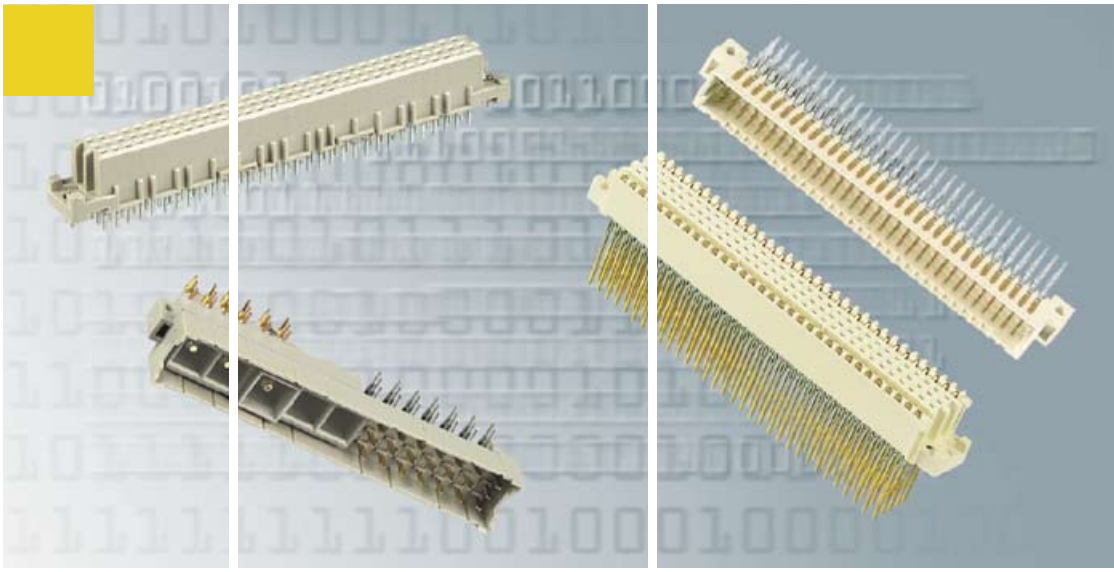
HARTING



Connectors DIN 41 612

HARTING People | Power | Partnership

HARTING People | Power | Partnership

Quality Connections Worldwide

HARTING was founded in 1945 by the family that still owns the company.

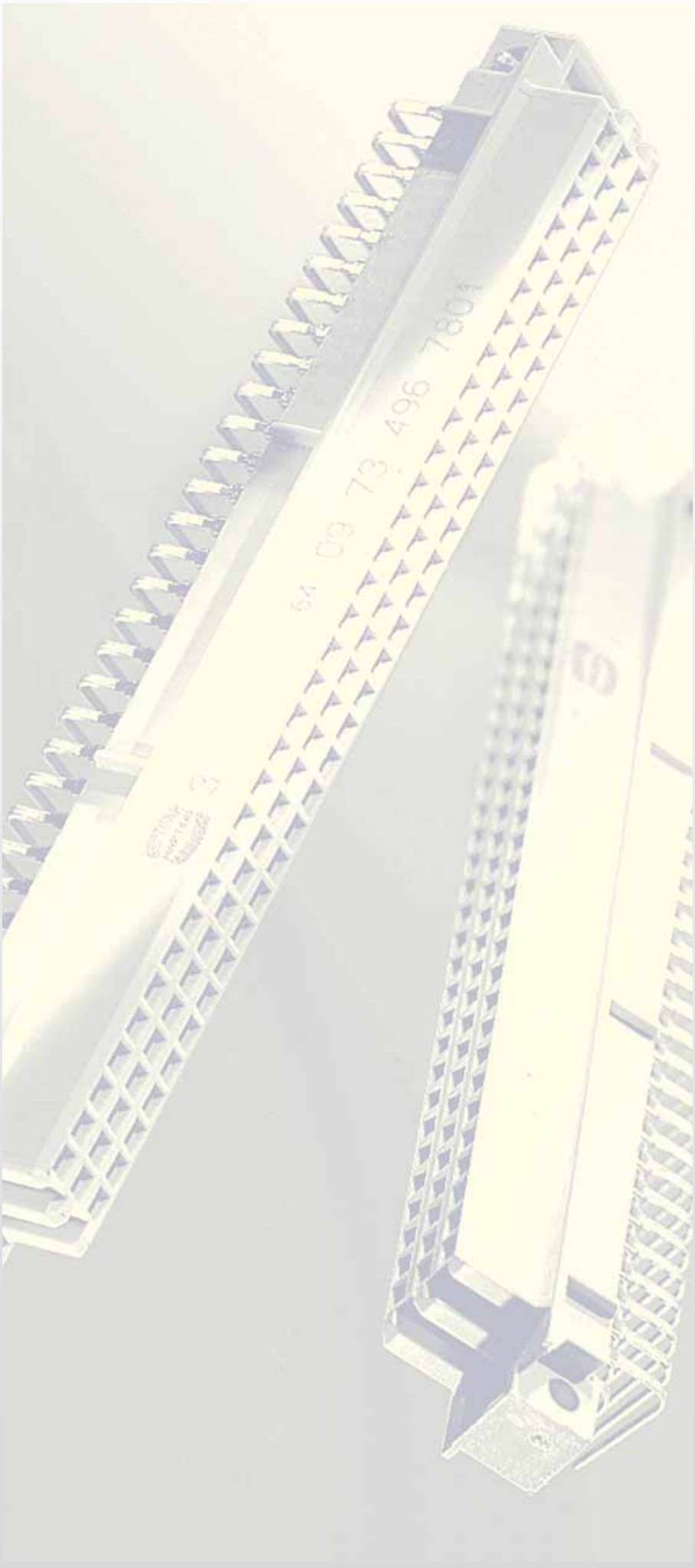
Today, HARTING employs around 2,000 people worldwide, including 150 qualified engineers. The sales team, including more than 100 sales engineers is in daily contact with our customers.

The company is one of the world's leading manufacturers of connectors, and currently have 34 subsidiary companies in Europe, the United States and Asia. In several product ares, HARTING is a market leader.

Great emphasis is placed on close links with customers, including the provision of a 'Just-in-Time'-Service to ensure rapid delivery to key customers.

HARTING products are designed and manufactured using the latest automated techniques, from CAD systems in the research and development department to automatic production techniques on the assembly lines.

Production and quality control is based on a 'zero-error' philosophy which can only be reached by the continuous successful implementation of fully automated production techniques. The organisation and procedures for quality assurance are based on the EN ISO 9001 standard. A total of 60 engineers and other employees, most of whom are trained and qualified to standards laid down by the DGQ (German Association of Quality) or the SAQ (Swiss Association of Quality), are employed solely on quality-assurance activities.



Printed Board Connectors according to DIN 41 612 / IEC 60603-2

Economic and Reliable Connections

Connector system for use in 19” racks to DIN 41 494 (replaced by DIN EN 60 297-3).

Connectors according to

IEC	60 603-2
DIN	41 612
(replaced by IEC 60 603-2)	

UL-listed	E 10 2079 (M)
CSA	098267 00 000
CECC	75 101-801
IEC	61 076-4-113

Developed for economical assembly of electronic plant and equipment.

HARTING offer the most comprehensive range of highly versatile connectors complemented by many styles of shell housings for a complete interconnection and interface system.

The division Printed Board Connectors is certified according to EN ISO 9001

The advantages

- Indirect mating (male/female)
- Automated production processes
- Continuous quality assurance
- 3-160 contacts
- Complete interconnection system
- Numerous interface connectors
- A wide variety of hoods
- Many termination technologies provide for the lowest installed cost
- Contacts selectively gold-plated
- Tinned terminations for increased solderability

The terminations

- Wrap posts for automated wiring
- Straight and angled solder pins for printed circuits
- High temperature connectors for reflow soldering
- Solder lugs for discrete wiring
- Press-in technology for backplanes
- Crimp contacts for selective loading
- Insulation displacement contacts for mass production
- Faston blades for higher power discrete wiring
- Cage-clamp contacts provide low cost connection for solid or stranded wires

For "non standard applications" we can manufacture designs to match your requirements.
Please discuss your requirements with us.

HARTING printed board connectors incorporate the latest design features and provide the assurance of high quality and reliability with economy.

General information:

It is the user's responsibility to check whether the components illustrated in this catalogue comply with different regulations from those stated in special fields of application which we are unable to foresee.

We reserve the right to modify designs in order to improve quality, keep pace with technological advancement or meet particular requirements in production.

Printed Board Connectors – general information

Extract DIN VDE 0110-04.97*)

This standard is a technical adaptation of IEC Report 664/664A and specifies, in general, the minimum insulation distances for equipment. It can be used by committees to protect persons and property in the best possible way from the effects of electrical voltages or currents (e.g. fire hazard) or from functional failure of the equipment by providing adequate dimensioning of clearances and creepage distances in equipment.

Clearance

Rated impulse without voltage

In allocation of the equipment to an installation category, the following factors shall be taken into account:

- Overvoltages which can enter the equipment from outside across the terminals.
- Overvoltages generated in the equipment itself and occurring at the terminals.

The following parameters apply to:

Installation category I

Equipment is intended for use only in appliances or installation parts, in which no overvoltages can occur.

Equipment in this installation category in normally operated at extra low voltage.

Installation category II

Equipment is intended for use in installations or parts of installations, in which lightning overvoltages need not be considered. Overvoltages caused by switching must be taken into account.

This includes for example domestic appliances.

Installation category III

Equipment is intended for use in installations or parts of installations, in which lightning overvoltages need not be considered, but which are subject to particular requirements with regard to the safety and availability of the equipment and its supply systems.

This includes equipment for fixed installation such as protective devices, relays, switches and sockets.

Installation category IV

Equipment is intended for use in installations or parts of installations, in which lightning overvoltages must be taken into account.

This includes equipment for connection to overhead lines such as omnidirectional control receivers and meters.

For circuits or parts of circuits inside the equipment, clearances may be dimensioned directly for the expected overvoltages. If the expected overvoltages are not impulse voltages but DC or AC voltages, the maximum value of these voltages shall be determined as the rated impulse withstand voltage for clearances both for homogeneous and inhomogeneous field.

Creepage

Degree of pollution

Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.

Pollution degree 2: Only non-conductive pollution occurs. A temporary conductive caused by condensation must be expected occasionally.

The degrees of pollution 3 and 4 are in this case not considered, as they are not relevant for the connectors shown in this catalogue. The minimum creepages in table 00.04 refer to the CTI-value for insulation group III a/b.

Procedure for the user

First specify the supply system and the maximum voltage, then calculate the applicable creepage and clearance distances.

To identify the clearance distances:

- Define the installation category.
- Define the degree of pollution expected.
- Select the rated impulse withstand voltage from table 00.01
- Select the minimum required clearance from table 00.02

Table 00.01

Voltages phase-to-earth derived from rated system voltages up to $U_{r.m.s.}$ and $U_{\_}$	Rated impulse withstand voltages in kV for installation category (Voltage form: 1.2/50 µs according to DIN VDE 0432 part 2)			
	I	II	III	IV
50	0.33	0.50	0.80	1.5
100	0.50	0.80	1.5	2.5
150	0.80	1.5	2.5	4.0
300	1.5	2.5	4.0	6.0
600	2.5	4.0	6.0	8.0

Table 00.02

Rated impulse withstand voltage in kV	Minimum clearances in mm up to 2000 m above sea level[1]			
	Case A (Inhomogeneous field[3])		Case B (Homogeneous field[2])	
	Pollution degree		Pollution degree	
	1	2	1	2
0.33 0.50	0.01 0.04	0.2	0.01 0.04	0.2
0.80	0.1		0.1	
1.5	0.5	0.5	0.3	0.3
2.5 4.0	1.5 3	1.5 3	0.6 1.2	0.6 1.2
6.0 8.0	5.5 8	5.5 8	2 3	2 3

[1] For higher altitudes see table 2b from DIN VDE 0110 for multiplying factors.
[2] Verification by an impulse voltage test is required if the clearance is less than the value specified for case A.
[3] Point to plane.

To identify the creepage distances

- From the nominal voltage and the type of supply system select the rated voltage from table 00.03 a/b
- From the rated voltage and degree of pollution select the minimum creepage required in table 00.04

Table 00.03 a. Single phase, three or two wire AC or DC systems

Nominal voltage of supply system[1] $U_{r.m.s.}$ or $U_{\_}$ in V	Rated voltage in V	
	Phase-to-phase All systems (between conductors of different polarity for $U_{\_}$) $U_{r.m.s.}$ or $U_{\_}$	Phase-to-earth $U_{r.m.s.}$ or $U_{\_}$
12.5	12.5	–
24 25	25	–
30	32	–
42 48 50[2]	50	–
60	63	–
60/30	63	32
100[2]	100	–
110 120	125	–
150[2]	160	–
220	250	–
220/110 240/120	250	125
300[2]	320	–
440/220	500	250
600[2]	630	–

Table 00.03 b. Three phase, four or three wire AC systems

Nominal voltage of supply system[1] $U_{r.m.s.}$ in V	Rated voltage in V		
	Phase-to-phase All systems $U_{r.m.s.}$	Phase-to-earth $U_{r.m.s.}$	
60	63	32	63
110 120 127	125	80	125
150[2]	160	–	160
208	200	125	200
220 230 240	250	160	250
300[2]	320	–	320
380 400 415	400	250	400
440	500	250	500
480 500	500	320	500
575	630	400	630
600[2]	630	–	630
660 690	630	400	630

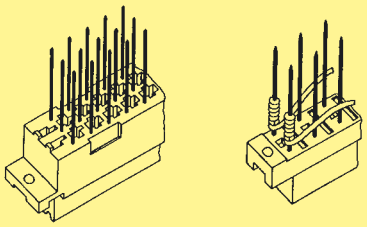
[1] This voltage can be the same as the rated voltage of the equipment.
[2] These values correspond to the values of table 00.01.
[3] In countries where both star and delta, earthed and unearthed supply systems are used the values for delta systems only should by used. Systems earthed across impedances are treated as unearthed systems.

Table 00.04

Rated voltage $U_{r.m.s.}$ or $U_{\_}$ in V	12.5	25	32	50	63	80	100	125	160	200	250	320	400	500	630	800	1000
Minimum creepage distance in mm																	
Degree of pollution 1	0.09	0.125	0.14	0.18	0.2	0.22	0.25	0.28	0.32	0.42	0.56	0.75	1	1.3	1.8	2.4	3.2
Degree of pollution 2	0.42	0.5	0.53	1.2	1.25	1.3	1.4	1.5	1.6	2	2.5	3.2	4	5	6.3	8	10

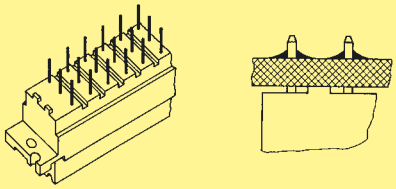
*) It is the users responsibility to ensure that the complete current issue of the specification is considered.

Wrap posts for automatic wiring techniques
explanation see page 00.06

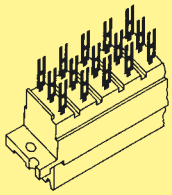


Solder pins for printed circuit boards
explanation see page 00.06

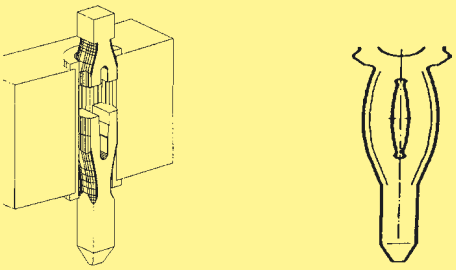
Solder pins for reflow soldering
explanation see chapter 05



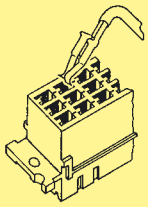
Solder lugs for discrete wiring
explanation see page 00.06



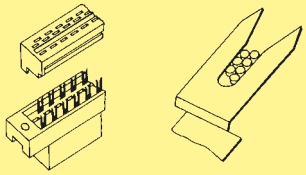
Press-in technology for printed circuit boards
explanation see chapter 04



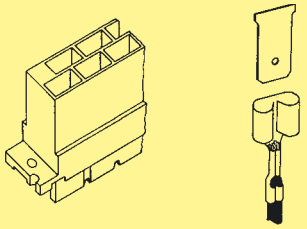
Crimp contacts for flexible wiring, selective loading and ease of replacement
explanation see page 00.07



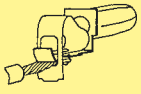
Insulation displacement contacts for mass termination of flat cable



Faston blades for higher power discrete wiring



Cage-clamp contacts provide low cost connection for solid or stranded wires



Solder connection

The term "soldering" is defined in DIN 8505:

> "Soldering is a method of connecting metallic materials using an additional melting metal, if necessary with the assistance of a flux and/or protective gas. The melting temperature of the solder must lie beneath the minimum melting temperature of the base metals being connected. These base metals shall be tinned without melting themselves."

Soft solders commonly used on electronic equipment are to DIN 1707-100. Solders for copper and silver are tin lead and have a melting range between 178°C and 215°C depending on the composition of the alloy. For soldering metallic materials the flux is defined in DIN EN 29 454-1. Tests are explained in DIN 8526. For soldering male connectors into printed circuit boards, see recommendations for soldering on page 00.08.

Wrapped connection

This technique permits high wiring density and takes over where other techniques would take up too much real estate. As a result of this process, there is a great time saving factor and cost per connection is relatively low when large numbers of connections are to be made.

When wires are correctly wrapped onto a precision manufactured rectangular post produced to the recommended specifications, one can state the following:

> A low resistance, mechanically strong and highly reliable connection is made which is unaffected by normal climatic or temperature changes.

Production of wrapped connections and associated material are defined in DIN EN 60 352-1.

Wrapping techniques

Standard wrap
: Only the non-insulated part of the wire is wrapped around the post. This means that the size of the wrapped connection is kept to the very minimum.

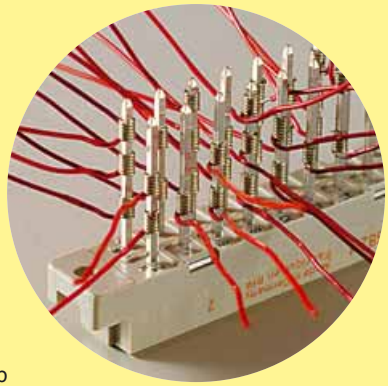
Modified wrap
: The top part of the wrapped connection is made using the cable conductor as stated above but an extra turn is made at the bottom. For this turn insulation is also wrapped around the post to give a great mechanical strength to the joint and also to provide insulation between adjacent posts.

Wrapping tools

To produce quality wrapped connections one must use a special wrapping tool, which can be pneumatic, electric or hand operated. Such tools have interchangeable wrapping heads and sleeves to suit the particular size of the wrap post being used.

The choice of accessories for these wrapping tools depends from the wrapping technique, the size of the wrap post itself and the conductor and insulation diameters of the wire.

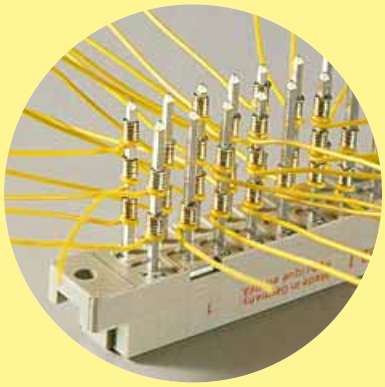
The adjacent tables show the maximum amount of wrapped connections that can be placed on the wire wrap post (in acc. to IEC 60352-1).



Standard wrap

Valid for standard wrap		Wire diameter [mm]						
		0.25	0.32	0.4	0.5	0.65	0.8	1.0
		max. allowed wire Ø incl. wire insulation [mm]						
		0.7	0.9	1.17	1.27	1.32	1.5	1.78
		min. necessary turns per wrap connection (for non-insulated wire)						
		7	7	6	5	4	4	4
Dimension of wire wrap post [mm]	Length of wire wrap post [mm]	possible wrap connections per wrap post						
0.6 x 0.6	13	6	5	4	4	4	3	2
0.6 x 0.6	17	8	6	6	5	5	4	3
1 x 1	20	10	7	7	6	6	5	4
1 x 1	22	11	8	7	7	6	5	4

Table 00.05



Modified wrap

Valid for modified wrap		Wire diameter [mm]						
		0.25	0.32	0.4	0.5	0.65	0.8	1,0
		max. allowed wire Ø incl. wire insulation [mm]						
		0.7	0.9	1.17	1.27	1.32	1.5	1.78
		min. necessary turns per wrap connection (for non-insulated wire)						
		7	7	6	5	4	4	4
Dimension of wire wrap post [mm]	Length of wire wrap post [mm]	possible wrap connections per wrap post						
0.6 x 0.6	13	4	3	2	2	2	2	1
0.6 x 0.6	17	5	4	3	3	3	2	2
1 x 1	20	6	4	4	3	3	3	2
1 x 1	22	6	5	4	4	4	3	2

Table 00.06

Crimp connection

A perfect crimp connection is gastight and therefore corrosion free. It is equivalent to a cold weld of the connected parts. For this reason, major features in achieving high quality crimp connections are the design of the crimping areas of the contact and of course the crimping tool itself. Wires to be connected must be carefully matched to the correct size of crimp contacts. If these basic requirements are met, users will be assured of highly reliable connections with a low contact resistance and a high resistance against corrosion.

The economical and technical advantages are:

- Constant contact resistance as a result of an unvariable crimp connection quality
- Corrosion free connections as a result of cold weld action
- Preparation of harnessing with crimp contacts already fitted
- More economic cable connection

Requirements for crimp connections are set out in DIN EN 60 352-2.

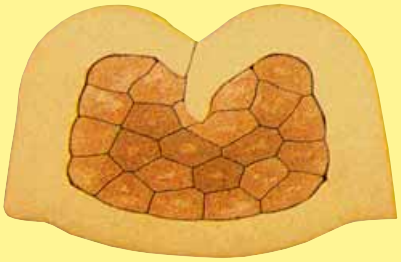
Pull out force of stranded wire

An essential consideration for a good quality of crimp connection is the mechanical retention of the wire in the crimp contact. As set out in DIN EN 60 352-2 the pull out force of the wire from the crimp must be at least 60 % (at 0.75 mm²) of the breaking force of the wire itself.

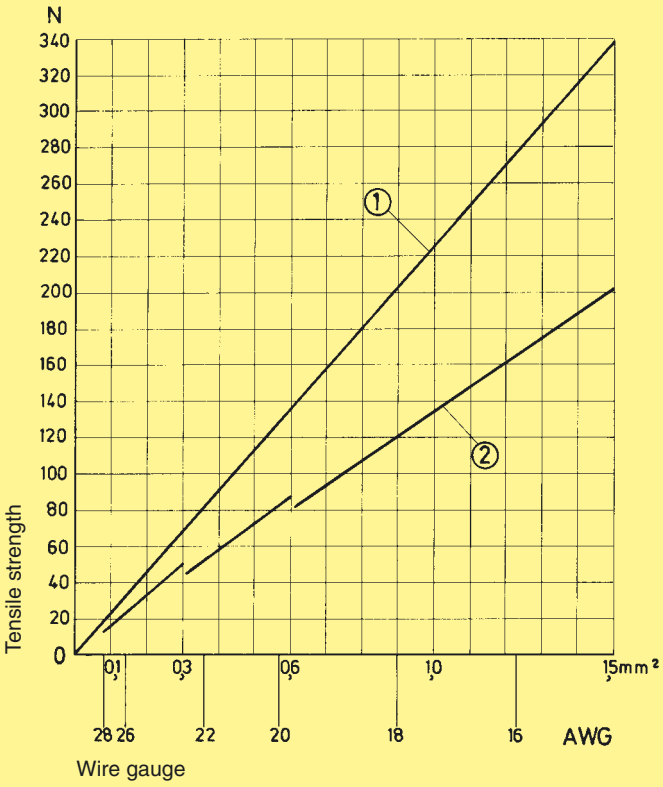
The adjacent diagram shows tensile strength plotted against wire cross sectional area. From this you can see the relationship between the breaking strength of wires and the force necessary to destroy HARTING crimp connections.

① Tensile strength of stranded wire

② Pull out force of wires from HARTING crimp contacts



Crimp cross-section



Crimping tools

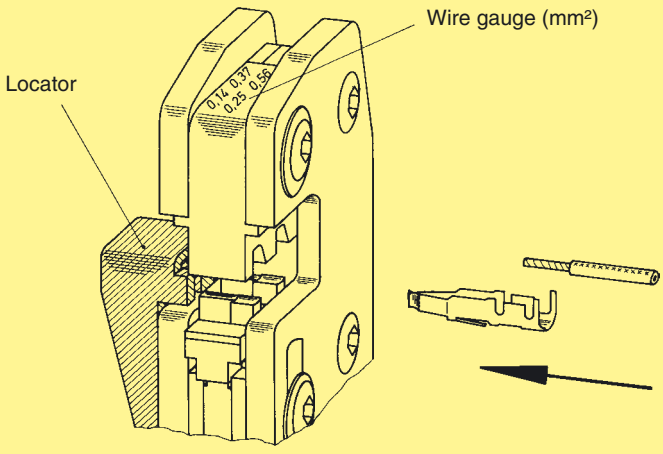
Crimping tools (hand operated or automatic) are carefully designed to guarantee a symmetrical deformation of the crimping area of the contact and the wire through the high pressure forming parts of the tool. The locator automatically engages the crimp contact and the wire at the correct point in the tool. The wire insulation can also be included as a secondary feature of some crimp contacts to care for additional mechanical strength.

The ratchet in the tool performs 2 functions:

① It prevents insertion of the crimp into the tool for crimping before the jaws are fully open

② It prevents the tool from being opened before the crimping action is completed

A quality crimp connection can be achieved with this crimping system.
The adjacent sketches show important features of the HARTING hand crimping tool.
The HARTING automatic crimping tool uses bandoliered contacts.
The machine strips insulation from the wire and then crimps the contact. Both the crimping area and the insulation support are independently adjustable to facilitate the use of any wire type with dimensions within the stated crimp capacity.



Performance level 3 as per DIN 41 612, part 5

50 mating cycles — then visual inspection. No gas test. No functional impairment.

Part No. explanation: 09 . . . . . 7 . . .

Performance level 2 as per DIN 41 612, part 5

400 mating cycles.
200 mating cycles — then 4 days gas test using 10 ppm SO_2. Measurement of contact resistance.
200 mating cycles — then visual inspection. No abrasion of the contact finish through to the base material. No functional impairment.

Part No. explanation: 09 . . . . . 6 . . .

Performance level 1 as per DIN 41 612, part 5

500 mating cycles.
250 mating cycles — then 21 days gas test using 10 ppm SO_2. Measurement of contact resistance.
250 mating cycles — then visual inspection. No abrasion of the contact finish through to the base material. No functional impairment.

Part No. explanation: 09 . . . . . 2 . . .

VG Version as per VG 95 324, part 1

500 mating cycles – then 1 day gas test using 10.000 ppm SO_2 and 1 day gas test using 10 .000 ppm H_2S. Then visual inspection. No abrasion of the contact finish through to the base material. No functional impairment.

Part No. explanation: 09 . . . . . 4 . . .

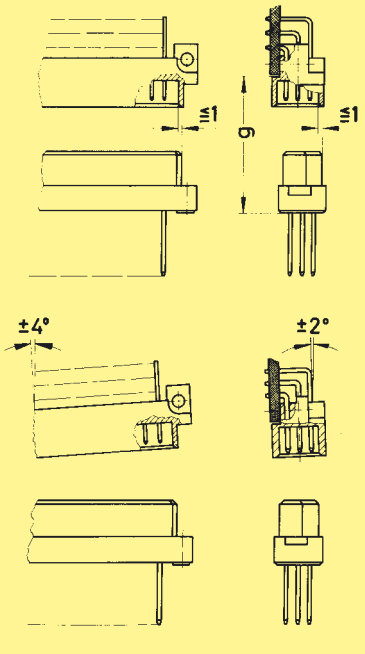
Other plating finishes available on request.

Mating conditions

To ensure reliable connections and prevent unnecessary damage, please refer to the application data diagrams.

These recommendations are set out in DIN 41 612, sheet 1.

The connectors should not be coupled and decoupled under electrical load.



g = 12,4 – 14,2

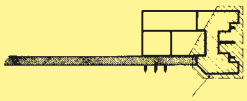
Soldering the male connectors into pcb´s

Male connectors should be protected when being soldered in a dip, flow or film soldering baths. Otherwise, they might become contaminated as a result of soldering operations or deformed as a result of overheating.

① For prototypes and short runs protect the connectors with an industrial adhesive tape, e.g. Tesaband 4657 grey. Cover the underside of the connector moulding and the adjacent parts of the pcb as well as the open sides of the connector. This will prevent heat and gases of the soldering apparatus from damaging the connector. About 140 + 5 mm of the tape should suffice.

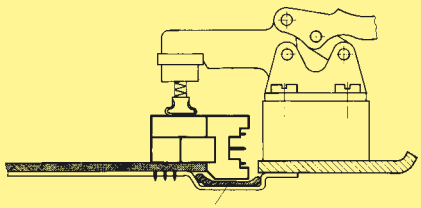
② For large series a jig is recommended. Its protective cover with a fast action mechanical locking device shields the connectors from gas and heat generated by the soldering apparatus. As an additional protection a foil can be used for covering the parts that should not be soldered.

③ For prototypes and short runs the protection described under point ① can be replaced by a solder protection cap. This cap can be ordered under the part no. 09 02 000 9935.

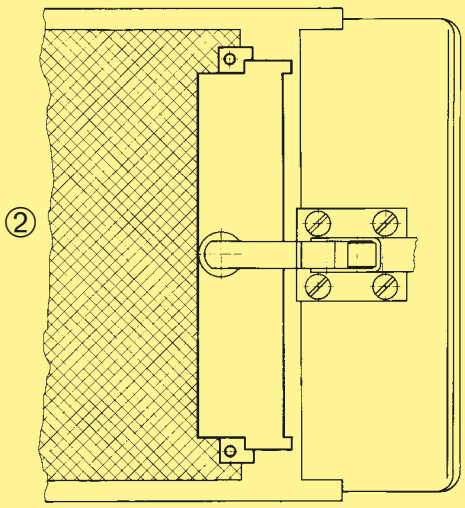


Adhesive tape or protection cap

① + ③



Intermediate foil



②

Specifications

These connectors meet the requirements set out in
DIN 41 612
VG 95 324
IEC 60 603-2
MIL-C-55 302
BT 222 · BS 9525
HE 11, HE 12, NFC 93-420
CECC 75 101-801

Design of connectors

- Standard fixing arrangement
- Standard positions for pcb´s and connectors provide a modular system in the card frame and a standard front panel system.
- Standard wiring matrix on the connection side for female connectors built up on a 2.54 mm (0.1" centres) grid. (This facilitates automatic wiring).
- Printed circuit boards with standard dimensions 100 x 160 resp. 233.4 x 160 mm as set out in DIN EN 60 297-3 standard sizes 3 U and 6 U.

Building up card frame systems

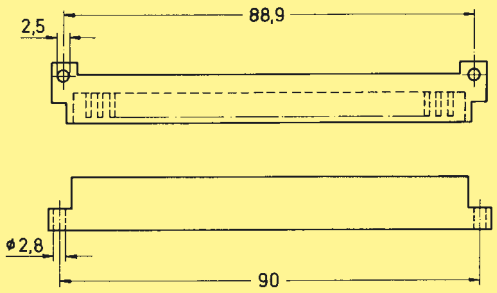
In the basic frame unit according to DIN EN 60 297-3 pcb's are inserted from the front and make contact with the connectors fitted to the back. This basic arrangement gives the following advantages:

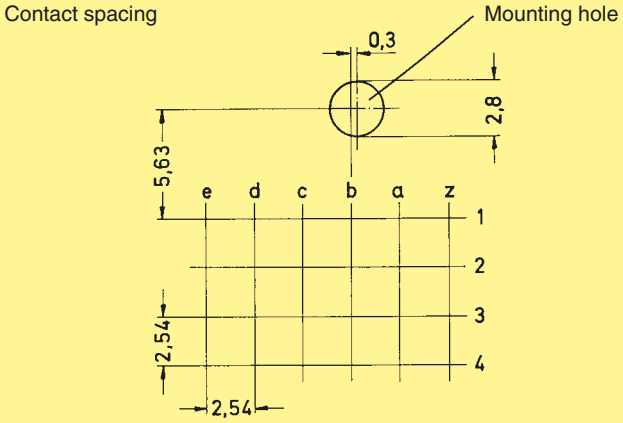
- When using conventional connectors on the back of the card frames, space is left above, below and in the middle along the horizontal line of the frame which can be used to fit extra connectors for cross connection or making plug connections by means of flying lead connectors.
- Using the HARTING system one can also connect flying lead connectors onto the front of the frame or even onto the inside of the back of the frame. This means that external equipment can easily be monitored, controlled or tested from the card frame itself.

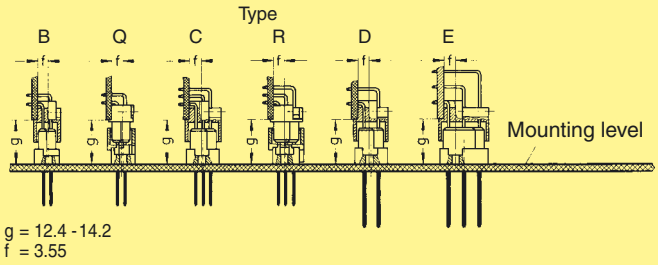
Complementary components

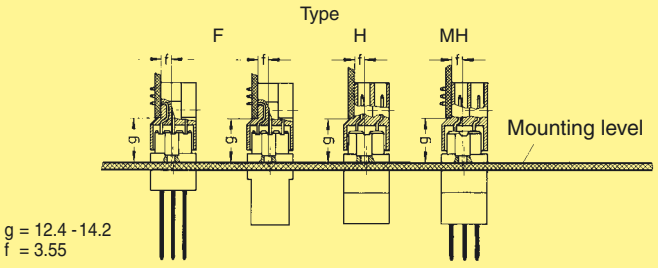
All connectors can be supplied with a complete range of accessories. These can be fitted above or below the wiring plane on the back of the card frame or on the front of the card frame. These connectors and accessories provide a complete connector system suitable for commonly used wiring techniques.

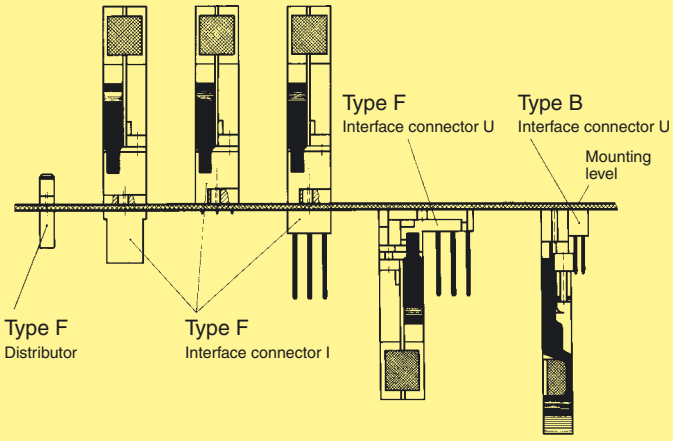
- The flying lead connector consists of a connector with crimp or solder contacts and a shell housing. The flying lead connector is latched or retained in position using screw fixings and is compatible with a corresponding male connector and interface connectors I and U.
- Fixing brackets prohibit the withdrawal of the pcb when a flying lead connector is used on the front side of the card frame.
- The interface connector I has blade contacts on the plug side and solder pins, wrap posts or crimp terminals on the termination side. It replaces the female connector type F fitted into the frame and allows interfacing to the internal wiring with the help of the flying lead connector on the back of the card frame unit.
- On the one plane the interface connector U has male contacts that are compatible with the flying lead connector. On the other plane it has wrap posts for interfacing to the internal wiring of the card frame. It can be mounted on the back of the card frame above or below other connectors arranged upright. Its wrap posts follow the same pitch as other connectors therefore allowing automated wiring. By using the U connector with the flying lead connector plug-in connections between the card frame and the peripheral equipment/ outlying stations are made easy.

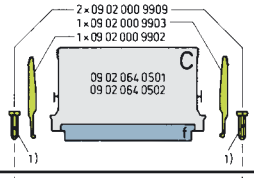
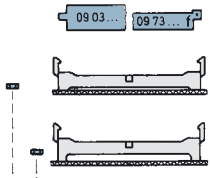
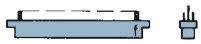
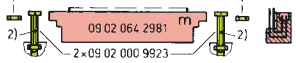
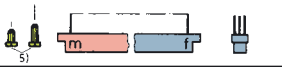
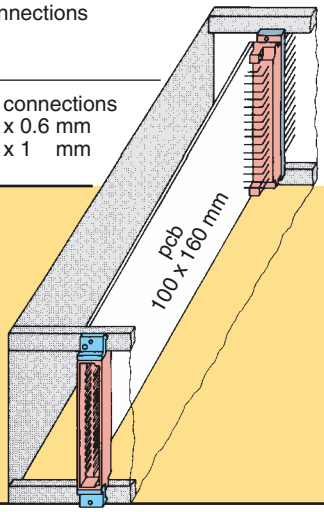
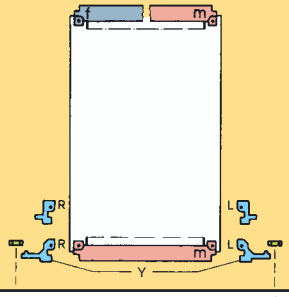
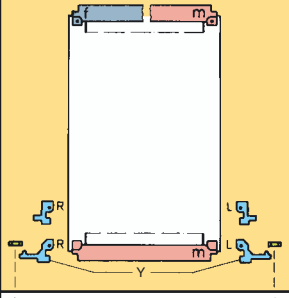
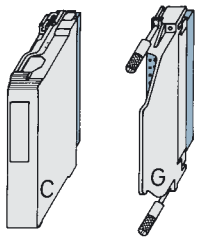
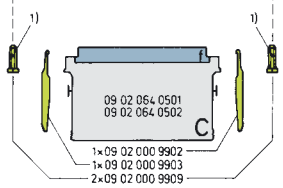
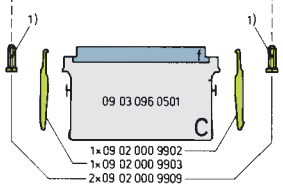










Type	B, Q		C, R
Wiring side	Input access from the front side via a female connector	Input access from the wiring side via a female connector	Input access via a female connector
			Pin shroud 
Soldering technique for a flexible wiring			
Soldering technique for pcb			
Crimp connections			
Wrapped connections posts 0.6 x 0.6 mm 1 x 1 mm	0.6 x 0.6 mm 	U element 0.6 x 0.6 mm 	0.6 x 0.6 mm 
Middle section 			
Front side 			

1) Screw fixing (cheesehead screw M 2.5 x 16 + nut) 09 02 000 9909

2) Screw fixing (cylindric screw M 2.5 x 22) 09 02 000 9923

3) 2 x screw fixing
(cylindric screw M 2.5 x 25 DIN EN ISO 1207 + nut M 2.5 DIN EN ISO 4032)

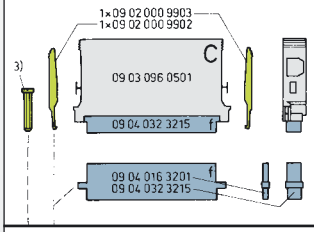
4) Fixing brackets for latching and screw fixing

5) Screw length depends on the pcb thickness

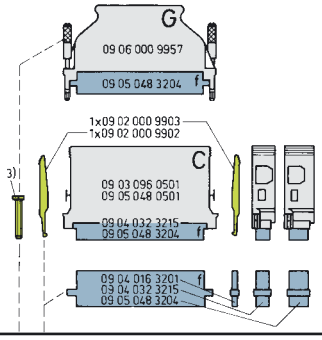
f = female connector
m = male connector
R = right hand
L = left hand

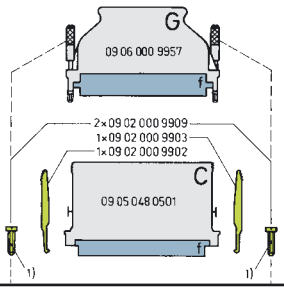
D	E	Universal adaptor type F
Input access from the front side via a female connector	Input access via a female connector	

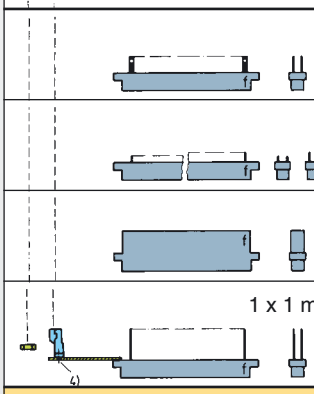
Piggyback connector

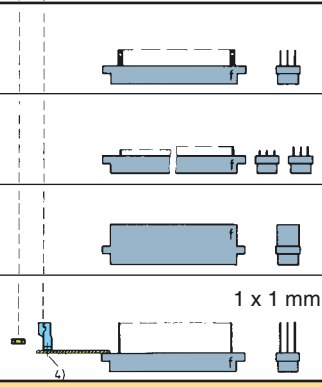


Piggyback connector

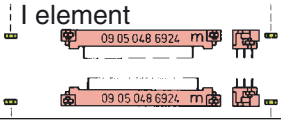


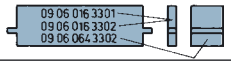


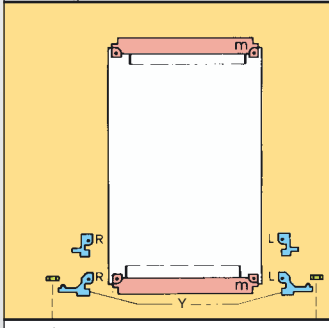


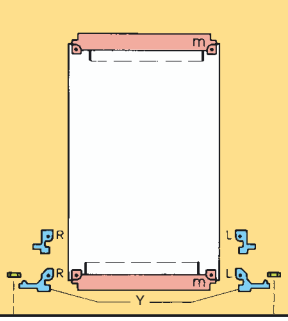


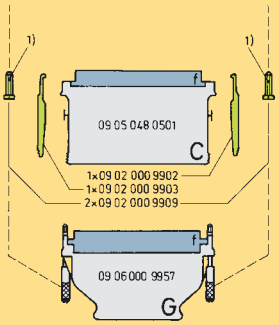
I element

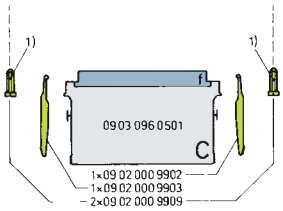


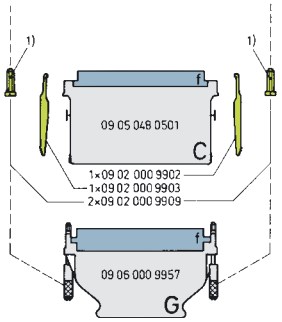








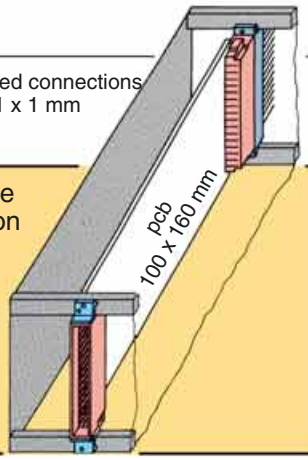


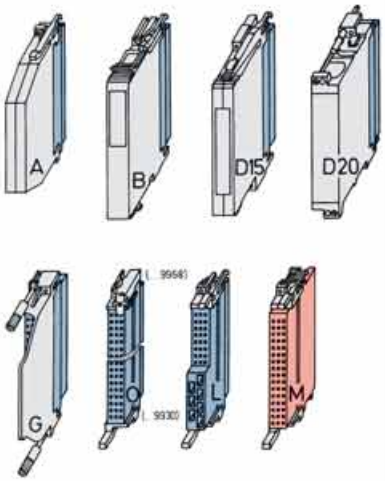


Y =

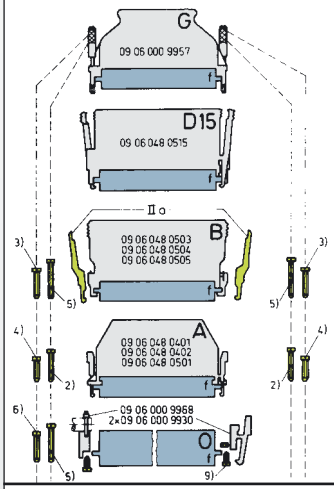
Combi-nations	Fixing bracket c for male connectors		I element	U element
	Multiple fixing 09 02 000 9919 09 02 000 9920	Single fixing 09 02 000 9921 09 02 000 9922		
Housing C	latchable	latch and screw fixing (M 2.5 x 16)	latch and screw fixing	
Housing G		screw fixing	screw fixing	

Type	F			
Wiring side	Input access via a female connector		Output from the front side via a male connector	
	Piggyback connector			Piggyback connector
Soldering technique for a flexible wiring				
Soldering technique for pcb		I element		
Crimp connections		I element		
Wrapped connections posts 1 x 1 mm		I element		
Middle section				
Front side				

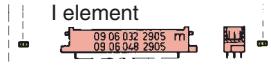


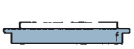


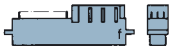
F	H	MH
Input acess from the wiring side via a female connector	Input access from the front side via a female connector	Input access from the front side via a female connector

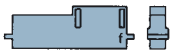


I element

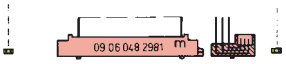


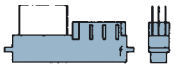


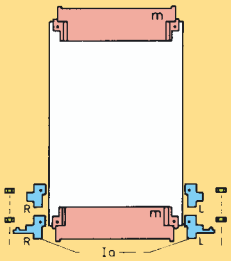


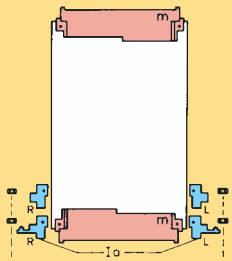


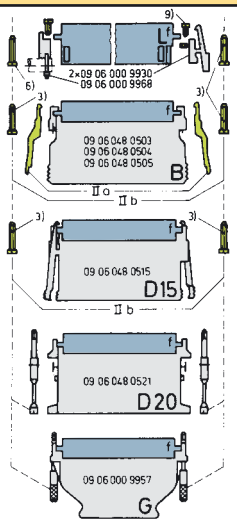
U element

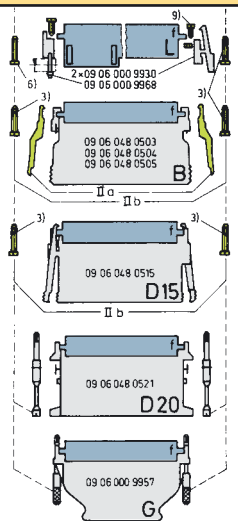












Ia

Combinations	Fixing bracket a for male connectors: Multiple fixing (09 06 000 9901 / 09 06 000 9902)	Fixing bracket a for male connectors: Single fixing (09 06 000 9905 / 09 06 000 9906)	Fixing bracket b for male connectors: Multiple fixing (09 06 000 9907 / 09 06 000 9908)	Fixing bracket b for male connectors: Single fixing (09 06 000 9909 / 09 06 000 9910)
Housing A	latch (M 2.5 x 12) and screw fixing		latchable	
Housing B			latch (M 2.5 x 20) and screw fixing	
Housing D15			latch (M 2.5 x 20) and screw fixing	
Housing D20			screw fixing	
Housing G			screw fixing	
Comb. O (...9930)			latch (M 2.5 x 20) and screw fixing	
Comb. O (...9968)			screw fixing	
Comb. L (...9930)			latch (M 2.5 x 20) and screw fixing	
Comb. L (...9968)			screw fixing	

Ib

Combinations	Fixing bracket b for female connectors Multiple fixing (09 06 000 9933 / 09 06 000 9933)	I element	U element
Housing A		(M 2.5x22) latch and (M 2.5x16) screw fixing	
Housing B	latchable	(M 2.5x26) latch and (M 2.5x20) screw fixing	
Housing D15	latchable	latchable	
Housing G		screw fixing	
Comb. O (...9930)		latchable	
Comb. O (...9968)		(M 2.5x26) screw fixing (M 2.5x20)	
Comb. M	latchable		

II

Housing B/D 15	II a		II b	
09 06 048 0503	2x	09 06 000 9913	and/or 2x	09 06 000 9926
09 06 048 0504	1x	09 06 000 9913 / 09 06 000 9919	and/or 2x	09 06 000 9926
09 06 048 0505	1x	09 06 000 9913 / 09 06 000 9919	and/or 2x	09 06 000 9926
09 06 048 0515	–	–	and 2x	09 06 000 9926
Comb. O + L	2x 2x	09 06 000 9930 09 06 000 9968	and 2x –	09 06 000 9926 –
Comb. M	2x	09 06 000 9930	–	–

1) Fixing brackets for latch and screw fixing
2) Screw M 2.5 x 22 belongs to supply of I elements, nut M 2.5 DIN EN ISO 4 036 does not belong to scope of supply
3) Screw fixing (cheesehead screw M 2.5 x 20 + nut) 09 06 000 9926
4) Screw fixing (cheesehead screw M 2.5 x 16 + nut) 09 02 000 9909
5) Cheesehead screw (M 2.5 x 26) 09 06 000 9955, nut M 2.5 DIN EN ISO 4 036 does not belong to scope of supply
6) Screw M 2.5 x 20 belongs to the junction element, hexagonal nut M 2.5 DIN EN ISO 4 036 does not belong to scope of supply

Following items not normally supplied

7) Screw M 2.5 x 12 and nut M 2,5 DIN EN ISO 4 036
8) Screw M 2.5 x 8
9) Screw M 2.5 x 8 and nut M 2.5 DIN EN 4 032
10) Screw M 2.5 x 25 and nut M 2.5 DIN EN 4 032

f = female connector
m = male connector
R = right hand
L = left hand

The automated insertion of components into pcb's is increasing.

To meet this market demand, HARTING has developed connectors according to DIN 41 612 which can be assembled and fixed to the pcb in one process.

To fix the connectors HARTING offers snap-in clips as well as kinked pins.

Snap-in clips

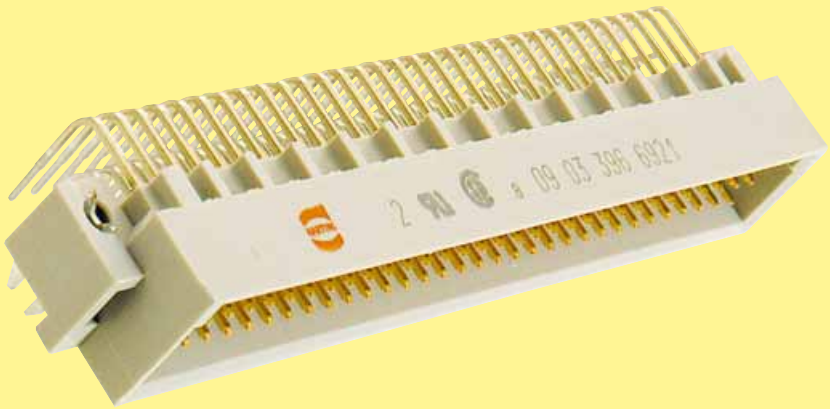
In the soldering process, all component terminations including the snap-in clips are soldered and therefore mechanically secured. This provides mechanical protection for the soldered contacts during mating and unmating of the connector.

Mouldings with snap-in clips offer the following advantages:

- Cost reduction when compared with the screw or rivet assembly methods due to the soldering of the tin plated clip along with other components in one process.
- The orientation of the clip after soldering in the plated through hole provides mechanical protection against the tensile forces arising from the mating and unmating of the connector.

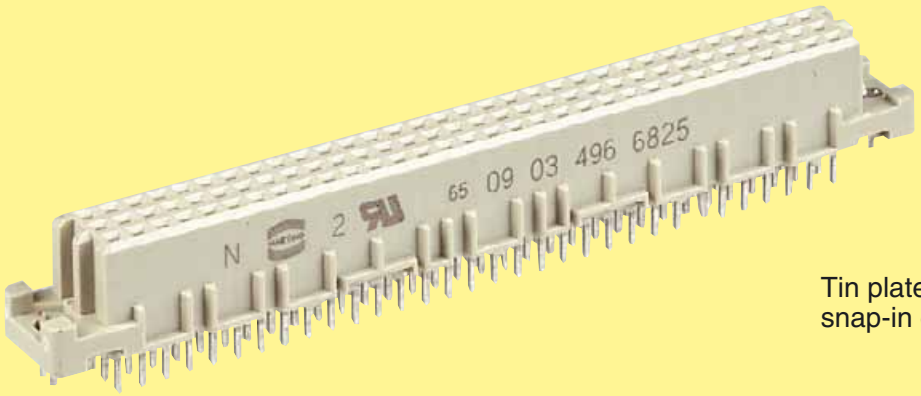
It is possible to supply the majority of male and female connectors with solder terminations according to DIN 41 612 with snap-in clips.

For pcb thickness
1.6 ± 0.2 mm
Ø = 2.8 $^{+0.1}$ mm



Mounting force
40 - 60 N

For pcb thickness
1.6 - 4.0 mm
Ø = 2.8 $^{+0.1}$ mm



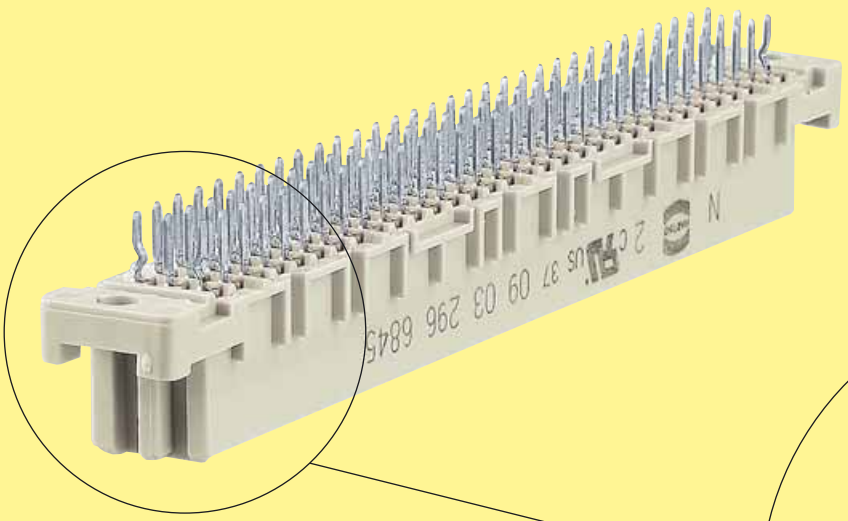
Tin plated
snap-in clip

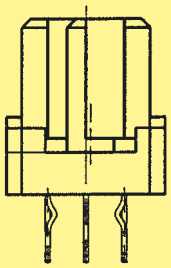
Kinked pins

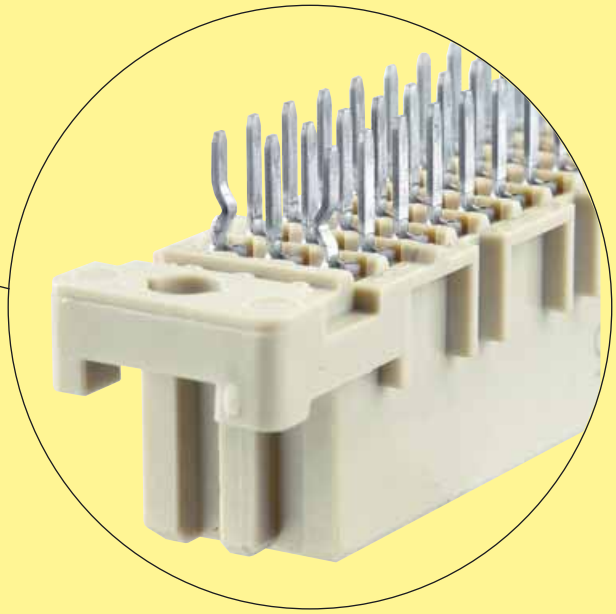
Before and during soldering, the connectors are fixed onto the pcb with four kinked contacts located in the rows a and c, e.g. the positions a1, c1, a32 and c32 for a fully loaded connector.

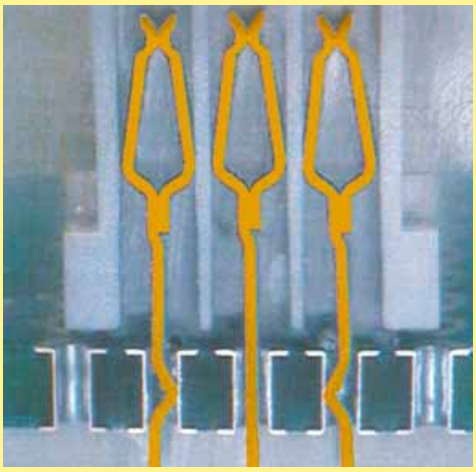
Connectors with kinked pins are a reliable alternative for female connectors with straight terminations because no additional elements like screws, rivets or clips are necessary.

Explanations see chapter 01.









Cross section of a connector with kinked contacts assembled to a pcb

Dimension of the plated through hole [mm]	Mounting force [N]	Retention force [N]
0.94	55	35
1.09	11	7

Typical measurements for a pcb of 2.4 mm thickness. Plating is tin above copper.

Types B, 2B, C, 2C, M, Q, 2Q, R, R (HE 11), 2R

Number of contacts	16-96
Contact spacing (mm)	2.54
Working current	2 A max.
see current carrying capacity chart	1 A with insulation displacement 40 A max. type M
Clearance	≥ 1.2 mm
Creepage	≥ 1.2 mm
Working voltage	
The working voltage also depends on the clearance and creepage dimensions of the pcb itself, and the associated wiring	according to the safety regulations of the equipment Explanations see chapter 00
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance	≤ 15 mΩ for wire wrap connection ≤ 20 mΩ including crimp connection
Insulation resistance	≥ 10^{12} Ω
Temperature range	– 55 °C … + 125 °C
The higher temperature limit includes the local ambient and heating effects of the contacts under load	
Degree of protection for crimp terminal according to DIN 40 050	IP 20

Electrical termination

Male connector	Solder pins for pcb connections Ø 1.0 ± 0.1 mm according to IEC 60 326-3 For pcb connection Ø 0.8 + 0.3 mm on request wrap posts 0.6 x 0.6 mm diagonal 0.79-0.86 mm
Female connector	wrap posts 0.6 x 0.6 mm diagonal 0.79-0.86 mm Solder pins for pcb connections Ø 1.0 ± 0.1 mm according to IEC 60 326-3 For pcb connection Ø 0.8 + 0.3 mm on request Crimp terminal 0.09-0.5 mm² Insulation displacement connection AWG 28/7
Insertion and withdrawal force	16way ≤ 15 N 32way ≤ 30 N 48way ≤ 45 N 64way ≤ 60 N 96way ≤ 90 N

Materials

Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy
Contact surface	Contact zone: selectively plated according to performance level[1)] Termination zone: tinned Wrap posts: selectively gold-plated on request

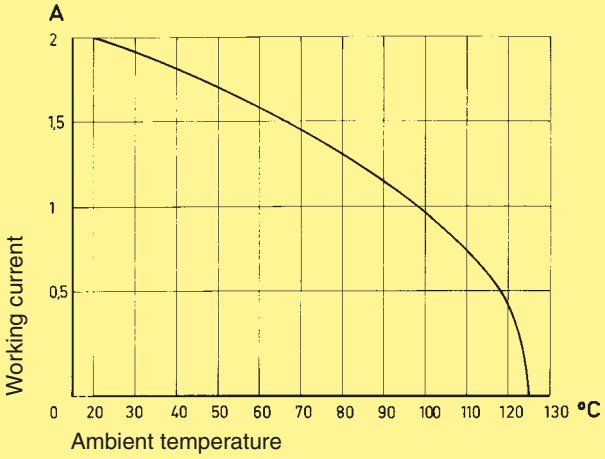
[1)] Explanation performance levels see chapter 00

Mating conditions see chapter 00

Current carrying capacity

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512



Pin shroud for female connectors with 0.6 x 0.6 mm pins according to DIN 41 612

A secure interfacing system for signals from the rear of 19" racks to connectors with wrap posts 0.6 x 0.6 mm is possible with the use of a pin shroud.

The pin shroud protects the wrap posts on the rear side of the rack and can be screwed to the printed circuit board.

After assembly the rear ends of the wire wrap posts become the mating areas of the type C male connector according to DIN 41 612.

This system can now accept:

- female connectors type C
- female connectors type R

The locking levers provide security for the mated connectors. Fast and simple disconnection is possible.

