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TDK·Lambda

MU4 Series

https://emea.lambda.tdk.com/mu
https://product.tdk.com/en/power

Medical Industrial Test Broadcast Comms Renewable

600W / 800W
1U Modular power supply

Features	Benefits
• Extremely low audible noise fan	Enhanced patient / user experience
• BF ready medical isolation (MOPP)	Eases design into systems (including BF)
• Up to 5 outputs	Eliminates need for additional supplies
• PMBus™ communication option	Remote monitoring and control
• 7 year warranty	Low cost of ownership



Input

Output power	600W	800W
Input voltage	85-264Vac (Contact sales for operation below 90Vac)	180-264Vac
Frequency	47 - 63 Hz (440Hz with reduced PFC)	
Input fuses	10A / 250Vac HBC Fast acting (not user accessible) in both Live and Neutral lines (single fusing optional)	
Inrush current	<45A at 25°C and 264Vac (cold start)	
Leakage current	300µA max	
Touch current	<100µA	
Power factor	> 0.9 (at 230Vac, 100% load)	

Isolation

Input to output / signals	Reinforced	2 x MOPPs (3rd edition 60601) 4kVac, 5.7kVdc type tested to 4kVac (equivalent to 5.7kVdc), production tested to 4.3kVdc.
Input to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to earth	Basic	1 x MOPP, 1.5kVac
Output / signals to output / signals	Basic	200Vdc (1 x MOPP between modules is available, contact sales for details)

How To Create A Product Description

The extensive range of output modules and options make it possible to achieve almost any combination of Volts and Amps. You can create your own MU configuration online at https://config.emea.tdk-lambda.com/. This method checks your configuration and offers the optimum solution. Alternatively, you can do this manually by using the guide below.

1. Calculate total output power to select the appropriate converter, then select required Cooling, Input Connection, Input Fuse, Leakage Current and Controls/Signals from the following table:
2. Select Output Modules using the output voltages tables and the module specifications.
3. Contact TDK-Lambda to validate configuration and issue a part number.

MU4	F	S	D	L	T5H

Converter 4 slots wide	MU4	600W low line, 800W high line
Cooling	F	**Variable speed Forward air - standard**
Input Connection	S	Screw
Input fuse	D	Dual AC fuses
	E	Single AC fuse in Live line (contact sales for details)
Standby / Signals	blank	none
	E5H	5V / 2A, AC good + Enable
	T5H	5V / 2A, AC good + Inhibit
	Q5H0000	5V / 2A, see PMBus™ app note
see specification page for details		
Leakage Current (max at 264Vac, 63Hz)	L	300µA

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Possible Outputs - see individual module data for full specifications

Module name	Slots used	Output voltage range			Maximum Output Current	Maximum Output Power
SB	1	3.3V	-	6V	30A	150W
ZC	2	3.3V	-	6V	54A	260W
SB	1	6V	-	15V	20A	240W
YC	2	6.6V	-	12V	30A	300W
YC	2	12V	-	30V	20A	480W
SB	1	15V	-	30V	10A	240W
SB	1	30V	-	52V	5A	240W
YC	2	30V	-	60V	10A	480W
YC	2	60V	-	104V	5A	480W

Note. 'Maximum Output Current' and 'Maximum Output Power' above are the maximum available from the module. It is not possible to exceed the 'Output Power' of the unit given on the previous page.

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Output Specification		
Turn on time	2s max	at 85Vac (180Vac for 800W) and 100% rated output power
Efficiency	Up to 90%	230Vac, 100% rated power, 25°C, configuration dependent
Hold up	12ms min 10ms min	at 600W output power (for 30-52Vdc SB module and 60 -104Vdc YC module, 9ms min) at 800W output power (for 30-52Vdc SB module and 60 -104Vdc YC module, 7ms min)
Over temperature protection	Yes	converter protection shuts down all outputs (except standby supplies) and fan, auto restarts. Shutdown temperature varies according to ambient, output power and input voltage.

