TDK-Lambda UK Limited
Kingsley Avenue, Ilfracombe
Devon, EX34 8ES, United Kingdom
Tel: +44 (0) 1271 856600
Fax: +44 (0) 1271 864894
www.emea.lambda.tdk.com/uk

EU DECLARATION OF CONFORMITY

CE

Vega DC Series

We, TDK Lambda UK Limited, of Kingsley Avenue, Ilfracombe, Devon, EX34 8ES declare under our sole responsibility that the TDK-Lambda power supplies, as detailed on the attached products covered sheets, comply with the provisions of the following European Directives and are eligible to bear the CE mark:

Low Voltage	Directive 2014/35/EU
RoHS	Directive 2011/65/EU (as amended by 2015/863)

Assurance of conformance of the described product with the provisions of the stated EC Directive is given through compliance to the following standards:

Electrical Safety (LVD)	EN 62368-1:2014/AC:2015
Restriction of Hazardous Substances (RoHS)	EN 63000:2018

Our representative in the EU is TDK-Lambda Germany GmbH, located at Karl-Bold-Str. 40, 77855 Achern, Germany.

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UK DECLARATION OF CONFORMITY

Vega DC Series

We, TDK Lambda UK Limited, of Kingsley Avenue, Ilfracombe, Devon, EX34 8ES declare under our sole responsibility that the TDK-Lambda power supplies, as detailed on the attached products covered sheets, comply with the provisions of the following European Directives and are eligible to bear the UKCA mark:

Electrical Equipment (Safety) Regulations 2016

Restriction of the Use of Certain Hazardous Substances in Electrical & Electronic Equipment Regulations 2012

Assurance of conformance of the described product with the provisions of the stated UK Regulation is given through compliance to the following standards:

Electrical Safety	EN 62368-1:2014/AC:2015
Restriction of Hazardous Substances (RoHS)	EN 63000:2018

Vega DC Series Products Covered

Unit Configuration Code:

a) V0, K0 or Vega DC
(may be prefixed by NS - # / or - where # may be any characters indicating non-safety related model differences.
b) followed by: F, R or C
where F = Standard fan, forward airflow
R = Standard fan, reverse air
C = Customer air
c) optionally followed by: F, S
where F = Fast-on or quick connect input terminals
S = Screw input terminals
d) optionally followed by S
where S = Standard filter
e) optionally followed by: E, F, EV, FV or D

where E = DC input fail with PSU & fan enable and 5V aux supply
F = DC input fail with PSU & fan inhibit and 5V aux supply
EV = DC input fail with PSU & fan enable and 5V/300mA aux supply
FV = DC input fail with PSU & fan inhibit and 5V/300mA aux supply
D = Primary digital option. Provides PSU inhibit and enable, fan monitor, standby supply, hours of operation, serial numbers, mains fail, over temperature warning. When secondary digital options fitted also provides status bytes, unit and module IDs, grouping, digital voltage and current limit programming, secondary inhibit and enable, secondary turn on delay, global and secondary module good, module monitoring.

Module Configuration Code:

B@, C@, C1Y, D@, E@, F1, F2, H@/@ or H@_@, L@, W2 or W5

where the letter represents a module and @ is a number between 1 and 5, which represents the number of turns on the transformer secondary. By reference to the following table, this in turn defines the permitted voltage range of the module.

@ may optionally be followed by the letter L or H, where L and H indicate the low or high output voltage variants of the module.

For W2 & W5 modules only: @ is followed by F or T, indicating fixed or tracking OVP.

Followed by F or S, where F indicates fast-on output terminals and S indicates screw output terminals.

or Z#
where # is a number between 1 and 99. This code represents any two of the above modules that have had their outputs paralleled together. The number # is a module reference number and does not represent the number of turns. May optionally followed by F or S, where F indicates fast-on output terminals and S indicates screw output terminals.

or BB@, CC@, DD@, EE@, HH@/@ or HH@_@, JJ@/@ or JJ@_@, LL@, C5B4 or B5B4
where @ is a number between 1 and 5, which represents the number of turns on the transformer secondary. For HH@/@ the code represents one H module that has had its two outputs connected in series. For all other variants this code represents two modules, selected from those listed above, that have had their outputs connected in series. May optionally followed by F or S, where F indicates fast-on output terminals and S indicates screw output terminals.

