV voltage side.

This function is available in two versions:

- *Basic* is present by default in Ekip UP+
- *Adaptive* can be purchased in the relative additional package.

All the parameters and measurements of the function are accessed via Ekip Connect, but those described below can be viewed and set via the display of Ekip UP+.



IMPORTANT: consult the Technical catalog or White paper of the function for full details.

Parameters on the display

A partial view of the parameters of the *Load Shedding* function is obtained using the Ekip UP+ display. It is advisable to make the full configuration using Ekip Connect.

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the function and its availability in the parameters menu	Off
<i>Version</i>	Display of the version of the function, Basic or Adaptive  NOTE: with the Basic version, the only parameter available is <i>Reconnection Timeout</i>	--
<i>Solar System Present</i> ⁽¹⁾	Establishes whether the microgrid includes a solar energy system (Off/On)	Off
<i>Rated Solar Power</i> ⁽¹⁾	Available with Solar Energy System Present = On, defines the rated power of its solar energy system. The value is given in kW and can be set within the range: 10 kW to 65535 kW, in 10 kW steps	100 kW
<i>ATS</i> ⁽¹⁾	Establishes whether the installation has an ATS system (Off/On)	Off
<i>Generator power</i> ⁽¹⁾	Available with ATS=On, defines the power received from the ATS branch; can be set within the range: 0 kW (. . . .) to 10000 kW, in 1 kW steps
<i>Frequency slope</i> ⁽¹⁾⁽²⁾	Defines the instantaneous frequency variation that activates <i>Load shedding</i> The value is given as absolute value (Hz/s) and can be set within the range: 0.6 Hz/s to 10 Hz/s in 0.2 Hz/s steps	0,6 Hz/s
<i>F W Warning</i> ⁽¹⁾⁽²⁾	Control threshold of the minimum frequency that activates Load shedding The value is given as absolute value (Hertz) and can be set within the range: 0.9 Fn to 1.1 Fn in 0.001 Fn steps	3 Fn
<i>Reconnection Timeout</i>	Defines the time employed by Ekip UP+ between reconnection of one load and the next, after the main CB has reclosed. The value is given as absolute value (s) and can be set within the range: 1 s to 1800 s in 1 s steps	10 s

⁽¹⁾ Only available in the Adaptive version

⁽²⁾ Load shedding activates if the monitoring conditions defined by the *Frequency slope* and *F W Warning* parameters are present at the same time.

Measurements on the display

The specific page containing the main measurements is available in the *Measurements* menu, with *Power Controller* activated:

Measurement	Description
<i>F</i>	Frequency measured
<i>Fn</i>	Rated frequency of Ekip UP ⁺
<i>LOADS</i>	Number of Slaves controlled
<i>LOADS Shed</i>	Number of Slaves disconnected

Information displayed

Information about the loads connected to Ekip UP⁺ can be viewed in the *About-Load Shedding* menu, if activated:

Submenus	Information provided
<i>Load Input Status</i>	State of the Slaves (from Load 1 to Load 15): open or closed
<i>Load Active</i>	Configuration of the Slaves (from Load 1 to Load 15): activated or deactivated

3 - IPS Interface protections

Description



The *IPS Interface protection* function allows faults to be managed in installations which are able to function thanks to the energy produced by renewable and local energy sources, especially the absence of power supply, e.g. caused by a fault on the MV voltage side.

The function can be configured for Ekip UP+ Protect and conforms to standard CEI 0-16.

All parameters and measurements of the function are available via Ekip Connect; however, Ekip UP+ allows protection *59 S1*, *V DIR*, *V INV* and *F WI* to be set, as presented below, as well as all protections provided for by the regulations and described in the Protections chapter (page 65).



IMPORTANT: for full details consult document [1SDH002043A1001](#) (annex CEI 0-16) and document [1SDH000008A1001](#) (diagram CEI 0-16).

Protection 59.S1 [ANSI 59S1]

Protection 59.S1 sends the TRIP command if the maximum mean value of the three line-to-line voltages, calculated in a 10-minute floating window, exceeds the *Threshold* value for longer than the set time value.

If the function is activated, the *Advanced* menu contains the *Protection 59.S1* submenu, which comprises the following parameters:

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	Off
<i>Trip Enable</i>	Activates/deactivates transmission of the open command: if disabled, the alarm and exceedance of protection time are only managed as information	Off
<i>Threshold</i>	Establishes the value that activates the protection. The value is given as both absolute value (V) and relative value (Un) and can be set within the range: 1 Un to 1.3 Un in 0.05 Un steps	1,1 Un
<i>Time</i>	This is the trip time of the protection; the value is given in seconds and can be set within a range: 3 s to 999 s, in 3 s steps	3 s

Limitations and additional functions

The parameters of the lock functions can be accessed by using Ekip Connect and accessing Ekip UP+ via service connector or system bus. (page 106).

Protection V DIR [ANSI 27VD]

Protection V DIR activates the alarm (without commanding TRIP) if the positive sequence voltage measured by Ekip UP+ exceeds or drops below set threshold value *Udir* (depending on the direction set). Threshold value *Udir* can be set via Ekip Connect. The *Advanced* menu includes the *V DIR Protection* submenu from which the following parameters can be configured:

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the control threshold of the parameters and their availability in the menu	Off
<i>Direction</i>	Defines whether sequence monitoring is performed after the measured sequence has dropped (Down) or been exceeded (Up)	Down
<i>Threshold</i>	Establishes the value that activates the alarm. The value is given as both absolute value (V) and relative value (Un) and can be set within the range: 0.1 Un to 1.5 Un in 0.05 Un steps	0,8 Un

Protection V INV [ANSI 59VI]

V INV Protection activates the alarm (without commanding TRIP) if the negative sequence voltage measured by Ekip UP+ drops below set threshold value *Uinv*. Threshold value *Uinv* can be set via Ekip Connect.

The *Advanced* menu includes the *V INV Protection* submenu from which the following parameters can be configured:

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates monitoring of the parameters and their availability in the menu	Off
<i>Threshold</i>	Establishes the value that activates the alarm. The value is given as both absolute value (V) and relative value (Un) and can be set within the range: 0.05 Un to 0.5 Un in 0.05 Un steps	0,05 Un

F W1 Warning

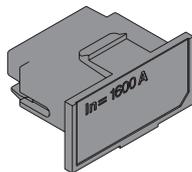
The *F W1 Warning* function activates the alarm (without commanding TRIP) if the frequency measured by Ekip UP+ exceeds or drops below the set threshold value (depending on the direction set).

The *Advanced-Warning* menu includes the *FS W1 Warning* submenu from which the following parameters can be configured:

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the control threshold of the parameters and their availability in the menu	Off
<i>Direction</i>	Defines whether frequency monitoring is performed after the measured sequence has dropped (Down) or been exceeded (Up)	Down
<i>Threshold</i>	Establishes the value that activates the alarm. The value is given as both absolute value (Hertz) and relative value (Fn) and can be set within the range: 0.9 Fn to 1.1 Fn in 0.001 Fn steps	3 Fn

Standard accessories and modules

1 - Rating Plug



The *Rating Plug*, supplied with Ekip UP⁺, establishes the rated current I_n required for the measuring range and for setting the current protections (relating to I_n).

It is installed on a dedicated front connector which can be accessed by the user.

Ekip UP⁺ continuously checks for the presence of the *Rating Plug* and signals its absence or any assembly or installation errors.

If a new model is installed, Ekip UP⁺ displays the request for installation when powered up.

The *Rat.Curr* field, with quantity I_n read by the unit, is available in the *About-Circuit breaker* menu of Ekip UP⁺.

Versions Various models of different sizes are available and can be ordered in two versions: a classic version and a version which activates Rc protection; the two versions have different labels:

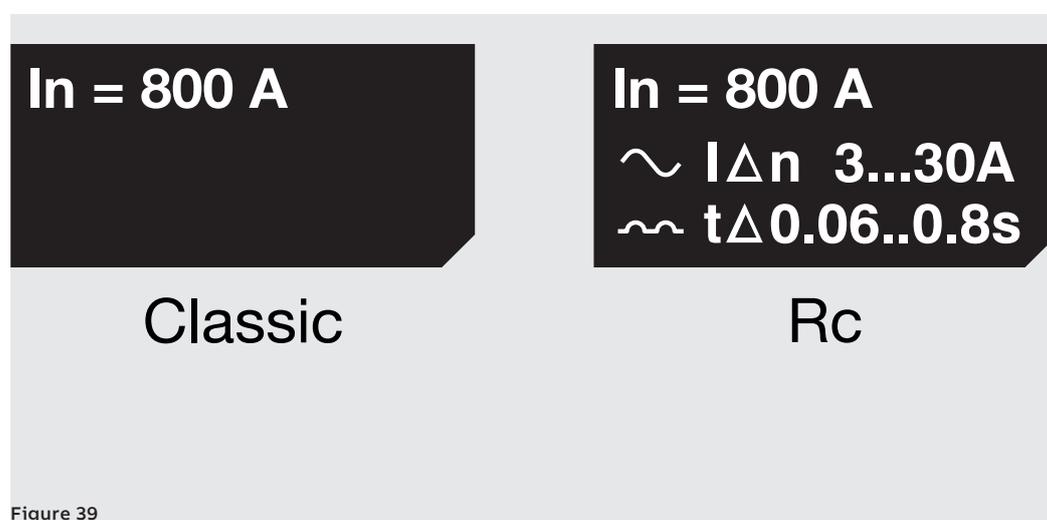


Figure 39

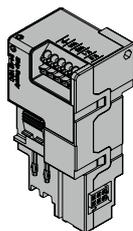
Replacement The module can be replaced by the user; any *Rating Plug* with maximum rated current equal to the current of the sensor in the unit can be installed.

i **NOTE:** a 2000 A to 6300 A *Rating Plug* can be installed in the presence of current sensors type C 290 mm.

Further details about assembly and the *Rating Plug* installation procedure are available in ABB Library, particularly in document [1SDH002011A1505](#).

! **IMPORTANT:** to avoid alarms or undesired trips, the *Rating Plug* must be replaced when Ekip UP⁺ is off, and in the absence of primary currents.

2 - Ekip Supply



Ekip Supply is the supply module of Ekip UP⁺.

It performs three functions:

- supplies auxiliary power to Ekip UP⁺
- allows the terminal box modules to be supplied and connected to Ekip UP⁺
- acts as a bridge for the Local Bus between Ekip UP⁺ and the external electronic accessories.

Electrical characteristics

Model	Ekip Supply 24-48VDC
Power supply voltages	21,5 ÷ 53 VDC
Frequency	--
Maximum power consumption without modules ⁽¹⁾	4 W
Maximum power consumption with modules ⁽²⁾	10 W
Maximum inrush current	2 A for 20 ms

⁽¹⁾ *Ekip UP⁺ complete with standard modules*

⁽²⁾ *Ekip UP⁺ complete with standard modules + four terminal box modules.*

Interface The module has a Power led to signal the presence of incoming power supply:

- off: no supply

complete with standard modules and four terminal box modules.

Connections With reference to the circuit diagrams, use AWG 22-16 cables with 1.4 mm maximum outer diameter for the external cabling [1SDM000116R0001](#)

3 - Ekip Measuring

Description The *Measuring* module allows the following measurements to be taken:

- Voltage (RMS measurement of line-to-line voltages and phase voltages in the applicable cases)
- Frequency of the voltages
- Power and energy, also using the phase current measurements.



NOTE: the measurement performance is described in the *Measuring* chapter on page 49.

If used in conjunction with *Ekip Synchrocheck*, it is also able to recognize whether the synchronization conditions between external sockets and external contacts are able to allow the synchronization contact to close (see chapter dedicated to *Ekip Synchrocheck* from page 205).

Electrical characteristics The *Ekip Measuring* functions when Ekip UP+ is on via auxiliary power supply and operates within the following range:

Component	Range
Phase-to-phase input voltage	0 ÷ 760 VAC (692 VAC +10 %)
Input frequency	30 ÷ 80 Hz

Isolation transformer In the case of connection to a line-to-line voltage exceeding rated 690 V AC (maximum 760 V AC), it is mandatory to use an isolation transformer that conforms to standard IEC 60255-27 and possesses the following characteristics:

Characteristics	Description
Mechanical	<ul style="list-style-type: none"> • fixing: EN 50022 DIN43880 rail • material: self-extinguishing thermoplastic • protection class: IP30 • electrostatic protection: with earth connector shield
Electrical	<ul style="list-style-type: none"> • Accuracy class: ≤ 0,2 • Performance: ≥ 4 VA • Overload: 20 % permanent • Insulations: 4 kV between inputs and outputs, 4 kV between shield and outputs, 4 kV between shield and inputs • Frequency: 45 to 66 Hz

Parameters The specific configuration area will activate in the *Settings-Modules* menu if the *Measuring* module is detected correctly by Ekip UP⁺.

The following parameters can be configured in this menu:

Parameter	Description	Default
<i>Voltage Transf.</i>	Selects the presence or absence of the external transformer	Absent
<i>Un Setting Mode</i>	Selects the rated voltage value selection mode: <ul style="list-style-type: none"> • Table: value editable in preset steps • Volt: value editable within the range in 1 V steps 	Volts
<i>Rated voltage</i>	Available in the absence of a transformer; defines rated voltage U_n . The value is given in absolute value (Volts), editable within the 100 V to 690 V range in steps which depend on the Un Setting Mode parameter setting.	100 V
<i>Primary voltage</i>	Available in the presence of a transformer; defines rated voltage U_n of the installation. The value is given in absolute value (Volts), editable within the 100 V to 230 V range in steps which depend on the Un Setting Mode parameter setting.	100 V with Un Setting Mode=Volt 400 V with Un Setting Mode=Table
<i>Secondary voltage</i>	Available in the presence of a transformer; defines the secondary voltage of the transformer. The value is given in absolute value (Volts), editable within the 100 V to 230 V range in steps which depend on the Un Setting Mode parameter setting.	100 V
<i>Positive Power flow</i>	Defines the power flow required for D protection (page 78); 2 options can be selected : <ul style="list-style-type: none"> • High → Low: the power flows from the low terminals to the high ones (load connected low) • Low → High: opposite power flow (load connected high) 	High → Low
<i>Neutral connection</i>	Available with 3 P configuration; allows the presence of the external neutral to be enabled.  NOTE: <i>presence of the neutral activates phase voltage measurement</i>	Absent

When *Un Setting Mode* is set in Table, the values of the voltage parameters can be as follows:

Parameter	Voltage values with adjustment in steps
<i>Rated voltage</i>	100 V, 115 V, 120 V, 190 V, 208 V, 220 V, 230 V, 240 V, 277 V, 347 V, 380 V, 400 V, 415 V, 440 V, 480 V, 500 V, 550 V, 600 V, 660 V, 690 V
<i>Primary voltage</i>	100 V, 115 V, 120 V, 190 V, 208 V, 220 V, 230 V, 240 V, 277 V, 347 V, 380 V, 400 V, 415 V, 440 V, 480 V, 500 V, 550 V, 600 V, 660 V, 690 V, 910 V, 950 V, 1000 V, 1150 V
<i>Secondary voltage</i>	100 V, 110 V, 115 V, 120 V, 200 V, 230 V

About The *About-Modules* menu contains the specific menu of the module with the serial number and version of the module itself.

Test The dielectric test is described in the Installation instructions [1SDH002011A1001](#), [1SDH002011A1002](#).

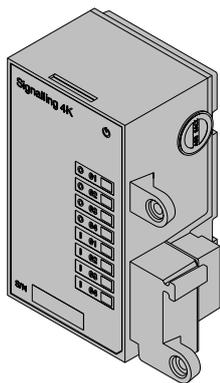
Connections When connecting external voltage sockets in all the possible configurations, please consult circuit diagrams ([1SDM000002A1001](#)):

- 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



NOTE: the configuration with residual voltage control is available for Ekip UP⁺ Protect.

4 - Ekip Signalling 4K-A and Ekip Signalling 4K-B



Ekip Signalling 4K is an accessory signalling module allowing programmable inputs/outputs to be managed. Ekip Signalling 4K is available in two models:

Ekip Signalling 4K-A, equipped with:

- 4 contacts for output signals and relative state led
- 4 digital inputs and relative state led
- Power led to indicate that the module is on

Ekip Signalling 4K-B, equipped with:

- 4 contacts for output signals and relative state led
- 2 digital inputs and relative state led
- 2 push-buttons for direct control of contact making and breaking
- Power led to indicate that the module is on.

Power supply Ekip Signalling 4K functions with Ekip UP⁺ on via auxiliary power supply.



NOTE: when the module is off, the output contacts are always in the open position and the state of the inputs is not valid

Input Ekip UP⁺ can be configured so that the state of the inputs corresponds to actions or signals, with various different programming options (see Menu on page 157).



NOTE: Access to certain inputs/outputs may be inhibited, being already programmed for specific actions; consult the configuration in the Breaker Connections menu on page 135.

Each input (H1, H2, H3, H4 in model 4K-A, H1 and H2 in model 4KB) must be connected with reference to the common contacts (HC).

The module permits two logic states, interpreted differently by Ekip UP⁺ depending on the configuration selected for each contact:

State	Electrical condition	Contact configuration (polarity)	State detected
Open	Circuit open ⁽¹⁾	Active open	ON
		Active closed	OFF
Closed	Short-circuit ⁽¹⁾	Active open	OFF
		Active closed	ON

⁽¹⁾ Open state: > 100 kΩ; Closed state: < 50 Ω.

Output Ekip UP⁺ can be configured so that the contacts of each output are closed or opened if one or more events occur, with different programming options (see Menu on page 157).



NOTE: Access to certain inputs/outputs may be inhibited, being already programmed for specific actions; consult the configuration in the Breaker Connections menu on page 135.

Each output consists of two contacts (K3-K7, K4-K8, K5-K9, K6-K10), isolated from the unit and from the other outputs, with the following electrical characteristics:

Characteristics	Maximum limit ⁽¹⁾
Maximum switchable voltage	150 VDC / 250 VAC (150 VAC for UL508)
Breaking capacity	2 A @ 30 VDC, 0,8 A @ 50 VDC, 0,2 A @ 150 VDC, 4A @ 250 VAC
Dielectric strength between open contacts	1000 V AC (1 minute @ 50 Hz).
Dielectric strength between each contact and coil	1000 V AC (1 minute @ 50 Hz).