Environment	
Temperature	-20°C to 70°C operational, -40°C to 70°C storage.
Derating	50°C to 70°C derate total output power and each output current by 2.5% per °C
Low temperature startup	-40°C, all specification parameters may not be achieved
Audible noise	As low as 36dBA, 25°C, 115Vac/240Vac and 80% unit power (fan speed increases with load / temperature)
Humidity	5 - 95% RH non condensing
Shock	±3 x 30g shocks in each plane, total 18 shocks (11ms (+/-0.5msec), half sine) Conforms to EN60068-2-27, EN60068-2-47, IEC68-2-27, IEC68-2-47, JIS C0041-1987. Conforms to MIL-STD-810G, Method 516.6, Pro IV
Vibration	Single axis 10 - 500 Hz at 2g (sweep and endurance at resonance) in all 3 planes Conforms to EN60068-2-6, IEC68-2-6 Conforms to MIL-STD-810G, Method 514.6, Pro I
Altitude	5000 metres operational (4000 metres for 60601-1), 5000 metres storage/transportation
Pollution	Degree 2, Material group IIIb
IP Rating	IPX0

Emissions EN61000-6-3:2007, EN60601-1-2:2015 - see application notes for best installation practice		
Radiated electric field	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants
Conducted emissions	EN55011, EN55032	(as per CISPR.11/32) Class B, FCC47 part 15 subpart B - 'L' leakage current variants
Conducted harmonics	EN61000-3-2	Class A and Class C
Flicker	EN61000-3-3	Compliant - d_{max} only

Immunity EN61000-6-2:2005, EN60601-1-2:2015 - see application notes for best installation practice				Criteria
Electrostatic discharge	EN61000-4-2	Level 4	F type cooling only	A
Electromagnetic field	EN61000-4-3	Level 3	Proximity fields, EN60601-1-2, Levels as defined in standard, Criteria A	A
Fast / burst transient	EN61000-4-4	Level 4	Tested at 5kHz and 100kHz	A
Surge immunity	EN61000-4-5	Level 3		A
Conducted RF immunity	EN61000-4-6	Level 3		A
Power frequency magnetic field	EN61000-4-8	Level 4		A
Voltage dips, variations, interruptions	EN61000-4-11	Class 3	Criteria B for 5s and 1 cycle interruptions	A
Voltage sags	Semi F-47	compliant	above 180Vac input	
Ring wave	EN61000-4-12	Level 3		A
Voltage fluctuations	EN61000-4-14	Class 3	See EMC report for full details.	A

Approvals / Accreditations	
IEC/EN 62368-1, UL62368-1 / CSA 22.2 No 62368-1	File E135494
IEC/EN 60950-1, UL60950-1 / CSA 22.2 No 60950-1	File E135494
IEC/EN 60601-1, UL/CSA 60601-1, ANSI/AAMI ES60601-1, CAN/CSA-C22.2 No 60601-1	File E349607
IEC/EN 61010-1	Designed to meet
CE Mark (EN62368-1)	Low Voltage Directive (LVD), electromagnetic compatibility (EMC) and Restriction of Hazardous Substances (RoHS)
UKCA (EN62368-1)	Electrical Equipment (Safety) Regulations, electromagnetic compatibility (EMC) and Restriction of Hazardous Substances (RoHS)
CB certificate and Report available on request	
Designed and manufactured under the control of ISO9001 and ISO13485 (including risk management).	

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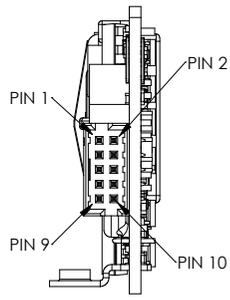
Standby / Signals	
Maximum power per channel	See table below
Available signals (Exx or Txx type)	PSU inhibit (Txx type) or enable (Exx type), AC Good
Available signals (Qxx type)	PMBus™ control of power supply fan speed and fail warning Serial number, date of manufacture, run time, on/off power cycles For further details, see the product range application notes, PMBus™ section

Available Output Voltages (at PSU signal connector)

