



TEST REPORT

Prepared For :	ZHEJIANG PQUAN TECHNOLOGY CO.LTD. 2nd Floor, Building A, 555 Station Road, Liushi Town, Yueqing City, Zhejiang Province
Product Name:	frequency converter
Model :	PQ580-18.5kW, PQ580-0.75kW, PQ580-1.5kW, PQ580-2.2kW, PQ580-3.0kW, PQ580-4kW, PQ580-5.5kW, PQ580-7.5kW, PQ580-11kW, PQ580-15kW, PQ580-22kW, PQ580-30kW, PQ580-37kW, PQ580-45kW, PQ580-55kW, PQ580-75kW, PQ580-90kW, PQ580-110kW, PQ580-132kW, PQ580-160kW, PQ580-185kW, PQ580-200kW, PQ580-220kW, PQ580-250kW, PQ580-280kW, PQ580-315kW, PQ580-355kW, PQ580-400kW, PQ580-450kW, PQ580-500kW, PQ580-550kW, PQ580-630kW, PQ580-700kW, PQ580-800kW, PQ580-1000kW
Prepared By :	Shenzhen HTT Technology Co., Ltd. 1F, B Building, Huafeng International Robotics Industrial Park, Gushu, Xixiang Street, Bao'an District, Shenzhen
Test Date:	Jan. 22, 2025 ~ Feb. 07, 2025
Date of Report :	Feb. 07, 2025
Report No.:	HTT202502037LR



Report No.: **HTT202502037LR**

TEST REPORT

EN 61800-5-1

**Adjustable speed electrical power drive systems - Part 5-1:
Safety requirements - Electrical, thermal and energy**

Report Number.....: HTT202502037LR

Tested by (name + signature).....: Andy Shen

Andy Shen

Approved by (name + signature)..: Kevin Yang

Kevin Yang

Date of issue.....: Feb. 07, 2025

Applicant's name.....: ZHEJIANG PQUAN TECHNOLOGY CO.LTD.

Address.....: 2nd Floor, Building A, 555 Station Road, Liushi Town, Yueqing City,
Zhejiang Province

Test specification:

Standard.....: EN 61800-5-1:2007/A11:2021

Test procedure.....: General report

Non-standard test method.....: N/A

Test Report Form No.....: /

Test Report Form(s) Originator.....: HTT

Product.....: frequency converter

Trade Mark.....: N/A

Manufacturer.....: ZHEJIANG PQUAN TECHNOLOGY CO.LTD.
2nd Floor, Building A, 555 Station Road, Liushi Town, Yueqing City,
Zhejiang Province

Model/Type reference.....: PQ580-18.5kW

Ratings: Input: AC3PH 380V $\pm$ 15% 50/60Hz
Output: AC3PH 0-380V 37A 0Hz-600Hz
Power: 18.5KW
Capacity: 22.5kVA



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List of Attachments:

- EN 61800-5-1 TRF
- Appendix : Product photos

Summary of testing:

The sample(s) tested complies with the requirements of EN 61800-5-1:2007/A11:2021.

Tests performed (name of test and test clause):

Refer to appended clause table for details

Testing location:

Shenzhen HTT Technology Co., Ltd.
1F, B Building, Huafeng International Robotics Industrial Park, Gushu, Xixiang Street, Bao'an District, Shenzhen

Copy of marking plate

frequency converter
Model: PQ580-18.5kW
Input: AC3PH 380V $\pm 15\%$ 50/60Hz
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Power: 18.5KW
Capacity: 22.5kVA



ZHEJIANG PQUAN TECHNOLOGY CO.LTD.

Note:

- The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
- Per client's requirement, the trade mark was not considered in this report.

Model List:

Test Model	PQ580-18.5kW
Other Model	PQ580-0.75kW, PQ580-1.5kW, PQ580-2.2kW, PQ580-3.0kW, PQ580-4kW, PQ580-5.5kW, PQ580-7.5kW, PQ580-11kW, PQ580-15kW, PQ580-22kW, PQ580-30kW, PQ580-37kW, PQ580-45kW, PQ580-55kW, PQ580-75kW, PQ580-90kW, PQ580-110kW, PQ580-132kW, PQ580-160kW, PQ580-185kW, PQ580-200kW, PQ580-220kW, PQ580-250kW, PQ580-280kW, PQ580-315kW, PQ580-355kW, PQ580-400kW, PQ580-450kW, PQ580-500kW, PQ580-550kW, PQ580-630kW, PQ580-700kW, PQ580-800kW, PQ580-1000kW
1.All tests are carried out on PQ580-18.5kW 2.All models have same diagram circuit, PCB layout, except different model names and components relevant to different power.	