⁽¹⁾ data relating to a resistive load

Interface The module has nine signaling leds:

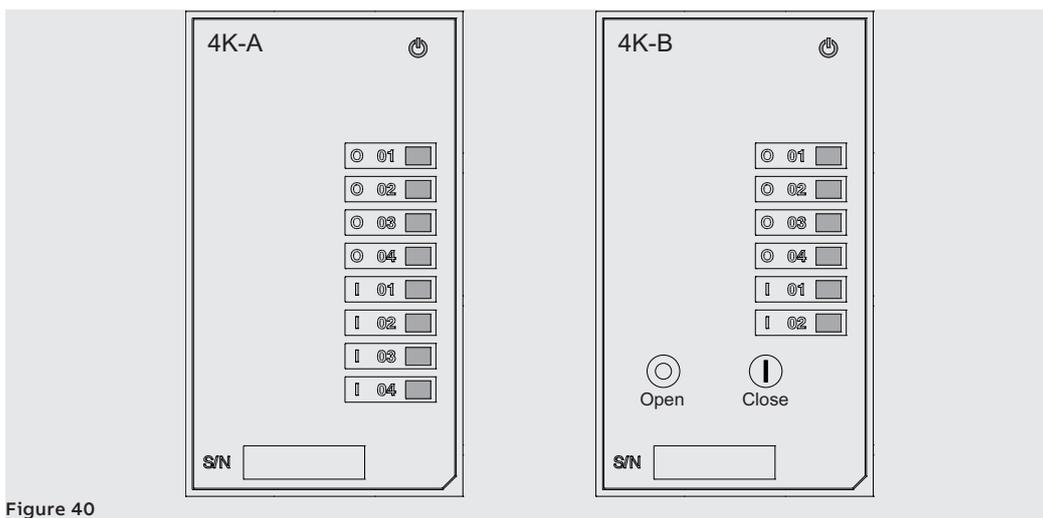


Figure 40

Ekip Signalling 4K-A

LEDs	Description
Power	Signal the presence of power supply on the input: • off: no power supply • on (steady): power supply present
O 01, O 02, O 03, O 04	Indicate the physical state of the contacts of each output: • off: contact open • on: contact closed
I 01, I 02, I 03, I 04	Indicate the physical state of the contacts of each input: • off: circuit open • on: short circuit

Ekip Signalling 4K-B

LEDs	Description
Power	Signal the presence of power supply on the input: • off: no power supply • on (steady): power supply present
O 01, O 02, O 03, O 04	Indicate the physical state of the contacts of each output: • off: contact open • on: contact closed
I 01, I 02	Indicate the physical state of the contacts of each input: • off: circuit open • on: short circuit
Command	Description
O Open	Commands contact opening
I Close	Commands contact closing

Menu The specific configuration area will activate in the *Settings-Modules* menu if the *Ekip Signalling 4K* module is detected correctly by Ekip UP⁺.

Contains the submenus of all the available inputs and outputs (depending on the Ekip UP⁺ version used), as described in the following paragraphs, and other configuration parameters:

Parameter	Description	Default
<i>Type 4K</i>	Enables the version of the module in the unit to be confirmed, an operation required if the module is changed after purchase.	As ordered
<i>PIN Lock</i>	Enables the function of the control buttons of the Ekip Signalling 4K-B module: <ul style="list-style-type: none"> • On: PIN code entry is requested when these push-buttons are pressed (page 48) to enable execution of the associated commands • Off: press push-buttons to run associated action <p> NOTE: <i>trip unit will not detect change in state if this is present for less than set Delay</i></p>	Off

Input parameters All the inputs enable the following parameters to be configured:

Parameter	Description	Default
<i>Polarity</i>	Defines whether the state of the input is ON when the contacts are open (Active open) or short-circuited (Active Closed)	Active closed
<i>Delay</i>	Minimum activation and deactivation time of an input enabling a change of state to be recognized by the trip unit; the Delay is given in seconds and can be set within a range between 0 s and 100 s, in 0.01 s steps. <p> NOTES:</p> <ul style="list-style-type: none"> • <i>the trip unit will not detect a change of state if it is present for less than the set Delay</i> • <i>if Delay = 0 s, the change of state must still be more than 300 mS</i> 	0.1 s

Output parameters All the available outputs enable the following parameters to be configured:

Parameter	Description	Default
Signal source	Event which activates the output and changes the state of the contacts. Different protection proposals, statuses and thresholds are available in the menu; the Custom mode can be configured via Ekip Connect so as to extend the solutions and combine several events.	None
Delay	Minimum presence of Source for output activation; the Delay is given in seconds and can be set within a range between 0 s and 100 s, in 0.01 s steps. i NOTES: <ul style="list-style-type: none"> output will not activate if Source deactivates before Delay has elapsed if delay = 0 s Source must still be present for longer than 300 mS 	0 s
Contact Type	Defines the rest status of the contact with Source not present between either: normally open (NO) and closed (NC). Output activation coincides with the change in state with respect to that of rest.	NO
Latched ⁽¹⁾	Allows the output to be managed differently when Source disappears: either keep contact activated (On) or deactivate it (Off). i NOTE: if Self-latching = On, the output resets if the module switches off, or in the case of a module auto test or signal reset command	Off
min Activation Time ⁽²⁾	If Self-latching = Off, defines the minimum activation time of the output in the presence of rapid Sources: <ul style="list-style-type: none"> Source duration < Min activ. time = the output remains activated for the duration of the Min activ. time Source duration > Min activ. time = the output remains activated for as long as the Source persists Choose between: 0 ms, 100 ms, 200 ms	0 ms

⁽¹⁾ deactivate the self-latchings of the outputs used for Power Controller if the module is used for the Power Controller function

⁽²⁾ the Pulse Mode option will be available as well as those described if the module is used for the Power Controller function. If selected, the output is maintained active for a fixed time pertaining to the function itself, regardless of whether the event that activated it persists or not.

About The About-Modules menu contains the specific area for Ekip Signalling 4K, in which the states of the inputs (On/Off) and outputs (Open/Closed) are present.

Test The dedicated area in the Test menu is activated if Ekip Signalling 4K is detected correctly by the trip unit.
For details of the test characteristics, please consult page 141.

Connections Consult circuit diagrams 1SDM000116R0001 for the connections of all the inputs/outputs, in all the possible configurations:

- Monitor version
- Protect and Monitor with Protect bundle versions.

5 - Current sensors

Description Ekip UP⁺ can be supplied with three different types of current sensors, available in several sizes and dimensions.

Sensors	Description	Available sizes [A]
Type A	Sensor closed with passing busbar	2000, 4000
Type B	Sensor closed without passing busbar	400, 1600, 2500 shaped
Type C	Openable sensor without passing busbar	4000 (100 mm) ⁽¹⁾ , 4000 (120 mm) ⁽¹⁾ , 4000 (200 mm) ⁽¹⁾ , 6300 (290 mm) ⁽¹⁾

⁽¹⁾ The measurement refers to the internal diameter of the sensor.

The sensors in the supply, which will all be of the same type and size, are defined when Ekip UP⁺ is purchased; their number varies and depends on the configuration of the unit (3P or 4P).

If not necessary, Ekip UP⁺ can be ordered by substituting the current sensors for the current bridges (Type D) described on page 217.

Measuring characteristics The current sensors supplied with Ekip UP⁺, in accordance with the operating conditions described on page 17, guarantee the measurement accuracies given in the next table:

Measurement	Ekip UP accuracy with sensors Type A and B ⁽¹⁾	Ekip UP accuracy with sensors Type C ⁽¹⁾
Phase currents	1%	1 % ⁽²⁾
Internal earth fault	2 %	2 % ⁽²⁾

⁽¹⁾ performance with reference to the normal operating range (0.2 to 1.2 I_n)

⁽²⁾ accuracies when sensor is centered and perpendicular to the busbar of its phase, cable connecting to Ekip UP⁺ far from the busbar and zones of possible disturbance (example: inverters), sensor closing far from the busbars.



IMPORTANT: To obtain the most accurate measurements, ABB advises users to comply with the greatest possible number of indications given in the NOTE (2).

Kits and identification

The current sensors are supplied with connection accessories and identification system:

Sensors	Cable	Accessories supplied	Identification
Type A and B	Separate	Cable connecting to Ekip UP ⁺ (3 m)	Phase label applied to sensor
Type C	Assembled (3 m)	Terminal for sensor wiring	Loose labels to apply to wiring

Labels or scoring marks are applied to the sensors to indicate the direction of the current to be measured.

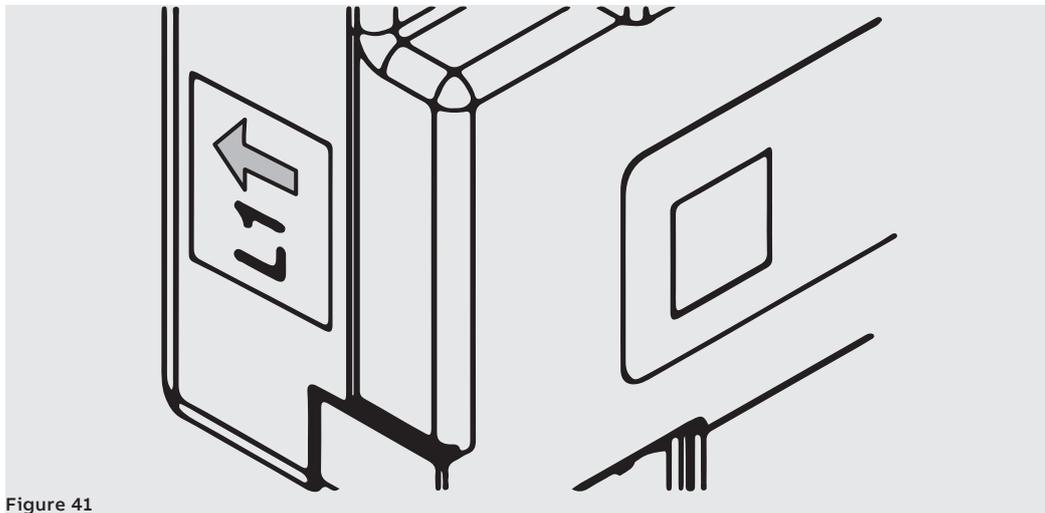


Figure 41

**IMPORTANT: at the installer's charge**

- connect the sensors correctly to Ekip UP⁺ as indicated in Getting Started instructions 1SDH002123A1001
- make sure that the serial number of the Ekip UP⁺ unit on sensors type A and B corresponds to that of the Ekip UP⁺ to which they are associated.

Replacement

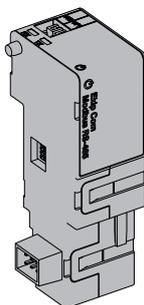
You can replace your sensor chain or change the configuration (3P/4P) by contacting ABB and indicating the serial number of Ekip UP⁺.



NOTE: *changing the configuration from three to four sensors must be completed by the Configuration parameter available on the display (page 133).*

Optional accessories and modules

1 - Ekip Com Modbus RTU



Ekip Com Modbus RTU is a communication module which allows Ekip UP⁺ to be integrated into an RS-485 network with Modbus RTU communication protocol, remote supervision and monitoring functions, in two different modes, master and slave.

You can perform the following operations remotely:

- read the information and measurements of Ekip UP⁺
- manage certain controls, including opening and closing the actuator
- access information and parameters not available on the display
- If connected to a withdrawable version of the circuit-breaker, the allows the racked-in/racked-out status to be detected



NOTE: the remote open and close commands of the circuit-breaker can only be executed if Ekip UP⁺ is in the Remote configuration.

The System Interface document is available for mapping the module in its communication network. All the required communication and command details are listed in the document (page 197).

Models Two different modules compatible with the Modbus RTU protocol are available: *Ekip Com Modbus RTU* and *Ekip Com Modbus RTU Redundant*.

The modules are identical in terms of characteristics and installation methods, except for: display menus, cabling and addresses for system communication, which are specific for each module.



NOTE: if different indications are not given, the information in the next chapter is valid for both models

The two modules can be connected at the same time to Ekip UP⁺ so as to expand the potential of the unit (e.g. for applications where high grid reliability is required).



IMPORTANT: each Ekip UP⁺ can be fitted with only one module per type. The configuration with two modules of the same model is not allowed (example: two Ekip Com Modbus RTU Redundant models)

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

To connect the module to its communication network and for references about the terminals, please consult document [1SDM000091R0001](#); use Belden 3105A type cables or equivalent for the external cabling.

To connect the module to Ekip UP⁺, please consult document [1SDH001000R0512](#).

Power supply *Ekip Com Modbus RTU* is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: communication between Ekip UP⁺ and the module is interrupted in the absence of auxiliary power supply

Interface the module has three signaling leds:

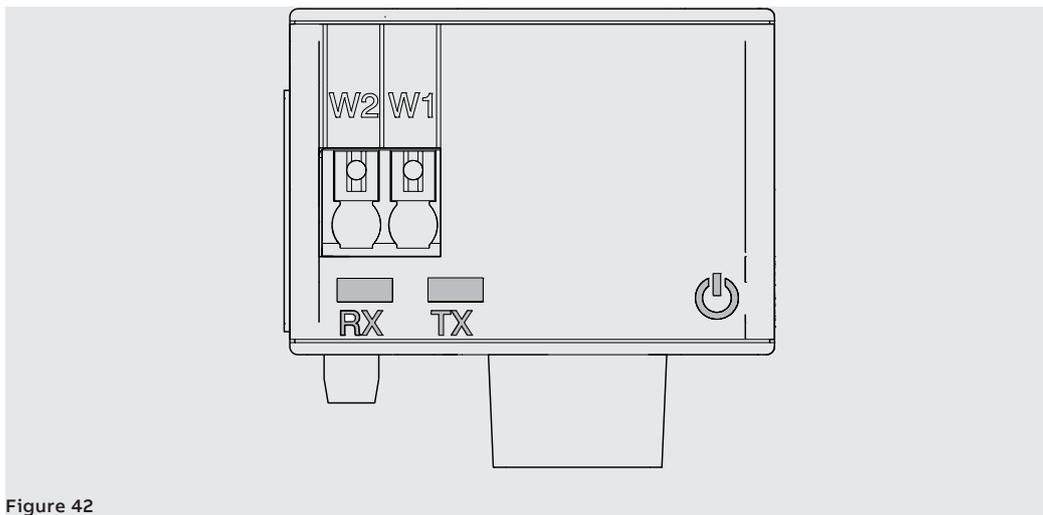


Figure 42

LEDs	Description
Power	Signals the on state and correct communication with Ekip UP+: <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with Power led of Ekip UP+: module on and communication with Trip unit present • flashing not synchronized with Power led of Ekip UP+ (two fast flashes per second): module on and communication with Trip unit absent
Rx	Indicates the status of the communication between network master and module (slave): <ul style="list-style-type: none"> • off: Modbus RTU communication not activated • on with fast flashes: Modbus RTU communication activated
Tx	Indicates the status of the communication between network master and module (slave): <ul style="list-style-type: none"> • off: communication between Modbus RTU not activated • on with fast flashes: Modbus RTU communication activated

Configurations Resistors can be connected to the RS-485 bus by configuring the dip-switches at the side of the module:

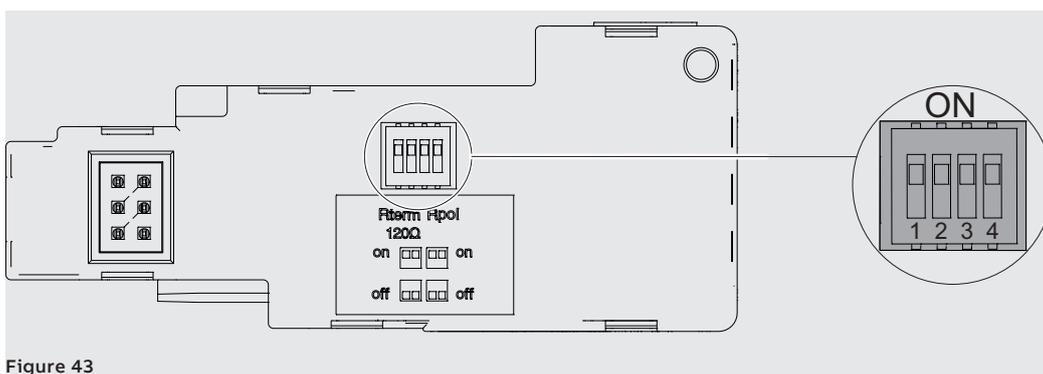


Figure 43

Resistor	Dip	Description	Default
Rterm	1 and 2	120 Ω termination resistor Move dip-switches 1 and 2 to the ON position to connect Rterm	Off
Rpol	3 and 4	220 Ω pull-up or pull-down resistor Move dip-switches 3 and 4 to the ON position to connect Rpol	Off

! **IMPORTANT: move the dip-switches before connecting the module to Ekip Supply and the communication network**

Configurations via menu Local bus activation, which is essential for starting communication between the module and Ekip UP⁺, is available in the *Settings* menu (page 136).

Two areas are activated if Ekip UP⁺ detects the module correctly:

- information area in the About-Modules menu, containing the software version and serial number of the module
- specific configuration area in the Settings-Modules menu, where the following communication parameters can be configured

Parameter	Description	Default
<i>Serial address</i>	Module address; 1 to 247 range available  IMPORTANT: devices connected to the same network must have different addresses	247 / 246 ⁽¹⁾
<i>Baudrate</i>	Data transmission speed; 3 options are available: 9600 bit/s, 19200 bit/s, 38400 bit/s	19200 bit/s
<i>Physical protocol</i>	Defines the stop and parity bit; 4 options are available: <ul style="list-style-type: none"> • 8,E,1 = 8 data bits, 1 EVEN parity bit, 1 STOP bit • 8,O,1 = 8 data bits, 1 ODD parity bit, 1 STOP bit • 8,N,2 = 8 data bits, no parity bit, 2 STOP bits • 8,N,1 = 8 data bits, no parity bit, 1 STOP bit 	8,E,1

⁽¹⁾ 247 default of the Ekip Com Modbus RTU module; 246 default of the Ekip Com Modbus RTU Redundant module

Remote configurations By using Ekip Connect and accessing Ekip UP⁺ via the service connector or system bus, the operating configuration can be changed from slave to master so as to integrate the module into an interactive data exchange network (see description of Ekip Com Hub, page 193).

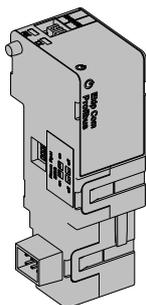


IMPORTANT:

- **In the Master configuration, the module does not allow data exchange as in the normal Slave function**
- **the presence of several masters in the same network can cause faulty operation**

Remote information By using Ekip Connect and accessing Ekip UP⁺ via the service connector or system bus you can access additional information about the version and state of the module: Boot and HW version, CRC state (correctness of SW in the module).

2 - Ekip Com Profibus DP



Ekip Com Profibus DP is a communication accessory which allows Ekip UP+ to be integrated into an RS-485 network with Profibus communication protocol, with remote supervision and monitoring functions.

The module is configured as a Slave and remotely, you can:

- read Ekip UP+ measurements and information
- manage certain controls, including opening and closing the actuator (MOE-E)
- access information not available on the display
- If connected to a withdrawable version of the circuit-breaker, the allows the racked-in/racked-out status to be detected



NOTE: the remote open and close commands of the circuit-breaker can only be executed if Ekip UP+ is in the Remote configuration.

See System Interface for Ekip Com modules to map the module into your communication network (page 197).

Models Two different modules compatible with the Profibus protocol are available: *Ekip Com Profibus DP* and *Ekip Com Profibus DP Redundant*.

The modules are identical in terms of characteristics and installation methods, except for: display menus, cabling and addresses for system communication, which are specific for each module.



NOTE: if different indications are not given, the information in the next chapter is valid for both models

The two modules can be connected at the same time to Ekip UP+ so as to expand the potential of the unit (e.g. for applications where high grid reliability is required).



IMPORTANT: Each Ekip UP+ can be fitted with only one module per type. The configuration with two modules of the same model is not allowed (example: two Ekip Com Modbus DP Redundant models)

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000091R0001](#); use Belden 3079A type cables or equivalent for the external cabling.

To connect the module to Ekip UP+, please consult document [1SDH001000R0512](#).

