TCL130 Series

FiDUS
power in motion...

130 Watts

- 100W Convection / 130W fan cooled
- 1.5 times rated current for 5 seconds
- IT & Medical safety approvals
- Designed for BF applications
- Suitable for EN60601-1-11 Home healthcare
- EN55011 Level B conducted & radiated
- 10 Year warranty

The TCL130 series provides 130W (fan cooled) or 100W (convection) from a 2" x 4" package. Units have been designed to suit both medical (BF) and IT applications and operate across a wide temperature range, from –40°C to 70°C. There is also a peak rating available for 150W for up to 5 seconds. Output voltages are available from 12 to 48V and every unit comes with a FiDUS 10 year warranty.

Dimensions:

2 x 4 x 1.2" (50.8 x 101.6 x 30.5mm)

Models & Ratings

INSTALLATION ADVICE PG4

Model Number	Output Power [1]	Output voltage	Output Current			Efficiency [4]
			Forced Air [2]	Convection	Peak [3]	
TCL13012-A	110W	12V	9.2A	7.5A	11.7A	86%
TCL13015-A	120W	15V	8A	6.6A	9.4A	86%
TCL13024-A	130W	24V	5.42A	4.17A	6.25A	86%

Notes

1. Maximum output power with forced air cooling
2. Requires 18 CFM from above
3. 5 seconds, duty cycle <50%, average power not to exceed rated power
4. At 100% load
5. Loom kit available, see 'Installation Advice' page 4
6. For home healthcare change -A for -H

Key specifications

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
AC Input range	90		264	VAC	No derating
Operating temperature	-40		70	°C	Derate linearly from 100% power at 50°C to 50% power at 70°C
Efficiency		86		%	
Dimensions	2 x 4 x 1.2" (50.8 x 101.6 x 30.5mm)				
EMC	EN55011 Level B Conducted and Radiated. EN61000-3 and EN61000-4, harmonics, flicker, Surge, EFT, ESD, PFMF, conducted and radiated,				
Safety	IEC/ANSI/AAMI/CSA/EN 60601-1: 3rd edition, UL/CSA/EN 60950-1: 2nd edition, CE, suitable for EN60601-1-11 for "–H" versions				

Input

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Input voltage	90		264	VAC	No derating
Input frequency	47		63	Hz	
Power factor					EN61000-3-2 class A compliant
Inrush current		<30/60		A	At 115/230 VAC cold start at 25°C
No load input power			<0.3	W	
Touch current			<100	uA	

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Output

20Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	12		48	VDC	See Model & Ratings table
Set point accuracy			±1.6	%	
Line regulation			±0.5	%	90VAC-264VAC compared with 115VAC
Load regulation			±1	%	20%-100% load compared to 60% load
Minimum load	0			%	
Transient response			1	%	20%-100% step. Recovery within 1% within 500 µs
Ripple & Noise			1%	pk-pk	20MHz bandwidth limited, 1X probe with 0.47uF parallel capacitor
Hold up time		16		mS	
Overload / Short circuit protection					Trip & restart. Automatic recovery
Overvoltage protection					Latch off

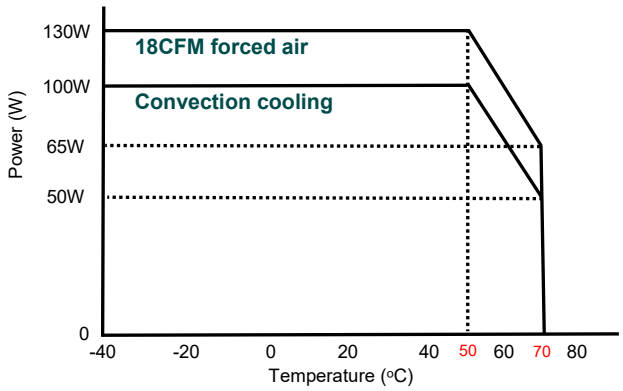
General

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		86		%	See models & Ratings table
Isolation: Input to Output	4000			VAC	
Input to Ground	1500			VAC	
Output to Ground	1500			VAC	BF rated
Power density			13.5	W/In^3	
Weight		165		g	
MTBF		425		Khrs	MIL-HDBK-217F 50°C

