

# GD5000 Series

High Performance Vector Control Medium Voltage Drive



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# About INVT



2019 revenue  
**314 million**



Announced time  
**13<sup>th</sup> Jan, 2010**



Employer  
more than **3000**



Patent  
More than **1140** pics



R&D center  
**10**



Manufacturing base  
**2**



Subsidiary  
**15**



Overseas subsidiary&office  
**11** countries



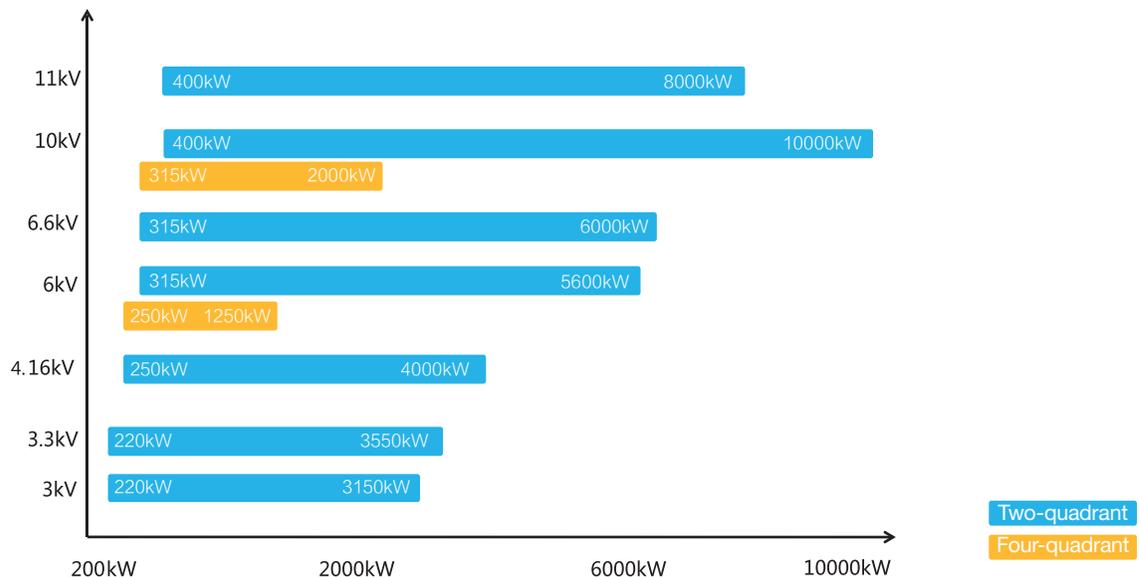
Global partners  
more than **80** countries



## Product introduction

GD5000 series medium-voltage VFDs are the second generation medium-voltage variable frequency drive independently developed, designed and manufactured by Shenzhen INVT Electric Co., Ltd. By adopting the most popular serial technology of power units, taking DSP+ARM+FPGA three-core processor as the control core, and integrating the most advanced motor vector control algorithm, the system owns the characteristics of high control precision, fast response speed, and low frequency and large torque, which are quite suitable for medium-voltage asynchronous motor and synchronous motor energy saving speed regulation and process improvement. GD5000 series medium-voltage VFDs have been widely used in fans, pumps, compressors, belt conveyors, hoists, and other loads.

## Product family tree



## Application fields

### Power

ID (induced draft) fan, FD (forced draught) fan, primary fan, secondary fan, feed water pump, circulating pump, condensate pump, mortar pump, etc.



### Mining

Main ventilator, forcing fan, exhaust fan, air compressor, gas drainage pump, medium pump, draining pump, belt conveyor, roller press, primary and secondary mine hoist, etc.



### Metallurgy

Sintering main drawing fan, blast furnace blower, dusting blower, sulfur dioxide blower, ring cooling fan, combustion fan, circulating pump, slag washing pump, dephosphorization pump, chemical liquid pump, slurry pump, rolling mill, etc.



### Oil and gas

Fuel supply pump, water injection pump, electric submersible pump, LNG pressure pump, etc.



### Cement

High temperature fan, exhaust fan at furnace head, exhaust fan at furnace end, coal mill circulating fan, raw mill circulating fan, cement mill circulating fan, ball mill fan, etc.



### Municipal engineering

Clean water pump, sewage pump, purifying pump, mixed-flow pump, oxygen blower, etc.



### Chemical

Dusting blower, gas blower, roots blower, sweetening fan, gas compressor (nitrogen, CO<sub>2</sub>, and ammonia), circulating pump, etc.



### Others

Pharmacy and paper making: fan, and water pump.  
Sugar industry: feeder, and presser  
Rubber and plastic industry: internal mixer.



## Product structure

### Cooling fan

- Well-known brand, high reliability, large air flow, and small noise

### Power unit cabinet

- Power units in series connection. Each power unit is equivalent to one AC-DC-AC voltage-type single-phase low-voltage VFD;
- Modular design. All power units can be interchanged.



### Touch screen

- TFT LCD, lifelike display;
- User-friendly interface, easy to operate.



### Transformer cabinet

- Adopting phase-shifting transformer for multi-pulse rectification greatly improves current waveforms at the grid side and effectively reduces harmonic pollution to the grid;
- Equipped with temperature controller to monitor the real-time states of the transformer and ensure the safe operation.

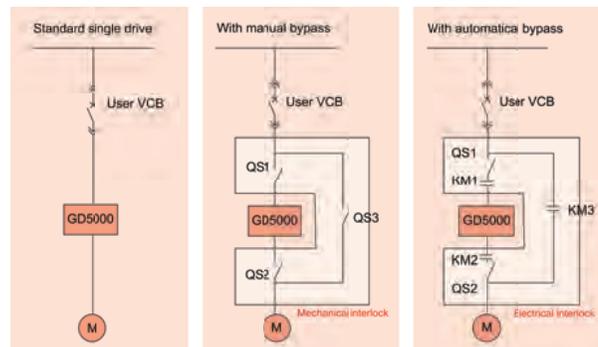


### Control cabinet

- DSP+FPGA+ARM 3-core control technology, high system control precision and rapid response speed;
- Adopt optical fiber communication with strong anti-interference performance between main control board and units.

## System bypass solution

- Manual bypass system need extra GD5000-MS manual bypass cabinet
- Automatic bypass system need extra GD5000-AS automatic bypass cabinet
- Support 1 drive more solution base on client requirements



## Product features

### 1 Three kinds of motor control technologies

#### High-performance V/F

Motor common control mode, supports various control curves and V/F separation function.

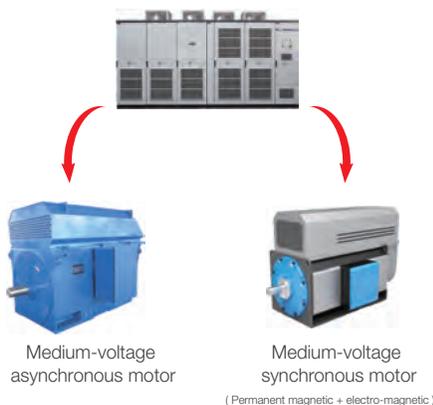
#### Open-loop vector

High precision control mode, and there is no need to install the speed sensor.

#### Closed-loop vector

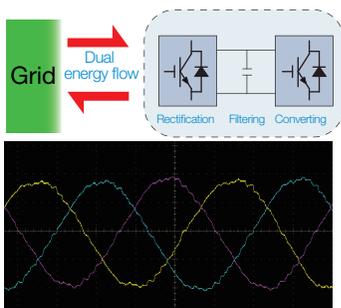
Ultra-high precision control mode, supports incremental encoders.

### 2 Drive two kinds of motors



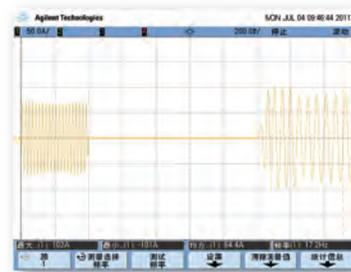
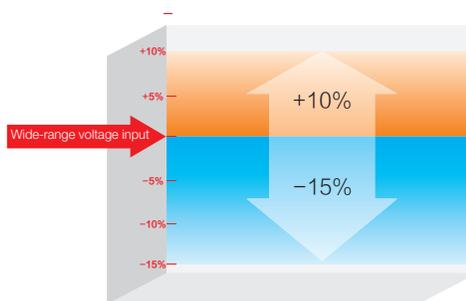
### 3 Four-quadrant driving technology (Four-quadrant VFDs)

- The power units use IGBT for rectification, achieving dual energy flow, energy saving and environmental protection.
- With 100% full power energy feedback capability.



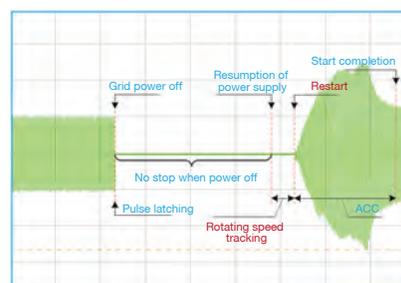
### 4 LVRT low-voltage ride through technology

- Wide-range voltage anti-interference capability. The system has AVR (automatic voltage regulation) function for meeting the harsh grid environment.  
85%-110% Full-load output  
65%-85% Derating output  
110%-120% Derating output
- No stop upon instantaneous power-off. During running, the system will not stop after the user medium-voltage bus powers off in the allowed time (0-5s). The former set value can be reached again if the voltage is restored within 0.1-1s after power-off.