Power supply *Ekip Com Profibus DP* is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: communication between Ekip UP+ and the module is interrupted in the absence of auxiliary power supply

Interface the module has three signaling leds:

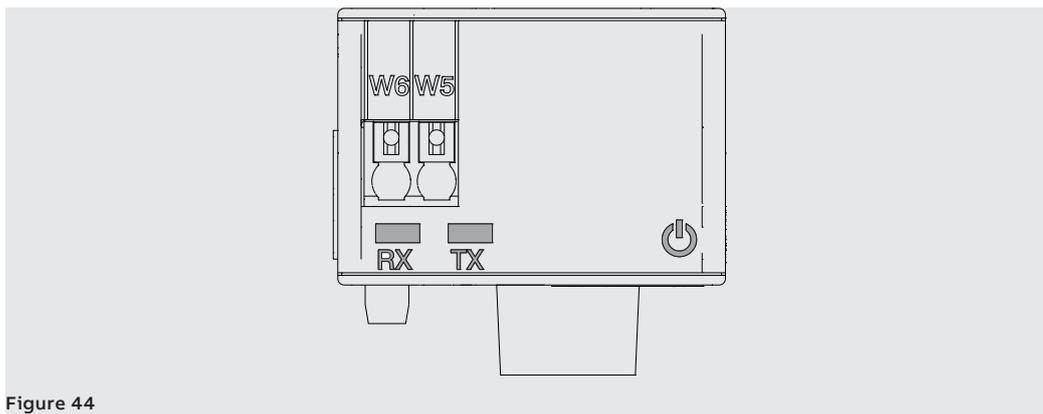


Figure 44

LEDs	Description
Power	Signals the on state and correct communication with Ekip UP+: <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with Power led of Ekip UP+: module on and communication with Trip unit present • flashing not synchronized with Power led of Ekip UP+ (two fast flashes per second): module on and communication with Trip unit absent
Rx	Indicates the status of the communication between network master and module (slave): <ul style="list-style-type: none"> • off: communication between master and module not activated • on steady: communication between master and module activated
Tx	Indicates the status of the communication between network master and module (slave): <ul style="list-style-type: none"> • off: communication between master and module not activated • on flashing: communication between master and module activated

Configurations Resistors can be connected to the RS-485 bus by configuring the dip-switches at the side of the module:

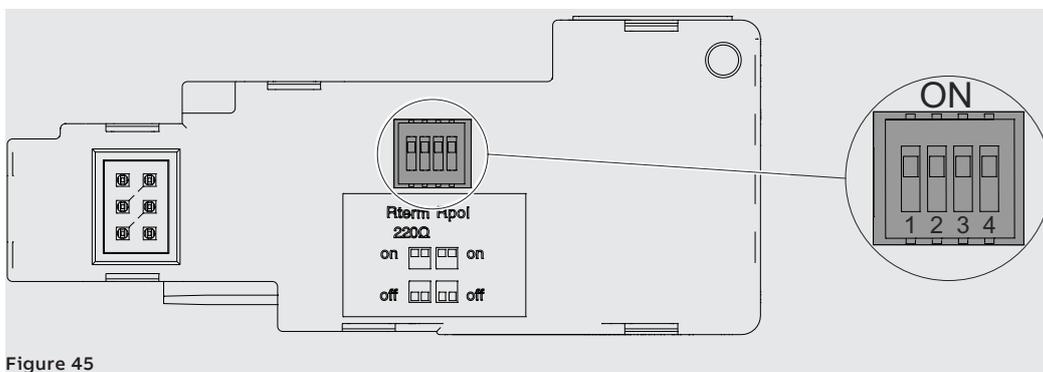


Figure 45

Resistor	Dip	Description	Default
Rterm	1 and 2	220 Ω termination resistor Move dip-switches 1 and 2 to the ON position to connect Rterm	Off
Rpol	3 and 4	390 Ω pull-up or pull-down resistor Move dip-switches 3 and 4 to the ON position to connect Rpol	Off

! IMPORTANT: move the dip-switches before connecting the module to Ekip Supply and the communication network

Configurations via menu Local bus activation, which is essential for starting communication between the module and Ekip UP⁺, is available in the *Settings* menu (page 44).

Two areas are activated if Ekip UP⁺ detects the module correctly:

- information area in the *About - Modules* menu, containing the software version and serial number of the module
- specific configuration area in the *Settings - Modules* menu, where the following communication parameters can be configured:

Parameter	Description	Default
<i>Serial address</i>	Module address; 1 to 126 range available  IMPORTANT: devices connected to the same network must have different addresses	125 / 124 ⁽¹⁾

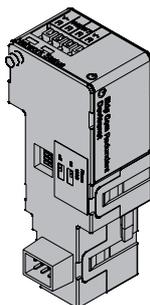
⁽¹⁾ 125 default of the Ekip Com Profibus DP module; 124 default of the Ekip Com Profibus DP Redundant module

Remote configurations Additional parameters can be accessed via the service connector (via Ekip Connect) or via a system bus communication:

Parameter	Description	Default
<i>Data access mode</i>	Defines Dataset (acyclic data) access mode <ul style="list-style-type: none"> • each individual acyclic register can be accessed in the Legacy mode, using Slot and Index fields • only complete blocks can be accessed in the Dataset mode; Slot is fixed at 0 and Index defines the block reference See System Interface for details.	Legacy access
<i>Cyclic data endianness</i>	Establishes whether the register of the cyclic data item is configured in Big endian or Little endian.	Little endian
<i>Acyclic data endianness</i>	Establishes whether the register of the acyclic data item is configured in Big endian or Little endian.	Little endian

Remote information By using Ekip Connect and accessing Ekip UP⁺ via the service connector or system bus you can access additional information about the version and state of the module: Boot and HW version, CRC state (correctness of SW in the module).

3 - Ekip Com DeviceNet™



Ekip Com DeviceNet™ is a communication accessory which allows Ekip UP+ to be integrated into a CAN network with DeviceNet™ communication protocol, with remote supervision and monitoring functions.

The module is configured as a Slave and remotely, you can:

- read the information and measurements of Ekip UP+
- manage certain controls, including opening and closing the actuator (MOE-E)
- access information and parameters not available on the display
- If connected to a withdrawable version of the circuit-breaker, the allows the racked-in/racked-out status to be detected



NOTE: the remote open and close commands of the circuit-breaker can only be executed if Ekip UP+ is in the Remote configuration.

See System Interface for Ekip Com modules to map the module into your communication network (page 197).

Models Two different modules compatible with the DeviceNet™ protocol are available: *Ekip Com DeviceNet™* and *Ekip Com DeviceNet™ Redundant*.

The modules are identical in terms of characteristics and installation methods, except for: display menus, cabling and addresses for system communication, which are specific for each module.



NOTE: if different indications are not given, the information in the next chapter is valid for both models

The two modules can be connected at the same time to Ekip UP+ so as to expand the potential of the unit (e.g. for applications where high grid reliability is required).



IMPORTANT: each Ekip UP+ can be fitted with only one module per type. The configuration with two modules of the same model is not allowed (example: two Ekip Com DeviceNet™ Redundant)

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000091R0001](#); use Belden 3084A type cables or equivalent for the external cabling.

To connect the module to Ekip UP+, please consult document [1SDH001000R0512](#).

Power supply *Ekip Com DeviceNet™* is supplied directly by the *Ekip Supply* module to which it is connected.

To function correctly, the DeviceNet™ bus must be supplied on terminals V+ and V- with a signal of over 12 VDC.



NOTE:

- the ABB PLC with DeviceNet (CM575-DN) communication module provides V+ V- supply
- communication between Ekip UP+ and the module is interrupted in the absence of power supplies from Ekip Supply and on the supply terminals of the bus.

Interface the module has three signaling leds:

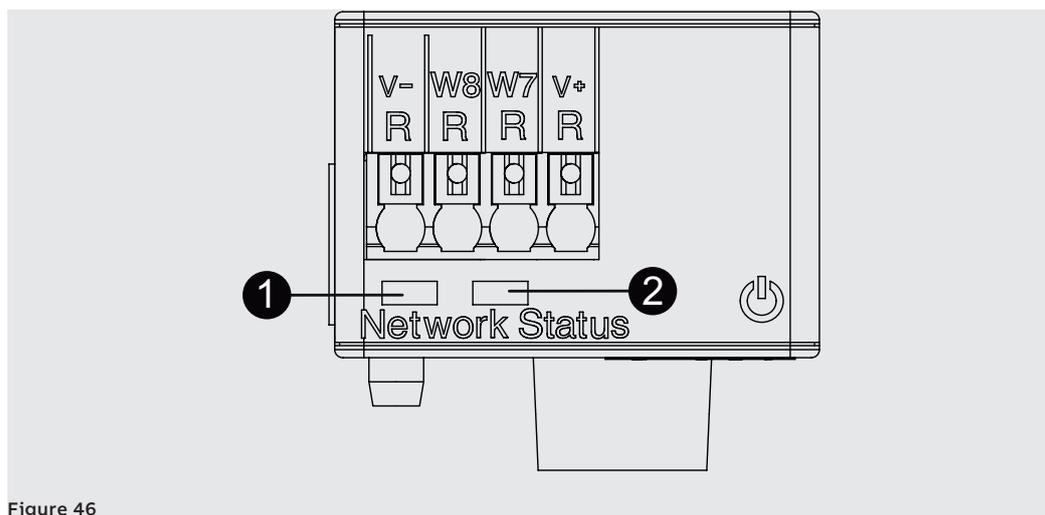


Figure 46

LEDs	Description
Power	<p>Signals the on state and correct communication with Ekip UP⁺:</p> <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with Power led of Ekip UP⁺: module on and communication with Trip unit present • flashing not synchronized with Power led of Ekip UP⁺ (two fast flashes per second): module on and communication with Trip unit absent
1 - Network Status	<p>Indicates the communication status on the bus:</p> <ul style="list-style-type: none"> • off: device off line (with Status led off)⁽¹⁾, or in the error condition (with Status led on) • on steady: device on line, and assigned to a master (operating condition) • on flashing: device on line, but not assigned to a master (device ready to communicate)
2 - Network Status	<p>Indicates the communication status on the bus:</p> <ul style="list-style-type: none"> • Off: no error. • On fixed: device in bus off, or Network Power absent. • On flashing: I/O connection (cyclic data) in timeout

⁽¹⁾ the device has not yet sent the Duplicate ID sequence in line

Configurations Resistors can be connected to the CAN bus by configuring the dip-switches at the side of the module:

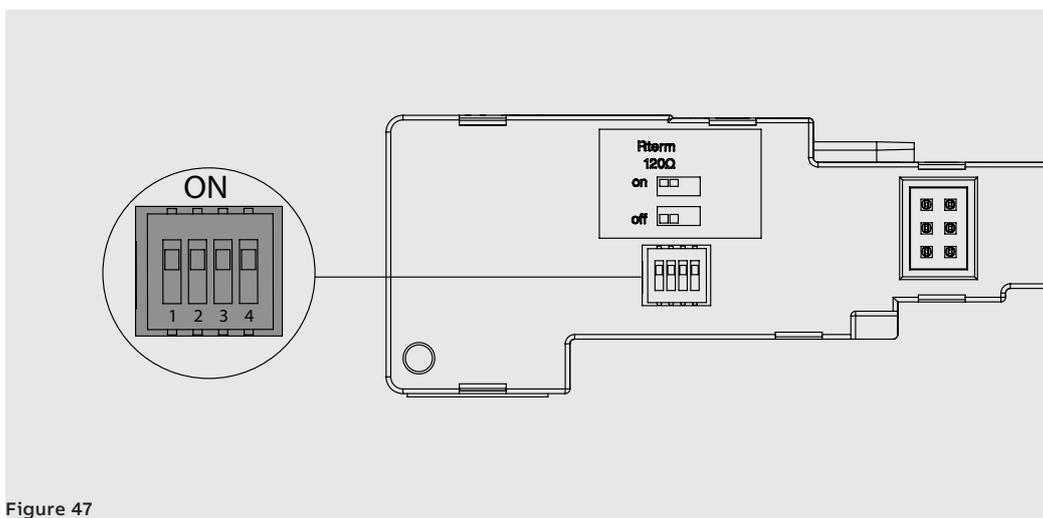


Figure 47

Resistor	Dip	Description	Default
Rterm	1 and 2	120 Ω termination resistor Move dip-switches 1 and 2 to the ON position to connect Rterm	Off



IMPORTANT:

- move the dip-switches before connecting the module to Ekip Supply and the network
- the termination resistors must never be included in the nodes; inclusion of this capacitance could lead to a network with improper termination (impedance too high or too low), which could potentially cause a failure. For example, removal of a node comprising a termination resistor could lead to network failure
- the termination resistors must never be installed at the end of a drop line but only at the ends of the main trunk line

Configurations via menu Local bus activation, which is essential for starting communication between the module and Ekip UP⁺, is available in the *Settings* menu (page 44).

Two areas are activated if Ekip UP⁺ detects the module correctly:

- information area in the *About - Modules* menu, containing the software version and serial number of the module
- specific configuration area in the *Settings - Modules* menu, where the following communication parameters can be configured:

Parameter	Description	Default
MAC Address	Module address; 1 to 63 range available IMPORTANT: devices connected to the same network must have different addresses	63 / 62 ⁽¹⁾
Baudrate	Data transmission speed; 3 options are available: 125 kbit/s, 250 kbit/s, 500 kbit/s	125 kbit/s

⁽¹⁾ 63 default of the Ekip Com DeviceNet™ module; 62 default of the Ekip Com DeviceNet™ Redundant module

Remote configurations

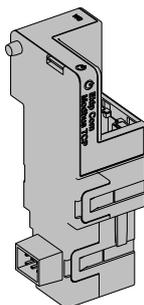
Parameters not directly available on the display can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

Parameter	Description	Default
<i>Class ID</i>	Defines the addressing class of the module, either 8 or 16 bits.	8-bit Class ID
<i>Bus-Off Behavior</i>	Defines the behavior of the module following loss of communication (Bus-Off), with a choice between Standard (supply reset is awaited if the communication is lost) and Advanced (the module attempts to reset itself if it detects the error status).	DeviceNet standard

Remote information

By using Ekip Connect and accessing Ekip UP⁺ via the service connector or system bus you can access additional information about the version and state of the module: Boot and HW version, CRC state (correctness of SW in the module).

4 - Ekip Com Modbus TCP



Ekip Com Modbus TCP is a communication accessory which allows Ekip UP+ to be integrated into an Ethernet network with Modbus TCP communication protocol, with remote supervision and monitoring functions.

The module is configured as master and remotely, you can:

- read the information and measurements of Ekip UP+
- manage certain controls, including opening and closing the actuator (MOE-E)
- access information and parameters not available on the display
- If connected to a withdrawable version of the circuit-breaker, the allows the racked-in/racked-out status to be detected



NOTE: the remote open and close commands of the circuit-breaker can only be executed if Ekip UP+ is in the Remote configuration.

See System Interface for Ekip Com modules to map the module into your communication network (page 197).

Depending on the parameter settings, described in the next pages, the ports used by the module are:

Port	Service	Notes
502/tcp	Modbus TCP	Valid for the Modbus TCP mode
319/udp	IEEE 1588	Valid with IEEE 1588 protocol enabled
20/udp		
68/udp	DHCP client	DHCP client enabled alternatively as: <i>Static address = On</i>

Safety and cyber security

Since the module allows the actuator connected to Ekip UP+ to be monitored and the data in the unit to be accessed, it can only be connected to networks equipped with all the necessary security and prevention measures against unauthorized access (for example, the network of the monitoring system of an installation).



IMPORTANT:

- **it is the 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). The plant manager must establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, the customer system and interface against any kind of security breaches, unauthorized access, interference, intrusion, loss and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized accesses, interference, intrusion, loss and/or theft of data or information.**
- **The module cannot be connected directly to the Internet. Only connect to dedicated Ethernet networks with Modbus TCP communication protocol**

Models

Two different modules compatible with the Modbus TCP protocol are available: *Ekip Com Modbus TCP* and *Ekip Com Modbus TCP Redundant*.

The modules are identical in terms of characteristics and installation methods, except for: display menus, cabling and addresses for system communication, which are specific for each module.



NOTE: if different indications are not given, the information in the next chapter is valid for both models

The two modules can be connected at the same time to Ekip UP+ so as to expand the potential of the unit (e.g. for applications where high grid reliability is required).



IMPORTANT: each Ekip UP+ can be fitted with only one module per type. The configuration with two modules of the same model is not allowed (example: two Ekip Com Modbus TCP Redundant)

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000091R0001](#); a cable of the Class 6 S/FTP type (Class 6 with double screening S/FTP) must be used for the communication bus.

To connect the module to Ekip UP⁺, please consult document [1SDH001000R0514](#).

Power supply *Ekip Com Modbus TCP* is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: communication between Ekip UP⁺ and the module is interrupted in the absence of auxiliary power supply

Interface the module has three signaling leds:

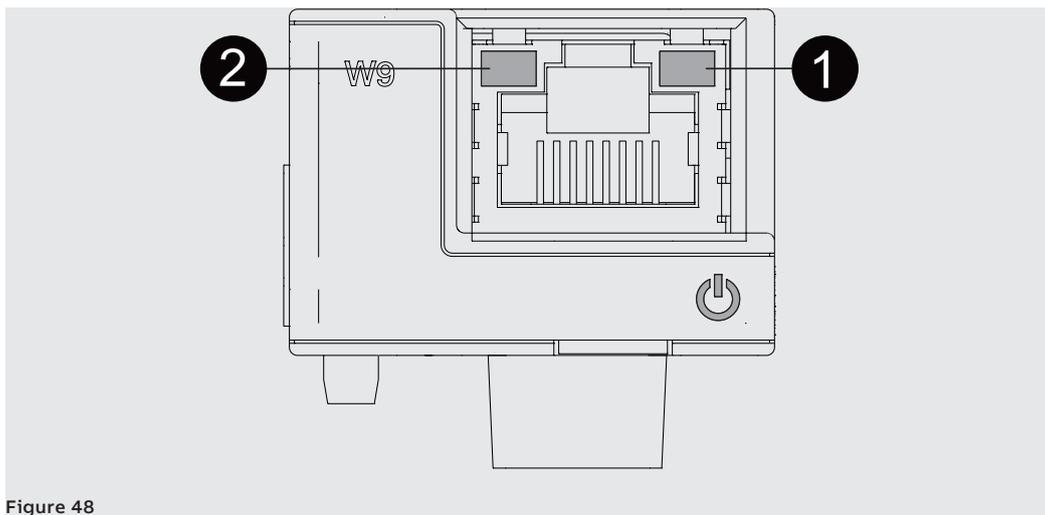


Figure 48

LEDs	Description
Power	Signals the on state and correct communication with Ekip UP ⁺ : <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with Power led of Ekip UP⁺: module on and communication with Trip unit present • flashing not synchronized with Power led of Ekip UP⁺ (two fast flashes per second): module on and communication with Trip unit absent
1 - Link	Indicates the communication state: <ul style="list-style-type: none"> • off: incorrect connection, signal absent. • on steady: connection correct
2 - Activity	Indicates the communication state: <ul style="list-style-type: none"> • off: no activity on line • flashing: activity on line present (receiving and/or transmitting)

Configurations via menu Local bus activation, which is essential for starting communication between the module and Ekip UP⁺, is available in the *Settings* menu (page 44).

