



MEDIUM VOLTAGE

ELECTRONIC
SOFT STARTER

VARIABLE
SPEED DRIVE

VS65
Series
MV
SOFT STARTER



XMV660
Series
MV VARIABLE
SPEED DRIVE



SAFETY, RELIABILITY,
PRECISION AND EFFICIENCY
FOR THE MOST DEMANDING
MV APPLICATIONS



Our core expertise is separated into two main segments, the Industrial Division, comprising the manufacture of AC variable speed drives and soft starters, in both low and medium voltage, and the Solar Division incorporating the manufacture of solar inverters and an extensive range of accessories.

Since our conception back in 1987 we haven't ceased to grow and compete against global corporations.

Our philosophy of giving exemplary service over and above that of our competition has helped lead us to where we are today.

Our horizons continue to grow at a dramatic rate as we welcome further expansion to our existing presence in more than 40 international markets.



INDUSTRIAL DIVISION

**VARIABLE SPEED DRIVES
ELECTRONIC SOFT STARTERS**



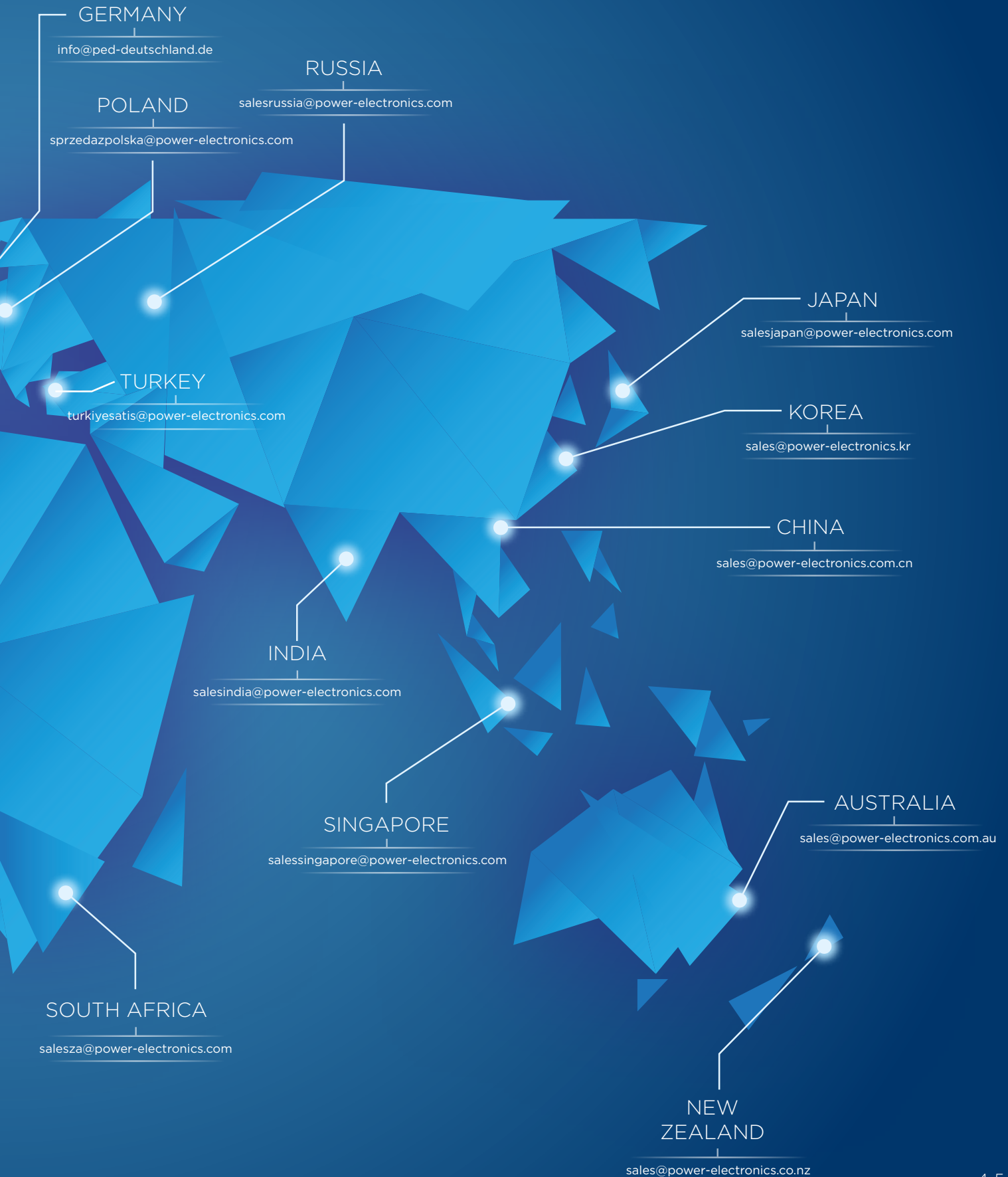
SOLAR DIVISION

**SOLAR INVERTERS
SOLAR POWER STATIONS**

BUILDING PERSONAL RELATIONSHIPS ALL AROUND THE WORLD



www.power-electronics.com



SAVING ENERGY FOR THINGS THAT MATTER

In Power Electronics we know that the modern world is getting faster and more complicated daily and that often our priorities in life can get confused. When we design and create our products, we not only think about numbers and graphics, we also think about our clients, their companies and the surrounding environment.

Power-Electronics understands that there are more things in life than work. We don't want our clients to worry about our products, we want to save their energy so that they can invest it in the things that really matter, their families, their friends, their hobbies...

We will take care of the rest: we will set up free technical seminars and courses so that our clients and their technicians can get to know the products as well as we do, we will assist with the commissioning because we believe in work well done, we will offer a 24h phone line so that you can always ask what you want to know no matter the time of day or night, and we will never let our clients down if they have a problem. We will take care of all these things so that you can save your energy for things that really matter...



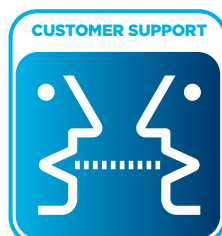
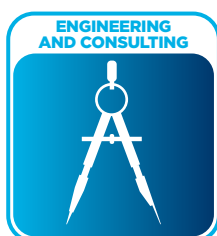
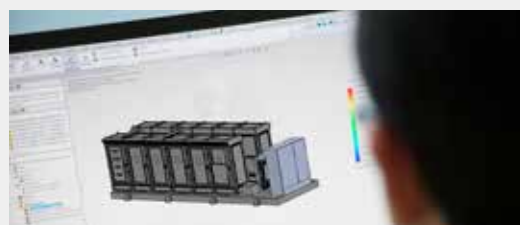
Power on Support, customer oriented strategy

Power on Support is the concept of a customer oriented strategy implemented by Power Electronics since its origins more than 25 years ago. We do not simply consider ourselves an advanced power electronics manufacturer, but a services company in the market to take care of all our customers' needs and adapt to their requirements.



Therefore, flexibility and specialization play a key role. We are flexible to be able to supply advanced products delivered in very short lead times, service our product ranges in any market where we have a branch within 24 hours, commission our devices worldwide, and offer a worldwide hotline 24/7...

We are ready to give technical advice and support about our products and the applications in which they are installed. Our clients also have at their disposal our engineering and consulting department, which comprises a large number of highly skilled and experienced engineers in the development of tailor-made solutions.



ENGINEERING SUPPORT
24/7 CUSTOMER SUPPORT
24/7 ONSITE ASSISTANCE

COMMISSIONING SUPPORT
TRAINING
3 YEAR WARRANTY

Vertical integration for customer satisfaction

Power Electronics' strategy of vertical integration gives unparalleled flexibility of the design and production processes, from very short turn-around metalwork prototyping through to high volume batch production of PCBs, enabling us to deliver the product that you want, when you want it, in full compliance with our stringent quality plan.



The benefits of Vertical Integration are clear:

- **Full control of production process from metalwork fabrication through to PCB assembly.**
- **Commonality of major components across model range to rationalize the supply chain.**
- **Warehousing strategy that ensures short lead-times.**
- **Large capital investment in manufacturing and test facilities.**



Medium voltage sectors



WATER

VS65 and XMV660 provide reliability and outstanding features aiming to optimise and increase safety in water applications. Well proven features in low voltage applications offer a wide number of possibilities in those high power applications that are driving the water life cycle.



VS65 SOFT STARTER

- Water Hammer control to prevent catastrophic pipes or valves breakdowns.
- Pipe filling function.
- Pump clogging detection due to the under and overpressure protections.
- Forward and reverse operation and torque pulse function.
- Double setting to adjust different pump performance depending on static pressure.
- Multi master-slave system working together in parallel.
- Visualisation of working time per pump and number of starts.
- Slow speed function for clearing blockages.



Facility: El Realito reservoir- water supply San Luis de Potosí and Guanajuato - CONAGUA
Location: San Luis de la Paz (Mexico)
Capacity: 86.400 m³/day



Facility: Irrigation community Canal Segarra Garrigues
Location: Lleida (Spain)
Capacity: 70.150 ha



Facility: Desalination plant Bajo Almanzora
Location: Almería (Spain)
Capacity: 20 hm³/year



water



XMV660 VARIABLE SPEED DRIVE

- Accurate direct and reverse action of the PID control regulation of pressure, flow, level.
- Water Hammer control to prevent catastrophic pipes or valves breakdowns.
- Power cell and cooling redundancy increase plant's availability.
- Conformal coating on PCBs with military and aerospace technology.
- Multi-step topology by using 700V power cells that leads into a very low dV/dt , THDi and HVF. No motor cable length limitation, no dV/dt filters and no power derating on medium voltage motors.
- Direct programming in engineering units (l/s , m^3/s , %, $^{\circ}C$, ...). Compatible with pulse measurement of the flow. Visualisation of working time per pump and number of starts.
- Operation in manual or automatic mode is up to you. Several Pump duty cycling modes for homogeneous ageing. Redundant master-slave systems.
- Under-pressure and Over-pressure compensation, pipe filling function, sleep and wake functionality for extra energy saving depending on pressure and flow, out of service motor monitoring, head or pressure compensation depending on flow rate.
- Pump safety protections: clogging detection, cavitation with reset activation time, minimum pressure detection, over-pressure control, zero-flow detection...

*OUTSTANDING RELIABILITY AND FEATURES
DESIGNED FOR SAFETY AND OPTIMISATION*

MINING & CEMENT

Copper, gold, aluminium, iron, uranium and coal, leading mining companies already trust the VS65 and the XMV660 by Power Electronics due to the product reliability, performance and quality. Our unique mechanical and hardware design works perfectly in adverse situations and demanding applications. Altitude, dust, pollution, moisture or hazardous environments are easy challenges for the VS65 and the XMV660 series.



VS65 SOFT STARTER

- Motor shaft unlocking by using either the torque pulse function or the direct on-line start.
- Accurate start and stop due to the dynamic torque control and the current limit functions, that reduce motor wear.
- Continuous thermal and electronic protection assures the integrity of your costly rotating assets.
- Constantly monitoring the motor and the application's duty cycle will help you follow performance trends and take remedial action before potential failures occur.
- Maximum efficiency and SCR protection due to the activation of the bypass vacuum contactor.
- Natural convection cooling without dust filters, 50°C operation without the need for fan replacement.
- Rugged and user friendly operator interface designed for the most demanding environments.



Plant: Ministro Hales Codelco North Division
Location: Calama, II Región de Antofagasta (Chile)
Capacity: 200 kton fine copper

*HEAVY DUTY AND
ACCURATE DESIGN*



XMV660 VARIABLE SPEED DRIVE

- PMC-OLTQ (Power Motor Control-Open Loop Torque Control) over fiber optics communications provides unique master-slave performance in the most demanding applications, and guarantees a perfect torque distribution.
- Automatic jaw crusher or mill unclogging and conveyor unblocking.
- Precise and high starting torque features dedicated to heavy loaded lifting systems.
- Fast commissioning and rapid control response due to motor or belt parameter variation.
- High power factor and low THDi due to the in-line phase shift transformer from 18 to 54 pulses.
- Multi-step topology by using 700V power cells that leads to low dV/dt , THDi and HVF. No motor cable length limitation, no dV/dt filters or motor derating required.



Plant: Zapolitic CEMEX
Location: Jalisco, Mexico
Capacity: 30mill tons per year



OIL & GAS

When security is paramount, the Medium Voltage VS65 Soft Starters and XMV660 Drives provide a high level of integrity of software and hardware, which enables their integration into critical industries such as chemical plants, refineries, exploration and extraction, processing and packaging plants, LNG treatment and storage... XMV660 Drives also offer custom solutions to operate with ATEX motors. The multi-level topology of the XMV660 generates a quasi-sine waveform, coupled with reduced dV/dt and lower THDi, minimises electrical stress on the motor mitigating the possibility of partial discharge. VS65 Soft Starter cabinets are designed in 4 independent arc-resistant sections for maximising safety.



VS65 SOFT STARTER

- The VS65 Soft Starter ensures frequent trouble free motor startup eliminating inrush current and damaging torque surges. Applications like seawater injection pumps, gas compressors, hot oil and emergency fire pumps take advantage of the unique features of the VS65, including standard **IP44** cabinet, easy programming and debugging, full accessibility to components for quick maintenance increasing efficiency and reducing system's downtimes.
- Maximum safety and reliability is offered through an Explosion proof cabinet, resistant to internal short-circuit, and oversized internal clearance distances.



Plant: PP-AYATSIL-B
Location: Ayatsil Field, Campeche bay, Mexico
Capacity: 150k barrels/day



XMV660 VARIABLE SPEED DRIVE

- The design and the construction of the XMV660 make it the ideal product for Oil & Gas pipelines, Gas Processing, LNG transportation, Refining and Petrochemical applications. Pumps, Compressors, Blowers and Cooling Fans are safely controlled by the XMV660 up to 15kV mains voltage with an input THD value lower than the 5% limit of IEEE-519 regulation. Fast installation allows quick start up. Safety systems, mechanical interlocks, password restricted settings access will protect your investment and personnel. Built-in web server easily connects the drive to the SCADA System.

- For isolated sites, the XMV660 is available in the exclusive “Outdoor Sandstorm proof” version. Customization capability within the cubicle arrangement allows the XMV to comply with your specific requirements and facilitate ease of integration into the plant lay-out.



Plant: CAB Poza Rica
Location: Nuevo Teapa - Veracruz, Mexico
Capacity: 2M barrels/day

METALS

The Medium Voltage VS65 Soft Starters and XMV660 drives are designed for high reliability, the modular arrangement increases system availability, reduces spare parts inventory, and results in less downtime. The precise and rapid responses of the motor controllers are necessary features for demanding applications such as multiple motors controlled by electronic line shafting. Additionally, high torque at low speed, high overload capacity and torque distribution control make them suitable for the most demanding applications. The Steel & Metallurgy Industries have a wide range of applications such as materials handling, material processing, many types of pumps, fans & compressors, where the VS65 and XMV660 provides time and energy saving, precision and accuracy of process control and full motor protection.

VS65 SOFT STARTER

- On applications such as a Hammer Mill the VS65 generates the right amount of torque to give linear acceleration with minimal starting current, even to this type of heavy load that has high breakaway torque. Choice of Spin or Ramp stop enables the VS65 to match the motor stop function to the application's needs.

- The Soft Starter can be customized to include: additional Controls and Pushbuttons, additional protection modules and Special RAL, cables in/out, etc. in order to fit the requirement of harsh working environment.

XMV660 VARIABLE SPEED DRIVE

- In metallurgy applications pumps and fans are essential for the process, such as, Descaling Pumps, Induced Draft and Forced Draft fans. Moreover, regulation of the rolling mills requires another magnitude of precision in the control of torque and speed in the high voltage, high power motors.

- The XMV660 Power Motor Control (PMC) and the Advanced Vector Control (AVC) algorithms provides high performance process control, multiple drives synchronization and 4-quadrant operations.



Plant: Chhattisgarh, Jindal Steel and Power Limited
Location: Raigarh, India
Capacity: 10mill tons per year

POWER GENERATION

The severe requirements of industry, together with our experiences in the solar sector where competitiveness, high availability and harsh environmental conditions are the norm, have compelled us to develop the most robust and cost effective Drives and Soft Starters for the Power Generation market. Power Electronics supply Drives into hydroelectric and thermal generation plants (geothermal, gas, coal and biomass) controlling many critical machines within the process. Power Electronics is a world leader in providing Drives into gigawatt range solar thermal power plants.

VS65 SOFT STARTER

- The VS65 Soft Starter provides high resolution control during the starting phase of large Medium Voltage motors in order to minimize high inrush currents and high starting torque shocks.
- Controlling the starting characteristics of a pumps in many hydroelectric and thermal plants (geothermal, gas, coal and biomass) enables customers to save money by reducing the peak DOL start-up current and reduce the shock loading on the system.
- The VS65 MV Soft Starter offers 5 different starting methods for optimal motor control and a specific function to reduce the effect of “hammering” often associated with DOL starting of large pumps. This makes the whole system more reliable and reduces production downtimes due to mechanical problems to pump system components.

