Test Report issued under the responsibility of:

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TEST REPORT
IEC 61010-1
Safety requirements for electrical equipment for measurement, control, and laboratory use
Part 1: General requirements

Report Number. ..... :	31183682.024
Date of issue ..... :	July 8, 2020
Total number of pages ..... :	**162 + Attachments**
Name of Testing Laboratory preparing the Report ..... :	TÜV Rheinland of North America, Inc. 1279 Quarry Lane, Ste. A, Pleasanton, CA 94566
Applicant's name ..... :	TDK-Lambda Ltd.
Address ..... :	56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel
Test specification:	
Standard ..... :	IEC 61010-1:2010
Test procedure ..... :	CB Scheme
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC61010_1M
Test Report Form(s) Originator .... :	VDE Testing and Certification Institute
Master TRF ..... :	2018-08-16

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

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.

Test item description .....:	Programmable power supply
Trade Mark .....:	TDK-Lambda TDK·Lambda for Z series; National Instruments NATIONAL INSTRUMENTS for RMX series.
Manufacturer .....:	TDK-Lambda Ltd., 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel

Model/Type reference .....:	1. Z200 **or** RMX-4101 series; 2. Z400 **or** RMX-4102 series; 3. Z600 **or** RMX-4103 series; 4. Z800 **or** RMX-4104 series
	configuration code: Zxxx-yyy-o-p**/**w**/**m**mmmm or** RMX-410z-xxx-yyy-o-p**/**w**/**m**mmmm** with
	z=1, 2, 3 or 4 (RMX series only)
	xxx=any number between 010 to 650
	yyy=any number between 0.32 to 72
	o=blank or (in any combination) L, L2, IEEE, IS420, IS510, LAN;
	p=blank or E, I, J or U;
	w=blank or CO **or CC or NC**.
	m=blank or A-Z, 0-9, not safety relevant)

Ratings .....:	Input: 1: ~100-240V, 3A, 50/60Hz; 2: ~100-240V, 6A, 50/60Hz; 3: ~100-240V, 9A, 50/60Hz; 4: ~100-240V, 12A, 50/60Hz. Output: 1. Z200 **or** RMX-4101: from 0-10VDC/0-20A to 0-650VDC/0-0.32A, 220W max. 2. Z400 **or** RMX-4102: from 0-10VDC/0-40A to 0-650VDC/0-0.64A, 432W max. 3. Z600 **or** RMX-4103: from 0-10VDC/0-60A to 0-650VDC/0-1A, 682W max. 4. Z800 **or** RMX-4104: from 0-10VDC/0-72A to 0-650VDC/0-1.25A, 864W max.

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**	TUV Rheinland of North America	
Testing location/ address.....:		1279 Quarry Lane, Suite A, Pleasanton, CA 94566, USA	
Tested by (name, function, signature) .....:		Priscilla Mui, Senior Test Engineer	
Approved by (name, function, signature) .:		James Howell, Senior Test Engineer	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address .....:			
Tested by (name, function, signature) .....:			
Approved by (name, function, signature) .:			
☐	**Testing procedure: CTF Stage 2:**		
Testing location/ address.....:			
Tested by (name, function, signature) .....:			
Witnessed by (name, function, signature) :			
Approved by (name, function, signature) .:			
☐	**Testing procedure: CTF Stage 3:**	TDK-Lambda Ltd.	
☐	**Testing procedure: CTF Stage 4:**		
Testing location/ address.....:		56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel	
Tested by (name, function, signature) .....:			
Approved by (name, function, signature) .:			
Supervised by (name, function, signature) .....:			

List of Attachments (including a total number of pages in each attachment):		
TABLE 1	List of safety relevant components	**147-161**
ATTACHMENT 1	National Differences (28 Pages)	
ATTACHMENT 2	Photo-documentation (**35** Pages)	
ATTACHMENT 3	Transformer Specifications (**20** Pages)	
ATTACHMENT 4	**PCB Layouts (69 Pages)**	

Summary of testing:

The measurements recorded in this Report only relate to the tested items detailed on the first page of this Report and demonstrate conformity with the stated specifications. The items tested were selected by the manufacturer as the worst case representative samples of the product group detailed in the first page of this Report, with which it has design and constructional similarity and a commonality of materials and components.
The following power supplies were supplied as a representative sample of the Z200 **or** RMX-4101 (1), Z400 **or** RMX-4102 (2), Z600 **or** RMX-4103 (3) and Z800 **or** RMX-4104 (4) series:
1. Z10-20, Z100-2;
2. Z10-40, Z100-4, Z160-2.6, Z650-0.64
3. Z10-60, Z100-6;
4. Z10-80, Z100-8. Z160-5, Z650-1.25
Units which represent Z200 **or** RMX-4101 and Z600 **or** RMX-4103 series subjected to partial testing due to similarity with base series Z400 **or** RMX-4102 and Z800 **or** RMX-4104 correspondingly.

Although the Standard requires testing for a 40° C ambient temperature, the represent items have been rated and therefore tested for operation in a 50° C ambient temperature.

Test Report History:
This report may consist of more than one report and is valid only with additional or previous issued reports:

Ref. No.	Item
31183682.001	Original report issued for model number Z400- and Z200 series, IEC61010-1 2nd Edition.
31183682.003	This report for an upgrade of standard to IEC61010-1:2010 [3rd Edition], additional
31183682.005	model Z600- and Z800 series; also change of applicant's name and address to 56 Haharoshet St.,P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel.
31183682.007	Amendment 1 to original CB-report with number 31183682.003 for the listing of an alternate PCB-material in the list of Critical Components. The PCB is manufactured by an alternate manufacturer but according to identical specification and drawings from the applicant which haven't changed.
31183682.009	Amendment 2 to original CB-report with number 31183682.003 for the change of configuration code from L to Lx (with x = blank or 0-9), change of input current rating for Z600 series from 12 to 9A, change of output ratings for Z200 and Z400 series from 100Vdc to 650Vdc at same overall power, update of list of critical
31183682.011	components due to change of output ratings.
31183682.013	Amendment 3 to CB-report with number 31183682.007 for the change of configure tion to xxx=any number between 010 to 650; yyy=any number between 0.32 to 72 This report replaces the original CB report 31183682.009 for the change of configuration code L2 and change of output current rating from 6A to 1A for series Z600 and from 8A to 1.25A for series Z800. Also the change of output ratings for Z600 and Z800 series from 100Vdc to 650Vdc at same overall power, update of list of critical components due to change of output ratings.
	Amendment 1 to the original CB report 31183682.011 to add "J" to suffix "p" for Japan power cord set and an additional suffix "w" = CO for models in with optional coating (for environmental protection only) used. This report also covers the modification to the CCL to remove some alternate components which were not fully specified and previously listed as "interchangeable".
31183682.015	Amendment 2 to the original CB report 31183682.011 to add alternate PCBs from APCB Inc. to the list of critical components. See the Table 1 for more information. No further testing deemed necessary.
31183682.018	New CB report covers addition of alternate models numbers RMX-41xx, associated trademark "National Instruments", addition of variable "m" in models nomenclature, correction of List of Critical Components, and replacement of Attachment 3 "Transformer Specifications" to meet an actual construction.
31183682.020	Amendment 1 to the original CB report 31183682.018 to add alternate T102 transformer to the list of critical components. No further testing deemed necessary.
31183682.022	Amendment 2 to the original CB report 31183682.018 to 1) correct the test report history: "31183682.020 Amendment 3 to the original CB report

	31183682.015" should be "31183682.020 Amendment 1 to the original CB report 31183682.018"; 2) Clarified Testing dates and Testing location. No further testing deemed necessary.
31183682.023	New CB report covers addition of the National Instruments trademark and models which were inadvertently removed from the previous report. No further testing deemed necessary.
31183682.024	**New CB report to 1) add alternate inrush resistors and to make minor corrections to the list of critical components; 2) update existing attachment 2 and attachment 3 to improve the quality of the Photos and Drawings; 3) include attachment 4 for PCB Layouts, 4) update of the labels artwork due to change of model designation nomenclature. No further testing deemed necessary,**

