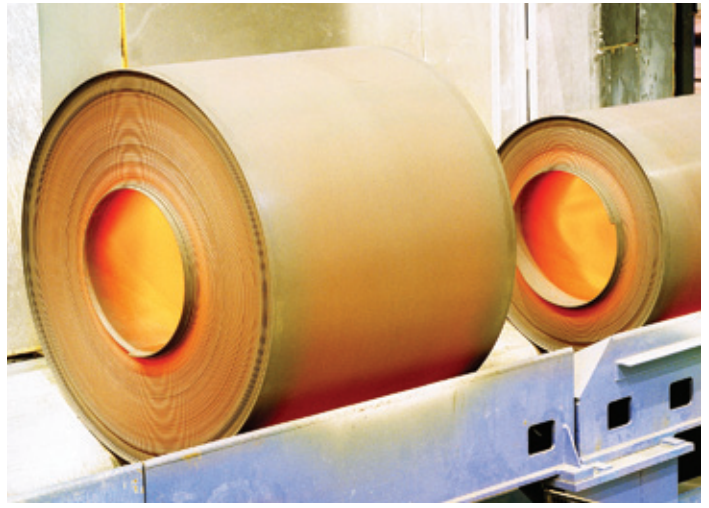




Technical brochure

The Vector series

The ABB comprehensive solution for automatic power factor correction



The Vector series

The Vector series is a powerful and compact automatic capacitor bank that provides the ideal power factor correction (PFC) solution for industrial and commercial networks.

ABB is the world leading supplier of high-technology solutions that deliver optimized power quality for low voltage networks by eliminating harmonic disturbances and improving power factor. ABB's extensive experience and leading edge technology has come together to create the Vector series of power factor correction (PFC) equipment – the latest addition to our comprehensive portfolio of power quality products.

State-of-the-art capacitor technology

Vector provides ABB's state-of-the-art CLMD03 capacitor technology in a modular system that is easy to install, operate and service while ensuring exceptional reliability and efficiency.

Powerful and compact

Vector features a specially designed ventilation system to deliver the maximum possible reactive power within a minimum volume. Power ranges from 25 to 400 kvar are available (in different configurations).

Vector series – a world of energy efficient applications

Vector power factor correction equipment can help optimize power networks for energy efficient operation in a wide variety of applications including:

- Mining
- Heavy industry
- Chemical
- Pulp and paper
- Shipping
- Cement
- Plastics
- Petro-Chemical
- Printing
- Food industry



The Vector series

Flexible solutions for installers and panel builders

The Vector series includes 4 modules:

- 3 different series of free-standing, floor mounted cubicles (Vector 400D, 300 and 200)
- A wall mounted enclosure (Vector 100)

Vector also includes individual capacitor shelves that enable panel builders to incorporate ABB's PFC technology within their own low voltage panels.

Easy to install

- Vector and commission assemblies are complete units, factory tested and ready for on site installation.
- Easy handling

Easy to use

Simple and easy to operate thanks to the multiple automatic functions provided by the integral RVC controller.

Detuned installations and network studies

The presence of harmonic currents can cause unacceptable disturbances in the supply network, and adversely affect the operation of other electrical equipment, including power factor correction capacitors. On request, ABB's Power Quality specialists will carry out a harmonic study of your network. If harmonics are present, we can offer the Vector assembly complete with detuning reactors that prevents any risk of resonance, for maximum reliability and safety.

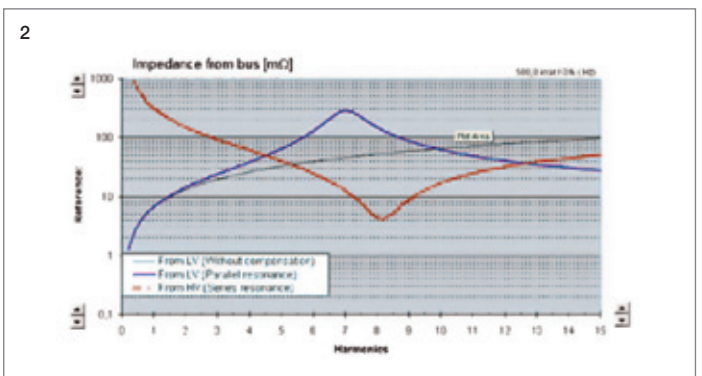
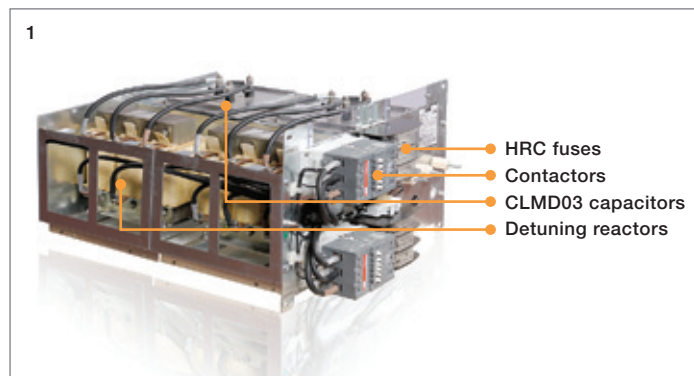
Total service approach

