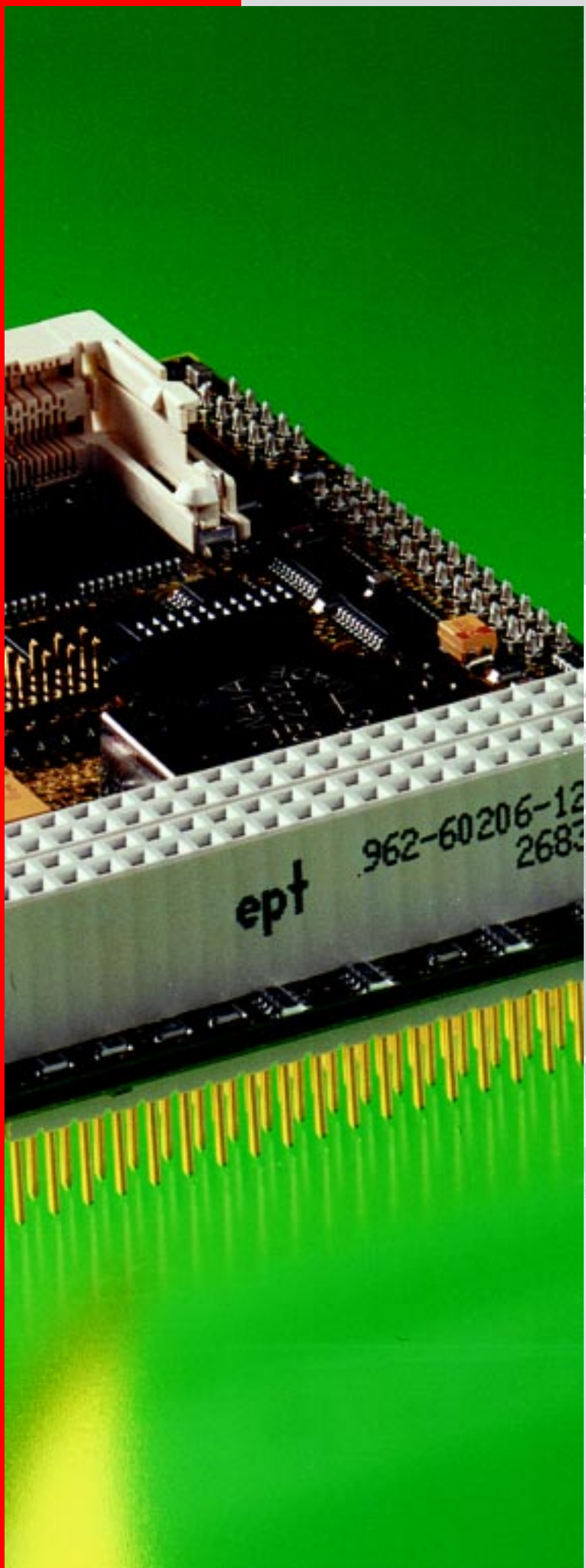
ept

...the better connection




# PC/104 – PC/104 Plus

Press-fit Technology

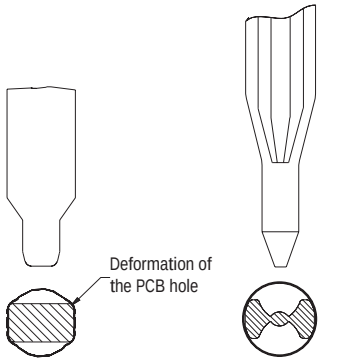
# Press-fit Process

## Basic Technology

A press-fit connection is made, as the name implies, through the pressing in of a contact pin into a PCB through hole. The important consideration here is that the cross section of the pin is greater than the diameter of the PCB hole. This difference in pin cross section and hole diameter results in a deformation of either the PCB hole or the cross section of the pin during the insertion process of pin into PCB through hole.

There are two major types of press-fit sections:

- A solid pin which does not deform in the insertion process.
- A compliant pin which compresses as a result of insertion into the PCB through hole.




The compliant pin technology for press-fit insertion is the clear choice of the engineering community for achieving a reliable press-fit contact. Compliant pin technology has a number of important advantages against solid pins:

– reduction in size of the press-fit section makes less demands on the PCB through hole.

– greater tolerances can be accepted for the plated through hole.

– lower insertion forces are required, resulting in fewer undesireable side effects.

– multible press in cycles into the same through hole are possible.

## A comparison of solder versus press-fit technology.

In comparison to standard soldering methods, press-fit technology exhibits a number of advantages:

– no thermal stress on the PCB.

– no fumes, gases or cleaning fluids which may reduce the contact reliability of the connector.

– no cold solder joints.

– no shorts as a result of solder bridging.

– mechanical mounting of the connector by means of the press-fit joint means the elimination of the need for mounting screws.

– long connector pins can be used for contacts from the backside of the PCB since there will be no solder build up on these pins.

– well defined impedance of the contact. (Good high frequency properties)

– fast, cost effective assembly of the connector onto the PCB or Backplane.

– complete repairability in that connectors or single contacts can be replaced easily.

– environmentally friendly since PCBs with press-fit connectors do not need to be washed.

– recycling of connectors can be made easy disassembly of connector and PCB, for recovery of gold.

An important but often underrated positive aspect of press-fit technology versus soldering is the advantage that press-fit technology has with respect of the efficient and effective manufacturing of Backplane and PCB assemblies. Studies at many companies have shown that the problems which arise from solder technology are often not evaluated correctly. An economic comparison between press-fit technology and solder technology shows that the efficiencies achieved with press-fit assembly of connectors and components are substantial in comparison with the solder process.

## Press-fit Technology and SMT

SMT and press-fit technology are the basis for a rational, cost effective and high quality assembly of components to printed circuit cards and Backplanes.

After the assembly of components to PCBs by means of reflow soldering, connector sockets and pins can be pressed into the through holes, which are unaffected by the reflow solder process.

## Specifications and Requirements of press-fit cross sections and PCB through holes.

The ept press-fit sections - solid and compliant pins - meet the requirements of the DIN 41612 Part 5 and IEC 352-5 specifications. Printed Circuit Card through holes must meet these specification for press-fit insertion of pins.

## Tcom press-fit sections for every need.

A well designed modern press-fit section can meet the requirements of a wide variety of applications.

Among these are:

– Avoidance of tin slivers on PCBs with hot air leveled plated through holes.

– Prevention of the warping of Backplanes. (banana effect)

– Variations of through hole tolerances.

– Functionability even by Ni/Au or pure copper plating.

## PC/104 Connectors in Press-fit version

ept now offers the VarPol-PC/ 104 female connector in FlatRock press-fit construction. This connector was developed for the stacking of PCBs (Piggyback, Sandwich) and is particularly well suited for use in PC/104 modules.

These connectors are available in the J1 and J2 variation with 2x32 and 2x20 pins. They can be obtained with short or long pins according to the PC/104 standard.

### Advantages of the PC/104 VarPol connector with press-fit pins

- Both female connectors can be pressed in with ept tooling in a one step process. This saves time in the production process.
- The expenses for the difficult hand soldering process are eliminated.
- No rework on long pins which can occur with the solder process due to solder bridging.
- Reduced testing requirements.
- Reduced insertion and extraction forces resulting in less possibility of pin misalignement.