Environmental

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-40		70	°C	Derating: 2.5% / °C >50°C for convection cooling
Storage temperature	-40		85	°C	
Cooling					Forced air or convection cooled (ratings differ)
Temperature coefficient			0.05	%/°C	
Humidity	5		95	%RH	Non-condensing
Operating altitude			5000	M	

Derating curve



EMC: Emissions

	Standard	Test level	Criteria	Notes & Conditions
Conducted	EN55011	B		
Radiated	EN55011	B		
Harmonic current	EN61000-3-2	Class A		
Voltage flicker	EN61000-3-3			

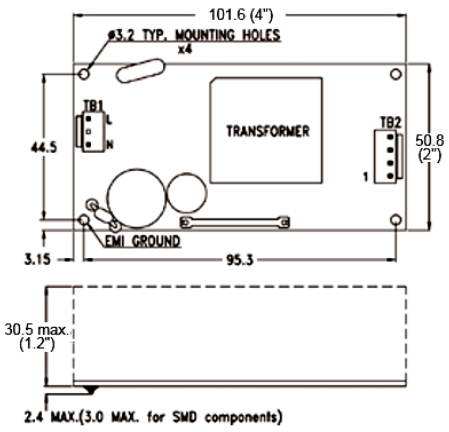
EMC: Immunity

	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	3	A	±6kV contact, ±8kV air
Radiated	EN61000-4-3	3	A	10V/m 80% AM
EFT	EN61000-4-4	3	A	2KV
Surges	EN61000-4-5	Installation Class 3	A	2KV Line-Line, 4KV Line– Earth
Conducted	EN61000-4-6	3	A	10V 80% AM
Dips and interruptions	EN61000-4-11	Dips: 100% 10ms, 100% 20ms, 30% 500ms, 60% 200ms, 100% 5000ms. Perf criteria A,B,A,B,B		

Safety Approvals

	Safety standard	Notes & Conditions
UL	UL/CSA-22.2 No. 60950-1: 2nd edition ANSI/AAMI/CSA 60601-1: 3rd edition	
CB	IEC 60950-1, 2nd Edition IEC 60601-1, 3.1 Edition	
TUV	EN60950-1: 2nd edition EN60601-1: 3.1 edition EN60601-1-11	EN60601-1-11 (on –H version only)
CE		2011/65/EU RoHS Directive and 2014/35/EU Low voltage directive
Means of patient protection	Input to Output: 2 x MOPP Input to Ground: 1 x MOPP Output to Ground: 1 x MOPP	
Equipment Protection Class		Class II

Mechanical Details



Pin Connections TB1[4]	
Pin	Function
1	Live
2	N/C
3	Neutral

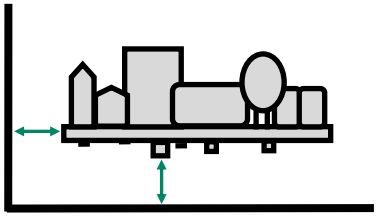
Pin Connections TB2[5]	
Pin	Function
1	Vout
2	Vout
3	GND
4	GND

Notes

1. All dimensions in mm
2. Mounting hole: 44.5 x 95.3mm
3. Recommended: if available, connect PSU to metal sheet beneath the PSU via the EMI ground –except "–H" version
4. TB1: AC input connector: JST B2P3-VH mating part: JST VAR-3N
5. TB2: DC output connector: JST B4P-VH mating part: JST VHR-4N

Installation Advice

Safety

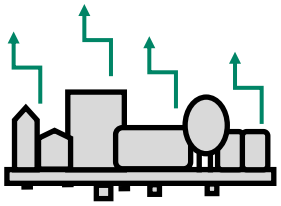


On installation customers must consider the required creepage and clearance distances between the PSU and the end-equipment enclosure. These distances vary depending on the installation class and safety standard requirements.

