Soft Starters

Speed Regulation and Compensation

Supporting Equipment

Intelligent IoT Systems

Partners

TGRY Series Medium and High Voltage Switchgear Solid State Soft Starter Integrated Cabinet

■ Overview

The Tenghui TGRY Series Medium and High Voltage Switchgear Solid State Soft Starter Integrated Cabinet integrates the functions of a thyristor-controlled soft starter cabinet, high voltage switchgear, and bypass cabinet into one comprehensive intelligent soft starter device. The soft start function of the device uses high-quality series-connected thyristors for stepless control of output voltage, ensuring smooth start and stop of motors.

■ Performance Features

◆ **Compact Size, Full Functionality**

This cabinet integrates a high voltage solid state soft starter, a high voltage switchgear, and a bypass cabinet into one, reducing the footprint by half compared to separate high voltage switchgear and soft starter cabinets, while offering soft start, soft stop, switchgear, and bypass functionalities.

◆ **Low Start Current, Significant Energy Saving**

The TGRY Series Medium and High Voltage Switchgear Solid State Soft Starter Integrated Cabinet controls voltage by changing the conduction angle of the thyristor, resulting in no energy loss, a low start current that is 2.5 to 3.5 times the rated current.

◆ **Strong Anti-Interference, Suitable for Various Environments**

The cabinet is designed with a special RC absorption circuit for strong anti-interference. The product performs reliably, unaffected by the environmental temperature or geographic location, enabling frequent starts.

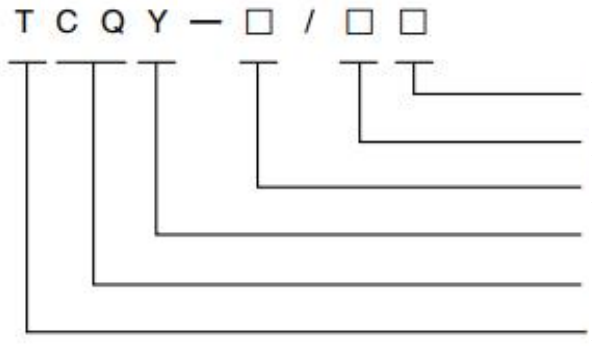
◆ **Comprehensive Protection Features, High Safety**

Feature overload, phase loss, and startup peak overcurrent protection functions. Startup parameters are selectable, adjustable, and controllable.

◆ **Maintenance-Free, Cost-Saving**

Use a maintenance-free design, reducing the wiring cables for high voltage switchgear and soft starter cabinets. No other maintenance required after deployment, significantly saving on maintenance costs.

■ Model Description



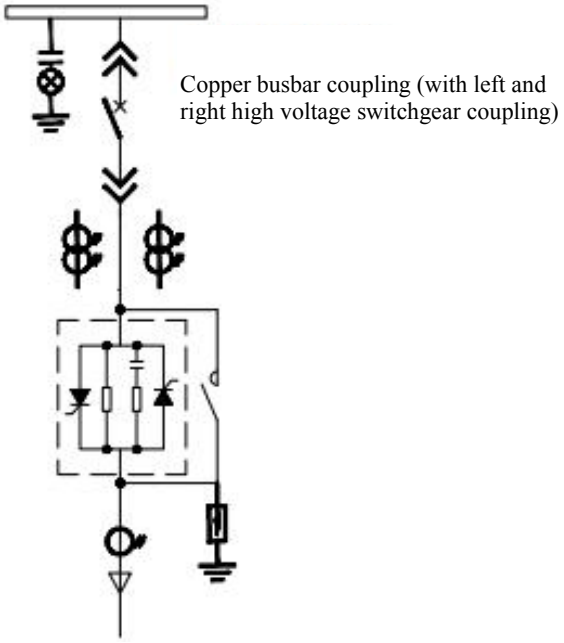
■ Performance Parameter Table

Item	Parameter
Applicable motor voltage	3-10kV (special design for 11kV motors is required)
Applicable motor power	200~5000kW
Starting current	2.5-3.5 times the rated current
Starting voltage drop	Less than 3V with bypass contactor
Starting time	0~120s adjustable
Starting frequency	Capable of frequent starting
Starting methods	Current-limit start, voltage linear curve start, voltage exponential curve start, current linear curve start, current exponential curve start
Stopping methods	Free stop, soft stop, braking stop, soft stop + automatic braking, jogging function
Overload capacity	500% for 30s, 120% for long term
Communication function	RS485 interface
Protection rating	IP4X
Overall structure	Cabinet type
Dimensions	W*D*H(mm):1000*1500*2300
Protection functions	Operating overcurrent protection, motor thermal overload protection, phase current imbalance protection, phase loss protection, overheating protection
Operating environment	Altitude not exceeding 1000 meters; use under reduced conditions if exceeded; Ambient temperature -25°C to +45°C; Maximum relative humidity 95% non-condensing; Installation location should be free of corrosive gases, conductive dust, severe vibration (less than 0.5G), and well-ventilated.

■ Selection Reference

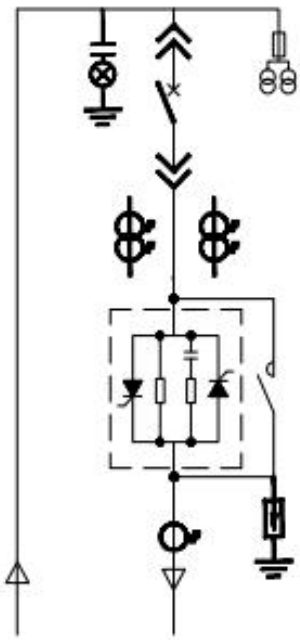
Product model	Applicable motor voltage (kV)	Applicable motor power (kW)	Dimensions W*D*H (mm)
TGRY-1000/6	6	1000	1000*1500*2300
TGRY-2000/6	6	2000	1000*1500*2300
TGRY-3000/6	6	3000	1000*1500*2300
TGRY-4000/6	6	4000	1200*1600*2300
TGRY-5000/6	6	5000	1200*1600*2300
TGRY-1000/10	10	1000	1000*1500*2300
TGRY-2000/10	10	2000	1000*1500*2300
TGRY-3000/10	10	3000	1000*1500*2300
TGRY-4000/10	10	4000	1000*1500*2300
TGRY-5000/10	10	5000	1200*1600*2300

■ Primary Scheme Diagram



Primary scheme diagram

Coupling scheme



Independent cabinet scheme

TCQY Series Medium and High Voltage Switchgear Magnetron Soft Starter Integrated Cabinet

■ Basic Principle

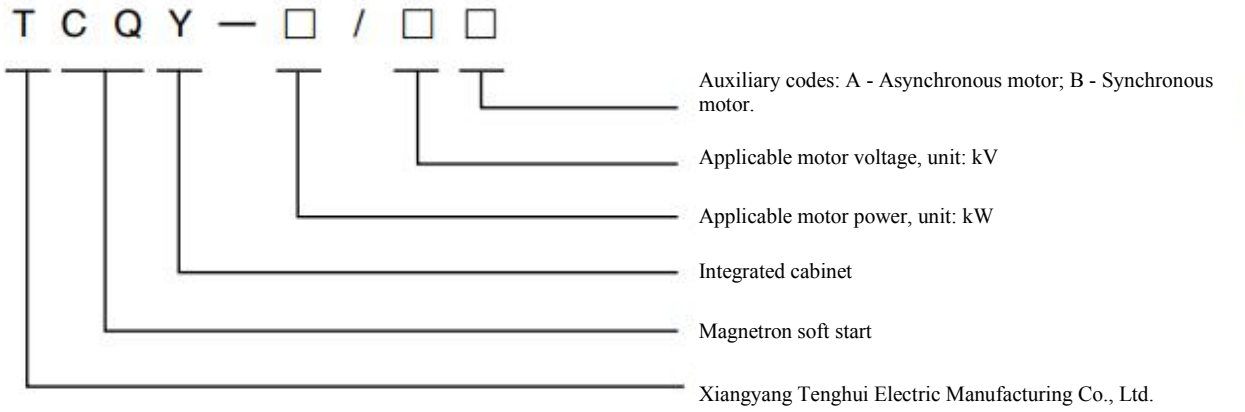
The TCQY Series Medium and High Voltage Switchgear Magnetron Soft Starter Integrated Cabinet is mainly used for the control and protection of starting and stopping squirrel-cage asynchronous motors and synchronous motors. It utilizes a new generation of autotransformer excitation soft start patent technology to successfully develop a new type of solid-state soft starting device, suitable for starting large, medium-sized, and particularly large squirrel-cage or synchronous motors.

By inserting a self-excited controllable reactor with a smoothly variable impedance into the stator circuit of the squirrel-cage or synchronous motor, the closed-loop control system automatically adjusts the size of the DC current in the self-excited controlled winding (without the need for an external high-current power source). The impedance of the self-coupling excited controllable reactor automatically decreases steplessly from high to low within a predetermined time, gradually increasing the motor terminal voltage to full voltage, thereby achieving a soft start for the motor.

■ Performance Features

- Different starting current curves such as constant current, ramp-up, and jump-start can be selected according to the requirements of different working conditions.
- Use internationally leading computer simulation technology, making the entire starting process predictable, controllable, and adjustable.
- User-friendly interface, convenient for setting, adjusting, and querying starting parameters.
- High safety and stability, long service life.
- Good reusability, starting performance unaffected by ambient temperature.
- High degree of automation, easy operation, capable of soft stopping.

■Model Description



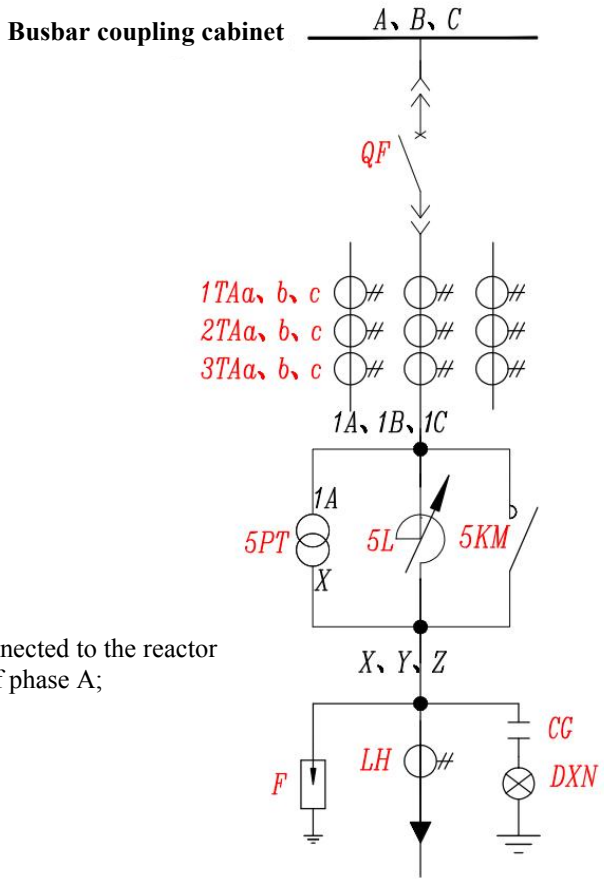
■Performance parameter table

Item	Parameter
Applicable motor voltage	3kV-10kV (special design for 11kV motors is required)
Applicable motor power	200kW~3000kW
Starting current	2.5-3.5 times the rated current
Starting voltage drop	Less than 3V with bypass contactor
Starting time	5~120s
Starting frequency	1-3 times/hour
Starting methods	Constant current, ramp, and jump start current curves
Stopping methods	Free stop, soft stop, braking stop
Overload capacity	500% for 30s; 120% for long-term
Communication function	Standard RS485 interface
Protection rating	IP4X, customization available for special requirements
Overall structure	Cabinet type
Dimensions	See selection parameters for details
Protection functions	Phase loss protection, overheating protection
Operating environment	Altitude not exceeding 1000 meters; use under reduced conditions if exceeded; Ambient temperature -25°C to +45°C; maximum relative humidity 95% non-condensing; Installation location should be free of corrosive gases, conductive dust, severe vibration (less than 0.5G), and well-ventilated.