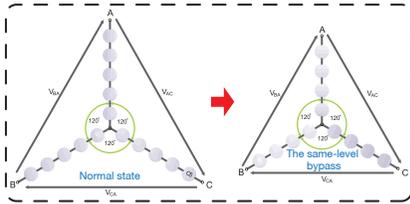
### 5 Full-band rotating speed tracking

- When the VFD is started under the condition that the running state of the motor is unknown, the system can accurately track the current rotating speed and direction of the motor, and control matching output voltage, so as to realize the flying start and reduce the impact on the power grid.

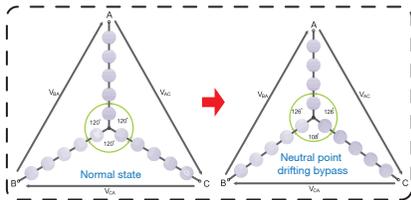


## 6 Unit bypass technology

- The same-level bypass. When one unit is failed, the system can automatically bypasses the corresponding unit of each phase, which is suitable for occasions where derating to run can be conducted.

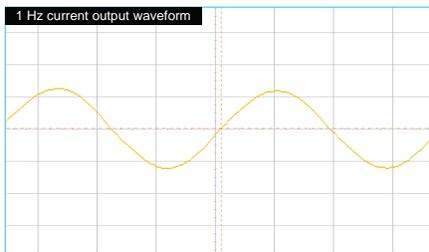


- Neutral point drifting bypass. Only bypass failed units. With medium voltage output capability and strong on-site adaptability, it is suitable for extreme cases.



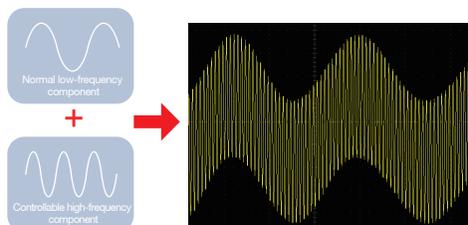
## 7 Excellent low frequency control

- With advanced dead zone compensation technology, good low-frequency waveforms, and optimized algorithm of low frequency oscillation suppression, no motor resonance will occur.



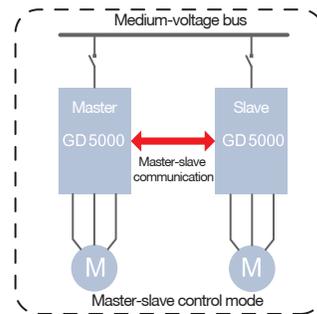
## 8 Dual-frequency braking technology

- By superimposing the reverse high-frequency component on the output voltage, a strong braking torque is generated, which can greatly reduce the motor deceleration time and apply to the occasions with high requirements on load braking.

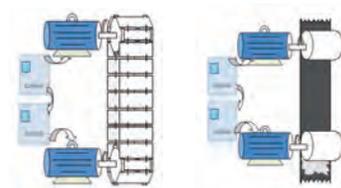


## 9 Master-slave control technology

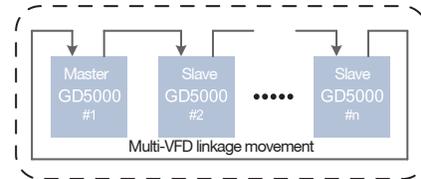
- With the multi-motor drive system solution, it can realize multi-motor coordination control and obtain power balance.



- The load can be connected rigidly or flexibly;

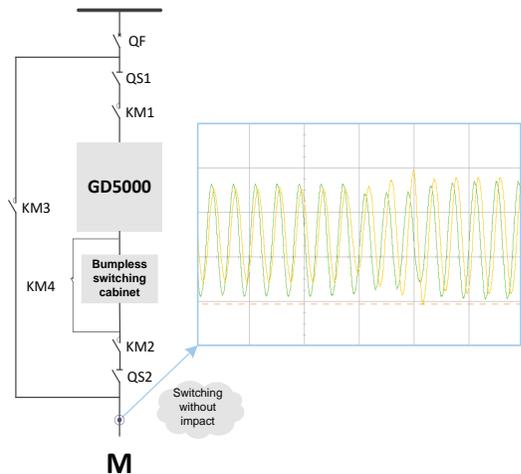


- Optical loop connection. Support a maximum of 16 motors for master-slave control, and the master can be set flexibly according to on-site conditions.



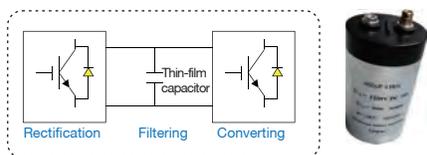
## 10 Synchronous bumpless switching

- With advanced "frequency-phase locking" control technology and high frequency-phase synchronization precision, smooth switching without impact between variable frequency and power frequency can be realized.
- Apply to the occasions of one-drive-more and soft start of the motor with large capacity.



## 11 Optional thin-film capacitor with long service life

- Medium voltage endurance capability and very high insulation resistance;
- Low ESR (equivalent series resistance) and strong resistance to ripple current;
- Good anti-pulse capability and high reliability;
- Very low loss, less heat, and long service life.



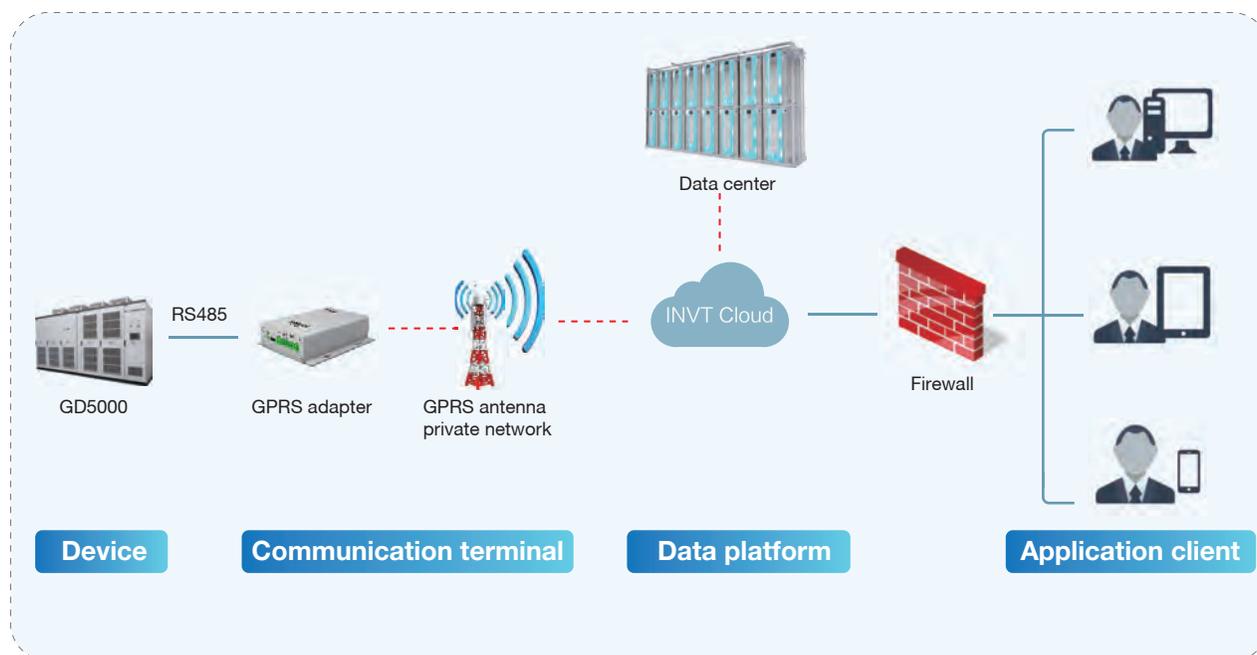
## 12 Rich bus interfaces

- Support various communication protocols including Modbus-RTU, Profibus-DP, Profinet, and UDP/IP, facilitating the connection with user DCS system and realization of device centralized management.



## 13 IoT monitoring program

- Remote monitoring: Conduct real-time monitoring on device status and operation data through computer, mobile phone or tablet PC.
- Device management: Establish data files and reports for each device to so as to facilitate historical tracing.
- Active fault alarm: Push the fault information to the customer in real time by SMS and change the passive inspection to active alarm for improving the work efficiency.
- Remote fault diagnosis: The manufacturer assists in fault analysis positioning to shorten the maintenance time.