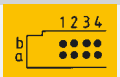
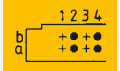
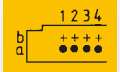
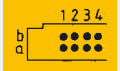
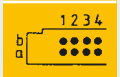
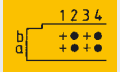
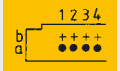
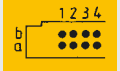
Fitting and removing crimp contacts

see technical characteristics chapter 02

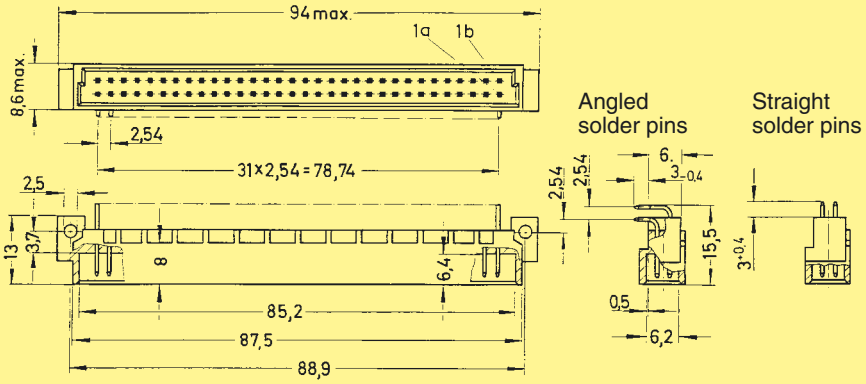
Number of contacts

64, 32

Male connectors

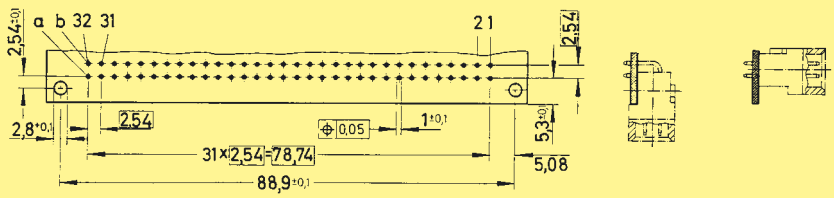
Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
				3	2	1
Male connector with angled solder pins	64		09 02 164 7921	09 02 164 6921	09 02 164 2921
	32		09 02 132 7921	09 02 132 6921	09 02 132 2921
	32		09 02 132 7931	09 02 132 6931	09 02 132 2931
	62 + 2▲		09 02 164 7951	09 02 164 6951	09 02 164 2951
Male connector with straight solder pins	64		09 02 164 7922	09 02 164 6922	09 02 164 2922
	32		09 02 132 7922	09 02 132 6922	09 02 132 2922
	32		09 02 132 7932	09 02 132 6932	09 02 132 2932
	62 + 2▲		09 02 164 7952	09 02 164 6952	09 02 164 2952

Dimensions



Board drillings

Mounting side



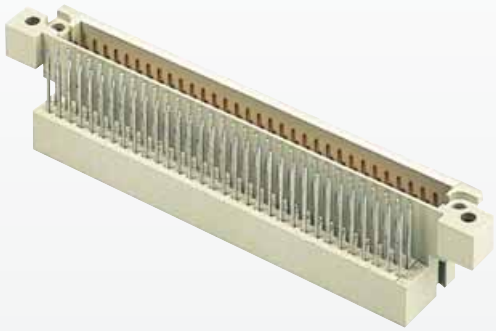
Dimensions in mm

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a32]
Other contact arrangements on request

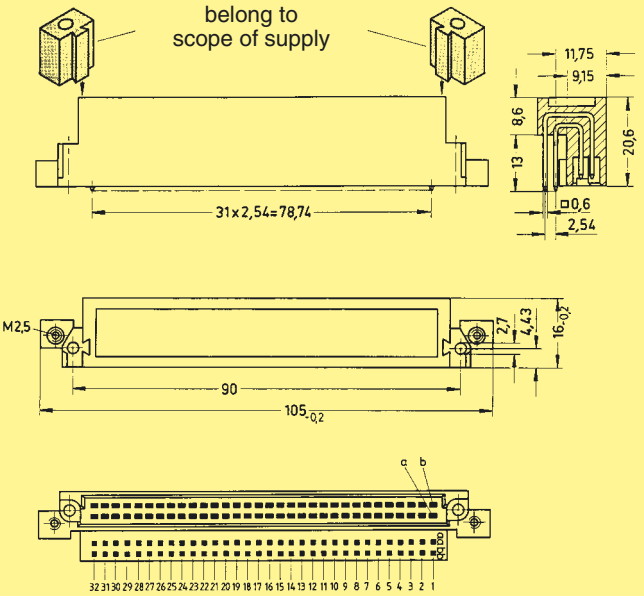
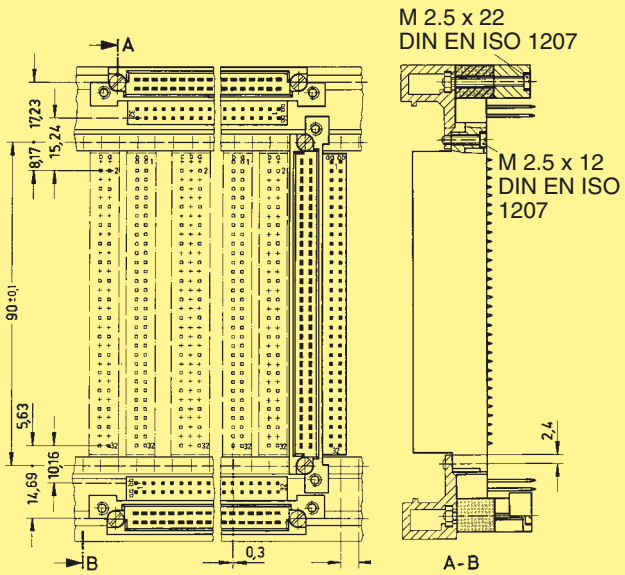
DIN 41 612 · complementary to type B

Number of contacts

64

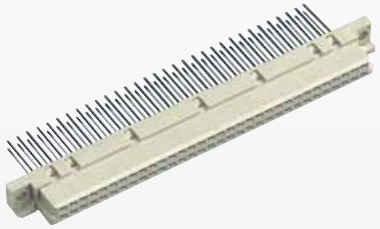


Interface connector U

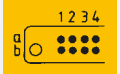
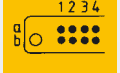
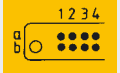
Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Interface connector U with wrap posts 0.6 x 0.6 mm	64	Performance level 1 09 02 064 2981		
Locking screw [1] Order 2 pieces for one interface connector U		09 02 000 9923[1]		
Mounting example				

Number of contacts

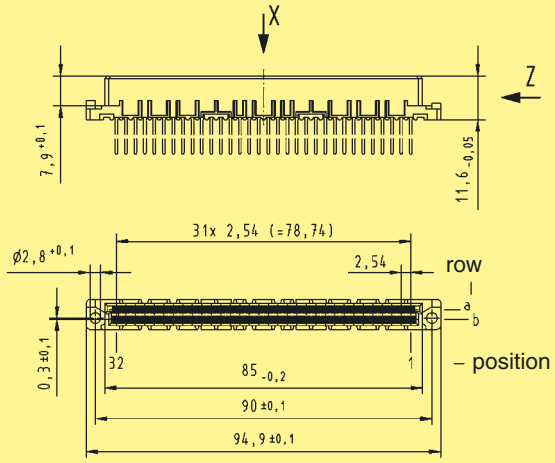
64

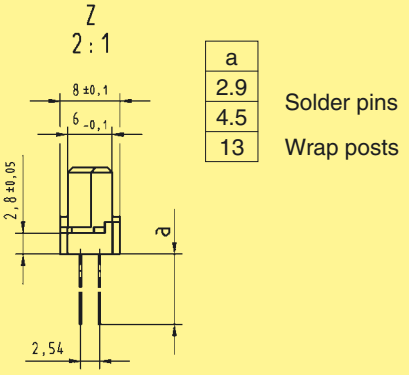


Female connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00	
			3	2	1
Female connector with solder pins 2.9 mm	64		Performance level 3 on request	09 02 264 6824	Performance level 1 on request
Female connector with solder pins 4.5 mm	64			09 02 264 6825	
Female connector with wrap posts 13 mm	64			09 02 264 6821	
Female connector with press-in pins	Part Nos. and variants see chapter 04				

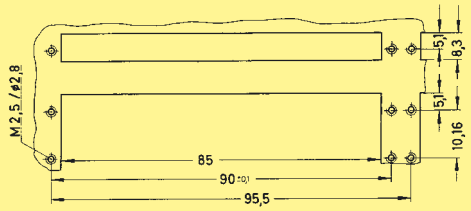
Dimensions





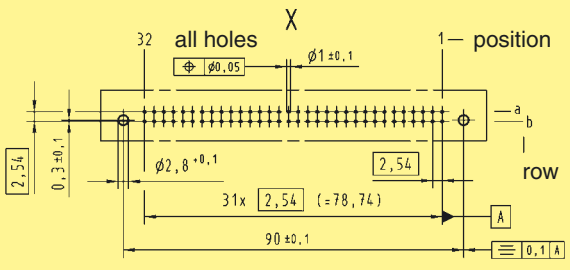
a	
2.9	Solder pins
4.5	
13	Wrap posts

Panel cut out



Board drillings

Mounting side



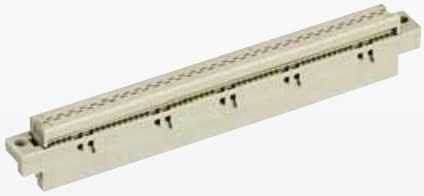
Identification strips see chapter 40

Dimensions in mm

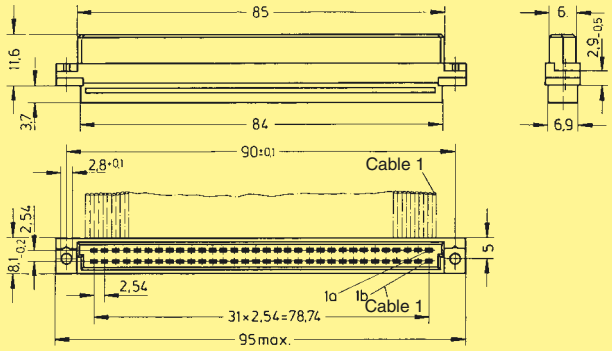
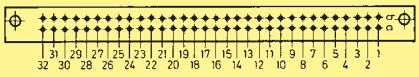
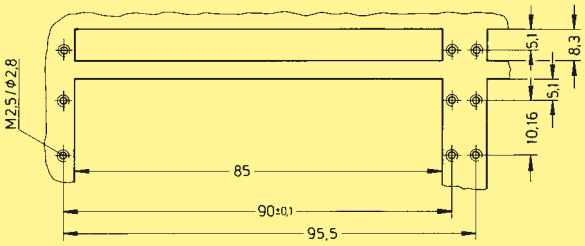
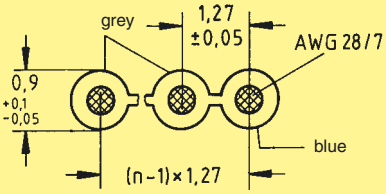
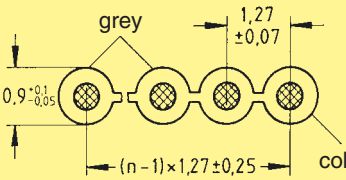
Wrap posts selectively gold plated on request
Other contact arrangements on request

Number of contacts

64



Female connectors

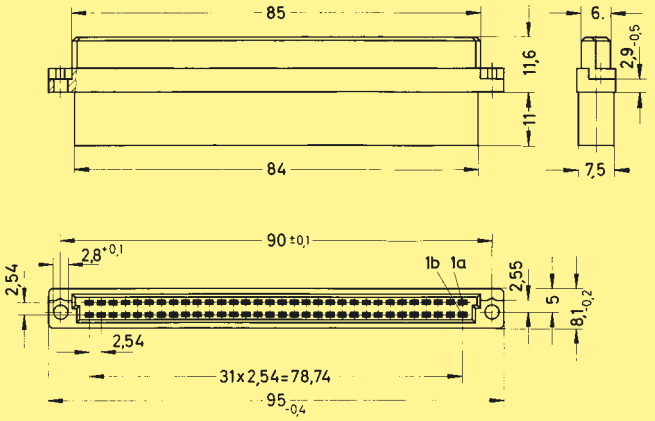
Identification	Number of contacts	Part No.	Drawing / Dimensions in mm
Female connector for insulation displacement	64	Performance level 2 09 02 264 6828 Performance level 3 09 02 264 7828	 Cable 1 to contact 1 b Contact arrangement View from termination side 
Panel cut out			
Flat cable AWG 28/7			 1) Termination area spacing = 508 mm **Important: always store reels vertically**
grey 50.00 m	64	09 18 064 7001	
grey 150.00 m	64	09 18 064 7004	
colour coded 30.48 m	64	09 18 064 7005	
twisted pair[1] 30.48 m	64	09 18 064 7006	
			Wire (tinned) Cu Gauge AWG 28/7 0.089 mm² Insulation material as per UL 2651 PVC
Round flat cable[2]			 2) Termination area spacing = 100 mm
with screening 30 m	64	09 18 064 7007	
with screening 150 m	64	09 18 064 7010	
without screening 30 m	64	09 18 064 7008	
without screening 150 m	64	09 18 064 7011	
Bench press		09 99 000 0114	
Base plate		09 99 000 0150	
Flat cable cutter		09 99 000 0116	
Spare parts			
Blade		09 99 000 0179	
Cutting plate		09 99 000 0180	

Further components and accessories for insulation displacement see interface catalogue

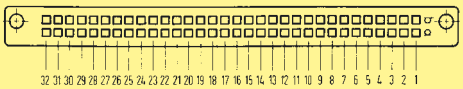
Number of contacts

max. 64

Female connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately	64	09 02 064 3214		

Contact arrangement View from termination side



Shell housing 09 02 064 0501 / 09 02 064 0502 see chapter 20

Identification	Part No. Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female crimp contacts BC		
Bandoliered contacts (approx. 5 ,000 pieces)	09 02 000 6484	09 02 000 6474
Bandoliered contacts (approx. 500 pieces)	09 02 000 8434	09 02 000 8444
Individual contacts (1,000 pieces)	09 02 000 8484	09 02 000 8474

Wire gauge mm²	AWG	Insulation ø mm
0.09 - 0.5	28 - 20	0.7 - 1.5

Bandoliered contacts

Individual contacts

3.5 + 0.5 mm of insulation is stripped

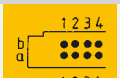
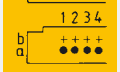
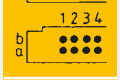
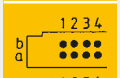
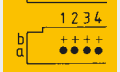
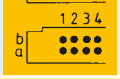
Insertion, removal and crimping tools see chapter 30

DIN 41 612 · complementary type 2B

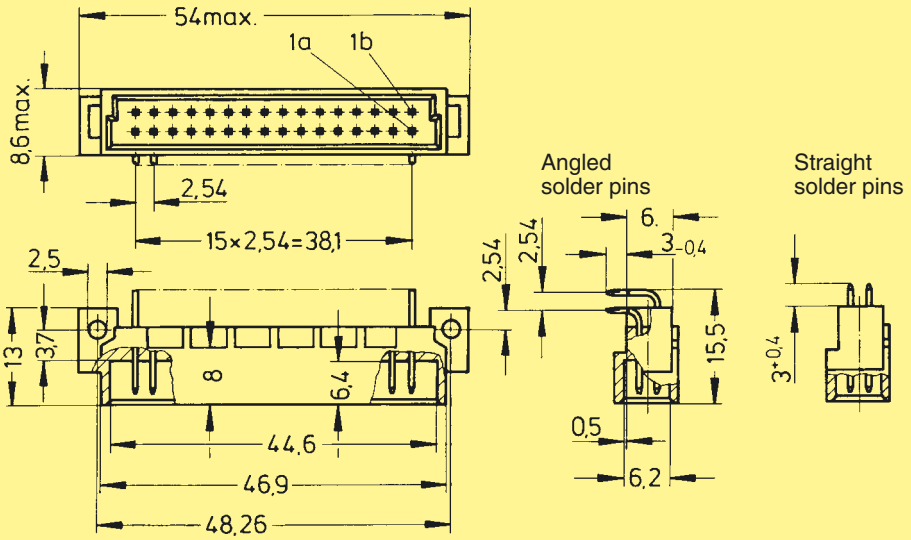
Number of contacts

32, 16

Male connectors

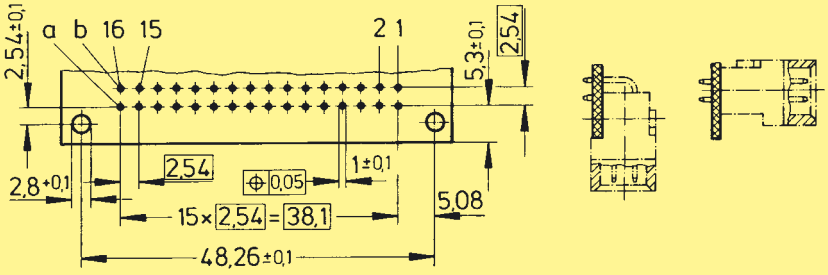
Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Male connector with angled solder pins	32		09 22 132 7921	09 22 132 6921	09 22 132 2921
	16		09 22 116 7931	09 22 116 6931	09 22 116 2931
	30 + 2▲		09 22 132 7951	09 22 132 6951	09 22 132 2951
Male connector with straight solder pins	32		09 22 132 7922	09 22 132 6922	09 22 132 2922
	16		09 22 116 7932	09 22 116 6932	09 22 116 2932
	30 + 2▲		09 22 132 7952	09 22 132 6952	09 22 132 2952

Dimensions



Board drillings

Mounting side



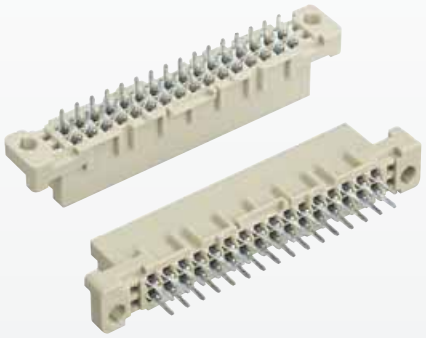
Dimensions in mm

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a16]
Other contact arrangements on request

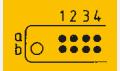
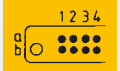
DIN 41 612 · complementary type 2B

Number of contacts

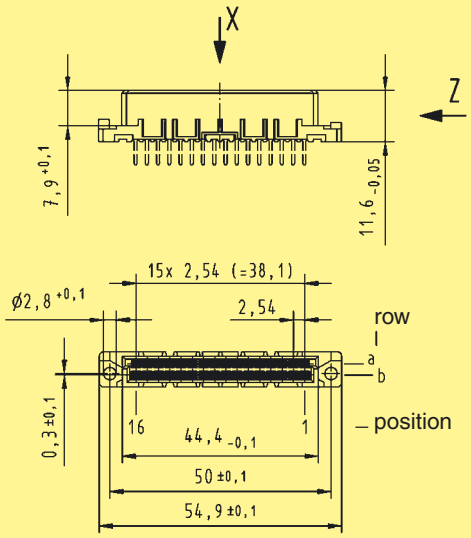
32

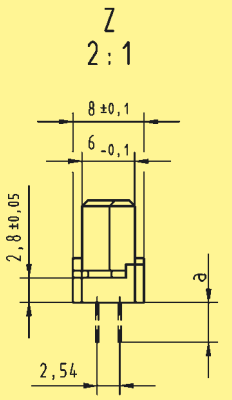


Female connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
				3	2	1
Female connector with solder pins 2.9 mm	32		Performance level 3 on request		09 22 232 6824	Performance level 1 on request
Female connector with solder pins 4.5 mm	32				09 22 232 6825	
Female connector with press-in pins	Part Nos. and variants see chapter 04					

Dimensions

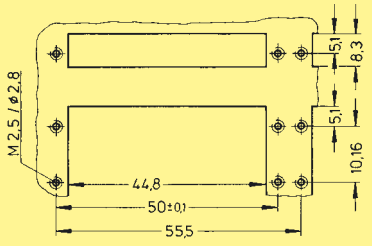




a
2.9
4.5

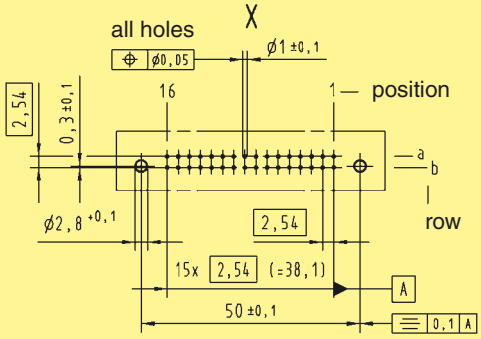
Solder pins

Panel cut out



Board drillings

Mounting side

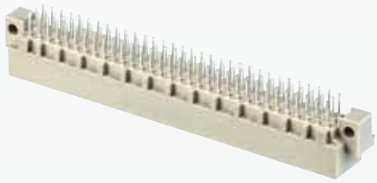


Dimensions in mm

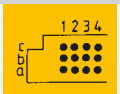
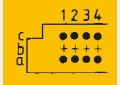
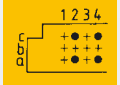
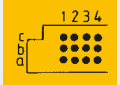
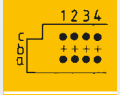
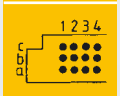
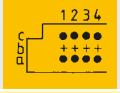
Further components and accessories for insulation displacement see interface catalogue
Other contact arrangements on request

Number of contacts

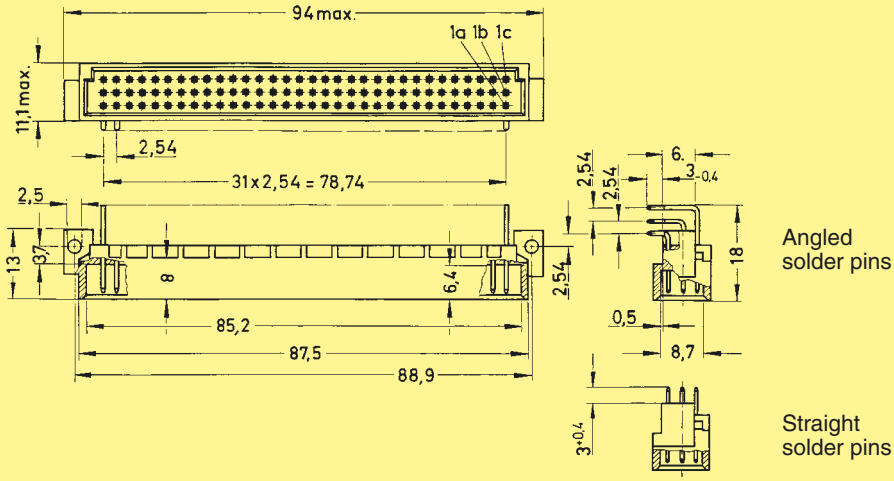
96, 64, 32



Male connectors

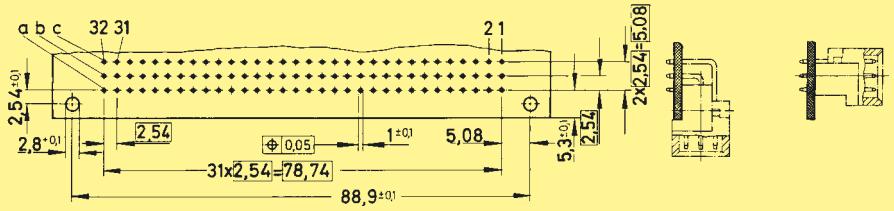
Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
				3	2	1
Male connector with angled solder pins	96		09 03 196 7921	09 03 196 6921	09 03 196 2921
	64		09 03 164 7921	09 03 164 6921	09 03 164 2921
	32		09 03 132 7921	09 03 132 6921	09 03 132 2921
	94 + 2▲		09 03 196 7951	09 03 196 6951	09 03 196 2951
	62 + 2▲		09 03 164 7951	09 03 164 6951	09 03 164 2951
Male connector with straight solder pins	96		09 03 196 7922	09 03 196 6922	09 03 196 2922
	64		09 03 164 7922	09 03 164 6922	09 03 164 2922

Dimensions



Board drillings

Mounting side



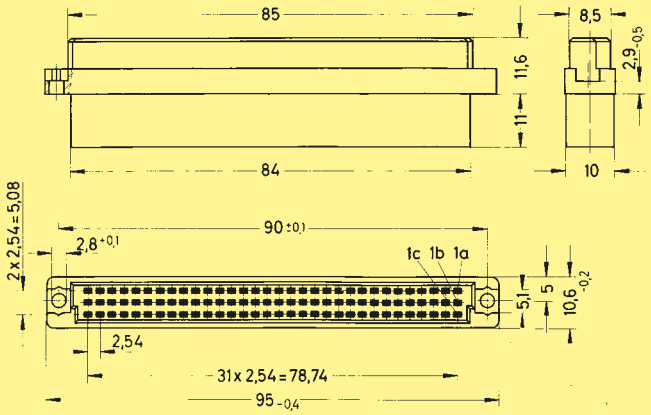
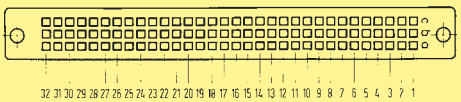
Dimensions in mm

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a32]
Other contact arrangements on request
High temperature connectors see chapter 05

Number of contacts

max. 96

Female connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately	96	09 03 096 3214	 Contact arrangement View from termination side  Shell housing 09 03 096 0501 see chapter 20	

Identification	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00 2	 1
Female crimp contacts BC			
Bandoliered contacts (approx. 5 ,000 pieces)		09 02 000 6484	09 02 000 6474
Bandoliered contacts (approx. 500 pieces)		09 02 000 8434	09 02 000 8444
Individual contacts (1,000 pieces)		09 02 000 8484	09 02 000 8474

Wire gauge mm²	AWG	Insulation ø mm
0.09 - 0.5	28 - 20	0.7 - 1.5

Bandoliered contacts

Individual contacts

3.5 + 0.5 mm of insulation is stripped from the wires to be crimped

Insertion, removal and crimping tools see chapter 30

Number of contacts

96, 64, 32

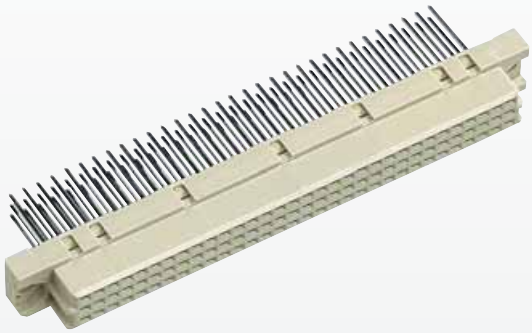
Female connectors

Identification	Number of contacts	Contact arrangement	Part No. Performance levels according to DIN 41 612. Explanation chapter 00 3	2	1
Female connector with solder pins 2.9 mm	96		09 03 296 7824	09 03 296 6824	09 03 296 2824
	64		09 03 264 7824	09 03 264 6824	09 03 264 2824
	32		09 03 232 7824	09 03 232 6824	09 03 232 2824
	32		09 03 232 7834	09 03 232 6834	09 03 232 2834
Female connector with kinked solder pins[1] 2.9 mm	96		**09 03 296 7855**	**09 03 296 6855**	**09 03 296 2855**
	64		**09 03 264 7855**	**09 03 264 6855**	**09 03 264 2855**
	32		**09 03 232 7855**	**09 03 232 6855**	**09 03 232 2855**
Female connector with solder pins 4.5 mm	96		09 03 296 7825	09 03 296 6825	09 03 296 2825
	64		09 03 264 7825	09 03 264 6825	09 03 264 2825
	32		09 03 232 7825	09 03 232 6825	09 03 232 2825
	32		09 03 232 7835	09 03 232 6835	09 03 232 2835
Female connector with kinked solder pins[1] 4.5 mm	96		**09 03 296 7845**	**09 03 296 6845**	**09 03 296 2845**
	64		**09 03 264 7845**	**09 03 264 6845**	**09 03 264 2845**
	32		**09 03 232 7845**	**09 03 232 6845**	**09 03 232 2845**
Female connector with wrap posts 13 mm	96			09 03 296 6821	
	96			09 03 296 6878[2]	
	64			09 03 264 6821	
	64			09 03 264 6878[2]	
Female connector with solder lugs a + c 5.2 mm b 7.7 mm	96			09 03 296 6823	
	64			09 03 264 6823	
Female connector with press-in pins	Part Nos. and variants see chapter 04				

[1] Kinked pins for fixing the connector onto the pcb see chapter 00
[2] Wrap posts for interfacing, selectively gold-plated (performance level 3)

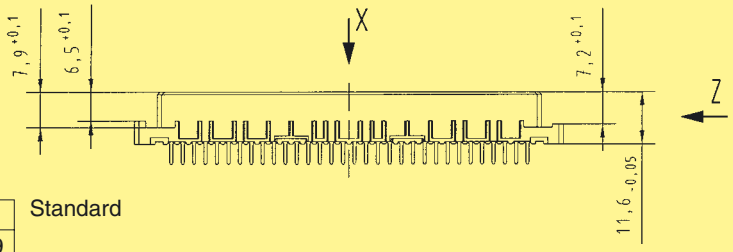
Other contact arrangements on request

bold type: preferred types



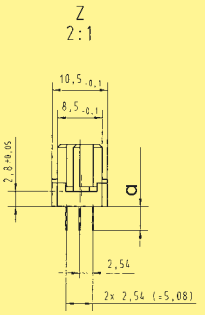
Identification	Drawing	Dimensions in mm

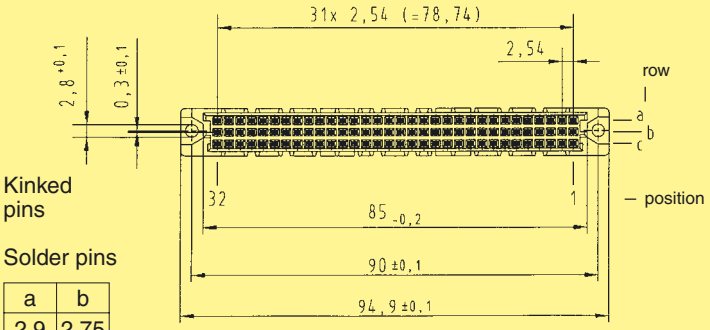
Female connectors type C DIN 41 612



a	
2.9	Solder pins
4.5	
13	Wrap posts

Standard



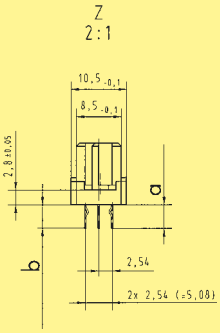


Kinked pins

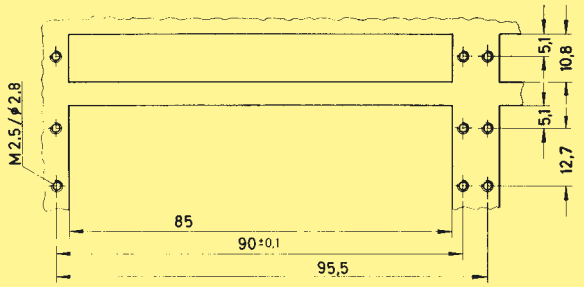
Solder pins

a	b
2.9	2.75
4.5	4.35

b ≙ Length of kinked pins

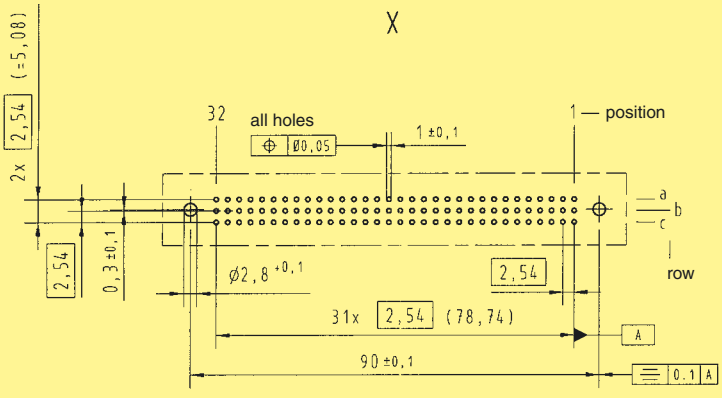


Panel cut out



Board drillings

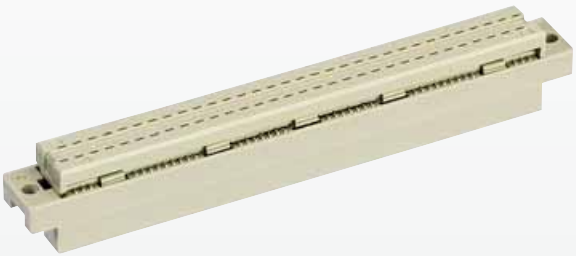
Mounting side



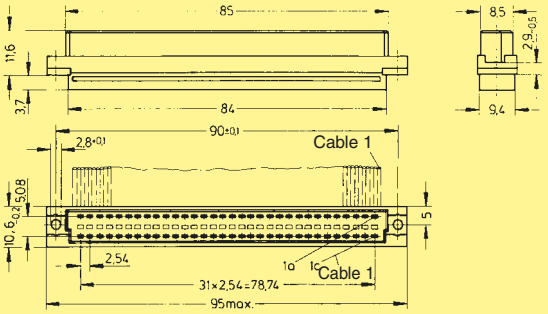
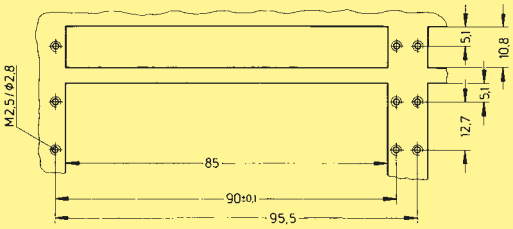
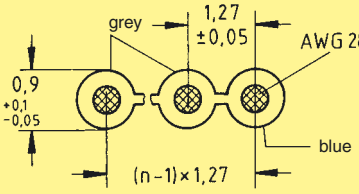
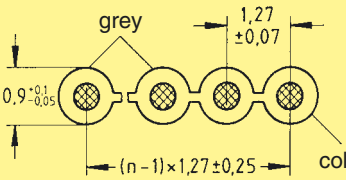
Identification strips see chapter 40

Number of contacts

64



Female connectors

Identification	Number of contacts	Part No.	Drawing / Dimensions in mm
Female connector for insulation displacement	64	Performance level 2 09 03 264 6828 Performance level 3 09 03 264 7828	 Cable 1 to contact 1 c Contact arrangement View from termination side 
Panel cut out			 Mateable with 3 row male connector type C, no female contacts in the middle row
Flat cable AWG 28/7			 [1] Termination area spacing = 508 mm **Important: always store reels vertically**
grey 50.00 m	64	09 18 064 7001	
grey 150.00 m	64	09 18 064 7004	
colour coded 30.48 m	64	09 18 064 7005	
twisted pair[1] 30.48 m	64	09 18 064 7006	
			Wire (tinned) Cu Gauge AWG 28/7 0.089 mm² Insulation material as per UL 2651 PVC
Round flat cable[2]			 [2] Termination area spacing = 100 mm
with screening 30 m	64	09 18 064 7007	
with screening 150 m	64	09 18 064 7010	
without screening 30 m	64	09 18 064 7008	
without screening 150 m	64	09 18 064 7011	
Bench press		09 99 000 0114	
Base plate		09 99 000 0150	
Flat cable cutter		09 99 000 0116	
Spare parts			
Blade		09 99 000 0179	
Cutting plate		09 99 000 0180	

Further components and accessories for insulation displacement see interface catalogue

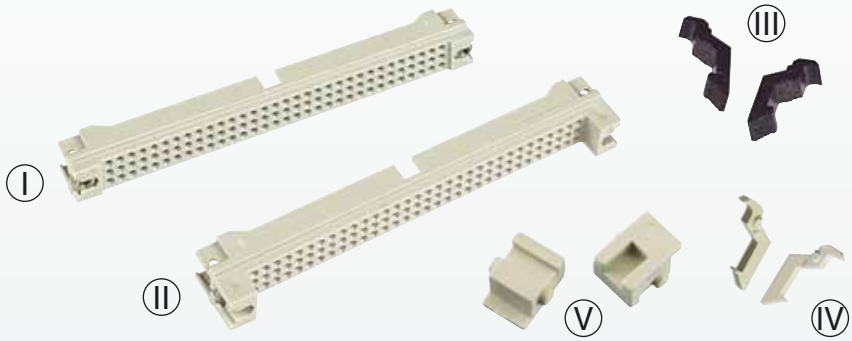
Complicated shapes are injected with upmost precision.

Integrated handling robots guarantee that new injected parts are not damaged.

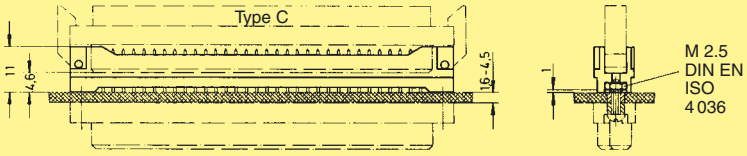
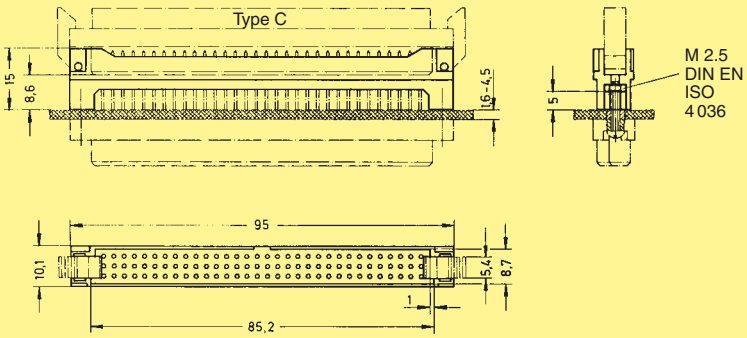
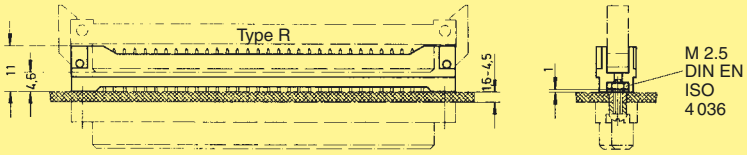
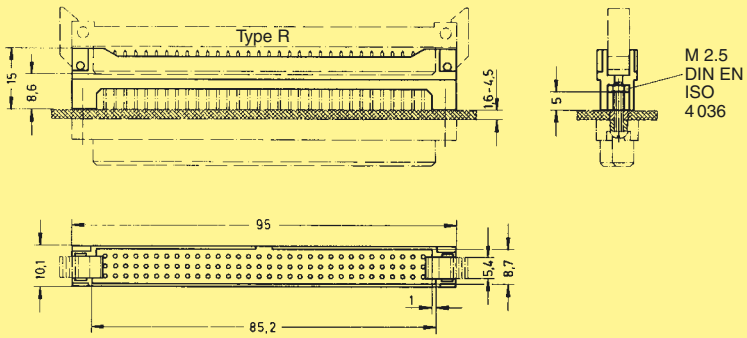
Pin shroud

Number of contacts

96

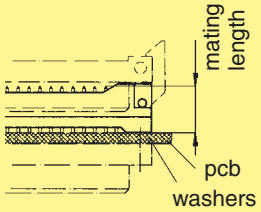


Pin shrouds/Locking levers for 0.6 x 0.6 mm wrap posts

Identification	Part No.	Drawing	Dimensions in mm
Pin shroud		for 13 mm wrap posts	
(I) for 13 mm wrap posts	09 03 000 9912		
(II) for 17 mm wrap posts	09 03 000 9915		
(III) Locking lever for female connector type C*	09 03 000 9914	for 17 mm wrap posts	
			
Pin shroud		for 13 mm wrap posts	
(I) (II) for 13 mm wrap posts	09 03 000 9912		
(IV) for 17 mm wrap posts	09 03 000 9915		
(V) Locking lever for female connector type R*	09 03 000 9913	for 17 mm wrap posts	
Fixing brackets for shell housing C*	09 03 000 9921		

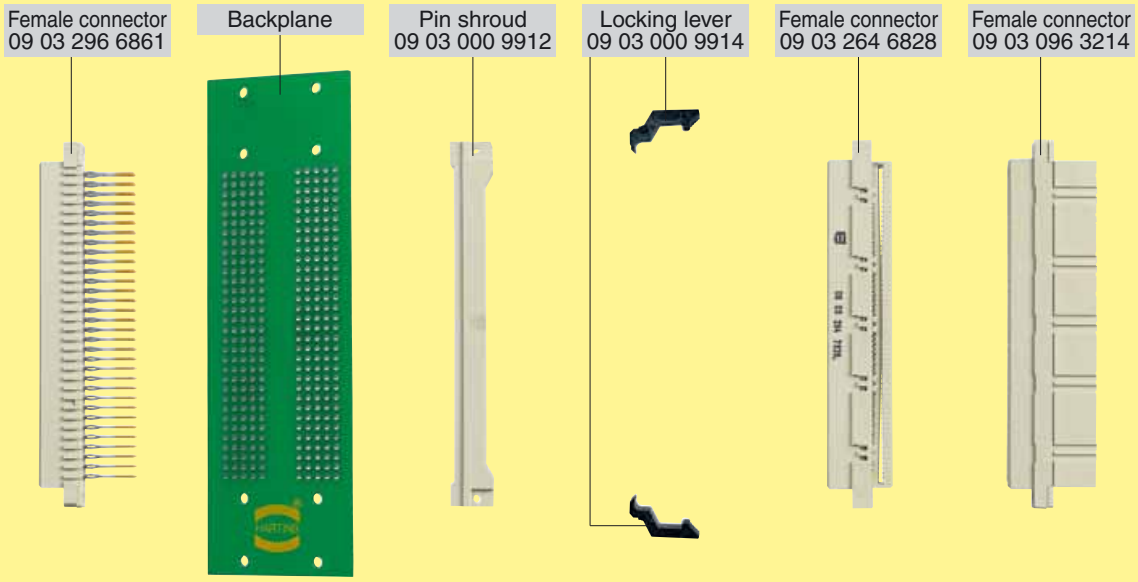
Height adjustment of the pin shroud for different pcb thickness with washers is possible.
The mating length can be calculated as follows:

Mating length = 8.4 mm – pcb thickness – washers thickness

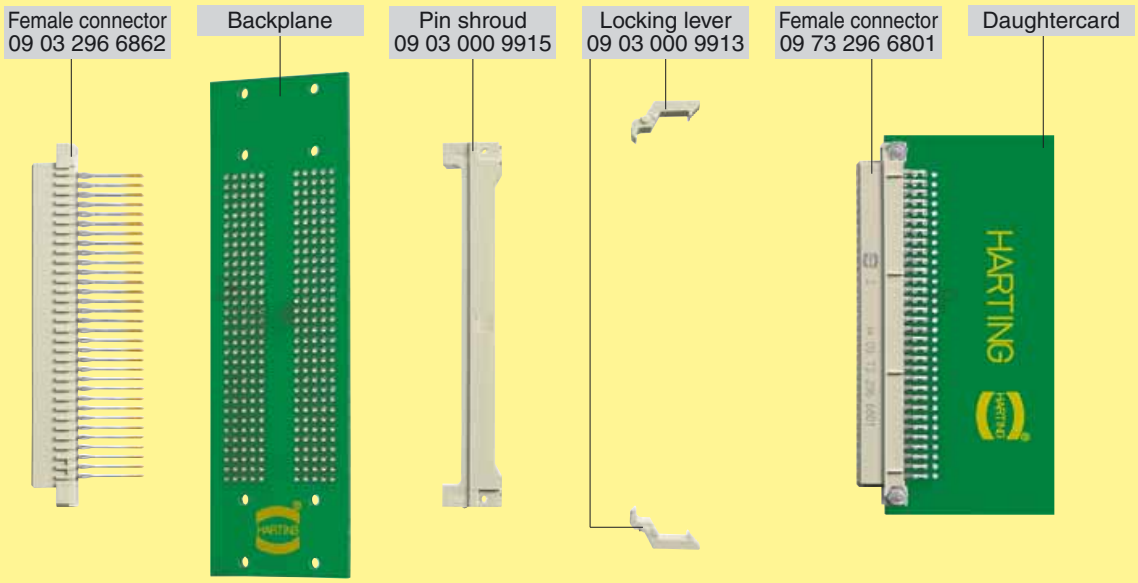


* order 2 pieces per connector

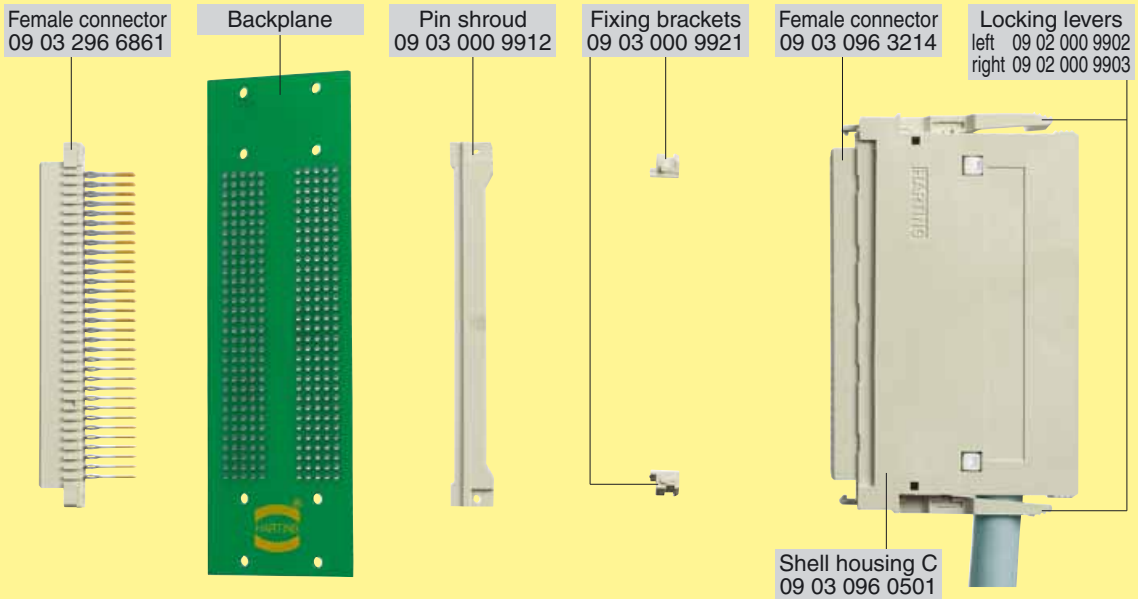
Application 1



Application 2



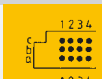
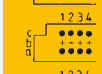
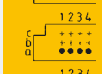
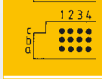
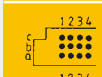
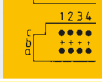
Application 3



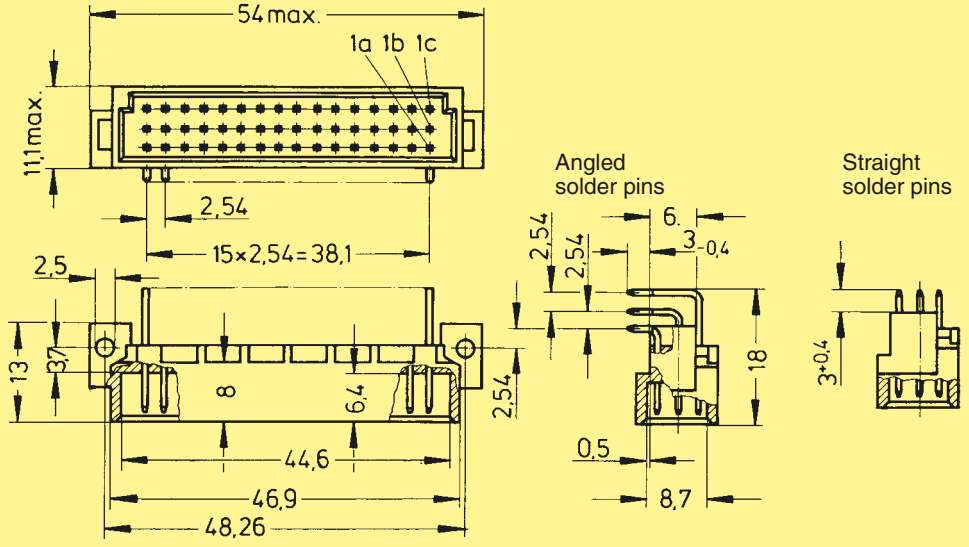
Number of contacts

48, 32, 16

Male connectors

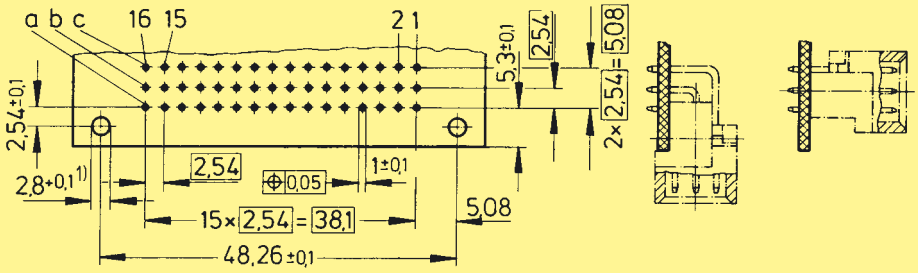
Identification	Number of contacts	Contact arrangement	Part No. 3	2	1
Male connector with angled solder pins	48		09 23 148 7921	09 23 148 6921	09 23 148 2921
	32		09 23 132 7921	09 23 132 6921	09 23 132 2921
	16		09 23 116 7931	09 23 116 6931	09 23 116 2931
	46 + 2▲		09 23 148 7951	09 23 148 6951	09 23 148 2951
Male connector with straight solder pins	48		09 23 148 7922	09 23 148 6922	09 23 148 2922
	32		09 23 132 7922	09 23 132 6922	09 23 132 2922

Dimensions



Board drillings

Mounting side

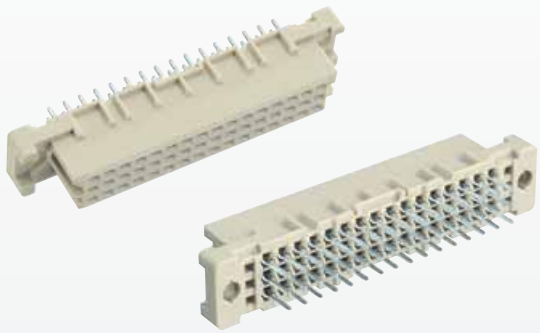


Dimensions in mm

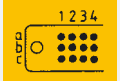
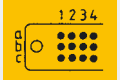
▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a16]
Other contact arrangements on request
High temperature connector see chapter 05

Number of contacts

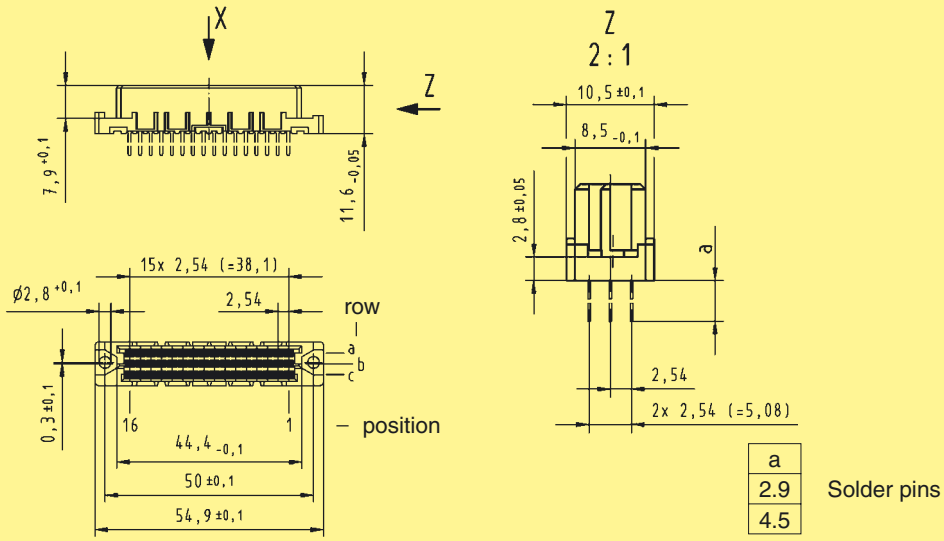
48



Female connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00	
			3	2	1
Female connector with solder pins 2.9 mm	48		Performance level 3 on request	09 23 248 6824	Performance level 1 on request
Female connector with solder pins 4.5 mm	48			09 23 248 6825	
Female connector with press-in pins	Part Nos. and variants see chapter 04				

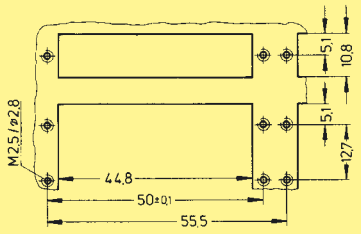
Dimensions



a
2.9
4.5

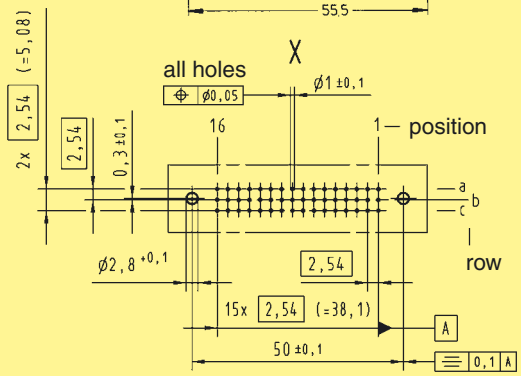
Solder pins

Panel cut out



Board drillings

Mounting side



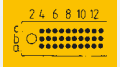
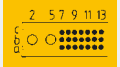
Dimensions in mm

Other contact arrangements on request

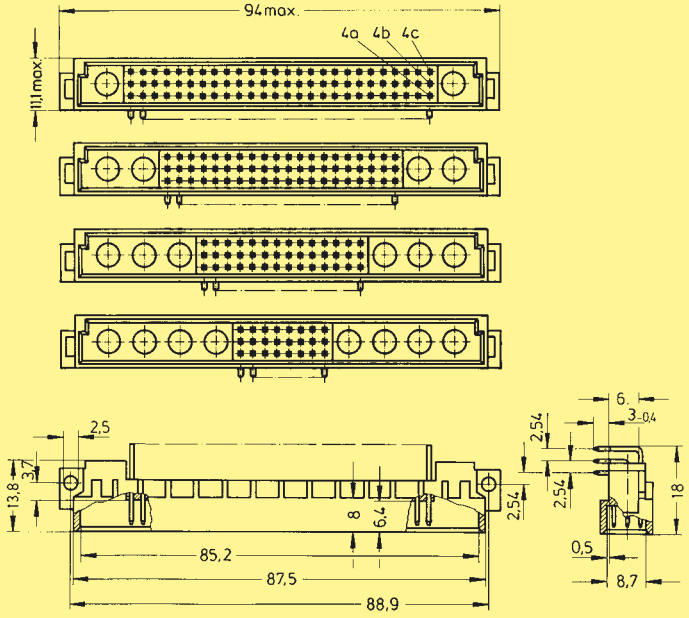
Number of contacts

78+2, 60+4, 42+6, 24+8

Male connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
				3	2	1
Male connector with angled solder pins	78 + 2		09 03 178 7901	09 03 178 6901	09 03 178 2901	
	60 + 4		09 03 160 7901	09 03 160 6901	09 03 160 2901	
	42 + 6		09 03 142 7901	09 03 142 6901	09 03 142 2901	
	24 + 8		09 03 124 7901	09 03 124 6901	09 03 124 2901	

Dimensions

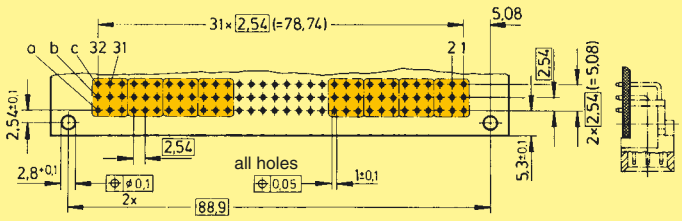


Angled solder pins

Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.30 and 01.31

Board drillings

Mounting side



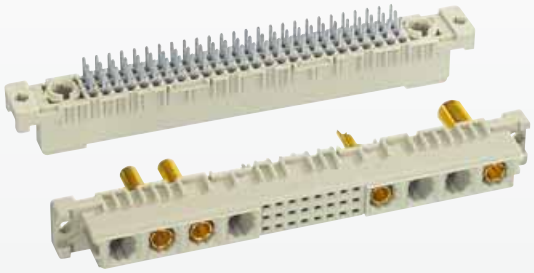
≙ Board drillings depend on type and special contact loading

Dimensions in mm

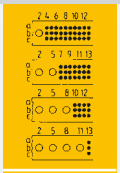
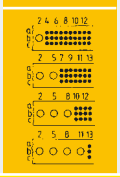
Other contact arrangements on request

Number of contacts

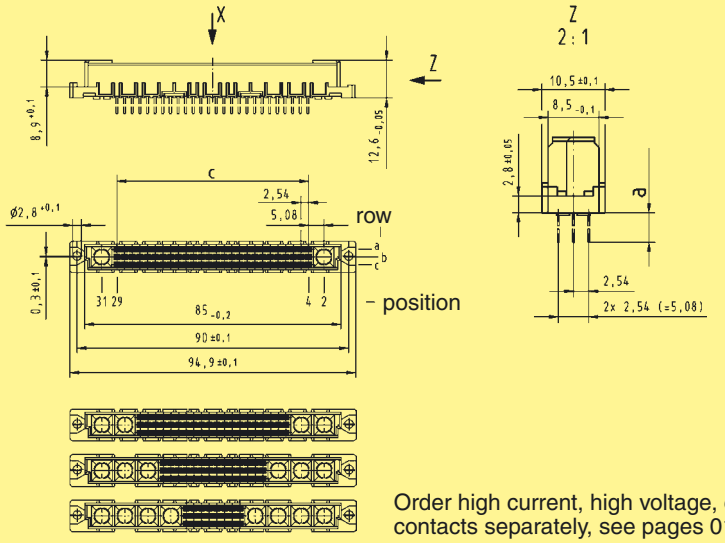
78+2, 60+4, 42+6, 24+8



Female connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with solder pins 2.9 mm	78 + 2 60 + 4 42 + 6 24 + 8		Performance level 3 on request	09 03 278 6804 09 03 260 6804 09 03 242 6804 09 03 224 6804	Performance level 1 on request
Female connector with solder pins 4.5 mm	78 + 2 60 + 4 42 + 6 24 + 8			09 03 278 6805 09 03 260 6805 09 03 242 6805 09 03 224 6805	
Female connector with press-in pins	Part Nos. and variants see chapter 04				

Dimensions

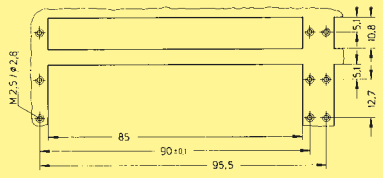


a
2.9
4.5

Solder pins

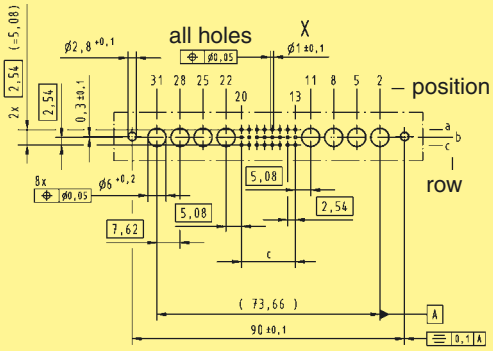
Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.30 and 01.31

Panel cut out

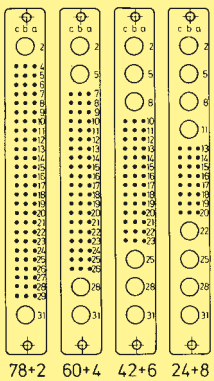


Board drillings

Mounting side



Contact arrangement
View from termination side

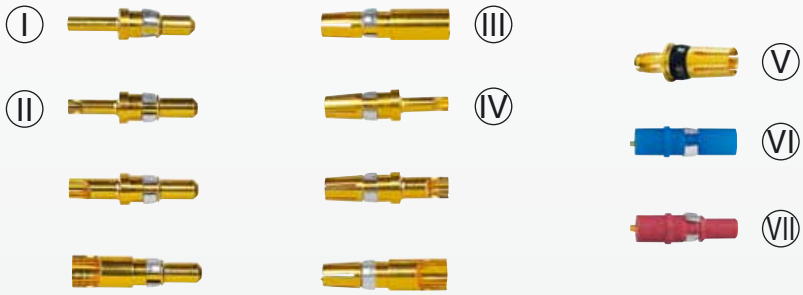


Type	c
78 + 2	25 x 2.54 = 63.5
60 + 4	19 x 2.54 = 48.26
42 + 6	13 x 2.54 = 33.02
24 + 8	7 x 2.54 = 17.78

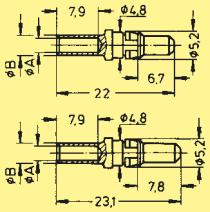
Dimensions in mm

Other contact arrangements on request

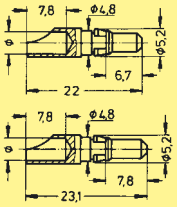
DIN 41 612 · Special contacts type M



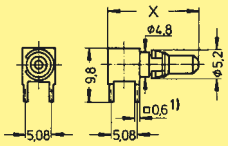
High current contacts
High voltage contacts

Identification			Part No. Performance level 2	Drawing	Dimensions in mm
High current male contacts for male connectors[1]					
I	for straight crimp termination	10 A	09 03 000 6113		
		20 A	09 03 000 6114		
		40 A	09 03 000 6115		
	Leading contact	10 A	09 03 000 6123		
		20 A	09 03 000 6124		
		40 A	09 03 000 6125		

	ø A	ø B	wire gauge [mm²]	AWG
10 A	1.85	2.55	1.5	16
20 A	2.80	3.70	4	12
40 A	4.40	5.60	10	8

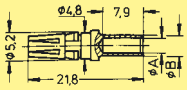
II	for straight solder termination	10 A	09 03 000 6101		
		20 A	09 03 000 6102		
		40 A	09 03 000 6103		
	Leading contact	10 A	09 03 000 6111		
		20 A	09 03 000 6122		
		40 A	09 03 000 6133		

	ø
10 A	1.7
20 A	2.8
40 A	4.8

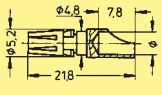
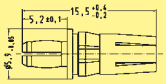
	for angled pcb termination	40 A	09 03 000 6104		
	Leading contact	40 A	09 03 000 6134		

	x
… 6104	17.7
… 6134	18.4

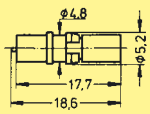
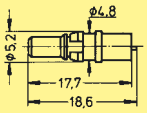
[1] Solder pins for hole ø 1 ± 0.1 mm

High current female contacts for female connectors[1]					
III	for straight crimp termination	10 A	09 03 000 6213		
		20 A	09 03 000 6214		
		40 A	09 03 000 6215		

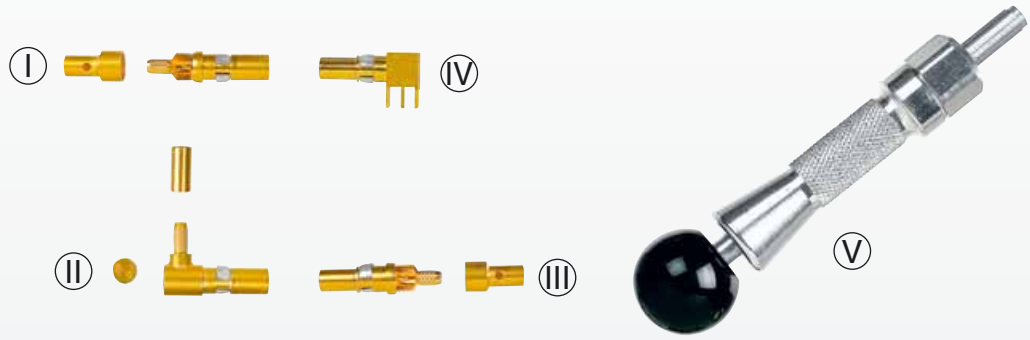
	ø A	ø B	wire gauge [mm²]	AWG
10 A	1.85	2.55	1.5	16
20 A	2.80	3.70	4	12
40 A	4.40	5.60	10	8

IV	for straight solder termination	10 A	09 03 000 6201		
		20 A	09 03 000 6202		
		40 A	09 03 000 6203		
V	for press-in termination for type M-flat	40 A	09 03 000 6250		

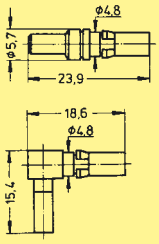
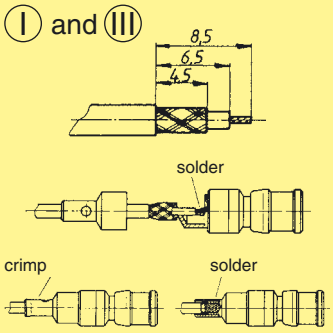
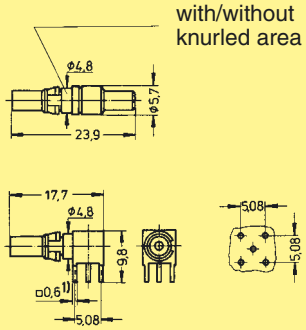
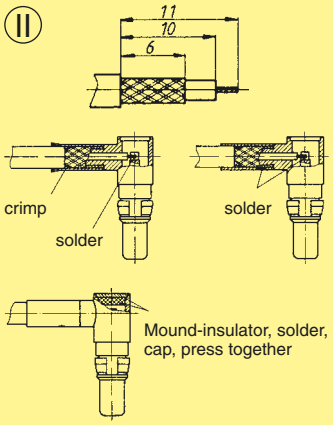
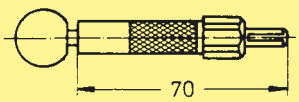
	ø
10 A	1.7
20 A	2.8
40 A	4.8

High voltage male contact for male connectors[2]					
VI	for straight solder termination	2.8 kV	09 03 000 6140		Wire gauge max. 0.5 mm²
High voltage female contact for female connectors[2]					
VII	for straight solder termination	2.8 kV	09 03 000 6240		Wire gauge max. 0.5 mm²
Crimping tool for high current contacts			09 99 000 0196		

[1] Contact resistance max. 1.5 mΩ
[2] Contact resistance internal wire max. 3 mΩ



Coaxial contacts

Identification	Part No. Performance level 2	Drawing	Dimensions in mm
Male coaxial contacts for female connectors Ⓘ for straight solder and/or crimp termination Ⓘⓘ for angled solder and/or crimp termination	09 03 000 6160 09 03 000 6181* 09 03 000 6161		**Assembly instruction for contacts** Ⓘ and Ⓘⓘⓘ 
Female coaxial contacts for male connectors Ⓘⓘⓘ for straight solder and/or crimp termination Ⓘⓥ angled for pcb termination	without knurled area 09 03 000 6260 09 03 000 6281* with knurled area 09 03 000 6274 09 03 000 6262 09 03 000 6269*	with/without knurled area  1) Solder pins for hole ø 1 ± 0.1 mm	for contacts Ⓘⓘ 
Crimping tool for coaxial contacts	09 99 000 0194		
Removal tool incl. removal jacket Ⓥ for contact replacement	09 99 000 0174		
Replacement removal jacket	09 99 000 0243		

Electrical characteristics of 50 Ω coaxial contacts and wires

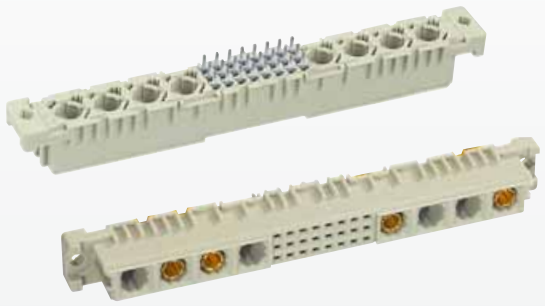
Impedance	50 Ω
Max. working frequency	2 up to 10 GHz
VSWR-value	1.07 + 0.02 f [GHz]
Proof voltage	750 V / 50 Hz
Working voltage	250 V / 50 Hz
Insulation resistance	≥ 1 GΩ
Contact resistance – Center contact – Outer contact	10 mΩ 3 mΩ
Contact current max.	1.5 A
Admissible power (depends on: frequency, application, VSWR, environmental characteristics)	Data on request
75 Ohm versions	Data on request

