

VFS Series Medium Voltage Soft Starter

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Power your future

EMPORIUM ENERGY

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Wolong Electric Group Co., Ltd

As a global well-known manufacturer of motor & drive solutions, Wolong Electric Group co., Ltd. was founded in 1984, after more than 30 years of innovation and development in China, Vietnam, England, Germany, Austria, Italy, Poland, Mexico, India and Serbia it has 39 manufacturing factories and three technology centers with more than 18000 staff. In 2018, total assets reaches CNY 30 billion, and annual sales revenue reaches CNY 36.5 billion. Wolong mainly manufacturers all types of motors, generators, control drive products, industrial automation products and so on to provide our customers optimal solution and service in oil & gas, petrochemicals, power, mining, rail transportation, building, water & waste water, automation, new energy vehicles and so on.



Wolong Electric Large Drive Business Group Drive Division

Wolong Electric Large Drive Business Group Drive Division (referred to as the Drive Division) focuses on the field of power electronics. With years of experience in medium-voltage electrical product design, taking high reliability as designing principle and maintenance-free as designing goal, the company has developed the industry-competitive RMVC5000, RMVC5100 series medium-voltage converter products, medium-voltage solid-state soft start VFS series products and explosion-proof electrical series products, etc. Its technical strength has reached international leading level.

VFS series medium-voltage solid-state soft starter is an advanced soft starting product independently developed by the company. Based on the technology of ordinary solid-state soft starter, this product is capable of realizing step-variable frequency conversion and stepless voltage-regulating start function. The equipment adopts a starting technology in-between the frequency conversion and voltage reducing start. It has applied for and obtained patents in many countries and regions such as China, the European Union, Japan, etc., and has been exported to Germany, the United Kingdom, Egypt, Iran, Indonesia, Australia, Poland, Russia, Vietnam, Sudan, India and other countries.

In order to meet the needs of different users, the products are continuously upgraded. The current products include: medium and small power type, high power type, integrated type, customized super high power type, marine type, vehicle type, long distance transmission type, mining general type, SFC variable frequency starting device, mine explosion-proof and intrinsically safe medium-voltage AC soft start controller.



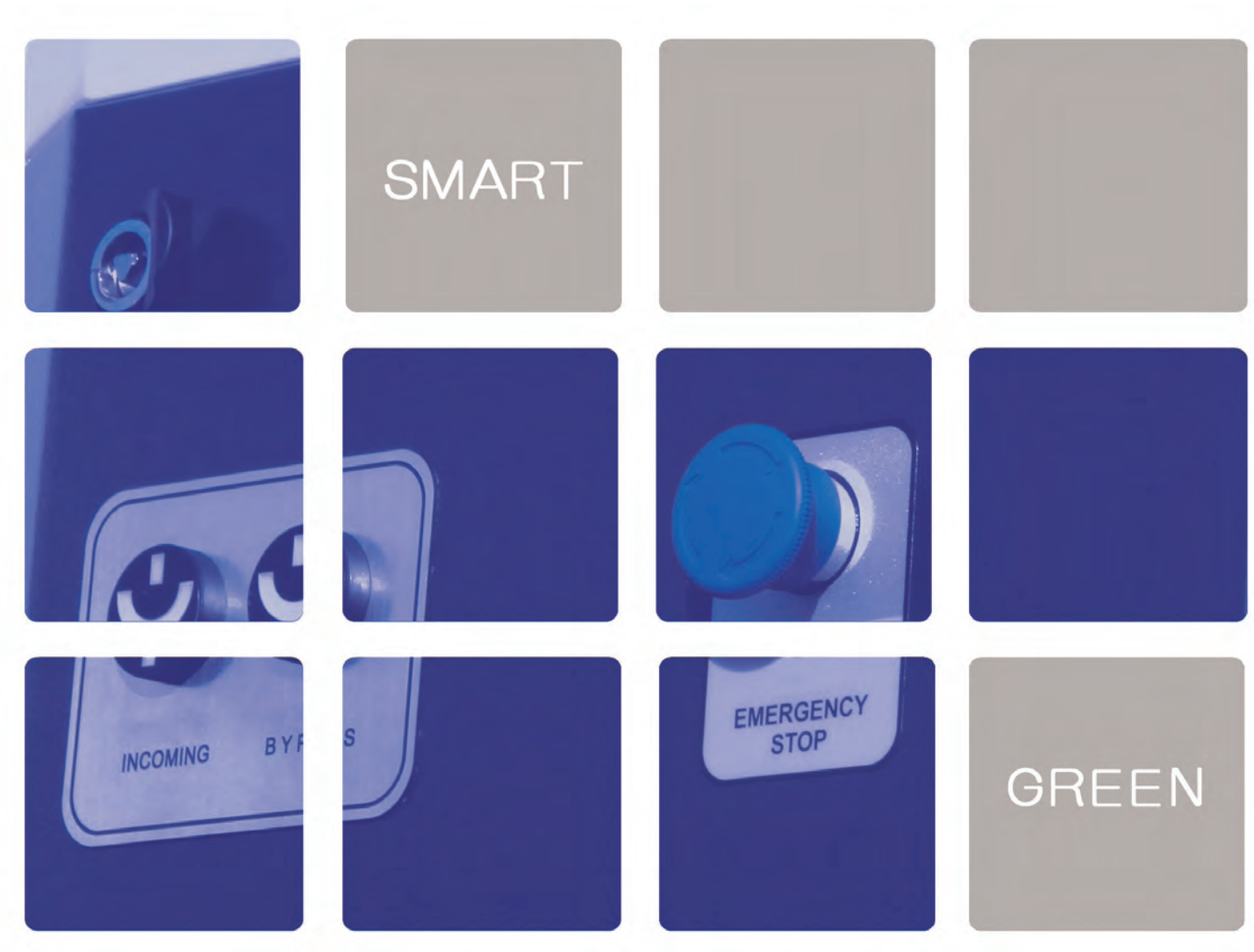
Codes and Standards

•IEC 60044-1	Current transformers
•IEC 62271-200	AC metal-enclosed switch gear and control gear for rated voltages above 1 kV and up to and including 52 kV
•IEC 60529	Degree of protection provided by enclosures
•IEC 62271-1	Common Specifications-Clauses for High-Voltage Switchgear and Control gear.
•IEC 60694	Common clauses for high voltage switchgear and control gear standards
•IEC 60060	High voltage test techniques
•IEC 60071	Insulation coordination
•IEC 60632	High Voltage motor starters
•IEC 60617	Graphical symbols for Electrical diagrams.
•IEC 60664	Insulation coordination for equipment within low-voltage systems, ncluding clearances and creepage distances for equipment.
•IEC 60470	High Voltage AC-Contactor and Contactor based Motor Starter.
•IEC 60688	Electrical measuring transducers for converting AC electrical quantities To analogue or digital signals.