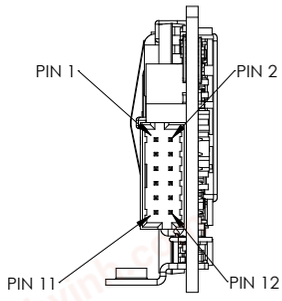
Option type	Standby 1			PSU on/off
	V	Max Current	Power	
E5H	5V	2A	10W	Enable
T5H	5V	2A	10W	Inhibit
Q5H0000	5V	2A	10W	see PMBus™ application note

Conector information	
10 way housing	Molex 51110-1060
12way housing	Molex 51110-1260
Crimp terminal	Molex 50394

Txx or Exx option	
Pin	5H
1	Standby +
2	Standby -
3	Do not connect
4	Do not connect
5	PSU on/off+
6	PSU on/off-
7	AC fail Out
8	AC fail Rtn
9	Fan fail Out
10	Fan fail Rtn



Pin	Q5Hxxxx option
1	Standby +
2	Standby -
3	Do not connect
4	Fan fail
5	Address 0
6	Address 1
7	Address 2
8	Address 3
9	SCL - Clock
10	SDA - Data
11	Control line in
12	GND



Output Specification		
Rise time	<30ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Ripple and noise	<2%	pk-pk, using 20MHz bandwidth
Voltage setting accuracy	<3%	of set voltage
Remote sense	No	
Minimum load	0W	on any output
Temperature coefficient	0.02%	of rated voltage per °C
Load regulation	<1.0%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	<0.4%	for 100% load change on any output
Transient deviation	<5%	of set voltage for 25-50% load change
Recovery	1ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, output shuts down, cycle ac to reset
Over current protection	Constant Current	Auto recovers
Short circuit protection	Constant Current	Auto recovers

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SB Module - single slot width, 1 output channel

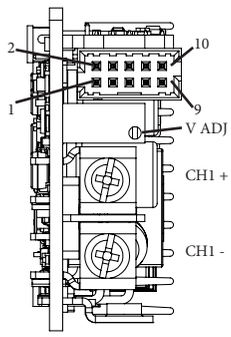
Maximum power per channel	see table below
Available signals	Remote sense, module good, module inhibit or enable (Note 1:)

Conector information	
10 way housing	Molex 51110-1060
Crimp terminal	Molex 50394

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output power	Max Capacitive Load
3.3	-	6.0	30A	150W	500µF/A
6	-	15	20A	240W	500µF/A
15	-	30	10A	240W	500µF/A
30	-	52	5A	240W	200µF/A

Note 1: Current share is only available on ZC module pair



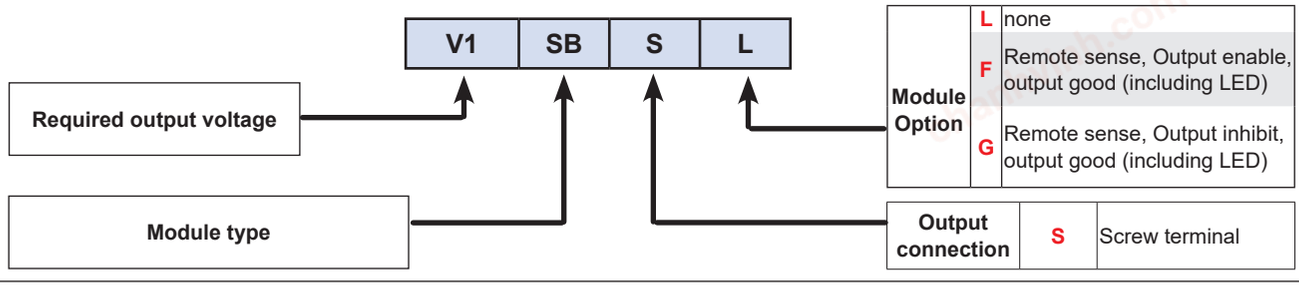
Pin	Connection
1	Remote Sense +
2	Remote Sense -
3	Current share (Note: 1)
4	Do not connect
5	
6	
7	Module good collector
8	Module good emitter
9	Module enable/inhibit anode
10	Module enable/inhibit cathode

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise	max of	pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1% or 50mV	2% above 6V output
-20°C - 0°C, >5% load	2% or 100mV	2% above 6V output
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Option	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.02%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	(5mV for outputs below 5V) for 100% load change on any output
Transient deviation	<5%	of set voltage for 25% to 75% load change 250mV for outputs below 5V
Recovery	1ms	for recovery to 1% or 100mV of set voltage (between 6V and 30V recovery is 1.5ms)
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected, see application notes for details
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 12V / 20A with remote sense, you would choose **12SBSF or G** as your required module.