The following communication parameters can be configured if the module has been correctly detected by Ekip UP⁺ in the *Settings-Modules* menu:

Parameter	Description	Default
<i>Static IP address ON</i>	Defines whether the module has the dynamic (Off) or static (On) IP address. Se = On all the associated parameters are enabled	Off
<i>Static address 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>	When there are several subnets, enables the IP address of the node to which the module is connected to be selected	0.0.0.0

Information in menu The following information will be available in the *About - Modules* menu if Ekip UP⁺ has detected the module correctly:

<i>About</i>	Description
<i>SN and version</i>	Identifier and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the time of connection to the network in the case of configuration with a dynamic IP, or can be set via the menu in the event of a static IP.  NOTE: without a DHCP server, the module automatically adopts a random IP address within the 169.254.xxx.xxx range
<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 the Server mode)
<i>MAC address</i>	Address assigned by ABB, with OUI (Organizationally Unique Identifier) equal to ac:d3:64, which uniquely identifies the manufacturer of an Ethernet device

Remote configurations

Parameters not directly available on the display can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

Parameter	Description	Default
Client/Server	Parameter for changing the configuration of the module from Server Only to Client and Server and for integrating it into an interactive data exchange network (see Ekip Com Hub on page 193)  IMPORTANT: if Client/Server, the module allows data exchange like a normal Server function	Server only
IEEE 1588 enable	Allows the IEEE 1588 protocol for distribution of the clock and synchronization signal to be enabled ⁽¹⁾ .	OFF
Master IEEE 1588	Enables the module to be set up as a master in the the network segment to which it belongs (synchronization clock).	OFF
IEEE 1588 delay mechanism	Allows the data exchange mode between module and master, either Peer-to-Peer or End-to-End, to be selected.	End-to-End
SNTP Client enable	Allows the SNTP protocol for distribution of the clock and synchronization signal to be enabled ⁽¹⁾	OFF
Force Static IP Address	Allows the network server that supplies the SNTP to be set.	0.0.0.0
Time zone	Defines the time zone to be used for synchronism	+00:00
Daylight Saving Time	Used to select whether daylight saving time is present (ON) or not (OFF) in the country to which the synchronization time refers	OFF
Disabilita Gratuitous ARP	Permits (Enabled ARP) the periodic generation of a Gratuitous ARP message, used by Ekip Connect to rapidly find the modules via Ethernet scan without knowing the IP address beforehand	ARP Enabled
Access protected by password	Enables the writing operations performed via the network to be protected by a password (Request password)	Standard mode
IEEE 1588 Boundary clock	Parameter useful if an IEEE 1588 GrandMaster clock is not available: • If enabled (ON), the module is seen as an IEEE1588 master clock by all the slaves/devices in the same local network, even when the source of external synchronism is different from IEEE 1588 (SNTP for example) • If disabled (OFF) the module benefits from the synchronism of the master in its own network)	OFF
Enable package Limitation	Enables the Rate limiter function, which limits the number of packages entering the module from the network, to be activated/ deactivated	Disable

⁽¹⁾ Enable IEEE 1588 and Enable SNTP client must not be enabled at the same time

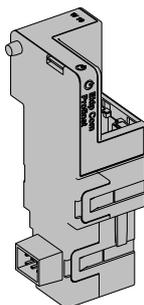
⁽²⁾ the parameter can only be changed via system bus in the remote configuration

Remote information

Additional information can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

Information	Description
Boot and HW version	General module information
Flash CRC status e result	Information about the correctness of the SW in the module
Stato Ekip Link	Signals Ethernet cable connection errors
SNTP Server Error	Error in communication with SNTP server
SNTP Server Synchronisation	State of synchronism with SNTP server
IEEE 1588 status	Valid with Master IEEE 1588= ON, notifies the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of the higher level master

5 - Ekip Com Profinet



Ekip Com Profinet is a communication accessory which allows Ekip UP⁺ to be integrated into an Ethernet network with Profinet communication protocol, with remote supervision and monitoring functions.

The module is configured as master and remotely, you can:

- read Ekip UP⁺ measurements and information
- manage certain controls, including opening and closing the actuator (MOE-E)
- access information not available on the display
- If connected to a withdrawable version of the circuit-breaker, the allows the racked-in/racked-out status to be detected



NOTE: the remote open and close commands of the circuit-breaker can only be executed if Ekip UP⁺ is in the Remote configuration.

See System Interface for Ekip Com modules to map the module into your communication network (page 197).

The ports used by the module are:

Ethertype	Port	Service	Notes
0x88CC	-	LLDP	Link Layer Discovery Protocol
0x8892 (Profinet)	-	Profinet IO	Specific for real time communications (RT)
0x0802	34964/udp	Profinet-cm (Context manager)	DCE/RPC

Safety and cyber security

Since the module allows the actuator connected to Ekip UP⁺ to be monitored and the data in the unit to be accessed, it can only be connected to networks equipped with all the necessary security and prevention measures against unauthorized access (for example, the network of the monitoring system of an installation).



IMPORTANT:

- **it is the 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). The plant manager must establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, the customer system and interface against any kind of security breaches, unauthorized access, interference, intrusion, loss and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized accesses, interference, intrusion, loss and/or theft of data or information.**
- **The module cannot be connected directly to the Internet. Only connect to dedicated Ethernet networks with Profinet communication protocol**

Models

Two different modules compatible with the Profinet protocol are available: *Ekip Com Profinet* and *Ekip Com Profinet Redundant*.

The modules are identical in terms of characteristics and installation methods, except for: display menus, cabling and addresses for system communication, which are specific for each module.



NOTE: if different indications are not given, the information in the next chapter is valid for both models

The two modules can be connected at the same time to Ekip UP⁺ so as to expand the potential of the unit (e.g. for applications where high grid reliability is required).



IMPORTANT: each Ekip UP⁺ can be fitted with only one module per type. The configuration with two modules of the same model is not allowed (example: two Ekip Com Modbus Profinet Redundant models)

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000091R0001](#); a cable of the Class 6 S/FTP type (Class 6 with double screening S/FTP) must be used for the communication bus.

To connect the module to Ekip UP⁺, please consult document [1SDH001000R0514](#).

Power supply *Ekip Com Profinet* is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: communication between Ekip UP⁺ and the module is interrupted in the absence of auxiliary power supply

Interface the module has three signaling leds:

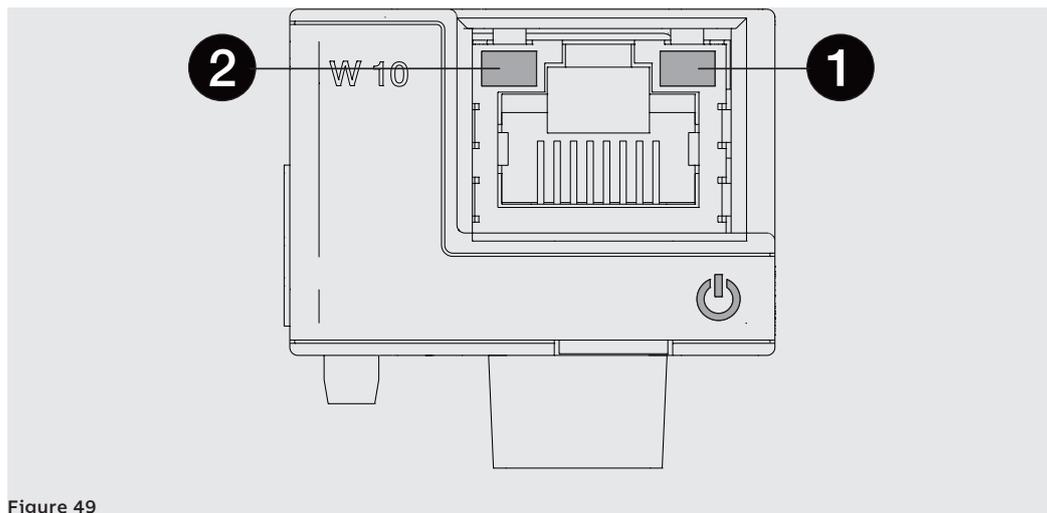


Figure 49

LEDs	Description
Power	Signals the on status and correct communication with Ekip UP ⁺ : <ul style="list-style-type: none"> • off: module off • on steady or flashing synchronized with the Power led of Ekip UP⁺: module on and communication with Trip unit present • flashing not synchronized with the Power led of Ekip UP⁺ (2 fast flashes per second): module on and communication with Trip unit absent.
Link (1)	Indicates the communication state: <ul style="list-style-type: none"> • off: incorrect connection, signal absent. • on steady: connection correct
Activity (2)	Indicates the communication state: <ul style="list-style-type: none"> • off: no activity on line • flashing: activity on line present (receiving and/or transmitting)

Configurations via menu Local bus activation, which is essential for starting the communication between module and Ekip UP⁺, is available in the *Settings* menu (page 44).

The following information will be available in the *About-Modules* menu if Ekip UP⁺ has detected the module correctly:

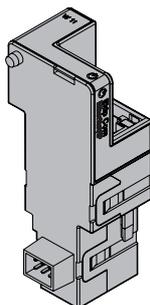
Information	Description
<i>SN and version</i>	Identifier and SW version of the module
<i>MAC address</i>	Address assigned by ABB, with OUI (Organizationally Unique Identifier) equal to ac:d3:64, which uniquely identifies the manufacturer of an Ethernet device

Remote configurations Additional parameters can be accessed via the service connector (via Ekip Connect) or via a system bus communication:

Parameter	Description	Default
<i>Data access mode</i>	Defines Dataset (acyclic data) access mode <ul style="list-style-type: none"> • each individual acyclic register can be accessed in the Legacy mode using the Slot, Subslot and Index fields (with Slot fixed at 3) • only complete blocks can be accessed in the Dataset mode; Slot is fixed at 0, Subslot at 1 and Index defines the block reference See System Interface for details.	Legacy access
<i>Cyclic data endianness</i>	Establishes whether the register of the cyclic data item is configured in Big endian or Little endian.	Little endian
<i>Acyclic data endianness</i>	Establishes whether the register of the acyclic data item is configured in Big endian or Little endian.	Big endian

Remote information Certain integrative information concerning the version and state of the module is available via service connector (via Ekip Connect) or through communication via system bus, i.e., HW and Boot version, CRC state (correctness of SW in module), DCP Name, network settings (IP address, Network Mask, Gateway address).

6 - Ekip Com EtherNet/IP™



Ekip Com EtherNet/IP™ is a communication accessory which allows Ekip UP+ to be integrated into an Ethernet network with EtherNet/IP™ communication protocol, with remote supervision and monitoring functions.

The module is configured as a Slave and remotely, you can:

- read the information and measurements of Ekip UP+
- manage certain controls, including opening and closing the actuator (MOE-E)
- access information and parameters not available on the display
- If connected to a withdrawable version of the circuit-breaker, the allows the racked-in/racked-out status to be detected



NOTE: the remote open and close commands of the circuit-breaker can only be executed if Ekip UP+ is in the Remote configuration.

See System Interface for Ekip Com modules to map the module into your communication network (page 197).

Port	Description	Default
44818	TCP	Encapsulation Protocol (example: ListIdentity, UCMM, CIP Transport Class 3)
44818	UDP	44818 UDP Encapsulation Protocol (example: ListIdentity)
2222	UDP	2222 UDP CIP Transport Class 0 or 1
68/UDP	DHCP Client	Client DHCP enabled as an alternative to Static address = On

Safety and cyber security

Since the module allows the actuator connected to Ekip UP+ to be monitored and the data in the unit to be accessed, it can only be connected to networks equipped with all the necessary security and prevention measures against unauthorized access (for example, the network of the monitoring system of an installation).



IMPORTANT:

- **it is the 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). The plant manager must establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, the customer system and interface against any kind of security breaches, unauthorized access, interference, intrusion, loss and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized accesses, interference, intrusion, loss and/or theft of data or information.**
- **The module cannot be connected directly to the Internet. Only connect to dedicated Ethernet networks with EtherNet/IP™ communication protocol**

Models

Two different modules compatible with the EtherNet/IP™ protocol are available: *Ekip Com EtherNet/IP™* and *Ekip Com EtherNet/IP™ Redundant*.

The modules are identical in terms of characteristics and installation methods, except for: display menus, cabling and addresses for system communication, which are specific for each module.



NOTE: if different indications are not given, the information in the next chapter is valid for both models

The two modules can be connected at the same time to Ekip UP+ so as to expand the potential of the unit (e.g. for applications where high grid reliability is required).



IMPORTANT: each Ekip UP+ can be fitted with only one module per type. The configuration with two modules of the same model is not allowed (example: two Ekip Com EtherNet/IP™ Redundant)

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000091R0001](#); use Belden 3084A type cables or equivalent for the external cabling.

To connect the module to Ekip UP⁺, please consult document [1SDH001000R0514](#).

Power supply *Ekip Com EtherNet/IP™* is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE:

- communication between Ekip UP⁺ and the module is interrupted in the absence of power supplies from Ekip Supply and on the supply terminals of the bus.

Interface the module has three signaling leds:

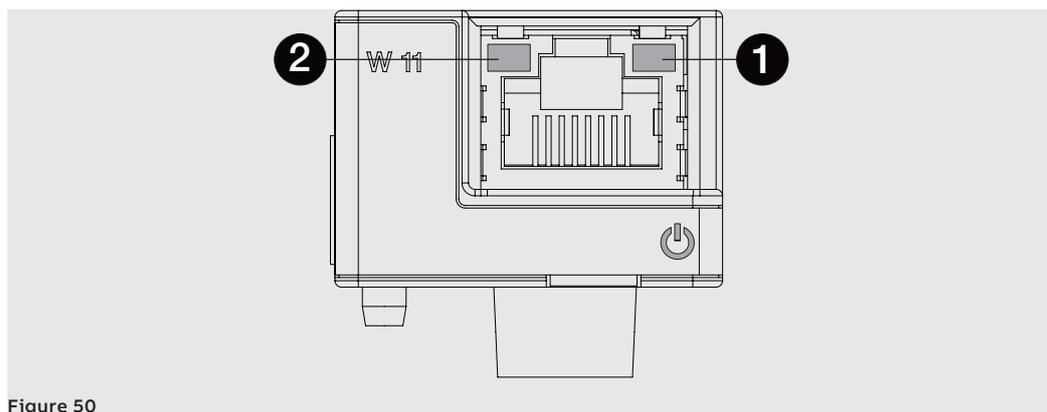


Figure 50

LEDs	Description
Power	Signals the on state and correct communication with Ekip UP ⁺ : <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with Power led of Ekip UP⁺: module on and communication with Trip unit present • flashing not synchronized with Power led of Ekip UP⁺ (two fast flashes per second): module on and communication with Trip unit absent
1 - Link	Indicates the communication state: <ul style="list-style-type: none"> • off: incorrect connection, signal absent. • on steady: connection correct
2 - Activity	Indicates the communication state: <ul style="list-style-type: none"> • off: no activity on line • flashing: activity on line present (receiving and/or transmitting)

Configurations via menu Local bus activation, which is essential for starting communication between the module and Ekip UP⁺, is available in the *Settings* menu (page 44).

The following communication parameters can be configured in the *Settings-Modules* menu if the module has been correctly detected by Ekip UP⁺:

Parameter	Description	Default
<i>Static IP address ON</i>	Defines whether the module has the dynamic (Off) or static (On) IP address. Se = On all the associated parameters are enabled	OFF
<i>Static address 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>	When there are several subnets, enables the IP address of the node to which the module is connected to be selected	0.0.0.0

Information in menu The following information will be available in the *About - Modules* menu if Ekip UP⁺ has detected the module correctly:

Information	Description
<i>SN and version</i>	Identifier and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the time of connection to the network in the case of configuration with a dynamic IP, or can be set via the menu in the event of a static IP  NOTE: <i>without a DHCP server, the module automatically adopts a random IP address within the 169.254.xxx.xxx range</i>
<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, which uniquely identifies the manufacturer of an Ethernet device

Remote configurations

Parameters not directly available on the display can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

Parameter	Description	Default
<i>Enable IEEE 1558</i>	Allows the IEEE 1588 protocol for distribution of the clock and synchronization signal to be enabled ⁽¹⁾ .	OFF
<i>IEEE 1558 Master</i>	Enables the module to be set up as a master in the the network segment to which it belongs (synchronization clock).	OFF
<i>IEEE 1558 Delay mechanism</i>	Allows the data exchange mode between module and master, either Peer-to-Peer or End-to-End, to be selected.	End-to-End
<i>Enable client SNTP</i>	Allows the SNTP protocol for distribution of the clock and synchronization signal to be enabled ⁽¹⁾	OFF
<i>ANTP Server address</i>	Allows the network server that supplies the SNTP to be set.	0.0.0.0
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Used to select whether daylight saving time is present (ON) or not (OFF) in the country to which the synchronization time refers	OFF
<i>IEEE 1588 Boundary clock</i>	Parameter useful if an IEEE 1588 GrandMaster clock is not available: <ul style="list-style-type: none"> • If enabled (ON), the module is seen as an IEEE1588 master clock by all the slaves/devices in the same local network, even when the source of external synchronism is different from IEEE 1588 (SNTP for example) • If disabled (OFF) the module benefits from the synchronism of the master in its own network 	OFF
<i>Enable package Limitation</i>	Enables the Rate limiter function, which limits the number of packages entering the module from the network, to be activated/ deactivated	Disable

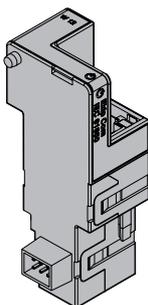
⁽¹⁾ *Enable IEEE 1588 and Enable SNTP client must not be enabled at the same time*

Remote information

Additional information can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

Information	Description
<i>HW and Boot version</i>	General module information
<i>Flash CRC status and result</i>	Information about the correctness of the SW in the module
<i>Ekip Link status</i>	Signals Ethernet cable connection errors
<i>SNTP Server Error</i>	Error in communication with SNTP server
<i>SNTP Server Synchronization</i>	State of synchronism with SNTP server
<i>IEEE 1558 status</i>	Valid with Master IEEE 1588= ON , notifies the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master

7 - Ekip Com IEC 61850



Ekip Com IEC 61850 is a communication accessory which allows Ekip UP⁺ to be integrated into an Ethernet network with IEC 61850 communication protocol, with remote supervision and monitoring functions.

The module is configured as master and remotely, you can:

- read the information and measurements of Ekip UP⁺
- manage certain controls, including opening and closing the actuator (MOE-E)
- access information and parameters not available on the display
- transmit vertical communication (report) to superior supervision systems (SCADA), with statuses and measurements (re-transmitted whenever and only if they change with respect to the previous report)
- transmit horizontal communication (GOOSE) to other actuator devices (example: medium voltage circuit-breakers), with all the information about status and measurements normally shared by Ekip Com communication modules via bus.
- If connected to a withdrawable version of the circuit-breaker, the allows the racked-in/racked-out status to be detected



NOTE: the remote open and close commands of the circuit-breaker can only be executed if Ekip UP⁺ is in the Remote configuration.

See System Interface for Ekip Com modules to map the module into your communication network (page 197).

