TEST REPORT

IEC 60335-2-41
Safety of Household and similar electrical appliances
Part 2-41: Particular requirements for pumps

Report Number.....	OViS202204-002
Date of Issue.....	May 04, 2022
number of pages.....	72
Testing Laboratory.....	Zhejiang European African Testing&Certification Co., Ltd.
Address.....	4th Floor, Building 4, No. 888 Donghuan Road,Development Zone,Taizhou City, Zhejiang P.R.China
Testing location/procedure.....	The same as above
Applicant's Name.....	Zhejiang Rambo Intelligent Technology Co., Ltd
Address.....	Daxi Industrial Zone, Daxi Town, Wenling City,Zhejiang Province, P.R.China
Test specification:	
Standard.....	IEC 60335-2-41:2012 IEC 60335-1:2010+A1:2013+A2:2016
Test procedure.....	IEC Scheme
Non-standard test method.....	N/A
Test Report Form No.....	IEC 60335_2_41
Test Report Form(s) Originator.....	VDE
Master TRF.....	Dated 2019-03
Test item description.....	SOLAR WATER PUMP
Trade Mark.....	/
Manufacturer.....	Zhejiang Rambo Intelligent Technology Co., Ltd
Address.....	Daxi Industrial Zone, Daxi Town, Wenling City,Zhejiang Province, P.R.China
Model/Type reference.....	1# Z3PC3-35-24-300,2# Z3PC3.5-47-48-400 3# Z3PC3.5-95-72-750,4# Z3PC7.5-62-110-1100 5# Z3PC3.8-180-110-1500 (Cover models see models list)
Ratings.....	See models list

Testing procedure and testing location:			
☒	**Testing Laboratory:**	Zhejiang European African Testing&Certification Co., Ltd.	
Testing Location/address.....		4th Floor, Building 4, No. 888 Donghuan Road, Development Zone,Taizhou City, Zhejiang P.R.China	
☐	**Associated Laboratory:**	N/A	
Testing Location/address.....			
☒	**Tested by(name+signature):**	Peniel Xu/ Project Engineer	Peniel Xu
☒	**Approved by(+signature)....:**	Kim Luo/ Reviewer	Kim Luo
☐	**Testing procedure:TMP**	N/A	
☐	**Tested by(name+signature):**	N/A	
☐	**Approved by(+signature)....:**	N/A	
Testing Location/address.....		N/A	
☐	**Testing procedure:WMT**	N/A	
☐	**Tested by(name+signature):**	N/A	
☐	**Witnessed by(+signature)..:**	N/A	
☐	**Approved by(+signature)....:**	N/A	
Testing Location/address.....		N/A	
☐	**Testing procedure:SMT**	N/A	
☐	**Tested by(name+signature):**	N/A	
☐	**Approved by(+signature)....:**	N/A	
☐	**Supervised by(+signature).:**	N/A	
Testing Location/address.....		N/A	
☐	**Testing procedure:RMT**	N/A	
☐	**Tested by(name+signature):**	N/A	
☐	**Approved by(+signature)....:**	N/A	
☐	**Supervised by(+signature).:**	N/A	

List of Attachments (including a total number of pages in each attachment):

Appendix I – Photo documentation – attachment 16 pages.

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
The provided samples were tested and found to meet the below standards: IEC 60335-2-41:2012 IEC 60335-1:2010+A1:2013+A2:2016, Tests of clause7,8,10,11,13,15,16,20,21,22,23, 26,28,29,30,31,32 were performed on ZCPC3.8-180-110-1500,Z3PC3-35-24-300. Tests of clause10,11,13 were performed on Z3PC3.5-47-48-400,Z3PC3.5-95-72-750, Tests of clause10 were performed on Z3PC7.5-62-110-1100	Zhejiang European African Testing&Certification Co., Ltd. 4th Floor, Building 4, No. 888 Donghuan Road, Development Zone,Taizhou City, Zhejiang P.R.China

Summary of compliance with National Differences:/

Copy of marking plate:

The artwork below may be only a draft.

SOLAR WATER PUMP MADE IN CHINA CE		
MODEL:Z3PC3.8-180-110-1500	No:	
Q.max: 3.8m³/h	H.max :180m	
Voltage: ⎓ 110V	Output power:1500W	
Current: ⎓ 10A	Max. liquid temperature:40℃	
Continuous duty	Max. operation depth:100m	
Thermally Protected	I.CL.F	IPX8
Zhejiang Rambo Intelligent Technology Co., Ltd Daxi Industrial Zone, Daxi Town, Wenling City,Zhejiang Province, P.R.China		

SOLAR WATER PUMP MADE IN CHINA CE		
MODEL:Z3PC3-35-24-300	No:	
Q.max: 3.0m³/h	H.max :35m	
Voltage: ⎓ 24V	Output power:300W	
Current: ⎓ 10A	Max. liquid temperature:40℃	
Continuous duty	Max. operation depth:100m	
Thermally Protected	I.CL.F	IPX8
Zhejiang Rambo Intelligent Technology Co., Ltd Daxi Industrial Zone, Daxi Town, Wenling City,Zhejiang Province, P.R.China		

Test item particulars:

Supply connection	Power cord
Nature of supply	a.c.
Class of protection against electric shock	I
Degree of protection against moisture	IPX8
Type of cord attachment	Y
Portable appliances	☐
Fixed appliances	☒
Built-in appliances	☐
Indoor use	☐
Outdoor use	☒
Submersible pumps	☒
Maximum operating depth	100m
Vertical wet pit pumps	☐
Sludge pumps	☐
Pumps for cleaning and other maintenance of swimming pools	☐
Pumps for outdoor fountains, garden ponds and similar places	☒
Shower-boost pumps	☐
Table fountain pumps	☐
Switch	☐
Thermostat	☐
without an OFF position	☐
Self-resetting thermal cut-out	☒
Non-self-resetting thermal cut-out	☐
Voltage-maintained non-self-resetting thermal cut-out	☐
Contact opening > 3 mm in each pole	☐
Thermal link	☐
Electronic circuit	☐
with software class	No
Protective electronic circuit	☒
with software class	Yes
Programmer, timer, switching devices	☐
Remote operation	☐
Appliances - with supply cord	☒
- with supply cord fitted with a plug	☐
Motor with capacitor in auxiliary winding	☒
Series motors incorporated	☐
Three-phase motor	☐
with protective device	☐
Used in vehicles or on board ships or aircraft, additional requirements may be necessary	☐
Additional requirements are specified by the national health authorities	☐
the national authorities responsible for the protection of labour	☐
similar authorities	☐

Possible test case verdicts:

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

Summary of testing:

Date of receipt of test item.....:	Apr. 07, 2022
Date(s) of performance of test.....:	Apr. 07, 2022 to Apr. 24, 2022
Sample appearance and function are in normal condition, yes or no.....:	Yes
Ambient temperature.....:	20-25°C
Ambient humidity.....:	55-65%

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(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.

The samples under test are in good condition.
The test items comply with the requirements of the standard.

Name and address of factory (ies)..... :	Same as manufacturer

General product information:

The test results presented in this report relate only to the object tested.
These models listed in this report, them shared the very similar construction/appearance and most critical components, the used motors for them were from the same manufacturer with very similar manufacturing process and shared the same working principle, refer to below product information table and photo documentation for further detailed:

All models:I.C.:F,IPX8,Max liquid temperature:40℃,Max.operation depth:100m,Input current: ⎓ 10A

Model	Rated Voltage (⎓ V)	Output Power (W)	Q.max. (m^3/h)	H.max. (m)
Z3PC3-25-24-200	24V	200W	3.0m^3/h	25m
Z3PC3-35-24-300	24V	300W	3.0m^3/h	35m
Z3PC3.5-47-48-400	48V	400W	3.5m^3/h	47m
Z3PC3.5-80-72-600	72V	600W	3.5m^3/h	80m
Z3PC3.5-95-72-750	72V	750W	3.5m^3/h	95m
Z3PC3.8-123-110-1100	110V	1100W	3.8m^3/h	123m
Z3PC3.8-155-110-1300	110V	1300W	3.8m^3/h	155m
Z3PC3.8-180-110-1500	110V	1500W	3.8m^3/h	180m
Z3PC5.2-45-48-500	48V	500W	5.2m^3/h	45m
Z3PC5.2-50-72-600	72V	600W	5.2m^3/h	50m
Z3PC5.2-75-72-750	72V	750W	5.2m^3/h	75m

Z3PC6-84-110-1100	110V	1100W	6.0m³/h	84m
Z3PC6-125-110-1500	110V	1500W	6.0m³/h	125m
Z3PC7.5-45-72-750	72V	750W	7.5m³/h	45m
Z3PC7.5-62-110-1100	110V	1100W	7.5m³/h	62m
Z3PC7.5-78-110-1500	110V	1500W	7.5m³/h	78m
Z4PC6-32-48-400	48V	400W	6.0m³/h	32m
Z4PC6-42-72-600	72V	600W	6.0m³/h	42m
Z4PC6-56-96-750	72V	750W	6.0m³/h	56m
Z4PC6-84-110-1100	110V	1100W	6.0m³/h	84m
Z4PC6-112-110-1300	110V	1300W	6.0m³/h	112m
Z4PC6-135-110-1500	110V	1500W	6.0m³/h	135m
Z4PC9-45-96-750	110V	750W	9.0m³/h	45m
Z4PC9-58-110-1100	110V	1100W	9.0m³/h	58m
Z4PC9-71-110-1300	110V	1300W	9.0m³/h	71m
Z4PC9-85-110-1500	110V	1500W	9.0m³/h	85m
Z4PC13-36-96-750	110V	750W	13m³/h	36m
Z4PC13-49-110-1100	110V	1100W	13m³/h	49m
Z4PC13-54-110-1300	110V	1300W	13m³/h	54m
Z4PC13-60-110-1500	110V	1500W	13m³/h	60m
Z4PC17-48-110-1500	110V	1500W	17m³/h	48m
Z3SC4-35-24-300	24V	300W	4.0m³/h	35m
Z3SC4-50-48-400	48V	400W	4.0m³/h	50m
Z3SC4-80-72-600	72V	600W	4.0m³/h	80m
Z3SC4.8-95-96-750	72V	750W	4.8m³/h	95m
Z3SC4.8-112-110-1100	110V	1100W	4.8m³/h	112m
Z3SC4.8-135-110-1500	110V	1500W	4.8m³/h	135m
Z4SC5.2-45-48-500	48V	500W	5.2m³/h	45m
Z4SC5.2-67-96-750	72V	750W	5.2m³/h	67m
Z4SC5.2-101-110-1100	110V	1100W	5.2m³/h	101m
Z4SC5.2-146-110-1300	110V	1300W	5.2m³/h	146m
Z4SC5.2-198-110-1500	110V	1500W	5.2m³/h	198m
Z4SC7.5-80-110-1300	110V	1300W	7.5m³/h	80m
Z4SC7.5-100-110-1500	110V	1500W	7.5m³/h	100m
Z4SC11-60-110-1500	110V	1500W	11m³/h	60m
Z4SC19-35-110-1500	110V	1500W	19m³/h	35m
Z4SC25-26-110-1500	110V	1500W	25m³/h	26m

