

ABB Ekip UP

Switchgear digital unit for monitoring, protecting and controlling plant

Manual on use, installation, configuration and maintenance
for the installing technician and user



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Glossary and definitions

Term	Definition
Ekip UP	Switchgear digital unit for monitoring, protecting and controlling plant
Actuators	Electrical devices for opening/closing the main body (switch or circuit breaker): coils, motors, contactors, etc.
TRIP	Concluding action of protection timing, coincides with making an external contact to command opening of the main actuator.
Monitor, Protect, Protect+, Control, Control+	Ekip UP versions available

Table 1: glossary

Introduction

1 - Contents

- Overview** This manual describes the characteristics of Ekip UP, including:
1. general overview
 2. managing operations: receipt, commissioning, maintenance, disposal
 3. operating conditions
 4. consulting menu to modify parameters and view measurements
 5. accessories

- Recipients** In accordance with standard IEC 60050, this manual is aimed at two user profiles:
- expert persons, in electric environment (IEV 195-04-01): persons with sufficient training and experience to enable them to perceive the risks and avoid the hazards potentially created by electricity
 - persons trained in an electrical environment (IEV 195-04-02): persons suitably informed or supervised by electrical technicians to enable them to perceive the risks and avoid the hazards potentially created by electricity



IMPORTANT: in this manual the tasks are specifically indicated that can be performed by trained persons in an electrical environment. All the remaining tasks described in the manual must be performed by trained persons in an electrical environment.

ABB accepts no liability for damage to property or personal injury due to failure to comply with the instructions contained in this document.

- Distribution and organization of information** For optimum installation and configuration of Ekip UP in the plant, the following tasks should be performed in sequence, which are available and distributed in the technical product documentation (user manual, Getting Started and electrical diagrams):

Task	number	Document
1	Consult the safety notes	User Manual (page 9)
2	Check operating conditions	User Manual (page 14)
3	Check material received	User Manual (page 18)
3	Installation	Getting Started 1SDH002004A1001 and electrical diagrams for 1SDM000116R0001
4	Parameters configuration	User manual (from page 37)
5	Test and commissioning	Getting Started 1SDH002004A1001 and user manual (page 21)

Table 2: technical documentation

- Production notes** The information in this document have been written in Italian and has then been translated into other languages to meet legislative and/or commercial product needs.

Safety prescriptions



Figure 1: Safety prescriptions



HAZARD! ELECTRIC SHOCK RISK! In the case of persons who are not authorized to work on plants carrying live voltage in accordance with local legislation, in order to avoid any potential electrical risk during assembly, installation, maintenance or removal of the Ekip UP from service, disconnect or lock out all electrical supplies.



WARNING!

- Detailed descriptions of the standard installation, use and maintenance procedures and principles for operating in safety are not included: it is important to note that this document contains safety and caution indications against certain methods (of installation, use and maintenance) that could harm persons, damage devices or make them less safe.
- These warnings and alarms do not encompass all conceivable installation, use and maintenance methods recommended or not recommended by ABB that could be applied and possible consequences and complications of each conceivable method. Neither will ABB investigate all these methods.
- Anybody who uses maintenance procedures or devices, recommended by ABB or not has to check thoroughly that neither personal safety or safety devices are placed in danger by the installation method, use, maintenance or by the instruments used; for further information, explanations or specific problems contact the nearest ABB.
- This manual has been written only for qualified persons and is not to be intended as a substitute for a suitable course or experience with the safety procedures for this device.
- For products provided with communication, the purchaser, the installer or the final customer are responsible for applying all the IT security measures to prevent risks arising from the connection to communications networks; these risks comprise amongst other things the use of the product by unauthorized persons, the alterations of its normal operation, access to and modification of information.
- The purchaser, the installer or the final customer and person responsible for ensuring that safety warnings and notices are displayed and also that all the access points and operating devices are safely locked when the switchgear is left unattended even momentarily.
- All the information contained in this document is based on the latest information available at the moment of publication. We reserve the right to modify the document at any moment without prior notice.

Warnings



WARNING! READ THE FOLLOWING MANUAL CAREFULLY BEFORE INSTALLING OR WORKING ON Ekip UP

- Keep this manual carefully with all the other available documents, including: Getting Started for first installation, electrical diagrams, drawings and any descriptive notes.
- Keep these documents available during the Ekip UP installation, operating and maintenance step to facilitate the following operations.
- Install the unit in compliance with the environmental, electrical and mechanical limits described in the product documentation.
- Ekip UP has been designed to operate with voltage and current values within the rated limits: do not install in systems that work at values that exceed these rated limits.
- Follow the safety procedures set by your company.
- Do not open lids or doors, do not work on devices before disconnecting all circuits and checking that they are disconnected with a measuring instrument.

General view of Ekip UP

3 - Main features

Versions and general functions

Ekip UP is a switchgear digital unit for monitoring, protection and controlling the performance of the plant, available in five versions:

Version	Measurements	Openings history	Basic protections	Plus protections	Power Controller
1. Monitor	☑				
2. Protect	☑	☑	☑		
3. Protect+	☑	☑	☑	☑	
4. Control	☑				☑
5. Control+	☑	☑	☑	☑	☑

Table 3: versions

All the Ekip UP versions can be fitted on a DIN 35mm guide or have a door and have been developed to work in specific conditions (page 14).

Measurements



All the Ekip UP versions carry out the following measurements:

- instantaneous, minimum and maximum phase and internal earth fault currents
- instant, minimum and maximum network voltage and phase voltage
- active, reactive and apparent power (total and phase)
- total active, reactive and apparent energy
- network frequency
- spike and power factor
- datalogger and waveform measurements
- measurements recording
- events log
- power quality

Ekip UP Protect, Protect+ and Control+ versions also show the openings history.

The description of all the measurements is available from page 46.

Protections



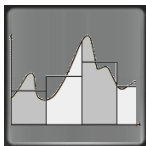
Ekip UP Protect, Protect+ and Control+ versions have the following protection functions:

Name	Protect	Protect+	Control+
Basic protections (L, S, I, G, IU, 2I, MCR, UV, OV, VU, UF, OF, RP, LC, Iw, Power Factor, Neutral)	☑	☑	☑
Plus protections (S2, D, UV2, OV2, UF2, OF2, S(V), RV, OP, OQ, UP, RQ, S2(V), ROCOF, Adaptive Protection)		☑	☑
Trip history	☑	☑	☑
Programmable status and functions	☑	☑	☑
Zone selectivity		☑	☑
Synchrocheck Protection (in the presence of <i>Ekip Synchrocheck</i>)	☑	☑	☑
Gext protection (in the presence of <i>S.G.R. sensor</i>)		☑	☑
RC Protection (in the presence of <i>RC toroid</i>)	☑	☑	☑

Table 4: protections

The description of all the protections is available from page 60.

Power Controller



Ekip UP Control and Control+ versions can be configured with the Power Controller function to optimize load management of its plant.

The description of the function is available from page 118 and dealt with fully in White Paper 1SDC007410G0201 “Managing loads with Ekip Power Controller for SACE Emax 2”.

Main connections

Ekip UP has a touchscreen display to access the menus for configuring and checking parameters, measurements, and information (page 29).

The Ekip UP supply is guaranteed by the *Ekip Supply* module (page 135), fitted to the upper terminal board, which also enables further modules to be connected (see following chapter).

On the terminal board the external connections of Ekip UP are also available:

- *Ekip Signalling 4K*, to manage programmable inputs/outputs (page 138)
- *Zone selectivity*, to manage trip signals between several devices (page 79-80)
- *External sensors for earth fault or residual current* (page 190)

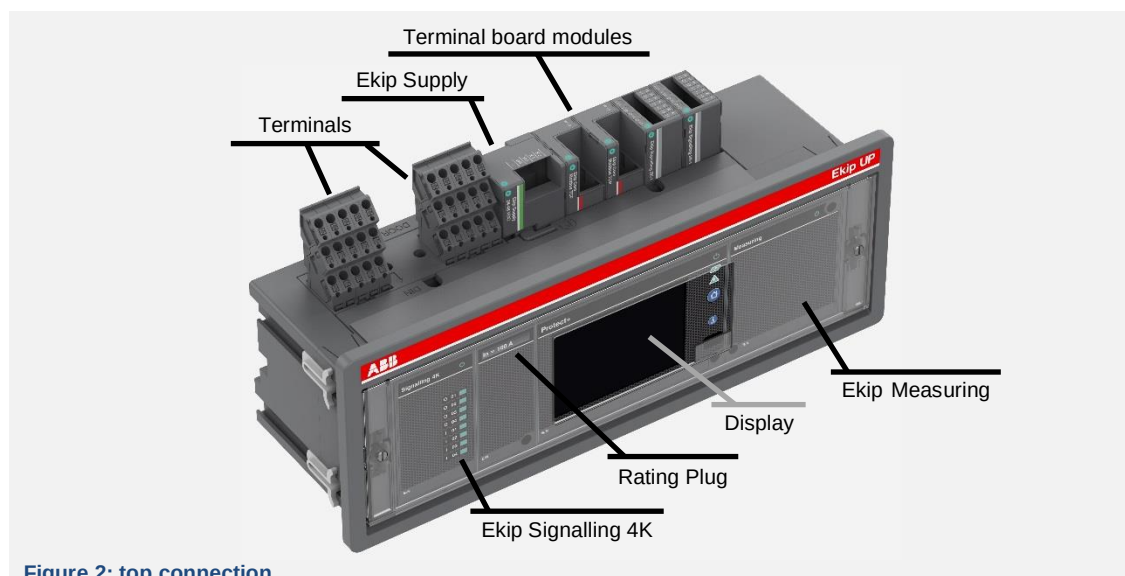


Figure 2: top connection

The measures can be taken by connecting Ekip UP to the plant lines:

- Current measurements: Ekip UP has to be connected to *current sensors*, which are available in various models (page 130), which are in turn installed on each phase; the rated unit current can be configured with the interchangeable *Rating Plug* module (page 134), placed next to the display.
- Voltage measurements Ekip UP can be connected to the main lines directly or with external transformers (page 140); voltage measuring is supported by the Ekip Measuring module (page 140).

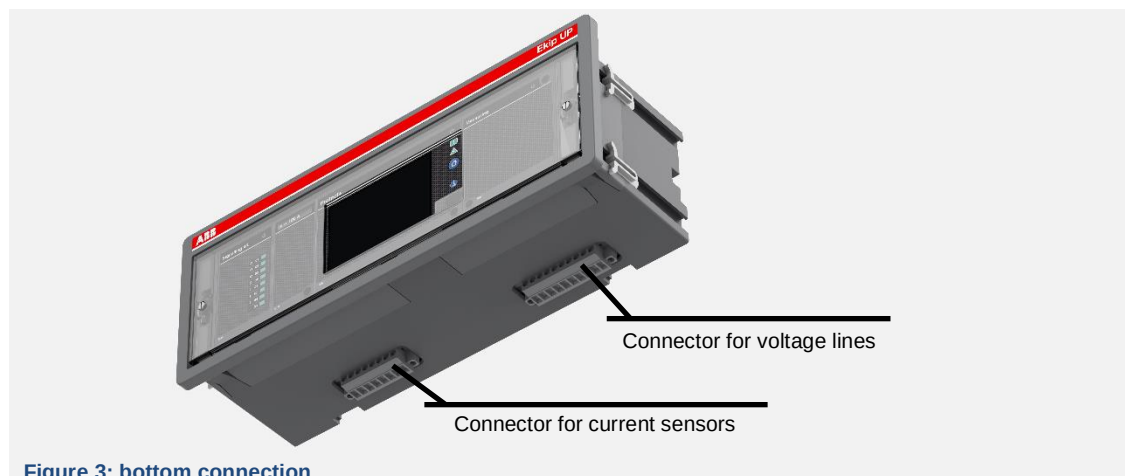
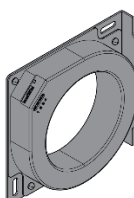
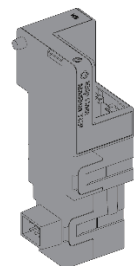
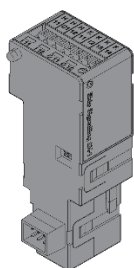


Figure 3: bottom connection

External accessories



Ekip UP can expand its functions with further external accessories and modules that differ according to the fitting function and position.

The modules available for higher terminal-box fitting of Ekip UP are:

Name	Function	Page
<i>Ekip Com</i>	Communication (various protocols)	141
<i>Ekip Link</i>	Communication with inner network with ABB proprietary protocol	166
<i>Ekip Signalling 2K</i>	Signalling with input/output	175
<i>Ekip Signalling 3T</i>	Signalling with analogic input	186
<i>Ekip Synchrocheck ⁽¹⁾</i>	Measurement of voltage and synchronism between two supply sources	179

Table 5: accessories 1

The external modules and accessories are:

Name	Function	Page
<i>Ekip Signalling 10K</i>	Signalling with input/output	186
<i>Ekip Signalling TCP Modbus</i>	Remote control and command	189
<i>S.G.R. Sensor ⁽¹⁾</i>	Protection from earth fault currents	190
<i>Toroid RC⁽¹⁾</i>	Protection from residual currents	190

Table 6: accessories 2

The supervision, configuration and reporting functions are also guaranteed by further modules for temporary supply and communication:

Name	Function	Page
<i>Ekip TT</i>	Supply and test	191
<i>Ekip T&P</i>	Supply, communication and test	
<i>Ekip Programming</i>	Supply, communication and programming	

Table 7: accessories 3

To support the measurement functions, there are some mechanical accessories:

Name	Function	Page
<i>Positioning device</i>	Positioning device for type C current sensors	192
<i>insertion bridges for current</i>	Insertion bridges for current sockets	
<i>insertion bridges for voltages</i>	Insertion bridges for voltages sockets	

Table 8: accessories 4



(1): the Ekip Synchrocheck module and the S.G.R and RC outer sensors are available with the Ekip UP Protect, Protect+ and Control+ versions

Additional functions

Ekip UP in the Protect, Protect+ and Control+ versions can be equipped with further software configurations compliant with different functional applications

- Load Shedding
- Automatic Transfer Switch

For details, see Technical Catalogue 1SDC001051D0201 or the specific white papers on each function (see page 13).

Support software and documents



Different software and documents are available, most of which are free of download on ABB Library website, to facilitate, optimize and extend functions and configure Ekip UP in its plant:



NOTE: some of the documents specified in the table that follows refer to the device SACE Emax 2, whose electronic platform Ekip UP shares.

Name ⁽¹⁾	Code	Description
Catalogue	1SDC001051D0201	Ekip UP General Catalogue
e-Configure	--	On-line tool for configuration and ordering
Ekip Connect 2 / Ekip Connect 3	--	ABB Software for interfacing with Ekip UP and other low-voltage devices, available in the versione 2 and 3
e-Design	--	ABB software suite that comprises the following instruments: • <i>DOC</i>, to design single-line diagrams of low and medium voltage electrical installations, choose the operating and protection device and check and coordinate protections. • <i>CAT</i>, for technical/commercial quotations for ABB products. • <i>Curves</i> for drawing, calibrating and printing tripping curves of the protection devices • <i>OTC</i>, to check the thermal behaviour of the switchgears and size fans and air conditioners of the switchgear. • <i>UniSec</i> for configuring medium voltage switchgears
Ekip Link	1SDC200031L0202	Introducing <i>Ekip Link</i> switchgear control system
Network Analyzer	1SDC210106D0201 1SDC200037L0901	Product note Network Analyzer Introducing <i>Network Analyzer</i> measuring and analysis system
Power Controller	1SDC007410G0202	detailed document (White Paper) of the <i>Power Controller</i> function.
Adaptive protections	1SDC007116G0201	White paper on adaptive protections
Load Shedding	1SDC210105D0201 1SDC007119G0201	Product note <i>Load Shedding</i> White Paper <i>Load Shedding</i> - Priorità distacco carichi
Generator Protections and synchronizing	1SDC210108D0201 1SDC007409G0901	Product note on generator protection and synchronizing White Paper on generator protections
Comunicazione	1SDC007412G0202	White paper comunicazione
Ekip Signalling 3T	1SDC210109D0201	Product note <i>Ekip Signalling 3T</i>
Handbook	1SDC010002D0206	General overview of the electrical installations

Table 9: supporting software and documentation



(1): each name or code on table has link that, when connected to an Internet network, directly opens the document described

4 - Operating conditions

Introduction Ekip UP has been developed and certified to work in specific environmental, electrical and mechanical conditions set out below.

- Standards** Ekip UP and their accessories conform to international 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), except for *Ekip Synchrocheck* and *Ekip Signalling 2K* conform to UL1066
 - DNV-GL (type approval certificate)
 - RINA (type approval certificate)

They conform to the following directives:

- CE "Low Voltage Directives" (LVD) 2014/35/EU
- CE "Electromagnetic Compatibility Directive" (EMC) 2014/30/EU
- UL and cULus

Warnings and precautions before installation



WARNING! Before carrying out installation, make sure that:

- Ekip UP is disconnected from all sources of energy
- all environmental, electrical and mechanical operating conditions are complied with.



IMPORTANT: persons trained in installing the Ekip UP and accessories must use the appropriate safety equipment.

Overall dimensions and weights

Ekip UP can be fitted to a 35 mm DIN guide or door; the overall dimensions in both configurations can be found in the file on the ABB website ([LINK](#)); the file contains the following drawings:

- Drawing 1: overall Ekip UP dimensions together with terminals and modules if fitting to DIN guide and door; door dimensions
- Drawing 2: overall dimensions of the current sensors, in all the set types

The overall dimensions of Ekip UP with modules and terminals fitted are approximately:

Fitting	Overall Dimensions (L x H x D)
DIN Guide	~ 296 mm x ~ 135 mm x ~ 95 mm
Door	~ 296 mm x ~ 135 mm x ~ 95 mm 86.2 mm x 282.4 mm x ≥ 2 mm (dimensions of hole of the door)

Table 10: dimension

Ekip UP with modules weighs ~ 1 kg.

Environmental conditions

Fit the switch in a dry environment without dust or corrosive acids and in such a way that it is not subject to blows or vibrations.

If this is not possible, fit the device by protecting it suitably.

IP Protection Class

Ekip UP ensures an IP 40 protection class. Nevertheless, Ekip UP should be installed in a properly ventilated switchgear in which penetration by dust is reduced.



NOTE: IP protection class guaranteed by transparent cover fitted to Ekip UP

Operating and storage temperatures The operating features of Ekip UP and accessories are guaranteed with ambient temperature between -25 °C and +70 °C (+60 °C in application compliant to UL standard)

Depending by type, the current sensors guarantee a correct working in different ambient temperature:

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

Store Ekip UP in a dry dust-free environment that is devoid of corrosive chemical agents; the ambient storage temperatures must be ensured, with Ekip UP in the original packaging, between -40 °C and +70 °C.

Particular atmospheric conditions Ekip UP can operate in particularly difficult industrial atmospheres. It has been tested in accordance with:

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

Mechanical vibrations Ekip UP complies with the following mechanical compatibility standards and classes.

- IEC 60255-21 class 1 (vibrations, shocks and blows), with DIN guide assembly
- IEC 60255-21 class 2 (vibrations, shocks and blows), with door assembly

Altitude Ekip UP maintains its rated operating features up to 2000 m above sea level.

Above this height, the fall in dielectric strength and the diminished refrigerating power of the air must be considered (contact ABB for evaluation of details)

Electromagnetic compatibility The use of specific devices in industrial installations can cause electromagnetic disturbances to the electrical plant; Ekip UP conforms to Directive 2014/30/EU and to the standards:

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

 **WARNING! Full electromagnetic compatibility in accordance with IEC 60255-26 is ensured by connecting Ekip UP and Ekip Supply to an ABB model CP-D 24/1,3 feeder.**

Electrical specifications Correct operation of Ekip UP is ensured by primary currents and voltages within well-defined ranges and characteristics:

Parameter	Operating limits
Primary current	0.03 - 16 In ⁽¹⁾
Primary voltage	0 - 1150 VAC ⁽²⁾
Rated frequency	50 / 60 Hz ±10 %

Table 11: Electrical specifications

 **NOTES:**

(1) range refers to each phase. In refers to the rated size defined by the Rating Plug fitted to the Ekip UP, which is available in 100 A to 6300 A models

(2) up to 690 VAC is possible to connected directly the voltages to the device; for higher voltages, external transformers have to be used, see chapter dedicated to Ekip Measuring module on page 140

Auxiliary supply Ekip Supply, supplied as standard with Ekip UP, to enable the unit to be supplied and the terminal board modules to be connected; see the dedicated chapter on page 135 for functioning details.

Dielectric strength and insulation resistance

Ekip UP conforms to directive 2014/30/EU and to the standards:

- IEC 61010-1
- IEC 60255-27
- UL 508

Type of strength and resistance	Voltage sockets	Auxiliary supply	Com Modules	I/O Modules
Continuous	3 kV ⁽¹⁾ / 1.5 kV ⁽²⁾	2 kV ⁽³⁾ / 500 V ⁽⁴⁾	500 V	1.5 kV
Pulsed	5 kV ⁽¹⁾ / 2.2 kV ⁽²⁾	5 kV ⁽³⁾ / 1 kV ⁽⁴⁾	1 kV	

Table 12: Dielectric strength and insulation resistance



NOTES:

- (1) voltage sockets with external transformer conforming to Ekip UP, see page 136 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 general line 24 48 VDC

The voltage sockets ensure (with transformer) the following degree of insulation: >100 MΩ @ 500 VDC.

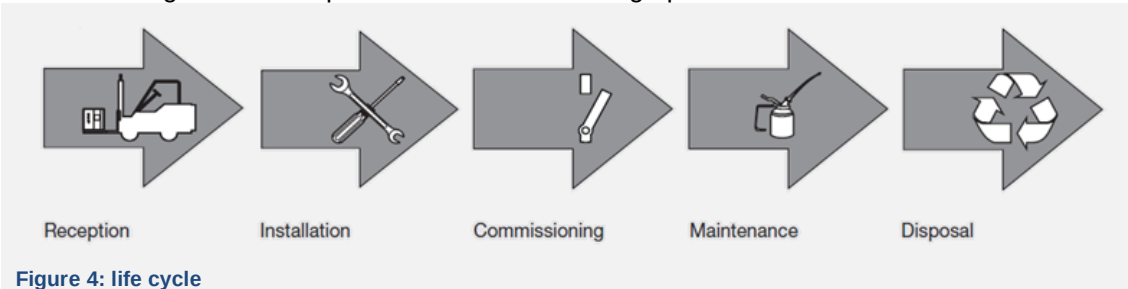
Safety

Ekip UP conforms to directive 2014/35/EU and to the standards:

- IEC 61010-1
 - IEC 60255-27
 - UL 508
-

Startup and management operations

Life cycle Correct management of Ekip UP involves the following operations:



Operation	Description	Page
Receipt	Unpacking and checking of received material	18
Installation	Assembly operations	20
Commissioning	General checks prior to startup	21
Maintenance and faults	Periodical checks and cleaning, managing alarms or faults	23
Decommissioning	End-of-life treatment and disposal	28

Table 13: life cycle

5 - Receipt

Introduction Every Ekip UP ordered is supplied with the following packing

- main packing with Ekip UP, terminal board modules and current sensors (if foresee type B, C and D)
- packing with current sensors type A, if foresee
- packing of external accessories modules not mounted on terminal box, if specified in order

The packings are listed ISTA® and have following dimensions:

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

Identifying and checking packing

Examine the status of the packing and check that:

- the information on each packing tag matches the information in the order
- the boxes are undamaged and completely closed

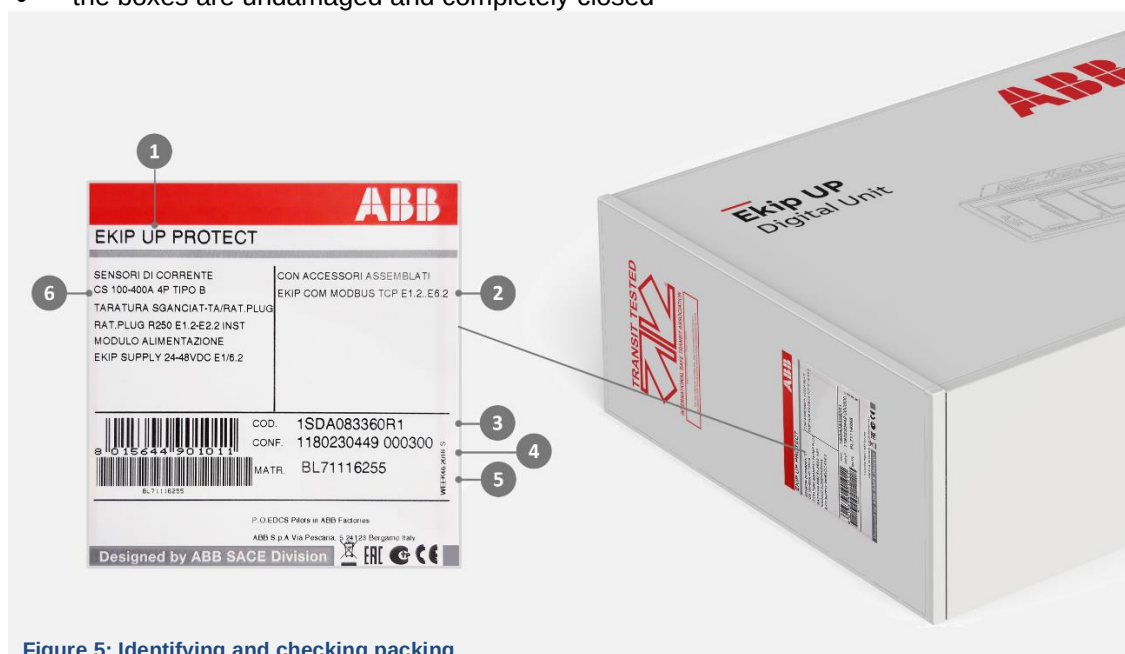


Figure 5: Identifying and checking packing

Pos.	Description
1	Short description of model
2	Description of possible accessories
3	Commercial code
4	Confirmation number
5	Ekip UP serial number
6	Ekip UP characteristics

Table 14: packing

Opening packing

1. Open the box.



Figure 6: opening 1



Figure 7: opening 2

2. Remove upper containing protection.



Figure 8: opening 3



NOTE: For disposal of the packing, see "Decommissioning" on page 28

Check of material

Examine the state of the material received and check that it matches the purchase order and is completely undamaged, in particular, check: Ekip UP version, *Rating Plug* size, terminal block modules, model and quantity of current sensors.



IMPORTANT: also check the material before storage

The other accessories ordered with Ekip UP are supplied in their respective packing: check the accompanying documentation for each product to conform that the version and contents are correct.

Reporting damage or consistency

If upon receipt damage to the packing or inconsistencies between the order and the tags identifying the product or the product itself are detected, contact ABB; ABB must be alerted within seven days of receipt of the material.



NOTE: quote the *Packing List* number (displayed on the packaging) and the product serial number.

6 - Installation

Getting Started Getting Started 1SDH002004A1001 and the kit sheet 1SDH002004A1002, accompanying the device packing and available on the ABB website, the main Ekip UP installation operations:

Type of operation	Operation described
Mechanical configuration	1. Fitting the mechanical polarizer of the terminals, according to the configuration prescribed for the device (DIN guide or door front)
	2. Fitting the hooks and the door locks, on the basis of the configuration prescribed for the device (DIN guide or door front)
	3. Connection of the terminals for external connections
Main connections	4. Connection of current sensors to the busbars in the switchgear and to Ekip UP
	5. Connection of primary voltages to Ekip UP
Accessories connection	6. Terminal board modules connection: Ekip Supply and accessories modules (<i>Ekip Com</i> , <i>Ekip Signalling 2k</i> , <i>Ekip Synchrocheck</i>)
	7. Connection of <i>Ekip Signalling 4K</i> switch/circuit breaker module in the versions in which there is the connection
SW configuration and checks	8. Main parameters configuration (wizard)
	9. Alarms check
Test	10. Trip test instructions

Table 15: installation (getting started)



NOTE:

- for each connection detail, see the electrical diagram 1SDM000116R0001
- the connection of the external accessories is shown on the kit sheets of the respective devices
- the Wizard window shows the main parameters: a complete overview of all the available device options is given in this document
- the test is available for the versions that involve the external trip connection; consult the electrical diagram 1SDM000116R0001 for connection details

The commissioning is also supported by a multimedia video ([LINK](#)).

Further device checking indications are set out in this document, in the chapters “Commissioning” on page 21 and “Maintenance and fault identification” on page 23.

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

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



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

7 - Commissioning

General checks In addition to the steps indicated in Getting Started, before commissioning, further supplementary checks must be carried out on the device and environment in which it is installed:

Points to be checked	Checks
Switchgear	1. Sufficient to change air to avoid overheating
	2. Clean plate free of installation waste (e.g: cables, tools, metal pieces, etc...)
	3. Ekip UP fitted correctly, as shown in Getting Started
	4. Environmental installation conditions conform to what is indicated in the chapter "Environmental conditions" on page 14
Main connections	1. Connections and direction of the current sensors correct
	2. Connections and socket tightening of voltage correct
	3. Earth connections correct
	4. Connection to Ekip Supply supply/module correct
Ekip UP alarms	If not supplied, connect the <i>Ekip TT</i> to Ekip UP and check that there are no alarms (details on page 24)
Parameters	Configure all the unit parameters appropriately

Table 16: General checks

Check accessories This check of any external accessories must be carried out before commissioning :



NOTE: some checks are available for specific versions:

- Zone selectivity: with Ekip UP Protect+ and Control+ version
- Opening and closing actuators, Switch status: with Ekip UP Protect, Protect+ and Control+ version

Accessories	Checks
Modules (terminal board and externals)	1. Check connection to Ekip Supply and connection of mechanical seat to terminal board
	2. Supply the auxiliary supply to Ekip UP (and to the module to if there is a separate supply)
	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 switched on like the power LED of Ekip UP (fixed or synchronous beam)
	5. Check the presence of the module in the <i>About-Modules</i> menu and that there are no alarms.
Homopolar and residual current sensors	1. Check correct connection to the terminal board
	2. Supply the auxiliary supply to Ekip UP
	3. Set size and protection parameters (<i>Settings-Digital Unit</i> menu)
	4. Check for absence of alarms

Table 17: Check accessories 1

Check
accessories [2]

Accessories	Checks
Zone selectivity	1. Make sure that the selectivity connections (between Ekip UP and the other units) match electrical diagrams for 1SDM000116R0001
	2. Supply the auxiliary supply to Ekip UP and make sure that the status of the actuator connected to the unit is OPEN
	3. Check that the protection of the selectivity concerned has been enabled (e.g.: protection S)
	4. Select the <i>Test-Zone Selectivity</i> menu and the submenu of the protection concerned; for each activated protection, repeat points 5, 6, 7 and 8
	 NOTE: for selectivity D, consider submenu S for Forward connections and G for Backward connections
	Output: 5. Select the <i>Force Output</i> command; on the unit connected to the Ekip UP output, check that its <i>Input</i> status is ON 6. Select <i>Release Output</i> ; check that the <i>Input</i> status is OFF Input: 7. Select on the unit connected to the input of Ekip UP the command <i>Force Output</i> ; check on Ekip UP that its <i>Input</i> status is ON 8. Select <i>Release Output</i> , check on Ekip UP that its <i>Input</i> status is OFF
Ekip Signalling 4K	 IMPORTANT: unlike the other tests, to optimize the check and prevent undesired activation of external members, the proposed test procedure for Ekip Signalling 4K is run with the following test connections:
	1. Connect K7, K8, K9 and K10 to the three HC contacts
	2. Connect K3, K4, K5 and K6 respectively to H1, H2, H3 and H4
	3. Supply the auxiliary supply to Ekip UP.
Opening and closing actuators	4. Select the menu <i>Test-Ekip Signalling 4K</i> and the <i>Auto Test</i> command: check all the output/input pairs in sequence (O 01 and I 01; O 02 and I 02; O 03 and I 03; O 04 and I 04).
	1. Connect the opening and closing actuators of the switch/circuit breaker to Ekip UP (see electrical diagram 1SDM000116R0001)
	2. Place switch/circuit breaker in closed position
	3. Supply the auxiliary supply to Ekip UP and rated voltage to the adjusters
	4. Run an opening test from menu (<i>Test-Test Protection, Open Unit command</i>) and check that the controlled device has switched.
Switch status inputs	5. Repeat the test by running the close command (<i>Close Unit</i>)
	1. Check that the status of the switch/circuit breaker connected to Ekip UP is read correctly (<i>About-Digital Unit</i> menu)
	2. Switch the status of the device and check the correct reading of the status change on Ekip UP (<i>About-Digital Unit</i> menu)

Table 18: Check accessories 2

8 - Maintenance and fault identification

Introduction Correct maintenance of the unit and the connected devices allow its long-term working efficiency to be maintained.

Maintenance operations must be performed by expert persons (see “Recipients” on page 8) in compliance with safety standards (see “Safety prescriptions” on page 9) and in the maintenance programme.

If there are anomalies or faults, the cause must be identified and eliminated before the unit is started up.



WARNING! Before checks, disconnect voltage supply to the auxiliary circuits

Checks and general cleaning

Carry out the following checks

1. Check that Ekip UP is clean and if necessary remove any dust or traces of other materials dry and clean cloths (non-corrosive detergent may be used; in the event of excessive deposits, a diluent like Henkel 273471 or Chemma 018 or equivalent can be used).
2. Check that there are no foreign bodies near the connectors or terminals.

Ekip UP control

Run the checks set out in the chapter “Commissioning” on page 21, to supplement the check of the status of the cables and of the accessory modules:

- check alarms
- check presence and connection of the modules (terminal board and externals)
- check Ekip Signalling 4K module
- check zone selectivity connections
- check opening and closing actuators
- check switch status



NOTE: the limits and notes set out for each point in the respective paragraphs must be complied with

Maintenance programme

The Ekip UP maintenance programme prescribes different frequencies for the maintenance tasks that depend on the installation environment:

Version	Maintenance frequency in standard environments	Maintenance frequency in dusty environments (measured dusts level > 1mg/m ³)
Monitor, Control	Yearly	Every six months
Protect, Protect+, Control+	Once a year or after a short circuit trip	Every six months or after a short circuit trip

Table 19: Maintenance programme

Display alarms and suggestions

Here is a list of anomalies that can be detected from a Ekip UP display and suggestions for solving them (in alphabetical order):

Message	Suggestions
Numerical alarm (e.g. 30002)	Internal error. For this type of error contact ABB
Configuration	Check there are these working conditions: • <i>Rating plug</i> model compatible with Ekip UP • If present, protection parameters not in conflict with the current size of the unit (see "Protections" on page 60) • Threshold I4 and/or I41 > 100 A in absence of <i>Vaux</i> • Time t4 and/or t41 > 100 ms in absence of <i>Vaux</i> • With RC protection active, there's <i>Rating Plug</i> RC type
Configuration session	TFTP server enabled and/or configuration session open on the <i>Ekip Com IEC61850</i> or <i>Ekip Com Hub</i> module.
Ekip Com Hub	Problem of the <i>Ekip Com Hub</i> module with: certificates, connected devices, missing Com modules (RTU or with Ethernet connection), API TLS device, Hub events, parser configuration
Ekip Installation	Installation error between HMI and Mainboard devices; for this type of error contact ABB
Ekip Link Bus	Malfunction of the <i>Ekip Link</i> module: check for loss of connection with one or more actors
Ekip Signalling 3T	Connection alarm of one or more analog inputs to the Ekip Signaling 3T module
Ethernet disconnected	External cable missing on one or more <i>Ekip Com</i> modules equipped with Ethernet connection
Gext sensor	Check connection and status of current sensor
Inst. Rating Plug	Install <i>Rating Plug</i> (<i>Settings- Digital Unit-Installation-Rating Plug-Install</i> menu) and if there are further glitches, check the connection
Internal error	Internal error. For this type of error contact ABB
Invalid date	Set date and time (menus <i>Settings-System-Date and -Time</i>)
IEEE1588 synch	Synchronization problem of the IEEE 1588 synchronization module
Local Bus	Unit turned on with auxiliary power supply, Local Bus parameter enabled but connection to modules not present, incorrect, or communication lost (for more than five seconds). Check: • connection and startup of the terminal or external modules • that the connected modules are compatible with Ekip UP • that the Local Bus parameter is: ON (see page 40)
Low battery	Replace the battery (see kit sheet 1SDH002004A1001)  WARNING! battery may explode if mistreated; do not recharge, disassemble or dispose of in fire. Replace battery with CR2450HR, use of another battery may present a risk of fire or explosion.
MAC address	<i>Ekip Com</i> module with wrong/unacceptable MAC address detected
Maintenance	Maintenance alarm: check if the set maintenance interval has been reached
Measuring Error	Module parameter reading error, contact ABB
PC Pot.	The average power limit set for the Power Controller has been exceeded
Rating plug	<i>Rating Plug</i> missing or size not compatible with Ekip UP parameters
Sensor L1/L2/L3/Ne	Check the current sensors, the status of the terminal and the connecting cables to Ekip UP
SNTP error	Malfunction with <i>Ekip Com</i> modules: synchronization problem of the SNTP synchronization module

Table 20: Display alarms 1

Display alarms and suggestions [2]

Message	Suggestions
Switchboard Actor communication Error	Check configuration and connection of the <i>Ekip Link</i> modules
Software Not Compatible	The software versions of main board (<i>Mainboard</i>) and display (<i>Ekip UP</i>) are not mutually compatible: to restore compatibility, please contact ABB  NOTE: <i>Modifying any of the parameters is inhibited by the display; if the protections L, I and linst are present they are active and operating with the parameters preceding the appearance of the alarm (if the display has been replaced, the parameters of the preceding unit are active)</i>
Trip fail command (BF)	Failed opening of the actuator and / or current still present after a TRIP command: check for other alarms, connection status, actuators and status contacts
Unit not defined	Check signalling contacts of switch status
Zone Selectivity Diag	Error in zone selectivity connections (Selectivity Hardware)

Table 21: Display alarms 2

Protections

In the event of alarms for protections or measurements the related alerts are displayed (in alphabetical order):

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

Table 22: Display alarms 3

Anomalies, causes and troubleshooting

A list of possible anomalous situations, their possible causes and suggestions for solving them follow.



NOTE: before consulting the table, check the error messages on the display; if the given suggestions do not solve the problem, contact the ABB assistance service, providing if possible the report produced by the Ekip Connect software.

Anomaly	Possible causes	Suggestions
The switch/circuit breaker does not react to the open/close command from Ekip UP	The connections or the supplies of the opening/closing actuators are not correct	Check connections and supplies
	Absence of auxiliary supply on Ekip UP	Check supply and status of power LED
	The switch or circuit breaker is in a condition that does not permit the selected command	Check the switch/circuit breaker documentation and the cases that do not allow the command to be run.
Display switched off	No auxiliary supply	Correct operating condition
	Temperature outside range	Correct operating condition
No current reading	Current below minimum displayable threshold	Correct operating condition
Incorrect voltage, power and $\cos \varphi$ readings	Incorrect connection between isolation transformer and <i>Ekip Measuring</i>	Check connections between the isolation transformer and <i>Ekip Measuring</i>
	Incorrect setting of <i>Rated voltage parameter</i>	Set correct parameters
Password not required	The password has been disabled or already inserted into the same programming session	Correct operating condition: consult the chapter on the password (page45)
Wrong Password	Incorrect or lost password	Consult document 1SDH001501R0001 or contact ABB

Table 23: Anomalies, causes 1

**Anomalies,
causes and
troubleshooting
for protection**

Some valid cases for Ekip UP Protect, Protect+, Control+ versions for problems for trip protections:

Anomaly	Possible causes	Suggestions
The expected trip did not occur	Trip overridden	Correct operating condition; enable trip if necessary
Trip times shorter than expected	Incorrect threshold or curve selected	Correct threshold and/or curve
	Thermal memory ON	Exclude if not necessary
	Selectivity of zone ON	Exclude if not necessary
	Incorrect neutral selection	Correct neutral selection
Trip times longer than expected	Incorrect threshold or curve selected	Correct threshold and/or curve
	Incorrect neutral selection	Correct neutral selection
Rapid trip with I3=Off	Linst trip	Correct operating condition with high-current short circuit
High earth current, but not trip	Incorrect sensor selection	Set inner or outer sensor
	Function G inhibited by high current	Correct operating condition (see cases in the chapter describing protection)
TRIP failure report: Trip Fail command (BF)	One or more of the following conditions: - Actuator not working - non-functioning status contacts - wiring problems	1. If closed, manually control the actuator opening and check its status change. 2. Press iTest on Ekip UP, check the disappearance of the message on the display and the general status of the alarms. 3. Check the condition of the wiring and status contacts 4. In safety conditions, close the actuator and perform a trip test from Ekip UP Contact ABB if there are problems

Table 24: Anomalies, causes 2

9 - Decommissioning

Introduction Decommissioning operations must be performed by expert persons (see “Recipients” on page 8) in compliance with safety standards (see “Safety prescriptions” on page 9) and the notes on treatment at the end of life and disposal set out below.



WARNING! Before decommissioning, disconnect and lock out auxiliary circuits.



NOTE: refer to the national regulations governing the decommissioning of the product if the decommissioning involves end-of-life treatment procedures other than those indicated

End-of-life treatment of materials

The materials used to make the Ekip UP units can be recycled and must be sorted into categories as shown in the following table:

Type	Material
A	Plastic parts
B	Mechanical parts
C	Printed circuits
D	Current sensors and cables

Table 25: treatment of materials



NOTE: plastic parts of significant dimensions display marking showing the type of material.

Disposal of packing materials

The materials used for Ekip UP packing can be recycled and must be sorted into categories as shown in the following table:

Type	Material
A	Plastic parts
B	Cardboard parts

Table 26: Disposal of packing materials

Interface and menus

10 - Interface presentation

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

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

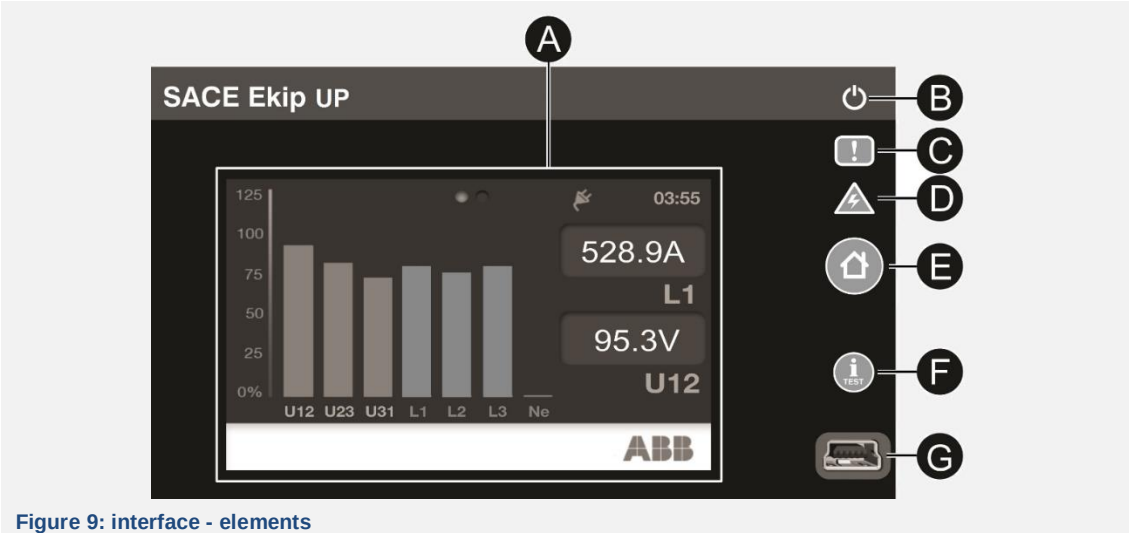
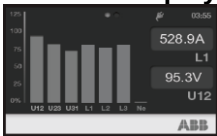


Figure 9: interface - elements

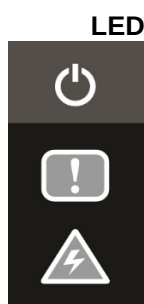
Pos.	Description
A	Single-touch colour display touchscreen
B	Power LED
C	Warning LED
D	LED Alarm
E	HOME pushbutton
F	iTEST pushbutton
G	Service connector

Table 27: interface elements

Display



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



LED	Colour	Description
Power 	Green	Indicates the status of Ekip UP: - off: no power supply and unit off. - on (steady beam or flashing): supply from Ekip Supply or from service connector present and powered-up unit Via Ekip Connect the <i>LED Alive</i> mode can be enabled that, with the unit switched on, starts the synchronized flashing of the power LEDs of Ekip UP and of some modules connected thereto; greater details in the chapter on the additional functions from Ekip Connect, page 125.
Warning 	Yellow	Reports the presence of some alarms: - off: no alarm - on with rapid flashing: installation error of <i>Rating Plug</i> or of the <i>Ekip Measuring module</i> - on with two fast flashes every 0.5 s: parameters error - on with steady beam: prealarm of protection L active or status contacts error
Alarm 	Red	Reports the presence of some alarms: - off: no alarm or error - on with fast flashing: disconnected current sensor or protection timing active - on with two fast flashes every 2 seconds: <i>Rating Plug</i> error - on with steady beam: protection TRIP signal

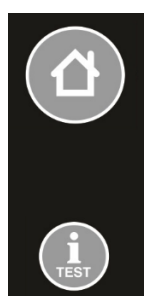
Table 28: led interface

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

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

These cases require the intervention of ABB.

Pushbuttons



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

Table 29: pushbutton interface

Service connector



The service connector enables Ekip UP to be connected to *Ekip TT*, *Ekip T&P* and *Ekip Programming*, with the possibility of a temporary supply to the unit, configuration of the parameters before commissioning, test, extension of the configuration functions.

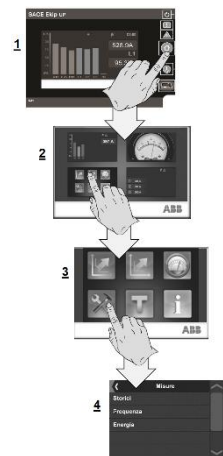


IMPORTANT: use only cables supplied by ABB or with ABB accessories

11 - Navigation

Levels and pages

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



Level and name	Description
1 HOME	This is the page that appears at startup if the Home pushbutton is pressed that is described on page 30; from which it is possible to: 1. access the <i>main page</i> (level 2), by pressing HOME 2. open the <i>Alarms List</i> page by selecting the diagnosis bar at the bottom Figure 10: menu level 1
2 MAIN PAGE	On this page, it is possible: 3. open one of the graph pages: <i>Histograms</i>, <i>Measuring Instruments</i> and <i>Measurements</i> 4. access the <i>menu area</i> (level 3) Figure 11: menu level 2

Table 30: menu levels 1

Levels and pages
[2]

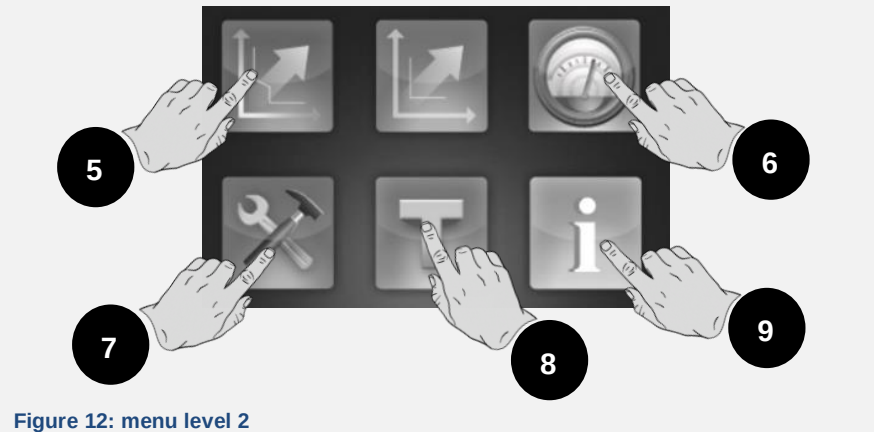
Level and name	Description
3 MENU AREA	On this page, it is possible access all the configuration menus and consult parameters available on the unit: 5. <i>Protections and Advanced</i> 6. <i>Measurements</i> 7. <i>Settings</i> 8. <i>Test</i> 9. <i>About</i>  Figure 12: menu level 2  NOTE: the availability of the menus depends on the Ekip UP version
4 MENUS and SUBMENUS	Selecting one of the level 3 menus opens a series of submenus with the list of available options, which develop at several levels up to the detail of the specific parameter. Each submenu has a control for returning to the previous menu (9); if the list exceeds the 5 options, a sliding bar (10) is also present for complete consultation.  Figure 13: menu level 3 To consult a parameter, just select it. To configure and save the parameters, just see the dedicated paragraph on page 43.

