



VarSet

Mini-Catalog 2018
Low Voltage Capacitor Banks



schneider-electric.us/powerquality

Life Is On

Schneider
Electric

Your requirements...



Optimize energy consumption

- By reducing electricity bills,
- By reducing power losses,
- By reducing CO₂ 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 CO₂ emissions are also reduced.

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



"Our energy consumption 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%, electricity bill optimised by 18%, payback in just

1 year."

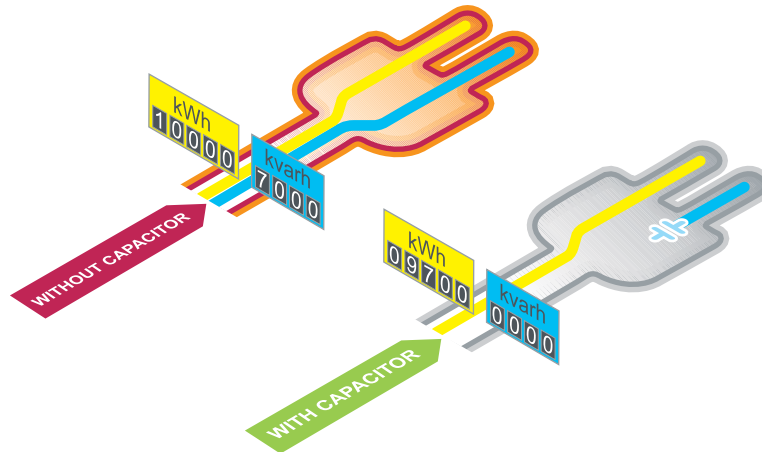
Madrid Barajas airport Spain.

"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.

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).

$$\text{Power Factor} = (kW) / (kVA)$$



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.

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.



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.

Power Factor correction Guidelines

Why reactive energy management?

A



Benefits of reactive energy management

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

Savings on utility bill

- Eliminating penalties on reactive energy and decreasing kW / kVA.
- 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 service capacity

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 cost

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

Improved voltage regulation

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.

Power Factor correction Guidelines

Typical solutions depending on applications

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 Standard	VarSet Detuned	VarSet Fast
Industry			
Food and drink			
Textiles			
Wood			
Paper			
Printing			
Chemicals – pharmaceuticals			
Plastics			
Glass – ceramics			
Steel production			
Metallurgy			
Automotive			
Cement works			
Mining			
Refineries			
Microelectronics			
Tertiary			
Banks - insurance			
Supermarkets			
Hospitals			
Stadiums			
Amusement parks			
Hotels – offices			
Energy and infrastructure			
Substations			
Water distribution			
Internet			
Railway transport			
Airports			
Underground train systems			
Bridges			
Tunnels			
Wind turbines			

A

VarSet offer Overview

VarSet

ISO 9001
Quality certified manufacturing
ISO 14001
Environmental management system



Non contractual picture



B

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.

EcoStruxure™
Innovation At Every Level

EcoStruxure™ Power ready

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

VarSet offer Overview



Safety

> Protection

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

> Robust Enclosure System

- NEMA 1 for indoor application
- high quality welding and painting
- IK10 protection against mechanical shocks

> Tested and certified

- fully type tested and certified to CSA 22.2 No. 190 and to UL 810

Reliability

> Long-life performance

- Schneider capacitor engineered for harsh environment and long life*
- multi level and redundancy 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

> 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

> Future-ready : "Connectable product"

* Cf. Low voltage components catalog PFCED310003EN

VarSet offer

Selection guide

B



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 harmonics

Non-linear loads, such as devices using power electronics, generate harmonics 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 G_h/S_n ratio, with:

- G_h = total power of the non-linear loads
- S_n = rated power of the supply transformer

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

VarSet offer

Selection guide

The compensation needs of your installation vary depending on factors such as load variation, network harmonic content 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

Automatic compensation

Network harmonics

TDDI	<8%
THD(U)	<3%

Choose
VarSet Standard



480 V 60 Hz
from 75 kVAR to 300 kVAR

TDDI	<20%
THD(U)	<7%

Choose
VarSet Detuned



480 V - 60 Hz
from 75 kVAR to 800 kVAR

Load sensitive to transient switching

Automatic and transient-free

TDDI	<8%
THD(U)	<5%

Choose
VarSet Fast



480 V 60 Hz
from 450 kVAR to 1200 kVAR

B

VarSet offer

VarSet Standard

Automatic compensation - standard, 480 V / 60 Hz



B

Environment

- Installation: Indoor
- Ambient temperature: 15 °F to 104 °F (-10 °C to 40 °C)
- Humidity: up to 95%
- Maximum altitude: 6500 feet (2000 m)

