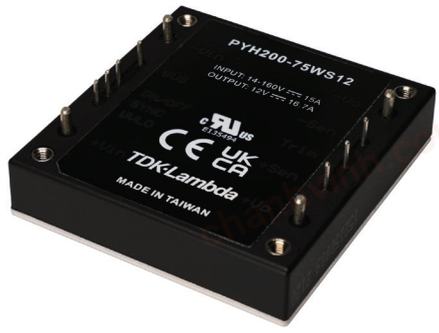
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# TDK·Lambda PYH200 Series

## 200W Single Output DC-DC converters, 1/2 Brick

https://product.tdk.com/en/power/py
www.emea.lambda.tdk.com/py







The 200W Half-brick footprint PYH series of isolated DC-DC converters operate from an ultra wide range input of 14 to 160Vdc (12:1) with single output voltages from 12V to 48V. The output voltage can be adjusted between -20% to +15% by using the trim terminal. Sense lines for the output voltage ensure a stable output voltage even with changing loads. The PYH200 models have efficiencies of up to 90% and can operate in ambient temperature of -40 to 100°C. The input to output isolation is 3,000Vac and the units are potted to provide a high resistance to shock and vibration. The converters are certified according to the 62368-1 safety standards and with additional circuits, the PYH200 series is also tested according to the EN 50155 railroad standard for electronic equipment in railroad vehicles.

| Features | Benefits |
|---|---|
| • Half-Brick Footprint | • Industry Standard Package Size |
| • 14 - 160Vdc Wide Input Range (12:1) | • Supports the Majority of Railway DC Input Voltages |
| • Certified to IEC 62368-1, Tested According to EN 50155 | • Easier System Compliance |
| • Potted Plastic Case | • High Resistance to Shock and Vibration |
| • 3000Vac Input to Output Isolation | • Suitable For Railway and Industrial Applications |

## Model Selector

| Model | Input Voltage (V) | Output Voltage (V) | Maximum Current (A) | Maximum Power (W) | No Load Input Current (mA) | Efficiency (%) at 72 / 110Vdc | Maximum Load Capacitance (uF) |
|---|---|---|---|---|---|---|---|
| PYH200-72WS12 | 14 - 160 | 12 | 16.7 | 200 | 50 | 90 / 90 | 16,700 |
| PYH200-72WS15 | 14 - 160 | 15 | 13.5 | 200 | 50 | 90 / 89 | 13,500 |
| PYH200-72WS24 | 14 - 160 | 24 | 8.4 | 200 | 50 | 88 / 88 | 8,000 |
| PYH200-72WS48 | 14 - 160 | 48 | 4.2 | 200 | 50 | 88 / 89 | 2,200 |

| PYH | 200 | -72W | S | 12 | -N |
|---|---|---|---|---|---|

- PYH: Series
- 200: Output Power 200W
- -72W: 14 - 160V Input Voltage
- S: Single Output
- 12: Output Voltage — 12 = 12V; 15 = 15V; 24 = 24V; 48 = 48V
- -N: Blank = Positive Logic Remote On/Off and M3 Thread; -N = Negative Logic Remote On/Off and M3 Thread; -PD = Positive Logic Remote On/Off and 3.2mm Hole; -ND = Negative Logic Remote On/Off and 3.2mm Hole

Preferred option

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## Related Products

| Type | Series | Description |
|---|---|---|
| Heatsink kit (User installation) | ACC-PYHB-HC01 | HC1 heatsink, thermal pad, screws and washers |
| Heatsink kit (User installation) | ACC-PYHB-HC02 | HC2 heatsink, thermal pad, screws and washers |
| Heatsink kit (User installation) | ACC-PYHB-HC05 | HC3 heatsink, thermal pad, screws and washers |
| DC-DC Converter | PYD20 | 20W, Input 8.5-160V, 2" x 1" |
| DC-DC Converter | PYQ50 | 30-50W, Input 14-160V, quarter brick |
| DC-DC Converter | PYQ75 | 75W, Input 9-75V, quarter brick |
| DC-DC Converter | CN-B | 200-300W, Input 60-160V, half brick |