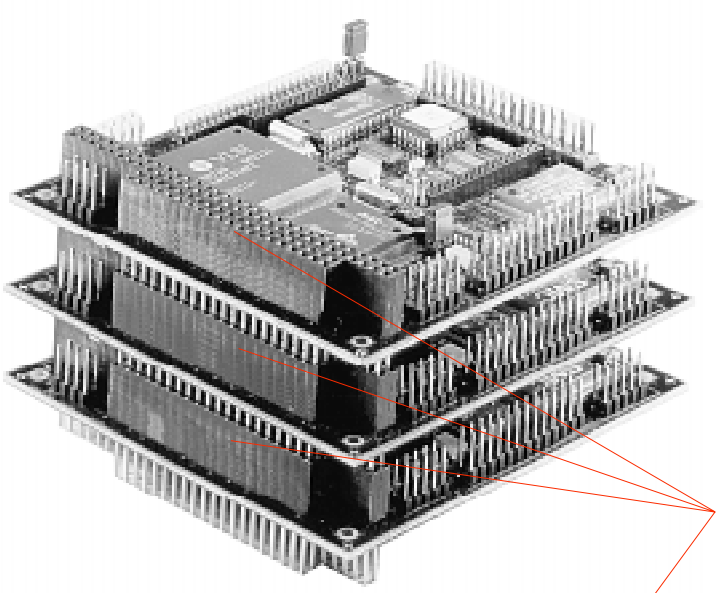
During the press-fit insertion of the PC/104 connector with long pins, a plastic guide is inserted onto the pins, offering the following advantages:

- No bending or misalignement of the long pins.
- This performs the function of the connector offset so that a seperation of 0,6“ is obtained during the assembly of the modules.
- Serves as a supported guide during the pressing in of the connector and helps prevent damage to circuit traces.

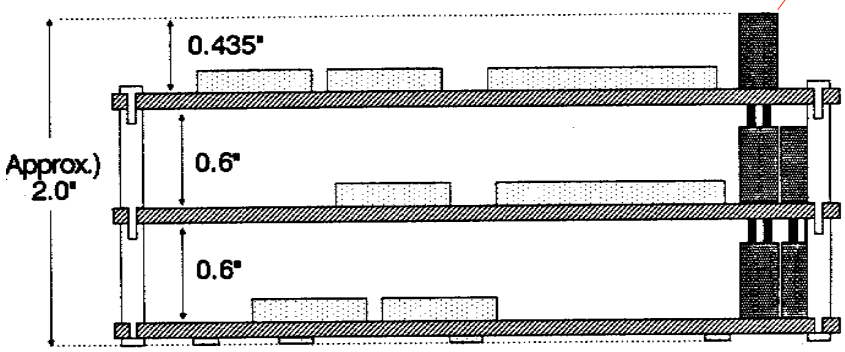
ept also supplies guide during the pressing in of the connector which can be used in PC/104 applications.

A few examples:

- DIN 41612 connectors in solder and press-fit version.
- IC- and PGA-sockets in flat rock press-fit technology.
- IC machined sockets in flat rock press-fit versions.
- Press-fit pins with long pins on top and bottom (support element for PC/104 female contact).



PC/104 pressfit connectors



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## PC/104 Plus Connectors in Press-fit Technology

Known from the desktop world, the PC/104 Plus connector has been added to the PC/104 spec by the PC/104 auditors. Recently, ept has developed an electromechanical connection with the PC/104 Plus connector system in press-fit technology. This connector system presents the J3 connector in accordance with the PC/104 Plus spec in a 2mm grid.

ept offers female 4x30 contact connectors, shrouds 4x30 contact and pin headers 2x30 contact as a standard for convenient stacking of Printed Circuit Boards (PCBs).

In order to meet the requirements of PC/104 Plus with pin headers, two headers are pressed-in parallely (see sketch). This offers the use of pin headers as termination of a board-stack.

### ept PC/104 Plus press-fit connectors offer a large number of advantages:

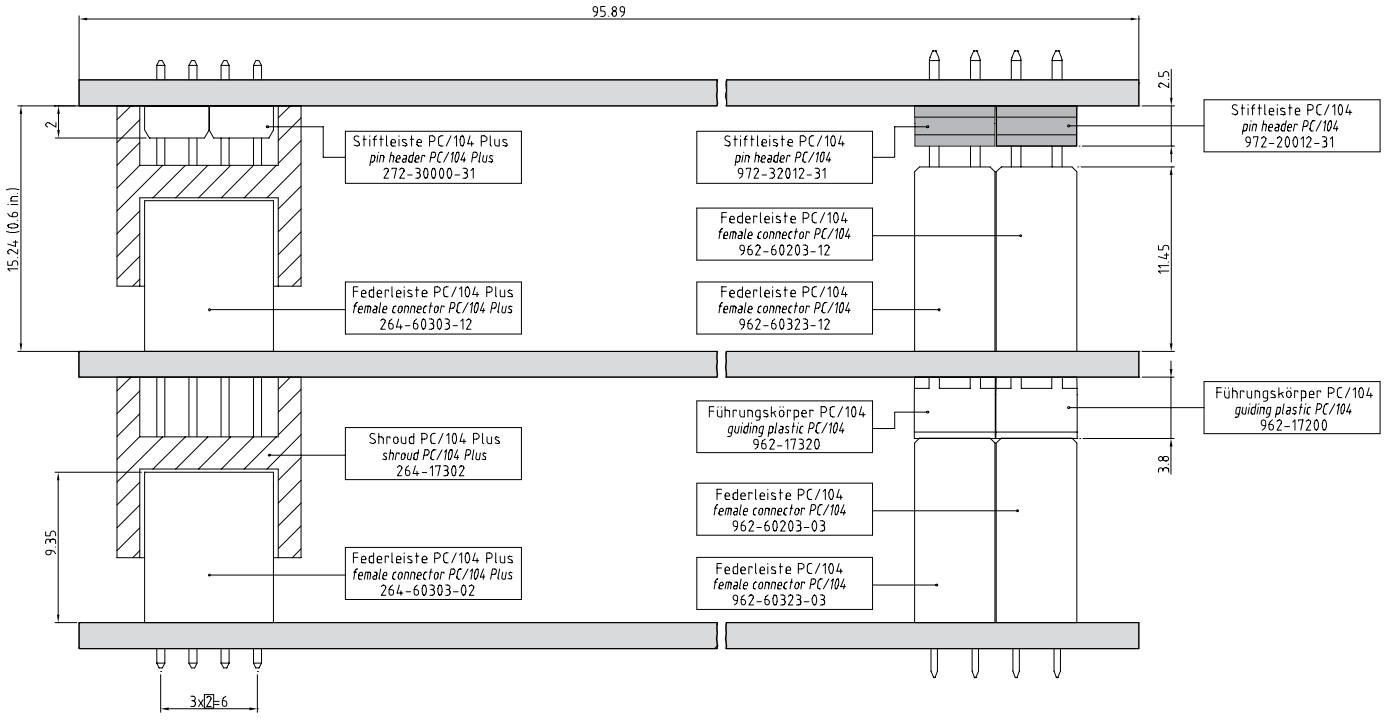
- Male and Female connectros can be pressed in with the same ept press-fit tool in one single step, thus offering a time-saving production.
- Female connectors can be mounted cost-effectively due to flatrock technology.
- No costly manual soldering
- No solder bridges due to solder-free press-fit connection.
- Reduced inspection process
- Shroud makes stand-offs unnecessary
- Secure assembly of shroud and board by overpressing on the connector tails.
- No soldering, thus no rework on long tail contacts
- Therefore no additional holes (normally 4 holes with 1,9 mm diameter) are needed for locking pegs which results in a more efficient usage of PCB surface.

### Customer-specific solutions Varpol 2.0 mm

ept offers development of customer-specific solutions in PC/104 Plus applications in 2.0 mm grid, e.g.:

- Female 1-, 2-, 3-, 4-row connectors with up to 50 contacts/row.
- Female connectors with pin-tails ranging from 2,8 mm up to 17,0 mm length for rear mating.
- Pin header 1-, 2,- 3-, 4-row connectors with up to 50 pins/row.
- Male connectors with length of mating zone ranging from 2.0 mm up to 17.0 mm, as well as rear mating up to 17.0mm length.
- Pin headers with double press-fit zones for board-to-board stacking.

