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The Standards Institution of Israel

TEST REPORT
IEC 62368-1

Audio/video, information and communication technology equipment
Part 1: Safety requirements

Report Number: 9912328257
Date of issue: October 29, 2020
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Applicant's name.....: TDK-Lambda Ltd.
Address: 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone,
Karmiel 2161401, Israel

Test specification:
Standard.....: IEC 62368-1:2014 (Second Edition)
Test procedure: CB Scheme
Non-standard test method.....: N/A

Test Report Form No.: IEC62368_1B
Test Report Form(s) Originator: UL(US)
Master TRF: 2014-03

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Test Item description	Switching power supplies and accessory racks - component for build-in
Trade Mark	TDK-Lambda
Manufacturer	TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500, Karmiel Industrial Zone, Karmiel 2161401, Israel
Model/Type reference	Single Power Supply Modules: 1). FPS1000-48xz, -32xz, -24xz, -12xz (x = "/P", "/S", "/PS", "/POE", blank; z=/CO, blank) 2). RFE1000-48xz, -32xz, -24xz (x = "-Y", blank; z=/CO, blank) Empty Racks: 3). FPS-S1Uxy (x = "/P", "/S", "/PS", "/TB", blank; y-/CO, blank) 4). FPS-T1Uxy (x = "/P", "/S", "/PS", blank; y=/CO, blank) Triple Power Supply Modules (based on FPS-S1U empty rack): 5). FPS3000-48x, -32x, -24x or -12x (x= "/P", "/S", "/PS", "/TB", blank)
Ratings	1). FPS1000-48xz, -32xz, -24xz, -12xz: 1.a) x= "/S", "/POE", blank; Input: 100-240 Vac, 13-6.3 A, 50/60 Hz; Output: [-48 @ T=50°C]: V1 = 48 Vdc, 21 A; V2 = 12 Vdc, 0.25 A; [-48 @ T=70°C]: V1 = 48 Vdc, 11.55 A; V2 = 12 Vdc, 0.25 A; [-32 @ T=50°C]: V1 = 32 Vdc, 31 A; V2 = 12 Vdc, 0.25 A; [-32 @ T=70°C]: V1 = 32 Vdc, 17.05 A; V2 = 12 Vdc, 0.25 A; [-24 @ T=50°C]: V1 = 24 Vdc, 40 A; V2 = 12 Vdc, 0.25 A; [-24 @ T=70°C]: V1 = 24 Vdc, 22 A; V2 = 12 Vdc, 0.25 A; [-12 @ T=50°C]: V1 = 12 Vdc, 72 A; V2 = 12 Vdc, 0.25 A; [-12 @ T=70°C]: V1 = 12 Vdc, 39.6 A; V2 = 12 Vdc, 0.25 A; 1.b) x= "/P", "/PS"; Input: 100-240 Vac, 13-6.3 A, 50/60 Hz; Output: [-48 @ T=50°C]: V1 = 48 Vdc, 21 A; V2 = 12 Vdc, 0.25 A; [-48 @ T=60°C]: V1 = 48 Vdc, 16.8 A; V2 = 12 Vdc, 0.25 A; [-32 @ T=50°C]: V1 = 32 Vdc, 31 A; V2 = 12 Vdc, 0.25 A; [-32 @ T=60°C]: V1 = 32 Vdc, 24.8 A; V2 = 12 Vdc, 0.25 A; [-24 @ T=50°C]: V1 = 24 Vdc, 40 A; V2 = 12 Vdc, 0.25 A; [-24 @ T=60°C]: V1 = 24 Vdc, 32 A; V2 = 12 Vdc, 0.25 A; [-12 @ T=50°C]: V1 = 12 Vdc, 72 A; V2 = 12 Vdc, 0.25 A; [-12 @ T=60°C]: V1 = 12 Vdc, 57.6 A; V2 = 12 Vdc, 0.25 A

2). RFE1000-48xz, -32xz, -24xz:

Input= 100-240 Vac, 13-6.3 A, 50/60 Hz;

Output:

[-48 @ T=50°C]: V1 = 48 Vdc, 21 A; V2 = 12 Vdc, 0.25 A;
 [-48 @ T=70°C]: V1 = 48 Vdc, 11.55 A; V2 = 12 Vdc, 0.25 A;
 [-32 @ T=50°C]: V1 = 32 Vdc, 31 A; V2 = 12 Vdc, 0.25 A;
 [-32 @ T=70°C]: V1 = 32 Vdc, 17.05 A; V2 = 12 Vdc, 0.25 A;
 [-24 @ T=50°C]: V1 = 24 Vdc, 40 A; V2 = 12 Vdc, 0.25 A;
 [-24 @ T=70°C]: V1 = 24 Vdc, 22 A; V2 = 12 Vdc, 0.25 A;

3). FPS-S1Uxy:

Input: 100-240Vac, 39-18.9 A, 50/60 Hz per unit, for full rack.