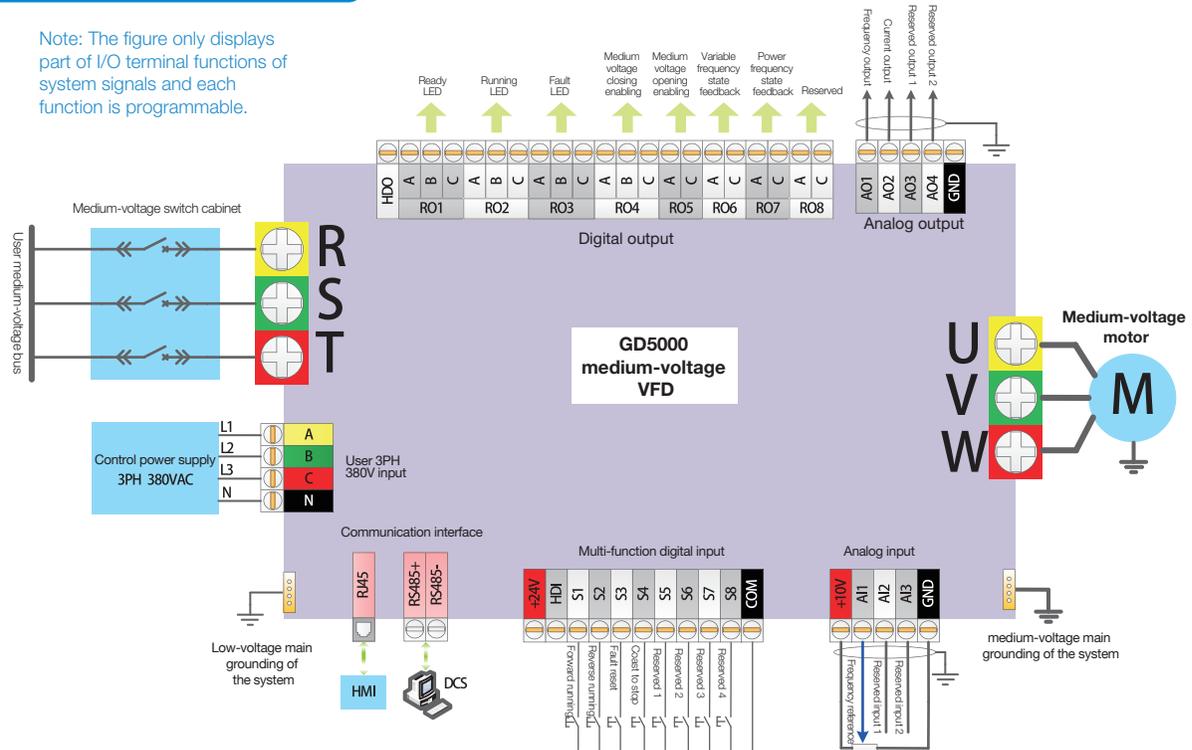


## Technical parameters

Item		Two-quadrant parameters							Four-quadrant parameters	
Input	Voltage degree	AC 3PH							AC 3PH	
		3kV	3.3kV	4.16kV	6kV	6.6kV	10kV	11kV	6kV	10kV
	Pulse number	18	18	24	30	36	48	54	30	48
	Voltage fluctuation range	-15%→+10%(Max. support: -35%→+20%, derating power output)								
	Voltage frequency	50/60Hz; ±5%								
	Power factor	≧0.97 (full load)								
	System efficiency	Converter Efficiency ≧98%, system Efficiency ≧96%(full load)								
Current harmonic	≧4%			≧2%				≧4%		
Output	Voltage range	0–rated input voltage								
	Frequency range	0–120Hz (customized)								
	Current harmonic	≧4%			≧2%				≧4%	
Control performance	Control mode	V/F; SVC; VC								
	Speed ratio	1:50 (VF); 1:100 (SVC); 1:200 (VC)								
	Speed control precision	±1% (VF); ±0.4% (SVC); ±0.2% (VC)								
	Torque response time	<200ms (SVC); <100ms (VC)vw								
	Starting torque	0.5Hz 150% of the rated torque (SVC); 0Hz 180% of the rated torque (VC)								
	Overload capacity	120%: 120s; 150%: 5s; 200%: protect immediately								
	ACC/DEC time	0-3600s (customized)								
	Feedback control mode	None							Synchronous rectification control technology	
Feedback capacity	None							100%, that is, the maximum feedback power of the VFD is the same as the maximum output power		
User terminals	Digital input	8 channels digital input (extensible and programmable)								
	Digital output	8 channels relay output (extensible and programmable)								
	Analog input	3 channels: AI1, AI2: 0–10V/0–20mA; AI3: -10V–10V								
	Analog output	4 channels: AO1, AO2, AO3, AO4: 0–10V/0–20mA								
	High-speed pulse input	1 channel: input range: 0–50kHz								
	High-speed pulse output	1 channel: output range: 0–50kHz								
Protection function	System protection	Overcurrent, overvoltage, undervoltage, motor overload, VFD overload, phase loss, overheating, temperature controller fault, access fault, communication fault, etc.								
	Unit protection	Undervoltage, overvoltage, power supply, overheating, input phase loss, VCE fault, power supply fault, communication fault, bypass failure, etc.								
Others	HMI	Touch screen								
	Communication mode	Support Modbus protocol (with standard RS485 interface), Profibus, Profinet, and Ethernet								
	Installation method	Cabinet mounting								
	Protection degree	Standard IP30 (Others optional)								
	Noise degree	≤75dB								
	Feed in and out method	Bottom in and out; other methods are optional								
	Cooling	Forced-air cooling								
	Control power supply	AC 380V±10% (Others optional)								
	MTBF	100000h								
	Environment temperature	-5C→+40C, derate 1.5% for every additional 1C if the temperature is above 40C and the maximum temperature is 50C; run without load if the temperature reaches 60C.								
	Environment humidity	5%–95%, no condensation								
	Altitude	Below 1000m; derate 1% for every additional 100m if the altitude is above 1000m								
Storage	Keep away from dust, direct sunlight, flammable or corrosive gas, oil, steam and vibration									
Vibration amplitude	0.59g below									

## Standard terminals

Note: The figure only displays part of I/O terminal functions of system signals and each function is programmable.



## Product model instruction

GD5000-A□□□□-□□□-XXXX

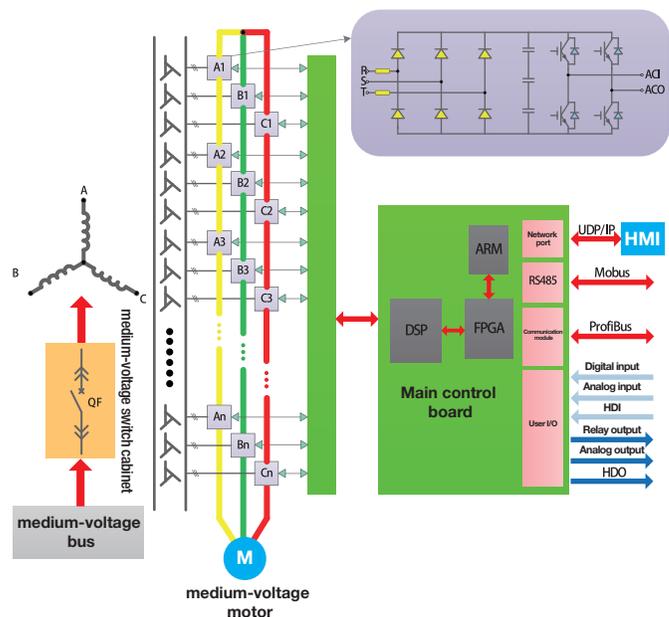
①      ②      ③                      ④      ⑤      ⑥      ⑦      ⑧

①	High-voltage product series name	GD5000: High-performance high-voltage VFD
②	Product type	A: Asynchronous vector product (AM) B: Synchronous vector product (SM)
③	Rated capacity	0500: 500kVA
④	Voltage degree	03: 3kV 3.3: 3.3kV 4.16: 4.16kV 06: 6kV 10: 10kV 11: 11kV
⑤	Lot No.	D: Dual-side maintenance S: Front maintenance L: Integrated machine
⑥	Lot No.	R: Energy feedback system X: If no, default
⑦	Lot No.	C: Bypass system with unit contactor X: If no, default
⑧	Lot No.	Lot No. for special products based on the specific industry or for other purposes

### For example:

GD5000-A3150-06-D indicates GD5000 series high-performance medium-voltage VFD, vector control, drive asynchronous motor, rated capacity 3150kVA, dual-side maintenance, and two-quadrant operation.

