# VarSet

**Catalogue 2018**
Low Voltage Capacitor Banks

schneider-electric.com

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# Your requirements…

**+ Optimize energy consumption**
- By reducing electricity bills,
- By reducing power losses,
- By reducing $CO_2$ emissions.

**+ Increase power availability**
- Compensate for voltage sags detrimental to process operation,
- Avoid nuisance tripping and supply interruptions..

**↱ Improve your business performance**
- Optimize installation size,
- Reduce harmonic distortion to avoid the premature ageing of equipment and destruction of sensitive components.

# Our solutions…

## Reactive energy management

In electrical networks, reactive energy results in increased line currents for a given active energy transmitted to loads.

The main consequences are:

- Need for oversizing of transmission and distribution networks by utilities,
- Increased voltage drops and sags along the distribution lines,
- Additional power losses.

This results in increased electricity bills for industrial customers because of:

- Penalties applied by most utilities on reactive energy,
- Increased overall kVA demand,
- Increased energy consumption within the installations.

Reactive energy management aims to optimize your electrical installation by reducing energy consumption, and to improve power availability. Total $CO_2$ emissions are also reduced.

Utility power bills are typically reduced by 5% to 10%*.

"Our energy con-sumption was reduced by **9%** after we installed 10 capacitor banks with detuned reactors. Electricity bill optimised by 8% and payback in 2 years."
Testifies Michelin Automotive in France.

"Energy consumption reduced by **5%** with LV capacitor bank and active filter installed."
POMA OTIS Railways, Switzerland.

"70 capacitor banks with detuned reactors installed, energy consumption reduced by 10%, electrcity bill optimised by 18%, payback in just **1 year.**"
Madrid Barrajas airport Spain.

"Our network performance improved significantly after we installed 225 LV Detuned capacitor banks. The capacitor banks incorporates advanced metering system and remote communication ensures continued operation and minimal down time."
Ministry of Electricity and Water, Kuwait.

* Performance reflects actual customer experience, your results may vary depending on your environment.

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# **Improve** electrical networks and **reduce energy costs**
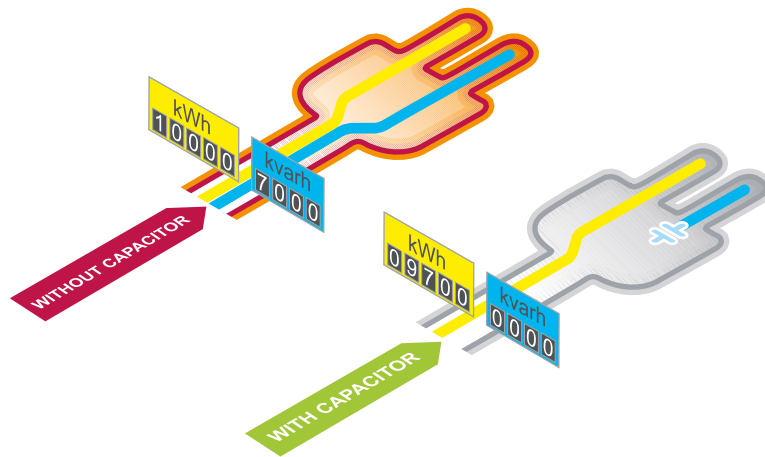
## Power Factor Correction

Every electric machine needs active power (kW) and reactive power (kVAr) to operate.

• The power rating of the installation in kVA is the combination of both:
  **$(kVA)^2 = (kW)^2 + (kVAr)^2$**

• The Power Factor has been defined as the ratio of active power (kW) to apparent power (kVA).
  **Power Factor = (kW) / (kVA)**

➡ The objective of Reactive Energy management is improvement of Power Factor, or "Power Factor Correction".

This is typically achieved by producing reactive energy close to the consuming loads, through connection of capacitor banks to the network.

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# Ensure **reliability** and **safety** on installations

## + Quality and reliability

- Continuity of service thanks to the high performance and long life expectancy of capacitors.

- 100% testing in manufacturing plant.

- Design and engineering with the highest international standards.

## + Safety

- Over-pressure system for safe disconnection at the end of life.

- All materials and components are free of PCB pollutants.

## + Efficiency and productivity

- Product development including innovation in ergonomics and ease of installation and connection.

- Specially designed components to save time on installation and maintenance.

- All components and solutions available through a network of distributors and partners in more than 100 countries.

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Thanks to the know-how developed over 50 years, Schneider Electric ranks as the global specialist in Energy management providing a unique and comprehensive portfolio.

**Schneider Electric helps you to make the most of your energy with innovative, reliable and safe solutions.**

# Quality & Environment

## Quality certified
### ISO9001, ISO14001 and ISO50001

### A major strength

In each of its units, Schneider Electric has an operating organization whose main role is to verify quality and ensure compliance with standards. This procedure is:

• uniform for all departments;

• recognized by numerous customers and official organizations.

But, above all, its strict application has made it possible to obtain the recognition of independent organizations.

The quality system for design and manufacturing is certified in compliance with the requirements of the ISO 9001 and ISO 14001 Quality Assurance model.

### Stringent, systematic controls

During its manufacture, each equipment item undergoes systematic routine tests to verify its quality and compliance:

• dielectric testing;

• earth connection continuity test;

• functional test of probes & ventilation;

• functional test of the PFC system;

• verification of protection settings;

• verification of compliance with drawings and diagrams.

The results obtained are recorded and initialled by the Quality Control Department on the specific test certificate for each device.

### RoHS, REACh Compliance

Low voltage power factor correction equipments and components of Schneider Electric are RoHS, REACh Compliant.

Schneider Electric undertakes to reduce the energy bill and $CO_2$ emissions of its customers by proposing products, solutions and services which fit in with all levels of the energy value chain.

The Power Factor Correction and harmonic filtering offer form part of the energy efficiency approach.

# Energy Efficiency



# Immediate Savings*

# General contents
## VarSet

A

B

C

# Power Factor correction Guidelines

# Power Factor correction
# Guidelines

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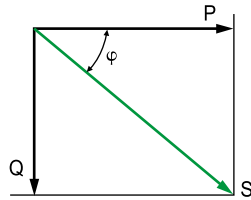### Other chapters

# Why reactive energy management?

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**Fig. 1** In this representation, the Power Factor (P/S) is equal to cos φ.

Due to this higher supplied current, the circulation of reactive energy in distribution networks results in:
- Overload of transformers
- Higher temperature rise in power cables
- Additional losses
- Large voltage drops
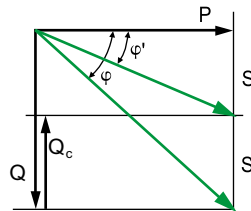- Higher energy consumption and cost
- Less distributed active power



**Fig. 4**

## Principle of reactive energy management

All AC electrical networks consume two types of power: active power (kW) and reactive power (kVAr):
- **The active power P** (in kW) is the real power transmitted to loads such as motors, lamps, heaters, computers, etc. The electrical active power is transformed into mechanical power, heat or light.
- **The reactive power Q** (in kVAr) is used only to power the magnetic circuits of machines, motors and transformers.

The apparent power S (in kVA) is the vector combination of active and reactive power.

The circulation of reactive power in the electrical network has major technical and economic consequences. For the same active power P, a higher reactive power means a higher apparent power, and thus a higher current must be supplied.

The circulation of active power over time results in active energy (in kWh).
The circulation of reactive power over time results in reactive energy (kvarh).

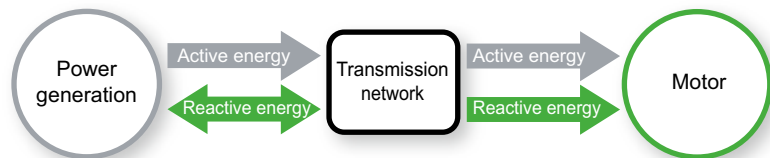In an electrical circuit, the reactive energy is supplied in addition to the active energy.



**Fig. 2** Reactive energy supplied and billed by the energy provider.

For these reasons, there is a great advantage in generating reactive energy at the load level in order to prevent the unnecessary circulation of current in the network. This is what is known as "power factor correction". This is obtained by the connection of capacitors, which produce reactive energy in opposition to the energy absorbed by loads such as motors.

The result is a reduced apparent power, and an improved power factor P/S' as illustrated in the diagram opposite.

The power generation and transmission networks are partially relieved, reducing power losses and making additional transmission capacity available.
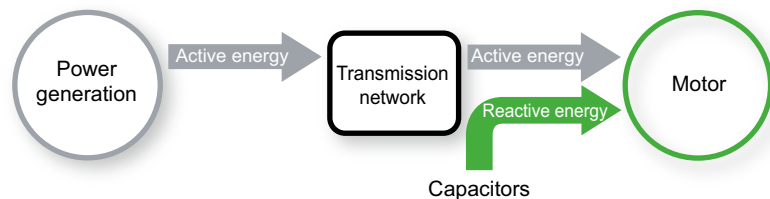


**Fig. 3** The reactive power is supplied by capacitors.
No billing of reactive power by the energy supplier

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## Benefits of reactive energy management

Optimized reactive energy management brings economic and technical advantages as follows:

### Savings on the electricity bill

- Eliminating penalties on reactive energy and decreasing kVA demand.
- Reducing power losses generated in the transformers and conductors of the installation.

**Example:**
Loss reduction in a 630 kVA transformer PW = 6,500 W with an initial Power Factor = 0.7.
With power factor correction, we obtain a final Power Factor = 0.98.
The losses become: 3,316 W, i.e. a reduction of 49%.

### Increasing available power

A high power factor optimizes an electrical installation by allowing better use of the components. The power available at the secondary of a MV/LV transformer can therefore be increased by fitting power factor correction equipment on the low voltage side.

The table opposite shows the increased available power at the transformer output through improvement of the Power Factor from 0.7 to 1.

| Power factor | Increased available power |
|---|---|
| 0.7 | 0% |
| 0.8 | + 14% |
| 0.85 | + 21% |
| 0.90 | + 28% |
| 0.95 | + 36% |
| 1 | + 43% |

### Reducing installation size

Installing power factor correction equipment allows conductor cross-section to be reduced, since less current is absorbed by the compensated installation for the same active power.

The opposite table shows the multiplying factor for the conductor cross-section with different power factor values.

| Power factor | Cable cross-section multiplying factor |
|---|---|
| 1 | 1 |
| 0.80 | 1.25 |
| 0.60 | 1.67 |
| 0.40 | 2.50 |

### Reducing voltage drops in the installation

Installing capacitors allows voltage drops to be reduced upstream of the point where the power factor correction device is connected.

This prevents overloading of the network and reduces harmonics, so that you will not have to overrate your installation.

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The selection of Power Factor Correction equipment should follow the following 4-step process and must be done by any people having the relevant skills:

■ Step 1: Calculation of the required reactive power.

■ Step 2: Selection of the compensation mode:
□ Central, for the complete installation
□ By sector
□ For individual loads, such as large motors.

■ Step 3: Selection of the compensation type:
□ Fixed, by connection of a fixed-value capacitor bank;
□ Automatic, by connection of a different number of steps, allowing adjustment of the reactive energy to the required value;
□ Dynamic, for compensation of highly fluctuating loads.

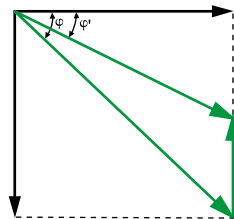■ Step 4: Allowance for operating conditions and harmonics.

## Step 1: Calculation of the required reactive power



**Fig. 5**

The objective is to determine the required reactive power $Q_c$ (kvar) to be installed, in order to improve the power factor cos φ and reduce the apparent power S.

For φ' < φ, we obtain: cos φ' > cos φ and tan φ' < tan φ.

This is illustrated in the diagram opposite.

$Q_c$ can be determined from the formula $Q_c = P. (\tan φ - \tan φ')$, which is deduced from the diagram.
$Q_c$ = power of the capacitor bank in kVAr.
P = active power of the load in kW.
tan φ = tangent of phase shift angle before compensation.
tan φ' = tangent of phase shift angle after compensation.

The parameters φ and tan φ can be obtained from billing data, or from direct measurement in the installation.

The following table can be used for direct determination.

| Before compensation | | Reactive power (kvar) to be installed per kW of load, in order to get the required cos φ' or tan φ' | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | tan φ' | 0.75 | 0.62 | 0.48 | 0.41 | 0.33 | 0.23 | 0.00 |
| | | cos φ' | 0.80 | 0.85 | 0.90 | 0.925 | 0.95 | 0.975 | 1.000 |
| tan φ | cos φ | | | | | | | | |
| 1.73 | 0.5 | | 0.98 | 1.11 | 1.25 | 1.32 | 1.40 | 1.50 | 1.73 |
| 1.02 | 0.70 | | 0.27 | 0.40 | 0.54 | 0.61 | 0.69 | 0.79 | 1.02 |
| 0.96 | 0.72 | | 0.21 | 0.34 | 0.48 | 0.55 | 0.64 | 0.74 | 0.96 |
| 0.91 | 0.74 | | 0.16 | 0.29 | 0.42 | 0.50 | 0.58 | 0.68 | 0.91 |
| 0.86 | 0.76 | | 0.11 | 0.24 | 0.37 | 0.44 | 0.53 | 0.63 | 0.86 |
| 0.80 | 0.78 | | 0.05 | 0.18 | 0.32 | 0.39 | 0.47 | 0.57 | 0.80 |
| 0.75 | 0.80 | | | 0.13 | 0.27 | 0.34 | 0.42 | 0.52 | 0.75 |
| 0.70 | 0.82 | | | 0.08 | 0.21 | 0.29 | 0.37 | 0.47 | 0.70 |
| 0.65 | 0.84 | | | 0.03 | 0.16 | 0.24 | 0.32 | 0.42 | 0.65 |
| 0.59 | 0.86 | | | | 0.11 | 0.18 | 0.26 | 0.37 | 0.59 |
| 0.54 | 0.88 | | | | 0.06 | 0.13 | 0.21 | 0.31 | 0.54 |
| 0.48 | 0.90 | | | | | 0.07 | 0.16 | 0.26 | 0.48 |

**Example:**
consider a 1000 kW motor with cos φ = 0.8 (tan φ = 0.75).
In order to obtain cos φ = 0.95, it is necessary to install a capacitor bank with a reactive power equal to k x P, i.e.: Qc = 0.42 x 1000 = 420 kvar.

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CC: Central Compensation
GC: Group Compensation
IC: Individual Compensation
M: Motor Load

**Fig. 6**

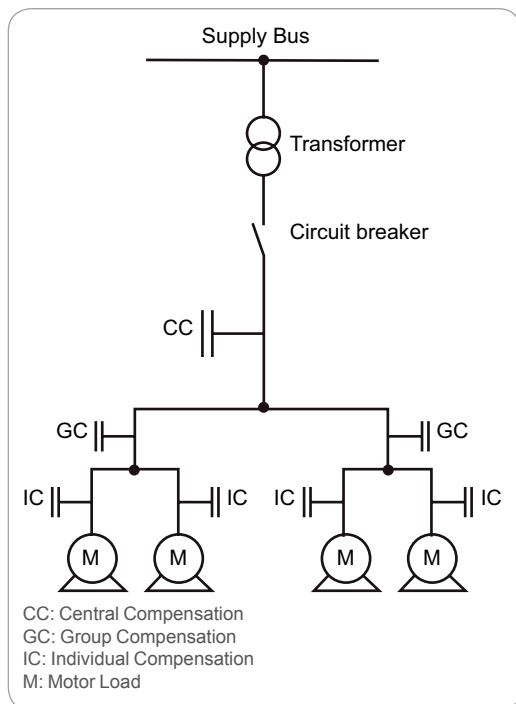## Step 2: Selection of the compensation mode

The location of low-voltage capacitors in an installation constitutes the mode of compensation, which may be central (one location for the entire installation), by sector (section-by-section), at load level, or some combination of the latter two. In principle, the ideal compensation is applied at a point of consumption and at the level required at any moment in time.

In practice, technical and economic factors govern the choice.

The location for connection of capacitor banks in the electrical network is determined by:
- the overall objective (avoid penalties on reactive energy relieve transformer or cables, avoid voltage drops and sags)
- the operating mode (stable or fluctuating loads)
- the foreseeable influence of capacitors on the network characteristics
- the installation cost.

### Central compensation

The capacitor bank is connected at the head of the installation to be compensated in order to provide reactive energy for the whole installation.
This configuration is convenient for a stable and continuous load factor.

### Group compensation (by sector)

The capacitor bank is connected at the head of the feeders supplying one particular sector to be compensated. This configuration is convenient for a large installation, with workshops having different load factors.

### Compensation of individual loads

The capacitor bank is connected right at the inductive load terminals (especially large motors). This configuration is very appropriate when the load power is significant compared to the subscribed power.
This is the ideal technical configuration, as the reactive energy is produced exactly where it is needed, and adjusted to the demand.

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### Step 3: Selection of the compensation type

Different types of compensation should be adopted depending on the performance requirements and complexity of control:

■ Fixed, by connection of a fixed-value capacitor bank
■ Automatic, by connection of a different number of steps, allowing adjustment of the reactive energy to the required value
■ Dynamic, for compensation of highly fluctuating loads.

#### Fixed compensation

This arrangement uses one or more capacitor(s) to provide a constant level of compensation. Control may be:

■ Manual: by circuit-breaker or load-break switch
■ Semi-automatic: by contactor
■ Direct connection to an appliance and switched with it.

These capacitors are installed:

■ At the terminals of inductive loads (mainly motors)
■ At busbars supplying numerous small motors and inductive appliances for which individual compensation would be too costly
■ In cases where the load factor is reasonably constant.

#### Automatic compensation

This kind of compensation provides automatic control and adapts the quantity of reactive power to the variations of the installation in order to maintain the targeted cos φ. The equipment is installed at points in an installation where the active-power and/or reactive-power variations are relatively large, for example:

■ on the busbars of a main distribution switchboard
■ on the terminals of a heavily-loaded feeder cable.

Where the kvar rating of the capacitors is less than or equal to 15% of the power supply transformer rating, a fixed value of compensation is appropriate. Above the 15% level, it is advisable to install an automatically-controlled capacitor bank.

Control is usually provided by an electronic device (Power Factor Controller) which monitors the actual power factor and orders the connection or disconnection of capacitors in order to obtain the targeted power factor. The reactive energy is thus controlled by steps. In addition, the Power Factor Controller provides information on the network characteristics (voltage amplitude and distortion, power factor, actual active and reactive power…) and equipment status. Alarm signals are transmitted in case of malfunction.

Connection is usually provided by contactors. For compensation of highly fluctuating loads use of active filters or Electronic Var Compensators (EVC) are recommened. Contact Schneider Electric for electronic compensation solutions.

#### Dynamic compensation

This kind of compensation is required when fluctuating loads are present, and voltage fluctuations have to be prevented. The principle of dynamic compensation is to associate a fixed capacitor bank and an electronic var compensator, providing either leading or lagging reactive currents.

The result is continuously varying fast compensation, perfectly suitable for loads such as lifts, crushers, spot welding, etc.

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## Step 4: Allowance for operating conditions and harmonics

Capacitor banks should be selected depending on the working conditions expected during their lifetime.

### Allowing for operating conditions

The operating conditions have a great influence on the life expectancy of capacitors. The following parameters should be taken into account:
- Ambient Temperature (°C)
- Expected over-current, related to voltage disturbances, including maximum sustained overvoltage
- Maximum number of switching operations/year
- Required life expectancy.

Our Power Factor Correction equipment are not suitable for a use in an environment with an explosive atmosphere (ATEX).

### Allowing for harmonics

**Impact of harmonics on capacitors**

Some loads (variable speed motors, static converters, welding machines, arc furnaces, fluorescent lamps, etc.) pollute the electrical network by reinjecting harmonics.

To take account of the effects of the harmonics on the capacitors, the type of compensation equipment must be correctly determined:

| Gh / Sn | ≤ 15% | ≤ 25% | ≤ 50% |
|---------|-------|-------|-------|
| Range | VarSet Easy "no polluted network" | VarSet "low polluted network" | VarSet "polluted network" |

**Choosing equipment according to the harmonic pollution level**

Equipment can be chosen:
- Either theoretically from the Gh/Sn ratio if the data is available.

Gh: apparent power of harmonic-generating loads (variable speed motors, static converters, power electronics, etc).

Sn: apparent power of the transformer.

The Gh/Sn rule is valid for a THD(I) of all the harmonic generators < 30% and for a pre-existing THD(U) < 2%.

If these values are exceeded, a harmonic analysis of the network or measurements are required.

**Example 1:**
U = 400 V, P = 300 kW, Sn = 800 kVA, Gh = 150 kVA
Gh/Sn = 18.75% φ VarSet "low polluted network" equipment

**Example 2:**
U = 400 V, P = 100 kW, Sn = 800 kVA, Gh = 300 kVA
Gh/Sn = 37.5% φ VarSet "polluted network" equipment

- Or from the total harmonic current distortion THD(I) measured at the transformer secondary, **at full load and without without connected capacitors**:

| THD(I) % | VarSet Easy "no polluted network" | VarSet "low polluted network" | VarSet "polluted network" | Accusine Active filters |
|----------|-----------------------------------|-------------------------------|---------------------------|-------------------------|
| ≤ 5% | ■ | | | |
| 5% < … ≤ 10% | | ■ | | |
| 10% < … ≤ 20% | | | ■ | |
| > 20% | | | | ■ |

- Or from the total harmonic voltage distortion THD(U) measured at the transformer secondary, **at full load and without without connected capacitors**:

| THD(U) % | VarSet Easy "no polluted network" | VarSet "low polluted network" | VarSet "polluted network" | Accusine Active filters |
|----------|-----------------------------------|-------------------------------|---------------------------|-------------------------|
| ≤ 3% | ■ | | | |
| 3% < … ≤ 4% | | ■ | | |
| 4% < … ≤ 7% | | | ■ | |
| > 7% | | | | ■ |

When Qc > 30% of Sn, "polluted network type" must be choosen to avoid any resonnance

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■ If both THD(I) and THD(U) are measured and do not result in the same type
of power factor correction, the most rigorous solution must be chosen.

**Example:**
A measurement gives:
■ THD(I) = 15% VarSet "polluted network" solution
■ THD(U) = 3.5% VarSet "low polluted network" solution
The VarSet "polluted network" solution must be chosen.

### General

The purpose of the detuned reactors (DR) is to prevent the harmonics present on
the network from being amplified and to protect the capacitors (this corresponds
to our VarSet "polluted network" range). They must be connected in series with
the capacitors.

Caution: as the detuned reactors generate an overvoltage at the capacitor terminals,
capacitors at least 480 V must be used for a 400 V network.

### Technical data

■ Choice of tuning
The tuning frequency fr corresponds to the resonance frequency of the L-C assembly.

$$fr = \frac{1}{(2\pi\sqrt{LC})}$$

We also speak of tuning order n.

