



Power Transmission & Distribution

Suzhou Silverstone Electric Co., Ltd
M:+86 180 6844 5569
M:+86 1880 185 8280
E:vector.xie@icloud.com
Skype:vector.xie
8 Yangyun Road, SIP, Suzhou, China, 215000



www.silverstone-electric.com



Medium Voltage Variable Frequency Drives

www.silverstone-electric.com

Suzhou Silverstone Electric Co.,Ltd
Specialises in Power Transmission, Distribution, Power Quality & Electrical
Automation Solutions



Company Profile

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Suzhou Silverstone Electric Co., Ltd is located in the heart of Suzhou - Singapore Industrial Park (SIP), one of the most high-tech development zones in China, with well-developed transportation system of modern logistics.

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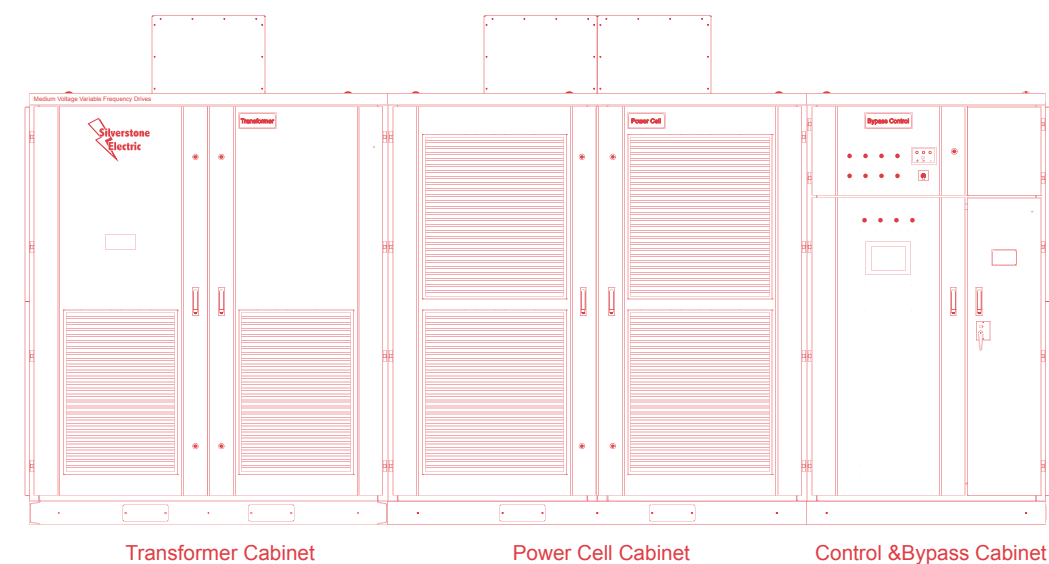
Application Fields

Silverstone medium voltage inverter is widely used for speed regulation, energy saving, soft startup and intelligent control of the medium voltage motors in such industries as thermal power plant, petroleum, chemicals, faucet water, mining and metallurgy.

- ▶ **Thermal power plant:** Air blower, draft fan, dust exhaust fan, circulation pump, feed pump, condensate pump, water supply pump for heat-supply network, return water pump for heat-supply pump, coal pulverizer, etc.
- ▶ **Urban water supply:** Water delivery pump, water intake pump
- ▶ **Petroleum:** Water injection pump, crude oil pump, etc.
- ▶ **Chemicals:** Compressor, fan, circulation pump, icemaker, etc.
- ▶ **Mine:** Slurry machine, ventilation blower, belt conveyer, etc.
- ▶ **Metallurgy:** Water supply pump, dust collection pump, draft fan, oxygen generator, etc.
- ▶ **Cement:** Water pump, draft fan, air blower, dust collection pump, grinding machine, etc.
- ▶ **Others:** Loads such as fan, pump and compressor in pharmaceutical, paper making and sewage treatment industry.



Product Structure



Transformer Cabinet

- ▶ **Isolating Transformer:** The multi-windings at the secondary side can provide independent phase-shift power supply for the power cells. It can efficiently reduce harmonic distortion and improve the current waveform on grid system.
- ▶ **Transformer Cooling Fan:** Cooling fan specifically for dry type transformer is configured according to different power ratings.

Power Cell Cabinet

- **Power Cell:** Modularized design of power cells, interchangeable and easy to production, maintenance and replacement.

Control & Bypass Cabinet

- **Controller:** For space vector PWM control, signals measurement and processing with complete electric isolation by the optic fiber communication between controller and all power cells.
- **I/O Board:** For processing of the digital and analog signals of the system, adaptable for the various applications on site.
- **HMI:** LCD display in English-language, easy to operation, parameter setting, status display, fault record, etc.
- **Automatic Bypass Cabinet:** To ensure the continuous production in case that the VFD is stopped by faults, the bypass cabinet can drive motor automatically from V/F mode to Grid frequency mode.

Grid-Connected Synchronous Switching System (Optional)

It is composed of the switching cabinets, a reactor cabinet and a synchronous-controller cabinet. The whole switching system is controlled synchronously by a sync-controller to ensure that the motor can be switched to the grid system smoothly from the VFD when its output voltage keep the phase-sequence and voltage value same as the grid system.