Report No.: **HTT202502037LR**

Test item particulars..... :			
Equipment under test : ☒ BDM ☐ CDM ☐ PDS ☐ Other:			
Intended equipment location..... : ☐ stand alone ☒ for building-in (open-type)			
Mains supply overvoltage category (OVC) : ☐ OVC I ☐ OVC II ☒ OVC III ☐ OVC IV			
Reduction of OVC for basic insulation used : ☒ No ☐ Yes, method:			
Supply earthing systems, rated and system voltage, altitude:			
Supply earthing system	Max. rated voltage (V)	System voltage for impulse voltage (V)	Altitude (m)
TN-S, TN-C, TN-CS, TT (neutral earthed)	380V~	2.5KV	0~2000
TN-S, TT (phase earthed)	380V~	2.5KV	0~2000
IT (isolated, impedance connected to phase or impedance connected to neutral)	--	--	--
TN-C (single phase, middle point earthed)	--	--	--
Other	--	--	--
DVC D circuits/terminals (other than mains) : / DVC C circuits/terminals (other than mains) : / DVC B circuits/terminals : / DVC A circuits/terminals : / Potential free terminals (location, OVC, system voltage, etc.) : / Class of equipment : ☒ Class I ☐ Class II ☐ Class 0 ☐ Class III Pollution degree (PD) : ☐ PD 1: ☒ PD 2: ☐ PD 3: ☐ PD 4: IP protection class(es) : IP20 Ambient temperature during operation (°C); derating : -10°C to +50°C Liquid cooling temperature during operation (°C) ; derating : N/A Altitude of test laboratory (m) : <2000m Other particulars : N/A			



Possible test case verdicts:

- test case does not apply to the test object..... : N/A
- test object does meet the requirement..... : P (Pass)
- test object does not meet the requirement..... : F (Fail)

Testing..... :

Date of receipt of test item..... : Jan. 22, 2025

Date (s) of performance of tests..... : Jan. 22, 2025 ~ Feb. 07, 2025

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

General product information and other remarks:

N/A



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EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	PROTECTION AGAINST ELECTRIC SHOCK, THERMAL, AND ENERGY HAZARDS		
4.1	General		P
4.2	Fault conditions		P
4.3	Protection against electric shock		P
4.3.1	Decisive voltage classification		P
4.3.1.1	Use of decisive voltage class (DVC): DVC		P
4.3.1.2	Limits of DVC		P
4.3.1.3	Requirements for protection		P
4.3.1.4	Circuit evaluation		P
4.3.1.4.1	General		P
4.3.1.4.2	A.C. working voltage	380V~	P
4.3.1.4.3	D.C. working voltage		N/A
4.3.1.4.4	Pulsating working voltage		N/A
4.3.2	Protective separation.....:		P
4.3.3	Protection against direct contact		P
4.3.3.1	General		P
4.3.3.2	Protection by means of insulation of live parts		P
4.3.3.3	Protection by means of enclosures and barriers		P
4.3.4	Protection in case of direct contact		P
4.3.4.1	General		P
4.3.4.2	Protection using DVC A:		P
4.3.4.3	Protection by means of protective impedance		P
4.3.4.4	Protection by means of using limited voltage		N/A
4.3.5	Protection against indirect contact		P
4.3.5.1	General:		P
4.3.5.2	Insulation between live parts and accessible conductive parts		P
4.3.5.3	Protective bonding circuit		P
4.3.5.3.1	General		P
4.3.5.3.2	Rating of protective bonding:		P



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EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.3.5.3.3	Protective bonding impedance		P
4.3.5.4	Protective earthing conductor		P
4.3.5.5	Means of connection for the protective earthing conductor		P
4.3.5.5.1	General		P
4.3.5.5.2	Touch current in case of failure of protective earthing conductor	0.13mA	P
4.3.5.6	Special features in equipment for protection class II		N/A
4.3.6	Insulation		P
4.3.6.1	General		P
4.3.6.1.1	Influencing factors		P
4.3.6.1.2	Pollution degree	2	P
4.3.6.1.3	Overvoltage Category	II	P
4.3.6.1.4	Supply earthing systems		P
4.3.6.1.5	Insulation voltages		P
4.3.6.2	Insulation to the surroundings		P
4.3.6.2.1	General		P
4.3.6.2.2	Circuits connected directly to the supply mains		P
4.3.6.2.3	Circuits not connected directly to the supply mains		N/A
4.3.6.2.4	Insulation between circuits		P
4.3.6.3	Functional insulation		P
4.3.6.4	Clearance distances	See appended table 4.3.6.4.	P
4.3.6.4.1	Determination		P
4.3.6.4.2	Electric field homogeneity		P
4.3.6.4.3	Clearance to conductive enclosures		P
4.3.6.5	Creepage distance	See appended table 4.3.6.5.	P
4.3.6.5.1	General		P
4.3.6.5.2	Materials		P
4.3.6.6	Coating		P
4.3.6.7	PWB spacings for functional insulation		P



