

HICONICS

kep

(6kV-10kV)315~20000kW/400~25000kVA



CATALOGUES



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- 03 External Cooling Water for the Drive
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01

SUMMARY

During the running of the Medium Voltage drives, there will be a certain amount of power loss. The power loss takes up around 3~5% of the drive capacity, among which the transformer's power loss takes up 45%, the rectifying and inverting parts take up 40%, and the control system, main circuit cables and copper bars take around 15%.

The effectiveness of cooling is an essential factor that may cause the reliability of the MV drives. The large power semiconductor components and the phase shifting transformer will produce a lot of heat during the MV drive working, if the cooling system of the drive cannot take the heat in time, it will cause the temperature of the components and transformer increasing continuously. When over-temperature, the features of the components will deteriorate.

The cooling methods of the MV drive are mainly two types: air-cooling and water-cooling. Currently, the air-cooled MV drives are the mainstream. However, the air-cooled MV drives have limitations such as: cooling surface, VFD room temperature, site environment, fan size, and noises, whereas the water-cooled MV drives do not have these limitations in cooling, thus improves the reliability of the MV drives.

> The Advantages of the Water-cooled MV Drives

**Low cost
for operation
and maintenance**

Less power loss of the MV drive; very few maintenance needed (almost no need for maintenance, only need to check regularly and clean the external water filters)

High efficiency

Water heat exchange efficiency is 100% more than air cooling; transformer cabinet fully enclosed, air circulating inside, solving the problem of the secondary winding cooling.

High IP level

Transformer cabinet fully enclosed, IP level can reach IP42, anti-dust, anti-corrosion

Strong adaptability

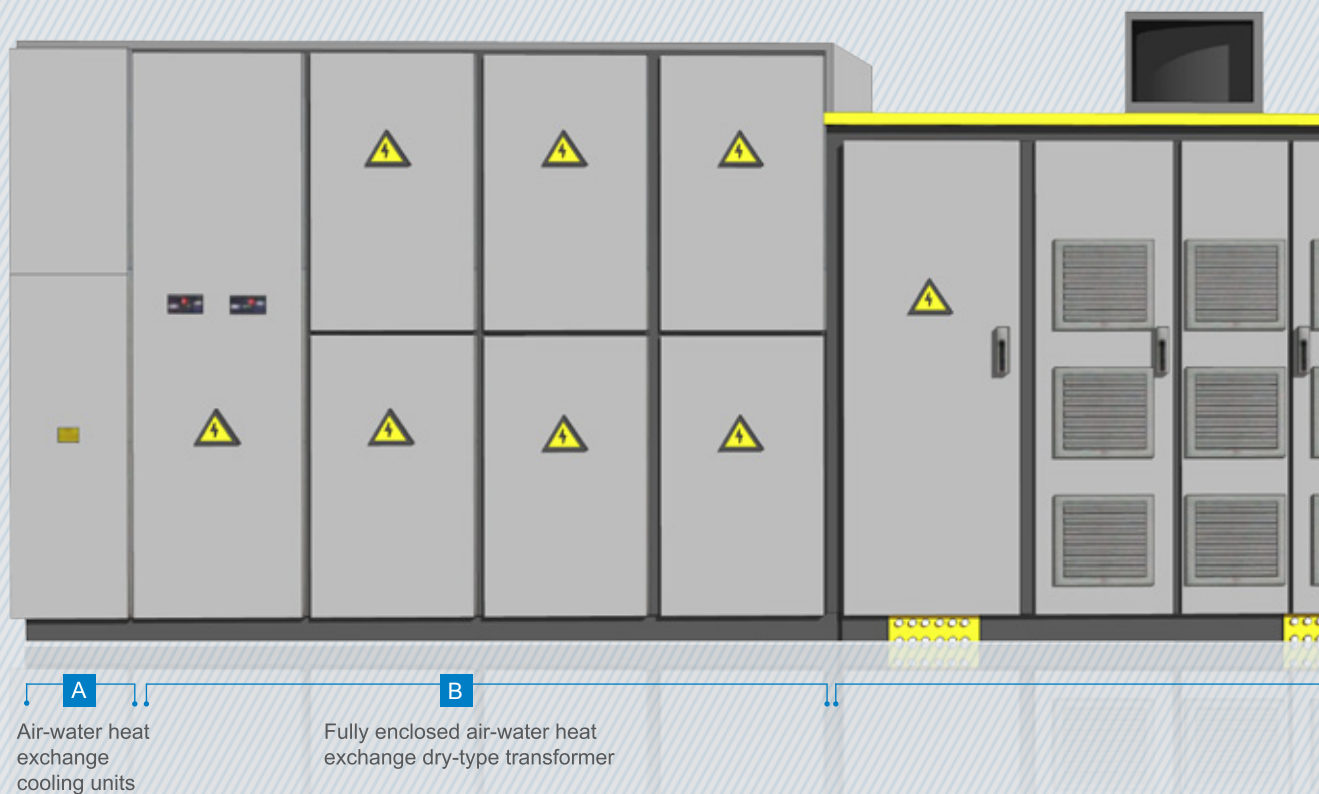
The MV drive room can be fully closed, not influenced by outside environment

Long life cycle

Reduce the power component junction temperature, life cycle prolonged.