Application

- Industry: Metallurgy, Coal, Mining, Petroleum, Chemical, Municipal, Shipbuilding, Electric Power, Paper, Cement, Food, Automobiles, etc.
- Load: Compressor, Fan, Water Pump, Ball Mill, Belt Conveyor, Crusher, etc.
- Special Application: High Altitude Area, Mining, Marine Environment, Vehicle, etc. Please Contact With Our Company.



Product Features

- Wide Application Range

3-phase asynchronous/synchronous motor, voltage class 3kV~13.8kV, power rating 100kW~50MW

- Advanced Smooth Start Technology without Impact

Phase-shifting voltage regulation technology + stepless voltage regulation technology with step frequency conversion, avoiding electrical and mechanical impact to motor and load caused by abrupt start.

- Flexible Control of Motor Start/Stop

2-step variable frequency start, voltage-ramp start, current-ramp start, current limiting start, and free stop, soft stop and braking stop.

- Full Protection to Motor

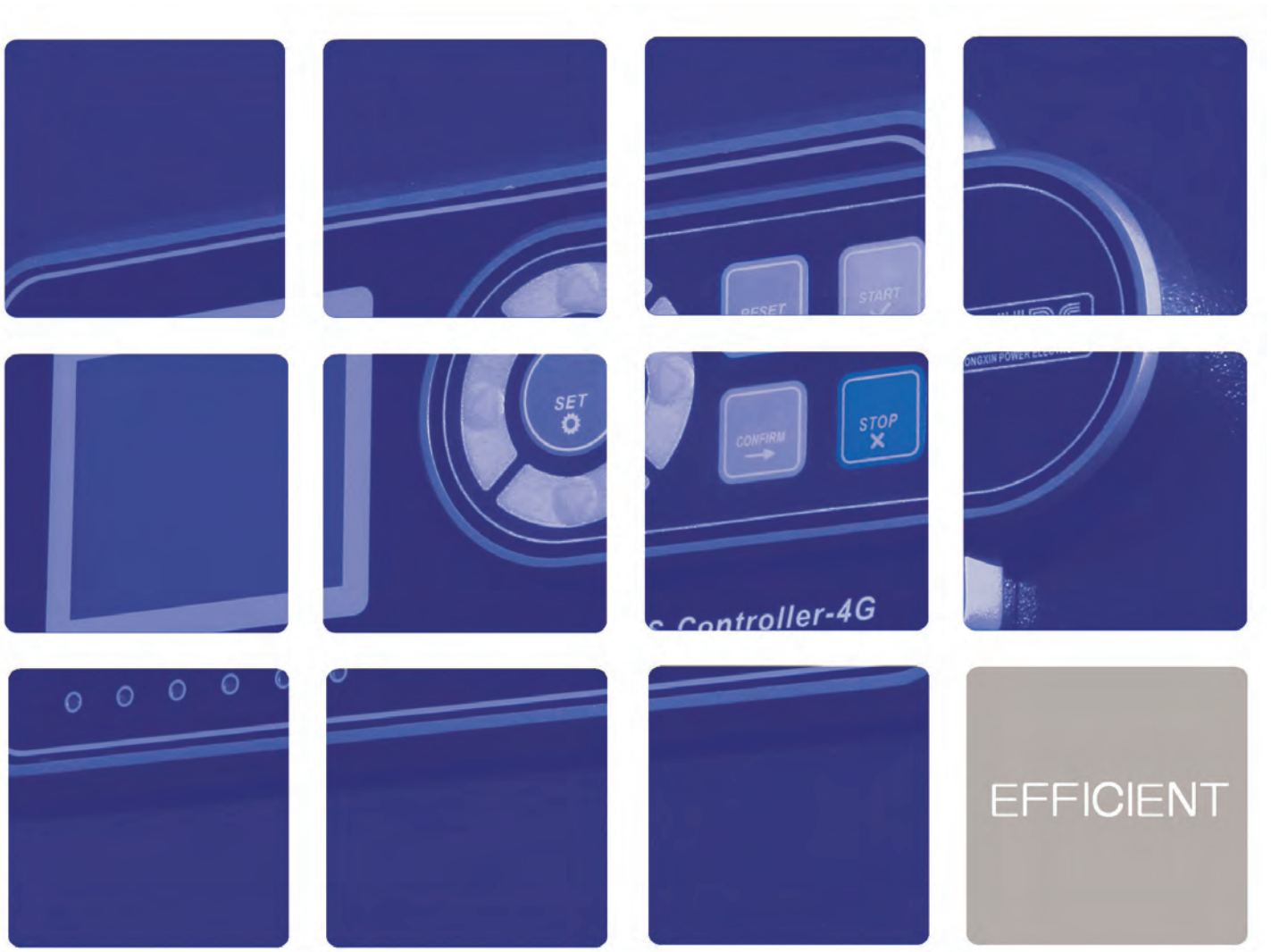
Integrated protection function to motor during start/stop

- Advanced Thyristor Protection Technology

Thyristor optical signal triggering technology, secondary pulse-supplementary technology, thyristor dynamic measurement technology for thyristor protection.

- Safety Isolation Design

Fully isolation between MV and LV circuit, LV pre-commissioning function, isolation device in MV chamber for safety protection.



- Flexible Communication Interface

Modus, Profibus, Canbus, EtherNet and so on are available on demand.

- Maintenance-free Design

Advanced protection & high-redundancy technology for maintenance-free.

- Excellent EMC Performance

Low harmonics in compliance with IEEE519-1992 and GB/T14549-93 without harmonics filter needed.

- Professional Soft Starter Customization Service

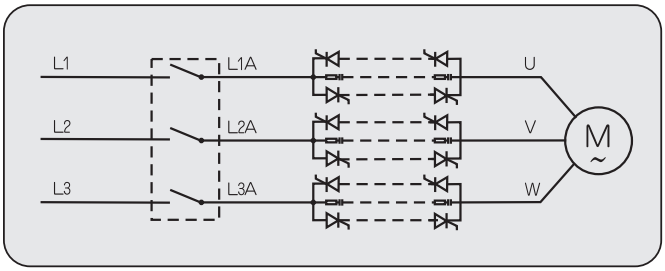
Customized input protection device, compensation device, harmonics filter, one for more motors, special dimension and so on.

- Strong Adaptability

Such as big range of power grid frequency fluctuation (40~70Hz), Diesel generator for power supply, high altitude, alpine region and so on.

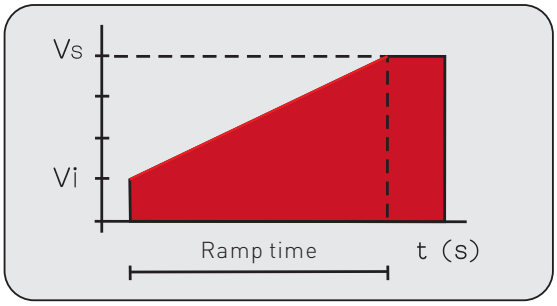
Principle

- MV soft starter is connected between power supply source and motor. While soft starter is working, the turn-on angle of thyristor is controlled by controller in soft starter in order to regulate the voltage of motor and achieve the optical motor current and motor torque. MV soft starter can work under voltage-ramp start, current-limiting start, 2-step variable frequency start.



