FLS400 Series

FiDUS
power in motion...

400 Watts

- Top fan or side fan versions
- High power density 23.7W/inch^3
- 3% Voltage output adjust
- Optional current share, 5V standby and control I/O card
- 5 Year warranty

The FLS400 series of power dense chassis mount AC-DC power modules offer a power dense 400W in two mechanical formats, depending on your power envelope. They have a high power density of 23.7W/inch^3 and are available in 6 output voltages from 12-58V (custom voltages possible) with an adjustment of 3% and optional current share card for parallel operation. All come with a FiDUS 5 year warranty.

Dimensions:

Top fan: 4.87 x 3.04 x 3.24" (123.7 x 77.2 x 82.3mm)
Side fan: 5.31 x 4.29 x 1.97" (135 x 109 x 50mm)

Models & Ratings

INSTALLATION ADVICE PG5

Model Number(1)	Output Voltage	Output Current	Power(2)	Ripple(3)
FLS400-1312-**TF**	12V	25.00A	300W	5%
FLS400-1315-**TF**	15V	20.00A	300W	5%
FLS400-1324-**TF**	24V	16.70A	400W	2%
FLS400-1330-**TF**	30V	13.30A	400W	2%
FLS400-1348-**TF**	48V	8.30A	400W	2%
FLS400-1358-**TF**	58V	6.90A	400W	2%

Notes

1. For side fan version, change **TF** above for **SF**. For current share option contact sales.
2. Combined output power; main output, fan output and 5V standby power >115<264VAC
3. Noise and ripple measured with 20MHz BW 10uF tantalum and 0.1uF electrolytic cap, ripple may be more than above at approximately <30% load conditions
4. Specifications at nominal input 25°C
5. Loom kits available. See 'Installation Advice' on pg5

Key specifications

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
AC Input range	85		264	VAC	See pg 3 for derating curve
Operating temperature	-40		70	°C	See derating curve p3.
Efficiency	Min 92%, max 94% at 230VAC				
Dimensions	Top fan: 4.87 x 3.04 x 3.24" (123.7 x 77.2 x 82.3mm) Side fan: 5.31 x 4.29 x 1.97" (135 x 109 x 50mm)				
EMC	EN55032 Level B conducted and level A radiated. EN61000-3 and EN61000-4, harmonics, flicker, Surge, EFT, ESD, conducted and radiated.				
Safety	IEC/EN/UL 62368-1, CE				

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Input

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Input voltage	85		264	VAC	See pg 3 for derating curve
Input frequency	47		63	Hz	
Power factor	0.95				EN61000-3-2 class A & D compliant at full load
Input current (rms)			6.3	A	At 115VAC
Inrush current			75	A	
No load input power			1	W	

Output

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	12		58	VDC	See Model & Ratings table
Output Voltage Adjust		±3		%	
Set point accuracy			±1	%	
Line regulation			±0.5	%	
Load regulation			±0.5	%	
Minimum load	0			%	
Transient response			4	%	25% step change, 0.1A/uS slew 50% duty 50hz in <5ms
Ripple & Noise	2		5	%	All models measured with 0.1uF ceramic and 10uF electrolytic capacitor. 20 MHz bandwidth at rated VAC. See models and ratings table pg 1
Hold up time		8		mS	230VAC
Overload protection	105			%	Automatic recovery
Short circuit protection					Trip and restart. Automatic recovery
Overvoltage protection	110		140	%	
Leakage current		300		uA	

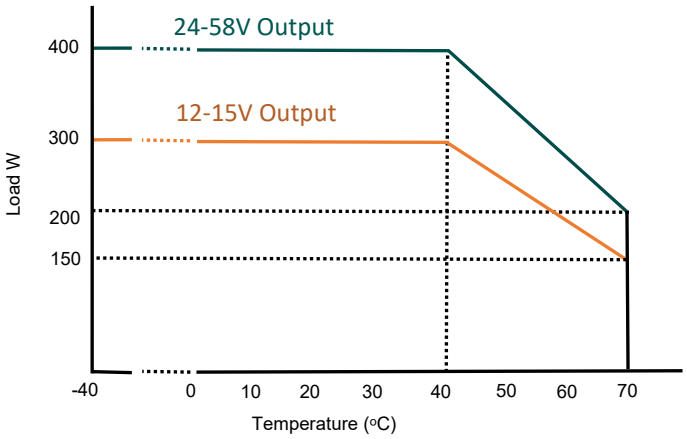
General

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	92		94	%	At 230VAC
Isolation: Input to Output	4000			VDC	
Input to Ground	2500			VDC	
Switching frequency	50		80	kHz	For power switching. PFC switching: 70-130kHz
Power density			23.7	W/In^3	
MTBF	>2.56			MHrs	As per Telcordia-SR332– issue 3
Weight		700		g	Approximation

