Goodrive5000

Series High Performance Medium Voltage Vector Control Inverters

Innovation, Value, Teamwork

invt

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Electric Drive: ■Frequency Inverter ■Intelligent Elevator Control System ■Traction Drive

Industrial Control: ■Servo & Motion Control ■Motor & Electric Spindle ■PLC ■HMI

New Energy: ■SVG ■Solar Inverter ■UPS ■Online Energy Management System

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TÜV SÜD Management Service

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ABOUT INVT

INVT, founded in 2002, dedicates to being the global leading, honorable supplier providing the products and service in electric drive, industrial control and new energy fields, and listed in A shares of Shenzhen Stock Exchange, stock code: 002334. INVT is one key high-tech enterprise of national torch project, which currently owns 11 holding subsidiaries, with key technologies of electric and electronic, automation, motor control, energy saving and environment protection, logistics network and informatization etc, and main products including high, medium and low voltage inverter, elevator intelligent integrated machine, servo, PLC, HMI, motor and electric principal axis, SVG, UPS and photovoltaic inverter etc. Currently, INVT has more than 1600 employees and 4 large-scale production bases, and its marketing network spreads all over more than 60 countries and regions home and abroad.

INVT holds trying bests to provide the products and services beyond their prices and let the customers become more competitive as mission, and takes initiatives to explore the requirements of the customers. There are 9 R&D centers distributed all over the country, with many technologies in electric drive, industrial control and new energy fields reaching the first-class standards domestically and internationally, and more than 310 various patents, making INVT be capable of providing the most suitable products and solutions for the users to satisfy their requirements in terms of high-efficiency, energy saving, environment protection and total cost control etc. High quality, continuously renovating technology and excellent services make the reputation of INVT deep-rooted in people's hearts.

Insights to the market and the grasp to the requirements make INVT maintain the innovation and flexibility of the products; advanced integrated product development and management, comprehensive product R&D testing and automation, informatization production guarantee INVT own the high reliability, performance and efficiency of the products; the branches distributed all around the world can provide professional guarantee of the solutions, technology training and service support for the users. Refined quality, wonderful value is brand promotion of INVT, which aims at better indicating that INVT's pursuit to refined quality and create maximum value for the customers.

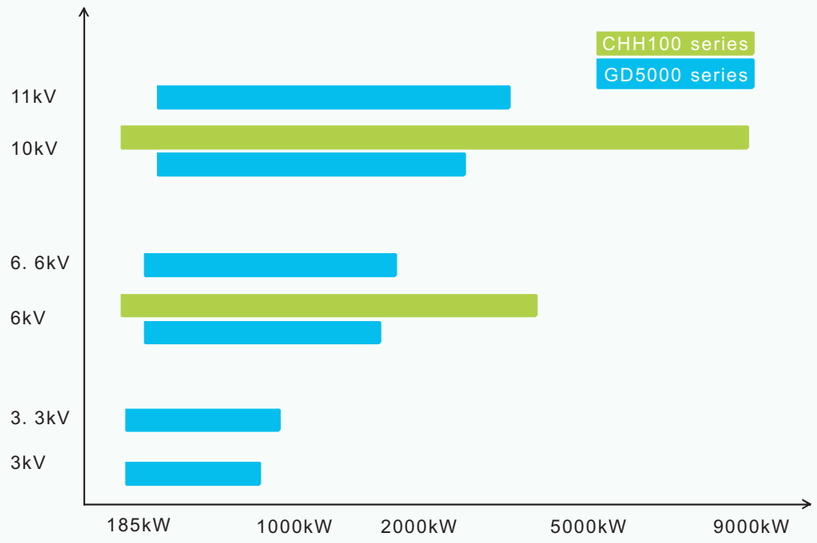
In the future decade, INVT will continue to inherit operating “conception of public sincerity and good virtue, realizing ambition with refined working”, focus on core fields, stand on the technologies including electric and electronic, automation and motor control, and grow bigger and stronger in electric drive, industrial control and new energy fields, implement brand strategies, seek global development, cooperate with the people at all circles, construct industrial group with harmonious enterprise environment, and sufficiently share social responsibility.




PRODUCT INTRODUCTION

Goodrive5000 series products are the new generation of medium voltage variable frequency speed control systems manufactured by INVT, adopting power unit serial technology, DSP+PFGA+ARM 3-core technology for the control system and the most advanced high-performance speed sensorless vector control mode compatible with SVPWM control, in features of high control precision, quick dynamic response, large low-frequency torque and dual-braking, etc. Besides, due to compact structure, the system can be installed against the wall with less maintenance, and its operating interface is more suitable for on-site applications.

PRODUCT FAMILY TREE



APPLICATIONS

Thermal power

induced draft fans, forced draft fans, primary air fans, secondary air fans, water pumps, circulating water pumps, condensate pumps, mortar pumps

Mining

main fans, gas drainage pumps, forced draught fans, exhaust fans, air compressors, draining pumps, medium pumps, belt conveyors

Metallurgy

blast furnace blowers, main exhaust fans for sintering, coke-oven blowers, dust extraction fans, circulating coolers, combustion fans, circulating water pumps, slag washing pumps, descaling pumps, rolling machines

Petrochemical industry

main piping pumps, oil well pumps, medium pumps, circulating pumps, booster pumps, compressors

Cement

high temperature fans, exhaust fans at the head of kilns, exhaust fans in the end of kilns, coal milling fans, raw materials milling fans, cement milling fans, ball mills

Water industry

submersible pumps, clean water pumps, sewage pumps, oxygen blowers

Chemical industry

sweetening fans, nitrogen compressors, CO^2 compressors, ammonia compressors, other compressors, gas fans, circulating water pumps

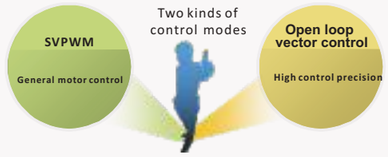
Others

fans and pumps applied to pharmacy, paper making, wind turbines and dynamometers, etc.