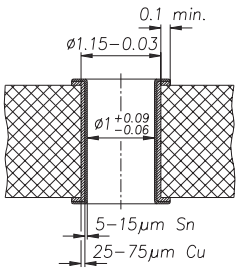
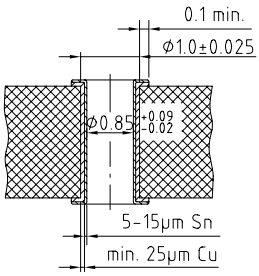
All these specific solutions can be developed according to customer specification in well-proven and reliable press-fit technology.



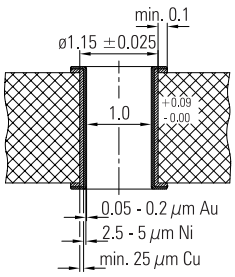
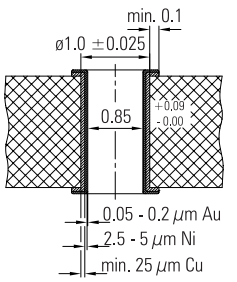
## Technical Specifications

| | PC/104 | PC/104 Plus |
|---|---|---|
| Housing | Polyester GV, self extinguishing acc. UL-V0 | |
| Contact Plating | copper alloy, sel. plated Au over Ni | |
| Insertion Force | Test pin Ø 0,6 mm, max. 0,9 N/Pin | Test pin Ø 0,5 mm, max. 1,5 N/Pin |
| Extraction Force | Test pin Ø 0,6 mm, min. 0,6 N/Pin | Test pin Ø 0,5 mm, min. 0,3 N/Pin |
| Press-in Force | max. 80 N/Pin | |
| Operating Temperature Connector | -55°C to +125°C | |
| Operating Temperature press-fit Connection | -55°C to +85°C | |
| Rated Currend | 1 A | 1 A |
| Rated Voltage | 150 V | 100 V |
| Contact Resistance | < 20mOhm | |
| Air- and Creepage | | min. 0,5 mm |

## Hole Specification for throuhole SnPb

| | PC/104 | PC/104 Plus |
|---|---|---|
| Hole Diameter | 1,0 mm | 0,85 mm |
| Drilled Diameter | 1,12 - 1,15 mm | 0,975 - 1,025 mm |
| Cu | 25 - 75 µm | min. 25 µm |
| Sn | 5 - 15 µm | 5 - 15 µm |
| Electroplated Diameter | 0,94 - 1,09 mm | 0,83 - 0,94 mm |
| |  |  |

## Hole Specification for throuhole Au/Ni

| | PC/104 | PC/104 Plus |
|---|---|---|
| Hole Diameter | 1,0 mm | 0,85 mm |
| Drilled Diameter | 1,125 - 1,175 mm | 0,975 - 1,025 mm |
| Cu | 25 - 50 µm | min. 25 µm |
| Ni | 2,5 - 5 µm | 2,5 - 5 µm |
| Au (plating) | 0,05 - 0,2 µm | 0,05 - 0,2 µm |
| Electroplated Diameter | 1,0 - 1,09 mm | 0,85 - 0,94 mm |
| |  |  |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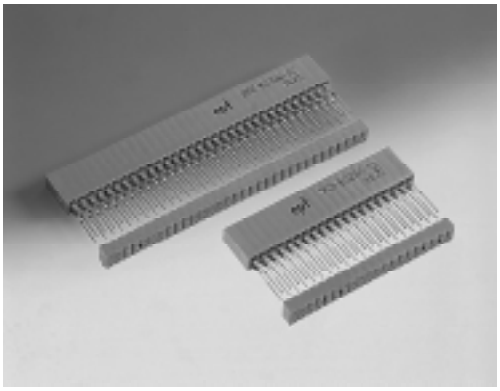
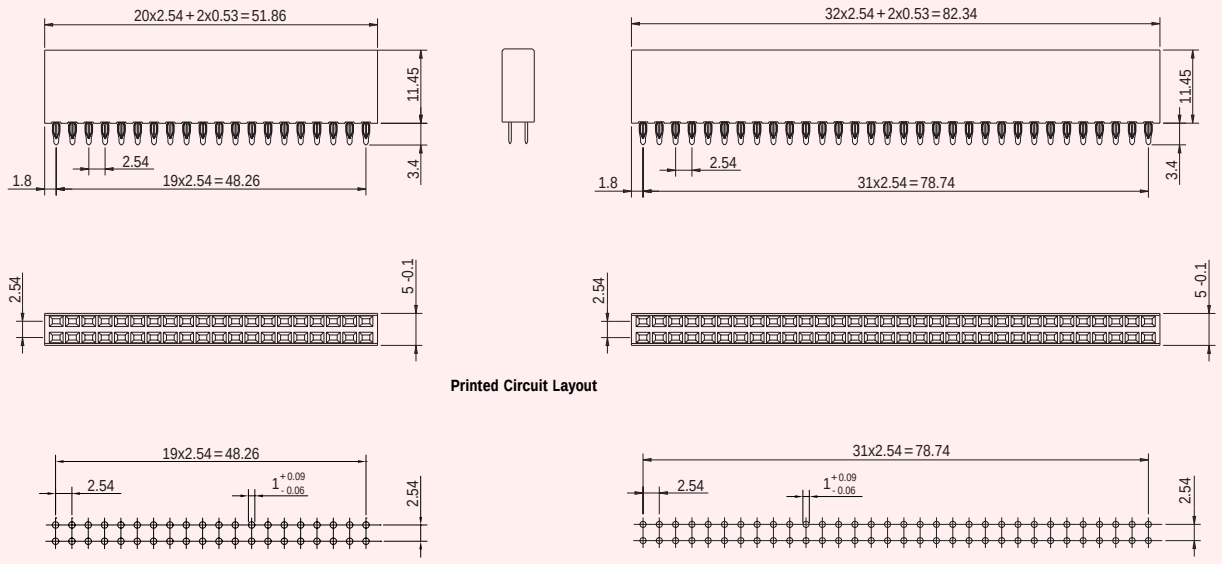


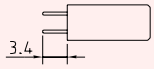
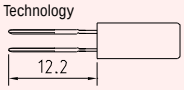
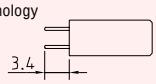
# VarPol PC/104 Female Connectors flat rock technology

