

VKP420 Series

420 Watts

- 300W Convection / 420W Fan cooled
- 600W peak for 5 seconds
- Surge 900W <1 sec
- 5V standby rail 1.5A max
- IT & medical (BF) safety approvals
- 4th ed EMC immunity IEC60601-1-2
- 10 Year warranty



Dimensions:

3.7 x 6.6 x 1.46" (95 x 167 x 34mm)

The VKP420 series of compact open frame AC-DC PSUs provide 300W (420W fan cooled) from a 3.7" x 6.6" package. The range is approved for use in both IT and medical applications and is available with either a 12, 24 or 60V output. In addition to the rated output, the VKP420 offers a 600W peak for up to 5 seconds and a surge current of up to 3x nominal current for less than a second. The unit is excellent for Energy Star applications with a no load power consumption of 0.2W. The units come complete with a FIDUS 10 year warranty.

Models & Ratings

INSTALLATION ADVICE PG5

Model Number	Output Power	Output voltage	Output Current				Fan output ⁽⁴⁾	Efficiency ⁽⁵⁾
			Convection	Forced Air ⁽¹⁾	Peak ⁽²⁾	Surge ⁽³⁾		
VKP42012	420W	12V	25.0A	35.0A	50.0A	75.0A	12V	90%
VKP42024	420W	24V	12.5A	17.5A	25.0A	37.5A	12V	91%
VKP42060 ⁽⁶⁾	420W	60V	5.0A	7A	10.0A	15.0A	12V	92%

Notes

1. Requires 10 CFM
2. 5 seconds, duty cycle <10%, average power to not exceed 420W
3. For surge currents <1sec Vo>60%. Please see surge curve page 3
4. Fan speed controlled by loading
5. Full load
6. 60V unit is ITE safety only
7. 5V standby 1A convection cooled and 1.5A fan cooled

Key specifications

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
AC Input range	90		264	VAC	No derating
Operating temperature	-20		70	°C	Derate linearly from 100% power at 50°C to 50% power at 70°C. See derating curve
Efficiency	90		92	%	At full load
Dimensions	3.7 x 6.6 x 1.46" (95 x 167 x 34mm)				
EMC	EN55022/11 Level B conducted and radiated. EN61000-3 and EN61000-4, harmonics (class D), flicker, Surge, EFT, ESD, conducted and radiated.				
Safety	IEC 60601-1:3.1 edition, ANSI/AAMI/CSA 60601-1: 3rd edition, EN60601-1: 3.1 edition. IEC 60950-1: 2nd edition, UL/CSA 60950-1: 2nd edition, EN60950-1: 2nd edition. Please see note 6 below model table				

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 D compliant
Input current	2.5		5	A	2.5A at 230VAC 5A at 115VAC
Inrush current		<35/70		A	115/230 VAC cold start at 25°C
Earth leakage current			300	uA	
Touch current			100	uA	
Remote on / off	TTL compatible (active low). When disconnected from secondary common output is off. Remote off status<0.5W				
No load power			0.2 / 5	W	5W when remote is on. <0.2W when remote off used

Output

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Output voltage	12		60	VDC	See Model & Ratings table
Set point accuracy			±1	V	
Line regulation			±1	%	±10% change of nominal line input
Load regulation			±1	%	±40% load change from 60% load
Minimum load	0			%	
Ripple & Noise		1		%	15MHz band. 0.47uF + 47uF capacitor on output
Hold up time	>16			mS	At rated load and 115VAC
Overload / Short circuit protection	110		130	%	Trip & restart. Automatic recovery
Overvoltage protection	60		78	V	60V unit. Latch off. AC reset required
	26.2		31		24V unit. Latch off. AC reset required
	13.1		15.1		12V unit. Latch off. AC reset required
	7		9.5		5V stand by. Latch off. AC reset required
DC OK output					10-50ms delay for OK (5V) and 10ms warning for not OK.
Remote sense		0.5		V	Voltage drop compensation on DC output
Capacitive load			20000	uF	
Fan output		12		V	
5V standby	1		1.5	A	1A convection cooled, 1.5A fan cooled

