30 W DC-DC Converter P30H-Series

PHI-CON

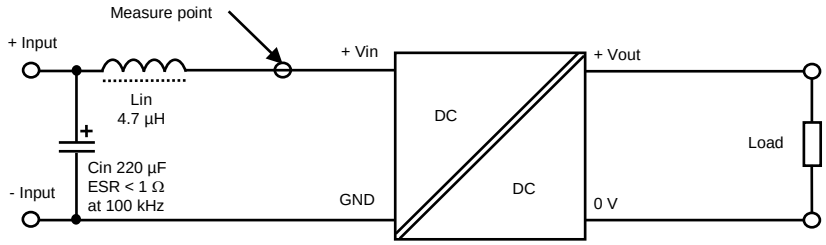
- Wide 4:1 input range
- Efficiency up to 90 %
- Adjustable output voltage
- Remote control on / off
- 1500 V_{DC} isolation
- Continuous short circuit protection
- Over voltage protection
- Standard package 2” x 1” x 0.4”
- MTBF > 1 Mio. hours
- -40...+85 °C operating temperature range

Model guide

Type	Input voltage		Input current		Output voltage	Output current		Efficiency @ full load typ.	Capacitive load (see note 3)
	Nominal	Range	no load	full load		minimum load	maximum load		
	[V_{DC}]	[V_{DC}]	[mA] typ.	[mA] typ.	[V_{DC}]	[mA] typ.	[A] typ.	[%] typ.	[µF] max.
P30H243R3S	24	9...36	60	1000	3.3	0	6000	85	10000
P30H2405S	24	9...36	60	1400	5	0	6000	88	10000
P30H2409S	24	9...36	6	1400	9	0	3333	88	4700
P30H2412S	24	9...36	6	1400	12	0	2500	90	2700
P30H2415S	24	9...36	6	1400	15	0	2000	90	1680
P30H2424S	24	9...36	6	1400	24	0	1250	90	680
P30H483R3S	48	18...75	20	500	3.3	0	6000	87	10000
P30H4805S	48	18...75	20	700	5	0	6000	88	10000
P30H4812S	48	18...75	5	700	12	0	2500	89	2700
P30H4815S	48	18...75	5	700	15	0	2000	89	1680
P30H4824S	48	18...75	5	700	24	0	1250	89	680

With suffix “K” heatsink version

Figure 0
Input reflected ripple current measure circuit



The input reflected ripple current is measured with inductor Lin and capacitor Cin to simulate source impedance.

HY-LINE® POWER COMPONENTS

Deutschland:
Inselkammerstraße 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

Schweiz:
Hochstrasse 355
CH-8200 Schaffhausen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch

30 W DC-DC Converter P30H-Series

PHI-CON

Specifications

Input			
Under voltage lockout	P30H24xxS	on @ 9 V_{DC}	off @ 5.5 V_{DC}
	P30H48xxS	on @ 18 V_{DC}	off @ 14 V_{DC}
Filter		π - type	
Reflected ripple current		40 mAp-p, typ. (see fig. 0)	
Remote control theshold	On state	3.5…12 V_{DC}, or open input	
	Off state	0…1.2 V_{DC}	
Input idle current @ Off state		8 mA, max.	
Rated isolation voltage			
Input / output (1 Min. tested)		1500 V_{DC}, min.	
Resistance		> 10^9 Ω, measured @ 500 V_{DC}	
Input / output capacitance		2000 pF, typ. @ 100 kHz, 0.1V	
Output			
Voltage tolerance		± 3 %, max. @ 5..100 % Load ± 5 %, max. @ 0..5 % Load	
Voltage load regulation		± 1 %, max. @ 5..100 % load	
Output voltage trim range		± 10 %	
Line regulation		± 0.5 %, max @ full Vin range	
Temperature coefficient		± 0.03 % / °C	
Transient recovery time		<500 µs, @ 25 % load steps	
Transient response deviation		<8 %, @ 25 % load steps	
Short circuit protection		Continuous, hiccup	
Short circuit restart		Automatic	
Over current protection		190 % of full load, max.	
Rippel & noise, BW 20MHz		100 mVp-p, max.	
Over voltage protection via integrated TVS-Diode		P30Hxx3R3x: 3.9 V_{DC}	
		P30Hxx05x: 6.2 V_{DC}	
		P30Hxx09x: 10.8 V_{DC}	
		P30Hxx12x: 15 V_{DC}	
		P30Hxx15x: 18 V_{DC}	
		P30Hxx24x: 30 V_{DC}	