Tests performed (name of test and test clause):		**Testing location:**
31183682.001		P.O. Box 500 Industrial Zone, Karmiel, Israel
4.4.2.2	Single fault – protective conductor	
4.4.2.6	Single fault – transformers (short / overload)	
4.4.2.7	Single fault – outputs short	
4.4.2.9	Single fault – cooling -ventilation openings blocked -fan(s) stopped	
4.4.2.11	Single fault – bridging of basic insulation	
5.1.3.c	Mains supply	
5.3	Durability of markings	
6	Values in normal condition (6.1.1 / 6.3.1)	
6.3	Discharge tests (6.6.2 / 6.10.3c)	
6.3.1.2	Accessible Current	
6.5.1.3/4	Bonding impedance of equipment	
6.8	Dielectric strength tests + humidity	
7.3	Stability tests	
8.1.1	Static test	
8.1.2	Dynamic test	
8.2	Drop test	
10	Temperature measurements	
10.5.2	Ball pressure test	
Annex D	Working voltages & Creepage and Clearances	

31183682.003		TÜV Rheinland of North America 12 Commerce Road, Newtown, CT 06470, USA
4.4.2.2	Single fault – protective conductor	
4.4.2.7	Single fault – transformers (short / overload)	
4.4.2.8	Single fault – outputs short	
4.4.2.10	Single fault – cooling -ventilation openings blocked -fan(s) stopped	
4.4.2.12	Single fault – bridging of basic insulation	
5.1.3	Mains supply	
5.3	Durability of markings	
6	Values in normal condition (6.1.1 / 6.3.1)	
6.3	Discharge tests (6.6.2 / 6.10.3c)	
6.3.2 b)	Accessible Current	
6.5.2./4	Bonding impedance of equipment	
6.8	Dielectric strength tests + humidity	
7.4	Stability tests	
8.2.1	Static test	
8.2.2	Dynamic test	
8.3	Drop test	
10.1, 10.2, 10.3	Temperature measurements	
10.5.2	Resistance to heat of non-metallic enclosures	
Annex D	Working voltages & Creepage and Clearances	
31183682.005		TÜV Rheinland of North America 12 Commerce Road, Newtown, CT 06470, USA
No testing performed		
31183682.007		TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel
4.4.2.2	Single fault – protective conductor	
4.4.2.7	Single fault – transformers (short / overload)	
4.4.2.8	Single fault – outputs short	
4.4.2.10	Single fault – cooling -ventilation openings blocked -fan(s) stopped	
4.4.2.12	Single fault – bridging of basic insulation	
5.1.3	Mains supply	
Annex D	Working voltages & Creepage and Clearances	

31183682.011 4.4.2.2 Single fault – protective conductor 4.4.2.7 Single fault – transformers (short / overload) 4.4.2.8 Single fault – outputs short 4.4.2.10 Single fault – cooling -ventilation openings blocked -fan(s) stopped 4.4.2.12 Single fault – bridging of basic insulation 5.1.3 Mains supply 5.3 Durability of markings 6 Values in normal condition (6.1.1 / 6.3.1) 6.3 Discharge tests (6.6.2 / 6.10.3c) 6.3.2 b) Accessible Current 6.5.2./4 Bonding impedance of equipment 6.8 Dielectric strength tests + humidity 7.4 Stability tests 8.2.1 Static test 8.2.2 Dynamic test 8.3 Drop test 10.1, 10.2, 10.3 Temperature measurements 10.5.2 Resistance to heat of non-metallic enclosures Annex D Working voltages & Creepage and Clearances	TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel
31183682.013 / 31183682.015 No testing performed	TÜV Rheinland of North America 12 Commerce Road, Newtown, CT 06470, USA
31183682.018 No testing performed	TDK-Lambda Ltd. 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel
31183682.020 No testing performed	TÜV Rheinland of North America 1279 Quarry Lane, Suite A, Pleasanton, CA, 94566, USA
31183682.022 No testing performed	TÜV Rheinland of North America 1279 Quarry Lane, Suite A, Pleasanton, CA, 94566, USA
31183682.023 No testing performed	TÜV Rheinland of North America 1279 Quarry Lane, Suite A, Pleasanton, CA, 94566, USA
31183682.024 **No testing performed**	**TÜV Rheinland of North America** **1279 Quarry Lane, Suite A, Pleasanton, CA, 94566, USA**

Summary of compliance with National Differences (List of countries addressed):

All EC countries are covered by the report. National Differences for Canada, Switzerland, and United States are addressed in Attachment 1.