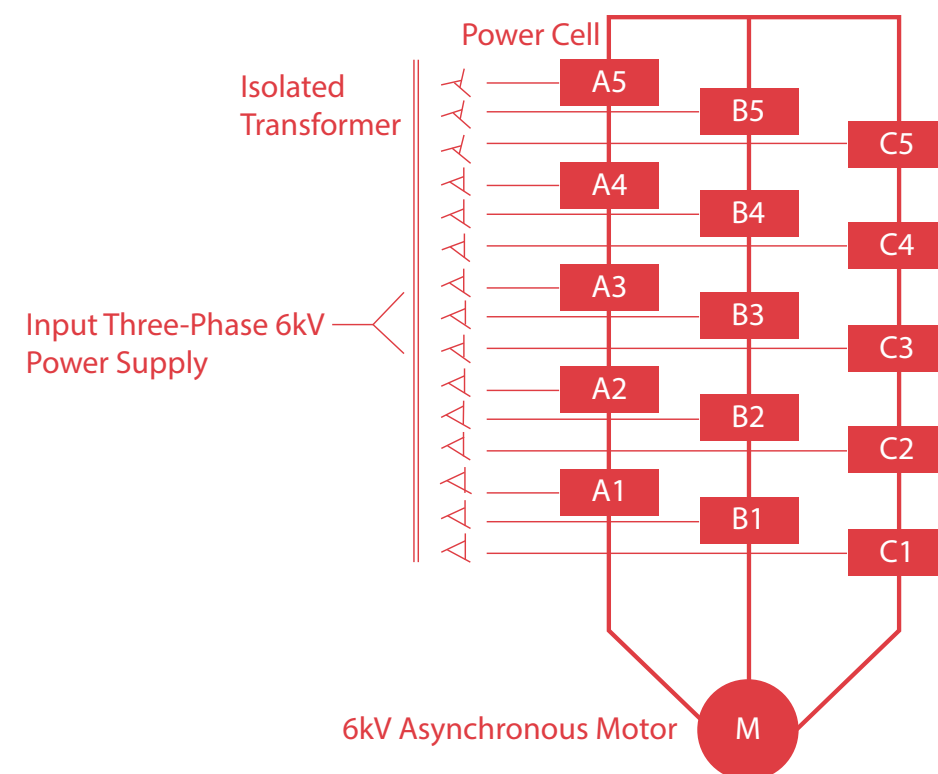


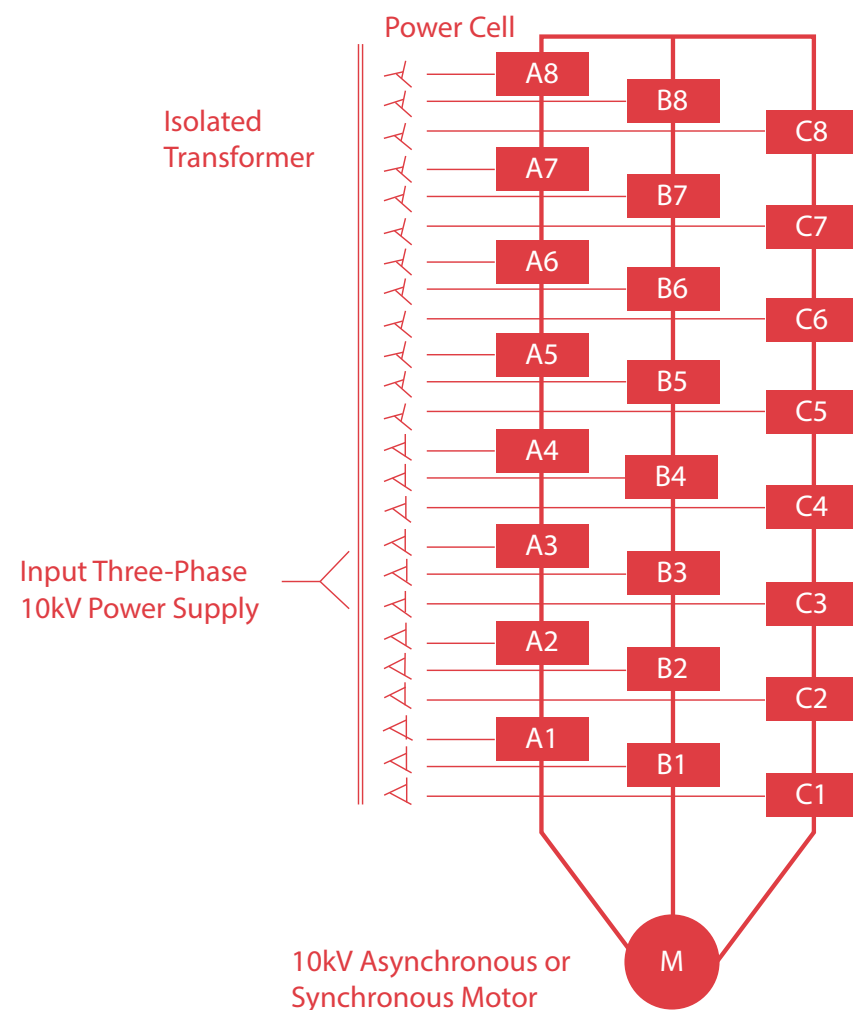
Working Principle of VFD

Silverstone series medium voltage VFD adopts AC-DC-AC mode, the electronic switch component is IGBT. It is highly reliable by means of the power cells connected in series and voltage overlapping method.

Topology Structure of Main Circuit (Take 6kV and 10kV for examples)

- **6kV Series:** 5 power cells per phase, total 15 power cells, three phases Y-Connected.
- **10kV Series:** 8 power cells per phase, total 24 power cells, three phases Y-Connected.