The document also describes the configuration files for the IEC 61850 protocol and relative uploading procedure for assigning the Technical Name and enabling GOOSE messages if required (by setting the relative MAC Addresses)

Depending on the parameter settings, described in the next pages, the ports used by the module are:

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 and cyber security

Since the module allows the actuator connected to Ekip UP⁺ to be monitored and the data in the unit to be accessed, it can only be connected to networks equipped with all the necessary security and prevention measures against unauthorized access (for example, the network of the monitoring system of an installation).



IMPORTANT:

- **it is the 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). The plant manager must establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, the customer system and interface against any kind of security breaches, unauthorized access, interference, intrusion, loss and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized accesses, interference, intrusion, loss and/or theft of data or information.**
- **The module cannot be connected directly to the Internet. Only connect to dedicated Ethernet networks with IEC 61850 communication protocol**

Models Two different modules compatible with the IEC 61850 protocol are available: *Ekip Com IEC 61850* and *Ekip Com IEC 61850 Redundant*.

The modules are identical in terms of characteristics and installation methods, except for: display menus, cabling and addresses for system communication, which are specific for each module.

i **NOTE:** if different indications are not given, the information in the next chapter is valid for both models

The two modules can be connected at the same time to Ekip UP+ so as to expand the potential of the unit (e.g. for applications where high grid reliability is required).

! **IMPORTANT:** each Ekip UP+ can be fitted with only one module per type. The configuration with two modules of the same model is not allowed (example: two Ekip Com IEC 61850 Redundant models)

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000091R0001](#); a cable of the Class 6 S/FTP type (Class 6 with double screening S/FTP) must be used for the communication bus.

To connect the module to Ekip UP+, please consult document [1SDH001000R0514](#).

Power supply *Ekip Com IEC 61850* is supplied directly by the *Ekip Supply* module to which it is connected..

i **NOTE:** communication between Ekip UP+ and the module is interrupted in the absence of auxiliary power supply

Interface the module has three signaling leds:

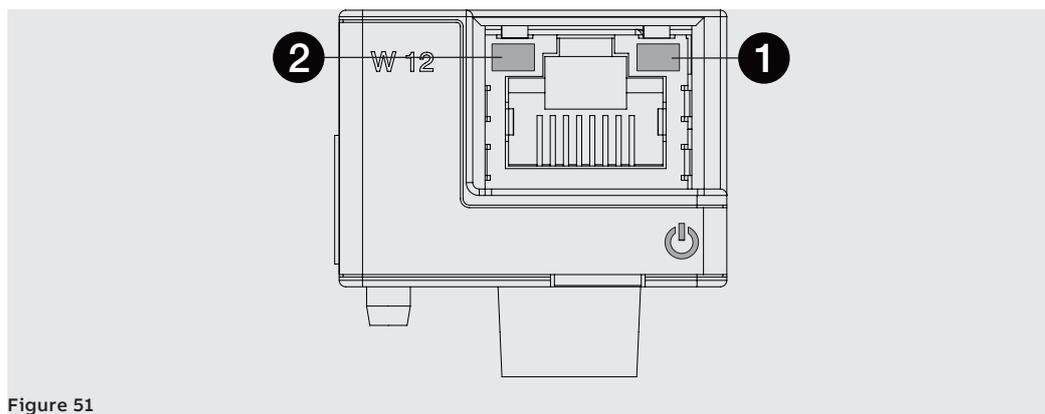


Figure 51

LEDs	Description
Power	Signals the on state and correct communication with Ekip UP+: <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with Power led of Ekip UP+: module on and communication with Trip unit present • flashing not synchronized with Power led of Ekip UP+ (two fast flashes per second): module on and communication with Trip unit absent
1 - Link	Indicates the communication state: <ul style="list-style-type: none"> • off: incorrect connection, signal absent. • on steady: connection correct
2 - Activity	Indicates the communication state: <ul style="list-style-type: none"> • off: no activity on line • flashing: activity on line present (receiving and/or transmitting)

Configurations via menu

Local bus activation, which is essential for starting communication between the module and Ekip UP⁺, is available in the *Settings* menu (page 44).

The following communication parameters can be configured in the *Settings-Modules* menu if the module has been correctly detected by Ekip UP⁺:

Parameter	Description	Default
<i>Static IP address ON</i>	Defines whether the module has the dynamic (Off) or static (On) IP address. Se = On all the associated parameters are enabled	OFF
<i>Static address 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>	When there are several subnets, enables the IP address of the node to which the module is connected to be selected	0.0.0.0
<i>Enable SNTP client</i>	Allows the SNTP protocol for distribution of the clock and synchronization signal to be enabled.	OFF
<i>SNTP Server Addr.</i>	Allows the network server that supplies the SNTP to be set.	0.0.0.0
<i>Configuration Session</i>	Defines the write mode of the configuration file in the module via the TFTP port; two options are available: <ul style="list-style-type: none"> • Always ON: the TFTP port is always open and write is always enabled • Activation requested: the TFTP is opened by a specific command, which enables write for a limited time (or for a finite number of data packages) 	Always ON
<i>Start Configuration</i>	Write enable command on TFTP port in Activation mode requested	---

Information in menu

The following information will be available in the *About - Modules* menu if Ekip UP⁺ has detected the module correctly:

Information	Description
<i>SN and version</i>	Identifier and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the time of connection to the network in the case of configuration with a dynamic IP, or can be set via the menu in the event of a static IP  NOTE: without a DHCP server, the module automatically adopts a random IP address within the 169.254.xxx.xxx range
<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, which uniquely identifies the manufacturer of an Ethernet device
<i>Cfg file</i>	Name of the configuration file uploaded to the modules
<i>Cfg file error</i>	Code of the error concerning the configuration file (0 = no error)

Remote configurations

Parameters not directly available on the display can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

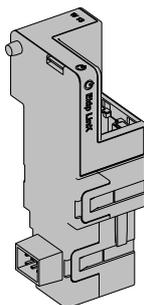
Parameter	Description	Default
<i>Preferred configuration file</i>	If several configuration files are present, allows file hierarchy between .cid and .iid to be defined	.cid
<i>Enable IEEE 1588</i>	Allows the IEEE 1588 protocol for distribution of the clock and synchronization signal to be enabled ⁽¹⁾ .	OFF
<i>IEEE 1588 Master</i>	Enables the module to be set up as a master in the the network segment to which it belongs (synchronization clock).	OFF
<i>IEEE 1588 Delay mechanism</i>	Allows the data exchange mode between module and master, either Peer-to-Peer or End-to-End, to be selected.	End-to-End
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Used to select whether daylight saving time is present (ON) or not (OFF) in the country to which the synchronization time refers	OFF
<i>TFTP Security level</i>	Defines the file loading procedure: <ul style="list-style-type: none"> • <i>TFTP always On</i> = port open, loading always possible • <i>TFTP enable required</i> = port normally closed. To start loading, <i>Enable TFTP</i> must be run at the start of the procedure and <i>Disable TFTP</i> 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 limitations to remote opening and closing command execution: <ul style="list-style-type: none"> • <i>Standard commands</i> = standard commands (unrestricted) activated • <i>CB operate request</i> = standard commands not activated. Use programmable functions YC COMMAND and YO COMMAND, and Request breaker open (28) and Request breaker close (29) commands 	Standard commands
<i>Zone Selectivity Analysis</i>	Analysis of selectivity input from IEC 61850 module can be enabled/disabled for each of protections S, S2, G, Gext, D, D(BW), D(FW)	Disabled (all)
<i>IEEE 1588 Boundary clock</i>	Parameter useful if an IEEE 1588 GrandMaster clock is not available: <ul style="list-style-type: none"> • If enabled (ON), the module is seen as an IEEE1588 master clock by all the slaves/devices in the same local network, even when the source of external synchronism is different from IEEE 1588 (SNTP for example) • If disabled (OFF) the module benefits from the synchronism of the master in its own network 	OFF
<i>Enable package Limitation</i>	Enables the Rate limiter function, which limits the number of packages entering the module from the network, to be activated/deactivated	Disable

⁽¹⁾ *Enable IEEE 1588 and Enable SNTP client must not be enabled at the same time*

Remote information Additional information can be accessed by using Ekip Connect and accessing Ekip UP+ via service connector or system bus.

Information	Description
<i>HW and Boot version</i>	General module information
<i>Flash CRC status and result</i>	Information about the correctness of the SW in the module
<i>Ekip Link status</i>	Signals Ethernet cable connection errors
<i>SNTP Server Error</i>	Error in communication with SNTP server
<i>SNTP Server Synchronization</i>	State of synchronism with SNTP server
<i>IEEE 1588 status</i>	Valid with Master IEEE 1588= ON , notifies the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master
<i>GOOSE Missing</i>	Signals that an expected GOOSE has not been received
<i>Configure Mismatch</i>	A GOOSE received does not conform to 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 states and information on selectivity arising from logic defined in the configuration files loaded in module IEC 61850
<i>Zone selectivity remote inputs</i>	

8 - Ekip Link



Ekip Link is a communication accessory which allows Ekip UP+ to be integrated into an internal Ethernet network with ABB proprietary protocol.

The following functions can be performed with the remote module:

- Programmable Logic
- Power Controller
- Zone Selectivity

To perform these functions, the system units involved must be equipped with their own *Ekip Link* and for each of these, the IP addresses of all the other *Ekip Link* connected must have been entered.

Each device is defined as an Actor in the Link network.

Each *Ekip Link* can interface with up to 15 actors, of which up to 12 for the *Zone Selectivity* function.

The ports used by the module are:

Port	Service	Notes
18/udp	ABB proprietary	In the case of rapid exchanges of information among ABB devices
319/udp 320/udp	IEEE 1588	Valid with IEEE 1588 protocol enabled
68/udp	DHCP client	DHCP client enabled alternatively as <i>Static address = On</i>

Network The *Ekip Link* modules must be connected to a dedicated network that includes only *Ekip Link* and Ethernet switches for which support for level L2 multicast is declared in the datasheet.

If the network also includes routers, multicast must be enabled and configured in all the level L3 VLAN interfaces.

Programmable Logic Activation of up to four bits of the *Ekip Link* can be programmed via the Programmable Logic function, each bit according to any combination of the status bits of an actor of which the IP address has been entered.

These four bits are indicated as Statuses A B C and D; they are remotely programmable and their value is transmitted to the device to which *Ekip Link* is connected

Power Controller Using the *Power Controller* function, each actor can:

- Acquire the status and control the loads
- Act as master and collect the energy measurements of actors entered as Energy Meters
- Supply energy measurements to actors entered as masters

The state of the loads can be acquired by checking the status of the inputs of the signaling modules connected to the actors of which the IP Addresses have been entered, while load control can be performed by programming the outputs.

Remote acquisition of the statuses of the loads and their control can also be performed with *Ekip Signalling 10K* connected to the network.

Further information on the potential of the function is available in the White Paper [1SDC007410G0201](#) "Load management with Ekip Power Controller for SACE Emax 2".

Zone selectivity With the Zone Selectivity function:

- the IP addresses entered refer to actors with the role of interlock with respect to the current role
- the protections for which selectivity must be actuated by setting a mask, must be selected for each interlock actor entered. Thus set, the function will now be indicated as logic in the following text so as to distinguish it from the standard function, now also indicated as hardware in the following text
- thus selected, the protections add to those of the hardware S, I, 2I, MCR, G, D-Backward and D-Forward
- hardware selectivity only, or both hardware and logic selectivity can be selected
- diagnosis can be set, for each interlock release, to ascertain whether there is consistency between the hardware and logic selectivity information
- a mask can be set for the purpose of identifying those protections whose received selectivity information must be re-transmitted, regardless of whether the actor is in the alarm status. The mask is only applicable to logic selectivity information

For further details about the *Zone Selectivity* function with *Ekip Link*, please consult page 111.

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000091R0001](#); a cable of the Class 6 S/FTP type (Class 6 with double screening S/FTP) must be used for the communication bus.

To connect the module to Ekip UP+, please consult document [1SDH001000R0514](#).

Power supply *Ekip Link* is supplied directly by the *Ekip Supply* module to which it is connected.

i **NOTE: communication between Ekip UP+ and the module is interrupted in the absence of auxiliary power supply**

Interface the module has three signaling leds:

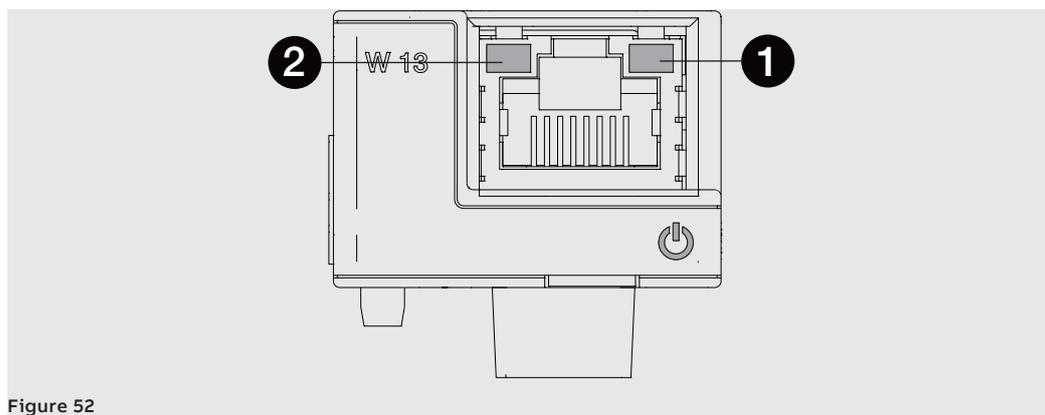


Figure 52

LEDs	Description
Power	Signals the on state and correct communication with Ekip UP+: <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with Power led of Ekip UP+: module on and communication with Trip unit present • flashing not synchronized with Power led of Ekip UP+ (two fast flashes per second): module on and communication with Trip unit absent
1 - Link	Indicates the communication state: <ul style="list-style-type: none"> • off: incorrect connection, signal absent. • on steady: connection correct
2 - Activity	Indicates the communication state: <ul style="list-style-type: none"> • off: no activity on line • flashing: activity on line present (receiving and/or transmitting)

Configurations via menu Local bus activation, which is essential for starting communication between the module and Ekip UP⁺, is available in the *Settings* menu (page 44).

The following communication parameters can be configured in the *Settings-Modules* menu if the module has been correctly detected by Ekip UP⁺:

Parameter	Description	Default
<i>Static IP address ON</i>	Defines whether the module has the dynamic (Off) or static (On) IP address. Se = On all the associated parameters are enabled	OFF
<i>Static address 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>	When there are several subnets, enables the IP address of the node to which the module is connected to be selected	0.0.0.0

Information in menu The following information will be available in the *About - Modules* menu if Ekip UP⁺ has detected the module correctly:

Information	Description
<i>SN and version</i>	Identifier and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the time of connection to the network in the case of configuration with a dynamic IP, or can be set via the menu in the event of a static IP  NOTE: <i>without a DHCP server, the module automatically adopts a random IP address within the 169.254.xxx.xxx range</i>
<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, which uniquely identifies the manufacturer of an Ethernet device

Remote configurations

Parameters not directly available on the display can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

Parameter	Description	Default
<i>Client/Server</i>	Parameter for changing the configuration of the module from Server Only to Client and Server and for integrating it into an interactive data exchange network (see Ekip Com Hub on page 193). ! IMPORTANT: if Client/Server, the module allows data exchange like a normal Server function	Server only
<i>Enable IEEE 1588</i>	Allows the IEEE 1588 protocol for distribution of the clock and synchronization signal to be enabled ⁽¹⁾ .	OFF
<i>IEEE 1588 Master</i>	Enables the module to be set up as a master in the network segment to which it belongs (synchronization clock).	OFF
<i>IEEE 1588 Delay mechanism</i>	Allows the data exchange mode between module and master, either Peer-to-Peer or End-to-End, to be selected.	End-to-End
<i>Enable client SNTP</i>	Allows the SNTP protocol for distribution of the clock and synchronization signal to be enabled ⁽¹⁾	Off
<i>ANTP Server address</i>	Allows the network server that supplies the SNTP to be set.	0.0.0.0
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Used to select whether daylight saving time is present (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, used by Ekip Connect to rapidly find the modules via Ethernet scan without knowing the IP address beforehand	ARP Enabled
<i>Password protected access</i>	Enables the writing operations performed via the network to be protected by a password (Request password)	Standard mode
<i>Password Modbus TCP</i>	With access protected by enabled password, this is the password to use before each writing session ⁽²⁾ .	Local access

⁽¹⁾ *Enable IEEE 1588 and Enable SNTP client must not be enabled at the same time*

⁽²⁾ *the parameter can only be changed via system bus in the remote configuration*

Remote Link configurations

Regarding the Link functions, the following further parameters are available:

Parameter	Description	Default
<i>Link Actor (1÷15)</i>	IP address of each actor (from 1 to 15)	0.0.0.0
<i>Remote Programmable Status (A÷D)</i>	Configuration parameters of the configurable states: <ul style="list-style-type: none"> • selection of actor (actor from 1 to 15) which activates the programmable status • event of the actor that determines change of programmable status 	Actor 1 None
<i>Remote Status word (A÷D)</i>	Configuration parameters of the words: <ul style="list-style-type: none"> • selection of actor (actor from 1 to 15) from which the word status is taken • selection of the taken word 	None 1 global
<i>Diagnostic</i>	Active (Passive diagnosis) or deactivated (No diagnosis) cabled selectivity diagnosis	No Diagnostic
<i>Diagnostic check timeout</i>	30 s, 1 min, 10 min, 60 min diagnosis frequency intervals available, if activated	30 seconds
<i>Zone Selectivity Type</i>	Configuration of hardware selectivity (Only HW) or hardware and logic (Mixed)	HW only
<i>Repeat Configuration mask</i>	Interactive mask for selecting selectivity to be sent also to the upper levels (even if not active in the programmed device)	0x0000

Remote information

Additional information can be accessed by using Ekip Connect and accessing Ekip UP+ via service connector or system bus.

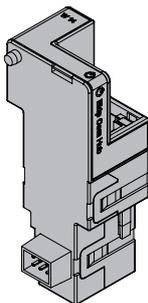
Information	Description
<i>HW and Boot version</i>	General module information
<i>Flash CRC status and result</i>	Information about the correctness of the SW in the module
<i>Ekip Link status</i>	Signals Ethernet cable connection errors
<i>SNTP Server Error</i>	Error in communication with SNTP server
<i>SNTP Server Synchronization</i>	State of synchronism with SNTP server
<i>IEEE 1588 status</i>	Valid with Master IEEE 1588= ON , notifies the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master

Remote Link information

Regarding the Link functions, the following further parameters are available:

Information	Description
<i>Line Congruency detection</i>	Information about the state and inconsistency of HW and logic selectivity (state and type of selectivity inconsistent)
<i>Remote Programmable Status</i>	Status (true/false) of remote programmable statuses A, B, C and D
<i>Remote Status Word</i>	Value of remote programmable Words A, B, C, D
<i>Logic Zone Selectivity</i>	Logic selectivity states (inputs and outputs)

9 - Ekip Com Hub



Ekip Com Hub is a communication accessory that enables the data and measurements of Ekip UP⁺ and other devices connected to the same installation to be gathered and then made available on the server via an Ethernet network.

See System Interface for Ekip Com modules to map the module into your communication network (page 197).