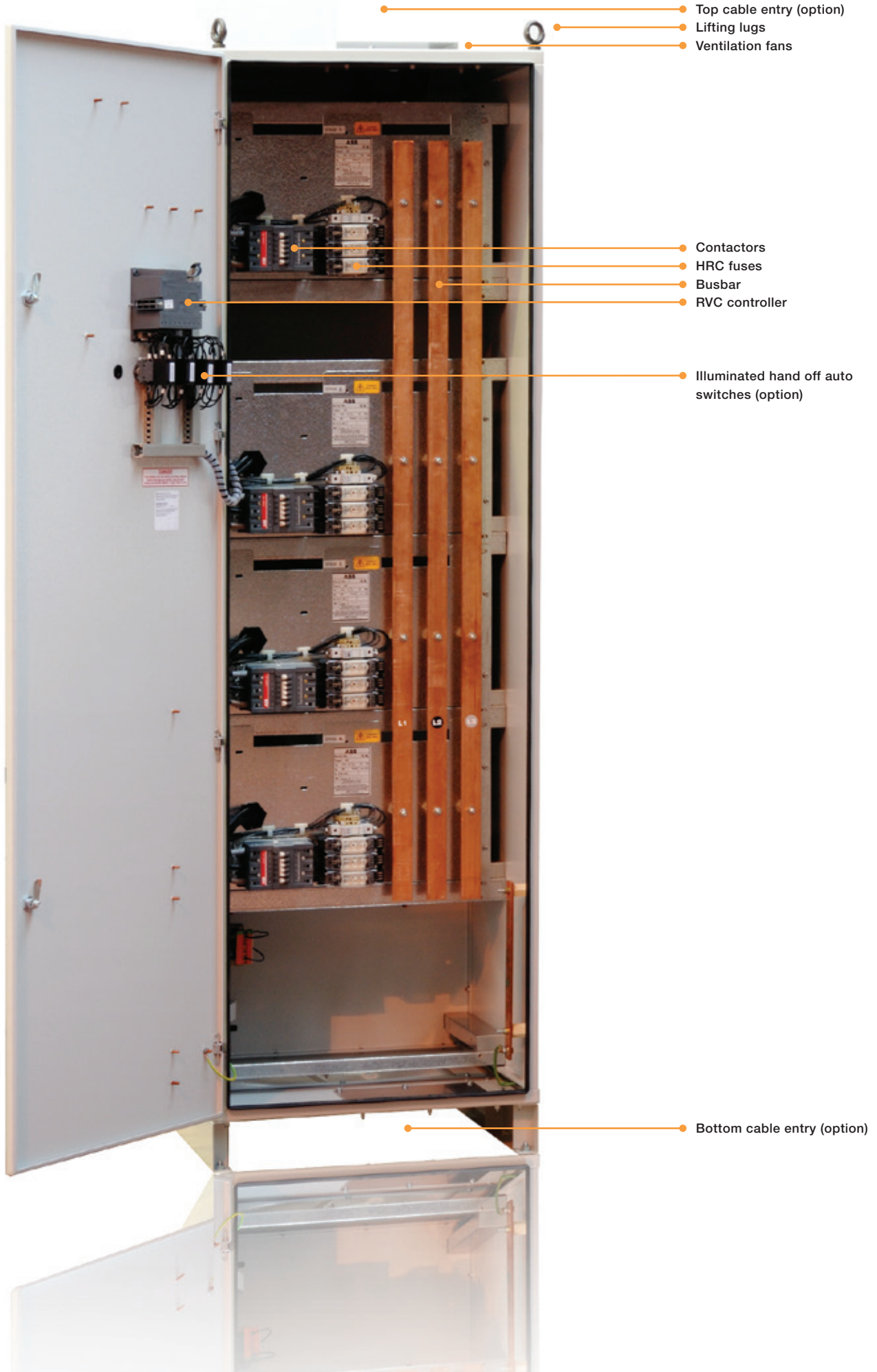
ABB's total PFC equipment approach goes well beyond supplying the Vector modules. Thanks to the unrivalled technical backup of the global ABB organization we support our customers through every step of the project, from establishing the problem, identifying the ideal solution and then installing and commissioning your PFC equipment. For complete peace of mind, we offer a comprehensive PFC equipment maintenance and repair service anywhere in the UK.

