

## Press-Fit Technology

1. As a solder free fastening technology, press-fit technology frequently offers an attractive alternative to simple soldering technology.
2. An effective electrical press-fit connection is created by pressing a pin into plated through hole of a circuit board and – as part of cold welding process – generating a gas-tight electrical connection.
3. The through-hole plating for a press-fit system is essentially made in the same way as the holes for accepting components for THT soldering. Thus there are no hinges required in the PCB manufacturing process.
4. One outstanding characteristic of the press-fit system compared to the soldering system is that it produces not only an electrical but also an extraordinarily strong mechanical connection between the inserted components and the PCB.

With regard to long-term reliability, the press-fit is convincing since it has the lowest FIT value (Failure in Time) of the overall system. It is to 30 times better than that of an SMT solder joint. A single solid press pin has a typical extraction force of 100N or approximately 70% of the insertion force. Therefore press-fit connections are predestined to provide not only electrical but also mechanical connection solutions for electrical components.

If after press insertion a solid press pin in a 2.4mm thick printed circuit board fits on each corner with more than 3 against the sleeve, the press connection zone has a lower electrical resistance than the brass pin itself and thus does not pose an electrical or thermal bottleneck. The connection surface angle is normally much greater, which provides a generous safety buffer for the electrical connection.

## Notice

The processing of press-fit elements fits seamlessly into the production process and is thus very cost-effective. Multiple power elements can be fitted simultaneously using press-fit tools. Compared to soldering, the printed circuit boards are not subjected to thermal loads.

1. Other components should be spaced at least 4mm away from the press-fit hole.
2. The hole should be at least 3mm away from the edge.
3. No special tools are necessary for the pressing process. A simple lever press is usually sufficient.
4. The insertion force per pin should be at least 40N. Typically this force is around 150N/pin.
5. The press connection area must be supported during the pressing process.
6. The press stroke should be 90° to the PCB. The pins should protrude slightly from the PCB after the pressing process.
7. If two-part press-fit elements are used, the base-part must always be fitted first to the PCB.
8. Press-in-process should be made after all soldering processes because of high heat absorption of power elements.



Continuous and extremely homogenous material transition between press pin and through-hole plating.

Required connection surface angle  $\approx 3^\circ$



## Advantages of the Press-Fit technology

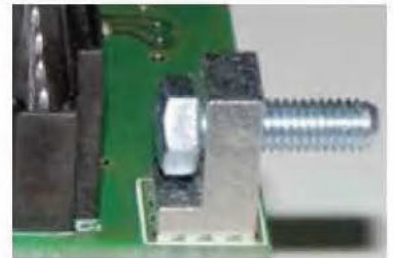
1. Very high ampacity, ideally suited for high continuous and peak currents.
2. Press-fit connections show extremely high environmental stability.
3. Low-resistance connection means low self heating, hence less heat must be dissipated through the system.
4. No heat development on sensitive components and no thermal stress of the circuit board.
5. Extremely stable mechanical.
6. No problems with cold solder joints.
7. High mechanical retaining forces.
8. Double-sided mounting of circuit board is possible.
9. Much higher long-term reliability as for solder connections.
10. More secure than soldering and screw connections.
11. No changes in the production of circuit boards necessary.



Press-Fit element for currents of up to 300 A



Press-Fit element for currents of up to 160 A



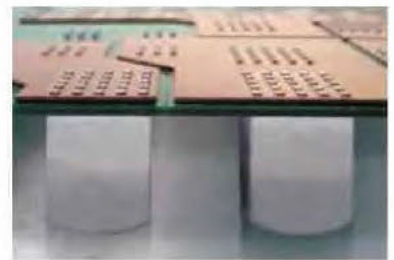
Angled power element for connecting the assembly with the housing