**Dimensions in mm**



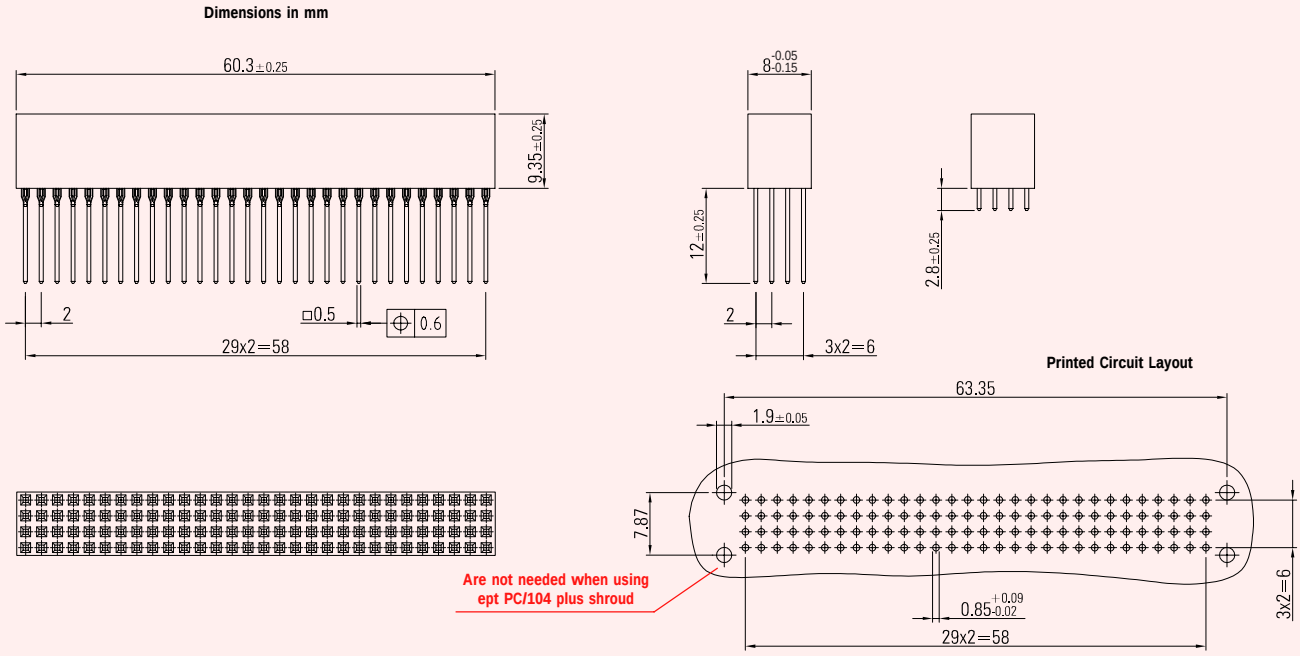

**Printed Circuit Layout**

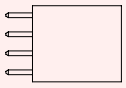
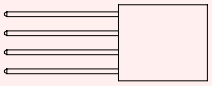



| No. of Positions | | 40 | 64 |
|---|---|---|---|
| Termination Methods | Quality Class | Part Numbers | |
| Press-fit Technology   | I | — | — |
| | II | 962-60206-03 | 962-60326-03 |
| | III | 962-60203-03 | 962-60323-03 |
| Press-fit Technology   | I | — | — |
| | II | 962-60206-12 | 962-60326-12 |
| | III | 962-60203-12 | 962-60323-12 |
| Solder Technology   | I | — | — |
| | II | 962-40206-03 | 962-40326-03 |
| | III | 962-40203-03 | 962-40323-03 |

**On request:** other numbers of positions


# PC/104 Plus Female Connectors
# flat rock technology




| No. of Positions | 120 |
|---|---|
| Termination Methods | **Part Numbers** |
|  | 264-60303-02 |
|  | 264-60303-12 |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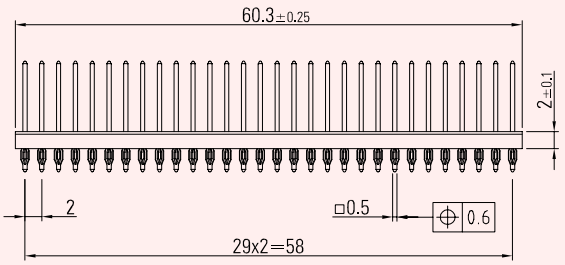
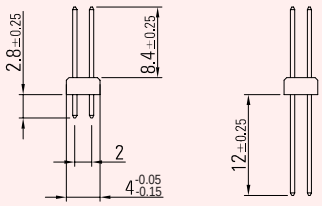
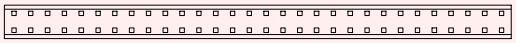
# PC/104 Plus Straight Headers

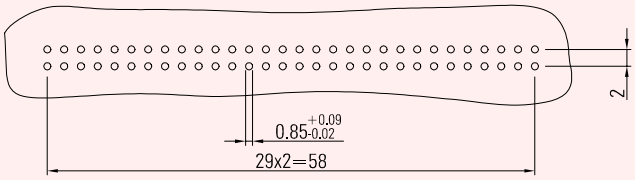
**Dimensions in mm**

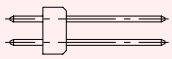


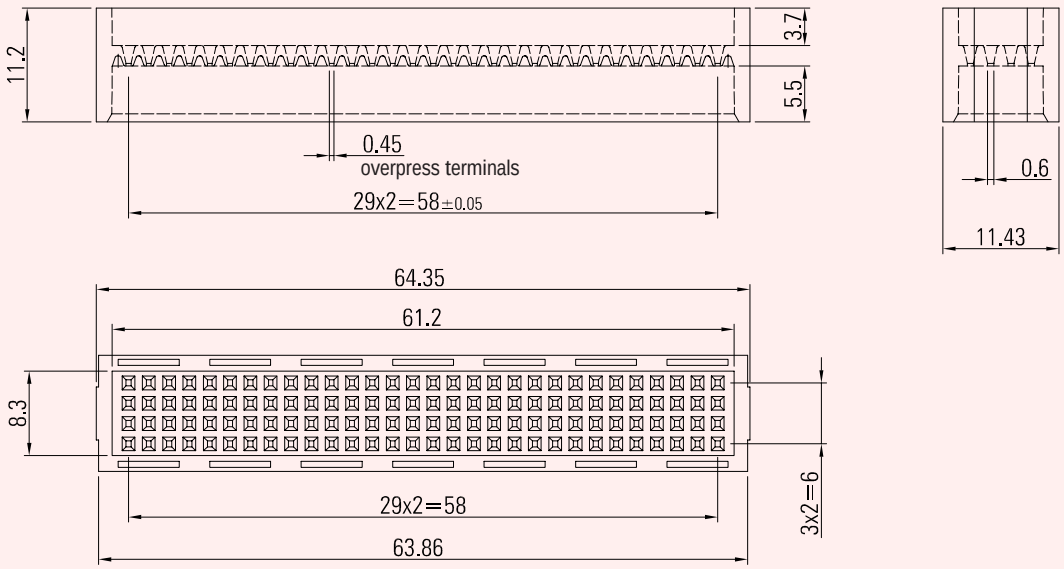
**Printed Circuit Layout**




| No. of Positions | 60 |
|---|---|
| Termination Methods | **Part Number** |
|  | 272-30000-31 |