Standards

- CSA 22.2 No. 190
- UL810, UL508a

Environment certifications

Produced in 14001 certified plants, product environmental profile available

General characteristics

Electrical Characteristics

Rated Voltage	480 V / 60 Hz
Capacitance Tolerance	-5%, +10%
Connection type	Three-phase
Power losses	< 2.5 W/kVAR
Maximum permissible over current	1.35 In
Maximum permissible over voltage	1.1 x Un, 8 h every 24 h

Enclosure

Degree of protection	NEMA 1
Colour	RAL 7035
Degree of mechanical resistance	IK10 and Sec 43 UL810

Controller

VarPlus Logic	VarPlus Logic controller with embedded Modbus communication
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Head circuit breaker protection

Without incoming circuit breaker	Lug connection LV PFC Bank must be protected by a circuit breaker or by a fused disconnect on upstream switchboard
With incoming circuit breaker	PowerPact with rotary handle

Step

Capacitors Type	Varplus Can 575 V for network voltage 480V Maximum over current: 1.8 In 3-phase overpressure protection Discharge resistance 50 V - 1 min
Contactors	Dedicated to capacitor switching
Circuit breaker protection	PowerPact

Temperature control

Double control	By thermostat and by controller
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Communication

ModBus	RS485
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Installation

Customer connection	Top entry
Auxiliary transformer	120 V included - no need for additional supply
CT not included	5 VA - secondary 1 or 5 A To be installed upstream of the load and capacitor bank
GenSet contact	Available for disconnection with generator
Alarm contact	Available for remote warning signal

VarSet offer VarSet Standard

Automatic compensation - standard, 480 V / 60 Hz



Network voltage 480V - 60Hz

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References	Power (kVAR)	Smallest step	Resolution	Electrical steps (#)	Physical steps (#)	Breaking Capacity	Main Circuit breaker	Enclosure type	Enclosure size (H x W x D) mm	Max weight (kg/lbs)
With incoming circuit breaker										
VLVAW2N66075AB	75	12.5	12.5 + 25 + 37.5	6	3	65 kA	HLF36150	VLVAW2N	850 x 800 x 400	80 / 175
VLVAW2N66100AB	100	25	25 + 25 + 50	4	3		JLF36200		33.5x31.5x15.7 in	
VLVAW3N66125AB	125	25	25 + 50 + 50	5	3		LLF36600U31X	VLVAW3N	1200 x 1000 x 400	125 / 275
VLVAW3N66150AB	150	25	25 + 25 + 2x50	6	4	65 kA	LLF36600U31X		47.2 x 39.4 x 15.7 in	
VLVAW3N66175AB	175	25	25 + 3x50	7	4		LLF36600U31X			
VLVAW3N66200AB	200	25	25 + 25 + 3x50	5	5		LLF36600U31X			
VLVAW3N66225AB	225	25	25 + 4x50	9	5		LLF36600U31X			
VLVAW3N66250AB	250	25	5x50	5	5	65 kA	LLF36600U31X			
VLVAW3N66275AB	275	25	25 + 5x50	11	6		LLF36600U31X			
VLVAW3N66300AB	300	50	6x50	6	6		LLF36600U31X			

References	Power (kVAR)	Smallest step	Regulation	Electrical steps (#)	Physical steps (#)	Short-time withstand current	Recommended upstream protection	Enclosure type	Enclosure size (H x W x D) mm	Max weight (kg/lbs)
With main lugs										
VLVAW2N66075AA	75	12.5	12.5 + 25 + 37.5	6	3	3 cycles	HLF36150	VLVAW2N	850 x 800 x 400	80 / 175
VLVAW2N66100AA	100	25	25 + 25 + 50	4	3		JLF36200		33.5x31.5x15.7 in	
VLVAW3N66125AA	125	25	25 + 50 + 50	5	3		LLF36600U31X	VLVAW3N	1200 x 1000 x 400	125 / 275
VLVAW3N66150AA	150	25	25 + 25 + 2x50	6	4	3 cycles	LLF36600U31X		47.2 x 39.4 x 15.7 in	
VLVAW3N66175AA	175	25	25 + 3x50	7	4		LLF36600U31X			
VLVAW3N66200AA	200	25	25 + 25 + 3x50	5	5		LLF36600U31X			
VLVAW3N66225AA	225	25	25 + 4x50	9	5		LLF36600U31X			
VLVAW3N66250AA	250	25	5x50	5	5		LLF36600U31X			