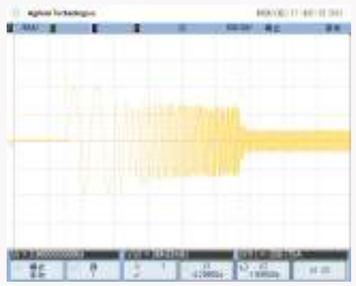
PRODUCT FEATURES

Two control modes

- Easy switching of control modes by parameters setting

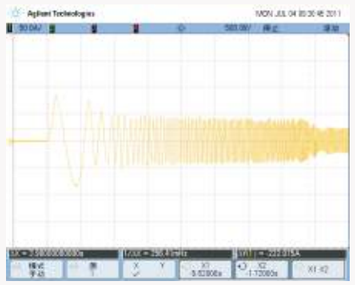


- High performance open loop vector control



Non-load start time 2s

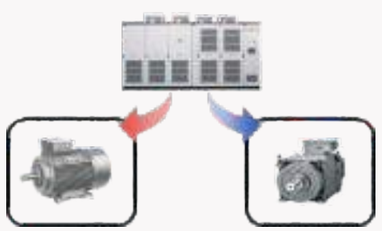
- SVPWM (Space Vector Pulse Width Modulation) control



Non-load start time 3.9s

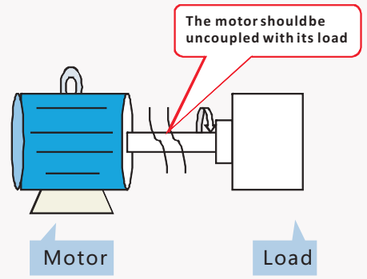
Two types of motor drives

- Be compatible with the synchronous motor and the asynchronous motor
- Easy motor-switching by parameters setting



Parameter autotuning

- Rotation parameter autotuning



Magnetic flux braking

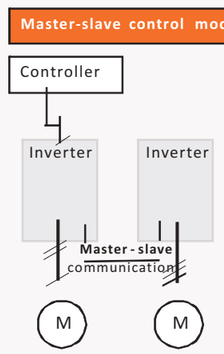
- Quick braking of the motor

Excellent overvoltage speed loss protection

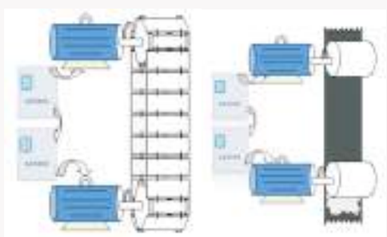
- Ensure no fault alarm during deceleration in case of improper time setting

Master-slave control (optional)

- Embedded master-slave control

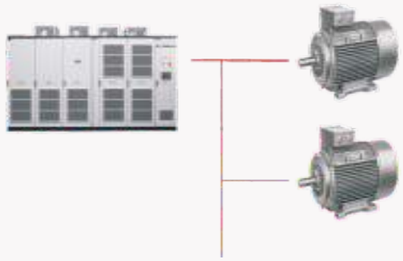


- Flexible & rigid connection in master-slave control



One drive more

- Up to 8 motors for master-slave control
- Downsize the equipment with one inverter driving multiple motors



Strong overload capacity

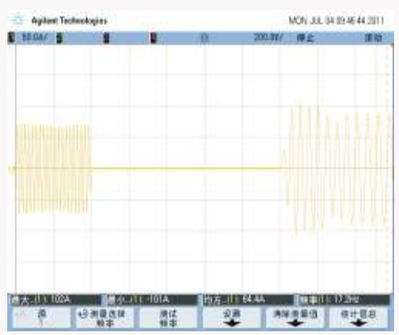
- 120% of the rated current: 120s, 150% of the rated current: 5s 200% of the rated current: protect immediately

Wide range of voltage fluctuation tolerance

- Run normally when the grid voltage is in the range of -15% ~ +10%
- Derate to run without stop when the voltage is 85% ~ 65% of the rating or 110% ~ 120% in a short time
- AVR, automatically adjust output voltage according to bus voltage fluctuation

No stop when instantaneous power off

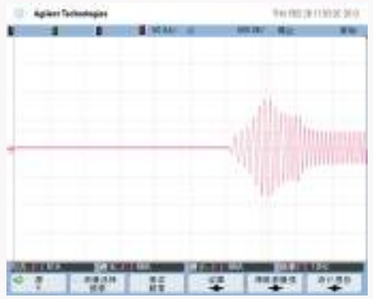
- Continue running without stop when the grid powers off for 1-5s



Frequency decreases 30Hz at load after power off for 1s

Full band rotating speed tracking

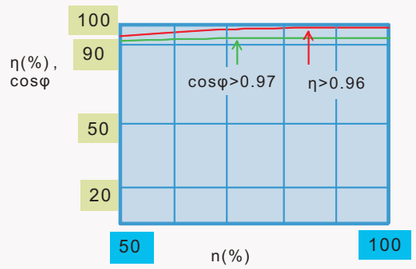
- Track all rotating speeds of the motor and restore to run in either static or dynamic state