# PC/104 Plus Shroud

Dimensions in mm




| No. of Positions | 120 |
|---|---|
| Termination Methods | **Part Number** |
| Shroud for PC/104 plus | 264-17302 |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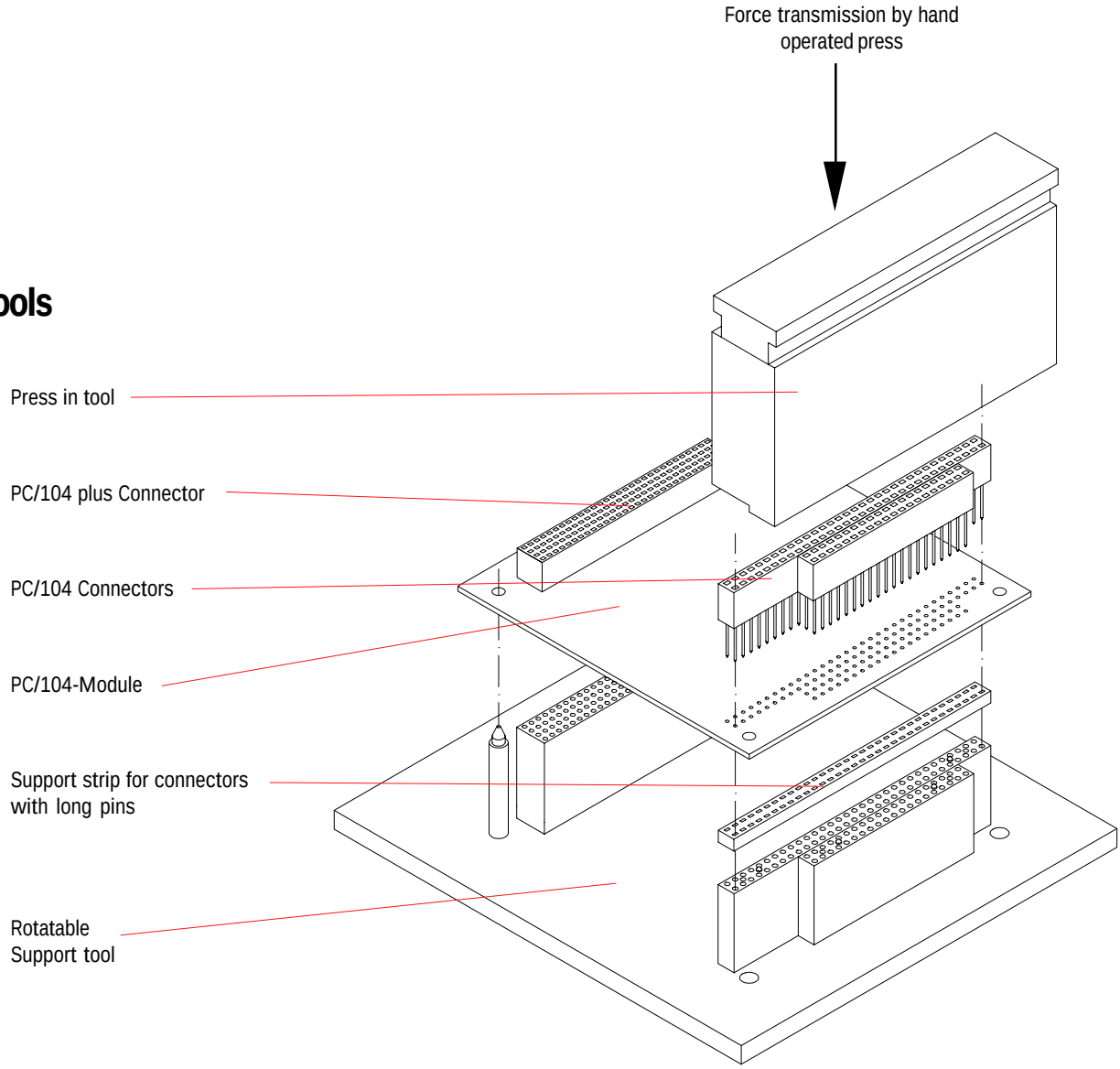
# Tools

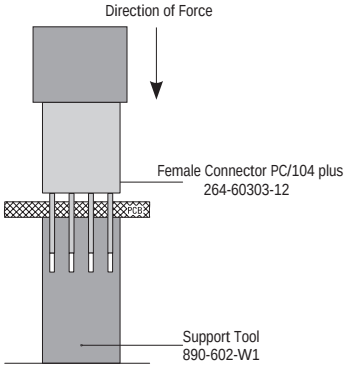


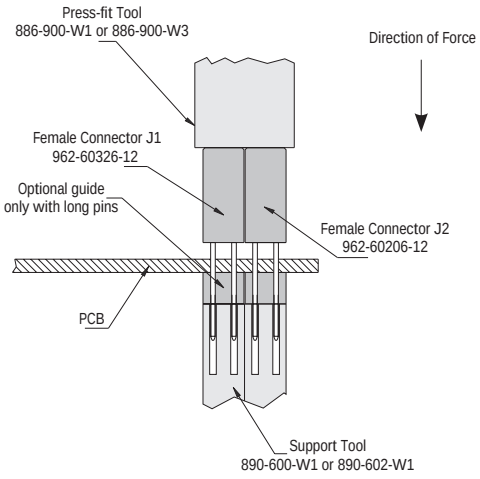

## For pressing in of PC/104 and PC/104 plus connectors, the following equipment is needed:

— A hand operated press which supplies the neccessary press-in force

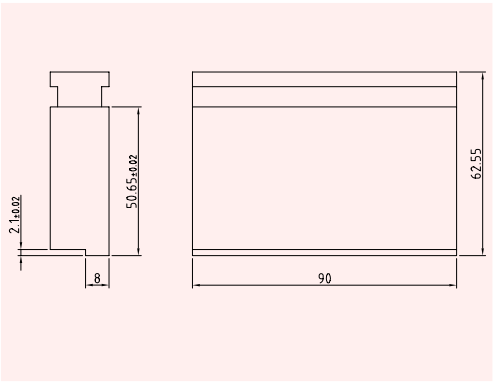
— flat rock press-in tool

— support tool



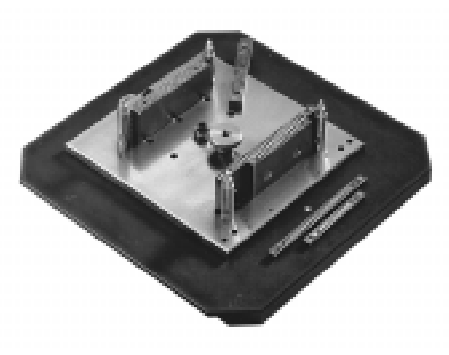



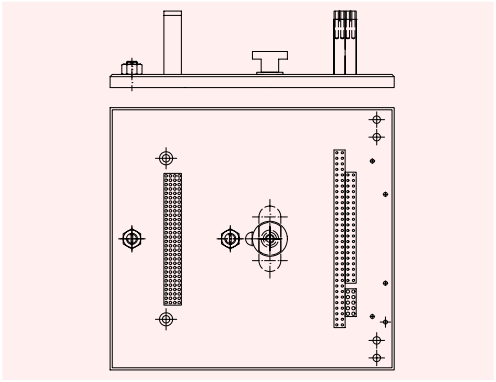
## Press-fit Tool for PC/104 and PC/104 plus Connectors




| Type | Part Number |
|---|---|
| PC/104 - PC/104 + | 886-900-W3 |

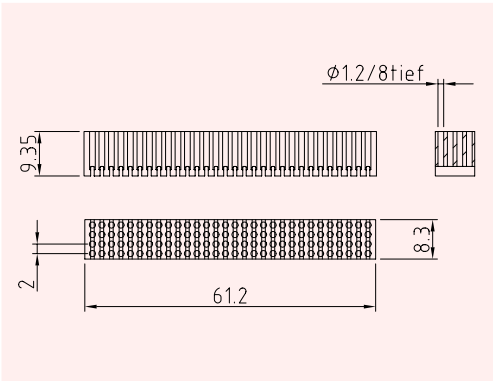
## Support Tool for PC/104 and PC/104 plus Connectors





| Type | Part Numbers |
|---|---|
| PC/104 - PC/104 + | 890-602-W1 |
| Modification Kit | 890-602-W2 |