XMV660 VARIABLE SPEED DRIVE

- The XMV660 Medium Voltage Drive is the perfect solution for new installations and renovation of existing systems. It does not require special motors and works seamlessly with existing motors.
- In older systems in Coal Power Plants, the boiler fans were typically controlled by inefficient dampers where the fan motor is run continuously at fixed speed, regardless of boiler load demand. Combustion rates were controlled by an air damper system located at each boiler to control airflow.
- The XMV660 Medium Voltage Drive allows the motors and boiler fans to run as needed, to directly match the required airflow rate, thus optimizing the boiler control and coal combustion, and reducing energy costs. Replacement of the air damper system directly with a variable speed drive also provides smooth system starting and stopping eliminating inrush current and spikes, while protecting the integrity of the electric motors.



Plant: Kaxu Solar One
Location: South Africa
Capacity: 100MW

Index

Page 20	VS65 Medium Voltage Soft Starter
Page 22	Topology and Presentation
Page 34	Technical characteristics
Page 36	Customised solutions
Page 38	Configuration tables and Dimensions
Page 40	Standard Ratings
Page 42	XMV660 Medium Voltage Variable Speed Drive INDOOR
Page 44	Topology and Presentation
Page 62	Technical characteristics
Page 64	Customised solutions
Page 66	Configuration tables and Dimensions
Page 68	Standard Ratings
Page 70	XMV660 Medium Voltage Variable Speed Drive OUTDOOR
Page 72	Topology and Presentation
Page 76	Technical characteristics
Page 78	Warranty
Page 79	Contact

~~IM~~POSSIBLE

THE MOST RELIABLE
MEDIUM VOLTAGE
TECHNOLOGY IN
ELECTRONIC SOFT
STARTERS AND
VARIABLE SPEED
DRIVES



VS65

— MV ELECTRONIC SOFT STARTER —



VS65

Power Electronics' VS65 medium voltage soft starter is the most reliable and safe solution, fully flexible and customised line-up of MV cells. Rated for applications from 2.3kV to 13.8kV, combines outstanding design and hardware under the most stringent IEC regulations, with advanced technology motor control and safety, that allows a smooth motor starting and stopping under any circumstance.

The VS65 series have been designed and tested under the most demanding environments, together with an easy and rugged user interface allows the user to configure the ultimate motor control and safety protections that will take care of your valuable rotating assets. The VS65 is compartmentalised in 4 independent arc-resistant sections that smartly isolate the medium voltage parts from the low voltage control sections. Fibre optics communicates between the control board and the power stage offering the maximum safety and immunity levels.

Our vertical integration of production and a dedicated project department allow us to offer customised equipment such as input MV protection cells, user terminal strips, communications protocols, ... the VS65 by Power Electronics is your fully integrated tailor made solution, manufactured and factory tested, with the most reliable warranty with unique on-site technical service.

THE MOST RELIABLE
AND SAFE CUSTOMER
ORIENTED SOLUTION

- HIGHEST OPERATOR SAFETY AND BUILT-IN MOTOR PROTECTION FUNCTIONALITIES
- HIGH RELIABILITY AND AVAILABILITY, EASY OPERATION AND INTUITIVE CONTROL
- HIGHEST BREAK AWAY TORQUE
- FULLY CUSTOMISABLE TO THE MOST DEMANDING REQUIREMENTS

VS65 - TOPOLOGY

MV CONNECTION AND VACUUM CONTACTORS

The input and output bus bars are tailor made to be ready to plug in to your mains. Top and bottom and either cable or copper bus bar connection options are available.

The VS65 integrates built-in as standard two MV vacuum contactors (line and bypass). The START command initialises the starting sequence by enabling the line contactor, and then the pre-configured soft start is performed. Once the motor reaches the designated point, the bypass contactor is enabled and the line contactor is opened.

This topology isolates the thyristors from the mains at rated speed, hence the VS65 offers 100% efficiency with maximum reliability and protection.

LV USER INTERCONNECTION AND INTERFACE

The user has easy frontal and safe access to the terminal strip (I/O signals) where the centralised control signals will be connected.

The front panel integrates built-in as standard: 3 push buttons (start, stop, E-stop), 1 start mode selector (LOC, REM, STOP), 5 status pilots lamps (running, stop, ready, power supply, warning). Additionally the user can easily configure the soft starter due to its intuitive backlit display and comprehensive documentation.

SCR POWER STAGE

The power stage consists of high voltage anti-parallel pairs of SCR, which are connected in series depending on the rated voltage. Available from 2,3kV to 13.8kV. Our heavy duty design has a maximum overload capacity of 500% In.

The VS65 takes care of its thyristors at any load and temperature condition by means of its built-in SCR snubber circuit and hardware protections. The Snubber circuit balances and protects the SCR stacks to enable a safe start and stop under any circumstance.

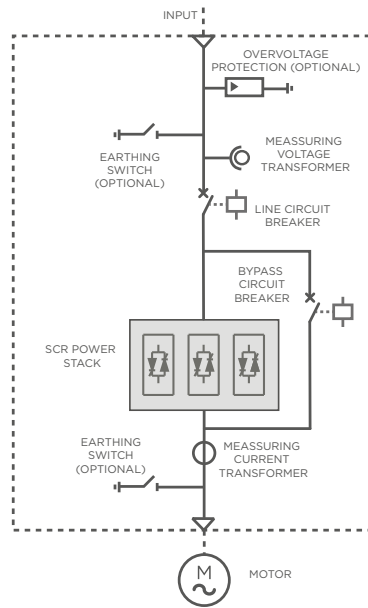
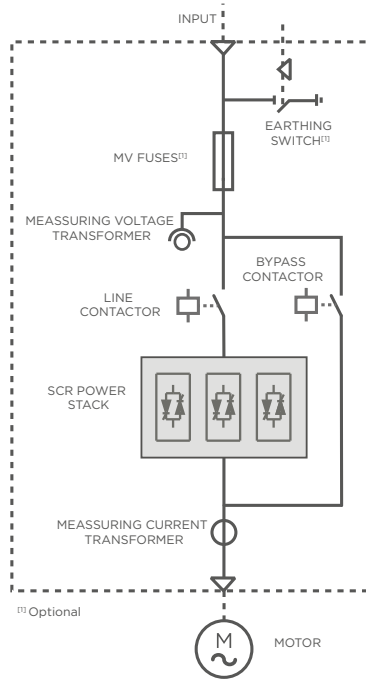
Located above the power stage is the trigger circuit. This board communicated through fibre optic to the main control board that precisely sends the triggering pulses to perform a soft start. A fibre optic communication offers maximum safety, total immunity to noise and fast communication rates.

TRIGGER
CIRCUIT

SCR
STACKS

MV TRANSFORMER
FOR AUX. POWER SUPPLY





HIGHEST
OPERATION
SAFETY WITH
INTERNAL ARC
APPROVED





Maximum safety

The VS65 has been designed under the stringent IEC and EN standards and regulations, hence minimising the inherent risk of medium voltage equipment.



MAXIMUM SAFETY

- Independent sections isolate terminal strip and interface, from medium voltage equipment.
- Mechanic interlock or by procedure that avoid unexpected door opening that give access to live parts of the equipment.
- Optional input grounding switch that connects to ground each phase avoiding unexpected reconnections during maintenance.
- Pre start low voltage test by using a LV motor allows a safely fully functional performance test including: plant control integration, enabling bypass and line contactors, I/O settings and thyristor firing.
- Explosion proof cabinet resistant to internal shortcircuit. The energy generated is released through a dedicated duct on the top, therefore avoiding any personal injury.
- BIL rating up to 50kV for safety and reliability. Clearance and creepage distances oversizing offers maximum safety.
- Factory tested at full current and optionally specific witness testing available.
- Power Electronics personnel is present in every commissioning to get the most to your application.

MAXIMUM SAFETY AND
OUTSTANDING FEATURES
DESIGNED FOR THE MOST
DEMANDING INDUSTRY



Maximum motor care and soft starter protection



The VS65 soft starter includes built-in as standard the ultimate motor and soft starter protections, features that allow it to act as a motor protection relay.

STANDARD MOTOR AND SOFT STARTER PROTECTIONS

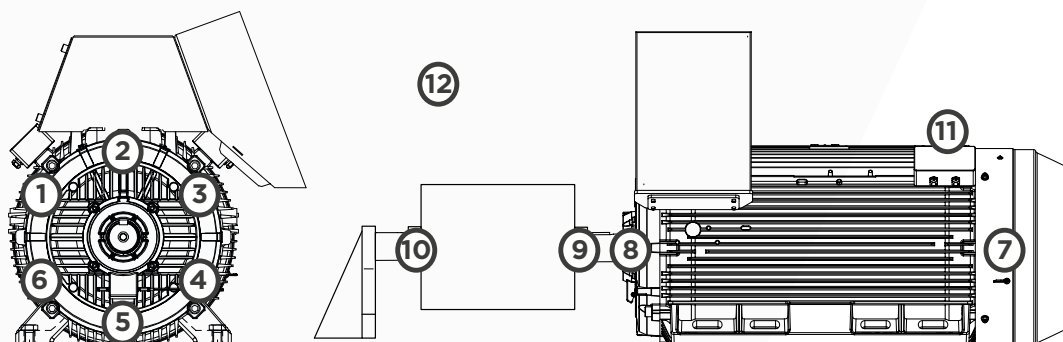
- Motor start delay
- Door open sensor
- Accelerating and decelerating control
- Starting to running transition
- SCRs over temperature
- Low input voltage
- Under-load protection
- Local and remote control selector
- Current imbalance
- Phase rotation
- Locked rotor / incomplete sequence
- i²t Electronic motor over load
- Instantaneous electronic over current trip / Shearpin
- Motor overcurrent
- Over voltage protection
- Input phase loss
- Controlled stopping ramp
- Starts per hour - Notching and jogging
- Communication loss
- Local emergency stop
- Line contactor
- Remote emergency stop
- Excessive start time (max. 120s)

OPTIONAL

- Input automatic circuit breaker, fuses, on-load disconnect or contactor
- Grounding switch
- Instantaneous ground fault detection
- Stator and bearing RTD protection
- Power factor protection
- Automatic circuit breaker, fuses and contactor status indicator
- Over and under frequency protection

REMOTE RTD SENSORS (OPTIONAL)

① STATOR WINDING 1	⑤ STATOR WINDING 5	⑨ APPLICATION BEARING 1
② STATOR WINDING 2	⑥ STATOR WINDING 6	⑩ APPLICATION BEARING 2
③ STATOR WINDING 3	⑦ MOTOR BEARING 1	⑪ CASE
④ STATOR WINDING 4	⑧ MOTOR BEARING 2	⑫ AMBIENT



CONTINUOUS CURRENT AND
VOLTAGE MONITORING



Reliability

Our record in industrial technical service has set the boundaries to all of our designs in terms of reliability. Hence, we offer the most comprehensive and extended warranties of the market.



- Electronics conformally coated with military and aerospace technology (IEC61086-1:2004, -3-1) and totally sealed, allow to be installed in harsh environments.
- Heavy duty SCR design (125% continuous, 500% 5s and 50°C) and high inverse peak voltage without reactors (chokes).
- IP44 and optional IP54 degree of protection. No dust filters that is suitable for humid and polluted environments.
- EMC cabinet design to offer maximum immunity and minimum emissions.
- Line and bypass vacuum contactors isolate the power stage in running mode against mains disturbances.
- Copper busbars that can withstand from 40kA to 80kA short circuit currents.

Rated voltage	SCR pairs in series	SCRs Inverse Peak Voltage
2.3kV	1	6.500V
3.3kV/4.16kV	2	13.000V
5kV/5.5kV/6kV/6.6kV	3	18.000V
10kV	4	26.000V
11kV	5	32.500V
13.8kV	6	39.000V

TOTALLY SEALED
AND CONFORMALLY
COATED ELECTRONICS

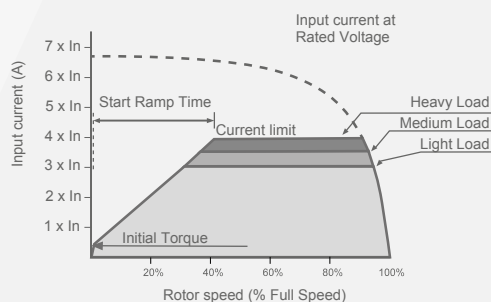
Multiple features

A high investment in the development of control software has lead to the most accurate, powerful and flexible performance.

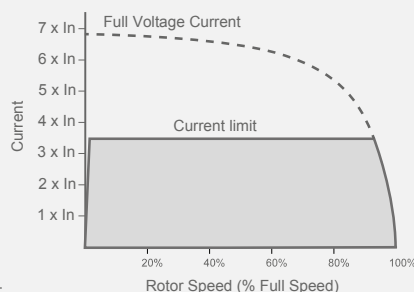


The VS65 soft starter gets the most from your facilities, by implementing the unique dynamic torque control algorithm (CDP) that offers an ultimate break away torque and starts the most demanding applications. Some of the starting and stopping extended settings are:

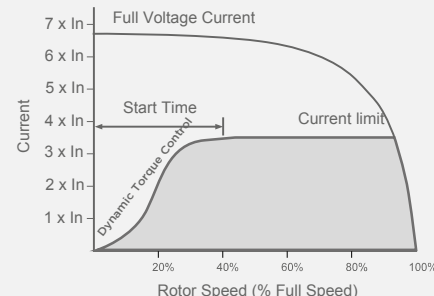
STARTING MODES



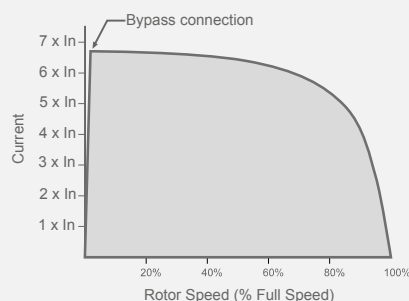
VOLTAGE RAMP



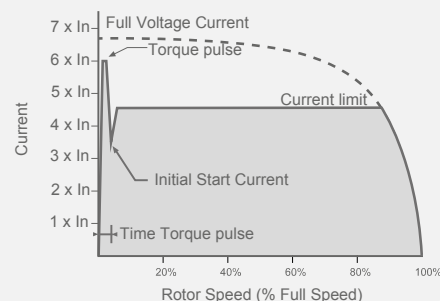
CURRENT LIMIT STARTING



DYNAMIC TORQUE CONTROL

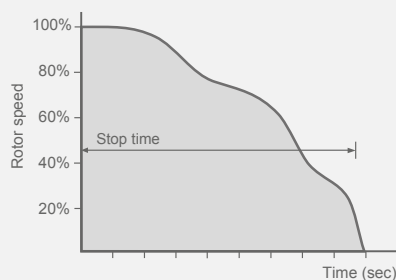


DIRECT STARTING

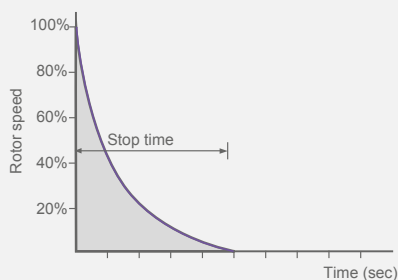


ROTOR LOCKED

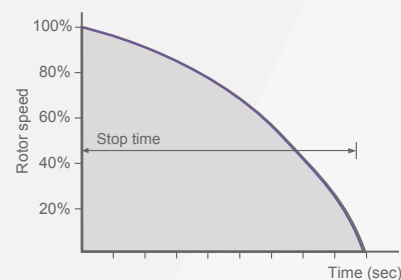
STOP MODES



WATER HAMMER CONTROL



SPIN STOP



STOP WITH VOLTAGE RAMP

GET THE MOST
OF YOUR
APPLICATION
WITH THE
DUAL SETTING
FUNCTION

The VS65 soft starter offers a double independent setting of the start and stop parameters, which permits the soft starter to shift performance according to the conditions: loaded or unloaded, raw material conditions, static pressure, temperature variations, blocked shaft, etc... the VS65 control allows the advanced users to adjust: torque pulse duration, break away torque and time, current limit, stop time, level and time of the overload and underload protections, i²t overload curve, n° start per hour, minimum speed and water hammer control algorithm.