■ Selection Reference

Product model	Applicable motor voltage (kV)	Applicable motor power (kW)	Dimensions W*D*H (mm)
TCQY-1000/6	6	1000	1200*1660*2300
TCQY-2000/6	6	2000	1200*1860*2300
TCQY-3000/6	6	3000	1200*1860*2300
TCQY-1000/10	10	1000	1200*1660*2300
TCQY-2000/10	10	2000	1200*1860*2300
TCQY-3000/10	10	3000	1200*1860*2300

■ Primary Scheme Diagram



Note: 5PT connected to the reactor at both ends of phase A;

TGRJ Series Medium and High Voltage Solid State Soft Starter Cabinet

■ Overview

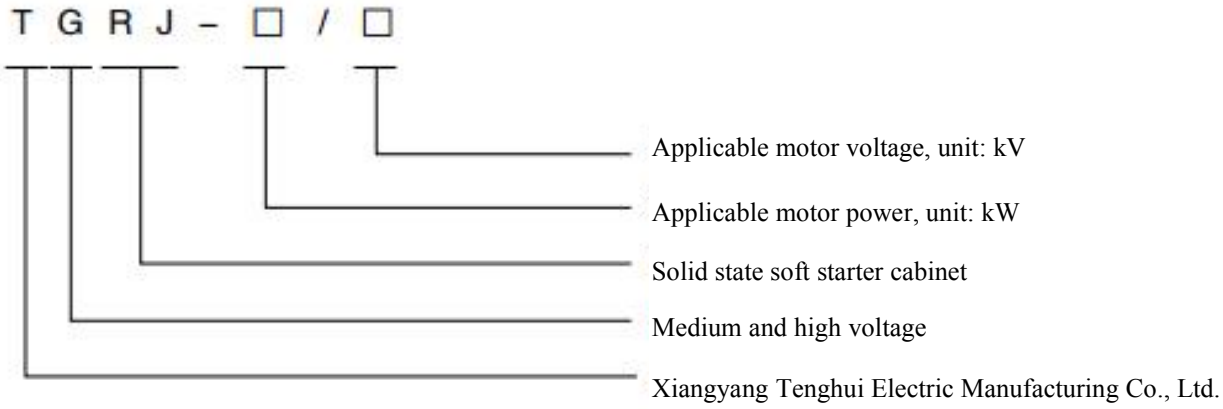
The TGRJ series medium and high voltage motor solid state soft starter cabinets are mainly used for the control and protection of starting and stopping (3~10kV) squirrel-cage asynchronous and synchronous motors. It involves connecting high-quality anti-parallel thyristor assemblies and electronic control devices between the high-voltage motor stator winding and the power source. When the motor starts, the thyristor's conduction angle is controlled according to a certain pattern (such as constant current or voltage ramp), continuously changing the input voltage to the motor stator winding until full voltage is reached. After starting, the bypass contactor is engaged. It features overload, phase loss, and start-up peak overcurrent protection functions, effectively avoiding harmful impacts on the power grid due to large motor start-up currents, allowing for the normal use of high-power motors under limited grid capacity and extending their service life. Additionally, the TGRJ series high voltage solid state soft starter cabinets have a "soft stop" function, where the motor stator winding voltage smoothly decreases during stopping, preventing sudden equipment halts, which is particularly useful for pumps (to avoid water hammer) or conveyors.

The TGRJ series medium and high voltage motor solid state soft starter cabinets are widely used in steel, chemical, metallurgy, building materials, coal mining, and other fields.

■ Performance Features

- Suitable for a wide range of voltages and powers, compatible with motors up to 20000kW within 3kV, 6kV, and 10kV;
- Feature soft start and soft stop functions, fully ensuring the safe starting and stopping of the system;
- Equipped with an LCD display, allowing for the setting of motor starting modes, starting times, and other parameters;
- Support PROFIBUS or MODBUS protocol via RS485 interface;
- Compact size, high degree of intelligence.

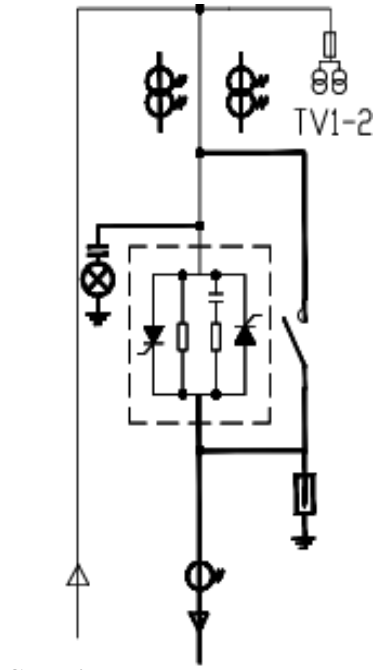
■ Model Description



■ Performance Parameter Table

Item	Parameter
Applicable motor voltage	3-10kV (special design for 11kV motors is required)
Applicable motor power	200~15000kW (custom dimension for cabinet power above 5000kW is required)
Starting current	2.5-3.5 times the rated current
Starting voltage drop	Less than 3V with bypass contactor
Starting time	0~120s adjustable
Starting frequency	Capable of frequent starting
Starting methods	Current-limit start, voltage linear curve start, voltage exponential curve start, current linear curve start, current exponential curve start
Stopping methods	Free stop, soft stop, braking stop, soft stop + automatic braking, jogging function
Overload capacity	500% for 30s, 120% for long term
Communication function	RS485 interface
Protection rating	IP4X
Overall structure	Cabinet type
Dimensions	W*D*H(mm):1000*1500*2300
Protection functions	Operating overcurrent protection, motor thermal overload protection, phase current imbalance protection, phase loss protection, overheating protection
Operating environment	Altitude not exceeding 1000 meters; use under reduced conditions if exceeded; Ambient temperature -25°C to +45°C; Maximum relative humidity 95% non-condensing; Installation location should be free of corrosive gases, conductive dust, severe vibration (less than 0.5G), and well-ventilated.

■ Primary Scheme Diagram



■ Selection Reference

Model	Nominal voltage (kV)	Nominal current (A)	Output power (kW)	Dimensions W*D*H (mm)
TGRJ-500/6	6	60	≤500	1000*1500*2300
TGRJ-1000/6	6	110	500~1000	1000*1500*2300
TGRJ-2000/6	6	320	1000~2000	1000*1500*2300
TGRJ-5000/6	6	600	2000~5000	1000*1500*2300
TGRJ-8000/6	6	1000	5000~8000	1000*1500*2300
TGRJ-500/10	10	60	≤500	1000*1500*2300
TGRJ-1000/10	10	80	500~1000	1000*1500*2300
TGRJ -1500/10	10	110	1000~1500	1000*1500*2300
TGRJ -2000/10	10	150	1500~2000	1000*1500*2300
TGRJ -3000/10	10	200	2000~3000	1000*1500*2300
TGRJ -5000/10	10	360	3000~5000	1200*1500*2300
TGRJ -8000/10	10	800	5000~8000	1200*1500*2300
TGRJ -10000/10	10	1000	8000~10000	1200*1500*2300
TGRJ -15000/10	10	1500	10000~15000	1200*1500*2300

TGRB Series Medium and High Voltage Step-down Compensation Soft Starter Cabinet

■ Overview

The TGRB series medium and high voltage step-down compensation soft starter cabinet adds capacitor compensation between the motor's starting step-down autotransformers, making the overall combination scientifically rational. Capacitors are paralleled in the system to provide part of the reactive power needed during the motor's starting process, thus reducing the impact of large direct starting currents on the electrical grid.

The TGRB series medium and high voltage step-down compensation soft starter cabinets can be widely applied in fields such as steel, chemical, metallurgy, building materials, coal mining, etc., for the starting of fans, pumps, compressors, air separation units, and other large and medium-sized motors.

■ Performance Features

◆ Suitable for altitudes not exceeding 1000 meters; ambient temperature: -20 to 40°C; relative humidity not exceeding 90%;

◆ Wide range of operating voltages and powers, motor voltage: 3 to 10kV; applicable motor power: 1000 to 50000kW;

◆ Small impact on the power grid during startup, with grid voltage drop within 5 to 15%, no harmonics;

◆ During startup, grid-side current is 1.5~2.5 times the motor's rated current, providing high starting torque to meet the requirements of different loads;

◆ Equipped with a human-machine interface display, offering intuitive and simple operation with Chinese display. It allows setting of motor start times and other parameters, with the option to query historical start curves (this is an optional feature);

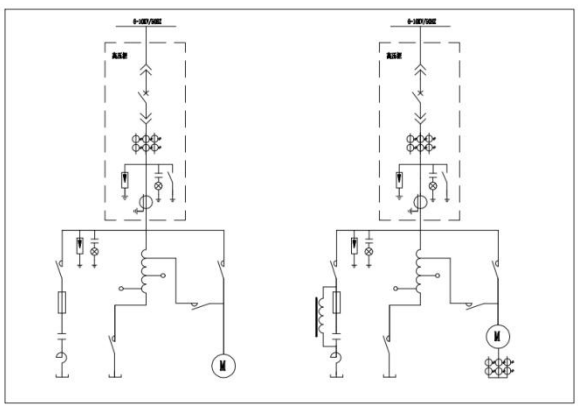
◆ Capable of detecting start current and voltage drop, with support of open communication and MODBUS (or PROFIBUS) communication protocols, uploading data to the DCS via RS485 interface (this is an optional feature);

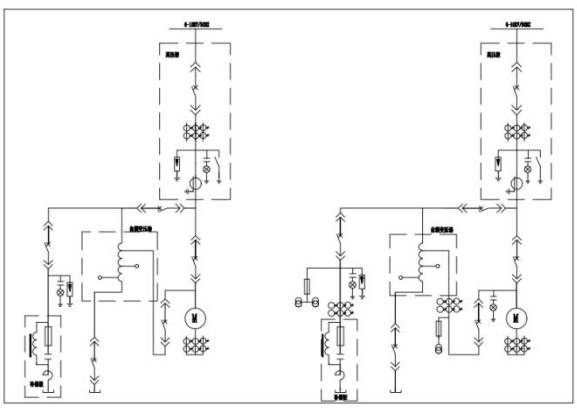
◆ Small size, simple structure, easy to operate and basically maintenance free.

■ Performance Parameter Table

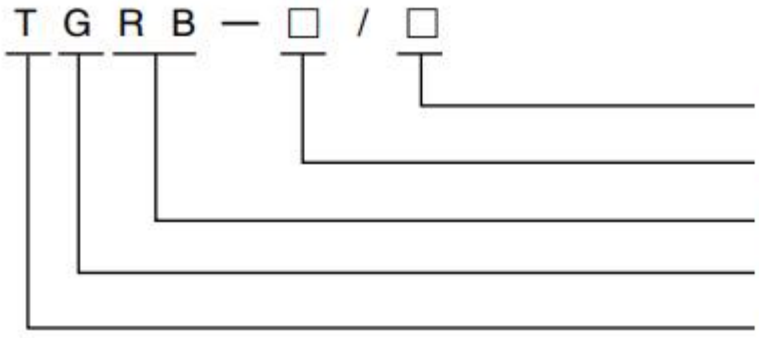
Item	Functions and Indicators
Applicable motor voltage	3kV-10kV (special design for 11kV motors is required)
Applicable motor power	1000kW~50000KW
Starting current	1.5~2.5 times rated current
Running mode	After the soft start is completed, the bypass contactor is engaged
Number of starts	2-3 times/hour
Rated short-circuit withstand capacity	⩽4kA
Starting power grid voltage drop	5%~15%
Starting features	The start has minimized impact on the power grid and no harmonics
Soft starting time	0~120s adjustable
Protection rating	IP40
Overall structure	Cabinet type
Monitoring	A man-machine interface is provided, and the motor start time can be set; the starting current and voltage drop can be detected
Operating environment	The altitude shall be no more than 1,000m; The upper limit is 40 ℃ (the average temperature within 24 hours shall not exceed 35 ℃), and the lower limit is -20 ℃; The relative humidity shall not exceed 90%; The installation site shall be free of conductive dust or corrosive gases.

■ Primary Scheme Diagram





■ Model Description



■ Selection Reference

Model	Applicable motor voltage (kV)	Applicable motor power (kW)	Dimensions W*D*H (mm)	Number of soft starter cabinets
TGRB-1000	3~10	1000以内	1100*1200*2300	2
TGRB-2000	3~10	1000-2000	1200*1300*2300	2
TGRB-3000	3~10	2000~3000	1200*1500*2300	2
TGRB-4000	3~10	3000~4000	1100*1200*2300+800*1500*2300	2 (4 pcs in total)
TGRB-5000	3~10	4000~5000	1100*1300*2300+800*1500*2300	2 (4 pcs in total)
TGRB-6000	3~10	5000~6000	1200*1500*2300+800*1500*2300	2 (4 pcs in total)
TGRB-7000	3~10	6000~7000	1200*1500*2300+1000*1500*2300	2 (4 pcs in total)
TGRB-8000	3~10	7000~8000	1300*1500*2300+1000*1500*2300	2 (4 pcs in total)
TGRB- 10000	3~10	9000~10000	1300*1500*2300+1000*1500*2300	2 (4 pcs in total)
TGRB-15000	3~10	10000~15000	1500*1600*2300+1000*1500*2300	2 (4 pcs in total)
TGRB-30000	3~10	15000~30000	2200*1800*2300+1000*1500*2300	2 (4 pcs in total)
Dimensions above 10000kW depending on site conditions				

■ Instructions for Ordering

◆ Users can provide the main transformer capacity, bus voltage, bus distance, minimum short-circuit capacity of the power grid, and bus power factor values when placing an order;

◆ Users need to provide the motor model and manufacturer, motor rated power, motor power factor, motor efficiency, motor rated torque, motor rotor GD2 value, motor rated voltage, motor rated current, and driving load conditions;

◆ Provide the shaft power of the loaded equipment and the rated torque of the mechanical equipment;

◆ This soft starter does not have the function of protecting the motor. The user must provide a high-voltage switchgear (or specify the high-voltage switchgear when ordering from us) as protection for the motor. Synchronous motors can match with our excitation cabinet;

◆ If users have special requirements, please contact us, and we can design separately according to the specified requirements.