The ports used by the module are:

Port	Service	Notes
67/udp 68/udp	DHCP client	DHCP client enabled alternatively as <i>Static address = On</i>
443/tcp	HTTPS	Always active when module is enabled
123/udp	SNTP	Active with SNTP client enabled
53/udp	DNS	Always active

The *Ekip Com Modbus RTU* and *Ekip Com Modbus TCP* modules can be configured to support *Ekip Com Hub* in the collection of data to send to Cloud. See Getting Started [1SDC200063B0201](#).

Safety and cyber security

Since the module allows the actuator connected to Ekip UP⁺ to be monitored and the data in the unit to be accessed, it can only be connected to networks equipped with all the necessary security and prevention measures against unauthorized access (for example, the network of the monitoring system of an installation).



IMPORTANT:

- **it is the 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). The plant manager must establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, the customer system and interface against any kind of security breaches, unauthorized access, interference, intrusion, loss and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized accesses, interference, intrusion, loss and/or theft of data or information.**

Connections

The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000091R0001](#); a cable of the Class 6 S/FTP type (Class 6 with double screening S/FTP) must be used for the communication bus.

To connect the module to Ekip UP⁺, please consult document [1SDH001000R0514](#).

Power supply

Ekip Com Hub is supplied directly by the Ekip Supply module to which it is connected.



NOTE: communication between Ekip UP⁺ and the module is interrupted in the absence of auxiliary power supply

Interface the module has three signaling leds:

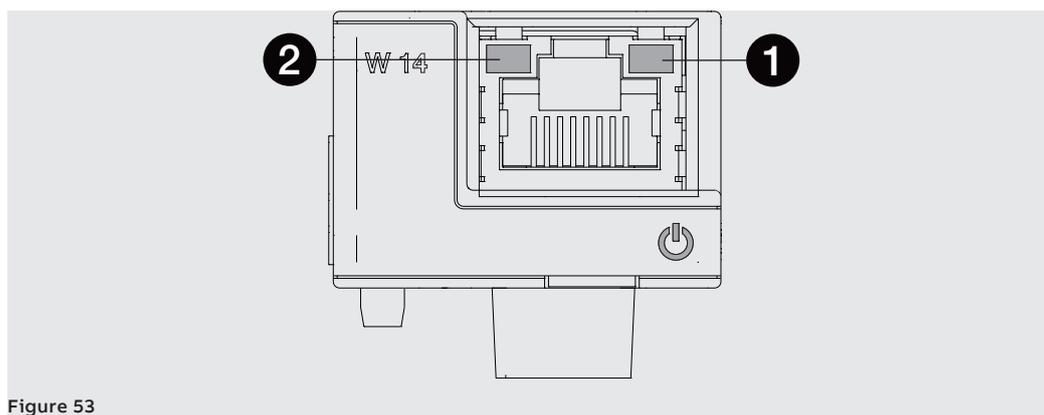


Figure 53

LEDs	Description
Power	Signals the on state and correct communication with Ekip UP ⁺ : <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with Power led of Ekip UP⁺: module on and communication with Trip unit present • flashing not synchronized with Power led of Ekip UP⁺ (two fast flashes per second): module on and communication with Trip unit absent
1 - Link	Indicates the communication state: <ul style="list-style-type: none"> • off: incorrect connection, signal absent. • on steady: connection correct
2 - Activity	Indicates the communication state: <ul style="list-style-type: none"> • off: no activity on line • flashing: activity on line present (receiving and/or transmitting)

Configurations via menu Local bus activation, which is essential for starting communication between the module and Ekip UP⁺, is available in the *Settings* menu (page 44).

The following communication parameters can be configured in the *Settings-Modules* menu if the module has been correctly detected by Ekip UP⁺:

Parameter	Description	Default
<i>Enable</i>	Switches communication between module and server on/off.	Off
<i>Static IP address ON</i>	Defines whether the module has the dynamic (Off) or static (On) IP address. If = On all the associated parameters are enabled	Off
<i>Static address 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>	When there are several subnets, enables the IP address of the node to which the module is connected to be selected	0.0.0.0
<i>Enable SNTP client</i>	Allows the SNTP protocol for distribution of the clock and synchronization signal to be enabled.	Off
<i>SNTP Server Addr.</i>	Allows the network server that supplies the SNTP to be set.	0.0.0.0
<i>Password</i>	Code required to register module on Cloud	---

Continued on the next page

The *Remote FW update* submenu enables the Firmware update function of the module to be managed; the following parameters are available:

Parameter	Description	Default
<i>Enable</i>	Enables firmware update function of module to be remotely activated/deactivated	Off
<i>Automatic</i>	This parameter is available when Enable = On and allows the automatic update mode to be activated (On): it is updated automatically when new Firmware is present. Updating is Manual if the parameter is Off: when new Firmware is present, the Ekip Com Hub FW Update message appears in the status bar and updating is performed via manual command	Off (manual)
<i>Start FW update</i>	This parameter is available when Enable = On, with Automatic = Off configuration and when new Firmware is present (see description above); allows the Firmware update of the module to run	Little endian

Information in menu The following information will be available in the *About - Modules* menu if Ekip UP+ has detected the module correctly:

Information	Description
<i>SN and version</i>	Identifier and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the time of connection to the network in the case of configuration with a dynamic IP, or can be set via the menu in the event of a static IP  NOTE: <i>without a DHCP server, the module automatically adopts a random IP address within the 169.254.xxx.xxx range</i>
<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, which uniquely identifies the manufacturer of an Ethernet device

Remote configurations

Parameters not directly available on the display can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

Parameter	Description	Default
<i>CRL Enable</i>	Allows the CRL (Certificate Revocation List) to be used to ascertain whether the server certificate is valid	
<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 in relation 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>	Used to select whether daylight saving time is present (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, used by Ekip Connect to rapidly find the modules via Ethernet scan without knowing the IP address beforehand	ARP Enabled
<i>Cloud data send enable</i>	Enables/disables the function that collects and transmits the module data	OFF
<i>JSON data compression</i>	Allows the compressed format of the JSON file sent to Cloud to be selected (enable)	Disabled

Remote information

Additional information can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

Information	Description
<i>HW and Boot version</i>	General module information
<i>Flash CRC status and result</i>	Information about the correctness of the SW in the module
<i>Publish enable configuration</i>	State of enabling in Security File
<i>Configuration file</i>	Name of the file dedicated to the information to transmit (measurements, etc.)
<i>Security file</i>	Name of the file dedicated to the information requested by the module for transmission purposes (addresses, certificates, etc.)
<i>Certificate Revocation List</i>	Name of the file containing the revoked certificates
<i>Executable file</i>	Name of the executable firmware update file
<i>Configuration error</i>	Module configuration error state
<i>Sample time</i>	Period of data acquisition from the connected devices
<i>Log time</i>	Period within which the acquired data are saved in the log
<i>Upload time</i>	Period (calculated by the module) between each data transmission
<i>Configured device</i>	Number of modules involved in the network with Hub module
<i>Polling period API events</i>	Period in which the module communicates with the API device
<i>Connection client 1, 2, 3</i>	Address of TCP Modbus clients connected to the module
<i>Statistics</i>	Recordings of the latest saving operations and percentage of resources being used
<i>Status plant side</i>	Information about the quality of the communication with the other devices
<i>Status Cloud side</i>	State of the errors concerning the TLS session established between module and server
<i>Application status</i>	Operation progress indicators
<i>Status</i>	General indicators of the module: SNTP state, flash, cable connection, FW availability, file errors, etc.

10 - System Interface for Ekip Com modules

Documents For correct use of Ekip Com communication modules, two documents are available in the ABB library:

Document	Description
1SDH002003A1006.pdf	Guidelines with details about how to put the communication modules into service, with reference to the protocols and supporting documents
1SDH002003A1006.xlsx	Table with the references of all the registers for parameters, controls, measurements, etc.

The documents are available in a single file in the .zip format (1SDH002003A1006).

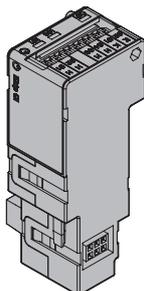
The .zip file contains the files for integrating Ekip UP + into the available communication networks, with the specific Ekip Com module and an IMPORTANT file with notes on how to use the files:

File ^{(1) (2)}	Ekip Com Module/Protocol
ABBS0E7F.gsd	File .gsd for configuring <i>Ekip Com Profibus DP</i>
Ekip_COM_EtherNetIPTM_vxx.eds	File .eds for configuring <i>Ekip Com EtherNet/IP™</i>
Ekip_COM_DeviceNetTM_vxx.eds	File .eds for configuring <i>Ekip Com DeviceNet™</i>
emax2_vxx_xx_xxxx.icd	File .icd for configuring <i>Ekip Com IEC 61850</i>
GSDML-Vx.xx.xml	File .xml for configuring <i>Ekip Com Profinet</i>

⁽¹⁾ The files are also valid for the respective Redundant versions

⁽²⁾ Check the Firmware version of your module so as to choose the correct configuration file

11 - Ekip CI



Ekip CI is an accessory which enables a remote control switch to be managed in the *Normal* configuration.

This module has:

- a contact for controlling a remote control switch
- an input for temperature probe PT100 (2 wires)
- a digital input for the Trip Reset function
- led for signaling the startup status and operating status of the module.

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000068R0001](#); for input I61, use insulated cables for resistance thermometers such as PENTRONIC TEC/SITW-24F (Type TX) or similar. Maximum length 3 meters.

To connect the module to Ekip UP⁺, please consult document [1SDH001000R0514](#).



IMPORTANT: input I61 is not insulated: regardless of plant voltage, the customer must ensure there is insulation between the input and power supply of the Ekip Supply module on the basis of the customer's own application and network

Power supply *Ekip CI* is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: in the absence of auxiliary power supply, communication between Ekip UP⁺ and the module is interrupted, the output contact maintains its state and the input signals are no longer valid.

Output Output contact O61 (K61 and K62), which is normally closed, is opened if a TRIP occurs. Re-closing can be obtained after a command on 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 ⁽¹⁾
Rated breaking capacity	8A @ 250 VAC / 5A @ 30 VDC
Minimum breaking capacity	10 mA @ 5 VDC
Insulation resistance between contact and Trip unit	1000 MΩ, 50 VDC

⁽¹⁾ data relating to a resistive load

Input PT100 Analog input I61 (H61 and H62) allows a thermocouple to be connected (model PT100) so as to monitor the temperature and, if *PTC protection* is activated, to manage a TRIP if an alarm occurs (120 °C fixed threshold) (page 102)

The contact has the following measuring characteristics:

Input	Measurement	Range	Resolution	Accuracy ⁽¹⁾
PT100	Temperature	-50 ÷ 250 °C	0,01 °C	± 0,25 °C ⁽²⁾

⁽¹⁾ accuracy values refer to *Ekip CI* module without sensor. For complete accuracy, consider the characteristics of the sensor and cabling used

⁽²⁾ accuracy valid in -25 to 250°C range; in complete range it is: ± 0.5 °C

Input Trip reset Digital input I63 (H63 and H64) allows contact O61 to be re-opened after a TRIP.

The module permits two logic statuses, interpreted differently by the Trip unit on the basis of the polarity configured by the user:

State	Electrical condition	Polarity	Status detected (and command required)
Open	Circuit open ⁽¹⁾	Active open	On (O61 open command)
		Active closed	Off
Closed	Short-circuit ⁽²⁾	Active open	Off
		Active closed	On (O61 open command)

⁽¹⁾ $R > 100 \text{ k}\Omega$

⁽²⁾ $R \text{ (wiring + short circuit contact)} < 25 \Omega$

The re-closing command is activated at the front.

Interface The module has four signaling leds:

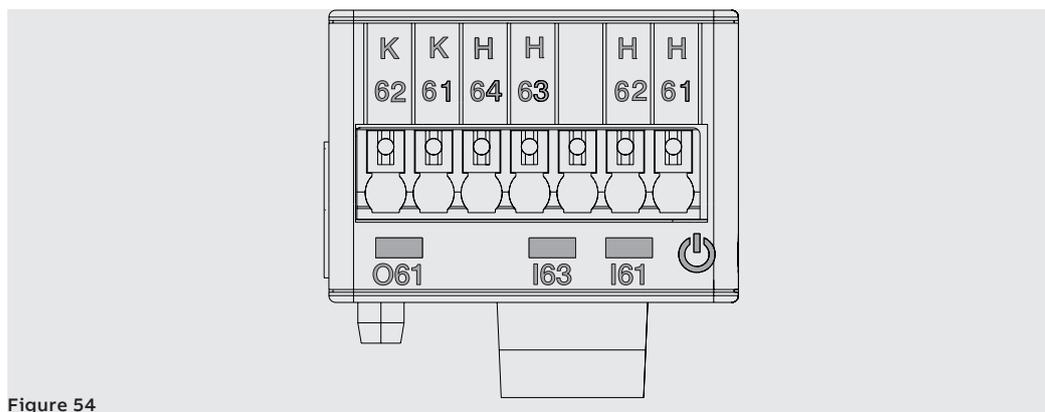


Figure 54

Parameter	Description
Power	Signals the on state and correct communication with Ekip UP ⁺ : <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with Power led of Ekip UP⁺: module on and communication with Trip unit present • flashing not synchronized with Power led of Ekip UP⁺ (two fast flashes per second): module on and communication with Trip unit absent
I 61	Status of input for temperature probe PT100 I61: <ul style="list-style-type: none"> • off: input disabled • on: input enabled and sensor present • flashing: input enabled and sensor disconnected or signal not valid
I 63	Indicates the status of the digital input for Trip Reset I63: <ul style="list-style-type: none"> • off: input open • on: input closed
O 61	Indicates the status of the command contact of remote control switch O61: <ul style="list-style-type: none"> • off: contact closed • on: contact open

Menu Local bus activation, which is essential for starting communication between the module and Trip unit, is available in the *Settings* menu (page 44).

The relative configuration, measurement, test and information areas will activate in the respective menus if the *Ekip CI* module is detected correctly by Ekip UP⁺.

Configuration The module parameters can be configured in the *Settings-Modules-Ekip CI* menu:

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates certain functions and their availability in the parameters menu: <ul style="list-style-type: none"> • if On: all the inputs, outputs and relative functions are activated • if Off: only input I61 is activated: the command function of O61 is off 	Off
<i>Polarity</i>	Defines whether input I63 is interpreted as On by Ekip UP ⁺ when it is open (<i>Active open</i>) or when it is closed (<i>Active Closed</i>)	Active closed
<i>Delay</i>	Minimum activation time of input I63 before the re-opening command of contact O61 is sent; the delay is given in seconds and can be set within range: 0 s to 100 s, in 0.01 s steps  NOTES : <ul style="list-style-type: none"> • if the input is deactivated before this time has elapsed, the re-opening command is not sent • if delay = 0 s the input must still be present for longer than 300 μs 	0.1 s



NOTE: the *Settings-MLRIU* menu contains the parameters that define the behavior of the MLRIU protection, which can be activated when the EKIP CI module is present, page **138**.

Measurements If *Ekip CI* is correctly detected by Ekip UP⁺, the *Measurements* menu will contain the specific area of the module in which the temperature measurement of probe PT100 is present, if connected and activated.



NOTE: value “- - -” will be displayed if no probe is detected

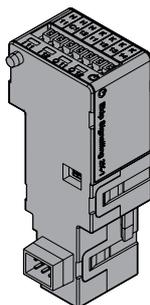
Test The test area in the *Test* menu is activated if the *Ekip CI* module is detected correctly.
For details of the test characteristics, please consult page 141.

About If *Ekip CI* is detected correctly by Ekip UP⁺, the specific area of the module will be available in the *About-Modules* menu, containing:

- the serial number and version of the module
- activation status of the input for temperature probe PT100

Remote information By using Ekip Connect and accessing Ekip UP⁺ via the service connector or system bus you can access additional information about the version and state of the module: Boot and HW version, CRC state (correctness of SW in the module).

12 - Ekip Signalling 2K



Ekip Signalling 2K is an accessory signaling module allowing programmable inputs/outputs to be managed.

This 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 Three different Signalling 2K modules are available: *Ekip Signalling 2K-1*, *Ekip Signalling 2K-2* and *RELT - Ekip Signalling 2K-3*.

The modules are identical in terms of characteristics and installation methods, except for: display menus, cabling and addresses for system communication, which are specific for each module.



NOTE: if different indications are not given, the information in the next chapter is valid for all three models

Two of the three modules can be connected at the same time to Ekip UP+ so as to expand the potential of the unit (e.g. to increase the number of control outputs and inputs).



IMPORTANT: each Ekip UP+ can be fitted with only one module per type. The configuration with two modules of the same model is not allowed (example: two Ekip Signalling 2K-1 models)

RELT - Ekip Signalling 2K-3

The RELT - Ekip Signalling 2k-3 module has a dedicated command (RELT Wizard) for auto-programming a set of trip unit parameters; The wizard ensures the activation of the 2I protection when the input of the RELT – Ekip Signalling 2k-3 module active. In addition, the 2I is placed in local model and the RELT module's outputs are activated.

Below is a complete list of the parameters configured by the command:

Parameter	Configuration from RELT Wizard command	Page
2I Protection ⁽¹⁾	On; Threshold I31 = 1,5 In	73
2I Protection Function	Delay ON=100 ms; Delay OFF=15s; Activation = dependent function; Function = RELT - Ekip Signalling 2K-3 Input 1 (I31)	73, 110
Input I31 (RELT - Ekip Signalling 2K-3)	Polarity = active closed; Delay = 0,1 s	202, 203
Output O31 and O32 (RELT - Ekip Signalling 2K-3)	Signal source = 2I protection active; Delay = 0 s; Contact type = NO; Self-latching = OFF; min Activation Time = 0 ms	204
SwitchOnLocal Function	Function = 2I protection active; Delay = 0 s	110

⁽¹⁾ if Dual set is present, programming performed for both Set A and Set B

The RELT setup Wizard can be found in the 2I protection menu and also the first time the trip unit is switched ON.

In the case that the wizard is not executed (or is rejected during the initial trip unit start up), the functionality and the characteristic of the RELT – Ekip Signalling 2k-3 module will be as described in the following pages.



NOTE: The input is able to operate with a maximum input resistance of 25 Ohm. Wiring distance limitation have to be calculated from this value. As example: considering an AWG20 cable with 29.5 Ohm/km and a microswitch with a resistance of few milliohm (negligible for the calculation) the limitation is: $25 \text{ (Ohm)}/29.5 \text{ (Ohm/km)}/2\text{wires}=0.423 \text{ km}=423\text{mt}$

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000091R0001](#) and [1SDM000019A1002](#); use AWG 22-16 cables with 1.4 mm maximum outer diameter for the external cabling.

To connect the module to Ekip UP⁺, please consult document [1SDH001000R0524](#).

Power supply *Ekip Com Signalling 2K* is supplied directly by the Ekip Supply module to which it is connected.



NOTE: communication between Ekip UP⁺ and the module is interrupted in the absence of auxiliary power supply

Input Ekip UP⁺ can be configured so that the state of the inputs corresponds to actions or signals, with different programming options (page 203).

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 made with reference to the common contacts (HC).