Cable group 2 flexible wires	Shell ø	Screening ø	Dielectric ø	Internal wire ø	Hexagonal crimp Spanner width
RG 174 A/U	2.5	2.0	1.5	0.48	3.25
RG 188 A/U	2.6	2.0	1.5	0.54	3.25
RG 316 U	2.5	2.0	1.5	0.54	3.25

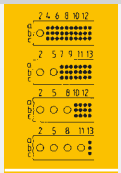
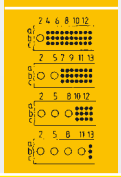
* Coaxial contact 75 Ω
Fibre optic contacts on request

Number of contacts

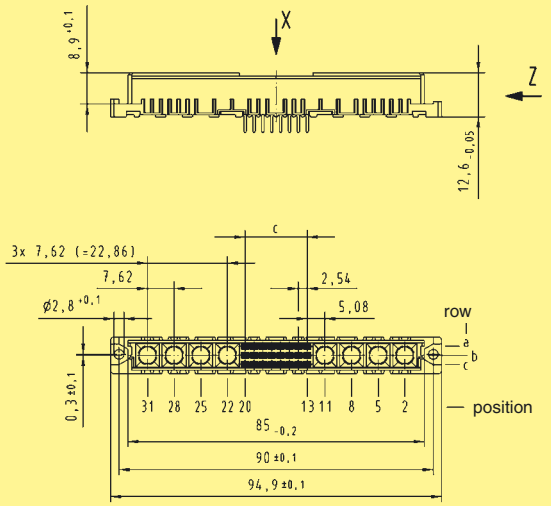
78+2, 60+4, 42+6, 24+8

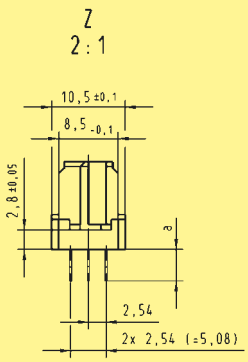


Female connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with solder pins 2.9 mm	78 + 2 60 + 4 42 + 6 24 + 8		Performance level 3 on request	09 03 278 6864 09 03 260 6864 09 03 242 6864 09 03 224 6864	Performance level 1 on request
Female connector with solder pins 4.5 mm	78 + 2 60 + 4 42 + 6 24 + 8			09 03 278 6865 09 03 260 6865 09 03 242 6865 09 03 224 6865	
Female connector with press-in pins	Part Nos. and variants see chapter 04				

Dimensions



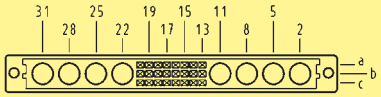


a
2.9
4.5

Solder pins

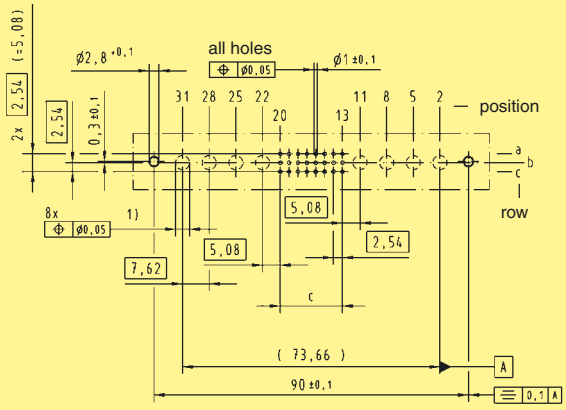
Order high current, high voltage, coaxial and fibre optic contacts separately, see pages 01.30 and 01.31

Panel cut out

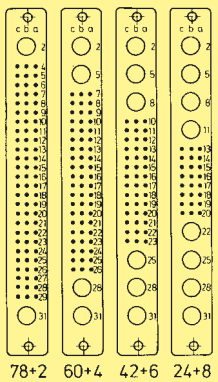


Board drillings

Mounting side



Contact arrangement
View from termination side



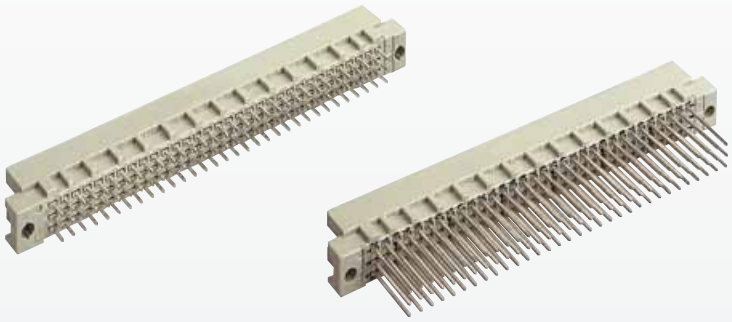
Type	c
78 + 2	25 x 2.54 = 63.5
60 + 4	19 x 2.54 = 48.26
42 + 6	13 x 2.54 = 33.02
24 + 8	7 x 2.54 = 17.78

Dimensions in mm

Other contact arrangements on request

Number of contacts

96, 64, 32

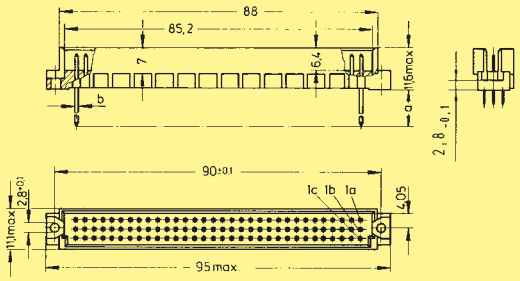


Types signal to 2 A

Male connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
				3	2	1
Male connector with solder pins 2.5 mm	96			09 73 196 7902	09 73 196 6902	09 73 196 2902
	94 + 2▲			09 73 196 7952	09 73 196 6952	09 73 196 2952
	64			09 73 164 7902	09 73 164 6902	09 73 164 2902
	32			09 73 132 7902	09 73 132 6902	09 73 132 2902
Male connector with solder pins 4.0 mm	96			09 73 196 7903	09 73 196 6903	09 73 196 2903
	94 + 2▲			09 73 196 7953	09 73 196 6953	09 73 196 2953
	64			09 73 164 7903	09 73 164 6903	09 73 164 2903
	32			09 73 132 7903	09 73 132 6903	09 73 132 2903
Male connector with wrap posts 13 mm	96			09 73 196 7907	09 73 196 6907	09 73 196 2907
	94 + 2▲			09 73 196 7957	09 73 196 6957	09 73 196 2957
	64			09 73 164 7907	09 73 164 6907	09 73 164 2907
	32			09 73 132 7907	09 73 132 6907	09 73 132 2907
Male connector with press-in pins	Part Nos. and variants see chapter 04					

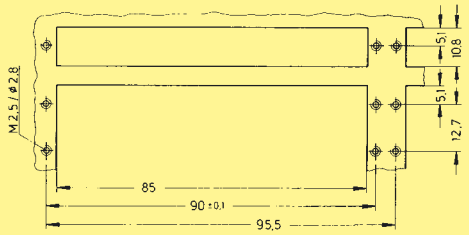
Dimensions



a	b	
2.5 4	ø 0.7	Solder pins

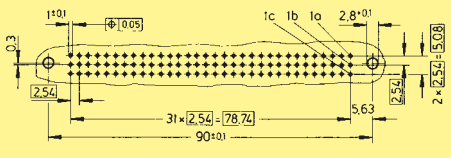
a	b	
13	□0.6	Wrap posts

Panel cut out

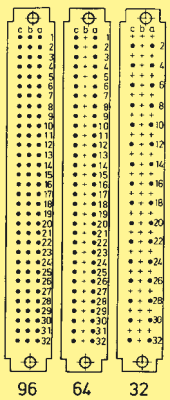


Board drillings

Mounting side



Contact arrangement
View from termination side

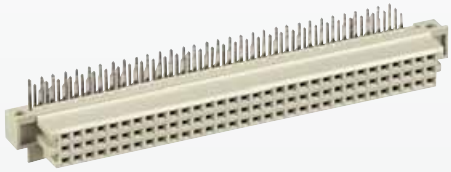


Dimensions in mm

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a32]
Other contact arrangements as well with lagging pins on request

Number of contacts

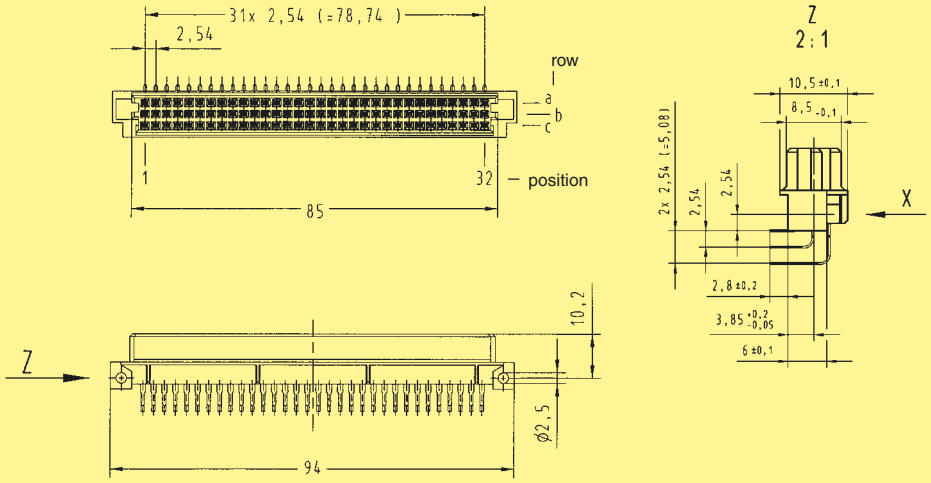
96, 64, 32



Female connectors

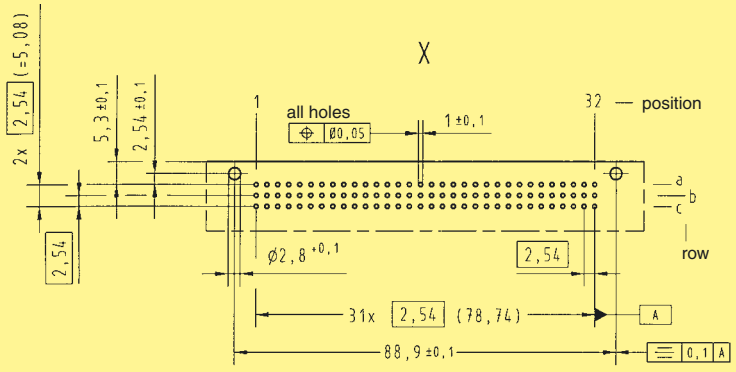
Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
				3	2	1
Female connector with angled solder pins	96	1 2 3 4		09 73 296 7801	09 73 296 6801	09 73 296 2801
	64	1 2 3 4		09 73 264 7801	09 73 264 6801	09 73 264 2801
	32	1 2 3 4		09 73 232 7801	09 73 232 6801	09 73 232 2801
	32	1 2 3 4		09 73 232 7811	09 73 232 6811	09 73 232 2811

Dimensions



Board drillings

Mounting side



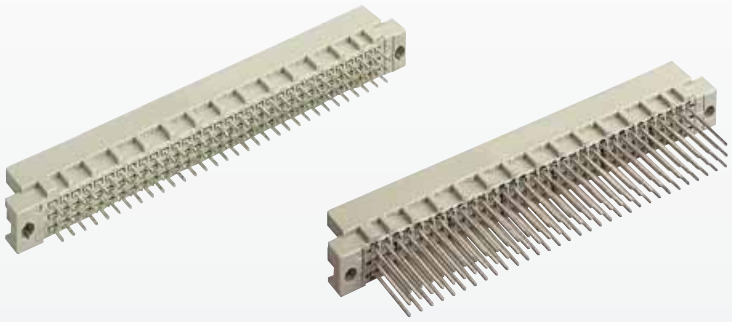
Dimensions in mm

Other contact arrangements on request
High temperature connectors see chapter 05

DIN 41 612 · complementary to type R (HE 11)

Number of contacts

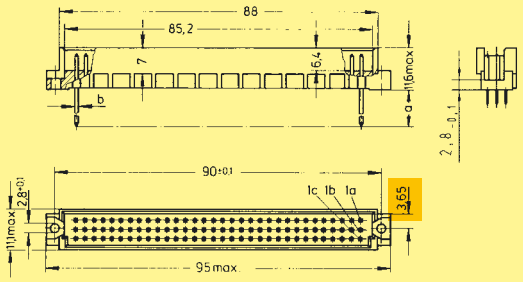
96, 64, 32



Male connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
			3	2	1
Male connector with solder pins 2.5 mm	96		09 79 196 7902	09 79 196 6902	Performance level 1 on request
	64		09 79 164 7902	09 79 164 6902	
	32		09 79 132 7902	09 79 132 6902	
Male connector with solder pins 4.0 mm	96		09 79 196 7903	09 79 196 6903	
	64		09 79 164 7903	09 79 164 6903	
	32		09 79 132 7903	09 79 132 6903	
Male connector with wrap posts 13 mm	96		09 79 196 7907	09 79 196 6907	
	64		09 79 164 7907	09 79 164 6907	
	32		09 79 132 7907	09 79 132 6907	

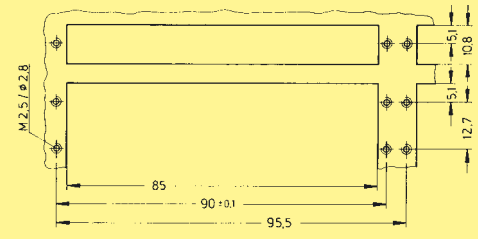
Dimensions



a	b	
2.5 4	ø 0.7	Solder pins

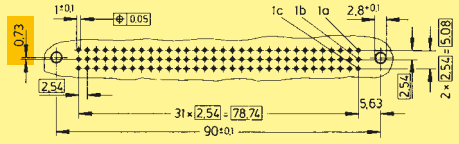
a	b	
13	□0.6	Wrap posts

Panel cut out



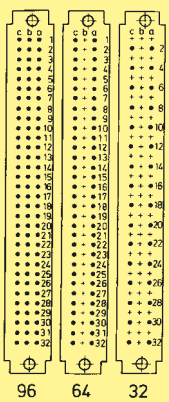
Board drillings

Mounting side



Contact arrangement

View from termination side



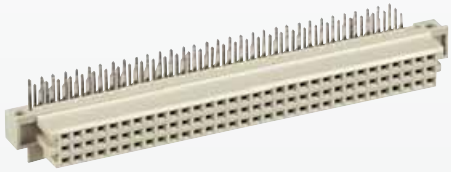
Dimensions in mm

Other contact arrangements on request

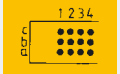
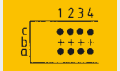
= deviating dimensions from standard male connectors (see page 01.34)

Number of contacts

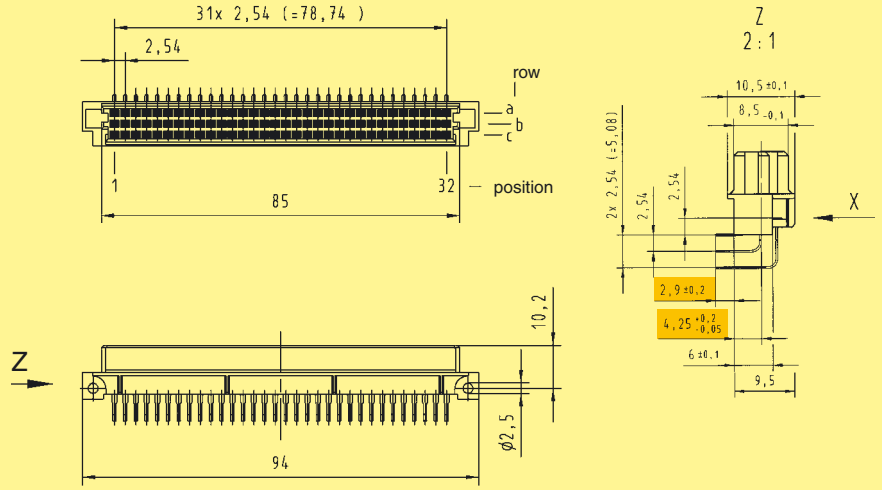
96, 64



Female connectors

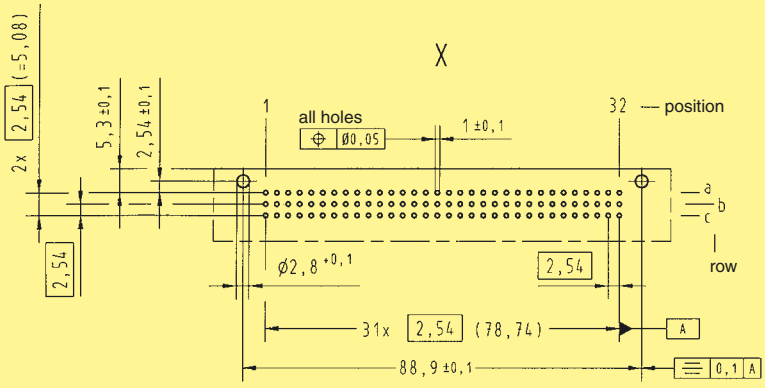
Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
			3	2	1
Female connector with angled solder pins	96		09 79 296 7801	09 79 296 6801	Performance level 1 on request
	64		09 79 264 7801	09 79 264 6801	

Dimensions



Board drillings

Mounting side



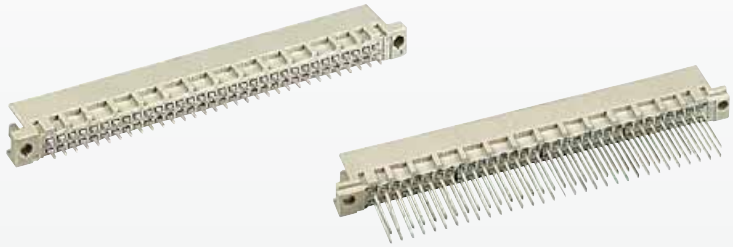
Dimensions in mm

Other contact arrangements on request

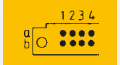
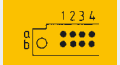
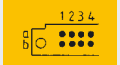
= deviating dimensions from standard female connectors (see page 01.35)

Number of contacts

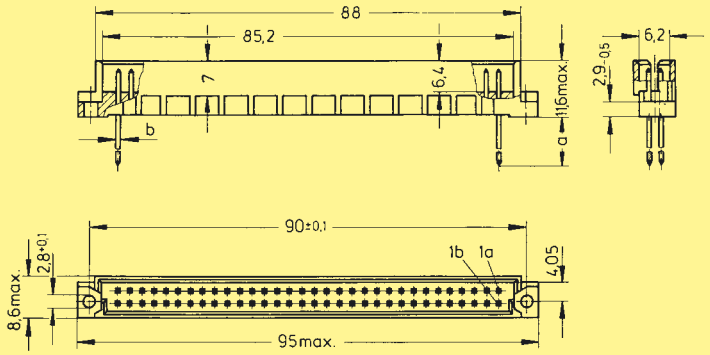
64



Male connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
			3	2	1
Male connector with solder pins 2.5 mm	64 62 + 2▲		09 72 164 7902 09 72 164 7952	09 72 164 6902 09 72 164 6952	Performance level 1 on request
Male connector with solder pins 4.0 mm	64 62 + 2▲		09 72 164 7903 09 72 164 7953	09 72 164 6903 09 72 164 6953	
Male connector with wrap posts 13 mm	64 62 + 2▲		09 72 164 7907 09 72 164 7957	09 72 164 6907 09 72 164 6957	
Male connector with press-in pins	Part Nos. and variants see chapter 04				

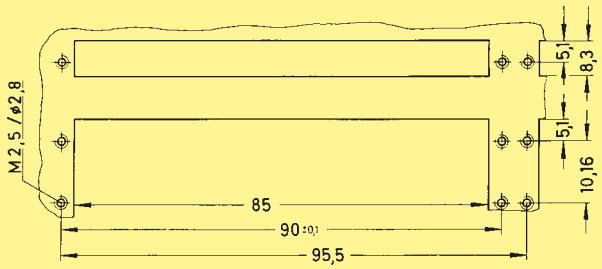
Dimensions



a	b	
2.5 4	ø 0.7	Solder pins

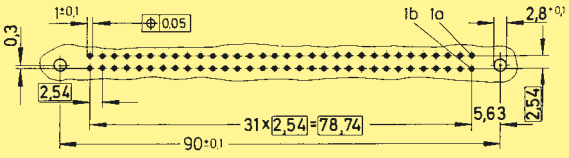
a	b	
13	□0.6	Wrap posts

Panel cut out



Board drillings

Mounting side

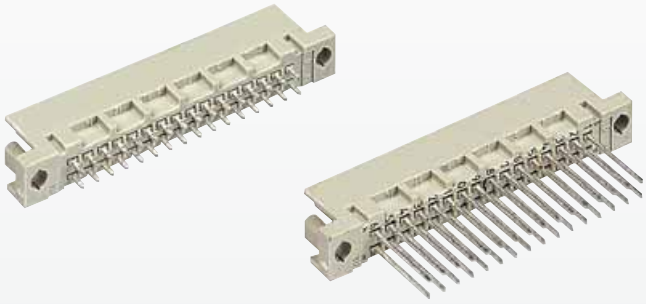


Dimensions in mm

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a32]
Other contact arrangements as well with lagging pins on request

Number of contacts

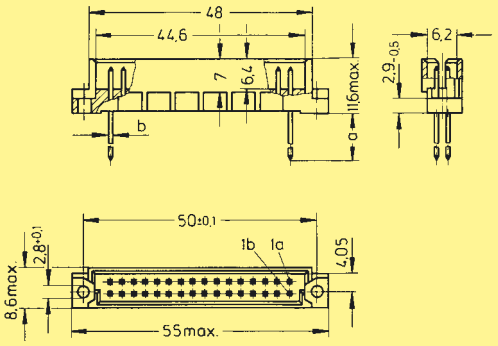
32



Male connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Part No. 2	Part No. 1
Male connector with solder pins 2.5 mm	32 30 + 2▲		09 27 132 7902 09 27 132 7952	09 27 132 6902 09 27 132 6952	Performance level 1 on request
Male connector with solder pins 4.0 mm	32 30 + 2▲		09 27 132 7903 09 27 132 7953	09 27 132 6903 09 27 132 6953	
Male connector with wrap posts 13 mm	32 30 + 2▲		09 27 132 7907 09 27 132 7957	09 27 132 6907 09 27 132 6957	
Male connector with press-in pins	Part Nos. and variants see chapter 04				

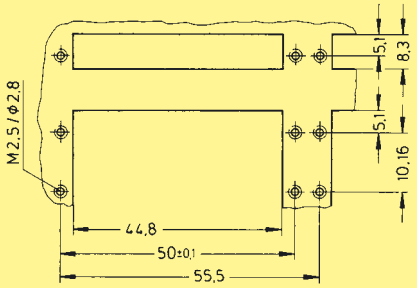
Dimensions



a	b	
2.5 4	ø 0.7	Solder pins

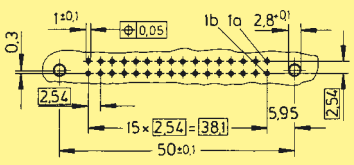
a	b	
13	□0.6	Wrap posts

Panel cut out



Board drillings

Mounting side



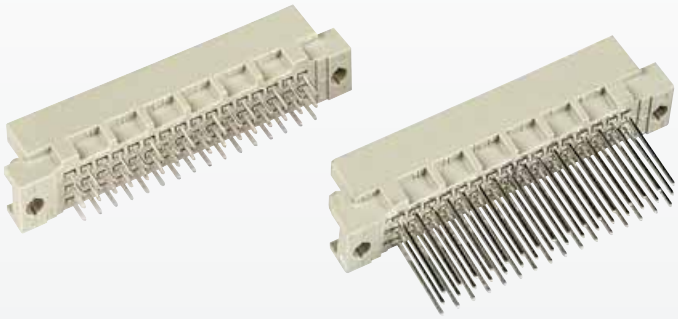
Dimensions in mm

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a16]
Other contact arrangements as well with lagging pins on request

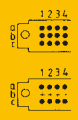
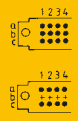
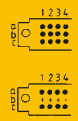
DIN 41 612 · complementary type 2R

Number of contacts

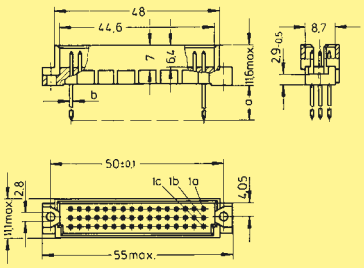
48, 32



Male connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
				3	2	1
Male connector with solder pins 2.5 mm	48 46 + 2▲ 32		09 28 148 7902 09 28 148 7952 09 28 132 7902	09 28 148 6902 09 28 148 6952 09 28 132 6902	09 28 148 2902 09 28 148 2952 09 28 132 2902
Male connector with solder pins 4.0 mm	48 46 + 2▲ 32		09 28 148 7903 09 28 148 7953 09 28 132 7903	09 28 148 6903 09 28 148 6953 09 28 132 6903	09 28 148 2903 09 28 148 2953 09 28 132 2903
Male connector with wrap posts 13 mm	48 46 + 2▲ 32		09 28 148 7907 09 28 148 7957 09 28 132 7907	09 28 148 6907 09 28 148 6957 09 28 132 6907	09 28 148 2907 09 28 148 2957 09 28 132 2907
Male connector with press-in pins	Part Nos. and variants see chapter 04				

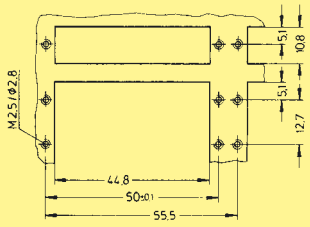
Dimensions



a	b	
2.5 4	ø 0.7	Solder pins

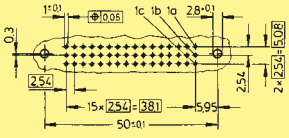
a	b	
13	□0.6	Wrap posts

Panel cut out



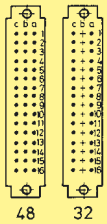
Board drillings

Mounting side



Contact arrangement

View from termination side



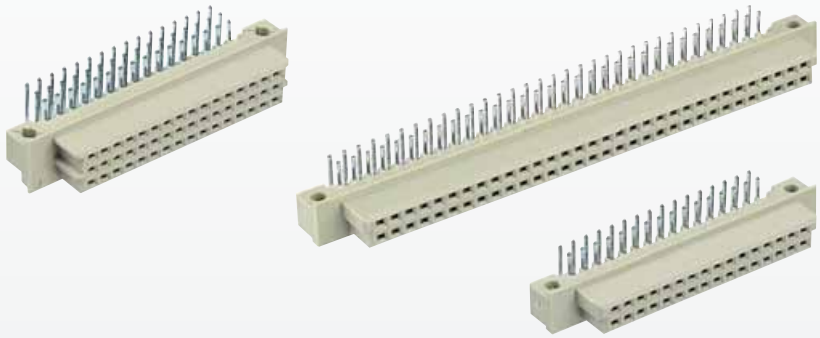
Dimensions in mm

▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a1 and a16]
Other contact arrangement on request

DIN 41 612 · Type Q – complementary to types 2Q, 2R

Number of contacts

64, 48, 32

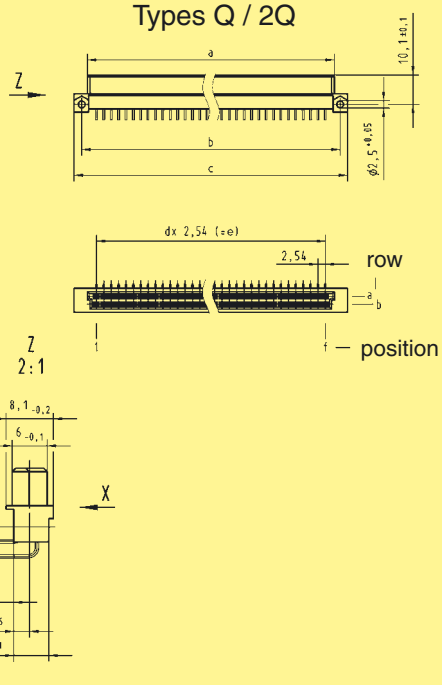


Female connectors

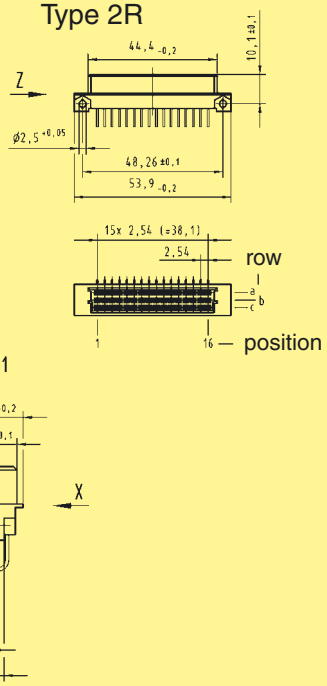
Identification	Number of contacts	Contact arrangement	Part No. Performance level 2 according to DIN 41 612. Explanation chapter 00
Female connector with angled solder pins			
Type Q	64		09 72 264 6801
Type 2Q	32		09 27 232 6801
Type 2R	48		09 28 248 6801

Dimensions

Types Q / 2Q



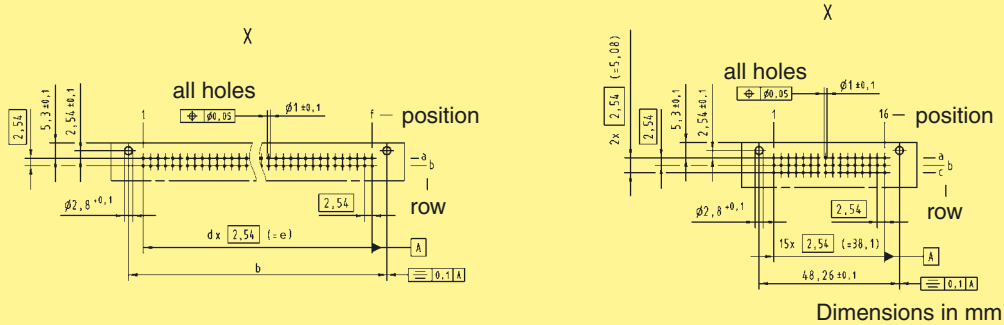
Type 2R



Type	a	b	c	d	e	f
Q	85.0$^{-0.2}$	88.90±0.1	94.0$^{-0.2}$	31	78.74	32
2Q	44.4$^{-0.2}$	48.26±0.1	53.9$^{-0.2}$	15	38.10	16

Board drillings

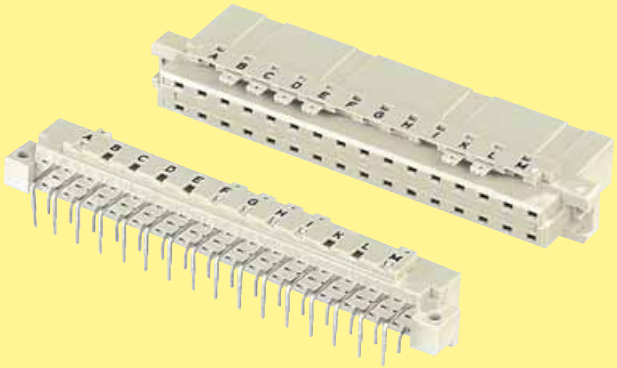
Mounting side

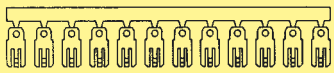


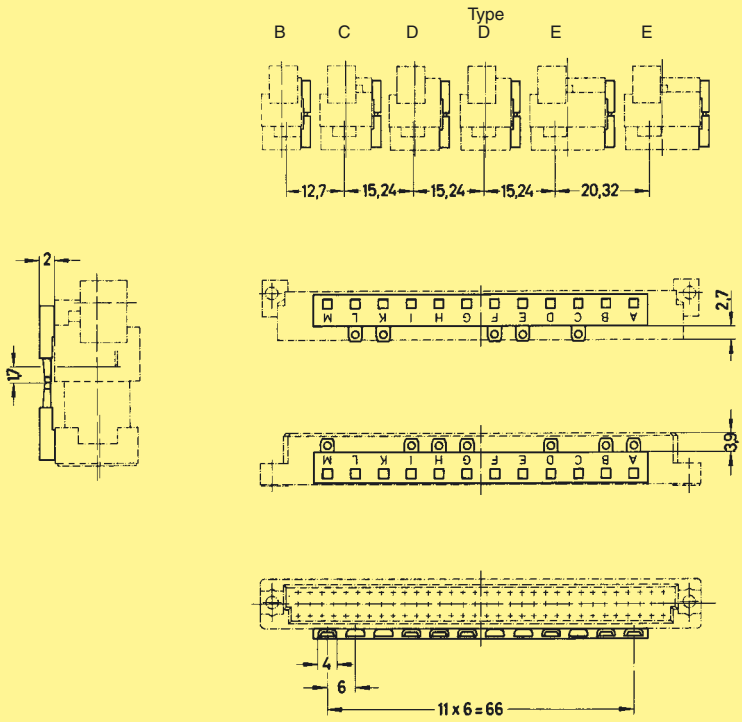
Dimensions in mm

Other contact arrangements on request

Identification	Part No.	Drawing	Dimensions in mm
Coding system without contact loss	Male and female connectors Type B, C, D and E on request	To avoid accidental and incorrect mating of adjacent connectors a coding system is required.This coding system is an integral part of both male and female connactors. A comb with 12 coding pins, which is supplied under a single part number, allows over 900 coding variations. The pins are to be locked into the male and female connectors. The connectors with the integrated coding facility are supplied for types B, C, D and E according to DIN 41 612 and are available for all variants. Please contact us.	
Coding pins Mounting example	12 pins on a comb 09 02 000 9928		







Types D, E, F, FM, 2F, F9, interface connectors I/U

Number of contacts

Type D	32
Type E	48

Contact spacing (mm)

Type D	5,08
Type E	male connector 5.08 x 5.08 male connector 2.54 x 5.08 female connector 5.08 x 5.08

Working current

6 A max.

see current carrying capacity chart

Clearance

Types D und E	≥ 3.0 mm
Type E male connector row separation 2.54 mm	≥ 1.6 mm

Creepage

≥ 3.0 mm

Working voltage

The working voltage also depends on the clearance and creepage dimensions of the pcb itself and the associated wiring

according to the safety regulations of the equipment
Explanations see chapter 00

Test voltage $U_{r.m.s.}$

1.55 kV

Contact resistance

≤ 15 mΩ for wire wrap and solder connections
≤ 20 mΩ including crimp connections

Insulation resistance

≥ 10^{12} Ω

Temperature range

– 55 °C … + 125 °C

The higher temperature limit includes the local ambient and heating effects of the contacts under load

Degree of protection for crimp terminal

IP 20

according to DIN 40 050

Electrical termination

Male connector	Solder pins for pcb connections Ø 1.0 ± 0.1 mm according to IEC 60 326-3
Female connector	Wrap posts 1 x 1 mm diagonal 1.34-1.45 mm Solder pins for pcb connections Ø 1.0 ± 0.1 mm according to IEC 60 326-3 Angled solder pins 1 x 1 mm for pcb connections Ø 1.6 ± 0.1 mm Solder lugs Crimp terminal 0.09-1.5 mm²

Insertion and withdrawal force

32 way ≤ 40 N
48 way ≤ 75 N

Materials

Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy

Contact surface

Contact zone: selectively gold plated according to performance level[1)]
Termination zone: tinned

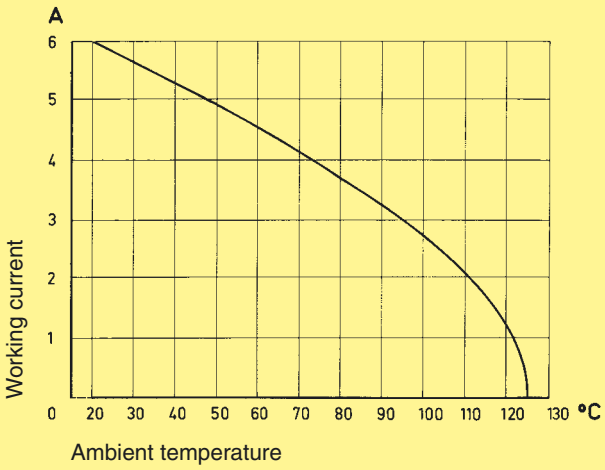
[1)] Explanation of performance levels see chapter 00

Mating conditions	see chapter 00
Coding systems	see page 02.36
Mounting clips	see chapter 00

Current carrying capacity

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512

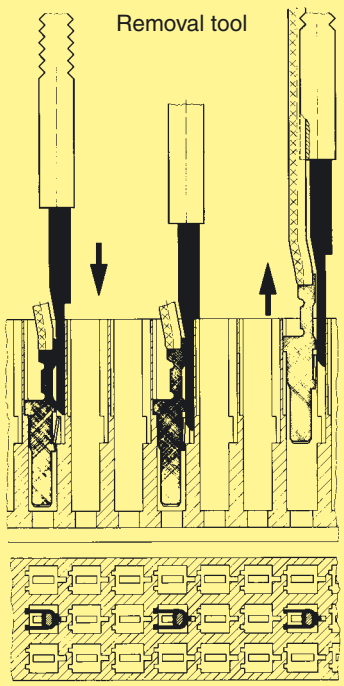


Fitting the crimp contacts

After crimping the wires onto the contacts with the help of a crimping tool or an automatic crimping machine the contacts should be correctly oriented and inserted into the cavities of the connector moulding in the required configuration. They snap into position and are firmly held in place. A light pull on the wire assures the correct tensile strength of the contact. When using stranded wires with a gauge below 0.37 mm² an insertion tool is necessary.

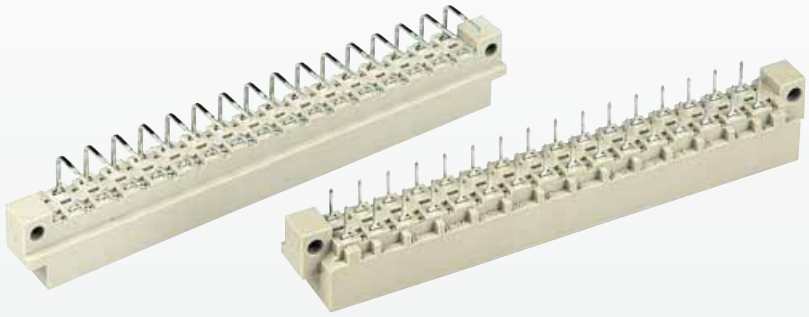
Removing the crimp contacts

The removal tool is inserted into a slot on the side of the respective crimp cavity. This action compresses the contact retaining spring therefore the contact can then be easily withdrawn using a light pull on the wire. This action will cause no damage to the contact/wire which can be repositioned/refitted as necessary. The drawing demonstrates the crimp removal procedure (max. 5x).

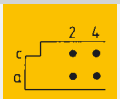
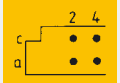
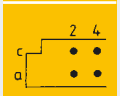
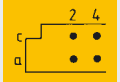


Number of contacts

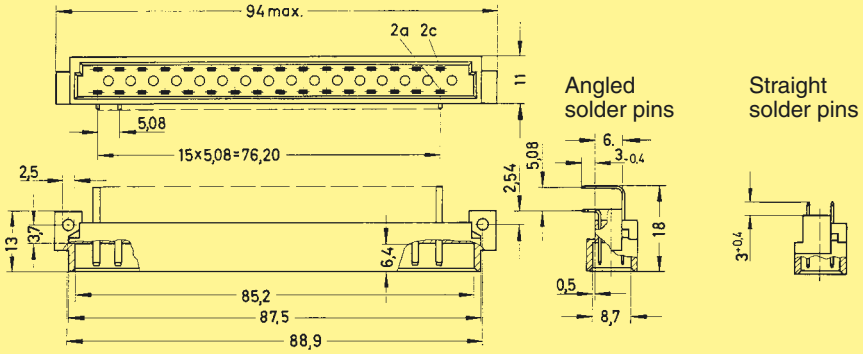
32



Male connectors

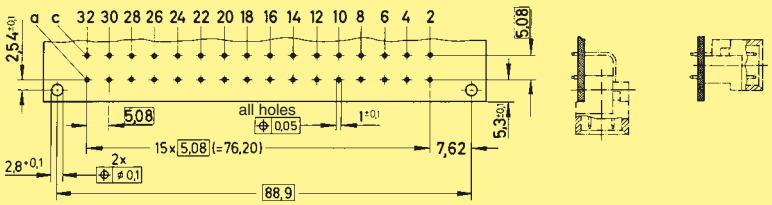
Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
			3	2	1
Male connector with angled solder pins	32		09 04 132 7921	09 04 132 6921	09 04 132 2921
	30 + 2▲		09 04 132 7951	09 04 132 6951	
Male connector with straight solder pins	32		09 04 132 7922	09 04 132 6922	
	30 + 2▲		09 04 132 7952	09 04 132 6952	

Dimensions



Board drillings

Mounting side

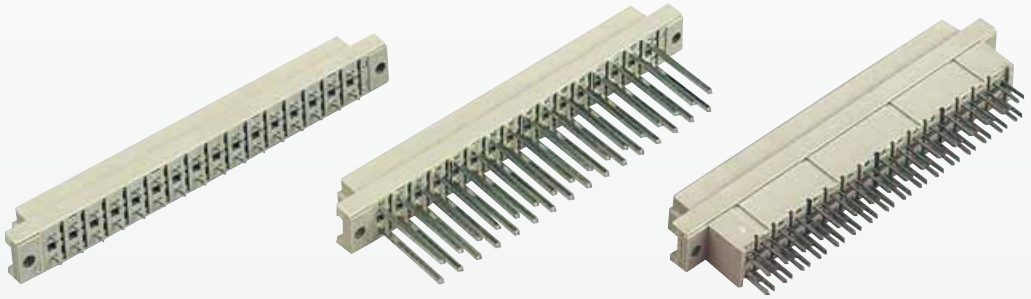


Dimensions in mm

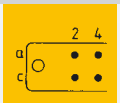
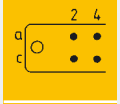
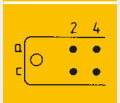
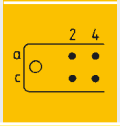
▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a2 and a32]
Other contact arrangements on request

Number of contacts

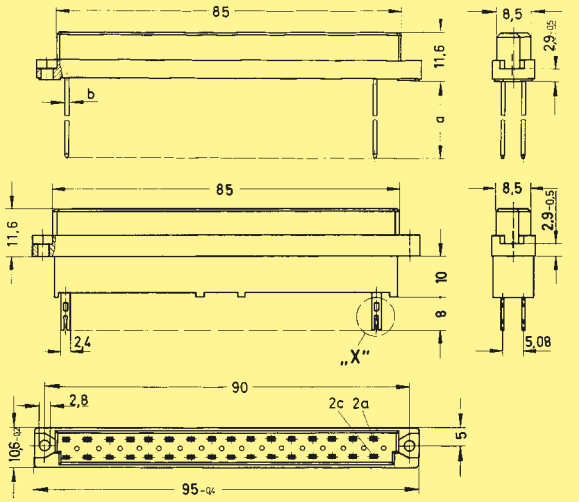
32



Female connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with solder pins 2.5 mm	32		09 04 232 7832	09 04 232 6832	09 04 232 2832
Female connector with solder pins 4.0 mm	32		09 04 232 7831	09 04 232 6831	09 04 232 2831
Female connector with wrap posts 20 mm	32		09 04 232 7821	09 04 232 6821	09 04 232 2821
Female connector with solder lugs	32		09 04 232 7823	09 04 232 6823	09 04 232 2823

Dimensions



a	b
2.5	ø 0.7
4	

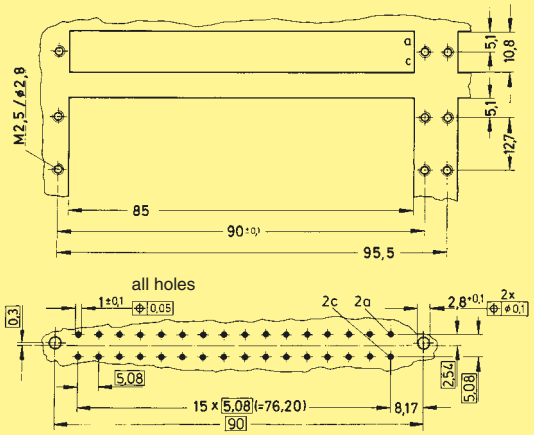
Solder pins

a	b
20	□ 1

Wrap posts

Solder lugs

Panel cut out

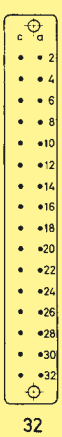


Board drillings

Mounting side

Contact arrangement

View from termination side



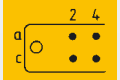
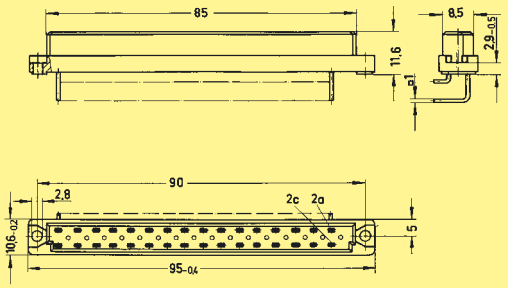
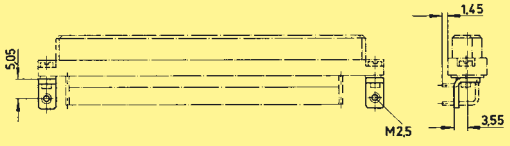
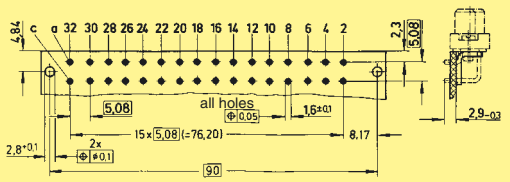
32

Dimensions in mm

Number of contacts

32

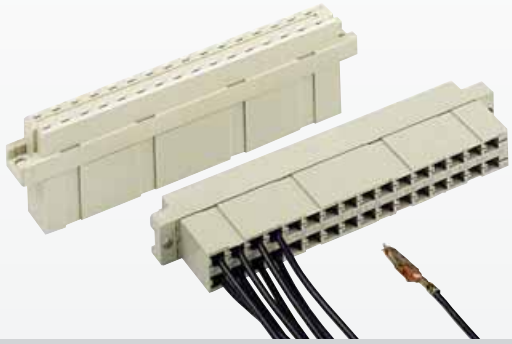
Female connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
				3	2	1
Female connector with angled solder pins 1 x 1 mm	32		09 04 232 7826		09 04 232 6826	09 04 232 2826
Dimensions						
Fixing bracket Metal [1] order 2 pieces for one connector			09 06 000 9912[1]			
Board drillings Mounting side						

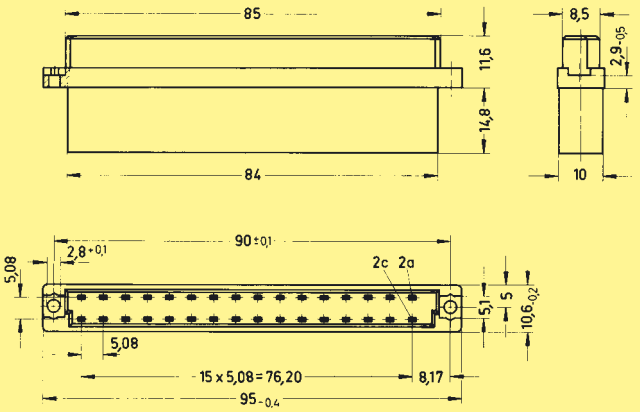
Dimensions in mm

Number of contacts

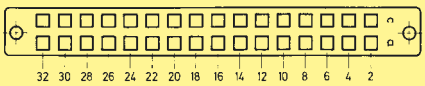
max. 32



Female connectors

Identification	Number of contacts	Part No.	Drawing / Dimensions in mm
Female connector for crimp contacts Order contacts separately	32	09 04 032 3213	

Contact arrangement View from termination side

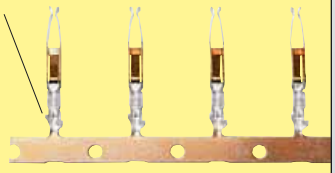


Shell housing 09 03 096 0501 see chapter 20

Identification	Identification Wire gauge	Part No. Performance levels according to DIN 41 612. Explanation chapter 00 2	 1
Female crimp FC contacts			
Bandoliered contacts (approx. 2 ,500 pieces)	1	09 06 000 6484	09 06 000 6474
	2	09 06 000 6481	09 06 000 6471
	3	09 06 000 6482	09 06 000 6472
Bandoliered contacts (approx. 250 pieces)	1	09 06 000 7484	09 06 000 7474
	2	09 06 000 7481	09 06 000 7471
	3	09 06 000 7482	09 06 000 7472
Individual contacts (1,000 pieces)	1	09 06 000 8484	09 06 000 8474
	2	09 06 000 8481	09 06 000 8471
	3	09 06 000 8482	09 06 000 8472

		Wire gauge mm²	AWG	Insulation ø mm
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5
FC 2	2	0.14 - 0.56	26 - 20	0.8 - 2.0
FC 3	3	0.5 - 1.5	20 - 16	1.6 - 2.8

Identification



Bandoliered contacts

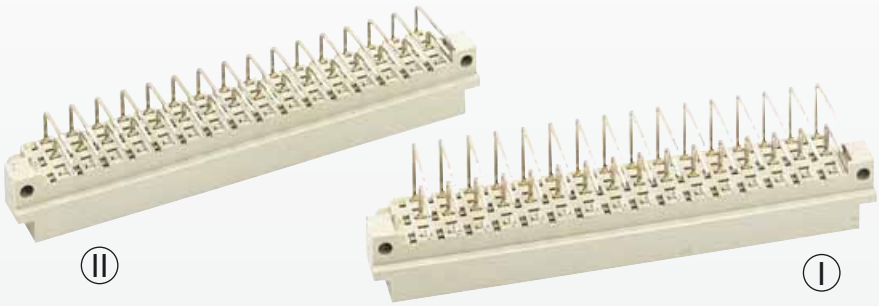
Individual contacts

3.5 + 0.5 mm of insulation is stripped from the wires to be crimped

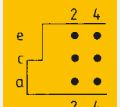
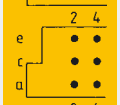
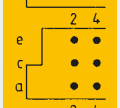
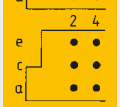
Insertion, removal and crimping tools see chapter 30

Number of contacts

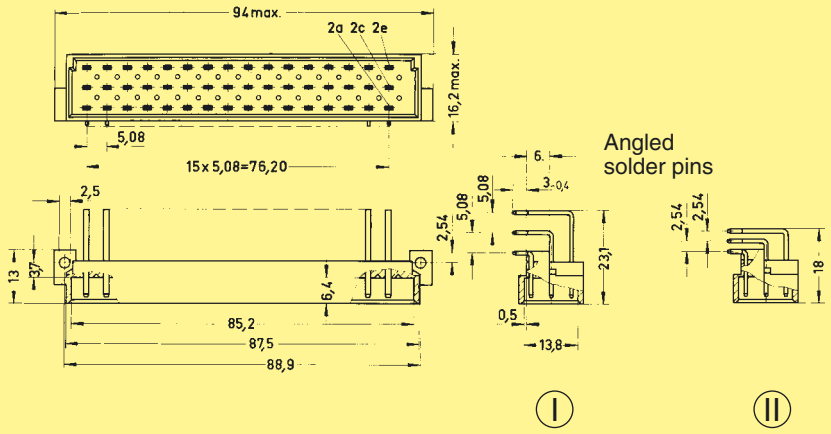
48



Male connectors

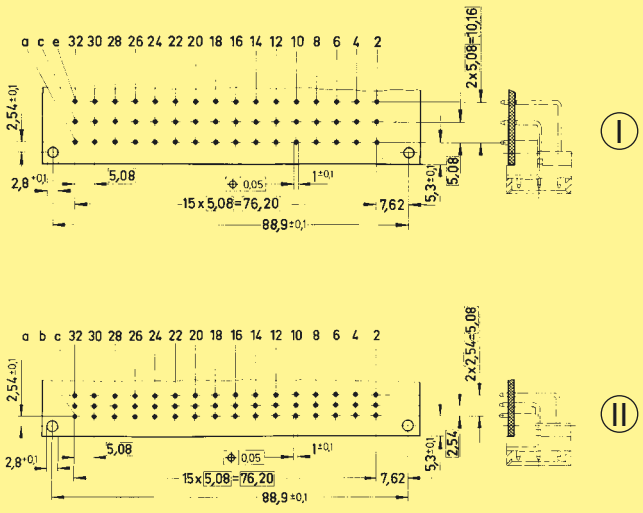
Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Male connector with angled solder pins					
Row separation termination side 5.08 mm Ⅰ	48		09 05 148 7921	09 05 148 6921	09 05 148 2921
	46 + 2▲		09 05 148 7951	09 05 148 6951	
Row separation termination side 2.54 mm Ⅱ	48		09 05 148 7931	09 05 148 6931	09 05 148 2931
	46 + 2▲		09 05 148 7961	09 05 148 6961	

Dimensions



Board drillings

Mounting side

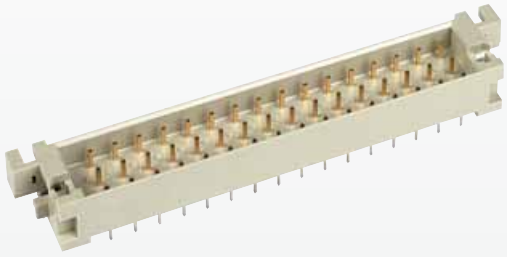


Dimensions in mm

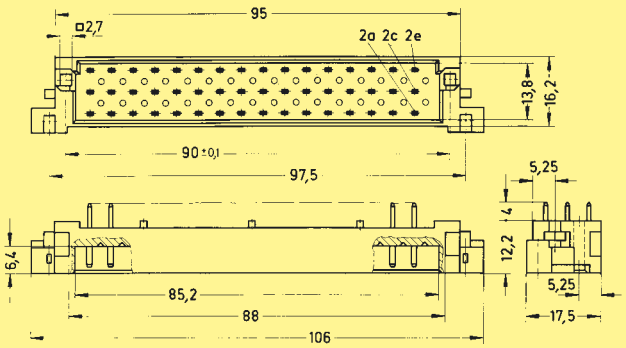
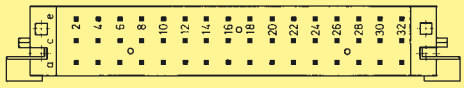
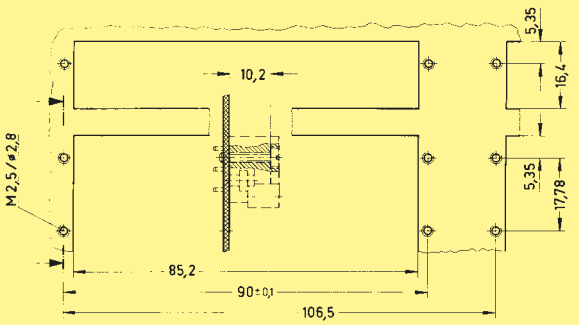
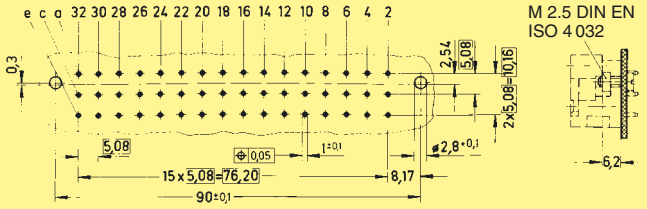
▲ Male connectors with 2 leading contacts [(0.8 mm) pos. a2 and a32]
Other contact arrangements on request

Number of contacts

48

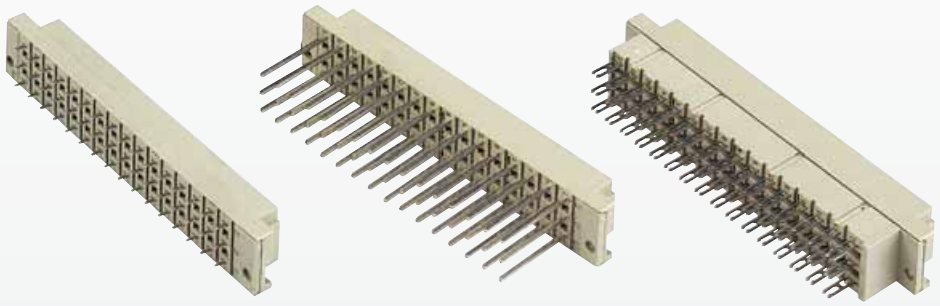


Interface connector I

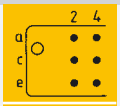
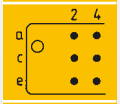
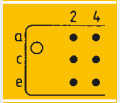
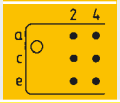
Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Interface connector I with solder pins 0.6 x 0.6 mm	48	Performance level 2 09 05 048 6924	 Contact arrangement View from termination side 	
Panel cut out				
Board drillings Mounting side				

Number of contacts

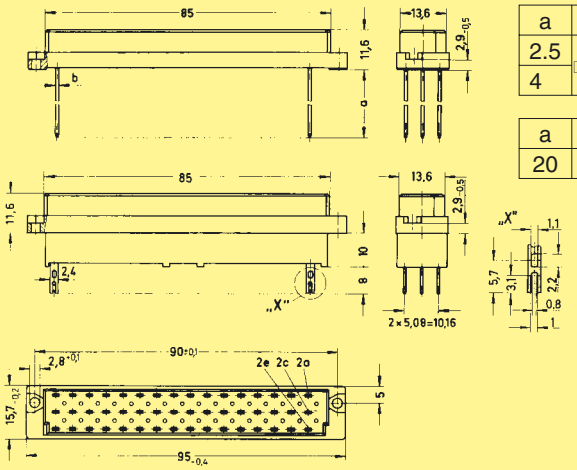
48



Female connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with solder pins 2.5 mm	48		09 05 248 7832	09 05 248 6832	09 05 248 2832
Female connector with solder pins 4.0 mm	48		09 05 248 7831	09 05 248 6831	09 05 248 2831
Female connector with wrap posts 20 mm	48		09 05 248 7821	09 05 248 6821	09 05 248 2821
Female connector with solder lugs	48		09 05 248 7823	09 05 248 6823	09 05 248 2823
Female connector with press-in pins	Part Nos. and variants see chapter 04				

Dimensions



a	b
2.5	□0.6
4	

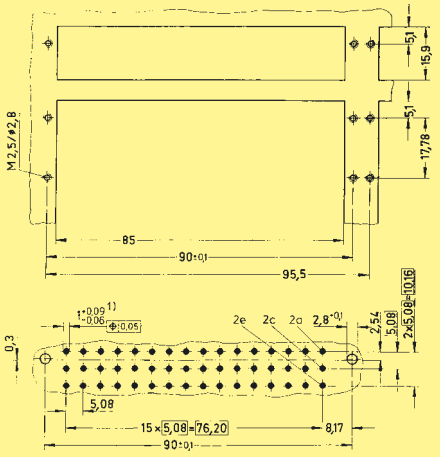
Solder pins

a	b
20	□1

Wrap posts

Solder lugs

Panel cut out

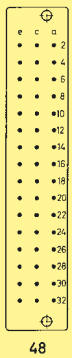


Board drillings

Mounting side

Contact arrangement

View from termination side

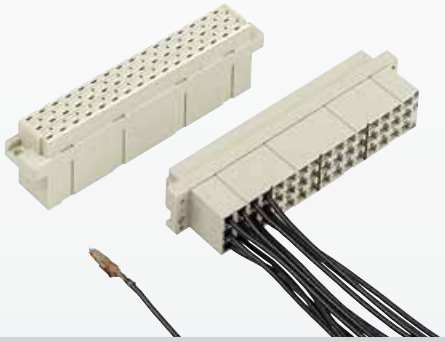


Dimensions in mm

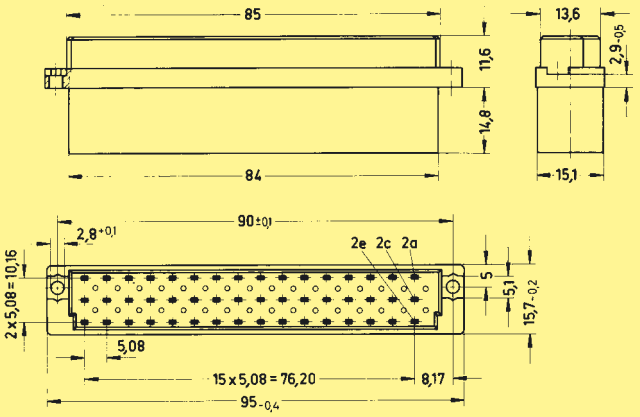
Types signal to 6 A

Number of contacts

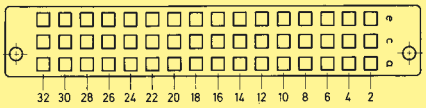
max. 48



Female connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately	48	09 05 048 3202		

Contact arrangement View from termination side

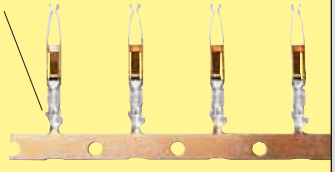


Shell housing 09 05 048 0501 see chapter 20

Identification	Identification Wire gauge	Part No. Performance levels according to DIN 41 612. Explanation chapter 00 2	 1
Female crimp FC contacts			
Bandoliered contacts (approx. 2 ,500 pieces)	1	09 06 000 6484	09 06 000 6474
	2	09 06 000 6481	09 06 000 6471
	3	09 06 000 6482	09 06 000 6472
Bandoliered contacts (approx. 250 pieces)	1	09 06 000 7484	09 06 000 7474
	2	09 06 000 7481	09 06 000 7471
	3	09 06 000 7482	09 06 000 7472
Individual contacts (1,000 pieces)	1	09 06 000 8484	09 06 000 8474
	2	09 06 000 8481	09 06 000 8471
	3	09 06 000 8482	09 06 000 8472

		Wire gauge mm²	AWG	Insulation ø mm
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5
FC 2	2	0.14 - 0.56	26 - 20	0.8 - 2.0
FC 3	3	0.5 - 1.5	20 - 16	1.6 - 2.8

Identification

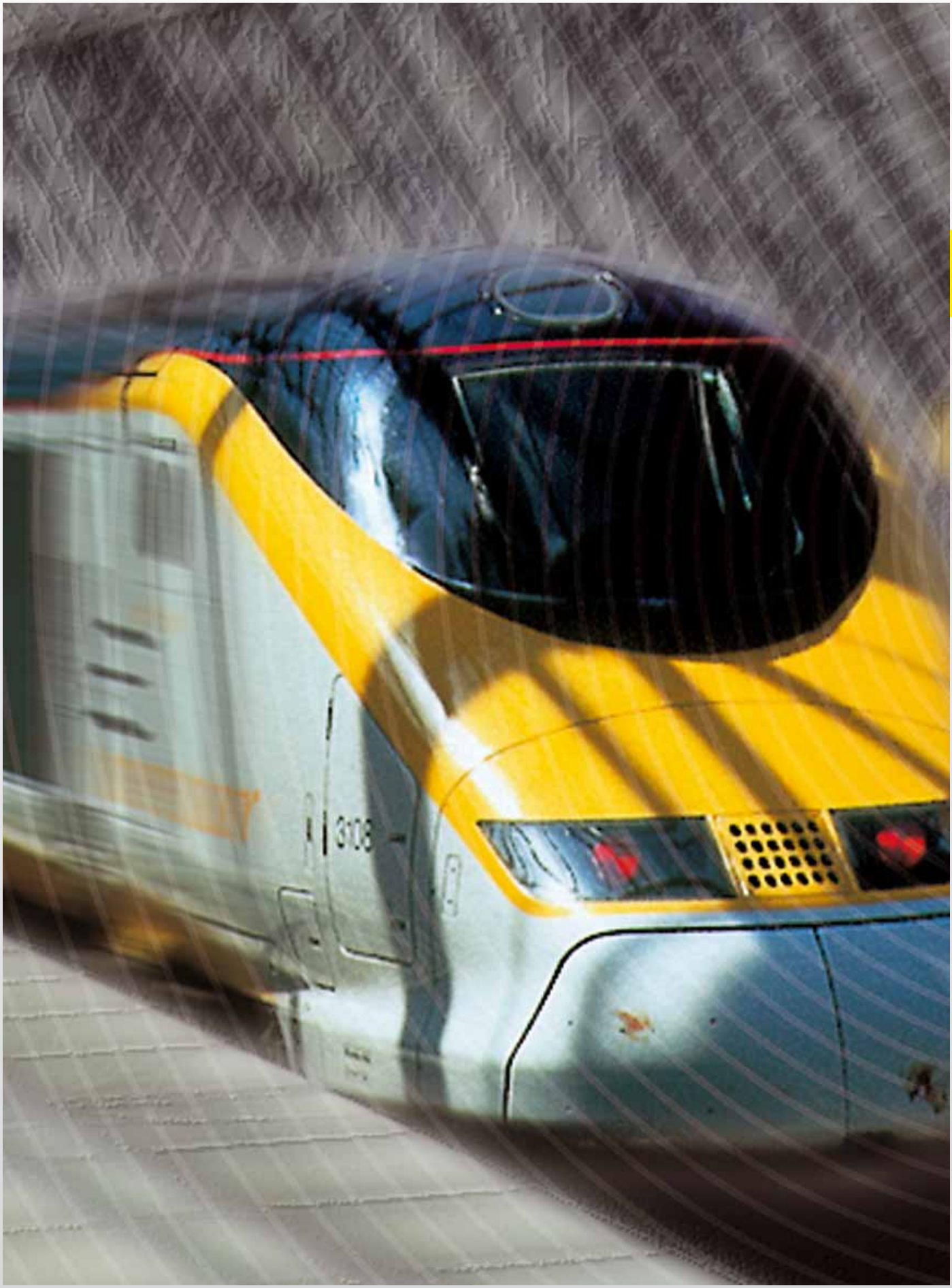


Bandoliered contacts

Individual contacts

3.5 + 0.5 mm of insulation is stripped from the wires to be crimped

Insertion, removal and crimping tools see chapter 30



Number of contacts

Type F	48, 32
Type FM	45
Type 2F	max. 24
Type F9	max. 9

Contact spacing (mm)

5.08

Working current

6 A max.

see current carrying capacity chart

Clearance

≥ 1.6 mm

Creepage

≥ 3.0 mm

Working voltage

The working voltage also depends on the clearance and creepage dimensions on the pcb itself and the associated wiring

according to the safety regulations of the equipment
Explanations see chapter 00

Test voltage $U_{r.m.s.}$

1.55 kV (contact-contact)
2.5 kV (contact-ground)

Contact resistance

≤ 15 mΩ for wire wrap and solder connections

≤ 20 mΩ including crimp connections

Insulation resistance

≥ 10^{12} Ω

Temperature range

– 55 °C … + 125 °C

The higher temperature limit includes the local ambient and heating effects of the contacts under load

Degree of protection for crimp terminal

IP 20

according to DIN 40 050

Electrical termination

Male connector	Solder pins for pcb connections Ø 1 ± 0.1 mm according to IEC 60 326-3 Wrap posts 1 x 1 mm diagonal 1.34-1.45 mm Crimp terminal 0.09-1.5 mm²
Female connector	Wrap posts 1 x 1 mm diagonal 1.34-1.45 mm Solder pins for pcb connections Ø 1 ± 0.1 mm according to IEC 60 326-3 Angled solder pins 1 x 1 mm for pcb connections Ø 1.6 ± 0.1 mm Solder lugs Crimp terminal 0.09-1.5 mm²
Distributor	Crimp terminal 0.09-1.5 mm²

Insertion and withdrawal force

48 way ≤ 75 N
45 way ≤ 70 N
32 way ≤ 50 N
24 way ≤ 37 N

Materials

Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy

Contact surface

Contact zone: selectively gold-plated according to performance level[1)]
Termination zone: tinned

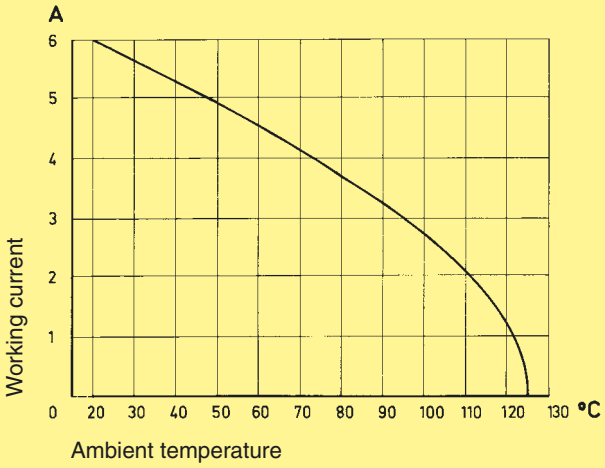
[1)] Explanation of performance levels see chapter 00

Mating conditions see chapter 00
Coding systems see page 02.36
Mounting clips see chapter 00

Current carrying capacity

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512

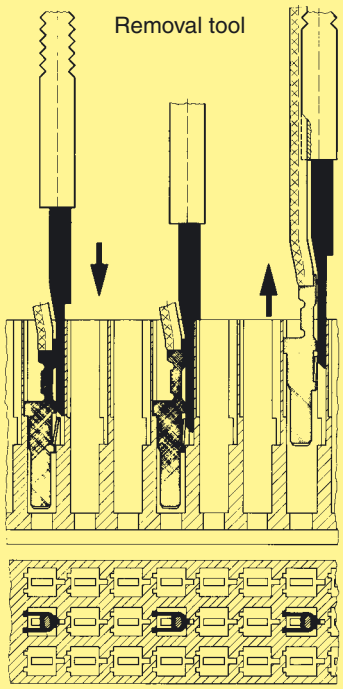


Fitting the crimp contacts

After crimping the wires onto the contacts with the help of a crimping tool or an automatic crimping machine the contacts should be correctly oriented and inserted into the cavities of the connector moulding in the required configuration. They snap into position and are firmly held in place. A light pull on the wire assures the correct tensile strength of the contact. When using stranded wires with a gauge below 0.37 mm² an insertion tool is necessary.