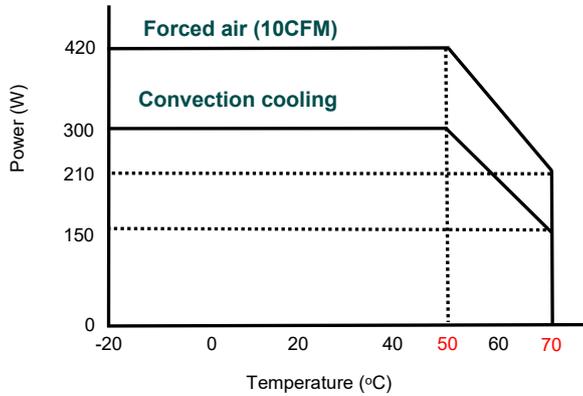
General

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	90		92	%	See models & Ratings table
Isolation: Input to Output	4000			VAC	
Input to Ground	1500			VAC	
Output to Ground	1500			VAC	
Power density			11.8	W/In ³	
Weight		650		g	
MTBF		200		KHrs	MIL-HDBK-217F, rated load 50°C

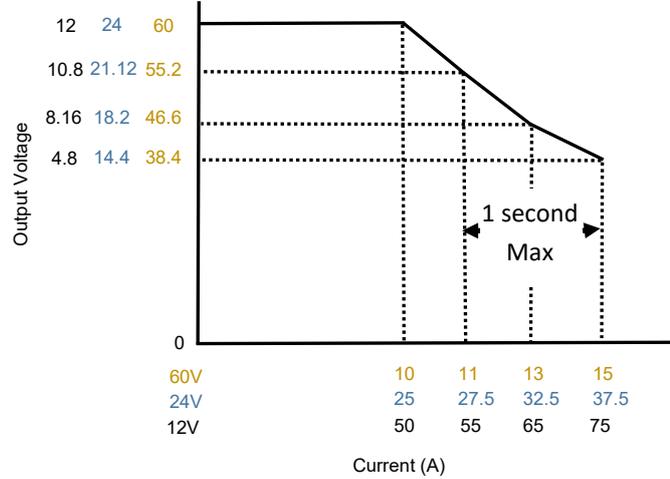
Environmental

Parameter	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating temperature	-20		70	°C	Derate linearly from 100% power at 50°C to 50% power at 70°C. See derating curve
Storage temperature	-40		85	°C	
Cooling					Fan cooled (requires 10CFM, starts at >50%±10% load) or convection cooled
Humidity	5		95	%RH	Non-condensing
Operating altitude			5000	M	

Derating curve



Surge curve



EMC: Emissions

	Standard	Test level	Criteria	Notes & Conditions
Conducted	EN55022/11	B		
Radiated	EN55022/11	B		
Harmonic current	EN61000-3-2	Class A		Also meets Class D requirements.
Voltage flicker	EN61000-3-3			