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Clause	Requirement + Test	Result - Remark	Verdict
4.3.6.8	Solid insulation	See appended table 4.3.6.8.	P
4.3.6.8.1	General		P
4.3.6.8.2	Requirements for electrical withstand capability		P
4.3.6.8.2.1	Basic or supplementary insulation		P
4.3.6.8.2.2	Double and reinforced insulation		P
4.3.6.8.2.3	Functional insulation		P
4.3.6.8.3	Thin sheet or tape material		P
4.3.6.8.3.1	General		P
4.3.6.8.3.2	Material thickness not less than 0,2 mm		P
4.3.6.8.3.3	Material thickness less than 0,2 mm		N/A
4.3.6.8.3.4	Compliance		P
4.3.6.8.4	Printed wiring boards		P
4.3.6.8.4.1	General		P
4.3.6.8.4.2	Use of coating materials		P
4.3.6.8.5	Wound components		P
4.3.6.8.6	Potting materials		P
4.3.6.9	Insulation requirements above 30 kHz		N/A
4.3.7	Enclosures		P
4.3.7.1	General:	See cl. 4.4.3, 5.2.2.5.3, 5.2.2.4.	P
4.3.7.2	Cast metal:		P
4.3.7.3	Sheet metal:		P
4.3.8	Wiring and connections		P
4.3.8.1	General		P
4.3.8.2	Routing		P
4.3.8.3	Colour coding		P
4.3.8.4	Splices and connections		P
4.3.8.5	Accessible connections		P
4.3.8.6	Interconnections between parts of the PDS		P
4.3.8.7	Supply connections		P



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Clause	Requirement + Test	Result - Remark	Verdict
4.3.8.8	Terminals		P
4.3.8.8.1	Construction requirements		P
4.3.8.8.2	Connecting capacity		P
4.3.8.8.3	Connection		P
4.3.8.8.4	Wire bending space for wires 10 mm ² and greater		N/A
4.3.9	Output short circuit requirements		N/A
4.3.10	Residual current-operated protective (RCD) or monitoring (RCM) device compatibility		N/A
4.3.11	Capacitor Discharge		N/A
4.3.12	Access conditions for high-voltage PDS		N/A
4.4	Protection against thermal hazards		P
4.4.1	Minimizing the risk of ignition	See appended table 1.	P
4.4.2	Insulation Materials		P
4.4.2.1	General	See appended table 5.2.3.8.	P
4.4.2.2	Material requirements	See cl. 5.2.5.1, 5.2.5.2 and appended table 1.	P
4.4.3	Flammability of enclosure materials	See appended table 1.	P
4.4.4	Temperature limits		P
4.4.4.1	Internal parts		P
4.4.4.2	External parts of CDM		N/A
4.4.5	Specific requirements for liquid cooled PDS		N/A
4.4.5.1	Coolant		N/A
4.4.5.2	Design requirements		N/A
4.4.5.2.1	Corrosion resistance		N/A
4.4.5.2.2	Tubing, joints and seals		N/A
4.4.5.2.3	Provision for condensation		N/A
4.4.5.2.4	Leakage of coolant		N/A
4.4.5.2.5	Loss of coolant		N/A
4.4.5.2.6	Conductivity of coolant		N/A
4.4.5.2.7	Insulation requirements for coolant loss		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
4.5	Protection against energy hazards		P
4.5.1	Electrical energy hazards		P
4.5.2	Mechanical energy hazards		P
4.5.2.1	General		P
4.5.2.2	Critical torsional speed		N/A
4.5.2.3	Transient torque analysis		N/A
4.5.3	Acoustic noise emission		N/A
4.6	Protection against environmental stresses		P
	Dry heat test	See 5.2.6.3.1.	P
	Damp heat test	See 5.2.6.3.2.	P
	Vibration test	See 5.2.6.4.	P
5	TEST REQUIREMENTS		--
5.1	General		P
5.1.1	Test objectives and classification		P
5.1.2	Selection of test samples		P
5.1.3	Sequence of tests		P
5.1.4	Earthing Conditions		P
5.1.5	Compliance		P
5.1.6	Test Overview		P
5.2	Test specifications		P
5.2.1	Visual inspections (type test, sample test and routine test)	Type test	P
5.2.2	Mechanical tests		P
5.2.2.1	Clearance and creepage distances (type test)	See appended table 5.2.2.1.	P
5.2.2.2	PWB short-circuit test (type test)	See appended table 5.2.2.2.	P
5.2.2.3	Non-accessibility test (type test)		P
5.2.2.4	Enclosure integrity test (type test)		P
5.2.2.5	Deformation tests		P
5.2.2.5.1	General		P
5.2.2.5.2	Deflection test (type test)		P