For a 50 Hz network, we have:

$$n = \frac{fr}{50\ Hz}$$

■ The tuning order chosen must ensure that the harmonic current spectrum range is
outside the resonance frequency.

■ It is also important to ensure that no remote-control frequencies are disturbed.

The most common tuning orders are 3, 8 or 4.2 (2.7 is used for 3rd order harmonics).

**Tuning order selection table for Network 50 Hz**

| Harmonic generators | Remote control frequency (Ft) | | |
|---|---|---|---|
| | 165 Hz < Ft ≤ 250 Hz | 250 Hz < Ft ≤ 350 Hz | None or Ft > 350 Hz |
| Three-phase harmonic generators (2) | 2.7 (1) | 3.8 | 4.2 |
| Single-phase harmonic generators (3) | 2.7 | | |

**Tuning order selection table for Network 60 Hz**

| Harmonic generators | Remote control frequency (Ft) | | |
|---|---|---|---|
| | 200 Hz < Ft ≤ 300 Hz | 300 Hz < Ft ≤ 450 Hz | None or Ft > 450Hz |
| Three-phase harmonic generators (2) | 2.7 | 3.8 | 4.2 |
| Single-phase harmonic generators (3) | 2.7 | | |

(1) a tuning order of 4.2 can be used in France with a remote control frequency of 175 Hz.
(2) Example of three-phase harmonic generators : Variable speed drives, rectifiers,UPS,starters.
(3) Single phase harmonic generators case must be considered if the power of single phase
harmonic generators in KVA is more than half of the total power of your harmonic generators.

### Concordance between tuning order, tuning frequency and relative impedance

| Tuning order | Relative impedance [ p = 1 / n² ] ( % ) | Tuning frequency for @ 50 Hz (Hz) | Tuning frequency for @ 60 Hz (Hz) |
|---|---|---|---|
| 2,7 | 14 | 135 | 162 |
| 3,8 | 7 | 190 | 228 |
| 4,2 | 5,7 | 215 | 252 |

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## Customer requirements

The table below shows the solutions most frequently used in different types of applications.

- Very frequently
- Usually
- Occasionally

In all cases, it is strongly recommended that measurements be carried out on site in order to validate the solution.

| Types of applications | VarSet Easy "no polluted network" Gh/Sn ≤ 15% | VarSet "low polluted network" Gh/Sn ≤ 25% | VarSet "polluted network" Gh/Sn ≤ 50% |
|---|---|---|---|
| **Industry** | | | |
| Food and drink | Occasionally | Occasionally | Very frequently |
| Textiles | | | Usually |
| Wood | Very frequently | Very frequently | Occasionally |
| Paper | | | Usually |
| Printing | | | Very frequently |
| Chemicals - pharmaceuticals | | | Very frequently |
| Plastics | | | Usually |
| Glass - ceramics | | | Usually |
| Steel production | | | Usually |
| Metallurgy | | | Usually |
| Automotive | | Very frequently | Usually |
| Cement works | | | Usually |
| Mining | | Very frequently | Occasionally |
| Refineries | | | Usually |
| Microelectronics | | | Very frequently |
| **Tertiary** | | | |
| Banks - insurance | Very frequently | | Very frequently |
| Supermarkets | Very frequently | | Usually |
| Hospitals | Very frequently | | Usually |
| Stadiums | Very frequently | | Very frequently |
| Amusement parks | | | Very frequently |
| Hotels - offices | Very frequently | Very frequently | Occasionally |
| **Energy and infrastructure** | | | |
| Substations | Usually | Usually | |
| Water distribution | | | Very frequently |
| Internet | | | Very frequently |
| Railway transport | | | Very frequently |
| Airports | | | Very frequently |
| Underground train systems | | | Very frequently |
| Bridges | | | Very frequently |
| Tunnels | | | Usually |
| Wind turbines | | Very frequently | |

# VarSet offer

# VarSet offer

**B**

# VarSet

**B**

ISO **9001**
Quality certified manufacturing

ISO **14001**
Environmental management system

Non contractual picture

The entire VarSet range offers a unique combination of abilities to give you more convenience, reliability and performance across a broad range of applications.

Forward-thinking design and meticulous manufacturing quality means you can count on VarSet capacitor banks to deliver dependable, long-term service.

Embedded communication features will allow you to optimize surveillance, maintenance and performance of your capacitor bank asset.

**Eco**struxure™
**Innovation At Every Level**

## EcoStruxure™ Power ready

- Seemless integration thanks to embedded Modbus communication
- Remote equipment follow up & control
- Remote troubleshooting
- Enable analytics & mobile benefits of EcoStruxure™ Power

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## Safety

### > Protection

- overload protection for each stage
- short-circuit protection for each stage
- thermal monitoring device
- 3 phase overPressure Disconnection System on each capacitor
- direct contact protection open door

### > Robust Enclosure System

- IP31 protection for indoor application
- IP54 kit available for dusty and harsh environment
- high quality welding and painting
- IK10 protection against mechanical shocks

### > Tested and certified

- fully type-tested according to IEC 61921 & IEC 61439- 1 & 2

## Reliability

### > Long-life performance

- Schneider capacitor engineered for harsh environment and long life*
- multi level and redondancy of protections
- reduced switching inrush current thanks to special design contactor or detuned reactors
- integration of high quality Schneider components

### > Easy maintenance

- automatic step size detection
- self diagnosis of capacitor output & derating
- alarm functions available (temperature, Harmonics, Voltage, Overload , hunting…)

## Performance

### > Easy installation & commissioning

- automatic step size detection
- current transformer polarity auto-detection
- top or bottom cable connection

### > Advanced measurement and monitoring functions

- real time step monitoring (remaining power, number of switches)
- harmonic control till the 19th harmonic
- 4 quadrant operations
- overload assessment thru harmonics

### > Configurable overload and short-circuit protection options

### > Future-ready : "Connectable product"

* Cf. Low voltage components catalog PFCED310003EN

# VarSet Easy

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VarSet easy range is optimized to give the performance you need for standard operating conditions.

Manufactured with meticulous quality means and designed to deliver reliable performance, it's the easy choice for savings and fast return on investment.

## Simplicity

### > Easy to install

- compact enclosure
- easy accessible gland plates for power cables

### > Ease of use and maintenance

- easy programming and commissioning with Varplus Logic controller
- simple replacement or retrofit of EasyCan capacitors
- straightforward integration with any building or any energy management system thanks to modbus communication

## Reliability

### > Protection

- thermal monitoring
- harmonic overload
- direct accidental contact
- 3 phase simultaneous safe diconnection at end of life

### > Robust enclosure

- IP31 for indoor application
- IK10 protection against mechanical shocks
- high quality welding and painting

### > Tested

- fully type tested according to IEC 61439-1 & 2, IEC 61921

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**Selector web page:**



**ECODIAL Software:**



**ID-Spec Software:**



## Compensation type

■ **Automatic compensation:**
This compensation type is used for unstable loads.
The VarSet LV equipment will automatically adjust the reactive power according to variations in load and/or power factor. Schneider Electric recommends the use of automatic compensation when the capacitor bank's power is more than 15% of the power of the transformer, in order to avoid overcompensation.

■ **Fixed compensation:**
This compensation type is used for stable loads, with synchronised voltage and current. The equipment will supply a constant reactive power irrespective of load variations.

## Network pollution

Non-linear loads, such as devices using power electronics, generate harmonic pollution on the network.

The selection of the appropriate power factor correction solution has to be adapted depending on the level of network pollution.

The selection is based on the value of the Gh/Sn ratio, with:
■ Gh = total power of the non–linear loads
■ Sn = rated power of the supply transformer

The selection can also be made according to the percentage of total harmonic current distorsion THDi or total harmonic voltage distorsion THDu measured.

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The compensation needs of your installation vary depending on factors such as load variation, Network harmonic pollution level and the characteristics of the installation. Find out the right level of compensation for your network with the help of the chart below.

## Your load variation

### Variable or unstable load

Choose
**automatic compensation**

**Network harmonic pollution level**

| No polluted | | Low polluted | | Polluted | |
|---|---|---|---|---|---|
| Gh/Sn | ≤ 15% | Gh/Sn | ≤ 25% | Gh/Sn | ≤ 50% |
| Thdu | ≤ 3% | Thdu | ≤ 4% | Thdu | ≤ 7% |
| Thdi | ≤ 5% | Thdi | ≤ 10% | Thdi | ≤ 20% |

Choose
**VarSet Easy for "no polluted network"**

Choose
**VarSet for "low polluted network"**

Choose
**VarSet for "polluted network"**

**400 V - 50 Hz**
from 7.5 to 600 kVAr

See page 28

**400 V - 50 Hz**
from 6 to 1150 kVAr

bottom - See page 30
Top - See page 38

**400 V - 60 Hz**
from 100 to 600 kVAr

See page 40

**400 V - 50 Hz**
from 50 to 1150 kVAr

DR 2.7 - See page 36
DR 3.8 - Bottom - See page 32
DR 3.8 - Top - See page 38
DR 4.2 - See page 34

**400V - 60 Hz**
from 200 to 600 kVAr

DR 2.7 - See page 34
DR 3.8 - See page 34

### Stable load

Choose
**fixed compensation**

**Network harmonic pollution level**

| Low polluted | | Polluted | |
|---|---|---|---|
| Gh/Sn | ≤ 25% | Gh/Sn | ≤ 50% |
| Thdu | ≤ 4% | Thdu | ≤ 7% |
| Thdi | ≤ 10% | Thdi | ≤ 20% |

Choose
**VarSet for "low polluted network"**

Choose
**VarSet for "polluted network"**

**400 V - 50 Hz**
from 79 to 200 kVAr

See page 26

**400 V - 50 Hz**
from 50 to 200 kVAr

See page 26

B

# VarSet offer
# Fixed compensation
## 400 V / 50 Hz
Low polluted network
Polluted network - Tuning order 3.8 & 4.2

B

### Environment
- Installation: Indoor
- Ambient temperature: -5°C to 45°C
- Average daily temperature: +35°C max
- Humidity: up to 95%
- Maximum altitude: 2000 m

### Standards
- IEC 61921
- IEC 61439-1/2

### Environment certifications

RoHS compliant, produced in 14001 certified plants, product environmental profile available

## General characteristics

| Electrical Characteristics | |
|---|---|
| Rated Voltage | 400 V - 50 Hz |
| Capacitance Tolerance | -5%, +10% |
| Connection type | Three-phase |
| Power losses | < 2.5 W/kVAr for low polluted network |
| | < 6 W/kVAr for polluted network |
| Maximum permissible over current (with thermal protection included) | 1.43 In for low polluted network |
| | 1.31 In for polluted network with 4.2 tuning factor |
| | 1.19 In for polluted network with 3.8 tuning factor |
| Maximum permissible over voltage | 1.1 x Un, 8 h every 24 h |
| Insulation voltage | 500 V up to 32 kVAr, 690 V from 50 kVAr |
| Rated Impulse Withstand Voltage (Uimp) | 8 kV |

| Enclosure | |
|---|---|
| Degree of protection | IP31 |
| Colour | RAL 7035 |
| Degree of mechanical resistance | IK10 |
| Protection against direct contacts open door | IPxxB |

| Head circuit breaker protection | |
|---|---|
| Without circuit breaker | Busbar Connection |
| | LV bank must be protected by a circuit breaker on upstream switchboard |
| With circuit breaker | Compact NSX |
| | Rotary handle above 100 kVAr |

| Step | |
|---|---|
| Capacitors Type | VarplusCan 400 V - 50 Hz for low polluted network |
| | VarplusCan 480 V - 50 Hz for polluted network |
| | Maximum over current: 1.8 In |
| | Overpressure protection |
| | Discharge resistance 50 V - 1 min |
| Detuned Reactor | Varplus DR |
| | Overheating protection by thermostat |

| Temperature control | |
|---|---|
| | By thermostat |

| Installation | |
|---|---|
| Auxiliary supply | Transformer 400/230 V included from 50 kVAr |

### Options available through configurator (see page 43):
- Top or bottom connection
- Tuning factor 2,7

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VarSet offer
# Fixed compensation
## 400 V / 50 Hz
Low polluted network
Polluted network - Tuning order 3.8 & 4.2

### Low polluted network

| References | Power (kVAr) | Breaking Capacity | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | |
| **Wall-mounted - Top connection** | | | | | | |
| VLVFW0N03501AA | 9 | 15 kA | IC60H 20A | VLVFW0N | 650 x 450 x 250 mm | 48 |
| VLVFW0N03502AA | 16 | | IC60H 40A | | | |
| VLVFW0N03503AA | 22 | | IC60H 50A | | | |
| VLVFW0N03504AA | 32 | | IC60H 63A | | | |
| VLVFW1N03506AA | 50 | 35 kA | NSX160F | VLVFW1N | 700 x 600 x 300 mm | 64 |
| VLVFW1N03507AA | 75 | | NSX250F | | | |
| VLVFW1N03508AA | 100 | | NSX250F | | | |
| **Floor-standing - Bottom connection** | | | | | | |
| VLVFW2N03509AA | 125 | 50 kA | NSX400N 400A | VLVFW2N | 1300 x 800 x 300 mm | 117 |
| VLVFW2N03510AA | 150 | | NSX400N 400A | | | |
| VLVFW2N03511AA | 175 | | NSX400N 400A | | | |
| VLVFW2N03512AA | 200 | | NSX400N 630A | | | |

| References | Power (kVAr) | Short-time withstand current | Preconised upstream protection | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|
| **Without circuit breaker** | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | |
| VLVFW2N03509AB | 125 | 30 kA/1s | NSX400N 400A | VLVFW2N | 1300 x 800 x 300 mm | 117 |
| VLVFW2N03510AB | 150 | | NSX400N 400A | | | |
| VLVFW2N03511AB | 175 | | NSX400N 400A | | | |
| VLVFW2N03512AB | 200 | | NSX400N 630A | | | |

### Polluted network

| References | Power (kVAr) | Tuning order / Tuning Frequency | Breaking Capacity | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | | |
| VLVFF2P03506AA | 50 | 3.8 / 190 Hz | 50 kA | NSX250N 250A | VLVFF2P | 1400 x 800 x 600 mm | 320 |
| VLVFF2P03507AA | 75 | | | NSX250N 250A | | | |
| VLVFF2P03508AA | 100 | | | NSX250N 250A | | | |
| VLVFF2P03510AA | 150 | | | NSX400N 400A | | | |
| VLVFF2P03512AA | 200 | | | NSX400N 400A | | | |
| VLVFF2P03506AD | 50 | 4.2 / 210 Hz | | NSX250N 250A | | | |
| VLVFF2P03507AD | 75 | | | NSX250N 250A | | | |
| VLVFF2P03508AD | 100 | | | NSX250N 250A | | | |
| VLVFF2P03510AD | 150 | | | NSX400N 400A | | | |
| VLVFF2P03512AD | 200 | | | NSX400N 400A | | | |

| References | Power (kVAr) | Tuning order / Tuning Frequency | Short-time withstand current | Preconised upstream protection | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|
| **Without circuit breaker** | | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | | |
| VLVFF2P03506AB | 50 | 3.8 / 190 Hz | 35kA/1s | NSX250N 250A | VLVFF2P | 1400 x 800 x 600 mm | 320 |
| VLVFF2P03507AB | 75 | | | NSX250N 250A | | | |
| VLVFF2P03508AB | 100 | | | NSX250N 250A | | | |
| VLVFF2P03510AB | 150 | | | NSX400N 400A | | | |
| VLVFF2P03512AB | 200 | | | NSX400N 400A | | | |
| VLVFF2P03506AE | 50 | 4.2 / 210 Hz | | NSX250N 250A | | | |
| VLVFF2P03507AE | 75 | | | NSX250N 250A | | | |
| VLVFF2P03508AE | 100 | | | NSX250N 250A | | | |
| VLVFF2P03510AE | 150 | | | NSX400N 400A | | | |
| VLVFF2P03512AE | 200 | | | NSX400N 400A | | | |

➜ **Dimensions and weight:**
**Main protection recommendations:**

# VarSet offer
# Automatic compensation
## 400 V / 50 Hz
VarSet Easy
No polluted network

B

## Environment

- Installation: Indoor
- Ambient temperature: -5°C to 45°C
- Average daily temperature: +35°C max
- Humidity: up to 95%
- Maximum altitude: 2000 m

## Standards

- IEC 61921
- IEC 61439-1/2

## Environment certifications

RoHS compliant, produced in 14001 certified plants, product environmental profile available

## General characteristics

| Electrical Characteristics | |
| --- | --- |
| Rated Voltage | 400 V - 50 Hz |
| Capacitance Tolerance | -5%, +10% |
| Connection type | Three-phase |
| Power losses | < 2 W/kVAr |
| Maximum permissible over current | 1.36 In for no polluted network |
| Maximum permissible over voltage | 1.1 x Un, 8 h every 24 h |
| Overload protection | By Thdu management from controller |
| Insulation voltage | 500 V up to 30 kVAr, 690 V from 37 kVAr |
| Rated Impulse Withstand Voltage (Uimp) | 8 kV |
| **Enclosure** | |
| Degree of protection | IP31 |
| Colour | RAL 7035 |
| Degree of mechanical resistance | IK10 |
| Protection against direct contacts open door | IP00 - protection against accidental direct contact |
| **Controller** | |
| VarPlus Logic | VPL06 / VPL12 with Modbus communication |
| **Head circuit breaker protection** | |
| Without circuit breaker | Without circuit breaker |
| | LV bank must be protected by a circuit breaker on upstream switchboard |
| With circuit breaker | iC60 up to 30 kVar, Easypact CVS from 32 kVar to 300 kvar, Compact NS above 300 kvar |
| | Rotary handle above 100 kVAr |
| **Step** | |
| Capacitors Type | EasyCan 400 V - 50 Hz |
| | Maximum over current: 1.5 In |
| | Overpressure protection |
| | Discharge resistance 50 V - 1 min |
| Contactors | Dedicated to capacitor switching |
| **Temperature control** | |
| Double control | By controller Varplus Logic VPL6 or VPL12 |
| **Communication** | |
| ModBUS | RS485 |
| **Installation** | |
| Auxiliary supply | Transformer 400/230 V included from 82 kVAr |
| TI not included | 5 VA - secondary 1 A or 5 A |
| | To be installed upstream of the load and capacitor bank |
| GenSet contact | Must be connected with the generator |
| Alarm contact | Available for remote warning signal |

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VarSet offer
# Automatic compensation
## 400 V / 50 Hz
VarSet Easy
No polluted network

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Breaking Capacity | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | | | | | |
| **Wall-mounted - Top connection** | | | | | | | | | | |
| VLVAW0L007A40A | 7.5 | 2.5 | 2.5 + 5 | 3 | 2 | 15 kA | IC60H 20A | VLVAW0L | 600 x 500 x 250 mm | 57 |
| VLVAW0L015A40A | 15 | 5 | 5 + 10 | 3 | 2 | | IC60H 32A | | | |
| VLVAW0L017A40A | 17.5 | 2.5 | 2.5 + 5 + 10 | 7 | 3 | | IC60H 40A | | | |
| VLVAW0L020A40A | 20 | 5 | 5 + 5 + 10 | 4 | 3 | | IC60H 40A | | | |
| VLVAW0L025A40A | 25 | 5 | 5 + 10 + 10 | 5 | 3 | | IC60H 50A | | | |
| VLVAW0L030A40A | 30 | 5 | 5 + 10 + 15 | 6 | 3 | | IC60H 63A | | | |
| VLVAW0L037A40A | 37.5 | 7.5 | 7.5 + 15 + 15 | 5 | 3 | 35 kA | CVS100F 80A | | | |
| VLVAW0L045A40A | 45 | 7.5 | 7.5 + 15 + 22.5 | 6 | 3 | | CVS100F 100A | | | |
| VLVAW0L050A40A | 50 | 10 | 10 + 20 + 20 | 5 | 3 | | CVS100F 100A | | | |
| VLVAW1L060A40A | 60 | 10 | 10 + 20 + 30 | 6 | 3 | | CVS160F 125A | VLVAW1L | 800 x 600 x 250 mm | 73 |
| VLVAW1L070A40A | 70 | 10 | 10 + 20 + 40 | 7 | 3 | | CVS160F 125A | | | |
| VLVAW1L075A40A | 75 | 15 | 15 + 30 + 30 | 5 | 3 | | CVS160F 125A | | | |
| VLVAW1L082A40A | 82.5 | 7.5 | 7.5 + 15 + 30 + 30 | 11 | 4 | | CVS160F 125A | | | |
| VLVAW1L090A40A | 90 | 15 | 15 + 15 + 30 + 30 | 6 | 4 | | CVS250F 200A | | | |
| VLVAW1L100A40A | 100 | 20 | 20 + 40 + 40 | 5 | 3 | | CVS250F 200A | | | |
| VLVAW2L125A40A | 125 | 25 | 25 + 50 + 50 | 5 | 3 | | CVS400F 320A | VLVAW2L | 1000 x 800 x 300 mm | 131 |
| VLVAW2L150A40A | 150 | 25 | 25 + 25 + 50 + 50 | 6 | 4 | | CVS400F 320A | | | |
| VLVAW2L175A40A | 175 | 25 | 25 + 3x50 | 7 | 4 | | CVS630F 500A | | | |
| VLVAW2L200A40A | 200 | 25 | 25 + 25 + 3x50 | 8 | 5 | | CVS630F 500A | | | |
| **Floor-standing - bottom connection** | | | | | | | | | | |
| VLVAF3L225A40A | 225 | 25 | 25 + 4x50 | 9 | 5 | 35 kA | CVS630F 500A | VLVAF3L | 1100 x 800 x 400 mm | 140 |
| VLVAF3L250A40A | 250 | 25 | 25 + 25 + 4x50 | 10 | 6 | | CVS630F 500A | | | |
| VLVAF3L275A40A | 275 | 25 | 25 + 5x50 | 11 | 6 | | CVS630F 600A | | | |
| VLVAF3L300A40A | 300 | 50 | 6x50 | 6 | 6 | | CVS630F 600A | | | |
| VLVAF5L350A40A | 350 | 50 | 7x50 | 7 | 7 | | NS800N | | | |
| VLVAF5L400A40A | 400 | 50 | 8x50 | 8 | 8 | | NS800N | VLVAF5L | 2200 x 800 x 600 mm | 340 |
| VLVAF5L450A40A | 450 | 50 | 9x50 | 9 | 9 | | NS1000N | | | |
| VLVAF5L500A40A | 500 | 50 | 10x50 | 10 | 10 | | NS1000N | | | |
| VLVAF5L550A40A | 550 | 50 | 11x50 | 11 | 11 | | NS1250N | | | |
| VLVAF5L600A40A | 600 | 50 | 12x50 | 12 | 12 | | NS1250N | | | |

