RYE
日业电气

Application Solution Manual

www.CSSUNYE.com

COMPANY PROFILE

Standing at the forefront of the industry
Leading the rapid development of China's inverter technology

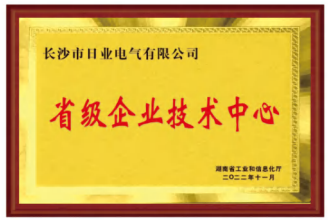
48000 ㎡	10800 ㎡	500 million yuan
Total area	Production lines & workshops	Annual output value

Founded in 2002, Changsha Sunye Electric Co., Ltd. is a national high-tech enterprise integrating the R&D, production, and sales of inverters, industrial all-in-one machines, servo drives, and new energy products. The company purchased 30 acres of land in the Changsha National High-Tech Development Zone to build its own industrial park, with a total construction area of approximately 48,000 square meters and an average annual output value of 500 million yuan. The company uses the Changsha Sunye Industrial Park as its R&D and production base, and utilizes its various offices as a hub to provide high-quality, integrated services to customers worldwide.

Honors

Sunye Electric products have passed the testing and certification of global authoritative organizations and obtained multiple software copyright and intellectual property certificates such as IOS9001, CE, and RoHS.

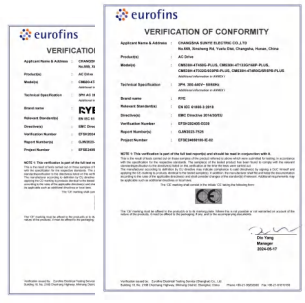
First recognized as a high-tech enterprise in 2015



Provincial-level enterprise technology center in 2022

National-level "Little Giant" Enterprise

ISO9001 quality system certification



CE certification

Over 100 patents

Development History

Journey Beyond

In 2025, A Universe of Renewal, Unveiling a New Chapter.

2025

Partner

In 2020, Midea Industrial Technology Group invested in Sunye, providing comprehensive empowerment for brand upgrading.

2020

Integration

In 2016 Merged with Hiconics(300048) Integrated in Technology, Capital, Supply Chain, and Standardization.

2016

Pioneer

In 2014 Changsha Sunye Electric Relocates to High-Tech Zone Xinsheng Road No.669.

2014

Honor

In 2010, Awarded the Title of “Top Ten Domestic Brands in Low-Voltage Inverters”.
In the same year Changsha Sunye Electric Co., Ltd. Established.

2010

Setting Sail

In 2002 Shenzhen Sunye Electric Co., Ltd. Established

2002

CONTENTS

Marine Industry Application Solutions

CM530H VFD Application for Marine Side Thruster Systems

1. Project Background/Application Scenarios

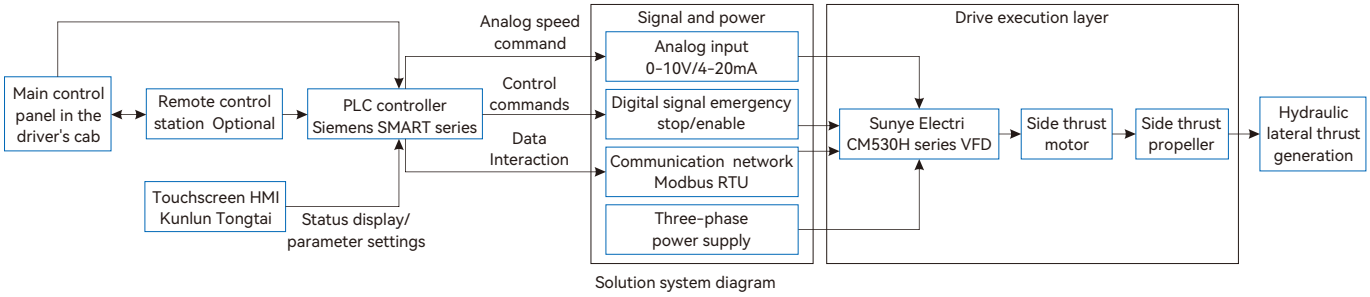
The ship's side thruster system is a key piece of equipment providing lateral thrust when navigating narrow waterways, berthing, or turning around, playing a crucial role, especially in situations where traditional rudder effectiveness is insufficient or in harsh sea conditions. Currently, side thruster systems mostly use AC motors for drive, with vfd used for precise speed regulation and control. However, the complex operating conditions of ships place high demands on the overload capacity, control flexibility, and environmental certification of vfd. The industry commonly suffers from insufficient control precision, slow response, and incomplete certifications, highlighting the urgent need for high-performance, high-reliability domestically produced vfd solutions.

2. Protect/Solution Introduction

Side Thruster System Control Principle: The side thruster system drives an AC motor via a vfd, which in turn drives the propeller to generate lateral thrust. In the system, the vfd receives analog signals (voltage or current) from the control panel as speed input and implements functions such as forward/reverse control, zero-speed dead-zone setting, and operational status feedback. The core of the electrical control lies in the vfd's precise processing of analog signals, smooth bidirectional speed switching, and real-time indication of operational status. The CM530H series vfd, with its flexible analog control, bidirectional speed input, zero-speed dead-zone setting, multi-channel relay output, and classification society certification, successfully achieves stable and reliable control of the side thruster motor, meeting the operational needs of ships navigating in narrow waterways and berthing/unberthing in complex conditions.

3. Solution Features

1) Flexible analog input: Supports 0~10V or 0/4~20mA signal input, and the signal range can be customized to adapt to different control panel outputs.
2) Bidirectional speed control: Forward and reverse rotation control is achieved through a single analog signal, simplifying wiring and logic design.
3) Zero-speed dead zone setting: A dead zone is set near zero speed to avoid frequent start-stop of the motor near the zero speed point, thus improving stability.
4) Bipolar analog output: Provides bidirectional analog output corresponding to rotational speed, facilitating system monitoring and display.
5) Multi-channel relay output: Configurable relay outputs indicate running direction, fault status, etc., enhancing system observability.



Solution system diagram

Marine Industry Application Solutions

No.	VFD Model	Quantity	Remark
1	CM530H-4T400G/450P	1	Supports analog bidirectional control, CCS Classification Society Certification
2	HMI	1	7-inch screen, used for monitoring and parameter setting.
3	PLC	1	Supports analog and digital I/O

4. Protect/ Solution Advantages

- Flexible and modification analog control:The CM530H supports customizable analog input ranges to adapt to different control panel signal outputs, which is superior to the fixed range limitations of traditional frequency converters.
- Bidirectional operation and zero-speed dead zone integration: Forward and reverse rotation control and zero-speed stability can be achieved through a single analog signal, simplifying the system structure and improving response consistency.
- Certification by Classification Society: Possesses CCS certification, meets mandatory standards in the shipping industry, and is superior to some competitors who lack complete certifications.
- High overload capacity and stable output: 150% overload capacity for 60 seconds ensures stable operation of the side thrust system under sudden loads.
- Domestic substitution and cost optimization: While achieving performance comparable to international brands, it offers better cost-effectiveness and local service support.

5. Customer Benefits

1) Improved Control Precision and Stability: Zero-speed dead zone and bidirectional analog control effectively prevent motor vibration, improving the handling experience during docking and turning.

2) Simplified System and Convenient Maintenance: Single-channel analog control enables complex control logic, reducing external components and lowering system complexity and failure rate.

3) Comprehensive Certifications and Strong Applicability: Certified by classification societies, it can be widely used in various types of vessels, helping domestically produced equipment enter the high-end market.

4) Cost Savings: Compared to imported brands, procurement and maintenance costs are significantly reduced, while rapid local technical support is provided.

Synchronous Machine Industry Application Solutions

CM530H VFD Application in Air Compressor

Traditional screw air compressor drive motors lack speed adjustment functionality. They typically use cylinder upper and lower pressure limit detection to start and stop the motor, or add a clutch to achieve relatively constant pressure control. The disadvantages are: the motor has a starting current of 6 times the rated current, creating a shock to the power grid and machine load; idling the motor is a waste of energy; adjusting the upper and lower pressure limits too narrowly can easily lead to frequent starts and stops, burning out the motor and the starting solenoid switch (MCC); setting the pressure too wide will create high pressure in the pipeline, causing air leakage and losses, and large pressure fluctuations cannot meet the needs of modern production processes.

The Advantages of the Sunye CM530HS VFD to Retrofit an Air Compressor:

- Strong compatibility: The CM530HS frequency converter can drive both synchronous motors (without speed vector control) and asynchronous motors (voltage vector control).
- More energy-efficient: Utilizing synchronous motors and automatic motor speed adjustment based on air pressure significantly improves system operating efficiency.
- Stable air pressure: The frequency converter's stepless speed regulation allows for rapid adjustment based on air pressure detection, resulting in exponentially improved air pressure stability compared to limit switch control used in power frequency operation.
- Significantly reduces power consumption and mechanical wear;
- The frequency converter itself has a soft-start function, eliminating large current surges during startup;
- Low noise during low-frequency operation: Precise air pressure control reduces requirements for the air tank, enhancing safety.

Synchronous Machine Industry Application Solutions

CM530HS VFD in the High-speed PMM Industry Application

Industry Introduction

Motors with a rotational speed greater than 10,000 RPM are defined as high-speed motors. High-speed motors have the following characteristics :

1. High rotational speed (10,000 to 60,000 RPM), high power density, and small size;
2. Small moment of inertia and fast dynamic response;
3. High efficiency (overall machine efficiency 2?) 96%), direct connection load without transmission mechanism;
4. High reliability (no friction);
5. Ultra-low maintenance cost (supported by magnetic levitation bearings, contactless, almost no maintenance required); 6. Low noise (no friction, no intermediate transmission mechanism).

High-speed motors are currently mainly applied in the following industries:

a) Commercial core air conditioners and refrigerators: High-speed motors are applied in various scenarios such as commercial core compressors in air conditioners or refrigerators;

6) Commercial center air compressor: including commercial center blower (pressure ratio <2), centrifugal air compressor (pressure ratio >2); The low-pressure air compressor market will gradually replace the speed-increasing box-type solution

c) High-speed turbine generator: A high-speed generator driven by steam or refrigerant, gradually applied in independent power sources, small power stations, energy recovery and other fields.

d) New energy vehicle motors: High-speed motors are small in size and light in weight, and have good application prospects in fields such as automobiles, aviation, and shipping.

With the development of science and technology, the improvement of living standards, and the demand for energy conservation and environmental protection, the application of high-speed motors will become increasingly widespread.

The Application of the CM530HS VFD in High Speed PMM has the Following Advantages

Our company's CM530HS VFD has a maximum carrier frequency of 12k and an output frequency of 1200Hz, and can be widely used in the high-speed motor industry. The following are the high-speed motors that our company's VFD have matched:

15kW-25000 rpm

The motor uses ball bearings and is air-cooled.

Rated Voltage	Rated Current	Rated Frequency	Rated Speed
380V	25A	833.4Hz	25000rpm

100kW-20000 rpm

The motor uses ball bearing, oil and gas lubrication, and water-cooled.

Rated Voltage	Rated Current	Rated Frequency	Rated Speed
380V	180A	667.67Hz	20000rpm

110kW-24000 rpm

The motor uses magnetic bearing and is water-cooled and air-cooled.

Rated Voltage	Rated Current	Rated Frequency	Rated Speed
380V	185	800Hz	24000rpm

Synchronous Machine Industry Application Solutions

Application of CM680 VFD in Oilfield Kowtow Machine

The beam pumping unit, also known as a "kowtow pump," is a traditional pumping device widely used in oilfields. It is typically driven directly by an ordinary AC asynchronous motor. Its crankshaft, with a counterweight, drives the sucker rod, driving the downhole pump in a fixed-cycle up-and-down reciprocating motion, pumping oil from the wellbore to the surface. Within a stroke, the motor operates in both motoring and generating modes as the sucker rod rises and falls. During the ascent, the motor draws energy from the grid for electric operation. During the descent, the motor's load is a potential load, and the negative downhole pressure causes the motor to generate electricity, converting mechanical energy into electrical energy and feeding it back to the grid. Frequency conversion retrofits for beam pumping units adjust the motor speed to meet the required stroke counts under seasonal operating conditions, achieving high efficiency, energy savings, and reduced consumption. The Sunye CM680 high-performance vector VFD has been tested and deployed in pumping units, achieving excellent energy-saving results and replacing the asynchronous motor currently used in these units.

The Advantages of CM680 VFD to Retrofit Oilfield Kowtow Machine Application

- Permanent magnet synchronous motors have the characteristics of high average operating efficiency, high power factor, large starting torque, strong overload capacity, high efficiency and energy saving.
- Reliable control performance and remote monitoring functions can adapt to the special working conditions of oil fields, which can not only improve the quality of the power grid and increase oil production efficiency, but also achieve significant energy-saving effects.
- Eliminating the position sensor saves system cost and improves stability.
- The power factor is significantly improved (from 0.25-0.5 to over 0.9), significantly reducing the supply current, thereby alleviating the burden on the grid and transformers and reducing line losses. This frequency conversion transformation aims to improve grid quality and minimize impact on the grid.
- The extraction speed can be dynamically adjusted according to the actual fluid supply capacity of the oil well, which can achieve energy saving and increase crude oil production at the same time.
- The "soft start" is realized, which avoids excessive mechanical impact on the motor, gearbox and pumping unit, extends the service life of the equipment and improves production efficiency.

