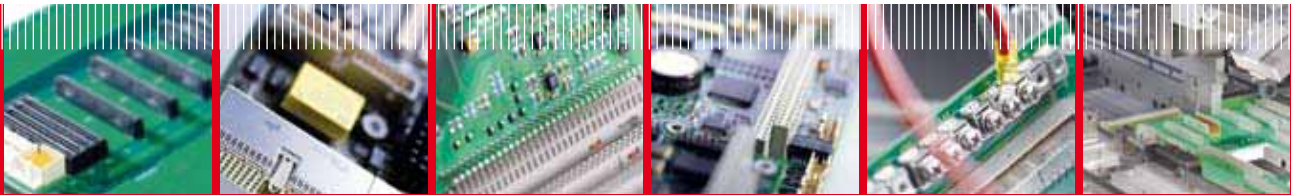




Electronic Precision Technology



Connectors

Standard products and customized solutions



Good connections bear a name: ept

If you are looking for a supplier of **electrical connection technology** with innovative product ideas and superior processing technology, there's no getting around ept.

With our range of **connectors** and **processing technology**, we offer you comprehensive **all-in-one solutions** from a single source. Not only now. As an independent family business with decades of experience, we can offer **technical competence** and an **extremely high quality standard**, combined with **creativity and precision**, when it comes to your individual product and machine solution.







At our locations in Germany (Peiting, Buching, Augsburg), the Czech Republic, the USA and China and in our international sales network, more than **700 employees worldwide** are responsible for top-notch **development, production** and **service work**. And the fact that our company is certified according to **ISO 9001:2000** and **ISO/TS 16949:2002** ensures your safety – and for us this goes without saying.

We are looking forward to working with you.

Your ept team



Here you will find everything.

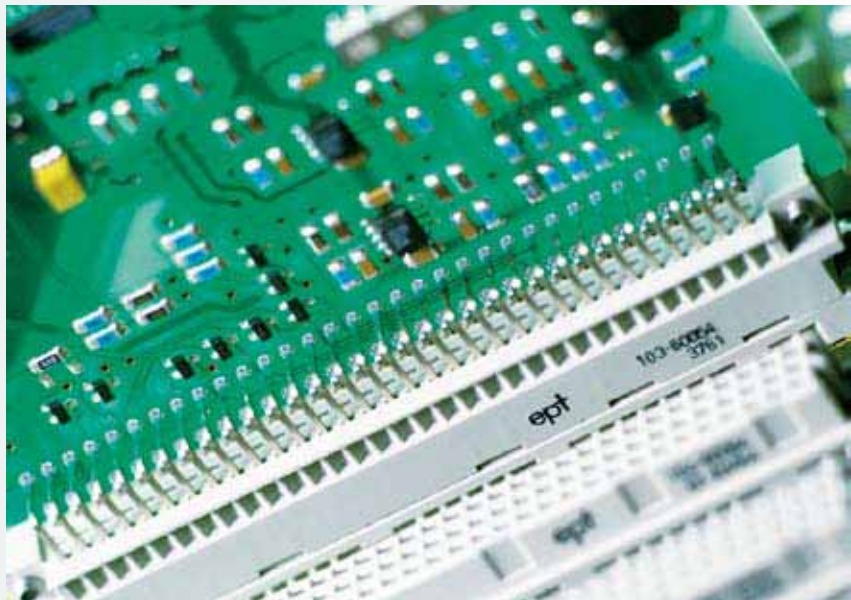
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ept – Quality from one source

Our core competence is the development and production of connectors – including the whole state-of-the-art technology range from the idea to the product. Especially our numerous customers in the sectors telecommunications, industrial automation and automotive electronics have come to appreciate this.

Seminal: the ept press-fit technology

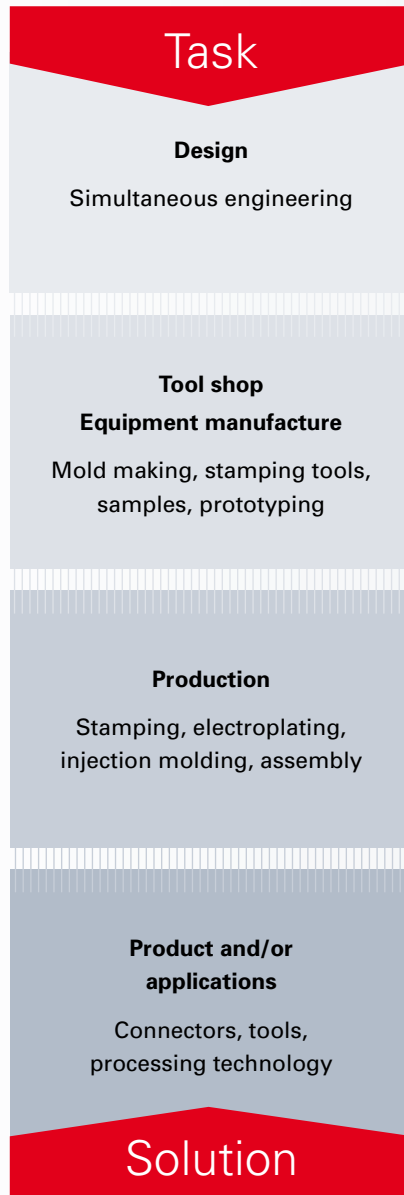
In modern connector technology, press-fit technology is still the seminal technology. For this, ept offers a unique solution: the proved and tested Tcom press® press-fit zone. It can be adapted to many different applications. We offer custom tailored all in one solutions with assembly tools and assembly machines designed by us.



Our solution for your requirements

Do you need an individual solution that is especially tailored to your requirements? Then ept is the perfect choice. We have ideas for new connector concepts, the expertise and equipment to work out not only standard solutions, but also individual solutions.

Our employees in R&D, Product Construction, Project Management, Process Development, Order Management/Controlling, Processing Technology and Logistics ensure the perfect project workflow – from development to implementation. Comprehensive consulting services and implementation according to the automotive guidelines (APQP) are also part of our range of services.



We can do a lot for you:

- We offer all you need regarding connectors, from design to final manufacture
- We are your efficient and reliable supplier for standard products
- We are also an innovative and trustworthy partner for product and process development
- We are an integrated part in the value-added chain of your production

You benefit from:

- Perfected production processes
- Capable staff
- State-of-the-art technology
- Permanent investments
- The consistent focus on your specific needs



Conclusion:

ept offers a very deep in-house vertical integration as well as transparent development and production sequences. Thus we can respond flexibly to customer-specific tasks in the connector technology area. An advantage that pays off. For you and for us.

Good to know – general terms

Air gap

The shortest distance between live parts in the air.

Capacity between two adjacent contacts

The value of the capacity with two electrical conductors which are isolated by a dielectric (insulating insert).

CE marking

Electronic components such as connectors cannot be marked with the CE mark. This is defined in the guidelines of the European Commission for the low-voltage and EMC directive.

Connection methods

Process for connecting electromechanical components; press-fit, solder, crimp, IDC and wrapped connections.

- Press-fit connection: According to EN 60352-5: The press-fit connection is implemented by pressing a flexible or solid (rigid) pin into the metalized hole of a printed circuit board. Gas-tight zones are created at the contact points between the press-fit pin and hole wall.
(Also refer to the separate press-fit technology section on page 9.)
- Surface contacting SMT (Surface Mount Technology): SMD stands for "surface-mounted devices". They have no wired connections. They are soldered direct onto a printed circuit board using solderable contact surfaces.
- Soldered through connection THT (Through Hole Technology): The printed circuit board features metalized drill holes into which the connector

can be inserted. Contacting of the connectors can be implemented by means of wave, reflow or manual soldering. The reflow variant is also named pin-in paste or THTR.

- Crimp connection: Crimping means that a permanent, solderless, electrical connection is created. The connection area of the contact element is deformed using a crimping tool, thus a permanent, gas-tight connection with the conductor is established.
- IDC: Using a special tool, the cable cores and their insulation are individually pressed into a "insulation displacement termination". The excess core end is cut off and the insulation of the core is cut open. An electroconductive connection is created.
- Wire wrap: Rigid single-core lines are mechanically wrapped around a sharp-edged rectangular or square pin. The high contact pressure at the pin edges results in oxide-free, gas-tight contact points by means of cold welding.

Contact force (CF)

Force that the contact springs exert on the blade contact.

Contact resistance

According to EN 60352-3 + 60352-5: The electrical resistance in a plugged-in contact pair measured via the connection points under specified measuring conditions.

Resistance that occurs at the connection point between contact spring and contact blade.

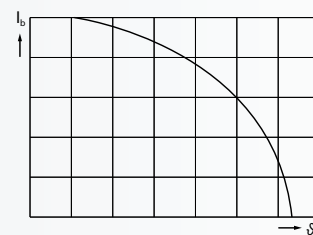
Creepage distance

The shortest distance between two current carrying conductors on the surface of the insulator.

Current limit

The current limit is the maximum permissible current at which the device can operate continuously without thermal overload.

Maximum permissible continuous current I_b that can flow through a connector contact pair. The thermal load capacity ϑ_β of the materials used limits the permissible current carrying capacity for the contact elements and their terminals as well as the insulating parts. This results in a dependency on the ambient temperature ϑ_v and selfheating $\Delta \vartheta$. The measuring procedure for the current carrying capacity is defined in IEC 60512-5-2. With this measuring procedure, the temperature at the measuring point ϑ_β (e. g. the hottest point) of the component and the temperature in the immediate environment ϑ_v is measured at different currents I .



Derating diagram

Dual contact

Electromechanical contact where two separate contact points ensure the electrical connection, e. g. a spring contact with two opposite contact spring elements.

Durability

The durability of connectors is the number of mating cycles which do not result in an increase of the contact resistance (e.g. due to abrasion of the contact surface).

Electromagnetic interferences

Undesired electromagnetic interferences in the connecting cables or in the environment of connectors is prevented by means of shielding.

Engaging and separating force

The force required to mate or unmate a connector. For geometrical reasons, the engaging force is usually slightly higher (approx. 10–20 %) than the separating force.

The equation for the separating force of a connector is as follows:

$$\text{Separating force} = n \times F \times \mu \text{ [N]}$$

(n Number of friction surfaces; F Contact force;
μ Friction coefficient)

Since the friction coefficient usually has wider tolerances (e.g. greased or dry contact surfaces), very different engaging or separating forces are possible, especially when multi-position connectors are used. Only maximum values must be considered when designing devices.

Grid

Uniform distance between the individual contact points of the connector on the printed circuit board.

Insulation resistance

Resistance of the insulation between two conductive parts. Insulation capacity of a material that isolates two adja-

cent contacts or a contact to ground as highly resistive as possible. Measuring and test procedure according to DIN EN 60512-3-1.

Keying

Arrangement where similar connectors that are equipped differently to prevent that the wrong connector is used. This prevents, e.g., that the wrong modules are plugged into the backplane.

Leakage current

Current that flows between two live parts via the surface of an insulating insert, especially if it is polluted with conductive deposits (dust, humidity).

Nominal current

Current that can continuously be conducted through any simultaneous connection of the connector within the test class, including self-heating.

Operating temperature range

The temperature range with which a component can be operated without permanently changing the technical specifications. If the component is operated at temperatures outside of the compensated temperature range, the specifications might not be fulfilled during this period.

Operational voltage

The defined voltage which is applied to the device/contacts in long term operation.

Pre- and late-mating contact

Pre- and late-mating contacts are used for safety reasons or hot swap functionality.

In this case defined contacts are mating earlier or unmating later during the mating process of the connector.

Press-fit pin

In the press-fit technology, this pin is required to create solder-free electrical connections. A press-fit pin is pressed into the metalized hole (through connection) of a printed circuit board. The main feature is the fact that the cross-section of the pin has a larger diameter than the hole in the printed circuit board.

(Also refer to the separate press-fit technology section on page 9.)

Reflow soldering

Reflow soldering is a standard soldering method in electrical engineering for soldering SMD components. It is the most common soldering method for producing thick film hybrid circuits.

Spring contact

Flexible contact element of a female connector, as opposed to the rigid blade contacts of male connectors.

Temperature limits

The minimum and maximum temperatures at which the connector still functions without faults; the temperature in-between is the operating temperature range.

Tin swarf formation

Formation of tin swarf from the printed circuit board hole when press-fit contacts are pressed in. Tin swarf can occur at printed circuit boards that were processed applying the hot air leveling (HAL) method.

Lead-free with ept

The directives of the European Union 2002/95/EG (RoHS) for restricting the use of hazardous materials in electrical and electronic devices, as well as 2002/96/EG (WEEE) for waste electrical and electronic equipment came into effect in February 2003.

RoHS (Restriction of the use of certain Hazardous Substances) is the directive for restricting the use of certain hazardous substances in electrical and electronic equipment.

WEEE (Waste from Electrical and Electronic Equipment) defines how waste electrical and electronic equipment is to be scrapped and recycled.

Our production has complied with RoHS since 2004. Thus we were able to comply with all directives long before the deadline specified by the EU.

We confirm that our products are RoHS compliant and that the following materials are not contained in our products in concentrations above the ones stipulated.

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chrome (Cr VI)
- Polybromated biphenyl (PBB)
- Polybromated diphenyl ether

ept has considered the environmental compatibility of its newly developed products for a long time now.

In order to comply with the European Directive mentioned above, RoHS compliant components were used for our products already in 2004. However, during this conversion quality assurance has always been top priority; no concessions are made regarding the functionality and design of our press-fit technology. Lead-free connectors are up to 100 % compatible and can be press-fit into "leaded" printed circuit boards without problem.

All ept products are 100% RoHS compliant.

In the future ept will continue to adapt its product development to the latest directives and consider environment protection aspects.

That fits – press-fit technology

Basic technology

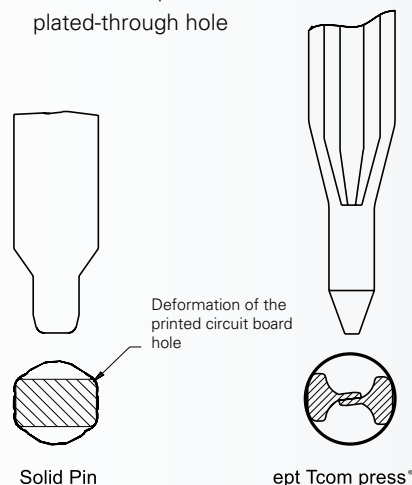
A press-fit connection is made by pressing a pin into a plated-through hole in the printed circuit board. The main feature is the fact that the cross-section of the pin has a larger diameter than the plated-through hole in the printed circuit board. When the pin is pressed into the hole, the excess material must be taken up either by deformation of the hole in the printed circuit board or of the pin.

There are two types of press-fit zones:

- the solid zone, which is not deformed. (solid pin)
- the flexible zone which is deformed. (compliant pin)

Especially the flexible zone has become established in the market for press-fit connectors. The flexible technology has many advantages over the solid technology:

- Flexible response of the press-fit zone on the pin, little strain on the plated-through hole



- A greater hole tolerance of the plated-through drill holes is permissible in the printed circuit boards

- Less press-fit forces are required, thus undesired side effects are reduced
- Multiple press-fitting of contacts into the same PCB drill hole is possible.

Comparison:

Solder technology – press-fit technology

The press-fit technology has a number of advantages compared to the conventional solder technology:

- No thermal load on the printed circuit board, since no soldering is required
- No solder vapors and welding flux residues that impair the contact stability of the connector
- No "cold" soldering joints
- No short circuits due to solder bridges
- Mechanical fixing of the connector direct via the press-fit pins (no screws are required)
- Long connector pins remain free of brazing solder and, if they are gold-plated, they can be used as rear mating connection
- Defined impedance of the connection due to a defined geometry (good HF properties)
- Fast, low-cost equipping of the connectors on the PCB
- Can be repaired without problems – Connectors and/or contacts can be replaced without problem
- Environmentally compatible, since printed circuit boards with press-fit components do not have to be washed
- Easy to recycle; the connector is disassembled by means of purely mechanical extrusion.

An important and often underestimated advantage of the press-fit technology over solder technology is the cost advantage when the PCB's are assembled. Studies in different companies have shown that costs due to soldering problems are considerably underestimated. A substantiated cost effectiveness study shows that press-fit technology is much more cost-effective than conventional solder technology.

Press-fit technology and SMT

SMT and press-fit technology are the basis for an efficient, cost-effective and high-quality assembly of modern modules.

After assembling the module PCBs with SMT components and reflow soldering, the connector, base, pins, sockets, etc. are pressed into the plated-through PCB holes, which were not affected due to the reflow soldering process.

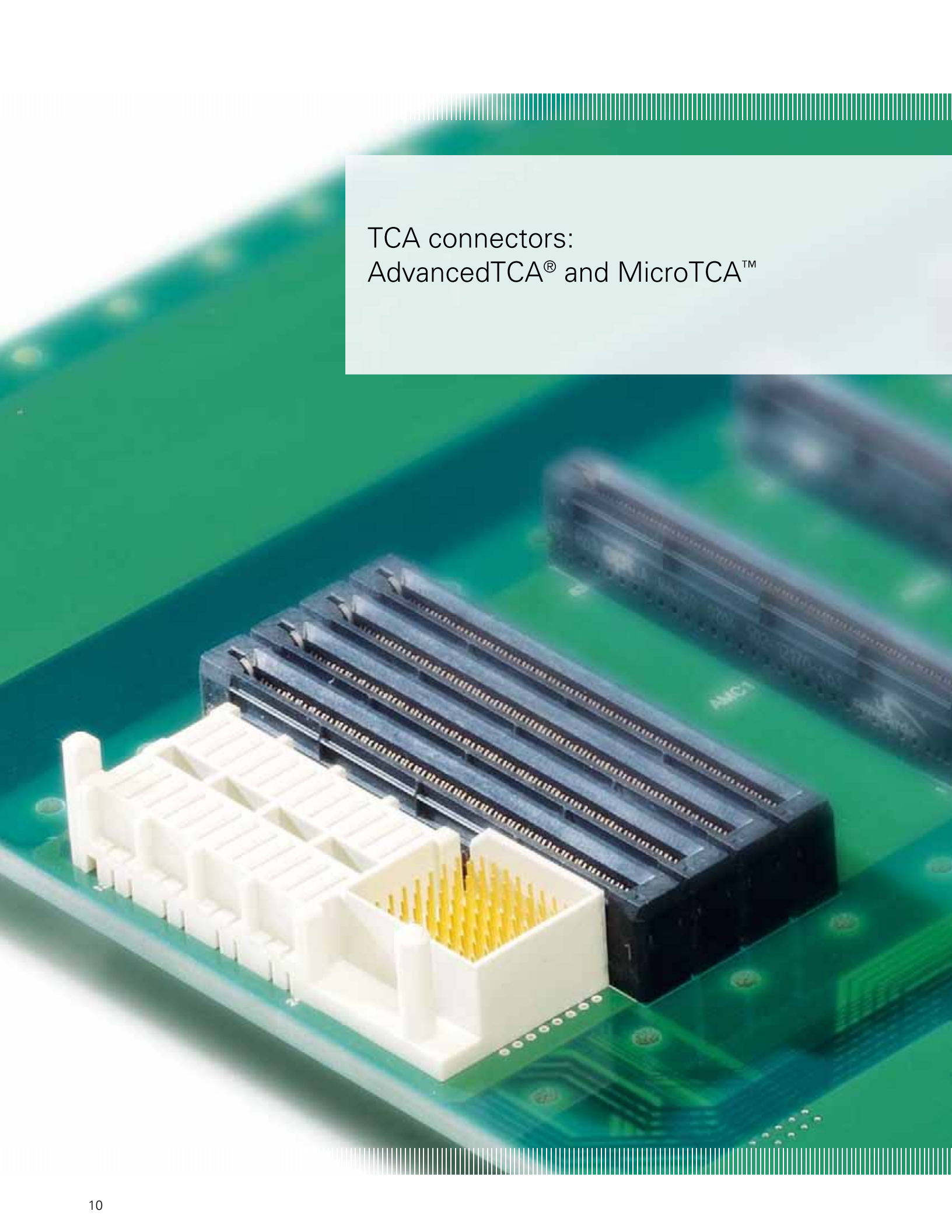
Press-fit zone requirements

The ept press-fit zones meet the requirements of DIN 41611 Part 5 or IEC 60352-5.

Tcom press® zones for any press-fit applications

A modern press-fit zone can be adapted to most application-related requirements. This includes:

- Tin swarf on printed circuit boards is avoided with hot air leveling
- Sagging of the backplanes is avoided (banana effect)
- Hole diameters can vary
- Functionality is ensured, for various PCB surfaces.



TCA connectors:
AdvancedTCA[®] and MicroTCA[™]

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AdvancedTCA®/MicroTCA™



To give consideration to increasing data traffic and new communication services, the PICMG® has developed and adopted the AdvancedTCA® specification (ATCA). AdvancedTCA® is mainly aimed at the infrastructure of telecommunications systems requiring maximum availability. With AdvancedTCA® it is possible to set up modular systems with modules from different manufacturers. This technology thus offers the possibility to develop flexible and low-cost systems faster than previously possible with proprietary systems.

AdvancedTCA® is a scalable, powerful architecture with a high degree of functionality, availability and future safety. Many future-oriented applications can be implemented on this platform. Further advantages are scalable data rates of several Tbit/s, support of multi-protocols, new services can be integrated, the convergence of access, core and optical networks as well as the integration of computer center functions. Interfaces for Gigabit Ethernet, Fibre Channel, Infiniband, StarFabric, PCI-Express and RapidIO are evidence of the high flexibility of the AdvancedTCA® architecture. Another core feature of the systems is their high availability of 99.999 %.

AdvancedTCA® is mainly used for telecommunications applications and can be optimally used, for example, for:

- Wireless
- Wireline
- Voice over IP
- Video on Demand
- Media gateways
- Broadband platform services



In order to make the described AdvancedTCA® system even more cost-effective, the PICMG® has developed the AdvancedMC™ standard (Advanced Mezzanine Card). The AdvancedMC™ modules are small cards that are plugged in parallel onto a "Carrier Board" (a carrier board in the form of an AdvancedTCA® subcard) as Mezzanine application. The Carrier Board contains only management functions, the actual application is implemented by means of the AdvancedMC™ modules.

MicroTCA™ is based on the approach to plug the AdvancedMC™ modules direct into the backplane. The objective is to create smaller and more flexible systems that do not depend on Carrier Boards and AdvancedTCA®. MicroTCA™ is targeted at applications that do not require a very high computing performance but rather where low space requirements and low costs are important.

This also opens up further application possibilities in the mid and low-end range - not only for telecommunication technology but also:

- Communication
 - Base stations
 - Media gateways
 - Video on demand
- Industrial automation
- Process automation
- Military technology
- Mobile applications
- Medical technology
- Image processing
- Automotive



The "PCI Industrial Computer Manufacturing Group" (PICMG®) is an association of approx. 450 companies. The objective of this group is to develop open standard architectures. The advantages for system developers and end users are low costs due to high quantities, a wide range of available components from many manufacturers and shorter development times for new applications.

In addition to the passive backplanes ISA/PCI and the CompactPCI standard, AdvancedTCA®, AdvancedMC™ and MicroTCA™ are further PICMG® specifications. The specifications are worked out in individual work groups from the participating companies. ept with its experience as connector manufacturer is actively participating in these work groups.



Quality with a seal – **con:card+®**

con:card+® is a quality seal for MicroTCA™ and AdvancedTCA® signal connectors with which the reliability of MicroTCA™ and AdvancedTCA® systems can be increased significantly.

In order to achieve the goal of 99.999 % availability, all system components must be carefully matched to each other and function reliably. Therefore the selection of suitable connectors is especially important, since the tolerances defined in the specification for AdvancedMC™ modules can hardly be observed today. The "GuideSpring" is ideal for compensation. This is only one of five advantages of the **con:card+®** philosophy. All advantages are described in short below and described in more detail in the **con:card+®** features.

- GuideSpring for reliable positioning
- An especially smooth contact surface for protecting the gold-plated PCB pads of the AdvancedMC™ modules
- Wear-resistant plating of the contacts (palladium/nickel with gold flash) improves the wear resistance by approx. 30 %.
- Special contact material with minimum relaxation, even under high contact spring load
- High-quality press-fit connection as efficient connection technology for series processing

con:card+® ensures the maximum availability of your system.

www.concardplus.com

Technical specifications

AdvancedTCA[®] and MicroTCA[™] signal connector

Diagram illustrating a 2x4 grid of ovals. The grid is divided into two rows: "extended side" (top) and "basic side" (bottom). The horizontal distance between the centers of the first and second ovals in the top row is 2,25. The horizontal distance between the center of the second oval in the top row and the center of the first oval in the bottom row is 0,75. The vertical distance between the centers of the first and second ovals in the top row is 1,5. The vertical distance between the centers of the first and second ovals in the bottom row is 1,5. The vertical distance between the center of the first oval in the top row and the center of the first oval in the bottom row is 1,5. The vertical distance between the center of the first oval in the bottom row and the ground line is 1,5. The ground line is labeled "ground".

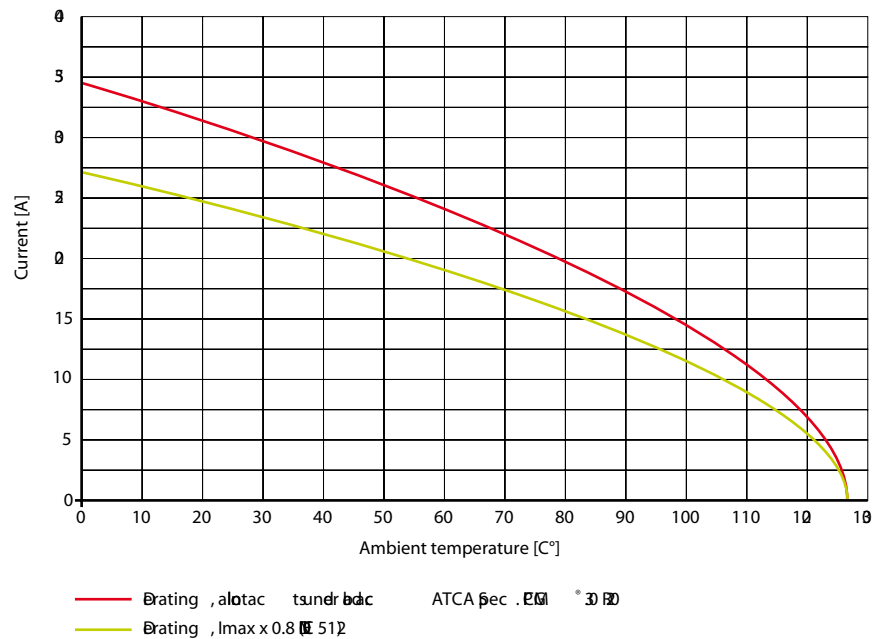
Technical specifications

AdvancedTCA[®] and MicroTCA[™] Power connector

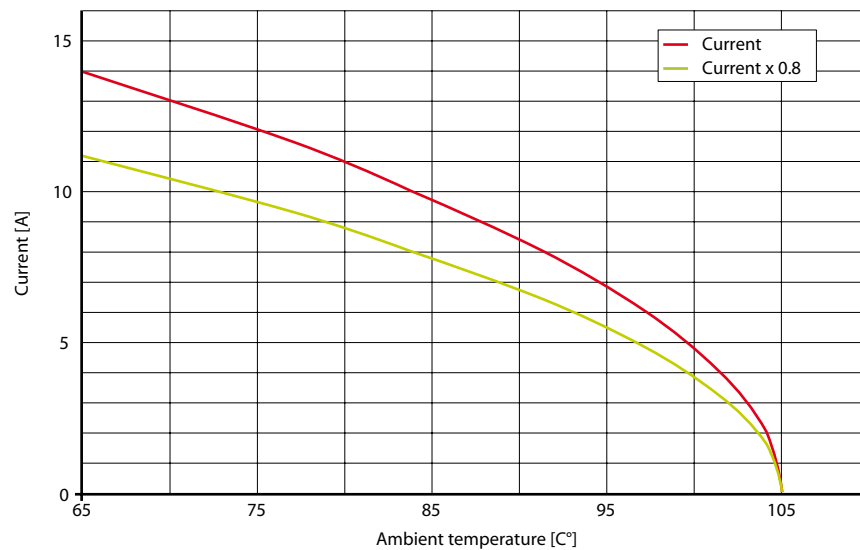
System	AdvancedTCA [®]	MicroTCA [™]
Type	Power connector Female and male connector	Power connector Backplane and power module output
Specification	PICMG [®] 3.0 R2.0	PICMG [®] MTCA.0 R1.0
No. of contacts	30	96
Power contacts	8	24
Signal contacts	22	72
Operational current	Power contacts: max. 16 A Signal contacts: max. 1 A	Power contacts: max. 12 A Signal contacts: max. 1 A
Operating temperature range	– 55 °C to + 125 °C	– 55 °C to + 105 °C
Test voltage	Contact 1 – 16 1000 V _{r.m.s} Contact 17 – 34 2000 V _{r.m.s}	80 V _{r.m.s}
Contact resistance	Power contacts: ≤ 3 mΩ Signal contacts: ≤ 10 mΩ	Power contacts: ≤ 5 mΩ Signal contacts: ≤ 25 mΩ
Insulation resistance	≥ 10 ¹⁰ Ω	≥ 10 ⁸ Ω
Mating cycles	250	200
Termination technology	Compliant Pin	Compliant Pin
Engaging force	max. 67 N	max. 50 N
Separating force	max. 67 N	max. 50 N
Insulator material	PBT, UL 94-V0	PBT, UL 94-V0
Contact material	Copper alloy	Copper alloy
Contact surface	Au	Power: Au Signal: Pd/Ni
Environment/approvals	RoHS compliant/UL (file: E130314)	RoHS compliant/UL (file: E130314)

Derating diagrams

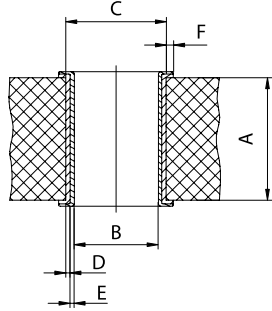
Derating diagram AdvancedTCA® Power



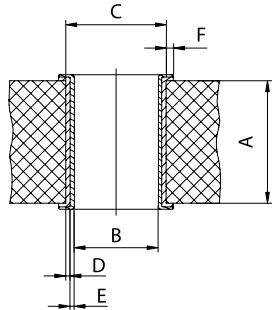
Derating diagram MicroTCA™ Power



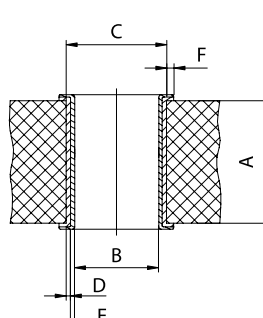
AMC signal connector for AdvancedTCA® and MicroTCA™

		Nominal hole	Ø 0.55 mm
Imm. Sn printed circuit boards			
	A	PCB thickness	min. 1.4 mm
	B	Plated hole	Ø 0.55 ± 0.05 mm
	C	Drill hole	Ø 0.64 ± 0.01 mm
	D	Cu plating	min. 25 µm
	E	Imm. Sn plating	max. 1.5 µm
	F	Annular ring	min. 0.15 mm
Ni, Au printed circuit boards			
	A	PCB thickness	min. 1.4 mm
	B	Plated hole	Ø 0.55 ± 0.05 mm
	C	Drill hole	Ø 0.64 ± 0.01 mm
	D	Cu plating	min. 25 µm
	E	Ni, Au plating	0.05 – 0.2 µm Au over 2.5 – 5 µm Ni
	F	Annular ring	min. 0.15 mm

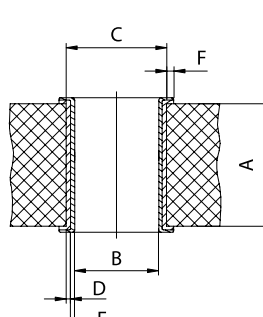
AdvancedTCA® Power male connector

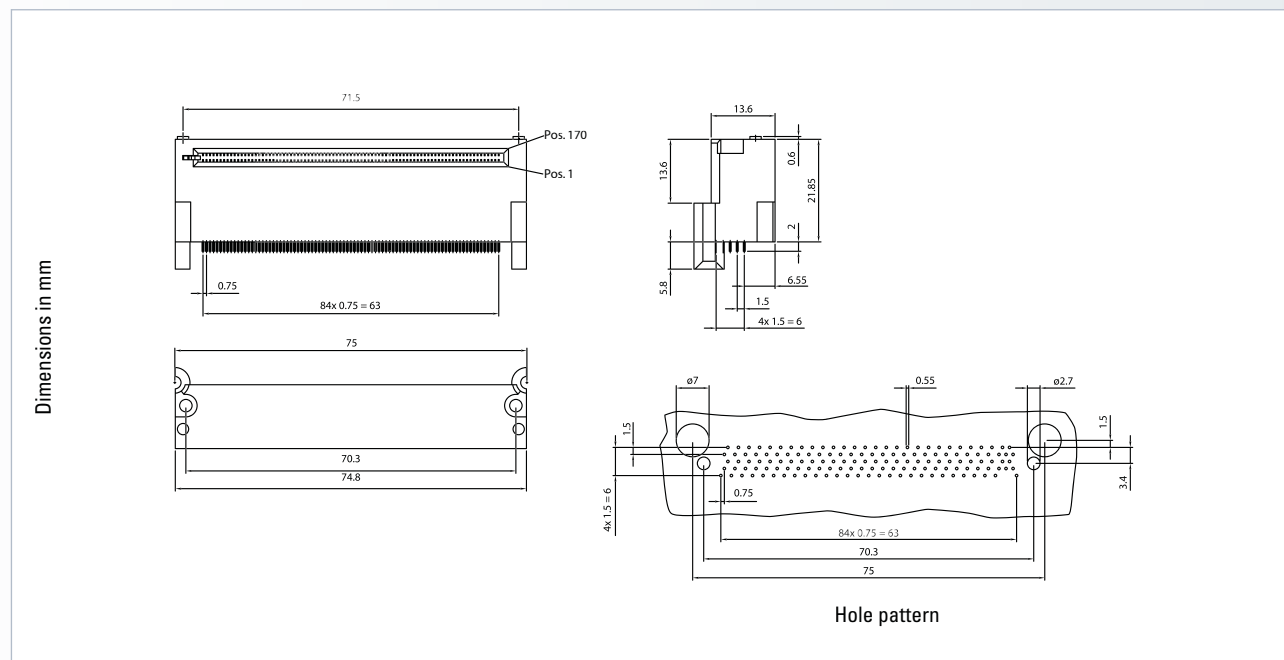
		Nominal hole	Ø 1.0 mm	Ø 1.6 mm
Imm. Sn printed circuit boards				
	A	PCB thickness	min. 1.4 mm	min. 1.4 mm
	B	Plated hole	Ø 1 + 0.09/- 0.06 mm	Ø 1.6 + 0.09/- 0.06 mm
	C	Drill hole	Ø 1.15 ± 0.025 mm	Ø 1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm
	E	Imm. Sn plating	max. 1.5 µm	max. 1.5 µm
	F	Annular ring	min. 0.15 mm	min. 0.15 mm
Ni, Au printed circuit boards				
	A	PCB thickness	min. 1.4 mm	min. 1.4 mm
	B	Plated hole	Ø 1 + 0.09/- 0.06 mm	Ø 1.6 + 0.09/- 0.06 mm
	C	Drill hole	Ø 1.15 ± 0.025 mm	Ø 1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm
	E	Ni, Au plating	0.05 – 0.2 µm Au over 2.5 – 5 µm Ni	0.05 – 0.2 µm Au over 2.5 – 5 µm Ni
	F	Annular ring	min. 0.15 mm	min. 0.15 mm

AdvancedTCA® Power female connector

		Nominal hole	Ø 1.0 mm	Ø 1.6 mm
		Imm. Sn printed circuit boards		
	A	PCB thickness	min. 2.9 mm	min. 2.9 mm
	B	Plated hole	Ø 1 + 0.09/- 0.06 mm	Ø 1.6 + 0.09/- 0.06 mm
	C	Drill hole	Ø 1.15 ± 0.025 mm	Ø 1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm
	E	Imm. Sn plating	max. 1.5 µm	max. 1.5 µm
	F	Annular ring	min. 0.15 mm	min. 0.15 mm
	Ni, Au printed circuit boards			
	A	PCB thickness	min. 2.9 mm	min. 2.9 mm
	B	Plated hole	Ø 1 + 0.09/- 0.06 mm	Ø 1.6 + 0.09/- 0.06 mm
	C	Drill hole	Ø 1.15 ± 0.025 mm	Ø 1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm
	E	Ni, Au plating	0.05 – 0.2 µm Au over 2.5 – 5 µm Ni	0.05 – 0.2 µm Au over 2.5 – 5 µm Ni
	F	Annular ring	min. 0.15 mm	min. 0.15 mm

MicroTCA™ Power (backplane and power module output)

		Nominal hole	Ø 0.60 mm
		Imm. Sn printed circuit boards	
	A	PCB thickness	min. 1.4 mm
	B	Plated hole	Ø 0.60 ± 0.05 mm
	C	Drill hole	Ø 0.70 ± 0.02 mm
	D	Cu plating	min. 25 µm
	E	Imm. Sn plating	max. 1.5 µm
	F	Annular ring	min. 0.15 mm
	Ni, Au printed circuit boards		
	A	PCB thickness	min. 1.4 mm
	B	Plated hole	Ø 0.60 ± 0.05 mm
	C	Drill hole	Ø 0.70 ± 0.02 mm
	D	Cu plating	min. 25 µm
	E	Ni, Au plating	0.05 – 0.5 µm Au over 2.5 – 5 µm Ni
	F	Annular ring	min. 0.15 mm



No. of contacts	Press-fit technology	
	Without peg	With peg
	Part number	
170	512-22170-453	512-23170-453

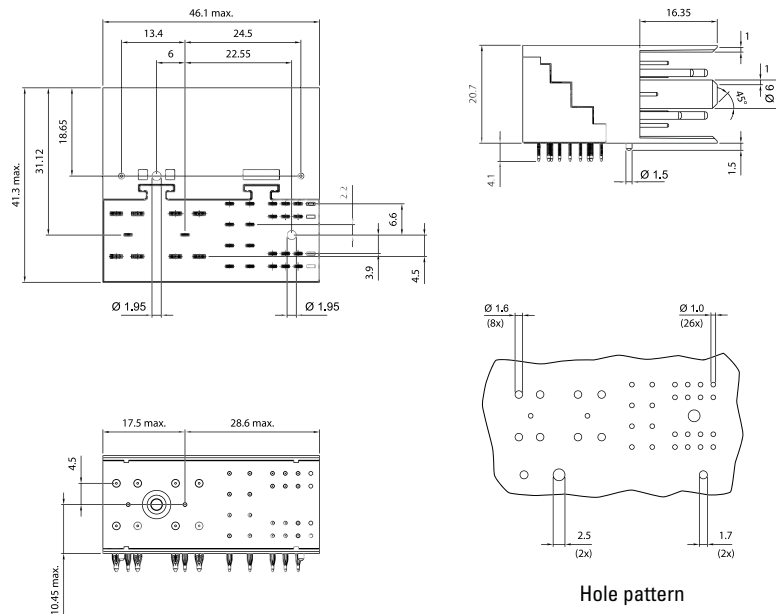
Accessories

- Press-fit tool (see page 194)
- Support tool (see page 195)

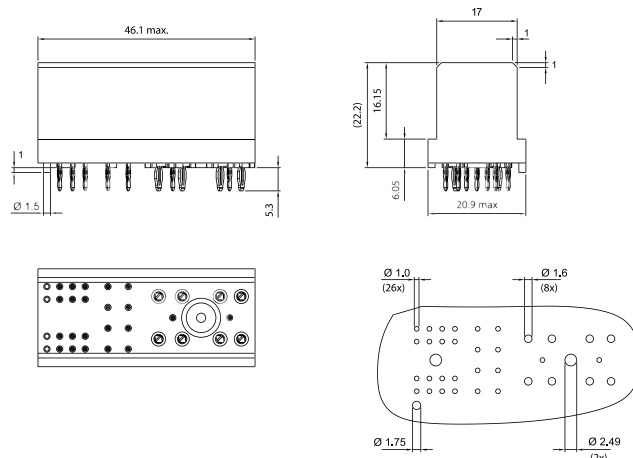
Cross reference

- Function GuideSpring/**con:card+**® (see page 13)





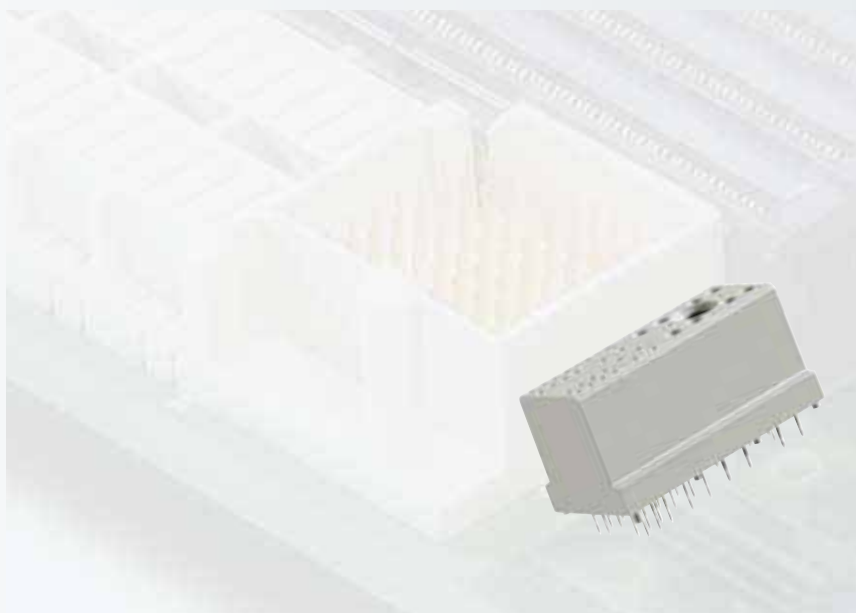
Dimensions in mm



Hole pattern

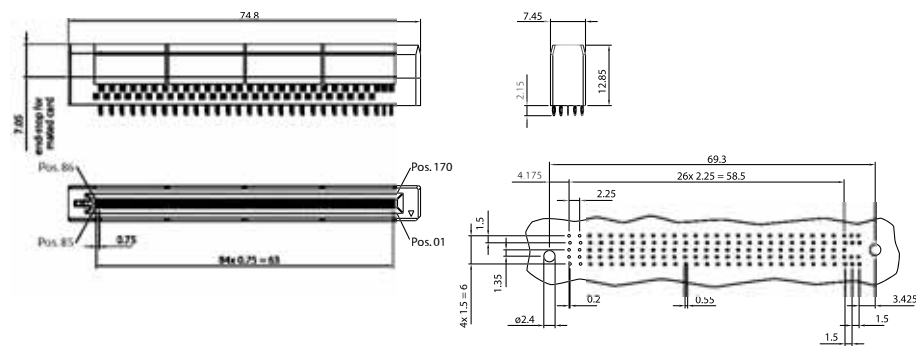
No. of contacts	Press-fit technology
	Part number
22 Signal 8 Power	512-50500-163
26 Signal 8 Power	512-50501-163

On request – Other contact numbers	Accessories – Press-fit tool (see page 194) – Support tool (see page 195)
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Dimensions in mm



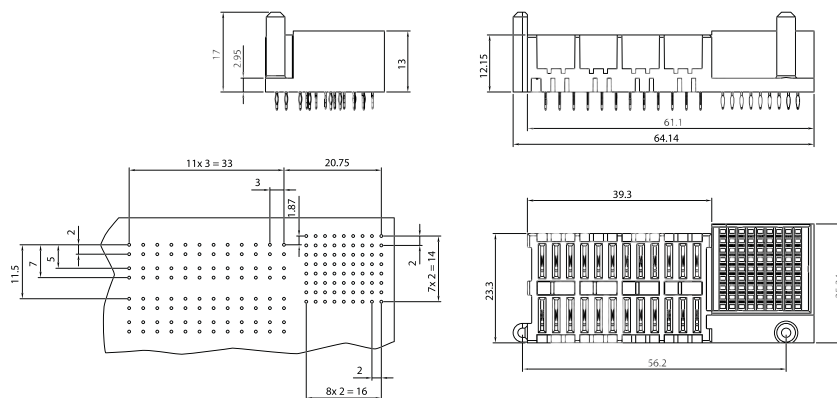
Hole pattern

No. of contacts	Press-fit technology
	Part number
170	502-12170-153

On request – With peg	Accessories – Press-fit tool (see page 196) – Support tool (see page 197)
Cross reference – Function GuideSpring/ con:card+ ® (see page 13)	



Dimensions in mm

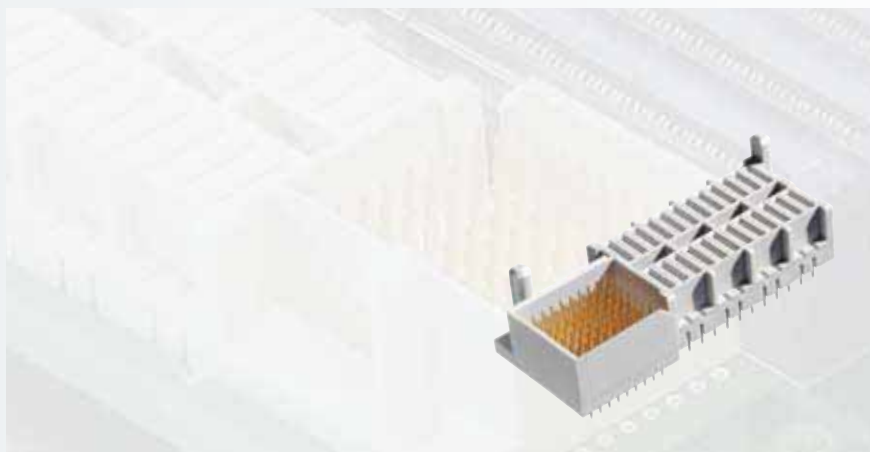


Hole pattern

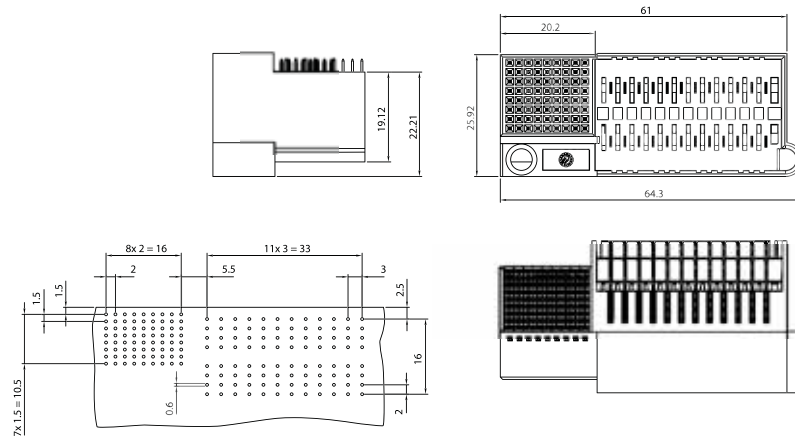
No. of contacts	Press-fit technology
	Part number
72 Signal 24 Power	502-50096-183

Accessories

- Press-fit tool (see page 196)
- Support tool (see page 197)



Dimensions in mm




Hole pattern

No. of contacts	Press-fit technology
	Part number
72 Signal 24 Power	501-50096-183

Accessories

- Press-fit tool (see page 196)
- Support tool (see page 197)





hm connectors: hm 2.0

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Connectors according to IEC 61076-4-101

The hardmetric connector system ept hm 2.0 was developed and manufactured according to the international standard IEC 61076-4-101. Thus the user can rely on a worldwide standard for the connection of printed circuit boards using connectors with a large number of contacts. The printed circuit boards can be exchanged between systems without difficulty. Important parameters such as the fixing, shielding and coding of the printed circuit boards are compatible regardless of the individual application.

The grid

ept hm 2.0 connectors are designed with a 2 mm metric grid. They can be easily connected in series to form a continuous 2 mm grid. This grid pattern is advantageous when creating a printed circuit board since no space is lost in the individual connector modules.

Connecting modules

The ends of the insulator material are chamfered to simplify the connection of additional modules and avoid twisting the connectors. The chamfers ensure the exact positioning on the printed circuit boards and stabilize the modules.

Coding

The connectors must be coded in a modern BUS system to avoid mixing up the printed circuit boards. The possibility of coding has already been defined in the IEC 61076-4-101.

"Coding keys" can be manually snapped onto the multi-function block of the connector types A, D, L and M. The different inserts are color-coded and can thus be kept apart.

Multi-function block

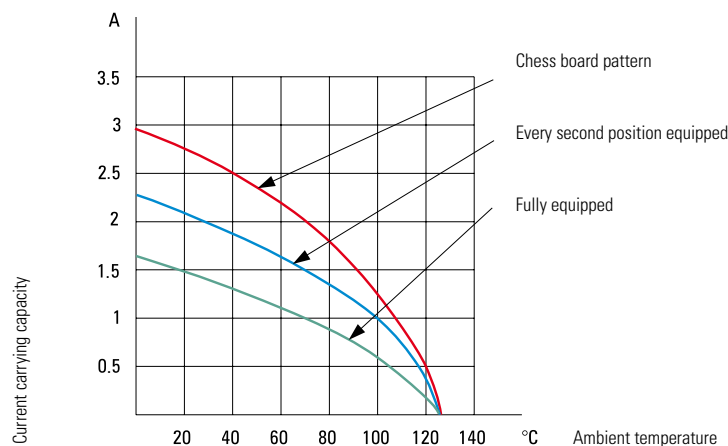
The modules A, D, L and M are equipped with a multi-function block. This in turn can be equipped with the coding keys. The molded guides ensure the correct alignment of the male and female connectors to each other and they offer anti-twist protection before contacting.

The coding keys can be inserted or withdrawn using a simple insertion or withdrawal tool.

Contact lengths of the mating and termination side

ept offers three different lengths for the front and four different lengths for the rear side. The different contact lengths are necessary because certain signal or ground contacts need to be the first to be connected/disconnected when adding/removing a module. The 11.25 mm long contacts are mainly required for the shielding rows z and f.

Derating diagram



Technical specifications

Electrical and mechanical properties		
Grid		2 mm
Temperature range		– 55 °C to + 125 °C
Durability	Performance level II	> 250 mating cycles
Insulator material		Polyester, glass fiber reinforced acc. to UL94V-0
Contact resistance acc. to IEC 512-5		max. 20 mΩ
Contact material	Male	Bronze
	Female	Bronze
Contact surface		Au over PdNi over Ni
Insulation resistance Acc. to IEC 512-5	Contact/Contact	min. 10 ⁴ MΩ
	Contact/Shielding	min. 10 ⁴ MΩ
Operational current at ambient temperature	+ 20 °C	1.5 A
	+ 70 °C	1.0 A
Insertion force per pin	Contact	max. 0.75 N
	Shielding	max. 1 N
Separating force per pin	Contact	min. 0.15 N
	Shielding	min. 0.15 N
Environment/approvals		RoHS compliant/UL (file: E130314)

Test voltage				
		Fully loaded	Every second position	Chessboard
Rows a, c, e Rows b, d	Within the row	750 V _{r.m.s}	1500 V _{r.m.s}	–
	Between the rows	1500 V _{r.m.s}	1500 V _{r.m.s}	–
Rows a, b, c Rows a, b, c, d Rows a, b, c, d, e	Within the row	750 V _{r.m.s}	1500 V _{r.m.s}	1500 V _{r.m.s}
	Between the rows	750 V _{r.m.s}	750 V _{r.m.s}	1200 V _{r.m.s}

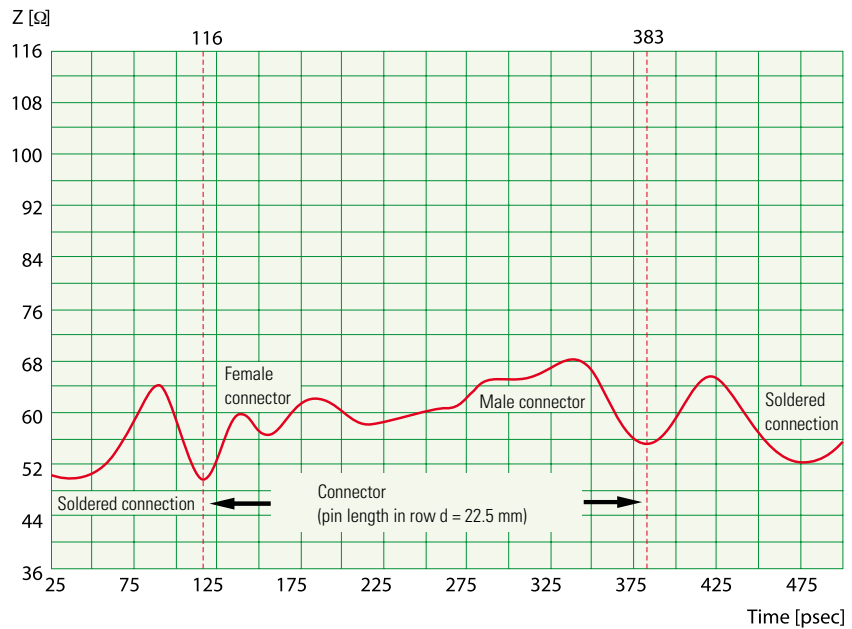
Creepages and clearances according to IEC 61076-4-101							
		Fully loaded		Every second position		Chessboard	
		Backplane Male connector	Module Female connector	Backplane Male connector	Module Female connector	Backplane Male connector	Module Female connector
Rows a, c, e Rows b, d	Within the row	0.8 mm	0.6 mm	2.5 mm	2.5 mm	–	–
	Between the rows	2.5 mm	2.5 mm	2.5 mm	2.5 mm	–	–
Rows a, b, c Rows a, b, c, d Rows a, b, c, d, e	Within the row	0.8 mm	0.6 mm	2.5 mm	2.5 mm	2.5 mm	2.5 mm
	Between the rows	0.8 mm	0.6 mm	0.8 mm	0.6 mm	1.2 mm	1.5 mm

Electrical characteristics

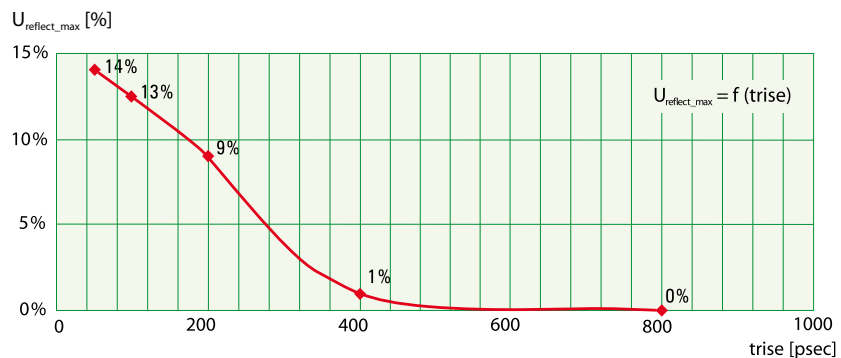
The connector system ept hm 2.0 has been especially developed for high data rates. Below some HF characteristics are described as example. A SPICE model is available for simulation when developing systems. The simulation model was verified by means of TDR measurements.

Impedance gradient along a pin in row d

Impedance measured after eliminating multiple reflection



$U_{\text{reflect_max}}$ is the maximum reflection of an ept hm 2.0 connector in percent, shown as function of the signal rise time. The connector is the only electrical discontinuity in a selected 50 ohm system.

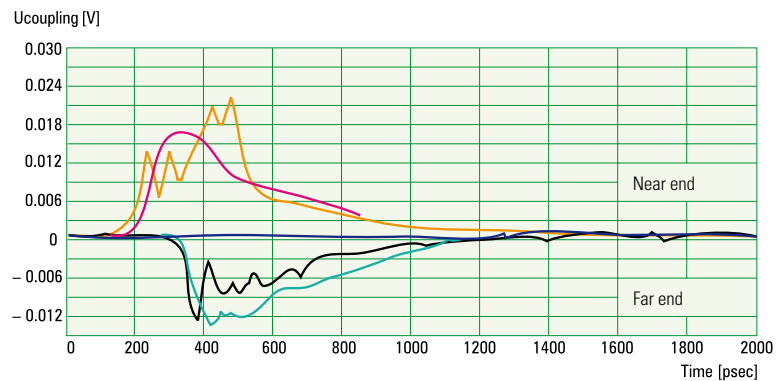


Cross talk

Near end and far end cross talk was measured and simulated for different arrangements. A 200 mV input signal and a signal rise time of 25 psec. were applied.

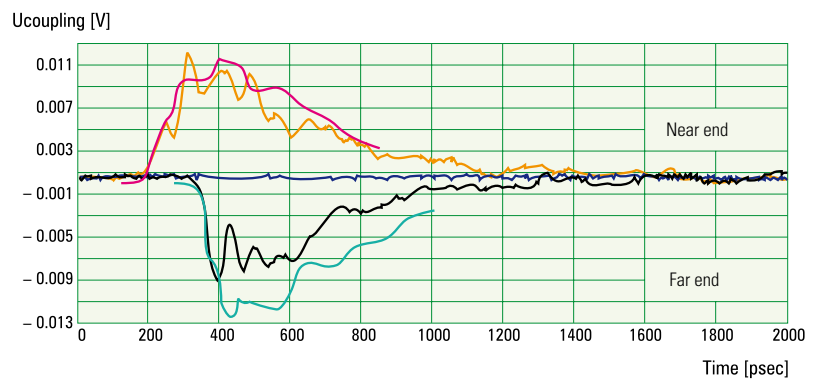
Cross talk from a pin in row d
to an adjacent pin in row d
(from C to G)

Measured cross talk, near end
Simulated cross talk, near end
Background noise
Measured cross talk, far end
Simulated cross talk, far end

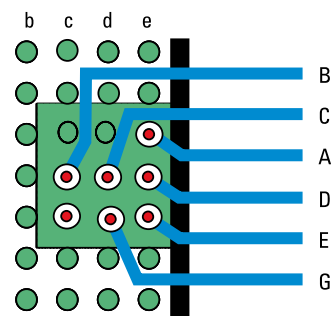


Cross talk from a pin in row d
to a diagonally positioned pin in
row e (from C to A or E)

Measured cross talk, near end
Simulated cross talk, near end
Background noise
Measured cross talk, far end
Simulated cross talk, far end

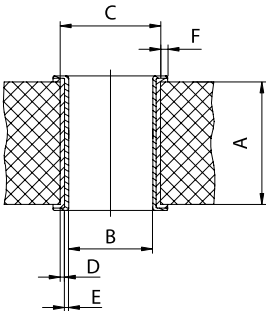


Setup for measuring



Hole specifications

ept offers adapted press-fit zones for various new board surfaces.