Table 31: menu levels 2

12 - Graphic pages

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

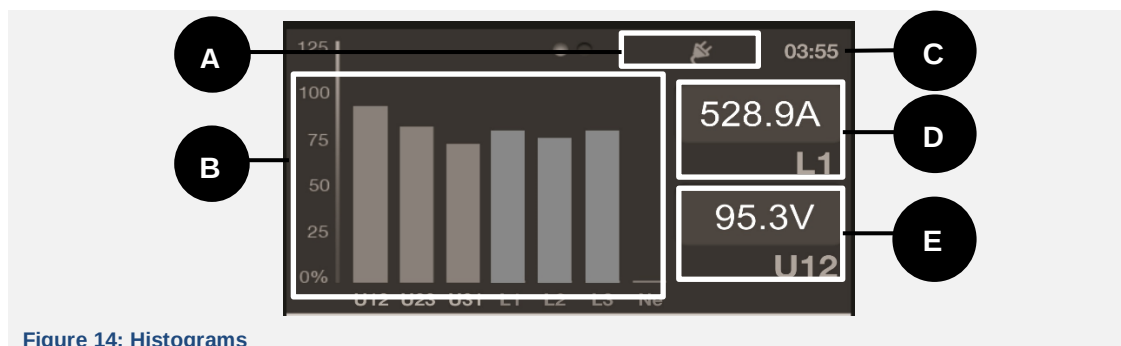


Figure 14: Histograms

Pos.	Description
A	Information icons:  Auxiliary supply present, Ekip Com modules connected and remote parameter writing configuration active  Auxiliary supply present  Ekip UP supplied by service connector  With the Protect+ and Control+ versions, if the <i>Adaptive Protection</i> function is enabled, the letter is shown that corresponds to the active configuration; fuller details on page 96
B	Histograms of the voltage and current measurements acquired in real time. The bar of each signal is on a scale from 0 to 125 % referring to the rated unit current and voltage values (I_n and U_n). The bars are blue, but if present some specific conditions can change colour (any bar is independent) - yellow: in case of the L protection prealarm - red: in case of L, OV, OV2, UV and UV2 alarm  NOTE: the histogram Ne is available with 4P or 3P configurations with neutral
C	current time
D	maximum phase current measured in real time
E	maximum network current measured in real time

Table 32: Graphic pages - Histograms



NOTE: Ekip UP is supplied with Histograms page configured as main page (default); in the event of a different configuration, to set again the default configuration: select the page, keep the **HOME** pushbutton pressed for five seconds, confirm the message on the display

- Summary Pages

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

 - main measurements page:maximum phase current, maximum network voltage, power factor, total active/reactive/apparent power
 - page main measurements Ekip Synchrocheck (in presence of the module): Int and Ext voltages and frequencies, phase difference, synchronism status (page 185 for detail)

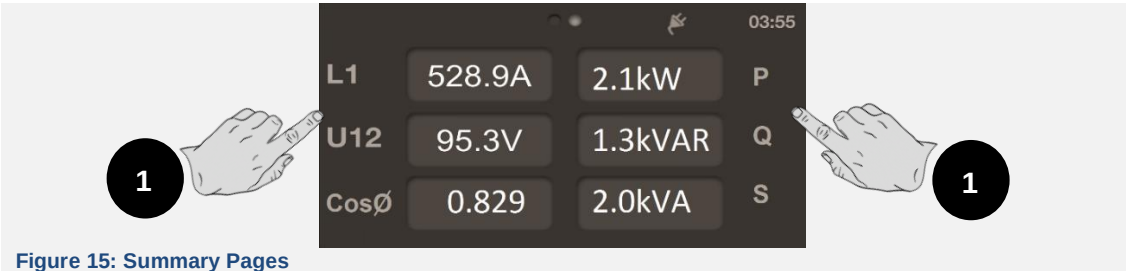


Figure 15: Summary Pages

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

Measuring instruments

On these pages some measurements are shown that were acquired in real time using a dial representation; each page has a specific measurement:

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

Table 33: Graphic pages – measuring istruments

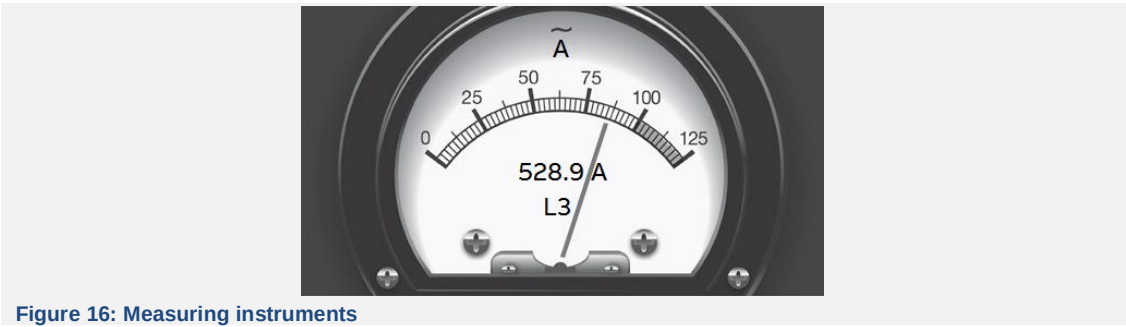


Figure 16: Measuring instruments

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

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

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

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

Measurements The Measurements pages show a list of measurements acquired in real time and expressed as an absolute value:

Page	Name	Measurements
1	<i>Current</i>	Currents: phase, earth fault, external earth fault/RC
2	<i>Voltage</i>	Voltage: network, phase, neutral
3	<i>Active Power</i>	Phase and total active power
4	<i>Reactive power</i>	Phase and total reactive power
5	<i>Apparent Power</i>	Phase and total apparent power
6	<i>Energy counters</i>	Total active, reactive and apparent energy
7	<i>Power Controller</i>	Summary of Power Controller measurements, see page 118
8	<i>Load shedding</i>	Summary of Load shedding measurements, see page 129
9	<i>Ekip Signalling 3T</i>	Summary of <i>Ekip Signalling 3T</i> measurements, if present

Table 34: Graphic pages – measurment

Measurements [2]

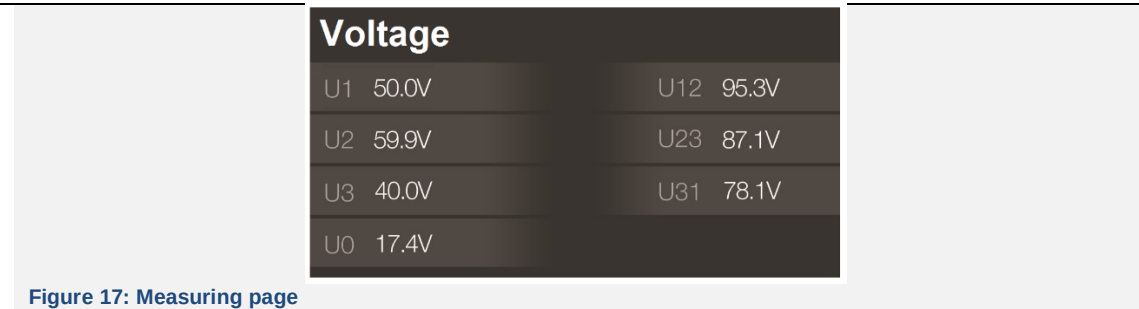


Figure 17: Measuring page

- The Ekip UP configuration involves some exceptions:
- the measurements of the current Ne is available with configurations 4P and 3P with neutral
 - the measurements of the phase voltages are available with 4P configuration
 - with 3P configuration the pages: Active Power, Reactive Power and Apparent Power are replaced from the Power page, which shows the measurements of the total active, reactive and apparent power
 - Ige/RC available with external sensor activated
 - page *Power Controller* available with Power Controller function active
 - page *Load Shedding* available with Load Shedding function active

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

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

Diagnosis bar and Alarms List

The *diagnosis bar* shows the faults detected by the unit, showing the details of each alarm for about 2 seconds.



Figure 18: Diagnosis bar

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

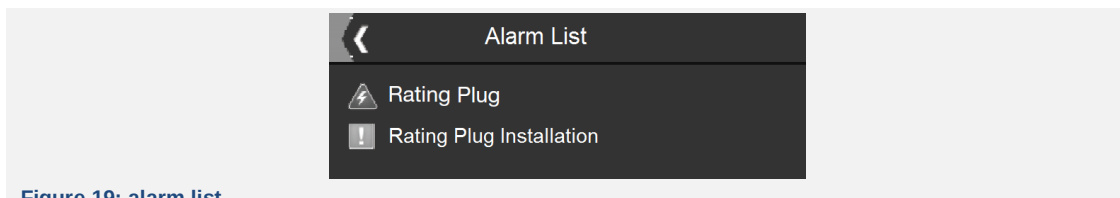


Figure 19: alarm list



NOTE: the Alarms List page also appears if the *iTEST* button is pressed in the cases envisaged and described on page 30

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

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

Table 35: Graphic pages – alarm icons

The complete list of alarms is available on page 24.

13 - Menu

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

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

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

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

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

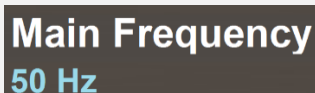
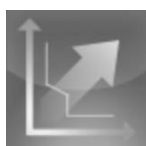


Figure 20: list

Protections Menu



The Protections menu is available with the Protect, Protect+ and Control+ versions of Ekip UP and enables the following protections to be configured:

Name	Parameters	Page
L	List and description in the dedicated chapter	64
S	List and description in the dedicated chapter	65
I	List and description in the dedicated chapter	66
G	List and description in the dedicated chapter	67
Gext ⁽¹⁾	List and description in the dedicated chapter	71

Table 36: menu – protections 1



(1): available if the presence of the S.G.R. sensor has been activated previously in the Settings menu

The Protect+ and Control+ versions enable a further protection to be configured:

Name	Parameters	Page
S2	List and description in the dedicated chapter	73

Table 37: menu – protections 2



NOTE: in the Protect+ and Control+ versions, if the Adaptive Protection has been activated (page 96), before the list of the protections, an intermediate menu is available for selecting the set (Set A / Set B)

Advanced Menus



The **Advanced** menu is available with the Protect, Protect+ and Control+ versions of Ekip UP and enables the following protections to be configured:

Name	Parameters	Page
MCR	List in the dedicated chapter	68
2I	List in the dedicated chapter	69
IU	List in the dedicated chapter	70
UV	List in the dedicated chapter	82
OV	List in the dedicated chapter	83
VU	List in the dedicated chapter	83
UF	List in the dedicated chapter	92
OF	List in the dedicated chapter	93
RP	List in the dedicated chapter	88
Synchrocheck ⁽¹⁾	List in the dedicated chapter	98
RC ⁽²⁾	List in the dedicated chapter	71
Signals	<i>Threshold 1 I1, Threshold 2 I1, Threshold Iw1, Threshold Iw2, Phase Sequence, CosØ</i>	85-96-96
Functions ⁽³⁾	<i>External trip, Trip Reset, Switch on SET B⁽³⁾</i>	97

Table 38: menu – advanced 1



NOTES:

- (1) available in the presence of the Ekip Synchrocheck module
- (2) available with RC rating plug installed on unit and if the presence of the RC sensor has been activated previously in the Settings menu
- (3) Function SET B available with Adaptive Protection function activated

The Protect+ and Control+ versions enable further protections to be configured:

Name	Parameters	Page
D	List in the dedicated chapter	74
S(V)	List in the dedicated chapter	76
S2(V)	List in the dedicated chapter	77
UV2	List in the dedicated chapter	84
OV2	List in the dedicated chapter	84
UP	List in the dedicated chapter	87
OP	List in the dedicated chapter	88
RQ	List in the dedicated chapter	88
OQ	List in the dedicated chapter	90
UF2	List in the dedicated chapter	93
OF2	List in the dedicated chapter	94
ROCOF	List in the dedicated chapter	94

Table 39: menu – advanced 2



NOTE: in the Protect+ and Control+ versions, if the Adaptive Protection has been activated (page 96), before the list of the protections, an intermediate menu is available for selecting the set (Set A / Set B)

Measurements Menu



Menu	Submenu	Description	Page
<i>Historicals</i>	<i>Openings⁽¹⁾</i>	Description in the dedicated chapter	60
	<i>Events</i>	List of the recorded events	48
	<i>Measurements</i>	List and description in the dedicated chapter	48
<i>Power factor</i>	--	Power factor measurement	49
<i>Frequency</i>	--	Measured frequency	47
<i>Energy</i>	<i>Energy counters</i>	Energy measurement	47
	<i>Reset Counters</i>	Counters reset command	
	<i>Energy RESET</i>	List and description in the dedicated chapter	98
<i>Peak factor</i>	--	Peak factor of each phase	49
<i>Harmonic dist.</i>	--	Command to activate control of harmonic distortion of the currents	96
<i>Ekip Synchrocheck</i>		Description in the dedicated chapter	184
<i>Network Analyzer⁽²⁾</i>	<i>Sequence V</i>	Measurements associated with the <i>Network Analyzer</i> function: list and description in the dedicated chapter	52
	<i>Sequence V 3s</i>		
	<i>THD Current</i>		
	<i>THD Voltages</i>		
	<i>Counters</i>		
	<i>Waveforms</i>		
<i>Maintenance</i>	<i>Installation</i>	Installation and maintenance dates and commands	49
	<i>Last maintenance</i>		
	<i>Service RESET</i>		

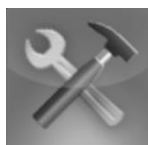
Table 40: menu - measurements



NOTES:

- (1) available with *Protect*, *Protect+* and *Control+* versions
- (2) available with the *Network Analyzer* function that was activated in the *Settings* menu

Settings Menu



Menu	Submenu	Description and <i>parameters</i>	Page
Digital unit	<i>Configuration</i> ⁽¹⁾	Selection of phases number	121
	<i>Hardware Trip</i> ⁽²⁾	Protection activation command	96
	<i>T Protection</i> ⁽²⁾	Protection activation command	96
	<i>Neutral Protection</i> ⁽²⁾⁽⁷⁾	<i>Enable Neutral Threshold</i>	70
	<i>Ground protection</i> ⁽²⁾	Configuration of external sensor	71
	<i>Current Sensor</i>	type of sensor installed	130
	<i>Breaker connections</i> ⁽²⁾	Configuration of commands and statuses	121
<i>Main frequency</i>	--	Network frequency configurations	121
<i>Phase sequence</i>	--	Phases sequence configuration	85
Modules	<i>Local/Remote</i>	Parameters writing configuration	122
	<i>Local bus</i>	Local bus presence configuration	122
	<i>Module x</i> ⁽³⁾	Details in the chapters of each module	128
	<i>Functions</i>	<i>Switch On LOCAL, RESET signal</i>	98
<i>Monitor time</i>	--	Monitor time configuration	48
<i>Test Bus</i>	--	Test bus activation	122
Power Controller ⁽⁴⁾	<i>Enable</i> ⁽⁵⁾	Function activation	119
	<i>Load Operating Mode</i>	<i>Load 1, Load 2, - , Load 15</i>	
	<i>Power Limits</i>	<i>Power Limit 1, - , Power Limit 10</i>	
Load Shedding ⁽⁴⁾	<i>Abilita</i> ⁽⁵⁾	Abilitazione e parametri della funzione: vedi i dettagli nel capitolo dedicato	128
	÷		
Network Analyzer	<i>Enable</i> ⁽⁵⁾	Function parameters and commands: see details in the dedicated chapter	52
	<i>I Harmonic analysis</i>		
	-		
Datalogger	<i>Enable</i> ⁽⁵⁾	Function parameters and commands: see details in the dedicated chapter	50
	<i>Num. of Datalogger</i>		
	-		
Adaptive Protection ⁽⁶⁾	<i>Enable</i> ⁽⁵⁾	Function activation	96
	<i>Default set</i>	Configuration of default set	
System	<i>Date</i>	Configuration of unit date	122
	<i>Time</i>	Configuration of unit time	
	<i>Language</i>	Configuration of menu language	
	<i>New Password</i>	Configuration of password	
View	<i>TFT orientation</i>	Function parameters: see details in the dedicated chapter	123
	-		
Functions ⁽²⁾	<i>YO Command</i>	<i>Function, Delay</i>	98
	<i>YC Command</i>	<i>Function, Delay</i>	
<i>Maintenance</i>	<i>Alarms</i>	Maintenance signals activation	49

Table 41: menu – settings 1

Settings Menu [2]



NOTES:

- (1) available with Ekip UP in 3P configuration
- (2) available with Protect, Protect+ and Control+ versions
- (3) The menu is populated with the list of the accessories modules detected by unit with Bus Local activated and in the envisaged connection and supply conditions
- (4) available with Control and Control+ versions
- (5) the list of the specific submenu is enhanced with the enabled (=On) function
- (6) available with Protect+ and Control+ versions
- (7) available with Ekip UP in 4P configuration or 3P with neutral

If Ekip UP detects that *Rating Plug* has not been installed correctly, it reports the alarm (see page 25) and completes the *Settings* menu with the specific installation section:

Menu	Submenu 1	Submenu 2	Commands
Digital unit	Installation	Rating Plug	Install

Table 42: menu – settings 2

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



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

Test Menu



Menu	Submenu	Description, parameters and commands	Page
Auto Test	--	Autotest command	126
Protection Test ⁽¹⁾	--	Close Unit, Open Unit	126
Ekip Signalling 2K ⁽²⁾	Ekip Signalling 2K-1 ⁽²⁾	Module autotest command	127
	Ekip Signalling 2K-2 ⁽²⁾	Module autotest command	
	Ekip Signalling 2K-3 ⁽²⁾	Module autotest command	
Ekip Signalling 4K ⁽³⁾	Auto Test	Module autotest command	126
Zone Selectivity ⁽⁴⁾⁽⁵⁾	Protection S ⁽⁴⁾	Inputs, Output Force, Output Release	127
	Protection G ⁽⁵⁾	Inputs, Output Force, Output Release	
RC Test ⁽⁶⁾	--	Test instructions	127

Table 43: menu – test



NOTES:

- (1) available with Protect, Protect+ and Control+ versions
- (2) menus and submenus available if one or more Ekip Signalling 2K modules are connected and detected by unit
- (3) available if Ekip UP is switched on with an auxiliary supply
- (4) available with Protect+ and Control+ versions, protection S enabled and curve t=k
- (5) available with Protect+ and Control+ versions, protection G enabled and curve t=k
- (6) available with Protect, Protect+ and Control+ versions and with the RC sensor present

About Menu



Menu	Submenu	Information contained
<i>Protection Unit</i>	--	Information on Ekip UP: serial number, type, version, applicable standards, SW version, date and time
<i>Digital Unit</i>	--	Plant information: Name TAG, Unit Name, rated current, unit status (open/closed/not defined), total operations
<i>Modules</i>	<i>Module x⁽¹⁾</i>	Information on modules: serial number, SW version, input/output/contacts status of (if present)
<i>Power Controller⁽²⁾</i>	<i>Load Input Status</i>	Loads status (open/closed)
	<i>Load Active</i>	Configuration of loads (active/inactive)
<i>Load shedding⁽²⁾</i>	<i>Load Input Status</i>	Loads status (open/closed)
	<i>Load Active</i>	Configuration of loads (active/inactive)

Table 44: menu – about



NOTES:

- (1) menus available if one or more modules are connected and detected by unit
- (2) available with Control and Control+ versions and Power Controller function active

14 - Modifying parameters and commands

Modifying parameters



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

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

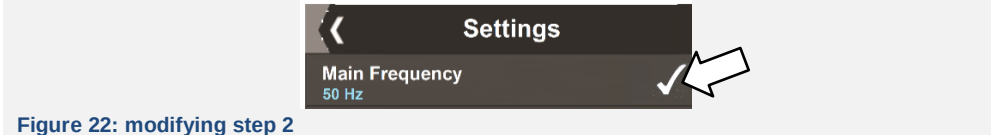
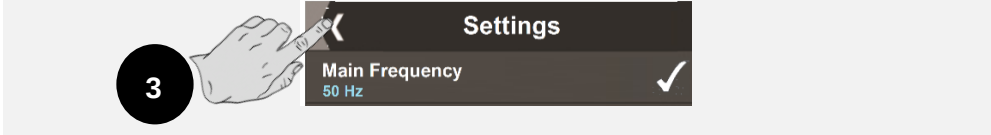
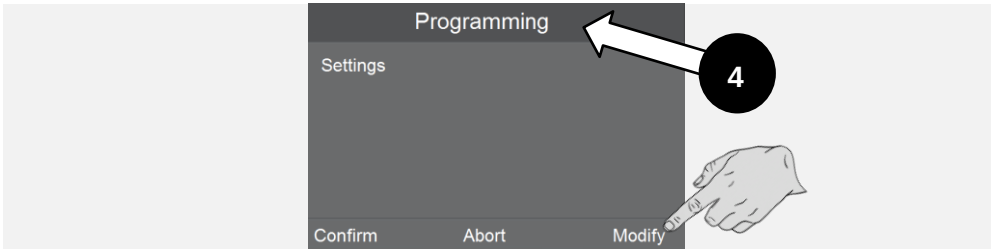
Step	Description
1	Select the parameter and if requested, insert the password.
2	❶ Select the new desired value from the list or with the support of the page commands, if available (-, +, MIN, MAX). ❷ If present, select the <i>Confirm</i> command: 
3	When the new value has been selected/confirmed, the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

Table 45: modifying parameters

Commands

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



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

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

- *Auto Test* (page 126)
- *Ekip Signalling 4K* (page 126)



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

Exceptions

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



If the unit detects an error condition on the display and/or the bar shows the details, the programming/running of the command is interrupted



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

15 - Password and security

Safety



WARNING! it is the user's responsibility to configure the security to prevent unauthorized accesses and changes: configure all the Ekip UP access points (menu on the display and, if present, Ekip Connect and remote communication systems) with access PIN and connection system checked and authorized

Function

The PIN allows access to some Ekip UP area and is intended to prevent unintentional setting errors made from the display.

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

- Service connector, with *Ekip T&P* or *Ekip Programming* and the Ekip Connect application
- Bus, with *Ekip Com* modules and with the Ekip UP configured *Remote* (page 40)

In order to facilitate making the unit secure, when the unit is first started up, the Wizard window proposes changing the password (page 20), which is strongly recommended by ABB.

Description

The password is a five-digit number, each of which can have a value from 0 to 9. The default value is: **00001** and can be changed in menu *Settings-System-New Password*

The password is required when:

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

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



NOTE: the password also expires when a programming session is canceled (page 43)

Entering the password

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

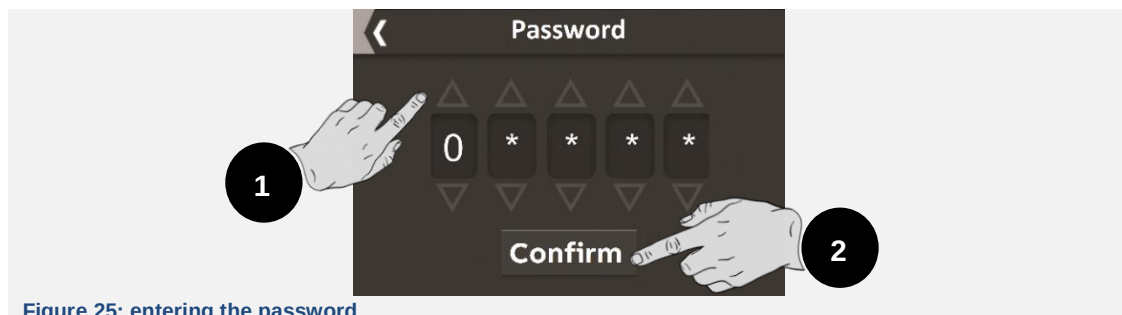


Figure 25; entering the password



NOTES:

- if the password is wrong, "Wrong Password" 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 password that can be entered

Disabling

The password can be disabled by configuring it with the values: **00000**; in this situation, the only case in which it will be entered is if the password itself is modified in the *Settings* menu.

Exceptions

If the password is lost, consult the document 1SDH001501R0001, available on the ABB website, or contact ABB directly.

Measurements

16 - Standard measurements

List the standard measurements are:



Name	Description	Page
<i>Instantaneous measurements</i>	Measurements in real time of: current, voltage, frequency, power	47
<i>Events</i>	List of events, status changes, alarms, recorded by Ekip UP	48
<i>Min-Max-Med Measurements</i>	History of minimum, maximum and medium currents, voltage and power, recorded at set intervals	48
<i>Peak factor</i>	Real time measurement of the peak factor of the currents	49
<i>Power factor</i>	Real time measurement of the power factor	49
<i>Energy counters</i>	Measurement of active, reactive and apparent energy	49
<i>Maintenance⁽¹⁾</i>	Unit maintenance status	49

Table 46: standard menu - list



(1): the Maintenance menu is available after activating the functions in the Settings menu (page 40).

The standard measurements packet includes *Datalogger* and *Network Analyzer*, as described in dedicated chapters starting from page 50.

The Protect, Protect+ and Control+ versions also have the trips history, described on page 60.

The Protect, Protect+ and Control+ versions that have the *Ekip Synchrocheck* module also have measurements of the module and synchronism, which are described from page 179.

Instantaneous measurements

the following instantaneous measurements are available with Ekip UP:

Measurement	Availability	Measurement interval	Normal operating interval	Accuracy of read value ⁽⁹⁾
Phase currents ⁽⁸⁾	Pages: Histogram Measurements⁽¹⁾ Measuring instruments⁽¹⁾ Measurements summary⁽¹⁾	0.03 - 64 In	0.2 - 1.2 In	1% ⁽¹⁰⁾
Internal earth fault current ⁽⁸⁾	Measurements Page	0.08 - 64 In	0.2 - 1.2 In	2 % ⁽¹⁰⁾
External earth fault current ^{(2) (8)}	Measurements Page	0.08 - 4 In	0.2 - 1.2 In	2 % ⁽¹⁰⁾
Residual current ^{(2) (8)}	Measurements Page	2 - 32 A		5 %
Network voltage	Pages: Measurements Histograms⁽¹⁾ Measuring instruments⁽¹⁾ Measurements summary⁽¹⁾	5 V - 1.25 Un	100 - 690 V	0.5 % ⁽¹¹⁾
Phase voltages ⁽³⁾	Measurements Page	5 V - 1.25 Un	50 - 400 V	0.5 % ⁽¹¹⁾
Network frequency	Measurements Menu	30 - 80 Hz ⁽⁴⁾	f -10 % - f +10 % ⁽⁵⁾	0.1 %
Total active, reactive and apparent power	Pages: Measurements Summary of measurements Measuring instruments	Pmin - Pmax ⁽⁶⁾	0.3 - 1.2 Sn ⁽⁷⁾	2 % ⁽¹⁰⁾
Active, reactive and apparent phase power ⁽³⁾	Pages: Measurements	Pmin - Pmax ⁽⁶⁾	0.3 - 1.2 Pn ⁽⁷⁾	2 % ⁽¹⁰⁾

Table 47: standard menu - performances



NOTES:

- (1) showed the highest rms value of those measured
- (2) available by activating the presence of the S.G.R. or RC sensor
- (3) available in the presence of 4P or 3P systems with neutral (Ekip Measuring menu)
- (4) available for voltages greater than 30 V (with Un < 277 V) or 60 V (with Un > 277 V)
- (5) 45-55 Hz with set frequency= 50 Hz; 54-66 Hz with f= 60 Hz
- (6) $P_{min} = 0.5 \text{ In} \times 5 \text{ V}$; $P_{max} = 3 \times 16 \text{ In} \times 690 \text{ V}$
- (7) $S_n = \text{In} \times \text{Un} \times \sqrt{3}$; $P_n = \text{In} \times \text{Un} / \sqrt{3}$
- (8) expressed as actual value
- (9) the accuracy values refer to normal operating intervals according to IEC 61557-12
- (10) performance refer to entire measurement chain: Ekip UP + current sens type A, B or C
- (11) without transformers; 0.7 % with class 0.2 external transformers

Special messages

Type of measurement	Measurement < min value	Measurement > max value	Shown: “_ _ _” (not available) per
Phase currents		> [64 In]	Disconnected sensors
Internal earth fault current		> [64 In]	Disconnected sensors
External earth fault current		> [4 In sensor]	Sensor not activated and/or disconnected
Residual current		> 32 A	Sensor not activated and/or disconnected
Network voltage and phase voltage		> [Un x 1.25]	Ekip Measuring not detected
Network frequency	30 Hz	80 Hz	Ekip Measuring not present, V < 5 V
Total active, reactive and apparent power and phase power		> [Pn x 1.25]	Disconnected sensors, Ekip Measuring not present, V < 5 V. I < 0.03 In

Table 48: standard menu – special messages

Events Ekip UP can record the last 200 events, mainly referring to variations in the status and operation of the unit, in particular:

- digital unit: configuration status of the bus, operating mode, active set, auxiliary supply
- connection statuses or alarms: *current sensors*, *rating plug*, *HMI*, external actuator

The Protect, Protect+ and Control+ versions also record events relating to:

- protections: timing in progress or alarm
- trip: status of open command, protection trip message



NOTE: in the events list, the first available event is the most recent event; after the threshold of 200 events is exceeded, the oldest events are progressively overwritten

Each event is completed by a series of pieces of information: icon of type of event, name of event, date and time of recording.

Four icons can identify the type of event:

Icon	Description
	Event reported for information purposes
	Timing of a current protection, expected trip
	Alarm refers to a non-hazardous condition
	Operating, fault or connection glitch alarm

Table 49: standard menu – events icon

Min-Max Measurements

Ekip UP stores in the *Historical-Measurements* menu the measurements of:

- maximum and minimum phase currents
- maximum and minimum network voltage
- total maximum and average active, reactive and apparent power

The recording interval between one measurement and the other can be set by the *Monitor time* parameter, which is available in the *Settings* menu (page 40).

Show

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

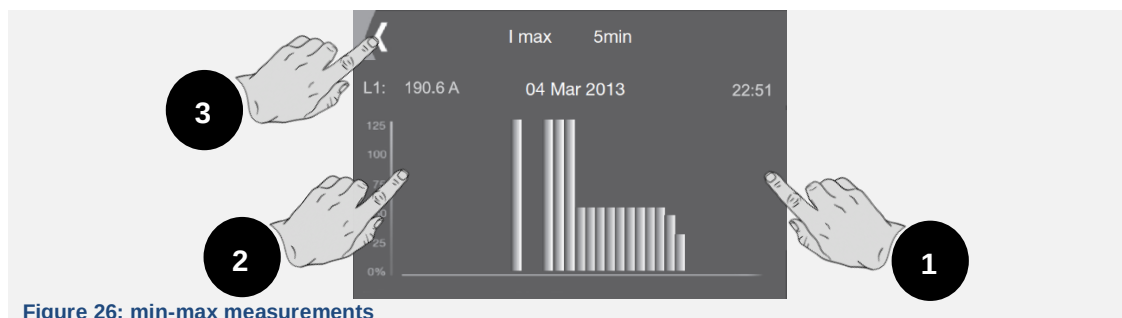


Figure 26: min-max measurements

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

The selected recording flashes to distinguish it from the others.

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

Each recording is correlated with the following information:

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

Reset measurements

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

Peak factor and power factor

The peak factors are the measurements in real time of the ratio between the peak values the RMS values of the phase currents; the measurement is supported by the protection function *Harmonic dist.* (page 96).

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

Measurement	Measurement interval	Accuracy	Applicational Notes
Peak factor	0.3 - 6In (currents)	1.5%	Shows “_ _ _” (not available) for out-of-range currents and disconnected sensors
Power factor	0.5 - 1	2.5%	Shows “_ _ _” (not available) for active and/or reactive power that is not available or is outside permitted ranges

Table 50: standard menu – Peak factor and power factor

Energy counters

The energy counters are the measurements of the total active, reactive and apparent energy, updated each minute.

Measurement	Measurement interval	Accuracy
Total active, reactive and apparent energy	1 kWh - 2 TWh; 1 kVARh - 2 TVARh; 1 kVAh - 2 TVAh	2 %

Table 51: standard menu – energy

Reset measurements

In the *Energy* menu, the Energy *RESET* command is available (page 39) to reset the energy counters.

Maintenance

The Maintenance function, activable on *Settings* menu (page 40), enables the user to be alerted by a Warning that a year has elapsed since the last maintenance sessions.

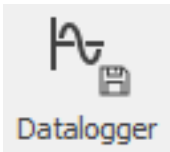
In the *Measurements-Maintenance* menu the following are available:

Name	Measurement interval
Installation	Information on installation date
Last Maintenance	date of last maintenance performed
Service RESET	maintenance confirmation command: press to update the maintenance date and make the displayed alarm disappear

Table 52: standard menu – maintenance

17 - Datalogger

Presentation



The datalogger is a function that enables the data associated with a trigger event to be recorded. The recorded data are:

- analogue measurements: phase currents and network voltage
- digital events: alarms or protection events, indications of switch status, protection trips

One or more recordings that are independent of one another can be configured and via Ekip Connect all the associate information can be downloaded, viewed and saved.

Function

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

In the presence of the trigger event (A), Ekip UP interrupts (STOP) the acquisition immediately or after a time that can be set by the user (C) and stores all the data of the window (D), which can then be downloaded onto a PC to be read and analyzed.



IMPORTANT: the function requires an auxiliary voltage supply

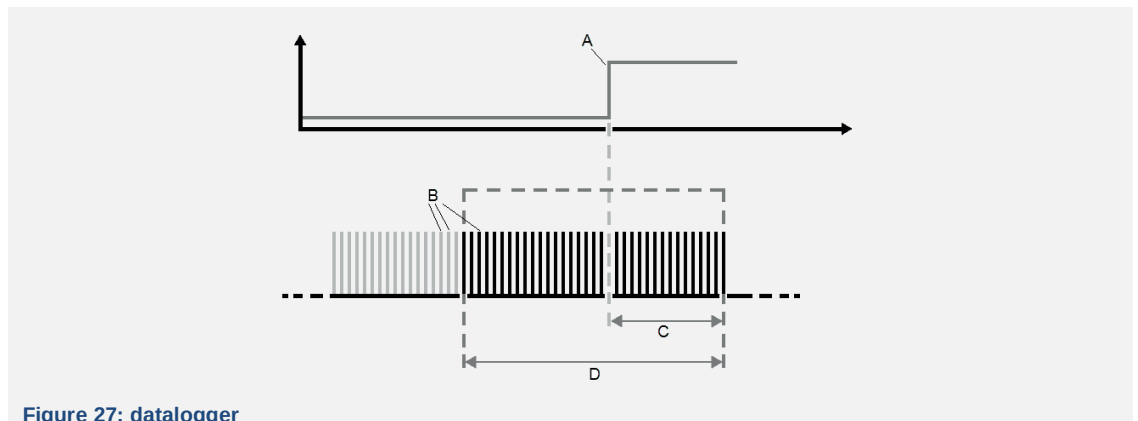


Figure 27: datalogger

Parameters 1 The function parameters and commands are available in the *Settings* menu (page 40).

Parameter	Description	Default
Enable	Activates/deactivates the function and the availability on the menu of the parameters <i>i</i> NOTE: the enable command is hidden with at least one activated datalogger	OFF
Num. of Datalogger	Determines number of registrations (1 or 2) <i>i</i> NOTE: the registrations share the settings of the sampling frequency and type of memory	1
Sampling Frequency	Determines the number of samples acquired per second and 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>i</i> NOTE: • A high frequency permits more accurate data analysis • with two dataloggers the recording window of each recording is halved	9600 Hz
Dataloggers 1 and 2	Menu with the parameters of each datalogger: trigger event, Recording delay and Restart/Stop command	
Restart and Stop all	Synchronized start and stop commands of the two dataloggers, valid and available with number of dataloggers = 2	

Table 53: datalogger – parameters 1

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

Option	Description	Default
Stop event	Trigger event at which to interrupt the recording; the display shows the main protection options (trip, timing, alarms) and actuator status (open/closed). Via Ekip Connect the Custom option configuration can be programmed	None
Stop delay	Recording interruption delay, calculated from the trigger; the value is expressed in seconds, which are settable in a range: 0 s - 10 s, with 0.01 s step.	0.01 s
Restart	Recording start command (START)	
Stop	Manual recording stop command (STOP)	

Table 54: datalogger – parameters 2

Memory Type

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

- *Non volatile*: Ekip UP maintains the recording even if it is switched off; the durability of the internal unit battery may decrease noticeably with respect to the declared value if there is a recording in the memory but there is no auxiliary supply.
- *Volatile*: Ekip UP loses the recording if it is switched off; the datalogger starts up automatically, losing the previously stored data.

The parameter is configured by default as non volatile.

Signals In the presence of a recording, Ekip UP shows the information on the diagnosis bar (Datalogger available).



NOTE: Ekip UP shows the general indication of recording availability also in a configuration with 2 dataloggers: using Ekip Connect for identifying which of the two recordings or both is available (or whether both are available).

Ekip Connect Ekip Connect has 2 specific areas for the Datalogger function:

1. **Datalogger** for configuring the recording parameters with a facilitated graphic interface and for downloading recording
2. **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.

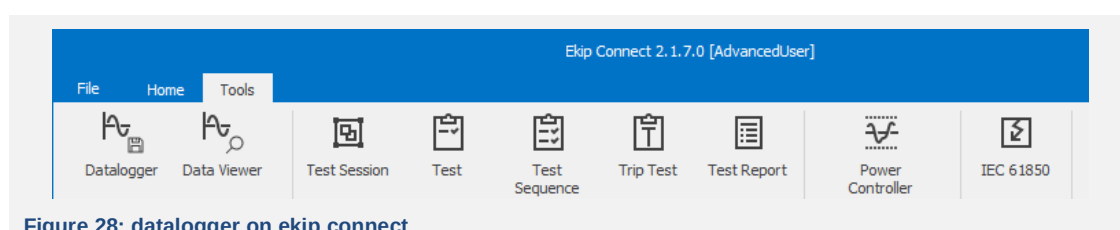


Figure 28: datalogger on ekip connect



NOTE: in the Help section dedicated to configuring the trigger the configuration details are available in Custom mode

Presentation The Network Analyzer function enables voltage and current controls to be set for a long period to analyze the operation of its plant.

For this purpose, voltage and currents are monitored in order to detect:

- sequences of voltages (Over, Under, Pos and Neg)
- unbalance between voltages (Unbalance)
- short voltage interruptions (V microinterruption) and slow sags (Sag)
- voltage spikes (Spikes) and slow swells (Swells)
- harmonic distortion of voltage and currents (THD)

Each monitoring session is associated with control parameters that can be set by the user and with counters that are increased whenever the set control conditions occur.

The function also enables the waveforms and harmonics of the network voltage and of the phase currents to be viewed (page 59).

Parameters The configuration parameters of the counters are available in the *Settings - Network Analyzer* menu (page 40).

In the *Settings* menu the *Monitor time* parameter can also be set that defines the period of each control session.



NOTE: the parameter is the one used for measuring maximum current and voltage

Main Menu

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

Table 55: network analyzer – main menu

Parameters [2] Sags Menu

All thresholds are expressed as a percentage of the rated voltage U_n , which can be set between 10 % - 95 % U_n , with 5% step

All times are given in seconds, which can be set between 0.04 s - 60 s with variable step.

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 <i>Short</i> threshold to validate count of <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 <i>Middle</i> threshold to validate count of <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 <i>Long</i> threshold to validate count of <i>Sags Long</i> counter	0.8 s

Table 56: network analyzer – sag



NOTE: Ekip UP accepts modifications of the parameters if the following constraints are followed: $V \text{ sag dur Long} \geq V \text{ sag dur Middle} \geq V \text{ sag dur Short}$

Swells Menu

All thresholds are expressed as a percentage of the rated voltage U_n , which can be set between 105 % - 125 % U_n , with 5% step

All times are given in seconds, which can be set between 0.04 s - 60 s with variable step.

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

Table 57: network analyzer – swell



NOTE: Ekip UP accepts modifications of the parameters if the following constraints are followed: $V \text{ swell dur Long} \geq V \text{ swell dur Short}$

Harmonics (Current and Voltage)

All the percentages are expressed as a percentage value and can be set in a 5 % - 20 % range (total THD) or 3 % - 10 % (single harmonics) with 1 % step.

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

Table 58: network analyzer – THD

Counters - Introduction

The main counters of the function are available in the *Measurements - Network Analyzer* menu (page 39), distributed in several sections.

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



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

Sequence V and Sequence V 3s

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

Menu	Counters	Description
V Sequences	<i>V pos seq</i>	Positive sequence of current period [V]
	<i>V neg seq</i>	Negative sequence of current period [V]
	<i>Last V pos seq</i>	Positive sequence of period preceding current period [V]
	<i>Last V neg seq</i>	Negative sequence of period preceding current period [V]
3s V Sequences	<i>V pos seq</i>	Positive sequence calculated for last three seconds [V]
	<i>V neg seq</i>	Negative sequence calculated for last three seconds [V]
	<i>Unbalance</i>	Voltage unbalance calculated over last three seconds [%]

Table 59: network analyzer – sequence counters list

Additional List

Counters (Sequences)	Description
<i>Last time stamp</i>	Date and time of last recording of the sequences

Table 60: network analyzer – sequence counters

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

Table 61: network analyzer – unbalance counters



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

Current THD and Voltages THD

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

Menu	Counters	Description
THD Current	<i>L1, L2, L3, Ne</i>	Instantaneous harmonic distortion value of each current phase
THD Voltages	<i>U12, U23, U31</i>	Instantaneous harmonic distortion value of each network voltage

Table 62: network analyzer – THD counters list

Over V Th and Under V Th

In the submenus *Counters - Day-1* and *Counters -Cumulative* are available referring to the measurements of the sequences:

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

Table 63: network analyzer – over and under counters

Additional List

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

Table 64: network analyzer – over voltage counters

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

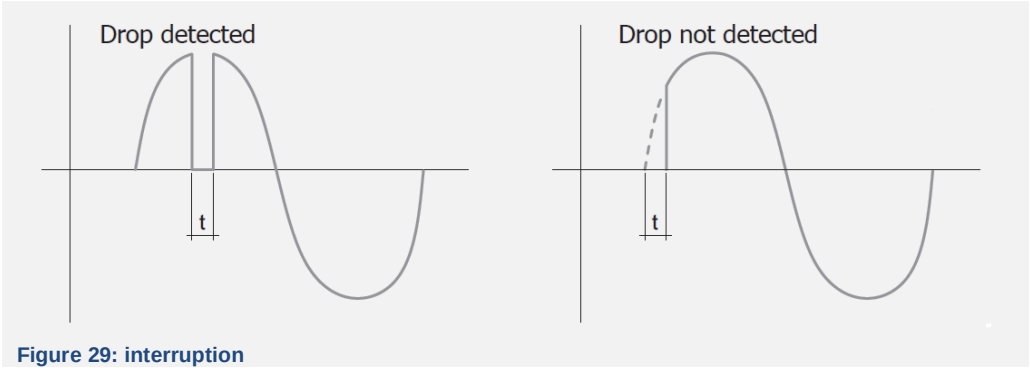
Table 65: network analyzer – under voltage counters

**V microinterr.
(Interruption)**

The *V microinterr.* counter is the reduction of the RMS value of the network voltage below the threshold *V microinterr. Th* set, for a duration lasting less than 40 ms (rapid voltage sag).

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

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



Additional List

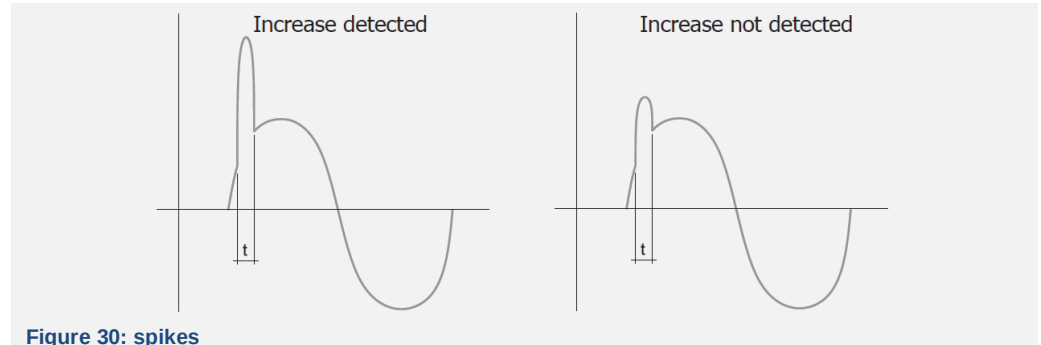
Counters (Interruptions)	Description
<i>Last instant</i>	Date and time of last recording of the <i>V microinterr.</i> counter
<i>Last value</i>	Value of last sag below <i>V microinterr.</i> [V] threshold
<i>Last duration</i>	Duration of last sag below <i>V microinterr.</i> [ms] threshold
<i>Current number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

Table 66: network analyzer – interruption counters

Spikes The *Spikes* counter is the increase of the RMS value of the network voltage above set *V Spike Threshold* threshold for a duration of less than 40 ms (voltage spike).
The counter is available in the two submenus *Counters - Day -1* and *Counters-Cumulative* (previous day or cumulative)



NOTE: as the counter is based on calculating the RMS value, two voltage spikes of equal duration may be valued differently because of their size:



Additional List

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

Table 67: network analyzer – spikes counters

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

Counters	Description
<i>Sags Short</i>	Counts the number of times that any network voltage falls below threshold <i>V sag Th Short</i> for a longer time than <i>V sag dur Short</i>
<i>Sags Middle</i>	Counts the number of times that any network voltage falls below threshold <i>V sag Th Middle</i> for a longer time than <i>V sag dur Middle</i>
<i>Sags Long</i>	Counts the number of times that any network voltage falls below threshold <i>V sag Th Long</i> for a longer time than <i>V sag dur Long</i>

Table 68: network analyzer – sags counters

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



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

Additional List

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

Table 69: network analyzer – short sags counters

Sags [2]

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

Table 70: network analyzer – middle sags counters

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

Table 71: network analyzer – long sags counters

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

Counters	Description
<i>Swells Short</i>	Counts the number of times that any network voltage exceeds threshold <i>V swell Th Short</i> for a longer time than <i>V swell dur Short</i>
<i>Swells Long</i>	Counts the number of times that any network voltage exceeds threshold <i>V swell Th Short</i> for a longer time than <i>V swell dur Long</i>

Table 72: network analyzer – swell counters

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



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

Additional List

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

Table 73: network analyzer – short swell counters

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

Table 74: network analyzer – long swell counters

THD Voltages and currents

In the submenus *Counters - Day-1* and *Counters-Cumulative* are available counters referring to the measurements of harmonic distortion:

Counters	Description
<i>THD Voltages</i>	Counts the total minutes in which the total distortion exceeds voltage threshold <i>THD</i>
<i>THD Current</i>	Counts the total minutes in which the total distortion exceeds current threshold <i>THD</i>

Table 75: network analyzer – THD counters



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

Additional List

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

Table 76: network analyzer – current THD counters

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

Table 77: network analyzer – voltages THD counters

Waveforms

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

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

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

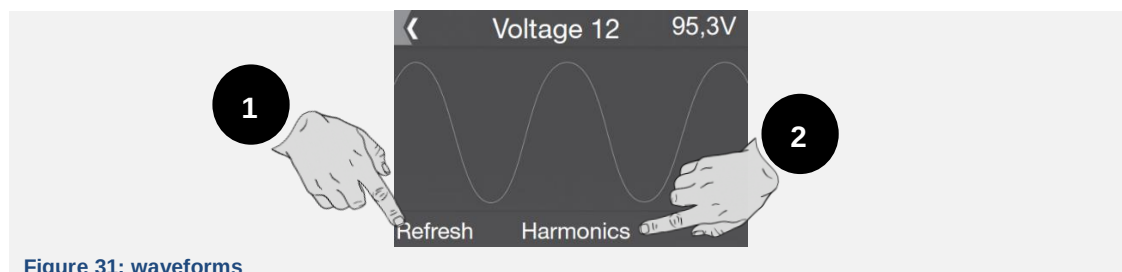


Figure 31: waveforms

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

Harmonics

If the harmonic analysis of currents and/or voltages (page 52) has been activated, in the waveform window, the *Harmonics* (2) command is available that opens the histogram of the harmonics that make up the waveform of the network frequency set on the menu.

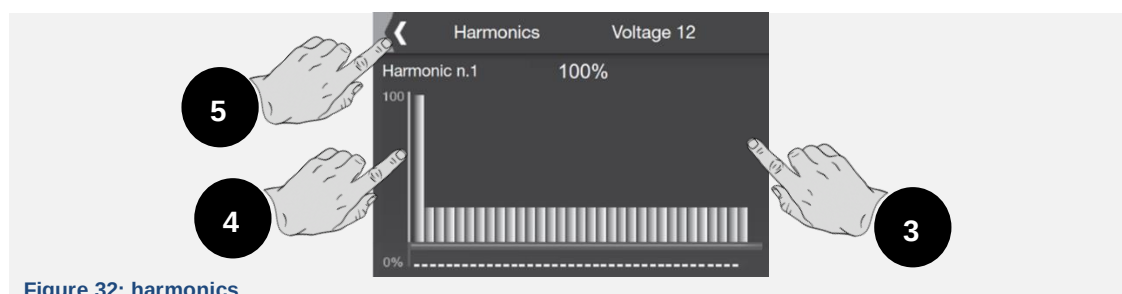


Figure 32: harmonics

Touch the sides of the display to scroll through the harmonics before (3) and after (4) the selected harmonic, which is shown by a flashing graph and the value of which is shown in the centre of the page.

In the top left corner (5) there is the command for exiting the page.

Presentation The Protect, Protect+ and Control+ versions of Ekip UP are able to record the last 30 openings of external actuators/switches/contactors caused by protection trips (TRIP).

The trips are available in the *Measurements - Historicals - Trip* menu in which the complete list is available; each trip is provided with useful information:

- the protection that caused the opening
- the consecutive number of the opening
- the date and time of the opening (referring to the inner clock)
- the measurements associated with the protection that has tripped



NOTE: if the 30 trip threshold has been exceeded, the older trips are progressively overwritten

Correlated measurements

The protection that trips causes the measurements recorded at the moment of opening:

Protection	Recorded measurements	Notes
Current	Currents <i>L1, L2, L3, Ne, Ig, Ige, Irc</i>	Ne is available in 4P configuration and 3P with neutral Ig is available in the event of a G trip protection Ige is available with <i>toroid S.G.R.</i> and trip for Gext protection Irc is available with <i>toroid RC</i>
Voltage	Currents <i>L1, L2, L3, Ne</i> , voltages <i>U12, U23, U31, U0</i>	U0 available in the event of a trip with 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 the protection tripped
Temperature	Currents <i>L1, L2, L3, Ne</i>	The temperature cannot be viewed from display.

Table 78: trip - measurements

Access to most recent trip

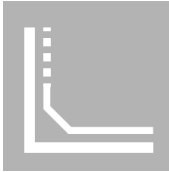
The information on the most recent trip cannot only be accessed in the *Historical* menu but can also be accessed in three different ways, depending on the Ekip UP conditions:

Condition	Access procedure and procedure
Trip just occurred with Ekip UP ON	The main page is temporarily replaced by the trip information page; press iTEST to reset and return to the normal page
Trip just occurred with Ekip UP switched off	Press iTEST to view trip information page for a few seconds
Rapid consultation in all the other conditions	From any page that is not a menu or a page opened by a menu, press iTEST buttons four times.

Table 79: trip – info access

Protections

Operating principle



The protection functions are available with the Ekip UP Protect, Protect+ and Control+ versions.

Each protection is combined with a different signal (current, voltage, frequencies, powers, etc) but the operating principle is the same:

1. If the measured signal exceeds the set **threshold**, the specific protection is activated (pre-alarm and/or **alarm**).
2. The **alarm** is displayed and depending on the set protection parameters, after an interval of time (timing), it may be converted into an **open command (TRIP)**.
3. The TRIP is combined with one or more unit contacts in order to be able to command external actuators/contactors and interrupt the electric network



NOTE:

- if the measured signal returns below the set threshold before the trip time has lapsed, Ekip UP exits alarm and/or timing status and returns to normal operating condition.
- all the protections have a default configuration: check the parameters and modify according to plant needs before commissioning

References

Many protection thresholds are shown on Ekip UP in 2 different parameters: as absolute and relative values.

The relative value depends on the type of measurement:

Type of protection	Reference	Description
Current	In	Rated current of the rating plug
Voltage	Un	Set network voltage
Frequency	fn	set frequency
Power	Sn	$\sqrt{3} \times I_n \times U_n$

Table 80: protection references

Open/close commands and status contacts

Presentation

In order to optimize the trip protections, Ekip UP manages:

- command contacts (outputs: open and close command), for actuators for interrupting the supply line
- status contacts (inputs: open and closed) to confirm the outcome of the command

Following a command, Ekip UP waits for the actuator to switch and supply the correct information on the status change; if the information is incorrect, Ekip UP sends the alarm.

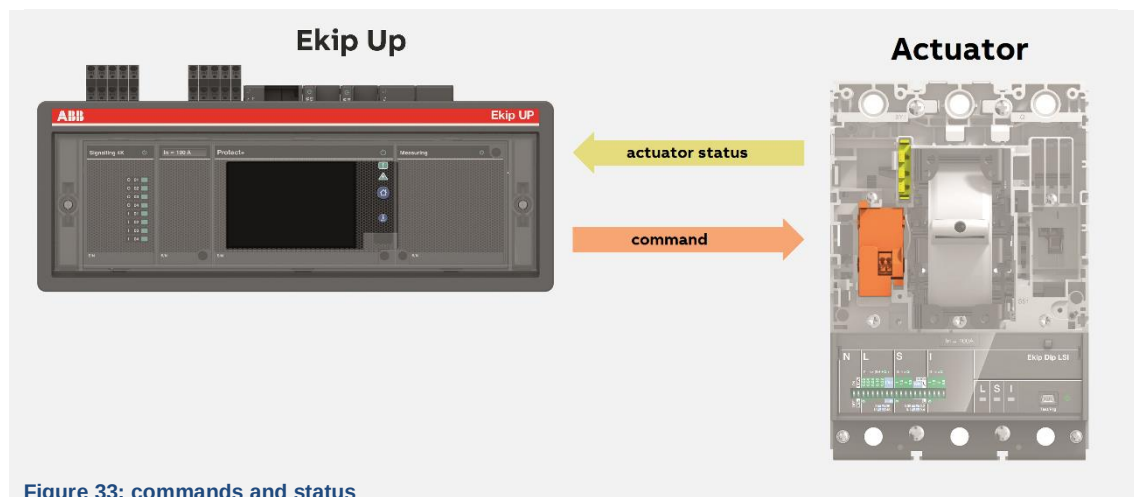


Figure 33: commands and status

Open/close commands and status contacts [2]

Open command

Ekip UP in the Protect, Protect+ and Control+ versions is always supplied with the O 01 contact of the *Ekip Signalling 4K* module configured to manage the open command (*YO Command*) of all the protections.

The contact is normally one; following a TRIP, the contact is closed for at least 200ms.

The contact manages external actuators that have the following electrical characteristics:

Characteristic	Maximum limit
Maximum switchable voltage	150 VDC / 250 VAC.
Switching power	2 A @ 30 VDC, 0.8 A @ 50 VDC, 0.2 A @ 150 VDC, 4A @ 250 VAC

Table 81: opening commands



NOTE:

- valid table data with resistive load
- the electrical characteristics between the contacts as described for Ekip Signalling 4K module on page 136

Close command

Ekip UP in the Protect, Protect+ and Control+ versions is always supplied with the O 02 contact of the *Ekip Signalling 4K* module configured to manage the closed command (*YC Command*) of external actuators in the prescribed cases (programmed commands, tests).

It is nevertheless possible to deactivate the configuration of the contact as a *Close command* in the *Settings - Digital unit - Breaker connections* menu (page 121).

