



Test Report issued under the responsibility of:



**TEST REPORT**  
**IEC 60950-1**  
**Information technology equipment – Safety –**  
**Part 1: General requirements**

**Report Number.** .....: T223-0492/15  
**Date of issue** .....: 2016-02-05  
**Total number of pages**.....: 217 pages

**Applicant’s name**.....: TDK-Lambda UK Ltd  
**Address** .....: Kingsley Avenue, Ilfracombe, Devon, EX34 8ES, UK

**Test specification:**

**Standard** .....: IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013  
**Test procedure**.....: CB Scheme  
**Non-standard test method**.....: N/A

**Test Report Form No**.....: IEC60950\_1F  
**Test Report Form(s) Originator**.....: SGS Fimko Ltd  
**Master TRF** .....: Dated 2014-02

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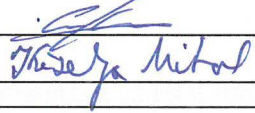
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**This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.**

**General disclaimer:**

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 CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

<b>Test item description</b> .....	AC DC Power Supply series for building in
<b>Trade Mark</b> .....	TDK-Lambda
<b>Manufacturer</b> .....	TDK-Lambda UK Ltd Kingsley Avenue, Ilfracombe, Devon, EX34 8ES, UK
<b>Model/Type reference</b> .....	ZPSAx-y, where “x” stands for the output power (20 W, 40 W, 60 W); where “y” stands for the output voltage 3R3 - 48 and 12/SE
<b>Ratings</b> .....	Input:        ZPSA20-y: 100-240 Vac; 0,5 A; 50-60 Hz ZPSA40-y: 100-240 Vac; 1,2 A; 50-60 Hz ZPSA60-y: 100-240 Vac; 1,4 A; 50-60 Hz  Output:       Voltage range 3,3-24 Vdc for 20 W Voltage range 3,3-48 Vdc for 40 W or 60 W

<b>Testing procedure and testing location:</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	SIQ Ljubljana Testing Laboratory is accredited by Slovenian Accreditation, Reg. No.: LP-009
<b>Testing location/ address.....:</b>		Tržaška c. 2, SI-1000 Ljubljana Slovenia
<input type="checkbox"/>	<b>Associated CB Testing Laboratory:</b>	
<b>Testing location/ address.....:</b>		
<b>Tested by (name + signature) .....</b>		Luka Košir
<b>Approved by (name + signature) .....</b>		Mihal Kiselja 
<input type="checkbox"/>	<b>Testing procedure: TMP/CTF Stage 1:</b>	
<b>Testing location/ address.....:</b>		
<b>Tested by (name + signature) .....</b>		
<b>Approved by (name + signature) .....</b>		
<input type="checkbox"/>	<b>Testing procedure: WMT/CTF Stage 2:</b>	
<b>Testing location/ address.....:</b>		
<b>Tested by (name + signature) .....</b>		
<b>Witnessed by (name + signature) .....</b>		
<b>Approved by (name + signature) .....</b>		
<input type="checkbox"/>	<b>Testing procedure: SMT/CTF Stage 3 or 4:</b>	
<b>Testing location/ address.....:</b>		
<b>Tested by (name + signature) .....</b>		
<b>Witnessed by (name + signature) .....</b>		
<b>Approved by (name + signature) .....</b>		
<b>Supervised by (name + signature) .....</b>		

**List of Attachments:**

1. Test Report (113 pages)
2. National Differences – Enclosure No. 1 (41 pages)
3. European Group Differences and National Differences according to EN 60950-1:2006 + A1:2010 + A2:2013 + A11:2009 + A12:2011 – Enclosure No. 1a (21 pages)
4. Pictures – Enclosure No. 2 (5 pages)
5. Schematics, Layouts, Transformer data - Enclosure No. 3 (23 pages)
6. Additional tests for standard IEC/EN61010-1 Model (ZPSA20) – Enclosure No. 4 (9 pages)

**Summary of testing:**

**Tests performed (name of test and test clause):**

- 1.6.2 Input Test
- 1.7.11 Durability
- 2.1.1.5 Energy Hazard Measurements
- 2.1.1.7 Capacitance Discharge Test
- 2.1.1.8 Energy hazards – d.c. mains supplies
- 2.2.2 SELV: Hazard Voltage (Circuit) Measurement Test
- 2.2.3 SELV Reliability testing
- 2.4 Limited Current Circuit (Bridging components)
- 2.5 Limited Power Source
- 2.9.2 Humidity Test
- 2.10.2 Working Voltage measurement on PCB and Transformer
- 2.10.3/2.10.4 Clearance and Creepage distance measurement
- 2.10.5 Distance Through Insulation measurement
- 2.10.5.6 Thin Sheet Material (barriers)
- 4.2.2-4.2.4 Steady force test, 10N
- 4.5.2 Heating (Temperature) Test
- 4.5.5 Resistance to abnormal heat (Ball pressure test)
- 5.1 Touch Current and protective conductor current
- 5.2 Electric Strength Test
- 5.3 Abnormal Operating Tests foreseeable misuse:  
SELV reliability and failure in the voltage regulation,  
Functional insulation, Component faults, Overload and short  
and no load at the outputs, Air holes closed, Fan blocked,  
Voltage Mismatch,