VarSet offer

VarSet Detuned

Automatic compensation – detuned, 480V / 60Hz

Tuning order 4.2

B



Environment

- Installation: Indoor
- Ambient temperature: -5 °C to 40 °C
- Humidity: up to 95%
- Maximum altitude: 2000 m

Standards

- CSA 22.2 No. 190
- UL810, UL508a

Environment certifications

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

General characteristics

Electrical Characteristics

Rated Voltage	480 V - 60 Hz
Capacitance Tolerance	-5%, +10%
Connection type	Three-phase
Power losses	< 6 W/kVAR
Maximum permissible over current	1.3 x In
Maximum permissible over voltage	1.1 x Un, 8 h every 24 h

Enclosure

Degree of protection	NEMA 1
Colour	RAL 7035 (VLV model) / ASA 49 (AV/BV Model)
Degree of mechanical resistance	IK10 for VLV, Sec 43 UL810 for VLV and AV/BV models

Controller

VarPlus Logic	VarPlus Logic controller with embedded Modbus communication
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Head circuit breaker protection

Without incoming circuit breaker	Lug connection LV PFC Bank must be protected by a circuit breaker or by a fused disconnect on upstream switchboard
With incoming circuit breaker	PowerPact with rotary handle

Step

Capacitors Type	Varplus Can 575 V for network voltage 480 V Maximum overcurrent 1,8xIn 3 ph overpressure disconnection system Discharge resistor 50 V - 1 mn
Contactors	Dedicated to capacitor switching
Detuned reactor	Varplus DR Overheating protection by thermostat
Circuit breaker protection	PowerPact

Temperature control

Double control	By thermostat and by controller
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Communication

ModBUS	RS485
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Installation

Customer connection	Top Entry
Auxilliary transformer	120 V included - no need for additionnal supply
CT not included	5 VA - secondary 1 or 5 A To be installed upstream of the load and capacitor bank
GenSet contact	Available for disconnection with generator
Alarm contact	Available for remote warning signal

Options available on request:

- Fixed stages (by controller programming)
- Custom staging ratios
- Other voltages and frequencies
- Outdoor arrangement - built to NEMA 3R (AV/BV models only)
- Bottom cable entry to main lugs (AV models only)
- Bottom cable entry to main breaker (BV models only)

VarSet offer VarSet Detuned

Automatic compensation – detuned, 480V / 60Hz
Tuning order 4.2

References	Power (kVAR)	Smallest step	Resolution	No. of electrical steps	No. of physical steps	Breaking capacity	Main Circuit breaker	Enclosure type	Enclosure size (H x W x D) mm / in	Max weight (kg/lb)
With incoming circuit breaker										
VLVAF4P66075AB	75	25	25 + 50	6	2	65 kA	HLF36125	VLVAF4P	1200 x 1300 x 400 47.2 x 51.2 x 15.7in	265 / 585
VLVAF4P66100AB	100	25	25 + 25 + 50	4	3		JLF36175			
VLVAF4P66125AB	125	25	25 + 2x50	5	3		JLF36200			
VLVAF4P66150AB	150	25	25 + 25 + 2x50	6	4		LLF36600U31X			
VLVAF4P66175AB	175	25	25 + 3x50	7	4		LLF36600U31X			
VLVAF4P66200AB	200	50	4x50	5	4		LLF36600U31X			
BV025046CV5F1N	250	50	50 + 2x100	5	3	65 kA	RKL type	BV 1 Section	2324 x 762 x 915 91.5 x 30 x 36 in	747 / 650
BV030046BV5F1N	300	50	50 + 50 + 2x100	6	4		RKL type			793 / 1750
BV035046CV5F2N	350	50	50 + 3x100	7	4		RKL type	BV 2 Sections	2324 x 1524 x 91 91.5 x 60 x 36 in	1110 / 2450
BV040046AV8F2N	400	100	4x100	4	4		RKL type			1155 / 2550
BV045046CV5F2N	450	50	50 + 4x100	9	5		RKL type			1223 / 2700
BV050046AV8F2N	500	100	5x100	5	5		RKL type			1291 / 2850
BV055046CV5F2N	550	50	50 + 5x100	11	6		RKL type			1359 / 3000
BV060046AV8F2N	600	100	6x100	6	6		RKL type			1427 / 3150
BV065046CV5F2N	650	50	50 + 6x100	13	7		RKL type			1495 / 3300
BV070046AV8F2N	700	100	7x100	7	7		RKL type			1563 / 3450
BV075046CV5F3N	750	50	50 + 7x100	15	8		RKL type	BV 3 Sections	2324 x 2286 x 915 91.5 x 90 x 36 in	1835 / 4050
BV080046AV8F3N	800	100	8x100	8	8		RKL type			1903 / 4200