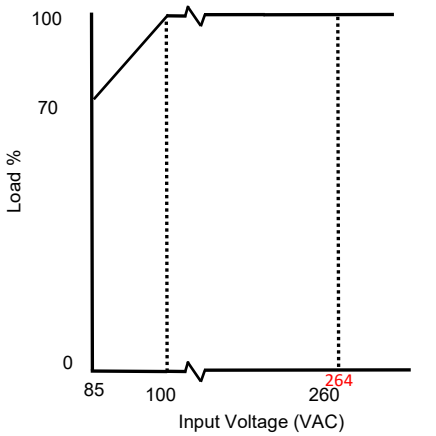
Environmental

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-40		70	°C	Please see derating curve on page 3. Spec deviation – 40 to 0°C
Storage temperature	-40		85	°C	
Altitude			16000	ft	
Humidity	5		95	% RH	Non condensing

Temperature Derating Curve



AC Input Derating Curve



EMC: Emissions

	Standard	Test level	Criteria	Notes & Conditions
Conducted	EN55032	B		
Radiated	EN55032	A		B With ferrite king core K5B RC 25x12x15-M on input 5 turns recommended
Harmonic current	EN61000-3-2	Class A		
Voltage flicker	EN61000-3-3			Compliant

EMC: Immunity

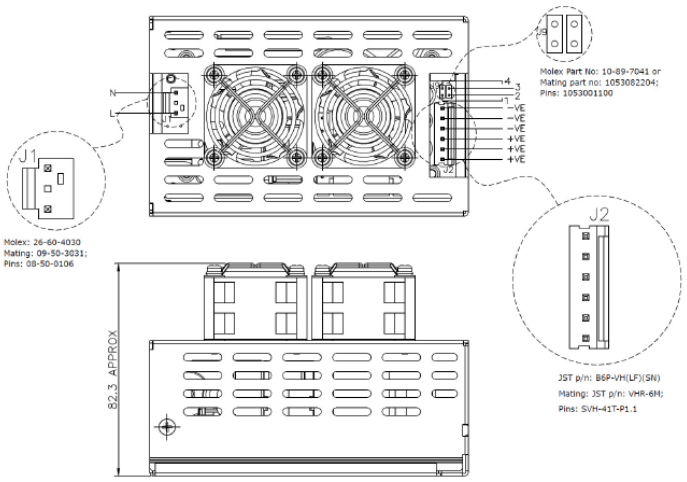
	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	3	A	±6kVcontact, ±8kV air.
Radiated	EN61000-4-3	3	A	10V/m 80MHz-2.7GHz sine wave 80% AM 1kHz
EFT	EN61000-4-4	3	A	2kV Power, 1kV I/O 5kHz
Surges	EN61000-4-5	Installation Class 3	A	1kV Live-Neutral, 2kV Live/Neutral—Earth
Conducted	EN61000-4-6	3	A	10V, 0.15 to 80MHz sine wave 80AM 1kHz
Magnetic Fields	EN61000-4-8	3	A	10A/m
Voltage Dips and Interruptions	EN61000-4-11		A,B	

Safety Approvals

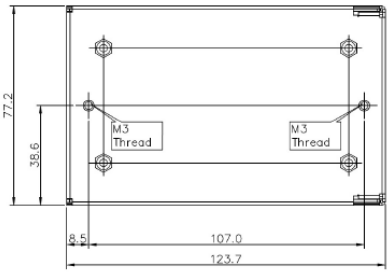
	Safety standard	Notes & Conditions
UL/CSA	UL62368-1	
CB	IEC62368-1: 2018	
Nemko	EN62368-1: 2020	
CE		2014/35/EU Low voltage directive
Equipment protection class		Class I

