

Professional cable calculation on Windows®

Available since 1991 and independent of manufactures of cables and circuit breakers

- selection of rated current or motor shaft power including means of starting,
- selection of the type of machine or safety fuse from the database,
- short circuit length dependent on the type of protection, cable temperature etc.
- higher harmonics,
- automatic diameter of 0.25 to 2500mm and 1 to 8 in parallel,
- partially or completely adjustable selectivity and graphical display,
- network or branched power cable available as separate module

Mini version

A free online tool. Calculates a cable, but only provides an indication. Motor starting types, exact type of security etc. are not included -> <http://www.icablecalc.eu>

Light version

The light version is specifically for small installers. It calculates a single outgoing load, but with all aspects and databases.

Advanced version

The Advanced version has several additional options, such as discrimination, and can be expanded with:

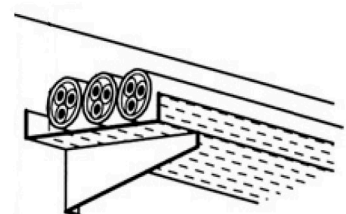
- Transformers and medium voltage calculation,
- Distribution network (cable list, power balance, single line, I/O list)
- Trunk cable calculation,
- Cabinet and transformer cell ventilation,
- PV array cabling.

Outsourcing Calculations

Outsourcing a calculation by e-mail is also possible. This costs £ 65,- per calculation.

Sandker Elektrosoftware
CoC nr 32122919
www.cablecalculation.eu

Netherlands:
Nijverheidsweg 32
3931 CX Woudenberg
Tel: 0031 (0)6 16594281



WWW.CABLECALCULATION.EU

LIGHT VERSION

Simple, cheap version, but with all aspects of cable calculation

Motor starting facility

Choice of various types of load: static in A or kW, motor capacity, freq. convertor, soft starter, star-delta, etc. Adjustable run time.

Safety fuses and circuit breakers

The program comes with a large number of safety fuses and circuit breakers:

- Fuses in accordance with IEC.
- Standard Features such as the B, C, D,
- Circuit-breakers, MCCB, ACB's,
- For public lighting, the Pro-tec,
- Inverse thermal in accordance with IEC 60255-3,
- The NEMA thermal trip for motors.

Cable types

Besides XLPE, PVC, silicon and rubber, there are also codes for VDE, CENELEC, Ölflex, etc. included. Medium voltage cables are also included.

Licence:

The program is suitable for both stand-alone and network environments and has no annual license restrictions. The program therefore has no dongle.

Retail price from € 165, -, excluding the expanded database with a large number of characteristics of safety fuses and circuit breaker sizes, and the database with many types of cables, with both British and international codes.

System Requirements: At least Windows 7, screen resolution 1000x900 pixels.

ADVANCED VERSION

The advanced version has various extras compared to the light version.

The screenshot shows the 'CABLE++ Cable calculation' software interface. It features a schematic diagram on the left, a top section for 'Type safety' and 'Size' selection, a middle section for 'Safety type' and 'Type of starting', a right section for 'Cable type' and 'Ambient temp', a bottom-left section for 'Voltage system' and 'Type of load', and a bottom-right section for 'Result' and 'Price'. The interface uses a color-coded system: yellow for safety and size settings, cyan for cable and ambient settings, and olive green for voltage and load settings. The 'Calculate' button is prominently displayed at the bottom right.

Colours guide the user through the different windows.

The advanced version has the following features compared to the Light version

- Selectivity calculation,
- Multiple sub-distributors in the power allowing lower short-circuit value,
- 50/60Hz motors,
- Double cable lay routing,
- Eco and EMV (most economically advantageous) calculation,
- Includes printing and file management,
- AWG cable type for the U.S. market,
- Several features, such as forces between two conductors, pump power, fluid line loss, light- and sound-pressure calculations and solar panel calculation.