The functional characteristics described for the open command on contact O 01 apply.

Status contact (open and closed)

Ekip UP in the Protect, Protect+ and Control+ versions is supplied with the contact I 01 and I 02 of the *Ekip Signalling 4K* module that are configured for reading the status of the actuator that are commanded by the unit.

There are two configurations for managing the contacts and the combined information.

Config	Contact	Contacts characteristics	Info with short circuit ⁽³⁾	Info with open circuit ⁽³⁾
A ⁽¹⁾	I 01	Configured for status reading: Open	Open	--
	I 02	Configured for status reading: Closed	Closed	--
B ⁽²⁾	I 01	Configured for status reading: Open/Closed	Open	Closed
	I 02	Free (programmable by user)	--	--

Table 82: status contact



NOTES:

- (1) can be used if the actuator has two contacts; each referring to a different status; if Ekip UP receives information simultaneously on Open and Closed status it reports the glitch as "Unit not defined"
- (2) can be used if the actuator has only one contact referring to the Open status; the non Open condition is interpreted by Ekip UP as a status: Closed
- (3) valid informations with inputs configured as Active close (default); the inputs can also be confired as Active open, in the unit menu

If not requested (during ordering phase) Ekip UP is supplied in configuration A.

It is nevertheless possible to deactivate the configuration of both inputs as *Status contacts* in the *Settings - Digital Unit - Breaker Connections* menu (page 121).

Connections

Check the electrical diagram 1SDM000116R0001 for the connections of the contacts.

19 - Current protections

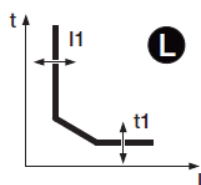
List The current protections are:



Name	Type of protection	Protect	Protect+	Control+	Page
L	Long time-delay overloads	☒	☒	☒	64
S	Selective short circuit	☒	☒	☒	65
I	Instantaneous short circuit	☒	☒	☒	66
G	Earth fault with adjustable delay	☒	☒	☒	67
MCR	Instantaneous short circuit when switch is closed	☒	☒	☒	68
2I	Programmable instantaneous short circuit	☒	☒	☒	69
IU	Current unbalance	☒	☒	☒	70
Neutral	Different protection on the neutral phase	☒	☒	☒	70
RC	Residual current	☒	☒	☒	71
Gext	External earth fault with adjustable delay		☒	☒	71
S2	Short circuit with adjustable delay		☒	☒	73
D	Directional short circuit with adjustable delay		☒	☒	74
S(V)	Short circuit with voltmeter control		☒	☒	76
S2(V)	Short circuit with voltmeter control		☒	☒	77

Table 83: current protections

Protection L



Function

If the current of one or more phases exceeds threshold I1 the protection is tripped and after a time determined by the read value and by the set parameters the protection sends the open command (page 61).

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

- table summarizing protections with calculation formulas (page 102)
- graph with trip curve (page 104-106)

Parameters

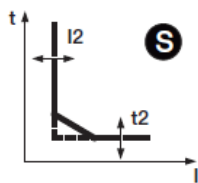
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Curve</i>	Determines curve dynamic and calculation of trip time: • $t=k/I^2$ in accordance with IEC 60947-2 • IEC 60255-151 SI • IEC 60255-151 VI • IEC 60255-151 EI • $t=k/I^4$ in accordance with 60255-151	$t= k/I^2$
<i>Threshold I1</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.4 In - 1In with 0.001 In step.	1 In
<i>Time t1</i>	Contributes to calculating trip time. The value is expressed in seconds, which are settable in a range: 3 s - 144 s, with 1 s step.	144 s
<i>Thermal memory</i>	Activates/deactivates the thermal memory function, see page 78 for details  NOTE: the function is available only with a curve $t=k/I^2$	OFF
<i>Pre-alarm I1</i>	Enables a warning to be sent that the measured current is near the threshold triggering the protection. The value is expressed as a percentage of the threshold I1, which is settable in a range 50 % I1 - 90 % I1, with 1 % step. The pre-alarm threshold is deactivated in two cases: • current below pre-alarm threshold I1 • current above threshold I1	90 % I1

Table 84: L protection

Constraints, limits and additional functions

- threshold I1 must be lower than threshold I2 (if the protections L and S are active)
- the trip time of the protection is forced at 1 s if the calculated theoretical value is lower and/or if the read current is higher than 12 In

Protection S



Function

If the current of one or more phases exceeds threshold I_2 the protection is tripped and after a time determined by the read value and by the set parameters sends the open command (page 61).

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

- table summarizing protections with calculation formulas (page 102)
- graph with trip curve (page 107)

Parameters

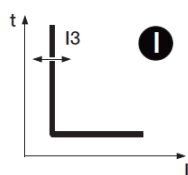
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	ON
<i>Function</i>	Determines the curve dynamic and threshold or the calculation of trip time: • $t = k$: trip at set time • $t = k/I^2$: dynamic inverse time-delay trip	$t = k$
<i>Threshold I_2</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: $0.6 I_n - 10 I_n$ with $0.1 I_n$ step.	$2 I_n$
<i>Time t_2</i>	Depending on the type of curve selected, this is the trip time or contributes to calculating timing. The value is expressed in seconds, which are settable in a range: $0.05 \text{ s} - 0.8 \text{ s}$, with 0.01 s step.	0.05 s
<i>Thermal memory</i>	Activates/deactivates the thermal memory function, see page 78 for details NOTE: the function is available only with a curve $t = k/I^2$	OFF
<i>Zone Selectivity</i>	Activates/deactivates the function and the display availability of selectivity time, see page 79 for details NOTE: the function is available only with versions Protect+ or Control+ and curve $t = k$	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function active and the selectivity input not present see page 79 for details The value is expressed in seconds, which are settable in a range: $0.04 \text{ s} - 0.2 \text{ s}$, with 0.01 s step.	0.04 s
<i>StartUp enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 81 for details	OFF
<i>StartUp threshold</i>	Protection threshold valid during Startup time, in conditions in which the function is active, see page 81 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: $0.6 I_n - 10 I_n$ with $0.1 I_n$ step.	$0.6 I_n$
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, set details on page 81 The value is expressed in seconds, which are settable in a range: $0.1 \text{ s} - 30 \text{ s}$, with 0.01 s step.	0.1 s

Table 85: S protection

Constraints, limits and additional functions

- threshold I_2 must be higher than threshold I_1 (if the protections L and S are active)
- with curve $t = k/I^2$, the protection trip time is forced to t_2 if calculations show a theoretical value lower than t_2 .
- From the service connector (via Ekip Connect) or with a system bus communication, also locking functions and selectivity type can be accessed, see page 81

Protection I



Function

If the current of one or more phases exceeds threshold I3 the protection is tripped and after a set non-programmable time, it sends the open command (page 61).

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

- table summarizing the protections with the operating characteristics (page 102)
- graph with trip curve (page 108)

Parameters

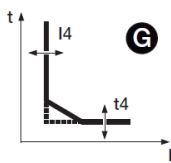
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Threshold I3</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 1.5 In - 15In with 0.1 In step .	4 In
<i>StartUp Enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 81 for details	OFF
<i>StartUp threshold</i>	Protection threshold valid during Startup time, in conditions in which the function is active, see page 81 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 1.5 In - 15In with 0.1 In step .	1.5 In
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, set details on page 81 The value is expressed in seconds, which are settable in a range: 0.1 s - 30 s, with 0.01 s step.	0.1 s

Table 86: I protection

Constraints, limits and additional functions

- threshold I3 must be higher than threshold I2 (if the protections S and I are active)
- protection I can be activated with MCR disabled
- from the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 81

Protection G



Function

Ekip UP calculates the vector sum of the phase currents (L1, L2, L3, Ne) to obtain the inner earth fault current (I_g): if the current I_g exceeds threshold I_4 the protection is tripped and after a time determined by the read value and by the set parameters it sends the open command (page 61).

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

- table summarizing protections with calculation formulas (page 102)
- graph with trip curve (page 108)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	ON
<i>Function</i>	Determines the curve dynamic and threshold or the calculation of trip time: • $t = k$: trip at set time • $t = k/I^2$: dynamic inverse time-delay trip	$t = k$
<i>Threshold I_4</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (I_n), settable in a range: $0.1 I_n - 1 I_n$ with $0.001 I_n$ step.	$0.2 I_n$
<i>Time t_4</i>	On the basis of the selection of the curve type, it is the trip time and contributes to calculating timing. The value is expressed in seconds, which are settable in a range: $0.1 s - 1 s$ with $0.1 s$ step <i>NOTE: with curve: $t = k$, t_4 can also be configured as: instantaneous; in this mode the trip time is comparable with the trip time declared for protection I, see page 101 for details</i>	$0.4 s$
<i>Pre-alarm I_4</i>	Enables a warning to be sent that the measured current is near the threshold triggering the protection. The value is expressed as a percentage of the threshold I_1 , which is settable in a range $50 \% I_4 - 90 \% I_4$, with 1% step. The pre-alarm threshold is deactivated in two cases: • current below pre-alarm threshold I_4 • current above threshold I_4	$90 \% I_4$
<i>Zone Selectivity</i>	Activates/deactivates the function and the display availability of selectivity time, see page 79 for details <i>NOTE: the function is available only with versions Protect+ or Control+ and curve $t = k$</i>	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function active and the selectivity input not present see page 79 for details The value is expressed in seconds, setting in a range: $0.04 s - 0.2 s$ with $0.01 s$ step	$0.04 s$
<i>StartUp enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 81 for details	OFF

Table 87: G protection 1

Protection G [2]

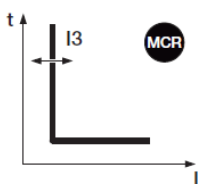
Parameter	Description	Default
<i>StartUp threshold</i>	Protection threshold valid during Startup time, in conditions in which the function is active, see page 81 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.2 In - 1In with 0.1 In step.	0.2 In
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, set details on page 81 The value is expressed in seconds, which are settable in a range: 0.1 s - 30 s, with 0.01 s step.	0.1 s

Table 88: G protection 2

Constraints, limits and additional functions

- with curve $t = k/I^2$, the protection trip time is forced to t_4 if calculations show a theoretical value lower than t_4 .
- in the absence of Vaux and with threshold $I_4 < 100$ A, threshold is forced by unit to 100 A and the error "Configuration" is displayed
- depending on the set threshold I_4 , the protection is deactivated for I_g greater than:
8 In with threshold $I_4 \geq 0.8$ In; 6 In with 0.8 In $> I_4 \geq 0.5$ In; 4 In 0.5 In $> I_4 \geq 0.2$ In; 2 In with $I_4 > 0.2$ In
- from the service connector (via Ekip Connect) or with a system bus communication, also locking functions and selectivity type can be accessed, see page 81

MCR Protection



Function

The protection is active for an interval of time starting with the change from open $\Rightarrow$ to closed status and then switches off.

If the current of one or more phases exceeds threshold I_3 during this interval, after a set non-programmable time the protection sends the open command (page 61).

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

- table summarizing the protections with the operating characteristics (page 102)
- graph with trip curve (page 108)



NOTE: to activate MCR, protection I must be disabled

Parameters

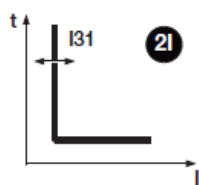
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Threshold I3</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 1.5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

Table 89: MCR protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 81

Protection 2I



Function

If the current of one or more phases exceeds threshold I31 and the activation event is present, after a set non-programmable time the protection sends the open command (page 61).

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

- table summarizing the protections with the operating characteristics (page 102)
- graph with trip curve (page 108)

Parameters

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

Table 90: 2I protection 1

Enabling the protection makes the section *2I Mode* in the *Advanced - Functions* menu available in which it is possible to configure the activation event of the protection:

Parameter	Description	Default
<i>Activation</i>	Two modes are available that are alternatives to one another: • <i>Dependent function</i>: the protection is active if the programmed activation even has occurred; this configuration makes the function and delay parameters available. • <i>Active</i>: the protection is always active	Dependent function
<i>Function</i>	The activation event can be selected from the input contacts of <i>Ekip Signalling 4K</i> and <i>Ekip Signalling 2K</i> , the unit status (open/closed) and the Custom function <i>i</i> NOTE: <i>Ekip Connect</i> enables the Custom function to be customized to combine the activation event with up to eight statuses in AND or OR configuration	Disabled
<i>Delay</i>	Protection activation delay calculated from the presence of the activation event. The value is expressed in seconds, settable in a range: 0 s - 100 s, with 0.1 s step. <i>i</i> NOTE: <i>the protection is activated if the event is present for a time greater than the set delay</i>	0 s

Table 91: 2I protection 2

Remote commands

With the unit connected to one or more Ekip Com modules, two further temporary activation/deactivation commands are available from remote:

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

Consult the System Interface of unit 1SDH002003A1006 for details.

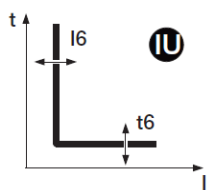


NOTE: *if the protection has been activated by the 2I Mode ON command, it is deactivated by the 2I Mode OFF command or when the unit switches off*

Signals

With the 2I protection active, in the Diagnosis bar and on the Alarms List page the message "2I active" and appears and the alarm LED is ON and shines with a fixed light.

Protection IU



Function

The protection is activated in the event of an unbalance between the read currents; if the detected unbalance exceeds threshold I_6 for a longer time than t_6 , the protection sends the open command (page 61).

The protection cuts out in two cases:

- the measurement of at least one current is higher than $6 I_n$
- the maximum current value between the phases is less than $0.3 I_n$

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

- table summarizing the protections with the operating characteristics (page 102)
- graph with trip curve (page 109)

Parameters

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

Table 92: IU protection

Neutral Protection

Function

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

The protection is available with 4P configuration and 3P with neutral; the configuration parameters are accessible from *Settings* menu (page 40).

Parameters

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

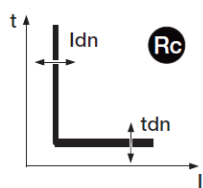
Table 93: neutral protection

Constraints, limits and additional functions

Ekip UP rejects modification of thresholds I_1 and I_n if the following constraint is not respected: $(I_1 \times I_n) \leq \text{sensors size}$

- I_1 is threshold of the protection L in Ampere (e.g.: $I_n = 1000 \text{ A}$ and $I_1 = 0.6 \Rightarrow I_1 = 600 \text{ A}$)
- I_n is the neutral threshold expressed as a multiple factor (e.g.: $I_n = 200 \% \Rightarrow I_n = 2$)
- Sensors Size is the size of the sensors connected to Ekip UP (e.g.: 2000 A).

RC Protection



Function

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

If the current from the RC toroid exceeds threshold I_{dn} for a longer time than T_{dn} , the protection sends the open command (page 61).

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

- table summarizing the protections with the operating characteristics (page 102)
- graph with trip curve (page 110)

Parameters

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

Table 94: Rc protection

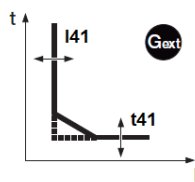
Constraints, limits and additional functions

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

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

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

Gext protection



Function

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

If the current from *toroid S.G.R* exceeds threshold I_{41} the protection is tripped and after a time determined by the read value and by the set parameter, it sends the open command (page 61).

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

- table summarizing the protections with the operating characteristics (page 102)
- graph with trip curve (page 108)

Parameters

The configuration of the sensor is available in the *Settings* menu (page 40):

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

Table 95: Gext protection 1

The configuration of the protection è available on the *Advanced* menu (page 38):

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	ON
<i>Function</i>	Determines the curve dynamic and threshold or the calculation of trip time: • $t = k$: trip at set time • $t = k/I^2$: dynamic inverse time-delay trip	$t = k$

Table 96: Gext protection 2

Gext protection
[2]

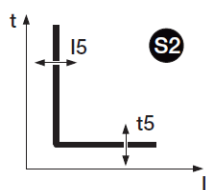
Parameter	Description	Default
<i>Threshold I41</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In, referring to the size of the outer toroid), settable in a range: 0.1 In - 1In with 0.001 In step.	0.2 In
<i>Time t41</i>	On the basis of the selection of the curve type, it is the trip time and contributes to calculating timing. The value is expressed in seconds, settable in a range: 0.1 s - 1 s, with 0.05 s step.	0.4 s
<i>Pre-alarm I41</i>	Enables a warning to be sent that the measured current is near the threshold triggering the protection. The value is expressed as a percentage of the threshold I41, which is settable in a range 50 % I41 - 90 % I41, with 1 % step. The pre-alarm threshold is deactivated in two cases: - current below the prealarm threshold I41 - current above threshold I41	90 % I41
<i>Zone Selectivity</i>	Activates/deactivates the function and the display availability of selectivity time, see page 79 for details  NOTE: - the function is available only with versions Protect+ or Control+ and curve $t = k$ - in the presence of both G and Gext active selectivity, the inlet and output are shared with an OR function: it is also sufficient for just one of the two to be activated to stimulate inputs and outputs	OFF
<i>Selectivity time</i>	This is the trip time of the protection with the zone selectivity function active and the selectivity input not present see page 79 for details The value is expressed in seconds, settable in a range: 0.04 s - 0.2 s, with 0.01 s step.	0.04 s
<i>StartUp enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 81 for details	OFF
<i>StartUp threshold</i>	Protection threshold valid during Startup time, in conditions in which the function is active, see page 81 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.2 In - 1In with 0.1 In step	0.2 In
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, set details on page 81 The value is expressed in seconds, settable in a range: 0.1 s - 30 s, with 0.01 s step.	0.1 s

Table 97: Gext protection 3

Constraints, limits and additional functions

- with curve $t = k/I^2$, the protection trip time is forced to t41 if calculations show a theoretical value lower than t41.
- Ekip UP activates and shows the parameters of the Gext protection if the presence of the S.G.R sensor has been enabled on the Settings menu (page 40); the activation of the protection includes checking for the presence of the S.G.R and the indication on the diagnosis bar in the event of alarm/absence
- the protection is inhibited automatically by the unit if the absence of the S.G.R. toroid has been detected.
- from the service connector (via Ekip Connect) or with a system bus communication, also locking functions and selectivity type can be accessed, see page 81

Protection S2



Function

The S2 protection acts as the S protection: if the current of one or more phases exceeds threshold I_5 for a longer time than t_5 , the protection is tripped and sends the open command (page 61).



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

It is independent of the S protection and it is thus possible to program thresholds and functions of the two protections to use different plant solutions (e.g.: signalling with S and open command with S2 or vice versa, or both in signalling or trip status).

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

- table summarizing protections with calculation formulas (page 102)
- graph with trip curve (page 107)

Parameters

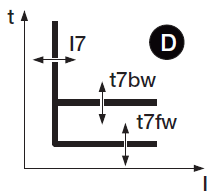
Parameter	Description	Default
Enable	Enables/disables protection and availability on menu of the parameters	OFF
Trip Enable	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	ON
Threshold I_5	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (I_n), settable in a range: $0.6 I_n - 10 I_n$ with $0.1 I_n$ step.	$2 I_n$
Time t_5	This is the trip time of the protection. The value is expressed in seconds, settable in a range: $0.05 \text{ s} - 0.8 \text{ s}$, with 0.01 s step.	0.05 s
Zone Selectivity	Activates/deactivates the function and the display availability of selectivity time, see page 79 for details  in the presence of both S and S2 active selectivity, the input and output are shared with an OR function: it is also sufficient for just one of the two to be active to stimulate inputs and outputs	OFF
Selectivity time	This is the trip time of the protection with the zone selectivity function active and the selectivity input not present see page 79 for details The value is expressed in seconds, which are settable in a range: $0.04 \text{ s} - 0.2 \text{ s}$, with 0.01 s step.	0.04 s
Startup enable	Activates/deactivates the function and display availability of the combined parameters, see page 81 for details	OFF
Startup threshold	Protection threshold valid during Startup time, in conditions in which the function is active, see page 81 for details The value is expressed both as an absolute value (Ampere) and as a relative value (I_n), settable in a range: $0.6 I_n - 10 I_n$ with $0.1 I_n$ step.	$2 I_n$
Startup time	This is the time for which the Startup threshold is active, calculated from tripping of activation threshold, see page 81 for details The value is expressed in seconds, which are settable in a range: $0.1 \text{ s} - 30 \text{ s}$, with 0.01 s step.	0.1 s

Table 98: S2 protection

Constraints, limits and additional functions

- threshold I_5 must be higher than threshold I_1 (if the protections L and S2 are active) from the service connector (via Ekip Connect) or with a system bus communication, also locking functions and selectivity type can be accessed, see page 81

Protection D Function



The protection D is very similar to the protection S but can also recognize the direction of the current during the fault period.

The direction of the current enables it to be detected whether the fault is upstream or downstream of the device controlled by Ekip UP (for example: switch).

In closed loop distribution systems the protection D enables the distribution portion to be identified where the fault occurred and enables the portion to be sectioned without affecting the rest of the plant (by using zone selectivity).

Depending on the direction of the fault, if the current of one or more phases exceeds threshold $I7$ (fw or bw) for a longer time than $t7$ (fw or bw), the protection is activated and sends the open command (page 61).

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



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

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

Table 99: D protection 1

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

- table summarizing calculation formulas (page 102)
- graph with trip curve (page 110)

Parameters

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

Table 100: D protection 2

Protection D [2]

Parameter	Description	Default
<i>Zone Selectivity</i>	Activates/deactivates the function and the display availability of selectivity time, see page 80 for details  NOTE: for correct operation of selectivity D, configure OFF selectivity S, S2, G and Gext	OFF
<i>Fw selectivity time</i>	This is the trip time of the protection with the zone selectivity function active, forward direction and selectivity input Fw not present, see page 80 for details The value is expressed in seconds, which are settable in a range: 0.1 s - 0.8 s, with 0.01 s step.	0.13 s
<i>Bw selectivity time</i>	This is the trip time of the protection with the zone selectivity function active, backward direction and selectivity input Bw not present, see page 80 for details The value is expressed in seconds, which are settable in a range: 0.1 s - 0.8 s, with 0.01 s step.	0.13 s
<i>StartUp enable</i>	Activates/deactivates the function and display availability of the combined parameters, see page 81 for details	OFF
<i>StartUp threshold Fw</i>	Protection threshold valid during Startup time, in the conditions in which the function is active and with forward current direction, see page 81 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In - 10In with 0.1 In step.	2 In
<i>StartUp threshold Bw</i>	Protection threshold valid during Startup time, in the conditions in which the function is active and with backward current direction, see page 81 for details The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In - 10In with 0.1 In step.	2 In
<i>StartUp time</i>	This is the time for which the StartUp threshold is active, calculated from tripping of activation threshold, set details on page 81 The value is expressed in seconds, which are settable in a range: 0.1 s - 30 s, with 0.01 s step.	0.1 s
<i>Min Angle Direction</i>	Ekip UP calculates the phase displacement angle between measured reactive power and measured power: when the phase displacement becomes greater than the set <i>Min Angle Direction</i> parameter, the unit considers the fault direction The value is expressed in degrees, which are settable in a range of 15 values from 3.6 ° to 69.6 °	3.6 °

Table 101: D protection 3

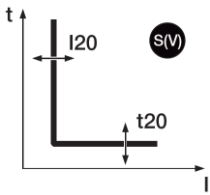
Constraints, limits and additional functions

- from the service connector (via Ekip Connect) or with a system bus communication, also locking functions and selectivity type and the *Trip only Forward* and *Trip Only Backward* parameters can be accessed, see page 78

Applicational Notes

- By activating direction protection D, the alarm is automatically activated that controls the phase sequence (which can be overridden and activated also manually): note that in the event of a cyclical sequence of the phases that is different from the set value, the direction protection reverses the reference direction in the case of a fault.
The details of the phase sequence protection are available on page 85.
- The behaviour of the direction protection is affected by small load overcurrents: in the event of capacitive load, to avoid the possibility of incorrect identification of the direction of the fault current, it is suggested that the adjustment of this protection refers to real fault conditions and not to overloads.

Protection S(V)



Function

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

If the current of one or more phases exceeds threshold I20 for a longer time than t20 the protection is activated and sends the open command (page 61).

Threshold I20, following a voltage sag, varies according to two different modes:

- **Scal** (scale) provides a scale variation according to the UI and Ks parameters.
- **Lin** (linear) provides a dynamic variation according to the parameters UI, Uh and Ks.

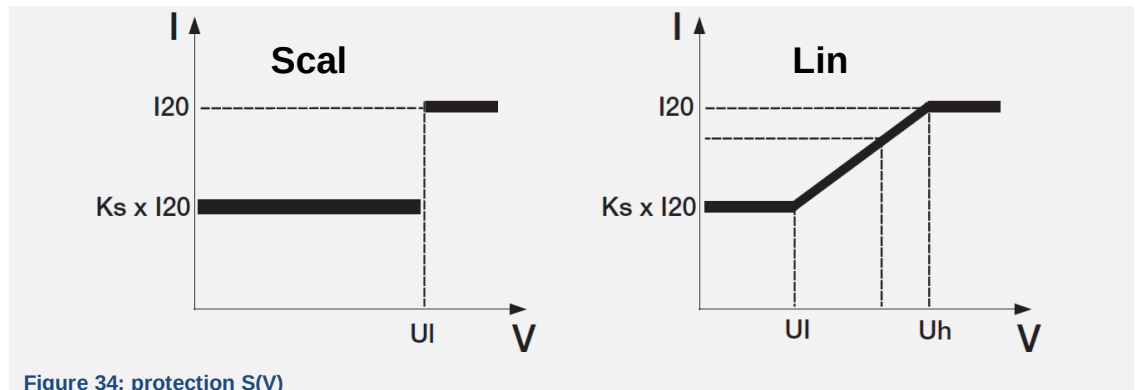


Figure 34: protection S(V)

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

- table summarizing protections with calculation formulas (page 102)
- graph with trip curve (page 111)

Parameters

Parameter	Description	Default													
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF													
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF													
<i>Function</i>	Enables the operating mode Scal or Lin to be selected:	Scal													
<i>Threshold I20</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In - 10In with 0.1 In step .	1 In													
<i>Threshold UI</i>	This voltage determines the change of the trip threshold I20, with different behaviour according to selective mode: <table border="1"> <thead> <tr> <th>Mod</th><th>Voltage read</th><th>Trip threshold</th></tr> </thead> <tbody> <tr> <td rowspan="2">Scal</td><td>< UI</td><td>Ks x I20</td></tr> <tr> <td>≥ UI</td><td>I20</td></tr> <tr> <td rowspan="2">Lin</td><td>< UI</td><td>Ks x I20</td></tr> <tr> <td>≥ UI (and < Uh)</td><td>$\frac{I20 \times (1 - Ks) \times (U_{mis} - Uh)}{Uh - UI} + I20$</td></tr> </tbody> </table> The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.2 Un - 1 Un with 0.01 Un step.	Mod	Voltage read	Trip threshold	Scal	< UI	Ks x I20	≥ UI	I20	Lin	< UI	Ks x I20	≥ UI (and < Uh)	$\frac{I20 \times (1 - Ks) \times (U_{mis} - Uh)}{Uh - UI} + I20$	1 Un
Mod	Voltage read	Trip threshold													
Scal	< UI	Ks x I20													
	≥ UI	I20													
Lin	< UI	Ks x I20													
	≥ UI (and < Uh)	$\frac{I20 \times (1 - Ks) \times (U_{mis} - Uh)}{Uh - UI} + I20$													
<i>Threshold Uh</i>	The parameter is shown with a Lin curve and helps to calculate the trip threshold I21: <table border="1"> <thead> <tr> <th>Mod</th><th>Voltage read</th><th>Trip threshold</th></tr> </thead> <tbody> <tr> <td rowspan="2">Lin</td><td>< Uh (and ≥ UI)</td><td>The threshold varies gradually (see above)</td></tr> <tr> <td>≥ Uh</td><td>I20</td></tr> </tbody> </table> The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.2 Un - 1 Un with 0.01 Un step.	Mod	Voltage read	Trip threshold	Lin	< Uh (and ≥ UI)	The threshold varies gradually (see above)	≥ Uh	I20	1 Un					
Mod	Voltage read	Trip threshold													
Lin	< Uh (and ≥ UI)	The threshold varies gradually (see above)													
	≥ Uh	I20													

Table 102: S(V) protection 1

Protection S(V) [2]

Parameter	Description	Default
<i>Threshold Ks</i>	Threshold I20 calculation constant. The value is expressed as a percentage value of the threshold I20, which is settable in a range: 0.1 xI20 - 1 xI20 with 0.01 step.	0.6 xI20
<i>Time t20</i>	This is the trip time of the protection. The value is expressed in seconds, which are settable in a range: 0.05 s - 30 s, with 0.01 s step.	0.1 s

Table 103: S(V) protection 2

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page81

Protection S2(V)

Function

The protection S2(V) operates like protection S(V) and protects against short circuits, with threshold sensitive to the value of the voltage.

It is independent of the S(V) protection and it is thus possible to program thresholds and functions of the two protections to use different plant solutions (e.g.: signalling with S(V) and open command with S2(V) or vice versa, or S(V) and S2(V) both in signalling or trip status).

If the current of one ore more phases exceeds threshold I21 for a longer time than t21, the protection is tripped and sends the open command (page 61).

The threshold I21, following a voltage sag, varies according to two different modes:

- **Scal** (scale) provides a scale variation according to the parameters UI2 and Ks2.
- **Lin** (linear) provides a dynamic variation according to the parameters UI2, Uh2 and Ks2.

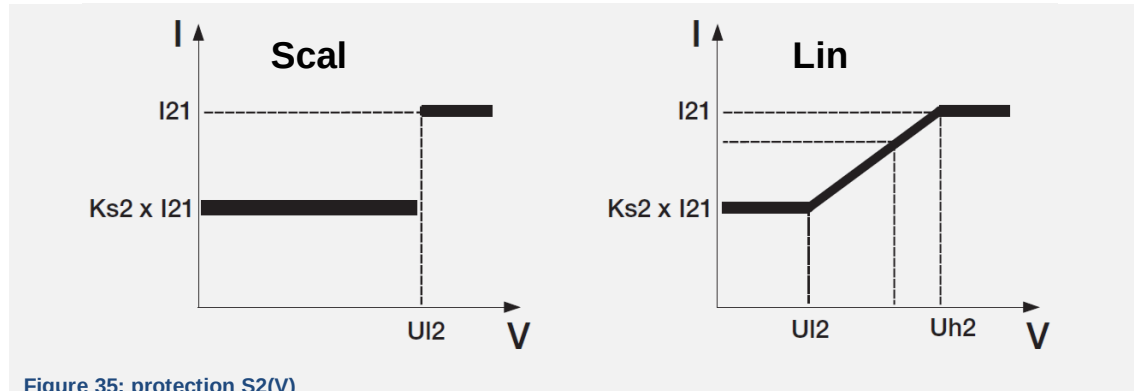
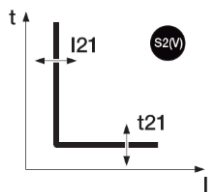


Figure 35: protection S2(V)

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

- table summarizing calculation formulas (page 102)
- graph with trip curve (page 111)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Function</i>	Enables the operating mode Scal or Lin to be selected:	Scal
<i>Threshold I21</i>	Defines the value that activates protection and contributes to calculating trip time. The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.6 In - 10In with 0.1 In step .	1 In

Table 104: S2(V) protection 1

Protection S2(V) [2]

Parameter	Description	Default													
Threshold $UI2$	This voltage determines the change of the trip threshold I21, with different behaviour according to the selected mode: <table border="1"> <thead> <tr> <th>Mod</th><th>Voltage read</th><th>Trip threshold</th></tr> </thead> <tbody> <tr> <td rowspan="2">Scal</td><td>< $UI2$</td><td>$Ks2 \times I21$</td></tr> <tr> <td>$\geq UI2$</td><td>$I21$</td></tr> <tr> <td rowspan="2">Lin</td><td>< $UI2$</td><td>$Ks \times I21$</td></tr> <tr> <td>$\geq UI2$ (and < $Uh2$)</td><td>$\frac{I21 \times (1 - Ks2) \times (U_{mis} - Uh2)}{Uh2 - UI2} + I21$</td></tr> </tbody> </table> The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.2 Un - 1 Un with 0.01 Un step.	Mod	Voltage read	Trip threshold	Scal	< $UI2$	$Ks2 \times I21$	$\geq UI2$	$I21$	Lin	< $UI2$	$Ks \times I21$	$\geq UI2$ (and < $Uh2$)	$\frac{I21 \times (1 - Ks2) \times (U_{mis} - Uh2)}{Uh2 - UI2} + I21$	1 Un
Mod	Voltage read	Trip threshold													
Scal	< $UI2$	$Ks2 \times I21$													
	$\geq UI2$	$I21$													
Lin	< $UI2$	$Ks \times I21$													
	$\geq UI2$ (and < $Uh2$)	$\frac{I21 \times (1 - Ks2) \times (U_{mis} - Uh2)}{Uh2 - UI2} + I21$													
Threshold $Uh2$	The parameter is shown with a Lin curve and helps to calculate the trip threshold I21: <table border="1"> <thead> <tr> <th>Mod</th><th>Voltage read</th><th>Trip threshold</th></tr> </thead> <tbody> <tr> <td rowspan="2">Lin</td><td>< $Uh2$ (and $\geq UI2$)</td><td>The threshold varies gradually (see above)</td></tr> <tr> <td>$\geq Uh2$</td><td>$I21$</td></tr> </tbody> </table> The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.2 Un - 1 Un with 0.01 Un step.	Mod	Voltage read	Trip threshold	Lin	< $Uh2$ (and $\geq UI2$)	The threshold varies gradually (see above)	$\geq Uh2$	$I21$	1 Un					
Mod	Voltage read	Trip threshold													
Lin	< $Uh2$ (and $\geq UI2$)	The threshold varies gradually (see above)													
	$\geq Uh2$	$I21$													
Threshold $Ks2$	Threshold I21 calculation constant. The value is expressed as a percentage value of the threshold I21, which is settable in a range: 0.1 xI21 - 1 xI21 with 0.01 step.	0.6 xI21													
Time $t21$	This is the trip time of the protection. The value is expressed in seconds, which are settable in a range: 0.05 s - 30 s, with 0.01 s step.	0.1 s													

Table 105: S2(V) protection 2

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 81

Thermal memory L and S

The function enables overheating of the cables to be prevented that are connected to the device controlled by Ekip UP: in the event of several open commands in close succession, the unit considers the time elapsed between the commands and the size of the faults to reduce the trip time.



NOTE: the function modifies the trip time also in the event of overloads that have not triggered an Open command

Trip Only Forward and Backward

From the service connector (via Ekip Connect) or with communication by system bus, protection D can be configured with 2 further parameters:

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

A possible fault in the opposite direction is managed only as an alarm message.

Type of selectivity S, S2, G, Gext, D

From the service connector (via Ekip Connect) or with a system bus communication, the zone selectivity inputs and some outputs can be configured:

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



IMPORTANT: in Customized configuration, the only event that can activate zone selectivity is the set event and accordingly standard selectivity operation is not active (change should be made only by expert technical staff)

Zone selectivity S, S2, G, Gext

Introduction

The function enables several devices to be connected together that belong to the same plant, including Ekip UP, to improve management of the trip commands in the event of S, S2, G and Gext protections.

The function enables the devices to be coordinated in such a manner that in the event of a fault:

- the device intervenes nearer the fault.
- The other devices are locked for a programmable time.



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

Characteristics

Ekip UP has 5 selectivity connections:

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

Table 106: zone selectivity - contacts

Configuration

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

1. Connect zone selectivity outputs of the same type (e.g.: Szo) devices belonging to the same zone selectivity input zone as the device immediately upstream (e.g.: Szi).
2. Connect together all the Szcs of the devices of the same network.
3. The t2 has to be configured at a value that is greater than or the same as t2 sel + 50 ms, excluding the device further downstream in its network

Logic table

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



NOTE:

- the table shows the case of protection S but is also valid for the other protections: G, S2 and Gext, each with the respective connections
- if the protection selectivities are active simultaneously that share the same connections (e.g.: S and S2), the inputs/outputs are managed with an OR logic: configure carefully the protection parameters to avoid undesired openings

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

Table 107: zone selectivity - conditions

Zone selectivity D Introduction

The function enables several devices to be connected together that belong to the same plant, including Ekip UP, to improve management of the trip commands in the event of protections D. It is particularly useful in closed-loop and grid systems where not only the zone but also the direction of the power flow supplying the fault has to be defined.

The function enables the devices to be coordinated in such a manner that in the event of a fault:

- the device intervenes nearer the fault.
- The other devices are locked for a programmable time.



NOTE:

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

Characteristics

Ekip UP has 5 selectivity connections:

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

Table 108: D zone selectivity - contacts

Configuration

For correct configuration of selectivity D in a closed-loop system:

1. Connect the selectivity output of each device (e.g.: DFin) at the selectivity input of the same direction as the device following on immediately (e.g.: DFout).
2. Connect together all the Szcs of the devices of the same network.

Logic table

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

If the **direction of the fault** is the same as the **reference direction** (see page 74 for details) the Forward output is activated; if the direction is the opposite direction, the Backward output is activated.

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

Table 109: Dzone selectivity - contions



NOTE: when the zone selectivity is activated, if the direction of the fault cannot be determined, the unit intervenes by considering the shorter of the programmed times t7 Fw and t7 Bw, without actuating any output (DFout or Dbout).

**Startup S, I, G,
Gext, S2, D**

The function enables the threshold of the protection (*StartUp threshold*) to be changed for a period that is settable by a user (*Startup time*).

The period is activated when a threshold (activation threshold) is passed, which is programmable by via Ekip Connect or by bus system, which is valid and checked for all the phase currents. The Startup condition lapses and reactivates when the activation threshold is next passed.



NOTE: the startup condition does not occur again until at least one current remains above the activation threshold level.

A graphic representation with protection S follows:

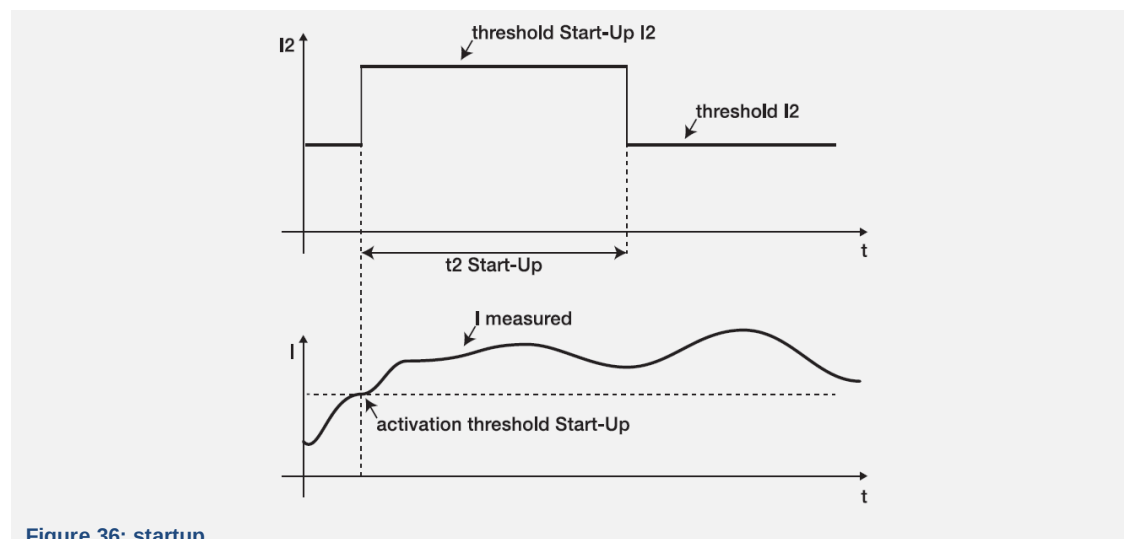


Figure 36: startup

**Block functions
for S, I, G, MCR,
Gext, S2, D, S(V),
S2(V)**

From the service connector (via Ekip Connect) or with a system bus communication, it is possible to configure for some protections six blocks, which are useful for deactivating the protection in function of programmable events:

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

Table 110: Block functions for currents

Each block is independent and has its own activation command (*Block On*), each protection must be configured with blocks (operation in OR logic condition).



IMPORTANT: the blocks can cause:

- increase of protection trip time (max: + 30 ms), owing to the check of the event (e.g.: frequency control)
- undesired deactivation of the protection, if the block is associated with statuses or signals with modules on local bus, and the auxiliary supply is absent. In this case, it can be useful to program the event by also considering the status of the auxiliary supply (Supply from Vaux).
- undesired deactivation of the protection, if the block is associated with frequency measurements and the voltage is below the minimum calculation threshold



IMPORTANT: during startup, the function is activated, the blocks are deactivated (except for BlockOnStartup that acts in this period)

20 - Voltage protections

List The voltage protections are:



Name	Type of protection	Protect	Protect+	Control+	Page
UV	Minimum voltage	☒	☒	☒	82
OV	Maximum voltage	☒	☒	☒	83
VU	Voltage unbalance	☒	☒	☒	83
UV2	Minimum voltage		☒	☒	84
OV2	Maximum voltage		☒	☒	84
RV	Residual voltage		☒	☒	85
Phase sequence	Incorrect phases sequence	☒	☒	☒	85

Table 111: voltage protections

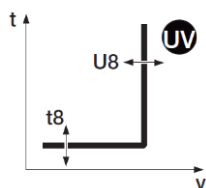
UV Protection

Function

If one or more network voltages read by the unit fall below threshold U_8 for a longer time than t_8 , the protection sends the open command (page 61).

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 111)



Parameters

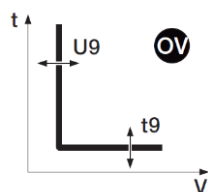
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold U_8</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Volt) and as a relative value (U_n), settable in a range: 0.05 U_n - 1 U_n with 0.001 U_n step	0.9 U_n
<i>Time t_8</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.05 s - 120 s, with 0.01 s step	5 s

Table 112: UV protection

Constraints, limits and additional functions

From the Ekip Connect connector or with a system bus connection, also locking functions can be accessed, see page 86

Protection OV



Function

If one or more network voltages read by the unit exceeds threshold U_9 for a longer time than t_9 , the protection sends the open command (page 61).

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 112)

Parameters

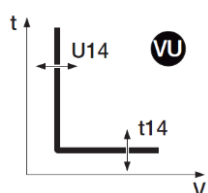
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold U_9</i>	Defines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

Table 113: OV protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 86

Protection VU



Function

The protection is activated in the event of an unbalance between the network voltages read by the unit; if the detected unbalance exceeds threshold U_{14} for a longer time than t_{14} , the protection sends the open command (page 61).

The protection excludes itself if the maximum network voltage value is less than $0.3 U_n$.

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 112)

Parameters

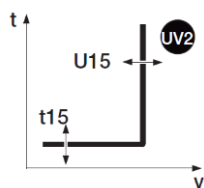
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold I_{14}</i>	Defines the unbalance value that activates the protection. The unbalance is expressed as a percentage value and is calculated as follows: $\% S_{bil} = 100 \times (\Delta_{\max} U_{mi}) / U_{mi}$ in a range: $2 \% - 90 \%$, with 1% step.  NOTE: $\Delta_{\max} U_{mi}$: maximum deviation between the three voltages by comparing each network voltage with the average value; U_{mi} : average value of the network voltages	50 %
<i>Time t_{14}</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: $0.5 \text{ s} - 60 \text{ s}$, with 0.5 s step	5 s

Table 114: VU protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 86

Protection UV2



Function

The UV2 protection acts as the UV protection: if one or more network voltages read by the unit fall below threshold U15 for a longer time than t15, the protection sends the open command (page 61).

It is independent of the UV protection and it is thus possible to program thresholds and functions of the two protections to use different plant solutions (e.g.: signalling with UV and open command with UV2 or vice versa, or both in signalling or trip status).

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 111)

Parameters

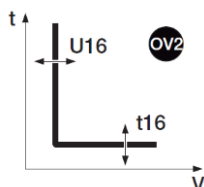
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold U15</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.05 Un - 1 Un with 0.001 Un step	0.9 Un
<i>Time t15</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.05 s - 120 s, with 0.01 s step	5 s

Table 115: UV2 protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 86

Protection OV2



Function

The UV2 protection acts as the UV protection: if one or more network voltages read by the unit exceed threshold U15 for a longer time than t16, the protection sends the open command (page 61).

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 112)

Parameters

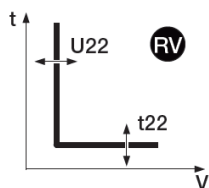
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold U16</i>	Defines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

Table 116: OV2 protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 86

Protection RV



Function

The protection is activated in the event of loss of insulation (check of residual voltage U0); if the voltage U22 exceeds the threshold U22 for a longer time than t2, the protection sends the open command (page 61).

The protection is still available in 4P configuration; by activating the presence of the neutral voltage on the Ekip Measuring module (page 140), the protection is available also with 3P configurations and 3P with neutral.

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 113)

Parameters

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

Table 117: RV protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 86

Phase sequence

The protection *Phase Sequence* trips when the sequence of the network voltages is not aligned on the sequence set by the user.

It is possible to set the desired sequence in the Settings menu (page 40) and activate the protection in the menu *Advanced* (page 38).

**Block functions
for UV, OV, VU,
UV2, VO2**

From the service connector (via Ekip Connect) or with a system bus communication, for certain protections five blocks can be configured that are used to deactivate the protection in function of programmable events:

Block name	Description
<i>BlockOnProgStatusA</i>	Active block if the programmable status A is true
<i>BlockOnProgStatusB</i>	Active block if the programmable status B is true
<i>BlockOnProgStatusC</i>	Active block if the programmable status C is true
<i>BlockOnProgStatusD</i>	Active block if the programmable status D is true
<i>BlockOnOutOfFrequency</i>	Active block if the measured frequency is outside the range 30 Hz-80 Hz

Table 118: Block functions for voltages

Each block is independent and has its own activation command (*Block On*), each protection must be configured with blocks (operation in OR logic condition).



IMPORTANT: the blocks can cause:

- increase of protection trip time (max: + 30 ms), owing to the check of the event (e.g.: frequency control)
- undesired deactivation of the protection, if the block is associated with statuses or signals with modules on local bus, and the auxiliary supply is absent. In this case it may be useful to program the event by also considering the status of the auxiliary supply (Supply from Vaux)
- undesired deactivation of the protection, if the block is associated with frequency measurements and the voltage is below the minimum calculation threshold

21 - Power protections

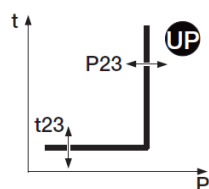
List The power protections are:



Name	Type of protection	Protect	Protect+	Control+	Page
UP	Active minimum power		☒	☒	87
OP	Active maximum power		☒	☒	88
RP	Reversal of active power	☒	☒	☒	88
RQ	Reversal of reactive power		☒	☒	88
OQ	Reactive maximum power		☒	☒	90

Table 119: power protection

UP Protection



Function

If one or more active voltages read by the unit falls below threshold P9 for more than t23, the protection sends the open command (page 61).

The protection is also active for negative active power (reversed power), but is independent of the RP protection (reversed active power protection).

The protection excludes itself if the maximum network voltage value is less than 30 V.

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 113)

Parameters

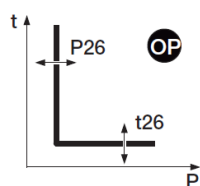
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold P23</i>	Defines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

Table 120: UP protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 91

Protection OP



Function

If one or more active voltages read by the unit exceeds threshold P9 for a longer time than t26, the protection sends the open command (page 61).

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 114)

Parameters

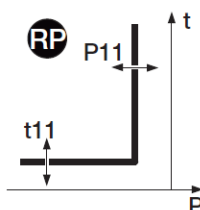
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold P26</i>	Defines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

Table 121: OP protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 91

Protection RP



Function

If total active power exceeds threshold P11 for a longer time than t1, the protection sends the open command (page 61).

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 114)

Parameters

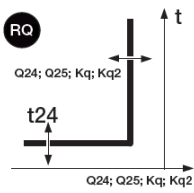
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold P11</i>	Defines the value that activates the protection. The value is expressed both as an absolute value (kW) and as a relative value (Sn), settable in a range: -0.05 Sn - -1 Sn with 0.001 Sn step  NOTE: threshold expressed in Sn preceded by the sign "-" to indicate that it is reversed power	-0.1 Sn
<i>Time t11</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.5 s - 100 s, with 0.1 s step	10 s

Table 122: RP protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 91

Protection RQ



Function

The protection RQ protects against a reversal of reactive power, with threshold that can be adjusted to the active power

When the reversed reactive power enters the TRIP area, which is determined by the protection parameters and by the read power, for a longer time than t_{24} the protection sends the open command (page 61).

Adjusting constants K_q and K_{q2} enables the trip threshold of the protection to be varied, the trip threshold is determined by the intersection of the two TRIP areas, the limits of which are a function of the parameters configured in the unit

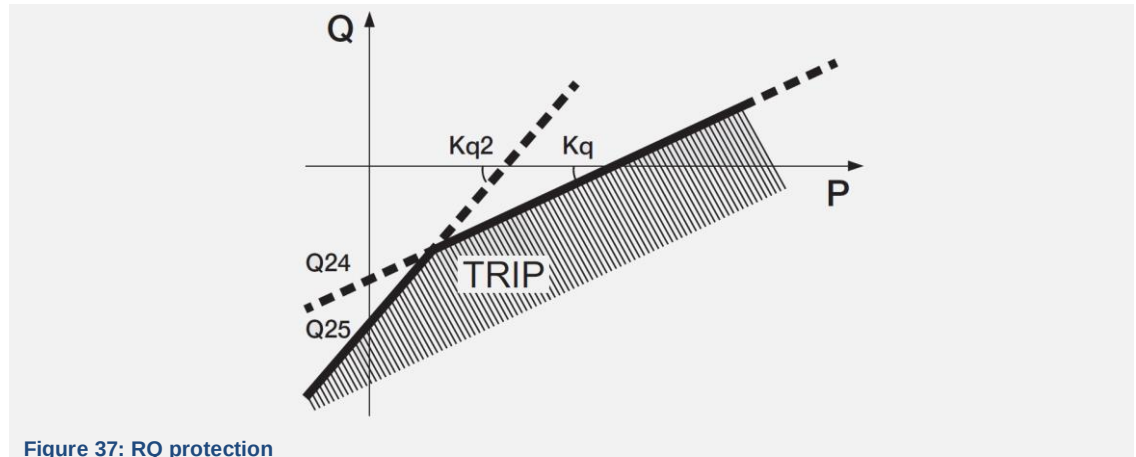


Figure 37: RQ protection

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 115)

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>K_q Threshold</i>	Defines the slope of the straight line in relation to the threshold Q24. The value is expressed as an absolute value (angular coefficient of the straight line), settable in a range: -2 - 2 with 0.01 step	-2
<i>-Q24 Threshold</i>	Is the reactive power that is necessary for defining the trip line and the relative TRIP area The value is expressed both as an absolute value (kVAR) and as a relative value (Sn), settable in a range: 0.1 Sn - 1 Sn with 0.001 Sn step NOTE: threshold expressed in Sn is not preceded by the sign "-" but must be understood to be reversed reactive power	0.1 Sn
<i>Time t24</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.05 s - 100 s, with 0.1 s step	100 s

Table 123: RQ protection 1

RQ Protection [2]

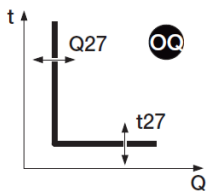
Parameter	Description	Default
<i>Kq2 Threshold</i>	Defines the slope of the straight line in relation to the threshold Q25. The value is expressed as an absolute value (angular coefficient of the straight line), settable in a range: -2 - 2 with 0.01 step	2
<i>-Q25 Threshold</i>	Defines the reactive power value for which the protection is activated and which is necessary for defining the relative TRIP area The value is expressed both as an absolute value (kVAR) and as a relative value (Sn), settable in a range: 0.1 Sn - 1 Sn with 0.001 Sn step NOTE: threshold expressed in Sn is not preceded by the sign "-" but must be understood to be reversed reactive power	0.11 Sn
<i>Vmin Threshold</i>	This is the minimum voltage for activating the protection. If at least one network voltage below the threshold Vmin is present, the protection is not active. The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.5 Un - 1.2 Un with 0.01 Un step	0.5 Un

Table 124: RQ protection 2

Constraints, limits and additional functions

- Ekip UP accepts parameters in accordance with the following limits $Q24 < Q25$ and $Kq < Kq2$
- From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 91

Protection OQ



Function

If one or more reactive powers read by the unit exceeds threshold Q27 for a longer time than t27, the protection sends the opening command (page 61).