TGRK Series Medium and High Voltage Reactance Soft Starter Cabinet

■ Overview

The TGRK series high-voltage reactance soft starter cabinet is a step-down soft starter equipment used for large and medium-sized squirrel cage motors or synchronous motors with the rated voltage of 3-10kV. It is a reactor that is connected in series in the stator circuit of the motor to adapt to the motor power, achieving step-down starting. During the starting process, the starting current is maintained at 4-5 times the rated current. After the start is completed, the reactor will be automatically switched off, and the starting process has no significant impact on the power grid.

■ Performance Features

◆ The coil is cast with epoxy resin and has advantages such as flame retardancy, self-extinguishing, maintenance free feature, high mechanical strength, strong resistance to short circuit impact, good insulation strength, small partial discharge, and long service life;

◆ The manufacturing technology of dry reactor has been adopted for the iron core, featuring low vibration, low noise, and low magnetic leakage;

◆ Suitable for environments with an altitude not exceeding 1000 meters; ambient temperature: -25~45 ℃; the relative humidity shall not exceed 90%;

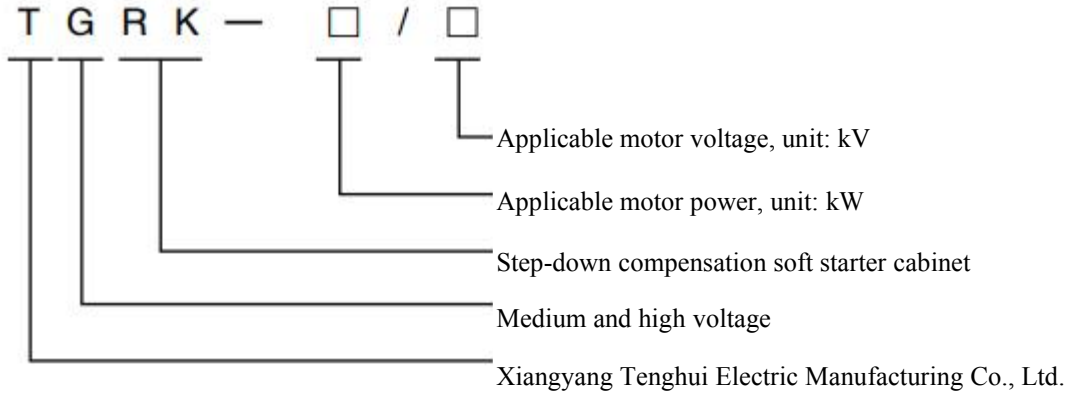
◆ The starting current is 4-5 times the rated current. The starting time is adjustable from 20 to 60 seconds, and it can be started continuously for 2-3 times;

◆ The overall structure of the product is compact, with small installation dimensions and small space occupation;

◆ Smooth start without impact, with a starting voltage drop of less than 10%, which has little impact on the power grid;

◆ PLC control can be used to communicate with the upper computer through RS485 interface, meeting the requirements of DCS control system.

■ Model Description



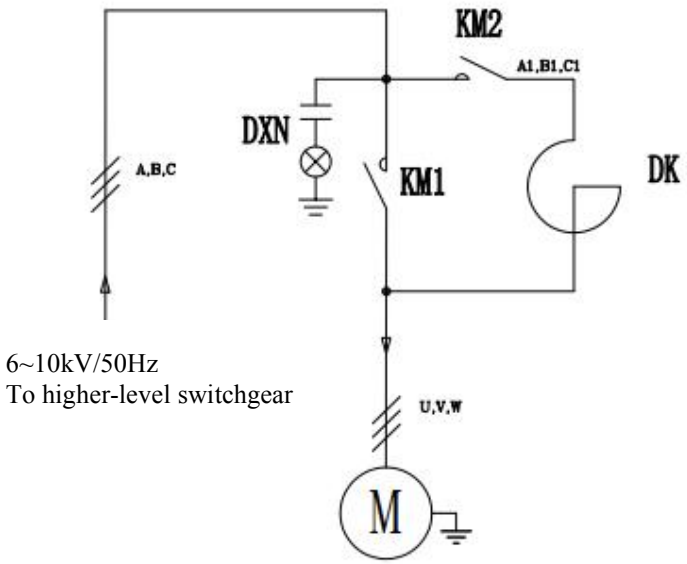
■ Performance Parameter Table

Item	Functions and Indicators
Applicable motor voltage	3kV-10kV (special design for 11kV motors is required)
Applicable motor power	200kW~3200kW
Starting current	4-5 times rated current
Running mode	After the soft start is completed, the bypass contactor is engaged
Number of starts	2-3 times/hour
Starting features	No great mpact on the power grid
Soft starting time	20~60s adjustable
Protection rating	IP20/IP40
Overall structure	Compact overall structure, with small installation dimensions and small space occupation
Protection and Monitoring	PLC control can be used to communicate with the upper computer through RS485 interface, meeting the requirements of DCS control system
Operating environment	The altitude shall be no more than 1,000m; The upper limit is 45 ℃ (the average temperature within 24 hours shall not exceed 35 ℃), and the lower limit is -25 ℃; The relative humidity shall not exceed 90%; The installation site shall be free of conductive dust or corrosive gases.

■ Parameters for Selection

Model	Nominal voltage (kV)	Output power (kW)	Dimensions W*D*H(mm)
TGRK-500/6	6	⩽500	1100*1500*2300
TGRK-1000/6	6	1000	1200*1500*2300
TGRK-1500/6	6	1500	1200*1500*2300
TGRK-1800/6	6	1800	1200*1500*2300
TGRK-500/10	10	⩽500	1100*1500*2300
TGRK-1000/10	10	1000	1200*1500*2300
TGRK-1500/10	10	1500	1200*1500*2300
TGRK-1800/10	10	1800	1200*1500*2300
Special design is provied in case of ⩾2000kw			

■ Primary Plan Diagram (this diagram is a standard version and can be customized according to actual situations)



■ Instructions for Ordering

◆ Users must provide the motor model, rated power, rated voltage, rated current, and load characteristics of the motor when placing an order;

◆ In case of special requirements, the products can be designed separately and can match with our high-voltage switchgear and TGWB high-voltage capacitor compensation cabinet.

TRG Series Medium and High Voltage Squirrel Cage Motor Electro-Hydraulic Starter Cabinet

■ Overview

The TRG series high and medium voltage squirrel cage motor electro-hydraulic starter cabinet is a voltage reduction soft starting equipment used for large and medium-sized squirrel cage motors or synchronous motors with the rated voltage of 3-10kV. Its operating principle is as follows. A specially designed controllable liquid resistor is connected in series in the stator circuit of the motor. As the motor starts, the distance between the liquid resistor's mobile and fixed plates automatically changes, the resistance value decreases smoothly, and the starting current is maintained below 3.5 times the rated current. After starting, the liquid resistor will be automatically switched off, and the starting process has no impact on the power grid and no harmonic pollution.

■ Performance Features

◆ The starting current is 2.5~3.5 times the rated current;

◆ The starting time is adjustable from 20 to 60 seconds;

◆ Smooth start without impact, with a starting voltage drop of less than 8%, which has little impact on the power grid;

◆ Complete protection functions, with multiple protection functions such as overcurrent, over temperature, low liquid level, startup timeout protection;

◆ PLC control can be used to communicate with the upper computer through RS485 interface, meeting the requirements of DCS control system; the product can also achieve closed-loop control;

◆ It can be started continuously for 2-3 times.

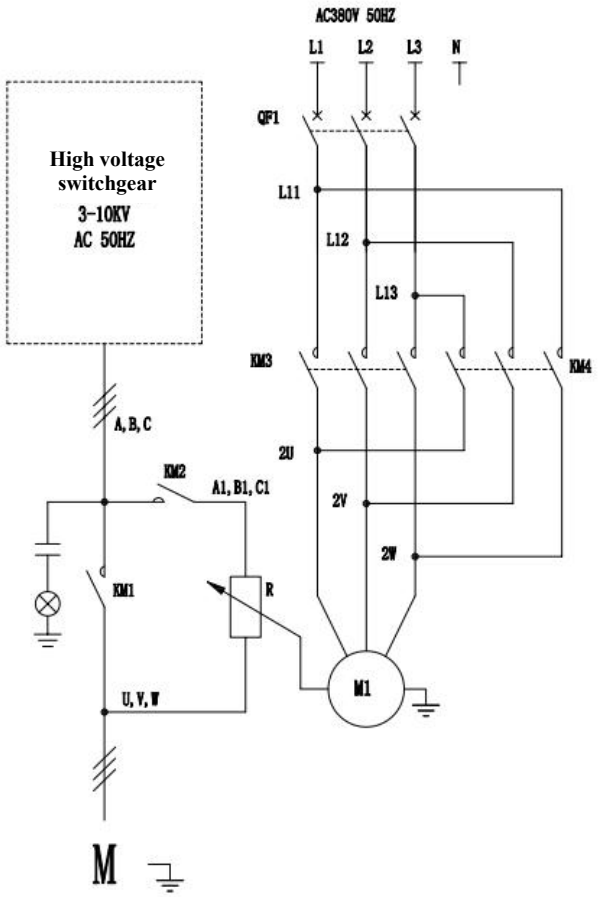
■ Performance Parameter Table

Item	Functions and Indicators
Applicable motor voltage	3kV-10kV (special design for 11kV motors is required)
Applicable motor power	200kW~20000kW
Starting current	2.5-3.5 times the rated current
Running mode	After the soft start is completed, the bypass contactor is engaged
Number of starts	2-3 times/day
Rated short-circuit withstand capacity	⩽4kA
Overload capacity	500% for 30s, 120% for long term
Starting features	Smooth start without impact on mechanical equipment
Soft starting time	20~60s adjustable
Protection rating	IP20
Overall structure	Cabinet type
Protection and Monitoring	Water tank liquid level monitoring, water tank temperature control
Operating environment	The altitude shall be no more than 1,000m; The upper limit is 40 ℃ (the average temperature within 24 hours shall not exceed 35 ℃), and the lower limit is 0 ℃; The relative humidity shall not exceed 90%; The installation site shall be free of conductive dust or corrosive gases.

■ Parameters for Selection

Model	Motor power (kW)	Overall dimensions W*D*H (mm)	Starting temperature rise ℃	Remarks	Star point cabinet
TRG-500/□□	500 below	1500*1200*2000	10	Single-side cabinet	
TRG-1000/□□	500~1000	1500*1300*2200	10	Single-side cabinet	
TRG-2000/□□	1000~2000	1600*1500*2650	14	Single-side cabinet	
TRG-3000/□□	2000~3000	1350*1350*2600	14	Three-side cabinet	One side
TRG-5000/□□	3000~5000	1450*1450*2650	20	Three-side cabinet	One side
TRG-8000/□□	5000~8000	1600*1650*2650	20	Three-side cabinet	One side
TRG-10000/□□	8000~10000	1800*2250*2800	20	Three-side cabinet	One side
TRG-15000/□□	10000~15000	2000*2500*2800	20	Three-side cabinet	One side
TRG-20000/□□	15000~20000	2000*2500*2800	20	Three-side cabinet	One side

■ Primary Scheme Diagram



Note: The connecting cables between cabinets shall be provided by the users, and the operating ambient temperature of the liquid resistance cabinet shall be above 0 ℃.

■ Instructions for Ordering

◆ Users must provide the motor model, rated power, rated voltage, rated current, stator winding connection method, star point switched on or off and load characteristics of the motor when placing an order;

◆ In case of special requirements, the products can be designed separately and can match with our high-voltage switchgear and TGWB high-voltage capacitor compensation cabinet;

◆ If the star point short-circuit switch is a vacuum circuit breaker or equipped with differential protection, the one-side "star point cabinet" must be added;

◆ PLC control can be used to communicate with the upper computer through RS485 interface, meeting the requirements of DCS control system.

TH-HVF Series High-voltage Variable-frequency Speed Control System

■ Basic Principle

By adopting the advanced power unit series stacking technology, vector control technology, and optimized PWM control algorithm, the 50Hz grid voltage is transformed into sine voltage and sine current output of 0-50Hz (60Hz) variable frequency and variable voltage, and the motor speed is adjusted to meet the urgent requirements of users for speed regulation, energy saving, and production process improvement for fans, water pumps, and other equipment.