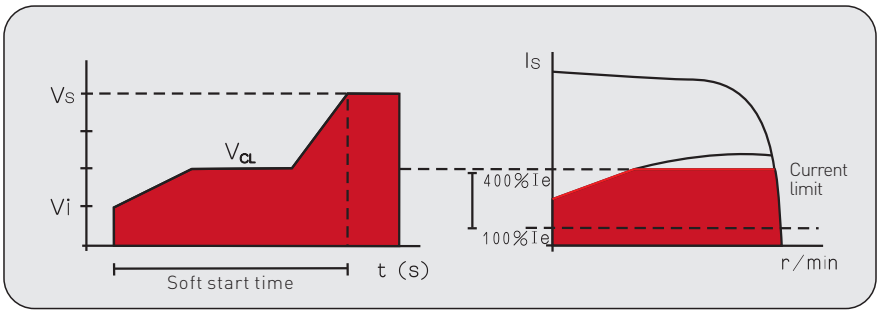
Voltage-ramp Start

- Note: under this start mode the start current cannot exceed 500%Ie due to easily cause over-current trip-off, and the turn-on angle makes the output voltage linearly increase to rated voltage linear



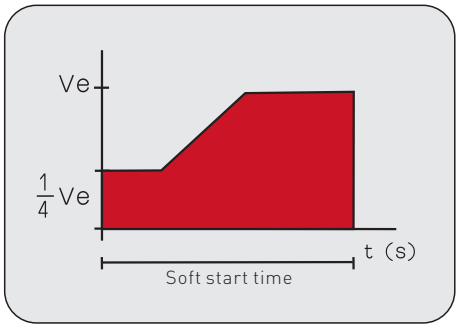
Current-limiting Start

- Current limiting range: 100%~400%Ie
- During operating and soft start, this mode cannot work



2-step Variable Frequency Start

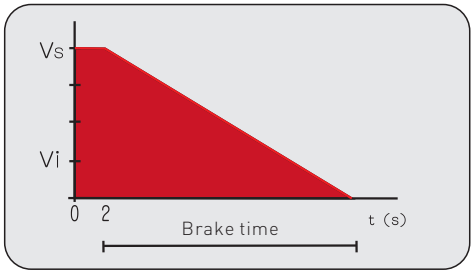
- According to actual application request, based on voltage reduction starting technology, new control method—2-step variable frequency start is developed, which controls thyristor's triggering moment to selectively control some half-cycle wave of power supply to turn-on and the other half-cycle wave to turn-off in order to get (1/4)f wave. At the beginning of start, the motor can get enough big starting torque with small starting current.



Brief Introduction on Starting Mode

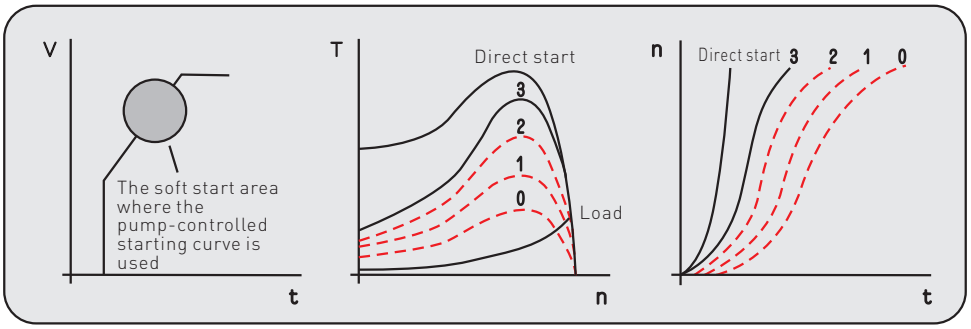
Soft Stop

- Deceleration soft-start(ramp down time)
- Deceleration control for high friction load
- Decide motor's voltage ramp-down time
- Time adjustment:1~30s



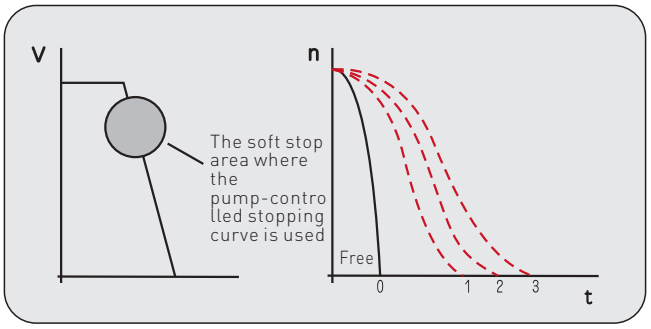
Motor Start

- During motor start, peak torque is 3 times of rated torque, which caused high pipeline pressure for pump application
- VFS series soft starter provides 4 types of start curves:
- Curve 0: applicable to no-load motor for trial run
- Curve 2: standard start curve (default), applicable to most motor start situations
- Curve1&3 or programmable curve: depend on special application situation



Motor Stop

- Soft-start can smoothly decrease the motor speed to zero in order to avoid the water hammer effect for pump application
- VFS series soft starter provides 4 types of stop curves:
- Curve 0: standard stop curve (default) for free-stop
- Curve 1,2&3: select according to actual pump performance characteristic or select soft-stop curve



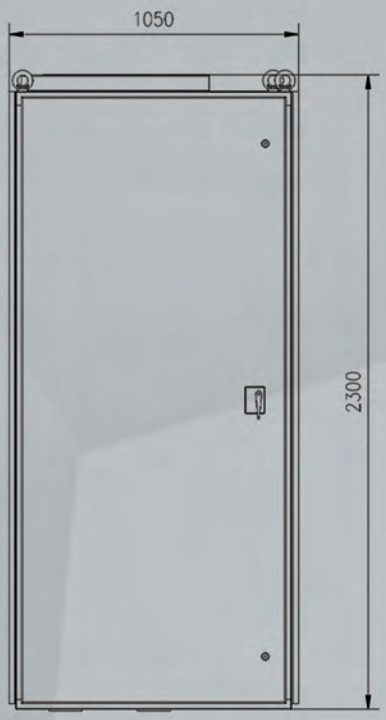
EXTENSIBLE TYPE

VFS Series

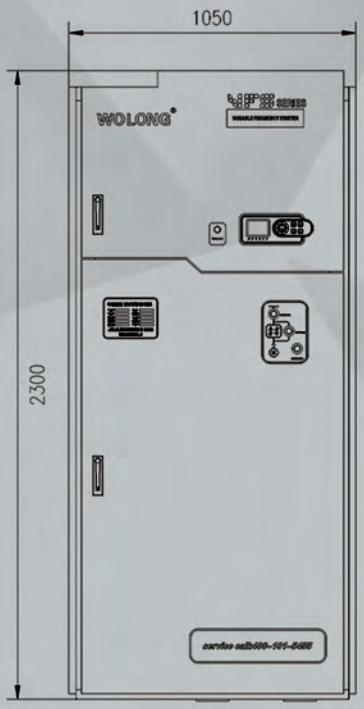
—Introduction of extensible type MV soft starter—

- Rated voltage: 3-11kV (-10% ~ +10%)
- Power range: 100kW - 5000kW
- Quanlity of thyrister; 18 SCRs; 24 SCRs; 30 SCRs (depending on model)
- PIV of thyrister: 4200V; 6500V (depending on model)
- Control voltage: 110V AC/DC or 220V AC/DC, 2000VA (customer supply)
- Overload capacity: 400% full-load current of the motor/60s
  500% full-load current of the motor/30s;
- Note: There are three type of soft starters, E-1,E-2, E-3.Please find the following pages for details.