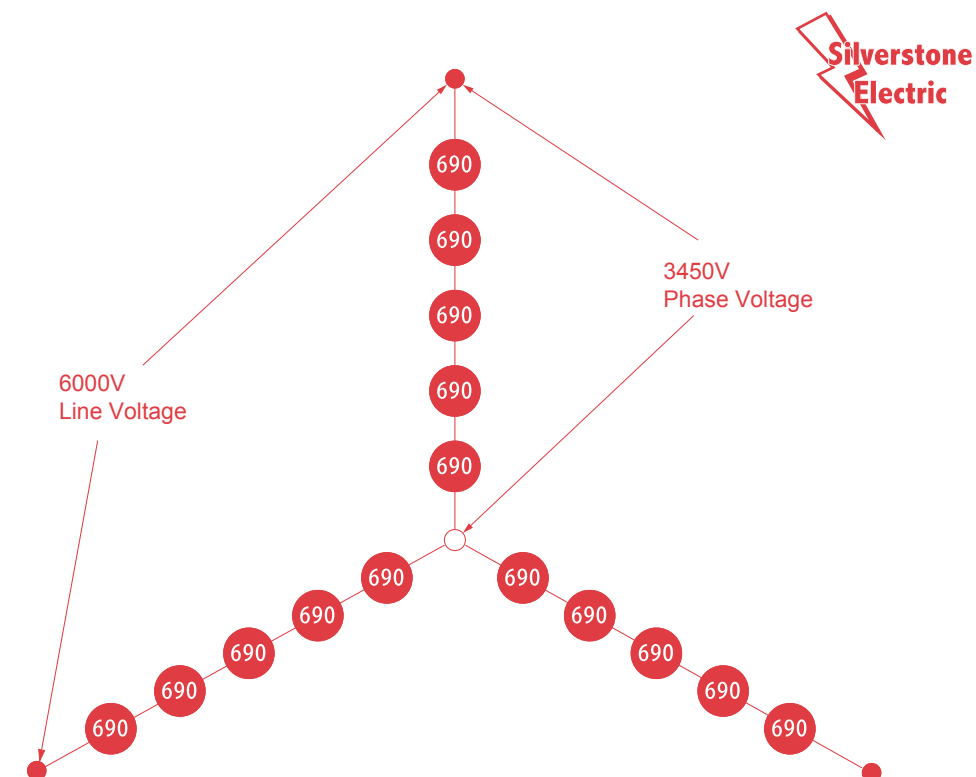




Voltage Overlapping Method

Silverstone medium voltage VFD has a number of power connected in series, the independent phase-shift power is supplied to each power cell by the isolated transformer. By changing the power cells number in each phase, the customer can get different output voltage conveniently without the limitation for the components' withstand voltage. For example, 6kV series VFD has 5 power cells in each phase, the rated voltage of each power cell is 690V, the phase voltage is 3460V (The corresponding line voltage is 6kV).

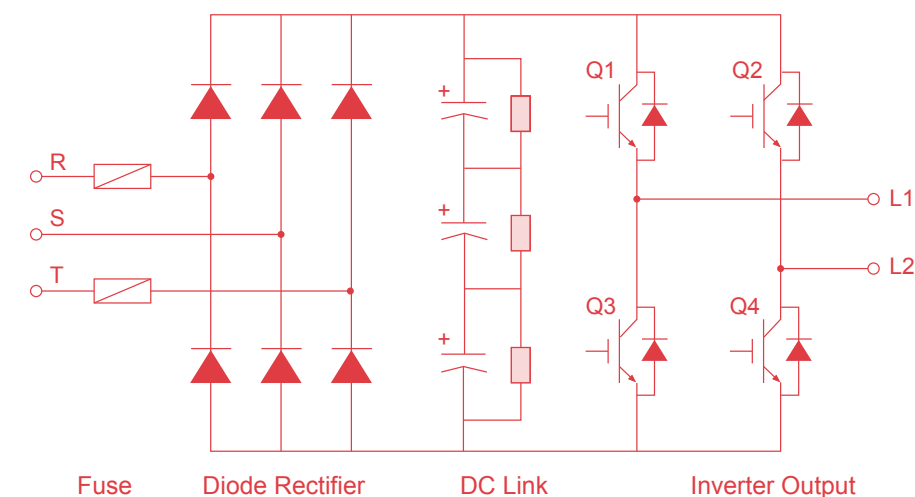
Rated Voltage	Cell Quantity per Phase	Phase Voltage (V)	Line voltage (kV)	Levels of Voltage
3.3kV	3	1900	3.3	7
4.16kV	4	2400	4.16	9
6kV	5	3460	6	11
6.6kV	6	3810	6.6	13
10kV	8	5770	10	17
11kV	9	6350	11	19