Power unit cabinet Transformer cabinet Switching cabinet

■ Performance Features

◆ High efficiency, high power factor, and no harmonic pollution

The TH HVF series high-voltage variable frequency speed control system adopts the high-high scheme of power unit, using a multi-winding high-voltage phase-shifting transformer. The current flowing through the secondary winding forms a sinusoidal current waveform when stacked ot the primary side of the transformer. The power factor is higher than 0.95, and the overall efficiency is higher than 98%. The multi-level technology is used to reduce harmonic amplitude through superposition. The pure harmonic free input has no interference with the power grid, and the output harmonic distortion is less than 2%, meeting and exceeding the requirements of the international standard IEE519 for the power quality public power grid.

◆ Advanced fault unit bypass operation technology

To improve the reliability of the system, a certain output voltage margin is considered in the whole variable frequency speed regulation system, and the bypass circuits are added in each power unit. When a power unit has a fault, it can automatically monitor the fault and start the bypass circuit to prevent the unit from operating again.

Then, through the automatic line voltage balancing technology, the angle between phases is adjusted to ensure the maximum line voltage balanced output under the premise of maximum and unequal phase voltage output.

◆ Reliable oscillation suppression technology

When the motor is lightly loaded or unloaded, local instability may occur, and the current amplitude will fluctuate greatly. The oscillation of the current may cause the system to trigger protection due to overcurrent or overvoltage. Exceptional current oscillation suppression algorithm is used to suppress current oscillation effectively and ensure system stability and reliability.

◆ Flying start function

Flying start, which is also called speed tracking start, is mainly used for starting the motor and switching from power frequency to variable frequency when the fan rotates in positive direction due to external force. If the flying start function is used, the frequency converter will, upon detecting the actual speed of rotor, output the frequency identical to the rotor so as to prevent the electric energy from being back to the DC bus of frequency converter and avoid overvoltage protection, thus starting the electric motor smoothly.

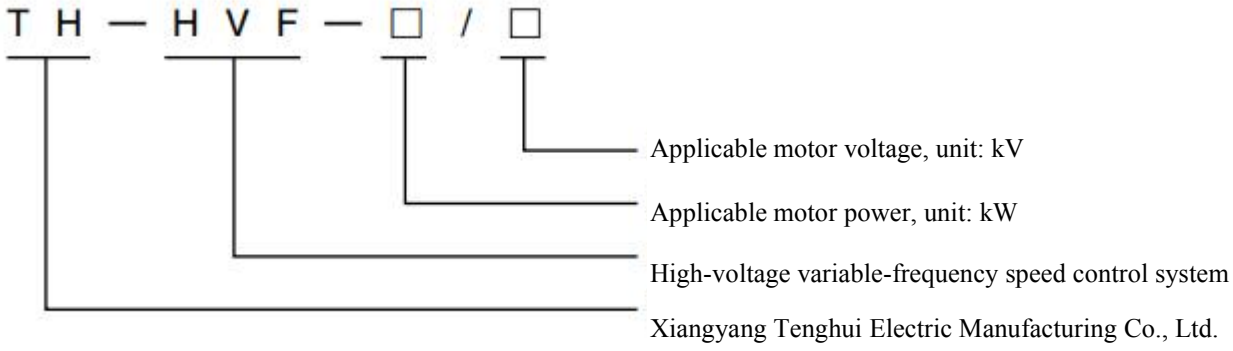
◆ Free switch between power frequency and variable frequency

It supports the free switch between power frequency and variable frequency. Protection shutdown function will not be triggered during the switching process. The switching from variable frequency to power frequency involves detecting the frequency, amplitude, and phase of the power frequency grid, and adjusting the output voltage frequency, amplitude, and phase of the inverter to match those of the grid. Upon receiving the switching command, the inverter is disconnected from the motor, which is then connected to the grid, completing the process of switching from variable frequency to power frequency. Switching between power frequency and variable frequency means running motor using flying start technology under variable frequency status by connecting the frequency converter and motor after disconnecting the power frequency grid and motor.

◆ Multi-machine master/slave technology

The frequency converter supports master/slave control function. Master/slave control network can be established among various sets of frequency converters through data busbar. To be specific, one frequency converter is set as host machine while the rest ones as slave machines. The host machine collects the information about the status of slave machines in real time and sends the frequency and torque commands of various slave machines at the same time, so as to realize the power balance and integrated control of various frequency converters. The technology is applicable to the scenarios where power balance control is required, such as belt conveyor and elevator.

■ Model Description



■ Performance Parameter Table

Applicable motor power (kW)		200kW~20,000kW (4-pole motor is the standard configuration; 6~12-pole motor is optional based on the specific current requirements)
Rated output	Rated power (kW)	Rated power of rated voltage of motor: 200kW~2,0000kW
	Rated current (A)	Rated current of rated voltage of motor
	Overload capacity	105% continuous, 120% 1min allowed, 150% 3s allowed, 180% immediate protection
	Output voltage (kV)	3-phase: 0~6kV, (0~10kV)
	Wave form	Multiple SPWM sine wave
Input voltage	Number of phases, frequency and voltage	3-phase, 50Hz, 6kV(10kV)
	Allowed fluctuation	Voltage: -10%~+10%, frequency: ±5%, -15% ~ -35% derated continuous running
Basic performance	Starting frequency	1.1~5Hz (range of setting)
	Precision	Simulation settings: Below 0.3% (25 ±10℃) of the max. frequency value Digital settings: Below 0.1% -10~+50℃) of the max. frequency value
	Resolution	Simulation settings: 0.0005% of the max. frequency value Digital settings: 0.01Hz (below 99.99Hz), 0.1Hz (above 100Hz)
	Efficiency	>98% under rated output
	Power factor	>0.95
Control	Acceleration and deceleration time	0.1~6000.0s, acceleration and deceleration time can be set independently
	Voltage/Frequency characteristics	Decided by the selected V/F curve
	PID	Manual settings of PID parameters
	Auxiliary functions	Setting of V/F curve, low-frequency compensation, rated current and current protection boundary
	High-voltage isolation	Electromagnetic coupling, multi-channel optical fiber transmission
	Input of control power	AC220V 2kVA
Operation	Operation	Operatin of body (touch screen), external control with a long distance and upper computer (optional)
	Frequency setting	Setting of touch screen number, multi-section speed, acceleration/deceleration speed, upper computer and external control simulation signal (DC4 ~20mA)

Applicable motor power (kW)		200kW~12,000kW (4-pole motor is the standard configuration; 6~12-pole motor is optional based on the specific current requirements)
Operation	Output of running status	Status indication of relay status output, fault of frequency converter, alarm, running/stop
	Touch screen	Input/output voltage, input/output current, setting value, fault and running status of various units, transformer status, bus voltage of various units, temperature of heat radiator of various units, etc.
	Protection functions	Motor overcurrent, overvoltage and undervoltage of machine, overcurrent and overvoltage of unit, unit overheating, phase loss of unit input, communication faults of optical fiber, etc.
	Applicable scenarios	Places with no gas and coal dust explosion dangers, external gas impact, corrosive or conductive gas and dust and direct sunshine with an altitude below 1,000m.
Environment	Ambient temperature/Humidity	0℃ ~+40℃ /20~90%RH non-condensation
	Vibration	5.9m/s^2 (below 0.6g)
	Storage temperature	-20~+65℃ (applicable to short-time storage such as transportation)
External interface	Digital input	15 ways in total
	Digital output	15 ways in total
	Simulation input	Two-way 4~20mA (adjustable channel): Frequency setting, pressure feedback and
	analog output	Four-way 4~20mA (adjustable channel): Output frequency, output current, output voltage and excitation control (used for synchronous motor controll)
	Communication interface	One-way RS485, supporting Modbus or Profibus communication protocol (settable)
Cooling method		Forced air cooling
Protection rating of housing		IP31

■ Selection Reference

Product model	Applicable motor voltage (kV)	Applicable motor power (kW)	Dimensions W*D*H (mm) (Excluding switch cabinet)
TH-HVF-450/6	6	450	2000*1500*1900
TH-HVF-560/6	6	560	2000*1500*1900
TH-HVF-630/6	6	630	2200*1700*2120
TH-HVF-710/6	6	710	2200*1700*2120
TH-HVF-800/6	6	800	2200*1700*2120
TH-HVF-1000/6	6	1000	2200*1700*2120

Product model	Applicable motor voltage (kV)	Applicable motor power (kW)	Dimensions W*D*H (mm) (Excluding switch cabinet)
TH-HVF-1120/6	6	1120	2200*1700*2120
TH-HVF-1250/6	6	1250	3300*1700*2420
TH-HVF-1400/6	6	1400	3300*1700*2420
TH-HVF-1600/6	6	1600	3600*1700*2420
TH-HVF-1800/6	6	1800	3600*1700*2420
TH-HVF-2000/6	6	2000	3600*1700*2420
TH-HVF-2400/6	6	2400	3600*1700*2420
TH-HVF-2500/6	6	2500	4600*1700*2420
TH-HVF-2800/6	6	2800	4600*1700*2420
TH-HVF-3150/6	6	3150	5900*1700*2420
TH-HVF-3300/6	6	3300	5900*1700*2420
TH-HVF-4000/6	6	4000	6500*1700*2420
TH-HVF-4500/6	6	4500	6500*1700*2420
TH-HVF-4800/6	6	4800	6500*1700*2620
TH-HVF-5000/6	6	5600	6500*1700*2620
TH-HVF-10000/6	6	10000	10200*1750*2720
TH-HVF-20000/6	6	20000	15200*1750*2720
TH-HVF-220/10	10	220	2500*1600*2000
TH-HVF-250/10	10	250	2500*1600*2000
TH-HVF-315/10	10	315	2500*1600*2000
TH-HVF-400/10	10	400	2500*1600*2000
TH-HVF-450/10	10	450	2500*1600*2000
TH-HVF-500/10	10	500	2500*1600*2000
TH-HVF-560/10	10	560	2500*1600*2000

Product model	Applicable motor voltage (kV)	Applicable motor power (kW)	Dimensions W*D*H (mm) (Excluding switch cabinet)
TH-HVF-630/10	10	630	2500*1600*2000
TH-HVF-710/10	10	710	2500*1600*2000
TH-HVF-800/10	10	800	2500*1600*2000
TH-HVF-900/10	10	900	2500*1600*2000
TH-HVF-1000/10	10	1000	2500*1600*2000
TH-HVF-1250/10	10	1250	2800*1700*2120
TH-HVF-1400/10	10	1400	2800*1700*2120
TH-HVF-1600/10	10	1600	2800*1700*2120
TH-HVF-1800/10	10	1800	2800*1700*2120
TH-HVF-2000/10	10	2000	2800*1700*2120
TH-HVF-2250/10	10	2250	4100*1700*2420
TH-HVF-2400/10	10	2400	4100*1700*2420
TH-HVF-2500/10	10	2500	4100*1700*2420
TH-HVF-2800/10	10	2800	4400*1700*2420
TH-HVF-3000/10	10	3000	4400*1700*2420
TH-HVF-3200/10	10	3200	4400*1700*2420
TH-HVF-3500/10	10	3500	4400*1700*2420
TH-HVF-4000/10	10	4000	4400*1700*2420
TH-HVF-4500/10	10	4500	6200*1700*2620
TH-HVF-4800/10	10	4800	6200*1700*2620
TH-HVF-5600/10	10	5600	6200*1700*2620
TH-HVF-10000/10	10	10000	10200*1750*2720
TH-HVF-20000/10	10	20000	15200*1750*2720

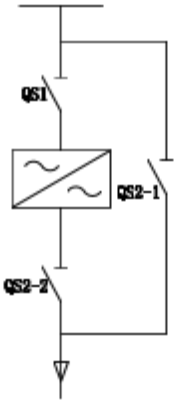
■ Tenghui TH-HVF High-voltage Variable-frequency Speed Control System Scheme

One-drive-one manual scheme: As the standard configuration of variable-frequency speed control system, it can switch between variable frequency and power frequency of load, to keep safety during maintenance of variable-frequency speed control system.

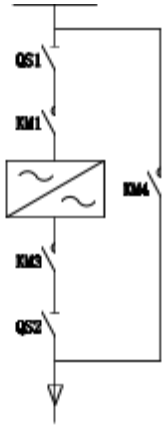
One-drive-one auto scheme: Realize quick switch between variable frequency and power frequency of load, to keep safety during maintenance of variable-frequency speed control system. This scheme is recommended when the switch time of system is short.

One-drive-two manual scheme: In addition to the functions of one-drive-one system, it can also switch two loads at the same time and satisfy the periodic running of two loads.

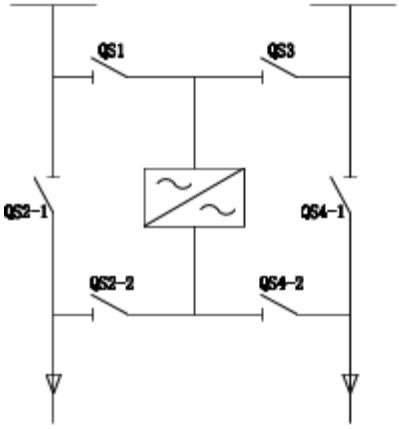
One-drive-two auto scheme: In addition to the functions of one-drive-one system, it can realize fast switch between two loads at the same time. This scheme is recommended when the switch time of system is short.