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
5	**GENERAL CONDITIONS FOR THE TESTS**		—
	Tests performed according to clause 5, e.g. nature of supply, sequence of testing, etc.		P
5.7	Temperature of liquid maintained between 0 °C and –5 °C of temperature marked on pump (IEC 60335-2-41)	Max. water temperature 40°C	P
5.10	Add the following as a new second paragraph: A class III construction part of the appliance is tested connected to its detachable power supply part taking into account the instructions provided with the appliance(IEC 60335-1:2010/A2:2016)		N/A
5.101	Pumps tested as portable appliances, unless (IEC 60335-2-41)		N/A
	they are fixed appliances (IEC 60335-2-41)		P
5.102	Stationary pumps having a three-phase motor that does not incorporate a protective device are installed with an appropriate device, in accordance with instructions (IEC 60335-2-41)		N/A
6	**CLASSIFICATION**		—
6.1	Protection against electric shock: Class 0, 0I, I, II, III.....:	Class I	P
	For a class III construction with a detachable power supply part the appliance is classified according to the detachable power supply part.		N/A
	Add the following to the requirement as a new second paragraph: If an appliance consists of a part of class III construction and a detachable power supply part, the complete appliance is classified as a class I appliance or class II appliance in accordance with the classification applicable to its detachable power supply part.(IEC 60335-1:2010/A2:2016)		N/A
	Submersible pumps for use in swimming pools when persons in the pool be of class III with a rated voltage < 12 V (IEC 60335-2-41)		N/A
	Other submersible pumps for use in water and other conducting liquids are class I or class III. However (IEC 60335-2-41)		N/A
	aquarium pumps may be class II (IEC 60335-2-41)		N/A
	Table fountain pumps for indoor use are class II as long as their rated power input ≤ 25 W (IEC 60335-2-41)		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Portable pumps for cleaning and other maintenance of swimming pools are class I or class III (IEC 60335-2-41)		N/A
	Other pumps are class I, class II or class III (IEC 60335-2-41)		P
6.2	Submersible pumps are IPX8 (IEC 60335-2-41)	IPX8	P
	Portable pumps for cleaning and other maintenance of swimming pools at least IP X7 (IEC 60335-2-41)		N/A
	Shower-boost pumps intended for installation outside of zones 1 and 2, as specified in IEC 60364-7-701, be at least IPX2 (IEC 60335-2-41)		N/A
	Other pumps are at least IPX4 (IEC 60335-2-41)		N/A
	Protection against harmful ingress of water		P
7	**MARKING AND INSTRUCTIONS**		—
7.1	Rated voltage or voltage range (V)	See models list	P
	Symbol for nature of supply, or	⎓	P
	Rated frequency (Hz)		N/A
	Rated power input (W), or		N/A
	Rated current (A)	10A	P
	Manufacturer's or responsible vendor's name, trademark or identification mark	See copy of nameplate	P
	Model or type reference	1# Z3PC3-35-24-300, 5# Z3PC3.8-180-110-1500	P
	Symbol IEC 60417-5172, for class II appliances		N/A
	IP number, other than IPX0	IPX8	P
	Symbol IEC 60417-5180, for class III appliances, unless		N/A
	the appliance is operated by batteries only,or		N/A
	for appliances powered by rechargeable batteries recharged in the appliance		N/A
	Symbol IEC 60417-5018, for class II and class III appliances incorporating a functional earth (IEC 60335-1:2010/A1:2013)		N/A
	Symbol IEC 60417-5036, for the enclosure of electrically-operated water valves in external hose-sets for connection of an appliance to the water mains, if the working voltage exceeds extra-low voltage		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Replace the last dashed item in the first paragraph by the following: – symbol IEC 60417-5180 (2003-02), for class III appliances. This marking is not necessary for appliances operated only by batteries (primary batteries or secondary batteries recharged outside of the appliance) or appliances powered by rechargeable batteries recharged in the appliance.(IEC 60335-1:2010/A2:2016)		N/A
	Pumps with rated power input exceeding 50 W marked with (IEC 60335-2-41):		—
	- minimum total head in meters (m), if > 0 m (IEC 60335-2-41)		N/A
	- maximum operating depth in metres (m), with a minimum of 1 m (for submersible pumps) (IEC 60335-2-41)	100m	P
	- direction of rotation (three-phase motor only) (IEC 60335-2-41)		N/A
	Pumps marked with maximum liquid temperature (°C) which not less than 35 °C (IEC 60335-2-41)	40°C	P
	If temperature exceeds 35 °C, they marked with maximum period of operation, unless (IEC 60335-2-41)		N/A
	they intended for continuous operation (IEC 60335-2-41)		P
7.2	Warning for stationary appliances for multiple supply		N/A
	Warning placed in vicinity of terminal cover		N/A
7.3	Range of rated values marked with the lower and upper limits separated by a hyphen		P
	Different rated values marked with the values separated by an oblique stroke		N/A
7.4	Appliances adjustable for different rated voltages or rated frequencies, the voltage or the frequency setting is clearly discernible.		N/A
	Requirement met if frequent changes are not required and the rated voltage or rated frequency to which the appliance is to be adjusted is determined from a wiring diagram.		N/A
7.5	Appliances with more than one rated voltage or one or more rated voltage ranges, marked with rated input or rated current for each rated voltage or range, unless		N/A
	the power input is related to the arithmetic mean value of the rated voltage range		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Relation between marking for upper and lower limits of rated power input or rated current and voltage is clear		N/A
7.6	Correct symbols used (IEC 60335-2-41)		P
	Symbol for nature of supply placed next to rated voltage		N/A
	Symbol for class II appliances placed unlikely to be confused with other marking		N/A
	Units of physical quantities and their symbols according to international standardized system		P
7.7	Connection diagram fixed to appliances to be connected to more than two supply conductors and appliances for multiple supply, unless		N/A
	correct mode of connection is obvious		N/A
7.8	Except for type Z attachment, terminals for connection to the supply mains indicated as follows:		—
	- marking of terminals exclusively for the neutral conductor (letter N)		N/A
	- marking of protective earthing terminals (symbol IEC 60417-5019)		P
	- marking of functional earthing terminals (symbol IEC 60417-5018)		N/A
	- marking not placed on removable parts		P
7.9	Marking or placing of switches which may cause a hazard		N/A
7.10	Indications of switches on stationary appliances and controls on all appliances by use of figures, letters or other visual means		N/A
	This applies also to switches which are part of a control		N/A
	If figures are used, the off position indicated by the figure 0		N/A
	The figure 0 indicates only OFF position, unless no confusion with the OFF position		N/A
7.11	Indication for direction of adjustment of controls		N/A
7.12	Instructions for safe use provided		P
	Details concerning precautions during user maintenance		P
	The instructions state that:		—
	- the appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- children being supervised not to play with the appliance		P
	For a part of class III construction supplied from a detachable power supply unit, the instructions state that the appliance is only to be used with the unit provided		N/A
	Instructions for class III appliances state that it must only be supplied at SELV, unless		N/A
	it is a battery-operated appliance, the battery being charged outside the appliance		N/A
	For appliances for altitudes exceeding 2000 m, the maximum altitude is stated: (IEC 60335-1:2010/A1:2013)		N/A
	The instructions for appliances incorporating a functional earth states that the appliance incorporates an earth connection for functional purposes only (IEC 60335-1:2010/A1:2013)		N/A
	Instructions for use of class I portable pumps for cleaning and other maintenance of swimming pools include substance of following (IEC 60335-2-41):		—
	- the pump must not be used when people are staying in the water (IEC 60335-2-41);		N/A
	- the pump must supplied through a residual current device (RCD) with a rated residual operating current ≤ 30 mA (IEC 60335-2-41)		N/A
	The instructions for use for pumps marked with a temperature exceeding 35 °C state maximum period of operation and minimum rest period, unless (IEC 60335-2-41)		N/A
	pump is intended for continuous operation at this temperature (IEC 60335-2-41)		P
	The instructions for submersible pumps for use in swimming pools state the substance of the following (IEC 60335-2-41):		—
	Disconnect the pump from the supply mains before carrying out user maintenance such as cleaning the filter. (IEC 60335-2-41)		N/A
7.12.1	Sufficient details for installation supplied		P
	For an appliance intended to be permanently connected to the water mains and not connected by a hose-set, this is stated		N/A
	If different rated voltages or different rated frequencies are marked, the instructions state what action to be taken to adjust the appliance (IEC 60335-1:2010/A1:2013)		N/A
	Installation instruction provide information on requirements specified for electrical installation and include reference to national wiring rules (IEC 60335-2-41)		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If reference made to zones, corresponding be included (IEC 60335-2-41)		N/A
	Installation instructions state substance of following (IEC 60335-2-41):		—
	- the maximum total head, in meters (for pumps with rated power input > 50 W) (IEC 60335-2-41);	1# 35m 5# 180m	P
	- pollution of the liquid could occur due to leakage of lubricants (for submersible pumps and vertical wet pit pumps containing lubricants) (IEC 60335-2-41)		P
	- additional information for installation of stationary pump having a three-phase motor not incorporating a protective device as specified (IEC 60335-2-41)		N/A
	Instructions for installation state that pumps for outdoor fountains, garden ponds and similar places have to be supplied through a RCD (operating current ≤ 30 mA) (IEC 60335-2-41)		N/A
	Installation instructions for class I pumps for swimming pools shall state that the pump is to be supplied by an isolating transformer or supplied through a RCD (operating current ≤ 30 mA) (IEC 60335-2-41)		N/A
	Installation instructions for class III pumps intended to be installed in zone 0 of a swimming pool, as defined in IEC 60364-7-702, state that the transformer is located outside zone 1 (IEC 60335-2-41)		N/A
	Installation instructions for class II pumps intended to be fixed in zone 1 of a swimming pool, as defined in IEC 60364-7-702, or fixed close to a garden pond or similar place, state that the pump is to be located where flooding cannot occur (IEC 60335-2-41)		N/A
7.12.2	Stationary appliances not fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under overvoltage category III, the instructions state that means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules		N/A
7.12.3	Insulation of the fixed wiring in contact with parts exceeding 50 K during clause 11; instructions state that the fixed wiring must be protected		N/A
7.12.4	Instructions for built-in appliances:		—
	- dimensions of space		N/A
	- dimensions and position of supporting and fixing		N/A
	- minimum distances between parts and surrounding structure		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- minimum dimensions of ventilating openings and arrangement		N/A
	- connection to supply mains and interconnection of separate components		N/A
	- allow disconnection of the appliance after installation, by accessible plug or a switch in the fixed wiring, unless		N/A
	a switch complying with 24.3		N/A
7.12.5	Replacement cord instructions, type X attachment with a specially prepared cord		N/A
	Replacement cord instructions, type Y attachment		P
	Replacement cord instructions, type Z attachment		N/A
7.12.6	Caution in the instructions for appliances incorporating a non-self-resetting thermal cut-out that is reset by disconnection of the supply mains, if this cut-out is required to comply with the standard		N/A
7.12.7	Instructions for fixed appliances stating how the appliance is to be fixed		P
7.12.8	Instructions for appliances connected to the water mains:		—
	- max. inlet water pressure (Pa)		N/A
	- min. inlet water pressure, if necessary (Pa)		N/A
	Instructions concerning new and old hose-sets for appliances connected to the water mains by detachable hose-sets		N/A
7.12.9	Instructions specified in 7.12 and from 7.12.1 to 7.12.8 appear together before any other instructions supplied with the appliance		P
	These instructions may be supplied with the appliance separately from any functional use booklet		N/A
	They may follow the description of the appliance that identifies parts, or follow the drawings/sketches		P
	In addition, instructions are also available in an alternative format such as on a website or on request from the user in a format such as a DVD		P
7.13	Instructions and other texts in an official language	English	P
7.14	Marking clearly legible and durable, rubbing test as specified		P
	Signal words WARNING, CAUTION, DANGER in uppercase having a height as specified		N/A
	Uppercase letter of the text explaining the signal word not smaller than 1,6 mm		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Moulded in, engraved, or stamped markings either raised above or have a depth below the surface of at least 0,25 mm, unless		N/A
	contrasting colours are used		P
	Markings checked by inspection, measurement and rubbing test as specified		P
7.15	Markings on a main part		P
	Marking clearly discernible from the outside, if necessary after removal of a cover		P
	For portable appliances, cover can be removed or opened without a tool		N/A
	For stationary appliances, name, trademark or identification mark and model or type reference visible after installation		N/A
	For fixed appliances, name, trademark or identification mark and model or type reference visible after installation according to the instructions		N/A
	Indications for switches and controls placed on or near the components. Marking not on parts which can be positioned or repositioned in such a way that the marking is misleading		P
	Symbol IEC 60417-5018 is placed next to the symbol IEC 60417-5172 or IEC 60417-5180 (IEC 60335-1:2010/A1:2013)		N/A
7.16	Marking of a possible replaceable thermal link or fuse link clearly visible with regard to replacing the link		N/A
8	**PROTECTION AGAINST ACCESS TO LIVE PARTS**		—
8.1	Adequate protection against accidental contact with live parts		P
8.1.1	Requirement applies for all positions, detachable parts removed		P
	Lamps behind a detachable cover not removed, if conditions met		N/A
	Insertion or removal of lamps, protection against contact with live parts of the lamp cap		N/A
	Use of test probe B of IEC 61032, with a force not exceeding 1 N: no contact with live parts		P
	Use of test probe B of IEC 61032 through openings, with a force of 20 N: no contact with live parts		P
8.1.2	Use of test probe 13 of IEC 61032, with a force not exceeding 1 N, through openings in class 0 appliances and class II appliances/constructions: no contact with live parts		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Test probe 13 also applied through openings in earthed metal enclosures having a non-conductive coating: no contact with live parts		P
8.1.3	For appliances other than class II, use of test probe 41 of IEC 61032, with a force not exceeding 1 N: no contact with live parts of visible glowing heating elements		N/A
8.1.4	Accessible part not considered live if:		—
	- safety extra-low a.c. voltage: peak value not exceeding 42,4 V		N/A
	- safety extra-low d.c. voltage: not exceeding 42,4 V		N/A
	- or separated from live parts by protective impedance		N/A
	If protective impedance: d.c. current not exceeding 2 mA, and		N/A
	a.c. peak value not exceeding 0,7 mA		N/A
	- for peak values over 42,4 V up to and including 450 V, capacitance not exceeding 0,1 μF		N/A
	- for peak values over 450 V up to and including 15 kV, discharge not exceeding 45 μC		N/A
	- for peak values over 15kV, the energy in the discharge not exceeding 350 mJ		N/A
8.1.5	Live parts protected at least by basic insulation before installation or assembly:		—
	- built-in appliances		N/A
	- fixed appliances		P
	- appliances delivered in separate units		N/A
8.2	Class II appliances and constructions constructed so that there is adequate protection against accidental contact with basic insulation and metal parts separated from live parts by basic insulation only		P
	Only possible to touch parts separated from live parts by double or reinforced insulation		P
9	**STARTING OF MOTOR-OPERATED APPLIANCES**		—
	Requirements and tests are specified in part 2 when necessary		N/A
10	**POWER INPUT AND CURRENT**		—
10.1	Power input at normal operating temperature, rated voltage and normal operation not deviating from rated power input by more than shown in table 1. :		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If the power input varies throughout the operating cycle and the maximum value of the power input exceeds, by a factor greater than two, the arithmetic mean value of the power input occurring during a representative period, the power input is the maximum value that is exceeded for more than 10 % of the representative period.		N/A
	Otherwise the power input is the arithmetic mean value		N/A
	Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless		N/A
	the rated power input is related to the arithmetic mean value		N/A
10.2	Current at normal operating temperature, rated voltage and normal operation not deviating from rated current by more than shown in table 2	(see appended table)	P
	If the current varies throughout the operating cycle and the maximum value of the current exceeds, by a factor greater than two, the arithmetic mean value of the current occurring during a representative period, the current is the maximum value that is exceeded for more than 10 % of the representative period.		N/A
	Otherwise the current is the arithmetic mean value.		P
	Test carried out at upper and lower limits of the ranges for appliances with one or more rated voltage ranges, unless		N/A
	the rated current is related to the arithmetic mean value of the range		N/A
11	**HEATING**		—
11.1	No excessive temperatures in normal use		P
11.2	The appliance is held, placed or fixed in position as described		P
11.3	Temperature rises, other than of windings, determined by thermocouples		P
	Temperature rises of windings determined by resistance method, unless		P
	the windings are non-uniform or it is difficult to make the necessary connections		N/A
11.4	Heating appliances operated under normal operation at 1,15 times rated power input (W)		N/A
11.5	Motor-operated appliances operated under normal operation at most unfavourable voltage between 0,94 and 1,06 times rated voltage (V)		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
11.6	Combined appliances operated under normal operation at most unfavourable voltage between 0,94 and 1,06 times rated voltage (V)..... :		N/A
11.7	Pumps operated with liquid maintained at temperature marked on pump (IEC 60335-2-41)	40°C	P
	They operated until steady conditions established unless (IEC 60335-2-41)		P
	they marked with a maximum period of operation. In this case, they operated for marked period followed by the rest period specified in instructions, test carried out for three cycles of operation (IEC 60335-2-41)		N/A
	Shower-boost pumps also supplied with cold water operated with cold water at 15 °C ± 2 °C (IEC 60335-2-41)		N/A
	Pumps, other than shower-boost pumps, marked with a maximum period of operation are also operated with liquid maintained at 35 °C until steady conditions established (IEC 60335-2-41)		N/A
11.8	Temperature rises monitored continuously and not exceeding the values in table 3 ..... :	(see appended table)	P
	If the temperature rise of a motor winding exceeds the value of table 3, or		N/A
	if there is doubt with regard to classification of insulation,		N/A
	tests of annex C are carried out		N/A
	Sealing compound does not flow out		P
	Protective devices do not operate, except		P
	components in protective electronic circuits tested for the number of cycles specified in 24.1.4		N/A
	Pumps marked with liquid temperature > 35 °C, temperature rise of external enclosure not measured (IEC 60335-2-41)		P
13	**LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE**		—
13.1	Leakage current not excessive and electric strength adequate		P
	Heating appliances operated at 1,15 times the rated power input (W)		N/A
	Motor-operated appliances and combined appliances supplied at 1,06 times the rated voltage (V)		P
	Protective impedance and radio interference filters disconnected before carrying out the tests		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
13.2	For class 0, class II and class III appliances, and class II constructions, leakage current measured by means of the circuit described in figure 4 of IEC 60990		N/A
	For class 0I and class I appliances, a low impedance ammeter may be used	Class I appliances	P
	Leakage current measurements..... :	(see appended table)	P
13.3	The appliance is disconnected from the supply		P
	Electric strength tests according to table 4.....:	(see appended table)	P
	No breakdown during the tests		P
14	**TRANSIENT OVERVOLTAGES**		—
	Appliances withstand the transient over-voltages to which they may be subjected		N/A
	Clearances having a value less than specified in table 16 subjected to an impulse voltage test, the test voltage specified in table 6..... :	(see appended table)	N/A
	No flashover during the test, unless		N/A
	of functional insulation if the appliance complies with clause 19 with the clearance short-circuited		N/A
15	**MOISTURE RESISTANCE**		—
15.1	Enclosure provides the degree of moisture protection according to classification of the appliance		P
	Compliance checked as specified in 15.1.1, taking into account 15.1.2, followed by the electric strength test of 16.3		P
	No trace of water on insulation which can result in a reduction of clearances or creepage distances below values specified in clause 29		P
15.1.1	Appliances, other than IPX0, subjected to tests as specified in IEC 60529.....:	IPX8	P
	Water valves containing live parts in external hoses for connection of an appliance to the water mains tested as specified for IPX7 appliances		N/A
	Shower-boost pumps subjected to appropriate test of IEC 60529 both at rest and in operation while supplied at rated voltage (IEC 60335-2-41)		N/A
15.1.2	Hand-held appliance turned continuously through the most unfavourable positions during the test		N/A
	Built-in appliances installed according to the instructions		N/A
	Appliances placed or used on the floor or table placed on a horizontal unperforated support		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Appliances normally fixed to a wall and appliances with pins for insertion into socket-outlets are mounted on a wooden board		N/A
	For IPX3 appliances, the base of wall mounted appliances is placed at the same level as the pivot axis of the oscillating tube		N/A
	For IPX4 appliances, the horizontal centre line of the appliance is aligned with the pivot axis of the oscillating tube, and		N/A
	for appliances normally used on the floor or table, the movement is limited to two times 90° for a period of 5 min, the support being placed at the level of the pivot axis of the oscillating tube		N/A
	Wall-mounted appliances, take into account the distance to the floor stated in the instructions		N/A
	Appliances normally fixed to a ceiling are mounted underneath a horizontal unperforated support, the pivot axis of the oscillating tube located at the level of the underside of the support, and		N/A
	for IPX4 appliances, the movement of the tube is limited to two times 90° from the vertical for a period of 5 min		N/A
	Appliances with type X attachment fitted with a flexible cord as described		N/A
	Detachable parts subjected to the relevant treatment with the main part		P
	However, if a part has to be removed for user maintenance and a tool is needed, this part is not removed		P
	IPX4 pumps tested as specified (IEC 60335-2-41)		N/A
	Submersible pumps immersed for 24 h in water as specified (IEC 60335-2-41)		P
	Water pressure on enclosure (IEC 60335-2-41):		—
	- 1,5 times pressure occurring at maximum operation depth, when this depth ≤ 10 m (IEC 60335-2-41)		N/A
	- 1,3 times pressure occurring at maximum operating depth, or (IEC 60335-2-41)		N/A
	- 15 m, if higher (IEC 60335-2-41)		N/A
15.2	Spillage of liquid does not affect the electrical insulation		N/A
	Spillage solution comprising water containing approximately 1 % NaCl and 0,6 % rinsing agent (IEC 60335-1:2010/A1:2013)		N/A
	Appliances with type X attachment fitted with a flexible cord as described		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Appliances incorporating an appliance inlet tested with or without an connector, whichever is most unfavourable		N/A
	Detachable parts are removed		N/A
	Overfilling test with additional amount of water, over a period of 1 min (l)		N/A
	The appliance withstands the electric strength test of 16.3		N/A
	No trace of water on insulation that can result in a reduction of clearances or creepage distances below values specified in clause 29		N/A
15.3	Appliances proof against humid conditions		P
	Checked by test Cab: Damp heat steady state in IEC 60068-2-78		N/A
	Detachable parts removed and subjected, if necessary, to the humidity test with the main part		N/A
	Humidity test for 48 h in a humidity cabinet		N/A
	Reassembly of those parts that may have been removed		N/A
	The appliance withstands the tests of clause 16		N/A
	Humidity test for 48 h in a humidity cabinet (not for submersible pumps) (IEC 60335-2-41)	Submersible pumps	N/A
16	**LEAKAGE CURRENT AND ELECTRIC STRENGTH**		—
16.1	Leakage current not excessive and electric strength adequate		P
	Protective impedance disconnected from live parts before carrying out the tests		N/A
	Tests carried out at room temperature and not connected to the supply		P
16.2	Single-phase appliances: test voltage 1,06 times rated voltage (V)		P
	Three-phase appliances: test voltage 1,06 times rated voltage divided by √3 (V)		N/A
	Leakage current measurements	(see appended table)	P
	Limit values doubled if:		—
	- all controls have an off position in all poles, or		N/A
	- the appliance has no control other than a thermal cut-out, or		N/A
	-all thermostats, temperature limiters and energy regulators do not have an off position, or		N/A
	- the appliance has radio interference filters		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	With the radio interference filters disconnected, the leakage current do not exceed limits specified.....:	(see appended table)	N/A
16.3	Electric strength tests according to table 7.....:	(see appended table)	P
	Test voltage applied between the supply cord and inlet bushing and cord guard and cord anchorage as specified.....:	(see appended table)	P
	No breakdown during the tests		P
17	**OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS**		—
	No excessive temperatures in transformer or associated circuits in event of short-circuits likely to occur in normal use.....:	(see appended table)	N/A
	Appliance supplied with 1,06 or 0,94 times rated voltage under the most unfavourable short-circuit or overload likely to occur in normal use (V).....:		N/A
	Basic insulation is not short-circuited		N/A
	Temperature rise of insulation of the conductors of safety extra-low voltage circuits not exceeding the relevant value specified in table 3 by more than 15 K		N/A
	Temperature of the winding not exceeding the value specified in table 8		N/A
	However, limits do not apply to fail-safe transformers complying with sub-clause 15.5 of IEC 61558-1		N/A
18	**ENDURANCE**		—
	Requirements and tests are specified in part 2 when necessary		N/A
19	**ABNORMAL OPERATION**		—
19.1	The risk of fire, mechanical damage or electric shock under abnormal or careless operation obviated		N/A
	Electronic circuits so designed and applied that a fault will not render the appliance unsafe		N/A
	Appliances incorporating heating elements subjected to the tests of 19.2 and 19.3, and		N/A
	if the appliance also has a control that limit the temperature during clause 11 it is subjected to the test of 19.4, and		N/A
	if applicable, to the test of 19.5		N/A
	Appliances incorporating PTC heating elements are also subjected to the test of 19.6		N/A
	Appliances incorporating motors subjected to the tests of 19.7 to 19.10, as applicable		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Appliances incorporating electronic circuits subjected to the tests of 19.11 and 19.12, as applicable		N/A
	Appliances incorporating contactors or relays subjected to the test of 19.14, being carried out before the tests of 19.11		N/A
	Appliances incorporating voltage selector switches subjected to the test of 19.15		N/A
	Unless otherwise specified, the tests are continued until a non-self-resetting thermal cut-out operates, or		N/A
	until steady conditions are established		N/A
	If a heating element or intentionally weak part becomes open-circuited, the relevant test is repeated on a second sample		N/A
	Pumps also subjected to tests of clause 19.101 and 19.102 (IEC 60335-2-41)		N/A
19.2	Test of appliances with heating elements with restricted heat dissipation; test voltage (V), power input of 0,85 times rated power input (W)		N/A
19.3	Test of 19.2 repeated; test voltage (V), power input of 1,24 times rated power input (W)		N/A
19.4	Test conditions as in clause 11, any control limiting the temperature during tests of clause 11 short-circuited		N/A
19.5	Test of 19.4 repeated on class 0I and I appliances with tubular sheathed or embedded heating elements. No short-circuiting, but one end of the element connected to the sheath		N/A
	The test repeated with reversed polarity and the other end of the heating element connected to the sheath		N/A
	The test is not carried out on appliances intended to be permanently connected to fixed wiring and on appliances where an all-pole disconnection occurs during the test of 19.4		N/A
19.6	Appliances with PTC heating elements tested at rated voltage, establishing steady conditions		N/A
	The working voltage of the PTC heating element is increased by 5 % and the appliance is operated until steady conditions are re-established. The voltage is then increased in similar steps until 1,5 times working voltage or until the PTC heating element ruptures (V)		N/A
19.7	Stalling test by locking the rotor if the locked rotor torque is smaller than the full load torque, or		N/A
	locking moving parts of other appliances		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Locked rotor, capacitors open-circuited one at a time		N/A
	Test repeated with capacitors short-circuited one at a time, unless		N/A
	capacitor is of class P2 of IEC 60252-1		N/A
	Appliances with timer or programmer supplied with rated voltage for each of the tests, for a period equal to the maximum period allowed		N/A
	An electronic timer or programmer that operates to ensure compliance with the test before the maximum period under the conditions of Clause 11 is reached, is a protective electronic circuit (IEC 60335-1:2010/A1:2013)		N/A
	Other appliances supplied with rated voltage for a period as specified		N/A
	Winding temperatures not exceeding values specified in table 8		N/A
19.8	Multi-phase motors operated at rated voltage with one phase disconnected		N/A
19.10	Series motor operated at 1,3 times rated voltage for 1 min (V)		N/A
	During the test, parts not being ejected from the appliance		N/A
19.11	Electronic circuits, compliance checked by evaluation of the fault conditions specified in 19.11.2 for all circuits or parts of circuits, unless		N/A
	they comply with the conditions specified in 19.11.1		N/A
	Appliances incorporating an electronic circuit that relies upon a programmable component to function correctly, subjected to the test of 19.11.4.8, unless		N/A
	restarting does not result in a hazard		N/A
	Appliances having a device with an off position obtained by electronic disconnection, or a device placing the appliance in a stand-by mode, subjected to the tests of 19.11.4		N/A
	If the safety of the appliance under any of the fault conditions depends on the operation of a miniature fuse-link complying with IEC 60127, the test of 19.12 is carried out		N/A
	During and after each test the following is checked:		—
	-the temperature of the windings do not exceed the values specified in table 8		N/A
	- the appliance complies with the conditions specified in 19.13		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	-any current flowing through protective impedance not exceeding the limits specified in 8.1.4		N/A
	If a conductor of a printed board becomes open-circuited, the appliance is considered to have withstood the particular test, provided both of the following conditions are met:		—
	- the base material of the printed circuit board withstands the test of annex E		N/A
	- any loosened conductor does not reduce clearance or creepage distances between live parts and accessible metal parts below the values specified in clause 29		N/A
19.11.1	Fault conditions a) to g) in 19.11.2 are not applied to circuits or parts of circuits meeting both of the following conditions:		—
	- the electronic circuit is a low-power circuit, that is, the maximum power at low-power points does not exceed 15 W according to the tests specified		N/A
	- the protection against electric shock, fire hazard, mechanical hazard or dangerous malfunction of other parts of the appliance does not rely on the correct functioning of the electronic circuit		N/A
19.11.2	Fault conditions applied one at a time, the appliance operating under conditions specified in clause 11, but supplied at rated voltage, duration of the tests as specified:		—
	a) short circuit of functional insulation if clearances or creepage distances are less than the values specified in clause 29		N/A
	b) open circuit at the terminals of any component		N/A
	c) short circuit of capacitors, unless		N/A
	they comply with IEC 60384-14		N/A
	d) short circuit of any two terminals of an electronic component, other than integrated circuits		N/A
	This fault condition is not applied between the two circuits of an optocoupler		N/A
	e) failure of triacs in the diode mode		N/A
	f) failure of microprocessors and integrated circuits		N/A
	g) failure of an electronic power switching device		N/A
	Each low power circuit is short-circuited by connecting the low-power point to the pole of the supply source from which the measurements were made		N/A
19.11.3	If the appliance incorporates a protective electronic circuit which operates to ensure compliance with clause 19, the relevant test is repeated with a single fault simulated, as indicated in a) to g) of 19.11.2		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
19.11.4	Appliances having a device with an off position obtained by electronic disconnection, or		N/A
	a device that can be placed in the stand-by mode,		N/A
	subjected to the tests of 19.11.4.1 to 19.11.4.7, the device being set in the off position or in the stand-by mode		N/A
	Appliances incorporating a protective electronic circuit subjected to the tests of 19.11.4.1 to 19.11.4.7, the tests being carried out after the protective electronic circuit has operated, except that		N/A
	appliances operated for 30 s or 5 min during the test of 19.7 are not subjected to the tests for electromagnetic phenomena.		N/A
	Surge protective devices disconnected, unless		N/A
	They incorporate spark gaps		N/A
19.11.4.1	The appliance is subjected to electrostatic discharges in accordance with IEC 61000-4-2, test level 4		N/A
19.11.4.2	The appliance is subjected to radiated fields in accordance with IEC 61000-4-3, test level 3		N/A
19.11.4.3	The appliance is subjected to fast transient bursts in accordance with IEC 61000-4-4, test level 3 or 4 as specified		N/A
19.11.4.4	The power supply terminals of the appliance subjected to voltage surges in accordance with IEC 61000-4-5, test level 3 or 4 as specified		N/A
	An open circuit test voltage of 2 kV is applicable for the line-to-line coupling mode (IEC 60335-1:2010/A1:2013)		N/A
	An open circuit test voltage of 4 kV is applicable for the line-to-earth coupling (IEC 60335-1:2010/A1:2013)		N/A
	Earthed heating elements in class I appliances disconnected		N/A
19.11.4.5	The appliance is subjected to injected currents in accordance with IEC 61000-4-6, test level 3		N/A
19.11.4.6	Appliances having a rated current not exceeding 16 A are subjected to the class 3 voltage dips and interruptions in accordance with IEC 61000-4-11		N/A
	Appliances having a rated current exceeding 16 A are subjected to the class 3 voltage dips and interruptions in accordance with IEC 61000-4-34		N/A
19.11.4.7	The appliance is subjected to mains signals in accordance with IEC 61000-4-13, test level class 2		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
19.11.4.8	The appliance is supplied at rated voltage and operated under normal operation. After 60 s the power supply is reduced to a level such that the appliance ceases to respond or parts controlled by the programmable component cease to operate		N/A
	The appliance continues to operate normally, or		N/A
	requires a manual operation to restart		N/A
19.12	If the safety of the appliance for any of the fault conditions specified in 19.11.2 depends on the operation of a miniature fuse-link complying with IEC 60127, the test is repeated, measuring the current flowing through the fuse-link; measured current (A); rated current of the fuse-link (A)		N/A
19.13	During the tests the appliance does not emit flames, molten metal, poisonous or ignitable gas in hazardous amounts		N/A
	Temperature rises not exceeding the values shown in table 9		N/A
	Compliance with clause 8 not impaired		N/A
	If the appliance can still be operated it complies with 20.2		N/A
	Insulation, other than of class III appliances or class III constructions that do not contain live parts, withstands the electric strength test of 16.3, the test voltage as specified in table 4:		—
	- basic insulation (V)		N/A
	- supplementary insulation (V)		N/A
	- reinforced insulation (V)		N/A
	After operation or interruption of a control, clearances and creepage distances across the functional insulation withstand the electric strength test of 16.3, the test voltage being twice the working voltage		N/A
	The appliance does not undergo a dangerous malfunction, and		N/A
	no failure of protective electronic circuits, if the appliance is still operable		N/A
	Appliances tested with an electronic switch in the off position, or in the stand-by mode:		—
	- do not become operational, or		N/A
	- if they become operational, do not result in a dangerous malfunction during or after the tests of 19.11.4		N/A
	If the appliance contains lids or doors that are controlled by one or more interlocks, one of the interlocks may be released provided that:		—