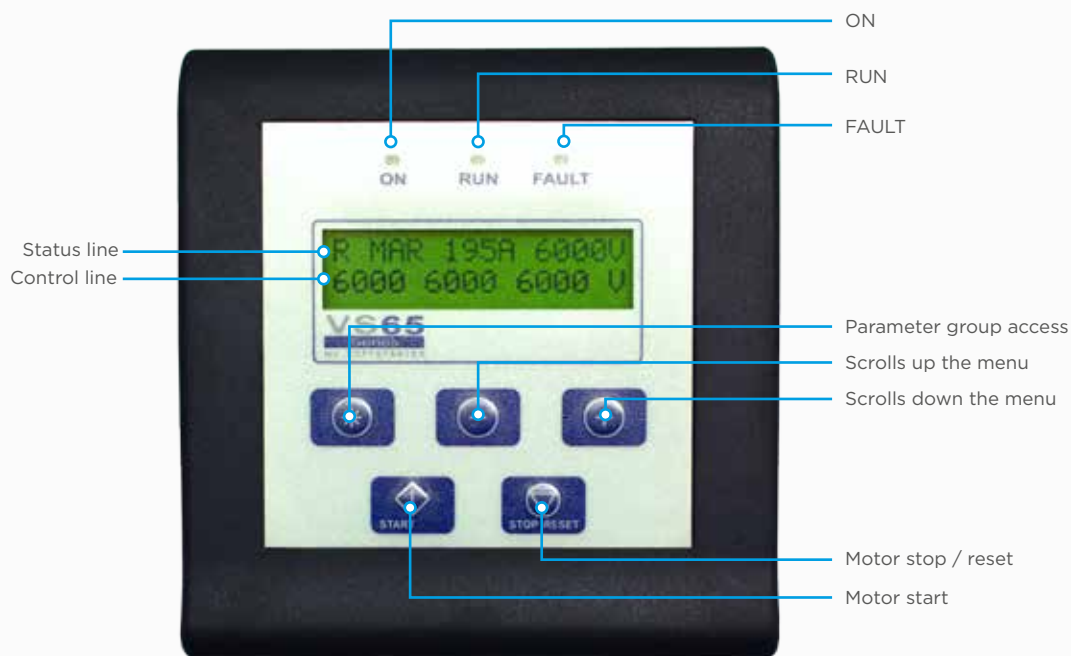


Intuitive control

The VS65 integrates an intuitive and dust resistant interface that includes backlit alphanumeric display with membrane key pad, status lights and pushbuttons that allow the user an easy operation and visualisation under the most demanding conditions.



Local operation through display or pushbuttons, and remote operation through serial communication or I/O signals, can both be easily selected using the door mounted selector.



COMMUNICATIONS



Modbus-RTU over serial communication (RS232/RS485) built-in as standard, optionally communications gateways are available: Ethernet TCP/IP, Profibus-DP and DeviceNet.

PROFIPOWER: Modbus RTU (RS485) to Profibus-DP (9 Pin D-SUB/F). Communication speed máx. 12MB, Profibus cable recommended.

DEVICENET: Modbus RTU (RS485) to Devicenet (CAN) gateway. 31 nodes maximum. Asynchronous communication control mode. Half Duplex communication system, Transmission type: Bus method, Multi drop Link system. Communication speed: 125kbps, 250kbps, 500kbps, 1000 kbps. Transmission distance max. 500m. (125kbps Devicenet cable).

ETHERNET: Modbus RTU (RS485) to Modbus TCP (Ethernet). Communication system: Half Duplex, Full Duplex. CSMA/CD communication method. Communication speed: 10Mbps, 100Mbps.

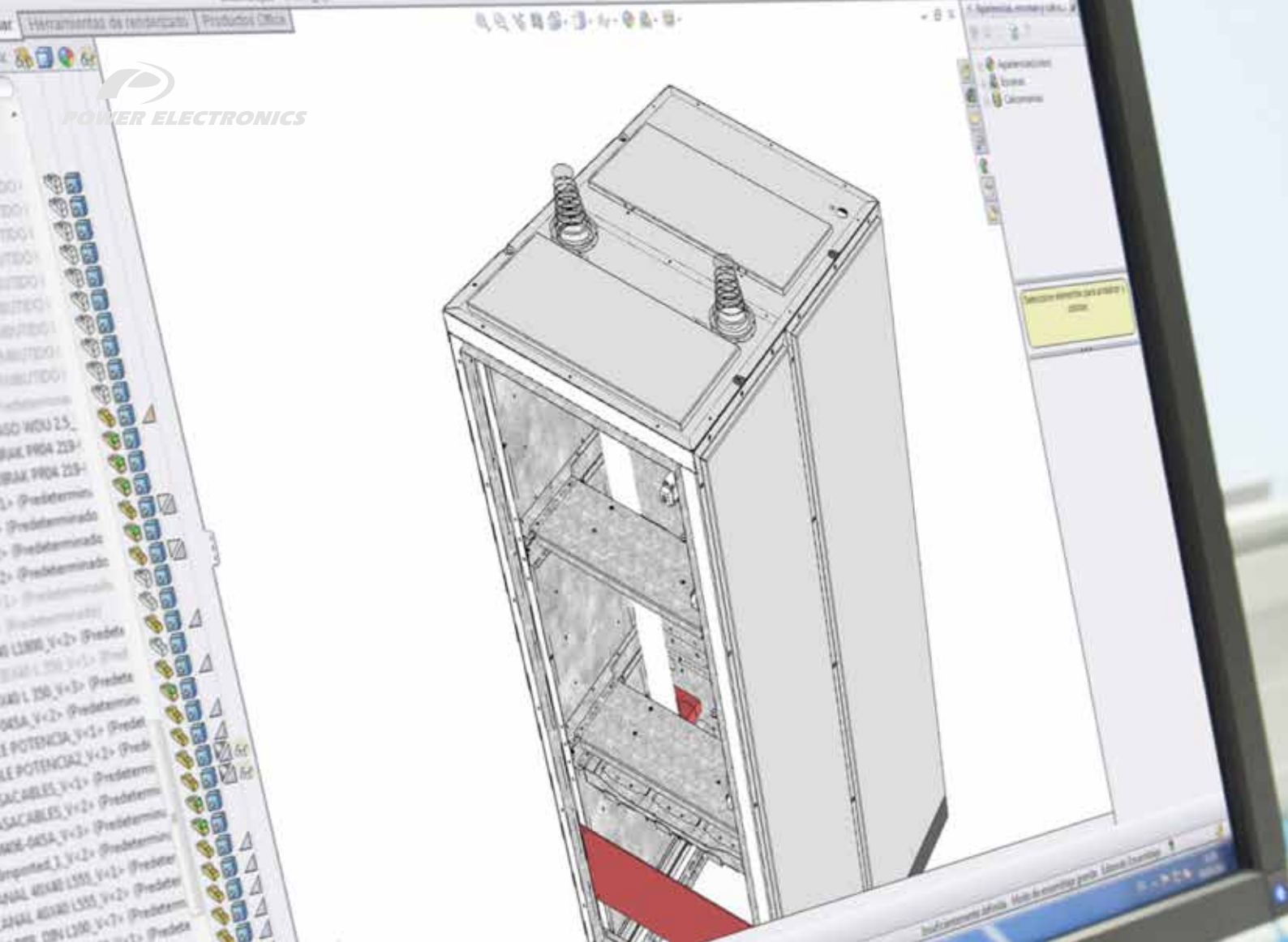
VS65

TECHNICAL CHARACTERISTICS

INPUT	Input voltage ^[1]	2,3kVca, 3kVca-3.3kVca, 4.16kVca, 5kVac-5.5kVac, 6kVca-6.6kVac, 10kVca-11kVca, 13.8kVca ^[1]
	Input frequency	47 ~ 62Hz
	Control voltage ^[1]	230Vac ±10%, 50Hz / 110Vac ±10%, 50Hz
	Phase sequence	Compatible with any phase sequence
	Transitory over voltage protection	Snubber network / Optional Surge arresters
OUTPUT	Efficiency (full load)	> 99.6%, 100% Bypass activated
	Overload	125% of the continuous rated value 100% to 500% (during 1 ~ 60s configurable)
	Bypass contactor	Powerful enough to start the motor in direct start mode
ENVIRONMENTAL CONDITIONS	Protection degree	IP44, IP54 (optional)
	Cooling system	Natural
	Work temperature	0°C to +50°C
	Storage temperature	-25°C to +55°C
	Humidity	5% - 95%, non condensing
	Height ^[1]	1000m, no power derating
INTERCONNECTION	Painting ^[1]	RAL 7035, C4 corrosion (ISO 12944-2)
	Digital inputs	5 configurable input
	Analogue inputs	2 analogue inputs of 0-20mA or 4-20mA, 0-10V
	Output relays	3 switched relays (non-inductive 10A 250Vac)
OPERATION MODES	Analogue outputs	1 configurable output 0-20mA or 4-20mA
	Starting modes	Current limit starting
		Current ramp and current limit starting
		Dynamic torque control
		Direct starting
KEYPAD AND CONTROL PUSH BUTTONS	Stop modes	Initial torque pulse starting
		Spin stop
		Stop with voltage ramp
KEYPAD AND CONTROL PUSH BUTTONS	Display	Backlit, alphanumeric 2x16 characters
		5 keys: start, stop, access and scroll menu
		Status leds: ON: Green. Turned on indicates there is voltage in the control boards. RUN: Orange. Flashing shows when the motor accelerates or decelerates. When turned on indicates the motor is working. FAULT: Red. Indicates fault.
	Door mounted indicators and buttons (soft starter)	3 push buttons: Start, Stop and emergency stop
		1 starting mode selector
		7 status pilots (running, stopped, ready, power supply, alarm, line contactor and bypass contactor)
	Door mounted indicators and buttons (Optional Input module)	7 status pilots (Power supply L1/L2/L3, MV switches status on/off/loaded control voltage supply)
		3 push buttons: switch status, connection and disconnection
		1 selector of MV locking
	Display information	Current of the three phases
		Line average voltage
		Digital inputs and relays status
		Analogue inputs and outputs status
		Power supply and motor frequency
		Power factor
		Motor torque and power
		Fault history (5 last faults)
		Total and partial starts number
		Total and partial operation hours
		Partial motor consumption (kWh)

NOTES [1] Other configurations consult with Power Electronics.

COMMUNICATIONS	Standard Hardware	RS232 / RS485
	Optional Hardware	Ethernet / 9-Pin D-SUB/F
	Standard Protocol	Modbus-RTU
	Optional Protocol	Profibus DP, Devicenet, Ethernet, IEC 61850
	Control modes	Local: from keyboard and pushbuttons Remote: from the digital and analogic inputs. PLC: start / stop
STANDARD MOTOR PROTECTIONS ^[1]	Input phases sequence	
	High voltage	
	Input low voltage	
	Start current limit	
	Rotor locked	
	Motor overload (thermal model)	
	Under load	
	Unbalanced phases	
	Shearpin current	
	Maximum number of starts/hour	
	Other, consult Power Electronics	
SOFT STARTER PROTECTIONS	SCR overheat	
	Excessive start time (max 120s)	
	Input phase loss	
SOFT STARTER SETTINGS	Torque pulse	
	Initial torque	
	Initial torque time	
	Acceleration time	
	Current limit: 1to 5•In	
	Overload: 0.8 to 1.2•In, Overload curve: 0 to 10	
	Deceleration time / Spin stop	
	Slow Speed(1/7 fundamental frequency)	
	Dual setting	
	Number of Starts/hour allowed	
	Torque control	
REGULATIONS	Water hammer control	
	Certification	CE
	Designed as	EMC Directive (2004/108/CE) EN61000-6-2, -4
	Design and construction	EN62271-1,-200
		EN60071-1,-2



CUSTOMISED SOLUTIONS

High value medium voltage projects often require customer specific solutions. Our team of highly experienced engineers are available to modify our standard products to suit your specific demands to ensure you get the product you need.



• Reactive power compensation module:

- Medium Voltage Line Fuses
- Withdrawable vacuum contactors
- Current limit inductances
- Medium Voltage capacitor banks

Input protection module:

- Automatic Circuit Breaker (VCB)
- Medium Voltage Line Fuses
- Withdrawable vacuum contactors
- Earthing switch
- Commutation MV cabin
- Surge arresters
- Line switch with earthing

Customised control and pushbuttons:

- Selectors and pushbuttons
- Digital and analogue I/O pre-configuration
- Customised user terminal strip
- PTC and PT100 relays
- Instantaneous ground fault protection relay.
- Specific external Power Supply (UPS, 110Vac,...)
- Optional communication protocols (Profibus-DP, Dvicenet, Modbus TCP,...)
- Soft starter's and motor's heating resistor control.

Documentation:

- Electrical and dimensional drawings.
- ITP reports
- Witness factory Acceptance test (FAT)
-

Cabinet features:

- Special RAL, special labelling and warning labels.
- Incoming MV cable or busbar connection from top, right or backside.
- Lined up soft starters with common main input busbar and protection "Run busbar".

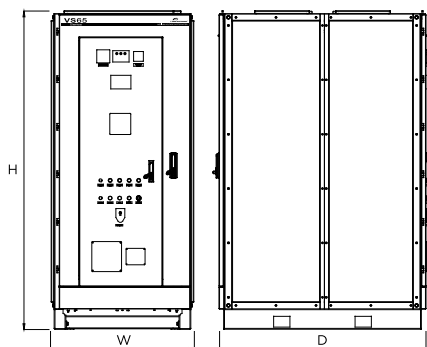
CONFIGURATION TABLE - VS65 SOFT STARTER MODULE

VS65	200		4		4		CL		0		-		-		
VS65 Series	Rated output current ^[1]		Rated input voltage		Degree of protection		Configuration		Power cable access		Fuses		Earth switch		
	200	200A	2	2300V	4	IP44	CL	Fixed line contactor / Fixed bypass contactor	O	Bottom input and output connection	-	Not Included	-	No Earth switch	
	400	400A	3	3000V 3300V			CX	Withdrawable line contactor/ Fixed bypass contactor	T	Top input and bottom output connection	F	Included	S	ON/OFF/Earth switch	
	...	...	4	4160V			XX	Withdrawable line contactor/ Withdrawable bypass contactor	U	Top input and output connection			E	With Earth switch
	600	600A	6	6000V 6600V											
			8	10000V 11000V			<div>NOTES</div> <div>[1] Check the rated current of the motor nameplate and indicate the short circuit current to guarantee the compatibility with the selected soft starter. [2] Consult availability with Power Electronics.</div>								
9			13200V 13800V												
-			Under request												

NOTES [1] Check the rated current of the motor nameplate and indicate the short circuit current to guarantee the compatibility with the selected soft starter.
[2] Consult availability with Power Electronics.

Request your quote by filling the ordering info template; please consult Power Electronics with your additional demands.

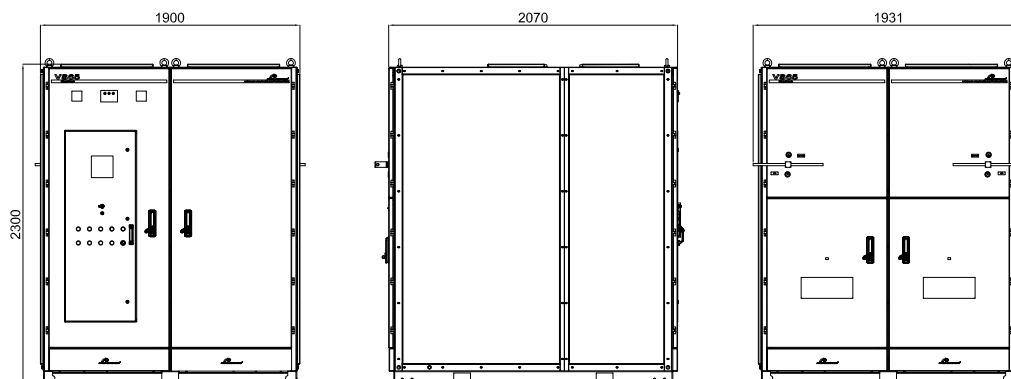
DIMENSIONS - VS65 SOFT STARTER MODULE - UP TO 6.6kV



VS65				
VOLTAGE	CONFIGURATION	DIMENSIONS		
		WIDTH W (mm)	DEPTH D (mm)	HEIGHT H (mm)
<4.16kV	CL, CL_F, CL_S	1050	1550	2300
	CL_E, CL_FS, CL_FE	1050	1820	2300
5kV-6.6kV	CL, CL_F	1050	1550	2300
	CL_E, CL_S	1050	1820	2300

[1] Units I_n < 300A. Other voltages and configurations consult Power Electronics.

DIMENSIONS - VS65 SOFT STARTER MODULE - 13.8kV



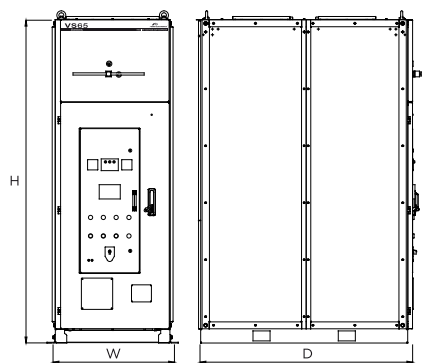
CONFIGURATION TABLE - PROTECTION MODULE VS65AR

VS65AR	1250		6		4		IA		T		-		-	
VS65 Protection module	Rated current ^[1]		Rated voltage		Degree of protection		Configuration		Acceso cables		Fusibles		Puesta a tierra	
	0400	400A	2	2300V	4	IP44	SF	Disconnecter with fuses	-	Entrada y salida inferior	-	No Incluido	-	Sin puesta a tierra
	0630	630A	3	3000V 3300V			IA	Automatic Circuit Breaker (VCB)	T	Entrada superior y salida inferior	F	Incluido	E	Puesta a tierra
	1250	1250A	4	4160V			IX	Withdrawable Automatic Circuit Breaker (VCB)	U	Entrada y salida superior			S	Seccionador ON/OFF/ Puesta a tierra
	...	...	6	6000V 6600V			CL	Fixed Line contactor					I	Seccionador ON/OFF/ Puesta a tierra ENTRADA y SALIDA
			8	10000V 11000V ^[2]			CX	Withdrawable Line contactor					M	Seccionador ON/OFF/ Puesta a tierra entrada y puesta a tierra salida
			9	13200V 13800V										
			-	Under request										
NOTAS [1] Compruebe la intensidad nominal de la placa de características del														

NOTAS [1] Compruebe la intensidad nominal de la placa de características del motor e indique la corriente de cortocircuito de la instalación para garantizar la compatibilidad de la celda de protección seleccionada.
[2] Consulte disponibilidad con Power Electronics.

