

Calculation and diagrams for Low Voltage electrical installations

REFERENCE MANUAL



Caneco BT

Version 5.4

Calculation and diagrams for Low Voltage electrical installations

www.alpi-software.com

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2 Installation

2.1 Goal of this manual

This manual introduces the main functions of Caneco BT version 5.4 and gives you a detailed breakdown of new features. This manual allows you to learn Caneco BT. Nevertheless, to familiarize fully with this software, we recommend going through a training course.

2.2 Prerequisites

This manual and the program were prepared for qualified electricians and engineers. Also, a good knowledge of Windows system and procedures is required.

2.3 Minimum system requirements

Caneco BT for Windows requires the following system configuration as a minimum:

Processor Intel® Pentium® IV, recommended (*): RAM: 1 Gb Screen: 17 »' Graphic resolution: 1024x768 System: Windows NT SP6 / 2000 / XP / Vista or Windows 7

Espace disque requis: environ 500 méga-octets



The Windows environment requires significant disk space for temporary files storage. Optimizing your disk space is recommended in order to operate the required disk space on a permanent basis (about 30% of total disk space)

2.4 System recommended

Processor: Intel® 3.0 GHz or a more efficient processor RAM: 2 Gb Screen: 19" Graphic resolution: 1280 × 1024 Windows 2000, XP / Vista or windows 7

2.5 Protection of Caneco BT

Caneco BT is protected by a «soft» Flexnet key or a dongle. The «soft» key checks that you are authorised to use the software and its associated files on your PC, within the license terms of use.

2.6 Installation of Caneco BT

To install **Caneco BT** for Windows, you must operate as follows:

- Quit all running applications.
- Insert the CD-Rom in your CD-Rom drive
- The installation program starts.
- Please answer to the questions:
- Assess the limit of liability of the ALPI License Agreement.
- Click on Yes to approve these conditions.

To take into account the access constraint to directories with Windows NT 2000, XP, Vista and Windows 7, the software is installed in various directories.

C:\Program Files\ALPI\Caneco BT\5.4

This directory contains the main useful and essential files to run the software.

C:\Documents and Settings\All Users\Application Data\ALPI\Caneco BT\5.4

Installation is made also in three main sub-directories:

LABELS (contains the images and logos)

FOLIOS (which includes folios)

"Country"\Schema (contains the associated diagrams)

"Country"\\ ENG\Template (contains the project templates)

"Country"\\BASE (which includes Caneco BT database)

"Country"\\ ENG\CFG (one directory per installation language, so ENG means English)

A three-character code distinguishes each language.



It is compulsory to reach target directory for writing/reading. Frequently, Caneco BT reaches CFG directory to store its configuration.

If there is not enough space on your hard disk, or if you prefer to install the software somewhere else, choose another path to install the software. Click on *Browse* button. Click on *Next*



See separate appendix "Installing Caneco BT"

2.7 Uninstalling Caneco BT

To uninstall **Caneco BT**, you must proceed as follows: Click on uninstall icon, the program will ask you to confirm and will delete all files linked to the software on the disk.



In order to uninstall **Caneco BT**, do not delete successively files and directories. You may forget to delete some files stored in the Windows system directory.

2.8 Contents of Caneco BT

2.8.1 CFG Directory

This is the configuration directory of Caneco BT

File	Function
*.dat	One file per Standard: manages installation coefficients
Caneco.bib	The symbol library for new projects
Caneco.blk	File of circuit blocks
Caneco.hlb	Symbols library for old projects
Caneco.cbt	General configuration file
Caneco.std	Standardised power
Caneco.sty	Circuit Styles
Caneco.wpa	Global parameters file (default options)
"Country".cbl	Cable file: phase cross-section
Cantips.txt	Binary file which includes containing day tricks
Normes.nrm	File containing standards
Protect.nco	File of inconsistency rules for diagram - protection
Protect.ptc	File of creation rules for diagram - protection
*.pse	Installation method tables according to the standard
*.cof	Laying factors according to the standard
*.cbl	Cable file: Neutral and PE cross-sections
*.cab	Cable file: 4 th conductor small cross-section

2.8.2 FOLIOS directory

Files *.inf Description file for document models

File	Description
A0.inf	Network single-line A0
A3.inf	Network single-line A3
Fiche.inf	Detailed calculation sheet for each circuit
Folio.inf	Landscape Folio background
Foliov.inf	Portrait Folio background
Lfolio.inf	List of landscape pages
Lfoliov.inf	List of portrait pages
Pagedg.inf	Flyleaf
Param.inf	Parameter sheet
protesg.eng	Caneco BT secondary data file
protspc.eng	Caneco BT secondary data file
source.inf	Calculation sheet for sources
Tab10.inf	Board single-line with 10 circuits per page

2.8.3 Files *.WMF

Graphic files (Windows MetaFile) corresponding to folio backgrounds.

File	Description
A0.wmf	Network single-line A0
A3.wmf	Network single-line A3
fiche.wmf	Calculation sheet
folio.wmf	Folio
foliov.wmf	Portrait Folio background
Param.wmf	Parameter sheet
pdg.wmf	Flyleaf
src.wmf	Sources (N & S) calculation sheet
Tab10.wmf	Board single-line with 10 circuits per page

2.8.4 BASE Directory

This directory contains all manufacturer files that Caneco BT can use

Fichier	Description
Files *.dug	General purpose circuit-breakers files (EN 60947)
Files *.dmi	Modular circuit-breaker files (EN 947-2)
Files *.dmd	Modular circuit-breaker files (EN 60 898)
Files *.dst	Circuit-breaker files without integrated thermal relays (EN 60 947)
Files *.dmt	Motor circuit-breaker files
Files *.dth	Circuit-breaker coordination files with contactors (EN 60947-4-1)
Files *.amt	Motor start coordination files protected by gM + thermal relay
Files *.g1t	Files of fuses g1 + thermal relays
Files *.fsb	Fuse files
Files *.fsa	aM fuse files
Files *.far	Ultra-fast aR fuse files
Files *.fgr	Ultra-fast gR fuse files
Files *.fgs	Ultra-fast gS fuse files
Files *.itr	Circuit-breaker files
Files *.ZTR	Files of transformer power and impedance
Files *.ZGE	Files of alternator power and impedance

2.9 Calculation reference

2.9.1 Technical Agreement

Caneco BT version 5 has obtained Compliance Approval Certificate no. 15L601 under these new terms of reference. This Approval Certificate arises out of an examination of the results that covered solely the abovementioned calculation modifications together with the application of the symmetry factor fs.

Caneco BT version 5 has obtained Approval Certificates for C15-100 (Approval Certificate no. 15L601), for the RGIE, and for BS7671. These Approval Certificates arise out of an examination of the results that covered the calculations in compliance with these standards.

2.9.2 The different calculation standards and the different versions of Caneco

Principle:

- Caneco BT 4 = standards and calculation standards prior to
- Caneco BT 5 = new calculation standard

2.9.3 Caneco 4 project recovery into Caneco BT 5.4

All the circuits of a Caneco 4 project recovered into version 5 are locked. Three separated cases must be considered:

2.9.4 Case 1: New installation for which the building permit is prior to 31 May 2003:

Projects must continue to be dealt with using Caneco 4

2.9.5 Case 2: New installation for which the building permit is later than 31 May 2003:

Projects must be dealt with using Caneco 5

If the project started to be designed using version 4.4, it must be started again using version 5 and converted to the new standard. Resizing of the cables and protective devices is required (full recalculation from the source). The circuits must previously be unlocked.

2.9.6 Case 3: Extension to an existing installation: dual calculation reference

The existing circuits must not be able to be modified. Protective devices and cables are in existence and were determined using an earlier calculation standard which is not in doubt (no retroactive changes). New circuits, on the other hand, must be determined using the new standard. These extensions must be processed using

Caneco BT 5. The existing circuits must be imported and locked. In this way, the protective devices and cables in these circuits will not be resized.

They must be recalculated to obtain IK values in accordance with the new standard. Caneco BT 5 will indicate, if necessary, that these existing circuits do not meet the new calculation standard. As for the new circuits, they will be sized in accordance with the new standard.



This dual standard makes it necessary to conserve the information concerning compliance with the earlier standard. It is highly advisable to archive the information in different formats (Caneco V4.4, .pdf and .dxf files, hard copies). For greater clarity on the new Caneco BT V5 project, it also advisable, for circuits which previously were compliant but would not be so under the new standard, to show the earlier compliance in the text fields which Caneco BT makes available for each circuit

2.9.7 Recovering a Caneco BT 5.3 project in BT 5.4

All the circuits of a Caneco BTT 5.3 project recovered in version 5.4 are locked. The project file format in Caneco BT 5.4 is not the same as in version 5.3 When loading a project calculated with version 5.3, two different cases must be considered:

Convert project : C:\Users\dln\Documents\Caneco\Demos\AFR-FRA-5.3.1\exemple6_schemas_5.3.AFR? Two cases are to consider: Project is still under study : All circuits of your affair CanecoBT 5.3 will be put to re-calculate. Defore making an automatic counting, if you keep certain results, lock circuits thanks to the Help function « lock » in the Menu Circuits Or Lock project thanks to the help function « lock » in the Menu tools. Make an automatic counting, cables and protection not locked by your installation will be resized without keeping old results.	*
 Two cases are to consider: Project is still under study : All circuits of your affair CanecoBT 5.3 will be put to re-calculate. Before making an automatic counting, if you keep certain results, lock circuits thanks to the Help function « lock » in the Menu Circuits Or Lock project thanks to the help function « lock project » in the Menu tools. Make an automatic counting, cables and protection not locked by your installation will be resized without keeping old results. 	•
 Project is still under study : All circuits of your affair CanecoBT 5.3 will be put to re-calculate. Before making an automatic counting, if you keep certain results, lock circuits thanks to the Help function « lock » in the Menu Circuits Or Lock project thanks to the help function « lock project » in the Menu tools. Make an automatic counting, cables and protection not locked by your installation will be resized without keeping old results. 	
 All circuits of your affair CanecoBT 5.3 will be put to re-calculate. Before making an automatic counting, if you keep certain results, lock circuits thanks to the Help function « lock » in the Menu Circuits <u>Or</u> Lock project thanks to the help function « lock project » in the Menu tools. Make an automatic counting, cables and protection not locked by your installation will be resized without keeping old results. 	
 Before making an automatic counting, if you keep certain results, lock circuits thanks to the Help function « lock » in the Menu Circuits <u>Or</u> Lock project thanks to the help function « lock project » in the Menu tools. Make an automatic counting, cables and protection not locked by your installation will be resized without keeping old results. 	=
 Lock project thanks to the help function « lock project » in the Menu tools. Make an automatic counting, cables and protection not locked by your installation will be resized without keeping old results. 	=
Make an automatic counting, cables and protection not locked by your installation will be resized without keeping old results.	-
Project is accomplished and you like to make an extension:: A re-counting of your installation will be performed to update news CanecoBT 5.4. All old circuits will be automatically locked, no data will be changed and circuits will remain sized as the version 5.3.	
You will be able to make an extension of your installation in version 5.4 by keeping the ancient circuits ok to	Ŧ
Project is still under study	_

Modification of specific processing (thermal constraint on Ik Max Upstream, discrimination, thermal management, singlepole breaking capacity of 2P2D protective devices protecting single-pole circuits, etc.) may result in changes in the calculations performed with version 5.4.

If you do not wish to interfere with the calculations made in version V5.3, completing the design note in that same version is recommended.

3 Database in EDIELEC format

3.1 « EDIELEC » format

Caneco BT version 5 uses a new data format for manufacturer files: the EDIELEC format. This format contains more information than earlier Caneco version format, called «Caneco4» format. Additional information of EDIELEC format allows:

- to «paste» more information in the manufacturer's catalogue enabling a more efficiently equipment choice. As the information workload in EDIELEC format is considerable, ALPI commits to provide with information on an EDIELEC format, ONLY the main manufacturers or those who has an agreement with ALPI.

The CTM software is offered:

either as separate tools (Tools menu) for determining equipment part numbers, unconnected with the equipment calculated within a Caneco BT project

or for automatically determining the part numbers for these items of equipment within Caneco. This possibility will be operational for users having optional features.

As the EDIELEC format involves a considerable volume of information, ALPI only undertakes to provide information in EDIELEC format for the main manufacturers or those who have an agreement with ALPI.

3.2 Identification of manufacturer format type

The manufacturer file you use for a given equipment defines its type. In the below picture, you can see the file type difference of general purpose circuit-breakers:

Normal Supply *	Manufacturers files		1.17	1 1	1.0	22	76.18	
ct Distribut t folders	Data base : C.VPiogramD End of Support: 31/12/20	MaVALPIVC II 1	aneco BT\5.	4\EN\Bas	eFRA\		Avaid	*:1
ject : Document1	Category		Catalo	gue.		File		
Symbol: Ibialy	Disjoncteurs		-		100 Million 100 Million 100 Million	10/18 - mar 200		-
Manufacturers file	list (Disjoncteurs-Usage Gén	eral)					-	
Boar Title		Country	Manufa	Year	Nb of elements	File	Creation	
Mod Moeller Elect	iic FR 2005/EN 60947-2 (Ed	France	Moeller	2005	1194	m05h1	03/04/2006	
Prov Moeler Elect	tic FR 2009/EN 60947-2 (Ed	France	Moeller	2009	1700	mi09tr1	30/07/2009	
Schneider E	/Abonné 2003/EN 60947-2 [France	Schnei	2009	78	mg09tr	06/11/2003	
Schneider E	/Abonné 2010/EN 60947-2 [France	Schnei.	2010	78	mg10h	06/11/2003	
Schneider D	Abonné 2011/EN 60947-2 [France	Schnei.	2011	70	mg11h_	18/10/2011	
Schneider E	/DC 2010/EN 60947-2 (E dE1	France	Schnei	2010	218	mg10d	09/06/2010	
Schneider E	/Marine 2009/EN 60947-2 (E	France	Schnei	2009	2473	mg09tr	30/03/2009	
Schneider E	ectric 2009/EN 60947-2 (EdEL.	France	Schnei	2009	3239	mg00tr	09/05/2011	
Schneider E	ectric 2010/EN 60947-2 (EdEL.	France	Schnei	2010	3239	mg10k	21/04/2006	
30 Schneider El	echic 2011/EN 60947-2 (EdEL	France	Schnei	2011	3039	mg11k	02/11/2011	
Siemens 195	8/EN 60947-2	France	Siemens	1998	106	cien/38	06/11/2003	
Siemens 200	1/EN 60947-2	France	Siemens	2001	618	sien01	06/11/2003	
Siemens 200	4/EN 60947-2 (EdElec)	France	Siemens	2004	791	umO4h1	03/04/2006	
Mail Summer 20	5.5N 50947.2 (EdElec)	France	Simmers	2005	291	+m(15h1	03/04/2006	

After you have chosen an equipment, the «Information» tab indicates the characteristics of the used file:

hoke Informations Sheet	Ĩ.		
	Catalogue 2	004-2005 + Electricien 2006	
	Manufacturer Manufacturer code	Main Gan Mid	
	flenane Inna	ing00in1.dag	
	County	Place DN 029072	
	View of Catalog Creation Date	2006	
	Last update	21/94/2006	
9		Seudation	X. Cancel

Circuit breaker choice in catalogue Catalogue 2004-2005 + Electricien 2006 Choice Informations Sheet **NS100N** Short-Circuits Protection **RCD** Protection Poles leu & len Technology Moulded Case 240V = 85kA Release Standard RCD lcu 100 A 10mA 1P1D Rated current 415V = 36kA 440V = 35kA 500V = 30kA 30mA 2P1D Onin Magn. setting 2P20 Release Magneto-thermal 300mA 190 A Ir Mag Min Adjustable 3P30 690V = 8kA 1000V = 0kA 4P30 Thermal Protection 190 A It Mag Max 0 mA It Min 4P4D 16 A Rating It Max 0 mA 4P3D+N 240V = 0kA Ice 4P4D1.6N 415V = 0kA Ir Th Min 12,8A 20 0 ms Delay Min 440V = 0kA Downgraded Rating 20°C = 0A 30°C = 16A Half release 0 ms Release T 500V = 0kA 690V = 0kA Delay Max 0 mt Acts on the Ir Delay Min 0 ms 40°C = 16A 50°C = 15,2A Mag 1000V = 0kA 0 ms Delay Max Icu IT 240V = 0kA 60°C = 14.5A Selectiv Pt On-O 415V = 9kA 70°C = 0A 440V = 0kA K Overating for DC Ô 500V = 0kA 5001 Sell inst On 0A Coord 0 Linstant Min 690V = 0kA 5001 0 Discrim Contactor Coord 0A Linstant, Max 1000V = 0kA 0 Discr Coord 5001 ST I setpoint UP Capacity 1P IT 24/N 415V 22 0 U.T. 0 0 Rel Curve ST D setpoint Inst Allowance 440V 2522 Û 0 Pt Curve LT I setpoint 500V No Price DC Allowance 660V LT D setpoint 0 2053 In Curve 1000 3 CI Simulation ٧ 0K Cancel

3.3 Differences between «Caneco 4» format and EDIELEC format

In this general purpose circuit-breaker example, the red surrounded information is:

- entered in the EDIELEC format
- non-existent in a Caneco 4 format. This means that this information is not taken into account for calculation.

3.3.1 Information about short-circuit protection

This concerns Min (20 ms) and Max (350 ms) delays on short-circuit protection. When you indicate the delay adjustment on a circuit-breaker of this model, Caneco BT checks if this adjustment is in possible limits (between 20 ms and 350 ms). Moreover, Caneco BT selects automatically the more appropriate adjustment value. This checking and this calculation cannot be made for the selected protections in a Caneco BT format file.

3.3.2 Information about RCD protection (Residual differential)

In the above example, you can see that the model has not a RCD release. In order to get a differential protection, it is mandatory to make cores and separated differential relay. If necessary, Caneco BT indicates this by means of an after calculation warning. With a Caneco BT format file, this process in not possible.

3.3.3 Information about tripped off/protected poles

In the above example, you can see that the model does not exist in 2P2D, i.e. in 2 tripped off poles presentation (2P), 2 protected poles (2D). P means «number of tripped off poles», D means Release, so «number of protected poles». Caneco BT does not allow to choose this circuit-breaker model in a 2P2D presentation. On the contrary, with a Caneco 4 format file, you can suppose that all presentation possibilities are possible. This can result in the impossibility of finding the wanted equipment in the manufacturer catalogue, while it was selected by Caneco BT.

3.4 Manufacturer file Information

The database of ultra-fast fuses is now available in Caneco BT. Version 5.4 incorporates ultra-fast fuse curves into Caneco BT circuit design.

Manufacturers files		X
Data base : C:\ProgramData\ALPI\Car	eco BT\5.4\EN\Base-FRA\	
End of Support: 31/12/2012		
Category	Catalogue	File
Circuit-breakers		
General Use	Schneider Electric 2011/EN 60947-2 (EdiElec)	mg11fr1.dug
Curves B/C/D	Schneider Electric 2011/EN 60947-2 (EdiElec)	mg11fr1.dmi
Motors	Schneider Electric 2011/EN 60947-2 (EdiElec)	mg11fr1.dmt
No thermal	Schneider Electric 2011/EN 60947-2 (EdiElec)	mg11fr1.dst
Prot. Dev. Association		
C/B+ thermal	Schneider Electric 2011/IEC 60947-4-1/2	Mgte2-11.dth
aM + thermal	Socomec 2007/EN 60-269	Socomec.amt
gG + thermal	Socomec 2005/EN 60-269	Socomec.g1t
Fuses		
gG	Standard gG 2008/EN 60-269	Alpigg08.fsb
aM	Socomec aM 2009/EN 60947-2	SocoaM09.fsa
aR	Ferraz aR 2010/EN 60947-2	fear10.far
gR	Ferraz gR 2010/EN 60947-2	fegr10.fgr
Cables		
Туре	Caneco.cbl	Caneco.cbl
Cross-sections of N and PE	Caneco.cab	Caneco.cab
Price + labour	alpi.prx	alpi.prx
Busbar Trunking Systems		
Busbar Trunking Systems	Schneider 2010	Sch10.kan
Cable trays		
Tablettes	CABLOFIL 2006	CABLOFIL.TBL
Switches		
Switches	Schneider Electric 2011/EN 60947-2	mg11fr1.itr
Standard Powers		
Standard Powers	Caneco.std	Caneco.std
Transformers		
Transformers	Transfo Huile 1995/NFC 52-112	UTE95.ZTR
Generating sets		
Generating sets	Alternateur 1995	UTE.ZGE
1	OK Cancel	

4 Caneco BT Interface

4.1 Caneco BT interface overview

Caneco BT user's interface looks like most programs functioning under Windows.

The action bar on top of the screen displays the eight **Caneco BT** CANECO BT. Actions contained in these menus make it possible to activate an action directly, or display a sub-menu or Dialog box.

The tool bar under this menu bar allows direct access to a command in one of the menus.

) 🨅 🛃 X 🐴 🥸	Appres Distribution Lincuits In 「見報」は、日日(ク・・)回 ・泉葉・)MSB ・	5015 Windows I 피탄수승(무.)귀귀 -4 요요.(+ + + + * O Net	【 🖆 年 . 🚹 夏 夏 夏 disconnectabl • 注 Ⅲ ↔	. ∰ ≦. ₽
roject Disti	1Dution (MSB /	Consumption 1 242 A	1000	Available : 003 A /3// A
Project folders × Project exemple2No	Mew caput As system MS8 - 50%		44. 111111111111	Results
Additional docum	2	3		Distribution : MSB Circuit co
8 Board single-line			3	Label Value
- 3 Modification inde	Q	10	200 200 3	dU total 0.32 %
- Project	1	48	1 1 1	\$3 Max 26837 A
A MSB	8		2 ×	BilMax 25481 A
DB_1			Floor	If Max 25481 A
2 m 06_2	E	8		Br2 Min 10475 A Br1 Min 11440 A
			330	If Mn 11440 A
No.	1月2日2日2日2日2日2日	1111日2日2日2日2日2日2日	计目标目的目 一	Source secours
	38387878787878			Ik3 Max 2108 A
	4 4	*	• \	3k2 Max 1825 A
				Ik1 Max 2841 A
_			°°°4	C m +
E		All second in the last in terms and an even at second at		
2	discrimination table conditions • C_21 Normal-Standby T_20 • D8_2	Circuit conforme Warning, 1 available negative ! [Ci	100	6

1: The project tree (old network graph, with additional information specific to the project)

- 2: The button for creating one or more circuits on the active switchboard
- 3: The buttons activating the 3 circuit data entry tools
- 4: Central screen for entering information.

This screen is different depending on the chapter selected in the project tree.

If the active chapter is one of the switchboards, the screen lets you enter the circuits with the help of the 3 data entry tools: network single-line, switchboard single-line, or table

5: Details of the active circuit

- 6: Results for the active circuit
- 7: Calculation report

4.2 Menus

4.2.1 Menus bar

Whatever is the used entry tool, the software has always, at top screen zone, the same tool bar.

Eile Edit Display Supplies Distributions Circuits Tools Windows ?

It shows the nine Caneco BT menus. Each menu contains commands described in this manual.

To display a menu, click on its title in the action bar. The different options will appear.

The menus are:

File

Available commands concern create, edit, save and print a project. The commands which are accessible relate to the creation, recovery, recording and printing of a project.

Edition

Circuit editing commands: Cut, Copy, Paste, Delete

Display

Display the different parts of the screen

Sources

To reach Sources windows (Normal and Standby)

Distribution

Searching of boards or LV/LV transformer feeding circuits

Circuits Commands on circuits

Johnmanus on circu

Tools

Circuits calculation parameters or default values

Windows standard menu to display project windows

Windows

Help

Help options

4.2.2 Local menus

Pop-up menus speed up certain operations. These are specific menus, adapted to the dialog box (window) in which you are.

These menus are activated by clicking the mouse right button.

Example of a local menu activated in the circuit calculation window:

KO.	Cancel	Alt+BkSp
Ж	Cut	Ctrl+X
	Сору	Ctrl+C
Ê.	Paste	Ctrl+V
×	Delete	Del
	Edit	
	New circuit	
vж	Automatic Calculation	. F8
į	Data entry options	
=	Symbol properties	
~	Toolsbar for network dia	agram
	Lock	
	Unlock	
	Previous Zoom	

4.3 Buttons

Under the menu bar you find the tool bar. Each button of this tool bar gives direct access to actions also existing in menus.



9: Full calculation (F8)

These buttons may be customised in two different ways: clicking on menu bar, you get access to the following pop-up menu allowing you to add or delete button groups:



by clicking on down arrow situated at right from each button group, you get access to a menu allowing you to modify this group:



4.4 Power requirement

If the Power requirement / Phase balancing function is present (Expert version), the automatic calculation will be preceded by a display of the power requirement window.

The user can then, if required, enforce the power value entered for one or more boards by ticking the «=IB» box and continue the calculation after validation of the window.

Caneco BT will display a list of the non-balanced distributions (if deviation >= 10%) before performing the calculation.



For the new way of operating, 3 options have been added:

• One option "Including sub-busbars" in the 'Adjust currents' box

If this option is checked (2), the current adjustment for sub-busbars is handled in the same way as for distributions at present.

• Two option defining the method for calculating the power requirement for distributions and sub-busbars:

• Calculation of the power requirement: using the average value of the I phases (3).

The calculation is performed as at present on the average currents, without taking phase imbalance into account.

• Calculation of the power requirement: using the I of the most heavily loaded phase (3).

The calculation is performed using the currents from the most heavily loaded phases, taking phase imbalance into account.

In terms of the power requirement, the adjustment is automatically performed using the average currents as in the earlier versions.

The adjustment for the I on the distributions' most heavily loaded phases is carried out in the phase balancing, after the power requirement has been validated.

The sub-busbar power requirement is automatically produced during phase balancing after the power requirement has been validated, regardless of the calculation option selected under the power requirement. The move on to phase balancing is user-transparent.

As in the earlier versions, if no adjustment is requested and the power requirement is validated, the consumptions of the distribution circuits and sub-busbars that are at 0 are replaced by the consumptions calculated using the 'Calculation' option under power requirement.

• Note 1:

The desired availability value and the option "Including sub-busbars" are specific to each distribution and its sub-busbars if the "For the selected distribution" option is enabled and 'Adjust' is clicked.

• Note 2:

As at present, the desired availability is taken into account for the per-phase power requirement, but not for carrying out the actual balancing itself.

4.5 The search function

The search function offers various options to search for the distribution(s) in a project.



4.5.1 Searching for a circuit by its reference mark:

Simply enter the mark, or part of the mark preceded by a *, in the Search field

S	earch in	Project					Advanced search] ×
	In:	Circuits	Search :	C	🔁 ок 🖨			
			Search fiel	lds : Ref Mark Intiate CAP/small ete words	T			
		Add new elements to selection	8					
	Ref Mark	Add new elements to selection	Upstream	State Normal/Standby Mode	Downstream Distribution	Downstream	Modification index	
1	Ref Mark	Add new elements to selection Upstream Distribution MSB	Upstream	State Normal/Standby Mode Circuit CNormal	Downstream Distribution DB_1	Downstream	Modification index	1
1	Ref Mark C_1 C_3	Add new elements to selection Upstream Distribution MSB MSB	Upstream	State Normal/Standby Mode Circuit C Normal Circuit C Normal	Downstream Distribution DB_1 DB_3	Downstream	Modification index	2
1 2 3	Ref Mark C_1 C_3 C_2	Add new elements to selection Upstream Distribution MSB MSB	Upstream	State Normal/Standby Mode Circuit C Normal Circuit C Normal Circuit C Normal	Downstream Distribution DB_1 DB_3 DB2	Downstream	Modification index	2
1 2 3 4	Ref Mark C_1 C_3 C_2 C_9	Add new elements to selection Upstream Distribution MSB MSB MSB	Upstream	State Normal/Standby Mode Circuit (Normal Circuit (Normal Circuit (Normal Circuit (Normal	Downstream Distribution DB_1 DB_3 DB2	Downstream	Modification index	-
1 2 3 4 5	Ref Mark C_1 C_3 C_2 C_9 C_11	Add new elements to selection Upstream Distribution MSB MSB MSB MSB DB_1	Upstream	State Normal/Standby Mode Circuit (Normal Circuit CNormal Circuit CNormal Circuit CNormal Circuit CNormal	Downstream Distribution DB_1 DB_3 DB2	Downstream	Modification index	
1 2 3 4 5 6	Ref Mark C_1 C_3 C_2 C_9 C_11 C_12	Add new elements to selection Upstream Distribution MSB MSB MSB DB_1 DB_1 DB_1	Upstream	State Normal/Standby Mode Circuit CNormal Circuit CNormal Circuit CNormal Circuit CNormal Circuit CNormal Circuit CNormal	Downstream Distribution DB_1 DB_3 DB2	Downstream	Modification index	

The OK button starts the search and the circuits matching the search criterion will be displayed in a list.

A	right click on	a circuit in the l	ist displavs a	pop-up menu of	ffering various of	commands.

Se	Search in Project Advanced search ×							×	
	ln :	Circuits	▼ Search	: C		🔁 ок 🏼 🖨			
			Search	fields :	Ref Mark	-			
			🗌 Dif	erentiate (CAP/small				
	_		Co	mplete wor	ds				
		Add new elements to :	selection						
	Ref Mark	Upstream Distrib	ution Upstrea	m Stat	e Normal/Standby Mode	Downstream Distribution	Downstream	Modification index	^
1	C_1	MSB		Circui	t C Normal	DB_1			
2	C_3	MSB	Edit		CNormal	DB_3			
3	C_2	MSB	Reach		CNormal	DB2			
4	C_9	MSB	Remove from sel	ection	CNormal				
5	C_11	DB_1	Clear selection		CNormal				
6	C_12	DB_1	Print selection		CNormal				
7	C_4	DB_1			CNormal				
8	C_5	DB_1	Move up		CNormal				
9	C_6	DB_1	Move down		CNormal				
10	C_7	DB_1		Circu	t CNormal				

The «Edit» command activates the circuit sheet

The «Reach» command returns to the entry editor, selects the circuit and opens its sheet.

4.5.2 Searching for circuits on the basis of their status

Select the «Status» option in «Search Field»

Search in Project						Advanced search
In : Circ	uits 🔻	Search :	rcuit to recalculate	🔽 🔁 ОК 🛛 🛲		
		Search fields :	State CAP/cmail	•		
📃 Add new e	elements to selection	Complete wo	rds			
Ref Mark Upst	ream Distribution	Upstream Stat	e Normal/Standby Mode	Downstream Distribution	Downstream	Modification index

Select the status of circuits in «Search Field»

S	earch in	Project							Advanced search	×
	In :	Circuits	Search : Search field Differen	Circ Circ Circ Cab tial Prot	at OK at OK at to recalculate es not correct ection not Correct at not correct	T	P ok 🕾	,		
		Add new elements to selection								
1	Ref Mark	Upstream Distribution	Upstream	State	Normal/Standby Mode	Dowr	nstream Distribution	Downstream	Modification index	^
1	C_1	MSB		Circuit (Normal	DB_1				
~	~ ~	unn		~ ~ ~	da e					

4.5.3 Searching for circuits on the basis of a condition

Example: search for all circuits of which the length is < 100m

Se	earch in	Project						Adva	nced search	×
	In :	Circuits 💌	Search :	<100	I	🔁 ок 🖨				
			Search fie	lds :	Length	-				
			Differe	intiate CAI	P/small					
	_		Compl	ete words						
		Add new elements to selection								
_	Ref Mark	Upstream Distribution	Upstream	State	Normal/Standby Mode	Downstream Distribution	Downstr	Modification	Designation	Lei ^
1	C_1	MSB		Circuit C	Normal	DB_1				
2	C_3	MSB		Circuit C	Normal	DB_3				
3	C_2	MSB		Circuit C	Normal	DB2				
4	C_9	MSB		Circuit C	Normal					
5	C_11	DB_1		Circuit C	Normal					=
6	C_12	DB_1		Circuit C	Normal					
7	C_4	DB_1		Circuit C	Normal					
8	C_5	DB_1		Circuit C	Normal					
9	C_6	DB_1		Circuit C	Normal					
10	C 7	DB 1		Circuit C	Normal					

4.6 Organising the list of styles

The style list (2) contents can be defined using the style filter (1)



Several options are available

New	circuit	All styles	-	400K	VA	-
] MSB	~	All styles Basic styles Modifiable styles Project styles Favourite styles			ø)
		Favourites managem	ient			

The «Favourite styles» list contains styles selected using the «Manage favourites» command

Organize circuits styles		×
From Caneco.STY		To CAN1C4D(Document1).ST
Switchboard + terminals + earth bar Switchboard with inverter supply	Сору	Switchboard + terminals + earth bar Switchboard with inverter supply
Splitter grid	Delete	Splitter grid
Internal LV / LV transformer Bell transformer with sounder	Rename	Internal LV / LV transformer Bell transformer with sounder
Display	Display	
Caneco.sty 💌		CAN1C4D(Document1).STY -
Close		Close
Description Board Content: 3P+N+PE; Supply: N and S; UL: Type: MCCB; UC: Basis Prot, Rating: 15; H L: 0 m; dU Max: 5 %; Type: U1000R2V; C K: 1; Cross-section: 2.5 mm ² ;	50V; Des: Board; < on C: 1; ore: Copper; Pole;	Multi/Single; Instal.: 13; KT: 1; KN: 0.72;
		Close

4.7 Circuit entry tools

These buttons are enabled by 3 buttons allowing to choose the circuit entry tools. This is a difference compared with the central zone of the Caneco BT screen:

4.7.1 Entry spreadsheet: circuits from the active board



4.7.2 Board single-line: Circuits from the active board



P. D	Istribution (NS8 / Anima Status	California (201,0) A(0,0)
ch example3No		
Symboli library		Tends
Additional docum		Circuit: C_1 Circuit Ok
load single kee	우들우	Cable 5525
fudication inde		. Rective
hied		Oterus (N)
Million College		Max length: \$60 m (\$C)
A 10 2	2 III 2	E 100,0 A
1.90 10 1		12 113,5 A
		ED Neutral 100,0 A
		LT Neutrin 113,5 A
		dU Circuit 0,64 %
		8203Mev 12978 A
		&1 May 7780 A
		Bit Min 4901 A
		# 4901 A
	The second secon	a Larth Dwnthr 2N.84A/13.0
	김가 묘장 태수 (미가 미가 미가 미강 미수 미가 미가 미가 미가 미수 미수 미수	Discrimination: Tatal
		Association With (50 IA)
		4. Track Ow
	<u>1</u>	
		c
L		
1	C:\Documents and Setting:\dim\Darean\at eng\example3inc_Normal Standby_DB.AFR Danak dame or: 00/20200711:18:10	

4.7.3 General Single-line Diagram: all project circuits

4.8 Maintenance toolbar

The «Maintenance» tool bar offers the following functions» Conversion of the symbol library for the project (5) Export of the symbol library for the project (6) Archiving a project (1) Verifying the integrity of a project (2) Busbar check (4) Redraw the single-line diagram (8) Verify the index list (links between circuits and distributions) (3) Compare the calculation results with those obtained in version V 5.3 (7)



4.9 Diagram toolbar

La barre d'outils « Schématique » permet de:

- The «Diagrams» toolbar allows you to:
- Draw the ground bar on single-line diagram for the board (1)
- Put terminals on the power circuits, the PE and the associated circuits (2)
- Specify the terminal technology (switchable or not) (3)
- Display text associated with symbols (4)
- Comply with the EN 60082 marking standard (5)
- Display the single-line diagram for the board in simplified or «print preview» mode (6)
- Allocate the same generic symbol to all the equipment (7)



4.10 A project with Caneco BT

In **Caneco BT**, a project is done from Upstream (source supply) to Downstream (end-user circuits). This method is used to determine the protective devices and cable cross-sections. You must first define the Source and the general characteristics of the project, then the distribution circuits (Board style circuits) and finish by end-user's circuits.