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VARIABLE FREQUENCY STARTER
EMERGENCY STOP
WARNING

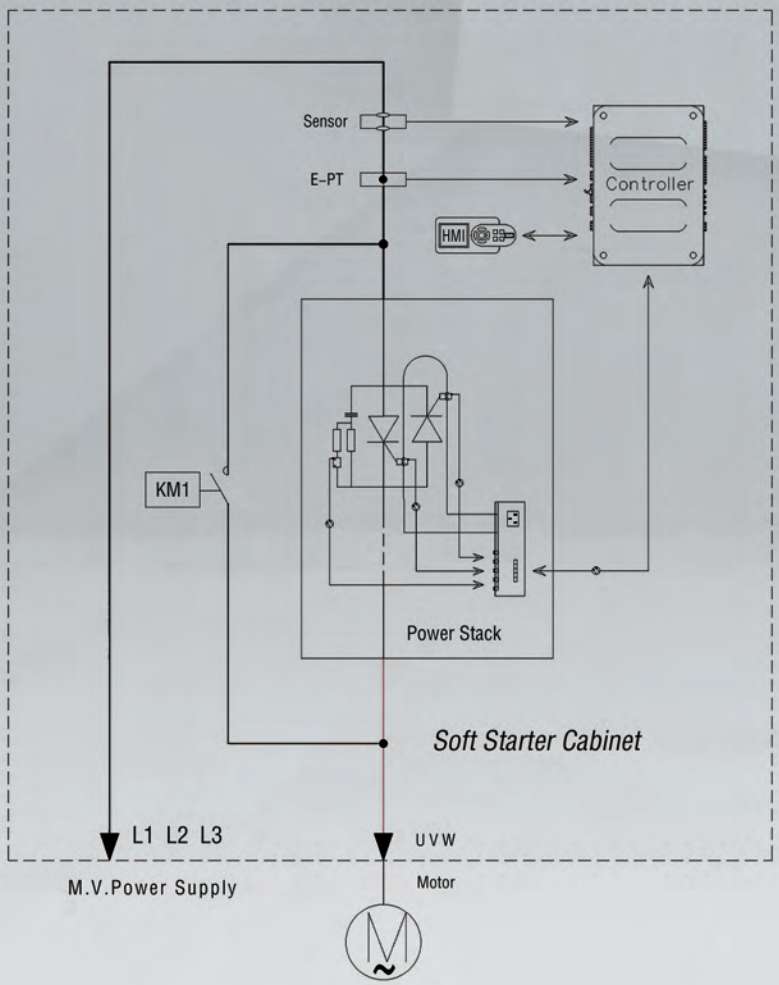


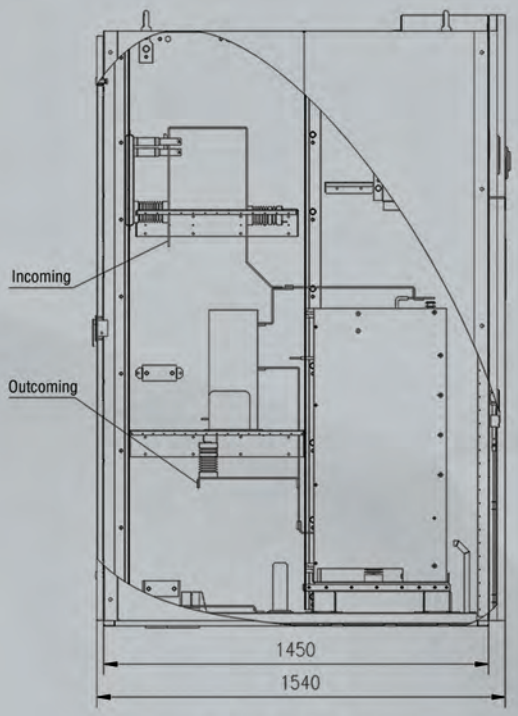
Back View With Doors



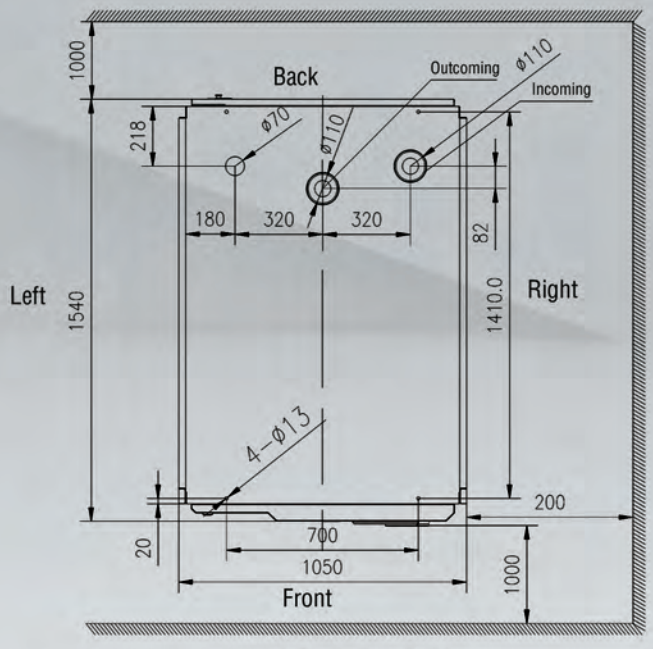
Front View With Doors

E-1 Type





Internal Side View

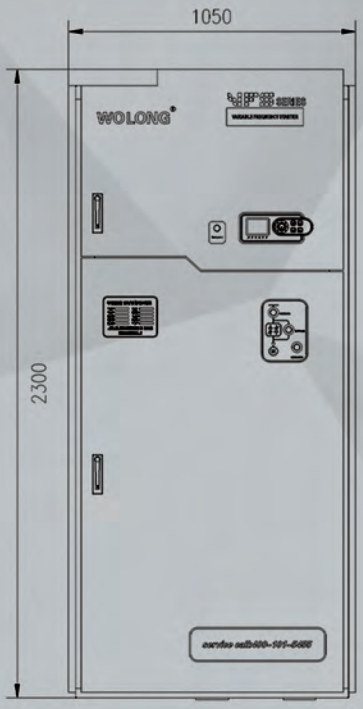


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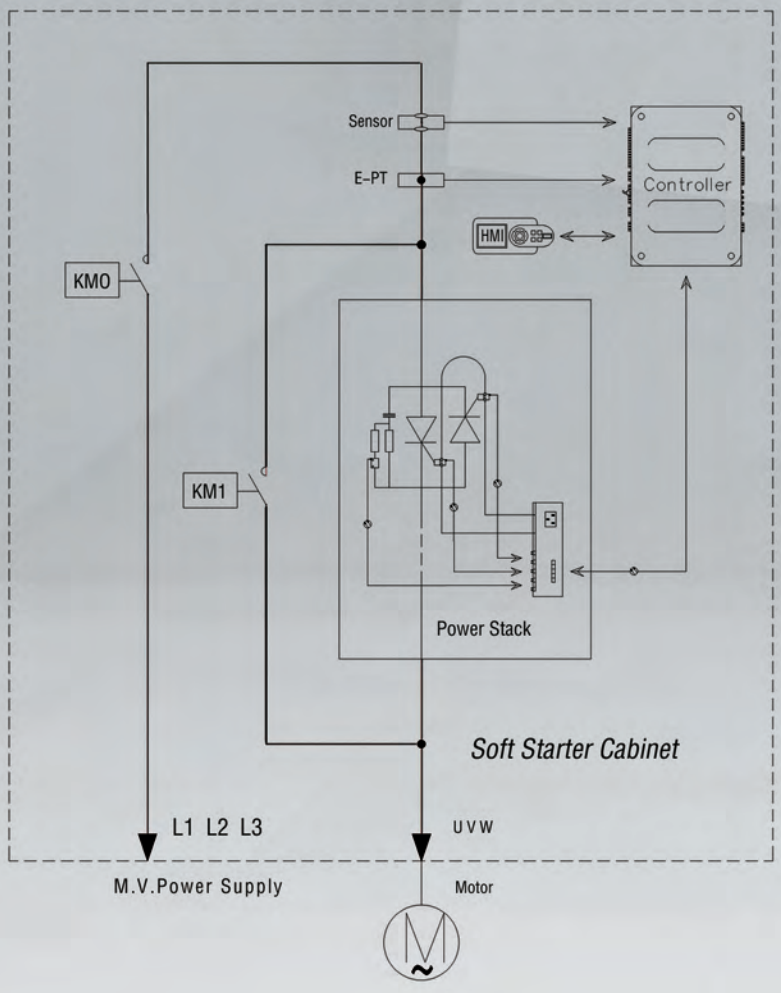