DC power connection up to 120 A



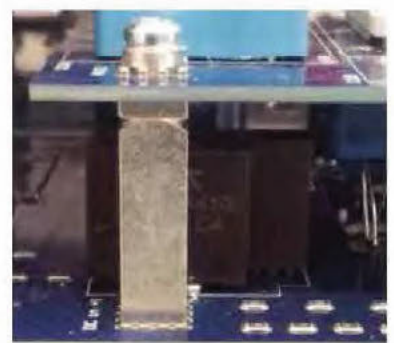
Double-sided mounting



Press-fitting of power element: PCB with copper bar



Option for fitting a fuse



High current Board-to-Board connection

## Power One Single-Piece Power Element

# 1000A

**reliable**  
**individual design**  
**mechanically usable / deployable**



Single-piece Power Elements are used for the supply and distribution of high currents in connection with circuit board based systems. Depending on the pin arrangement and the layout, currents of up to 1,000A are possible. Meanwhile this product group has been successfully used in the field in thousands of various designs. The manufacturing method allows individual adaptations regarding design and dimensions. That is the reason why Power Elements perfectly qualify as connecting element for fuses, IGBTs, switches and cables to the circuit board or as contact element for board-to-board respectively board-to-case.

### Application Possibilities

- Board-to-board over 90° or packaging
- Wire-to-board screw connection of ring terminals
- Electro mechanics such as hinges and case mounting
- Spacers
- Retainers / fastenings of switches, fuses, IGBTs
- Any combination of all these and much more

### Processing

PowerOne Power Elements are pressed in into the circuit board. Soldering is not necessary. Therefore, the PCBs are not exposed to temperature stress. This processing step easily blends in to the processing chain and is highly cost efficient. With the aid of the corresponding Press Fit tools, several Power Elements can be pressed in simultaneously.

- For assembling prototypes, no special equipment is needed for pressing in, a simple toggle press is sufficient.
- The circuit board needs support during the pressing procedure.
- The pressing force must be executed in a 90° angle to the circuit board.
- After the pressing process the pins should stand out of the drilled hole (ca. 0.2 – 0.5 mm).
- Plated through holes of the circuit board must be executed according to our indications.
- PowerOne high current terminal blocks and spacers are manufactured for pressing, soldering is not intended.

#### Technical Data

Current carrying capacity per pin at 20 °C	~ 10 /15 A (areal / circumferential pins)
Current carrying capacity per pin at 85 °C	~ 6 /10 A (areal / circumferential pins)
Material	CuZn39
Surfaces	Tin-plated (standard)
	further surfaces such as nickel, silver, nickel / gold and others on demand

#### Dimensions

Length x width	from 5 x 5 to 22 x 22 mm
Height	from 3 mm individually
Height above PCB	from 3 mm individually
Pin length	up to 7.5 mm (standard of 3.5 mm)
Pin diagonal	1.6 mm standard others on demand

#### Circuit Board

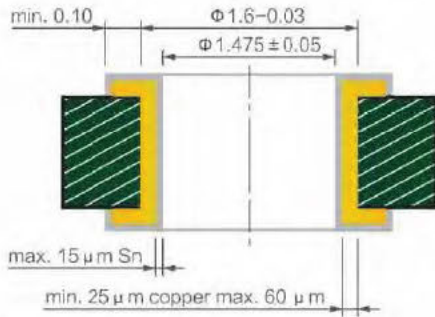
Base material	FR4 (EPGC202)
PCB thickness	from 1.5 mm
Drilling diameter	1.60 ± 0.025 mm
Final diameter HAL surface	1.45 ± 0.05 mm
chemical surface	1.475 ± 0.05 mm
Copper in hole thickness	min. 25 µm, max. 80 µm

#### Processing Parameters

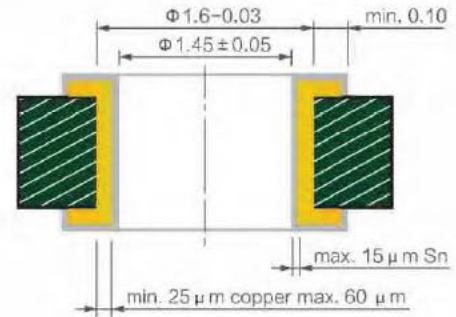
Press-in force	min. 40 N per Pin max. 250 N per Pin
Retention force	60 – 80 % of the press-in force
Press-in speed	100 – 250 mm /min

## Circuit Board Design

■ Via Specification For Chemical Surfaces



■ Via Specification For HAL ( Hot Air Solder Leveling )



## Torques

The torques indicated in the table are based on DIN 267 part 25. Different material combinations or different thread lengths of the connectors are not regarded here.