Consulte a Power Electronics sus requerimientos particulares.

DIMENSIONS - PROTECTION MODULE VS65AR



VS65AR			
CONFIGURATION	DIMENSIONS		
	WIDTH W (mm)	DEPTH D (mm)	HEIGHT H (mm)
IA / SF / CX / SE	850	1550	2300

STANDARD RATINGS - VS65 SOFT STARTER MODULE

VS65 2.3kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW)	(HP) ^[1]
VS65040 2	40	149	200
VS65050 2	50	186	250
VS65060 2	60	224	300
VS65070 2	70	261	350
VS65090 2	90	298	400
VS65100 2	100	336	450
VS65110 2	110	373	500
VS65130 2	130	447	600
VS65150 2	150	522	700
VS65170 2	170	597	800
VS65190 2	190	671	900
VS65210 2	210	746	1000
VS65270 2	270	932	1250
VS65320 2	320	1119	1500
VS65370 2	370	1305	1750
VS65420 2	420	1491	2000
VS65480 2	480	1678	2250
VS65530 2	530	1864	2500
VS65590 2	590	2051	2750

[1] HP standard motor rated power (cos φ = 0.88, 2.3kV)

VS65 3kV-3.3kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[2]	(HP)
VS65040 3	40	200	268
VS65050 3	50	250	335
VS65060 3	60	315	422
VS65070 3	70	355	476
VS65080 3	80	400	536
VS65090 3	90	450	603
VS65100 3	100	500	670
VS65110 3	110	560	751
VS65120 3	120	630	845
VS65140 3	140	710	952
VS65160 3	160	800	1073
VS65180 3	180	900	1207
VS65200 3	200	1000	1341
VS65250 3	250	1250	1676
VS65280 3	280	1400	1877
VS65320 3	320	1600	2145
VS65360 3	360	1800	2413
VS65400 3	400	2000	2681
VS65450 3	450	2240	3003
VS65500 3	500	2500	3352
VS65560 3	560	2800	3754

[2] kW standard motor rated power (cos φ = 0.88, 3.3kV)

VS65 4.16kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW)	(HP) ^[3]
VS65050 4	50	298	400
VS65055 4	55	336	450
VS65060 4	60	373	500
VS65070 4	70	447	600
VS65080 4	80	522	700
VS65095 4	95	597	800
VS65110 4	110	671	900
VS65120 4	120	746	1000
VS65150 4	150	932	1250
VS65180 4	180	1119	1500
VS65210 4	210	1305	1750
VS65240 4	240	1491	2000
VS65270 4	270	1678	2250
VS65300 4	300	1864	2500
VS65320 4	320	2051	2750
VS65350 4	350	2237	3000
VS65410 4	410	2610	3500
VS65470 4	470	2983	4000
VS65530 4	530	3356	4500
VS65590 4	590	3728	5000

[3] HP standard motor rated power (cos φ = 0.88, 4.16kV)

VS65 5-5.5kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[4]	(HP)
VS65050 5	50	400	536
VS65055 5	55	450	603
VS65060 5	60	500	671
VS65065 5	65	560	751
VS65075 5	75	630	845
VS65085 5	85	710	952
VS65095 5	95	800	1073
VS65110 5	110	900	1207
VS65120 5	120	1000	1341
VS65150 5	150	1250	1676
VS65170 5	170	1400	1877
VS65190 5	190	1600	2146
VS65220 5	220	1800	2414
VS65240 5	240	2000	2682
VS65270 5	270	2240	3004
VS65300 5	300	2500	3353
VS65330 5	330	2800	3755
VS65380 5	380	3150	4224
VS65420 5	420	3550	4761
VS65480 5	480	4000	5364
VS65540 5	540	4500	6035
VS65600 5	600	5000	6705

[4] kW standard motor rated power (cos φ = 0.88, 5.5kV)

VS65 6kV - 6.6kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[5]	(HP)
VS65040 6	40	400	536
VS65045 6	45	450	603
VS65050 6	50	500	671
VS65055 6	55	560	751
VS65060 6	60	630	845
VS65070 6	70	710	952
VS65080 6	80	800	1073
VS65090 6	90	900	1207
VS65100 6	100	1000	1341
VS65125 6	125	1250	1676
VS65140 6	140	1400	1877
VS65160 6	160	1600	2146
VS65180 6	180	1800	2414
VS65200 6	200	2000	2682
VS65220 6	220	2240	3004
VS65250 6	250	2500	3353
VS65280 6	280	2800	3755
VS65300 6	300	3150	4224
VS65350 6	350	3550	4761
VS65400 6	400	4000	5364
VS65450 6	450	4500	6035
VS65500 6	500	5000	6705
VS65560 6	560	5600	7510

[5] kW standard motor rated power (cos ϕ = 0.88, 6.6kV)

VS65 10kV - 11kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[6]	(HP)
VS65020 8	20	355	476
VS65025 8	25	400	536
VS65030 8	30	500	671
VS65035 8	35	630	845
VS65040 8	40	710	952
VS65050 8	50	800	1073
VS65055 8	55	900	1207
VS65060 8	60	1000	1341
VS65075 8	75	1250	1676
VS65085 8	85	1400	1877
VS65095 8	95	1600	2146
VS65110 8	110	1800	2414
VS65120 8	120	2000	2682
VS65135 8	135	2240	3004
VS65150 8	150	2500	3353
VS65170 8	170	2800	3755
VS65190 8	190	3150	4224
VS65210 8	210	3550	4761
VS65240 8	240	4000	5364
VS65270 8	270	4500	6035
VS65300 8	300	5000	6705
VS65340 8	340	5600	7510
VS65380 8	380	6300	8449

[6] kW standard motor rated power (cos ϕ = 0.88, 11kV)

VS65 13.8kV - NEMA			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[7]	(HP)
XMV66040 138	40	746	1000
XMV66050 138	50	932	1250
XMV66060 138	60	1119	1500
XMV66070 138	70	1305	1750
XMV66080 138	80	1491	2000
XMV66090 138	90	1678	2250
XMV66100 138	100	1864	2500
XMV66120 138	120	2237	3000
XMV66140 138	140	2610	3500
XMV66160 138	160	2983	4000
XMV66180 138	180	3356	4500
XMV66200 138	200	3728	5000
XMV66220 138	220	4101	5500
XMV66240 138	240	4474	6000
XMV66270 138	270 ^[8]	5220	7000
XMV66310 138	310 ^[8]	5966	8000

[7] kW standard motor rated power (cos ϕ = 0.8, 13.8kV).

[8] Overload capacity limited.

NOTES

Request your quote by filling the Ordering info template; please consult Power Electronics with your additional demands.

Soft starters over 400A and 7.2kV will be equipped with automatic circuit breaker instead of vacuum contactors and engineered under request, consult availability.

XMV660 INDOOR

MV VARIABLE SPEED DRIVE



GRID QUALITY



MAX. MOTOR CARE



ELECTRICAL SAFETY



RELIABILITY



EASY TO USE



MULTIPLE COMMUNICATIONS



POWERFUL CONTROL



SOFTWARE TOOLS



EASY MAINTENANCE



CUSTOMISABLE

XMV660 INDOOR

XMV660 MV drive goes one step further in achieving high performance by implementing proven low voltage technology within a modular and reliable configuration. An input phase shift transformer powers low voltage cells that are combined in series producing a quasi-sinusoidal current and voltage output wave with a reduced dV/dt and THDi level.

It is designed under the strictest safety regulations and complies with the most demanding industrial requirements. The XMV660 is available in a wide voltage and power range, offering the best power quality, maximum motor care, uncompromising safety and reliability with reduced maintenance across the whole range.

MAXIMUM MOTOR CARE,
OPERATOR SAFETY AND
RELIABILITY WITHOUT
COMPROMISING MAINTENANCE

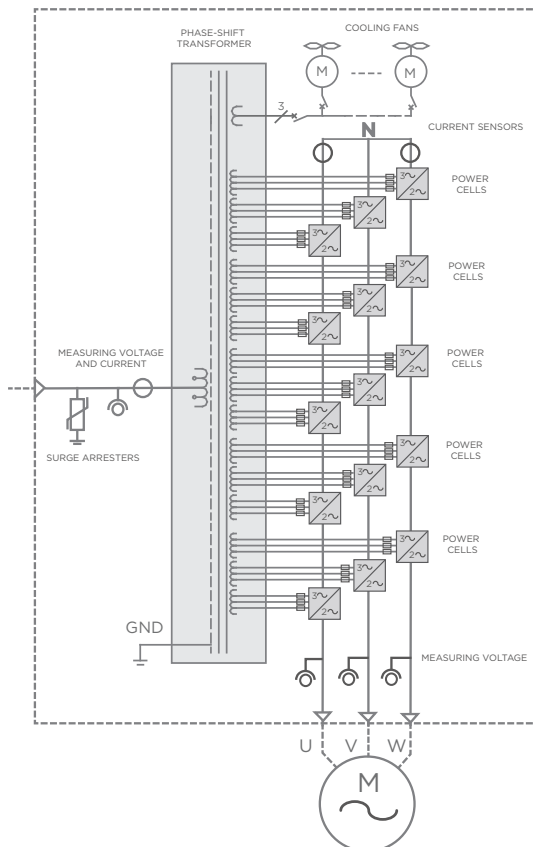
- MULTI-LEVEL, PULSE-WIDTH MODULATION WITH PHASE SHIFT TRANSFORMER
- HIGH EFFICIENCY AND POWER FACTOR AT PARTIAL LOADS
- LOW HARMONICS - IEEE 519 COMPLIANCE
- LOW dV/dt - NO MOTOR DERATING OR MOTOR CABLE LENGTH RESTRICTION
- OUTPUT VOLTAGE BOOSTING
- REDUNDANCY - WITH CELL BYPASS
- RUGGED AND MAINTENANCE FRIENDLY DESIGN

XMV660 - TOPOLOGY

The XMV660 is based on a multi-step pulse width modulation (PWM). Low voltage power cells are connected in series producing a quasi-sinusoidal voltage and current motor wave. This topology offers a low dV/dt , THDi and HVF without output dV/dt or sinusoidal filters. This leads to reduce: peak voltages at the motor terminals, motor vibrations and overheating.

Power cells are connected to dedicated output terminals of the phase-shift transformer that can be configured from 18 to 54 pulses. This transformer offers a low THDi, high electric protection, and high power factor at low loads.

The control panel, which can be mounted over the transformer cabinet or in an adjoining cabinet, monitors the transformer status and communicates with power cells through fiber optics. At the same time, interacts with the user and DCS (Distributed Control system) through the local display, serial communication ports, I/O signals or the ultimate new wifi web display.



Cooling system

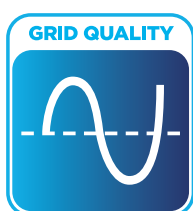
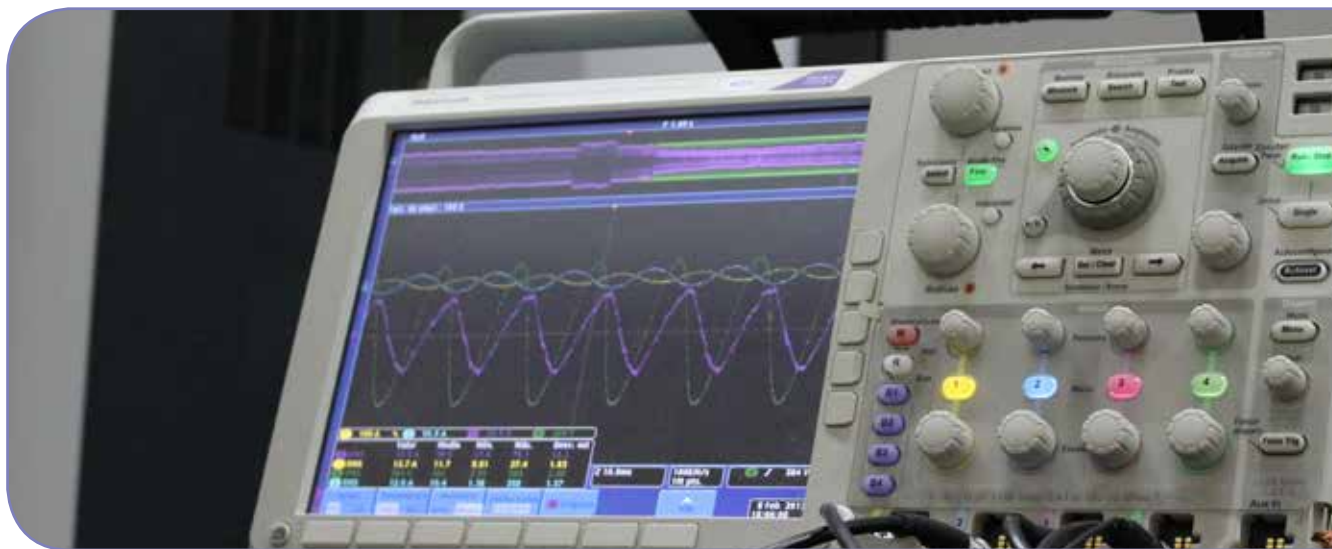
Main control &
User terminal strip

Input busbar
Voltage & current measurement
Surge arresters

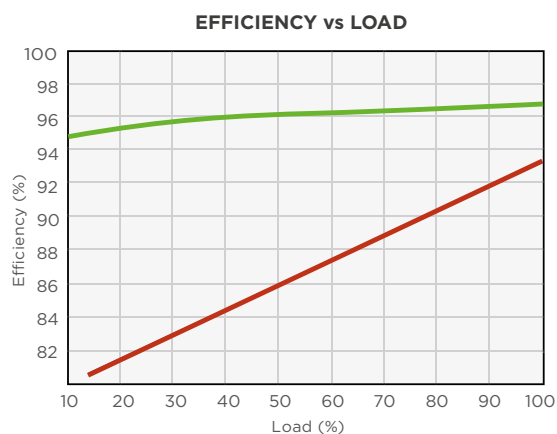
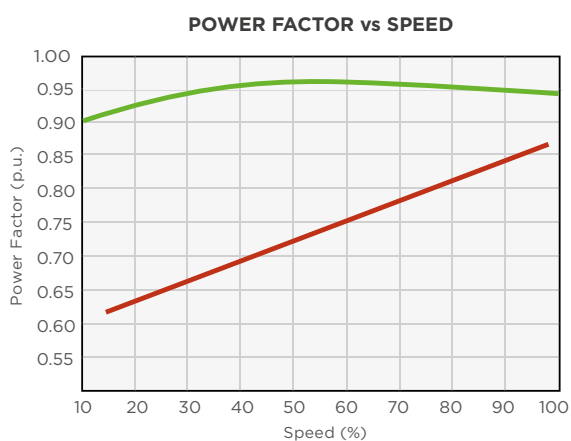


Power quality and efficiency

XMV660 topology meets the most stringent regulations regarding power quality (IEEE519) and electromagnetic compatibility (EMC 2004/108/EC).



- An input phase shift transformer from 18 to 54 pulses reduces the THDi level, thus no harmonics filters are needed.
- Outstanding Power Factor $PF > 0.95$ above 20% load, therefore no capacitor banks or active filters are needed.
- High efficiency $\eta > 96\%$ above 40% load (Including transformer).



■ XMV660 MV Drive
■ PWM GTO current source inverter

HIGHEST EFFICIENCY
AND POWER FACTOR

Maximum motor care

700V power cells combined in series generate a quasi sinusoidal voltage and current output waveform therefore achieving a low dV/dt , HVF and THDi. The XMV660 eliminates installation restrictions and additional expense that reduce profitably.