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 115)

Parameters

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

Table 125: OQ protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 91

Block functions
UP, OP, RP, RQ,
OQ

From the service connector (via Ekip Connect) or with a system bus communication, for certain protections five blocks can be configured that are used to deactivate the protection in function of programmable events:

Block name	Description
<i>BlockOnProgStatusA</i>	Active block if the programmable status A is true
<i>BlockOnProgStatusB</i>	Active block if the programmable status B is true
<i>BlockOnProgStatusC</i>	Active block if the programmable status C is true
<i>BlockOnProgStatusD</i>	Active block if the programmable status D is true
<i>BlockOnOutOfFrequency</i>	Active block if the measured frequency is outside the range 30 Hz-80 Hz

Table 126: Block functions for power

Each block is independent and has its own activation command (*Block On*), each protection must be configured with blocks (operation in OR logic condition).



IMPORTANT: the blocks can cause:

- increase of protection trip time (max: + 30 ms), owing to the check of the event (e.g.: frequency control)
- undesired deactivation of the protection, if the block is associated with statuses or signals with modules on local bus, and the auxiliary supply is absent. In this case it may be useful to program the event by also considering the status of the auxiliary supply (Supply from Vaux)
- undesired deactivation of the protection, if the block is associated with frequency measurements and the voltage is below the minimum calculation threshold

22 - Frequency protections

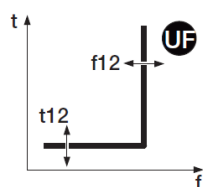
List The power protections are:



Name	Type of protection	Protect	Protect+	Control+	Page
UF	Minimum frequency	☒	☒	☒	92
OF	Maximum frequency	☒	☒	☒	93
UF2	Minimum frequency		☒	☒	93
OF2	Maximum frequency		☒	☒	94
ROCOF	Frequency derivative		☒	☒	94

Table 127: frequency protection

UF Protection



Function

If the frequency read by the unit falls below threshold f_{12} for a longer time than t_{12} , the protection sends the open command (page 61).

The protection excludes itself if the maximum network voltage value is less than 30 V.

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 116)

Parameters

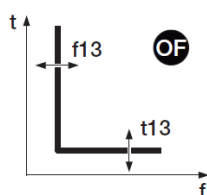
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold f_{12}</i>	Defines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

Table 128: UF protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 95

Protection OF



Function

If the frequency read by the unit exceeds threshold f13 for a longer time than t13, the protection sends the open command (page 61).

The protection excludes itself if the maximum network voltage value is less than 30 V.

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 116)

Parameters

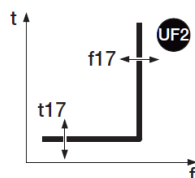
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold f13</i>	Defines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

Table 129: OF protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 95

Protection UF2



Function

The UV2 protection acts as the UF protection: if the network frequency read by the unit falls below threshold f17 for a longer time than t17, the protection sends the open command (page 61).

It is independent of the UF protection and it is thus possible to program thresholds and functions of the two protections to use different plant solutions (e.g.: signalling with UF and open command with UF2 or vice versa, or both in signalling or trip status).

The protection excludes itself if the maximum network voltage value is less than 30 V.

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 116)

Parameters

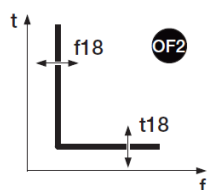
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold f17</i>	Defines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

Table 130: UF2 protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 95

Protection OF2



Function

The OV2 protection acts as the OF protection: if the network frequency read by the unit exceeds threshold f_{18} for a longer time than t_{18} , the protection sends the open command (page 61).

It is independent of the OF protection and it is thus possible to program thresholds and functions of the two protections to use different plant solutions (e.g.: signalling with OF and open command with OF2 or vice versa, or both in signalling or trip status).

The protection excludes itself if the maximum network voltage value is less than 30 V.

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 116)

Parameters

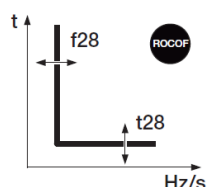
Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold f_{18}</i>	Defines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

Table 131: OF2 protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 95

Protection ROCOF



Function

The ROCOF protection protects against rapid frequency fluctuations: if the frequency varies more rapidly than the control fluctuation f_{28} set on the unit for a time greater than t_{28} , the protection the open command (page 61).

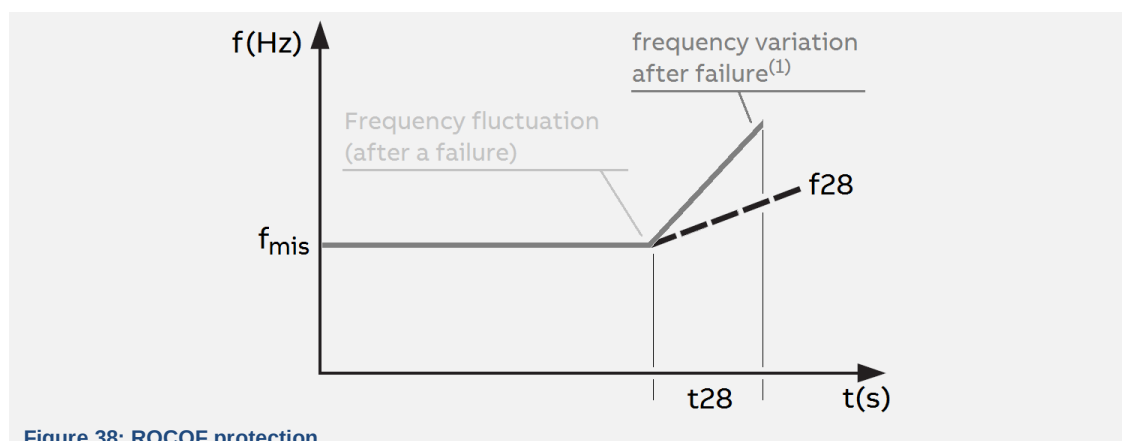


Figure 38: ROCOF protection



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

The protection excludes itself if the maximum network voltage value is less than 30 V.

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

- table summarizing the protections with the operating characteristics (page 103)
- graph with trip curve (page 117)

Protection ROCOF [2]

Parameters

Parameter	Description	Default
<i>Enable</i>	Enables/disables protection and availability on menu of the parameters	OFF
<i>Trip Enable</i>	Activates/deactivates the open command: if disabled, the alarm and the lapsing of the protection time are managed only as information	OFF
<i>Threshold f28</i>	Defines the maximum permitted frequency fluctuation rate over the time; if the limit is exceeded, protection is tripped. The value is expressed as an absolute value (Hz/s) Fn), settable in a range: 0.4 Hz/s - 10 Hz/s with 0.2 Hz/s step	0.6 Hz/s
<i>Trip direction</i>	Defines whether the protection monitors an increase (Up), a decrease (Down) or both variations (Up or Down)	Up or Down
<i>Time t28</i>	This is the trip time of the protection; the value is expressed in seconds, which are settable in a range: 0.5 s - 10 s, with 0.01 s step	0.5 s

Table 132: ROCOF protection

Constraints, limits and additional functions

From the service connector (via Ekip Connect) or with a system bus communication, also locking functions can be accessed, see page 95

Block functions

From the service connector (via Ekip Connect) or with a system bus communication, for certain protections four blocks can be configured that are used to deactivate the protection in function of programmable events:

Block name	Description
<i>BlockOnProgStatusA</i>	Active block if the programmable status A is true
<i>BlockOnProgStatusB</i>	Active block if the programmable status B is true
<i>BlockOnProgStatusC</i>	Active block if the programmable status C is true
<i>BlockOnProgStatusD</i>	Active block if the programmable status D is true

Table 133: Block functions for frequency

Each block is independent and has its own activation command (*Block On*), each protection must be configured with blocks (operation in OR logic condition).



IMPORTANT: the blocks can cause:

- increase of protection trip time (max: + 30 ms), owing to the check of the event (e.g.: frequency control)
- undesired deactivation of the protection, if the block is associated with statuses or signals with modules on local bus, and the auxiliary supply is absent. In this case it may be useful to program the event by also considering the status of the auxiliary supply (Supply from Vaux)
- undesired deactivation of the protection, if the block is associated with frequency measurements and the voltage is below the minimum calculation threshold

23 - Other protections

Hardware Trip Hardware Trip, available in the *Settings - Digital Unit* menu (page 40), protects from connection errors inside Ekip UP.

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

- Disconnected current sensors (phase, or external if enabled)
- Disconnected rating plug.
- Internal unit problems.

The alarm is shown and an open command is sent.



IMPORTANT: the protection is tripped if the error states persist for more than a second

Harmonic Distortion

Enables an alarm to be activated in the event of distorted waveforms.

In the *Measurements* menu the protection can be enabled (page 39): if enabled, an alarm alerting to peak factors above 2.1 is triggered.



IMPORTANT: the protection does not manage the trip but only the signal

Protection T

The protection T protects from anomalous temperatures recorded by unit.

Is always active and has two statuses according to temperature read:

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

Table 134: T protection

The parameter *Trip Enable*, in the *Settings - Digital Unit* menu (page 40) can be enabled to manage an open command in the event of alarm.

Cos φ

The protection trips when the total Cos φ value falls below the set threshold.

The total cos φ is calculated as a ratio between total active power and total apparent power;

Parameters

The parameters are available in the *Advanced - Signals* menu (page 38):

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

Table 135: Cos φ protection

Adaptive Protection

The function enables two different protection configurations to be obtained as alternatives to one another to manage the set change with programmable events.

In the *Settings* menu (page 40), it is possible to activate the function

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

In the *Advanced - Functions* menu, the event can be programmed that caused the set change (from default to secondary), see the chapter *Programmable commands* (page 97).

Table 136: adaptive protection

Current thresholds

Function

The current thresholds enable checks of the current lines to be set to be combined with the programmable contacts of the Ekip Signalling modules (in all the versions).

Two pairs of programmable contacts are available:

- Threshold 1 I1 and Threshold 2 I1, with control referring to I1.
- Threshold 1 I1 and Threshold Iw2, with control referring to In.

The thresholds can be enabled and set in the *Advanced - Signals* menu (page 38).



IMPORTANT:

- the current thresholds do not manage the trip but only the signal
- the function is active if the unit is powered up by auxiliary supply

Parameters

Threshold	Available parameters	Default
Threshold I1	<i>Enable</i> : Activates protection and availability of protection threshold on menu	OFF
	<i>Threshold</i> : The value is expressed as a percentage of the threshold I1, which is settable in a range: 50 % I1 - 100 % I1, with 1 % step	50 % I1
Threshold I2	<i>Enable</i> : Activates protection and availability of protection threshold on menu	OFF
	<i>Threshold</i> : The value is expressed as a percentage of the threshold I1, which is settable in a range: 50 % I1 - 100 % I1, with 1 % step	75 % I1
Threshold Iw1	<i>Enable</i> : Activate protection and availability of protection threshold on menu	OFF
	<i>Direction</i> : enables you to choose to have the signal when the current is higher (Up) or lower (Down) than the threshold.	Down
	<i>Threshold</i> : The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.1 In - 10 In, with 0.01 step In	3 In
Threshold Iw2	<i>Enable</i> : Activate protection and availability of protection threshold on menu	OFF
	<i>Direction</i> : enables you to choose to have the signal when the current is higher (Up) or lower (Down) than the threshold.	Up
	<i>Threshold</i> : The value is expressed both as an absolute value (Ampere) and as a relative value (In), settable in a range: 0.1 In - 10 In, with 0.01 step In	3 In

Table 137: Current thresholds

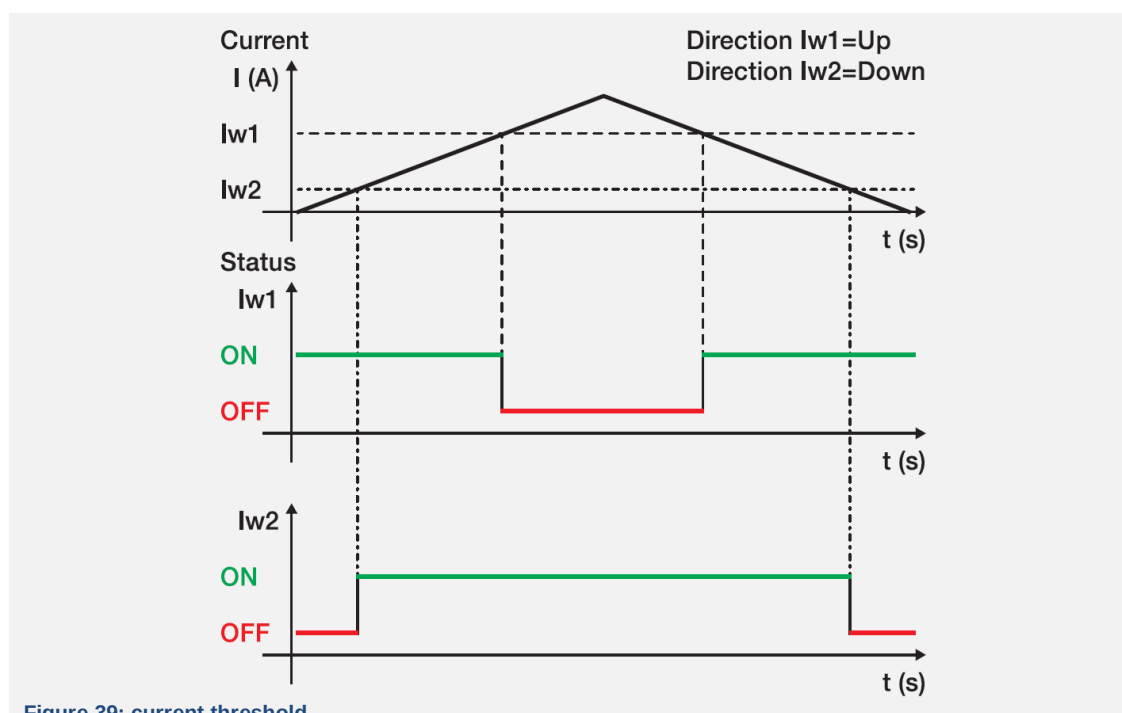


Figure 39: current threshold

Programmable commands

Eight commands are available with programmable activation in function of signals or events. The commands distributed in different Ekip UP menus are:

Name	Description	Path (page)
<i>External trip</i>	Sends an open command (page 61)	<i>Advanced - Functions (38)</i>
<i>Trip RESET</i>	Reset of the trip signal	
<i>Switch on SET B</i>	Check protections set, from Set A to Set B	
<i>Energy RESET</i>	Reset of energy counters	<i>Measurements - Energy (39)</i>
<i>YO Command</i>	Sends an open command (page 61)	<i>Settings - Functions (40)</i>
<i>YC Command</i>	Sends a close command (page 61)	
<i>Switch On LOCAL</i>	Configuration change, from Remote to Local	<i>Settings - Modules - Functions (40)</i>
<i>Signalling RESET</i>	Reset contacts of signalling modules	

Table 138: Programmable commands 1

Parameters

Each command has two programming parameters:

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

Table 139: Programmable commands 2



IMPORTANT: the commands are sent if all the operating conditions expected by the unit exist (connection, supplies, alarms, etc)

Synchrocheck

The *Ekip Synchrocheck* module recognizes and reports whether the synchronism conditions exist between two independent voltage sources (e.g.: generator + network) to close the interconnection switch.

The description of the module, of the protection function and the performance are set out in the chapter dedicated to the modules (page 179).

24 - Logic Selectivity

Logic Selectivity - Presentation The Zone Selectivity via Bus Link is indicated as Logic Selectivity. The Logic Selectivity can be actuated for a maximum of 12 of the 15 actors that can be associated with Ekip UP via Bus link (see *Ekip Link* module, page 166).

Parameters

For each protection for which it is desired to activate Zone Selectivity, the available protection parameter to enable the function must be set.

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

For the rest, Zone Selectivity can be set only by the Ekip Connect software.



NOTE: all the following parameters and configurations are available via Ekip Connect with Ekip Link module connected and switched on.

Logic Selectivity - 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 Link Advanced Selectivity* page for each actor present: the mask allows the protections of the actors (S, G, D-Forward, D-Backward, S2) that activate the selectivity input of Ekip UP to be selected (example: actor 1, protection mask S= S2: selectivity S of Ekip UP will be active in the presence of signals S2 of actor 1).

In this configuration if for protection S the function is enabled and is in alarm status, the S/D-Forward hardware lock output signal is activated and the S logic selectivity bit is activated. On the basis of the lock signals:

- if the S/D-Forward hardware lock input signal and the logic selectivity bits S2 and Gext of the actor 1 are not active, the open command is sent in accordance with the selectivity set for the protection S
- if the S/D-Forward hardware lock input signal is active and mixed selectivity is selected and the logic selectivity bits S2 or Gext of the actor 1 are active, the wait time is the same as the trip time of the protection S (and the open command is sent only if the protection S is still in alarm status after this time has elapsed)



NOTE:

- the output and input logic selectivity bits are those in the data packet shared by the unit via Bus link
- the S/D-Forward (G/D-Backward) hardware output is activated only if the S or D-Forward (G or D-Backward) protections are in alarm status, and the S/D-Forward (G/D-Backward) hardware input acts as a lock only for the S and D-Forward (G and D-Backward) protections, regardless of whether only hardware or mixed selectivity has been selected.



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

Selectivity masks

Remote Programmable States A and B are also included in the **selectivity masks**: these two 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.

Two further states are available, C and D, but they cannot be configured for Zone Selectivity. All four programmable states are used for the Programmable Logic function (see *Ekip Link* module on page 166).



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

Logic 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

Logic Selectivity - Diagnosis

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 Status* page will indicate: Unknown

Logic Selectivity – 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 on the *Ekip Link Status* page.



NOTE: in order to check line inconsistency, all the actors associated with the unit are checked, including the actors whose function has not been enabled (the *Actor Selectivity* parameter has not been assigned the value: True)

A line error (detected by the diagnosis) indicates a possible cabling error (e.g.: physical disconnection):

- the hardware selectivity can then be disabled by not cabling the lock outputs and the inputs and not enabling the diagnosis (disabled by default)

A line inconsistency (regardless of the diagnosis) indicates a possible configuration error (e.g.: a hardware input of the Ekip UP is linked to the hardware output of a device that is not associated via Bus link, or of an actor whose function has not been enabled).

- to prevent a line inconsistency being reported, the devices whose hardware outputs are connected to the hardware inputs of Ekip UP must also be connected to the Bus link and be associated with Ekip UP whereas it is not necessary for their function to be enabled (it is not necessary for the *Actor Selectivity* parameter to be assigned the value: true)

25 - Performance tables

- General notes**
- The performance data shown in the following tables are valid with a trip time of ≥ 100 ms, and temperature and signals within the operating limits; if these constraints are respected, the tolerances can increase.
 - Ekip UP sends the open command if the read signal exceeds the threshold for a longer time than the set time (or the time specified by the calculation formula)
 - With a dependent inverse time-delay trip curve, the calculation refers to a constant value signal during all the timing: the variation of the alarm signal causes a different trip time
-

**Current
protections**

Protection	Tripping time $t_t^{(1)}$	Tripping threshold tolerance	Tripping time tolerance
L	Curve $t = k/I^2 \Rightarrow t_t = \frac{t1 \times 9}{\left(\frac{If}{I1}\right)^2}$ Curves 60255-151 $\Rightarrow t_t = \frac{t1 \times a \times b}{\left(\left(\frac{If}{I1}\right)^k - 1\right)}$	Activation for If in the range: (1.05-1.2) x I1	$\pm 10 \%$ with $If \leq 6 \times In$ $\pm 20 \%$ with $If > 6 In$
S	Curve $t = k \Rightarrow t_t = t2$ Curve $t = k/I^2 \Rightarrow t_t = \frac{t2 \times 100}{If^2}$	$\pm 7 \%$ with $If \leq 6 In$ $\pm 10 \%$ with $If > 6 In$	The best of: $\pm 10 \%$ or $\pm 40 ms$ $\pm 15 \%$ with $If \leq 6 \times In$ $\pm 20 \%$ with $If > 6 In$
I	$t_t \leq 30 ms$	$\pm 10 \%$	--
G	Curve $t = k \Rightarrow t_t = t4$ Curves $t = k/I^2 \Rightarrow t_t = \frac{2}{\left(\frac{If}{I4}\right)^2}$	$\pm 7 \%$	The best of: $\pm 10 \%$ or $\pm 40 ms^{(2) (5)}$ $\pm 15 \%$
MCR	$t_t \leq 30 ms$ with $If \leq 2 I3$ $t_t \leq 20 ms$ with $If > 2 I3^{(4)}$	$\pm 10 \%$	--
2I	$t_t \leq 30 ms$	$\pm 10 \%$	--
IU	$t_t = t6$	$\pm 10 \%$	The best of: $\pm 10 \%$ or $\pm 40 ms$ with $t6 < 5 s$; $\pm 100 ms$ with $t6 \geq 5 s$
Gext	Curves $t = k \Rightarrow t_t = t41$ Curves $t = k/I^2 \Rightarrow t_t = \frac{2}{\left(\frac{If}{I41}\right)^2}$	$\pm 7 \%$	The best of: $\pm 10 \%$ or $\pm 40 ms^{(5)}$ $\pm 15 \%$
RC	$t_t = tdn$	-20 % - 0	140 ms @ 0.06 s ⁽³⁾ 950 ms @ 0.8 s ⁽³⁾
S2	$t_t = t5$	$\pm 7 \%$ with $If \leq 6 In$ $\pm 10 \%$ with $If > 6 In$	The best of: $\pm 10 \%$ or $\pm 40 ms$
D	$t_t = t7$	$\pm 7 \%$ with $If \leq 6 In$ $\pm 10 \%$ with $If > 6 In$	The best of: $\pm 10 \%$ or $\pm 40 ms$
S(V) S2(V)	$t_t = t20 (t21)$	$\pm 10 \%$	The best of: $\pm 10 \%$ or $\pm 40 ms$ with $t20 < 5 s$ $\pm 100 ms$ with $t20 \geq 5 s$

Table 140: current protections performances



NOTES:

- (1) to calculate t_t , use the values of the tripping and threshold currents expressed as In (e.g.: $If = 0.8 In$, $I1 = 0.6 In$)
- (2) with $t4$ = instantaneous, maximum tolerance is 60 ms
- (3) maximum tripping time
- (4) the tripping time becomes $\leq 25ms$ considering the contact switching of the Ekip Signalling 4K module
- (5) With $t4 = 100ms$ the tripping time tolerance is $\pm 15\%$ considering the contact switching of the Ekip Signalling 4K module.

Startup

Protection	Tripping time t_t	Tripping threshold tolerance	Tripping time tolerance
S StartUp	$t_t = t2 \text{ startup}$	$\pm 7 \%$ with $I_f \leq 6 \text{ In}$ $\pm 10 \%$ with $I_f > 6 \text{ In}$	The best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$
I StartUp	$t_t \leq 30 \text{ ms}$	$\pm 10 \%$	--
G StartUp	$t_t = t4 \text{ startup}$	$\pm 7 \%$	The best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$
Gext StartUp	$t_t = t41 \text{ startup}$	$\pm 7 \%$	The best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$
S2 StartUp	$t_t = t5 \text{ startup}$	$\pm 7 \%$ with $I_f \leq 6 \text{ In}$ $\pm 10 \%$ with $I_f > 6 \text{ In}$	The best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$
D StartUp	$t_t = t7 \text{ startup}$	$\pm 10 \%$	The best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$

Table 141: startup performances

Voltage protections

Protection	Tripping time t_t	Tripping threshold tolerance ⁽⁴⁾	Tripping time tolerance
UV UV2	$t_t = t8 \text{ (} t15 \text{)}$	$\pm 2 \%$	the best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$ with $t8 < 5 \text{ s}$ $\pm 100 \text{ ms}$ with $t8 \geq 5 \text{ s}$
OV OV2	$t_t = t9 \text{ (} t16 \text{)}$	$\pm 2 \%$	the best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$ with $t9 < 5 \text{ s}$ $\pm 100 \text{ ms}$ with $t9 \geq 5 \text{ s}$
VU	$t_t = t14$	$\pm 5 \%$	the best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$ with $t14 < 5 \text{ s}$ $\pm 100 \text{ ms}$ with $t14 \geq 5 \text{ s}$
RV	$t_t = t22$	$\pm 10 \%$	the best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$ with $t22 < 5 \text{ s}$ $\pm 100 \text{ ms}$ with $t22 \geq 5 \text{ s}$

Table 142: voltage protections performances

Power protections

Protection	Tripping time t_t	Tripping threshold tolerance	Tripping time tolerance
UP	$t_t = t23$	$\pm 10 \%$	the best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$ with $t23 < 5 \text{ s}$ $\pm 100 \text{ ms}$ with $t23 \geq 5 \text{ s}$
OP	$t_t = t26$	$\pm 10 \%$	the best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$ with $t26 < 5 \text{ s}$ $\pm 100 \text{ ms}$ with $t26 \geq 5 \text{ s}$
RP	$t_t = t11$	$\pm 10 \%$	the best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$ with $t11 < 5 \text{ s}$ $\pm 100 \text{ ms}$ with $t11 \geq 5 \text{ s}$
RQ	$t_t = t24$	$\pm 10 \%$	the best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$ with $t24 < 5 \text{ s}$ $\pm 100 \text{ ms}$ with $t24 \geq 5 \text{ s}$
OQ	$t_t = t27$	$\pm 10 \%$	the best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$ with $t27 < 5 \text{ s}$ $\pm 100 \text{ ms}$ with $t27 \geq 5 \text{ s}$

Table 143: power protections performances

Frequency protections

Protection	Tripping time t_t	Tripping threshold tolerance	Tripping time tolerance
UF UF2	$t_t = t12 \text{ (} t17 \text{)}$	$\pm 1 \%$ ⁽¹⁾	The best of: $\pm 100 \text{ ms}$ with $t12 \geq 5 \text{ s}$ $\pm 10 \%$ (min = 30 ms) or $\pm 40 \text{ ms}$ with $t12 < 5 \text{ s}$
OF OF2	$t_t = t13 \text{ (} t18 \text{)}$	$\pm 1 \%$ ⁽¹⁾	The best of: $\pm 10 \%$ or $\pm 40 \text{ ms}$ with $t13 < 5 \text{ s}$ $\pm 100 \text{ ms}$ $t13 \geq 5 \text{ s}$
ROCOF	$t_t = t28$	$\pm 10 \%$ ⁽²⁾	The best of: $\pm 20 \%$ or 200 ms

Table 144: frequency protections performances



NOTES:

- (1) valid tolerance for frequency in range: $f_n \pm 2 \%$. For frequencies outside the range, the tolerance is $\pm 5 \%$
- (2) $\pm 20 \%$ for the threshold 0.4 Hz / s

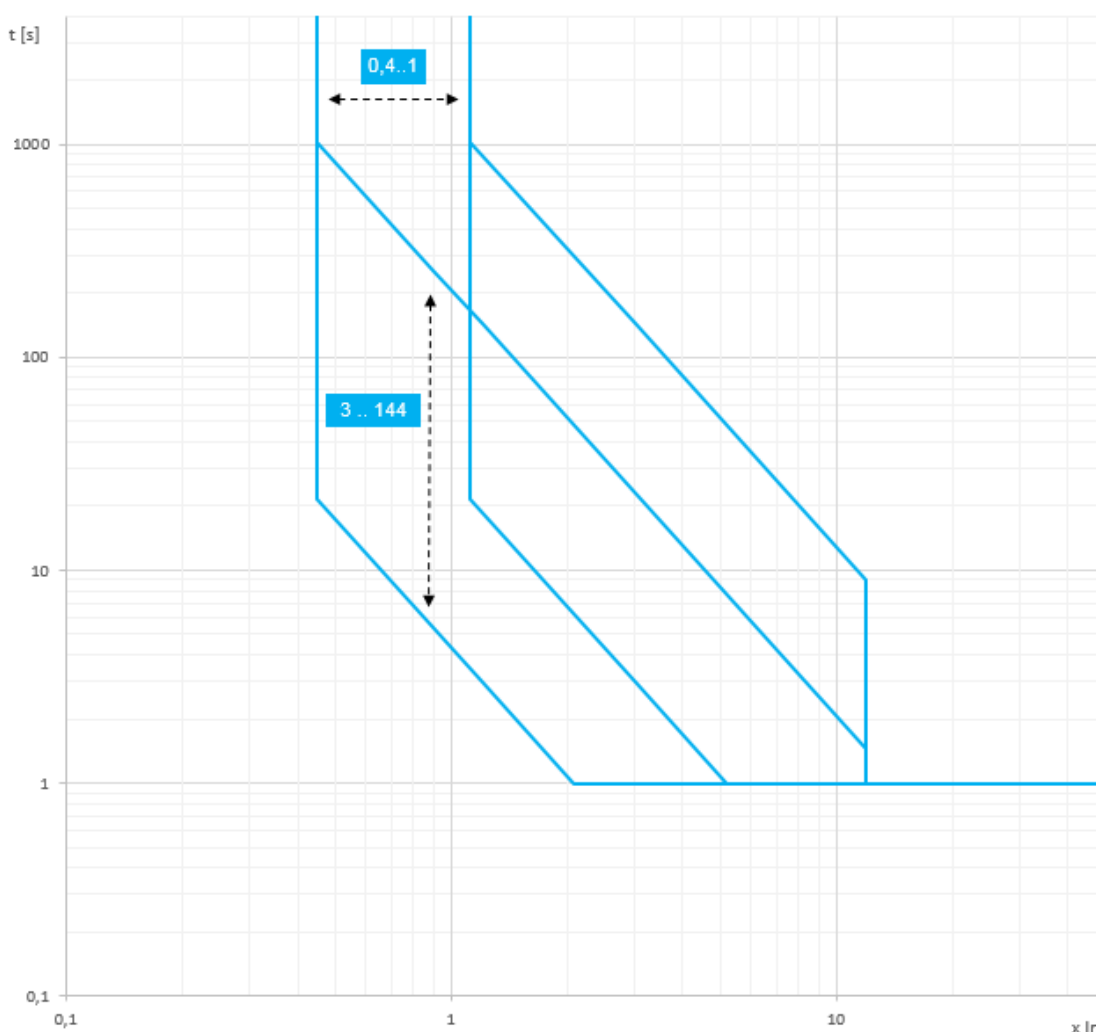
Introduction In this chapter, the trip curves of the protections are shown, which are set out in different point graphs:

- The curves consider the maximum and minimum values of the parameters of each protection.
- The protections that have several curves (e.g.: protection G), are shown in several different graphs.
- The curves do not take account of the effects of special parameters like the thermal memory and the startups.

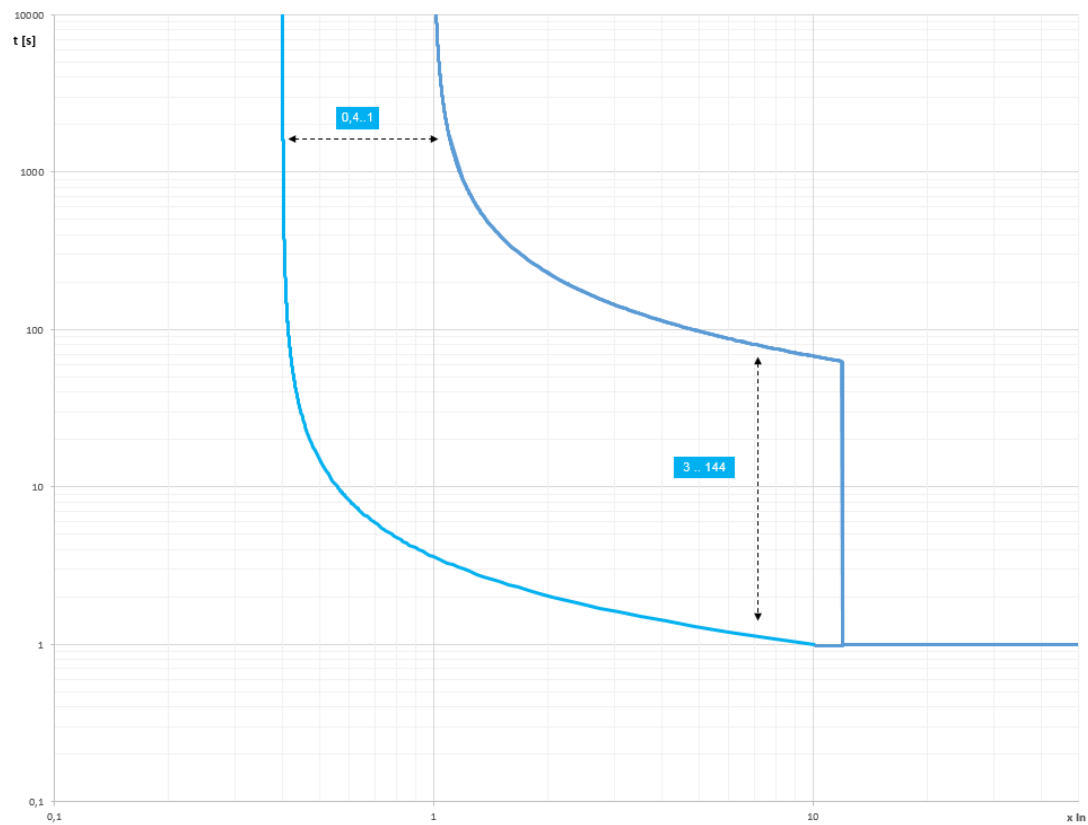


NOTE: to calculate the trip time, you are advised to always use the mathematical function available on the table summarizing the protections (page 101)

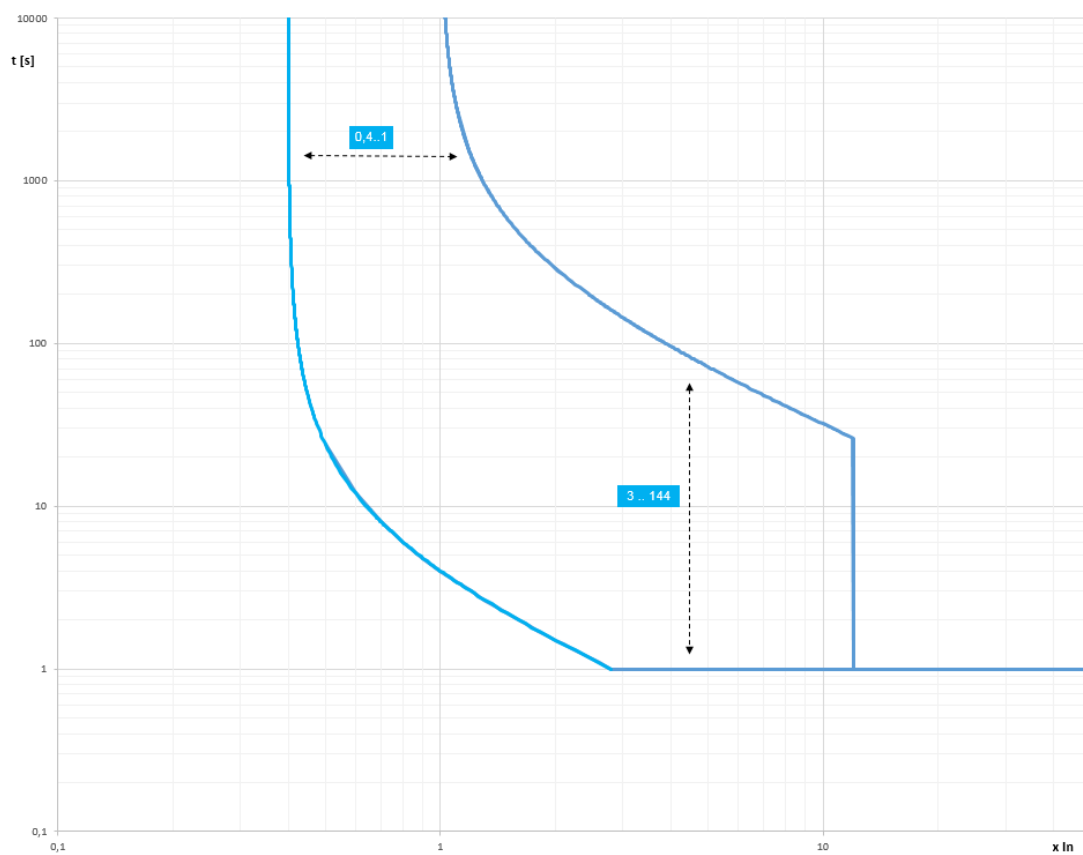
Curve L ($t = k/I^2$)



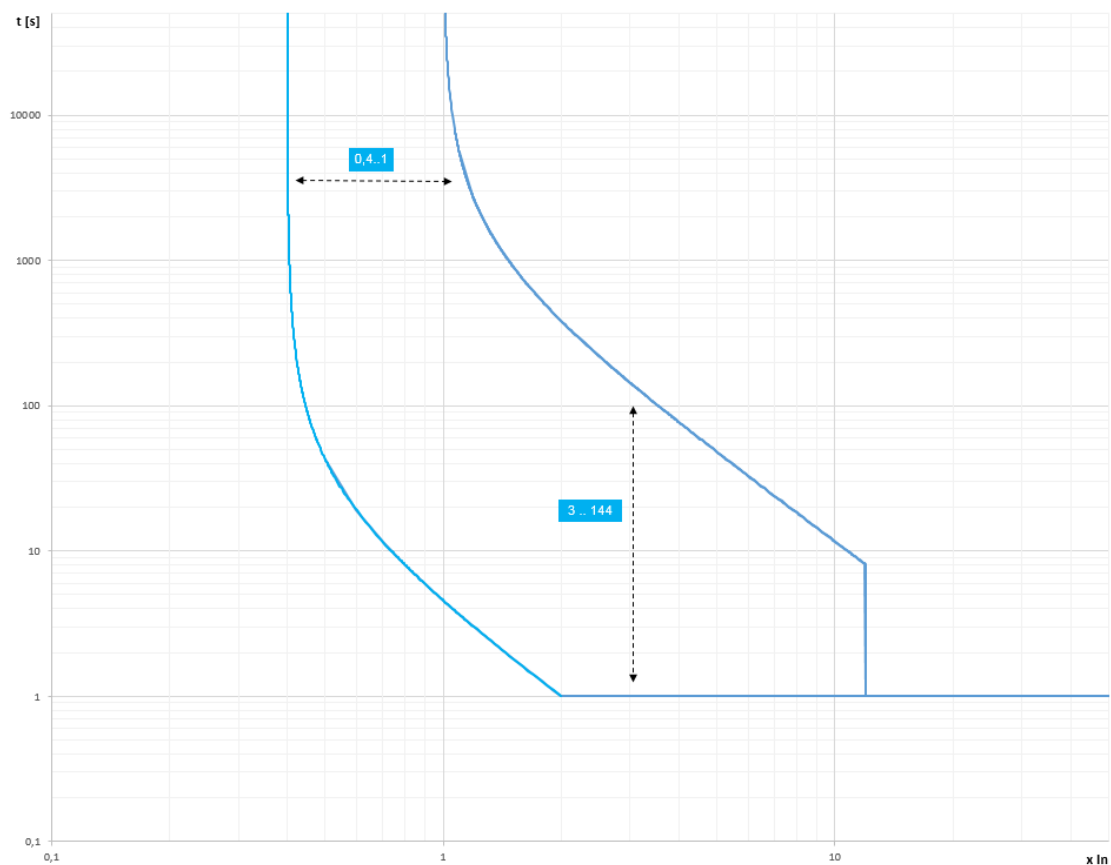
**Curve L (IEC
60255-151 SI)**



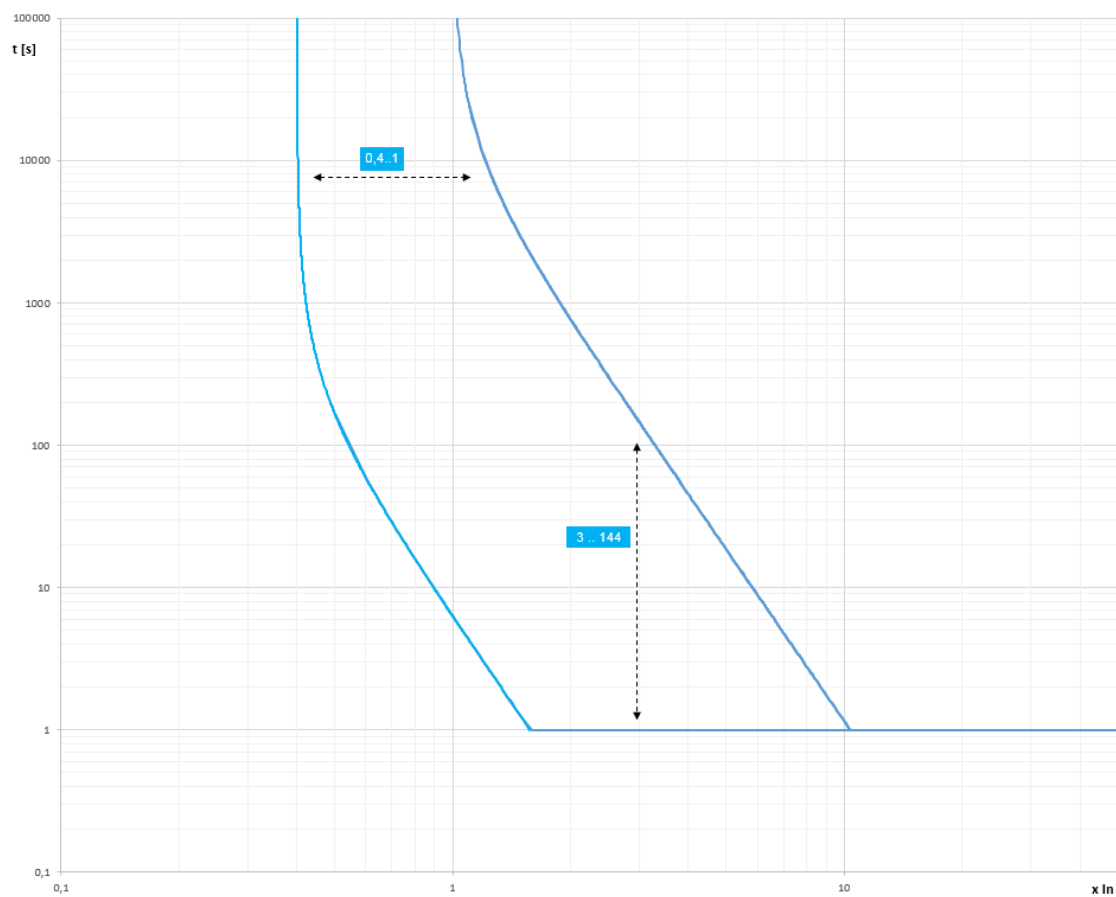
**Curve L (IEC
60255-151 VI)**



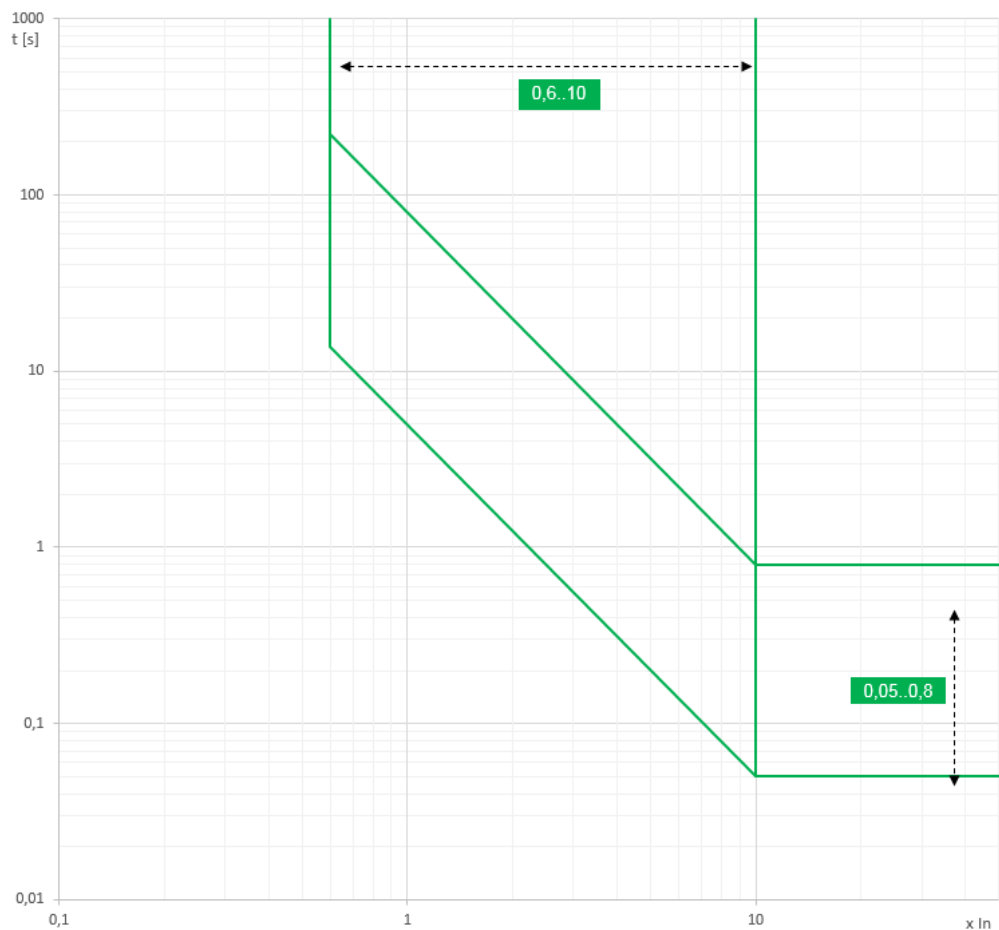
Curve L (IEC
60255-151 EI)



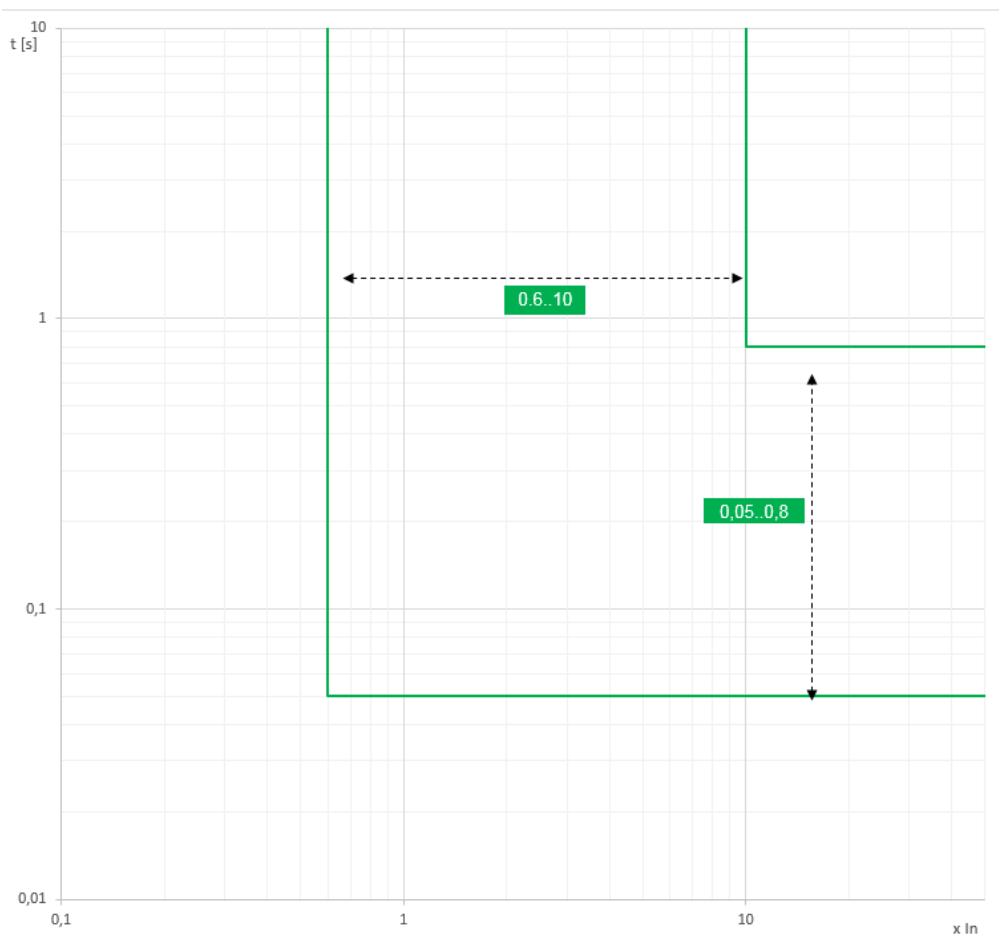
Curve L ($t = k/l^4$)



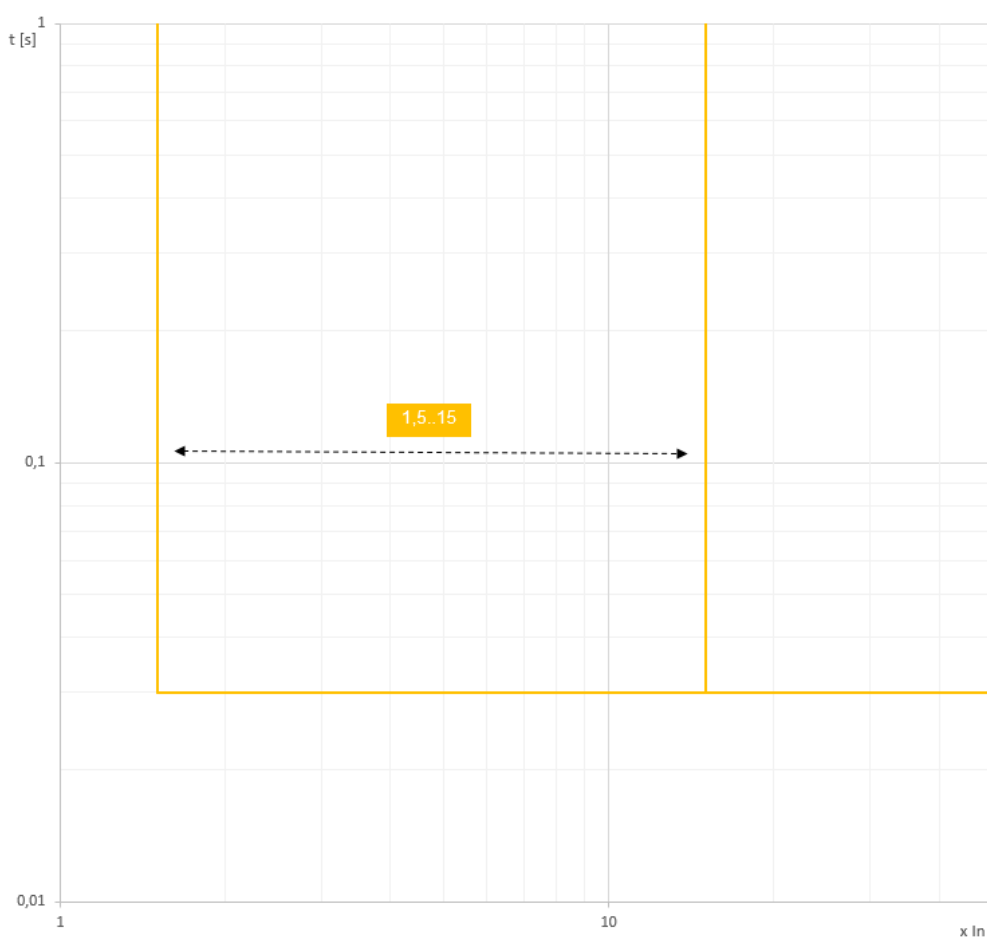
Curve S ($t = k/l^2$)