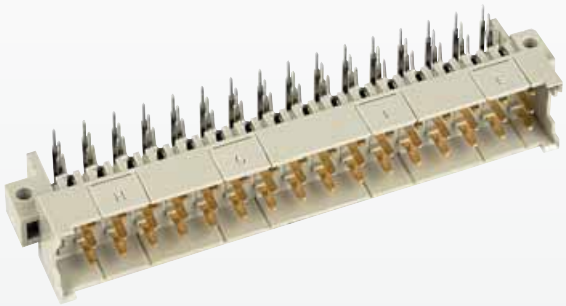
Removing the crimp contacts

The removal tool is inserted into a slot on the side of the respective crimp cavity. This action compresses the contact retaining spring therefore the contact can then be easily withdrawn using a light pull on the wire. This action will cause no damage to the contact/wire which can be repositioned/refitted as necessary. The drawing demonstrates the crimp removal procedure (max. 5x).

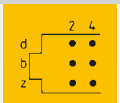
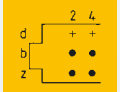
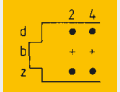
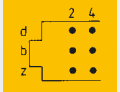
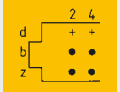
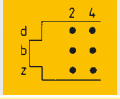


Number of contacts

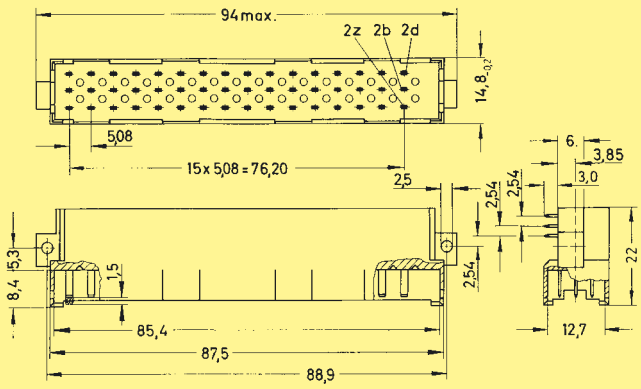
48, 32



Male connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Male connector with angled solder pins	48		09 06 148 7901	09 06 148 6901	09 06 148 2901
	32		09 06 132 7901	09 06 132 6901	09 06 132 2901
	32		09 06 132 7931	09 06 132 6931	09 06 132 2931
1 leading contact (position z 32)	47 + 1		09 06 148 7921	09 06 148 6921	09 06 148 2921
	31 + 1		09 06 132 7921	09 06 132 6921	09 06 132 2921
2 leading contacts (positions b 2 + b 32)	46 + 2			09 06 148 6925	09 06 148 2925

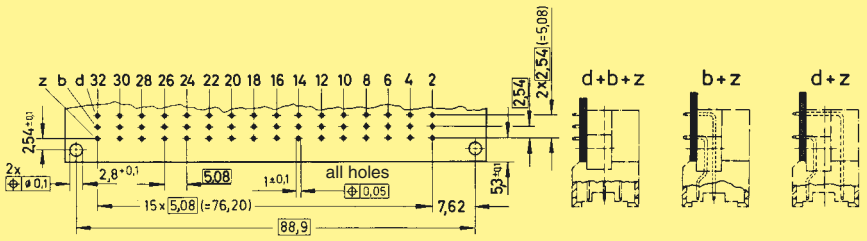
Dimensions



Angled solder pins

Board drillings

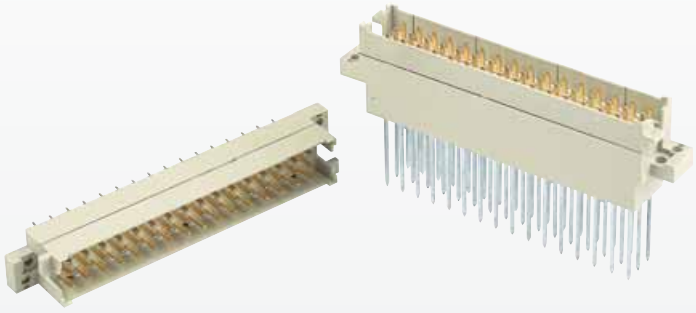
Mounting side



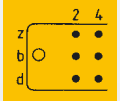
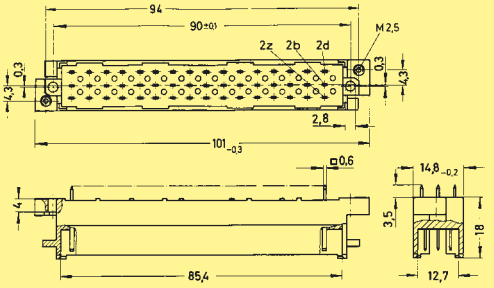
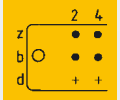
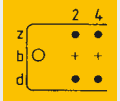
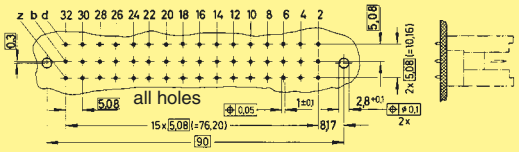
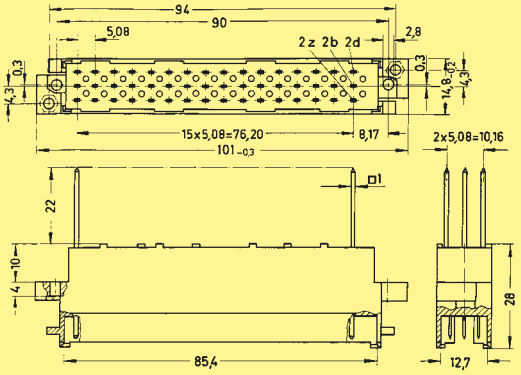
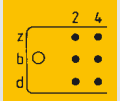
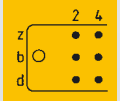
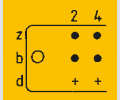
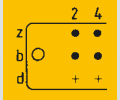
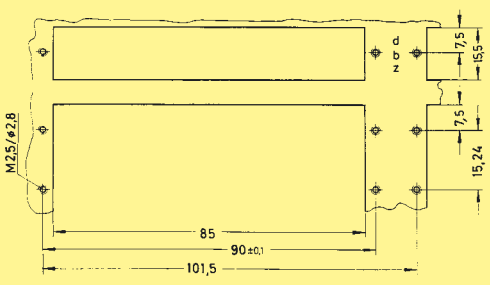
Dimensions in mm

Number of contacts

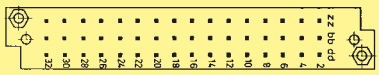
48, 32



Interface connectors I

Identification	Number of contacts	Contact arrangement	Part No.	Drawing	Dimensions in mm
Interface connector I with solder pins 0.6 x 0.6 mm			Performance level 1*		
	48		09 06 048 2905		
	32		09 06 032 2905		
	32		09 06 032 2941		
Board drillings Mounting side					
Interface connector I with wrap posts 1 x 1 mm			Performance level 1*		
without nut	48		09 06 048 2903		
with nut	32		09 06 032 2963		
without nut	32		09 06 032 2903		
with nut	32		09 06 032 2963		
Panel cut out					

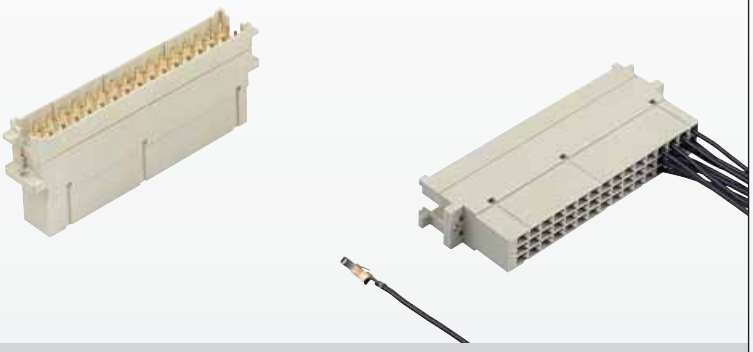
Contact arrangement View from termination side



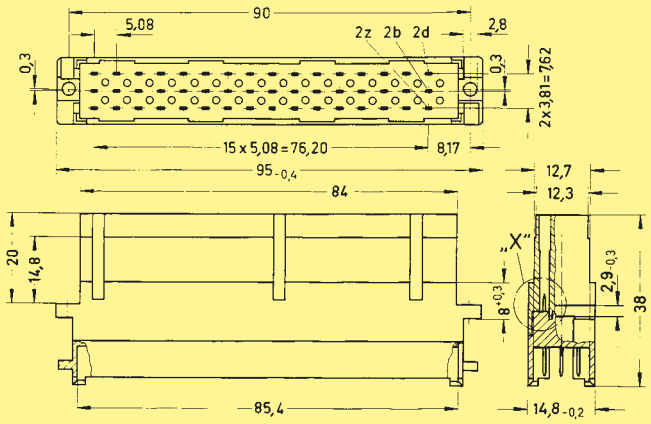
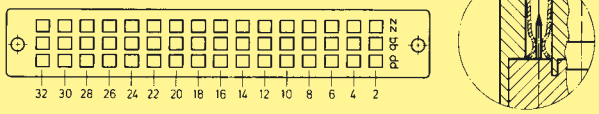
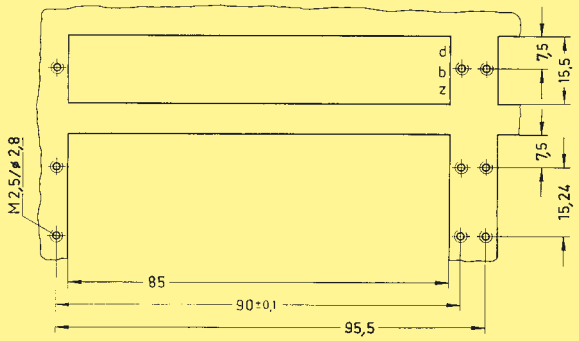
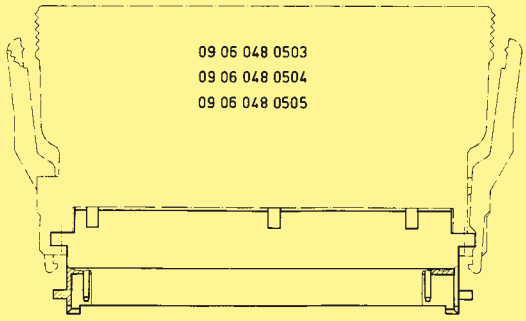
* Performance level 2 on request

Number of contacts

48

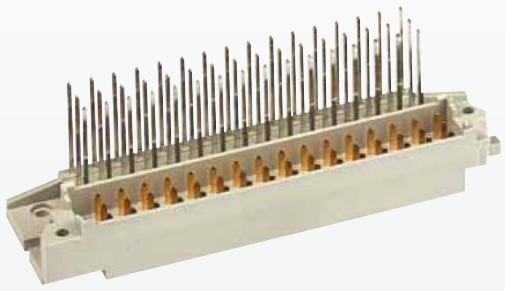


Interface connector I

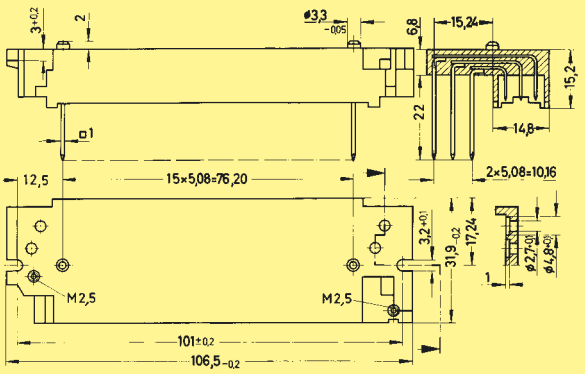
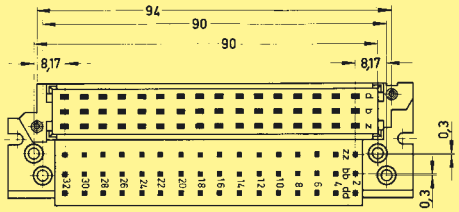
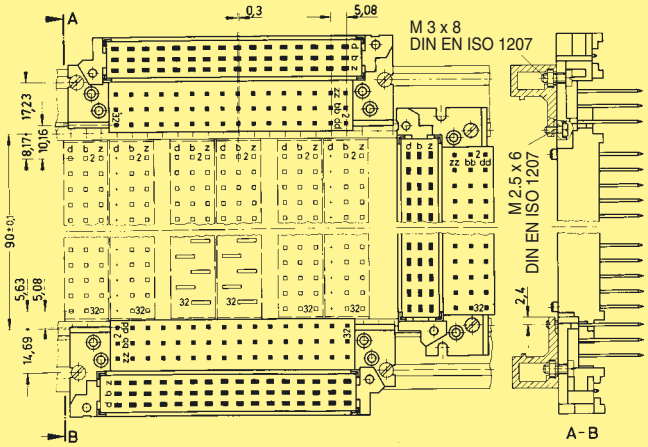
Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Interface connector I utilising female crimp contacts Order crimp contacts separately see page 02.25	48	Performance level 1 09 06 048 2906	 Contact arrangement View from termination side  Shell housing see chapter 20	
Panel cut out				
Mounted in shell housing B			 09 06 048 0503 09 06 048 0504 09 06 048 0505	

Number of contacts

48



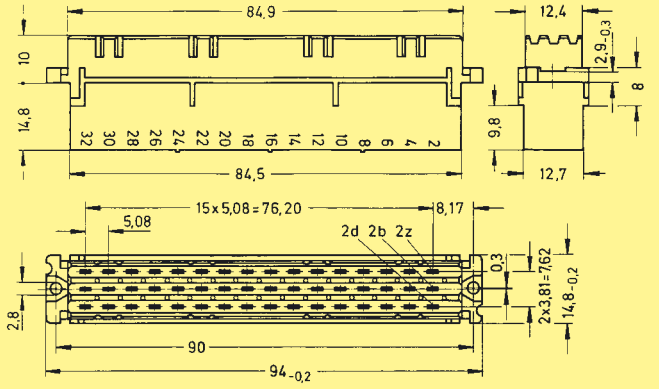
Interface connector U

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Interface connector U with wrap posts 1 x 1 mm	48	Performance level 1 09 06 048 2981		
			Contact arrangement View from termination side 	
Mounting example				

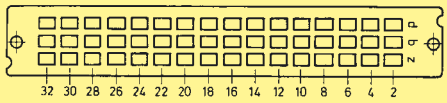
Number of contacts

max. 48

Female connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately	48	09 06 248 3201		

Contact arrangement View from termination side

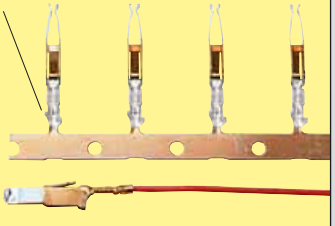


Shell housing see chapter 20

Identification	Identification Wire gauge	Part No. Performance levels according to DIN 41 612. Explanation chapter 00 2	 1
Female crimp FC contacts			
Bandoliered contacts (approx. 2 ,500 pieces)	1	09 06 000 6484	09 06 000 6474
	2	09 06 000 6481	09 06 000 6471
	3	09 06 000 6482	09 06 000 6472
Bandoliered contacts (approx. 250 pieces)	1	09 06 000 7484	09 06 000 7474
	2	09 06 000 7481	09 06 000 7471
	3	09 06 000 7482	09 06 000 7472
Individual contacts (1,000 pieces)	1	09 06 000 8484	09 06 000 8474
	2	09 06 000 8481	09 06 000 8471
	3	09 06 000 8482	09 06 000 8472

		Wire gauge mm²	AWG	Insulation ø mm
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5
FC 2	2	0.14 - 0.56	26 - 20	0.8 - 2.0
FC 3	3	0.5 - 1.5	20 - 16	1.6 - 2.8

Identification



Bandoliered contacts

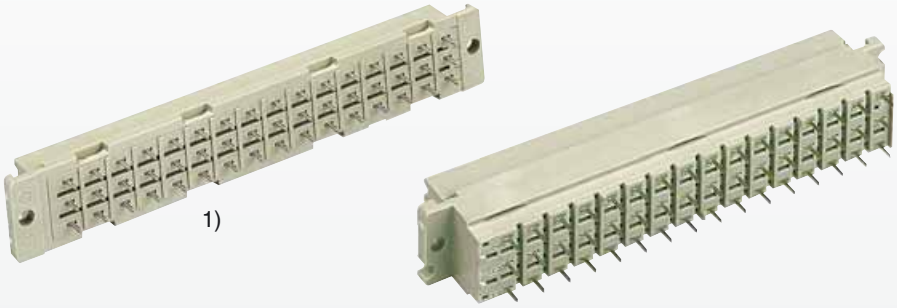
Individual contacts

3.5 + 0.5 mm of insulation is stripped from the wires to be crimped

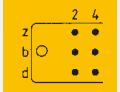
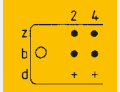
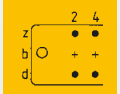
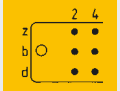
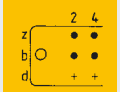
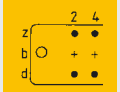
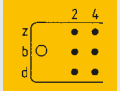
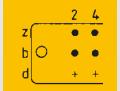
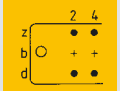
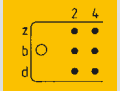
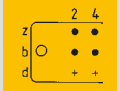
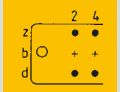
Insertion, removal and crimping tools see chapter 30

Number of contacts

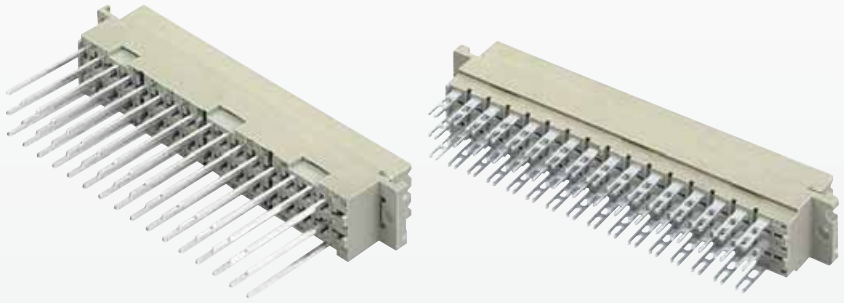
48, 32



Female connectors

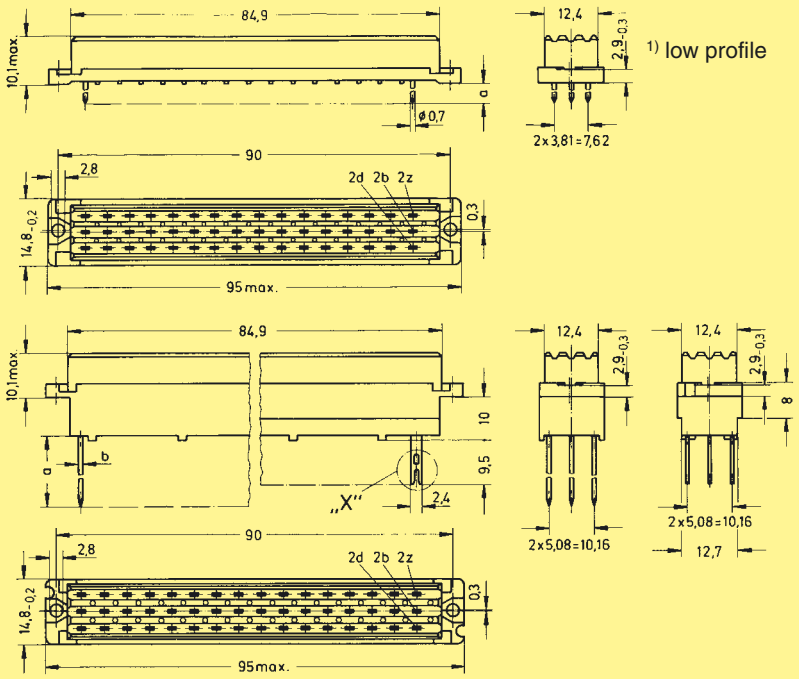
Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00	
			3	2	1
Female connector with solder pins 3.2 mm	48		09 06 248 7848 09 06 248 7833[1)]	09 06 248 6848 09 06 248 6833[1)]	09 06 248 2848 09 06 248 2833[1)]
	32		09 06 232 7848 09 06 232 7833[1)]	09 06 232 6848 09 06 232 6833[1)]	09 06 232 2848 09 06 232 2833[1)]
	32		09 06 232 7858 09 06 232 7893[1)]	09 06 232 6858 09 06 232 6893[1)]	09 06 232 2858 09 06 232 2893[1)]
Female connector with solder pins 4.5 mm	48		09 06 248 7835 09 06 248 7834[1)]	09 06 248 6835 09 06 248 6834[1)]	09 06 248 2835 09 06 248 2834[1)]
	32		09 06 232 7835 09 06 232 7834[1)]	09 06 232 6835 09 06 232 6834[1)]	09 06 232 2835 09 06 232 2834[1)]
	32		09 06 232 7845 09 06 232 7894[1)]	09 06 232 6845 09 06 232 6894[1)]	09 06 232 2845 09 06 232 2894[1)]
Female connector with wrap posts 22 mm	48		09 06 248 7821	09 06 248 6821	09 06 248 2821
	32		09 06 232 7821	09 06 232 6821	09 06 232 2821
	32		09 06 232 7831	09 06 232 6831	09 06 232 2831
Female connector with solder lugs open solder lug 	48		09 06 248 7823	09 06 248 6823	09 06 248 2823
	32		09 06 232 7823	09 06 232 6823	09 06 232 2823
	32		09 06 232 7843	09 06 232 6843	09 06 232 2843
Female connector with press-in pins	Part Nos. and variants see chapter 04				

[1)] Low profile female connectors



Identification	Drawing	Dimensions in mm

Female connectors type F DIN 41 612



a
3.2
4.5

Solder pins

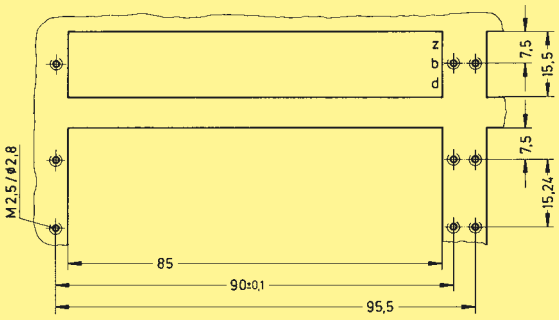
a	b
3.2	□0.6
4.5	

Solder pins

a	b
22	□1

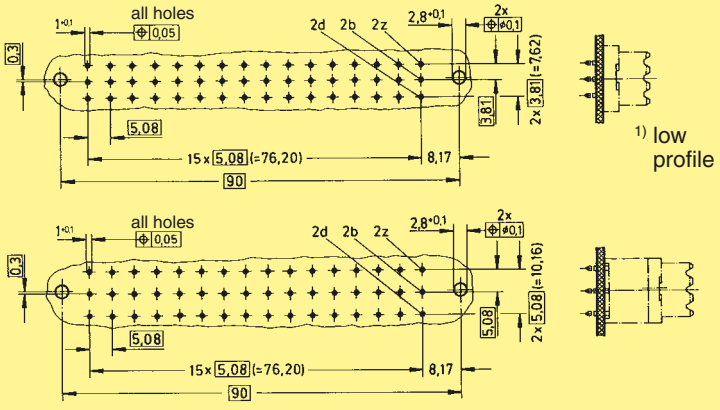
Wrap posts

Panel cut out



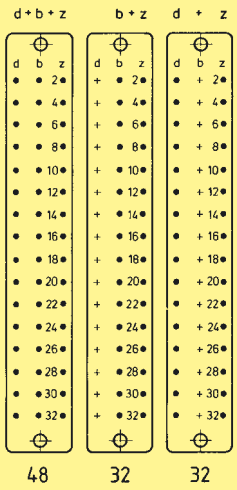
Board drillings

Mounting side



Contact arrangement

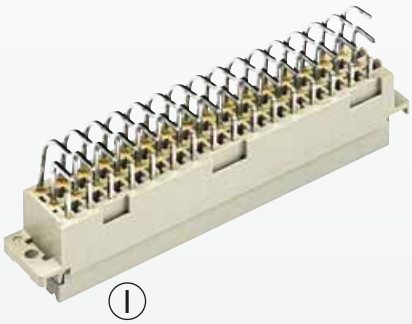
View from termination side



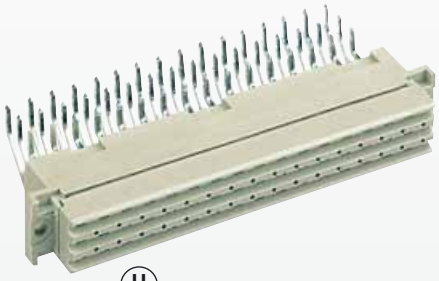
Identification strips see chapter 40

Number of contacts

48, 32

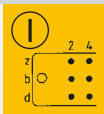
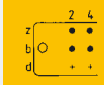
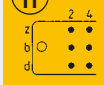
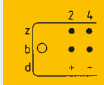
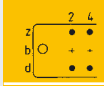
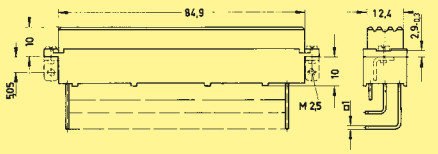
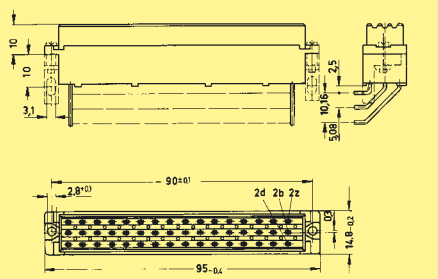
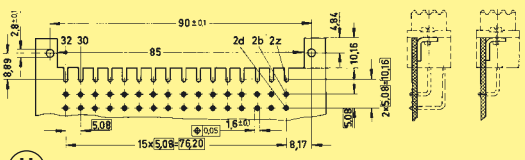
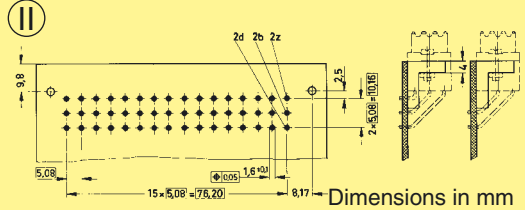


Ⅰ



Ⅱ

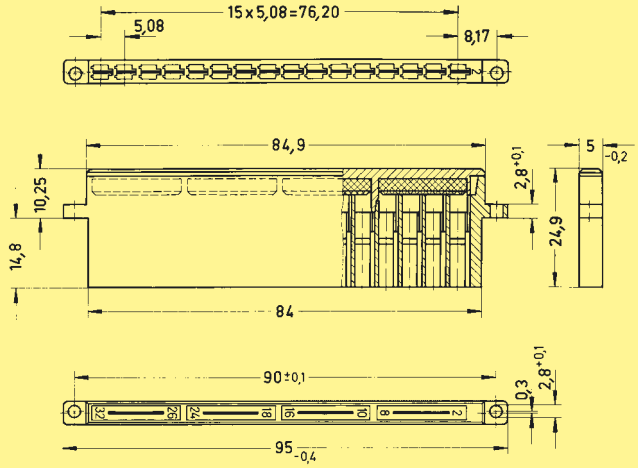
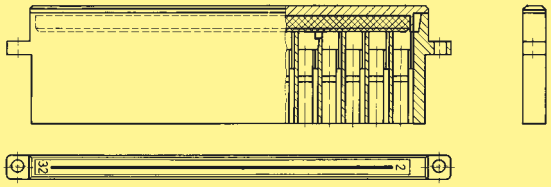
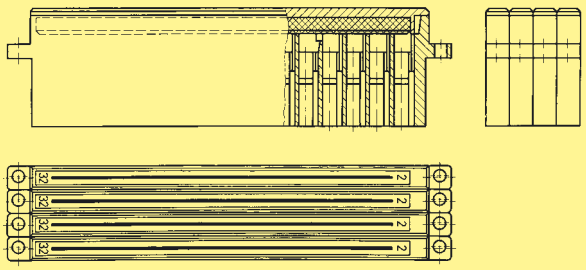
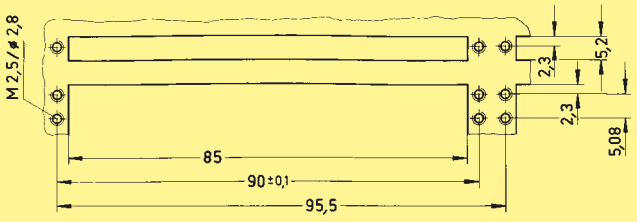
Female connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with angled solder pins 1 x 1 mm	48	Ⅰ 	09 06 248 7826	09 06 248 6826	
	32		09 06 232 7826	09 06 232 6826	
	48	Ⅱ 	09 06 248 7836	09 06 248 6836	
	32		09 06 232 7846	09 06 232 6846	
	32		09 06 232 7836	09 06 232 6836	
Dimensions				Ⅰ  Ⅱ 	
Fixing bracket		Metal	09 06 000 9912[1]	for version Ⅰ	
[1] Order 2 pieces for one connector		Plastic	09 06 000 9975[1]	for version Ⅱ	
Board drillings Mounting side				Ⅰ  Ⅱ  Dimensions in mm	

Number of contacts

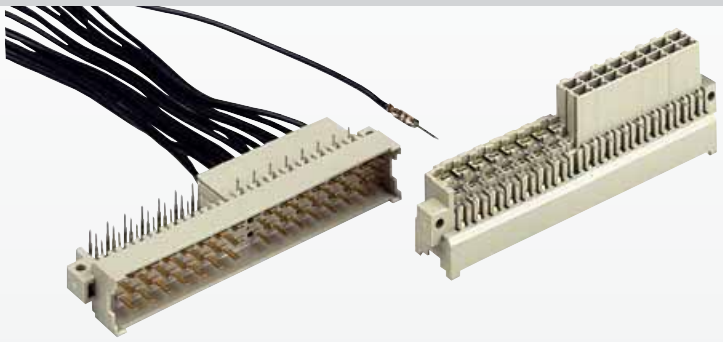
16, 64

Universal adaptors

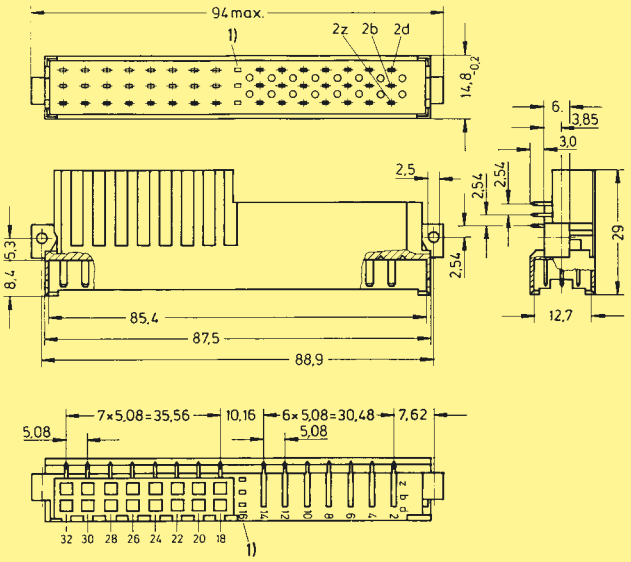
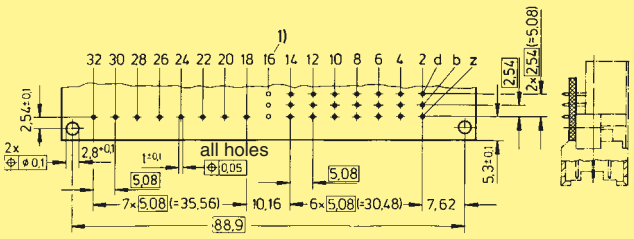
Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Universal adaptor utilising crimp contacts crimp contacts see page 02.25	4 x 4	09 06 016 3301		
	16 x 1	09 06 016 3302		
	16 x 4	09 06 064 3302		
Panel cut out				

Number of contacts

45



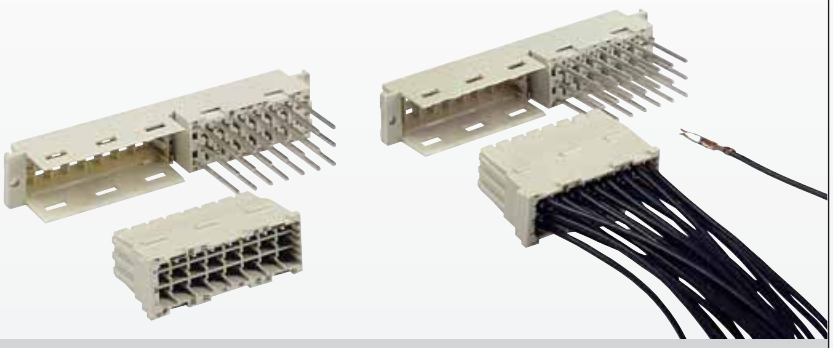
Male connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Male connector 29 angled solder pins 16 cavities for male crimp contacts crimp contacts see page 02.32	45	Performance level 1 09 06 145 2971		
Board drillings Mounting side				

1) A special 48 way version with 3 extra angled solder contacts at position 16 (rows d, b, z) can be supplied

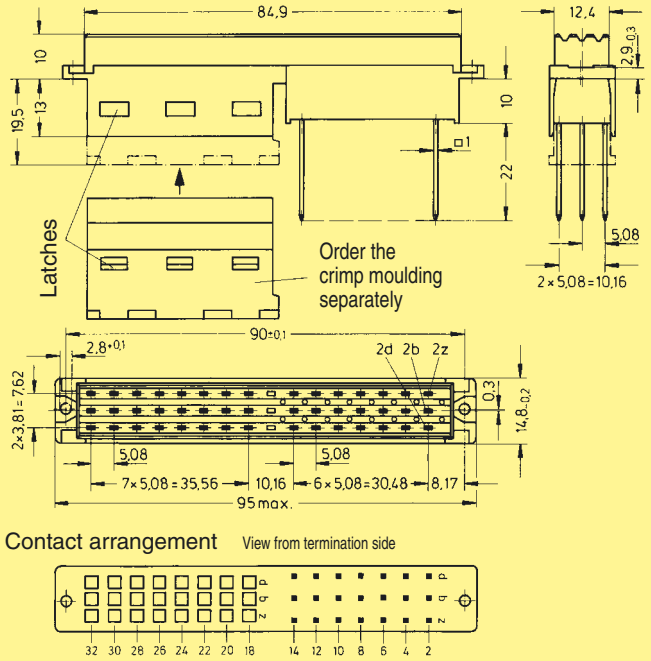
Number of contacts

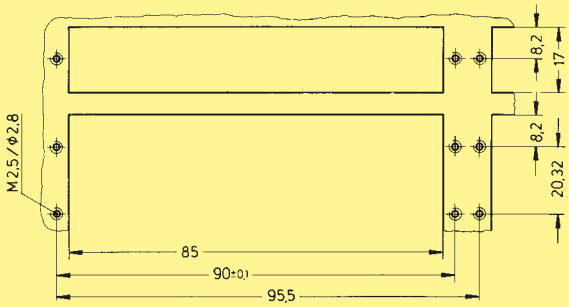
45

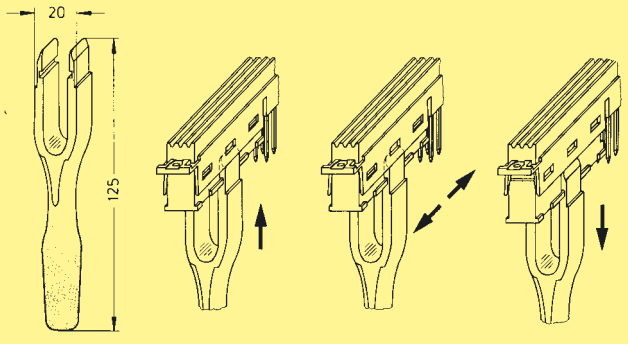


Female connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector		Performance level 1		
Female moulding with 21 wrap posts	45	09 06 045 2872		
Crimp moulding for 24 female crimp contacts		09 06 024 3202		
crimp contacts see page 02.25				
Panel cut out				
Removal tool for the crimp moulding		09 99 000 0172		



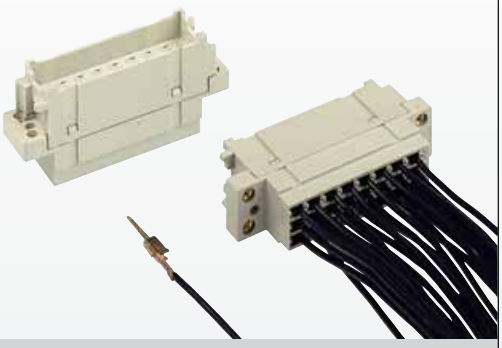




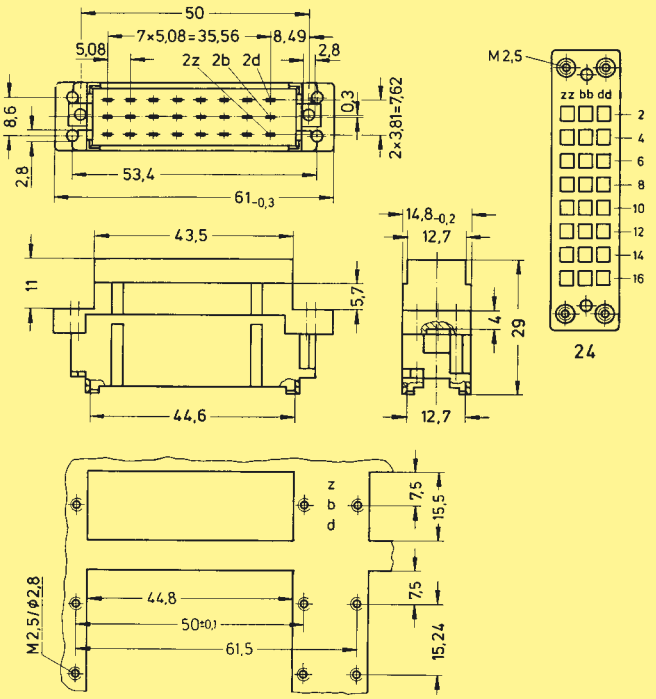
The crimp moulding can be extracted with the help of the removal tool.

Number of contacts

max. 24



Interface connector I

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Interface connector I for male crimp contacts Order contacts separately	24	09 26 024 3411		

Identification	Identification Wire gauge	Part No. Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Male crimp FC contacts			
Bandoliered contacts (approx. 2 ,500 pieces)	1	09 06 000 9564	09 06 000 9544
	2	09 06 000 9561	09 06 000 9541
	3	09 06 000 9562	09 06 000 9542
Individual contacts (1,000 pieces)	1	09 06 000 9574	09 06 000 9554
	2	09 06 000 9571	09 06 000 9551
	3	09 06 000 9572	09 06 000 9552

		Wire gauge mm²	AWG	Insulation ø mm
FC 1	1	0.09 - 0.25	28 - 24	0.7 - 1.5
FC 2	2	0.14 - 0.56	26 - 20	0.8 - 2.0
FC 3	3	0.5 - 1.5	20 - 16	1.6 - 2.8

Identification

Bandoliered contacts

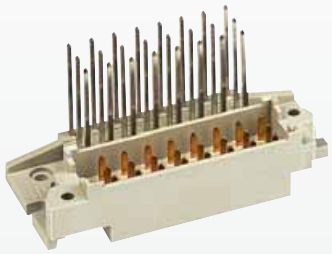
Individual contacts

3.5 + 0.5 mm of insulation is stripped from the wires to be crimped

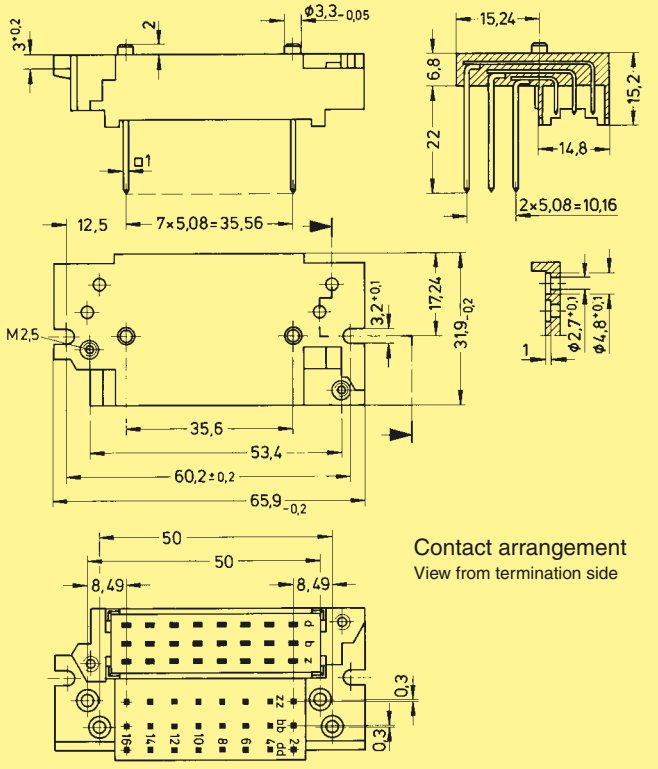
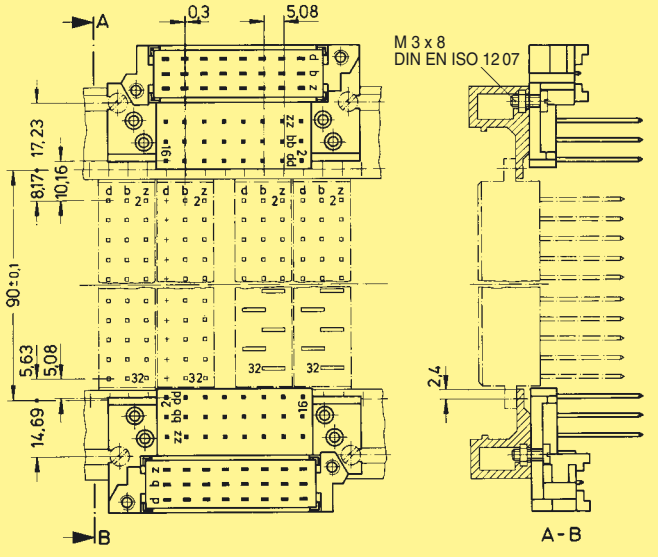
Insertion, removal and crimping tools see chapter 30

Number of contacts

max. 24



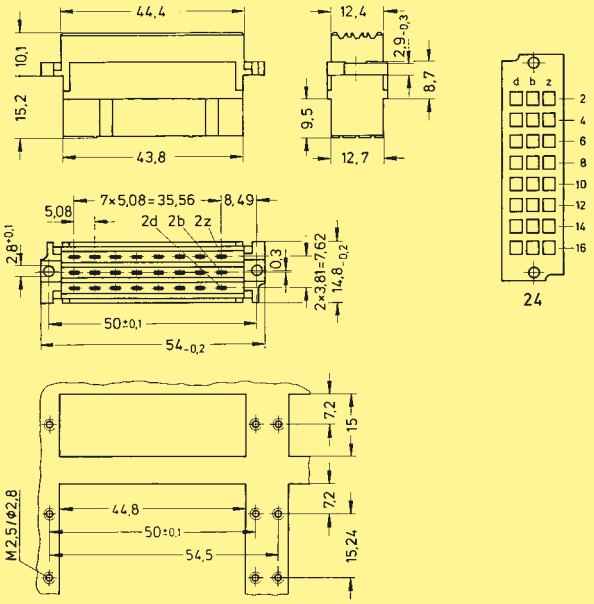
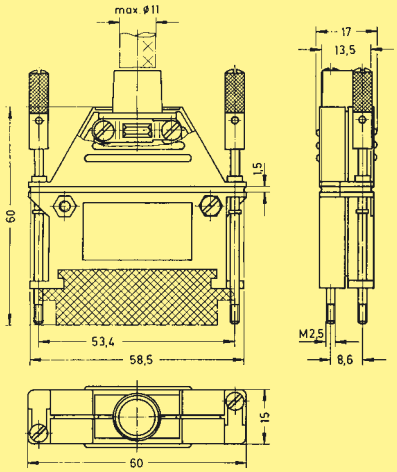
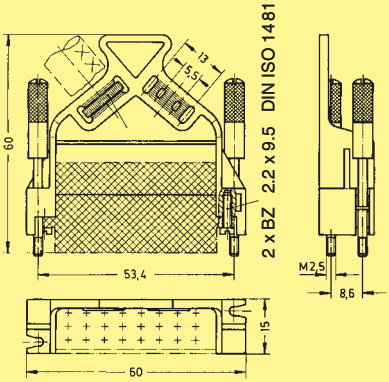
Interface connector U

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Interface connector U with wrap posts 1 x 1 mm	24	Performance level 1 09 26 024 2981		
Mounting example				

Number of contacts

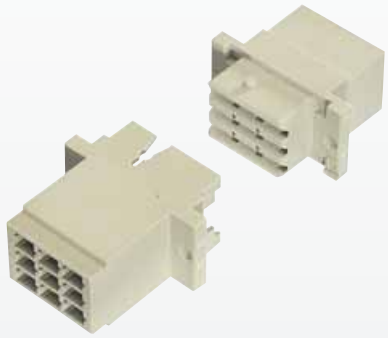
max. 24

Female connectors

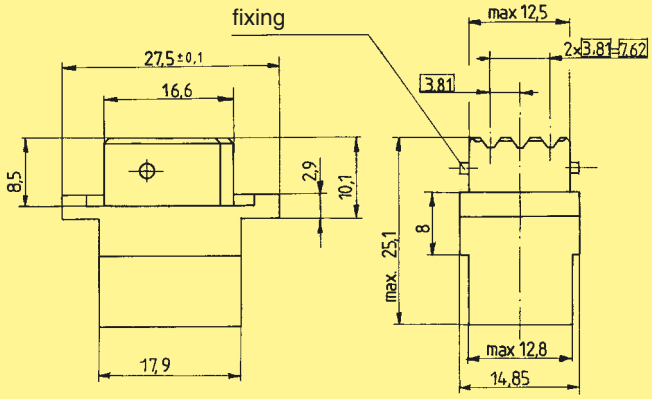
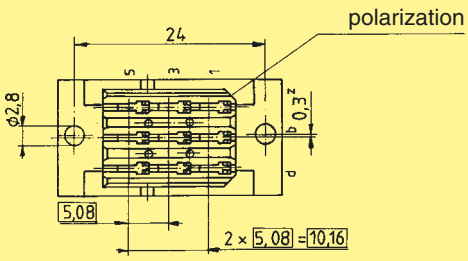
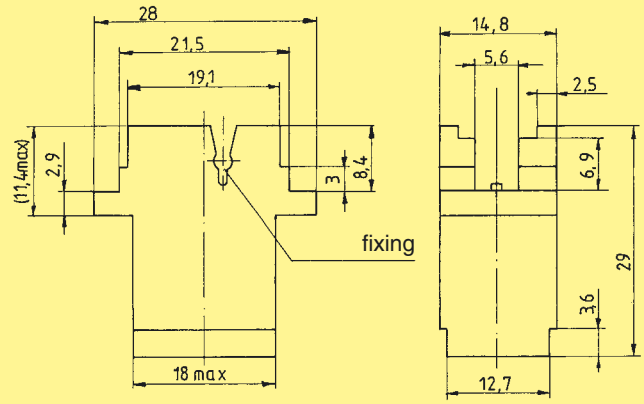
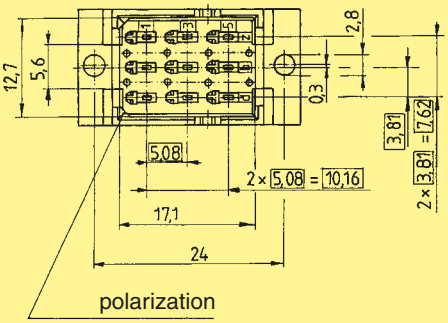
Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately see page 02.25	24	09 26 024 3201		
Shell housing A with integrated fixing screws		09 26 024 0401		
Open hood		09 26 000 9901		

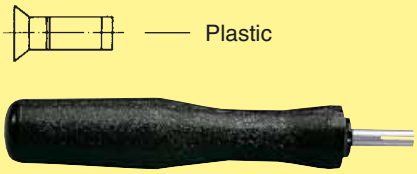
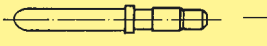
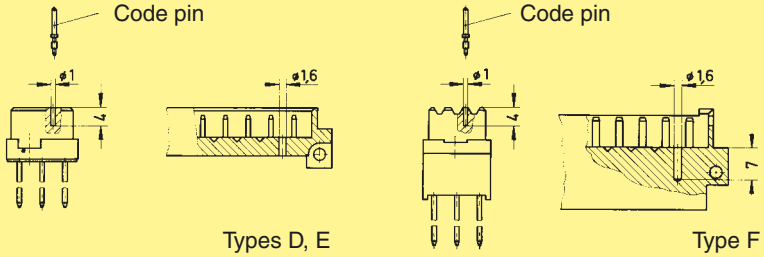
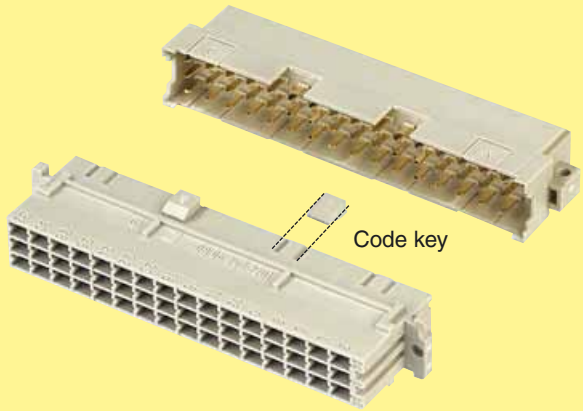
Number of contacts

max. 9

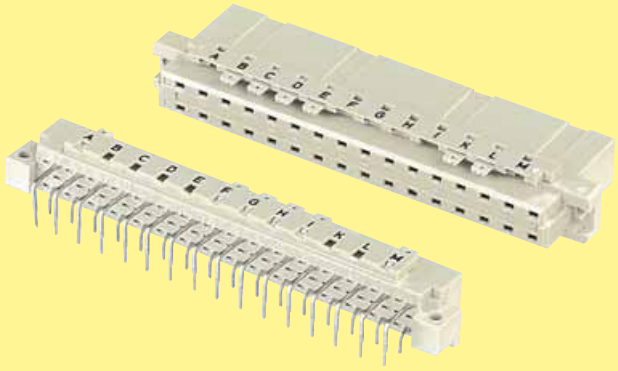


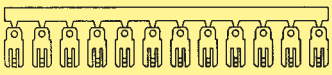
Female and male connectors

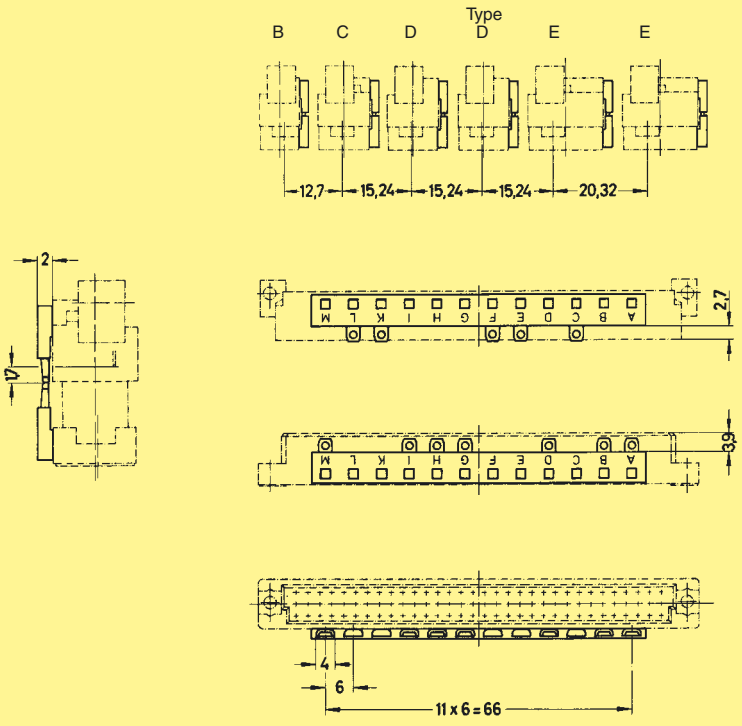
Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector for crimp contacts Order contacts separately	9	09 06 209 3201		
Female crimp contacts		see page 02.25		
Male connector for crimp contacts Order contacts separately	9	09 06 109 3401		
Male crimp contacts		see page 02.32		

Identification	Part No.	Drawing	Dimensions in mm
Coding system with contact loss	Code pin Type D, E Type F Type FM Type 2F 09 04 000 9908 Removal tool for male contacts 09 99 000 0038	To avoid accidental and incorrect mating of adjacent connectors a coding system is required. The coding is achieved by means of a code pin which is inserted into the selected chamber of the female connector (the contact cavity must be filled with a female contact!). The opposite male contact must be removed with the help of the specially designed tool.  Plastic	
Coding system without contact loss		With the aid of the marked indents between the contact rows of the male connector a hole has to be drilled at the desired position (also see drawing). The code pin can then be inserted into the corresponding cavity of the female connector by means of the insertion tool. This coding system is available only for the types D, E, F and interface connectors I	
with code pin	Code pin 09 06 000 9950 Insertion tool 09 99 000 0103	 Metal  Mounting example  Types D, E Type F	
shroud coding Type F	Code key 09 06 001 9919	Insert the code key into one of the keyways of the female connector as shown in the drawing. Break out the corresponding area of the male shroud. Connectors coded this way can only be applied in a minimum rack spacing of 20.32 mm.  	
Tool for breaking out the coding area of the male shroud	09 99 000 0242		

Identification	Part No.	Drawing	Dimensions in mm
Coding system <u>without</u> contact loss	Male and female connectors Type B, C, D and E on request	To avoid accidental and incorrect mating of adjacent connectors a coding system is required.This coding system is an integral part of both male and female connactors. A comb with 12 coding pins, which is supplied under a single part number, allows over 900 coding variations. The pins are to be locked into the male and female connectors. The connectors with the integrated coding facility are supplied for types B, C, D and E according to DIN 41 612 and are available for all variants. Please contact us.	
Coding pins	12 pins on a comb 09 02 000 9928		
Mounting example			







Types H, MH

Number of contacts	15 14 + 1 leading contact (position z 32) 13 + 2 leading contacts (position z 4 und z 32) 3
Working current	15 A max.
see current carrying capacity chart	
Clearance	≥ 4.5 mm*
Creepage	≥ 8.0 mm*
Working voltage	
The working voltage also depends on the clearance and creepage dimensions of the pcb itself and the associated wiring	according to the safety regulations of the equipment Explanations see chapter 00 Connectors should not be mated under voltage
Test voltage $U_{r.m.s.}$	3.1 kV*
Contact resistance	≤ 8 mΩ
Insulation resistance	≥ 10^{12} Ω
Temperature range	– 55 °C … + 125 °C
The higher temperature limit includes the local ambient and heating effects of the contacts under load	

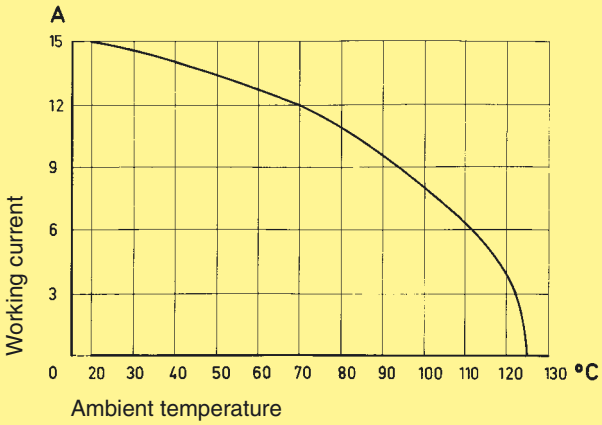
Electrical termination	
Male connector	Connector with faston 6.3 x 2.5 (faston blade width x wire gauge) according to DIN 46 245 and DIN 46 247 Solder pins for pcb connections Ø 1.6 ± 0.1 mm DIN EN 60 097
Female connector	Connector for faston 6.3 x 2.5 (faston blade width x wire gauge) according to DIN 46 245 and DIN 46 247 Solder pins for pcb connections Ø 1.6 ± 0.1 mm DIN EN 60 097 Cage clamp terminal 0.14-1.5 mm²
Insertion and withdrawal force	≤ 90 N
Materials	
Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy
Contact surface	Hard silver plated, gold plated on request terminal ends of female connectors tinned

Mating conditions see chapter 00
Coding systems see page 03.26

Current carrying capacity

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512

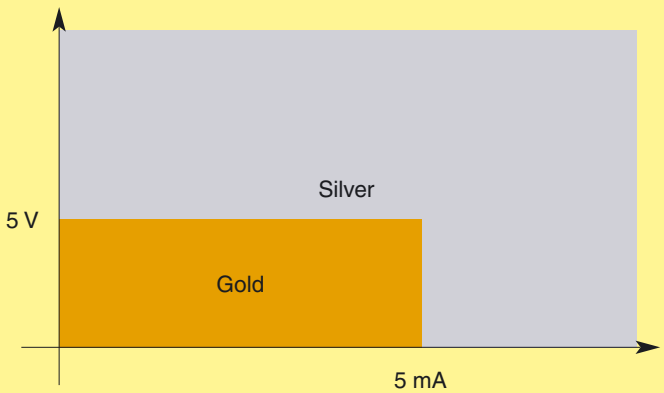


Low currents and voltages

Type H standard contacts have a silver plated surface. This precious metal has excellent conductive properties. In the course of a contact's lifetime, the silver surface generates a black oxide layer due to its affinity to sulphur. This layer is smooth and very thin and is partly interrupted when the contacts are mated and unmated, thus guaranteeing very low contact resistances. In the case of very low currents or voltages small changes to the transmitted signal may be encountered. This is illustrated below where an artifically aged contact representing a twenty year life is compared with a new contact.

In systems where such a change to the transmitted signal could lead to faulty functions and also in extremely aggressive environments, HARTING recommend the use of gold plated contacts.

Below is a table derived from actual experiences.