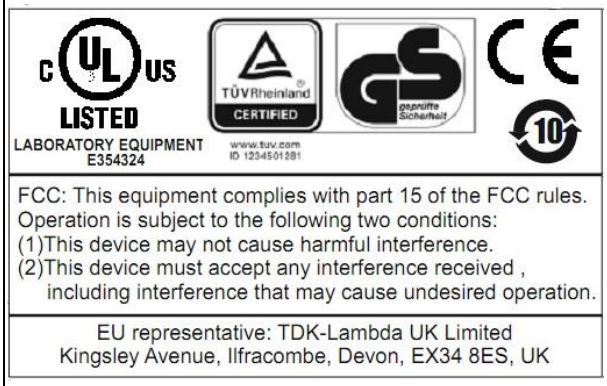
☒ **The product fulfils the requirements of** EN 61010-1: 2010 (3rd Edition)

Copy of marking plate:

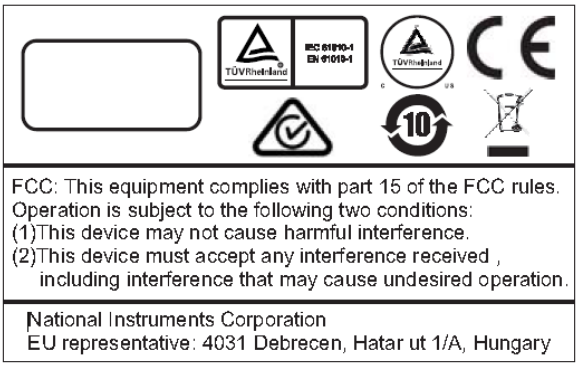
The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Main marking plate

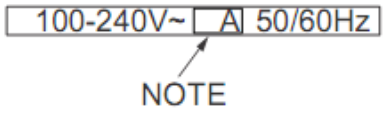
Z+ series



RMX series

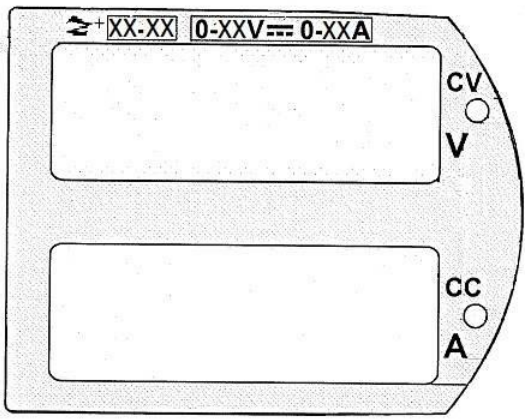


Input rating label (located on rear side near to appliance inlet)

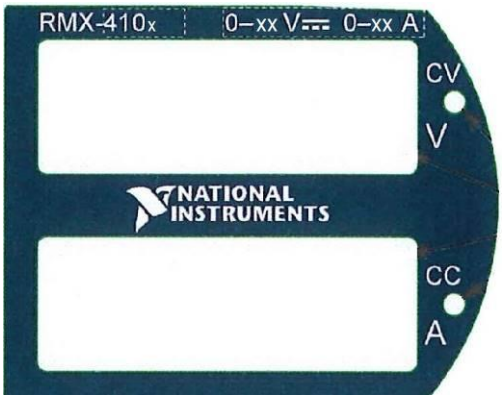


NOTE
1. Z200 or RMX-4101 series – 3A
2. Z400 or RMX-4102 series – 6A
3. Z600 or RMX-4103 series – 9A
4. Z800 or RMX-4104 series – 12A