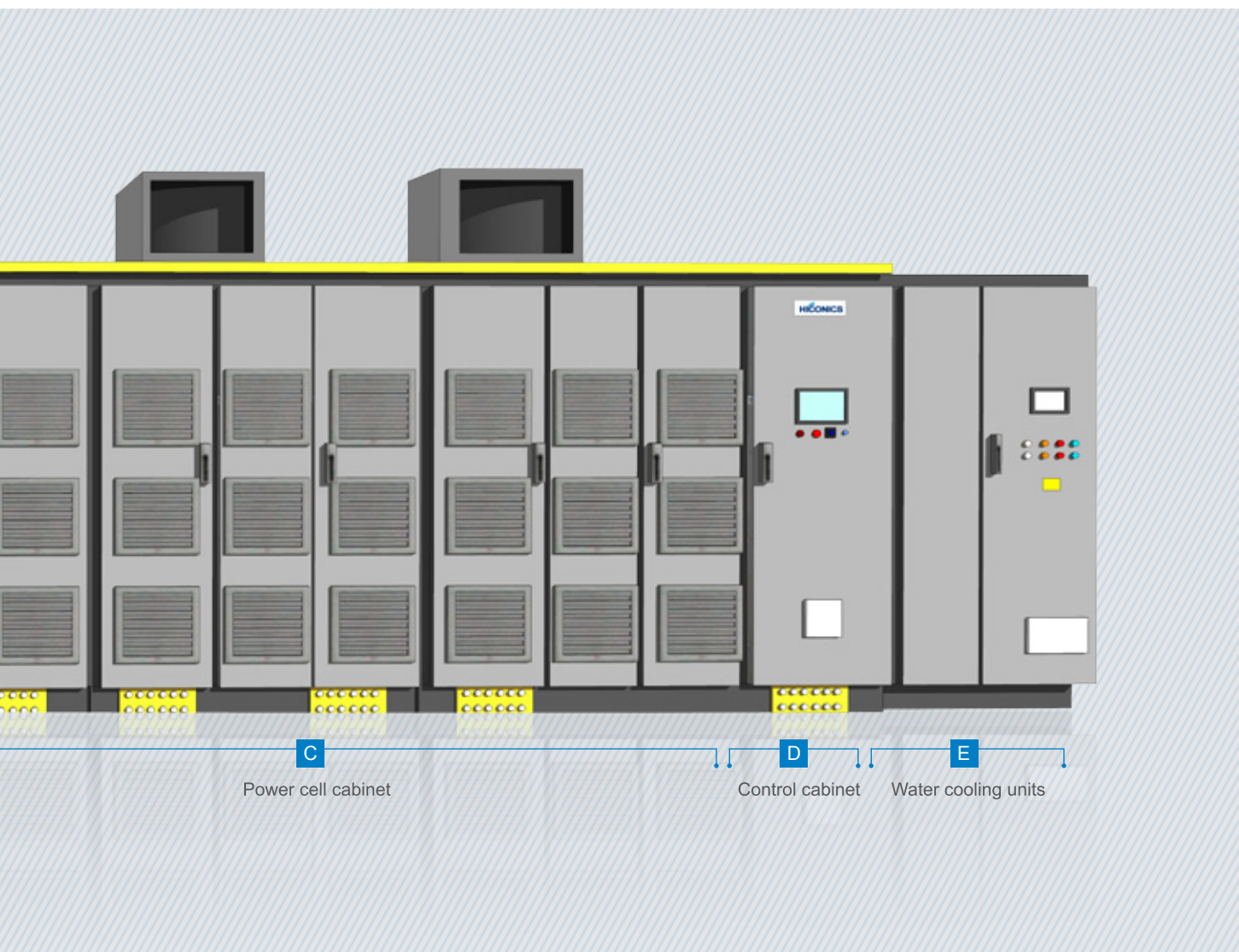
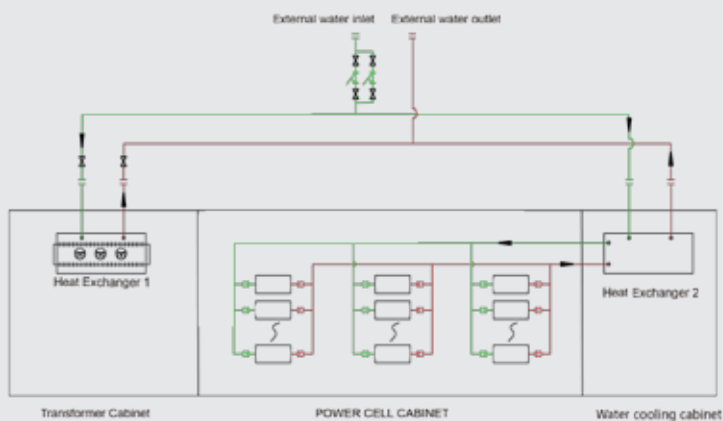
02