References	Power (kVAR)	Smallest step	Regulation	No. of electrical steps	No. of physical steps	Short-time withstand current	Recommended upstream protection	Enclosure type	Enclosure size (H x W x D) mm / in	Max weight (kg/lb)
With main lugs										
VLVAF4P66075AA	75	25	25 + 50	6	2	3 cycles	HLF36125	VLVAF4P	1200 x 1300 x 400 47.2 x 51.2 x 15.7 in	265 / 585
VLVAF4P66100AA	100	25	25 + 25 + 50	4	3		JLF36175			
VLVAF4P66125AA	125	25	25 + 2x50	5	3		JLF36200			
VLVAF4P66150AA	150	25	25 + 25 + 2x50	6	4		LLF36600U31X			
VLVAF4P66175AA	175	25	25 + 3x50	7	4		LLF36600U31X			
VLVAF4P66200AA	200	50	4x50	5	4		LLF36600U31X			
AV025046CV5F1N	250	50	50 + 2x100	5	3	4 cycles	RKL type	AV 1 Section	2324 x 762 x 915 91.5 x 30 x 36 in	612 / 1350
AV030046BV5F1N	300	50	50 + 50 + 2x100	6	4		RKL type			657 / 1450
AV035046CV5F1N	350	50	50 + 3x100	7	4		RKL type	AV 2 Sections	2324 x 1524 x 915 91.5 x 60 x 36 in	725 / 1600
AV040046AV8F1N	400	100	4x100	4	4		RKL type			793 / 1750
AV045046CV5F2N	450	50	50 + 4x100	9	5		RKL type			1132 / 2500
AV050046AV8F2N	500	100	5x100	5	5		RKL type			1200 / 2650
AV055046CV5F2N	550	50	50 + 5x100	11	6		RKL type			1268 / 2800
AV060046AV8F2N	600	100	6x100	6	6		RKL type			1336 / 2950
AV065046CV5F2N	650	50	50 + 6x100	13	7		RKL type			1404 / 3100
AV070046AV8F2N	700	100	7x100	7	7		RKL type			1472 / 3250
AV075046CV5F2N	750	50	50 + 7x100	15	8		RKL type			1540 / 3400
AV080046AV8F2N	800	100	8x100	8	8		RKL type			1608 / 3550

VarSet offer

VarSet Fast

Automatic and transient free compensation – detuned, 480 V / 60Hz
Tuning order 4.2



B

Environment

- Installation: Indoor
- Ambient temp: 15 °F to 104 °F (-5 °C to 40 °C)
- Humidity: up to 95%
- Maximum altitude: 6500 feet (2000 m)

Standards

- CSA 22.2 No. 190
- UL810, UL508a

Environment certifications

Produced in 14001 certified plants, product environmental profile available

General characteristics

Electrical Characteristics

Rated Voltage	480 V / 60 Hz
Capacitance Tolerance	-5% +10%
Connection type	Three-phase
Power losses	< 13 W per kVAR
Maximum permissible over current	1,3 x In
Maximum permissible over voltage	1,1 x Un, 8 h per 24 h

Enclosure

Degree of protection	NEMA 1
Colour	ASA 49 (AT Model)
Degree of mechanical resistance	Sec 43 UL810

Controller

VarPlus Logic	VarPlus Logic controller with embedded Modbus communication
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Head circuit breaker protection

Without incoming circuit breaker	Lug connection LV PFC Bank must be protected by a circuit breaker or by a fused disconnect on upstream switchboard
With incoming circuit breaker	PowerPact with rotary handle

Step

Capacitors Type	Varplus Can 575V for network voltage 480V Maximum overcurrent 1,8xIn 3 ph overpressure disconnection system Discharge resistor: 50 V - 1 mn
Transient-free switches	Electronically controlled to avoid capacitor switching transients
Detuned Reactor	Varplus DR Overheating protection by thermostat
Circuit breaker protection	PowerPact