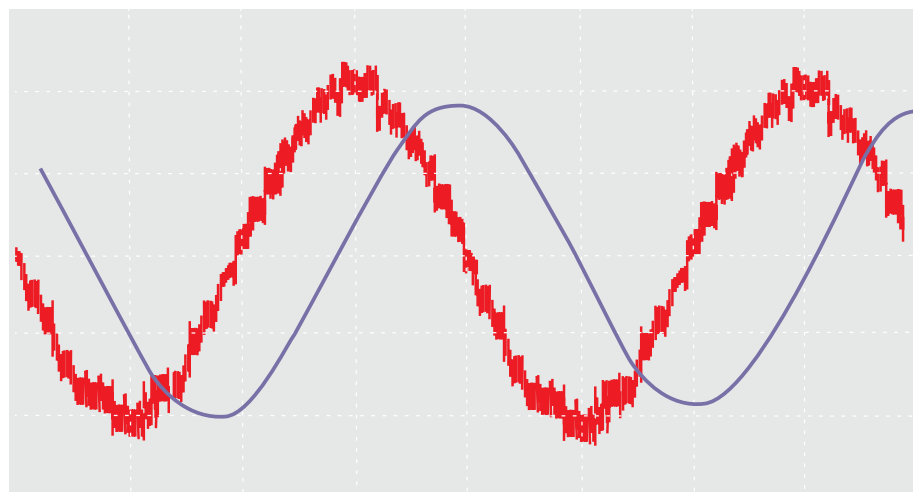
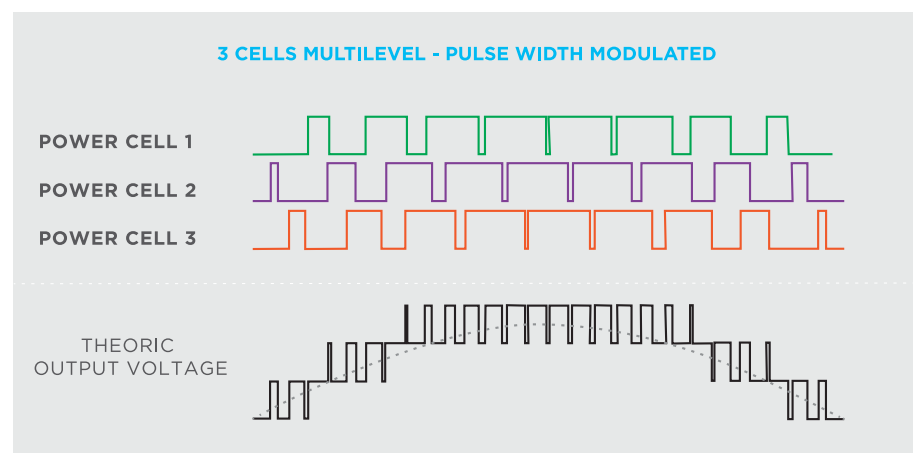


A low dV/dt reduces the voltage peaks at the motor winding and the common mode voltage (CMV) on the motor stator. Therefore, the XMV660 can be installed with new and existing motors with standard insulation and motor cables.

Negligible common mode currents (CMC) through motor bearings allow the use of standard bearings and lubrication.

Reduced motor losses caused by non sinusoidal waveforms (high THDi). There is no need to apply a power derating in medium voltage motors.

Reduced induced vibrations and torque pulses on the motor shaft by implementing a multi-step pulse width modulation (PWM) with low voltage power cells.



-  Motor Voltage Wave Form
-  Motor Current Wave Form

COMPATIBLE WITH NEW
AND EXISTING MOTORS

Safety and protection

The XMV660 integrates built-in hardware and software protections that reduce the associated risk of medium voltage facilities as standard.



An input phase-shift transformer offers a wide variety of benefits to your installation:

- Protects power rectifier bridge semiconductors and withstands grid transitory fluctuations.
- Reduces the short circuit power and therefore the fault current in case of an unlikely internal isolation defect.
- Compensates grid and drive voltage drops by using an on-site tap adjustment of the transformer. The motor will work under the rated voltage avoiding undesired motor oversizing and overheating.
- A tailor made input transformer allows the user to order a different input and output voltage. Thus, there is no need to install further transformers or switchgear, and allows the user to work with different rated voltage equipment within the same facilities.

The drive monitors the input, the output and each individual power cell offering multiple software and hardware protections that will take care of your costly rotating assets (pump, fan, conveyor, compressors...).

Each cell is protected by three fuses that provide overcurrent protection to the rectifier bridge.

The XMV660 can be delivered with a pre-charge system that magnetises the transformer and charges each cell DC bus. This system limits the inrush current at the drive's connection.

The XMV660 can be delivered with input protection modules that avoid the need for medium voltage protection switchgear.

Safety system, mechanical interlocks, restricted settings access with password and a warning buzzer will warn you of undesirable settings.

MAXIMUM
OPERATOR SAFETY

Maximum reliability and availability

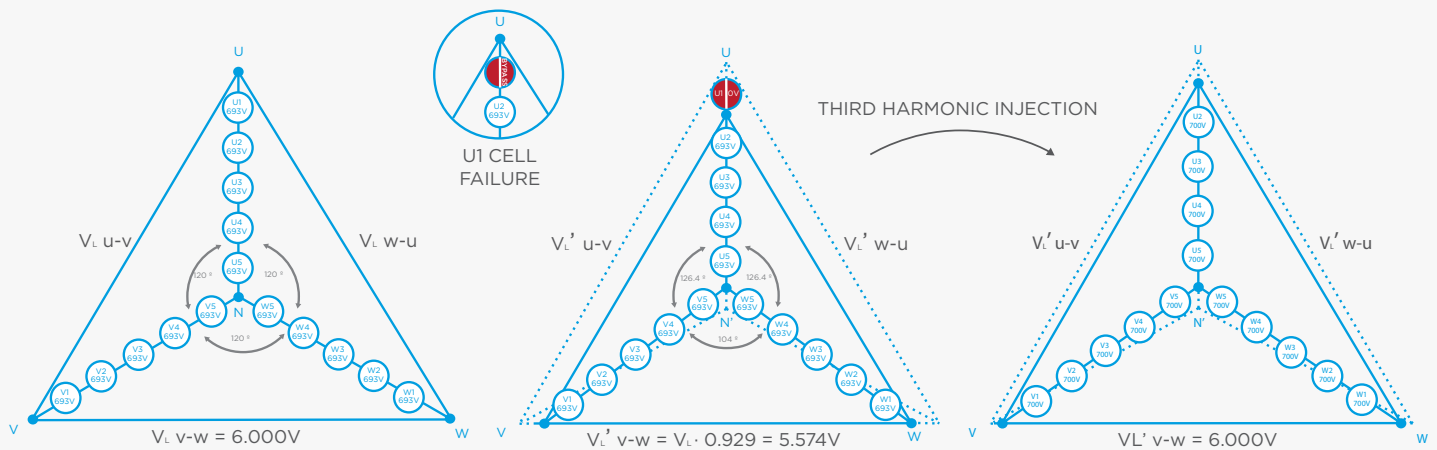
A multi-step topology based on proven low voltage semiconductors ensures service life, quality and availability.



The XMV660 is delivered fully factory tested to ensure the best performance under any load condition.

Transformer's and cell's temperature are permanently monitored to detect fan clogging or failure. Additionally the drive is available with a redundant cooling system that maximises the availability rate.

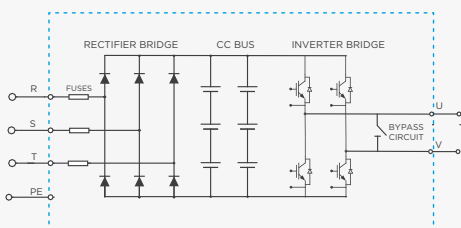
The XMV660 is delivered with a bypass in each cell and a centralised algorithm that permits the drive to keep running even when one or more cells fail, and at maximized output voltage.



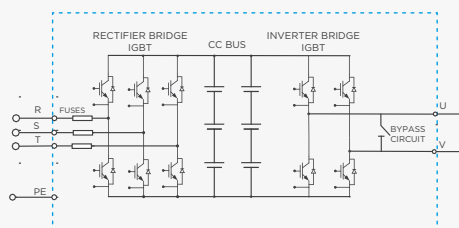
The XMV660 is available with different cell topologies that improve built-in standard features (regenerative, reduced size...), for further information consult Power Electronics.

CELL TYPOLOGIES

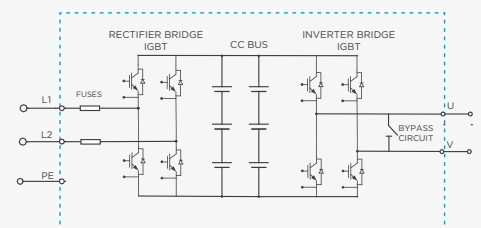
CELL TYPOLOGY A



CELL TYPOLOGY B



CELL TYPOLOGY C



Maintenance friendly

The XMV660 is delivered with three independent compartments: power transformer cabinet, power cells cabinet and control cabinet.



All of the cabinets are designed to provide an easy front access that simplifies maintenance and supervision. The transformer cabinet can be installed out of the plant room in order to reduce indoor heat loads.

Low voltage test allow a safely fully functional performance before commissioning.

An accessible front connection together with a guide frame permits power cells to be manually changed by an operator with the aid of a trolley.

A redundant design of the power conversion stage and cooling system increases availability rates with a reduced stock of spare parts.

Filters and gratings are easily removable from the front without opening the cabinet or disturbing the normal operation of the application. Hence providing maximum safety to routine maintenance tasks.

AN EASY FRONT ACCESS SIMPLIFIES MAINTENANCE AND SUPERVISION



Accurate, powerful and flexible motor control

Power Electronics' success is measured by our customer's satisfaction so the motor control systems developed by Power Electronics have been designed to meet the most demanding features. It integrates the V/f control and two vector controls: the Power Motor Control (PMC) and the Advanced Vector Control (AVC) as standard.



QUICK AND POWERFUL RESPONSE

PMC and AVC allow its application in high starting torque, dynamic or precise applications. The XMV660 is suitable for all existing applications.

NO AUTO TUNING NEED

PMC factory settings and motor nameplate parameters ensure perfect performance without enabling the auto tuning function during commissioning. We have invested in new control methods to simplify settings. A fast and reliable commissioning saves time and money.

START AND STOP MAXIMUM CONTROL

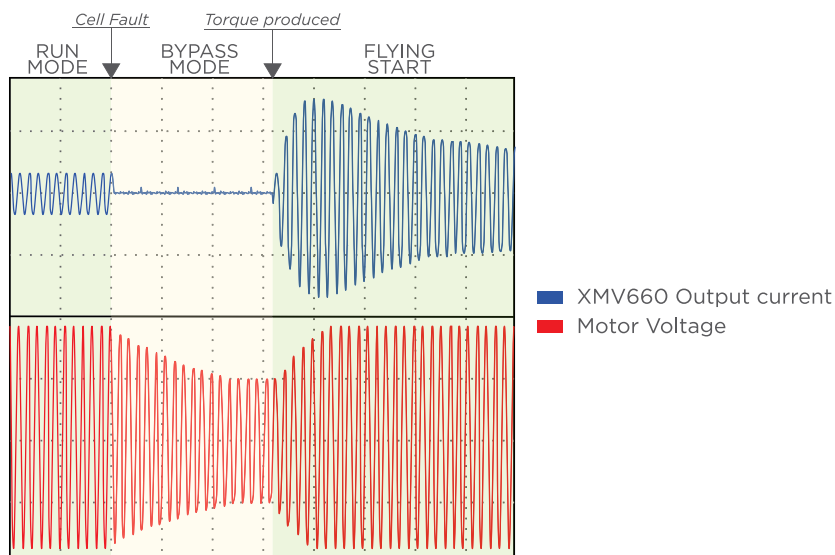
Thanks to the MBC (Mechanical Brake Control), the Pre-Magnetisation and Delay off IGBT, the loaded process will have a smooth start and stop.

MULTIPLE DRIVE'S SYNCHRONIZATION

PMC-OLTC is the unique master-slave motor control that allows the synchronisation of multiple drives and motors without encoder. The result is a smooth, powerful and fast response with the least maintenance and supervision. Every motor will provide the same torque under any circumstance, therefore ageing all the motors homogeneously. Moreover, its reduced starting in-rush current peaks allow the reduction of the drive and motor oversizing in demanding conveyors and mills.

NON-STOP POWER CELL BYPASS

When one or more power cells fail, the drive depending on the fault severity, automatically cuts off the power to the motor and bypasses the damaged cells. Then without losing the motor synchronisation, recalculates phase to phase angles to maximise output voltage (neutral-shift algorithm) and re-connects in a few milliseconds.



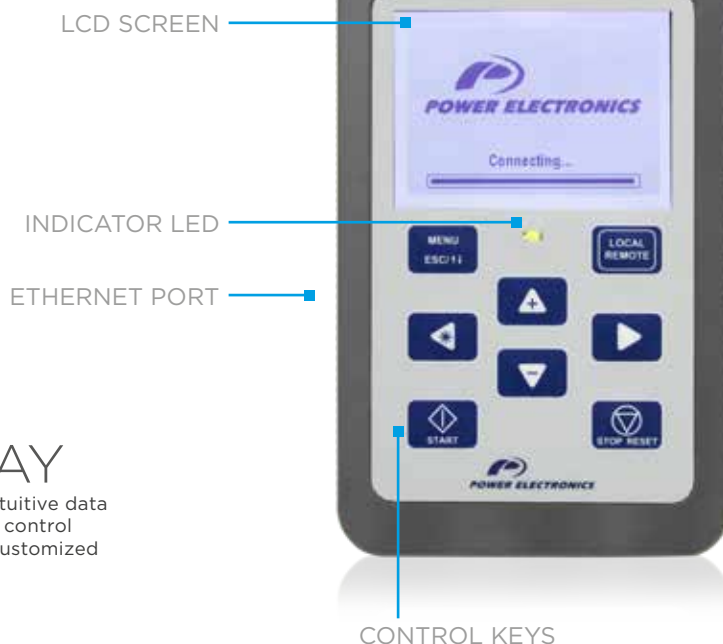
ADDITIONAL FUNCTIONALITIES

Thermal motor protection, motor overload prediction, motor stall, fly start, automatic restart, etc... complete the wide control features.



Easy to drive

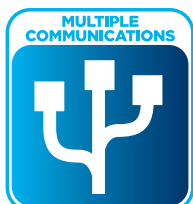
In Power Electronics, we have developed the XMV660 with an user-friendly interface and fully compatible with the most extended industrial protocols, which leads into a comfortable workflow. Intuitive and comprehensive screens and buttons enhance user's control and configuration.



GRAPHIC DISPLAY

The graphic display provides a much more intuitive data presentation, an easy navigation through the control parameters and allows saving thousands of customized configurations defined by the user.

- TFT-LCD screen of 2.8".
- Customized visualization by the user.
- Fault Register (Logs).
- Language selection.
- Removable display unit for remote installation.



COMMUNICATIONS

The XMV660 integrates as standard Modbus RTU protocol over RS232, RS485 and USB hardware. Optionally fibre optic and the communication protocols Profibus -DP, DeviceNet, CAN Open, Ethernet Modbus TCP and Ethernet IP are available.

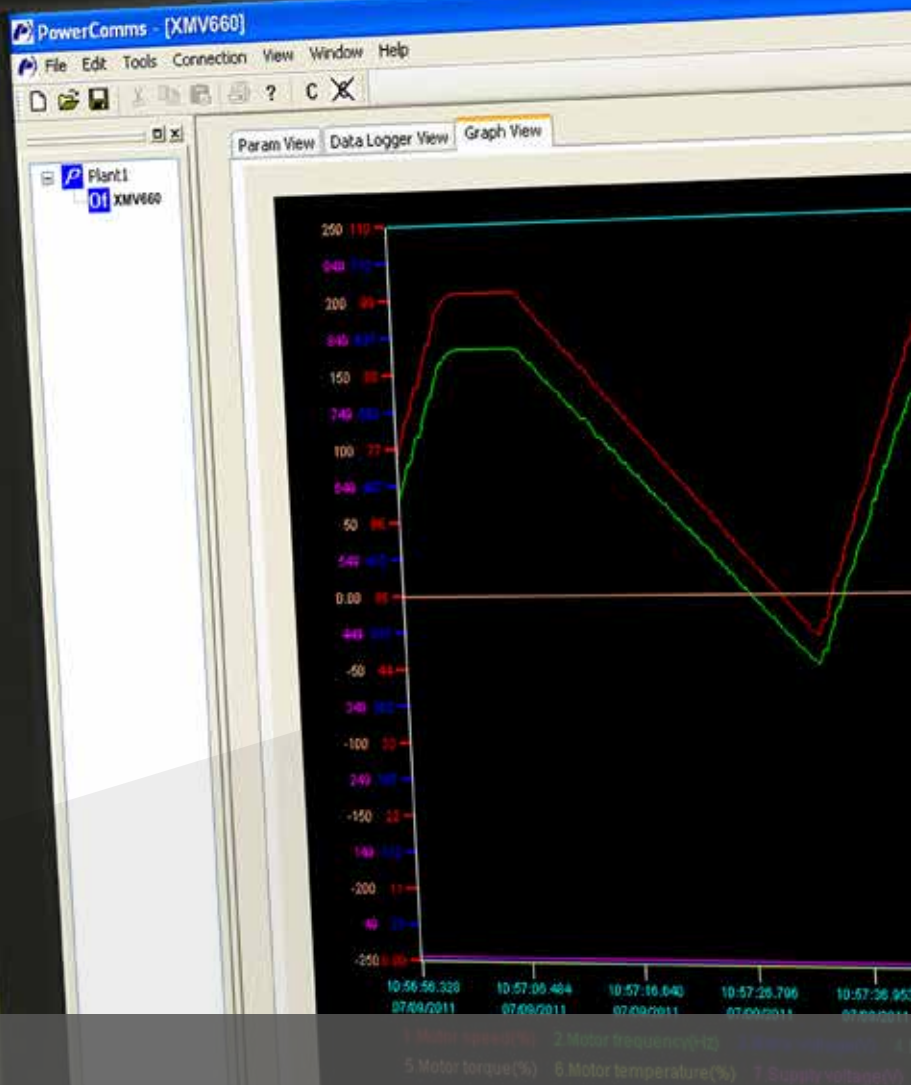
I/O SIGNALS

DI: There are 9 programmable and 5 preassigned digital inputs optically isolated and 1 motor PTC input built-in. 3 digital inputs can be programmed to get up to 7 different speed or torque references or they can be programmed individually to set remote commands such as start, stop, reverse, set acceleration and deceleration ramps, speed limit, alternative control, pulse flow meter, ...