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Clause	Requirement + Test	Result - Remark	Verdict
	Impulse voltage test (5.2.3.1)	See appended table 5.2.3.1.	P
	A.C. or d.c. voltage test (5.2.3.2)	See appended table 5.2.3.2.	P
	Live parts are not accessible (4.3.3.3)		P
	No cracks or openings which could cause a hazard in enclosure(s)		P
	Clearances not less than their minimum permitted values	See appended table 5.2.2.1.	P
	Other insulation undamaged		P
	Barriers not damaged or loosened		P
	No moving parts which could cause a hazard exposed		P
5.2.2.5.3	Impact test (type test)		P
	Fall test		P
	Swing test		P
	Test temperature (°C) : 25.0		P
	Impulse voltage test (5.2.3.1)	See appended table 5.2.3.1.	P
	A.C. or d.c. voltage test (5.2.3.2)	See appended table 5.2.3.2.	P
	Live parts are not accessible (4.3.3.3)		P
	No cracks or openings which could cause a hazard in enclosure(s)		P
	Clearances not less than their minimum permitted values	See appended table 5.2.2.1.	P
	Other insulation undamaged		P
	Barriers not damaged or loosened		P
	No moving parts which could cause a hazard exposed		P
5.2.3	Electrical tests		P
5.2.3.1	Impulse voltage test (type test and sample test)	See appended table 5.2.3.1.	P
5.2.3.2	A.C. or d.c. voltage test (type and routine test)	See appended table 5.2.3.2.	P
5.2.3.2.1	Purpose of test		P
5.2.3.2.2	Value and type of test voltage		P
5.2.3.2.3	Performing the voltage test		P



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Clause	Requirement + Test	Result - Remark	Verdict
5.2.3.2.4	Duration of the a.c. or d.c. voltage test		P
5.2.3.2.5	Verification of the a.c. or d.c. voltage test		P
5.2.3.3	Partial discharge test (type test, sample test)	See appended table 5.2.3.3.	P
	Pre-conditioning		P
	Impulse voltage test		P
5.2.3.4	Protective impedance (type test and routine test) :		P
5.2.3.5	Touch current measurement (type test)	See appended table 5.2.3.5.	P
5.2.3.6	Short-circuit test and Breakdown of components test (type tests)	See appended table 5.2.3.6.	P
5.2.3.6.1	General		P
5.2.3.6.2	Test configuration		P
5.2.3.6.2.1	Supply voltage and current		P
5.2.3.6.3	Short-circuit test		P
5.2.3.6.3.1	Load conditions		P
5.2.3.6.3.2	Location of short-circuit		P
5.2.3.6.4	Breakdown of component test		P
5.2.3.6.4.1	Load condition		P
5.2.3.6.4.2	Application of short-circuit or open-circuit		P
5.2.3.6.5	Test sequence		P
5.2.3.6.6	Pass criteria		P
	No emission of flame or molten metal		P
	Surgical cotton indicator not ignited		P
	Earth connection not opened		P
	Door or cover not blown open		N/A
	SELV and PELV circuits within limits of Table 7		N/A
	Parts other than DVC A not accessible		N/A
5.2.3.7	Capacitor discharge (type test)		P
5.2.3.8	Temperature rise test (type test)	See appended table 5.2.3.8.	P
5.2.3.9	Protective bonding (type test and routine test)	See appended table 5.2.3.9.	P
5.2.4	Abnormal operation tests	See appended table 5.2.4.	P