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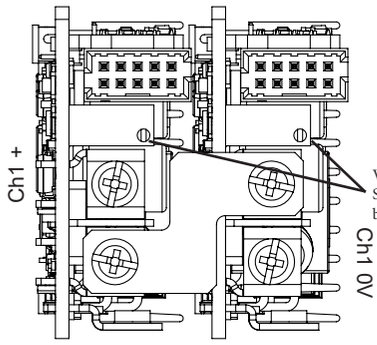
YC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit or enable

Conector information	
10 way housing	Molex 51110-1060
Crimp terminal	Molex 50394

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output Power	Max Capacitive Load
6.6	-	12	30A	300W	500µF/A
12	-	30	20A	480W	275µF/A
30	-	60	10A	480W	200µF/A
60	-	104	5A	480W	100µF/A



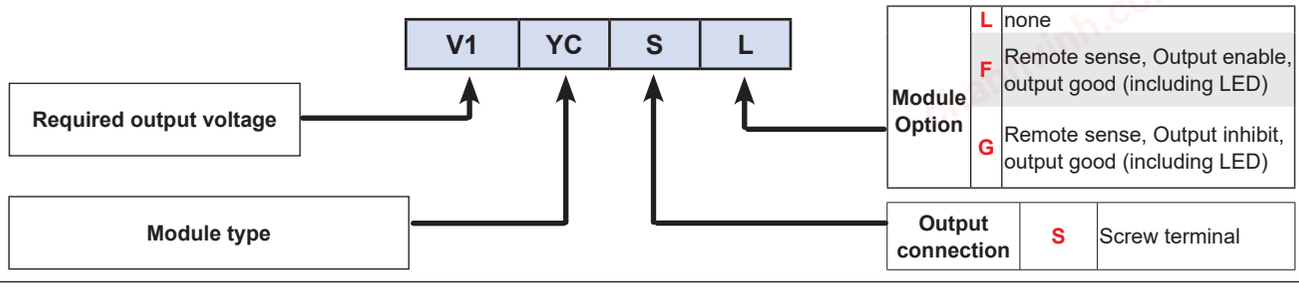
See application notes for signal connection details

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	2% above 12V output
-20°C - 0°C, >5% load	2%	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Option	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.02%	of rated voltage per °C
Load regulation	<1%	for 0-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	(10mV for outputs below 10V) for 100% load change on any output
Transient deviation	<5%	of set voltage for 25% to 75% load change
Recovery	1ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers
Short circuit protection	Yes	Indefinitely protected, see application notes for details
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 60V / 5A with remote sense, you would choose **60YCSG** as your required module.



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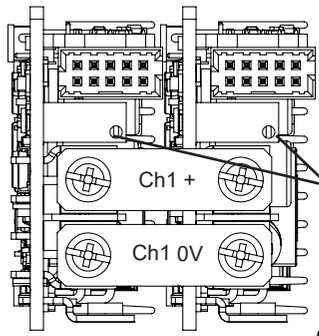
ZC Module - two slots width, 1 output channel

Maximum power per channel	see table below
Available signals	Module good, module inhibit or enable

Conector information	
10 way housing	Molex 51110-1060
Crimp terminal	Molex 50394

AVAILABLE OUTPUT VOLTAGES (at PSU output terminals)

Adjustment Range (Volts)			Current	Output Power	Maximum capacitive load
3.3	-	6	54	260W	500µF/A