Rotating speed tracking and start at 5Hz

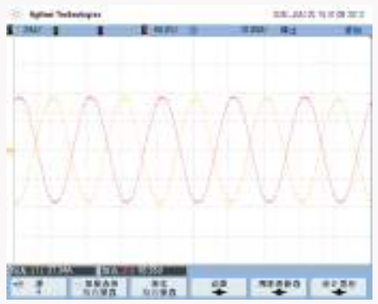
High power factor and efficiency

- The diode rectifier bridge in each power unit ensures the power factor≥0.97 at full load
- The excellent control performance ensures the efficiency of the system≥96% at full load



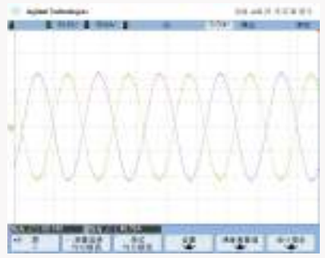
Low harmonic design

- Dry type phase-shifting transformer
- Multi-pulse diode bridge rectifier (6kV: 30 pulses, 10kV: 48 pulses) in strict accordance with IEEE519~1992 and GB/T14519~93 standards on voltage and current distortion r
- Input harmonic＜2% at rated load

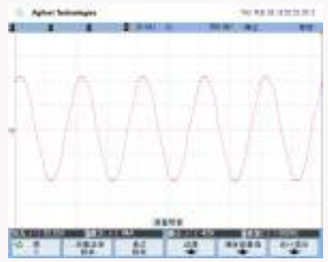


Perfect output waveforms

- Phase-shifting multi-level PWM (6kV:11 levels, 10kV:17 levels), almost sine waves
- Output harmonic＜2% at rated load



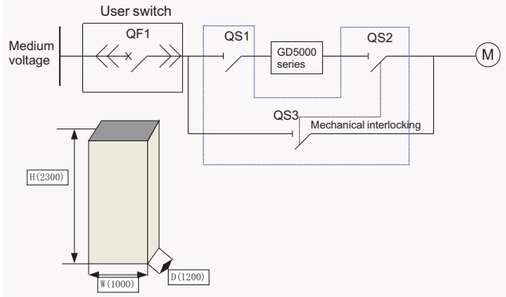
Voltage and current waveforms at 50Hz



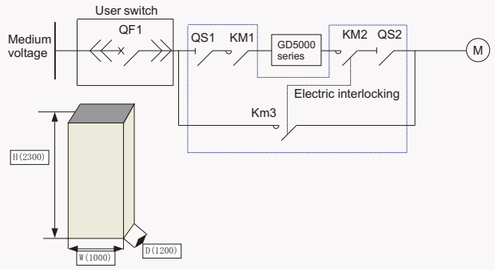
Current waveform at 1Hz

Various bypasses

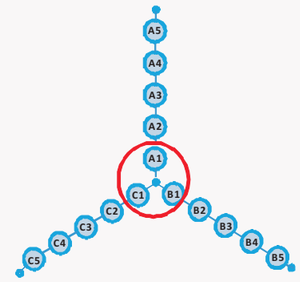
- System bypass: one-drive-one manual bypass



- System bypass: one-drive-one isolating automatic bypass



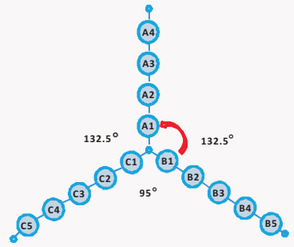
- Unit bypass: the same level bypass



Electronic or contactor mechanical bypass

> When one unit is invalid, bypass it and derate to run
> Bypass the fault unit in 200ms
> Be applicable to occasions with good working conditions
> Contactor mechanical bypass (optional)

- Unit bypass: neutral point drifting bypass



> When one unit is invalid, bypass it and let other units work normally by algorithm
> Maximum 2 unit bypasses for each phase
> Be applicable to occasions with bad working conditions

Various communication methods

- Standard Modbus, or optional Profibus-DP and Ethernet based on user configuration

Communication methods
- Modbus
- Profibus (optional)
- Ethernet (optional)

Fault diagnosis

- Fault positioning and diagnosis in ways of fault record, waveform record and black box

Upper computer software (optional)

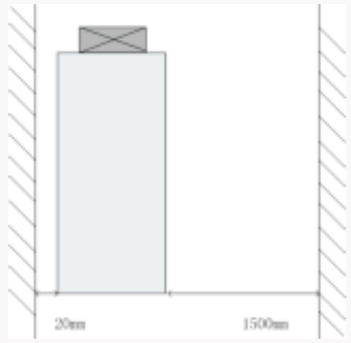
- Parameters setting and monitoring by computer

Synchronous switching (optional)

- Switch on the premise of consistent parameters at power frequency and variable frequency, greatly reducing current surge, decreasing impact on the grid and motor, and prolonging the service life of the motor

Front maintenance (optional)