## Two-quadrant topology



## Two-quadrant selection table

### 3kV series

VFD model	Rated power (kW)	Rated current (A)	Dimensions W*D*H (mm)	Weight (kg)
GD5000-A0280-03-S	220	54	3200X1200X2720	2416
GD5000-A0315-03-S	250	61	3200X1200X2720	2466
GD5000-A0355-03-S	280	68	3200X1200X2720	2506
GD5000-A0400-03-S	315	77	3800X1200X2720	2731
GD5000-A0450-03-S	355	87	3800X1200X2720	2881
GD5000-A0500-03-S	400	96	3800X1200X2720	2961
GD5000-A0560-03-S	450	108	4000X1200X2720	3149
GD5000-A0630-03-S	500	121	4000X1200X2720	3299
GD5000-A0710-03-S	560	137	4000X1200X2720	3349
GD5000-A0800-03-S	630	154	4000X1200X2720	3549
GD5000-A0900-03-S	710	173	4000X1200X2720	3790
GD5000-A1000-03-S	800	192	4000X1200X2720	3890
GD5000-A1120-03-S	900	216	4000X1200X2720	4030
GD5000-A1250-03-S	1000	241	4000X1200X2720	4380
GD5000-A1400-03-D	1120	269	5000X1500X2820	5560
GD5000-A1600-03-D	1250	308	5000X1500X2820	5810
GD5000-A1800-03-D	1400	346	5400X1500X2820	6710
GD5000-A2000-03-D	1600	385	5400X1500X2820	7010
GD5000-A2240-03-D	1800	431	5800X1500X2820	7760
GD5000-A2500-03-D	2000	481	5800X1500X2820	8160
GD5000-A2800-03-D	2240	539	5800X1500X2820	8860
GD5000-A3150-03-D	2500	609	5800X1500X2820	9300
GD5000-A3550-03-D	2800	722	5800X1500X2820	10160

### 3.3 kV series

VFD model	Rated power (kW)	Rated current (A)	Dimensions W*D*H (mm)	Weight (kg)
GD5000-A0280-3.3-S	220	49	3200X1200X2660	2283
GD5000-A0315-3.3-S	250	55	3200X1200X2720	2416
GD5000-A0355-3.3-S	280	62	3200X1200X2720	2466
GD5000-A0400-3.3-S	315	70	3200X1200X2720	2506
GD5000-A0450-3.3-S	355	79	3800X1200X2720	2731
GD5000-A0500-3.3-S	400	87	3800X1200X2720	2881
GD5000-A0560-3.3-S	450	98	3800X1200X2720	2961
GD5000-A0630-3.3-S	500	110	4000X1200X2720	3149
GD5000-A0710-3.3-S	560	124	4000X1200X2720	3299
GD5000-A0800-3.3-S	630	140	4000X1200X2720	3349
GD5000-A0900-3.3-S	710	157	4000X1200X2720	3549
GD5000-A1000-3.3-S	800	175	4000X1200X2720	3790
GD5000-A1120-3.3-S	900	196	4000X1200X2720	3890
GD5000-A1250-3.3-S	1000	219	4000X1200X2720	4030
GD5000-A1400-3.3-S	1120	245	4000X1200X2720	4380
GD5000-A1600-3.3-D	1250	280	5000X1500X2820	5560
GD5000-A1800-3.3-D	1400	315	5000X1500X2820	5810
GD5000-A2000-3.3-D	1600	350	5400X1500X2820	6710
GD5000-A2240-3.3-D	1800	392	5400X1500X2820	7010
GD5000-A2500-3.3-D	2000	437	5800X1500X2820	7760
GD5000-A2800-3.3-D	2240	490	5800X1500X2820	8160
GD5000-A3150-3.3-D	2500	551	5800X1500X2820	8860
GD5000-A3550-3.3-D	2800	620	5800X1500X2820	9650
GD5000-A4000-3.3-D	3150	722	5800X1500X2820	10200

## 4.16 kV series

VFD model	Rated power (kW)	Rated current (A)	Dimensions W*D*H (mm)	Weight (kg)
GD5000-A0315-4.16-S	250	44	3600X1200X2720	3405
GD5000-A0355-4.16-S	280	49	3600X1200X2720	3455
GD5000-A0400-4.16-S	315	56	3600X1200X2720	3638
GD5000-A0450-4.16-S	355	62	3600X1200X2720	3718
GD5000-A0500-4.16-S	400	69	3600X1200X2720	3798
GD5000-A0560-4.16-S	450	78	4200X1200X2720	4053
GD5000-A0630-4.16-S	500	87	4200X1200X2720	4353
GD5000-A0710-4.16-S	560	99	4200X1200X2720	4483
GD5000-A0800-4.16-S	630	111	4600X1200X2720	4743
GD5000-A0900-4.16-S	710	125	4600X1200X2720	5093
GD5000-A1000-4.16-S	800	139	4600X1200X2720	5243
GD5000-A1120-4.16-S	900	155	4600X1200X2720	5593
GD5000-A1250-4.16-S	1000	173	4600X1200X2720	5975
GD5000-A1400-4.16-S	1120	194	4600X1200X2720	6425
GD5000-A1600-4.16-S	1250	222	4600X1200X2720	6865
GD5000-A1800-4.16-S	1400	236	4600X1200X2720	7515
GD5000-A2000-4.16-D	1600	278	5000X1500X2820	8910
GD5000-A2240-4.16-D	1800	311	5000X1500X2820	9410
GD5000-A2500-4.16-D	2000	347	5400X1500X2820	10860
GD5000-A2800-4.16-D	2240	389	5400X1500X2820	11510
GD5000-A3150-4.16-D	2500	437	5800X1500X2820	13210
GD5000-A3550-4.16-D	2800	493	5800X1500X2820	14110
GD5000-A4000-4.16-D	3150	555	5800X1500X2820	15010
GD5000-A4500-4.16-D	3550	624	6200X1500X2820	16000
GD5000-A5000-4.16-D	4000	722	6200X1500X2820	17010

## 6 kV series

VFD model	Rated power (kW)	Rated current (A)	Dimensions W*D*H (mm)	Weight (kg)
GD5000-A0400-06-S	315	38	3800X1200X2660	2965
GD5000-A0500-06-S	400	48	3800X1200X2660	3035
GD5000-A0560-06-S	450	54	3800X1200X2660	3170
GD5000-A0630-06-S	500	61	3800X1200X2660	3320
GD5000-A0710-06-S	560	68	3800X1200X2660	3370
GD5000-A0800-06-S	630	77	4400X1200X2660	3635
GD5000-A0900-06-S	710	87	4400X1200X2660	3785
GD5000-A1000-06-S	800	96	4400X1200X2660	3885
GD5000-A1120-06-S	900	108	4800X1200X2720	4268
GD5000-A1250-06-S	1000	120	4800X1200X2660	4408
GD5000-A1400-06-S	1120	135	4800X1200X2660	4758
GD5000-A1600-06-D	1250	154	4650X1500X2660	5058
GD5000-A1800-06-D	1400	173	4650X1500X2720	5610
GD5000-A2000-06-D	1600	192	4650X1500X2720	5810
GD5000-A2240-06-D	1800	216	4650X1500X2720	6060
GD5000-A2500-06-D	2000	241	4650X1500X2720	6560
GD5000-A2800-06-D	2240	269	5800X1200X2820	7550
GD5000-A3150-06-D	2500	303	5800X1200X2820	8350
GD5000-A3550-06-D	2800	342	6400X1200X2820	9750
GD5000-A4000-06-D	3150	385	6800X1200X2820	10000
GD5000-A4500-06-D	3550	433	7400X1200X2820	11600
GD5000-A5000-06-D	4000	481	7400X1200X2820	12000
GD5000-A5600-06-D	4500	539	7600X1200X2820	13180
GD5000-A6300-06-D	5000	606	8200X1500X2820	15510
GD5000-A7500-06-D	6000	722	8200X1500X2820	16110

## 6.6 kV series

VFD model	Rated power (kW)	Rated current (A)	Dimensions W*D*H (mm)	Weight (kg)
GD5000-A0400-6.6-S	315	35	4000X1200X2720	3026
GD5000-A0450-6.6-S	355	39	4000X1200X2720	3056
GD5000-A0500-6.6-S	400	44	4000X1200X2720	3096
GD5000-A0560-6.6-S	450	49	4000X1200X2720	3126
GD5000-A0630-6.6-S	500	55	4000X1200X2720	3402
GD5000-A0710-6.6-S	560	62	4000X1200X2720	3482
GD5000-A0800-6.6-S	630	70	4000X1200X2720	3552
GD5000-A0900-6.6-S	710	79	4600X1200X2720	3917
GD5000-A1000-6.6-S	800	87	4600X1200X2720	4017
GD5000-A1120-6.6-S	900	98	4600X1200X2720	4117
GD5000-A1250-6.6-D	1000	109	4650X1500X2650	4597
GD5000-A1400-6.6-D	1120	122	4650X1500X2650	4657
GD5000-A1600-6.6-D	1250	140	4650X1500X2650	5077
GD5000-A1800-6.6-D	1400	157	4650X1500X2650	5301
GD5000-A2000-6.6-D	1600	175	4650X1500X2650	5693
GD5000-A2240-6.6-D	1800	196	4650X1500X2650	6050
GD5000-A2500-6.6-D	2000	219	4650X1500X2650	6284
GD5000-A2800-6.6-D	2240	245	4650X1500X2650	6564
GD5000-A3150-6.6-D	2500	276	5800X1500X2820	8425
GD5000-A3550-6.6-D	2800	311	5800X1500X2820	8725
GD5000-A4000-6.6-D	3150	350	6800X1500X2820	9625
GD5000-A4500-6.6-D	3550	394	6800X1500X2820	10825
GD5000-A5000-6.6-D	4000	437	7400X1500X2820	12975
GD5000-A5600-6.6-D	4500	490	7600X1500X2820	13755
GD5000-A6300-6.6-D	5000	551	7600X1500X2820	14555
GD5000-A7100-6.6-D	5600	620	7600X1500X2820	15355
GD5000-A8000-6.6-D	6300	722	10000X1500X2820	20000