Temperature control

Double control	By thermostat and controller
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Communication

ModBUS	RS485
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Installation

Customer connection	Top entry
Auxiliary transformer	120 V included - no need of additionnal supply
TI not included	5 VA - secondary 1 A or 5 A To be installed upstream of the load and capacitor bank
GenSet contact	Available for disconnection with the generator
Alarm contact	Available for remote warning signal

Options available on request:

- Fixed stages (by controller programming)
- Custom staging ratios
- Other voltages and frequencies
- Outdoor arrangement - Built to NEMA 3R (AV/BV models only)
- Bottom cable entry to main lugs or main breaker requires incoming cubicle

VarSet offer VarSet Fast

Automatic and transient free compensation – detuned, 480 V / 60Hz
Tuning order 4.2

Network 480V - 60Hz

References	Power (kVAR)	Smallest step	Resolution	No. of electrical and physical steps	Breaking Capacity	Main Circuit breaker	Enclosure type	Enclosure size (H x W x D) mm / in	Max weight (kg/lb)
With incoming circuit breaker									
BT045046AVBF2N	450	150	3x150	6	65 kA	RKL type	BT 1 Section	2324 x 762 x 915 91.5 x 30 x 36 in	900 / 2000
BT060046AVBF2N	600	150	4x150	4		RKL type	BT 2 Sections	2324 x 1524 x 915 91.5 x 60 x 36 in	1400 / 3100
BT090046AVBF3N	900	150	6x150	5		RKL type	BT 2 Sections	2324 x 1524 x 915 91.5 x 60 x 36 in	1540 / 3400
BT120046AVBF3N	1200	150	8x150	6		RKL type	BT 3 Sections	2324 x 2286 x 915 91.5 x 90 x 36 in	2310 / 5100

References	Power (kVAR)	Smallest step	Resolution	No. of electrical and physical steps	Short-time withstand current	Recommended upstream protection	Enclosure type	Enclosure size (H x W x D) mm / in	Max weight (kg/lb)
With main lugs									
AT045046AVBF2N	450	150	3x150	6	4 cycles	RKL type	AT 1 Section	2324 x 762 x 915 91.5 x 30 x 36 in	770 / 1700
AT060046AVBF2N	600	150	4x150	4		RKL type	AT 2 Sections	2324 x 1524 x 915 91.5 x 60 x 36 in	1360 / 3000
AT090046AVBF3N	900	150	6x150	5		RKL type	AT 2 Sections	2324 x 1524 x 915 91.5 x 60 x 36 in	1500 / 3300
AT120046AVBF3N	1200	150	8x150	6		RKL type	AT 3 Sections	2324 x 2286 x 915 91.5 x 90 x 36 in	2270 / 5000

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VarSet offer

VarSet Hybrid

Hybrid Compensator System – 480V / 60Hz



VarSet Hybrid provides real time power factor correction, voltage support, and harmonic suppression.

This is a custom, engineered to order solution that is comprised of a VarSet Detuned Capacitor Bank with either an Active Harmonic Filter (AccuSine PCS+) or an AccuSine Electronic Var Compensator (AccuSine PFV+).

The VarSet Hybrid provides instantaneous and infinitely variable power factor correction for industrial networks containing highly transient or unstable loads, as well as system compensation for large AC motor inrush current.

It integrates conventional power factor correction systems and the latest IGBT-based solutions to provide ultra rapid response and infinitely variable kVAR control never before seen in a power factor correction product. Specifically designed for the instantaneous support required by welding equipment, the VarSet Hybrid eliminates voltage sags and voltage flicker while increasing system capacity, providing energy savings and improving weld quality. It also provides current inrush support for applications such as large horsepower motor starting.

Product features

- Ultra fast reactive current compensation for transient or cyclical loads
- Infinitely variable control
- Instantaneous response for inrush support
- Independently compensates each phase
- Heavy duty dry capacitors provide no risk of fluid leakage, no environmental pollution and no need for drip pans
- Detuned iron core reactors prevent resonance
- IGBT based power electronic technology
- Stepless power factor correction
- Best-in-class harmonic cancellation up to 50th harmonic and less than 3% THDi
- Energy efficient 3-level IGBT inverter technology
- All major components from Schneider Electric

B

Your Schneider Electric representative can help you select the correct Hybrid solution for your specific needs.