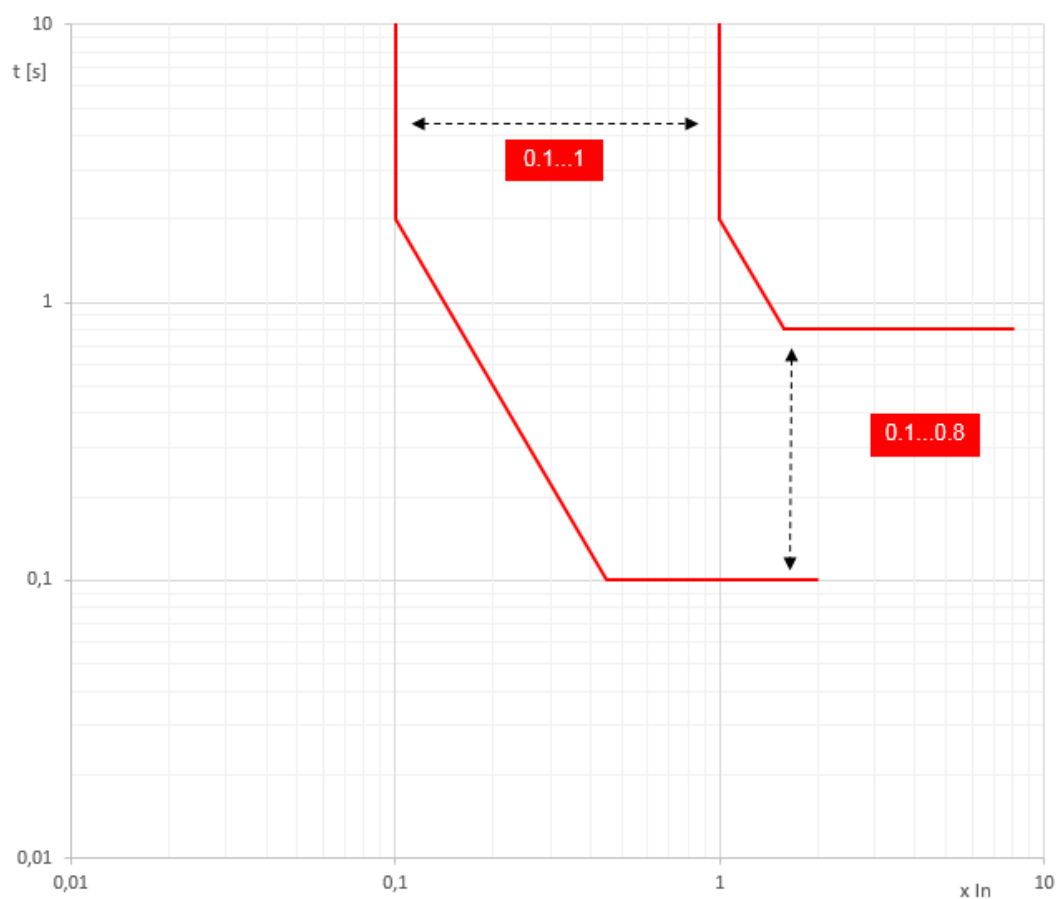
Curve S ($t = k$)
Curve S2



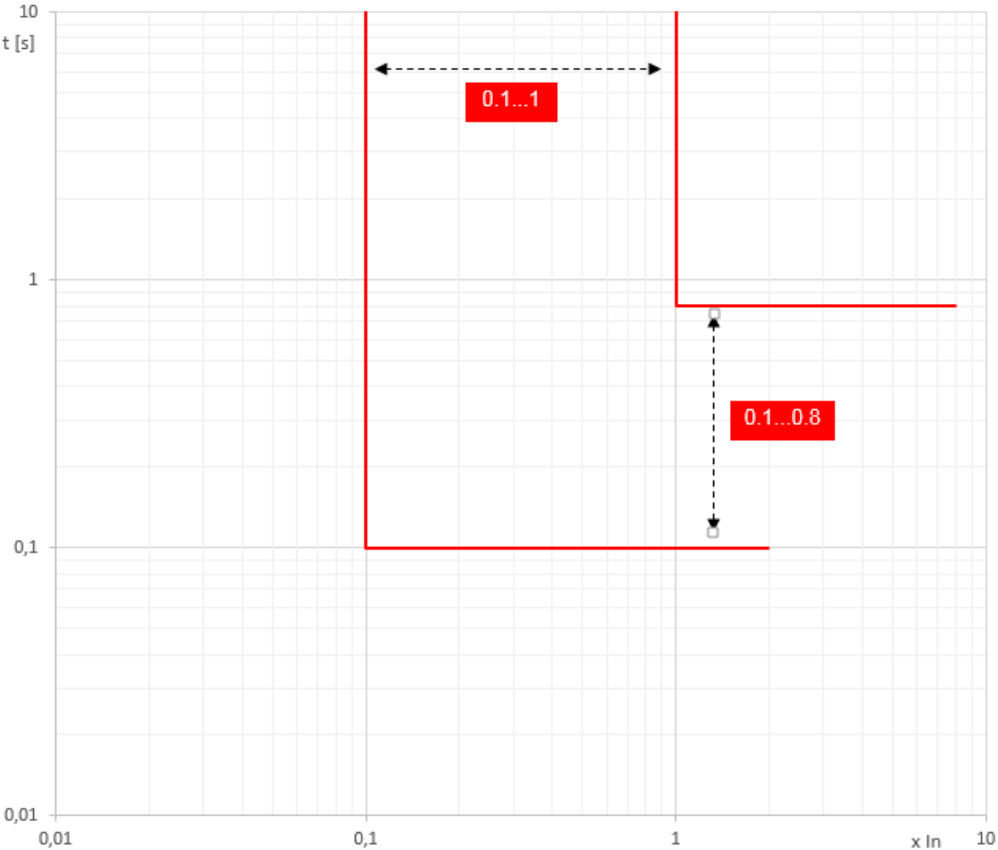
Curve I
Curve MCR
Curve 2I



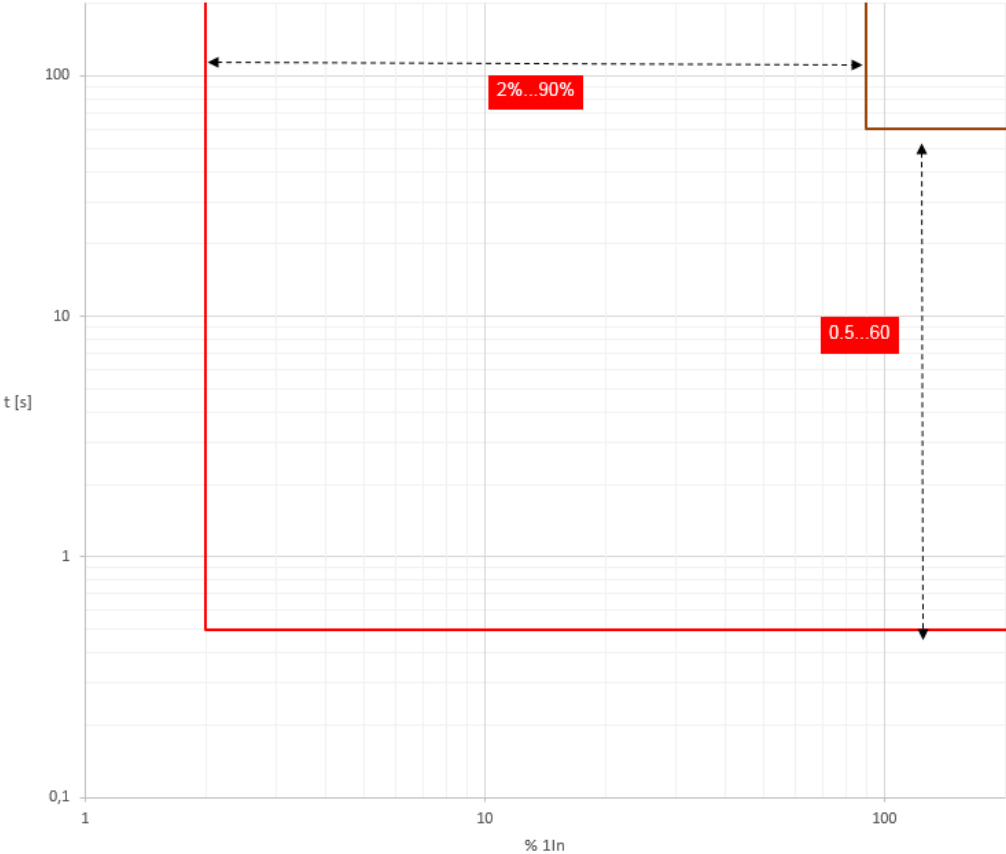
Curve G ($t = k/l^2$)
Gext ($t = k/l^2$)



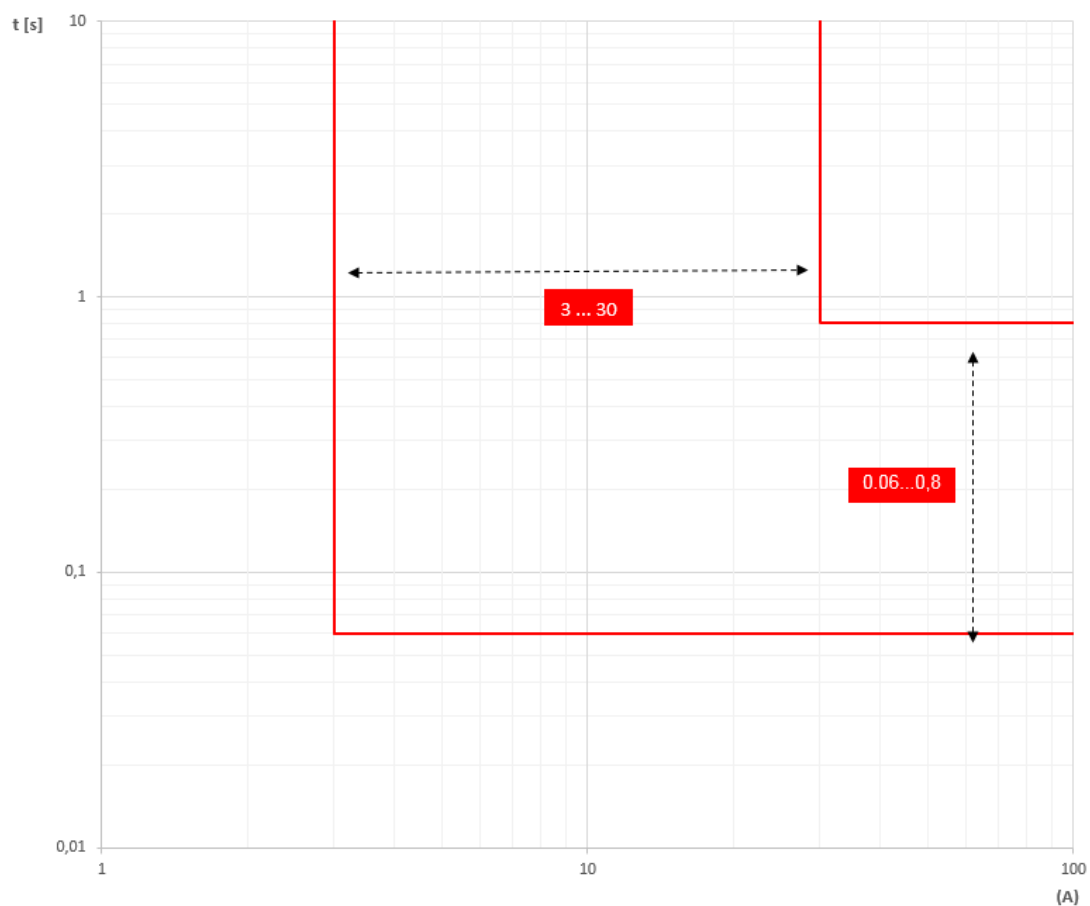
Curve G (t= k)
Curve Gext (t= k)



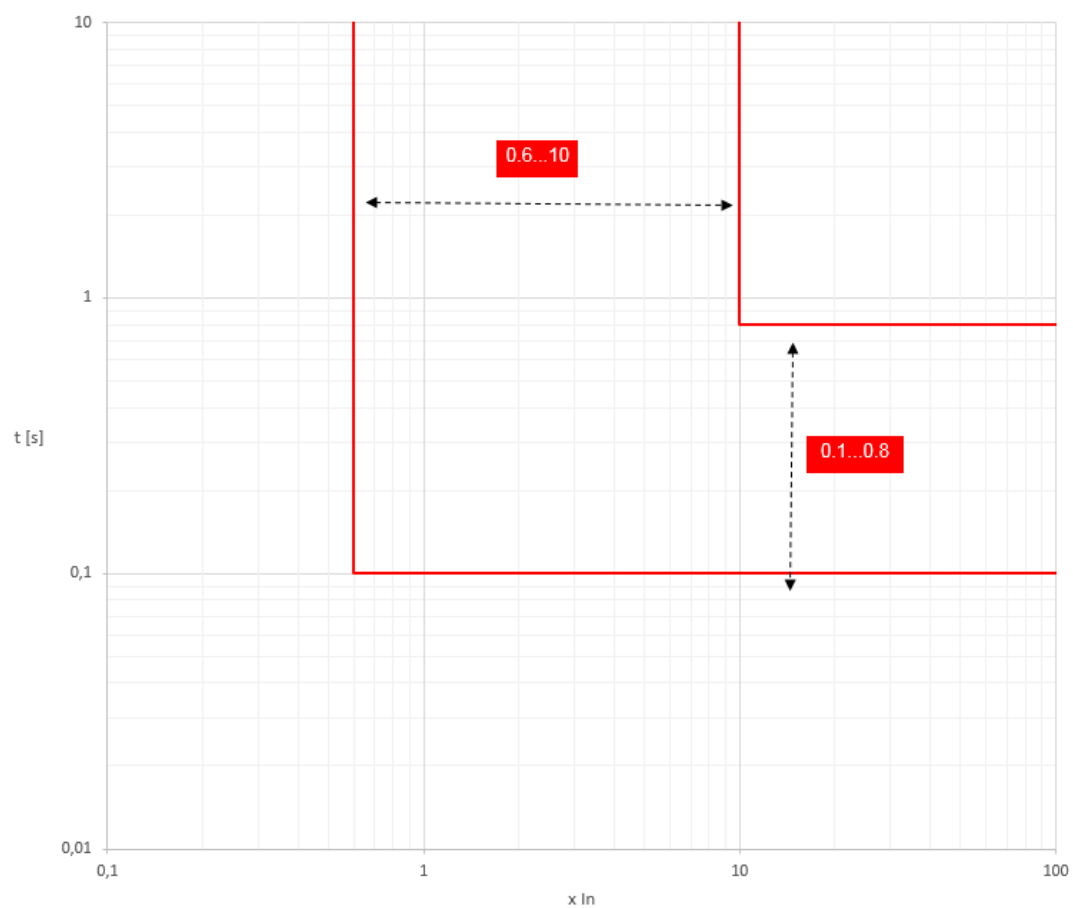
Curve IU



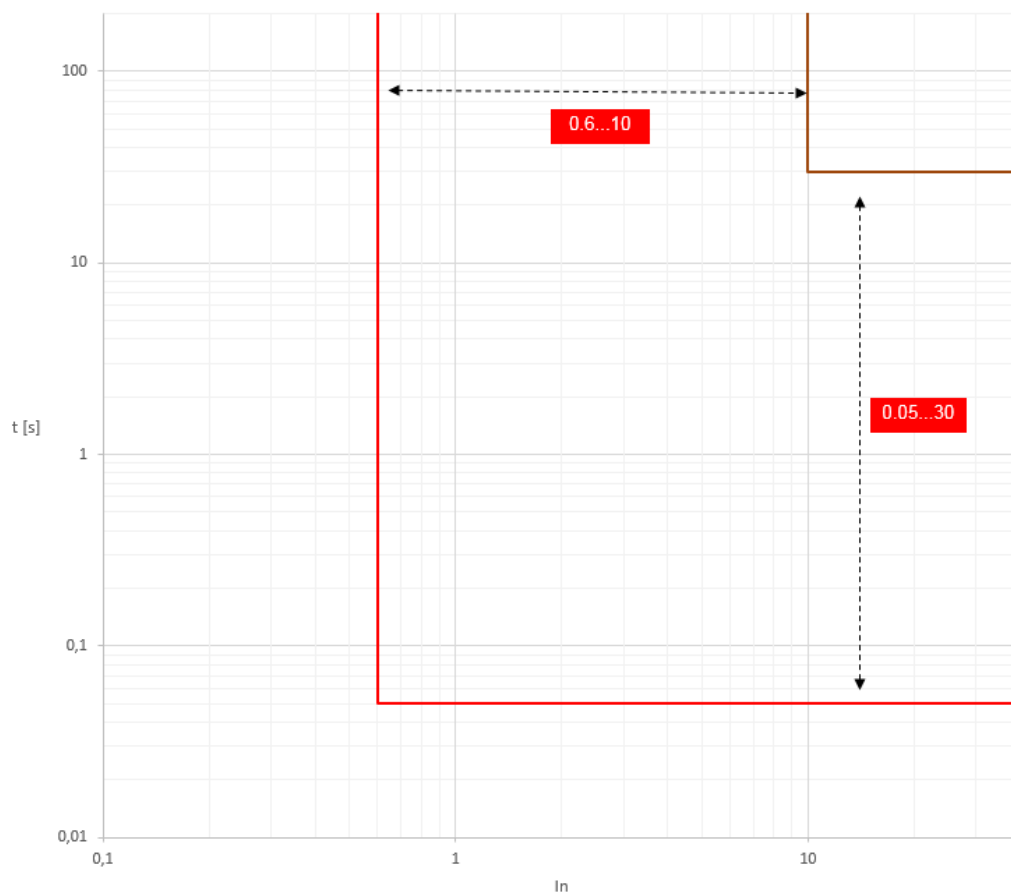
Curve RC



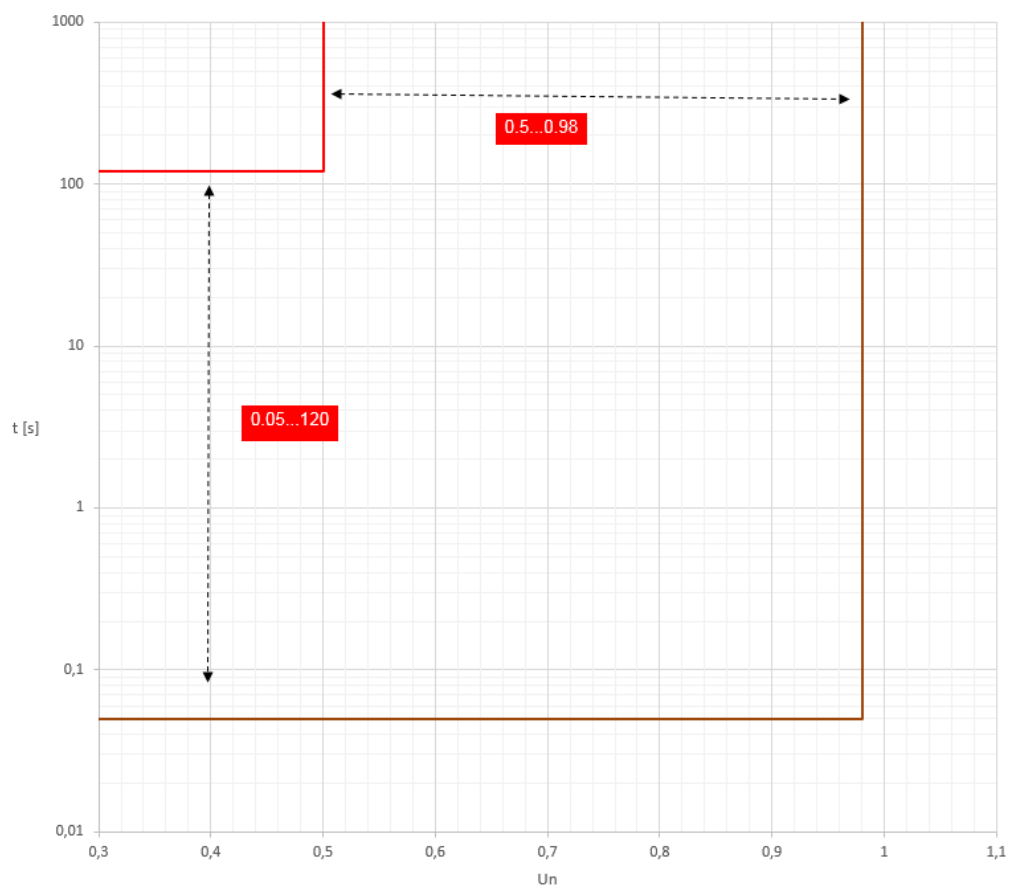
Curve D



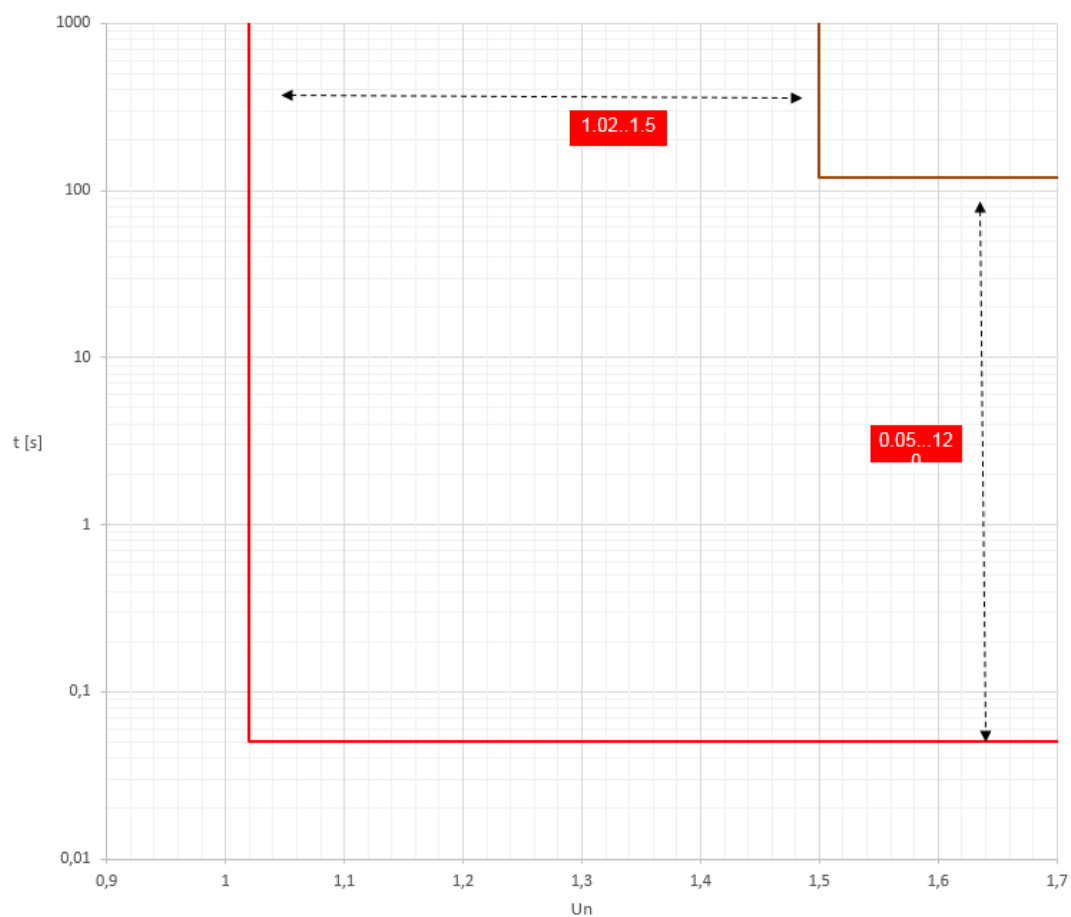
Curve S(V)
Curve S2(V)



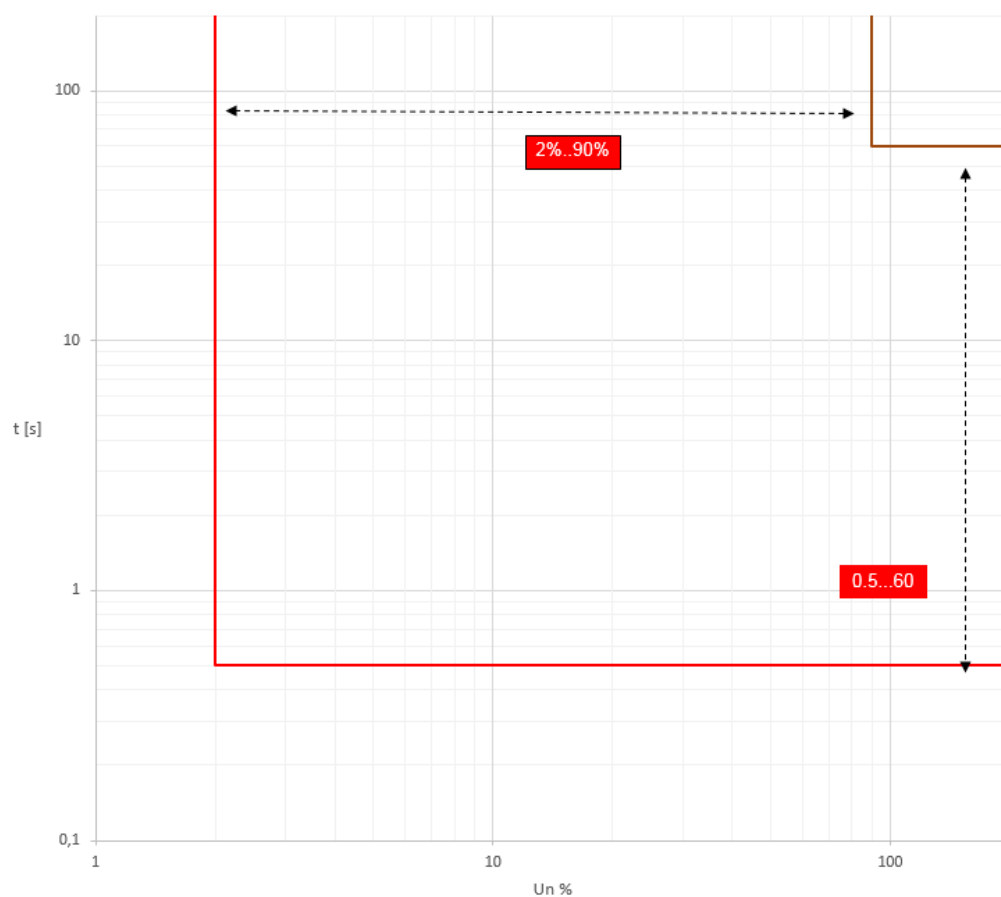
Curve UV
Curve UV2



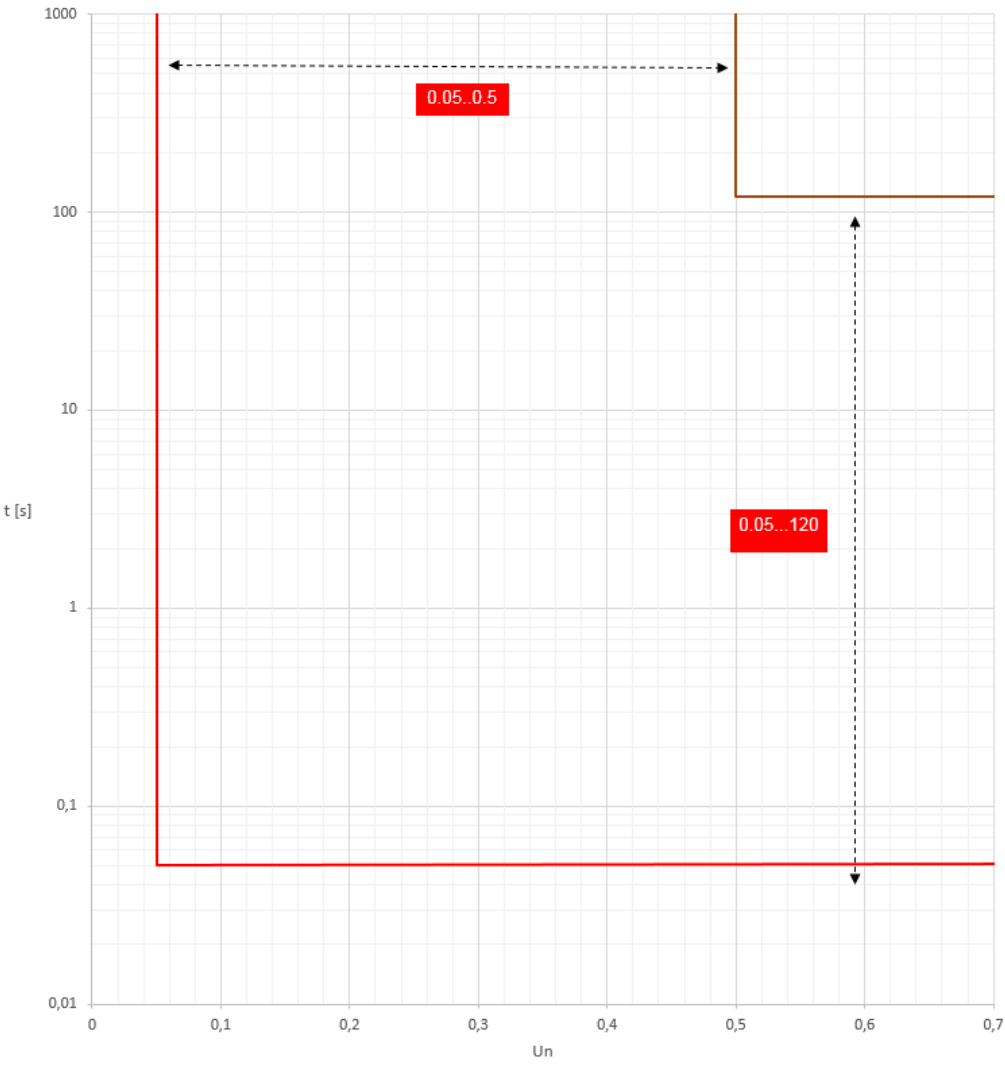
Curve OV
Curve OV2



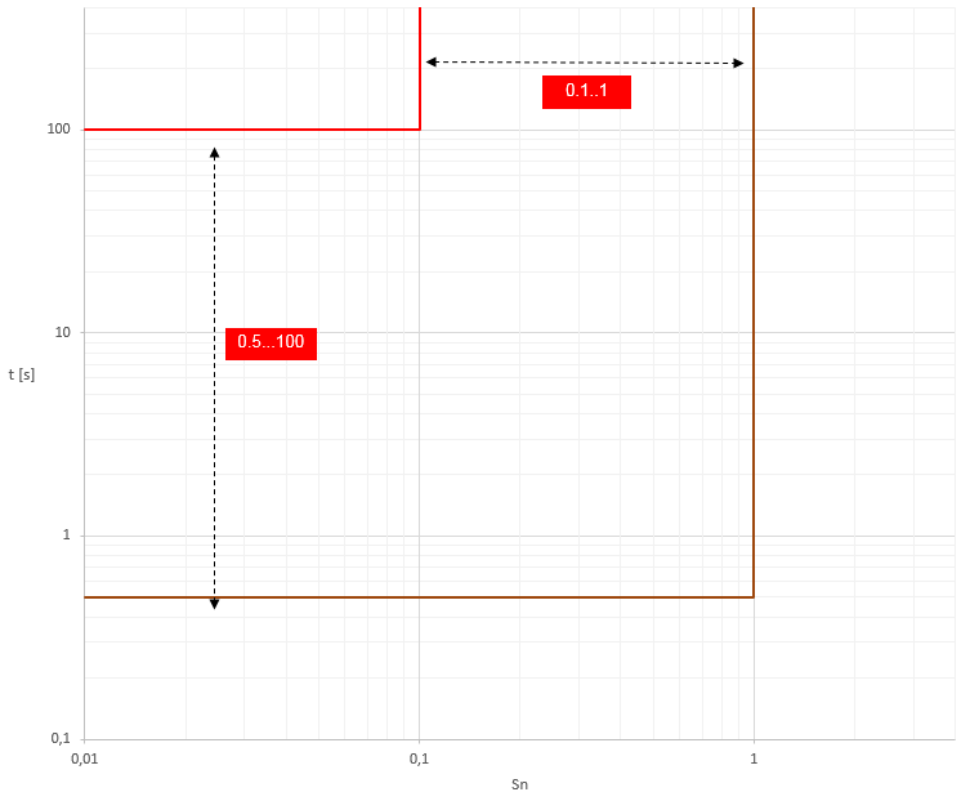
Curve VU



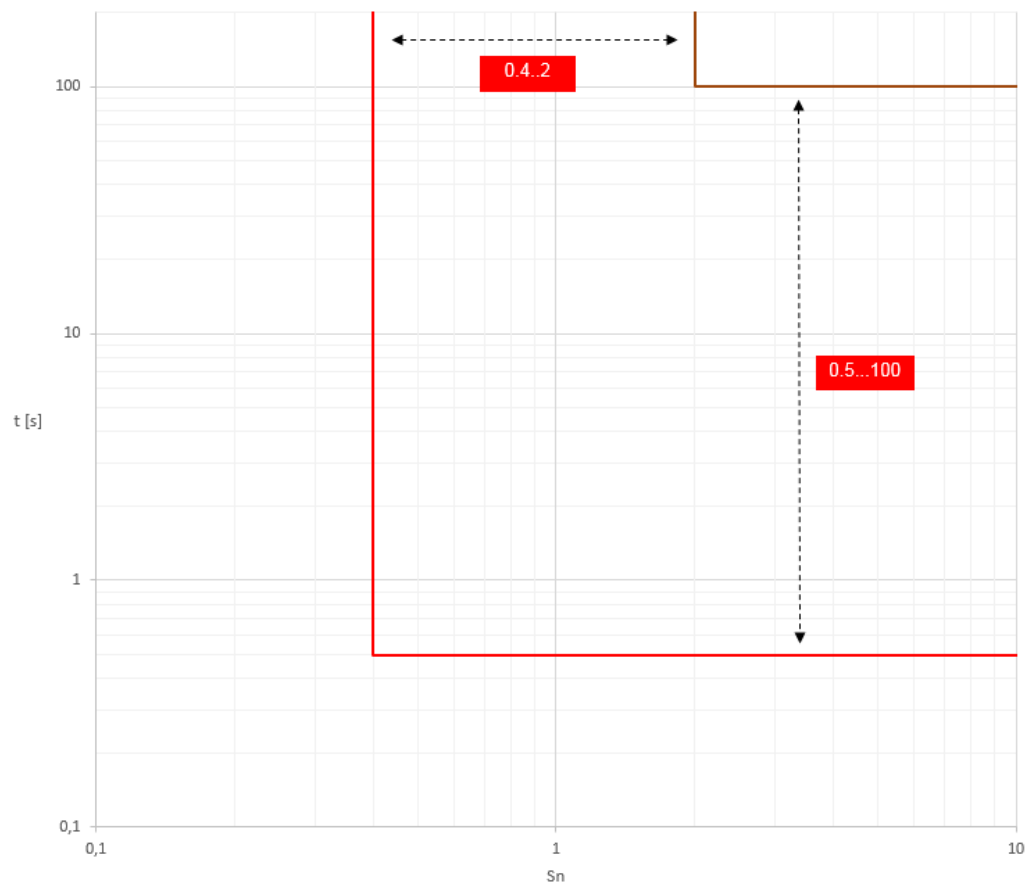
Curve RV



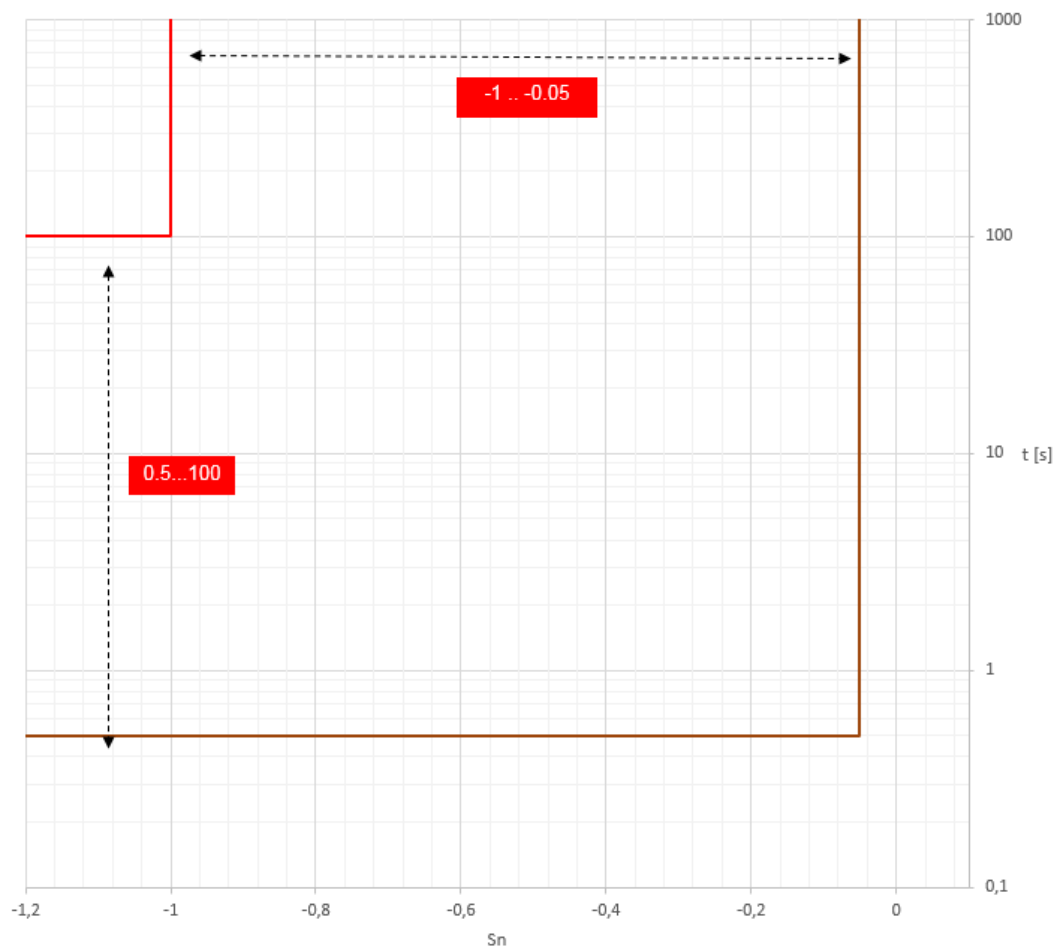
Curve UP



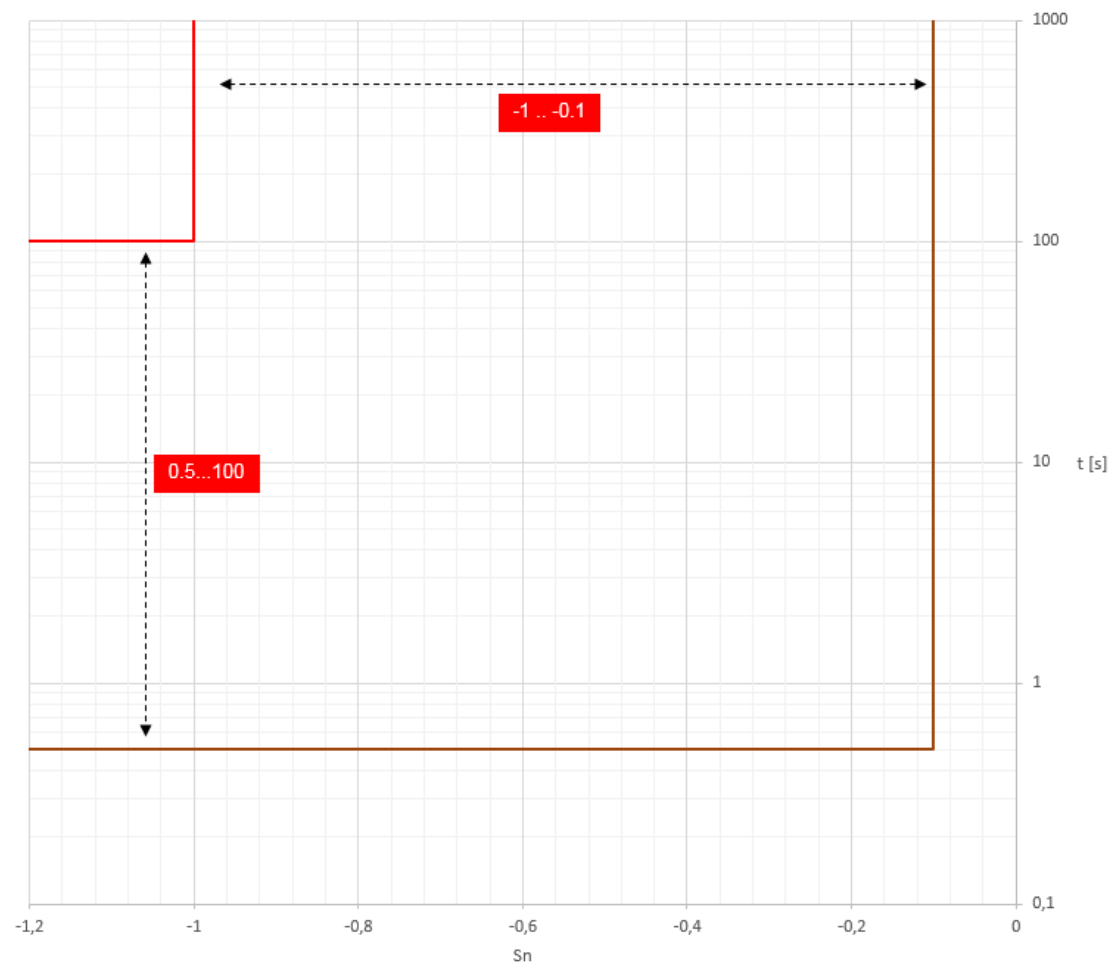
Curve OP



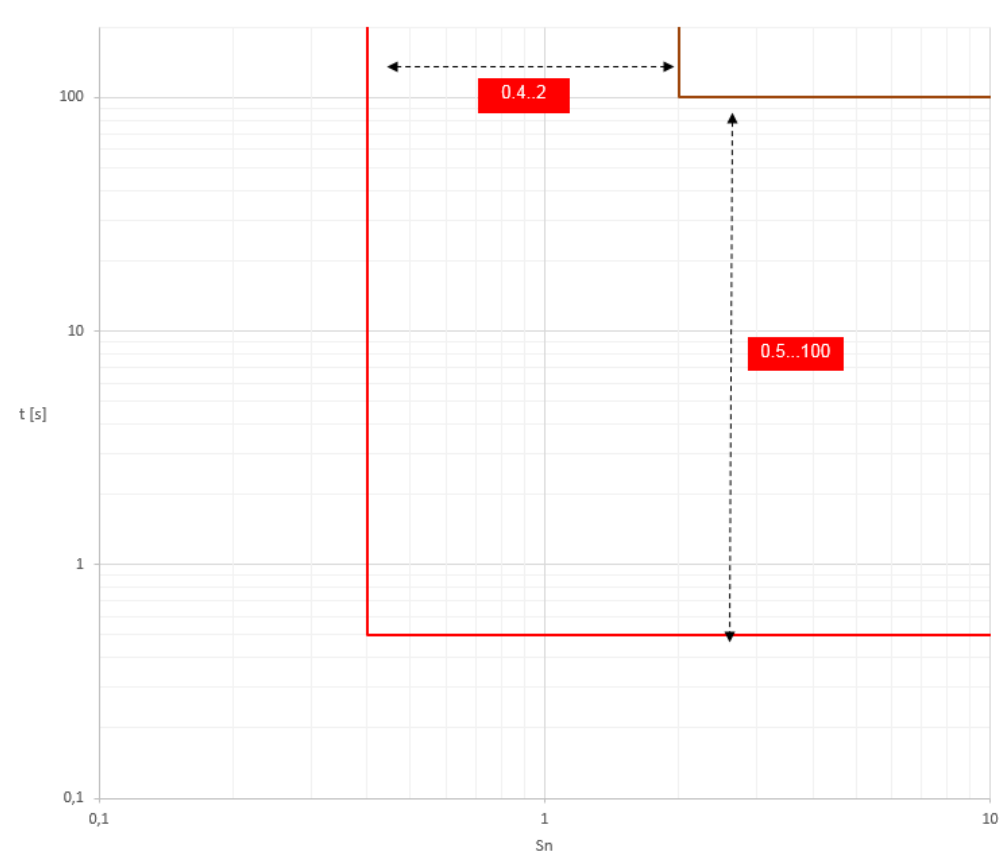
Curve RP



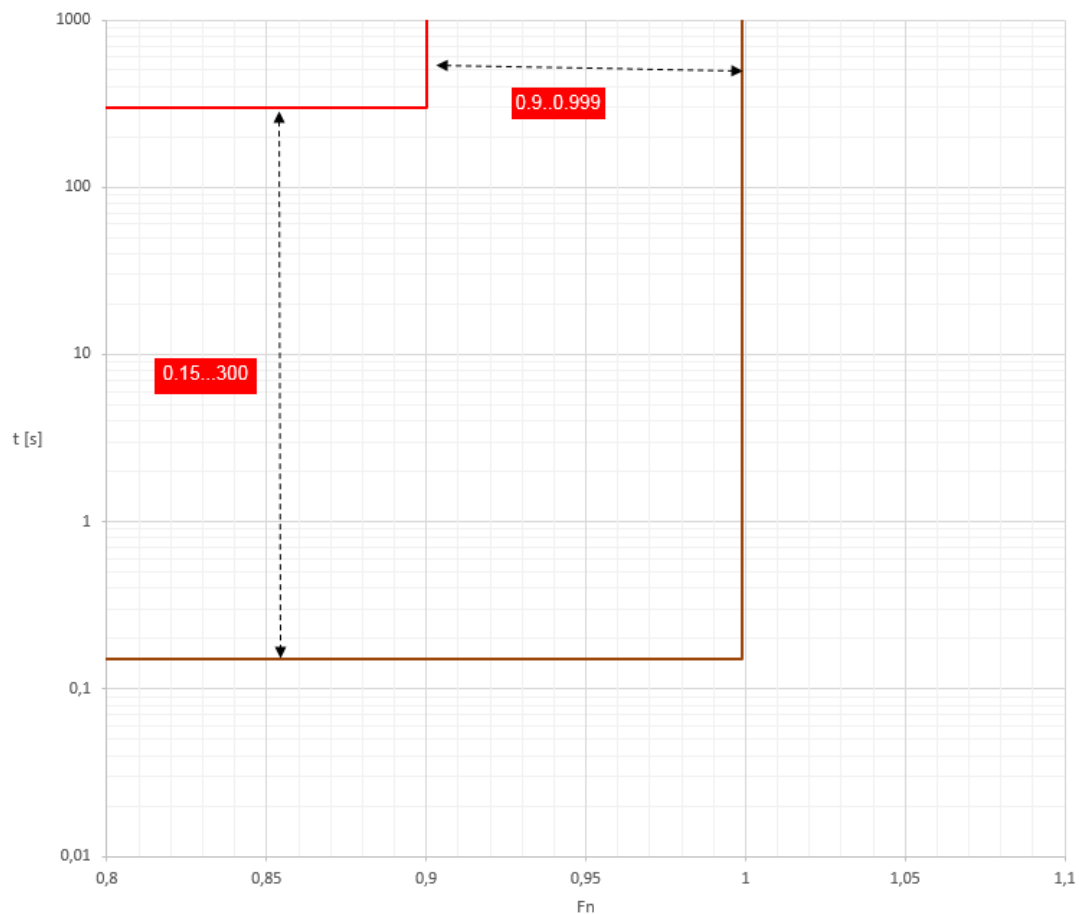
Curve RQ



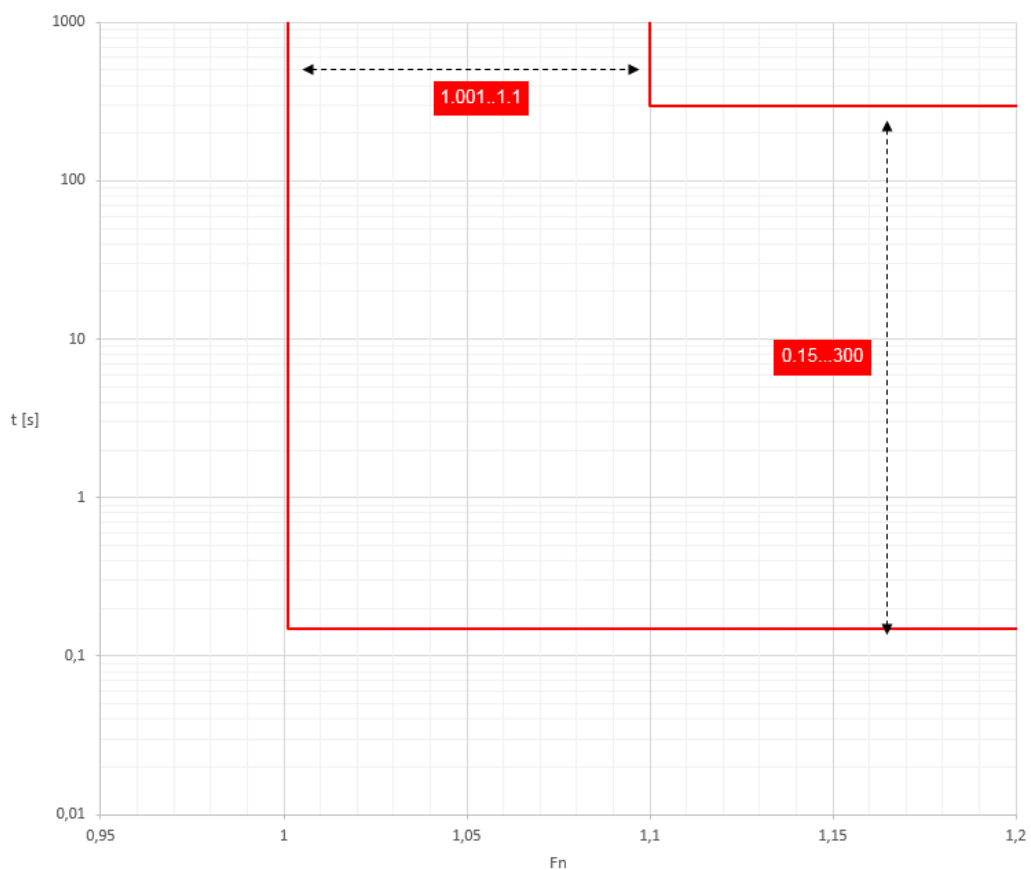
Curve OQ



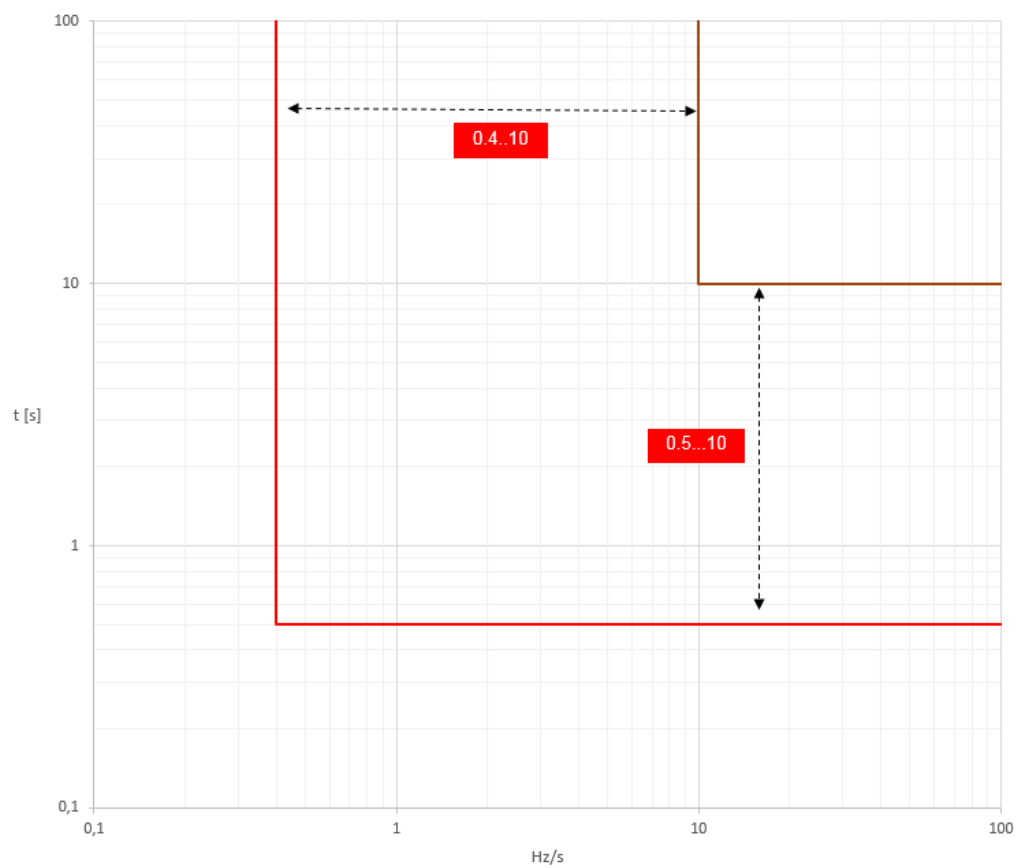
Curve UF
Curve UF2



Curve OF
Curve OF2

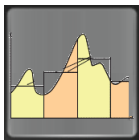


Curve ROCOF



27 - Power Controller

Presentation



The Ekip Power Controller function, available for Ekip UP in the Control and Control+ versions, enables the loads of a plant to be managed in function of power consumption, to limit consumption and optimize energy efficiency.