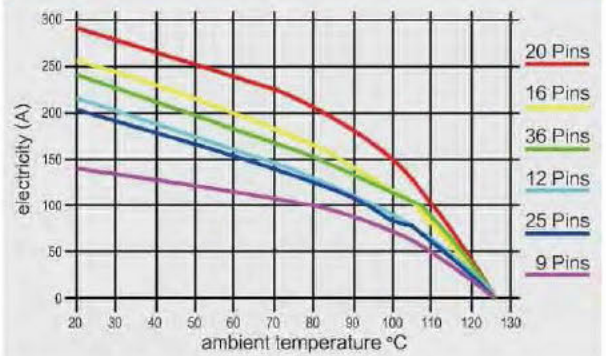
Torques for Brass

Thread	M2.5	M3	M4	M5	M6	M8	M10	M12
(Nm)	0.3	0.5	1.2	2.2	3.9	9.0	17.0	35.0

## Current Carrying Capacity

The current carrying capacity of a Press Fit connection needs to be seen in the context of the overall system. The Press Fit zone has a very low electrical contact resistance of 100 – 200  $\mu\Omega$ . The limiting factor therefore usually lies in the circuit board layout or in the connection of a feed line.

Derating Curve



Overview of PowerOne products

Customer Specific	through hole vertical (two-rows)	blind hole vertical (two-rows)	through hole vertical (circumference)	blind hole vertical (full plain)	bolt	bracket through hole (two-rows)	bracket through hole (full plain)	U groove bracket (full plain)
Pins								
4					M3			
6					M3, $\Phi 3.2$			
8					M2.5, M4, M5, M6, $\Phi 4.2$ , $\Phi 5.2$			
9					M3, M4, M5, $\Phi 3.2$			
10					M6, M8, $\Phi 6.2$ , $\Phi 8.2$			
12					M4, M5, $\Phi 10.2$			
16					M4, M5, M6, $\Phi 4.2$ , $\Phi 5.2$			
20					M8, M10			
25					M6, M8, $\Phi 5.2$ , $\Phi 6.2$ , $\Phi 8.2$			
36					M10, M12, $\Phi 8.2$ , $\Phi 10.2$			

All threads are available in UNC

## Supplies

Based on your different requirements, we also provide some relevant products at the back of this brochure. For further inquiries, please contact our sales representative.

**Power Two**  
**Two-Piece Power Element**

**500A**

**no stress on PCB**  
**high lifelong torque**  
**mechanically usable / deployable**



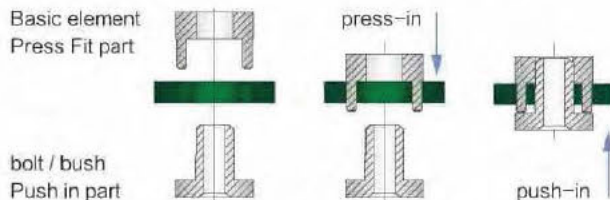
Two-piece Power Elements are a solution for through screw technologies on circuit boards. These high current terminal blocks and spacers enable a durable and reliable connection and mounting on the PCB without stressing it. Depending on the pin arrangement and the layout, currents of up to 500A are possible. The assembly method allows individual adaptations regarding design and dimensions. That is the reason why Power Elements perfectly qualify as connecting elements for fuses, IGBTs, switches and cables and the circuit board or for board-to-board connections.