For **Class I** installations there should be 3-4mm between any part of the PSU and any earthed metal part of the enclosure. 3mm is acceptable for IT applications, 4mm required for medical applications. In Class I installations the PSU earth point must be connected to system safety ground.
For **Class II** installations distances may need to be increased if being installed into a surrounding metal enclosure.
Ensure consideration of components on the underside of the PCB or low lying spills when measuring clearance distances between the PSU and the end-equipment. Also top surface especially in tight enclosures such as 1U boxes. An insulation material can be used between PSU and metal if smaller gap required.

FiDUS recommends installing the PSU on 6mm stand offs typically, but check the distances.

EMC

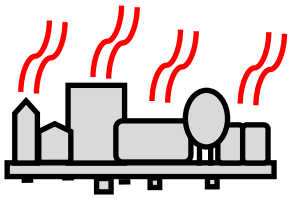


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that can be done to optimise EMC performance either as best practice, or if you are struggling for compliance:

1) Connect all marked EMI ground points to earth. Often these are combined with the safety earth point (in class I installations), but on some power supplies there may be additional earth tags or mounting points.
2) Minimise the length of input/output wiring where possible and try to maintain max distance of the conductors from the PSU, to prevent noise pick up. Avoid bundling input and output cables together. A common component to avoid placing wiring near is the PFC inductor in power factor corrected power supplies.
3) Apply additional filtering before the PSU input (ensure consideration of which frequencies there are issues with before selecting a filter).
4) When using an open frame PSU, mount the supply on a metal plate and connect EMI mounting points.
5) In multi circuit systems, decouple the circuits locally.
6) Ferrites added between the PSU and system input connector and/or the DC output cables can help in reducing radiated noise issues in systems. If seen, issues are commonly in the 30-150MHz area.

For more detailed assistance, if you still have any concerns with compliance, please get in contact with our Engineering department who are on hand to assist with any queries.

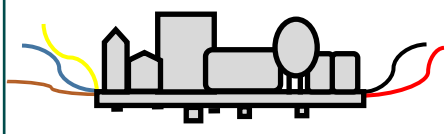
Thermal



Thermal management is an important consideration when thinking about equipment service life. Electrolytic capacitors within the PSU wear with time and are typically the first end-of-life failure. Keeping the operation temperature of key components within the PSU, such as the electrolytic capacitors, as low as possible is paramount. As a general rule, for every 10°C drop in the operating temperature of the electrolytic capacitators you double their lifetime, and thus the lifetime of the power supply. When looking at thermal performance it is helpful to test under a worst-case set of conditions, to ensure component temperatures are in an acceptable range for the required service life. Then consider the impact of operational time, load and temperature profile to estimate a more realistic lifetime for your PSU.

Also, many FiDUS power supplies offer a *Peak Power* rating to provide for customers with pulsing loads. When using a peak power capability customers must consider:
1) Peak duration rating: the maximum length of time the peak can be drawn for
2) Duty cycle: the frequency with which the peak can be drawn. (e.g. 10% duty cycle, 1 second on:9 seconds off)
3) Average power value: datasheets will state the maximum average power acceptable with peak power PSUs.
If any of these elements are exceeded the supply may overheat, with performance and lifetime suffering as a result.

Connectivity



All FiDUS Power engineering samples requested will arrive with a free of charge loom kit for ease of testing.

The loom kit connects to the input/output terminals of the PSU and provides the customer with bare wire ends to connect with.

The loom kits can also prove advantageous for ease of installation in production. Please contact sales if you are interested in including the loom kit in your quotation.
Alternatively the input/output connector and mating part details can be found in the attached table.

	Part Number	Mating Part Number
Input	JST B2P3-VH	JST VHR-3N
Output	JST B4P-VH	JST VHR-4N
Loom Kit	TCL130 LK	