Output:

[-48 @ T=50°C]: V1 = 48 Vdc, 63 A; V2 = 12 Vdc, 0.75 A;
 [-48 @ T=70°C]: V1 = 48 Vdc, 34.66 A; V2 = 12Vdc, 0.75 A;
 [-32 @ T=50°C]: V1 = 32 Vdc, 93 A; V2 = 12Vdc, 0.75 A;
 [-32 @ T=70°C]: V1 = 32 Vdc, 51.15 A; V2 = 12Vdc, 0.75 A;
 [-24 @ T=50°C]: V1 = 24 Vdc, 120 A; V2 = 12Vdc, 0.75 A;
 [-24 @ T=70°C]: V1 = 24 Vdc, 66 A; V2 = 12Vdc, 0.75 A;
 [-12 @ T=50°C]: V1 = 12 Vdc, 216 A; V2 = 12Vdc, 0.75 A;
 [-12 @ T=70°C]: V1 = 12 Vdc, 118.8 A; V2 = 12Vdc, 0.75 A.

4). FPS-T1Uxy:

Input: 100-240 Vac, 13-6.3 A, 50/60 Hz per unit, up to 3 units;

Outputs (per each installed unit):

[-48 @ T=50°C]: V1 = 48 Vdc, 21 A; V2 = 12 Vdc, 0.25 A;
 [-48 @ T=70°C]: V1 = 48 Vdc, 11.55 A; V2 = 12 Vdc, 0.25 A;
 [-32 @ T=50°C]: V1 = 32 Vdc, 31 A; V2 = 12 Vdc, 0.25 A;
 [-32 @ T=70°C]: V1 = 32 Vdc, 17.05 A; V2 = 12 Vdc, 0.25 A;
 [-24 @ T=50°C]: V1 = 24 Vdc, 40 A; V2 = 12 Vdc, 0.25 A;
 [-24 @ T=70°C]: V1 = 24 Vdc, 22 A; V2 = 12 Vdc, 0.25 A;
 [-12 @ T=50°C]: V1 = 12 Vdc, 72 A; V2 = 12 Vdc, 0.25 A;
 [-12 @ T=70°C]: V1 = 12 Vdc, 39.6 A; V2 = 12 Vdc, 0.25 A;

5). FPS3000-48x, -32x, -24x or -12x:

Input: 100-240Vac, 39-18.9 A for /TB only and 13-6.3 each input, 50/60 Hz for full rack;

Outputs:

[-48 @ T=50°C]: V1 = 48 Vdc, 63 A; V2 = 12V dc, 0.75A;
 [-48 @ T=60°C]: V1 = 48 Vdc, 50.4 A; V2 = 12V dc, 0.75A;
 [-32 @ T=50°C]: V1 = 32 Vdc, 93 A; V2 = 12V dc, 0.75A;
 [-32 @ T=60°C]: V1 = 32 Vdc, 74.4 A; V2 = 12V dc, 0.75A;
 [-24 @ T=50°C]: V1 = 24 Vdc, 120 A; V2 = 12V dc, 0.75A;
 [-24 @ T=60°C]: V1 = 24 Vdc, 96 A; V2 = 12V dc, 0.75A.
 [-12 @ T=50°C]: V1 = 12 Vdc, 216 A; V2 = 12V dc, 0.75A;
 [-12 @ T=60°C]: V1 = 12 Vdc, 172.8 A; V2 = 12V dc, 0.75A



Testing procedure and testing location:		
<input type="checkbox"/>	CB Testing Laboratory:	
Testing location/ address		
<input type="checkbox"/>	Associated CB Testing Laboratory:	
Testing location/ address		
Tested by (name + signature).....:		
Approved by (name + signature)		
<input type="checkbox"/>	Testing procedure: TMP/CTF Stage 1	
Testing location/ address		
Tested by (name + signature).....:		
Approved by (name + signature)		
<input type="checkbox"/>	Testing procedure: WMT/CTF Stage 2	
Testing location/ address		
Tested by (name + signature).....:		
Witnessed by (name + signature).....:		
Approved by (name + signature)		
<input checked="" type="checkbox"/>	Testing procedure: SMT/CTF Stage 3 or 4	
Testing location/ address		56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone, Karmiel 2161401, Israel
Tested by (name + signature).....:		Boris Gorinshtein <i>Boris G.</i>
Witnessed by (name + signature).....:		Vladimir Chernikh <i>V. Chernikh</i>
Approved by (name + signature)		Vladimir Chernikh <i>V. Chernikh</i>
Supervised by (name + signature)		Irina Antonov <i>Irina Antonov</i>

<p>List of Attachments (including a total number of pages in each attachment):</p> <p>Attachment 1 National differences – 34 pages Attachment 2 Photos – 11 pages Attachment 3 Schematics – 10 pages Attachment 4 PCB – 19 pages Attachment 5 Magnetics – 12 pages Attachment 6 Wire harness – 9 pages Attachment 7: Additional test data – 1 page</p>	
<p>Summary of testing:</p>	
<p>Tests performed (name of test and test clause):</p> <p>The tests performed in CB Report Number 9912328257 (August 28, 2020):</p> <p>5.2.2 ES Limits 5.4.1.10.3 Ball Pressure test 5.4.9 Electric Strength test 5.5.2.2 Capacitance discharge test 5.6.6.2 Resistance of protective conductors and terminations 5.7 Touch current test 6.2.2 PS Limits test</p> <p>The tests performed in TUV CB Report Number 30680243.001 with CB Certificate US-TUVR-3051:</p> <p>5.2.2 ES Limits test 5.2.2, 5.4.1.8 Working voltage measurement test, ES1 reliability tests 5.4.1.4.3 Temperature test for EIS 5.4.1.10.3 Ball Pressure test 5.4.2 Determination of clearances 5.4.3 Determination of creepage distances 9.2.6 Accessible temperature limits test B.2.5 Input test B.2.6 Heating test B.3.2 Abnormal condition – blocked vents test B.3.5 Abnormal condition – overload of outputs test B.4.4 Single fault condition – functional insulation B.4.3 Motor tests B.4.5 Single fault condition – Short-circuit and interruption of electrodes in tubes and semiconductors B.4.6 Single fault condition – short-circuit or disconnection of passive components F.3.10 Marking durability test G.5.3.2, G.5.3.3 Transformer overload tests G.7.6.2.2 Stranded wire 8mm test P.2.2 Openings in enclosure measurement Q LPS evaluation for communication circuitry T.2 Steady force 10N T.5 Steady force 250N T.6 Impact test V Accessibility tests</p>	<p>Testing location:</p> <p>TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500, Karmiel Industrial Zone, Karmiel 2161401, Israel</p>