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Short-time withstand current Icw | Preconised upstream protection | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Without circuit breaker** | | | | | | | | | | |
| **Wall-mounted - Top connection** | | | | | | | | | | |
| VLVAW0L007A40B | 7.5 | 2.5 | 2.5 + 5 | 3 | 2 | 30 kA/1s | IC60H 20A | VLVAW0L | 600 x 500 x 250 mm | 57 |
| VLVAW0L015A40B | 15 | 5 | 5 + 10 | 3 | 2 | | IC60H 32A | | | |
| VLVAW0L017A40B | 17.5 | 2.5 | 2.5 + 5 + 10 | 7 | 3 | | IC60H 40A | | | |
| VLVAW0L020A40B | 20 | 5 | 5 + 5 + 10 | 4 | 3 | | IC60H 40A | | | |
| VLVAW0L025A40B | 25 | 5 | 5 + 10 + 10 | 5 | 3 | | IC60H 50A | | | |
| VLVAW0L030A40B | 30 | 5 | 5 + 10 + 15 | 6 | 3 | | IC60H 63A | | | |
| VLVAW0L037A40B | 37.5 | 7.5 | 7.5 + 15 + 15 | 5 | 3 | | CVS100F 80A | | | |
| VLVAW0L045A40B | 45 | 7.5 | 7.5 + 15 + 22.5 | 6 | 3 | | CVS100F 100A | | | |
| VLVAW0L050A40B | 50 | 10 | 10 + 20 + 20 | 5 | 3 | | CVS100F 100A | | | |
| VLVAW1L060A40B | 60 | 10 | 10 + 20 + 30 | 6 | 3 | | CVS160F 125A | VLVAW1L | 800 x 600 x 250 mm | 73 |
| VLVAW1L070A40B | 70 | 10 | 10 + 20 + 40 | 7 | 3 | | CVS160F 125A | | | |
| VLVAW1L075A40B | 75 | 15 | 15 + 30 + 30 | 5 | 3 | | CVS160F 125A | | | |
| VLVAW1L082A40B | 82.5 | 7.5 | 7.5 + 15 + 30 + 30 | 11 | 4 | | CVS160F 125A | | | |
| VLVAW1L090A40B | 90 | 15 | 15 + 15 + 30 + 30 | 6 | 4 | | CVS250F 200A | | | |
| VLVAW1L100A40B | 100 | 20 | 20 + 40 + 40 | 5 | 3 | | CVS250F 200A | | | |
| VLVAW2L125A40B | 125 | 25 | 25 + 50 + 50 | 5 | 3 | | CVS400F 320A | VLVAW2L | 1000 x 800 x 300 mm | 131 |
| VLVAW2L150A40B | 150 | 25 | 25 + 25 + 50 + 50 | 6 | 4 | | CVS400F 320A | | | |
| VLVAW2L175A40B | 175 | 25 | 25 + 3x50 | 7 | 4 | | CVS630F 500A | | | |
| VLVAW2L200A40B | 200 | 25 | 25 + 25 + 3x50 | 8 | 5 | | CVS630F 500A | | | |
| **Floor-standing - bottom connection** | | | | | | | | | | |
| VLVAF3L225A40B | 225 | 25 | 25 + 4x50 | 9 | 5 | 30 kA/1s | CVS630F 500A | VLVAF3L | 1100 x 800 x 400 mm | 140 |
| VLVAF3L250A40B | 250 | 25 | 25 + 25 + 4x50 | 10 | 6 | | CVS630F 500A | | | |
| VLVAF3L275A40B | 275 | 25 | 25 + 5x50 | 11 | 6 | | CVS630F 600A | | | |
| VLVAF3L300A40B | 300 | 50 | 6x50 | 6 | 6 | | CVS630F 600A | | | |
| VLVAF5L350A40B | 350 | 50 | 7x50 | 7 | 7 | | NS800N | | | |
| VLVAF5L400A40B | 400 | 50 | 8x50 | 8 | 8 | | NS800N | VLVAF5L | 2200 x 800 x 600 mm | 340 |
| VLVAF5L450A40B | 450 | 50 | 9x50 | 9 | 9 | | NS1000N | | | |
| VLVAF5L500A40B | 500 | 50 | 10x50 | 10 | 10 | | NS1000N | | | |
| VLVAF5L550A40B | 550 | 50 | 11x50 | 11 | 11 | | NS1250N | | | |
| VLVAF5L600A40B | 600 | 50 | 12x50 | 12 | 12 | | NS1250N | | | |

➡ **Dimensions and weight:** see page 48.

# VarSet offer
# Automatic compensation
## 400 V / 50 Hz - Bottom entry
### Low polluted network

**B**

### Environment
- Installation: Indoor
- Ambient temperature: -5°C to 45°C
- Average daily temperature: +35°C max
- Humidity: up to 95%
- Maximum altitude: 2000 m

### Standards
- IEC 61921
- IEC 61439-1/2

### Environment certifications

RoHS compliant, produced in 14001 certified plants, product environmental profile available

## General characteristics

| Electrical Characteristics | |
|---|---|
| Rated Voltage | 400 V - 50 Hz |
| Capacitance Tolerance | -5%, +10% |
| Connection type | Three-phase |
| Power losses | < 2.5 W/kVAr |
| Maximum permissible over current (with thermal protection included) | 1.43 In |
| Maximum permissible over voltage | 1.1 x Un, 8 h every 24 h |
| Overload protection | By Thdu management from controller |
| Insulation voltage | 500 V up to 32 kVAr, 690 V from 34 kVAr |
| Rated Impulse Withstand Voltage (Uimp) | 8 kV |
| **Enclosure** | |
| Degree of protection | IP31 |
| Colour | RAL 7035 |
| Degree of mechanical resistance | IK10 |
| Protection against direct contacts open door | IPxxB |
| **Controller** | |
| VarPlus Logic | VPL06 / VPL12 with Modbus communication |
| **Head circuit breaker protection** | |
| Without circuit breaker | Busbar Connection |
| | LV bank must be protected by a circuit breaker on upstream switchboard |
| With circuit breaker | Compact NSX or Compact NS |
| | Rotary handle above 100 kVAr |
| **Step** | |
| Capacitors Type | VarplusCan 400 V - 50 Hz |
| | Maximum over current: 1.8 In |
| | Overpressure protection |
| | Discharge resistance 50 V - 1 min |
| Contactors | Dedicated to capacitor switching |
| Fuse protection | Type gG above 300 kVar |
| **Temperature control** | |
| Double control | By thermostat and controller |
| **Communication** | |
| ModBUS | RS485 |
| **Installation** | |
| Auxiliary supply | Transformer 400/230 V included from 50 kVAr |
| TI not included | 5 VA - secondary 1 A or 5 A |
| | To be installed upstream of the load and capacitor bank |
| GenSet contact | Must be connected with the generator |
| Alarm contact | Available for remote warning signal |

### Options available through configurator (see page 43):
- Step protection by circuit breaker
- Top or Bottom connection
- Plinth for wall mounted banks
- Short-time withstand current 65 kA/1s
- Breaking capacity 65 kA

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# Automatic compensation
## Bottom entry - 400 V / 50 Hz
### Low polluted network

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Breaking Capacity | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | | | | | |
| **Wall-mounted - Bottom connection** | | | | | | | | | | |
| VLVAW0N03526AA | 6 | 3 | 3 + 3 | 2 | 2 | 15 kA | IC60H 13A | VLVAW0N | 650 x 450 x 250 mm | 57 |
| VLVAW0N03501AA | 9 | 3 | 3 + 6.25 | 3 | 2 | | IC60H 20A | | | |
| VLVAW0N03527AA | 12.5 | 3 | 3 + 3 + 6.25 | 4 | 3 | | IC60H 32A | | | |
| VLVAW0N03502AA | 16 | 3 | 3 + 6.25 + 6.25 | 5 | 3 | | IC60H 40A | | | |
| VLVAW0N03503AA | 22 | 3 | 3 + 6.25 + 12.5 | 7 | 3 | | IC60H 50A | | | |
| VLVAW0N03504AA | 32 | 6.25 | 6.25 + 12.5 + 12.5 | 5 | 3 | | IC60H 63A | | | |
| VLVAW1N03505AA | 34 | 3 | 3 + 6.25 + 12.5 + 12.5 | 11 | 4 | 35 kA | NSX160F 125A | VLVAW1N | 700 x 600 x 250 mm | 73 |
| VLVAW1N03528AA | 37.5 | 6.25 | 6.25 + 6.25 + 12.5 + 12.5 | 6 | 4 | | NSX160F 125A | | | |
| VLVAW1N03506AA | 50 | 6.25 | 6.25 + 6.25 + 12.5 + 25 | 8 | 4 | | NSX160F 160A | | | |
| VLVAW1N03529AA | 69 | 6.25 | 6.25 + 12.5 + 25 + 25 | 11 | 4 | | NSX250F 200A | | | |
| VLVAW1N03507AA | 75 | 25 | 25 + 25 + 25 | 3 | 3 | | NSX250F 200A | | | |
| VLVAW1N03530AA | 87.5 | 12.5 | 12.5 + 25 + 25 + 25 | 7 | 4 | | NSX250F 250A | | | |
| VLVAW1N03508AA | 100 | 25 | 25 + 25 + 25 + 25 | 4 | 4 | | NSX250F 250A | | | |
| VLVAW2N03509AA | 125 | 25 | 25 + 50 + 50 | 5 | 3 | 50 kA | NSX400N 400A | VLVAW2N | 1200 x 800 x 300 mm | 131 |
| VLVAW2N03531AA | 137.5 | 12.5 | 12.5 + 25 + 50 + 50 | 11 | 4 | | NSX400N 400A | | | |
| VLVAW2N03510AA | 150 | 50 | 50 + 50 + 50 | 3 | 3 | | NSX400N 400A | | | |
| VLVAW2N03511AA | 175 | 25 | 25 + 3x50 | 7 | 4 | | NSX400N 400A | | | |
| VLVAW3N03512AA | 200 | 25 | 25 + 25 + 3x50 | 8 | 5 | | NSX400N 400A | VLVAW3N | 1200 x 1000 x 300 mm | 175 |
| VLVAW3N03513AA | 225 | 25 | 25 + 4x50 | 9 | 5 | | NSX630N 630A | | | |
| VLVAW3N03532AA | 238 | 12.5 | 12.5 + 25 + 4x50 | 19 | 6 | | NSX630N 630A | | | |
| VLVAW3N03514AA | 250 | 25 | 25 + 25 + 4x50 | 10 | 6 | | NSX630N 630A | | | |
| VLVAW3N03515AA | 275 | 25 | 25 + 5x50 | 11 | 6 | | NSX630N 630A | | | |
| VLVAW3N03516AA | 300 | 50 | 6x50 | 6 | 6 | | NSX630N 630A | | | |
| **Floor-standing - Bottom connection** | | | | | | | | | | |
| VLVAF5N03517AA | 350 | 50 | 50 + 3x100 | 7 | 4 | 50 kA | NS800N | VLVAF5N | 2200 x 800 x 600 mm | 434 |
| VLVAF5N03518AA | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS1000N | | | |
| VLVAF5N03519AA | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | | | |
| VLVAF5N03520AA | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF5N03521AA | 550 | 50 | 50 + 5x100 | 11 | 6 | | NS1250N | | | |
| VLVAF5N03522AA | 600 | 50 | 50 + 50 + 5x100 | 12 | 6 | | NS1250N | | | |
| VLVAF7N03534AA | 700 | 25 | 25 + 25 + 50 + 6x100 | 28 | 9 | 65 kA | NS800H+NS1000H | VLVAF7N (2 incomings) | 2200 x 1600 x 600 mm | 868 |
| VLVAF7N03536AA | 900 | 50 | 50 + 50 +8x100 | 18 | 10 | | NS800H+NS1000H | | | |
| VLVAF7N03537AA | 1000 | 50 | 50 + 50 + 9x100 | 20 | 11 | | 2xNS1250H | | | |
| VLVAF7N03539AA | 1150 | 50 | 50 + 10x100 | 23 | 12 | | NS1250H+NS1600H | | | |

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Short-time withstand current Icw | Preconised upstream protection | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Without circuit breaker** | | | | | | | | | | |
| **Wall-mounted - Bottom connection** | | | | | | | | | | |
| VLVAW2N03509AB | 125 | 25 | 25 + 50 + 50 | 5 | 3 | 30 kA/1s | NSX400N 400A | VLVAW2N | 1200 x 800 x 300 mm | 131 |
| VLVAW2N03531AB | 137.5 | 12.5 | 12.5 + 25 + 50 + 50 | 11 | 4 | | NSX400N 400A | | | |
| VLVAW2N03510AB | 150 | 50 | 50 + 50 + 50 | 3 | 3 | | NSX400N 400A | | | |
| VLVAW2N03511AB | 175 | 25 | 25 + 3x50 | 7 | 6 | | NSX400N 400A | | | |
| VLVAW3N03512AB | 200 | 25 | 25 + 25 + 3x50 | 8 | 5 | | NSX400N 400A | VLVAW3N | 1200 x 1000 x 300 mm | 175 |
| VLVAW3N03513AB | 225 | 25 | 25 + 4x50 | 9 | 5 | | NSX630N 630A | | | |
| VLVAW3N03532AB | 238 | 12.5 | 12.5 + 25 + 4x50 | 19 | 6 | | NSX630N 630A | | | |
| VLVAW3N03514AB | 250 | 25 | 25 + 25 + 4x50 | 10 | 6 | | NSX630N 630A | | | |
| VLVAW3N03515AB | 275 | 25 | 25 + 5x50 | 11 | 6 | | NSX630N 630A | | | |
| VLVAW3N03516AB | 300 | 50 | 6x50 | 6 | 6 | | NSX630N 630A | | | |
| **Floor-standing - Bottom connection** | | | | | | | | | | |
| VLVAF5N03517AB | 350 | 50 | 50 + 3x100 | 7 | 4 | 35 kA/1s | NS800N | VLVAF5N | 2200 x 800 x 600 mm | 434 |
| VLVAF5N03518AB | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS1000N | | | |
| VLVAF5N03519AB | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | | | |
| VLVAF5N03520AB | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF5N03521AB | 550 | 50 | 50 + 5x100 | 11 | 6 | | NS1250N | | | |
| VLVAF5N03522AB | 600 | 50 | 50 + 50 + 5x100 | 12 | 6 | | NS1250N | | | |
| VLVAF7N03534AB | 700 | 25 | 25 + 25 + 50 +6x100 | 28 | 9 | 65 kA/1s | NS800H+NS1000H | VLVAF7N (2 incomings) | 2200 x 1600 x 600 mm | 868 |
| VLVAF7N03536AB | 900 | 50 | 50 + 50 +8x100 | 18 | 10 | | NS800H+NS1000H | | | |
| VLVAF7N03537AB | 1000 | 50 | 50 + 50 + 9x100 | 20 | 11 | | 2xNS1250H | | | |
| VLVAF7N03539AB | 1150 | 50 | 50 + 10x100 | 23 | 12 | | NS1250H+NS1600H | | | |

➜ **Dimensions and weight:** see page 48.
**Main protection recommendations:** see page 64 to 66.

# VarSet offer
# Automatic compensation
## 400 V / 50 Hz - Bottom entry
Polluted network
Tuning order 3.8 - Tuning frequency 190 Hz

**B**

## General characteristics

| Electrical Characteristics | |
|---|---|
| Rated Voltage | 400 V - 50 Hz |
| Capacitance Tolerance | -5%, +10% |
| Connection type | Three-phase |
| Power losses | < 6 W/kVAr for polluted network |
| Maximum permissible over current (with thermal protection included) | 1.19 In for polluted network with 3.8 tuning factor |
| Maximum permissible over voltage | 1.1 x Un, 8 h every 24 h |
| Overload protection | By Thdu management from controller |
| Insulation voltage | 690 V up to 200 kVAr, 800 V from 225 kVAr |
| Rated Impulse Withstand Voltage (Uimp) | 8 kV |
| **Enclosure** | |
| Degree of protection | IP31 |
| Colour | RAL 7035 |
| Degree of mechanical resistance | IK10 |
| Protection against direct contacts open door | IPxxB |
| **Controller** | |
| VarPlus Logic | VPL06 / VPL12 with Modbus communication |
| **Head circuit breaker protection** | |
| Without circuit breaker | Busbar Connection |
| | LV bank must be protected by a circuit breaker on upstream switchboard |
| With circuit breaker | Compact NSX or Compact NS |
| | Rotary handle |
| **Step** | |
| Capacitors Type | VarplusCan 480 V - 50 Hz |
| | Maximum over current: 1.8 In |
| | Overpressure protection |
| | Discharge resistance 50 V - 1 min |
| Detuned Reactor | Varplus DR |
| | Overheating protection by thermostat |
| Contactors | TeSys range |
| Fuse protection | Type gG |
| **Temperature control** | |
| Double control | By thermostat and controller |
| **Communication** | |
| ModBUS | RS485 |
| **Installation** | |
| Auxiliary supply | Transformer 400/230 V included from 50 kVAr |
| TI not included | 5 VA - secondary 1 A or 5 A |
| | To be installed upstream of the load and capacitor bank |
| GenSet contact | Must be connected with the generator |
| Alarm contact | Available for remote warning signal |

### Environment
- Installation: Indoor
- Ambient temperature: -5°C to 45°C
- Average daily temperature: +35°C max
- Humidity: up to 95%
- Maximum altitude: 2000 m

### Standards
- IEC 61921
- IEC 61439-1/2

### Environment certifications

RoHS compliant, produced in 14001 certified plants, product environmental profile available

### Options available through configurator (see page 43):
- Step protection by circuit breaker
- Short-time withstand current 65 kA/1s
- Breaking capacity 65 kA
- Top or Bottom connection

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VarSet offer
# Automatic compensation
## Bottom entry - 400 V / 50 Hz
### Polluted network
### Tuning order 3.8 - Tuning frequency 190 Hz

**B**

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Breaking Capacity | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | | | | | |
| VLVAF2P03506AA | 50 | 12.5 | 12.5 + 12.5 + 25 | 4 | 3 | 50 kA | NSX250N 250A | VLVAF2P | 1400 x 800 x 600 mm | 350 |
| VLVAF2P03507AA | 75 | 25 | 25 + 50 | 3 | 2 | | NSX250N 250A | | | |
| VLVAF2P03508AA | 100 | 25 | 25 + 25 + 50 | 4 | 3 | | NSX250N 250A | | | |
| VLVAF2P03509AA | 125 | 25 | 25 + 50 + 50 | 5 | 3 | | NSX250N 250A | | | |
| VLVAF2P03531AA | 137.5 | 12.5 | 12.5 + 25 + 50 + 50 | 11 | 4 | | NSX250N 250A | | | |
| VLVAF2P03510AA | 150 | 25 | 25 + 25 + 50 + 50 | 6 | 4 | | NSX400N 400A | | | |
| VLVAF2P03511AA | 175 | 25 | 25 + 50 + 100 | 7 | 3 | | NSX400N 400A | | | |
| VLVAF2P03512AA | 200 | 50 | 50 + 50 + 100 | 4 | 3 | | NSX400N 400A | | | |
| VLVAF3P03513AA | 225 | 25 | 25 + 50 + 50 + 100 | 9 | 4 | 50 kA | NSX630N 630A | VLVAF3P | 2000 x 800 x 600 mm | 400 |
| VLVAF3P03514AA | 250 | 50 | 50 + 2x100 | 5 | 3 | | NSX630N 630A | | | |
| VLVAF3P03515AA | 275 | 25 | 25 + 50 + 2x100 | 11 | 4 | | NSX630N 630A | | | |
| VLVAF3P03516AA | 300 | 50 | 50 + 50 + 2x100 | 6 | 4 | | NSX630N 630A | | | |
| VLVAF5P03517AA | 350 | 50 | 50 + 3x100 | 7 | 4 | | NS800N | VLVAF5P | 2200 x 800 x 600 mm | 450 |
| VLVAF5P03518AA | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS800N | | | |
| VLVAF6P03519AA | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | VLVAF6P | 2200 x 1400 x 600 mm | 952 |
| VLVAF6P03520AA | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF6P03521AA | 550 | 50 | 50 + 5x100 | 11 | 6 | | NS1250N | | | |
| VLVAF6P03522AA | 600 | 50 | 6 x 100 | 6 | 6 | | NS1600N | | | |
| VLVAF8P03534AA | 700 | 50 | 50 + 50 + 6x100 | 14 | 8 | 65 kA | NS630BH+NS1000H | VLVAF8P (2 incomings) | 2200 x 2800 x 600 mm | 1904 |
| VLVAF8P03535AA | 800 | 50 | 50 + 50 + 7x100 | 16 | 9 | | NS630BH+NS1000H | | | |
| VLVAF8P03536AA | 900 | 50 | 50 + 50 + 8x100 | 18 | 10 | | NS800H+NS1000H | | | |
| VLVAF8P03537AA | 1000 | 50 | 50 + 50 + 9x100 | 20 | 11 | | NS800H+NS1000H | | | |
| VLVAF8P03538AA | 1100 | 50 | 50 + 50 + 10x100 | 22 | 12 | | NS1000H+NS1250H | | | |
| VLVAF8P03539AA | 1150 | 50 | 50 + 11x100 | 23 | 12 | | 2xNS1250H | | | |

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Short-time withstand current Icw | Preconised upstream protection | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Without circuit breaker** | | | | | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | | | | | |
| VLVAF2P03506AB | 50 | 12.5 | 12.5 + 12.5 + 25 | 4 | 3 | 35 kA/1s | NSX250N 250A | VLVAF2P | 1400 x 800 x 600 mm | 350 |
| VLVAF2P03507AB | 75 | 25 | 25 + 50 | 3 | 2 | | NSX250N 250A | | | |
| VLVAF2P03508AB | 100 | 25 | 25 + 25 + 50 | 4 | 3 | | NSX250N 250A | | | |
| VLVAF2P03509AB | 125 | 25 | 25 + 50 + 50 | 5 | 3 | | NSX250N 250A | | | |
| VLVAF2P03531AB | 137.5 | 12.5 | 12.5 + 25 + 50 + 50 | 11 | 4 | | NSX250N 250A | | | |
| VLVAF2P03510AB | 150 | 25 | 25 + 25 + 50 + 50 | 6 | 4 | | NSX400N 400A | | | |
| VLVAF2P03511AB | 175 | 25 | 25 + 50 + 100 | 7 | 3 | | NSX400N 400A | | | |
| VLVAF2P03512AB | 200 | 50 | 50 + 50 + 100 | 4 | 3 | | NSX400N 400A | | | |
| VLVAF3P03513AB | 225 | 25 | 25 + 50 + 50 + 100 | 9 | 4 | 35 kA/1s | NSX630N 630A | VLVAF3P | 2000 x 800 x 600 mm | 400 |
| VLVAF3P03514AB | 250 | 50 | 50 + 2x100 | 5 | 3 | | NSX630N 630A | | | |
| VLVAF3P03515AB | 275 | 25 | 25 + 50 + 2x100 | 11 | 4 | | NSX630N 630A | | | |
| VLVAF3P03516AB | 300 | 50 | 50 + 50 + 2x100 | 6 | 4 | | NSX630N 630A | | | |
| VLVAF5P03517AB | 350 | 50 | 50 + 3x100 | 7 | 4 | | NS800N | VLVAF5P | 2200 x 800 x 600 mm | 450 |
| VLVAF5P03518AB | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS800N | | | |
| VLVAF6P03519AB | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | VLVAF6P | 2200 x 1400 x 600 mm | 952 |
| VLVAF6P03520AB | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF6P03521AB | 550 | 50 | 50 + 5x100 | 11 | 6 | | NS1250N | | | |
| VLVAF6P03522AB | 600 | 50 | 6 x 100 | 6 | 6 | | NS1600N | | | |
| VLVAF8P03534AB | 700 | 50 | 50 + 50 + 6x100 | 14 | 8 | 65 kA/1s | NS630BH+NS1000H | VLVAF8P (2 incomings) | 2200 x 2800 x 600 mm | 1904 |
| VLVAF8P03535AB | 800 | 50 | 50 + 50 + 7x100 | 16 | 9 | | NS630BH+NS1000H | | | |
| VLVAF8P03536AB | 900 | 50 | 50 + 50 + 8x100 | 18 | 10 | | NS800H+NS1000H | | | |
| VLVAF8P03537AB | 1000 | 50 | 50 + 50 + 9x100 | 20 | 11 | | NS800H+NS1000H | | | |
| VLVAF8P03538AB | 1100 | 50 | 50 + 50 + 10x100 | 22 | 12 | | NS1000H+NS1250H | | | |
| VLVAF8P03539AB | 1150 | 50 | 50 + 11x100 | 23 | 12 | | 2xNS1250H | | | |