The purpose of the function is to prevent a given power consumption limit being exceeded by:

- the cumulative measurement of the energy consumed by the plant of a lapse of time
- the estimate of the energy consumed at the end of the monitoring periods into which the electric energy invoicing period is divided
- the automatic control of the loads: temporary disconnection of the less urgent loads if the control thresholds are exceeded that derive from the set parameters (power limit and monitoring period)
- automatic recognition of the monitoring periods, on the basis of the unit's inner clock or of an external synchronization signal, with reset and restart of the energy counters at the start of each period.

More information on the potential of the function are available in the White Paper [1SDC007410G0201](#) "Managing loads with Ekip Power Controller for SACE Emax 2" and in the product note [1SDC210110D0201](#).

Advantages

The function allow to:

- prevents the contractual power limit with the electric power provider being exceeded and the contractual power and overheads having to be increased to cope with possible spikes and avoid fines
- enables the plant to be oversized to avoid the overload protection being tripped
- provides smart real time management of the loads in response to actual plant consumption needs at any instant.

The control of the loads based on the energy measurement rather than the instantaneous power enables power spikes to be tolerated that are greater than the contractual limit if the duration of the spikes is such that the average power over the monitoring period does not exceed the contractual limit.

This is useful because invoicing and possible fines by the power provider are calculated on the basis of the average power measured at predefined intervals of time, precisely on the basis of the highest average power reached during the invoicing period.

Operating principle

A central unit (**master**), the seat of the function, is linked by cables or a dedicated bus link to the appliances located upstream of the load supply circuits (**slave**).

The slave can be loads or generators. The generators are controlled in the opposite manner to the loads, i.e. they are connected in the event of high consumption (to activate additional sources of energy) and are disconnected in the event of reduced consumption.

The master estimates at regular intervals (monitoring period) the consumed energy; at the end of each period, the master makes certain evaluations:

1. if the estimate is in the region of high consumption, a load is disconnected (or a generator is connected)
2. if the estimate is in the region of reduced consumption, a load is connected (or a generator is disconnected)
3. if the estimate is in the region of acceptable consumption, nothing happens.

- Rules** The loads are still controlled by the master, in accordance with these rules:
- the maximum number of the controllable loads is 15 (including the generators)
 - the sequence with which the loads are disconnected and connected depends on the priority level assigned to the loads: the lower the priority, the less important the load (a load with lower priority than another is disconnected before and is connected after a load with higher priority)
 - The same priority level can be assigned to several loads
 - If the same priority level is assigned to several loads, the master first deals with the load that has been in its current status longer.
 - In order to avoid damage or for operating needs, a load that has been disconnected (connected) can be reconnected (disconnected) only after a certain minimum time (the minimum time during which a load has to remain disconnected and connected may be different). In addition, a load might not be able to remain disconnected for longer than a certain maximum time. This information can be entered into the master (separately for each load) and the master will disconnect (connect) each load only after its minimum time has elapsed, and will reconnect it before its maximum time has elapsed, regardless of its priority level.
 - If a load to be disconnected is already disconnected (e.g.: because an Ekip UP protection has been tripped upstream, or manual opening), it is classed as unavailable and is excluded from the function until it becomes available again.

- Connections** The loads can be controlled in different master-slave link configurations:
1. via cables and the opening/closing coils or the motor commands (if the slaves are switches).
 2. Bus link on *Ekip Link*
 3. Bus link with *Ekip Signalling 10K modules*.



NOTE: If the unit housing the function is fitted with the Ekip Link module and the clock and synchronization signal is available on the bus link in accordance with the IEEE 1588 protocol, the synchronization can be carried out on the basis of this signal; greater details on page 167

Configuration The parameters and the monitor of all the measurements/information can be configured by a dedicated tool inside the Ekip Connect software.

On the Ekip UP display, the main parameters can be set and the main measurements can be viewed:

- modifying some of the parameters of the function
- viewing some of the measurements of the function
- viewing loads

Ekip UP parameters in the *Settings - Power Controller* menu (page 40) certain configuration parameters of the function are available.

Parameter	Description	Default
<i>Enable</i>	Activates/deactivates the function and the availability on the menu of the parameters	OFF
<i>Load Operating Mode</i>	Enables each of the 15 programmable loads (from Load 1 to Load 15) to be set; the Automatic or Manual configuration can be chosen.	Manual
<i>Power Limits</i>	Enables 10 power limits to be set (from Limit Power 1 to Limit Power 10); the value is expressed in kW, which is settable in a range: 10 kW - 10000 kW with 10 kW step.	10 kW

Table 145: power controller - ekip up parameters



NOTE: in order to characterize all the parameters of the function, first configure the parameters via Ekip Connect, and only then use the Ekip UP to enable or modify power loads and limits

**Ekip UP
measurements**

On the *Measurements* pages (page 35), with Power Controller activated, the specifications page is available with the main measurements:

Measurement	Description
<i>Ea</i>	Envisaged energy
<i>DT</i>	Time elapsed inside the evaluation window
<i>LOADS</i>	Number of controlled loads
<i>LOADS Shed</i>	Number of loads shed
<i>Sp</i>	Set load shed priority
<i>T</i>	Evaluation window

Table 146: power controller - ekip up measurements

On the *About* page (page 42), with Power Controller activated, the *Power Controller* menu is available that shows information in 15 loads in 2 submenus:

Submenu	Contained information
<i>Load Input status</i>	Loads status (from Load 1 to Load 15): open or closed
<i>Load Active</i>	Configuration of the loads (from Load 1 to Load 15): active or inactive

Table 147: power controller - ekip up information

Settings

28 - Main settings

Introduction



All the following parameters are available directly or starting from the *Settings* menu in the conditions specified by Ekip UP on the basis of the described version and configuration.

For the parameters that are present in the menu but are not described below, see page 40 for correct addressing.



WARNING! For the Protect, Protect+ and Control+ versions, make all changes to the settings in the absence of the timing signals

Configuration

The parameter used in the event of replacement of current sensors and change of the configuration from three to four sensors.

It is available in the *Digital unit* submenu for Ekip UP in 3P configuration.

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

- histogram of the phase Ne on the *Histograms* page
- neutral current measurements
- menu for configuring the Neutral protection, for the Protect, Protect+ and Control+ versions
- recording neutral current in the event of trip, for the Protect, Protect+ and Control+ versions

Ekip UP in 3P configuration is supplied with the parameter set as: **3P**.

Breaker Connections

The parameter enables the configuration of contacts of the module *Ekip Signalling 4K* to be changed by supplying functions for controlling and reading the status of external actuators, see page 61 for details.

It is available for Protect, Protect+ and Control+ versions in the *Digital unit* submenu.

Parameter	Option	<i>Ekip Signalling 4K</i> contacts detail	Default
<i>Open output</i>	--	O 01 configured as: close command (YC <i>Open</i>)(read only)	4K-O01
<i>Close output</i>	Not Connected	O 02 free ⁽¹⁾	4K-O02
	4K-O02	O 02 configured as: close command (YC <i>Command</i>)	
<i>Open/Close input</i>	Not Connected	I 01 and I 02 free ⁽¹⁾	4K-I01
	4K-I01/4K-I02	Configuration A described on page 62: I 01 for Open status reading; I 02 for Closed status reading	
	4K-I01	Configuration B described on page 62: I 01 for Open/Closed status reading; I 02 free ⁽¹⁾	

Table 148: breaker connection



(1): "free" means that the specific input or output operates as described in the chapter of the *Ekip Signalling 4K* module (page 136)

Main frequency

The frequency is regulated to set the plant frequency; it is possible to choose between 50 Hz and 60 Hz.



NOTE: the measurements are made according to the set Main frequency: an incorrect configuration of the parameter can cause measurement and protection glitches

Ekip UP is supplied with the parameter set to: **50 Hz**.

Bus The **Modules** menu has different options:

Parameter	Description	Default
Local/Remote	The parameter defines the writing method of the parameters on the unit: • <i>Local</i>: modifies parameters only from display or from the service connector • <i>Remote</i>: modifies parameters only from remote (Ekip Com modules)  NOTE: • <i>the Remote mode requires the presence of an auxiliary supply and of Ekip Com modules, otherwise it is disabled automatically</i> • <i>In Remote mode it is anyway possible to modify the Local/Remote parameter</i>	Local
Local bus	The parameter enables the communication to be activated between Ekip UP and the modules assembled on a terminal board or outside the unit. The correct communication between units and modules is confirmed by: • populating the <i>Modules</i> menu with all the connected modules • power LED of the modules switched on and synchronized like the power LED of Ekip UP • absence of the Local Bus alarm in the diagnosis bar	ON
Ekip Signalling 4K	Menu with the parameters of the module; see page 138	
Ekip Measuring	Menu with the parameters of the module; see page 140	
-	Menu of each module connected / detected, details from 141	
Functions	Access to the functions <i>Switch On LOCALE</i> and <i>RESET signalling</i> , see page 98	

Table 149: modules menu

Test Bus The parameter enables the parameters to be enabled/disabled by the service bus, limiting the possibility of configuring all the options on the display (in Local mode) or by Ekip Com modules (in Remote mode).

Disabling the parameter, Local mode and using the password enable security against undesired modification by unauthorized persons to be increased.



NOTE: with Test Bus= Off reading by the service bus is guaranteed

Ekip UP is supplied with the parameter set to: **On**.

System The **System** menu has different options:

Parameter	Description	Default
<i>Date</i>	Setting current date	
<i>Time</i>	Setting current time	
<i>Language</i>	Setting language in display menus	English
<i>Password</i>	Setting password, see page 45 for details	00001

Table 150: system menu



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 (see Getting Started 1SDH002004A1001)

View The Views menu has different options:

Parameter	Description	Default
<i>TFT orientation</i>	Enables the orientation of the pages <i>Alarms List</i> , <i>Measuring Instruments</i> and <i>Main Measurements</i> to be set. The options are: Horizontal, Vertical clockwise, Vertical anticlockwise	Horizontal
<i>Customers page</i>	Enables a supplementary information page to be activated, which is accessible by pressing the iTEST button twice on any page that has a diagnosis bar. The configuration of the information on the new page is permitted via Ekip Connect (page 125)	Off
<i>Ammeter phase</i>	Enables the current that is to be displayed on the <i>Measuring instruments</i> page to be set and selected from: I _{max} , I ₁ , I ₂ , I ₃ , Ne (only in 4P or 3P configuration with neutral)	I _{max}
<i>Voltmeter phase</i>	Enables the voltage that is to be displayed on the <i>Measuring instruments</i> page to be set and selected from: V _{max} , V ₁₂ , V ₂₃ , V ₃₁	V _{max}

Table 151: view menu

Maintenance The parameter enables an alarm to be enabled/disabled referring to the maintenance of the unit that is described on page 49.

Ekip UP is supplied with the parameter set to: On.

29 - Supplementary settings

Presentation From the service connector (via Ekip Connect) or with communication by system bus it is possible to access parameters and commands that are not available directly from the display.

The list and description of the different functions are set out below.

Programmable Statuses Sixteen independent programmable statuses are available that are identified by the letters A, B, C, D, E, F, G, H, I, L, M, N, O, P, Q, R and provide different event control solutions.

Each programmable status can have two values: *True* or *False* and has different configuration parameters available:

- **Trigger:** event or combination of several events (up to 24, in AND or OR logic configuration) to activate status.
- **Delay On:** status activation delay, calculated by the presence of the trigger
- **Delay Off:** status deactivation delay, calculated by the absence of the trigger



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

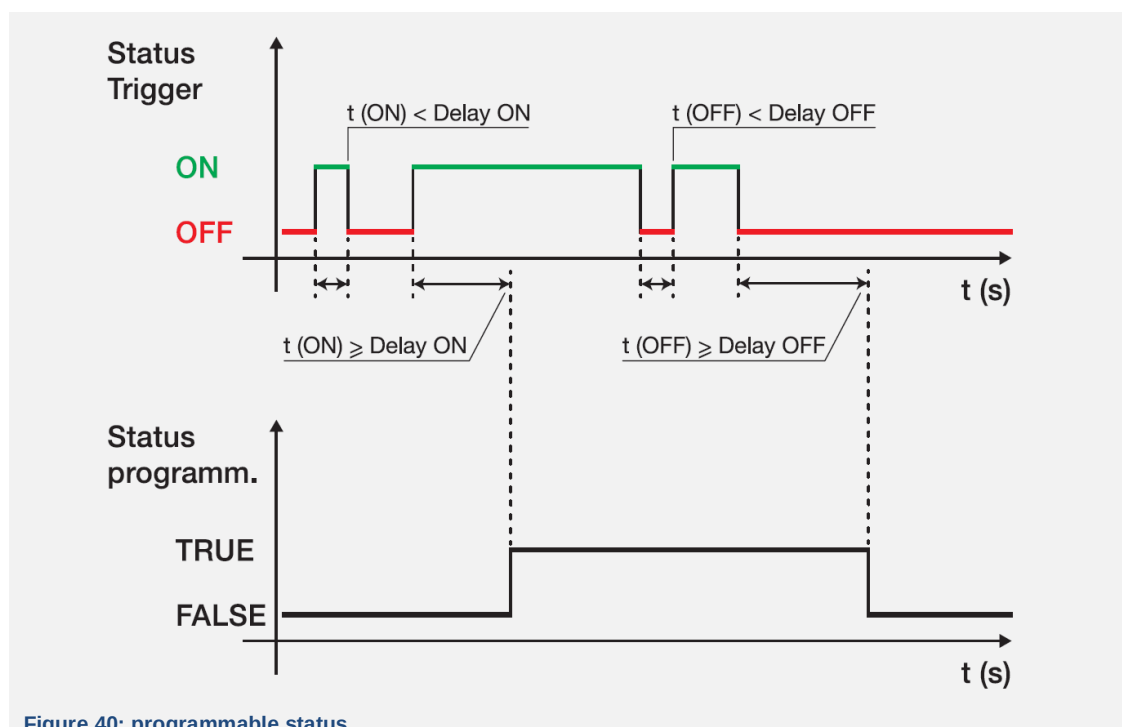


Figure 40: programmable status

The statuses can be used with the external module *Ekip Signalling 10K*, on Bus link or with the programmable functions, to show the desired combination of signalling on contacts.

Filters Measuring filters can be activated on the 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 active neutral connection

If the filter is activated, the measurements and the specific protections (G, Gext and RC for GTE filter, and V0 for V0 filter) are treated differently: Ekip UP applies a pass-band filter on the signal to measure only the basic component (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 make up the identification used by Ekip Connect for the connected devices

Customers Page	Enabling and fields for editing the Customers page (5 information lines) that can be viewed on the unit display (page 123).
Installation	Date of installation of unit
Load Profile Time	The counter indicates the time elapsed since the last reset of the energies measurements. It is active and updated in the presence of at least an auxiliary supply or a supply from Ekip T&P.
LED Alive	The parameter enables the operation of the power LED of Ekip UP and of all the modules connected to the terminal board to be modified; If activated, the power LEDs act as follows: • <i>Ekip UP</i>: switches on with 0.5Hz frequency • <i>Modules</i>: if there are no communication errors, they synchronize with the Ekip UP LED. If deactivated, the Power LEDS on the respective devices come on with a fixed light.
Open/Close Remote Direct Command	The parameter manages 2 different packets of commands for remote opening and closing: • <i>Enabling</i>: commands 7 and 8 valid (direct Open and Close command). • <i>Disabled</i>: commands 7 and 8 not valid: in this case, remote opening and closing are possible using the programmable functions YC COMMAND and YO COMMAND and the commands Request open switch (28) and Request close switch (29).
Change of double set of parameters always	If activated, it enables the set parameters (<i>Adaptive Protection</i>) to be changed even if timing alarms have been triggered Default disabled
Repeat S/G HW zone selectivity	If Enabled, the zone selectivity HW signals propagation logic applies in accordance with the table in the technical log QT1 1SDC007100G0205 . If disabled, the HW selectivity signal is not propagated by Ekip UP
Zone selectivity input functions	In these section the inputs and some zone selectivity outputs can be configured: • <i>Standard</i>: operation of the input and or the output as a standard logic of zone selectivity (see 1SDC007100G0205 or 1SDC007401G0201); all the selectivity functions are set as Standard. • Customized: the event can be selected that activates the zone selectivity input or output.  IMPORTANT: In Customized configuration, the only event that can activate zone selectivity is the set event and accordingly standard selectivity operation is not active (change should be made only by expert technical staff)
Glitch	Glitch commands 16 to 23 activate the glitch registers. These are used to customize programmable functions or output contacts.
Reset Wizard	Reset Wizard: at first startup Ekip UP will show the Wizard window for setting certain unit parameters

30 - Test

Presentation



On the display the test area can be accessed, in which commands are available for checking certain unit functions; all the commands are set out in detail below that are available in the Test menu (page 41).

Ekip T&P with Ekip Connect has the section *Protections Test*, to simulate the presence of alarm current or voltage signals and check times and trips (page).

Auto Test

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

The sequence consists of the following test phases:

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



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

Test Protection

The menu that is available for the Protect, Protect+ and Control+ versions has two commands:

Command	Description	Conditions for a correct test
<i>Close Unit</i>	Closes the contact 4K O 02 for 0.2 s	Auxiliary supply present Status= Open 4K O 02 contact configured as Close Output (page 121)
<i>Open Unit</i>	Closes the contact 4K O 01 for 0.2 s	Vaux present

Table 152: Test Protection command

Ekip UP checks that the command has been sent correctly, confirmed by the display window by the message "Test Executed"; if any conditions are incorrect, the message "Busy" is displayed.



IMPORTANT: after a command, it is the user's responsibility to check that the actuator and information status has actually changed: make sure that the devices connected to Ekip UP are connected, supplied and operating correctly before the test is run

Ekip Signalling 4K

The menu is activated in the presence of the Ekip Signalling 4K module and auxiliary supply.

The *Auto Test* command is available in the module to activate the automatic sequence of tests of the outputs (contacts and LEDs) and performs the following tasks:

1. Reset output contacts (= open) and LED (= off).
2. Closure in sequence of all the output contacts with startup of the relative LEDs
3. Reset initial conditions



IMPORTANT: for the Protect, Protect+ and Control+ versions, the sequence does not include the O 01 output; the output O 02 is also included if configured as a close command (page 121)



IMPORTANT: the *Auto Test* command closes the contacts regardless of the configuration set by the user: making the devices secure that are connected to the *Ekip Signalling 4K* module, checking the correct closure of the contacts and switch-on of the LEDs are the user's responsibility.

Ekip Signalling 2K

The menu is activated in the presence of the *Ekip Signalling 2K* module, auxiliary supply, and enabled local bus.



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

The *Auto Test* command is available in the module to activate the automatic sequence of tests of the outputs (contacts and LEDs) and inputs (LEDs) and performs the following tasks:

1. Reset output contacts (= open) and LED (= off).
2. Startup in sequence of all the LEDs (output and inputs).
3. Closure and switch-off in sequence of all two output contacts with startup of the relative LEDs
4. Reset initial conditions



IMPORTANT: the *Auto Test* command closes the contacts regardless of the configuration set by the user: making the devices secure that are connected to the *Ekip Signalling 4K* module, checking the correct closure of the contacts and switch-on of the LEDs are the user's responsibility.

Zone Selectivity

The menu is available with the Protect+ and Control+ versions and has 1 or 2 submenus, which can be seen on the basis of the enabled protections:

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

Table 153: zone selectivity test command 1

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

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

Table 154: zone selectivity test command 2

For the selectivity contacts check, follow the commissioning procedure (page 22).

RC Test

The command is available for Protect, Protect+ and Control+ versions, in the presence of the *RC Rating Plug*.

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

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



IMPORTANT: the command sends a signal to the RC toroid and ends with a trip command. It is the user's responsibility to check that the initial connection (of the toroid and unit supplies) are correct and that the open command is run

Additional functions

31 - Load Shedding

Description



The *Load Shedding* function allows you to manage malfunctions on systems that can work thanks to the energy produced by renewable and local energy sources, in particular a lack of power, e.g. due to a malfunction on the MV voltage side.

The function is configurable for the versions Protect, Protect+ and Control+ of Ekip UP and available in two versions:

- *Basic* is supplied as default on Ekip UP
- *Adaptive* can be purchased with the relative additional package

All the parameters and measurements of the function are available via Ekip Connect; while the Ekip UP allows setting and viewing some of them, as noted below.



IMPORTANT: for full details see the *Technical Catalog* or the function's documentation (see page 13)

Ekip UP parameters

Some function configuration parameters are available In the *Settings - Load Shedding* menu (page 40).



NOTA : it is advisable to first configure the parameters via Ekip Connect, and only then operate on the Ekip UP

Parameter	Description	Default
<i>Enable</i>	Enable/disable the function and the availability of the parameters in the menu	OFF
<i>Version</i>	Display of the function version, Basic or Adaptive  NOTE: with the Basic version the only parameter available is Reconnection Timeout	--
<i>Solar System Present</i>	Defines if the microgrid includes a solar system (Off/On)	Off
<i>Solar rated power</i>	Available with Solar System Present = On, defines the rated power of your solar system. The value is expressed in kW, which can be set in a range: 100 kW .. 65535 kW with 1 kW steps	100 kW
<i>ATS</i>	Defines if the system has an ATS system (Off/On)	Off
<i>Generator power</i>	Available with ATS = On, it defines the power received from the ATS branch, which can be set in a range: 0 kW (. . .) .. 10000 kW with 1 kW steps	
<i>Frequency slope</i> (NOTE)	Defines the variation of real-time frequency that triggers <i>Load shedding</i> The value is expressed in (Hz/s), which can be set in a range: 0.6 Hz/s .. 10 Hz/s with 0.2 Hz/s steps	0.6 Hz/s
<i>FW Warning</i> (NOTE)	Minimum frequency control threshold that activates Load shedding The value is expressed in an absolute value (Hertz), which can be set in a range: 0.9 Fn .. 1.1 Fn with 0.001 Fn steps	1 Fn
<i>Reconnection Timeout</i>	Defines the time used by Ekip UP between the one load and the next, following the re-closure of the main CB. The value is expressed in (s), which can be set in a range: 10 s ..1800 s with 1 s steps	10 s

Table 155: load shedding - parameters



NOTA: Load shedding is activated if the control conditions defined by the Frequency slope and FW Warning parameters are simultaneously present

**Ekip UP
measurements**

In the *Measurements* page, with *Load Shedding* activated, the specific page with the main measurements is available:

Measurement	Description
<i>F</i>	Frequency measured
<i>F_n</i>	Rated frequency of Ekip UP
<i>LOADS</i>	Number of controlled loads
<i>LOADS Shed</i>	Number of loads shed

Table 156: load shedding - measurements 1

With *Power Controller* activated, the *Load Shedding* menu is available in the *Information* page (page 42), and it provides information on the 15 loads in 2 submenus:

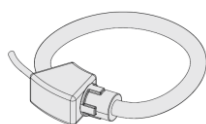
Submenu	Information included
<i>Load Input Status</i>	Load status (from Load 1 to Load 15): open or closed
<i>Active load</i>	Load configuration (from Load 1 to Load 15): active or inactive

Table 157: load shedding - measurements 2

Standard Modules

Introduction Ekip UP is always supplied with a series of accessories, as shown on page 11.
The functional details and possible references for replacing all accessories are set out below.

32 - Current Sensors



Ekip UP can be equipped with three different types of current sensor, which are available in different sizes and dimensions to meet different functional and applicational solutions:

Sensors	Description	Available sizes [A]
Type A	Closed sensor with bushing bar	2000, 4000
Type B	Closed sensor without bushing bar	400, 1600, 2500 shaped
Type C	Openable sensor without bushing bar	4000 (100 mm) ⁽¹⁾ , 4000 (120 mm) ⁽¹⁾ , 4000 (200 mm) ⁽¹⁾ , 6300 (290 mm) ⁽¹⁾

Table 158: sensor type



(1) The measure refet to internal diameter of the sensor

Ekip UP is always supplied with three or four sensors of the same type and size, depending on the unit configuration (3P or 4P).

Another solution (Type D) is available, which includes insertion bridges instead of sensors; see page 192 for more details

Measurement characteristics

All types of sensor connected to Ekip UP, in the envisaged operating conditions (page 14), ensure the accuracy of the measurements set out on the summary table on page 47:

Measurement	Ekip UP accuracy with Type A sensors A ⁽¹⁾	Ekip UP accuracy with Type A sensors B ⁽¹⁾	Ekip UP accuracy with Type A sensors C ⁽¹⁾
Phase currents	1%	1%	1 % ⁽²⁾
Internal earth fault	2 %	2 %	2 % ⁽²⁾

Table 159: sensor performances



NOTES:

- (2)** performance relating to the normal operating range (0.2 - 1.2 In)
(3) accuracy with sensor that is centred and perpendicular to the bar of its phase, cable connected to Ekip UP far from bar and zones of possible disturbances (e.g.: inverter), closure of the sensor far from the bars.



IMPORTANT: ABB recommends complying with as many as possible of the instructions set out in the note (2) to obtain the best possible accuracy

Kit and identification

The current sensors are supplied with connection and identification accessories:

Sensors	Cable	Accessories supplied	Identification
Types A and B	Separated	Cable connecting to Ekip UP (3 m)	Phase label applied to sensor
Type C	Fitted (3 m)	Terminal for sensor cables	Loose tags to be affixed to cabling

Table 160: sensor identification

The sensors also have a tag or incision that shows the direction of the current.

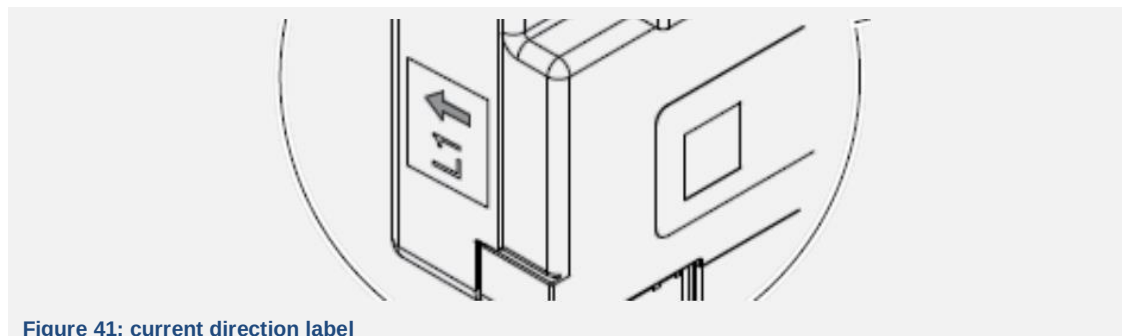


Figure 41: current direction label



IMPORTANT: it is the installing technician's responsibility to:

- connect the sensors correctly to Ekip UP in accordance with the instructions in Getting Started 1SDH002004A1001
- for A and B sensors, check the match between units (type A and B sensors display the serial number of the associated Ekip UP)

Sensor Type A

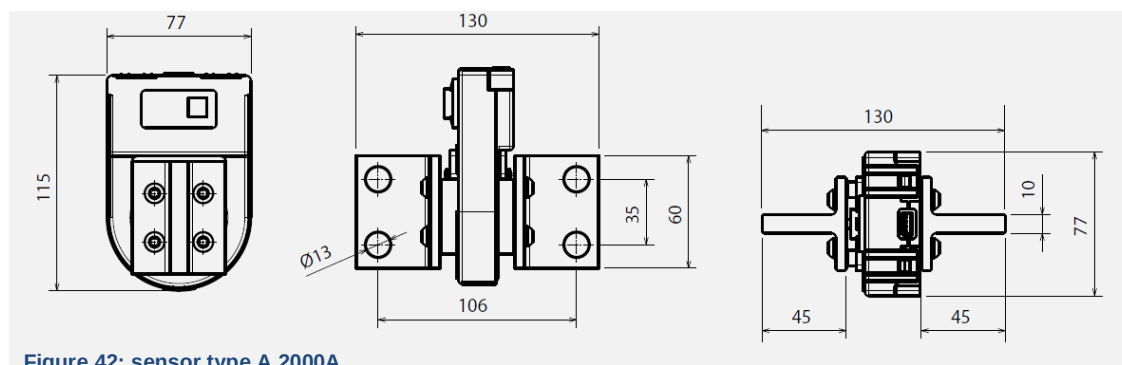


Figure 42: sensor type A 2000A

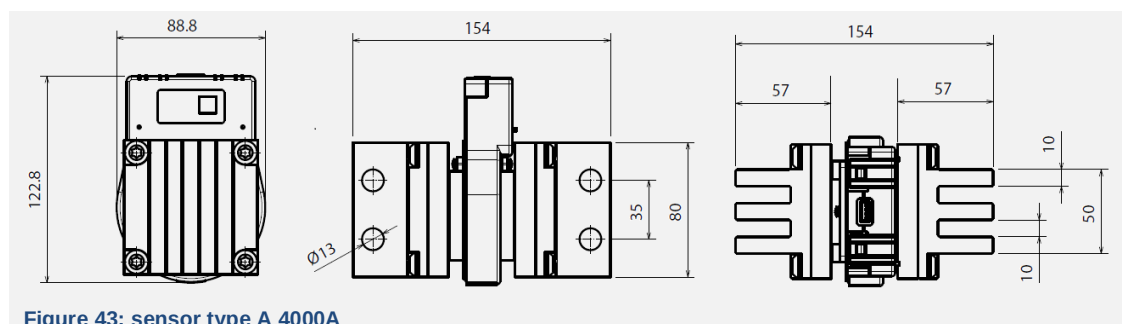
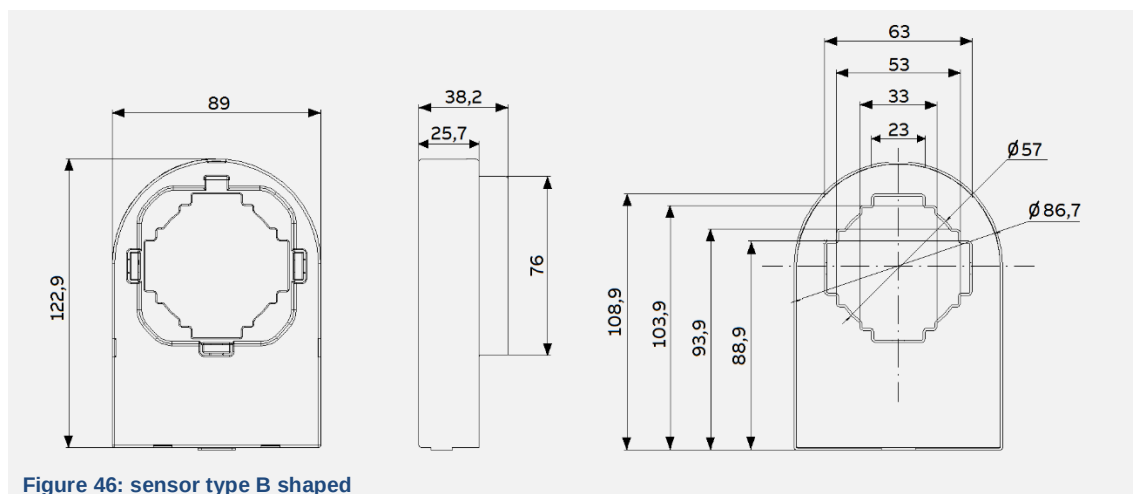
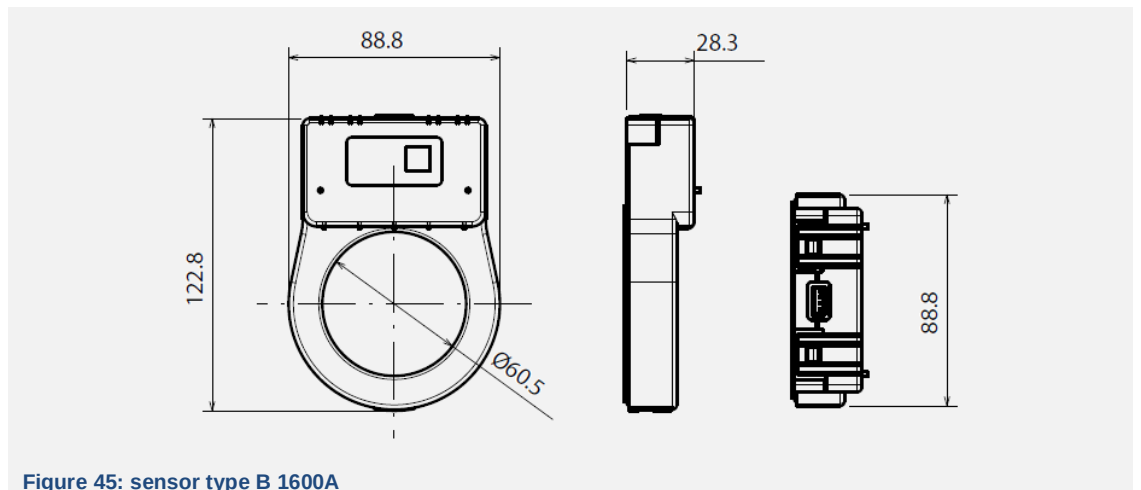
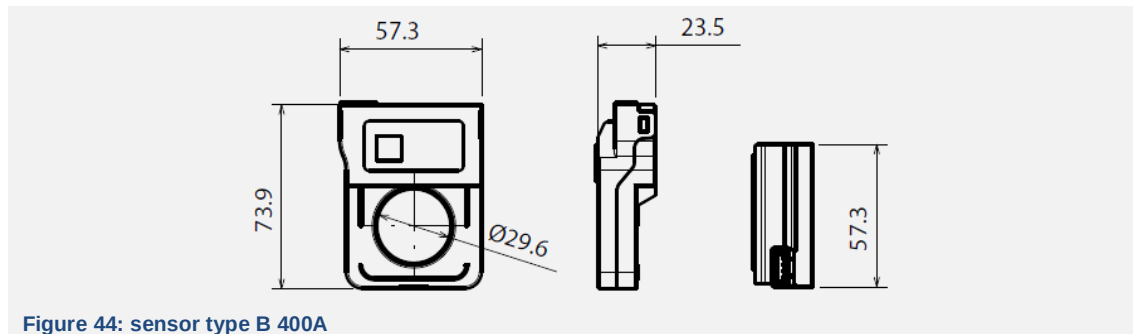


Figure 43: sensor type A 4000A

Sensor Type B



With sensor Type B shaped are allowed:

- busbars with dimensions up to 30 x 50 mm or 20 x 60 mm
- cable with maximum diameter 54 mm

Sensor Type C

A (mm)	B (mm)
100	125
120	145
200	225
290	315

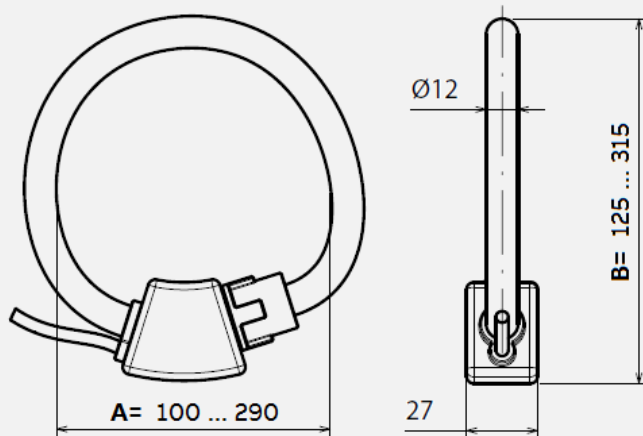


Figure 47: sensor type C

Sensors Type C guarantee an insulation resistance of 1000 Vrms CAT III / 600 Vrms CAT IV and an IP67 protection degree.

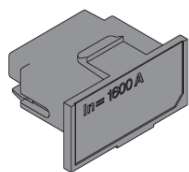
Replacement

You can replace Ekip UP's sensor chain or change its configuration (3P/4P) by contacting ABB and supplying the serial number of Ekip UP.



NOTE: the configuration change from three to four sensors must be completed with the parameter Configuration that is available on the display (page 121)

33 - Rating plug



The *Rating Plug* that is supplied with Ekip UP defines the rated current I_n , which is necessary for the measurement ranges and for setting the current protections (for I_n). It is fitted to a dedicated frontal connector that the user can access.

Ekip UP continuously monitors the presence of the *Rating Plug*, and reports its absence and any fitting or installation errors.

If a new model is fitted, upon startup, Ekip UP shows the installation request.

In the *About - Digital Unit* menu, the *Rated Current* field is available that shows the I_n current read by the user.

Versions Different sizes (100A up to 6300A), can be ordered in two version: one classic and one that activate the Rc protection; the two versions use different label

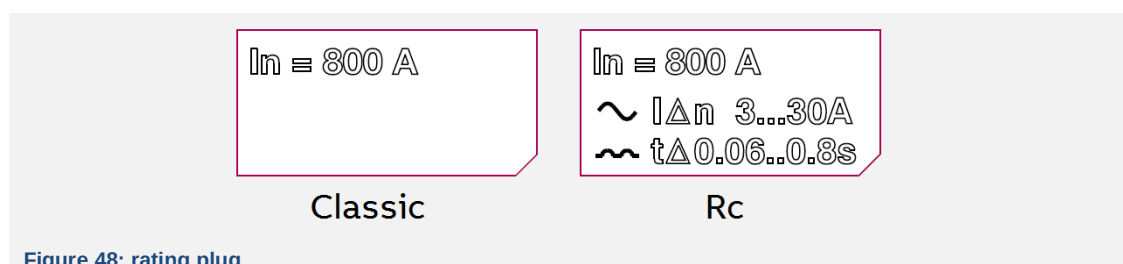


Figure 48: rating plug

Replacement The module can be replaced by the user; any *Rating Plug* can be fitted that has a maximum rated current that is equal to the current of the sensor fitted to the unit.

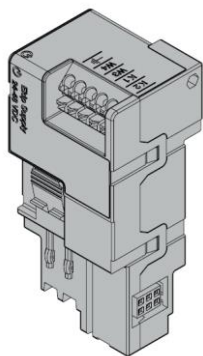


NOTE: if present the sensor type C 290mm it's possible to fit Rating Plug with size from 2000 A up to 6300 A

More information on fitting and the *Rating Plug* installation procedure is available from <http://www.abb.com/abblibrary/DownloadCenter/>, in particular in Getting Started 1SDH002004A1001.



IMPORTANT: in order to avoid undesired alarms or tripping, switch off and disconnect main power supply before changing the *Rating Plug*.



Ekip Supply is an accessory supply module.

Performs three functions:

- Supplies auxiliary supply to Ekip UP.
- Enables terminal board 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 specifications

Module	Supply voltage	Maximum power consumption without accessories ⁽¹⁾	Maximum power consumption with accessories ⁽²⁾	Maximum inrush current
Ekip Supply 24-48VDC	21.5-53 VDC	4 W	10 W	2 A for 20 ms

Table 161: ekip supply - performances

-  **NOTE:**
- (1)

Ekip UP with standard modules
- (2)

Ekip UP with standard modules + four modules on terminal board

Interface

The module has a power LED to signal the presence of an input supply:

- Off: no power supply
- On (steady beam): powered up

Connections

For external cabling, use AWG 22-16 cables with a maximum external diameter of 1.4 mm, with reference to the electrical diagrams for 1SDM000116R0001.

Introduction *Ekip Measuring* is an accessory measuring module:

- Voltage (RMS measurement of the network and voltage phases in the specified cases)
- Frequency of the voltages
- Power and energy, using all the measurements of the phase currents



NOTE: the measurement performance levels are disclosed in the Measurements chapter, page 47

The module, if combined with *Ekip Synchrocheck*, also enables it to be established whether the synchronism conditions exist between external sockets and external contacts that are necessary for closing the synchronism contact (see chapter dedicated to *Ekip Synchrocheck*, page 179).

Electrical specifications

The *Ekip Measuring* operates with Ekip UP powered by auxiliary supply and works in the following ranges:

Component	Range
Input network voltage	0 ÷ 760 VAC (692 VAC +10 %)
Input frequency	30 - 80 Hz

Table 162: ekip measuring - performances

Isolation transformer

Isolation transformer

For connecting at a network voltage above a rated value of 690 VAC (760 VAC maximum), an isolation transformer must be used that complies with IEC 60255-27 and has the following characteristics:

Characteristics	Description
Mechanical	• fixing: EN 50022 DIN43880 guide • material: self-extinguishing plastic • protection level: IP30 • electrostatic protection: with screen to be earthed
Electrical	• accuracy class: ≤ 0.2 • performance: ≥ 4 VA • overload: 20 % permanent • insulation: 4 kV between inputs and outputs, 4 kV between screen and 4 kV outputs between screen and inputs. • frequency: 45-66 Hz

Table 163: ekip measuring - transformer

Menu If the *Ekip Synchrocheck* module is detected correctly by Ekip UP the specific configuration area is activated in the *Modules - Settings* menu.

In this menu, the following parameters can be configured:

Parameter	Description	Default
<i>Voltmeter transf.</i>	Selects the presence or absence of the external transformer	Absent
<i>Rated voltage</i>	Available in absence of transformer, defines rated voltage Un. The value is expressed as an absolute value (Volt), settable in a range: 100 V - 690 V with variable step	400 V
<i>Primary voltage</i>	Available in presence of transformer, defines rated plant voltage. The value is expressed as an absolute value (Volt), settable in a range: 100 V - 1150 V with variable step	400 V
<i>Secondary voltage</i>	Available in presence of transformer, defines the secondary voltage of the transformer. The value is expressed as an absolute value (Volt), settable in a range: 100 V - 230 V with variable step	100 V
<i>Positive Power Flow</i>	Defines the power flow required for protection D (page 74); 2 selections available: - High $\Rightarrow$ Low: the power flow of the actuator connected to Ekip UP goes from the low to the high terminals (load connected low) - Low $\Rightarrow$ High: opposite power flow (high connected load)	High $\Rightarrow$ Low
<i>Neutral connection</i>	Available with 3P configuration, enables the presence of external neutral to be enabled.  NOTE: the presence of the active neutral activates the measurement of the phase voltages	Absent

Table 164: ekip measuring - menu

Information In the *About-Modules* menu, the specific menu of the module is available in which the serial number and the embodiment of the module are present.

Test For the dielectric test of the module, refer to Getting Started 1SDH002004A1001.

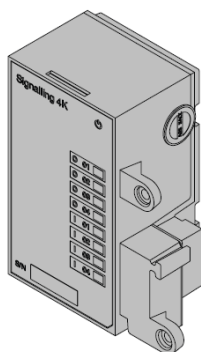
Connections Refer to the electrical diagrams for 1SDM000116R0001 for connecting the external voltage sockets, in all the possible configurations:

- three-phase system (with or without transformer)
- three-phase system with neutral (with or without transformer)
- three-phase system and residual voltage control
- three-phase system with transformer and residual voltage control



NOTE: configuration with residual voltage control available with *Protect+* and *Control+* versions

36 - Ekip Signalling 4K



Ekip Signalling 4K is a signalling accessory that enables programmable inputs/outputs to be managed.

The module has:

- four contacts for output signals and relative status LED
- four digital inputs and relative status LED
- a power LED with the startup status of the module



NOTE: the availability of some inputs/outputs can be limited for the *Protect*, *Protect+* and *Control+* versions because they are used for specific functions (open/close commands and status reading, see page 61)

Supply *Ekip Signalling 4K* runs with Ekip UP powered up by auxiliary supply.



NOTE: in the absence of an auxiliary supply, the output contacts are always in an open position and the statuses of the inputs are not valid

Input Ekip UP can be configured in such a way that the status of the inputs corresponds to actions or signals, with different programming options (see *Menu* on page 139)

Each input (H1, H2, H3, H4) must be connected with reference to the common contacts (HC). The module permits two logic statuses, interpreted by Ekip UP according to the configuration selected for each contact:

Status	Electrical condition	Configuration of contact	Status detected by Ekip UP
Open	Circuit open ⁽¹⁾	Active open	ON
		Active closed	OFF
Closed	Short circuit ⁽¹⁾	Active open	OFF
		active closed	ON

Table 165: ekip signaling 4k - input



(1): circuit open: > 100 k Ω ; short circuit: < 50 Ω

Output Ekip UP can be configured in such a manner that the contacts of each output are closed or open according to one or more events, with different programming options (see *Menu* on page 139)).

Each output consists of 2 contacts (K3-K7, K4-K8, K5-K9, K6-K10), isolated from unit and from the other outputs, that have the following electrical characteristics:

Characteristics	Maximum limit ⁽¹⁾
Maximum switchable voltage	150 VDC / 250 VAC.
Switching power	2 A @ 30 VDC, 0.8 A @ 50 VDC, 0.2 A @ 150 VDC, 4A @ 250 VAC
Dielectric strength between open contacts	1000 VAC (1 minute @ 50 Hz)
Dielectric strength between each contact and coil	1000 VAC (1 minute @ 50 Hz)

Table 166: ekip signaling 4k - output



(1): data on a resistive load

Interface The module has three signalling LEDs:

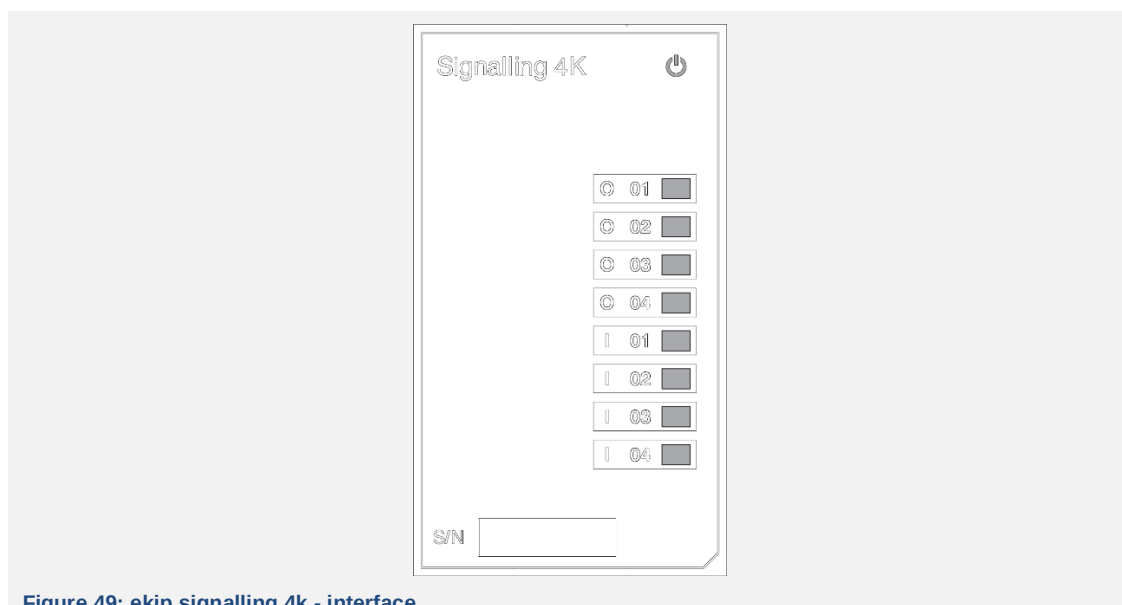


Figure 49: ekip signalling 4k - interface

LED	Description
Power	Report presence in input power supply: • Off: no power supply • On (steady beam): powered up
O 01, O 02, O 03, O 04	Indicate status of the contacts of each output: • off: open contact • on: closed contact
I 01, I 02, I 03, I 04	Indicate status of the contacts of each input: • off: circuit open • on: short circuit

Table 167: ekip signaling 4k - interface

Menu If the Ekip Signalling 4K module is detected correctly by Ekip UP the specific configuration area in the *Modules - Settings* menu is activated.

This menu contains the submenus of all the available inputs and outputs (according to the Ekip UP version being used), containing all the configuration parameters.

Input Parameters

All the available inputs enable the following parameters to be configured:

Parameter	Description	Default
<i>Polarity</i>	Defines whether the input is defined as ON by Ekip UP when it is open (<i>Active open</i>) or when it is closed (<i>Active Closed</i>)	Active closed
<i>Delay</i>	Minimum duration of activation of the input before the status change is recognized; the delay is expressed in seconds, which are settable in a range: 0 s - 100 s with 0.01 s step  NOTE: • if the source is deactivated before this time has elapsed the status change is not recognized • with delay = 0 s the status change must be anyway greater than 300 μS	0.1 s

Table 168: ekip signaling 4k – input parameters

Output Parameters

All the available outputs enable the following parameters to be configured:

Parameter	Description	Default
<i>Signal source</i>	Event that activates the output and switches the contact. Different protection, status and threshold proposals are displayed; Custom mode can be configured via Ekip Connect to extend the solutions and combine several events	None
<i>Delay</i>	Minimum duration of presence of the source before the output is activated; the delay is expressed in seconds, which are settable in a range: 0 s - 100 s with 0.01 s step  NOTE: - if the source is deactivated before this time the output is not switched - with delay = 0 s the source must be present for more than 300 μS	0 s
<i>Contact type</i>	Defines the rest status of the contact with a non-present source between: open (NO) and closed (NC)	NO
<i>Latched⁽¹⁾</i>	Enables the output (and relative status LED) to be maintained active (ON) or be deactivated (OFF) until the event disappears.	Off
<i>Activation time Minimum⁽¹⁾</i>	Defines the minimum closure time of the contact following the rapid presence of sources: - Source duration < min. activation= the contact is activated for the minimum activation time - Source duration $\geq$ min. activation= the contact is activated for the time that the source is present It is possible to choose between: 0 ms, 100 ms, 200 ms	0 ms

Table 169: ekip signaling 4k – output parameters



(1): if Ekip Measuring is used for the Power Controller function, the following considerations apply:

- Latched:* deactivate all the Latched configuration of the outputs used for Power Controller
- Minimum activation time:* the Power Controller option is available in addition to those that have already been described: if selected, the output and active latching is active for a set time that depends on the function, regardless of the persistence of the event that activated it.

Information

In the *About-Modules* menu, the specific menu of the module is available, in which the status of the inputs (*On/Off*) and of the outputs (*Open/Closed*) are present.

Test

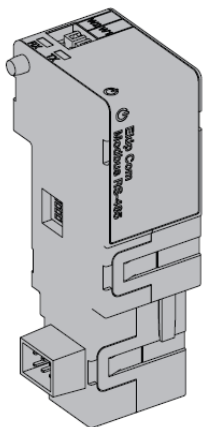
If the *Ekip Signalling 4K* module is detected correctly, the test area in the Test menu is activated.
For details of test characteristics, see page 126.

Connections

Refer to the electrical diagrams for 1SDM000116R0001 for the connection of all the input/outputs in all possible configurations:

- Monitor and Control+ versions
- Protect, Protect+ and Control versions with/without close command and without status contacts
- Protect, Protect+ and Control versions with/without close command and with one status contact
- Protect, Protect+ and Control versions with/without close command and two status contacts

37 - Ekip Com Modbus RTU



Ekip Com Modbus RTU is a communication accessory that enables Ekip UP to be integrated into a RS-485 network with Modbus RTU communication protocol, with remote supervision and control functions, in two different modes, master and slave.