<p>The tests performed in TUV CB Report Number 30680243.004 (FPS1000-12) with CB Certificate US-TUVR-3051-A1:</p> <p>5.4.1.4.3 Temperature test for EIS 5.4.2 Determination of clearances 5.4.3 Determination of creepage distances B.2.5 Input test B.3.2 Abnormal condition – blocked vents test B.3.5 Abnormal condition – overload of outputs test B.4.4 Single fault condition – functional insulation B.4.5 Single fault condition – Short-circuit and interruption of electrodes in tubes and semiconductors.</p> <p>The tests performed in TUV CB Report Number 30680243.008 (RFE1000) with CB Certificate US-TUVR-3051-A3:</p> <p>5.2.2.3 Capacitance Limits 5.4.9 Electric strength tests 5.6.6. Resistance of protective conductors and terminations</p> <p>The tests performed in TUV CB Report Number 30680243.010 (FPS-S1U/TB) with CB Certificate US-TUVR-5420:</p> <p>5.4.9 Electric strength tests 5.7.4, 5.7.2.2 Earthed accessible conductive part</p>	
<p>Summary of compliance with National Differences:</p> <p>List of countries addressed</p> <p>EU Group Differences, EU Special National Conditions, EU A-Deviations, Austria (AT), Australia (AU), Belgium (BE), Belarus (BY)*, Canada (CA), Switzerland (CH), China (CN)*, Germany (DE), Denmark (DK), Finland (FI), France (FR), United Kingdom (GB), Hungary (HU), Israel (IL)*, Italy (IT), Japan (JP)*, Korea (KR)*, Malaysia (MY)*, Netherlands (NL), Sweden (SE), Singapore (SG)*, Slovenia (SI), United States (US)</p> <p>*) For countries marked with an asterisk, no National Differences have been reported.</p> <p><input checked="" type="checkbox"/> The product fulfils the requirements of IEC 62368-1:2014, EN62368-1:2014/A11:2017.</p>	

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.

TDK-Lambda

FPS-T1U

INPUT:	100 - 240V~ 13 - 6.3A EACH INPUT 50/60Hz
OUTPUT:	<p style="text-align: center;">MAX. OUTPUT POWER : 3000W</p> <p>48V MODEL: 48V 21A (PER INSTALLED FPS1000-48 UNIT) 12V 0.25A</p> <p>32V MODEL: 32V 31A (PER INSTALLED FPS1000-32 UNIT) 12V 0.25A</p> <p>24V MODEL: 24V 40A (PER INSTALLED FPS1000-24 UNIT) 12V 0.25A</p> <p>12V MODEL: 12V 72A (PER INSTALLED FPS1000-12 UNIT) 12V 0.25A</p>

USE ONLY FPS SERIES POWER SUPPLIES .

MADE IN CHINA

J1(A), J2(B), J3(C)

16	9
8	1

PIN# SIGNAL

- 1 SDA (I²C)
- 2 SCL (I²C)
- 3 SIGNAL_RET.
- 4 ON/OFF-2
- 5 DC_OK
- 6 V TRIM
- 7 -SENSE
- 8 +SENSE
- 9 +12V AUXILIARY
- 10 CUR. SHARE
- 11 AC FAIL
- 12 ON/OFF-1
- 13 ON/OFF LOGIC SELECT
- 14 TEMP. ALARM
- 15 -LS
- 16 +LS

TDK-Lambda

FPS-S1U

INPUT:	100 - 240V~ 13 - 6.3A EACH INPUT 39 - 18.9A for /TB only 50/60Hz
OUTPUT:	MAX. OUTPUT POWER : 3000W 48V MODEL: 48V 63A (21A PER INSTALLED FPS1000-48 UNIT) 12V 0.75A (0.25A PER INSTALLED FPS1000-48 UNIT) 32V MODEL: 32V 93A (31A PER INSTALLED FPS1000-32 UNIT) 12V 0.75A (0.25A PER INSTALLED FPS1000-32 UNIT) 24V MODEL: 24V 120A (40A PER INSTALLED FPS1000-24 UNIT) 12V 0.75A (0.25A PER INSTALLED FPS1000-24 UNIT) 12V MODEL: 12V 216A (72A PER INSTALLED FPS1000-12UNIT) 12V 0.75A (0.25A PER INSTALLED FPS1000-12 UNIT)

USE ONLY FPS SERIES POWER SUPPLIES OF THE SAME OUTPUT VOLTAGE RATING.