To learn more, contact us at powersolutions@schneider-electric.com



VarSet offer VarSet accessories

A current transformer is required for automatic control

In order to have automatic control, a current transformer must be ordered in addition to the PFC bank.

A current transformer (not included) is necessary to provide accurate network information to the VarSet's controller in order to apply the correct quantity of kVAR at any given time.

Note: CT must be sized to your network and have a secondary rating of 5 A.

CT catalog number: TRAI****SC^^ where **** is current rate code of bus/cable and ^^ is window size code. Codes are listed in the table below.

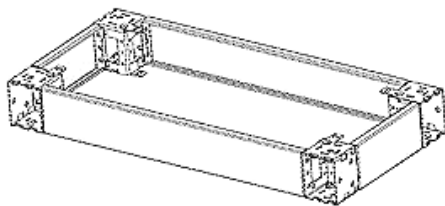
E.g. TRAI1000SC07 is a CT for 1000 A bus with 7" x 4" window.

CT selection table

Current rating of Bus/Cable		Window size	
Amperes	Rating Code	7" x 4" size code	11" x 4" size code
600	0600	07	N/A
800	0800	07	N/A
1000	1000	07	N/A
1200	1200	07	11
1500	1500	07	N/A
1600	1600	07	N/A
2000	2000	07	11
2500	2500	07	11
3000	3000	07	11
3500	3500	07	11
4000	4000	07	11
5000	5000	N/A	11
6000	6000	N/A	11

B

Floor mounting of VLVAW2N and VLVAW3N models



For enclosure	Order the following parts
VLVAW2N	NSYSPF8100 + NSYSPS4100
VLVAW3N	NSYSPF10100 + NSYSPS4100

VarSet offer

Construction of references

VarSet Standard & VarSet Detuned

VLVAW2N	6	6	1	0	0	AA
Equipment type (7 digits)	Voltage	Frequency	Power (3 digits)			Used to differentiate incomer (2 digits)
VLVAW2N: small-size standard VLVAW3N: mid-size standard VLVAF4P: detuned	6 = 480 V	6 = 60 Hz	e.g 100 = 100 kVAR			AA = lugs AB = incoming CB

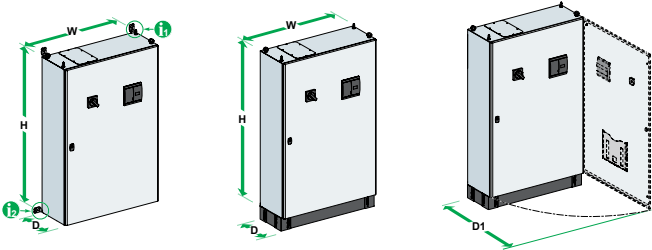
VarSet Detuned & VarSet Fast

A	V	0 3 0 0	4	6	A	V	5	F	1	N
Equipment type (2 digits)	Power (4 digits)	Voltage	Series designation	Stage ratio of controller	Cable entry	Smallest step size (kVAR)	Enclosure type and paint	Lug size per phase	N	
AV= automatic standard with main lugs BV= automatic standard with main circuit breaker AT = automatic transient free with main lugs BT = automatic transient free with main circuit breaker	eg. 0300=300 kVAR	4 = 480 V	6 = Detuned	A= 1:1:1:1:1:1:1... B= 1:1:2:2:2:2:2... C= 1:2:2:2:2:2:2...	V = Top	5=50 8=100 B=150	F=NEMA 1 ASA 49 paint G=NEMA 1 with drip guard ASA 49 paint	Copper saddle clamp 1 = 2 X 1/0 to 500MCM 2 = 4 x 1/0 to 500MCM 3 = 6 x 1/0 to 500MCM	No option	