STRUCTURE OF WATER-COOLED MV DRIVE



> The water circulating system principle of the water-cooled MV drives

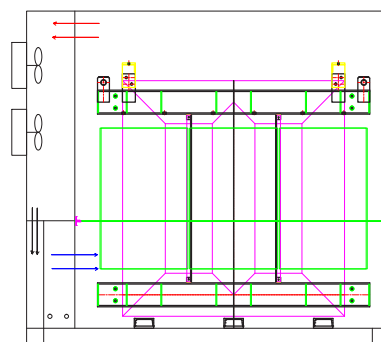
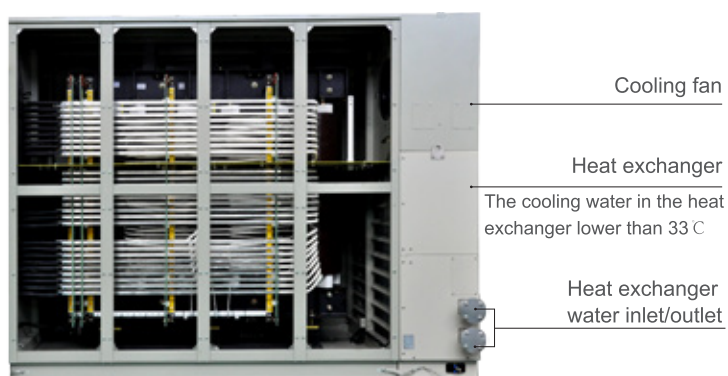
The water circulating system includes: internal water circulating system and external water circulating system. As the figure shows, the water circulation between plate-type heat exchanger (in the water cooling cabinet) and the power cells called the internal water circulation, also called primary circulation; the water circulation between the whole drive and the external cooling water is called external water circulating system, also called secondary circulation.





A + B Air-water heat exchange cooling units + Transformer cabinet

Transformer cabinet includes the transformer and air-water heat exchange unit. The “air-water heat exchange cooling unit” is used to cool down the phase shift transformer, that means to take the heat produced by transformer to the air channel by using fans, the collected heat air goes through the heat exchanger, passing the heat to the cooling water in the pipes in the heat exchanger. The air after cooling will return back to the transformer cabinet, maintaining the cabinet temperature to a certain level. At the same time, the cooling water in the pipes will flow out from the exit, taking the heat outside the drive.



> Working Features

01 Parameter display

The pipes that the cooling water passing through, installed a meter to display the circulating water temperature and water flow data;

02 Water drain off to prevent freezing

Air-evacuation valve installed at the top of the heat exchanger, a drainage valve installed at the bottom of the heat exchanger, able to drain off the circulating water to prevent freezing



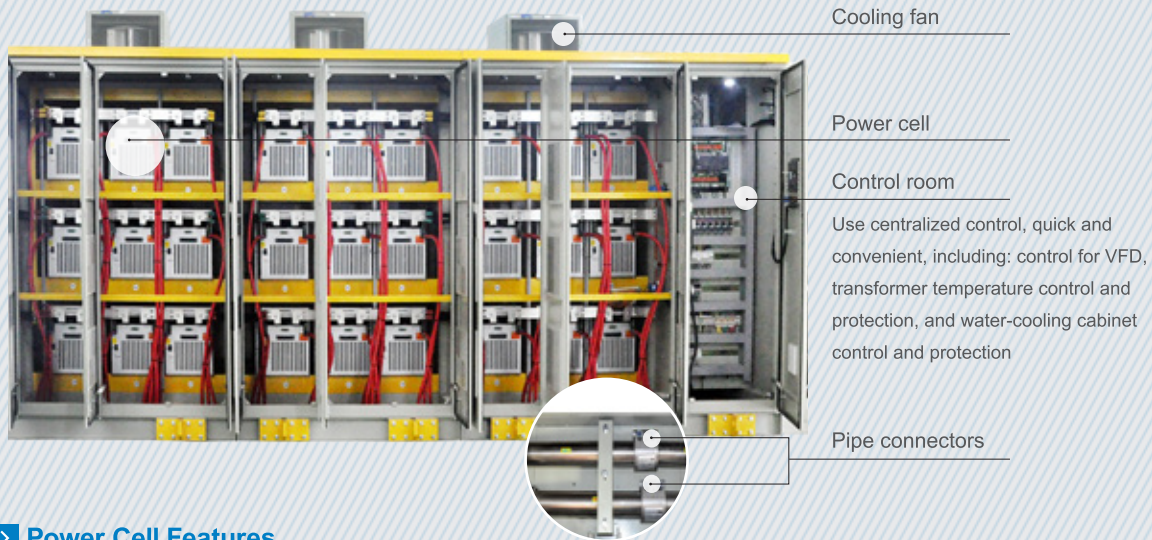
03 Environment monitoring

The entrance of the fan and the air outlet of the heat exchanger both installed temperature transmitter, monitoring the working ambient temperature of transformer

04 Temperature monitoring

PT 100s are installed on transformer primary winding, and the secondary winding, monitoring the transformer winding air duct temperature

C + D C+D Power Cell Cabinet + Control Cabinet



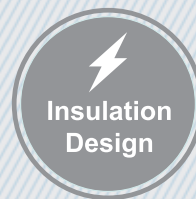
> Power Cell Features



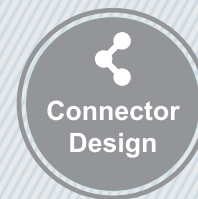
Water cooling primarily;
Air cooling in assistance



Cooling water pipes parallel connected in;
Water flow evenly distributed



Stainless steel, rubber material;
Ensure power cell insulation



Ring gear anti-pull-off type pipe connector;
Convenient and effective for installation

> Advantages of Power Cells



Compact Structure

Compact structure and 30% smaller than air-cooled power cell in size



High Withstand Pressure

Expert design for radiator flow pipe, pressure holding test, withstand pressure achieves 1Mpa.



Easy To Replace

The inlet and outlet of cooling water on the radiator adopt double-cut fast connection quick joints, convenient for replacing the cells.