Note: Seriesed outputs may make all outputs hazardous, see Electrical & Thermal Ratings section for details. JJ@/@ or JJ@_@, modules are HH@/@ or HH@_@, or modules with reduced OVP and/or current ratings.

or X1, X2, X4 or X8

where the number relates to the maximum voltage capability of the X module in accordance with X1=10V, X2=20V, X4=40V, X8=80V. The X module is connected to the output terminals of D or E modules, which may be connected in series or parallel. The X module contains diodes in series with its output (for paralleling use) and additional circuitry for remote sense, paralleling with other X modules and module inhibit. A maximum of two X modules may be fitted in a PSU.

or B/S where B/S indicates that a blanking plate is fitted in place of a module.

Any of the above modules (except the X modules) may have the module letter preceded with # or #/# where # is represents the module output voltage.

Module Options:

N, P, R, T, L, K, D, V‡ or R‡

Where:

N = Inhibit, module good and remote sense

P = Parallel with current share

R = Remote sense (twin output modules only)

T = Remote sense (one output of twin output modules only)

L = Module good using LED indication

K = Allows for Vega products to be paralleled with Omega products

D = Secondary digital option (may only be fitted to single output modules). Provides analogue voltage and resistive programming, current limit modes, inhibit output, enable output, turn on delay, module good, N+1 paralleling.

V‡ = Voltage programmable output voltage

R‡ = Resistance programmable output voltage

where ‡ represents a number between 1 and 99. Each number indicates an option variant which does not affect safety, of these the following are standard variants:

1 = Inhibit, fixed current limit

2 = Inhibit, programmable current limit

3 = Enable, fixed current limit

4 = Enable, programmable current limit

<u>SELV and Outputs Connected In Series:</u>

Outputs are SELV except as described below:

- Non-earthed outputs that have secondaries with 2 or more turns are non-SELV as a single fault in the secondary may make them exceed the SELV limit between output and earth.
- Non-earthed outputs that are connected in series are non-SELV unless all the seriesed outputs use 1 turn secondaries and there are no more than 3 outputs connected in series.
- Outputs connected in series are non-SELV if the total output voltage + 20% of the max. rated output voltage of the output with the highest rated voltage exceeds 60Vdc (the 20% addition allows for a single fault in any one individual channel).
- The total voltage of a seriesed output must not exceed 160V.
- If any output or seriesed output is non-SELV then all the outputs in the PSU must be considered non-SELV.
- All outputs have operational spacings to earth, and due consideration must be given to this in the end product design.

Note: Non-SELV outputs must be guarded or a deflector fitted during installation to avoid a service engineer making inadvertent contact with the output terminals, or dropping a tool onto them.

ELECTRICAL & THERMAL RATINGS:

Input Ratings

Nominal input voltage	48V dc
Input voltage range	34 - 75 V dc
Maximum Input Current	17.5A dc
Inrush Current	<40A AT 25°C

Adjustment and Derating:

The Vega DC series is designed to provide a max power of 450W at nominal output voltages. The following procedurre must be used to ensure the PSU is operated within its ratings:

-Calculate user power for each module (volts x amps)
-Add all individual module powers together. The total power must not exceed the value given
-Calculate secondary transformer turns x amps for each module. See the outputs table for transformer secondary turns
-Add all modules turns x amps together and this must not exceed amperturns
-If necessary reduce the loading untill the conditions are met, ie. Power and amper-turns maxima

Output modules:

Module	Output Voltage	Current	Power	Occupied Slots	Secondary Turns	Ampere Turns	Max Current Limit	Setting for Hazardous Energy
B1L	1.8 – 3.8V	20A	76W	1	1	20	25A	-
B1H	3.9 – 5.5V	20A	110W	1	1	20	25A	-
B2	5 – 9V	25A	225W	1	2	50	31.3A	> 7.6V
B3	9.1 – 16.2V	12A	195W	1	3	36	15A	> 16V
B5	21.6 – 31V	6A	186W	1	5	30	7.5A	-
C1	1.8 – 4.1V	35A	144W	1	1	35	43.8A	-
C1Y	1.8 – 4.1V	40A	164W	1	1	40	50A	-
C3	9.1 – 16.2V	18A	292W	1	3	54	22.5A	> 10.6V
C4	16.3 – 21.5V	14A	301W	1	4	56	17.5A	> 13.7V
C5	21.6 – 31V	10A	310W	1	5	50	12.5A	> 19.2V
D1L	1.8 – 3.8	50A	190W	1.5	1	50	62.5A	-
D1H	3.9 – 5.5	50A	275W	1.5	1	50	62.5A	> 3.8V
D2	3.8 – 9V	45A	405W	1.5	2	90	56.25A	> 4.2V
D3	8 – 16.5V	24A	396W	1.5	3	72	30A	> 8V
D4	14 – 21.5V	18A	387W	1.5	4	72	22.5A	> 10.6V
D5	21 – 28V	15A	420W	1.5	5	75	18.75A	> 12.8V
E1	1.8 – 3.8V	60A	228W	2	1	60	75A	> 3.2V
E2	3.8 – 8V	60A	480W	2	2	120	75A	> 3.2V
E3L	8 – 13.9V	40A	556W	2	3	120	50A	> 4.8V
E3H	14 – 15V	36A	540W	2	3	108	45A	> 5.3V
E4	14 – 19.9V	30A	597W	2	4	120	37.5A	> 6.4V
E5L	20 – 24V	27A	648W	2	5	135	33.8A	> 7.1V
E5H	24 – 28V	25A	700W	2	5	125	31.3A	> 7.6V
F1	1.8 – 3.8V	80A	304W	2	1	80	100A	-
F2	3.8 – 8V	80A	640W	2	2	160	100A	> 7.6V
H1L/1L	1.8-3.8/1.8-3.8V	12A/8A	46W/31W	1	1/1	12/8	15A/12A	-
H1L/1H	1.8-3.8/3.9-5.5V	12A/8A	46W/44W	1	1/1	12/8	15A/12A	-
H1H/1L	3.9-5.5 /1.8-3.8V	12A/8A	66W/31W	1	1/1	12/8	15A/12A	-
H1H/1H	3.9-5.5 /3.9-5.5V	12A/8A	66W/44W	1	1/1	12/8	15A/12A	-
H1L/2	1.8-3.8/5-9V	12A/6A	46W/54W	1	1/2	12/12	15A/9A	-