		Nominal hole	Ø 0.6 mm
Imm. Sn printed circuit boards			
	A	PCB thickness	min. 1.4 mm
	B	Plated hole	Ø 0.60 + 0.05/- 0.01 mm
	C	Drill hole	0.70 ± 0.02 mm
	D	Cu plating	min. 25 µm
	E	Imm. Sn plating	max. 1.5 µm
	F	Annular ring	min. 0.1 mm
	Ni, Au printed circuit boards		
	A	PCB thickness	min. 1.4 mm
	B	Plated hole	Ø 0.60 + 0.05/- 0.01 mm
	C	Drill hole	0.70 ± 0.02 mm
	D	Cu plating	min. 25 µm
	E	Ni, Au plating	0.05 – 0.2 µm Au over 2.5 – 5 µm Ni
	F	Annular ring	min. 0.1 mm
	pure Cu printed circuit boards		
	A	PCB thickness	min. 1.4 mm
	B	Plated hole	Ø 0.60 + 0.05/- 0.03 mm
	C	Drill hole	0.70 ± 0.02 mm
	D	Cu plating	min. 25 µm
	E	OSP*	e. g. GLICOAT-SMD (F2) with 0.12 – 0.15 µm
	F	Annular ring	min. 0.1 mm
	HAL Sn printed circuit boards		
	A	PCB thickness	min. 1.4 mm
	B	Plated hole	Ø 0.60 ± 0.05 mm
	C	Drill hole	0.70 ± 0.02 mm
	D	Cu plating	min. 25 µm
	E	HAL Sn	5 – 15 µm
	F	Annular ring	min. 0.1 mm

* OSP = Organic Solderability Preservatives

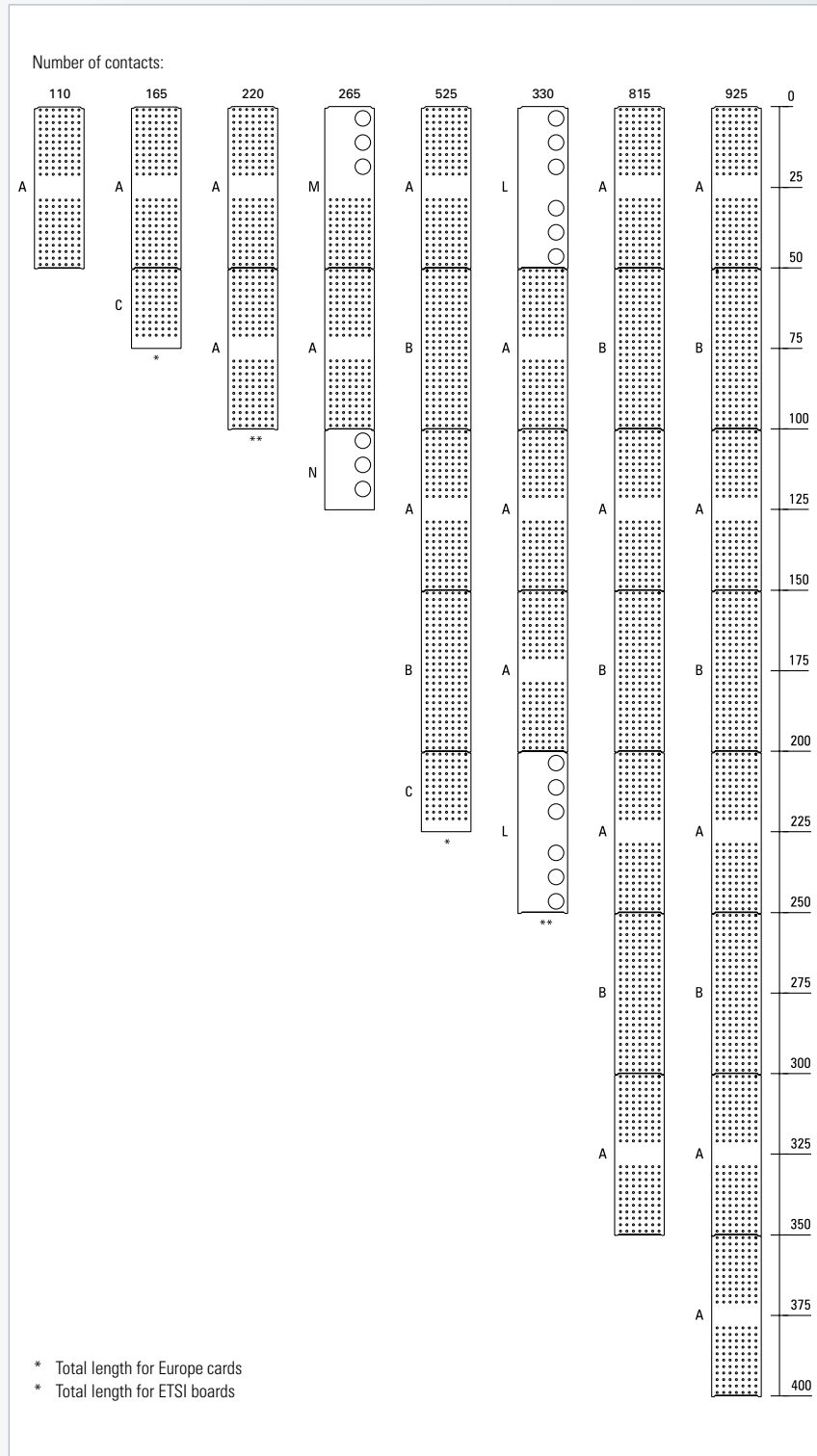
System modularity

ept hm 2.0 modules offer a number of possibilities to optimize large contact densities, especially in combination with coaxial or fiber-optic connections.

Using module type A, connections with a length of 50 mm can be set up in increments of 25 mm to achieve an overall length as required.

The connectors with a multifunction block (types A, M, L) are preferably arranged at the beginning of a connector row. The type B module on the other hand is only arranged between other modules.

Due to their inverse-polarity protection the 25 mm type C and N modules are arranged at the end of a connector row. The coding keys in the multifunction block and the modules type C and N ensure that the modules are plugged in correctly.

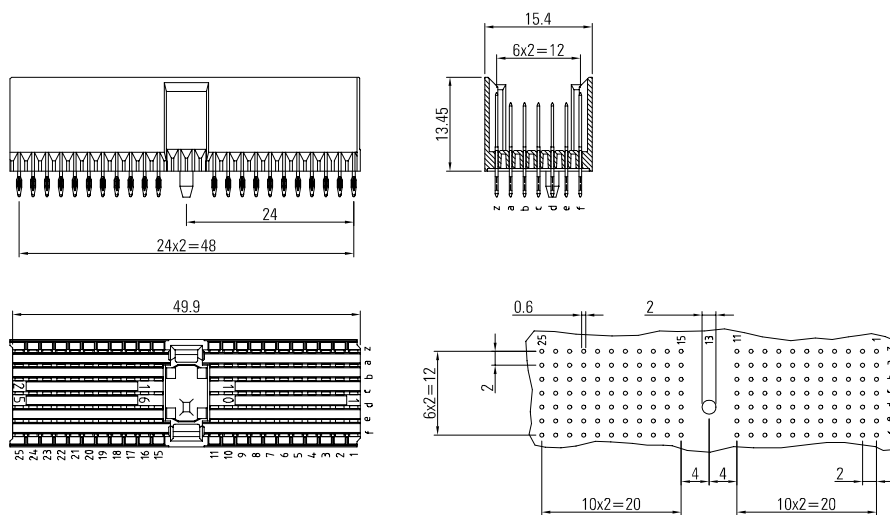


Pin lengths

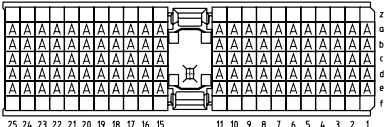
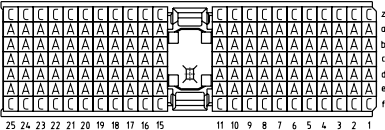
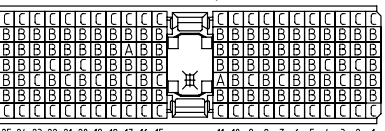
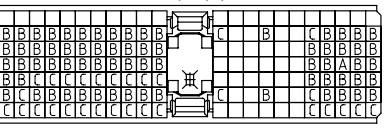
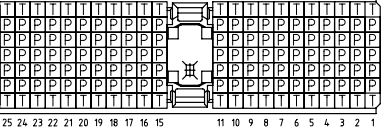
Dimension drawing	Contact	Connection	Contact length	Use
	A	Without rear mating zone	8.25 ± 0.1	Level 1, contact for signal
	B		9.75 ± 0.1	Level 2, contact for signal
	C		11.25 ± 0.1	Level 3, shielding
	K	With rear mating zone 13 mm	8.25 ± 0.1	Level 1, contact for signal
	L		9.75 ± 0.1	Level 2, contact for signal
	M		11.25 ± 0.1	Level 3, shielding
	N	With rear mating zone 14.5 mm	8.25 ± 0.1	Level 1, contact for signal
	P		9.75 ± 0.1	Level 2, contact for signal
	Q		11.25 ± 0.1	Level 3, shielding
	R	With rear mating zone 16 mm	8.25 ± 0.1	Level 1, contact for signal
	S		9.75 ± 0.1	Level 2, contact for signal
	T		11.25 ± 0.1	Level 3, shielding



Dimensions in mm



Hole pattern

No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
110		243-11010-05	243-11010-15
154		243-11310-05	243-11310-15
154	cPCI Hot-Swap (P1) 	243-11322-05	243-11322-15
100	cPCI Telephony Spec (P4) 	243-11323-05	243-11323-15
154		243-11360-05	243-11360-15



On request

- Performance level I or customer-specific
- Contact arrangement (see page 75)

Accessories

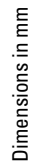
- Press-fit tool (see page 198)
- Support tool (see page 199)
- Coding keys (see page 68)
- Shroud (see page 66)

Cross reference

- Pin lengths (see page 34)

Note

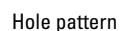
- CompactPCI P1/P4



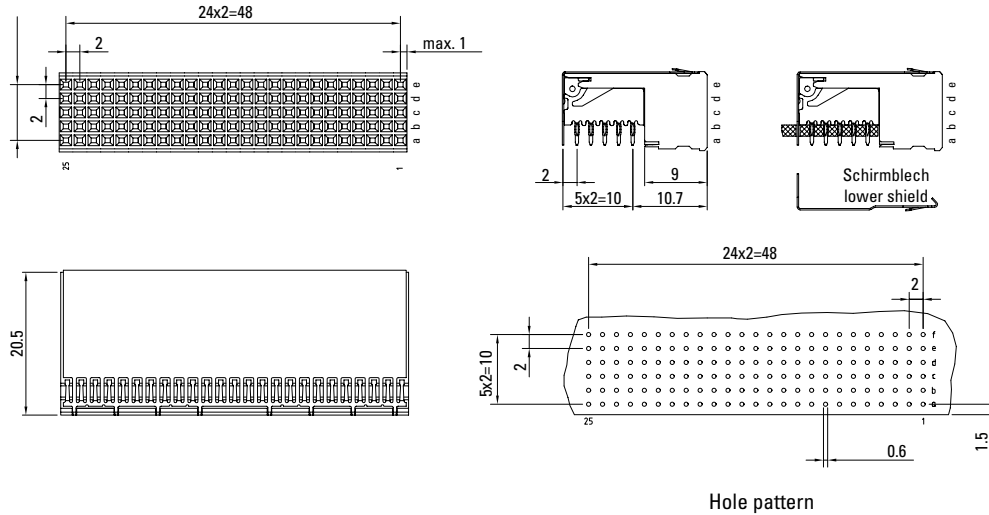
- Performance level I or customer-specific
- Also in THTR

- Press-fit tool
(see page 202)
- Support tool
(see page 203)
- Coding keys
(see page 68)

- CompactPCI J1/J4

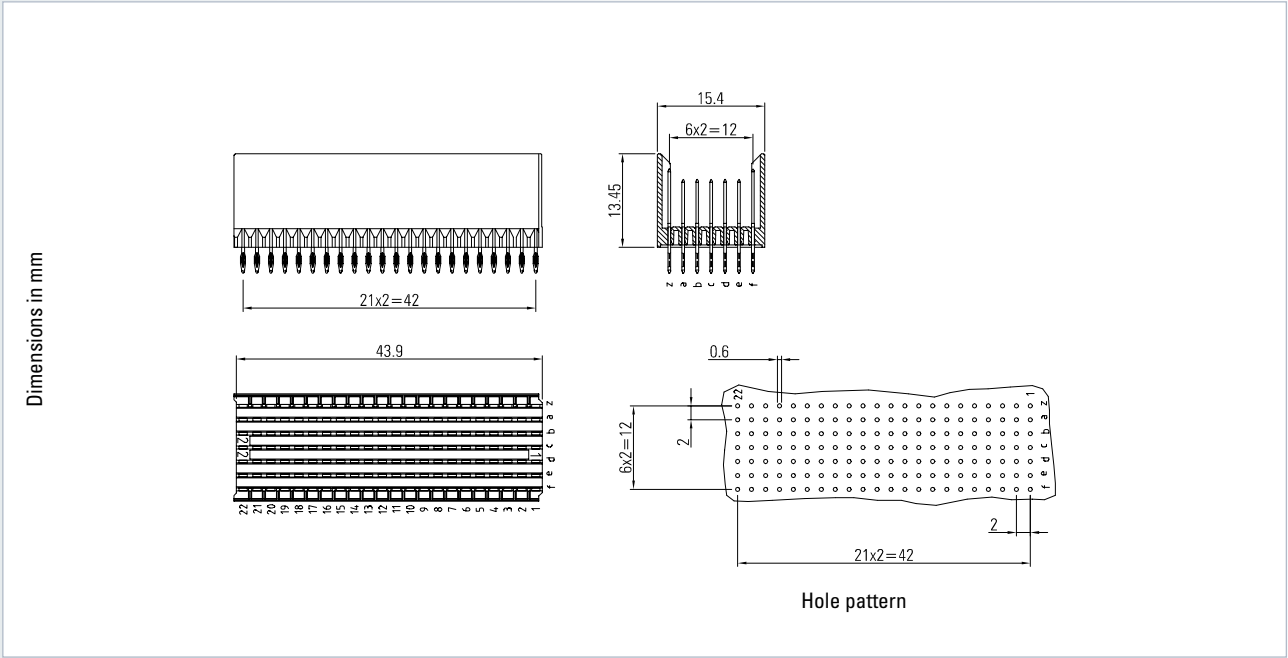


Cross reference
– Pin lengths (see page 34)



Accessories

- Press-fit tool
(see page 202)
- Support tool
(see page 203)



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
154		243-22310-05	243-22310-15
154		243-22311-05	243-22311-15
154		243-22320-05	243-22320-15
154		243-22360-05	243-22360-15



On request

- Performance level I or customer-specific
- Contact arrangement (see page 75)

Accessories

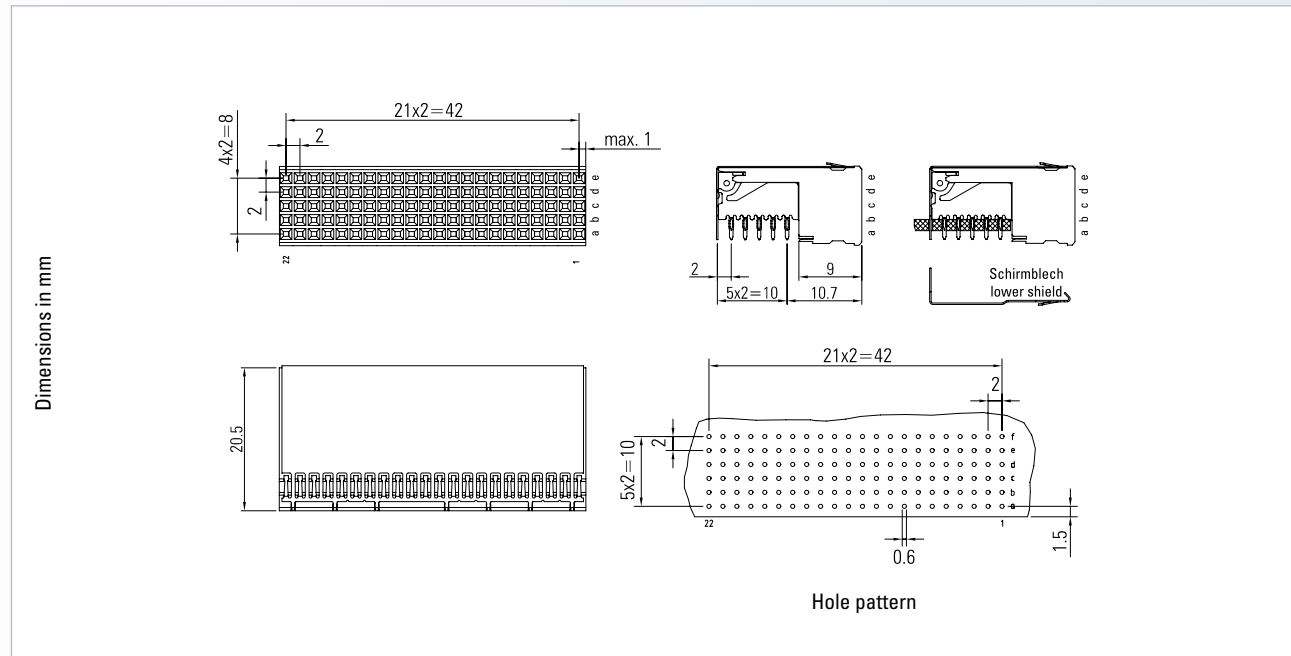
- Press-fit tool (see page 200)
- Support tool (see page 201)
- Shroud (see page 66)

Cross reference

- Pin lengths (see page 34)

Note

- CompactPCI P2/P5



No. of contacts	Description	Press-fit technology Performance level II
		Part number
110	Without shielding	244-22000-15
110	With shielding	244-22300-15
—	Lower shield	244-22600-1

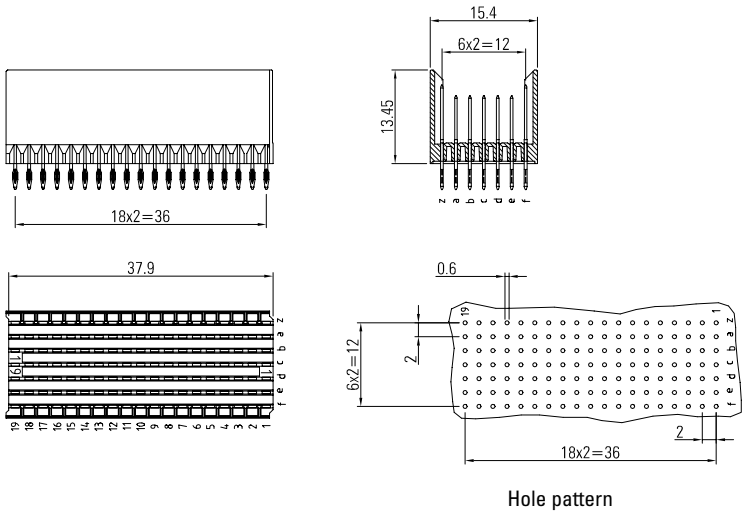


On request
– Performance level I or customer-specific
– Also in THTR

Accessories
– Press-fit tool (see page 202)
– Support tool (see page 203)

Note
– CompactPCI J2/J5

Dimensions in mm



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
133		243-23310-05	243-23310-15
133		243-23320-05	243-23320-15
133		243-23360-05	243-23360-15
133		243-23700-05	243-23700-15

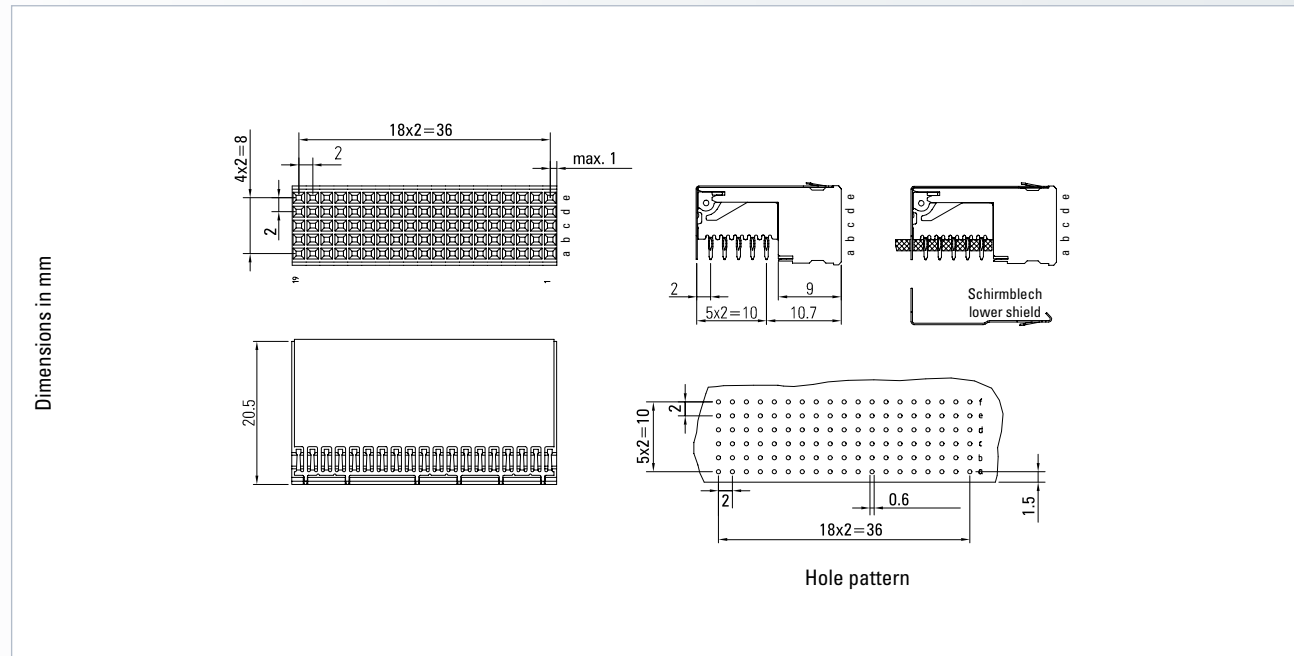


On request
– Performance level I or customer-specific
– Contact arrangement (see page 75)

Accessories
– Press-fit tool (see page 200)
– Support tool (see page 201)
– Shroud (see page 66)

Cross reference
– Pin lengths (see page 34)

Note
– VME J0 and cPCI P3



No. of contacts	Description	Press-fit technology Performance level II
		Part number
95	Without shielding	244-23000-15
95	With shielding	244-23300-15
—	Lower shield	244-23600-1

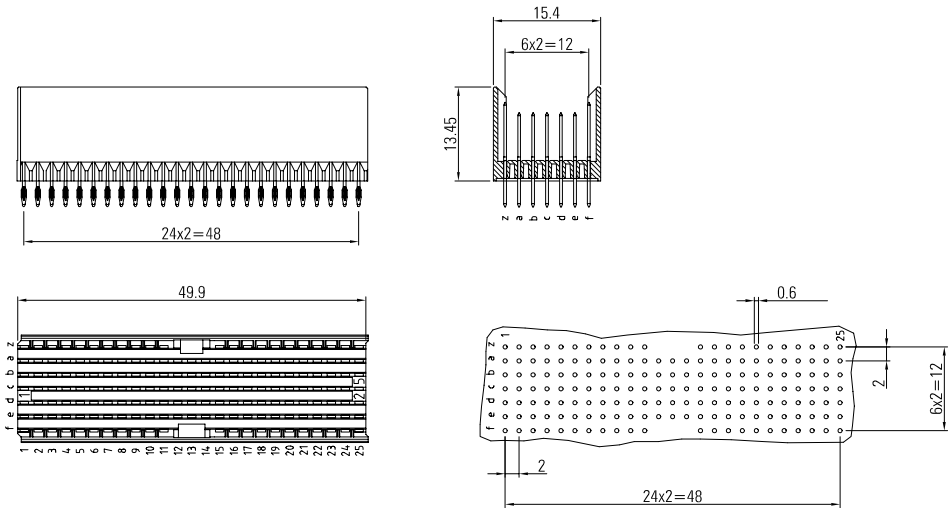


On request
 – Performance level I or customer-specific
 – Also in THTR

Accessories
 – Press-fit tool (see page 202)
 – Support tool (see page 203)

Note
 – VME P0 and cPCI J3

Dimensions in mm



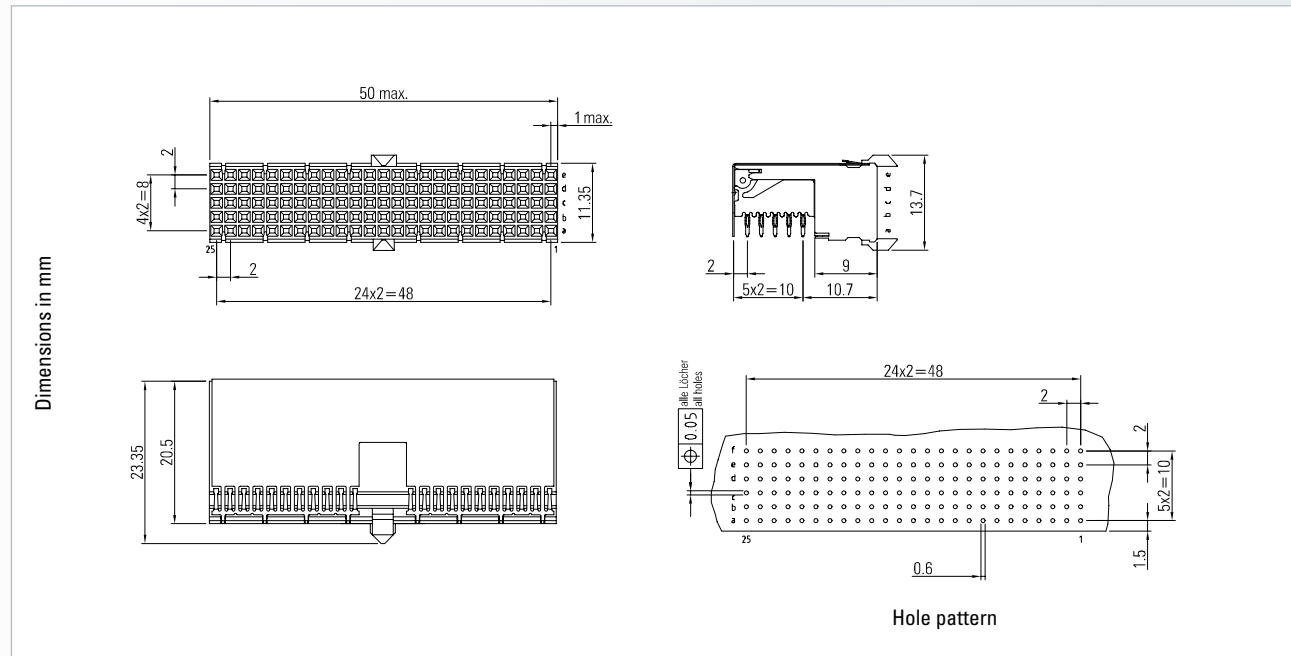
Hole pattern

No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
125		243-61010-05	243-61010-15
169		243-61310-05	243-61310-15
169		243-61320-05	243-61320-15
169		243-61360-05	243-61360-15



On request <ul style="list-style-type: none">– Performance level I or customer-specific– Contact arrangement (see page 76)	Accessories <ul style="list-style-type: none">– Press-fit tool (see page 198)– Support tool (see page 199)– Shroud (see page 67)
--	---

Cross reference <ul style="list-style-type: none">– Pin lengths (see page 34)
--



No. of contacts	Description	Press-fit technology
		Performance level II
		Part number
125	Without shielding	244-61000-15
125	With shielding	244-61300-15
—	Lower shield	244-11600-1

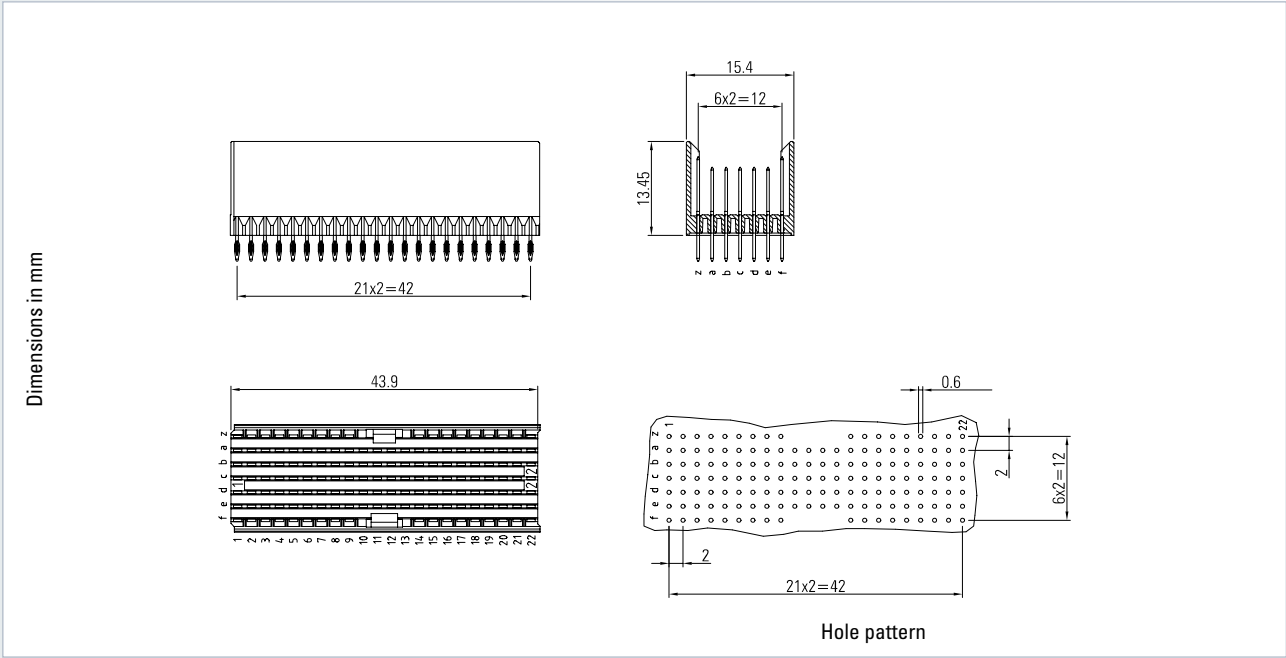


On request

- Performance level I or customer-specific
- Also in THTR

Accessories

- Press-fit tool (see page 202)
- Support tool (see page 203)



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
110		243-62010-05	243-62010-15
146		243-62310-05	243-62310-15
146		243-62320-05	243-62320-15
146		243-62360-05	243-62360-15



On request

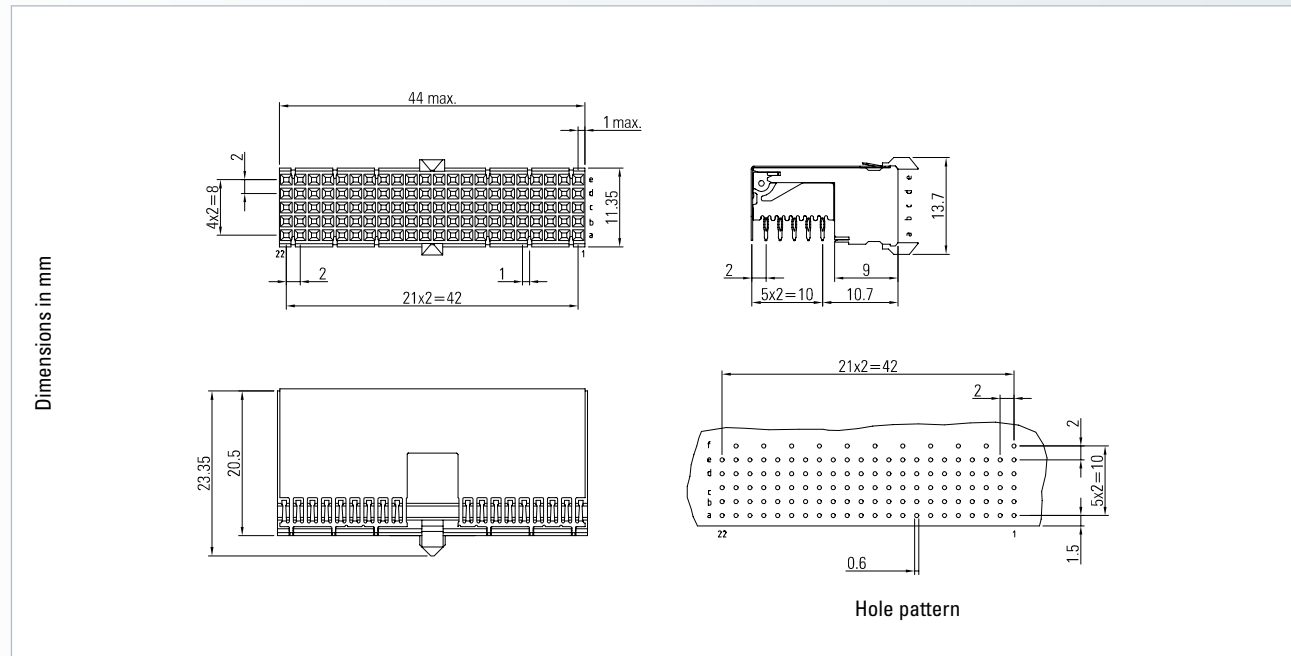
- Performance level I or customer-specific
- Contact arrangement (see page 76)

Accessories

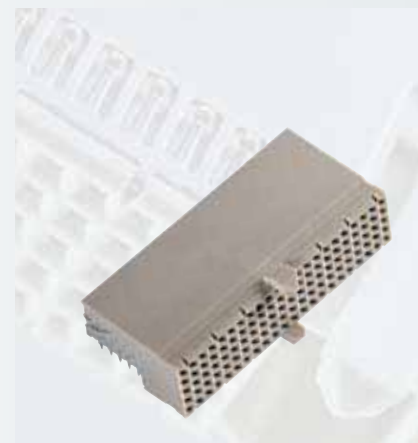
- Press-fit tool (see page 198)
- Support tool (see page 199)
- Shroud (see page 67)

Cross reference

- Pin lengths (see page 34)



No. of contacts	Description	Press-fit technology
		Performance level II
		Part number
110	Without shielding	244-62000-15
110	With shielding	244-62300-15

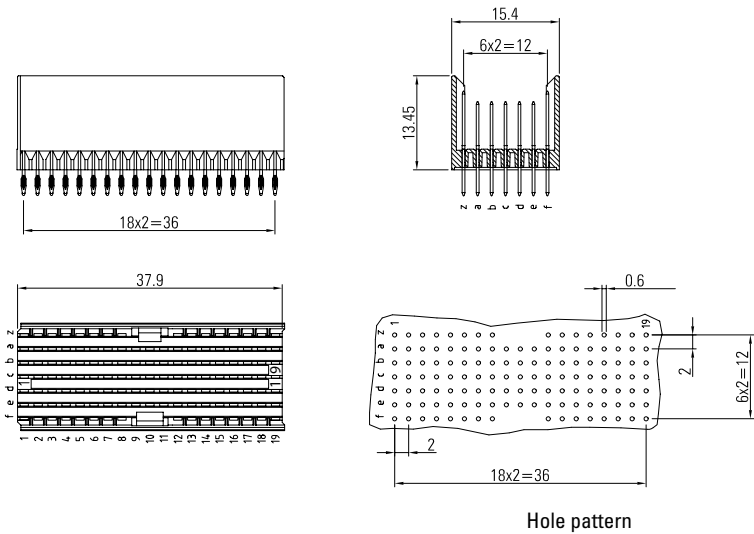


On request
 – Performance level I or customer-specific
 – Also in THTR

Accessories
 – Press-fit tool (see page 202)
 – Support tool (see page 203)

Note
 – CompactPCI RJ5

Dimensions in mm



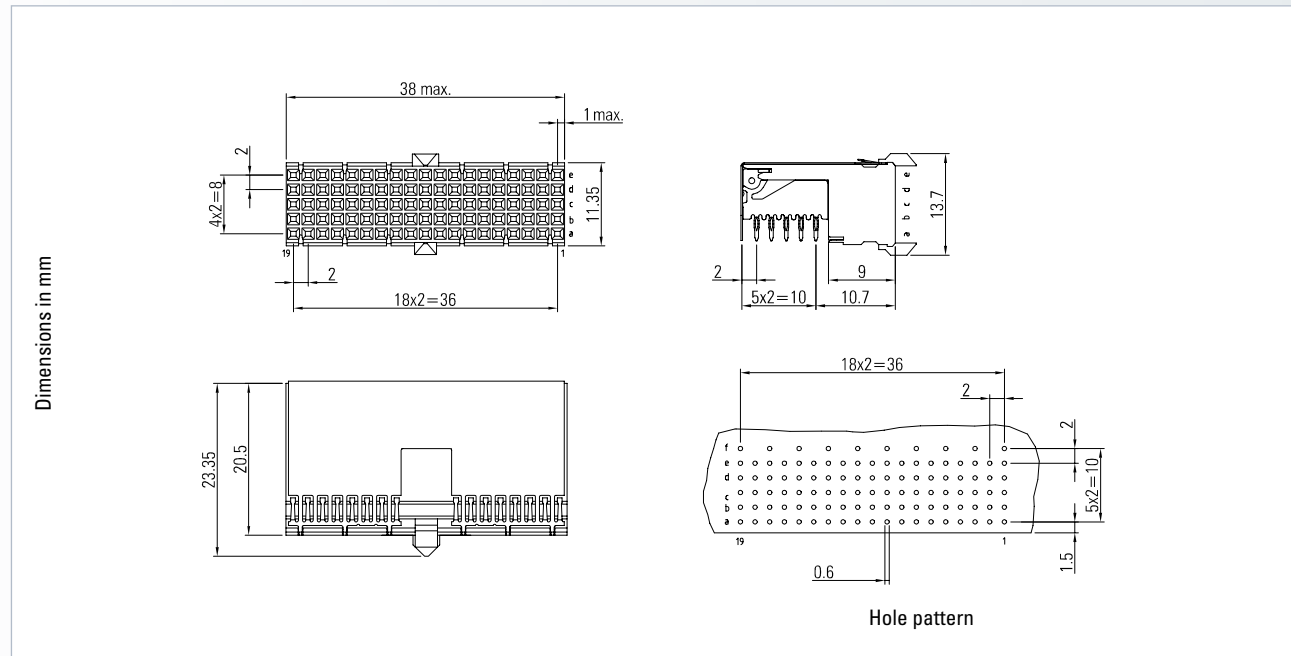
No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
95		243-63010-05	243-63010-15
127		243-63310-05	243-63310-15
127		243-63320-05	243-63320-15
127		243-63360-05	243-63360-15



On request
– Performance level I or customer-specific
– Contact arrangement (see page 76)

Accessories
– Press-fit tool (see page 198)
– Support tool (see page 199)
– Shroud (see page 67)

Cross reference
– Pin lengths (see page 34)



No. of contacts	Description	Press-fit technology
		Performance level II
		Part number
95	Without shielding	244-63000-15
95	With shielding	244-63300-15



On request

- Performance level I or customer-specific
- Also in THTR

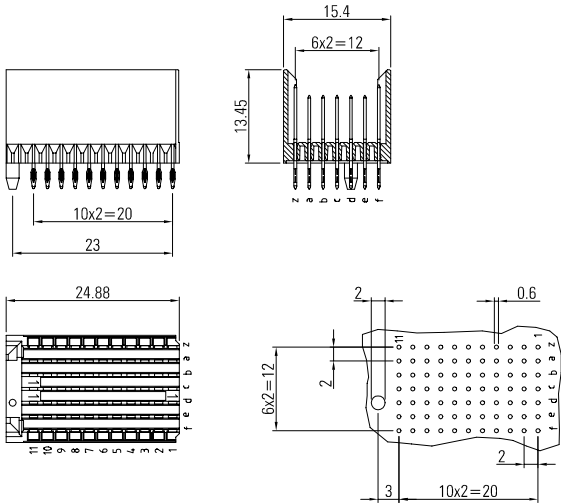
Accessories

- Press-fit tool (see page 202)
- Support tool (see page 203)

Note

- CompactPCI RJ3

Dimensions in mm



Hole pattern

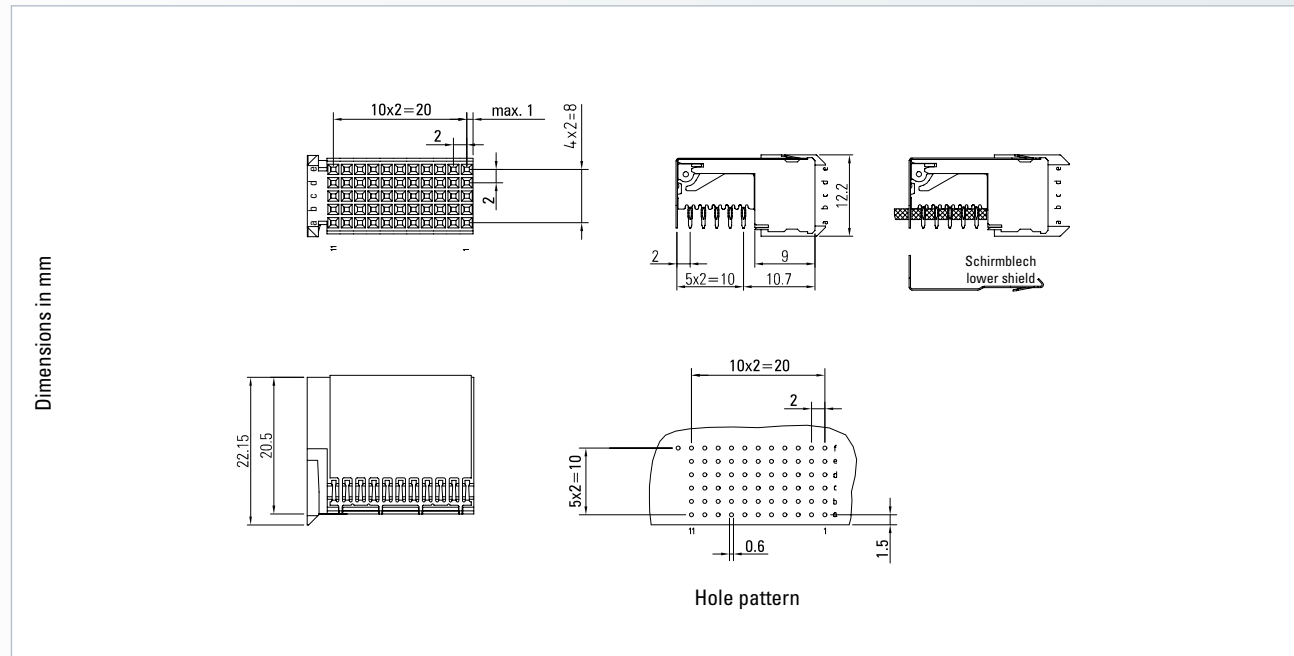
No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
55		243-31010-05	243-31010-15
55		243-31020-05	243-31020-15
77		243-31310-05	243-31310-15
77		243-31320-05	243-31320-15



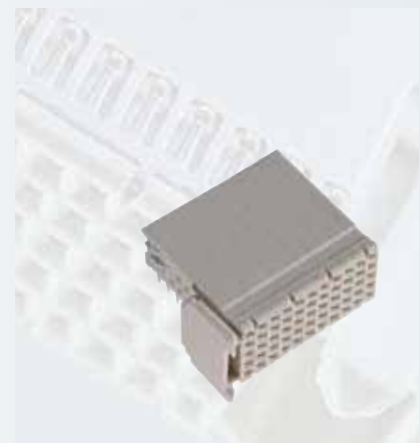
On request
– Performance level I or customer-specific
– Contact arrangement (see page 75)

Accessories
– Press-fit tool (see page 200)
– Support tool (see page 201)
– Shroud (see page 66)

Cross reference
– Pin lengths (see page 34)



No. of contacts	Description	Press-fit technology Performance level II
		Part number
55	Without shielding	244-31000-15
55	With shielding	244-31300-15
—	Lower shield	244-31600-1

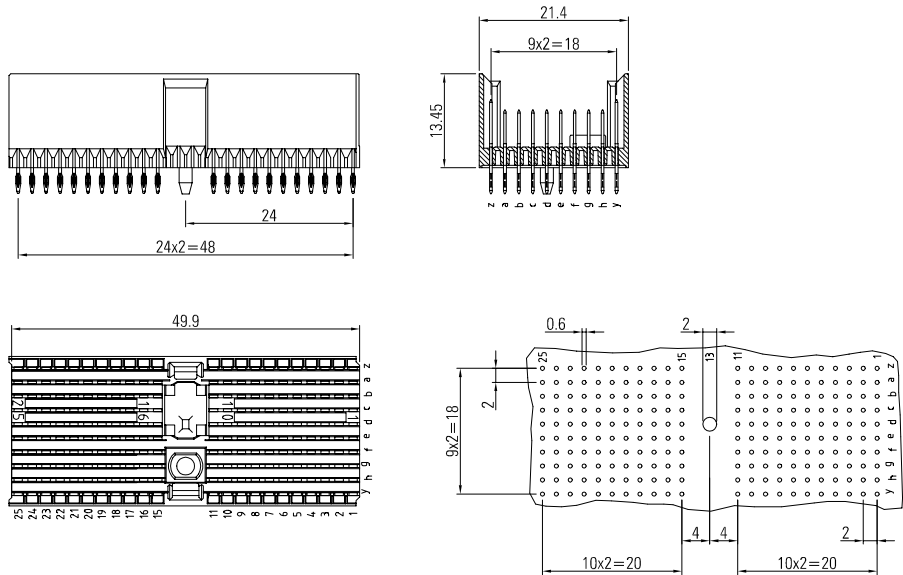


On request
 – Performance level I or customer-specific
 – Also in THTR

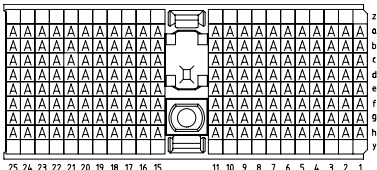
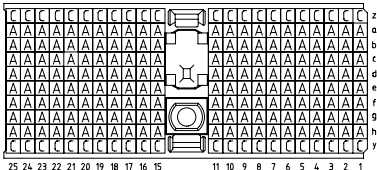
Accessories
 – Press-fit tool (see page 202)
 – Support tool (see page 203)

hm connectors
Type D
Male connector

Dimensions in mm

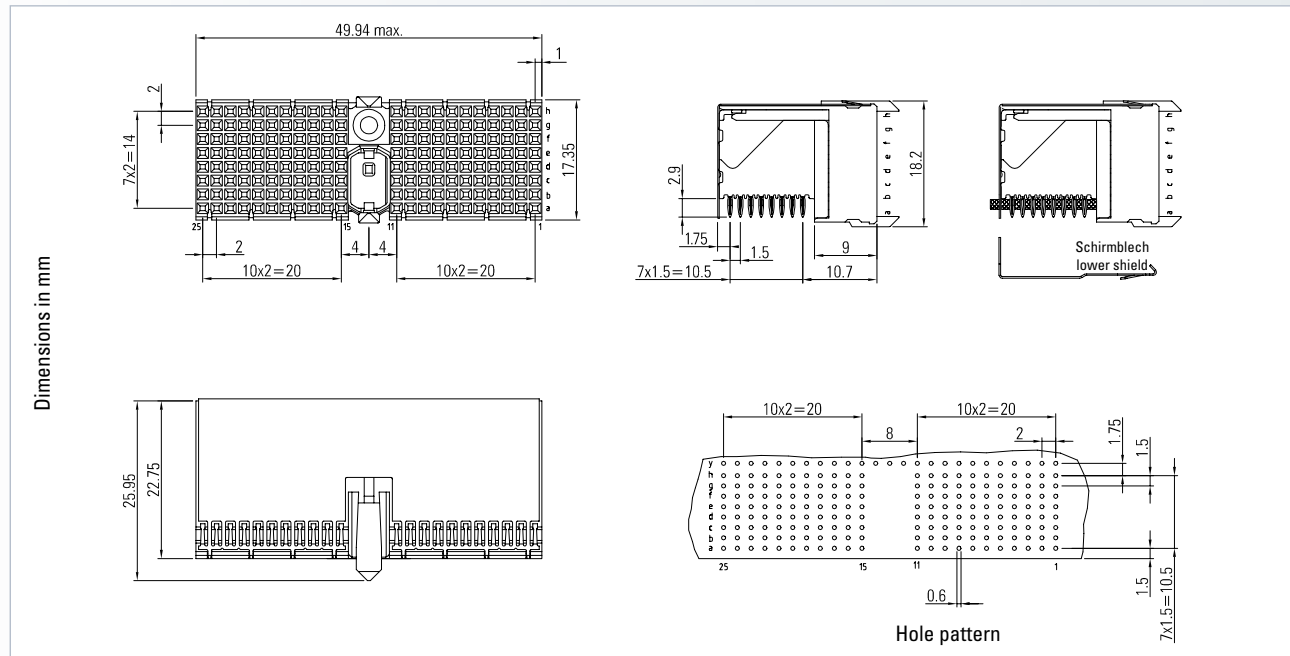


Hole pattern

No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
176		245-11010-05	245-11010-15
220		245-11310-05	245-11310-15



On request <ul style="list-style-type: none">– Performance level I or customer-specific– Contact arrangement (see page 77)	Accessories <ul style="list-style-type: none">– Press-fit tool (see page 198)– Support tool (see page 199)– Coding keys (see page 68)
Cross reference <ul style="list-style-type: none">– Pin lengths (see page 34)	



No. of contacts	Description	Press-fit technology Performance level II
		Part number
176	Without shielding	246-11000-15
176	With shielding	246-11300-15
—	Lower shield	246-11600-1

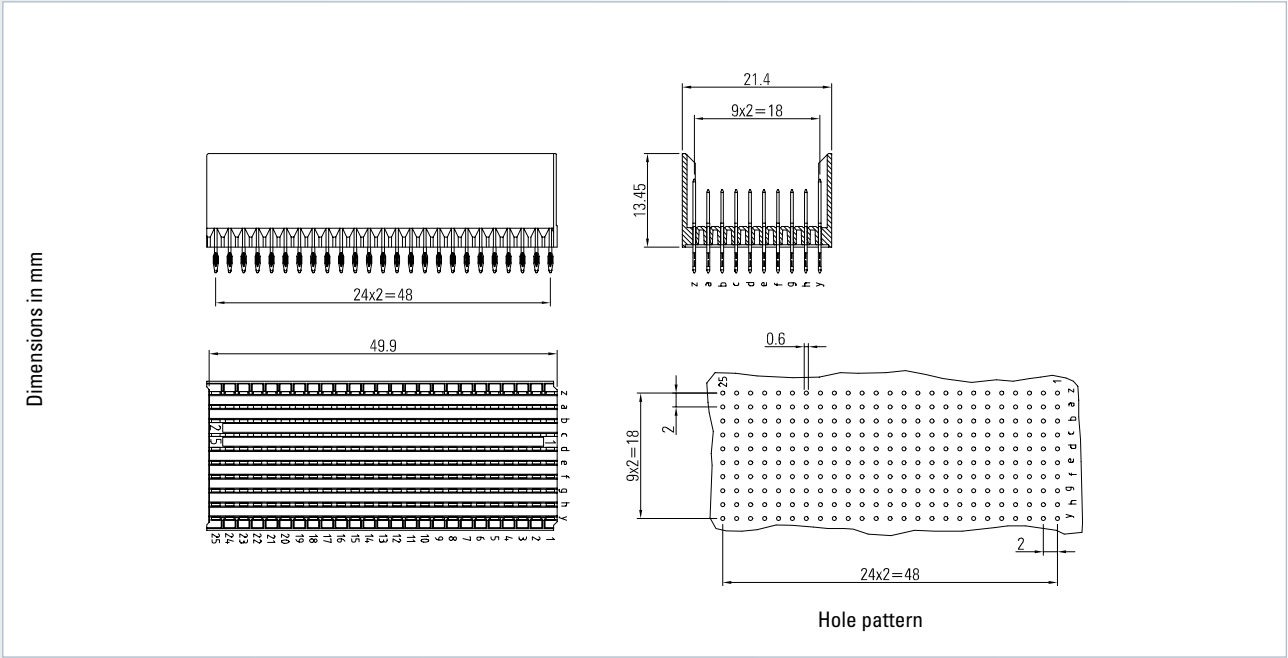


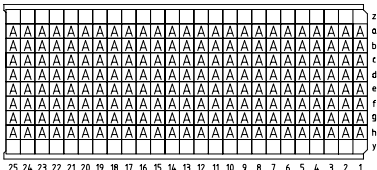

On request

- Performance level I or customer-specific

Accessories

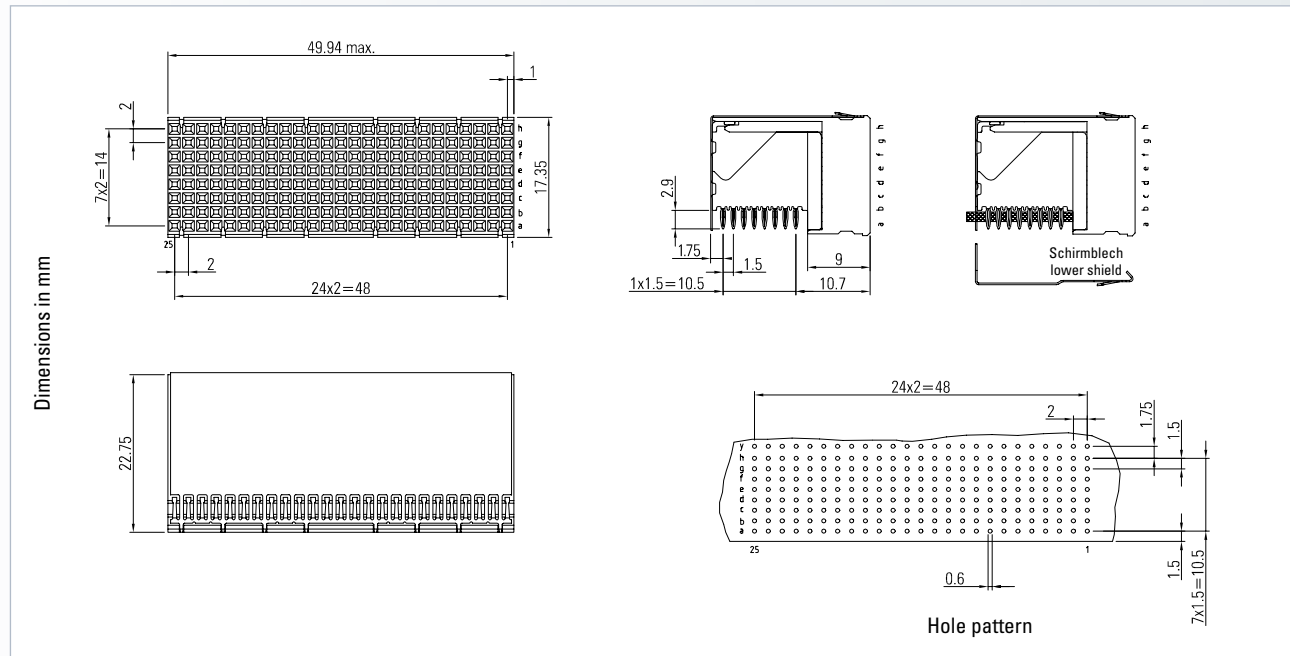
- Press-fit tool (see page 202)
- Support tool (see page 203)
- Coding keys (see page 68)



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
200		245-21010-05	245-21010-15
250		245-21310-05	245-21310-15



On request <ul style="list-style-type: none">– Performance level I or customer-specific– Contact arrangement (see page 77)	Accessories <ul style="list-style-type: none">– Press-fit tool (see page 200)– Support tool (see page 201)
Cross reference <ul style="list-style-type: none">– Pin lengths (see page 34)	



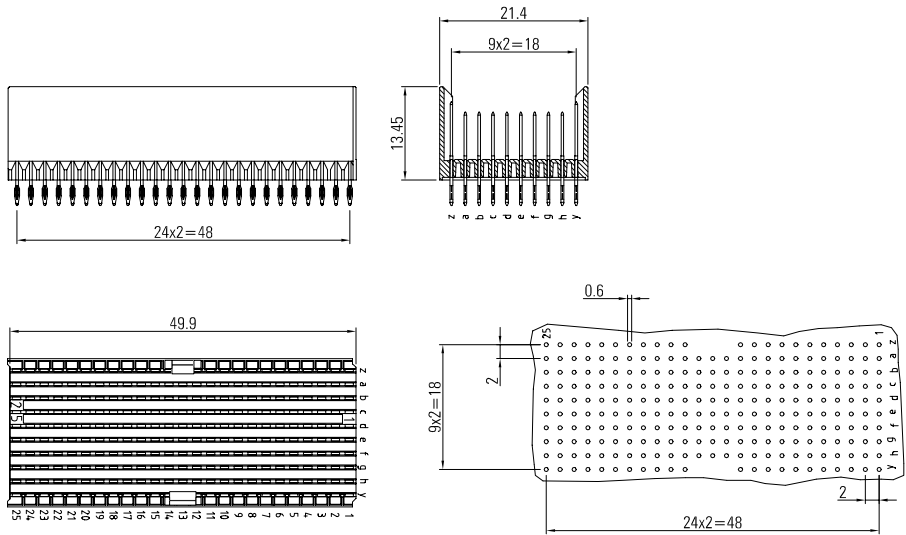
No. of contacts	Description	Press-fit technology
		Performance level II
		Part number
200	Without shielding	246-21000-15
200	With shielding	246-21300-15
—	Lower shield	246-21600-1



On request
 – Performance level I or customer-specific

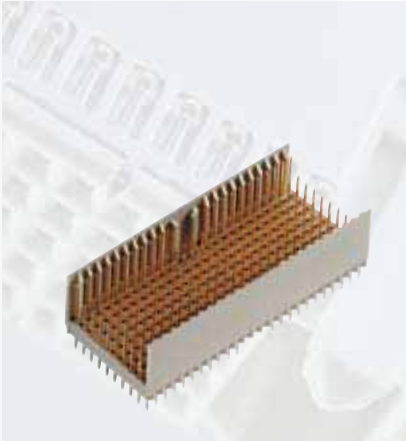
Accessories
 – Press-fit tool (see page 202)
 – Support tool (see page 203)

Dimensions in mm



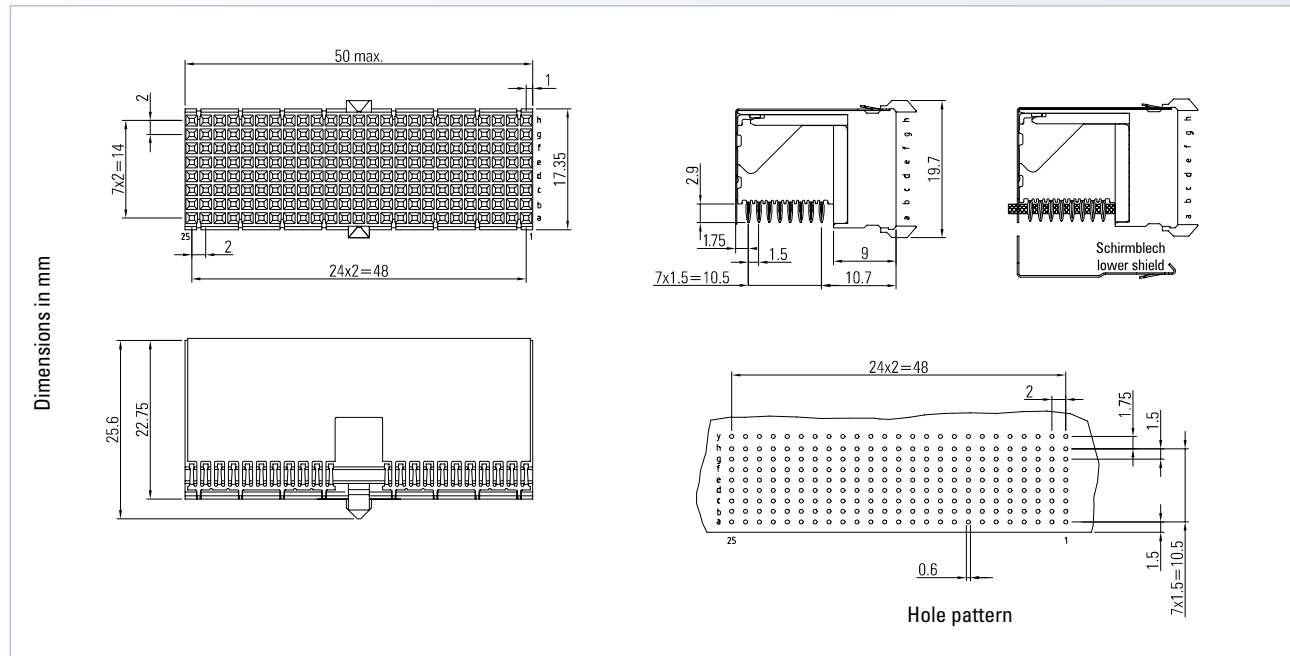
Hole pattern

No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
200		245-61010-05	245-61010-15
244		245-61310-05	245-61310-15



On request <ul style="list-style-type: none">– Performance level I or customer-specific– Contact arrangement (see page 77)	Accessories <ul style="list-style-type: none">– Press-fit tool (see page 198)– Support tool (see page 199)
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Cross reference <ul style="list-style-type: none">– Pin lengths (see page 34)
--



No. of contacts	Description	Press-fit technology
		Performance level II
		Part number
200	Without shielding	246-61000-15
200	With shielding	246-61300-15
—	Lower shield	246-11600-1

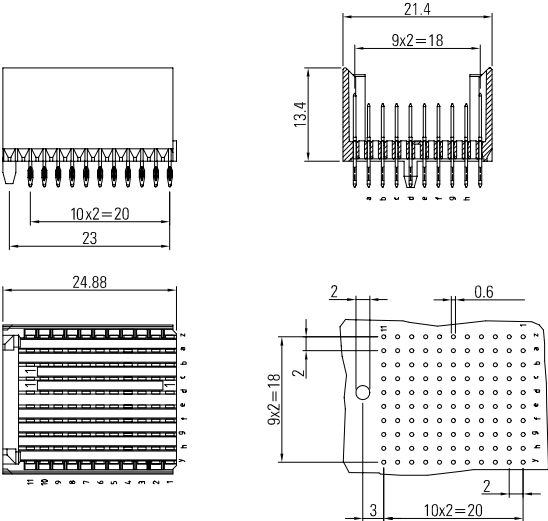


On request
 – Performance level I or customer-specific

Accessories
 – Press-fit tool (see page 202)
 – Support tool (see page 203)