Reliable Performance

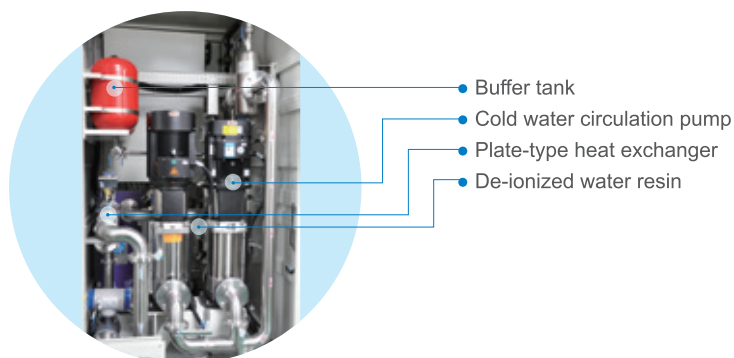
Laminated busbar connection, small parasitic inductance, and product performance more reliable.



Longer life cycle

The Water-cooled radiator has strong heat exchange ability, causing low temperature fluctuation on the components, effectively guaranteeing the life and reliability of the components

E Water Cooling Units



> Principle of Water Cooling Units

Cooling water driven by the main circulation pump, passing along the pipelines at a constant speed and passing through the power cell heat sink, taking the heat with the water; after the water warming up, go along the main pipe into the plate-type heat exchanger to exchange heat; after water cooled down, cooling water back flows to the inlet of the main circulation pump, forming a closed circulation cooling system

01 Main circulating pump: provides the dynamic needed for the closed circulation of the cooling water.

02 Power cell: heat source.

03 Plate-type heat exchanger: heat exchange to take away heat.

Among them, the system control module can automatically adjust the heat exchange proportion according to the preset temperature of the cooling water, accurately controlling the temperature of the water. At the same time, under the high voltage operation condition, the cooling water must have high electrical resistivity, paralleled with de-ionized water treatment device in the main circulating cooling loop, bypassing a certain percentage of the cooling water, flowing through the ion exchanger, continuously removing the ion precipitated from equipment and pipes.

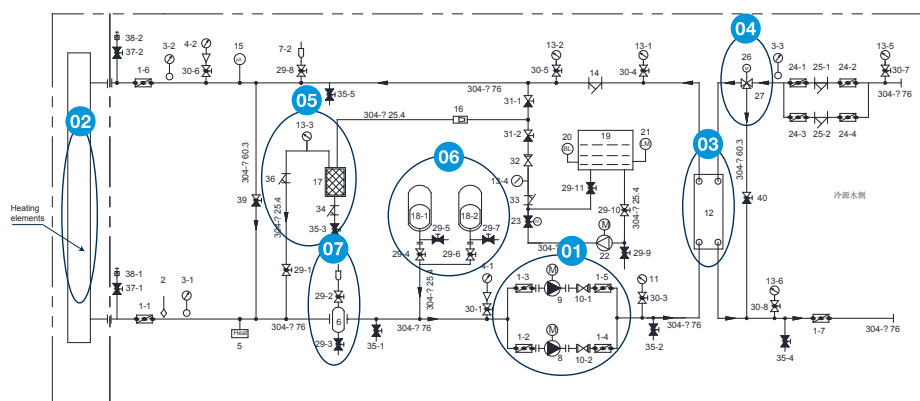
04 Control module: to realize temperature regulation of the cooling water

05 De-ionized tank: make water purified to ensure that the conductivity of water under the safety value.

To keep the pipeline under constant pressure and to keep the cooling water fully filled, buffer tank and the water replenishing device are installed, which can effectively control the pressure balance in pipeline, to buffer the cooling water volume change caused by the temperature change.

06 Water- vapor tank: to adjust the pressure balance in the closed pipe.

07 Air exhausting tank: to separate the water and the air and remove the air from the water.



> Water-cooling Units Characteristics



**High
Anticorrosion
Ability**

All devices in the pipes are made of stainless steel materials



**Convenient for
Maintenance**

Main circulating pump using redundancy design and can be replaced and maintained on-line



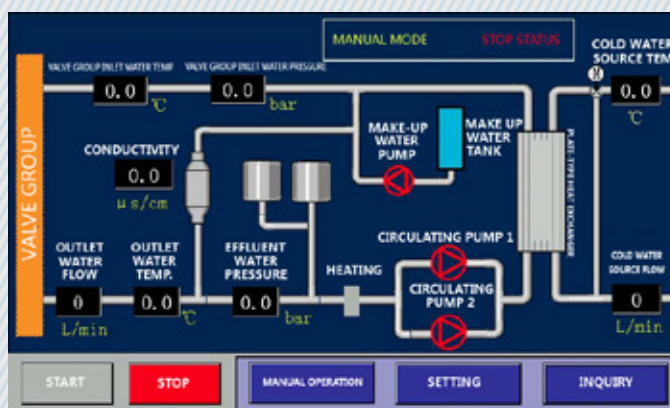
**Remote
Monitoring**

Independent PLC monitoring, realize remote monitoring



**Pre-warning
Protection**

Full and comprehensive pre-warning protection function. Real-time monitoring.



HMI – remote monitoring realized

> Water-cooling Cabinet Functions



Constant Temperature Control

PID logic control on electric three-way valve based on the deviation between the actual value and the set value of inlet water temperature of valve group, regulating the flow rate of the cold water, so to ensure the constant water temperature.



Condensation Control

The temperature and humidity transmitter can display in real time the ambient humidity, temperature and the corresponding dew point temperature in the valve chamber, but when the temperature and humidity is higher or close to the dew point temperature, the electric heater can be automatically turned on.



Leakage Protection

Liquid leakage detection is provided inside the water-cooling cabinet, and PLC will give the alarm signal immediately when there is water leakage in the cabinet.