This suppose that distribution circuit currents has been set.

Otherwise, you can do a power checking with **Caneco BT**, this will determine the current for the distribution circuits depending on the circuits they supply and on possible capacitors.

In **Caneco BT**, at any time you can change the main circuits, then determine the protective devices and the size of the cables for the end circuits accordingly. The automatic calculation command from Circuits menu allows you to redefine automatically the protection devices and the cable cross-section size accordingly to upstream.



A circuit is fed by a distribution (Board, Transformer LV/LV)

4.11 Entry and analysis of distributions using a graph

The distribution tree structure can be created using the «Graph» tool by selecting «Design» in the Network graph.



A pop-up menu contains the following commands:

Print distributions

Analyse status of distributions (balance, power requirement, etc.)



5 Source creation

5.1 Source types

There are three possible choices:

- Transformer HV-LV
- Alternators (genset) supplying a LV source,
- LV supplies (supervised power connection, yellow rate).

5.2 Definition of a Source in Caneco BT

A project done with **Caneco BT** can have a maximum of *two source types*, a Normal Source and a Standby Source, each being made up of one to 6 sources identical in parallel.

5.3 Presentation

The New option of File menu displays on the screen the Sources Edition Dialog box which concerns Normal sources.

Supply		×
SOURCE Board supplied : MSB		۹
Supply Impedances Downstream boar Supply SOURCE]	
Power : 400 kVA ▼ Supplies Nb : 1 min ♣ 2 max ♣	Type :	Transfo V Ukr (transfo) : 4,0 % File V UTE95.ZTR V
Network Standard : Earthing syst. : LV Voltage : 400 V ▼ / 420 V	Frequency : Conductors : HV Prot Funct T.:	50 Hz ▼ 3P+PEN ▼ SkQ Min : 500 MVA 500 ms SkQ Max : 500 MVA Cable
Instal. 13 Perforated tra	Core:	Copper
Loerricients Temperature : 1,00 •• Group : 1,00 ••	Phase : PEN	1 240 mm² 1 240 mm² Loaded Neutral
a Calo	ulate	OK Cancel Help

5.4 Source Section

5.4.1 Source ref mark

The default proposed ref mark is SOURCE. It can be modified.

5.4.2 Source power

Standardized power if source characteristics are given from a file (click on the combo box arrow to get the list of standard powers). Power can be «not normalized» if you choose source characteristics from <u>Ukr</u> (see above).

5.4.3 Number of sources in parallel

Caneco BT proposes 1 by default, however several supplies may be installed in parallel but operate only in the event of failure of the primary supply

5.4.4 Max. active supplies in parallel

In **Caneco BT**, elementary sources are considered as identical. This data is used to determine Ikmax, which makes it possible to propose downstream protective device in case of coupling between several transformers

5.4.5 Min. active supplies in parallel

Ik mini are calculated taking into account the minimum number of sources in parallel.

Caneco BT proposes 1 by default which means that it is possible to have only one source in certain conditions for the installation.

Usually it is advisable to take the maximum number of sources in parallel minus one

5.4.6 Source type

Five possible choices:

- Transformer HV-LV
- Genset
- Board Source by lk
- Board Source by R and X
- Power-monitored supply
- Battery set source (DC)

5.4.7 Source characteristics

They can be obtained:

- From a file: giving sources impedances and standard powers.
- From Ukr, short circuit voltage in % for transformers steady state and transient reactances, given in % to define generating sets.

Genset or transformer power can in this case be a not standardized power.

5.4.8 File

This is the name of the standard source characteristics file. These files can be completed by means of new files or from source values: choose *"Database"* from *"Options"* menu. This function is used to handle equipment database. The field is automatically filled and cannot be changed if you choose to define source characteristics from a file.

Caneco BT version 5.4 displays supply filenames in plain text

5.4.9 Ukr

This field can be filled only if you have chosen to define source characteristics from Ukr.

Transfo ▼ Transfo Genset Board with Ik Board by R &X Supply 2 (medium) D.C. current

5.5 Network section

5.5.1 Standard

This field specifies recommended default electrical installation standard.

Only users having multi-standard version can get access to this field. They have the following choices C1510002 (2002), VDE 2010, CEI64-8, HD384, IEC364-09, BS7671-08, RGIE-AREI08, NIBT-NIN10, NP, NEN1010-96, NBR5410-04, AS3008,

5.5.2 Earthing system

Source earthing system: TN, TT, IT with or without Neutral.

It is possible within one project to change earthing system downstream LV-LV transformer. Apart from this specific case no other change is possible.

Distinction between TNC and TNS is done by selecting the conductors used in source or in a circuit (see section circuit. TNC is selected by a 3P + PEN link, TNS by a 3P+N+PE link).

5.5.3 Installation LV operation voltage

This is the source operating voltage between phases, on load (default 400V).

5.5.4 No load voltage

This value cannot be entered but can be calculated from standard operating voltage. Par convention, it is equal to 1,05 times the design voltage and can not be modified. This is the no-load voltage as reference used to calculate all maximum short-circuit currents.

It must not be confused with transformers dimensioning no-load voltage (410V for transformers 400V).



In IEC or CENELEC standard, this voltage equals C x operating voltage, C is specified by IEC 909 standard

5.5.5 Frequency

Frequency of the installation (50 Hz).

For 60 Hz, Caneco BT increases reactances for cables and equipments by a factor of 1,2.

5.5.6 Polarity

Type of Network: Three-phase or Single-phase

5.5.7 T Func. Prot HV

HV Protection functioning Time (ms).

5.5.8 Harmonics

According to standard, calculation does not take harmonics into account. It is user's responsibility to entry manually the factors to be taken into account, or to impose appropriate values for protection devices and cables, This calculation is possible only with french standard NFC15-100-02 (2002) for which calculation rules have been defined.

- Harmonics Rate <= 15% (Neutral cross-section reduction possible)
- 15% < Harmonics Rate <= 33% (No Neutral cross-section reduction)
- Harmonics Rate > 33% (Increase of Phase and Neutral cross-section)

5.5.9 Short-circuit HV power

Updated short-circuit power values are proposed by default in Caneco BT version 5.4

Maximum power: SkQ Max

The default value of 433 MVA (the short-circuit power for the 20 kV grid) can be modified. Choose lower values in order to allow for e.g. high-impedance overhead LV lines. This parameter has only a small

effect on the lk calculations.

Minimum power: SkQ Min

Enter a value different from the maximum value where your supply is a transformer supplied at HV and if the HV supply is backed up by alternators. In this case, enter the short-circuit power of these alternators.

Minimum and maximum values can be calculated through calculation and HV installation diagram software, Caneco HT. These two values are sufficient to assure calculation continuity between HV part and LV networks calculated with Caneco BT.

5.6 Link section

Mean length between sources and MSB 5.6.1

Enter mean length between sources terminals and MSB.

5.6.2 Installation method

When the wiring system is made of cables, cable installation method must be entered. Caneco BT proposes installation method "on perforated cable trays" as default with Standard.

5.6.3 Link type

Cables or bar sheath

5.6.4 Link nature

When the wiring system is made of cables, link nature can be copper or aluminium.

5.6.5 Cable type

Choose the desired cable type.

5.6.6 Calculation

To Calculate source according to entered values



-F

It is possible to calculate directly the source by a right click on the mouse.

5.7 Results forcing

actors		Conductors
Temperature :	1.00 •••	Phase : 1 🚔 1.5 mm² 🔻
Group :	1.00 •••	Loaded Neutral :
Apply Fs :	Fs = 1.0	PEN: 1 - 1.5 mm ² K loaded neut .1 00
Additional :	1.00	K loaded neut. 1.00

Case of transformer-MSB cable links.

To fix a value tick corresponding box and enter required value.

5.7.1 **Temperature factor K temp**

Temperature factor limiting cable current carrying capacity. This default coefficient equals 1.0, which corresponds to a normal ambient temperature (30°C, non confined atmosphere with aerial installation method, 20 °C underground).

5.7.2 Group factor K prox

The corresponding value is calculated considering the cables on cable trays, issued from one single transformer with touching installation. Links with other transformers are assumed separated by a distance such as their thermal influence can be neglected (characterised by the group factor).

For installation methods other than on cable trays, you must modify eventually this group factor as proposed by **Caneco BT**. To do so, use button which displays installation methods tables according to standard used.

Symmetrical factor fs 5.7.3

Symmetrical factor fs (0,8) in the case of various cables in parallel.

5.7.4 Additional factor

Enter the additional permitted current derating factor in accordance with external influences. This factor is not laid down by standards, it is defined by the user.

5.7.5 Conductors

Number of conductors

- Calculated value taking into account a maximum cross-section of 300 mm², up to 3 cables.
- If current requires a cross-section bigger than 3X300 mm² per phase, the programme proposes different possible choices.

Forced value can go up to 10 conductors per phase.

Phases cross-section:

Maximum calculated value: 300 mm². (Commonly found size). Maximum forced value: 800 mm.

Neutral/PEN characteristic (Single-phase):

Calculated values taking into account Neutral reduction parameters, defined in dialog box opened by the option section of options menu.

Loaded neutral

When Neutral is loaded, a downgrading factor of 0.84 must be applied to current carrying capacities.

K loaded neut.:

Corresponds to the loaded neutral factor, 0.84 or 1 depending on the harmonic level

5.8 Board Source by lk

The LV supply by Ik applies in the following cases:

'Two-part tariff' supply: in this case, enter the Ikmax value at the delivery point.

5.8.1 Installation extension:

Copy all the short-circuit values at the existing switchboard.

Multiple-supply configuration:

The supplies are different and are not coupled: the design study will then be performed in several design calculations. The design calculations will be linked together by copying the lk values at the intermediate switchboard

Coupling of supplies of the same type but with different powers: this sort of configuration can be modelled by a "Board supply by Ik", adding together the Ik values from each supply.

Supply	
SUPPLY Board supplied : MSB	٥
Supply Additional Downstr board	
Supply SUPPLY	
	Type : Board with Ik
Network	
Standard : C15100 2002 💌 ···	Frequency : 50 Hz Harmonics : HR <= 15%
Earthing TN -	Conductors : 3P+PEN 🔻 dU origin : 0.00 %
LV Voltage : 400 V 🔻 / 420 V	1
Currents	Not standardised
Available 909 A	Init. Ik
current:	Ik3 Max au tableau : 20996 A
	Ik1 Max on Board : 19477 A
	Ik2 Min on Board : 15163 A
	Ik1 Min on Board : 15240 A
	If on Board : 1540 A
2 Calc	ulate OK Cancel Help

5.8.2 dU origin

Voltage drop at beginning of the installation, in %. Theoretically, 0% warranted by the provider. For the *'two-part rate'*.

5.8.3 I available

The current contracted before the electricity provider.

5.8.4 Ik on board

Max. and Min. short-circuit currents at the MSB making it possible to accurately recalculate the impedances at the switchboard.
5.9 Board source by R and X

The supply by LV Switchboard applies in the following cases:

- Installation extension:
- Multiple-supply configuration:

The design study will then be performed in several design calculations. The design calculations will be linked together by copying the impedances that will be injected at the Switchboard supply by R and X.

Supply	×
SUPPLY Board supplied : MSB	٩
Supply Additional Downstr board	
Supply SUPPLY	
	Type : Board by R & X
Network Standard: C15100 2002 ▼ ···· Earthing system: TN ▼ LV Voltage: 400 V ▼ /	Frequency : 50 Hz ▼ Harmonics : HR <= 15% ▼ Conductors : 3P+PEN ▼ dU origin : 0.00 % ↓
Lurrents	Not standardised
Available 455 A	Ik3 Max at board: 6000 A Ik1 Max on Board : 4800 A Ik2 Min on Board : 0 A Ik1 Min on Board : 0 A If Max on board : 0 A If on Board : 0 A

5.9.1 dU origin

Voltage drop at beginning of the installation, in %..



Choose values different from 0 only when low voltage supply has a noticeable voltage drop, for example:

- design study for an installation from a subsidiary switchboard remote from the supply source.
- design study for an installation from an LV/LV transformer
- installation including a Standby generator located a long way from the MSB

5.9.2 I available

Available current for distribution.

5.9.3 Ik Max on board

Max. short-circuit current at switchboard. Calculated from the impedances entered under the 'Additional' tab



If the existing installation was designed in a version of Caneco BT, the "Board supply by R and X" configuration can be achieved by copying the impedances for the distribution from which the extension begins under the 'Impedances' tab of the LV switchboard supply. This makes it possible to calculate the voltage drop and short-circuits more accurately

Supply	
Board supplied : MSB	•
Supply Additional Downstr board	
Misc	Options for connection sizing
	Ratio IB connection 100 % (454.7 A)
	Overload criterion
	Short-circuit criterion
Input from motors: 1.00	
Upstream Board Impedances	
R0 Phase-Phase	R0 Phase-PEN
R1 Phase-Phase	R1 Phase-PEN
X Max Phase-Phase	X Max Phase-PEN
X Min Phase	X Min Phase-PEN
	R0 Phase-PE
	R1 Phase-PE
	X Max Phase-PE
	X Min Phase-PE

5.10 Power-monitored supply

Caneco BT 5.4 lets you configure a Power-Monitored supply as per the standard.

Supplu		E			1	
Power : Supplies Nb :	1000 kVA 👻	Type : Caract. from :	Supply 2 (medium) 💌	Ukr (transfo) ;	6,0 Use corr the volt	this to pensate fo calculated age drop
Network Standard : Earthing syst. : LV Voltage :		Frequency : Conductors :	50 Hz 💌	Harmonics : Harmon	0.00 % ÷	
Link Length :	15 m	Type: Core:	Singlecore 💌			
			Conductors Phase V 1 V Neutrat V 1 V	240 mm² 💌 240 mm² 💌		

If the length of the connection leads to a voltage drop greater than 0 %, it is possible to decrement the 'DU origin' field (1) to bring the calculated value back to 0 %.

A template 'Tarif jaune.mdl' for a "Power-Monitored Supply" project can be found in:

C:\Documents and Settings\All Users\Application Data\ALPI\Caneco\5.4\FR\ ENG\Template

5.11 Battery set source (direct current)

Board s	PLY upplied : MS8			۲
Supply Addition	al Downstr board		1	
Supply	SUPPLY	-		
	Ty	pe D.C. current	-	
Network		Voltages	1	
Standard :	C15100 DC 2002 📝	Of discharge : 400 V 💌	Discharge current	909 A
Earthing system :	TN 🔻	End of discharge : 380 V	lk Max :	20996 A
Conductors :	2P 💌	Mid-point	lk Min :	15240 A

- Supply type (1)
- DC calculation standard (2)
- Supply characteristics (3)

For further details concerning direct current calculations, please refer to the document entitled "NT_2009_Direct Current Module PDF", which can be found in:

C:\Program Files\Alpi\Caneco\5.4\ENG\Documents. Or, consult ALPI technical Support.

5.12 Creating a new project from an existing project

This technique is a new feature in version 5.4, it makes it possible to handle a complex project (multiple supplies) in the form of several .afr files.



Existing project



Creating a new project from circuit TD001

Originating switchboar	rd for normal supply:	
MSB		-
MSB		to form
TD_002		
0rig TD_003		
TD_005		
■ Merge data an N/B sw	a for incoming N supply v itchboard in the new pro	with those for B supply to form sject
Type of supply for nev	w project:	
	-	

Select the switchboard from which you want to continue your installation

To take the switchboard's N&S characteristics into account, check "Merge data for incoming N supply with those for S supply to form an N/S switchboard in the new project"

Creating a project
Creation of a project from a point
Originating switchboard for normal supply:
TD_001
Merge data for incoming N supply with those for B supply to form an N/B switchboard in the new project
Originating switchboard for backup supply:
(None)
Merge data for incoming N supply with those for B supply to form an N/B switchboard in the new project
Type of supply for new project:
Board by Ik
Create project Cancel Help

Result of creating the project



You can still create a 2nd supply from the 'Supply' menu: "Standby Supply" "New project from"

Creating a project	x
Creation of a project from a point	
Originating switchboard for normal supply:	
TD_001	
Merge data for incoming N supply with those for B supply to form an N/B switchboard in the new project	
Originating switchboard for backup supply:	
TD_002	
Merge data for incoming N supply with those for B supply to form an N/B switchboard in the new project	
Type of supply for new project:	
Board by Ik.	
Create project Cancel Help	

5.13 Additional tabs

5.13.1 Miscellaneous

Spo: Cross-section of the P0 conductor connecting the HV/LV transformer to the MSB.

Ra: Earth resistance value at the supply. Ra is only displayed if the earthing system is TT.

Supply		X
Board supplied : MSB		۲
Supply Additional Downstr board		
Misc	Options for ca	nnection sizing
SPo: 1 📮 35 mm² 🔻 Copper 💌	Ratio IB con	nection 100 % (454.7 A)
	Overload crite	arion 🗹
	Voltage drop (criterion 🗹
Input from motors: 1.00	Short-circuit c	riterion
Upstream Board Impedances		
Fixed impedances		
R0 Phase-Phase 0.0159 Ω	R0 Phase-PEN	0.0093 Ω
R1 Phase-Phase 0.0169 Ω	R1 Phase-PEN	0.0102 Ω
X Max Phase-Phase 0.0471 Ω	X Max Phase-PEN	0.0258 Ω
X Min Phase 0.0226 Ω	× Min Phase-PEN	0.0238 Ω
	R0 Phase-PE	0.0070 Ω
	R1 Phase-PE	0.0070 Ω
	X Max Phase-PE	0.0242 Ω
	X Min Phase-PE	0.0222 Ω
HT supplies in parallel		
Calculate	ОК	Cancel Help

5.13.2 Options for connection sizing

IB/In ratio:

Makes it possible to define the power actually provided by the supply (value expressed in % of the nominal power). This item of information will make it possible to calculate the cross-section for the connection and the thermal trip setting in the MSB.

5.13.3 "Overloads" check option:

If unchecked, the overload criterion will not be checked

5.13.4 "Short-circuit" check option:

If unchecked, the short-circuit criterion will not be checked

These two options are useful in those cases where the supply–MSB connection is imposed and does not have to be verified by Caneco BT.

5.13.5 HV supplies in parallel

Check option (1) if the HV circuit is common in parallel with the HV/LV transformer. In this case, the Ik values calculated will be higher.

5.13.6 Upstream Board Impedances

This relates to the loop impedances upstream of the MSB and relating to a single transformer. Hence these values are the sum of the upstream HV loop impedances (transposed to the secondary), the transformer's loop impedances, and the loop impedances of the transformer–MSB connection.



In the event that you have to override these values, make sure you enter <u>loop</u> impedances (and not line impedances)

R0 Phase-Phase

Resistance of the Phase-Phase loop (equals twice the resistance of one phase), calculated at ambient temperature. This value is used for determining maximum 3-phase short-circuit currents (lk Max Tri).

R1 Phase-Phase

Resistance of the Phase-Phase loop (equals twice the resistance of one phase), calculated at operating temperature. This value is used for determining minimum short-circuit currents (lk Min).

X Phase-Phase

Reactance of the Phase-Phase loop (equals twice the reactance of one phase in the case of a cable connection). This value is used for determining maximum 3-phase short-circuit currents (Ik Max Tri).

Max. X Ph-Phase

Maximum reactance of Phase-Phase loop. This value is used for determining minimum 2- or 3-phase short-circuit currents. In the case of a cable connection, it is equal to X Ph-Phase.

5.14 Downstream board

Clicking on the 'Downstr board' tab opens the following window:

Supply	x
SUPPLY Board supplied : MSB	
Supply Additional Downstr board	
Board UPS Ik/dU Currents Schematic Options Specifications	
Board Data	-
Ref mark : MSB Designation :	
Diversity 1.00 Geographic	
Content : 3P+PEN 💌	
Network	-
Earthing TN Voltage 230/400 V No load voltage 420 V	
system : voldge to the standard	
Upstream supply Normal	
Upstream circuit ref	
mark :	
protection : Basis Prot	
Calculate OK Cancel Help	

For a description of all these fields, see the 'Board window' paragraph in the 'Distributions' section

5.14.1 Protection

Supply	Additional	Downs	tr board						
Board	Protection	UPS	lk/dU	Currents	Schematic	Options	Specifications		
Nor	mal					_			
File :	Schneid	er Electi	ic 2010/E	N 60947-2	(Ec 🔻 😶				
Protect	tion :								
□ ^{NS>}	K630F Microle	ogic 2.3	630A 3P	зт [·	•• • •				
Ratin	g:		6	30 A					
IrTh :					455 A				
Relea	ase :			Ele	ctronic 💌				
IrMg					4550 A				
Delaj	yed		Delay :	2	0 ms				
			l Insta	ntaneou	6930				



For a description of all these fields, see the '*Board window*' paragraph in the '*Distributions*' section

5.14.2 lk/dU

oard Protection UPS	Ik/dU Currents	Schematic	Options	Specifications	
Normal			Stan	dby	
lk			lk		
🖂 lk3 Max		10635 A	🖯 lk3	Max	1321 A
lp		21271 A		lp	1981 A
K Asym		2.00		K Asym	1.50
🖽 lk2 Max		9211 A	⊞ lk2	Max	1144 A
🖂 lk1 Max		9977 A	🖂 lk1	Max	1788 A
lp		16960 A		lp	2681 A
K Asym		1.70		K Asym	1.50
🖂 If Max		9977 A	🖂 lf M	tax	1788 A
lp		16960 A		lp	2681 A
K Asym		1.70		K Asym	1.50
lk2 Min		7968 A	lk2	Min	1035 A
lk1 Min		8314 A	lk1	Min	1617 A
If Min		8314 A	If M	fin	1617 A
Voltage drop			Vo	ltage drop	
dU		0.34 %	dU		0.32 %



For a description of all these fields, see the 'Board window' paragraph in the 'Distributions' section

5.14.3 Currents

Board	Protection	UPS	lk/dU	Currents	Schematic	Options	Specification	s		
Pow	er requiren	nent No	ormal Su	ipply		Powe	r requiremer	it Standby]	
l allo	owed :			454.68 A		l allo	wed :		909.35 A	
LAv	ailable :			455.00 A		l Ava	ailable :		909.00 A	
S. C	urrents :			0.00 A		S. Ci	urrents :		0.00 A	
Меа	ın Cos Phi :			0.00		Mea	n Cos Phi :		0.00	
R=.	<u>Σ IZ cables</u> irth board			0.00		R=_ <u>1</u> i	<u>E IZ cables</u> : rth board		0.00	

For a description of all these fields, see the 'Board window' paragraph in the 'Distributions' section

5.14.4 Schematic

Supply
Board supplied : MSB
Supply Additional Downstr board
Board Protection UPS Ik/dU Currents Schematic Options Specifications
Drawing N*
Drawing N° for the actual
Terminal blocks / earth bar
Terminals on power circuits Draw the earth bar on single-line diagram V Terminals on no calculated circuits (associated) Max cables cross-section on terminals 35 V
Terminals on PE Type of default terminal Not disconnectable 💌
Calculate OK Cancel Help

For a description of all these fields, see paragraph in 'Schematic' section

5.14.5 Options

iupply
SUPPLY Board supplied : MSB
Supply Additional Downstr board
Board Protection UPS Ik/dU Currents Schematic Options Specifications
Board equipment calculation options
Ambient temperature of Circuit-breakers
General purpose Circuit-breaker : 40 °C ▼
Distribution Circuit-breakers : 30 °C 💌
Switches : 30 °C 💌
Downgrading due to temperature
Factor on thermal r. for gM+Th and gG+Th : 1.00
Factor on fuse : 1.00
Options for sizing and verifying the circuits in the switchboard
Cables Overload
Voltage drop
Indirect contact
Short-circuit
Calculate OK Cancel Help

For a description of all these fields, see the 'Board window' paragraph in the 'Distributions' section

5.14.6 Specifications

Supply				21	X
0	SUPPLY Board supplied : MSB				۲
Supply	Additional Downstr	board			
Board	Protection LIPS	Ik/dl Currents Sche	matic Options Specification	IS	
Ca	binet production sh	heet			
Equ	ipment brand		Imposed to CCTP		
🗆 Cal	binet metal sheets				
	Color		According to CCTP		E
E	Enclosure type		According to CCTP		
1	Material		According to CCTP		
F F	Position		At ground level		
1	Dimension: H	W D	By selection 0 mm	0 mm 0 mm	
	Transport separation			1 mm	
1	Aspect (IEC 60439-1, E	N 60439-1)	2b		
□ □ 1	ndexes				
	Index IP		1		
	Index IK		1		
	Service Factor	Other index	313		
1	Plinth			✓	
(Cables sheath		No		
E (Door			✓	-
			1 4		
De De	efault options			Apply the default values	
a		Calculate	ОК	Cancel Help	

For a description of all these fields, see paragraph in 'Schematic' section

5.15 Results

Display in Results window: Menu Display/Calculation results



5.15.1 Cable

Multi-core cable conventional writing, or phase conductors if the link is of single-core type. Examples:

4G1.5 means 4 conductors out of which 1 is earth (yellow/green) (G = ground) 2x3x (1x185) means a single-pole connection made up of two conductors per phase.

5.15.2 Neutral

Conventional writing of neutral conductors if the connection is a single-pole one. PE or PEN

Neutral conductors conventional writing if the link is of single-core type.

5.15.3 IB

Source on load nominal current in the phase conductors. Transfo-MSB link design current is considered equal to that value.

5.15.4 IB Neutral

Source on load nominal current in the neutral conductor. Transfo-MSB link design current is considered equal to that value.

5.15.5 STH

Theoretical cross-section of phase conductor in mm², according to overload condition.

5.15.6 STH Neutral

Theoretical cross-section of neutral conductor in mm², according to overload condition.

5.15.7 dU (%)

Voltage drop at the end of the sources cable (at MSB level).

5.15.8 lk3 Max

This is the max. symmetrical 3-phase short-circuit current, at the MSB, used for determining the breaking capacity of the equipment and for calculating the thermal stresses for 3-phase circuits. This value is calculated according to the maximum number of sources in parallel and to maximum power of HV

network short-circuit.

5.15.9 lk2 Max

This is the max. symmetrical 2-phase short-circuit current, at the MSB, used for determining the breaking capacity of the equipment and for calculating the thermal stresses for 2-phase circuits.

5.15.10 lk1 Max

This is the max. symmetrical single-phase short-circuit current, at the MSB, used for determining the breaking capacity of the equipment and for calculating the thermal stresses for single-phase circuits.



This value is calculated according to the Maximum number of sources in parallel and to the maximum power of HV network short-circuit.

5.15.11 IK2 Min

This is min. 2-phase short-circuit current (Ik2: Ik phase-phase), at the MSB, when there is no neutral present.

5.15.12 IK1 Min

Single phase minimum short circuit current (IK1: IK phase-neutral), at MSB level, when neutral is present,

This value is calculated according to the min. number of supplies in // and the HV grid's minimum short-circuit power.

5.15.13 lf

Default short circuit current (phase - PE), at MSB level, used to check human protection (indirect contacts).



This value is calculated according to the *Minimum number* of sources in parallel and to the minimum power of HV network short-circuit.

6 Distributions

6.1 General

A distribution is a device used to supply other circuits:

- a board
- a busbar trunking system
- a transformer LV-LV

6.2 Board windows

You can display the Board window: In the Source Window by clicking on the Downstream Board Tab

Supply	
0	STANBY Board supplied : MSB
Supply	Impedances Downstream board

In the Board style circuit window by clicking on the Downstream Upstream Tab

Circ	uit sheet					X
1	C_1 on I Board(St	M <mark>SB</mark> tandard).				۲
	Curve disc	rimination	Coordin	ation Cable/Protection	Dowr	nstream
	Upstream	Circuit	Additional	Additional results	Conformity	Texts

6.2.1 Downstream board tab

Supply Impedances Downstream board				
Board Protection UPS Ik/dU Cur	ents Schematic	Temperature		
Board Data				
Ref mark : MSB	Designation :			
	Simultaneity factor :	1,00	Geographic location :	•
Network				
Earthing syst. :	Voltage :	230/400 V	No load voltage :	420 V
Upstream supply Normal				
Upstream circuit ref STANBY mark :				
Breaking device :	MCCB 🔻			
Indirect contact protection :	asis Prot 💌			

Ref mark

Board Downstream Ref mark.

Designation

Board name (data recommended for ease of identification).

Diversity factor

Diversity factor for circuits fed by the considered board (simultaneity between them).

Example: a distribution feeds 10 circuits of 10 Amps each. A Simultaneity factor of 0.8 means that the total real consumption is $10 \times 10 \times 0.8$, to say 80 Amps.

Geographic location

Equipment geographical location. This data cannot be entered in this window. To modify it, you must change the geographical location of the circuit feeding the board.

Earthing system

Board Earthing system: TT, TN, IT

Voltage

Voltage in V:

- between board phase and neutral, in a single phase board (Phase-Neutral)
- between phases in other cases

No load voltage

No load voltage in V, used to calculate lk3 Max.

Upstream circuit ref mark

Circuit Upstream ref mark. In case of an installation with a standby, the board can be fed by two different circuits. An upstream circuit supplied from the normal supply and another one from the standby source supply.

Breaking device

Board breaking device (generally a switching device in distribution boards).

Case of a MSB in which the breaking device is a circuit breaker to get an efficient source protection:



Case of a distribution board in which the breaking device is a switch:



IC Protection

Nature of the human protection against electrical shock realized by the breaking device (for example: differential residual current in TT earthing system).

6.2.2 Protection Tab

Protection characteristics at the supply point of the board (breaking device) calculated by **Caneco BT**. This protection must not be confused with the protection of the circuit feeding the board. See previous examples of boards breaking devices.

Supply			
STAND Board s	BY upplied : MSB		۲
Supply Impedance:	s Downstream board		
Board Protection	UPS Ik/dU Currents Schematic	Temperature	
Normal File : Merlin G Protection : NS630N STR23	érin 2005/EN 60947-2 (EdiElec 💌 SE 630A 3P3T 🔃 🗔 🔪	Standby File : Merlin G Protection : NS630N STR23	érin 2005/EN 60947-2 (EdiElec ▼ ···· 3SE 630A 3P3T
Rating :	630 A	Rating :	630 A
IrTh :	578 A	IrTh :	578 A
IrMg	5780 A	IrMg	1436 A
Magnetic :	Electronic 💌	Magnetic :	Electronic 💌
Delayed	Delay : 40 ms	Delayed	Delay : 40 ms
3	Calculate	OK	Cancel Help

File

Protection manufacturer file.

Protection

Protective device commercial name.

Rating

Circuit breakers rating.

Irth

Circuit breaker thermal relay setting or fuses rating value.

IrMg/In

Circuit breaker magnetic setting or fuses rating value.

Magnetic

Type of magnetic used Standard or C curve for modular CrBrk Low or B curve Electronic or D/K curve

Delay

Circuit breakers short circuit delay.

RCD setting

Circuit breakers residual current (differential) delay setting.

RCD delay

Circuit breakers residual current differential) delay.

6.2.3 UPS tab

If necessary, default values must be replaced by manufacturers ones.

rier mark.		Power:	60.00 kVA 💌	Max number in parallel :	1
Max permitted Pt:		1			
hort-circuit T	ittel				
Tsc :	40 ms		<u> </u>		
- www.set-setter.rg/					
ihini circuit c	144.6	82:	180 A	Bd: .	144 A

(1) Thermal stress permitted by inverter.

A UPS can be connected either on a *Normal* or *Standby* distribution. A comparison between Ik is done to keep the least favourable one (Ik max on the network, Ik min on the UPS). The process is inverted when Normal source Ik Min become less than UPS ones.

UPS are considered as current gensets. Due to that, Ik are unchanged along the network tree. The UPS is always considered as connected in *« By-Pass »* mode. Functioning Time of the circuits protection downstream the UPS are compared with the sustaining time of the UPS on Ik.