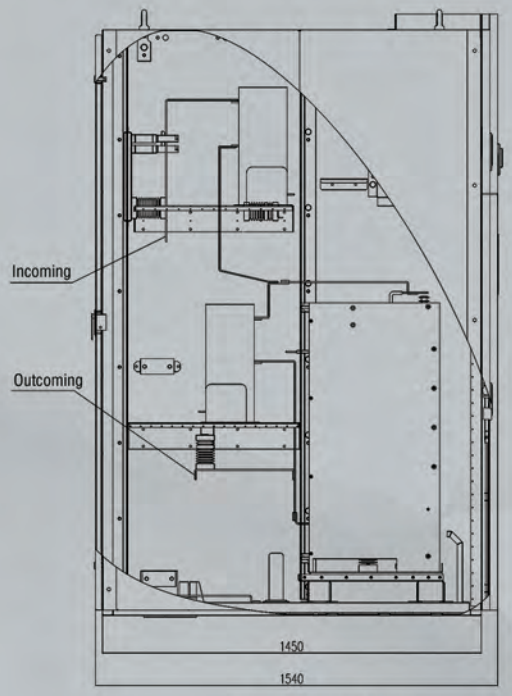
Back View With Doors



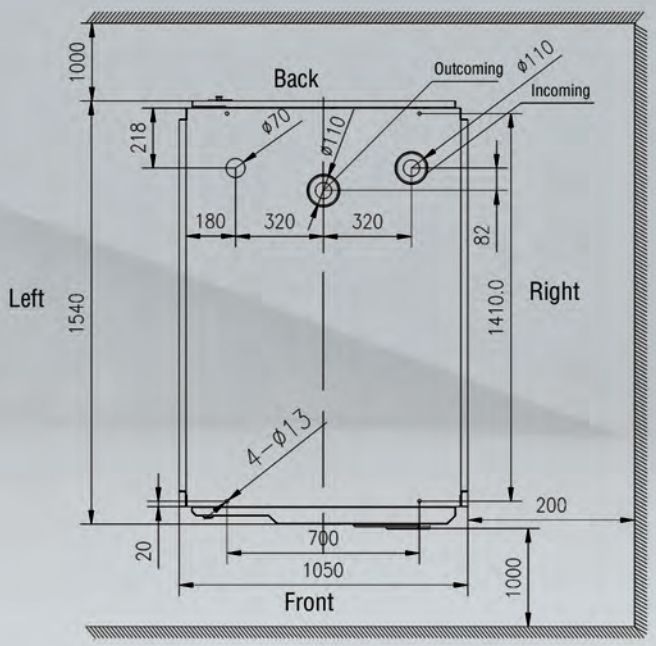
Front View With Doors

E-2 Type





Internal Side View



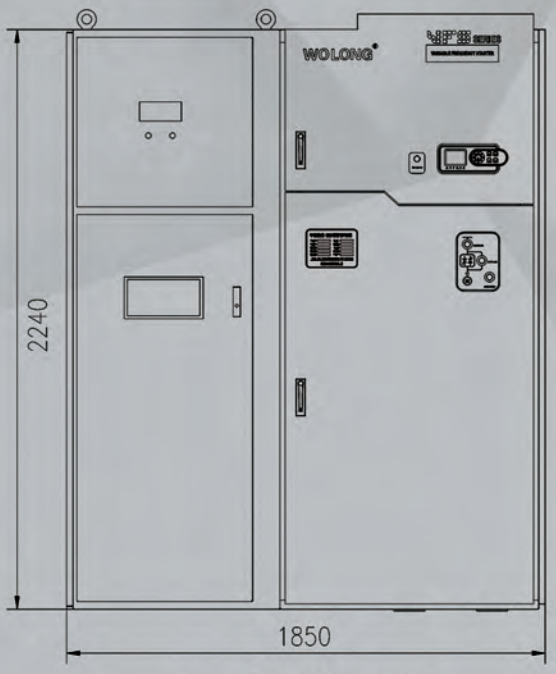
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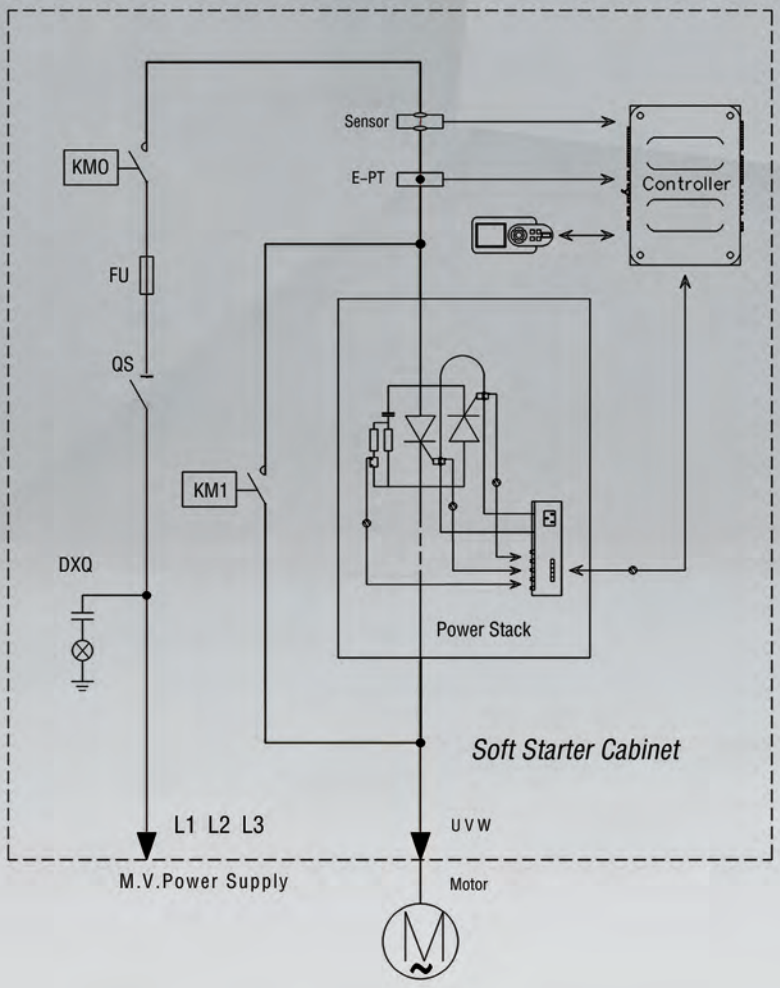
E-3 Type

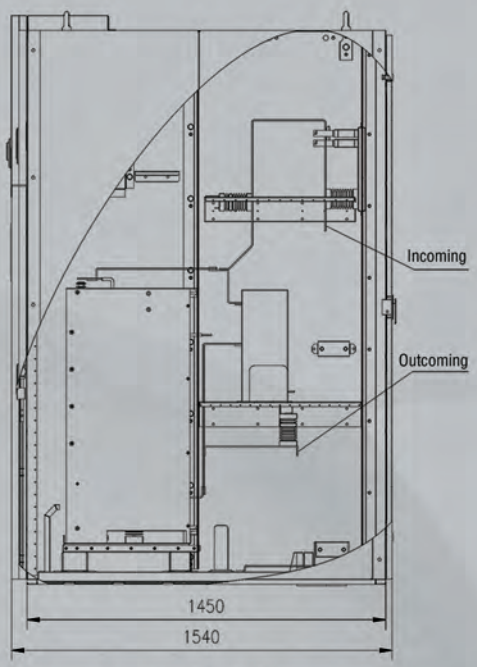


Back View With Doors

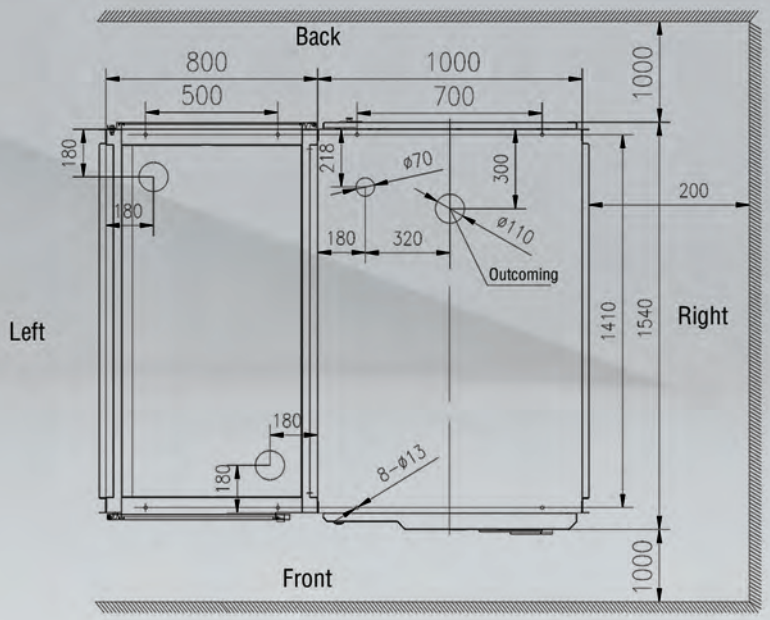


Front View With Doors





Internal Side View



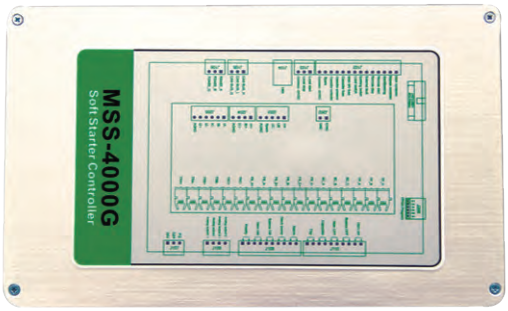
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VFS SERIES
MEDIUM VOLTAGE SOFT STARTER

A Digital Controller

- Digital Controller is the brain of VFS.
- It mainly Contains trigger control module and peripheral control module.
- The Controller is used for trigger control of thyristor, peripheral control and motor protection, etc.



B HMI

- 3.5 Inch TFT LCD
- 9-key keyboard
- 6 LED indication: run/stop, ready, direct start, fault, remote/local.



C Power Units

- Including three phase independent power unit.
- It mainly contains thyristor, power module, trigger module, protection module.
- With high-redundant design. It is suitable for applications requiring heavy-load start and overload start.



D Bypass Contactor

- The motor will be connected to the power supply via the bypass vacuum contactor after the motor started.
- There is a built-in high voltage vacuum contactor in the medium and small power type VFS. (12kV 630A)
- High-power type VFS requires a vacuum circuit breaker as a bypass switch, which shall be provided by customer.