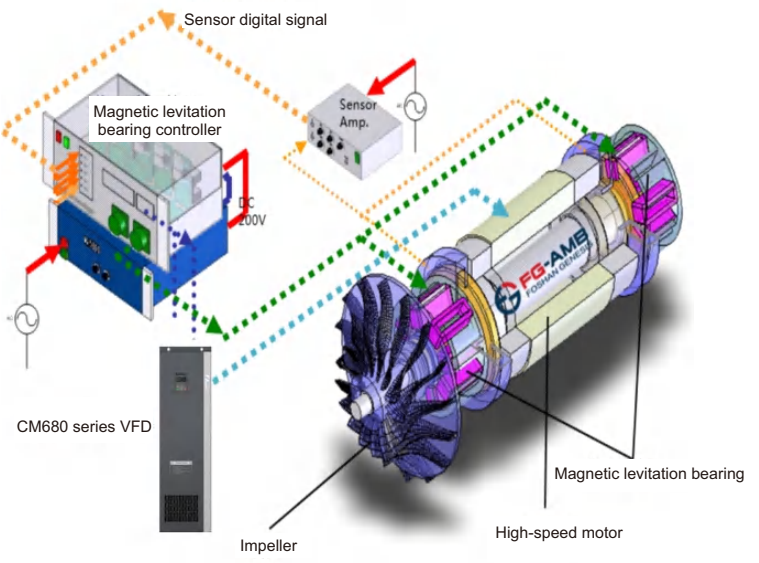
Synchronous Machine Industry Application Solutions

CM680 VFD in Magnetic Levitation High Speed Blowers Application

Industry Introduction

Magnetic levitation high speed blowers are mechanical equipment for conveying gas. Magnetic levitation technology integrates magnetic levitation bearings and high-power high-speed permanent magnet motor technology into a high-speed motor, and adds a dedicated high-speed permanent magnet motor frequency converter to form a high-speed driver, which drives the high-speed centrifugal impeller, enabling the high-speed centrifugal impeller to operate in the most energy-efficient working area.

It adopts core technologies such as magnetic levitation bearings, ternary flow impellers, high-speed permanent magnet synchronous motors, high-efficiency frequency converter speed regulation, and intelligent monitoring and control. When starting, it first suspends and then rotates, with no friction and no need for lubrication. The ternary flow impeller is directly connected to the rotor, ensuring zero transmission loss. Compared with traditional Roots blowers, the sales volume has increased by 30-40%, making it a high-tech, green, energy-saving and environmentally friendly product.



The Application Advantages of the CM680 VFD in Magnetic Levitation High Speed Blowers

- High stability and reliability; The rapid start-up current is more stable, and the high-speed control is more stable. It has a fast response speed to sharply fluctuating loads. The maximum operating frequency is 2000Hz
- It is standard-equipped with a 485 interface, facilitating data collection and control by the magnetic levitation fan control system.
- High power density, with a full range of narrow body designs for easy installation. Adjusting the magnetic levitation blower to achieve the most economical operation, significantly reduces customer costs and enhances product competitiveness.

Printing and Packaging Industry Application Solutions

CM530HLS tension control dedicated VFD film blowing machine application

The Principle of a Blown Film Machine

The film blowing machine is composed of an extruder, a die head, a die head, a cooling device, a bubble stabilizing frame, a herb-shaped plate, a traction roller, a winding device, etc. The plastic particles are pushed towards the die opening by the inclined surface of the rotating screw of the extruder. Due to the friction between the plastic and the screw, between the plastic and the barrel, as well as the collision and friction between the particles, and also due to the external heating of the barrel, the plastic gradually melts. The molten plastic is filtered by the die head to remove impurities and then comes out of the die head and die opening. After being cooled by the air ring and inflated, it passes through the herringbone plate, the traction roller, and is wound to form the finished film into a cylinder.

Solution Description

The blown film machine is composed of a screw extruder VFD, a traction roller VFD and a tension winding VFD. Among them, the screw extruder VFD and the traction roller VFD adopt the Sunye Electric CM530H vector VFD, which can ensure the stability of the extrusion torque and traction speed. The winding VFD adopts the CM530HLS tension control dedicated VFD of Sunye Electric. The system does not require tension swing rods or tension sensors. It can control the output torque size only by calculating the internal winding diameter, simplifying the mechanical structure and reducing the user's cost.

Advantages of the Sunye Electric CM530HLS Tension Control Dedicated VFD

- It can replace traditional torque motors. The original operating habits remain unchanged, with no additional heat loss and obvious energy-saving effects.
- No need to add encoder speed feedback, saving costs, reducing interference and failure points;
- The roll diameter is automatically calculated, and the tension control is precise. Especially during acceleration and deceleration, it can maintain a constant material tension.

The Sunye Electric CM530HLS tension control dedicated VFD can also be used in slitting machines, cast film machines and other papermaking, printing and packaging industries, in open-loop tension control scenarios where encoders do not need to be installed.

Rubber and Plastics Industry Application Solutions

ES300 Series Electric Hydraulic Servo Drive Application in Injection Molding Machine

Introduction to Injection Molding Machine

Injection molding machines, as key equipment in plastic molding, often employ fixed displacement pumps or asynchronous motors with frequency converters in their hydraulic systems. This results in significant energy waste, slow response, and large pressure fluctuations. Especially under off-load conditions, the fixed displacement pump system discharges oil through an overflow valve, causing substantial wasted power consumption. The industry urgently needs a highly efficient, stable, and energy-saving drive solution to address the dual challenges of rising electricity costs and improving product quality.

Working Principle

Injection molding machines complete product molding through steps such as mold clamping, injection stage forward movement, injection, pressure holding and cooling, pre-plasticizing, injection stage retraction, mold opening and ejection. The hydraulic system provides power to all actuators, with the oil pump motor being the main energy-consuming unit. Traditional systems are inefficient under partial loads, while servo systems can dynamically adjust motor speed and output torque according to real-time process requirements, achieving on-demand energy supply.

Sunye Solution

The system employs an ES300 series electro-hydraulic servo drive and a permanent magnet synchronous motor to form a closed-loop control system.

It supports dual closed-loop control for pressure and flow, with pressure fluctuation ≤ ±0.5 BAR.

Torque response time is <5 ms, and speed stability is ±0.02%.

It features multi-pump confluence/splitting capabilities, adapting to complex multi-cylinder processes.

An integrated braking unit and dedicated PID control module simplify the system structure.

The Application Advantages of the ES300 Series Electric Hydraulic Servo Driver

- Significant energy savings: 30%~70% energy saving compared to traditional fixed displacement pumps, and 10%~20% higher energy saving compared to variable frequency solutions;
- Fast response : Hydraulic pressure response time is less than 100ms, resulting in faster pressure build-up and shorter molding cycles;
- Stable pressure holding: Pressure holding is 175KG with a fluctuation of 1KG and a pressure overshoot of 1.5KG, improving product consistency and surface quality;
- Simple debugging: The driver has a built-in dedicated control algorithm that supports self-identification of motor parameters, reducing debugging workload.

CNC Machine Tool Application Solutions

E560H Engraving and Milling Machine Dedicated VFD Application

Functional Requirements of the Engraving Machine

1) The control mode is selected as V/F control , multi-segment V/F curves.

2) Terminal control is required as the command source, two-wire terminal control, only one forward rotation command FWD is required.

3) The frequency source is set as an analog quantity (the computer control board outputs 0 to 10VDC), and only the frequency command needs to be input from the AI1 port.

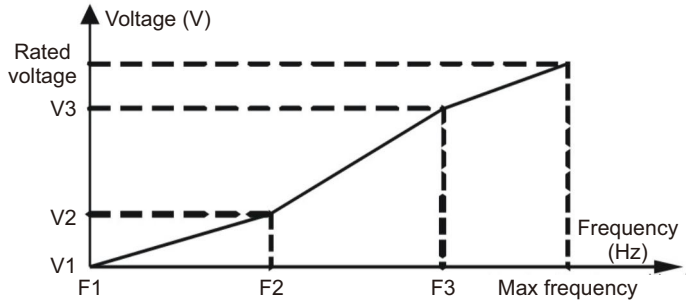
4) One fault reset signal input/output (DI2)

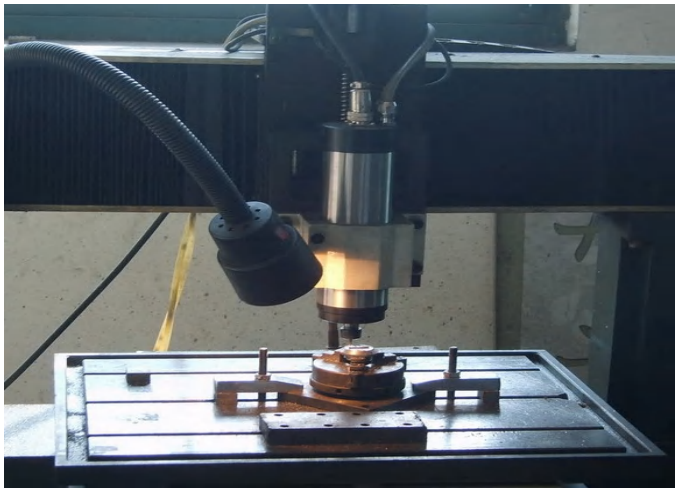
5) One fault signal output signal

The maximum operating speed is generally 24,000 r/min, which converts to the operating frequency of the frequency converter at 800Hz(for a 4-level high-speed motor). The lowest cutting speed is 2000r/min. By using the E560H dedicated frequency converter from Sunye Electric with a maximum frequency of 1200Hz, the lowest cutting speed can be maintained at around 500r/min. It can also achieve multi-segment V/F curves to meet the different torque requirements at high and low speeds.

Advantages of Applying the Sunye E560H Series VFD

- Small speed fluctuation throughout the entire speed range;
- It has a large low-speed torque, which can ensure low-speed cutting.
- Stable current, large torque, and no cutting marks;
- The motor noise is low.





Textile Industry Application Solutions

CM680 Application Solution for Calender Winding Tension Control

Equipment Introduction

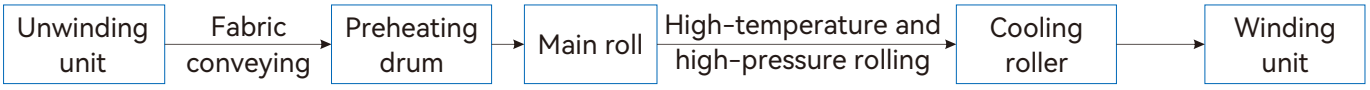
The calender is a key surface treatment equipment in the textile finishing process, mainly used to improve the texture and appearance of fabrics. It uses high-temperature and high-pressure rollers (usually 150-250℃) to roll the fabric, achieving three core functions: enhancing luster: eliminating fiber fuzz and improving the smoothness of the fabric surface

Shaping: Improve the dimensional stability of fabrics (shrinkage rate ≤3%)

Special effects: Produce three-dimensional patterns such as faux leather texture and marble texture

In the textile industry chain, the calender is in the quality control link of "weaving - dyeing and finishing - finished product", and its process accuracy directly affects production.

Process Flow

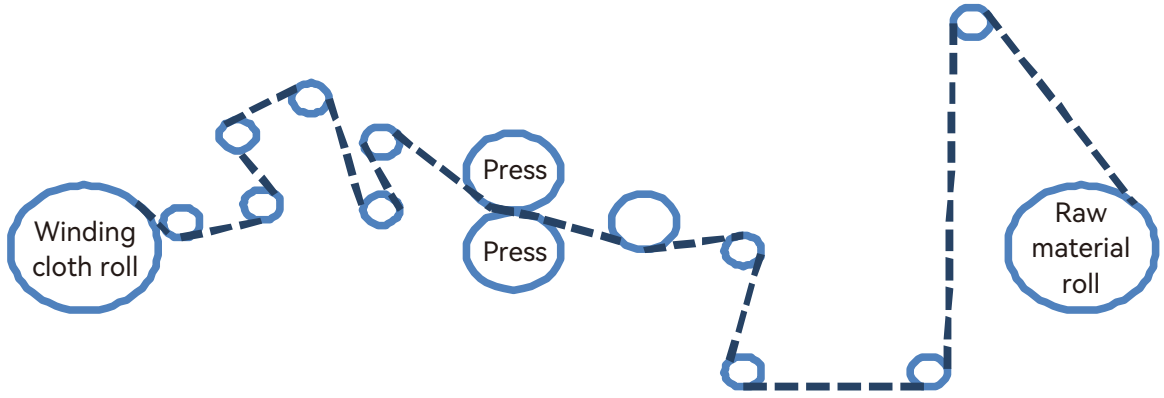


Working Principle

The equipment consists of a pair of pressure rollers, a winding motor and several fabric transmission rollers, as shown below:

Main control objects

1. Pressing roller: Pressing roller speed: the basic speed of the entire equipment
2. Winding: Winding speed: open loop speed