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# VarSet offer
# Automatic compensation
## 400 V / 50 Hz - Bottom entry
### Polluted network
### Tuning order 4.2 - Tuning frequency 210 Hz

## General characteristics

| Electrical Characteristics | |
| --- | --- |
| Rated Voltage | 400 V - 50 Hz |
| Capacitance Tolerance | -5%, +10% |
| Connection type | Three-phase |
| Power losses | < 6 W/kVAr for polluted network |
| Maximum permissible over current (with thermal protection included) | 1.31 In for polluted network with 4.2 tuning factor |
| Maximum permissible over voltage | 1.1 x Un, 8 h every 24 h |
| Overload protection | By Thdu management from controller |
| Insulation voltage | 690 V up to 200 kVAr, 800 V from 225 kVAr |
| Rated Impulse Withstand Voltage (Uimp) | 8 kV |

| Enclosure | |
| --- | --- |
| Degree of protection | IP31 |
| Colour | RAL 7035 |
| Degree of mechanical resistance | IK10 |
| Protection against direct contacts open door | IPxxB |

| Controller | |
| --- | --- |
| VarPlus Logic | VPL06 / VPL12 with Modbus communication |

| Head circuit breaker protection | |
| --- | --- |
| Without circuit breaker | Busbar Connection |
| | LV bank must be protected by a circuit breaker on upstream switchboard |
| With circuit breaker | Compact NSX or Compact NS |
| | Rotary handle |

| Step | |
| --- | --- |
| Capacitors Type | VarplusCan 480 V - 50 Hz |
| | Maximum over current: 1.8 In |
| | Overpressure protection |
| | Discharge resistance 50 V - 1 min |
| Detuned Reactor | Varplus DR |
| | Overheating protection by thermostat |
| Contactors | TeSys range |
| Fuse protection | Type gG |

| Temperature control | |
| --- | --- |
| Double control | By thermostat and controller |

| Communication | |
| --- | --- |
| ModBUS | RS485 |

| Installation | |
| --- | --- |
| Auxiliary supply | Transformer 400/230 V included from 50 kVAr |
| TI not included | 5 VA - secondary 1 A or 5 A |
| | To be installed upstream of the load and capacitor bank |
| GenSet contact | Must be connected with the generator |
| Alarm contact | Available for remote warning signal |

### Environment
- Installation: Indoor
- Ambient temperature: -5°C to 45°C
- Average daily temperature: +35°C max
- Humidity: up to 95%
- Maximum altitude: 2000 m

### Standards
- IEC 61921
- IEC 61439-1/2

### Environment certifications

RoHS compliant, produced in 14001 certified plants, product environmental profile available

### Options available through configurator (see page 43):
- Step protection by circuit breaker
- Short-time withstand current 65 kA/1s
- Breaking capacity 65 kA
- Top or Bottom connection

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B

# Automatic compensation
## Bottom entry - 400 V / 50 Hz
### Polluted network
### Tuning order 4.2 - Tuning frequency 210 Hz

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Breaking Capacity | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | | | | | |
| VLVAF2P03530AD | 87.5 | 12.5 | 12.5 + 25 + 50 | 7 | 3 | 50 kA | NSX250N 250A | VLVAF2P | 1400 x 800 x 600 mm | 350 |
| VLVAF2P03508AD | 100 | 25 | 25 + 25 + 50 | 4 | 3 | | NSX250N 250A | | | |
| VLVAF2P03509AD | 125 | 25 | 25 + 50 + 50 | 5 | 3 | | NSX250N 250A | | | |
| VLVAF2P03510AD | 150 | 25 | 25 + 25 + 50 + 50 | 6 | 4 | | NSX400N 400A | | | |
| VLVAF2P03511AD | 175 | 25 | 25 + 50 + 100 | 7 | 3 | | NSX400N 400A | | | |
| VLVAF2P03512AD | 200 | 50 | 50 + 50 + 100 | 4 | 4 | | NSX400N 400A | | | |
| VLVAF3P03513AD | 225 | 25 | 25 + 50 + 50 + 100 | 9 | 4 | 50 kA | NSX630N 630A | VLVAF3P | 2000 x 800 x 600 mm | 400 |
| VLVAF3P03514AD | 250 | 50 | 50 + 2x100 | 5 | 3 | | NSX630N 630A | | | |
| VLVAF3P03515AD | 275 | 25 | 25 + 50 + 2x100 | 11 | 4 | | NSX630N 630A | | | |
| VLVAF3P03516AD | 300 | 50 | 50 + 50 + 2x100 | 6 | 4 | | NSX630N 630A | | | |
| VLVAF5P03517AD | 350 | 50 | 50 + 3x100 | 7 | 4 | | NS800N | VLVAF5P | 2200 x 800 x 600 mm | 450 |
| VLVAF5P03518AD | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS800N | | | |
| VLVAF6P03519AD | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | VLVAF6P | 2200 x 1400 x 600 mm | 952 |
| VLVAF6P03520AD | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF6P03522AD | 600 | 50 | 6x100 | 6 | 6 | | NS1600N | | | |
| VLVAF8P03534AD | 700 | 50 | 50 + 50 + 6x100 | 14 | 8 | 65 kA | NS630BH+NS1000H | VLVAF8P (2 incomings) | 2200 x 2800 x 600 mm | 1904 |
| VLVAF8P03535AD | 800 | 50 | 50 + 50 + 7x100 | 16 | 9 | | NS630BH+NS1000H | | | |
| VLVAF8P03536AD | 900 | 50 | 50 + 50 + 8x100 | 18 | 10 | | NS800H+NS1000H | | | |
| VLVAF8P03537AD | 1000 | 50 | 50 + 50 + 9x100 | 20 | 11 | | NS800H+NS1000H | | | |
| VLVAF8P03538AD | 1100 | 50 | 50 + 50 + 10x100 | 22 | 12 | | NS1000H+NS1250H | | | |
| VLVAF8P03539AD | 1150 | 50 | 50 + 11x100 | 23 | 12 | | 2xNS1250H | | | |

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Short-time withstand current Icw | Preconised upstream protection | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Without circuit breaker** | | | | | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | | | | | |
| VLVAF2P03530AE | 87.5 | 12.5 | 12.5 + 25 + 50 | 7 | 3 | 35 kA/1s | NSX250N 250A | VLVAF2P | 1400 x 800 x 600 mm | 350 |
| VLVAF2P03508AE | 100 | 25 | 25 + 25 + 50 | 4 | 3 | | NSX250N 250A | | | |
| VLVAF2P03509AE | 125 | 25 | 25 + 50 + 50 | 5 | 3 | | NSX250N 250A | | | |
| VLVAF2P03510AE | 150 | 25 | 25 + 25 + 50 + 50 | 6 | 4 | | NSX400N 400A | | | |
| VLVAF2P03511AE | 175 | 25 | 25 + 50 + 100 | 7 | 3 | | NSX400N 400A | | | |
| VLVAF2P03512AE | 200 | 50 | 50 + 50 + 100 | 4 | 4 | | NSX400N 400A | | | |
| VLVAF3P03513AE | 225 | 25 | 25 + 50 + 50 + 100 | 9 | 4 | 35 kA/1s | NSX630N 630A | VLVAF3P | 2000 x 800 x 600 mm | 400 |
| VLVAF3P03514AE | 250 | 50 | 50 + 2x100 | 5 | 3 | | NSX630N 630A | | | |
| VLVAF3P03515AE | 275 | 25 | 25 + 50 + 2x100 | 11 | 4 | | NSX630N 630A | | | |
| VLVAF3P03516AE | 300 | 50 | 50 + 50 + 2x100 | 6 | 4 | | NSX630N 630A | | | |
| VLVAF5P03517AE | 350 | 50 | 50 + 3x100 | 7 | 4 | | NS800N | VLVAF5P | 2200 x 800 x 600 mm | 450 |
| VLVAF5P03518AE | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS800N | | | |
| VLVAF6P03519AE | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | VLVAF6P | 2200 x 1400 x 600 mm | 952 |
| VLVAF6P03520AE | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF6P03522AE | 600 | 50 | 6x100 | 6 | 6 | | NS1600N | | | |
| VLVAF8P03534AE | 700 | 50 | 50 + 50 + 6x100 | 14 | 8 | 65 kA/1s | NS630BH+NS1000H | VLVAF8P (2 incomings) | 2200 x 2800 x 600 mm | 1904 |
| VLVAF8P03535AE | 800 | 50 | 50 + 50 + 7x100 | 16 | 9 | | NS630BH+NS1000H | | | |
| VLVAF8P03536AE | 900 | 50 | 50 + 50 + 8x100 | 18 | 10 | | NS800H+NS1000H | | | |
| VLVAF8P03537AE | 1000 | 50 | 50 + 50 + 9x100 | 20 | 11 | | NS800H+NS1000H | | | |
| VLVAF8P03538AE | 1100 | 50 | 50 + 50 + 10x100 | 22 | 12 | | NS1000H+NS1250H | | | |
| VLVAF8P03539AE | 1150 | 50 | 50 + 11x100 | 23 | 12 | | 2*NS1250H | | | |

➜ **Dimensions and weight:** see page 48.

**B**

# VarSet offer
## Automatic compensation
### 400 V / 50 Hz - Bottom entry
Polluted Network
Tuning order 2.7 - Tuning frequency 135 Hz

**B**

## General characteristics

| Electrical Characteristics | |
| --- | --- |
| Rated Voltage | 400 V - 50 Hz |
| Capacitance Tolerance | -5%, +10% |
| Connection type | Three-phase |
| Power losses | < 6 W/kVAr for polluted network |
| Maximum permissible over current (with thermal protection included) | 1.12 In for polluted network with 2.7 tuning factor |
| Maximum permissible over voltage | 1.1 x Un, 8 h every 24 h |
| Overload protection | By Thdu management from controller |
| Insulation voltage | 690 V up to 200 kVAr, 800 V from 225 kVAr |
| Rated Impulse Withstand Voltage (Uimp) | 8 kV |
| **Enclosure** | |
| Degree of protection | IP31 |
| Colour | RAL 7035 |
| Degree of mechanical resistance | IK10 |
| Protection against direct contacts open door | IPxxB |
| **Controller** | |
| VarPlus Logic | VPL06 / VPL12 with Modbus communication |
| **Head circuit breaker protection** | |
| Without circuit breaker | Busbar Connection |
| | LV bank must be protected by a circuit breaker on upstream switchboard |
| **Step** | |
| Capacitors Type | VarplusCan 480 V - 50 Hz |
| | Maximum over current: 1.8 In |
| | Overpressure protection |
| | Discharge resistance 50 V - 1 min |
| Detuned Reactor | Varplus DR |
| | Overheating protection by thermostat |
| Contactors | TeSys range |
| Fuse protection | Type gG |
| **Temperature control** | |
| Double control | By thermostat and controller |
| **Communication** | |
| ModBUS | RS485 |
| **Installation** | |
| Auxiliary supply | Transformer 400/230 V included from 50 kVAr |
| TI not included | 5 VA - secondary 1 A or 5 A |
| | To be installed upstream of the load and capacitor bank |
| GenSet contact | Must be connected with the generator |
| Alarm contact | Available for remote warning signal |

### Environment
- Installation: Indoor
- Ambient temperature: -5°C to 45°C
- Average daily temperature: +35°C max
- Humidity: up to 95%
- Maximum altitude: 2000 m

### Standards
- IEC 61921
- IEC 61439-1/2

### Environment certifications
RoHS compliant, produced in 14001 certified plants, product environmental profile available

### Options available through configurator (see page 43):
- Step protection by circuit breaker
- Incomer circuit breaker protection
- Short-time withstand current 65 kA/1s
- Breaking capacity 65 kA
- Top or Bottom connection

# Automatic compensation
## Bottom entry - 400 V / 50 Hz
### Polluted Network
### Tuning order 2.7 - Tuning frequency 135 Hz

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Short-time withstand current Icw | Preconised upstream protection | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Without circuit breaker** | | | | | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | | | | | |
| VLVAF2P03506AG | 50 | 12.5 | 12.5 + 12.5 + 25 | 4 | 3 | 35 kA/1s | NSX250N 250A | VLVAF2P | 1400 x 800 x 600 mm | 350 |
| VLVAF2P03507AG | 75 | 25 | 25 + 50 | 3 | 2 | | NSX250N 250A | | | |
| VLVAF2P03508AG | 100 | 25 | 25 + 25 + 50 | 8 | 3 | | NSX250N 250A | | | |
| VLVAF2P03509AG | 125 | 25 | 25 + 50 + 50 | 3 | 4 | | NSX250N 250A | | | |
| VLVAF2P03510AG | 150 | 25 | 25 + 25 + 50 + 50 | 6 | 4 | | NSX400N 400A | | | |
| VLVAF2P03511AG | 175 | 25 | 25 + 50 + 100 | 7 | 3 | | NSX400N 400A | | | |
| VLVAF3P03512AG | 200 | 50 | 50 + 50 + 100 | 4 | 3 | 35 kA/1s | NSX400N 400A | VLVAF3P | 2000 x 800 x 600 mm | 400 |
| VLVAF3P03513AG | 225 | 25 | 25 + 50 + 50 + 100 | 9 | 4 | | NSX630N 630A | | | |
| VLVAF3P03514AG | 250 | 50 | 50 + 2x100 | 5 | 3 | | NSX630N 630A | | | |
| VLVAF3P03515AG | 275 | 25 | 25 + 50 + 2x100 | 11 | 4 | | NSX630N 630A | | | |
| VLVAF5P03516AG | 300 | 50 | 50 + 50 + 2x100 | 6 | 4 | | NSX630N 630A | VLVAF5P | 2200 x 800 x 600 mm | 450 |
| VLVAF5P03517AG | 350 | 50 | 50 + 3x100 | 7 | 4 | | NS800N | | | |
| VLVAF6P03518AG | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS800N | VLVAF6P | 2200 x 1400 x 600 mm | 952 |
| VLVAF6P03519AG | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | | | |
| VLVAF6P03520AG | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF6P03521AG | 550 | 50 | 50 + 5x100 | 11 | 8 | | NS1250N | | | |
| VLVAF6P03522AG | 600 | 50 | 6x100 | 6 | 6 | | NS1600N | | | |

B

# VarSet offer

# Automatic compensation

## 400 V / 50 Hz - Top entry
Low polluted network
Polluted network - Tuning order 3.8

**B**

## General characteristics

| Electrical Characteristics | |
|---|---|
| Rated Voltage | 400 V - 50 Hz |
| Capacitance Tolerance | -5%, +10% |
| Connection type | Three-phase |
| Power losses | < 2.5 W/kVAr for low polluted network |
| | < 6 W/kVAr for polluted network |
| Maximum permissible over current (with thermal protection included) | 1.43 In for low polluted network |
| | 1.19 In for polluted network with 3.8 tuning factor |
| Maximum permissible over voltage | 1.1 x Un, 8 h every 24 h |
| Overload protection | By Thdu management from controller |
| Insulation voltage | 500 V up to 32 kVAr, 690 V from 37.5 kVAr for low polluted network |
| | 690 V up to 200 kVAr, 800 V from 225 kVAr for polluted network |
| Rated Impulse Withstand Voltage (Uimp) | 8 kV |

| Enclosure | |
|---|---|
| Degree of protection | IP31 |
| Colour | RAL 7035 |
| Degree of mechanical resistance | IK10 |
| Protection against direct contacts open door | IPxxB |

| Controller | |
|---|---|
| VarPlus Logic | VPL06 / VPL12 with Modbus communication |

| Head circuit breaker protection | |
|---|---|
| Without circuit breaker | Busbar Connection |
| | LV bank must be protected by a circuit breaker on upstream switchboard |
| With circuit breaker | Compact NSX with rotary handle |

| Step | |
|---|---|
| Capacitors Type | VarplusCan 400 V - 50 Hz for low polluted network |
| | VarplusCan 480 V - 50 Hz for polluted network |
| | Maximum over current: 1.8 In |
| | Overpressure protection |
| | Discharge resistance 50 V - 1 min |
| Detuned Reactor | Varplus DR |
| | Overheating protection by thermostat |
| Contactors | TeSys range |
| Fuse protection | Type gG |

| Temperature control | |
|---|---|
| Double control | By thermostat and controller |

| Communication | |
|---|---|
| ModBUS | RS485 |

| Installation | |
|---|---|
| Auxiliary supply | Transformer 400/230 V included from 50 kVAr |
| TI not included | 5 VA - Secondary 1 A or 5 A |
| | To be installed upstream of the load and capacitor bank |
| GenSet contact | Must be connected with the generator |
| Alarm contact | Available for remote warning signal |

### Environment
- Installation: Indoor
- Ambient temperature: -5°C to 45°C
- Average daily temperature: +35°C max
- Humidity: up to 95%
- Maximum altitude: 2000 m

### Standards
- IEC 61921
- IEC 61439-1/2

### Environment certifications

RoHS compliant, produced in 14001 certified plants, product environmental profile available

### Options available through configurator (see page 43):
- Step protection by circuit breaker
- Short-time withstand current 65 kA/1s
- Breaking capacity 65 kA
- Top or Bottom connection
- Plinth for wall-mounted type

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VarSet offer
# Automatic compensation
## Top entry - 400 V / 50 Hz
### Low polluted network
### Polluted network - Tuning order 3.8

### Low polluted network

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Breaking Capacity | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | | | | | |
| **Wall-mounted - Top connection** | | | | | | | | | | |
| VLVAW0N03527AK | 12.5 | 3 | 3 + 3 + 6.25 | 4 | 4 | 15 kA | IC60H 32A | VLVAW0N | 650 x 450 x 250 mm | 57 |
| VLVAW0N03504AK | 32 | 6.25 | 6.25 + 2x12.5 | 4 | 3 | | IC60H 63A | | | |
| VLVAW1N03528AK | 37.5 | 6.25 | 6.25 + 6.25 + 12.5 + 25 | 6 | 4 | 35 kA | NSX160F 125A | VLVAW1N | 700 x 600 x 250 mm | 73 |
| VLVAW1N03506AK | 50 | 6.25 | 6.25 + 6.25 + 12.5 + 25 | 8 | 4 | | NSX160F 160A | | | |
| VLVAW1N03507AK | 75 | 25 | 25 + 25 + 25 | 3 | 3 | | NSX250F 200A | | | |
| VLVAW1N03508AK | 100 | 25 | 4x25 | 4 | 4 | | NSX250F 250A | | | |
| VLVAW2N03509AK | 125 | 25 | 25 + 50 + 50 | 5 | 3 | 50 kA | NSX400N 400A | VLVAW2N | 1200 x 800 x 300 mm | 131 |
| VLVAW2N03510AK | 150 | 50 | 3x50 | 3 | 3 | | NSX400N 400A | | | |
| VLVAW2N03511AK | 175 | 25 | 25 + 3x50 | 7 | 4 | | NSX400N 400A | | | |
| VLVAW3N03512AK | 200 | 25 | 25 + 25 + 3x50 | 8 | 5 | | NSX400N 400A | VLVAW3N | 1200 x 1000 x 300 mm | 175 |
| VLVAW3N03516AK | 300 | 50 | 6x50 | 6 | 6 | | NSX630N 630A | | | |
| **Floor-standing - Top connection** | | | | | | | | | | |
| VLVAF5N03517AK | 350 | 50 | 50 + 3x100 | 7 | 4 | 50 kA | NS800N | VLVAF5N | 2200 x 800 x 600 mm | 434 |
| VLVAF5N03518AK | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS1000N | | | |

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Short-time withstand current Icw | Preconised upstream protection | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Without circuit breaker** | | | | | | | | | | |
| **Wall-mounted - Top connection** | | | | | | | | | | |
| VLVAW2N03509AC | 125 | 25 | 25 + 50 + 50 | 5 | 3 | 30 kA/ 1s | NSX400N 400A | VLVAW2N | 1200 x 800 x 300 mm | 131 |
| VLVAW2N03510AC | 150 | 50 | 3x50 | 3 | 3 | | NSX400N 400A | | | |
| VLVAW2N03511AC | 175 | 25 | 25 + 3x50 | 7 | 4 | | NSX400N 400A | | | |
| VLVAW3N03512AC | 200 | 25 | 25 + 25 + 3x50 | 8 | 5 | | NSX400N 400A | VLVAW3N | 1200 x 1000 x 300 mm | 175 |
| VLVAW3N03516AC | 300 | 50 | 6x50 | 6 | 6 | | NSX630N 630A | | | |
| **Floor-standing - Top connection** | | | | | | | | | | |
| VLVAF5N03517AC | 350 | 50 | 50 + 3x100 | 7 | 4 | 35 kA/1s | NS800N | VLVAF5N | 2200 x 800 x 600 mm | 434 |
| VLVAF5N03518AC | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS1000N | | | |