From remote it is possible to:

- read information and Ekip UP measurements
- manage certain commands, including opening and closing actuator
- access to information and parameters that are not available on the display



NOTE: the remote open and close commands to the switch can be run only if Ekip UP is in Remote configuration

To map the module in its own communication network, the document System Interface is available (page 174), in which all the necessary communication and command details are listed.

Models Ekip UP can be configured with two different modules that are compatible with the Modbus RTU protocol: *Ekip Com Modbus RTU* and *Ekip Com Modbus RTU Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.



NOTE: if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip UP to increase the potential of unit (for example: for applications in which great network reliability is necessary).



IMPORTANT: in each Ekip UP can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com Modbus RTU Redundant*)

Supply *Ekip Com Modbus RTU* is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: in the absence of an auxiliary supply, the communication between Ekip UP and module is interrupted

Interface The module has three signalling LEDs:

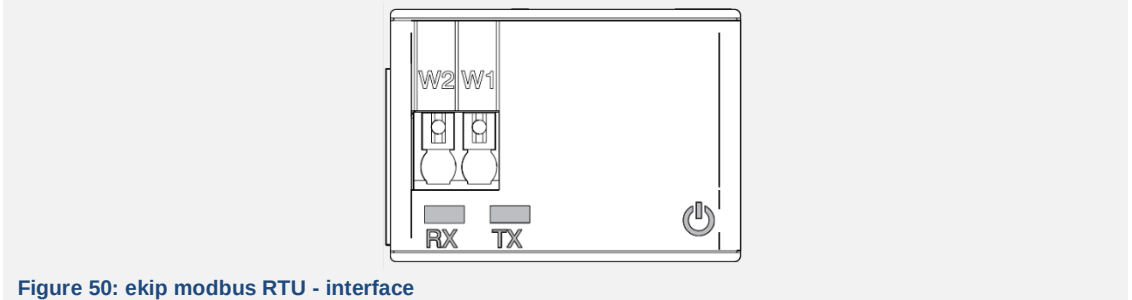


Figure 50: ekip modbus RTU - interface

LED	Description
Power	Reports ON status and correct communication with Ekip UP: - off: module off - fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present - flashing not synchronized with power LED of Ekip UP (2 fast flashes per second): module ON and communication with Ekip UP absent
Rx	Indicates the status of the communication between the network master and the module (slave): - off: Modbus RTU communication not active - on with fast flashing: Modbus RTU communication active
Tx	Indicates the status of the communication between the network master and the module (slave): - off: communication between Modbus RTU not active - on with fast flashing: Modbus RTU communication active

Table 170: ekip modbus RTU – interface

Configurations Resistances can be linked to bus RS-485, configuring dip switches located on the side of the module:

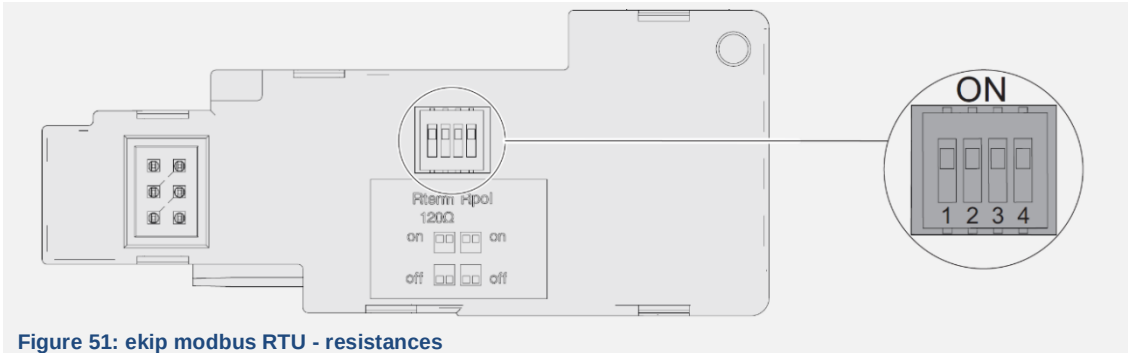


Figure 51: ekip modbus RTU - resistances

Resistances	Dip switch	Description	Default
Rterm	1 and 2	Termination resistance 120 Ω Move dip switches 1 and 2 to ON position to connect Rterm	Off
Rpol	3 and 4	200 pull-up or pull-down resistance Ω Move dip switches 3 and 4 to ON position to connect Rpol	Off

Table 171: ekip modbus RTU – resistances

! IMPORTANT: move the dip-switches before connecting to Ekip Supply module and to the communication network

Menu Activating the local bus is required to start communication between the module and Ekip UP and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip UP two areas are activated:

- information area in the *About-Modules* menu containing the software version and the serial number of the module
- area of specific configuration in the *Modules Settings* menu, in which the following communication parameters can be configured:

Parameter	Description	Default
<i>Serial address</i>	Module address; range from 1 to 247 available  IMPORTANT: devices connected to the same network must have different directions	247 / 246 ⁽¹⁾
<i>Baudrate</i>	Data transmission speeds: 3 options available: 9600 bit/s, 19200 bit/s, 38400 bit/s	19200 bit/s
<i>Physical protocol</i>	Define the stop and parity bit; 4 options available: • 8,E,1 = 8 bit datum, 1 EVEN parity bit, 1 STOP bit • 8,O,1 = 8 bit datum, 1 ODD parity bit, 1 STOP bit • 8,N,2 = 8 bit datum, no parity bit, 2 STOP bits • 8,N,1 = 8 bit datum, no parity bit, 1 STOP bit	8,E,1

Table 172: *ekip modbus RTU – menu*



(1): 247 default of the module Ekip Com Modbus RTU; 246 default of the module Ekip Com Modbus RTU Redundant

Remote configurations

From the service connector (via Ekip Connect) or with a system bus communication, it is possible to change the operating configuration from slave to master, to integrate the module into an interactive data exchange network (see description of *Ekip Com Hub*, page170).



IMPORTANT:

- **In Master configuration, the module does not allow data to be exchanged as in normal Slave mode**
- **the presence of several masters on the same network can cause malfunctions**

Remote information

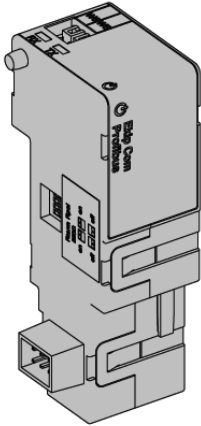
From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).

Connections

Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for terminal references.

The connections must be made with Belden 3105A or equivalent cables.

To connect the module to *Ekip Supply* and Ekip UP, see the instruction sheets 1SDH002004A1002.



Ekip Com Profibus DP is a communication accessory that enables Ekip UP to be integrated into a RS-485 network with Profibus communication protocol, with remote supervision and control functions.

The module is configured as Slave and from remote it is possible to:

- read information and Ekip UP measurements
- manage certain commands, including opening and closing actuator
- access to information that is not available on the display



NOTE: the remote open and close commands to the switch can be run only if Ekip UP is in Remote configuration

To map the module in its communication network, the document System Interface is available (page 174) that lists the necessary communication and command details.

Models

Ekip UP can be configured with two different modules that are compatible with the Profibus protocol: *Ekip Com Profibus DP* and *Ekip Com Profibus DP Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.



NOTE: if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip UP to increase the potential of unit (for example: for applications in which great network reliability is necessary).



IMPORTANT: in each Ekip UP can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com Profibus DP Redundant*)

Supply

Ekip Com Profibus DP is supplied directly by the *Ekip Supply* module, to which it is connected.



NOTE: in the absence of an auxiliary supply, the communication between Ekip UP and module is interrupted

Interface The module has three signalling LEDs:

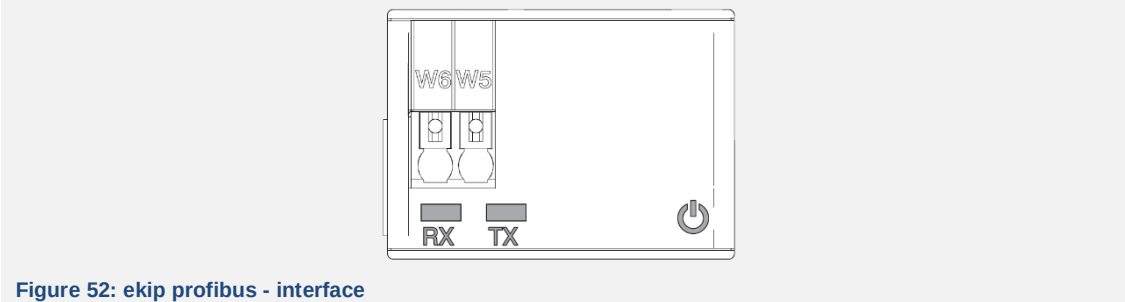


Figure 52: ekip profibus - interface

LED	Description
Power	Reports ON status and correct communication with Ekip UP: - off: module off - fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present - flashing not synchronized with power LED of Ekip UP (2 rapid flashes per second): module ON and communication with Ekip UP absent
Rx	Indicates the status of the communication between the network master and the module (slave): - off: communication between master and module not active - fixed light: communication between master and module active
Tx	Indicates the status of the communication between the network master and the module (slave): - off: communication between master and module not active - flashing light: communication between master and module active

Table 173: ekip profibus – interface

Configurations Resistances can be linked to bus RS-485, configuring dip switches located on the side of the module:

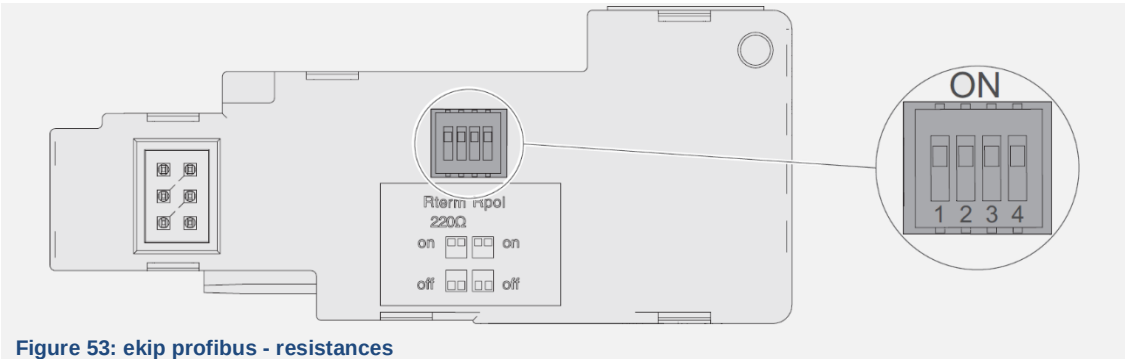


Figure 53: ekip profibus - resistances

Resistances	Dip switch	Description	Default
Rterm	1 and 2	Termination resistance 220 Ω Move dip switches 1 and 2 to ON position to connect Rterm	Off
Rpol	3 and 4	390 pull-up or pull-down resistance Ω Move dip switches 3 and 4 to ON position to connect Rpol	Off

Table 174: ekip profibus – resistances

! IMPORTANT: move the dip-switches before connecting to *Ekip Supply* module and to the communication network

Menu Activating the local bus is required to start communication between the module and Ekip UP and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip UP two areas are activated:

- information area in the *About-Modules* menu containing the software version and the serial number of the module
- area of specific configuration in the *Modules Settings* menu, in which the following communication parameters can be configured:

Parameter	Description	Default
<i>Serial address</i>	Module address; range from 1 to 125 available  IMPORTANT: devices connected to the same network must have different directions	125 / 124 ⁽¹⁾

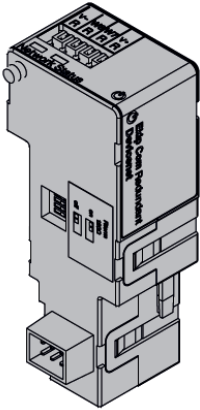
Table 175: ekip profibus – menu



(1): 125 default of the module Ekip Com Profibus DP; 124 default of the module Ekip Com Profibus DP Redundant

Remote information From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).

Connections Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for terminal references.
The connections must be made with Belden 3079A or equivalent cables.
To connect the module to *Ekip Supply* and Ekip UP, see the instruction sheets 1SDH002004A1002.



Ekip Com DeviceNet™ is a communication accessory that enables Ekip UP to be integrated into a CAN network with communication protocol DeviceNet™, with supervision and remote control functions.

The module is configured as Slave and from remote it is possible to:

- read Ekip UP information and measurements
- manage certain commands, including opening and closing actuator
- access information and parameters that are not available on the display



NOTE: *the remote open and close commands to the switch can be run only if Ekip UP is in Remote configuration*

To map the module in its communication network, the document System Interface is available (page 174) that lists the necessary communication and command details.

Models

Ekip UP can be configured with two different modules that are compatible with the DeviceNet™ protocol: *Ekip Com DeviceNet™* and *Ekip Com DeviceNet™ Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.



NOTE: *if not specified, the information in the following chapter applies to both models*

Both modules can be connected simultaneously to Ekip UP to increase the potential of unit (for example: for applications in which great network reliability is necessary).



IMPORTANT: *in each Ekip UP can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com DeviceNet™ Redundant*)*

Supply

Ekip Com DeviceNet™ is supplied directly by the *Ekip Supply* module to which it is connected.

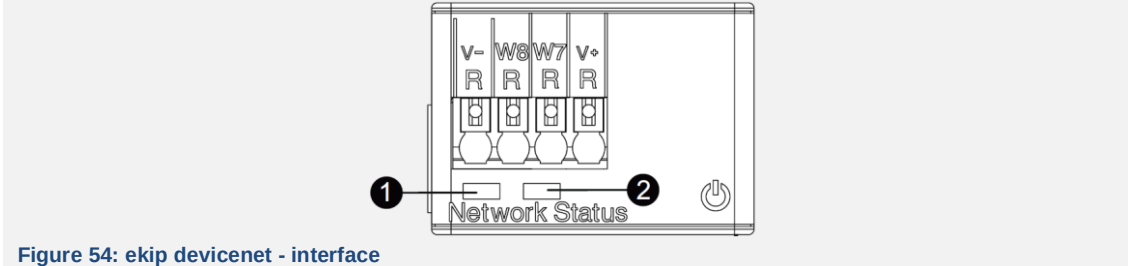
In order to ensure correct operation, the DeviceNet™ bus must be supplied on the V+ and V- terminals with a signal greater than 12 VDC.



NOTE:

- *the PLC ABB with DeviceNet (CM575-DN) communication module already supplies the V+ V- supply*
- *in the absence of the supplies from Ekip Supply and on the supply terminals of the bus, the communication between Ekip UP and module is interrupted.*

Interface The module has three signalling LEDs:

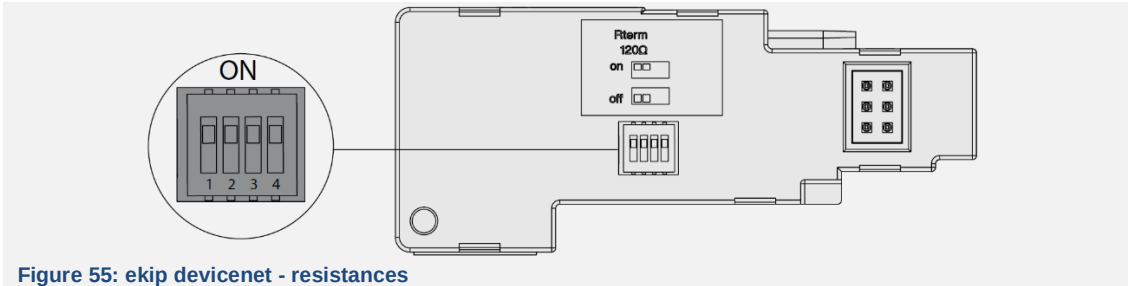


LED	Description
Power	Reports ON status and correct communication with Ekip UP: - off: module off - fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present - flashing not synchronized with power LED of Ekip UP (two fast flashes per second): module ON and communication with Ekip UP absent
① Network Status	Indicates status of the communication on bus: - off: device off line (with status LED OFF) ⁽¹⁾, or in error condition (with status LED ON) - Fixed light: device on line, and assigned to a master (operating condition) - flashing light: device on line, but assigned to a master (device ready to communicate)
② Network Status	Indicates status of the communication on bus: - Off: no error. - Fixed light: device in bus off, or Network Power absent condition. - Flashing light: I/O connection (cyclical data) in timeout.

Table 176: ekip devicenet – interface

i (1): the device has not yet sent the in-line Duplicate ID sequence

Configurations Resistances can be linked to the CAN bus, configuring dip switches located on the side of the module:



Resistances	Dip	Description	Default
Rterm	1 and 2	Termination resistance 120 Ω Move dip switches 1 and 2 to ON position to connect Rterm	Off

Table 177: ekip devicenet – resistances

! **IMPORTANT:**

- move the dip-switches before connecting to *Ekip Supply* and to the network
- the termination resistances must not be included in the nodes; including this capacity could easily lead to a network with incorrect termination (impedance too high or too low), which might cause a failure. For example, removing a node that includes a termination resistance could lead to a network failure
- the termination resistances must not be installed at the end of a drop line but only at the two ends of the main trunk line

Menu Activating the local bus is required to start communication between the module and Ekip UP and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip UP two areas are activated:

- information area in the *About-Modules* menu containing the software version and the serial number of the module
- area of specific configuration in the *Modules Settings* menu, in which it is possible to configure the following communication parameters:

Parameter	Description	Default
MAC Address	Module address; range from 1 to 63 available  IMPORTANT: devices connected to the same network must have different directions	63 / 62 ⁽¹⁾
Baudrate	Data transmission speeds: 3 options available: 125 kbit/s, 250 kbit/s, 500 kbit/s	125 kbit/s

Table 178: ekip devicenet – menu



(1): 63 default of module Ekip Com DeviceNet™; 62 default of module Ekip Com DeviceNet™ Redundant

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
Class ID	Defines the addressing class of the module, between 8 and 16 bit	8-bit Class ID
Bus-Off behaviour	Defines the behaviour of the module following loss of communication(Bus-Off), available between Standard (if the communication is lost, a supply reset is awaited) and Advanced (the module tries to reset and detects the error status)	DeviceNet standard

Table 179: ekip devicenet – remote configuration

Remote information

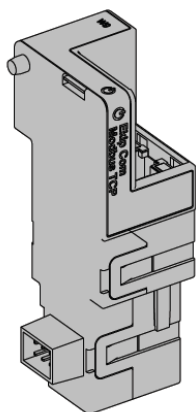
From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).

Connections

Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for terminal references.

The connections must be made with Belden 3084A or equivalent cables.

To connect the module to *Ekip Supply* and Ekip UP, see the instruction sheets 1SDH002004A1002.



Ekip Com Modbus TCP is a communication accessory that enables Ekip UP to be integrated into an Ethernet network with Modbus TCP communication protocol, with remote supervision and control functions, in two different modes, standard and HTTP server.

The module is configured as master and from remote it is possible to

- read Ekip UP information and measurements
- manage certain commands, including opening and closing actuator
- access information and parameters that are not available on the display



NOTE: the remote open and close commands to the switch can be run only if Ekip UP is in Remote configuration

To map the module in its communication network, the document System Interface is available (page 174) that lists the necessary communication and command details.

Depending on the parameters set, which are illustrated on subsequent pages, the following module ports are used:

Port	Service	Notes
502/tcp	TCP Modbus	Valid for TCP Modbus modes
80/tcp	Server HTTP	Valid for Server HTTP modes
319/udp	IEEE 1588	Valid with IEEE 1588 protocol enabled
320/udp		
68/udp	DHCP client	DHCP client enables alternatively to: <i>static address = On</i>

Table 180: ekip Modbus TCP – ports

Safety As the module enables the actuator to be controlled that is connected to Ekip UP and enables unit data to be accessed, it can be connected only to networks meeting all the necessary security and unauthorized-access prevention requirements (e.g. the control system network of a plant).



IMPORTANT:

- It is customer's sole responsibility to provide and continuously ensure a secure connection between the module and customer network or any other network (as the case may be); customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.
ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
- The module cannot be connected directly to the Internet; connect only to dedicated Ethernet networks, with Modbus TCP communication protocol

Models Ekip UP can be configured with two different modules that are compatible with the Modbus TCP protocol: *Ekip Com Modbus TCP* and *Ekip Com Modbus TCP Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.

NOTE: if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip UP to increase the potential of unit (for example: for applications in which great network reliability is necessary).

IMPORTANT: in each Ekip UP can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com Modbus TCP Redundant*)

Supply *Ekip Com Modbus TCP* is supplied directly by the *Ekip Supply* module to which it is connected.

NOTE: in the absence of an auxiliary supply, the communication between Ekip UP and module is interrupted

Interface The module has three signalling LEDs:

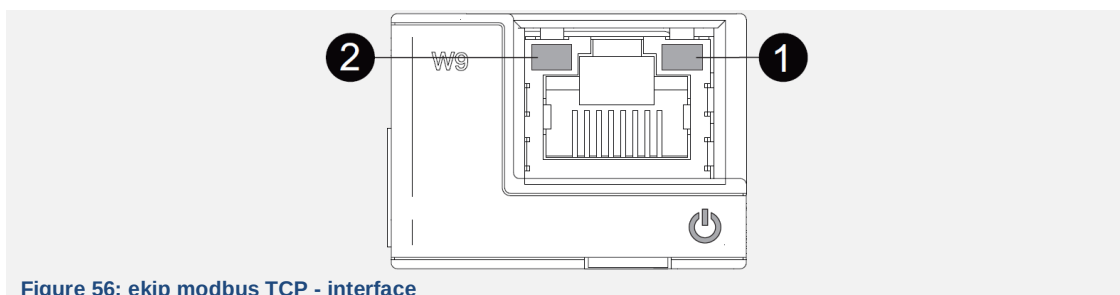


Figure 56: ekip modbus TCP - interface

LED	Description
Power	Reports ON status and correct communication with Ekip UP: - off: module off - fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present - flashing not synchronized with the power LED of Ekip UP (2 rapid flashes a second): module ON and communication with Ekip UP absent
① Link	Indicates status of the communication: - off: incorrect connection, signal absent - fixed light: correct connection
② Activity	Indicates status of the communication: - off: activity on line absent - flashing: activity on line present (receiving and/or transmitting)

Table 181: ekip Modbus TCP – interface

Modes Two operating modes are available, which can be configured from the menu:

Modes	Description
TCP Modbus	Information and commands managed by single requests/questions, according to mapping and rules of TCP Modbus protocol (see System Interface)
Server HTTP	Information and commands available on a web page, which can be accessed by a browser by inserting the IP Address of the module as the address. The page has a login window requesting the user password to be entered that is the same as the password required on the display to modify parameters.

Table 182: ekip Modbus TCP – modes

Configurations on menu

Activating the local bus is required to start communication between the module and Ekip UP and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip UP in the *Modules Settings* menu, the following communication parameters can be configured:

Parameter	Description	Default
<i>Function</i>	Defines the mode between TCP Modbus and Server HTTP	TCP Modbus
<i>Static IP address ON</i>	Defines whether the module has a dynamic IP (Off) address or static (On) IP address If = On all the associated parameters are enabled	Off
<i>Static IP address</i>	Enables static IP to be selected	0.0.0.0
<i>Static Network Mask</i>	Enables the subnet mask to be selected	0.0.0.0
<i>Static Gateway address</i>	Enables, in the presence of several subnets the IP address of the node to which the module is connected to be selected	0.0.0.0

Table 183: ekip Modbus TCP – configurations

Information on menu

If the module is detected correctly by Ekip UP, the following information is available on the *About-Modules* menu:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the moment of the connection to the network in the event of configuration with dynamic IP or can be set by menu in the case of a static IP  NOTE: without a DHCP server, the module automatically adopts a causal IP address in the interval 169.254.xxx.xxx
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients
<i>Gateway address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>TCP Client 1, 2, 3</i>	IP addresses of the client devices connected to the module (in Server mode)
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device

Table 184: ekip Modbus TCP – information

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters

Parameter	Description	Default
<i>Client/Server</i>	Parameter for changing the configuration of the module from Server Only to Client and Server and integrating the module into an interactive data exchange network (see <i>Ekip Com Hub</i> on page 170)  IMPORTANT: if Client/Server, the module enables the data to be exchanged as a normal Server function	Server only
<i>Enable IEEE 1588</i>	Permits the IEEE 1588 protocol for distributing the clock and synchronization signal to be enabled ⁽¹⁾	OFF
<i>IEEE 1588 Master</i>	Enables the module to be set as a master in the network segment to which it belongs (synchronization clock)	OFF
<i>IEEE 1588 Delay mechanism</i>	Enables the data exchange mode between module and master, between Peer-to-Peer and End-to-End to be chosen	End-to-End
<i>Enable SNTP client</i>	Permits enabling of SNTP distribution protocol of the clock and synchronization signal ⁽¹⁾	OFF
<i>SNTP Server Address</i>	Enables the network server to be set that supplies SNTP	0.0.0.0
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Enables it to be selected whether there is daylight saving time (ON) or not (OFF) in the country to which the synchronization time refers.	OFF
<i>Disable Gratuitous ARP</i>	Permits (Enabled ARP) the periodic generation of a Gratuitous ARP message to be enabled that is used by Ekip Connect to find rapidly the modules with Ethernet scanning without its IP address being known beforehand	ARP enabled
<i>Access protected by password</i>	Enables the writing operations conducted by the network to be protected by a password (password request)	Standard mode
<i>TCP Modbus password</i>	With <i>access protected by enabled</i> password, this is the password to use before each writing session ⁽²⁾	Local access

Table 185: ekip Modbus TCP – remote configuration



NOTES:

- (1) Enable IEEE 1588 and Enable SNTP client *must not be enabled simultaneously*
- (2) the parameter can be modified only by system bus in remote configuration

Remote information

From the service connector (via Ekip Connect) or with a system bus communication, additional information can be accessed:

Information	Description
<i>HW and Boot version</i>	general module information
<i>Flash CRC status and result</i>	information on the correctness of the SW in the module
<i>Ekip Link status</i>	Signals connection errors of the Ethernet cable
<i>SNTP Server Error</i>	Communication error with the SNTP server
<i>SNTP Server Synchronisation</i>	Synchronism status with SNTP server
<i>IEEE 1588 status</i>	Valid with IEEE 1588 Master = ON, communicates the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master

Table 186: ekip Modbus TCP – remote information

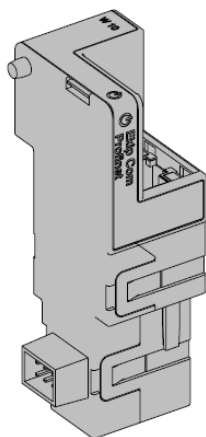
Connections

Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for terminal references.

For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield).

To connect the module to *Ekip Supply* and *Ekip UP*, see the instruction sheets 1SDH002004A1002.

41 - Ekip Com Profinet



Ekip Com Profibus is a communication accessory that enables Ekip UP to be integrated into an Ethernet network with Profinet communication protocol, with remote supervision and control functions.

The module is configured as master and from remote it is possible to

- read information and Ekip UP measurements
- manage certain commands, including opening and closing actuator
- access to information that is not available on the display



NOTE: the remote open and close commands to the switch can be run only if Ekip UP is in the Remote configuration

To map the module in its own communication network, the document System Interface is available (page 174), in which all the necessary communication and command details are listed.

The following ports are used by the module:

Ethertype	Port	Service	Notes
0x88CC	-	LLDP	Link Layer Discovery Protocol
0x8892 (Profinet)	-	Profnite IO	Specific for communications in real time (RT)
0x0800	34964/udp	Profinet-cm (Context manager)	DCE/RPC

Table 187: ekip profinet – ports

Safety

As the module enables the actuator to be controlled that is connected to Ekip UP and enables unit data to be accessed, it can be connected only to networks meeting all the necessary security and unauthorized-access prevention requirements (e.g. the control system network of a plant).



IMPORTANT:

- It is customer's sole responsibility to provide and continuously ensure a secure connection between the module and customer network or any other network (as the case may be); customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.
ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches,any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
- The module cannot be connected directly to the Internet; connect only to dedicated Ethernet networks, with Profinet communication protocol

Models Ekip UP can be configured with two different modules that are compatible with the Profinet protocol: *Ekip Com Profinet* and *Ekip Com Profinet Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.

i **NOTE:** if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip UP to increase the potential of unit (for example: for applications in which great network reliability is necessary).

! **IMPORTANT:** in each Ekip UP can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com Profinet Redundant*)

Supply *Ekip Com Profinet* is supplied directly by the *Ekip Supply* module to which it is connected.

i **NOTE:** in the absence of an auxiliary supply, the communication between Ekip UP and module is interrupted

Interface The module has three signalling LEDs:

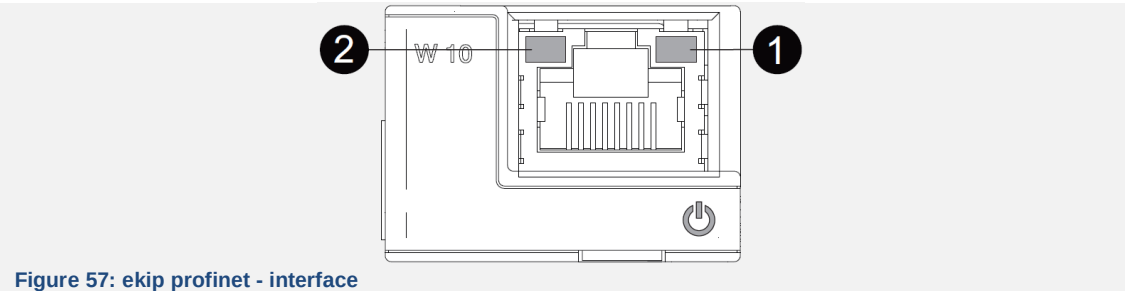


Figure 57: ekip profinet - interface

LED	Description
Power	Reports ON status and correct communication with Ekip UP: • off: module off • fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present • flashing not synchronized with power LED of Ekip UP (2 fast flashes per second): module ON and communication with Ekip UP absent
1 Link	Indicates status of the communication: • off: incorrect connection, signal absent • fixed light: correct connection
2 Activity	Indicates status of the communication: • off: activity on line absent • flashing: activity on line present (receiving and/or transmitting)

Table 188: ekip profinet – interface

Menu Activating the local bus is required to start communication between the module and Ekip UP and is available in the *Settings menu* (page 122).

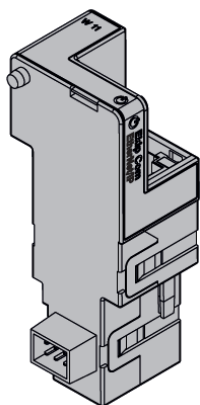
If the module is detected correctly by Ekip UP, the following information is available in the *About-Modules* menu:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device

Table 189: ekip profinet – menu

Remote information From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).

Connections Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for terminal references.
For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield).
To connect the module to *Ekip Supply* and Ekip UP, see the instruction sheets 1SDH002004A1002.



Ekip Com EtherNet/IP™ is a communication accessory that enables Ekip UP to be integrated into an Ethernet network with communication protocol EtherNet/IP™, with supervision and remote control functions.

The module is configured as master and from remote it is possible to

- read information and Ekip UP measurements
- manage certain commands, including opening and closing actuator
- access to information and parameters that are not available on the display



NOTE: the remote open and close commands to the switch can be run only if Ekip UP is in Remote configuration

To map the module in its communication network, the document System Interface is available (page 174) that lists the necessary communication and command details.

Depending on the parameters set, which are illustrated on subsequent pages, the following module ports are used:

Port	Protocol	Notes
44818	TCP	Encapsulation Protocol (e.g.: ListIdentity, UCMM, CIP Transport Class 3)
44818	UDP	44818 UDP Encapsulation Protocol (e.g.: ListIdentity)
2222	UDP	2222 UDP CIP Transport Class 0 or 1
68/udp	DHCP Client	DHCP client enables alternatively to <i>static address = On</i>

Table 190: ekip ethernet – ports

Safety

As the module enables the actuator to be controlled that is connected to Ekip UP and enables unit data to be accessed, it can be connected only to networks meeting all the necessary security and unauthorized-access prevention requirements (e.g. the control system network of a plant).



IMPORTANT:

- It is customer's sole responsibility to provide and continuously ensure a secure connection between the module and customer network or any other network (as the case may be); customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
- The module cannot be connected directly to the Internet; connect only to dedicated Ethernet networks, with EtherNet/IP™ communication protocol

Models Ekip UP can be configured with two different modules that are compatible with the EtherNet/IP™ protocol: *Ekip Com EtherNet/IP™* and *Ekip Com EtherNet/IP™ Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.

 **NOTE:** if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip UP to increase the potential of unit (for example: for applications in which great network reliability is necessary).

 **IMPORTANT:** in each Ekip UP can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com EtherNet/IP™ Redundant*)

Supply Ekip Com EtherNet/IP™ is supplied directly by the Ekip Supply module to which it is connected .

 **NOTE:** in the absence of an auxiliary supply, the communication between Ekip UP and module is interrupted

Interface The module has three signalling LEDs:

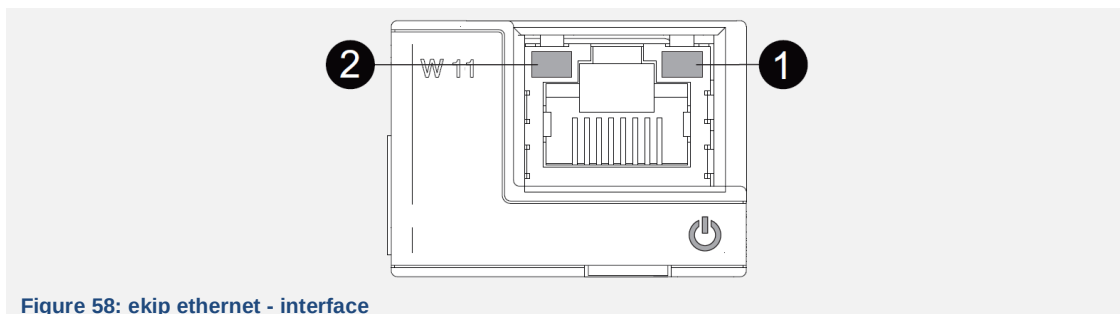


Figure 58: ekip ethernet - interface

LED	Description
Power	Reports ON status and correct communication with Ekip UP: • off: module off • fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present • flashing not synchronized with the power LED of Ekip UP (2 rapid flashes a second): module ON and communication with Ekip UP absent
 Link	Indicates status of the communication: • off: incorrect connection, signal absent • fixed light: correct connection
 Activity	Indicates status of the communication: • off: activity on line absent • flashing: activity on line present (receiving and/or transmitting)

Table 191: ekip ethernet – interface

Configurations on menu

Activating the local bus is required to start communication between the module and Ekip UP and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip UP the following communication parameters can be configured in the Settings Modules menu:

Parameter	Description	Default
<i>Static IP address ON</i>	Defines whether the module has the dynamic IP address (Off) or static IP address (On) If = On all associated parameters are enabled	Off
<i>Static IP address</i>	Enables the static IP to be selected	0.0.0.0
<i>Static Network Mask</i>	Enables the subnet mask to be selected	0.0.0.0
<i>Static Gateway address</i>	In the presence of several subnets it enables the IP address to be selected of the node to which the module is connected	0.0.0.0

Table 192: ekip ethernet – configurations

Information on menu

If the module is detected correctly by Ekip UP in the *About-Modules* menu the following information is available:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the moment of the connection to the network in the event of configuration with dynamic IP or can be set by menu in the case of a static IP  NOTE: without a DHCP server, the module automatically adopts a causal IP address in the interval 169.254.xxx.xxx
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients
<i>Gateway address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device

Table 193: ekip ethernet – information

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>Enable IEEE 1588</i>	Permits the IEEE 1588 protocol for distributing the clock and synchronization signal to be enabled ⁽¹⁾	OFF
<i>IEEE 1588 Master</i>	Enables the module to be set as a master in the network segment to which it belongs (synchronization clock)	OFF
<i>IEEE 1588 Delay mechanism</i>	Enables the data exchange mode between module and master, between Peer-to-Peer and End-to-End to be chosen	End-to-End
<i>Enable client SNTP</i>	Permits enabling of SNTP distribution protocol of the clock and synchronization signal ⁽¹⁾	OFF
<i>SNTP Server Address</i>	Enables the network server to be set that supplies SNTP	0.0.0.0
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Enables it to be selected whether there is daylight saving time(ON) or not (OFF) in the country to which the synchronization time refers.	OFF

Table 194: ekip ethernet – remote configuration



(1): Enable IEEE 1588 and Enable SNTP client *must not be enabled simultaneously*

Remote information

From the service connector (via Ekip Connect) or with a system bus communication, additional information can be accessed:

Information	Description
<i>HW and Boot version</i>	general module information
<i>Flash CRC status and result</i>	information on the correctness of the SW in the module
<i>Ekip Link status</i>	Signals connection errors of the Ethernet cable
<i>SNTP Server Error</i>	Communication error with the SNTP server
<i>SNTP Server Synchronisation</i>	Synchronism status with SNTP server
<i>IEEE 1588 status</i>	Valid with IEEE 1588 Master = ON, communicates the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master

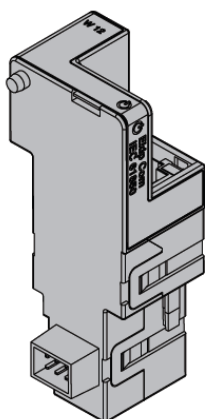
Table 195: ekip ethernet – remote information

Connections

Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for terminal references.

For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield).

To connect the module to *Ekip Supply* and *Ekip UP*, see the instruction sheets 1SDH002004A1002.



Ekip Com IEC 61850 is a communication accessory that enables Ekip UP to be integrated into an Ethernet network with IEC 61850 communication protocol, with remote supervision and control functions.

The module is configured as master and from remote it is possible to

- read information and Ekip UP measurements
- manage certain commands, including opening and closing actuator
- access to information and parameters that are not available on the display
- supply vertical communication (reports) to higher supervision systems (SCADA), with statuses and measurements (retransmitted each time and only if they are different from the previous report)
- supply horizontal communication (GOOSE) to other actuator devices (e.g.: medium voltage switches), with all information on status and measurements normally shared by Ekip Com communication modules on bus.



NOTE: the remote open and close commands to the switch can be run only if Ekip UP is in Remote configuration

To map the module in its communication network, the document System Interface is available (page 174) that lists the necessary communication and command details.

The document also describes configuration files for protocol IEC 61850 and relative loading procedure for assigning the Technical Name and any GOOSE enabling (by setting relative MAC Addresses)

Depending on the parameters set, which are illustrated on subsequent pages, the following module ports are used:

Ethertype	Port	Protocol
0x0800-IP	102	ISO Transport Service on top of the TCP (RFC 1006)
0x88B8	-	GOOSE Messages
0x0800-IP	123 UDP	NTP - Network Time Protocol
0x0800-IP	69 UDP	TFTP - Trivial File Transfer Protocol

Table 196: ekip iec 61850 – ports

Safety

As the module enables the actuator to be controlled that is connected to Ekip UP and enables unit data to be accessed, it can be connected only to networks meeting all the necessary security and unauthorized-access prevention requirements (e.g. the control system network of a plant).



IMPORTANT:

- It is customer's sole responsibility to provide and continuously ensure a secure connection between the module and customer network or any other network (as the case may be); customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.
ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.
- The module cannot be connected directly to the Internet; connect only to dedicated Ethernet networks, with IEC 61850 communication protocol

Models Ekip UP can be configured with two different modules that are compatible with the IEC 61850 protocol: *Ekip Com IEC 61850* and *Ekip Com IEC 61850 Redundant*.

The two modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.

i NOTE: if not specified, the information in the following chapter applies to both models

Both modules can be connected simultaneously to Ekip UP to increase the potential of unit (for example: for applications in which great network reliability is necessary).

! IMPORTANT: in each Ekip UP can be installed only one module per type; it is not admitted the connection of two equal modules (for example: two *Ekip Com IEC 61850 Redundant*)

Supply Ekip Com IEC 61850 is supplied directly by the Ekip Supply module to which it is connected .

i NOTE: in the absence of an auxiliary supply, the communication between Ekip UP and module is interrupted

Interface The module has three signalling LEDs:

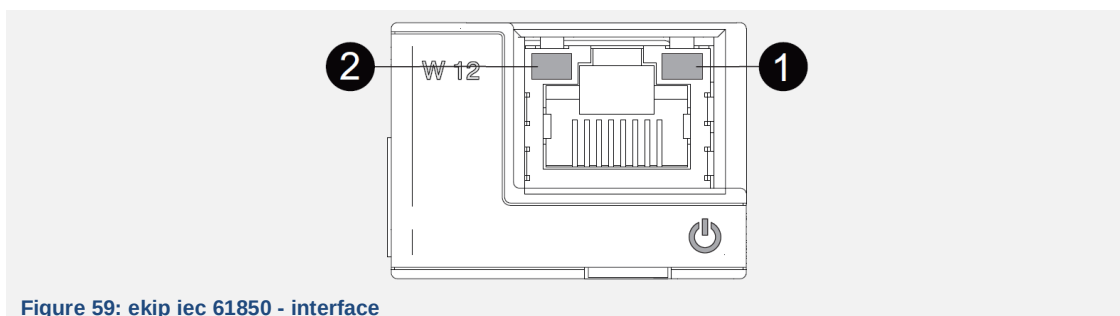


Figure 59: ekip iec 61850 - interface

LED	Description
Power	Reports ON status and correct communication with Ekip UP: • off: module off • fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present • flashing not synchronized with the power LED of Ekip UP (2 rapid flashes a second): module ON and communication with Ekip UP absent
1 Link	Indicates status of the communication: • off: incorrect connection, signal absent • fixed light: correct connection
2 Activity	Indicates status of the communication: • off: activity on line absent • flashing: activity on line present (receiving and/or transmitting)

Table 197: ekip iec 61850 – interface

Configurations on menu

Activating the local bus is required to start communication between the module and Ekip UP and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip UP, in the *Settings Modules menu*, the following communication parameters can be configured:

Parameter	Description	Default
<i>Static IP address ON</i>	Defines whether the module has the dynamic IP address (Off) or static IP address (On) If = On all associated parameters are enabled	Off
<i>Static IP address</i>	Enables the static IP to be selected	0.0.0.0
<i>Static Network Mask</i>	Enables the subnet mask to be selected	0.0.0.0
<i>Static Gateway address</i>	In the presence of several subnets it enables the IP address to be selected of the node to which the module is connected	0.0.0.0
<i>SNTP client enabled</i>	Permits enabling of SNTP distribution protocol of the clock and synchronization signal	OFF
<i>SNTP address Server</i>	Enables the network server to be set that supplies SNTP	0.0.0.0

Table 198: ekip iec 61850 – configurations

Information on menu

If the module is detected correctly by Ekip UP in the *About-Modules menu* the following information is available:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the moment of the connection to the network in the event of configuration with dynamic IP or can be set by menu in the case of a static IP  NOTE: without a DHCP server, the module automatically adopts a causal IP address in the interval 169.254.xxx.xxx
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients
<i>Gateway address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device
<i>Cfg file</i>	Name of the configuration file loaded in the modules
<i>Error Cfg file</i>	Error code of the configuration file (0 = no error)

Table 199: ekip iec 61850 – information

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>Preferred configuration file</i>	If several configuration files are present, it enables the file hierarchy to be defined between .cid and .iid	.cid
<i>Enable IEEE 1558</i>	Permits the IEEE 1588 protocol for distributing the clock and synchronization signal to be enabled ⁽¹⁾	OFF
<i>IEEE 1588 Master</i>	Enables the module to be set as a master in the network segment to which it belongs (synchronization clock)	OFF
<i>IEEE 1588 Delay mechanism</i>	Enables the data exchange mode between module and master, between Peer-to-Peer and End-to-End to be chosen	End-to-End
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Enables it to be selected whether there is daylight saving time(ON) or not (OFF) in the country to which the synchronization time refers.	OFF
<i>TFTP Security level</i>	Defines the file loading procedure: <i>TFTP always On</i>= port open, loading still possible <i>TFTP enable required</i>= port normally closed; to start loading, the <i>Enable TFTP</i> command must be run at the start of the procedure and the <i>disable TFTP</i> command must be run at the end of the procedure (disable not necessary, security command)	TFTP always On
<i>CB Open/CB Close command</i>	Defines the constraints for running remote open and close commands: <i>standard commands</i> = standard commands (without constraints) active <i>CB operate request</i>= standard commands not active; use the programmable functions YC COMMAND and YO COMMAND and the commands Request open switch (28) and Request close switch (29)	Standard commands
<i>Flag word hex</i>	set a filter on the selectivity status	0

Table 200: ekip iec 61850 – remote configuration



NOTE: Enable IEEE 1558 and Enable SNTP client *must not be enabled simultaneously*

Remote information

From the service connector (via Ekip Connect) or with communication by system bus, it is possible to access additional information:

Information	Description
<i>HW and Boot version</i>	general module information
<i>Flash CRC status and result</i>	information on the correctness of the SW in the module
<i>Ekip Link status</i>	Signals connection errors of the Ethernet cable
<i>SNTP Server Error</i>	Communication error with the SNTP server
<i>SNTP Server Synchronisation</i>	Synchronism status with SNTP server
<i>IEEE 1588 status</i>	Valid with IEEE 1588 Master = ON, communicates the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master
<i>GOOSE Missing</i>	Signals whether an expected GOOSE has been received
<i>Configure Mismatch</i>	A received GOOSE does not comply with the expected structure
<i>Decode Error</i>	
<i>Sequence number error</i>	
<i>Remote programmable statuses (from E to R)</i>	Condition (true/false) of the programmable statuses and information on selectivity arising from logics defined in the configuration files loaded on module IEC 61850
<i>Remote inputs of zone selectivity</i>	

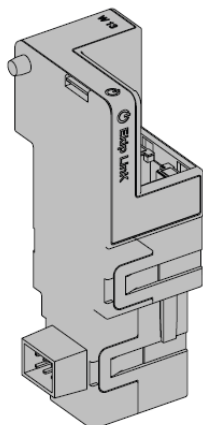
Table 201: ekip iec 61850 –remote information

Connections

Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for the terminals references.

For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield).

To connect the module to *Ekip Supply* and *Ekip UP*, see the instruction sheets 1SDH002004A1002.



Ekip Link is a communication accessory that enables Ekip UP to be integrated into an internal Ethernet with ABB proprietary protocol.

With the remote module, the following functions can be performed:

- Programmable logic
- Power Controller
- Zone selectivity

For these functions, the system units involved can have their own *Ekip Link* and for each of them the IP addresses of all the other connected *Ekip Links* must be inserted.

In the Link network, each device is defined as an Actor.

Each *Ekip Link* can interface with at most 15 actors, with a maximum of 12 for the Zone Selectivity function.

The following ports are used by the module:

Port	Service	Notes
18/udp	ABB Proprietor	In the event of fast information exchange between ABB devices
319/udp	IEEE 1588	Valid with IEEE 1588 protocol enabled
320/udp		
68/udp	DHCP client	DHCP client enables alternatively to <i>static address = On</i>

Table 202: ekip link – ports

Network The *Ekip Links* must be connected to a dedicated network, comprising only *Ekip Links* and Ethernet switches that declare on the data sheet the support to the level L2 multicast.

If the network also comprises routers, the multicast must be enabled and configured on all the level L3 VLAN interfaces.

Programmable logic With the Programmable Logic function, it is possible to program the activation up to four bits of the *Ekip Link*, each bit according to any combination of the status bits of an actor whose IP address has been entered.

These four bits are indicated as statuses A B C and D that are programmable remotely and their value is transmitted to the device to which *Ekip Link* is connected

Power Controller With the *Power Controller* function, each actor can:

- acquire the status and control the loads
- act as master and gather the energy measurements of the actors inserted as energy meters
- Supply the energy measurements to the actors inserted as masters

The Loads status can be acquired by checking the status of the inputs of the signalling modules connected to the actors whose IP addresses have been entered, whereas the loads can be controlled by programming their outputs.

The remote acquisition of the loads status and control of loads status can also be achieved with *Ekip Signalling 10K* connected to the network.

More information on the potential of the function are available in the White Paper 1SDC007410G0201 “Managing loads with Ekip Power Controller for SACE Emax 2”.

- Zone selectivity** With the Zone Selectivity function:
- the inserted IP addresses refer to the actors with an interlock role with respect to the current role
 - For each interlock actor inserted, the protections have to be selected for which to actuate selectivity by setting a mask. The function that is thus set is indicated as a logic hereinafter to distinguish it from the standard function, which is indicated hereinafter as the hardware
 - the thus selected protections are added to the hardware protections S, G, D-Backward and D-Forward
 - it is possible to choose between only hardware selectivity or both hardware and logic hardware
 - it is possible to set the diagnosis, to check for each interlock unit whether there is consistency between the information on hardware and logic selectivity
 - it is possible to set a mask that identifies the protections with which to retransmit the information on received selectivity, regardless of whether the actor is in alarm status. The information to which the mask can be applied is only the logic selectivity information
- For more information on the Zone Selectivity function with *Ekip Link* see page 99.

Supply Ekip Link is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: in the absence of auxiliary power, the communication between Ekip UP and module is interrupted.