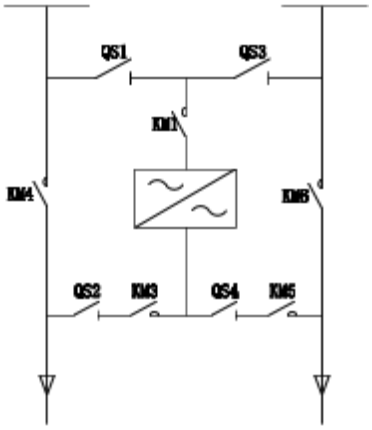
One- drive -one (manual)



One- drive -one (automatic)



One- drive -two (manual)



One- drive -two (automatic)

■ Instructions for Ordering

◆ Tenghui TH-HVF high-voltage variable frequency applies to boiler feed pump, circulating pump, condensate pump, mortar pump, supply fan, induced draft fan, primary air fan and booster fan in the power industry; the drain pump, exhaust fan and elevator of mine in the mining industry; blast furnace blower, smelting oxygen generator and dedusting fan in the metallurgical industry; large oil delivery pump and chemical production compressor in the petrochemical industry; the tap water supply pump and central air conditioning compressor in urban construction.

◆ TBP series low-voltage variable-frequency speed control cabinet or TYT series liquid resistance speed control cabinet can be equipped as demanded by user.

TH-SVG Series High-voltage Dynamic Reactive Power Compensation Device

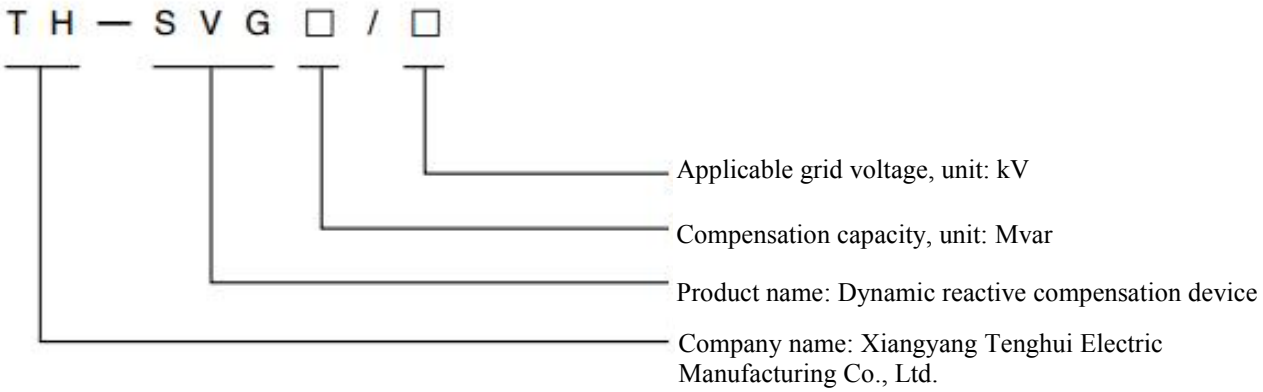
■ Basic Principle

By using the most advanced instantaneous reactive power theory and the power decoupling algorithm that is based on synchronous coordinate transformation, TH-SVG applies to the modern power electronics, electric energy control, automation, micro-electronics and network communication technology, to realize reactive quick compensation of system. It can effectively maintain the voltage stability of system and realize harmonic suppression even if the grid system has major disturbance.

When used in power transmission grid, TH-SVG is mainly used for: Providing voltage supports dynamically and restraining the system overvoltage in case the system has a fault or sudden load increase, to ensure the stability of power transmission line: Power oscillation of damping power system.

When used in power distribution network, TH-SVG is mainly used for quality control of electric energy, maintaining the busbar voltage through dynamic reactive quick compensation, effectively restraining voltage flicker, or realizing real-time dynamic compensation of impact load or harmonic load through current tracking compensation, in order to improve the power factor.

■ Model Description



■ Performance Features

◆ Fast response

Based on the high-power switching device such as IGBT and instantaneous reactive power algorithm, the TH-SVG hardware system can quickly restrain the voltage fluctuation, voltage flicker and realize reactive power compensation within the response time of 30ms, to greatly reduce the power rush of load and protect the electrical equipment.

◆ Low harmonic

Based on the chain main-circuit structure and high-frequency PWM control technique, TH-SVG can reduce less sub-harmonic and effectively reduce the pollution of power grid due to harmonic wave.

◆ Wide operating range

The reactive current provided by TH-SVG decreases as the busbar decreases. When the busbar is too low, the reactive compensation ability of TH-SVG is weak; The reactive power output is directly proportional to the busbar, and the reactive current provided is independent of the busbar. When the busbar decreases, TH-SVG operates in a constant current source state, and its ability to compensate for reactive power is weak. The reactive power compensation capability of TH-SVG devices with the same capacity is equivalent to 1.3-1.5 times that of SVC devices with the same capacity.

◆ Low power, low noise, and space-saving

The TH-SVG chain main circuit does not require large capacity multiple transformers, multiple filters, and large capacity reactors, with low power consumption and low noise (about 15dB). TH-SVG of the same capacity occupies no more than half of the SVC area.

◆ Advanced technology

Using advanced PSCAD power system simulation technology for product design and system validation.

The reactive power detection and control technology within 10ms can detect and follow the changes in system reactive power in real-time, especially suitable for rapid reactive power compensation of sudden loads, with significant energy-saving effects.

Carrier phase shifted SPWM control technology, capacitor DC voltage balancing technology, relay protection and monitoring protection technology. The application of specialized valve body crimping technology and switch device buffering technology ensures the reliability of IGBT valve string operation.

The main controller adopts a fully enclosed anti-interference unit chassis, a new back structure design, double-layer shield, and the control bus is not externally connected to reduce electromagnetic interference.

Flexible control methods, can adopt various control strategies such as constant reactive power or constant voltage control, three-phase balance control or split phase control.

◆ High reliability

The IGBT valve body adopts a horizontal design, which ensures reliable operation and minimal maintenance workload; Simultaneously adopting power unit series connection, redundancy, and bypass measures to improve equipment utilization and reliability.

According to the system application environment and device capacity, forced air cooling, heat pipe cooling, or water air exchange cooling systems are used for users to choose from, with safe and reliable cooling performance and low maintenance costs.

The fully digital intelligent control system has comprehensive control, monitoring, and fault diagnosis functions, greatly reducing the time for debugging, maintenance, and repair.

The control system and power unit use fiber optic communication, which ensures stable signals and is not affected by external electromagnetic fields, effectively solving the isolation problem between strong and weak signals.

The primary circuit has undergone detailed simulation analysis, fully considering various overload, overvoltage, and system disturbance issues. A complete microcomputer protection system can ensure the safe operation and reliable operation of the equipment.

Extremely strong self diagnostic function, including both static self inspection and dynamic detection during operation, can provide accurate alarm and protection actions for various unexpected events in the system in a timely manner.

■ Performance Parameter Table

Item	Parameter
System capacity	±1Mvar~ ±100Mvar
Input line voltage	6kV,10kV,27.5kV,35kV
Valve group structure	Open frame, chain H-bridge power inverter, connected to the power grid through reactors
Cooling method	Pure water cooling/heat pipe/forced air cooling
Control system	Full digital control system
Control method and accuracy	Voltage control, reactive power control or voltage and reactive power combined control, control quantity PCC point voltage; Control accuracy: 0.5%; Trigger accuracy: 0.1° ~0.3°
Reactive power regulation range	-100%~+100%
Adjustment method	Three-phase balance, sub-adjustment
Average power factor	≥0.95
Response time	No more than 5ms
Between control system and power unit	Optical fiber isolation
Total power loss	Under rated conditions, do not exceed 2% of the rated power of the control object
Noise level	Self-cooling no noise ≤52dB; Water cooling ≤78dB
Control voltage	AC380V, AC220V or DC220V
Service life	≥20 years

TGWB Series High Voltage Capacitance Compensation Device

■ Overview

TGWB series of high voltage capacitor compensators are parallel connected with capacitor banks in the stator windings of high voltage electrical machines, which are used to improve the power factor of the electrical machines and reduce the current of the electrical machines so as to save energy and improve the quality of consumption.

■ System Characteristics

◆ The high quality three-phase high voltage power capacitor is used, which has the characteristics of small dielectric loss, small volume, low operating temperature and light weight.

◆ The discharge resistance is built into the electric vessel, which can reduce the remaining voltage to below 50V within 5 minutes after the device is removed from the grid;

◆ Power factor can be increased to more than 0.95, reduce reactive power;

◆ With high-voltage live display and electromagnetic lock to ensure reliable operation of equipment and personal safety.

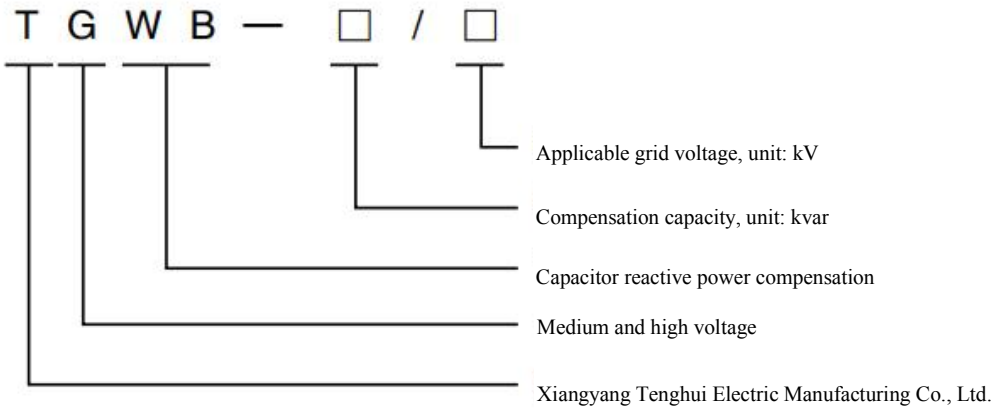
■ Performance Parameter Table

Item	Functions and Indicators
Applicable voltage	3kV~10kV
Compensating capacity	75kvar~500kvar
Maximum working current	≤1.3 times rated current
Maximum operating voltage	≤1.1 times rated voltage
Cut-off residual voltage	≤10% rated voltage after 5s
Protection rating	IP20/IP40
Overall structure	Cabinet type
Protection and Monitoring	External fuse
Operating environment	The altitude shall be no more than 1,000m; The upper limit is 40 ℃ (the average temperature within 24 hours shall not exceed 35 ℃), and the lower limit is 0 ℃; The relative humidity shall not exceed 90%; The installation site shall be free of conductive dust or corrosive gases.

■ Selection Reference

Model	Compensation capacity (kvar)	Dimensions W*D*H (mm)	Remarks
TGWB-6.6-75	≤75	1100*1200*2000	High voltage 6kV
TGWB-6.6-150	≤150	1100*1200*2000	
TGWB-6.6-250	≤250	1100*1200*2200	
TGWB-6.6-350	≤350	1100*1200*2200	
TGWB-6.6-450	≤450	1100*1200*2400	
TGWB-6.6-500	≤500	1100*1200*2400	
TGWB-12-75	≤75	1100*1200*2000	High voltage 10kV
TGWB-12-150	≤150	1100*1200*2000	
TGWB-12-250	≤250	1100*1200*2200	
TGWB-12-350	≤350	1100*1200*2200	
TGWB-12-450	≤450	1100*1200*2400	
TGWB-12-500	≤500	1100*1200*2400	

■ Model Description



■ Instructions for Ordering

◆ Provide rated voltage, compensation capacity and other technical requirements when the user orders;

◆ Inlet and outlet mode of compensation device;

◆ Maximum operating voltage: not more than 110% of the rated voltage (except for the transition process), maximum operating current: not more than 1.3 times the rated current;

◆ Capacitor compensation cabinet can compensate the motor on the spot, but also can centrally compensate the power grid, the user can choose high voltage capacitance compensation cabinet TGWB, low voltage capacitance compensation cabinet TDWB;

◆ If the user's motor is a wound-type motor, it can be equipped with our company's TJ static phase converter and TJ-B variable load phase advancer to reduce the reactive power and improve the power factor.

TJ Series Static Phase Advancer

■ Overview

TJ series static phase advancer is a kind of local no-power compensation device used to improve the efficiency factor of large and medium-sized three-phase winding off-stepping motor. The utility model is connected in series with the rotor circuit of the motor for reducing the reactive power of the motor and reducing the stator current. Its performance is far superior to the traditional capacitor compensation and self-excited advance camera, and it is widely used in large and medium-sized wound asynchronous motors in building materials, cement, chemical industry, metallurgy, mining, paper making, pharmaceutical and other industries.