**Application Possibilities**

- Board-to-board stackable
- Wire-to-board screw connection of ring terminals
- Electro mechanics, through screw technology, spacers
- Retainers / fastenings of switches, fuses, IGBTs
- Any combination of all these and much more

**Processing**

PowerTwo Power Elements are pressed in into the circuit board. Soldering is not necessary. Therefore, the PCBs are not exposed to temperature stress. This processing step easily blends in to the processing chain and is highly cost efficient. With the aid of the corresponding Press Fit tools, several Power Elements can be Press Fit simultaneously.



For assembling prototypes, no special equipment is needed for pressing in, a simple toggle press is sufficient

1. The circuit board needs support during the pressing procedure
2. The pressing force must be executed in a 90° angle to the circuit board
3. After the pressing process the pins should stand out of the drilled hole (ca. 0.2 – 0.5mm)

Technical Data	
Current carrying capacity per pin at 20 °C	~ 15A
Current carrying capacity per pin at 85 °C	~ 10A
Material	CuZn39
Surfaces	Tin-plated (standard)
	further surfaces such as nickel, silver, nickel / gold and others on demand

Dimensions	
Length x width	from 9 x 9 to 22 x 22 mm
Height	from 3mm individually
Height above PCB	from 3mm individually
Pin length	up to 7.5mm (standard of 3.5mm)
Pin diagonal	1.6mm standard
	others on demand

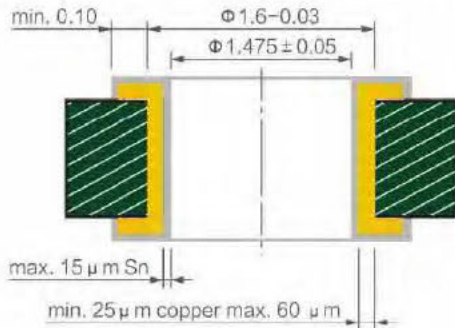
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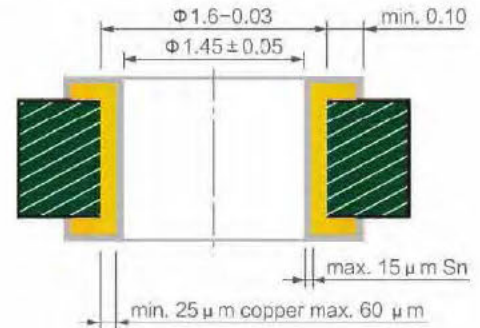
4. Plated through holes of the circuit board must be executed according to our indications
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## Circuit Board Design

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### Via Specification For HAL ( Hot Air Solder Leveling )



## Torques

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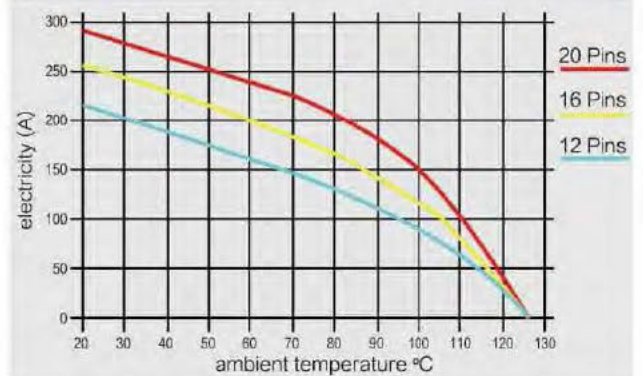
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## Current Carrying Capacity

The current carrying capacity of a Press Fit connection needs to be seen in the context of the overall system. The Press Fit zone has a very low electrical contact resistance of 100 – 200 μΩ. The limiting factor therefore usually lies in the circuit board layout or in the connection of a feed line.

### Derating Curve



### Overview of PowerTwo products

Customer Specific	basic element pins two-rowed	basic element pins circumferential	socket female thread	socket through hole	bolt male thread
	Pins		Thread or Hole		
	8, 10, 12	12, 16, 20	M3 – M10	φ3.2 – φ10.2	M3 – M10

All threads are available in UNC

## Supplies

Based on your different requirements, we also provide some relevant products at the back of this brochure. For further inquiries, please contact our sales representative.