General		
Start up time		10 ms, typ @ R-load
Switching frequency		300…345 kHz, typ.
Reliability calculated MTBF MIL-HDBK-217F @ 25 °C		> 1 Mio. hours
EMC characteristics		
Radiated emissions		CISPR22 / EN55022 Class A
Radiated emissions, see Fig. 2		CISPR22 / EN55022 Class B
Conducted emissions		CISPR22 / EN55022 Class A
Conducted emissions, see Fig. 2		CISPR22 / EN55022 Class B
ESD, contact ± 4kV		EN61000-4-2 perf. crit. B see Fig. 2
RS 10 V/m		EN61000-4-3 perf. crit. A
EFT ±2 kV		EN61000-4-4 perf. crit. B see Fig. 2
Surge ±2 kV		EN61000-4-5 perf. crit. B see Fig. 2
CS 3 Vrms		EN61000-4-6 perf. crit. A
Environmental		
Operating ambient temperature		-40 … 80 °C with derating
Case temperature		105 °C, max.
Storage temperature		-55 … 125 °C
Over temp. protection		t-case 110 °C, typ
Storage humidity		5…95 %, non condensing
Cooling		Free air convection
Physical		
Dimensions	without heatsink	50.8 x 25.4 x 11.8 mm
	with heatsink	51.4 x 26.2 x 16.5 mm
Weight	without heatsink	26 g
	with heatsink	36 g
Case material		Aluminium alloy
Potting Material		Epoxy (UL94V-0 rated)
Absolute max. ratings		
Pin soldering temperature 1.5 mm distance from body		300 °C for 10 sec
Max. input voltage < 1 sec	P30H24xxx	-0.7…50 V_{DC}
	P30H48xxx	-0.7…100 V_{DC}

Note:
1. Min. load should not be less than 5 %, otherwise ripple maybe increased dramatically, If the product operates under min. load, it may not be guaranteed to meet all specifications listed. Operation under minimum load will not damage the converter.
2. Maximum capacitive load is tested at input voltage range and full load.
3. All specifications measured at Ta 25 °C, humidity < 75 %, nominal input voltage and rated output load unless otherwise specified.
4. Specifications of this product are subject to changes without prior notice.
5. It is not recommended to increase the output power capability by connecting two or more converters in parallel.
6. The converters are not hot swappable.

HY-LINE® POWER COMPONENTS

Deutschland:
Inselkammerstraße 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

Schweiz:
Hochstrasse 355
CH-8200 Schaffhausen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch

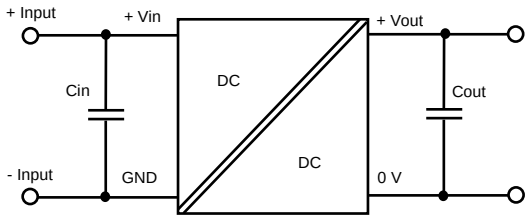
30 W DC-DC Converter P30H-Series

PHI-CON

1) Typical application circuit

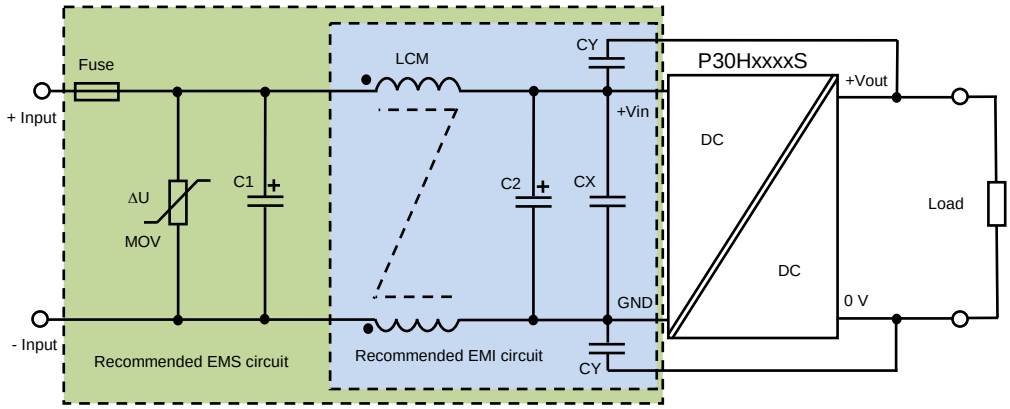
The P30H series is been tested according to the following recommended test circuit before leaving the factory (see Figures 1).
If you want to further decrease the input / output ripple, you can increase a capacitance values properly or choose capacitors with low ESR, but the total capacitance of the filter capacitor must not exceed the maximum load capacitance value (see „Model guide“ table).