Textile Industry Application Solutions

Customer Requirements

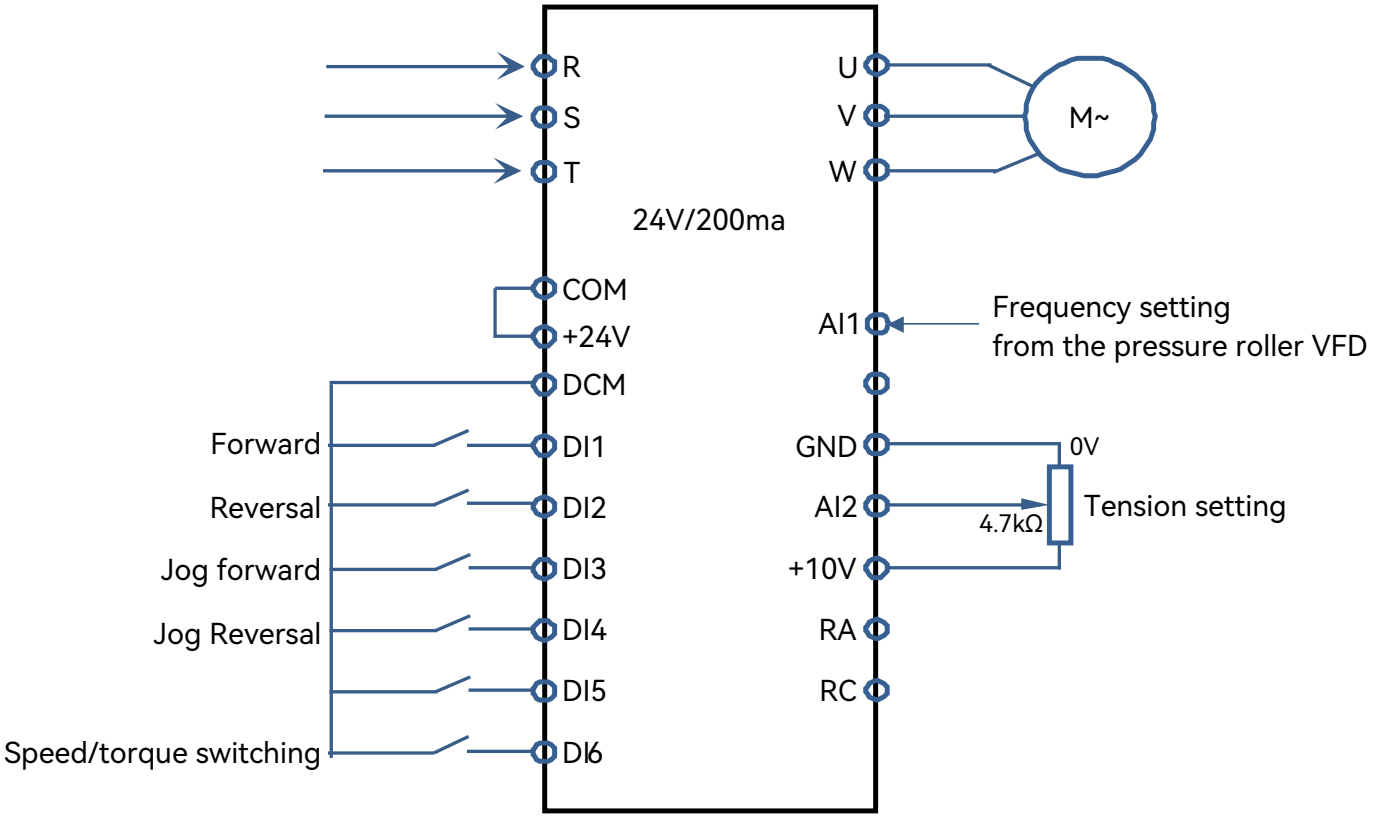
1) Tension stability: The tension fluctuation throughout the operation is ≤5%.
2) Large roll diameter capacity: Supports roll diameters over 1600mm (increasing the output per roll by 50%);
3) Domestic substitution: The comprehensive cost is reduced by 40% compared with the imported solution.

Detailed Explanation of Sunye Electric's Solution

The entire electrical control system is centered around the CM680 winding drive, with the frequency signal coming from the CM530H pressure roller VFD and the tension set via a potentiometer.

Solution Features

1)The winding unit uses a CM680 VFD to drive a 5.5kW asynchronous motor,
2) Control mode: SVC open-loop torque control;
3)Tension setting method: analog potentiometer,
4)Roll diameter calculation: real time calculation of line speed;



Textile Industry Application Solutions

Solution Configuration

The motor configuration list is as follows

No.	Name	Rated Voltage(V)	Power(kW)	Unit	Quantity	Remarks
1	Press roller	380	5.5	Set	1	
2	Motor winding motor	380	5.5	Set	1	

The VFD configuration list is as follows

No.	Name	Rated Voltage(V)	Power(kW)	Unit	Quantity	Remarks
1	CM530H-C4T5R5GB	380	5.5	Set	1	Press roller control
2	CM680-4T5R5GB	380	5.5	Set	1	Winding control

The Introduction of the High-performance CM680 Series Vector VFD Can Systematically Solve the Pain Points of Calender Tension Control and Achieve Core Breakthroughs

1) Precise Tension Closed-Loop: A torque compensation algorithm reduces tension fluctuations to ≤+3%, completely eliminating startup shock and fabric sagging.

2) Enhanced Dynamic Response: SVC open-loop vector control reduces torque response time to ≤10ms, reducing fabric tracking lag during acceleration by 50%.

Customer Benefits

1) Improved production efficiency;

2) Reduced energy consumption: Torque control accuracy is improved, and ineffective motor power consumption is reduced;

3) Reduced maintenance costs: Mechanical shock is eliminated, and the life of the transmission mechanism is doubled;

4) Optimized equipment costs: Tension stability is comparable to imported equipment, while overall costs are reduced by 30%.



Textile Industry Application Solutions

CM530H VFD Application in Needle-punched Roughening Equipment

Sunye Electric's CM530H VFD is used in non-woven equipment (needling and napping equipment on textiles). The cloth feeding speed is controlled by the CM530H VFD, and the feed and discharge rollers adopt stepless speed regulation. The feeding speed can be modified according to the requirements of the non-woven fabric, so that the density and strength of each part of the non-woven fabric are consistent during the operation of the needle loom. At the same time, the real-time display of the line speed improves the intuitiveness of the equipment.

Acupuncture Machine Principle

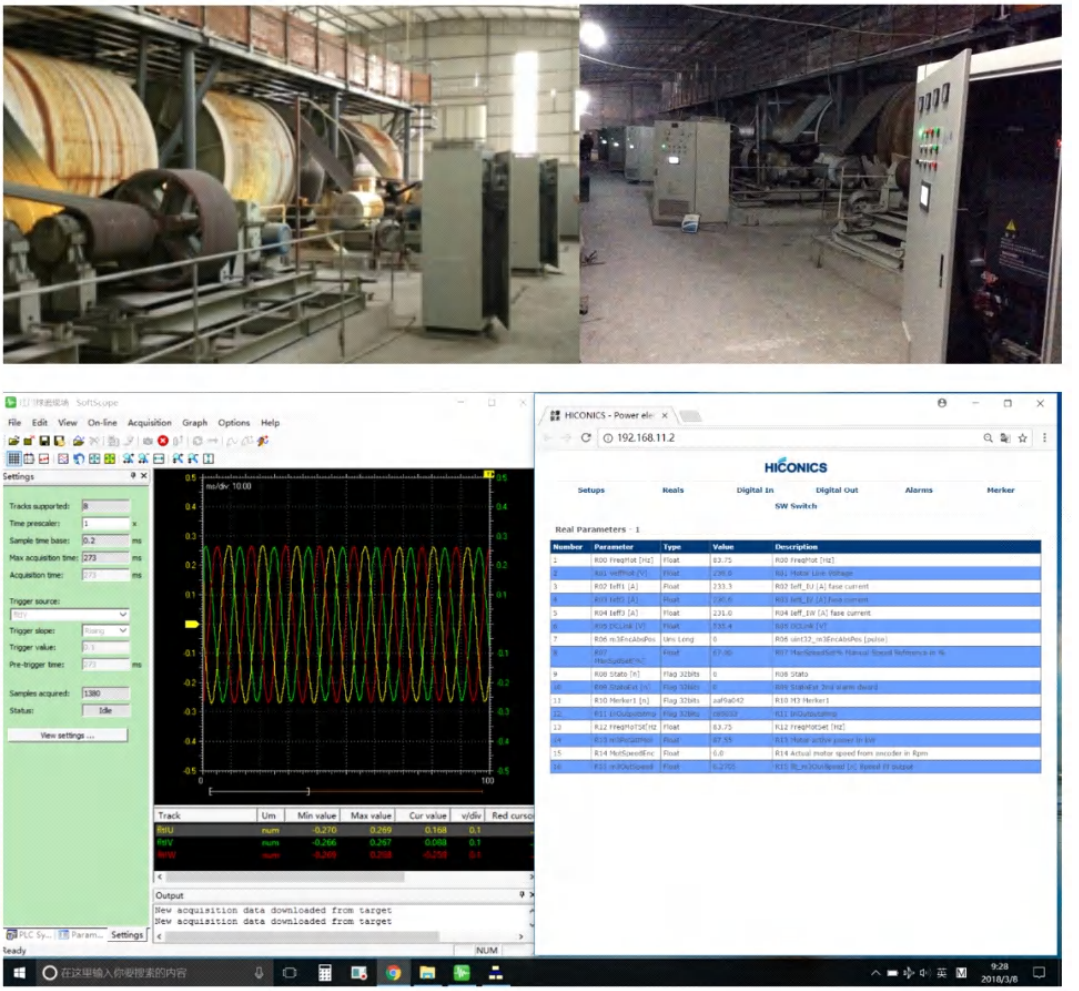
After reaching a certain depth, the needle begins to rise. Due to the forward direction of the barbed hook, the displaced fibers are separated from the barbed hook and remain in the fiber web in an almost vertical state, just like many fiber bundles "pins" nailed into the fiber web, so that the compression of the fiber web cannot be restored. If the fiber web is repeatedly punctured dozens or hundreds of times per square centimeter, a considerable number of fiber bundles will be pierced into the fiber web, and the friction between the fibers in the fiber web will increase, the strength of the fiber web will increase, and the density will increase. The fiber web will form a non-woven product with certain strength, density, elasticity and other properties.

Advantages of Using the CM530H VFD in Textile Needle Punching and Napping Equipment

- Sufficient torque output at low speeds, with smooth acceleration and deceleration;
- A non-stop function reduces machine failures;
- A positioning (upper position) function during shutdown improves product quality;
- Innovative keyboard-less operating status monitoring provides significant convenience;
- An upper position positioning function ensures the needle stops at its highest point during each shutdown.

Ceramics & Metallurgy Industry Application Solutions

CM680 Application Solution for Calender Winding Tension Control



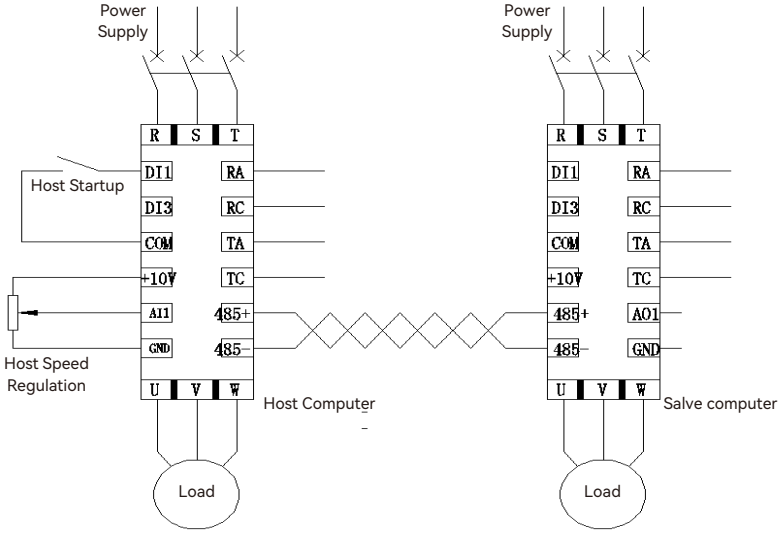
Advantages of Using the Sunye CM530H Series VFD in Ball Mills:

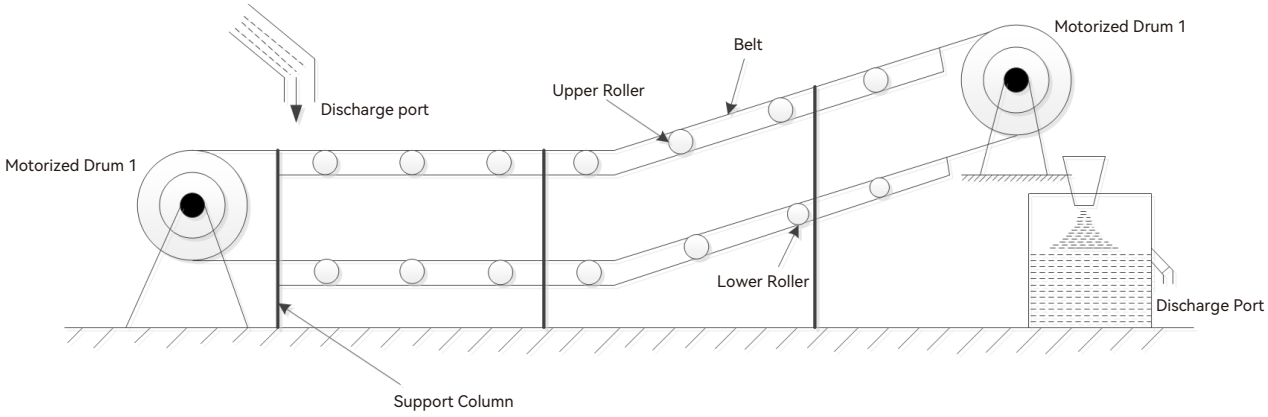
- High low-frequency starting torque, reaching 180% of rated torque at 0.5 Hz, and excellent starting performance with material;
- Up to 16 speed steps, meeting diverse grinding processes;
- Customization V/F curves for further optimized starting and acceleration performance;
- Soft-start functionality and low peak current ensure zero impact on the power grid, completely avoiding electrical shock, reducing mechanical vibration, extending equipment life, and increasing installed capacity;
- Sunye CM530H VFDs can also eliminate the need for hydraulic couplings in ball mills, reducing energy consumption, mechanical system investment, and maintenance costs.