6.2.4 lk/dU Tab

Normal and standby short circuit currents at board level

Supply	y Impedances	Downstream board			
Board	d Protection U	PS Ik/dU Currents Schema	atic Temp	perature	
N	lormal		St	andby	
	lk			lk	
] lk2/3 Max	26837 A	Ξ	lk2/3 Max	2108 A
	lp	56358 A		lp	3162 A
	K Asym	2,10		K Asym	1,50
] lk1 Max	25481 A	Ξ	lk1 Max	2841 A
	lp	53509 A		lp	4262 A
	K Asym	2,10		K Asym	1,50
	lk1/2 Min	11126 A		lk1/2 Min	2570 A
	1 lf	11440 A	Ξ	lf	2570 A
	lp	22880 A		lp	3856 A
	K Asym	2,00		K Asym	1,50
	Voltage drop			Voltage drop	
	dU	0,32 %		dU	0,32 %

IK3 Max

Maximum three-phase short circuit current. Maximum value between Normal and standby if it exists.

lk2 Max

Maximum 2-phase short-circuits current if there is no neutral. The higher of Normal and Standby values, if there is a Standby.

lk1 Max

Maximum single-phase short-circuit current if there is a neutral. The higher of Normal and Standby values, if there is a Standby.

If Max

Maximum Phase/PE short-circuit current if there is a PE. The higher of Normal and Standby values, if there is a Standby.

lk2Min

Minimum 2-phase (Phase-Phase) short-circuits current if there is no neutral.

lk1Min

Minimum short-circuit current: single-phase if there is a neutral.

lf

Phase–PE fault short-circuit current. Minimum of Normal and Standby values, if there is a Standby.

dU

Cumulated voltage drop (in %) at board level from source of installation.

6.2.5 Impedances Tab

Upstream	Circuit	Additional data	Additional results	Conformity	Texts
Curve di	scrimination	Coo	rdination Cable/Protection	Downstrea	am
Board UPS Ik	/dU Impedances	Currents Schematic	Options Specifications		
				Copy	
Normal			Standby		
Phase to phase	e		Phase to phase		
RO		0.0995 Ω	RO	0.0020 Ω	
R1		0.1037 Ω	R1	0.0026 Ω	A
Xd		0.1358 Ω	Xd	0.2408 Ω	- →
ХЬ		0.2715 Q	ХЬ	0.4816 Ω	
Phase-Neutral			Phase-Neutral		
R0		0.0572 Ω	R0	0.0020 Ω	
B1		0.0614 Q	R1	0.0026 Ω	
ХЬ		0.1369 Ω	Xb	0.1776 Ω	
🗆 Phase-PE			Phase-PE		
RO		0.0572 <u>Ω</u>	R0	0.0020 Ω	
B1		0.0614 Q	R1		
×b		0.1369 Ω	×b	0.1776 Ω	

Phase-Phase

R0 Phase-Phase

Loop resistance Phase to Phase (equals to 2 times one phase resistance), calculated at ambient temperature. This value is used to determine the tree-phase maximum short circuit currents (Ik Max Three).

R1 Phase-Phase

Loop resistance Phase to Phase (equals to 2 times one phase resistance), calculated at operating temperature. This value is used to determine the minimum short circuit currents (Ik Min)

Хт

Mean loop reactance Phase to Phase.

Xd

Loop reactance Phase to Phase.

6.2.6 Currents tab

Upstream	Circuit	Addition	al data	Additional res	ults	Conformity		Texts
Curve disc	crimination		Coordinatio	on Cable/Protection		D	ownstream)	
Board UPS Ik/o	U Impedances	Currents Scł	nematic Optio	ons Specifications				
Power requireme	ent Normal Supp	y	P	ower requiremen	t Standby	_		
I allowed :	10).00 A	I	allowed :		10.00 A		
I Available :	10).00 A	I	Available :		10.00 A		
S. Currents :	().00 A	9	5. Currents :		0.00 A		
Mean Cos Phi :		0.00	1	Mean Cos Phi :		0.00		Ŧ
R= <u>Σ IZ cables</u> : irth board		0.00	F	R= <u>Σ IZ cables</u> : irth board		0.00		

I Allowed

Allowed current downstream board. This value is equal to the current of the circuit feeding the board.

l available

Available current downstream board: available design current for new circuits which can still be fed from the board.

S currents

Design current IB sum of all circuits issued from the board multiplied by the board simultaneity factor.

Mean cos phi

Mean cosinus phi at board level, taking into account downstream circuits and eventual capacitors.

R=S IZ cables / Irth board

Ratio between sum of *IZ* of downstream circuits (IZ calculated without taking into account group factor) and the upstream thermal relay setting.

The use of this information figures in the standard. It makes it possible to modify the proximity factors of the circuits located downstream, provided that all these circuits are juxtaposed, in the absence of any other circuits.

6.2.7 Schematic tab

Upstream	Circuit	Additional data	Additional results	Conformity	Texts
Curve dis	crimination	Coc	rdination Cable/Protection	Downs	stream
oard UPS Ik/	dU Impedances (Currents Schematic	Options Specifications		
Drawing N*					-
Description NI [®] for the					
board printing :	e actual				
Terminal blocks	: / earth bar				_ A
Terminals on pov	ver circuits		Draw the earth bar on single-line (diagram 🗸	
Terminals on pov Terminals on no o	ver circuits calculated circuits (as	sociated)	Draw the earth bar on single-line of Max cables cross-section on term	diagram ✔ inals 35 ▼	→ ▼
Terminals on pow Terminals on no o Terminals on PE	ver circuits calculated circuits (as	sociated)	Draw the earth baron single-line of Max cables cross-section on term Type of default terminal	diagram ♥ inals 35♥ ti disconnectable ♥	
Terminals on pov Terminals on no o Terminals on PE	ver circuits calculated circuits (as	sociated)	Draw the earth bar on single-line (Max cables cross-section on term Type of default terminal No	diagram V inals 35 V ot disconnectable V	
Terminals on pov Terminals on no o Terminals on PE Incoming termin	ver circuits calculated circuits (as ral	sociated)	Draw the earth bar on single-line (Max cables cross-section on term Type of default terminal	diagram 🗸	-
Terminals on pov Terminals on no o Terminals on PE Incoming termin Normal	ver circuits calculated circuits (as nal	sociated)	Draw the earth bar on single-line (Max cables cross-section on term Type of default terminal No	diagram 🗸 inals 35 🗸 t disconnectable 🗶	-
Terminals on pov Terminals on no o Terminals on PE Incoming termin Normal	ver circuits calculated circuits (as nal	sociated)	Draw the earth bar on single-line (Max cables cross-section on term Type of default terminal No	diagram ♥ inals 35▼ at disconnectable ▼	-

For a description of all these fields, see paragraph in 'Schematic' section

6.2.8 Options tab

Circuit sheet	-	X
TD001 on MSB		9
Upstream Circuit Additional	data Additional results	Conformity Texts
Curve discrimination	Coordination Cable/Protection	Downstream
Board UPS Ik/dU Impedances Currents Scher	natic Options Specifications	
Board equipment calculation options		
Ambient temperature of Lircuit-breakers	10 *0 -	
Distribution Circuit-breaker :	40 C -	
Distribution Circuit-breakers .	30 C -	*
Switches :	30 C +	
Downgrading due to temperature		
Factor on thermal r. for gM+Th and gG+Th :	1.00	
Factor on fuse :	1.00	
Ontions nous la dimensionnement et la uérifie	ien des sirouits du tableau	
options pour le unitensionnement et la vennca		
Cables Overload		
Voltage drop		
Indirect contact Short-circuit	~	
Shok circuit		
		4
	Calculate OK Canc	el Help

Board equipment calculation options

These options make it possible to de-rate equipment ratings according to temperature.

Options for sizing and verification of board circuits

If they are unchecked, these options make it possible to not calculate and not verify the circuits downstream of the switchboard.

This is useful, for example, in cases where the circuits are calculated under another standard but one wishes to represent them within a Caneco BT project.

Circuit sheet TD001 on MSB 0 Ł Conformity | Downstream Circuit Additional data Additional results Upstream Texts Curve discrimination Coordination Cable/Protection Board UPS Ik/dU Impedances Currents Schematic Options Specifications Cabinet production sheet Imposed to CCTP Cabinet metal sheets According to CCTP Color Enclosure type According to CCTP Material According to CCTP Position At ground level D By selection 0 mm Dimensions H W | 0 mm | 0 mm Transport separation Aspect (IEC 60439-1, EN 60439-1) 0 mm 2Ь 🗆 Index dexes Index IP Index IK 313 Service Factor 0 ther index . Plinth Cables sheath No 4 🖸 Door Hinge Lock Left Standard 🗄 Engraving Label Engraved Outgoing ref Mark • Label colour 8 Conduit ref Mark V 3 Apply the default values Default options Calculate OK Cancel Help

6.2.9 Specifications tab

For a description of all these fields, see paragraph in 'Schematic' section

6.3 Busbar Trunking System Window

6.3.1 Definition

When you create a circuit with a busbar trunking system style, Caneco creates:

- the circuit made up of a protection device, a link and an equipment
- the *busbar trunking system* which makes up a particular equipment because it has its characteristics (length, equipment type, etc.). This busbar trunking system is a distribution because it can supply itself others circuits.

If busbar trunking system *circuit* does not include a supply cable, you must specify that this *circuit* has a null length link.

On the contrary, the *busbar trunking system* length is necessarily longer than 0 meters.

When Caneco calculates a busbar trunking system circuit, it calculates simultaneously:

- the protection taking into account the busbar trunking system
- the circuit cable connection
- the busbar trunking system.

A circuit of busbar trunking system style includes:



6.3.2 Information on the busbar trunking system

It is possible to display the window of a busbar trunking system: In the Source Window, if this source supplies MSB, by clicking on the Downstream Board Tab.

Supply Additional	Downstr board				
SupplyS	UPPLY				
Power :	315 kVA 🔻	Type :	Transfo 🔻	Ukr (transfo) :	4.0 %
Supplies Nb	1 🌩	Caract. from :	File 🔻]	
: actives :	1 min 🚔 1 max 🌲	File :	Transfo Huile 1995/NF	C 52-112	▼
Network					
Standard :	C15100 2002 🔻 🚥	Frequency :	50 Hz 🔻	Harmonics :	HR <= 15% ▼
Earthing system:	TN 🔻	Conductors :	3P+PEN 💌	SkQ Min :	125 MVA
LV Voltage :	400∨▼ / 420∨	HV Prot Funct T.:	200 ms	SkQ Max :	433 MVA
Link	10 m	Tupe :	BB Trunk Sust 🔻	BBtrkSyst manu	facturer :
Lavout :	Normal 🔻	Type .	DD Hunc Syse	Schneider 201	0 🔻
				Ref:	KVA50 🔻
Factors Temperature	1.00	ז	Conductors		
					Loaded Neutral : 📃
Additional :	1.00				K loaded neut. (1,00

In the Busbar trunking system style circuit window, by clicking on the Downstream Upstream Tab:

Circuit sheet		-	- 21	B. 97	100	×
CEP001 Busbar Trunk	on MSB ing System (Standa	rd).				۲
Upstream	Circuit	Additional	data	Additional results	Conformity	Texts
Curve dis	crimination		Coordination	Cable/Protection	Downs	stream
Busbar trunking syste	m Ik/dU Impeda	ances Currents	Schematic	Options		
Manufacturer						
Elec Sc	hneider 2010		T	Dof Mark -	KNA160 -	
rile.			•		KitA100	
Busbar Trunkin	g System Data					
Upstream circu CE	P001	Ref mark : CE	P_001	Distribution : Transp	oort Distributior 💌	*
Designation :				Layout :	Standard 🔻	- ►
Length :	10 m			Content :	3P+N+PE 💌	Ŧ
Factore						
Tactors				Lavout :	1.00	
Temperature :	1.00	Diversity :	1.0	K loaded neutral:	1.00	
Network						
Eatthing				No load	10011	
system :	TN 🔻	Voltage :	230/400	voltage :	420 V	

(This same window is displayed by clicking on Upstream board tab, in a window of any circuit supplied by a busbar trunking system).

6.3.3 Manufacturer Section

File

Name of the busbar trunking system manufacturer file.

Reference

Name of the busbar trunking system model.

6.3.4 Busbar Trunking System Data Section

Upstream circuit

Ref. mark of the circuit supplying the busbar trunking system

Ref mark

Busbar trunking system ref mark.

Designation

Name of the busbar trunking system

Distribution

Kind of distribution made up by busbar trunking system. This data has an effect on voltage drop calculation in this busbar trunking system:

Transport distribution: the busbar trunking system carries electricity: This busbar trunking system allows to supply only an equipment at the end: a board or a busbar trunking system, or any other circuit. The mean current carried by the BB trunking system on its length is IB.



• **Comb Distribution**: the busbar trunking system feeds circuits distributed along its length. The mean current carried by the BB trunking system on its length is IB/2



- **Transport terminal:** the busbar trunking system is a terminal circuit, which feeds a terminal circuit fitted at the end of it.
- **Comb terminal:** the busbar trunking system is regarded as a terminal circuit, which feeds a number of regularly distributed terminal equipments (e.g. luminaires).
- *New:* A busbar trunking system configured as a comb terminal (1) may be regarded as feeding a number of identical, evenly distributed terminal equipments (e.g. lighting) without intermediate connections.

In this case:

- - define the number of items of equipment in the corresponding field on the circuit sheet (2)
- fill in the distance to the first equipment (3) under the 'Downstream' > 'Busbar trunking system' tab

Equipmen	Factors Permanent
onsumption :	1 160A Use : 1 Cos phi : 0.8
ocation	▼ HR <= 15% ▼ dU max: 8% →
lusbar trunking	system lk/dU Impedances Currents Schematic Options
Manufacti	system lk/dU Impedances Currents Schematic Options
Manufach File :	system ik/dU Impedances Currents Schematic Options
usbartrunkin Manufacti File : Busbar Tr	system lik/dU Impedances Currents Schematic Options er Schneider 2010 Finn System Doto
usbartrunkin Manufastr File : Busbar Tr Upstream c	system lik/dU Impedances Currents Schematic Options
Manufacti File : Busbar Tr Upsteam o Designation	system lik/dU Impedances Currents Schematic Options

Layout

Arrangement of the busbar trunking system made in the site. According to the above layout, the busbar trunking system is more or less efficiently cooled by ambient air. This layout defines the layout factor default value which reduces the admissible current of the busbar trunking system.

- **Standard:** standard layout recommended by the manufacturer which determines nominal current carrying capacity (K layout equals 1 in this case).
- **Perpendicular:** horizontal layout perpendicular to the one recommended by the manufacturer. In this case K layout is given by the manufacturer. When this value is unknown, Caneco BT proposes 0.8 for K layout.
- Vertical: In this case K layout is given by the manufacturer. When this value is unknown, Caneco BT proposes 0.8

Content

Presence of N, PE or PEN in the busbar trunking system. This value must be compatible with the feeding circuit content but can be different.

For ex., circuit can be TNC (3P+PEN), when busbar trunking system is TNS (3P+N+PE).

6.3.5 Factors Section

Temperature

Temperature factor: this factor, given by the manufacturer, reduces the admissible current of the busbar trunking system. Its value is 1 for 30°C.

Simultaneity

Simultaneity factor for circuits fed by the considered board (simultaneity between them).

Layout

Layout factor, it reduces the admissible current of the busbar trunking system. It depends on chosen layout (see above). You must modify the values proposed by Caneco BT according to the special conditions (e.g., confined air) the manufacturer's information or the standard.

K Loaded Neutral

Just as for cable, a derating factor may be applied in the event of harmonics.

6.3.6 Network Section

Diagram

Busbar trunking system Earthing system: TT, TN, IT

Voltage

Voltage in V:

- between board phase and neutral, with single-phase busbar trunking system (Phase-Neutral)
- between phases in other cases

No load voltage

No load voltage in V, used to calculate Ik Max..

6.3.7 Currents tab

l	Board			×
	MSB Board supplied	by : SUPPLY/STANDBY		9
	Board UPS Ik/dU	Currents Schematic Ten	nperature Specifications	
	Power requiremer	nt Normal Supply	Power requirement St	andby
	I allowed :	721,71 A	I allowed :	288,68 A
	l Available :	572,00 A	I Available :	289,00 A
	S. Currents :	150,00 A	S. Currents :	0,00 A
	Mean Cos Phi :	0,80	Mean Cos Phi :	0,00
	R= <u>Σ IZ cables</u> : itth board	0,00	$R = \sum_{i \in I} \frac{\sum i Z \text{ cables }}{ith \text{ board }}$	0,00

I Allowed

Allowed current downstream busbar trunking system. This value is equal to the current of the circuit feeding the busbar trunking system.

l Available

Available current downstream busbar trunking system: sum of the circuit design currents for new circuits which can still be fed from the busbar trunking system.

S Currents

Sum of design current IB of all circuits issued from the busbar trunking system, multiplied by its simultaneity factor.

Mean Cos phi

Mean cosinus phi at busbar trunking system level, taking into account downstream circuits and eventual capacitors.

6.3.8 lk / DU Tab

Information concerning short-circuit currents a voltage drops in the busbar trunking system:

For a description of the fields, see the Board window paragraph in the Distributions chapter

6.3.9 Schematic Tab

For a description of the fields, see the Board window paragraph in the Distributions chapter

6.3.10 Temperature Tab

For a description of the fields, see the *Board window* paragraph in the *Distributions* chapter

6.4 LV-LV transformer window

6.4.1 Definition

- When a circuit of LV-LV transformer style has been created, it creates automatically:
- LV-LV transformer downstream circuit cable.
- Virtual board on LV-LV transformer secondary terminals, which makes it possible to feed other circuits.



6.4.2 Transformer Tab



Ref Mark

Board ref mark on transformer secondary.

Upstream Circuit

Upstream circuit ref mark.

Power Transformer output power in kVA

Designation

Board designation on transformer secondary taps.

Downstream coincidence factor K

Coincidence factor K (simultaneity) downstream transformer.

Ukr

Short circuit current on the transformer secondary, in %.

Geographic location

Geographical location of the LV/LV transformer.

Earthing system

Earthing system on the transformer secondary. It is possible to change earthing system between primary and secondary.

Secondary voltage

Transformer secondary on load voltage:

- voltage between phases for three-phase or two-phased circuits.
- voltage between phase and neutral for single-phase circuits

This on load voltage is followed by the reference no load voltage which is used to calculate short-circuit and which is calculated by **Caneco BT** and cannot be entered.

Content

Earthing system on the transformer secondary.

6.4.3 UPS Tab

From version 5.4, possibility of connecting an inverter.

Upstream	Circuit	Additional data	Additional results	Conformity	Texts
Curve discrir	nination	Coordi	nation Cable/Protection	Downst	ream
ransformer UPS	k/dU Impedanc	ces Currents Schema	tic Options		
Supplying ID_UU	1		Max number		
Ref mark :		Power:	in parallel :	U	
Max. permitted I ² t:	0.0 A²/	's			
Short-circuit Time					
Tere	0.000				
ISC :	UIIIS				
Short-circuit curr	ents				
lk3:	0 A	lk2:	0 A Ik1 :	0 A	
lk3:	0 A 0 A	lk2:	0A lk1 :	D.A.	
lk3:	0 A 0 A	lk2 :	0A Ik1:	0.A	
lk3:	0 A 0 A	lk2:	0 A Ik1 :	0 A	
1k3:	0.A 0.A	lk2 :	0.A ik1 :	0 A Delete	
Ik3: If:	A 0 A 0	Ik2 :	0A IK1 :	0 A Delete	
Ik3: If: TN V 400 V Cábleo uni Cábleo uni Cábleo uni	0 A 0 A	Ik2:	0A K1:	0 A Delete	
Ik3: If: TN 400 V Câbles uni U10000R2V	0 A 0 A	Ik2:	0A K1:	0 A Delete	
Ik3: If: TN 400 V Câbles uni U1000R2V	0 A 0 A 0	Ik2:	0A K1:	0 A Delete	
Ik3: If: TN 400 V Càbles uni U10000R2V TN TN TR TR TR TR	0 A 0 A 0	Ik2:	0A K1:	0 A Delete	
Ik3: If: TN 400 V 60 m Câbles uni U10000R2V TN TN TN TN TN TN TN TN TN TN	0 A)	Ik2:	0A K1:	0 A Delete	
Ik3: If: TN 400 V 60 m Câbles uni U1000R2V TN TN TN TN TN TN TN TN TN TN	0 A 0 A 0	Ik2:		0 A Delete	

 $\left|\right\rangle$

6.4.4 lk/dU Tab

ircuit sheet					E
C_4 on MS Transformer	B LV/LV(Standard).				۲
Upstream	Circuit	Additional	Additional results	Conformity	Texts
Curve discrimin	ation	Coord	ination Cable/Protection	Downstrea	m
Transformer Ik/dU Im	pedances Curren	t Schematic Te	emperature		
Ik □ Ik2/3 Max Ip K Aure		467 A 700 A			▲ ■ ►
E Ik1 Max		407.6			Ŧ
		407 A			
lp		611 A			
K Asym		1,50			
Voltage drop		0.00.01			
dU		0,00 % 🚩			

For the description of all these fields, see paragraph *Board window* from *Distributions* chapter

6.4.5 Impedances Tab

Upstream	Circuit		Additional	Ad	ditional results	Conformity		Texts
Curve disc	rimination Co		oordination Cab	ordination Cable/Protection		Downstream		
Transformer Ik/dU	Impedances	Current	Schematic	Temperature				
						Сору		
Normal								
Phase to phase								
RO			0,4461 Ω					
B1			0,5098 Ω					▲
Xd			0,3372 Ω					- ►
ХЬ			0,6743 Ω					T
Phase-Neutral								
Phase-PE								
B1			0,5098 Ω					
Xb			0,6743 Ω					

For the description of all these fields, see paragraph *Board window* from *Distributions* chapter

6.4.6 Currents Tab

Upstream	Circuit	Additional	Additional results	Conformity	Texts
Curve discri	imination	Coordin	ation Cable/Protection	Dowr	stream
Transformer Ik/dU	Impedances Currer	nt Schematic Ten	perature		
Power requireme	nt				
I allowed :	18	,00 A			
l Available :	18	,00 A			
S. Currents :	0	,00 A			
Mean Cos Phi :		0,00			Ψ
R= <u>Σ IZ cables</u> irth board	:	0,00			

For the description of all these fields, see paragraph *Board window* from *Distributions* chapter

7 Network single-line

7.1 Description of the network single-line

The Network single-line is a graphical editor which represents each circuit by a vertical column made up of maximum 10 symbols



Circuits displayed in the window are those issued from the whole project or one distribution (board).

- 1: Active supply
- 2: Active distribution
- 3: Project tree structure
- 4: Zoom
- 5: Consumption of active circuit
- 6: Length of active circuit
- 7: Network single-line
- 8: Calculation report
- 9: Results for the active circuit

7.1.1 Active Source

In Caneco BT, network single-line represents only the circuits supplied by active source. This may be either the Standby Source. The diagram is differenced according to the active Source.



7.1.2 Active Distribution

Choose board downstream from which you want to display the network diagram (MSB in this example). This command allows you to restrict the diagram range, when you describe a large installation.

7.1.3 Zoom

Choose zooming in (values above 100 %) or zooming out (values below 100 %) to increase or decrease diagram view.

Choose screen size to get the whole diagram fit in the project window.



With the Window zoom you can zoom on the zone selected by the cursor.

With the centre zoom centre you can make a zoom In or Out centred on the cursor position. Press Shift key to zoom out.

7.1.4 I available

I available on the selected Board (MSB in the example). This value is determined by a local power requirement calculation, taking into account the currents of circuits which are fed, coincidence factor and design current of feeding circuit.

7.1.5 Consumption

Consumption of circuits supplied by the distribution taking into account coincidence (simultaneity) and use factors.

7.2 Create one or more circuits

Create a circuit

To create one or more circuits, use the command New from Circuit menu. You can create also these circuits without leave the network single-line diagram.

First, select board supplying this circuit. For this, you can:

- either click on the project tree or on the distribution icon
- either click on the network single-line diagram from the board horizontal bar or, at right side from this bar, if you want to insert a circuit at right of this bar.

Then, click on button «New circuit» at left top from the network single-line diagram. A menu appears displaying the different circuit styles.



• Step 1: Click on the 'New circuit' button (A) and select the style of circuit you want to create.

• Step 2: Click to the right of the board 'bar' (B) to create a circuit to the right of the last one created.

The new circuit is represented automatically on the diagram (1)



To entry its characteristics, double-click on the circuit, the «Circuit sheet» window appears ...

r

See the following chapter: Circuit data entry and results.

The button «New circuit» becomes «Replace circuit» when the cursor is on a circuit. In this case, it is possible to modify the active circuit style.

Create several circuits

To create simultaneously several circuits, proceed as above but before you choose the circuit style, press and hold the Shift key. After you has chosen the circuit style, Caneco BT ask you for the number of identical circuits you want to create:



Deleting circuits

1- Select the circuit(s) to be deleted; the selection 2- Press the 'Del' key on your keyboard or use must include at least two squares (1).



the Windows methods (Ctrl X, etc.)



7.3 Representation of the network single-line diagram

We has seen in Description of the network single-line diagram paragraph, how this diagram can be represented from a board and differenced from the active source.

- Other commands can be used to customize the network single-line diagram:
- add labels
- delete terminal circuits on the diagram

7.3.1 Labels

A label is a wording made up of data or results and attached to the source, a distribution, or a circuit. To create and define labels, select the menu *Tools/Preferences* and then *Network single-line* tab.

Automatic mer marks i mir	t Colours [)efault Values	Direc	tories Warnin	ngs and	remarka
Save Display Circuit	Spreadsheet Boa	rd Single-line D	liagram	Network single	eline	Track:
Vetwork singleding		 Display labe Display final 	ls circuits			
Display		1.	120.00	122		-
 Display supplies labe 	ł=	D6	padé Titre	e actil	٠	
V Display distribution la	bels	Act	ive Borde	r	•	
 Display circuits labels 		Mor	ney Green	1	٠	
Fields selection Records	Availa	ble fields		Selecte	d fields	
Circuits	All fields		2	Ref Mark		
Sources	E Circuit			Prot Device		- 11
Busbar trunking systems	Protectiv	e device	>>	Consumption		
boards	E Cable	at the	Trees of	Cable Tune		1
	E Results	2	< .	Cable		
2	E Miscellar	eous	~~	Neutral PE/PEN		
Preservation				historia (n. 1997)		
Display wordings						
Display a border	 Display a shade 	ow under the b	order			
1. minhad a merani	2		Labels u	ath	100 p	ivels

Records

Choice of information kind to be displayed: Circuits, Sources, Boards

Available fields

List of fields which can be displayed among all record fields, or from fields categories.

Selected fields

Includes all selected fields for display. Select the fields with the appropriate arrows

Labels displaying

Check the "Display labels" option (1). The label legends can be displayed by checking the "Display legends" option (2).

Labels size

You may modify the label width modifying the column width reserved to them (1):

🔽 MSB 👻	60%	💽 🔍 🖌 💕 🕼	

You can get this display reducing column width:



Modification is applied to all labels of the network single-line diagram.

Delete final circuit display

In large projects with a large number of distributions, network single-line diagram may be used difficulty. You can then:

• do not represent whole tree but the active board only.

• represent circuits supplying distributions only (boards, busbar trunking systems or LV-LV transformers)

All these commands are in Tools/Preferences menu, Editors tools tab:

Example: By unchecking the "Display terminal circuits" option (1), you limit the diagram to the circuits feeding distributions

Automatic Hel Marks Ptr	t Colours	Default Values	Direct	tories 1	Varnings and	remark.
Save Display Circuit	Spreadsheet Bo	ard Single-line Di	agram	Network	single-line	Track
Network single-line						
V Ditplay Grid		 Display label 				
V Display the complete the	•	Display final	circuitz			
Labels			-			
Display			_	-	1	_
 Display supplies labe 	As .	Dég	radé Titre	actit	•	
V Display distribution la	bels	Activ	ve Border	ř.		
Display circuits label	10000	Mon	ey Green	ř.		
	-					
Fields selection	120.0	22.232		122	3 3 2 5 3	
Records	Avak	able fields		S	elected helds	3
Circuits	E All heids		2	Post Dava		
Bushar trunking systems	# Protection	e device	inst.	Consumo	ban	
Boards	E Cable	in derive	22	Length		÷
	E Equipme	nt	111	Cable Typ	10	
	E Results		5.	Cable		
	I Miscella	neou:	1001	Neutral		
				PE/PEN		
Presentation						
Presentation						
Presentation Display wordings Display a border	🔽 Display a shad	ow under the bo	nder			
Presentation Display wordings Display a border Label font	 Display a shad Arial 	ow under the bo	rder Labels w	idth	103 p	ixels

7.4 Representation of a project with a Standby source

If there is no standby source, diagram has only one possible representation.

Otherwise, when there is a standby source, diagram may be different according to supply source.

If you choose normal source (default reference mark *SOURCE*) you represent the diagram of circuits which may be supplied from this source. Represented circuits are all circuits supplied by normal source, i.e. the circuits with a N (Normal, i.e. not backed up circuits) or N+S (Normal and Standby).

If you choose standby source (default reference mark *STANDBY*) you represent the diagram of circuits which may be supplied from this source. Represented circuits are all *backed up* circuits, i.e. the circuits with S (Standby) supply or N+S (Normal and Standby). See the example below.

Diagram is differenced according to active source (Normal or Standby). On the contrary of version 4, version 5 represents all sources supplying each board.

Example of diagram in configuration on circuits normal source supplied from normal source (Normal or Normal-Standby circuits).

7.4.1 Board with N & S supplies

The short-circuit currents are automatically calculated on the N and on the S branches. This makes it possible to determine the Ik values for the downstream circuits in an appropriate manner according to their powering mode (N, S, or N+S).

Example of the same diagram in configuration normal Source

Circuits supplied from the normal source (Standby or Normal-Standby circuits)



To improve legibility, all supplies are shown (even ones that are not active)

Example of the same diagram in configuration Standby Source Circuits supplied from the Standby source (Standby or Normal-Standby circuits)

Project Distribution :	TD_001 /		Consumption : 0	A O A
Project folders × Project: Document all Symbols library Manufacturers lifes Additional documents for pirring Baard single-line additional pictur Modification indexets Most Most Most TD_001	AXA - Ne	v ciccuit All of V 5002 V 500		

Conventionally, in Caneco, diagram of circuits represented with Standby source, corresponds to this source at left. Normal sources (in this case, 1 transformer) are shifted to right.

At printing, diagram may be represented either as Normal or as Standby, according to parameters chosen. For a project with a standby source is possible (and recommended) to include in Caneco BT folder the two diagrams: Normal AND Standby.

8 Board Single-line Tool

8.1 Board Single-line Tool

This entry tool is especially suitable for circuit schematic data entering. Circuits displayed are those with an active distribution only.

To enable the board single-line diagram, you must:

to enable the Board Single-Line Tool

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Select the distribution you want to display. You can do it by clicking on this distribution, in the project tree situated at left side of the screen:



- Step 1: Click on the board you want to edit (1)
- Step 2: Caneco BT displays the diagram (2)

Create a circuit

To create one or more circuits, use the command New from Circuit menu. You can create also these circuits without leave the network single-line diagram.

First, select the point from which you want to insert the circuit. Caneco BT inserts any new circuit at left side from the active circuit. You must click on the point situated at right from the last created circuit to put a new circuit at left from this one. Then, click on «New circuit» button at top left from the network single-line diagram.



To create simultaneously several circuits, proceed as above but before you choose the circuit style, press and hold the Shift key. After you has chosen the circuit style, Caneco BT ask you for the number of identical circuits you want to create.

8.2 Modifying the diagram of a circuit



You want to modify the diagram of a circuit through the symbol library. Enable it by clicking on Library tab, in the screen zone reserved to results. Choose the «Protections» tab of this library. To add a symbol, choose it from the library and put it using drag-release control:



Caneco BT does not allow you to modify a circuit diagram if this modification is contrary to data used to its calculation. In this case, Caneco BT opens the circuit sheet and you must modify the data so that they will be in accordance with diagram meaning.

8.2.1 Delete a symbol

To delete a symbol, replace it with the first continuity symbol from « connections » zone of the library:



8.2.2 Creating circuits using style libraries and circuit blocks

To create one or more circuits, it is possible to use also the circuit style and circuit block libraries. Each of these libraries has different proprieties;

Circuit style library allows to create a single circuit, completed with one or more associated circuits (not calculated circuits). Values of created circuit are initialised depending on rules set for this style.

The library of circuit blocks allows you to create several circuits as you use the copy-paste control. Values of created circuits are identical to those of the block circuits.

To active circuit style and circuit block libraries, click on buttons situated at the bottom of the library



From the circuit style library, create a lighting circuit with standby block:



In the same way, you can create several circuits from the circuit block library.

The circuit style and circuit block libraries are also used in network and board single-line editors.
<u>≭</u> зрзо ∖ 63 А 3930 63 A 4940 63 A 7 \triangleright 2 举 ΗΦ 本 ~ μı TN 400 V TN 400 V 0 ⊚ ECOURS OURCE IS_003 110005 R002 R001

8.2.3 Creating new blocks of inverter circuits with built-in LV/LV transformers

8.3 Edition Commands

8.3.1 Selection of one or more circuits

Selection is made as for columns on a spreadsheet software, clicking on a first column, pressing and holding Shift key, then clicking on last column you want to choose.

8.3.2 Cut, Copy, Paste

When several circuits are selected, the Cut, Copy, Paste commands become active. These commands run as in a spreadsheet.

8.3.3 Enriching the circuit style and circuit bloc libraries

To enrich the circuit style and circuit bloc libraries, select the circuits you want include in the library and use the slide-release control to slide them into the library. Caneco BT opens a window allowing you to set, in the library, the identification of the created circuit block:



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The circuit style and circuit block libraries are also enriched from the network and board single-line editors.