## Press-fit Tool PC/104 plus Straight Headers




| Type | Part Number |
|---|---|
| Pin Header | 886-903-W1 |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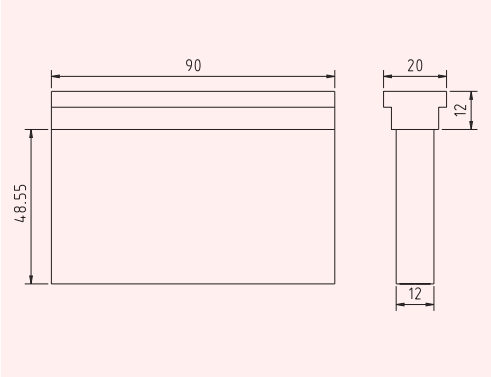
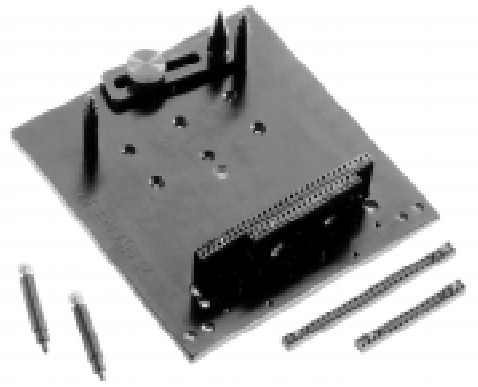
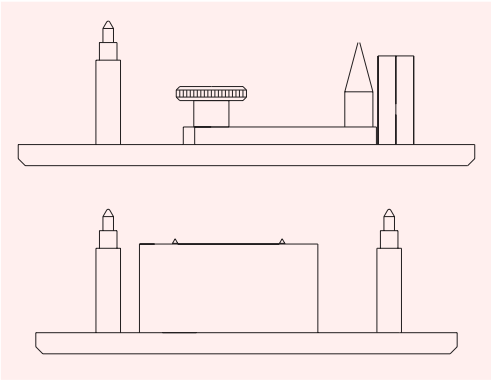
## Press-fit Tool for PC/104 Connectors




| Type | Part Number |
|---|---|
| PC/104 | 886-900-W1 |

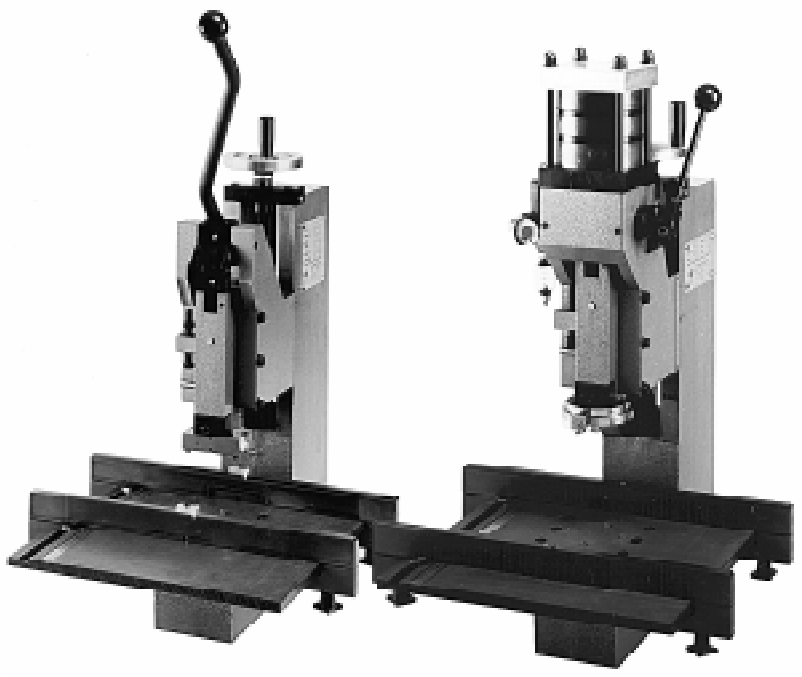
## Support Tool PC/104 Connectors





| Type | Part Number |
|---|---|
| PC/104 | 890-600-W1 |

# Combined manual/pneumatic C-frame press HKP 16/20



## Features

This equipment can be used for the assembly of small quantities of backplanes and PCB's. It is also recommended for assembling prototypes and repair purpose.

The press is supplied with

- a mounting plate and adjustable guide rails for the PCBs.
- manual movement of pressfit lever up to limit switch that activates the pneumatic insertion process (HKP20).
- an adjustable limit switch engagement setting.
- a quick release tool fixture.
- as an optional feature a flexible tool holding fixture can be provided. This allows the operator to adjust the directions of the tools with 45° steps in both directions.

## Technical Specifications

### HKP 16 (manually operated)

| | |
|---|---|
| Press-in force max. | 16 kN / 3.597 lb. |
| Depth | 160 mm / 6.3" |
| Installation height | 100 - 230 mm / 3.94"-12.6" |
| Stroke range max. | 58 mm / 22.83" |
| Ram hole | Ø15 mm / 0.4724" |
| Floor space | 300 x 420 mm / 11.81"x16.54" |
| Weight app. | 50 kg / 158 lb. |
| Guide-track | prism |

### HKP 20 (combined manual-/pneumatic press)

| | |
|---|---|
| Press-in force max. | 20 kN /4.496 lb. |
| Depth | 160 mm / 6.3" |
| Installation height, adjustable | 100 - 320 mm / 3.94"-12.6" |
| Stroke range, adjustable | 230 - 300 mm / 9.05"-11.81" |
| Operating pressure min. | 5 bar / 72 psi |
| Ram hole | Ø15 mm / 0.4724" |
| Floor space | 300 x 420 mm / 11.81"x16.54" |
| Weight app. | 72 kg / 158 lb. |
| Guide-track | prism |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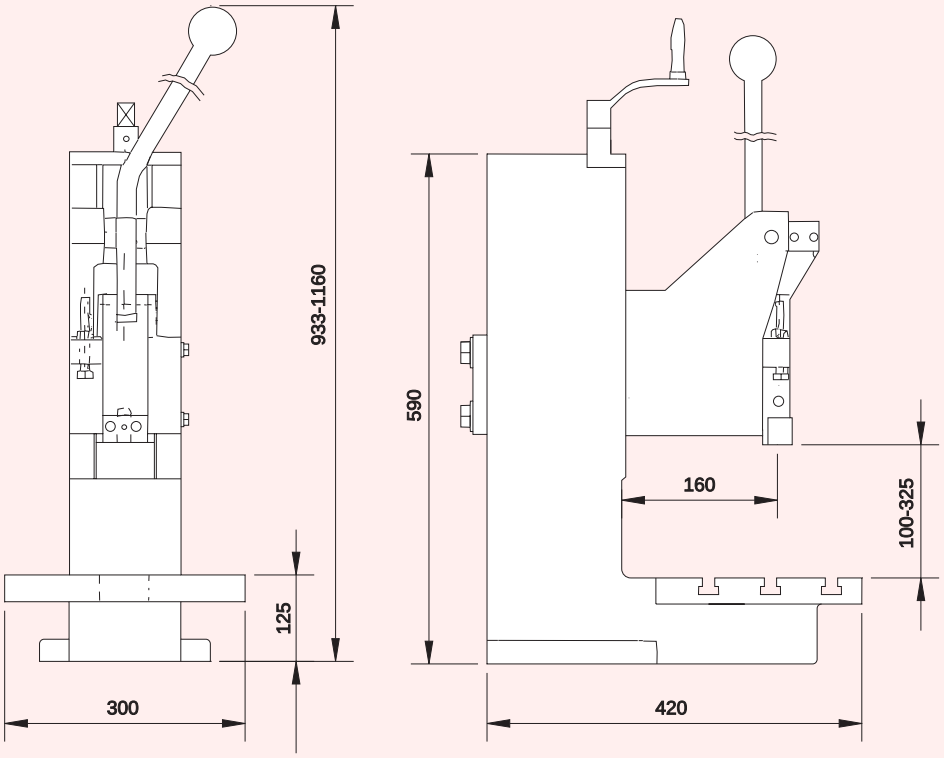
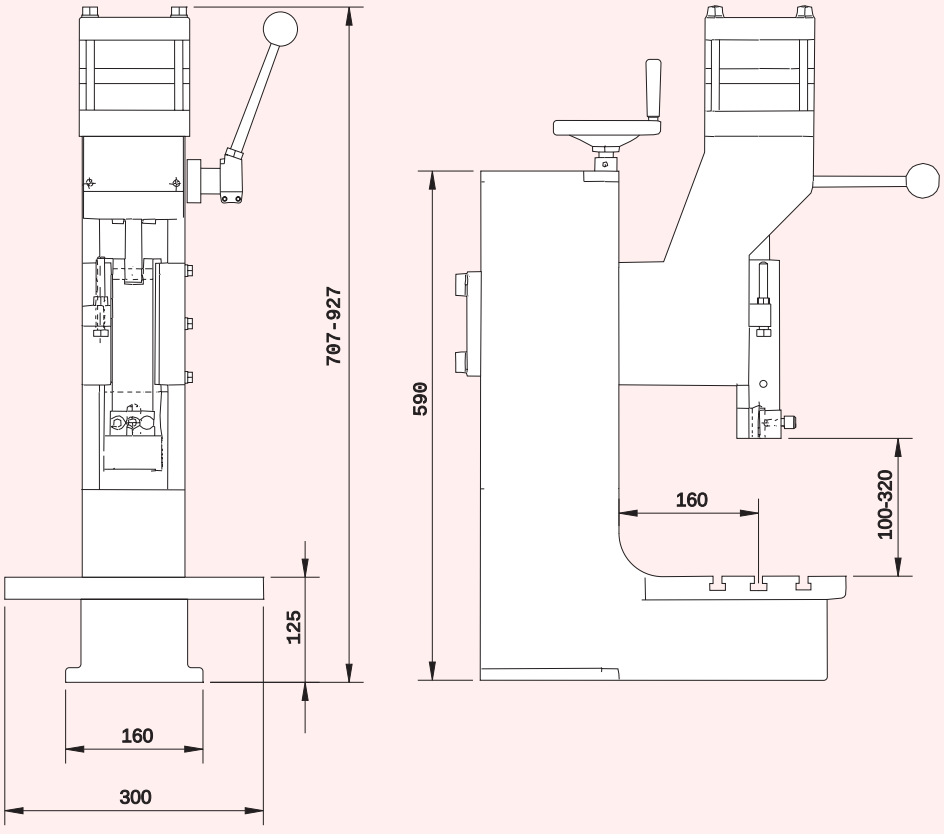
## *HKP 16*