Ceramics & Metallurgy Industry Application Solutions

CM530H Application for Belt Conveyor in Metallurgical Industry

Master-slave control is achieved through the standard 485 interface connection. The CM530H series VFD comes standard with a Modbus RTU protocol communication module. Through the RS485 communication module, the VFD can easily connect two or more VFDs for master-slave control to drive the same load.





Advantages of Ssing Sunye VFDs in Belt Conveyors:

- Master-slave control ensures synchronized start and stop of multiple motors, preventing slippage caused by inconsistent start times.
- Master-slave control ensures balanced power output across multiple motors.
- Optimized SVPWM waveform modulation provides stable output current, strong overcurrent capability, and low output harmonics.
- Infinitely variable speed control meets diverse process requirements, offering superior energy savings compared to power frequency operation.
- High starting torque, suitable for full-load starting and intermittent operation.
- The VFD operates smoothly during sudden feeding, preventing overcurrent and overload.

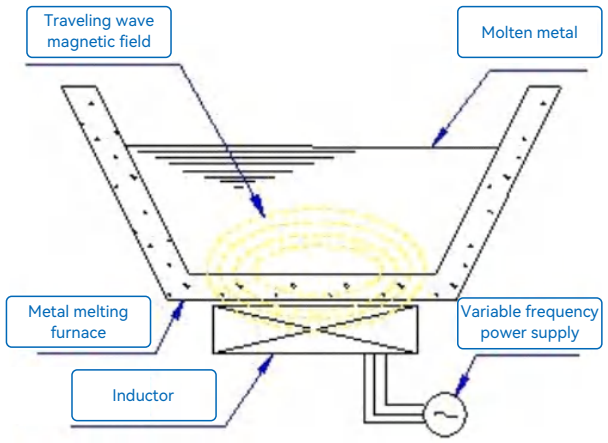
Ceramics & Metallurgy Industry Application Solutions

CM530H-PLUS Application for Electromagnetic Mixer in Metallurgical Industry

Electromagnetic stirrers offer numerous advantages, including zero contact contamination, uniform solution temperature, short melting times, consistent chemical composition, reduced slag, low burnout, high controllability, and a high level of electrification. As key equipment in the metallurgical process, they are widely used in the metallurgical industry. The variable frequency power supply (VFD) is a crucial component of electromagnetic stirrers, and its characteristics determine the quality of metallurgy, energy savings, and stirring performance. This article discusses the theory of electromagnetic stirring, the specific power supply requirements for electromagnetic stirring, and the characteristics of the CM530H-PLUS series VFD that make it suitable for electromagnetic stirring.

Working Principle

The induction electromagnetic stirrer is mainly composed of a variable frequency power supply and an inductor. According to the principle of electromagnetic induction, a high-intensity magnetic field acts on the metal solution (conductor), thereby causing it to move regularly. The variable frequency power supply changes the 50/60Hz AC power frequency to an adjustable output voltage of 0.5~5.0Hz. The variable frequency separation low-frequency power supply forms an alternating moving magnetic field when the power passes through the inductor. The moving magnetic field acts on the metal solution by penetrating the stainless steel plate at the bottom of the furnace. Under the action of the magnetic field, the metal solution generates an induced electromotive force and an induced current. At the same time, under the interaction of the magnetic field, the induced current generates an electromagnetic force, thereby causing the metal solution to move regularly, achieving the purpose of solution stirring. Changing the direction and intensity of the moving magnetic field can effectively control the stirring direction and intensity of the metal solution. The schematic diagram of electromagnetic stirring is shown in Figure (1).



Working Principle

- Frequency conversion separation control: Frequency adjustment resolution 0.1Hz(minimum),0.05Hz (optimum)
- Voltage level:AC 380V: Allow three-phase output current imbalance ≥15%
- Low frequency large inductance devices: Consider the energy release of the load inductance during an emergency stop.
- Can set running time: Countdown stop setting
- Profibus-DP communication protocole: Adjustable frequency 0.5Hz-10Hz, normal operating frequency 1Hz-8Hz

Ceramics & Metallurgy Industry Application Solutions

Features of the CM530H-PLUS Series VFD for Electromagnetic Stirring Equipment

Electromagnetic stirring power supplies can be generally divided into two categories: one employing discrete components in conjunction with a PLC, single-chip microcomputer, or industrial computer to create a variable-frequency power supply; the other employing a modified general-purpose VFD. Many power supply manufacturers have successfully developed variable-frequency power supplies using discrete components. However, due to the relatively backward domestic power electronics technology and product processes, the use of general-purpose control chips and electronic technology has made it difficult to produce high-performance, dedicated AC-DC-AC power supplies. Furthermore, due to the large number of components and limited production scale, manufacturers lack strict quality control measures. Consequently, the reliability of these power supplies is lower than that of mass-produced general-purpose VFDs, resulting in a higher failure rate and difficulty locating the exact fault point when problems arise. Modifying a general-purpose VFD offers significantly higher reliability than assembling discrete components, but not every VFD is suitable for modification. This is primarily because general-purpose VFDs are designed for controlling AC motors and are not suitable for use as electromagnetic stirring power supplies.

Compared to similar VFDs, the CM530H-PLUS series VFDs are more suitable for conversion into variable-frequency power supplies for electromagnetic stirring. The 160kW- 450kW series VFDs come standard with a built-in DC reactor, which protects the VFD's rectifier during transient grid voltage fluctuations. This reactor also suppresses the impact of some harmonic currents generated by the rectifier on the grid, improves the current waveform input to the VFD, and enhances the VFD's ability to withstand grid voltage surges.

1) Compatible with various motors: synchronous, asynchronous, and permanent magnet synchronous motors;

2) Diverse control modes: Supports VF control, open-loop vector control (SVC), and closed-loop vector control (FVC);

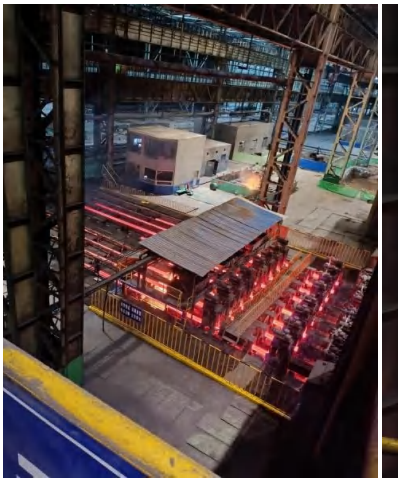
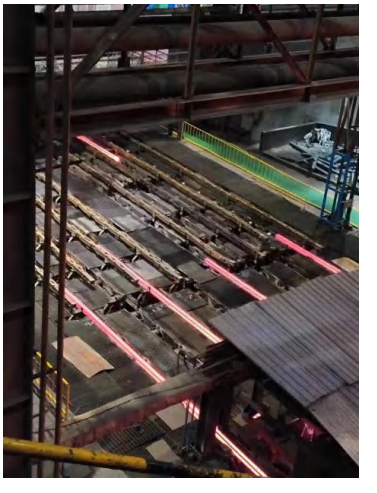
3) Rich expansion functions: Supports I0 expansion cards and PG cards (including incremental, resolver, and UVW);

4) The full-power LCD control panel supports long-distance communication up to 30 meters and parameter copying;

5) Supports ModBUS, PROFINET, PROFIBUS-DP, and CANopen bus communication expansion cards;

6) Reliable and efficient protection functions: Power-on motor short-circuit detection, input and output phase loss protection, overcurrent protection, overvoltage protection, undervoltage protection, overheating protection, and overload protection;

7) A narrow design (<340mm width) is adopted for models above 200kW, facilitating installation in confined areas. The size is 35% smaller than the previous generation, saving installation space.

Ceramics & Metallurgy Industry Application Solutions

On-site Solution Implementation

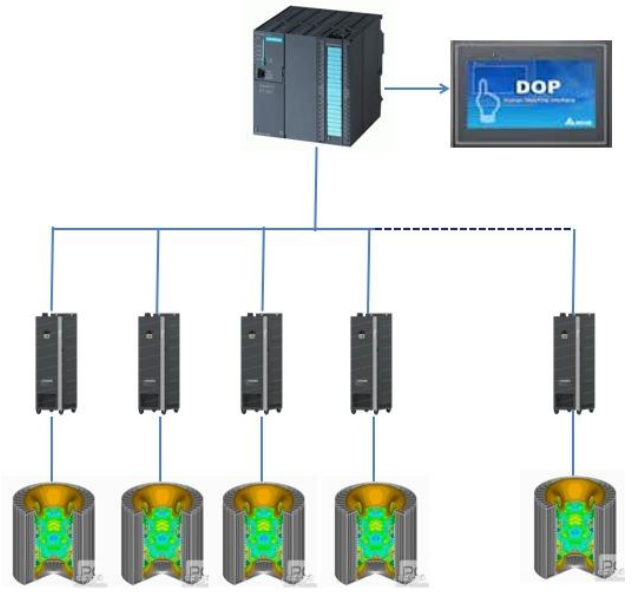
1) Technical requirement: input voltage 400V50Hz, output current 400A, frequency 0-10Hz, using GGD cabinet, to meet the communication and control requirements of steel enterprises.

2) Electrical control: SIEMENS S7-300 PLC is used to control 8 dedicated variable frequency power supply systems, and Profibus-DP communication is used to collect data and issue control instructions.

3) Control Function

a) Automatically set stirring parameters, frequency and current according to the casting steel type and casting conditions; you can also manually set stirring parameters online;

b) The industrial computer is configured with configuration software to form a friendly Chinese human-machine interface, which can display process parameter values such as three-phase current, frequency, temperature of each flow in the water system, flow rate, fault alarm, and record.



The Project Effect is Very Obvious

1) Energy saving and consumption reduction by 15-24%;

2) Increase the melting rate by 13-16%;

3) Increase metal casting yield by 0.5-1%;

4) The temperature difference between the upper and lower melts can be reduced from 90℃ to within 5℃.

5) Manual stirring with large rakes is eliminated, reducing metal and environmental pollution.

6) Work intensity is reduced and working conditions are improved.

7) The automation level of the stirring process is improved.

Forging Equipment Industry Application Solutions

ES100 VFD Application for Forging Press

Project Background

Forging presses, as key equipment for metal forming, are widely used in industries such as automotive, aerospace, military, and home appliances. Forging presses use a hydraulic system to drive a slide block to complete actions such as pressing, holding pressure, and return. Traditional forging presses mostly use a hydraulic system with an asynchronous motor and a fixed displacement pump, which suffers from problems such as high energy consumption, high noise, low control precision, and slow response.

Sunye Solution:

The electro-hydraulic servo system uses the ES100 servo driver to adjust the speed of the permanent magnet synchronous motor in real time, achieving precise matching of flow and pressure, and reducing energy loss at the source.

Solution Feature:

1) Employs ES100 series servo drives, permanent magnet synchronous servo motors, and high-precision pressure sensors;

2) Supports dual closed-loop control for pressure and flow, achieving precise pressure output and rapid response;

3) Features multi-pump confluence/splitting functions, adapting to high flow and high pressure conditions;

4) Built-in EMC filters and DC reactors enhance system electromagnetic compatibility;

5) Supports pure button/shuttle operation, facilitating convenient debugging and providing a user-friendly human-machine interface.

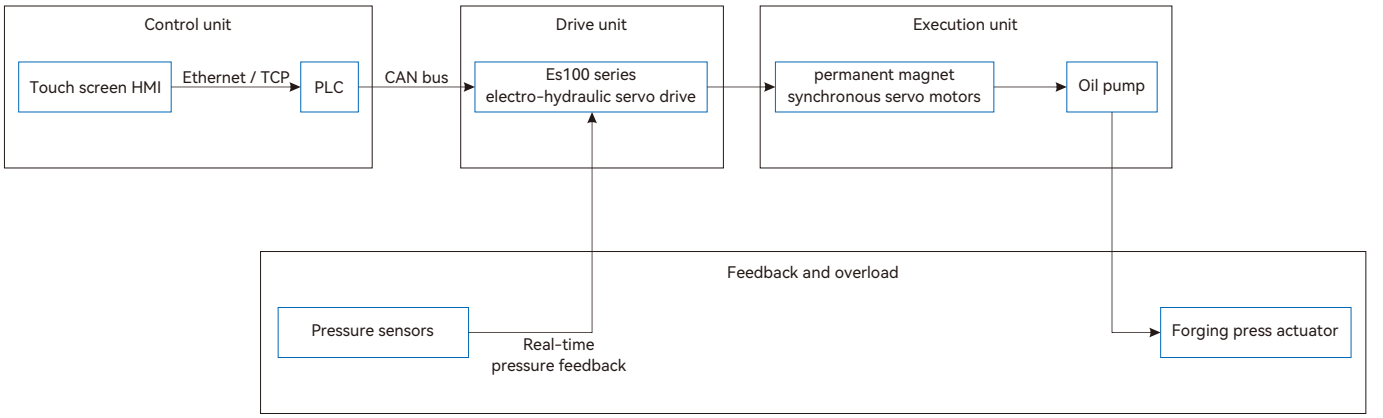
Taking a 13,000-ton forging press from a large forging press factory in Zhejiang as an example, the original system suffered from low drive efficiency, large pressure fluctuations, and high electricity costs. By introducing the Changsha Sunye Electric ES100 electro-hydraulic servo system, a technological upgrade from "extensive oil supply" to "precise pressure control" was achieved, significantly improving the overall performance of the equipment.