8.3.4 Inserting additional diagrams

See DIAGRAMS section

9 Spreadsheet Tool

This entry tool is especially suitable to entering numerous circuit data. It is specially useful to entering information on designation, length, consumption and number of circuit devices. To enable the spreadsheet, you must: Select the spreadsheet tool

<u>T</u> ools <u>W</u>	lindows ↓↓↓	54	2	9	Ģ														
	Project	Dist	ributio	n :MSB	1						Availab	e : 863,0	0 A (377,0) A					
	List of folders X			Neн сісці		All Styles	• 1	OOA	۲		25 n								
Olan da	A Project : example2-No Symbols library		Ref.nark	Style	Content	No Consumptio	n Length	Protection	IC Prot	Busbar	D. Origin	Supply	Location (lesignation	CableType	Material	Poletype	Insta	Step 2:
Step 1:	Manufacturers fil	1	01	Board	3P+N+PE	1 100A	2	MCCB	Basis Prot		0	Nomal			PRC	Copper	Single S) M	ax 13	displays the
board you	Additional docum	2	C <u>.</u> 2	Board	3P+N+PE	1 50A	3	MCCB	Basis Prot		0	N and S		~	1	•	C-LLOW	w 12	spreadsheet to
want to edit			*	Board	3P+N+PE	1 150A	X	MCCB	Basis Prot		0	N and S			PRC	Copper			board circuits
	Modification inde	4	63	Capacitor	3P+PE	1 10KVAR	ł	MCCB	Basis Prot		0	Nomal			PRC	Copper	Single S>M	ax 13	
	🗄 🗋 Project	5																	
	🖃 🚋 MSB	6																	
	🔒 🛅 DB_2	7																	
	🗄 🔂 DB_3	9																	

Select the distribution you want to display. You can do it by clicking on this distribution, in the project tree situated at left side of the screen

9.1 Creation of a new circuit

To create one or more circuits in the spreadsheet, select first the point from which you want to insert the circuit. Caneco BT inserts any new circuit above the active circuit. You must click on the point situated below the last created circuit (2) to put this new circuit below. Then, click on «New circuit (2)» button at top left from the network single-line diagram

Project Distribution :	TD_	001	1				Consu	mption : 36 A/3	BAC.			
Project folders ×	-	·A.	New circuit	All styles	•		•	0 m				
Project : Document1 ah	-	1	Standard		~	<u> </u>	* mpton	Length	Protection	IC Prot		Buster
Symbols Reary	3	C_0	Motor	Hotor	22			0	Switch	Dif 30mA		
- S Manufacturers tiles	2	PCO	Socket	Socket	6	J	1	0	C. Breaker C	Basis Prot	1.1	
Additional documents for printing	3	PCD	Lighting	Lighting	1.2	100		0	C. Breaker C	Basis Prot	1.1	
Board single-line additional pictur	4	PCO	Heating	Heating			-	0 C. Breaker C		Basis Prot	1.1	
- S Modification indexes	6	PCO	Misc	Hisc				0	C. Breaker C	Basis Prot	11	
Project		BCO	Board	Board					C Breakler C	Basis Dod	1.1	
MSB			BDTrkSpit	Busbar In	unking System			40	C. Breaker C	Basis Prot	1.1	
5 GA TO 00	-		TransfillMIN	Lapacitor	- INAN			10	C. Dreaker C	DIASIS PTOC	43	
	10	DIVIG	Buches	C.A. Bush	III LY/LY			0	C. Breaker C	Basis Prot		
	10	ECU	BUIDA	SUD BUSDAR				0	C. Breaker C	Basis Prot		
		ECL	Motor				·	0	C. Breaker C	Basis Prot		
		ECLO	MOT DIS+CONT	Mot protégé	Mot protégé par disi, + contacteur	n.#		0	C. Breaker C	Basis Prof.		
	12	ECL	MOT DISJ	Mot protégi	légé par disjoncteur			0	C. Breaker C	Basis Prof		
	13	ECU	MOT_INVERS	Moteur deux	x sens de marche			0	C. Breaker C	Basis Prot		
	14	ECU	MOT TH AVAL	Motoca auto	themine and		7	0	C. Breaker C	Basis Prof.		
	15	ECU	×				1	0	C. Breaker C	Basis Prot		
	16	ECU	800	ECL+BAES+TL1	2-3-25	1		0	C. Breaker C	Basis Prot		
	17	ECU.	909	ECL-BAES+TL1	P+N+PE	1		0	C. Breaker C	Basis Prot		
	18	ECU	010	ECL+BAES+TL1	P+N+PE	1		0	C. Breaker C	Basis Prot		
	19	ECU	011	ECL-BAES+TL1	P+8+9E	1		0	C. Breaker C	Basis Prot		
	20											

To create simultaneously several circuits, proceed as above but before you choose the circuit style, press and hold the Shift key. After you has chosen the circuit style, Caneco BT ask you for the number of identical circuits you want to create.

9.2 Edition Commands

9.2.1 Selection of one or more circuits

Selection is made as for rows on a spreadsheet software, clicking on a first row, pressing and holding Shift key, then clicking on last row you want to choose. So, you can copy and paste one or more circuits.

9.2.2 Selection of one or more cells

Selection is made as for cells on a spreadsheet software, clicking on a first cell, pressing and holding Shift key, then clicking on last cell you want to choose.

9.2.3 Cut, Copy, Paste

When you select one or more circuits, or one or more cells, the *Cut/Copy/Paste* commands become active. These commands run as in a spreadsheet.

10 Detailed circuit calculation window

To display the circuit window you can double-click on a circuit or pass through the Circuit/Edit menu. User can then choose between two display modes:

- Minimum display
- Detailed display

10.1 Minimum display

Minimum display shows the minimum data needed to calculate a circuit.

Circuit state Green: circu Magenta: cir	it OK cuit not OK
Circuit sheet	
C_1 on MSB Board(Standard).	Š
Curve discrimination Coordination Cable/Protection Downstre	sam
Upstream Circuit Additional Additional results Conformity	Texts
Circuit C.1	-
Upstream : MSB Index : ▼ Supply : Normal ▼ Conductors : 3P+N+PE ▼ Designation :	Navigation arrows
Command Protection	· 7 /
Type : MCCB < Indirect contacts : Basis Pro	
Protection NR100F TM100D 100A 4P3T	• I
Overtal protection Shot-circuit protection sing: 100 A 1 IN/rTh/iLR : 100 A 0 Delayed 0 0 Delay: 0 0	
Cable maximum display	
Length: 25 m Coefficients 1.00 ··· Type: PRC ▼ Proximity: 0.72 ··· Coce: Copper ▼ Additional 1.00 Instal: 13 Perforated tra ▼ Total Correction: 0.72 Pole: Single S>Max ▼ Total Correction: 0.72	
Equipment DB_1 Coefficients Permanent Consumption : 1004 ▼ Use : 1 Cos phi : 0.8 Location : ▼ Use : 1 Cos phi : 0.8	3
Calculate OK Cancel Help	
	Circuitlock

10.2 Detailed display

With detailed display you can see and modify circuit data at expert level.



10.3 Navigation arrows



10.3.1 Upstream distribution arrow

Opens upstream distribution window (feeding circuit)

10.3.2 Downstream distribution arrow

Opens downstream distribution window (fed by the circuit)

10.3.3 Next circuit arrow

Validates active circuit, and display following circuit

10.3.4 Previous circuit arrow

Validates active circuit, and display previous circuit

10.4 Circuit Tab

10.4.1 Circuit topic

Circuit

Specify the circuit identification on maximum 15 characters.

Upstream

Board ref mark from which the circuit is issued. This ref mark is automatically completed by **Caneco BT**, when you have created a circuit.

You can modify it, so as to shift one circuit from one board to another one.

Supply

There are three possibilities:

- Normal: the circuit issued from board is supplied only by Normal source (not essential circuit)
- Standby: the circuit issued from board is supplied only by Standby source (essential circuit)
- Normal/Standby: the circuit issued from board is supplied by Normal and Standby source (essential circuit)



Indicating that a circuit is supplied in Normal/Standby implies that it is calculated taking into account the two possible sources, which sometimes may be very unfavourable, in case of the standby supply is provided by small low power gensets.

Content

Indicates the content of the circuit: for example 3 phases, N and PE.

• PE means equipotential bonding conductor.

In TN diagram, the 3P+PEN content allows to make TNC, 3P+N+PE from TNS.

Content	Meaning
3P+PE	Three-phased circuit with PE
3P+N+PE	Three-phased circuit with Neutral and PE
3P	Three-phased circuit without PE
3P+N	Three-phased circuit with N and without PE
3P+PEN	Three-phased circuit with PEN (TNC system)
P+N+PE	Single-phase circuit with Neutral and PE
P+N	Single-phase circuit with Neutral and without PE
2P	Two-phased circuit (phase to phase) without PE
2P+PE	Two-phased circuit (phase to phase) with PE



Do not confuse 2P with P+N. In 230/400V installation, P+N means single phase (230V), while 2P means two-phase (400V)

Designation

Circuit designation (maximum 36 characters).

10.4.2 Protection topics

Type :	MCCB -		Indirect contacts :	Basis Prot 🔻
Protection _		NR100F TM63D 63A 4P3T		
Overload protec	tion	Short-circuit protection		
Rating: IN/IrTh/IrLR :	63 A 1 50,4 A	IrMg 500 Delayed Delay : 0	A	•

if manufacturer file has an EDIELEC format, click on «delayed» to get a delayed protection on shortcircuit. If human protection against indirect contacts is made by a Differential, the window is completed with other information:

Гуре :	MCCB 💌			Ind	irect contact :	Dif.30mA
Protection _]	NSX160F M	dicrologic 2.2	160A 4P3T		
Overload prot	ection	Short-cir	cuit protect	ion	RCD Prote	ction
Rating:	160 A 1	IrMg	1250 A	Delayed	Setting:	30 mA
IN/IrTh/IrLR :	160 A	Delay:	20 ms		Delayed	

if manufacturer file has an EDIELEC format, click on «delayed» to get a delayed differential protection.

Туре

Enter circuit protection.

Туре	Meaning
CrBrk. moulded case	general purpose circuit-breaker, moulded case according to EN 60947-2 and IEC 947 standards.
Open circuit-breaker	general purpose circuit-breaker, Open according to EN 60947-2 and IEC 947 standards.
CrBrk C	modular circuit-breaker, C and U curves according to standard EN 60947-2 or EN 60898
CrBrk B	modular circuit-breaker, B and L curves according to standard EN 60947-2 or EN 60898
CrBrk D	modular circuit-breaker, D or K curves according to standard EN 60947-2 or EN 60898
CrBrk Mot	motor circuit-breaker according to standard EN 60947-2 and IEC 947 ensuring motor protection.
CrBrk + Th	motor start protection realized by a coordination contactor + circuit-breaker + thermal relay type 1 or type 2.
gG	fuse g1 or gG type
aR	Ultra-fast fuse
gR	Ultra-fast fuse
gS	Ultra-fast fuse
gG + Th	association fused switch contactor + thermal relay with fuse of g1/gG type. This type of protection is suitable for distribution circuits. Contactor is determined in category AC1
aM	fuse g1 or aM type
aM + Th	association fused switch contactor + thermal relay with fuse of aM/gM type. This type of protection is suitable for motors. Contactor is determined in category AC3-AC4
CrBrk without thermal r.	circuit without overload protection, which is allowed by the standard for some circuits (not supposed to produce overload). Caneco BT will ask you for the type of protection against short-circuits. The overload condition is checked taking into account the design current (IB).
Without protection	Protection is in fact a protection against Short-circuits of the circuit feeding the upstream board. This is the case with feeding lines with decreasing cross-section. No protection against overload is accepted only with the following standard conditions: equipment not capable of producing an overload or protected at circuit ending.

Indirect contacts

This is the mean to ensure human protection against indirect contacts.

Indirect Contacts	Meaning
Basic Prot	Protection against electrical shocks is ensured by the protection defined in field
	Type (protection against short-circuits).
Dif. 300mA	residual differential protection of 300 mA rating
Dif. 30mA	residual differential protection of 30 mA rating
Dif. 10mA	residual differential protection of 300 mA rating
Autres DDR	Adjustable residual current protection
AEB	Additional Equipotential Bonding (AEB).
Equipot	Earth general equipotential bonding. This is the case of installations in which chassis are connected to an earth general equipotential bonding network, realised by bared underground earth cables or by bared earth cables laid on cable ways. This device allows to not distribute the PE in each circuit cable (cable content can be then a 3P without PE). Equipment chassis for this circuit must be directly connected to this equipotential bonding network.

Protection

Name of the protection model (Breaking device, Release, RCD References), Rating and number of poles.

Protection Lock

Unlocking/Locking of the protection is reported by the ticked or not ticked state of the box planned with this end in view.

Protection	Γ	NS400N STR23SE Vigi MB 400A 4P3D	 H	1	
		-	 4.0		

During a calculation, a locked protection is not modified. The user can modify the values in the catalogue' value limits.

Rating

Rating of the smallest protection which can satisfy standard conditions, if your *protection choice* is *automatic*; **or** the rating you have selected if your *protection choice* is *manual*.

If you want to impose this value, the button is the user's choice by model situated at right from this field allows you to choose the protection amongst all ones included in the manufacturer file you has chosen, and according to standards



IN/Irth/IrLR

Réglage du thermique du disjoncteur ou calibre du fusible assurant la protection contre les surcharges. Pour un disjoncteur, le réglage du thermique est paramétrable (commande *protection* du menu *Option*). Il peut être réglé au minimum (IB: courant d'emploi), au maximum (calibre de la protection) ou au maximum supporté par la liaison (IZ du câble pour les *récepteurs* ne nécessitant pas d'être protégé contre les surcharges). If you want to force this value, enter the value which characterizes the protection against overloads:

- thermal relay setting when protection is a circuit-breaker,gM+th or g1+th fuse.
- fuse rating when protection is a fuse g1.

Thermal			
Protection	-	04. 3P	
Overload p	protection	Short-circuit protection	
Rating:	0A 🗌 1	A0 A0	
Thermal :	Upstream 🔻		

Impact of choice of position of thermal circuit breaker:

Upstream of the busbar trunking: Cross-section calculated according to the protection of the upstream circuit

• Downstream of the busbar trunking: The cable cross-section will be calculated according to In or thermal adjustment for a circuit breaker or I2 for a gG fuse (value to be entered by the user if the protection is not defined in Caneco BT)

Irmg or IN (protection against SC)

Circuit-breaker magnetic setting or fuse rating insuring protection against short-circuits.

- For a circuit-breaker, magnetic setting is set to the maximum value compatible with circuit-breaker, and insuring opening with the smallest of the minimum short-circuits (If or Ik1 or Ik2).
- If you want to force this value, enter the value which characterises the protection against short-circuits: magnetic setting when protection is a general purpose circuit-breaker (Gen CBrk) or a motor circuit-breaker (CBrk. Mot.) or a circuit-breaker in coordination with a contactor (CBrk. + Th).
- Maximum release value warranted on short-circuit, when protection is a modular circuit-breaker (CBrk C, B, D/K)
- Fuse rating when protection is a fuse gG, or aM+th

Delayed

With the tab, you can select protections with a delayed release

Delay

Magnetic delay in ms.

10.4.3 Cable topics

Cable	<u> </u>			
Length :	200 m	Coefficients Temperature :	1,00 •••	Conductors
Туре :	PVC 🔻	Proximity :	0,72 •••	Neutral: 1 1 185 mm² -
Core :	Copper 🔻	Additional	1,00	PF 1 50 mm ²
Instal. :	13 Perforated tray 💌			
Pole :	Single Trefoil 💌	Total Correction :	0,72	Neutral loaded :

Length

In case of several equipments, it is the distance of the far device. In this case, it appears an additional distance to the 1st equipment:

Cable	<u> </u>		,
Length : Type :	12 m 15	Distance from the 1st Equipment Proximity :	0,72 ··· Phase : 1 1,5 mm² ▼ 0,72 ··· Neutral 1 1,5 mm² ▼
Core :	Copper 🔻	Additional	1,00 PF 1 1 15 mm² -
Instal. :	31 On perforated 🔻		
Pole :	Single S>Max 🔻	Total Correction :	0,72

1er Equipment (m)

Enter (with circuits having several devices) the distance between protection and nearest device. This data is used in versions after 4.1B, for voltage drop and discrimination calculation.

_ . .

Cable type

Enter the cable type used for the link between protection and device. This type is chosen in the list of cable type. This list is saved in a file with extension *.*cbl*. The file can be selected for the project and modified by means of *Manufacturer files / Cable* topic from Options menu. The default file is *Caneco.cbl*.

Cable conductor	core
Core	Meaning
Copper	copper conductor
Alu	aluminium conductor
Cu or Alu	copper conductor for small cross-sections, in aluminium for big cross-sections. The threshold between copper and Alu is defined in the Dialog box called by <i>Cables</i> command in Options menu.
Alu + PE Alu	copper conductor for phases and Neutral, and PE in Alu. This choice is possible only when link is of type <i>Single-core</i> or <i>Multi</i> + <i>PE</i> (multi-core)

Installation method

Enter the cable installation method according to chosen the calculation standard. Clicking the button on the right to get the list of the different methods of installation.

Pole

Choose single-core or multi-core cables.

Uni / Multi: Automatic switching between single-core or multi-core cables from specified cross-section.

Temperature factor (K. temp)

This coefficient is named in standard as *Temperature correction factor*. It downgrades the current carrying capacity depending on the temperature. Default value is 1, this factor is defined by the standard, depending on the cable insulation and cable operating reference temperature. It can be determined by **Caneco BT**, depending on given

temperature, and the choice of cable type, if you used the button - located immediately on the right.

To calculate the coefficient with **Caneco BT**, depending on the given temperature it is assumed that you have correctly chosen your cable type before. If you change the cable type and if your cable insulation has changed, it is necessary to recalculate this factor

depending on the desired temperature.

Group factor (K. prox)

This factor is known in standards as *cables or circuits group correction factor*. It downgrades the current carrying capacity depending of the proximity of other cables.

The value proposed by **Caneco BT** depends on the style. It is usually 0,72, which corresponds to perforated cable track installation method, on one layer, touching, unlimited number of cables.

This factor has a significant impact on the cable calculated cross-section, you must study carefully among all parameters the most important one:

- Proximity of cables between themselves. According to standard, installation methods, and according to their spacing, cables distant from each other do not mutually heat each other.
- Cables load compared to their current carrying capacity. a circuit with IB < 0.7 Iz is supposed not to heat neighbouring cables.
- Global load of cables laid on same cable track. This global load can be reduced by the thermal setting of the circuit feeding the distribution.
- See section *Distributions* / Board window / information on boards / cables S IZ / Board IrTh

To facilitate estimation of this coefficient, in the window you can press button on the right to get help on this matter.

Additional factor (K. Addit)

Enter additional downgrading factor for current carrying capacity depending on external conditions. This factor is not standardised, it can be fixed by the user.

Symmetrical factor fs

Apply a symmetrical factor (fs=0.8), if need and if the number of conductors per phase >1 (according to NFC 15-100 standard only).

10.4.4 Results fixing topic

Conduc	tors	
Phase :		1 🌲 🔄 1,5 mm² 💌
Neutral :		1 🌲 🔄 1,5 mm² 💌
PE		1 🌲 🔄 1,5 mm² 💌

Results which may be fixed are values calculated by **Caneco BT**, which you can eventually adapt to existing data. It concerns cables and protection.

To force one data, you must tick the box on the left of this data. You can cancel fixing by clicking again on the check box.

When a value is fixed, it is checked by Caneco BT.

Conductors - Phase

The smallest calculated phase cross-section of the link, taking into account all standard criteria. If you want to force this value, enter the number of conductors per phase for the link, then the cross-section for each phase.

Conductors - Neutral

The smallest calculated neutral cross-section of the link, taking into account all standard criteria. If you want to force this value, enter the neutral number of conductors for the link, then the cross-section for neutral.

Conductors – PE (or PEN)

The smallest calculated PE/PEN cross-section of the link, taking into account all standard criteria. If you want to force this value, enter the PE/PEN number of conductors for the link, then the cross-section in mm2.

Loaded Neutral

To apply an additional factor to current carrying capacity if Neutral is loaded.

10.4.5 Equipment topics



Ref Mark of the equipment (1). (00 V5).

For the distribution circuits (board, LV/LV transformer, busbar trunking system), you can modify directly the distribution ref. mark fed.

Equipment number

Enter the equipment number (2). You can also design circuits feeding several pieces of equipment.

Example: 12 lighting devices of 2*36 W

Total circuit consumption equals to:

Total circuit power = number of equipments * consumption, where *consumption* is defined as follows.

Consumption

Enter the consumption for each equipment: current or consumed electrical power or *standard power*. Power can be entered in A, W, kW, kVA, consistency of the chosen unit is checked according to selected equipment type.

• Ex: KVA are forbidden for motors.

The arrow at right from this field makes allows to open the standard power list, which related to the circuit style.

- If the circuit style is based on *Caneco BT motor* style, the standard powers are motor mechanical powers.
- If the circuit style is based on Caneco BT Lighting style, standard powers are conventional designations (1*58 W, 2*36 W, etc.) of fluorescent lights. 2*36W means a light having 2 fluo lights of 36W.
- if the circuit style is based on *Socket* style, standard powers are conventional designations (2*16 A, 3*32 A, etc) for sockets: 3*32A means three-phase socket 32 Amps.

Standard power list can be extended. It is saved in a file with extension **.std*. The file can be selected for the project and modified by means of *Manufacturer files* command from Options menu. The default file is *Caneco.std*.



Do not put blanks in consumption. Correct examples: 120, 50KVA, 30KW.

Consumption given in KW has a meaning depending on the equipment type: for a motor, it is the available mechanical power on the axle and not the electrical power.

Default unit is the one indicated (and which can be modified) in Calculation action from Option menu. In all cases, consumption is transformed in design current (IB in the results window).

Geographic location

Enter this data with the equipment nearest geographical location.

Rate of harmonics (4)

The level of 3rd order harmonics and multiple of 3 is applicable to circuit. Calculation takes into account the standard rules for neutral cross-section calculation.



Attention: Neutral is considered as loaded at a rate of harmonics between 15 % and 33%, so that a reduction factor is applied on the withstand currents. Calculated cross-sections are increased about 25%.

See paragraph affected by standard



Attention: When a rate of harmonics is >33%, the neutral is calculated to get a withstand current at least equal to 1,45 times the design current on the phase. The protection device must have, in neutral, an assigned current al least equal to this value.

See paragraph affected by standard

Use factor

Circuit use factor which can be specified.

Default proposed value is:

- that of chosen standard power, if consumption is got from standard power table
- or that of the circuit style.

This value has no incidence on cable and protection dimensioning. It affects only the power requirement.

Diversity factor

When a circuit has several equipments (sockets, lighting, etc.), it is possible to apply a Diversity/simultaneity factor *kSimult* for equipments amongst themselves. Circuit total power = number_of_equiment*consumptio*KSimult

Permanent Cosinus Phi

Circuit Power Factor which can be specified.

Default proposed value is:

- that of chosen standard power, if consumption is got from standard power table
- or that of the circuit style

dU max

Indicates maximum admissible voltage drop in %, from the beginning of the installation to the cable end. Default proposed values by **Caneco BT** depends on the style and takes into account source supply (private supply or LV distribution) and of equipment kind.

Cos Phi Start

Cosinus phi at start, to calculate voltage drop during motor start for example. Default proposed value is:

• that of chosen standard power, if consumption is got from standard power table

• or that of the circuit style.

You can modify this default value.

ID/IN

ID/IN factor. The same remarks as above.

10.5 Upstream tab

For the description of all these fields, see paragraph Board window from Distributions chapter.

10.6 Additional Tab

Board (Stary	on MSB					
Curve de	cinination	Ce	ordination Cable/Prote	ction .	Down	dean.
Upshears	Circuit	Additional data	Addition	al results	Conformily	
B Device 1 P	intection/Control					1-
Fot Mark.	design and the state of the		00.0.000000000	and the second		
Protective device	ce manufacturer		Schreider Electric 20	11/EN 60947-2	(EdDec)	
Switch manufac	thurse.					
Minimum protect	tion device rating				15	Δ.
F 1K.1a	e TTC devaling		1.05			
No verification i	of short-circuit capac	sty				
Pt Dry/Oll			11000			0
Max penalted	PE (APA)		0.0 AV			
Min. calegory re	rquired		2		AC	2
Fuce size			10-			9
B Direct current						-1
B Device 2 Ano	ciated control	/				
Device 2 prese	ril .	/		11		- 1
Matel Device	2.					- 1
Device nanda	CLARK					1.58
Device type					Contacto	8 ()
Control devices	ry laminel					1.1

10.6.1 Topic Device 1: Protection/Command (1)

Ref mark

Enter here the reference mark for the protective device: this reference will be displayed to the right of the protective device in the Board Single-line tool.

Protection manufacturer

Allows you to choose a protection/breaking device from a circuit specific catalogue file.

Protection minimum rating

Minimum rating is defined in circuit style.

- Light Style: 10A
- Socket Style: 16A

User may modify this value. For example minimum rating for sockets can be reduced to 10A instead of 16A. It is incumbent on user must to enforce standard rules.

K, fuse T°C derating

The line fuse derating factor. This factor may depend on the type of fuse holder. It is mandatory to always enter this, as the nominal rating of UR fuses is given at a T_{amb} of 20°C, and hence this factor is rarely 1.

No check on short-circuits thermal stress for conductors

When this option is ticked, protection against short-circuit may be provided by protection against overload, according to conditions specified in the standard

The following table shows the protective devices for which the "No check on conductor short-circuit capacity" option can be used.

Max. permitted I2t (A2/s)

The max. permitted I²t for the electronic equipment to be protected on the line. This value should be given by the manufacturer of the equipment to be protected.

Fuse size

It is necessary to add this parameter necessary in order to limit the number of UR fuse files to one per family. There are several sizes in each family, and the same rating is found in several sizes, but with different T/C, I²t lim, and Ip lim characteristics.

Type of protective device	YES	NO
Instantaneous thermal-magnetic circuit-	V	
breaker	X	
Electronic circuit-breaker with long delay	~	
incorporated and short instantaneous delay	*	
Modular circuit-breakers	х	
gG fuses	х	
Non-thermal circuit-breakers		Х
Magnetic + Thermal circuit-breakers		Х
aM fuse with or without thermal trip		х
All delayed protective devices		Х

10.6.2 Topic Device 2: Associated control (2)

This item allows you to enter the type of associated control device on a circuit.

Topic Device 2:

Enter here the reference mark for the device: this reference will be displayed to the right of the device symbol in the Board Single-Line tool.

Device type

Specify here the device type

Device 2: Associated control		
Device 2 present	✓	
Marker, Device 2		
Device manufacturer		
Device type	Contactor	-
Control device name	Contactor	*
Rating	Off-peak contactor	
Number of poles cut	Emergency-stop contactor	=
Device 3: Relay	Load shedding contactor	
Relay Ref Mark	Heating contactor	
Thermal relay	Time switch	
🗆 Cable	Liebt intersity suitely	
Bef Mark	Light intensity switch	*

Control device name

Allows enter reference mark of control device

Rating

Allows enter device rating.

These data will be displayed at right of device symbol, in Board network single-line tool.

Number of tripped poles

Allows enter number of tripped poles. These data will be displayed at right of device symbol, in Board network single-line tool.

10.6.3 Topic Device 3: Thermal relay

Thermal relay:

E Cable

Thermal relay associated with a power contactor as per stipulations in manufacturers' catalogues.

10.6.4 Cable topics

-	Cable	
	Ref Mark	
	Minimum cross-section	2.5 mm ²
	Nature of separated PE	Isolated
	PE number of conductors	=1
	Number of additional conductors	0

Minimum cross-section:

User may modify this value. For example minimum cross-section for sockets can be reduced to 1.5mm2 instead of 2.5 mm2. It is incumbent on user must to enforce standard rules.

Nature of separated PE:

User may set here the nature of separated PE conductor (Isolated, Bare)

Number of PE conductors:

User may set here the number of PE conductors.

(allows reduce phase cross-section)

The default value for "Number of PE conductors" is set as 1.

In situations where this option would lead to over-sizing of the cross-sections for the phase conductors, or even prevent calculation (indirect contact criterion), a message will be displayed to suggest checking the "Number of PE conductors = no. of phases" option in the 'Calculation options' window, under the 'Cables' tab.

Handling PE thermal stress -

This is handled by automatically taking into account the "Breaking Time Rule" or BTR. This may affect: BBTS sizing PE cross-section reduction Magnetic trip settings

The calculation criterion and compliance

Number of additional conductors:

User may set here the number of additional conductors (for example: pilot wire on a heating circuit).

10.6.5 'Terminals' section

The user can set terminal marking, define a terminal block name, enter the number and type of terminals.

-	l erminals	
	Wiring on terminals	\checkmark
	Terminal fixing	
	Terminal block name	
	Terminal numbers	
	Number of additional terminals	0
	Terminals type	Not disconnectable

10.6.6 'Circuit characteristics' section

Creating circuit attributes (attributes 1, 2, and 3) makes it possible to describe the nature and diagram of a circuit. These attributes can make it possible to automatically generate multi-line block diagrams in electrical wiring diagram applications.

These attributes are usually correlated with the attributes of the symbols used in the Caneco single-line diagram of the circuit, including any associated circuits there may be. They may give a form of synthesis of it.

Example of a star-delta motor feed:

- attribute 1: star-delta

- attribute 2: Local control, remote manual disconnect

Example of an instrumentation circuit (associated circuit alone):

- attribute 1: instrumentation
- attribute 2: datalogger

These attributes may be initialized by Caneco BT in accordance with information defined by their style. They may be modified by the user at will.

ΞC	Circuit/equipment characteristics	
	Internal Circuit	
	Attribute 1	NA
	Attribute 2	
	Attribute 3	

10.6.7 'Calculation criterion' section

The user can choose not to verify one calculation criterion for a very specific reason.

If the 'Overload' criterion is deselected, the following message will appear:

A virtually identical message will appear, depending on which criterion is deselected.

• Attention! This section is intended for experienced users only.

In the event of a reservation expressed by a technical inspection service, the Caneco BT user will be obliged to provide justification.

Ξ	Calculation criteria	
	Overloads	\checkmark
	Voltage drop	\checkmark
	Indirect contact	\checkmark
	Short circuits	\checkmark

10.7 Additional results Tab

Curve dis	crimination	Coordin	nation Cable/Protection	Dowr	nstream
Upstream	Circuit	Additional	Additional results	Conformity	Texts
Discrimination-A	Association Backu	p	-		
Thermal Discrim	hination				
Limit					
From					
Ir Diff					
Diff Delay					
Differential Disc	rimination	0			
lcu	lcu Backup	kA	kA		
🗉 Maximum break	ing time : ms				
IC max time		0 ms			
Phase Max Tim	e	0 ms			
PE Max Time		0 ms			
Neutral Max Tir	ne	0 ms			
UL		50V			
⊟ Link					
R Phases af	fectation	123			
Width		mm			
Height		mm			
Weight		0,00 Kg/m			
dU Start.					
□ Ik at end of link	۲.				
Ip not limited		0,00 kA			
lk2/3 Max End		A			
Ik1 Max End		A			
Ik2 Min End		A			
Ik1 Min End		A			2
If		A			

10.7.1 Discrimination-Association Backup Topic

Thermal discrimination with upstream

- *Without* means that in certain cases of overload faults, discrimination with upstream may not be provided. The upstream protective device is liable to trip before the downstream protective device.
- With means that in all cases of overload faults, discrimination with upstream is provided.

Discrimination Limit.

Current discrimination limit on short-circuit in Amps

Discrimination from

Distance from which there is total discrimination on short-circuit. The considered distance is the one separating protection from short-circuit point.

With this distance one can appreciate functional discrimination conditions for circuits made up of several equipments (lighting circuits, sockets). If the given distance is more than the first equipment distance (most unfavourable place for short-circuits risks), discrimination becomes functional.

Ir Diff

Differential Residual Current Device adjustable in mA.

You cannot get access to this value if you choose Diff Ad. (Differential adjustable) for human protection against indirect contacts.

Diff Time delay

Residual Current time delay in ms.

Diff Discr.

Differential discrimination with upstream. This is the differential discrimination in case of earth fault current (If) on the calculated circuit.

It can be:

Discrimination	Meaning
Nil	the upstream protection trips at the same time as that of the circuit
Uncertain	the upstream protection is liable to trip at the same time as that of the circuit
Total	the circuit protection trips and the upstream protection does not
Not calculated	the differential discrimination is not calculated

lcu

Protection breaking capacity (eventually with backup, coordination) in kA.

10.7.2 Max Breaking Time Topic

Tmax IC

Max functioning time in ms for a circuit-breaker protection not to exceed human protection against electrical shocks condition. This time is fixed by the standard (from 100 to 800ms according to voltage and earthing system). For distributions, the time is increased to 5s, (see standard).

Tmax Ph

Max functioning time in ms for a circuit-breaker protection not to exceed cable phase thermal stress.

This time is calculated considering a max three-phase short-circuit at the beginning of the link (Ik3 max: see I3Max later).

For fused protections, this time is by convention 5000 ms, but it is not significant.

Tmax Ne

Max. operating time in ms for a circuit-breaker protective device so as not to exceed the thermal stress of the cable neutral.

This time is calculated taking into account a max. single-phase short-circuit at the start of the circuit (Ik1 Max upstream).

For fused protections, this time is by convention 5000 ms, but it is not significant

Tmax PE

Max functioning time in ms for a circuit-breaker protection not to exceed cable PE thermal stress. This time is calculated taking into account a min. phase–PE short-circuit at the far end of the circuit (If min). For fused protections, this time is by convention 5000 ms, but it is not significant

10.7.3 Link topic

F/Poles distribution

Phase distribution for single-phase circuits, fixed or not.

Link width

This is the width of the link on cable track. If cables are single-core, they are supposed to be in trefoil configuration if there are several cables (separated N or PE for example) they are touching. This value is used to calculate useful height on cable track sections.

Link height

This is the link height. If cables are single-core, they are supposed to be in trefoil configuration if there are several cables (separated N or PE for example) height is the height of the bigger cable. This value is used to calculate useful height on cable track sections.

Weight

Link weight for one metre in kg (cable, neutral and PE eventually separated). This value is used to calculate useful load of cable tracks sections.