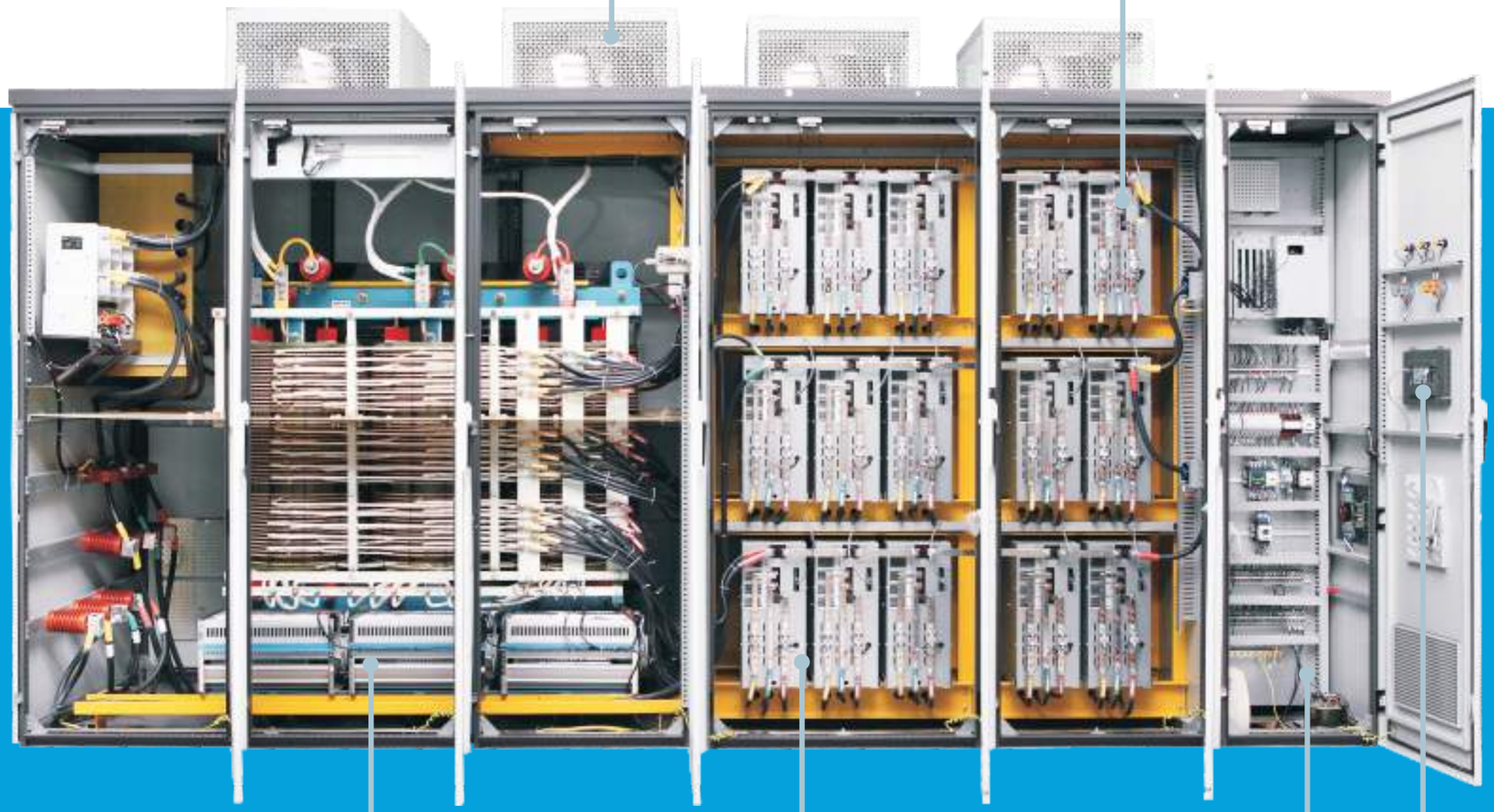
- Available front maintenance for all series at optional wall mounting



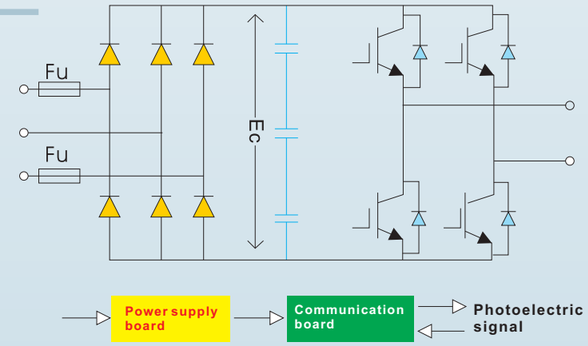
PRODUCT CONSTRUCTION

Cooling fan

- Import fan, with large air flow,low noise and high reliability



Power unit



- Each power unit is equivalent to an AC-DC-AC single-phase low voltage inverter
- Diode bridge rectifier
- The rectifier transformer secondary output (690V), supply power to the unit via the fuse; when the system of 6*n pulse full bridge uncontrolled rectifier gains DC power after filtering, the power will invert into PWM single-phase AC power at H bridge.

Phase-shifting transformer cabinet

- Greatly improve voltage waves at grid side and effectively restrain harmonics
- Guarantee reliable running by realtime transformer temperature detecting

Power unit cabinet

- Series connection technology of power units
- Modularized design, each unit interchangeable

Voltage degree	Qty of single-phase power units	Total
3/3.3kV	3	9
6kV	5	15
6.6kV	6	18
10kV	8	24
11kV	9	27

Control cabinet

- DSP+FPGA+ARM 3-core control improves control precision and response speed
- Communicate with the unit by optical fiber communication of strong anti-interference performance