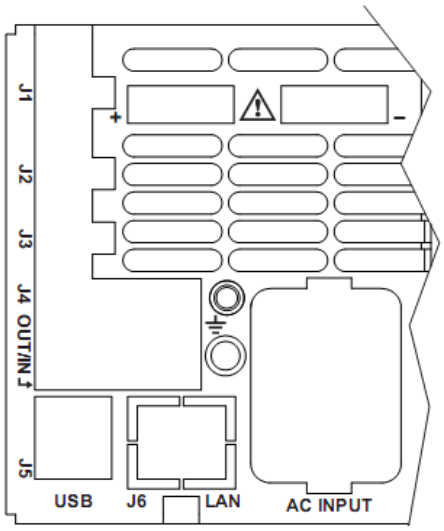
Front screening



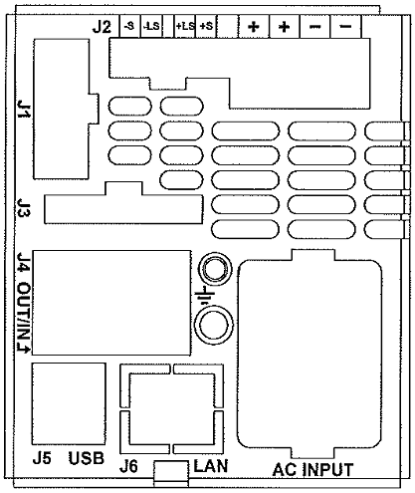
Z+ series



series RMX

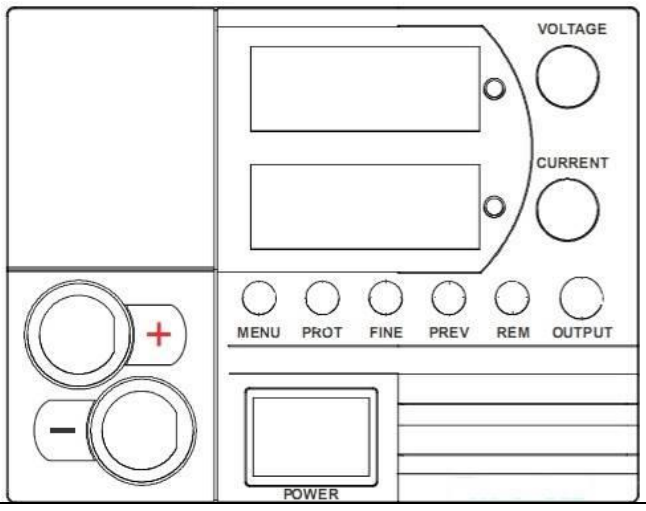


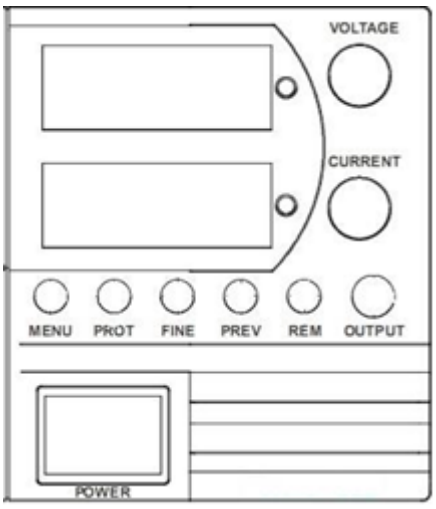
rear side screening



Standard

Wide body enclosure, front side screening
Standard enclosure, front side screening





Test item particulars:	
Type of item .....:	Laboratory
Description of equipment function.....:	Programable power supply
Connection to MAINS supply.....:	Detachable cord set
Overvoltage category.....:	II
POLLUTION DEGREE.....:	2
Means of protection .....:	Class I (PE connected)
Environmental conditions .....:	Extended (Specify): max. ambient-50°C, altitude-3000m
For use in wet locations.....:	No
Equipment mobility .....:	Portable
Operating conditions.....:	Continuous
Overall size of equipment (W x D x H).....:	Standard enclosure: 70X350X83; Wide body enclosure: 105/350/83
Mass of equipment (kg).....:	Standard enclosure: 1.9 kg max; Wide body enclosure: 2.4 kg max.
Marked degree of protection to IEC 60529.....:	Not marked, IPX0
Classification of installation and use .....:	Class I
Supply Connection.....:	Appliance Inlet and Detachable cord set
.....:	
Possible test case verdicts:	
- Test case does not apply to the test object.....:	N/A
- Test object does meet the requirement .....:	P (Pass)
- Test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	11/11/2011 - 31183682.001 12/03/2012 - 31183682.003 N/A - 31183682.005 12/19/13 - 31183682.007 04/02/14 - 31183682.011 N/A-31183682.013 N/A-31183682.015 N/A-31183682.018 N/A-31183682.020 N/A-31183682.022 N/A-31183682.023 **N/A-31183682.024**
Date (s) of performance of tests.....:	11/11/2011 – 11/29/2011 - 31183682.001 01/21 – 01/25/2013 - 31183682.003 N/A - 31183682.005 12/19/13-12/23/13 - 31183682.007 04/02/14 – 05/18/14 - 31183682.011 N/A-31183682.013 N/A-31183682.015 N/A-31183682.018 N/A-31183682.020 N/A-31183682.022 N/A-31183682.023 **N/A-31183682.024**