■ Performance Features

◆ Adopt advanced AC frequency conversion and SCM control technology, high degree of automation, high control precision;

◆ After phase advancement, the stator current of the motor is reduced by 10%~20%, reducing line losses and copper losses by 20%~30%;

◆ The power factor is increased to more than 0.95, and the reactive power is reduced by more than 60%;

◆ With phase loss, over-temperature, over-current and other protection functions;

◆ After phase advancement, the motor temperature significantly decreases, greatly extending the motor's service life.

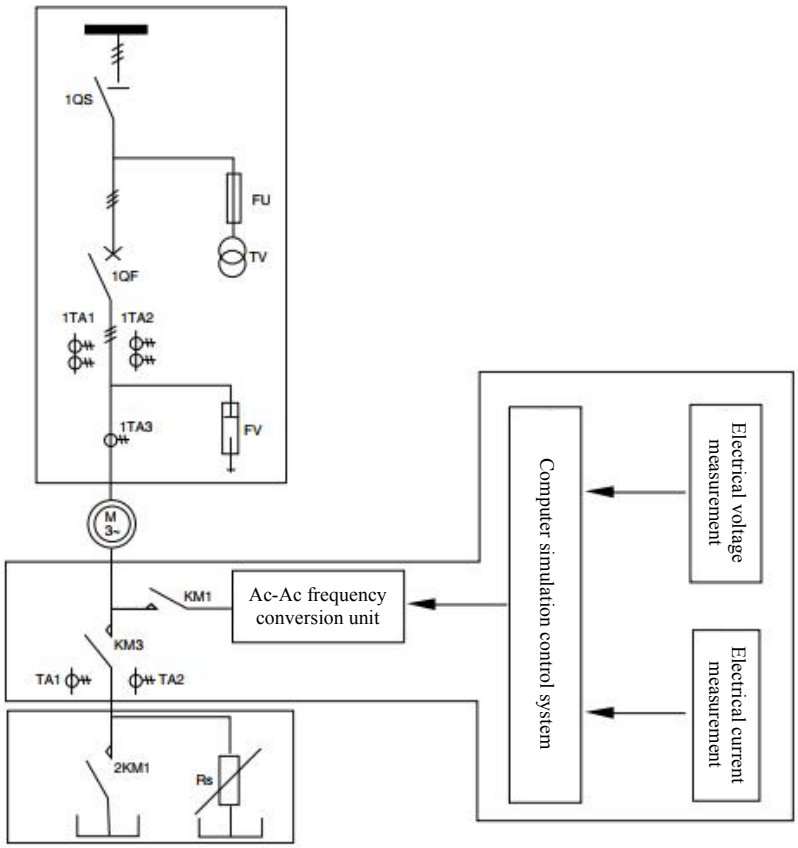
■ Performance Parameter Table

Item	Functions and Indicators
Applicable motor voltage	380V~10kV
Applicable motor power	200kW~3200kW
Running mode	String into the rotor circuit
Power factor	⩾0.95
Reduce copper loss	20%~30%
The stator current decreases	10%~20%
Reactive power decreases	60%
Protection rating	IP20
Overall structure	Cabinet type
Protection and Monitoring	Phase loss protection, over-current protection
Operating environment	The altitude shall be no more than 1,000m; The upper limit is 40 ℃ (the average temperature within 24 hours shall not exceed 35 ℃), and the lower limit is 0 ℃; The relative humidity shall not exceed 90%; The installation site shall be free of conductive dust or corrosive gases.

■ Selection Reference

Model	Overall dimensions W*D*H(mm)	Applicable motor parameters	
		Motor rotor current (A)	Stator rated operating voltage (V)
TJ-400D	1000*750*2000	⩽ 400	380
TJ-600D	1000*750*2000	⩽ 600	380
TJ-400G	1000*750*2000	⩽ 400	6000 ~ 10000
TJ-600G	1000*750*2000	⩽ 600	6000 ~ 10000
TJ-800G	1300*850*2000	⩽ 800	6000 ~ 10000
TJ-1000G	1300*850*2000	⩽ 1000	6000 ~ 10000
TJ-1200G	1500*850*2000	⩽ 1200	6000 ~ 10000
TJ-2000G	1500*1200*2400	⩽ 2000	6000 ~ 10000
TJ-2500G	1500*1200*2400	⩽ 2500	6000 ~ 10000

■ Primary Scheme Diagram



■ Instructions for Ordering

◆ When ordering, customers should provide motor model, rated power, stator voltage, stator current, rotor voltage, rotor current and other related parameters;

◆ Users can choose the high voltage switch cabinet, liquid resistance starting cabinet and other related products produced by our company.

TBP Series Low Voltage Frequency Conversion Control Cabinet

■ Overview

The TBP Series Low Voltage Frequency Conversion Control Cabinet is designed for three-phase asynchronous or synchronous speed regulation. It is a kind of speed control product which can change the speed of the motor by changing the supply frequency of the motor stator circuit. It is widely used in energy saving and speed control of fans and pumps in chemical industry, metallurgy, iron and steel, coal, cement and other industries.

■ Performance Features

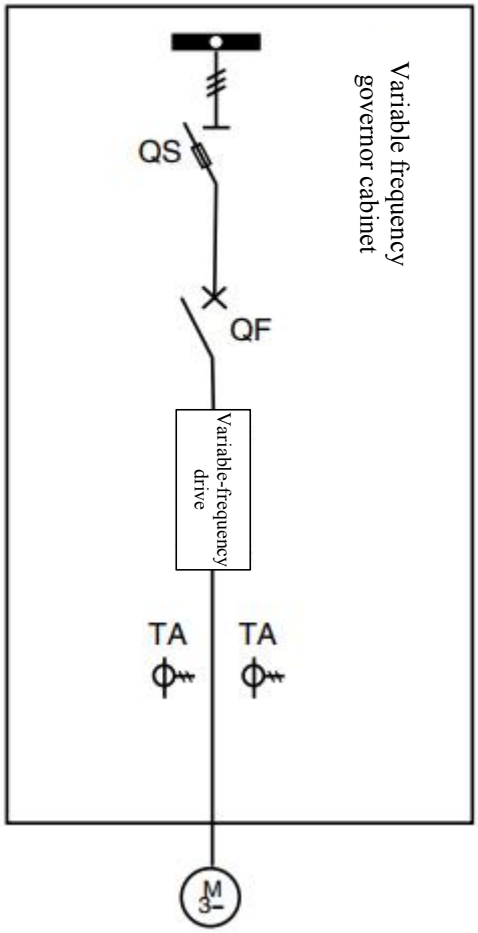
- Large adjustment range, speed regulation ratio up to 20:1, high speed regulation accuracy;
- Energy saving effect is remarkable, the power saving rate is more than 30%, especially for variable load motors such as centrifugal fans and axial fans;
- With overload, lack of phase, undervoltage, three-phase unbalanced tripping and other protection functions to protect the safe operation of the motor;
- With serial communication interface, variable-frequency drive can be connected to remote control system.

■ Performance Parameter Table

Item		Project Introduction
Input	Rated voltage; frequency	Three-phase, 380V~440V；50Hz/60Hz
		Single-phase, 200V~220V；50Hz/60Hz
	Allowable voltage operating range	Voltage: 380V(- 15%)~ 440V(+10%),200V(- 10%)~ 220V (+10%); Voltage unbalance rate: < 3%; Frequency: ±5%
Output	Voltage	0 ~ Input voltage
	Frequency	0Hz ~ 550Hz
Main control performance	Control method	V/F mode, vector mode
	Speed range	1:100(vector)
	Starting torque	150% rated load at 0.50Hz
	Frequency accuracy	Digital setting: maximum frequency ×±0.01%; Simulation setting: maximum frequency ×±0.2%
	Frequency resolution	Digital setting: 0.01Hz; Simulation setting: maximum frequency x 0.1%
	Torque boost	Automatic torque increase, manual torque increase 0.1% ~ 30.0%
	V/F curve	Four modes: 1 user set V/F curve mode and 3 torque reduction characteristic curve modes (2.0 power, 1.7 power, 1.2 power)
	Acceleration and deceleration curve	Acceleration and deceleration time, time unit (min/sec) Optional, maximum 600 minutes
	Built-in PI	The closed-loop control system can be constructed conveniently
	Automatic energy-saving operation	According to the load, the V/F curve is automatically optimized for energy saving operation
	Automatic Voltage Regulation (AVR)	When the grid voltage changes, it can automatically keep the output voltage constant
Protection functions		Input phase loss protection (optional), output phase loss protection (optional), overcurrent protection, overvoltage protection, undervoltage protection, overheat protection, overload protection, etc

■ Selection Reference

Model	Applicable motor power kW	Dimensions W*D*H (mm)	Mounting dimension W*D*Φ(mm)	Cooling method
TBP-30/440	≤30	800*800*2000	750*750*14	Air cooling
TBP-75/440	30~75	800*800*2000	750*750*14	
TBP-160/440	75~160	1000*800*2000	850*750*14	
TBP-245/440	160~245	1000*800*2000	850*750*14	
TBP-475/440	245~475	1000*1000*2000	850*850*14	



■ Instructions for Ordering

- ◆ When ordering, please provide the product model, specifications and load conditions;
- ◆ Ambient temperature: -40~60℃;
- ◆ The relative humidity of the air does not exceed 90%;
- ◆ The altitude does not exceed 1000 meters;
- ◆ Installation location: indoor, no dust, no corrosive gas, no direct sunlight;
- ◆ If there are particular requirements, it will be designed separately.

KYN Series High Voltage Switchgear

■ Overview

The metal enclosed switchgear is mainly used in power plants with voltage of 3~ 10kV and frequency of 50Hz, power transformation and distribution offices, industrial and mining enterprises and public institutions. The equipment has the functions of load feedback control, monitoring, metering and relay protection.

■ Performance Features

◆ "Five prevention" blocking function;

1) Prevent misoperation of circuit breakers;
2) Prevent operating isolator switches (plug) with load;
3) Prevent live switching of grounding switches;
4) Prevent power transmission with grounding switch;
5) Prevent mistakenly entering the electrified interval;

a) The cable room door and the ground switch are mechanical latching, and equipped with an emergency unlocked device;
b) When the circuit breaker is in the closing position, the circuit breaker trolley cannot be pushed or pulled out;
c) When the circuit breaker trolley is not in the working or test position, the circuit breaker cannot be closed;
d) When the ground switch is in the closing position, the circuit breaker trolley cannot enter the working position from the test position;
e) When the circuit breaker trolley is between the test position and the working position (including the working position), it cannot operate the grounding tool brake;

◆ High precision, high level of protection;

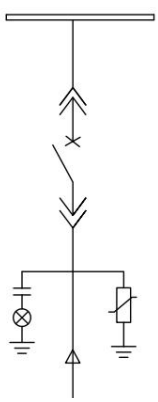
◆ Small size, small footprint;

◆ High mechanical strength, light weight, beautiful appearance and long service life.

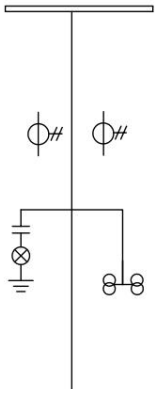
■ Selection Reference

Model	Dimensions W*D*H(mm)	Rated voltage (kV)	Maximum rated current (A)	Operating mode
KYN28A-12	800*1500*2300	12	⩽1600	Spring energy storage type
	1000*1500*2300		＞1600	

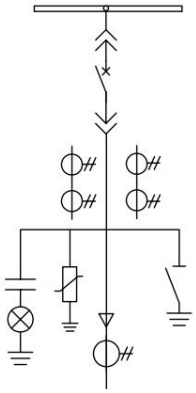
■ Primary Scheme Diagram



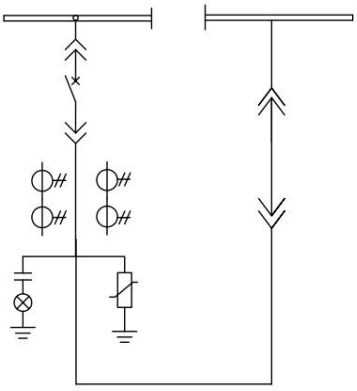
Incoming cabinet



Metering cabinet



Feeder cabinet



Bus coupler cabinet + Isolation cabinet

■ Instructions for Ordering

◆ It can be designed according to the drawings or technical requirements provided by users;

◆ Information provided should include name, model, quantity, system diagram, if there are particular requirements need to explain to our company first, in order to meet user requirements as far as possible;

◆ Our company can design primary and secondary system schemes for customers;

◆ For low-voltage power distribution, users can choose to equip our company GGD Low Voltage Switchgear or GCS, GCK, MNS series low-voltage withdrawal switchgear.

GGD Low Voltage Switchgear

■ Overview

GGD Low Voltage Switchgear belongs to the national standard cabinet type, which is a new type of switchgear designed on the principle of safety, economy, rationality and reliability. It is suitable for power plants, substations, factories and mining enterprises as AC rated working voltage to 660V, frequency 50/60Hz, rated current to 3200A, as a low-voltage distribution system power, distribution, lighting and other power distribution, motor control and no power compensation. The box has good protective characteristics and can be used in dusty places.