Additional to the Advanced version the following modules can be ordered

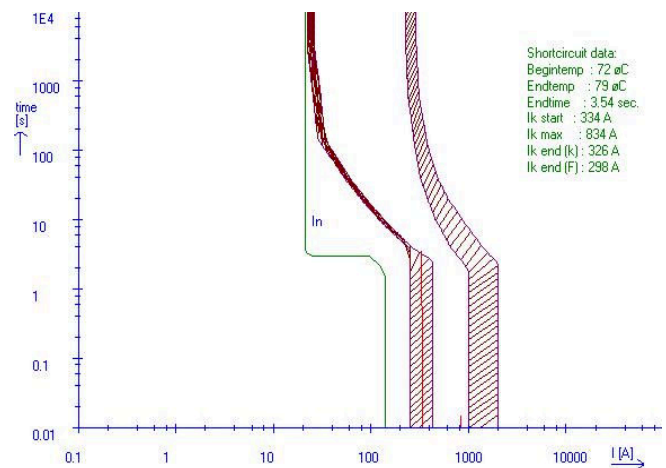
- +K Up to 8 self definable characteristics of fuses and breakers, and 8 cable constructions,
- +T Medium Voltage and Transformer Calculation,
- +S Mains trunk cable for, e.g., Lighting columns (Public lighting for public transport),
- +LK Distribution network: Cable List,
- +LE Distribution network: EROEI
- +LS Distribution network: DXF drawing, single line,
- +LM Distribution network: DXF drawing, MCC front,
- +LIO Distribution network: I/O list,
- +V Ventilation for cabinets and transformer room,
- +PV Solar panels array cabling.

System Requirements: At least Windows 7, screen resolution 1400x1000 pixels.

Discrimination

To determine the selectivity, the user can specify a second safety type which switches prior to the protection of the outgoing cable. Just like in the light version, Cable++ determines the size of the immediate protection (fuse or circuit breaker with or without earth leakage, thermal and magnetic adjust) of the motor and sets this against the safety higher up and considering the short circuit current.

The graphs of both the main and immediate protective equipment is shown graphically in which the nominal, motor-start and short circuit current are displayed..



Substations:

Select if a substation distribution board or extra cabinet in the field feeds the concerned cable. The short-circuit length is then strongly influenced by the reduction in the power supply to that substation. The selectivity calculation is also affected improved by this. The increase in voltage drop when starting the motor is also monitored.



Eco and EAO

Find the optimal cable dimensions, i.e. the cable investment compared to the energy consumption of the write-off of the cable. The economically most advantageous (EMA) optimum, even with varying loads.

Choice of 50/60 Hz

The frequency can now be selected. As well as any other frequency.

The standard motor shaft capacities depend on the selected frequency. Necessary for the U.S. market, among others. Other frequencies can also be chosen, but the standard motor capacities are limited to 50 and 60 Hz. The cable calculation takes higher frequencies into account. The influence of higher frequencies is particularly noticeable in longer cables.

Cable type AWG

By choosing AWG, CABLE++ makes a conversion of the metric mm^2 cable, and the cross-section is reported in AWG cable code. Necessary for the U.S. market.

Step-up transformer

In some instances, a step-up transformer is used for longer cables and large capacities in order to save money on cables..

Various calculation tools

Pump power, line loss, light strength, solar panel, and sound pressure.

Functional preservation

Cables for functional integrity must also continue to perform their function during fire.

TRANSFORMER MODULE

(Can be ordered to expand the Advanced version)

Objective

- Calculations of the size of your transformer based on a capacity provided by you, or the capacity calculated by the network module.
- Calculating the medium-voltage cable.
- Calculating the Generator Capacities.



Medium-voltage Cable

The cable diameter is determined by the transformer capacity or external capacity, and of course earthing voltage drop, short circuit length, discrimination and network short circuit capacity.

Transformer

The size is determined by a specified simultaneous capacity or the Energy balance calculation from the network module..

Low voltage distributor

The thermal current value and the long and short circuit current value are calculated using the medium-voltage and transformer impedances. The transformer cable is also calculated, possibly ecologically.

Discrimination (selectivity)

The discrimination between the transformer protection and the medium voltage protection safeguards are included dependent on your settings. The selectivity is also compared to the outgoing cable, the mains cable, or network module.