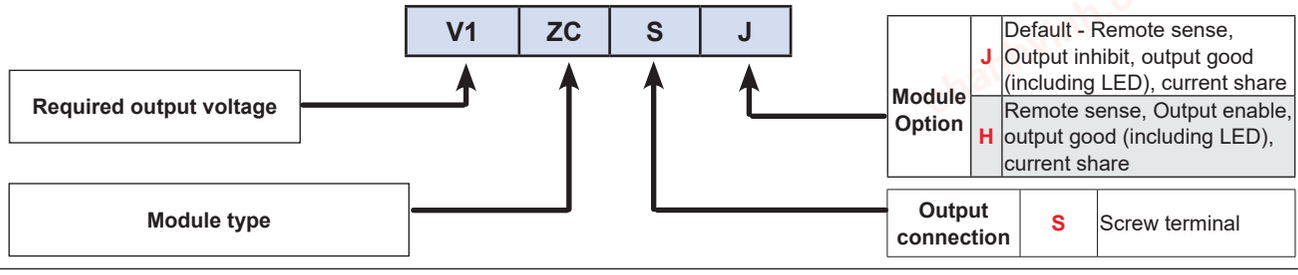
See application notes for signal connection details

Output Specification

Rise time	<75ms	(with resistive load) to 90% of voltage, monotonic rise above 10%
Turn on overshoot	<5%	Load type dependent
Ripple and noise		pk-pk, using 20MHz bandwidth
0°C - 70°C, >5% load	1%	
-20°C - 0°C, >5% load	2%	
≤5% load	4%	
Voltage setting accuracy	<1%	of set voltage
Remote sense	Option	0.5V (voltage at the output terminals must remain within the adjustment range specified above)
Minimum load	0W	
Temperature coefficient	0.02%	of rated voltage per °C
Load regulation	<5%	for 1-100% load change
Line regulation	<0.1%	for 90-264Vac input change
Cross regulation	0.1%	for 100% load change on any output
Transient deviation	<5%	of set voltage for 25% to 75% load change
Recovery	30ms	for recovery to 1% or 100mV of set voltage
Over voltage protection	Yes	Latching, module shuts down, cycle ac to restart.
Over current protection	Hiccup	Auto recovers after removal of load
Short circuit protection	Yes	Indefinitely protected, see application notes for details
Over temperature protection	Yes	Module protection shuts down output, cycle ac to restart. Shutdown temperature varies according to ambient, output power and input voltage.

How To Create A Product Description

Choose your required output voltage (from the table above)
For example, if you need 3.3V / 54A with remote sense, you would choose **3.3ZCSJ** as your required module.



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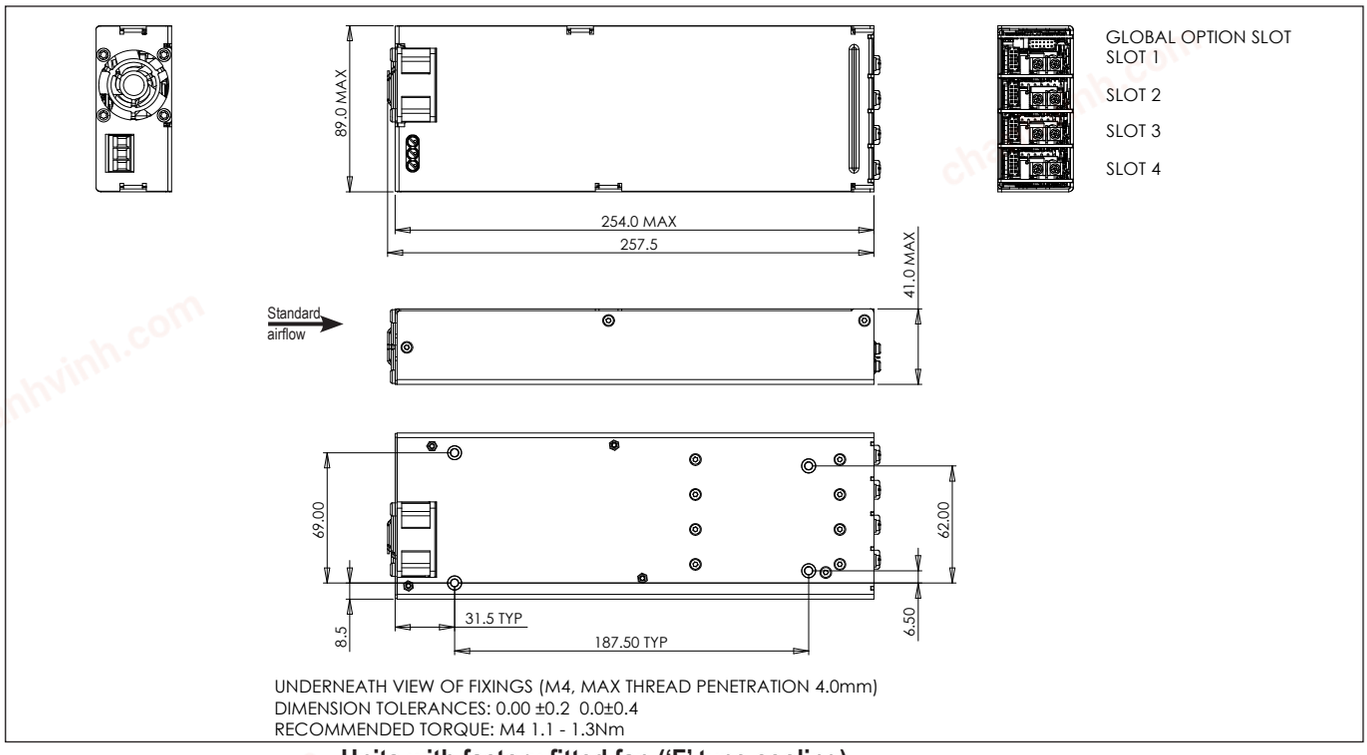