MADE IN CHINA

J1

PIN#	SIGNAL
1	V TRIM (B)
2	TEMP. ALARM (B)
3	DC OK (B)
4	TEMP. ALARM (A)
5	ON/OFF (A)
6	DC OK (A)
7	V TRIM (A)
8	+12V AUXILIARY
9	CUR. SHARE
10	V TRIM (C)
11	SIGNALS RETURN
12	DC OK (C)
13	+ SENSE
14	AC FAIL (B)
15	ON/OFF (B)
16	AC FAIL (A)
17	NC
18	NC
19	NC
20	SCL (I ² C)
21	SDA (I ² C)
22	-SENSE
23	TEMP. ALARM (C)
24	AC FAIL (C)
25	ON/OFF (C)

TDK-Lambda

FPS3000- /

INPUT:	100 - 240V~ 13 - 6.3A EACH INPUT 39 - 18.9A for /TB only 50/60Hz
OUTPUT:	MAX. OUTPUT POWER : 3000W <div style="border: 1px solid black; padding: 2px; display: inline-block;">V---A</div> 12V---0.75A

USE ONLY FPS SERIES POWER SUPPLIES OF THE SAME OUTPUT VOLTAGE RATING.

Type Approved
Safety
Regular Production
Surveillance

MADE IN CHINA

J1

PIN#	SIGNAL
1	V TRIM (B)
2	TEMP. ALARM (B)
3	DC OK (B)
4	TEMP. ALARM (A)
5	ON/OFF (A)
6	DC OK (A)
7	V TRIM (A)
8	+12V AUXILIARY
9	CUR. SHARE
10	V TRIM (C)
11	SIGNALS RETURN
12	DC OK (C)
13	+ SENSE
14	AC FAIL (B)
15	ON/OFF (B)
16	AC FAIL (A)
17	NC
18	NC
19	NC
20	SCL (I ² C)
21	SDA (I ² C)
22	-SENSE
23	TEMP. ALARM (C)
24	AC FAIL (C)
25	ON/OFF (C)

TDK-Lambda

RFE1000- []

INPUT	OUTPUT
100 - 240V~ 13 - 6.3A 50/60Hz	V1 <div style="border: 1px solid black; padding: 2px; display: inline-block;">V---A</div> V2 12V---0.25A

Type Approved
Safety
Regular Production
Surveillance

MADE IN CHINA

IEC62368_1B

Management: Tel: 972-3-6467800 Fax: 972-3-6467779 Electronics: Tel 972-3-6465050 Fax: 972-3-7454026
 Alarms Systems Section: Tel: 972-3-6467626 Fax: 972-3-6465370 Electrical: Tel: 972-3-6465160, Fax: 972-3-6465287
 42 Chaim Levanon St, Tel Aviv 6997701 Israel. www.sii.org.il

TDK-Lambda
FPS 1000- /

INPUT	OUTPUT
100 - 240V~ 13 - 6.3A 50/60Hz	V1 <input type="text"/> V <input type="text"/> A V2 12V <input type="text"/> 0.25A

ERC

CUL US

Type Approved
Safety
Regular Production
Surveillance

MADE IN CHINA

TDK-Lambda
FPS 1000- /

INPUT	OUTPUT
100 - 240V~ 13 - 6.3A 50/60Hz	V1 <input type="text"/> V <input type="text"/> A V2 12V <input type="text"/> 0.25A

ERC

CUL US

Type Approved
Safety
Regular Production
Surveillance







MADE IN ISRAEL

Risk Of Electrical Shock

Before touching output terminals, disconnect AC input and discharge each output terminal to chassis ground.

TDK-Lambda
FPS1000-48/S

INPUT	OUTPUT
100-240V~ 13-6.3A 50/60Hz	V1: 48V \equiv 21A V2: 12V \equiv 0.25A










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Made in China/ 中國製造/ 中国制造

TDK-Lambda
FPS1000-48/POE

INPUT	OUTPUT
100 - 240V~ 13 - 6.3A 50/60Hz	V1: 48V \equiv 21A V2: 12V \equiv 0.25A