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- the lid or door does not move automatically to an open position when the interlock is released, and		N/A
	- the appliance does not start after the cycle in which the interlock was released		N/A
19.14	Appliances operated under the conditions of clause 11, any contactor or relay contact operating under the conditions of clause 11 being short-circuited		N/A
	For a relay or contactor with more than one contact, all contacts are short-circuited at the same time		N/A
	A relay or contactor operating only to ensure the appliance is energized for normal use is not short-circuited		N/A
	If more than one relay or contactor operates in clause 11, they are short-circuited in turn		N/A
19.15	For appliances with a mains voltage selector switch, the switch is set to the lowest rated voltage position and the highest value of rated voltage is applied		N/A
19.101	Pump supplied at rated voltage and operated at approximately half at maximum total head for 5 min (IEC 60335-2-41),		N/A
	after which inlet is removed from liquid and operation continued for 7 h (IEC 60335-2-41)		N/A
	Pumps operated again for 5 min at approximately half maximum total head (IEC 60335-2-41)		N/A
	If the pump becomes inoperable during test, it is disconnected from supply and filled with water (IEC 60335-2-41)		N/A
19.102	Pumps marked with maximum period of operation supplied at rated voltage and operated under normal operation until steady conditions established (IEC 60335-2-41)		N/A
20	**STABILITY AND MECHANICAL HAZARDS**		—
20.1	Appliances having adequate stability	Fixed appliance	P
	Tilting test through an angle of 10°, appliance placed on an inclined plane/horizontal support, not connected to the supply mains; appliance does not overturn		N/A
	Tilting test repeated on appliances with heating elements, angle of inclination increased to 15°		N/A
	Possible heating test in overturned position; temperature rise does not exceed values shown in table 9		N/A
	Submersible pumps not subjected to test (IEC 60335-2-41)		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
20.2	Moving parts adequately arranged or enclosed as to provide protection against personal injury		P
	Protective enclosures, guards and similar parts are non-detachable, and		P
	have adequate mechanical strength		P
	Enclosures that can be opened by overriding an interlock are considered to be detachable parts		N/A
	Self-resetting thermal cut-outs and overcurrent protective devices not causing a hazard by unexpected closure		P
	Not possible to touch dangerous moving parts with the test probe described		P
21	**MECHANICAL STRENGTH**		—
21.1	Appliance has adequate mechanical strength and is constructed as to withstand rough handling		P
	Checked by applying 3 blows to every point of the enclosure like to be weak, in accordance with test Ehb of IEC 60068-2-75, spring hammer test, with an impact energy of 0,5 J	(see appended table)	N/A
	Pumps, other than shower-boost pumps, impact energy is increased to 1,0 J (IEC 60335-2-41)	No damage.	P
	The appliance shows no damage impairing compliance with this standard, and		P
	compliance with 8.1, 15.1 and clause 29 not impaired		P
	If doubt, supplementary or reinforced insulation subjected to the electric strength test of 16.3		N/A
	If necessary, repetition of groups of three blows on a new sample		N/A
21.2	Accessible parts of solid insulation having strength to prevent penetration by sharp implements		N/A
	Test not applicable if the thickness of supplementary insulation is at least 1 mm and reinforced insulation at least 2 mm		N/A
	The insulation is tested as specified, and does withstand the electric strength test of 16.3		N/A
22	**CONSTRUCTION**		—
22.1	Appliance marked with the first numeral of the IP system, relevant requirements of IEC 60529 are fulfilled	IPX8	N/A
22.2	Stationary appliance: means to ensure all-pole disconnection from the supply being provided:		—
	- a supply cord fitted with a plug, or		N/A
	- a switch complying with 24.3, or		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- a statement in the instruction sheet that a disconnection incorporated in the fixed wiring is to be provided, or		P
	- an appliance inlet		N/A
	Singe-pole switches and single-pole protective devices for the disconnection of heating elements in single-phase, permanently connected class 01 and class I appliances, connected to the phase conductor		N/A
22.3	Appliance provided with pins: no undue strain on socket-outlets		N/A
	Applied torque not exceeding 0,25 Nm		N/A
	Pull force of 50 N to each pin after the appliance has being placed in the heating cabinet; when cooled to room temperature the pins are not displaced by more than 1 mm		N/A
	Each pin subjected to a torque of 0,4 Nm; the pins are not rotating, unless		N/A
	rotating does not impair compliance with this standard		N/A
22.4	Appliance for heating liquids and appliance causing undue vibration not provided with pins for insertion into socket-outlets		N/A
22.5	No risk of electric shock when touching the pins of the plug, for appliances having a capacitor with rated capacitance equal to or greater than 0,1 μF, the appliance being disconnected from the supply at the instant of voltage peak		N/A
	Voltage not exceeding 34 V (V)		N/A
	If compliance relies on the operation of an electronic circuit, the electromagnetic phenomena tests of 19.11.4.3 and 19.11.4.4 are applied		N/A
	The discharge test is then repeated three times, voltage not exceeding 34 V (V)		N/A
22.6	Electrical insulation not affected by condensing water or leaking liquid		P
	Electrical insulation of class II appliances not affected if a hose ruptures or seal leaks		N/A
	In case of doubt, test as described		N/A
	Class II pumps seal is removed from shaft. Pump is supplied at rated voltage and operated for 10 min with maximum head (IEC 60335-2-41)		N/A
	If static pressure can occur, test repeated at a pressure corresponding to maximum total head (IEC 60335-2-41)		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Pump withstand electric strength test of clause 16.3 (IEC 60335-2-41)		N/A
	Shower-boost pumps with separate enclosure have a drain hole in enclosure positioned so that water can drain out without impairing electrical insulation, unless water cannot accumulate within enclosure in normal use (IEC 60335-2-41)		N/A
	Hole be at least 5 mm in diameter or (IEC 60335-2-41)		N/A
	20 mm² in area with a width of least 3 mm (IEC 60335-2-41)		N/A
22.7	Adequate safeguards against the risk of excessive pressure in appliances containing liquid or gases or having steam-producing devices		N/A
22.8	Electrical connections not subject to pulling during cleaning of compartments to which access can be gained without the aid of a tool, and that are likely to be cleaned in normal use		N/A
22.9	Insulation, internal wiring, windings, commutators and slip rings not exposed to oil, grease or similar substances, unless		P
	the substance has adequate insulating properties		N/A
22.10	Not possible to reset voltage-maintained non-self-resetting thermal cut-outs by the operation of an automatic switching device incorporated within the appliance, if:		N/A
	- a non-self-resetting thermal cut-out is required by the standard, and		N/A
	- a voltage maintained non-self-resetting thermal cut-out is used to meet it		N/A
	Non-self-resetting thermal motor protectors have a trip-free action, unless		N/A
	they are voltage maintained		N/A
	Reset buttons of non-self-resetting controls so located or protected that accidental resetting is unlikely		N/A
22.11	Reliable fixing of non-detachable parts that provide the necessary degree of protection against electric shock, moisture or contact with moving parts		P
	Obvious locked position of snap-in devices used for fixing such parts		P
	No deterioration of the fixing properties of snap-in devices used in parts that are likely to be removed during installation or servicing		N/A
	Tests as described		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
22.12	Handles, knobs etc. fixed in a reliable manner, if loosening result in a hazard		P
	Removing or fixing in wrong position of handles, knobs etc. indicating position of switches or similar components not possible, if resulting in a hazard		N/A
	A choking hazard does not apply to appliances for commercial use		N/A
	Axial force 15 N applied to parts, the shape being so that an axial pull is unlikely to be applied		N/A
	Axial force 30 N applied to parts, the shape being so that an axial pull is likely to be applied		P
	If the part is removed and can be contained within the small parts cylinder, it is considered to be a choking hazard		N/A
22.13	Unlikely that handles, when gripped as in normal use, make the operator's hand touch parts having a temperature rise exceeding the value specified for handles which are held for short periods only		N/A
22.14	No ragged or sharp edges creating a hazard for the user in normal use, or during user maintenance		P
	No exposed pointed ends of self-tapping screws or other fasteners, likely to be touched by the user in normal use or during user maintenance		P
22.15	Storage hooks and the like for flexible cords smooth and well rounded		N/A
22.16	Automatic cord reels cause no undue abrasion or damage to the sheath of the flexible cord, no breakage of conductors strands and no undue wear of contacts		N/A
	Cord reel tested with 6000 operations, as specified		N/A
	Electric strength test of 16.3, voltage of 1000 V applied		N/A
22.17	Spacers not removable from the outside by hand or by means of a screwdriver or a spanner		N/A
22.18	Current-carrying parts and other metal parts resistant to corrosion		P
22.19	Driving belts not relied upon to provide the required level of insulation, unless		N/A
	constructed to prevent inappropriate replacement		N/A
22.20	Direct contact between live parts and thermal insulation effectively prevented, unless		N/A
	material used is non-corrosive, non-hygroscopic and non-combustible		N/A
22.21	Wood, cotton, silk, ordinary paper and fibrous or hygroscopic material not used as insulation, unless		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	impregnated		N/A
	This requirement does not apply to magnesium oxide and mineral ceramic fibres used for the electrical insulation of heating elements		N/A
22.22	Appliances not containing asbestos		P
22.23	Oils containing polychlorinated biphenyl (PCB) not used		N/A
22.24	Bare heating elements, except in class III appliances or class III constructions that do not contain live parts, adequately supported		N/A
	In case of rupture, the heating conductor is unlikely to come in contact with accessible metal parts		N/A
22.25	Sagging heating conductors, except in class III appliances or class III constructions that do not contain live parts, cannot come into contact with accessible metal parts		N/A
22.26	For class III constructions the insulation between parts operating at safety extra-low voltage and other live parts complies with the requirements for double or reinforced insulation		N/A
22.27	Parts connected by protective impedance separated by double or reinforced insulation		N/A
22.28	Metal parts of class II appliances conductively connected to gas pipes or in contact with water, separated from live parts by double or reinforced insulation		N/A
22.29	Class II appliances permanently connected to fixed wiring so constructed that the required degree of access to live parts is maintained after installation		N/A
22.30	Parts serving as supplementary or reinforced insulation fixed so that they cannot be removed without being seriously damaged, or		P
	so constructed that they cannot be replaced in an incorrect position, and so that if they are omitted, the appliance is rendered inoperable or manifestly incomplete		P
22.31	Neither clearances nor creepage distances over supplementary and reinforced insulation reduced below values specified in clause 29 as a result of wear		P
	Neither clearances nor creepage distances between live parts and accessible parts reduced below values for supplementary insulation if wires, screws etc. become loose		P
22.32	Supplementary and reinforced insulation constructed or protected against pollution so that clearances or creepage distances are not reduced below the values in clause 29		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Supplementary insulation of natural or synthetic rubber resistant to ageing, or arranged and dimensioned so that creepage distances are not reduced below values specified in 29.2		N/A
	Ceramic material not tightly sintered, similar materials or beads alone not used as supplementary or reinforced insulation		N/A
	Ceramic and similar porous material in which heating conductors are embedded is considered to be basic insulation, not reinforced insulation (IEC 60335-1:2010/A1:2013)		N/A
	Oxygen bomb test at 70 °C for 96 h and 16 h at room temperature		N/A
22.33	Conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts are not in direct contact with live parts		P
	unearthed metal parts separated from live parts by basic insulation only (IEC 60335-1:2010/A1:2013)		N/A
	Electrodes not used for heating liquids		N/A
	For class II constructions, conductive liquids that are or may become accessible in normal use and conductive liquids that are in contact with unearthed accessible metal parts, not in direct contact with basic or reinforced insulation, unless		N/A
	the reinforced insulation consists of at least 3 layers		N/A
	For class II constructions, conductive liquids which are in contact with live parts, not in direct contact with reinforced insulation, unless		N/A
	the reinforced insulation consists of at least 3 layers		N/A
	An air layer not used as basic or supplementary insulation in a double insulation system if likely to be bridged by leaking liquid		N/A
22.34	Shafts of operating knobs, handles, levers etc. not live, unless		N/A
	the shaft is not accessible when the part is removed		N/A
22.35	For other than class III constructions, handles, levers and knobs, held or actuated in normal use, not becoming live in the event of a failure of basic insulation		N/A
	Such parts being of metal, and their shafts or fixings are likely to become live in the event of a failure of basic insulation, are either adequately covered by insulation material or their accessible parts are separated from their shafts or fixings by supplementary insulation		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	This requirement does not apply to handles, levers and knobs on stationary appliances and cordless appliances, other than those of electrical components, provided they are reliably connected to an earthing terminal or earthing contact, or separated from live parts by earthed metal. P		N/A
	Insulating material covering metal handles, levers and knobs withstand the electric strength test of 16.3 for supplementary insulation		N/A
22.36	For appliances other than class III, handles continuously held in the hand in normal use so constructed that when gripped as in normal use, the operators hand is not likely to touch metal parts, unless		N/A
	they are separated from live parts by double or reinforced insulation		N/A
22.37	Capacitors in class II appliances not connected to accessible metal parts and their casings, if of metal, separated from accessible metal parts by supplementary insulation, unless		N/A
	the capacitors comply with 22.42		N/A
22.38	Capacitors not connected between the contacts of a thermal cut-out		P
22.39	Lamp holders used only for the connection of lamps		N/A
22.40	Motor-operated appliances and combined appliances intended to be moved while in operation, or having accessible moving parts, fitted with a switch to control the motor. The actuating member of the switch being easily visible and accessible		N/A
	If the appliance cannot operate continuously, automatically or remotely without giving rise to a hazard, appliances for remote operation being fitted with a switch for stopping the operation. The actuating member of the switch being easily visible and accessible		N/A
	Requirement not applicable to submersible pumps and vertical wet pit pumps (IEC 60335-2-41)		N/A
22.41	No components, other than lamps, containing mercury		P
22.42	Protective impedance consisting of at least two separate components		N/A
	Values specified in 8.1.4 not exceeded if any one of the components are short-circuited or open-circuited		N/A
	Resistors checked by the test of 14.1 a) in IEC 60065		N/A
	Capacitors checked by the tests for class Y capacitors in IEC 60384-14		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
22.43	Appliances adjustable for different voltages, accidental changing of the setting of the voltage unlikely to occur		N/A
22.44	Appliances not having an enclosure that is shaped or decorated like a toy		P
22.45	When air is used as reinforced insulation, clearances not reduced below the values specified in 29.1.3 due to deformation as a result of an external force applied to the enclosure		N/A
22.46	For programmable protective electronic circuits used to ensure compliance with the standard, the software contains measures to control the fault/error conditions in table R.1		N/A
	Software that contains measures to control the fault/error conditions specified in table R.2 is to be specified in parts 2 for particular constructions or to address specific hazards		N/A
	These requirements are not applicable to software used for functional purpose or compliance with clause 11		N/A
22.47	Appliances connected to the water mains withstand the water pressure expected in normal use		N/A
	No leakage from any part, including any inlet water hose		N/A
22.48	Appliances connected to the water mains constructed to prevent backsiphonage of non-potable water		N/A
22.49	For remote operation, the duration of operation is to be set before the appliance can be started, unless		N/A
	the appliance switches off automatically or can operate continuously without hazard		N/A
22.50	Controls incorporated in the appliance take priority over controls actuated by remote operation		N/A
22.51	There is a control on the appliance manually adjusted to the setting for remote operation before the appliance can be operated in this mode		N/A
	There is a visual indication showing that the appliance is adjusted for remote operation		N/A
	These requirements not necessary on appliances that can operate as follows, without giving rise to a hazard:		—
	- continuously, or		N/A
	- automatically, or		N/A
	- remotely		N/A
22.52	Socket-outlets on appliances accessible to the user in accordance with the socket-outlet system used in the country in which the appliance is sold		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
22.53	Class II appliances and class III appliances that incorporate functionally earthed parts have at least double insulation or reinforced insulation between live parts and the functionally earthed parts		N/A
22.54	Button cells and batteries designated R1 not accessible without the aid of a tool, unless		N/A
	the cover of their compartment can only be opened after at least two independent movements have been applied simultaneously		N/A
22.55	Devices operated to stop the intended function of the appliance, if any, are be distinguished from other manual devices by means of shape, size, surface texture or position .....:		N/A
	The requirement concerning position does not preclude use of a push on push off switch		N/A
	An indication when the device has been operated is given by:		
	-tactile feedback from the actuator or from the appliance, or		N/A
	-..... reduction in heat output; or		N/A
	-..... audible and visible feedback		N/A
22.56	Detachable power supply part provided with the part of class III construction		N/A
22.57	The properties of non-metallic materials do not degrade from exposure to UV-C radiation, as specified in annex T		N/A
22.101	Pumps withstand the static pressure occurring in normal use (IEC 60335-2-41)		P
	Pump filled with water, ensuring that all air is removed. Pressure raised hydraulically to 1,2 times pressure occurring at maximum total head and maintained for 1 min (submersible pumps and vertical wet pit pumps not subjected to this test) (IEC 60335-2-41)	Submersible pumps	N/A
	No trace of water on insulation that could result in a reduction of clearances and creepage distances below values specified in clause 29 (IEC 60335-2-41)		N/A
22.102	Material of pump not be affected by liquid for which pump is intended if a hazard could result (IEC 60335-2-41)		P
22.103	Submersible pumps and vertical wet pit pumps so constructed that pollution of liquid by lubricants prevented as far as possible (IEC 60335-2-41)		P
22.104	Submersible pumps and vertical wet pit pumps having a mass > 3 kg so constructed that means for hoisting can be attached (IEC 60335-2-41)		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
22.105	Class I submersible pumps with plastic enclosure so constructed that leakage of liquid into motor does not result in a hazard (IEC 60335-2-41)		N/A
	After specified test accumulating water come in contact with earthed metal before it reaches live parts (IEC 60335-2-41)		N/A
22.106	Shower-boost pumps constructed so that they can be permanently connected to water supply (IEC 60335-2-41)		N/A
	Shower-boost pumps for wall mounting constructed so that they can be securely fixed independently of connection to water supply (IEC 60335-2-41)		N/A
	Keyhole slots, hooks and similar means, without any further means to prevent the pump from being inadvertently lifted off the wall, are not considered to be adequate means for fixing the pump securely. (IEC 60335-2-41)		N/A
23	**INTERNAL WIRING**		—
23.1	Wireways smooth and free from sharp edges		P
	Wires protected against contact with burrs, cooling fins etc.		P
	Wire holes in metal well-rounded or provided with bushings		P
	Wiring effectively prevented from coming into contact with moving parts		P
23.2	Beads etc. on live wires cannot change their position, and are not resting on sharp edges		N/A
	Beads inside flexible metal conduits contained within an insulating sleeve		N/A
23.3	Electrical connections and internal conductors movable relatively to each other not exposed to undue stress		N/A
	Flexible metallic tubes not causing damage to insulation of conductors		N/A
	Open-coil springs not used		N/A
	Adequate insulating lining provided inside a coiled spring, the turns of which touch one another		N/A
	No damage after 10 000 flexings for conductors flexed during normal use, or		N/A
	100 flexings for conductors flexed during user maintenance		N/A
	Electric strength test of 16.3, 1000 V between live parts and accessible metal parts		N/A
	Not more than 10 % of the strands of any conductor broken, and		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	not more than 30 % for wiring supplying circuits that consume no more than 15 W		N/A
23.4	Bare internal wiring sufficiently rigid and fixed		N/A
23.5	The insulation of internal wiring subjected to the supply mains voltage withstanding the electrical stress likely to occur in normal use		P
	Basic insulation electrically equivalent to the basic insulation of cords complying with IEC 60227 or IEC 60245, or		N/A
	no breakdown when a voltage of 2000 V is applied for 15 min between the conductor and metal foil wrapped around the insulation		P
	For class II construction, the requirements for supplementary insulation and reinforced insulation apply,		N/A
	except that the sheath of a cord complying with IEC 60227 or IEC 60245 may provide supplementary insulation.		N/A
	A single layer of internal wiring insulation does not provide reinforced insulation		P
23.6	Sleeving used as supplementary insulation on internal wiring retained in position by clamping at both ends, or		N/A
	be such that it can only be removed by breaking or cutting		N/A
23.7	The colour combination green/yellow only used for earthing conductors		P
23.8	Aluminium wires not used for internal wiring		P
23.9	Stranded conductors not consolidated by soldering where they are subjected to contact pressure, unless		P
	the contact pressure is provided by spring terminals		N/A
23.10	The insulation and sheath of internal wiring, incorporated in external hoses for the connection of an appliance to the water mains, at least equivalent to that of light polyvinyl chloride sheathed flexible cord (60227 IEC 52)		N/A
24	**COMPONENTS**		—
24.1	Components comply with safety requirements in relevant IEC standards		N/A
	List of components		N/A
	Motors not required to comply with IEC 60034-1, they are tested as part of the appliance		N/A
	Relays tested as part of the appliance, or		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	alternatively acc. to IEC 60730-1, and meeting the additional requirements in IEC 60335-1		N/A
	The requirements of Clause 29 apply between live parts of components and accessible parts of the appliance		N/A
	Components can comply with the requirements for clearances and creepage distances for functional insulation in the relevant component standard		N/A
	30.2 of this standard apply to parts of non-metallic material in components including parts of non-metallic material supporting current-carrying connections		N/A
	Components that have not been previously tested to comply with the IEC standard for the relevant component are tested according to the requirements of 30.2		N/A
	Components that have been previously tested to comply with the resistance to fire requirements in the IEC standard for the relevant component need not be retested provided the specified conditions are met		N/A
	If these conditions are not satisfied, the component is tested as part of the appliance.		N/A
	Power electronic converter circuits not required to comply with IEC 62477-1, they are tested as part of the appliance		N/A
	If components have not been tested and found to comply with relevant IEC standard for the number of cycles specified, they are tested in accordance with 24.1.1 to 24.1.9		N/A
	For components mentioned in 24.1.1 to 24.1.9 no additional tests specified in the relevant component standard are necessary other than those specified in 24.1.1 to 24.1.9		N/A
	Components not tested and found to comply with relevant IEC standard and components not marked or not used in accordance with its marking, tested under the conditions occurring in the appliance		N/A
	Lampholders and starterholders that have not being tested and found to comply with the relevant IEC standard, tested as a part of the appliance and additionally according to the gauging and interchangeability requirements of the relevant IEC standard		N/A
	No additional tests specified for nationally standardized plugs such as those detailed in IEC/TR 60083 or connectors complying with the standard sheets of IEC 60320-1 and IEC 60309		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
24.1.1	Capacitors likely to be permanently subjected to the supply voltage and used for radio interference suppression or for voltage dividing, complying with IEC 60384-14		N/A
	If the capacitors have to be tested, they are tested according to annex F		N/A
24.1.2	Transformers in associated switch mode power supplies comply with Annex BB of IEC 61558-2-16		N/A
	Safety isolating transformers complying with IEC 61558-2-6		N/A
	If they have to be tested, they are tested according to annex G		N/A
24.1.3	Switches complying with IEC 61058-1, the number of cycles of operation being at least 10 000		N/A
	Level switches subjected to 50 000 cycles of operation (IEC 60335-2-41)		N/A
	If they have to be tested, they are tested according to annex H		N/A
	If the switch operates a relay or contactor, the complete switching system is subjected to the test		N/A
	If the switch only operates a motor staring relay complying with IEC 60730-2-10 with the number of cycles of a least 10 000 as specified, the complete switching system need not be tested		N/A
24.1.4	Automatic controls complying with IEC 60730-1 with the relevant part 2. The number of cycles of operation being at least:		—
	- thermostats:..... 10 000		N/A
	- temperature limiters:..... 1 000		N/A
	- self-resetting thermal cut-outs:.....300		N/A
	- voltage maintained non-self-resetting thermal cut-outs:..... 1 000		N/A
	- other non-self-resetting thermal cut-outs:..... 30		N/A
	- timers:..... 3 000		N/A
	- energy regulators:..... 10 000		N/A
	The number of cycles for controls operating during clause 11 need not be declared, if the appliance meets the requirements of this standard when they are short-circuited		N/A
	Thermal motor protectors are tested in combination with their motor under the conditions specified in annex D		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	For water valves containing live parts and that are incorporated in external hoses for connection of an appliance to the water mains, the degree of protection declared for subclause 6.5.2 of IEC 60730-2-8 is IPX7		N/A
	Thermal cut-outs of the capillary type comply with the requirements for type 2.K controls in IEC 60730-2-9 (IEC 60335-1:2010/A1:2013)		N/A
24.1.5	Appliance couplers complying with IEC 60320-1		N/A
	However, for class II appliances classified higher than IPX0, the appliance couplers complying with IEC 60320-2-3		N/A
	Interconnection couplers complying with IEC 60320-2-2		N/A
24.1.6	Small lamp holders similar to E10 lampholders complying with IEC 60238, the requirements for E10 lampholders being applicable		N/A
24.1.7	For remote operation of the appliance via a telecommunication network, the relevant standard for the telecommunication interface circuitry in the appliance is IEC 62151		N/A
24.1.8	The relevant standard for thermal links is IEC 60691		N/A
	Thermal links not complying with IEC 60691 are considered to be an intentionally weak part for the purposes of clause 19		N/A
24.1.9	Contactors and relays, other than motor starting relays, tested as part of the appliance		N/A
	They are also tested in accordance with clause 17 of IEC 60730-1, the number of cycles of operations in 24.1.4 selected according to the contactor or relay function in the appliance.....:		N/A
24.2	Appliances not fitted with:		—
	- switches or automatic controls in flexible cords		N/A
	- devices causing the protective device in the fixed wiring to operate in the event of a fault in the appliance		N/A
	- thermal cut-outs that can be reset by soldering, unless		N/A
	the solder has a melding point of at least 230 °C		N/A
	Level switches incorporated in interconnection cords (IEC 60335-2-41)		N/A
24.3	Switches intended for all-pole disconnection of stationary appliances are directly connected to the supply terminals and have a contact separation in all poles, providing full disconnection under overvoltage category III conditions		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
24.4	Plugs and socket-outlets for extra-low voltage circuits and heating elements, not interchangeable with plugs and socket-outlets listed in IEC/TR 60083 or IEC 60906-1 or with connectors and appliance inlets complying with the standard sheets of IEC 60320-1		N/A
24.5	Capacitors in auxiliary windings of motors marked with their rated voltage and capacitance, and used accordingly		N/A
	Voltage across capacitors in series with a motor winding does not exceed 1,1 times rated voltage, when the appliance is supplied at 1,1 times rated voltage under minimum load		N/A
24.6	Working voltage of motors connected to the supply mains and having basic insulation that is inadequate for the rated voltage of the appliance, not exceeding 42 V		N/A
	In addition, the motors comply with the requirements of annex I		N/A
24.7	Detachable hose-sets for connection of appliances to the water mains comply with IEC 61770		N/A
	They are supplied with the appliance		N/A
	Appliances intended to be permanently connected to the water mains not connected by a detachable hose-set		N/A
24.8	Motor running capacitors in appliances for which 30.2.3 is applicable and that are permanently connected in series with a motor winding, not causing a hazard in event of a failure		N/A
	One or more of the following conditions are to be met:		—
	- the capacitors are of class P2 according to IEC 60252-1		N/A
	- the capacitors are housed within a metallic or ceramic enclosure		N/A
	- the distance of separation of the outer surface to adjacent non-metallic parts exceeds 50 mm		N/A
	- adjacent non-metallic parts within 50 mm withstand the needle-flame test of annex E		N/A
	- adjacent non-metallic parts within 50 mm classified as at least V-1 according to IEC 60695-11-10		N/A
25	**SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS**		—
25.1	Appliance not intended for permanent connection to fixed wiring, means for connection to the supply:		—
	- supply cord fitted with a plug, the current rating and voltage rating of the plug being not less than the corresponding ratings of its associated appliance		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- an appliance inlet having at least the same degree of protection against moisture as required for the appliance, or		N/A
	- pins for insertion into socket-outlets		N/A
	Submersible pumps, other than class III, provided with a supply cord fitted with a plug		N/A
25.2	Appliance not provided with more than one means of connection to the supply mains		N/A
	Stationary appliance for multiple supply may be provided with more than one means of connection, provided electric strength test of 1250 V for 1 min between each means of connection causes no breakdown		N/A
25.3	Appliance intended to be permanently connected to fixed wiring provided with one of the following means for connection to the supply mains:		—
	- a set of terminals allowing the connection of a flexible cord		N/A
	- a fitted supply cord		N/A
	-a set of supply leads accommodated in a suitable compartment		N/A
	- a set of terminals for the connection of cables of fixed wiring, cross-sectional areas specified in 26.6, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support		N/A
	- a set of terminals and cable entries, conduit entries, knock-outs or glands, allowing connection of appropriate types of cable or conduit, and the appliance allows the connection of the supply conductors after the appliance has been fixed to its support		N/A
	For a fixed appliance constructed so that parts can be removed to facilitate easy installation, this requirement is met if it is possible to connect the fixed wiring without difficulty after a part of the appliance has been fixed to its support		N/A
	Submersible pumps, other than class III pumps, provided with a flexible cord (IEC 60335-2-41)		N/A
25.4	Cable and conduit entries, rated current of appliance not exceeding 16 A, dimension according to table 10 (mm).....:		N/A
	Introduction of conduit or cable does not reduce clearances or creepage distances below values specified in clause 29		N/A
25.5	Method for assembling the supply cord to the appliance:		N/A
	- type X attachment (not allowed for submersible pumps) (IEC 60335-2-41)		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- type Y attachment		N/A
	- type Z attachment for pumps having a rated power input ≤ 100 W (IEC 60335-2-41)		N/A
	- type Z attachment pumps for garden ponds (IEC 60335-2-41)		N/A
	Type X attachment, other than those with a specially prepared cord, not used for flat twin tinsel cords		N/A
	For multi-phase appliances supplied with a supply cord and that are intended to be permanently connected to fixed wiring, the supply cord is assembled to the appliance by type Y attachment		N/A
25.6	Plugs fitted with only one flexible cord		N/A
25.7	Pumps intended for outdoor use and pumps intended for use in swimming pools, other than class III pumps, supply cord be (IEC 60335-2-41):		N/A
	- polychloroprene sheathed or equivalent synthetic elastomer and not lighter than heavy polychloroprene sheathed cord (code designation 60245 IEC 66). However (IEC 60335-2-41),		N/A
	- fixed pumps having a rated power input ≤ 1 kW and portable pumps having a mass ≤ 5 kg fitted with ordinary polychloroprene sheathed cord (code designation 60245 IEC 57) (IEC 60335-2-41)		N/A
	Pumps intended for indoor use, except table fountain pumps, aquarium pumps, shower-boost pumps and class III pumps, supply cord be (IEC 60335-2-41):		N/A
	- polychloroprene sheathed or equivalent synthetic elastomer and not be lighter than ordinary polychloroprene sheathed cord (code designation 60245 IEC 57) (IEC 60335-2-41)		N/A
	Supply cords, other than for class III appliances, being one of the following types:		N/A
	- rubber sheathed (at least 60245 IEC 53)		N/A
	- polychloroprene sheathed (at least 60245 IEC 57)		N/A
	- polyvinyl chloride sheathed. Not used if they are likely to touch metal parts having a temperature rise exceeding 75 K during the test of clause 11		N/A
	- light polyvinyl chloride sheathed cord (60227 IEC 52), for appliances not exceeding 3 kg		N/A
	- ordinary polyvinyl chloride sheathed cord (60227 IEC 53), for other appliances		N/A
	- heat resistant polyvinyl chloride sheathed. Not used for type X attachment other than specially prepared cords		N/A
	- heat-resistant light polyvinyl chloride sheathed cord (60227 IEC 56), for appliances not exceeding 3 kg		N/A
	- heat-resistant polyvinyl chloride sheathed cord (60227 IEC 57), for other appliances		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Supply cords for class III appliances adequately insulated		N/A
	Test with 500 V for 2 min for supply cords of class III appliances that contain live parts		N/A
25.8	Nominal cross-sectional area of supply cords not less than table 11; rated current (A); cross-sectional area (mm²)		N/A
	Supply cord of submersible pumps intended for outdoor use, other than class III pumps, has a length of 10 m or at least 3 m in excess of the maximum operating depth marked on the pump, whichever is greater (IEC 60335-2-41)		N/A
	Supply cord of submersible pumps, other than class III pumps, aquarium pumps and table fountain pumps, has a length of at least 3 m in excess of the maximum operating depth marked on the pump (IEC 60335-2-41)		N/A
	Supply cord of deep well pumps have a length of at least 3 m in excess of the maximum well depth, unless the deep well pump is provided with a coupling device having at least the same degree of protection as required for the pump.		N/A
25.9	Supply cords not in contact with sharp points or edges		N/A
25.10	Supply cord of class I appliances have a green/yellow core for earthing		N/A
	In multi-phase appliances, the colour of the neutral conductor of the supply cord is blue.		N/A
	Where additional neutral conductors are provided in the supply cord:		—
	-other colours may be used for these additional neutral conductors;		N/A
	-all of the neutral conductors and line conductors are identified by marking using the alpha numeric notation specified in IEC 60445		N/A
	-the supply cord is fitted to the appliance		N/A
25.11	Conductors of supply cords not consolidated by soldering where they are subject to contact pressure, unless		N/A
	the contact pressure is provided by spring terminals		N/A
25.12	Insulation of the supply cord not damaged when moulding the cord to part of the enclosure		N/A
25.13	Inlet openings so constructed as to prevent damage to the supply cord		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If it is not evident that the supply cord can be introduced without risk of damage, a non-detachable lining or bushing complying with 29.3 for supplementary insulation provided		N/A
	If unsheathed supply cord, a similar additional bushing or lining is required, unless the appliance is		N/A
	class 0, or		N/A
	a class III appliance not containing live parts		N/A
25.14	Supply cords moved while in operation adequately protected against excessive flexing		N/A
	Portable pumps are subjected to the test. (IEC 60335-2-41):		N/A
	Flexing test (only for portable pumps, except table fountain pumps and aquarium pumps) (IEC 60335-2-41):		N/A
	- applied force (N)		N/A
	- number of flexings		N/A
	The test does not result in:		—
	-short-circuit between the conductors, such that the current exceeds a value of twice the rated current		N/A
	-breakage of more than 10 % of the strands of any conductor		N/A
	- separation of the conductor from its terminal		N/A
	- loosening of any cord guard		N/A
	- damage to the cord or the cord guard		N/A
	- broken strands piercing the insulation and becoming accessible		N/A
25.15	For appliances with supply cord and appliances to be permanently connected to fixed wiring by a flexible cord, conductors of the supply cord relieved from strain, twisting and abrasion by use of cord anchorage		N/A
	The cord cannot be pushed into the appliance to such an extent that the cord or internal parts of the appliance can be damaged		N/A
	Pull and torque test of supply cord:		—
	- fixed appliances: pull 100 N; torque (not on automatic cord reel) (N.m)		N/A
	- other appliances: values shown in table 12: mass (kg); pull (N); torque (not on automatic cord reel) (N.m)		N/A
	Pull and torque test of supply cord, values shown in table 12: mass (kg); pull (N); torque (not on automatic cord reel) (N.m)		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Cord not damaged and max. 2 mm displacement of the cord		N/A
25.16	Cord anchorages for type X attachments constructed and located so that:		—
	- replacement of the cord is easily possible		N/A
	- it is clear how the relief from strain and the prevention of twisting are obtained		N/A
	- they are suitable for different types of supply cord		N/A
	- cord cannot touch the clamping screws of cord anchorage if these screws are accessible, unless		N/A
	they are separated from accessible metal parts by supplementary insulation		N/A
	- the cord is not clamped by a metal screw which bears directly on the cord		N/A
	- at least one part of the cord anchorage securely fixed to the appliance, unless		N/A
	it is part of a specially prepared cord		N/A
	- screws which have to be operated when replacing the cord do not fix any other component, unless		N/A
	the appliance becomes inoperative or incomplete or the parts cannot be removed without a tool		N/A
	- if labyrinths can be bypassed the test of 25.15 is nevertheless withstood		N/A
	- for class 0, 0I and I appliances they are of insulating material or are provided with an insulating lining, unless		N/A
	failure of the insulation of the cord does not make accessible metal parts live		N/A
	- for class II appliances they are of insulating material, or		N/A
	if of metal, they are insulated from accessible metal parts by supplementary insulation		N/A
	After the test of 25.15, under the conditions specified, the conductors have not moved by more than 1 mm in the terminals		N/A
25.17	Adequate cord anchorages for type Y and Z attachment, test with the cord supplied with the appliance		N/A
25.18	Cord anchorages only accessible with the aid of a tool, or		N/A
	Constructed so that the cord can only be fitted with the aid of a tool		N/A
25.19	Type X attachment, glands not used as cord anchorage in portable appliances		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Tying the cord into a knot or tying the cord with string not used		N/A
25.20	The conductors of the supply cord for type Y and Z attachment insulated from accessible metal parts (IEC 60335-1:2010/A1:2013)		N/A
25.21	Space for supply cord for type X attachment or for connection of fixed wiring constructed:		—
	- to permit checking of conductors with respect to correct positioning and connection before fitting any cover		N/A
	- so there is no risk of damage to the conductors or their insulation when fitting the cover		N/A
	- for portable appliances, so that the uninsulated end of a conductor, if it becomes free from the terminal, prevented from contact with accessible metal parts		N/A
	2 N test to the conductor for portable appliances; no contact with accessible metal parts		N/A
25.22	Appliance inlets:		—
	- live parts not accessible during insertion or removal		N/A
	Requirement not applicable to appliance inlets complying with IEC 60320-1		N/A
	- connector can be inserted without difficulty		N/A
	- the appliance is not supported by the connector		N/A
	- not for cold conditions if temp. rise of external metal parts exceeds 75 K during clause 11, unless		N/A
	the supply cord is unlikely to touch such metal parts		N/A
25.23	Interconnection cords comply with the requirements for the supply cord, except that:		N/A
	- the cross-sectional area of the conductors is determined on the basis of the maximum current during clause 11		N/A
	- the thickness of the insulation may be reduced		N/A
	If necessary, electric strength test of 16.3		N/A
25.24	Interconnection cords not detachable without the aid of a tool if compliance with this standard is impaired when they are disconnected		N/A
25.25	Dimensions of pins that are inserted into socket-outlets compatible with the dimensions of the relevant socket-outlet.		N/A
	Dimensions of pins and engagement face in accordance with the dimensions of the relevant plug in IEC/TR 60083		N/A
26	**TERMINALS FOR EXTERNAL CONDUCTORS**		—