Ion Purifying

Ion exchange resin is specially used for removing micro ion and preventing leakage current under high voltage environment. Conductivity meter can monitor the change of circulating water quality in real time and gives alarm.



Automatic Water Make up

When the outlet pressure of the valve group is low, the system can automatically open the water supplement solenoid valve, and the make-up water pump starts to replenish water until the stop pressure of the make-up water pump.



Antifreeze Setting

The internal circulating water is a mixture of de-ionized water and ethylene glycol, the concentration of the glycol should be determined by the minimum ambient temperature of the site. See the table on the right.

Ambient Temperature	Ethylene Glycol Mass Concentration
0	0
-5	13
-10	22
-15	29.5
-20	36
-25	41.2
-30	45.8
-35	48.7
-40	52.9
-45	55.7
-50	58

Relationship Diagram between Temperature and Concentration

03

EXTERNAL COOLING WATER FOR THE DRIVE

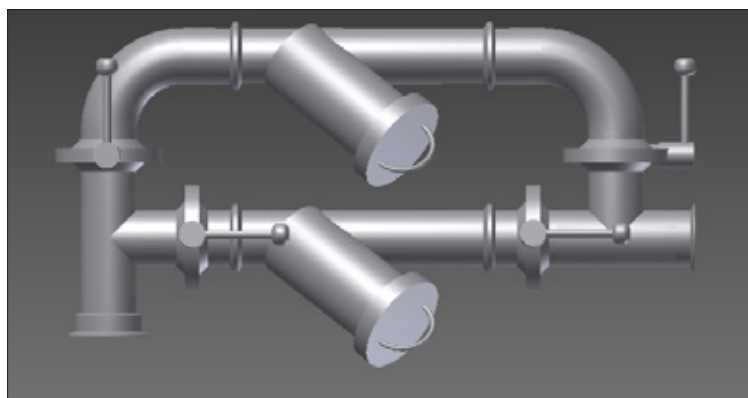
According to the difference of the cooling capacity and the site environment, the system releases the heat into the environment by using twice heat exchange measures such as water-water, water-air, etc. There are three schemes for on-site external water supply.

Scheme 1 Site provides the required external water

The external water quality and temperature requirements are shown in the table:

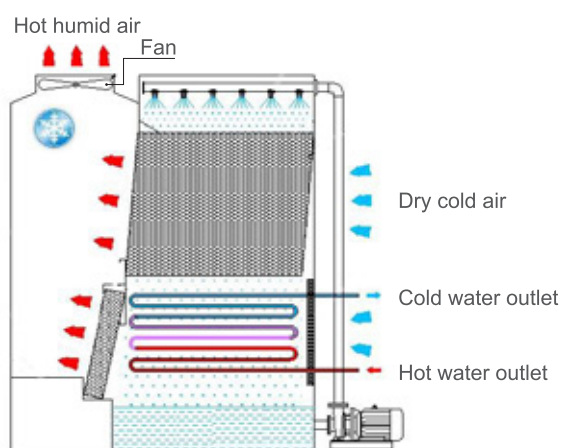
No	Name	Requirement	Quantifier
1	Soluble total solids	≤ 1000	mg/L
2	External water PH	6.5-8.5	
3	Hardness	≤ 450	mg/L
4	chloride	≤ 250	mg/L
5	Sulfate	≤ 250	mg/L
6	External water suspended matter	≤ 30	mg/L
7	External water inlet pressure	2.5-6	Bar
8	Solid particle size	≤ 200	μm
9	External water flow required	Depending on the drive model	t/h
11	External enter water temperature (T1)	5-32	$^{\circ}\text{C}$
12	External exit water temperature	T1+5	$^{\circ}\text{C}$

If the external water on site is turbid, the filter need to be added in front of external water inlet valve, as shown in the figure below, the filter accuracy is 200 μm (80 meshes); the filter has bypass function and the filter of external water tube needs regular cleaning according to the water quality on site.



Scheme 2 Closed-type cooling tower

System working principle: As shown in the figure below, the working fluid (pure water) circulates in the coil of closed cooling tower; working fluid heat disperses into the passing water in the coils. At the same time, the outside air enters from the side air-inlet grille, it is perpendicular to the water flow direction, flowing passing the coil crosswise, a small part of the water evaporates and absorb heat. The hot humid air is being exhausted from the top of the cooling tower fan into the atmosphere; the rest of the water falls into the bottom of the water dish, being recycled to the water distribution system by the water pump, passing pre-cooling fillers, and pours back into the coil.



Working principle diagram of closed-type cooling tower



Closed-type cooling tower

Scheme 3 Precision cold water machine

Working principle of the system: the cooling system is mainly composed of compressor, condenser, expansion valve, plate heat exchanger, cooling fan, water tank, internal water circulating pump, external water circulating pump, etc. On the one hand, cold water in water tank flows into the external water inlet pipe on the water cooling cabinet by the an external water circulating pump, and after heat exchanged in the plate-type heat exchanger it flows back to the water tank, to decrease the internal water temperature of the water cooling cabinet; on the other hand, the back hot water flown in the water tank exchanges heat with the low temp. refrigerant by the plate-type heat exchanger, reduces temperature and maintains the cold water temperature in the water tank; the high temp. refrigerant exchanges heat with the environment by cooling fans.



Precision cold water machine

04

APPLICATION
CASES

A

Inner Mongolia Daban Power Generation

MV Drive capacity: 10kV/12500kW×2

Load: Electrically driven feed pump**Key words:** Power plant 600MW unit sets.