## 10 kV series

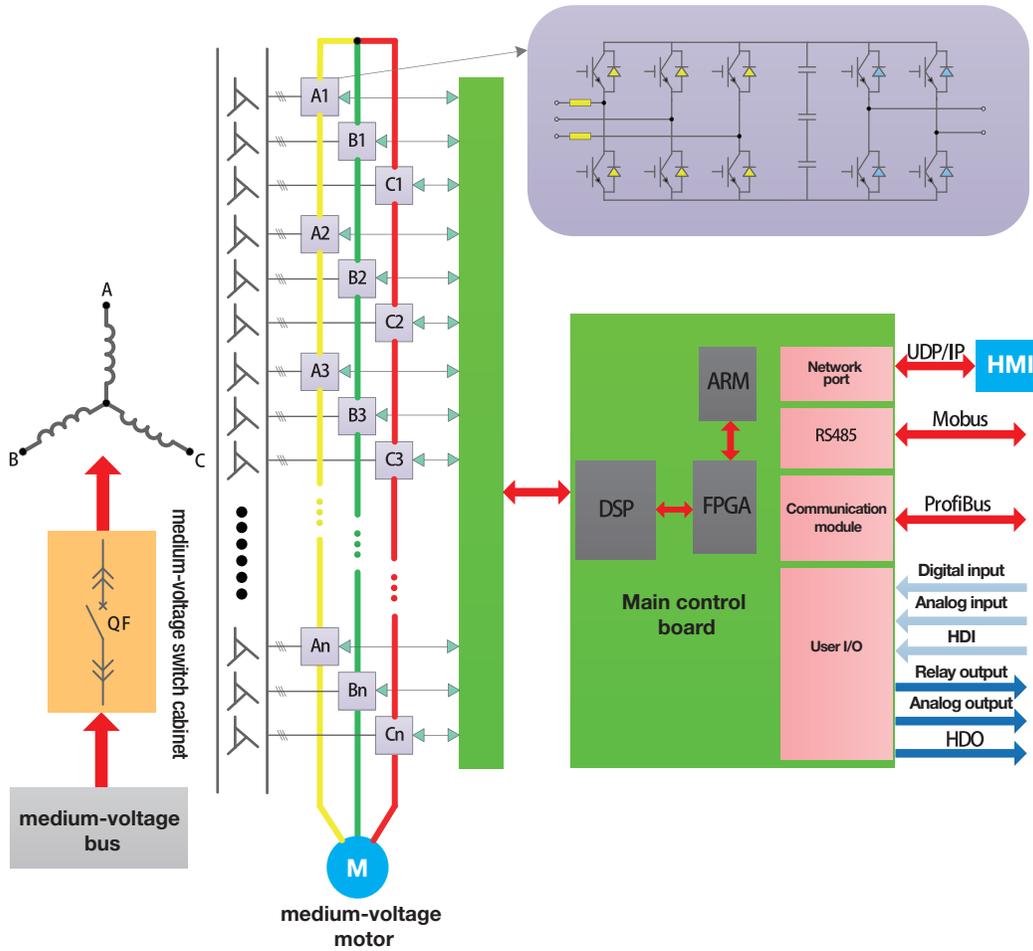
VFD model	Rated power (kW)	Rated current (A)	Dimensions W*D*H (mm)	Weight (kg)
GD5000-A0500-10-S	400	29	4600X1200X2660	3550
GD5000-A0560-10-S	450	32	4600X1200X2660	3550
GD5000-A0710-10-S	560	41	4800X1200X2660	3960
GD5000-A0800-10-S	630	46	4800X1200X2720	4070
GD5000-A0900-10-S	710	52	4800X1200X2720	4366
GD5000-A1000-10-S	800	58	4800X1200X2660	4426
GD5000-A1120-10-S	900	65	4800X1200X2660	4776
GD5000-A1250-10-S	1000	72	4800X1200X2660	4976
GD5000-A1400-10-S	1120	81	5200X1200X2720	5271
GD5000-A1600-10-S	1250	92	5200X1200X2720	5421
GD5000-A1700-10-S	1400	98	5200X1200X2720	5621
GD5000-A2000-10-S	1600	115	5800X1200X2720	6481
GD5000-A2240-10-S	1800	129	6200X1500X2720	6876
GD5000-A2500-10-S	2000	144	6200X1500X2720	7276
GD5000-A2800-10-D	2240	162	5050X1500X2720	7576
GD5000-A3150-10-D	2500	182	5050X1500X2720	8210
GD5000-A3550-10-D	2800	205	5050X1500X2720	9310

VFD model	Rated power (kW)	Rated current (A)	Dimensions W*D*H (mm)	Weight (kg)
GD5000-A4000-10-D	3150	231	5050X1500X2720	10030
GD5000-A4500-10-D	3550	260	7000X1500X2820	10960
GD5000-A5000-10-D	4000	289	7000X1500X2820	11260
GD5000-A5600-10-D	4500	323	7200X1500X2820	11940
GD5000-A6300-10-D	5000	364	8000X1500X2820	14340
GD5000-A7100-10-D	5600	410	8800X1500X2820	15990
GD5000-A7500-10-D	6000	433	11200X1500X2820	19880
GD5000-A8000-10-D	6300	462	11200X1500X2820	21080
GD5000-A9000-10-D	7100	520	11200X1500X2820	22280
GD5000-A10000-10-D	8000	577	11200X1500X2820	23080
GD5000-A11200-10-D	9000	647	12000X1500X2820	26020
GD5000-A12500-10-D	10000	722	12000X1500X2820	26820

## 11 kV series

VFD model	Rated power (kW)	Rated current (A)	Dimensions W*D*H (mm)	Weight (kg)
GD5000-A0500-11	400	26	4800X1200X2720	3699
GD5000-A0560-11	450	29	4800X1200X2720	3749
GD5000-A0630-11	500	33	4800X1200X2720	3849
GD5000-A0710-11	560	37	5000X1200X2720	4129
GD5000-A0800-11	630	42	5000X1200X2720	4179
GD5000-A0900-11	710	47	5000X1200X2720	4279
GD5000-A1000-11	800	52	5000X1200X2660	4608
GD5000-A1120-11	900	59	5000X1200X2660	4918
GD5000-A1250-11	1000	66	5000X1200X2660	5118
GD5000-A1400-11	1120	73	5000X1200X2660	5368
GD5000-A1600-11	1250	84	5400X1200X2720	5503
GD5000-A1800-11	1400	94	5400X1200X2720	5843
GD5000-A2000-11	1600	105	4650X1500X2650	5906
GD5000-A2240-11	1800	118	4650X1500X2650	6211
GD5000-A2500-11	2000	131	5050X1500X2650	6656
GD5000-A2800-11	2240	147	5050X1500X2650	6977
GD5000-A3150-11	2500	165	5050X1500X2650	7219
GD5000-A3550-11	2800	186	5050X1500X2650	8355
GD5000-A4000-11	3150	210	5050X1500X2650	8619
GD5000-A4500-11	3550	236	5050X1500X2650	9698
GD5000-A5000-11	4000	262	7800X1500X2820	12005
GD5000-A5600-11	4500	294	8000X1500X2820	14385
GD5000-A6300-11	5000	331	9000X1500X2820	16885
GD5000-A7000-11	5600	367	9000X1500X2820	17585
GD5000-A8000-11	6300	420	12600X1500X2820	21765
GD5000-A9000-11	7100	472	12600X1500X2820	23265
GD5000-A10000-11	8000	525	12600X1500X2820	25665
GD5000-A11200-11	9000	587	12600X1500X2820	28625
GD5000-A12500-11	10000	656	12600X1500X2820	30555
GD5000-A13500-11	10800	722	12600X1500X2820	33265

## Four-quadrant topology



## Four-quadrant selection table

### 6kV series

VFD model	Rated power (kW)	Rated current (A)	Dimensions W*D*H (mm)	Weight (kg)
GD5000-A0315-06	250	30	4400X1200X2660	3190
GD5000-A0355-06	280	34	4400X1200X2660	3240
GD5000-A0400-06	315	38	4400X1200X2660	3370
GD5000-A0450-06	355	43	4400X1200X2660	3420
GD5000-A0500-06	400	48	4400X1200X2660	3470
GD5000-A0560-06	450	54	4400X1200X2660	3520
GD5000-A0630-06	500	61	4800X1200X2660	3890
GD5000-A0710-06	560	68	4800X1200X2660	3990
GD5000-A0800-06	630	77	4800X1200X2660	4090
GD5000-A0900-06	710	87	4800X1200X2660	4290
GD5000-A1000-06	800	96	4800X1200X2660	4540
GD5000-A1120-06	900	108	4800X1200X2720	4755
GD5000-A1250-06	1000	120	4800X1200X2720	4945
GD5000-A1400-06	1120	135	4800X1200X2720	5145
GD5000-A1600-06	1250	154	4800X1200X2720	5345