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
26.1	Appliances provided with terminals or equally effective devices for connection of external conductors		P
	Terminals only accessible after removal of a non-detachable cover, except		P
	for class III appliances that do not contain live parts		N/A
	Earthing terminals may be accessible if a tool is required to make the connections and means are provided to clamp the wire independently from its connection		N/A
26.2	Appliances with type X attachment and appliances for the connection of cables to fixed wiring provided with terminals in which connections are made by means of screws, nuts or similar devices, unless		P
	the connections are soldered		N/A
	Screws and nuts not used to fix any other component, except		P
	internal conductors, if so arranged that they are unlikely to be displaced when fitting the supply conductors		P
	If soldered connections used, the conductor so positioned or fixed that reliance is not placed on soldering alone, unless		N/A
	barriers provided so that neither clearances nor creepage distances between live parts and other metal parts reduced below the values for supplementary insulation if the conductor becomes free at the soldered joint		N/A
26.3	Terminals for type X attachment and for connection of cables of fixed wiring so constructed that the conductor is clamped between metal surfaces with sufficient contact pressure but without damaging the conductor		P
	Terminals fixed so that when the clamping means is tightened or loosened:		—
	- the terminal does not become loose		P
	- internal wiring is not subjected to stress		P
	- neither clearances nor creepage distances are reduced below the values in clause 29		P
	Compliance checked by inspection and by the test of subclause 9.6 of IEC 60999-1, the torque applied being equal to two-thirds of the torque specified (N.m)		P
	No deep or sharp indentations of the conductors		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
26.4	Terminals for type X attachment, except those having a specially prepared cord and those for the connection of cables of fixed wiring, no special preparation of conductors such as by soldering, use of cable lugs, eyelets or similar, and		N/A
	so constructed or placed that conductors prevented from slipping out when clamping screws or nuts are tightened		N/A
26.5	Terminals for type X attachment so located or shielded that if a wire of a stranded conductor escapes, no risk of accidental connection to other parts that result in a hazard		N/A
	Stranded conductor test, 8 mm insulation removed		N/A
	No contact between live parts and accessible metal parts and,		N/A
	for class II constructions, between live parts and metal parts separated from accessible metal parts by supplementary insulation only		N/A
26.6	Terminals for type X attachment and for connection of cables of fixed wiring suitable for connection of conductors with cross-sectional area according to table 13; rated current (A); nominal cross-sectional area (mm^2)		P
	If a specially prepared cord is used, terminals need only be suitable for that cord		N/A
26.7	Terminals for type X attachment, except in class III appliances not containing live parts, accessible after removal of a cover or part of the enclosure		N/A
26.8	Terminals for the connection of fixed wiring, including the earthing terminal, located close to each other		P
26.9	Terminals of the pillar type constructed and located as specified		N/A
26.10	Terminals with screw clamping and screwless terminals not used for flat twin tinsel cords, unless		N/A
	conductors ends fitted with means suitable for screw terminals		N/A
	Pull test of 5 N to the connection		P
26.11	For type Y and Z attachment, soldered, welded, crimped or similar connections may be used		P
	For class II appliances, the conductor so positioned or fixed that reliance is not placed on soldering, welding or crimping alone		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If soldering, welding or crimping alone used, barriers provided so that clearances and creepage distances between live parts and other metal parts are not reduced below the values for supplementary insulation if the conductor becomes free		N/A
27	**PROVISION FOR EARTHING**		—
27.1	Accessible metal parts of class 0I and I appliances permanently and reliably connected to an earthing terminal or earthing contact of the appliance inlet		N/A
	Earthing terminals and earthing contacts not connected to the neutral terminal		N/A
	Class 0, II and III appliances have no provision for protective earthing		N/A
	Class II appliances and class III appliances can incorporate an earth for functional purposes		N/A
	Safety extra-low voltage circuits not earthed, unless		N/A
	protective extra-low voltage circuits		N/A
27.2	Clamping means of earthing terminals adequately secured against accidental loosening		N/A
	Terminals for the connection of external equipotential bonding conductors allow connection of conductors of 2,5 to 6 mm², and		N/A
	do not provide earthing continuity between different parts of the appliance, and		N/A
	conductors cannot be loosened without the aid of a tool		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes (IEC 60335-1:2010/A1:2013)		N/A
27.3	For a detachable part having an earth connection and being plugged into another part of the appliance, the earth connection is made before and separated after current-carrying connections when removing the part		N/A
	For appliances with supply cords, current-carrying conductors become taut before earthing conductor, if the cord slips out of the cord anchorage		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes (IEC 60335-1:2010/A1:2013)		N/A
27.4	No risk of corrosion resulting from contact between parts of the earthing terminal and the copper of the earthing conductor or other metal		N/A
	Parts providing earthing continuity, other than parts of a metal frame or enclosure, have adequate resistance to corrosion		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	If of steel, these parts provided with an electroplated coating with a thickness at least 5 µm		N/A
	Adequate protection against rusting of parts of coated or uncoated steel, only intended to provide or transmit contact pressure		N/A
	In the body of the earthing terminal is a part of a frame or enclosure of aluminium or aluminium alloys, precautions taken to avoid risk of corrosion		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes (IEC 60335-1:2010/A1:2013)		N/A
27.5	Low resistance of connection between earthing terminal and earthed metal parts		N/A
	This requirement does not apply to connections providing earthing continuity in the protective extra-low voltage circuit, provided the clearances of basic insulation are based on the rated voltage of the appliance		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes		N/A
	Resistance not exceeding 0,1 Ω at the specified low-resistance test (Ω)		N/A
27.6	The printed conductors of printed circuit boards not used to provide earthing continuity in hand-held appliances.		N/A
	They may be used to provide earthing continuity in other appliances if at least two tracks are used with independent soldering points and the appliance complies with 27.5 for each circuit		N/A
	Requirements not applicable to class II appliances and class III appliances that incorporate an earth for functional purposes (IEC 60335-1:2010/A1:2013)		N/A
28	**SCREWS AND CONNECTIONS**		—
28.1	Fixings, electrical connections and connections providing earthing continuity withstand mechanical stresses		P
	Screws not of soft metal liable to creep, such as zinc or aluminium		P
	Diameter of screws of insulating material min. 3 mm		N/A
	Screws of insulating material not used for any electrical connections or connections providing earthing continuity		N/A
	Screws used for electrical connections or connections providing earthing continuity screwed into metal		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Screws not of insulating material if their replacement by a metal screw can impair supplementary or reinforced insulation		N/A
	For type X attachment, screws to be removed for replacement of supply cord or for user maintenance, not of insulating material if their replacement by a metal screw impairs basic insulation		N/A
	For screws and nuts; torque-test as specified in table 14	(see appended table)	P
28.2	Electrical connections and connections providing earthing continuity constructed so that contact pressure is not transmitted through non-ceramic insulating material liable to shrink or distort, unless		P
	there is resiliency in the metallic parts to compensate for shrinkage or distortion of the insulating material		N/A
	This requirement does not apply to electrical connections in circuits of appliances for which:		—
	- 30.2.2 is applicable and that carry a current not exceeding 0,5 A		N/A
	- 30.2.3 is applicable and that carry a current not exceeding 0,2 A		N/A
28.3	Space-threaded (sheet metal) screws only used for electrical connections if they clamp the parts together		N/A
	Thread-cutting (self-tapping) screws and thread rolling screws only used for electrical connections if they generate a full form standard machine screw thread		N/A
	Thread-cutting (self-tapping) screws not used if they are likely to be operated by the user or installer		N/A
	Thread-cutting, thread rolling and space threaded screws may be used in connections providing earthing continuity provided it is not necessary to disturb the connection:		—
	- in normal use,		N/A
	- during user maintenance,		N/A
	- when replacing a supply cord having a type X attachment, or		N/A
	- during installation		N/A
	At least two screws being used for each connection providing earthing continuity, unless		N/A
	the screw forms a thread having a length of at least half the diameter of the screw		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
28.4	Screws and nuts that make mechanical connection secured against loosening if they also make electrical connections or connections providing earthing continuity		P
	This requirement does not apply to screws in the earthing circuit if at least two screws are used, or		N/A
	if an alternative earthing circuit is provided		N/A
	Rivets for electrical connections or connections providing earthing continuity secured against loosening if the connections are subjected to torsion		N/A
29	**CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION**		—
	Clearances, creepage distances and solid insulation withstand electrical stress		P
	For coatings used on printed circuits boards to protect the microenvironment (Type 1) or to provide basic insulation (Type 2), annex J applies		N/A
	The microenvironment is pollution degree 1 under type 1 protection		N/A
	For type 2 protection, the spacing between the conductors before the protection is applied is not less than the values specified in Table 1 of IEC 60664-3		N/A
	These values apply to functional, basic, supplementary and reinforced insulation		N/A
29.1	Clearances not less than the values specified in table 16, taking into account the rated impulse voltage for the overvoltage categories of table 15, unless	(see appended table)	P
	for basic insulation and functional insulation they comply with the impulse voltage test of clause 14		N/A
	However, if the distances are affected by wear, distortion, movement of the parts or during assembly, the clearances for rated impulse voltages of 1500 V and above are increased by 0,5 mm and the impulse voltage test is not applicable		P
	For appliances intended for use at altitudes exceeding 2 000 m, the clearances in Table 16 is increased according to the relevant multiplier values in Table A.2 of IEC 60664-1 (IEC 60335-1:2010/A1:2013)		N/A
	Impulse voltage test is not applicable:		—
	- when the microenvironment is pollution degree 3, or		P
	- for basic insulation of class 0 and class 01 appliances		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- to appliances intended for use at altitudes exceeding 2 000 m (IEC 60335-1:2010/A1:2013)		N/A
	Appliances are in overvoltage category II		P
	A force of 2 N is applied to bare conductors, other than heating elements		P
	A force of 30 N is applied to accessible surfaces		P
29.1.1	Clearances of basic insulation withstand the overvoltages, taking into account the rated impulse voltage		P
	The values of table 16 or the impulse voltage test of clause 14 are applicable	(see appended table)	P
	Clearance at the terminals of tubular sheathed heating elements may be reduced to 1,0 mm if the microenvironment is pollution degree 1		N/A
	Lacquered conductors of windings considered to be bare conductors		P
29.1.2	Clearances of supplementary insulation not less than those specified for basic insulation in table 16 .....:	(see appended table)	P
29.1.3	Clearances of reinforced insulation not less than those specified for basic insulation in table 16, using the next higher step for rated impulse voltage.....:	(see appended table)	P
	For double insulation, with no intermediate conductive part between basic and supplementary insulation, clearances are measured between live parts and the accessible surface, and the insulation system is treated as reinforced insulation		P
29.1.4	Clearances for functional insulation are the largest values determined from:		—
	- table 16 based on the rated impulse voltage.....:	(see appended table)	P
	- table F.7a in IEC 60664-1, frequency not exceeding 30 kHz		N/A
	- clause 4 of IEC 60664-4, frequency exceeding 30 kHz		N/A
	If values of table 16 are largest, the impulse voltage test of clause 14 may be applied instead, unless		N/A
	the microenvironment is pollution degree 3, or		P
	the distances can be affected by wear, distortion, movement of the parts or during assembly		N/A
	However, clearances are not specified if the appliance complies with clause 19 with the functional insulation short-circuited		N/A
	Lacquered conductors of windings considered to be bare conductors		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	However, clearances at crossover points are not measured		P
	Clearance between surfaces of PTC heating elements may be reduced to 1mm		N/A
29.1.5	Appliances having higher working voltages than rated voltage, clearances for basic insulation are the largest values determined from:		—
	- table 16 based on the rated impulse voltage		P
	- table F.7a in IEC 60664-1, frequency not exceeding 30 kHz		N/A
	- clause 4 of IEC 60664-4, frequency exceeding 30 kHz		N/A
	If clearances for basic insulation are selected from Table F.7a of IEC 60664-1 or clause 4 of IEC 60664-4, the clearances of supplementary insulation are not less than those specified for basic insulation		N/A
	If clearances for basic insulation are selected from Table F.7a of IEC 60664-1, the clearances of reinforced insulation dimensioned as specified in Table F.7a are to withstand 160% of the withstand voltage required for basic insulation		N/A
	If clearances for basic insulation are selected from clause 4 of IEC 60664-4, the clearances of reinforced insulation are twice the value required for basic insulation		N/A
	If the secondary winding of a step-down transformer is earthed, or if there is an earthed screen between the primary and secondary windings, clearances of basic insulation on the secondary side not less than those specified in table 16, but using the next lower step for rated impulse voltage		N/A
	Circuits supplied with a voltage lower than rated voltage, clearances of functional insulation are based on the working voltage used as the rated voltage in table 15		N/A
29.2	Creepage distances not less than those appropriate for the working voltage, taking into account the material group and the pollution degree	(see appended table)	P
	Pollution degree 2 applies, unless		N/A
	- precautions taken to protect the insulation; pollution degree 1		N/A
	- insulation subjected to conductive pollution; pollution degree 3		P
	A force of 2 N is applied to bare conductors, other than heating elements		P
	A force of 30 N is applied to accessible surfaces		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	In a double insulation system, the working voltage for both the basic and supplementary insulation is taken as the working voltage across the complete double insulation system		P
29.2.1	Creepage distances of basic insulation not less than specified in table 17	(see appended table)	P
	However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from table 2 of IEC 60664-4, these values being used if exceeding the values in table 17		N/A
	Except for pollution degree 1, corresponding creepage distance not less than the minimum specified for the clearance in table 16, if the clearance has been checked according to the test of clause 14		N/A
29.2.2	Creepage distances of supplementary insulation at least those specified for basic insulation in table 17, or	(see appended table)	P
	Table 2 of IEC 60664-4, as applicable		N/A
29.2.3	Creepage distances of reinforced insulation at least double those specified for basic insulation in table 17, or	(see appended table)	P
	Table 2 of IEC 60664-4, as applicable		N/A
29.2.4	Creepage distances of functional insulation not less than specified in table 18	(see appended table)	P
	However, if the working voltage is periodic and has a frequency exceeding 30 kHz, the creepage distances are also determined from table 2 of IEC 60664-4, these values being used if exceeding the values in table 18		N/A
	Creepage distances may be reduced if the appliance complies with clause 19 with the functional insulation short-circuited		N/A
29.3	Supplementary and reinforced insulation have adequate thickness, or a sufficient number of layers, to withstand the electrical stresses		N/A
	Compliance checked:		—
	- by measurement, in accordance with 29.3.1, or		N/A
	- by an electric strength test in accordance with 29.3.2, or		N/A
	- for insulation, other than single layer internal wiring insulation, by an assessment of the thermal quality of the material combined with an electric strength test, in accordance with 29.3.3, and		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- for accessible parts of reinforced insulation consisting of a single layer, by measurement in accordance with 29.3.4, or		N/A
	- by an assessment of the thermal quality of the material according to 29.3.3 combined with an electric strength test in accordance with 23.5, for each single layer internal wiring insulation touching each other, or		N/A
	- as specified in subclause 6.3 of IEC 60664-4 for insulation that is subjected to any periodic voltage having a frequency exceeding 30 kHz		N/A
29.3.1	Supplementary insulation have a thickness of at least 1 mm	Electric control box enclosure: min. thickness 3.29mm	P
	Reinforced insulation have a thickness of at least 2 mm		N/A
29.3.2	Each layer of material withstand the electric strength test of 16.3 for supplementary insulation		N/A
	Supplementary insulation consist of at least 2 layers		N/A
	Reinforced insulation consist of at least 3 layers		N/A
29.3.3	The insulation is subjected to the dry heat test Bb of IEC 60068-2-2, followed by		N/A
	the electric strength test of 16.3		N/A
	If the temperature rise during the tests of clause 19 does not exceed the value specified in table 3, the test of IEC 60068-2-2 is not carried out		N/A
29.3.4	Thickness of accessible parts of reinforced insulation consisting of a single layer not less than specified in table 19		N/A
30	**RESISTANCE TO HEAT AND FIRE**		—
30.1	External parts of non-metallic material,		P
	parts supporting live parts, and		P
	parts of thermoplastic material providing supplementary or reinforced insulation		P
	sufficiently resistant to heat		P
	Ball-pressure test according to IEC 60695-10-2		P
	External parts tested at 40 °C plus the maximum temperature rise determined during the test of clause 11, or at 75 °C, whichever is the higher; temperature (°C)	(see appended table)	P
	Parts supporting live parts tested at 40 °C plus the maximum temperature rise determined during the test of clause 11, or at 125 °C, whichever is the higher; temperature (°C)	(see appended table)	P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	Parts of thermoplastic material providing supplementary or reinforced insulation tested at 25 °C plus the maximum temperature rise determined during clause 19, if higher; temperature (°C)		N/A
30.2	Parts of non-metallic material resistant to ignition and spread of fire		P
	This requirement does not apply to:		—
	parts having a mass not exceeding 0,5 g, provided the cumulative effect is unlikely to propagate flames that originate inside the appliance by propagating flames from one part to another, or		N/A
	decorative trims, knobs and other parts unlikely to be ignited or to propagate flames that originate inside the appliance		N/A
	Compliance checked by the test of 30.2.1, and in addition:		—
	- for attended appliances, 30.2.2 applies		N/A
	- for unattended appliances, 30.2.3 applies		P
	For appliances for remote operation, 30.2.3 applies		N/A
	For base material of printed circuit boards, 30.2.4 applies		N/A
	For submersible pumps if their live parts are completely contained within an enclosure of metal or porcelain and the instructions state that the pump shall be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA, 30.2.1 is applicable. (IEC 60335-2-41)		N/A
	For other pumps 30.2.3 is applicable. (IEC 60335-2-41)		P
30.2.1	Parts of non-metallic material subjected to the glow-wire test of IEC 60695-2-11 at 550 °C	(see appended table)	P
	However, test not carried out if the material is classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 550 °C, or		N/A
	the material is classified at least HB40 according to IEC 60695-11-10		N/A
	Parts for which the glow-wire test cannot be carried out need to meet the requirements in ISO 9772 for material classified HBF		N/A
30.2.2	Appliances operated while attended, parts of non-metallic material supporting current-carrying connections, and		N/A
	parts of non-metallic material within a distance of 3 mm of such connections,		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	subjected to the glow-wire test of IEC 60695-2-11		N/A
	The test severity is:		—
	- 750 °C, for connections carrying a current exceeding 0,5 A during normal operation		N/A
	- 650 °C, for other connections		N/A
	Glow-wire applied to an interposed shielding material, if relevant		N/A
	The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least:		—
	- 750 °C, for connections carrying a current exceeding 0,5 A during normal operation		N/A
	- 650 °C, for other connections		N/A
	The glow-wire test is also not carried out on small parts. These parts are to:		—
	- comprise material having a glow-wire flammability index of at least 750 °C, or 650 °C as appropriate, or		N/A
	- comply with the needle-flame test of annex E, or		N/A
	- comprise material classified as V-0 or V-1 according to IEC 60695-11-10		N/A
	Glow-wire test not applicable to conditions as specified		N/A
30.2.3	Appliances operated while unattended, tested as specified in 30.2.3.1 and 30.2.3.2		P
	The tests are not applicable to conditions as specified		N/A
30.2.3.1	Parts of non-metallic material supporting connections carrying a current exceeding 0,2 A during normal operation, and		P
	parts of non-metallic material, other than small parts, within a distance of 3 mm,		P
	subjected to the glow-wire test of IEC 60695-2-11 with a test severity of 850 °C		P
	Glow-wire applied to an interposed shielding material, if relevant		N/A
	The glow-wire test is not carried out on parts of material classified as having a glow-wire flammability index according to IEC 60695-2-12 of at least 850 °C		N/A
30.2.3.2	Parts of non-metallic material supporting connections, and		P
	parts of non-metallic material within a distance of 3 mm,		P
	subjected to glow-wire test of IEC 60695-2-11		P