933-1160
125
300
590
160
100-325
420

## *HKP 20*


707-927
125
160
300
590
160
100-320

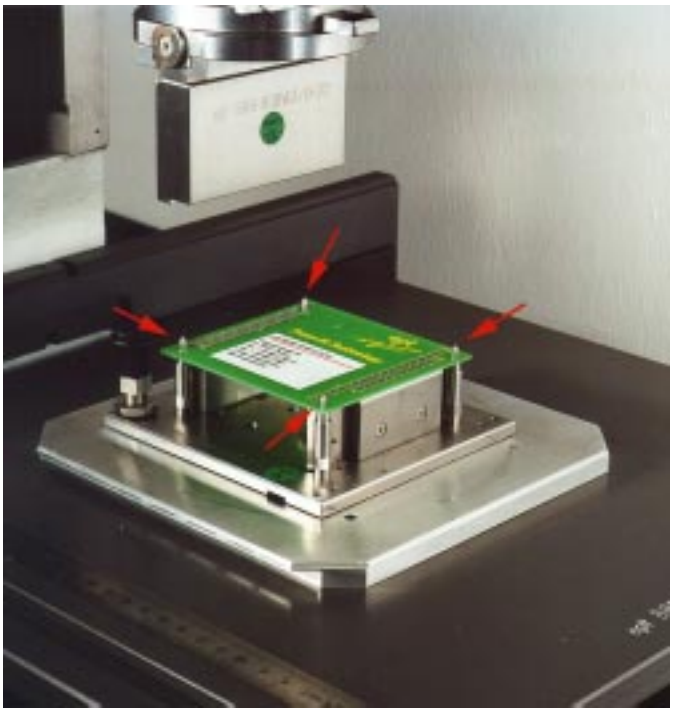
# Manufacturing Instruction

1. Load the support tool for the PC/104 connectors with the dummies (for connectors with short pins) or with the plastic support strips (for connectors with long pins).

   *Den Gegenhalter für die PC/104 Steckverbinder mit den Dummies (für Steckverbinder mit kurzen Pfosten) oder mit den Kunststoff-leisten (für Steckverbinder mit langen Pfosten) vorbestücken.*

2. Place the PC/104 plus module with the holes onto the pins of the support tool.

   *PC/104 plus Modul mit den Bohrungen auf die Aufnahmezapfen des Unterwerkzeuges legen.*

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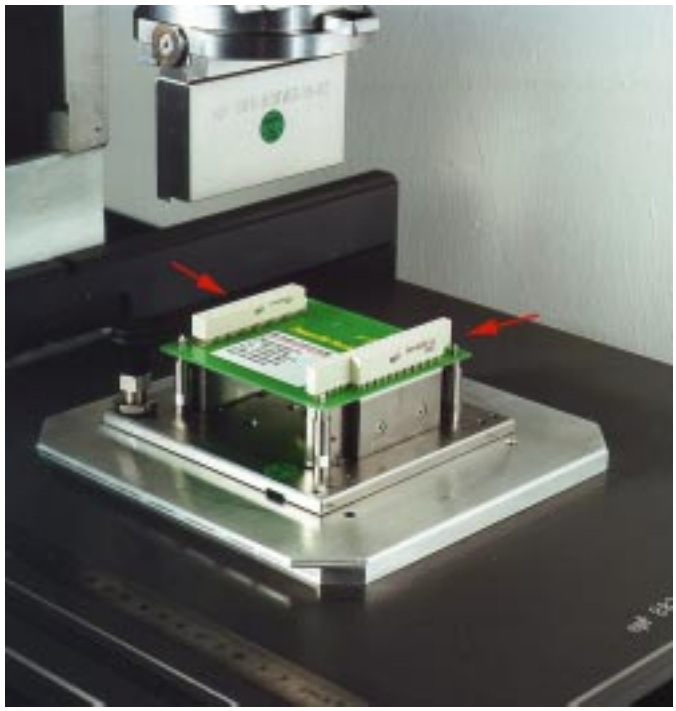
3. Load the PC/104 and PC/104 plus connectors.

   *PC/104 und PC/104 plus Steckverbinder vorbestücken.*



4. Move press-fit tool down and press the connectors into the PCB (Pos. 1). The PC/104 plus connector must be inserted with the high, the PC/104 connectors with the lower field of the press-fit tool.

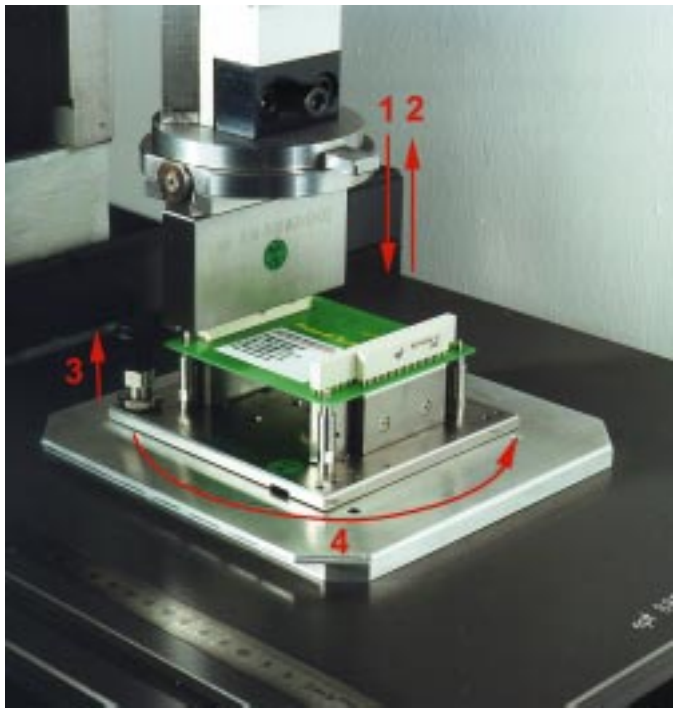
   If this is not the case, the support tool must be adjusted again.