DO: 2 programmable and 3 pre-assigned changeover relays and 3 programmable contacts built-in as standard. The XMV660 is capable of configuring the output relays by using the 3 built-in comparators to set remote alarms (current, speed, torque, power, flow, low and high input voltage, reference, acceleration and deceleration ramps, etc), control external mechanical brakes, control external cooling, action pipe filling pump,...

AI/AO: There are 3 inputs and 3 programmable analogue outputs. They are optically and galvanically isolated. External sensors or potentiometers are easily programmable as a voltage or current analogue signal in engineering units (% , l/s, m³/s ,l/m, m³/m, l/h, m³/h, m/s, m/m, m/h, Bar, kPa, Psi, m, °C, °F, °K, Hz, rpm). Additionally if the sensor is damaged or with noise coupling problems, the drive is able to filter, detect the failure and stop the application.

Many more options available. Consult Power Electronics with your requirements.



Dedicated software tools and Macros

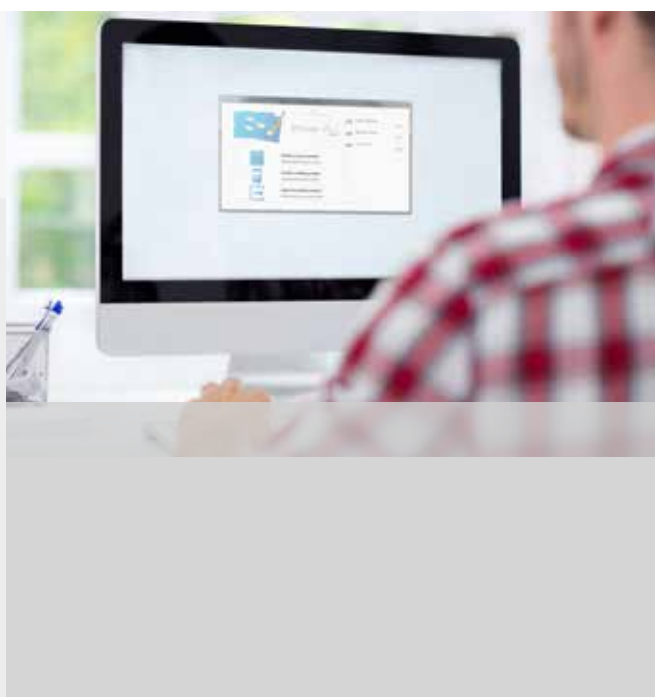
Real performance information about motor and drive status. The XMV660 integrates an accurate power grid analyser and drive diagnosis function.



POWERCOMMS

The PowerCOMMS tool offers real performance information about motor and drive status. The XMV660 integrates an accurate power grid analyser and drive's diagnosis function. This tool executed from a PC, and communicated with the drives through Ethernet or RS485/RS232, registers, plots and exports all the drive visualisation parameters: energy consumption, regenerated energy, motor voltage, PTC signal, IGBT temperature, motor overload, Power Cells status, etc.

Not only can you monitor both drive and motor, you can also remotely control and commission multiple drives. User-friendly and flexible tool to copy and save the XMV660 parameters remotely to speed up the commissioning or configuration, saving time and money.



POWERPLC

PowerPLC tool will enhance the XMV660 performance implementing multiple functions without additional hardware. Dedicated software for customers' application.

Multiple motor control, automatic pump and crusher unclogging, compressor regulation, cranes driving, petrol pump softstart, paper and cable rolling control, biogas digesters mixers, accumulators, calendar functions, and much more... The user establishes the limits for the XMV660.

WE HAVE INVESTED IN NEW
SOFTWARE TOOLS TO SIMPLIFY
SETTINGS AND OPERATION

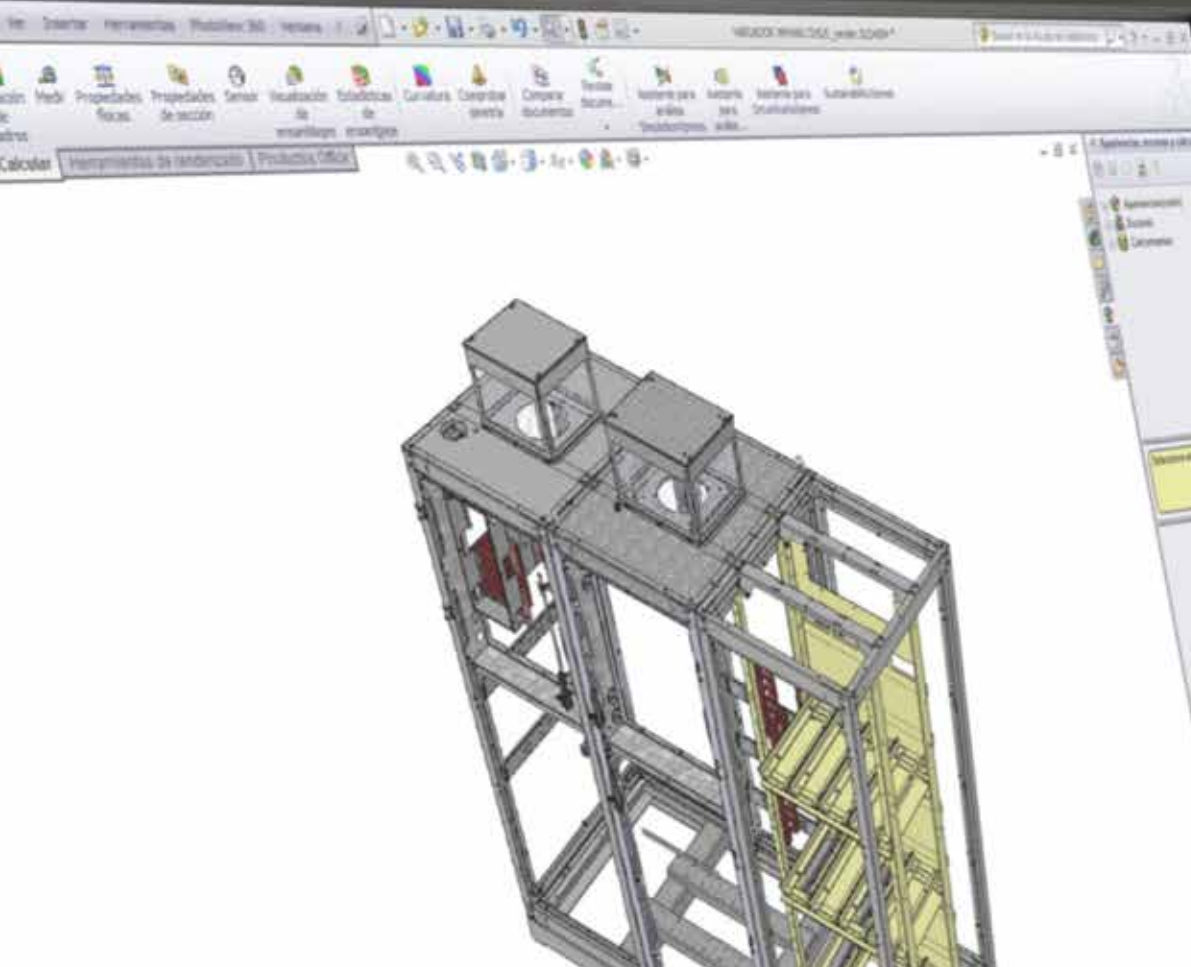
XMV660indoor

TECHNICAL CHARACTERISTICS

INPUT	Input voltage (kV) ^[1]	2.3kV to 11kV (±10%), (Voltage/Power Ride Through -35%)
	Frequency	50/60Hz (±10%)
	Power factor	> 0.95 (over 20% load)
	THDi (%) current ^[2]	< 5%
	Power transformer	Phase-shift transformer, dry type (From 18 to 54)
	Overvoltage protection	Surge Arresters
	Drive bypass	Optional bypass cabinet
OUTPUT	Technology	Multi-level, pulse-width modulation, low voltage power cells connected in series.
	Output voltage (kV)	2.3kV, 3kV, 3.3kV, 4.16kV, 5kV, 5.5kV, 6kV, 6.6kV, 10kV, 11kV
	Pulses / power cells in series	18p/3, 24p/4, 30p/5, 36p/6, 54p/9
	Power cells (A) / (V)	100A, 200A, 300A, 400A, 630A / 600V-700V
	Overload capacity	150% (60s/10min)
	Current harmonic distortion (THDi)	< 5%
	dV/dt value	< 1000V/μs (Multi-level topology reduce peak voltages)
	Harmonic voltage factor (HVF)	< 0.019 (No motor derating required)
	Frequency	0.5 to 120Hz. (0.01Hz accuracy)
	Efficiency	≥96% (including transformer)
	Power cell bypass	Built-in as standard
	Output voltage balance	Neutral phase shift
ENVIRONMENTAL RATINGS	Output voltage boosting	Space vector modulation
	Operation conditions	Indoor, No caustic and volatile air, no dust
	Degree of protection	IP41 (IEC60529) / IP54 Optional
	Operation temperature	-20°C to +50°C; >50°C power derating 1%/°C Pn
	Storage temperature	-25°C a +55°C
	Humidity	< 95%, non condensing
	Altitude	<1000m; >1000m power derating 1%/100m. Max. 3000m
CONTROL	Cooling	Forced air cooling. Optional redundant
	Control mode	Local control (Graphic display 2.8" and push-button) Remote control I/O
	Control method	V/hz VECTOR CONTROL Open Loop: PWM speed / torque control, AVC: speed / torque control Close Loop (Encoder): PWM speed / torque control, AVC: speed / torque control
	Carrier frequency	1kHz
	Control power supply	Redundant 2x230Vac II P+N (3kVA), UPS integrated
	Other characteristics	Voltage/Power ride through, quick setting and commissioning, master-slave synchronization, skip critical frequencies, delay-off IGBT, motor pre-magnetization, flux reduction at low load (energy saver), electric DC brake, multi-reference and speed ramp, Power PLC programming, Other consult Power Electronics.
LOCAL CONTROL PANEL	Display	Graphic displayTFT-LCF 2.8"
	Connection	RJ45, 3m (5m Optional)
	Features	4Gb MicroSD card | Faults and events log and notification, save and copy the parameters. Quad Band GSM modem integrated to remote start, stop and notification by SMS. Ethernet switch with double connection RJ45 Self powered by RJ45, optional 5Vdc external power supply or batteries Comprehensive screens with built-in help system Coded access to parameters with password
	Leds	Led ON: Control board is energized Led RUN: Motor receiving power supply Led FAULT: Flashing displays that a fault has occurred
	Display information	Average current and 3-phase motor current, Average voltage and 3-phase motor voltage, Average input voltage and 3-phase input voltage, 3-phase input and output frequency, Drive Status, Speed, Torque, Power, Power factor of motor, Individual Cells status, Register of total and partial drive running time with reset function. (hours), Register of total and partial drive energy consumption with reset function (kWh), Relay status, Digital inputs / PTC status, Output comparator status, Analogue inputs and sensor values, Analogue output value, Motor overload and equipment status, Drive and rectifier temperature, Fault history (last 6 faults).
	Visualization leds	RED: Running; GREEN: Stopped; AMBER:Warning; RED: Fault
	Push buttons	Control mode selector: local/stop/remote Emergency Stop Green: Local start push button Red: Local Stop push button White: Fault Reset

USER INTERCONNECTION ^[1]	Digital inputs	9 programmable, Active high (24Vdc), Isolated power supply 5 pre-configured (Start/Stop ; Reset, control mode, reference) 1 PTC input
	Analogue inputs	3 programmable differential inputs. 0 - 20mA, 4 - 20mA, 0 - 10Vdc and ±10Vdc. (Optically isolated)
	Digital outputs	2 programmable changeover relays (250Vac, 8A or 30Vdc, 8A) 3 programmables NO contacts (250Vac, 8A or 30Vdc, 8A) 3 pre-configured contacts (Start/Stop, Warning, Failure)
	Analogue outputs	3 isolated programmable outputs: 0 - 20mA, 4 - 20mA, 0 - 10Vdc and ±10Vdc
	Encoder (optional)	2 differential encoders input (process y vector control). Input signal from 5 to 24Vdc
COMMUNICATIONS	Standard hardware	USB, RS232, RS485
	Optional hardware	Fiber optics, Ethernet, 9 Pin D-SUB, CAN
	Standard protocol	Modbus-RTU
	Optional protocol	Profibus-DP, DeviceNet, Ethernet (Modbus TCP), Ethernet IP, CAN Open
PROTECTIONS	Motor protections	Rotor locked, torque limit, Motor overload (thermal model), Output current limit, Phase current imbalance, Ground fault current, Phase voltage imbalance, Motor over-temperature (PTC signal), Speed limit, excessive starting and stopping time.
	Drive protections	Input phase loss, Low input voltage, High input voltage, maximum number of faulty cells, High input frequency, Low input frequency, drive overload, drive over-temperature, Analogue input signal loss (speed reference loss), communication loss (time-out), Power supply fault, Emergency stop
	Power cells protections	Overcurrent (fuses), high DC bus voltage, Low DC bus voltage, DC bus voltage instability, low input voltage, fiber optics communication lost, communication time overpassed (time-out), control voltage lost, gate drive fault, power cell overtemperature.
REGULATION	Electromagnetic compatibility	EMC 2004/108/EC
		IEC/EN 61800-3
		IEEE 519-1992
	VSD design and construction	IEC/EN 61800-4 General requirements
		IEC/EN 61800-5-1 Safety
		IEC/EN 60146-1-1 Semiconductor converters
	MV transformer	IEC/EN 60076 -1, -11
		IEC/EN 60146-1-3
		IEC/EN 61378-1

NOTES [1] Other configurations, consult Power Electronics.
[2] Harmonics are below the limits defined in IEEE519 for all I_{sc}/I_L .



CUSTOMISED SOLUTIONS

High value medium voltage projects often require customer specific solutions. Our team of highly experienced engineers are available to modify our standard products to suit your specific demands to ensure you get the product you need.

Control, user terminal strip and pushbuttons:

- Pushbuttons, selectors and pilots.
- Digital and analogue I/O pre-configuration
- Customised user terminal strip
- PTC and PT100 relays
- Process and motor encoder boards.
- Optional communication protocols (Profibus-DP, Dvicenet, Ethernet Modbus TCP, CAN Open...)
- Power PLC dedicated applications

Cabinet features:

- IP54 protection degree, stainless steel enclosure, specific RAL, tailor made labelling.
- Incoming MV cable or busbar connection from top, right or backside.
- Lined up VSD with common main input busbar and protection.



Documentation:

- Electrical and dimensional drawings.
- ITP reports
- Witness factory Acceptance test (FAT)
-

Input and output protection cells

- Synchronous or Asynchronous bypass cell with fully controlled contactors, VCBs and earthing switches.
- Input protection cell featured with Automatic circuit breaker, fuses, withdraw-able contactor, on-load disconnecter with or without fuses, Earthing switch, Motor protection relay.
- Commutation cells.
- Cell with Soft-load system.