**Testing location:**

**SIQ Ljubljana, Tržaška c. 2, SI-1000 Ljubljana, Slovenia**

**Summary of compliance with National Differences****List of countries addressed:**

Argentina\*\*, Australia, Austria\*\*\*, Bahrain\*\*, Belarus\*\*, Belgium\*\*\*, Brazil\*\*, Bulgaria\*\*\*, Canada, China, Cyprus\*\*\*, Colombia\*\*, Croatia\*\*, Czech Republic\*\*\*, Denmark\*\*\*, Finland\*\*\*, France\*\*\*, Germany\*\*\*, Greece\*\*\*, Hungary\*\*\*, India\*\*, Indonesia\*\*, Iran\*\*, Ireland\*\*\*, Israel, Italy\*\*\*, Japan\*, Kazakhstan\*\*, Kenya\*\*, Korea, Lybia\*\*, Malaysia\*\*, Mexico\*\*, Netherlands\*\*\*, New Zealand\*, Norway\*\*\*, Pakistan\*\*, Poland\*\*\*, Portugal\*\*\*, Romania\*\*\*, Russian Federation\*\*, Saudi Arabia\*\*, Serbia\*\*, Singapore\*\*, Slovakia\*\*\*, Slovenia\*\*\*, South Africa\*\*, Spain\*\*\*, Sweden, Switzerland, Thailand\*\*, Turkey\*\*\*, Ukraine\*\*, United Arab Emirates\*\*, United Kingdom, Uruguay\*\*, USA, Vietnam\*\*

\* No national differences to IEC 60950-1:2005 (2<sup>nd</sup> edition) (+ A1 + A2) declared

\*\* No national differences to IEC 60950-1:2005 (2<sup>nd</sup> edition) + A1 + A2 or IEC 60950-1:2001 (1<sup>st</sup> edition) declared

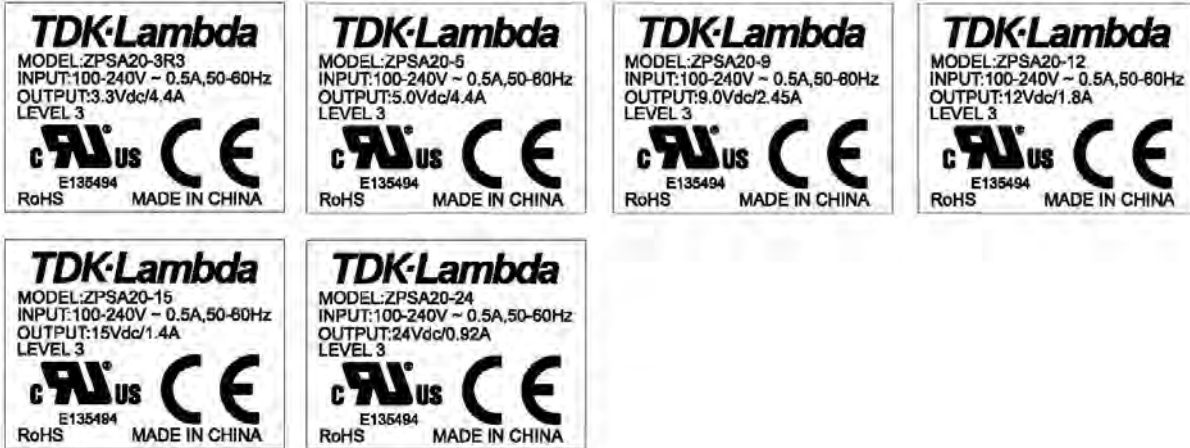
\*\*\* EU group differences

**The product fulfils the requirements of EN 60950-1:2006 + A1:2010 + A2:2013 + A11:2009 + A12:2011 (see Enclosure No. 1a).**