Two sets of Hiconics 6kV/12500kW MV drives used on the electrically driven feed pump water on the 1st unit of the 2 set of 600MW. After the retrofit, the energy saving rate of the pump reaches 35%, the power plant electricity consumption rate reduces by 0.8%.



B

Inner Mongolia Jinghai Coal Power Generation

MV Drive capacity: 6kV/3200kW×8

Load: Primary and secondary fan**Key words:** 8 sets of Water-cooled drives in total

The 8 sets of 6kV/3200kW water-cooled type MV drives have been put into use to control the primary fan and secondary fan of 4×330MW Circulating fluidized bed aircooling unit. This increases the economic efficiency of the unit operation.



C

Ordos City Yihua Mining

MV Drive capacity: 6kV/3300kW×2

Load: Mine hoist

Key words: Hoist control

The 6kV / 3300 kW four quadrant AFE water cooled MV drives adopt double linkage control, controlling the synchronous mining hoist. This is the largest power water cooled drive used on mining hoist in China.



D

Shanxi Zhaoguang Power Generation

MV Drive capacity: 6kV/8000kW×4

Load: Induced Fan

Key words: BF & ID Fan Combined

The 6kV/8000kW water-cooled MV drives was used on the retrofit of 600MW supercritical double cylinder double exhaust steam direct air cooling unit.



E

One Steel Plant Overseas

MV Drive capacity: 6kV/10000kW×1

Load: Compressor

Key words: biggest current—1540A

The 6kV/10000kW water-cooled MV drive controls the compressor motor in the oxygen generation system in a steel plant overseas. It overcomes the complex environment, improves the equipment power factor, increases productivity and reduces costs.



F

Lingbao Jincheng Metallurgy

MV Drive capacity: 10kV/7100kW×1

Load: Germany 3K fan

Key words: special fan.

The 10kV/7100kW water-cooled MV drive was applied in 2000 tons of complex refractory gold concentrate multi-metal recovery project.



G

Xuzhou Coal Ming Group Aksu Thermal Power

MV Drive capacity: 10kV/7400kW×1

Load: Electrical water feed pump

Key words: Aid construction of western development.

The 6kV/5000kW water-cooled MV drive was used in the electric feed pump of the 2# unit in the Xu mine's 200MW power unit for frequency conversion reconstruction for energy-saving. After the modification, the power saving effect exceeded the expectation, and the electricity use rate of the plant decreased by 0.41%.



H

The Center for Fusion Science (CFS)

MV Drive capacity: 6kV/10000 kW

Load: Pulse generator set

Key words: Experimental platform

The 6kV/10000kW water-cooled type MV drive used on 8500 kW motor for the frequency control. It is used in the magnetic confinement nuclear fusion experimental device for pulse generator (man-made sun), which is the first case in this area in China.



05

FUNCTIONS AND FEATURES

- **Synchronous transfer function:**

Using phase lock loop technology to adjust the output of the drive, make the frequency, phase position and a mplitude match those of the network. Achieve switching motor power from medium voltage drive to the network power (bypass mode) or vice versa (drive mode).

Multi-motor synchronous transfer function allows users to start multiple (up to 4) MV motors sequentially in drive mode and control the last motor speed.

- **Flying start:**

Also called “speed start”, when the motor is still rotating, the drive will automatically estimate the motor speed, and output the same voltage waveform with the motor frequency. When start, current is limited within the rated current, this will not cause over current problem.

Used when the drive automatically restarts after power loss, or Motor switch from network running to drive mode running.

- **Instant power loss:**

When grid voltage drop or power off for less than 1000ms, VFD can run without stop to support process at site.

- **Torque boost:**

Increasing the output voltage when at low frequency, to boost the motor torque when running with low speed. This can solve the big torque load starting problem.

- **Master-slave control:**

For multiple VFD system, by fiber communication, VFD analyzes torque and load to balance motors running speed and torque.

- **Double winding motor control:**

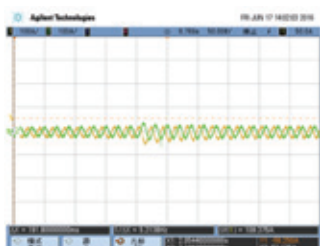
Double winding motor has higher PF and efficiency, smaller loop circuit increase system capacity. VFD driving the double winding motor can realize full speed with half load, half speed with full load, improve system stability.

- **Power cell braking function:**

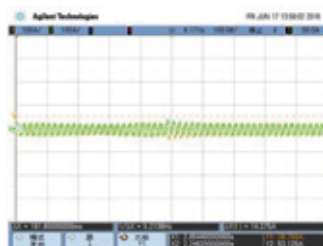
It uses for site need quick braking at lower frequency; the energy will be consumed by heat.

- **Neutral point shift:**

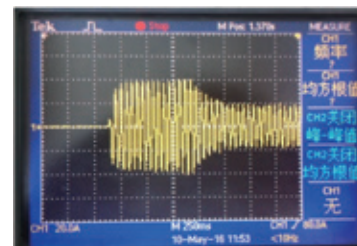
When 1 power cell fault, other power cells can adjust output voltage to keep normal output voltage, by change phase position to maintain continuous running.