Figure 1



Recommended peripheral components to figure 1a		
Type	Cin	Cout
P30Hxx3R3S	100 µF	220 µF
P30Hxx05S		220 µF
P30Hxx09S		220 µF
P30Hxx12S		100 µF
P30Hxx15S		100 µF
P30Hxx24S		100 µF

Figure 2
Recommended EMC circuit



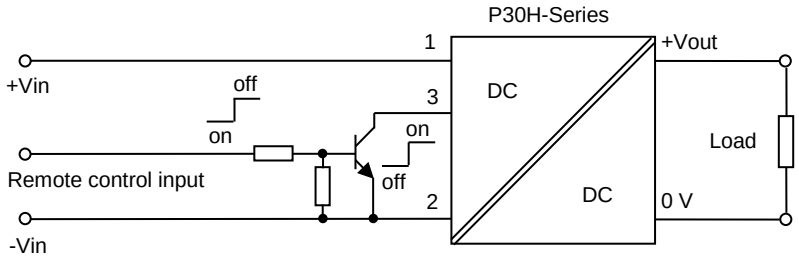
Recommended peripheral components to circuits in figures 2								
Type	Fuse time delay type	MOV Type	C1	C2	CX	LCM	CY	Co
P30H243R3S	5 A	S20K30	680 µF, 50 V	330 µF, 50 V	4.7 µF	1 mH	1 nF, 2 kV	220 µF
P30H2405S								
P30H2409S								
P30H2412S	5 A	S20K30	680 µF, 50 V	330 µF, 50 V	4.7 µF	1 mH	1 nF, 2 kV	100 µF
P30H2415S								
P30H2424S								
P30H483R3S	2.5 A	S14K60	330 µF, 100 V	330 µF; 100 V	2.2 µF	1 mH	1 nF, 2 kV	220 µF
P30H4805S								
P30H4809S								
P30H4812S	2.5 A	S14K60	330 µF, 100 V	330 µF; 100 V	2.2 µF	1 mH	1 nF, 2 kV	100 µF
P30H4815S								
P30H4824S								

HY-LINE® POWER COMPONENTS

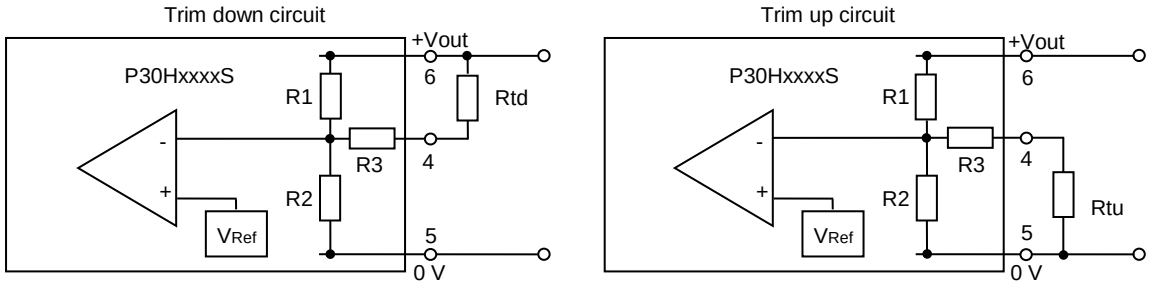
Deutschland:
Inselkammerstraße 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

Schweiz:
Hochstrasse 355
CH-8200 Schaffhausen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch

Application circuit remote control



Application circuit to output voltage trimming



Calculation for trim down resistor (Rtd) or trim up resistor (Rtu)

Model series	R1 [kΩ]	R2 [kΩ]	R3 [kΩ]	V Ref [V]	Rtd min. [kΩ]	Rtu min. [kΩ]
P30Hxx3R3S	4.801	2.87	12.4	1.24	11.75	6.43
P30Hxx05S	2.883		10	2.5	1.27	4.75
P30Hxx09S	7.5		15		30	6.63
P30Hxx12S	11		15		56	9.6
P30Hxx15S	14.494		15		83	11.4
P30Hxx24S	24.872		17.8		167.5	10
Maximum output voltage adjust range ± 10 % of Vout nominal, see min. Rtd / Rtu						