UNDERNEATH VIEW OF FIXINGS (M4, MAX THREAD PENETRATION 4.0mm)
DIMENSION TOLERANCES: 0.00 ±0.2 0.0±0.4
RECOMMENDED TORQUE: M4 1.1 - 1.3Nm

Units with factory fitted fan ('F' type cooling)

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TDK-Lambda France SAS
Tel: +33 1 60 12 71 65
tlf.fr-powersolutions@tdk.com
www.emea.lambda.tdk.com/fr



Italy Sales Office
Tel: +39 02 61 29 38 63
tlf.it-powersolutions@tdk.com
www.emea.lambda.tdk.com/it



Netherlands
tlf.nl-powersolutions@tdk.com
www.emea.lambda.tdk.com/nl



TDK-Lambda Germany GmbH
Tel: +49 7841 666 0
tlg.powersolutions@tdk.com
www.emea.lambda.tdk.com/de



Austria Sales Office
Tel: +43 2256 655 84
tlg.at-powersolutions@tdk.com
www.emea.lambda.tdk.com/at



Switzerland Sales Office
Tel: +41 44 850 53 53
tlg.ch-powersolutions@tdk.com
www.emea.lambda.tdk.com/ch



Nordic Sales Office
Tel: +45 8853 8086
tlg.dk-powersolutions@tdk.com
www.emea.lambda.tdk.com/dk



TDK-Lambda UK Ltd.
Tel: +44 (0) 12 71 85 66 66
tlu.powersolutions@tdk.com
www.emea.lambda.tdk.com/uk



TDK-Lambda Ltd.
Tel: +9 723 902 4333
tli.powersolutions@tdk.com
www.emea.lambda.tdk.com/il-en



TDK-Lambda Americas
Tel: +1 800-LAMBDA-4 or 1-800-526-2324
tla.powersolutions@tdk.com
www.us.lambda.tdk.com



TDK Electronics do Brasil Ltda
Tel: +55 11 3289-9599
sales.br@tdk-electronics.tdk.com
www.tdk-electronics.tdk.com/en



TDK-Lambda Corporation
Tel: +81-3-6778-1113
www.jp.lambda.tdk.com



TDK-Lambda (China) Electronics Co. Ltd.
Tel: +86 21 6485-0777
tlc.powersolutions@tdk.com
www.lambda.tdk.com.cn



TDK-Lambda Singapore Pte Ltd.
Tel: +65 6251 7211
tls.marketing@tdk.com
www.sg.lambda.tdk.com



TDK India Private Limited, Power Supply Division
Tel: +91 80 4039-0660
mathew.philip@tdk.com
www.sg.lambda.tdk.com

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https://product.tdk.com/en/power/