10.7.4 Ik Topic

Ip not limited

This is the peak value of three-phase short-circuit for three-phase circuits (Used to verify electrodynamic stress)

lk3 Max

This is the max three-phase Ik for three-phase circuits

lk1 Max

This is the max short-circuit current, single-phase if neutral is present

If Max

This is the maximum fault short-circuit current if there is a PE.

lk2Min

This is the min short-circuit current, single-phase if neutral is present, two-phase (Phase to phase) if neutral is absent

lk1Min

This is the min short-circuit current, single-phase if neutral is present, two-phase (Phase to phase) if neutral is absent

lf

This is the default short-circuit current If phase-PE at the end of the link.

10.8 Conformity Tab

Curve discrimin	nation	Coordin	ation Cable/Protection	Dov	vnstrear	n
Upstream	Circuit /	Additional	Additional results	Conformity		Texts
All Defaults						
E Circuit						
Bef Mark		MS	3B=C 001			
Modification index		A			_	
Standard		IEC	0364-01		_	
Consumption		12	Δ.		-	
Coincidence factor		1,0	0			*
Voltage		42	0 V			
Circuit type		Bo	ard			
Protection device						
Туре		MC	CB			
Manufacturer		mg	06fr1.dug			
Family		NS	100N			
Overrating factor		1,0	10			
lem	>= Ip Upstream I	imited	>=			
vlcu	>= lk Max	36	.0 kA >= 2	1,1 kA		
Icu with Backup	>= Ik Max	36	,0 kA >= 2	1,1 kA		
Icu single-pole	>= Ik in IT	25	5 kA >= 0	,0 kA		
 Differential Discrin 	nination	No	t calculated			
 Magnetic discrimination 	nation	To	tal			
Thermal Discrimin	ation	Wi	th			
ln or Ir	>= Ib x k oversi	zing 12	.8A >= 1	2,00 A		
✓In or Ir Ne	>= Ib Ne x k ov	ersizing 12	,80 A >= 1	2,00 A		
🗆 Cable						4
Poles		3P	+N+PE		_	
Length		12	m		_	3
Core		L.C.o	nner		_	

10.8.1 Standard conditions

The Conformity sheet is used to indicate all standard conditions which must be satisfied by a circuit, to determine corresponding values and indicate if they are satisfied or not.

These conditions are:

- Protection
- determination of thermal relay rating or setting depending on IB:
- Thermal relay Ir or IN >= IB
- breaking capacity
- Icu with or without association with upstream >= IkMax

Cables

- Voltage drop
- Overload
- Protection against indirect contacts
- Thermal stress for phases, neutral and PE (PEN)

All of the conditions indicated are:

- those directly expressed in the standard e.g.: $|k_{2}^{2}C_{2}^{2} = |^{2t}$ for the thermal stress condition
- $k^2S^2 \ge l^2t$, for the thermal stress condition.
- or the corollary conditions.

For example the condition:

Ik Mini > IrMagn x 1,2 (magnetic release on IkMini) which is one of the conditions to get the standard condition above.

These conditions translated by formulae can be completed by graphical representations

Compliant/non-compliant conditions

With the conformity sheet one can see immediately if conditions are not correct. In such case, with **Caneco BT** one can see in «Fault» tab of the conformity sheet, all standard conditions which are not correct.

- The conditions not met are identifiable by a red cross.
- Conditions met are identifiable by the green OK symbol.

10.9 Text Tab

This window allows free entry of additional information concerning the circuits.

Example: text 8 is reserved for indicating in which sheet of the control diagram you can find the wiring details for additional diagrams associated with the protection devices

(See Schematics chapter).

10.10 Downstream Board Tab

For the description of all these fields, see paragraph Board window from Distributions chapter

10.10.1 Protection choice

The protection choice window is displayed for each circuit calculation. The user can choose between three ways to get a protection

Protection	NS100N TM16D 16A 4P3T	
Overload protection	Short-circuit protection	C Automatic choice
Rating: 16A 1	IrMg 190 A	🕵 User choice by model
IN/IrTh/IrLR : 12,8 A	Delayed 🗌	🕵 User technical choice (CTM)
	Delay : Oms	🋷 Choice out of catalog

Economical automatic choice

Caneco BT automatically selects in the list of protection the first one which satisfies all conditions according to

circuit data. The automatic choice made by **Caneco BT** is indicated by the icon

• User's choice by model

The user can choose another protection in the list, the User's choice by model is indicated by the icon Choice out of catalogue •

The user can choose a protection out of catalogue. The choice out of catalogue is indicated by the icon Caneco BT uses the protection data entry given by the user to calculate. Rating, IrTh, IrMag.

User's technical choice

The user can choose in the «Equipment technical choice» window another protection and its accessories, the

user's technical choice is then indicated by the icon \square

Economical automatic choice

Circuit breaker choice in catalogue Catal	ogue 2004-2	2005 + Ele	ectricien :	2006		X
Choice Informations Sheet						
	Protec	tion of ci	rcuit MSI	B=C_001		
Madal name	In Brook(A)	Poting	IrTh Min	leu (kA)	Poloco A Poles	
Netoon Twice	In Dreak(A)	Trating	12.00	ICU (KA)	Release 3P3T	
NSTOON TWIGD	100,00	10,00	12,00	26	Magneto thermal Leve 4P3T	
NOTON THTOD	100,00	10,00	12,00	36	Magneto-triennal Low 4P4T	
NSTOUN TMTOD	160,00	16,00	12,00	20	Magneto-thermal lieu	
NS160N TM160	250.00	16,00	12,00	36	Magneto-thermal	
NS250N TM16D	250,00	16,00	12,00	20	Magneto-thermal ow	
NS100SY TM16D	100.00	16,00	12,00	50	Magneto-thermal Without	
NS1005X TM16D	100,00	16,00	12,00	50	Magneto-thermal low	
NS1605X TM160	160,00	16,00	12,00	50	Magneto-thermal	
NS1605X TM160	160,00	16,00	12,00	50	Magneto-thermal low	
NS250SX TM16D	250.00	16.00	12,80	50	Magneto-thermal	
NS2505X TM166	250,00	16.00	12,80	50	Magneto-thermal Low	
	200,00	10,00	112,000	-		
Thermal Characteristics (A)				S	hort-Circuit Protection (Short delay)	
In (Breaking 100 Ir Min (A)	12,8				Ir Min (A) 190 Tf Min (mS)	0
Release rating 16 Ir Max (A)	16				Ir Max (A) 190 Tf Max (mS)	0
Dises 20						
Phases 30						
				1		
			Sir	nulation	▲ ▼ OK Cancel	

Model name

According to catalogue, the model name may include the name of the breaking device, release relay, and Residual current Device.

In Break

Nominal current of the breaking device

Rating

Rating of the release relay

lcu(A)

Breaking capacity of the protection (eventually with association -coordination) in kA. Déclencheur

Release

Release type: Thermal with Magnetic (5 to 10 ln) Thermal with Low Magnetic (3 to 5 ln) Electronic

Th. Discr.

Displays the Thermal discrimination with the upstream circuit-breaker when selecting the circuit protective device

lk Discr.

Displays the short-circuit discrimination with the upstream circuit-breaker when selecting the circuit protective device

Poles

Configuration at the protective circuit breaker: number of poles of the protection number of protected poles

RCD

Residual current Device: without, separated, Ir Min/Ir Max

User's choice by model

Circuit breaker choice in catalogue Cata	logue 2004-2	2005 + El	ectricien	2006		×
Choice Informations Sheet						
	Protec	tion of ci	rcuit MSI	B=C_001		
Model name	In Break(A)	Rating	IrTh Min	lcu (kA)	Release	Poles
NS100N TM16D	100,00	16,00	12,80	36	Magneto-thermal	3P3T
NS100N TM16G	100,00	16,00	12,80	36	Magneto-thermal Low	4P3T 4P4T
NS160N TM16D	160,00	16,00	12,80	36	Magneto-thermal	1 1
NS160N TM16G	160,00	16,00	12,80	36	Magneto-thermal Low	
NS250N TM16D	250,00	16,00	12,80	36	Magneto-thermal	PCD
NS250N TM16G	250,00	16,00	12,80	36	Magneto-thermal Low	nuu
NS100SX TM16D	100,00	16,00	12,80	50	Magneto-thermal	without
NS1005X TM16G	100,00	16,00	12,80	50	Magneto-thermal Low	
NS1605X TM16D	160,00	16,00	12,80	50	Magneto-thermal	
NS1605X TM16G	160,00	16,00	12,80	50	Magneto-thermal Low	
NS2505X TM16D	250,00	16,00	12,80	50	Magneto-thermal	
NS250SX TM16G	250,00	16,00	12,80	50	Magneto-thermal Low 🖌	
Thermal Characteristics (A) In (Breaking device) 100 Ir Min (A) Release rating 16 Ir Max (A)	12,8 16			S	Short-Circuit Protection /Short dele Ir Min (A) 190 Tf Min (m Ir Max (A) 190 Tf Max (m	s) 0 s) 0
Phases 36						
a C			Sir	nulation	.▲ ▼ 0K	Cancel

Choice out of catalogue

Breaking c⊷ device)	Releas	е		RCD)
Protection Name	NS100N -	ction of circ	uit MSB 01			\mathcal{V}	
Overload protection Rating: IN/IrTh/IrLR :	16A 12.8A	Short-circui IMg Delay :	190 A				
Contactor :				Poles :	4P3T Cancel	•	

The user enters the name of the breaking device, release and RCD, as well as the protection data: Rating, thermal setting, magnetic setting, magnetic delay for short-circuit protection (short magnetic or protection delay of the electronic circuit-breakers), differential setting, differential delay. Breaking capacity is not taken into account. **Caneco BT** does not check if the data are consistent.

Calculation is done taking into account entered data, not taking into account breaking capacity.

10.11 Results Window

To display this window choose Display/Results in the Display menu:

🐨 Results]
Results		
Circuit : C_1	ircuit Ok	
Label	Value	
Cable	3X(1X185)	
Neutral	1X185	
PE or PEN	1X50	
Criterium	IN!!	
Max length	200 m (IC)	
IB	300,0 A	
STH	190,1 mm²	
IZ	294,7 A	
IB Neutral	300,0 A	
STH Neutral	190,1 mm²	1
IZ Neutral	294,7 A	1.
dU Circuit	3,74 %	
dU total	4,10 %	
Ik2/3 Max	8299 A	
Ik1 Max	4507 A	
k2 Min	5927 A	
k1 Min	3673 A	
If	1906 A	
IrMg Max	1588 A	
lk UpStr/DwnStr	43,0 kA/8,3 kA	
Discrimination		
Association		
Magnetic	Electronic	
L. Track	245 m	
<	>	

Limit results are shown in a different colour (orange: limit value, red: incorrect value)

10.11.1 Circuit

Circuit ref mark

State	
State	Description
Circuit OK	means that the circuit complies with standard
To recalculate	means that the circuit must be calculated again. Due to some changes results may be wrong.
Cable not correct	means a circuit with fixed cable and whose cross-section is not sufficient to satisfy standard conditions
Protection not correct	means a circuit which protection type or characteristics have been forced, and which doesn't satisfy standard conditions.

10.11.2 Cable

Multi-core cable conventional writing, or phase conductors if the link is of single-core type.

Examples: 4G1,5 means 4 conductors out of which 1 vert-jaune (G = ground) 3X50+N35 signifie 3 means 3 • phase conductors + 1 N conductor of 35 mm²

10.11.3 Neutral

Neutral conductors conventional writing if the link is of single-core type.

10.11.4 PE or PEN

PE conductors conventional writing if the link is of single-core type.

10.11.5 Criterion

This is the criterion for the phase cross-section calculation:

Criterion	Meaning			
MINI	Minimum section			
IN	overload condition			
DU	Voltage drop			
IC	Indirect contacts, Human protection against electrical shocks			
CC	Thermal stress after Short-Circuit			
Overridden	Values have been imposed			

One or two exclamation marks can be added after these criteria:

- If gap corresponds to a cross-section, a «!» is added (i.e: *CI* ! means *Human protection* criterion, with a cross-section gap according to the more unfavourable of other criteria.
- If gap is two cross-sections or more, a «!! » is added.

When the cross-section is determined simultaneously by two or more criteria, the last two criteria kept are displayed: ex.: *IN-DU* means *Overload condition* and *Voltage drop* criterion.

10.11.6 Max protected L.

Cable maximal length to keep protection and circuit design conditions.

This length is preceded by a 2 letter prefix:

Criterion	Meaning
DU	It means that with the maximum indicated length, the maximum voltage drop entered in cable data is reached
IC	It means that over the maximum indicated length, the human protection condition is no more fulfilled
СС	It means that over the maximum indicated length, the cable short-circuit protection condition is no more fulfilled.

10.11.7 Circuit dU

Circuit voltage drop in % on the *cable length*. This value does not include upstream voltage drop.

10.11.8 dU (%) start

Voltage drop at start (motors) or when switching on (lights), calculated by **Caneco BT**. This value is calculated only when ID/IN ratio is >1.

10.11.9 dU Total

Total Voltage drop in % from source.

10.11.10 lk3 Max

Maximum 3-phase short-circuit current at far end of the circuit.

10.11.11 lk2 Max

Maximum 2-phase short-circuit current at far end of the circuit.

10.11.12 lk1 Max

This is the max short-circuit current, single-phase at circuit ending if neutral is present

10.11.13 If Max

Maximum fault short-circuit current at far end of the circuit if there is a PE.

10.11.14 lk2 Min

Min. 2-phase short-circuit current at far end of the circuit if there is no neutral.

10.11.15 lk1 Min

lf

Min. single-phase short-circuit current at far end of the circuit if there is a neutral.

10.11.16

This is the default short-circuit current phase-PE at the end of the circuit.

10.11.17 IrMg max

Maximum setting for protection magnetic (general purpose circuit-breaker). This value is calculated from IkMini (Ik1 or Ik2) or If.

10.11.18 lk Am/Av

IK Max Upstream / Downstream the link in kA.

10.11.19 Discrimination on IK

Short-circuit discrimination with upstream. It can be:

Discrimination	Description
Nil	No discrimination
Total	There is a selectivity for all short-circuits situated on the circuit, even on protection terminals
Functional	there is discrimination for all downstream short-circuits (most common situation), but not for a short-circuit at protection terminals (very low probability of SC)
Discrimination enhanced by cascading	Caneco BT uses M-G's "Discrimination enhanced by cascading" table. This makes it possible to combine (at least partial) discrimination and cascading. In this event, Caneco BT puts a + sign after the displayed discrimination value. And the association value in square brackets. (e.g. Total+, association [30 kA]).
Partial	Caneco BT gives you the discrimination limit. Caneco displays: I < values (ex. I < 10kA)
I< (I limit) + ?	the discrimination limit is (I limit) at the end of the curve before the Reflex zone. (see 'Discrimination' section)

No value means:

no value in the discrimination tables between circuit protection and upstream protection. or **Caneco BT** doesn't know how to calculate the protection discrimination with upstream protection. This result is completed by differential discrimination (see below)

See also Additional Tab from Circuit window

10.11.20 Thermal discrimination

This relates to discrimination on an overload fault. The results are "With" or "Without" (see 'Discrimination' section).

10.11.21 Discrimination differential. See « discrimination » chapter.

10.11.22 Backup (Association)

It can be With or Without Backup (coordination, or association) with the upstream protection. There is backup when breaking capacity of the circuit protection (alone) is not sufficient (hence lower than board Ik Max) and manufacturers backup tables show a backup possibility. In this case, it is necessary that its breaking capacity in coordination with the upstream protective device is higher than Ik max.

10.11.23 Magnetic

Standard, low or electronic according to chosen device.

11 Entering and calculating complex circuits

11.1 Uninterruptible power supplies – UPS –

UPS operating principles and the calculation method adopted in Caneco BT are described in an on-line document accessible via the 'Documentation' command from the Help menu.

2	
۲	Help Items
2	Search Help on
	Documentation
	About ALPI
	Distributor
	License borrowing
	Today's trick
	About Caneco-BT

This paragraph sets out the procedure for entering data for the various configurations of UPSs in Caneco BT and how to use the results obtained where these are present.

11.1.1 Single-supply UPS

This is a UPS supplied via a single feed. The protective device and cross-section of the latter will be calculated according to the inverter power.

In order to allow for the battery charging and optimizing the inverter efficiency, it is recommended to over-rate the protective device by 25 %.

Data for the UPS circuit can be entered by: Selecting "UPS BOARD" in the style list

ECL + TEL + CDE	Lighting + Remote + Integrat control	^
ECL + TELE	Lighting + Remote + Separate control	
ECL_TELER	Lighting via remote switch	
ECL + BAES	Lighting + BASL	
ECL+BAES+TELE	Lighting + BASL + Rem + Sepa control	
ECL+BAES+TL+CDI	Lighting + BASL+ Rem + integ control	
ECL + MINUT	Lighting + Timer	
ECL + VAR	Lighting with dimmer	
ECL + TELEVAR	Lighting with remote-control. dimmer	
Heating		^
CHAU FIL PILOT1	Heating with pilot wire	
CHAU FIL PILOT2	Heating with pilot wire 2	
Misc		^
TR_SON + SON	Bell transformer with sounder	
TR AUX	Auxiliary transformers	
TR_SON SEUL	Bell transformer on its own	
TBS	Remote control for BASL	
REG CHAUFF	Heating regulation	
CDE FIL PILOTE	Control by pilot wire	
CDE FIL PILOT 1	Heating control via P/w/ + N/0 cont.	
PARAFOUDRE 1	Surge Arrester 1	
PARAFOUDRE 2	Surge Arrester 2	=
RES_EQUIP	Spare capacity, equipped	_
RES_N_EQUIP	Spare capacity, not equipped	
PARASURTENSEUR	Over-Voltage Protector	
Board		^
TAB-BORNES	Switchboard + terminals + earth bar	
TABL: OND.	Switchboard with inverter supply	
ONDUL2	Inverter, N1 & N2 together	
GRILLE	Splitter grid	
GRILLE SEC.	Secondary grid	
Transformer		^
TRANSFO_INT	Internal LV / LV transformer	
TRANSFOASI	Transformer with back-up supply	
Busbar		· · ·
×		4

Dragging-and-dropping the block available in the circuit block library



Representation of the UPS in the Board Representation of the UPS in the network single-line diagram





• Attention: don't forget to fill in the inverter data under the 'UPS' tab in the 'BOARD' window.

The short-circuit values (2) and the short-circuit withstand time (1) must be updated in accordance with the information provided by the equipment manufacturer.

This will make it possible to calculate the circuits downstream of the UPS, taking the latter's short-circuit ratings into account. (3)





11.1.2 Dual-supply UPS

The circuit is available in the graphics library under the 'Circuit blocks' tab (1)

It is based on a miscellaneous circuit for calculating the network 1 (A) and a board circuit for calculating the network 2 or By-Pass (B) and filling in the inverter data ('UPS' tab under 'Board'). The downstream circuits are obviously entered downstream of the board



single-line diagram



Representation of the UPS network 1 (A) Representation of the UPS network 1 (A) and and network 2 or By-Pass (B) in the Board network 2 or By-Pass (B) in the network single-line diagram



Attention: don't forget to fill in the inverter data under the 'UPS' tab in the 'BOARD' window.

The Network 1 circuit is based on a 'Miscellaneous' circuit and makes it possible to calculate the Network 1 crosssection and protective device. The protective device is over-rated by 25 % by default.

The Network 2 (or By-Pass) circuit is based on a 'Board' circuit and makes it possible to calculate the Network 2 (or By-Pass) cross-section and protective device, and to enter the UPS data. Date for the downstream circuits will be entered downstream of the board (Network 2) and will be calculated as for the single-supply UPS (see above).

Note: In cases where the Normal and By-pass supplies are not connected to the same busbars, the • representation in Caneco BT can be produced using two blocks, Network 1 (1) and Network 2 (2) available in the graphics library.

Caneco BT ©



	Syntoch Cleruh Style Cleruh Style		
C C C C C C C C C C C C C C C C C C C	6.10 ° C ~	#0*0-	
1		10	
1	2	ą	
2 - ED -	*	2	

Graphical representation in Caneco BT:



The cross-reference texts between one circuit and the other will be entered using the "Modify symbol text" command in the contextual menu.



11.1.3 Dual-supply UPS with isolating transformer

The circuit is available in the graphics library under the 'Circuit blocks' tab (1)

It is based on a miscellaneous circuit for calculating the network 1 (A) cross-section and protective device and an LV/LV transformer circuit for calculating the network 2 or By-Pass (B) cross-section and protective device and filling in the inverter data ('UPS' tab of the LV/LV transformer).

The data for the downstream circuits will obviously be entered downstream of the LV/LV transformer and the calculation rules are the same as for the previous cases.



Representation in the network single-line diagram

Representation in the Board single-line diagram





11.2 Regulator + motor output

The regulator + motor output calculation method adopted in Caneco BT is described in an on-line document accessible via the 'Documentation' command from the Help menu.

The motor output will be regarded as being protected against over-current and indirect contact by the regulator. The cross-section of the motor supply connection will be calculated in accordance with the permitted current (Iz). The latter depends directly on the motor operating current.

The voltage drop at the regulator terminals shall be taken as 0 V.

Entering the regulator from the style list



Representation of the regulator in the Board single-



Enter the motor downstream of the Representation of the regulator + motor combination regulator and don't forget to select in the Board single-line diagram "Without Prot." for the protective device type (1) and to select the overload protective device as "Upstream" (2)





• Note: The regulator + motor output is available as a block (1) in the graphics library, under the 'Circuit blocks' tab.



12 Preferences

12.1 Generalities on Preferences

The «Preferences» tool enables to set the default preferences parameters, classified by items. To each item corresponds a tab containing options to set up.

Preferences [Documen	it1]				×
Automatic Ref Marks	Print Colours	Default Values	Directories	Warnings an	d remarks
Save Display	Circuit Spreadsheet	Board Single-line Dia	agram Netv	vork single-line	Tracks
Entry and Surfin	g				
Commands S	earch/Reach open the	corresponding dialogs	200		
🗸 Display dialo	gs help				
🔽 Display netw	vork graphic				
✓ Display the c	calculations and results v	vindow			
Libraries]				
🔽 Display librarie	is and				
Library Symbols s	size				
Small		🔘 Big			
Circuit or symbol	selection				-
Click		Orag and D	rop		
General					
Last files use	ed : 5 🜲	file(s)			
✓ <u>S</u> tatusbar					
🗌 Display todaj	y's trick at start				
Default options		OK	Can	cel He	elp

12.2 Display tab

This window enables you:

- To set acquisition and navigation context
- To set use mode for symbol library
- To display status bar
- To set the number of files used which will be displayed in File window
- To enable the Today's trick at start window

Preference	es (Documen	t1]					X		
Autom	atic Ref Marks	Print	Colours	Default Values	Directories	Warnings ar	nd remarks		
Save	Display	Circuit Spre	adsheet	Board Single-line Dia	igram Neti	vork single-line	Tracks		
Ent	y and Surfin	g							
. F	Commands Search/Reach open the corresponding dialogs								
E I	Display dialo	gs help							
l F	Display netw	ork graphic							
I F	Display the c	alculations a	nd results w	indow					
Libr	aries								
	Display librarie	s							
L Li	brary Symbols s	ize							
) Small			🔘 Big					
Ci	rcuit or symbol :	selection					-		
C	Click			Drag and Dr	rop				
Gen	eral								
	Last files use	ed :	5 🌲	file(s)					
I I	 <u>S</u>tatusbar 								
	Display today's trick at start								
Defa	ult options			OK	Can	cel H	elp		

12.3 Save tab

This item allows you to set saving options

references [Document1]	x
Automatic Ref Marks Print Colours Default Values Directories Warnings and remark	(S
Save Display Circuit Spreadsheet Board Single-line Diagram Network single-line Track	<s< td=""></s<>
Sharing options	
Read password : Password for modification :	
<u>Read only recommended</u>	
New project	
Create a modification index	
✓ Engineering fields of the project filled with default values	
Choice of default manufacturers	
Save online	
✓ Allow quick saving	
\checkmark Ask for the project properties	
✓ Use "Project" folder for open and save as files	
Create a backup file	
I for each change of modification index	
for each project saving	
Default options OK Cancel Help	

12.4 Colours tab

This item allows you to choose colour for each circuit state:

- Correct circuit
- Circuit to be recalculated
- Circuit not OK

Section and route colours of a cable tray may be also set in this window

Preferences [Document1]					×
Save Display Circuit Sprea	dsheet	Board Single-line Dia	gram Netw	ork single-line	Tracks
Automatic Ref Marks Print	Colours	Default Values	Directories	Warnings an	d remarks
Circuits colors					
Correct :		-			
Not correct :		•			
to be recalculed :		•			
Tracks colours]				
Sections :		•			
Route :		-			
Default options		ОК	Cano	el H	elp

12.5 Default Values Tab

This window enables you to set:

- Default cable type
- Default installation method
- Initial modification index

references	s (Document	1]					×
Save	Display	Circuit Sprea	adsheet	Board Single-line Dia	gram Netw	ork single-line	Tracks
Automati	c Ref Marks	Print	Colours	Default Values	Directories	Warnings and	d remarks
Star	ndard :	C15100;	2002		V		
Cab	les file :			U1000R2V	•		
Insta	al. method :	13 Surc	hemin de c	âbles perforés horizor	ntal 💌		
Moc	dification inde:	« :		А			

12.6 Directories Tab

User can not modify the directories containing configuration files and database.

User may put project files, sheet backgrounds and Caneco BIT type diagrams into directories chosen by him. Caneco BT version 5.4 offers more possibilities, logos and stamps, user diagrams and documents can also be put into directories chosen by the user.

Preferences				X			
Save Display	Circuit Spreadsheet	Board Single-line Diagram	Network single-line	Tracks			
Automatic Ref Marks	Print Colours	Default Values Direc	tories Warnings and re	emarks			
Database :	L:\Caneco 5.4\B	ase-FRAN					
Configuration :	L:\Caneco 5.4\Cl	FG-ENG avec paramétrage fra	N I				
Backgrounds :	C:\ProgramData\	C:\ProgramData\ALPI\Caneco BT\5.4\F0LI0S\					
Logos and stamps:	C:\ProgramData\	C:\ProgramData\ALPI\Caneco BT\5.4\LABELS\					
Project :	C:\Users\dln\Doo	cuments\Caneco\					
Caneco diagrams	C:\ProgramData\	ALPI\Caneco BT\5.4\FR\SC	HEMAN				
User's diagrams	C:\Users\dln\Doo	cuments\Caneco\					
User documents:	C:\Users\dln\Doo	cuments\Caneco\					
12.7 Print Tab

This window lets you select the company logo and to define a stamp indicating the progress state of the project. Image with the logo must be in the FOLIOS directory.

The user can define a generic default symbol to represent equipment. The specified stamp (text or image) can be positioned and oriented and will appear on print-out documents.

Preferences	×
Save Display I Automatic Ref Marks	Circuit Spreadsheet Board Single-line Diagram Network single-line Tracks Print Colours Default Values Directories Warnings and remarks
Misc	LOGO
Personal Logo :	Entreprise
Replacement symbol	ior the equipments :
Colour printing	
Seal type :	No
Text identical to	progress
Seal text or image file :	
Font and text color :	Arial Black - 23°
Shift on X :	Rotation :
Shift on Y :	0%
Scale :	100 %
	OK Cancel Help

12.8 Warnings and Remarks Tab

This window allows you to set operating mode of warnings and reporting.



12.9 Automatic reference marks Tab

Automatic circuit and equipment ref. marks can be defined under the 'Automatic Ref Marks' tab.

This window allows you to set default automatic reference marks.

The button « Advanced... » actives the «Advanced prefixes for circuits» window. So, user may set a different prefix for each equipment.

An '=' sign can be placed in front of an object (functional unit) prefix for marking as per the EN 60082 standard. A number of prefixes are also provided for automatic equipment marking

The default ref. marks are defined as per the EN 60082 standard:

' ' sign in front of a device ref. mark

(see 'Schematics' section)

Save Display Circuit Spreadsh	eet Board S	ingle-line Diagram 🛛 N	etwork single-line Track:
Automatic Ref Marks Print Co	olours Defa	ult Values Directorie	warnings and remarks
Objects ref mark			
Number of caracters for the suffix :	3	k	
Boards and transformers :	BT_		
Busbar Trunking Systems :	BTS_		
Circuits :	C_	Enter after the a distribution nam	e Advanced
Busbar :	B_	Fatar after the s	
Associated circuits :	AC_	distribution nam	e
Styles :	STY_		
Cables : 🔽 Identical to circuit ref. Mark		Enter after the a distribution nam	active e
Equipments : Identical to circuit ref. Mark		Enter after the a distribution nam	e e
Equipments ref mark			
Circuit-breaker :	CB	Currently used meth	iod : line of the circuit
Contactor and others (remote control switch, time-delay switch)	CO		The of the circuit
Fuse disconnector, Fuse switch, fuse :	F	Change	marking method
Switch, disconnector :	SD		
Thermal relay :	TR		
Terminal block:	ТВ	Advanced	
Default options		ОКС	ancel Help
lvanced prefixes for circuits			×
Use a different prefix for	r each type o	of equipment	
Advanced prefixes			
Motor : M		Board :	BO
Socket: S		Busbar	BTS
Lighting :		Capacitor	CAP
		tapacitor.	
		Fransformer :	IIK
Heating: H			

ΟK

12.10 'Circuit spreadsheet' Tab

Cancel

This window allows you to set operating mode of the «Spreadsheet» entry tool.

Preferences [Document]	1]						×
Automatic Ref Marks	Print	Colours	Default Va	alues D)irectories	Warnings and	d remarks
Save Display (Circuit Sprea	idsheet	Board Single-	line Diagra	m Netw	ork single-line	Tracks
Spreadsheet							
Adjust column	size for eac	h distributio	n				
🔽 Display the line	e number						
🔽 Display Grid							
Appearance :	Colour	•					
Fonts Header :	Arial	Α	<u>C</u> ircuits : 🖌	Arial	Α		

12.11 'Board Single-line Diagram' Tab

This window allows you to:

- Define the options for using the 'Board Single-line Diagram' tool,
- Define the position of the ref. marks for terminal blocks and terminals,
- Display device ref. marks as per the EN 60082 standard.

Preferences [Document1]
Automatic Ref Marks Print Colours Default Values Directories Warnings and remarks
Board Single-line Diagram
Circuit representation as at printing
Display the line number
💌 Display Grid
✓ Display symbols text
Ref Marks and Terminals
✓ Display reference marks according to EN 61082 standarc
Terminal block Ref Mark position : Terminal Ref Mark position :
Ounderneath the Ref Marks terminals Ounderneath to the Ref Marks terminals Counted to the Ref Marks terminals
on the right of the symbol
Default options OK Cancel Help

12.12 'Network single-line' Tab

This window allows you to:

- Set operating mode for the «Network single-line» entry tool
- Display circuit and distribution labels.
- Set a background colour for each label type.
- Set fields for each label
- Display field wording
- Set label attributes and field fonts

Preferences [Document1]				×
Automatic Ref Marks Print Save Display Circuit Sprea	Colours adsheet	Default Values Board Single-line Dia	Directories \ agram Network	Varnings and remarks single-line Tracks
Network single-line				
✓ Display Grid		🔽 Display labels		
 Display the complete tree 		🔽 Display final c	ircuits	
Labels				
Display				
 Display supplies labels 		Dégra	adé Titre actif	-
 Display distribution labels 		Activ	e Border	-
 Display circuits labels 		Mone Mone	y Green	•
Fields selection				
Records	A	wailable fields	Se	elected fields
Circuits	⊞ All fie	elds	> Ref Mark	<u>^</u>
Busbar trunking systems		ctive device	Consumpt	ion
Boards	⊕ Cable	9	Length	E
	🕀 Equi	oment	Cable Typ	e i i
	E Resu	llts 	Cable	
	E MISC	cildifeous	< PE/PEN	-
Presentation				
Display wordings				
🔽 Display a border 🖉	Display a s	hadow under the bor	der	
Label font Ar	ial	A	abels width.	100 pixels
Default options		ОК	Cancel	Help

12.13 'Tracks' Tab

This window allows you to set display parameters for cable trays.

P	references [Document1]					×
	Automatic Ref Marks Print Save Display Circuit S	Colours	Default Values Board Single-line Di	Directories iagram Netw	Warnings and ork single-line	remarks Tracks
	Data entry grid ✓ Display the line number	I	Appearance :	Colour	•	
	✓ Display Grid Fonts Header : Arial	Α	<u>C</u> ircuits :	Arial	Α	
	Presentation					
	© 2D	🔘 Isome	try	🔘 3D		
	Display		Location used or	nly		
	View		Track reference:	8		
	Complete view		Min height : Max height : From :	0 m 0 m	•••	
	Scale and view point				7	
	Size factor : Projection angle :	100.0%	Rotation X axi Rotation Z axi	s: 0° -	1	
8						
	Default options		ОК	Canc	el Hel	p

13 Calculation options

13.1 Calculation Tab

ulation Options	[Document1]			
Calculation	Protection	Cables	Price	Tracks
Human protect	ion against indirec	ct contact]	
Singlecore or	multicore + separate l	PE cables:		
Increase \$	PH	Increase SPI	E	
Admissible time	e for protective device	es :		
🗌 Always	<= tables 41			
Boards and bu	isbar trunking systems	5:		
🔽 Equipo	tential bonding betwe	en Earth and (
Default power	unit			
Amps	💿 Watt	0	/Α	
⊚ k₩	🔘 kVA	0	<var< td=""><td></td></var<>	
Circuit-breaker				
Thermal settir	Ig			
On IB		🔘 On rating		
No check of t <i>(Standard C1</i>	hermal stress for Ik on 51.0002 - 4.35 1/	n conductors		
Diversity facto	on sockets er = consumPC + (co	nsumPC * (nbPC-1))/ 100	
Critères pour le	dimensionnemen	t et vérificatior	des circuits]
✓ Surcharge	s			
Voltage dr	p.			
Contacts II	it			
Default options		OK I	Cancel	Help

13.1.1 Protection of personnel:

Singlecore or multicore + separate	e PE cables:
Increase SPH	Increase SPE

if phase cross-section is equal to PE, you must set a priority to increase the conductor cross-section, according to the choice made by ticking.