Solution Configuration Table

Product Type	Series/Model	Quantity	Remark
Servo drive	ES100 series	9 unit	Supports parallel operation
Servo motor	ABT series permanent magnet synchronous	9 unit	Compatible with 160cc oil pumps
Pressure sensors	NVK/Honeywell	1 PCS	Measuring range 0~400bar, accuracy ±0.5%FS
Braking resistor	External optional	9 set	Suitable for frequent start-stop conditions

Forging Equipment Industry Application Solutions

Solution System Diagram



Advantage of Product/Solution

- Significant Energy Savings: Compared to traditional asynchronous motor systems, energy savings exceed 40%, especially noticeable during pressure holding and standby phases.
- Rapid Response: Pressure build-up time <50ms, improving equipment cycle time and production efficiency.
- Precise Control: Pressure control accuracy ±1kg, improving product consistency and yield.
- Strong Overload Capacity: Supports 1.9 times short-term overload, adapting to the impact load characteristics of forging presses.
- High System Integration: Integrated design of the driver and control board reduces external wiring and improves reliability.

Customer Benefits

- Reduced energy consumption: Overall energy saving rate exceeds 40%, resulting in significant annual electricity cost savings;
- Improved accuracy: Pressure holding fluctuation < ±1kg, significantly improving product consistency;
- Faster response: Pressure settling time < 50ms, increasing production efficiency by approximately 15%;
- Enhanced reliability: System failure rate decreases, and maintenance cycle is extended.

Cable Industry Application Solutions

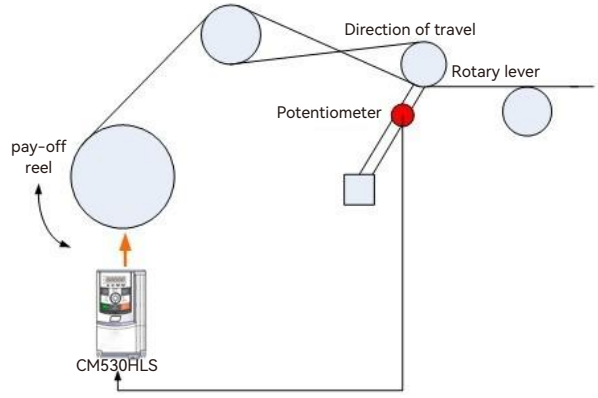
CM530HLS Power Pay-off Stand Application Solution

The cable industry is currently developing towards higher technological levels, characterized by product diversification and production automation. Pay-offs are the most widely used equipment in the industry, and powered pay-offs are among the most technologically advanced. Powered pay-offs generally require VFDs with PID control and bidirectional PID control. The Sunye Electric CM530HLS powered pay-off VFD, with its superior vector control and reliability, ensures its superior performance in the cable industry.

Powered Payoff Process Introduction:

Powered payoffs, as the forefront of various equipment, are widely used in the cable industry. Generally speaking, the following requirements apply to powered payoffs:

- When the take-up speed increases, the payout speed must also rapidly accelerate;
- When the take-up speed decreases, the payout speed must also slow down;
- When operating at a stable speed, the payoff arm must be stable;
- In the event of loose or broken wire, the payoff reel must automatically reverse.



All of these requirements are met by the VFD's PID function, and the VFD must be highly responsive to speed.

Control Solution:

The CM530HLS series VFDs offer flexible and diverse frequency source combinations. Ten main and auxiliary frequency sources are available, along with the ability to switch between main/auxiliary, main/main+auxiliary, and main+auxiliary frequency modes, providing users with a customized frequency source. To meet the VFD requirements of power pay-offs, Sunye Electric's CM530HLS series frequency source can be configured with a PID reference mode, enabling bidirectional control.

The Advantages of Choosing the Sunye Electric CM530HLS Flux Vector Control VFD System Include:

- Sensitive PID response speed;
- Excellent response in both line speed tracking and line release and reverse rewinding.

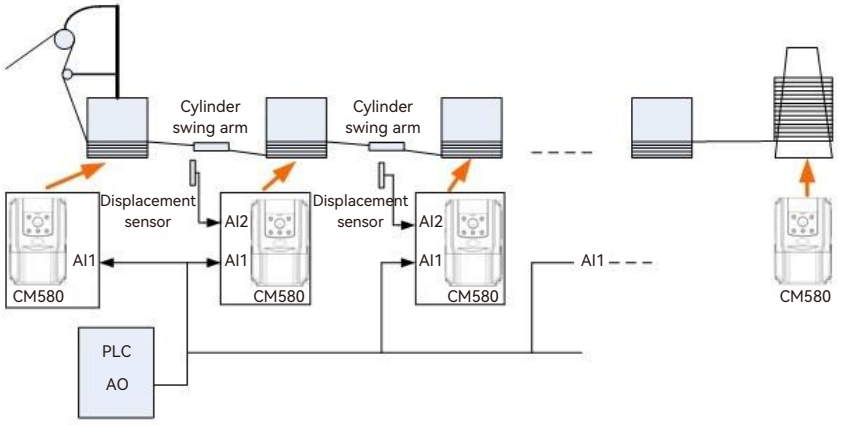
Cable Industry Application Solutions

Straight Wire Drawing Machine Application Solution

Straight Type Wire Drawing Machine:

The straight-line wire drawing machine is one of the more challenging types of wire drawing machines to control. As a continuous production line consisting of multiple drawing heads, it cold-draws steel wire, copper wire, welding wire, etc., to the required specifications in a single pass through staged drawing, and then winds the finished wire. It boasts high efficiency, a small footprint, and high operational efficiency. However, it also places high demands on the synchronization and dynamic response speed of the motor.

Sunye Electric's Straight Wire Drawing Machine Application Solution:



Its working principle is: the speed of the operation is determined by the operator setting on the panel, and the analog signal of the speed enters the PLC. After considering the acceleration and deceleration time, the PLC outputs the analog signal according to a certain slope. The purpose of this is mainly to meet the needs of some operations such as inching and threading. The analog voltage signal output by the PLC is simultaneously connected to the A11 input terminal of all VFDs as the main given signal of the speed. The signal of each swing arm displacement sensor is connected to the corresponding drum drive VFD as the feedback signal of PID control. According to the position of the swing arm in the middle, a PID given value is set by yourself (PID given is a digital given). This system is a very typical PID control system with feedforward, with one level in series and PID as the fine-tuning amount.

Advantage of Choosing Sunye Electric CM580 High-performance Flux Vector Control VFD to Control Straight Wire Drawing Machine:

- It can easily realize the function of main speed following and PID fine-tuning without the need for an additional control board.
- All complex controls are completed by the VFD, reducing the difficulty of PLC program and system hardware development.
- No need D/A and A/D conversiond modules, which reducing the requirements of PLC indicators.
- Optimize cost and improved the cost-effectiveness of the system.

Cable Industry Application Solutions

CM530HLS Water Tank Type Dual Frequency Conversion Wire Drawing Machine Application Solution

Dual-frequency wire drawing machines can gradually stretch copper or steel wire and rapidly rewind the finished product. They are commonly used for processing wires thicker than 0.1mm. Dual-frequency wire drawing machines typically utilize passive payoff. The raw material passes through a payoff rack and into a draw box. After passing through multiple dies, the wire is drawn to a pre-set thickness. The wire then undergoes a wire arrangement process before being wound onto a spool.

The Main Processes Include:

1. Mold threading. Before the machine is started, the raw material is manually polished at the front end and passed through die step by step. The main stretching motor must have high and stable torque during startup and low-speed operation, stable operating speed, and no reverse rotation during deceleration and shutdown.

2. Stretching. After manually threading the die, continuous stretching can be achieved by gradually increasing the motor speed.It requires minimal motor speed fluctuation regardless of load, and high and stable torque output at low speeds or in the weak magnetic field range.

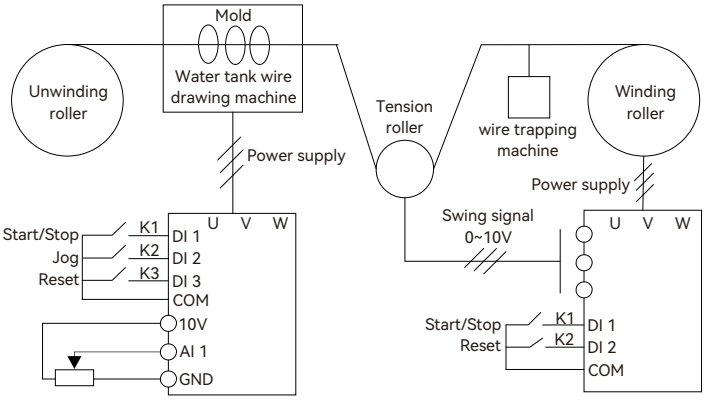
3. Winding. It is performed by an independent winding motor, which synchronizes the linear speed with the stretching motor through PID control of the tension rocker. It requires fast PID speed control and precise speed control for the winding motor.

4. Wire Arrangement. Typically, the finished wire layer is wound onto an I-beam roller. On the roller's horizontal axis, the wire is arranged tightly and parallelly from one end of the axis to the other, forming a single layer. Layer by layer, the wire is then thickened to create a final roll.

5. Startup and Emergency Stop. When the equipment starts, the stretching and winding motors accelerate. As the wire overcomes friction, the swing arm swings significantly. This requires a smooth start with minimal swing and no wire breakage. During operation, if an emergency occurs, the entire equipment must be stopped as quickly as possible. During this time, the stretching and winding motors decelerate rapidly, ensuring the wire does not break after the shutdown process.

The Advantage of Sunye Electric CM530HLS Wire Drawing Machine Winding Dedicated VFD

- Fast PID response: The winding inverter can respond to speed changes of the traction inverter in real time.
- Smooth speed control: Minimal swing arm position fluctuations during normal operation.
- Optimized three-proof and heat dissipation features adapt to the harsh metal dust and high-temperature environments of the wire drawing industry.
- Software-optimized start-up and shutdown processes ensure smooth startup and continuous shutdown.



Petrochemical Industry Application Solutions

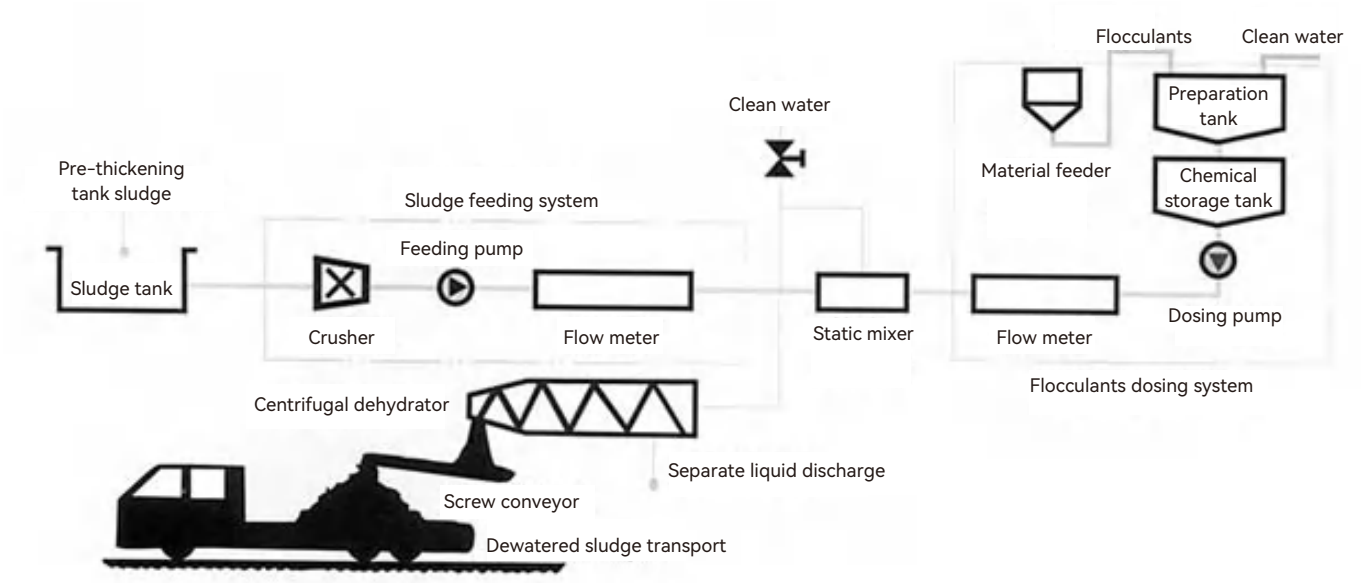
CM530H Series VFD Application for Centrifuge .

Equipment Introduction

The horizontal spiral sedimentation centrifuge (hereinafter abbreviated as horizontal centrifuge) is mainly used in the petrochemical industry. It can accomplish separation processes such as solid - phase dehydration, liquid - phase clarification, liquid - liquid - solid, liquid - solid - solid three - phase separation, and particle size classification. The application site this time belongs to the centrifugal dehydration of chemical sludge. The sludge centrifugal dehydration treatment complete set device (sludge thickening and dewatering complete set equipment) is an important equipment in sludge treatment projects for industrial and agricultural sewage treatment, urban domestic sewage treatment, and tap water production.