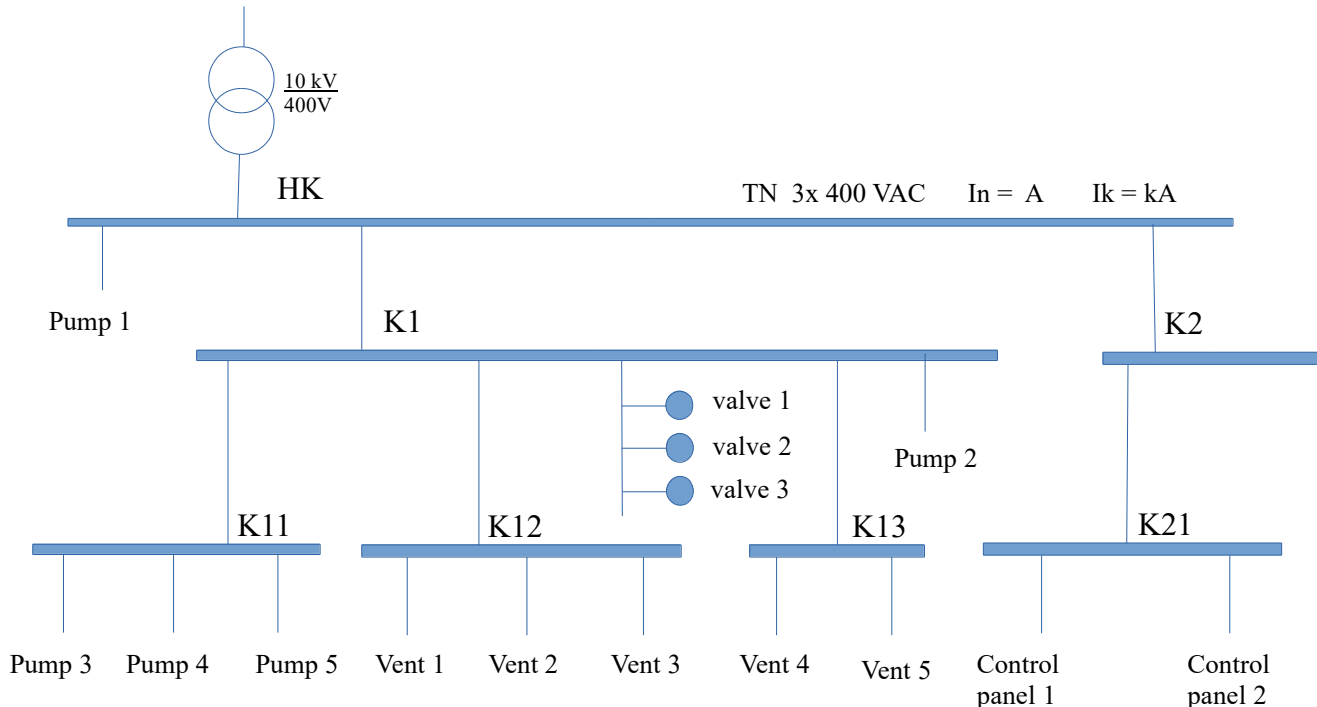


MODULE NETWORK

(Can be ordered to expand the Advanced version)

Objective

Calculating a basic scheme including full selectivity



Input table

Input is not a graphic, but just a simple consumer list, which ensures easy and rapid use. Can also be imported from your P&ID system, for example through CSV comma delimited values, Excel.

Up to 2000 fields, a maximum of 100 distribution cabinets divided over a main distributor and three levels of distribution boards.

Network includes several modules, namely:

- **Cable List ([LK](#))**
The design power, the size of the security and the cable cross section is calculated for each cable on the list. The main circuit breaker or fuse is also selected, and the diameter of the main power cable is calculated.
When determining the main safety, the total capacity is also calculated and the transformer can be selected, which can then can be linked to the cable list. Finally, the cross sections of the necessary cable ducts are calculated for two route segments.
- **[Energy balance \(LE\)](#)**
Calculation of the energy consumption. An estimate of the dimensions of the low-voltage distribution board is also calculated, including the corresponding control panel. The heat radiation is calculated in order to determine the air-conditioning,

- [Single line diagram per distributor or for all distributors in one diagram \(LS\)](#)

The basic scheme is drawn. A motor and power group is drawn in the diagram for each consumer. The drawing is generated as DXF.

- [Front view per distributor. \(LM\)](#)

The front of the MCC panel is drawn. Of each user from the list, a motor feeder or outgoing power field is drawn in a MCC layout. The drawing is generated as DXF, and can be read in Autocad, among others.

- [I/O list \(LIO\)](#)

Based on a template and the entered table, an I/O list is generated for further engineering of your PLC and SCADA engineering. The list is generated as CSV and can be accessed with, among others, Excel, for possible further editing.