Interface The module has three signalling LEDs:

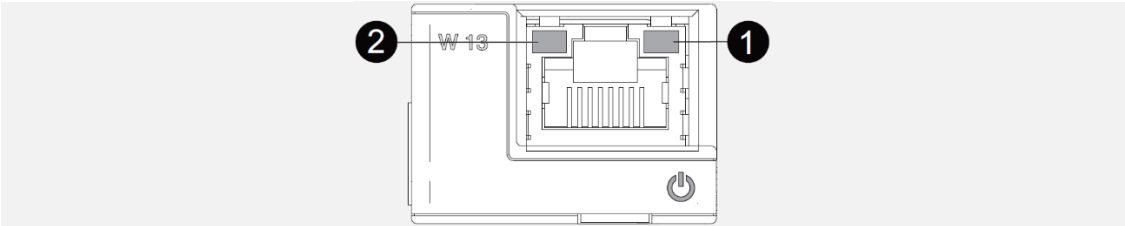


Figure 60: ekip link - interface

LED	Description
Power	Reports ON status and correct communication with Ekip UP: - off: module off - fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present - flashing not synchronized with the power LED of Ekip UP (2 rapid flashes a second): module ON and communication with Ekip UP absent
① Link	Indicates status of the communication: - off: incorrect connection, signal absent - fixed light: correct connection
② Activity	Indicates status of the communication: - off: activity on line absent - flashing: activity on line present (receiving and/or transmitting)

Table 203: ekip link – interface

Configurations on menu Activating the local bus is required to start communication between the module and Ekip UP and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip UP, in the Settings Modules menu, the following communication parameters can be configured:

Parameter	Description	Default
Static IP address ON	Defines whether the module has the dynamic IP address (Off) or static IP address (On); if = On all the associated parameters are enabled	Off
Static IP address	Enables the static IP to be selected	0.0.0.0
Static Network Mask	Enables the subnet mask to be selected	0.0.0.0
Static Gateway address	In the presence of several subnets it enables the IP address to be selected of the node to which the module is connected	0.0.0.0

Table 204: ekip link – configurations

Information on menu If the module is detected correctly by Ekip UP in the *About-Modules* menu the following information is available:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the moment of connection to the network in the event of configuration with dynamic or settable IP that can be set by the menu in the event of a static IP  NOTE: without a DHCP server, the module automatically adopts a causal IP address in the interval 169.254.xxx.xxx
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients
<i>Gateway address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device

Table 205: ekip link – information

Remote configurations From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>Client/Server</i>	Parameter for changing the configuration of the module from Server Only to Client and Server and integrating it into an interactive data exchange network (see <i>Ekip Com Hubon</i> page170)  IMPORTANT: if <i>Client/Server</i> , the module enables the data to be exchanged as a normal Server function	Server only
<i>Enable IEEE 1588</i>	Permits the IEEE 1588 protocol for distributing the clock and synchronization signal to be enabled ⁽¹⁾	OFF
<i>IEEE 1588 Master</i>	Enables the module to be set as a master in the network segment to which it belongs (synchronization clock)	OFF
<i>IEEE 1588 Delay mechanism</i>	Enables the data exchange mode between module and master, between Peer-to-Peer and End-to-End to be chosen	End-to-End
<i>Enable SNTP client</i>	Permits enabling of SNTP distribution protocol of the clock and synchronization signal ⁽¹⁾	OFF
<i>SNTP Server Address</i>	Enables the network server to be set that supplies SNTP	0.0.0.0
<i>Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>Daylight Saving Time</i>	Enables it to be selected whether there is daylight saving time(ON) or not (OFF) in the country to which the synchronization time refers.	OFF
<i>Disable Gratuitous ARP</i>	Permits (Enabled ARP) the periodic generation of a Gratuitous ARP message to be enabled that is used by Ekip Connect to find rapidly the modules with Ethernet scanning without its IP address being known beforehand	ARP enabled
<i>Access protected by password</i>	Enables the writing operations conducted by the network to be protected by a password (password request)	Standard mode
<i>TCP Modbus password</i>	With <i>access protected by enabled</i> password, this is the password to use before each writing session ⁽²⁾	Local access

Table 206: ekip link – remote configurations



NOTES:

- (1) Enable IEEE 1588 and Enable SNTP client *must not be enabled simultaneously*
- (2) the parameter can be modified only by system bus in remote configuration

Remote link configurations

Further link function parameters are available:

Parameter	Description	Default
<i>Actor link (1-15)</i>	IP address of each actor (1 to15)	0.0.0.0
<i>Remote programmable status (A-D)</i>	Configuration parameters of programmable statuses - actor selection (actor from 1 to 15) that activates programmable status - event of the actor that determines the change of programmable status	Actor 1 None
<i>Word status (A-D)</i>	Word configuration parameters: - actor selection (actor from 1 to 15) from which the word status is taken - selection of the taken word	None 1 global
<i>Diagnosis</i>	Active (passive diagnosis) or deactivated diagnosis (no diagnosis) of the diagnosis of cabled selectivity	No diagnosis
<i>Timeout diagnosis control</i>	Diagnosis checking interval, if active available between 30 s, 1 min, 10 min, 60 min	30 seconds
<i>Zone selectivity type</i>	Configuration of hardware selectivity (only HW) or hardware and logic selectivity (mixed)	Only HW
<i>Repeat Configuration Mask</i>	interactive mask for selecting selectivity do be sent also to the upper levels (even if not active on the programmed device)	0x0000

Table 207: ekip link – remote link configurations

Remote information

From the service connector (via Ekip Connect) or with communication by system bus, it is possible to access additional information:

Information	Description
<i>HW and Boot version</i>	general module information
<i>Flash CRC status and result</i>	information on the correctness of the SW in the module
<i>Ekip Link status</i>	Signals connection errors of the Ethernet cable
<i>SNTP Server Error</i>	Communication error with the SNTP server
<i>SNTP Server Synchronisation</i>	Synchronism status with SNTP server
<i>IEEE 1588 status</i>	Valid with IEEE 1588 Master = ON, communicates the presence (Slave or PTP Master Active) or absence (PTP Master but Passive) of a higher level master

Table 208: ekip link – remote information

Remote Link information

Further link function parameters are available:

Information	Description
<i>Line Congruency detection</i>	Information on status and unsuitability of HW and logic selectivity (status and unsuitable selectivity type)
<i>Remote programmable statuses</i>	(True/false) status of the remote programmable statuses A, B, C and D
<i>Remote programmable Word status</i>	value of the remote programmable Word A, B, C, D
<i>Zone logic selectivity</i>	Statuses of the logic selectivity (inputs and outputs)

Table 209: ekip link – remote link information

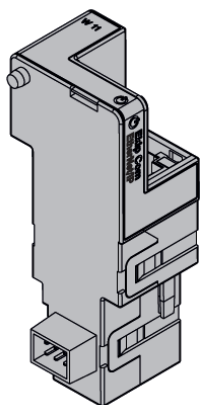
Connections

Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for the terminals references.

For the communication bus a Cat.6 S/FTP must be used (Cat.6 with double S/FTP shield).

To connect the module to *Ekip Supply* and *Ekip UP*, see the instruction sheets 1SDH002004A1002.

45 - Ekip Com Hub



Ekip Com Hub è a communication accessory that enables the data and measurements of Ekip UP and other devices to be gathered that are connected to the same plant and then be made available on the server through an Ethernet network.

The configuration of the module is available via Ekip Connect or with the System Interface document (page 174) in which all the details are listed.

The following ports are used by the module:

Port	Service	Notes
67/udp 68/udp	DHCP client	DHCP client enables alternatively to <i>static address = On</i>
443/tcp	HTTPS	always active with enabled module
123/udp	SNTP	active with SNTP client enabled
53/udp	DNS	always active

Table 210: ekip hub – ports

The Ekip Com Modbus RTU and Ekip Com TCP Modbus modules can be configured to support *Ekip Com Hub* in gathering data to be sent to Cloud. See Getting Started 1SDC200063B0201.

Safety The module uses the HTTPS protocol and can be connected to the Internet.



IMPORTANT: it is customer's sole responsibility to provide and continuously ensure a secure connection between the module and customer network or any other network (as the case may be); customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Supply Ekip Com Hub is supplied directly by the *Ekip Supply module* to which it is connected.



NOTE: in the absence of an auxiliary supply, the communication between Ekip UP and module is interrupted

Interface The module has three signalling LEDs:

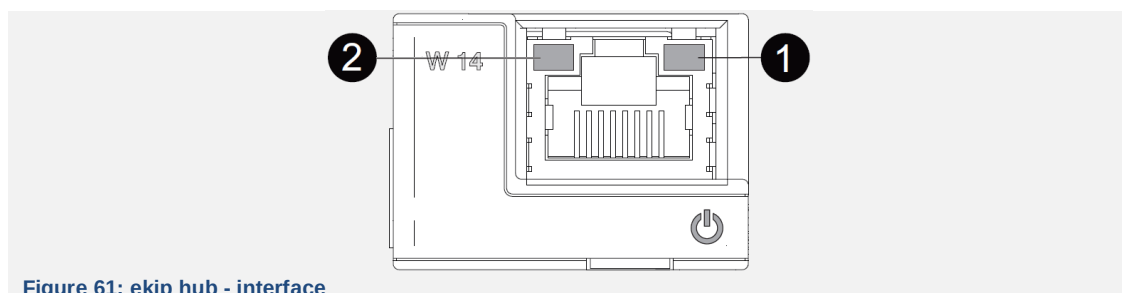


Figure 61: ekip hub - interface

LED	Description
Power	Reports ON status and correct communication with Ekip UP: - off: module off - fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present - flashing not synchronized with the power LED of Ekip UP (2 rapid flashes a second): module ON and communication with Ekip UP absent
① Link	Indicates status of the communication: - off: incorrect connection, signal absent - fixed light: correct connection
② Activity	Indicates status of the communication: - off: activity on line absent - flashing: activity on line present (receiving and/or transmitting)

Table 211: ekip hub – interface

Configurations on menu

Activating the local bus is required to start communication between the module and Ekip UP and is available in the *Settings menu* (page 122).

If the module is detected correctly by Ekip UP, in the Settings Modules menu, the following communication parameters can be configured:

Parameter	Description	Default
<i>Enable</i>	Switches on/switches off the communication between module and server	
<i>Static IP address ON</i>	Defines whether the module has the dynamic IP address (Off) or static IP address (On) If = On all associated parameters are enabled	Off
<i>Static IP address</i>	Enables the static IP to be selected	0.0.0.0
<i>Static Network Mask</i>	Enables the subnet mask to be selected	0.0.0.0
<i>Static Gateway address</i>	Enables, in the presence of several subnets, the IP address of the node to be selected to which the module is connected	0.0.0.0
<i>SNTP client enabled</i>	Permits enabling of SNTP distribution protocol of the clock and synchronization signal	OFF
<i>SNTP address Server</i>	Enables the network server to be set that supplies SNTP	0.0.0.0
<i>Password</i>	Code required to record the module on Cloud	---
<i>Remote firmware update</i>	Enables the module's firmware to be updated. Two parameters are available: <i>Enable</i>, to configure the firmware download <i>Automatic</i>, to automate updating the module	OFF Automatic

Table 212: ekip hub – configurations

Information on menu

If the module is detected correctly by Ekip UP in the *About-Modules* menu the following information is available:

Information	Description
<i>SN and version</i>	Identification and SW version of the module
<i>IP address</i>	Address of the module, assigned to the module by a DHCP server at the moment of connection to the network in the event of configuration with dynamic or settable IP that can be set by the menu in the event of a static IP  NOTE: without a DHCP server, the module automatically adopts a causal IP address in the interval 169.254.xxx.xxx
<i>Network Mask</i>	Subnet mask; identifies the method for recognizing the subnet to which the modules belong and enables modules to be searched for within a defined set of recipients
<i>Gateway address</i>	IP address of the node to which the module is connected, in the presence of several subnets
<i>MAC Address</i>	Address assigned by ABB with OUI (Organizationally Unique Identifier) equal to ac:d3:64 that identifies uniquely the manufacturer of an Ethernet device

Table 213: ekip hub – information

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>CRL Enable</i>	Enables the CRL (Certificate Revocation List) to check the validity of the server certificate	
<i>Clock update hardening enable</i>	Enables control of the time reference transmitted by the SNTP server	
<i>SNTP Server Location</i>	Enables the position of the SNTP server to be set with respect to the network in which the module is installed	
<i>SNTP Time zone</i>	Defines the time zone to be used for synchronism	+00:00
<i>SNTP Daylight Saving Time</i>	Enables it to be selected whether there is daylight saving time(ON) or not (OFF) in the country to which the synchronization time refers.	OFF
<i>Disable Gratuitous ARP</i>	Permits (Enabled ARP) the periodic generation of a Gratuitous ARP message to be enabled that is used by Ekip Connect to find rapidly the modules with Ethernet scanning without its IP address being known beforehand	ARP enabled

Table 214: ekip hub – remote configuration

Remote information

From the service connector (via Ekip Connect) or with communication by system bus, it is possible to access additional information:

Information	Description
<i>HW and Boot version</i>	general module information
<i>Flash CRC status and result</i>	information on the correctness of the SW in the module
<i>Publish enable configuration</i>	Publish enable status contained in <i>Security File</i>
<i>Configuration file</i>	Name of the file dedicated to the information to be transmitted (measurements, etc)
<i>Security file</i>	Name of the file dedicated to the information required by the module for the transmission (addresses, certificates, etc)
<i>Certifying Revocation List</i>	name of file containing revoked certificates
<i>Executable file</i>	name of the executable firmware executable file
<i>Configuration error</i>	error status of the module configuration
<i>Sample time</i>	period of acquisition of data from the connected devices
<i>Log time</i>	period within which the acquired data are saved inside the log
<i>Upload time</i>	period (calculated by module) that occurs between each data transmission
<i>Configured device</i>	Number of modules involved in the network with <i>Hub module</i>
<i>API events polling period</i>	period with which the module communicates with the API device
<i>Connection client 1, 2, 3</i>	Addresses of the TCP Modbus clients connected to the module
<i>Statistics</i>	Recordings of the last saving operations and percentage of resources being used
<i>Plant side status</i>	information on quality of the communication with the other devices
<i>Status Cloud side</i>	Status of errors linked to the TLS session installed between the module and the server
<i>Application status</i>	indicators of progress of the operations
<i>Status</i>	general module indicators: SNTP status, flash, cable connection, FW availability, file errors, etc

Table 215: ekip hub – remote information

Connections

Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for the terminals references.

For the communication bus, a Cat.6 S/FTP cable must be used (Cat.6 with double S/FTP shield).

To connect the module to *Ekip Supply* and *Ekip UP*, see the instruction sheets 1SDH002004A1002.

Documentation Two documents are available in the ABB library in order to ensure that the Ekip Com communication modules are used correctly:

Document	Description
1SDH002003A1006 -A.pdf	Guidelines with details for commissioning the communication modules, with reference to protocols and to support documents.
1SDH002003A1006 - A.xlsx	Table with references of all the registers for the parameters, the controls, the measurements, etc-

Table 216: system interface 1

The documents are available in a single file in .zip format (1SDH002003A1006).

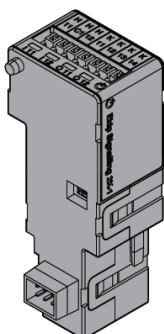
The zip file contains the files for supplementing Ekip UP in the communication networks that are available with the specific Ekip Com module and an IMPORTANT file with notes on the use of the files:

File	Ekip Com Protocol/Module
ABBS0E7F.gsd	File .gsd for configuring Ekip Com Profibus DP
Ekip COM EtherNetIPTM_v02.eds	File .eds for configuring Ekip Com EtherNet/IP™
Ekip_COM_DeviceNetTM_v02.eds	File .eds for configuring Ekip Com DeviceNet™
emax2_v02_00_2003.icd	File .icd for configuring Ekip Com IEC 61850
emax2_v02_00_2003_Citect.icd	File .icd for configuring Ekip Com IEC 61850
GSDML-V2.3-ABB S.p.A.-SACE Emax 2-20130924.xml	File .xml for configuring Ekip Com Profinet

Table 217: system interface 2



NOTE: the file are also valid for the respective Redundant versions



Ekip Signalling 2K is an external accessory signalling module that enables programmable inputs/outputs to be managed.

The module has:

- two contacts for output signals and relative status LED
- two digital inputs and relative status LED
- a power LED with the startup status of the module

Models Ekip UP can be configured with three different Signalling 2K modules: *Ekip Signalling 2K-1*, *Ekip Signalling 2K-2* and *Ekip Signalling 2K-3*.

The three modules are identical in terms of characteristics and installation methods, except for: display menus on unit, cablings and addresses for external communication, that are specific for each model.



NOTE: if not specified, the information in the following chapter applies to all models

All the modules can be connected simultaneously to Ekip UP to increase the potential of unit (for example: to increase number of input and output).



IMPORTANT: in each Ekip UP can be installed only one module per type; it is not admitted the connection of two or three equal modules (for example: two *Ekip Signalling 2K-3*)

Supply *Ekip Com Signalling 2K* is supplied directly by the Ekip Supply module to which it is connected .



NOTE: in the absence of an auxiliary supply, the communication between Ekip UP and module is interrupted, the output contacts are always in an open position and the statuses of the inputs are not valid

Input Ekip UP can be configured in such a way that the status of the inputs corresponds to actions or signals, with different programming options (see *Menu* on page 177)

The connection of each input (H11 and H12 for model 2K-1, H21 and H22 for model 2K-2, H31 and H32 for model 2K-3) must be carried out in reference with the common contacts (HC).

The module permits two logic statuses, interpreted by Ekip UP according to the configuration selected for each contact:

Status	Electrical condition	Configuration of contact	Status detected by Ekip UP
Open	Circuit open ⁽¹⁾	Active open	ON
		Active closed	OFF
Closed	Short circuit ⁽¹⁾	Active open	OFF
		active closed	ON

Table 218: ekip signalling 2k - input



(1): circuit open: > 100 kΩ; short circuit: < 50 Ω

Output Ekip UP can be configured in such a manner that the contacts of each output are closed or open according to one or more events, with different programming options (see *Menu* on page 177)).

The output of each module consists of 2 contacts (K11-K12 and K13-K14 for model 2K-1; K21-K22 and K23-K24 for model 2K-2; K31-K32 and K33-K34 for model 2K-3), insulated from unit and from the other outputs, which have the following electrical characteristics:

Characteristics	Maximum limit ⁽¹⁾
Maximum switchable voltage	150 VDC / 250 VAC.
Switching power	2 A @ 30 VDC, 0.8 A @ 50 VDC, 0.2 A @ 150 VDC, 4A @ 250 VAC
Dielectric strength between open contacts	1000 VAC (1 minute @ 50 Hz)
Dielectric strength between each contact and coil	1000 VAC (1 minute @ 50 Hz)

Table 219: ekip signalling 2k - output



(1): data on a resistive load

Interface The module has three signalling LEDs:

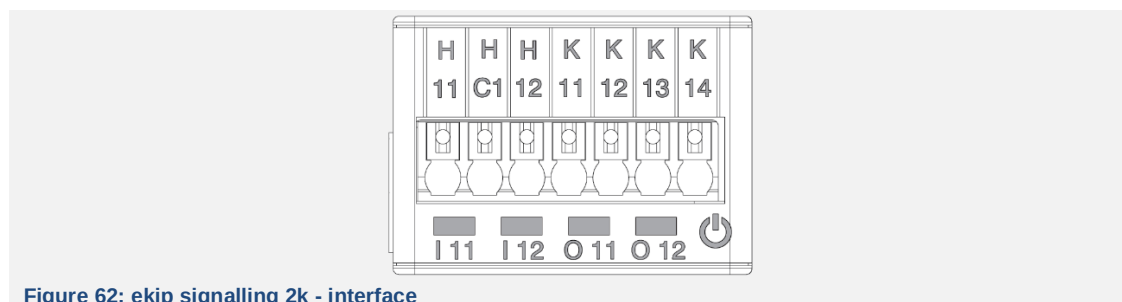


Figure 62: ekip signalling 2k - interface

LED	Description
Power	Reports ON status and correct communication with Ekip UP: - off: module off - fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present - flashing not synchronized with power LED of Ekip UP (2 fast flashes per second): module ON and communication with Ekip UP absent
I 11, I 12	Indicate status of the contacts of each output: - off: open contact - on: closed contact
O 11, O 12	Indicate status of the contacts of each input: - off: circuit open - on: short circuit

Table 220: ekip signalling 2k - interface

Menu If the Ekip Signalling 2K module is detected correctly by Ekip UP the specific configuration area in the *Modules Settings menu is activated*.

For each Ekip Signalling 2K module detected by Ekip UP, a specific menu is available containing the submenus of all the available and configurable inputs and outputs.

Input Parameters All the available inputs enable the following parameters to be configured:

Parameter	Description	Default
<i>Polarity</i>	Defines whether the input is defined as ON by Ekip UP when it is open (<i>Active open</i>) or when it is closed (<i>Active Closed</i>)	Active closed
<i>Delay</i>	Minimum duration of activation of the input before the status change is recognized; the delay is expressed in seconds, which are settable in a range: 0 s - 100 s with 0.01 s step  NOTE: - if the source is deactivated before this time has elapsed the status change is not recognized - with delay = 0 s the status change must be anyway greater than 300 μS	0.1 s

Table 221: ekip signalling 2k – input parameters

Parameters Output

Parameter	Description	Default
<i>Signal source</i>	Event that activates the output and switches the contact. On the display, different protection proposals, statuses and thresholds are available; via Ekip Connect the Custom mode can be configured to extend the solutions and combine several events.	None
<i>Delay</i>	Minimum duration of presence of the source before the output is activated; the delay is expressed in seconds, which are settable in a range: 0 s - 100 s with 0.01 s step  NOTE: - if the source is deactivated before this time the output is not switched - with delay = 0 s the source must be anyway present for more than 300 μS	0 s
<i>Contact type</i>	Defines the rest status of the contact with a non-present source between: open (NO) and closed (NC)	NO
<i>Latched⁽¹⁾</i>	Enables the output (and relative status LED) to be maintained active (ON) or be deactivated (OFF) until the event disappears.	Off
<i>Activation time Minimum⁽¹⁾</i>	Defines the minimum closure time of the contact following the rapid presence of sources: - Source duration < min. activation= the contact is activated for the minimum activation time - Source duration $\geq$ min. activation=the contact is activated for as long as the source persists It is possible to choose between: 0 ms, 100 ms, 200 ms	0 ms

Table 222: ekip signalling 2k – output parameters



(1): if Ekip Measuring is used for the Power Controller function, the following considerations apply:

- Latched:* deactivate all the Latched configuration of the outputs used for Power Controller
- Minimum activation time:* the Power Controller option is available in addition to those that have already been described: if selected, the output and active latching is active for a set time that depends on the function, regardless of the persistence of the event that activated it.

Information In the *About-Modules* menu the specific menu of the module is available that contains:

- the serial number and the version of the module
- the status of the inputs (On/Off) and of the outputs (Open/Closed)

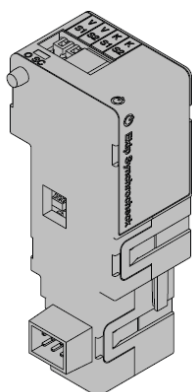
Test If the *Ekip Signalling 2K* module is detected correctly, the test area in the Test menu is activated.
For details of test characteristics, see page 127.

Remote information From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).

Test If the *Ekip Signalling 2K* module is detected correctly, the test area in the Test menu is activated.
For details of test characteristics, see page 126.

Connections Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for terminal references.
For external cabling, AWG 22-16 cables with a maximum external diameter of 1.4 mm must be used

To connect the module to *Ekip Supply* and *Ekip UP*, see the instruction sheets 1SDH002004A1002.



Ekip Synchrocheck is an accessory module that is used to control closing of an actuator if there are synchronism conditions that are programmable by the user.

In order to actuate the synchronism:

- *Ekip Synchrocheck* and *Ekip Measuring* measure respectively the voltage on the external contacts (external voltage) and on the inner contacts (internal voltage) of the actuator
- *Ekip Synchrocheck* manages a closed contact



NOTE:

- *in the following description and in the menus the actuator is specified as a switch or CB*
- *with a generator and the actuator being configured: Normally, the external voltage is the network voltage and the internal voltage is the generator voltage*



IMPORTANT: Only one *Ekip Synchrocheck* can be installed on each *Ekip UP*

Modes The module operates in two modes, configurable by user (in manual configuration) or managed automatically by unit (in automatic configuration)

Conditions	Description
Busbar active	Operation with external voltage other than zero: • the synchronism search is started up if the external voltage is less than or the same as a maximum (0.5 U_n default), for a minimum time (1 s default). • the synchronism is considered to be reached if the differences between the RMS values, the frequencies and the voltage phases are less than or the same as a maximum (0.12 U_n, 0.1 Hz, and 50 ° default)
Dead busbar and configuration: <i>Normal</i>	Operation with one of the voltages nil: • the synchronism search is started up if the internal voltage is less than or the same as a minimum (0.5 U_n default), for a minimum time (1 s default). • the synchronism is considered to be reached if the external voltage is less than or the same as a maximum (0.2 U_n default), for a minimum time (1 s default).

Table 223: ekip synchrocheck – modes



NOTE: *with dead busbar and configuration: reverses the roles of internal and external voltages, which are reversed*

Synchronism signal:

- is activated and maintained after synchronism is reached and is kept active for at least 2 s
- is deactivated when the synchronism falls or the switch is open (with condition: *Evaluate CB status*= enabled) or the interrupted communication with Ekip UP

Additional functions

In the above remote synchronism conditions, certain options can be configured:

- adding open switch condition (disabled by default)
- removing the frequency and phase controls can be disabled



IMPORTANT: in order to be able to disable the frequency and phase controls, make sure that there is already the desired frequency and phase correspondence between external and internal contacts

Supply Ekip Com Synchrocheck is supplied directly by the Ekip Supply module to which it is connected .



NOTE: in the absence of an auxiliary supply, the communication between Ekip UP and module is interrupted

Input Ekip Synchrocheck has an input (V S1 - V S2) for reading voltage, the operation of which is ensured in the following ranges and with the following performance:

Component	Operating range	Normal operating interval	Accuracy ⁽⁵⁾
Voltage	0-120 VAC	10 - 120 VAC	1 % ⁽¹⁾
Frequency ⁽²⁾	30-80 Hz	30 - 80 Hz	0.1 % ⁽³⁾
Phase ⁽⁴⁾	-	-180 - +180 °	1 °

Table 224: ekip synchrocheck – input



NOTES:

- (1) with busbar active
- (2) with busbar active, the measurement of the frequency starts with ≥ 36 VAC measured voltage and stops with ≤ 32 VAC measured voltage
- (3) in the absence of harmonic distortion
- (4) measurement of the phase refers to the phase difference between internal and external voltage
- (5) The accuracy values refer to normal operating intervals according to IEC 61557-12

Isolation transformer

Between the external contacts of the switch and the input of the module, an isolation transformer must always be installed that has the following characteristics:

Characteristics	Description
Mechanical	- fixing: EN 50022 DIN43880 guide - material: self-extinguishing plastic - protection level: IP30 - electrostatic protection: with screen to be earthed
Electrical	- accuracy class: ≤ 0.2 - performance ≥ 4 VA - overload: 20 % permanent - insulation: 4 kV between inputs and outputs, 4 kV between screen and 4 kV outputs between screen and inputs. - frequency: 45-66 Hz

Table 225: ekip synchrocheck – transformer

Output Ekip Synchrocheck has an output (K S1 - K S2) used as synchronism contact.

The output is insulated from the unit and the input and has the following electrical characteristics:

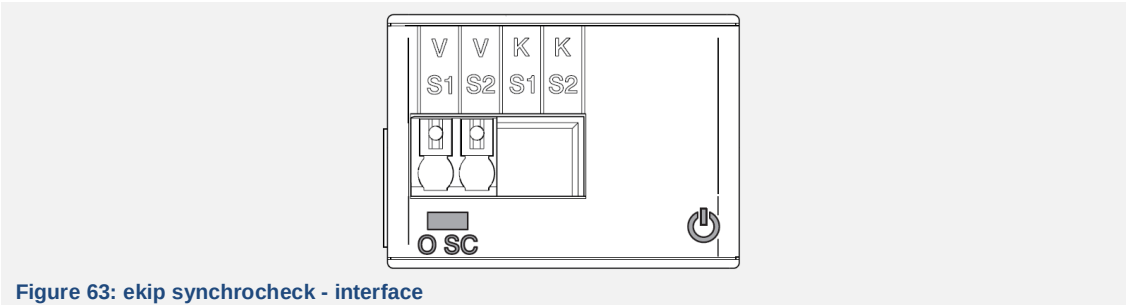
Characteristics	Maximum limit ⁽¹⁾
Maximum switchable voltage	150 VDC / 250 VAC.
Switching power	2 A @ 30 VDC, 0.8 A @ 50 VDC, 0.2 A @ 150 VDC, 4A @ 250 VAC
Dielectric strength between open contacts	1000 VAC (1 minute @ 50 Hz)
Dielectric strength between each contact and coil	1000 VAC (1 minute @ 50 Hz)

Table 226: ekip synchrocheck – output



(1): data on a resistive load

Interface The module has two signalling LEDs:



LED	Description
Power	Reports ON status and correct communication with Ekip UP: • off: module off • fixed or flashing light synchronized on power LED of Ekip UP: module ON and communication with Ekip UP present • flashing not synchronized with power LED of Ekip UP (2 fast flashes per second): module ON and communication with Ekip UP absent
O SC	Indicate status of the contact of each output: • off: open contact • on: closed contact <i>i</i> NOTE: The LED shows output status: depending on the rest configuration of the contact (normally open or closed), it can indicate synchronization OK or Not OK

Table 227: ekip synchrocheck – interface

Configurations on menu

If the *Ekip Synchrocheck* module is detected correctly by Ekip UP the specific configuration area is activated in the *Advanced-Synchrocheck menu*.

Parameter	Description	Default
<i>Activate</i>	Enables/disables protection and availability on menu of the parameters	Off
<i>Dead bar option</i>	On= busbar active; Off= dead busbar present	Off
<i>Udead Threshold</i> (1) (2)	Maximum external voltage (with dead busbar and configuration : <i>Normal</i> ⁽²⁾ is the first synchronism condition) The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.02 Un - 2 Un with 0.001 Un step	0.2 Un
<i>Threshold Ulive</i> (2) (3)	Minimum voltage for starting monitoring of external voltage (with busbar active) or internal voltage (with dead busbar and <i>Normal</i> configuration) The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.5 Un - 1.1 Un with 0.001 Un step	0.5 Un
<i>Stability time</i>	Minimum time within which the <i>Ulive Threshold</i> condition must be fulfilled to start up voltage monitoring. The value is expressed in seconds, settable in a range: 100 ms - 30 s with 1 ms step	1 s
<i>Delta Voltage</i>	Maximum difference between internal and external voltage (first synchronism condition) The value is expressed both as an absolute value (Volt) and as a relative value (Un), settable in a range: 0.02 Un - 0.12 Un with 0.001 Un step	0.12 Un
<i>Delta Frequency</i> ⁽⁴⁾	Maximum difference between internal and external frequency (second synchronism condition) The value is expressed in Hertz, which is settable in a range: 0.1 Hz - 1 Hz with 0.1 Hz step	0.1 Hz

Table 228: ekip synchrocheck – configurations 1

Configurations on menu [2]

Parameter	Description	Default
<i>Delta Phase</i> ⁽⁴⁾	Maximum difference between internal and external phase (third synchronism condition) The value is expressed in degrees, which are settable in a range: 5 ° - 50 ° with 5 ° step	50 °
<i>Dead bar configuration</i>	With dead busbar and generator: - Reversed = <i>Ekip Synchrocheck</i>/external contacts connected to the generator - Normal = <i>Ekip Synchrocheck</i>/external contacts connected to the network	Normal
<i>Auto Live-dead detect</i>	Enables automatic synchronism control to be activated: - Manual = Ekip UP considers the parameter <i>Dead bar option</i> - Automatic = Ekip UP automatically evaluates the configuration to be actuated between the dead busbar and the active busbar	Manual
<i>Auto Deadbar detect</i>	Configuration for detecting dead busbar: - Manual = Ekip UP considers the <i>Dead Bar Configuration</i> parameter - Automatic = Ekip UP automatically evaluates the configuration to be actuated between: <i>Reversed</i> and <i>Normal</i>	Manual
<i>Primary voltage</i>	Rated voltage U_n of plant; the value is expressed as an absolute value (Volt), settable in a range: 100 V - 1150 V with variable step	100 V
<i>Secondary voltage</i>	Secondary voltage of the transformer; the value is expressed as an absolute value (Volt), settable in a range: 100 V - 120 V with variable step	100 V
<i>Concatenated Ref</i>	Network voltage entering module between the 3 plant voltages	U12
<i>Contact Type</i>	Defines the rest status of the contact with non-present synchronism between: open (NO) and closed (NC)	NO

Table 229: ekip synchrocheck – configurations 2



NOTE:

- (1) parameter not available with busbar active and Auto Live-dead detect = Manual
- (2) with dead busbar and configuration = Reversed, reverses the roles of internal and external voltages
- (3) to the minimum voltage condition, 10% hysteresis is applied: once it is reached, the condition is lost if voltage falls below 90% of the set limit
- (4) parameter not available with dead busbar and Auto Live-dead detect = Manual

Remote configurations

From the service connector (via Ekip Connect) or with communication by system bus it is possible to access additional parameters:

Parameter	Description	Default
<i>Frequency check</i>	Activate (ON) or deactivate(OFF) the frequency control for synchronism evaluation	ON
<i>Phase control</i>	Activate (ON) or deactivate (OFF) the phase control for synchronism evaluation	ON
<i>Evaluate switch status</i>	Activate (YES) or deactivate (NO) the open switch status control for synchronism evaluation NOTE: fourth synchronism condition with busbar active; second synchronism condition with dead busbar	NO
<i>Minimum matching time</i>	With active busbar, minimum time within which the <i>Delta Phase</i> time has to be fulfilled The value is expressed in seconds, settable in a range: 100 ms - 3 s with 10 ms step NOTE: this is not a synchronism condition, but a parameter that enables correct and incorrect combinations of the Delta frequency and Delta Phase conditions to be made. Owing to the worst-case latency, the time that elapses before the synchronism is recognized may be greater than the set time (circa 20 ms)	100 ms

Table 230: ekip synchrocheck – remote configurations

Measurements If the Ekip Synchrocheck module is detected correctly by Ekip UP the specific area of measurement in the *Measurements-Synchrocheck* menu is activated

Measurement	Description
<i>Module</i>	- OK = synchronism conditions fulfilled - Not OK = synchronism conditions not fulfilled or function disabled
<i>Frequency</i>	- OK = frequency synchronism condition fulfilled - Not OK = frequency synchronism condition not fulfilled or synchronism function disabled or frequencies outside measurement range --- = Synchronism condition for frequencies is not available (e.g.: for operation with dead busbar)
<i>Voltage</i>	- OK = Voltage synchronism conditions fulfilled - Not OK = Voltage synchronism conditions not fulfilled or function disabled
<i>Phase</i>	- OK = Phase-difference synchronism condition fulfilled - Not OK = Phase-difference synchronism condition not fulfilled or synchronism function disabled or frequencies outside measurement range --- = Phase-difference synchronism condition is not available (e.g.: for operation with dead busbar)
<i>Ext Side Voltage⁽¹⁾</i>	Voltage measured by <i>Ekip Synchrocheck</i> , expressed in Volt = DC measurement DC or less than 1 VAC --- = measurement not available (e.g.: because synchronism function disabled)
<i>Int Side Voltage⁽²⁾</i>	Voltage measured by Ekip Measuring, expressed in Volt. = measurement less than 1 VAC
<i>Ext Side frequency⁽¹⁾</i>	Frequency measured by <i>Ekip Synchrocheck</i> --- = measurement not available (e.g.: because of disabled synchronism or operation with dead busbar or frequencies outside measurement range)
<i>Int Side frequency⁽²⁾</i>	Frequency measured by Measuring --- = measurement not available (e.g.: because of disabled synchronism or operation with dead busbar or frequencies outside measurement range)
<i>Phase difference⁽¹⁾</i>	Phase difference between voltages, expressed in degrees --- = measurement not available (e.g.: because of disabled synchronism or operation with dead busbar or frequencies outside measurement range)
<i>Auto detection</i>	- Busbar active = with automatic detection of the operating mode and operation with busbar active, or with synchronism function not enabled - Dead busbar = with automatic detection of the operating mode and operation with dead busbar --- = Measurement not available (e.g.: because of manual detection of operating mode)
<i>Voltage relation</i>	$V_{int} \leq V_{ext}$ = Internal voltage less than or the same as the external voltage $V_{int} > V_{ext}$ = Internal voltage greater than the external voltage --- = Measurement not available (e.g.: because of disabled synchronism or direct voltage or less than 1 V)
<i>frequency relation</i>	$f_{int} \leq f_{ext}$ = Internal frequency less than or the same as the external frequency $f_{int} > f_{ext}$ = internal frequency greater than the external frequency --- = Measurement not available (e.g.: because of disabled synchronism, or operation with dead busbar, or frequencies outside measurement range)

Table 231: ekip synchrocheck – Measurements



NOTES:

- (1) the measurement accuracy of the voltage difference is $\pm 10\%$, unless the parameter value is $0.02 U_n$, in which case accuracy is $\pm 20\%$
- (2) for the characteristics of the voltage and frequency measurements Ekip Measuring (internal), see the measurements of Ekip Measuring (page 47)

Summary Page The summary page is activated in the presence of the module *Ekip Synchrocheck*; access is possible as for the other summary pages (page 34).

in this page, the measurements are:

- green if the relative synchronism condition is fulfilled
- red if the relative synchronism condition is not fulfilled or the function is disabled
- white if the measurements are not available

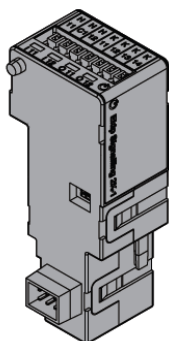
Information In the *About-Modules* menu, the specific menu of the module is available, which contains the serial number and the version of the module

Remote information From the service connector (via Ekip Connect) or with a system bus communication, additional information is available on the version and the status of the module: HW and Boot version, CRC status (correctness of SW in the module).

Connections Consult the electrical diagrams for 1SDM000116R0001 to connect the module to its communication network and for terminal references.

For external cabling, AWG 22-16 cables with a maximum external diameter of 1.4 mm must be used

To connect the module to *Ekip Supply* and *Ekip UP*, see the instruction sheets 1SDH002004A1002.



Ekip Signalling 3T is a signalling accessory that enables:

- three analogue inputs for temperature sensors PT1000 (2-wire): I44, I43, I42
- one analogue input for 4-20mA current loops: I41

The measurements supplied by the module can be combined with different control thresholds, which are useful for configuring alarm and status signals and programmable commands.

Models *Ekip UP 2* can be configured with two different 3T modules: *Ekip Signalling 3T-1* and *Ekip Signalling 3T-2*.

The modules are identical in terms of characteristics and installation methods, except for: display menus, cabling and addresses for system communication that are specific to each model.



NOTE: unless specified, the information shown in the following chapter is valid for both the models; on the model two, the names of input are: I51 (loop 4-20mA), I54, I53, I52 (PT1000)

The two modules can be fitted simultaneously on the same *Ekip UP* to increase the possibility of measuring and controlling the plant.



IMPORTANT: Each *Ekip UP* can fit just one module by type; configuration with two modules of the same model is not permitted (e.g.: two *Ekip Signalling 3T-1* modules)

Supply *Ekip Signalling 3T* is supplied directly by the *Ekip Supply* module to which it is connected.



NOTE: in case of absence of an auxiliary supply the communication between *Ekip UP* and the module is interrupted

Connections For the PT1000 sensors, use insulated cables for temperature sensors like PENTRONIC TEC/SITW-24F (TX type) or the like, with maximum length of three metres.

For 4-20mA current loops sensor, use cables that are suitable and compatible with the work environment in which the 4-20mA current sensor is used, with a maximum length of three metres.



IMPORTANT: The inputs are not insulated: in any case and for any value of the plant voltage, the customer must ensure the insulation between each input and between inputs and supply of the *Ekip Supply* module on the basis of the application and network.

For applications in low voltage plants, ABB suggests using a dedicated external insulated PT1000 sensor. This can be ordered using the 1SDA085695R1 code and is provided with a nut and screw for use on a bar and is compatible with the dielectric strength and insulation levels specified in standard IEC 60947-2 ($U_i = 1000$ V, $U_{imp} = 12$ kV).

Input The module enables the following parameters to be measured

Input	Measurement	Range	Resolution	Accuracy ⁽¹⁾
PT1000	Temperature	-50 .. 250 °C	0.01 °C	± 0.25 °C ⁽²⁾
4-20mA current loop	DC current	0 .. 100 % ⁽³⁾	0.1 %	± 0.5 % ⁽⁴⁾

Table 232: ekip signalling 3t - input



NOTES:

- (1) accuracy refers to Ekip UP at ambient temperature 23 °C ± 5 °C and 3T module without sensors (for complete accuracy, consider the characteristics of the sensors and cabling used)
- (2) accurate within the range -25 ... 150 °C; in the complete range it is: ± 0.5°C
- (3) the measurement is expressed as a percentage, in which: 0 % = 4 mA and 100 % = 20 mA
- (4) accuracy refers to the full scale: 0.5 % = 0.1 mA

Interface Five signalling LEDs are available:

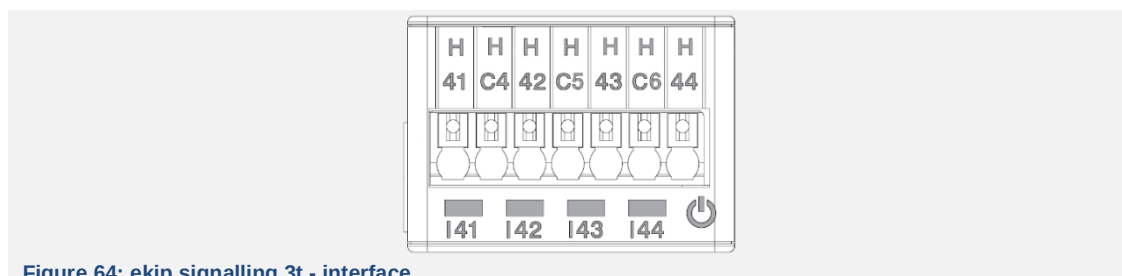


Figure 64: ekip signalling 3t - interface

LED	Description
Power	Reports ON status and correct communication with Ekip UP: - off: module off - fixed or flashing light synchronized with power LED of Ekip UP: module ON and communication with Ekip UP present - flashing not synchronized with power LED of Ekip UP (two rapid flashes per second): module ON and communication with Ekip UP absent
I 41, I 42, I 43, I 44	Indicate status of the input contacts: - off: input disabled - fixed on: input enabled, sensor connected and measurement valid - flashing: input enabled, sensor not connected and/or measurement not valid

Table 233: ekip signalling 3t - interface

Access from display If the *Ekip Signalling 3T* module is detected correctly, the following areas became available on Ekip UP:

- *Measurements* page, accessible from *Home* (see page 35), containing the measurements of all the PT1000 inputs and 4-20mA current loops of both 3T-1 and 3T-2 modules
- information submenu in the *Modules-Information* menu containing: serial number, module version and sensors status (Present/Alarm)



IMPORTANT:

- if one or more sensors are in alarm status, this signal is activated on the diagnosis bar: Ekip Signalling 3T
- if a sensor is not enables, the reported state is: Present

Remote configurations

The module configuration is available:

- via Ekip Connect, with communication accessories from service connector or with communication from system bus
- with its own communication system and Ekip Com modules fitted to the Ekip UP in the conditions prescribed for the unit (use the System Interface for the details)



NOTA: parameters and measurements are distributed on Ekip Connect pages and communication addresses that are sometimes not consequential; the following tables show the page references to Ekip Connect 2

Enabling and measurements

In the *Ekip Signalling 3T* page, it is possible to enable the individual inputs of the modules:

- PT1 Temperature (I44), PT2 Temperature (I43), PT3 Temperature (I42), Current 4-20mA (I41) for 3T-1
- PT1 Temperature (I54), PT2 Temperature (I53), PT3 Temperature (I52), Current 4-20mA (I51) for 3T-2

Parameter	Description	Default
<i>Enable</i>	It enables the specific input and the relative checks of alarm statuses and messages to be checked	Enabled

Table 234: ekip signalling 3t - parameters 1

The page also shows the status alarms and measurements detected for each input.

Alarm signals

On the page *Protection Parameters - Other parameters A* (and *B*, if the dual set is activated) it is possible to activate and configure up to three alarm thresholds for each inputs, which are independent of one another: Threshold A, Threshold B, Threshold C.

Each alarm threshold provides the following configuration parameters:



NOTE: the table shows the threshold A parameters of the input I42 1; for all the other thresholds and inputs, the names and the references to be considered change

Parameter	Description	Default
<i>Threshold A enable</i>	Activates the I42 input test with alarm threshold Threshold A	Disable
<i>Threshold A hysteresis direction</i>	Defines whether the alarm is triggered by the measured value exceeding (<i>up</i>) or falling below (<i>down</i>) the set Threshold A.	Down
<i>Threshold A value</i>	Alarm Threshold A of the I42 input. The value is expressed in degrees Celsius (°C), which are settable in a range: -40 °C .. 240 °C with 0.1 °C step. NOTE: the I41 and I51 input thresholds are expressed as a percentage settable in a range: 0 % - 100 % with 0.1 % step (each step equivalent to 16µA)	200 °C (I42, I43, I44, I52, I53, I54) / 50 % (I41, I51)
<i>Threshold A hysteresis</i>	Hysteresis value valid for leaving the alarm condition if the set alarm Threshold A is exceeded. The hysteresis parameter permits only positive values, the Ekip UP decides whether to add or subtract this value to the alarm threshold on the basis of the ConFigure parameter. For example: • <i>Config= Up, value= 200 °C, hysteresis= 10 °C</i> the alarm is activated when 200 °C is exceeded and is deactivated when it falls below 190 °C The value is expressed in degrees Celsius (°C), which are settable in a range: 0 °C - 50 °C with 0.1 °C step. NOTE: the thresholds combined with the I41 and I51 input are expressed as a percentage settable in a range: 0 % .. 30 % with 0.1 % step (each step equivalent to 16µA)	1 °C (I42, I43, I44, I52, I53, I54) / 1 % (I41, I51)

Table 235: ekip signalling 3t - parameters 2

Collegamenti

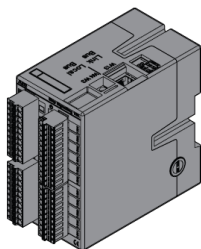
Consultare gli schemi elettrici 1SDM000116R0001 per collegare il modulo alla propria rete di comunicazione e per i riferimenti dei terminali.

Per collegare il modulo a *Ekip Supply* e *Ekip UP* vedi i fogli di istruzioni 1SDH002004A1002.

Stati e allarmi

Nella pagina *Avvisi/Allarmi* è possibile verificare lo stato di tutte le soglie di controllo.

50 - Ekip Signalling 10K



Ekip Signalling 10K is an external accessory signalling module, which can be installed on a standard 35 mm DIN guide (DIN EN 50022, type TS 35x15 mm).

The module has:

- Ten programmable output contacts.
- Ten or eleven programmable digital inputs.
- One startup LED and twenty or twenty-one signalling LEDs (one for each output/input).

The module can be set in four different configurations

- One in the case of a connection to a bus link network.
- Three configurations in the event of connection via Local Bus (to enable up to three modules to be connected to the same device)

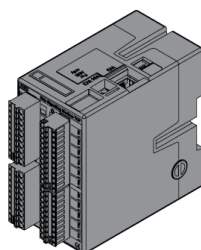
The module can be supplied at 110-240 VAC / DC or 24-48 VDC.

More information on *Ekip Signalling 10K* is available on the website <http://www.abb.com/abblibrary/DownloadCenter/>, document 1SDH001318R0002.



IMPORTANT: make sure that you have read the safety requirements and requirements regarding prevention of unauthorized accesses.

51 - Ekip Signalling TCP Modbus



Ekip Signalling Modbus TCP is an external accessory module, which can be installed on a standard 35 mm DIN guide (DIN EN 50022, type TS 35x15 mm).

Its function is to share on another Ethernet network with a TCP communication protocol TCP Modbus information on the status of actuators/switches even if they are unable to supply this information via Ethernet, and to enable these devices to be remote-controlled.

The module has 11 digital inputs and 10 output contacts:

- The inputs enable the status of the devices and other information to be monitored.
- The outputs enable the switches to be controlled.

Each input and output is combined with a status LED.

The module can operate in three modes:

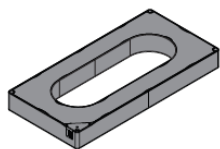
Modes	Characteristics
CB Supervisor	The module can be associated with a single switch, which is selectable from a list, and the inputs and outputs configuration is preset
Multi MCCB Supervisor	The module can be associated with up to five switches, and the inputs and outputs configuration is preset  NOTE: mode available with boxed switches
Free I/O	The inputs and outputs can be configured completely by the user

Table 236: ekip signaling modbus TCP - modes

The module can be supplied to 110-240 VAC / DC or 24-48 VDC.

More information on Ekip Signalling TCP Modbus can be found at <http://www.abb.com/abblibrary/DownloadCenter/>, document 1SDH001456R0002.

52 - Toroid and RC



RC is the external residual current sensor that can be installed in the Ekip UP unit Protect, Protect+ and Control+ versions provided with *RC rating plugs*.

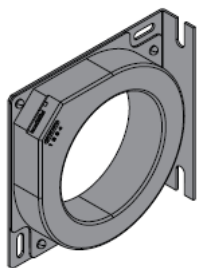
During Ekip UP programming, the presence of the sensor in the Settings menu must be checked (page 40). This is necessary for activating the configuration menu of the RC protection parameters in the *Advanced* menu (page 38).



IMPORTANT: the RC toroid and relative protection can be selected as an alternative to the Gext toroid; the Gext and RC protections are alternative

More information on the *RC toroid* connection can be found at <http://www.abb.com/abblibrary/DownloadCenter/>, kit sheet 1SDH001000R0521 (document compatible with Ekip UP and with SACE Emax 2).

53 - S.G.R Sensor



S.G.R. or Source Ground Return is the external homopolar current sensor, available for the Protect, Protect+ and Control+ versions.

During programming of Ekip UP, its presence must be selected (see the Settings, Switch, Earthing Protection menu), which activates the protection against the earth fault Gext (see Advanced menu).

During unit programming, the presence of the sensor in the Settings menu must be checked (page 40). This is necessary for activating the configuration menu of the RC protection parameters in the *Protections* menu (page 37).



IMPORTANT: the S.G.R sensor and relative protection can be selected as an alternative to the RC sensor; the Gext and RC protections are alternative

More information on the *S.G.R. toroid* connection can be found at <http://www.abb.com/abblibrary/DownloadCenter/>, kit sheet 1SDH001000R0521 (document compatible with Ekip UP and with SACE Emax 2).

Ekip TT



Ekip TT is a supply accessory for accessing Ekip UP in the absence of auxiliary supply; the unit enables:

- Ekip UP to be supplied and the protection to be viewed that has tripped, in the event of TRIP and absence of auxiliary voltage
- set the protections and certain parameters before installing on a plant



IMPORTANT:

- ***Ekip TT* can be connected to Ekip UP even when it is in service**
- ***Ekip TT* supplies only the display: to set and display the information on the electronic accessories, an auxiliary supply is required**

Ekip TT is connected to the service connector of Ekip UP by the cable provided.

To switch on the module, move the lateral switch to the ON position and check the status of the LED:

- if green, proceed with the reading operations and desired configuration
- if red, replace the batteries of the device (three AA 1.5 V batteries)

Further information is available on the website [http://www.abb.com/abblibrary/DownloadCenter/kit sheet 1SDH001000R0519](http://www.abb.com/abblibrary/DownloadCenter/kit%20sheet%201SDH001000R0519) (document compatible with Ekip UP and with SACE Emax 2).

Ekip Programming



Ekip Programming is a supply accessory and communication used for:

- supplying Ekip UP and displaying the protection that has tripped, in the event of TRIP and absence of auxiliary voltage
- setting the protections and certain parameters before installing on a plant
- Use the Ekip Connect software to access the pages for programming, measurements and other exclusive functions (Datalogger, Dataviewer, Power Controller, IEC 61850)



IMPORTANT:

- ***Ekip Programming* can be connected to Ekip UP even when it is in service**
- ***Ekip Programming* supplies only the display: to set and display the information on the electronic accessories the auxiliary supply has to be present**

Ekip Programming is connected from a USB port of the PC, from which it receives the energy to switch on and supply also Ekip UP; the cable provided must be used for the connection to the service connector of Ekip UP.

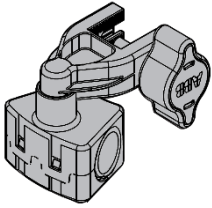
Ekip Programming is provided with two LEDs, a green LED indicating that module is ON and a yellow LED indicating that communication is active.

Ekip T&P



Ekip T&P is a supply and communication accessory with the same characteristics as *Ekip Programming*, to which a further function is added:

- With the Ekip Connect software, enables the test pages to be accessed



Positioning device

The positioning of the type C sensors on their own bus bars is facilitated by using a specific mechanical positioner, which can be ordered as a loose part; each position allows the positioning of a single sensor.

Consult *Catalogue* and Getting started 1SDH002004A1003 for ordering and connection details.

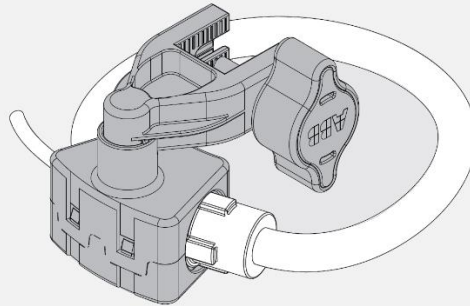


Figure 65: positioner for sensor type C

Insertion bridges for current

If current measurements are not required, a kit of insertion bridges can be used instead of sensors; the jumpers make it possible to secure the connector and ensure that the unit measures nothing.

When ordered, Ekip UP is in any case programmed to support the replacement with current sensors type C (120 mm) configuration 3P.

Consult *Catalogue* and Getting started 1SDH002004A1003 for ordering and connection details.

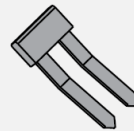


Figure 66: insertion bridges for current

Insertion bridges for voltate

If the measurement of the voltages is not required, it is possible to use a kit of insertion bridges to be connected to the voltage sockets; the jumpers make it possible to secure the connector and ensure that the unit measures nothing.

The insertion bridges are supplied as standard with Ekip UP; consult Getting started 1SDH002004A1003 for ordering and connection details.

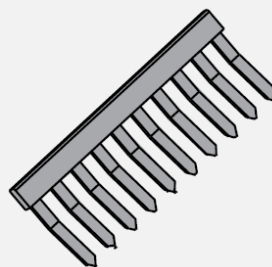


Figure 67: insertion bridges for voltage

Reviews

Review	ECN	Description
A	ECN000071509	First version
B	ECN000089543	Rating plugs inserted, current sensors, 3T signaling, mechanical accessories, additional functions and relative menu areas; updated regulations, graphics, documentation
C	ECN000141620	Table updated on: RQ protection, Voltage protections and power protections
D	ECN000141620	Paragraph Current protections updated page 101

1SDH002003A1002 ECN000141620 Rev D