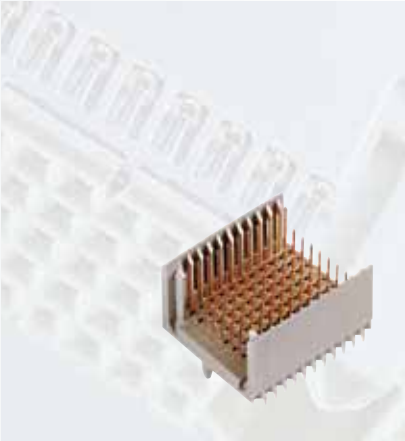
hm connectors
Type F
Male connector

Dimensions in mm

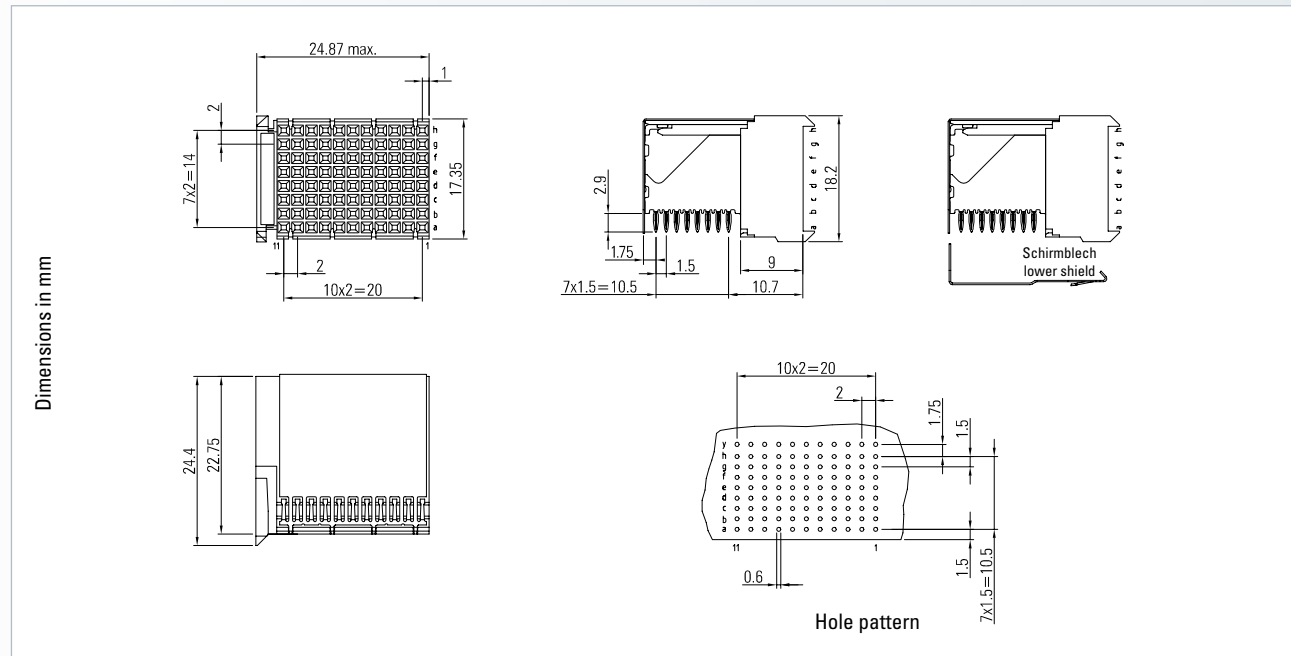


Hole pattern

No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
88		245-31010-05	245-31010-15
110		245-31310-05	245-31310-15



On request <ul style="list-style-type: none">– Performance level I or customer-specific– Contact arrangement (see page 77)	Accessories <ul style="list-style-type: none">– Press-fit tool (see page 200)– Support tool (see page 201)
Cross reference <ul style="list-style-type: none">– Pin lengths (see page 34)	



No. of contacts	Description	Press-fit technology Performance level II
		Part number
88	Without shielding	246-31000-15
88	With shielding	246-31300-15
—	Lower shield	246-31600-1



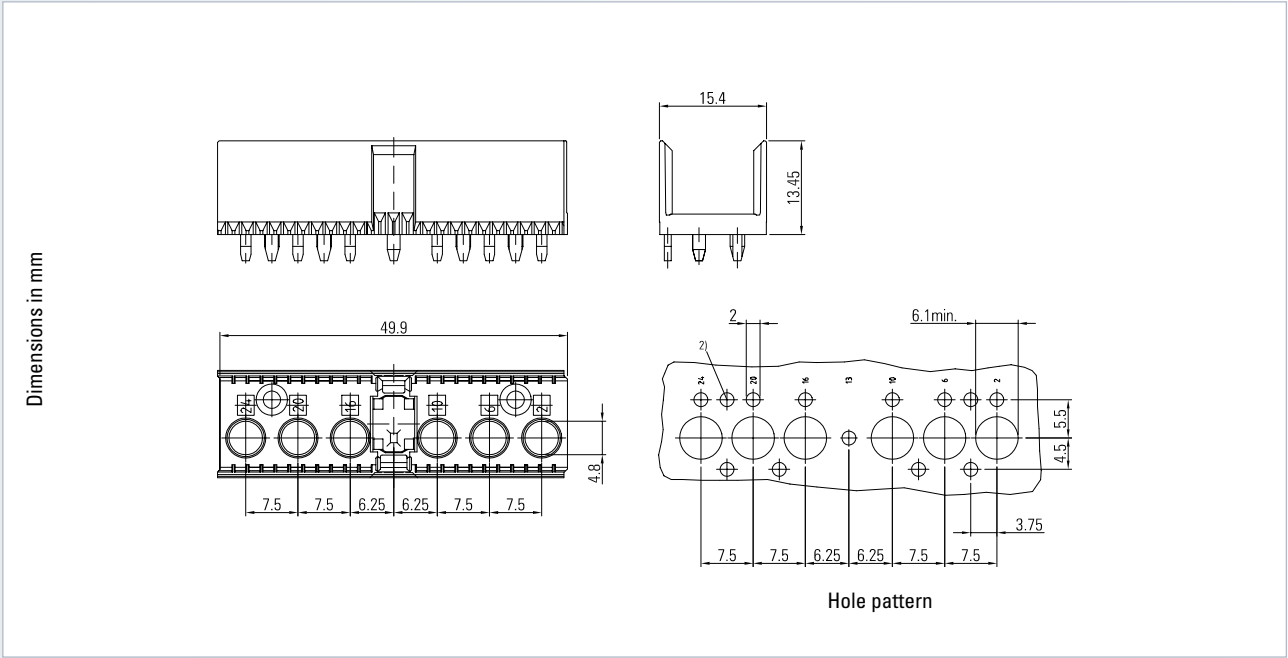
On request
 – Performance level I or customer-specific

Accessories
 – Press-fit tool (see page 202)
 – Support tool (see page 203)

hm connectors

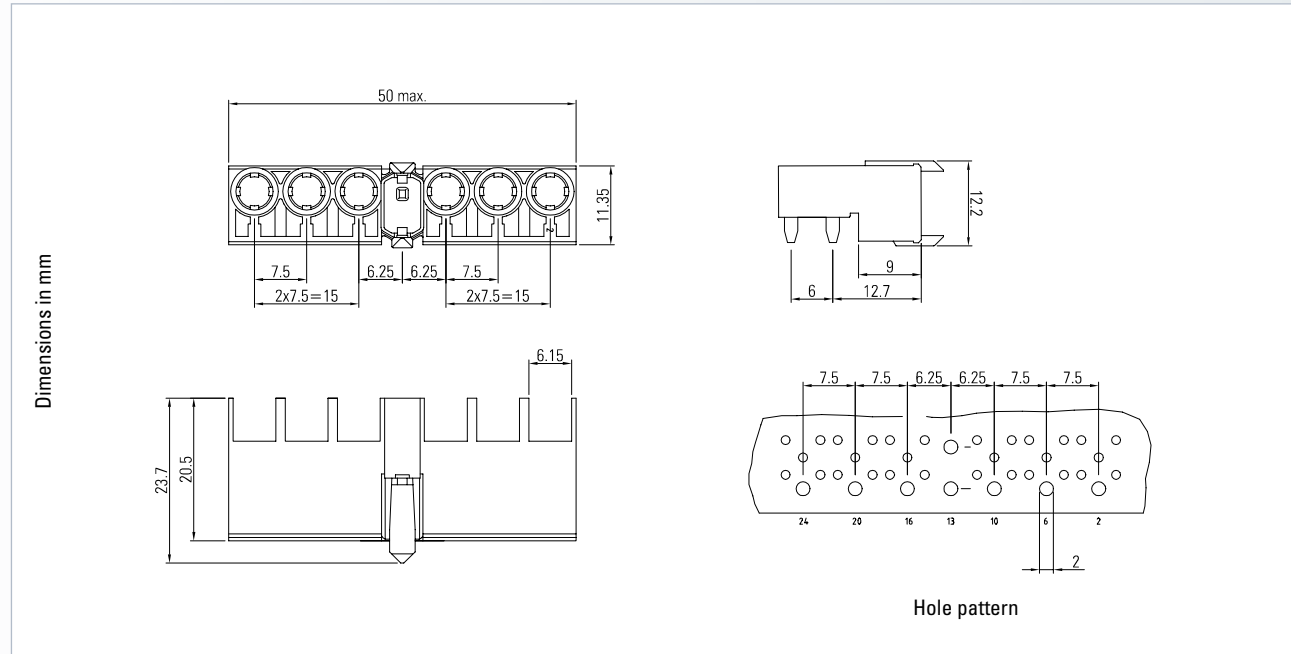
Type L

Male connector



No. of contacts	Description	Press-fit technology
		Part number
6		243-51000

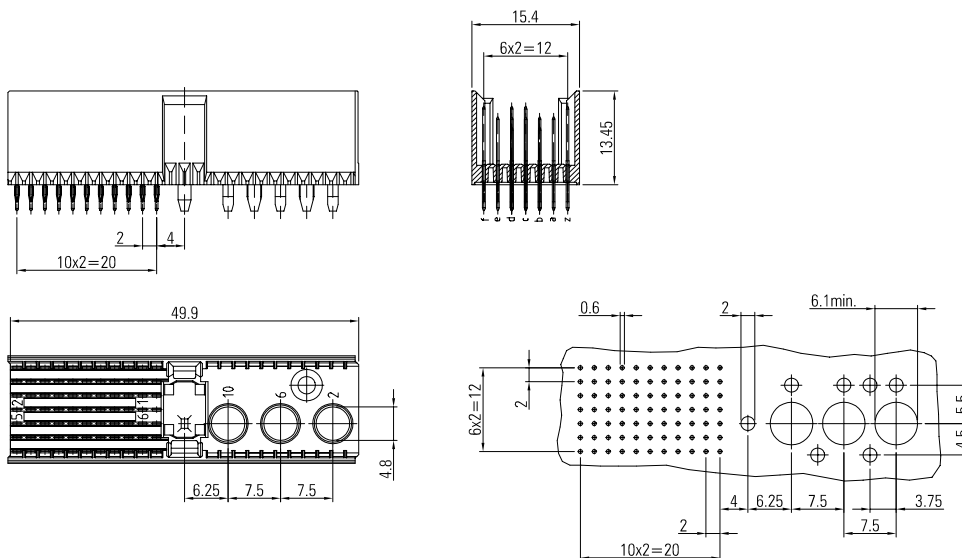




No. of contacts	Description	Press-fit technology
		Part number
6	Without shielding	244-51000



Dimensions in mm



Hole pattern

No. of contacts		Contact arrangement	Press-fit technology – Performance level II	
			PCB thickn. 1.6 – 2.8	PCB thickness > 2.8
			Part number	
55+3	Without shielding			



On request

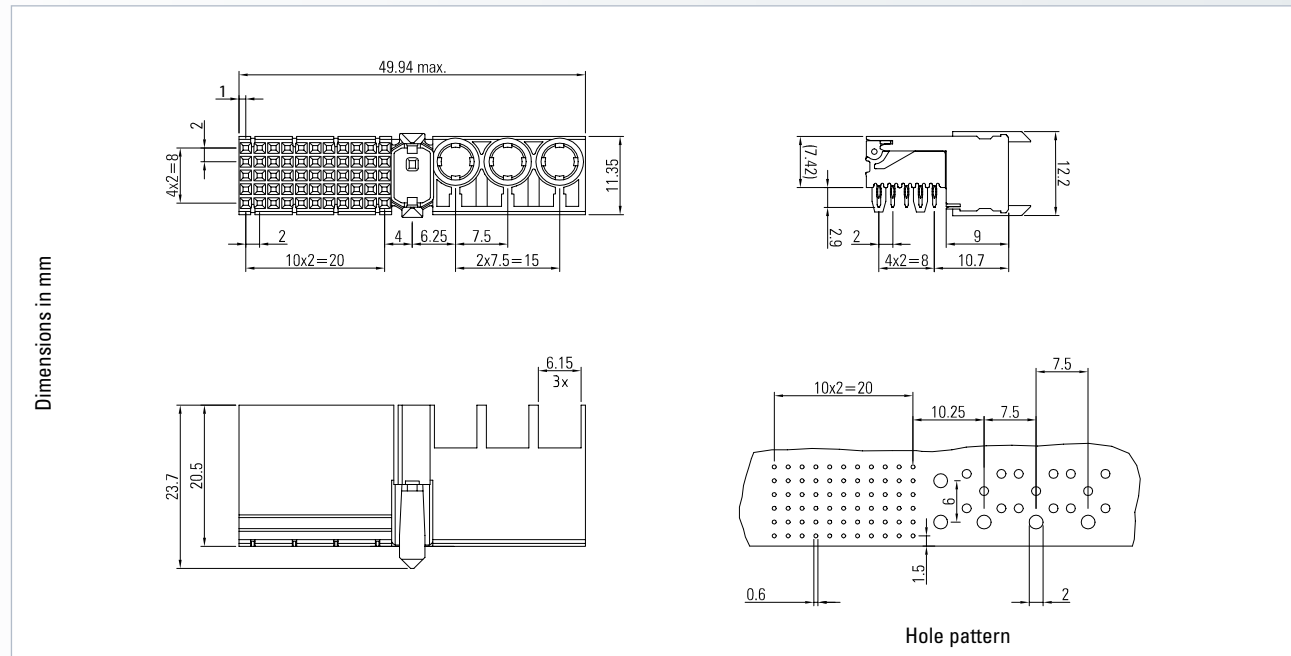
- Performance level I or customer-specific
- Contact arrangement (see page 75)
- Press-fit tool
- Support tool

Accessories

- Coding keys (see page 68)

Cross reference

- Pin lengths (see page 34)



No. of contacts	Description	Press-fit technology
		Performance level II
		Part number
55+3	Without shielding	244-41000-15
55+3	With shielding	244-41300-15
—	Lower shield	244-31600-1



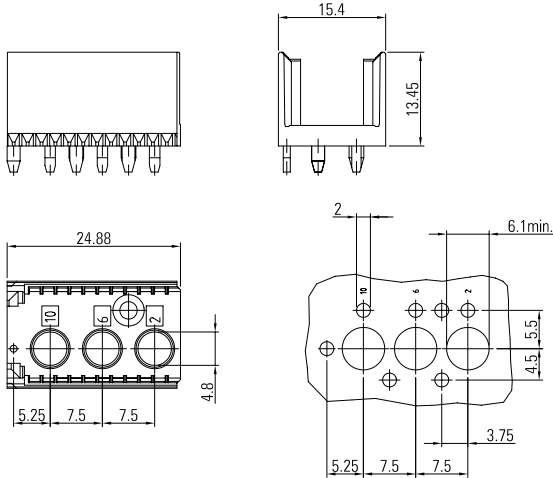
On request

- Performance level I or customer-specific
- Press-fit tool
- Support tool

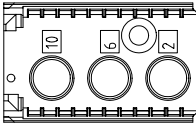
Accessories

- Coding keys (see page 68)

Dimensions in mm

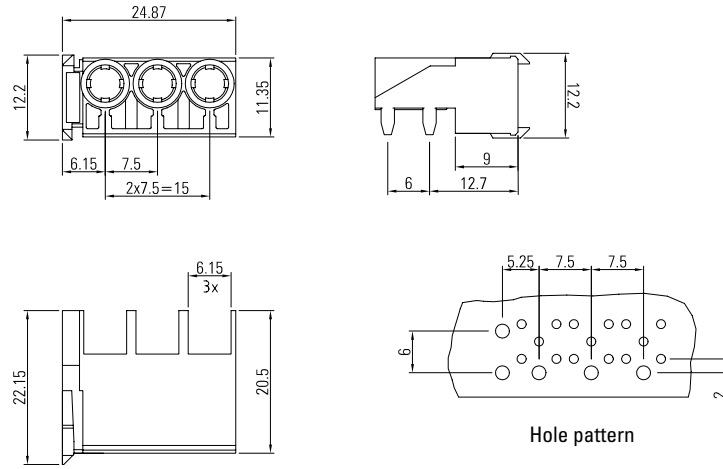


Hole pattern

No. of contacts	Contact arrangement	Press-fit technology
		Part number
3	Without shielding 	243-52000

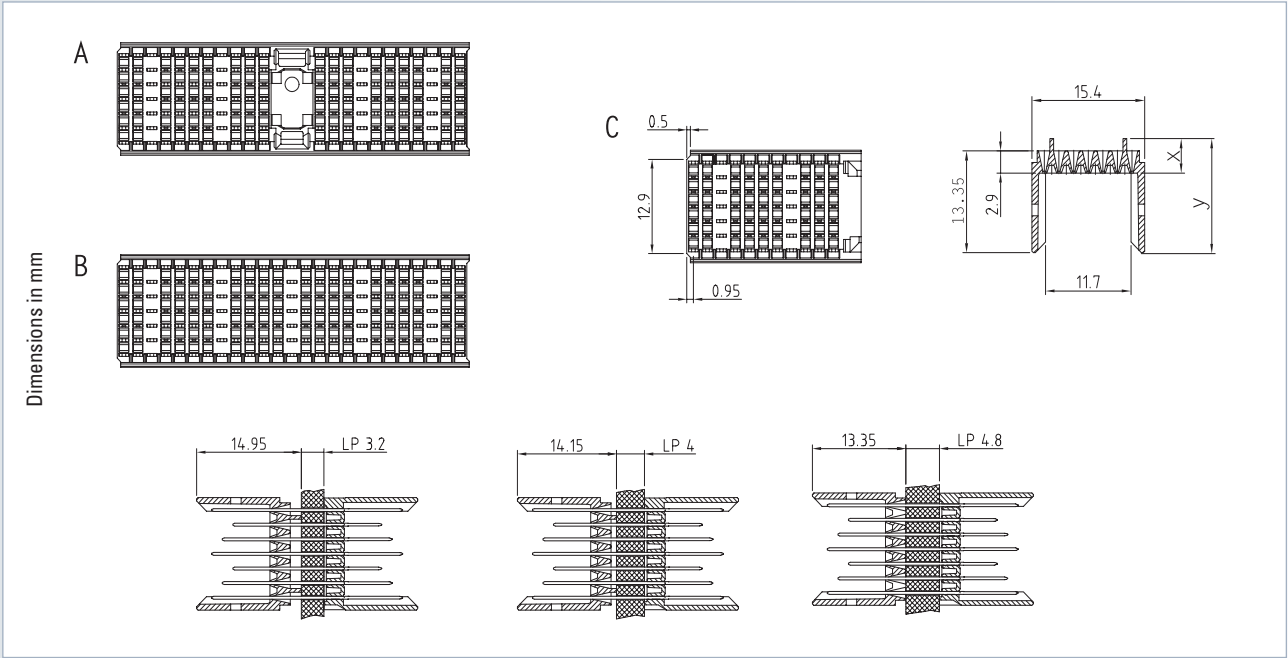


Dimensions in mm



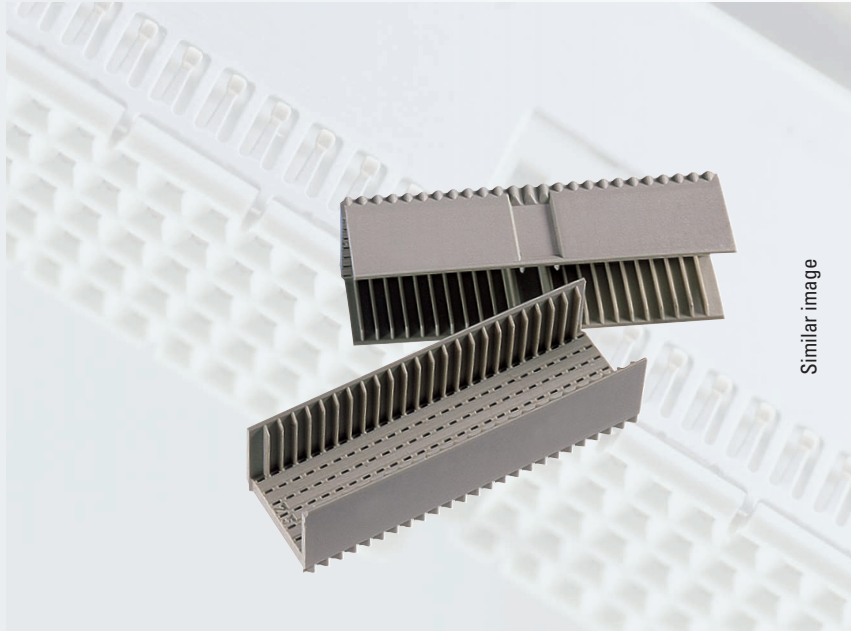
No. of contacts	Description	Press-fit technology
		Part number
3	Without shielding	244-52000



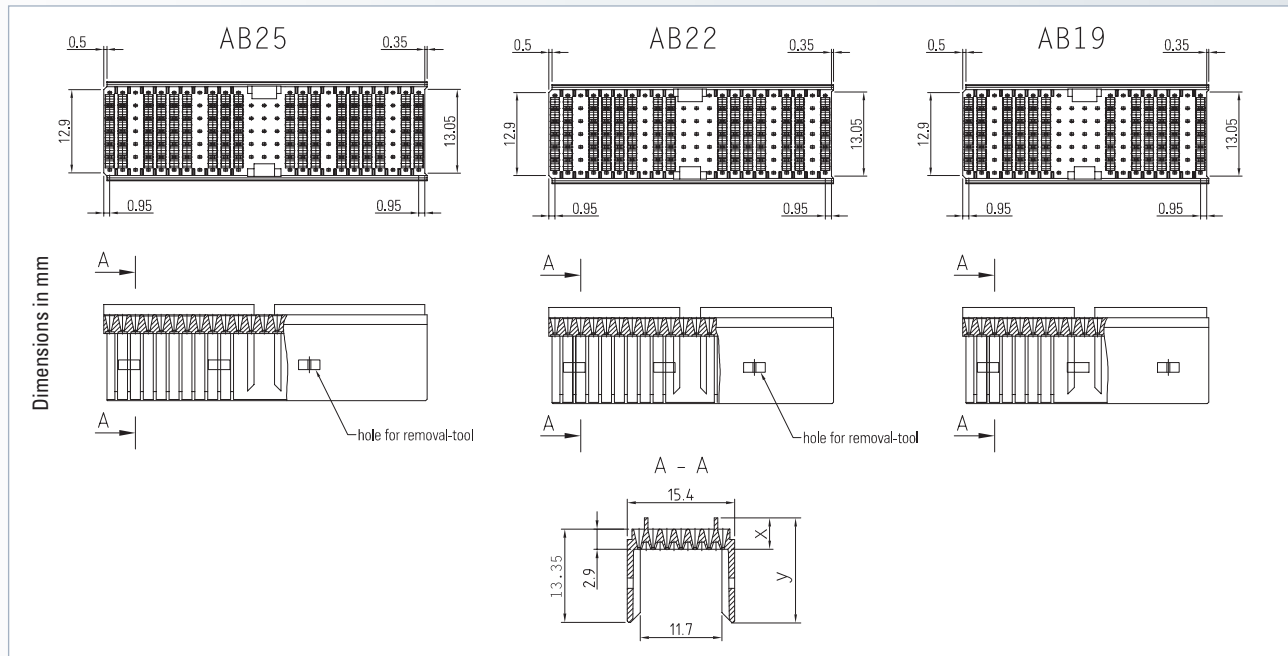


			Part number				
PCB thickness	X	Y	A	B	B22	B19	C
< 2.4 mm	6.3 mm	16.75 mm	243-5525-5/1	243-5625-5/1	243-5622-5/1	243-5619-5/1	243-5511-5/1
2.4 – 3.2 mm	4.9 mm	15.35 mm	243-5525-4/1	243-5625-4/1	243-5622-4/1	243-5619-4/1	243-5511-4/1
3.2 – 4.0 mm	4.5 mm	14.95 mm	243-5525-1/1	243-5625-1/1	243-5622-1/1	243-5619-1/1	243-5511-1/1
4.0 – 4.8 mm	3.7 mm	14.15 mm	243-5525-2/1	243-5625-2/1	243-5622-2/1	243-5619-2/1	243-5511-2/1
> 4.8 mm	2.9 mm	13.35 mm	243-5525-3/1	243-5625-3/1	243-5622-3/1	243-5619-3/1	243-5511-3/1

On request – Different designs and special types	Accessories – Insertion and removal tool (see page 205)
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Similar image



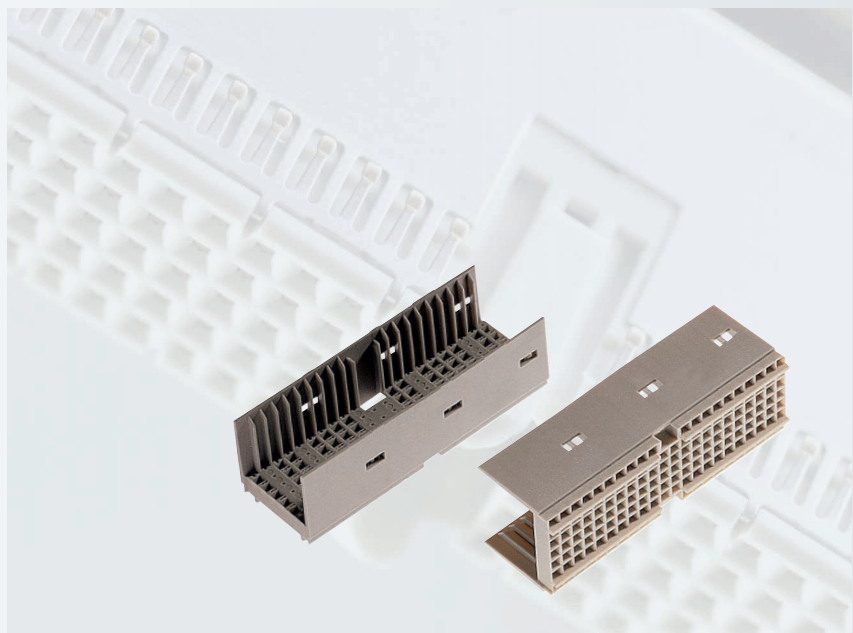
			Part number		
PCB thickness	X	Y	AB25	AB22 (cPCI RP 5)	AB19 (cPCI RP 3)
< 2.4 mm	6.3 mm	16.75 mm	243-5725-5/1	243-5722-5/1	243-5719-5/1
2.4 – 3.2 mm	4.9 mm	15.35 mm	243-5725-4/1	243-5722-4/1	243-5719-4/1
3.2 – 4.0 mm	4.5 mm	14.95 mm	243-5725-1/1	243-5722-1/1	243-5719-1/1
4.0 – 4.8 mm	3.7 mm	14.15 mm	243-5725-2/1	243-5722-2/1	243-5719-2/1
> 4.8 mm	2.9 mm	13.35 mm	243-5725-3/1	243-5722-3/1	243-5719-3/1

On request

– Different designs and special types

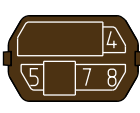
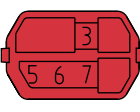
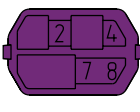
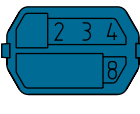
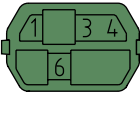
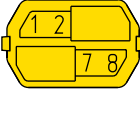
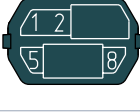
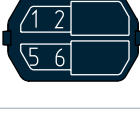
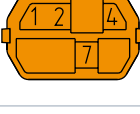

Accessories

– Insertion and removal tool (see page 205)



Coding keys

Male connector			
Coding key	Code No.	Color	Part number
	1236	Nut brown RAL 8011	243-8011
	1248	Strawberry red RAL 3018 Telephony Spec	243-8012
	1356	Blue lilac RAL 4005	243-8013
	1567	Brilliant blue RAL 5007 5.0 V cPCI	243-8014
	2578	Reseda green RAL 6011	243-8021
	3456	Cadmium yellow RAL 1021 3.3 V cPCI	243-8031
	3467	Slate gray RAL 7015	243-8032
	3478	Steel blue RAL 5011	243-8033
	3568	Pastel orange RAL 2003	243-8034
	4678	Ocher yellow RAL 1024	243-8041

Female connector			
Coding key	Code No.	Color	Part number
	4578	Nut brown RAL 8011	244-8011
	3567	Strawberry red RAL 3018 Telephony Spec	244-8012
	2478	Blue lilac RAL 4005	244-8013
	2348	Brilliant blue RAL 5007 5.0 V cPCI	244-8014
	1346	Reseda green RAL 6011	244-8021
	1278	Cadmium yellow RAL 1021 3.3 V cPCI	244-8031
	1258	Slate gray RAL 7015	244-8032
	1256	Steel blue RAL 5011	244-8033
	1247	Pastel orange RAL 2003	244-8034
	1235	Ocher yellow RAL 1024	244-8041

Overview of CompactPCI connectors

Female connectors for daughter card	Location	Shielding	Part number
Type A	J1/rJ1/J4/rJ4	top	244-11300-15
Type B22	J2/J5	top	244-22300-15
Type AB22*	rJ2/rJ5	top	244-62300-15
Type B19	J3	top	244-23300-15
Type AB19*	rJ3	top	244-63300-15
Type A for telephony	J4	divided	244-11305-15
Type A for telephony (mirrored)	rJ4	divided	244-11306-15

* For rear transition card applications the AB connectors are used with AB shroud. All connectors are also available without shield.

Male connectors for backplanes	Position	Contact arrangement *	Part number
Type A Hot Swap	P1	CB***BC	243-11322-15
Type A Hot Swap for Midplane	P1	TP***PT	243-11710-15
Type B22	P2	CB BBBBC	243-22320-15
Type B22 AB compatible	P2/P5	*PPPPP*	243-22361-15
Type B22 AB compatible	P2/P5	*NNNNN*	243-22734-15
Type B22 AB compatible	P2/P5	*SSSSS*	243-22371-15
Type B19	P3	CB BBBBC	243-23320-15
Type B19 AB compatible	P3	*PPPPP*	243-23361-15
Type B19 AB compatible	P3	*NNNNN*	243-23712-15
Type B19 AB compatible	P3	*SSSSS*	243-23371-15
Type A for telephony	P4	—*****	243-11323-15
Type A for telephony Midplane	P4	—*****	243-11709-15
Type A	P4	TPPPPPT	243-11360-15
Type A	P4	TNNNNNT	243-11734-15
Type A	P4	TSSSSST	243-11715-15
Type B22 for telephony	P5	C*****C	243-22311-15
Type B22 for telephony, row Z not loaded	P5	—*****C	243-22312-15
Type B22 for telephony, row Z not loaded	P5	—*****	243-22351-15

* Different pin lengths in this row/— not loaded.

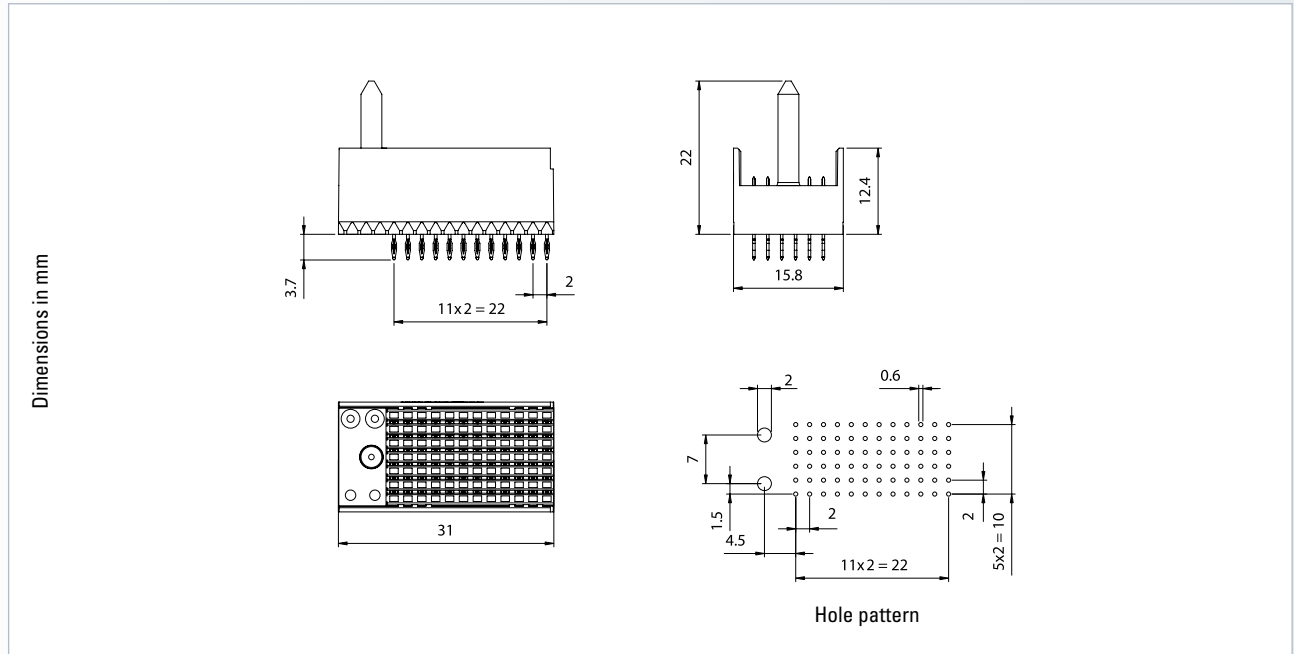
All connectors are also available with row Z unloaded/for other contact arrangements, please contact ept.

Overview of CompactPCI connectors

Coding keys	Color	Application	Part number
Male connector backplane	Brilliant blue	5 V – P1	243-8014
Male connector backplane	Cadmium yellow	3.3 V – P1	243-8031
Male connector backplane	Strawberry red	Telephony – P4	243-8012
Female connector daughter card	Brilliant blue	5 V – J1	244-8014
Female connector daughter card	Cadmium yellow	3.3 V – J1	244-8031
Female connector daughter card	Strawberry red	Telephony – J4	244-8012

Shroud	Position	Height	Base height	PCB thickness	Part number
Type A	P1/P4	16.75 mm	6.3 mm	< 2.4 mm	243-5525-5
Type A	P1/P4	15.35 mm	4.9 mm	2.4 – 3.2 mm	243-5525-4
Type A	P1/P4	14.95 mm	4.5 mm	3.2 – 4.0 mm	243-5525-1
Type A	P1/P4	14.15 mm	3.7 mm	4.0 – 4.8 mm	243-5525-2
Type A	P1/P4	13.35 mm	2.9 mm	> 4.8 mm	243-5525-3
Type AB22	P2/P5	16.75 mm	6.3 mm	< 2.4 mm	243-5722-5
Type AB22	P2/P5	15.35 mm	4.9 mm	2.4 – 3.2 mm	243-5722-4
Type AB22	P2/P5	14.95 mm	4.5 mm	3.2 – 4.0 mm	243-5722-1
Type AB22	P2/P5	14.15 mm	3.7 mm	4.0 – 4.8 mm	243-5722-2
Type AB22	P2/P5	13.35 mm	2.9 mm	> 4.8 mm	243-5722-3
Type AB19	P3	16.75 mm	6.3 mm	< 2.4 mm	243-5719-5
Type AB19	P3	15.35 mm	4.9 mm	2.4 – 3.2 mm	243-5719-4
Type AB19	P3	14.95 mm	4.5 mm	3.2 – 4.0 mm	243-5719-1
Type AB19	P3	14.15 mm	3.7 mm	4.0 – 4.8 mm	243-5719-2
Type AB19	P3	13.35 mm	2.9 mm	> 4.8 mm	243-5719-3

The height/bottom thickness of the shroud depends on the thickness of the backplane.



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thic kn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
72		247-10401-05	247-10401-15
72		247-11401-05	247-11401-15
72		247-12401-05	247-12401-15
72		247-16401-05	247-16401-15
72		247-17401-05	247-17401-15

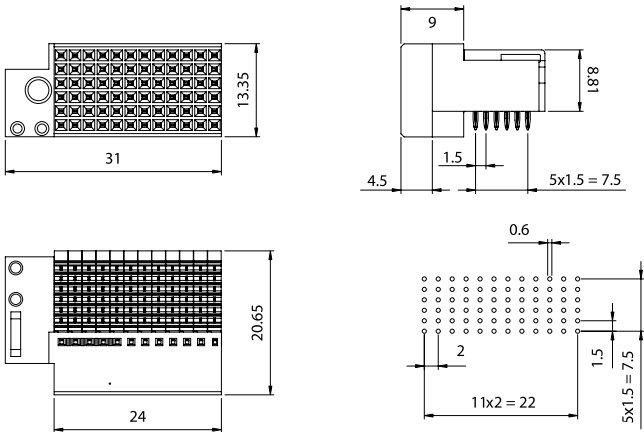


On request

- Performance level I or customer-specific
- Press-fit tool
- Support tool
- Contact arrangement

hm connectors
hm 2.0-6 I 72 contacts
Female connector

Dimensions in mm

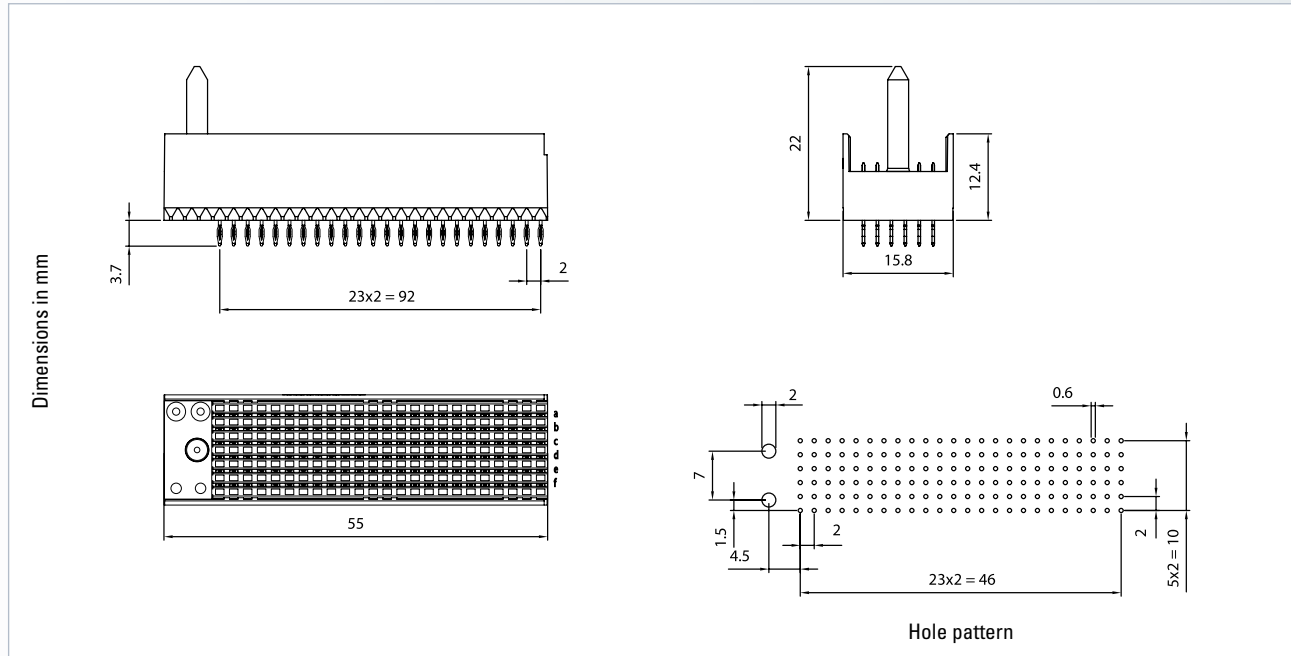


Hole pattern

No. of contacts	Description	Press-fit technology	THTR
		Performance level II	Performance level II
		Part number	
72	Without guide	248-10000-15	248-10000-25
72	With guide	248-11000-15	248-11000-25
72	With guide coding pos1	248-12000-15	248-12000-25
72	With guide coding pos2	248-13000-15	248-13000-25



- On request**
- Performance level I or customer-specific
 - Press-fit tool
 - Support tool



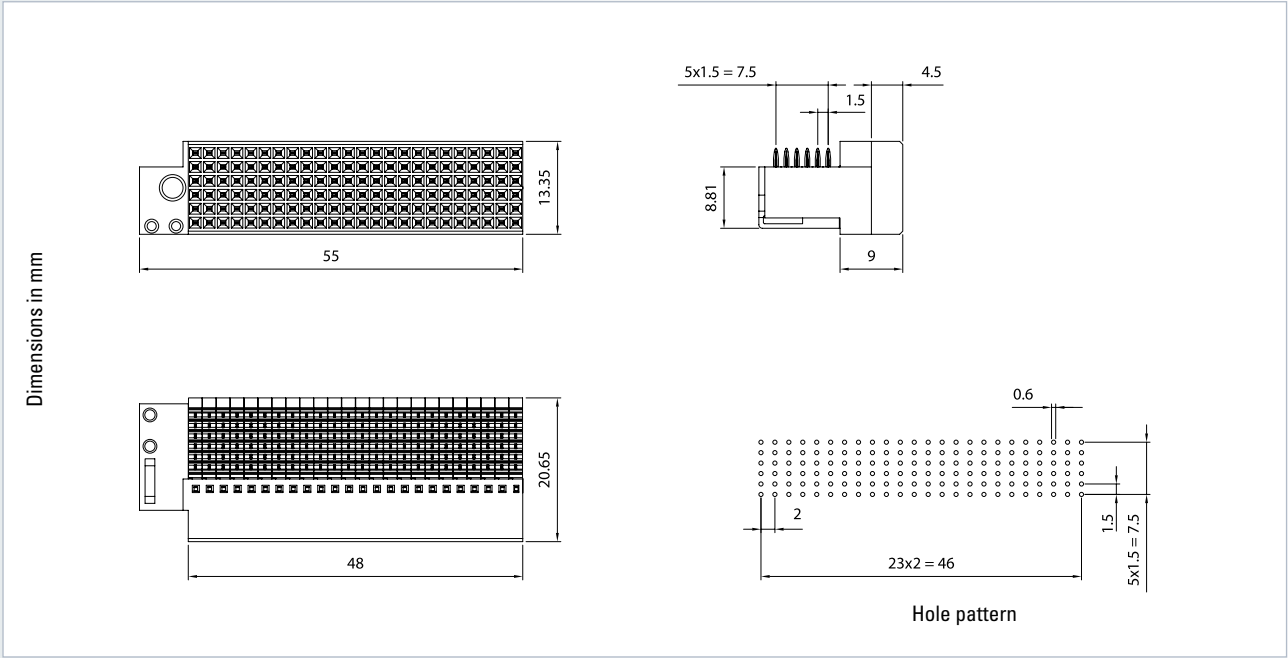
No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		PCB thckn. 1.6 – 2.8	PCB thickness > 2.8
		Part number	
144		247-20401-05	247-20401-15
144		247-21401-05	247-21401-15
144		247-22401-05	247-22401-15
144		247-26401-05	247-26401-15
144		247-27401-05	247-27401-15



On request

- Performance level I or customer-specific
- Press-fit tool
- Support tool
- Contact arrangement

hm connectors
hm 2.0-6 I 144 contacts
Female connector



No. of contacts	Description	Press-fit technology	THTR
		Performance level II	Performance level II
		Part number	
144	Without guide	248-20000-15	248-20000-25
144	With guide	248-21000-15	248-21000-25
144	With guide coding pos1	248-22000-15	248-22000-25
144	With guide coding pos2	248-23000-15	248-23000-25



- On request**
- Performance level I or customer-specific
 - Press-fit tool
 - Support tool

Fax request AB

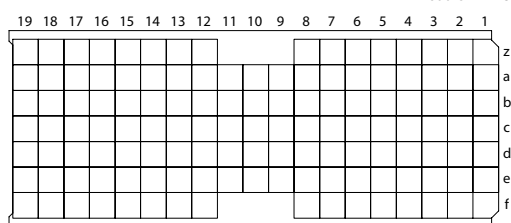
Company		Phone
First name	Name	Fax
Address		
Signature		

Estimated quantity required:

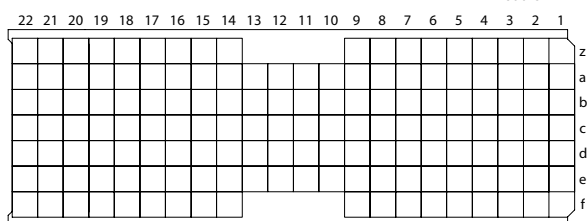
Number of required samples:

Front view

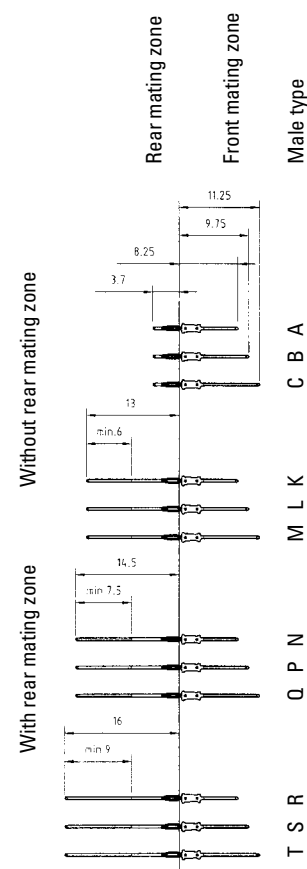
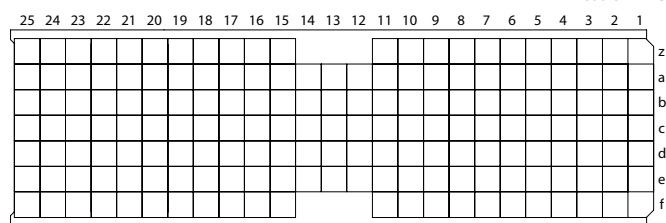
Module AB-19



Module AB-22



Module AB-25



Assembly reference:

In order to achieve cost-effective assembly of the connectors, we recommend that the termination lengths are specified for each row. If only position 1 of a row is specified, the complete row will be equipped with this termination length. Exceptions can be entered at the respective position.

Surface:

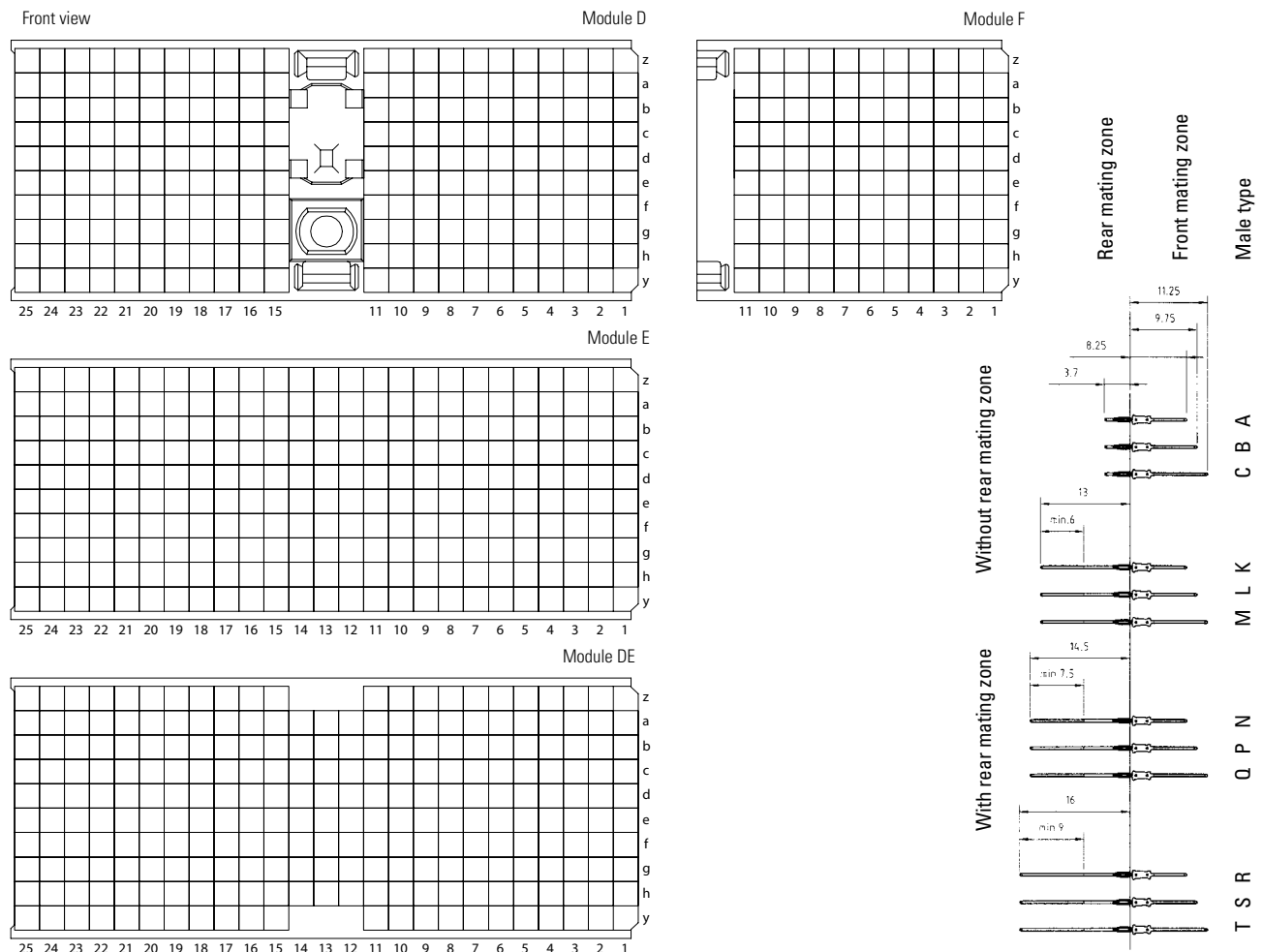
Performance level II according to IEC 61076-4-101. Au over Pd/Ni over Ni

Fax request (8+2)

Company		Phone
First name	Name	Fax
Address		
Signature		

Estimated quantity required:

Number of required samples:

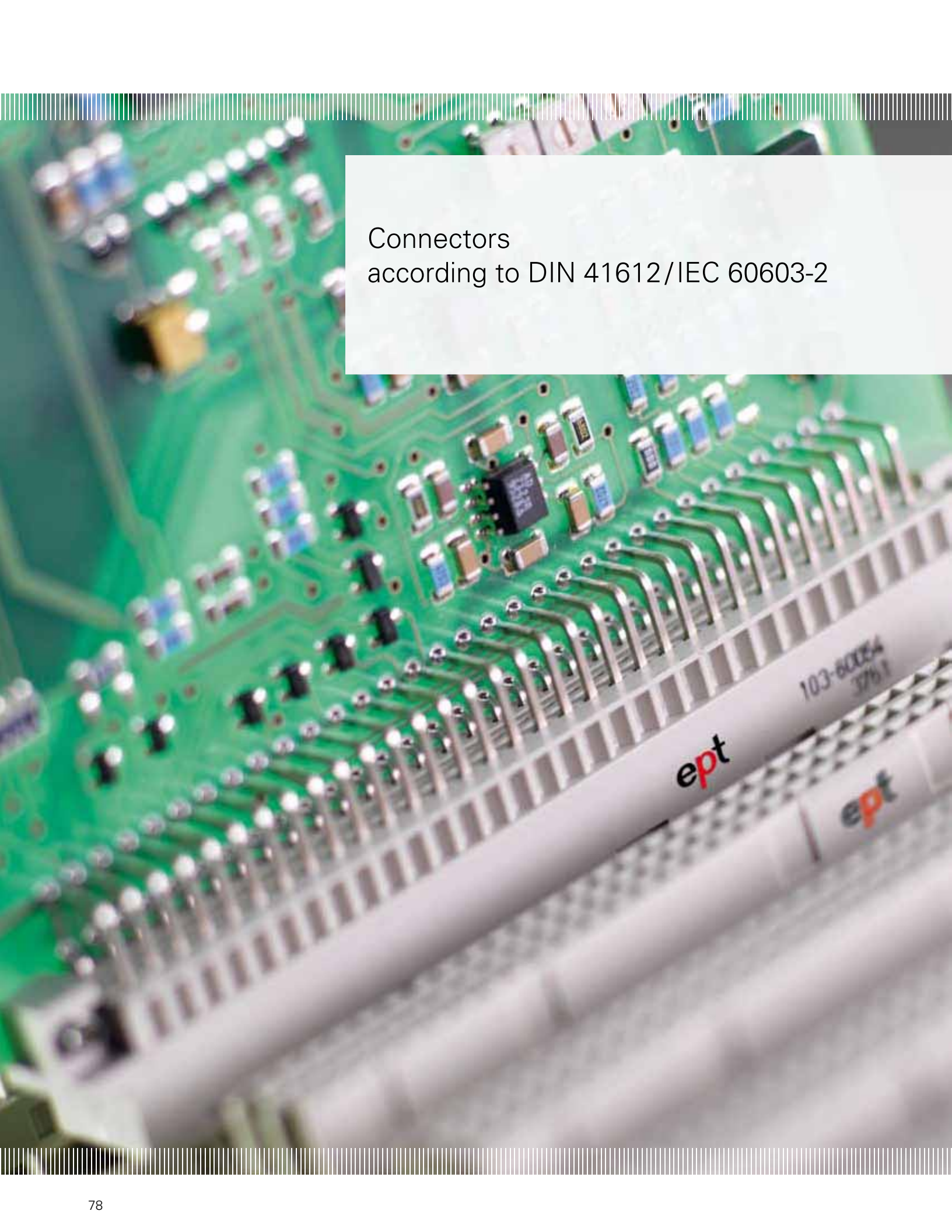


Assembly reference:

In order to achieve cost-effective assembly of the connectors, we recommend that the termination lengths are specified for each row. If only position 1 of a row is specified, the complete row will be equipped with this termination length. Exceptions can be entered at the respective position.

Surface:

Performance level II according to IEC 61076-4-101. Au over Pd/Ni over Ni



Connectors
according to DIN 41612/IEC 60603-2

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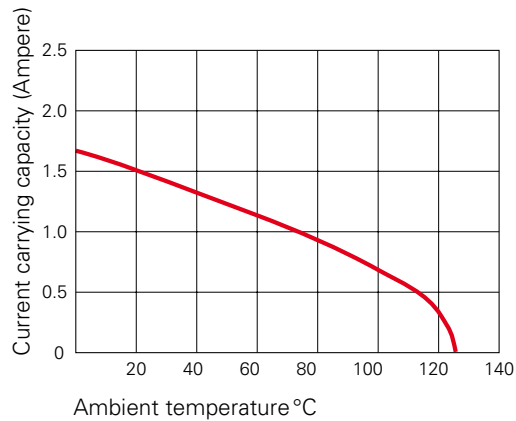
Technical specifications

Types according to IEC 60603-2			B, B/2, B/3	C, C/2, C/3	D	E	F	G	H		VME 64x	
Inverted type				R, R/2, R/3								
Maximum no. of contacts			64/32/20	96/48/30	32	48	48	64	11	15	160	
Contact row designation of male and female connectors			a b	a b c	a c	a c e	z b d	z b d f	b	z d	z a b c d	
											a b c	z d
Operating temperature range			− 55 °C to + 125 °C						− 65 °C to + 125 °C		− 55 °C to + 125 °C	
Creepage (K) and clearance (L) in mm	Within a row	K	1.2 mm	3.0 mm		3.0 mm	3.0 mm	8.0 mm	8.0 mm	1.2	1.0	
		L	1.2 mm	3.0 mm		1.6 mm	1.6 mm	4.5 mm	4.5 mm	1.2	1.0	
	Between the rows	K	1.2 mm	3.0 mm		3.0 mm	3.0 mm	8.0 mm	8.0 mm	1.2	1.2	
		L	1.2 mm	3.0 mm		1.6 mm	1.6 mm	4.5 mm	4.5 mm	1.2	1.2	
Max. operating current at ambient temperature	I		See diagrams on page 81									
	+ 20 °C		1.5 A	5.6 A				15 A		1.5 A		
	+ 70 °C		1.1 A	4.0 A				11 A		1.1 A		
	+ 100 °C		0.7 A	2.5 A				8 A		0.7 A		
Test voltage, 50 Hz, 1 minute												
Contact/contact		V _{rms}	1000 V	1550 V		1550 V	1550 V	3100 V		1000 V		
Contact/ground		V _{rms}	1550 V	1550 V		2500 V	2500 V	3100 V		1550 V		
Contact resistance		R	< 20 mΩ	< 15 mΩ				< 8 mΩ		20 mΩ	< 30 mΩ	
Insulation resistance		R	> 10 ⁹ MΩ								10 ⁴ MΩ	
Durability according to DIN EN 60603-2			Performance level I = 500 mating cycles								500 mating cycles	
			Performance level II = 400 mating cycles								250 mating cycles	
			Performance level III = 50 mating cycles								–	
Engaging and separating force for the complete, fully equipped connector	F	64 contacts < 60 N 96 contacts < 90 N	< 40 N	< 60 N	< 75 N	< 100 N	< 80 N	< 90 N	160 N			
		32 contacts < 30 N 48 contacts < 45 N										
		20 contacts < 18 N 30 contacts < 28 N										
Separating force per contact (test measuring device)		F	> 0.15 N			> 0.2 N			> 0.15 N			
Design female contact			Double contact									
Insulator material			PBTP fiber-glass reinforced, not combustible acc. to UL 94V-0 PC fiber-glass reinforced, not combustible acc. to UL 94V-1									
Environment/approvals			RoHS compliant/UL (file: E130314)									

*** Note on press-fit technology:**

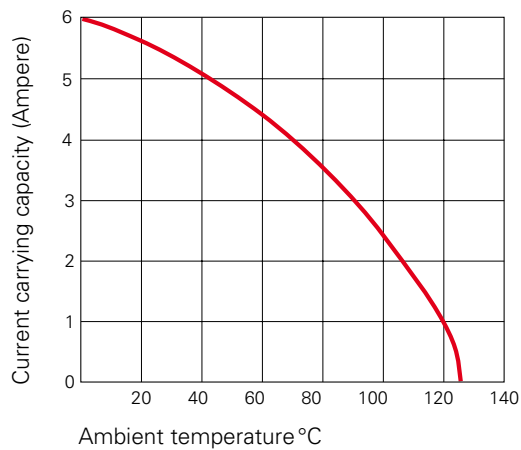
Printed circuit boards with flame protection FR-4 or FR-6 are permissible up to a temperature of 115 °C. The press-fit standard IEC 352-5 only specifies the press-fit connection up to an working temperature of 85 °C. For working temperatures that exceed 85 °C, it is recommended that the press-fit connection is qualified application-specific by ept.

Derating diagrams



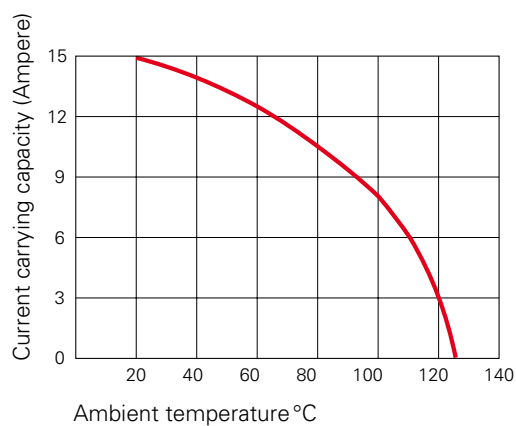
Type B, C, R

20°C	1.5 A
70°C	1.1 A
100°C	0.7 A



Type D, E, F, G

20°C	5.6 A
70°C	4.0 A
100°C	2.5 A

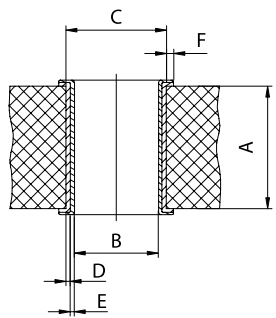


Type H11

20°C	15 A
70°C	11 A
100°C	8 A

Hole specifications

ept offers adapted press-fit zones for various new board surfaces.