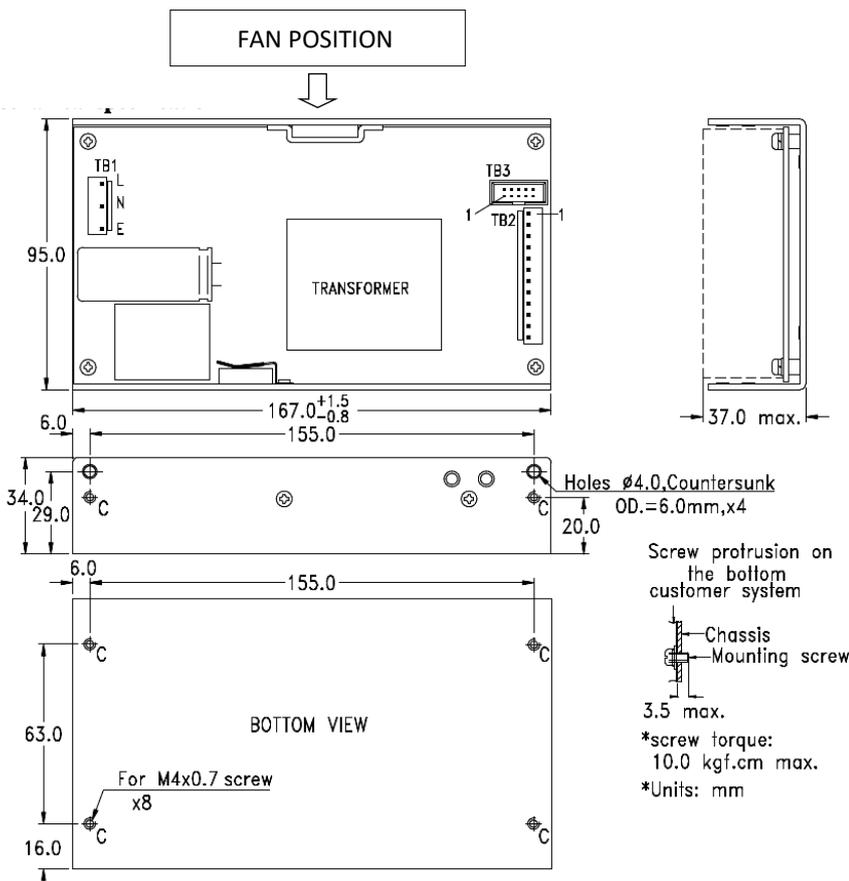
EMC: Immunity

	Standard	Test level	Criteria	Notes & Conditions
ESD	EN61000-4-2	4	A	±8kV contact, ±15kV air
Radiated	EN61000-4-3	3	A	10V/m 80% AM
EFT	EN61000-4-4	3	A	4KV
Surges	EN61000-4-5	Installation Class 3	A	1KV Line-Line, 2KV Earth - Line
Conducted	EN61000-4-6	3	A	10V 80% AM
PFMF	EN61000-4-8		A	30A/m
Dips and interruptions	EN61000-4-11	Dips: 30% 500ms, 60% 200ms, 100% 10ms, 00% 20ms, 100% 5000ms, . Per criteria A B A B B		

Safety Approvals

	Safety standard	Notes & Conditions
UL	UL/CSA/ 60950-1: 2nd edition ANSI/AAMI/CSA/ 60601-1: 3.1 edition	60V product is ITE only
CB	IEC 60950-1: 2nd edition IEC 60601-1: 3.1 edition	60V product is ITE only
TUV	EN60950-1: 2nd edition EN60601-1: 3.1 edition	60V product is ITE 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	60V product is ITE only
Equipment protection class		Class I

Mechanical Details



Pin Connections—Signals (TB2) ⁽⁴⁾	
Pin	Function
1-6	+Vout
7-12	-Vout

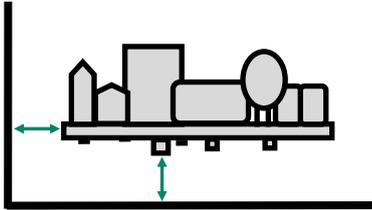
Pin Connections—Signals (TB3) ⁽⁶⁾	
Pin	Function
1	+5V
2	+5V
3	+Fan
4	-Fan
5	P.G.
6	P.G. GND
7	CTL GND
8	CTL
9	Remote Sense -
10	Remote Sense +

Notes

1. All dimensions in mm
2. TB3: Signals 10 way IDC, mates with AWHC 10-0111-T 10 way IDC connector
3. TB1: JST B5P-VH mates with JST VHR-5N
4. TB2: JST B12P-VH, mates with Molex 09-50-7121
5. Fan is to be positioned 6cm above the centre of PSU

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.

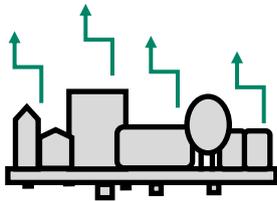
For **Class I** installations there should be 3-4mm between any part of the PSU and any earthed metal part of the enclosure. 3mm is acceptable for IT applications, 4mm required for medical applications. In Class I installations the PSU earth point must be connected to system safety ground.

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

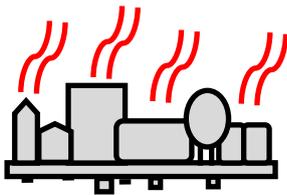


Conducted and radiated emissions compliance is a common application consideration. It is important to remember that even when using a properly filtered PSU, an application may still not achieve compliance if it is not designed to minimise emissions. That being said, there are a number of things that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

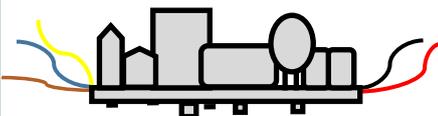


Thermal management is an important consideration when thinking about equipment service life. Electrolytic capacitors within the PSU wear with time and are typically the first end-of-life failure. Keeping the operation temperature of key components within the PSU, such as the electrolytic capacitors, as low as possible is paramount. As a general rule, for every 10°C drop in the operating temperature of the electrolytic capacitors 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 B5P-VH	JST VAR5N
Output	JSTB12P-VH	Molex 09-50-8121
Loom Kit	VKP420 LK	