Equipment Working Principle

Principle of the Sewage dewatering treatment complete equipment



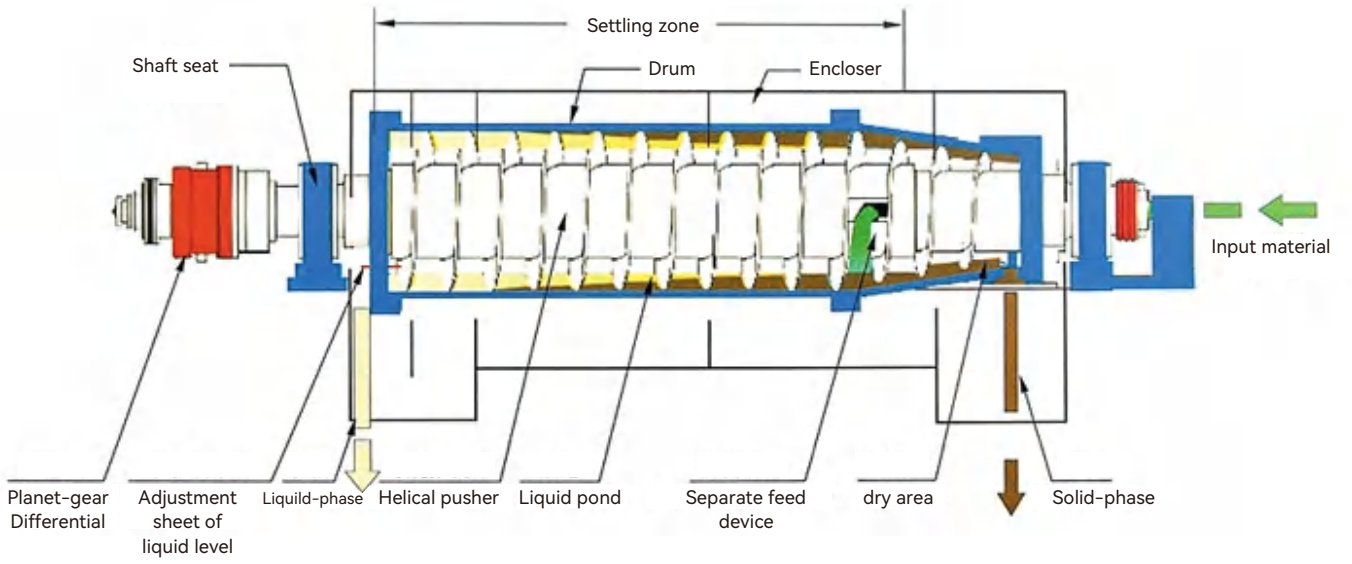
Complete sludge centrifugal dewatering equipment (sludge thickening and dewatering complete equipment) is a vital piece of equipment used in municipal sewage treatment, sludge treatment during tap water production, and industrial and agricultural wastewater treatment projects. It integrates sludge dewatering and thickening functions. Internationally, a fully enclosed, continuously operating, high-aspect-ratio horizontal spiral decanter centrifuge (referred to as a high-aspect-ratio decanter) is generally used as the main sludge dewatering unit. These centrifuges offer advantages not found in other types of sludge dewatering equipment:

- Fully enclosed operation ensures a clean, pollution-free site;
- Small amount of flocculant and clean water consumption, low daily operating costs;
- The equipment's compact layout and minimal footprint significantly reduce land acquisition and infrastructure investment.

Petrochemical Industry Application Solutions

A horizontal rotary centrifuge consists of two rotors: a bowl and a discharge screw (or simply the screw). When the bowl rotates at high speed, the slurry inside rotates with it and is subjected to centrifugal force, which is many times greater than gravity. This forces the solid particles out of the liquid and settles along the bowl axis onto the inner wall. The discharge screw, located inside the bowl, rotates at a slower speed than the bowl and pushes the deposited solid particles to the discharge port. The differential speed between the outer bowl and the discharge screw is determined by the differential gear ratio and its speed.

Working Principle of a Horizontal Centrifuge:

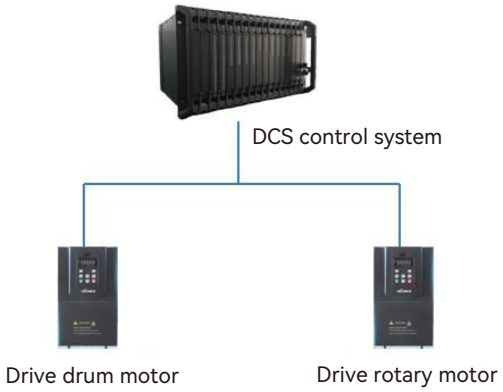


Our Solution Introduction

In this system, each business center machine is controlled by two SUNYE CM530H inverters. The CM530H-93kW drives the drum motor (90kW), while the CM530H-22kW drives the rotary motor (18.5kW). Both inverters are controlled by a DCS control system, including start signals, frequency reference, operating current feedback, operating signals, and fault signals. It is important to note that the busbars of the two inverters must be connected together, and the 22kW inverter does not need to provide AC power to the drum motor. Because the drum motor rotates faster than the rotary motor, it will drag the rotary motor into a power generation state, which can cause the 22kW inverter to skip voltage.

Petrochemical Industry Application Solutions

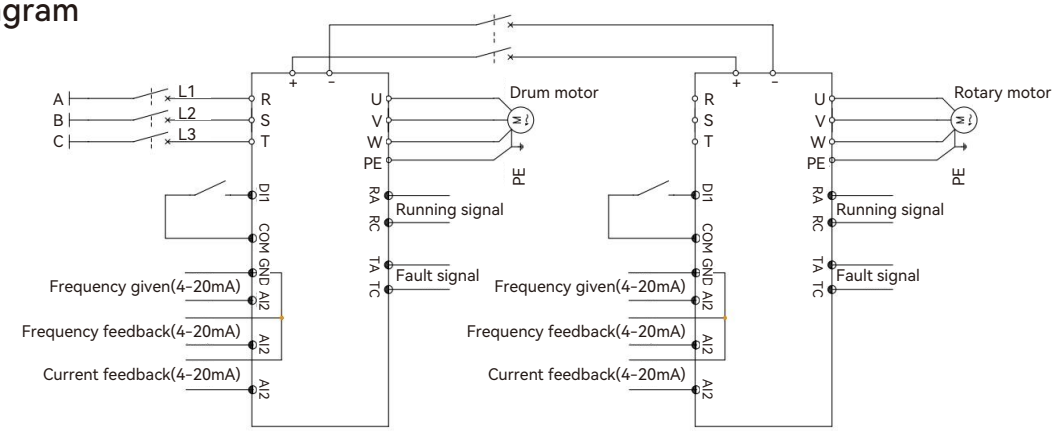
Solution System Diagram



Parameter Table

Function Code	Name	Setting Value
F0-03	Control mode	2
F0-04	Terminal command channel(LED lighting)	1
F0-06	Frequency source Ai2	3
F0-23	Acceleration time	800
F0-24	Deceleration time	1000
F0-26	Carrier frequency	4
F2-01	Torque boost	0. 1
F2-10	Flux braking gain	100
F2-09	Slip compensation coefficient	50. 0
F5-20	AI2 minimum input value	2. 00
F5-23	AI2 maximum input corresponding setting	1. 0
F9-18	Overvoltage suppression mode 1	1
F9-19	Overexcitation is only effective during deceleration	2
F9-04	Overvoltage stall protection voltage	650

Wring Diagram



Product Advantages of Wsing SUNYE Inverters

- V/F control achieves optimal energy-saving operation through motor parameter detection.
- Stepless motor speed regulation allows for adjustment to suit different process requirements, making the equipment suitable for various operating scenarios.
- High torque at low frequency. Utilizing advanced software algorithms, the unit can output 150% of rated torque at 0.5 Hz.
- Standard RS485 interface supports MODBUS communication protocol, enabling network communication with host computers such as touch screens and PLCs.
- Comprehensive protection measures: Provides protection against nearly 20 fault types, including overvoltage, undervoltage, input phase loss, overload, overheating, overcurrent, external terminal fault, communication fault, and current detection error, ensuring high reliability.

Customer benefits

- Significantly improves product qualification rate, avoids duplication of work, and improves production efficiency.
- Soft starting and stopping of the motor reduces the probability of mechanical failure.

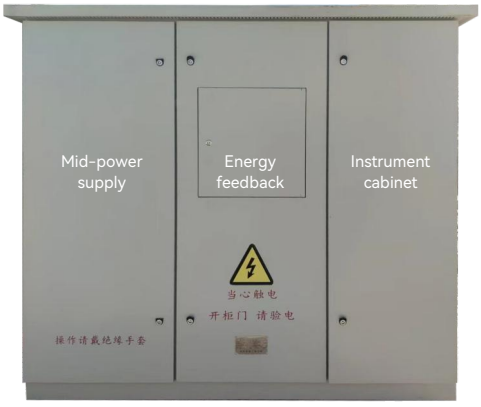
Petrochemical Industry Application Solutions

CM530H VFD Application for Oil Pipeline Heating System

Electromagnetic heating products mainly include electromagnetic heaters, electromagnetic induction heating equipment, and electromagnetic induction furnaces. These products all operate on the principle of electromagnetic induction, using an electromagnetic field to generate eddy currents inside metal pipes, thereby achieving heating. Compared to traditional heating methods such as electric furnaces, various fossil fuel furnaces, and resistance heating cables, electromagnetic induction heating devices offer numerous advantages, including rapid heating, easy temperature adjustment, energy saving, and environmental friendliness. Currently, frequency conversion technology is applied to heating devices, changing the AC frequency to achieve different heating effects. This allows these heating devices to be used in various scenarios such as riveting processes, metal smelting, metal pipe heating, and induction brazing. Sunye's CM530H series medium-frequency heating power supply inverter has been successfully applied in projects such as metal smelting and oilfield extraction, achieving heating efficiency of 50%~70% (compared to only 30% for general heating methods). It features rapid heating, high heating temperature, continuously adjustable output frequency, and wide application coverage, earning the trust of customers.

System Configuration

Winter temperatures in Northeast China are low, and the oil in the region's oil fields contains a high amount of wax. When temperatures are low, this wax solidifies, clogging pipelines and hindering transportation. Even in summer, the low temperatures deep underground make oil extraction pipelines prone to blockage. Therefore, local oil pipelines generally require heating devices to ensure smooth extraction and a stable flow of oil.



The heating system in this Northeast oilfield utilizes a Sunye CM530H medium-frequency VFD for heating power supplies, coupled with a touchscreen operation. The inverter's Y1 and Y2 terminals output the current operating status and fault information to the touchscreen, facilitating personnel inspection and monitoring of pipeline heating conditions, and enabling pipeline temperature monitoring. The output frequency is automatically adjusted based on the set temperature to ensure the pipeline temperature remains within a reasonable range, reducing oil extraction difficulty, minimizing energy loss, and improving transportation efficiency.

Petrochemical Industry Application Solutions

Some Parameter Settings:

Function Code	Name	Content	Factory	Address
N0-00	Industry application macros	0: General Purpose 1: Medium Frequency Power Supply	0	0×C000
F0-04	Command source selection	0: Keyboard 1: Terminal 2: Communication 3: Target voltage	0	0×F004
N1-00	Power output selection	0: Invalid 1: Enable	0 [1]	0×C100
N1-03	Primary side output voltage source selection	0: Digital setting; 1: When A1 is selected as an analog quantity, N1-04 corresponds to 100% output.	0 [1]	0×C100
N1-04	Primary side maximum voltage output	0-600V	440	0×C104
N1-05	Single-phase power supply output voltage phase sequence	0: uv	0	0×C105
F2-17	Power supply voltage acceleration time	The power supply voltage acceleration time can be adjusted independently.	8.0s	0×F211
F2-18	Power supply voltage deceleration time	The power supply voltage deceleration time can be adjusted independently.	8.0s	0×F212
F5-00	Multi-function digital input terminal 1	0~54 51: External oil temperature fault; terminal default is active low.	1	0×F500
F5-01	Multi-function digital input terminal 2		0	0×F501
F5-02	Multi-function digital input terminal 3		51	0×F502
F8-07	Communication address selection	0: General 1: Dedicated	0	0×F807

Advantages of Using Sunye VFD:

- High efficiency and energy saving: Heating efficiency reaches 70%, significantly reducing energy consumption.
- Intelligent temperature control: Automatic frequency adjustment ensures stability and reduces the risk of blockage.
- Stable and reliable: Optimized design improves stability and extends lifespan.
- Flexible application: Continuously adjustable frequency adapts to various operating conditions.
- Rich interfaces: Supports multiple digital inputs and communication, facilitating system integration and remote control.
- Fault early warning: Real-time monitoring and output of operating status and faults facilitates rapid response.