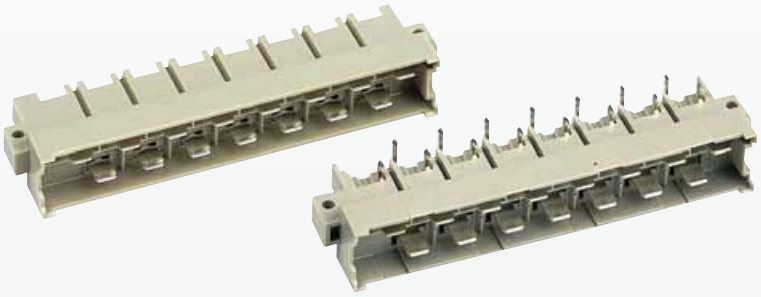
Recommendation

* only valid for type H with 15 contacts

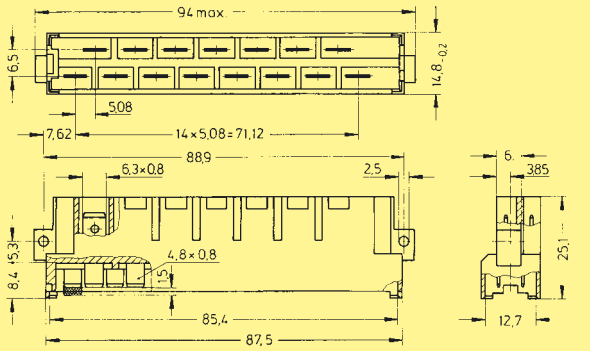
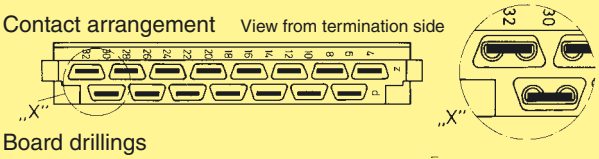
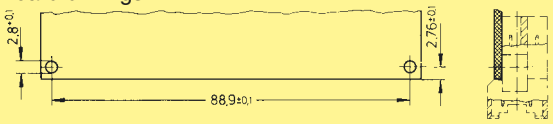
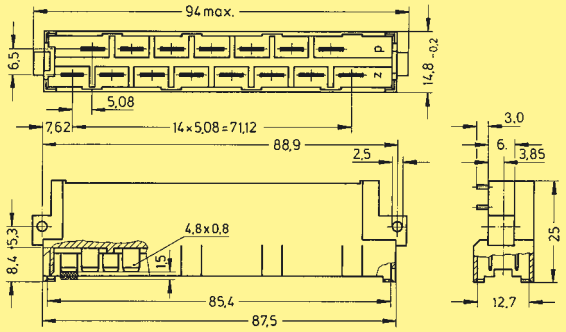
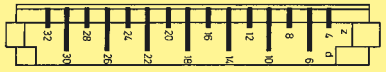
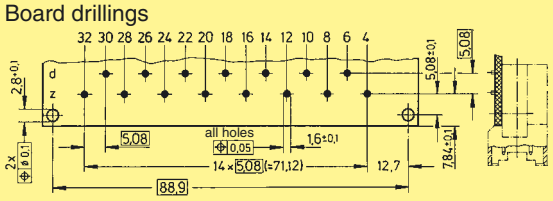
DIN 41 612 · Type H

Number of contacts

15



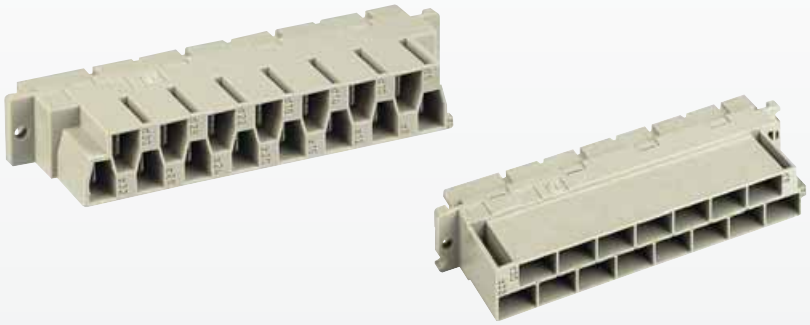
Male connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Male connector* for faston 6.3 x 2.5		Performance level 1		
	15	09 06 015 2912		
1 leading contact (position z 32)	14 + 1	09 06 015 2931	Contact arrangement View from termination side 	
2 leading contacts (position z 4 + z 32)	13 + 2	09 06 015 2922	Board drillings 	
Male connector* with angled solder pins		Performance level 1		
	15	09 06 115 2911		
1 leading contact (position z 32)	14 + 1	09 06 115 2932	Contact arrangement View from termination side 	
2 leading contacts (position z 4 + z 32)	13 + 2	09 06 115 2921	Board drillings 	
Male connector* with straight solder pins		Performance level 1		
	15	09 06 015 2913		
1 leading contact (position z 32)	14 + 1	09 06 015 2914		

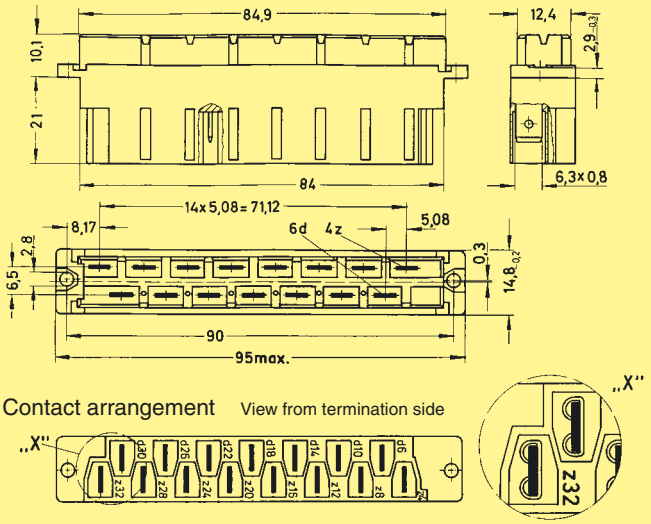
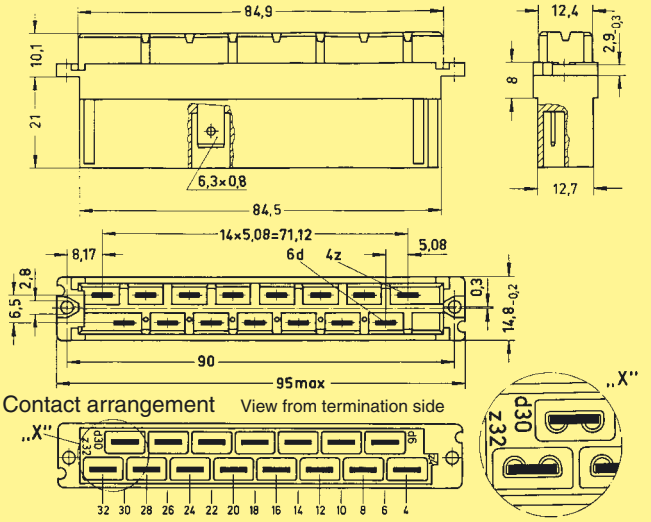
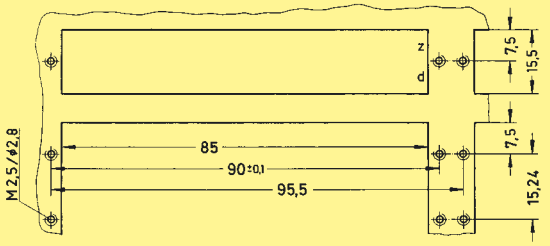
* Gold plated contacts on request

Number of contacts

15



Female connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector for faston 6.3 x 2.5 Cannot be used in a shell housing	15	Performance level 1 09 06 215 2811		
Female connector for faston 6.3 x 2.5 May be used in a shell housing	15	Performance level 1 09 06 215 2871	 Shell housing see chapter 20	
Panel cut out				

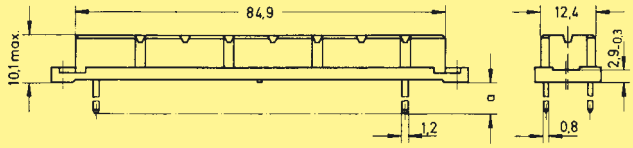
Types power to 15 A

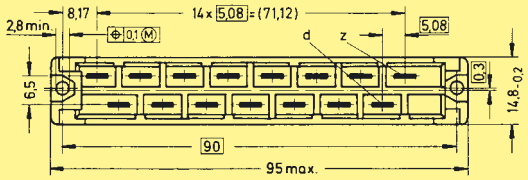
Number of contacts

15

Female connectors

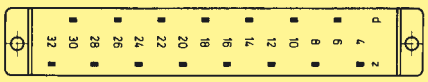
Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector* with solder pins "low profile"		Performance level 1		
2.7 mm	15	09 06 215 2812[1]		
4 mm	15	09 06 215 2821[1] 09 06 215 2892[2]		
5.5 mm	15	09 06 215 2890[2]		
7 mm	15	09 06 215 2831[1] 09 06 215 2891[2]		
10 mm	15	09 06 215 2841[1]		





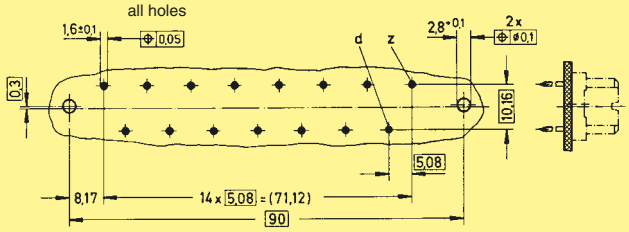
a
2.7
4
5.5
7
10

Contact arrangement View from termination side



Board drillings

Mounting side

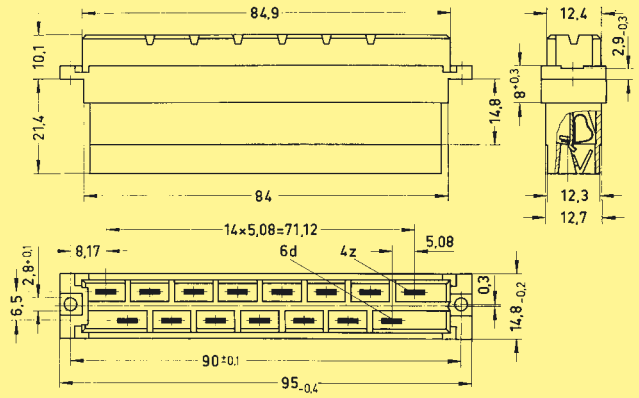
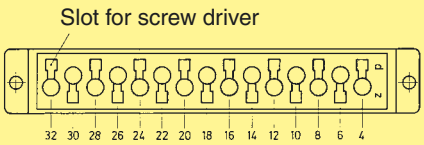
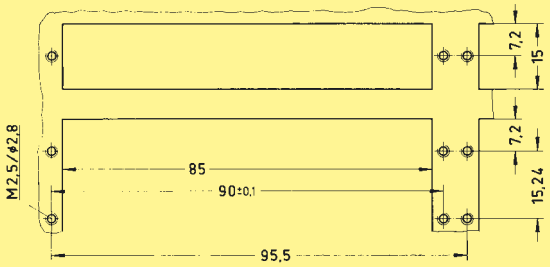
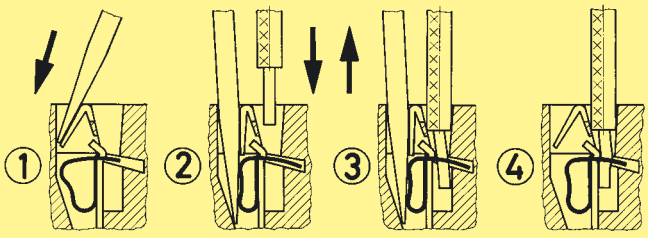


[1] Variant with silver plated contacts
[2] Variant with gold plated contacts

Number of contacts

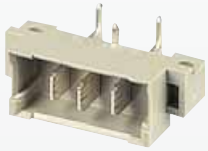
15

Female connectors

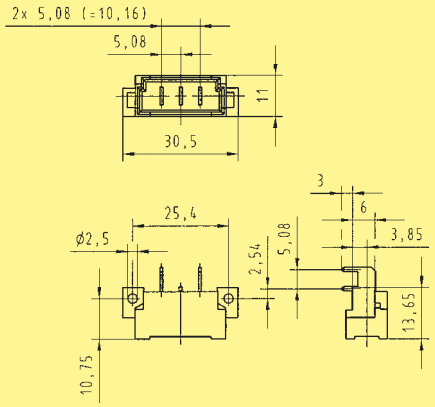
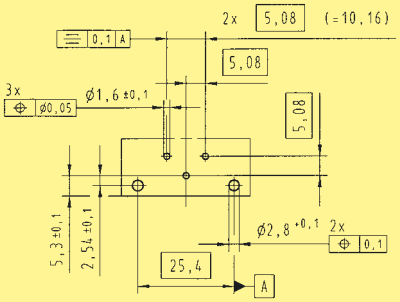
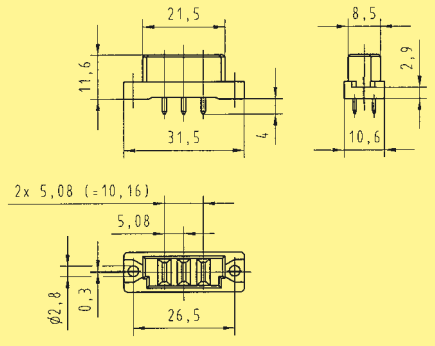
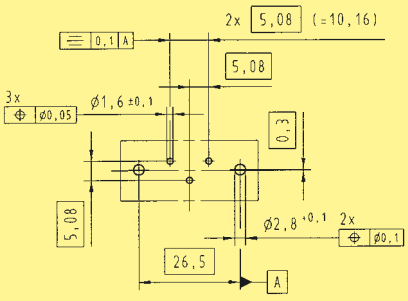
Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector with cage clamp May be used in a shell housing	15	Perfomance level 1 09 06 015 2813	 Contact arrangement View from termination side  Shell housing see chapter 20	
Panel cut out				
Termination instructions			 Screw driver width: 2.5 x 0.4 mm Stripping length: 4 - 7 mm Wire gauge: 0.14 - 1.5 mm² (AWG 26 - 16)	

Number of contacts

3



Male and female connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Male connector with angled solder pins and preleading middle contact	3	Performance level 1 09 06 203 2911	 Board drillings 	
Female connector with solder pins	3	Performance level 1 09 06 203 2811	 Board drillings 	

Types power to 15 A

ELECTRONIC SECTION	
Number of contacts	21, 24
Contact spacing (mm)	
Male connector	2.54 x 5.08
Female connector	5.08
Working current see current carrying capacity chart	6 A max.
Clearance	≥ 1.6 mm
Creepage	≥ 3 mm
Working voltage The working voltage also depends on the clearance and creepage dimensions on the pcb itself, and the associated wiring	according to the safety regulations of the equipment. Explanations see chapter 00
Test voltage $U_{r.m.s.}$	1.55 kV
Contact resistance	≤ 15 mΩ wrap, solder termination ≤ 20 mΩ including crimp connection
Electrical termination	
Male connector	Solder pins for pcb connection Ø 1 ± 0.1 mm acc. to IEC 60 326-3
Female connector	Wrap posts 1 x 1 mm diagonal 1.34-1.45 mm Solder pins for pcb connection Ø 1 ± 0.1 mm acc. to IEC 60 326-3 Crimp terminal 0.09-1.5 mm²
Contact surface	Contact zone: selectively plated according to performance level[1)] Termination zone: tinned
HEAVY DUTY SECTION*	
Number of contacts	7
Working current see current carrying capacity chart	15 A max.
Clearance	≥ 4.5 mm
Creepage	≥ 8.0 mm
Working voltage The working voltage also depends on the clearance and creepage dimensions on the pcb itself, and the associated wiring	according to the safety regulations of the equipment. Explanations see chapter 00
Test voltage $U_{r.m.s.}$	3.1 kV
Contact resistance	≤ 8 mΩ
Electrical termination	
Male and female connector	Connector for faston 6.3 x 2.5 (faston width x wire gauge) acc. to DIN 46 245 and DIN 46 247
Male connector	Solder pins for pcb connection Ø 1.6± 0.1 mm acc. to DIN EN 60 097
Contact surface	Hard silver plated terminal ends of the female connectors tinned
BOTH PARTS	
Insulation resistance	≥ 10^{12} Ω
Temperature range The higher temperature limit includes the local ambient and heating effects of the contacts under load	– 55 °C … + 125 °C
Insertion and withdrawal force	≤ 85 N
Materials	
Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy

* only for type MH 24 + 7

[1)] Explanation of performance levels see chapter 00

Mating conditions see chapter 00

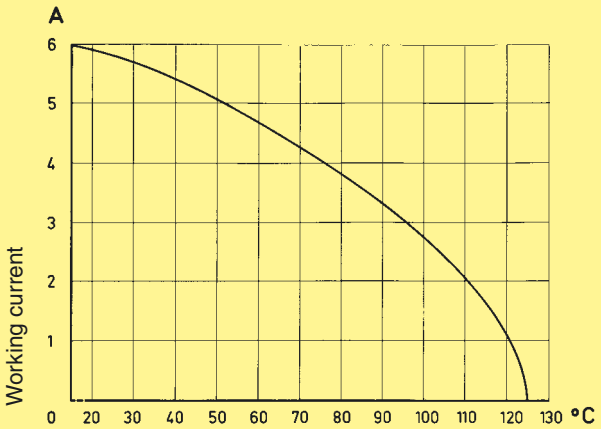
Coding systems see page 03.26

Current carrying capacity

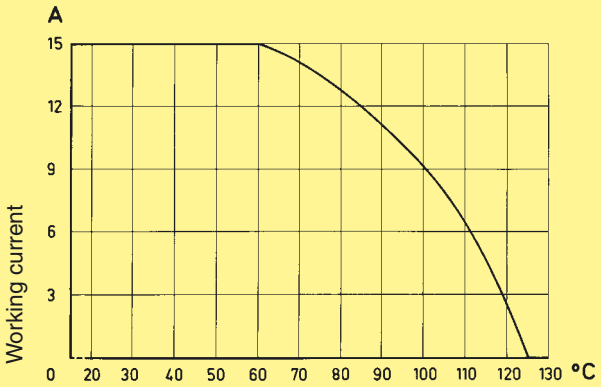
The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512

Electronic section



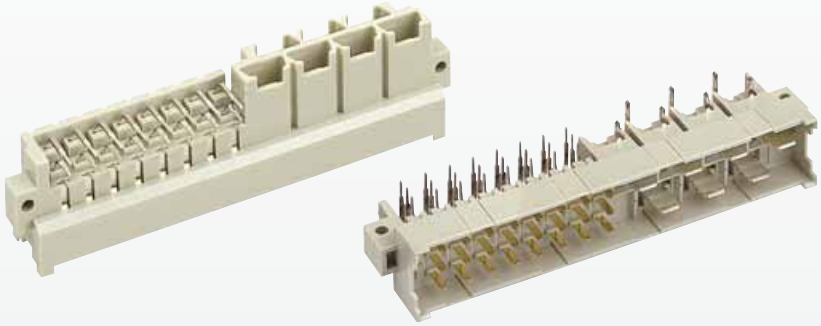
Heavy duty section



Number of contacts

24 + 7

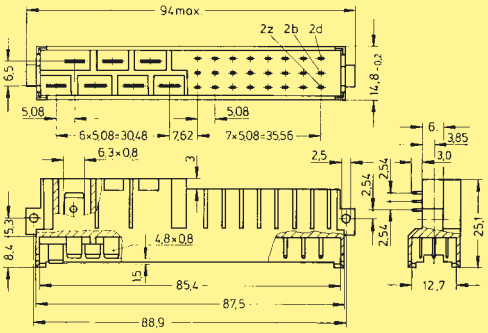
F + H



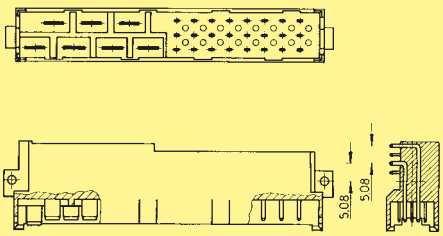
Male connectors

Identification	Number of contacts	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Male connector for faston 6.3 x 2.5				
1 leading contact (position z 32)	24 + 7		09 06 031 6921	09 06 031 2921
2 leading contacts (position z 2 + z 32)	24 + 7		09 06 031 6923	
Male connector with angled solder pins				
1 leading contact (position z 32)	24 + 7		09 06 131 6922	
2 leading contacts (position z 2 + z 32)	24 + 7		09 06 131 6924	

Faston terminal

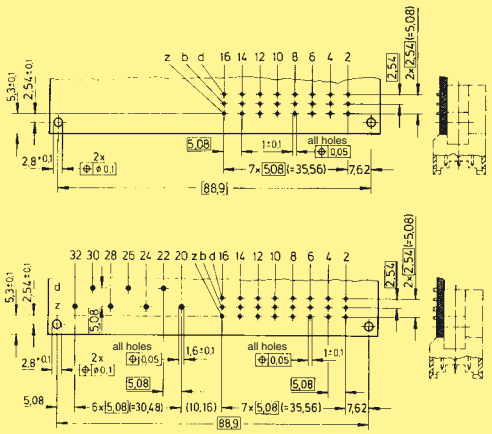


Angled solder pins



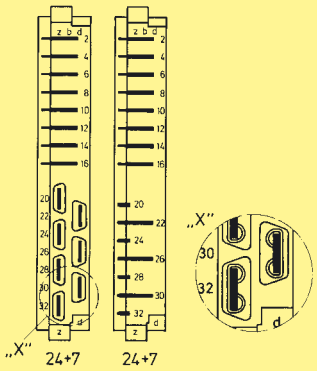
Board drillings

Mounting side



Contact arrangement

View from termination side



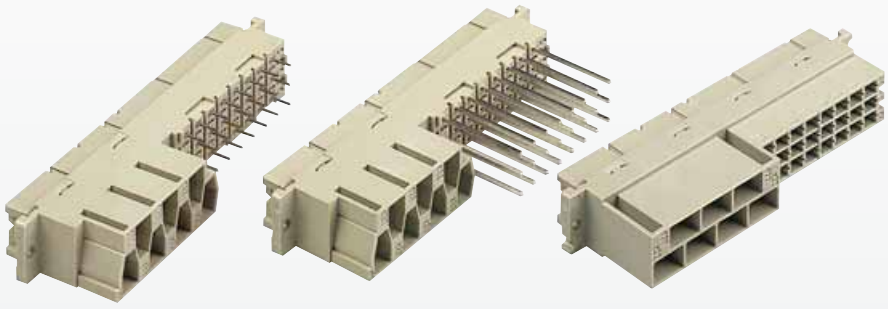
Dimensions in mm

Types power to 15 A

Number of contacts

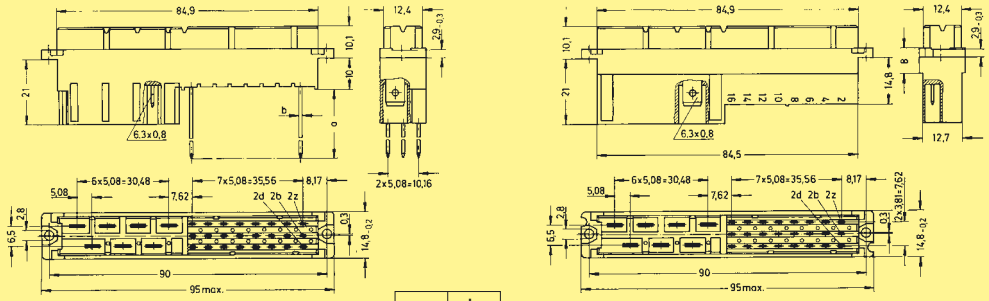
24 + 7

F + H



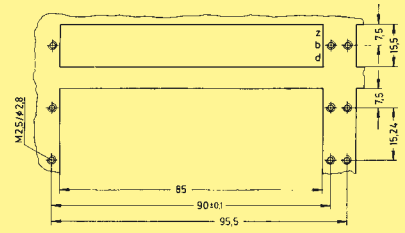
Female connectors

Identification	Number of contacts	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with solder pins 4.5 mm	24 + 7		09 06 231 6822	09 06 231 2822
Female connector with wrap posts 1 x 1 mm	24 + 7		09 06 231 6821	09 06 231 2821
Female connector for crimp contacts Order contacts separately, see chapter 02	24 + 7			09 06 231 2881



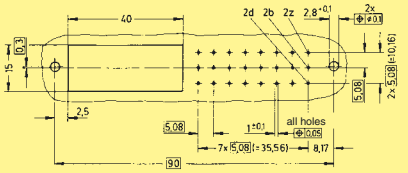
a	b
4.5	□0.6
22	□1

Panel cut out



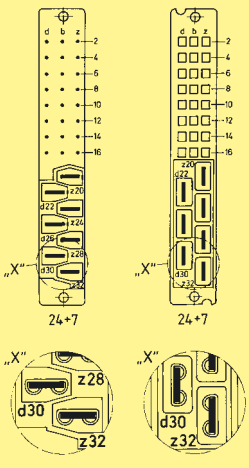
Board drillings

Mounting side



Contact arrangement

View from termination side



Shell housing for female connector with crimp contacts see chapter 20

Dimensions in mm

Number of contacts

21 + 5

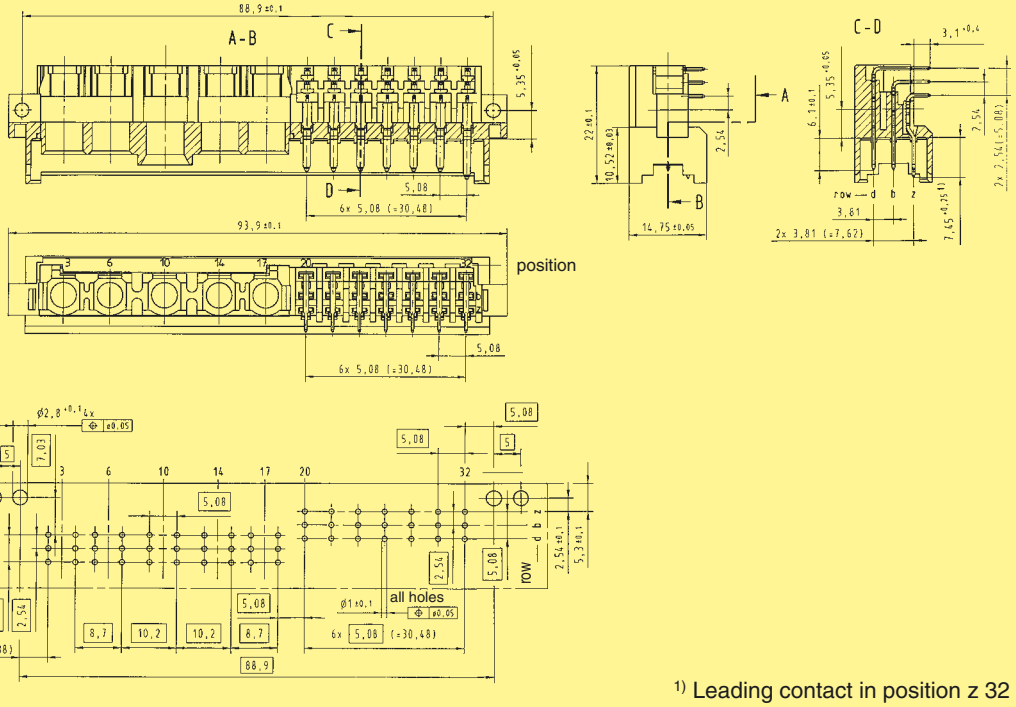
F + M

Male connectors

Identification	Number of contacts	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Male connector with angled solder pins (without special contacts)*	21 + 5	Performance level 3 on request	09 06 121 6981	Performance level 1 on request
High current contact for printed circuit terminations 40 A			09 03 000 6127	
leading contact 40 A			09 03 000 6128	
Removal jacket (to be used with removal tool 09 99 000 0174)			09 99 000 0320	

Types power to 15 A

Dimensions



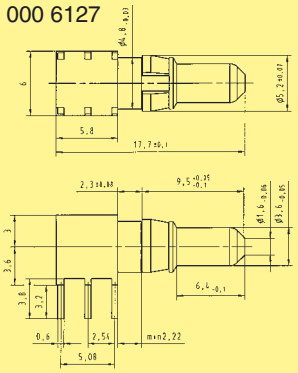
Board drillings

Mounting side

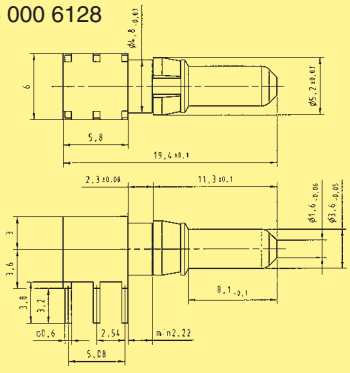
1) Leading contact in position z 32

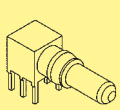
Dimensions

09 03 000 6127



09 03 000 6128





Dimensions in mm

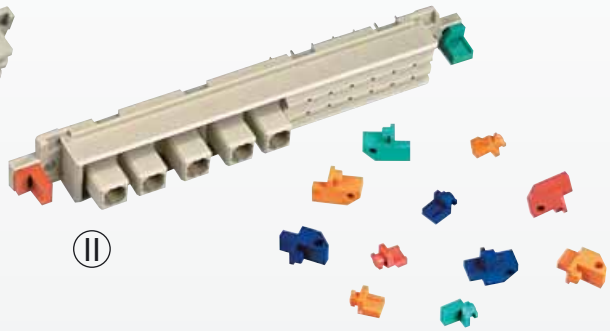
* Pre-loaded with special contacts on request
Code keys see page 03.26

Number of contacts

21 + 5

F + M

Ⅰ

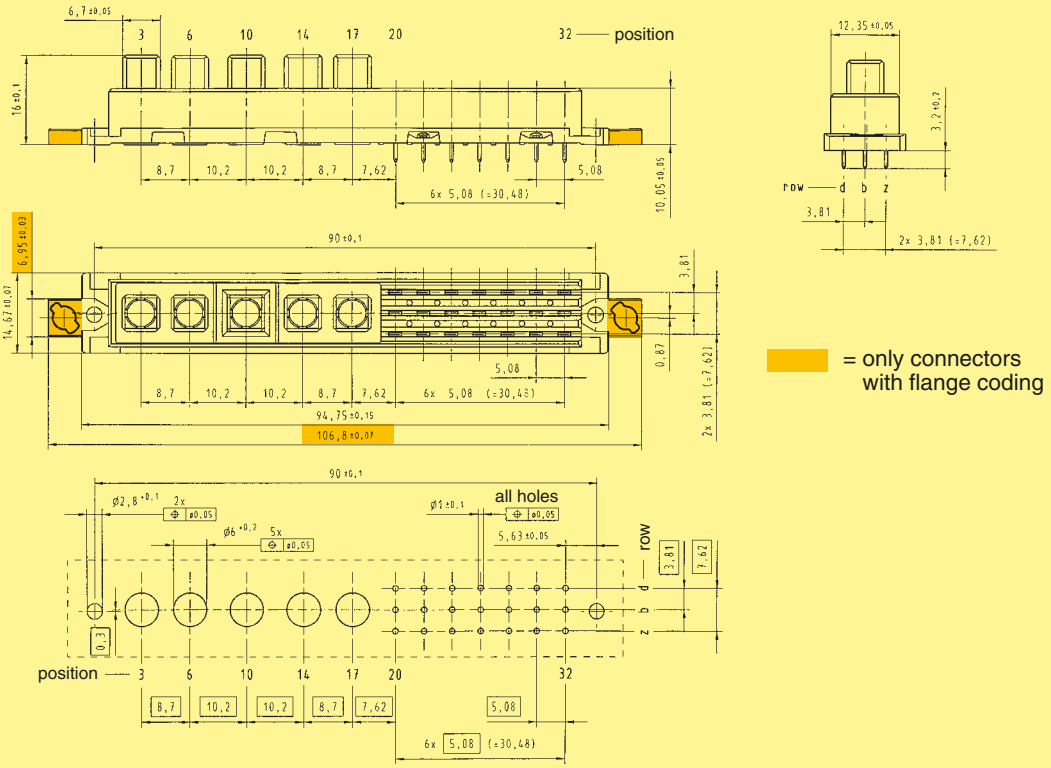


Ⅱ

Female connectors

Identification	Number of contacts	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with solder pins 3.2 mm (without special contacts)*				
without flange coding Ⅰ	21 + 5	Performance level 3 on request	09 06 221 6883	Performance level 1 on request
with flange coding[1] Ⅱ	21 + 5		09 06 721 6883	
High current contact Crimp contacts for printed circuit termination 20 A			09 03 000 6220	

Dimensions

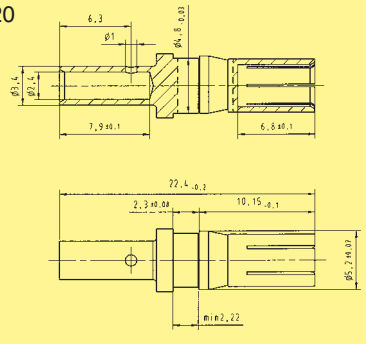


Board drillings

Mounting side

Dimensions

09 03 000 6220



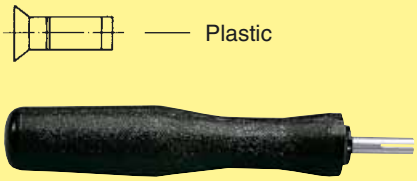
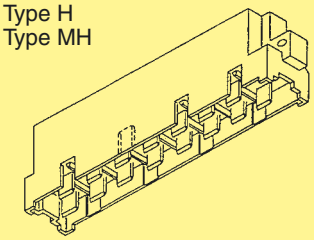
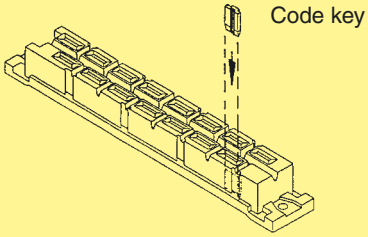
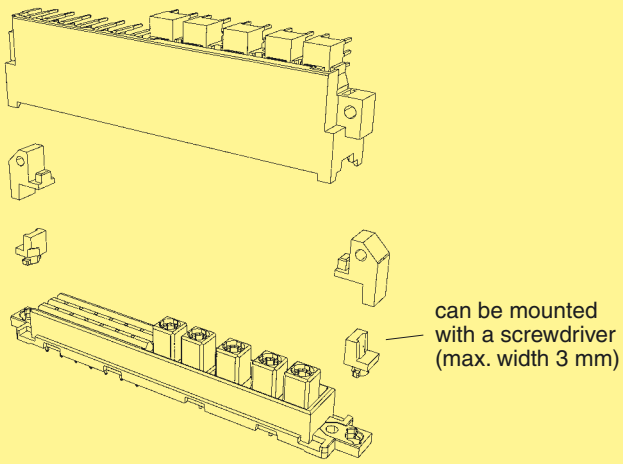
Dimensions in mm

Types power to 15 A

* Pre-loaded with special contacts on request

[1] Code keys see page 03.26

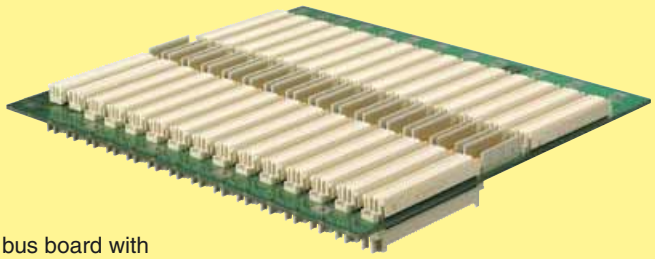
Removal tool for contacts is available with part number 09 99 000 0174

Identification	Part No.	Drawing	Dimensions in mm
Coding system with contact loss	Code pin Type MH 09 04 000 9908 Removal tool for male contacts 09 99 000 0038	To avoid accidental and incorrect mating of adjacent connectors a coding system is required. The coding is achieved by means of a code pin which is inserted into the selected chamber of the female connector (the contact cavity must be filled with a female contact!). The opposite male contact must be removed with the help of the specially designed tool. 	
Coding system without contact loss shroud coding Types H, MH 24 + 7	Code key 09 06 001 9918	Type H Type MH  Insert the code key into one of the keyways of the female connector as shown in the drawing. Break out the corresponding area of the male shroud. Connectors coded this way can only be applied in a minimum rack spacing of 20.32 mm. 	
flange coding Type MH 21 + 5 colour red blue green orange colour red blue green orange	Code keys for male connectors 09 06 001 9950 09 06 001 9951 09 06 001 9952 09 06 001 9953 for female connectors 09 06 001 9960 09 06 001 9961 09 06 001 9962 09 06 001 9963		
Tool for breaking out the coding area of the male shroud	09 99 000 0242		

Connectors with press-in termination

Press-in tools and press-in machines see chapter 30

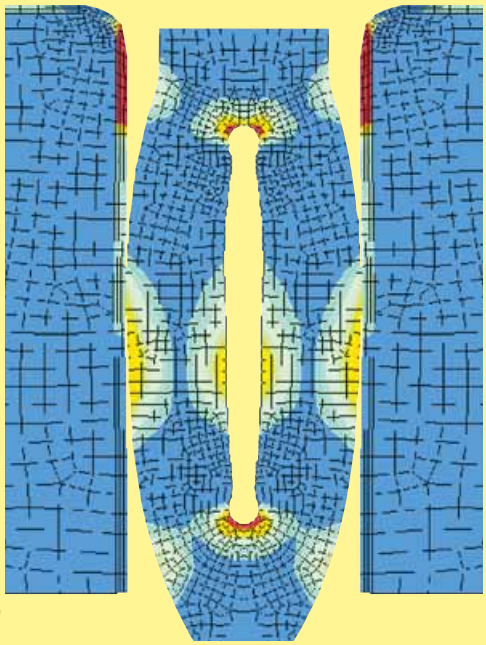
Solderless termination for connectors has proven to be reliable for decades. Today the use of press-in connectors encompasses all fields of electrical and electronical applications.



bus board with
press-in connectors

Pressing of electrical components, mainly connectors, is characterised through the matching of the connector pin and the plated through hole of the pcb. Whereas the desired electrical characteristics can be attained relatively independant from the design of the press-in zone, the mechanical characteristics of the press-in zone are crucial for the reliable assembly of connectors where pcb's have different surfaces.

Although the scope of requirements at the press-in process is generally defined in time-tested specifications, the novel press-in zones should offer an optimal handling and a reliable termination. Essentially, this is guaranteed through the design of the press-in zone and the meticulous observance of tolerances. HARTING has been using FEM simulations for the calculation and optimisation of press-in zones for a long period of time. This expertise allows us to simulate various pcb configurations very accurate.



FEM simulation
of the needle eye
press-in zone

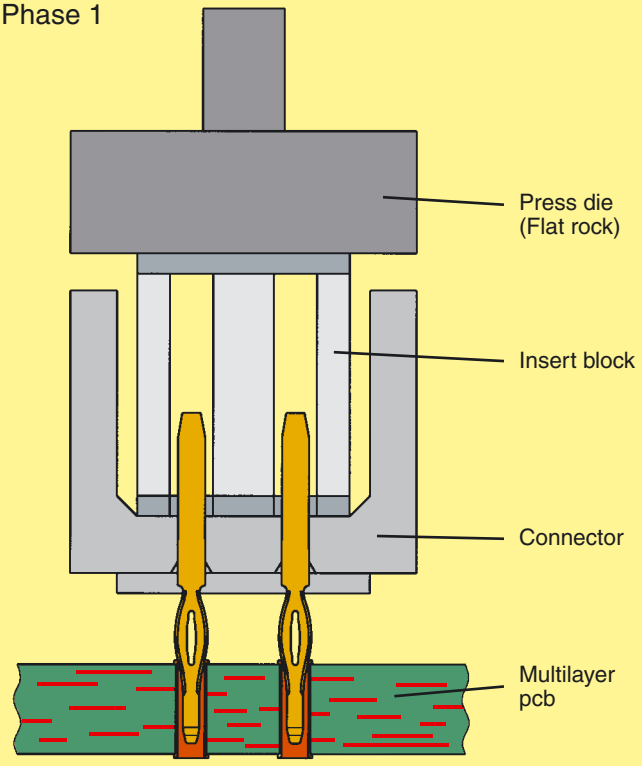
The processing of press-in connectors can be divided into 3 phases, containing both mechanical and metallurgical operations:

1. **Centering and placing of the termination pins**

   The centering of connectors before pressing is important in order to prevent damage to the pcb and the termination pins. Centering can be omitted when connectors are pressed using a flat rock die.

   HARTING offers insert blocks for male connectors to make the centering of connectors unnecessary.

Phase 1



2. **Pressing in the pins**

In the press-in process the insertion force is continuously transformed into compression force. The resulting friction frees the contacting bars of insulating films. Superfluous plating (tin) is transferred within the plated through hole. A gas-tight connection of fresh non-oxidised metal surfaces is obtained.

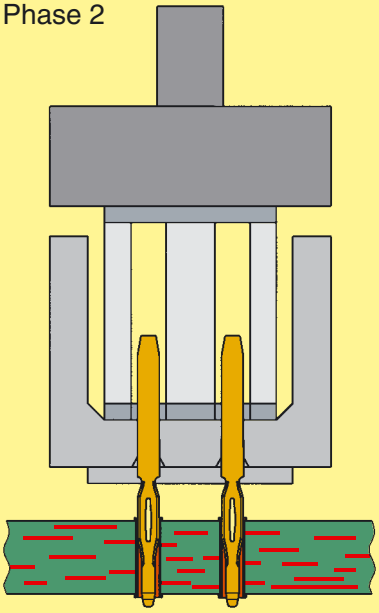
3. **Obtaining the final position**

The press-in operation should be terminated as soon as the connector obtains its final position on the pcb to avoid unnecessary compressive stress. The press-in machines of HARTING feature automatic termination of the press-in operation independant of pcb thickness and surface properties.

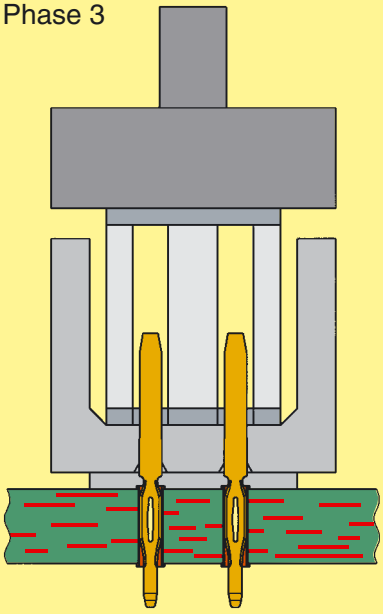
The entire dynamic press-in process is characterised through changes of the press-in force that can be statistically evaluated. HARTING records the changes of force with the help of special software. This is an important step towards permanent process control and documented manufacturing data.

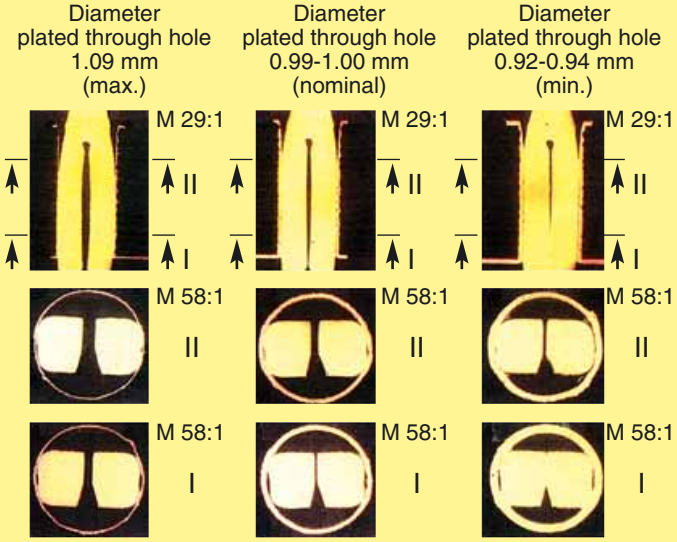
The har:press®-zone is based on the industry renowned needle eye technology. Its special design allows for compensation of tolerances of pcb surface properties (eg. superfluous tin plating). The excessive material is displaced within the plated through hole, whereby a gas-tight and corrosion resistant electrical connection is assured.

Phase 2



Phase 3





Cross section of a pcb 2.4 mm thick with various hole diameters

Due to the high deformation resistance and resilience of har-press® contacts, they can be easily and repeatedly removed in case of repairs without impairment to their functioning.

har-press® is extremely versatile and offers a reliable electrical contact, therefore it is especially well suited for applications with these surfaces.

Please contact us for detailed test reports.

Benefits of the press-in technology

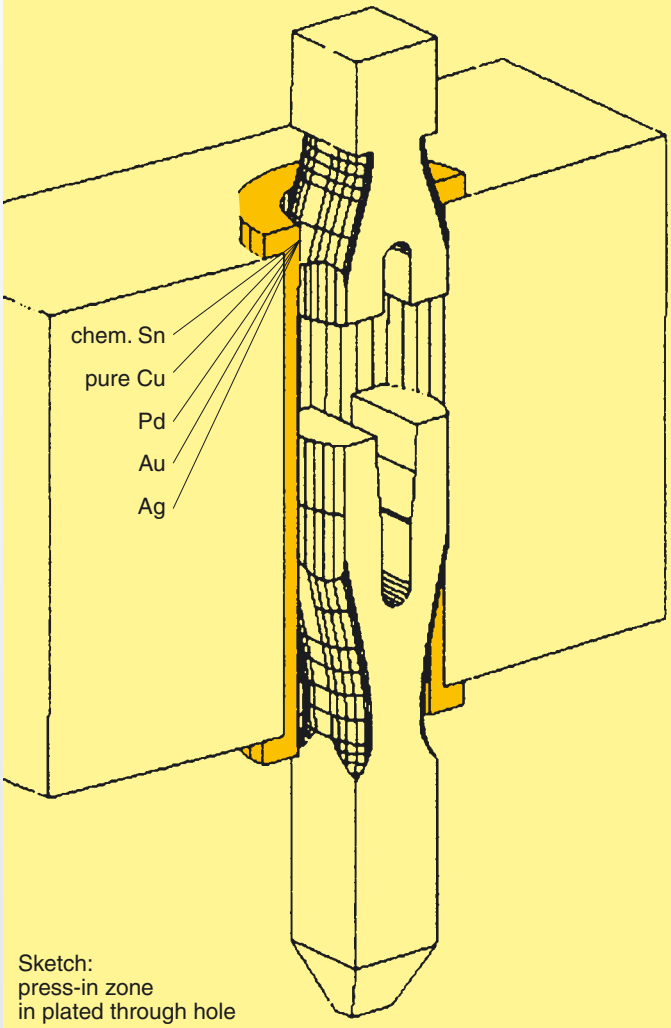
- Thermal shocks associated with the soldering process and the risk of the board malfunction are avoided.
- No need for the subsequent cleaning of the assembled pcb's
- Additional wrap connections are made possible by using connectors with long pins
- Unlimited and efficient processing of partially gold-plated pins for rear I/O - manual soldering is no longer necessary!

Recommended configuration of plated through holes

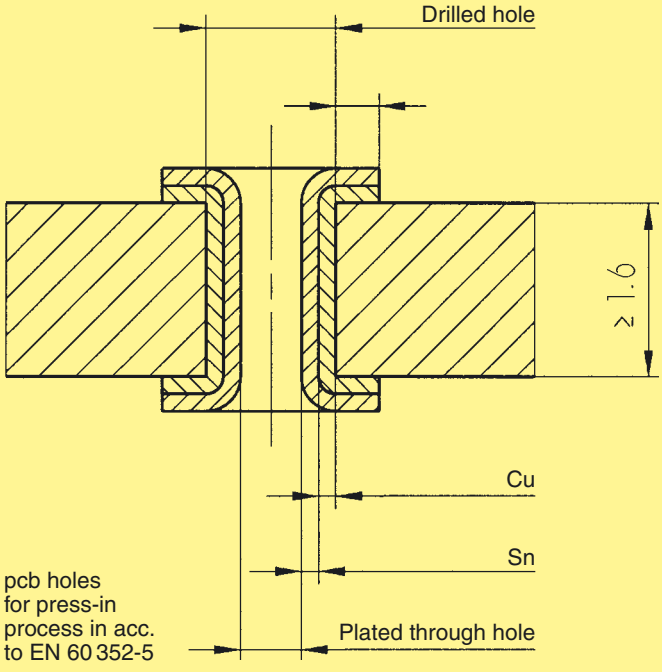
In addition to the hot-air-level (HAL) pcb surfaces are getting more important. Due to their different properties, such as mechanical strength and coefficient of friction we recommend the following configuration of pcb through holes.

Tin-lead plated PCB (HAL) acc. EN 60 352-5	Hole	$1.15^{\pm 0.025}$ mm
	Cu	min. 25 µm
	Sn	max. 15 µm
	Plated hole	0.94-1.09 mm
Chemical tin-plated PCB	Hole	$1.15^{\pm 0.025}$ mm
	Cu	min. 25 µm
	Sn	min. 0.8 µm
	Plated hole	1.00-1.10 mm
Au / Ni plated PCB	Hole	$1.15^{\pm 0.025}$ mm
	Cu	min. 25 µm
	Ni	3-7 µm
	Au	0.05-0.12 µm
	Plated hole	1.00-1.10 mm
Silver plated PCB	Hole	$1.15^{\pm 0.025}$ mm
	Cu	min. 25 µm
	Ag	0.1-0.3 µm
	Plated hole	1.00-1.10 mm
OSP copper plated PCB	Hole	$1.15^{\pm 0.025}$ mm
	Cu	min. 25 µm
	Plated hole	1.00-1.10 mm

PCB board thickness: ≥ 1,6 mm



Sketch:
press-in zone
in plated through hole

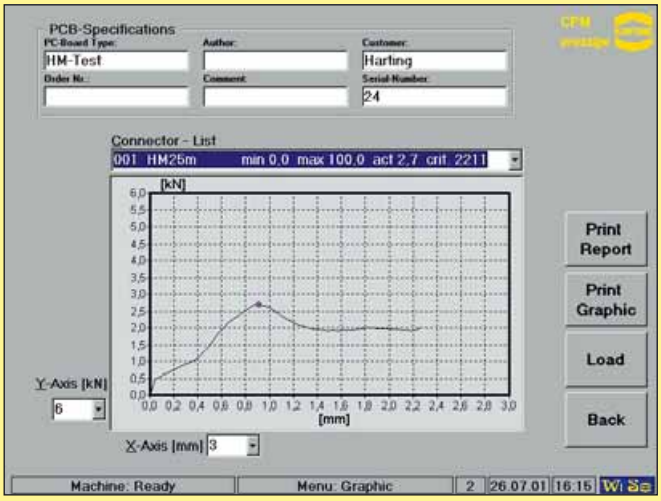


pcb holes
for press-in
process in acc.
to EN 60 352-5

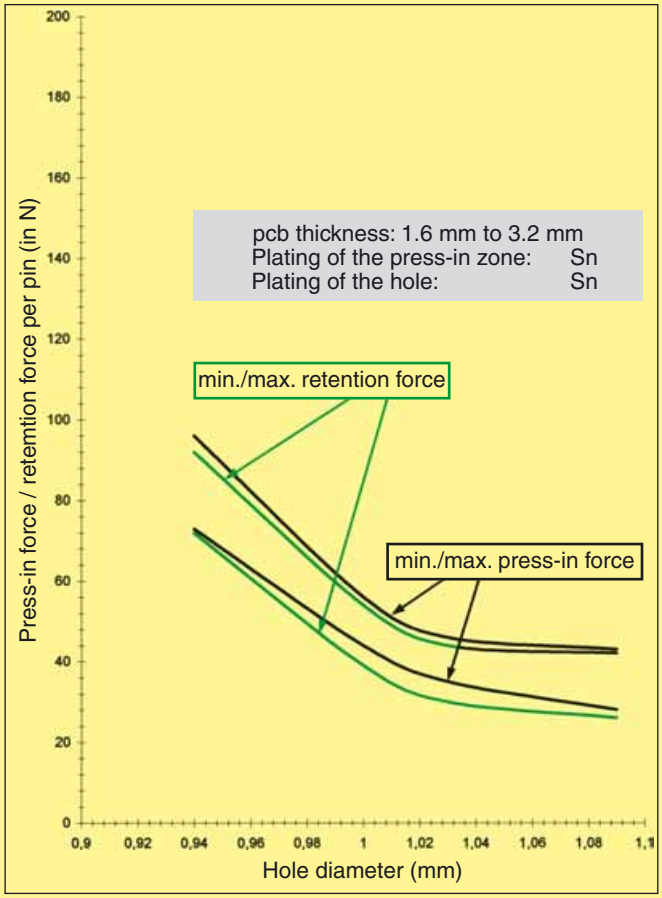
Quality control of the press-in termination

The press-in force correlates with the diameter of the plated through hole and with the friction coefficient of the surface; therefore it can be used for a continuous monitoring of the process.

The retention force, as an indirect measure of the normal force, serves to qualify the process or random tests

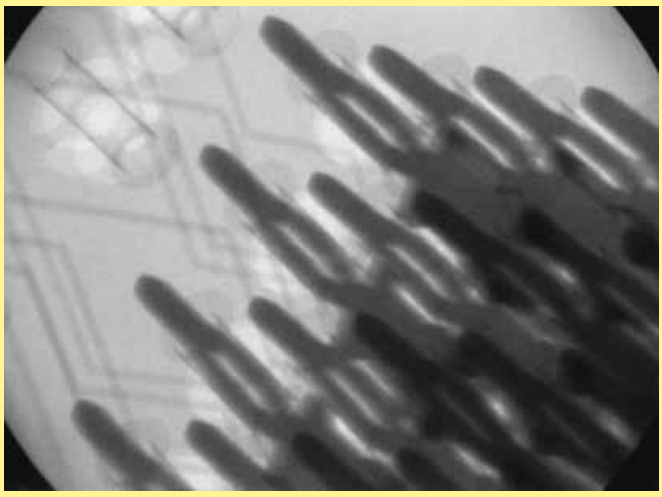


HARTING assists you with the most advanced quality assurance methods beyond the usual scope.



Typical press-in and retention forces for the har·press

The automatic press-in machines of HARTING feature a graphical user interface for monitoring the process and the quality of the press-in termination (see chapter 30).



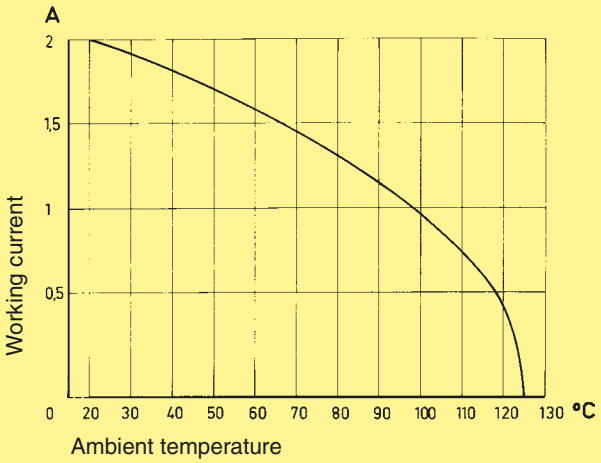
X-ray photo of a pressed-in connector

Number of contacts	32-96
Contact spacing (mm)	2.54
Working current see current carrying capacity chart	2 A max.
Clearance	≥ 1.2 mm
Creepage	≥ 1.2 mm
Working voltage The working voltage also depends on the clearance and creepage dimensions of the pcb itself and the associated wiring	according to the safety regulations of the equipment Explanations see chapter 00
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance	≤ 15 mΩ
Insulation resistance	≥ 10^{12} Ω
Temperature range The upper temperature is limited by the property of the pcb material	– 40 °C … + 105 °C
Electrical termination	
Male and female connectors	Compliant press-in terminations
Diameter of pcb plated through holes	0.94-1.09 mm
pcb thickness	≥ 1.6 mm
Recommended pcb holes for press-in process in acc. to EN 60 352-5[2)]	
Insertion and withdrawal force	32pol. ≤ 30 N 48pol. ≤ 45 N 64pol. ≤ 60 N 96pol. ≤ 90 N
Materials	
Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy
Contact surface	
Contact zone	plated according to performance level[1)]
Press-in zone	tinned
Wrap zone	tinned
with selectively gold plated wrap posts	wrap zone: tinned interface zone: gold plated according to performance level 3

Current carrying capacity

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512



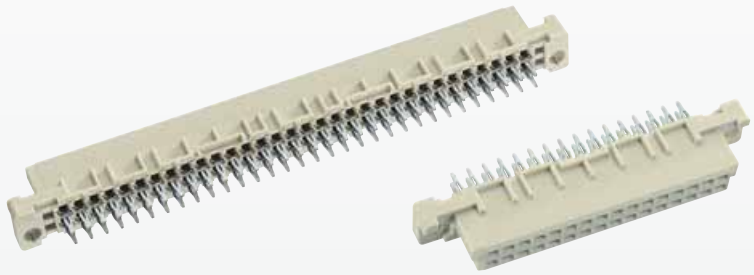
[1)] Explanation of performance levels see chapter 00
[2)] for details see page 04.04

Mating conditions see chapter 00

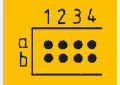
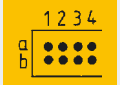
Tooling see chapter 30

Number of contacts

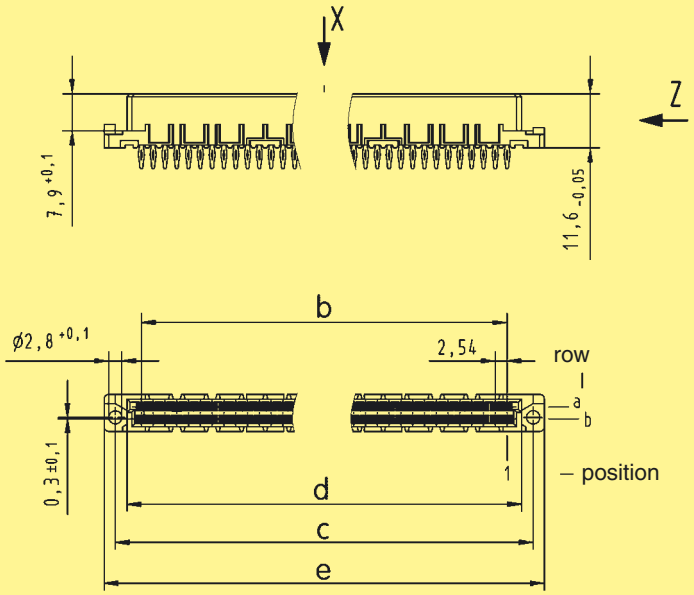
64, 32

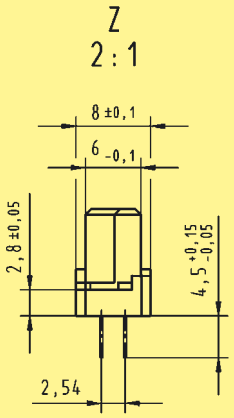


Female connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with press-in terminations 5.3 mm					
Type B	64		Performance level 3 on request	09 02 264 6850	Performance level 1 on request
Type 2B	32			09 22 232 6850	

Dimensions

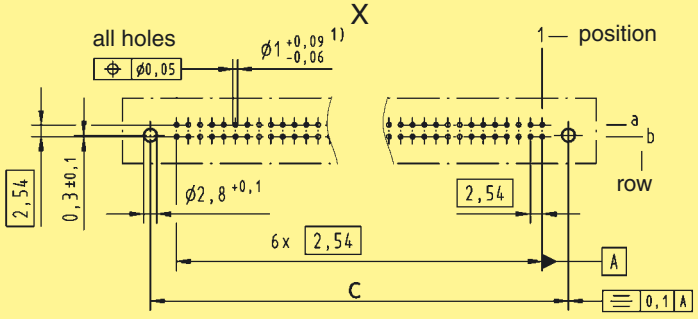




	b	c	d	e
Type B	31 x 2.54 (= 78.74)	90 ± 0.1	85 – 0.2	94.9 ± 0.1
Type 2B	15 x 2.54 (= 38.1)	50 ± 0.1	44.4 – 0.2	54.9 ± 0.1

Board drillings

Mounting side



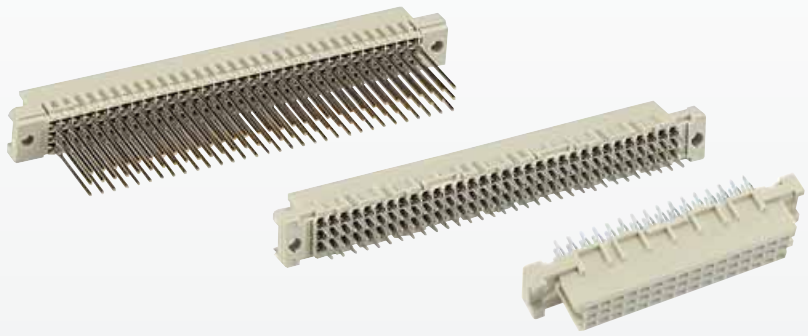
Dimensions in mm

Other contact arrangements on request

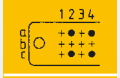
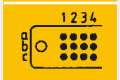
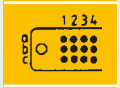
1) refer to recommended configuration of pcb holes, see page 04.04

Number of contacts

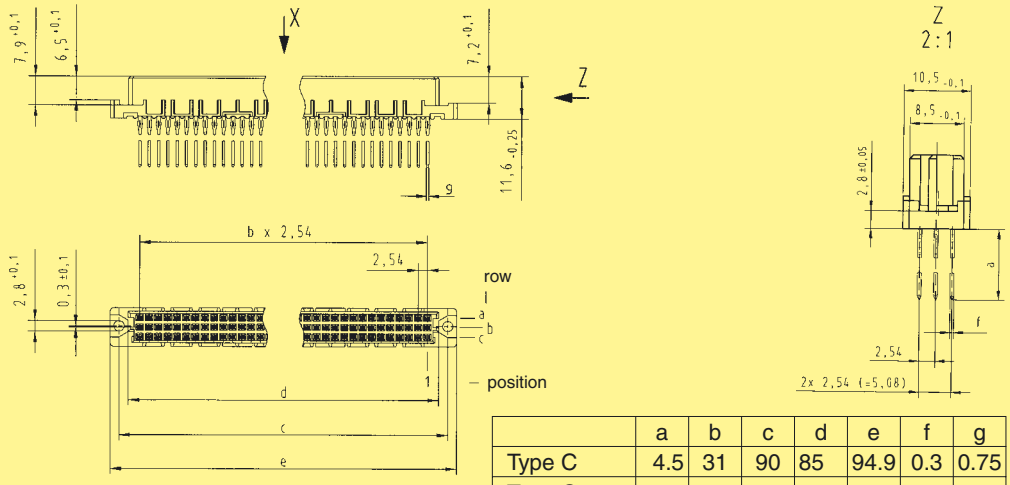
96, 64, 48, 32



Female connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
				3	2	1
Female connector Type C with press-in terminations 4.5 mm	96		09 03 296 7850		09 03 296 6850	09 03 296 2850
	64		09 03 264 7850		09 03 264 6850	09 03 264 2850
	32		09 03 232 7850		09 03 232 6850	09 03 232 2850
13.2 mm	96				09 03 296 6851 09 03 296 6861•	
	64				09 03 264 6851 09 03 264 6861•	
17 mm	96				09 03 296 6852 09 03 296 6862•	
Female connector Type 2C with press-in terminations 4.5 mm	48				09 23 248 6850	

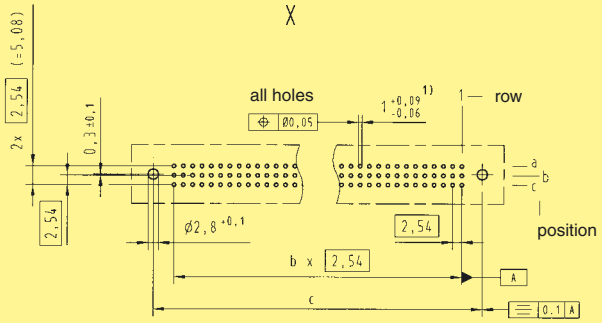
Dimensions



	a	b	c	d	e	f	g
Type C	4.5	31	90	85	94.9	0.3	0.75
Type C	13.2	31	90	85	94.9	0.6	0.6
Type C	17.0	31	90	85	94.9	0.6	0.6
Type 2C	4.5	15	50	44.4	54.9	0.3	0.75

Board drillings

Mounting side



Dimensions in mm

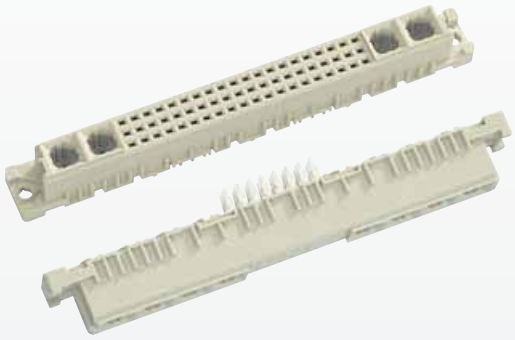
• Wrap posts for interfacing selectively gold plated (performance level 3)
Other contact arrangements on request