		C female connector Special version	B/C/R/M/F low profile/ G low profile/VME64x	D/E/F/G	
		Nominal hole	Ø 0.85 mm	Ø 1.0 mm	Ø 1.6 mm
	imm. Sn printed circuit boards				
	A	PCB thickness	min. 1.6 mm	min. 1.6 mm	min. 1.6 mm
	B	Plated hole	Ø 0.85 + 0.09/– 0.00 mm	Ø 1 + 0.09/– 0.00 mm	Ø 1.6 + 0.09/– 0.00 mm
	C	Drill hole	1.0 ± 0.025 mm	1.15 ± 0.025 mm	1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm	min. 25 µm
	E	imm. Sn plating	max. 1.5 µm	max. 1.5 µm	max. 1.5 µm
	F	Annular ring	min. 0.1 mm	min. 0.1 mm	min. 0.1 mm
	Ni, Au printed circuit boards				
	A	PCB thickness	min. 1.6 mm	min. 1.6 mm	min. 1.6 mm
	B	Plated hole	Ø 0.85 + 0.09/– 0.00 mm	Ø 1 + 0.09/– 0.00 mm	Ø 1.6 + 0.09/– 0.00 mm
	C	Drill hole	1.0 ± 0.025 mm	1.15 ± 0.025 mm	1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm	min. 25 µm
	E	Ni, Au plating	0.05 – 0.2 µm Au more than 2.5 – 5 µm Ni	0.05 – 0.2 µm Au more than 2.5 – 5 µm Ni	0.05 – 0.2 µm Au more than 2.5 – 5 µm Ni
	F	Annular ring	min. 0.1 mm	min. 0.1 mm	min. 0.1 mm
	pure Cu printed circuit boards				
	A	PCB thickness	min. 1.6 mm	min. 1.6 mm	min. 1.6 mm
	B	Plated hole	Ø 0.85 + 0.09/– 0.00 mm	Ø 1 + 0.09/– 0.04 mm	Ø 1.6 + 0.09/– 0.07 mm
	C	Drill hole	1.0 ± 0.025 mm	1.15 ± 0.025 mm	1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm	min. 25 µm
	E	OSP*	e.g. GLICOAT-SMD (F2) with 0.12 – 0.15 µm	e.g. GLICOAT-SMD (F2) with 0.12 – 0.15 µm	e.g. GLICOAT-SMD (F2) with 0.12 – 0.15 µm
	F	Annular ring	min. 0.1 mm	min. 0.1 mm	min. 0.1 mm
	HAL Sn printed circuit boards				
	A	PCB thickness	min. 1.6 mm	min. 1.6 mm	min. 1.6 mm
	B	Plated hole	Ø 0.85 + 0.09/– 0.02 mm	Ø 1 + 0.09/– 0.06 mm	Ø 1.6 ± 0.09 mm
	C	Drill hole	1.0 ± 0.025 mm	1.15 ± 0.025 mm	1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm	min. 25 µm
	E	HAL Sn	5 – 15 µm	5 – 15 µm	5 – 15 µm
F	Annular ring	min. 0.1 mm	min. 0.1 mm	min. 0.1 mm	

* OSP = Organic Solderability Preservatives

Technical information

For connectors according to DIN 41612/IEC 60603-2 (DIN connectors), ept offers three Tcom press® press-fit zone variants for different printed circuit board thicknesses.

Part numbers key

Type	PCB thickness 1.5 to 2.0 mm	PCB thickness 2.0 to 2.8 mm	PCB thickness > 2.8 mm
B, B/2, B/3 (female connectors)	102-xxxxx-01	102-xxxxx-02	102-xxxxx-03
C, C/2, C/3 (female connectors)	104-xxxxx-01	104-xxxxx-02	104-xxxxx-03

Hole diameter 0.85 mm

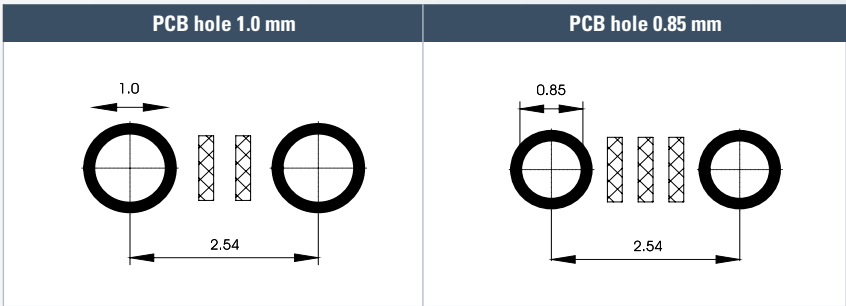
In addition to the 1.0 standard hole, for the DIN types B and C female connectors a Tcom press® press-fit zone for the 0.85 mm hole is available. This provides more space between two plated-through holes and there can be an additional circuit between the drill holes.



Tcom press® 1.0 mm/0.85 mm

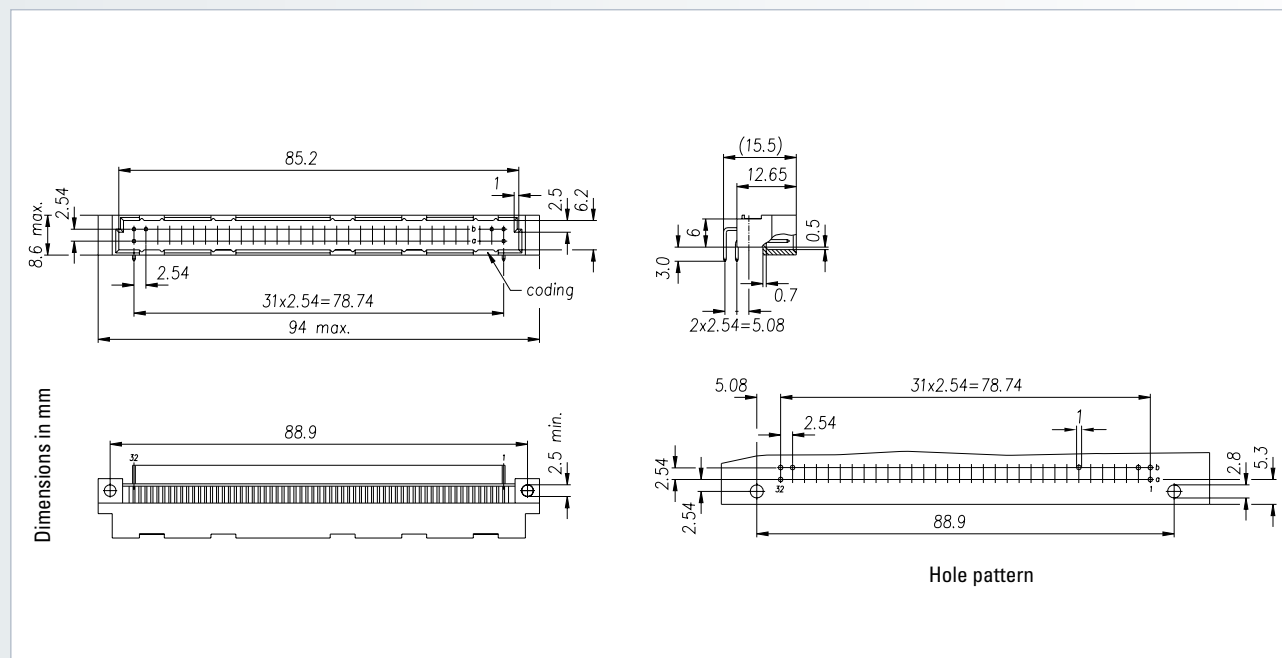
Part numbers key
for 0.85 mm Tcom press® on request


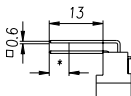
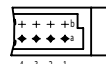
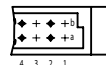
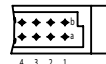
Type	Part number
B, B/2, B/3 (female connectors)	002-xxxxx-xx
C, C/2, C/3 (female connectors)	004-xxxxx-xx



Type B

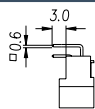
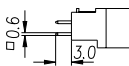
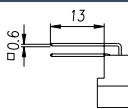
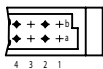
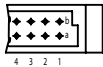
Male connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
			
Part number			
32		101-60004	101-65005
32		101-60014	101-65015
64		101-60064	101-65065

Accessories <ul style="list-style-type: none"> – Press-fit tool (see page 206) – Support tool (see page 207) – Coding accessories (see page 160) 	On request <ul style="list-style-type: none"> – Performance levels I + III or customer-specific – Special contact length 	Options <ul style="list-style-type: none"> – Contact arrangement (see page 162)
Note <ul style="list-style-type: none"> – * Rear mating zone Ni, Au 		

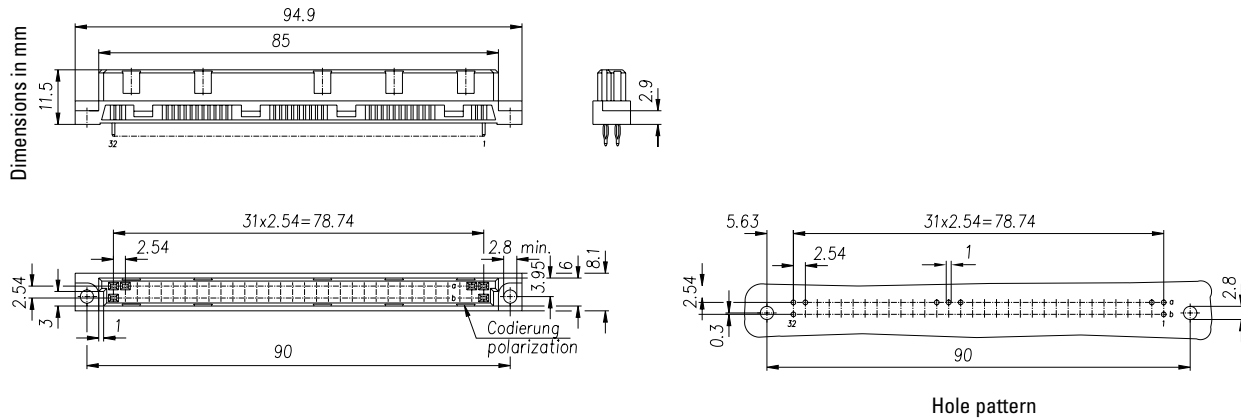


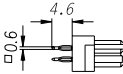
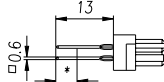
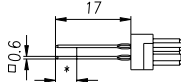
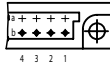
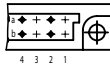

No. of contacts	Contact arrangement	Solder technology – Performance level II		
		Termination length		
				
Part number				
32		101-40024	101-40025	101-40044
64		101-40064	101-40065	101-40074

Accessories <ul style="list-style-type: none">Coding accessories (see page 160)	On request <ul style="list-style-type: none">Performance levels I + III or customer-specificSpecial contact lengthAlso in THTR	Options <ul style="list-style-type: none">Board lock (see page 159)Contact arrangement (see page 162)
--	---	---

Type B

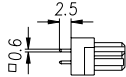
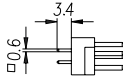
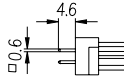
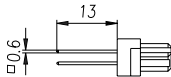
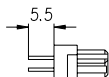
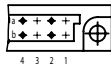
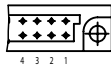
Female connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II		
		Termination length		
				
Part number				
32		302-63014-02	302-65015-03	302-65016-04
32		102-63024-xx	102-65025-xx	102-65026-xx
64		302-63064-02	302-65065-03	302-65066-04

Accessories <ul style="list-style-type: none"> – Press-fit tool (see page 208) – Support tool (see page 209) – Coding accessories (see page 160) 	On request <ul style="list-style-type: none"> – Performance levels I + III or customer-specific – Special contact length – Alternative surface Sn, e.g. for WireWrap 	Options <ul style="list-style-type: none"> – Without flange – Contact arrangement (see page 162)
Note <ul style="list-style-type: none"> – * Rear mating zone Ni, Au 	Ordering note <ul style="list-style-type: none"> Only for 102 <ul style="list-style-type: none"> – PCB 1.5 to 2.0 mm = xxx-xxxx-01 termination length = 3.2 mm – PCB 2.0 to 2.8 mm = xxx-xxxx-02 termination length = 4.6 mm – PCB > 2.8 mm = xxx-xxxx-03 termination length = 4.6 mm 	Cross reference <ul style="list-style-type: none"> – Type B with IDC (see page 156)



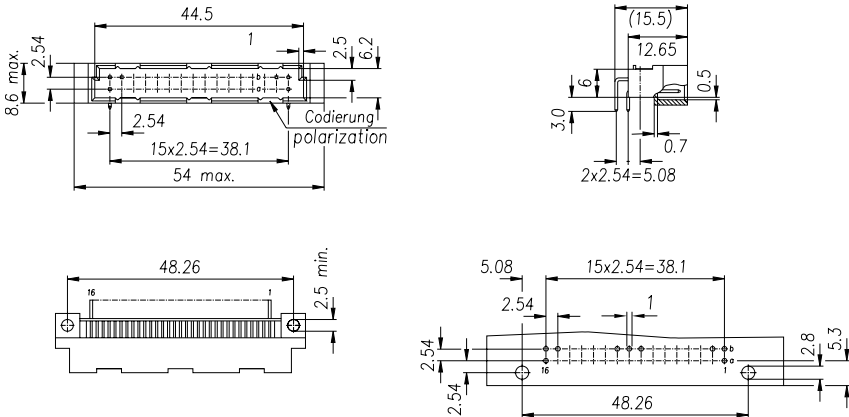
No. of contacts	Contact arrangement	Solder technology – Performance level II				
		Termination length				
						Manual soldering with solder lug 
		Part number				
32		102-40024	–	–	102-40026	102-40044
64		302-40064-05	302-40064-01	302-40064-02	302-40065-03	102-40074

Accessories – Coding accessories (see page 160)	On request – Performance levels I + III or customer-specific – Special contact length – Also in THTR	Options – Board lock (see page 159) – Contact arrangement (see page 162)
Cross reference – Type B with IDC (see page 156)		


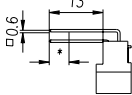
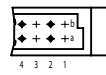
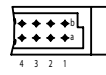
Type B/2

Male connector

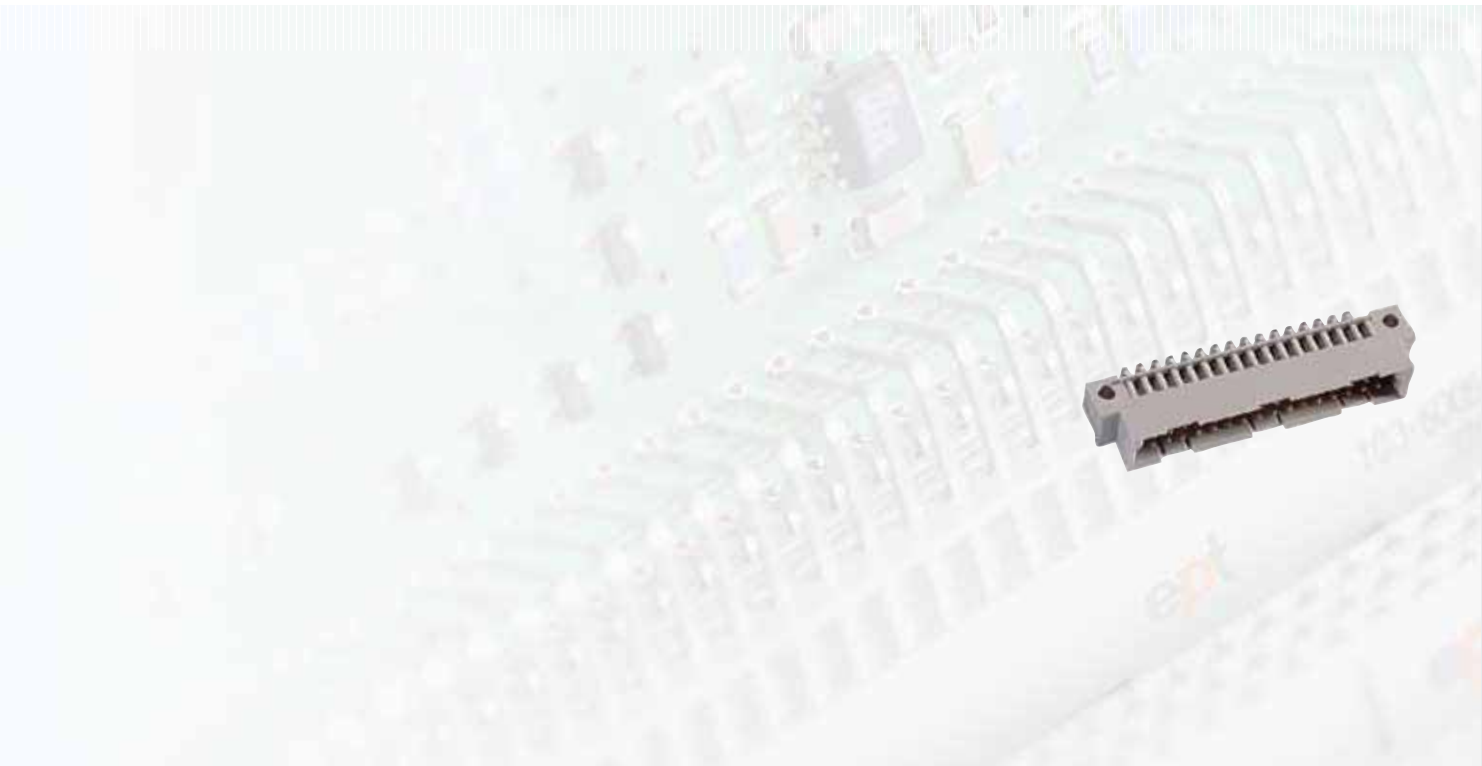
Dimensions in mm

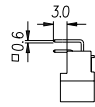
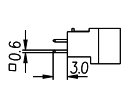
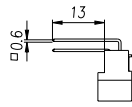
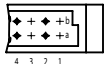
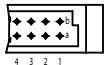


Hole pattern

No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
			
Part number			
16		101-69004	101-79006
32		101-69014	101-79016

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 206)– Support tool (see page 207)– Coding accessories (see page 160)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length	Options <ul style="list-style-type: none">– Contact arrangement (see page 162)
Note <ul style="list-style-type: none">– * Rear mating zone Ni, Au		



No. of contacts	Contact arrangement	Solder technology – Performance level II		
		Termination length		
				
Part number				
16		101-90004	101-90115	101-90006
32		101-90014	101-90105	101-90016

Accessories

– Coding accessories (see page 160)

On request

– Performance levels I + III or customer-specific
 – Special contact length
 – Also in THTR

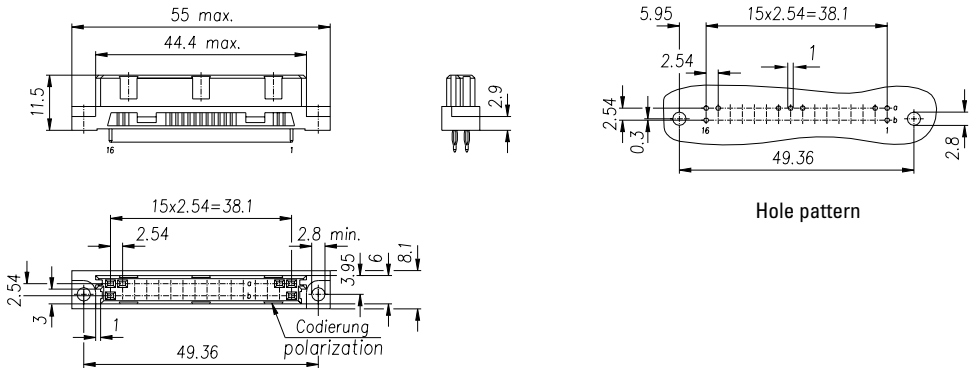
Options

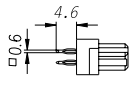
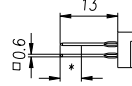
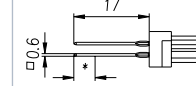
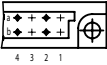
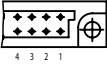
– Board lock (see page 159)
 – Contact arrangement (see page 162)

Type B/2

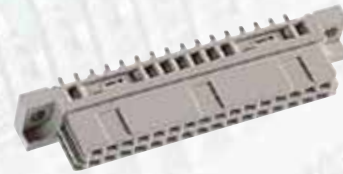
Female connector

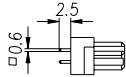
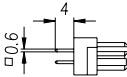
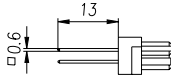
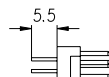
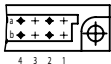
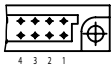
Dimensions in mm



No. of contacts	Contact arrangement	Press-fit technology – Performance level II		
		Termination length		
				
Part number				
16		102-69004-xx	102-79006-xx	102-79106-xx
32		102-69064-xx	102-79066-xx	102-79166-xx

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 208)– Support tool (see page 209)– Coding accessories (see page 160)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length– Alternative surface Sn, e.g. for WireWrap	Options <ul style="list-style-type: none">– Without flange– Contact arrangement (see page 162)
Note <ul style="list-style-type: none">– * Rear mating zone Ni, Au	Ordering note <ul style="list-style-type: none">– PCB 1.5 to 2.0 mm = xxx-xxxxx-01 termination length = 3.2 mm– PCB 2.0 to 2.8 mm = xxx-xxxxx-02 termination length = 4.6 mm– PCB > 2.8 mm = xxx-xxxxx-03 termination length = 4.6 mm	



No. of contacts	Contact arrangement	Solder technology – Performance level II			
		Termination length			
					Manual soldering with solder lug 
Part number					
16		102-90004	102-90005	102-90006	102-90025
32		102-90064	102-90065	102-90066	102-90075

Accessories

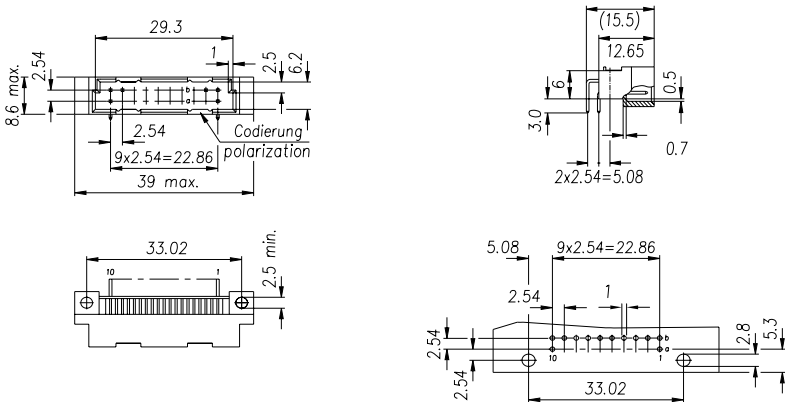
– Coding accessories (see page 160)

On request– Performance levels I + III or customer-specific
– Also in THTR**Options**– Board lock (see page 159)
– Contact arrangement (see page 162)


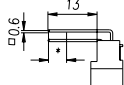

Type B/3

Male connector

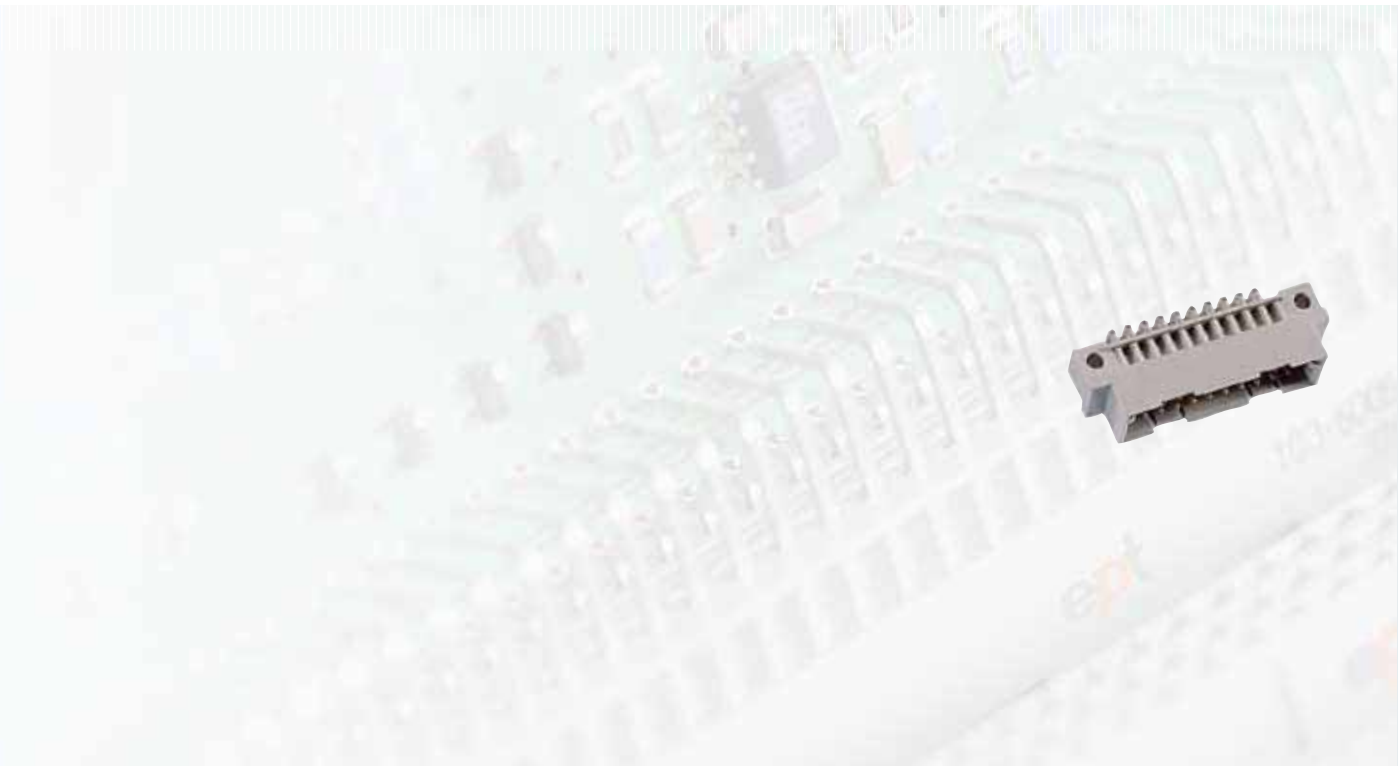
Dimensions in mm

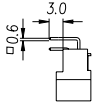
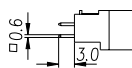
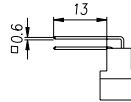
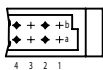
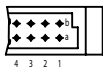


Hole pattern

No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
			
Part number			
20		101-68014	101-78016

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 206)– Support tool (see page 207)– Coding accessories (see page 160)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length	Options <ul style="list-style-type: none">– Contact arrangement (see page 162)
Note <ul style="list-style-type: none">– * Rear mating zone Ni, Au		



No. of contacts	Contact arrangement	Solder technology – Performance level II		
		Termination length		
				
Part number				
10		101-80004	101-80105	101-80006
20		101-80014	101-80115	101-80016

Accessories

- Coding accessories (see page 160)

On request

- Performance levels I + III or customer-specific
- Special contact length
- Also in THTR

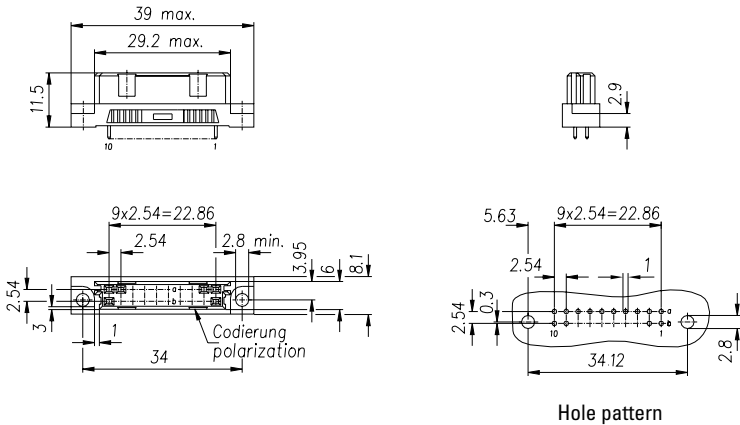
Options

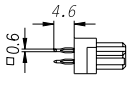
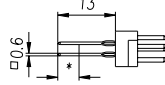
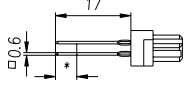
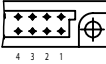
- Board lock (see page 159)
- Contact arrangement (see page 162)

Type B/3

Female connector

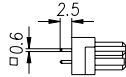
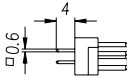
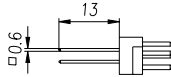
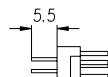
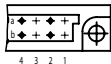
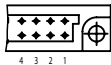
Dimensions in mm



No. of contacts	Contact arrangement	Press-fit technology – Performance level II		
		Termination length		
				
Part number				
20		102-68014-xx	102-78016-xx	102-78116-xx

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 208)– Support tool (see page 209)– Coding accessories (see page 160)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length– Alternative surface Sn, e. g. for WireWrap	Options <ul style="list-style-type: none">– Without flange– Contact arrangement (see page 162)
Note <ul style="list-style-type: none">– * Rear mating zone Ni, Au	Ordering note <ul style="list-style-type: none">– PCB 1.5 to 2.0 mm = xxx-xxxxx-01 termination length = 3.2 mm– PCB 2.0 to 2.8 mm = xxx-xxxxx-02 termination length = 4.6 mm– PCB > 2.8 mm = xxx-xxxxx-03 termination length = 4.6 mm	



No. of contacts	Contact arrangement	Solder technology – Performance level II			
		Termination length			
					Manual soldering with solder lug 
Part number					
10		102-80004	102-80005	102-80006	102-80025
20		102-80064	102-80065	102-80066	102-80075

Accessories

– Coding accessories (see page 160)

On request

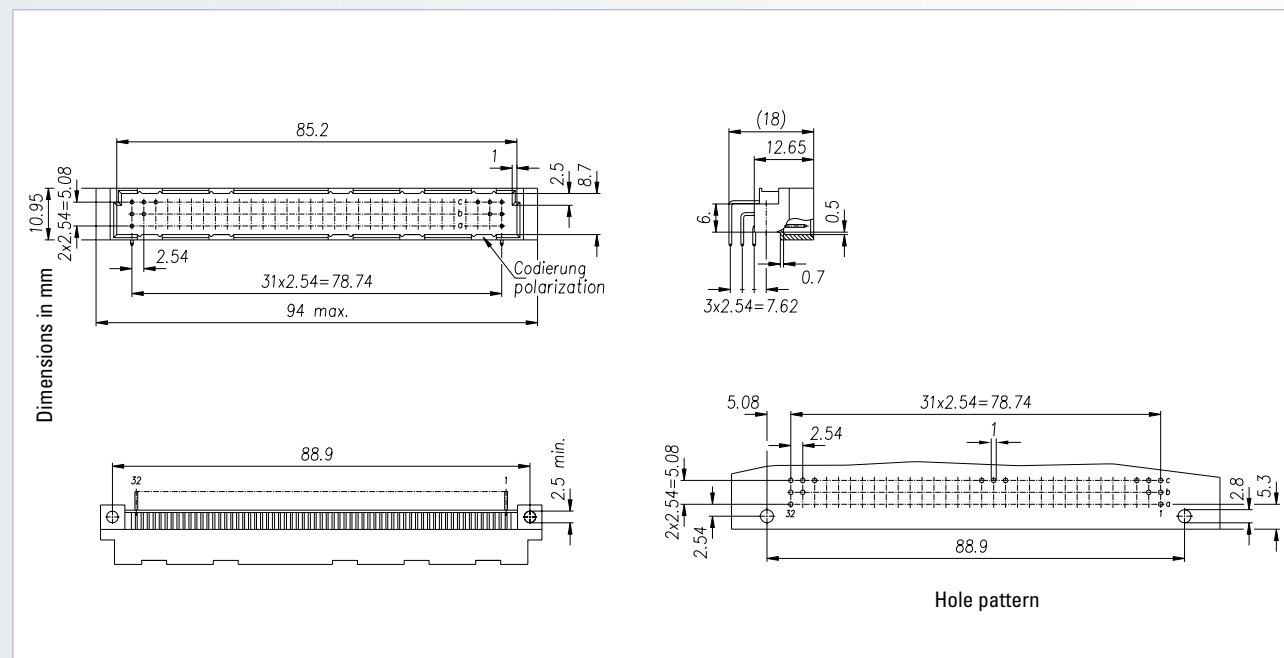
– Performance levels I + III or customer-specific
– Special contact length
– Also in THTR


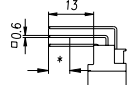
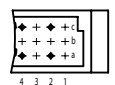
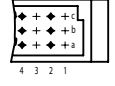

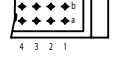
Options

– Board lock (see page 159)
– Contact arrangement (see page 162)

Type C

Male connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
			
Part number			
32		103-60014	103-65015
48		103-60044	103-65045
64		103-60054	103-65055
96		103-60064	103-65065

Accessories

- Press-fit tool (see page 206)
- Support tool (see page 207)
- Coding accessories (see page 160)

On request

- Performance levels I + III or customer-specific
- Special contact length

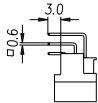
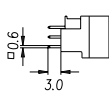
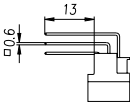
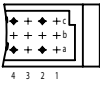
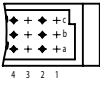
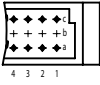
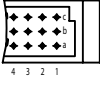
Options

- Contact arrangement (see page 162)

Note

- * Rear mating zone Ni, Au



No. of contacts	Contact arrangement	Solder technology – Performance level II		
		Termination length		
				
Part number				
32		103-40014	103-40015	103-40194
48		103-40024	103-40025	103-40144
64		103-40034	103-40035	103-40154
96		103-40064	103-40065	103-40174

Accessories

– Coding accessories (see page 160)

On request

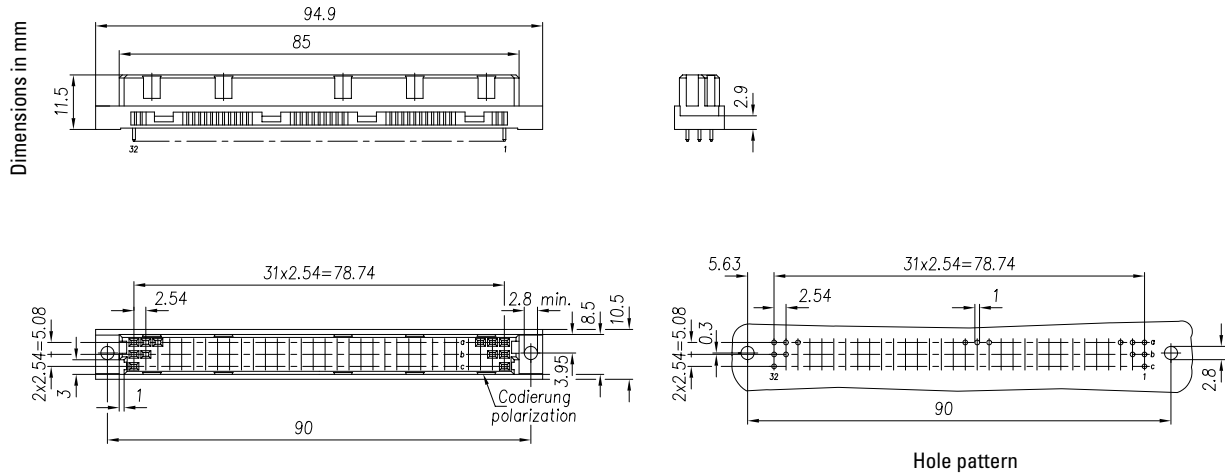
– Performance levels I + III or customer-specific
 – Special contact length
 – Also in THTR

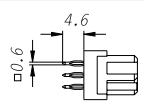
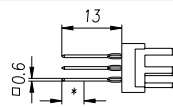
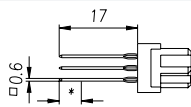
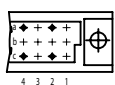
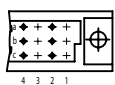
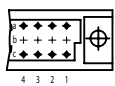
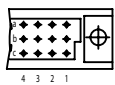
Options

– Board lock (see page 159)
 – Contact arrangement (see page 162)

Type C

Female connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II		
		Termination length		
				
Part number				
32		104-60014-xx	104-65015-xx	104-65016-xx
48		104-60044-xx	104-65045-xx	104-65046-xx
64		304-60054-02	304-65055-03	304-65056-04
96		304-60064-02	304-65065-03	304-65066-04

Note – * Rear mating zone Ni, Au
Options – Without flange – Contact arrangement (see page 162)
Cross reference – Type C with switching function (see page 155) – VMEx (see page 152) – Type C with IDC (see page 157)

Accessories

- Press-fit tool (see page 208)
- Support tool (see page 209)
- Coding accessories (see page 160)
- Shroud (see page 158)

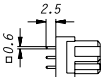
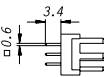
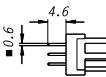
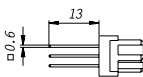

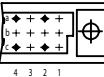
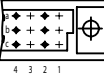
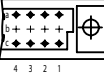
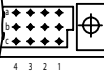
On request

- Performance levels I + III or customer-specific
- Special contact length
- Alternative surface Sn, e.g. for WireWrap

Ordering note

- Only for 104
- PCB 1.5 to 2.0 mm = xxx-xxxx-01 termination length = 3.2 mm
 - PCB 2.0 to 2.8 mm = xxx-xxxx-02 termination length = 4.6 mm
 - PCB > 2.8 mm = xxx-xxxx-03 termination length = 4.6 mm



No. of contacts	Contact arrangement	Solder technology – Performance level II				
		Termination length				
						Manual soldering with solder lug 
Part number						
32		104-40014	—	—	104-40016	—
48		104-40044	—	—	104-40046	—
64		304-40054-05	304-40054-01	304-40054-02	304-40055-03	104-40115
96		304-40064-05	304-40064-01	304-40064-02	304-40065-03	104-40075

Accessories

– Coding accessories (see page 160)

On request

– Performance levels I + III or customer-specific
– Special contact length
– Also in THTR

Options

– Board lock (see page 159)
– Contact arrangement (see page 162)

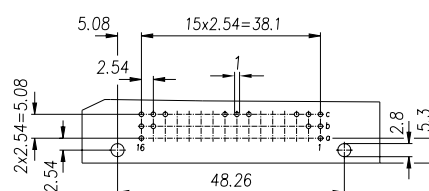
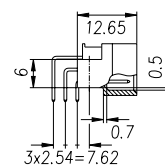
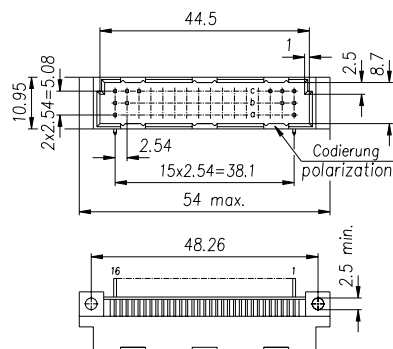
Cross reference

– Type C with switching function (see page 155)
– VMEx (see page 152)
– Type C with IDC (see page 157)


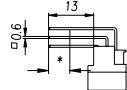
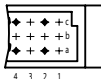
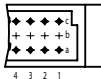
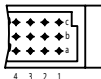
Type C/2

Male connector

Dimensions in mm



Hole pattern

No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
			
Part number			
16		103-69004	103-79006
32		103-69014	103-79016
48		103-69064	103-79066

Accessories

- Press-fit tool (see page 206)
- Support tool (see page 207)
- Coding accessories (see page 160)

On request

- Performance levels I + III or customer-specific
- Special contact length

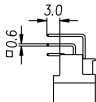
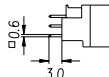
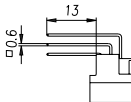
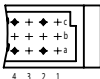
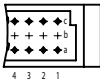
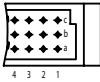
Options

- Contact arrangement (see page 162)

Note

- * Rear mating zone Ni, Au



No. of contacts	Contact arrangement	Solder technology – Performance level II		
		Termination length		
				
Part number				
16		103-90004	103-90105	103-90006
32		103-90014	103-90115	103-90016
48		103-90064	103-90165	103-90066

Accessories

– Coding accessories (see page 160)

On request

– Performance levels I + III or customer-specific
 – Special contact length
 – Also in THTR

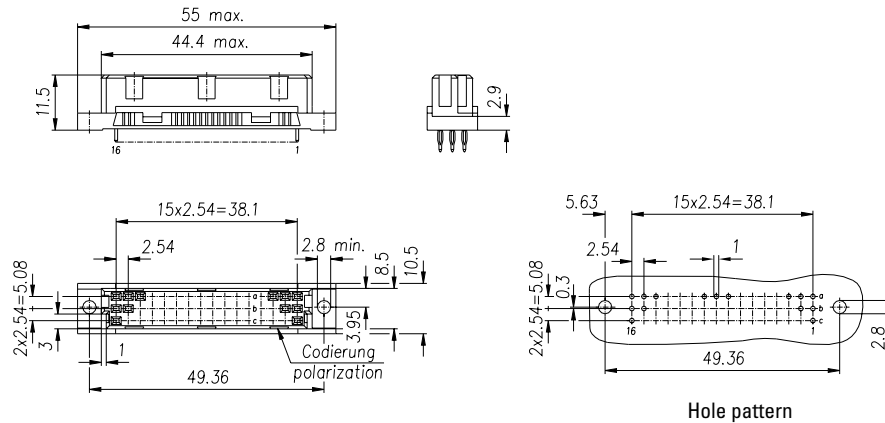
Options

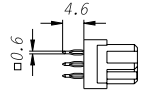
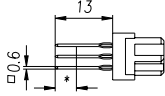
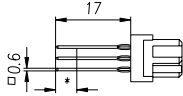
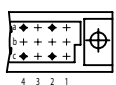
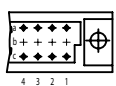
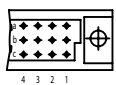
– Board lock (see page 159)
 – Contact arrangement (see page 162)

Type C/2

Female connector

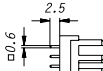
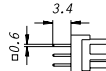
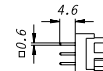
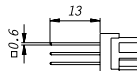

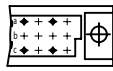
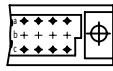
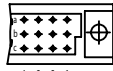
Dimensions in mm



No. of contacts	Contact arrangement	Press-fit technology – Performance level II		
		Termination length		
				
Part number				
16		104-69004-xx	104-79006-xx	104-79106-xx
32		304-69014-02	304-79016-03	304-79116-04
48		304-69064-02	304-79066-03	304-79166-04

Accessories <ul style="list-style-type: none"> – Press-fit tool (see page 208) – Support tool (see page 209) – Coding accessories (see page 160) 	On request <ul style="list-style-type: none"> – Performance levels I + III or customer-specific – Special contact length – Alternative surface Sn, e.g. for WireWrap 	Options <ul style="list-style-type: none"> – Without flange – Contact arrangement (see page 162)
Note <ul style="list-style-type: none"> – * Rear mating zone Ni, Au 	Ordering note <p>Only for 104</p> <ul style="list-style-type: none"> – PCB 1.5 to 2.0 mm = xxx-xxxx-01 termination length = 3.2 mm – PCB 2.0 to 2.8 mm = xxx-xxxx-02 termination length = 4.6 mm – PCB > 2.8 mm = xxx-xxxx-03 termination length = 4.6mm 	



No. of contacts	Contact arrangement	Solder technology – Performance level II				
		Termination length				
						Manual soldering with solder lug 
Part number						
16		104-90004	—	—	104-90006	104-90025
32		304-90014-05	304-90014-01	304-90014-02	304-90016-03	104-90035
48		304-90064-05	304-90064-01	304-90064-02	304-90066-03	104-90075

Accessories

– Coding accessories (see page 160)

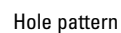
On request

– Performance levels I + III or customer-specific
 – Special contact length
 – Also in THTR

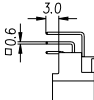
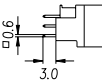
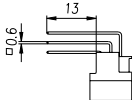
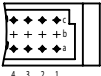
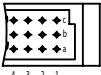
Options

– Board lock (see page 159)
 – Contact arrangement (see page 162)

Male connector





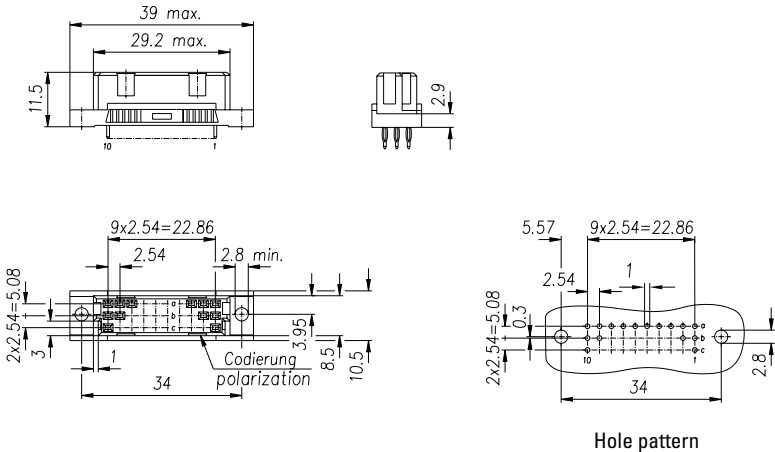
No. of contacts	Contact arrangement	Solder technology – Performance level II		
		Termination length		
				
Part number				
20		103-80014	103-80255	103-80016
30		103-80004	103-80265	103-80006

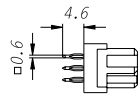
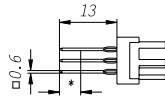
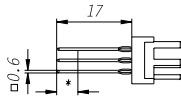
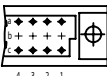
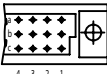
Accessories <ul style="list-style-type: none">Coding accessories (see page 160)	On request <ul style="list-style-type: none">Performance levels I + III or customer-specificSpecial contact lengthAlso in THTR	Options <ul style="list-style-type: none">Board lock (see page 159)Contact arrangement (see page 162)
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Type C/3

Female connector

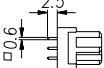
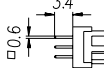
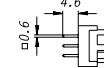
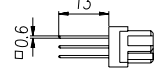

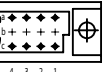
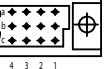
Dimensions in mm



No. of contacts	Contact arrangement	Press-fit technology – Performance level II		
		Termination length		
				
		Part number		
20		304-68004-02	304-78006-03	304-78106-04
30		304-68014-02	304-78016-03	304-78116-04

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 208)– Support tool (see page 209)– Coding accessories (see page 160)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length– Alternative surface Sn, e. g. for WireWrap	Options <ul style="list-style-type: none">– Without flange– Contact arrangement (see page 162)
Note <ul style="list-style-type: none">– * Rear mating zone Ni, Au		



No. of contacts	Contact arrangement	Solder technology – Performance level II				
		Termination length				
						Manual soldering with solder lug 
		Part number				
20		304-80014-05	304-80014-01	304-80014-02	304-80016-03	104-80035
30		304-80064-05	304-80064-01	304-80064-02	304-80066-03	104-80075

Accessories

– Coding accessories (see page 160)

On request

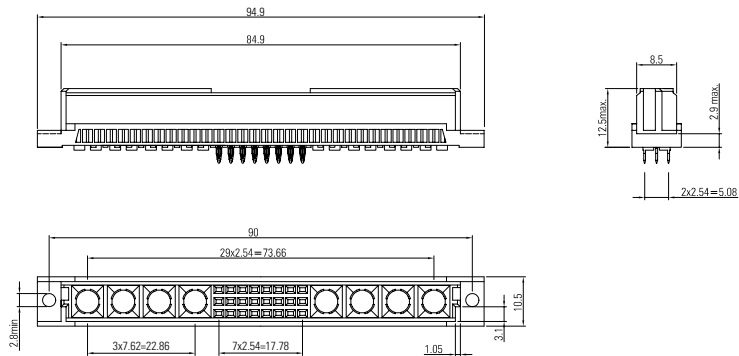
– Performance levels I + III or customer-specific
 – Special contact length
 – Also in THTR

Options


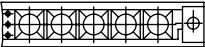
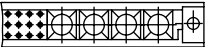
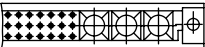
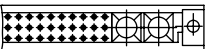

– Board lock (see page 159)
 – Contact arrangement (see page 162)

Connectors according to DIN 41612 / IEC 60603-2
Type M for special contacts according to DIN 41626
Female connector

Dimensions in mm

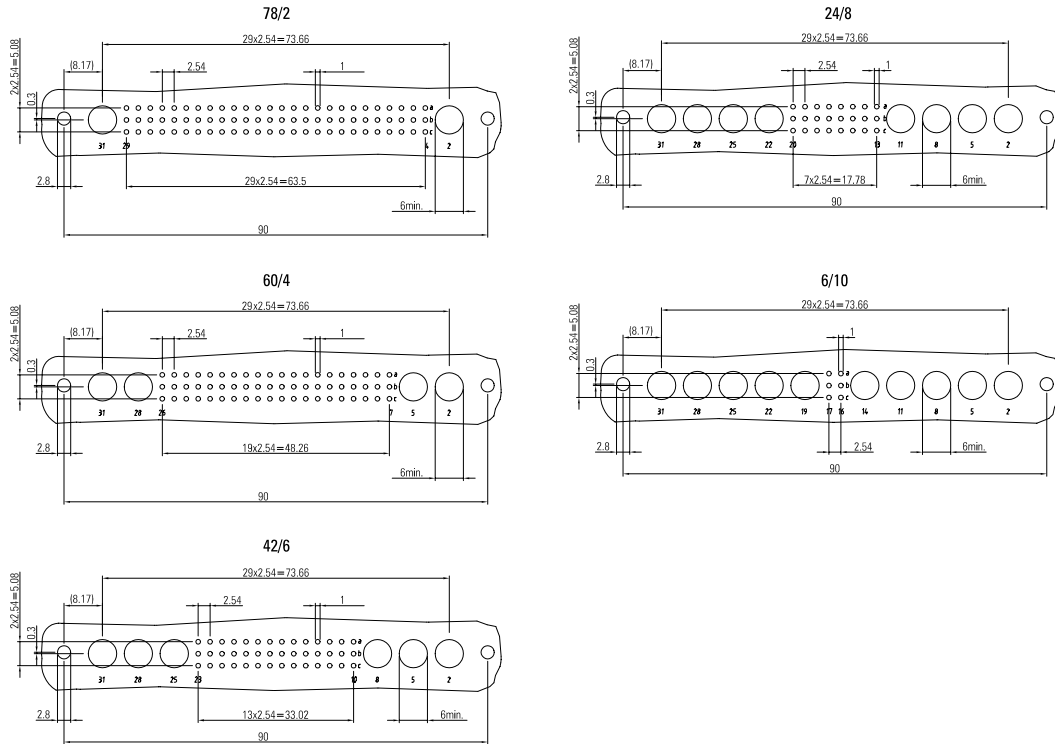


Similar drawing

No. of contacts	Contact arrangement	Press-fit technology – Performance level II
		Termination length
		 Part number
6/10		124-60112-00
24/8		124-60182-00
42/6		124-60162-00
60/4		124-60142-00
78/2		124-60122-00



Connectors according to DIN 41612 / IEC 60603-2
Type M for special contacts according to DIN 41626
 Female connector



On request

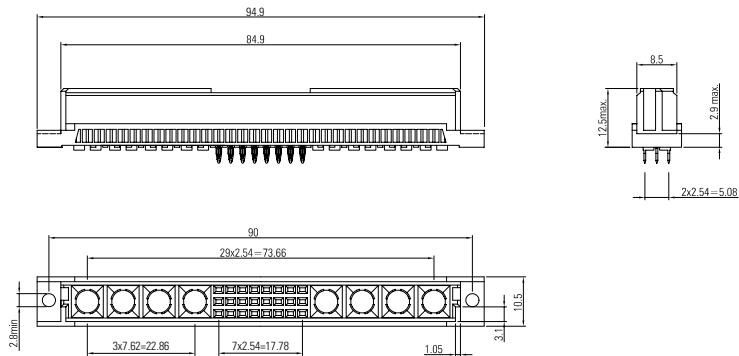
- Performance levels I + III or customer-specific
- Special contact length
- Press-fit tool
- Support tool

Note

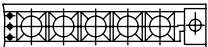
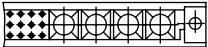
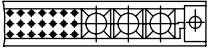


- Female connectors must be screwed or riveted onto the printed circuit board at the flange

Connectors according to DIN 41612 / IEC 60603-2
Type M for special contacts in press-fit technology
Female connector

Dimensions in mm

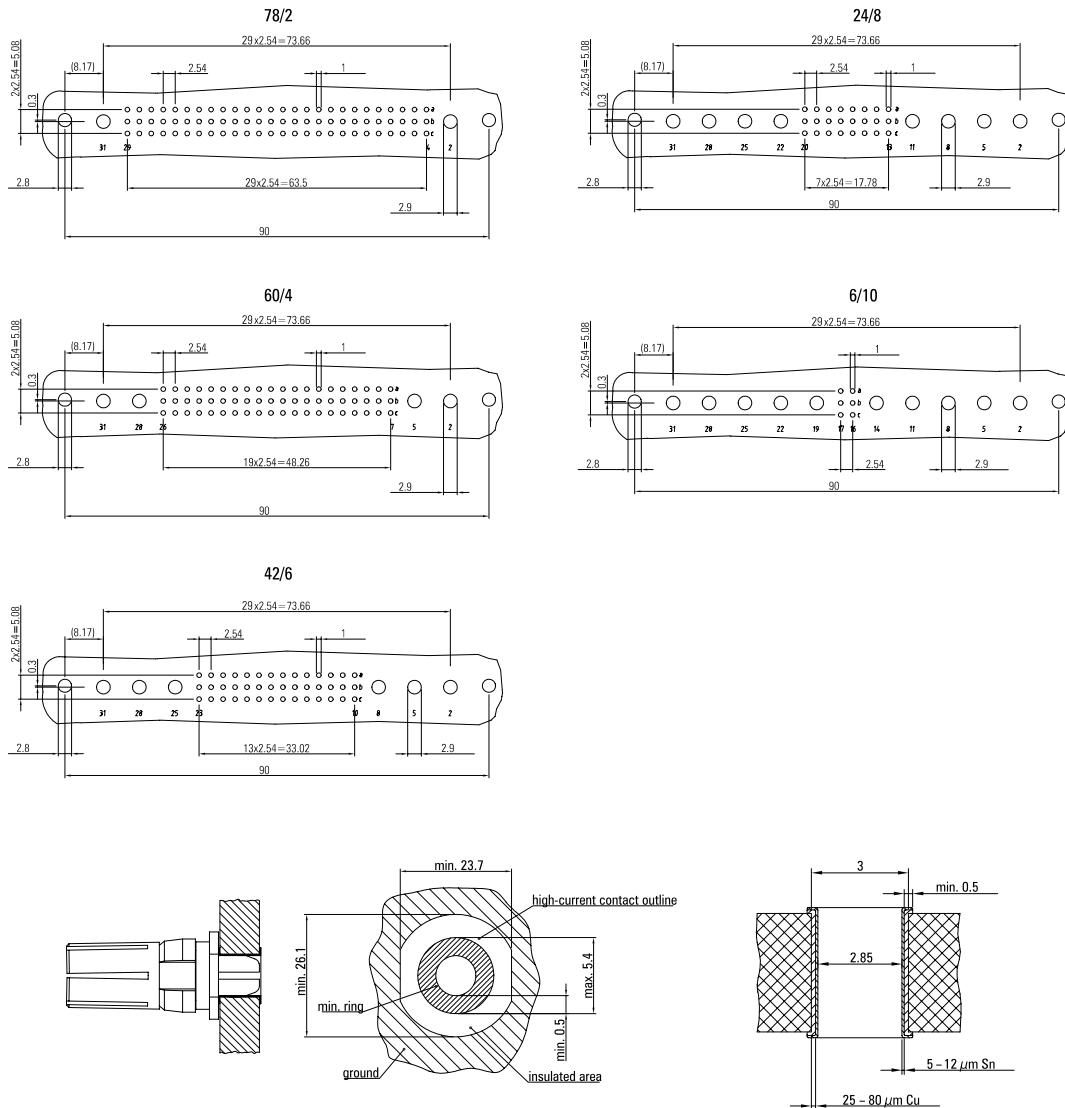


Similar drawing

No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
		Special contact is not pre-loaded	Special contact is pre-loaded
		Part number	
6/10		124-60012-00	124-60012-02
24/8		124-60082-00	124-60082-02
42/6		124-60062-00	124-60062-02
60/4		124-60042-00	124-60042-02
78/2		124-60022-00	124-60022-02



Connectors according to DIN 41612 / IEC 60603-2
Type M for special contacts in press-fit technology
 Female connector



On request

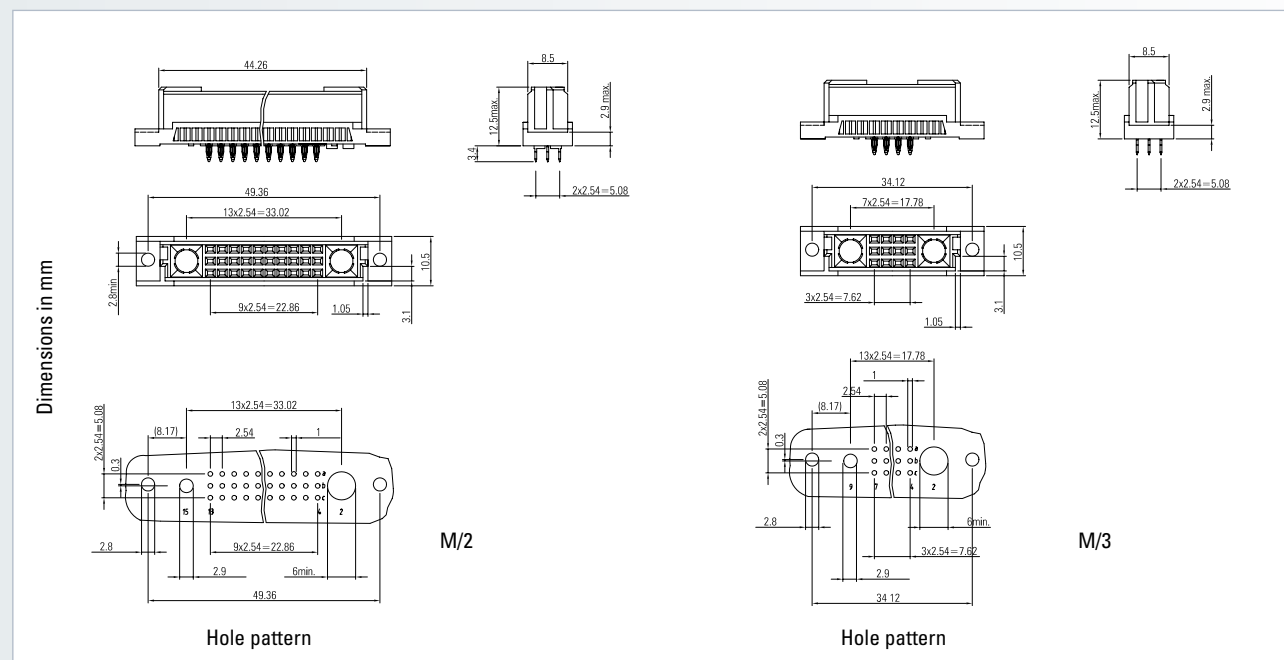
- Performance levels I + III or customer-specific
- Special contact length
- Press-fit tool
- Support tool

Options

- Contact arrangement of the special contacts

Note

- Female connectors must be screwed or riveted onto the printed circuit at the flange



No. of contacts	Contact arrangement	Press-fit technology – Performance level II
		Termination length
		Part number
M/2 30/2		124-69122-00
M/3 12/2		124-68122-00