■ Product Features

- ◆ Novel structure, reasonable, circuit configuration, electrical scheme practical;
- ◆ High breaking capacity, good dynamic and thermal stability, strong applicability, reliable breaking;
- ◆ High protection level;
- ◆ Implementation standard: GB/T 7251.12-2013
  GB7251.1-1997 iec439-1:1992

■ Overall Dimensions

Height (mm)	2200				
Width (mm)	400	600	800	1000	1200
Depth (mm)	600	600	600	600	600
	800	800	800	800	800

■ Performance Parameter Table

Item	Functions and Indicators
Voltage	≤660V
Frequency	50Hz
Vertical busbar system carrying capacity	1000A
Horizontal busbar system carrying capacity	2000A
Peak current	30kA≤Ish≤220kA
Effective current	15kA＜IK＜110kA
Short-circuit time	0.1s＜t＜1 s
Protection rating	IP30
Overall structure	Cabinet type
Protection and Monitoring	Voltage, current, overload, short circuit
Operating environment	The altitude shall be no more than 1,000m; The upper limit is 40℃(the 24-hour average temperature does not exceed 35℃), the lower limit is -5℃; The relative humidity shall not exceed 90%; The installation site shall be free of conductive dust or corrosive gases. If the above-mentioned normal use conditions are exceeded, our company can design and manufacture separately according to the requirements of users.

GCS, GCK, MNS Series Low Voltage Withdrawable Switchgear

■ Overview

Low-voltage withdrawable switchgear (hereinafter referred to as "the device") is used for AC 50Hz, voltage 380V, main transformer rated capacity 1000kVA, three-phase three-wire or three-phase four-wire systems in industrial and mining, high-rise civil buildings,as a low-voltage power distribution system for power receiving, feeding or motor control.

Low-voltage withdrawable switchgear is a new type of drawer-type switchgear, the structure type is assembled.The drawers of the same type can be interchanged, which is convenient for maintenance and installation. The technical performance of this product meets IEC39-85 standards,with protection level IP30, the breaking capacity of the main switch 80kA. It can be used for power conversion, distribution and control in circuits with rated voltage 380V or 660V, frequency 50Hz, rated current of main bus 3150A, feeder current 630A or below for power supply, power distribution of power distribution system and motor control centers, capacitor compensation in high-rise buildings, power plants, substations, petrochemical industry, factories, mines and enterprises, and can also be used for direct starting of motors.

The equipment meets the needs of the electric power market for capacity increase, computer interface, power centralized control, convenient installation, maintenance, shortened accident processing time, etc. The new type of low-voltage withdrawable switchgear is designed based on the principle of safety, economy, reasonableness and reliability, and the product has the features of high breaking and making capacity, good dynamic and thermal stability, flexible electrical scheme, convenient combination, strong series utility, novel structure, and high protection level, etc.It can be used as a replacement product for the low-voltage withdrawable switchgear.

■ Performance Parameter Table

Item	Functions and Indicators
Voltage	≤660V
Frequency	50Hz
Vertical busbar system carrying capacity	1000A
Horizontal busbar system carrying capacity	2000A
Peak current	30kA≤Ish≤220kA
Effective current	15kA＜IK＜110kA
Short-circuit time	0.1s＜t＜1 s
Protection rating	IP3X/IP4X
Overall structure	Cabinet type
Protection and Monitoring	Voltage, current, overload, short circuit
Operating environment	The altitude shall be no more than 1,000m; The upper limit is 40℃(the 24-hour average temperature does not exceed 35℃), the lower limit is -5℃; The relative humidity shall not exceed 90%; The installation site shall be free of conductive dust or corrosive gases.

KGL Series Synchronous Motor Excitation Cabinet

■ Overview

KGL series synchronous motor excitation cabinet adopts digital control technology, monitors operating status of synchronous motor by the microcomputer, featuring precise control, strong anti-interference ability, friendly host interface, easy and fast operation, stable and reliable operation. It is widely used for dragging such as mining ball mill, smelting blower, cement factory tube mill, chemical fertilizer factory joint compressor, carbon dioxide compressor, cold storage ammonia compressor, oxygen generator, water pump and other general machinery and equipment by the synchronous motors. The device mainly provides DC excitation power supply for large synchronous motors and is used in combination with synchronous motors alone.

■ Performance Features

◆ Adopting digital control technology improves the reliability of the system operation, ensures precise control,
without debugging;

◆ The reset circuit of this device can automatically resume operation under severe interference conditions to ensure continuous operation of the system;

◆ The combination of hardware detection and software determination is used for full voltage starting, excitation and fault reporting to ensure the smooth polarity of slip excitation and backup excitation;

◆ The demagnetization voltage of the demagnetization circuit adopts step-by-step automatic adjustment method and has the function of false conduction protection;

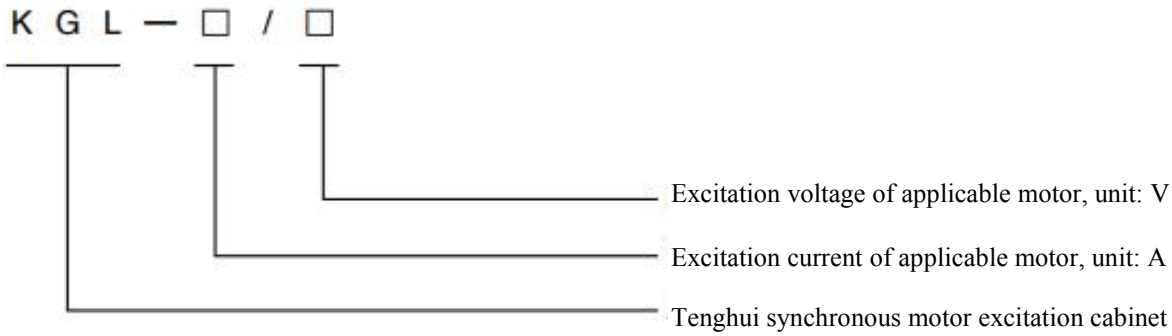
◆ With out-of-step protection function, it can automatically detect out-of-step faults during operation and issue protection instruction;

◆ Synchronous motors can automatically demagnetize during starting, stopping and asynchronous operation to prevent the excitation device from being broken down by excessive induced voltage;

◆ With user-friendly operation interface, the controller fault detection function can record the working state at the moment of shutdown due to fault, in order to troubleshoot the device;

◆ Automatic zero-voltage demagnetization during driving and stopping, and automatic high-flux demagnetization during synchronous operation of the motor maximize the protection of available SCR and motor safety.

■ Model Description



■ Performance Parameter Table

Item	Parameter
Main circuit voltage	Three-phase AC380V to 10000V
Control circuit	AC380V
Rated excitation voltage	50V~170V
Rated excitation current	130A~450A
Adjustment mode	Single regulator, dual regulator
Communication	RS485 interface
Protection rating	IP20
Overall structure	Cabinet type
Limitation and protection	Minimum excitation limit, inverse time field-forcing limit, over-excitation limit, minimum reactive power limit, out-of-step protection, long-time non-excitation protection (power frequency asynchronous starting of motor), PT disconnection protection, excitation control 4 to 20mA circuit disconnection detection and protection, software and hardware fault monitoring for control power supply and regulator.
Operating environment	Altitude not higher than 1000 meters, temperature range -10℃ to +50℃, relative humidity less than 85% RH, no condensation, indoor installation, no conductive dust, no corrosive gas, no risk of explosion.

■ Selection Reference

Product model	Applicable motor voltage (V)	Rated excitation voltage (V)	Rated excitation current (V)	Dimensions W*D*H (mm)
KGL-130/50~75	380~10000	50~75	130	800*800*2200
KGL-200/50~170	380~10000	50~170	200	800*800*2200
KGL-300/50~170	380~10000	50~170	300	900*800*2200
KGL-450/50~170	380~10000	50~170	450	1000*800*2200

■ Instructions for Ordering

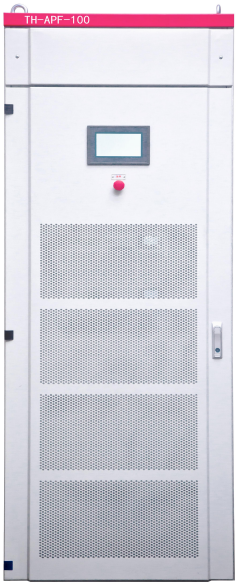
◆ Users must provide the rated excitation voltage, rated excitation current, power and rotor resistance at 75℃ of the synchronous motor when ordering the product;

◆ Confirm whether the user has any special requirements in terms of the color of the excitation cabinet body;

◆ Users can select and match the company's TRD / TRG high and low voltage squirrel cage motor liquid resistance soft starter cabinet or TGRJ / TGRD high and low voltage solid motor soft starter cabinet.

TH-APF Series Active Power Filter Cabinet

■ Overview



TH-APF Series Active Power Filter Cabinet adopts modular standard design, of which modules of different capacity can be freely matched for easy installation and maintenance. The equipment adopts the current advanced analog logic method to detect the current waveform generated by the nonlinear load in the power grid, and to dynamically generate the reverse harmonic current to compensate for the harmonic current of the load. It can effectively eliminate 2 to 50 times of grid harmonics, and can select specific subharmonic compensation.

TH-APF Series Active Power Filter Cabinet has the advantages of fast response speed, wide filtering range, high filtering efficiency, no impact from system parameters, perfect protection function and small size, etc. It is an ideal filtering product to improve the quality of power consumption, reduce the loss of the power grid, and increase the efficiency of power supply utilization and load carrying capacity.

This active filtering device is widely used in commercial construction, metallurgy and mining, automobile manufacturing, photovoltaic, petrochemical, machinery, light industry, municipal, military, electronics, non-ferrous, shipping industries and other industries.

■ Performance Features

◆ **Improve the power supply security and reliability of power grid**

It can filter out harmonics, reduce line and equipment heating, reduce equipment failure, misoperation, and inaccuracy of measuring instruments, communication interference and other safety hazards caused by harmonic pollution, in order to provide guarantee for the orderly conduct of production and life.

◆ **Extremely low loss and low noise**

The equipment adopts the fifth-generation IGBT which can greatly improve the switching frequency; when it is working at full load, the active loss is less than or equal to 2.5%, which is lower than the industry mainstream index 3% to 4%. When the whole machine is working at full load, the noise is less than or equal to 60dB.

◆ **Real-time detection for dynamic compensation**

It can detect harmonic current in real time, automatically track load harmonic changes, with high controllability and fast response.

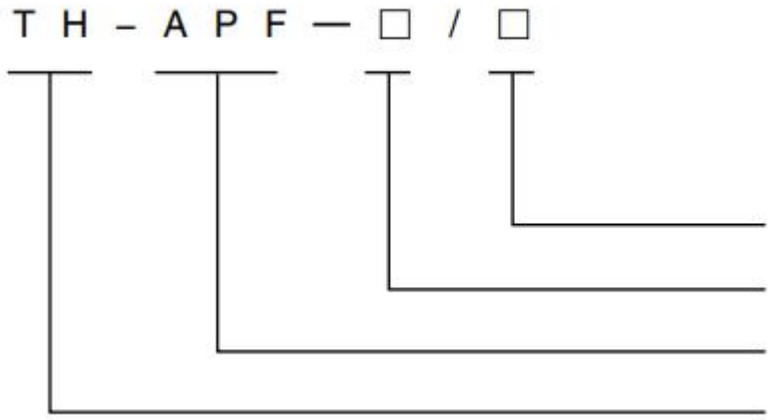
◆ **Safe and reliable performance**

Filtering performance is not affected by system impedance. Resonance prediction management can effectively prevent capacitor capacity decay, avoiding resonance risk.

◆ **Easy maintenance**

It features standard modular design, plug and play, free combination, unlimited expansion.