Module	Output Voltage	Rated Current	Power	Occupied Slots	Secondary Turns	Ampere Turns	Max Current Limit	Setting for Hazardous Energy
H1H/2	3.9-5.5/5-9V	12A/6A	66W/54W	1	1/2	12/12	15A/9A	-
H1L/3	1.8-3.8/9.1-16.2V	12A/6A	46W/98W	1	1/3	12/18	15A/9A	-
H1H/3	3.9-5.5/9.1-16.2V	12A/6A	66W/98W	1	1/3	12/18	15A/7.5A	-
H1L/4	1.8-3.8/16.3-25V	12A/4.5A	46W/113W	1	1/4	12/18	15A/6A	-
H1H/4	3.9-5.5/16.3-25V	12A/4.5A	66W/113W	1	1/4	12/18	15A/6A	-
H2/1L	5.6-9/1.8-3.8V	10A/8A	90W/31W	1	2/1	20/8	15A/12A	-
H2/1H	5.6-9/3.9-5.5V	10A/8A	90W/44W	1	2/1	20/8	15A/12A	-
H2/2	5.6-9/5.6-9V	10A/6A	90W/54W	1	2/2	20/12	15A/9A	-
H2/3	5.6-9/9.1-16.2V	10A/6A	90W/98W	1	2/3	20/18	15A/7.5A	-
H2/4	5.6-9/16.3-25V	10A/4.5A	90W/113W	1	2/4	20/18	15A/6A	-
H3/1L	9.1-16.2/1.8-3.8V	10A/8A	162W/31W	1	3/1	30/8	15A/12A	>16V/N/A
H3/1H	9.1-16.2/3.9-5.5V	10A/8A	162W/44W	1	3/1	30/8	15A/12A	>16V/N/A
H3/2	9.1-16.2/5.6-9V	10A/6A	162W/54W	1	3/2	30/12	15A/9A	>16V/N/A
H3/3	9.1-16.2/9.1-16.2V	10A/6A	162W/98W	1	3/3	30/18	15A/7.5A	>16V/N/A
H3/4	9.1-16.2/16.3-25V	10A/4.5A	162W/113W	1	3/4	30/18	15A/6A	>16V/N/A
H5/1L	16.2-31/1.8-3.8V	5A/8A	155W/31W	1	5/1	25/8	7.5A/12A	-
H5/1H	16.2-31/3.9-5.5V	5A/8A	155W/44W	1	5/1	25/8	7.5A/12A	-
H5/2	16.2-31/5.6-9V	5A/6A	155W/54W	1	5/2	25/12	7.5A/9A	-
H5/3	16.2-31/9.1-16.2V	5A/6A	155W/98W	1	5/3	25/18	7.5A/7.5A	-
H5/4	16.2-31/16.3-25V	5A/4.5A	155W/113W	1	5/4	25/18	7.5A/6A	-
L1	4.2 – 5.5V	35A	193W	1	1	35	43.8A	>5.4V
W2	0.25 – 7.5V	30A	225W	1	2	60	37.5A	>6.4V
W5 (STD)	0.25 – 32V	8.5A	272W	1	5	42.5	10.6A	>22.6V
W5 (high current O/P)	0.25 – 15V	10A	150W	1	5	50	13.0A	-
	15.01 – 32V	8.5A	272W	1	5	42.5	10.6A	>22.6V
W8	1 – 48V	5A	240W	1	8	40	7.25A	>33V
X1/XR1	10V (see Note 1)	90A	See Note 2	1	-	-	-	-
X2/XR2	20V (see Note 1)	64.5A	See Note 2	1	-	-	-	-
X4/XR4	40V (see Note 1)	32.4A	See Note 2	1	-	-	-	-
X8/XR8	80V (see Note 1)	16.2A	See Note 2	1	-	-	-	-
BB4	32.6 - 43V	10A	430W	2	8	80	12.5A	>19.2V
CC3	18.2 - 32.4V	18A	583W	2	6	108	22.5A	>10.6V
CC5	48.1 - 62V	10A	620W	2	10	100	12.5A	>19.2V
DD4	28 - 43V	18A	774W	3	8	144	22.5A	>10.6V
DD5	42 - 56V	15A	840W	3	10	150	18.75A	>12.8V
EE2	7.6 - 16V	55A	880W	4	4	220	75A	>3.2V
HH5/3	25.3 – 44.2V	5A	221W	1	8	40	7.5A	>32V
HH5/4	32.5 - 53V	4.5A	238.5W	1	9	40.5	6A	>40V
C5B4	43 - 48V	10A	480W	2	9	90	12.5A	>19.2V
Z2 (D1L+D1L)	1.8 - 3.8V	95A	361W	3	1/1	95/95	125A	>1.9V
Z3 (E1+E1)	1.8 - 3.8V	114A	433W	4	1/1	114/114	150A	>1.6V
Z4 (D1H+D1H)	3.9 - 5.5V	95A	523W	3	1/1	95/95	125A	>1.9V
Z6 (E2+D1H)	3.9 - 5.5V	104.5A	575W	3.5	2/1	209/104.5	137.5A	>1.7V

Module	Output Voltage	Rated Current	Power	Occupied Slots	Secondary Turns	Ampere Turns	Max Current Limit	Setting for Hazardous Energy
Z7 (D3+D3)	8 - 16.5V	45.6A	752W	3	3/3	136.8/136.8	60A	>4V
Z18 (L1+L1)	4.5 - 5.5V	66.5A	366W	2	1/1	66.5/66.5	87.5A	>2.7V

Note 1: Actual voltage and current output of an X module is dependent, and limited by, the ratings of the modules from which it is fed. The ratings given above are additional rating limitations imposed by the X module itself.