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Clause	Requirement + Test	Result - Remark	Verdict
5.2.4.1	General		P
5.2.4.2	Test duration		P
5.2.4.3	Pass criteria		P
5.2.4.4	Loss of phase (type test)		N/A
	No emission of flame or molten metal		N/A
	Surgical cotton indicator not ignited		N/A
	Earth connection not opened		N/A
	Door or cover not blown open		N/A
	SELV and PELV circuits within limits of Table 7		N/A
	Parts other than DVC A not accessible		N/A
5.2.4.5	Cooling failure tests (type tests)		N/A
5.2.4.5.1	General		N/A
5.2.4.5.2	Inoperative blower motor (type test)		N/A
	No emission of flame or molten metal		N/A
	Surgical cotton indicator not ignited		N/A
	Earth connection not opened		N/A
	Door or cover not blown open		N/A
	SELV and PELV circuits within limits of Table 7		N/A
	Parts other than DVC A not accessible		N/A
5.2.4.5.3	Clogged filter (type test)		P
	No emission of flame or molten metal		P
	Surgical cotton indicator not ignited		P
	Earth connection not opened		P
	Door or cover not blown open		N/A
	SELV and PELV circuits within limits of Table 7		N/A
	Parts other than DVC A not accessible		N/A
5.2.4.5.4	Loss of coolant		N/A
	No emission of flame or molten metal		N/A
	Surgical cotton indicator not ignited		N/A
	Earth connection not opened		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	Door or cover not blown open		N/A
	SELV and PELV circuits within limits of Table 7		N/A
	Parts other than DVC A not accessible		N/A
5.2.5	Material tests		P
5.2.5.1	High current arcing ignition test (type test)		P
5.2.5.2	Glow-wire test (type test)		P
5.2.5.3	Hot wire ignition test (type test - alternative to Glow-wire test)		P
5.2.5.4	Flammability test (type test)		P
5.2.6	Environmental tests (type tests)		P
5.2.6.1	General		P
5.2.6.2	Acceptance criteria		P
5.2.6.3	Climatic tests		P
5.2.6.3.1	Dry heat test (steady state)		P
	No degradation of any safety-relevant component		P
	No potentially hazardous behaviour during the test		P
	No sign of component overheating		P
	No live part shall become accessible		P
	No cracks in the enclosure and no damaged or loose insulators		P
	Routine a.c. or d.c. voltage test	See Table 5.2.3.2.	P
	Protective bonding test	See Table 5.2.3.9.	P
	No potentially hazardous behaviour when operating after the test		P
5.2.6.3.2	Damp heat test (steady state)		P
	No degradation of any safety-relevant component		P
	No live part shall become accessible		P
	No cracks in the enclosure and no damaged or loose insulators		P
	Routine a.c. or d.c. voltage test	See Table 5.2.3.2.	P
	Protective bonding test	See Table 5.2.3.9.	P



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Clause	Requirement + Test	Result - Remark	Verdict
	No potentially hazardous behaviour when operating after the test		P
5.2.6.4	Vibration test (type test)		P
	No degradation of any safety-relevant component		P
	No live part shall become accessible		P
	No cracks in the enclosure and no damaged or loose insulators		P
	Routine a.c. or d.c. voltage test	See Table 5.2.3.2.	P
	Protective bonding test	See Table 5.2.3.9.	P
	No potentially hazardous behaviour when operating after the test		P
5.2.7	Hydrostatic pressure test (type test and routine test)		P
6	INFORMATION AND MARKING REQUIREMENTS		P
6.1	General		P
6.2	Information for selection	See appended table 6, part 6.2.	P
6.3	Information for installing and commissioning	See appended table 6, part 6.3.	P
6.3.1	General		P
6.3.2	Mechanical considerations		P
6.3.3	Environment		P
6.3.4	Handling and mounting		P
6.3.5	Motor and driven equipment		P
6.3.5.1	Motor selection		P
6.3.5.2	Motor integrated sensors		P
6.3.5.3	Critical torsional speeds		P
6.3.5.4	Transient torque analysis		P
6.3.6	Connections		P
6.3.6.1	General		P
6.3.6.2	Interconnection and wiring diagrams		P
6.3.6.3	Conductor (cable) selection		P



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Clause	Requirement + Test	Result - Remark	Verdict
6.3.6.4	Terminal capacity and identification		P
6.3.6.5	Protection requirements		P
6.3.6.6	Earthing		P
6.3.6.7	Protective earthing conductor current		P
6.3.6.8	Special requirements		P
6.3.7	Overcurrent and short-circuit protection		P
6.3.8	Motor overload protection		P
6.3.9	Commissioning		P
6.4	Information for use	See appended table 6, part 6.4.	P
6.4.1	General		P
6.4.2	Adjustment		P
6.4.3	Labels, signs and signals		P
6.4.3.1	General		P
6.4.3.2	Isolators		N/A
6.4.3.3	Visual and audible signals		N/A
6.4.3.4	Hot surfaces		N/A
6.4.3.5	Equipment marking		P
6.5	Information for maintenance	See appended table 6, part 6.5.	P
6.5.1	General		P
6.5.2	Capacitor discharge		P
6.5.3	Auto restart/bypass connection		P
6.5.4	PT/CT connection		N/A
6.5.5	Other hazards		N/A
Annex A	Examples of protection in case of direct contact		N/A
Annex B	Examples of overvoltage category reduction		N/A
Annex C	Measurement of clearance and creepage distances		N/A
Annex D	Altitude correction for clearances		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
Annex E	Clearance and creepage distance determination for frequencies greater than 30 kHz		N/A
Annex F	Cross sections of round conductors		N/A
Annex G	Guidelines for RCD compatibility		N/A
Annex H	Symbols referred to in this part of IEC 61800		P