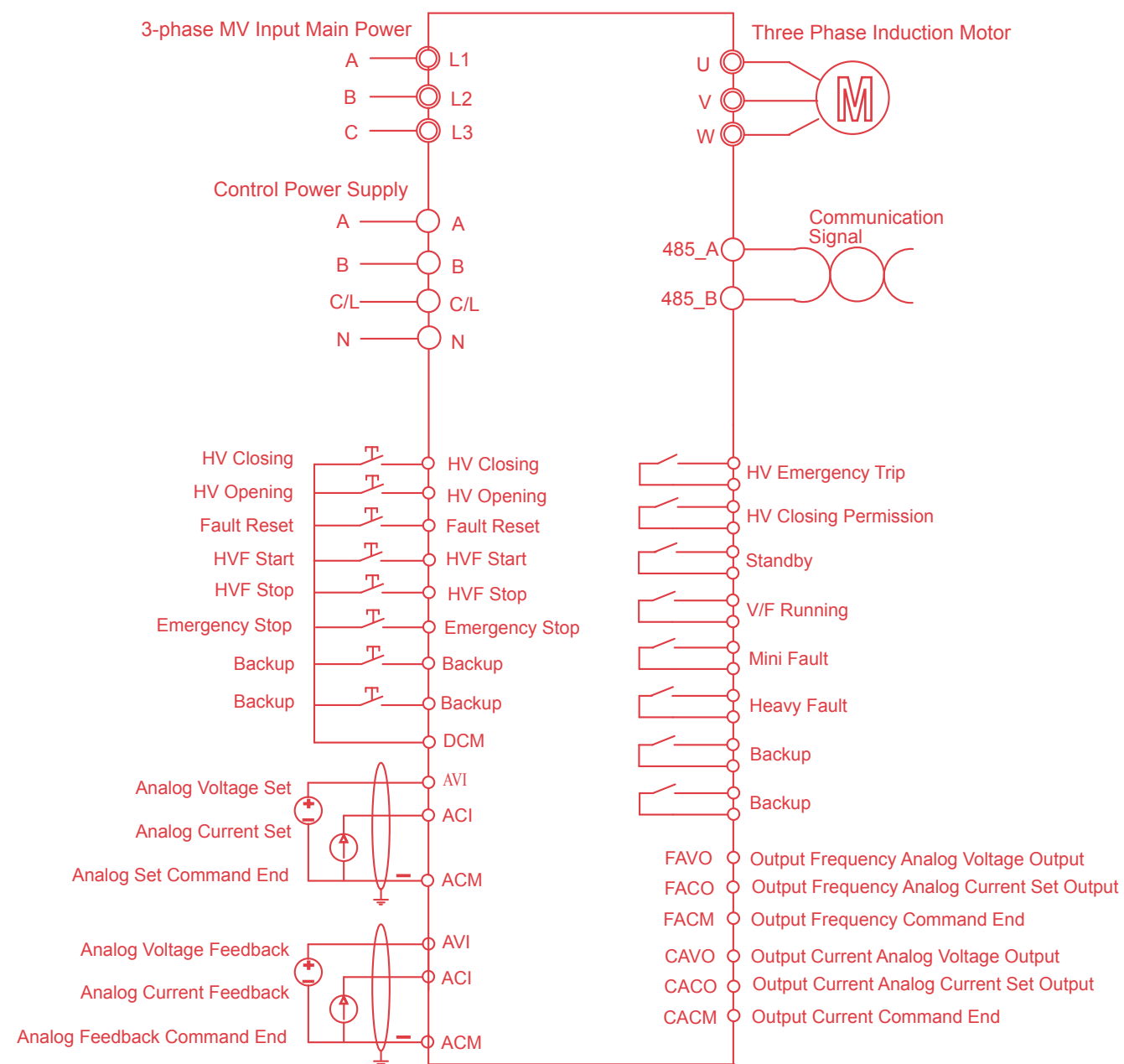
Power Cell Topology

Silverstone medium voltage VFD consists of a number of power cells connected in series, the power cell adopts AC-DC-AC mode, equivalent to a low-voltage voltage-source inverter with three-phase input and single phase output. All power cells are fully same in electrical and mechanical features, thus very easy for maintenance and replacement.

The power cell receives the signals via optic fiber and adopts space vector sine wave pulse width modulation (PWM) to control the conductivity and disconnection of Q1~Q4 IGBT, outputting single-phase pulse width modulation waveform. Each cell only has three possible output voltage statuses. When Q1 and Q4 are conducted, the output voltage status between L1 and L2 will be "1"; when Q2 and Q3 are conducted, the output voltage status between L1 and L2 will be "-1"; when Q1 and Q2 are conducted, or Q3 and Q4 are conducted, the output voltage status between L1 and L2 will be "0".



External system Diagram



Product Characteristics

Silverstone Series Medium voltage VFD adopts multi-level cascaded power cells technology, all power cells in each phase are connected in series.

Silverstone Medium voltage VFD is complied with IEEE 519-1992 and GB/T 14549-1993. They do not require the additional input filter and reactive power compensator, saving the cost for harmonic filter and reactive power compensator.

High-quality Power Input Section

Silverstone MV VFD adopts isolated transformer with the phase-shifted secondary windings, which can provide independent power supply for the power cells with multi-pulse diode rectifier (30 pulses for 6kV, 54 pulses for 11kV), the harmonic current of power cells can be effectively reduced.

Perfect Power Output Section

Silverstone MV VFD adopts voltage overlapping method (i.e. Power cells multi-level cascade technology); it can output the perfect PWM sinusoidal waveform. It has the following advantages:

- ◎ No need for the additional output filter.
- ◎ Directly driving general synchronous or asynchronous motor
- ◎ No de-rating operation on the motor.
- ◎ No dV/dt stress on the insulation of motor and cables.
- ◎ No torque ripple, extending service life of motors and mechanism.
- ◎ No cable length restriction within the acceptance voltage drop.

Flexible Control Options

- **Local Control:** Direct control from the button on cabinet door or the keypad. This is the main control method.
- **Remote I/O Control:** Realize remote control by connecting to the remote switch signal via the I/O board.
- **Host Control:** Isolated RS485 port and adoption of standard MODBUS RTU communication protocol. Able to connect with host system like DCS for optimized coordination control.

Five Options of Frequency Set

- ◎ Direct command from main interface;
- ◎ Set by analog signal (0~10V or 4~20mA signal);
- ◎ Set by host computer via RS485 port;
- ◎ Multi-speed set, suitable for the working conditions in cyclic change;
- ◎ In event of closed-loop operation, it will be automatic set by built-in PID via computation

AVR (Automatic Voltage Adjustment) Function

According to output voltage feedback, the inverter can automatically adjust the output voltage to make it free from the influence caused by the change of grid voltage and loads, and protect the motor from insulation damage due to long overvoltage or core overheating due to high magnetic density.

PID Function

Built-in full digital PID is provided for closed-loop control upon the user' s requirements and for realization of operation under constant press or constant fluid flux. PID parameters can be adjusted online.

Protection functions and other features:

- ◎ Overload and over-current
- ◎ Phase loss and grounding
- ◎ Over voltage
- ◎ Overheat
- ◎ Redundant control power supply
- ◎ Power cell bypass
- ◎ Cabinet door alarm
- ◎ Phase-lock function
- ◎ Wide range of input voltage;
- ◎ Synchronous switching between VFD and Grid system (Optional)
- ◎ Soft starter of motor
- ◎ High efficiency>98% (VFD at full load)
- ◎ Electrical isolation by optic fiber.
- ◎ Built-in PID regulator
- ◎ Rich in communications modes.
- ◎ Faults history record
- ◎ Compact structure and layout, customized design is available.

Current Limiting Function

In event the output current of the inverter exceeds the preset value, the inverter will automatically limit the current output to avoid over current protection incurred during acceleration or deceleration or due to sudden change of the loads, thus to minimize the stop times of the machine.