## 10kV series

VFD model	Rated power (kW)	Rated current (A)	Dimensions W*D*H (mm)	Weight (kg)
GD5000-A0400-10	315	23	5200X1200X2660	3877
GD5000-A0450-10	355	26	5200X1200X2660	3927
GD5000-A0500-10	400	29	5200X1200X2660	4057
GD5000-A0560-10	450	32	5200X1200X2660	4157
GD5000-A0630-10	500	36	5200X1200X2660	4207
GD5000-A0710-10	560	41	5200X1200X2660	4357
GD5000-A0800-10	630	46	5200X1200X2720	4547
GD5000-A0900-10	710	52	5200X1200X2720	4747
GD5000-A1000-10	800	58	5800X1200X2660	5261
GD5000-A1120-10	900	65	5800X1200X2660	5411
GD5000-A1250-10	1000	72	5800X1200X2660	5611
GD5000-A1400-10	1120	81	5800X1200X2720	5921
GD5000-A1600-10	1250	92	5800X1200X2720	6221
GD5000-A1700-10	1400	98	5800X1200X2720	6321
GD5000-A1900-10	1500	110	5800X1200X2720	6797
GD5000-A2000-10	1600	115	5800X1200X2720	6997
GD5000-A2120-10	1700	122	5800X1200X2720	7097
GD5000-A2240-10	1800	129	6200X1500X2720	7392
GD5000-A2500-10	2000	144	6200X1500X2720	7792

## List of options and parts

Name	Model	Picture	Description
Bypass cabinet	GD5000-AS GD5000-MS		Manual bypass cabinet: 2 knife switches. Isolating automatic bypass cabinet: 2 knife switches, 3 contactors. Can select different bypass solutions according to on-site conditions.
Bumpless switching cabinet	GD5000-SS		Embedded with reactors, used for synchronous bumpless switching between power frequency and variable frequency.
Remote operation cabinet	GD5000-CB		Used for on-site remote control, and the button functions and the displayed parameters can be customized as needed.
Communication card	GD5000-DP		Support Profibus-DP protocol
PG card	GD5000-PG		Encoder interface, support push-pull encoder A, B, Z signal input, differential, push-pull and open collector output.
Communication card	GD5000 set		Support Profinet protocol
Isolation grating	GD5000 set		Realize device input/output analog isolation, and enhance security and stability of the system.
Upper computer monitoring software	INVT Studio		Achieve the control of the upper computer on the VFD, and possess the functions of start/stop command, parameter read/write, fault diagnosis and oscilloscope. It can meet clients' non-standard requirements by modifying relative configuration files.

## Application cases

### Power industry

Application of GD5000 series medium-voltage VFDs in the feed water pump of circulating fluidized bed boiler

#### 1 Project background

One thermoelectric center of Sinopec has a 300MW coal-fired power generating set whose feed water pump of the bed boiler is driven by a 6kV/2240kW asynchronous motor. During production, the water pump runs in power frequency and the flow is adjusted by the outlet valve of the water pump, causing great energy waste, severe wind board wear, and large noise.

#### 2 Economic benefits

Parameters	Power frequency	Variable frequency
Practical running current	220A	140A
Power factor	0.84	0.95
Power saving rate	28%	
Annual power saving cost	1,681,000 RMB each machine	



▲ On-site pictures

#### 3 Other applications



内蒙华电  
N M H D

2\*600M set



Shenhua Guohua (Zhoushan)  
Power Plant 2\*300M set



Guodian Qingshan Thermal  
Power Plant 2\*350M set

## Application cases

### Power industry

Application of GD5000 series medium-voltage VFDs in the condensate pump in power plant

#### 1 Project background

Yidian Holding Group Co., Ltd. is a large industrial circular economy enterprise covering power generation, aluminum smelting, aluminum processing, carbon production, fly ash comprehensive utilization and other industries. In 2014, a power plant of this group invited our technical personnel to go to the plant for analyzing the running statuses of steam water system and air and flue gas system of the 2\*330MW set and making energy saving evaluation. According to the field operation data and process requirements, our technical personnel conducted a comprehensive analysis of the operation conditions, submitted an overall solution for the variable-frequency transformation of the boiler and steam turbine auxiliary motors, and finally determined that the condensate pump with a larger energy saving space should be transformed first.

#### 2 Benefit analysis

- ◆ Obvious power saving effect (The following table shows the electric energy statistical data of one month)

Device pump	Current	Power-frequency power	Valve	Variable-frequency power	Saving power	Power saving rate
Condensate pump	85A	742kW	35%	439W	302W	41%

Calculating based on that 2# set runs for 7,200 hours per year, using our VFDs can save 2.17 million kWh of auxiliary power per year, equivalent to 1.13 million Yuan.

- ◆ Reduce the current surge when the motor starts.
- ◆ Improve the reliability of the pipe network system.



## Application cases

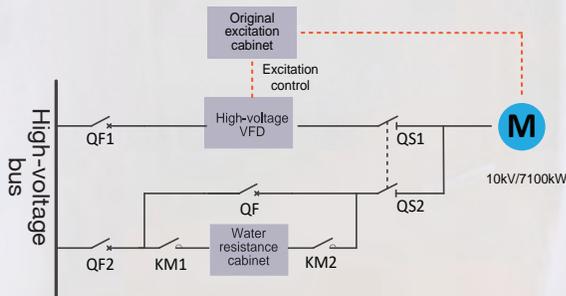
### Metallurgy industry

Application of GD5000 series medium-voltage VFDs in the large power synchronous motor

#### 1 Project background

One company of Hebei Iron & Steel Group has two 200m<sup>2</sup> sintering machines whose main sintering fan is driven by a 10kV/7100kW synchronous motor. At beginning, the water resistance cabinet was used to start the motor. During the process of starting, once the excitation system is under inaccurate control, the motor will be "out of step" and cannot start. Additionally, the wind boards were used to adjust air flow, causing great energy waste.

#### 2 Schematic diagram of scheme



▲ On-site pictures

#### 3 Result after improvement

The excellent synchronous motor control technology of GD5000 products perfectly solves the "out of step" problem of the synchronous motor. The energy saving effect is very obvious, and the power saving rate reaches up to 26%.

#### 4 Other applications



## Application cases

### Metallurgy industry

Application of GD5000 series medium-voltage VFDs in the sweetening fan

#### 1 Project background

Yunnan Copper Group establishes a set of sweetening system whose induced draft fan is driven by a 6kV/800kW motor. The load plays an important part in production. Once it goes wrong, environmental pollution will be caused. Furthermore, there are a lot of particles and dust on site, putting a high requirement on corrosion resistance.

#### 2 Product feature

The dual-layer conformal coating technology ensures corrosion resistance capability of the components and plates.



▲ On-site pictures

## Application cases

### Building materials industry

Application of GD5000 series medium-voltage VFDs at high altitude

#### 1 Project background

One building materials company in Tibet is located at over 3700km high altitude. The high temperature fan at furnace end is driven by 10kV/2800kW asynchronous motor. Due to frequent material collapse, the production cannot be continuous.

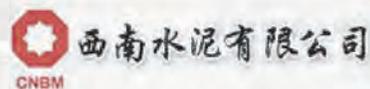
#### 2 Product feature

One building materials company in Tibet is The design of high altitude components ensures the VFD meets the safety requirements at high altitude;  
With excellent speed and strong overload capability, GD5000 can ensure continuous production during material collapse.



▲ On-site pictures

#### 3 Other applications



## Application cases

### Building materials industry

Application of GD5000 series medium-voltage VFDs in permanent-magnet synchronous coal mill

#### 1 Project background

Handan Jinyu Taihang Cement Co., Ltd. belongs to Beijing Jinyu Group which is one of the world's top 100 building materials enterprises and one of 12 large building enterprises supported by the central government. The original ball mills of 6kV,1400kW in Jinyu Taihang coal mill field, after the transformation, were changed to be directly driven by the permanent-magnet synchronous motor, and former asynchronous motor and deceleration mechanism were removed. The permanent-magnet synchronous motor adopts pole pairs of 20 and 150 rpm, insulation grade F, motor power of 1120kW, rated current of 114A and voltage of 6000V. This project adopts INVT GD5000-B1800-06-S VFDs for variable frequency operation in a one-drive-one way, and the running frequency is between 35Hz and 45Hz according to the production requirements. The project adopts vector control, and SVC 1 adopts double closed-loop of speed and torque. In order to suppress the frequency fluctuation, speed filter parameters are added. Considering that fast response needs to be started, speed filter parameters shall not be too large. Restrain current fluctuation in overcurrent operation, appropriately enhance current loop, and low and high frequency band ranges from 20 to 45 Hz, the operation is stable. After transformation, the power saving rate of the whole system is improved by 16% compared with that of the original system.