5.2.2.1	TABLE: General selection and information of supply earthing systems for clearance distances of basic, supplementary and reinforced insulation								P
Supply earthing system	TN-S, TN-C, TN-CS, TT (neutral earthed)		TN-S, TT (phase earthed)		IT (isolated, neutral or phase earthed over impedance)		TN-C (single-phase, middle point earthed)		
Rated voltage (V)	380-480V~		Not evaluated		Not evaluated		Not evaluated		
System voltage (V)	300V~		--		--		--		
Max. altitude (m)	2000		--		--		--		
	BI/SI	RI	BI/SI	RI	BI/SI	RI	BI/SI	RI	
Rated Impulse voltage (kV)	4.0	6.0	--	--	--	--	--	--	
Temporary overvoltage (rms [V] / crest [V])	1500/2120	3000/4240	--	--	--	--	--	--	
Clearance (mm)	3.0	5.5	--	--	--	--	--	--	
Test impulse voltage for clearance (kV)	4.0	6.0	--	--	--	--	--	--	
Supplementary information:									

5.2.2.1	TABLE: Working voltage measurements for clearance and creepage distances										P
Supply voltage (V)	380V~		--		--		--		--		
Supply frequency (Hz)	50Hz		--		--		--		--		
Condition	Between	TN-S, TN-C, TN-CS, TT (neutral earthed)		TN-S, TT (phase earthed)		IT (impedance connected to neutral)		IT (impedance connected to phase)		TN-C (single phase, middle point earthed)	
		U peak (V)	U rms (V)	U peak (V)	U rms (V)	U peak (V)	U rms (V)	U peak (V)	U rms (V)	U peak (V)	U rms (V)
	Liver part to PE	537	380	--	--	--	--	--	--	--	--
Supplementary information:											
Condition #: A: Stand-by; B: Motor running; C: Motor braking.											
Impedance used for IT supply systems: kΩ.											



5.2.2.1	TABLE: Clearance and creepage distance measurements							P
Clearance (cl) and creepage distance (cr) at/of/between:	PWB layer	CTI min.	U peak (V)	U rms (V)	Req. cl (mm)	Meas. cl (mm)	Req. cr (mm)	Meas. cr (mm)
L to N	--	175	537	380	3.0	4.0	3.8	4.0
L/N to PE	--	175	537	380	3.0	4.0	3.8	4.0
L/N to enclosure	--	175	537	380	6.0	8.0	7.6	8.0
Supplementary information:								

5.2.2.2	TABLE: PWB short-circuit test		P
PWB manufacturer	--		—
PWB material designation ...:	Plastic		—
PWB CTI	175		—
PWB flammability	V-0		—
Short circuit applied between	Observation		Verdict
IC short circuit	No damage, no hazard		Pass
Supplementary information:			

4.3.6.8 5.2.3.1 5.2.3.2 5.2.3.3	TABLE:	Solid insulation Impulse voltage test A.C. or d.c. voltage test Partial discharge test				P
Test voltage applied between:		DTI (mm)	Impulse test (kV, circuit)	Electric strength test (VAC, VDC, s)	Partial discharge test (V)	Result
Basic / supplementary insulation						
L to N		--	6.0	1500	--	P
L/N to PE		--	6.0	1500	--	P
Reinforced insulation						
L/N to enclosure		--	8.0	3000	--	P
After deflection test:						
L/N to enclosure		--	8.0	3000	--	P
After impact test:						
L/N to enclosure		--	8.0	3000	--	P
After dry heat test:						



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L/N to enclosure	--	8.0	3000	--	P
After damp heat test:					
L/N to enclosure	--	8.0	3000	--	P
After vibration test:					
L/N to enclosure	--	8.0	3000	--	P
After hydrostatic pressure test:					
L/N to enclosure	--	8.0	3000	--	P
Supplementary information:					

5.2.3.6.3 5.2.3.6.4 5.2.4.4 5.2.4.5	TABLE: Short-circuit test Breakdown of components test Loss of phase test Cooling failure tests					P
Tested item	Fault (SC, OC, OL)	Supply voltage (V)	PSCC (kA)	Test time	Test environment (ambient, fuse etc.) and observation	Result
Output	SC	380	--	10mins	No damage, no hazard	Pass
IC	SC	380	--	10mins	No damage, no hazard	Pass
Supplementary information:						

5.2.3.5		TABLE: Touch current measurement						P
Single phase equipment								
Supply		L – N TN-S, TN-C, TN-CS, TT (neutral earthed) Figure 6	L – L TN-C, TT (middle point earthed) Figure 7	L – L TN, TT (neutral earthed) Figure 8	L – N IT (impedance connected to neutral) Figure 9	L – N IT (impedance connected to phase) Figure 9	L – L IT (impedance connected to neutral) Figure 10	L – L IT (impedance connected to phase) Figure 10
(V)	(Hz)							
380	60	0.01	0.13	--	--	--	--	--
Three-phase equipment								
Supply		TN-S, TN-C, TN- CS, TT (nutral earthed) Figure 11	IT (impedance connected to neutral) Figure 12	IT (impedance connected to phase) Figure 12	TN, TT (phase earthed) Figure 13	TN, TT (centre earthed) Figure 14		
(V)	(Hz)							
--	--	--	--	--	--	--		
Supplementary information:								
Measurements have been carried out according to figures of IEC 60990 with a 1 kΩ resistor used in IT supply systems as impedance.								