Trim down resistor formula

$$b = \frac{Vout - Vref}{Vref} * R2$$

$$Rtd = \frac{R1 * b}{R1 - b} - R3$$

Trim up resistor formula

$$a = \frac{Vref}{Vout - Vref} * R1$$

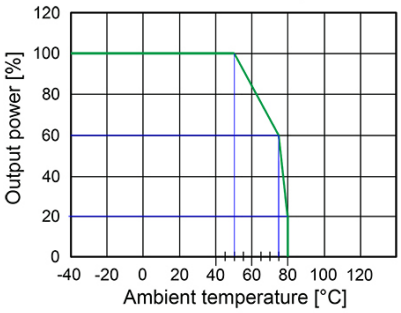
$$Rtu = \frac{R2 * a}{R2 - a} - R3$$

HY-LINE® POWER COMPONENTS

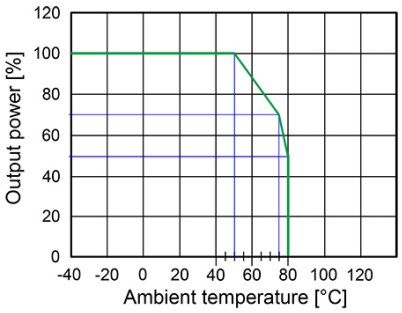
Deutschland:
Inselkammerstraße 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

Schweiz:
Hochstrasse 355
CH-8200 Schaffhausen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch

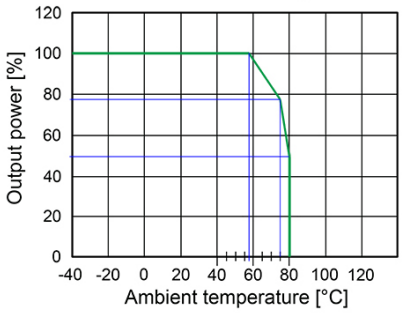
Temperatur vs power derating without heatsink, air convection10 cm/s P30Hxx3R3S, P30Hxx05S



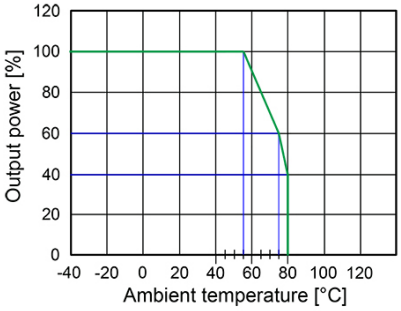
Temperatur vs power derating without heatsink, air convection 50 cm/s P30Hxx3R3S, P30Hxx05S



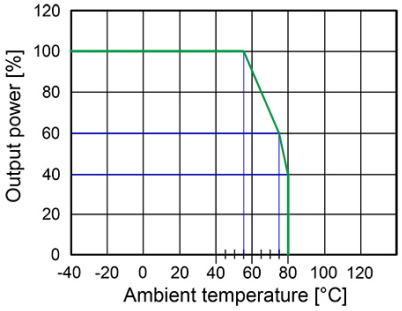
Temperatur vs power derating without heatsink, air convection 100 cm/s P30Hxx3R3S, P30Hxx05S



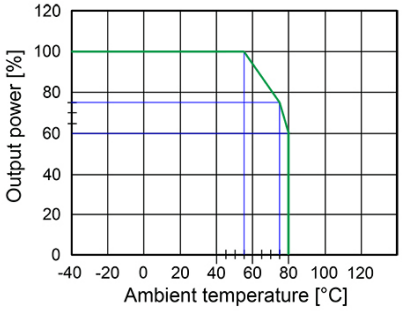
Temperatur vs power derating with heatsink, air convection 10 cm/s P30Hxx3R3S, P30Hxx05S



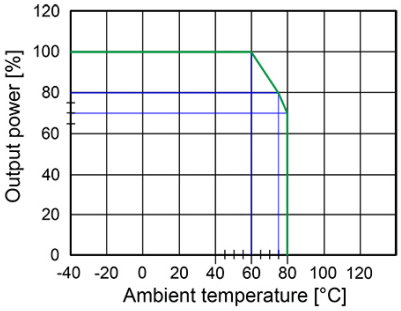
Temperatur vs power derating without heatsink air convection 10 cm/s P30Hxx09S, P30Hxx12S, P30Hxx15S, P30Hxx24S



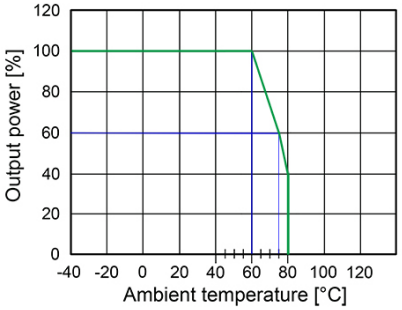
Temperatur vs power derating without heatsink air convection 50 cm/s P30Hxx09S, P30Hxx12S, P30Hxx15S, P30Hxx24S