Mining Industry Application Solutions

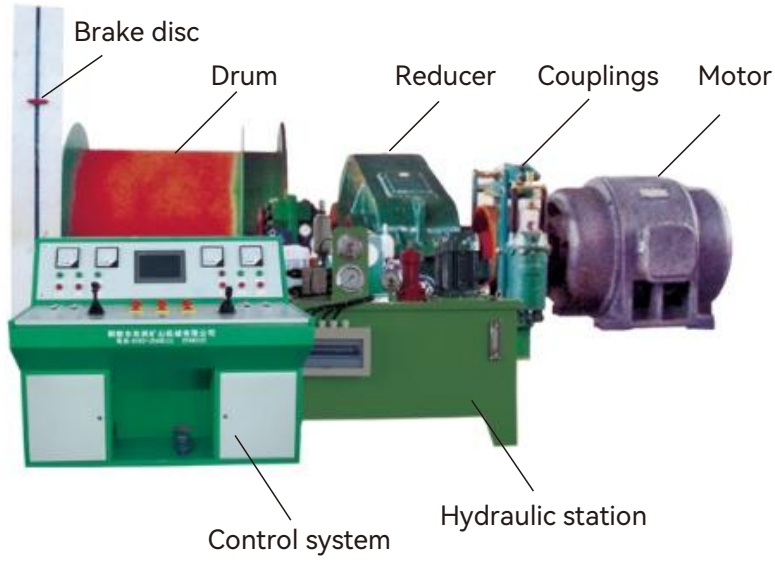
CM530H Mining Hoist Machine Application Solution

Equipment Introduction

In mine hoisting systems, hoists primarily transport personnel and materials. Traditional hoist control systems consist of contactors and relays, and the motor drive primarily utilizes a resistor in series with the motor windings. This makes hoist systems prone to potential failures, resulting in high power consumption and a lack of assurance of safe, stable, and reliable system operation. However, the use of a VFD in the hoist control system enables stepless variable frequency speed regulation, enabling flexible hoist startup and significantly improving hoist reliability and stability.

Solution Introduction

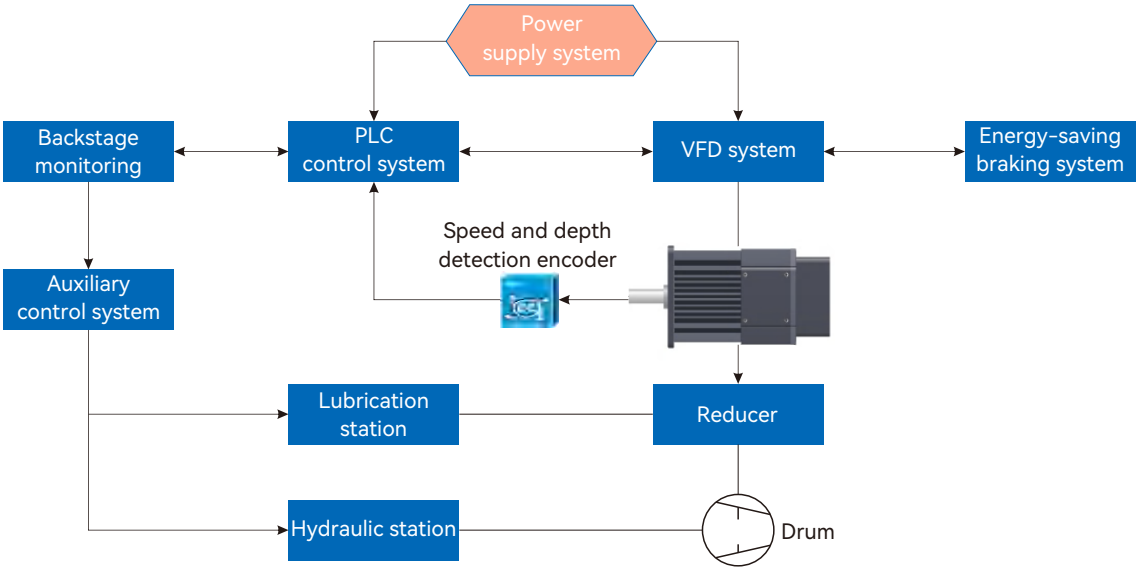
Taking the Hebi Shuangmin JTP series mining hoist as an example, the JPT series mining hoist primarily consists of a main shaft assembly, a surge pressure station, a base, a motor, a control system, a frequency converter system, and an energy-consuming braking system.



Mining Industry Application Solutions

System Topology

The JPT series mining hoist system topology is shown below:

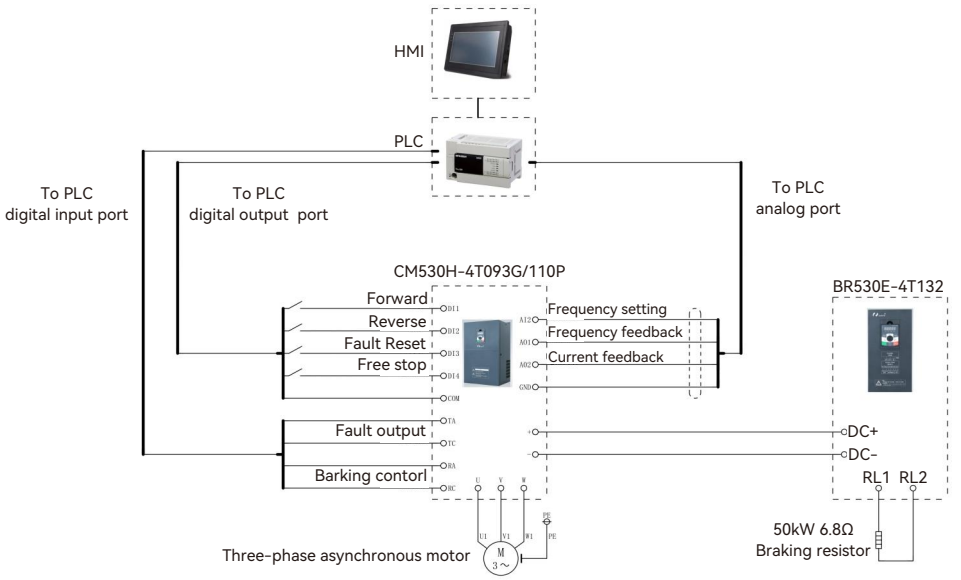


Operating Principle

When the main motor is started, the motor rotor transmits power to the high-speed shaft of the reducer through an elastic coupling. After being decelerated by the reducer, the power is then transmitted to the main shaft assembly via the driven shaft of the reducer through a gear coupling. By continuously changing the direction of the motor, the reel winds or unwinds the wire rope, causing the hoist container to move up and down cyclically on the reel.

Introduction to Our Solution

The selected inverter is the CM530H series; the braking unit is the BR530E series. The electronic control system architecture is shown in the figure.



Mining Industry Application Solutions

Product Advantages

- The CM530H universal vector inverter offers sufficient starting torque, open-loop vector control at 0.5 Hz, 180% starting torque, and a torque response of ≤40ms, making it suitable for applications such as hoist start-ups with load.
- The built-in CBC current limiting function minimizes overcurrent faults in the inverter, ensuring uninterrupted hoist operation.
- The CM530H universal vector inverter features a rich interface, meeting mine hoist application scenarios without requiring additional expansion.

Customer Benefits

- The original motor, driven by a series resistor, had a low power factor under light loads. By adopting the CM530H universal vector inverter, the power factor on the power supply side can be increased to over 0.9, significantly reducing reactive power without the need for reactive power compensation devices.
- It improves the efficiency of mine hoists, conserves energy, reduces equipment operating costs, and maximizes production progress.
- It enables soft starting of the motor, ensuring that the starting current does not exceed 1.2 times the rated current, extending the motor's service life.
- It offers powerful protection features and is highly adaptable to grid voltage fluctuations.
- The use of variable frequency speed control devices improves automation levels, providing a foundational solution for achieving highly automated mining operations.

Woodworking Industry Application Solutions

EL10 Inverter in Dispensing Machine Application Solution

Industry Background

Woodworking glue dispensing machines, core equipment for automated gluing, edge banding, and precision gluing in the furniture manufacturing and wood product processing industries, are experiencing rapid growth driven by rising labor costs, increasing quality requirements, and tightening environmental regulations. In these automation upgrades, VFDs precisely regulate the motor speed of the glue pump and conveyor belt, enabling linear glue control, soft start/stop, and variable speed operation. This significantly improves glue application quality, equipment adaptability, and energy efficiency, becoming a key enabler for high-precision production.

Advantages of Using the Sunye EL10 Inverter in Dispensing Machines:

- Accurate speed regulation, precisely controlling the mixing frequency of the adhesive.
- Comprehensive protection features, supporting 30 fault detections including overcurrent, overvoltage, overload, and phase failure.
- The standard 485 interface supports fast networking and PLC communication, enabling multi-station collaboration and integration.

Woodworking Industry Application Solutions

Cm800 Inverter in Edge Banding Machine Application Solution

Industry Background:

Woodworking machinery refers to a type of machine tool used in the wood processing process to transform semi-finished wood products into finished wood products. Panel furniture machinery is a key component. Panel furniture is a modular piece of furniture made primarily of wood-based panels, supplemented with various stickers or veneers, and manufactured through a process of sawing, edge banding, drilling, milling, and surface treatment. Slitting machines, edge banding machines, side hole drills, and six-sided drills are the most essential machinery for panel furniture processing.

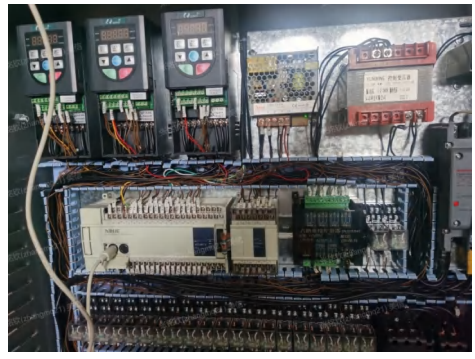
Customer Needs:

In the woodworking machinery industry, customers have four key requirements: ① Smooth spindle switching during high-speed operation (high dynamic response and reduced settling time); ② Smooth, jitter-free startup ("curved" smooth startup); stable operation; high overload capacity (1.2x overload for continuous operation for 1 hour; 1.5x overload for 1 minute); and a cost-effective control solution (open-loop vector control; VF control).

Typical Applications of the Sunye CM800 Inverter in Edge Banding Machines

Various continuous-pass edge banding machines are used to quickly seal the edges of panels with edge banding strips. This process significantly improves the appearance of furniture and prevents damage to corners during transportation and use. Using the CM800 series inverter in edge banding machines not only increases production efficiency but also improves edge banding quality and reduces energy consumption.

Advantages of Using the Sunye CM800 Inverter in Edge Banding Machines:



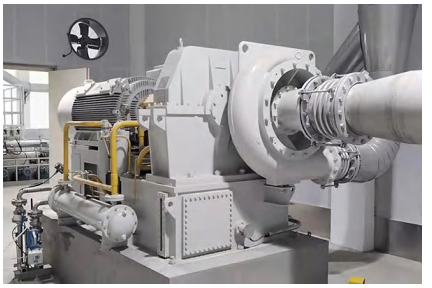
- Fast cutting speed and high efficiency;
- Soft limit protection and fault protection for the X/Y/Z axes;
- Rapid start/stop and quick tool change;
- Easy and flexible parameter adjustment and quick commissioning;
- Fast torque dynamic response and high speed stabilization accuracy;
- Increased stall speed significantly shortens stall time;
- Reduced equipment failure rate, helping customers lower production costs and enhance product competitiveness;
- Improved woodworking machining accuracy and the quality of veneer, significantly increasing production efficiency and the overall automation level.

Paper Industry Application Solutions

CM530H Inverter in Turbine Blower Application Solution

Equipment Introduction

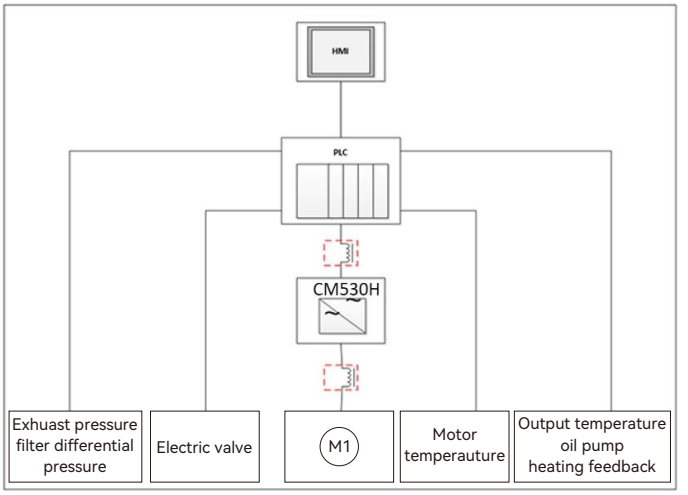
Turbine blowers were introduced relatively late to the Chinese papermaking industry, only officially beginning use in 2007. Papermaking technicians are relatively unfamiliar with them, and they are often considered "new technology." Turbine blowers offer advantages such as high mechanical efficiency, which reduces energy consumption. Furthermore, turbine blowers have high exhaust temperatures, typically between 120℃ and 180℃, allowing heat to be recovered and used to heat the paper machine's white water and air systems. Furthermore, turbine blowers do not require water as a working fluid, thus conserving water.



Turbine blower host system

Customer Needs

As turbine blowers become increasingly versatile and demand for them surges, the performance of papermaking equipment is also constantly improving, moving towards lower energy consumption, higher yields, and higher output. A papermaking company in Zhejiang province is considering upgrading its production equipment on-site, aiming to improve processes, increase production efficiency, and reduce energy consumption.



Schematic diagram of turbine blower system

Sunye Solution

To meet customer needs, Sunye Electric used the CM530H series inverter to regulate the motor operating frequency. This series offers the advantages of free-stop and speed tracking, controlling the fan speed to meet wind pressure requirements. Furthermore, the inverter's operating mode can be adjusted based on production process conditions, significantly improving production efficiency and energy savings.