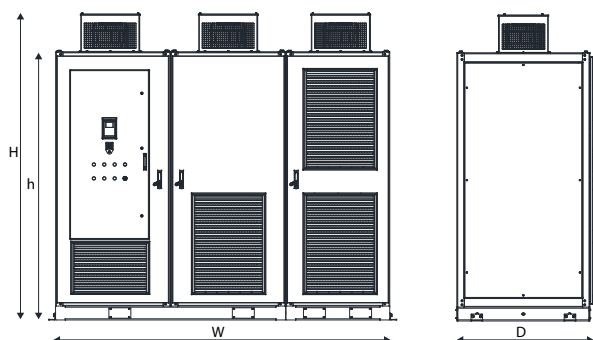
CONFIGURATION TABLE - XMV660

XMV66	100		66		X		Y		Z		-		-		-			
XMV660 Series	Rated Output Current ^[1]		Rated Motor Voltage		Overload %		Degree of protection		Models ^[2]		Cable access		Soft Load System		Cooling Redundancy		Nominal Input Voltage ^[2]	
	100	100A	23	2.3kV (9 cells)	1	110% Light Duty	4	IP41	-	Asynchronous motor	-	Bottom input and output	-	Not included	-	Not included	-	Nominal Output Voltage
	200	200A	30	3kV (9 cells)	2	120% Normal Duty			S	Synchronous motor	T	Top input and bottom output	C	Included	V	Included	A	2.3kV
	300	300A	33	3.3kV (9 cells)	5	150% Heavy Duty			R	Asynchronous motor 4Q Regenerative	U	Top input and output					B	3kV
	400	400A	41	4.16kV (12 cells)	...	Under request			W	Synchronous motor 4Q							C	3.3kV
	630	630A	60	6kV (18 cells)					M	Asynchronous motor 4Q Regenerative Monophase Bridge rectifier							D	4.16kV
	...	Under request	66	6.6kV (18 cells)													E	6kV
			10 ^[2]	10kV (27 cells)													F	6.6kV
			11 ^[2]	11kV (27 cells)													...	Under request
																	M	15kV

NOTES [1] Check the rated current of the motor nameplate and indicate the short circuit current to guarantee the compatibility with the selected drive.
[2] Consult availability with Power Electronics
[3] Preliminary, consult Power Electronics the definitive values.

Request your quote by filling the ordering info template; please consult Power Electronics with your additional demands.

DIMENSIONS - XMV660



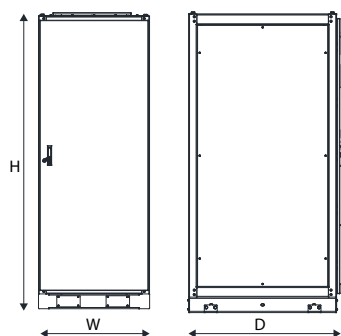
	Rated Current	Width W (mm)	Depth D (mm)	Height h (mm)	Height H (mm)	Height RC ^[1] H (mm)
4.16kV	< 100A	2700	1200	2320	2650	2800
	101A - 200A	4020	1425	2320	2650	2800
	201A - 300A	4390	1425	2370	2790	2930
	> 300A	Under request				
6.6kV	< 100A	3420	1200	2320	2650	2800
	101A - 200A	4580	1425	2320	2650	2800
	201A - 300A	5685	1425	2370	2790	2900
	> 300A	Under request				

NOTES [1] Total height with redundant cooling option (RC).
Dimensions valid for aluminum transformer, A power cell type and 120% overload.

CONFIGURATION TABLE - PROTECTION MODULE XMV660

XMV66AR	0100	6	4	SE	-	-	-
Protection module XMV660	Rated output current ^[1]	Rated voltage	Degree of protection	Configuration	Power cable access	Fuse protection	Earthing switch
	0100 100A	2 2300V	4 IP41	IA Automatic Circuit Breaker	- Bottom input and output	- Not included	- Not included
...	...	3 3000V-3300V	5 IP54 ^[2]	SF Disconnecter with fuses	T Top input and bottom output	F Included	E Included
2000	2000A	4 4160V		CX Withdrawable Line contactor	U Top input and output		
...	Under request	6 6000V-6600V		SE Disconnecter and earthing switch			
		8 10000V-11000V		BP Line contactor and bypass contactor			
		- Under request					

DIMENSIONS - PROTECTION MODULE XMV660



CONFIGURATION	DIMENSIONS		
	WIDTH W (mm)	DEPTH D (mm)	HEIGHT H (mm)
IA / SF / SE / BP	900	1200/1400	2320

NOTES [1] Check the rated current of the motor nameplate and indicate the short circuit current to guarantee the compatibility with the selected drive.
[2] Consult availability with Power Electronics.

Please consult Power Electronics with your demands.

STANDARD RATINGS - XMV660

XMV660 2.3kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW)	(HP) ^[1]
XMV66050 023	50	149	200
XMV66060 023	60	186	250
XMV66070 023	70	224	300
XMV66080 024	80	261	350
XMV66090 023	90	298	400
XMV66100 023	100	336	450
XMV66120 023	120	373	500
XMV66140 023	140	447	600
XMV66170 023	170	522	700
XMV66190 023	190	597	800
XMV66210 023	210	671	900
XMV66230 023	230	746	1000
XMV66300 023	300	932	1250
XMV66350 023	350	1119	1500
XMV66410 023	410	1305	1750
XMV66470 023	470	1491	2000
XMV66530 023	530	1678	2250
XMV66590 023	590	1864	2500

[1] HP standard motor rated power (cos ϕ • Eff = 0.8, 2.3kV)

XMV660 3kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[2]	(HP)
XMV66050 030	50	200	268
XMV66060 030	60	250	335
XMV66075 030	75	315	422
XMV66085 030	85	355	476
XMV66100 030	100	400	536
XMV66110 030	110	450	603
XMV66120 030	120	500	671
XMV66135 030	135	560	751
XMV66150 030	150	630	845
XMV66170 030	170	710	952
XMV66200 030	200	800	1073
XMV66220 030	220	900	1207
XMV66240 030	240	1000	1341
XMV66300 030	300	1250	1676
XMV66340 030	340	1400	1877
XMV66390 030	390	1600	2146
XMV66430 030	430	1800	2414
XMV66480 030	480	2000	2682
XMV66540 030	540	2240	3004
XMV66600 030	600	2500	3353

[2] kW standard motor rated power (cos ϕ • Eff = 0.8, 3kV)

XMV660 3.3kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[3]	(HP)
XMV66045 033	45	200	268
XMV66055 033	55	250	335
XMV66070 033	70	315	422
XMV66080 033	80	355	476
XMV66090 033	90	400	536
XMV66100 033	100	450	603
XMV66110 033	110	500	671
XMV66120 033	120	560	751
XMV66140 033	140	630	845
XMV66150 033	150	710	952
XMV66175 033	175	800	1073
XMV66200 033	200	900	1207
XMV66220 033	220	1000	1341
XMV66270 033	270	1250	1676
XMV66310 033	310	1400	1877
XMV66350 033	350	1600	2146
XMV66400 033	400	1800	2414
XMV66440 033	440	2000	2682
XMV66490 033	490	2240	3004
XMV66550 033	550	2500	3353

[3] kW standard motor rated power (cos ϕ • Eff = 0.8, 3.3kV)

XMV660 4.16kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW)	(HP) ^[4]
XMV66050 416	50	298	400
XMV66060 416	60	336	450
XMV66070 416	70	373	500
XMV66080 416	80	447	600
XMV66090 416	90	522	700
XMV66100 416	100	597	800
XMV66120 416	120	671	900
XMV66130 416	130	746	1000
XMV66160 416	160	932	1250
XMV66200 416	200	1119	1500
XMV66230 416	230	1305	1750
XMV66260 416	260	1491	2000
XMV66290 416	290	1678	2250
XMV66320 416	320	1864	2500
XMV66360 416	360	2051	2750
XMV66390 416	390	2237	3000
XMV66450 416	450	2610	3500
XMV66520 416	520	2983	4000
XMV66580 416	580	3356	4500

[4] HP standard motor rated power (cos ϕ • Eff = 0.8, 4.16kV)

NOTE Request your quote by filling the Ordering info template; please consult Power Electronics with your additional demands. Variable speeds drives over 400A and 7.2kV will be engineered under request, consult availability.

XMV660 6kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[5]	(HP)
XMV66050 060	50	400	536
XMV66055 060	55	450	603
XMV66060 060	60	500	671
XMV66070 060	70	560	751
XMV66080 060	80	630	845
XMV66085 060	85	710	952
XMV66100 060	100	800	1073
XMV66110 060	110	900	1207
XMV66120 060	120	1000	1341
XMV66150 060	150	1250	1676
XMV66170 060	170	1400	1877
XMV66190 060	190	1600	2146
XMV66220 060	220	1800	2414
XMV66240 060	240	2000	2682
XMV66270 060	270	2240	3004
XMV66300 060	300	2500	3353
XMV66340 060	340	2800	3755
XMV66380 060	380	3150	4224
XMV66430 060	430	3550	4761
XMV66480 060	480	4000	5364
XMV66540 060	540	4500	6035
XMV66600 060	600	5000	6705

[5] kW standard motor rated power (cos ϕ • Eff = 0.8, 6kV)

XMV660 6.6kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[6]	(HP)
XMV66045 066	45	400	536
XMV66050 066	50	450	603
XMV66055 066	55	500	671
XMV66060 066	60	560	751
XMV66070 066	70	630	845
XMV66080 066	80	710	952
XMV66090 066	90	800	1073
XMV66100 066	100	900	1207
XMV66110 066	110	1000	1341
XMV66140 066	140	1250	1676
XMV66150 066	150	1400	1877
XMV66180 066	180	1600	2146
XMV66200 066	200	1800	2414
XMV66220 066	220	2000	2682
XMV66250 066	250	2240	3004
XMV66270 066	270	2500	3353
XMV66300 066	300	2800	3755
XMV66350 066	350	3150	4224
XMV66390 066	390	3550	4761
XMV66440 066	440	4000	5364
XMV66500 066	500	4500	6035
XMV66550 066	550	5000	6705

[6] kW standard motor rated power (cos ϕ • Eff = 0.8, 6.6kV)

XMV660 10kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[7]	(HP)
XMV66020 100	20	315	422
XMV66025 100	25	355	476
XMV66030 100	30	400	536
XMV66035 100	35	500	671
XMV66040 100	40	560	751
XMV66045 100	45	630	845
XMV66050 100	50	710	952
XMV66060 100	60	800	1073
XMV66065 100	65	900	1207
XMV66070 100	70	1000	1341
XMV66090 100	90	1250	1676
XMV66100 100	100	1400	1877
XMV66115 100	115	1600	2146
XMV66130 100	130	1800	2414
XMV66145 100	145	2000	2682
XMV66160 100	160	2240	3004
XMV66180 100	180	2500	3353
XMV66200 100	200	2800	3755
XMV66230 100	230	3150	4224
XMV66260 100	260	3550	4761
XMV66290 100	290	4000	5364
XMV66325 100	325	4500	6035
XMV66360 100	360	5000	6705
XMV66400 100	400	5600	7510

[7] kW standard motor rated power (cos ϕ • Eff = 0.8, 10kV)

XMV660 11kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[8]	(HP)
XMV66020 110	20	315	422
XMV66023 110	23	355	476
XMV66025 110	25	400	536
XMV66030 110	30	500	671
XMV66035 110	35	560	751
XMV66040 110	40	630	845
XMV66045 110	45	710	952
XMV66050 110	50	800	1073
XMV66060 110	60	900	1207
XMV66065 110	65	1000	1341
XMV66080 110	80	1250	1676
XMV66090 110	90	1400	1877
XMV66100 110	100	1600	2146
XMV66120 110	120	1800	2414
XMV66130 110	130	2000	2682
XMV66150 110	150	2240	3004
XMV66165 110	165	2500	3353
XMV66185 110	185	2800	3755
XMV66210 110	210	3150	4224
XMV66230 110	230	3550	4761
XMV66260 110	260	4000	5364
XMV66300 110	300	4500	6035
XMV66330 110	330	5000	6705
XMV66370 110	370	5600	7510

[8] kW standard motor rated power (cos ϕ • Eff = 0.8, 11kV)

XMV660OUTDOOR

MV VARIABLE SPEED DRIVE



IP55 / NEMA3R



XMV660 OUTDOOR

The XMV660 NEMA3R is the most innovative, reliable and long lasting outdoor medium voltage drive ready for 24/7 operation under the most demanding environments.

The XMV660 goes one step further in achieving high performance by implementing proven low voltage technology within a modular and reliable configuration. An input phase shift transformer powers low voltage cells that are connected in series producing a quasi-sinusoidal current and voltage output wave with reduced dV/dt and THDi. It is designed under the strictest safety regulations and complies with the most demanding industrial requirements. The XMV660 is available in a wide voltage and power range, offering the best power quality, maximum motor care, uncompromising safety and reliability with reduced maintenance across the whole range.

A RUGGED DESIGN
WITH THE BEST
TECHNOLOGY INSIDE

- RUGGED DESIGN: NEMA3R | IP55-OUTDOOR RATED ENCLOSURE WITH MINERAL ISOLATION
- NON-STOP INNOVATIVE COOLING - SMART AND RELIABLE CYCLONE AIR FILTERING THAT WITHSTANDS EXTREME DESERT CONDITIONS
- MULTI-LEVEL, PULSE-WIDTH MODULATION WITH PHASE SHIFT TRANSFORMER
- HIGH EFFICIENCY AND POWER FACTOR AT PARTIAL LOADS
- LOW HARMONICS - IEEE 519 COMPLIANCE
- LOW HVF - NO MOTOR DERATING OR MOTOR CABLE LENGTH RESTRICTION
- OUTPUT VOLTAGE BOOSTING
- REDUNDANCY WITH CELL BYPASS

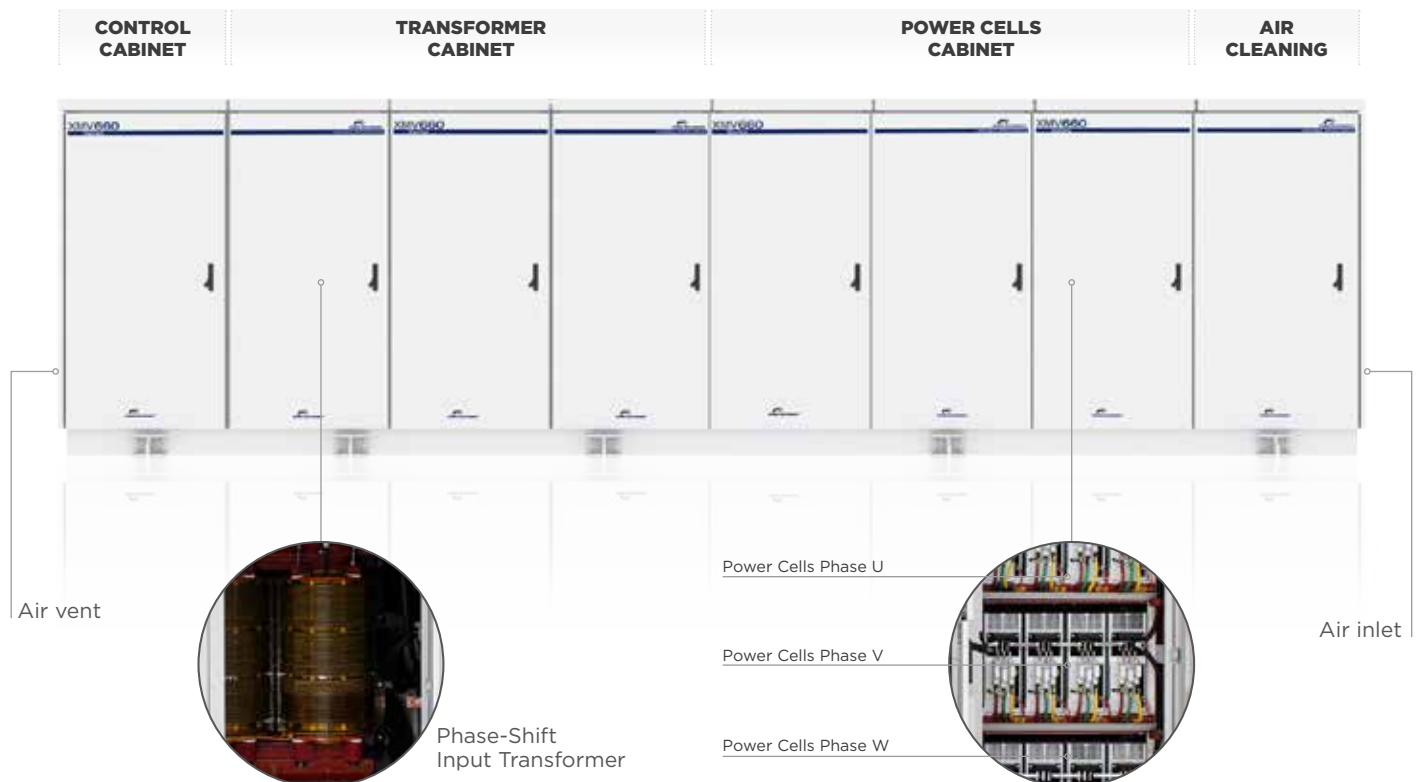
OUTDOOR XMV660 TOPOLOGY

The XMV660 is based on a multi-step pulse width modulation (PWM). Low voltage power cells are connected in series producing a quasi-sinusoidal voltage and current motor wave. This topology offers a low dV/dt , THDi and HVF without output dV/dt or sinusoidal filters. This leads to reduce: peak voltages at the motor terminals, motor vibrations and overheating.

Power cells are connected to dedicated output terminals of the phase-shift transformer that can be configured from 18 to 54 pulses. This transformer offers a low THDi, high electric protection, and high power factor at low loads.

The control panel monitors the transformer status and communicates with power cells through fiber optics. At the same time, interacts with the user and DCS (Distributed Control system) through the local display, serial communication ports, I/O signals or the ultimate new wifi web display.