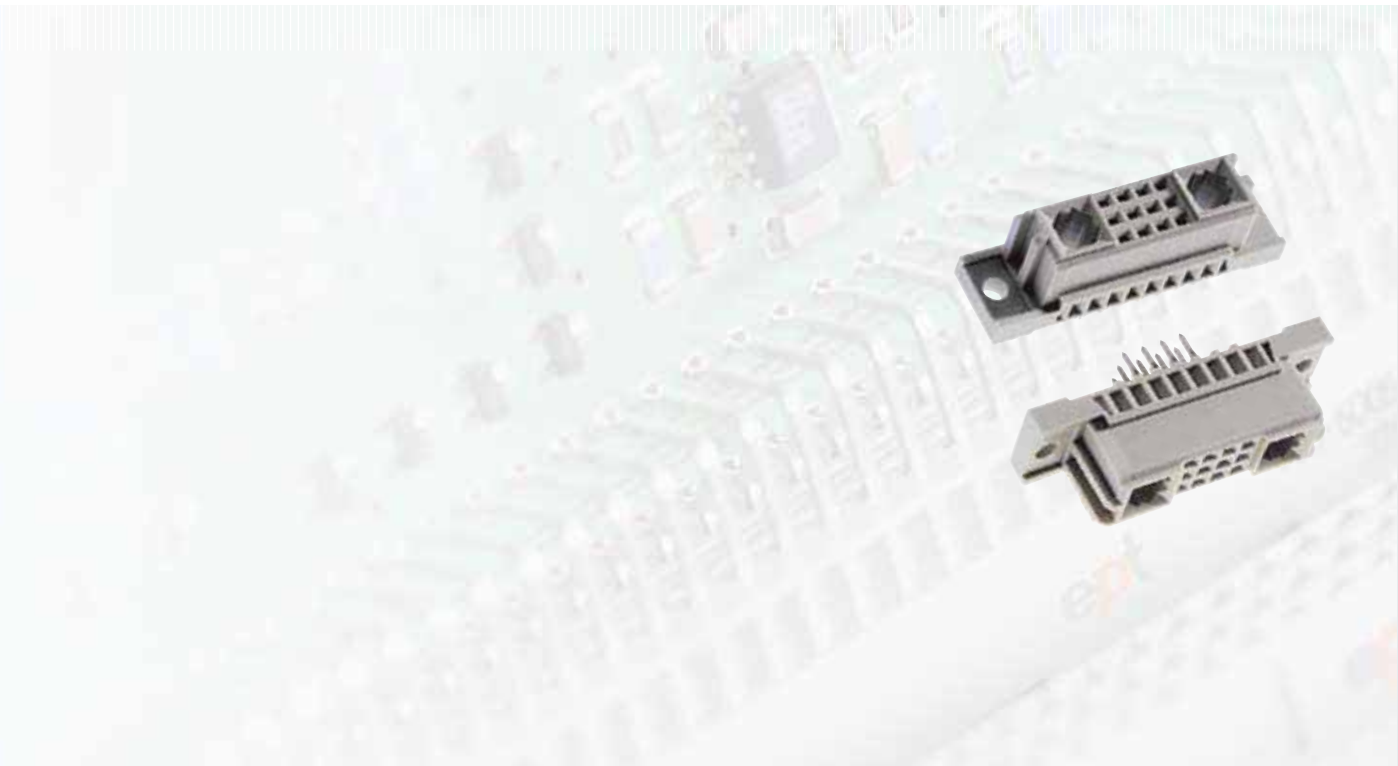
On request





- Performance levels I + III or customer-specific
- Special contact length
- Press-fit tool
- Support tool

Note

- Female connectors must be screwed or riveted onto the printed circuit at the flange

Connectors according to DIN 41612 / IEC 60603-2
Type M/2, M/3 for special contacts in press-fit technology
 Female connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
		Special contact is not pre-loaded	Special contact is pre-loaded
		Part number	
M/2 30/2			
M/3 12/2			

On request

- Performance levels I + III or customer-specific
- Special contact length
- Press-fit tool
- Support tool

Options

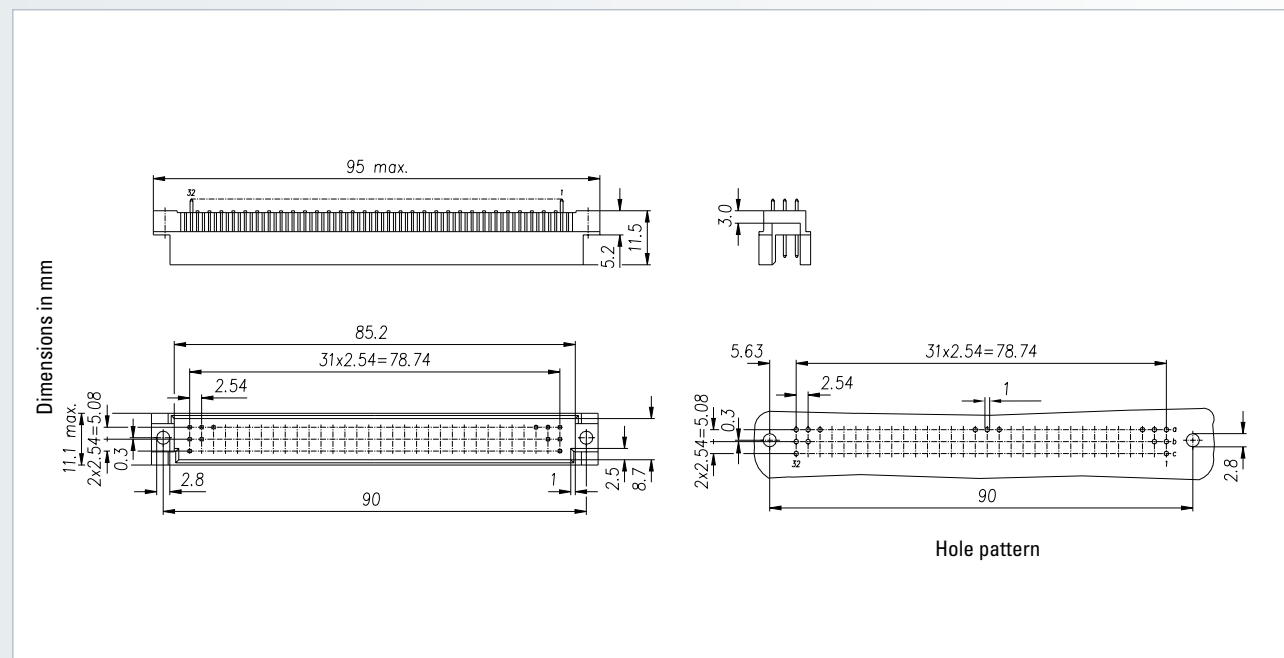
- Contact arrangement of the special contacts

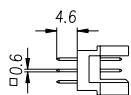
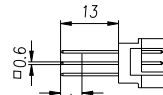
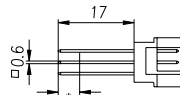
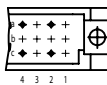
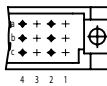
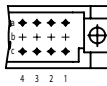
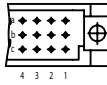
Note

- Female connectors must be screwed or riveted onto the printed circuit at the flange

Type R

Male connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II		
		Termination length		
				
Part number				
32		115-60014	115-65015	115-65016
48		115-60044	115-65045	115-65046
64		115-60054	115-65055	115-65056
96		115-60064	115-65065	115-65066

Accessories

- Press-fit tool (see page 206)
- Support tool (see page 207)
- Shroud (see page 158)

On request

- Performance levels I + III or customer-specific
- Special contact length
- Alternative surface Sn, e.g. for WireWrap

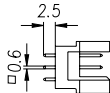
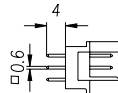
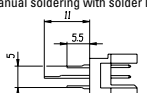
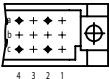
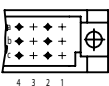
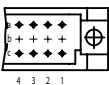
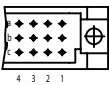
Options

- Contact arrangement (see page 162)

Note

- * Rear mating zone Ni, Au



No. of contacts	Contact arrangement	Solder technology – Performance level II		
		Termination length		
				Manual soldering with solder lug 
Part number				
32		115-40015	115-40046	—
48		115-40026	115-40025	—
64		115-40035	115-40054	115-40036
96		115-40065	115-40074	115-40066

On request

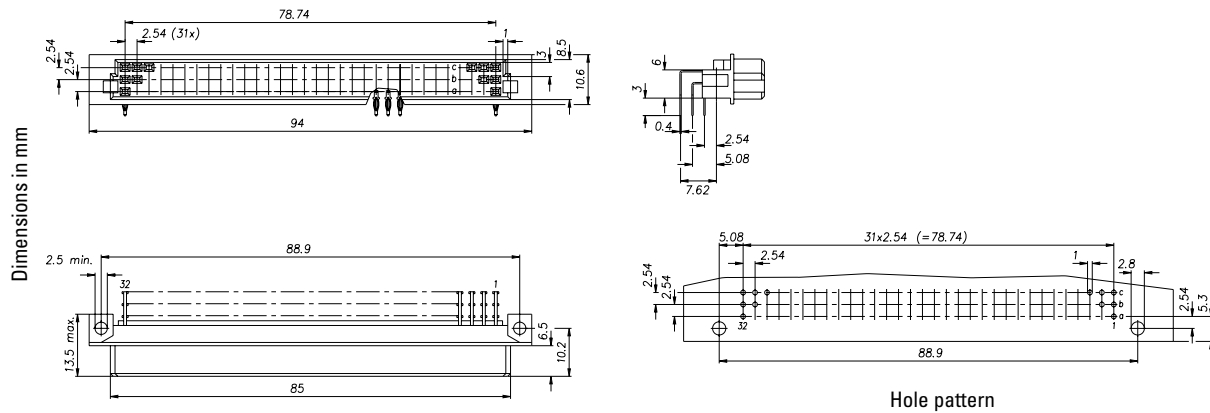
- Performance levels I + III or customer-specific
- Special contact length
- Also in THTR

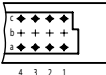
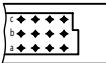
Options

- Board lock (see page 159)
- Contact arrangement (see page 162)

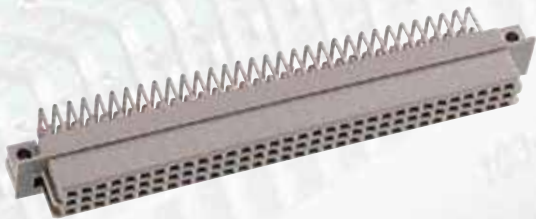
Type R

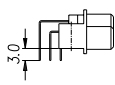
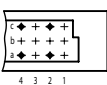
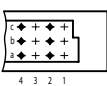
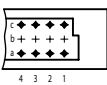
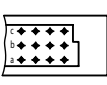
Female connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II
		Termination length
		Part number
64		116-60054
96		116-60074

Accessories <ul style="list-style-type: none"> – Press-fit tool (see page 210) – Support tool (see page 211) 	On request <ul style="list-style-type: none"> – Performance levels I + III or customer-specific – Special contact length 	Options <ul style="list-style-type: none"> – Without flange – Contact arrangement (see page 162)
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No. of contacts	Contact arrangement	Solder technology – Performance level II
		Termination length
		
		Part number
32		116-40034
48		116-40044
64		116-40054
96		116-40074

On request

- Performance levels I + III or customer-specific
- Special contact length
- Also in THTR

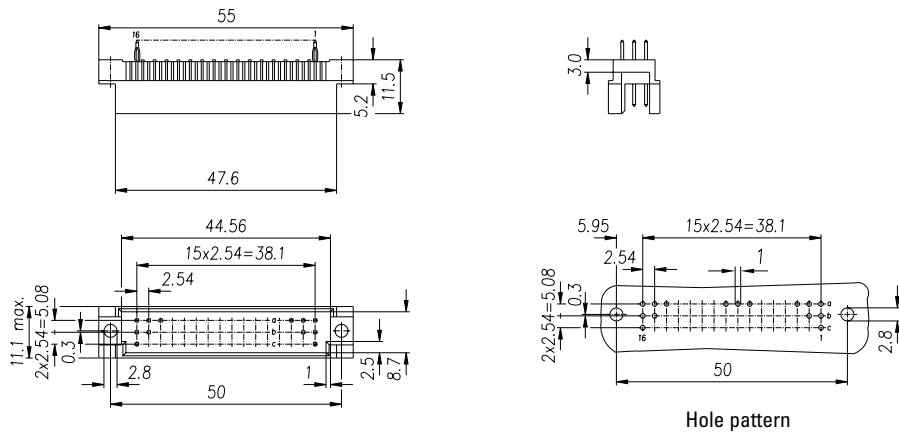
Options

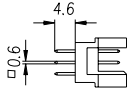
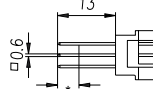
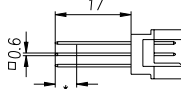
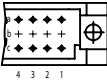
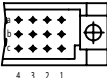
- Board lock (see page 159)
- Contact arrangement (see page 162)

Type R/2

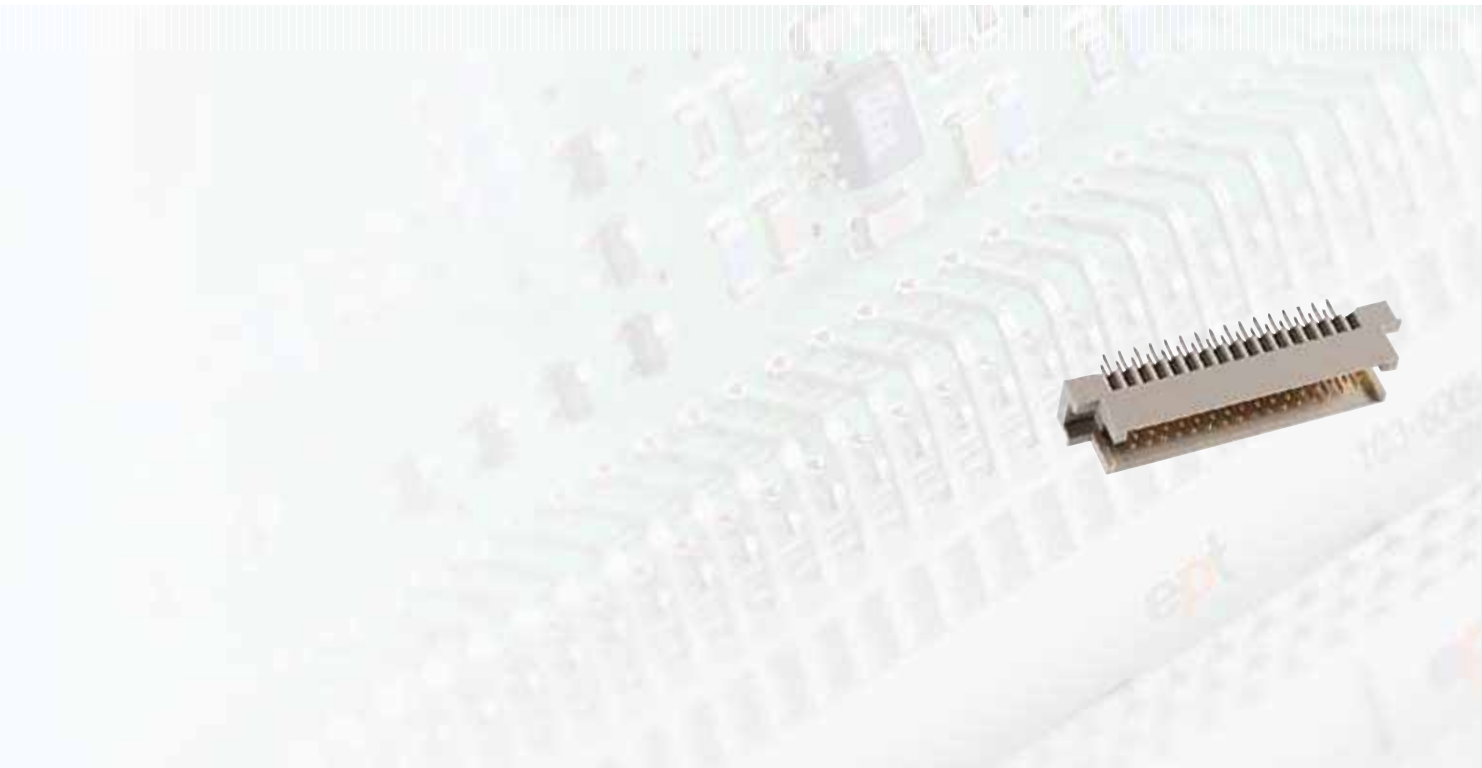
Male connector

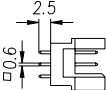
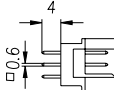
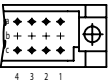
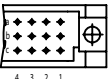
Dimensions in mm



No. of contacts	Contact arrangement	Press-fit technology – Performance level II		
		Termination length		
				
Part number				
32		115-69054	115-79055	115-79056
48		115-69064	115-79065	115-79066

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 206)– Support tool (see page 207)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length– Alternative surface Sn, e.g. for WireWrap	Options <ul style="list-style-type: none">– Contact arrangement (see page 162)
Note <ul style="list-style-type: none">– * Rear mating zone Ni, Au		



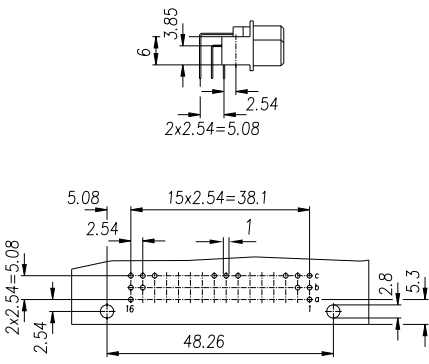
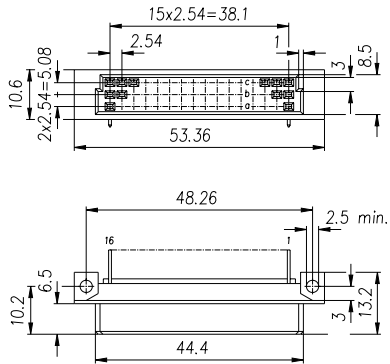
No. of contacts	Contact arrangement	Solder technology – Performance level II	
		Termination length	
			
Part number			
32		115-90014	115-90015
48		115-90064	115-90065

On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length– Also in THTR	Options <ul style="list-style-type: none">– Board lock (see page 159)– Contact arrangement (see page 162)
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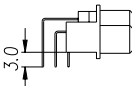
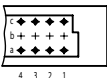
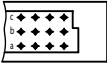
Type R/2

Female connector

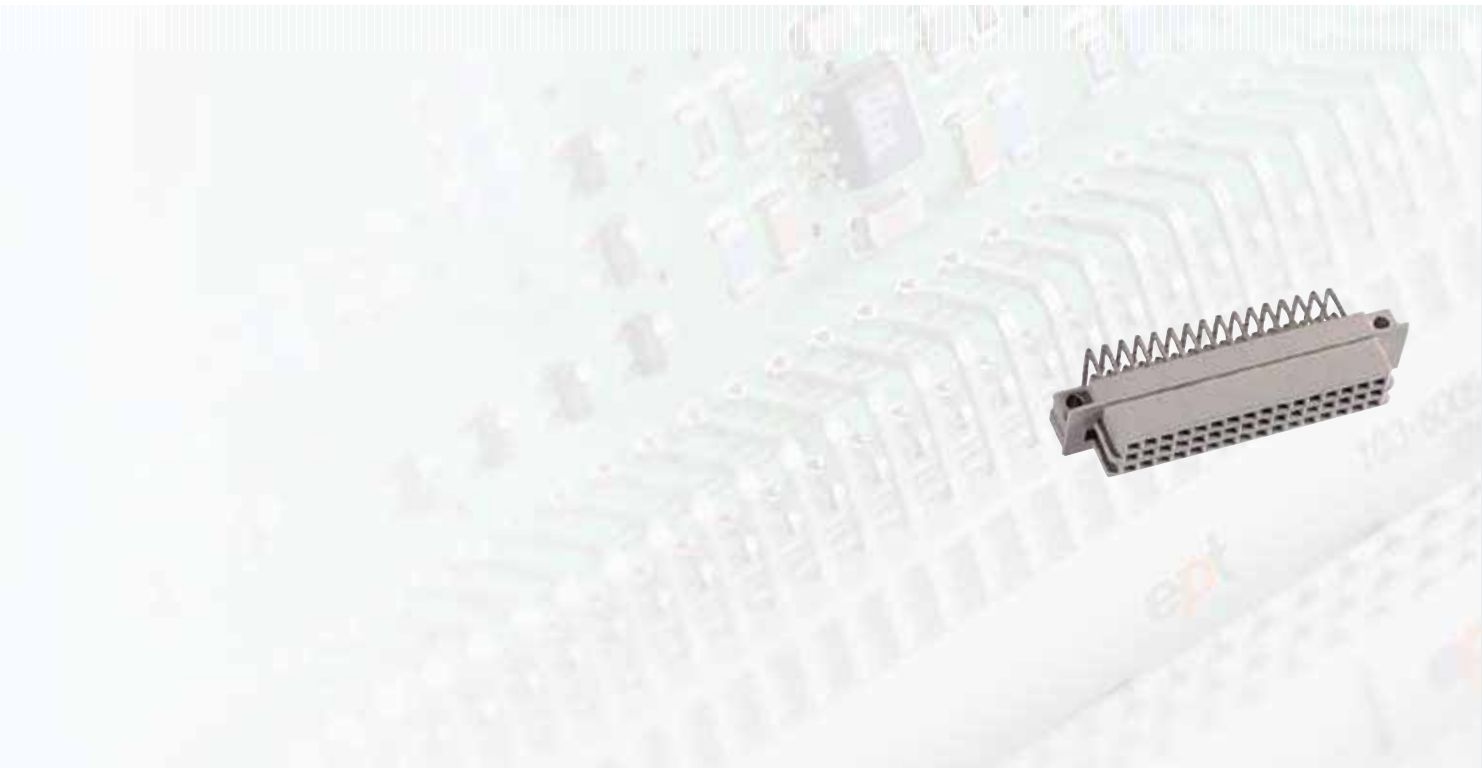
Dimensions in mm

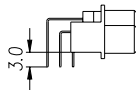
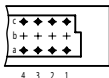
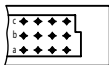


Hole pattern

No. of contacts	Contact arrangement	Press-fit technology – Performance level II
		Termination length
		
		Part number
32		116-69054
48		116-69064

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 210)– Support tool (see page 211)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length	Options <ul style="list-style-type: none">– Without flange– Contact arrangement (see page 162)
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No. of contacts	Contact arrangement	Solder technology – Performance level II
		Termination length
		
		Part number
32		116-90054
48		116-90064

On request

- Performance levels I + III or customer-specific
- Special contact length
- Also in THTR

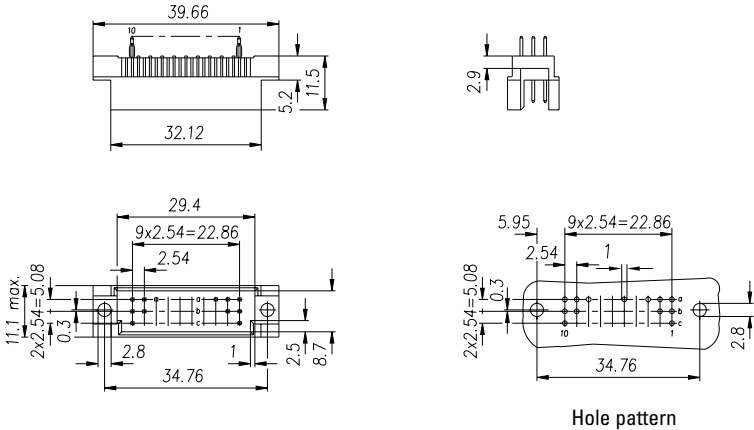
Options

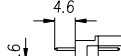

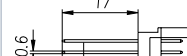
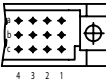
- Board lock (see page 159)
- Contact arrangement (see page 162)

Type R/3

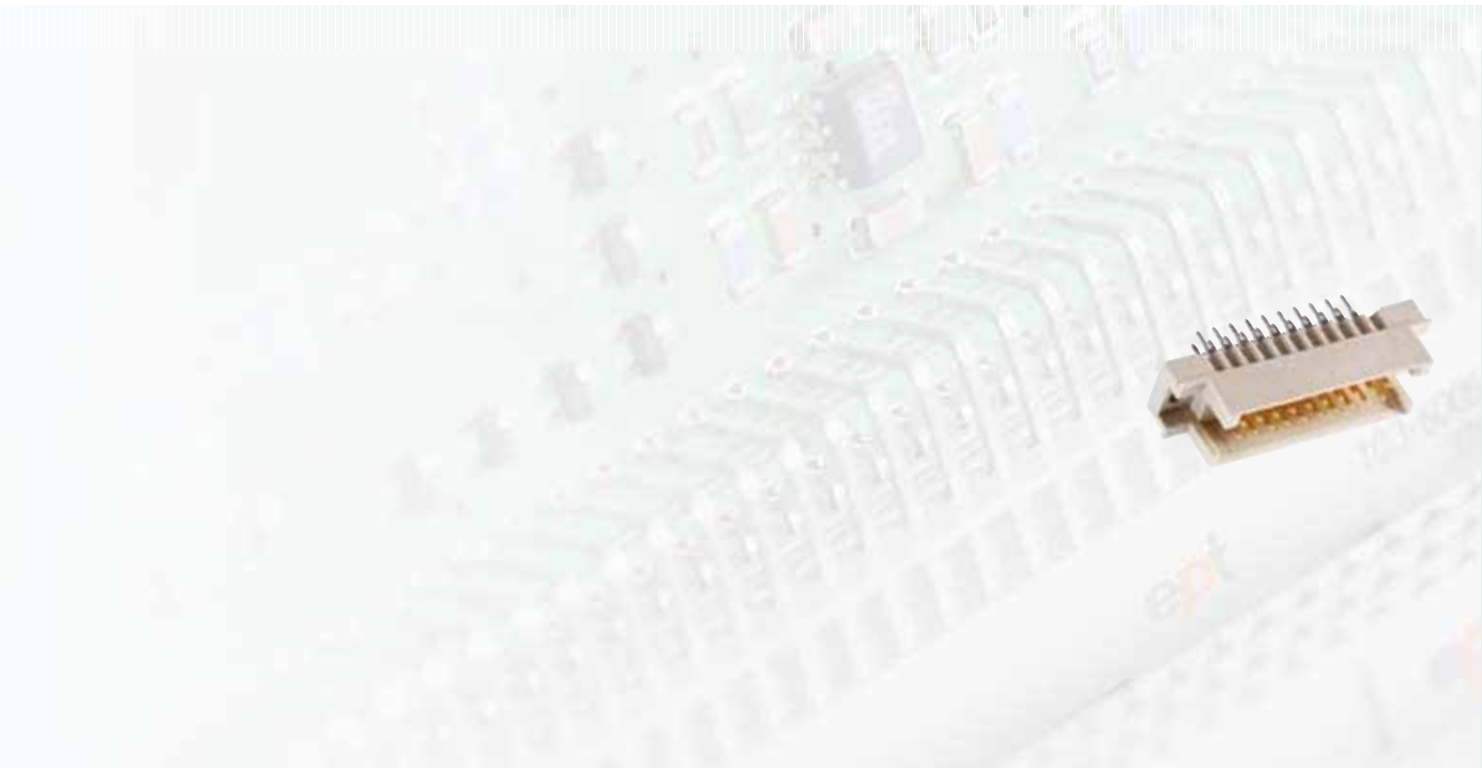
Male connector

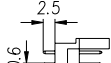
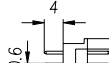
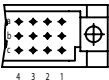
Dimensions in mm



No. of contacts	Contact arrangement	Press-fit technology – Performance level II		
		Termination length		
				
		Part number		
30		115-68014	115-78015	115-78016

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 206)– Support tool (see page 207)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length– Alternative surface Sn, e.g. for WireWrap	Options <ul style="list-style-type: none">– Contact arrangement (see page 162)
Note <ul style="list-style-type: none">– * Rear mating zone Ni, Au		



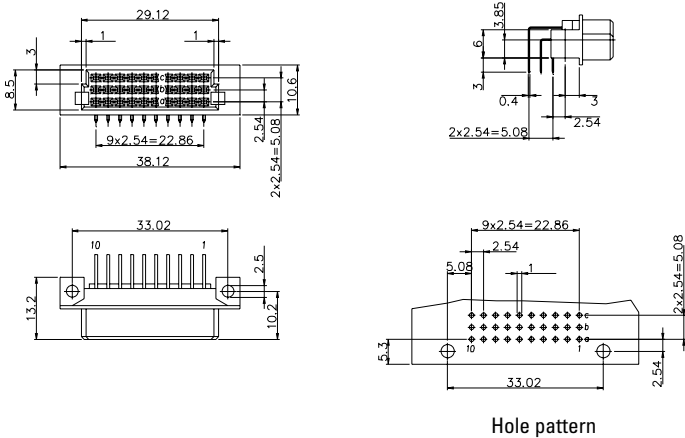
No. of contacts	Contact arrangement	Solder technology – Performance level II	
		Termination length	
			
Part number			
30		115-80064	115-80065

On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length– Also in THTR	Options <ul style="list-style-type: none">– Board lock (see page 159)– Contact arrangement (see page 162)
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Type R/3

Female connector

Dimensions in mm



No. of contacts	Contact arrangement	Press-fit technology – Performance level II
		Termination length
		Part number
30		116-68064

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 210)– Support tool (see page 211)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length	Options <ul style="list-style-type: none">– Without flange– Contact arrangement (see page 162)
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No. of contacts	Contact arrangement	Solder technology – Performance level II
		Termination length
		Part number
32		116-80064

On request

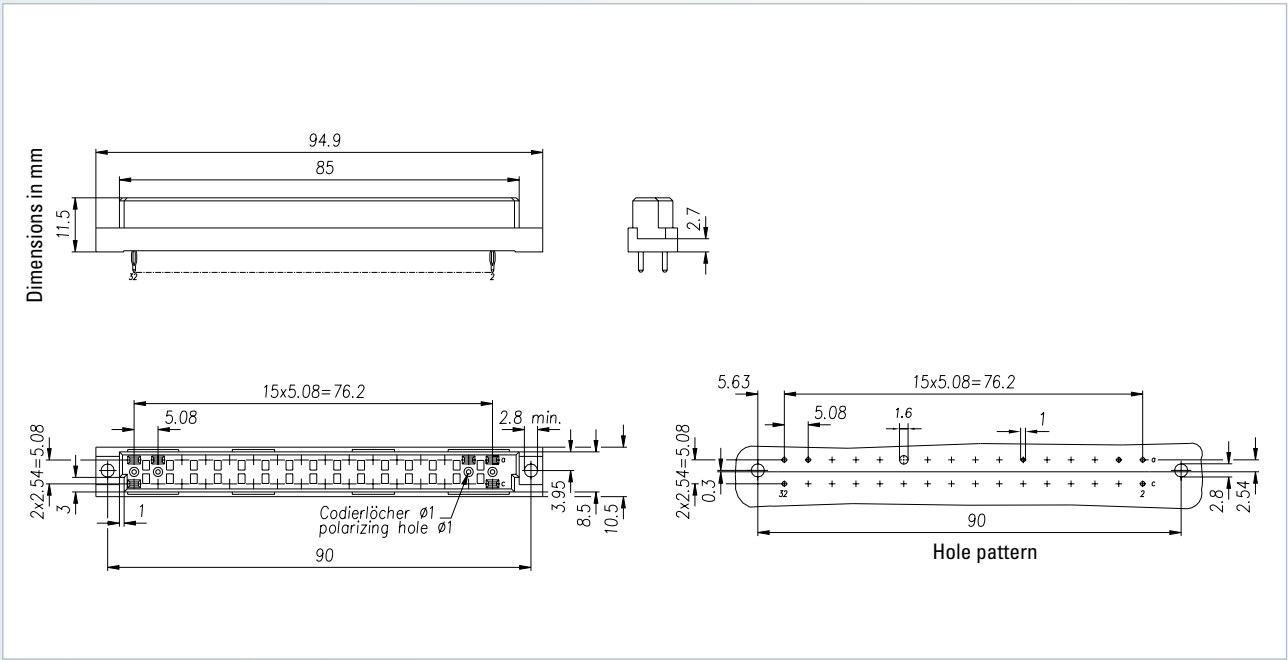
- Performance levels I + III or customer-specific
- Special contact length
- Also in THTR

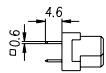
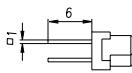
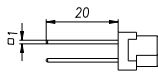
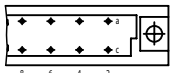
Options

- Board lock (see page 159)
- Contact arrangement (see page 162)

Type D

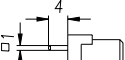
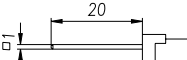

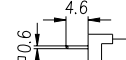

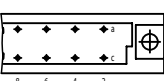
Female connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II		
		Termination length		
				
Part number				
32		106-60084	106-60064	106-60065

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 208)– Support tool (see page 209)– Coding accessories (see page 160)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length	Options <ul style="list-style-type: none">– Without flange– Contact arrangement (see page 162)
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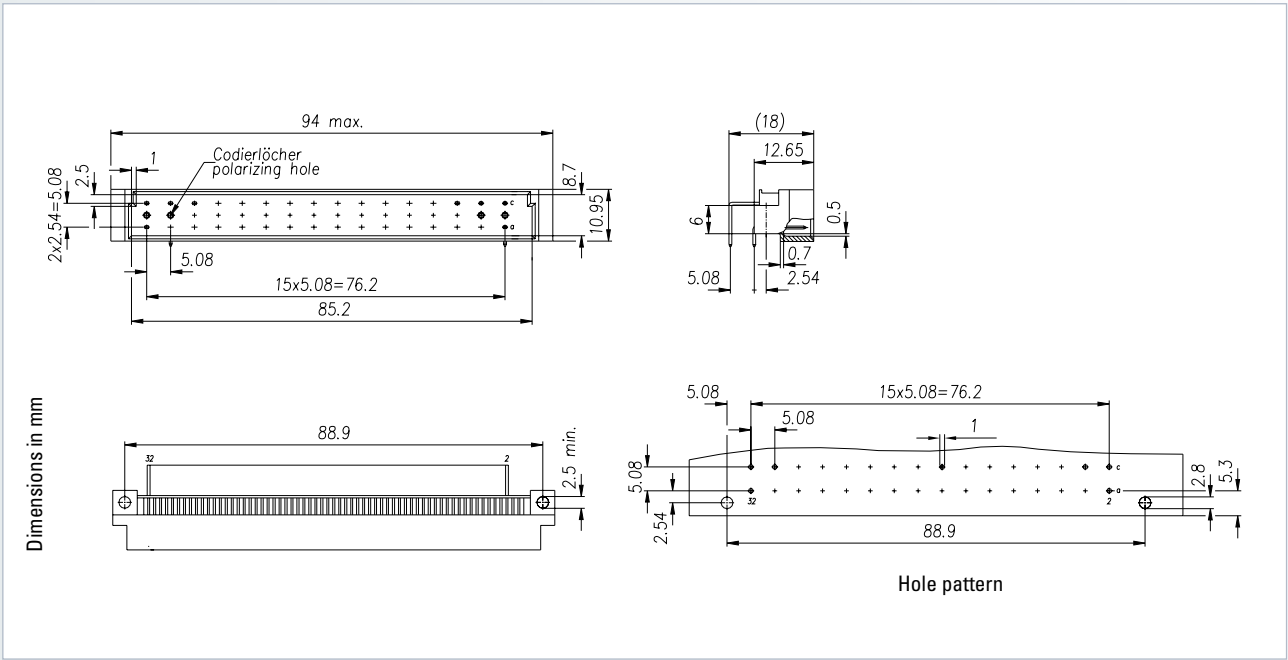


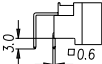
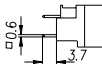
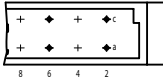
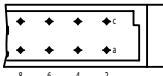
No. of contacts	Contact arrangement	Solder technology – Performance level II				
		Termination length				
						Manual soldering with solder lug 
Part number						
32		106-40064	106-40065	106-40084	106-40075	106-40066

Accessories <ul style="list-style-type: none">Coding accessories (see page 160)	On request <ul style="list-style-type: none">Performance levels I + III or customer-specificSpecial contact lengthAlso in THTR	Options <ul style="list-style-type: none">Board lock (see page 159)Contact arrangement (see page 162)
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Type D

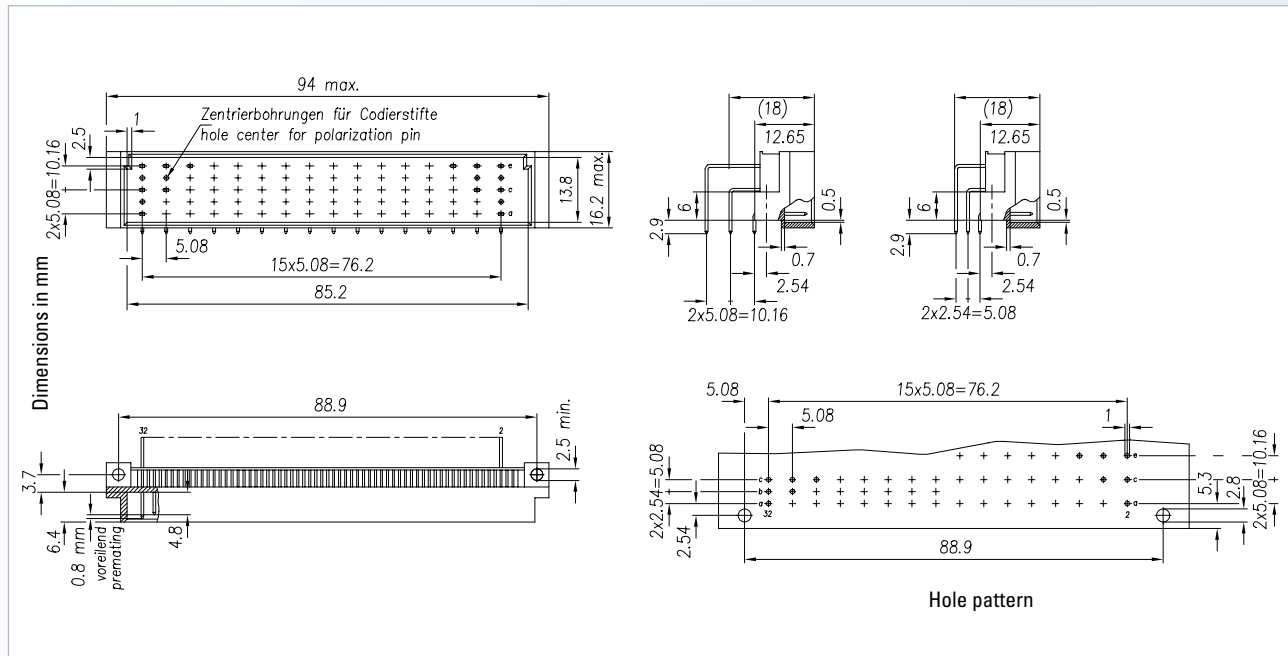
Male connector

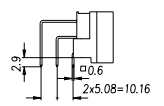
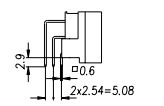
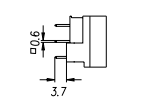
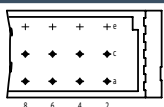
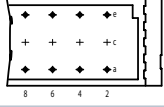
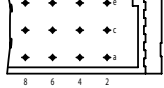


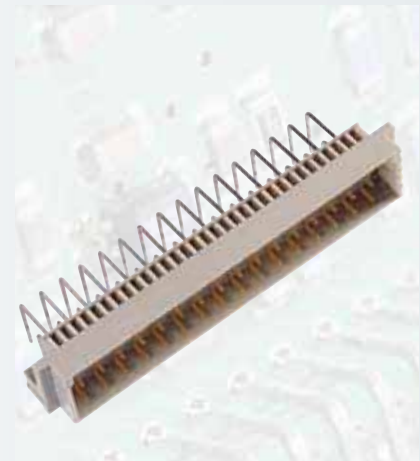
No. of contacts	Contact arrangement	Solder technology – Performance level II	
		Termination length	
			
Part number			
16		105-40014	105-40016
32		105-40064	105-40066



Accessories <ul style="list-style-type: none">– Coding accessories (see page 160)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length– Also in THTR	Options <ul style="list-style-type: none">– Board lock (see page 159)– Contact arrangement (see page 162)
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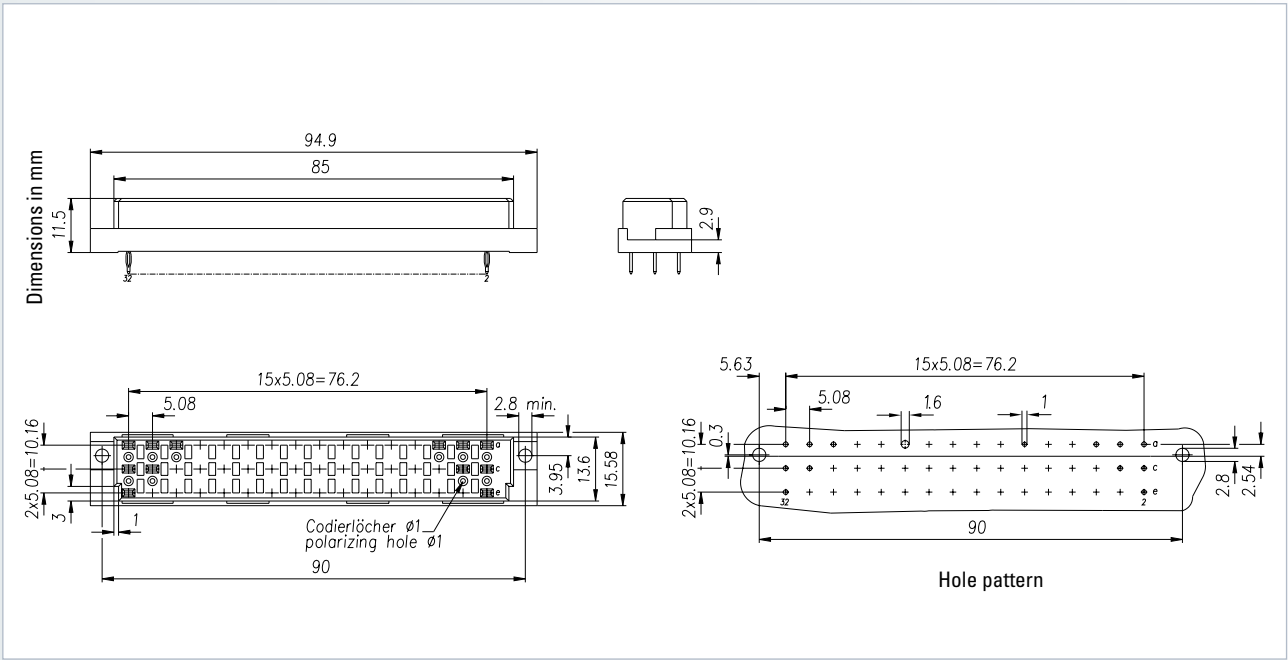
No. of contacts	Contact arrangement	Solder technology – Performance level II		
		Termination length		
				
Part number				
32		107-40024	107-40025	107-40026
32		107-40014	107-40015	107-40016
48		107-40064	107-40065	107-40066


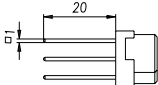
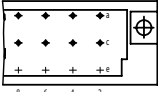
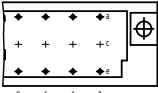
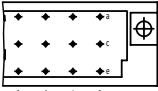


Accessories <ul style="list-style-type: none"> – Coding accessories (see page 160) 	On request <ul style="list-style-type: none"> – Performance levels I + III or customer-specific – Special contact length – Also in THTR 	Options <ul style="list-style-type: none"> – Board lock (see page 159) – Contact arrangement (see page 162)
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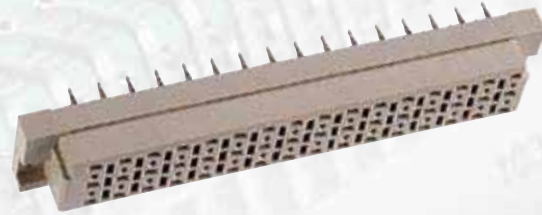
Type E

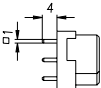
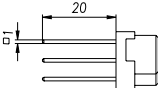
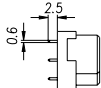
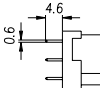
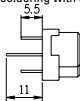
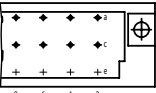
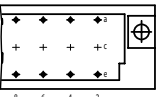
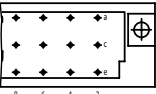
Female connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
			
Part number			
32		108-60054	108-60015
32		108-60044	108-60025
48		108-60084	108-60065

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 208)– Support tool (see page 209)– Coding accessories (see page 160)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length	Options <ul style="list-style-type: none">– Without flange– Contact arrangement (see page 162)
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No. of contacts	Contact arrangement	Solder technology – Performance level II				
		Termination length				
						Manual soldering with solder lug 
Part number						
32		108-40014	108-40015	—	108-40044	108-40046
32		108-40024	108-40025	—	108-40034	108-40036
48		108-40064	108-40065	108-40084	108-40074	108-40076

Accessories

– Coding accessories (see page 160)

On request

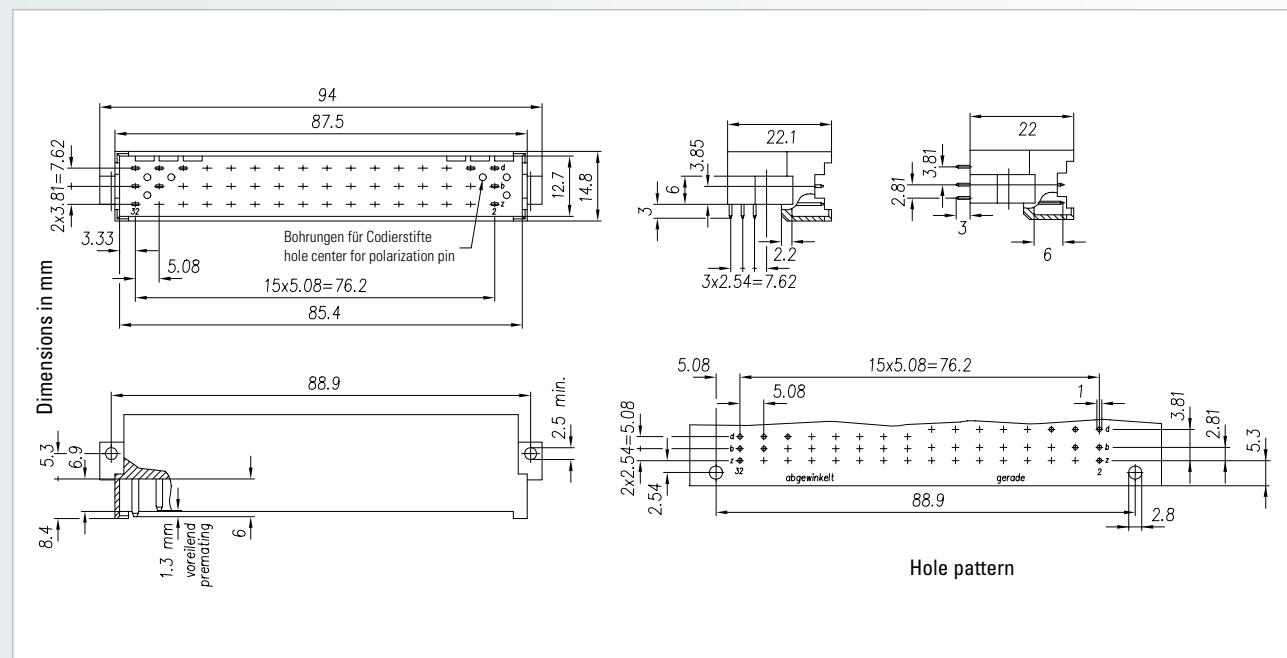
– Performance levels I + III or customer-specific
 – Special contact length
 – Also in THTR

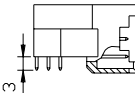
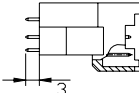
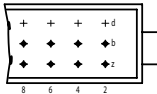
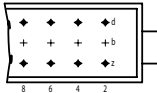
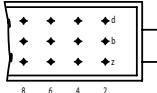
Options

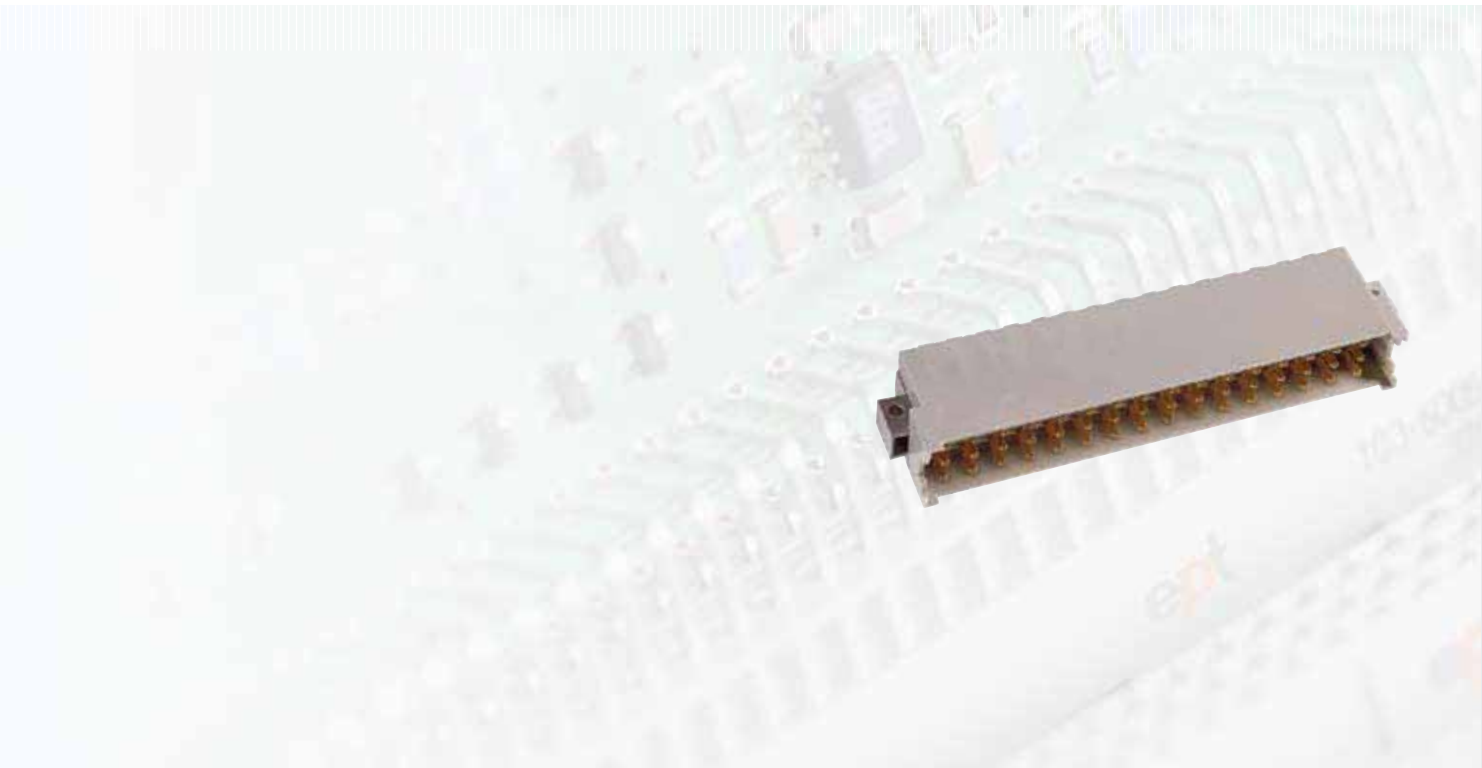
– Board lock (see page 159)
 – Contact arrangement (see page 162)

Type F

Male connector



No. of contacts	Contact arrangement	Solder technology – Performance level II	
		Termination length	
			
Part number			
32		109-40024	109-40025
32		109-40014	109-40015
48		109-40064	109-40065

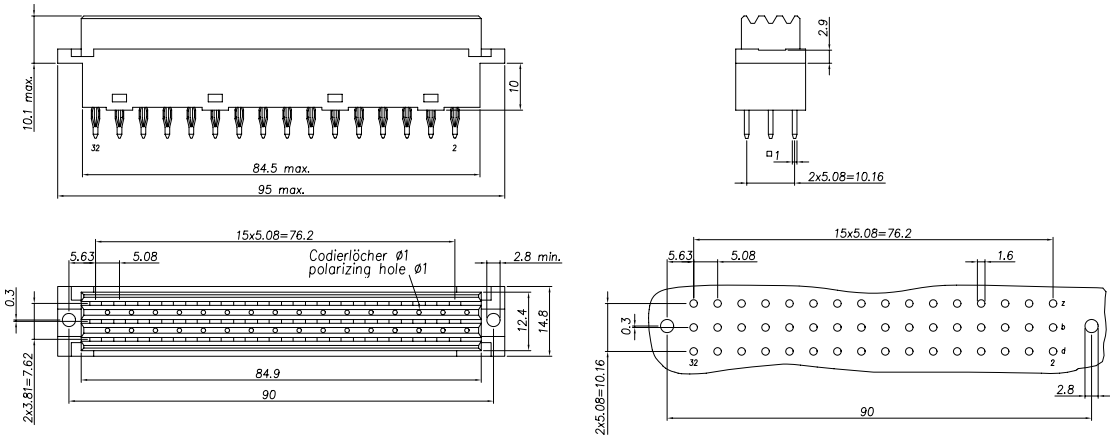


Accessories <ul style="list-style-type: none">– Coding accessories (see page 160)	On request <ul style="list-style-type: none">– Performance levels I + III or customer-specific– Special contact length– Also in THTR	Options <ul style="list-style-type: none">– Board lock (see page 159)– Contact arrangement (see page 162)
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

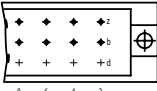
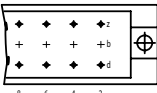
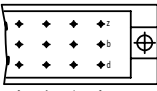
Type F

Female connector

Dimensions in mm



Hole pattern

No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
			
Part number			
32		110-60025	110-60024
32		110-60015	110-60014
48		110-60065	110-60064

Accessories

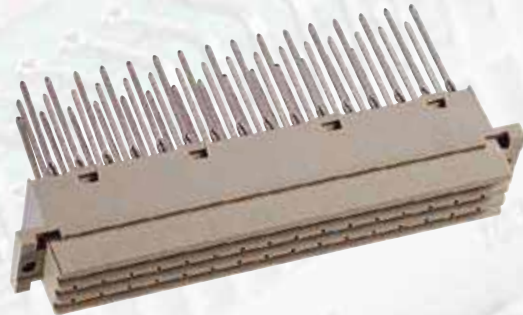
- Press-fit tool (see page 208)
- Support tool (see page 209)
- Coding accessories (see page 160)

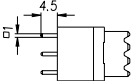

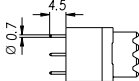
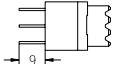
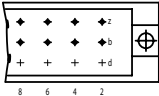
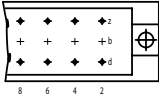
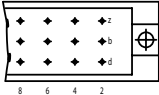
On request

- Performance level I + III or customer-specific
- Special contact length

Options

- Special contact arrangement (see page 162)

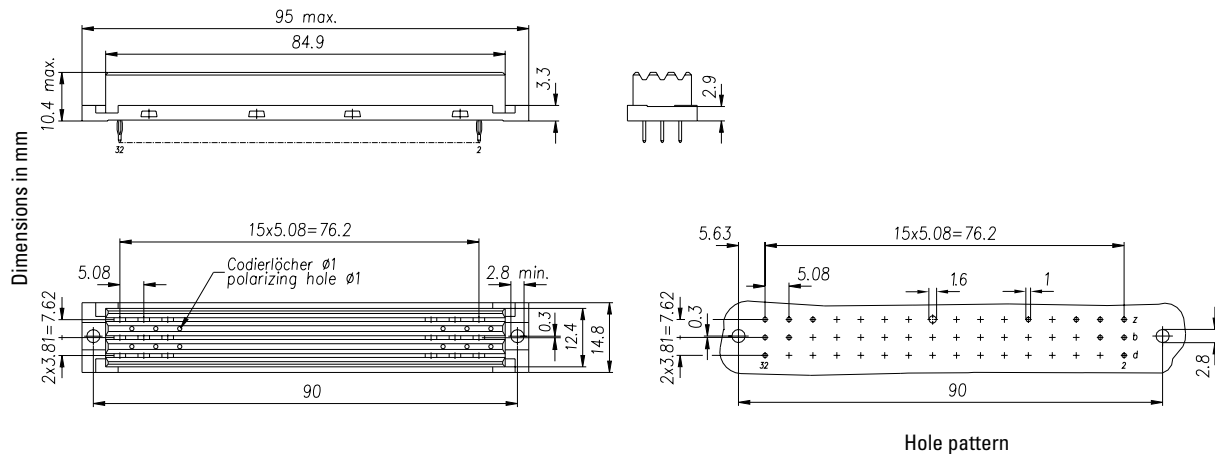


No. of contacts	Contact arrangement	Solder technology – Performance level II			
		Termination length			
					Manual soldering with soldering lug 
Part number					
32		110-40025	110-40024	110-40005	110-40026
32		110-40015	110-40014	110-40004	110-40016
48		110-40065	110-40064	110-40084	110-40066

Accessories – Coding accessories (see page 160)	On request – Performance level I + III or customer-specific – Special contact length – Also in THTR	Options – Special contact arrangement (see page 162)
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Type F low profile

Female connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
Part number			
32		110-61005	110-66025
32		110-61004	110-66015
48		110-61084	110-66065

Accessories

- Press-fit tool (see page 208)
- Support tool (see page 209)
- Coding accessories (see page 160)

On request

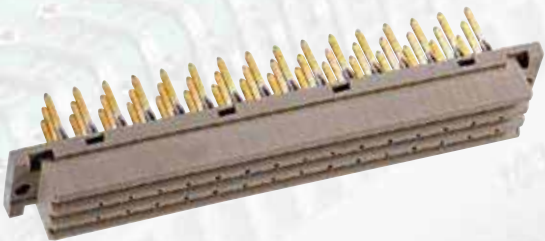
- Performance level I + III or customer-specific
- Special contact length


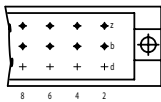
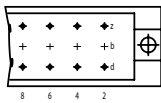
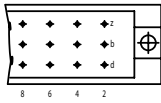
Options

- Without flange
- Special contact arrangement (see page 162)

Note

- * Rear mating zone Ni, Au

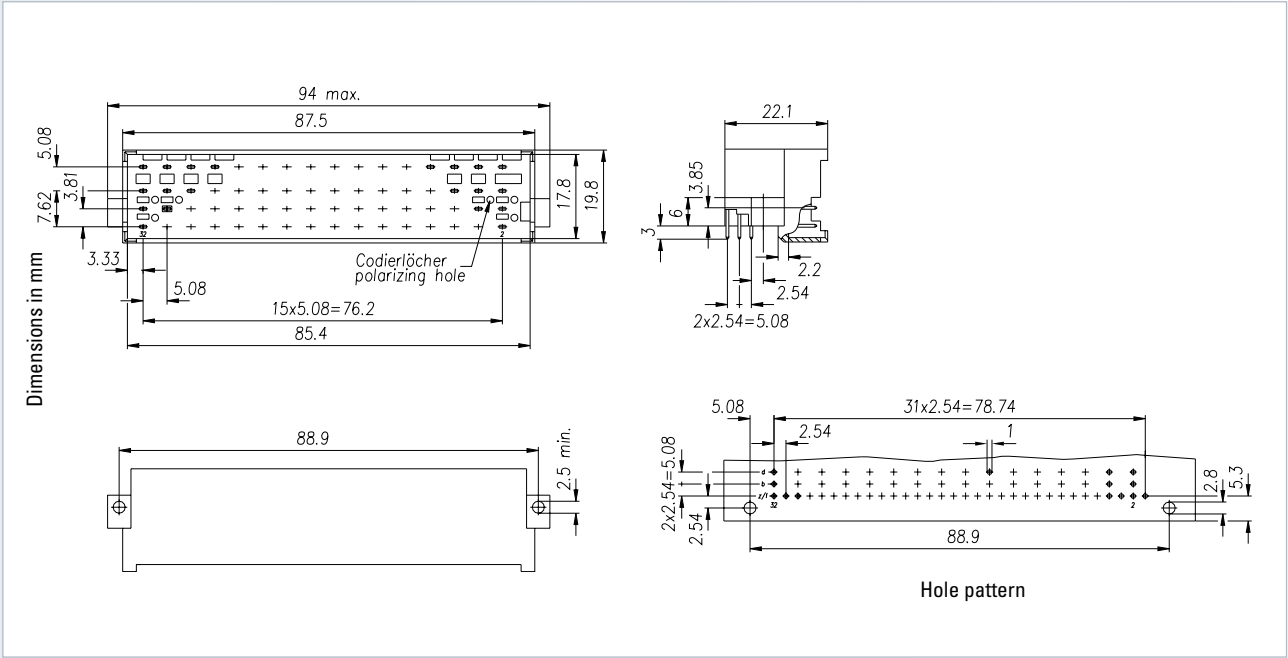


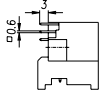
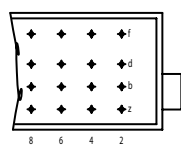
No. of contacts	Contact arrangement	Solder technology – Performance level II
		Termination length
		