VFD system

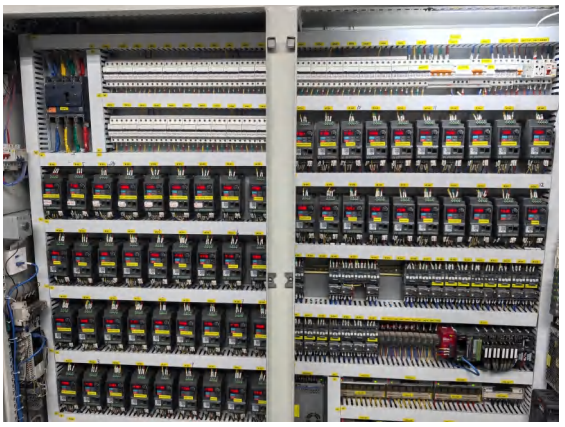
Sunye Solution

Equipment Cost: The P-type inverter is suitable for motor power, saving equipment costs. Production Efficiency: Rapid acceleration and deceleration are achieved, quickly increasing the fan speed to the operating frequency.

Energy Savings: The inverter stops output during coasting, and then restarts with a follow-up start, eliminating standby operation and achieving energy savings.

Energy-saving Transformation Application Solutions

EL10 Series Inverter in Household Air Conditioners Application Solution



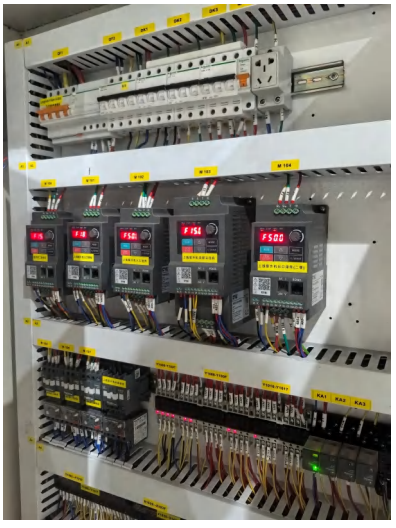
Background: The household air-conditioning production line is a model of high automation, technology-intensiveness, and scale in modern manufacturing. Its level of automation is reflected in the entire process from sheet metal stamping, heat exchanger manufacturing, assembly to packaging. It makes extensive use of industrial robots, AGV automatic guided vehicles, and intelligent detection systems. The core of these high-precision motion control devices - the VFD - plays a vital role. By precisely adjusting the motor speed and torque, it not only ensures the precise positioning and smooth operation of the robot arm and the flexible start and stop of the conveyor belt, but also greatly improves production efficiency and product consistency, while achieving significant energy saving effects.

Demand: Household air conditioner production line application site, a single line consumes 150 units, mainly driving electric rollers, fans, belts, etc.

In this project, EL10 is used to control the air-conditioning production line. The machine is installed centrally and works with the PLC to control the line operation, steering, and material lifting. The EL10 is compact and easy to debug. The centralized installation facilitates on-site operation speed control, and the fault protection function effectively protects the line operation and maintenance, ensuring high-speed and efficient production on site.

Sunye Solution

- Compact design and DIN-rail mounting support, saving space on the distribution board.
- External panel supports parameter upload and download, facilitating debugging.
- Standard coated circuit boards and optimized independent air ducting enhance product reliability in harsh environments.



Energy-saving Transformation Application Solutions

CM800 Series VFD Application for Industrial Washing Machines.

Industry Background:

Industry Background: Industrial washing machines are electrical devices used in hotels, restaurants, laundries, or factories for large-volume laundry cleaning. Their washing process generally consists of water inlet, forward/pause washing, reverse washing, drainage, and spin-drying. With the rapid development of automation and the continuous improvement of industry process requirements, industrial washing machines place increasingly higher demands on VFD, requiring them to meet the requirements of high starting torque, multiple speeds, wide voltage range, automatic slip compensation, and fast and powerful communication methods. Furthermore, they must have stable performance and be able to adapt to various complex high-temperature and high-humidity environments.

Operating Principle:

Under the unified scheduling and management of the timing controller, the VFD controls the asynchronous motor to continuously rotate in both directions, achieving asynchronous movement of water and clothes. This causes the water and clothes to rub and knead each other, achieving the purpose of washing. There are two ways to set the speed:

1) Set the operating speed of each stage directly on the inverter in a multi-speed mode;

2) Set the operating speed of each stage through communication with the washing machine's dedicated control computer.

The operating speed of each stage:

Washing: Around 7Hz

Balance: Around 15Hz

Medium spin: 80Hz

Max spin: 110Hz

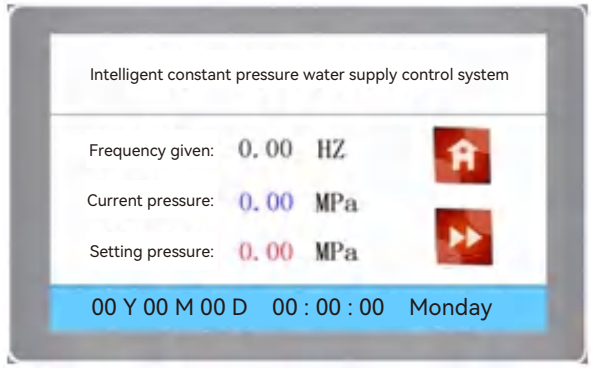
Advantages of Using the Sunye CM800 VFD in Industrial Washing Machines:

- High starting torque, normal start-up under full load;
- Stable speed throughout high, medium, and low speed range;
- No stalling or overcurrent during acceleration and deceleration;
- Wide speed range;
- High low-frequency torque to meet 7Hz washing process;
- Simple parameter settings, default V/F is sufficient for production needs;
- Equipped with a protective cover, strong environmental adaptability.

Energy-saving Transformation Application Solutions

CM530H Series VFD Application for Constant Pressure Water Supply

By using a host computer and PLC, different pressures can be set for different time periods to maximize energy savings and achieve more stable water supply pressure.



485communication control VFD, 485 communication requires only two control lines, greatly optimizing the control circuitry. It can also achieve remote control via fiber optic or wireless communication modules, solving the problem of remote water pumps being difficult to monitor.

Range of System Application:

1. Waterworks and booster pump stations.
2. High-rise buildings and urban and rural residential communities.
3. Industrial water use: cooling water circulation, heating network water circulation, boiler circulating water, boiler feedwater, etc.
4. Central air conditioning systems, farmland irrigation, sewage treatment, artificial fountains.
5. Various fluid constant pressure control systems.

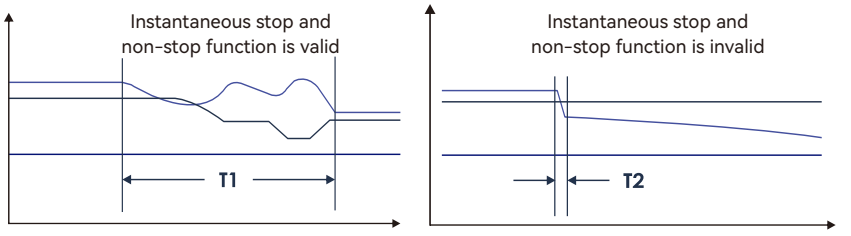
CUSTOMIZATION CAPABILITIES

Precisely Matching Your Industrial Needs

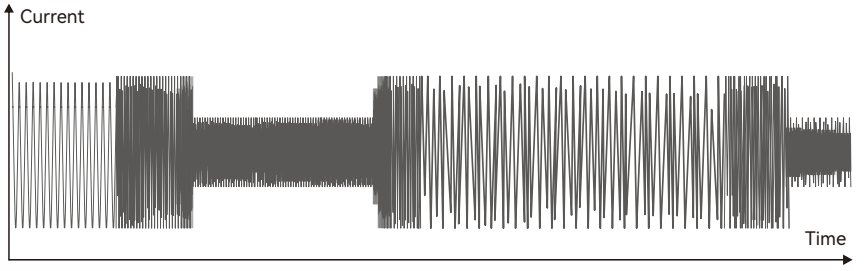
Our dedicated inverter R&D team masters core technologies such as vector control, intelligent algorithms, and modular design. Our products support multiple voltage levels, wide-band speed regulation, and various communication protocols. Through simulation testing, environmental validation, and continuous optimization, we ensure stable operation under extreme operating conditions. We are committed to providing customers with energy-efficient, precise control inverter.

Professional Vector Control Algorithm

(sensorless vector control algorithm, V/F control, synchronous motor control algorithm)



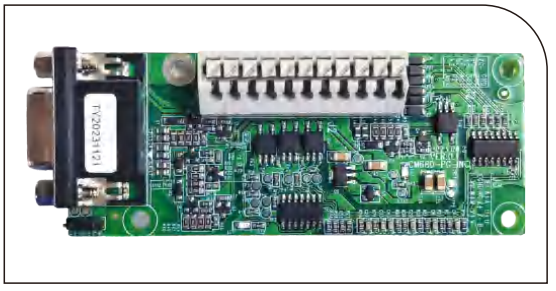
Note: Comparison chart of instant stop and non-stop functions

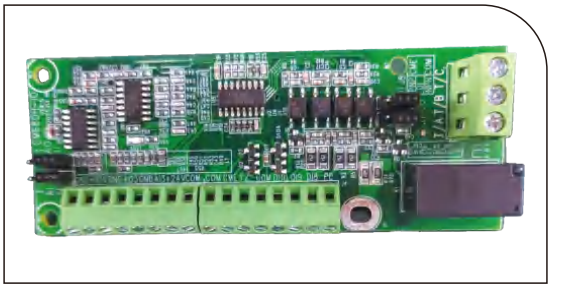


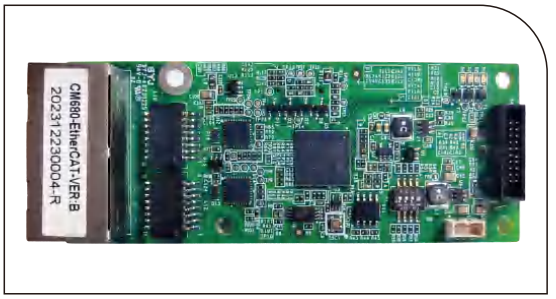
Sudden loading and unloading measured current waveform

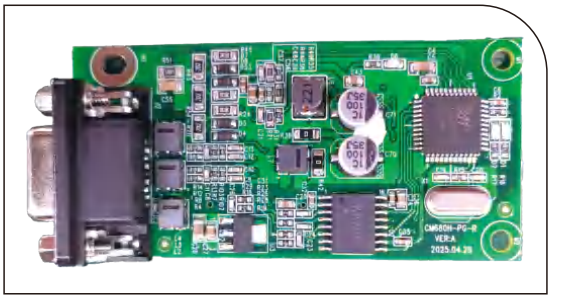
Rich Engineering Communication Protocols

(Modbus, CANopen, PROFIBUS, PROFINET, EtherCAT, Ethernet/IP, etc)









Comprehensive Testing And Verification Capabilities

(test specifications, simulation, high-power test platform, motor-to-motor platform, environmental test chamber, EMC laboratory, etc.)

Deep Collaborative Development (timely response, rapid delivery)

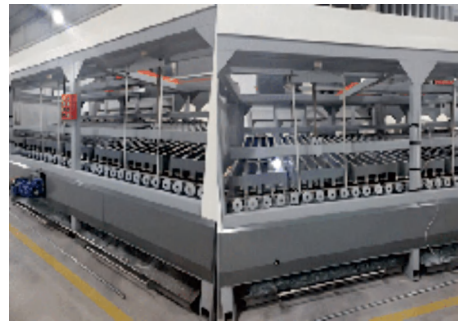
Working condition diagnosis → Customized solutions → Test Platform → **Product delivery** → After-sales guarantee → Regular return visits

Non-Standard Product Examples

Leveraging advanced technology, we can precisely adapt to special voltages, complex control logic, and stable operation in harsh environments, improving energy efficiency and reliability. Let the inverter no longer be a limitation, but the efficient engine of your production line!

Customized electromagnetic mixer development and application solutions

Customized turbine blower development and application solutions



Customized tempered glass development and application solutions

QUALITY / SERVICE

THE FIRST CHOICE

Quality

10,800 square meters of fully automated production line, first-class domestic and foreign production and testing equipment, adopting a lean production system, to create excellent quality and provide customers with a more excellent user experience.

Automated production line



Automated testing platform



Service

Before Sale
Technology promotion
On-site production
Solution development
Energy-saving assessment

On Sale
Customized design
Design liaison
Installation and commissioning
On-site training

After Sale
Regular maintenance
follow-up visits
Timely repairs
a full range of accessories

3-level
Response Mechanism

After-sales and R&D
expert teams work together to
ensure timely troubleshooting
Full-time follow-up on any issues
Resolve issues promptly

13
Nationwide Service Network

Covering most customer areas
24/7 dedicated hotline service
Remote + On-site
after-sales service

30
Regional Managers

Dedicated personnel
for specific areas
Troubleshooting + technical
troubleshooting
Efficient and precise service

CHANGSHA SUNYE ELECTRIC CO.,LTD.

HotLine: 0731-89932666 400-0755-731
E-mail: sales@cssunye.com info@cssunye.com
WhatsApp: +86152 7327 6875
Address: No.669, Xinsheng Road, Yuelu District, Changsha City, China.
Website: www.cssunye.com