- INSTALLATION SUITABLE FOR THE HARSHTEST ENVIRONMENTS
- AUTONOMOUS DESIGN, NO NEED FOR ADDITIONAL VENTILATION
- READY FOR A WIDE RANGE OF OPERATION TEMPERATURES
- MODULAR CONSTRUCTION ISOLATES THE ELECTRONICS SECTION
- LOW MAINTENANCE, NO FILTERS
- SMALL FOOTPRINT



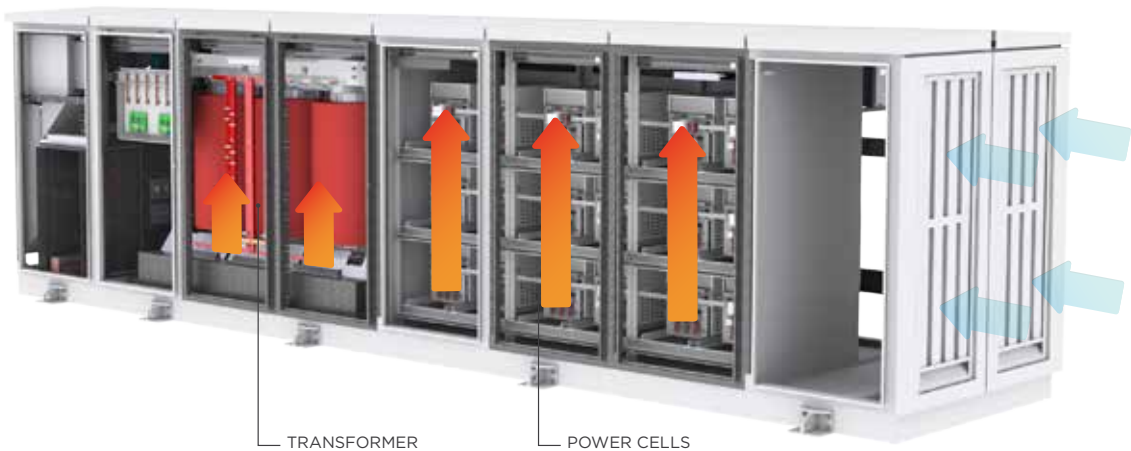
XMV660 OUTDOOR COOLING SYSTEM

Our innovative filter-less “cyclone drive” cooling system delivers a constant stream of clean air to the XMV660. Initially the inlet labyrinth sifts the larger dust particles from the air stream, enabling the cyclone drive to eject the remaining contaminants, ensuring a constant flow of clean air into the electronics chamber without the need to maintain cumbersome dust filters. (Patent pending)

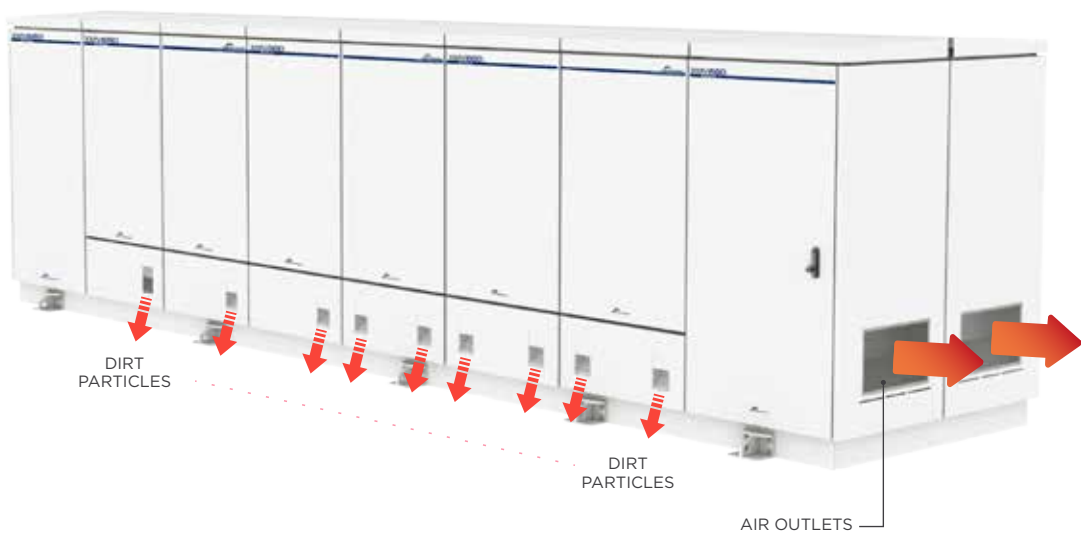
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Robust design ready for outdoor conditions

The XMV660 delivers a high performance under extreme conditions thanks to its rugged sandstorm resistant design.

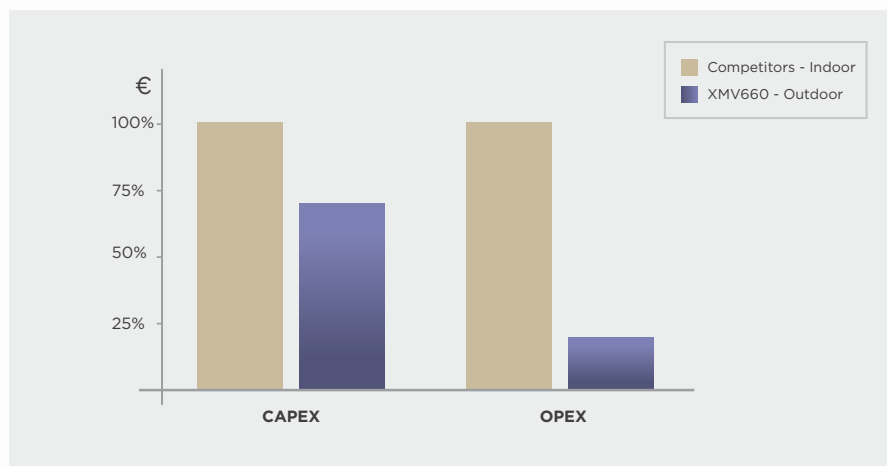


RUGGED DESIGN

The leading medium voltage technology has been integrated in a truly outdoor enclosure. A system born to run under the most demanding conditions with dust, moisture or ice. Extreme conditions that are commonplace in Oil & Gas, Power Generation and Water applications. A highly globalized market demands reliable, safe and efficient solutions to reduce the OPEX and CAPEX in new projects, and XMV660 Outdoor MV VFD links these concepts by providing substantial savings on:

- **CAPEX (Construction and Civil Works):** Multi-MW AC drives have a large foot print that force designers and constructors to build impressive technical rooms. The civil works in remote locations represent an important investment that the outdoor XMV660 helps to minimize.

- **OPEX (HVAC):** The AC drives dissipates in heat between 2% to 4% of the power converted, this means that the HVAC systems for e-houses represents a high percentage of the electrical operating cost of the facility. The XMV660 Outdoor is ready to directly exchange heat into the surrounding environment at up to 50°C, being the smarter and the most cost-effective solution.



Outdoor equipment is a challenge that has been overcome by Power Electronics' Solar Division, and the best engineering practices have been migrated to the Outdoor XMV660 by featuring the unit with:

- **Totally Sealed electronics protected from dust and moisture**
- **Conformal coating on electronic board shields PCBs from aggressive atmospheres**
- **Rugged outdoor enclosure with double gasketed doors**
- **50mm mineral isolation panel that dissipates heat from direct sunlight**
- **Corrosion impervious polymeric coating (C5-M)**
- **Temperature and humidity control prevents harmful internal water condensation**

READY FOR ANY
ENVIRONMENT IN ANY SECTOR,
OIL & GAS, WATER, ENERGY...

XMV660_{outdoor}

TECHNICAL CHARACTERISTICS

INPUT	Input voltage (kV) ^[1]	2.3kV to 15kV (±10%), (Voltage/Power Ride Through -35%)
	Frequency	50/60Hz (±10%)
	Power factor	> 0.95 (over 20% load)
	THDi (%) current ^[2]	< 5%
	Power transformer	Phase-shift transformer, dry type (Copper or aluminum)
	Overvoltage protection	Surge Arresters
OUTPUT	Technology	Multi-level, pulse-width modulation, low voltage power cells connected in series.
	Pulses / power cells in series	18p/3, 24p/4, 30p/5, 36p/6, 54p/9
	Power cells (A) / (V)	100A, 200A, 300A, 400A, 630A / 600V-700V
	Current harmonic distortion (THDi)	< 5%
	Harmonic voltage factor (HVF)	< 0.019 (No motor derating required)
	Efficiency	≥96% (including transformer) @Pn
	Power cell bypass	Built-in as standard
	Output voltage balance	Neutral phase shift
	Output voltage boosting	Space vector modulation
ENVIRONMENTAL RATINGS	Degree of protection	(IEC60529) IP55, NEMA3R / IP65 (Optional)
	Operation temperature ^[3]	-20°C to +50°C
	Storage temperature	-25°C to +55°C
	Humidity	< 90%, non condensing
	Altitude	<1000m; >1000m power derating 1%/100m. Max. 3000m
	Cooling	Forced air cooling
CONTROL	Control mode	Local control (Display and push-buttons) Remote control (I/O and communications), Web display (wifi)
	Control method	V/Hz VECTOR CONTROL Open Loop: PWM speed / torque control, AVC: speed / torque control Close Loop (Encoder): PWM speed / torque control, AVC: speed / torque control
	Carrier frequency	1kHz
	Control power supply	Redundant 2x230Vac II P+N (1kVA), UPS integrated
	Other characteristics	Voltage/Power ride through, quick setting and commissioning, master-slave synchronization, skip critical frequencies, delay-off IGBT, motor pre-magnetization, flux reduction at low load (energy saver), electric DC brake, multi-reference and speed ramp, Power PLC programming, Other consult Power Electronics.
USER INTERCONNECTION ^[1]	Digital inputs	5 programmable, Active high (24Vdc), Isolated power supply 5 pre-configured (Start/Stop ; Reset, control mode, reference) 1 PTC input
	Analogue inputs	3 programmable differential inputs. 0 – 20mA, 4 – 20mA, 0 – 10Vdc and ±10Vdc. (Optically isolated)
	Digital outputs	2 programmable changeover relays (250Vac, 8A or 30Vdc, 8A) 3 programmables NO contacts (250Vac, 8A or 30Vdc, 8A) 3 pre-configured contacts (Start/Stop, Warning, Failure)
	Analogue outputs	3 isolated programmable outputs: 0 – 20mA, 4 – 20mA, 0 – 10Vdc and ±10Vdc
	Encoder (optional)	2 differential encoders input (process y vector control).Input signal from 5 to 24Vdc
COMMUNICATIONS	Standard Hardware	USB, RS232, RS485, Ethernet
	Optional Hardware	Fiber optics, 9 Pin D-SUB, CAN
	Standard Protocol	Modbus-RTU, Modbus TCP, Ethernet IP
	Optional Protocol	Profibus-DP, Devicenet, CAN Open
REGULATION	Electromagnetic compatibility	Directive EMC 2004/108/EC, IEC/EN 61800-3, IEEE 519-1992
	VSD design and construction	IEC/EN 61800-4 General requirements, IEC/EN 61800-5-1 Safety, IEC/EN 60146-1-1 Semiconductor converters
	MV transformer	IEC/EN 60076 -1, -11, IEC/EN 60146-1-3, IEC/EN 61378-1

NOTES [1] Other configurations, consult Power Electronics.
[2] Harmonics are below the limits defined in IEEE519 for all I_{sc}/I_L .

CONFIGURATION TABLE - XMV660 OUTDOOR

XMV66	100		66		X		Y		Z	
XMV660 Series	Rated Output Current ^[1]		Rated Motor Voltage		Overload %		Degree of protection		Model ^[2]	
	100	100A	23	2.3kV (9 cells)	1	110% Light Duty	5	IP55	-	Asynchronous motor
	200	200A	30	3kV (9 cells)	2	120% Normal Duty			S	Synchronous motor
	300	300A	33	3.3kV (9 cells)	5	150% Heavy Duty			R	Asynchronous motor 4Q Regenerative
	400	400A	41	4.16kV (12 cells)	...	Under request			W ^[1]	Synchronous motor 4Q
	630	630A	60	6kV (18 cells)					M	Asynchronous motor 4Q Regenerative Monophase Bridge rectifier
	...	Under request	66	6.6kV (18 cells)						
				10kV (27 cells)						
				11kV (27 cells)						

NOTES [1] Check the rated current of the motor nameplate and indicate the short circuit current to guarantee the compatibility with the selected drive.
[2] Consult availability with Power Electronics
[3] Preliminary, consult Power Electronics the definitive values.
Request your quote by filling the ordering info template; please consult Power Electronics with your additional demands.

STANDARD RATINGS - OUTDOOR XMV660

XMV660 4.16kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW)	(HP) ^[1]
XMV66050 416	50	298	400
XMV66060 416	60	336	450
XMV66070 416	70	373	500
XMV66080 416	80	447	600
XMV66090 416	90	522	700
XMV66100 416	100	597	800
XMV66120 416	120	671	900
XMV66130 416	130	746	1000
XMV66160 416	160	932	1250
XMV66200 416	200	1119	1500
XMV66230 416	230	1305	1750
XMV66260 416	260	1491	2000
XMV66290 416	290	1678	2250
XMV66300 416	300	1752	2350
XMV66320 416	320	1864	2500
XMV66360 416	360	2051	2750
XMV66390 416	390	2237	3000
XMV66450 416	450	2610	3500
XMV66520 416	520	2983	4000
XMV66580 416	580	3356	4500
Under request			

XMV660 6.6kV			
CODE	NOMINAL CURRENT (A)	MOTOR POWER	
		(kW) ^[2]	(HP)
XMV66045 066	45	400	536
XMV66050 066	50	450	603
XMV66055 066	55	500	671
XMV66060 066	60	560	751
XMV66070 066	70	630	845
XMV66080 066	80	710	952
XMV66090 066	90	800	1073
XMV66100 066	100	900	1207
XMV66110 066	110	1000	1341
XMV66140 066	140	1250	1676
XMV66150 066	150	1400	1877
XMV66180 066	180	1600	2146
XMV66200 066	200	1800	2414
XMV66220 066	220	2000	2682
XMV66250 066	250	2240	3004
XMV66270 066	270	2500	3353
XMV66300 066	300	2800	3755
XMV66350 066	350	3150	4224
XMV66390 066	390	3550	4761
XMV66440 066	440	4000	5364
XMV66500 066	500	4500	6035
XMV66550 066	550	5000	6705
Under request			

NOTES [1] HP standard motor rated power ($\cos \phi \cdot \text{Eff} = 0.8$, 4.16kV)
[2] kW standard motor rated power ($\cos \phi \cdot \text{Eff} = 0.8$, 6.6kV)

2.3kV, 3kV, 3.3kV, 6kV, 10kV, 11kV, and 12kV Standard Ratings available under request.

Warranty

Power Electronics (the Seller) warrants that their INDUSTRIAL Products are free of faults and defects for a period of 3 years, valid from the date of delivery to the Buyer.

The warranty shall not extend to any Products whose defects are due to (i) careless or improper use, (ii) failure to observe the Seller's instructions regarding the transport, installation, functioning, maintenance and the storage of the Products, (iii) repairs or modifications made by the Buyer or third party without prior written authorization of the Seller, (iv) negligence during the implementation of authorized repairs or modifications, (v) if serial numbers are modified or illegible, (vi) anomalies caused by, or connected to, the elements coupled directly by the Buyer or by the final customer, (vii) accidents or events that place the Product outside its storage and operational specification.

The warranty excludes components that must be replaced periodically such as fuses, lamps & air filters or consumable materials subject to normal wear and tear.

The warranty excludes external parts that are not manufactured by the Seller under the brand of Power Electronics.

The Seller undertakes to replace or to repair, himself, any Product or its part that demonstrates a fault or defect, which is in conformance with the aforementioned terms of the warranty. Costs associated with the disassembly/assembly, transport and customs of equipment will also be undertaken by the Seller except in cases of approved intervention by the Buyer and/or their representative where cost allocation has been previously agreed.

In case of fault or defect, the Buyer shall notify the Seller in writing by using the following contact email: **quality@power-electronics.com**, of the presence of any fault or defect within 15 days of the fault or defect event. The serial number of the defective product plus a brief description of the fault must be included in the email. Failure to notify the Seller of fault or defect within this time period may result in the warranty becoming invalid.

In the event of replacement of defective Product or part thereof, the property of the Product or part shall be transferred to the Seller.

The Seller shall bear no liability for damages to property or third persons, even as manufacturer of the Products, other than that expressly provided by virtue of applicable mandatory law provisions. In any case, the Seller shall not be liable for indirect or consequential damages of whatsoever nature as, by way of example, production losses or unearned profits.

The Seller shall, at their discretion, forfeit all warranty rights of the Buyer if the total sum of the contract and payment has not been reached in accordance with the agreed conditions of the contract.

No other warranties, express or implied, are made with respect to the Products including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose. In any case, the Buyer's right to damages shall be limited to a maximum amount equal to no more than the value of the faulty or defective Products.



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