Self-diagnosis Function

Silverstone inverter is provided with complete self-diagnosis capability to monitor the system status online. In event of any fault, the inverter will be automatically activated to take protective actions and save the time, cause and location of the fault. This will help the maintenance personnel find the cause and eliminate the fault quickly.

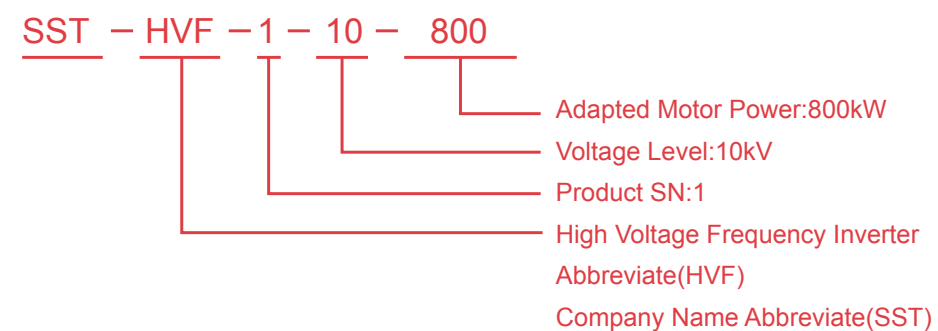
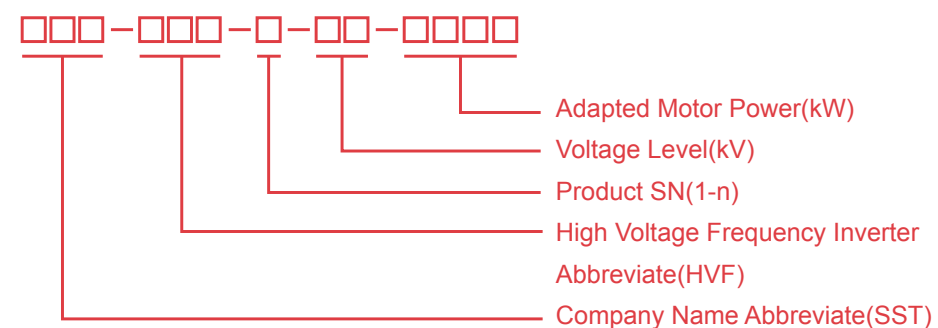
Instantaneous Power Loss Tracing Function

In event the electric grid is incurred to instantaneous power loss, the inverter will control the motor to be under power-generating status and keep decelerated operation. If the electric grid resumes to normal, the inverter will immediately return to original operating status. The keeping time is 100ms and typical value of the fan load is 3s.

Technical Specification

Rated Power	150KW~7600KW/200kVA~9500kVA
Rated Voltage	3kV, 3.3kV, 4.16kV, 6kV, 6.6kV, 10kV, 11kV (-20%~+15%)
Rated Frequency	50Hz/60Hz (-10%~+10%)
Modulation Technique	SPWM
Control Power Supply	380, 5kVA (Can be customized)
Input Power Factor	>0.96
Efficiency	>=0.96
Output Frequency Range	0~120Hz
Frequency Resolution	0.01 Hz
Instantaneous Over-current Protection	200% protect immediately
Overload Capability	120% for 120s, 150% for 3s
Current-limit Protection	10%~150% setting
Analog Input	2 channels 4~20mA
Analog Output	2 channels 4~20mA
Communications	RS485 interface, ModBus RTU as standard configuration Optional: Profibus DP, EtherNet, Devicenet, etc.
Accelerating and Decelerating Time	5s~1600s (depend on the load)
Digital Inputs/Outputs	8 inputs/8 outputs (extensible)
Working Temperature	-5~+400C
Storage/Transportation Temperature	-40~+700C
Cooling Method	Forced air-cooling
Environment Humidity	<95%, non-condensation
Installing Altitude	<1000m If altitude >1000m, de-rating 1% per 100m
Dust	Non-conductive, Non-corrosive, <6.5mg/dm3
Protection Level	IP30
Cabinet Colors	Customized

Identification Code



For example, the system voltage is 10kV, the power of motor is 800kW, 1 series product should be selected, and the model is as top right.

Power Specifications

The Silverstone general MV VFD has 3kV, 3.3kV, 4.16kV, 6kV, 6.6kV, 10kV and 11kV ratings, and Silverstone also can supply customized VFD to meet special ratings.

Attention

In case of the special load or special motor or special operation environment, in addition to consider the rated power and rated current of the motor, the selection of Silverstone MV VFD should also refer to the following:

- ◎ For the load with the high torque ripple such as compressor, vibrating machine and kneader, the rated current of the selected VFD should be larger than the maximum current of motor at the industrial frequency based on the practical operation condition.
- ◎ For the submersible pump with higher than the rated current of the general motor, the rated current of the selected VFD should be larger than the rated current of the motor.
- ◎ For the asynchronous motor with multiple poles, the rated current of the selected MV VFD should be enlarged according to the rated current of the motor and the practical working condition.
- ◎ When the roots fan with large starting current, the rated current of the selected VFD should be enlarged accordingly.
- ◎ For the Wanlida general MV VFD driving several motors in parallel, the rated current of the selected VFD should be larger than the total current of these motors.
- ◎ For the oil pump with peak current, the rated current of the selected MV VFD should be enlarged properly.
- ◎ Under the extreme environments, such as high temperature or high altitude (>1000m), the Wanlida general MV VFD should be de-rating and the VFD power should be enlarged accordingly.
- ◎ If the required working condition is explosion-proof, the Wanlida general MV VFD should be installed at safety site because it is not the explosion-proof design.

Notice

The advice above does not include the cases of special loads and special motors, please contact with Suzhou Silverstone Electric Co., Ltd. To confirm the selection of the Silverstone general MV VFD.