Standards

The Vector series fully complies with EN6192.

1 Vector double shelf | 2 Waveform | 3 Vector 100 wall mounted cubicle | 4 Vector service | 5 Vector cubicle





Reliable and safe

Vector's exceptional reliability is achieved by using a set of ABB components specially designed for reactive power compensation applications. Vector has an IP41 protection level (closed door) and is protected against direct and accidental contact (open door).

ABB Contactors

The Vector contactors are specially selected for their capacitor switching capability.

CLMD Capacitors

ABB's CLMD capacitors are acknowledged worldwide as the most reliable, durable and fail-safe dry capacitors on the market today. They represent the combination of over 60 years experience in manufacturing dry capacitors with state-of-the-art technology, such as the unique patented sequential protection system.

CLMD03

At the heart of the Vector is the latest addition to the CLMD range – the new CLMD03 that provides all the advantages of ABB's dry capacitor technology in a compact case, delivering high performance within a small installation footprint. The CLMD03 features an innovative approach to materials and ventilation that promotes enhanced heat dissipation – this enables it to offer up to 50 kvar in a single unit.

The CLMD03 design offers a number of exceptional properties:

- High voltage withstand capability
- Excellent peak current handling capacity
- High capacitance stability
- Long life even under high electrical stress
- Very low losses
- Exceptional self-healing properties

The CLMD03 is available in two versions: one single capacitor section or two sections. Within the double-capacitor version the power is distributed over two sets of three-phase terminals in order to achieve respectively 1/3 and 2/3 of the total power.

1 CLMD03 units | 3 Capacitor element (IPE) | 3 CLMD03 capacitor

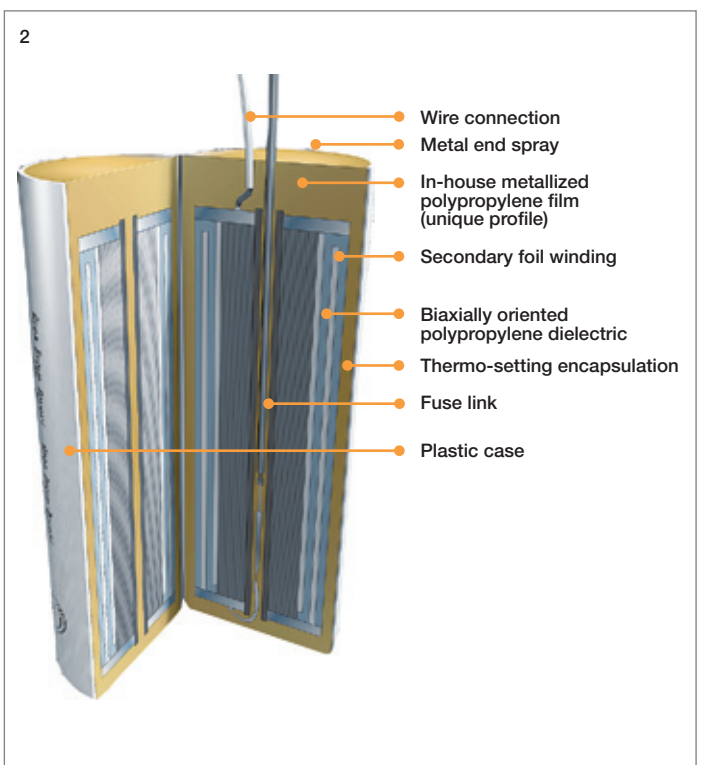
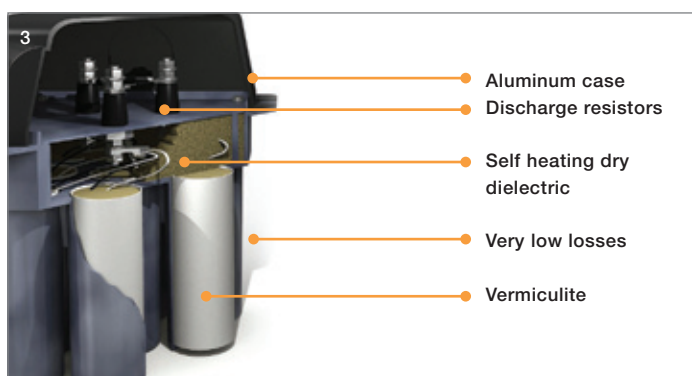


ABB Reactors (for detuned installations)

For detuned Vector installations, ABB offers iron cored reactors specially designed to suit reactive power compensation applications. Their exceptional linearity and thermal stress resistance characteristics ensure a high level of reliability even in the case of temporary overvoltage.