   After pressing in, bring the upper tool into the upper position (Pos. 2). Pull lock button (Pos. 3) and turn support-tool 180° (Pos. 4). Lock button must engage again.

   *Einpreßwerkzeug absenken und die Steckverbinder in die Leiterplattenbohrungen einpressen (Pos. 1). Der PC/104 plus Steckverbinder muß mit dem hohen, die PC/104 Steckverbinder müssen mit dem niedrigeren Bereich des Einpreßwerkzeuges eingepresst werden.*
   *Sollte dies nicht der Fall sein muß das Unterwerkzeug neu justiert werden.*

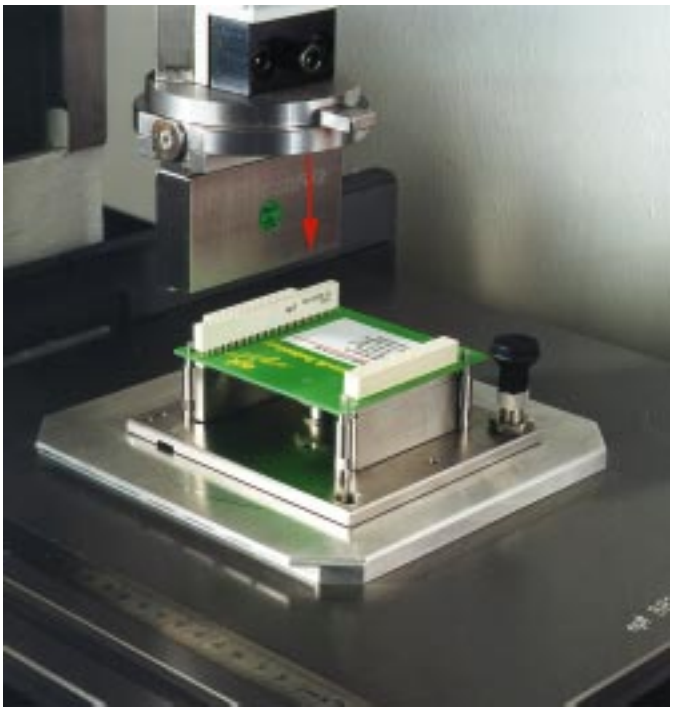
   *Nach dem Einpreßvorgang das Oberwerkzeug wieder in die obere Position zurück bringen (Pos. 2).*

   *Verriegelungsknopf ziehen (Pos. 3) und Unterwerkzeug um 180° drehen (Pos. 4). Verriegelungsknopf muß wieder einrasten.*



5. Press-in connector with upper tool.

   *Steckverbinder mit Oberwerkzeug verpressen.*



6. Remove the PC/104 module of the support tool and turn it upside down. Assemble the Shroud manually for the PC/104 plus connector (only at long pins) and press down firmly.

   *PC/104 Modul vom Unterwerkzeug abheben und umdrehen. Den Shroud für den PC/104 plus Steckverbinder (nur bei langen Pfosten) von Hand aufsetzen und fest nach unten drücken.*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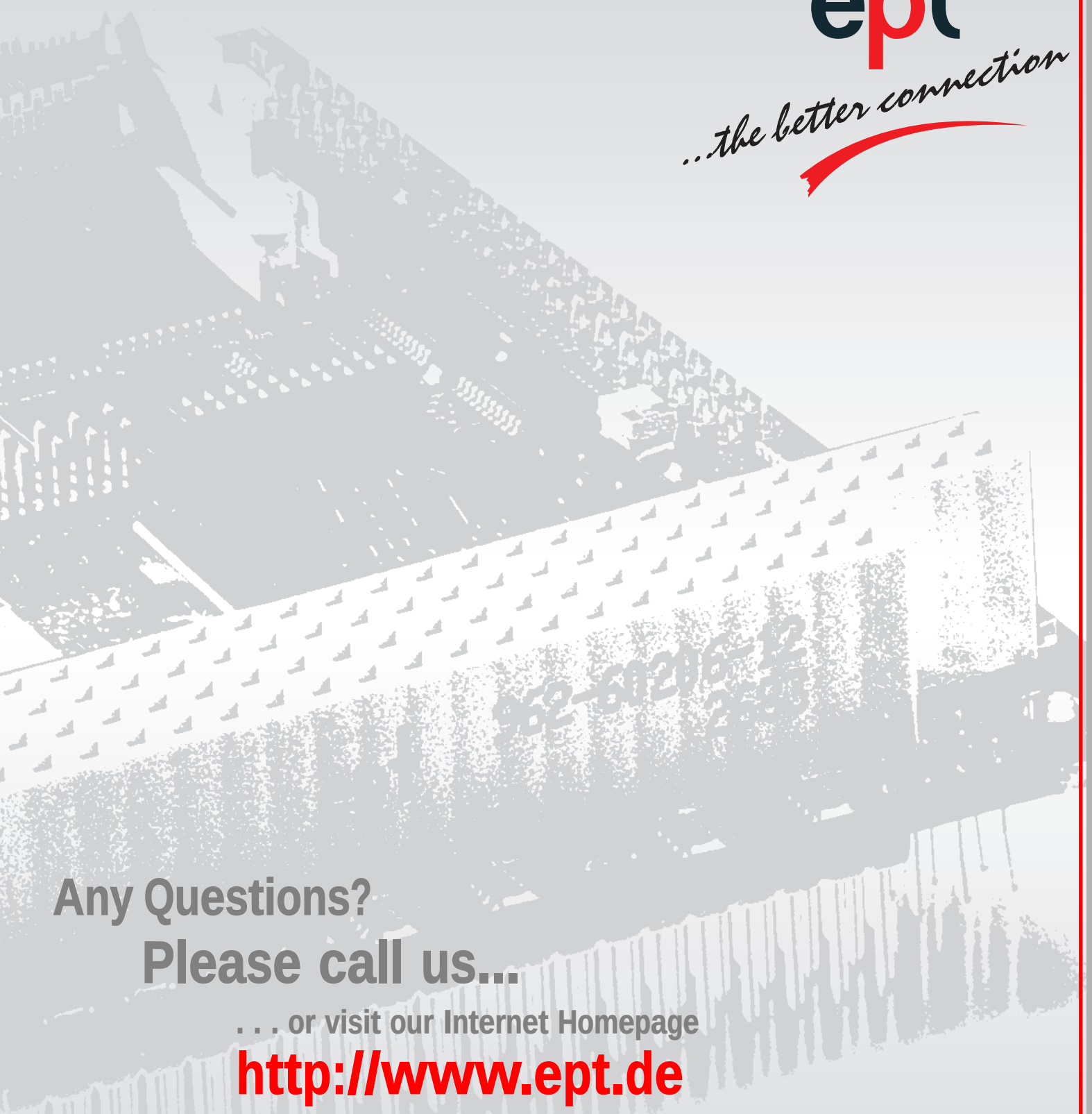

# Any Questions?
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