Admissible time for protective devices :

Always <= tables 41

If ticked, values from standard board will be applied

Circuit-breaker:	
Thermal setting	
💿 On IB	🔘 On rating

Adjustment of IB allows more favourable cable cross-sections.

In this case ensure that the adjustment value of the thermal trip unit is not modified.

No check of thermal stress for Ik on conductors

If unselected, this option allows to be free from release condition on lkmin: lkmin \geq 1,2 x lrMg. Attention, for more information, see the related standard paragraph.

13.1.2 Sizing criterion:

The user can choose not to verify one calculation criterion for a very specific reason. If the 'Overload' criterion is unchecked, the following message will appear:

A virtually identical message will appear, depending on which criterion is deselected.

• Attention: This section is intended for experienced users only.

In the event of a reservation expressed by a technical inspection service, the Caneco BT user will be obliged to provide justification.

13.2 'Cables' Tab

Calculation Protection	Cables	Price	Tracks
Cables cross-section			
Multicore cables up to :	70 mm² •	•	
Aluminium cables from :	25 mm²	•	
Allowance for cross-section calc	ulation : 5 %		
Apply allowance to Supply/N	4SB link		
Max cables cross-section on terr	ninals : 35 mm² •	•	
Nature of separated PE			
 Isolated 	🔘 Bare		
PE number of conductors			
🔘 = Phase nb			
Reduction of conductors allow	ved		
Neutral cross-section :			
Main circuits			
Final circuits			
PE cross-section :			
 Main circuits 	Cection mini PE suiv	ant	
 Final circuits 	Par calcul	🔘 Parta	bles normatives
Phase dimensionning for over	loads	_	
✓ Afficher un message d'alerte	si le nombre de conduc	teurs par phas	e est ≻ 1
Default options	ОК С	ancel	Help

13.2.1 Cables sections

Multicore cables up to :	70 mm ² 🔻
--------------------------	----------------------

Allows to define the cross-section from which Caneco will choose single-core cables if the « Multi / Uni « option is selected in the <u>Pole field</u> of the circuit sheet

Cable]		
Length :	12 m		
Type :	XLPE 🔻		
Core :	Copper 🔻		
Instal. :	31 On perforated 🔻		
Pole :	Single S≻Max ▼		
Equipment	Multi		
Equipment	Multi+PE		
Consumption :	Single S>Max		
Location :	Single Trefoil		
	Single Touching		
	Single Spaced		
Aluminium c	ables from		

Allows to define the cross-section from which Caneco will choose aluminium cables if the «Cu / Al» option is selected in the Core field of the circuit sheet

50 🔻

Cable	F	_
Length : Type : Core : Instal. : Pole :	12 m XLPE V Copper V Alu	
Equipment	Cu/Alu Alu + PECu	
Allowance for cro	ss-section calculation nce to Supply/MSB link	5

This option enables cross-sections to be calculated applying a tolerance of 5% max. in Iz.

Unselect the box if the specifications say that this tolerance is not to be applied to the Source - MSB link.

Max cables cross-section on terminals :	35 mm² 🔻	
---	----------	--

Terminal numbering will be performed for all cable cross-sections \leq 35 mm²,

13.2.2 Authorization to reduce conductors

PE cross-section :		
Main circuits	⊢Min. PE cross-section a:	sper
Final circuits	By calculation	By normative tables

The min. PE cross-section can be calculated according to 2 methods defined in standard.

13.3 'Protection' Tab

Iculation Protection (Cables Price Tracks Automatic calculation	
Protection		
Protection choice		
🔘 Manual	 Automatic 	
Discrimination calcu	Ilation	
Method		
From Tables	with Curves	
Curve discrimin	ation with limited Ik	
Thermal and electro	dynamic stresses and Association	
 Limitation effect 	t considered for Circuit-Breakers	
 Limitation effect 	considered for Fuses	
Breaking capacity o	alculated with Backup (Coordination) (association)	
🗹 In TT and TN e	aarthing system 🗌 In IT earthing system	
✓ Fuse- circuit-bre	eaker & fuse - interruptor	
Switches		
Verifying making	n canacity (Icm)	
Verifying short-t	erm lk (lcw)	
Downgrading due to	temperature	
Factor on thermal r. f	or gM+Th and gG+Th : 1.00	
Factor on fuse :	1.00	
Ambient temperature	e of Circuit-breakers	
General purpose Circ	cuit-breaker: 40 °C ▼	
Distribution Circuit-br	eakers : 30 °C 💌	
Switche :	30 °C 🔻	

13.3.1 Discrimination calculation.

Discrimination by board

Caneco BT uses the discrimination tables provided by the manufacturers (same brand and catalogue year).

Discrimination by curves:

Caneco BT determines the discrimination by superimposition of the curves.

Check the "Curve discrimination with limited Ik" option in order to make use of the effect of limitation by the downstream circuit-breaker.

13.3.2 Thermal and electrodynamic stress and backup

Use of the limitation curves under thermal stress (12.t) to calculate cross-sections.



Use of the current limitation of circuit-breakers (determination of limited Ip peak according to the RMS short-circuit current)

This value is used for verifying:

•

Electrodynamic stress for busbar trunking systems

- Association/coordination with downstream fuses
- The electrodynamic stress of the busbar trunking system



13.3.3 Breaking capacity calculated with co-ordination (association)

TT and TN earthing system:

If checked, Caneco BT will look for upstream and downstream protective devices with cascading.

Fuses and switches:

If checked, Caneco BT handles the co-ordination between fuse and switch.

13.3.4 Switch

For the description of the two fields, see section (15) 'Circuit-breaker/switch co-ordination'

14 Discrimination

14.1 Discrimination on lk

Discrimination on Ik takes into account the whole range of overcurrents, from overload to the maximum presumed shortcircuit current.

The determination of discrimination can be obtained:

- either from manufacturers' tables: the method By tables
- or by superimposition of protection curves if they exist in the Caneco databases: the method **By Curves**

1ethod	
) From Tables	🔘 with Curves

14.1.1 Possible discrimination results:

Nil:

no discrimination (the upstream and downstream protections both trip)

Partial:

Total discrimination up to a maximum value of overcurrent. Beyond this limit, the discrimination becomes nil. In which case the diagnosis will be: I < Limit

IrMg Max	1386 A
Ik UpStr/DwnStr	15,5 kA/5,9 kA
Discrimination on Ik	I<2,00kA
Thermal discrimination	With
RCD discrimination	Not Applicable

Total:

Discrimination for all downstream circuit over-currents, obtained by offsetting the operating curves with respect to the current axis or by the limitation effect of the downstream protective device.

Functional:

Discrimination for overcurrents at end of the downstream trunking (the most frequent faults).

In general, to obtain discrimination other than «Nil», the ratio between the magnetic setting of the upstream protection and that of the downstream protection must be at least 1.5.

14.2 Discrimination by Tables

14.2.1 Conditions to be met on the Upstream and Downstream

- same manufacturer
- same catalogue year
- conditions of access to tables valid (protections with electronic tripping)

The discrimination result will be that specified in the tables.

If the table specifies a discrimination limit, and if the upstream/downstream thermal curves intersect, the thermal discrimination result will be «Not calculated».

The discrimination on Ik will be equal to the limit indicated by the table. (see example 1).

If the upstream protection is electronic, use of the tables is only possible if the access conditions defined by the manufacturer are present (Im setting, Inst on/off, etc.)

In the opposite case, the discrimination will be defined automatically by superimposition of the curves.



Upstream protection: DT 40 32A Downstream protection: DT40 16A The table provides a discrimination limit of 0.25 kA. The thermal curves intersect and there is no thermal discrimination. The figure below shows the Caneco BT diagnosis



14.3 Discrimination by Curves

Discrimination will be determined by superimposition of curves in the following cases:

• The selected discrimination option is «By Curves».

• No value in the tables, or the conditions of access to the tables are not met; if the discrimination option is «By Tables».

• The manufacturers and/or the catalogue years of the upstream and downstream protections are not identical.

In this case, the diagnosis is established by a graphical analysis of short circuits according to superimposition of the upstream and downstream curves. See example 2

With a view to optimising discrimination, it is possible to make use of the limitation capability of the downstream protection by ticking «Discrimination by curves with lks limited» See Example 3

Method	
🔘 From Tables	💽 with Curves

• Example 2:



Analysis of the curves shows that discrimination is total because of the protection settings and the specified time on the upstream protection (difference > 40 ms).

Caneco diagnosis: Total

Ik2/3 Max	26325 A
Ik1 Max	16741 A
Ik2 Min	19716 A
Ik1 Min	14244 A
If	9192 A
IrMg Max	7660 A
Ik UpStr/DwnStr	26,3 kA/26,3 kA
Discrimination on Ik	Total
hermal discrimination	With
RCD discrimination	Not Applicable



Since Caneco BT does not handle the Reflex zone of moulded-case circuit-breakers, in this case the discrimination limit is therefore 3.84 kA (end of the curve before the Reflex zone).

• Example 3: Using the "Curve discrimination with limited Ik" option.

4.3.1 1 - Option not checked	Method From Tables	💿 with Curves	
14.3.1 T - Option not checked	Curve discrimination wit	h limited Ik	



In this case, the calculated short-circuit values are used.

The graphical analysis shows that discrimination is nil.

Caneco diagnosis: I<3.84kA+? Discrimination up to 3.84 kA, not handled above this value

Ik3 Max	11497 A
Ik2 Max	9957 A
Ik1 Max	7233 A
If Max	5482 A
Ik2 Min	7755 A
Ik1 Min	5388 A
IF	4005 A
IrMg Max	
Ik Am/Av	15,9 kA/11,5 kA
Type de sélectivité	Par Courbes
Sélectivité sur Ik	I<3,84kA+?
Sélectivité thermique	Avec



T(s) 10000 5000 TD001 NSX160FMicrologic 2.2|160A 1000 500 11 11 100 50 10 5 11 1 0,5 11 11 0,1 0,05 1 1 1 11 lk 0,01 0,005 limits ı İkMax Lim Amə İkMax Lim Av=3> İkMin Lim Av=1,8kA 0,001 **Ik(kA)** 50 0,05 0,1 5 10 0,01 0,5 1

In this case, the limited short-circuit values are used . The graphical analysis shows that discrimination is total .

Caneco diagnosis: Total

lks

Ik2/3 Max	26325 A
Ik1 Max	16741 A
Ik2 Min	19716 A
Ik1 Min	14245 A
If	9192 A
IrMg Max	ATTAT OF ST
Ik UpStr/DwnStr	26,3 kA/26,3 kA
Discrimination on Ik	Total
ermal discrimination	With
RCD discrimination	Not Applicable

14.4 Discrimination by Curves on 3 levels

Discrimination can be analysed on 3 levels by superimposition of curves. The curve for the 3_{rd} protection is obtained by copy/paste in the «Discrimination by curves» tab of the circuit sheet.

The «Copy curve» command in the pop-up menu of the «Discrimination by Curves» tab allows the insertion of the graph representing the superimposition of curves in a text document, for example in order to produce a report on discrimination.





Right click on the « discrimination by curves » tab of circuit A sheet.

Select the « copy the circuit curve » command.

Right click on the « discrimination by curves » tab of circuit C sheet.

Select the « copy the circuit curve » command

The figure opposite shows.



IkMax Am=13k

lk(kA)

0,01 0,005

0.001

0,0

0,05 0,

14.5 Differential Discrimination

The diagnosis of differential discrimination is done according to the following rule:

Discrimination is total if (I upstream >= 3x L_{downstreamI})[1] and (t upstream - t downstream) >= 40ms [2]

• Discrimination is partial if: one of both conditions above is not met.

- Discrimination is nil in all other cases
- Discrimination is not relevant if the upstream circuit has no differential.

Differential discrimination Nil



Partial differential discrimination



Label	¥alue	
Max. lenght	21 m (CC)	
IB	200,0 A	
STH	73,5 mm ²	
IZ	317,9 A	
dU Circuit	0,30 %	
dU total	2,13 %	
lk2/3 Max	6056 A	
lk1 Max	3307 A	
lk2 Min	3910 A	
lk1 Min	2410 A	
lf	2266 A	
IrMg Max	2008 A	
Ik UpStr/DwnStr	6,5 kA/6,1 kA	
Discrimination on I	lk <mark>Nul</mark>	
Thermal discrimina	at Without	
RCD discrimination	n Total	
Backup	Without	
Path lenght	0 m	

lupstream = 300 mA
tupstream = 0ms
Idownstream = 30 mA
tdownstream = 0ms
The condition [1] is met.
The condition [2] is not met.

Total differential discrimination





lupstream = 300 mA tupstream = 40ms ldownstream = 300 mA tdownstream = 0ms

The two conditions [1] and [2] are met

15 Circuit-breaker/switch co-ordination

To enable co-ordination between circuit-breaker and switch, check 'Fuse/circuit-breaker' and 'Fuse/switch'

Calculation Prot	ection Cables	Price	Tracks	Automatic calculation	
Protection					
Protection	n choice				
🔘 Manua	le		Auto	matic	
Discrimina	ation calculation				_
 From 	n Tables		🔘 with	Curves]
Curve	ediscrimination w	ith limited	lk		
Thermal a	ind electrodynam	ic stresse	es and Ass	ociation	7
 Limital 	ition effect consid	dered for	Circuit-Bre	akers	
 Limital 	tion effect consid	dered for	Fuses		
Breaking	capacity calculat	ed with B	ackup (C	oordination) (association)	
 In TT 	and TN earthing	system		n IT earthing system	
✓ Fuse-	circuit-breaker &	fuse - int	erruptor		
Switches					7
 Verifyi 	ing making capa	city (Icm)			
Verifyi	ing short-term lk	(Icw)	>		

15.1 General rule

Where possible, Caneco uses the circuit-breakers limit curves for selecting the switch.

Hence when a fault appears in 1, switch Q2 is selected using: Q2 lcm > Ip peak fault in 1 (limited by Q1)

Lastly, if the fault appears at point 2 Switch Q3 is selected using: Q3 Icm > Ip peak fault in 2 (limited by Q1)



15.2 Application in Caneco BT

Calculation method

If switch Q2 Icm is < n * Ik Max at the point considered 1:

The value of Ip peak limited is displayed in the "Additional results" window of the circuit concerned.

If the resulting Ip peak limited \leq Icm for switch Q2, this protective device is accepted.

Icm associated = Max rms non-limited Ip in A. In this case Caneco displays cascading WITH (Max rms non-limited Ip) in the results window.

Label	Value			
Cable				
Neutral				
PE or PEN				
Criterion	IN!!			
Max. length				
IB	63.0 A			
STH	7.6 mm²			
IZ	74.7 A			
dU circuit	0.00 %			
dU total	0.30 %			
Ik3 Max	20996 A	. 8		
Ik2 Max	18183 A			
Ik1 Max	19477 A			
It Max				
Ik2 Min	15163 A			
IK1 Min	15239 A			
IT Table Merry	15162.4			
Irmg Max	15165 A	•		
IK AM/AV	21.0 KA/21.0 KA	-		
Discrimination on Ik	Not calculated	•		
ermal discrimination	Not Calc	•		
ential discrimination	Not Applicable			
Association	With [25 kA]			

Icm: Making capacity of the switch or switch/fuse. Ip pk: Peak current limited by the protective device or non-limited n: crest factor



Manufacturer's tables method

If switch Q2 Icm is < n * Ik Max at the point considered 1

Calculation of Ip peak limited or non-limited, at point 1 The value of Ip peak limited or non-limited is displayed in "Additional results" window of the circuit concerned..

If the resulting Ip peak limited \leq Icm for switch Q2, this device is not valid.

It can only be accepted using co-ordination with Q1.

Icm or Icw Associated in kA = co-ordination value given by manufacturer

In this case Caneco displays cascading WITH [Icm or Icw Associated in kA] in the results window.



Icm: Making capacity of the switch or switch/fuse. Ip pk: Peak current limited by the protective device or non-limited n: crest factor



• Example: Upstream circuit-breaker NG125N 63A 4P4D

The INS63 switch handles an Icm of 15 kA and an Icw of [25 kA] in co-ordination with the upstream circuit-breaker

Note Informations														C
ng1181.8129			-	P	rotectio	on of bor	and TD_I	101						
Name Model	Function	Technology	In GA3	Rom (PA)	Pules	Cp Vis.	Ca App.	Cp Ornes.	809	FRCD (mA)	TRCD(n)	Disc. th	Diec, th	10
N563	Switch	Moulded Carlot	62.00	15.012978	47	₩.	₩.		Without					80
NF 63 22x58	Owconner.	Modulara		err i	48	P.	R .	- 2	Webout					16
HF 63 DH	Deconnec.	Modulare	63.68	176.8	48	P	R .	2	Wheat					
N31256A	Decement	Mudulere	62.00	(25.4)	48	12	12	9	Wheel					
8(58)	Switzt	Moutled Leve	80.00	15.5 (25.0)	48	P	P	12	Wood					
NO1298A	Decenner.	Midulare	00.00	21.0	47	P.	R	9	Wend					
NS100	Switch	Bloubled Case	100.00	20.0 (25.0)	47	P.	P	12	Websal					
N0250-100A	Switch	Moulded Case	100.00	300(44.1)	40	12	R	1. F	Wheel					
W/100	Switch	Moulded Case	100.00	30 0 (44.1)	42	19 I	R.	R	Wheat					
86125	Setch	Moulded Ease	125.00	208(25.8)	49	12	P.	P	Without					
NF 125 22x58	Deconnect	Modulere	125.00	176.0	49	12	P		WINGS					
NG1258A	Decemet.	Modulare	125.00	(25.2)	4	12	12	9	WEAL					3
		Short circuit Ion 240V = 154A 415V = 154 415V = 154 445V = 154A 500V = 154A 650V = 154A 650V =	capacity Itol	ign (penalted (f + 1° (2 + 2° () + 20°	11 + 300 (2 + 170 (3 + 6.7	19.J 08.A 08.A 906.4	2010 2010 4010 5010 5010 5010	- 634 - 634 - 634 - 634 - 64 - 64 - 64 - 65		Condition (1) Condition(1) Fungli Fungli Fungli (1) U.P. (1)	n km 167 (0167 (0.00			

INS63 is non-compliant, as the Icm (15 kA) \leq Ip peak limited or non-limited (44.09 kA) By virtue of the co-ordination with the upstream circuit-breaker \rightarrow INS63 is compliant Icw [25 kA] \geq Ik Av 20.99 kA

Sub Busber (Standard).		-
Upstean Circuit Additional data Additional les	Contamity Texts Curve docrimination Coordination Cable/Protection	
B Discrimination Association Backup		
Type of docrimination	By Calculation	
Discrimination on Ik.	Not calculated	
Themal documination	Not Calc	
Limit of discrimination		
Film		
6 PICD		
RCD Delay		
RCD disclimination	Not Applicable +	.,
Iom Iou Backup	15kA 25kA	
🗄 Maximum breaking time		
T max Cl		
T max Ph	Stell 1	
T max PE		
TmacN	9 mc	
UL.		
E Link		
F Phases affectation	123	
Width	(spe	
Height	htt	
Waing system weight	0.00 Kp/m	
U circuit end	399/	
U stat circuit end		
Sharing vokage drop		
Eilk at end of link		
Ip not limited	44.09 kA	
IN 2/3 Max	20996 A	2
Ik7 Max	194224	-
B 7 Mar	161234	

Results Libraries

Label	Value			
Neutral		ļ		
PE or PEN				
Criterion	IN!!			
Max. length				
IB	63.0 A			
STH	7.6 mm ²			
IZ	74.7 A			
dU circuit	0.00 %			
dU total	0.30 %			
Ik3 Max	20996 A			
Ik2 Max	18183 A			
Ik1 Max	19477 A			
If Max				
Ik2 Min	15163 A			
Ik1 Min	15239 A			
If				
IrMg Max	15163 A			
Ik Am/Av	21.0 kA/21.0 kA			
Discrimination Type				
Discrimnation on Ik	Not calculated			
rmal discrimination	Not Calc			
ential discrimination	Not Applicable			
Association	With [25 kA]			
L. chemin	0 m			
4	b.			

15.2.1 Result Without the limitation of the circuit-breaker with co-ordination taken into account

Туре		Switch	
Manufacturer		mg11fr1.itr	
Family		INS63	
Overrating factor		1.00	
×lcm	>= Ip upstream	15.0 kA	>= 44.1 kA
✓Icw (t)	>= I FUnct. (t)	3.0 kA (1.0 s)	>= 0.6 kA (1.0 s)
Icm with Backup	>= Ik Max	25.0 kA	>= 21.0 kA

15.2.2 Result With the circuit-breaker limitation with co-ordination taken into account

Туре		Switch				
Manufacturer		mg11fr1.itr				
Family		INS63				
Overrating factor		1.00				
√lcm	>= Ip upstream limited	15.0 kA	>= 8.7 kA			
✓Icw (t)	>= I FUnct. (t)	15.0 kA (1.0 s)	>= 0.6 kA (1.0 s)			
Icm with Backup	>= lk Max	25.0 kA	>= 21.0 kA			

The Icw (short-term short-circuit current) is only verified if circuit-breaker / switch co-ordination is not requested or if there are no co-ordination tables, or no value in the table.

This verification ($Icw^2 \times t \ge I \text{ op } \times t \text{ op}$) is in addition to verifying the fuse's Icm and Icu, if it is a switch fuse.

Each manufacturer gives lcw values associated with a time, but if this is not the case, according to the 947-3 standard, a value of lcw = 12*In for 1 second must be considered for the verification

16 Schematics

16.1 Functions of the schematics

The functions of the schematics are only effective in the BOARD SINGLE-LINE DIAGRAM entry tool in *Print preview* mode.

In addition to the possibilities offered by Caneco BT, like creating new styles, creating circuit blocks, creating new symbols, etc., a number of more advanced features are also available:

- Inserting associated circuits in incoming feeders
- Management of parameters for associated circuits
- Ground bar management
- Management of terminals and their numbering
- Automatic marking of circuits and components
- Support of the EN 60 082 marking standard
- Insertion of additional diagrams for each distribution (control, layout, cabinet front panel).
- Definition of the specifications of a cabinet and print-out of the associated manufacturing sheet.
- Insertion of auxiliary diagrams associated with protections Diagram

16.2 Diagram representation

16.2.1 Representation as printed (large display)

In this representation, the diagrams (circuits + associated circuits + inserted images) are displayed as at printing.



The choice is made in the «Board singleline diagram 'tab from the "Preferences» window'

Preferences								
Automatic Ref Marks F Save Display Circu	Print Colors it Spreadsheet	Default Values Board Single-line Di	Direct agram					
Board Single-line Diagram								
 Circuit representative Display the line no 	uuon as at piinung umber							
🗸 Display Grid								

16.3 Insertion of associated circuits in incoming feeders

Create the associated circuit using symbols from the library and store it with the circuit blocks. The drag-drop command allows it to be inserted in the feed.



16.4 Enrich the symbol text

Defining texts associated with symbols is possible in Caneco BT. 'Text insertion' window is used to enter a symbol with circuit parameters.



Choose the parameters you want to display nearby the symbol

Selected parameter is validated (in this case, circuit ref. mark)

Then, set the field alignment.

16.5 Parameter management for associated circuits

You can enter parameters corresponding to the circuit associated with a power circuit: Ref mark, consumption, trunking characteristics, terminal wiring, terminal numbers, etc. The window allowing these different values to be entered is displayed by double-clicking on the associated circuit.

• Example: *Lighting* + *BASL*



necting circuit	
⊙ C_12	OC_3
	1
Ref Mark	AS_1
Designation	
Equipments number	
Consumption	
Device 1 Ref Mark	
Device 1	
Device 1 rating	
Device 1 Poles Nb	
Device 2 Ref Mark	
Device 2	
Device 2 rating	
Device 2 Poles Nb	
Device 3 Ref Mark	
Device 3	
Cable Ref Mark	
Cable type	
Cable core	
Length	
Instal. method	

The characteristics of the associated circuit will be defined in the window opposite, displayed by double-clicking on the associated circuit

16.6 Management of ground bar and terminals

16.6.1 Representation of ground bar and circuit terminals

2

Type of default terminal Not disconnectable -

Draw the earth bar on angle line diagram

Max cables cross-section on terminals

Caneco BT offers the ability to draw the ground bar and circuit terminals (power circuits and associated circuits).

It is also possible to number the circuit terminals (power circuits and associated circuits). Insertion of the ground bar and the circuit terminals is done from the «Schematics» option of the «Downstream» tab of a distribution sheet.

÷.

.

35.+

Where:

Circuit sheet

Upstream

Drawing N*

Ċ

TD001 on MSB

Curve discrimination

Soard Protection UPS III/dU

Drawing N° for the actual board printing :

Terminal blocks 7 earth ba

Teminals on power cecults

Terrinals on PE

a - 0

Teminals type

Terninal name

inals N*

Terminals on no calculated circuits (as

Circuit

check on the buttons on the Terminuis but.	Click on	the	buttons	on the	'Terminals'	bar:
--	----------	-----	---------	--------	-------------	------

1

Coordination Cable/Phoh

Schematic Opt

nta

÷.

.

2

ind.

- 28 Associated Circuit Connecting circuit TD001 • Cable core Length 3 installation (No. cables Cable Phases Neutral PEPEN Additional Conductors Wiring on terminal block Over-riding terminals Terminal block + Terminal numb Terminal Type Additional Additional designati Text 1 Text 2 Tent

OK. Cancel

🕴 🦸 🔿 Not disconnectabl 🗸



- The terminals will be drawn if options are checked (1).
- The earth bar will be drawn if the option is checked (2).
- The terminals on the associated circuits will be drawn if options are checked (3).
- Associated circuit wired on terminal block.
- Terminals + earth (5)
- The circuit does not include a PE conductor: only the terminals are shown (not the earth) (6).

16.6.2 Terminal block management

A terminal block is assumed to be infinite. The following technologies are available:

Switchable or non-switchable terminals

The default terminal type and the maximum cross-sections on terminals can be defined in the

«Schematics» tab of the «Distribution» sheet

Circuit terminals with cross-sections greater than the maximum are not drawn

The incoming feeder can also be brought to terminals and terminal numbers allocated to it.

Bu	usbar trunking system	lk/dU	Impedances	Currents	Schematic	Temperature			
	Drawing N*								
	Drawing N° for the a wiring system printing	ctual I :							
	Terminal blocks /	earth b	ar						
	Terminals on power	circuits		~	Draw	the earth bar on s	ingle-line diagram	~	
	Terminals on no cal	culated c	ircuits (associal	ted) 🗌	Мах с	ables cross-sectio	on on terminals	35 🔻	
	Terminals on PE			~	Туре с	of default terminal	O Not discor	nnectat 🔻	
	Incoming terminal						O Not discor	nnectable	
	Terminals type :		O Not discon	inectat 🔻			Disconner	able	
	Terminal name :		1	•					
	Terminals N* :								
_	1	2	. *	3	*	4 . *	5	6	^
2			160 A		63 A	63 A			
3	± 3P3D 1250 A								
4									
5									
6									
7			50 mm*		16 mm*	16	mm*		
8		<u> </u>							
9				1181					
-			۵Ż	اھ	7	۹Ż			>

For this circuit, the terminals are not drawn since the cross-section is > 35 mm2

16.7 Numbering terminals

16.7.1 Numbering power circuit terminals

Manually from the 'Additional data' tab on the power circuits sheet.

Select the number of the terminal	🗆 Terminals	
	Wiring on terminals	✓
block in the «Terminal block name»	Terminal fixing	
	Terminal block name	bb
ieid.	Terminal numbers	5-8
Specify here the terminal numbers in	Number of additional terminals	0
	Terminals type	Not disconnectable

Manually from the associated circuits sheet.

the «Terminal number» field

Terminal blocks	0 🗸
Terminals N*	11
Terminals type	Not disconnectable 🗾 👻

From version 5.4 onwards, you have the possibility of assigning several different Terminal Block Names within the same cabinet

Terminal name for lighting Terminal name for socket outlets, etc.

🖂 Terminals	
Wiring on terminals	\checkmark
Terminal fixing	
Terminal block name	bb 💌
Terminal numbers	
Number of additional terminals	bb
Terminals type	New terminal block

Automatically using the «Marking» command in the «Options» menu

Tool	s <u>W</u> indows <u>?</u>	Rename
≏ ⁄∄	Global balancing Power requirement Ctrl+B Modification indexes Lock project	Apply again naming rules for : Circuits ref marks Busbars ref marks Associated circuits ref marks
*	Marking	Distributions ref marks
8 0	Manufacturers files Ctrl+J Database	Equipment ref marks Cables ref marks Protective devices ref marks
1	Styles Ctrl+Y	Terminals ref marks
Ş	Edit library Caneco Dessin	Select all Unselect all
9	Calculation tool	► So For active distribution
₩ ¥	Preferences Ctrl+G Calculation Options Ctrl+K Field categories	 For all distributions Do not rename the locked elements Automatic Ref Marks
	Printing documents models Language choice	Rename Close

The position of the terminal numbers can be defined from the «Board single-line diagram» tab of the «Preferences» window.



The prefix of the terminal block (1) ref marks can be defined from the «Board single-line diagram» tab of the «Preferences» window

Preferences [Document1]					×
Save Display Circuit Spreadshe	et Boa	rd Single-line Dia	gram	Netwo	ork single-line Tracks
Automatic Ref Marks Print Co	lours [)efault Values	Direc	tories	Warnings and remarks
Objects ref mark					
Number of caracters for the suffix :	E	×			
Boards and transformers :	TD_				
Busbar Trunking Systems :	CEP_				
Circuits :	C_	Ente distr	er after t ibution i	he activ name	e Advanced
Busbar :	SJB_	dist			
Associated circuits :	AS_	Ente	er after t	he activ	e
Styles :	STY_	dist	badom		
Cables : 🔽 Identical to circuit ref. Mark		Ente distr	er after t ibution i	he activ name	e
Equipments : 🗹 Identical to circuit ref. Mark		Ente distr	er after t ibution i	he activ name	e
Equipments ref mark					
Circuit-breaker :	Q	Current	used r	nethod :	
Contactor and others (remote	КМ	N* acco	N° according to the line of the circuit		
Fuse disconnector, Fuse switch, fuse :	Q		Cha	ange ma	rking method
Switch, disconnector :	Q				
Thermal relay :	F				
Terminal block:	Х	Advan	ed		
Default options		ОК		Canc	el Help

The «Advanced» button allows you to select the terminal management options.



Terminals forced after circuit calculation

Incoming terminal	
Normal 🗸 🗸	
Terminals type :	Not disconnectable 💌
Terminal name :	bb 💌
Terminals N* :	1-5



Example of terminal block marking and terminal numbering.

16.7.2 Numbering associated circuit terminals

The number of terminals for an associated circuit is calculated as follows:

N = n1 + n2

Where:

n1 is the number of conductor resulting from Caneco BT's interpretation of the number of conductor of the connecting cable you have defined in the window. If you have defined a 2×1.5 cable for the connection with a wall-mounted P/B within the installation, Caneco BT deduces that n1 = 2 (as many terminals as there are conductors). If you have written 5G1.5, Caneco BT deduces from this n1 = 4 + 1 PE conductor which will be connected to the earth bar, possibly with intermediate terminals, depending on terminal option you have selected.

n2 is the number of additional terminals defined in the associated circuit window.

Automatic Marking

The «Marking» command in the «Options» menu displays the «Rename» window.

The window allows automatic marking of:

- Circuits
- Equipment
- Protection devices
- Terminals



Various options allow the user to define the operation of the «Rename» function.

The «Automatic ref marks» button activates the automatic prefix definition window

Save Display Circuit Spreadsh	eet Board Si	ngle-line Dia	agram Netw	ork single-line Tracks		
Automatic Hef Marks Print Co	olours Defau	It Values	Directories	Warnings and remarks		
Objects ref mark						
Number of caracters for the suffix :	1	3				
Boards and transformers :	B_T					
Busbar Trunking Systems :	BTS	1				
Circuits :	C_	Ente	er after the activ ibution name	Advanced		
Busbar :	J_		action of the second se			
Associated circuits :	AS_	Enter after the active		re		
Styles :	STY_					
Cables : V Identical to circuit ref. Mark		Ente	er after the activ ibution name	re.		
Equipments : 🔽 Identical to circuit ref. Mark		Ente	er after the activ ibution name	e		
Equipments ref mark						
Circuit-breaker :	CB	Currently used method :				
Contactor and others (remote control switch, time delay switch)	CO	N* according to the line of the circuit				
Fuse disconnector, Fuse switch, fuse :	F	i (Change ma	rking method		
Switch, disconnector :	SD]				
Thermal relay :	TR]				
Terminal block:	ТВ	Advand	ced			

«Equipment ref marks» section:

Allows you to define prefixes for each type of equipment.

Default prefixes comply with the EN 60 082 marking standard

The «Change method of marking» button activates the «Equipment marking method» window to allow a marking method to be selected (see next page).

Object ref marks» section»:

Defines the prefixes for different objects Various options are available to enhance object marking.

The «Advanced» button activates the «Advanced circuit prefixes» window to enable prefixes to be customised for each type of equipment

	·		
Motor :	М	Board :	В
Socket:	S	Busbar trunking system :	BTS
Lighting :	L	Capacitor :	С
Heating :	Н	Transformer :	Τ
Misc :	М	Busbar :	В

16.8 Methods for marking equipment:

This is where a marking method is selected.

The zone on the right shows a diagram associated with the selected marking method.



The «Display ref marks in accordance with EN 60 082» option in the «Board single-line diagram» tab of the «Preferences» window prefixes with a (-) sign the equipment ref marks according to the EN 60 082 Standard.

Display reference marks according to E	N 60082 standard
Terminal block Ref Mark position :	Terminal Ref Mark position :
🔿 not visible	💿 not visible
💿 on the left of the symbol	 Underneath the Ref Marks terminals Coupled to the Ref Marks terminals
◯ on the right of the symbol	O on the left of the symbol

Example of automatic equipment marking



Equipment ref marks can be entered manually from the «Additional data» tab of the circuit sheet.

- 1: Ref mark device 1
- 2: Ref mark device 2
- 3: Ref mark device 3



16.9 Specifying the distribution enclosure

The characteristics of a distribution enclosure can be defined in the «Specifications» tab of the «Board» sheet.