The module permits two logic states, interpreted differently by Ekip UP⁺ depending on the configuration selected for each contact:

State	Electrical condition	Contact configuration	Status detected by Trip unit
Open	Circuit open ⁽¹⁾	Active open	ON
		Active closed	OFF
Closed	Short-circuit ⁽²⁾	Active open	OFF
		Active closed	ON

⁽¹⁾ $R > 100 \text{ k}\Omega$

⁽²⁾ $R (\text{wiring} + \text{short circuit contact}) < 25 \text{ }\Omega$

Output Ekip UP⁺ can be configured so that the contacts of each output are closed or opened when one or more events occur, with different programming options (page 204).

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), which are isolated from the unit and from the other outputs, and have the following electrical characteristics:

Characteristics	Maximum limit ⁽¹⁾
Maximum switchable voltage	150 VDC / 250 VAC
Breaking capacity	2 A @ 30 VDC, 0,8 A @ 50 VDC, 0,2 A @ 150 VDC, 4 A @ 250 VAC
Dielectric strength between open contacts	1000 V AC (1 minute @ 50 Hz).
Dielectric strength between each contact and coil	1000 V AC (1 minute @ 50 Hz).

⁽¹⁾ data relating to a resistive load

Interface the module has three signaling leds:

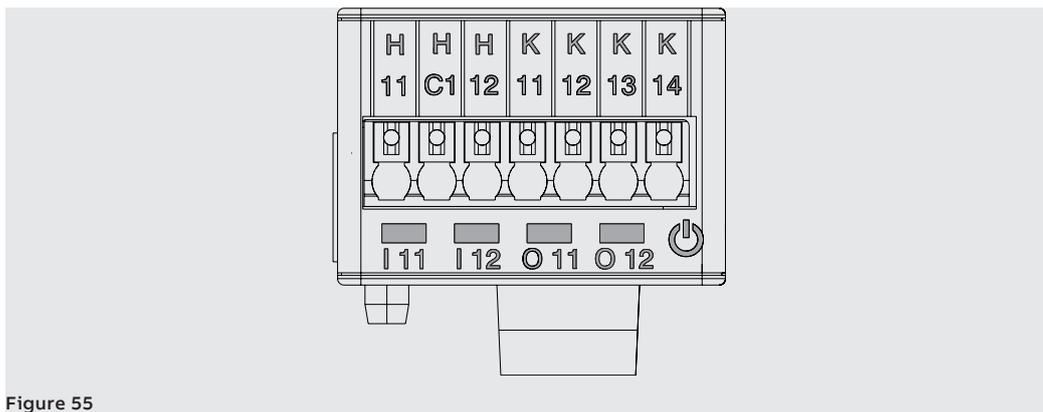


Figure 55

LEDs	Description
Power	Signals the on state and correct communication with Ekip UP ⁺ : <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with Power led of Ekip UP⁺: module on and communication with Trip unit present • flashing not synchronized with Power led of Ekip UP⁺ (two fast flashes per second): module on and communication with Trip unit absent
I 11, I 12	Indicate the status of the contacts of each output: <ul style="list-style-type: none"> • off: contact open • on: contact closed
O 11, O 12	Indicate the status of the contacts of each input: <ul style="list-style-type: none"> • off: circuit open • on: short circuit

Menu The specific configuration area will activate in the *Settings-Modules* menu if the *Ekip Signalling 2K* module is detected correctly by Ekip UP⁺.

A specific menu containing the submenus of all the available and configurable inputs and outputs is available for each *Ekip Signalling 2K* module detected by Ekip UP⁺.

Input parameters All the available inputs enable the following parameters to be configured:

Parameter	Description	Default
<i>Polarity</i>	Defines whether the input is interpreted by Ekip UP ⁺ as On when it is open (<i>Active open</i>) or when it is closed (<i>Active Closed</i>)	Active closed
<i>Delay</i>	Minimum activation time of the input before status change is recognized; the delay is given in seconds and can be set within range: 0 s to 100 s, in 0.01 s steps i NOTES: <ul style="list-style-type: none"> • if the input is deactivated before this time has elapsed the status change is not recognized • if delay = 0 s status change must still be more than 300 μS 	0.1 s

Output parameters All the available inputs enable the following parameters to be configured:

Parameter	Description	Default
<i>Signal source</i>	Event which activates the output and switches the contacts. Different protection proposals, statuses and thresholds are available on the display; the Custom mode can be configured via Ekip Connect so as to extend the solutions and combine several events	None
<i>Delay</i>	Minimum duration of the presence of the source before the output is activated; the delay is given in seconds and can be set within range: 0 s to 100 s, in 0.01 s steps i NOTES: <ul style="list-style-type: none"> the output will not be switched if the source is deactivated before this time has elapsed if delay = 0 s the source must still be present for longer than 300 µS 	0 s
<i>Contact Type</i>	Defines the rest status of the contact with source not present between: open (NO) and closed (NC)	NO
<i>Latched⁽¹⁾</i>	Allows the output (and relative status led) to be kept activated (On) or deactivated (Off) when the event disappears	OFF
<i>min Activation Time⁽²⁾</i>	Defines the minimum closing time of the contact following the rapid presence of sources: <ul style="list-style-type: none"> Source duration < min. activation = contact is activated for the minimum activation time Source duration ≥ min. activation = contact is activated for as long as the source persists Choose between: 0 ms, 100 ms, 200 ms	0 ms

⁽¹⁾ deactivate self-latches of outputs used if Ekip Measuring module is used for the Power Controller function

⁽²⁾ If the Ekip Measuring module is used for the Power Controller function, the Power Controller option will also be available; if selected, the output is kept activated for a set time that depends on the function, regardless of whether the event that activated it persists

About The specific menu of the module available in the *About - Modules* menu contains:

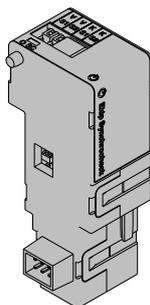
- the serial number and version of the module
- the statuses of the inputs (On/Off) and outputs (Open/Closed)

Test The test area in the *Test* menu is activated if the *Ekip Signalling 2K* module is detected correctly.

For details of the test characteristics, please consult page 141.

Remote information By using Ekip Connect and accessing Ekip UP⁺ via the service connector or system bus you can access additional information about the version and state of the module: Boot and HW version, CRC state (correctness of SW in the module).

13 - Ekip Synchrocheck



Ekip Synchrocheck is an accessory module that is used to control closing of an actuator when synchronism conditions, programmable by the user, exist.

To actuate synchronism:

- *Ekip Synchrocheck* and the internal sockets measure, respectively, the voltage on the external contacts (external voltage) and on the internal contacts (internal voltage) of the actuator
- *Ekip Synchrocheck* manages a closing contact



NOTES:

- *the actuator is described as a circuit-breaker in the following description and in the menus*
- *with a generator and the actuator being configured: Normally, the external voltage is that of the grid and the internal voltage is that of the generator*



IMPORTANT: only one Ekip Synchrocheck can be installed on each CB

Mode The module operates in two modes, configurable by the user (manual-mode configuration) or managed automatically by the unit (automatic-mode configuration).

Conditions	Description
Busbar active	Operation with external voltage other than zero: <ul style="list-style-type: none"> • synchronism search starts if the external voltage is (0.5 Un by default) or more, for at least (1 s by default) • synchronism is considered to have been reached if the differences between RMS values and frequencies and the voltage phases are (0.12 Un, 0.1 Hz, and 50° by default) or less
Dead busbar and configuration: <i>Normal</i>	Operation with one of the voltages nil: <ul style="list-style-type: none"> • synchronism search starts if the internal voltage is (0.5 Un by default) or more, for at least (1 s by default) • synchronism is considered to have been reached if the external voltage is (0.2 Un by default) or less, for at least (1 s by default)



NOTE: *with dead busbar and configuration: Reversed, the roles of the internal and external voltages are reversed*

Synchronism signal:

- is activated and maintained, after synchronism has been reached, for at least 0.2 s
- is deactivated when synchronism ends or the circuit-breaker is opened (with condition: *Evaluate CB status* = enabled) or communication with Ekip UP+ interrupted

Additional functions Certain options can be remotely configured in the synchronism conditions described above:

- the open circuit-breaker condition can be added (disabled by default)
- removal of the frequency and phase controls can be disabled



IMPORTANT: to be able to disable the frequency and phase controls, first make sure that the required frequency and phase correspondence between external and internal contacts already exists

Connections The module must be assembled in the first vacant slot of the terminal box after *Ekip Supply*, either on the circuit-breaker (fixed version) or on the fixed part (withdrawable version).

For references about the connection and terminals, please consult document [1SDM000091R0001](#); use AWG 22-16 cables with 1.4 mm maximum outer diameter for the external cabling.

To connect the module to Ekip UP+, please consult document [1SDH001000R0513](#).

Power supply *Ekip Com Synchrocheck* is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: communication between Ekip UP⁺ and the module is interrupted in the absence of auxiliary power supply

Input *Ekip Synchrocheck* has an input (V S1 - V S2) for reading voltage, operation of which is ensured within the ranges and with the performance given below:

Component	Operating range	Normal operating range	Accuracy ⁽¹⁾
Voltage	0÷120 VAC	10 ÷ 120 VAC	1 % ⁽²⁾
Frequency ⁽³⁾	30÷80 Hz	30 ÷ 80 Hz	0,1 % ⁽⁴⁾
Phase ⁽⁵⁾	-	-180 ÷ +180 °	1 °

⁽¹⁾ the accuracy values refer to normal operating ranges, as established by IEC 61557-12

⁽²⁾ with busbar activated

⁽³⁾ with the busbar activated, frequency measurement starts at ≥ 36 V AC and ends at ≤ 32 V AC measured voltage

⁽⁴⁾ in the absence of harmonic distortion

⁽⁵⁾ phase measurement refers to the phase difference between internal and external voltage

Isolation transformer

An isolating transformer with the characteristics given below must always be installed between the external contacts of the circuit-breaker and the input of the module:

Characteristics	Description
Mechanical	<ul style="list-style-type: none"> fixing: EN 50022 DIN 43880 rail material: self-extinguishing thermoplastic protection class: IP30 electrostatic protection: with earth connector shield
Electrical	<ul style="list-style-type: none"> accuracy class: $\leq 0,2$ performance: ≥ 4 VA overload: 20% permanent insulations: 4 kV between inputs and outputs, 4 kV between screen and outputs, 4 kV between screen and inputs frequency: 45 to 66 Hz

Output *Ekip Synchrocheck* has an output (K S1 - K S2) used as synchronism contact.

The output is insulated from the unit and input, and has the following electrical characteristics:

Characteristics	Maximum limit ⁽¹⁾
Maximum switchable voltage	150 VDC / 250 VAC.
Breaking capacity	2 A @ 30 VDC, 0,8 A @ 50 VDC, 0,2 A @ 150 VDC, 4 A @ 250 VAC
Dielectric strength between open contacts	1000 V AC (1 minute @ 50 Hz).
Dielectric strength between each contact and coil	1000 V AC (1 minute @ 50 Hz).

⁽¹⁾ data relating to a resistive load

Interface the module has three signaling leds:

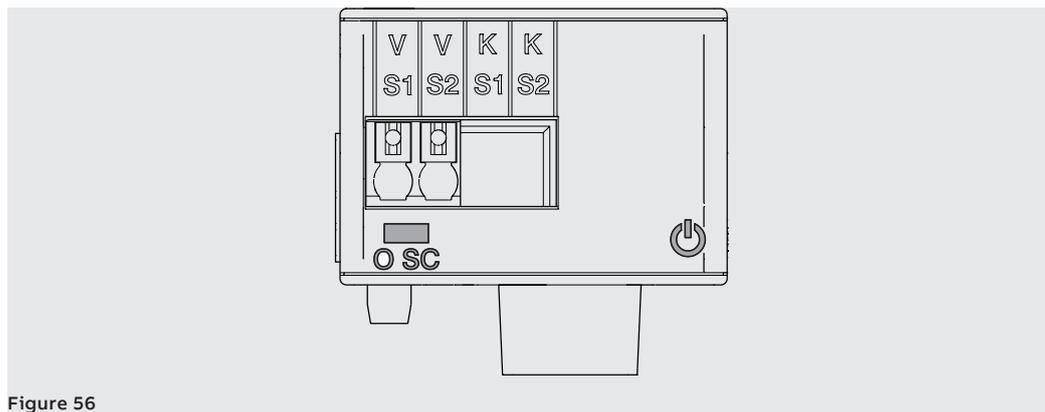


Figure 56

LEDs	Description
Power	Signals the on state and correct communication with Ekip UP ⁺ : <ul style="list-style-type: none"> • off: module off • on and steady or with flashing synchronized with the Power led of Ekip UP⁺: module on and communication with Trip unit present • flashing not synchronized with the Power led of Ekip UP⁺ (two fast flashes per second): module on and communication with Trip unit absent
O SC	Indicate the status of the contacts of each output: <ul style="list-style-type: none"> • off: contact open • on: contact closed <p>i NOTE: The LED displays the state of the output: it can indicate synchronization OK or KO, depending on the contact rest configuration (normally open or closed)</p>

Configurations via menu

The specific configuration area will activate in the *Advanced - Synchrocheck* menu if the *Ekip Synchrocheck* module is detected correctly by Ekip UP⁺.

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the protection and its availability in the parameters menu	Off
<i>Dead bar option</i>	On = busbar activated; 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 given as both absolute value (V) and relative value (Un) and can be set within the range: 0.02 Un to 2 Un, in 0.001 Un steps	0.2 Un
<i>Ulive Threshold</i> ⁽²⁾⁽³⁾	Minimum voltage for starting monitoring of external voltage (with busbar activated) or internal voltage (with dead busbar and <i>Normal</i> configuration) The value is given as both absolute value (V) and relative value (Un) and can be set within the range: 0.5 Un to 1.1 Un, in 0.001 Un steps	0.5 Un
<i>Stability Time</i>	Minimum time within which the <i>Ulive Threshold</i> condition must be obtained in order to activate voltage monitoring The value is given in seconds and can be set within the range: 100 ms to 30 s, in 1 ms steps	1 s

Continued on the next page

Parameter	Description	Default
<i>Delta Voltage</i>	Maximum difference between internal and external voltage (first synchronism condition) The value is given as both absolute value (V) and relative value (Un) and can be set within the range: 0.02 Un to 0.12 Un, in 0.001 Un steps	0.12 Un
<i>Delta frequency</i> ⁽⁴⁾	Maximum difference between internal and external frequency (second synchronism condition) The value is given in Hertz and can be set within the range: 0.1 Hz to 1 Hz in 0.1 Hz steps	0.1 Hz
<i>Delta phase</i> ⁽⁴⁾	Maximum difference between internal and external phase (third synchronism condition) The value is given in degrees and can be set within the range: 5° to 50° in 5° steps	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 grid	Standard
<i>Auto Live-dead detect</i>	Enables automatic synchronism control to be activated: • Manual = Ekip UP+ considers the <i>Dead bar option</i> parameter • Automatic = Ekip UP+ automatically assesses the configuration to be actuated between the dead busbar and active busbar	Manual
<i>Auto Deadbar detect</i>	Configuration for detecting dead busbar: • Manual = Ekip UP+ considers the <i>Dead bar configuration</i> parameter • Automatic = Ekip UP+ automatically assesses the configuration to be actuated between: <i>Reversed</i> and <i>Normal</i>	Manual
<i>Primary voltage</i>	Rated voltage Un of installation; the value is given as absolute value (V) and can be set within the range: 100 V to 1150 V in variable steps.	100 V
<i>Secondary voltage</i>	Secondary voltage of the transformer; the value is given as absolute value (V) and can be set within the range: 100 V to 120 V in variable steps.	100 V
<i>Concatenated Ref</i>	Line-to-line voltage entering the module among the 3 installation voltages	U12
<i>Contact Type</i>	Defines the rest status of the contact with synchronism not present between: open (NO) and closed (NC)	NO

⁽¹⁾ parameter not available with busbar active and Auto deadbar detect= Manual

⁽²⁾ with dead busbar and configuration: Reversed, the roles of the internal and external voltages are reversed

⁽³⁾ 10% hysteresis is applied to the minimum voltage condition: once reached, the condition is lost if the voltage drops below 90% of the set limit

⁽⁴⁾ parameter not available with dead busbar and Auto deadbar detect= Manual



NOTE: all the thresholds have ±10% tolerance with the exception of:

- Voltage Delta; the tolerance is the higher value between: ±10% of the set threshold and 0.5% Un (with Un > 220 V) or 1% Un (with Un ≤ 220 V)
- Frequency Delta; the tolerance is the higher value between ±10% of the set threshold and 0.02 Hz

Remote configurations

Parameters not directly available on the display can be accessed by using Ekip Connect and accessing Ekip UP⁺ via service connector or system bus.

Parameter	Description	Default
<i>Frequency check</i>	Activates (ON) or deactivates (OFF) frequency control for synchronism assessment	ON
<i>Phase check</i>	Activates (ON) or deactivates (OFF) phase control for synchronism assessment	ON
<i>Evaluate CB status</i>	Activates (YES) or deactivates (NO) circuit-breaker open status control for synchronism assessment i NOTE: <i>fourth synchronism condition with busbar active; second synchronism condition with dead busbar</i>	NO
<i>Minimum matching time</i>	With active busbar, minimum time within which the <i>Delta Phase</i> condition must be obtained The value is given in seconds and can be set within the range: 100 ms to 3 s, in 10 ms steps i NOTE: <i>this is not a synchronism condition, but a parameter allowing a discrimination to be made between correct and incorrect combinations of the Delta Frequency and Delta Phase conditions. Owing to worst case latencies, the time that effectively elapses before synchronism is recognized may be longer than the set time (approx. 20 ms)</i>	100 ms

Measurements

The specific area will activate in the *Measurements - Synchrocheck* menu if the *Ekip Synchrocheck* module is detected correctly by Ekip UP⁺.