MADE IN CHINA



TEST ITEM PARTICULARS:	
Classification of use by	<input checked="" type="checkbox"/> Ordinary person (See comments in General Product Information) <input checked="" type="checkbox"/> Instructed person <input checked="" type="checkbox"/> Skilled person <input type="checkbox"/> Children likely to be present
Supply Connection.....	<input checked="" type="checkbox"/> AC Mains <input type="checkbox"/> DC Mains <input type="checkbox"/> External Circuit - not Mains connected - <input type="checkbox"/> ES1 <input type="checkbox"/> ES2 <input checked="" type="checkbox"/> ES3
Supply % Tolerance	<input checked="" type="checkbox"/> +10%/-10% <input type="checkbox"/> +20%/-15% <input type="checkbox"/> + ____% / - ____% <input type="checkbox"/> None
Supply Connection – Type	<input checked="" type="checkbox"/> pluggable equipment type A - <input checked="" type="checkbox"/> non-detachable supply cord (FPS-S1Uxy followed by /TB, FPS-T1Uxy followed by /TB, FPS3000 followed by /TB and RFE1000) <input checked="" type="checkbox"/> appliance coupler (FPS1000 single power supply modules (followed by /P or /PS), FPS-S1Uxy without suffix /TB, FPS-T1Uxy without suffix /TB). <input type="checkbox"/> direct plug-in <input type="checkbox"/> mating connector <input checked="" type="checkbox"/> pluggable equipment type B - <input checked="" type="checkbox"/> non-detachable supply cord (FPS-S1Uxy followed by /TB, FPS-T1Uxy followed by /TB, FPS3000 followed by /TB and RFE1000 single power supply modules) <input type="checkbox"/> appliance coupler <input checked="" type="checkbox"/> permanent connection (FPS-S1Uxy followed by /TB, FPS-T1Uxy followed by /TB, FPS3000 followed by /TB and RFE1000) <input checked="" type="checkbox"/> mating connector (FPS1000 single power supply modules) <input type="checkbox"/> other: _____ <i>NOTE: Connection to the mains is various, depends on model: refer to General Product Information</i>
Considered current rating of protective device as part of building or equipment installation	FPS-S1U/.../TB, FPS-T1U/.../TB, FPS3000/.../TB: 60A Other units: 20A Installation location: <input checked="" type="checkbox"/> building; <input type="checkbox"/> equipment
Equipment mobility	<input type="checkbox"/> movable <input type="checkbox"/> hand-held <input type="checkbox"/> transportable <input type="checkbox"/> stationary <input checked="" type="checkbox"/> for building-in (FPS1000 single power supply modules series, RFE1000 power supply modules series, FPS-S1Uxy, FPS-T1Uxy, FPS3000) <input type="checkbox"/> direct plug-in <input checked="" type="checkbox"/> rack-mounting (FPS-S1Uxy ,FPS-T1Uxy, FPS3000) <input type="checkbox"/> wall-mounted



GENERAL REMARKS:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p>	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60068-2-1:	
<p>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</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> Not applicable</p>
When differences exist; they shall be identified in the General product information section.	
<p>Name and address of factory (ies)</p>	<p>1) TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone, Karmiel 2161401, Israel.</p> <p>2) TDK-Lambda (China) Electronics Co., Ltd. No.95, Zhujiang Road, Xinwu District, Wuxi, Jiangsu 214028, P.R. China</p>

GENERAL PRODUCT INFORMATION:**Product Description –**

All products are component for build-in, Class I, designed for Over voltage Category II Pollution Degree 2.

FPS1000-48xz, -32xz, 24xz and -12xz (FPS1000 series) is a family of front-end (component) power supplies for built-in use. All units provide a handle on front side for plugging/unplugging the unit to/from the rack. Rear panel contains a connector with AC pins, output DC pins and signal pins. Only the front panel is accessible to an ordinary person.

FPS1000 with suffix /P or /PS contains a standard appliance inlet at the front panel.

The FPS1000 series is intended for accessory racks. The FPS1000 units may be used in the complete set of the accessory racks FPS-S1U, FPS-T1U or separately from TDK-Lambda designed accessory racks, in accordance with the "Additional application considerations".

RFE1000-48xz, -32xz, -24xz or -12xz (RFE1000 series) is a family of front-end (component) power supplies for built-in use, which is the same as the FPS1000 series and have minor differences due to using of separate input terminal block (TB) on the rear panel only, separate signals connectors and output bus-bars instead of common I/O connector used in the modules. RFE1000 is a power supply series intended to be used separately from TDK-Lambda designed accessory racks.

For RFE1000 and FPS1000 series units used separately from TDK-Lambda designed accessory racks, the means of connection to the mains shall be specified in the end-installation.

Accessory racks FPS-S1U and FPS-T1U are intended for use with up to three FPS1000 power supply modules. In the FPS-S1U and FPS3000 units all outputs are connected in parallel. In FPS-T1Uxy units, each output is separated from the other.

Accessory racks FPS3000 followed by /TB and FPS-T1U followed by /TB are connected to AC mains by means of a single terminal block and from there the supply is distributed to each FPS1000 unit. Accessory racks FPS3000, FPS-S1U and FPS-T1U without suffix /TB are provided with a connection to the AC mains for each FPS1000 unit separately by means of a standard appliance inlet.

FPS1000 units followed by /P or /PS, the accessory racks FPS-S1U (not followed by /TB), FPS-T1U and FPS3000 units (without suffix /TB) are Pluggable Type A.

FPS1000, RFE1000, FPS-S1U (followed by /TB) and FPS3000 (followed by /TB) units: type of connection to the AC mains shall be specified in end-product.

All outputs considered ES1 and separated by reinforced insulation from primary mains. Outputs are unearthed and may or may not be earthed during product installation.

Disconnect device:

Appliance coupler(s):

FPS1000 units followed by /P or /PS, FPS-T1U;
FPS-S1U (not followed by /TB);
FPS3000 (not followed by /TB)

Without disconnect device:

FPS1000 and RFE1000 units followed by /S, -48/POE, -48/S/POE;
RFE1000 units followed by /S, -48/POE, -48/S/POE;
FPS3000 units (followed by /TB)
(An appropriate disconnect device shall be provided by the end-product.)

For the FPS1000, RFE1000 series power supplies an appropriate Electrical and Fire Enclosure shall be provided in the end product.

For the FPS-S1U and FPS-T1U accessory racks, designed by TDK-Lambda, and FPS3000 series triple power supplies an appropriate Electrical and Fire enclosure shall be provided in the end product.

The FPS1000, FPS3000, RFE1000 series power supplies and accessory racks FPS-S1U and FPS-T1U designed by TDK-Lambda should only be installed in a Restricted Access Area. Access should be available to service personnel only.