## Specifications

| Model | | PYH200 |
|---|---|---|
| **Input** | | |
| Input Voltage Range | Vdc | 14-160 Derate output power linearly from 200W to 150W between 16.5V and 14V input voltage |
| Input Surge Voltage | Vdc | 180 (100ms maximum) |
| Input Shutdown Voltage | Vdc | 13 Typ. (for all models at 70% load, when UVLO pin is left open, can be adjusted with external resistor) |
| Start-up Time (typ) | ms | 200 Typ. |
| Hold-up Time | - | Depending on the capacitor connected to the BUS pin, see table below |
| No Load Current Consumption | - | See model selector table. Typically 15mA when remote on/off is activated |
| Efficiency | - | See model selector table |
| Conducted & Radiated EMI | - | EN55032. See installation manual for external circuitry |
| Immunity | - | See immunity section |
| Railroad Applications | - | EN 50155, EN45545-2, EN 61373, EN 50121-3-2: See application note for railroad use |
| Safety Certification and Markings | - | IEC/UL/CSA/EN62368-1, CE Mark and UKCA Mark |

## Immunity

| Test | Standard | Test Level | Criteria | Notes (See installation manuals for external circuitry) |
|---|---|---|---|---|
| ESD | EN61000-4-2 | Air ± 8kV and Contact ± 6kV | A | - |
| Radiated Susceptibility | EN61000-4-3 | 20V/m | A | - |
| Electrical Fast Transient Burst | EN61000-4-4 | ± 2kV | A | With an input filter of two 100uF capacitors and a 180V supressor diode (SMCJ180A) |
| Surge | EN61000-4-5 | ± 2kV | A | |
| Conducted Susceptibility | EN61000-4-6 | 10 Vrms | A | - |

## Specifications

| Model | | PYH200 |
|---|---|---|
| **Output** | | |
| Output Voltage Tolerance | % | ±1 |
| Output Voltage Adjustment | % | -20/+15 |
| Switching Frequency | kHz | 432-528 |
| Ext.Switching Frequency Synchronization | - | Yes, use Sync pin, see installation manual for external circuitry |
| Line Regulation | % | ±0.2 |
| Load Regulation | % | ±0.2 |
| External Load Capacitance | - | See model selector table |
| Ripple & Noise(1) | mVp-p | 200 (12V, 15V models), 240 (24V, 48V models) |
| Temperature Coefficient | %/°C | ±0.02 |
| Minimum Load | - | No minimum load required |
| Transient Loading | - | 250us recovery time for a 25% load change |
| Overcurrent Protection (typ) | % | 110-140 (hiccup mode) |
| Overvoltage Protection (typ) | % | 117-140 |
| Overtemperature Protection | °C | 105, automatic recovery when temperature falls below 95°C |
| Remote Sense | % | ±15 |
| Remote On/Off | - | Positive Logic (Blank): ON: Open or 3.5-160V, OFF Short or 0-1.2V<br>Negative Logic (-N): ON: Short or 0-1.2V, OFF: Open or 3.5-160V |

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## Specifications

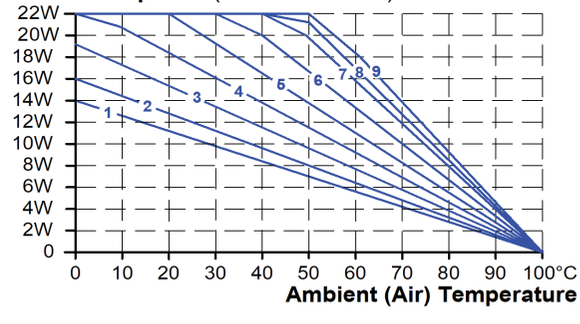
| Model | | PYH200 |
|---|---|---|
| **Environmental** | | |
| Operating Temperature(2) | °C | -40 to +100 (see derating section and confirm case temperatures in end system) |
| Maximum Case Temperature | °C | 100 |
| Storage Temperature | °C | -55 to +125 |
| Humidity (non condensing) | %RH | 95 (maximum, for operation & storage) |
| Cooling | - | Convection, conduction or forced air |
| Altitude | m | 5,000 (operating) |
| Withstand Voltage (For 1 minute) | - | Input to output 3000Vac or 4200Vdc, input to base plate 3000Vac or 4200Vdc, output to base plate 500Vac or 700Vdc |
| Isolation Capacitance | pF | 500 (input to output) |
| Vibration (Operating) | - | MIL-STD-810F |
| Thermal Shock | - | MIL-STD-810F |
| **Other** | | |
| Weight (Typ) | g | 105 |
| Size (LxWxH) | mm | 61.0 x 57.9 x 12.7 |
| Size (LxWxH) | Inches | 2.4 x 2.28 x 0.5 |
| Case Material | - | Plastic |
| Base Plate Material | - | Aluminum |
| MTBF - MIL-HDBK-217F, Full Load, GB25 | Hours | 475,000 - 629,000 depending on model |
| Warranty | yrs | 3 |