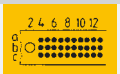
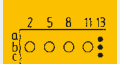
[1] refer to recommended configuration of pcb holes, see page 04.04

Number of contacts

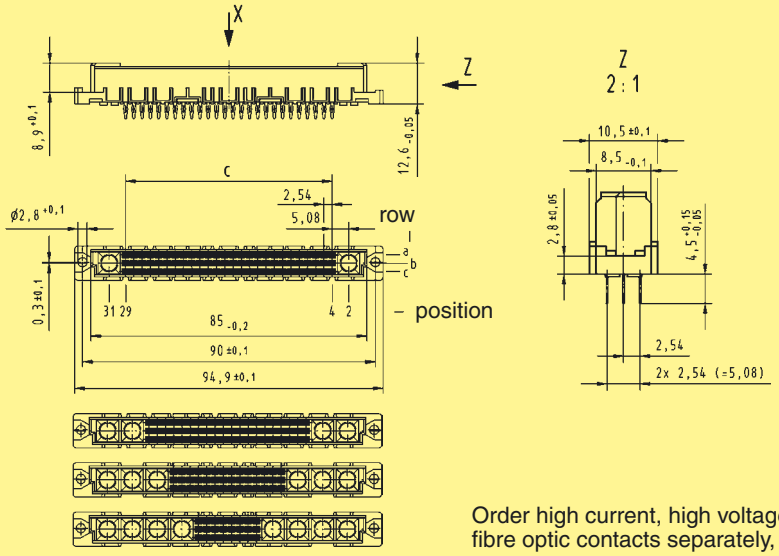
78+2, 60+4
42+6, 24+8

Female connectors



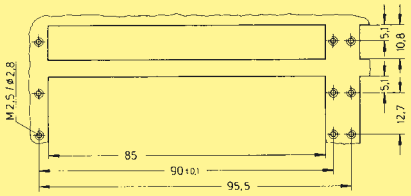
Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with press-in terminations 4.5 mm	78 + 2		Performance level 3 on request	09 03 278 6850	Performance level 1 on request
	60 + 4			09 03 260 6850	
	42 + 6			09 03 242 6850	
	24 + 8			09 03 224 6850	

Dimensions

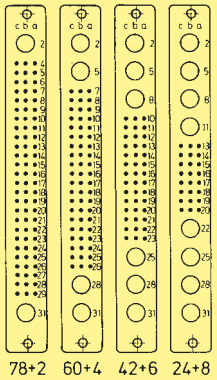


Order high current, high voltage, coaxial and fibre optic contacts separately, see chapter 01

Panel cut out

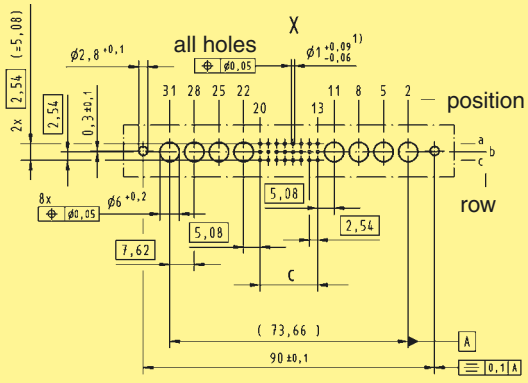


Contact arrangement
view from termination side



Board drillings

Mounting side



Type	c
78 + 2	25 x 2.54 = 63.5
60 + 4	19 x 2.54 = 48.26
42 + 6	13 x 2.54 = 33.02
24 + 8	7 x 2.54 = 17.78

Dimensions in mm

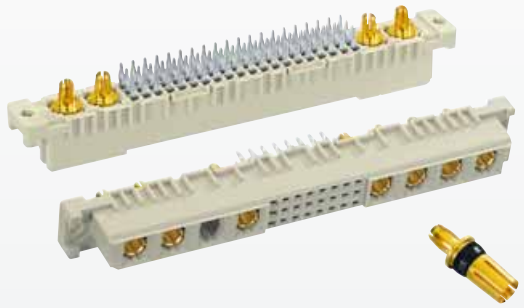
Other contact arrangements on request

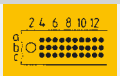
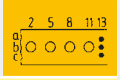
1) refer to recommended configuration of pcb holes, see page 04.04

Number of contacts

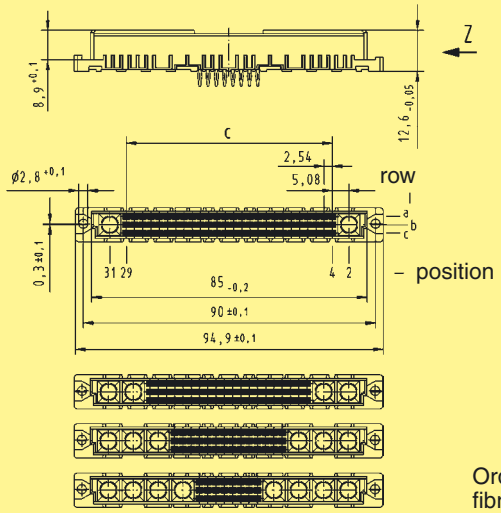
78+2, 60+4
42+6, 24+8

Female connectors



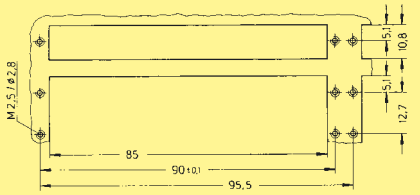
Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with press-in terminations 4.5 mm	78 + 2		Performance level 3 on request	09 03 278 6830	Performance level 1 on request
	60 + 4			09 03 260 6830	
	42 + 6			09 03 242 6830	
	24 + 8			09 03 224 6830	
High current female contact with press-in termination	40 A			09 03 000 6250	

Dimensions



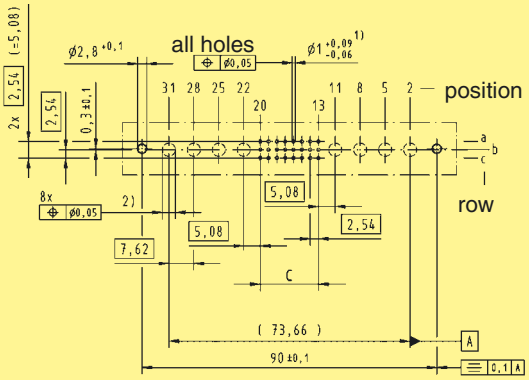
Order high current, high voltage, coaxial and fibre optic contacts separately, see chapter 01

Panel cut out

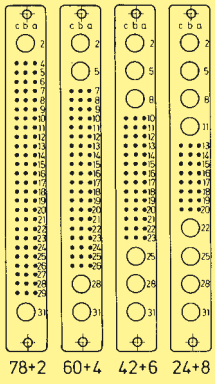


Board drillings

Mounting side



Contact arrangement
view from termination side



Type	c
78 + 2	25 x 2.54 = 63.5
60 + 4	19 x 2.54 = 48.26
42 + 6	13 x 2.54 = 33.02
24 + 8	7 x 2.54 = 17.78

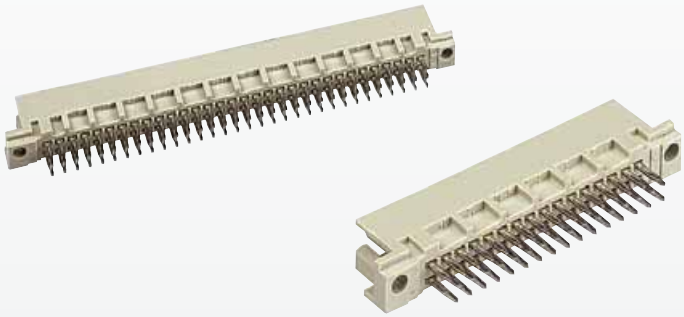
Dimensions in mm

Other contact arrangements on request

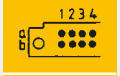
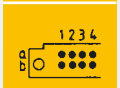
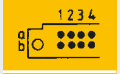
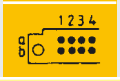
[1] refer to recommended configuration of pcb holes, see page 04.04

Number of contacts

64, 32

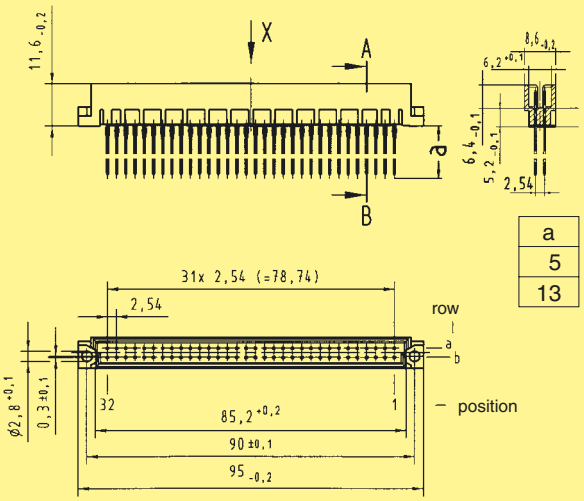


Male connectors

Identification	Number of contacts	Contact arrangement	Part No. 3	Part No. 2	Performance levels according to DIN 41 612. Explanation chapter 00 1
Male connector Type Q with press-in terminations					
5.0 mm	64 62 + 2▲		09 72 164 7904 09 72 164 7954	09 72 164 6904 09 72 164 6954	performance level 1 or special gold plating on request
13 mm	64 62 + 2▲		09 72 164 7985 09 72 164 7974• 09 72 164 7995	09 72 164 6985 09 72 164 6974• 09 72 164 6995	
Male connector Type 2Q with press-in terminations					
5.0 mm	32 30 + 2▲		09 27 132 7904 09 27 132 7954	09 27 132 6904 09 27 132 6954	
13 mm	32 30 + 2▲		09 27 132 7985 09 27 132 7995	09 27 132 6985 09 27 132 6995	

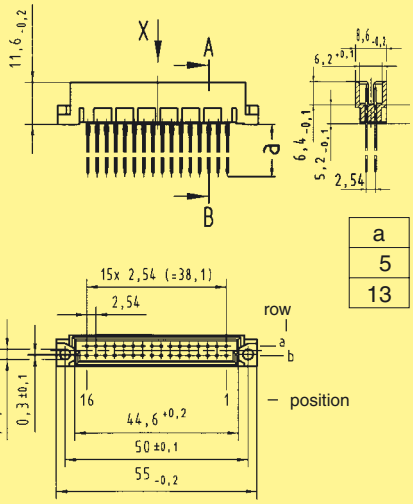
Dimensions

Type Q



a
5
13

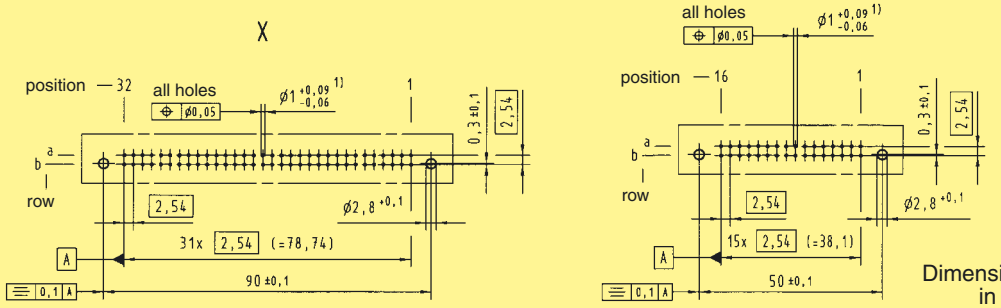
Type 2Q



a
5
13

Board drillings

Mounting side



Dimensions in mm

Press-in technology

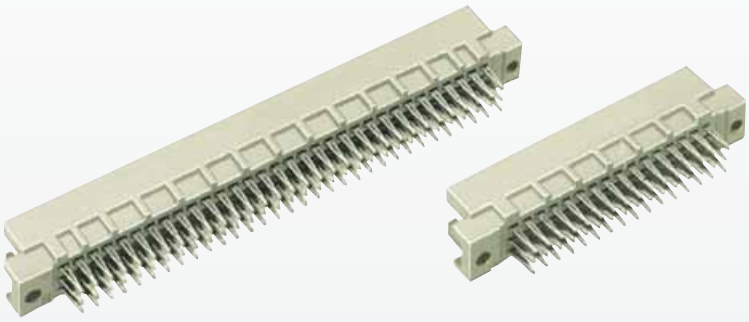
▲ Male connectors with 2 leading contacts (0.8 mm) pos. a1 and a32/a16
• Wrap posts for interfacing selectively gold plated (performance level 3)
1) refer to recommended configuration of pcb holes, see page 04.04

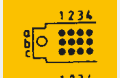
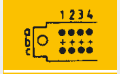
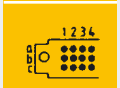
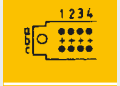
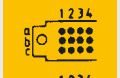
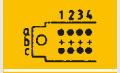
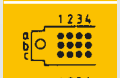
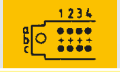
Other contact arrangements as well with lagging pins on request

Number of contacts

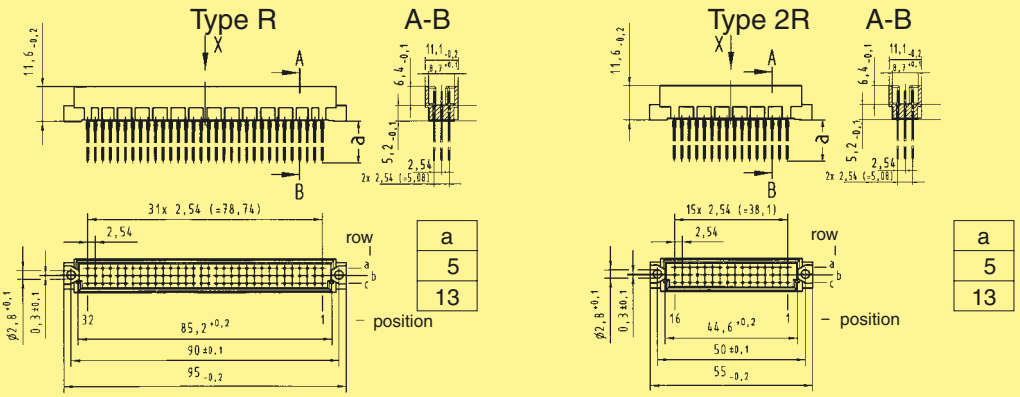
96, 64, 48, 32

Male connectors



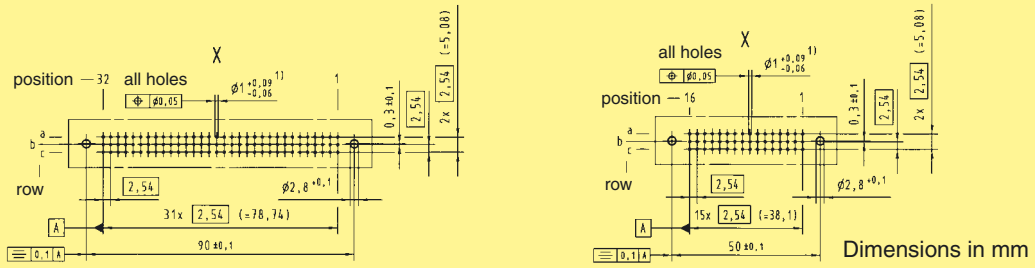
Identification	Number of contacts	Contact arrangement	Part No. 3	Part No. 2	Part No. 1
Male connector Type R with press-in terminations					
5.0 mm	96		09 73 196 7904	09 73 196 6904	performance level 1 or special gold plating on request
	94 + 2▲		09 73 196 7954	09 73 196 6954	
	64		09 73 164 7904	09 73 164 6904	
13 mm	96		09 73 196 7985 09 73 196 7974•	09 73 196 6985 09 73 196 6974•	
	94 + 2▲		09 73 196 7995	09 73 196 6995	
	64		09 73 164 7985 09 73 164 7974•	09 73 164 6985 09 73 164 6974•	
Male connector Type 2R with press-in terminations					
5.0 mm	48		09 28 148 7904	09 28 148 6904	
	46 + 2▲		09 28 148 7954	09 28 148 6954	
	32		09 28 132 7904	09 28 132 6904	
13 mm	48		09 28 148 7985	09 28 148 6985	
	46 + 2▲		09 28 148 7995	09 28 148 6995	
	32		09 28 132 7985	09 28 132 6985	

Dimensions



Board drillings

Mounting side

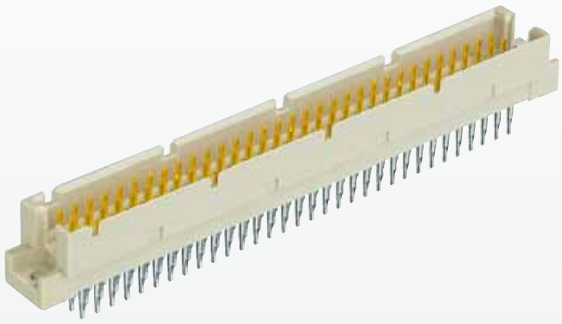


▲ Male connectors with 2 leading contacts (0.8 mm) pos. a1 and a32/a16
• Wrap posts for interfacing selectively gold plated (performance level 3)
[1] refer to recommended configuration of pcb holes, see page 04.04

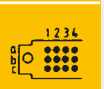
Other contact arrangements also with lagging pins on request

Number of contacts

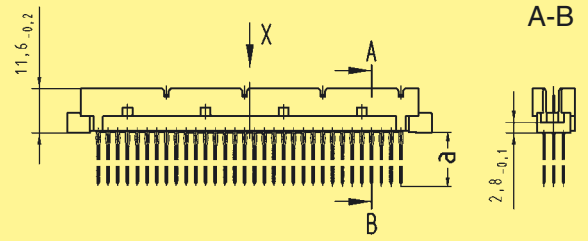
96, 64



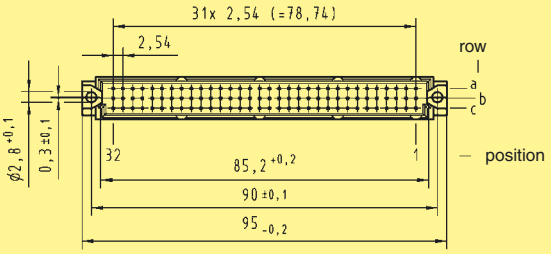
Male connectors

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00		
			3	2	1
Male connector with press-in terminations					
5.0 mm	96		performance level 3 or special gold plating on request	performance level 2 or special gold plating on request	09 79 196 2950
	64				09 79 164 2950
13 mm	96				09 79 196 2961*

Dimensions

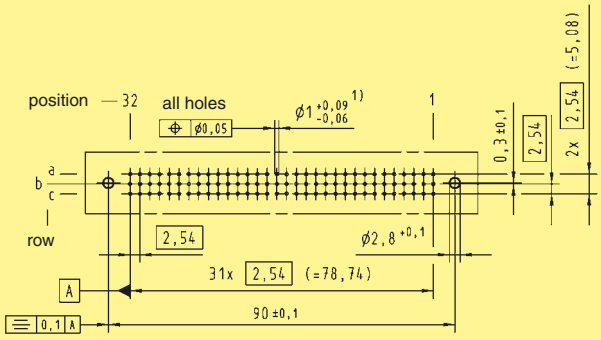


a
5
13



Board drillings

Mounting side



Dimensions in mm

Press-in technology

* Wrap posts for interfacing selectively gold plated (performance level 2)

1) refer to recommended configuration of pcb holes, see page 04.04

Other contact arrangements on request

Number of contacts	32, 48
Contact spacing (mm)	5.08
Working current see current carrying capacity chart	6 A max. for unpressed connectors*
Clearance	≥ 1.6 mm
Creepage	≥ 3.0 mm
Working voltage The working voltage also depends on the clearance and creepage dimensions of the pcb itself and the associated wiring	according to the safety regulations of the equipment Explanations see chapter 00
Test voltage $U_{r.m.s.}$	1.55 kV
Contact resistance	≤ 15 mΩ
Insulation resistance	≥ 10^{12} Ω
Temperature range The upper temperature is limited by the property of the pcb material	– 40 °C … + 105 °C
Electrical termination	
Female connectors	Compliant press-in terminations
Diameter of pcb plated through holes	0.94-1.09 mm
pcb thickness	≥ 1.6 mm
Recommended pcb holes for press-in process in acc. EN 60 352-5[1)]	
Insertion and withdrawal force	32pol. ≤ 50 N 48pol. ≤ 75 N
Materials	
Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy
Contact surface	
Contact zone	plated according to performance level[2)]
Press-in zone	tinned
Wrap zone	tinned
with selectively gold plated wrap posts	wrap zone: tinned interface zone: gold plated according to performance level 3

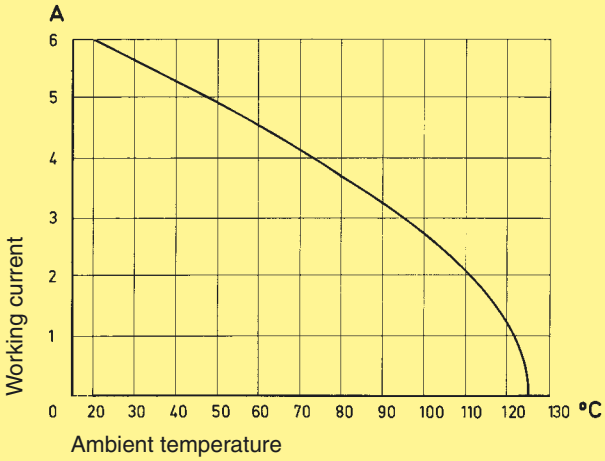
[1)] Details see page 04.04
[2)] Explanation of performance levels see chapter 00

Mating conditions see chapter 00

Current carrying capacity

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

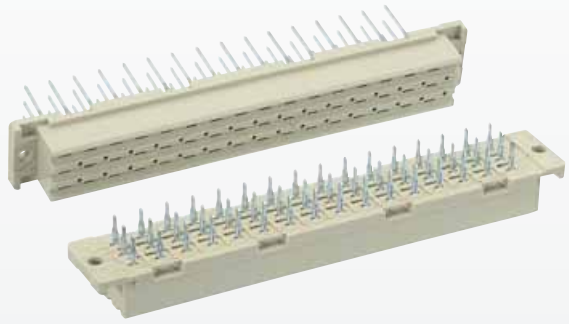
Control and test procedures according to DIN IEC 60 512



* Is limited by the property of the pbc material to 4 A max. if the connector is pressed-in.
Tooling see chapter 30

Number of contacts

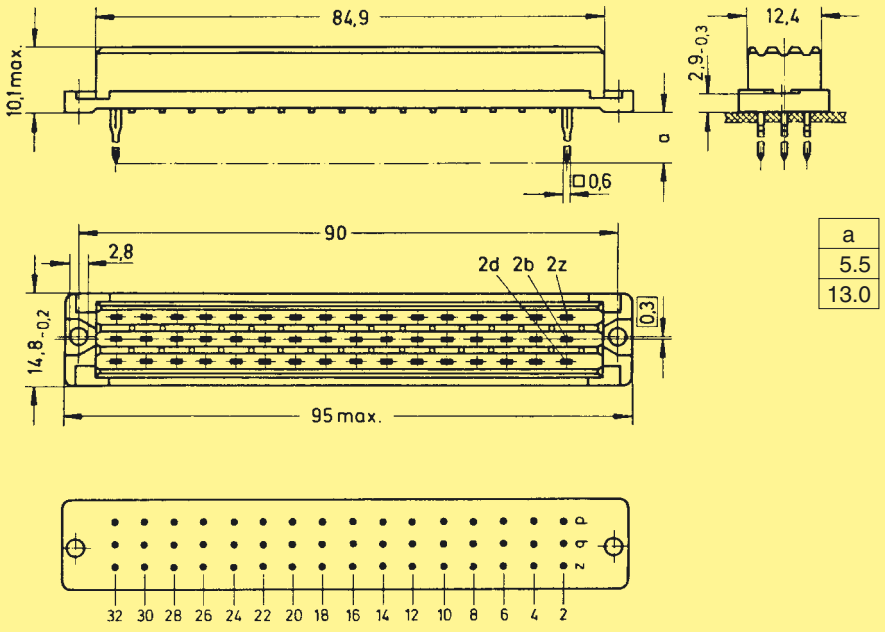
48, 32



Female connectors

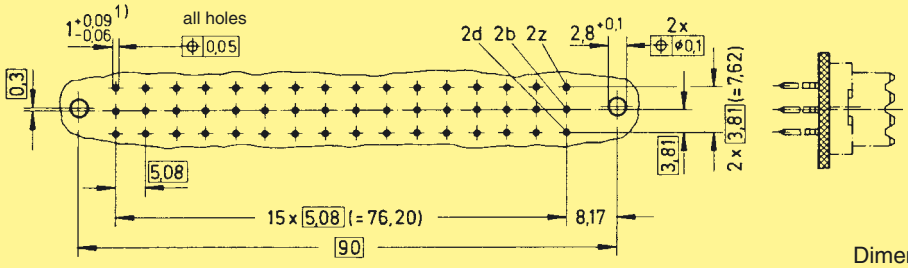
Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector "low profile" with press-in terminations 5.5 mm	48		09 06 248 7832	09 06 248 6832	performance level 1 or special gold plating on request
	32		09 06 232 7832	09 06 232 6832	
	32		09 06 232 7892	09 06 232 6892	
Female connector "low profile" with press-in terminations 13 mm	48		09 06 248 7837	09 06 248 6837	
	32		09 06 232 7837	09 06 232 6837	
	32		09 06 232 7897	09 06 232 6897	

Dimensions



Board drillings

Mounting side

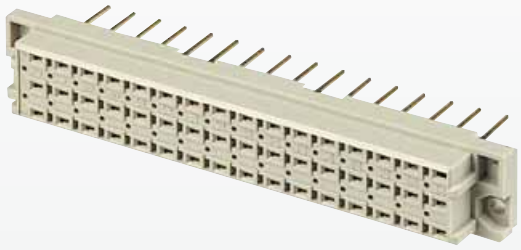


Dimensions in mm

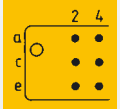
Selectively or fully gold plated wrap posts on request
Other contact arrangements on request
[1] refer to recommended configuration of pcb holes, see page 04.04

Number of contacts

48

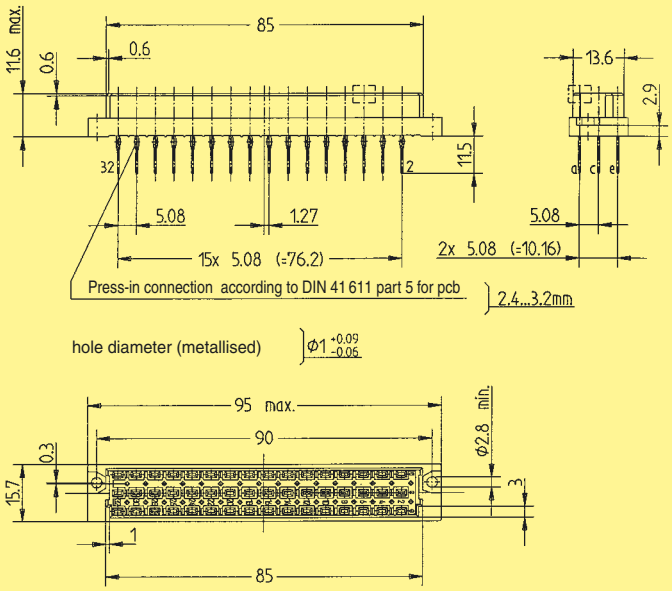


Female connectors

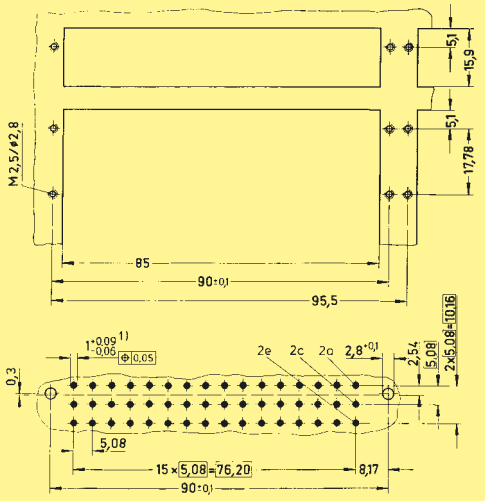
Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector with press-in terminations 11.5 mm	48		09 05 248 7851	09 05 248 6851	09 05 248 2851

Press-in technology

Dimensions



Panel cut out

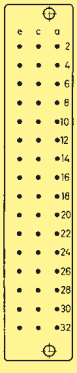


Board drillings

Mounting side

Contact arrangement

view from termination side



48

Dimensions in mm

VG versions on request

1) refer to recommended configuration of pcb holes, see page 04.04

Pin shroud

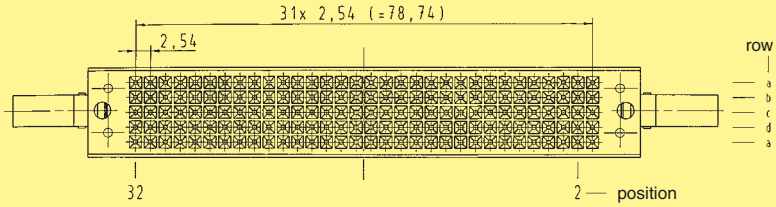
Number of contacts

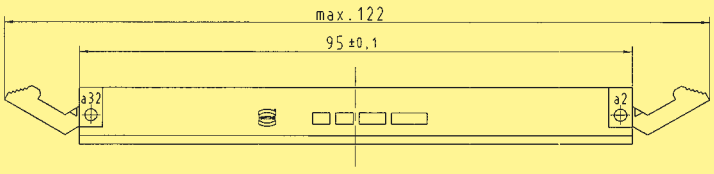
48

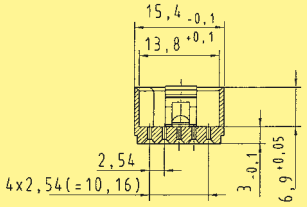
Pin shrouds

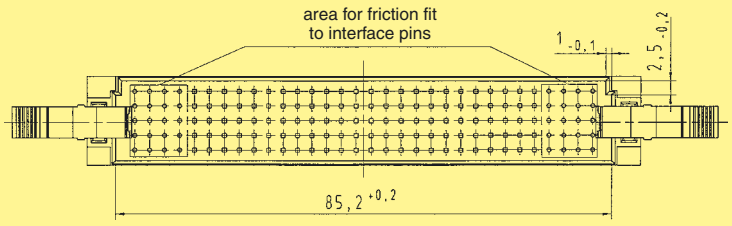
Identification	Number of contacts	Contact arrangement	Part No.	pcb thickness (+ 0.2 / – 0.3 mm)
Pin shrouds				
I with fixing brackets	48	a, c, e	09 05 000 9924	2.8
II without fixing brackets			09 05 000 9914	2.8
I with fixing brackets			09 05 000 9922	3.4
II without fixing brackets			09 05 000 9912	3.4

Dimensions









pcb thickness	X
2.8 (+ 0.2 / – 0.3)	3.6 – 0.1
3.4 (+ 0.2 / – 0.3)	3.0 – 0.1

Dimensions in mm

Number of contacts	160
Contact spacing (mm)	2.54
Working current	1 A at 70 °C and all contacts are loaded

see current carrying capacity chart

Clearance and creepage distances*

minimal clearance and creepage distance[1]		distance in mm	
		rows a, b, c	rows z, d
between two rows	clearance	1.2	1.2
	creepage	1.2	1.2
between two contacts (in a row)	clearance	1.2	1.0
	creepage	1.2	1.0

[1] valid for mated and unmated connectors

Working voltage

The working voltage also depends on the clearance and creepage dimensions of the pcb itself and the associated wiring — according to the safety regulations of the equipment. Explanations see chapter 00

Test voltage $U_{r.m.s.}$

1 kV

Contact resistance

rows a, b, c: ≤ 20 mΩ
rows z, d: ≤ 30 mΩ

Insulation resistance

≥ 10^{10} Ω acc. to IEC 60512-2

Temperature range

– 55 °C … + 125 °C

Electrical termination

Male and female connectors	Compliant press-in terminations
Diameter of pcb plated through holes	0.94 - 1.09 mm
pcb thickness	≥ 1.6 mm
Recommended pcb holes for press-in process acc. to EN 60 352-5[2]	

Insertion and withdrawal force

≤ 160 N

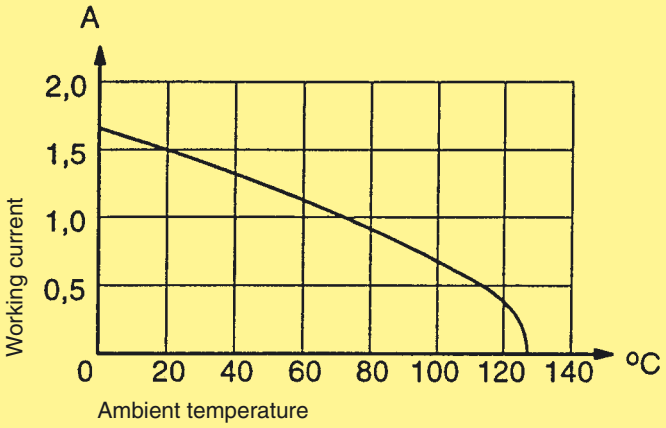
Materials

Mouldings (LCP),	● Liquid Cristal Polymer for female connectors, UL 94-V0 ● Thermoplastic resin, glass-fibre filled, for male connectors, UL 94-V0
Contacts	Copper alloy
Contact surface	Contact zone: selectively plated[3] Press-in zone: tinned selectively plated[3] similar to the performance level of the contact zone

Current carrying capacity

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512

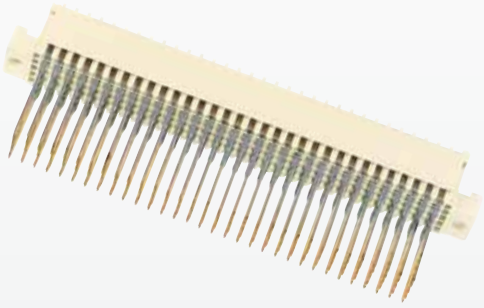


[2] Details see page 04.04
[3] Explanation of performance levels see chapter 00

* for har-bus® 64 inverse male connectors see chapter 06
Tooling see chapter 30

Number of contacts

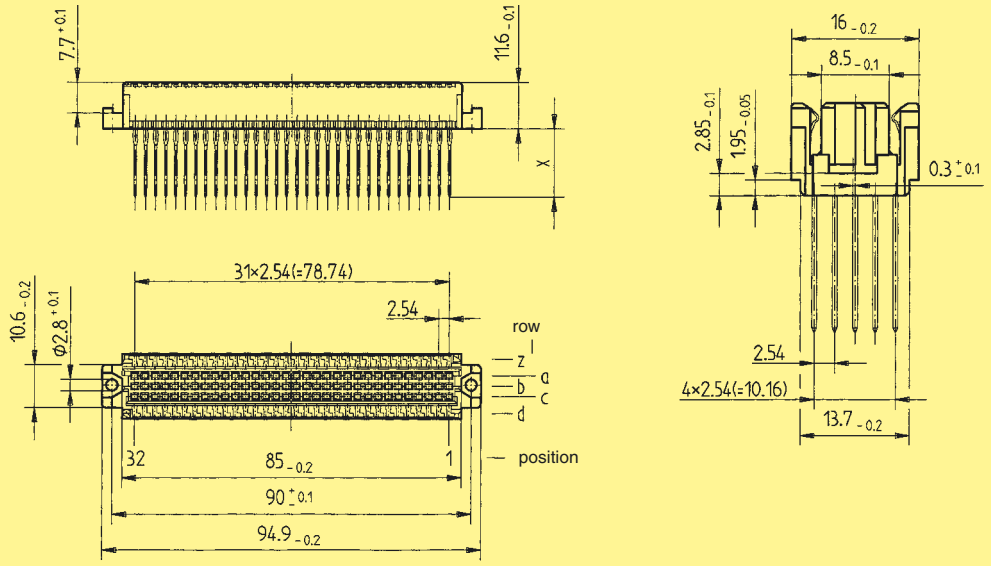
160



Female connectors

Identification	Number of contacts	Contact arrangement	Part No. Performance levels according to DIN 41 612 Explanation chapter 00 2	1
Female connectors, straight				
with press-in terminations				
with 4.5 / 5 mm	160	z, a, b, c, d	02 02 160 2201	02 02 160 1201
fixing flange 17 mm*	160	z, a, b, c, d	02 02 160 2301	02 02 160 1301
without 5 mm	160	z, a, b, c, d	02 02 160 2202	02 02 160 1202
fixing flange 17 mm*	160	z, a, b, c, d	02 02 160 2302	02 02 160 1302

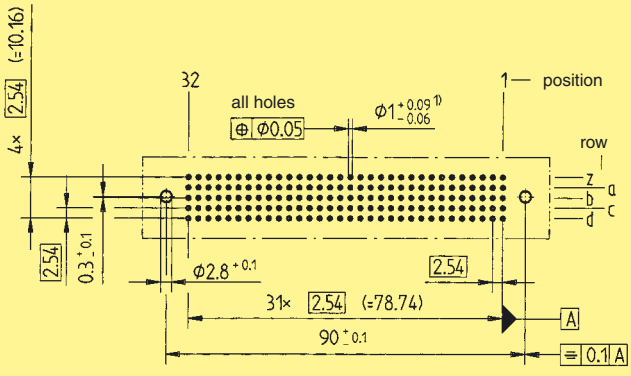
Dimensions



Part number	Dimension "X" for row z	a	b	c	d
02 02 160 2201 / 02 02 160 1201	5.0	4.5	4.5	4.5	5.0
02 02 160 2301 / 02 02 160 2302	17.0	17.0	17.0	17.0	17.0
02 02 160 2202 / 02 02 160 1202	5.0	5.0	5.0	5.0	5.0
02 02 160 2302 / 02 02 160 1302	17.0	17.0	17.0	17.0	17.0

Board drillings

Mounting side

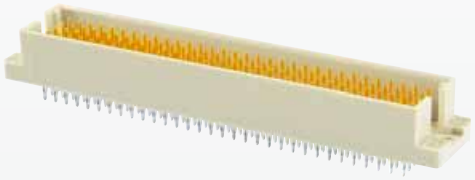


Dimensions in mm

Tooling see chapter 30
Additional components see chapter 06
* selectively gold-plated

Number of contacts

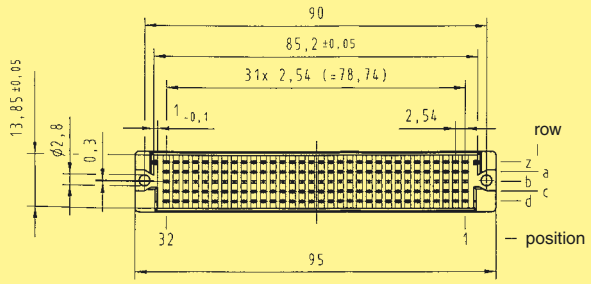
160

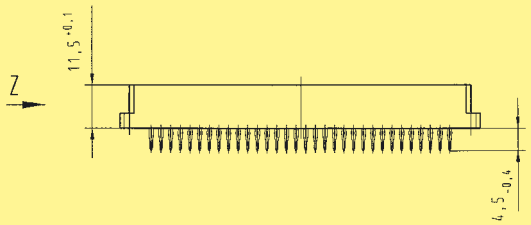


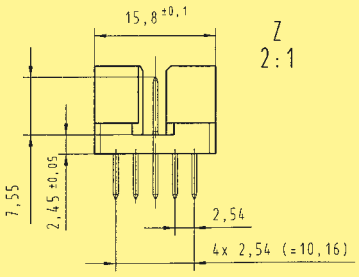
Male connectors

Identification	Number of contacts	Contact arrangement	Part No. 2	Performance levels according to DIN 41 612 Explanation chapter 00 1
Male connectors, straight with press-in terminations	160	z, a, b, c, d	02 08 160 2601	02 08 160 1601

Dimensions

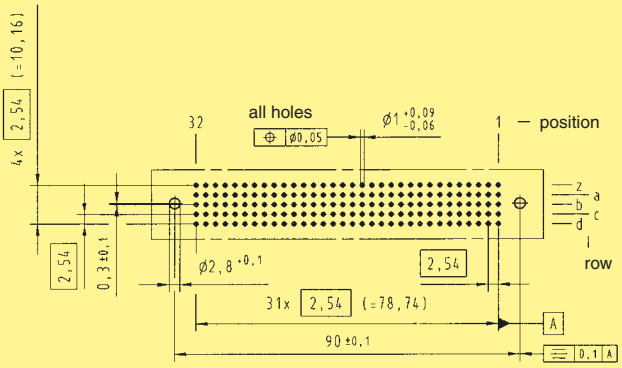






Board drillings

Mounting side



Dimensions in mm

Press-in technology

Additional components see chapter 06
Tooling see chapter 30

High temperature connectors **S**urface **M**ount **C**ompatible (SMC)

The continuing trend towards miniaturisation has revolutionised the assembly of electronic components. For the past 15 years, most components have been secured directly to the pcb surface by means of Surface Mount Technology (SMT). By dispensing with drilled holes on the pcb, a space saving of up to 70 percent is achieved.

Today, typical components such as resistors, ICs, capacitors, and connectors with straight terminal pins are almost exclusively fitted using SMD (Surface Mount Device) technology in mass production. In contrast, angled SMD connectors at the edge of the board have not been successful because of tolerance problems (co-planarity) and stresses during mating. Modified solder connectors for assembly with "Pin in Hole Intrusive Reflow" process offer a better solution. These can be mounted at low cost, utilising existing SMD production lines.

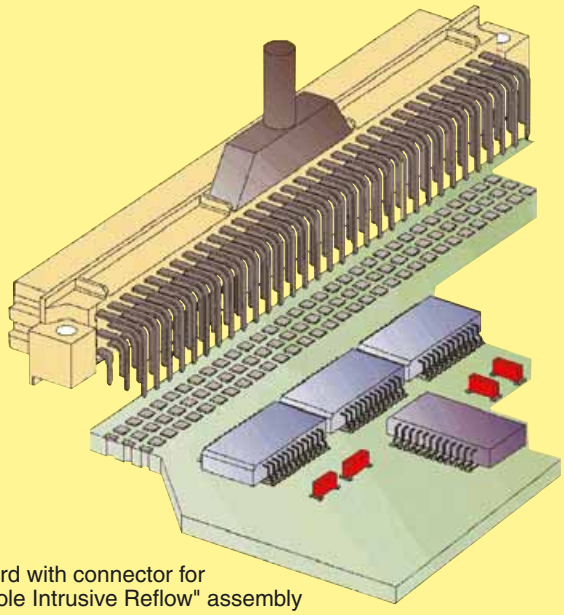


Fig. 1:
SMT board with connector for
"Pin in Hole Intrusive Reflow" assembly

"Pin in Hole Intrusive Reflow"

In this process, the connector is inserted into plated through holes in a comparable way to conventional component mounting. All other components can be assembled on the pcb surface.

The components are positioned using pick-and-place machines. These automatic assembly machines differ according to whether the components are small, lightweight or bulky. Connectors are considered bulky (odd form) because of their comparatively heavy weight and large volume which makes them more difficult to grip. Furthermore, machines for odd form components must have higher insertion power to fit the components into pcb holes, which are filled with solder paste. As a rule, modern SMC production lines are equipped with both types of machine, therefore the "Pin in Hole Intrusive Reflow" process generally entails no extra investment costs for the user.

Conventional assembly process:

1. Application of solder paste
2. Positioning the components
3. Positioning odd form components
4. Reflow soldering
5. Pressing in or partially dip soldering the connector at the board edge
6. Quality inspection

"Pin in Hole Intrusive Reflow" assembly:

1. Application of solder paste
2. Positioning the components
3. Positioning odd form components
4. Reflow soldering
5. ~~Pressing in or partially dip soldering the connector at the board edge~~
6. Quality inspection

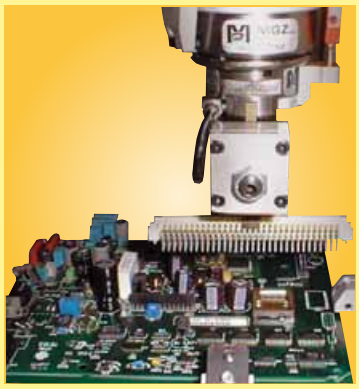


Fig. 2:
Pick-and-place machine for odd form components
(Courtesy of JOT Automation GmbH)

Application of solder paste

Before the components are assembled, solder paste must be applied to all the solder pads (for connecting surface-mount components) and the plated through contacts (pcb holes for "Pin in Hole Intrusive Reflow" insertion). Usually a screen printing process is used for this purpose. A squeegee moves across the pcb, which is masked with screens and presses the solder paste into all unmasked areas. To ensure that the plated through holes are completely filled, significantly more solder paste must be applied than traditional solder pads on the pcb surface. The required quantity can be set exactly via several parameters.

As an alternative to screen printing, the solder paste can be applied by means of a dispenser. A high-precision robot moves the dispenser to all required positions on the pcb. The dispensing method is particularly suitable for small pcb's or applications which demand high precision and flexibility in dispensing volumes.

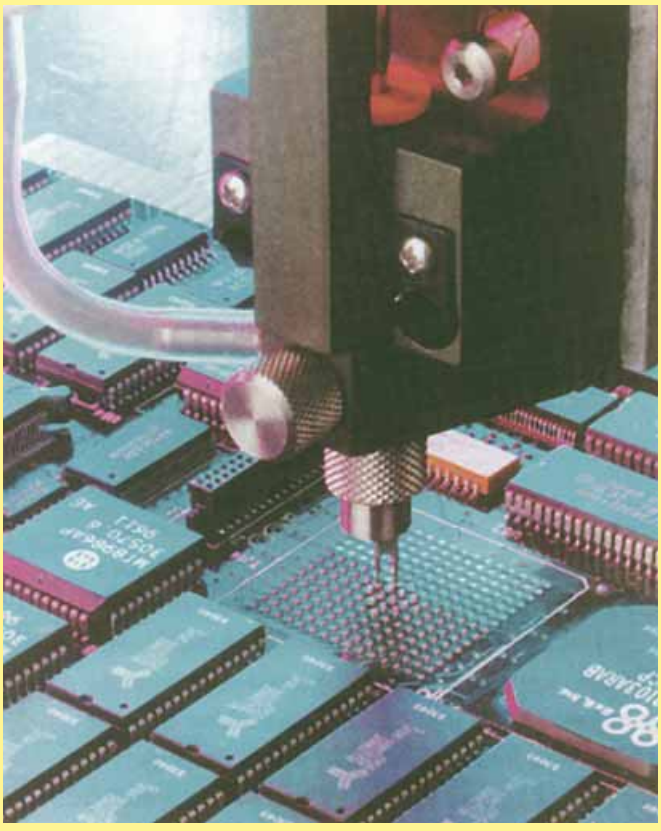


Fig. 3: Dispenser in operation

Requirements for the solder connection

There are numerous scientific studies dealing with calculation of the required quantity of solder paste. These studies use various parameters, e.g. the shrinking factor of the paste during soldering or the thickness of the screens used for masking the pcb. Since such calculation methods are complicated to apply, the following rule of thumb has proved valuable in practice:

$$V_{Paste} = 2(V_H - V_P)$$

in which:

V_{Paste} = Required volume of solder paste

V_H = Volume of the plated through hole

V_P = Volume of the connector termination in the hole

Comment: the multiplier "2" compensates for solder paste shrinkage during soldering. For this purpose, it was assumed that 50 % of the paste consists of the actual solder, the other 50 % being soldering aids.

At the beginning of a new production batch, the process parameters, such as quantity of solder paste and soldering temperature, can be set by interpreting simple cross-sections of the soldered connection. A reliable measure for achieving optimum parameters is the quantity of solder required to fill the hole. In soldered connections of high quality, the holes are filled to between 75 % and 100 %.

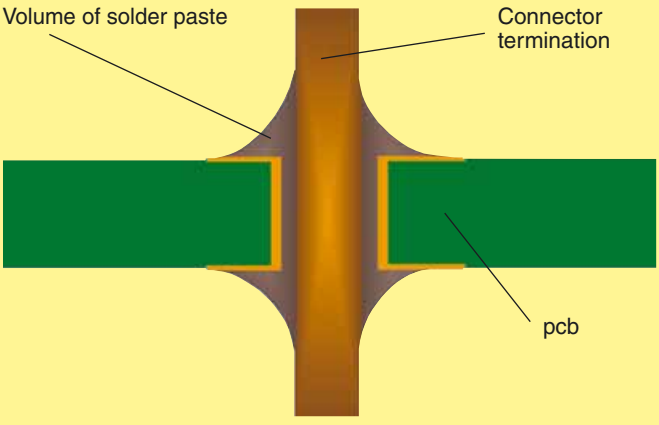


Fig. 4: Plated through hole with connector termination

SMC connectors

SMC (Surface Mount Compatible) connectors have to withstand temperatures of up to 225°C in the reflow oven for 10 to 15 seconds. Therefore, the moulding must be made from a dimensionally stable plastic which expands at the same rate as the pcb material when subjected to heat.

The length of the connector contacts should be such that they protrude by no more than 1.5 millimetres after insertion to the pcb. Each contact collects solder on its tip as it penetrates the solder paste in the hole. So if the contact was too long, this solder would no longer be able to reflow back into the plated through hole by capillary action during the soldering process, therefore the quality of the soldered connection would suffer as a result.

Connector design must permit both automatic assembly with pick-and-place machines and manual positioning for test and pre-production batches. It is also important for the packaging of the connectors to be suitable for automated assembly. Experience shows that deep-drawn film and reel packaging fed into the pick-and-place machines with the aid of a conveyor system is particularly suitable.

HARTING SMC technology

HARTING offers its customers a complete system concept for integrating SMC technology into existing production lines. We manufacture a wide range of SMC connectors (3 and 5 row) in compliance with DIN 41612, D-Sub connectors in compliance with DIN 41651 and connectors from the har-mik® series with contact spacing of 1.27 millimetres. In addition, HARTING supports the market with packaging and processing concepts, which have been developed in collaboration with renowned manufacturers of SMC soldering and assembly plants.

You will find more detailed information in our SMC catalogue, as well as in our hard metric connectors catalogue.

Advantages of the "Pin in Hole Intrusive Reflow" process:

- Partial dip soldering or press fitting is no longer required
- Complete compatibility with Surface Mount Technology
- Complete integration into the automated assembly process
- Reduced floor space in the production plant
- As a rule, no additional investment costs

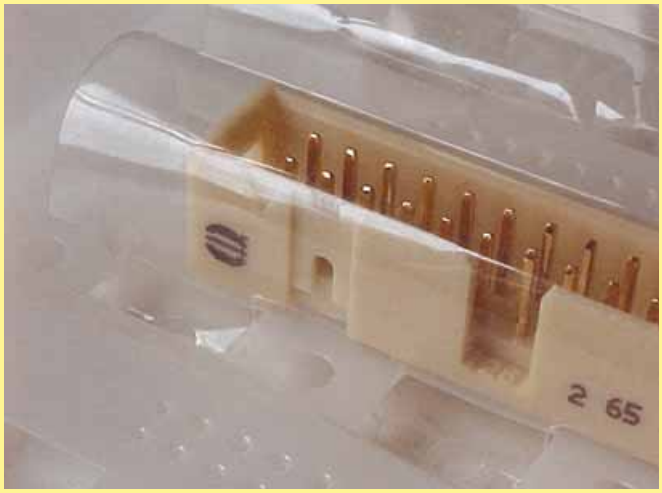


Fig. 5: HARTING connector mounted in a tape ready for placement using an odd form assembly station.

Fully automated assembling and printing devices, monitored through video camera inspection systems and laser technology.

Our claim is quality

Our challenge is to improve quality from day to day.

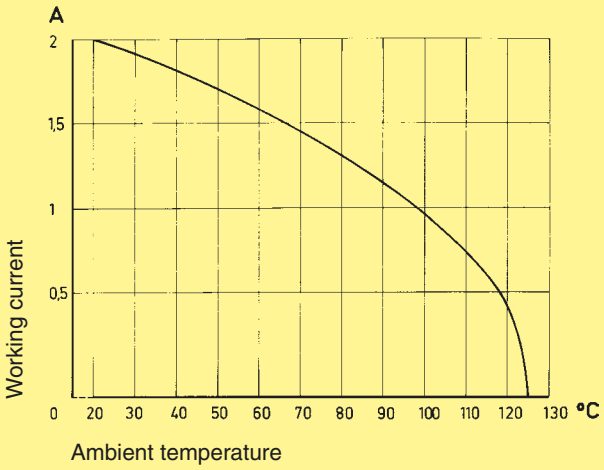
Number of contacts	32, 48, 64, 96
Contact spacing (mm)	2.54
Working current see current carrying capacity chart	2 A max.
Clearance	≥ 1.2 mm
Creepage	≥ 1.2 mm
Working voltage The working voltage also depends on the clearance and creepage dimensions of the pcb itself and the associated wiring	according to the safety regulations of the equipment Explanations see chapter 00
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance	≤ 15 mΩ
Insulation resistance	≥ 10^{12} Ω
Temperature range during reflow soldering	– 55 °C … + 125 °C max. + 240 °C for 15 s
Electrical termination	
Male connector	Solder pins for pcb connection Ø 1.0 ± 0.1 mm according to IEC 60 326-3
Female connector	Solder pins for pcb connection Ø 1.0 ± 0.1 mm according to IEC 60 326-3
Insertion and withdrawal force	32 way ≤ 30 N 48 way ≤ 45 N 64 way ≤ 60 N 96 way ≤ 90 N
Materials	
Mouldings	Poly cyclohexylene terephthalate (PCT), UL 94-V0
Contacts	Copper alloy
Contact surface	Contact zone: selectivly plated according to performance level[1)] Termination zone: tinned

[1)] Explanation performance levels see chapter 00

Current carrying capacity chart

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512

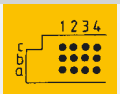
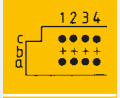
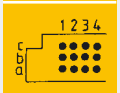
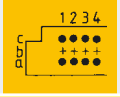


SMC

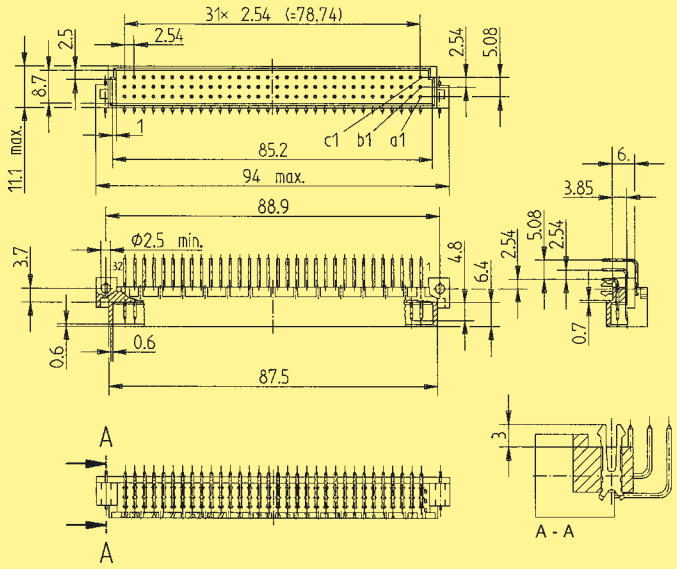
Number of contacts

96, 64

Male connectors, angled

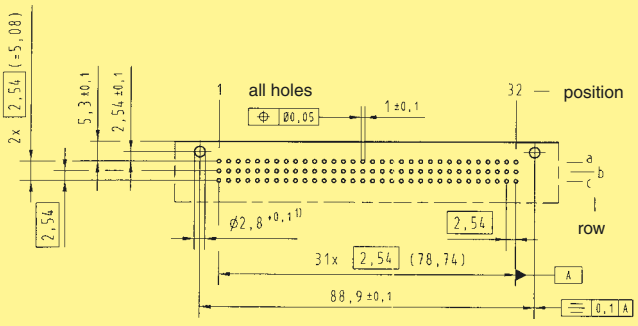
Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Male connector without retention clip	96			09 03 196 6919	09 03 196 2919
	64			09 03 164 6919	09 03 164 2919
with retention clip	96			09 03 396 6919	09 03 396 2919
	64			09 03 364 6919	09 03 364 2919

Dimensions

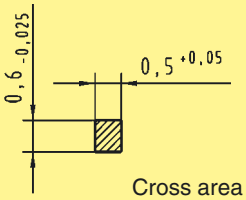


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b, c: A = 0.288 - 0.33 mm²

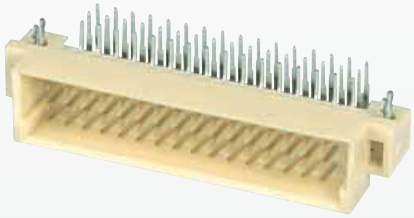
Dimensions in mm

SMC

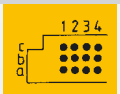
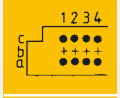
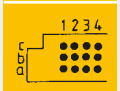
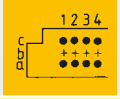
1) Recommendation for variants with clip: Drillings can be enlarged up to 3.1 mm ø to reduce standard mounting force (see chapter 00)

Number of contacts

48, 32

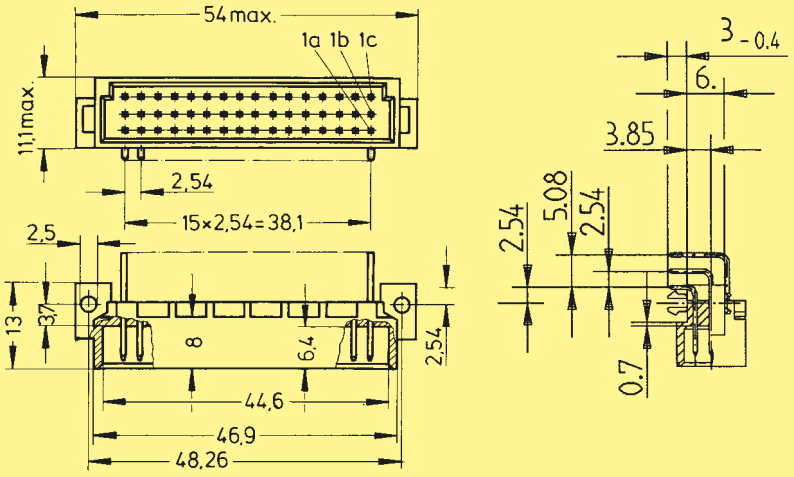


Male connectors, angled

Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00 2	Performance levels according to DIN 41 612. Explanation chapter 00 1
Male connector					
without retention clip	48			09 23 148 6919	09 23 148 2919
	32			09 23 132 6919	09 23 132 2919
with retention clip	48			09 23 348 6919	09 23 348 2919
	32			09 23 332 6919	09 23 332 2919

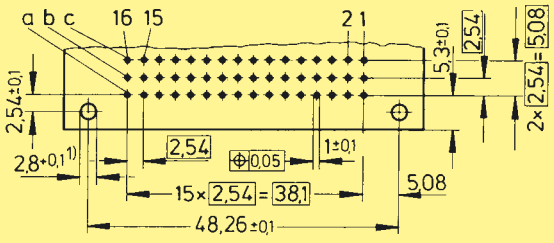
SMC

Dimensions

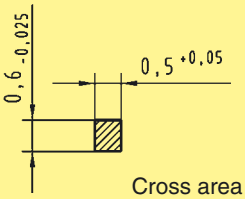


Board drillings

Mounting side



Cross section of solder terminations



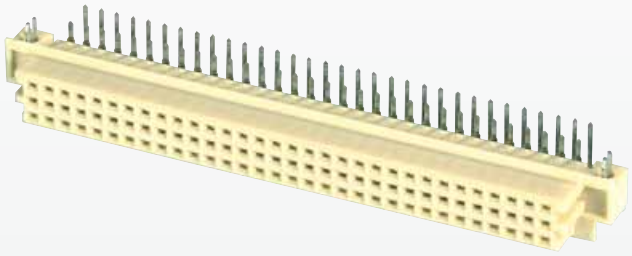
Cross area (A) of contacts row a, b, c: A = 0.288 - 0.33 mm²

Dimensions in mm

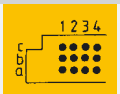
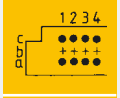
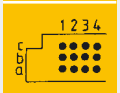
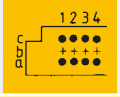
1) Recommendation for variants with clip: Drillings can be enlarged up to 3.1 mm ø to reduce standard mounting force (see chapter 00)

Number of contacts

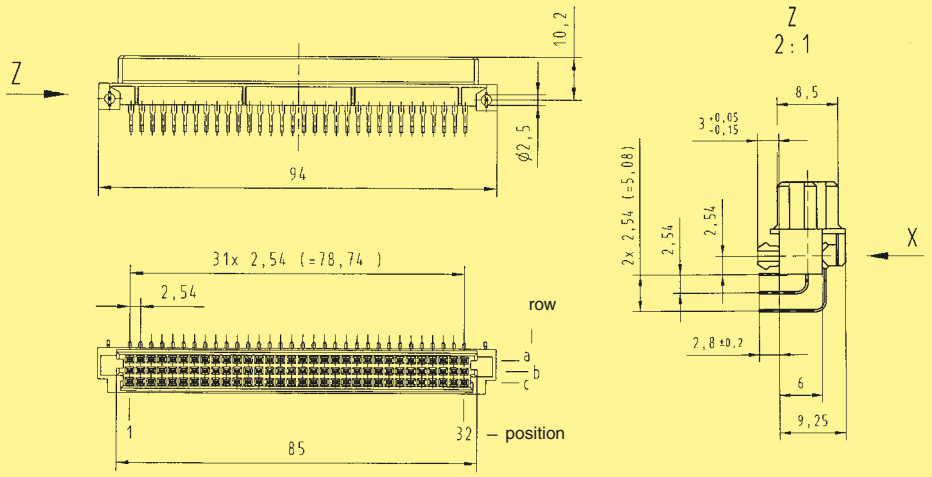
96, 64



Female connectors, angled

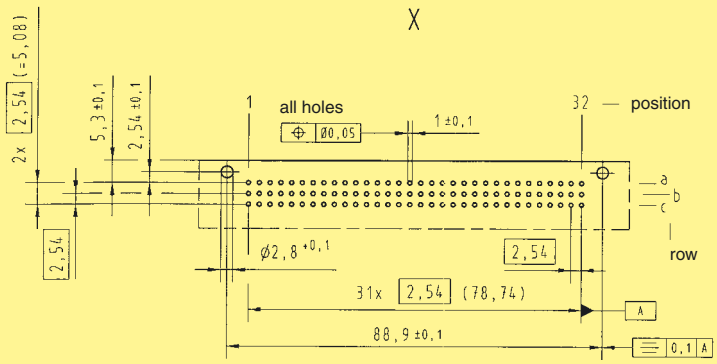
Identification	Number of contacts	Contact arrangement	Part No.	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Female connector					
without retention clip	96			09 73 296 6804	09 73 296 2804
	64			09 73 264 6804	09 73 264 2804
with retention clip	96			09 73 496 6804	09 73 496 2804
	64			09 73 464 6804	09 73 464 2804

Dimensions

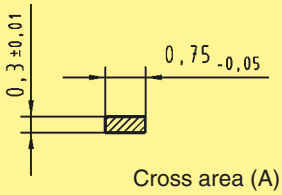


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row a, b, c: A = 0.203 - 0.233 mm²

Dimensions in mm

SMC

[1] Recommendation for variants with clip: Drillings can be enlarged up to 3.1 mm ø to reduce standard mounting force (see chapter 00)

Number of contacts	160
Contact spacing (mm)	2.54
Working current	1 A at 70 °C and all contacts are loaded

see current carrying capacity chart

Clearance and creepage distances

minimal clearance and creepage distance[1]		distance in mm	
		rows a, b, c	rows z, d
between two rows	clearance	1.2	1.2
	creepage	1.2	1.2
between two contacts (in a row)	clearance	1.2	1.0
	creepage	1.2	1.0