The screenshot shows the 'Verdelen' software interface. On the left is a sidebar with buttons for 'Nieuw', 'Openen', 'Opslaan', 'Verwijderen', 'Terugzetten', 'Kopieer', 'Kopieer cel', 'Typical', 'Beveiliging', 'Legwijze', 'Configure', 'In-Export', 'Genereren', 'Kabeltype', 'Energie', 'Single line', 'MCC aanpak', 'VO opt', 'Afdrukken list', and 'Sluiten'. The main area displays a single-line diagram with components like 'Middenspanning', 'Transformator', 'Tussenstations', and 'MCC'. Below the diagram is a table with the following data:

Tagnummer	Omschrijving	Pla	Oud/nieuw	kW	V	Fase	Cos	Kast	Typical	Zekermid	Magneet	Lengte	Regel	Contig	Haast	Afgesl	Code	Tra.1	Tra.2	Beleed	Der.1
M52401B	oil detection	existing	4,6E-4	24	1	0,95	CP1	IND	35	6,0	60	C	1	3	1	-	-	-	-	0,75	0,85
P5001A	rectic pump aeratie 1	existing	11,8	400	3	0,86	CP1	VSD	42	6,0	60	C	1	3	1	-	-	-	-	0,85	0,85
P5001B	rectic pump aeratie 2	position change	11,8	400	3	0,86	CP1	VSD	42	6,0	60	C	1	3	1	-	-	-	-	0,85	0,85
BLOWERS																					
BW3001	blower	existing	200	400	3	0,88	BP1	VSD	44	6	10	C	1	1	0	-	-	-	-	0,75	0,85
F3001	fan	existing	0,41	400	3	0,74	BP1	DOL	36	6,0	10	C	1	3	0	-	-	-	-	0,75	0,85
TS3001	temp guard	existing	4,6E-4	24	1	0,95	CP1	IND	36	6,0	10	C	1	3	0	-	-	-	-	0,75	0,85
X59015	valve position	new	4,6E-4	24	1	0,95	CP1	IND	36	6,0	10	C	1	3	0	-	-	-	-	0,75	0,85
BW3002	blower	existing	200	400	3	0,88	BP2	SS	44	6,0	10	C	1	1	0	-	-	-	-	0,75	0,85
F3002	fan	existing	0,41	400	3	0,74	BP2	DOL	36	6,0	10	C	1	3	0	-	-	-	-	0,75	0,85
TS3002	temp guard	existing	4,6E-4	24	1	0,95	CP1	IND	36	6,0	10	C	1	3	0	-	-	-	-	0,75	0,85
X59016	valve position	new	4,6E-4	24	1	0,95	CP1	IND	36	6,0	10	C	1	3	1	-	-	-	-	0,75	0,85

TRUNK CABLE MODULE

(Can be ordered to expand the Advanced version)