Identification Code

Voltage	Adaptable Motor	Output Capacity	Model
3.3kV	150 KW	200 kVA	SST-HVF-1-3.3-150
	180 KW	250 kVA	SST-HVF-1-3.3-180
	220 KW	275 kVA	SST-HVF-1-3.3-220
	275 KW	350 kVA	SST-HVF-1-3.3-275
	350 KW	440 kVA	SST-HVF-1-3.3-350
	440 KW	550 kVA	SST-HVF-1-3.3-440
	590 KW	750 kVA	SST-HVF-1-3.3-590
	700 KW	880 kVA	SST-HVF-1-3.3-700
	790 KW	990 kVA	SST-HVF-1-3.3-790
	880 KW	1100 kVA	SST-HVF-1-3.3-880
	1000 KW	1250 kVA	SST-HVF-1-3.3-1250
	1100 KW	1400 kVA	SST-HVF-1-3.3-1100
	1250 KW	1600 kVA	SST-HVF-1-3.3-1250
	1400 KW	1800 kVA	SST-HVF-1-3.3-1400
	1600 KW	2000 kVA	SST-HVF-1-3.3-1600
	1825 KW	2300 kVA	SST-HVF-1-3.3-1825
	2000 KW	2500 kVA	SST-HVF-1-3.3-2000
	2280 KW	2900 kVA	SST-HVF-1-3.3-2280
	2500 KW	3150 kVA	SST-HVF-1-3.3-2500
	180 KW	250 kVA	SST-HVF-1-4.16-180
4.16kV	240 KW	300 kVA	SST-HVF-1-4.16-240
	280 KW	350 kVA	SST-HVF-1-4.16-280
	350 KW	440 kVA	SST-HVF-1-4.16-350
	450 KW	560 kVA	SST-HVF-1-4.16-450
	550 KW	700 kVA	SST-HVF-1-4.16-550
	750 KW	950 kVA	SST-HVF-1-4.16-750
	900 KW	1100 kVA	SST-HVF-1-4.16-900
	1000 KW	1250 kVA	SST-HVF-1-4.16-1000
	1100 KW	1400 kVA	SST-HVF-1-4.16-1100
	1250 KW	1600 kVA	SST-HVF-1-4.16-1250
	1400 KW	1800 kVA	SST-HVF-1-4.16-1400
	1600 KW	2000 kVA	SST-HVF-1-4.16-1600
	1800 KW	2250 kVA	SST-HVF-1-4.16-1800
	2000 KW	2500 kVA	SST-HVF-1-4.16-2000
	2300 KW	3000 kVA	SST-HVF-1-4.16-2300
	2500 KW	3150 kVA	SST-HVF-1-4.16-2500
	2900 KW	3600 kVA	SST-HVF-1-4.16-2900
	3200 KW	4000 kVA	SST-HVF-1-4.16-3200

6kV	250 KW	315 kVA	SST-HVF-1-06-250
	315 KW	400 kVA	SST-HVF-1-06-315
	400 KW	500 kVA	SST-HVF-1-06-400
	500 KW	630 kVA	SST-HVF-1-06-500
	630 KW	800 kVA	SST-HVF-1-06-630
	800 KW	1000 kVA	SST-HVF-1-06-800
	1000 KW	1250 kVA	SST-HVF-1-06-1000
	1250 KW	1600 kVA	SST-HVF-1-06-1250
	1400 KW	1800 kVA	SST-HVF-1-06-1400
	1600 KW	2000 kVA	SST-HVF-1-06-1600
	1800 KW	2250 kVA	SST-HVF-1-06-1800
	2000 KW	2500 kVA	SST-HVF-1-06-2000
	2250 KW	2800 kVA	SST-HVF-1-06-2250
	2500 KW	3150 kVA	SST-HVF-1-06-2500
	2800 KW	3500 kVA	SST-HVF-1-06-2800
	3200 KW	4000 kVA	SST-HVF-1-06-3200
	3600 KW	4500 kVA	SST-HVF-1-06-3600
	4000 KW	5000 kVA	SST-HVF-1-06-4000
	4500 KW	5630 kVA	SST-HVF-1-06-4500
	5000 KW	6300 kVA	SST-HVF-1-06-5000
6.6kV	280 KW	350 kVA	SST-HVF-1-6.6-280
	365 KW	450 kVA	SST-HVF-1-6.6-365
	440 KW	550 kVA	SST-HVF-1-6.6-440
	550 KW	700 kVA	SST-HVF-1-6.6-550
	700 KW	880 kVA	SST-HVF-1-6.6-700
	880 KW	1100 kVA	SST-HVF-1-6.6-880
	1200 KW	1500 kVA	SST-HVF-1-6.6-1200
	1400 KW	1800 kVA	SST-HVF-1-6.6-1400
	1600 KW	2000 kVA	SST-HVF-1-6.6-1600
	1800 KW	2250 kVA	SST-HVF-1-6.6-1800
	2000 KW	2500 kVA	SST-HVF-1-6.6-2000
	2250 KW	2800 kVA	SST-HVF-1-6.6-2250
	2500 KW	3150 kVA	SST-HVF-1-6.6-2500
	2800 KW	3500 kVA	SST-HVF-1-6.6-2800
	3100 KW	3900 kVA	SST-HVF-1-6.6-3100
	3600 KW	4500 kVA	SST-HVF-1-6.6-3600
	3900 KW	4900 kVA	SST-HVF-1-6.6-3900
	4550 KW	5700 kVA	SST-HVF-1-6.6-4550
	5000 KW	6300 kVA	SST-HVF-1-6.6-5000
	5500 KW	7000 kVA	SST-HVF-1-6.6-5500