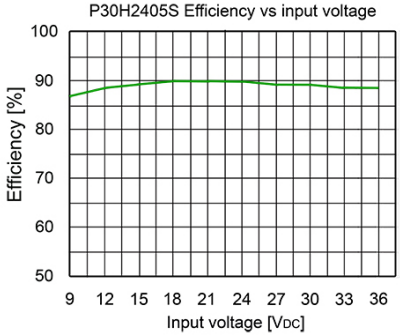
Temperatur vs power derating without heatsink air convection 100 cm/s P30Hxx09S, P30Hxx12S, P30Hxx15S, P30Hxx24S



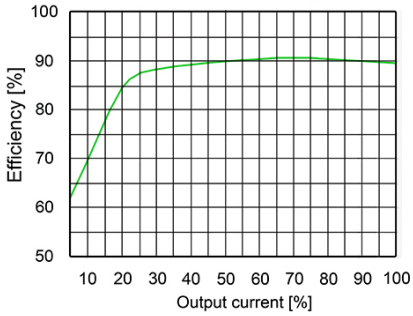
Temperatur vs power derating with heatsink air convection 10 cm/s P30Hxx09S, P30Hxx12S, P30Hxx15S, P30Hxx24S



P30H2405S Efficiency vs input voltage



P30H2405S Efficiency vs output load



HY-LINE® POWER COMPONENTS

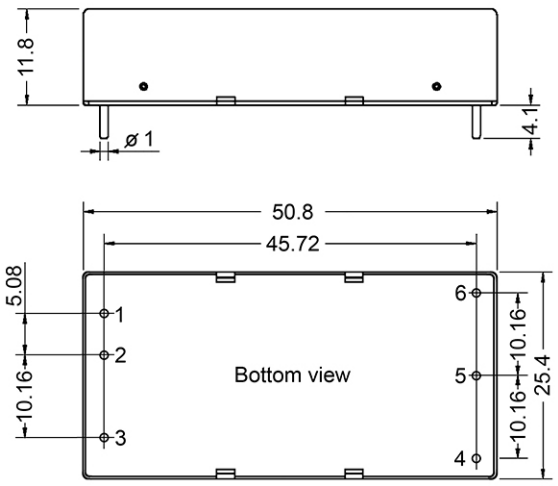
Deutschland:
Inselkammerstraße 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

Schweiz:
Hochstrasse 355
CH-8200 Schaffhausen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch

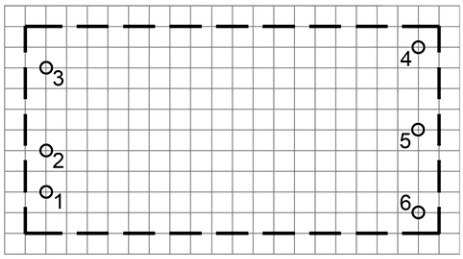
30 W DC-DC Converter P30H-Series

PHI-CON

Dimensions standard version



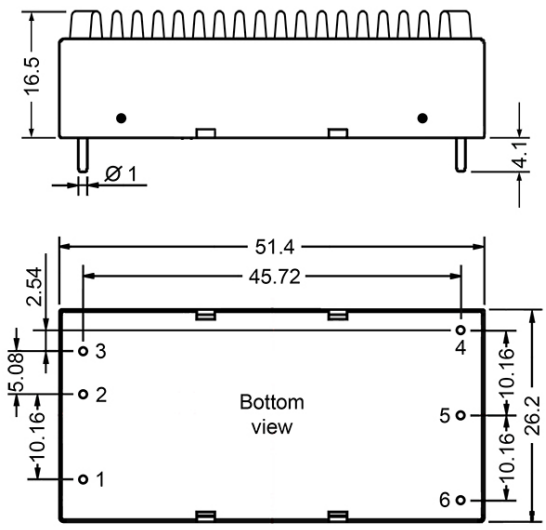
Footprint top view



Pitch 2.54 mm
Recommended hole diameter ø 1.5 mm

Pin assignment	
1	+ Vin
2	GND
3	CTRL
4	Trim
5	0 V
6	+ Vo

Dimensions heatsink version



Unit: mm
Pin diameter tolerance:± 0.1 mm
Pin height tolerance:± 0.5 mm
General tolerances:± 0.3 mm

HY-LINE® POWER COMPONENTS

Deutschland:
Inselkammerstraße 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

Schweiz:
Hochstrasse 355
CH-8200 Schaffhausen
Tel.: 052 647 42 00
E-Mail: power@hy-line.ch