■ Model Description

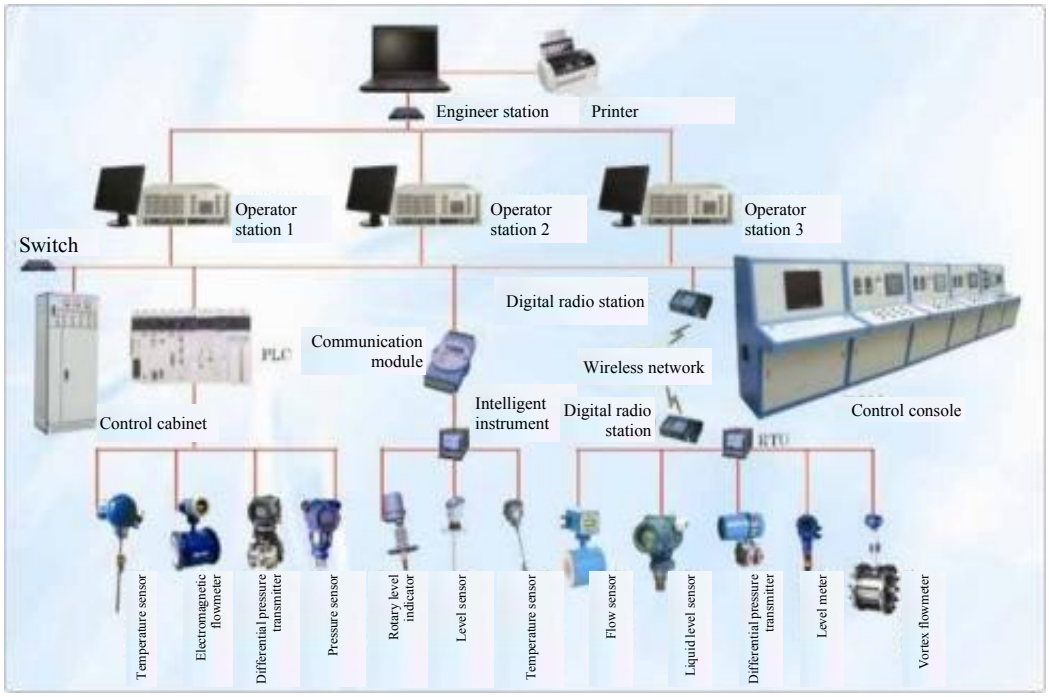


■ Performance Parameter Table

Category	Item	Indexes					
Specifications	Voltage level		380V				660V
	Module specifications		35A	50A	75A	100A	150A	50A /100A
	Maximum capacity of a single cabinet	600*600	300A					
		600*800	450A					
		800*800 or 800*1000	750A					500A
	Number of available parallel connections	10						
Input	Operating voltage	380V(-20%~+20%) 660V(-20%~+20%)						
	Operating frequency	50Hz (-10%~+10%)						
	Current transformer	100:5~10000:5						
Function	Harmonic compensation	2 to 50 times						
	Compensation of reactive power	-1 to +1 adjustable (within equipment capacity)						
	Compensation of three-phase unbalance	100% full compensation of imbalance						
Communication method		With RS485, MODBUS protocol, communication can be made with the upper computer through the RS485 interface.						
Protection rating		IP2X /IP4X						
Environmental requirements		The altitude should not exceed 1000 meters; Operating ambient temperature -10℃ to +45℃; The relative humidity shall not exceed 90%; The installation site shall be free of conductive dust or corrosive gases.						

Introduction to TZ Automation Control System

■ System Architecture



As shown in the above figure, the dotted box is the whole control system, which mainly includes three major parts, namely, controller (PLC), operator and engineer station. The controller communicates with the field instrumentation through Ethernet and ProfiBus DP or other communication methods, and the operator station and engineer station communicate with the controller through Ethernet. According to the size of the project, different numbers of operator stations can be configured to meet the needs of actual engineering applications.

■ Main Functions of the Controller

- Use signals from field instruments (pulses, 4 to 20mA, 0 to 10V, temperature and other signals);
- Perform all control operations;
- Output execution signals based on the calculation result;
- Complete data communication tasks;
- Provides the operator station with information on the completion of processing.

Main Functions of the Engineer Station

- Complete the configuration of the entire system;
- Configure the database and reports;
- Make changes to the entire system.

Engineer station

Main Functions of the Operator Station

- Manage and monitor the production site;
- Perform centralized management and monitoring of system data;
- Display process flow diagrams;
- Print statement;
- Make changes to various process parameters.

Operator station

Typical interfaces that can be seen at the operator station are the state of control system, production process flow diagrams, various production statements, real-time and historical trends, etc.

Air Compressor Station Cloud Intelligent Control Energy-Saving System

Air Compressor Station Cloud Intelligent Control Energy-Saving System is used to solve the problems of traditional air compressor station, such as low efficiency of manual inspection and machine debugging; equipment failure cannot be detected, resulting in long-time maintenance, high cost; maintenance is not carried out timely, affecting the service life of the equipment; the production line changes in demand for air, supply and demand do not match, the equipment is frequently loaded and unloaded; the lack of management of the post-treatment equipment results in unstable air quality and other problems. TheAir Compressor Station Cloud Intelligent Control Energy-Saving System is required for future air compressor station for energy saving and reducing production costs.

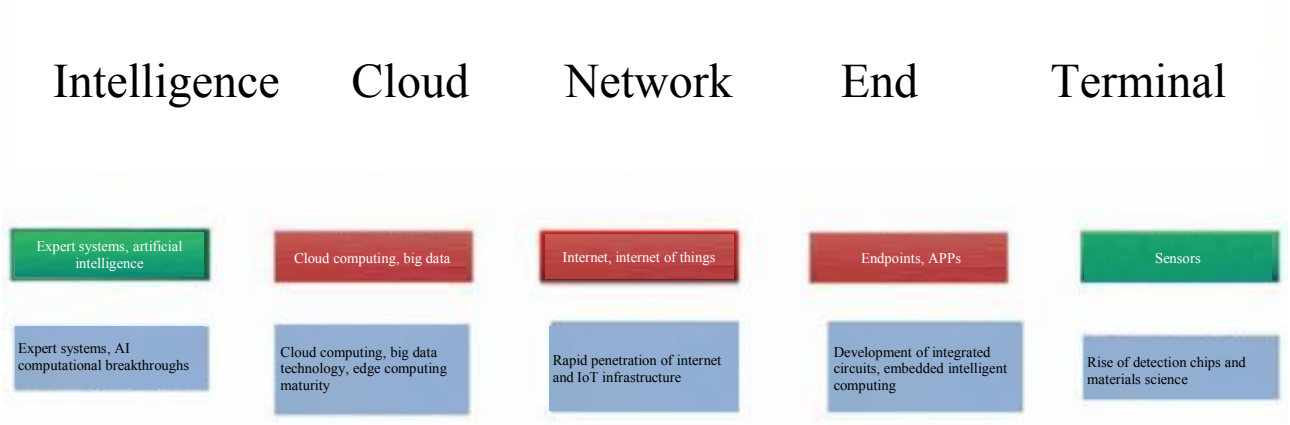
■ Advantages of the Cloud Intelligent Control System

■ The architecture of the cloud intelligent control system is shown below:

Intelligent Electrical Terminal Monitoring and Alarm Platform of Pumping Station

During application of water conservancy pumping stations in the actual project, 35kV and below power supply systems, low-voltage power supply and distribution system in the long-term operation have various types of failures, such as equipment failures in the operating mechanism failure, arrester failures, transformer failures, cabinet condensation, capacitor failures, etc., line failures such as insulation failures at cable joint, busbar insulation failures, inspection failures and other problems. This will bring hidden danger to the safety of the equipment itself and the reliable operation of the power grid. This will directly affect the safe and stable operation of power supply and distribution. In addition, the power distribution system has a large number of equipment, the distributed scattered inspection area is large, resulting in greater difficulties for the industry's traditional manual inspection operation and maintenance management mode.

According to the characteristics of electrical equipment, our company has gradually promoted the construction of ubiquitous connectivity edge layer, data cloud, equipment cloud, inspection cloud, system intelligent fusion platform, and developed intelligent power distribution IOT terminals.



Through the installation of intelligent sensors, embedded integrated circuits connected to industrial control systems, the collection of product parameters and operational data process, the data is combined with the enterprise's long years of accumulated actual experience in the production to form the basic ability to analyze massive industrial data, in order to provide the product safety operation and maintenance, process optimization and other services.

■ Core features

◆ Intelligent power distribution IOT terminal

Intelligent IOT terminal is located in the core of medium and low-voltage distribution IOT, which adopts standard platform hardware design and edge computing architecture, supports in situ data storage and decision-making analysis. The terminal adopts modular, scalable, low-power, maintenance-free design standards, thereby adapting to the complex operating environment, with high reliability and stability.

◆ Longitudinal Big Data Analysis

The smart IoT device is equipped with a longitudinal big data analysis feature. This allows it to analyze all historical scene perception data from important feeder circuits, forming a longitudinal data chain for online analysis. This feature enables data analysis of crucial feeder circuits and has the capability to analyze and discern large sets of historical data from a single point. It also allows for dynamic grading (excellent, good, pass, poor) of the operational status of important feeder circuits and equipment. It can adaptively calculate inspections, automatically generate status evaluation reports, and store them. The accuracy of the evaluation time is no less than one month.

◆ AI Online Analysis

The smart IoT device possesses an intelligent model for identifying important feeder circuits and an artificial analysis theoretical model. It can perform human-like analysis to analyze the online status of important feeder circuits, make judgments, and output reports.

Through a sensor network, it can analyze data, upload results, and draw conclusions about the status of inspected equipment such as transformers and switch cabinets using its integrated expert analysis system.

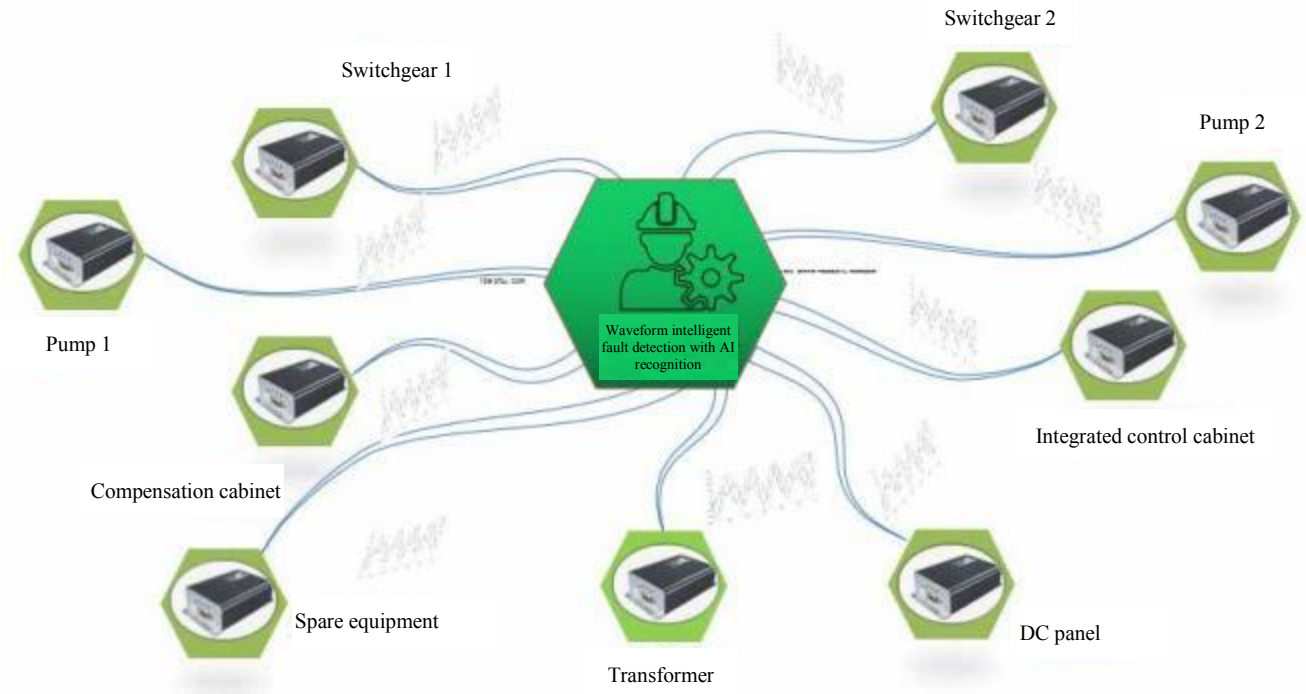
◆ Future State Prediction

The smart IoT device can analyze past data law to predict the future operational status of important feeder circuits. It is able to calculate the probability of future equipment malfunctions.

The system has a dual-layer future prediction feature, namely the MEMS (Micro-Electro-Mechanical Systems) prediction and the control cloud prediction. The MEMS prediction is responsible for uploading single-scene data prediction results to the cloud service platform, while the control cloud prediction analyzes the judgment results of all equipment, synthesizes them, and draws system-wide conclusions.

◆ Warning Function

The smart IoT device is equipped with various warning functions such as abnormal sound warning, abnormal travel warning, abnormal environmental warning, and abnormal status warning.



■ Key Outcomes of IoT Implementation in Pump Stations

The intelligent maintenance model for equipment malfunctions keeps track of the operational status of crucial components in key equipment. It gathers data on conditions such as temperature, noise, vibration, and radial and axial displacement. By integrating environmental data, historical operational data, and maintenance records, it deeply analyzes and uncovers equipment failure patterns based on underlying mechanisms. This model understands the progression and degradation trends of malfunctions. Using big data extrapolation, it can predict equipment failure trends and send proactive alerts. This changes traditional methods like scheduled equipment maintenance, reduces the occurrence of sudden major malfunctions, minimizes equipment downtime, and cuts down on losses due to failures.

Intelligence-system composition and function