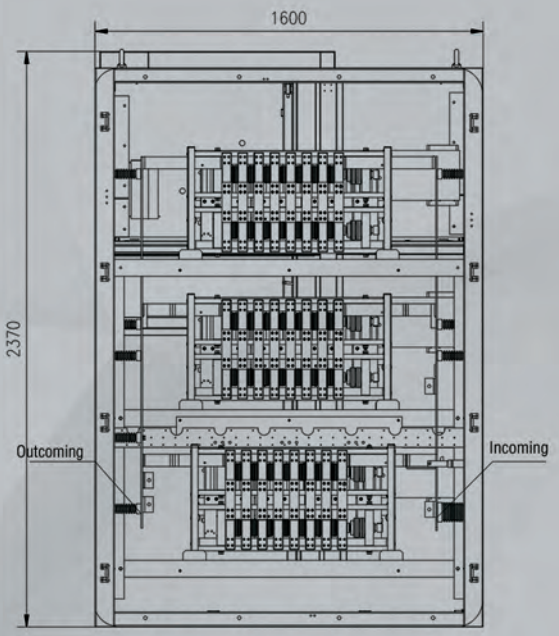


VFS Series

—Introduction of high power type MV soft starter—

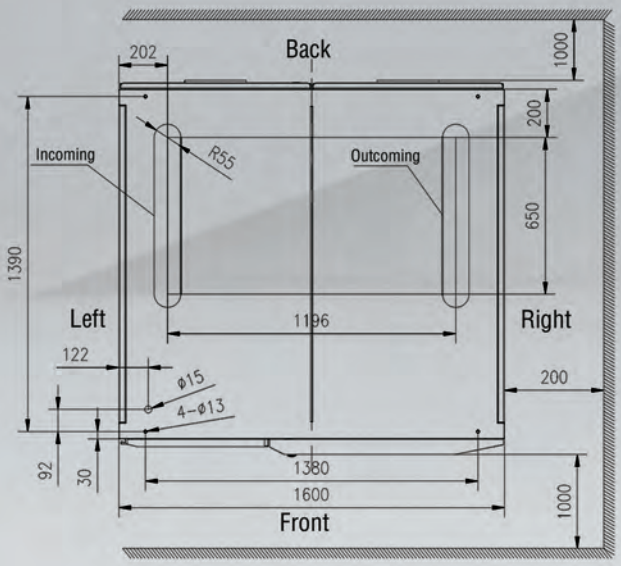
- Rated voltage: 6-13.8 kV (-10% ~ +10%)
- Power range: 4000kW-10000kW (6.6kV)/5000kW-1 OOOOkW (11kV)
- Quantity of thyrister: 24 SCRs; 30 SCRs; 42 SCRs (depending on model)
- PIV of thyrister: 4200V; 6500V (depending on model)
- Control voltage: 110V AC/DC or 220V AC/DC, 2000VA (customer supply)
- Overload capacity: 400% full-load current of the motor/60s
  500% full-load current of the motor/30s
- Note: Bypass breaker is not included in the VFS scope of supply. It shall be provided by customer.


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VFS SERIES
MEDIUM VOLTAGE SOFT STARTER



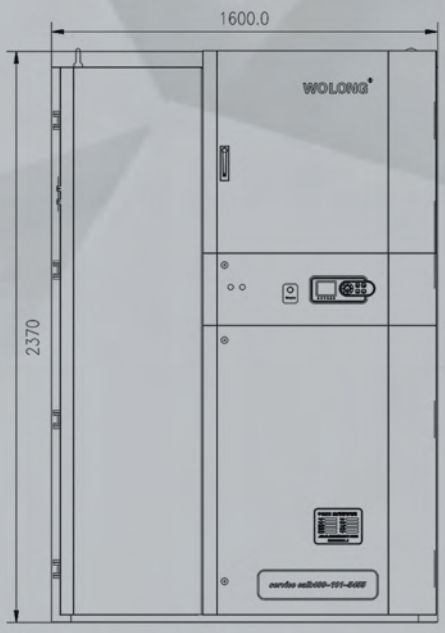
Back View With Doors





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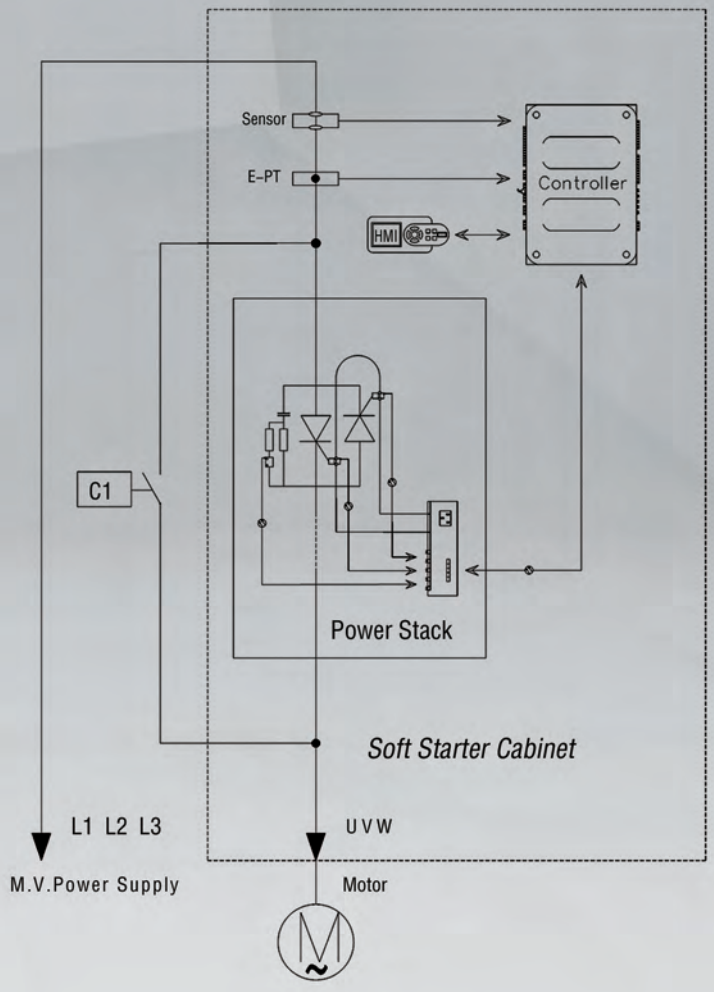
HIGH POWER TYPE



Front View With Doors



Internal Side View



TECHNICAL PARAMETERS

Scope of work	
Rated Voltage	2.3 kV/3kV/3.3 kV/4.16 kV /6 kV/6.6 kV /10kV/11 kV/13.8 kV (-10% ~ +10%)
Power Range	100kW~50000kW
Overload Capacity	400% full-load current of the motor/60s 500% full-load current of the motor/30s
Frequency	50Hz/60Hz ± 2Hz (customized)
Environment Conditions	
Installation Site	Indoor, non explosive or corrosive gas, low dust
Ambient Temperature	0℃ - 40℃ (optional -20℃ to 0℃with heaters)
Humidity	5% — 95%, non-condensing
Altitude	< 1000m
Starting Data	
Starting Current	< 4 In (adjustable)
Starting Time	≤ 60s (adjustable)
Starting Limit	6 times/hour (20℃)
Control	
Control Supply Voltage	110V AC/DC or 220V AC/DC .2000VA (customer supply)
Power Circuit	12 thyristors 18 thyristors 24 thyristors 30 thyristors 42 thyristors
Communication Protocol	Modbus RTU Profibus (option) Ethernet (option)
Communication Interface	RS-485
Event History	Displays 100 recent events,such as start, stop,alarm,trip,external fault,etc.
LCD Display	3.5 inchTransflektiver Farb-TFT
Cooling	Natural cooling
Ingress Protection Level	IP4X
Painting	RAL7035 (customized)
Protection parameter	
Over-current Protection	Over-current alarm and trip setting range: 100-300% off, Full-load current, Over-current, Over-current trip time: 1 -20 Sec Antl time-limit function
Under-current Protection	Undercurrent alarm and trip setting range: 10-90% off. Full-load current, Under-current, Over-current trip time: 1-60 Sec
Over-voltage Protection	Over voltage alarm and trip setting range. 100-150% off, Full-load current, Over-current trip time: 0.1-60 Sec
Under-voltage Protection	Undervoltage protection alarm and trip setting range: 5-90% off, Full-load current, Over-current trip time: 0.1-60 Sec