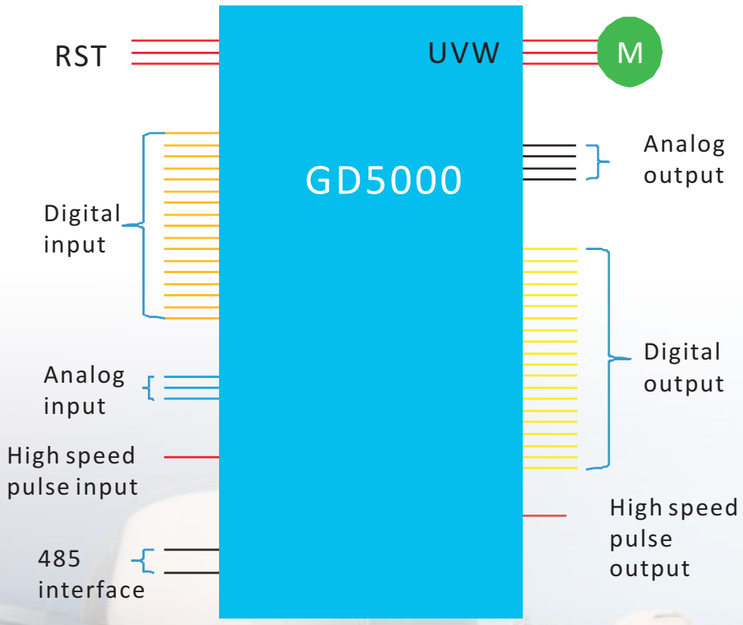
Touch screen

- 10′, better display quality
- Realtime data monitoring and waveform displaying

HMI

- 65536 color LCD, high contrast, wide view, vivid display
- Various languages switching online
- Easy program update, fault information and running data copy by USB
- Accurate menu levels for running parameters, function parameters and faults displaying

USER TERMINALS



※Refer to General parameters or Operation manual of GD5000 series medium voltage inverters for detailed instructions on terminals, or contact with SHENZHEN INVT ELECTRIC CO., LTD.

GENERAL PARAMETERS

	Item	3kV	3.3kV	6kV	6.6kV	10kV	11kV
Input	Rated input voltage	AC 3PH 3kV	AC 3PH 3.3kV	AC 3PH 6kV	AC 3PH 6.6kV	AC 3PH 10kV	AC 3PH 11kV
	Voltage fluctuation range	-15%~+10%					
	Input frequency	50/60Hz ±5%					
	Input power factor	≥0.97 (Full load)					
	System efficiency	≥96% (Full load)					
	Input current harmonic	≤2%, meet IEC standards of IEEE519~1992 and GB/T14519~93 Quality of electric energy supply - Harmonics in public supply network					
Output	Output voltage	0~3kV	0~3.3kV	0~6kV	0~6.6kV	0~10kV	0~11kV
	Output current	0-216A	0-219A	0-216A	0-219A	0-205A	0-223A
	Output capacity	0-1120kVA	0-1250kVA	0-2240kVA	0-3550kVA	0-3550kVA	0-4250kVA
	Output power	0-900kW	0-1000kW	0-1800kW	0-2000kW	0-2800kW	0-3350kW
	Output frequency	0~120Hz					
	Output current harmonic	≤2%					
Control performance	Control mode	Open loop vector control , SVPWM control					
	Control system	DSP FPGA ARM					
	HMI	10′ touch screen					
	Speed ratio	1:50 (SVPWM) ; 1:100 (open loop vector)					
	Speed control precision	±1% the maximum speed (SVPWM) ; ±0.4% the maximum speed (open loop vector)					
	Torque response time	<200ms (open loop vector)					
	Starting torque	150% of the rated torque					
	Overload protection	120% of the rated current: 120s,150% of the rated current: 5s 200% of the rated current: protect immediately					
	ACC/DEC time	0-3600s, customized					
Signal I/O	Digital input	16 channels digital input					
	Digital output	20 channels relay output					
	Analog input	3 channels: AI1, AI2: 0~10V/0~20mA; AI3: -10V~10V					
	Analog output	4 channels: AO1, AO2: 0~10V; 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					
	Communication method	Modbus(RS485 interface),optional: Profibus-DP, Ethernet					
Protection function	System	Overcurrent, overvoltage, undervoltage, motor overload, inverter overload, input phase loss, output phase loss					
		Overheating, temperature controller fault, communication fault, access fault, uplink communication fault, downlink communication fault, fan overheating					
	Unit	Optical fiber uplink communication fault, optical fiber downlink communication fault, overvoltage, undervoltage, power supply overheating, input phase loss, VCE fault, bypass failure					
Others	Installation method	Cabinet mounting					
	Protection degree	IP30					
	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%					
	MTBF	100000h					
	Temperature of running environment	-5℃~+40℃, derate 1.5% for every additional 1℃ if the temperature is above 40 ℃ and the maximum temperature is 50℃; run without load if the temperature reaches 60℃.					
	Altitude	Below 1000m; derate 1% for every additional 100m if the sea level is above 1000m					
	Storage	Keep away from dust, direct sunlight, flammable or corrosive gas, oil, steam and vibration					
	Vibration	2~9Hz displacement 3mm; 9~20Hz ACC 9.8m/s2; 20~55Hz ACC 2m/s2; 55~200Hz ACC 1m/s2					