		Part number
32		110-40505
32		110-40504
48		110-40584

Accessories – Coding accessories (see page 160)	On request – Performance level I + III or customer-specific – Special contact length – Also in THTR	Options – Board lock (see page 159) – Special contact arrangement (see page 162)
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Type G

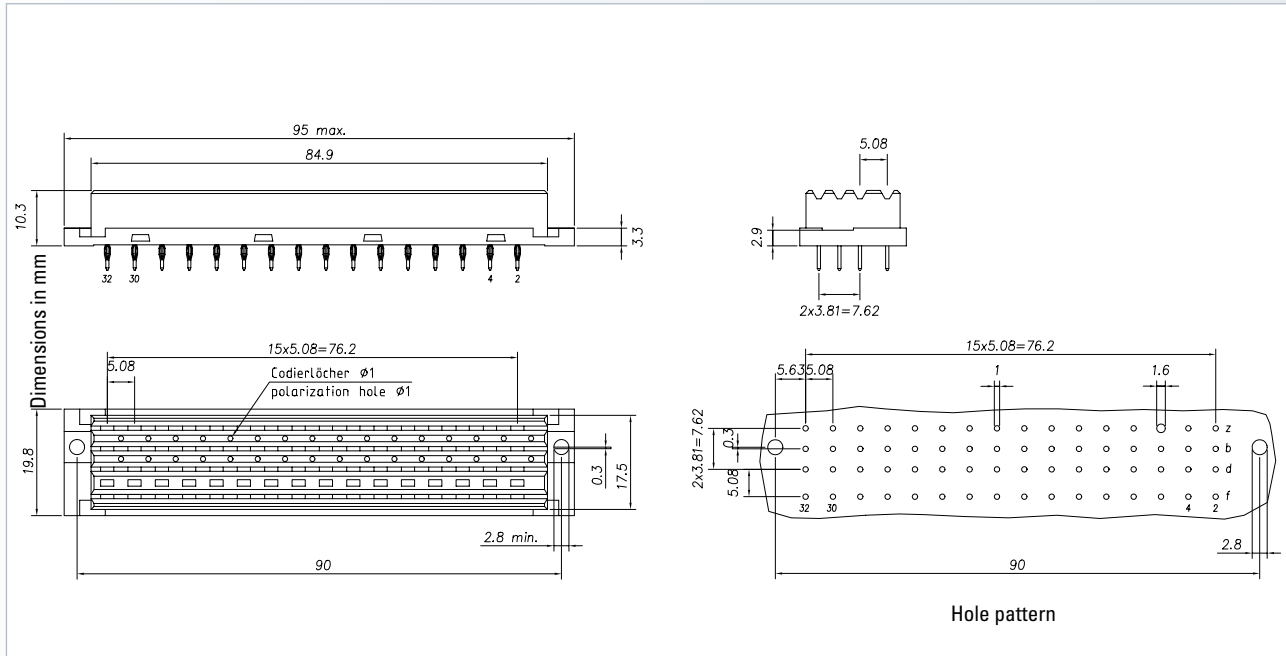
Male connector


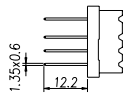
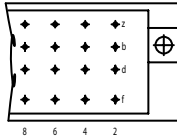


No. of contacts	Pre-mating contact at position	Contact arrangement	Solder technology – Performance level II
			Termination length
			
			Part number
64	Without		111-40064
64	Z 2		111-40164
64	Z 2 and Z 32		111-40264



Accessories – Coding accessories (see page 160)	On request – Performance level I + III or customer-specific – Also in THTR	Options – Board lock (see page 159) – Special contact arrangement (see page 162)
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No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
			
		Part number	
64		112-61084	112-66065

**Accessories**

- Press-fit tool (see page 208)
- Support tool (see page 209)
- Coding accessories (see page 160)

On request

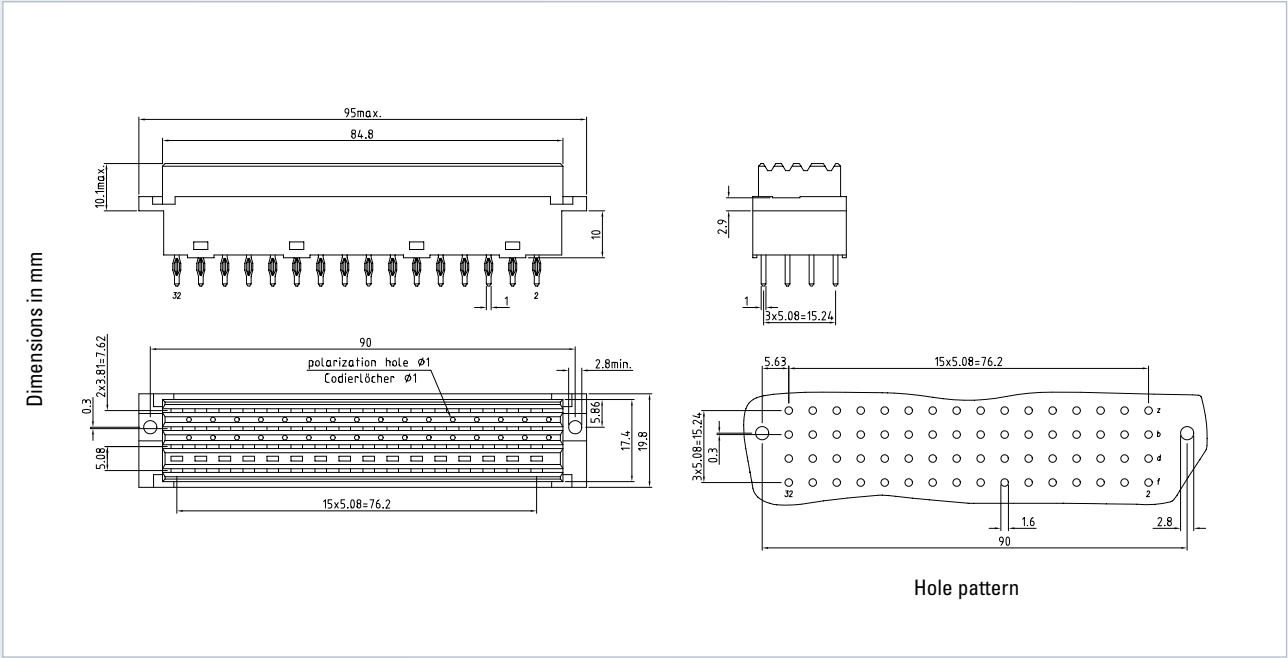
- Performance level I + III or customer-specific
- Special contact length

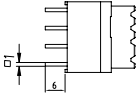
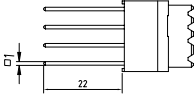
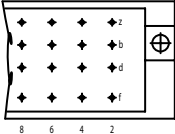
Options

- Without flange
- Special contact arrangement (see page 162)

Type G

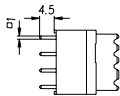
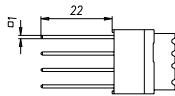
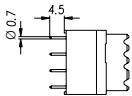
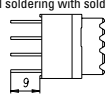
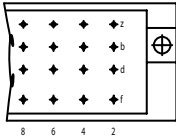
Female connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II	
		Termination length	
			
Part number			
64		112-60064	112-60065

Accessories <ul style="list-style-type: none">– Press-fit tool (see page 208)– Support tool (see page 209)– Coding accessories (see page 160)	On request <ul style="list-style-type: none">– Performance level I + III or customer-specific– Special contact length	Options <ul style="list-style-type: none">– Without flange– Special contact arrangement (see page 162)
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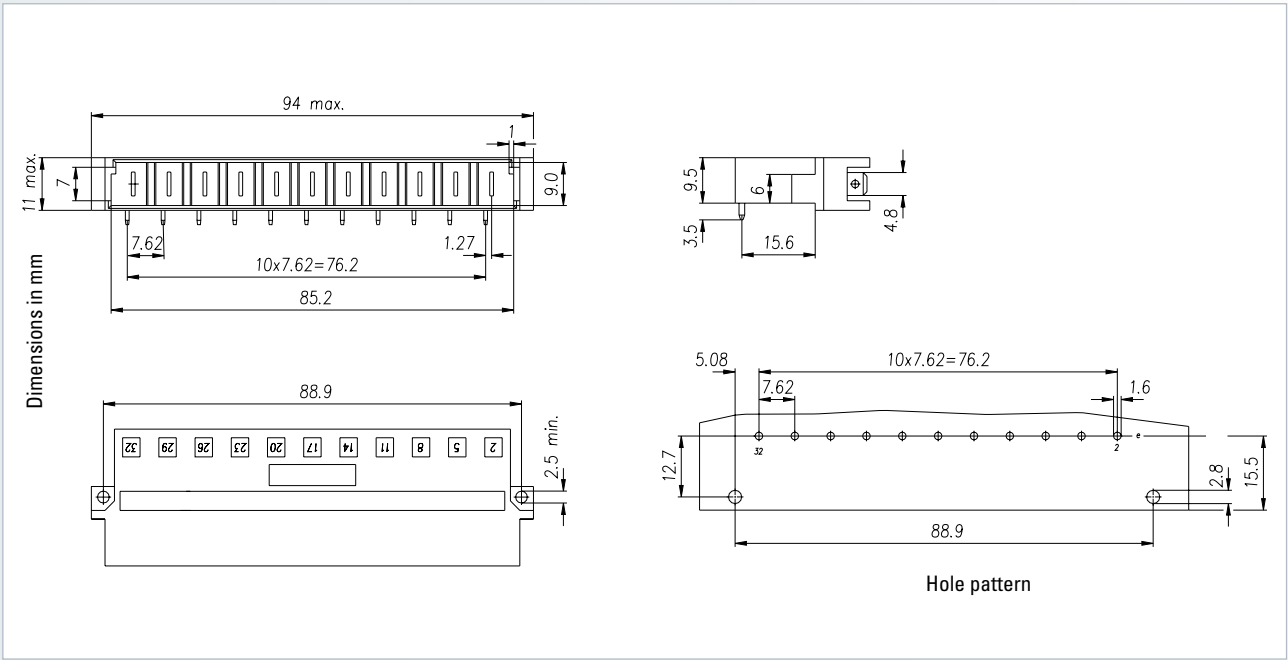


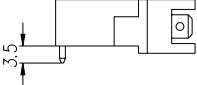
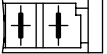
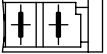
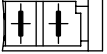
No. of contacts	Contact arrangement	Solder technology – Performance level II			
		Termination length			
					Manual soldering with soldering lug 
Part number					
64		112-40064	112-40065	112-40084	112-40095

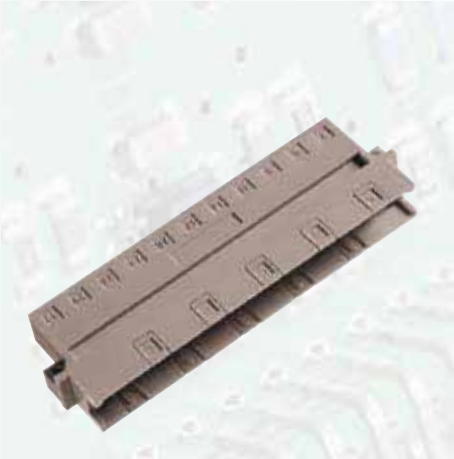
Accessories <ul style="list-style-type: none">Coding accessories (see page 160)	On request <ul style="list-style-type: none">Performance level I + III or customer-specificSpecial contact lengthAlso in THTR	Options <ul style="list-style-type: none">Board lock (see page 159)Special contact arrangement (see page 162)
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Type H11

Male connector

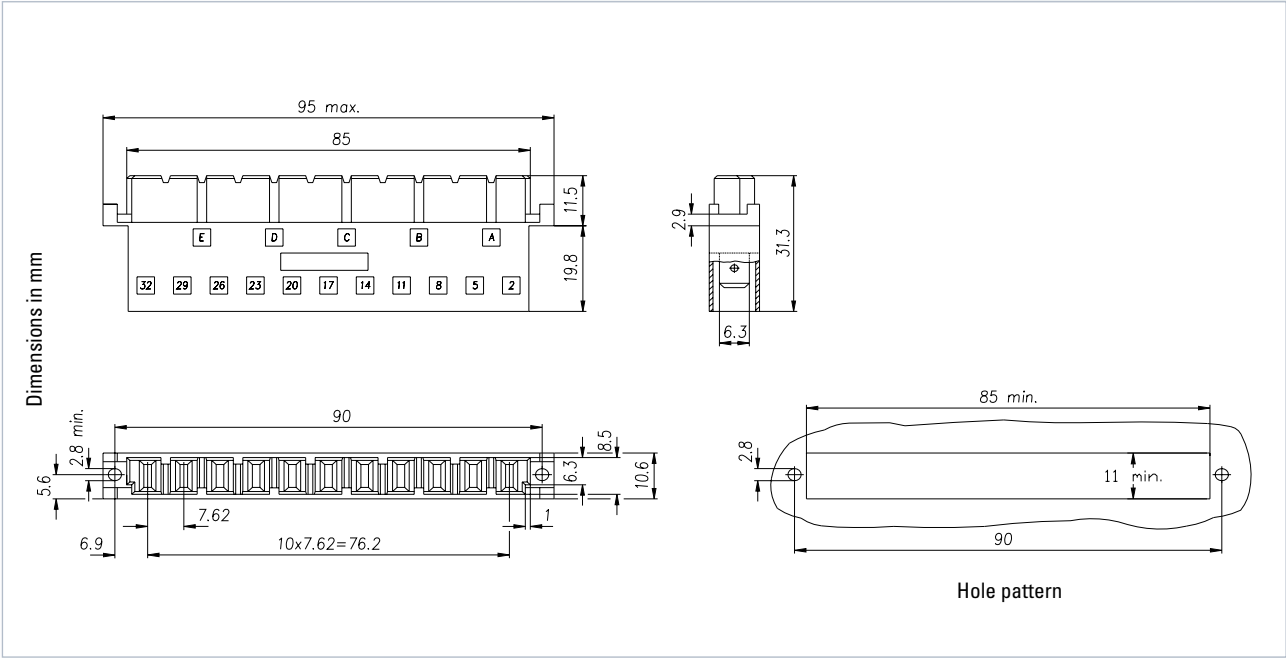


No. of contacts	Pre-mating contact at position	Contact arrangement	Solder technology – Performance level II
			Termination length
			 Part number
11	Without		113-40010
10+1	32		113-40015
9+2	2; 32		113-40020

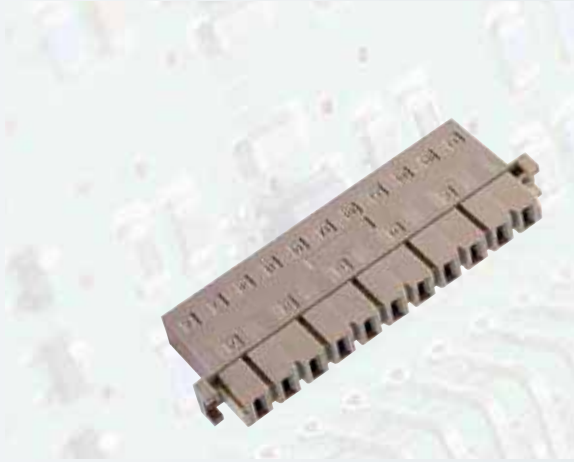


Accessories

– Coding accessories (see page 160)



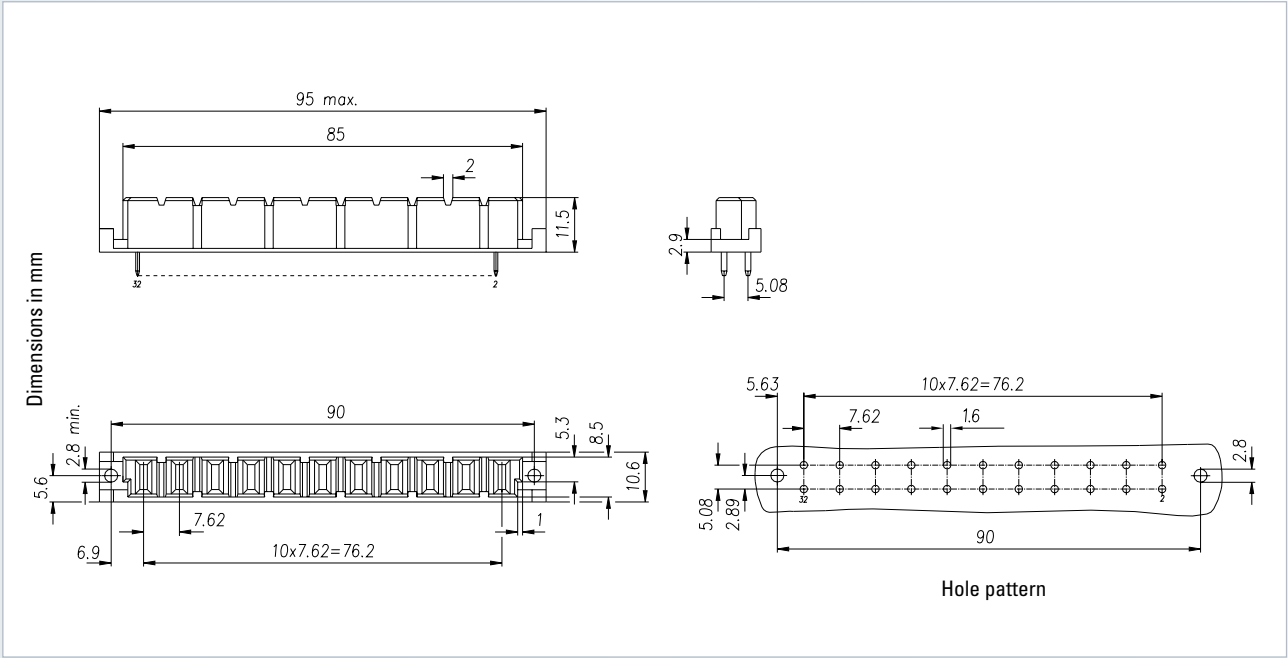
No. of contacts	Contact arrangement	Faston – Performance level II
		Termination length
11		
		Part number
		114-40040

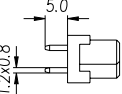



Accessories
– Coding accessories (see page 160)

Type H11 low profile

Female connector



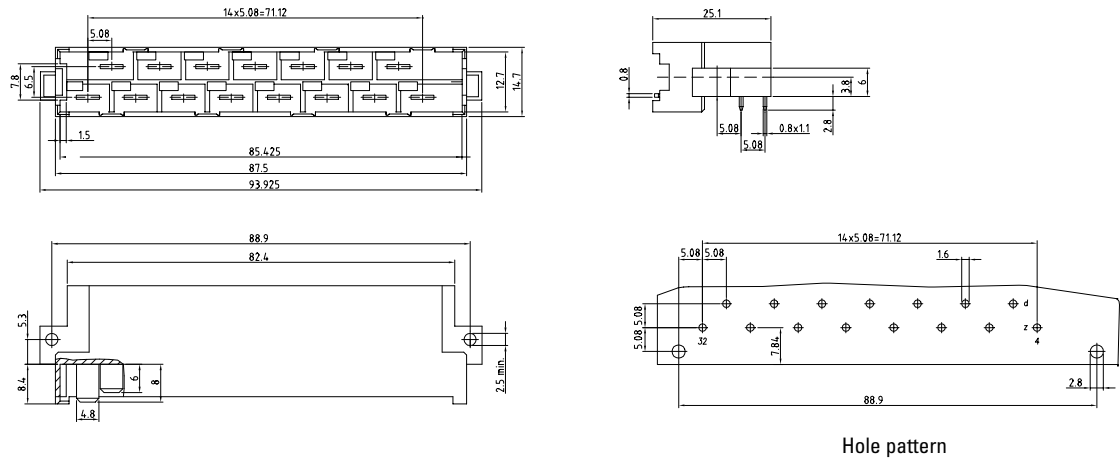
No. of contacts	Contact arrangement	Solder technology – Performance level II	
		Termination length	
			
		Part number	
11		114-40050	



Accessories

– Coding accessories (see page 160)

Dimensions in mm



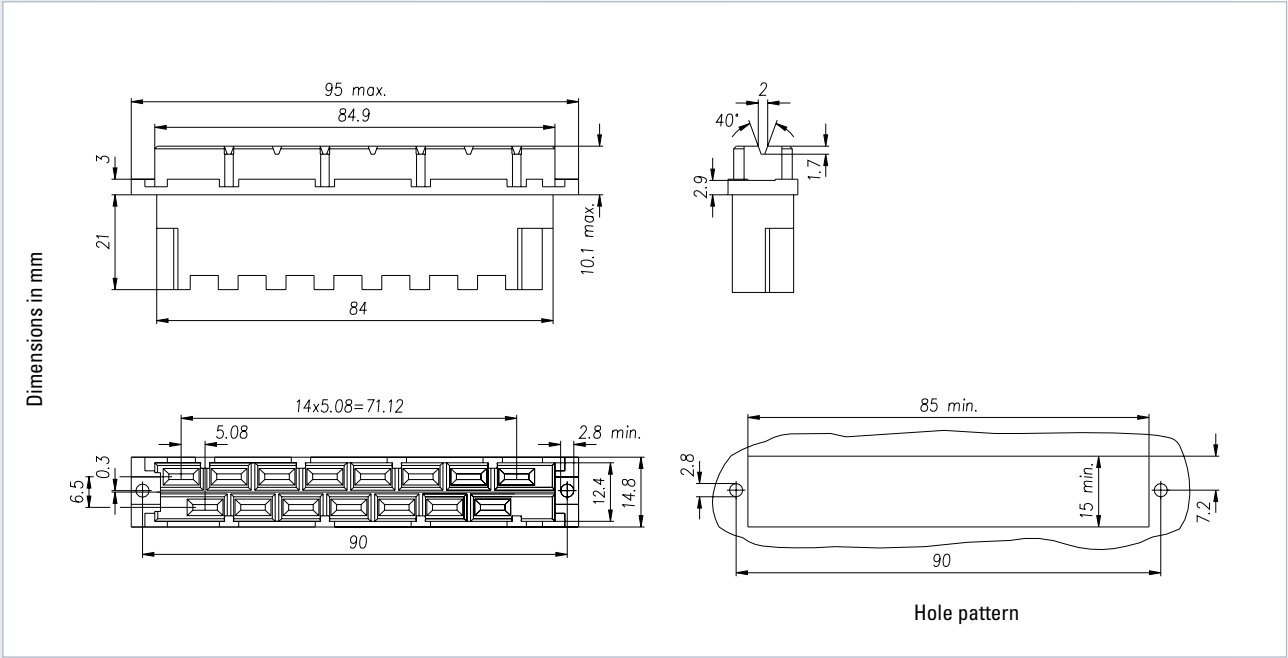
No. of contacts	Pre-mating contact at position	Contact arrangement	Solder technology – Performance level II
			Termination length
			Part number
15	Z 32		113-40060
15	Z 4 and Z 32		113-40160



Options
– Board lock (see page 159)

Type H15

Female connector

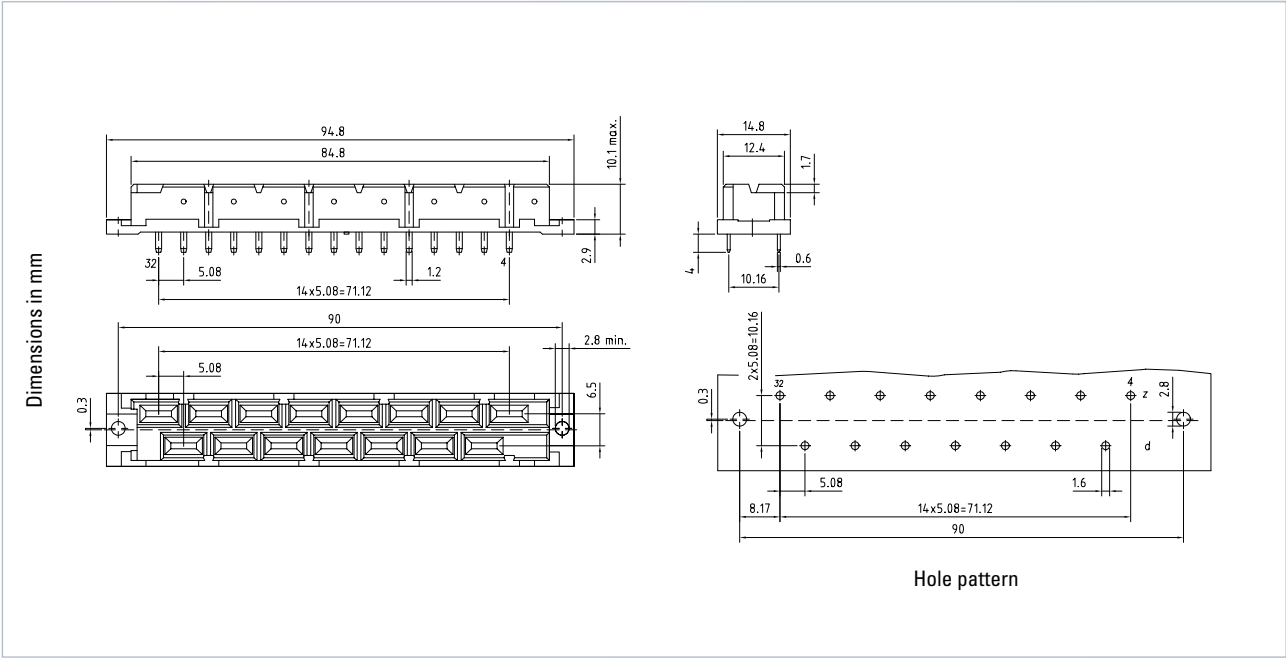



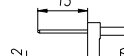

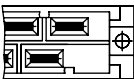
No. of contacts	Contact arrangement	Faston – Performance level II
		Termination length
15		Part number
		114-40060



Options

– Board lock (see page 159)



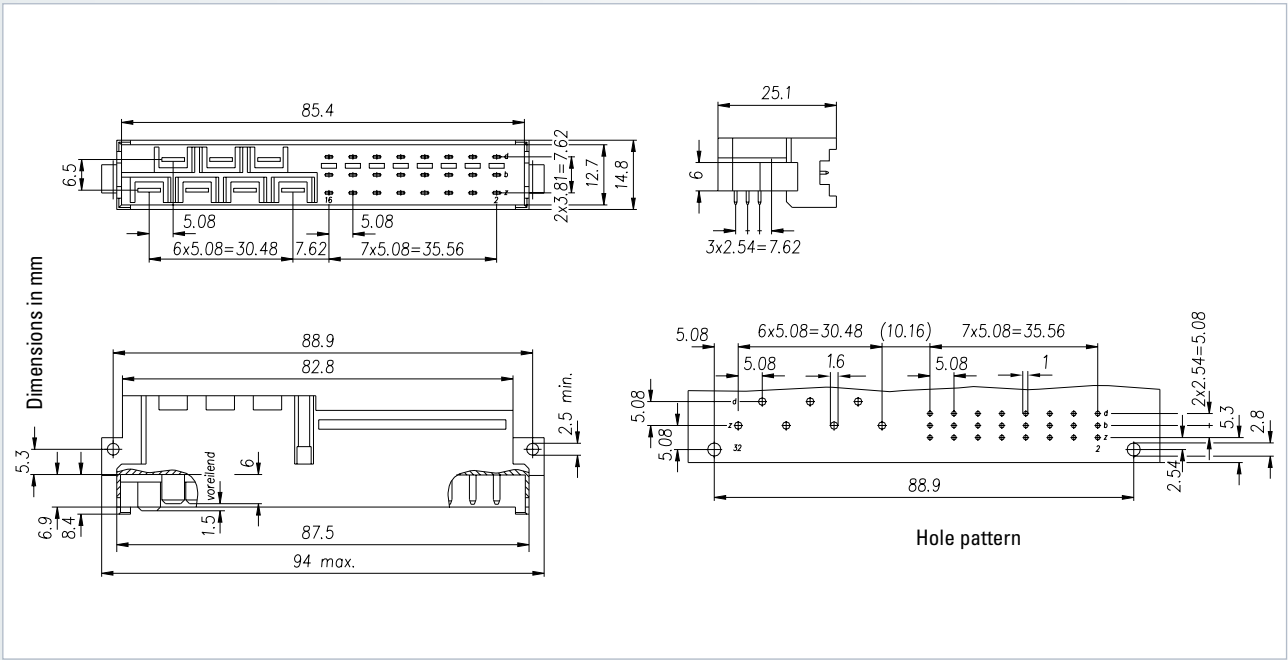
No. of contacts	Contact arrangement	Solder technology – Performance level II		
		Termination length		
				Manual soldering with soldering lug 
Part number				
15		114-40080	114-40090	114-40100

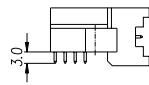
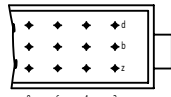


Options
– Board lock (see page 159)

Type H7/F24

Male connector

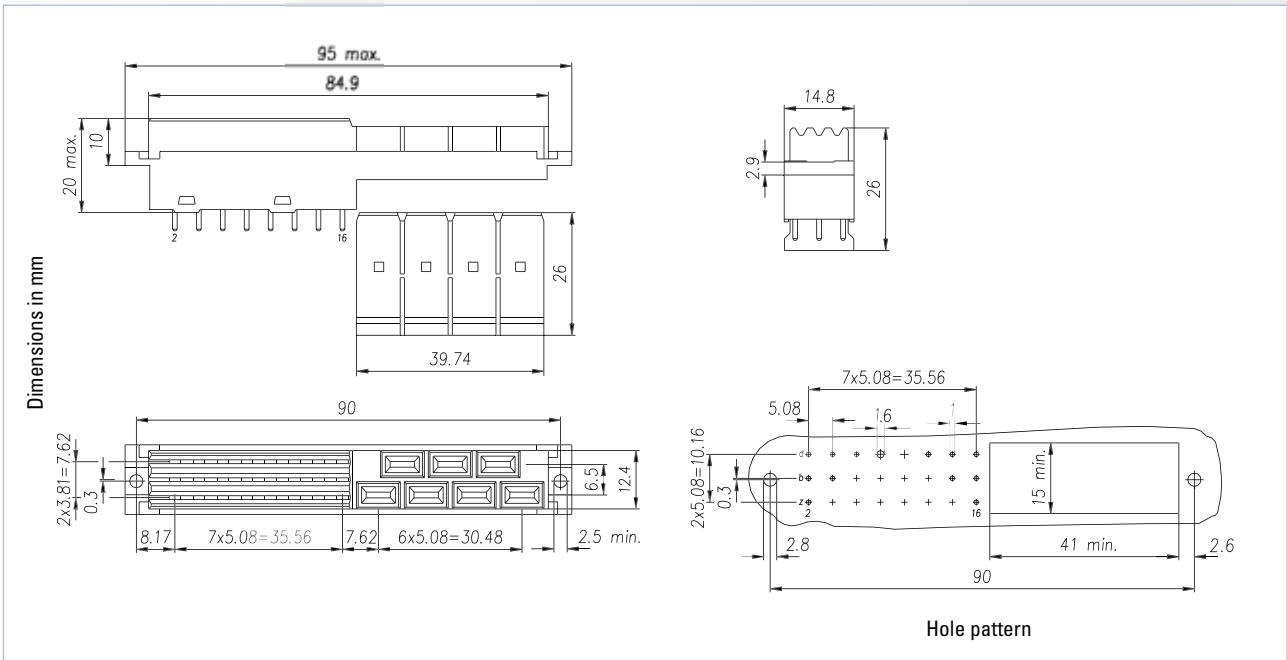


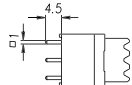
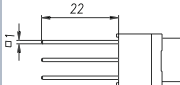
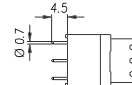
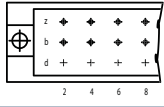
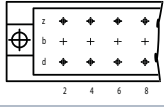
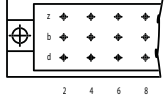
No. of contacts	Pre-mating contact at position	Contact arrangement	Solder technology – Performance level II
			Termination length
			
			Part number
7+24	Z 32		117-40164



Options

- Board lock (see page 159)



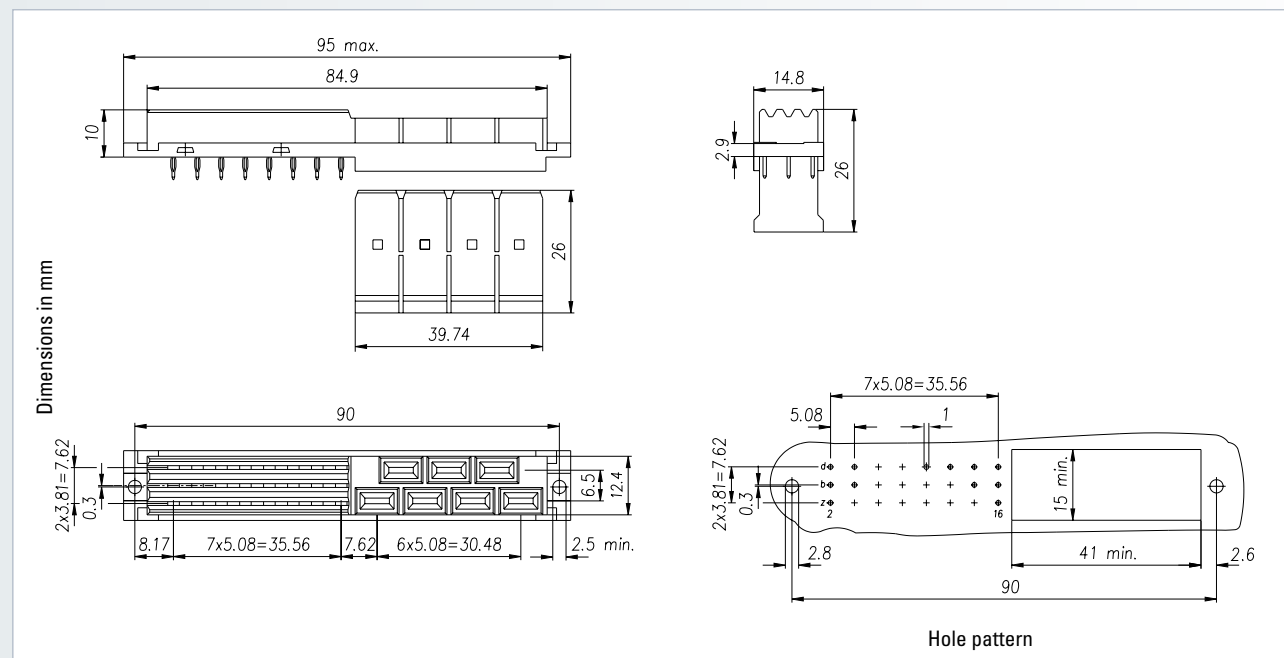
No. of contacts	Contact arrangement	Solder technology – Performance level II		
		Termination length		
				
Part number				
16		118-40025	118-40024	118-40005
16		118-40015	118-40014	118-40004
24		118-40065	118-40064	118-40084



On request <ul style="list-style-type: none">– Performance level I + III or customer-specific– Special contact length– Also in THTR– Crimp contacts	Options <ul style="list-style-type: none">– Special contact arrangement (see page 162)
---	---

Type H7/F24 low profile

Female connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level II
		Termination length
Part number		
7+16		118-60016
7+16		118-60006
7+24		118-60084


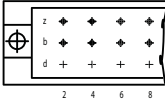
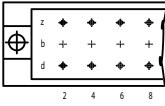
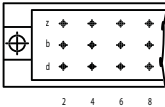
On request

- Performance level I + III or customer-specific
- Special contact length
- Crimp contacts
- Press-fit tool
- Support tool

Options

- Without flange
- Special contact arrangement



No. of contacts	Contact arrangement	Solder technology – Performance level II
		Termination length
		
		Part number
7+16		118-40505
7+16		118-40504
7+24		118-40584

On request

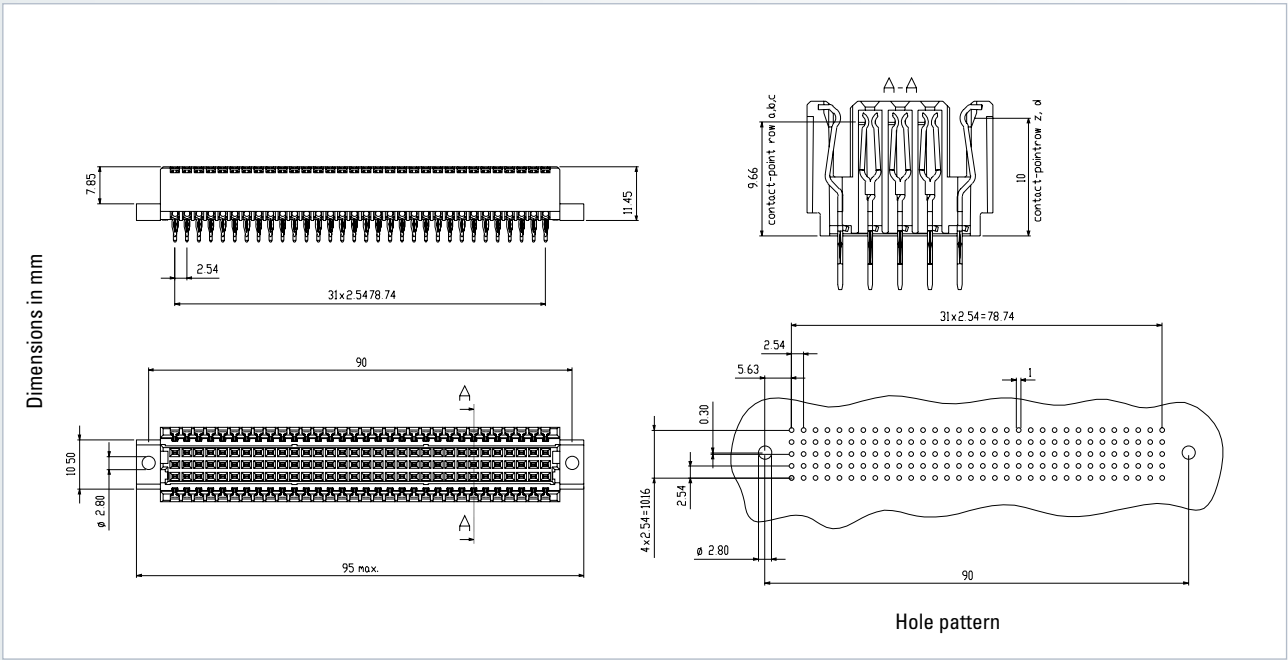
- Performance level I + III or customer-specific
- Special contact length
- Also in THTR
- Crimp contacts


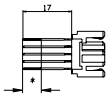
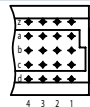
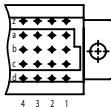
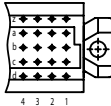
Options

- Board lock (see page 159)
- Special contact arrangement (see page 162)

Type VME 64x

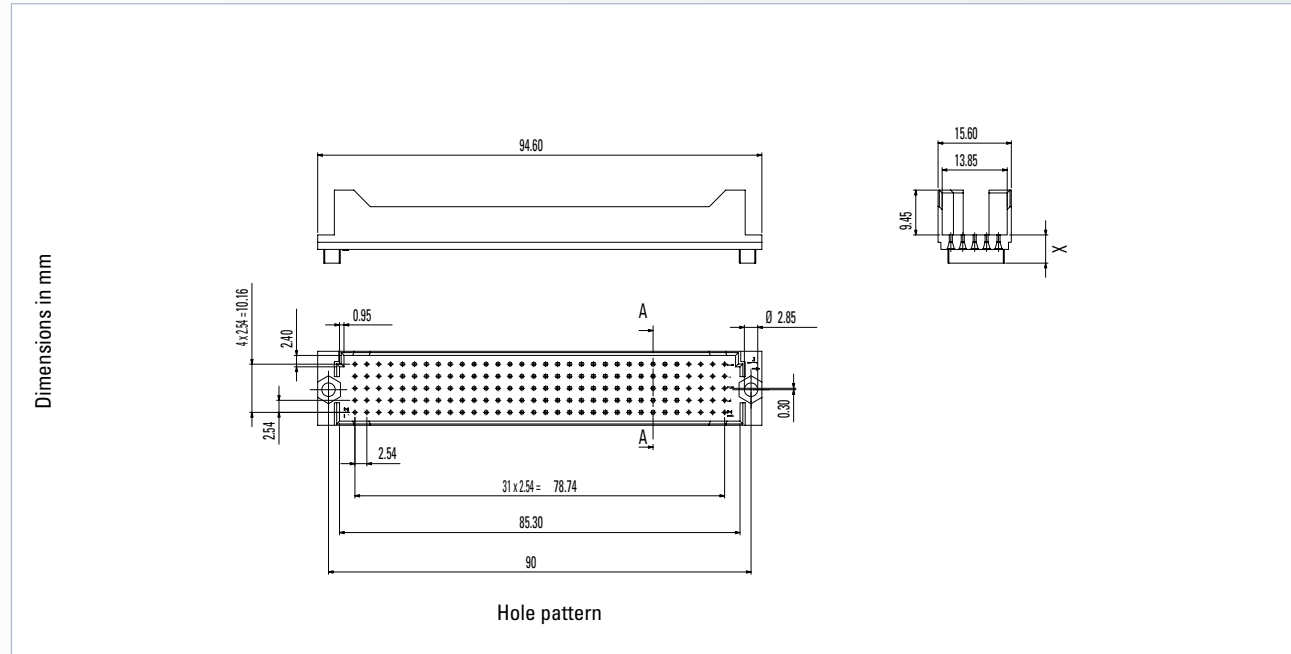
Female connector



No. of contacts	Contact arrangement	Press-fit technology – Performance level I	
		Termination length	
			
Part number			
160		306-61067-12	306-66069-14
160		306-60067-12	306-65069-14
160		306-62067-12	306-67069-14



Accessories <ul style="list-style-type: none">– Press-fit tool (see page 208)– Support tool (see page 209)– Shroud (see page 153)	On request <ul style="list-style-type: none">– Performance level II + III or customer-specific– Special contact length	Note <ul style="list-style-type: none">– * Rear mating zone Ni, Au
--	--	---



PCB thickness	X	Post length	Part number
			VME 64
3.4 mm	6.0 mm	17 mm	315-15401
4.6 mm	4.8 mm	17 mm	315-15402

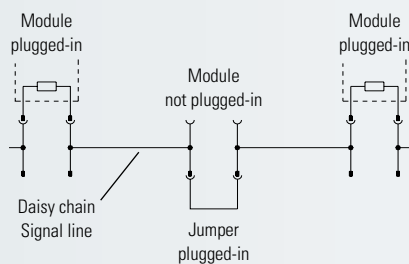
**On request**

– Different designs and
special types

Switching connectors – female connector with integrated switches

Problem

A principle often used for different bus systems is the looping-through of signal lines via module boards, the so-called "daisy chaining".



This daisy chaining, however, leads to a new problem, which becomes obvious when one of the modules is pulled from the system: The daisy chain signal connection is broken and must be re-established using jumpers. This is not easy as the modules are located close to each other in the rack. More often a large part of the housing must be taken apart or the whole endeavour of placing the jumper on the correct pins results in "nerve-wracking fumbling". Mistakes and therefore mispositionings can happen.

A possible solution

The integration of switches into a standard connector according to IEC 60603-2, e.g. into a female connector type C, is a simple and elegant solution for the problem described. The contact springs of this C female connector were extended by wing-like contact tabs. A gold-plated metal disk is located between the contact springs. In rest position, with the male connector not plugged-in, the adjacent contact springs are short-circuited through placing of the contact tabs on the metal disk. With the male connector plugged-in, the contact springs are separated from each other through the contact pins of the male connector. The contact tabs of the spring are lifted off the metal disk. This interrupts the connection between the two springs. Due to the switching behavior of the C female connector, the daisy chain connection is automatically closed when the module board is pulled out. Function-wise the closed switching contact between two contact springs corresponds to a jumper automatically

being plugged in when the male connector is pulled out.

Application in the VME bus

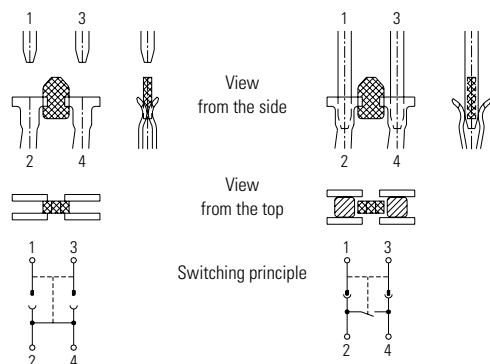
The daisy chaining principle is used for the IACK and BG 0...3 signal lines in the VME bus.

By integrating a switching function at the positions of the respective signal lines in the connector, the jumpers used so far are no longer required.

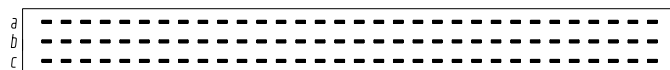
Further applications

The integrated switching function is not restricted to the positions in the C female connector stated above. A switch can be integrated between any positions in the a, b and c rows of a C female connector IEC 60603-2 and/or between the a and c rows of a C female connector IEC 60603-2. A further application for ept switching connectors are e.g. network concentrators (hubs). In this application, too, the daisy chaining is carried out fully automatically via customer-specific switching connectors.

Functional principle of the switching connectors

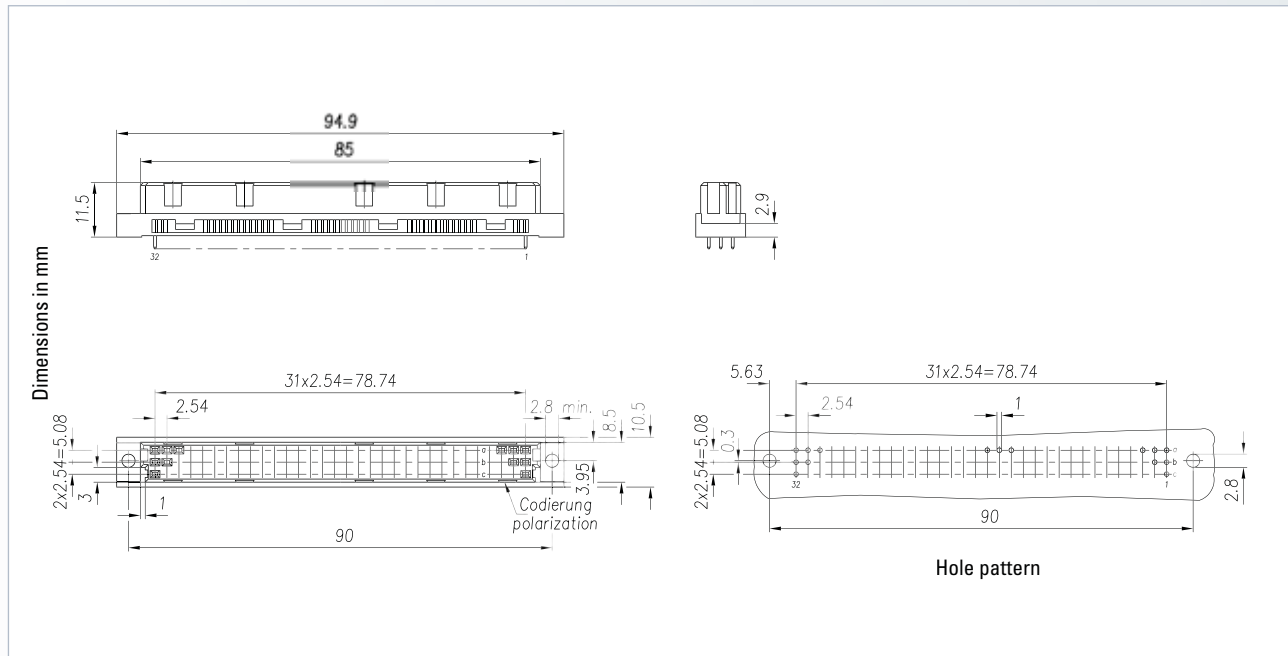


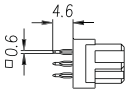
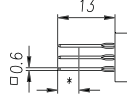
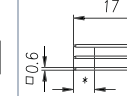
Switching contacts in rows



Switching contacts across rows





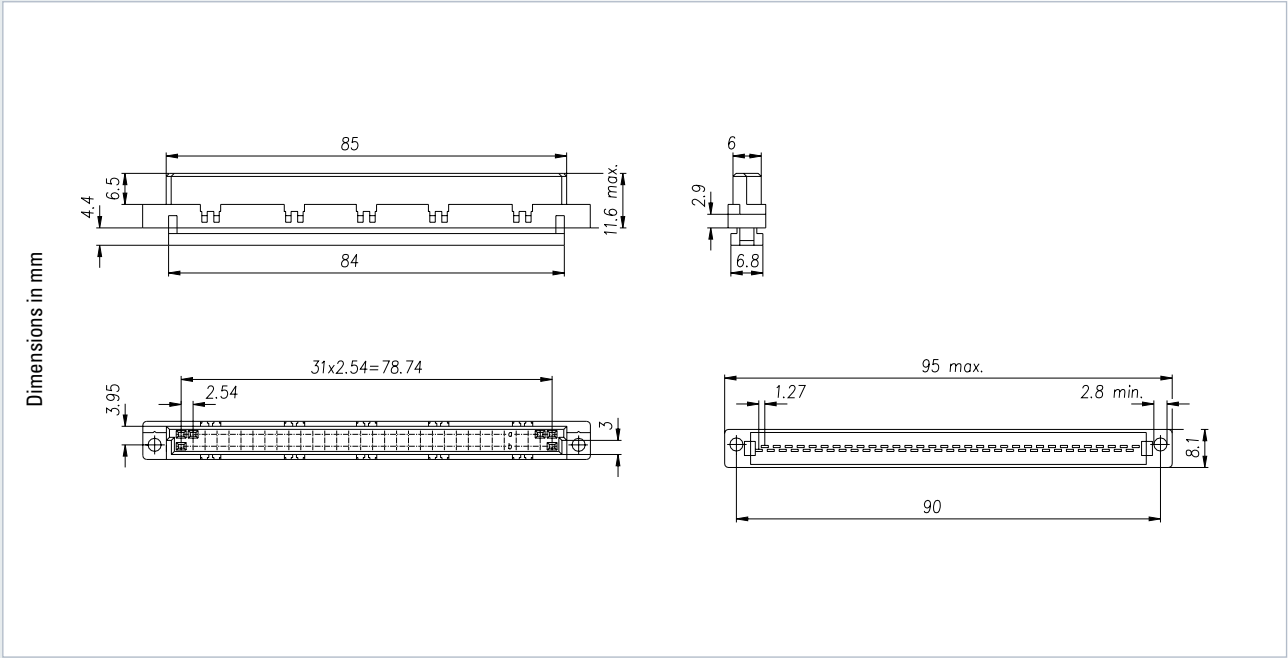
No. of contacts	Switching contacts at position	Press-fit technology – Performance level II		
		Termination length		
				
		Part number		
96	a21 – a22, b4 – b5, b6 – b7, b8 – b9, b10 – b11 for VME	104-60464-xx	104-65465-xx	104-65466-xx
96	a – c 1, 2, 3, 4, ..., 32	104-60565-xx	104-65565-xx	104-65566-xx

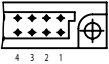


Accessories <ul style="list-style-type: none"> – Press-fit tool (see page 208) – Support tool (see page 209) – Coding accessories (see page 160) 	On request <ul style="list-style-type: none"> – Performance level I + III or customer-specific – Special termination length 	Options <ul style="list-style-type: none"> – Without flange – Special contact arrangement (see page 162) – Customer-specific switching bridge positions (see page 163)
Note <ul style="list-style-type: none"> – * Rear mating zone Ni, Au 	Ordering note <ul style="list-style-type: none"> – PCB 1.5 to 2.0 mm = xxx-xxxxx-01 termination length = 3.2 mm – PCB 2.0 to 2.8 mm = xxx-xxxxx-02 on request – PCB > 2.8 mm = xxx-xxxxx-03 termination length = 4.6 mm 	

IDC: type B and technical specifications

Female connector



No. of contacts	Contact arrangement	IDC Performance level II
		Part number
64		102-49064

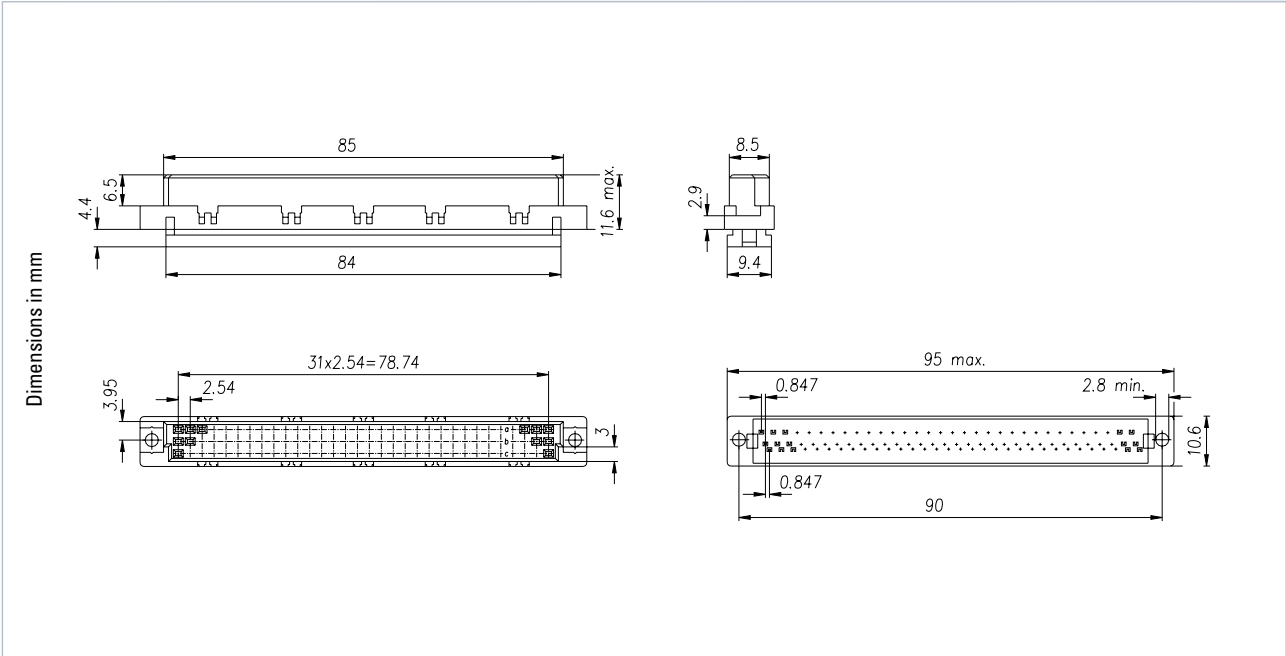
On request <ul style="list-style-type: none">– Strain relief bracket– Ribbon cable	Options <ul style="list-style-type: none">– Also available in solder/press-fit technology (see page 86)
--	--

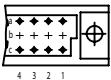
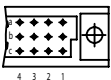


Technical specifications IDC

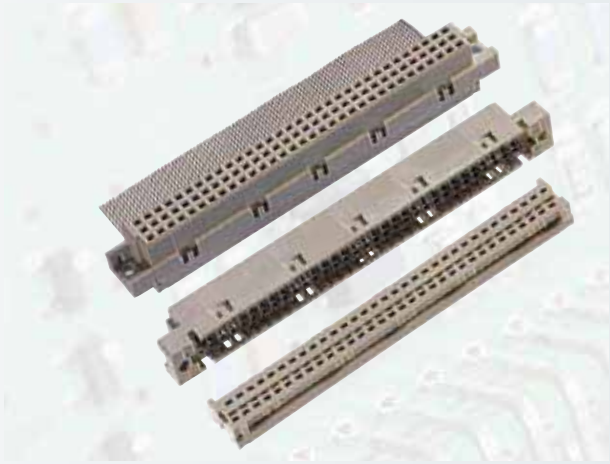
Connections	IDC
Insulator material	Polyester, self-extinguishing UL 94 V0
Temperature range	– 55 °C to + 125 °C
Capacity	approx. 0.5 – 1 pF
Operational current	1 A at 20 °C

Operational voltage	220 V, 50 Hz
Test voltage	500 V/1.27 mm; 350 V/0.84 mm
Contact resistance	≤ 30 mΩ
Insulation resistance	≥ 10 ⁶ MΩ
Environment	RoHS compliant



No. of contacts	Contact arrangement	IDC Performance level II
		Part number
64		104-49054
96		104-49064

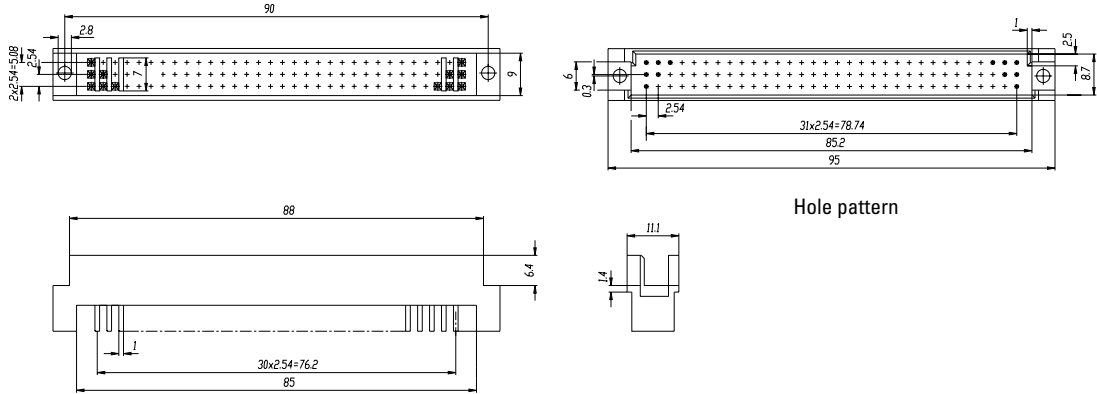
On request <ul style="list-style-type: none">– Strain relief bracket– Ribbon cable	Options <ul style="list-style-type: none">– Also available in solder/press-fit technology (see page 98)
--	--



Accessories

Shroud

Dimensions in mm



PCB thickness	Post length	Part number			
		C/R with nut	C/R	C/R self-retaining	C/R self-retaining without flange
2.4	13 mm	—	115-15401	—	—
2.4	17 mm	—	115-15301	—	—
3.2	13 mm	115-15701	115-15402	115-15405	115-15408
3.2	17 mm	115-15702	115-15302	—	—

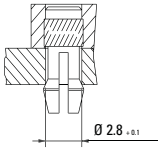

On request
– Different designs and special types



Board lock

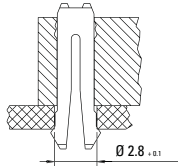

As an alternative to the rivet and/or screw fastening of the male and/or female connectors to the PCBs, connectors can also be mounted and held onto PCBs using board lock's. The connector with the board lock is pressed onto the PCB to be equipped. The board locks either lock into place or are under

tension. The connections are strong enough to hold the connector onto the PCB during the soldering process. Using plated mounting holes, soldering the board locks also essentially improves the strain relief of the connector during insertion and/or withdrawal.

Suitable for connectors with type B, C, D, E, F low profile, G low profile female connectors and R male connectors					
					
Forces Type of insertion	F_m	not soldered F_h	soldered F_h	Part number	PCB thickness
Locked	< 20 N	> 10 N	> 25 N	xxx-xxxxxC1	1.6 mm
Under tension	< 20 N	> 5 N	> 25 N	xxx-xxxxxC2	2.4 mm
				xxx-xxxxxC3	3.6 mm

F_m : max. mounting force per board lock
 F_h : min. retention force per board lock

Ordering example: C-FL/PCB 1.6 mm, part number 104-40014C1

Suitable for connectors with type B, C, D, E, F, G male connectors and R female connectors					
					
Forces Type of insertion	F_m	not soldered F_h	soldered F_h	Part number	PCB thickness
Locked	< 30 N	> 10 N	> 20 N	xxx-xxxxxC1	1.6 mm
Under tension	< 30 N	> 7.5 N	> 20 N	xxx-xxxxxC2	2.4 mm
				xxx-xxxxxC3	3.6 mm

F_m : max. mounting force per board lock
 F_h : min. retention force per board lock

Ordering example: C-ML/PCB 1.6 mm, part number 103-40014C1

Coding without loosening contacts

Type B and C

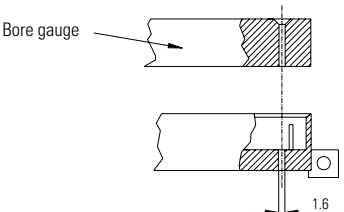
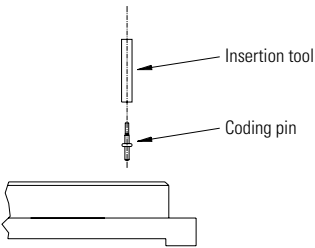
The integrated coding of the connectors with type B and C prevent that the wrong modules are plugged in. For coding, coding wedges are inserted

into the female connector and matching parts are broken out of the insulator material of the male connector with coding pliers.