Mechanical Details

FLS400-XXXX-TF

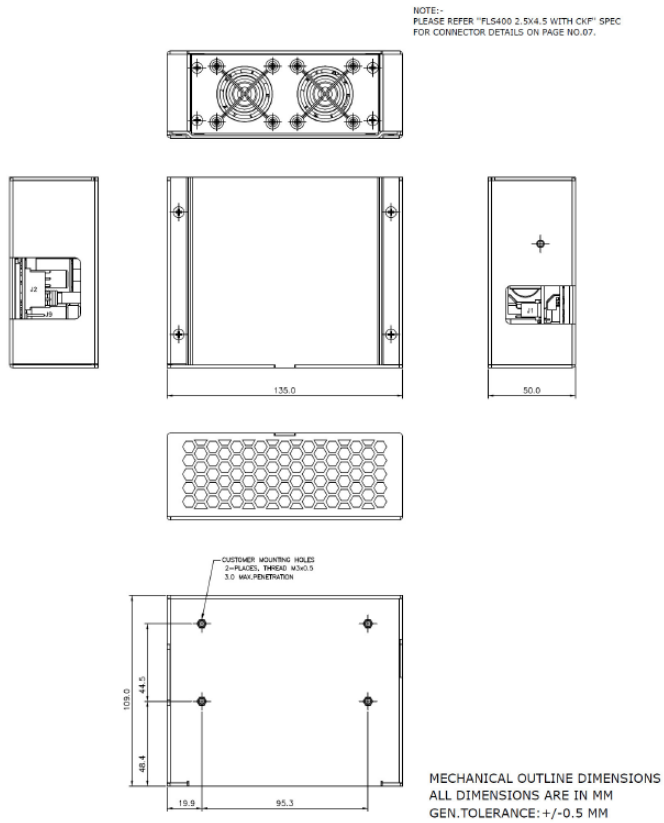


(J9) SIGNAL CONNECTOR	
PIN 1	+VS
PIN 2	-VS
PIN 3	FAN-
PIN 4	FAN+



MECHANICAL OUTLINE DIMENSIONS
ALL DIMENSIONS ARE IN MM
GEN.TOLERANCE: +/-0.5 MM

FLS400-XXXX-SF



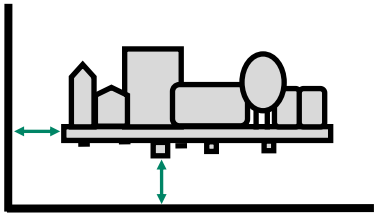
MECHANICAL OUTLINE DIMENSIONS
ALL DIMENSIONS ARE IN MM
GEN.TOLERANCE: +/-0.5 MM

Notes

1. All dimension shown in Inches [mm]
2. J1: Input connector details: Molex: 26-60-4030 mating part: Molex: 09-50-3031 or equivalent
3. J2: Output connector details: JST B6P-VL mating part JST: VHR-6M or equivalent
4. J9: Output connector details: Molex: 10-89-7041, mates with molex 1053082204
5. J(310) multi function connector (on special option only) 2.54mm pitch mates with CONN RCPT HSNG 5POS CST-100 II p/n 1375820-5

Installation Advice

Safety

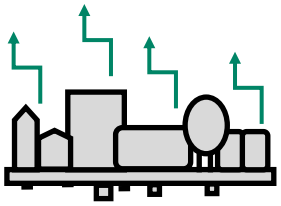


On installation customers must consider the required creepage and clearance distances between the PSU and the end-equipment enclosure. These distances vary depending on the installation class and safety standard requirements.

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

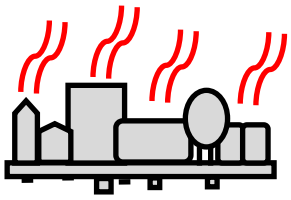


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that 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.

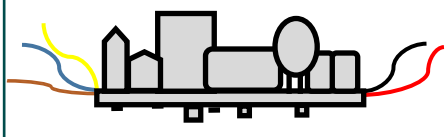
Thermal



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	Molex: 26-60-4030	Molex: 09-50-3031
Output	JST B6P-VL	VHR-6M
Loom Kit	FLS-LK	