[1] valid for mated and unmated connectors

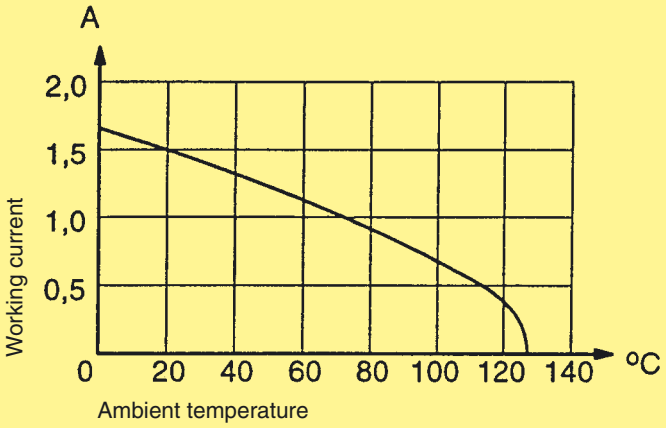
Working voltage	
The working voltage also depends on the clearance and creepage dimensions of the pcb itself and the associated wiring	according to the safety regulations of the equipment Explanations see chapter 00
Test voltage $U_{r.m.s.}$	1 kV
Contact resistance	
rows a, b, c	≤ 20 mΩ
rows z, d	≤ 30 mΩ
Insulation resistance	≥ 10^{10} Ω acc. to IEC 60 512-2
Temperature range	– 55 °C … + 125 °C
during reflow soldering	max. + 240 °C for 20 s
Electrical termination	
Male connector	Solder pins for pcb connection Ø 1.0 ± 0.1 mm according to IEC 60 326-3
Insertion and withdrawal force	≤ 160 N
Materials	
Mouldings	Liquid Cristal Polymer (LCP), UL 94-V0
Contacts	Copper alloy
Contact surface	Contact zone: selectively plated[2] Termination zone: tinned

[2] Explanation performance levels see chapter 00

Current carrying capacity

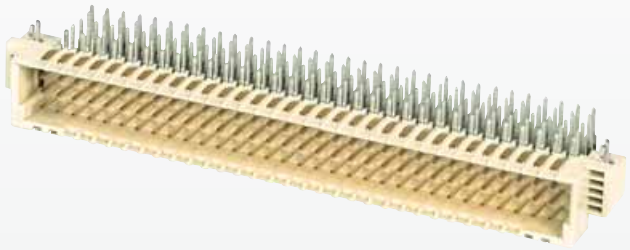
The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512



Number of contacts

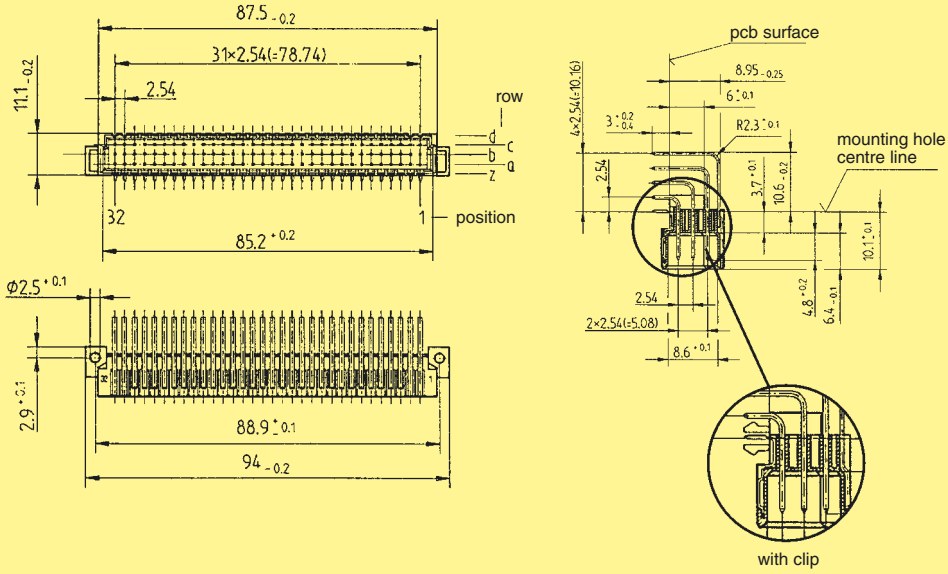
160



Male connectors, angled

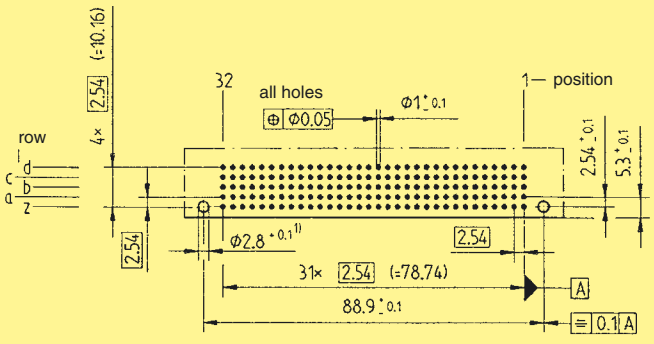
Identification	Number of contacts	Contact arrangement	Part No. Performance levels according to DIN 41 612 Explanation chapter 00 2	1
Male connector* without retention clip	160	z, a, b, c, d	02 01 160 2101	02 01 160 1101
with retention clip	160	z, a, b, c, d	02 01 160 2102	02 01 160 1102

Dimensions



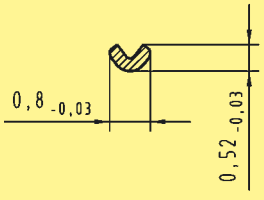
Board drillings

Mounting side

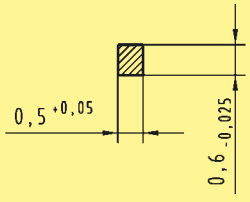


Cross section of solder terminations

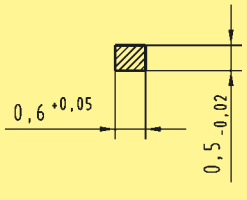
Row z:
A = 0.214 - 0.248 mm²



Rows a, b, c:
A = 0.288 - 0.33 mm²



Row d:
A = 0.288 - 0.325 mm²



A = cross area of contacts

Dimensions in mm

* Pre-leading contacts at positions d1, d2, d31 and d32

1) Recommendation for variants with clip: Drillings can be enlarged up to 3.1 mm ø to reduce standard mounting force (see chapter 00)

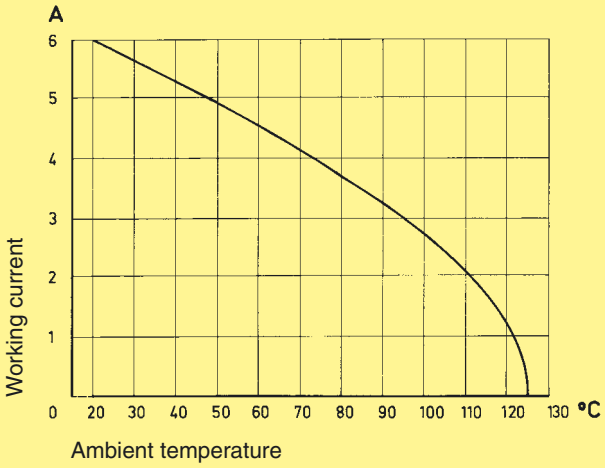
Number of contacts	48
Contact spacing (mm)	5.08
Working current see current carrying capacity chart	6 A max.
Clearance	≥ 1.6 mm
Creepage	≥ 3.0 mm
Working voltage The working voltage also depends on the clearance and creepage dimensions on the pcb itself and the associated wiring	according to the safety regulations of the equipment Explanations see chapter 00
Test voltage $U_{r.m.s.}$	1.55 kV (contact-contact) 2.5 kV (contact-ground)
Contact resistance	≤ 15 mΩ
Insulation resistance	≥ 10^{12} Ω
Temperature range beim Reflowlöten	– 55 °C … + 125 °C max. + 240 °C für 15 s
Electrical termination Male connector	Solder pins for pcb connections Ø 1 ± 0.1 mm according to IEC 60 326-3
Insertion and withdrawal force	≤ 75 N
Materials Mouldings	Poly cyclohexylene terephthalate (PCT) UL 94-V0
Contacts	Copper alloy
Contact surface	Contact zone: selectively plated according to performance level[1)] Termination zone: tinned

[1)] Explanation of performance levels see chapter 00

Current carrying capacity

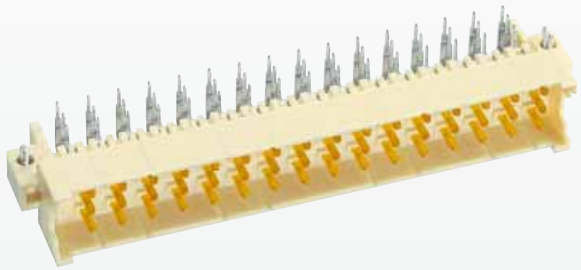
The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512

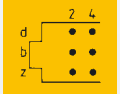
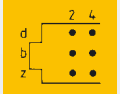


Number of contacts

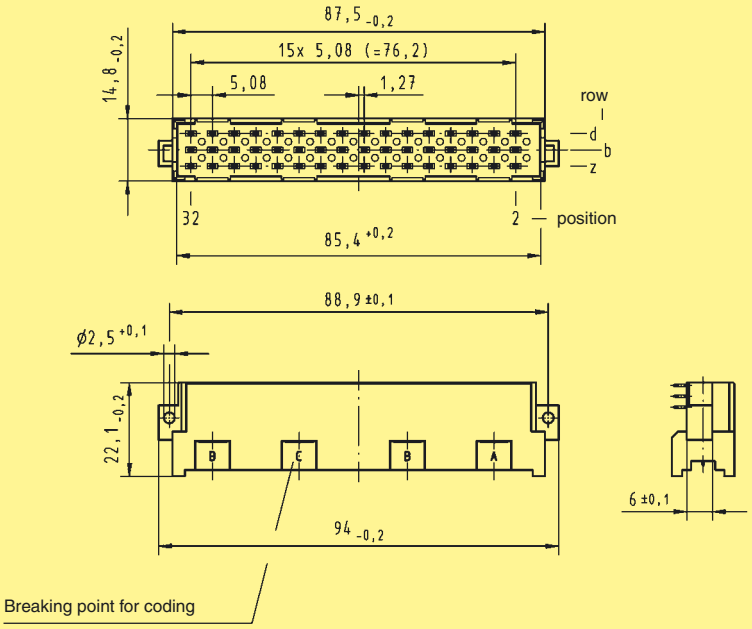
48



Male connectors, angled

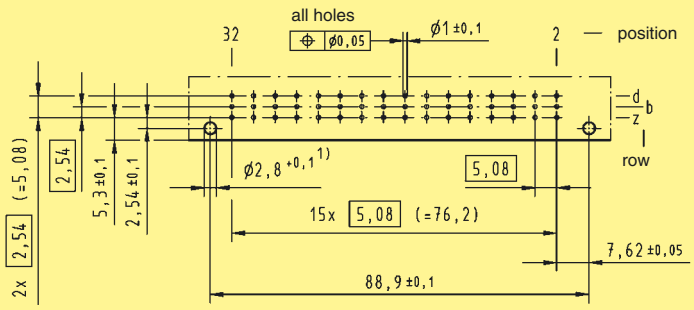
Identification	Number of contacts	Contact arrangement	Part No. 3	Performance levels according to DIN 41 612. Explanation chapter 00 2	1
Male connector without retention clip	48		09 06 148 7951	09 06 148 6951	09 06 148 2951
with retention clip	48		09 06 348 7951	09 06 348 6951	09 06 348 2951

Dimensions

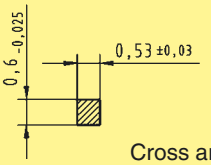


Board drillings

Mounting side



Cross section of solder terminations



Cross area (A) of contacts row z, b, d: A = 0.288 - 0.336 mm²

Dimensions in mm

SMC

1) Recommendation for variants with clip: Drillings can be enlarged up to 3.1 mm ø to reduce standard mounting force (see chapter 00)


Bilder, Grafiken,
Animationen,
nem System, in dem diese Infor-
Mul|ti|me
Zusam
iedener
der, Grafiken,
imationen,
in vielen Staaten
m System

har:bus® 64 / har:bus® 64 inverse

The past 20 years the VMEbus has reached a dominant position for industrial busses with a number of suppliers.

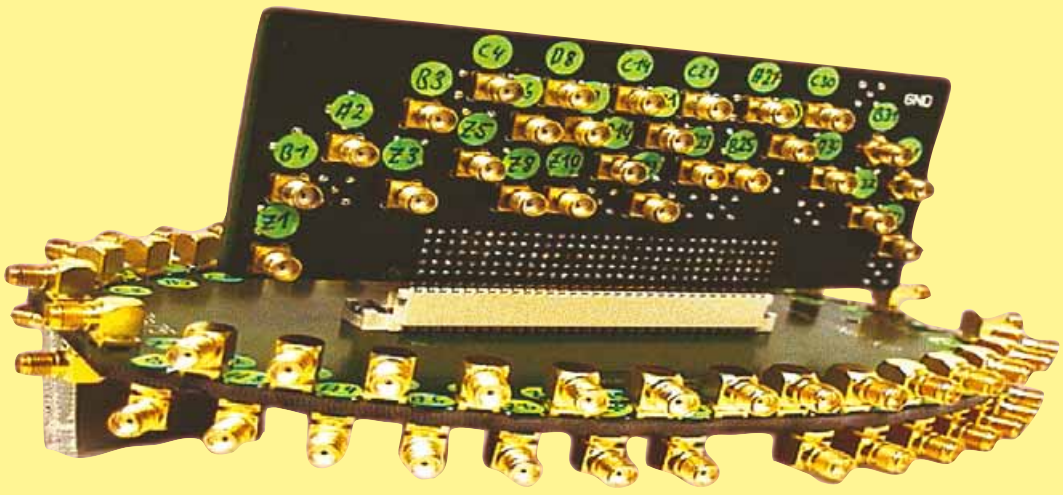
Despite numerous new bus systems based on the rapid changes in chip technology, VMEbus systems offer significant advantages such as their robustness, reliability and increased availability of processor, memory and I/O cards.

Additional advantages appear under real-time conditions, where unforeseen events have to be managed. This is realised with the program interrupt concept and variable control that closely monitors the bus system.

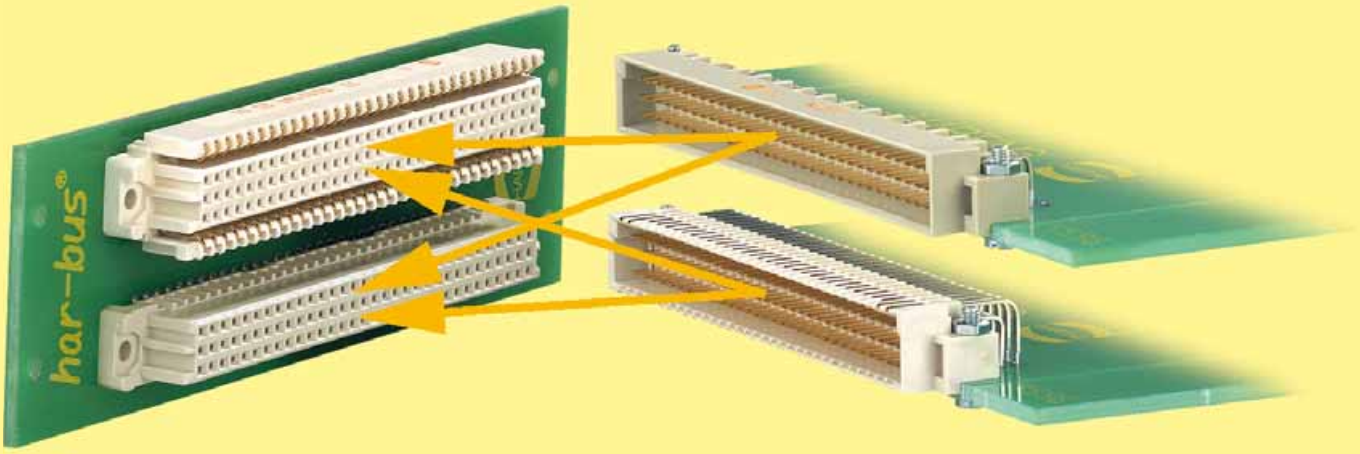
With the increase in processing speeds and data transmission rates, 3 row DIN 41 612 connectors have reached their limit, so the VME standard needs to be enhanced further.

When VME architecture was increased from 8-bit to 64-bit and data transmission rates up to 160 Mbyte/s (VME 64x), HARTING introduced **har-bus® 64** with 160 pins. This Eurocard connector is 100 % backwards compatible to existing 3 row connectors with 96 contacts, therefore old can plug into new.

To offer the best design possible from the start, HARTING developed spice models that were later certified via signal integrity measurements of the connector.



High precision slot structure with VME pinning for connector characterisation.



Backward compatibility

The design of har:bus® 64 female connectors allows mating of any combinations of the 5 or 3 row versions without mechanical interference, thus making it possible for users to upgrade and maintain existing systems at lower costs. It is also possible to mate 5 row male connectors with 3 row female connectors.

The feature of backward compatibility allows a gradual upgrade of existing Eurocard based systems without the additional cost of a complete system redesign. It is not necessary to replace conventional 96 pin based boards as they remain pluggable into the 160 pin based systems.

Not only VMEbus, but also existing proprietary bus systems for which 3 row 96 pin connectors are no longer performance sufficient, har:bus® 64 provides the opportunity to adapt the system economically without a complete redesign to a new bus architecture.

har:bus® 64 – five rows – 160 poles

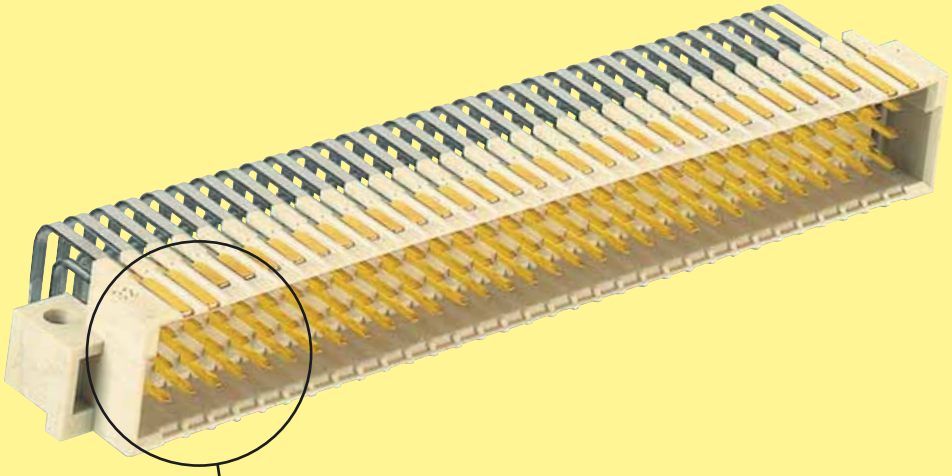
Two additional rows of contacts in the har:bus® 64 connector offer new system features:

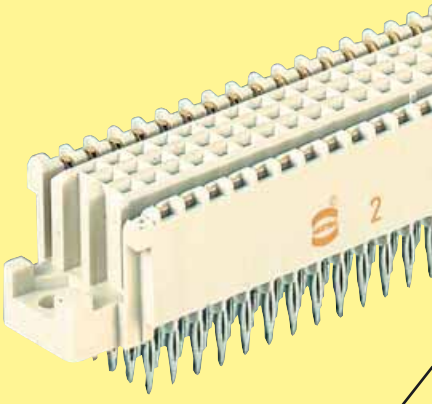
- Additional contacts for I/O and system upgrade
- New voltage supplies for 3.3 V and 48 V system components
- Identifying locations of system components and the bus length. “Plug & Play“
- Improved signal/ground ratio for reliable signal data transfer at rates up to 320 MByte/s
- Live Insertion for replacing processor or memory cards without closing down the system
- User defined pins for test and maintenance bus lines

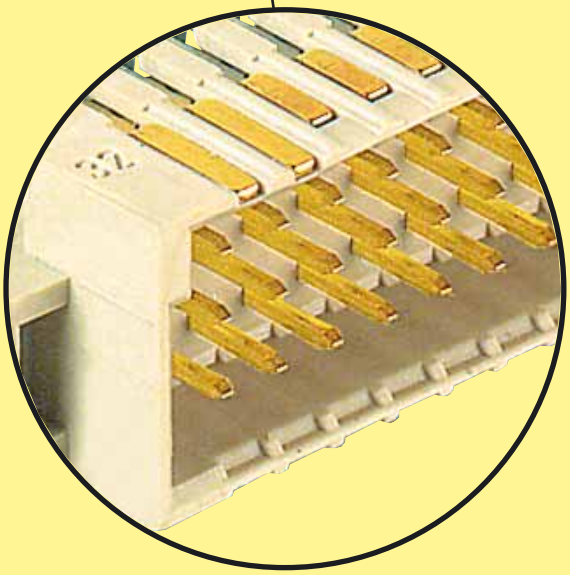
The advantages of har:bus® 64 in detail

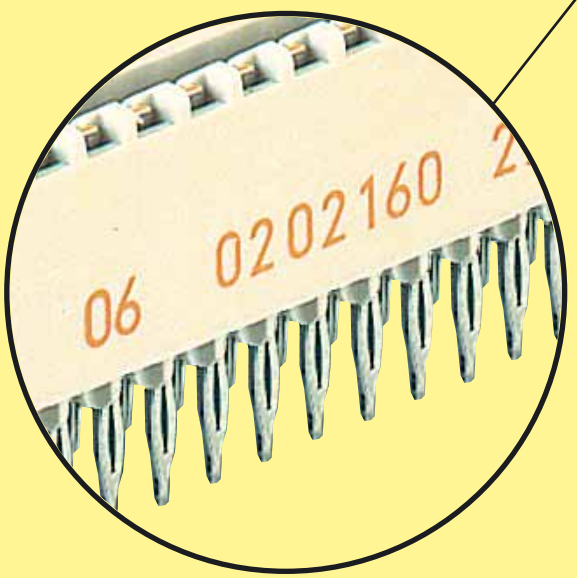
User-defined pins in the outer rows can be used for application specific functions such as **additional I/O**. Configured as a shield to provide larger ground return paths, they assure for **data transfer rates up to 320 MByte/s**.

Proprietary bus systems can utilise the new contact rows to optimise signal-to-ground ratios and improve system speed.





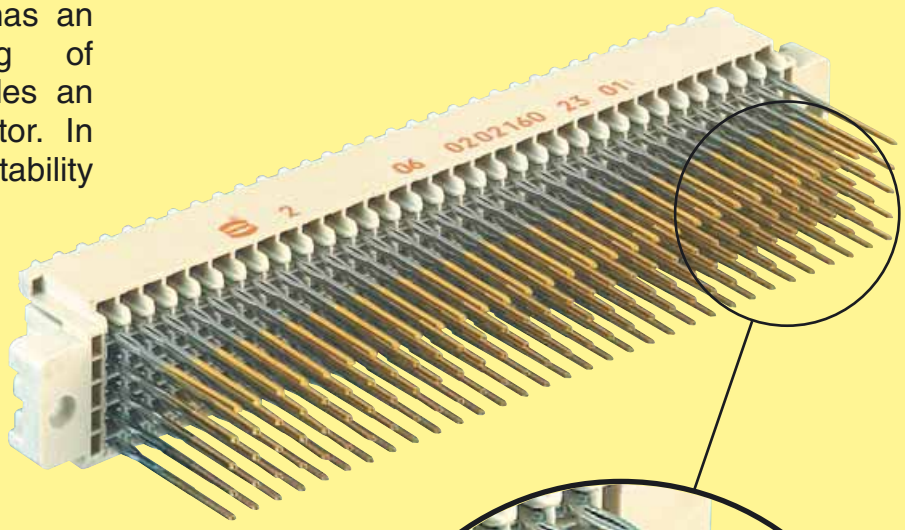


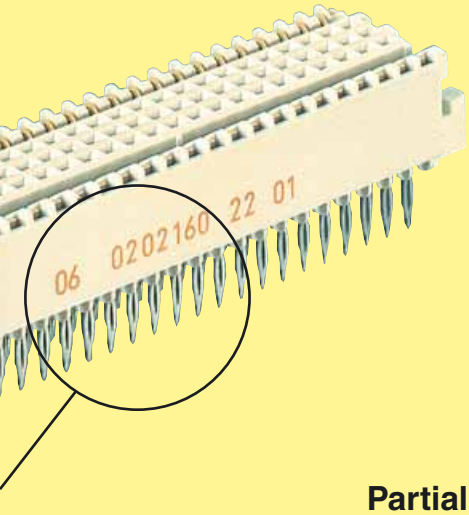


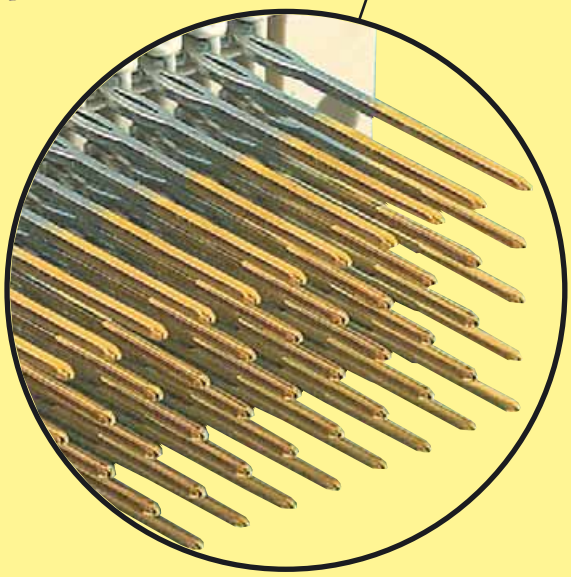
Four preleading contacts (1.5 mm) serve to pre-load the transmit and receive logic so that the bus will not experience glitches during **live insertion** of new cards into the backplane.

Backplane connector terminations are designed in solderless **press-in technology**.
The connector can be installed without any special tooling using economical **flat dies** for high speed insertion.

The insulator, made of LCP, has an inherent flammability rating of UL 94-V0 and therefore provides an **environment friendly** connector. In addition, the heat deformation stability of LCP makes the connector **surface-mount compatible** (see chapter 05).

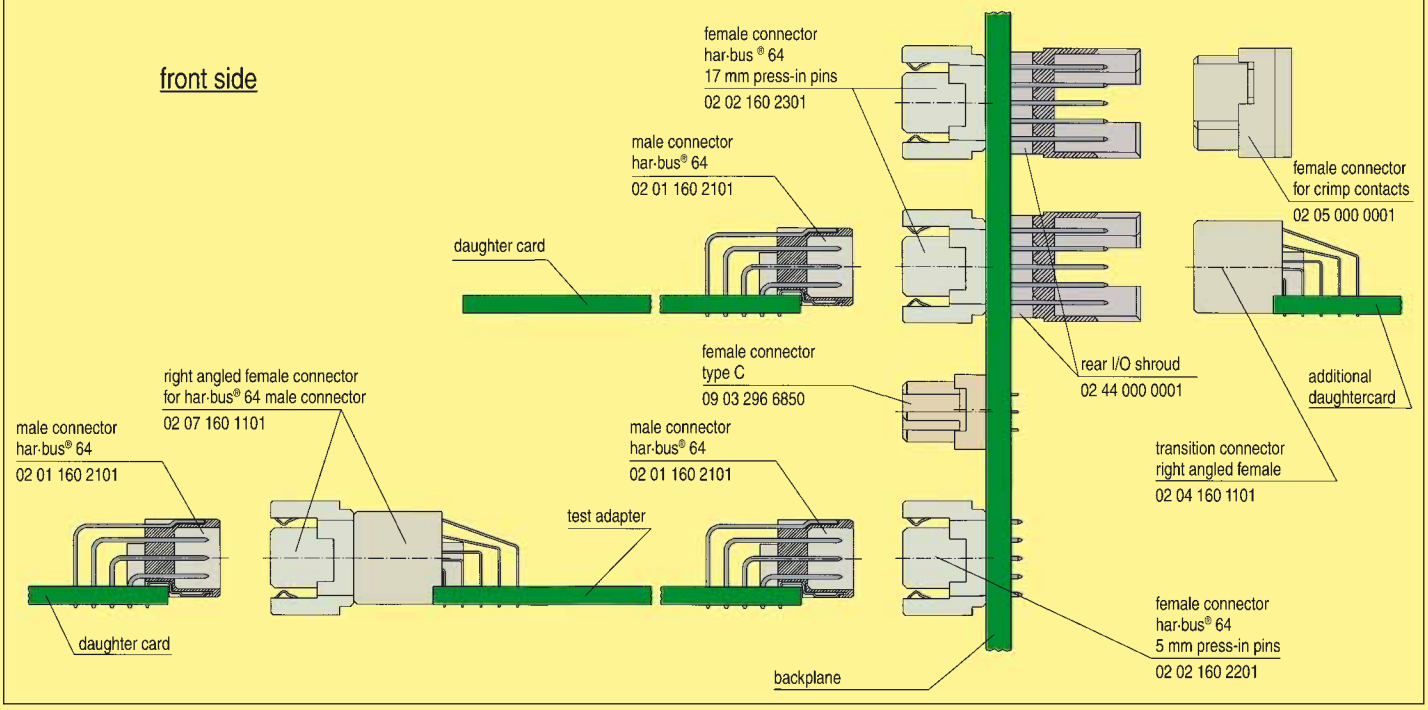






Partially gold plated terminations with precisely formed tips serve as contact area for **rear transition boards.**

har·bus® 64 system description



Number of contacts	160
Contact spacing (mm)	2.54
Working current	1 A at 70 °C and all contacts are loaded

see current carrying capacity chart

Clearance and creepage distances*

minimal clearance and creepage distance[1]		distance in mm	
		rows a, b, c	rows z, d
between two rows	clearance	1.2	1.2
	creepage	1.2	1.2
between two contacts (in a row)	clearance	1.2	1.0
	creepage	1.2	1.0

[1] valid for mated and unmated connectors

Working voltage

The working voltage also depends on the clearance and creepage dimensions of the pcb itself and the associated wiring: according to the safety regulations of the equipment. Explanations see chapter 00

Test voltage $U_{r.m.s.}$

1 kV

Contact resistance

rows a, b, c: ≤ 20 mΩ
rows z, d: ≤ 30 mΩ

Insulation resistance

≥ 10^{10} Ω acc. to IEC 60512-2

Temperature range

– 55 °C … + 125 °C

Electrical termination

Male connector	Solder pins for pcb termination Ø 1.0 ± 0.1 mm according to IEC 60 326-3
Female connector	Solder pins for pcb termination Ø 1.0 ± 0.1 mm according to IEC 60 326-3 Compliant press-in terminations Crimp terminal 0.08 - 0.56 mm²
Diameter of pcb plated through holes	0.94 - 1.09 mm
pcb thickness	≥ 1.6 mm
Recommended pcb holes for press-in technology	in acc. to EN 60 352-5[2]

Insertion and withdrawal force

≤ 160 N

Materials

Mouldings	• Liquid Cristal Polymer (LCP), for male connectors, straight female connectors, UL 94-V0 • Thermoplastic resin glass-fibre filled, UL 94-V0
Contacts	Copper alloy

Contact surface

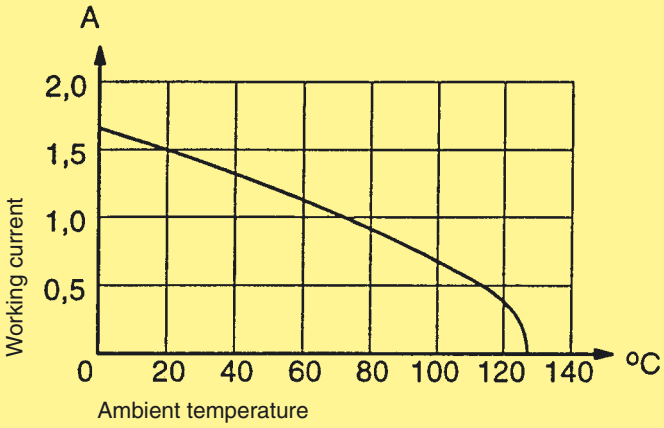
Contact zone: selectively plated[3]
Termination zone: tinned selectively plated[3] similar to the performance level of the contact zone

[2] Details see chapter 04
[3] Explanation performance levels see chapter 00

Current carrying capacity chart

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512



VITA

VMEbus Technology ™

* for angled female connector see page 06.20

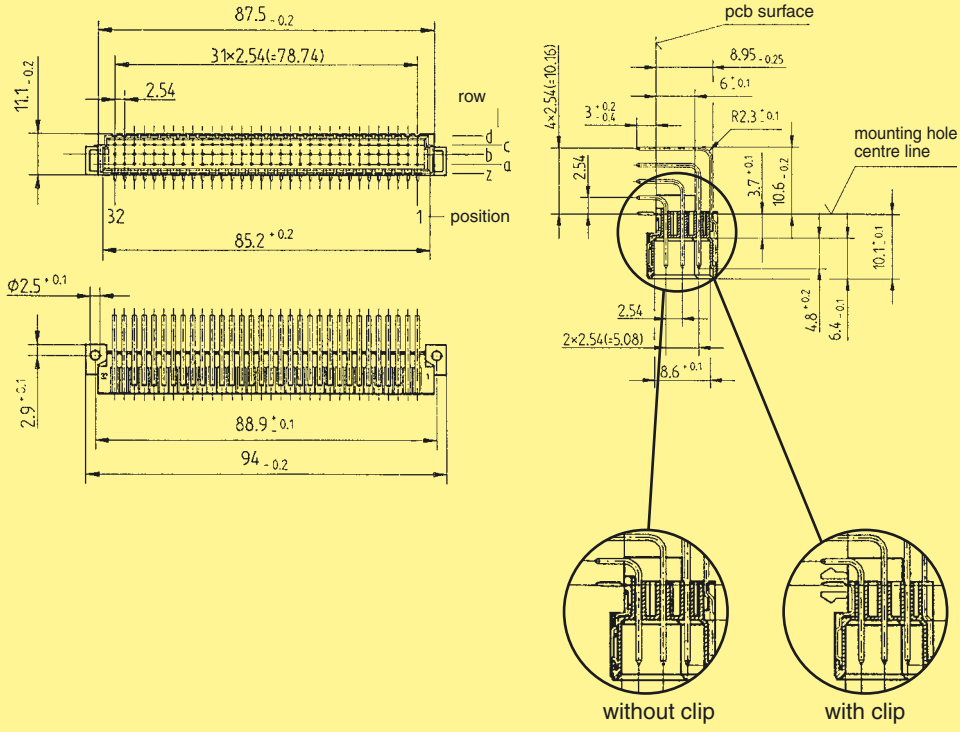
Number of contacts

160

Male connectors

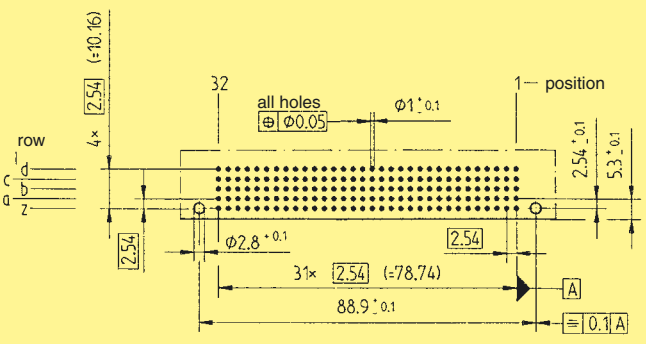
Identification	Number of contacts	Contact arrangement	Part No. Performance levels according to DIN 41 612 Explanation chapter 00 2	1
Male connectors, angled[1]				
SMC version with solder pins*				
without retention clip	160	z, a, b, c, d	02 01 160 2101	02 01 160 1101
with retention clip	160	z, a, b, c, d	02 01 160 2102	02 01 160 1102

Dimensions



Board drillings

Mounting side



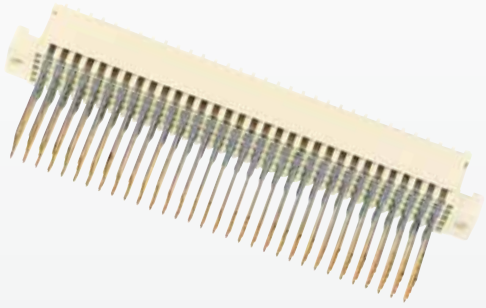
Dimensions in mm

* SMC see chapter 05

[1] Pre-leading contacts at positions d1, d2, d31 and d32

Number of contacts

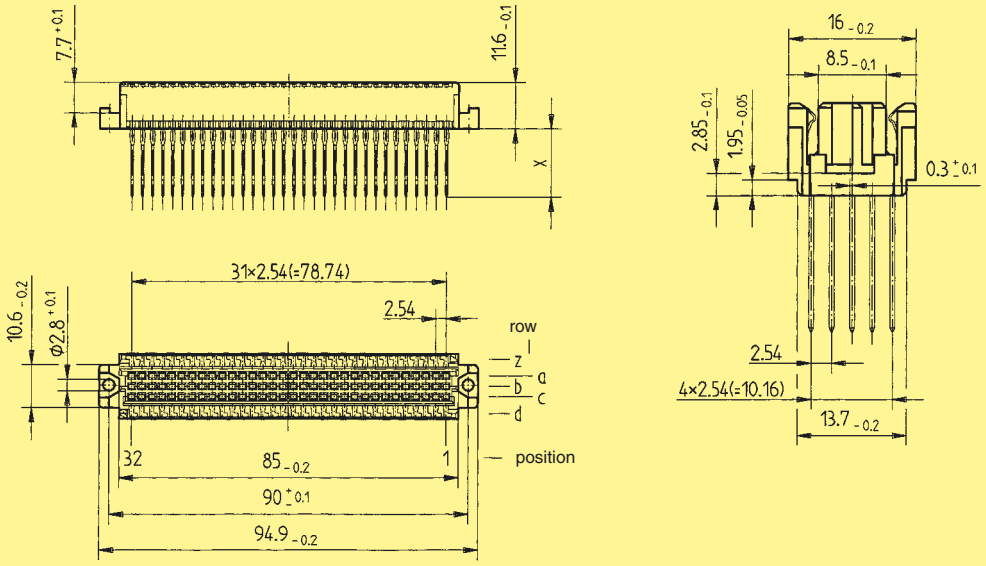
160



Female connectors

Identification	Number of contacts	Contact arrangement	Part No. Performance levels according to DIN 41 612 Explanation chapter 00 2	1
Female connectors, straight				
with press-in terminations				
with 4.5 / 5 mm	160	z, a, b, c, d	02 02 160 2201	02 02 160 1201
fixing flange 17 mm*	160	z, a, b, c, d	02 02 160 2301	02 02 160 1301
without 5 mm	160	z, a, b, c, d	02 02 160 2202	02 02 160 1202
fixing flange 17 mm*	160	z, a, b, c, d	02 02 160 2302	02 02 160 1302

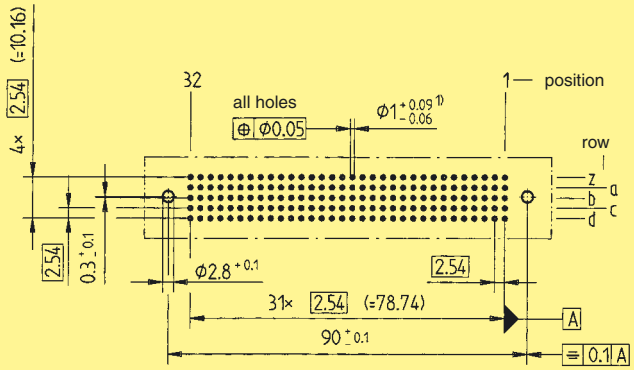
Dimensions



Part number	Dimension "X" for row z	a	b	c	d
02 02 160 2201 / 02 02 160 1201	5.0	4.5	4.5	4.5	5.0
02 02 160 2301 / 02 02 160 2302	17.0	17.0	17.0	17.0	17.0
02 02 160 2202 / 02 02 160 1202	5.0	5.0	5.0	5.0	5.0
02 02 160 2302 / 02 02 160 1302	17.0	17.0	17.0	17.0	17.0

Board drillings

Mounting side

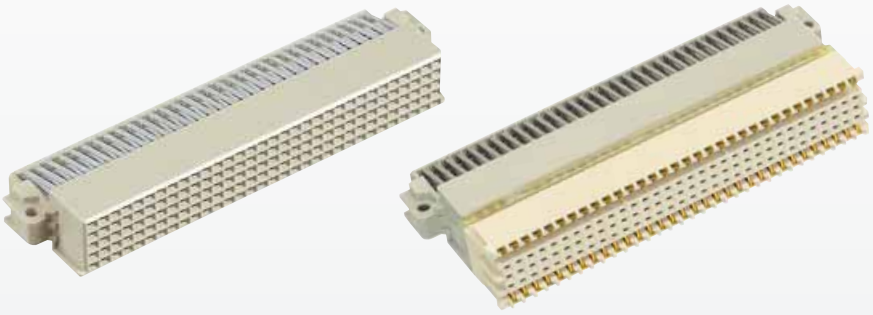


Dimensions in mm

* selectively gold-plated
Press-in technology see chapter 04
Tooling see chapter 30

Number of contacts

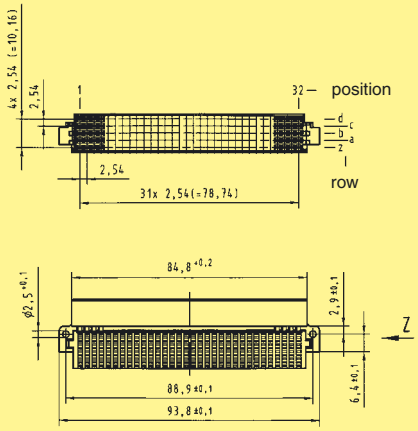
160

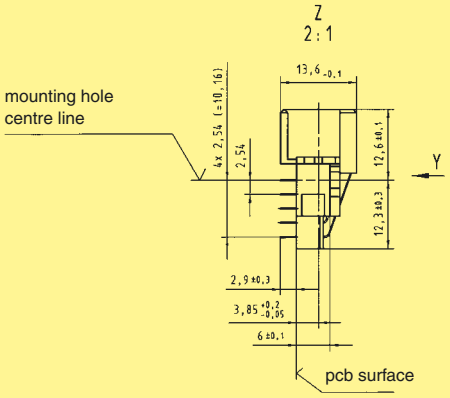


Female connectors

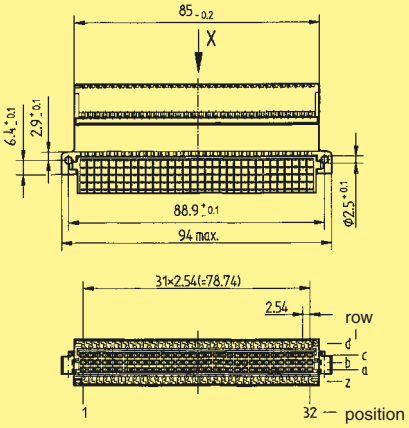
Identification	Number of contacts	Contact arrangement	Part No. Performance level 1 according to DIN 41 612	Explanation chapter 00
Female connectors, angled				
with solder pins				
for rear access and har-bus® 64 inverse male connector	160	z, a, b, c, d	02 04 160 1101	
for har-bus® 64 male connector	160	z, a, b, c, d	02 07 160 1101	

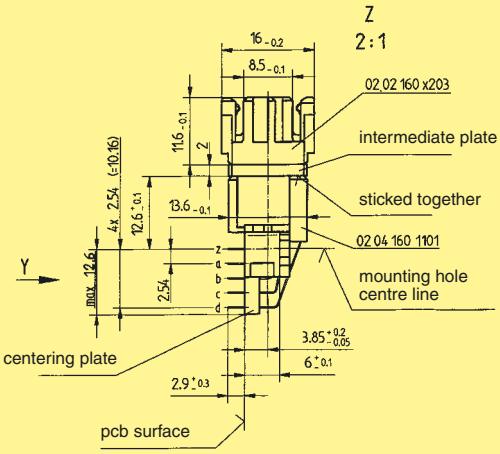
Dimensions
02 04 160 1101



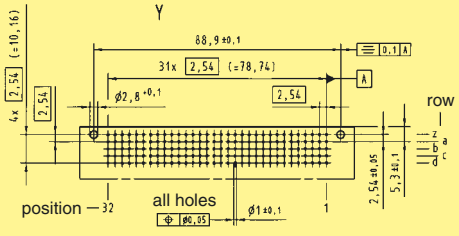


Dimensions
02 07 160 1101





Board drillings
Mounting side

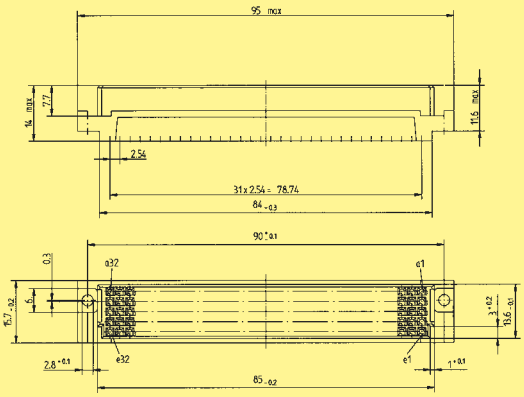
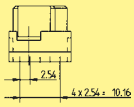


Dimensions in mm

Number of contacts

max. 160

Female connectors

Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Female connector for crimp contacts order contacts separately fits into shell housing C see chapter 20	160	02 05 000 0001		

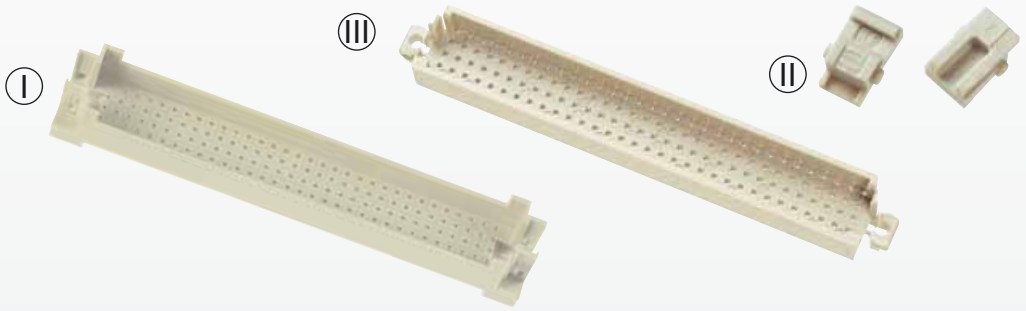
Identification Wire gauge	Performance level 2	Wire gauge mm²	AWG	Insulation-ø mm
Female crimp contacts Bandoliered contacts (approx. 500 pieces)				
1	02 05 000 2501	0.08 - 0.22	28 - 24	0.7 - 1.5
2	02 05 000 2502	0.14 - 0.56	26 - 20	0.8 - 2.0

HARTING crimping tool for bandoliered contacts (500 pieces)	02 99 000 0010	Wire gauge 0.08 - 0.5 mm²

Removal tool	02 99 000 0013

Number of contacts

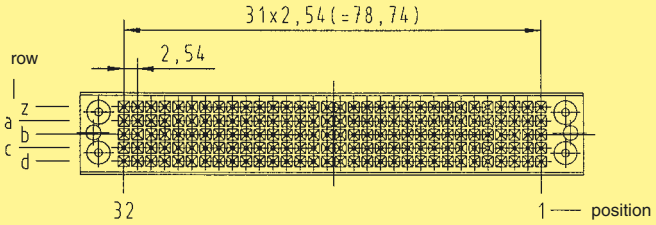
160

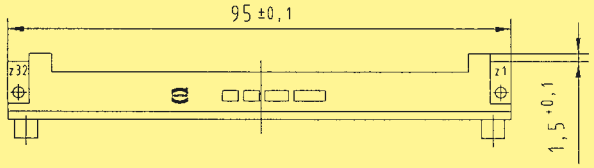


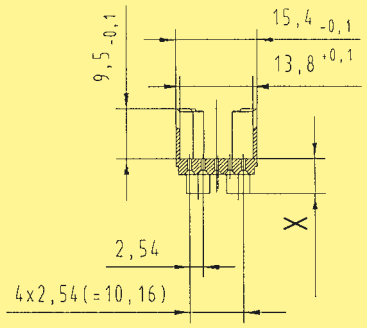
Pin shrouds

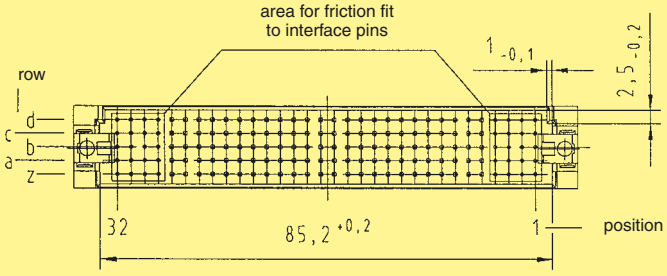
Identification	Number of contacts	Contact arrangement	Part No.	pcb thickness (± 0.3 mm)
Pin shrouds[1] I	160	z, a, b, c, d	02 44 000 0007	2.8
			02 44 000 0001	3.4
			02 44 000 0002	4.0
			02 44 000 0003	4.6
			02 44 000 0004	5.2
			02 44 000 0005	5.8
			02 44 000 0006	6.4
II Fixing brackets for shell housing C[2]			02 44 000 0009	
III Shroud insert for 3 row female connectors			02 44 000 0008	

Dimensions









pcb thickness	X
2.8 ± 0.3	6.6 – 0.1
3.4 ± 0.3	6.0 – 0.1
4.0 ± 0.3	5.4 – 0.1
4.6 ± 0.3	4.8 – 0.1
5.2 ± 0.3	4.2 – 0.1
5.8 ± 0.3	3.6 – 0.1
6.4 ± 0.3	3.0 – 0.1

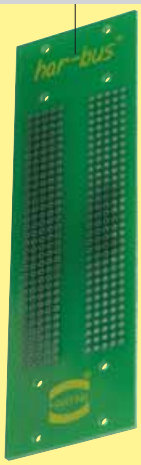
Dimensions in mm

[1] Insert block (02 09 000 0012) for assembly see chapter 30
[2] order 2 pieces per connector

Application 1*

Female connector
02 02 160 2301

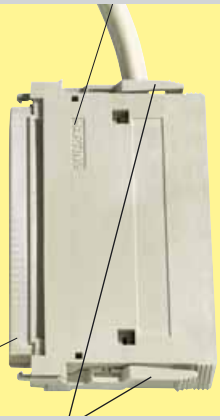
Backplane



Pin shroud
02 44 000 0007

Fixing brackets
02 44 000 0009

Shell housing C
09 05 048 0501



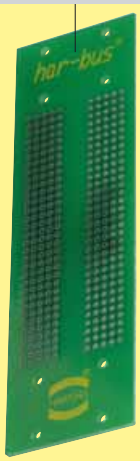
Female connector
with crimp contacts
02 05 000 0001

Locking lever
left 09 02 000 9902
right 09 02 000 9903

Application 2*

Female connector
02 02 160 2301

Backplane



Pin shroud
02 44 000 0007

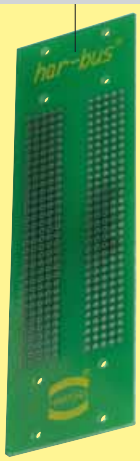
Locking lever
09 03 000 9913

Female connector
for crimp contacts
02 05 000 0001

Application 3

Female connector
02 02 160 2301

Backplane



Pin shroud
02 44 000 0007

Shroud insert
02 44 000 0008

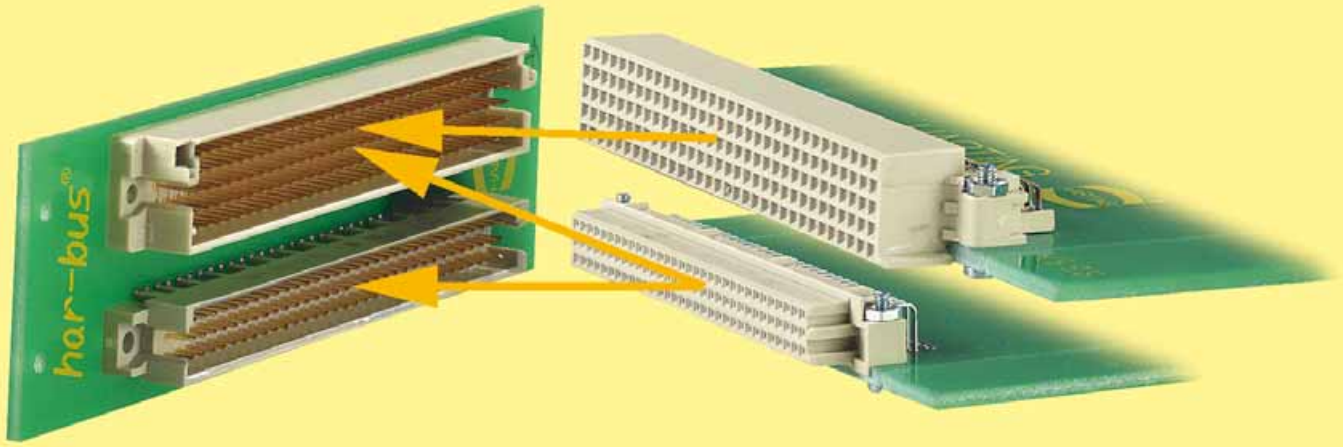
Female connector
09 73 296 6801

* Only for applications without rear PO-connector

Backward compatible system upgrade with inverse connectors

The inverse types of DIN 41 612 connectors, e.g. 3 row type R connectors, have a strong position in telecoms. However, the trend is for increasing data transfer rates and the demand for additional signal pins.

The 5 row inverse connector system allows a gradual enhancement of existing systems. The 5 row male connector is mateable with both daughter cards with 3 row female connectors and with innovative high-speed boards with 5 row female connectors.



har:bus® 64 inverse is a 5 row 160 pin connector that supplies additional rows d and z to type R connectors according to DIN 41 612.

Due to the special design of the moulding the male connectors are backwards compatible to 3 row type R female connectors. An internal coding system prevents the mismating of female connectors.

The male connector is fully compatible with all 3 row type R female connectors and the 5 row angled har:bus® 64 female connector.

The additional contact rows d and z of har:bus® 64 inverse offer following advantages to the user:

- **Additional contacts** for I/O or new functions yet to be defined
- **Improved signal/ground ratio** for reliable data transfer at rates up to 320 MByte/s
- **Backward compatibility** i.e. daughter cards with 3 row connectors can be upgraded without function loss
- **Secure mating** due to internal coding
- **Gradual system enhancement on demand**

Number of contacts	160
Contact spacing (mm)	2.54
Working current	1 A at 70 °C and all contacts are loaded

see current carrying capacity chart

Clearance and creepage

minimal clearance and creepage distance[1]		distance in mm	
		male connector	female connector
between two rows	clearance	1.4	0.6
	creepage	1.4	0.6
between two contacts (in a row)	clearance	1.2	0.8
	creepage	1.2	0.8

[1] valid for mated and unmated connectors

Working voltage

The working voltage also depends on the clearance and creepage dimensions of the pcb itself and the associated wiring: according to the safety regulations of the equipment. Explanations see chapter 00

Test voltage $U_{r.m.s.}$	1 kV
Contact resistance	≤ 20 mΩ
Insulation resistance	≥ 10^{10} Ω acc. to IEC 60512-2
Temperature range	– 55 °C … + 125 °C

Electrical termination

Male connector	Compliant press-in termination
Diameter of pcb plated through holes	0.94 - 1.09 mm
pcb thickness	≥ 1.6 mm
Recommended pcb holes for press-in technology	in acc. to EN 60 352-5[2]
Female connector	Solder pins for pcb connection Ø 1.0 ± 0.1 mm according to IEC 60 326-3
Insertion and withdrawal force	≤ 160 N

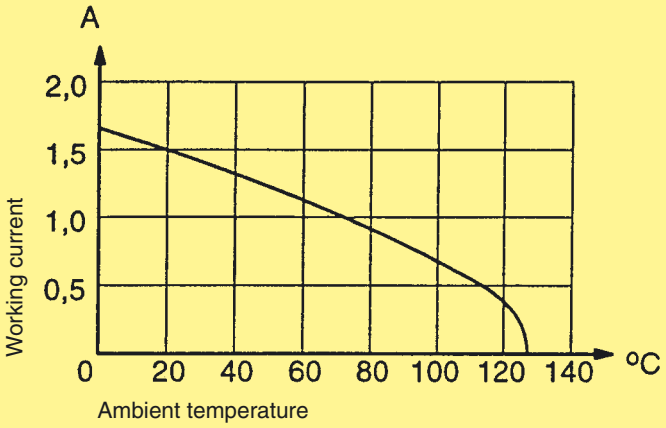
Materials

Mouldings	Thermoplastic resin, glass-fibre filled, UL 94-V0
Contacts	Copper alloy
Contact surface	Contact zone: selectively plated[3] Termination zone: tinned

Current carrying capacity chart

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

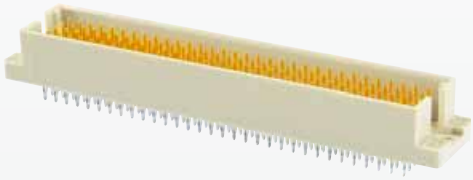
Control and test procedures according to DIN IEC 60 512



[2] Details see chapter 04
[3] Explanation of performance levels see chapter 00

Number of contacts

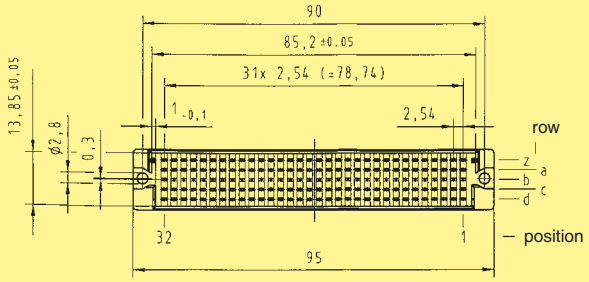
160

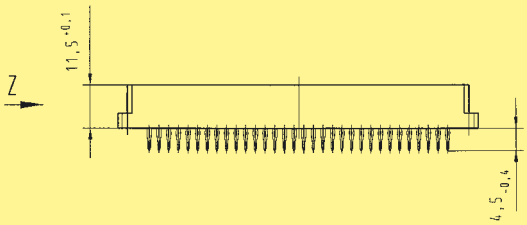


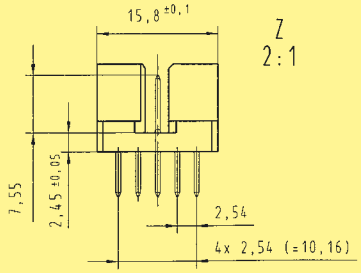
Male connectors

Identification	Number of contacts	Contact arrangement	Part No. Performance levels according to DIN 41 612 Explanation chapter 00 2	1
Male connectors, straight with press-in terminations	160	z, a, b, c, d	02 08 160 2601	02 08 160 1601

Dimensions

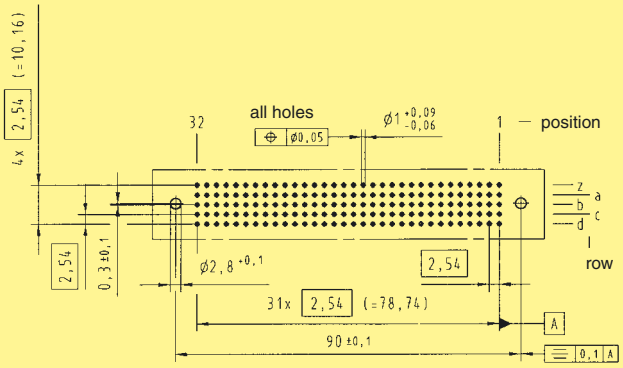






Board drillings

Mounting side

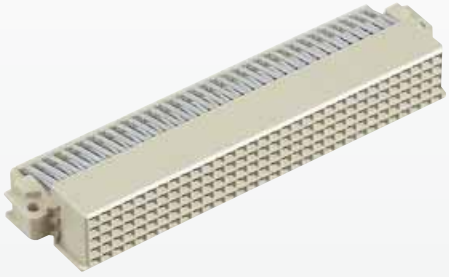


Dimensions in mm

Tooling see chapter 30
Press-in technique see chapter 04

Number of contacts

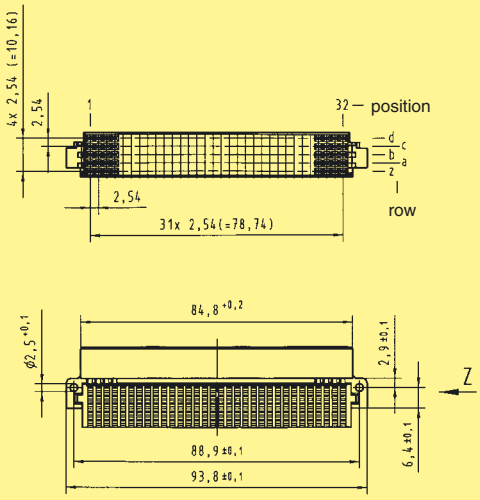
160

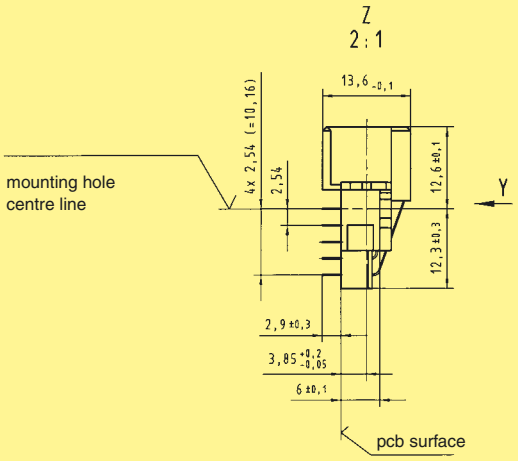


Female connectors

Identification	Number of contacts	Contact arrangement	Part No. Performance level 1 according to DIN 41 612	Explanation chapter 00
Female connectors, angled with solder pins for har-bus® 64 inverse male connectors and for rear access	160	z, a, b, c, d	02 04 160 1101	

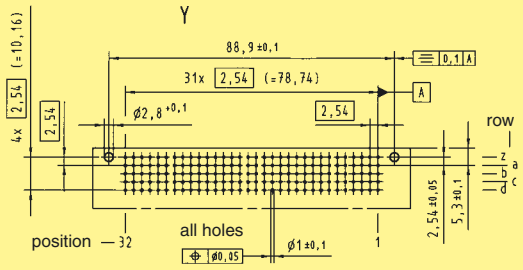
Dimensions





Board drillings

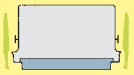
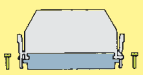
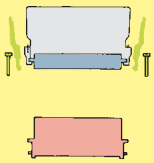
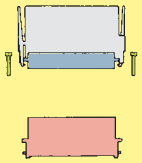
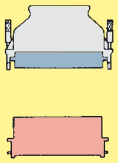
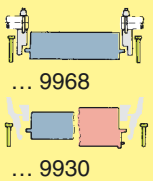
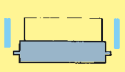
Mounting side