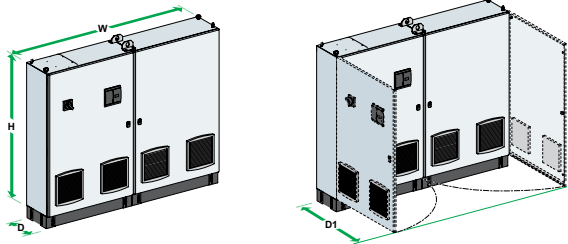
B

VarSet offer
Typical dimensions

VLVAW2N and VLVAW3N



VLVAF4P



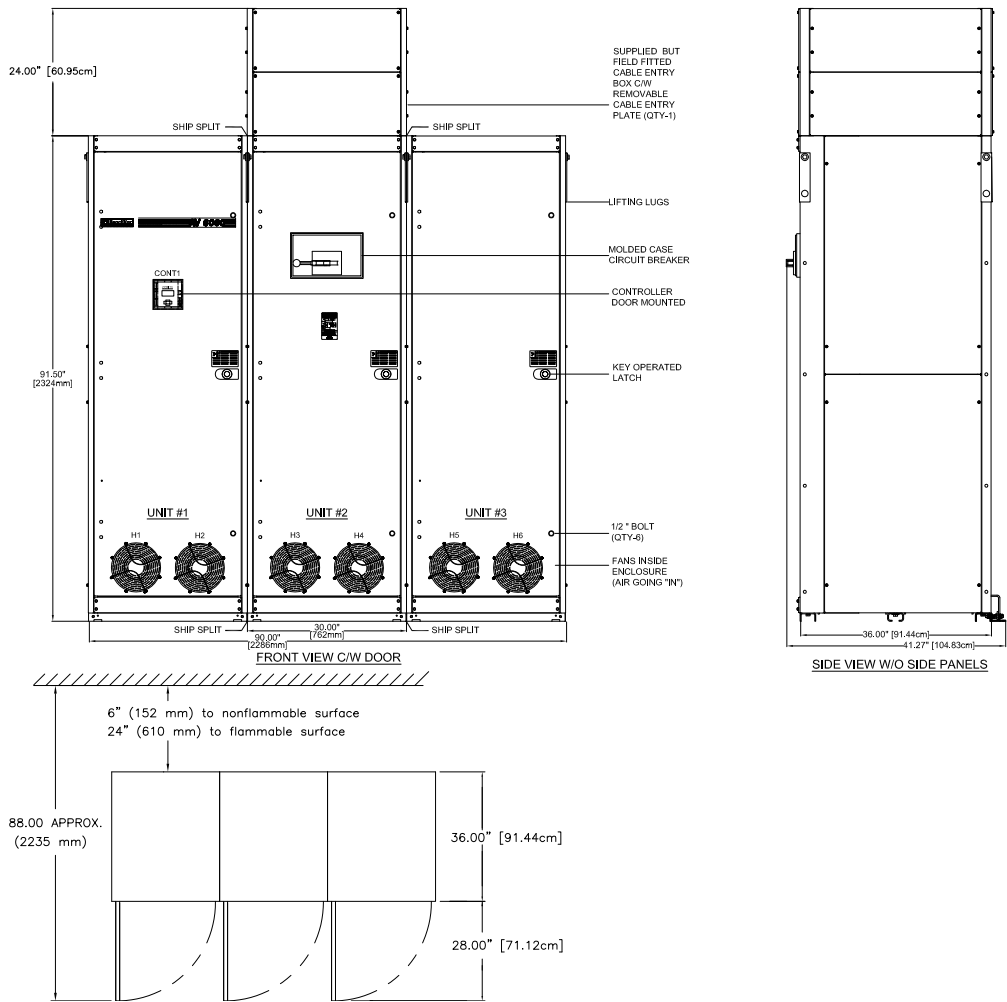
Dimensions and weight

Type	Dimensions (mm / inches)			
	H	W	D	D1
VLVAW2N	850/33.5	800/31.5	400/15.7	1200/47.2
VLVAW3N	1200/47.2	1000/39.4	400/15.7	1400/55.1
VLVAF4P	1200/47.2	1300/51.2	400/15.7	1200/47.2
AV/BV/AT/BT 1 section	2324/91.5*	762/30	915/36	1626/64
AV/BV/AT/BT 2 sections	2324/91.5*	1524/60	915/36	1626/64
AV/BV/AT/BT 3 sections	2324/91.5*	2286/90	915/36	1626/64

* With cable entry 24", H=2934 / 115.5 - Entry cable supplied but to be fitted on field

* With cable entry 12", H=2629 / 103.5 - Entry cable supplied but to be fitted on field

AV,BV,AT,BT
models



B

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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.us>
- <https://www.schneider-electric.us/powerquality>
- <http://engineering.electrical-equipment.org/>
- <http://www.electrical-installation.org>

Relevant standards

- CSA 22.2 No.190 - Capacitors for power factor correction
- UL810 - Capacitors
- UL508a - Standard for industrial panels

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