INSTRUCTION OF MODELS

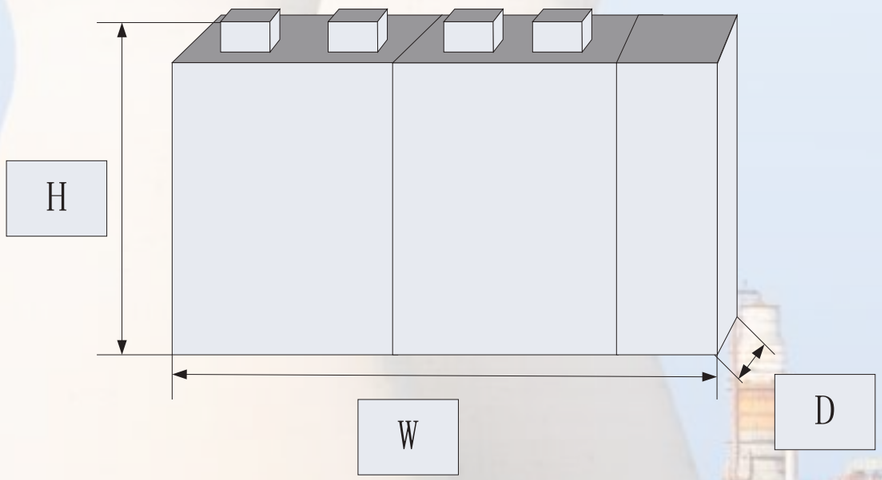
GD5000-A□□□□-□□-X X X X

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①	Name of medium voltage series products	GD5000:high performance medium voltage inverter	⑤	Management code	D:dual-side maintenance S:front maintenance L:small power integrated machine
②	Product type	A:asynchronous vector product(AM) B:synchronous vector product(SM)	⑥	Management code	R:energy feedback system X:default value
③	Rated capacity	0500 : 500kVA	⑦	Management code	C:bypass system with unit contactor X:default value
④	Voltage degree	03:3kV 3.3:3.3kV 06:6kV 6.6:6.6kV 10:10kV 11:11kV	⑧	Management code	P:belt conveyor Other important non-standard or special management code for other industries

※GD5000-A0800-06-DX: GD5000 series high performance medium voltage inverters, vector control, asynchronous motor drive, rated capacity 800kVA, rated voltage 6kV, dual-side maintenance, two-quadrant

SELECTION TABLE



3kV series

Inverter model	Rated capacity (kVA)	Rated output current (A)	Motor power (kW)	Dimension W*D*H(mm)	Standard weight (kg)
GD5000-□0250-03	250	48	200	3200X1200X2720	1559
GD5000-□0280-03	280	54	225	3200X1200X2720	1559
GD5000-□0315-03	315	61	250	3200X1200X2720	1559
GD5000-□0375-03	375	72	300	3200X1200X2720	1587
Gd5000-□0400-03	400	77	315	3200X1200X2720	1607
GD5000-□0425-03	425	82	335	3200X1200X2720	1647
Gd5000-□0450-03	450	87	355	3200X1200X2720	1657
GD5000-□0500-03	500	96	400	3200X1200X2720	1669
GD5000-□0560-03	560	108	450	3400X1200X2720	1744
GD5000-□0630-03	630	121	500	3400X1200X2720	1826
GD5000-□0710-03	710	137	560	3400X1200X2720	1881
GD5000-□0750-03	750	144	600	3400X1200X2720	1881
GD5000-□0800-03	800	154	630	3400X1200X2720	1999
GD5000-□0850-03	850	165	670	3400X1200X2720	2082
GD5000-□0900-03	900	173	710	3600X1200X2720	2082
GD5000-□1000-03	1000	192	800	3600X1200X2720	2137
GD5000-□1120-03	1120	216	900	3600X1200X2720	2347

6kV series

Inverter model	Rated capacity (kVA)	Rated output current (A)	Motor power (kW)	Dimension W*D*H(mm)	Standard weight (kg)
GD5000-□0315-06	315	30	250	3800X1200X2720	2835
GD5000-□0355-06	355	34	280	3800X1200X2720	2885
GD5000-□0400-06	400	38	315	3800X1200X2720	2965
GD5000-□0450-06	450	43	355	3800X1200X2720	2995
GD5000-□0500-06	500	48	400	3800X1200X2720	3035
GD5000-□0560-06	560	54	450	3800X1200X2720	3170
GD5000-□0630-06	630	61	500	3800X1200X2720	3320
Gd5000-□0710-06	710	68	560	3800X1200X2720	3390
GD5000-□0750-06	750	72	600	3800X1200X2720	3420
GD5000-□0800-06	800	77	630	4400X1200X2720	3635
GD5000-□0900-06	900	87	710	4400X1200X2720	3785
GD5000-□1000-06	1000	96	800	4400X1200X2720	3885
GD5000-□1120-06	1120	108	900	4800X1200X2720	4268
GD5000-□1250-06	1250	120	1000	4800X1200X2720	4408
GD5000-□1400-06	1400	135	1120	4800X1200X2720	4758
GD5000-□1600-06	1600	154	1250	4800X1200X2720	5058
GD5000-□1800-06	1800	173	1400	4800X1200X2720	5610
GD5000-□2000-06	2000	192	1600	4800X1200X2720	5810
GD5000-□2240-06	2240	216	1800	4800X1200X2720	6060

10kV series

Inverter model	Rated capacity (kVA)	Rated output current (A)	Motor power (kW)	Dimension W*D*H(mm)	Standard weight (kg)
GD5000-□0400-10	400	23	315	4600X1200X2720	3370
GD5000-□0450-10	450	26	355	4600X1200X2720	3460
GD5000-□0500-10	500	29	400	4600X1200X2720	3550
GD5000-□0560-10	560	32	450	4600X1200X2720	3590
GD5000-□0630-10	630	36	500	4600X1200X2720	3660
GD5000-□0710-10	710	41	560	4800X1200X2720	3960
GD5000-□0800-10	800	46	630	4800X1200X2720	4080
GD5000-□0850-10	850	49	670	4800X1200X2720	4120
GD5000-□0900-10	900	52	710	4800X1200X2720	4370
GD5000-□0950-10	950	55	750	4800X1200X2720	4416
GD5000-□1000-10	1000	58	800	4800X1200X2720	4506
GD5000-□1060-10	1060	61	850	4800X1200X2720	4526
GD5000-□11200-10	1120	65	900	4800X1200X2720	4680
GD5000-□1180-10	1180	68	950	4800X1200X2720	4776
GD5000-□1250-10	1250	72	1000	4800X1200X2720	4976
GD5000-□1400-10	1400	81	1120	5200X1200X2720	5271
GD5000-□1600-10	1600	92	1250	5200X1200X2720	5421
GD5000-□1700-10	1700	98	1400	5200X1200X2720	5621
GD5000-□1900-10	1900	110	1500	5800X1200X2720	6181
GD5000-□2000-10	2000	115	1600	5800X1200X2720	6270
GD5000-□2120-10	2120	122	1700	5800X1200X2720	6381
GD5000-□2240-10	2240	129	1800	6200X1500X2720	6876
GD5000-□2500-10	2500	144	2000	6200X1500X2720	7276
GD5000-□2800-10	2800	162	2240	6200X1500X2720	7576
GD5000-□3150-10	3150	182	2500	6200X1500X2720	8210
GD5000-□3350-10	3350	193	2650	6200X1500X2720	8810
GD5000-□3550-10	35500	205	2800	6200X1500X27200	9310