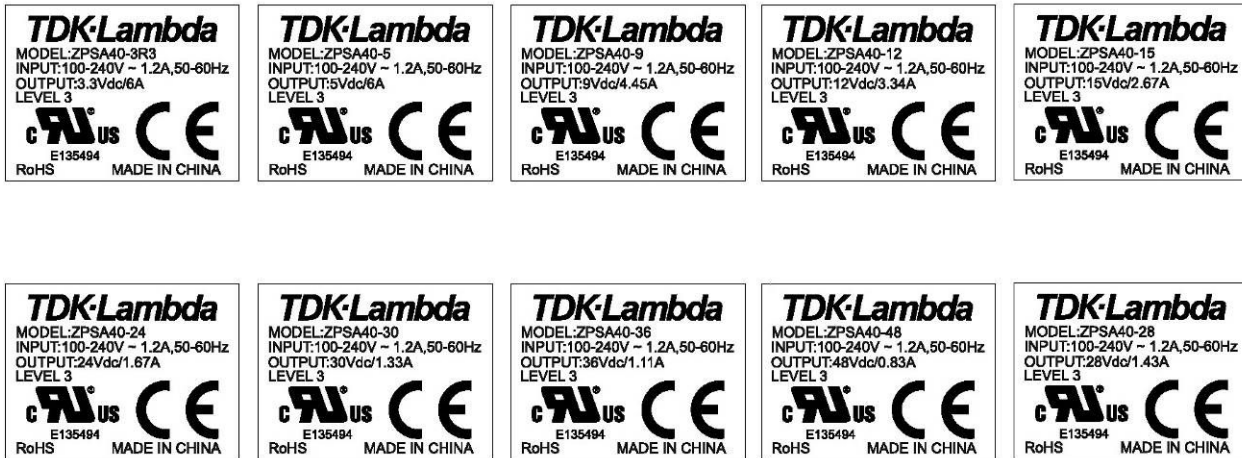
**Copy of marking plate**

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

**a) ZPSA20 Series:**



**b) ZPSA40Series:**



c) ZPSA60 Series:

<p><b>TDK-Lambda</b>            MODEL:ZPSA60-3R3            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:3.3Vdc/8A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>	<p><b>TDK-Lambda</b>            MODEL:ZPSA60-5            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:5Vdc/8A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>	<p><b>TDK-Lambda</b>            MODEL:ZPSA60-9            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:9Vdc/6.67A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>	<p><b>TDK-Lambda</b>            MODEL:ZPSA60-12            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:12Vdc/5A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>	<p><b>TDK-Lambda</b>            MODEL:ZPSA60-15            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:15Vdc/4A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>
<p><b>TDK-Lambda</b>            MODEL:ZPSA60-18            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:18Vdc/3.33A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>	<p><b>TDK-Lambda</b>            MODEL:ZPSA60-24            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:24Vdc/2.5A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>	<p><b>TDK-Lambda</b>            MODEL:ZPSA60-30            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:30Vdc/2A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>	<p><b>TDK-Lambda</b>            MODEL:ZPSA60-36            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:36Vdc/1.67A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>	<p><b>TDK-Lambda</b>            MODEL:ZPSA60-48            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:48Vdc/1.25A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>
<p><b>TDK-Lambda</b>            MODEL:ZPSA60-28            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:28Vdc/2.14A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>	<p><b>TDK-Lambda</b>            MODEL:ZPSA60-13R5            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:13.5Vdc/4.44A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>	<p><b>TDK-Lambda</b>            MODEL:ZPSA60-5R3            INPUT:100-240V ~ 1.4A,50-60Hz            OUTPUT:5.3Vdc/7.5A            LEVEL 3              E135494            RoHS MADE IN CHINA</p>		

<b>Test item particulars</b> .....	
<b>Equipment mobility</b> .....	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input type="checkbox"/> stationary <input checked="" type="checkbox"/> for building-in <input type="checkbox"/> direct plug-in
<b>Connection to the mains</b> .....	<input type="checkbox"/> pluggable equipment <input type="checkbox"/> type A <input type="checkbox"/> type B <input type="checkbox"/> permanent connection <input type="checkbox"/> detachable power supply cord <input type="checkbox"/> non-detachable power supply cord <input checked="" type="checkbox"/> not directly connected to the mains
<b>Operating condition</b> .....	<input checked="" type="checkbox"/> continuous <input type="checkbox"/> rated operating / resting time:
<b>Access location</b> .....	<input type="checkbox"/> operator accessible <input type="checkbox"/> restricted access location <input checked="" type="checkbox"/> service access area (for building-in)
<b>Over voltage category (OVC)</b> .....	<input type="checkbox"/> OVC I <input checked="" type="checkbox"/> OVC II <input type="checkbox"/> OVC III <input type="checkbox"/> OVC IV <input type="checkbox"/> other:
<b>Mains supply tolerance (%) or absolute mains supply values</b> .....	90 – 264Vac
<b>Tested for IT power systems</b> .....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>IT testing, phase-phase voltage (V)</b> .....	230 Vac line to line (Norway only)
<b>Class of equipment</b> .....	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III <input type="checkbox"/> Not classified
<b>Considered current rating of protective device as part of the building installation (A)</b> .....	16A (IEC); 20A (North America)
<b>Pollution degree (PD)</b> .....	<input type="checkbox"/> PD 1 <input checked="" type="checkbox"/> PD 2 <input type="checkbox"/> PD 3
<b>IP protection class</b> .....	IPX0
<b>Altitude during operation (m)</b> .....	3000m
<b>Altitude of test laboratory (m)</b> .....	300m
<b>Mass of equipment (kg)</b> .....	ZPSA20: 72 g ZPSA40, ZPSA60: 130 g