▲ On-site pictures

#### 2 Function characteristics

- ◆ Frequency setting mode: Digital setting, analog setting, high-speed pulse, multi-speed terminal reference, UP/DOWN terminal reference, Modbus remote communication setting, Profibus communication setting, master-slave mode reference, and hierarchical multi-step speed reference.
- ◆ Running mode: Keypad command, terminal command, Modbus communication command, and Profibus communication command.
- ◆ Start pre-torque compensation.
- ◆ Start/stop DC braking.
- ◆ PG card: Asynchronous machine PG card (12V), synchronous machine PG card (5V) (the VFD adopts the closed-loop control, and UWW-type encoder is optional)
- ◆ Automatic voltage regulation function: When the grid voltage changes, it can automatically keep the output voltage constant.

## Application cases

### Chemical industry

Application of GD5000 series medium-voltage VFDs in the centrifugal compressor

#### 1 Project background

One petrochemical company in Shang dong mainly involving in petroleum refining is one of China's top 500 companies. The circulating gas compressor in the propylene production workshop belongs to heavy load, causing large starting impulse current, large noise and sudden changes in pressure. Furthermore, because the load has large fluctuation, adjusting the pressure only by the opening of the valve will cause great energy waste.



▲ On-site pictures

#### 2 Main advantages

Excellent low frequency control feature of GD5000 series satisfies heavy-load start of the compressor on site, the average running current of the motor reduces greatly, and the energy-saving benefit is obvious.

Parameters	Power frequency	Variable frequency
Running current	47A	7A
Rotating speed of the motor	2980r/min	1200r/min
Power factor	0.47	0.95
Annual electricity saving cost	943,000 RMB each machine	

## Application cases

### Chemical industry

Application of GD5000 series medium-voltage VFDs in the induced draft fan of the coal chemical industry

#### 1 Project background

In a new urea plant project of one coal chemical company of Jincheng Anthracite Mining Group, our high-voltage VFDs have been used in 8 induced draft fans and 1 feed water pump of the boiler system for project construction. Since putting into operation, the VFDs have been in stable running with good economic benefits and high praise from customers.



▲ On-site pictures

Application of GD5000 series medium-voltage VFDs in the gas pressure blower

#### 1 Project background

For the gas pressure blower of one chemical fertilizer production enterprise in Anhui, the roots blower is driven by one 6kV/560kW 10-pole motor. Before improvement, the large starting current has a bad effect on the devices in the same bus, and the air flow is adjusted by return valve, causing great energy waste.



▲ On-site pictures

## Application cases

### Mine industry

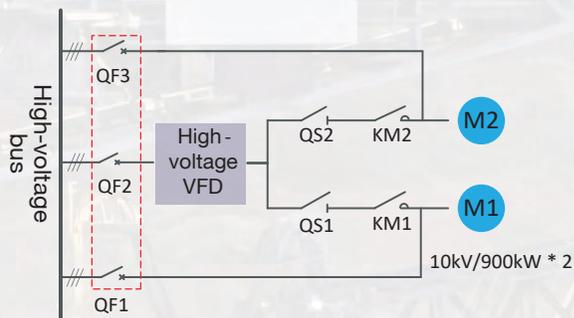
Application of GD5000 series medium-voltage VFDs in the main fan

#### 1 Project background

The counter-rotating fan for ventilation in one mine of Shanxi Meijin Group is driven by two 10kV/900kW asynchronous motors at power frequency and constant speed. Its air flow is adjusted by adjusting the position of the wind board manually, causing great energy waste and having bad effect on production.

#### 2 Schematic diagram of scheme

Excellent low frequency control feature of GD5000 series satisfies heavy-load start of the compressor on site, the average running current of the motor reduces greatly, and the energy-saving benefit is obvious.



▲ On-site pictures

#### 3 Main advantages

- ◆ Obvious energy saving effect, and power saving rate up to 30%;
- ◆ Adopting "One-drive-two" structure, downsizing the devices.

## Application cases

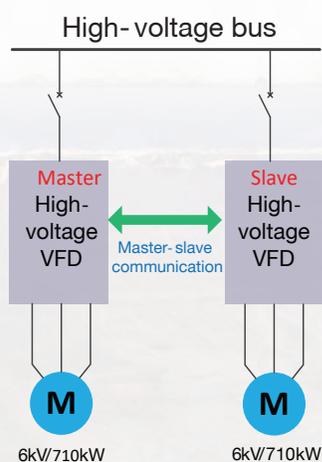
### Mine industry

Application of GD5000 series medium-voltage VFDs in the belt conveyor

#### 1 Project background

One coal company of Jincheng Anthracite Mining Group has an annual coal production of 0.6 million tons. The belt conveyor at the outlet of the mine is driven by two motors. The company previously adopted soft starter and hydraulic coupler for solving motor start and speed regulation problems, which comes about a lot of disadvantages. The soft starter may generate a great deal of harmonic, the hydraulic coupler may easily have faults, there is heavy maintenance workload, and the hydraulic coupling cannot solve the problem of power balance among motors during multi-motor driving.

#### 2 Schematic diagram of scheme



#### 3 Main advantages

- ◆ Master-slave control of GD5000 series achieves power balance between two motors.
- ◆ Excellent low frequency control feature of GD5000 series satisfies heavy-load start of the belt conveyor.

▲ On-site pictures

## Application cases

### Mine industry

Application of GD5000 series medium-voltage VFDs in the underground drainage pump

#### 1 Project background

The underground devices of Guizhou Zijin Mining Group are powered by generators. The capacity of the grid is small. To reduce the starting current, the stator reactor starting is adopted, but the result is not satisfactory. Furthermore, someone is needed on duty for the whole day to start/stop the motor on site when the water level changes, so the labor intensity is great.



▲ On-site pictures

#### 2 Main advantages

- ◆ The design of split-type system structure and underground installation facilitate the maintenance;
- ◆ The soft start and stop of the motor and small starting current completely satisfy the working conditions.

## Application cases

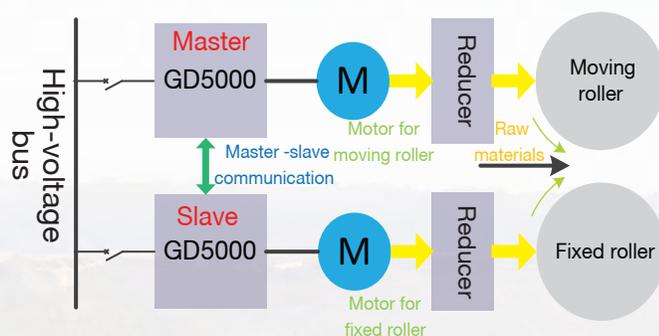
### Mine industry

Application of GD5000 series medium-voltage VFDs in the roller press

#### 1 Project background

The moving and fixed rollers of one tungsten ore factory in Fujian are separately driven by two 10kV/630kW motors. Currently, roller presses of almost all enterprises run in constant frequency, resulting the yield cannot be adjusted. In addition, overcurrent may occur due to unbalanced power of the moving roller and fixed roller, affecting the production.

#### 2 Schematic diagram of scheme



#### 3 Main advantages

- ◆ Master-slave control achieves power balance between the moving and fixed rollers, and improves the stability of the system.
- ◆ Excellent low frequency control feature of GD5000 series satisfies heavy-load starting needs of the roller press.



▲ On-site pictures

## Application cases

### Oil & gas industry

Application of GD5000 series medium-voltage VFDs in the pipeline oil transfer pump

#### 1 Project background

The first oil production plant in Daqing oil field is the largest and the first oil production plant in China to produce 500 million tons of crude oil accumulatively. One oil storage of the oil production plant is equipped with two oil transfer pumps of 6kV/315kW and two of 6kV/280kW. Four pumps runs in parallel with the valve opening of less than 30%, which is the main energy consumption equipment in the production and operation of the oil storage. In order to respond to the call of national energy conservation and emission reduction, reduce operating costs and improve competitiveness, the company used our two sets of GD5000 medium-voltage variable frequency speed regulation system. The main circuit of the site downsizes the equipment through adopting the structure of one-drive-two structure, and meets different working conditions through adjusting the rotating speed of the oil transfer pump by frequency conversion, eliminating the throttling loss caused by the pressure difference of the oil pump pipe, reducing the unit power consumption, saving the electric energy, and improving the process.



▲ On-site pictures

#### 2 Energy-saving benefit

Parameter name		Measuring and calculating results	
		1#Oil pump	2#Oil pump
State of running at power frequency	Average current (A)	28.2	31.5
	Day power consumption (KWh)	5626	6285
	Unit power consumption (kWh/t)	1.04	1.03
Running state of the VFD	Average current (A)	17.6	18.5
	Day power consumption (KWh)	4214	4429
	Oil consumption (kWh/t)	0.76	0.77
Power saving rate (%)		26.9%	25.2%

## Application cases

### Oil & gas industry

Application of GD5000 series medium-voltage VFDs in the water injection pump

#### 1 Project background

As we all known, the water injection pump consumes large part of electricity in the oil industry, and the water injection of each area needs to be adjusted usually when the exploitation conditions change. The water injection pump in one well of Jiangsu Oil Field adopted the return valve to control the flow, which is a serious energy waste and easy to be mined out. After improvement by using our VFD, not only does the water injection pump become energy-saving, but also the process improves greatly.



