

Medium voltage high-performance VFD



CONTENTS

About us	1
R&D capability	2
Reliable quality assurance	4
Manufacturing process control.....	5
Software control platform 3.0	6
Core functions of medium voltage applications	7
Medium-voltage product introduction	8
Detailed technical parameters	9
Model description	10
Options.....	12



/ About us

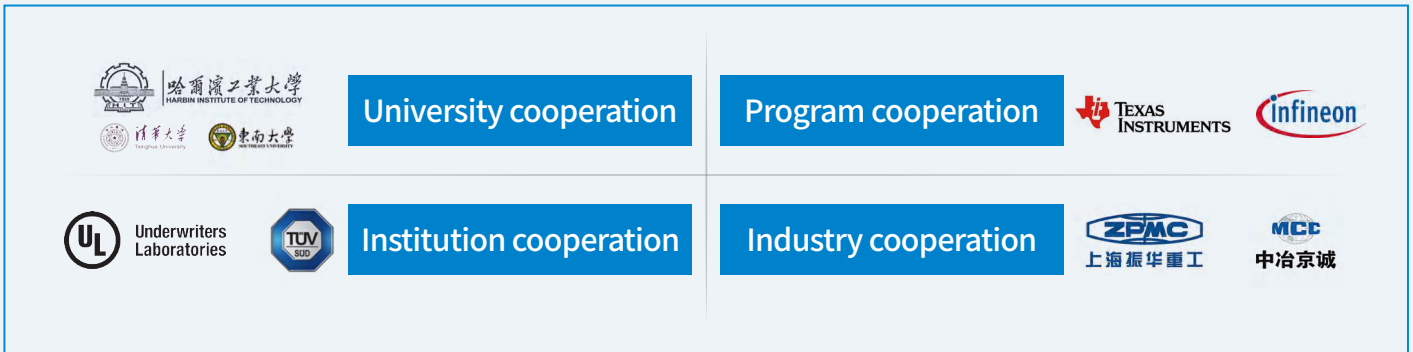
INVT (Shenzhen INVT Electric Co., Ltd) has been concentrating on industry automation and energy power since its foundation in 2002 and is committed to "Providing the best product and service to allow customers more competitiveness". INVT goes public in 2010 and is the first A-share listed company (002334) in Shenzhen Stock Exchange in the industry. At present, INVT owns 15 subsidiaries and more than 4500 employees, over 40 branches, forming a sales network covering more than 100 overseas countries and regions.

INVT has been awarded as the Key High-tech Enterprise of National Torch Plan based on mastering of key technologies in power electronics, auto control and IT. With business covering industry automation, electric vehicle, network power and rail transit, INVT has established 10 R&D centers nationwide, boasts more than 1400 patents and owns the first lab in the industry awarded ACT qualification from TÜV SÜD, UL-WTDP and CNAS National Lab. The industrial parks in Shenzhen and Suzhou aim to provide customers with advanced integrated product development design management, comprehensive product R&D test and auto informational production. The worldwide INVT branches and warranty service centers are ready to offer customers all-around back-ups including professional solutions, technical trainings and service support.

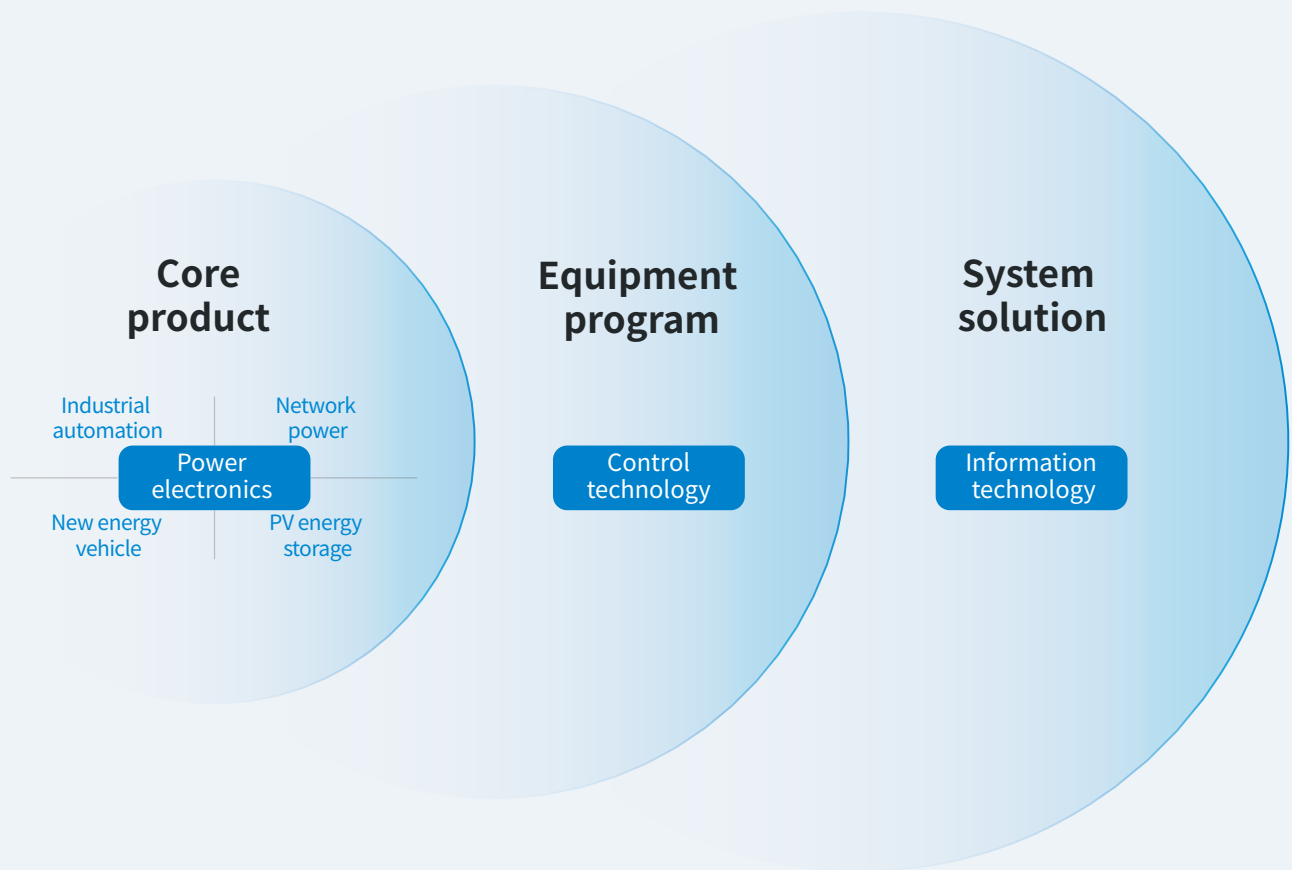
In the next decade, INVT will continue to take "Sincere Virtuous, Professional Aspiring" as our business philosophy, enhance core business sectors including industrial automation, electric vehicle, network power and rail transit based on the three major technologies in industry automation and energy power fields, and strive to become a leading, responsible and harmonic international professional group armed with proper product structure, leading technologies, efficient management, robust profitability and superior competitiveness.



Informatization | Digitization | Digital Intelligence | Digital governance



Open R&D system with strong alliances
of resources from all parties

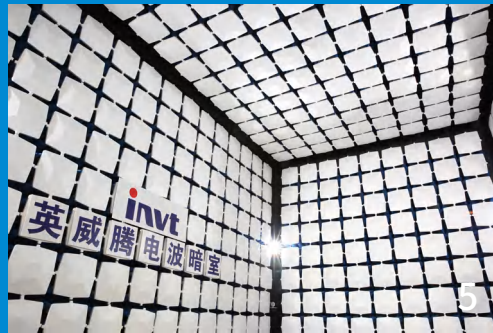


Constructing system solutions by advancing in three technological directions

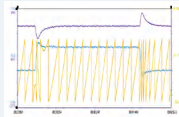
Reliable quality assurance



- 1.Component Lab
- 2.Environmental Reliability Lab
- 3. Performance Lab
- 4. Safety Lab
- 5. EMC Lab
- 6. Mechanical Reliability Lab
- 7. Dust/Water Proofing Lab
- 8. Equipment Development Lab
- 9. Pre-research Lab



Software control platform 3.0



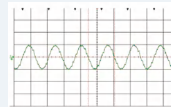
Open-loop vector performance improvement

- Response bandwidth improvement
- Improved motor adaptability
- Stable ride-through of electromotive and power generation



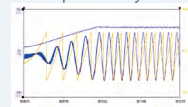
High-speed operation stability

- Deep flux-weakening operation AM10
- Carrier ratio 5:1



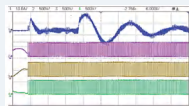
Low-speed load carrying capacity

- Speed regulation ratio 200:1
- Low-speed heavy-load startup



Speed-tracking start

- No need for motor side voltage detection circuit
- Fast tracking, without current surge



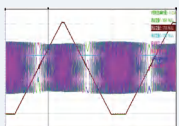
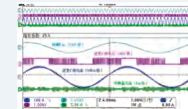
Energy-saving control

- VF and vector energy conservation
- Fast tracking, without current surge



Modulation metrics optimization

- Less switch damage
- Low electromagnetic noise
- Low current harmonic

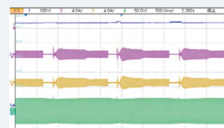


Open-loop low-speed performance improvement

- Speed regulation ratio 1:200
- Startup with 200% load
- Stable ride-through of electromotive and power generation

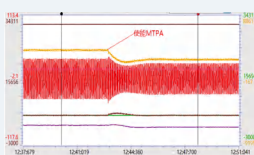
Software speed tracking

- New software speed tracking algorithm
- Fast tracking, without current surge
- Fast tracking within 400Hz



Energy-saving control

- Low no-load current
- MTPA algorithm



High-speed operation stability

- Deep flux-weakening operation
- Stable operation with low carrier ratio
- On-line counter-emf estimation, demagnetization warning
- Loop parameter adaptation

Improved usability of closed-loop vector

- Parameter autotuning with "one click"
- Automatic identification of encoder PPR, direction
- Loop parameter autotuning, with small speed overshoot and fast torque response
- Load adaptive algorithm with high rigidity and strong anti-interference ability

VVC+ control

- Good parameter robustness
- Low no-load current
- MTPA control supported



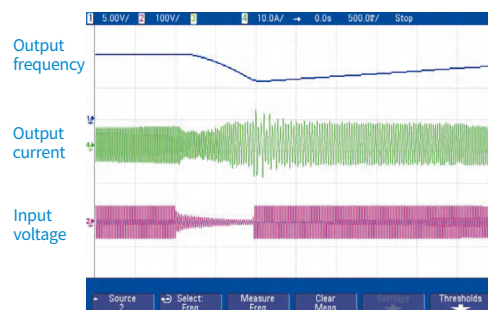
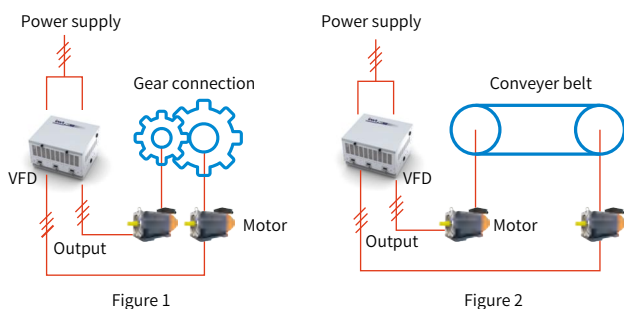
Core functions of medium voltage applications

Master-slave control

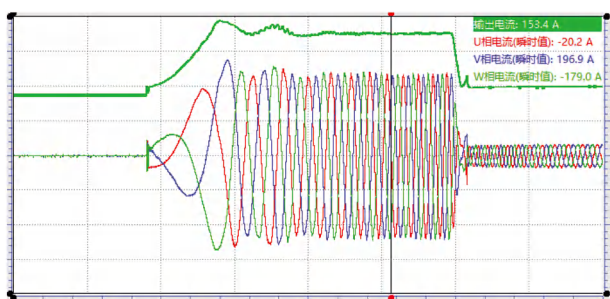
- ◆ Power balancing: meet the VFD output torque balancing after connecting the master-slave VFD to the motor through load connection.
- ◆ Speed synchronization: meet the VFD speed synchronization after connecting the master-slave VFD to the motor through load connection.
- ◆ Master-Slave switchover: support flexible switching between master and slave with just one click and single machine switching.

Transient power loss ride-through

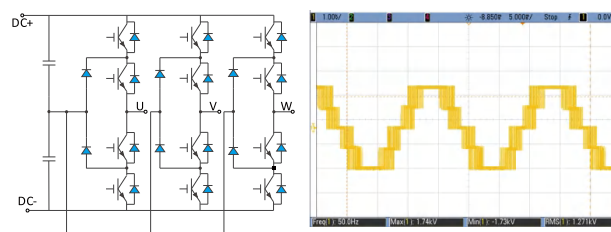
- ◆ When the grid transiently drops, the VFD can keep running within an effective time with the regenerative energy.
- ◆ It is particularly suitable for applications requiring high continuity of equipment operation, such as belt conveyors, elevators, etc.



200% low-frequency heavy-load startup



NPC three-level inverter technology



- ◆ Three-level output, with low harmonic content, reducing filter size and cost.
- ◆ Reduced output voltage variation (du/dt) to minimize insulation damage to the motor.
- ◆ Lower motor common-mode voltage to reduce shaft current.



Medium-voltage product introduction

INVT medium-voltage products for mining industry are developed based on our advanced power electronics technology and fully independently developed motor control algorithms. Combined with the application characteristics of mining equipment, we have developed three series of products: GD1000 series, GD2000 series and GD3000 series, covering voltage levels of 380V, 660V, 1140V, 3300V, and power ranges of 22kW-2500kW. These products are widely used in mining electrical equipment, such as coal mining machine, continuous mining machine, bolter miner, scraper conveyors, belt conveyors, mine hoists, local fans, and emulsion pumps for over a decade.

After more than a decade of sedimentation, INVT mining industry system solutions have been developed. These products are not only utilized in numerous domestic coal mines, both above and below ground, but also exported to foreign mines in Southeast Asia, West Asia, Africa, and Europe.

Additionally, GD3000 series products are extensively used in oil fracturing, brick wells, and pumping units, among other fields.

Application scenarios



Coal mining machine



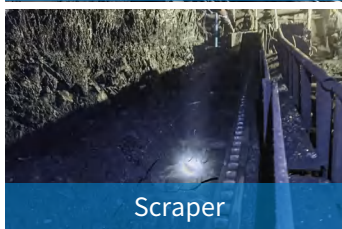
Hoists



Belt conveyor



Local fan



Scraper



Emulsion pump



Oil pumping machine



Petroleum drilling

/ Detailed technical parameters

Item	Specifications	
Input and output	Input voltage	AC 3PH 325V~437V (380V)
		AC 3PH 560V~760V (660V)
		AC 3PH 970V~1310V (1140V)
		AC 3PH 2805V~3630V (3300V)
	Input frequency	50/60Hz (47~63Hz)
	Power factor	> 0.95@ rated
	Output voltage	0~Input voltage
	Output power	For details, see the product ratings table.
Output frequency	0~400Hz	
Rated efficiency	> 96.5%	
Control feature	Rectifier control mode	Six-pulse regenerative rectifier
	Inverter control mode	Space voltage vector control, sensorless vector control (SVC), and sensor vector control (VC)
	Motor type	Asynchronous motor (AM), permanent magnetic synchronous motor (SM), and linear motor
	Running commands	Keypad, terminal, and communication
	Frequency reference	Digital setting, analog setting, communication setting, multi-step speed setting, and simple PLC setting, which can implement the setting combination and method switchover.
	Overload capacity	150% of rated current: 60s; 180% of rated current: 10s; 200% of rated current: 1s
	Torque response	SVC<20ms、FVC<10ms
	Torque accuracy	10% (SVC) , 5% (FVC)
	Starting torque	For asynchronous motors: 0.25Hz/150% (SVC) For synchronous motors: 0.5 Hz/150% (SVC), 0Hz/200% (FVC)
	Speed regulation range	1:50 (VF) 、 1:200 (SVC) 、 1:1000 (FVC)
	Speed accuracy	±0.2% (SVC) , ±0.02% (FVC)
	Braking mode	Regenerative braking, DC braking
Important functions	Master-slave control, torque control, torque boost, retention at transient voltage drop, droop control, PID control, speed tracking, multi-step speed running, simple PLC, S curve acceleration	
Protection functions	More than 30 protection functions, such as protection against overcurrent, overvoltage, undervoltage, overtemperature, phase loss, and overload	
Communication and interfaces	Communication function	RS485 embedded as standard configuration, expandable for PROFIBUS-DP, CANopen, PROFINET, CAN master-slave, Ethernet, GPRS, etc
	Analog input	Two inputs; AI1: 0~10V/0~20mA; AI2: -10~10V
	Analog output	One input; AO1: 0~10V/0~20mA
	Digital input	Four regular inputs; max. frequency: 1kHz; internal impedance: 3.3kΩ Two high-speed inputs; max. frequency: 50kHz; supporting quadrature encoder input; with speed measurement function
	Digital output	One high-speed pulse output; max. frequency: 50kHz One Y terminal open collector output
	Relay output	RO1A: NO; RO1B: NC; RO1C: common RO2A: NO; RO2B: NC; RO2C: common Contact capacity: 3A/AC250V, 1A/DC30V
	Extended interfaces	Supporting PG cards, communication expansion cards, and I/O cards
Others	Cooling method	Water cooling/Heat pipe cooling
	Ingress protection (IP) rating	IP00
	Storage temperature	-40~70°C
	Working environment temperature	-10~50°C ; derating is required if the ambient temperature exceeds 40° C.
	Relative humidity	5%~95%, no condensation
	Altitude	< 4000m. Derating is required when the altitude exceeds 1000m.

Note: There are slight differences in the functions and configurations of different series of products. Please refer to the instructions of our corresponding series of products for details.

Model description

Product model designation

GD1000 – 31A – 110G – 12

① ② ③ ④

Field	Symbol	Description
Product series	①	GD1000: Product for coal mining machines GD2000: Two-level module product GD3000: Three-level module product
Subseries	②	01: Two-quadrant module 11/31: Four-quadrant module A/B/C: Subseries version
Rated power	③	110G: 110kW
Voltage class	④	04:380V 06:660V 12:1140V 33:3300V

Goodrive1000 series four-quadrant module VFD ratings

Product model	Rated voltage (V)	Rated power (kW)	Rated input current (A)	Rated output current (A)
GD1000-31-110G-04	380	110	201	215
GD1000-31A-160G-04	380	160	310	320
GD1000-31A-315G-06	660	315	334	320
GD1000-31A-110G-12	1140	110	68	73

Goodrive2000 series four-quadrant module VFD ratings

Product model	Rated voltage (V)	Rated power (kW)	Rated input current (A)	Rated output current (A)
GD2000-31-075G-06	660	75	85	86
GD2000-31-090G-06	660	90	95	98
GD2000-31-110G-06	660	110	118	120
GD2000-31-132G-06	660	132	145	150
GD2000-31-160G-06	660	160	165	175
GD2000-31-185G-06	660	185	190	200
GD2000-31-200G-06	660	200	210	220
GD2000-31-250G-06	660	250	255	270
GD2000-31-315G-06	660	315	306	350
GD2000-31-400G-06	660	400	390	430
GD2000-31-500G-06	660	500	486	540
GD2000-31-630G-06	660	630	615	680

Goodrive2000 series two-quadrant module VFD ratings

Product model	Rated voltage (V)	Rated power (kW)	Rated input current (A)	Rated output current (A)
GD2000-01-030G-06	660	30	31	32
GD2000-01-037G-06	660	37	39	40
GD2000-01-075G-06	660	75	85	86
GD2000-01-090G-06	660	90	95	98
GD2000-01-110G-06	660	110	118	120
GD2000-01-132G-06	660	132	145	150
GD2000-01-160G-06	660	160	165	175
GD2000-01-185G-06	660	185	190	200
GD2000-01-200G-06	660	200	210	220
GD2000-01-250G-06	660	250	255	270
GD2000-01-315G-06	660	315	306	350
GD2000-01-400G-06	660	400	390	430
GD2000-01-500G-06	660	500	486	540
GD2000-01-630G-06	660	630	615	680

Goodrive3000 series two-quadrant module VFD ratings

Product model	Rated voltage (V)	Rated power (kW)	Rated input current (A)	Rated output current (A)
GD3000-01-055G-12	1140	55	34	36
GD3000-01-075G-12	1140	75	47	50
GD3000-01-090G-12	1140	90	56	60
GD3000-01-110G-12	1140	110	68	73
GD3000-01-132G-12	1140	132	82	85
GD3000-01-160G-12	1140	160	98	104
GD3000-01-200G-12	1140	200	122	128
GD3000-01-250G-12	1140	250	150	160
GD3000-01-315G-12	1140	315	185	195
GD3000-01-400G-12	1140	400	235	250
GD3000-01-500G-12	1140	450	275	285
GD3000-01-630G-12	1140	500	300	310
GD3000-01-710G-12	1140	630	380	395
GD3000-01-800G-12	1140	800	480	500
GD3000-01-1000G-12	1140	1000	600	620
GD3000-01-0855G-33	3300	855	187	190
GD3000-01-1250G-33	3300	1250	260	280
GD3000-01-1600G-33	3300	1600	330	360

Goodrive3000 series four-quadrant module VFD ratings

Product model	Rated voltage (V)	Rated power (kW)	Rated input current (A)	Rated output current (A)
GD3000-11-055G-12	1140	55	34	36
GD3000-11-075G-12	1140	75	47	50
GD3000-11-090G-12	1140	90	56	60
GD3000-11-110G-12	1140	110	68	73
GD3000-11-132G-12	1140	132	82	85
GD3000-11-160G-12	1140	160	98	104
GD3000-11-200G-12	1140	200	122	128
GD3000-11-250G-12	1140	250	150	160
GD3000-11-315G-12	1140	315	185	195
GD3000-11-400G-12	1140	400	235	250
GD3000-11-500G-12	1140	450	275	285
GD3000-11-630G-12	1140	500	300	310
GD3000-11-710G-12	1140	630	380	395
GD3000-11-800G-12	1140	800	480	500
GD3000-11-1000G-12	1140	1000	600	620

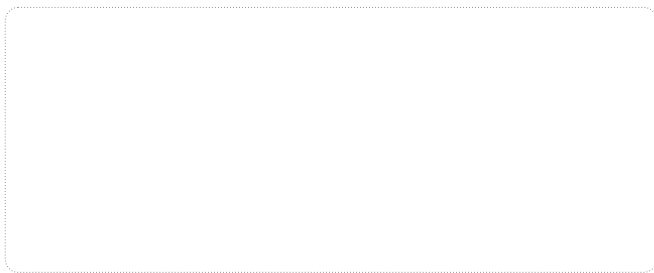
Goodrive3000 series cabinet VFD ratings

Product model	Rated voltage (V)	Rated power (kW)	Rated input current (A)	Rated output current (A)
GD3000-00-055G-12	1140	55	34	36
GD3000-00-110G-12	1140	110	68	73
GD3000-00-200G-12	1140	200	122	128
GD3000-00-400G-12	1140	400	235	250
GD3000-00-630G-12	1140	630	380	395
GD3000-00-1000G-12	1140	1000	600	620

Options

Expansion card type	Model	Specification
CANopen communication card	EC-TX505D	<ul style="list-style-type: none"> · Based on the CAN2.0A and CAN2.0B physical layer · Supporting the CANopen protocol · Adopting INVT master-slave control proprietary protocol
CAN master/slave card	EC-TX505D	Adopting INVT master-slave control proprietary protocol
IO expansion card 1	EC-IO501-00	<ul style="list-style-type: none"> · Four digital inputs · One digital output · One analog input · One analog output · Two relay outputs: one double-contact output and one single-contact output
PROFIBUS-DP communication card	EC-TX503D	Supporting the PROFIBUS-DP protocol
Ethernet communication card	EC-TX510B	<ul style="list-style-type: none"> · Supporting Ethernet communication with internal INVT protocol · Used with the host controller monitoring software, INVT Workshop
PROFINET communication card	EC-TX510B	Supporting the PROFINET protocol
Sin/Cos PG card	EC-PG502	<ul style="list-style-type: none"> · Applicable to Sin/Cos encoders with or without CD signals · Supporting the frequency-divided output of A, B, and Z · Supporting input of pulse train reference
UVW incremental PG card	EC-PG503-05	<ul style="list-style-type: none"> · Applicable to differential encoders of 5V · Supporting the orthogonal input of A, B, and Z · Supporting the pulse input of phase U, V, and W · Supporting the frequency-divided output of A, B, and Z · Supporting input of pulse train reference
Resolver PG card	EC-PG504-00	<ul style="list-style-type: none"> · Applicable to resolver encoders · Supporting frequency-divided output of resolver-simulated A, B, Z · Supporting input of pulse train reference
24V incremental PG card	EC-PG505-24B	<ul style="list-style-type: none"> · Applicable to OC encoders of 24V · Applicable to push-pull encoders of 24V · Supporting the orthogonal input of A, B, and Z · Supporting the frequency-divided output of A, B, and Z · Supporting input of pulse train reference
GPRS expansion card	EC-IC501-2	<ul style="list-style-type: none"> · Supporting IoT monitoring · Supporting remote VFD upgrade

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 - Solar Inverter
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