**THR (Through-hole Reflow)  
Power Element**

**50A 85A**

**reliable**  
**Automatic installation**  
**high mechanical perfor**



The miniaturization of electronic components has elevated the requirements of our products. In the PCB industry, low power components increased the demand and the requirements of automation. After years of research and development, we developed miniaturization and low resistance THR products series. The product can meet the requirements of either manual or automatic installation for the line to board connection or plate to board 90 degree connection.

THR (Through-hole Reflow, also called pin in paste-PIP) technology is the technology of combining high mechanical strength and automated processing. For the large number of PCB processing board

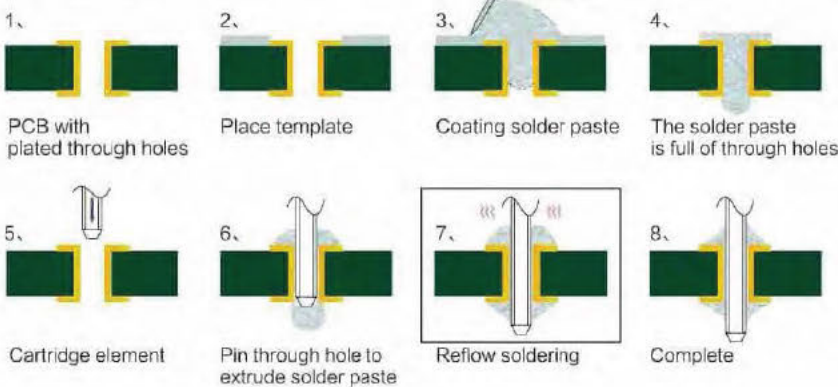
application of perforated elements, this technology can be replaced of wave-soldering in SMT process.

These products can be handled like SMD products because the two products are using the same principle. At the same time, the clear benefits of THR products is that it has better mechanical bonding strength can be achieved with vias.

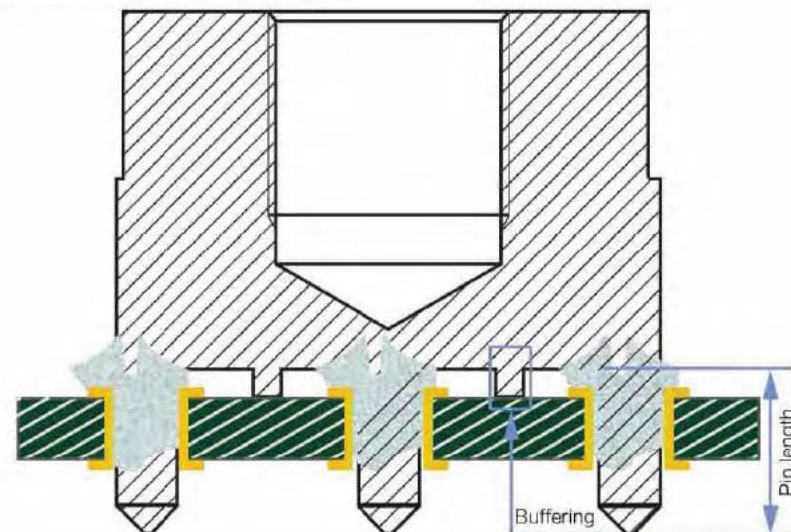
THR series products have 4, 8, 9, three kinds of pin configuration, the maximum current support up to 85A. By integrating the design, the soldering are more stable and easier to control within the production tolerances. The through hole reflow welding has lower resistance, less current loss, improve work efficiency, reduce energy consumption compared to microwave soldering.

The THR product series is a better choice for environmental friendliness that require high mechanical connection strength and low energy consumption.