Model Differences –**1. FPS1000 units:**

- Basic power supply module-without an AC inlet and secondary communication option;
- Followed by "/S"-with communication circuit (ES1 circuit);
- Followed by "/P"-with AC inlet located on the front panel;
- Followed by "/PS"-with both options listed above;
- * Followed by "/POE"- same as FPS1000-48 except Y-cap to ground, C152, C153 (0.01uF, 250V);
- Followed by "/CO"-with conformal coating (used for environmental protection only)

* The PSU followed by POE has no relevant safety changes/additions.

RFE1000 units (modified FPS1000 units):

- Basic power supply module-without an "or-ing" diodes in the ES1 output;
- Followed by "-Y"-with "or-ing" diodes in the ES1 output to allow parallel connection of units;
- Followed by "/CO"-with conformal coating (used for environmental protection only)

2. Accessory Rack FPS-S1U, intended for installation of up to three FPS1000-xx units:

- Basic model: with 3 AC inlets on the rear side and common main and auxiliary outputs;
- Followed by "/P"-without AC inlets on the rear side (for installation of power supply modules with an appliance inlet on the front panel)
- Followed by "/TB" -for option with common AC input terminal block:

3. Accessory Rack FPS-T1U, intended for installation of up to three FPS1000 units:

- Basic model: with three AC inlets on the rear side and separate main and auxiliary outputs for each installed unit;
- Followed by "/P"-without AC inlets on the rear side (for installation of power supply modules with an appliance inlet on the front panel)
- Followed by "/S"-with secondary communication option (in ES1 circuit);
- Followed by "/PS"-with both options listed above
- Followed by "/CO"-with conformal coating (used for environmental protection only)

4. Power Supply FPS3000: accessory rack model FPS-S1U or FPS-T1U with three installed FPS1000 units:

- Basic model-with three AC inlets on the rear side;
- Followed by "/P"-without AC inlets on the rear side (for installation of power supply modules with an appliance inlet on the front panel);
- Followed by "/S"-with secondary communication option (in ES1 circuit);
- Followed by "/PS"-with both options listed above;
- Followed by "/TB"-with common AC input terminal block.

Additional application considerations – (Considerations used to test a component or sub-assembly) –**CONDITIONS OF USE:**

1. All units shall be installed in compliance with the enclosure, mounting, spacing, segregation and other safety related requirements of the final application.
2. The main outputs (48VDC, 32VDC, 24VDC or 12VDC) have been investigated for ES1, PS3.
3. Auxiliary output (12VDC) has been investigated for ES1, PS2.
4. All outputs are separated by reinforced insulation from supply mains and primary circuit. Outputs are unearthed and may or may not be earthed during product installation.
5. FPS1000, RFE1000:
The maximum working voltage measured between primary and secondary was 359 Vrms and the repetitive peak voltage was 695Vpk.
The maximum working voltage measured between primary and earth was 416Vrms and the repetitive peak voltage was 780Vpk.
Dielectric Strength Test for the end product should be based on these values.
6. A suitable Electrical and Fire enclosure shall be provided for FPS1000, RFE1000 by the end-product.
7. A suitable Mechanical enclosure shall be provided for FPS1000 by the end-product.
8. Power supplies FPS3000 and accessory racks FPS-S1U, FPS-T1U: an appropriate Electrical and Fire enclosure shall be provided in the end product.
9. For FPS1000, FPS3000 series power supplies and accessory racks FPS-S1U and FPS-T1U designed by TDK-Lambda: the products shall be properly bonded to the protective earth termination in the end-product.
10. For RFE1000, the products shall be properly bonded by screw through the end-equipment's chassis to the power supply chassis, that would connect the power supply to an electrical ground
11. Disconnect Device.
FPS1000 units followed by /P, /PS, /P/POE, /PS/POE, FPS-T1U(-T1U/P), FPS-S1U blank or followed by /P and FPS3000 blank or followed by /P: appliance coupler(s);

FPS1000 units blank or followed by /S, /POE, S/POE, RFE1000 units, FPS-S1U/TB and FPS3000/TB do not employ a disconnect device. An appropriate disconnect device shall be provided by the end-product.

Note: the PSU followed by POE has no relevant safety changes/additions.
12. All units, except for FPS-S1U/TB and FPS3000/TB, were tested with a 20A circuit breaker for each AC input. FPS-S1U/TB and FPS3000/TB were tested with a 60A circuit breaker. If used with a circuit breaker greater than listed above, additional testing may be necessary.
13. Power supplies are suitable for the maximum ambient operating temperature of:
 - 50°C @ 100%, or less of rated output for all units;
 - 60°C at 80% or less of rated output for FPS1000 units with appliance inlet; accessory racks FPS-S1U, FPS-T1U and FPS3000 triple power supplies not followed by TB;
 - 70°C @ 55% or less output power for FPS1000 units without appliance inlet, RFE1000 units, accessory rack FPS-S1U/TB and triple power supply FPS3000/TB.