Upstrea	m	Circuit	Ac	Iditional	Addition	nal results	Conformity		Texts
0	urve discrimi	ination		Coordi	nation Cable/P	rotection	Do	wnstrear	n
oard UP9	6 Ik/dU	Impedances	Currents	Schematic	Temperature	Specifications			
Cabine	t productio	on sheet]						
Equipmen	nt brand			Impose	d to CCTP			~	
Cabinet	metal she	eets							
Colou	r			Accordi	ing to CCTP				
Enclo	sure type			Accordi	ing to CCTP	6			•
Materi	ial			Accordi	ing to CCTP				- 1
Positio	on			Mural					-
Sizes	H	W	D	By sele	ction 0 mm	0 mm	0 mm		
Trans	port separati	ion				0 mm			
Aspec	t (IEC 6043	9-1, EN 60439-	1)	2b					
E Indexe	es								
Inc	iex IP			1					
Inc	lex IK			1					
Se	rvice coeffic	cient		313					
Plinth									
Cable	s sheath			No					
🗆 Door						~			
Hir	nge			Left					
Lo	ck			Standar	rd				
3 Engravi	ng								
Label				Engrave	ed				
Outgo	iing ref Mark	Label co	olour		~			-	-
Condu	uit ref Mark					~		~	
🗌 Default	options					Apply	the default values		3

The user can then print a manufacturing form for each cabinet.

The choice to print the manufacturing form is made from the «Board single-line diagram parameters» which is opened by clicking the «Details» button associated with the single-line diagram in the «Document» tab of the «Print manager» window.

Documents :	· Composition : Definition	
Calculation sheet 3 cir Conformity sheet Conformity sheet	Board single-line diagram parameters Print settings When there are not outlets in the distribution ♥ Print a page Replace equipment symbols by default symbol Associated documents ♥ Print a production sheet for the cabinet before each distribution Cabinet production sheet ♥ Print an image document after each distribution General drawing ♥	
New Organize	OK Cancel	Details

The following illustration shows the «cabinet manufacturing form» as it will be printed..

202000000000000000000000000000000000000		CABINET PRO	DUCTION	SHEET	
Ref mark: MSB	Designation	:			
Project Num.				N°Diagram:	
Project:				1	
		Ne	twork		
Network:TN Voltage: 400 V	Ik Cabinet :	lk3Max N: lk3Max S:	21021 A	lk1Min N:19513 A lk1Min S:	Current: N: 909,35 A S:
Equipment brand: Msc:	Imposed to C	СТР			
		Cab. m	etal sheets		
Color:	According to	ССТР		Mise:	
Туре:	According to	ССТР		Misc:	
Index:	According to	ССТР		Misc:	
Position:	At ground lev	el	T	ransport separation	: 0
Size: By s	election H: O	W: 0	D: 0	Aspect	:2b
IP: 01	IK: 01	Service co	efficient:31	3	
Additionals:	with Base	Cables she	athNo		
with Door	Hinge	_eft		lock:Standard	Mise:
		IDENT	IFICATION	Engraved	
🛚 Outgoing Tab	Color Ou	tgoing Tab:	Mice	Location: with with	n Plastrons n Cell
with a with Formel or a	e entrine plan	Davina	misc Front	al by All and transpo	orted on terminals
without alverop	e carries prari	Fower	Dreak.	,	
N		Cor	nnection		
suppry:	By the top				
able outgoing.	According to	Besitiestorith			t Dhe besizestal T
erninais.		POSITION	t	Layot	ar por nonzonrari ob
avout equipment:	Proposed				
ocation:	According to Draw	winfi Wires	П	Dutaoina	DEquipment
arth:	stoording to blad			Commutator/Bar	lindifferent
Miring:		Strand		Conduit	🛙 Indifferent
- Busbar <i>i</i> phase Splitt	er	Polybloc	D Multicli	o DSplitter	🛛 Indifferent
		(thers	•	
Respect of CCTP:	Yes Date:		Ref Mark:		
🛙 sheet of manufa	cture present to clo	se properly to th	e board		
Notices:					
-				Cabine Loroduc Id	on sheel MSB
LOGO	2 2			PRO JECT N	Folio
Entreprise	nd.	MODIFICATIONS		PROJECT N	Foin T
16.10 Insertion of additional diagrams for each distribution

The following additional diagrams can be associated with each distribution:

- Cabinet layout
- Front panel of cabinet
- Control diagram

These diagrams can be created in formats such as DWG, wmf, etc.

The files containing the diagrams must have a name identical to the distribution ref mark followed by a suffix corresponding on the type of diagram to be inserted (_FAV, _IMP or _SCH). They must be saved in the same folder as the project.

• Example of a control diagram in DWG format associated with TD1 distribution panel



A contextual menu allows a certain number of commands



The «Edit» command opens a diagram in the default editor (e.g. AutoCAD)

The «New» command opens a drawing editor to create the required diagram.

The «Reload file» allows an image to be updated.

The «File name format» command opens a window for defining the composition of a file name and the file extension.

File name	X
File name composition	
Name :	Extension :
[dist]_SCH	.dwg 💌
OK Cancel	.dwg .dxf .wmf .emf

The additional diagram to be printed is made from the «Board single-line diagram parameters» which is opened by clicking the «Details» button associated with the single-line diagram in the «Document» tab of the «Print manager» window.

ocuments : Calculation sheet Distr	to tipution ► Composition :		
Calculation sheet 3 cir Conformity sheet Conformity shee	Board single-line diagram parameters Print settings When there are not outlets in the distribution Image: Print a page Replace equipment symbols by default symbol Associated documents Image: Print a production sheet for the cabinet before enclabinet production sheet Image: Print an image document after each distribution Image: General drawing Image: DK Cancel	ach distribution	

16.11 Inserting additional diagrams associated with protections

A library of additional diagrams representing auxiliary contacts is available from the «Additional diagrams» tab of the library.



The additional diagrams may be in DWG or wmf format and are found in the following folder: C:\Documents and Settings\All Users\Application Data\ALPI\Caneco BT\5.4\ENG\Schema

An additional diagram is inserted by drag and drop using the «Board single-line diagram» entry tool.

2	3	4	5	• 4	Results	Libraier	
1				al and		Symbols	
2	🗶 ភ៉ពី 🗶			1000		Circuis Style	4 0
-				- 1 2	Åd	ditional diag	ams
3				nt certa	A	m	-
•	_			Fare ava	A.	1001	
5				artation	নার্নায়	1	
6				Imme	RATI	ī.	
7					闸	Pehlil	
8				*			

Additional diagrams have an attribute to specify the sheet in the control diagram where their wiring will be represented.

This information is defined in the «Text 8» field of the «Circuit sheet text» tab (see below).

Curve dis	Curve discrimination Coordination Cable/Prote		ation Cable/Protection	Dowr	stream
Upstream	Circuit	Additional	Additional results	Conformity	Tests
Texts					
Additional designa	tion				
Text 1					
Test 2					
198.2					
lext 3					^
Text4					-
Text5					
Text6					
Text7					
Text8	FOLI	0.004			
Plac de circuite	AutoCAD®				
not de tritani					
Nom du bloc Auto	CAD®:				

The sheet number is entered in the Text 8 field

Result obtained



17 Printing

17.1 General

Caneco BT produces documents or folders according to standard or customizable models.

To customize printing content

you must use the Printing Models / Documents Models or Printing Models/Folders commands from the Tools menu.

To run printing,

Vous devez vous servir des commandes figurant dans le menu Fichier:

- Page setup
- Preview + Button « Setup »
- Print

or from Tool Bar: Buttons « Preview « (1) or « Page Setup « (2) or « Configure » (3)

	Control Control States	THE PERSON NEEDED	- (
Eile Edit Di	Supplies	Distribution	Circu	1	pls	Windows	1	
		a ant	E)	-	右[]	T P R	9	
Normal Supply	- 0. 8	. MSB	3		\$5	<u>\$2</u> - \$ "	+	ķ

You can set the printing parameters in the following window:

Page setup Paper Size A4 (210 Source Selection Preview Preview Parameters Printing language Document date	x 297 mm) x 297 mm) magasin auto Margins Iop: 4.24 Bottom: 0 Left: 4.24 Bight: 0 Anglais (Royaume-Uni) (Anglais (Royaume-Uni) (Anglais (Royaume-Uni)) (Anglais	Detribution to print All Select Stable Stable Stable MSB Detribution to print Stable Stable MSB Detribution to print Stable MSB Detribution to print Stable MSB Detribution to print Stable MSB Detribution to print Stable MSB Detribution to print Detribution to pr	Folders and documents Folders and documents Folders and documents Gravitation
Plan or document Number	1	Print one folder by distribution	Goppy and III Tile page List of folios
		PrinterOK	Cancel Preview <u>H</u> elp

17.1.1 Print setup

Caneco BT enables various document editing modes: Global editing of given folder content (see Folders models)



17.1.2 Editing a folder for selected distributions



17.1.3 Editing a document type



- Select the folder to edit and Documents».

- Select «All» option in the zone

- Select the folder to edit in the window « Folders and Documents ».

- Click on option « Select « in the zone Distributions to print «

- Select the distributions to print in the tree structure.

- Select the document to edit in the window « Folders and Documents ».

- Select distributions to edit.

17.1.4 Editing a folder by distribution

Page setup		X
Paper Sige A Source S Preview	4 (210 x 297 mm)	Folders and documents Folders and documents Studies folder Control folder Legal Documentation Fiyleaf Folios list Network Single line A4 Normal Network single line A4 Standby Network single line A4 Standby Network single line A2 Network single line A2 Network single line A2 Network single line A2 Network single line A2
Margins	Parameters	Supply sheet Calculation sheet 1c
<u>I</u> op : 4,24	Printing language Anglais (Royal 🗸	Calculation sheet distribution Calculation sheet 3 circuits
<u>B</u> ottom: 0 Left: 4,24	Plan or document	Calculation sheet 4 circuits

Caneco BT enables to edit a folder by distribution. Editing will have as many folders as selected distributions.

17.2 Documents models

This command of Option menu is used to work with documents models given, personalise documents models (Customisation Pack).

A document model is a model which characterizes a printed document: presentation, content...

The command opens the following window:

Printing manager	δ	<
Documents Folders Translation		
Documents : Image: Constraint of the second sec	Composition : Definition Name Flyleaf Type Flyleaf Orientation E Landscape Folio Pagedg.inf (Flyleaf) Background Pagedg.inf (Flyleaf)	
	Close Help	

17.2.1 Composition

Configures the selected or created mode. <u>Definition topic</u> Name: Name of the document model used to select it for printing. Type: This is the document printing type The different types are:

N°	Document type	N°	Document type
1	Flyleaf	14	Nomenclature
2	List of folios	15	Power requirement
3	Supply	16	Distribution tree
4	Circuits	17	Tracks
5	Boards	18	Discrimination
6	Transformers	19	Compliance
8	Busbar trunking	20	Curve I ² t
	system		
9	Sheets		
10	General single-line		
	diagram		
11	Board Single-line		
	Diagram		
12	Text File		
13	Image File		

Orientation: Portrait or landscape Folio background: Choice of the Folio background.

17.2.2 Details button

To choose the document setup.

Board composition						
Board composition based on Equipments Nomenclature type fields						
Nomenclature Fields Sheet Borders						
Nomenclature	Total					
Cables	 For the project 					
Associated circuit cables	O By distribution					
Associated circuit Devices Busbar trunking systems Bupments	Separator None Line feed					
Tracks	O Page break					
OK Cancel						

17.3 Print settings

17.3.1 Caneco BT offers the following printing possibilities: The possibility of creating 'text' document templates in enriched 'rtf' (rich text format) format.

This is the exchange format for word-processing applications. Word lets you save document in rtf. This format saves text enhancement features, including in particular customization of fonts and colours.

17.3.2 The possibility of creating 'image' document templates in 'dxf' format

This format is the exchange format for AutoCAD as well as for vector drawing applications. AutoCAD lets you save document in dxf, which respects the idea of image blocks and layers. Only users with the "Import/export" Pack are able to save a Caneco BT document or folder in dxf.

17.3.3 Printing one folder per distribution

Define a number for each distribution Insert empty folios Insert page breaks Choose the folio numbering from a start value (this lets you add documents in front of the Caneco folder).

17.4 Folder templates

This command of Tools menu (Tools / Print templates / Folder templates) allows to manage and customize the folder templates.

A folder template is a template which differentiates a printed folder. It is set by the list of document templates making it up.



In the active window, you can choose (in the left side) the folder template you want to modify. You may also create (or delete) a template using the New (or Delete) command.

The content of a folder is set choosing the available document templates in the right side of the screen and putting them on the central zone, using the slide - release control.

To remove a document from the folder, choose it and click on the trash can icon.

To change the order of a document in a folder, select it and then use Up and Down arrows on the top central zone of the screen.

17.5 Printing language

This function is operational if International Pack is present.

inting manager				
ocuments Folders Translation				
New language :	Filter on fields :			
	✓ All fields	v 🖌		
Translated languages	List of 1368 fields to tran	slate		
Allemand (Allemagne) Anglais (Royaume-Uni) Espagnol (traditionnel)				
Français (France) Italien (Italie)	Fields name	Field Wording	Possible values List	
(2007) (((2007)	Abouti	End		-
	Aboutissant	End		
	Affaire	Project		
	AffCaneco400	Caneco 400 project	No Yes	
	AffCanecoLight	Caneco Light project	No Yes	
	AfficheRep	Display Ref Mark	No Yes	
	AffPrix	Price	No Yes	
	AfrName	Project		
	AideContexte	Help		
	AjusterCols	Adjust Colomns	1.20	
		Cid	ose Help	

17.6 Documents with external files

For any printing document with an image file (in wmf, dxf, bmp, jpg format) or text (txt, rtf) it is necessary to set the link between this template and the external file. You can see and modify this link in the « project specific documents » of the project tree. To set this link, click-right on the file – link which you attach, for this project, to the Caneco BT document or folder templatel, and use the « Replace file » command.

In the example below, you can see the «Chassis plan» document template used in «Decree of 10 October 2000» folder template. Caneco BT notify that the external file is missing (document template is not attached to any other external file).

In this example, you can see a « premises plan with earthing system » document linked to an external file called « track » and whose access path is indicated at right.

Additional docume	ents for printing					
List of folders ×	Document title	File	File Type	Pres	Path	Size
Project : example2-No	General drawing	Pavillon.wmf	Image WMF	Yes	C:\Documents and Settings\All Users	539 Ko
- 🔄 Symbols library	Glossary	Glossary Canec	Format RTF	Yes	C:\Documents and Settings\All Users	249 Ko
- 💣 Manufacturers fil	Open	AU.wmt	Image WMF	Yes	C:\Documents and Settings\All Users	105Ko 12Ko
	Open with Caneco Dr.	aw ical specif	romacrin	165	c. coocontents and Settings with Sets	13 10
🛛 🥮 Board single-line	Display					
😑 📋 Project						
😑 🔂 MSB						
😐 🔂 DB_1						
⊞ 🔂 DB_2						
😟 🛅 DB_3						

18 Import / Export

Caneco BT offers import and export functions for text and graphics The commands are accessible from the «File» option in the main menu

s <u>?</u>
2 📼
FT 🕴
s
_]

18.1 Graphic export (Import/Export Pack)

Graphical Export	×
Folders and documents Preliminary study folder Studies folder Control folder Legal Documentation detailed bord folder Project folder Network single-line A4 Normal1 Network single-line A4 Standby Network single line A3 Normal Network single line A1 Exclusion sheet 1 circuit	Distributions to be exported All Selection SUPPLY MSB Export extent : All pages Selected pages Documents parameters
E Calculation sneet Distribution	Language : Anglais (Royaume-L v Date : 03/02/2012 v Drawing or Document Number :
File Metafiles (*.wmf) Export prefix : Document1_ Folder :	
C:\Users\dln\Documents\Caneco\	IK Cancel Help

The export format can be defined in the «File» field

File	
Autocad R14 DXF (*.dxf)	*
E Metafiles (*.wmf) Enhenced Metafiles (*.emf) Autocad R14 DXF (*.dxf)	

The graphic export function enables

Caneco BT documents to be exported in wmf or DXF format.

Various options are available for defining the export parameters.

The name of a document to be exported must be preceded by an Export prefix

Documents will be exported to a folder defined in the **Folder** field.

The method for creating DXF files can be selected in the section named **DXF** file configuration

Selection of distributions concerned by the export of documents

Distributions to be exported	
 Selection 	
SOURCE	*
🖻 🥅 🔂 MSB	
🗖 🛅 DB_1	
🖻 🦵 🔂 DB_2	
🖵 🗖 🗖 T_20	
🗖 🔂 DB_3	
STANDBY	
🛉 🗖 🔂 DB 2	-

Export extent :	
Documents parameters	
Language :	Anglais (Royaume-L 🔽
Date :	22/04/2009
Drawing or Document Number :	
DXF file setup	
🔘 Create a file per fo	lio
🔘 Create a file per di	stribution
💿 Create only a file fo	or all folios
Folios presentati	on and a second
💽 spread out	🔘 stacked

Choose folio layout: Optimized (the same number of rows and columns) 	
In rows (all folios are laid out on only a row)	
🔿 In columns 🔋 🚊	

Different export options can be selected

Caneco BT creates files according to the options selected. You can then modify them using a suitable editor (e.g. AutoCAD for DXF files).

When creating a single file for all the sheets, the user can select the presentation and layout of the sheets.



If you wish to complete the Caneco BT diagrams using AutoCAD or another DXF editor, it is advisable to:

- create a special layer for the additions, so as to avoid modifying the original Caneco BT layers
- previously allocate the space necessary in Caneco for the diagram additions
- To this end, you can use blank pages function in Caneco BT.

18.1.1 Export a single sheet

A single sheet can also be exported

This requires you to display the print preview for the sheet to be exported. Then request the export of the sheet in DXF format, using the pop-up menu activated by a right click:

	Modi	fication	5		6															
TWO	ORK	loudon		158											1158					
rth.	Syst.	TN																		
kag	je	400 V		0	\$11			1*		1*		1*			1*					
TR	IBUTIO	N		Ţ,		Ę														
	Norm al	SOURCE	7))	1														
stre	eam		-																	
	sandby																			
Ma	ark	MSB																		
sigr	nation			7	4	5														
_		Normal Standb;																		
sta	lled	1154,73 A																		
otal		291,59 A	-					and a		and and		and the			1					
ma	ах	25837 A						1		-		1			-					
ma	ax	25481 A		a	6	à		1 E		R		2			<u> </u>					
ma	х	0,32 %		\checkmark	2															
	Ref Ma	ink / Cable	SOURCE	1	SOURCE	1	C 1	1	C 2	1	C 3	/		C 9	1		1			1
	Equipr	nent Ker Maik	MSB		MSB		08 1		08 2		083		-			2		-+		
	Dealar																			
3	Design	ation																		
1	Nb	Consumption	1 40	OKVA	1 400	KVA	1 1	00A	1 5	DA	1 1	50A		1 101	<var< td=""><td></td><td></td><td></td><td></td><td></td></var<>					
,	Supph	V BB	Norm al		Normal		Norm al	- 107 S	Normal		Normal	10/34175	_	Normal				-	~	
	Туре	Install	XLPE	31	XLPE	31	PRC	13	PRC	13	PRC	1							202	
	Length	Core	10 m	Copper	10 m Co	opper	25 m	Copper	30 m	Copper	20 m	Copper	Pirs	t page						
	dU Tot	tal	0,32 %		0,32 %		0,78 %	0	0,84 %		0.64 %	0	Pre	vious Page				\vdash		
	Cable		3X(1X240	1)	3X(1X240)		4X50+G	35	5625		4X95		Nex	t Page						
	Neutra PE/PE	N Separate	d 1X240		1X240						1X25		Las	t page				\vdash		
	Harmo	nics rate										_	Set	up					_	
	IB IK3 M •	X II/2 Min	577,37 A	11440 A	26937 A	11440 A	100,00 A	7396 A	50,00 A	4956 A	150,00 A	167	Prin	it .		Ctr	1+P			12
	lk1 Mir	n ID	A A	11440,1 A	A .	11440,1 A	5993 A	5403,6 A	3372 A	3372 A	8246 A	603				20	201010			
	Discrim	nination	NORDEN		NCROON		Total		Total		Total		Sav	e as a WMF	Windows m	etafile				10
	Туре		STR23SE		STR23SE		TM100D	×	TM63D		TM160D	×	Sav	e as DXF						
	Rating	IrTh/IN	630 A	578,00	630 A	578,00	100 A	100,00	63 A	63,00	160 A	160,0	0	25 A	22,00			-		
	Dolay	IrMg/IN	40 mc	5780,0	40 mc	5780,0	0.000000000	1250,0		1000,0	-	1250,	0		300,0 2760 A		-	_		
	INd. C	ont.	Basis Prot	10A	Basis Prot		Basis Pro	t t	Basis Pro	1 2010 A	Basis Pro	1 3028.	^	Basis Prot	2708 A					
•	Ir Diff.	Delay.Diff.		0 ms		0 ms		0 ms		0 ms		0 ms			0 ms					
ase	distribu	tion	12	13	123		1	23	1:	23	1	23		123		L				
	1	00	\sim	exa	mple2-hd_M	Vormal Star	idby_DB		\vdash						BS C15	100 RGIE	Certifi	cates		
		UG	\mathbf{O}						\vdash						PROIE	ст·				F
	Ľ۲	tronr	60	D	rd Cinala L	na Maintar	on oo 0 -	MOD	Ind		MODU	LCOTIONS			1 KOJI					-
		nuepr	50	BOa	ra Sirigle Li	rie wanten	ance 8 ci	111128	nia.		MUDI	TICATIONS			DRAW	ING				

18.2 Text export (Import/Export Pack)

The export text function allows the user to export project data in various text formats.

Models : 🖑 🖓	Configuratio	n :		Transfert dire	ction
Basis Export	Name :	TEST		Export	an constants
TEST	Type:	ASCII Transfer		Types of text	
		ASCII Transfer		format supported	
Import / Export template	Concerned Gen Sup Boar Busb	CSV Transfer Excel Transfer HTML Transfer XML Transfer ds and transformers art trunking systems its	Name, File		
New Delete Execute Translate	Calco	ks ulation parameters ny: L:\Caneco 5.3\Afr-EN	4G 5.3.1	Specify the outp	the name ut file
Organize				C	etails

18.2.1 Procedure:

- 1. Create an export template using the command «New»
- 2. Define the export format in the «Type» field
- 3. Tick **«Export**» in the **«Transfer direction**» area
- 4. Tick the data to be exported in the «Concerned data» area
- 5. Specify the file name(s) to be associated with the data
- 6. The «Details» button gives access to the setting window for export files
- 7. Validate the «Transfer options» window after defining the transfer options.
- 8. Activate the **«Execute**» command to create the export files

New elements creation	Langu	age International	
Delete not transfered elemen	ts Lists	Numerical	
Taking into account associal	ted circuits		
ASCII Transfer			
ASCII Transfer	Fields separators	🔘 Semi-column	



Select «*Literals*» to enter item names in the Lists field instead of a number

indicating their position in the list.

Example: Conductors scrolling field – the content 3P + N + PE is the 2nd in the list

the list.		
Conductors :	3P+N+PE	•
Command P	3P+PE	^
	3P+N+PE	
Туре :	3P	_

18.3 Text import (Import/Export Pack)

The import text function allows Caneco BT to take account of modifications made in the exchange file (e.g. xls).

This gives valuable flexibility in cases where the user wishes to enter the circuits for a project directly in Excel (modification, addition and deletion of circuits).

Importing the Excel file will apply the necessary updates in the project which is active in Caneco BT (the data imported must of course correspond to the active project)

fodels :	\$ \$	Configuration : Definition	Selection the	Transfert direction
Basis Export		Name: TEST		C Export
TEST V		Type: Excel Transfer		() Import
		Concerned data		
		General Information		
		Supplies		
		Boards and transform	ers	T
		🗌 Busbar trunking syste	ems	
		Circuits	Name_File	•
		Tracks		Ŧ
		Calculation paramete	rs	
New	Delete	Directory: L:\Caneco	5.3\Afr-ENG 5.3.1	
Execute	Translate			
ſ	Organize			Details

Procedure:

- 1. Open the project concerned by the data import
- 2. Activate the Import Text command
- 3. Select the required import template
- 4. Tick «Import» in the «Transfer direction» area
- 5. The «Details» button gives access to the setting window for import conditions
- 6. Tick the desired import options (creation of new circuits, etc.)
- 7. Validate the «Transfer options» window after defining the transfer options.
- 8. Activate the **«Execute**» command to update the data for the active project.

ansfer Options					1
New elements creation		Language	Internat	tional	-
Delete not transfered el	ements	Lists	Numeric	cal	-
Taking into account as:	sociated circuits				
cel Transfer					
With title line					
What doe mile					
Text identifier : "					
] Text identifier : "					
Text identifier : " ansfered fields					
Text identifier : " ransfered fields Records	Available	ields	- #2	Select	ted fields
Text identifier : " ansfered fields Records cuits	Available	ïelds	▲ >	Select	ted fields
Text identifier : " ansfered fields Records cuits	Available	ïelds	<u>></u>	Select TabAmont RepCir	ted fields
Text identifier : " ansfered fields Records cuits	Available Available Available Autifields	ields vice	◆ <u>></u> >>	Select TabAmont RepCir Consommation	ted fields
Text identifier : " ansfered fields Records cuits	Available Available Available	ields vice	▲ <u>></u> >>	Select TabAmont RepCir Consommation Longueur	ted fields
Text identifier : " ansfered fields Records cuits	Available All fields Circuit Protective de Cable Equipment Results	iields 	▲ <u>></u> >> <	Select TabAmont RepCir Consommation Longueur JdbAmont ModeCir	ted fields
Text identifier : " ansfered fields Records cuits	Available	ields vice	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	Select TabAmont RepCir Consommation Longueur JdbAmont ModeCir TurBecepteur	ted fields

Tick the desired update options

Define the data to be imported

19 Warnings and remarks

19.1 Generalities on warnings and remarks

This chapter concerns warnings and remarks produced by **Caneco BT**.

Warnings and remarks have been identified for easier use. The identifier is made up of one letter followed by figures:

- S ...: general warnings concerning system or Caneco BT
- G ...: warnings concerning source supply
- C ...: warnings concerning circuits (cable and protection)
- T ...: warnings concerning boards

Warnings and remarks generated by Caneco BT may be: saved in the calculation report:

		<		>
SUPPLY • SUPPLY	Check Group factor (G22)			^
Document1 Calculation done on	07/01/2008 10:56:11			~
			NUM	

after calculation. shown dialog typed or in а box you have а data entry or а Example:



You can personalise these possibilities by means of *Preferences* command in «Tools» menu:

Preferences	🔛 🕹
Save Display Circuit Spreadsheet Board Automatic Ref Marks Print Colors Def Display report	Single-line Diagram Network single-line Tracks fault Values Directories Warnings and remarks
Warnings display Edit warnings in the report Warnings validation	
Default options	OK Cancel Help

19.2 Editing of calculation report

Calculation report is a file which fills itself automatically with the data resulting from the last calculations made. If the file becomes too large Caneco BT will ask you to either save it or erase it.

You may print the report at any time. To do so, put your cursor in the part reserved for report. Click the mouse right button to see the following contextual menu:



• Click «Reach circuit» to see the circuit sheet

Click «Help on remark» to see a help bubble corresponding to the message

19.3 List of warnings and remarks, and suggested remedies

19.3.1 General warnings concerning the system or Caneco BT

S1: Manufacturers directory not found.

Caneco cannot find the manufacturers directory where the manufacturers' files are stored. This directory is normally Caneco BT's BASE sub-directory, the Caneco installation directory. Check it is there, and if not, re-install Caneco.

S2: File format error saving no.?

Project file write error.

S4: File read error.

The file is not recognized by CANECO. Wrong format: check that it is indeed a project file.

S6: Impossible to write changes.

File access is denied: check it is not open in another application.

S7: Invalid manufacturers directory

Attention, it is imperative that the manufacturers' file directory is located below your application.

S8: No manufacturer type file

Check the contents of the CFG directory.

S9: Too many manufacturer type files

You have reached the maximum number of manufacturers' files of the same type.

S10: Impossible... You do not have this module available.

Check in the 'Help' menu under the option 'About' to see if the module/pack concerned is validated.

S11: Standards file (*.NRM) not found

The standards file has been deleted in the CFG directory.

S12: Delete report file?

If you answer 'Yes', the modifications written into the report file will be deleted. If you want to keep these comments, you can print or save this data in a text file (editable using a word-processor for Windows).

S13: The report file is getting large. Delete the file?

When you perform an automatic calculation of your whole project, the 'Print report' option saves a file name_project.rap in the working directory. This file is limited to 64 kB. CANECO asks if you want to delete it or keep it. If you keep it, the most recent modifications will not be saved.

S14: Dongle not found. Unable to continue.

Check that your dongle is properly plugged in to the parallel port on your computer. If your printer is connected, check that its power is on. Contact ALPI to check if your dongle is in the correct format.

S15: No clock available. Quit an application that is running.

The number of clocks available in Windows has been exceeded. Quit an application in order to free up a clock.

S16: File ? empty or does not exist. Select another file.

You are trying to use a file that has not been declared in CANECO's parameters (usually a manufacturer's file).

S17: CANECO has detected a change in format. Convert the project.

You have saved your project using an older version of CANECO. The program proposes converting the project to the new format (recommended).

S18: The file is already open

You are trying to open the same file twice (sharing violation). Warnings and comments about the supply.

S19: Standards file (*.NRM)

The standards file does not contain the standard selected. Check the project parameters and the installation of the application.

19.3.2 Warnings concerning the supply

G1: Calculation impossible, power not in accordance with standard

Change the power of your supply (which does not correspond to the values of the selected file), or opt to determine the characteristics of your supply by Ucc for transformers or by X' and Xo for alternators.

G2: This length may possibly compromise the following calculation

The magnitude of the length may require a protective device upstream of the cable instead of downstream. Check that the voltage drop is not excessive; if it is, override the conductor cross-sections to higher values.

G3: The connection cannot be calculated because of the overridden values

Calculation is prevented by an inconsistency in the overridden values.

G4: Working current too high, the Cross-section cannot be calculated

The current of your supply is too great for Caneco to be able to calculate the connection to it. Try a connection using a busbar trunking system.

G5: Override the number of conductors first

G6: Override values contradict data

Identify and correct the inconsistency between the override values and the data.

G7: only the TT earthing system makes it possible to accept this data

You are entering data that is contradictory with the earthing system being used.

G8: Override cross-section too small

The override cross-section you have entered will not carry the permanent current of your supply. Modify your override value or correct your supply.

G9: Override neutral cross-section too small or calculation not programmed

Modify your override values for the number of neutral conductor and their cross-sections.

G10: Non-standardized cross-section

Modify the cross-section you have entered, as it does not appear in the file of standardized cross-sections.

G12: Cable not in catalogue (price = 0 in the price standard)

The cable selected by Caneco has a zero price in the *.PRX price file in the manufacturers' file selection window (first command on the 'Options' menu). This may indicate that the cable is not listed in the supplier's catalogue.

G13: Current too high for the busbar trunking systems on file

Check in the busbar trunking system file if there are any busbar trunking systems with a rated current higher than the load current of your supply. Where applicable, add the missing item to this file or try with another manufacturer's file.

G14: The selected busbar trunking system will not withstand the electrodynamic forces. Override the type of busbar trunking system chosen.

G15: No check is performed for non-standard busbar trunking systems.

The busbar trunking system you have imposed is not in the busbar trunking system file.

G17: The calculation does not take the imbalances between conductors into account

You are advised to add a permitted current reduction factor for the cables in order to allow for the adverse current distribution between the different conductor on each phase. See "Standard calculations / high-current circuits – parallel conductors" section.

G18: Supply from electricity company: You must specify this in the supply type

G19: Supply file to be defined

G20: Transformer Ukr (%) to be defined

G21: Selection impossible... Ref mark reserved for the supply

G22: Check the proximity factor

The proximity factor proposed by Caneco corresponds to the installation method on the cable tray. Modify this factor in accordance with the indications given in the "Warnings and comments about circuits" help section.

G23: One or more supply parameters have been modified.

You must calculate the supply in order to be able to calculate the project circuits.

19.3.3 Warnings concerning circuits (cable and protective device)

C2: Upstream magnetic trip set too high

The short-circuit currents are too low to operate the magnetic trip on the circuit-breaker protecting your circuit. Reduce this setting or increase the conductor cross-sections.

C3: This ref. mark is already in use for another circuit

Change this ref. mark, as Caneco does not allow two identical ref. marks.

C4: Operating current too high, impossible to calculate the cross-section

The program only calculates cable connections if there are no more than 6 conductors per phase and if the crosssection does not exceed 800 mm².

Check your data, then correct if necessary by:

• Changing to a busbar trunking system.

• Changing the parameters affecting the cable conductivity (factors, installation method, etc.)

C5: Situation not handled, modify or override values where necessary

C6: Override values contradict data

Cancel the overridden conductors (neutral or PE) that are not included in your connection, or modify the contents of your circuit.

C7: The upstream switchboard conductors do not allow this choice

Check (and correct if necessary) that the upstream circuit of the upstream distribution (switchboard or busbar trunking system) does indeed have the necessary conductors: Neutral, PE, or 3-phase, or modify the conductors for the circuit you are working on.

C8: Upstream circuit not identified, cannot calculate

Check the existence or validity of the circuit powering the active distribution.

C9: Upstream board not identified, impossible to calculate

Check the existence of the upstream board and the cable feeding it (upstream circuit).

C10: Short-circuit protection is provided by the overload protective device.

In the configuration window ('Options' menu, 'Cross-sections' command), you have opted for the circuit-breaker not to be tripped as a matter of course on Ik Min. Your circuit-breaker's magnetic trip does not trip when a short-circuit occurs at far end of the circuit (Ik Min). See "Standard calculations / Short-circuit protection / protection by circuit-breaker" section.