Measurement	Description
<i>Module</i>	<ul style="list-style-type: none"> • Ok = Synchronism conditions fulfilled • Not Ok = Synchronism conditions not fulfilled or function disabled
<i>Frequency</i>	<ul style="list-style-type: none"> • Ok = Synchronism condition regarding frequencies fulfilled • Not Ok = Synchronism condition regarding frequencies not fulfilled or synchronism function disabled, or frequencies outside measuring range limits. • --- = Synchronism condition regarding frequencies not available (example: for operation with dead busbar)
<i>Voltage</i>	<ul style="list-style-type: none"> • Ok = Synchronism conditions regarding voltages fulfilled. • Not Ok = Synchronism conditions regarding voltages not fulfilled or synchronism function disabled
<i>Phase</i>	<ul style="list-style-type: none"> • Ok = Synchronism condition regarding phase difference fulfilled • Not Ok = Synchronism condition regarding phase difference not fulfilled or synchronism function disabled, or frequencies outside measuring range limits • --- = Synchronism condition regarding phase difference not available (example: for operation with dead busbar)
<i>Ext Side Voltage⁽¹⁾</i>	<ul style="list-style-type: none"> • Voltage measured by <i>Ekip Synchrocheck</i> given in Volts • = measurement DC or less than 1 VAC • --- = measurement not available (example: because synchronism function is disabled)
<i>Int Side Voltage⁽²⁾</i>	<ul style="list-style-type: none"> • Voltage measured on internal sockets, given in Volts. • = measurement less than 1 VAC
<i>Ext Side Frequency⁽¹⁾</i>	<ul style="list-style-type: none"> • Frequency measured by <i>Ekip Synchrocheck</i> • --- = measurement not available (example: because synchronism function is disabled, or operation with dead busbar, or frequencies outside measuring range limits)
<i>Int Side Frequency⁽²⁾</i>	<ul style="list-style-type: none"> • Frequency measured on internal sockets • --- = measurement not available (example: because synchronism function is disabled, or operation with dead busbar, or frequencies outside measuring range limits)

Continued on the next page

Measurement	Description
Phase Difference ⁽¹⁾	Phase difference between voltages, given in degrees <ul style="list-style-type: none"> • --- = measurement not available (example: because synchronism function is disabled, or operation with dead busbar, or frequencies outside measuring range limits)
Auto detection	<ul style="list-style-type: none"> • Busbar active = with automatic detection of operating mode and operation with active busbar, or with synchronism function not enabled • Dead bar = with automatic detection of operating mode and operation with dead busbar • --- = Measurement not available (example: owing to manual detection of operating mode)
Voltage relation	<ul style="list-style-type: none"> • $V_{int} \leq V_{ext}$ = Internal voltage the same as external voltage or lower • $V_{in} > V_{ext}$ = Internal voltage higher than external voltage • --- = Measurement not available (example: because the synchronism function is disabled, or direct voltages or voltages lower than 1 V).
Frequency relation	<ul style="list-style-type: none"> • $f_{int} \leq f_{ext}$ = Internal frequency the same as external frequency or lower • $f_{in} > f_{ext}$ = Internal frequency higher than external frequency • --- = Measurement not available (example: because synchronism function is disabled, or operation with dead busbar, or frequencies outside measuring range limits)

⁽¹⁾ voltage difference measurement accuracy is $\pm 10\%$ unless the parameter value is $0.02 U_n$, in which case accuracy is $\pm 20\%$

⁽²⁾ the characteristics of the voltage and frequency measurements coincide with those given on the internal sockets (page 49)

Summary page The summary page is activated in the presence of the *Ekip Synchrocheck* module; access is obtained in the same way as the other summary pages (page 37).

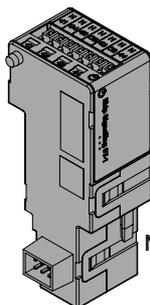
The measurements in this page are:

- V int: voltage read by Ekip UP⁺
- f int: frequency read by Ekip UP⁺
- $\Delta\phi$: phase difference
- SYNC: status of synchronism

About The *About - Modules* menu contains the specific menu of the module with the serial number and version of the module itself.

Remote information By using Ekip Connect and accessing Ekip UP⁺ via the service connector or system bus you can access additional information about the version and state of the module: Boot and HW version, CRC state (correctness of SW in the module).

14 - Ekip Signalling 3T



Models

Ekip Signalling 3T is a signaling accessory which enables the connection of:

- three analog inputs for PT100/PT1000 temperature sensors (2 wires): I42, I43, I44
- an analog input for 4-20 mA current loop: I41

The measurements supplied by the module can be associated with different control threshold, useful for configuring alarm signals, states and programmable commands.

Ekip UP⁺ can be configured with two different 3T modules: *Ekip Signalling 3T-1* and *Ekip Signalling 3T-2*.



NOTE: if different indications are not given, the information in the next chapter is valid for both models; on the second module the inputs are called I51 (loop 4-20 mA), I52, I53, I54 (PT100/PT1000)

The two modules can be installed at the same time on the same circuit-breaker so as to extend the opportunities for measuring and monitoring the installation.



IMPORTANT: each circuit-breaker can only be fitted with one module per type. Configuration with two modules of the same model is not allowed (example: two *Ekip Signalling 3T-1* modules)

Connections

For references about the connection and terminals, please consult document [1SDM000091R0001](#)

To connect the module to *Ekip UP*⁺, please consult document [1SDH001000R0527](#).

For PT100/PT1000 sensors, use insulated cables for resistance thermometers such as PENTRONIC TEC/SITW-24F (Type TX) or similar. Maximum length 3 meters.

For the 4-20 mA Current Loop sensor, use suitable cables up to 3 meters in length compatible with the workplace in which the 4-20 mA current sensor is used.



IMPORTANT: the inputs are not insulated: regardless of plant voltage, the customer must ensure there is insulation between each input and between the inputs and power supply of the *Ekip Supply* module on the basis of the customer's own application and network.

For applications in low voltage installations ABB suggests use of the external probe PT1000 3mt, is equipped with a nut and screw for use on busbars and is compatible with the dielectric withstand and insulation levels established by standard IEC 60947-2 (U_i= 1000 V, U_{imp}= 12 kV).

Power supply

Ekip Signalling 3T is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: communication between *Ekip UP*⁺ and the module is interrupted in the absence of auxiliary power supply

Input The module enables the following quantities to be measured

Input	Measurement	Range	Resolution	Accuracy ⁽¹⁾
PT100/PT1000	Temperature	-50 ÷ 250 °C ⁽²⁾	0,01 °C	± 1 °C ⁽⁵⁾
Current loop 4-20 mA	DC current	0 ÷ 100 % ⁽³⁾	0.1 %	± 0,5 % ⁽⁴⁾

⁽¹⁾ accuracy values refer to 3T module without sensors. For complete accuracy, consider the characteristics of the sensors and cabling used; accuracy increases by 0.5 °C with the ABB sensor

⁽²⁾ with ABB PT1000 sensor, the range is -25 ÷ 150 °C

⁽³⁾ the measurement is expressed as a percentage, where: 0% = 4 mA and 100% = 20 mA

⁽⁴⁾ accuracy values refer to full scale: 0.5%= 0.1 mA

⁽⁵⁾ Accuracy valid within the 0 to 130 °C range with module at 25 °C ambient temperature. The accuracy value is ± 2 °C over the whole range, with module at 25 °C ambient temperature

Interface Five signalling leds are available:

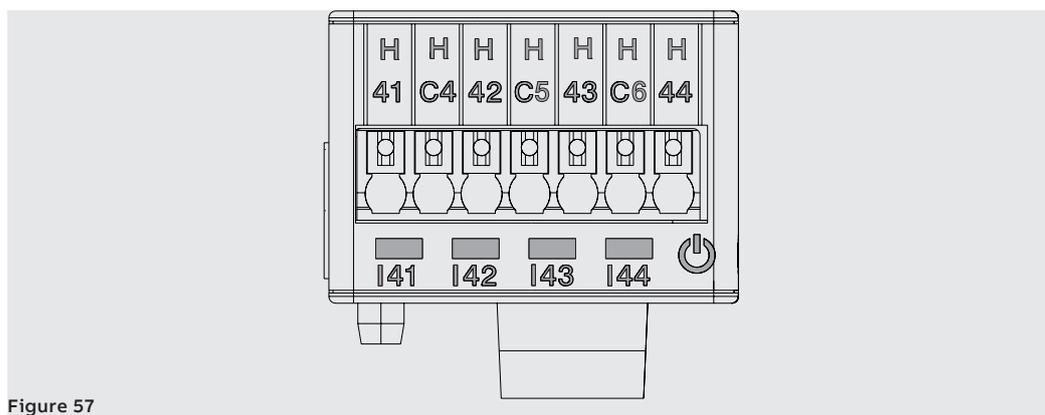


Figure 57

LEDs	Description
Power	Signals the on state and correct communication with the trip unit: <ul style="list-style-type: none"> • off: module off • on steady or flashing synchronized with the trip unit Power led: module on and communication with trip unit present • flashing not synchronized with trip unit Power led (two fast flashes per second): module on and communication with trip unit absent
I 41, I 42, I 43, I 44	Indicate the state of the input contacts: <ul style="list-style-type: none"> • off: input disabled • on steady: input enabled, sensor connected and measurement valid • flashing: input enabled, sensor not connected and/or measurement not valid

Access from the display The following areas are activated in Ekip UP+ if the Ekip Signalling 3T module is detected correctly:

- *Measurements* page, accessible from the Home page, containing the measurements of all the PT100/PT1000 and 4-20 mA Current Loop inputs of both modules 3T-1 and 3T-2
- information submenus in the *About-Modules* menu containing: serial number, module version and statuses of sensors (Present/Alarm)



IMPORTANT:

- if one or more sensors are in the alarm status, the signal on the diagnosis bar will be: **Ekip Signalling 3T**
- if a sensor is not enabled, the status indicated is: **Present**

Remote configurations

The configuration of the module is available:

- via Ekip Connect, with communication accessories via service connector or with communication via system bus
- with its own communication system and *Ekip Com* modules mounted on the circuit-breaker, in the conditions provided for by the trip unit (see *System Interface for Ekip Com* modules on page 197)

All the measurements, states and alarms of the module are available in both conditions.



NOTE: parameters and measurements are distributed in *Ekip Connect* pages and communication addresses sometimes nonsequential; references to the pages in *Ekip Connect 3* are given in the tables below

Enabling and measurements

The individual inputs of the module can be enabled in the *Ekip Signalling 3T* page: I42 Temperatures, I43 Temperatures, I44 Temperatures, I41 Current 4-20 mA (per 3T-1), I52 Temperatures, I53 Temperatures, I54 temperatures, I51 Current 4-20 mA (for 3T-2).

Parameter	Description	Default
<i>Enable</i>	Enables the specific input and relative alarm state and signaling controls to be activated	Enabled

The state alarms and the measurement detected for each input are also available in the page.

Alarm signals

Up to three alarm thresholds (independent of each other), Threshold A, Threshold B, Threshold C, can be activated and configured for each input in the *Protection parameters - Other parameters A* (and B if dual set is activated) page

Each alarm threshold has the following configuration parameters:



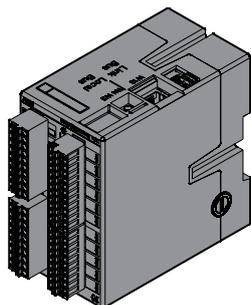
NOTE: the table lists the parameters of threshold A of input I42; the names and references of all the other thresholds and inputs change

Parameter	Description	Default
<i>Threshold A enable</i>	Activates verification of input I42 with alarm Threshold A	Off
<i>Threshold A hysteresis direction</i>	Defines whether the alarm must activate when measurement is above (<i>Up</i>) or below (<i>Down</i>) the set value, with reference to the Threshold A setting	Up
<i>Threshold A value</i>	Alarm threshold A of input I42. The value is given in degrees Celsius (°C) and can be set within the range: -40°C to 240°C, in 0.1°C steps. NOTE: the thresholds of the 4-20 mA (I41 and I51) Current Loop input are given in percentage form and can be set within the range: 0% to 100 %, in 0.1% steps (each step equivalent to 0.016 µA)	200 °C (I42, I43, I44, I52, I53, I54) / 50 % (I41, I51)
<i>Threshold A hysteresis</i>	Hysteresis value, valid for quitting the alarm condition if the set Threshold A alarm threshold has been exceeded. The hysteresis parameter only allows positive values. The trip unit decides whether to add or subtract this value to or from the alarm threshold on the basis of the direction parameter, example: • <i>Direction</i> = Up, <i>Value</i> = 200°C, <i>hysteresis</i> = 10°C, the alarm activates over 200° and de-activates below 190°C The value is expressed in degrees Celsius (°C) and can be set within the range: 0°C to 50°C with 0.1°C steps. NOTE: the thresholds associated with the 4-20 mA (I41 and I51) Current Loop input are given in percentage form and can be set within the range 0% to 30 %, in 0.1% steps (each step equivalent to 0.016 µA)	1 °C (I42, I43, I44, I52, I53, I54) / 1 % (I41, I51)

States and alarms

The state of all control thresholds can be checked in the *Warnings/Alarms* page

15 - Ekip Signalling 10K



Ekip Signalling 10K is an external accessory signaling module. It can be installed on a standard 35 mm DIN rail (DIN EN 50022 type TS 35x15 mm).

This module has:

- Ten programmable output contacts
- Ten or eleven programmable digital inputs
- One power led and twenty-one signaling leds (one for each input/output)

The module can be set in four different configurations

- One in case of connection to a Link bus network
- Three configurations in case of connection via Local Bus (to allow up to three modules to be connected to the same trip unit)

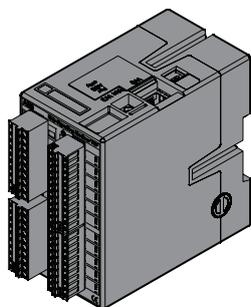
The module can be supplied by 110...240 V AC / DC or 24...48 V DC.

Further details about *Ekip Signalling 10K* are available in ABB Library, especially in document [1SDH001318R0002](#).



IMPORTANT: make sure that you have read the recommendations concerning safety and prevention of unauthorized access.

16 - Ekip Signalling Modbus TCP



Ekip Signalling Modbus TCP is an external accessory module. It can be installed on a standard 35 mm DIN rail (DIN EN 50022 type TS 35 x 15 mm).

Its function is to share on another Ethernet network with communication protocol.

The module has 11 digital inputs and 10 output contacts:

- The inputs allow the state of the devices and other information to be monitored
- The outputs allow the circuit-breakers to be operated.

Each input and output is associated with a state LED.

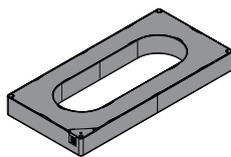
The module can operate in three modes:

Mode	Characteristics
CB Supervisor	The module can be associated with a single circuit-breaker, which can be selected from a list. Configuration of the inputs and output is pre-defined
Multi MCCB Supervisor	The module can be associated with up to five circuit-breakers. Configuration of the inputs and output is pre-defined.  NOTE: mode available with moulded-case circuit-breakers
Free I/O	The inputs and outputs can be fully configured by the user

The module can be supplied by 110...240 V AC / DC or 24...48 V DC.

Further details about *Ekip Signalling Modbus TCP* are available in ABB Library, especially in document [1SDH001456R0002](#).

17 - Rc Toroid



Rc is an external residual current sensor which can be installed in Ekip UP+ Trip units equipped with *Rc Rating Plug*.

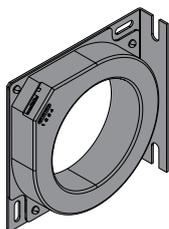
When Ekip UP+ is being programmed, check in the *Settings-Circuit breaker-Earth protection* menu to make sure that the toroid is present (page 44), the configuration menu of the Rc protection parameters must be activated in the *Advanced* menu (page 42).



IMPORTANT: the toroid can be chosen as an alternative to the S.G.R. one: protections Gext, MDGF and Rc are alternatives to each other

Further details about the *Rc toroid* connection are available in ABB Library, especially in document [1SDH001000R0521](#).

18 - S.G.R. Toroid



S.G.R. or *Source Ground Return* is an external single-pole current sensor available for LSIG version Ekip UP+ Trip units.

When Ekip UP+ is being programmed, check in the *Settings-Circuit breaker-Earth protection* menu to make sure that the toroid is present (page 44), the configuration menu of the Gext protection parameters must be activated in the *Advanced* menu (page 42).

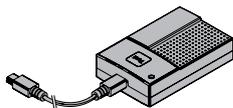


IMPORTANT: the toroid can be chosen as an alternative to the Rc one; protections Gext, MDGF and Rc are alternatives to each other

Further details about the *S.G.R. toroid* connection are available in ABB Library, especially in document [1SDH001000R0507](#).

19 - Testing and Programming

Ekip TT



Ekip TT is a supply accessory and is useful for accessing Ekip UP⁺ in the absence of auxiliary power supply; the unit allows:

- Ekip UP⁺ to be supplied and the tripped protection to be displayed, in the event of a TRIP and absence of auxiliary voltage
- the protections and certain parameters to be set before installation in the system



IMPORTANT:

- Ekip TT can also be connected to Ekip UP⁺ **when in service**.
- **Ekip TT only supplies the Trip unit: the presence of an auxiliary supply is required in order to set and display the information about the electronic accessories**

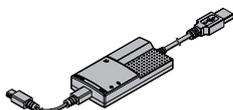
Ekip TT is connected to the service connector of Ekip UP⁺ by means of the supplied cable.

To switch on the module, set the side switch to the ON position and check the status of the led:

- if green, proceed with the required reading and configuring operations
- if red, replace the batteries of the device (three 1.5 V AA batteries)

Further details are available in ABB Library, especially in document [1SDH001000R0519](#)

Ekip Programming and Ekip T&P



Ekip Programming is a supply and communication accessory that is useful for:

- Ekip UP⁺ to be supplied and the tripped protection to be displayed, in the event of a TRIP and absence of auxiliary voltage
- the protections and certain parameters to be set before installation in the system
- with Ekip Connect software, accessing the programming, measuring pages and other exclusive functions (Datalogger, Dataviewer, Power Controller, Load Shedding, IPS, IEC 61850)
- with Ekip Connect software, accessing the programming, measuring pages and other exclusive functions (Datalogger, Dataviewer, IEC 61850)



IMPORTANT:

- Ekip Programming can also be connected to Ekip UP⁺ **when in service**
- **Ekip Programming only supplies the Trip unit: the presence of an auxiliary supply is required in order to set and display the information about the electronic accessories**

Ekip Programming connects to the USB port of the PC, from which it receives the power required to switch on and also supply Ekip UP⁺; connection to the service connector of Ekip UP⁺ must be made using the supplied cable.

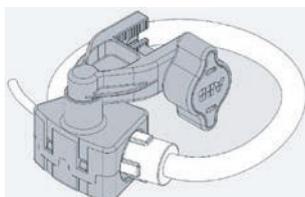
Ekip Programming has two leds, one green to indicate when the module is on, the other yellow to indicate when communication is activated.

Ekip T&P is a supply and communication accessory with the same characteristics as *Ekip Programming*, plus a further function:

- with Ekip Connect software, it enables access to the test pages

Mechanical accessories

1 - Sensor positioner

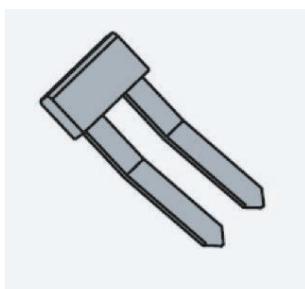


The sensor positioner helps to assemble type C sensors on the busbar in the correct way.

Each sensor positioner handles one single sensor.

- Sensor positioners are not part of the standard equipment supplied with Ekip UP+ but can be ordered by choosing them from the catalog.
- The catalog gives the characteristics of the accessory while instructions for installing it correctly are given on kit sheet 1SDH002004A1003.

2 - Current bridges (Type D)

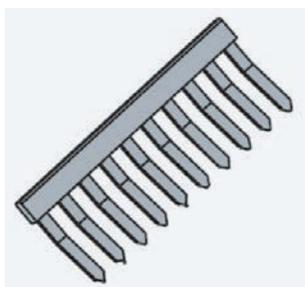


Current bridges set the current connector to safe conditions and ensure the unit functions properly when current measurement is not required.

Current bridges are not part of the standard equipment supplied with Ekip UP+ but can be ordered by choosing them from the catalog.

- Even when supplied with current bridges, Ekip UP+ is still programmed to support the presence of type C current sensors (120 mm), 3P configuration.
- The catalog gives the characteristics of the accessory while instructions for installing it correctly are given in Getting started 1SDH002004A1001.

3 - Voltage bridges



Voltage bridges set the voltage connector to safe conditions and ensure the unit functions properly when voltage measurement is not required.

The bridges are supplied with Ekip UP+. Instructions for installing them correctly are given in Getting Started 1SDH002004A1001.



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