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	The test severity is:		—
	- 750 °C, for connections carrying a current exceeding 0,2 A during normal operation		P
	- 650 °C, for other connections		N/A
	Glow-wire applied to an interposed shielding material, if relevant		—
	However, the glow-wire test of 750 °C or 650 °C as appropriate, is not carried out on parts of material fulfilling both or either of the following classifications:		N/A
	- a glow-wire ignition temperature according to IEC 60695-2-13 of at least:		N/A
	- 775 °C, for connections carrying a current exceeding 0,2 A during normal operation		N/A
	- 675 °C, for other connections		N/A
	- a glow-wire flammability index according to IEC 60695-2-12 of at least:		N/A
	- 750 °C, for connections carrying a current exceeding 0,2 A during normal operation		N/A
	- 650 °C, for other connections		N/A
	The glow-wire test is also not carried out on small parts. These parts are to:		—
	- comprise material having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or		N/A
	- comprise material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- comply with the needle-flame test of annex E, or		N/A
	- comprise material classified as V-0 or V-1 according to IEC 60695-11-10		N/A
	The consequential needle-flame test of annex E applied to non-metallic parts that encroach within the vertical cylinder placed above the centre of the connection zone and on top of the non-metallic parts supporting current-carrying connections, and parts of non-metallic material within a distance of 3 mm of such connections if these parts are those:		—
	- parts that withstood the glow-wire test of IEC 60695-2-11 of 750 °C or 650 °C as appropriate, but produce a flame that persist longer than 2 s, or		N/A
	- parts that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- small parts, that comprised material having a glow-wire flammability index of at least 750 °C or 650 °C as appropriate, or		N/A
	- small parts for which the needle-flame test of annex E was applied, or		N/A