5.2.3.8	TABLE: Temperature rise test						P
Supply voltage (V)	380V~						—
Supply frequency (Hz)	50Hz						—
Test ambient (°C)	25.0	--	--	--	--	--	—
Rated ambient (°C)	50.0	--	--	--	--	--	—
Thermocouple location	T _{ra} (°C)						Limit (°C)
Terminal	36.8	--	--	--	--	--	85
Internal wire	38.5	--	--	--	--	--	85
Transformer winding	81.2	--	--	--	--	--	110
PCB near transformer	75.9	--	--	--	--	--	130
Enclosure	40.6	--	--	--	--	--	70
Supplementary information: Measured temperature values have been corrected to the applicable ambient temperature.							

5.2.3.8		TABLE: Heating test, resistance method							N/A	
Case			1	2	3	4	5	6	—	
Supply voltage (V)			--	--	--	--	--	--	—	
Supply frequency (Hz)			--	--	--	--	--	--	—	
Motor output voltage (V)			--	--	--	--	--	--	—	
Motor output current (A)			--	--	--	--	--	--	—	
Motor output frequency (Hz) . :			--	--	--	--	--	--	—	
Switching frequency (Hz)			--	--	--	--	--	--	—	
Derating (%)			--	--	--	--	--	--	—	
Rated ambient (°C)			--	--	--	--	--	--	—	
Case	Winding		t_1 (°C)	r_1 (mΩ)	t_2 (°C)	r_2 (mΩ)	Δt (K)	T_{ra} (°C)	Limit (°C)	Insulation class
--	--		--	--	--	--	--	--	--	--
Supplementary information:										

5.2.3.9	TABLE: Protective bonding	P
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Points of application	Current (A)	Voltage (V)	Resistance (mΩ)	Test time (min)	Result
Earthing terminal to metal enclosure	32	--	16.5	2	Pass
After dry heat test:					
Earthing terminal to metal enclosure	32	--	16.2	2	Pass
After damp heat test:					
Earthing terminal to metal enclosure	32	--	16.2	2	Pass
After vibration test:					
Earthing terminal to metal enclosure	32	--	16.3	2	Pass
Supplementary information:					

5.2.2.5.2	TABLE: Deflection test		P
Surface tested		Observation	Verdict
EUT surface		No damage, no hazard	Pass
Supplementary information:			

5.2.2.5.3	TABLE: Impact test		P
Surface tested		Observation	Verdict
EUT surface		No damage, no hazard	Pass
Supplementary information:			

5.2.5	TABLE: Material test			P
Object / Part No. / Material	Manufacturer / trademark / type designation	Test procedure		Result
Enclosure	Various	V-0		Pass
Supplementary information:				

6	TABLE: Information and marking requirements					P
		Product	Package	Installation manual	User manual	Maintenance manual
6.2	Information for selection					
- Name or trademark of the manufacturer, supplier or importer		ZHEJIA NG PQUAN TECHNOLOGY CO.LTD.	--	--	--	--



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- Catalogue number or equivalent	--	--	--	--	--
- Input voltage rating	380V~	-	--	--	--
- Input current rating	37	-	--	-	--
- Input power rating	18.5KW	-	--	-	--
- Input frequency	50/60Hz	-	--	-	--
- Input number of phases	3	-	--	-	--
- Output voltage rating	380V	-	--	--	--
- Output current rating	37A	-	--	-	--
- Output power rating	18.5kW	-	--	-	--
- Output frequency	0-600Hz	-	--	-	--
- Output number of phases	3	-	--	-	--
- Protective class	See 6.3.6.6.				
- Type of electrical supply system	See 6.3.3.				
- Prospective short-circuit current and protective device characteristics	See 6.3.7.				
- Field supply requirements (if any)	See 6.3.3.				
- Coolant type and design pressure	-	-	--	-	--
- IP rating	IP20	-	--	-	--
- Operating and storage environment	See 6.3.3.				
- Reference to relevant standards	-	-	--	-	-
- Date code or serial number	--	-	-	-	-
- Reference to instructions	-	-	--	--	--
6.3	Information for installation and commissioning				
6.3.2: Mechanical considerations	-	-	--	-	--
- Dimensional drawing (SI units)	-	-	--	-	--
- Mass (SI units)	-	-	--	-	--
- Mounting drawing (SI units)	-	-	--	-	--
6.3.3: Environment (operation, transport, storage)	-	-	--	-	--
- Temperature	-	-	--	-	--
- Humidity	-	-	--	-	--
- Altitude	-	-	--	-	--
- Pollution	-	-	--	-	--
- Ultra violet light	-	-	--	-	--
- Type of electrical supply system	-	-	--	-	-
- Field supply requirements (if any)	-	-	--	-	-