Current valid value 15A, switch peak 31A before sync transfer



The motor current waveform during sync transfer



Flying start motor/network waveform

06

TYPE CODE AND
SPECIFICATION

HI VERT-Y/T V F 06 / 500 W

Default: Air-cooling; W: Water-cooling

The rated output current (A)

The rated output voltage (kV)

F : Regenerative

Default value :Common VFD ; V: Vector control

Application motor: Y-Asynchronous motor;T-Synchronous motor

Product initials

Company initials

VFD rated capacity/Motor power range	400~25000kVA /315~20000kW
Rated voltage	6kV/10kV (-20% ~ +5%) able to keep running by derating under 35% voltage drop (3.3kV, 4.16kV on customers' request)
Rated frequency	50Hz/60Hz (-10% ~ +10%)
Modulation technique	SVPWM, sensorless vector control
Control power	380VAC, ≤5kVA (depending on the drive power)
Input power factor	>0.96
Efficiency	≥96% (whole drive); >98% (inverter part)
Output frequency range	0Hz ~ 80Hz ※
Frequency resolution	0.01Hz/ 0.002Hz
Instantaneous over-current protection	150% protect immediately (customized)
Overload capability	120% 125s
Current limited protection	10%-150% (1000ms~3s inverse time protection)
Analog input	Three ways 4~20mA/2-10V (excitation feedback 4-20mA/2-10V included)
Analog output	Four ways 4~20mA (two ways are fixed and the other two ways are optional)
Host communication	Isolated RS485 interface, ModBus RTU, Profibus DP(optional), Industry Ethernet Protocol (optional)
Acceleration and deceleration time range	5s ~ 1600s
DI inputs and outputs	14 inputs/ 22 outputs
Environment temperature	-5 ~ +45°C ※
Storage/transportation temperature	-40 ~ +70°C ※
Cooling	Water cooled
Humidity	<95%, no condensation ※
Altitude	≤1500m, when altitude is higher than 1500m, every 100 meters higher, 1% derating of VFD
Dust	Non-conductive, no causticity, <6.5mg/dm³ ※
Protection level	IP41

07 DIMENSION

> 6kV (6 cell) MV drive dimensions/external water flow required/ flange diameters required


Drive power (kW)	Drive Model	Drive dimension(mm) (W×D×H)	Air-water cooling units			Water cooling units		
			Power loss (kW)	Water flow (t/h)	Flange (mm)	Power loss (kW)	Water flow (t/h)	Flange (mm)
315	HIVERT-Y/T 06 6/040W	5100×1200×1900	60	11.4	DN32	50	9.5	DN32
400	HIVERT-Y/T 06 6/048W							
500	HIVERT-Y/T 06 6/061W							
630	HIVERT-Y/T 06 6/077W	5800×1200×2200	80	15.2	DN40	50	9.5	DN40
800	HIVERT-Y/T 06 6/096W							
1000	HIVERT-Y/T 06 6/130W							
1250	HIVERT-Y/T 06 6/154W	6900×1200×2300	100	19.0	DN40	50	9.5	DN40
1400	HIVERT-Y/T 06 6/173W							
1600	HIVERT-Y/T 06 6/192W							
1800	HIVERT-Y/T 06 6/220W							
2000	HIVERT-Y/T 06 6/243W							
2250	HIVERT-Y/T 06 6/275W	7870×1400×2400	80	15.2	DN40	80	15.2	DN40
2500	HIVERT-Y/T 06 6/304W							
2800	HIVERT-Y/T 06 6/340W							
3200	HIVERT-Y/T 06 6/400W							
3600	HIVERT-Y/T 06 6/425W	9700×1600×2800/2400	130	24.7	DN65	100	19.0	DN65
4000	HIVERT-Y/T 06 6/500W							
5000	HIVERT-Y/T 06 6/600W							
5600	HIVERT-Y/T 06 6/660W	9850×1600×2800/2400	100	19.0	DN65	130	24.7	DN65
6300	HIVERT-Y/T 06 6/750W							
6600	HIVERT-Y/T 06 6/800W							
8000	HIVERT-Y/T 06 6/960W	10450×1800×2800/2400	130	24.7	DN65	150	28.5	DN65
10000	HIVERT-Y/T 06 6/1200W	14400×1800×2800/2400	150	28.5	DN65	200	38.0	DN80
12500	HIVERT-Y/T 06 6/1250W		200	38.0	DN65			

> 10kV (9 cell) MV drive dimensions/external water flow required/ flange diameters required


Drive power (kW)	Drive model	Drive dimension(mm) (W×D×H)	Air-water cooling units			Water cooling units		
			Power loss (kW)	Water flow (t/h)	Flange (mm)	Power loss (kW)	Water flow (t/h)	Flange (mm)
400	HIVERT-Y/T 10 9/031W	5900×1200×1900	60	11.4	DN32	50	9.5	DN32
500	HIVERT-Y/T 10 9/040W							
630	HIVERT-Y/T 10 9/048W							
800	HIVERT-Y/T 10 9/061W							
1000	HIVERT-Y/T 10 9/077W	6400×1200×2200	80	15.2	DN40	50	9.5	DN40
1250	HIVERT-Y/T 10 9/096W							
1400	HIVERT-Y/T 10 9/104W							
1600	HIVERT-Y/T 10 9/115W							
1800	HIVERT-Y/T 10 9/130W							
2000	HIVERT-Y/T 10 9/154W	7500×1200×2300	100	19.0	DN40	50	9.5	DN40
2250	HIVERT-Y/T 10 9/165W							
2500	HIVERT-Y/T 10 9/192W							
2800	HIVERT-Y/T 10 9/205W							
3200	HIVERT-Y/T 10 9/243W							
3600	HIVERT-Y/T 10 9/260W	9920×1600/1400×2400	100	19.0	DN50	100	19.0	DN50
4000	HIVERT-Y/T 10 9/304W							
4500	HIVERT-Y/T 10 9/325W							
5000	HIVERT-Y/T 10 9/364W							
5500	HIVERT-Y/T 10 9/400W							
6300	HIVERT-Y/T 10 9/462W	11350×1600×2800/2400	130	24.7	DN65	150	28.5	DN65
7100	HIVERT-Y/T 10 9/500W							
8000	HIVERT-Y/T 10 9/600W							
10000	HIVERT-Y/T 10 9/800W	11850×1600×2800/2400※	150	28.5	DN65	200	38.0	DN65
12500	HIVERT-Y/T 10 9/1000W	15300×(1800+600)×2800/2400※	200	38.0	DN80	200	38.0	DN80
16000	HIVERT-Y/T 10 9/1250W		250	47.5	DN80	300	57.0	DN80
20000	HIVERT-Y/T 10 9/1445W		300	57.0	DN100	300	57.0	DN100