IEC 60335-2-41+IEC 60335-1			
Clause	Requirement + Test	Result - Remark	Verdict
	- small parts for which a material classification of V-0 or V-1 was applied		N/A
	However, the consequential needle-flame test is not carried out on non-metallic parts, including small parts, within the cylinder that are:		—
	- parts having a glow-wire ignition temperature of at least 775 °C or 675 °C as appropriate, or		N/A
	- parts comprising material classified as V-0 or V-1 according to IEC 60695-11-10, or		N/A
	- parts shielded by a flame barrier that meets the needle-flame test of annex E or that comprises material classified as V-0 or V-1 according to IEC 60695-11-10		N/A
30.2.4	Base material of printed circuit boards subjected to the needle-flame test of annex E		N/A
	Test not applicable to conditions as specified		N/A
31	**RESISTANCE TO RUSTING**		—
	Relevant ferrous parts adequately protected against rusting		P
	Tests specified in part 2 when necessary		N/A
32	**RADIATION, TOXICITY AND SIMILAR HAZARDS**		—
	Appliance does not emit harmful radiation or present a toxic or similar hazard due to their operation in normal use		P
	Compliance is checked by the limits or tests specified in part 2, if relevant		N/A
	- undesired conditions requiring system action		N/A

10.1	TABLE: Power input deviation				N/A
Input deviation of/at:	P rated (W)	P measured (W)	Δ P	Required Δ P	Remark
—	—	—	—	—	—
—	—	—	—	—	—
Supplementary information: —					

10.2	TABLE: Current deviation				P
Current deviation of/at:	I rated (A)	I measured (A)	Δ I	Required Δ I	Remark
⎓ 24V	10	8.4	-16%	+15%	Z3PC3-35-24-300
⎓ 48V	10	9.1	-9%	+15%	Z3PC3.5-47-48-400
⎓ 72V	10	10.3	+3%	+15%	Z3PC3.5-95-72-750
⎓ 110V	10	6.9	-31%	+15%	Z3PC7.5-62-110-1100
⎓ 110V	10	9.9	-1%	+15%	Z3PC3.8-180-110-1500
Supplementary information: —					

11.8-1	TABLE: Heating test(Z3PC3-35-24-300)			P
	Test voltage (V) ..... :	⎓ 25.5V	⎓ 22.5V	—
	Ambient, t_1 (°C) :	22.9	22.9	—
	Ambient, t_2 (°C) :	24.0	24.0	—

Thermocouple locations	dT (K)		Max. dT (K)
	⎓ 25.5V	⎓ 22.6V	
Capacitor	8.1	8.9	T105-25=80
Buzzer	5.7	7.0	For ref.
Internal wire for output	6.2	6.5	50
Terminal block	5.6	6.2	60
PCB	13.8	15.4	120
Power cord	2.9	3.0	50
Transformer	21.4	23.3	65
Internalwire for input	8.8	9.4	50
Water temperature	40.0°C	40.0°C	35-40°C

11.8-1	TABLE: Heating test, resistance method(Z3PC3-35-24-300)					P
	Test voltage (V) :			⎓ 22.5V		—
	Ambient, t_1 (°C) :			22.9		—
	Ambient, t_2 (°C) :			24.0		—
Temperature rise of winding		R1 (Ω)	R2 (Ω)	Δ T (K)	Max. Δ T (K)	Insulation class
Motor winding		0.205	0.233	34.1	115	F
Supplementary information: —						

11.8-2	TABLE: Heating test(Z3PC3.5-47-48-400)			P
	Test voltage (V) ..... :	⎓ 50.9V	⎓ 45.1V	—
	Ambient, t_1 (°C) :	21.6	21.6	—
	Ambient, t_2 (°C) :	22.5	22.5	—

Thermocouple locations	dT (K)		Max. dT (K)
	⎓ 50.9V	⎓ 45.1V	
Capacitor	11.9	10.7	T105-25=80
Buzzer	8.2	7.0	For ref.
Internal wire for output	10.6	9.9	50
Terminal block	8.1	7.2	60
PCB	18.9	17.6	120
Power cord	4.4	3.4	50
Transformer	24.9	23.9	65
Internalwire for input	12.5	12.5	50
Water temperature	40.0°C	40.0°C	35-40°C

11.8-2	TABLE: Heating test, resistance method(Z3PC3.5-47-48-400)					P
	Test voltage (V) :			⎓ 50.9V		—
	Ambient, t_1 (°C) :			21.6		—
	Ambient, t_2 (°C) :			22.5		—
Temperature rise of winding		R1 (Ω)	R2 (Ω)	Δ T (K)	Max. Δ T (K)	Insulation class
Motor winding		0.370	0.433	42.7	115	F
Supplementary information: —						

11.8-3	**TABLE: Heating test(**Z3PC3.5-95-72-750**)**			P
	Test voltage (V) ..... :	⎓ 76.4V	⎓ 67.6V	—
	Ambient, t_1 (°C) :	21.4	21.4	—
	Ambient, t_2 (°C) :	22.0	22.0	—

Thermocouple locations	dT (K)		Max. dT (K)
	⎓ 76.4V	⎓ 67.6V	
Capacitor	19.6	20.1	T105-25=80
Buzzer	19.6	20.7	For ref.
Internal wire for output	18.6	18.6	50
Terminal block	16.4	17.3	60
PCB	22.5	21.7	120
Power cord	13.3	11.2	50
Transformer	21.3	18.4	65
Internalwire for input	18.1	21.6	50
Water temperature	40.0°C	40.0°C	35-40°C

11.8-3	**TABLE: Heating test, resistance method(**Z3PC3.5-95-72-750**)**			P
	Test voltage (V) :	⎓ 76.4V		—
	Ambient, t_1 (°C) :	21.4		—
	Ambient, t_2 (°C) :	22.0		—

Temperature rise of winding	R1 (Ω)	R2 (Ω)	Δ T (K)	Max. Δ T (K)	Insulation class
Motor winding	0.457	0.513	30.8	115	F
Supplementary information: —					

11.8-4	TABLE: Heating test(Z3PC3.8-180-110-1500)			P
	Test voltage (V) ..... :	⎓ 116.6V	⎓ 103.4V	—
	Ambient, t_1 (°C) :	21.7	21.7	—
	Ambient, t_2 (°C) :	22.0	22.0	—

Thermocouple locations	dT (K)		Max. dT (K)
	⎓ 116.6V	⎓ 103.4V	
Capacitor	27.2	29.6	T105-25=80
Buzzer	23.6	24.2	For ref.
Internal wire for output	21.8	24.7	50
Terminal block	22.2	21.8	60
PCB	30.8	32.2	120
Power cord	9.9	9.9	50
Transformer	32.8	33.1	65
Internalwire for input	26.6	28.0	50
Water temperature	40.0°C	40.0°C	35-40°C

11.8-5	TABLE: Heating test, resistance method(Z3PC3.8-180-110-1500)					P
	Test voltage (V) :		⎓ 116.6V			—
	Ambient, t_1 (°C) :		21.7			—
	Ambient, t_2 (°C) :		22.0			—
Temperature rise of winding	R1 (Ω)	R2 (Ω)	Δ T (K)	Max. Δ T (K)	Insulation class	
Motor winding	0.713	0.943	82.4	115	F	
Supplementary information: —						

13.2	TABLE: Leakage current			P
Heating appliances: 1,15 x rated input (W) :			—	—
Motor-operated and combined appliances: 1,06 x rated voltage (V):			⎓ 25.5/50.9/76.4/116.6	—
REMARKS	Leakage current between		I (mA)	Max. allowed I (mA)
Z3PC3-35-24-300	L/N and accessible earthed metal enclosure		0.02	3.5
Z3PC3.5-47-48-400	L/N and accessible earthed metal enclosure		0.04	3.5
Z3PC3.5-95-72-750	L/N and accessible earthed metal enclosure		0.07	3.5
ZCPC3.8-180-110-1500	L/N and accessible earthed metal enclosure		0.09	3.5
Supplementary information: —				

13.3	TABLE: Electric strength			P
REMARKS	Test voltage applied between:		Voltage (V)	Breakdown (Yes/No)
Z3PC3-35-24-300	Live part and accessible earthed metal parts		500	No
Z3PC3.5-47-48-400	Live part and accessible earthed metal parts		1000	No
Z3PC3.5-95-72-750	Live part and accessible earthed metal parts		1000	No
ZCPC3.8-180-110-1500	Live part and accessible earthed metal parts		1000	No
Supplementary information: —				

14	TABLE: Transient overvoltages					N/A
Clearance between:		Cl (mm)	Required Cl (mm)	Rated impulse voltage (V)	Impulse test voltage (V)	Flashover (Yes/No)
Supplementary information: —						

16.2	TABLE: Leakage current			P
Single phase appliances: 1.06 x rated voltage .:			⎓ 25.5/116.6	—
Three phase appliances 1.06 x rated voltage divided by √3: .....:			—	—
REMARKS	Leakage current between		I (mA)	Max. allowed I (mA)
Z3PC3-35-24-300	Live parts and surface of earthed metal parts		0.06	3.5
ZCPC3.8-180-110-1500	Live parts and surface of earthed metal parts		0.11	3.5
Supplementary information: —				

16.3	TABLE: Dielectric strength			P
REMARKS	Test voltage applied between:		Voltage (V)	Breakdown (Yes/No)
Z3PC3-35-24-300	Live part and accessible earthed metal parts		1250	No
ZCPC3.8-180-110-1500	Live part and accessible earthed metal parts		1250	No
Supplementary information: —				

21.1	TABLE: Impact resistance			P
Impacts per surface	Surface tested		Impact energy (J)	Comments
3	Metal enclosure		1.0	No damage
3	Electric control box		1.0	No damage
Supplementary information: —				

28.1	TABLE: Threaded part torque test			P
Threaded part identification	Diameter of thread (mm)		Column number (I, II, or III)	Applied torque (Nm)
Fixing screw	6.06		II	2.5
Supplementary information: —				

29.1	TABLE: Clearances					P
	Overvoltage category.....:			II		–
		Type of insulation:				
Rated impulse voltage (V):	Min. cl (mm)	Basic (mm)	Functional (mm)	Supplementary (mm)	Reinforced (mm)	Verdict / Remark
330	0,2* / 0,5 / 0,8**	–	–	–	–	N/A
500	0,2* / 0,5 / 0,8**	–	–	–	–	N/A
800	0,2* / 0,5 / 0,8**	–	–	–	–	N/A
1 500	0,5 / 0,8** / **1,0****	B1	F1	–	–	P
2 500	1,5 / 2,0***	–	–	–	–	N/A
4 000	3,0 / 3,5***	–	–	–	–	N/A
6 000	5,5 / 6,0***	–	–	–	–	N/A
8 000	8,0 / 8,5***	–	–	–	–	N/A
10 000	11,0 / 11,5***	–	–	–	–	N/A

Supplementary information:
*) For tracks on printed circuit boards if pollution degree 1 and 2
**) For pollution degree 3
***) If the construction is affected by wear, distortion, movement of the parts or during assembly
B = Basic insulation, S = Supplementary insulation, R = Reinforced insulation
B1: Between motor winding and earthed metal: Cl.>6.6 mm
F1: between P+ and P-:Cl.>2.5mm
REMARKS:As all prototype controllers have the same internal layout, only Z3PC3.8-180-110-1500 is tested.