10kV	400 KW	500 kVA	SST-HVF-1-10-400
	500 KW	630 kVA	SST-HVF-1-10-500
	630 KW	800 kVA	SST-HVF-1-10-630
	800 KW	1000 kVA	SST-HVF-1-10-800
	1000 KW	1250 kVA	SST-HVF-1-10-1000
	1250 KW	1600 kVA	SST-HVF-1-10-1250
	1400 KW	1800 kVA	SST-HVF-1-10-1400
	1600 KW	2000 kVA	SST-HVF-1-10-1600
	1800 KW	2250 kVA	SST-HVF-1-10-1800
	2000 KW	2500 kVA	SST-HVF-1-10-2000
	2250 KW	2800 kVA	SST-HVF-1-10-2250
	2500 KW	3150 kVA	SST-HVF-1-10-2500
	2800 KW	3500 kVA	SST-HVF-1-10-2800
	3200 KW	4000 kVA	SST-HVF-1-10-3200
	3600 KW	4500 kVA	SST-HVF-1-10-3600
	4000 KW	5000 kVA	SST-HVF-1-10-4000
	4500 KW	5630 kVA	SST-HVF-1-10-4500
	5000 KW	6300 kVA	SST-HVF-1-10-5000
	6300 KW	7900 kVA	SST-HVF-1-10-6300
11kV	470 KW	590 kVA	SST-HVF-1-11-470
	610 KW	760 kVA	SST-HVF-1-11-610
	730 KW	920 kVA	WLD-HVF-1-11-730
	930 KW	1200 kVA	SST-HVF-1-11-930
	1200 KW	1500 kVA	SST-HVF-1-11-1200
	1450 KW	1800 kVA	SST-HVF-1-11-1450
	1550 KW	1950 kVA	SST-HVF-1-11-1550
	1750 KW	2200 kVA	SST-HVF-1-11-1750
	2000 KW	2500 kVA	SST-HVF-1-11-2000
	2400 KW	3000 kVA	SST-HVF-1-11-2400
	2500 KW	3150 kVA	SST-HVF-1-11-2500
	2950 KW	3700 kVA	SST-HVF-1-11-2950
	3150 KW	4000 kVA	SST-HVF-1-11-3150
	3700 KW	4600 kVA	SST-HVF-1-11-3700
	4000 KW	5000 kVA	SST-HVF-1-11-4000
	4650 KW	5800 kVA	SST-HVF-1-11-4650
	5000 KW	6300 kVA	SST-HVF-1-11-5000
	5550 KW	7000 kVA	SST-HVF-1-11-5550
	6100 KW	7650 kVA	SST-HVF-1-11-6100
	7050 KW	8800 kVA	SST-HVF-1-11-7050
	7600 KW	9500 kVA	SST-HVF-1-11-7600

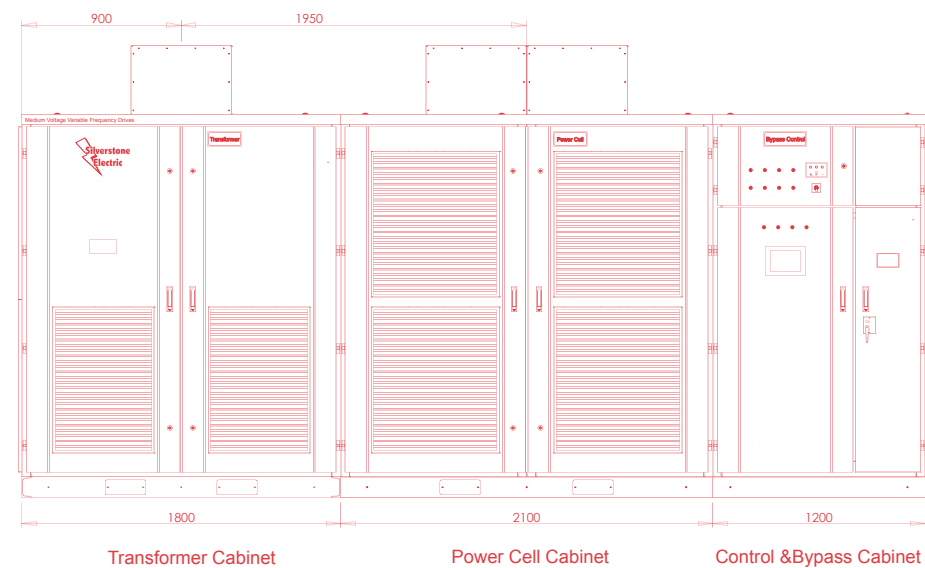
Deliver Factory Acceptance Test

Suzhou Silverstone Electric Co., Ltd built the first-class high voltage and big capacity power electronic equipments test platform to realize Deliver Factory Acceptance Test for VFD, all of MV VFDs will be tested at maximum power with or without motor.

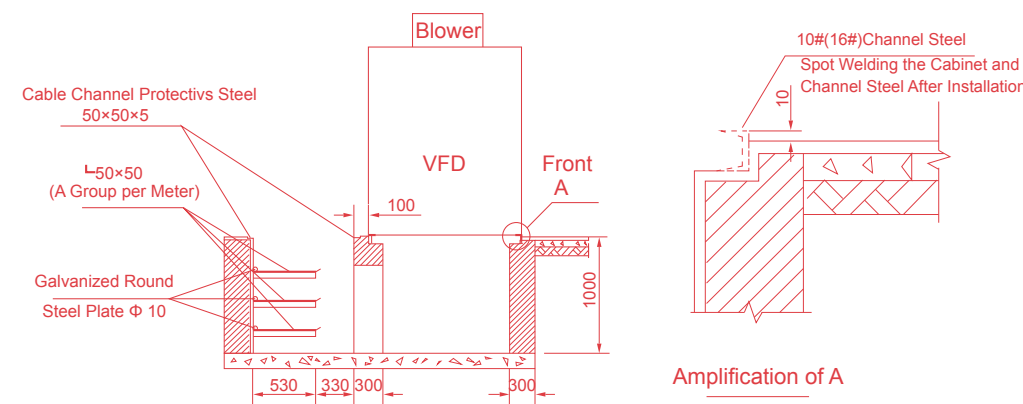


Transportation & Installation

Description based on an 1800kW/10kV cabinet:



Cabinets Layout (Front View)



Section Diagram of Cable Duct & Trench

Installation Instruction:

1. The minimum length of cable trench is the length of VFD;
2. For the safety and convenience of the cable placement, it is recommended that the cabinets be installed upon the cable trench as the above figure show. The bottom of the VFD is made of 10# channel steel, (For the rated power >1600KW, it is made of 16# channel steel. For the rated power >4000KW, it is made of 18# I beam steel.) Please refer to VFD weight accordingly.
3. Keep a distance around the cabinets. The distance between the back of cabinet and the wall must be >1000mm for 6kV VFD and >1200mm for 10kV VFD, the distance between the top of cabinet and the ceiling must be >800mm, the distance between the front of cabinet and the wall must be >1500mm.