TECHNICAL PARAMETERS

Motor Short-circuit Protection	Over-current trip setting range: 300-800% off. Full-load current, Short-current trip time: 0-3 Sec
Motor Locked-rotor Protection	setting range: 300-1000% off Full-load current Locked-rotor trip time: 1-10 Sec
Phase Unbalance Protection	Phase unbalance alarm and trip setting range: 5-30% off. optional 2 phases. Unbalance alarm and trip setting time: 1-20 Sec
Load Phase-loss Protection	Trip value: 10-90% FLA Trip time: 1-60 Sec
Power Factor Protection	alarm and trip setting range: 0.1-1.0 off alarm and trip setting time: 1-20 Sec
Overtime Starting Protection	Starting time setting range: 1 -60 Sec
Starting Interval Protection	Setting range:1-6 times Interval of each task:0-60 min

Product Model Composition

VFS - A / S - X XXXX X - I

- **VFS** — Wolong Soft Starter
- **A** — Asynchronous Motor
- **S** — Synchronous Motor
- **X** — Rated Voltage Code
- **XXXX** — Output Power
- **X** — Control Voltage Code
- **I** — Design Number

Rated Voltage Code				Control Voltage Code	
A 3kV	B 3.3kV	C 4.16kV	D6.0kV	A single phase 110-120V AC	B single phase 220-240VAC
E 6.6kV	F 10kV	G 11kV	H 13.8kV	C single phase 110-120V DC	D single phase 220-240VDC

MODEL SELECTION

Order No.	Voltage	Power	weight	Reference Type	Remark
VFS-A(S)-B200X-I	3.3kV	200kW	800kg	E type	Low power
VFS-A(S)-B300X-I	3.3kV	300kW			
VFS-A(S)-B500X-I	3.3kV	500kW			
VFS-A(S)-B700X-I	3.3kV	700kW			
VFS-A(S)-B900X-I	3.3kV	900kW			
VFS-A(S)-B1000X-I	3.3kV	1000kW			
VFS-A(S)-B1200X-I	3.3kV	1200kW			
VFS-A(S)-B1300X-I	3.3kV	1300kW			
VFS-A(S)-B1500X-I	3.3kV	1500kW			
VFS-A(S)-E500X-I	6.6kV	500kW	800kg	E type	Low power
VFS-A(S)-E630X-I	6.6kV	630kW			
VFS-A(S)-E710X-I	6.6kV	710kW			
VFS-A(S)-E800X-I	6.6kV	800kW			
VFS-A(S)-E900X-I	6.6kV	900kW			
VFS-A(S)-E1000X-I	6.6kV	1000kW			
VFS-A(S)-E1120X-I	6.6kV	1120kW			
VFS-A(S)-E1200X-I	6.6kV	1200kW			
VFS-A(S)-E1250X-I	6.6kV	1250kW			
VFS-A(S)-E1400X-I	6.6kV	1400kW			
VFS-A(S)-E1500X-I	6.6kV	1500kW			
VFS-A(S)-E1600X-I	6.6kV	1600kW			
VFS-A(S)-E1700X-I	6.6kV	1700kW			
VFS-A(S)-E1800X-I	6.6kV	1800kW			
VFS-A(S)-E2000X-I	6.6kV	2000kW			
VFS-A(S)-E2250X-I	6.6kV	2250kW			
VFS-A(S)-E2500X-I	6.6kV	2500kW			
VFS-A(S)-E2800X-I	6.6kV	2800kW			
VFS-A(S)-E3000X-I	6.6kV	3000kW			
VFS-A(S)-E3200X-I	6.6kV	3200kW			
VFS-A(S)-E3500X-I	6.6kV	3500kW			
VFS-A(S)-E3800X-I	6.6kV	3800kW			
VFS-A(S)-E4000X-I	6.6kV	4000kW			
VFS-A(S)-E4500X-I	6.6kV	4500kW	1200kg	H type	High power
VFS-A(S)-E5000X-I	6.6kV	5000kW			
VFS-A(S)-E5500X-I	6.6kV	5500kW			
VFS-A(S)-E6000X-I	6.6kV	6000kW			
VFS-A(S)-E7000X-I	6.6kV	7000kW			
VFS-A(S)-E8000X-I	6.6kV	8000kW			

MODEL SELECTION

Order No.	Voltage	Power	weight	Reference Type	Remark
VFS-A(S)-G500X-I	11kV	500kW	800kg	E type	Low power
VFS-A(S)-G630X-I	11kV	630kW			
VFS-A(S)-G710X-I	11kV	710kW			
VFS-A(S)-G800X-I	11kV	800kW			
VFS-A(S)-G900X-I	11kV	900kW			
VFS-A(S)-G1000X-I	11kV	1000kW			
VFS-A(S)-G1120X-I	11kV	1120kW			
VFS-A(S)-G1300X-I	11kV	1300kW			
VFS-A(S)-G1400X-I	11kV	1400kW			
VFS-A(S)-G1600X-I	11kV	1600kW			
VFS-A(S)-G1800X-I	11kV	1800kW			
VFS-A(S)-G2000X-I	11kV	2000kW			
VFS-A(S)-G2300X-I	11kV	2300kW			
VFS-A(S)-G2500X-I	11kV	2500kW			
VFS-A(S)-G2800X-I	11kV	2800kW			
VFS-A(S)-G3000X-I	11kV	3000kW			
VFS-A(S)-G3150X-I	11kV	3150kW			
VFS-A(S)-G3500X-I	11kV	3500kW			
VFS-A(S)-G3800X-I	11kV	3800kW			
VFS-A(S)-G4000X-I	11kV	4000kW			
VFS-A(S)-G4300X-I	11kV	4300kW			
VFS-A(S)-G5000X-I	11kV	5000kW			
VFS-A(S)-G5500X-I	11kV	5500kW	1200kg	H type	High power
VFS-A(S)-G6000X-I	11kV	6000kW			
VFS-A(S)-G6600X-I	11kV	6600kW			
VFS-A(S)-G8000X-I	11kV	8000kW			
VFS-A(S)-G10000X-I	11kV	10000kW			
		10000kW-50000kW		For high Power soft starter please contact our company	

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