Notes
See website for detailed specifications, test methods and installation manual
(1): Measured with a 10uF tantalum/ aluminium capacitor and a 1.0uF multi-layer ceramic capacitors in parallel t the measurement path.
(2). The case temperature must be confirmed in the end application. The product rating may be affected by airflow direction and physical obstructions near the module.

## Derating Curve - Vertical Mount, Natural Convection

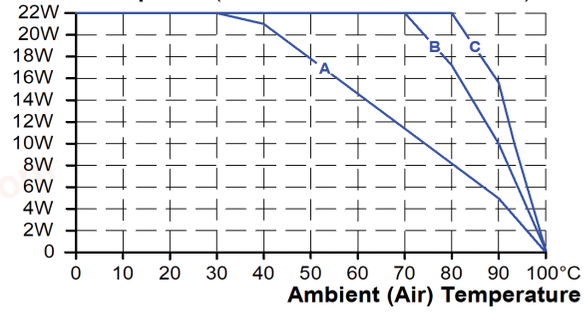
The possible temperature range depends on the power dissipation at the operating point of the DC-DC converter and the cooling method used.
See installation manual for details.

**Power Dissipation** (without heatsink)




1 Natural convection 20LFM (0.1m/s, RTH 7.12°C/W)
2 Forced air 100LFM (0.5m/s, RTH 6.21°C/W)
3 Forced air 200LFM (1.0m/s, RTH 5.17°C/W)
4 Forced air 300LFM (1.5m/s, RTH 4.29°C/W)
5 Forced air 400LFM (2.0m/s, RTH 3.64°C/W)
6 Forced air 500LFM (2.5m/s, RTH 2.96°C/W)
7 Forced air 600LFM (3.0m/s, RTH 2.53°C/W)
8 Forced air 700LFM (3.5m/s, RTH 2.37°C/W)
9 Forced air 800LFM (4.0m/s, RTH 2.19°C/W)

**Power Dissipation** (with heatsink ACC-PYHB-HC01)



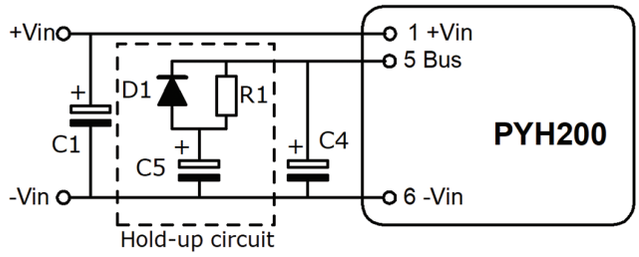

A Natural convection 20LFM (0.1m/s, RTH 4.78°C/W)
B Forced air 100LFM (0.5m/s, RTH 1.44°C/W)
C Forced air 400LFM (2.0m/s, RTH 0.95°C/W)