**Product installation flow chart**



**Product installation drawing**



**The Advantages of  
Through hole reflow soldering**

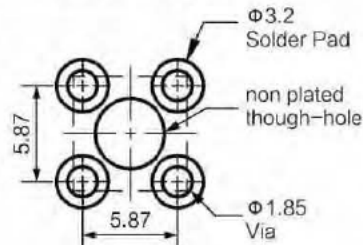
1. Through hole reflow soldering provides better quality low PPM rate (PPM rate of defects) which can be less than 20%.
2. Soldering tinless defects, and the rework rate is very low.
3. The layout design of the PCB has less consideration factors compared to the wave soldering process.
4. The process is simple and the equipment is easy to operate.
5. The hole reflow soldering equipment covers less area, because of its printing presses and reflow furnace are smaller, so only a small area required.
6. Free of Tin slag.
7. The machine is fully enclosed, clean, and odorless in the production workshop.
8. The reflow soldering equipment management and maintenance is easy.
9. The printing template is adopted in the printing process, and each welding point and the amount of printed paste can be adjusted according to the requirements.
10. During the reflow, the use of special templates, the temperature of each welding point can be adjusted according to the need.

## THR System of Pin and mounting hole layout

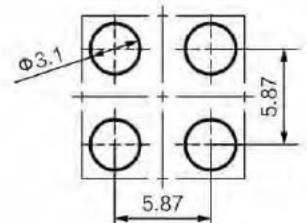
Research and development of THR products for PCB layout and production has specific requirements, thus, we provide a standard PCB product layout and design specifications of solder paste bushing.

For customized products, the layout design for the PCB and the solder bushing need to be correct in order to achieve the optimum performance of the products.

Recommended Land Pattern: [mm]

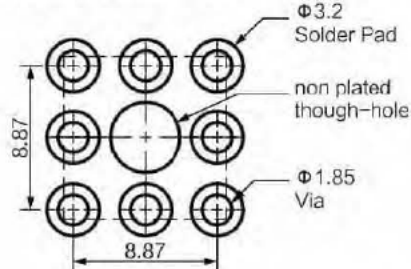


Stencil Suggestion:

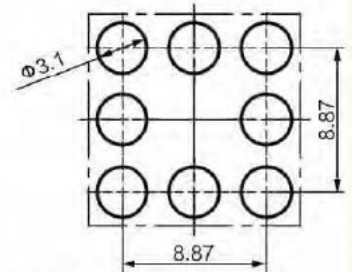


This layout is only for PE19 4Pins

Recommended Land Pattern: [mm]

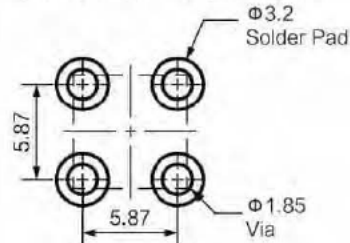


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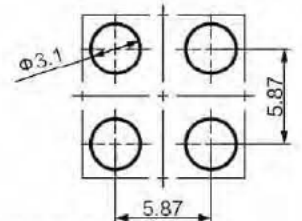


This layout is only for PE19 8Pins

Recommended Land Pattern: [mm]

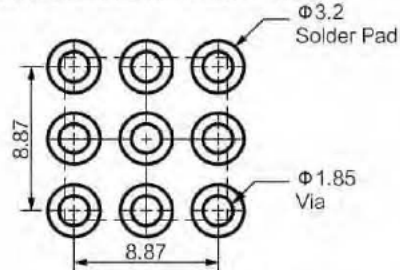


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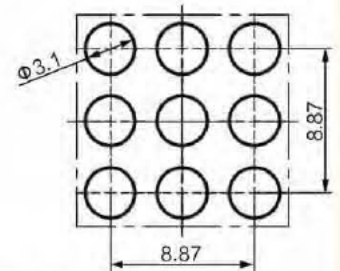


This layout is only for PE20, PE21 4Pins

Recommended Land Pattern: [mm]



Stencil Suggestion:



This layout is only for PE20, PE21 9Pins