3.3kV series

Inverter model	Rated capacity (kVA)	Rated output current (A)	Motor power (kW)	Dimension W*D*H(mm)	Standard weight (kg)
GD5000-□0250-3.3	250	44	200	3200X1200X2720	1559
GD5000-□0280-3.3	280	49	225	3200X1200X2720	1559
GD5000-□0315-3.3	315	55	250	3200X1200X2720	1559
GD5000-□0355-3.3	355	62	280	3200X1200X2720	1559
GD5000-□0400-3.3	400	70	315	3200X1200X2720	1587
GD5000-□0450-3.3	450	79	355	3200X1200X2720	1647
GD5000-□0500-3.3	500	88	400	3200X1200X2720	1669
GD5000-□0560-3.3	560	98	450	3200X1200X2720	1669
GD5000-□0630-3.3	630	110	500	3400X1200X2720	1744
GD5000-□0710-3.3	710	124	560	3400X1200X2720	1826
GD5000-□0800-3.3	800	140	630	3400X1200X2720	1881
GD5000-□0900-3.3	900	158	710	3400X1200X2720	1999
GD5000-□1000-3.3	1000	175	800	3600X1200X2720	2082
GD5000-□1120-3.3	1120	195	900	3600X1200X2720	2137
GD5000-□1250-3.3	1250	219	1000	3600X1200X2720	2347

6.6kV series

Inverter model	Rated capacity (kVA)	Rated output current (A)	Motor power (kW)	Dimension W*D*H(mm)	Standard weight (kg)
GD5000-□0315-6.6	315	28	250	4000X1200X2720	2977
GD5000-□0355-6.6	355	31	280	4000X1200X2720	3029
GD5000-□0400-6.6	400	35	315	4000X1200X2720	3113
GD5000-□0450-6.6	450	39	355	4000X1200X2720	3145
GD5000-□0500-6.6	500	44	400	4000X1200X2720	3187
GD5000-□0560-6.6	560	49	450	4000X1200X2720	3329
GD5000-□0630-6.6	630	55	500	4000X1200X2720	3486
GD5000-□0710-6.6	710	62	560	4600X1200X2720	3591
GD5000-□0800-6.6	800	70	630	4600X1200X2720	3817
GD5000-□0900-6.6	900	79	710	4600X1200X2720	3974
GD5000-□1000-6.6	1000	87	800	4600X1200X2720	4079
GD5000-□1120-6.6	1120	98	900	4600X1200X2720	4481
GD5000-□1250-6.6	1250	109	1000	5000X1200X2720	4628
GD5000-□1400-6.6	1400	122	1120	5000X1200X2720	4995
GD5000-□1600-6.6	1600	140	1250	5000X1200X2720	5310
GD5000-□1800-6.6	1800	157	1400	5000X1200X2720	5891
GD5000-□1900-6.6	1900	165	1500	5000X1200X2720	6101
GD5000-□2000-6.6	2000	175	1600	5000X1200X2720	6101
GD5000-□2240-6.6	2240	195	1800	5000X1200X2720	6363
GD5000-□2500-6.6	2500	219	2000	5000X1200X2720	6363

11kV series

Inverter model	Rated capacity (kVA)	Rated output current (A)	Motor power (kW)	Dimension W*D*H(mm)	Standard weight (kg)
GD5000-□0400-11	400	21	315	4800X1200X2720	3707
GD5000-□0450-11	450	24	355	4800X1200X2720	3840
GD5000-□0500-11	500	26	400	4800X1200X2720	3905
GD5000-□0560-11	560	29	450	4800X1200X2720	3950
GD5000-□0630-11	630	33	500	4800X1200X2720	3980
GD5000-□0670-11	670	35	530	5000X1200X2720	4026
GD5000-□0710-11	710	37	560	5000X1200X2720	4190
GD5000-□0750-11	750	39	600	5000X1200X2720	4356
GD5000-□0800-11	800	42	630	5000X1200X2720	4532
GD5000-□0900-11	900	47	710	5000X1200X2720	4858
GD5000-□1000-11	1000	52	800	5000X1200X2720	4979
GD5000-□1120-11	1120	59	900	5000X1200X2720	5254
GD5000-□1250-11	1250	66	1000	5000X1200X2720	5474
GD5000-□1400-11	1400	73	1120	5400X1200X2720	5798
GD5000-□1500-11	1500	79	1180	5400X1200X2720	5963
GD5000-□1600-11	1600	84	1250	5400X1200X2720	5963
GD5000-□1800-11	1800	94	1400	5400X1200X2720	6799
GD5000-□1900-11	1900	100	1500	6000X1200X2720	6799
GD5000-□2000-11	2000	105	1600	6000X1200X2720	7019
GD5000-□2120-11	2120	110	1700	6000X1500X2720	7564
GD5000-□2240-11	2240	118	1800	6400X1500X2720	7564
GD5000-□2360-11	2360	124	1900	6400X1500X2720	8004
GD5000-□2500-11	2500	131	2000	6400X1500X2720	8004
GD5000-□2800-11	2800	147	2240	6400X1500X2720	8334
GD5000-□3150-11	3150	165	2500	6400X1500X2720	9031
GD5000-□3550-11	3550	186	2800	6400X1500X2720	9691
GD5000-□4000-11	4000	210	3150	6400X1500X2720	10241
GD5000-□4250-11	4250	223	3350	6200X1500X2720	10241

※If the value exceeds the rated data, please contact with SHENZHEN INVT ELECTRIC CO., LTD.