<b>Possible test case verdicts:</b>	
- test case does not apply to the test object .....	: N/A
- test object does meet the requirement.....	: P (Pass)
- test object does not meet the requirement .....	: F (Fail)
<b>Testing..... :</b>	
<b>Date of receipt of test item.....</b>	: 2009-03-24
	2010-03-04 (Rev. No. 1)
	2010-06-01 (Rev. No. 2)
	2013-07-16; 2014-03-13 (Rev. No.4)
<b>Date(s) of performance of tests .....</b>	: From 2009-03-25 to 2009-04-10
	From 2010-04-06 to 2010-06-14 (Rev. No. 1)
	From 2010-07-26 to 2010-08-06 (Rev. No. 2)
	From 2012-07-09 to 2012-08-08 (Rev. No. 3)
	From 2013-07-06 to 2014-04-02 (Rev. No. 4)
	From 2015-12-01 to 2015-12-03 (Rev. No. 5)
<b>General remarks:</b>	
"(See Enclosure #)" refers to additional information appended to the report.	
"(See appended table)" refers to a table appended to the report.	
<b>Throughout this report a <input checked="" type="checkbox"/> comma / <input type="checkbox"/> point is used as the decimal separator.</b>	

**Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:**

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :

 **Yes** **Not applicable**

**When differences exist; they shall be identified in the General product information section.**

**Name and address of factory (ies) ..... : 1) Cincon Electronics Co., Ltd**

**No.306, 14F, Hsin Yi Rd. Sec 4, Taipei, Taiwan, R.O.C.**

**2) Dongguan Cincon Electronics Limited**

**No. 1 Jing Xiang Rd.  
DongCheng Foreign Trade Industrial Park,  
ZhuShan DongCheng District, DongGuan,  
GuangDong, CN-523128, P.R. China**

**3) Cincon Electronics Factory**

**No.8-1 Fu Kung Rd. Fu Hsing Park, Fu Hsing  
Hsiang, Chang Hua Hsien, Taiwan, R.O.C.**

**General product information:**

**Information about the Product:**

The EUT is component level switch mode power supply with a single output power and with universal input range 100-240Vac. Power supply is open frame construction provided without enclosure. Input and output connectors are provided on the PCB. Power supplies are of class I, and have protective earth terminal provided on the PCB near input connector. Output is provided with green LED indicator for "power good".

The power supply series ZPSA20-x ("x" stands for the voltage) may include any version with an output voltage between 3,3Vdc and 24Vdc. The maximum allowed output current is 4,4A and the maximum allowed output power is 20W. All versions of ZPSA20-x use identical PCB layout, electrical circuits, primary components and transformer construction. The difference of the versions is the ratio of windings of the transformer and the secondary sub-PCB. List of available versions of ZPSA20-x is in the following table.

**ZPSA20-y, 20W Series, x=20 for power rating, y=3R3-24 in steps of 0,1**

Models	Output voltage	Max. load
ZPSA20-3R3 (*)	3.3V	4.4A
ZPSA20-5	5V	4.4A
ZPSA20-9	9V	2.45A
ZPSA20-12	12V	1.8A
ZPSA20-15	15V	1.4A
ZPSA20-24 (*)	24V	0,92A

(\*) Unless other indicated, all tests were performed on above models to represent entire series

The power supply series ZPSA40-x ("x" stands for the voltage) may include any version with an output voltage between 3,3Vdc and 48Vdc. The maximum allowed output current is 6,0A and the maximum allowed output power is 40W. All versions of ZPSA40-x use identical PCB layout, electrical circuits, primary components and transformer construction. The difference of the versions is the ratio of windings of the transformer and the secondary sub-PCB. List of available versions of ZPSA40-x is in the following table.