RVC PF Controller

As standard, the Vector modules incorporate ABB's RVC PF (Power Factor) controller that offers a number of key features:

- Unaffected by harmonics
- Complies with EU directives for EMC for operation at 50 Hz and carries the relevant CE marking
- Suitable for hot environments thanks to its maximum ambient operating temperature of +60°C
- Fitted with an overvoltage/undervoltage protection and protection against harmonic distortion (THDV)

Environment friendly

The ISO 14001 certification guarantees ABB's commitment to the environment.



Reactor unit

RVC PF Controller



Options and wiring diagram

Vector options

- Main circuit-breaker/isolator
- Top cable entry
- RVT controller

RVT

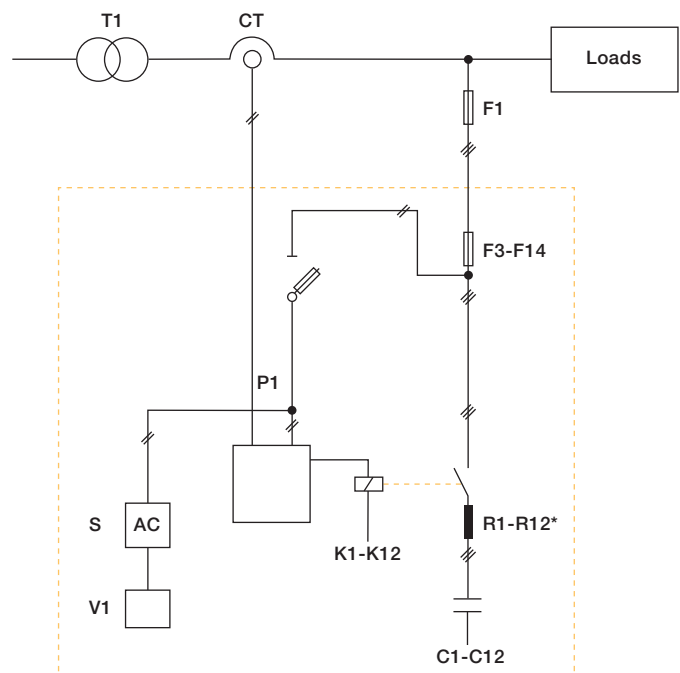
For maximum protection of your Vector installation against temporary network quality problems, ABB offers the optional RVT PF controller.

While incorporating all the functions of the RVC, the RVT provides additional features including:

- Programmable protection thresholds (undervoltage, over-temperature, excessive harmonic distortion)
- Full graphics display with backlighting
- Guided navigation and programming
- Network information and bank monitoring (voltage, current, harmonics spectrum)
- RS-485 Modbus adapter allowing communication with a monitoring system
- All RVT parameters are remotely accessible (including harmonic spectra and tables)
- Multi-language support
- Help button giving instant access to a description of all RVT features and functionality
- Printer connection
- Input contacts for day/night cos ϕ and external alarm
- Output contacts for alarm and fan relays

Wiring diagram

- C1...C12 - Capacitor steps
- F1 - Main fuses or protective devices
- F2 - Control fuses
- F3...F14 - Capacitor step fuses
- K1...K12 - Contactors
- P1 - PF controller
- T1 - Power transformer
- S - VT supply
- CT - Current transformer
- V1 - Fan
- R1...R12 - Reactors (*de-timed only)



RVT modbus attached to RVT controller

For further information on the RVT controller, please refer to our specific documentation.

Technical specifications

Configuration

- Master unit only
- Master and slave units
- Slave units are not equipped with PF controller but are fitted with H/O/A storage selector switches

Power factor setting

- From 0.7 inductive to 0.7 capacitive

Starting current setting (C/k)

- From 0.01 A to 3 A for the RVC controller
- From 0.01 A to 5 A for the RVT controller

Operation

Automatic or manual setting of the controller with indication of:

- The number of active outputs
- The inductive or capacitive power factor
- Alarm conditions
- Overtemperature
- Demand for switching on/off a capacitor step
- Voltage, current, THDV and THDI
- Threshold setting for protection against overvoltage, undervoltage and high THDV

Installation

- Dielectric losses: less than 0.2 Watt/kvar
- Capacitor total losses: less than 0.5 Watt/kvar (discharge resistors included)
- Automatic bank total losses at 415 V 50 Hz:
 - Without reactors: less than 1.5 Watt/kvar (including accessories losses), with reactors: less than 6 Watt/kvar (including accessories losses)