### Polluted network - Tuning order 3.8 / Tuning frequency 190 Hz

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Breaking Capacity | Preconised upstream protection | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | | | | | |
| **Floor-standing - Top connection** | | | | | | | | | | |
| VLVAF2P03506AK | 50 | 12.5 | 12.5 + 12.5 + 25 | 4 | 3 | 50 kA | NSX250N 250A | VLVAF2P | 1400 x 800 x 600 mm | 350 |
| VLVAF2P03507AK | 75 | 25 | 25 + 50 | 3 | 2 | | NSX250N 250A | | | |
| VLVAF2P03508AK | 100 | 25 | 25 + 25 + 50 | 4 | 3 | | NSX250N 250A | | | |
| VLVAF2P03509AK | 125 | 25 | 25 + 50 + 50 | 5 | 3 | | NSX250N 250A | | | |
| VLVAF2P03531AK | 137.5 | 12.5 | 12.5 + 25 + 50 + 50 | 11 | 4 | | NSX400N 400A | | | |
| VLVAF2P03510AK | 150 | 25 | 25 + 25 + 50 + 50 | 6 | 4 | | NSX400N 400A | | | |
| VLVAF2P03512AK | 200 | 50 | 50 + 50 + 100 | 4 | 3 | | NSX400N 400A | | | |
| VLVAF3P03513AK | 225 | 25 | 25 + 50 + 50 + 100 | 9 | 5 | | NSX630N 630A | VLVAF3P | 2000 x 800 x 600 mm | 400 |
| VLVAF3P03514AK | 250 | 50 | 50 + 2x100 | 5 | 3 | | NSX630N 630A | | | |
| VLVAF3P03516AK | 300 | 50 | 50 + 50 + 2x100 | 6 | 4 | | NSX630N 630A | | | |
| VLVAF5P03517AK | 350 | 50 | 50 + 3x100 | 7 | 4 | | NS800N | VLVAF5P | 2200 x 800 x 600 mm | 450 |
| VLVAF5P03518AK | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS800N | | | |
| VLVAF6P03519AK | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | VLVAF6P | 2200 x 1400 x 600 mm | 952 |
| VLVAF6P03520AK | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF6P03522AK | 600 | 50 | 6x100 | 6 | 6 | | NS1600N | | | |

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Short-time withstand current Icw | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Without circuit breaker** | | | | | | | | | | |
| **Floor-standing - Top connection** | | | | | | | | | | |
| VLVAF2P03506AC | 50 | 12.5 | 12.5 + 12.5 + 25 | 4 | 3 | 35 kA/1s | NSX250N 250A | VLVAF2P | 1400 x 800 x 600 mm | 350 |
| VLVAF2P03507AC | 75 | 25 | 25 + 50 | 3 | 2 | | NSX250N 250A | | | |
| VLVAF2P03508AC | 100 | 25 | 25 + 25 + 50 | 4 | 3 | | NSX250N 250A | | | |
| VLVAF2P03509AC | 125 | 25 | 25 + 50 + 50 | 5 | 3 | | NSX250N 250A | | | |
| VLVAF2P03531AC | 137.5 | 12.5 | 12.5 + 25 + 50 + 50 | 11 | 4 | | NSX400N 400A | | | |
| VLVAF2P03510AC | 150 | 25 | 25 + 25 + 50 + 50 | 6 | 4 | | NSX400N 400A | | | |
| VLVAF2P03512AC | 200 | 50 | 50 + 50 + 100 | 4 | 3 | | NSX400N 400A | | | |
| VLVAF3P03513AC | 225 | 25 | 25 + 50 + 50 + 100 | 9 | 5 | | NSX630N 630A | VLVAF3P | 2000 x 800 x 600 mm | 400 |
| VLVAF3P03514AC | 250 | 50 | 50 + 2x100 | 5 | 3 | | NSX630N 630A | | | |
| VLVAF3P03516AC | 300 | 50 | 50 + 50 + 2x100 | 6 | 4 | | NSX630N 630A | | | |
| VLVAF5P03517AC | 350 | 50 | 50 + 3x100 | 7 | 4 | | NS800N | VLVAF5P | 2200 x 800 x 600 mm | 450 |
| VLVAF5P03518AC | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS800N | | | |
| VLVAF6P03519AC | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | VLVAF6P | 2200 x 1400 x 600 mm | 952 |
| VLVAF6P03520AC | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF6P03522AC | 600 | 50 | 6x100 | 6 | 6 | | NS1600N | | | |

➡ **Dimensions and weight:** see page 48. / **Main protection recommendations:** see page 64 to 66.

B

# VarSet offer
## Automatic compensation
### 400 V / 60 Hz - Bottom entry
Low polluted network
Polluted network - Tuning order 2.7 & 3.8

## General characteristics

| Electrical Characteristics | |
| --- | --- |
| Rated Voltage | 400 V - 60 Hz |
| Capacitance Tolerance | -5%, +10% |
| Connection type | Three-phase |
| Power losses | < 2.5 W/kVAr for low polluted network |
| | < 6 W/kVAr for polluted network |
| Maximum permissible over current (with thermal protection included) | 1.43 In for low polluted network |
| | 1.19 In for polluted network with 3.8 tuning factor |
| | 1.12 In for polluted network with 2.7 tuning factor |
| Maximum permissible over voltage | 1.1 x Un, 8 h every 24 h |
| Overload protection | By Thdu management from controller |
| Insulation voltage | 690 V for low polluted network |
| | 690 V for 200 kVAr, 800 V from 300 kVAr for polluted network |
| Rated Impulse Withstand Voltage (Uimp) | 8 kV |
| **Enclosure** | |
| Degree of protection | IP31 |
| Colour | RAL 7035 |
| Degree of mechanical resistance | IK10 |
| Protection against direct contacts open door | IPxxB |
| **Controller** | |
| VarPlus Logic | VPL06 / VPL12 with Modbus communication |
| **Head circuit breaker protection** | |
| With circuit breaker | Compact NSX |
| | Rotary handle |
| **Step** | |
| Capacitors Type | VarplusCan 400 V - 60 Hz for low polluted network |
| | VarplusCan 480 V - 60 Hz for polluted network |
| | Maximum over current: 1.8 In |
| | Overpressure protection |
| | Discharge resistance 50 V - 1 min |
| Detuned Reactor | Varplus DR |
| | Overheating protection by thermostat |
| Contactors | TeSys range |
| Fuse protection | Type gG |
| **Temperature control** | |
| Double control | By thermostat and controller |
| **Communication** | |
| ModBUS | RS485 |
| **Installation** | |
| Auxiliary supply | Transformer 400/230 V included from 50 kVAr |
| TI not included | 5 VA - secondary 1 A or 5 A |
| | To be installed upstream of the load and capacitor bank |
| GenSet contact | Must be connected with the generator |
| Alarm contact | Available for remote warning signal |

### Environment
- Installation: Indoor
- Ambient temperature: -5°C to 45°C
- Average daily temperature: +35°C max
- Humidity: up to 95%
- Maximum altitude: 2000 m

### Standards
- IEC 61921
- IEC 61439-1/2

### Environment certifications

RoHS compliant, produced in 14001 certified plants, product environmental profile available

**Options available through configurator (see page 43):**
- Step protection by circuit breaker
- No incomer circuit breaker
- Short-time withstand current 65 kA/1s
- Breaking capacity 65 kA
- Top or Bottom connection

B

VarSet offer
# Automatic compensation
## Bottom entry - 400 V / 60 Hz
### Low polluted network
### Polluted network - Tuning order 2.7 & 3.8

## Low polluted network

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Breaking Capacity | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | | | | | |
| VLVAW2N03608CB | 100 | 25 | 25 + 25 + 50 | 4 | 3 | 50 kA | NSX400N 400A | VLVAW2N | 1300 x 800 x 300 mm | 131 |
| VLVAW2N03609CB | 125 | 25 | 25 + 2x50 | 4 | 3 | | NSX400N 400A | | | |
| VLVAW2N03610CB | 150 | 25 | 25 + 25 + 2x50 | 6 | 4 | | NSX400N 400A | | | |
| VLVAW2N03612CB | 200 | 50 | 4x50 | 4 | 4 | | NSX400N 400A | | | |
| VLVAW3N03614CB | 250 | 50 | 5x50 | 5 | 5 | | NSX630N 630A | VLVAW3N | 1300 x 1000 x 300 mm | 175 |
| VLVAW3N03616CB | 300 | 50 | 6x50 | 6 | 6 | | NSX630N 630A | | | |
| VLVAF5N03617CB | 350 | 50 | 50 + 3x100 | 7 | 4 | 50 kA | NS800N | VLVAF5N | 2200 x 800 x 600 mm | 434 |
| VLVAF5N03618CB | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS1000N | | | |
| VLVAF5N03619CB | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | | | |
| VLVAF5N03620CB | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF5N03621CB | 550 | 50 | 50 + 5x100 | 11 | 6 | | NS1250N | | | |
| VLVAF5N03622CB | 600 | 50 | 50 + 50 + 5x100 | 12 | 7 | | NS1250N | | | |

## Polluted network - Tuning order 3.8

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Breaking Capacity | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | | | | | |
| VLVAF2P03608CA | 100 | 25 | 25 + 25 + 50 | 4 | 3 | 50 kA | NSX250N 250A | VLVAF2P | 1400 x 800 x 600 mm | 350 |
| VLVAF2P03609CA | 125 | 25 | 25 + 2x50 | 4 | 3 | | NSX250N 250A | | | |
| VLVAF2P03610CA | 150 | 25 | 25 + 25 + 2x50 | 4 | 4 | | NSX400N 400A | | | |
| VLVAF2P03612CA | 200 | 50 | 50 + 50 + 100 | 4 | 3 | | NSX400N 400A | | | |
| VLVAF3P03614CA | 250 | 50 | 50 + 100 + 100 | 5 | 3 | | NSX630N 630A | VLVAF3P | 2000 x 800 x 600 mm | 400 |
| VLVAF3P03616CA | 300 | 50 | 50 + 50 + 2x100 | 6 | 4 | | NSX630N 630A | | | |
| VLVAF5P03617CA | 350 | 50 | 50 + 3x100 | 7 | 4 | | NS800N | VLVAF5P | 2200 x 800 x 600 mm | 450 |
| VLVAF5P03618CA | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS800N | | | |
| VLVAF6P03619CA | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | VLVAF6P | 2200 x 1400 x 600 mm | 952 |
| VLVAF6P03620CA | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF6P03621CA | 550 | 50 | 50 + 5x100 | 11 | 6 | | NS1250N | | | |
| VLVAF6P03622CA | 600 | 50 | 50 + 50 + 5x100 | 12 | 7 | | NS1600N | | | |

## Polluted network - Tuning order 2.7

| References | Power (kVAr) | Smallest step | Regulation | No. of electrical Steps | No. of physical Steps | Breaking Capacity | Main Circuit breaker | Enclosure type | Enclosure size (H x W x D) | Max weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **With circuit breaker** | | | | | | | | | | |
| **Floor-standing - Bottom connection** | | | | | | | | | | |
| VLVAF2P03608CH | 100 | 25 | 25 + 25 + 50 | 4 | 3 | 50 kA | NSX250N 250A | VLVAF2P | 1400 x 800 x 600 mm | 350 |
| VLVAF2P03609CH | 125 | 25 | 25 + 2x50 | 4 | 3 | | NSX250N 250A | | | |
| VLVAF2P03610CH | 150 | 25 | 25 + 25 + 2x50 | 4 | 4 | | NSX400N 400A | | | |
| VLVAF3P03612CH | 200 | 50 | 50 + 50 + 100 | 4 | 3 | | NSX400N 400A | VLVAF3P | 2000 x 800 x 600 mm | 400 |
| VLVAF3P03614CH | 250 | 50 | 50 + 100 + 100 | 5 | 3 | | NSX630N 630A | | | |
| VLVAF3P03616CH | 300 | 50 | 50 + 50 + 2x100 | 6 | 4 | | NSX630N 630A | VLVAF5P | 2200 x 800 x 600 mm | 450 |
| VLVAF5P03617CH | 350 | 50 | 50 + 3x100 | 7 | 4 | | NS800N | | | |
| VLVAF6P03618CH | 400 | 50 | 50 + 50 + 3x100 | 8 | 5 | | NS800N | VLVAF6P | 2200 x 1400 x 600 mm | 952 |
| VLVAF6P03619CH | 450 | 50 | 50 + 4x100 | 9 | 5 | | NS1000N | | | |
| VLVAF6P03620CH | 500 | 50 | 50 + 50 + 4x100 | 10 | 6 | | NS1250N | | | |
| VLVAF6P03621CH | 550 | 50 | 50 + 5x100 | 11 | 6 | | NS1250N | | | |

**➜ Dimensions and weight:** see page 48.

# VarSet accessories
## Plinth for enclosure, IP54 kits

Due to installation constraint or by preference, you want to install your wall-mounted LV banks on the floor or due to harsh and dusty environments, you want to increase IP level of your enclosure or cubicle.

These accessories and kits are made for you.

You can easily transform enclosures of size W2N & W3N into a floor-standing type.

| Accessory for plinth assembly | |
|---|---|
| Accessory for VarSet plinth mounting | VLVACCESS001 |

| Plinth for VLV*W2N size | |
|---|---|
| Accessory for VarSet plinth mounting | VLVACCESS001 |
| Front plinth 100 x 800 | NSYSPF8100 |
| 2 Plinth side panels 300 x 100 | NSYSPS3100SD |

| Plinth for VLV*W3N size | |
|---|---|
| Accessory for VarSet plinth mounting | VLVACCESS001 |
| Front plinth 100 x 1000 | NSYSPF10100 |
| 2 Plinth side panels 300 x 100 | NSYSPS3100SD |
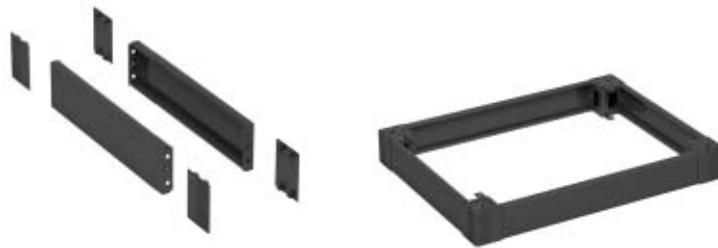
You can easily move from an IP31 performance to an IP54 performance.
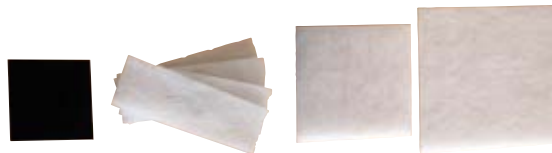
| Kits Option IP54 | |
|---|---|
| Kit for enclosures size VLV*W0N, VLV*W1N | VLVIP54KIT01 |
| Kit for enclosures size VLV*W2N, VLV*W3N | VLVIP54KIT02 |
| Kit for cubicles size VLVF5N | VLVIP54KIT02 |
| Kit for cubicles size VLVF7N | 2 x VLVIP54KIT02 |
| Kit for cubicles size VLV*F2P, VLVAF3P, VLVAF5P, VLVAF6P | VLVIP54KIT03 |
| Kit for cubicles size VLVAF8P | 2 x VLVIP54KIT03 |

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A large range of power in kvar are available and some options can be choosen by our customers, to adapt the offer to exact and specifics needs.

## Options available

### Tuning Order

- 2.7
- 3.8
- 4.2

### Incomer protection

- 35 kA circuit breaker protection, with rotary handle
- 65 kA circuit breaker protection, with rotary handle
- No incomer protection

### Step protection

- Circuit breaker
- Fuse or smart protection

### Installation

- Top connection
- Bottom connection
- with or without plinth

### Packaging

- Standard or maritime

## VarSet Configurator

**>** Available from your **http://Schneiderelectric.com**

    **1 -** Search for VarSet LV
    **2 -** On VarSet LV homepage
    **3 -** Click on product configurator



**B**
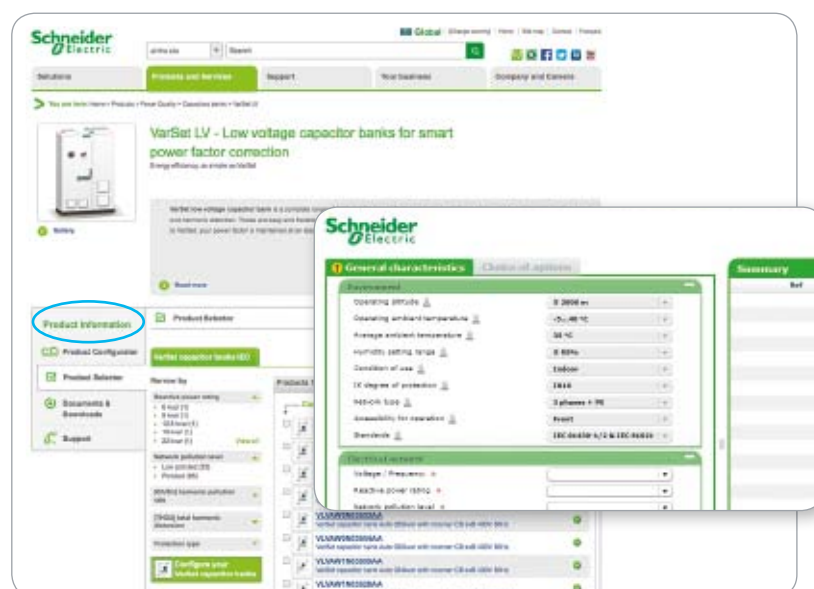
# Configured offer
## 400 V / 50 Hz - 400 V / 60 Hz
Fixed or automatic compensation

**B**

**1** **Enter the electrical characteristics**



**2** **Choose the options**



Look at the
characteristics of
your capacitor bank

Export your
configuration
reference list
to Excel

**3** **Send your order document to your
Schneider Electric Contact**



**4** **Receive your capacitor bank in the best lead time**

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**V L V A W 0 L 0 2 0 A 4 0 A**

**1** **2** **3** **4** **5** **6** **7** **8** **9**

**1** **Range**
**V:** VarSet

**2** **Low Voltage**
**LV:** Low Voltage

**3** **Type of compensation**
**A:** Automatic
**F:** Fixed

**4** **Type of enclosure**  **Size of enclosure**
**W:** Wall-mounted  **From 0:** small cabinet
**F:** Floor-standing  **to 8:** big cubicle

**5** **Pollution**
**L:** No polluted

**6** **Power**

| Power Code | kVAr | Power Code | kVAr |
|---|---|---|---|
| 007 | 7.5 | 125 | 125 |
| 015 | 15 | 150 | 150 |
| 017 | 17.5 | 175 | 175 |
| 020 | 20 | 200 | 200 |
| 025 | 25 | 225 | 225 |
| 030 | 30 | 250 | 250 |
| 037 | 37.5 | 275 | 275 |
| 045 | 45 | 300 | 300 |
| 050 | 50 | 350 | 350 |
| 060 | 60 | 400 | 400 |
| 070 | 70 | 450 | 450 |
| 075 | 75 | 500 | 500 |
| 082 | 82.5 | 550 | 550 |
| 090 | 90 | 600 | 600 |
| 100 | 100 | | |

**7** **Frequency**
**A:** 50 Hz
**B:** 60 Hz

**8** **Design voltage**

| Voltage | Voltage code |
|---|---|
| 400 V | 40 |

**9** **Options**
**A:** Head CB & no step protection & no additional voltage supply
**B:** No Head CB & no step protection & no additional voltage supply

B

# Construction of references
# VarSet

| V | L V | A | W 0 | N | 0 3 | 5 | 1 0 | AA |
|---|---|---|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** |

**1** **Range**
**V:** VarSet

**2** **Low Voltage**
**LV:** Low Voltage

**3** **Type of compensation**
**A:** Automatic
**F:** Fixed

**4** **Type of enclosure**          **Size of enclosure**
**W:** Wall-mounted          **From 0:** small cabinet
**F:** Floor-standing          **to 8:** big cubicle

**5** **Pollution**
**N:** Low polluted
**P:** Polluted

**6** **Voltage**

| Voltage | Voltage code |
|---|---|
| 01 | 230 V |
| 02 | 240 V |
| 03 | 400 V |
| 05 | 440 V |
| 06 | 480 V |
| 07 | 600 V |
| 08 | 690 V |

**7** **Frequency**
**A:** 50 Hz
**B:** 60 Hz

**8** **Power**

| Power Code | kVAr | Power Code | kVAr | Power Code | kVAr | Power Code | kVAr |
|---|---|---|---|---|---|---|---|
| 26 | 6 | 29 | 69 | 13 | 225 | 20 | 500 |
| 1 | 9 | 7 | 75 | 32 | 238 | 21 | 550 |
| 27 | 12.5 | 30 | 87.5 | 14 | 250 | 22 | 600 |
| 2 | 16 | 8 | 100 | 15 | 275 | 34 | 700 |
| 3 | 22 | 9 | 125 | 16 | 300 | 35 | 800 |
| 4 | 32 | 31 | 137.5 | 17 | 350 | 36 | 900 |
| 5 | 34 | 10 | 150 | 18 | 400 | 37 | 1000 |
| 28 | 37.5 | 11 | 175 | 33 | 425 | 38 | 1100 |
| 6 | 50 | 12 | 200 | 19 | 450 | 39 | 1150 |

**9** **Options**
**Used to differentiate other options:** for example, with and without incoming circuit-breaker

| Low polluted Network | |
|---|---|
| AA | Head CB |
| AB | Without Head CB |
| AC | Without Head CB & Top Entry |
| AK | Head CB & Top entry |
| CB | Head CB & network frequency 60hz |

| Polluted Network | |
|---|---|
| AA | Head CB & Tuning factor 3.8 |
| AB | Without Head CB & Tuning factor 3.8 |
| AC | Without Head CB & Tuning factor 3.8 & Top entry |
| AD | Head CB & Tuning factor 4.2 |
| AE | Without Head CB & Tuning factor 4.2 |
| AG | Without Head CB & Tuning factor 2.7 |
| AH | Head CB & Tuning factor 2.7 |
| AK | Head CB & Tuning factor 3.8 & Top entry |
| CB | With Head CB & Tuning factor 3.8 & network frequency 60Hz |
| CH | With Head CB & Tuning factor 2.7 & network frequency 60Hz |