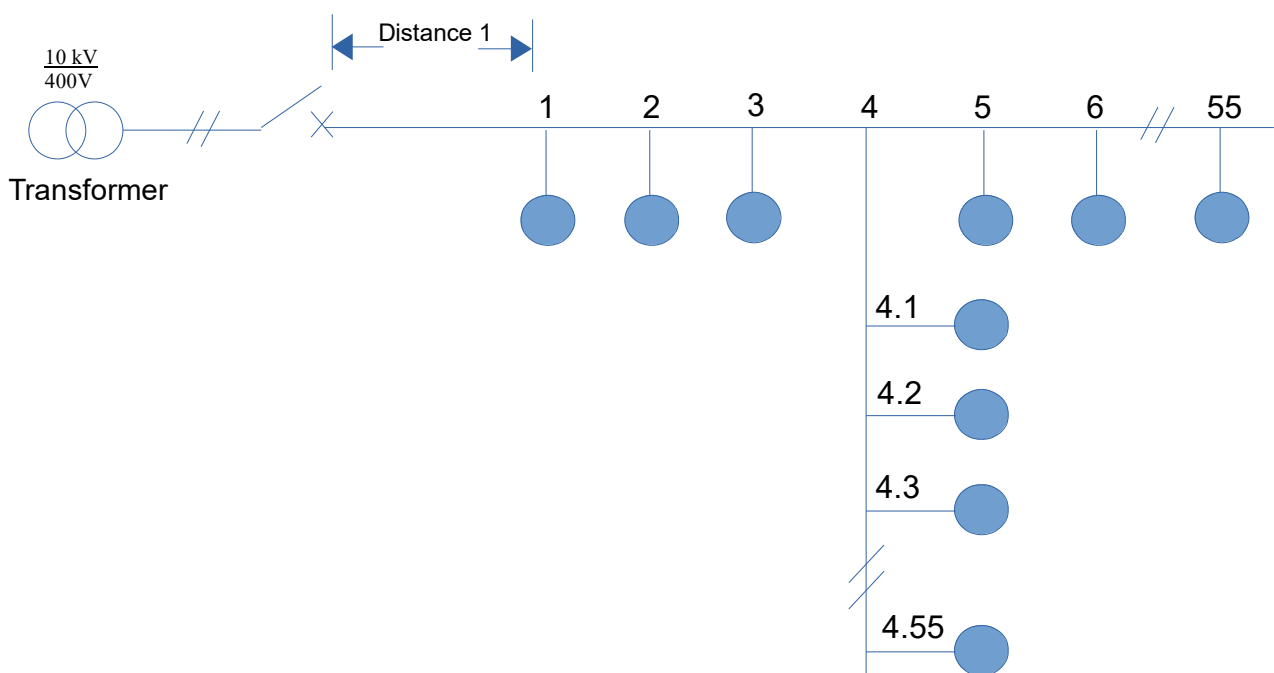
Objective

Trunk cable with branches:
can be used for

- Public lighting along high-ways,
- borehole pumps in well field,
- recreation park with cottages,
- windmills on a single power supply.



Scheme



A module to calculate a cable strand with branches. The program divides the voltage loss so that an optimum, i.e. most economically advantageous, cross section is chosen.

Up to 55 branches can be connected to the mains cable (or up to 123 single lamp, lamp posts). A specific length can be specified for the length of the branches.

The user can choose to optimize the diameter of the cable pieces, meaning:

- using the same diameter as much as possible, by dividing the maximum allowable voltage drop unevenly;
- or to rejuvenate if customers are further away, with resulting lower electric current flow and therefore less voltage drop and load, making a smaller diameter possible.

Of course, also the short circuit length (on both the magnetic and thermal component of the curve for machines) is monitored. The short circuit length can be improved by ticking a supporting earth halfway.



Light poles along the road.

Although a three phase cable runs along all light poles, the lights are connected in single phase. Each pole has therefore single phase power. 400V lamps connected between two phases can also be selected.



Borehole pumps field

Consider a borehole pumps field for pumping groundwater for, for example, the drinking-water supply.

A mains cable runs along all well pumps in the field. The cable is three-phase and three-phase motors are connected.

MODULE PV ARRAY CABLING

(Can be ordered to expand the Advanced version)

Objective

calculate:

- the section of DC cables between the panels and the inverter,
- determining whether protection and surge protection are required,
- taking into account return flows.
- up to 36 strings.
- choice cable to the strings as master cable or as a cable per string connected to the tracker.

PV array calculation

	1	2	3	4	5	6
Length:	10 [m]	10 [m]	10 [m]	10 [m]	10 [m]	10 [m]
dU max.:	2.0 %	2.0 %	2.0 %	2.0 %	2.0 %	2.0 %
	[mm2]	[mm2]	[mm2]	[mm2]	[mm2]	[mm2]

Trunc cable, 5 segments

Energy panels	[kW]
Energy loss cables	[kW] / %
dU longest cable	%
I_{MPP}	10 [A]
I_{SC}	11 [A]
$I_{reverse}$	25 [A]
U_{MPP} per panel	60 [V]
K factor	1.00
Number panels/strand	3.0
number of strands	5
Every strand it's own cable	<input type="checkbox"/>
Number lightning strikes/year	3
Surrounding	House
Distance to lightning rod <0.5 m	<input type="checkbox"/>

Panel 1

Panel 6

DC

AC

.. kW

Calculate Close Print

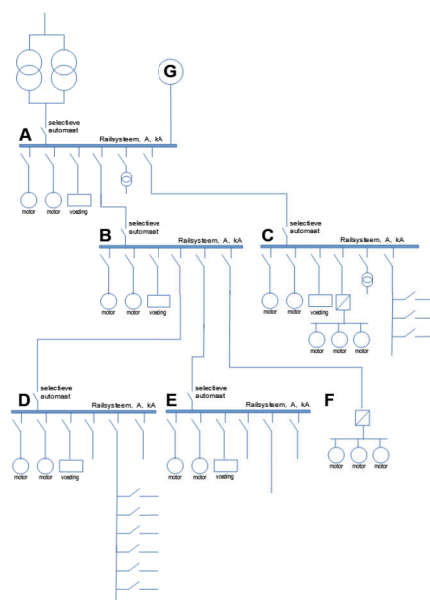
MODULE VENTILATION

(can be ordered additionally with both the Light and the Advanced version)

Objective

Calculate the required ventilation for a:

- Switch board
The required ventilation capacity is calculated by entering the number of relays, frequency converters, etc., together with the cabinet dimensions and colour of the outside.
- Transformer room
Depending on the transformer capacity, the ventilation rate or the dimensions of the ventilation openings are calculated.



website



Current
price list:

