PFQD

PowerPard Four-quadrant Drive

The PFQD are modularly designed which integrates the AFE and DC/AC unit in the cabinet, to feed back the regenerated energy from motor brake to grid with super low harmonic interference, realizing much more energy saving than any other drives.

COMPATIBILITY

Synch motor Asynch motor
High-speed motor Synch reluctance motor

POWER RATINGS

3× 380 - 480V 30kW - 4.5MW
3× 525 - 690V 90kW - 5.0MW

CONTROL TECHNOLOGY

V/Hz control
SVC1 SVC2 VC

FEATURES

	Reliable	User-friendly	Intelligent
	Ambient temperature 45°C without derating Thickened conformal coating Optimized cooling system	Parameter copy Detachable control panel One platform numarous versions Modularized design	Warning systems Multiple frequency references All-sided protection Online autotuning PC-based monitoring software Extensible features/parameter blocks
Benefit	Less need for cooling or oversizing Resistant to harsh surroundings Lower temperature rise	Save time for Commissioning Easy for remote control Save stocks Easy for maintenance	Warning before stop Powerful in intelligent applications Long lifetime & less maintaince cost Intelligent response to delicate variation Easy to operate Make the drives "just for you"

APPLICATIONS

Conveyor system, hoists & cranes, kowtow machine, paper shears, sugar mills, centrifugal, eddy current dynamometers.

The King in Low Harmonics and Energy Saving

01 Remarkable in energy saving

PFQD drives, in addition to low harmonics, offer remarkable energy saving in applications with frequent braking, such as cranes， centrifuges, sugar cane mills, test benches and winders. They provide smooth and precise control, and allow interrupted power flow to and from the mains supply. Active frond end, a part of PFQD, can be supplied individually when required.

02 Module design

A PFQD consists of an active front end and a drive. The AFE and the drive are separately arranged in the cabinet, extremely convenient for operation and maintenance. High power density, communication through optical fiber to increase the anti-interference capability and independent air duct design for better heat dissipation.

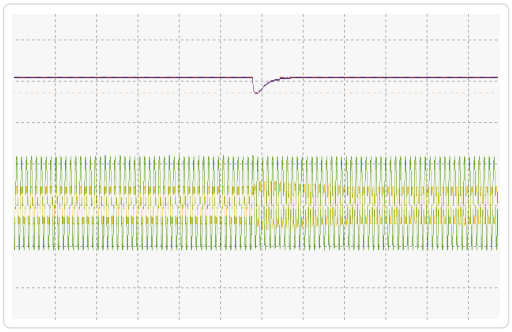
Power Units:

03 Integrated power module control unit

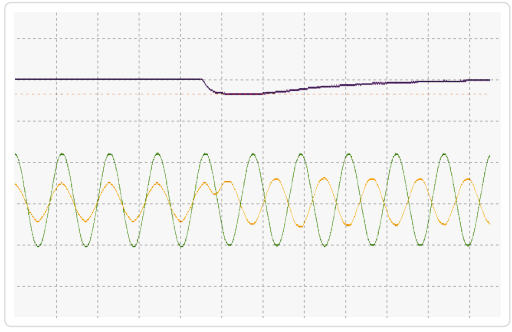
Integrated power module control unit, realizing the active current sharing and synchronous control strategics.

04 Active Front End - AFE

Active Front End allows real-time regeneration of energy back onto the power line (No demand on phase difference). The active front end also provides power factor control for power quality management and greatly reduces unwanted power harmonics.



▲ Figure Waveform of regeneration state

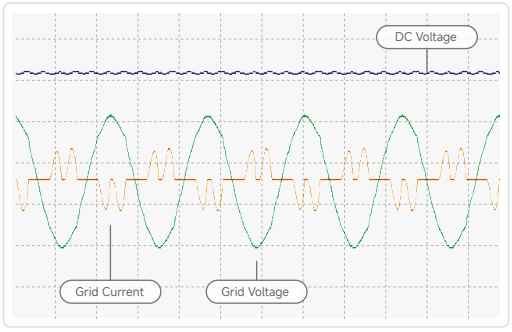


▲ Figure Waveform of motoring state

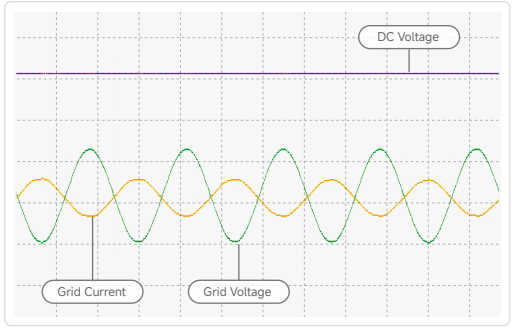
05 Purified output

PFQD are much greener than general drives since they are equipped with function of active power factor adjustment. The output current THD is less than 3%, no pollution to grid power supply according to standard GB14549, GB/Z17625.6-2003.

NOTE: Output current THD is 2.18% according the test by a reputed third party. Please contact Gtake to get this report when it is needed.



▲ Figure Waveform of common AC Drives



▲ Figure Waveform of PFQD AC drives

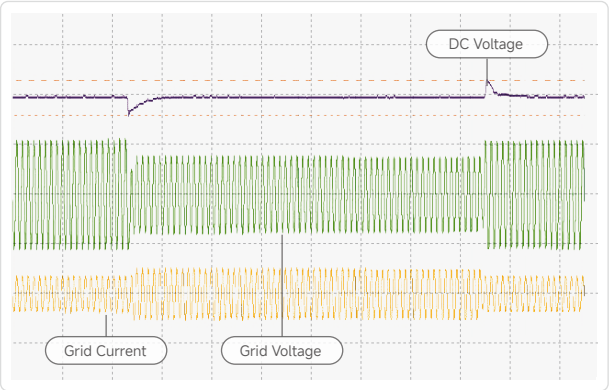
06 Bus voltage auto adapted

PFQD AFE drives can auto adjust bus voltage, which ensures the stability of drive output current and motor rotary speed. Even if there is a big fluctuation on power supply voltage for short time, or sudden change on the load, PFQD bus voltage self adaption can make sure of the system operation without trip, reducing motor temperature rise and prolong the load lifespan.

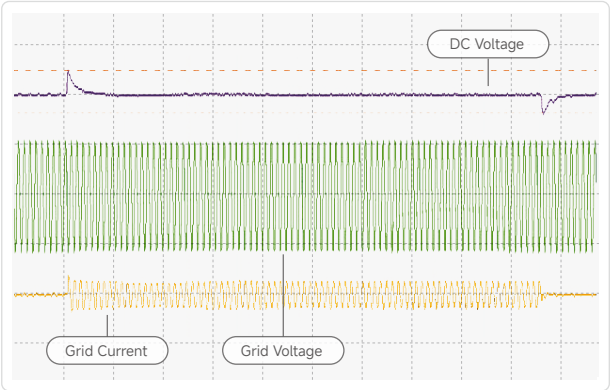
☆ 40% input voltage drop acceptable

07 Marvelous dynamic response

PFQD AFE drives have quick and marvelous dynamic response to load change, no matter load is added or lessened. The drive can output suited torque simultaneously to a sharp change load.



▲ Figure Waveform of grid voltage dropping



▲ Figure Waveform of grid voltage dropping

08 Four control modes

PFQD AFE drives are equipped with four control modes, V/Hz, SVC1, SVC2, and VC, fulfilling the requirement of almost all general and demanding industrial systems.

Control mode	V/Hz	SVC1	SVC2	VC
Speed adjustable range	1:100	1:100	**1:200**	**1:1000**
Speed accuracy	±0.5%	±0.2%	±0.2%	±0.02%
Speed ripple	/	±0.3%	±0.3%	±0.1%

09 Abundant hot-plugged options

One platform millions of version is the basic design concept of PFQD. Numerous options are available and can be mounted and tested at factory or be hot-plugged in later for change-over or upgrade.

Fieldbus options

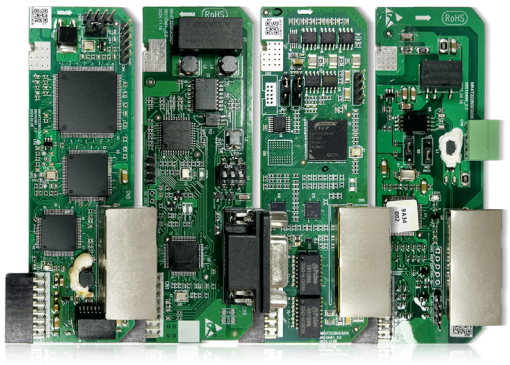
- EPC-CM31 Modbus 485
- EPC-CM32 CAN
- EPC-CM33 MIII
- EPC-CM34 EtherCAT
- EPC-CM35 Profinet
- EPC-CM36 CANOpen
- EPC-CM39 Modbus TCP
- EPC-CM40 Ethernet

I/O options

- EPC-TM32 Digital, analog, relay, STO, leakage current input detection

Encoder options

- EPC-PG31 ABZ no-isolated, dual DB connection
- EPC-PG32 ABZ single channel isolated, dual DB connection
- EPC-PG33 Resolver
- EPC-PG34 Sin/Cos
- EPC-PG35 Absolute, SSI/ENDAT/BISS
- EPC-PG36 ABZ one channel isolated & one channel no-isolated, 18 pin connection
- EPC-PG37 ABZ single channel isolated, 18 pin connection
- EPC-PG38 Resolver & Sin/Cos
- EPC-PG39 ABZ one channel isolated & one channel no-isolated, dual DB connection



Adapts to future upgrade

This typically benefits for the applications when your automation system has a need of upgrade or has a new motional requirement or new request for system adjustment. Gtake can provide the kit for online upgrade operated easily by customers theirselves, making "just for you" achieved.

SPECIFICATIONS

Mains supply (R/L1, S/L2, T/L3)

Supply voltage	380-480V/525-690V ±10% (lasting), -15% (60s)
Supply frequency	50/60Hz ±5%
True Power Factor (λ)	1 nominal at rated load
Displacement Power Factor (cosφ) near unity	(> 0.98)

Output data (U/T1, V/T2, W/T3)

Output voltage	0-100% of supply voltage
Output frequency	0-600Hz(standard) 0-1.2kHz (customized)
Switching on output	Unlimited
Ramp times	0-600.00s/6000.0s/60000s

Note: 150% current can be provided for 1 minute, 180% for 10 seconds, 200% for 0.5 second. Higher overload rating is achieved by oversizing the drive.

Digital input

Programmable digital inputs	5 (local), 10 (extensible)
Logic	PNP or NPN
Input	24VDC, 10mA
Frequency range	0-200Hz
Voltage level	10V-30V

Analog input

Analog inputs	2 (local), 4 (extensible)
Modes	Voltage or current
Voltage level	0 to +10 V, -10 to +10V (scaleable)
Current level	0/4 to 20mA (scaleable)

Pulse input

Progammable pulse input	1
Frequency range	0.1Hz-100kHz
Voltage level	10-30V

Analog output

Progammable analog outputs	1 (local), 2 (extensible)
Voltage level	0-10V
Current level	0-20mA

Digital output

Programmable digital/pulse outputs	2/1(local), 5/1(extensible)
Voltage level	0-24V
Current level	0-50mA
Pulse frequency	0-50kHz

Remote control panel

Maximum cable length	15m

Relay output

Programmable relay outputs	1 (local), 2 (extensible)

AFE

DC-side parameters

DC-side voltage setting range	380V: 560-720V 690V: 960-1100V

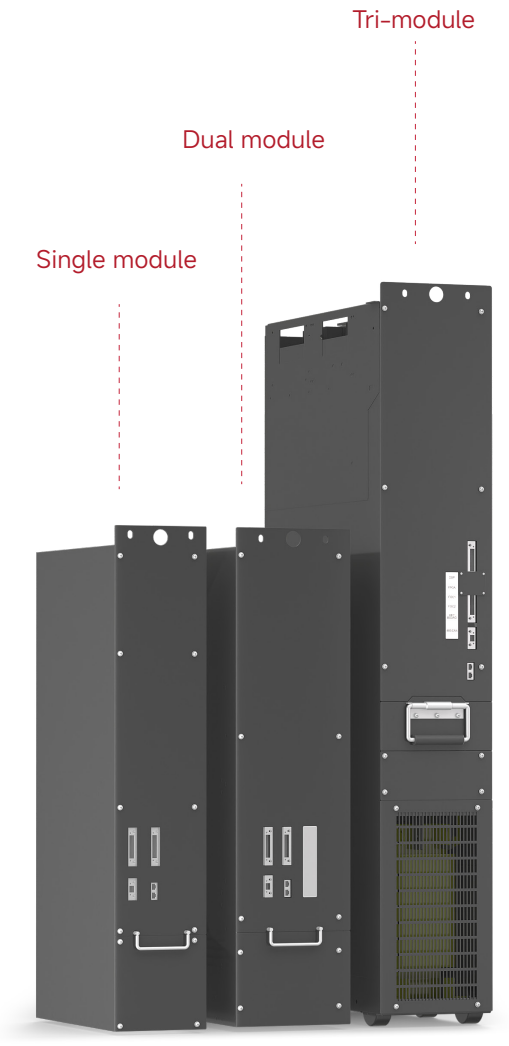
Grid-side parameters

THD	< 3% @ rated power
Power Factor	⩾ 0.99*1 0.95(Advanced)-1*2 0.95(Lagged)-1*2

NOTE

*1: Running at unit power factor.

*2: Consecutive adjustment at rated power.



MODEL INFORMATION

Model-4T: 380V (with LCL)								AFE Unit
Power Rating	[kW]	132	160	185	200	220	250	280
Current of LCL filter	[A]	200	310	310	310	430	430	430
Rated Current	[A]	203	247	285	308	339	385	432
Input Voltage	[VAC]	380	380	380	380	380	380	380
Output Voltage	[VDC]	650	650	650	650	650	650	650

Model-4T: 380V (with LCL)								AFE Unit
Power Rating	[kW]	315	355	400	450	500	630	800
Current of LCL filter	[A]	540	540	700	700	960	960	1250
Rated Current	[A]	486	547	617	694	771	971	1233
Input Voltage	[VAC]	380	380	380	380	380	380	380
Output Voltage	[VDC]	650	650	650	650	650	650	650

Model-5T: 460V (with Isolation transformer)							AFE Unit
Power Rating	[kW]	120	160	200	250	300	350
Isolation transformer	[V/V]	400/460	400/460	400/460	400/460	400/460	400/460
Rated Current	[A]	157	209	261	327	410	461
Input Voltage	[VAC]	380	380	380	380	380	380
Output Voltage	[VDC]	750/850	750/850	750/850	750/850	750/850	750/850

Model-5T: 460V (with Isolation transformer)							AFE Unit
Power Rating	[kW]	400	450	500	600	750	800
Isolation transformer	[V/V]	400/460	400/460	400/460	400/460	400/460	400/460
Rated Current	[A]	550	588	653	823	980	1046
Input Voltage	[VAC]	380	380	380	380	380	380
Output Voltage	[VDC]	750/850	750/850	750/850	750/850	750/850	750/850

Model-6T: 690V (with Isolation transformer)

AFE Unit

Power Rating	[kW]	120	160	200	250	300	350
Isolation transformer	[V/V]	400/660	400/660	400/660	400/660	400/660	400/660
Rated Current	[A]	109	146	182	228	273	319
Input Voltage	[VAC]	380	380	380	380	380	380
Output Voltage	[VDC]	1050	1050	1050	1050	1050	1050

Model-6T: 690V (with Isolation transformer)

AFE Unit

Power Rating	[kW]	400	450	500	600	750	800
Isolation transformer	[V/V]	400/660	400/660	400/660	400/660	400/660	400/660
Rated Current	[A]	364	410	455	574	683	729
Input Voltage	[VAC]	380	380	380	380	380	380
Output Voltage	[VDC]	1050	1050	1050	1050	1050	1050

Model-7T: 690V (with LCL)

AFE Unit

Power Rating	[kW]	160	185	200	220	250	280
Current of LCL filter	[A]	180	180	180	220	220	300
Rated Current	[A]	134	155	167	184	209	234
Input Voltage	[VAC]	690	690	690	690	690	690
Output Voltage	[VDC]	1050	1050	1050	1050	1050	1050

Model-7T: 690V (with LCL)

AFE Unit

Power Rating	[kW]	315	355	400	450	500	1000
Current of LCL filter	[A]	300	350	350	440	440	900
Rated Current	[A]	264	297	335	377	418	837
Input Voltage	[VAC]	690	690	690	690	690	690
Output Voltage	[VDC]	1050	1050	1050	1050	1050	1050

Model-4T: 380V

Inverter Unit

Power Rating	[kW]	132	160	185	200	220	250	280
Rated Current	[A]	253	310	350	380	430	470	520
Input Voltage	[VDC]	620	620	620	620	620	620	620
Output Voltage	[VAC]	380	380	380	380	380	380	380

Model-4T: 380V

Inverter Unit

Power Rating	[kW]	315	355	400	450	500	630	800
Rated Current	[A]	590	650	725	820	860	1100	1500
Input Voltage	[VDC]	620	620	620	620	620	620	620
Output Voltage	[VAC]	380	380	380	380	380	380	380

Model-5T: 460V

Inverter Unit

Power Rating	[kW]	132	160	185	200	220	250	280
Rated Current	[A]	253	310	350	380	430	470	520
Input Voltage	[VDC]	750	750	750	750	750	750	750
Output Voltage	[VAC]	460/480	460/480	460/480	460/480	460/480	460/480	460/480

Model-5T: 460V

Inverter Unit

Power Rating	[kW]	315	355	400	450	500	630	800
Rated Current	[A]	590	650	725	820	860	1100	1500
Input Voltage	[VDC]	750	750	750	750	750	750	750
Output Voltage	[VAC]	460/480	460/480	460/480	460/480	460/480	460/480	460/480

Model-6T: 690V

Inverter Unit

Power Rating	[kW]	132	160	185	200	220	250	280
Rated Current	[A]	150	164	198	218	235	280	330
Input Voltage	[VDC]	1050	1050	1050	1050	1050	1050	1050
Output Voltage	[VAC]	690	690	690	690	690	690	690

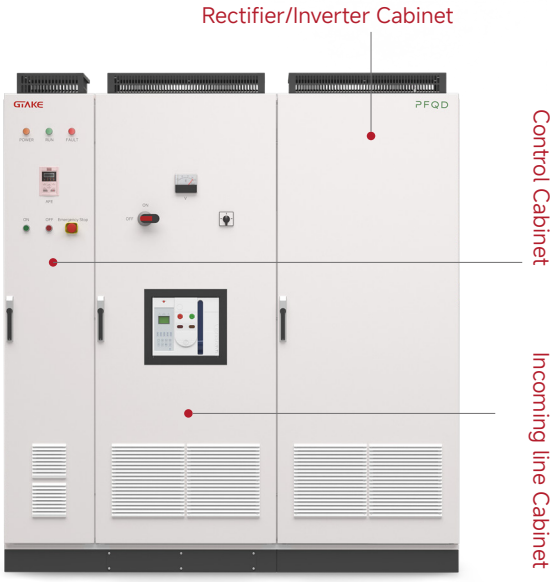
Model-6T: 690V

Inverter Unit

Power Rating	[kW]	315	355	400	450	500	630	800
Rated Current	[A]	345	380	430	466	540	680	826
Input Voltage	[VDC]	1050	1050	1050	1050	1050	1050	1050
Output Voltage	[VAC]	690	690	690	690	690	690	690

NOTE: Except the models listed in the table, all others need to be customized. Please contact Gtake to know their dimensions.

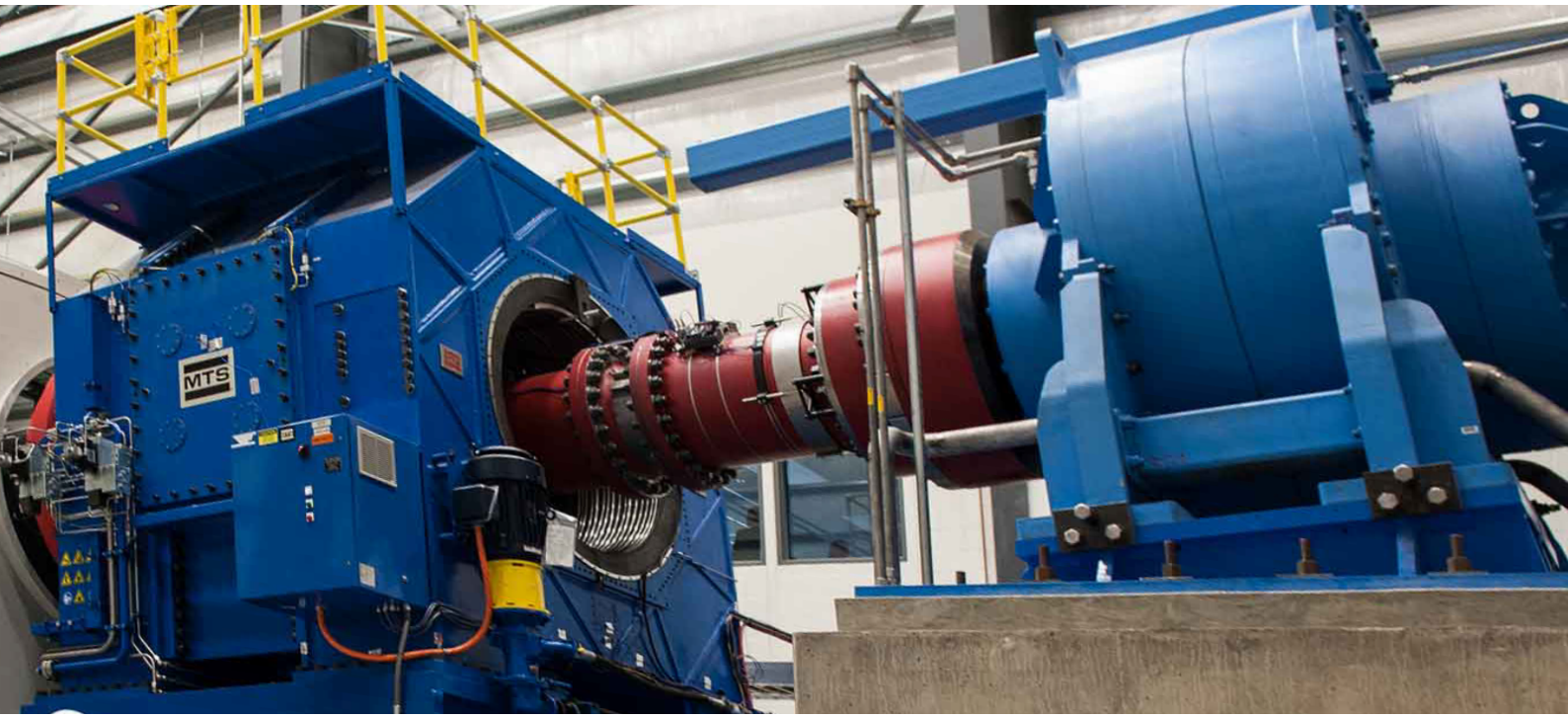
DIMENSIONS



The control cabinets and incoming line cabinets are of the same size, and the rectifier cabinets and inverter cabinets are also of the same size. Depending on different power ranges, N+N rectifier cabinets and inverter cabinets would be integrated. Meanwhile, if there are a large number of paralleling power units, an additional control cabinet needs to be installed after the inverter cabinets.

For example:

The figure below shows a 5MW model, which consists of two control cabinets, one incoming line cabinet, and 7 rectifier/inverter cabinets.



Contact GTAKE for more PowerPard products and solutions.

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JIANGSU GTAKE ELECTRIC CO., LTD.
ADDR. : Building 10, Zhong-yun-tai Industrial Park, Tangtou Road NO.1, Bao'an District, Shenzhen, China, 518108
www.gtake.com
T +86 755 86392601 F +86 755 86392625 M info@gtake.com.cn