C11: Operating current or breaking capacity too high for the type of protective device

The type of protective device you have selected does not offer equipment with the current or breaking capacity required. If you have selected a modular circuit-breaker (curve B or C), select a general-purpose circuit-breaker.

C12: Out of calculation (voltage drop condition)

The voltage drop condition gives a cross-section greater than 800 mm² and a number of conductors greater than 6. This usually means there is an error: you are imposing on your circuit a maximum voltage drop that it is not able to obtain, either because this value is too low, or because the upstream voltage drop is too great. In the latter case, recalculate this upstream circuit, imposing on it a lower maximum voltage drop or overriding the cross-section value.

C13: Non-standardized override rating, impossible to calculate

Modify this rating or override the thermal and magnetic trip settings.

C14: No discrimination table with this choice of manufacturer

The (general-purpose and modular) circuit-breaker filenames shown in the window called up by the 'Manufacturers' files' command from the 'Options' menu do not have discrimination tables. The manufacturers' files must be from the same year.

C15: Short-circuit protection override forbidden

Case of a g1 fuse: as the rating of the overload protective device is the same as that of the short-circuit protective device, by convention, only the former is allowed.

Case of a modular circuit-breaker (curves B, C, and D):

As the magnetic trips for these devices are set by manufacture, you are not allowed to override these values. You are allowed to override only the thermal trip value (rating, in this case).

C16: Out of calculation (personnel protection condition)

See "Standard calculations / Indirect contact protection" section.

The fault current If (phase/PE) at far end of your circuit is not high enough to trip your protective device within the time required by the standard.

You can correct this problem:

Whatever the protective device:

By choosing for protecting personnel against indirect contact: a differential protective device, protection by SPEB (Supplementary Protective Equipotential Bonding) or by overall protective equipotential bonding of exposed conductive parts.

If your protective device is a general-purpose circuit-breaker:

By selecting a circuit-breaker with a low magnetic trip setting

If your protective device is a curve C or D circuit-breaker:

By selecting a curve B circuit-breaker

C17: Override obligatory

C18: The data entered is contradictory

Override values are present that contradict the options selected.

C19: The cable insulation cannot withstand the ambient temperature you have selected Modify the temperature factor.

C20: Delete use of neutral override or revert to 3-phase.

C21: Protective device / terminal equipment combination inadvisable

Change the type of protective device, taking account of the type of terminal equipment in your circuit.

C22: Add the PE or select protective equipotential bonding of exposed conductive parts

Absence of a PE is only acceptable if the ground of the terminal equipment you are powering is connected, independently of the cable connection, to an overall equipotential system.

C23: Provision to be made for additional mechanical cable protection This remark concerns A05 VV-U cables when installed underground. Change the cable type, installation method, or make provision for additional mechanical protection.

C24: Neutral-free IT earthing system appears to contradict the presence of the neutral Delete the neutral or correct the earthing system of your supply.

C25: The PEN conductor may only be used with the TN earthing system Your connection has a PEN conductor, which is prohibited in TT or IT earthing systems.

C26: Replace the neutral by a PEN conductor, or opt for separate neutral and earth Above 10 mm², the PE and neutral must be separate.

C27: Consumption unit not allowed for this type of terminal equipment Choose a different consumption unit, e.g. kW for indicating the mechanical power of a motor.

C28: Single-core 1000 RVFV cables not allowed

C29: Cable not in catalogue (aluminium cross-section too small) Select copper as the conductor core.

C30: Cable not in catalogue (max. cross-section for A05VV-U cables: 25 mm²) This type of conductor does not exist in cross-sections above 25 mm².

C31: Cable not in catalogue (max. cross-section for multicore cables: 240 mm²) Multicore cable become very hard to use above 120 mm². Change to single-core cables.

C32: Cable not in catalogue (max. cross-section for H07RN-F cables: 95 mm²)

C33: Invalid override of number of neutral conductors Perform calculation, releasing the override on the neutral conductors.

C34: Cables ex-catalogue, price calculated based on standard Your override corresponds to a non-standard cable. The price has been calculated anyway, but corresponds to the calculated cable and not the override cable.

C35: In order to reduce the SPE, we have adopted a lower magnetic trip value The cross-section of the PE can be reduced using this choice of equipment.

C36: In order to reduce the SPE, select and over-rated C/B with a low magnetic trip value

SPE is the cross-section of the PE. The program has selected a low magnetic trip for the general-purpose circuitbreaker

If you don't want the automatic choice of a low magnetic trip in order to reduce this cross-section, change the "Choice of low magnetic trip" parameter ('Protective devices' command from 'Options' menu).

C37: In order to avoid increasing the cross-section, we have adopted a low magnetic trip value See "Standard calculations / Indirect contact protection" section.

C38: Supplementary Protective Equipotential Bonding obligatory

Your cable does not have a PE. Select SPEB or introduce a separate earth (select Multi + E).

C39: In order to reduce the phase cross-section, select a circuit-breaker with a low magnetic trip

A low magnetic trip exists in this range of circuit-breakers and will make it possible to reduce the cross-section of the phase.

C40: The cross-section or type of cable requires the neutral to be separated Above 10 mm², the PEN must be replaced by a separate neutral and PE.

C41: It is forbidden to protect or disconnect the PEN

In a TNC earthing system, select a 3P3D trip unit.

C42: In IT, the neutral must be protected if there is no differential device.

Delete the neutral use override you have carried out.

C43: PE cross-section too small

The PE conductor's thermal stress is exceeded. Override the cross-section of this conductor or make provision for an additional protective device.

C44: The override on the number of neutral conductors is in conflict with its use

C45: To reduce the neutral, change to single-core or separate the PE

C46: Out of calculation (short-circuit)

The conductor heating condition following a short-circuit gives a cross-section greater than 800 mm² with a number of conductors greater than 6.

See "Standard calculations / Indirect contact protection" section.

If your protective device is a circuit-breaker, try to reduce the magnetic trip setting, so it will trip on a min. shortcircuit at far end of the circuit.

C47: 30 mA differential device mandatory

For power outlet circuits, differential protection is mandatory. Fit this differential device, set to a maximum of 30 mA, either in the circuit under consideration, or in a circuit upstream (sub-busbars powering the power outlets).

C48: Override neutral cross-section too small

The neutral conductor's thermal stress is exceeded. Override the cross-section of this conductor.

C49: Override cross-section too small

The operating current is too high. Check your data.

C51: Error, unknown protective device

Delete your override, correct the name of this protective device, or override the thermal and magnetic settings. This protective device is not known in the range selected.

C52: Selecting a curve B circuit-breaker might reduce your cross-section

The short-circuit currents (IkMin or ID) are not high enough to trip your circuit-breaker's magnetic trip. Caneco has therefore increased the cross-section to achieve this tripping. Select a curve B circuit-breaker is this is possible and verify if this reduces your cross-section.

Choosing an SPEB or protective equipotential bonding of exposed conductive parts may also be advised, if the criterion for determining your cable is "IC" (protection against indirect contact).

C53: This rating appears too high for a modular circuit-breaker

Opt for a general purpose circuit-breaker.

C54: The cross-section is non-standard

C55: Very unfavourable calculation criterion!!

Remember that the program calculates the phase cross-section (and number of conductors) according to 4 criteria: • Overload condition (IN). This determines a minimum STH cross-section to carry the maximum continuous current liable to not trip the protective device.

• Voltage drop (DU criterion)

• Human protection against indirect contact (IC criterion)

• Heating of the conductor following a short-circuit (SC criterion)

The cross-section adopted is that for the most unfavourable criterion.

If this differs by more than 2 cross-sections from the most unfavourable of the other criteria, message C55 appears. You must then interpret the results so as to obtain, if possible, a reduction of the cross-section due to this criterion.

C56: Check if the protective device is suitable for this type of terminal equipment

In the case of an LV/LV transformer or a capacitor, the protective device rating has been chosen using an approximate over-rating factor. You must check this value in accordance with the exact characteristics of your terminal equipment.

C57: Error in indicating the location of one of the circuit destinations

The geographic location you have entered for your circuit (or for the switchboard feeding it) is not in the list of geographic locations defined in the routings (source and destination of the runs).

C58: Non-standard motor power Enter its consumption in amps.

Caneco accepts that the consumption for a motor circuit is entered in kW. This consumption is deemed to be a mechanical power. In order to deduce from this the corresponding operating current, Caneco looks for this power in the standard powers file (default: CANECO.STD). If this power is not in the file, Caneco refuses to calculate and obliges you to define the consumption in amps.

C59: Override the number of conductors first

An overridden cross-section can only be valid if the number of conductors is also overridden.

C60: Overriding the no. of PE or neutral conductors is not allowed for multi, unless the no. of phase conductors is also overridden

Change to single-core cables or override the number of phase conductors.

C61: Override phase conductor cross-section first

C62: Cables coming from a busbar trunking system do not accept help with bill of quantities

The geographic location entered for your circuit does not enable Caneco to deduce how long it is. The cable trays feeding this circuit will not take this length into account either.

C63: Protection is obligatory for cables coming from a busbar trunking system

Caneco's calculation module does not let you design a case where there is no protective device on a circuit feeding a busbar trunking system.

C64: Check that the max. C/B operating time is less than 20 ms

The cable selected by the program will only carry the maximum short-circuit current (thermal stress) at the far end of the circuit if it lasts less than the time shown. The operating time for the circuit-breaker indicated by Caneco is longer than this value. This exceptional case usually corresponds to short, low cross-section circuits connected to a switchboard with a high short-circuit current capacity.

In this case, you can:

• override the phase conductor cross-section to the suggested figure,

• opt for a fuse,

• increase the length of the cable to reduce the lk values.

In certain (rare) cases, the personnel protection condition may be the reason for this message. In this instance, the problem can be solved by choosing a differential device or an LES.

C65: The 'Poles' information has been changed from "Uni / Multi" to multi-pole or single-pole

Your override and the "Uni / Multi" information led to ambiguity as to the nature of the cable. The program has resolved this ambiguity by changing the information to single-pole or multi-pole.

C66: The connection includes an unlisted cable

One of the cables selected by the program is not listed in the catalogue (its price is zero in the price standard).

• Where applicable, replace the zero price in the cable price file.

• Where necessary, modify the minimum or maximum cross-sections in the cable cross-section file.

C67: We have selected a COPPER cable and changed the conductor core information to COPPER

Caneco has taken into account the minimum value for aluminium cables which is given in the window called up using the 'Cables' command from the 'Options' menu.

C68: No circuit-breaker with adequate breaking capacity

This case usually corresponds to a modular circuit-breaker (curves B, C, or D) installed in a switchboard with a high short-circuit current capacity.

Opt for a general purpose circuit-breaker or a fuse.

C69: This data is not listed

C70: The calculation does not take the imbalances between conductors into account

The number of conductors per phase is greater than 3. In this event, the current in each phase is not shared evenly between the different conductors. In any one phase, certain conductors carry a current greater than IB divided by the number of conductors per phase. You must allow for this mutual inductance phenomenon by entering a reduction factor for the permitted current (Caneco's KD miscellaneous factor). For 4 conductors, take KD as around 0.8.

C71: For conductors > 3 → override the no. of conductors and the Ph, N, and PE cross-sections

C72: Are you selecting a low magnetic trip value in order to reduce the phase cross-section?

The choice of a low magnetic trip value should makes it possible to reduce the phase conductor cross-section. Do not select a low magnetic trip value for circuits subject to a high inrush current (motor, LV/LV transformer, capacitor).

C73: Are you selecting a low magnetic trip value in order to reduce the PE cross-section?

The choice of a low magnetic trip value should makes it possible to reduce the PE cross-section. Do not select a low magnetic trip value for circuits subject to a high inrush current (motor, LV/LV transformer, capacitor).

C74: Destination not found

The geographic location you have entered for your circuit (or for the switchboard feeding it) is not in the list of geographic locations defined in the routings (source and destination of the runs). Modify the location entered or add it to the routing list.

C75: The calculation does not take the imbalances between conductors into account

Above three conductors per phase, the currents are not shared evenly between the each conductor. To allow for this imbalance, reduce the proximity factor by at least 20 %.

C76: Unknown cable type!

The cable type entered for your circuit is not in the cable type file for your project (*.CBL). This error usual arises when you have imported from an external application.

Modify the cable type for your circuit, or add it to the cable list in the cable cross-section file.

C77: Apply modifications to existing circuits?

The configuration modification you've just made may affect some existing circuits. If you answer "Yes", Caneco will regard all the circuits affected by the modification as "to be recalculated". Hence you will then have to recalculate these circuits, which may lead to significant modifications.

Answer "No" if you want your modification to only affect new circuits.

C78: Cable type file not found

The cable type file is missing, show in the window called up by the "Manufacturers' files" command from the 'Options' menu. By default, this file is CANECO.CBL and is located in the CFG sub-directory of the directory where CANECO is installed.

C79: Busbars ref mark already exists

Sub-busbars in the same switchboard have the same ref. mark. Modify the ref. mark.

C80: Incorrect installation method

The installation method indicated in your circuit does not appear in the list of installation methods associated with the standard. This error arises from:

• an error importing data from an external application,

• a change to the standard for the project.

In this event, Caneco automatically replaces the incorrect installation method by the one shown in the window called up by the 'Preferences' command in the 'Options' menu. Modify the latter in order to automatically replace any installation method not complying with the calculation standard with the one you want.

Before making any changes, check that the calculation standard shown in the supply window is indeed the one you want.

C81: Zero discrimination with the upstream

There is a risk of tripping of the upstream device if a high short-circuit current flows in the circuit in question. For this situation not to exist,

IrMagnUpstream must > 1/5 IrMagnDownstream.

You have 3 possibilities for correcting this anomaly:

• Increase the upstream magnetic trip setting, if necessary by overriding the type of protective device.

• Carry out time-dependent discrimination by adding a time delay to the magnetic trip or the short-delay protective device.

• Override the setting of the magnetic trip for the current circuit to a more reliable value.

C82: No thermal discrimination over and above the setting of the upstream thermal trip

If your circuit carries an occasional overload, this fault may cause the upstream circuit's protective device to trip before the current circuit's protective device trips.

The probability of this type of failure is very low. To correct this, increase the upstream circuit's thermal trip setting or over-rate its protective device.

C83: Zero differential discrimination

In the event of a Phase–PE fault, there is a risk that the upstream circuit's protective device will trip before the current circuit's protective device trips.

To correct this, you can modify the upstream circuit protection:

• increase the setting of its differential protective device,

• or eliminate its differential protective device,

• or add a time delay to its differential protective device (type 'S' differential or time-delay differential relay).

You can also take action on the current circuit's protective device:

• reduce the setting of its differential protective device,

• or add a differential protective device, if it doesn't already have one.

C84: Attention, the starting voltage drop is greater than 15 %

This case concerns motors. A voltage drop greater than 15 % risks causing the motor to fail to start.

Override the phase conductor cross-section to a higher value

• Possibly select a type of starter that limits the starting current.

C85: Do you want to select a single-core cable?

C86: Selected cross-section within a tolerance of X % lower than the calculated cross-section.

The standard you are using allows you to select a cross-section with a permitted current X % lower than the theoretical cross-section calculated, according to the overload condition.

See User Manual / Standard calculations / Overload condition.

You can remove this tolerance by modifying the corresponding information in the window called up by the 'Cables' command in the 'Options' menu.

C87: Check the proximity factor (KN), taking into account the no. of conductors / phase

The proximity factor for your circuit must take into account the fact that your circuit includes several cables per phase. In this instance, the standard considers that there are as many circuits (the number to be taken into consideration when determining the proximity factor) as there are conductors per phase in parallel.

C88: Program cross-section search error

C89: Attention: available power is negative!

The current distribution (switchboard or busbar trunking system) does not have a high enough permitted current. See User Manual / Power requirement.

· Check the simultaneity factor for this distribution

• If necessary, increase the current of the circuit feeding your distribution (this value defines the permitted current in the distribution).

C90: No cascading table with this choice of manufacturer

The (general-purpose and modular) circuit-breaker filenames shown in the window called up by the 'Manufacturers' files' command from the 'Options' menu do not have cascading tables.

C91: Error in circuit, to be deleted

This circuit has not been saved correctly. We advise you to delete it. If there are any circuits connected downstream, use copy/paste to save them.

C92: Nonexistent circuit block

Circuit block does not exist in the list.

C93: Enter new name for diagram template

C94: This circuit block already exists in the list. Modify circuit block name

C95: Maximum number of circuit blocks reached

You cannot create any more new circuit blocks.

C96: Impossible to insert associated circuits without a base circuit

You can insert a maximum of nine circuits associated with a single main circuit. An associated circuit has to be attached to a base circuit.

C97: Delete the circuits coming from this busbar?

Deleting this circuit feeding a sub-busbar will lead to the circuits it feeds being deleted too. If you do not want this to happen, use the table to modify the busbar upstream of these circuits, then delete the current circuit.

C98: Circuit XXXX already exists

Modify the ref. mark of your current circuit. Ref. marks are unique.

C99: The upstream voltage drop is ignored from this transformer onwards

Caneco's voltage drop calculations ignore the voltage drop upstream of the transformer.

C100: Protective conductor cross-section to be checked

Check that the Spo cross-section is adequately sized.

C101: Style XXXX already exists! Modify the ref. of your current style.

C102: Problem with this project!

Some sub-busbar circuits are looped within the same distribution. Check the circuits interconnections.

C103: The switchboard ref. mark does not exist

C104: Looped switchboards

C105: System library read error

C106: Consumption of circuit is obligatory Enter a consumption in amps, kW, kVA, or in the form of a standard power.

C107: Delete the circuits fed from the downstream distribution first

Deleting a distribution means the circuits fed from it will be deleted too.

C108: Impossible to create a busbar trunking system circuit on this distribution

It is not possible to create a busbar trunking system downstream of a Standby supply. The upstream circuit must be N or N+S

C109: You are not allowed to create a transformer circuit from this distribution

It is not possible to create a low-voltage transformer downstream of a Standby supply only. The upstream circuit must be N or N+S

C110: Impossible to redirect the Standby

Several switchboards are fed with N and S separately. Look for the Standby circuits feeding these switchboards and redirect them.

C111: Impossible to redirect the Standby Look for circuit XXXX and redirect it.

C112: Switchboard XXXX contains circuits Delete these or redirect the Standby from them.

C113: Risks of looping

Caneco does not calculate looped networks.

C114: Upstream switchboard forbidden

C115: Inconsistency on downstream switchboard. The Standby circuit feeding the switchboard has been deleted.

C116: Inconsistency on downstream switchboard. Delete the Standby circuit feeding the switchboard.

C117: File not found for specified cable.

The cable type file is missing, shown in the window called up by the "Manufacturers' files" command from the 'Options' menu. By default, this file is CANECO.CBL and is located in the CFG sub-directory of the directory where CANECO is installed.

C118: Unsuitable protective device

C119: Risk of tripping when circuit is closed (start-up, ignition)

The circuit-breaker's magnetic trip setting is too low to avoid a risk of tripping when the circuit is powered up.

C120: Switchboard prohibited in Standby mode

You cannot connect your Standby supply to this switchboard because of an incompatibility in:

- voltage
- earthing system
- contents

Check and where necessary modify the values for your Standby supply or for the Normal feed circuit to the switchboard you want to back up. It may be necessary to insert an LV/LV transformer in order to modify the earthing system.

C121: Transformer prohibited in Standby mode

It is not possible to connect a transformer in Standby alone.

C122: Busbar trunking system prohibited in Standby mode

It is not possible to connect a busbar trunking system in Standby alone.

C123: Unauthorized type of protective device

Your version or your licence does not allow you to use this type of protective device. Please choose a different type of protective device for this circuit.

K1: The busbar trunking system requires the neutral and PE to be separated Change the busbar trunking system to 3P+N+PE.

K2: Error in busbar trunking system, to be deleted

Impossible to read the information about the trunking system. Delete this circuit then create it again.

K3: This ref. mark is already in use for another busbar trunking system

Attention, each ref. mark is unique, change the ref. mark for this busbar trunking system.

K4: Busbar trunking system length is zero!

Fill in this length. Click on the button downstream of the circuit feeding the busbar trunking system. The default length is 0 m.

K5: Distance from origin > length of busbar trunking system

The value you have quoted is the length between the origin of the busbar trunking system and the point where your circuit fed by this busbar trunking system is connected. Hence at most it is the same as the length of the busbar trunking system.

K6: Distance greater than the length of the busbar trunking system!

Check the connection distance from the origin, or the length of the busbar trunking system.

K12: Operating current too high for the type of busbar trunking system

Your current is too high or the file you are using does not include a busbar trunking system of a sufficient rating.

K15: The upstream circuit conductors do not allow this choice Change the content of the cable or of the busbar trunking system.

K16: The busbar trunking systems in the catalogue do not allow this choice

K21: Out of calculation: cable neutral thermal stress

The neutral of the circuit feeding your busbar trunking system cannot carry the maximum single-phase short-circuit current, at the input to the busbar trunking system Override the cable's neutral or phase cross-section to a higher value.

K22: Out of calculation: cable PE thermal stress

The PE of the circuit feeding your busbar trunking system cannot carry the maximum phase–PE short-circuit current (ID), at the input to the busbar trunking system Override the cable's PE or phase cross-section to a higher value.

K23: Out of calculation: cable Phase thermal stress

The phase conductor of the circuit feeding your busbar trunking system cannot carry the maximum 3-phase shortcircuit current, at the input to the busbar trunking system Override the cable's phase conductor cross-section to a higher value.

K24: Out of calculation: BBTS neutral thermal stress

The neutral of your busbar trunking system cannot carry the maximum single-phase short-circuit current, at the input to the busbar trunking system Override to change the type of busbar trunking system, or try to reduce the short-circuit current.

K25: Out of calculation: BBTS PE thermal stress

The PE of your busbar trunking system cannot carry the maximum phase-PE short-circuit current (ID), at the input to the busbar trunking system. Override to change the type of busbar trunking system, or try to reduce the short-circuit current.

K26: Out of calculation: BBTS Phase thermal stress

The phase conductor of your busbar trunking system cannot carry the maximum 3-phase short-circuit current, at the input to the busbar trunking system Override to change the type of busbar trunking system, or try to reduce the short-circuit current.

K28: Out of calculation: personnel protection

The impedance of the Phase–PE fault loop is too high to ensure personnel are protected from indirect contact. Where necessary, increase the cable's PE and phase conductors, or try to provide personnel protection using a differential device or SPEB, or overall equipotentiality.

K29: Out of calculation: magnetic trip set too high (neutral)

The impedance of the Phase-Neutral fault loop is too high to ensure the magnetic unit will trip. Where necessary, increase the cable's neutral and phase conductors, or adjust your magnetic trip to a lower value, or select a circuit-breaker with a low magnetic trip value.

K30: Out of calculation: magnetic trip set too high (PE)

Your magnetic trip unit does not provide adequate breaking to protect your PE.

K31: Out of calculation: magnetic trip set too high (Phase)

Your magnetic trip unit does not provide adequate breaking to protect your Phase conductor.

K32: Out of calculation: electrodynamic stress

The peak current calculation exceeds the lk value laid down by the manufacturer. Check if the circuit-breaker is limiting the energy (limit curves)

19.3.4 Warnings concerning switchboards

T1: Error in switchboard, to be deleted

The switchboard has been saved incorrectly, delete the circuit feeding it.

T2: Downstream switchboard incorrect, as fed from two different earthing systems.

This switchboard is connected by 2 circuits with different earthing systems. If this involves a transformer circuit, create another circuit downstream if the earthing system is different.

T3: This ref. mark is already in use for another switchboard Each ref. mark is unique.

T4: The maximum number of switchboards or busbar trunking systems has been reached You can handle a maximum of 300 distributions in any one project.

T5: Error in distribution, unable to calculate The distribution is unknown or incorrectly saved.

T6: The modification to the distribution is not taken into account in the diagram The distribution input diagram does not match the calculation.

T7: Downstream switchboard incorrect, as fed from two different voltage levels. There is too great a voltage difference between the Normal and Standby circuits for it to be calculated.

T8: Error in upstream distribution, unable to calculate Check the validity of the upstream circuit.

T9: Selection not possible on a circuit fed from the first switchboard

T10: Deleting a switchboard Attention: All the circuits fed from this distribution will also be deleted.

T11: Downstream switchboard incorrect, as the types of the supply circuit conductors are incompatible This switchboard is connected by 2 circuits with incompatible conductors.

20 Glossary

20.1 Source Glossary

Power File	Source standardized Power in KVA. (1 to 2500 kVA) Dry95.ZTR: File for dry transformers Oil95.ZTR: File for oil transformers
Ukr Xd Xo	Short circuit voltage in % Transient direct Reactance in % (standard 30%) Steady state direct Reactance in % (standard 6%)
Network LV Voltage	Source operating voltage, between phases, on load (default 400V).
Frequency Funct. T. Prot HV Pcc. HV Min Pcc. HV Max	Network frequency 50Hz or 60Hz Operating time for HV protective device at transformer HV/LV primary level. High voltage Min short circuit Power (default 500 MV) High voltage Max short circuit Power (default 500 MV)
Factors	
Temperature (K T) Group (K prox) Symmetrical fs	Temperature factor downgrading Cable current carrying capacity. Conductors group factor fs Symmetrical factor according to standard NFC 15-100 § 523.6
Conductors	
Phase PEN Po RA Input from motors	Phase conductor cross-section Neutral/PEN conductor cross-section Protective conductor cross-section Earth resistance
Ratio Ib connection / In Supply Loaded Neutral	Factor taken into account for calculating lk Max values Value in % allowing the Supply/MSB connection to be calculated in accordance with the thermal setting of the supply circuit-breaker. Factor of 0.84 applied to the cable's Iz
Results	
IB	Transformer Nominal intensity calculated with on load voltage (between phases)
STH dU total lk3 Max	Theoretical cross-section calculated according to overload condition Voltage drop % at MSB level from transformer Maximum 3-phase short-circuit current at far end of connection
lk2 Max	Maximum 2-phase short-circuit current at far end of connection
Ik1 Max Ik2 Min Ik1 Min If	Maximum single-phase short-circuit current at far end of connection Minimum 2-phase short-circuit current at far end of connection Minimum single-phase short-circuit current at far end of connection Default short circuit current (phase - PE), at MSB level (in A)

20.2 Circuit Glossary

Upstream Ref Mark Style D/Origin Bus Bar Supply Content Designation Index	Distribution upstream reference mark Circuit reference mark (15 characters maximum) Circuit style (template) Connecting distance from the beginning of the Busbar trunking system Upstream sub-busbar Ref Mark Circuit supply (Normal, Standby, N and S) Wiring system distribution (3P+N+PE, P+N+PE) Circuit designation (36 characters maximum) Circuit modification index
Protection	
Туре	Type of protective device used (General purpose Breaker, C curve breaker, B
Indirect Contacts Rating	Protection against indirect contacts Circuit breakers rating or support rating (Switch, disconnector or Disconnector switch) or fuse rating
K on C Thermal relay In/Irth/IrLR	Oversizing factor for overload setting Thermal relay reference Circuit-breaker thermal setting or fuse rating insuring protection against
lrMg/In	overload. Circuit-breaker magnetic setting insuring protection against short-circuits or
Cal. gG Delay (SC CC) Differential protection setting Delay (Prot. Diff)	Fuses rating value Fuse rating Circuit breakers magnetic delay in ms Circuit breakers residual current (differential) setting in mA Time delay on RCD relay in ms
Cable	
Type Core Pole Install method Length(m) 1st Equip(m) K Temp K Group	Type of cable (PVC, XLPE, PRC) Core nature (Copper or Aluminium) Single-core or multi-core cables Installation method according to standard the cable length in meters Distance from protective device to nearest equipment Temperature factor on IZ (from 0.4 to 1.3 - 1.0 for 30°C) Group factor on IZ (from 0.2 to 1.3) according to installation method and
K Additional	Additional downgrading factor on IZ (explosive atmosphere 0.85, unbalanced neutral 0.84)
Symmetrical factor	Symmetrical factor (0.8) for wiring systems with cables in parallel
Total Correction Phase Neutral PE/PEN Loaded Neutral	Total correction factor (K Temp x K Group x K Addit x fs x Neutral factor) Phase cross-section Neutral cross-section PE or PEN cross-section apply an additional factor of 0.84 to current carrying capacity if Neutral is loaded

Equipment

Nb	Equipment number for final circuits
Consumption	Consumption for each equipment (in A, W, kW, VA, kVA and kVAR)
Location	Circuit Geographical location (used in cable tracks module)
TH<= 15%	Level of 3rd order harmonics < 15%
15% < TH <= 33%	Level of 3rd order harmonics between 15% and 33%
Use factor	Circuit use factor
Coincidence factor	Coincidence factor (Diversity, simultaneity) of equipments fed by same circuit
Cos phi	Equipment Cosinus phi (Circuit Power Factor)
Cos phi	Equipment Cosinus phi (Circuit Power Factor)
Cos phi (Start)	Cosinus phi at start
ID/IN	Starting current, ratio between Starting current and steady current
dU max	Maximum admissible voltage drop in %from beginning of installation

20.3 Circuit window Additional Tab

Manufacturer	Manufacturer's catalogue used for the protective device
Minimal Protection	Protective device minimum rating (also defined in circuit style)
lcu (kA)	Protection breaking capacity in kA
With backup	Protection breaking capacity with backup (coordination) in kA
Thermal	Thermal discrimination with upstream
discrimination	
Differential	Differential discrimination with upstream
discrimination	
Limit (A)	Current discrimination limit on short-circuit in Amps
From (m)	Distance from which there is total discrimination on short-circuit
Ir Diff	Differential Residual Current Device adjustable in mA
Diff delay	Residual Current time delay in ms
Max operating Time	
IC	Max operating time for a circuit-breaker protection not to exceed human protection
	against electrical shocks condition (ms)
Ph	Max operating time for a circuit-breaker protection not to exceed phase cable
	thermal stress (ms)
PE	Max operating time for a circuit-breaker protection not to exceed PE cable thermal
	stress (ms)
Ne	Max operating time in ms for a circuit-breaker protection not to exceed Neutral
	cable thermal stress (ms)
Link width (mm)	width of the link on cable track
Link height (mm)	Link height on cable track
Weight (Kg/m)	Link weight for one metre in kg
Ip limited or not	Maximum peak short-circuit current limited or not in kA at beginning of circuit
20.4 Results window

Cable	Multi-core cable conventional writing, or phase conductors if the link is of single-core type
	Examples:
	4G1,5 means 4 conductors out of which 1 is earth (yellow-green) (G = ground $3*50+N35$ means 3 phase conductors + 1 N conductor of 35 mm ²
Neutral	Neutral conductors conventional writing if the link is of single core type
DE or DEN	DE/DEN conductors conventional writing if the link is of single core type.
Criterion	Criterion for the phase cross section calculation
Chienon	MINI: Minimal cross section (ex 15mm2 for Light 25 mm2 for Socket
	motors)
	IN: overload condition
	DU: Voltage drop
	IC: Indirect contacts, Human protection against electrical shocks
	FIXED: Fixed value by user
Max Length	Cable maximal length to keep protection and circuit design conditions
IR (A)	Circuit design current directly deducted from consumption in A
STH (mm ²)	Theoretical cross-section calculated in mm ² according to overload condition
IZ (A)	Current carrying capacity of the link adjusted with correction factors
	this value gives the maximum protection thermal setting.
dU circuit (%)	Circuit voltage drop in % on the <i>cable length</i>
dU total (%)	Total Voltage drop in % from source supply
dU start `	Voltage drop at start (motors) or when switching on (lights)
Ika Max	Circuit maximum 3 phase short circuit current (at Λ)
Iko Max	Circuit maximum 2-phase short-circuit current (at A)
lk1 Max	Circuit maximum single-phase short-circuit current (at Λ)
If Max	Circuit maximum fault short-circuit current (at A)
lk2 Min	Minimum 2-phase short-circuit current at far end of connection (at A)
lk1 Min	Minimum single-phase short-circuit current at far end of connection (at A)
Cable	Multi-core cable conventional writing, or phase conductors if the link is of
	single-core type
	Examples:
	4G1,5 means 4 conductors out of which 1 is earth (yellow-green) (G = ground
Navimal	3°50+N35 means 3 phase conductors + 1 N conductor of 35 mm ²
	Neutral conductors conventional writing if the link is of single-core type.
PE OF PEN	PE/PEN conductors conventional writing if the link is of single-core type.
Chienon	MINI: Minimal gross section (av. 1 5mm2 for Light 2 5mm2 for Socket
	motors)
	IN: overload condition
	DU: Voltage drop
	IC: Indirect contacts. Human protection against electrical shocks
	SC: Thermal stress after Short-Circuit
	FIXED: Fixed value by user
Max Length	Cable maximal length to keep protection and circuit design conditions

20.5 Board Glossary

Ref mark Designation	Board Downstream Ref mark. Board designation
Coincidence factor t	Diversity/Simultaneity factor for circuits fed by the considered board.
Earthing system	Board Earthing system: TT_TNC_TNS_IT
Voltage	between phase and neutral, in a single phase board (Phase-Neutral), between phases in other cases
No load voltage	No load voltage in V, used to calculate Ik3 Max.
Upstream circuit ref mark	Circuit Upstream ref mark. (feeding board)
Breaking device	Board breaking device (generally a switching device in distribution boards).
IC Protection	Nature of the human protection against electrical shock (RCD)
I Allowed	Allowed current downstream board.
l available	Available current downstream board.
S Intensities	Design current IB sum of all circuits issued from the board multiplied by the board diversity/simultaneity factor.
Mean cos phi	Mean cosinus phi at board level, taking into account downstream circuits and eventual capacitors
R=S IZ cables / Irth board	Ration between: sum of <i>IZ</i> of downstream circuits (IZ calculated without taking into account group factor) and upstream thermal relay setting.

20.6 UPS Glossary

Power	Power in kVA
Tsc	sustaining time of the UPS in ms
lk3	Maximum three-phase short-circuit current (in A)
lk2	Maximum two-phase short-circuit current (in A)
lk1	Maximum single-phase short-circuit current (in A)
lf	Fault current (phase/PE) (in A)



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