Note 2: The maximum power output of PSUs fitted with X modules is reduced from 450W by the following power: 0.55 x (total X1 current) + 0.7 x (total X2 & X4 current) + 0.9 x (total X8 current).
Note 3: 'Z' modules are designed as follows:

Z2 = D1L+D1L
Z3 = E1+E1
Z4 = D1H+D1H
Z6 = E2+D1H
Z7 = D3+D3
Z18 = L1+L1

Additional module limitations:
E2 module fitted in slots 4/5 is limited to 55A.
C1Y module can only be fitted in slot 1.
F1 module is only permitted in slots 1 and 2.
F2 module may only be fitted in slots 1 and 2 and is limited to 75A for ambient temperatures of greater than 45°C.

For PSUs with three D modules fitted:
D1L & D1H in slots 2/3 is limited to 42A and in slots 4/5 is limited to 47A
D2 in slots 2/3 is limited to 40A

PSUs fitted with a W2 module are limited to a maximum ambient of 45°C.

All the above ratings and limitations apply to the individual modules from which a series or paralleled pair is made.

Cooling for unit:

The following method must be used for determining the safe operation of PSUs.

The components listed in the following table must not exceed the temperatures given. To determine the component temperatures the heating tests must be conducted in accordance with the requirements of the applicable standards. Consideration should also be give to the requirements of other safety standards.

Test requirements include: PSU to be fitted in its end-use equipment and operated under the most adverse conditions permitted in the end-use equipment handbook/specification and which will result in the highest temperatures in the PSU. To determine the most adverse conditions consideration should be given to the end use equipment maximum operating ambient, the PSU loading and input voltage, ventilation, end use equipment orientation, the position of doors & covers, etc. Temperatures should be monitored using type K fine wire thermocouples (secured with cyanoacrylate adhesive or similar) placed on the hottest part of the component (out of any direct airflow) and the equipment should be run until all temperatures have stabilised.

Cooling Option	Max Ambient	Input Voltage	Max Power	Max AT (total)	Module Current Rating
F	50	34	344	140	100%
		36	360	140	100%
		44 - 75	450	180	100%
R	50	34	300	145	100%
		36	320	145	100%
		44 - 75	420	165	100%
C	50	See Customer Air Cooling section for ratings			

Power and AT (Ampere Turns) ratings may be interpolated.
Ampere Turns is the sum of (output amps x secondary turns)

Customer Air Cooling (option C):

The following method must be used for determining the safe operation of PSUs when C option (Customer Air) is fitted, ie fan not fitted to PSU.

For PSUs cooled by customer supplied airflow the components listed in the following table must not exceed the temperatures given. Additionally ratings specified for units with an internal fan must still be complied with, eg mains input voltage range, maximum output power, ampere turns, module voltage / current ratings and maximum ambient temperature. To determine the component temperatures the heating tests must be conducted in accordance with the requirements of IEC60950-1 Clause 4.5. Consideration should also be give to the requirements of other safety standards.

Test requirements include: PSU to be fitted in its end-use equipment and operated under the most adverse conditions permitted in the end-use equipment handbook/specification and which will result in the highest temperatures in the PSU. To determine the most adverse conditions consideration should be given to the end use equipment maximum operating ambient, the PSU loading and input voltage, ventilation, end use equipment orientation, the position of doors & covers, etc. Temperatures should be monitored using type K fine wire thermocouples (secured with cyanoacrylate adhesive or similar) placed on the hottest part of the component (out of any direct airflow) and the equipment should be run until all temperatures have stabilised.

Circuit Ref.	Description	Max. Temperature (°C)
-	Power transformer primary, secondary and core	130
T1, TX101, TX201	Module current transformer windings	127
XQ1, XTR1	E, EV, F & FV Primary option transformers	90
L1, XT601	Choke winding	127
L4, T2	Choke winding	117
Various	All other choke & transformer windings	140
Various	All X capacitors and electrolytic capacitors	105

Alpha Series Signature Page

Name of Authorized Signatory	Christopher Haas
Signature of Authorized Signatory	
Position of Authorized Signatory	Head of Quality & Compliance Europe
Date	23 September 2021
Date when this CE declaration first issued	26 March 2004
Date when this UKCA declaration first issued	6 April 2021
Place where signed	Achern, Germany

This declaration is signed for and on behalf of TDK-Lambda