PRODUCT APPLICATION

GD5000 medium voltage inverters applied to synchronous motors in metallurgy

• Project introduction

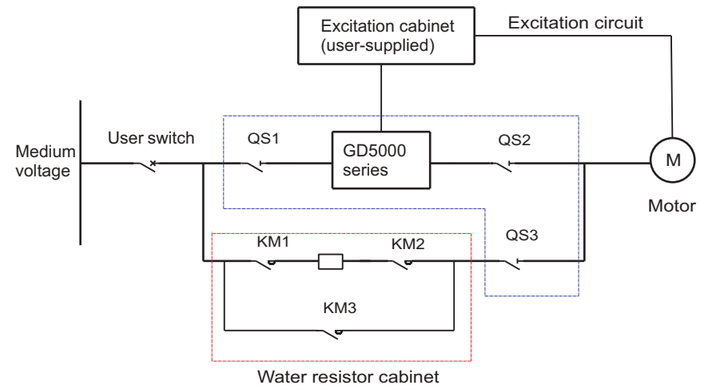
A steel plant in Tianjin owns four large sintering machines with an annual production of 4.76 million tons, among which the sintering and cooling fans of 200m² sintering system have much higher power, 5000kW and 3500kW synchronous motors respectively. At first, water resistor was used to start motors and the baffle of ventilation door was adopted to control air. After a period of time, the disadvantage of air regulation becomes increasingly evident.

To follow the national policy of energy-saving and emission reduction and improve operation and core competitiveness, after research and comparison, the plant chooses to install INVT's GD5000 series medium voltage inverters to improve 5000kW and 3500kW synchronous motors.

• Solution

The variable frequency speed control system of the synchronous motors mainly includes user switch, inverter, bypass cabinet, synchronous motor and excitation cabinet, of which the inverter achieves start/stop control and variable frequency speed regulation by controlling the current in the excitation cabinet via signals.

The schematic diagram of the system is shown as follows:



• Economic benefits

1.Running data of 5000kW cooling fan

Comparison before and after improvement			
Running data of power frequency		Running data of the inverter	
Running frequency	50Hz	Running frequency	40Hz
Input voltage	6 .1KV	Input voltage	5.8kV
Input current	432.3 A	Input current	257.7A
Power factor	0.9	Inverter efficiency	0.96
Motor power	4111 kW	Motor power	2508kW

The above data show that the energy saving rate of 5000kW sintering fan reaches 39%. If, on average, the equipment runs 300 days annually and 24 hours daily at the price of 0.4 yuan per kilowatt-hour, it will save 300*24*(4111-2508)*0.4=4.617 million yuan on the electricity bill each year. Totally, the remarkable energy saving, stable performance and reliable running make INVT receive a good reputation among the customers.

GD5000 medium voltage inverters applied to belt conveyors in mines

Preface

The belt conveyor is a general machine used in mines. Due to the elastic belt, based on Safety Regulations in Coal Mine, the large power conveyor should be installed with soft-start device which is mainly the hydraulic coupler currently and also CST (the integration of gearbox, coupler and electric hydraulic control). Although the hydraulic coupler can partly solve the problems of soft start, it increases maintenance and energy consumption, and puts high demands on the belt tension. With the development of medium voltage frequency technology, the hydraulic coupler is gradually replaced.

Advantages of adopting medium voltage inverters

- Soft-start of the belt conveyor
- Lower belt tension
- Power balance of multiple motors
- Function of inspection
- Stable start at heavy load
- Automatic speed regulation
- Energy saving

On-site introduction

A mine located in Quang Ninh province in Vietnam belongs to the government.
The parameters of belt conveyors in the mine are shown in following table:

Belt	Rated carrying capacity	Speed	Width	Angle of inclination	Capacity
	455t/h	2m/s	1000mm	9-16	900kg/m3
Motor	Model	Power	Rated voltage	Rated current	Power factor
	YBPT400-4	355KW	6KV	42.5A	0.86

Debugging of GD5000 series medium voltage inverters

According to on-site investigation and communication with customers, our company configures two GD5000 series medium voltage inverters of rated power 450kW, rated current 54A and rated voltage 6kV under the control of vector, master-slave and SVPWM.

As a result of parameter autotuning, the relative parameters of two motors have little differences; under SVPWM and vector modes at the same frequency, the output voltage and current of the inverter also have little differences. It proves that the inverter works normally and parameter autotuning is correct.

After one inverter finishes debugging, implement master-slave debugging from 0Hz-50Hz and then observe the output voltage and current of the master and slave. The debugging finishes when the inverters work normally and the motors run stably.

Conclusion

The application of INVT GD5000 series medium voltage inverters to the drive system of the belt conveyor not only improves efficiency, reliability and reduces energy consumption, but also achieves convenient on-site installing and excellent running performance.