Coding	Coding star (4 coding wedges)	Coding pliers
<div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></d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Type D, E and F

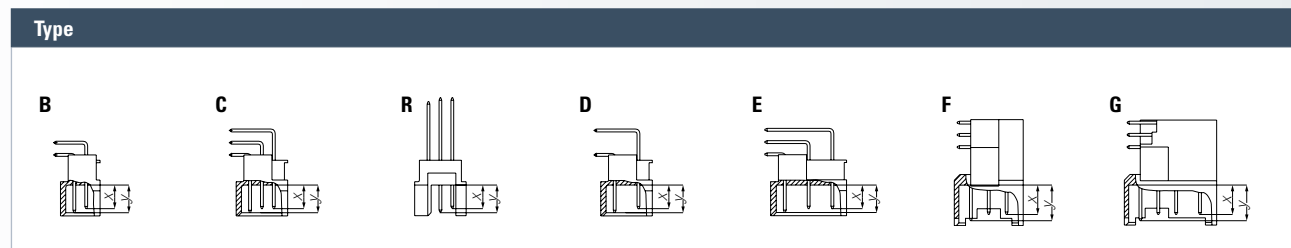
With connectors with type D, E and F holes can be drilled into the male connector and pins can be inserted into the female connector in matching positions.

Male connectors	Female connectors								
Drill coding hole with gauge.	Insert coding pin into the coding hole using the insertion tool.								
									
	<table> <tr> <th>Part number – coding pin</th><th>Packaging unit</th></tr> <tr> <td>106-10001</td><td>100 items</td></tr> <tr> <th>Part number – insertion tool</th><td></td></tr> <tr> <td>894-302</td><td></td></tr> </table>	Part number – coding pin	Packaging unit	106-10001	100 items	Part number – insertion tool		894-302	
Part number – coding pin	Packaging unit								
106-10001	100 items								
Part number – insertion tool									
894-302									

Pre-mating and late-mating contacts

For DIN type B, C, R, D, E, F, G

The pre-mating contact can – as special contact arrangement – be inserted into any desired position.



Type	Standard (X)	Pre-mating (Y)					Late-mating (Y)	
		+ 0.8 mm	+ 1.0 mm	+ 1.3 mm	– 0.4 mm	– 0.8 mm		
B, B/2, B/3, C, C/2, C/3	4.9	–	5.9	–	–	4.1		
R, R/2, R/3	Mating side	4.9	5.9	–	4.5	4.1		
	Termination side	13.0	13.8	–	12.6	12.2		
D	4.9	5.7	–	–	–	–		
E (grid 2.54 mm)	4.9	5.7 Rows a, c, e	–	–	–	–		
E (grid 5.08 mm)	4.9	5.7 Row a	–	–	–	–		
F, G	6.1	–	–	7.4	–	–		

On request

– Other lengths possible for pre-mating and late-mating

Description of the special types – pre-mating and/or late-mating contacts – selective loading

Basic connectors according to DIN 41612 / IEC 60603-2: types B, C, R, D, E, F, G

Company		Phone
First name	Name	Fax
Address		
Signature		

Estimated quantity required:

Number of required samples:

Basic connectors according to the
ept catalog
ept part number:

				-						-	

Type B, C, R female connector:

A 3x32 grid with columns numbered 1 to 32. Vertical lines are drawn after column 10 (labeled $\frac{1}{3}$) and after column 16 (labeled $\frac{1}{2}$). The bottom right corner is labeled B.E.

Type B, C, R male connector:

Connector side

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
a																																	
b																																	
c																																	

A, B, D, E

Rear side

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
a																																
b																																
c																																

A, D, E

Type D, E:

- ☐ Female connector
☐ Male connector

	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	
a																	
c																	
e																	

A. B

Type F, G male connector:

- ☐ Female connector
☐ Male connector

[illegible]

x = Standard
empty = not loaded

a = 0.8 mm pre-mating
b = 1.0 mm pre-mating
c = 1.3 mm pre-mating

d = 0.4 mm late-mating
e = 0.8 mm late-mating
f = 1.0 mm late-mating

Fax request

Female connector type C with integrated switching contacts at customer-specific positions

Company		Phone
First name	Name	Fax
Address		
Signature		

Estimated quantity required:

Number of required samples:

Basic connectors according to the
ept catalog
ept part number:

Type C female connectors:

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
a																																
b																																
c																																

- ☐ Switches in rows
☐ Switches across rows

Ordering example:

Switches in rows


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
a																																
b																																
c																																

Switching position at: a1 – a2, b3 – b4, b5 – b6, a8 – a9 – a10, c8 – c9

Switches across rows

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
a																																
b																																
c																																

Switching position at: a1 – c1, a3 – c3, a4 – c4, a7 – c7, a8 – c8



PC/104, PC/104-*Plus*,
VarPol connectors

Definitions	166
Technical specifications	168
Hole specifications	169
PC/104	170
PC/104-Plus	172
Accessories: PC/104 and PC/104-Plus	174
VarPol angled pin header	175
VarPol straight pin header	176
VarPol female connector	178
Socket connector	180

PC/104 and PC/104-Plus

Simply stack it – with ept press-fit technology

PC/104 is a standard for PC-compatible modules which are intermateable to set up a complete computing system. The PC/104 ensures complete hardware and software compatibility, is extremely compact (96 mm x 90 mm), and comes with a standardized PC/104 Bus (ISA). Due to this standardization, different PC/104 cards can be combined to implement a defined task.

Based on PC/104, many different boards are offered such as:

- Complete single-board computers
- I/O boards for digital or analog I/O
- Boards for CAN, Profibus, LON, Ethernet
- PCMCIA boards

Since more powerful components are available, the PC/104 systems had to be supplemented with a faster bus system. The PC/104 system was supplemented with the PCI bus and thus it was further developed. This supplement is described in the *PC/104-Plus* specification.

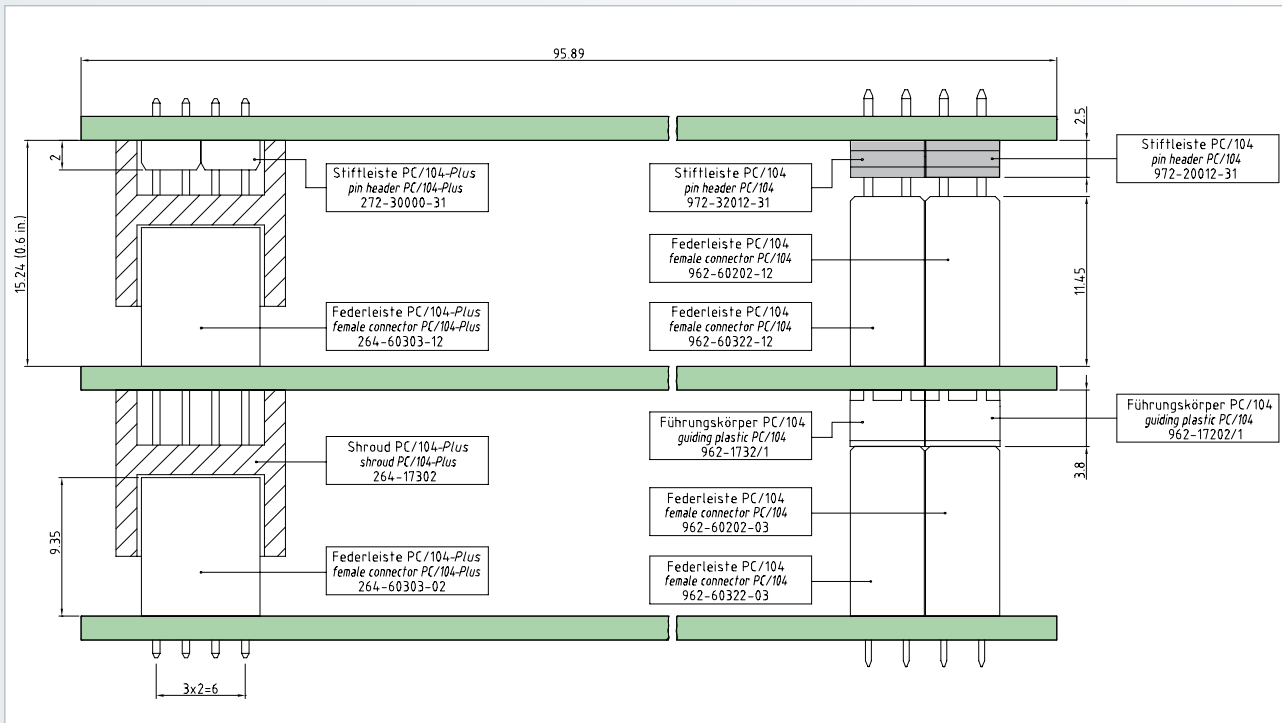
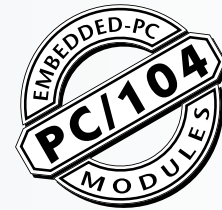
PC/104 and PC/104-Plus connector

While the PC/104 bus comprises two connectors with 40 and 64 pins which can be placed side-by-side and a grid size of 2.54 mm, the *PC/104-Plus* features 120 pins with a distance of 2.00 mm.

By using connectors with long pins in press-fit technology, several boards can be stacked on top of each other (see

figure). The clearances specified by the PC/104 consortium are ensured by using spacers and shrouds.

The additional use of spacing bolts is therefore not required.



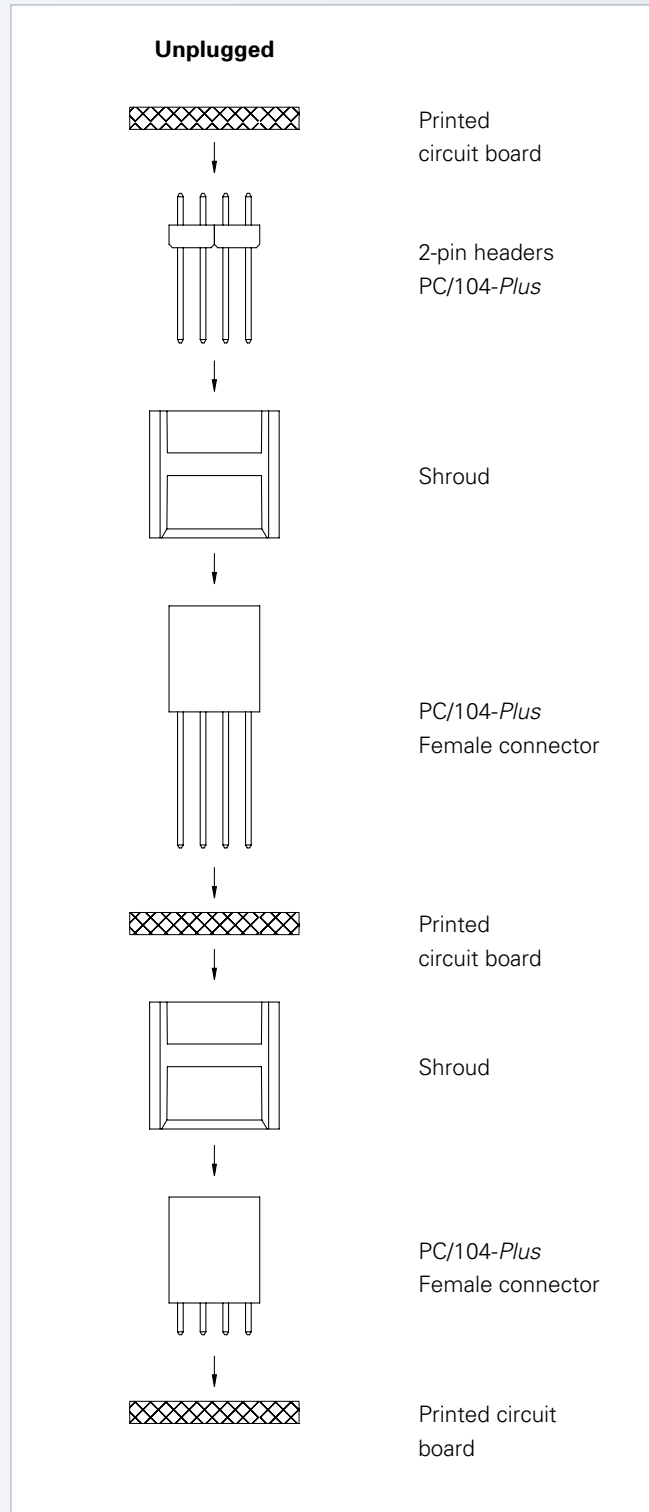
PC/104 and PC/104-Plus press-fit connectors from ept offer various advantages:

- The female connectors are pressed in by means of a simple flat rock press-fit tool
- No additional costs due to complex manual soldering
- No reworking at the rear mating zone (solder bridges, solder splashes)
- Less inspection overhead
- Lower engaging and separating forces; therefore bending of the rear mating zone is prevented
- When female connectors with rear mating zone are pressed in, a guiding block is pushed up from below. This offers the following advantages:
 - No bending of the rear mating zone
 - Serves as spacer so that the clearance of 0.6" is achieved when the modules are plugged in
 - Serves as support tool when pressing in and prevents that the strip lines between the through connections are damaged.

The shroud is reliably fixed on the PCB by additional press in of the shroud housing onto the rear mating zone.

Customer-specific solutions

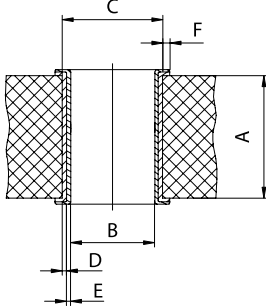
Within the scope of PC/104 and PC/104-Plus applications, upon request ept also offers various customer-specific solutions with 2.0 mm and 2.54 mm grid.



Technical specifications

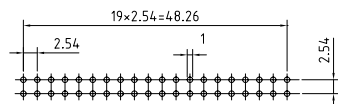
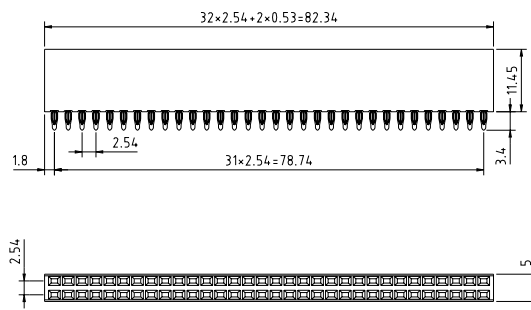
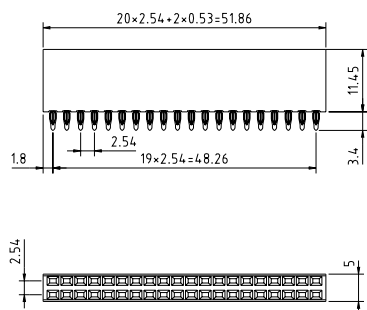
Technical specifications	VarPol connectors		
	PC/104	PC/104-Plus	Socket connectors
Operating temperature range	– 55 °C to + 125 °C		
Current carrying capacity	max. 1.9 A	max. 1.7 A	max. 1 A
Operational voltage	150 V	100 V	100 V
Contact resistance	< 20 mΩ	< 20 mΩ	< 10 mΩ
Creepages and clearances	1.2 mm	min. 0.5 mm	> 0.6 mm
Insulation resistance	> 10 ⁸ MΩ		
Engaging force per pin	max. 0.9 N	max. 1.5 N	max. 1.8 N
Seperating force per pin	min. 0.6 N	min. 0.3 N	min. 1 N
Insertion force per pin	max. 80 N		
Insulator material	PBT, UL 94V-0		
Contact	Copper alloy		
Contact surface	Au		
Environment/ approvals	RoHS compliant/UL (file: E130314)		

Hole specifications

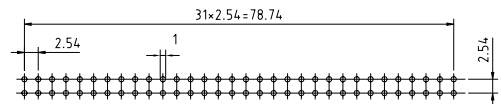
			PC/104-Plus	PC/104, socket connector, VarPol
		Nominal hole	Ø 0.85 mm	Ø 1.0 mm
imm. Sn printed circuit boards				
	A	PCB thickness	min. 1.4 mm	min. 1.4 mm
	B	Plated hole	Ø 0.85 + 0.09/-0.00 mm	Ø 1 + 0.09/-0.00 mm
	C	Drill hole	1.0 ± 0.025 mm	1.15 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm
	E	imm. Sn plating	max. 1.5 µm	max. 1.5 µm
	F	Annular ring	min. 0.1 mm	min. 0.1 mm
	Ni, Au printed circuit boards			
	A	PCB thickness	min. 1.4 mm	min. 1.4 mm
	B	Plated hole	Ø 0.85 + 0.09/-0.00 mm	Ø 1 + 0.09/-0.00 mm
	C	Drill hole	1.0 ± 0.025 mm	1.15 ± 0.025 mm
	D	Cu plating	min 25 µm	min. 25 µm
	E	Ni, Au plating	0.05 – 0.2 µm Au more than 2.5 – 5 µm Ni	0.05 – 0.2 µm Au over 2.5 – 5 µm Ni
	F	Annular ring	min. 0.1 mm	min. 0.1 mm
	pure Cu printed circuit boards			
	A	PCB thickness	min. 1.4 mm	min. 1.4 mm
	B	Plated hole	Ø 0.85 + 0.09/-0.00 mm	Ø 1 + 0.09/-0.04 mm
	C	Drill hole	1.0 ± 0.025 mm	1.15 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm
	E	OSP*	e.g. GLICOAT-SMD (F2) with 0.12 – 0.15 µm	e.g. GLICOAT-SMD (F2) with 0.12 – 0.15 µm
	F	Annular ring	min. 0.1 mm	min. 0.1 mm
	HAL Sn printed circuit boards			
	A	PCB thickness	min. 1.4 mm	min. 1.4 mm
	B	Plated hole	Ø 0.85 + 0.09/-0.02 mm	Ø 1 + 0.09/-0.06 mm
	C	Drill hole	1.0 ± 0.025 mm	1.15 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm
	E	HAL Sn	5 – 15 µm	5 – 15 µm
	F	Annular ring	min. 0.1 mm	min. 0.1 mm

*OSP -Organic SolderabilityPreservatives

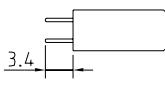
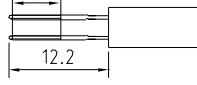
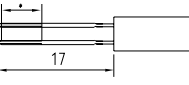
Dimensions in mm



Hole pattern



Hole pattern

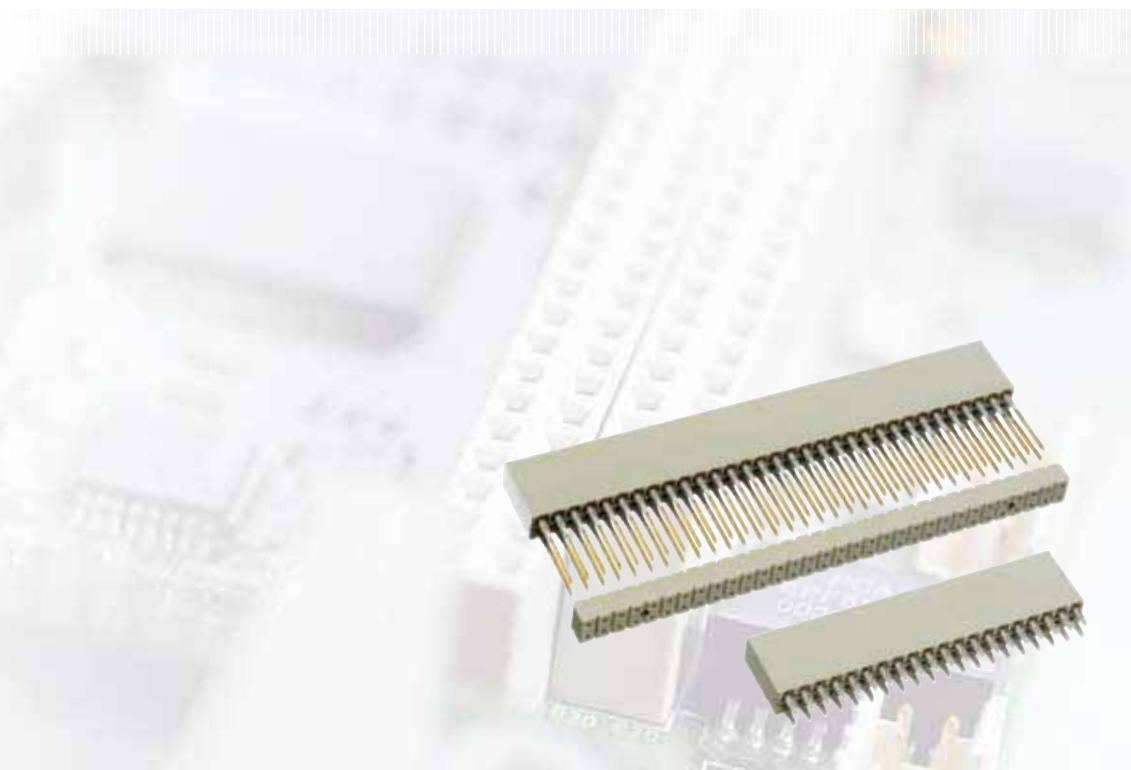
No. of contacts	Perform- ance level	Press-fit technology		
		Termination length		
				
Part number				
40	II	962-60206-03	962-60206-12	962-60206-17
40	III	962-60202-03	962-60202-12	962-60202-17
64	II	962-60326-03	962-60326-12	962-60326-17
64	III	962-60322-03	962-60322-12	962-60322-17

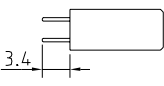
Accessories

- Guiding lock (see page 174)
- Press-fit tool (see page 214)
- Support tool (see page 215)

Note

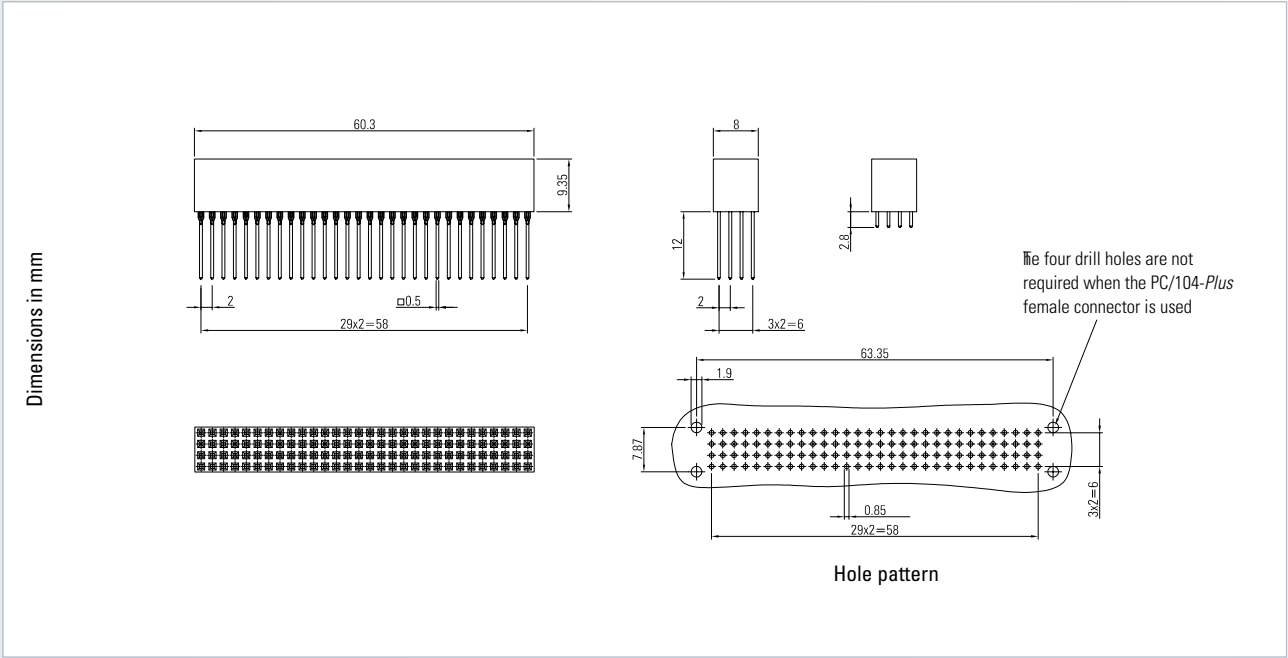
- *Bar mating zone Ni, A
- Aa contact length of 12.2 mm a guiding lock is scope of delivery



No. of contacts	Performance level	Solder technology
		Termination length
		
Part number		
40	II	962-40206-03
40	III	962-40202-03
64	II	962-40326-03
64	III	962-40322-03

PC/104, PC/104-Plus, VarPol connector
PC/104-Plus

Female connector



No. of contacts	Press-fit technology – Performance level III		Solder technology – Performance level III
	Termination length		
Part number			
120	264-60303-02	264-60303-12	264-40303-02

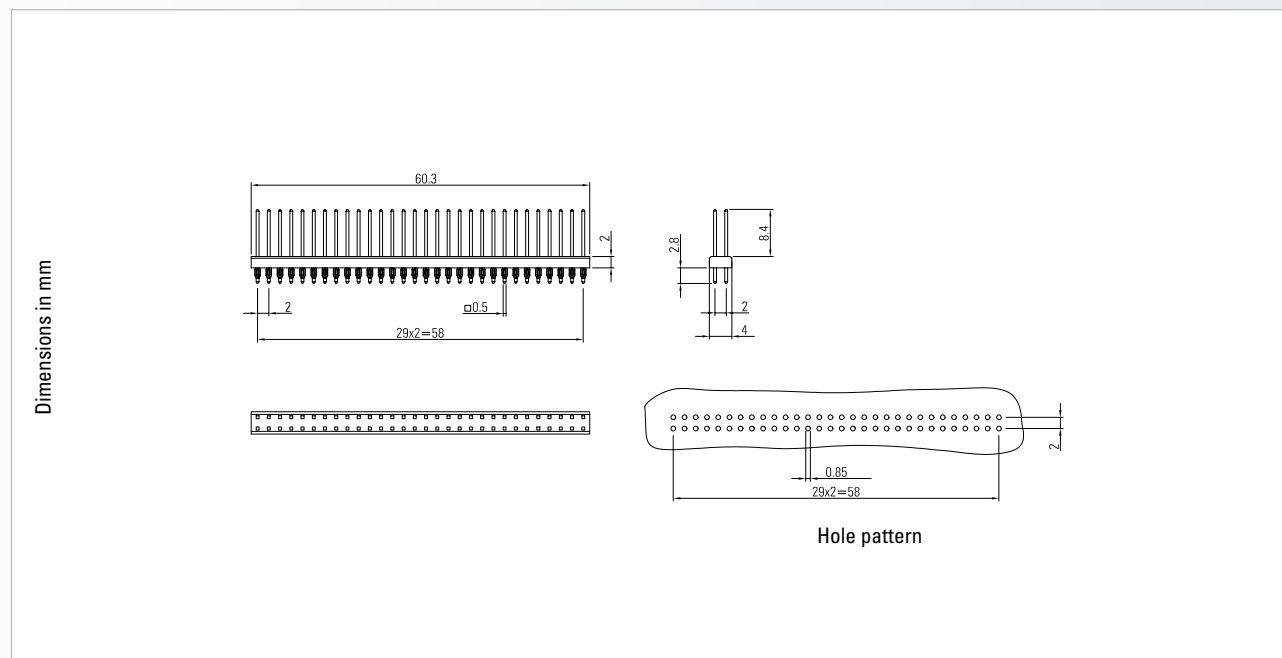
Accessories

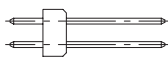
- Press-fit tool (see page 214)
- Support tool (see page 215)
- Shroud (see page 174)

On request

- Other contact numbers





No. of contacts	Press-fit technology – Performance level III
	Termination length
	
Part number	
60	272-30000-31

Accessories

- Press-fit tool (see page 214)
- Support tool (see page 215)

On request

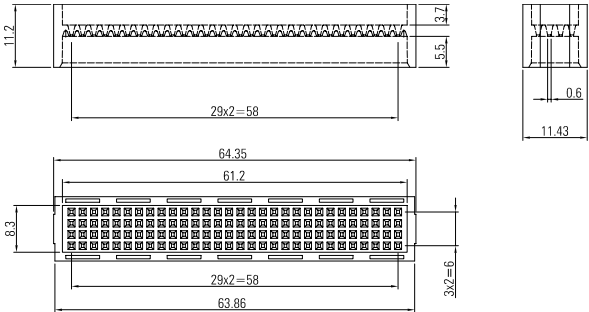
- Other lengths
- Other contact numbers


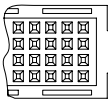
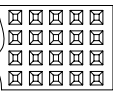


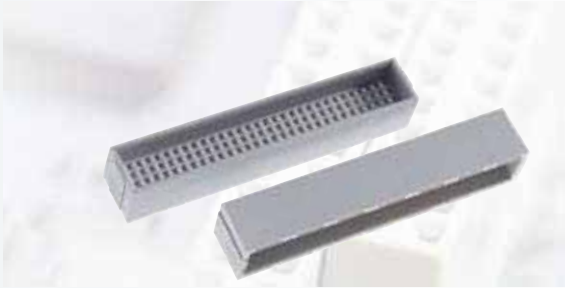
PC/104, PC/104-Plus, VarPol connector
PC/104, PC/104-Plus

Accessories

Dimensions in mm



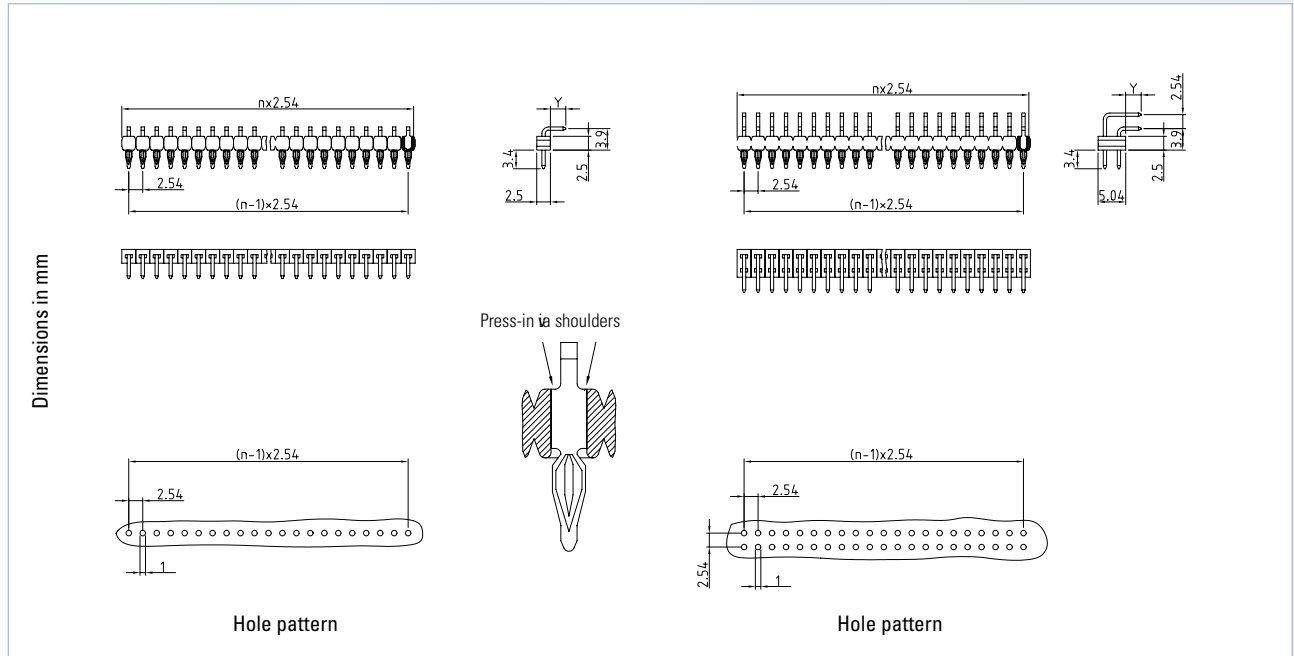
No. of contacts	PC/104	PC/104-Plus	
	Guiding block	Shroud	Spacer
			
Part number			
40	962-17202/1	—	—
64	962-17322/1	—	—
120	—	264-17302	264-16302



PC/104-Plus shroud



PC/104 guiding block



No. of contacts		Y	Press-fit technology
			Termination length
			Part number
max. 54	1-row	2.8	981-nn010-b1
		5.6	981-nn011-b1
		7.8	981-nn012-b1
		10.6	981-nn013-b1
max. 108	2-row	2.8	982-nn010-b1
		5.6	982-nn011-b1

Accessories

- Press-fit tool (see page 214)
- Support tool (see page 215)

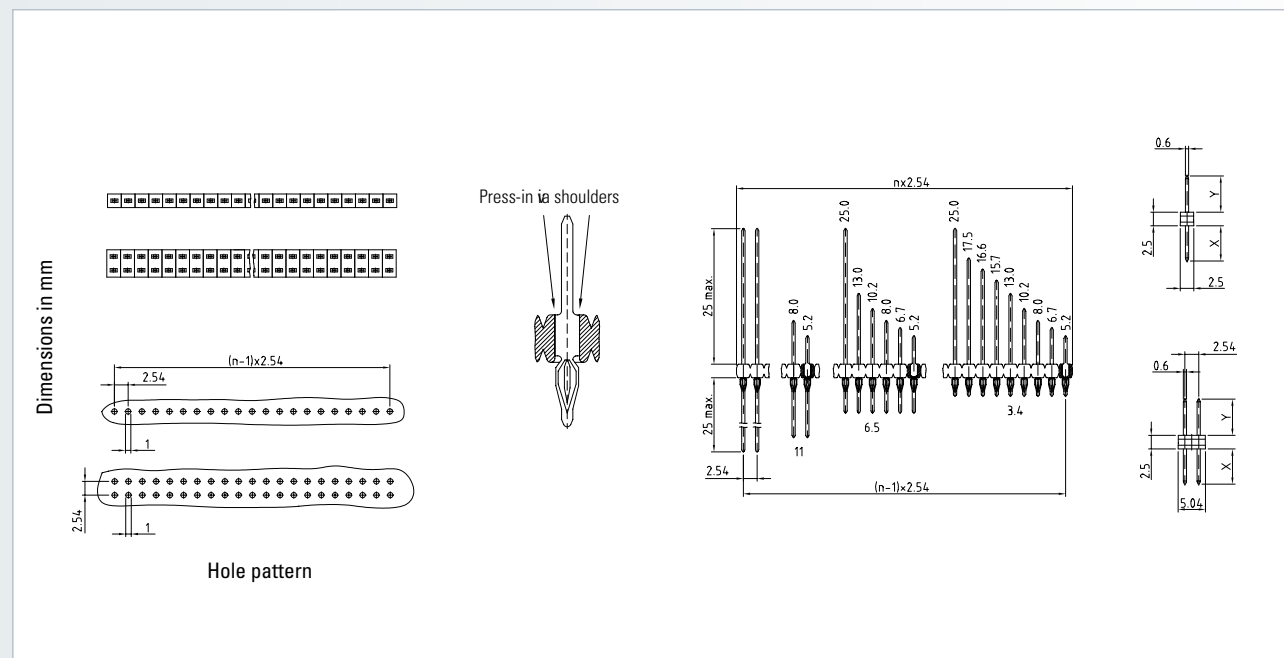
Note

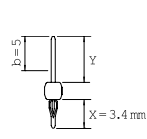
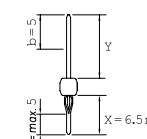
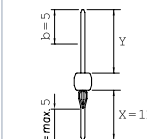
Surfaces Y side (b)
b2: 0.80 µm Δ on 1.27 µm Ni
b3: 0.15 µm Δ on 1.27 µm Ni

Ordering note

nn = no. of contacts/row
b = surface Y side

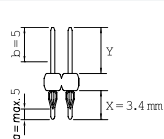
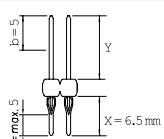
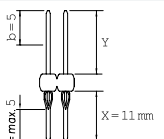




No. of contacts		Y	Press-fit technology		
			Termination length		
					
Part number					
max. 54	1-row	5.2	971-nn010-b1*	971-nn020-ba	971-nn050-ba
		6.7	971-nn009-b1*	971-nn039-ba	—
		8.0	971-nn011-b1*	971-nn021-ba	971-nn051-ba
		10.2	971-nn012-b1*	971-nn022-ba	—
		13.0	971-nn013-b1*	971-nn023-ba	—
		15.7	971-nn026-b1*	—	—
		16.6	971-nn006-b1*	—	—
		17.5	971-nn018-b1*	—	—
		25.0	971-nn019-b1*	971-nn029-ba	—

Accessories – Press-fit tool (see page 214) – Support tool (see page 215)	Note Surfaces X _{side} (b) b ±0.80 mm Δ on 1.27 μm Ni b ±0.15 mm Δ on 1.27 μm Ni	Surfaces X _{side} (interface zone a) a ±0.80 mm Δ on 1.27 μm Ni a ±0.15 mm Δ on 1.27 μm Ni
	Ordering note nn = no. of contacts/row b = surface X _{side} a = surface X _{side} 1 if X _{side} mm (no interface zone), surface a cannot b selected	

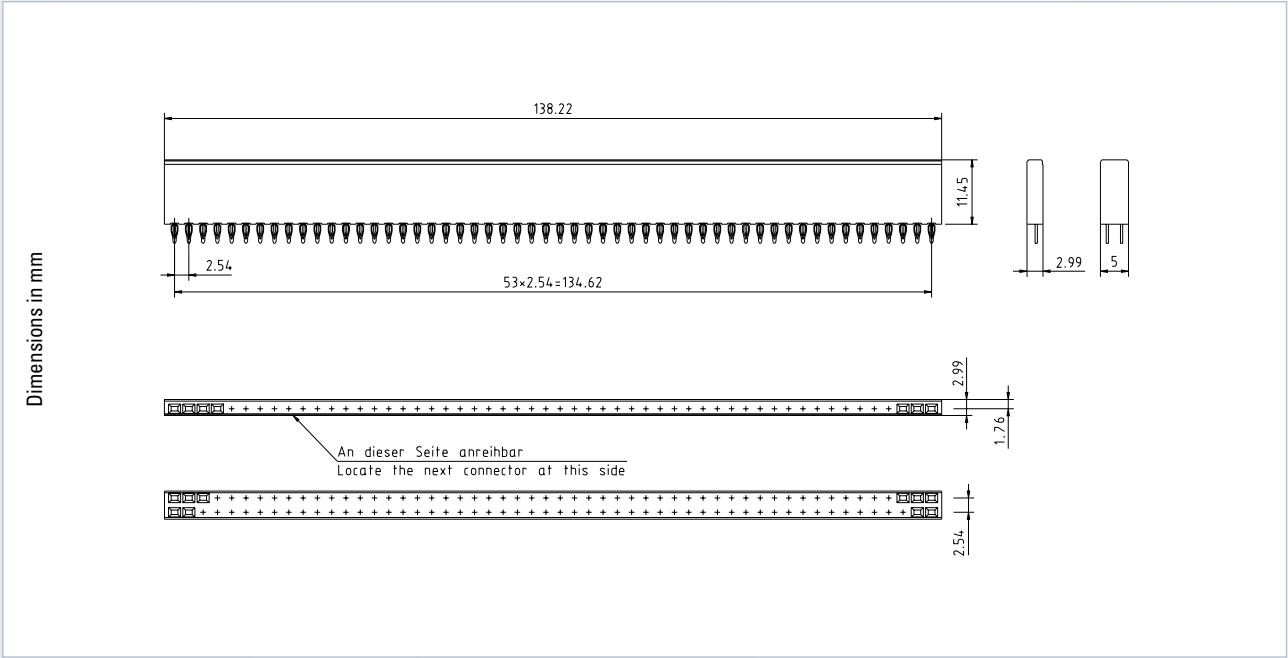


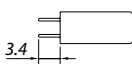
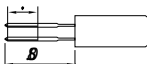
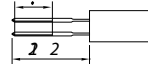
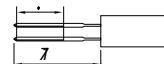
No. of contacts		Y	Press-fit technology		
			Termination length		
					
Part number					
max. 108	2-row	5.2	972-nn010-b1*	972-nn020-ba	972-nn050-ba
		6.7	972-nn009-b1*	972-nn039-ba	—
		8.0	972-nn011-b1*	972-nn021-ba	972-nn051-ba
		10.2	972-nn012-b1*	972-nn022-ba	—
		13.0	972-nn013-b1*	972-nn023-ba	—
		15.7	972-nn026-b1*	—	—
		16.6	972-nn006-b1*	—	—
		17.5	972-nn018-b1*	—	—
		25.0	972-nn019-b1*	972-nn029-ba	—

Accessories – Press-fit tool (see page 214) – Support tool (see page 215)	Note Surfaces Yside (b) b ≥ 0.80 mm Δ on 1.27 mm Ni b ≥ 0.15 mm Δ on 1.27 mm Ni	Surfaces Xside (interface zone a) a ≥ 0.80 mm Δ on 1.27 mm Ni a ≥ 0.15 mm Δ on 1.27 mm Ni
	Ordering note nn = no. of contacts/row b = surface Yside a = surface Xside 1 if $X \geq 34$ mm (no interface zone), surface a cannot b selected	

VarPol connectors

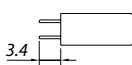
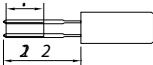
Female connector



No. of contacts		Perform- ance level	Press-fit technology			
			Termination length			
						
Part number						
max. 54	1-row	II	961-60nn6-03	961-60nn6-07	961-60nn6-12	961-60nn6-17
		III	961-60nn2-03	961-60nn2-07	961-60nn2-12	961-60nn2-17
max. 108	2-row	II	962-60nn6-03	962-60nn6-07	962-60nn6-12	962-60nn6-17
		III	962-60nn2-03	962-60nn2-07	962-60nn2-12	962-60nn2-17

Accessories <ul style="list-style-type: none">– 2-row guide lock 962-17nn2/1 (see page 174)– Press-fit tool (see page 214)– Support tool (see page 215)	Note <ul style="list-style-type: none">– Plug-in zone Ni,A– nn = no. of contacts/row	Ordering note <p>Example for female connector: 2-row, 100 contacts performance level II, post length 34 mm</p> <p>Example for guide lock: 2-row, 100 contacts</p> <p>962-60506-03 962-17502/1</p>
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No. of contacts		Performance level	Solder technology	
			Termination length	
				
Part number				
max. 54	1-row	II	961-40nn6-03	961-40nn6-12
		III	961-40nn2-03	961-40nn2-12
max. 108	2-row	II	962-40nn6-03	962-40nn6-12
		III	962-40nn2-03	962-40nn2-12

Note

– nn = no. of contacts/row

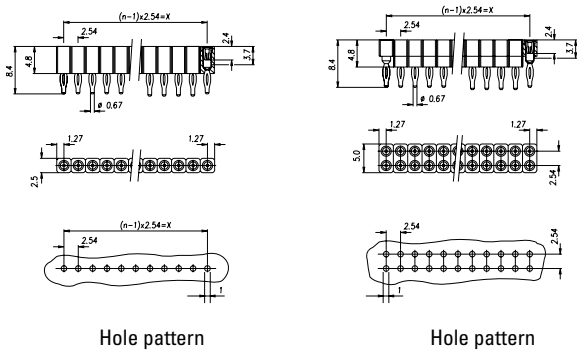
Ordering note

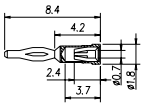
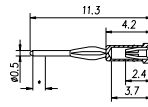
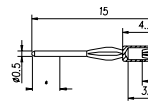
Example for female connector: 2-row,
100 contacts performance level II,
post length 34 mm

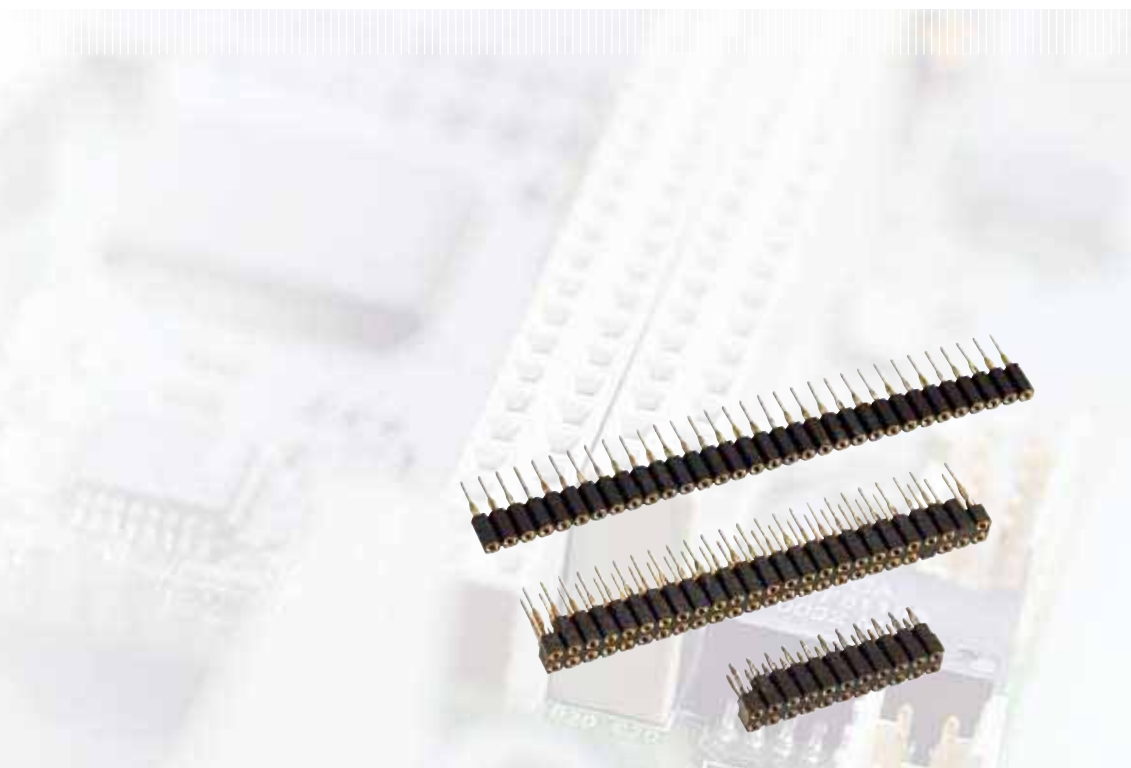
962-40506-03

PC/104, PC/104-Plus, VarPol connector
Socket connector

Dimensions in mm



No. of contacts		Surface	Press-fit technology		
			Termination length		
					
			Part number		
max. 32	1-row	5 µm Sn	930-61nn0	—	—
		0.25 µm Au	930-61nn4	930-66nn4	930-66nn5
max. 64	2-row	5 µm Sn	936-61nn0	—	—
		0.25 µm Au	936-61nn4	936-66nn4	936-66nn5



On request

- Press-fit tool
- Support tool

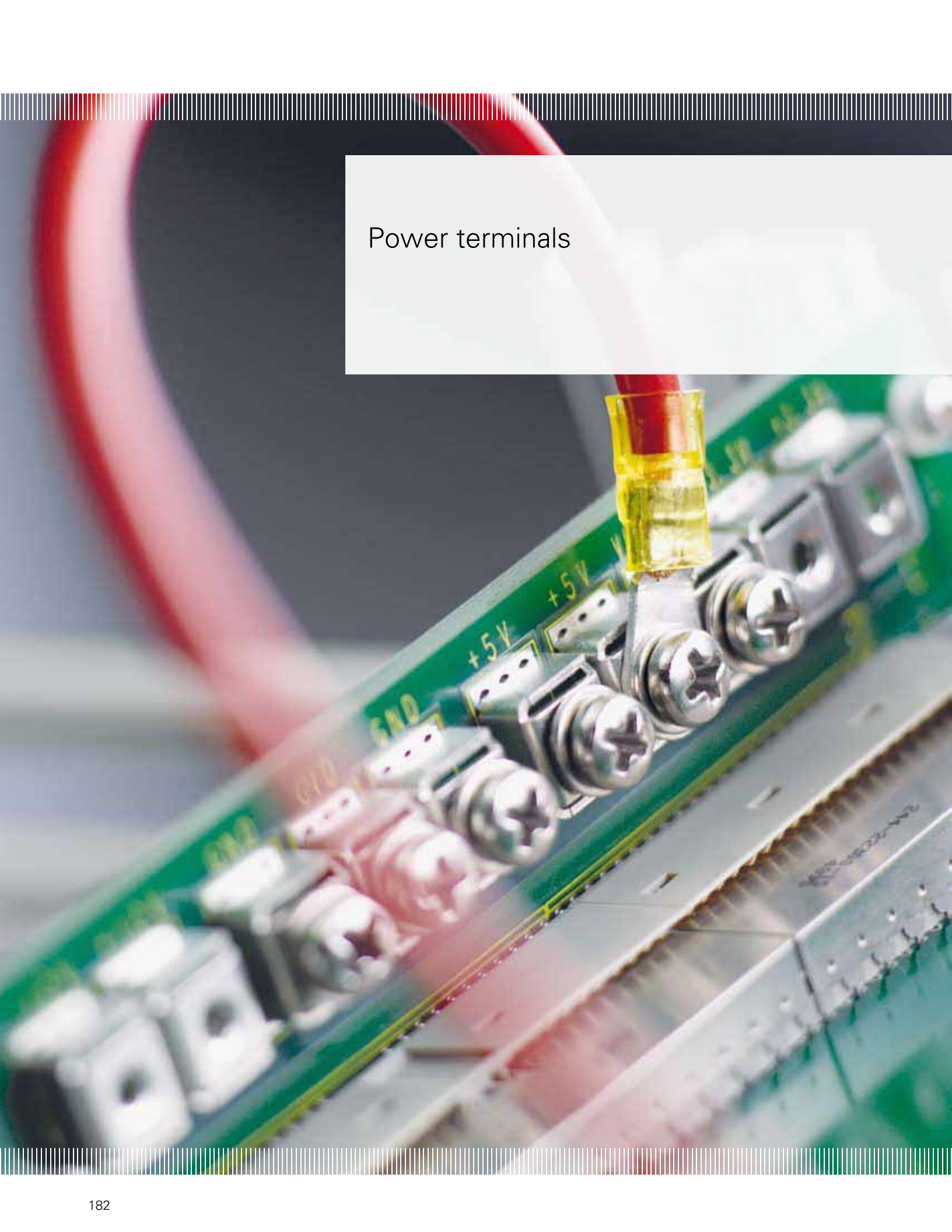
Note

- Bar mating zone Ni, A

Ordering note

- nn no. of contacts/row
- Example for female connector: 2-row, 28 contacts,
0.25 mm A, 15 mm termination length

936-66145



Power terminals

Technical specifications	184
Hole specifications	185
Power terminal grid 5.08 x 7.62 mm	186
Power terminal grid 5.08 x 10.16 mm	188
Blade connector	190
Accessories	191

Technical specifications

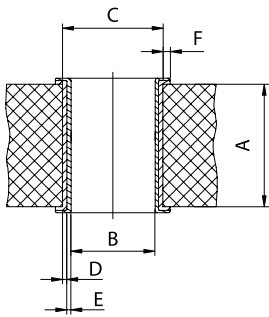
Technical specifications			
	Grid 5.08 x 7.62 mm	Grid 5.08 x 10.16 mm	Blade connector
Operating temperature range	– 55 °C to + 125 °C		
Current carrying capacity at ambient temperature			
20 °C	45 A	45 A	25 A
70 °C	30 A	30 A	20 A
100 °C	25 A	25 A	15 A
The operational current is determined by the printed circuit board, the cable diameter, and the cable lug used (values when using a 6 mm ² cable).			
Insertion force	Type 150 N/pin	Type 150 N/pin	max. 300 N/pin
Retention force	min. 60 N/pin	min. 60 N/pin	min. 60 N/pin
Plating	2 – 8 µm Sn	2 – 8 µm Sn	2 – 8 µm Sn
Thread	M4 or M5	M4	–
Max. tightening torque	1.3 Nm	1.3 Nm	–
Environment	RoHS compliant		

Current carrying capacity

The connection is made by means of commercially available cable lugs, or with the variants by means of a plug connection or optionally using a flat blade connection (FASTON).

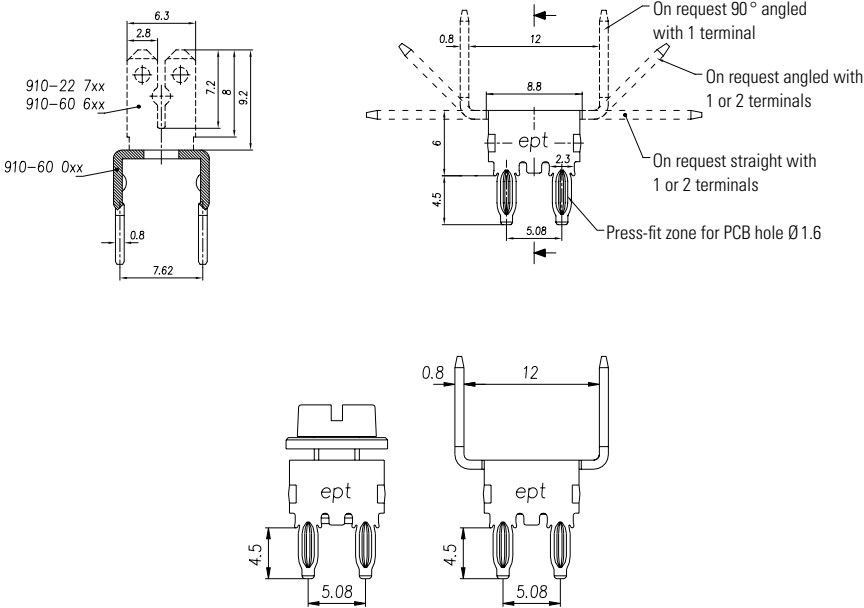
The operational current is determined by the printed circuit board, the cable diameter, and the cable lug used.