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# VarSet characteristics
## Physical & Electrical steps

| Type | Power kVAr | Smallest step | Regulation | No. of steps | | Sequence | Network frequency | Tuning order |
|---|---|---|---|---|---|---|---|---|
| | | | | physical | elec. | | Frequency | |
| **No polluted** | | | | | | | | |
| VLVAW0L | 7.5 | 2.5 | 2.5 + 5 | 2 | 3 | 1.2.2.2 | 50 Hz | NA |
| | 15 | 5 | 5 + 10 | 2 | 3 | 1.2.2.2 | | |
| | 17.5 | 2.5 | 2.5 + 5 + 10 | 3 | 7 | 1.2.4.4 | | |
| | 20 | 5 | 2x5 + 10 | 3 | 4 | 1.1.2.2 | | |
| | 25 | 5 | 5 + 2x10 | 3 | 5 | 1.2.2.2 | | |
| | 30 | 5 | 5 + 10 + 15 | 3 | 6 | 1.2.3.3 | | |
| | 37.5 | 7.5 | 7.5 + 2x15 | 3 | 5 | 1.2.2.2 | | |
| | 45 | 7.5 | 7.5 + 15 + 22.5 | 3 | 6 | 1.2.3.3 | | |
| | 50 | 10 | 10 + 2x20 | 3 | 5 | 1.2.2.2 | | |
| VLVAW1L | 60 | 10 | 10 + 20 + 30 | 3 | 6 | 1.2.3.3 | | |
| | 70 | 10 | 10 + 20 + 40 | 3 | 7 | 1.2.4.4 | | |
| | 75 | 15 | 15 + 2x30 | 3 | 5 | 1.2.2.2 | | |
| | 82.5 | 7.5 | 7.5 + 15 + 2x30 | 4 | 11 | 1.2.4.4 | | |
| | 90 | 15 | 2x15 + 2x30 | 4 | 6 | 1.1.2.2 | | |
| | 100 | 20 | 20 + 2x40 | 3 | 5 | 1.2.2.2 | | |
| VLVAW2L | 125 | 25 | 25 + 2x50 | 3 | 5 | 1.2.2.2 | | |
| | 150 | 25 | 2x25 + 2x50 | 4 | 6 | 1.1.2.2 | | |
| | 175 | 25 | 25 + 3x50 | 4 | 7 | 1.2.2.2 | | |
| | 200 | 25 | 2x25 + 3x50 | 5 | 8 | 1.1.2.2 | | |
| VLVAF3L | 225 | 25 | 25 + 4x50 | 5 | 9 | 1.2.2.2 | | |
| | 250 | 25 | 2x25 + 4x50 | 6 | 10 | 1.1.2.2 | | |
| | 275 | 25 | 25 + 5X50 | 6 | 11 | 1.2.2.2 | | |
| | 300 | 50 | 6x50 | 6 | 6 | 1.1.1.1 | | |
| VLVAF5L | 350 | 50 | 7x50 | 7 | 7 | 1.1.1.1 | | |
| | 400 | 50 | 8x50 | 8 | 8 | 1.1.1.1 | | |
| | 450 | 50 | 9x50 | 9 | 9 | 1.1.1.1 | | |
| | 500 | 50 | 10x50 | 10 | 10 | 1.1.1.1 | | |
| | 550 | 50 | 11x50 | 11 | 11 | 1.1.1.1 | | |
| | 600 | 50 | 12x50 | 12 | 12 | 1.1.1.1 | | |
| **Low polluted** | | | | | | | | |
| VLVAW0N | 6 | 3 | 2x3 | 2 | 2 | 1.1 | 50 Hz / 60 Hz | NA |
| | 9 | 3 | 3 + 6.25 | 2 | 3 | 1.2 | | |
| | 12.5 | 3 | 3 + 3 + 6.25 | 3 | 4 | 1.1.2 | | |
| | 16 | 3 | 3 + 2x6.25 | 3 | 5 | 1.2.2 | | |
| | 22 | 3 | 3 + 6.25 + 12.5 | 3 | 7 | 1.2.4 | | |
| | 32 | 6.25 | 6.25 + 2x12.5 | 3 | 5 | 1.2.2 | | |
| VLVAW1N | 34 | 3 | 3 + 6.25 + 2x12.5 | 4 | 11 | 1.2.4 | | |
| | 37.5 | 6.25 | 2 x 6.25 + 2x12.5 | 4 | 6 | 1.1.2 | | |
| | 50 | 6.25 | 2x6.25 + 12.5 + 25 | 4 | 8 | 1.1.2.4 | | |
| | 69 | 6.25 | 6.25 + 12.5 + 2x25 | 4 | 11 | 1.2.4 | | |
| | 75 | 25 | 3x25 | 3 | 3 | 1.1.1 | | |
| | 87.5 | 12.5 | 12.5 + 3x25 | 4 | 7 | 1.2.2 | | |
| | 100 | 25 | 4x25 | 4 | 4 | 1.1.1 | | |
| VLVAW2N | 125 | 25 | 25 + 2x50 | 3 | 5 | 1.2.2 | | |
| | 137.5 | 12.5 | 12.5 + 25 + 2x50 | 4 | 11 | 1.2.4 | | |
| | 150 | 50 | 3x50 | 3 | 3 | 1.1.1 | | |
| | 175 | 25 | 25 + 3x50 | 4 | 7 | 1.2.2 | | |
| VLVAW3N | 200 | 25 | 25 + 25 + 3x50 | 5 | 8 | 1.1.2 | | |
| | 225 | 25 | 25 + 4x50 | 5 | 9 | 1.2.2 | | |
| | 238 | 12.5 | 12.5 + 25 + 4x50 | 6 | 19 | 1.2.4 | | |
| | 250 | 25 | 2x25 + 4x50 | 6 | 10 | 1.1.2 | | |
| | 275 | 25 | 25 + 5x50 | 6 | 11 | 1.2.2 | | |
| | 300 | 50 | 6x50 | 6 | 6 | 1.1.1 | | |
| VLVAF5N | 350 | 50 | 50 + 3x100 | 4 | 7 | 1.2.2 | | |
| | 400 | 50 | 2x50 + 3x100 | 5 | 8 | 1.1.2 | | |
| | 450 | 50 | 50 + 4x100 | 5 | 9 | 1.2.2 | | |
| | 500 | 50 | 2x50 + 4x100 | 6 | 10 | 1.1.2 | | |
| | 550 | 50 | 50 + 5x100 | 6 | 11 | 1.2.2 | | |
| | 600 | 50 | 2x50 + 5x100 | 7 | 12 | 1.1.2 | | |
| **Polluted** | | | | | | | | |
| VLVAF2P | 50 | 12.5 | 12.5 + 25 + 50 | 3 | 4 | 1.2.4 | 50 Hz / 60 Hz | 2.7 / 3.8 / 4.2 |
| | 75 | 25 | 25 + 50 | 3 | 3 | 1.2.2 | | 2.7 / 3.8 / 4.2 |
| | 87.5 | 12.5 | 12.5 + 25 + 50 | 3 | 7 | 1.2.4 | | 2.7 / 3.8 / 4.2 |
| | 100 | 25 | 25 + 25 + 50 | 3 | 4 | 1.2.2 | | 2.7 / 3.8 / 4.2 |
| | 125 | 25 | 25 + 2x50 | 3 | 5 | 1.2.2 | | 2.7 / 3.8 / 4.2 |
| | 137.5 | 12.5 | 12.5 + 25 + 2x50 | 4 | 11 | 1.2.4 | | 2.7 / 3.8 / 4.2 |
| | 150 | 25 | 2x25 + 2x50 | 4 | 6 | 1.2.2 | | 2.7 / 3.8 / 4.2 |
| | 175 | 25 | 25 + 50 + 100 | 3 | 7 | 1.2.4 | | 2.7 / 3.8 / 4.2 |
| | 200 | 50 | 50 + 50 + 100 | 3 | 4 | 1.2.2 | | 3.8 / 4.2 |
| VLVAF3P | 200 | 50 | 50 + 50 + 100 | 3 | 4 | 1.2.2 | 50 Hz / 60 Hz | 2.7 |
| | 225 | 25 | 25 + 4x50 | 5 | 9 | 1.2.2 | | 2.7 / 3.8 / 4.2 |
| | 250 | 50 | 50 + 2x100 | 3 | 5 | 1.2.2 | | 2.7 / 3.8 / 4.2 |
| | 275 | 25 | 25 + 50 + 2x100 | 4 | 11 | 1.2.4 | | 2.7 / 3.8 / 4.2 |
| | 300 | 50 | 2x50+ 2x100 | 4 | 6 | 1.2.2 | | 3.8 / 4.2 |
| VLVAF5P | 300 | 50 | 2x50+ 2x100 | 4 | 6 | 1.2.2 | 50 Hz / 60 Hz | 2.7 |
| | 350 | 50 | 50 + 3x100 | 4 | 7 | 1.2.2 | | 2.7 / 3.8 / 4.2 |
| | 400 | 50 | 2x50 + 3x100 | 5 | 8 | 1.2.2 | | 3.8 / 4.2 |
| VLVAF6P | 400 | 50 | 2x50 + 3x100 | 5 | 8 | 1.2.2 | 50 Hz / 60 Hz | 2.7 |
| | 450 | 50 | 50 + 4x100 | 5 | 9 | 1.2.2 | 50 Hz / 60 Hz | 2.7 / 3.8 / 4.2 |
| | 500 | 50 | 2x50 + 4x100 | 6 | 10 | 1.2.2 | 50 Hz / 60 Hz | 2.7 / 3.8 / 4.2 |
| | 550 | 50 | 50 + 5x100 | 6 | 11 | 1.2.2 | 50 Hz / 60 Hz | 2.7 / 3.8 / 4.2 |
| | 600 | 100 | 6x100 | 6 | 6 | 1.1.1 | 50 Hz / 60 Hz | 2.7 / 3.8 / 4.2 |
| | 600 | 50 | 2x50 + 5x100 | 7 | 12 | 1.2.2 | 60 Hz | 3.8 |

**VLV•W0**, **VLV•W1** Wall-mounted enclosures.

## Dimensions and weight

| Type | Assembly | Dimensions (mm) | | | | Max. weight |
|---|---|---|---|---|---|---|
| | | H | W | D | D1 | (kg) |
| VLVAW0L | Wall-mounted enclosures | 600 | 500 | 250 | 735 | 57 |
| VLVAW0N | Wall-mounted enclosures | 650 | 450 | 250 | 686 | 57 |
| VLVFW0N | | | | | | 48 |
| VLVAW1L | Wall-mounted enclosures | 800 | 600 | 250 | 830 | 73 |
| VLVAW1N | Wall-mounted enclosures | 700 | 600 | 300 | 886 | 73 |
| VLVFW1N | | | | | | 64 |
| VLVAW2L | Wall-mounted enclosures or floor-standing with optional plinth ref. NSYSPF8200 | 1000 / 1200 with plinth | 800 | 300 | 1080 | 131 |
| VLVAW2N | Wall-mounted enclosures or floor-standing with optional plinth with configurator | 1200 / 1300 with plinth | 800 | 300 | 1086 | 131 |
| VLVFW2N | | | | | | 117 |
| VLVAW3N | Wall-mounted enclosures or floor-standing with optional plinth with configurator | 1200 / 1300 with plinth | 1000 | 300 | 1286 | 175 |
| VLVAF3L | Floor-standing enclosures | 1100 | 800 | 400 | 1175 | 140 |
| VLVAF5L | Floor-standing enclosures | 2200 | 800 | 600 | 1361 | 340 |
| VLVAF5N | Floor-standing enclosures | 2200 | 800 | 600 | 1361 | 434 |
| VLVAF7N | 2 floor-standing enclosures VLVAF5N with 2 incomings | 2200 | 1600 | 600 | 1361 | 868 |
| VLVFF2P | Floor-standing enclosures | 1400 | 800 | 600 | 1361 | 320 |
| VLVAF2P | Floor-standing enclosures | 1400 | 800 | 600 | 1361 | 350 |
| VLVAF3P | Floor-standing enclosures | 2000 | 800 | 600 | 1361 | 400 |
| VLVAF5P | Floor-standing enclosures | 2200 | 800 | 600 | 1361 | 450 |
| VLVAF6P | Floor-standing enclosures | 2200 | 1400 | 600 | 1361 | 952 |
| VLVAF8P | 2 floor-standing enclosures VLVAF6P with 2 incomings | 2200 | 2800 | 600 | 1361 | 1904 |



**VLVAF5L**, **VLVAF5N**, **VLVAF5P** Floor-standing enclosures.
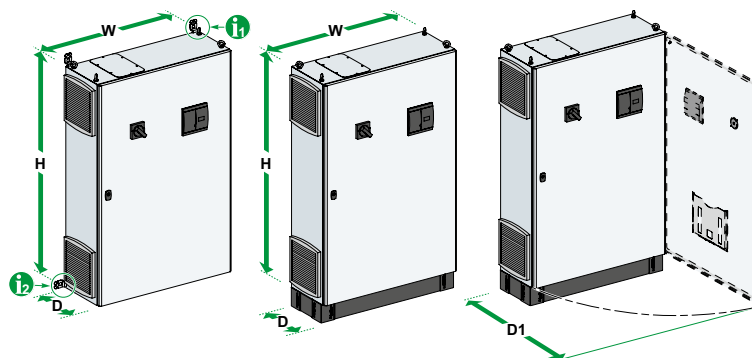


**VLV•W2,VLV•W3,VLV•F3** Wall-mounted enclosures or floor-standing with plinth.



**VLVAF6P** Floor-standing enclosures.
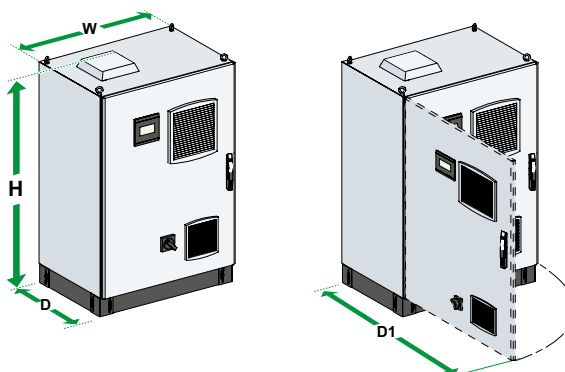


**VLV•F2P**, **VLVAF3P** Floor-standing enclosures.

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B

# Appendix

# Appendix

**C**

# Power factor of most common receiving devices

## Practical calculation of reactive power

| Type of circuit | Apparent power S (kVA) | Active power P (kW) | Reactive power Q (kVAr) |
|---|---|---|---|
| Single phase (Ph + N)<br>Single phase (Ph + Ph) | S = V x I<br>S = U x I | P = V x I x cos φ<br>P = U x I x cos φ | P = V x I x sin φ<br>P = U x I x sin φ |
| Example:<br>5 kW load<br>Cos φ= 0.5 | 10 kVA | 5 kW | 8.7 kVAr |
| Three-phase<br>(3Ph or 3Ph+N) | S = √3 x U x I | P = √3 x U x I x cos φ | Q = √3 x U x I x sin φ |
| Example of<br>Motor with Pn = 51kW<br>cos φ = 0.86<br>efficiency = 0.91 | 65 kVA | 56 kW | 33 kVAr |

**Calculations in the three-phase example were as follows:**

Pn = power supplied to the rotary axis  = 51 kW

P  = active consumed power  = Pn/ρ = 56 kW

S  = apparent power  = P/cos φ  = P/0.86 = 65 kVA

Hence:

Q  = √(S² - P²)  = √(65² - 56²)  = 33 kVAr

The average power factor values for various loads are given below.

## Power factor of the most common loads

| Device | Load | cos φ | tg φ |
|---|---|---|---|
| Ordinary asynchronous motor | 0% | 0.17 | 5.8 |
|  | 25% | 0.55 | 1.52 |
|  | 50% | 0.73 | 0.94 |
|  | 75% | 0.8 | 0.75 |
|  | 100% | 0.85 | 0.62 |
| Incandescent lamps |  | 1 | 0 |
| Fluorescent lamps |  | 0.5 | 1.73 |
| Discharge lamps |  | 0.4 to 0.6 | 2.29 to 1.33 |
| Resistance furnaces |  | 1 | 0 |
| Induction furnaces |  | 0.85 | 0.62 |
| Dielectric heating furnaces |  | 0.85 | 0.62 |
| Resistance welding machine |  | 0.8 to 0.9 | 0.75 to 0.48 |
| Single-phase static arc-welding centres |  | 0.5 | 1.73 |
| Rotary arc-welding sets |  | 0.7 to 0.9 | 1.02 |
| Arc-welding transformers/rectifiers |  | 0.7 to 0.9 | 1.02 to 0.75 |
| Arc furnaces |  | 0.8 | 0.75 |

Cos φ of the most commonly-used devices.

C

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**Fig. 7** Power flow in an installation with an uncompensated transformer.
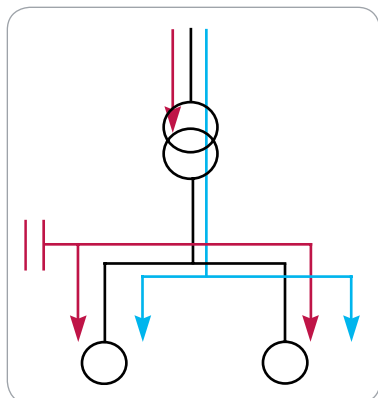


**Fig. 8** Power flow in an installation where the transformer is compensated by a fixed power factor correction device.

## Fixed power factor correction for transformer

A transformer consumes a reactive power that can be determined approximately by adding:

- a fixed part that depends on the magnetising off-load current Io:
  $Q_0 = I_0 \times U_n \times \sqrt{3}$
- a part that is proportional to the square of the apparent power that it conveys:
  $Q = U_{sc} \times S^2/S_n$

Usc: short-circuit voltage of the transformer in p.u.
S: apparent power conveyed by the transformer
Sn: apparent nominal power of the transformer
Un: nominal phase-to-phase voltage

The total reactive power consumed by the transformer is: $Q_t = Q_0 + Q$.

If this correction is of the individual type, it can be performed at the actual terminals of the transformer.

If this correction is performed globally with load correction on the busbar of the main switchboard, it can be of the fixed type provided that total power does not exceed 15% of transformer nominal power(otherwise use banks with automatic regulation).

The individual correction values specific to the transformer, depending on transformer nominal power, are listed in the table below.

| Transformer | | Oil bath | | Dry | |
|---|---|---|---|---|---|
| S (kVA) | Usc (%) | No-load | Load | No-load | Load |
| 100 | 4 | 2.5 | 5.9 | 2.5 | 8.2 |
| 160 | 4 | 3.7 | 9.6 | 3.7 | 12.9 |
| 250 | 4 | 5.3 | 14.7 | 5.0 | 19.5 |
| 315 | 4 | 6.3 | 18.3 | 5.7 | 24 |
| 400 | 4 | 7.6 | 22.9 | 6.0 | 29.4 |
| 500 | 4 | 9.5 | 28.7 | 7.5 | 36.8 |
| 630 | 4 | 11.3 | 35.7 | 8.2 | 45.2 |
| 800 | 4 | 20.0 | 66.8 | 10.4 | 57.5 |
| 1000 | 6 | 24.0 | 82.6 | 12 | 71 |
| 1250 | 5.5 | 27.5 | 100.8 | 15 | 88.8 |
| 1600 | 6 | 32 | 126 | 19.2 | 113.9 |
| 2000 | 7 | 38 | 155.3 | 22 | 140.6 |
| 2500 | 7 | 45 | 191.5 | 30 | 178.2 |

C

# Appendix
# When should fixed power factor correction be used?

## Fixed power factor correction for asynchronous motor

The cos φ of motors is normally very poor off-load and when slightly loaded, and poor in normal operating conditions. Installation of capacitors is therefore recommended for this type of load. The table opposite gives, by way of an example, the values for capacitor bank power in kVAr to be installed according to motor power.

| Rated power | | Number of revolutions per minute Reactive power in kVAr | | | |
|---|---|---|---|---|---|
| kW | HP | 3000 | 1500 | 1000 | 750 |
| 11 | 15 | 2.5 | 2.5 | 2.5 | 5 |
| 18 | 25 | 5 | 5 | 7.5 | 7.5 |
| 30 | 40 | 7.5 | 10 | 11 | 12.5 |
| 45 | 60 | 11 | 13 | 14 | 17 |
| 55 | 75 | 13 | 17 | 18 | 21 |
| 75 | 100 | 17 | 22 | 25 | 28 |
| 90 | 125 | 20 | 25 | 27 | 30 |
| 110 | 150 | 24 | 29 | 33 | 37 |
| 132 | 180 | 31 | 36 | 38 | 43 |
| 160 | 218 | 35 | 41 | 44 | 52 |
| 200 | 274 | 43 | 47 | 53 | 61 |
| 250 | 340 | 52 | 57 | 63 | 71 |
| 280 | 380 | 57 | 63 | 70 | 79 |
| 355 | 485 | 67 | 76 | 86 | 98 |
| 400 | 544 | 78 | 82 | 97 | 106 |
| 450 | 610 | 87 | 93 | 107 | 117 |

When a motor drives a high inertia load, it may, after breaking of supply voltage, continue to rotate using its kinetic energy and be self-excited by a capacitor bank mounted at its terminals. The capacitors supply the reactive energy required for it to operate in asynchronous generator mode. Such self-excitation results in voltage holding and sometimes in high overvoltages.

## Correction requirements of asynchronous motors

■ **Case of mounting capacitors at the motor terminals**

To avoid dangerous overvoltages caused by the self-excitation phenomenon, you must ensure that capacitor bank power verifies the following equation:

$Qc \leq 0{,}9 \times \sqrt{3} \times U_n \times I_0$

- ■ $I_0$: motor off-load current Io can be estimated by the following expression:
  $I_0 = 2 \times I_n \times (I - \cos \varphi_n)$
- ■ $I_n$: value of motor nominal current
- ■ $\cos \varphi_n$: cos φ of the motor at nominal power
- ■ $U_n$: nominal phase-to-phase voltage

**Fig. 9** Mounting capacitors at motor terminals.

■ **Case of parallel-mounting of capacitors with separate operating mechanism**

To avoid dangerous overvoltages due to self-excitation or in cases in which the motor starts by means of special switchgear (resistors, reactors, autotransformers), the capacitors will only be switched after starting.

Likewise, the capacitors must be disconnected before the motor is de-energised. In this case, motor reactive power can be fully corrected on full load.

Caution: if several banks of this type are connected in the same network, inrush current limiting reactors should be fitted.

**Fig. 10** Parallel-mounting of capacitors with separate operating mechanism.

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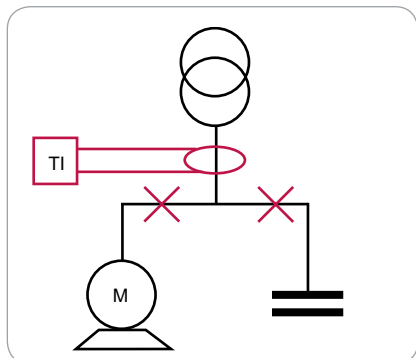
**Fig. 11** Diagram of connection to a single LV busbar and CT location.
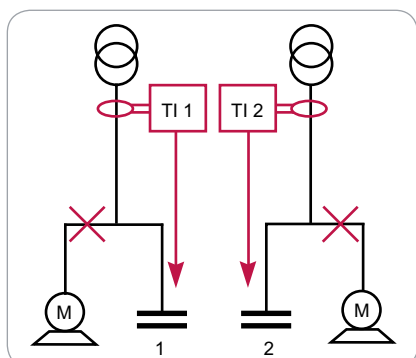


**Fig. 12** Diagram of connection to independent LV busbars and CT location.
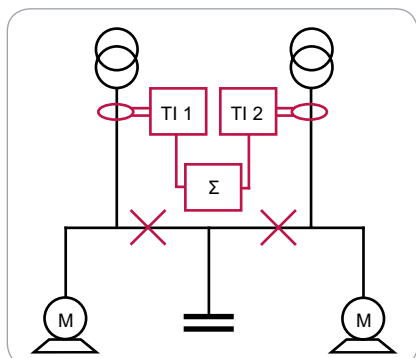


**Fig. 13** Diagram of various transformers connected in parallel and TI location.

## Single busbar compensation

### General

An installation with a single LV busbar is that most often encountered. This type of installation requires that the reactive power can change with respect to the methods defined previously.