▲ On-site pictures

## Application cases

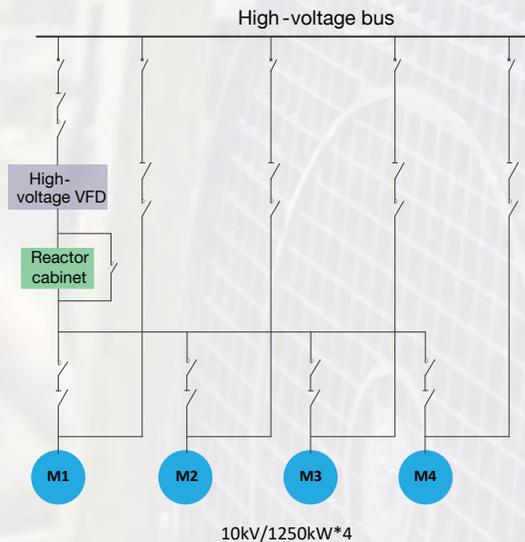
### Municipal industry

Application of GD5000 series medium-voltage VFDs in the pumping station

#### 1 Project background

One pumping station in Xinjiang was equipped with 4 centrifugal water pumps and common bus pipe separately driven by 10kV/1250kW asynchronous motors. Currently, the pumping station adopts our high-voltage VFD to conduct the project transformation, and finally reaches the process requirements of three in power frequency and one in variable frequency.

#### 2 Schematic diagram of scheme



▲ On-site pictures

#### 3 Main advantages

- ◆ Adopting "One-drive-four" structure to significantly downsize the device.
- ◆ The motors can realize soft start in turn.
- ◆ The VFD has synchronous bumpless switching function for ensuring no impact current between the power frequency and variable frequency switching.

## Application cases

### Thermal power industry

Application of GD5000 series medium-voltage VFDs in the secondary fan of thermal power station

#### 1 Project background

In the initial construction period of the boiler system from one thermal power factory in Dongning, Heilongjiang province, the fan kept running at the power frequency, and the air flow was adjusted by the wind board. In the practical production, the opening of the board was very small, causing serious energy waste. After investigating from many aspects, the company chose our VFDs for energy saving reconstruction.



▲ On-site pictures

Application of GD5000 series medium-voltage VFDs in the circulating pump of heat-supply network



◀ On-site pictures

#### 1 Project background

The thermal power plant of one thermal company in Mishan city, Heilongjiang Province mainly applies to central heating for local residents. In the heat source phase II expansion project of heat-supply system, the main pipe network of the extension takes #3 and #4 circulating pump (10kV/560kW) of heat-supply network as the transporting power. The stability of the heat supply network in the heating supply system mainly depends on the boiler, heat network circulation system and pipelines, and the main function of the heat network circulating system is to ensure the stable water circulation and constant pressure, that is to say, control the water level for safe operation. When the heating load changes, the water volume needs to be adjusted. If water volume is adjusted only through the opening of the outlet valve of the circulating pump, it actually means that the feed water flow is reduced by pressure loss while the output torque of the motor does not change, resulting in a large amount of energy waste. After careful analysis by our technical engineers and multiple trade-offs by the company's leaders, the company finally adopted our medium-voltage VFDs as the speed regulating scheme.

#### 2 Energy-saving benefit

Parameter name		Measuring and calculating results	
		Circulating pump#3	
State of running at power frequency	Average current (A)	43.8	
	Power factor	0.82	
Running state of the VFD	Average current (A)	30.1	
	Power factor	0.96	
Power saving rate (%)		17.9%	

## Application cases

### Four Quadrant VFDs application

Application of GD5000 series medium-voltage quadrant VFDs in the inclined shaft hoisting system

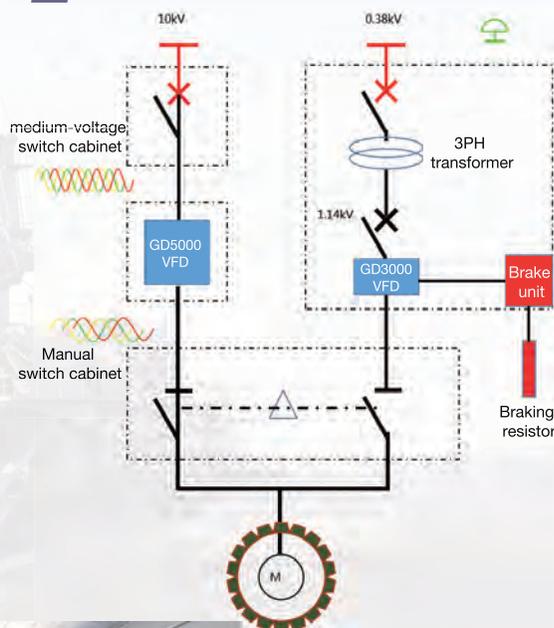
#### 1 Project background

Baoji-Pingkan highway is the largest construction project with the highest construction standards and the largest construction difficult in shaanxi province during the 13th five-year plan period, with total length of 73.238 kilometers, estimated investment of 12.9 billion Yuan, and construction period of 6 years. The inclined shaft hoisting system of the tunnel in this project is composed of INVT quadrant medium-voltage VFDs, three-level medium-voltage VFDs (standby) and control system. The medium-voltage quadrant VFDs can achieve energy feedback. By using vector control, speed closed-loop and current closed-loop control, dynamic response of the torque control is rapid, so as to obtain good speed regulation performance. The control system has a good power-saving effect and improves the resource utilization rate of grid capacity. The application of INVT quadrant products not only meets the improvement of the system operation efficiency and reasonable treatment of the energy management, but also meets the requirements of improving system safe and stable operation with the energy saving effect of up to 15%-20%.



◀ On-site pictures

#### 2 Schematic diagram of scheme



#### 3 Main features

- ◆ The machine adopts the multiplex rectification/feedback to offset harmonics. Current and voltage harmonics at the grid side meet the national standard.
- ◆ Each power unit of the machine is independently phase-locked.
- ◆ The power units can automatically identify the ratio and primary/secondary-side phase difference of the phase-shifting transformer, and the power units have good compatibility, facilitating to achieve the interchange of power units.
- ◆ The working states of the power units (rectification/feedback state) are controlled uniformly by the main control system based on the current working state of the motor, and the state consistency of the each power unit is good.
- ◆ Each power unit has a unique debugging interface. It is convenient to monitor the working status of any unit through photoelectric conversion equipment and upper computer software, which can quickly locate unit faults and shorten the time of fault repairmen.

## Application cases

### Overseas application cases

Application of GD5000 series medium-voltage VFDs in pressers of one sugar mill in Thailand

#### 1 Project background

One sugar mill in Thailand is one of the leading sugar processing enterprises in Thailand, which can produce 30,000 tons per day, and its annual output can reach above 4 million tons. In one program, the sugar mill transforms the third milling train in the squeezing production line by using our medium-voltage VFDs (asynchronous motor of 3.3kV, 1600kW). The original milling trains were driven by power frequency. Because the frequency and rotating speed are fixed, sugar extraction rate is not high, and the milling train is easy to get stuck, so milling trains are changed to be driven by the VFDs.



▲ On-site pictures

#### 2 Application and advantages

- ◆ Soft start can be realized, and start time and start method can be adjusted according to the site conditions.
- ◆ High power factor (up to more than 0.96).
- ◆ No harmonic pollution is produced to the motor, effectively reducing the heat of the motor.
- ◆ Very low torque pulse doesn't lead to the resonance of the motor and other mechanical equipment, and also reduces the wear of the transmission mechanism.
- ◆ The output waveform is perfect with degree of distortion less than 2%.
- ◆ Reduce the phenomenon of milling train stopping line caused by too thick cane layer and stuck presser.
- ◆ Improve the extraction rate with high efficiency and energy saving, reduce the loss of maintenance downtime, and save a lot of maintenance costs.

## Application cases

### Overseas application cases

Application of GD5000 series medium-voltage VFDs in one cement plant in India

#### 1 Project background

Located in Beawar, one cement plant in India is a large cement plant whose annual production is 10 million tons. Its 9 blowers, driven by the medium-voltage asynchronous motors of 630KW/6.6kV, controlled the air flow through the traditional wind board, causing a large amount of energy consumption on the wind board and pipe network. Currently, it is changed to be driven by the VFD.



#### 2 Application and advantages

- ◆ Remarkable electricity saving benefits.
- ◆ Small VFD current and voltage harmonics, high efficiency, and low maintenance cost.
- ◆ Rich alarm and fault protection function.



▲ On-site pictures

Application of GD5000 series medium-voltage VFDs in water pumps of one water supply plant in Russia

#### 1 Project background

One water supply pump in Russia is equipped with three centrifugal water pumps whose are separately driven by two 6kV/500kW and one 6kV/250kW asynchronous motors. Before improvement, it controlled the flow through the traditional valve, causing great energy waste. Afterwards, the water pumps have been changed to be driven by our medium-voltage VFDs.



▲ On-site pictures

# Marketing service network



- ★ INVT Headquarters
- INVT Sales & Service in 11 countries
- Sales and Service Partners in 65 countries