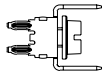
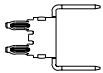
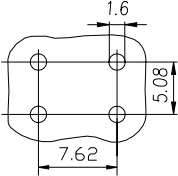
Hole specifications

			Grid 5.08 x 10.16 mm	Grid 5.08 x 7.62 mm
		Nominal hole	Ø 1.45 mm	Ø 1.6 mm
Imm. Sn printed circuit boards				
	A	PCB thickness	min. 2.9 mm	min. 2.9 mm
	B	Plated hole	Ø 1.45 + 0.09/- 0.00 mm	Ø 1.6 + 0.09/- 0.00 mm
	C	Drill hole	1.6 ± 0.025 mm	1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm
	E	Imm. Sn plating	max. 1.5 µm	max. 1.5 µm
	F	Annular ring	min. 0.1 mm	min. 0.1 mm
Ni, Au printed circuit boards				
	A	PCB thickness	min. 2.9 mm	min. 2.9 mm
	B	Plated hole	Ø 1.45 + 0.09/- 0.00 mm	Ø 1.6 + 0.09/- 0.00 mm
	C	Drill hole	1.6 ± 0.025 mm	1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm
	E	Ni, Au plating	0.05 – 0.2 µm Au over 2.5 – 5 µm Ni	0.05 – 0.2 µm Au over 2.5 – 5 µm Ni
	F	Annular ring	min. 0.1 mm	min. 0.1 mm
HAL Sn printed circuit boards				
	A	PCB thickness	min. 2.9 mm	min. 2.9 mm
	B	Plated hole	Ø 1.45 + 0.09/- 0.06 mm	Ø 1.6 ± 0.09 mm
	C	Drill hole	1.6 ± 0.025 mm	1.75 ± 0.025 mm
	D	Cu plating	min. 25 µm	min. 25 µm
	E	HAL Sn	5 – 15 µm	5 – 15 µm
	F	Annular ring	min. 0.1 mm	min. 0.1 mm

Power terminals
5.08 x 7.62 mm

Dimensions in mm



Pins	Contact arrangement	Press-fit technology – thread M4			
					
		Part number			
4		910-60045	910-22015	910-60645/1	910-22715/1

Accessories

- Screws DIN 84 (see page 191)
- Washer (see page 191)
- Lock nut (see page 191)
- Philips screw (see page 191)
- Press-fit tool (see page 216)
- Support tool (see page 217)

On request

- With 1 or 2 terminals angled
- With 1 or 2 terminals straight
- With 1 terminal 90°



Pins	Contact arrangement	Press-fit technology – thread M5			
		Part number			
4		910-60050	910-22020	910-60650/1	910-22720/1

Accessories

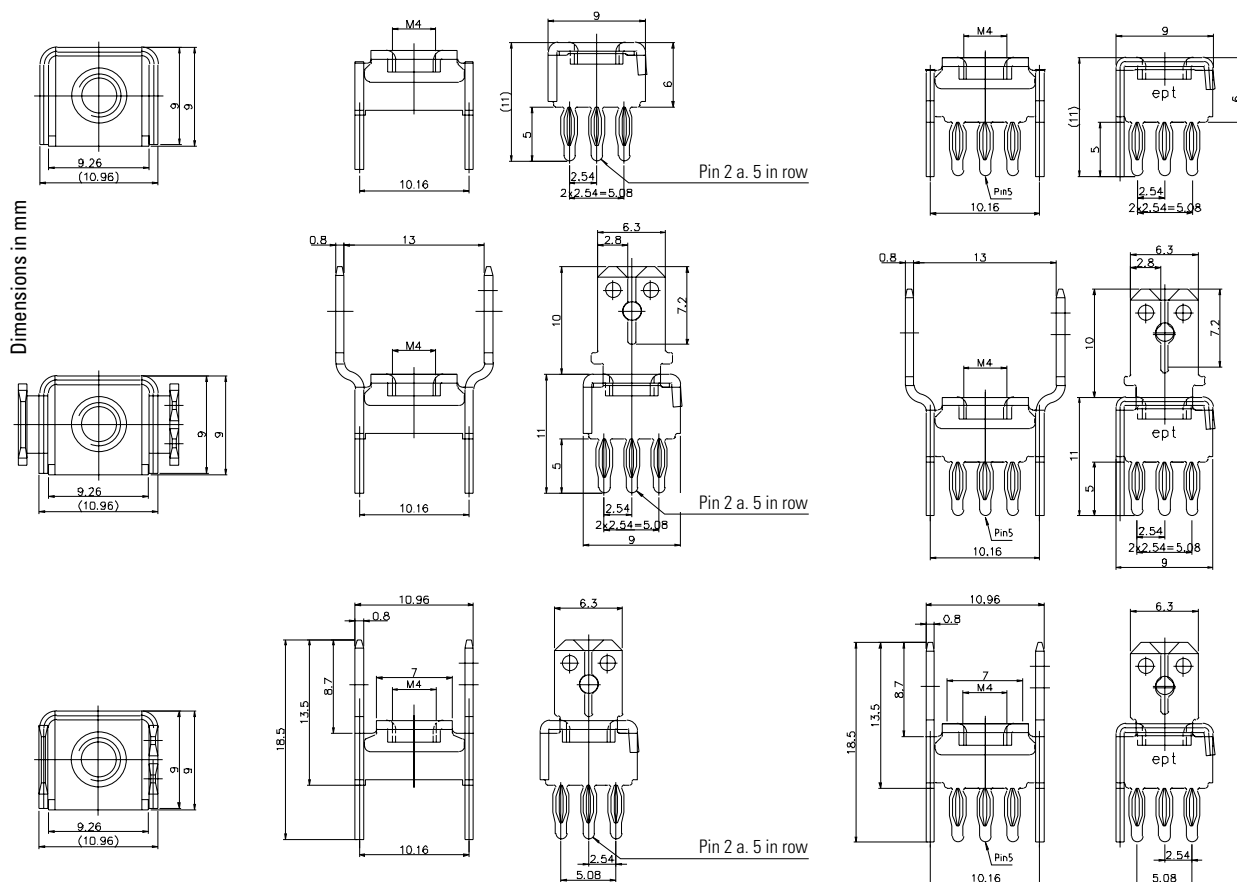
- Screws DIN 84 (see page 191)
- Washer (see page 191)
- Lock nut (see page 191)
- Press-fit tool (see page 216)
- Support tool (see page 217)


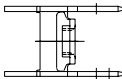
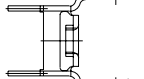
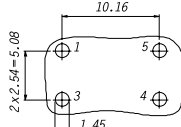
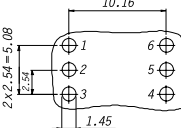
On request

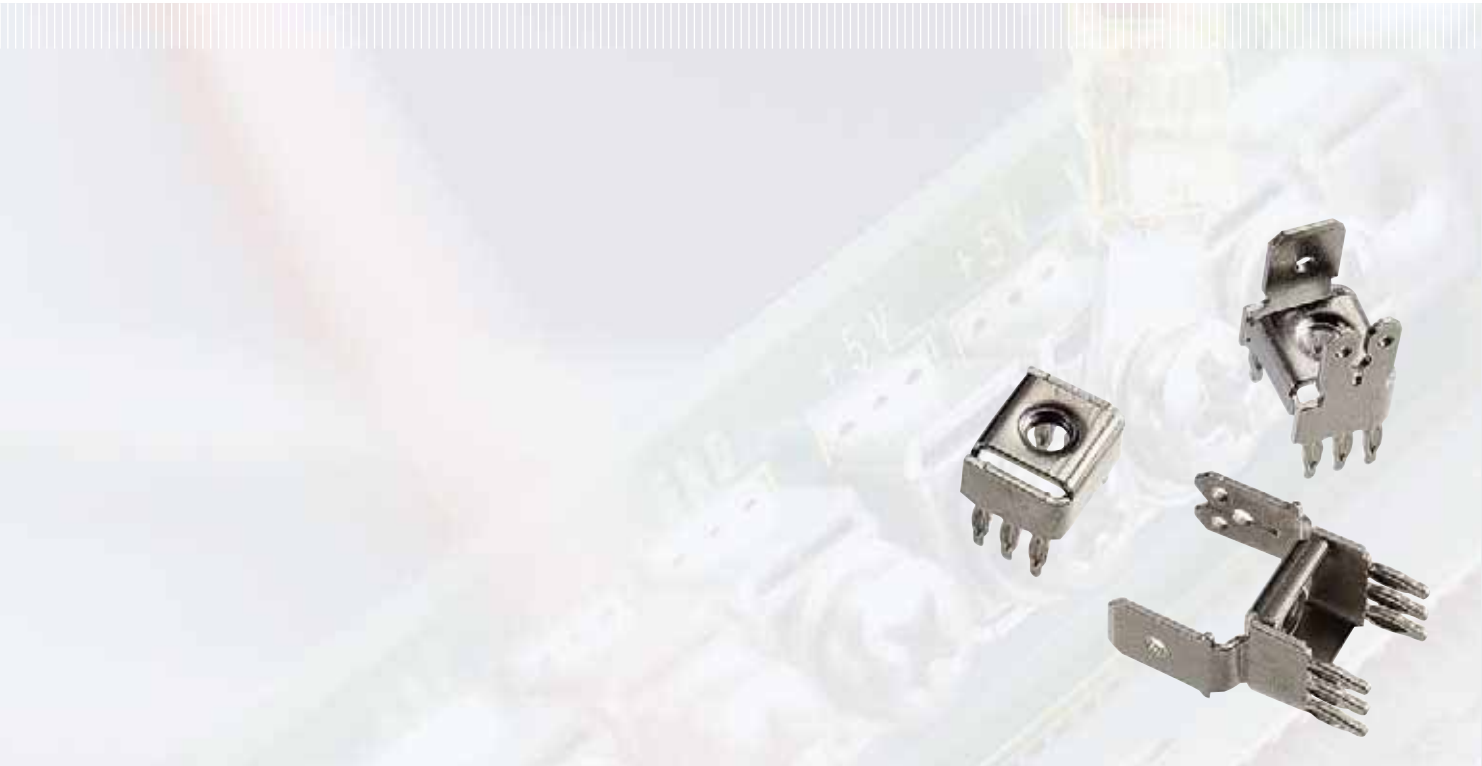
- Philips screw
- With 1 or 2 terminals angled
- With 1 or 2 terminals straight
- With 1 terminal 90°


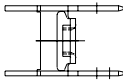
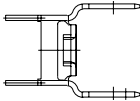
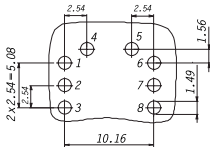
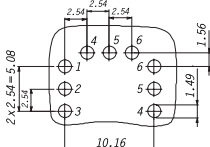
Power terminals 5.08 x 10.16 mm

Dimensions in mm



Pins	Contact arrangement	Press-fit technology – thread M4		
				
		Part number		
4		911-32004	911-32244	911-32044
6		911-32006	911-32246	911-32046

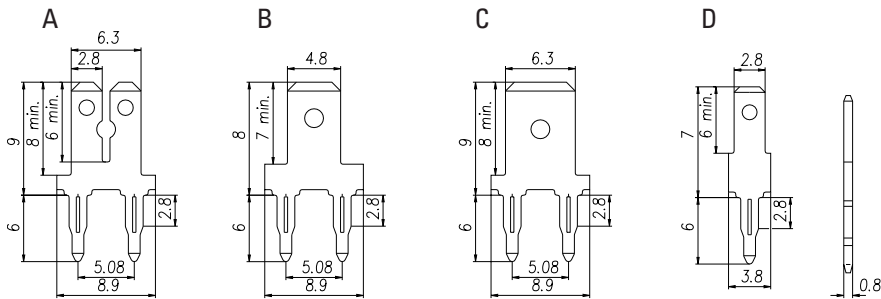


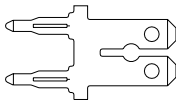
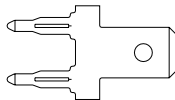
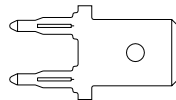
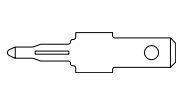
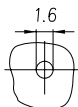
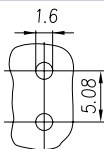
Pins	Contact arrangement	Press-fit technology – thread M4		
				
		Part number		
8		911-33008	911-33248	911-33048
9		911-33009	911-33249	911-33049

Accessories

- Screws DIN 84 (see page 191)
- Washer (see page 191)
- Philips screw (see page 191)
- Press-fit tool (see page 216)
- Support tool (see page 217)

Dimensions in mm



Pins	Contact arrangement	Press-fit technology			
		A	B	C	D
					
Part number					
1		—	—	—	090-10164
2		090-10162	090-10161	090-10163	—





Accessories

- Press-fit tool (see page 216)
- Support tool (see page 217)

Note

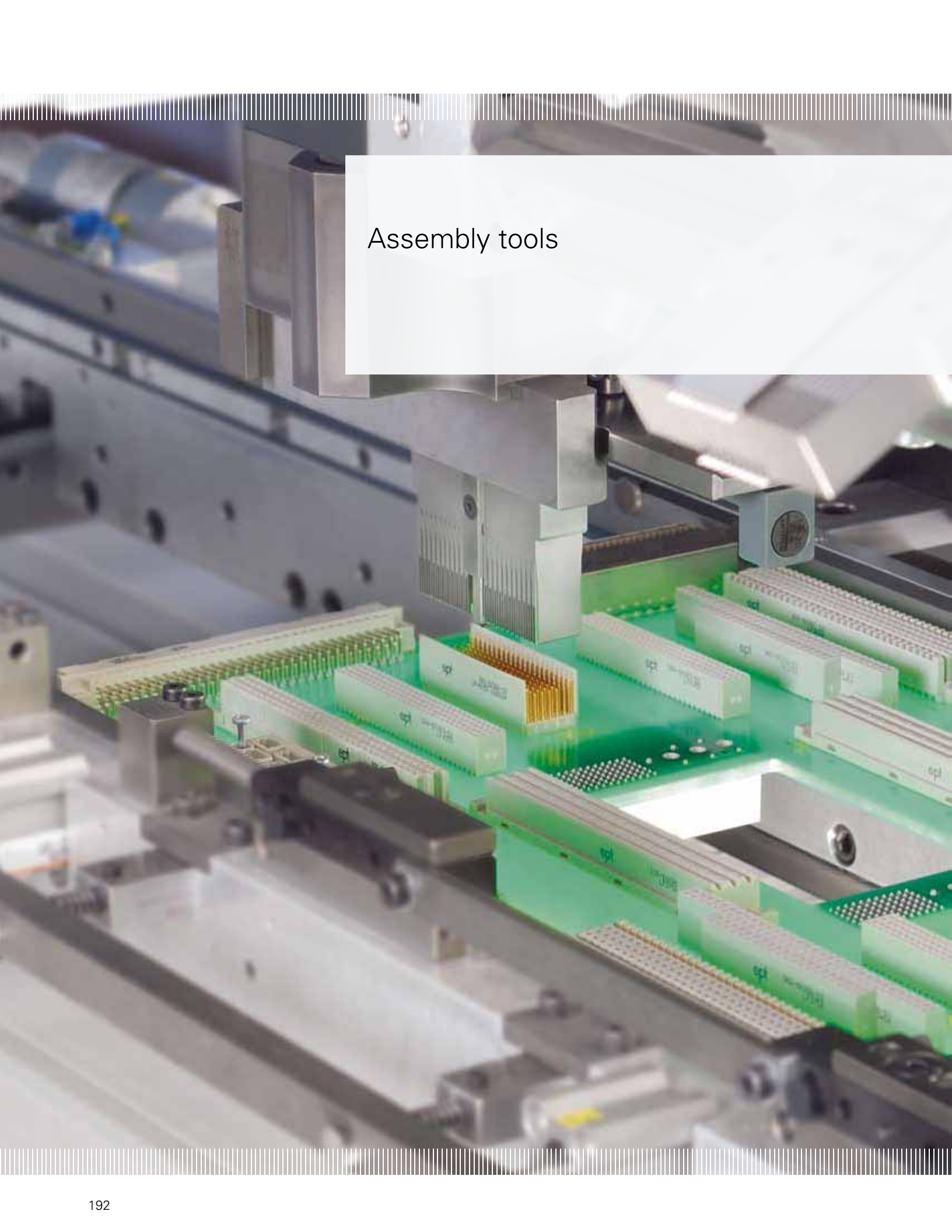
- Plated hole $\varnothing 1.6 + 0.04/-0.06$ mm (solid pin)



Thread		Part number	
	Side view	M4	M5
Socket cap screw DIN 84		910-20145	910-20150
Philips screw		910-20146	—
Washer		910-20320	910-20330
Lock nut		910-20015	910-20020

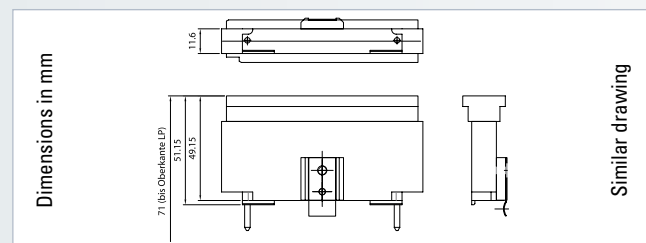
On request

– Philips screw in M5



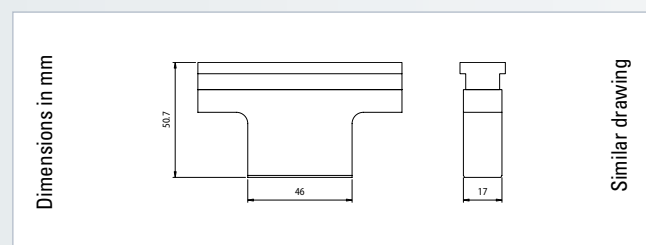
Assembly tools

TCA products	194
Hardmetric products	198
Accessories	204
DIN products	206
Accessories	212
PC/104, PC/104-Plus	214
VarPol connectors	214
Power terminals	216
Other tools	218



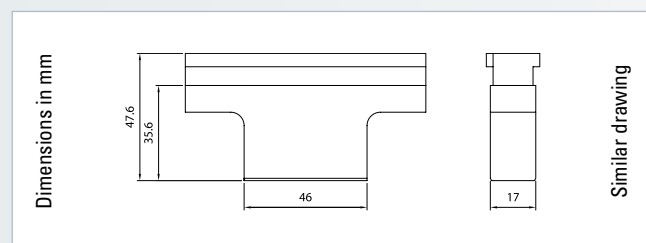
AdvancedTCA® Signal B+	
Type	Part number
AMC B+	886-115-W21

On request
– Customer-specific adaptation



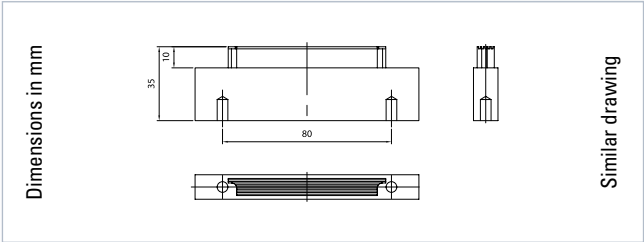
AdvancedTCA® Power male connector	
Type	Part number
Male connector	884-050-W1

On request
– Customer-specific adaptation



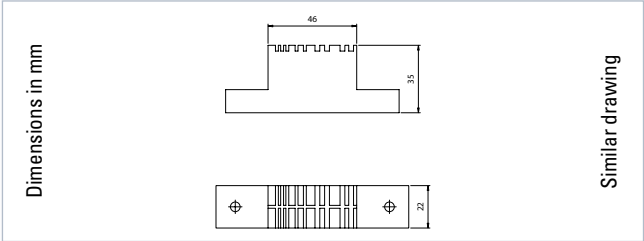
AdvancedTCA® Power female connector	
Type	Part number
Female connector	884-051-W1

On request
– Customer-specific adaptation



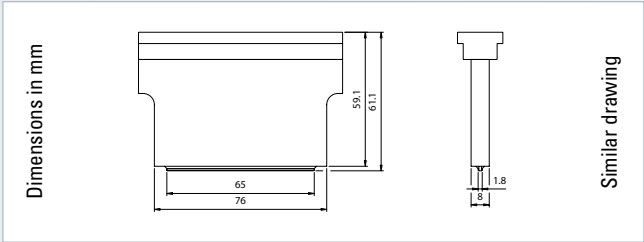
AdvancedTCA® Signal B+	
Type	Part number
AMC B+ with/without peg	890-115-W21

On request
– Customer-specific adaptation



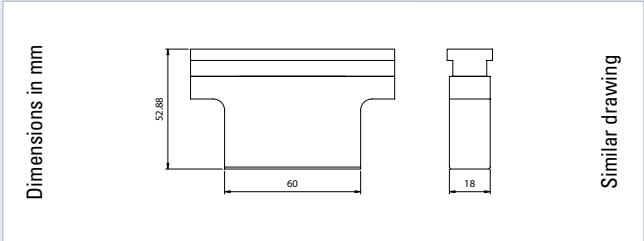
AdvancedTCA® Power male/female connector	
Type	Part number
Male connector	890-050-W1
Female connector	890-051-W1

On request
– Customer-specific adaptation



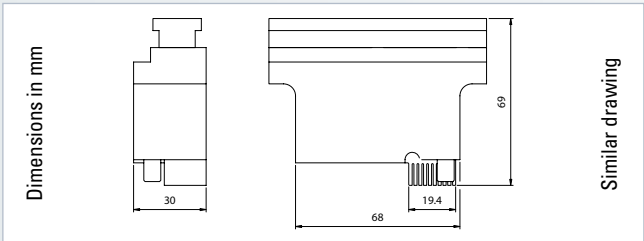
MicroTCA™ Signal AMC	
Type	Part number
MicroTCA™ AMC	884-046-W1

On request
– Customer-specific adaptation



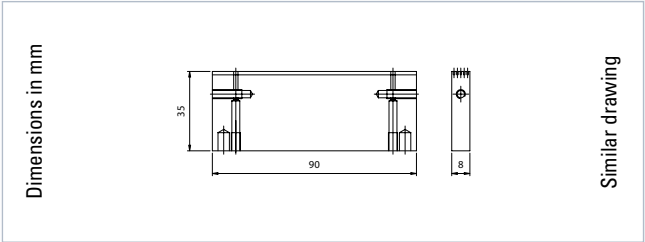
MicroTCA™ Power	
Type	Part number
Power module output	884-045-W1

On request
– Customer-specific adaptation



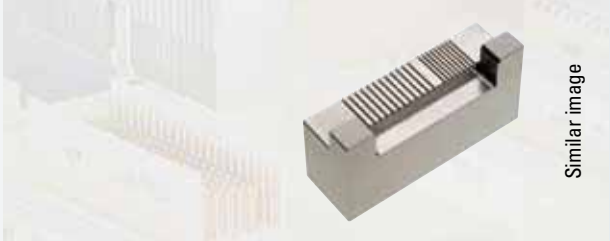
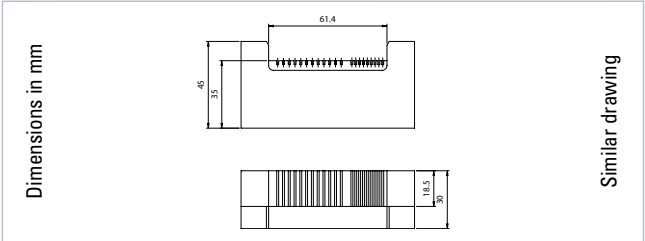
MicroTCA™ Power	
Type	Part number
Backplane connector	884-044-W1

On request
– Customer-specific adaptation



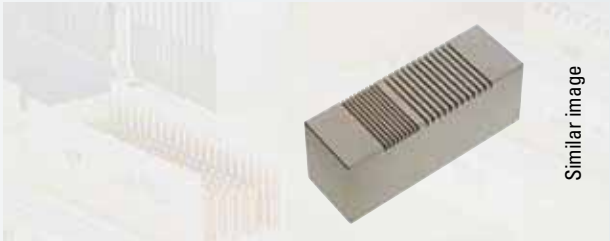
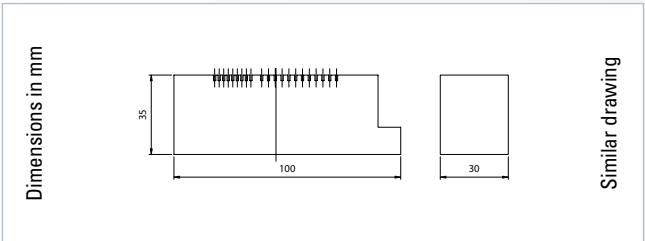
MicroTCA™ Signal AMC	
Type	Part number
MicroTCA™ AMC	890-046-W1

On request
– Customer-specific adaptation



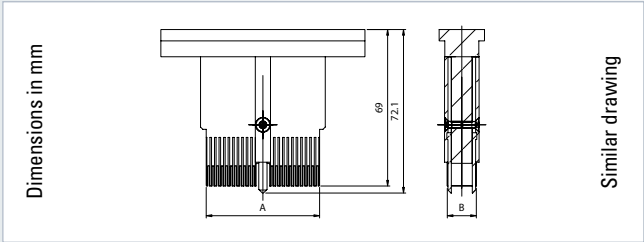
MicroTCA™ Power	
Type	Part number
Power module output	890-045-W1

On request
– Customer-specific adaptation



MicroTCA™ Power	
Type	Part number
Backplane connector	890-044-W1

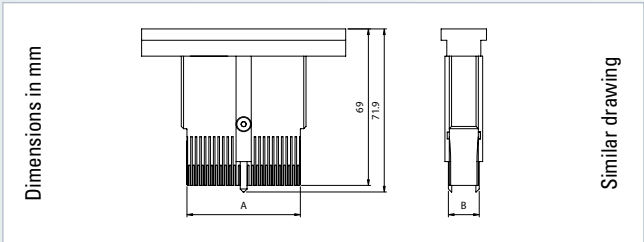
On request
– Customer-specific adaptation



hm 2.0 male connector			
Type	Dimension A	Dimension B	Part number
A	50	13.6	884-700-W25
D	50	19.6	884-710-W25



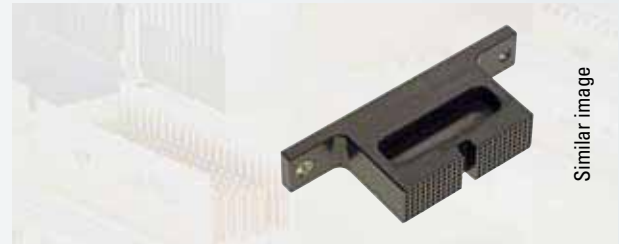
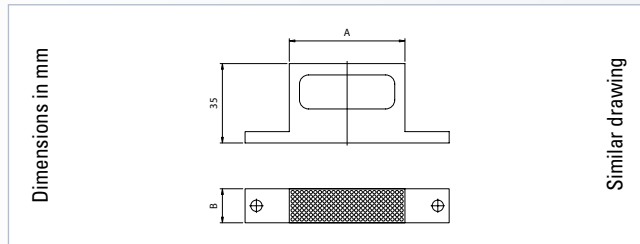
On request
– Customer-specific adaptation



hm 2.0 male connector			
Type	Dimension A	Dimension B	Part number
AB25	50	13.6	884-708-W25
AB22	44	13.6	884-708-W22
AB19	38	13.6	884-708-W19
DE	50	19.6	884-712-W25



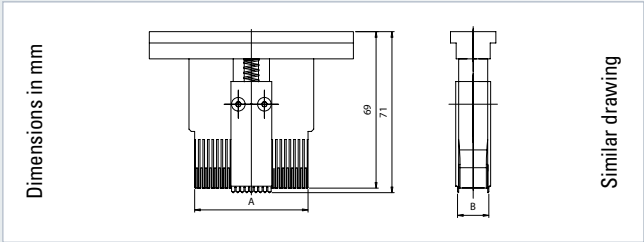
On request
– Customer-specific adaptation



hm 2.0 male connector			
Type	Dimension A	Dimension B	Part number
A	51	15	890-700-W25
D	51	21	890-710-W25
AB25	51	15	890-701-W25
AB22	45	15	890-701-W22
AB19	39	15	890-701-W19
DE	51	21	890-711-W25

On request
 – Customer-specific adaptation

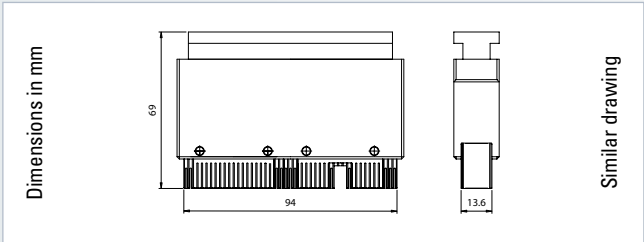
Assembly tools
Hardmetric products
Press-fit tool



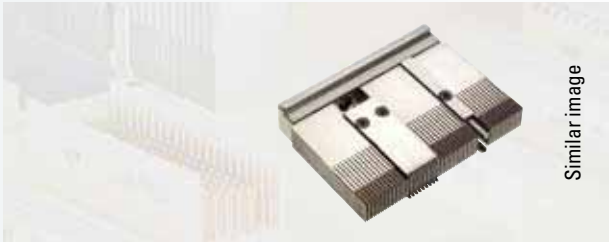
hm 2.0 male connector			
Type	Dimension A	Dimension B	Part number
B25	50	13.6	884-701-W25
B22	44	13.6	884-701-W22
B19	38	13.6	884-701-W19
E	50	19.6	884-711-W25



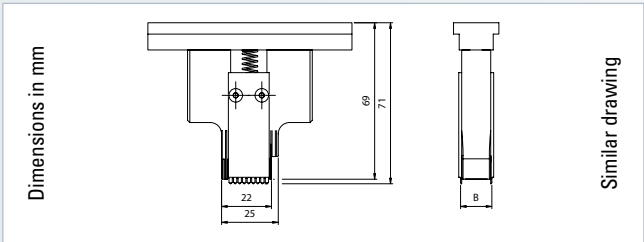
On request
– Customer-specific adaptation



hm 2.0 accessory male connector	
Type	Part number
A + B22 (cPCI)	884-703-W47



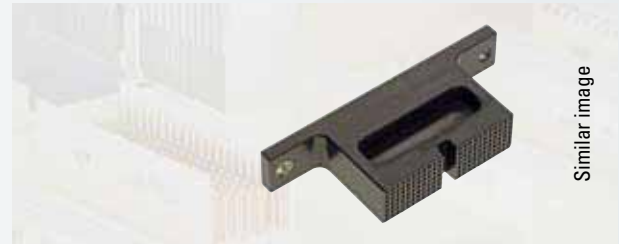
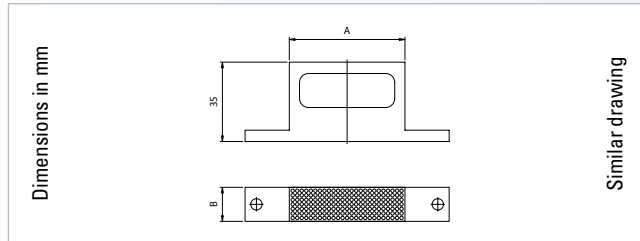
On request
– Customer-specific adaptation



hm 2.0 male connector		
Type	Dimension B	Part number
C	13.6	884-702-W11
F	19.6	884-713-W11



On request
– Customer-specific adaptation



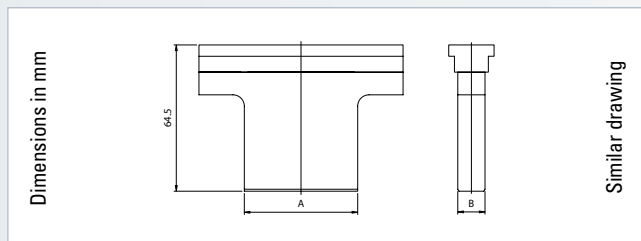
hm 2.0 male connector			
Type	Dimension A	Dimension B	Part number
B25	51	15	890-701-W25
B22	45	15	890-701-W22
B19	39	15	890-701-W19
E	51	21	890-711-W25
C	23	15	890-702-W11
F	23	21	890-713-W11
A + B22 (cPCI)	95	15	890-703-W47

On request
– Customer-specific adaptation

Assembly tools

Hardmetric products

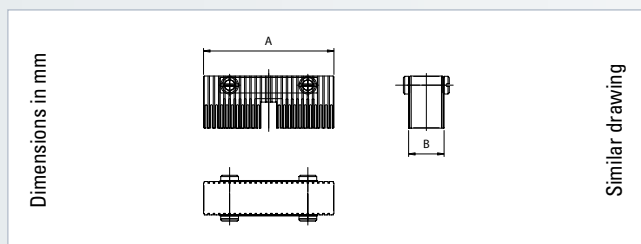
Press-fit tool



hm 2.0 female connector flat rock			
Type	Dimension A	Dimension B	Part number
A	50	12	884-720-W25
B25	50	12	884-720-W25
B22	44	12	884-720-W22
B19	38	12	884-720-W19
AB25	60	12	884-720-W25
AB22	44	12	884-720-W22
AB19	38	12	884-720-W19
C	25	12	884-720-W11
D	50	16	884-730-W25
E	50	16	884-730-W25
DE	50	16	884-730-W25
F	25	12	884-720-W11
A + B22 (cPCI)	94	12	884-720-W47



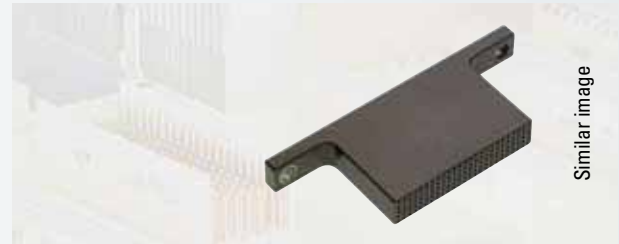
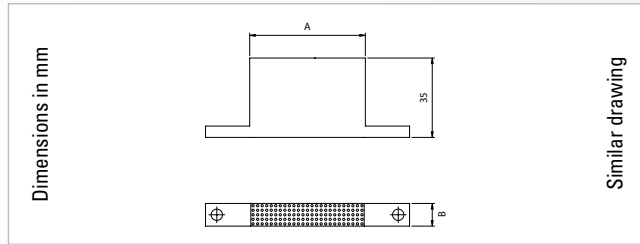
On request
– Customer-specific adaptation



hm 2.0 male connector			
Type	Dimension A	Dimension B	Part number
A	50	13.6	884-700-W125
B	50	13.6	884-700-W125
B22	44	13.6	884-701-W122
B19	38	13.6	884-708-W119
AB25	50	13.6	884-708-W125
AB22	44	13.6	884-708-W122
AB19	38	13.6	884-708-W119
C	25	13.6	884-702-W111
D	50	19.6	884-710-W125
E	50	19.6	884-711-W125
DE	50	19.6	884-712-W125
F	25	19.6	884-713-W111
A + B22 (cPCI)	94	13.6	884-703-W147

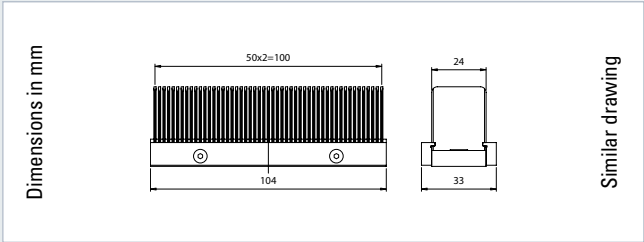


On request
– Customer-specific adaptation



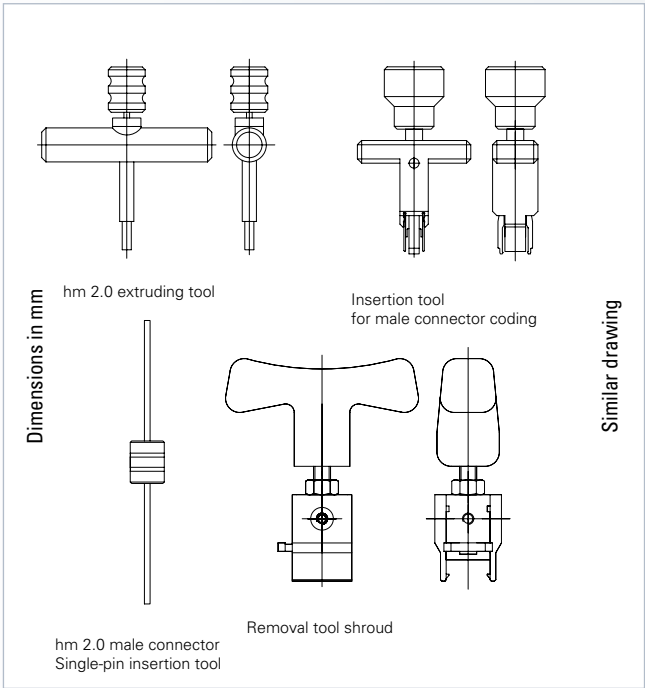
hm 2.0 female connector			
Type	Dimension A	Dimension B	Part number
A	50	10	890-720-W25
B25	50	10	890-720-W25
B22	44	10	890-720-W22
B19	38	10	890-720-W19
AB25	50	10	890-720-W25
AB22	44	10	890-720-W22
AB19	38	10	890-720-W19
C	25	10	890-720-W11
D	50	13	890-710-W25/1
E	50	13	890-711-W25/1
DE	50	13	890-731-W25
F	25	13	890-713-W11/1
A + B22 (cPCI)	94	10	890-720-W47

On request
– Customer-specific adaptation



hm 2.0 support tool	
Type	Part number
Modular	890-705-W50

On request
– Customer-specific adaptation



hm 2.0 repair kit	
Contents of the kit	Part number
A, B, C, D	892-705- W
C, D	892-705- V

On request
– Customer-specific adaptation



Removal tool/shroud



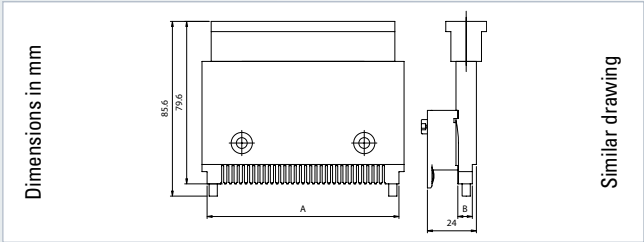
Insertion tool for male connector coding



hm 2.0 extruding tool

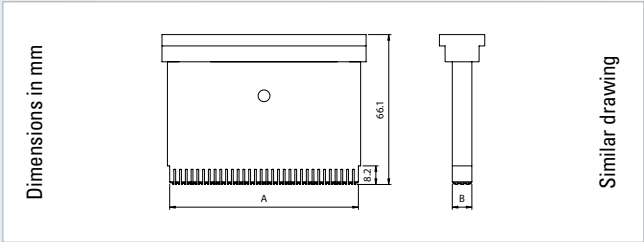


hm 2.0 male connector single-pin/insertion tool



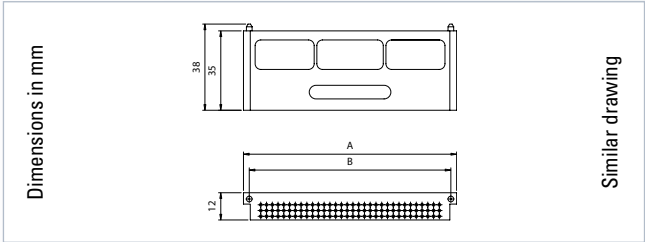
DIN male connector			
Type	Dimension A	Dimension B	Part number
B	94	55	884-150
B/2	534	55	884-151
B/3	38	55	884-152
C	94	85	884-250
C/2	534	85	884-251
C/3	38	85	884-252

On request
– Customer-specific adaptation



DIN male connector			
Type	Dimension A	Dimension B	Part number
R	83	86	884-525
R2	425	86	884-526
R3	273	86	884-527

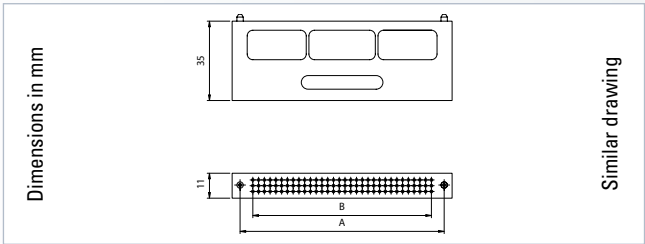
On request
– Customer-specific adaptation



DIN male connector			
Type	Dimension A	Dimension B	Part number
B	96	89	890-302
B/2	55	48	890-303
B/3	40	33	890-304
C	96	89	890-305
C/2	55	48	890-306
C/3	40	33	890-307



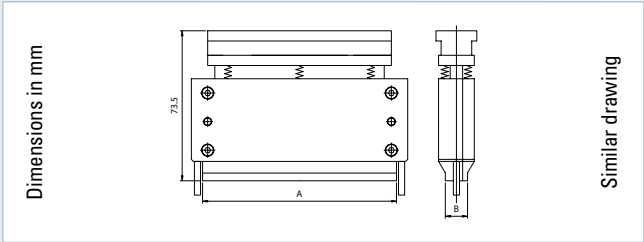
On request
– Customer-specific adaptation



DIN male connector			
Type	Dimension A	Dimension B	Part number
R	90	7874	890-317
Æ	50	3810	890-348
Æ	3476	2286	890-336



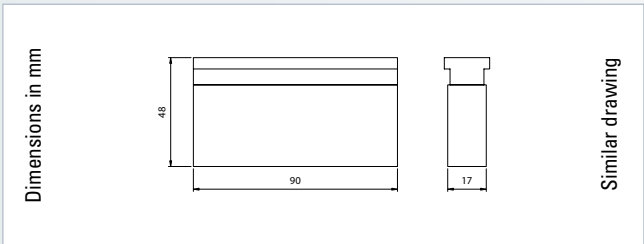
On request
– Customer-specific adaptation



DIN female connector			
Type	Dimension A	Dimension B	Part number
B*	95	11	884-100
B/2*	54	11	884-101
B/3*	39	11	884-102
C*	95	135	884-200
C/2*	54	135	884-201
C/3*	39	135	884-202
D	95	135	884-303
E	95	186	884-353
F	95	175	884-401
flow profile	95	175	884-406
G	95	226	884-453
Gow profile	95	226	884-451
ME switching connector	95	—	884-200
Switching connector across rows	95	—	888-214

On request
— Customer-specific adaptation

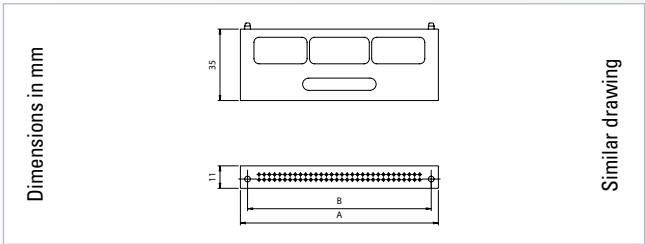
Note
* Only for connector 102-x
** Only for connector 104-x



DIN female connector	
Type	Part number
B*	886-900-WV
C*	886-900-WV
C/2*	886-900-WV
C/3*	886-900-WV
ME 64x	886-900-WV

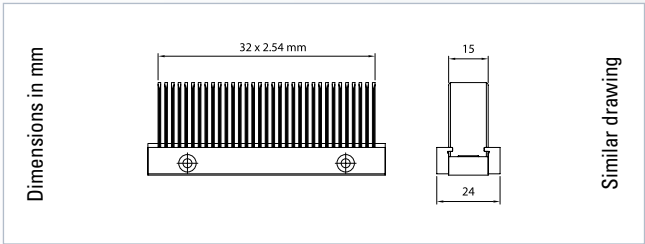
On request
— Customer-specific adaptation

Note
* Only for connector 302-x
** Only for connector 304-x



DIN female connector			
Type	Dimension A	Dimension B	Part number
B	97	90	890-333
B/2	57	4936	890-334
B/3	40	3302	890-335
C and switching connector	97	90	890-317
C/2	57	4826	890-331
C/3	41	34	890-332

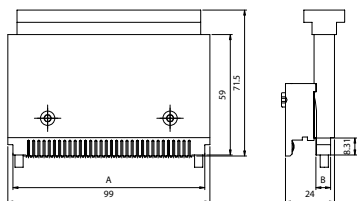
On request
– Customer-specific adaptation



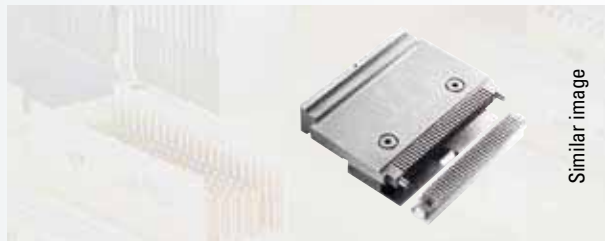
DIN female connector	
Type	Part number
D	890-100- W
E	890-100- W
F	890-100- W
flow profile	890-100- W
G	890-100- W
flow profile	890-100- W
ME 64x	890-100- W

On request
– Customer-specific adaptation

Dimensions in mm



Similar drawing

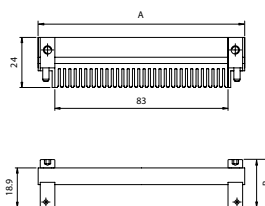


Similar image

DIN female connector			
Type	Dimension A	Dimension B	Part number
R	94	72	884-500
R	55	72	884-501
R	—	72	890-504

On request
– Customer-specific adaptation

Dimensions in mm



Similar drawing

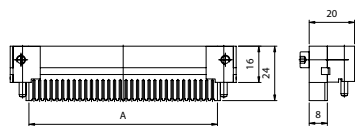


Similar image

DIN male connector insert block for flat rock			
Type	Dimension A	Dimension B	Part number
C	99	136	884-260
C/2	59	136	884-261
C/3	41	136	884-262

On request
– Customer-specific adaptation

Dimensions in mm



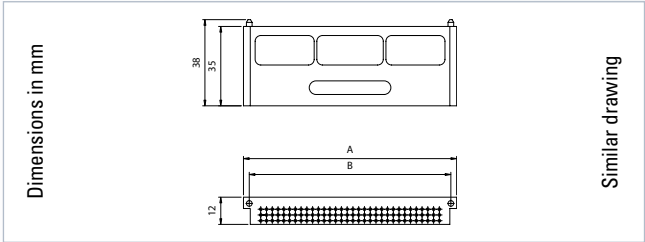
Similar drawing



Similar image

DIN female connector insert block for flat rock			
Type	Dimension A	Dimension B	Part number
R	8313	8	884-503
R	4249	8	884-502
R	2740	8	884-504

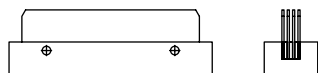
On request
– Customer-specific adaptation



DIN female connector			
Type	Dimension A	Dimension B	Part number
R	96	89	890-305
Æ	55	48	890-306
ß	40	33	890-307

On request
– Customer-specific adaptation

Dimensions in mm



Similar drawing



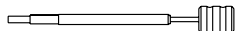
Similar image

DIN disassembly support tool

Type	Part number
B/C female connector	892-300
Male connector	892-304
D female connector	892-301
Flow profile female connector	892-302
E female connector	892-303

On request
– Customer-specific adaptation

Dimensions in mm



Similar drawing



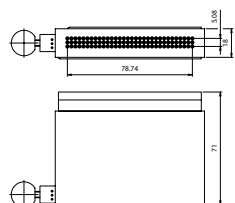
Similar image

DIN extruding tool single contacts male connector

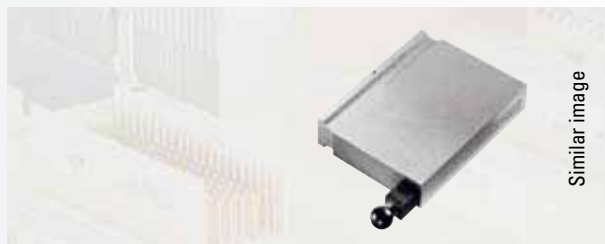
Type	Part number
06 x 06	892-203

On request
– Customer-specific adaptation

Dimensions in mm



Similar drawing

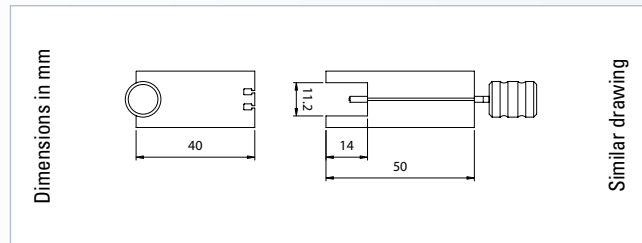


Similar image

DIN extruding tool contacts male and female connector

Type	Part number
Short contacts	892-210
B/C female connector, Male connector	892-200
D/E female connector	892-201
Flow profile female connector	892-202

On request
– Customer-specific adaptation



DIN insertion tool single contacts female connector	
Type	Part number
B*	892-400
C*	892-401
R	892-405
D	892-402
E	892-403
flow profile	892-404

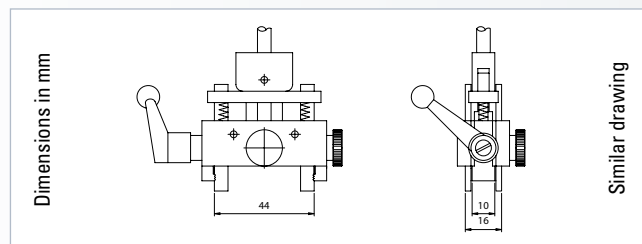
On request

– Customer-specific adaptation

Note

* Only for connector 302-x

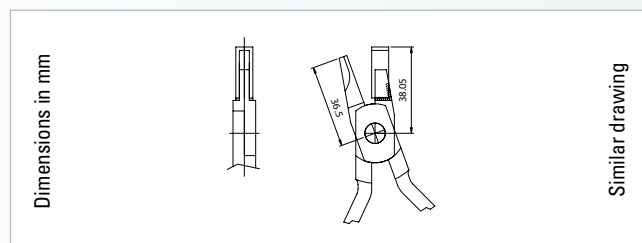
** Only for connector 304-x



DIN female connector ejector tool	
Type	Part number
1/1	892-100
1/2	892-103
1/3	892-104

On request

– Customer-specific adaptation



DIN keying pliers	
Type	Part number
B and C	894-301

On request

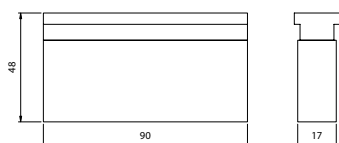
– Customer-specific adaptation

Assembly tools

PC/104, PC/104-Plus, VarPol connector

Press-fit tool

Dimensions in mm



Similar drawing



Similar image

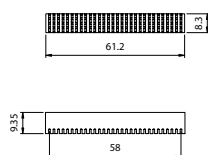
PC/104, PC/104-Plus, VarPol female connector

Type	Part number
PC 104	886-900-WV
PC/104-Plus	886-900-WV
VarPol 1-, 2-row	886-900

On request

– Customer-specific adaptation

Dimensions in mm



Similar drawing



Similar image

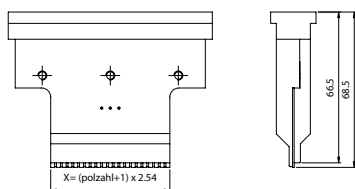
PC/104-Plus straight pin header

Type	Part number
2 mm grid	886-903-WV

On request

– Customer-specific adaptation

Dimensions in mm



Similar drawing



Similar image

VarPol pin header

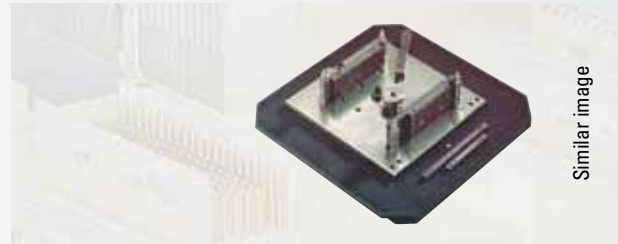
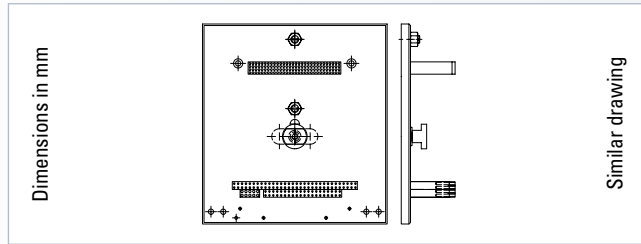
Type	Part number
Straight, 1-row	886-461-xx
Straight, 2-row	886-462-xx
Straight, 3-row	886-463-xx
Angled, 1-row	886-471-xx
Angled, 2-row	886-472-xx
Angled, 3-row	886-473-xx

On request

– Customer-specific adaptation

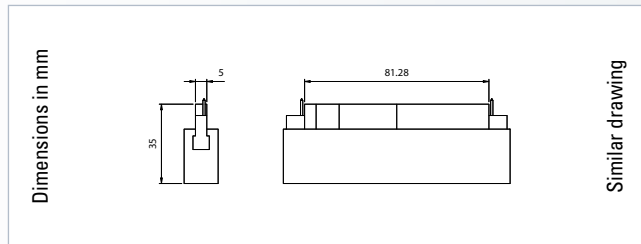
Note

xx = no. of contacts of connector per row



PC/104, PC/104-Plus female connector	
Type	Part number
PC/104	890-600-W
PC/104-Plus	890-602-W

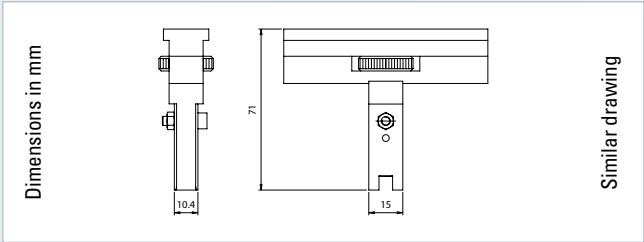
On request
 – Customer-specific adaptation



VarPol female connector and VarPol pin header	
Type	Part number
1-row	890-330
2-row	890-323

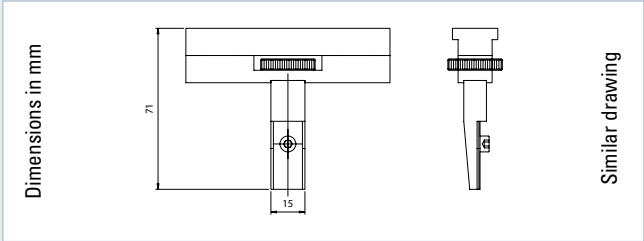
On request
 – Customer-specific adaptation

Assembly tools
Power terminals
Press-fit tool



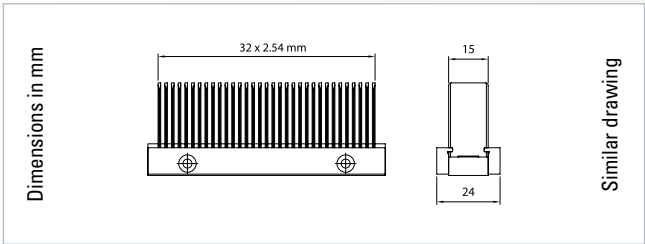
Power terminal	
Type	Part number
Grid 5.08 x 7.62	
Part N910-2xxxx	886-601
Part N910-6xxxx	886-601
Grid 5.08 x 10.16	
Part N911-320xx	886-601-1
Part N911-330xx	886-601-1
Part N911-322xx	886-604
Part N911-322xx	886-604

On request
– Customer-specific adaptation



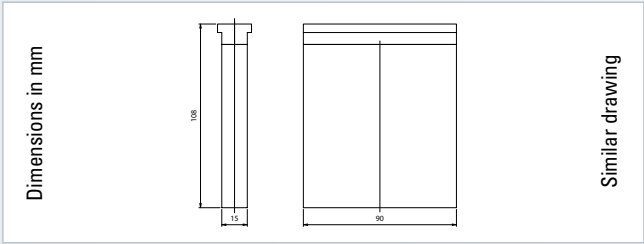
Blade connector	
Type	Part number
Blade connector	884-650

On request
– Customer-specific adaptation

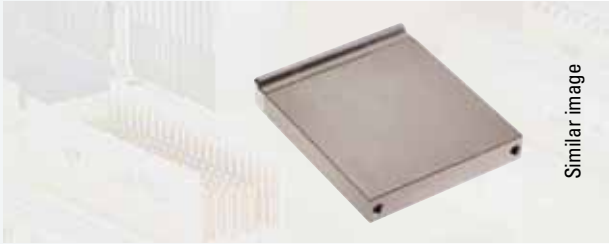


Universal support tool grid 2.54 mm	
Type	Part number
Modular	890-100- VV
Ød 508 x 762 mm	890-361- VÜ
Ød 508 x 1016 mm	890-362- VÜ
Blade connector	890-364- VÜ

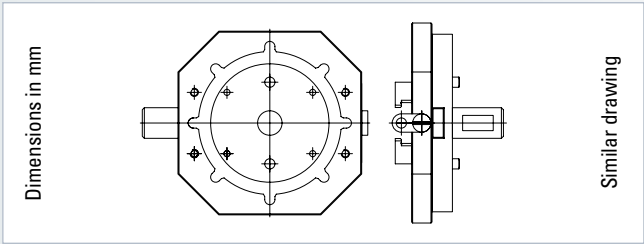
On request
– Customer-specific adaptation



Alignment tool	
Type	Part number
Alignment tool	892-903



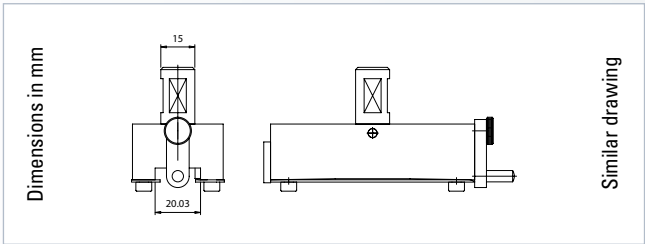
On request
– Customer-specific adaptation



Rotary tool holder	
Type	Part number
Rotary tool holder	882-204



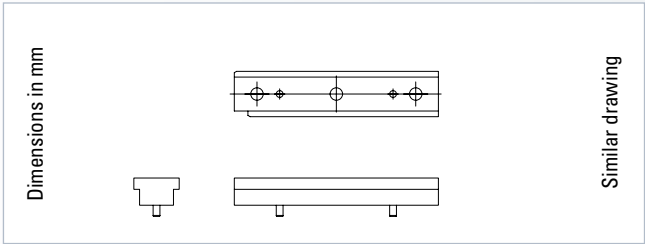
On request
– Customer-specific adaptation



Quick release tool holder	
Type	Part number
Quick release tool holder	882-201



On request
– Customer-specific adaptation



Tool adapter	
Type	Part number
T-unit	882-300



On request
– Customer-specific adaptation

The perfect supplement

In order to ensure that we offer perfect solutions from one source, we also supply suitable assembly machines for press-fit connectors. You can choose various highly efficient solutions – from manual production all the way to complete automated processes.

ept assembly machines

By supplementing the ept connectors with suitable ept assembly machines and the associated ept tools, you will receive an all-in-one system solution from one source. The advantages are obvious: the design of the connectors, press-fit zone, assembly tools and the process and machine are perfectly matched to each other. This results in a considerable reduction of the process costs and thus the reduction of the "Total Cost of Ownership" (TCO). Practical experience has shown that a fast amortization of the investment – within a few months – is possible. Another important advantage is the increased quality and thus increased reliability of the electrical connections.

From manual to serial production – We offer the right assembly machine for any application

For the production of small and pilot series, manual workstations with manual lift with or without pneumatic support (HKP 16 or HKP 20) are the preferred choice.

For more sophisticated applications, the manual workstation HKP 35 can be used. This assembly machine offers many expansion options depending on your requirements, e.g. a free-moving XY bench or the monitoring of the press-fit force by a PC controlled programmable electronic force-displacement monitoring.

A database for recorded data permits simple documentation of the press-fit processes. Furthermore, the HKP 35 can be expanded to create a complete workstation where the required connectors and printed circuit boards as well as the press-fit tools are stored and readily provided.

For large serial production, the PEM100 has already been proven in the market. This modular system permits fully automatic press-fit process of pre-loaded printed circuit boards, the upper and lower die can be vertically traversed along the Z axis, the XY bench can program controlled traversed along both horizontal axes.

The customer's benefits are obvious:

- Bidirectional printed circuit board transport is possible, thus "inline-capable"
- Fully automatic production, including loading and unloading of printed circuit boards, automatic tool change, monitoring of the press-fit force
- High production capacity of up to 1000 press-fit connectors per hour
- Quick conversion to new product series by means of simple program and tool change
- Connectors can be pressed in on both sides of the board
- Modular configuration and retrofitting are possible
- Remote maintenance is possible

Let us know the demand of your machine

Together, we analyze your requirements and configure the ideal assembly machine for you. You will benefit from the experience of our specialists gained in many realized projects.

As one of the few connector manufacturers we can offer you the whole range of services from one source, we have the comprehensive expertise, the right tools and selected partners. By combining connectors, the assembly machine and tools we can offer optimum technical, schedule-based, and economical results for you.



Machine type	Insertion force	PCB size	Insertion force monitoring	Suitable for				
		Max. (mm)		Modules	Backplanes	Pilot and small series	Repair	Large series
 HKP 16	16 kN	400 x 300		X	X	X	X	
 HKP 20	20 kN	500 x 300		X	X	X	X	
 HKP 35	35 kN	500 x 300	Optional pneumatic force deactivation or PC control	X	X	X	X	
 PEM 100	40 kN (optionally 80 kN)	600 x 800	X	X	X			X



Absolutely flexible –
ept automotive GmbH & Co. KG

ept
automotive

ept automotive GmbH & Co. KG was founded in 2004. Customer-specific automotive solutions are developed at our headquarters in Peiting/Germany and produced at different locations (Peiting, Augsburg in Germany and Czech Republic). Our location in the USA, ept automotive, L.P., was founded in 2005.

Regarding contact technology of printed circuit boards, the focus is on press-fit technology with the reliable press-fit zone Tcom press®, which was developed by ept. This technology was approved in the automotive industry several years ago and has been used in various applications.

Do you need a customized automotive solution?

Then ept is the right partner for you:

Our comprehensive technical expertise in development and production of standard components as well as the experience gained from the development of many customer-specific solutions in the automotive sector are directly applied for implementing individual customer solutions.

Examples of current ept products are:

- Stamped contacts
- Loaded connectors (straight and angled)
- Overmolded connectors
- Sensor cases with overmolded or inserted contacts
- Printed circuit board connectors
- Shielding

These are used in the following applications:

- Control devices
(e.g. ABS/ESP, climate control, body & security, engine control, adaptive forward lighting, seat adjustment, power windows)
- Sensor cases
(e.g. airbag sensors, rain/light sensors, sunlight sensors, axle position sensors)

Automotive solutions

Our strengths are your advantages

- We have many years of successful experience in working together with renowned automobile component suppliers
- We are flexible and fast, due to our own
 - Product development and design
 - Prototyping
 - Test and qualification equipment
 - Toolmaking (stamping and injection molding tool, jig department as well as automation equipment)
 - Stamping shop
 - Injection molding (incl. overmolding)
 - Conveyor galvanic equipment
 - Manual, semi-automatic and fully automatic assembling
- We have subsidiaries all over the world
- We offer you product-specific processing technology according to your specifications and requirements

Certified quality

All ept sites are certified according to ISO 9001:2000.

Locations where components for automotive applications are produced are also certified according to ISO/TS 16949:2002

Certifications:

- ISO 9001:2000
- ISO/TS 16949:2002

Planned:

- Certification according to DIN ISO 14001 in Peiting/Germany
- Certification according to ISO/TS 16949 for the site in the Czech Republic

This stands for top quality

- Standardized methods
- Detailed production planning
- Complete handling and technical documentation of all processes
- Assembly processes adapted to your requirements
- Electrical and mechanical testing
- Supplier and customer complaints management



AC control unit



Adaptive forward lighting control unit



ABS controller

Automotive examples

Application example	Application area	ept solution	Advantages
AC control unit	Passenger compartment	64 contacts interface connector with signal and power pins, 22 contacts printed circuit board connector, 4 contacts connector for ventilation motor	Space savings, increased reliability, cost advantages for customer's manufacturing process
ABS/ESP control units	Engine compartment/underbody (safety-relevant)	Different signal, power, pump, coil and locking contacts in press-fit technology	Increased contact reliability in the terminal equipment, cost advantages for the manufacturing process, successful elimination of initial quality problems due to solder technology
Body & security control device (central control unit)	Passenger compartment	Several printed circuit board connectors for the connection of two printed circuit boards	Cost savings in the manufacturing process since the soldering process is omitted, higher reliability, the complete electronics box
Engine control	Engine compartment	Several printed circuit board connectors for the connection of two printed circuit boards	Optimized utilization of the installation space in the control unit; cost savings in processing, since the soldering process is omitted
Electronic seat adjustment	Passenger compartment	Several printed circuit board connectors for the connection of two printed circuit boards	Optimized utilization of the installation space with the control unit; cost savings in processing, since the soldering process is omitted
Control device for adaptive head lighting	Engine compartment	Angled connector with integrated housing wall	Simplification of the processing process, increased vibration resistance
Sensor housing for adaptive head lighting	Underbody/rear axle	Multi-angled single contacts	Simplification of the manufacturing process, increased vibration resistance, integrated printed circuit board fixing
Sunlight sensor housing	Climate control (engine hood outdoor area)	Sensor housing with straight and angled, overmolding signal contacts	Technological advantages for the further processing of the sensor at customer
Airbag sensor	Body	Overmolding single contacts and sockets in the sensor case	High contact reliability, simplification of the manufacturing process
Power window control unit	Passenger compartment	Press-fit contact block	High mechanical stability, reliability, simplification of the manufacturing process

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ept GmbH & Co. KG

Electronic Precision Technology
Bergwerkstr. 50
86971 Peiting, Germany
Phone +49 (0) 88 61/25 01 0
Fax +49 (0) 88 61/55 07
E-mail: sales@ept.de

Legal form:
GmbH & Co. KG

Registered office: Peiting, Germany

Register court:
AG Munich, HRA 76554

Managing Director:
Bernhard Guglhör, Thomas Guglhör

General Partner:
ept Beteiligungs-GmbH

Registered office:
Peiting, Germany

Register court:
AG Munich, HRA 132411

Managing Director:
Bernhard Guglhör, Thomas Guglhör

Catalog concept and design:
kaltnermedia GmbH
www.kaltnermedia.de

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www.ept.de

ept GmbH & Co. KG

Electronic Precision Technology
Bergwerkstr. 50
86971 Peiting, Germany
Phone +49 (0) 88 61/25 01 0
Fax +49 (0) 88 61/55 07
sales@ept.de

ept, inc.

150 Hartwell Street
West Boylston, MA 01583-2410, USA
Phone +1 508 835 9850
800 323 2568
Fax +1 508 835 9851
sales@eptusa.com

**ept Electronic Precision Technology
(Shanghai) Ltd.**

6F Building 37, No. 333 Qin Jiang Road
Shanghai, P. R. China
Post code: 20 02 33
Phone +86 (0) 21-54 26-09 88
Fax +86 (0) 21-64 95-39 49
sales@eptcn.com