Compensation uses all the receiving devices of the installation and the amperage of the current transformer is determined according to the total current conducted through the main protection circuit breaker.

### Precautions during installation

As mentioned previously, it will be necessary to ensure a complementary installation of the current transformer so that it can read the total consumption of the installation.

It is indispensable to set up the current transformer (CT) in accordance with **Fig. 11**, and installing the system at any of the points indicated by a cross would result in the system malfunctioning.

## Compensation with several busbars

### Independent LV busbars

Another installation possibility is to have the various independent busbars which do not require to be connected to two identical transformers. For this reason: the reactive power requirement will be different for each busbar and need to be evaluated separately using the methods defined previously.

Compensation will use all the receiving devices and the amperage of each current transformer will be determined according to the total current through the main protection circuit breaker of each busbar.

### Installation precautions

In a similar manner to the previous case, the location of each current transformer (CT) will need to be decided upon in the same way so that some transformers can read the consumption in each part of the installation separately.

## Compensation for a busbar supplied by various transformers

An installation differing from the above is one in which there are many transformers connected in parallel on the low voltage side.

### Separate distribution transformers

Compensation in this installation can be obtained by placing together the two automatic batteries and their respective current transformers.

### Equal distribution transformers

In this case, it will be possible to obtain compensation with a single bank in which the controller is powered by a summing transformer, itself powered by the two CTs of each transformer.

The maximum number of summing inputs is 5 (**Fig. 13**).

### Installation precautions

■ Separate distribution transformers:
Each bank is powered by a separate CT connected to the output of each transformer. The settings and the installation must be made as if these were independent busbars.

■ Equal distribution transformers:
Compensation uses a single bank and the only precaution is to be made on start up: the C/K relation that needs to be programmed into the controller must consider the sum of all the CTs feeding the summing circuit.
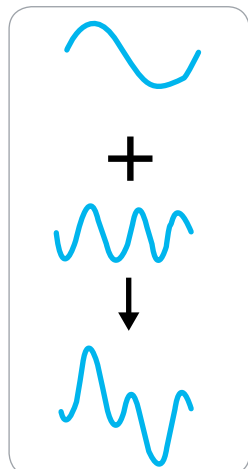
**Fig. 14** Decomposition of a distorted wave.
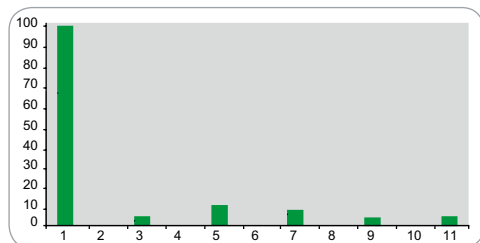


**Fig. 15 Typical graph of the frequency spectrum**
The frequency spectrum, also known as the spectral analysis, indicates the types of harmonic generator present on the network.

## Introduction

Harmonics are usually defined by two main characteristics:

■ Their amplitude:
value of the harmonic voltage or current.

■ Their order:
value of their frequency with respect to the fundamental frequency (50 Hz).

Under such conditions, the frequency of a 5th order harmonic is five times greater than the fundamental frequency, i.e. 5 x 50 Hz = 250 Hz.

## The root mean square value

The rms value of a distorted wave is obtained by calculating the quadratic sum of the different values of the wave for all the harmonic orders that exist for this wave:

Rms value of I:

$$I (A) = \sqrt{I_1^2 + I_2^2 + \ldots + I_n^2}$$

The rms value of all the harmonic components is deduced from this calculation:

$$I_h (A) = \sqrt{I_2^2 + \ldots + I_n^2}$$

This calculation shows one of the main effects of harmonics, i.e. the increased rms current passing through an installation, due to the harmonic components with which a distorted wave is associated.

Usually, the switchgear and cables or the busbar trunking of the installation is defined from the rated current at the fundamental frequency; all these installation components are not designed to withstand excessive harmonic current.

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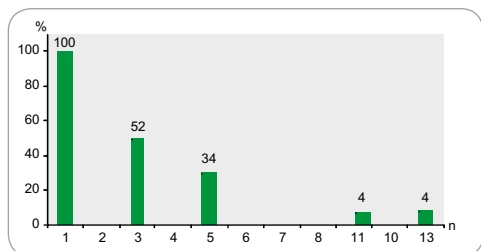
**Fig. 16** Harmonic spectrum for single phase industrial devices, induction furnaces, welding machines, rectifiers,etc.
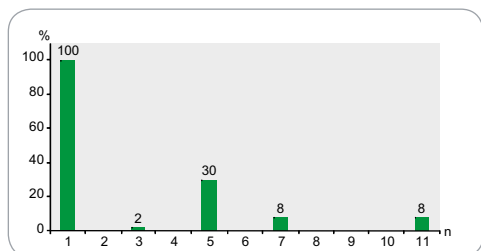


**Fig. 17** Harmonic spectrum for 3 phases variable speed drives, asynchronous motors or direct current motors.

## Harmonic measurement: distortion

The presence of varying amounts of harmonics on a network is called distortion. It is measured by the harmonic distortion rates:

■ **Th: individual distortion rate**
It indicates, as a %, the magnitude of each harmonic with respect to the value of the fundamental frequency:

Th (%) = Ah / A1

Where:

Ah = the value of the voltage or current of the h-order harmonic.

A1 = the value of the voltage or current at the fundamental frequency (50 Hz).

■ **THD: Total Harmonic Distortion**

It indicates, as a %, the magnitude of the total distortion with respect to the fundamental frequency or with respect to the total value of the wave.

$$THD_{CIGREE} = \frac{\sqrt{\Sigma_2^{\,h} A_h^2}}{A_1} \qquad THD_{IEC\,555} = \frac{\sqrt{\Sigma_2^{\,h} A_h^2}}{\Sigma_1^{\,h} A_h^2}$$

The operating values used to find the true situation of the installations with respect to the degree of harmonic contamination are:

■ **The total harmonic voltage distortion [THD(U)]** indicating the voltage wave distortion and the ratio of the sum of the harmonic voltages to the fundamental frequency voltage, all expressed as a %.

■ **The total harmonic current distortion [THD(I)]** determining the current wave distortion and the ratio of the sum of the harmonic currents to the fundamental frequency current, expressed as a %.

■ **The frequency spectrum (TFT)** is a diagram that gives the magnitude of each harmonic according to its order.
By studying it, we can determine which harmonics are present and their respective magnitude.

## Interharmonics

Interharmonics are sinusoidal components with frequencies that are not integral multiples of the fundamental frequency (and therefore situated between the harmonics). They are the result of periodic or random variations of the power absorbed by different loads such as arc furnaces, welding machines and frequency converters (variable speed drives, cycloconvertors).

# Causes and effects of harmonics
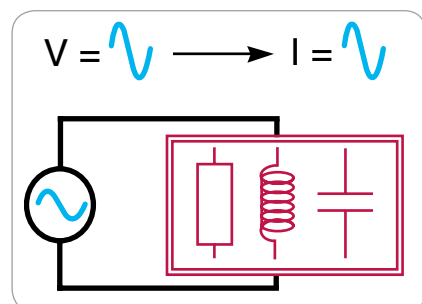


**Fig. 18** Linear loads such as inductors, capacitors and resistors do not generate harmonics.
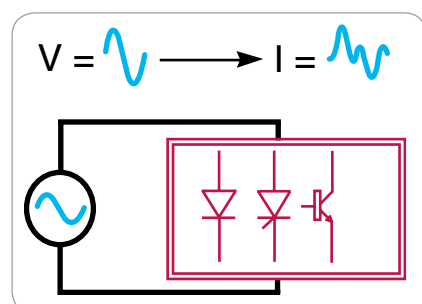


**Fig. 19** Non-linear loads are those that generate harmonics.



## Harmonic generators

Harmonics are generally produced by non-linear loads which, although powered by a sinusoidal voltage, absorb a non-sinusoidal current.

In short, non-linear loads are considered to behave as current sources that inject harmonics into the network.

The most common non-linear harmonic loads are those found in devices fed by power electronics, such as variable speed drives, rectifiers, converters, etc.

Loads such as saturable reactors, welding equipment, arc furnaces etc. also inject harmonics.

Other loads have a linear behaviour and do not generate harmonics: inductors, resistors and capacitors.

## Main harmonic sources

We differentiate between these loads, according to whether they are used for industrial or residential applications:

■ Industrial loads:
□ power electronics devices: variable speed drives, rectifiers, UPS, etc.
□ loads using an electric arc: arc furnaces, welding machines, lighting (fluorescent lamps, etc.); harmonics (temporary) are also generated when motors are started with an electronic starter and when power transformers come into service.
■ Residential loads: TVs, microwave ovens, induction plates, computers, printers, fluorescent lamps, etc.

The following table is a guide to the various loads with information on the injected harmonic current spectrum.

**Indications about the harmonic spectrum injected by various loads**

| Type of load | Harmonics generated | Comments |
|---|---|---|
| Transformer | Even and odd order | DC component |
| Asynchronous motors | Odd order | Interharmonics and subharmonics |
| Discharge lamp | 3.° + odd | Can reach 30% of I1 |
| Arc welding | 3.° | |
| AC arc furnaces | Unstable variable spectrum | Non linear - asymmetric |
| Inductive filter rectifier | h = K x P ± 1<br>Ih = I1/h | UPS - variable speed drives V |
| Capacitive filter rectifier | h = K x P ± 1<br>Ih = I1/h | Electronic device power supply |
| Cycloconvertor | Variables | Variable speed drives V |
| PWM controllers | Variables | UPS - DC - AC converter |

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**Fig. 20** Cables.



**Fig. 21** Induction furnace.



**Fig. 22** VarplusCan capacitor.

## The effects of harmonics on loads

The following two types of effects appear in the main equipment: immediate or short-term effects and long-term effects.

**Immediate or short-term effects:**
- Unwanted tripping of protection devices,
- Induced interference from LV current systems (remote control, telecommunications),
- Abnormal vibrations and noise,
- Damage due to capacitor thermal overload,
- Faulty operation of non-linear loads.

Long-term effects associated with current overload that causes overheating and premature deterioration of the equipment.

**Affected devices and effects:**
- Power capacitors:
  □ additional losses and overheating,
  □ fewer possibilities of use at full load,
  □ vibrations and mechanical wear,
  □ acoustic disComfort.

- Motors:
  □ additional losses and overheating,
  □ fewer possibilities of use at full load,
  □ vibrations and mechanical wear,
  □ acoustic disComfort.

- Transformers:
  □ additional losses and overheating,
  □ mechanical vibrations,
  □ acoustic disComfort.
  □ automatic switch:
  □ unwanted tripping due to the peak current being exceeded.

- Cables:
  □ additional dielectric and chemical losses, especially on the neutral, when $3^{rd}$ order harmonics are present,
  □ overheating.

- Computers:
  □ functional disruptions causing data losses or faulty operation of control equipment.

- Power electronics:
  □ waveform interference: switching, synchronisation, etc.

**Summary table of effects, causes and consequences of harmonics**

| Effects of the harmonics | Causes | Consequences |
|---|---|---|
| On the conductors | ■ The harmonic currents cause the Irms to increase<br>■ The skin effect reduces the effective crosssection of the conductors as the frequency increases | ■ Unwanted tripping of the protection devices<br>■ Overheated conductors |
| On the neutral conductor | ■ A balanced three-phase + neutral load generates 3rd order multiple odd harmonics | ■ Closure of homopolar harmonics on the neutral, causing overheating and overcurrents |
| On the transformers | ■ Increased IRMS<br>■ Foucault losses are proportional to the frequency | ■ Increased overheating due to the Joule effect in the windings<br>■ Increased losses in iron |
| On the motors | ■ Similar to those for the transformers and generation of a field added to the main one | ■ Similar to those of transformers, plus efficiency losses |
| On capacitors | ■ Decreased capacitor impedance with increased frequency | ■ Premature ageing, amplification of the existing harmonics |

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VarPlus Logic has all what you need for the simple and efficient operation of your automatic power factor correction equipment to maintain your power factor.

It is a simple and intelligent relay which measure, monitor and controls the reactive energy. Easy commissioning, step size detection and monitoring makes it different from others in the market.

VarPlus Logic VL6, VL12

## Capacitor bank step monitoring

- Monitoring of all the connected capacitor steps.
- Real time power in "kvar" for the connected steps .
- Remaining step capacity per step as a % of the original power since installation.
- Derating since installation.
- Number of switching operations of every connected step.

## System Measurement and monitoring

- THD(u) and THD(u) Spectrum 3rd to 19th – Measurement, Display and Alarm.
- Measurement of DQ – "kvar" required to achieve target cos phi.
- Present cabinet temperature and maximum recorded temperature.
- System parameters – Voltage, Current, Active, reactive and apparent power.
- Large LCD display to monitor real step status and other parameters.

## Easy Commissioning

- Automatic Initialization and automatic step detection to do a auto commissioning.
- Automatic wiring correction - voltage and current input wiring correction.
- 1 A or 5 A CT secondary compatible.

## Flexibility to the panel builder and retrofitting

- No step sequence restriction like in the traditional relays.
- Any step sequences with auto detect. No programming needed.
- Easy to retrofit the faulty capacitor with different power.
- Quick and simple mounting and wiring.
- Connect to the digitized Schindler solutions through RS485 communication in Modbus protocol.
- Seamless connection to the Schneider software and gateways.

## Do more with VarPlus Logic

- Programmable alarms with last 5 alarms log.
- Suitable for medium voltage applications.
- Suitable for 4 quadrant operations.
- Dual cos phi control through digital inputs or export power detection.
- Dedicated alarm and fan control relays.
- Advance expert programming Menu to configure the controller the way you need.
- New control algorithm designed to reduce the number of switching operations and quickly attain the targeted power fact.

## Alarms

- Faulty Step.
- Configurable alarm for step derating.
- THDu Limit alarm.
- Temperature alarm.
- Self correction by switching off the steps at the event of THDu alarm, temperature alarm and overload limit alarm.
- Under compensation alarm.
- Under/Over Voltage Alarm.
- Low/High Current Alarm.
- Overload limit alarm.
- Hunting alarm.
- Maximum operational limits - Time and number of switching.

## Range

| Type | Number of step output contacts | Part number |
|------|-------------------------------|-------------|
| VL6  | 06                            | VPL06N      |
| VL12 | 12                            | VPL12N      |

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| General characteristics | |
|---|---|
| **Voltage and current Input** | |
| Direct supply voltage | 90 – 550 V, 1ph, 50/60 Hz |
| | VA Burden: 6 VA |
| | 300 V LN / 519 V LL CAT III or 550 V CAT II |
| Type of input connection | Phase to phase or phase to neutral |
| Protection against voltage dips | Automatic disconnection of steps for dips > 15 ms (protection of capacitor) |
| CT secondary | 1A or 5A compatible |
| CT primary range | Up to 9600 A |
| Current | 15 mA – 6 A, 1PH, |
| | VA Burden : < 1 VA |
| Connection terminals | Screw type, pluggable. Section: 0.2 – 2.5 mm² (0.2 – 1 mm² for Modbus and digital inputs) |
| **Power factor settings & algorithm selection** | |
| Regulation setting - Programmable | From Cos Phi 0.7c to 0.7i |
| Reconnection time -Programmable | From 1 to 6500 s |
| Response time -Programmable | From 1 to 6500 s |
| Possibility of dual cos Phi target | Yes, Through Digital Input or if export power detected |
| Program algorithm | AUTOMATIC (best fit) - Default |
| | LIFO |
| | PROGRESSIVE |
| Import export application compatibility | 4- Quadrant operation for generator application |
| **Program intelligence** | |
| Automatic Initialization and Automatic bank detection | Yes |
| Detection and display of power, number of switching & derating of all connected steps | Yes |
| Capacitor bank step sequence | Any sequence. No restriction/limitation on sequence |

**Dimensions**
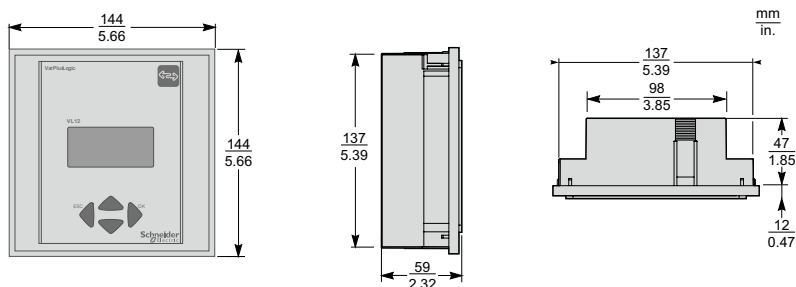


**Mounting**
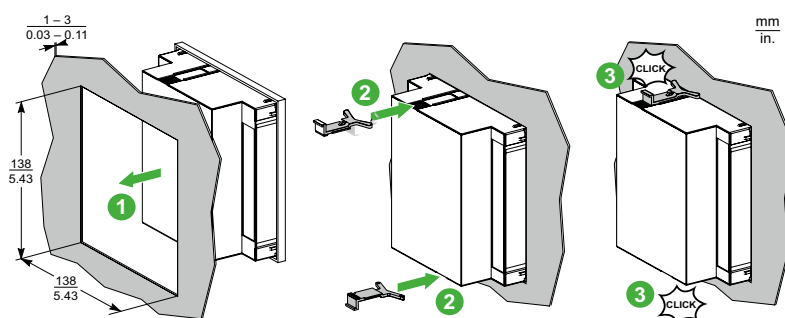
**Phase-to-Neutral with VTs (3PH4W)**
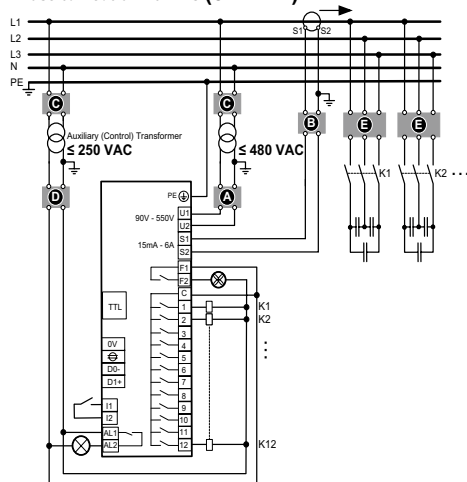


**Phase-to-Phase with VTs (3PH3W)**
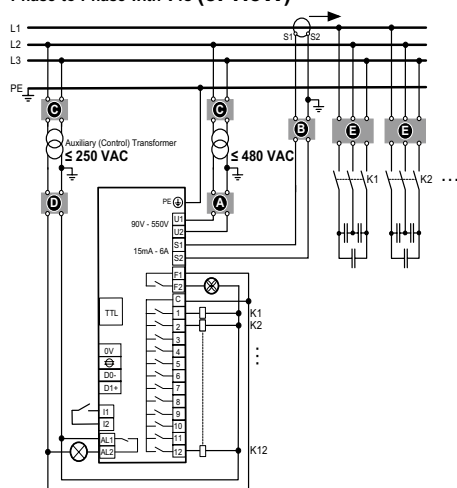


**A** Upstream protection
Voltage input: 2A certified circuit breakers or fuses

**B** Shorting block for CT

**C** VT primary fuses and disconnect switch

**D** Output relays: 10 A (max.) certified circuit breakers or fuses
(Applicable for applications with voltage transformers only)

**E** Capacitor primary fuses or CB's

| General characteristics | |
|---|---|
| **Alarm and control** | |
| Control outputs (step output) | VL6: 6 relays VL12: 12 relays ( NO contact) |
| | 250 V LN or LL (CAT III) |
| | DC Rating : 48 V DC / 1 A |
| | AC Rating : 250 V AC / 5 A |
| | Common root: 10 A max. |
| Dedicated fan control relay | Yes. Normal open contact (NO) |
| | 48 V DC / 1 A, 250 V AC / 5 A |
| Alarm contact | The relay contact is open when the controller is energized with no alarm and will close in the event of an alarm. The relay is a NC (Normally Close) when the controller is not energized. |
| | Rating : 48 V DC / 1 A, 250 V AC / 5 A |
| Digital Input for Cos phi2 target | Dry contact (internal supply 5 V, 10 mA) |
| Modbus RS-485 serial port (RTU) | Line polarization / termination, not included |
| Communication protocol | Modbus |
| Interface TTL | Service port. Only for internal use |
| Internal Temperature probe | Yes |
| **Display and measurement** | |
| Display | LCD graphic 56 x 25 (Backlit) |
| Alarms log | 5 last alarms |
| Voltage Harmonic Distortion measurement | THDu ; Individual odd harmonics distortion from H3 to H19 |
| Measurement displayed and accuracy | Voltage, Current & Frequency: ±1% |
| | Energy measurements, Cos Phi, THD(u): ±2% |
| | Individual Voltage harmonics ( H3 to H19): ±3% |
| | Temperature measurement : ±3 °C |
| **Testing standards and conformities** | |
| Standards | IEC 61010-1 |
| | IEC 61000 6-2 |
| | IEC 61000 6-4: level B |
| | IEC 61326-1 |
| | UL 61010 |
| Conformity and listing | Conformity and listing CE, NRTL, c NRTL, EAC |
| **Mechanical specifications** | |
| Case | Front: Instrument case plastic RAL 7016 |
| | Rear: Metal |
| Degree of Protection | Front: IP41, (IP54 by using a gasket) |
| | Rear: IP20 |
| Weight | 0.6 kg |
| Size | 144 x 144 x 58 mm (H x W x D) |
| Panel Cutout | 138 x 138 (+0.5) mm, thickness 1 – 3 mm |
| Panel Mounting | Flush mounting |
| **Storage condition** | |
| Temperature for operation | -20 °C +60 °C |
| Storage | -40 °C +85 °C |
| Humidity | 0% - 95%, without condensation for operation and storage |
| Maximum pollution degree | 2 |
| Maximum altitude | ≤ 2000m |

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## Calculation of reactive power: Selection table

The table gives a coefficient, according to the cos φ of the installation before and after power factor correction. Multiplying this figure by the active power gives the reactive power to be installed.