Transportation Conditions

- Silverstone series MV VFD can be transported by truck, train, ship etc.
- During the transportation, please handle careful, keep dry and away from the direct sunlight, strenuous vibration and impact, and do not be inverted.
- Please consider the limited height while selecting the conveyance and route.
- The bearing capacity of conveyance must be larger than the weight of VFD.

Storage Conditions

The operation circumstance temperature range of Silverstone series medium voltage VFD is $-5^{\circ}\text{C} \sim +45^{\circ}\text{C}$ and the storage circumstance temperature range is $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$. The surrounding temperature can affect the life time and reliability of the VFD in high degree. Please don't install the VFD in a high temperature situation. If the surrounding temperature exceeds the permissible value, it is strongly suggested that ventilation condition (Air duct) be improved or air-conditioner be equipped.

Following situations should be avoided for VFD storage and operation:

- Exposed to sunlight
- Corrosion gas
- Inflammable and explosive gas
- Conductive dust
- Condensing
- Salt, oil fume and heavy dust

Handling Conditions

- Crane
- Chain Hoist
- Roller

Construction Conditions

- The VFD has to be installed vertically.
- No obvious vibration on the ground.
- The ground must be fire-proof material, smooth and wear-resistant, level and can bear the weight of VFD (minimum 1000kg/m^2)

Attention!

- The transformer cabinet and power cell cabinet are completely assembled, strictly tested, and carefully packed in the factory before delivery. When lifting, please do best to make the lifting center coincident with the barycenter of transformer cabinet and power cell cabinets.
- According to the package mark and drawing position to lift the transformer cabinet. Don't lift the transformer cabinet only by hook of the cabinet.
- If the installation ground is not flat, the metal cabinets of the VFD may be buckle, causing the cabinet doors to be misaligned and/or not open and close properly.
- The devices inside the cabinet are not weatherproof. If it is necessary to temporarily store the drive in an outdoor area, heaters should be placed inside the equipment to prevent moisture accumulation, and a plastic cover or a tarp should be placed over the drive.
- Standing under the crane is forbidden while lifting the cabinets.
- Forbidden to correct the cabinet position while the cabinet is tilted during lifting, otherwise death may be caused because of the heavy cabinets.

Power Cable Selection

Selection of power cable should strictly observe related norms and meet the following requirements:

- Current carrying capacity
- Installation and laying modes
- Power industry standard
- Manufacturer standard
- Voltage drop caused by cable length

Attention!

- Armored cables with shielding effect is recommended for high voltage cable used between the VFD and motor;
- If the whole section area is less than 50% section area of single-phase cable, a grounding cable is needed to prevent the shield over-current produced by potential difference of grounding grid.
- Section area of grounding cables should be bigger than 16mm²
- After cabinets are installed, the cabinets and channel steel base should be fixed by spot welding, and the channel steel base should be reliable grounding. The value of grounding resistance should be no more than 4Ω.

Control and Communication Cables Selection

- High quality single shielded twisted pair line or multiple shielded twisted pair line should be selected for control, signal and communication cable.
- Analog input and output cable: whole shielded twisted pair line, section area 0.5 ~ 1.5mm²
- Digital input and output cable: whole shielded twisted pair line, section area 0.5 ~ 1.5mm²
- Communication wire: Special communication wires or whole shielded twisted pair line, section area 0.5 ~ 1.5 mm²

Attention!

- Control, signal, communication, and power cables should be routed separately in cable channel and bridge duct. In case of mix routing, the distance between the secondary wires and power cables should be kept larger than 30cm. Avoid to lay wires in parallel as possible, if parallel routing is inevitably, the longer the parallel wires is, the larger the distance between the secondary wires and power cables should be kept.
- It is not permitted that power cables or ground wires share a common shielded wire with signal wires.
- If the length of signal or control cable is longer than 50m, active isolated converter and auxiliary relay should be used in the input and output circuit.
- Shielding layer of cables should be single-end grounding at the side of VFD.
- For diminishing the electric potentials interference between different components, a electric potential balance cable should be laid in parallel to control wires, and the section area of wires should be bigger than 16mm²
- If there are relays or contactors in the circuit, or the load is inductive or capacitive, anti-interference components should be mounted in the loop of relays and contactors.
- Control, signal and communication cables should be laid at the corner and the zero electric potential to improve the capability of anti- interference.
- Cables for different kinds of signals should be cross routing.
- The distance between shielding layer and terminal should be short as possible. Avoid wiring a cable to extend connection of earth cable.

Please consult with Suzhou Silverstone Electric Co. Ltd. for more information.

Silverstone Product List

Medium Voltage Motor Drive Solutions

Medium voltage variable frequency drives
Medium voltage soft starter

Power Quality Solutions

Static synchronous compensator (STATCOM/SVG)
Static VAR compensator (SVC)
Low voltage dynamic reactive power compensator (TSC/TSF)
Active power filter (APF/AHF)

Transformer Substation

LV & HV Switchgear

Gas Insulated Switchgear (GIS Substation)

Medium Voltage Vacuum Circuit Breaker

Substation Automation Protection & Control

The Company keeps improving its existing products and developing new products. For updated product list and changes in technical data, please consult us by telephone or our official website of the Company: [HTTP://WWW.SILVERSTONE-ELECTRIC.COM](http://www.silverstone-electric.com).
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