Capacitors

- Dry type self healing according to IEC 60831-1&2
- Voltage test: 2.15 Un between terminals during 10 sec at rated frequency (above IEC 60831-1&2)
- Acceptable overloads:
 - Overvoltage tolerance: 10% max. intermittently
 - Overcurrent tolerance: 30% permanently
- Temperature range: -25°C/class D according to IEC 60831-1&2

Connection

- Three phase

Reactors (APCR only)

- Type iron cored according to IEC 289, VDE0532
- Maximal harmonic voltage distortion:
 - 210 Hz standard
 - Other frequencies available on request

Standards

The automatic capacitor bank complies with EN 61921.

Automatic capacitor bank tests

- Insulation test
- Functional test

CE Marked

Protection

- IP41 (closed door)
- Protected against direct and accidental contact (open door)

Location

- Indoor

Color

- Light grey RAL 7035

Ambient temperature

- -5°C/+40°C according to EN 61921

Ventilation

- Forced

Installation

- Box:
 - Wall mounting (Vector 100 series)
 - Top or bottom cable entry
- Cubicle:
 - Floor mounted
 - Equipped with a plinth
 - Lifting lugs provided
 - Top or bottom cable entry

Important notice

The installation of capacitors on networks disturbed by harmonics may require special precautions especially when there is a risk of resonance.

Technical information

415 V 50 Hz Standard range

Optional Integral Isolation with MCCB or Switch-disconnector

Type	Power (kvar) at 415 V	Step rating	Optional isolation
Vector 100	25	1x25	Yes
	37.5	1x12.5 + 1x25	Yes
	50	2x25	Yes
		1x50	Yes
	75	2x37.5	Yes
		1x25 + 1x50	Yes
100	2x50	Yes	
Vector 200	75	2x12.5 + 2x25	Yes
		3x25	Yes
	100	4x25	Yes
		2x25 + 1x50	Yes
	125	1x25 + 2x50	Yes
	150	2x25 + 2x50	Yes
3x50		Yes	
200	4x50	Yes	
Vector 300	150	4x12.5 + 4x25	Yes
		2x12.5 + 5x25	Yes
	175	2x12.5 + 6x25	Yes
		2x12.5 + 4x25 + 1x50	Yes
		7x25	Yes
	200	2x12.5 + 3x25 + 2x50	Yes
		8x25	Yes
		6x25 + 1x50	Yes
	225	2x12.5 + 2x25 + 3x50	Yes
		5x25 + 2x50	Yes
	250	6x25 + 2x50	Yes
	275	2x12.5 + 2x25 + 4x50	Yes
		3x25 + 4x50	Yes
	300	4x25 + 4x50	Yes
	325	1x25 + 6x50	Yes
	350	2x25 + 6x50	Yes
7x50		Yes	
375	1x25 + 7x50	Yes	
400	8x50	Yes	
	2x50 + 3x100	Yes	

Other ratings available on request

415 V 50 Hz Detuned range

Optional Integral Isolation with MCCB or Switch-disconnector

Type	Reactor (%)	Power (kvar) at 415 V	Step rating	Optional isolation
Vector 200D	5.67	25	1x25	Yes
		50	1x50	Yes
		50	2x25	Yes
		75	1x25 + 1x50	Yes
		100	2x50	Yes
Vector 300D	5.67	75	3x25	Yes
		100	4x25	Yes
			2x25 + 1x50	Yes
		125	1x25 + 2x50	Yes
			3x25 + 1x50	Yes
		150	2x25 + 2x50	Yes
			3x50	Yes
175	1x25 + 3x50	Yes		
200	4x50	Yes		
Vector 400D	5.67	175	2x12.5 + 6x25	No
		225	7x25 + 1x50	No
		250	6x25 + 2x50	No
		275	5x25 + 3x50	No
		300	4x25 + 4x50	No
		325	3x25 + 5x50	No
		350	2x25 + 6x50	No
		375	1x25 + 7x50	No
		400	8x50	No
			2x50 3x100	No
		150	6x25	Yes
		175	5x25 + 1x50	Yes
		200	4x25 + 2x50	Yes
		225	3x25 + 3x50	Yes
		250	2x25 + 4x50	Yes
		275	1x25 + 5x50	Yes
		300	6x50	Yes
2x50 2x100	Yes			

Other reactors and ratings available on request

Dimensions

Type	Cubical size (W x D x H mm)
Vector 100	600 x 385 x 600
Vector 200	650 x 595 x 1125
Vector 300	650 x 595 x 2251
Vector 400D	650 x 800 x 2251

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