General remarks:	
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 Form A.xx)" refers to a table appended to the report. Bottom lines for measurement tables Form A.xx are optional if used as record. Throughout this report a ☐ comma / ☒ point is used as the decimal separator.	
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)……..:	TDK-Lambda Ltd., 56 Haharoshet St., P.O.B. 500 Karmiel Industrial Zone Karmiel 2161401, Israel

General product information and other remarks:
Description of unit:

Z200 **or** RMX-4101 series, Z400 **or** RMX-4102 series, Z600 **or** RMX-4103 series and Z800 **or** RMX-4104 series are family of switching mode programmable power supplies with output rating as listed below:
1. Z200 **or** RMX-4101 series - from 0-10VDC/0-20A to 0-650VDC/0-0.32A, 220W max.
2. Z400 **or** RMX-4102 series - from 0-10VDC/0-40A to 0-650VDC/0-0.64A, 432W max.
3. Z600 **or** RMX-4103 series - from 0-10VDC/0-60A to 0-650VDC/0-1A, 682W max.
4. Z800 **or** RMX-4104 series - from 0-10VDC/0-72A to 0-650VDC/0-1.25A, 864W max.

Z200/RMX-4101 and Z400/RMX-4102 series, Z600/RMX-4103 and Z800/RMX-4104 series in pairs are fully identical (el. schematic, construction, PCB, components) except for some components influence of that covered by Temperature Test done for both series.
All series are constructed in two variants of enclosure.
-Standard: standard output located on the rear, no possibility to install an optional modules except for LAN;
-Wide body: two variants of wide body enclosure:
- standard output located on the rear, additional section for optional IEEE card and Isolated Analog card;
- output on front side (binding post), additional section for optional IEEE card and Isolated Analog card.

Description of model differences.

Z200 **or** RMX-4101 series, Z400 **or** RMX-4102 series, Z600 **or** RMX-4103 series and Z800 **or** RMX-4104 series
Configuration Code: Zxxx-yyy-o-p**/**w**/**m**mmmm** or RMX-410z-xxx- yyy-o-p**/**w**/**m**mmmm**
where:
z=1, 2, 3 or 4 (for RMX series only)
xxx = max. output voltage, may be any between 10 and 650;
yyy = max. output current, may be any between 72 and 0.32;
o=options, may be one or combination of some from listed below:
blank- standard model (without an additional modules installed, standard enclosure);
L - lab. option: output on front side-binding post (wide body enclosure, standard connectors, models with output up to 60VDC);
L2 - lab. option: output on front side-binding post (wide body enclosure, isolated CATIII type connectors, all models);
IEEE- fitted with optional IEEE communication module (wide body enclosure);
IS420-fitted with optional current mode Isolated Analog module (wide body enclosure);
IS510-fitted with optional voltage mode Isolated Analog module (wide body enclosure);
LAN- fitted with optional LAN communication module (standard and wide body enclosure)
p=optional power cord set provided with unit, may be as following:
blank- power cord set not provided with unit;
E- power cord set for Europe;
I- power cord set for Israel;
J-power cord set for Japan;
U- power cord set for US/Canada.
w=CO-optional coating used for environmental protection only,
=CC-Conformal Coating
=NC-Nakamura Choukou
=blank-coating not used.
m= blank or any combination of letters and numbers (not related safety)

Description of special features.
(HV circuits, high pressure systems etc.)