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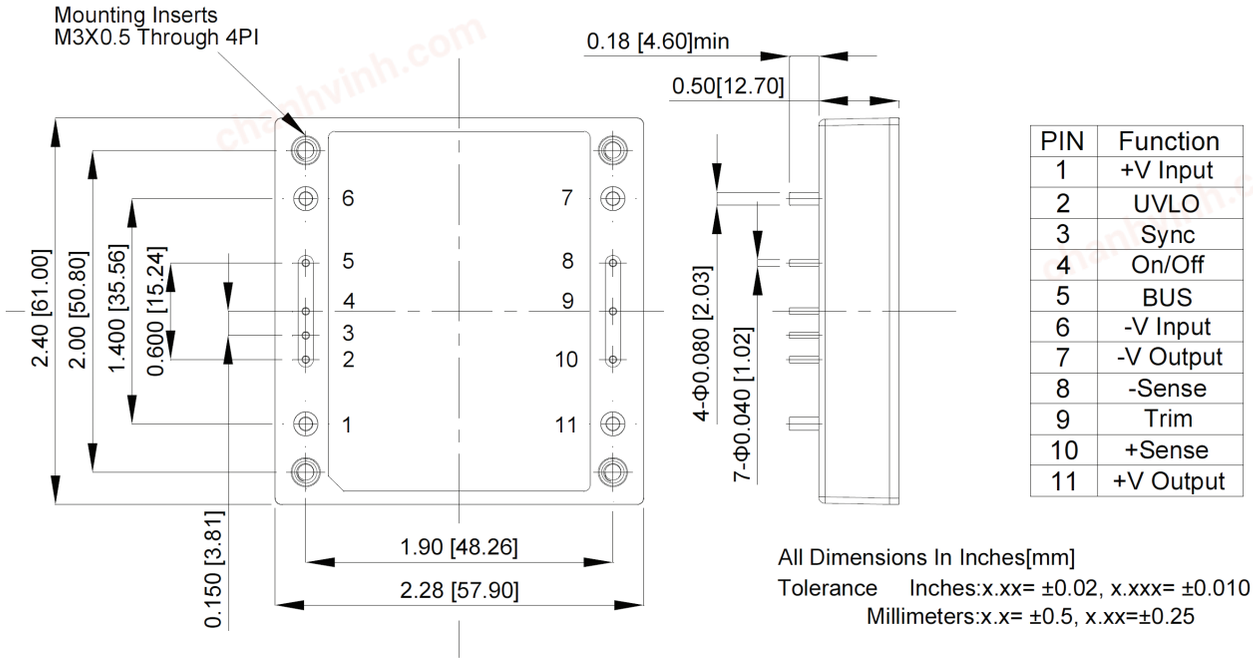
## Hold-up Time

The hold time is defined as the time period during which the DC-DC converter output remains active after a loss of input power. The DC-DC converter itself is not capable of providing a hold time. For this, an external circuit with a large hold-up (storage) capacitor is required. See installation manual for details.




| Input Voltage (Vdc) | Capacitor for 10ms hold-up time (µF) | Capacitor for 30ms hold-up time (µF) |
|---|---|---|
| 24 | 2400 | 7200 |
| 36 | 2400 | 7200 |
| 48 | 2400 | 7200 |
| 72 | 2400 | 7200 |
| 96 | 820 | 2460 |
| 110 | 560 | 1680 |

## Outline Drawing and Pinout




| PIN | Function |
|---|---|
| 1 | +V Input |
| 2 | UVLO |
| 3 | Sync |
| 4 | On/Off |
| 5 | BUS |
| 6 | -V Input |
| 7 | -V Output |
| 8 | -Sense |
| 9 | Trim |
| 10 | +Sense |
| 11 | +V Output |

All Dimensions In Inches[mm]
Tolerance Inches:x.xx= ±0.02, x.xxx= ±0.010
Millimeters:x.x= ±0.5, x.xx=±0.25

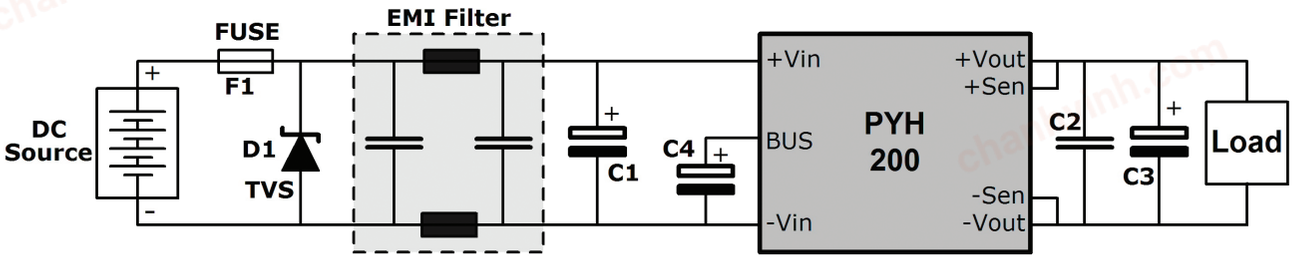
Recommendations for Pad Design:

| | |
|---|---|
| Pin 1, 6, 7, 11: | 2.4mm through hole 4.8mm pad size |
| Pin 2, 3, 4, 5, 7, 8, 9, 10: | 1.4mm through hole 2.8mm pad size |
| Converter Screws: | 3.5mm through hole |

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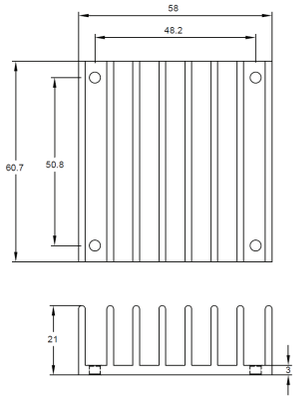


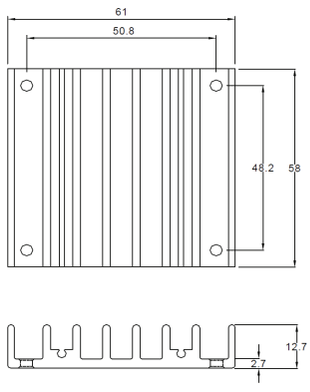
## Recommended Wiring Scheme

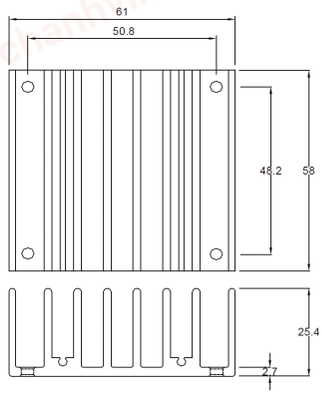



**Fuse F1:** The DC-DC converter is not internally fused. An external input fuse must always be used. Use a 25A slow-blow fuse.
**Capacitor C1 and Diode D1:** These two components provide higher transient resistance (surge and burst) at the input and are required if the DC-DC converter has to meet the EN61000-4-4 and EN61000-4-5 standards. The capacitor C1 should be 100µF/200V and the suppressor diode D1 should be a SMCJ180A.
**EMI Filter:** This filter reduces the conducted emission to the input. See installation manual for details.
**Capacitor C2, C3:** For a good transient response behavior, low ESR output capacitors should be utilized. Use a 1µF ceramic multilayer capacitor for C2 and a 10µF aluminum or tantalum capacitor for C3.
**Capacitor C4:** External capacitor connected between BUS and -Vin is necessary to keep operating stable. Use an aluminum capacitor with 240µF (e.g. VISHAY 118 AHT series)

## Heatsinks




| | ACC-PYHB-HC05 | ACC-PYHB-HC02 | ACC-PYHB-HC01 |
|---|---|---|---|
| **Fin Style** | **Longitudinal** | **Transverse** | **Transverse** |
| **Size (L x W x H)** | 58 x 60.7 x 21mm | 61 x 58 x 12.7mm | 61 x 58 x 25.4mm |
| **Thermal Impedance** | 3.90°C/W nat. convection | 4.70°C/W nat. convection | 3.00°C/W nat. convection |
| | 1.74°C/W with 100LFM | 2.89°C/W with 100LFM | 1.44°C/W with 100LFM |
| | 1.33°C/W with 200LFM | 2.30°C/W with 200LFM | 1.17°C/W with 200LFM |
| | 1.12°C/W with 300LFM | 1.88°C/W with 300LFM | 1.04°C/W with 300LFM |
| | 0.97°C/W with 400LFM | 1.59°C/W with 400LFM | 0.95°C/W with 400LFM |

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