**ZPSA40-y, 40W Series, x=40 for power rating, y=3R3-48 in steps of 0,1**

Models	Output voltage	Max. load
ZPSA40-3R3	3,3 Vdc	6,0 A
ZPSA40-5 (*)	5 Vdc	6,0 A
ZPSA40-9	9 Vdc	4,45 A
ZPSA40-12	12 Vdc	3,34 A
ZPSA40-15	15 Vdc	2,67 A
ZPSA40-24	24 Vdc	1,67 A
ZPSA40-28	28 Vdc	1,43 A
ZPSA40-30	30 Vdc	1,33 A
ZPSA40-36	36 Vdc	1,11 A
ZPSA40-48 (*)	48 Vdc	0,834 A

(\*) Unless other indicated, all tests were performed on above models to represent entire series

**ZPSA60-y, 60W Series, x=60 for power rating, y=3R3-48 and 12/SE in steps of 0,1**

Models	Output voltage	Max. load
ZPSA60-3R3	3,3 Vdc	8,0 A
ZPSA60-5 (*)	5 Vdc	8,0 A
ZPSA60-9	9 Vdc	6,67 A
ZPSA60-12	12 Vdc	5,0 A
ZPSA60-12/SE	12 Vdc	5,0 A
ZPSA60-15	15 Vdc	4,0 A
ZPSA60-24	24 Vdc	2,5 A
ZPSA60-28	28 Vdc	2,14 A
ZPSA60-30	30 Vdc	2,0 A
ZPSA60-36	36 Vdc	1,67 A
ZPSA60-48 (*)	48 Vdc	1,25 A

(\*) Unless other indicated, all tests were performed on above models to represent entire series

The tests were performed on the version ZPSA60-5, which provides highest output current and on the version ZPSA60-48, which provides highest output voltage and highest output power. This was considered to cover all versions within the range as described above.

**The difference between ZPSA20-x and ZPSA40-x, ZPSA60-x is in different layout, electrical circuits, primary components and transformer construction. See list of critical components and Enclosure No. 3 - Schematics, layouts and transformer drawings.**

**NOMENCLATURE:**

ZPSAx-y, where “x” stands for the output power like 20W, 40W, 60W; where “y” stands for the output voltage 3R3 - 48 and 12/SE

Note: ZPSA60-12/SE modify TH1 (see appended table 1.5.1)

**Summary of testing:**

The component was tested according to the standard IEC 60950-1:2005 (2nd Edition) + A1:2009 + A2:2013 and/or EN 60950-1:2006 + A1:2010 + A2:2013 + A11:2009 + A12:2011.

Additionally the component was also evaluated according to the standards CSA C22.2 No. 60950-1:2007 + A1:2011 + A2:2014 and UL60950-1:2007 (2<sup>nd</sup> Edition) + A1:2011 + A2:2014 and fulfils the requirements of these standards.

- 1) The products were tested on a 20 A (USA) and a 16 A (IEC) branch circuit in series. External circuit breaker did not open during the testing. The unit provides internally one fuse in line.
- 2) All secondary output circuits are separated from mains by reinforced insulation and rated SELV non hazardous energy levels.
- 3) Outputs of following models comply with Limited Power Source (LPS) requirements:  
ZPSA20-12, ZPSA20-24
- 4) Unit does not provide a disconnect device – End product consideration
- 5) Unit is intended for building-in. No operator access area.
- 6) AC supply voltage is considered as primary circuit.
- 7) Safety Instructions: Built in product, safety instructions are end product considerations
- 8) The input and output terminal are suitable for field wiring. The units could also be provided with pins for soldering to a PCB.
- 9) The PE connection of the power supply shall be done in the end product via screw to PCB of the unit. The unit is considered as class I
- 10) The transformer T1 provides reinforced insulation. This transformer is built up to fulfills the requirement of insulation class B (130 °C) and provide in addition an UR (OBJY2) insulation system (see also list of safety critical components).
- 11) The equipment has been evaluated for use in a Pollution Degree 2 and overvoltage category II environment and a maximum altitude of 2000 m.
- 12) The product was evaluated for a maximum ambient of 70 °C.

The ZPSA20 series products derate linearly from 100% load at 45°C to 37,5% load at 70°C.

The ZPSA40/60-3R3, -5, -9, -12 products derate linearly from 100% load at 40°C to 25% load at 70°C.

The ZPSA40/60-15, -24, -28, -30, -36, -48 products derate linearly from 100% load at 50°C to 50% load at 70°C. See also derating diagram on next page.