Note: ※ The dimensions are only estimated.

> 6kV (6 cell) Enclosed-type cooling tower model and pipe inlet/outlet dimension

Name	Drive model (kW/kW)	Enclosed-type cooling tower												
		Cooling tower model	Inlet/ outlet pipe diameter	Fan power (kw)	Spray pump power (kw)	Blow- off pipe diameter	Water make- up pipe diameter	Dimension(mm) (L×W×H)	Main tower weight (kg)	Working weight (kg)	Water pump model (one for use one for spare)	Power (kw)	Hydraulic head (m)	Water flow (t/h)
	6/315	GHM-230	DN80	1.1×2	1.5	DN40	DN25	2960×1940×2200	1050	2020	DFG65-160/2/4	4	32	25
	6/400													
	6/500													
	6/630	GHM-230	DN80	1.1×2	1.5	DN40	DN25	2960×1940×2200	1050	2020	DFG65-160/2/4	4	32	25
	6/800													
	6/1000													
	6/1250	GHM-340	DN80	1.1×3	2.2	DN40	DN25	3360×1940×2200	1310	2540	DFG65-160(I)/2/7.5	7.5	32	50
	6/1400													
	6/1600													
	6/1800	GHM-340	DN80	1.1×3	2.2	DN40	DN25	3360×1940×2200	1310	2540	DFG65-160(I)/2/7.5	7.5	32	50
	6/2000													
	6/2250													
	6/2500	GHM-340	DN80	1.1×3	2.2	DN40	DN25	3360×1940×2200	1310	2540	DFG65-160(I)/2/7.5	7.5	32	50
	6/2800													
	6/3200													
	6/3600	GHM-350	DN80×2	1.1×3	2.2	DN40	DN25	3760×2240×2200	1450	3080	DFG65-160(I)/2/7.5	7.5	32	50
	6/4000													
	6/5000													
6/5600	GHM-350	DN80×2	1.1×3	2.2	DN40	DN25	3760×2240×2200	1450	3080	DFG65-160(I)/2/7.5	7.5	32	50	
6/6300														
6/6600														
6/8000	GHM-365	DN80×2	1.5×3	2.2	DN40	DN25	3360×1940×2730	1520	3200	DFG80-160(I)/2/15	15	32	100	
6/10000	GHM-380	DN80×2	1.5×4	2.2	DN40	DN25	4220×2240×2680	2050	4920	DFG80-160(I)/2/15	15	32	100	
6/12500	GHM-3100	DN80×2	1.5×4	2.2	DN40	DN25	4220×2240×2840	2150	5100	DFG80-160(I)/2/15	15	32	100	

> 10kV (9 cell) Enclosed-type cooling tower model and pipe inlet/outlet dimension

Name	Drive model (kW/kW)	Enclosed-type cooling tower													
		Cooling tower model	Inlet/ outlet pipe diameter	Fan power (kW)	Spray pump power (kW)	Blow- off pipe diameter	Water make- up pipe diameter	Dimension(mm) (L×W×H)	Main tower weight (kg)	Working weight (kg)	Water pump model (one for use one for spare)	Power (kW)	Hydraulic head (m)	Water flow flow (t/h)	
	10/400	GHM-230	DN80	1.1×2	1.5	DN40	DN25	2960×1940×2200	1050	2020	DFG65-160/2/4	4	32	25	
	10/500														
	10/630														
	10/800														
	10/1000	GHM-230	DN80	1.1×2	1.5	DN40	DN25	2960×1940×2200	1050	2020	DFG65-160/2/4	4	32	25	
	10/1250														
	10/1400														
	10/1600														
	10/1800	GHM-340	DN80	1.1×3	2.2	DN40	DN25	3360×1940×2200	1310	2540	DFG65-160(I)/2/7.5	7.5	32	50	
	10/2000														
	10/2250														
	10/2500														
	10/2800	GHM-350	DN80×2	1.1×3	2.2	DN40	DN25	3760×2240×2200	1450	3080	DFG65-160(I)/2/7.5	7.5	32	50	
	10/3200														
	10/3600														
	10/4000														
	10/4500	GHM-365	DN80×2	1.5×3	2.2	DN40	DN25	3360×1940×2730	1520	3200	DFG80-160(I)/2/15	15	32	100	
	10/5000														
	10/5500														
	10/6300														
10/7100	GHM-380	DN80×2	1.5×4	2.2	DN40	DN25	4220×2240×2680	2050	4920	DFG80-160(I)/2/15	15	32	100		
10/8000															
10/10000															
10/12500															
10/16000	GHM-5125	DN100×2	1.5×4	3.7	DN40	DN40	4740×2240×2910	2800	6800	DFG125-160/2/22	22	32	160		
10/20000															
10/25000															
10/30000															