ENERGY SOURCE IDENTIFICATION AND CLASSIFICATION TABLE:	
<p>(Note 1: Identify the following six (6) energy source forms based on the origin of the energy.) (Note 2: The identified classification e.g., ES2, TS1, should be with respect to its ability to cause pain or injury on the body or its ability to ignite a combustible material. Any energy source can be declared Class 3 as a worse case classification e.g. PS3, ES3.)</p>	
<p>Electrically-caused injury (Clause 5): (Note: Identify type of source, list sub-assembly or circuit designation and corresponding energy source classification) Example: +5 V dc input ES1</p>	
Source of electrical energy	Corresponding classification (ES)
AC mains, primary circuitry	ES3 (primary)
Secondary circuitry directly at safety isolating transformers outputs (T101, T102, T103)	ES2 (secondary)
Output main (V+ to V-) originated from T101, T102	ES1
Output Auxiliary (12Vdc) originated from T103	ES1
Data communication connectors	ES1
Enclosure	ES1
<p>Electrically-caused fire (Clause 6): (Note: List sub-assembly or circuit designation and corresponding energy source classification) Example: Battery pack (maximum 85 watts): PS2</p>	
Source of power or PIS	Corresponding classification (PS)
AC mains, primary circuitry	PS3
Output main (V+ to V-) originated from T101, T102	PS3
Output Auxiliary (12Vdc) originated from T103	PS2
Data communication circuitry	PS2
<p>Injury caused by hazardous substances (Clause 7) (Note: Specify hazardous chemicals, whether produces ozone or other chemical construction not addressed as part of the component evaluation.) Example: Liquid in filled component Glycol</p>	
Source of hazardous substances	Corresponding chemical
N/A	
<p>Mechanically-caused injury (Clause 8) (Note: List moving part(s), fan, special installations, etc. & corresponding MS classification based on Table 35.) Example: Wall mount unit MS2</p>	
Source of kinetic/mechanical energy	Corresponding classification (MS)
Sharp edges	MS1
Fans	MS3 (Not accessible)
<p>Thermal burn injury (Clause 9) (Note: Identify the surface or support, and corresponding energy source classification based on type of part, location, operating temperature and contact time in Table 38.) Example: Hand-held scanner – thermoplastic enclosure TS1</p>	
Source of thermal energy	Corresponding classification (TS)
Internal components	TS3
Accessible surfaces- front panel	TS1
<p>Radiation (Clause 10) (Note: List the types of radiation present in the product and the corresponding energy source classification.) Example: DVD – Class 1 Laser Product RS1</p>	
Type of radiation	Corresponding classification (RS)
Indication LEDs	Inherently RS1 (exempt group)

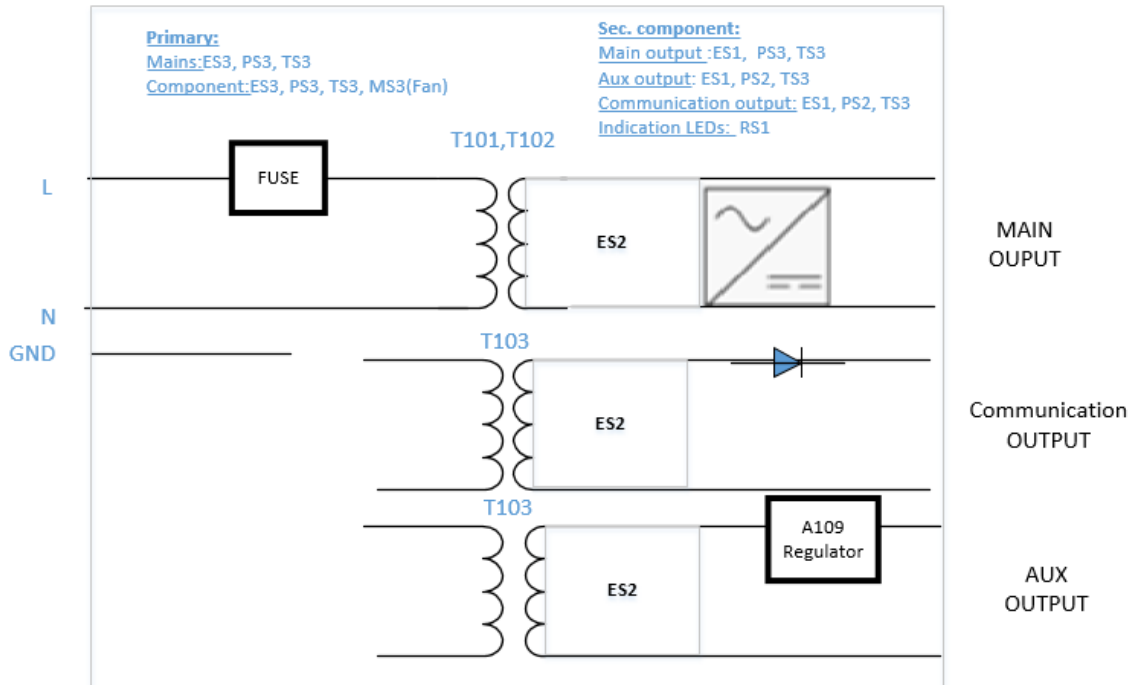
ENERGY SOURCE DIAGRAM

Indicate which energy sources are included in the energy source diagram. Insert diagram below

ES PS MS TS RS

Electrical Energy Source Classification

Single Power Supply Module:



Enclosure :
 MS1, ES1, PS1
 accessible surfaces (front pane) : TS1

ENERGY SOURCE DIAGRAM

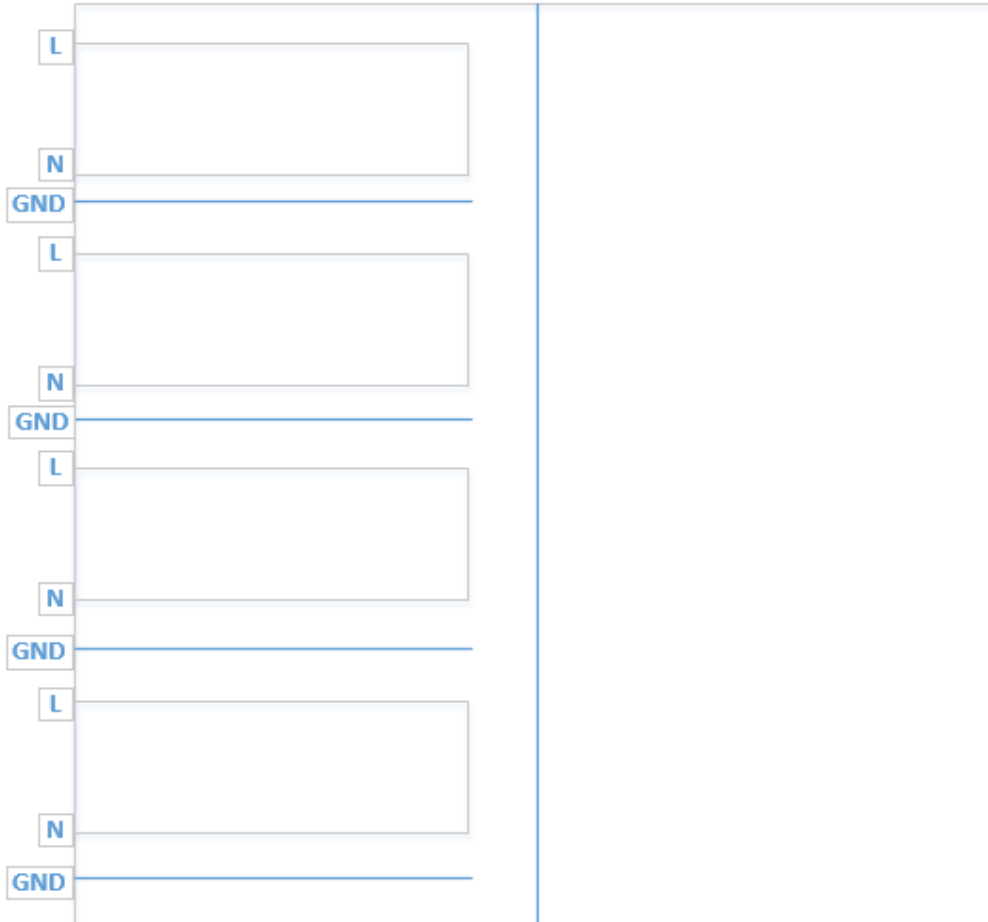
Accessory Rack:

Primary:

ES3, PS3, TS3

Secondary :

ES1, PS3, TS3



Enclosure : (sharp edge): MS1
 Weight : MS1(MS3 for FPS3000)
 Accessible parts : TS1, ES1, PS1

OVERVIEW OF EMPLOYED SAFEGUARDS				
Clause	Possible Hazard			
5.1	Electrically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (ES3: Primary Filter circuit)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary – accessible parts of metal enclosure	ES3 primary circuit	Basic Insulation between accessible parts and primary	Connection of the enclosure to PE	-
Ordinary – secondary ES1 outputs	ES3 primary circuit	-	-	Reinforced insulation between primary and secondary
Ordinary – secondary ES1 outputs	ES2 secondary circuits	-	-	Fault tests – ES1 reliability tests
6.1	Electrically-caused fire			
Material part (e.g. mouse enclosure)	Energy Source (PS2: 100 Watt circuit)	Safeguards		
		Basic	Supplementary	Reinforced
Primary and secondary PS3 circuits	PS3	Temperatures below ignition temperature	Components mounted on PCB V-0, rated min. V-2, contained within fire enclosure	-
Secondary Main outputs	PS3	Temperatures below ignition temperature	Fire enclosure shall be provided by end- product.	-
Output Auxiliary (12Vdc) originated from T103	PS2	-	-	Annex Q
Data communication circuitry	PS2	-	-	Annex Q
7.1	Injury caused by hazardous substances			
Body Part (e.g., skilled)	Energy Source (hazardous material)	Safeguards		
		Basic	Supplementary	Reinforced
N/A				
8.1	Mechanically-caused injury			
Body Part (e.g. Ordinary)	Energy Source (MS3: High Pressure Lamp)	Safeguards		
		Basic	Supplementary	Reinforced (Enclosure)
Ordinary – accessible parts of enclosure	Fans MS3	-	-	Enclosure
9.1	Thermal Burn			
Body Part (e.g., Ordinary)	Energy Source (TS2)	Safeguards		
		Basic	Supplementary	Reinforced
Ordinary – accessible parts of enclosure	Internal components TS3	-	-	Enclosure
10.1	Radiation			
Body Part (e.g., Ordinary)	Energy Source (Output from audio port)	Safeguards		
		Basic	Supplementary	Reinforced
N/A				
Supplementary Information:				
(1) See attached energy source diagram for additional details.				
(2) "N" – Normal Condition; "A" – Abnormal Condition; "S" Single Fault				