29.1	TABLE: Creepage distances, basic, supplementary and reinforced insulation										P
Working voltage (V)	Creepage distance (mm) Pollution degree										
	1	2			3			Type of insulation			Verdict
		Material group			Material group						
		I	II	IIIa/IIIb	I	II	IIIa/IIIb*	B**	S**	R**	
≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9		—	—	N/A
≤50	0,18	0,6	0,85	1,2	1,5	1,7	1,9	—		—	N/A
≤50	0,36	1,2	1,7	2,4	3,0	3,4	3,8	—	—		N/A
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4	B1	—	—	P
125	0,28	0,75	1,05	1,5	1,9	2,1	2,4	—		—	N/A
125	0,56	1,5	2,1	3,0	3,8	4,2	4,8		—		N/A
250	0,56	1,25	1,8	2,5	3,2	3,6	4,0		—	—	N/A
250	0,56	1,25	1,8	2,5	3,2	3,6	4,0	—		—	N/A
250	1,12	2,5	3,6	5,0	6,4	7,2	8,0	—	—		N/A
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3		—	—	N/A
400	1,0	2,0	2,8	4,0	5,0	5,6	6,3	—		—	N/A
400	2,0	4,0	5,6	8,0	10,0	11,2	12,6	—	—		N/A
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0		—	—	N/A
500	1,3	2,5	3,6	5,0	6,3	7,1	8,0	—		—	N/A
500	2,6	5,0	7,2	10,0	12,6	14,2	16,0	—	—		N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0		—	—	N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	—		—	N/A
>630 and ≤800	3,6	6,4	9,0	12,6	16,0	18,0	20,0	—	—		N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5		—	—	N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	—		—	N/A
>800 and ≤1000	4,8	8,0	11,2	16,0	20,0	22,0	25,0	—	—		N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0		—	—	N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	—		—	N/A
>1000 and ≤1250	6,4	10,0	14,2	20,0	25,0	28,0	32,0	—	—		N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0		—	—	N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	—		—	N/A
>1250 and ≤1600	8,4	12,6	18,0	25,0	32,0	36,0	40,0	—	—		N/A

>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0		—	—	N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	—		—	N/A
>1600 and ≤2000	11,2	16,0	22,0	32,0	40,0	44,0	50,0	—	—		N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0		—	—	N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	—		—	N/A
>2000 and ≤2500	15,0	20,0	28,0	40,0	50,0	56,0	64,0	—	—		N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0		—	—	N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	—		—	N/A
>2500 and ≤3200	20,0	25,0	36,0	50,0	64,0	72,0	80,0	—	—		N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0		—	—	N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	—		—	N/A
>3200 and ≤4000	25,0	32,0	44,0	64,0	80,0	90,0	100,0	—	—		N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0		—	—	N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	—		—	N/A
>4000 and ≤5000	32,0	40,0	56,0	80,0	100,0	112,0	126,0	—	—		N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0		—	—	N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	—		—	N/A
>5000 and ≤6300	40,0	50,0	72,0	100,0	126,0	142,0	160,0	—	—		N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0		—	—	N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	—		—	N/A
>6300 and ≤8000	50,0	64,0	90,0	126,0	160,0	180,0	200,0	—	—		N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0		—	—	N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	—		—	N/A
>8000 and ≤10000	64,0	80,0	112,0	160,0	200,0	220,0	250,0	—	—		N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0		—	—	N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	—		—	N/A
>10000 and ≤12500	80,0	100,0	142,0	200,0	250,0	280,0	320,0	—	—		N/A

Supplementary information:

*) Material group IIIb is allowed if the working voltage does not exceed 50 V

**) B = Basic insulation, S = Supplementary insulation, R = Reinforced insulation

B1: Between motor winding and earthed metal: Cr.= 6,6 mm;

R1: Between live part and electric box enclosure: Cr.>10,0 mm

29.2	TABLE: Creepage distances, functional insulation							P
Working voltage (V)	Creepage distance (mm) Pollution degree							Verdict / Remark
	1	2			3			
		Material group			Material group			
		I	II	IIIa/IIIb	I	II	IIIa/IIIb*	
≤10	0,08	0,4	0,4	0,4	1,0	1,0	1,0	N/A
50	0,16	0,56	0,8	1,1	1,4	1,6	1,8	N/A
125	0,25	0,71	1,0	1,4	1,8	2,0	**2,2**	P
250	0,42	1,0	1,4	2,0	2,5	2,8	*3,2*	N/A
400	0,75	1,6	2,2	3,2	4,0	4,5	5,0	N/A
500	1,0	2,0	2,8	4,0	5,0	5,6	6,3	N/A
>630 and ≤800	1,8	3,2	4,5	6,3	8,0	9,0	10,0	N/A
>800 and ≤1000	2,4	4,0	5,6	8,0	10,0	11,0	12,5	N/A
>1000 and ≤1250	3,2	5,0	7,1	10,0	12,5	14,0	16,0	N/A
>1250 and ≤1600	4,2	6,3	9,0	12,5	16,0	18,0	20,0	N/A
>1600 and ≤2000	5,6	8,0	11,0	16,0	20,0	22,0	25,0	N/A
>2000 and ≤2500	7,5	10,0	14,0	20,0	25,0	28,0	32,0	N/A
>2500 and ≤3200	10,0	12,5	18,0	25,0	32,0	36,0	40,0	N/A
>3200 and ≤4000	12,5	16,0	22,0	32,0	40,0	45,0	50,0	N/A
>4000 and ≤5000	16,0	20,0	28,0	40,0	50,0	56,0	63,0	N/A
>5000 and ≤6300	20,0	25,0	36,0	50,0	63,0	71,0	80,0	N/A
>6300 and ≤8000	25,0	32,0	45,0	63,0	80,0	90,0	100,0	N/A
>8000 and ≤10000	32,0	40,0	56,0	80,0	100,0	110,0	125,0	N/A
>10000 and ≤12500	40,0	50,0	71,0	100,0	125,0	140,0	160,0	N/A
Supplementary information: *) Material group IIIb is allowed if the working voltage does not exceed 50 V F1: Between L/N terminals on motor winding: Cr. >12.5 mm								

30.1	TABLE: Ball Pressure Test of Thermoplastics		P
Allowed impression diameter (mm) .....:		2.0	—
Object/ Part No./ Material	**Manufacturer/ trademark**	**Test temperature (°C)**	**Impression diameter (mm)**
Terminal block	/	125	1.02
Terminal support	/	125	0.88
Supplementary information:—			

30.2	TABLE: Resistance to heat and fire - Glow wire tests							P
Object/ Part No./ Material	Manufacturer/ trademark	Glow wire test (GWT); (°C)						Verdict
		550	650		750		850	
			te	ti	te	ti		
X2 Capacitor	/	—	—	—	0	0	X	P
Terminal block	/	—	—	—	0	0	X	P
Terminal support	/	—	—	—	0	0	X	P
Fuse	/	—	—	—	0	0	X	P
Transformer	/	—	—	—	0	0	X	P
Object/ Part No./ Material	Manufacturer/ trademark	Glow-wire flammability index (GWFI), °C				GW ignition temp. (GWIT), °C		Verdict
		550	650	750	850	675	775	
—	—	—	—	—	—	—	—	—
The test specimen passed the glow wire test (GWT) with no ignition [(te – ti) ≤ 2s] (Yes/No):								YES
If no, then surrounding parts passed the needle-flame test of annex E (Yes/No).....:								N/A
The test specimen passed the test by virtue of most of the flaming material being withdrawn with the glow-wire (Yes/No)?.....:								N/A
Ignition of the specified layer placed underneath the test specimen (Yes/No).....:								NO
Supplementary information: - 550 °C GWT not relevant (or applicable) to parts of material classified at least HB40 or if relevant HBF - The GWIT pre-selection option, the 850 °C GWFI pre-selection option, and the 850 °C GWT are not relevant (or applicable) for attended appliances								

30.2/30.4	TABLE: Needle- flame test (NFT)				P
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
PCB	/	30	No	0	P
Supplementary information: - NFT not relevant (or applicable) for Parts of material classified as V-0 or V-1 - NFT not relevant (or applicable) for Base material of PCBs classified as V-0 or if relevant VTM-0					

---- End of The Report --

Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3-35-24-300

Detail of: Z3PC3-35-24-300

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Z3PC3-35-24-300

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3-35-24-300

Detail of: Z3PC3-35-24-300

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Z3PC3-35-24-300

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3-35-24-300

Detail of: Control box for Z3PC3-35-24-300

View:

[ ] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Internal view of control box for Z3PC3-35-24-300

View:

[ ] general

[ ] front

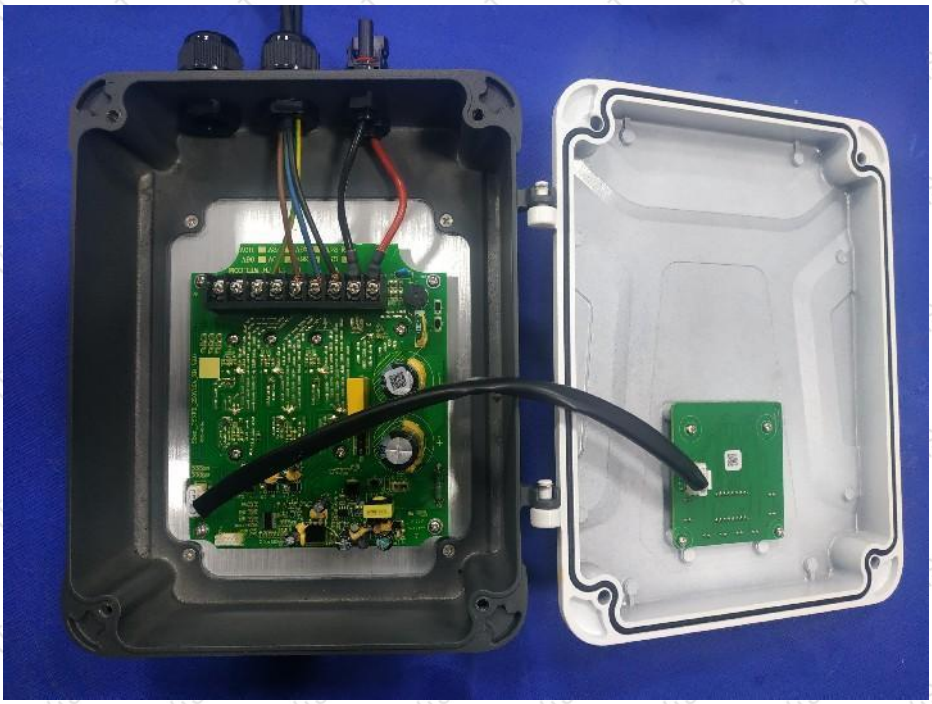
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3.5-47-48-400

Detail of: Z3PC3.5-47-48-400

View:

[X] general

[ ] front

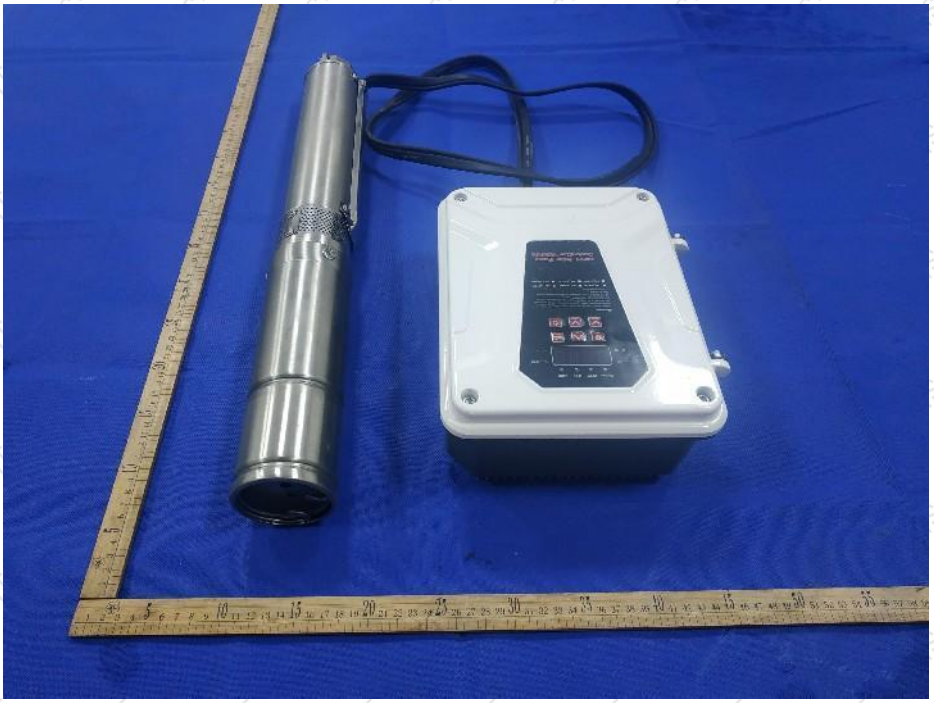
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Detail of: Z3PC3.5-47-48-400

View:

[X] general

[ ] front

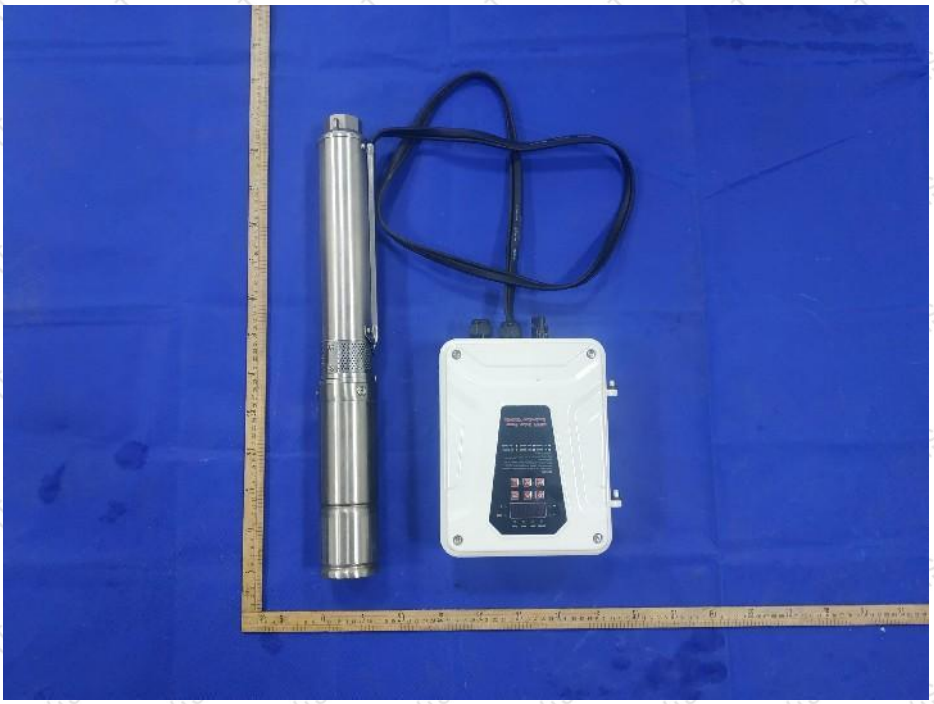
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3.5-47-48-400

Detail of: Z3PC3.5-47-48-400

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Z3PC3.5-47-48-400

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3.5-47-48-400

Detail of: Control box for Z3PC3.5-47-48-400

View:

[ ] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Internal view of control box for Z3PC3.5-47-48-400

View:

[ ] general

[ ] front

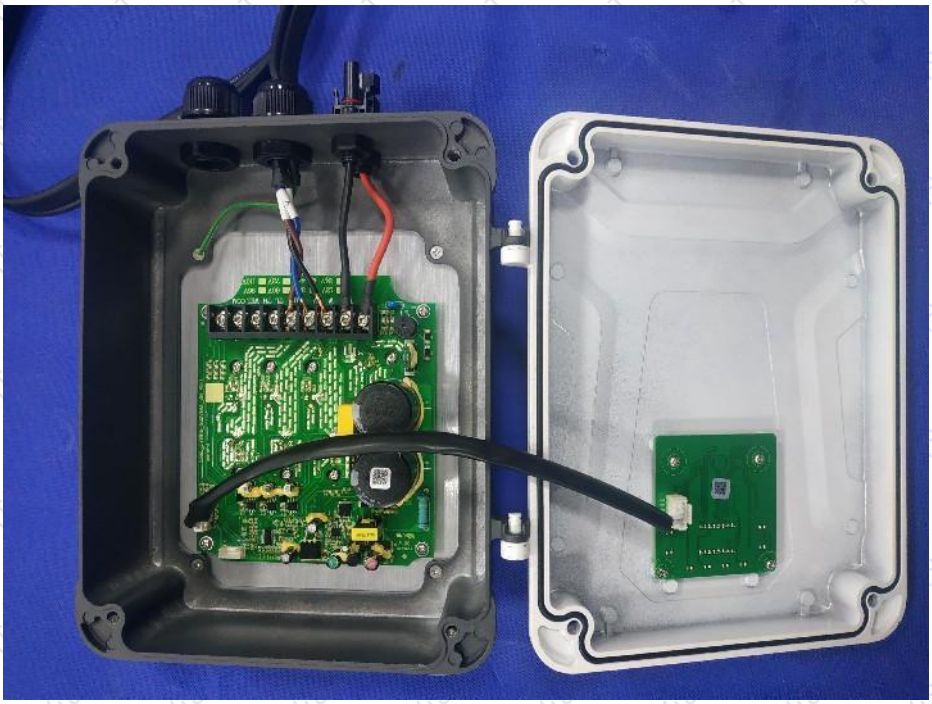
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3.5-95-72-750

Detail of: Z3PC3.5-95-72-750

View:

[X] general

[ ] front

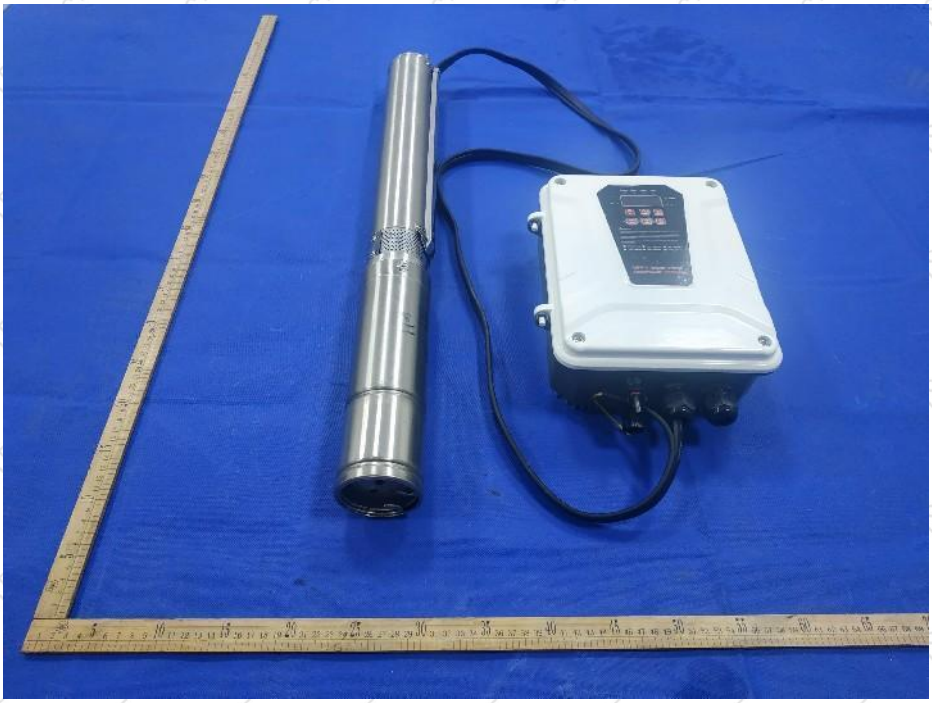
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Detail of: Z3PC3.5-95-72-750

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3.5-95-72-750

Detail of: Z3PC3.5-95-72-750

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Z3PC3.5-95-72-750

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3.5-95-72-750

Detail of: Control box for Z3PC3.5-95-72-750

View:

[ ] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Internal view of control box for Z3PC3.5-95-72-750

View:

[ ] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC7.5-62-110-1100

Detail of: Z3PC7.5-62-110-1100

View:

[X] general

[ ] front

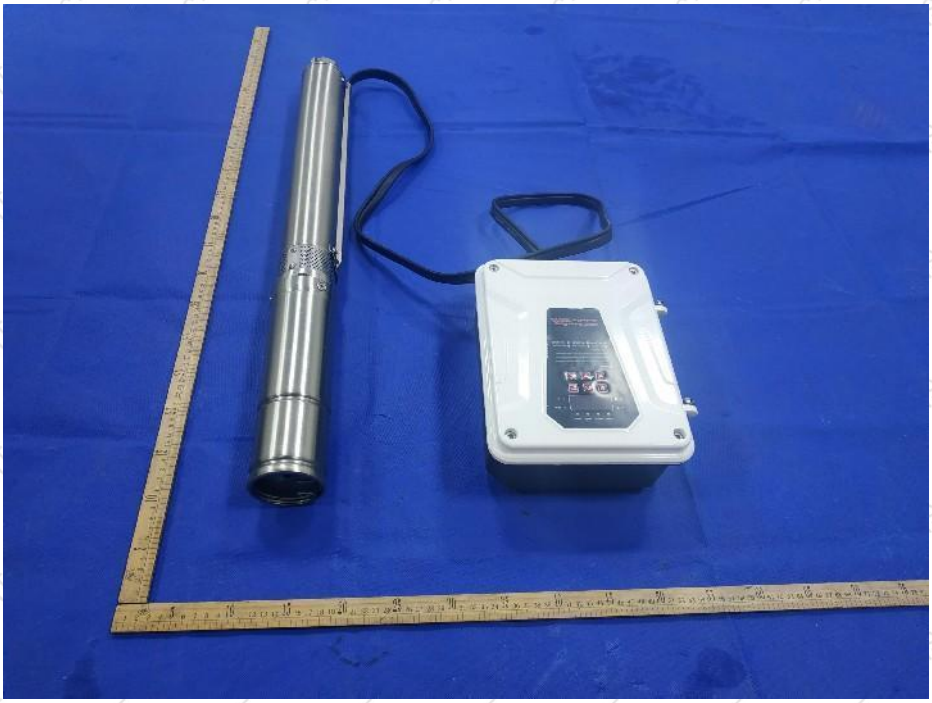
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Detail of: Z3PC7.5-62-110-1100

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC7.5-62-110-1100

Detail of: Z3PC7.5-62-110-1100

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Z3PC7.5-62-110-1100

View:

[X] general

[ ] front

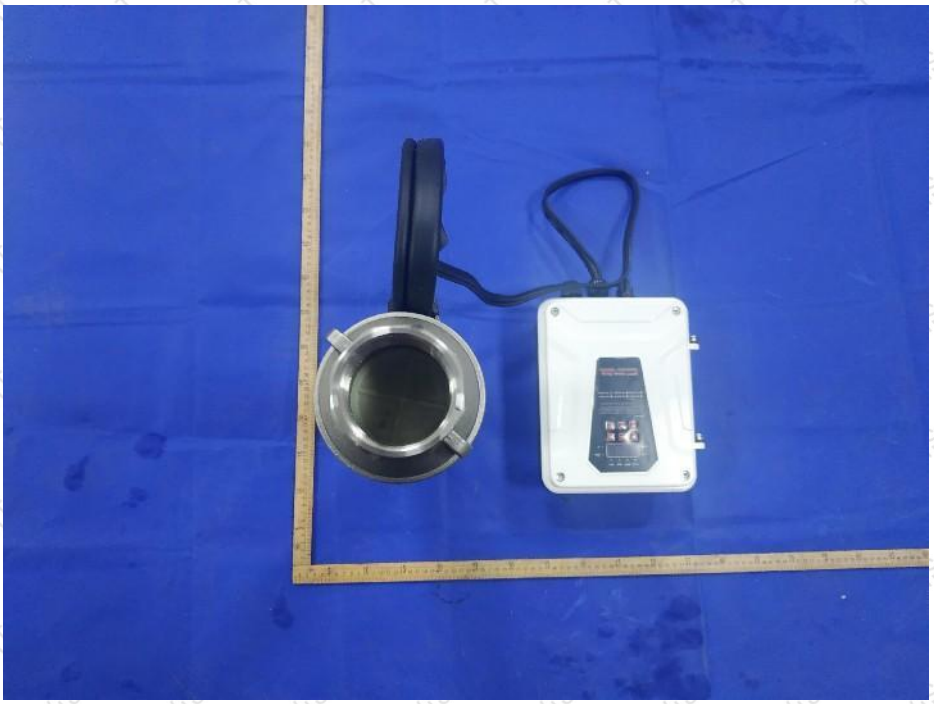
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC7.5-62-110-1100

Detail of: Control box for Z3PC7.5-62-110-1100

View:

[ ] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Internal view of control box for Z3PC7.5-62-110-1100

View:

[ ] general

[ ] front

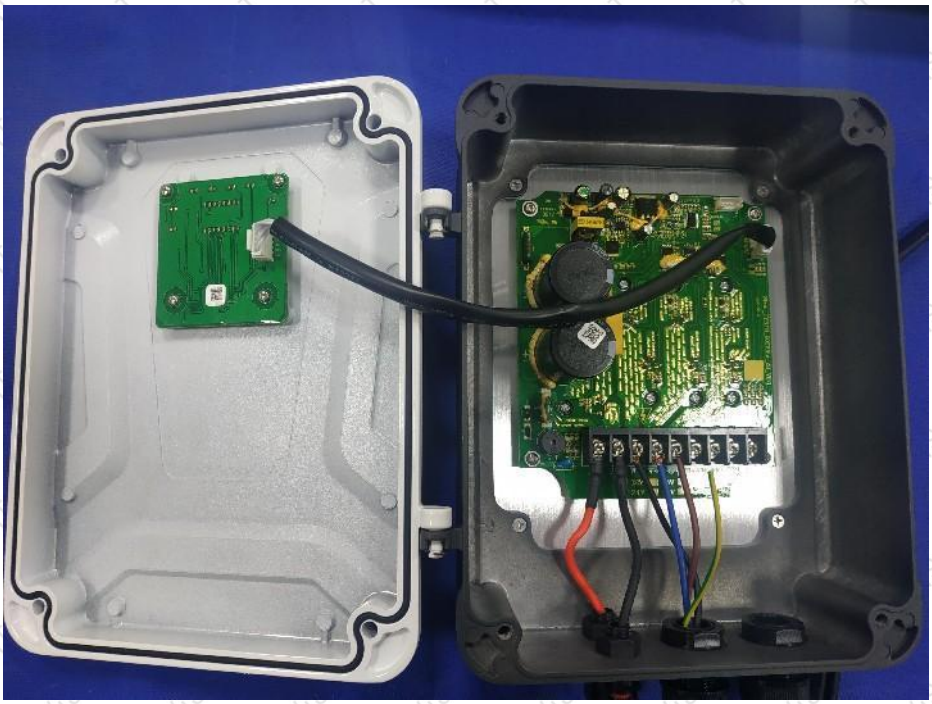
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3.8-180-110-1500

Detail of: Z3PC3.8-180-110-1500

View:

[X] general

[ ] front

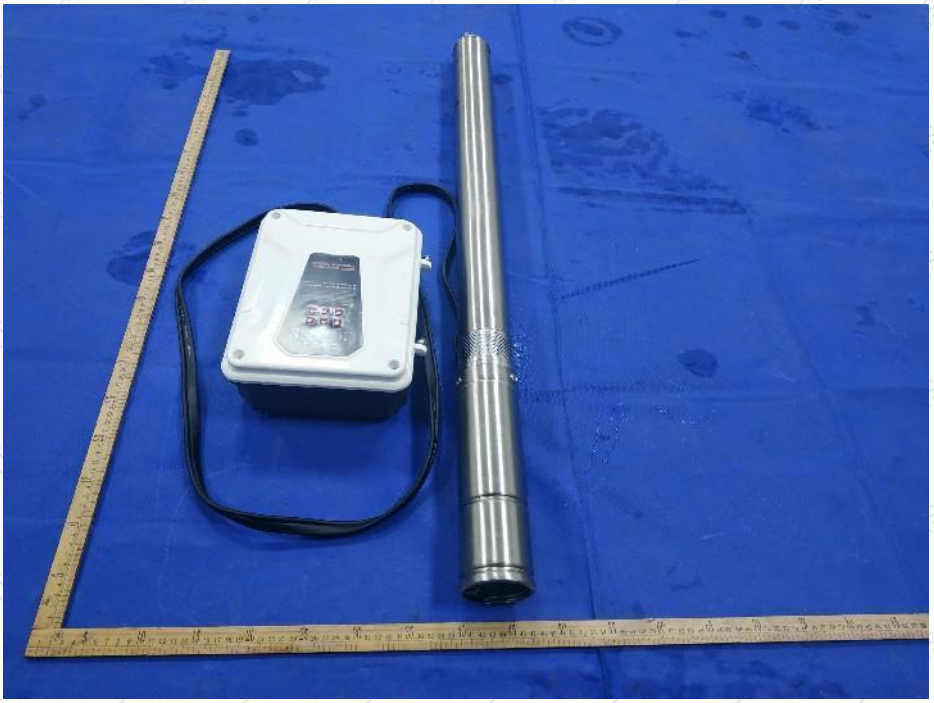
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Detail of: Z3PC3.8-180-110-1500

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3.8-180-110-1500

Detail of: Z3PC3.8-180-110-1500

View:

[X] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Z3PC3.8-180-110-1500

View:

[X] general

[ ] front

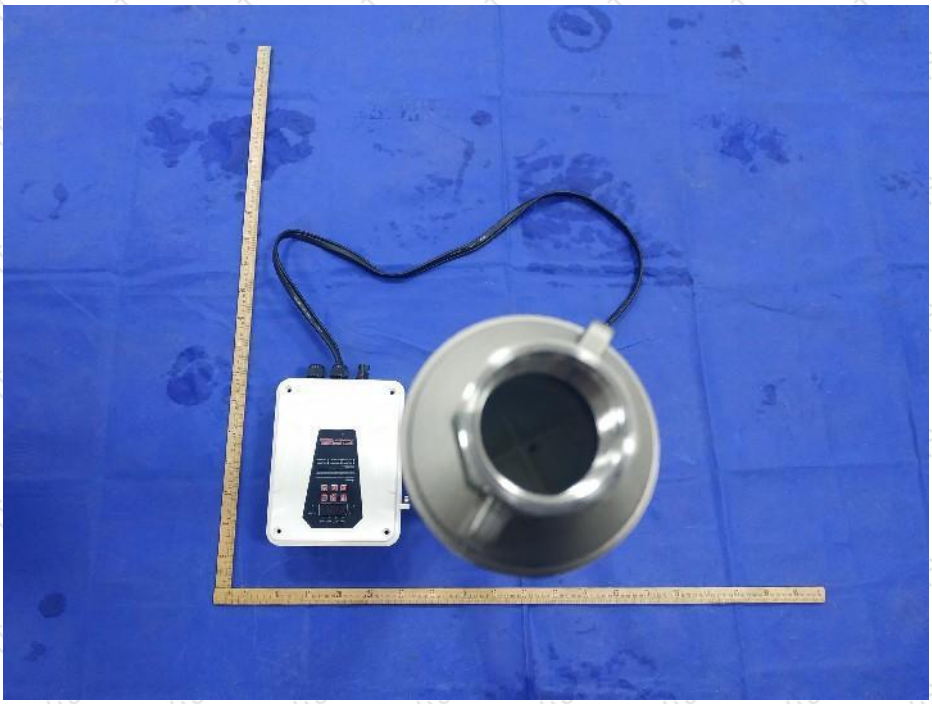
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3.8-180-110-1500

Detail of: Control box for Z3PC3.8-180-110-1500

View:

[ ] general

[ ] front

[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom

Detail of: Internal view of control box for Z3PC3.8-180-110-1500

View:

[ ] general

[ ] front

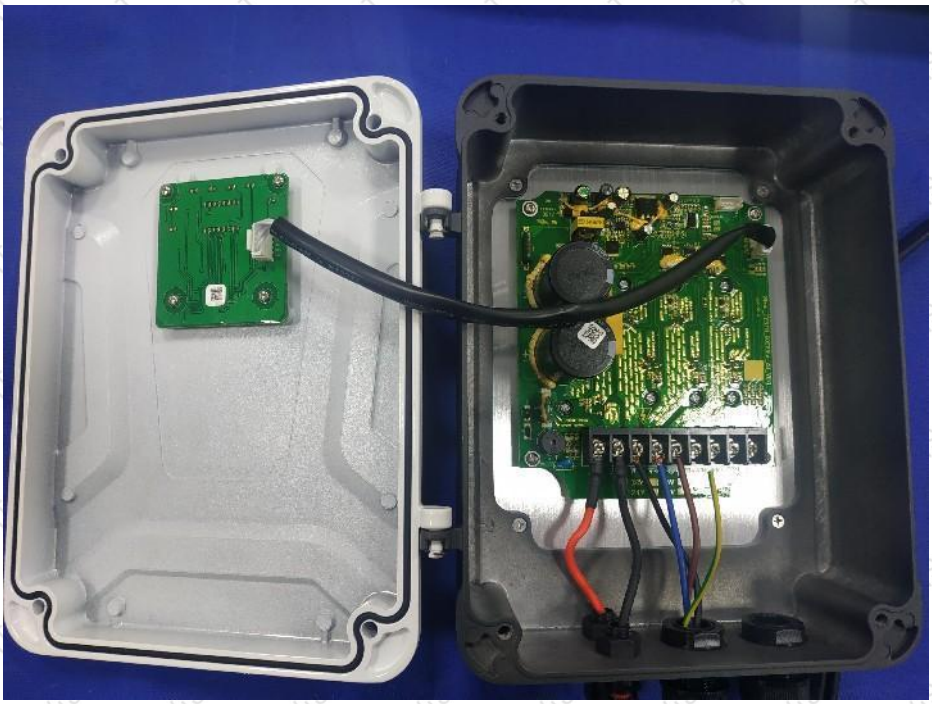
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



Appendix I
Photo documentation
SOLAR WATER PUMP
Z3PC3.8-180-110-1500

Detail of: Fuse for all models

View:

[ ] general

[ ] front

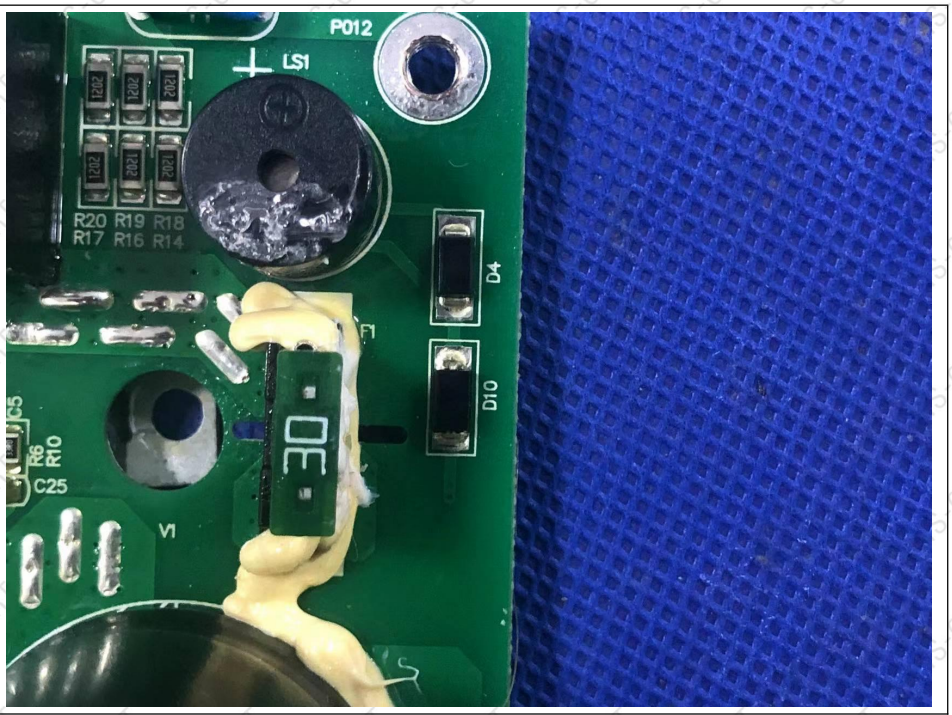
[ ] rear

[ ] right

[ ] left

[ ] top

[ ] bottom



REMARKS

1. This report is invalid without the seal of special stamp for OViS test report and invalid if altered.

2. The copy of this report is invalid without a new seal of special stamp for OViS test report and invalid if altered.

3. This report is invalid without seals or signatures of Tester,Checker and Approval.

4. If there is no special announcement in this report,the informat ion of producer and samples is not identified by OViS,the customer is responsible for truth of the samples.

5. Objections to the test report must be submitted to OViS within 15 days.

6. The test results shown in this report is only applicable for the samples supplied directly by the customer and accepted by the test organization,the customer shall not propagandize improperly without permission by OViS.

7. “P” means “pass” , “F” means “fail”, “N/A” or “—” means “not applicable” and “ / ”means “not test”.

Address: 4th Floor, Building 4, No. 888 Donghuan Road,Development Zone,
Taizhou City, Zhejiang P.R.China
Tel: 400-8008-959
Post Code: 318000
E-mail:info@ovis-lab.com
http://www.ovis-lab.com