- Other	-	-	--	-	-
6.3.4: Handling and mounting	-	--	--	-	--
- Packing and unpacking	-	--	--	-	--
- Moving	-	--	--	-	--
- Lifting	-	--	--	-	--
- Strength and rigidity of mounting surface	-	--	--	-	--
- Fastening	-	--	--	-	--
- Provision of adequate access for operation, adjustment and maintenance	-	--	--	-	--
- Warning regarding combustibility if mounting surface exceeds 90 °C	-	-	--	-	-
6.3.5: Motor and driven equipment	-	-	--	--	--
6.3.5.1: Motor selection	-	-	--	--	--
6.3.5.2: Motor integrated sensors	-	-	--	--	--
6.3.5.3: Critical torsional speeds	-	-	--	--	--
6.3.5.4: Transient torque analysis	-	-	--	--	--
6.3.6: Connections	Terminal	-	--	--	--
6.3.6.1: General	-	-	--	-	--
6.3.6.2: Interconnection and wiring diagrams ..	-	-	--	-	--
6.3.6.3: Conductor (cable) selection	-	-	--	-	--
6.3.6.4: Terminal capacity and identification	--	-	--	-	--
6.3.6.5: Protection requirements	-	-	--	-	--
- Protective class 0	--	-	--	-	--
- Interface details	-	-	--	-	--
- Terminals with protective separation	-	-	--	-	--
6.3.6.6: Earthing	-	-	--	-	--
- High-voltage PDS: Earthing switch	-	-	--	-	--
- Symbol IEC 60417-5019, PE or green-yellow	--	-	-	-	-
- Symbol IEC 6417-5172 for Class II	--	-	-	-	-
6.3.6.7: Protective earthing conductor current	--	-	--	--	--
- Symbol ISO 7000-0434 and instruction.....	--	-	--	-	--
- RCD compability	-	-	--	-	--
- RCD/RCM caution notice and marking ISO 7000-0434	--	-	-	--	-
6.3.6.8: Special requirements	-	-	--	-	--



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6.3.7: Overcurrent or short-circuit protection ..:	-	-	--	-	--
- Electronic power output short-circuit protection circuitry conditions	-	-	--	-	-
6.3.8: Motor overload protection	-	-	--	-	--
6.3.9: Commissioning	-	-	--	-	-
6.4	Information for use				
6.4.1: General	-	-	--	--	--
6.4.2: Adjustment	--	-	--	--	--
6.4.3: Labels, signs, and signals	--	-	--	--	--
6.4.3.1: General	--	-	--	--	--
6.4.3.2: Isolators	--	-	-	-	-
6.4.3.3: Visual and audible signals	--	-	-	--	-
6.4.3.4: Hot surfaces, symbol IEC 60417-5041	--	-	-	--	-
6.4.3.5: Equipment marking	--	-	--	--	--
- Control devices	--	-	--	--	--
- Indicating devices	--	-	--	--	--
- Replaceable fuses	--	-	--	--	--
- Movable connectors	--	-	--	--	--
- Test points	--	-	--	--	--
- Polarized devices	--	-	--	--	--
- Pre-set controls	--	-	--	--	--
6.5	Information for maintenance				
6.5.1: General.....	-	-	-	--	--
- Maintenance procedures.....	-	-	-	-	--
- Maintenance schedules.....	-	-	-	--	--
- Safety precautions	-	-	-	-	--
- Location of live parts accessible during maintenance	-	-	-	-	--
- Adjustment procedures	-	-	--	--	--
- Repair and replacement procedures	-	-	-	-	--
- Other relevant information (e.g. special tools list)	-	-	-	--	--
6.5.2: Capacitor discharge	--	-	--	-	--
6.5.3: Auto restart/bypass connection	-	-	--	--	--
6.5.4: Potential Transformer (PT) / Current Transformer (CT) connection	--	-	--	-	--
6.5.5: Other hazards	--	-	-	-	--



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Supplementary information:

1	TABLE: List of materials and components separately evaluated					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity	
General						
PCB	Various	Various	V-0	UL94	UL	
Relay K1	Various	Various	60A 400VAC	CE	CE, RoHS	
Terminal	Various	Various	V-0	CE	CE, RoHS	
Internal wire	Various	Various	12AWG	UL758	UL	
Plastic part	Various	Various	V-0	UL94	UL	
High-frequency transformer	Various	Various	Class B	IEC 61558-1	CE, RoHS	
Supplementary information:						

Appendix 2: Photo-documentation

Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



*****End of Test Report*****