| Before compensation | | Capacitor power in kVAr to be installed per kW of load to raise the power factor (cos φ or tg φ) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| tg φ | cos φ | tg φ | 0.75 | 0.59 | 0.48 | 0.45 | 0.42 | 0.39 | 0.36 | 0.32 | 0.29 | 0.25 | 0.20 | 0.14 | 0.00 |
| | | cos φ | 0.8 | 0.86 | 0.9 | 0.91 | 0.92 | 0.93 | 0.94 | 0.95 | 0.96 | 0.97 | 0.98 | 0.99 | 1 |
| 2.29 | 0.40 | | 1.541 | 1.698 | 1.807 | 1.836 | 1.865 | 1.896 | 1.928 | 1.963 | 2.000 | 2.041 | 2.088 | 2.149 | 2.291 |
| 2.22 | 0.40 | | 1.475 | 1.631 | 1.740 | 1.769 | 1.799 | 1.829 | 1.862 | 1.896 | 1.933 | 1.974 | 2.022 | 2.082 | 2.225 |
| 2.16 | 0.42 | | 1.411 | 1.567 | 1.676 | 1.705 | 1735 | 1.766 | 1.798 | 1.832 | 1.869 | 1.910 | 1.958 | 2.018 | 2.161 |
| 2.10 | 0.43 | | 1.350 | 1.506 | 1.615 | 1.644 | 1.674 | 1.704 | 1.737 | 1.771 | 1.808 | 1.849 | 1.897 | 1.957 | 2.100 |
| 2.04 | 0.44 | | 1.291 | 1.448 | 1.557 | 1.585 | 1.615 | 1.646 | 1.678 | 1.712 | 1.749 | 1.790 | 1.838 | 1.898 | 2.041 |
| 1.98 | 0.45 | | 1.235 | 1.391 | 1.500 | 1.529 | 1.559 | 1.589 | 1.622 | 1.656 | 1.693 | 1.734 | 1.781 | 1.842 | 1.985 |
| 1.93 | 0.46 | | 1.180 | 1.337 | 1.446 | 1.475 | 1.504 | 1.535 | 1.567 | 1.602 | 1.639 | 1.680 | 1.727 | 1.788 | 1.930 |
| 1.88 | 0.47 | | 1.128 | 1.285 | 1.394 | 1.422 | 1.452 | 1.483 | 1.515 | 1.549 | 1.586 | 1.627 | 1.675 | 1.736 | 1.878 |
| 1.83 | 0.48 | | 1.078 | 1.234 | 1.343 | 1.372 | 1.402 | 1.432 | 1.465 | 1.499 | 1.536 | 1.577 | 1.625 | 1.685 | 1.828 |
| 1.78 | 0.49 | | 1.029 | 1.186 | 1.295 | 1.323 | 1.353 | 1.384 | 1.416 | 1.450 | 1.487 | 1.528 | 1.576 | 1.637 | 1.779 |
| 1.73 | 0.5 | | 0.982 | 1.139 | 1.248 | 1.276 | 1.306 | 1.337 | 1.369 | 1.403 | 1.440 | 1.481 | 1.529 | 1.590 | 1.732 |
| 1.69 | 0.51 | | 0.937 | 1.093 | 1.202 | 1.231 | 1.261 | 1.291 | 1.324 | 1.358 | 1.395 | 1.436 | 1.484 | 1.544 | 1.687 |
| 1.64 | 0.52 | | 0.893 | 1.049 | 1.158 | 1.187 | 1.217 | 1.247 | 1.280 | 1.314 | 1.351 | 1.392 | 1.440 | 1.500 | 1.643 |
| 1.60 | 0.53 | | 0.850 | 1.007 | 1.116 | 1.144 | 1.174 | 1.205 | 1.237 | 1.271 | 1.308 | 1.349 | 1.397 | 1.458 | 1.600 |
| 1.56 | 0.54 | | 0.809 | 0.965 | 1.074 | 1.103 | 1.133 | 1.163 | 1.196 | 1.230 | 1.267 | 1.308 | 1.356 | 1.416 | 1.559 |
| 1.52 | 0.55 | | 0.768 | 0.925 | 1.034 | 1.063 | 1.092 | 1.123 | 1.156 | 1.190 | 1.227 | 1.268 | 1.315 | 1.376 | 1.518 |
| 1.48 | 0.56 | | 0.729 | 0.886 | 0.995 | 1.024 | 1.053 | 1.084 | 1.116 | 1.151 | 1.188 | 1.229 | 1.276 | 1.337 | 1.479 |
| 1.44 | 0.57 | | 0.691 | 0.848 | 0.957 | 0.986 | 1.015 | 1.046 | 1.079 | 1.113 | 1.150 | 1.191 | 1.238 | 1.299 | 1.441 |
| 1.40 | 0.58 | | 0.655 | 0.811 | 0.920 | 0.949 | 0.969 | 1.009 | 1.042 | 1.076 | 1.113 | 1.154 | 1.201 | 1.262 | 1.405 |
| 1.37 | 0.59 | | 0.618 | 0.775 | 0.884 | 0.913 | 0.942 | 0.973 | 1.006 | 1.040 | 1.077 | 1.118 | 1.165 | 1.226 | 1.368 |
| 1.33 | 0.6 | | 0.583 | 0.740 | 0.849 | 0.878 | 0.907 | 0.938 | 0.970 | 1.005 | 1.042 | 1.083 | 1.130 | 1.191 | 1.333 |
| 1.30 | 0.61 | | 0.549 | 0.706 | 0.815 | 0.843 | 0.873 | 0.904 | 0.936 | 0.970 | 1.007 | 1.048 | 1.096 | 1.157 | 1.299 |
| 1.27 | 0.62 | | 0.515 | 0.672 | 0.781 | 0.810 | 0.839 | 0.870 | 0.903 | 0.937 | 0.974 | 1.015 | 1.062 | 1.123 | 1.265 |
| 1.23 | 0.63 | | 0.483 | 0.639 | 0.748 | 0.777 | 0.807 | 0.837 | 0.873 | 0.904 | 0.941 | 1.982 | 1.030 | 1.090 | 1.233 |
| 1.20 | 0.64 | | 0.451 | 0.607 | 0.716 | 0.745 | 0.775 | 0.805 | 0.838 | 0.872 | 0.909 | 0.950 | 0.998 | 1.058 | 1.201 |
| 1.17 | 0.65 | | 0.419 | 0.672 | 0.685 | 0.714 | 0.743 | 0.774 | 0.806 | 0.840 | 0.877 | 0.919 | 0.966 | 1.027 | 1.169 |
| 1.14 | 0.66 | | 0.388 | 0.639 | 0.654 | 0.683 | 0.712 | 0.743 | 0.775 | 0.810 | 0.847 | 0.888 | 0.935 | 0.996 | 1.138 |
| 1.11 | 0.67 | | 0.358 | 0.607 | 0.624 | 0.652 | 0.682 | 0.713 | 0.745 | 0.779 | 0.816 | 0.857 | 0.905 | 0.996 | 1.108 |
| 1.08 | 0.68 | | 0.328 | 0.576 | 0.594 | 0.623 | 0.652 | 0.683 | 0.715 | 0.750 | 0.878 | 0.828 | 0.875 | 0.936 | 1.078 |
| 1.05 | 0.69 | | 0.299 | 0.545 | 0.565 | 0.593 | 0.623 | 0.654 | 0.686 | 0.720 | 0.757 | 0.798 | 0.846 | 0.907 | 1.049 |
| 1.02 | 0.7 | | 0.270 | 0.515 | 0.536 | 0.565 | 0.594 | 0.625 | 0.657 | 0.692 | 0.729 | 0.770 | 0.817 | 0.878 | 1.020 |
| 0.99 | 0.71 | | 0.242 | 0.485 | 0.508 | 0.536 | 0.566 | 0.597 | 0.629 | 0.663 | 0.700 | 0.741 | 0.789 | 0.849 | 0.992 |
| 0.96 | 0.72 | | 0.214 | 0.456 | 0.480 | 0.508 | 0.538 | 0.569 | 0.601 | 0.665 | 0.672 | 0.713 | 0.761 | 0.821 | 0.964 |
| 0.94 | 0.73 | | 0.186 | 0.427 | 0.452 | 0.481 | 0.510 | 0.541 | 0.573 | 0.608 | 0.645 | 0.686 | 0.733 | 0.794 | 0.936 |
| 0.91 | 0.74 | | 0.159 | 0.398 | 0.425 | 0.453 | 0.483 | 0.514 | 0.546 | 0.580 | 0.617 | 0.658 | 0.706 | 0.766 | 0.909 |
| 0.88 | 0.75 | | 0.132 | 0.370 | 0.398 | 0.426 | 0.456 | 0.487 | 0.519 | 0.553 | 0.590 | 0.631 | 0.679 | 0.739 | 0.882 |
| 0.86 | 0.76 | | 0.105 | 0.343 | 0.371 | 0.400 | 0.429 | 0.460 | 0.492 | 0.526 | 0.563 | 0.605 | 0.652 | 0.713 | 0.855 |
| 0.83 | 0.77 | | 0.079 | 0.316 | 0.344 | 0.373 | 0.403 | 0.433 | 0.466 | 0.500 | 0.537 | 0.578 | 0.626 | 0.686 | 0.829 |
| 0.80 | 0.78 | | 0.052 | 0.289 | 0.318 | 0.347 | 0.376 | 0.407 | 0.439 | 0.574 | 0.511 | 0.552 | 0.559 | 0.660 | 0.802 |
| 0.78 | 0.79 | | 0.026 | 0.262 | 0.292 | 0.320 | 0.350 | 0.381 | 0.413 | 0.447 | 0.484 | 0.525 | 0.573 | 0.634 | 0.776 |
| 0.75 | 0.8 | | | 0.235 | 0.266 | 0.294 | 0.324 | 0.355 | 0.387 | 0.421 | 0.458 | 0.449 | 0.547 | 0.608 | 0.750 |
| 0.72 | 0.81 | | | 0.209 | 0.240 | 0.268 | 0.298 | 0.329 | 0.361 | 0.395 | 0.432 | 0.473 | 0.521 | 0.581 | 0.724 |
| 0.70 | 0.82 | | | 0.183 | 0.214 | 0.242 | 0.272 | 0.303 | 0.335 | 0.369 | 0.406 | 0.447 | 0.495 | 0.556 | 0.698 |
| 0.67 | 0.83 | | | 0.157 | 0.188 | 0.216 | 0.246 | 0.277 | 0.309 | 0.343 | 0.380 | 0.421 | 0.469 | 0.530 | 0.672 |
| 0.65 | 0.84 | | | 0.131 | 0.162 | 0.190 | 0.220 | 0.251 | 0.283 | 0.317 | 0.354 | 0.395 | 0.443 | 0.503 | 0.646 |
| 0.62 | 0.85 | | | 0.105 | 0.135 | 0.164 | 0.194 | 0.225 | 0.257 | 0.291 | 0.328 | 0.369 | 0.417 | 0.477 | 0.620 |
| 0.59 | 0.86 | | | 0.079 | 0.109 | 0.138 | 0.167 | 0.198 | 0.230 | 0.265 | 0.302 | 0.343 | 0.390 | 0.451 | 0.593 |
| 0.56 | 0.87 | | | 0.053 | 0.082 | 0.111 | 0.141 | 0.172 | 0.204 | 0.238 | 0.275 | 0.316 | 0.364 | 0.424 | 0.567 |
| 0.53 | 0.88 | | | 0.029 | 0.055 | 0.084 | 0.114 | 0.145 | 0.177 | 0.211 | 0.248 | 0.289 | 0.337 | 0.397 | 0.540 |
| 0.51 | 0.89 | | | | 0.028 | 0.057 | 0.086 | 0.117 | 0.149 | 0.184 | 0.221 | 0.262 | 0.309 | 0.370 | 0.512 |
| 0.48 | 0.90 | | | | | 0.029 | 0.058 | 0.089 | 0.121 | 0.156 | 0.193 | 0.234 | 0.281 | 0.48 | 0.484 |

# Appendix
# Main protection recommendations
## VarSet Easy PFC Equipment without incomer circuit breaker

Following protection are defined in coordination with embedded protection inside the equipment.

| Short circuit withstand current 15 kA | | |
|---|---|---|
| **Power kvar** | **References** | **Designation** |
| 7.5 | A9F85320 | ACTI9 IC60H 3P 20A |
| 15 | A9F85332 | ACTI9 IC60H 3P 32A |
| 17.5 | A9F85340 | ACTI9 IC60H 3P 40A |
| 20 | A9F85340 | ACTI9 IC60H 3P 40A |
| 25 | A9F85350 | ACTI9 IC60H 3P 50A |
| 30 | A9F85363 | ACTI9 IC60H 3P 63A |

| Short circuit withstand current 35 kA | | |
|---|---|---|
| **Power kvar** | **References** | **Designation** |
| 37.5 | LV510336 | CVS100F TM80D 3P3D |
| 45 | LV510337 | CVS100F TM100D 3P3D |
| 50 | LV510337 | CVS100F TM100D 3P3D |
| 60 | LV516332 | CVS160F TM125D 3P3D |
| 70 | LV516333 | CVS160F TM160D 3P3D |
| 75 | LV516333 | CVS160F TM160D 3P3D |
| 82.5 | LV516333 | CVS160F TM160D 3P3D |
| 90 | LV525332 | CVS250F TM200D 3P3D |
| 100 | LV525332 | CVS250F TM200D 3P3D |
| 125 | LV540305 | CVS400F TM320D 3P3D |
| 150 | LV540305 | CVS400F TM320D 3P3D |
| 175 | LV563305 | CVS630F TM500D 3P3D |
| 200 | LV563305 | CVS630F TM500D 3P3D |
| 225 | LV563305 | CVS630F TM500D 3P3D |
| 250 | LV563305 | CVS630F TM500D 3P3D |
| 275 | LV563306 | CVS630F TM600D 3P3D |
| 300 | LV563306 | CVS630F TM600D 3P3D |
| 350 | 33466 | NS800N MICROLOGIC 2.0 |
| 400 | 33466 | NS800N MICROLOGIC 2.0 |
| 450 | 33472 | NS1000N MICROLOGIC 2.0 |
| 500 | 33472 | NS1000N MICROLOGIC 2.0 |
| 550 | 33478 | NS1250N MICROLOGIC 2.0 |
| 600 | 33478 | NS1250N MICROLOGIC 2.0 |

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# Main protection recommendations
## VarSet Low polluted PFC Equipment without incomer circuit breaker

Following protection are defined in coordination with embedded protection inside the equipment.

| Short circuit withstand current 15 kA | | |
|---|---|---|
| Power kvar | References | Designation |
| 6 | A9F85313 | ACTI9 IC60H 3P 13A |
| 9 | A9F85320 | ACTI9 IC60H 3P 20A |
| 12.5 | A9F85332 | ACTI9 IC60H 3P 32A |
| 16 | A9F85340 | ACTI9 IC60H 3P 40A |
| 22 | A9F85350 | ACTI9 IC60H 3P 50A |
| 32 | A9F85363 | ACTI9 IC60H 3P 63A |

| Short circuit withstand current 35 kA | | |
|---|---|---|
| Power kvar | References | Designation |
| 34 | LV430631 | NSX160F TM125D 3P3T |
| 37.5 | LV430631 | NSX160F TM125D 3P3T |
| 50 | LV430630 | NSX160F TM160D 3P3T |
| 69 | LV431631 | NSX250F TM200D 3P3 |
| 75 | LV431631 | NSX250F TM200D 3P3 |
| 87.5 | LV431630 | NSX250F TM250D 3P3T |
| 100 | LV431630 | NSX250F TM250D 3P3T |

| Short circuit withstand current 50 kA | | | Short circuit withstand current 65 kA | |
|---|---|---|---|---|
| Power kvar | References | Designation | References | Designation |
| 125 | LV432693 | NSX400N 400A 3P3T MICROLOGIC 2.3 | LV432695 | NSX400H 400A 3P3T MICROLOGIC 2.3 |
| 137.5 | LV432693 | NSX400N 400A 3P3T MICROLOGIC 2.3 | LV432695 | NSX400H 400A 3P3T MICROLOGIC 2.3 |
| 150 | LV432693 | NSX400N 400A 3P3T MICROLOGIC 2.3 | LV432695 | NSX400H 400A 3P3T MICROLOGIC 2.3 |
| 175 | LV432693 | NSX400N 400A 3P3T MICROLOGIC 2.3 | LV432695 | NSX400H 400A 3P3T MICROLOGIC 2.3 |
| 200 | LV432693 | NSX400N 400A 3P3T MICROLOGIC 2.3 | LV432695 | NSX400H 400A 3P3T MICROLOGIC 2.3 |
| 225 | LV432893 | NSX630N 630A 3P3T MICROLOGIC 2.3 | LV432895 | NSX630H 630A 3P3T MICROLOGIC 2.3 |
| 237.5 | LV432893 | NSX630N 630A 3P3T MICROLOGIC 2.3 | LV432895 | NSX630H 630A 3P3T MICROLOGIC 2.3 |
| 250 | LV432893 | NSX630N 630A 3P3T MICROLOGIC 2.3 | LV432895 | NSX630H 630A 3P3T MICROLOGIC 2.3 |
| 275 | LV432893 | NSX630N 630A 3P3T MICROLOGIC 2.3 | LV432895 | NSX630H 630A 3P3T MICROLOGIC 2.3 |
| 300 | LV432893 | NSX630N 630A 3P3T MICROLOGIC 2.3 | LV432895 | NSX630H 630A 3P3T MICROLOGIC 2.3 |

| Short circuit withstand current 50 kA | | | Short circuit withstand current 65 kA | |
|---|---|---|---|---|
| Power kvar | References | Designation | References | Designation |
| 350 | 33466 | NS800N MICROLOGIC 2.0 | 33467 | NS800H MICROLOGIC 2.0 |
| 400 | 33472 | NS1000N MICROLOGIC 2.0 | 33473 | NS1000H MICROLOGIC 2.0 |
| 450 | 33472 | NS1000N MICROLOGIC 2.0 | 33473 | NS1000H MICROLOGIC 2.0 |
| 500 | 33478 | NS1250N MICROLOGIC 2.0 | 33479 | NS1250H MICROLOGIC 2.0 |
| 550 | 33478 | NS1250N MICROLOGIC 2.0 | 33479 | NS1250H MICROLOGIC 2.0 |
| 600 | 33478 | NS1250N MICROLOGIC 2.0 | 33479 | NS1250H MICROLOGIC 2.0 |
| 700 | - | - | 33467 33473 | NS800H MICROLOGIC 2.0 NS1000H MICROLOGIC 2.0 |
| 900 | - | - | 33467 33473 | NS800H MICROLOGIC 2.0 NS1000H MICROLOGIC 2.0 |
| 1000 | - | - | 33479 x 2 | NS1250H MICROLOGIC 2.0 |
| 1150 | - | - | 33479 33483 | NS1250H MICROLOGIC 2.0 NS1600H MICROLOGIC 2.0 |

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# Main protection recommendations
## VarSet polluted PFC Equipment
## without incomer circuit breaker

Following protection are defined in coordination with embedded protection inside the equipment.

| Short circuit withstand current 50 kA | | | Short circuit withstand current 65 kA | |
|---|---|---|---|---|
| Power kvar | References | Designation | References | Designation |
| 50 | LV431830 | NSX250N TM250D 3P3T | LV431670 | NSX250H TM250D 3P3T |
| 75 | LV431830 | NSX250N TM250D 3P3T | LV431670 | NSX250H TM250D 3P3T |
| 87.5 | LV431830 | NSX250N TM250D 3P3T | LV431670 | NSX250H TM250D 3P3T |
| 100 | LV431830 | NSX250N TM250D 3P3T | LV431670 | NSX250H TM250D 3P3T |
| 125 | LV431830 | NSX250N TM250D 3P3T | LV431670 | NSX250H TM250D 3P3T |
| 137.5 | LV432693 | NSX400N 400A 3P3T MICROLOGIC 2.3 | LV432695 | NSX400H 400A 3P3T MICROLOGIC 2.3 |
| 150 | LV432693 | NSX400N 400A 3P3T MICROLOGIC 2.3 | LV432695 | NSX400H 400A 3P3T MICROLOGIC 2.3 |
| 175 | LV432693 | NSX400N 400A 3P3T MICROLOGIC 2.3 | LV432695 | NSX400H 400A 3P3T MICROLOGIC 2.3 |
| 200 | LV432693 | NSX400N 400A 3P3T MICROLOGIC 2.3 | LV432695 | NSX400H 400A 3P3T MICROLOGIC 2.3 |
| 225 | LV432893 | NSX630N 630A 3P3T MICROLOGIC 2.3 | LV432895 | NSX630H 630A 3P3T MICROLOGIC 2.3 |
| 250 | LV432893 | NSX630N 630A 3P3T MICROLOGIC 2.3 | LV432895 | NSX630H 630A 3P3T MICROLOGIC 2.3 |
| 275 | LV432893 | NSX630N 630A 3P3T MICROLOGIC 2.3 | LV432895 | NSX630H 630A 3P3T MICROLOGIC 2.3 |
| 300 | LV432893 | NSX630N 630A 3P3T MICROLOGIC 2.3 | LV432895 | NSX630H 630A 3P3T MICROLOGIC 2.3 |
| 350 | 33466 | NS800N MICROLOGIC 2.0 | 33467 | NS800H MICROLOGIC 2.0 |
| 400 | 33466 | NS800N MICROLOGIC 2.0 | 33467 | NS800H MICROLOGIC 2.0 |
| 450 | 33472 | NS1000N MICROLOGIC 2.0 | 33473 | NS1000H MICROLOGIC 2.0 |
| 500 | 33478 | NS1250N MICROLOGIC 2.0 | 33479 | NS1250H MICROLOGIC 2.0 |
| 550 | 33478 | NS1250N MICROLOGIC 2.0 | 33479 | NS1250H MICROLOGIC 2.0 |
| 600 | 33482 | NS1600N MICROLOGIC 2.0 | 33483 | NS1600H MICROLOGIC 2.0 |
| 700 | - | - | 33461 33473 | NS630BH MICROLOGIC 2.0 NS1000H MICROLOGIC 2.0 |
| 800 | - | - | 33461 33473 | NS630BH MICROLOGIC 2.0 NS1000H MICROLOGIC 2.0 |
| 900 | - | - | 33467 33473 | NS800H MICROLOGIC 2.0 NS1000H MICROLOGIC 2.0 |
| 1000 | - | - | 33473 x 2 | NS1000H MICROLOGIC 2.0 |
| 1100 | - | - | 33473 33479 | NS1000H MICROLOGIC 2.0 NS1250H MICROLOGIC 2.0 |
| 1150 | - | - | 33479 x 2 | NS1250H MICROLOGIC 2.0 |

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## Relevant documents

**Relevant documents published by Schneider Electric**
- Electrical Installation Guide.
- Expert Guide n°4: "Harmonic detection & filtering".
- Expert Guide n°6: "Power Factor Correction and Harmonic Filtering Guide"
- Technical Guide 152: "Harmonic disturbances in networks, and their treatment".
- White paper: controlling the impact of Power Factor and Harmonics on Energy Efficiency.

**Relevant websites**
- http://www.schneider-electric.com
- https://www.solution-toolbox.schneider-electric.com/segment-solutions
- http://engineering.electrical-equipment.org/
- http://www.electrical-installation.org

**Relevant standards**
- IEC 60831 - Shunt power capacitors of the self healing for a.c. systems up to 1000V
- IEC 61642 - Application of filters and shunt capacitors for industrial a.c. networks affected by harmonics
- IEC 61921 - Power capacitors-low voltage power factor correction capacitor banks

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# Notes

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