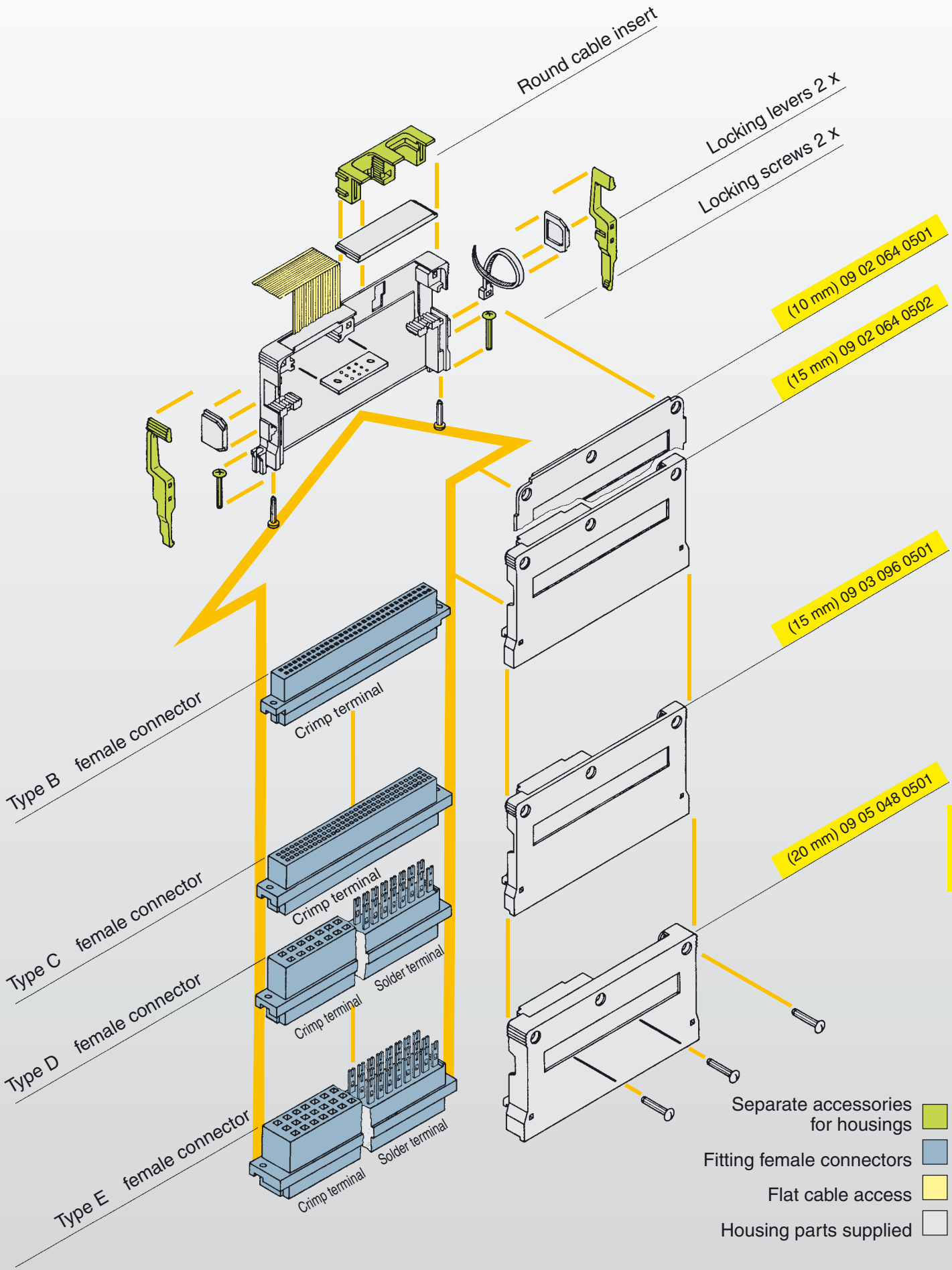
Dimensions in mm

Shell housings

Summary shell housings and accessories

Appropriate connectors in shell housings	Types B, C, D, E	Type F	Types F, H, MH	Types F, H, MH	Types F, H, MH	Types E, F, H, MH	Types F, H, MH
Check list: How to order shell housings and accessories. The Part No. is stated.							 … 9968 … 9930
Shell housings	C	A	B	D 15	D 20*	G	O
	09 02 064 0501 09 02 064 0502 09 03 096 0501 09 05 048 0501	09 06 048 0501 09 06 048 0401 09 06 048 0402	09 06 048 0503 09 06 048 0504 09 06 048 0505	09 06 048 0515	09 06 048 0521	09 06 000 9957	09 06 000 9968 09 06 000 9930° ° order 2 pieces
Cable insert	09 02 000 9910 09 02 000 9911		09 06 000 9914 09 06 000 9915		09 06 000 9988 09 06 000 9989		
Insert for LED			09 06 000 9917		09 06 000 9986 09 06 000 9987		
Locking lever Order 2 pieces, in some cases each with different Part Nos. for left and right hand	09 02 000 9902 09 02 000 9903	Supplied with the shell housing	09 06 000 9913 09 06 000 9919	Supplied with the shell housing			
Locking screws Order 2 sets — for fixing elements with male connectors	09 02 000 9909 M 2.5 x 16 M 2.5	M 2.5 x 12 M 2.5	09 06 000 9926 M 2.5 x 20 M 2.5	09 06 000 9926 M 2.5 x 20 M 2.5	Supplied with the shell housing	Supplied with the shell housing	09 06 000 9926 M 2.5 x 20 M 2.5
for interface connectors U	09 02 000 9909 M 2.5 x 16 M 2.5	09 02 000 9909 M 2.5 x 16 M 2.5	09 06 000 9926 M 2.5 x 20 M 2.5	——	——	Supplied with the shell housing	——
for interface connectors I	09 02 000 9909 M 2.5 x 16 M 2.5	M 2.5 x 22 Supplied with the interface connector I	09 06 000 9955 M 2.5 x 26	——	——	Supplied with the shell housing	——
Fixing brackets for 19" racks — for male connectors	C	A	B	B	B	B	B
Multiple fixing — left	09 02 000 9919	09 06 000 9901	09 06 000 9907	09 06 000 9907	09 06 000 9907 09 06 000 9995 09 06 000 9997	09 06 000 9907	09 06 000 9907
Multiple fixing — right	09 02 000 9920	09 06 000 9902	09 06 000 9908	09 06 000 9908	09 06 000 9908 09 06 000 9996	09 06 000 9908	09 06 000 9908
Single fixing — left	09 02 000 9921	09 06 000 9905	09 06 000 9909	09 06 000 9909	09 06 000 9909	09 06 000 9909	09 06 000 9909
Single fixing — right	09 02 000 9922	09 06 000 9906	09 06 000 9910	09 06 000 9910	09 06 000 9910	09 06 000 9910	09 06 000 9910
for female connectors			B	B			B
Multiple fixing — left			09 06 000 9933	09 06 000 9933			only … 9930 09 06 000 9933
Multiple fixing — right			09 06 000 9933	09 06 000 9933			09 06 000 9933
Fixing brackets for inverse male connectors on pcb	R						
R 1 R 32	09 02 000 9953 09 02 000 9954						
Distance fixing brackets for piggyback connectors							
Type D top Type E bottom	09 04 000 9907 09 04 000 9906					09 04 000 9907 09 04 000 9906	
Type F top bottom	09 06 000 9936 09 06 000 9937					09 06 000 9936 09 06 000 9937	
Protection strip for 20 mm shell housing			09 06 000 9929				
Protection and fixing strip for 20 mm shell housing			09 06 001 9909		09 06 001 9909		

Female connectors Male connectors * metallised and full metal versions available



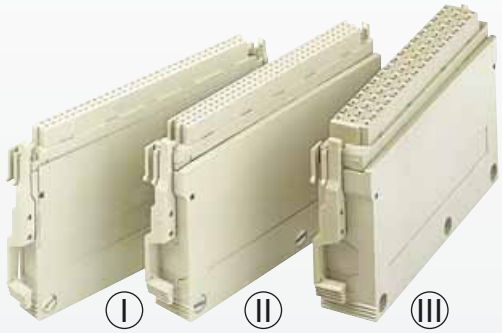
Separate accessories for housings

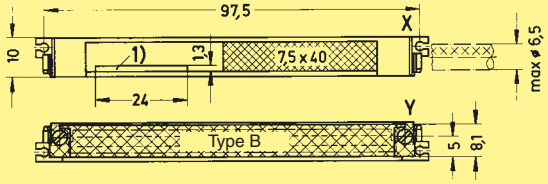
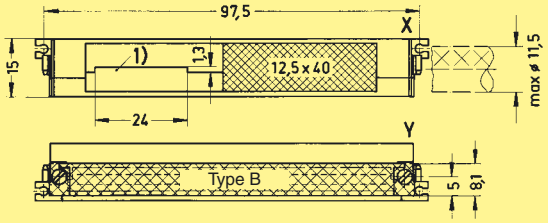
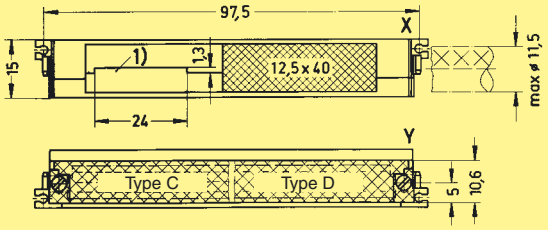
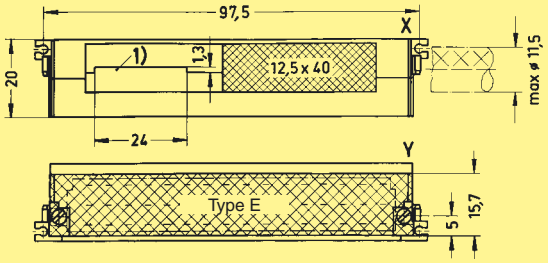
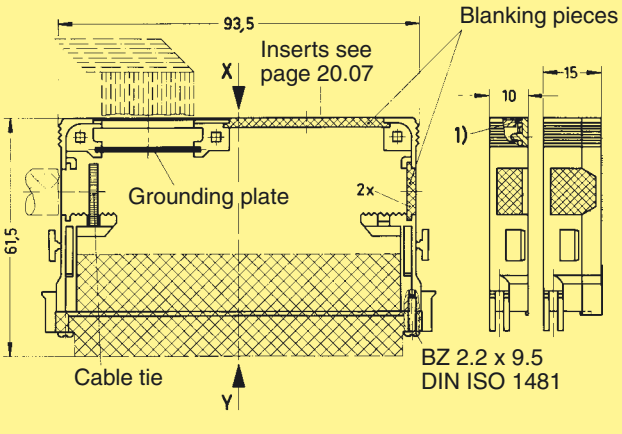
Fitting female connectors

Flat cable access

Housing parts supplied

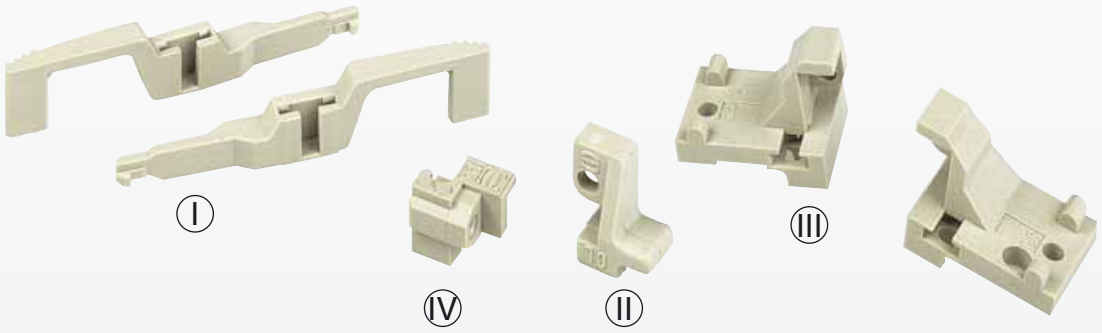
Shell housing C for types B, C, D and E



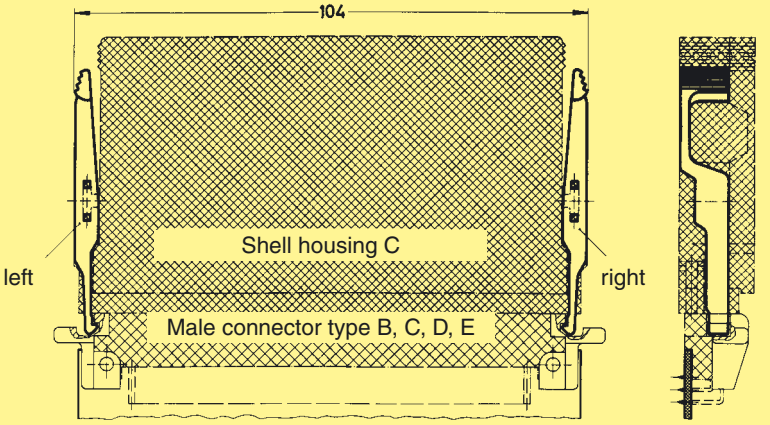
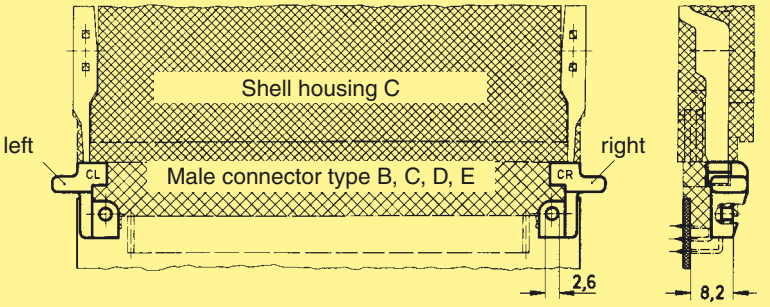
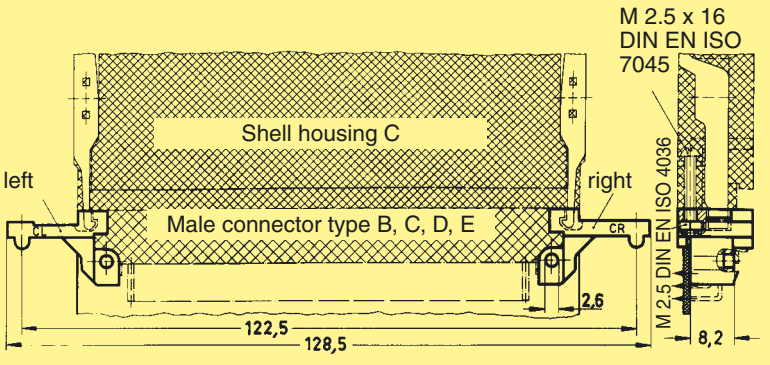
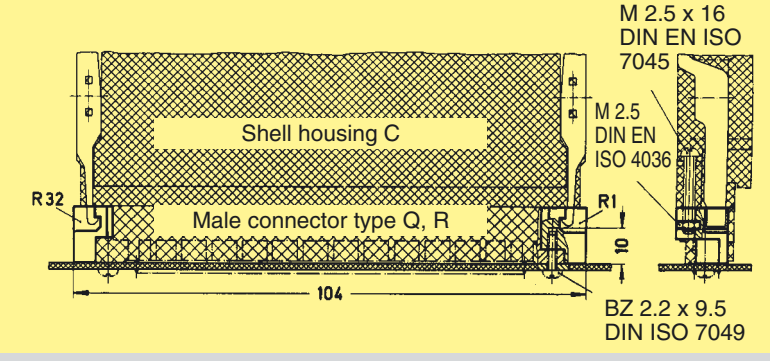
Identification	Part No.	Drawing	Dimensions in mm
Shell housing C for female connectors type B I	10 mm 09 02 064 0501		
	15 mm 09 02 064 0502		
Shell housing C for female connectors types C, D II	15 mm 09 03 096 0501		
Shell housing C for female connectors type E III	20 mm 09 05 048 0501		
			

[1] Possible access for flat cable (18 x Ø 1.27). Remove the blanking piece.

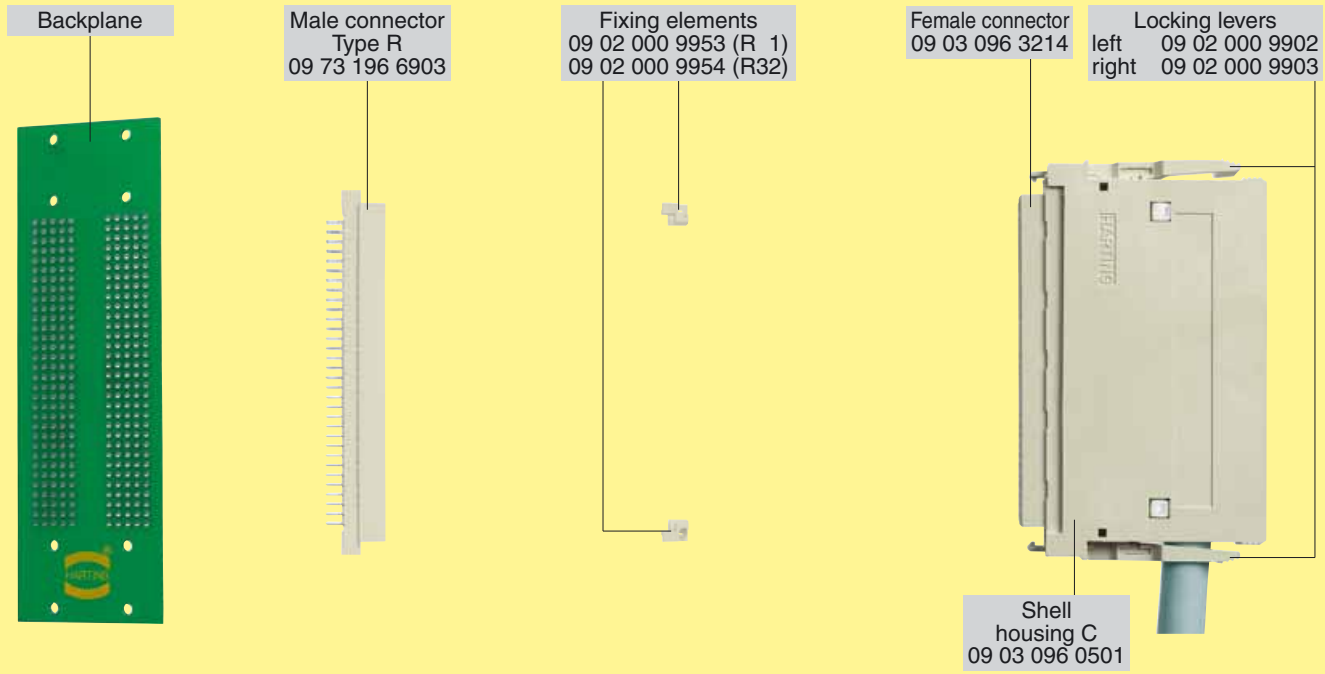
Shell housing C

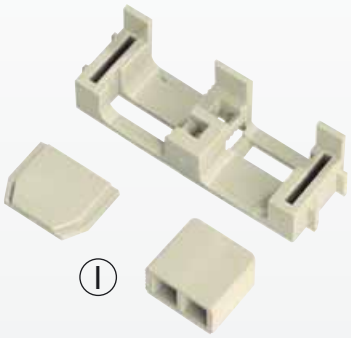


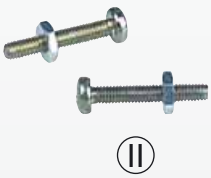
Accessories

Identification	Part No.	Drawing	Dimensions in mm
Locking lever for shell housing C Ⅰ	left 09 02 000 9902 right 09 02 000 9903		
Fixing brackets C for male connectors for 19“ racks according to DIN 41 494, sheet 5 Multiple fixing Ⅱ	left 09 02 000 9919 right 09 02 000 9920		
Single fixing Ⅲ	left 09 02 000 9921 right 09 02 000 9922		
Fixing brackets R for inverse male connectors on pcb's Ⅳ	R 1 09 02 000 9953 R 32 09 02 000 9954		

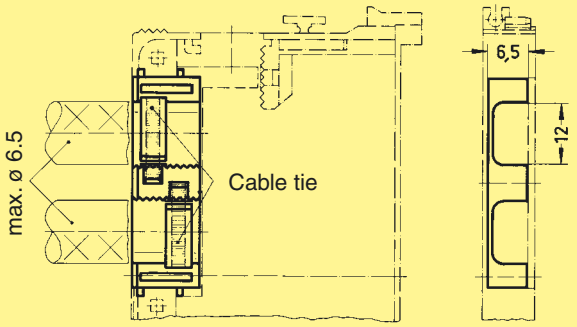
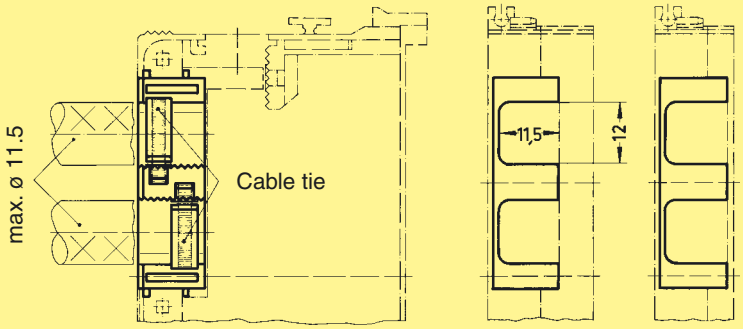
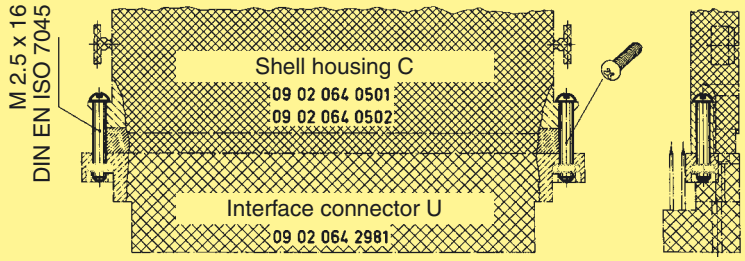
Application



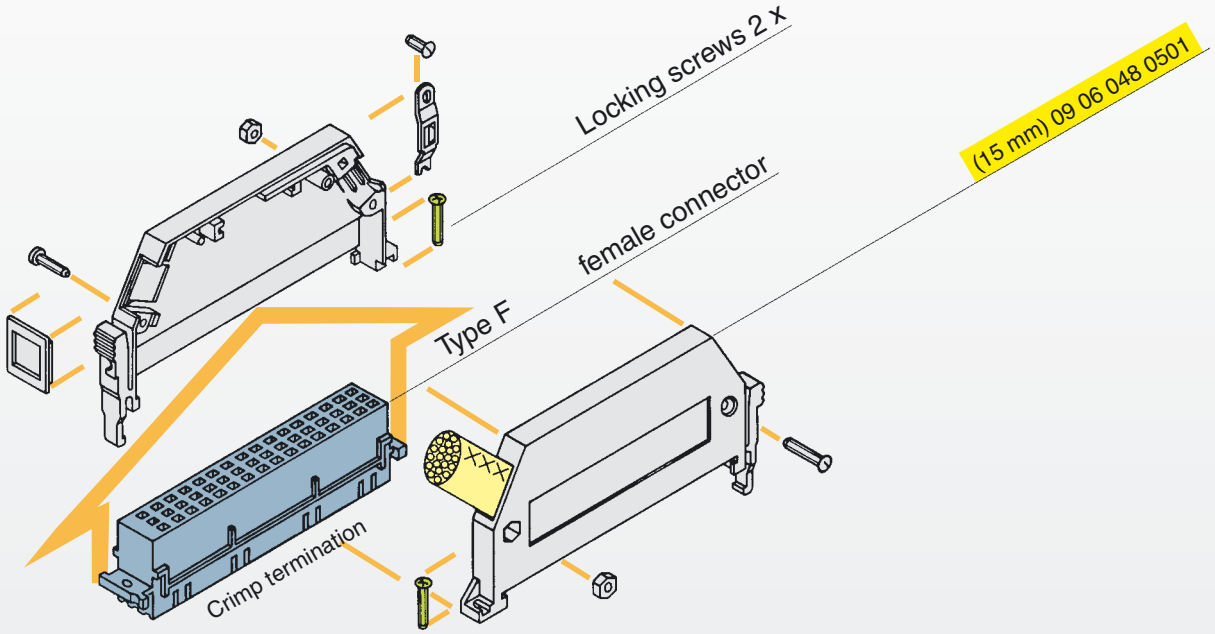


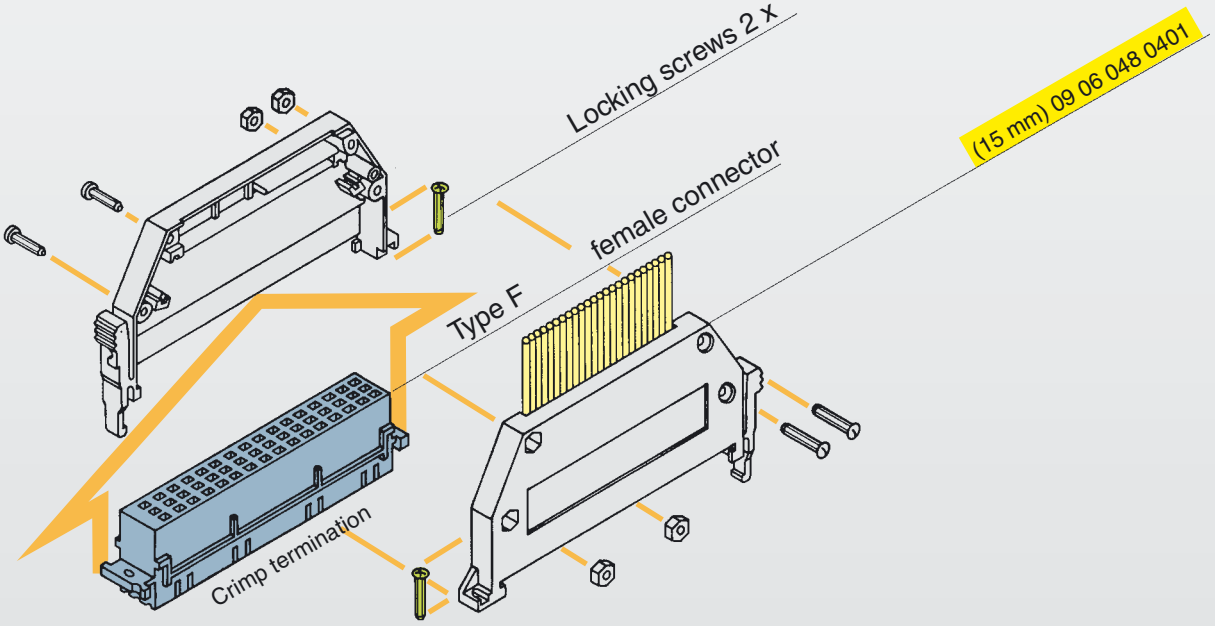


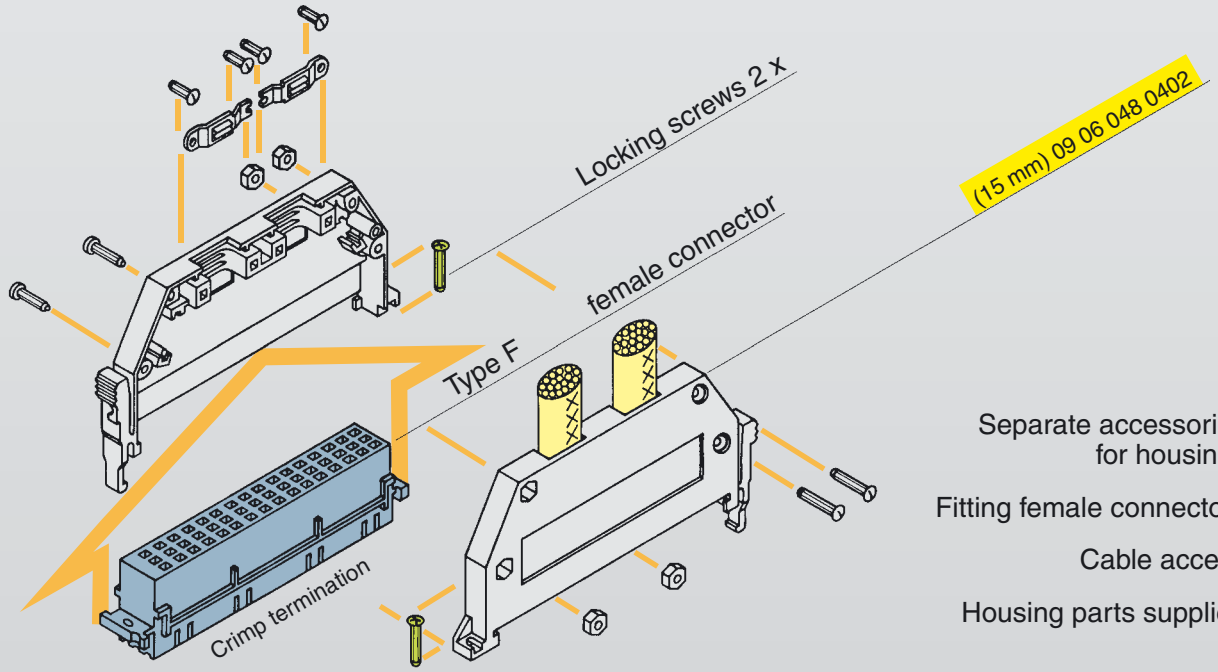
Accessories

Identification	Part No.	Drawing	Dimensions in mm
Round cable insert 2 x ø 6.5 for shell housing C 09 02 064 0501	09 02 000 9910		
Round cable insert 2 x ø 11.5 I for shell housings C 09 02 064 0502 09 03 096 0501 09 05 048 0501	09 02 000 9911		
Locking screws II	09 02 000 9909[1)]		

[1)] Order 2 pieces for one shell housing







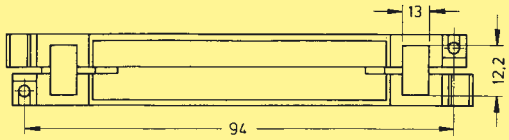
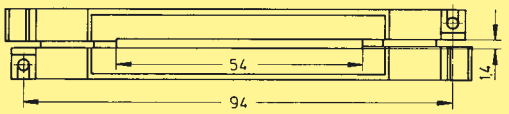
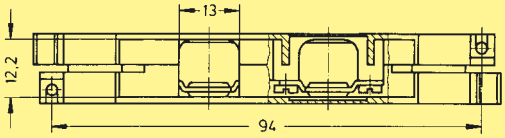
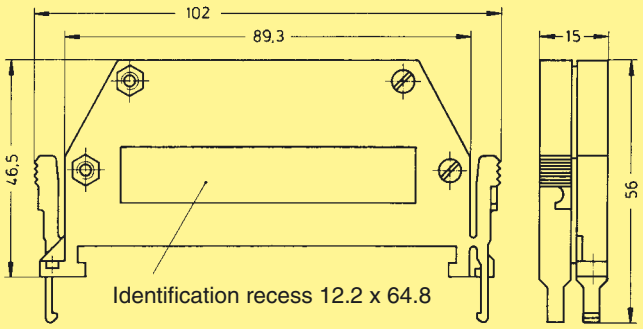
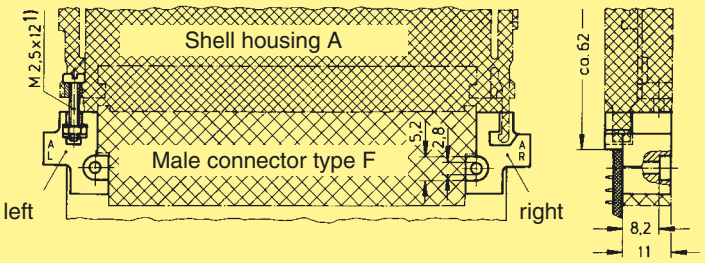
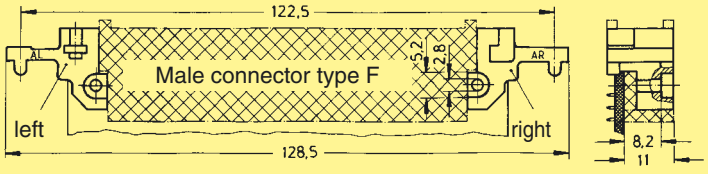
Separate accessories for housings

Fitting female connectors

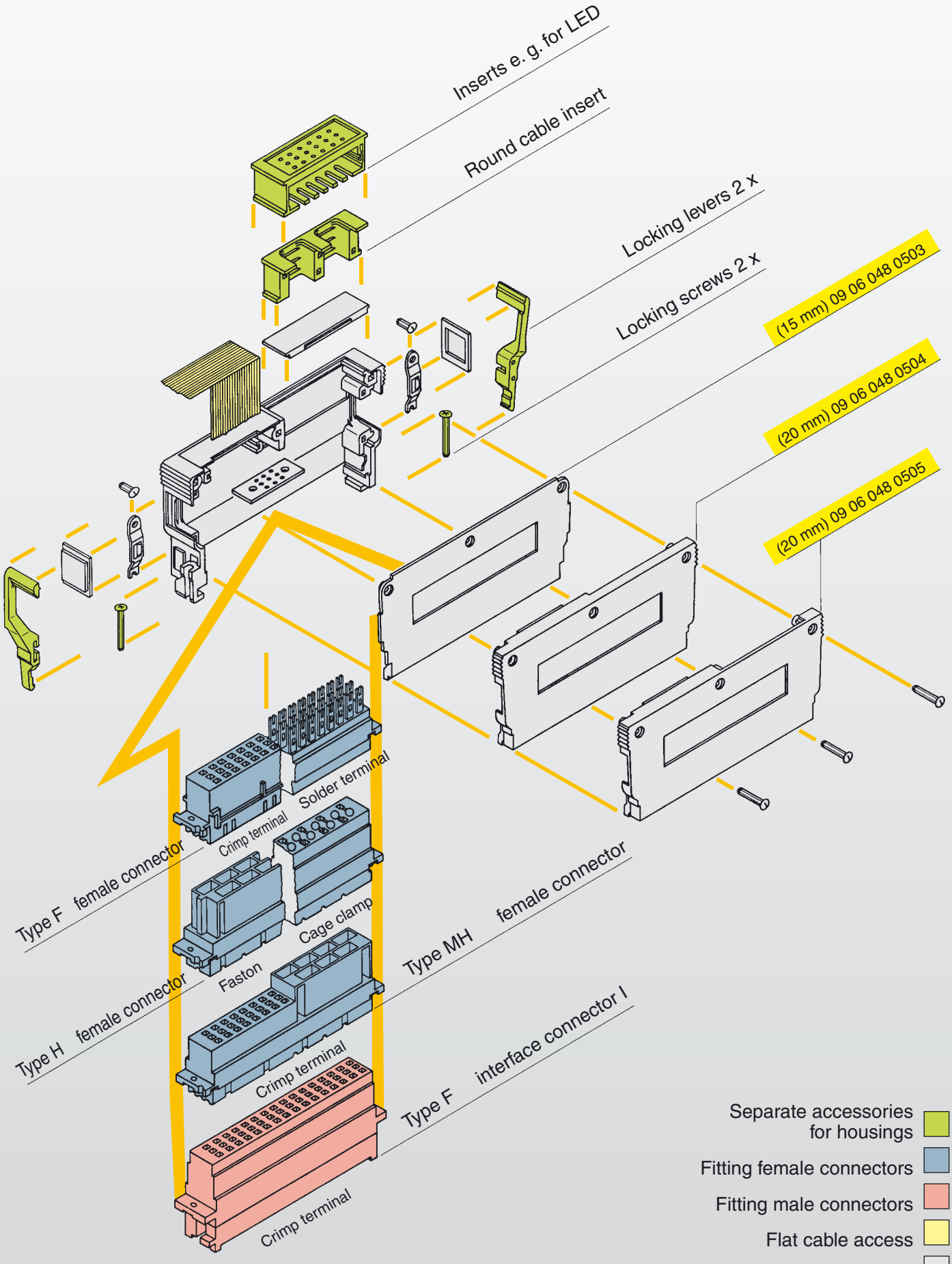
Cable access

Housing parts supplied

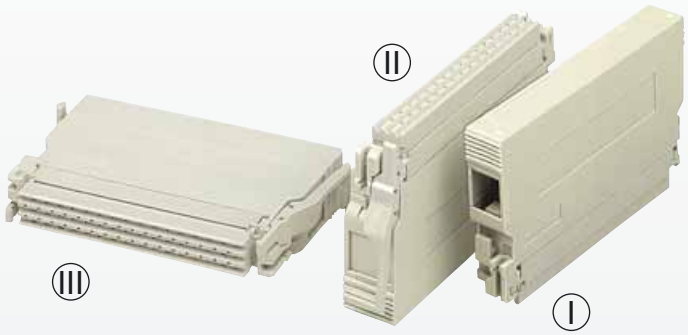
Shell housing A for type F

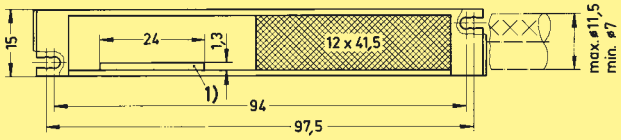
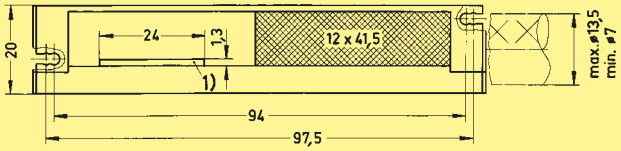
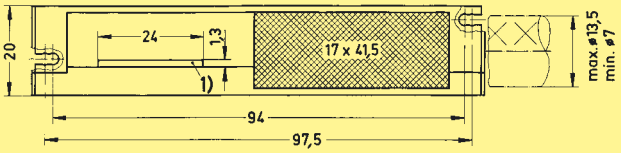
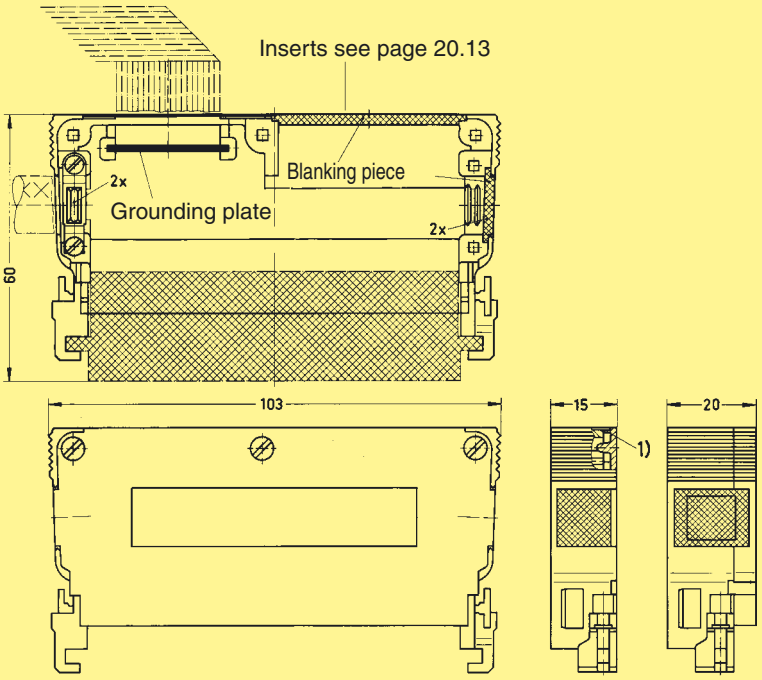
Identification	Part No.	Drawing	Dimensions in mm
Shell housing A Side entry Ⅰ	15 mm 09 06 048 0501		
Flat cable entry	15 mm 09 06 048 0401		
Top entry Ⅱ	15 mm 09 06 048 0402		
			
Fixing brackets A for male connectors for 19" racks according to DIN 41 494, sheet 5 Multiple fixing Ⅲ	left 09 06 000 9901 right 09 06 000 9902		
Single fixing Ⅳ	left 09 06 000 9905 right 09 06 000 9906		

[1] not supplied with bracket


Inserts e. g. for LED
Round cable insert
Locking levers 2 x
Locking screws 2 x
(15 mm) 09 06 048 0503
(20 mm) 09 06 048 0504
(20 mm) 09 06 048 0505
Type F female connector
Solder terminal
Crimp terminal
Type H female connector
Faston
Cage clamp
Type MH female connector
Crimp terminal
Type F interface connector I
Crimp terminal
Separate accessories for housings
Fitting female connectors
Fitting male connectors
Flat cable access
Housing parts supplied

Shell housing B for types F, H and MH

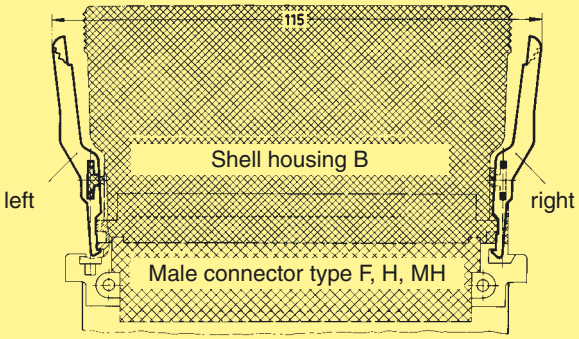
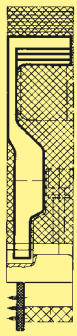
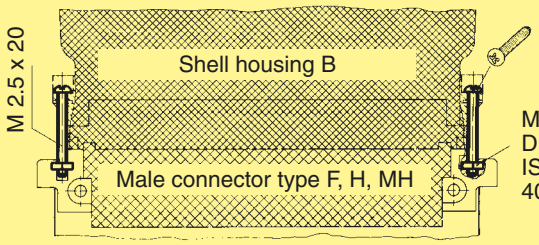
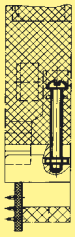
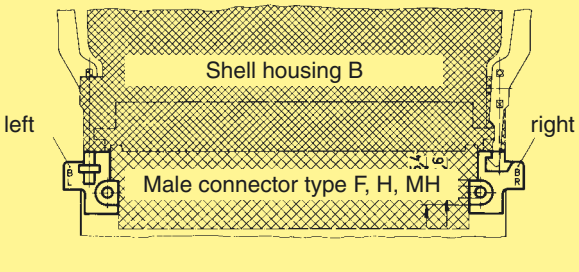
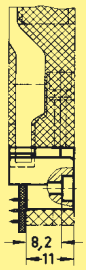
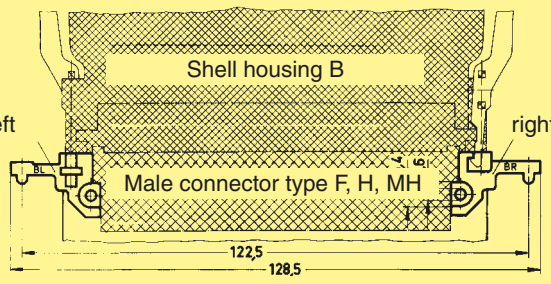
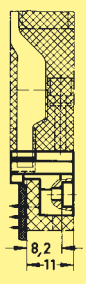


Identification	Part No.	Drawing	Dimensions in mm
Shell housing B (I)	15 mm 09 06 048 0503		
(II)	20 mm 09 06 048 0504		
(III)	20 mm 09 06 048 0505		
			

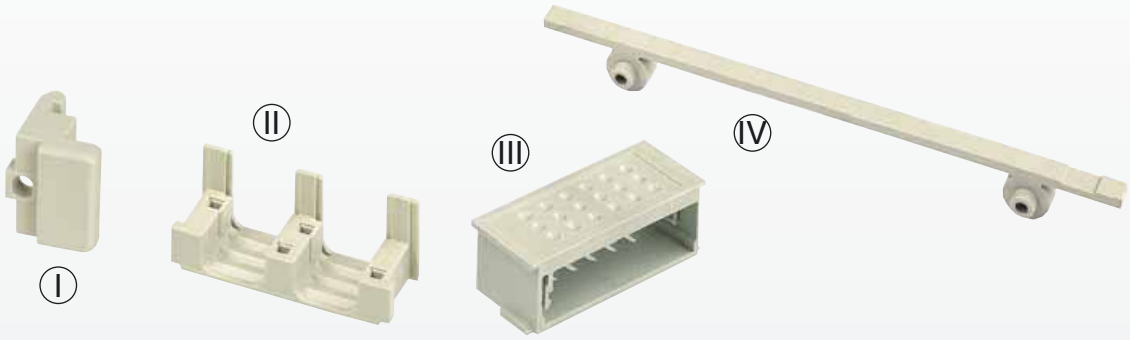
[1] Possible access for flat cable (18 x ø 1.27). Remove the blanking piece

Shell housing B

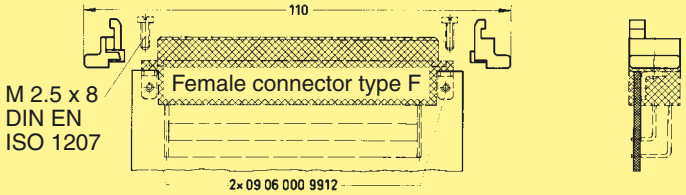
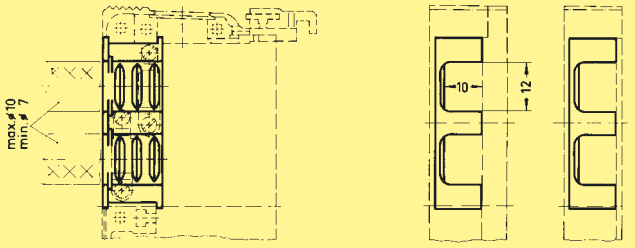
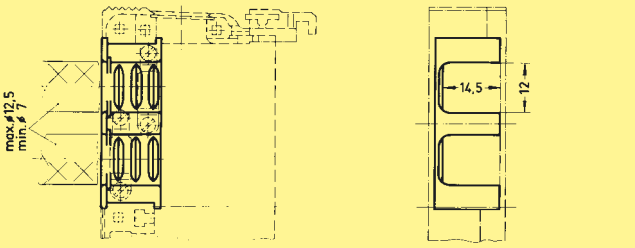
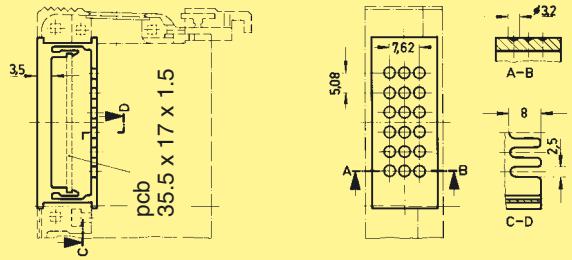
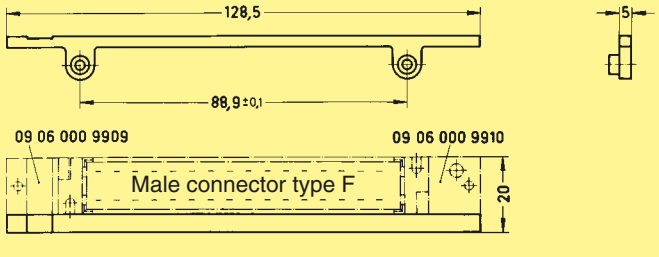
Accessories

Identification	Part No.	Drawing	Dimensions in mm
Locking lever for shell housing B 09 06 048 0503 (I) 09 06 048 0504 09 06 048 0505 1) Order 2 pieces for one shell housing	09 06 000 9913 1) left 09 06 000 9913 right 09 06 000 9919		
Locking screws (II) 1) Order 2 pieces for one shell housing	09 06 000 9926 1)		
Fixing brackets B for male connectors for 19" racks according to DIN 41 494, sheet 5 **Multiple fixing** without nut with nut M 2.5 DIN 562	left 09 06 000 9907 right 09 06 000 9908 left 09 06 000 9966 right 09 06 000 9967		
Single fixing (III)	left 09 06 000 9909 right 09 06 000 9910		

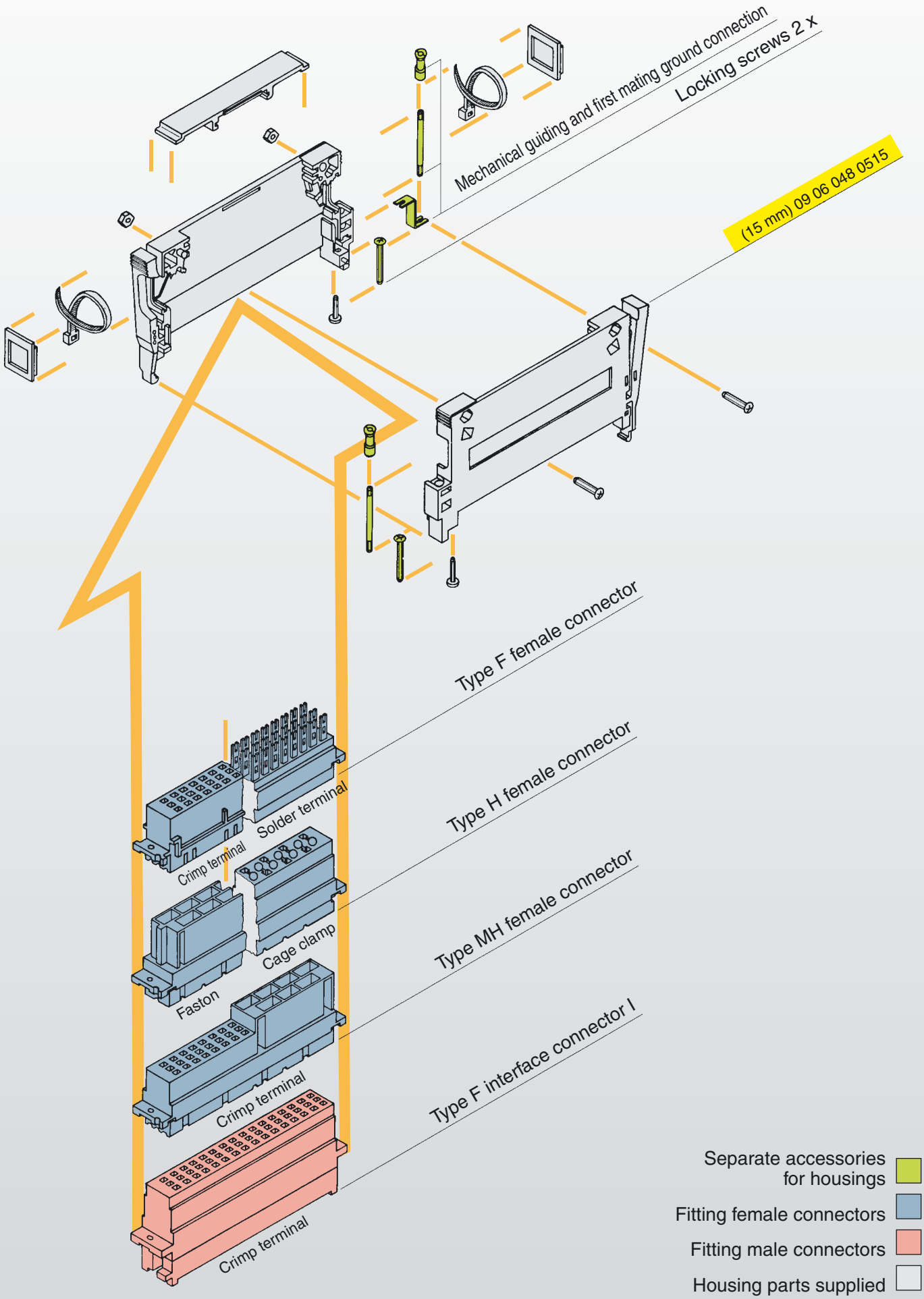
Shell housing B



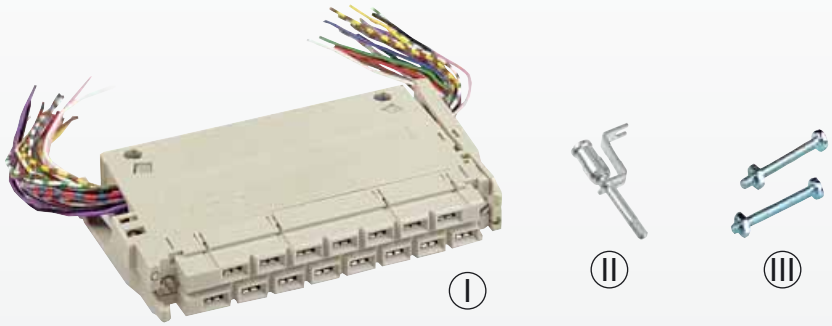
Accessories

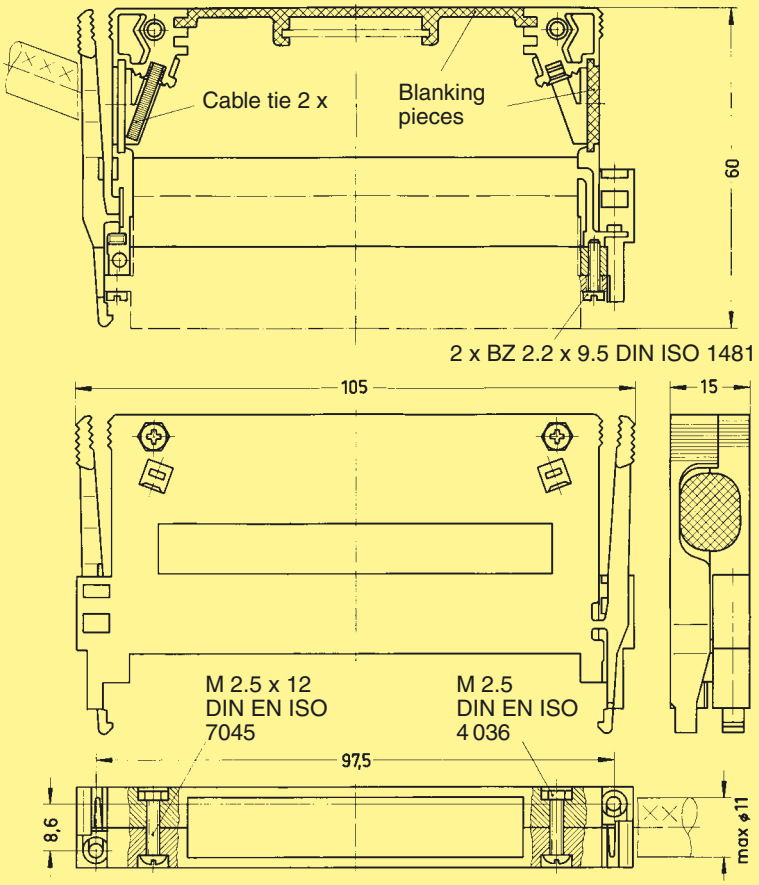
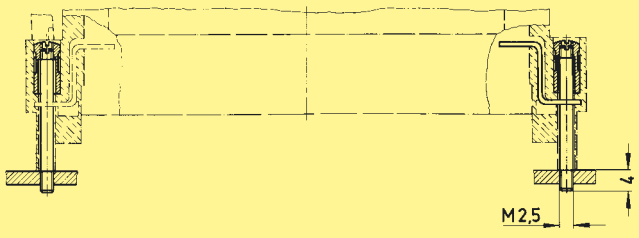
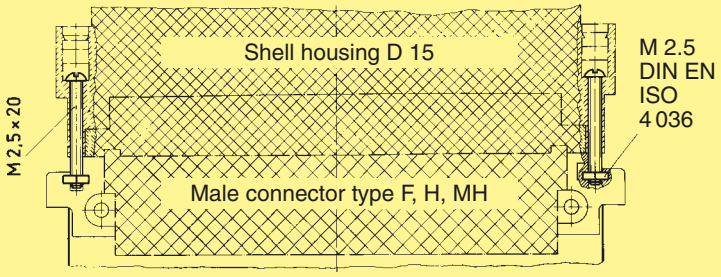
Identification	Part No.	Drawing	Dimensions in mm
Fixing brackets B for female connectors for 19" racks according to DIN 41 494, sheet 5 Multiple fixing I [1] Order 2 pieces for one female connector	09 06 000 9933[1]		
Round cable insert 2 x ø 10 for shell housings B 09 06 048 0503 09 06 048 0504	09 06 000 9914		
Round cable insert 2 x ø 12.5 II for shell housing B 09 06 048 0505	09 06 000 9915		
Insert for LED III for shell housing B 09 06 048 0505	09 06 000 9917		
Protection strip IV Used with shell housings type B for front side access 09 06 048 0504 09 06 048 0505	09 06 000 9929		

Shell housing D 15 for types F, H and MH

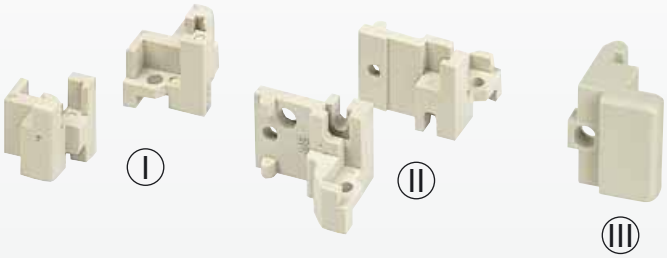


Shell housing D 15 for types F, H and MH

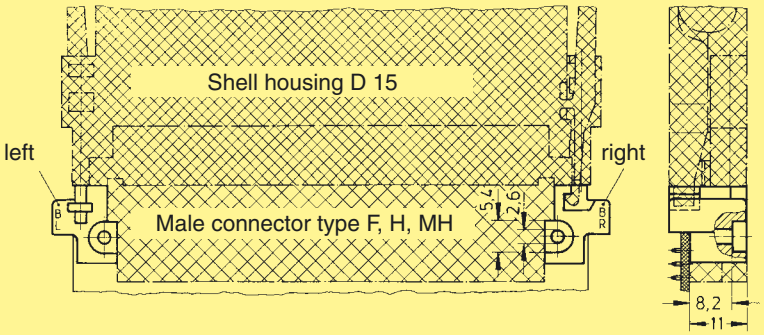
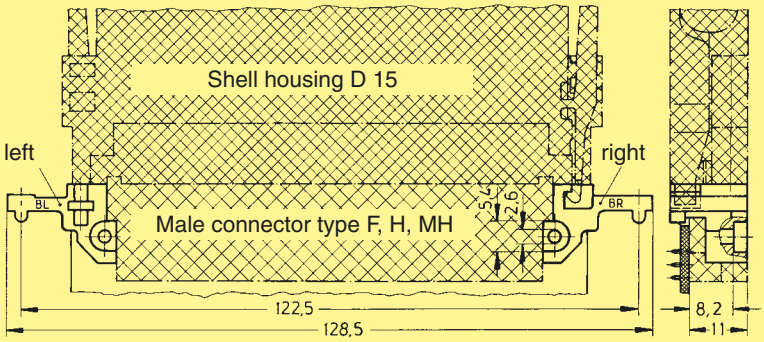
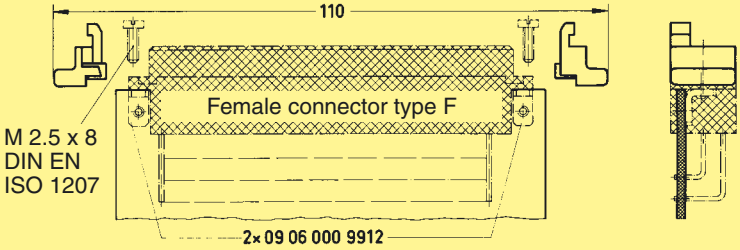


Identification	Part No.	Drawing	Dimensions in mm
Shell housing D 15 I	15 mm 09 06 048 0515		
Mechanical guiding and first mating ground connection II	09 06 000 9961		
Locking screws III	09 06 000 9926[1]		

[1] Order 2 pieces for one shell housing

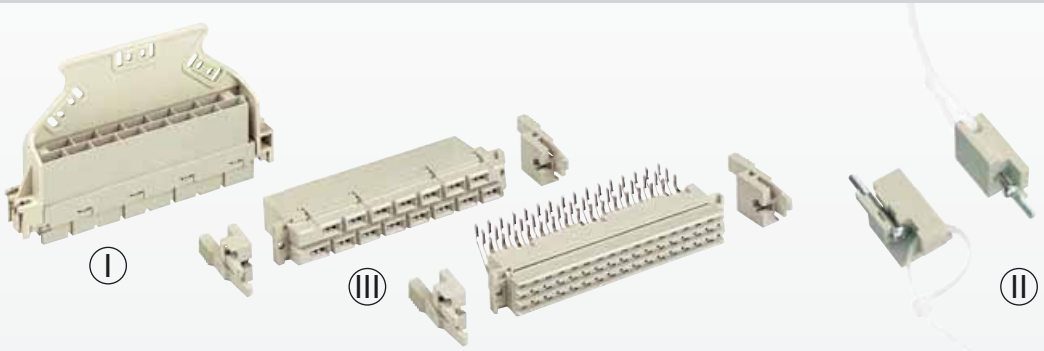


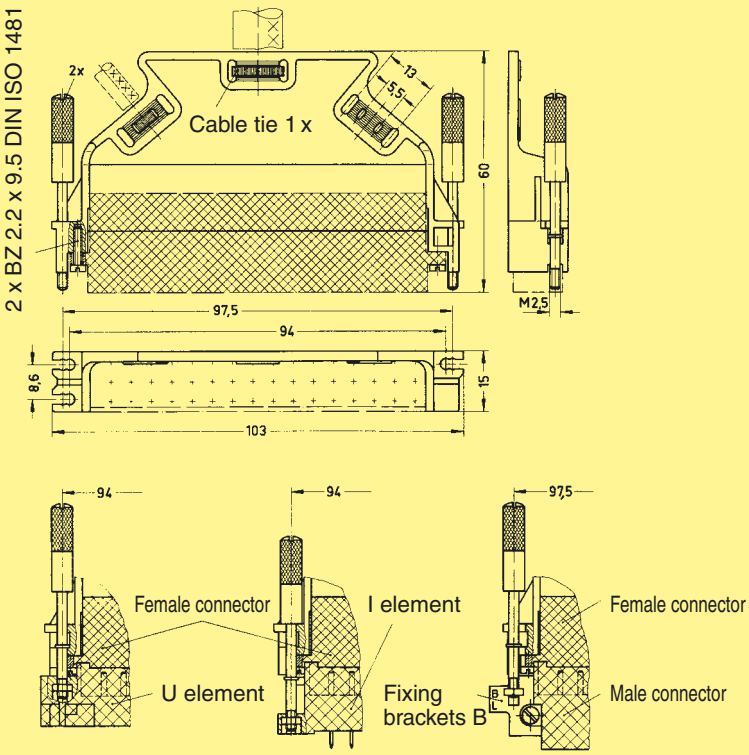
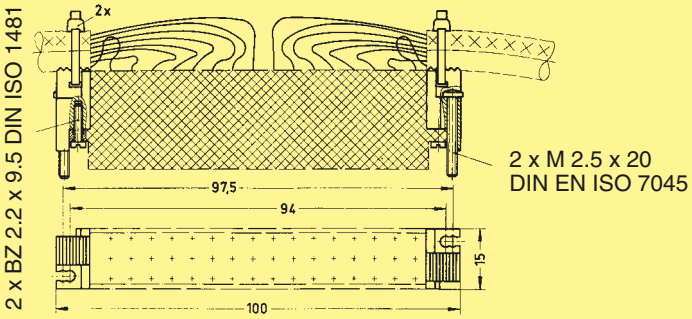
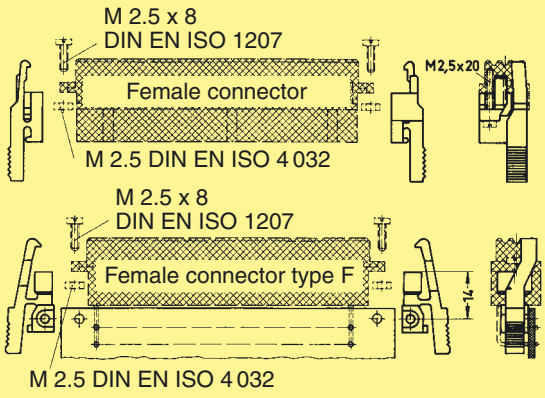
Accessories

Identification	Part No.	Drawing	Dimensions in mm
Fixing brackets B for male connectors for 19" racks according to DIN 41 494, sheet 5 **Multiple fixing** ohne Mutter (I) mit Mutter M 2,5 DIN 562	left 09 06 000 9907 right 09 06 000 9908 left 09 06 000 9966 right 09 06 000 9967		
Single fixing (II)	left 09 06 000 9909 right 09 06 000 9910		
Fixing brackets B for female connectors for 19" racks according to DIN 41 494, sheet 5 **Multiple fixing** (III)			

[1] Order 2 pieces for one female connector

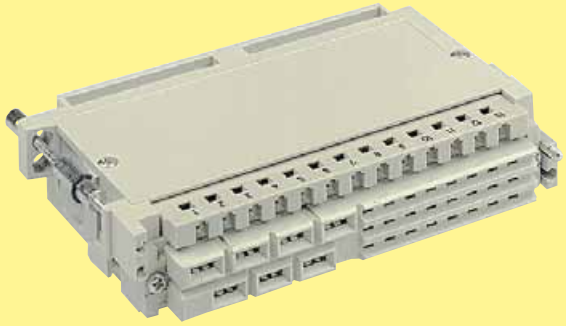
Open hood G, junction element O, locking lever

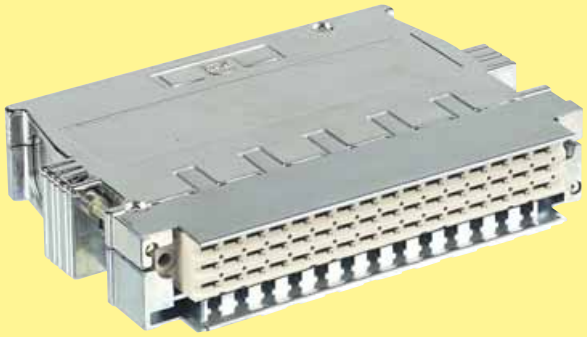


Identification	Part No.	Drawing	Dimensions in mm
Open hood G for types E, F, H and MH I	09 06 000 9957		
Junction element O for type F Part No. contains 2 junction elements II	09 06 000 9968		
Locking lever for type F III	09 06 000 9930[1)] 09 06 000 9911[1)]		

[1)] Order 2 pieces for one female connector

Shell housing D 20





Fitting female connectors

Part-No.	Type	D 20/2	D 20/4	D 20 metal	D 20 metal HF
09 06 2__ _823	F with open solder lugs	X		X	X
09 06 2__ _853	F with closed solder lugs	X		X	X
09 06 248 3201	F moulding for crimp contacts	X	X	X	X
09 06 215 2871	H for faston	X		X	X
09 06 015 2813	H with cage clamps	X		X	X
09 06 231 2881	MH moulding for crimp contacts	X		X	X

Order example: 09 06 2__ _853

32 = 32 contacts
48 = 48 contacts

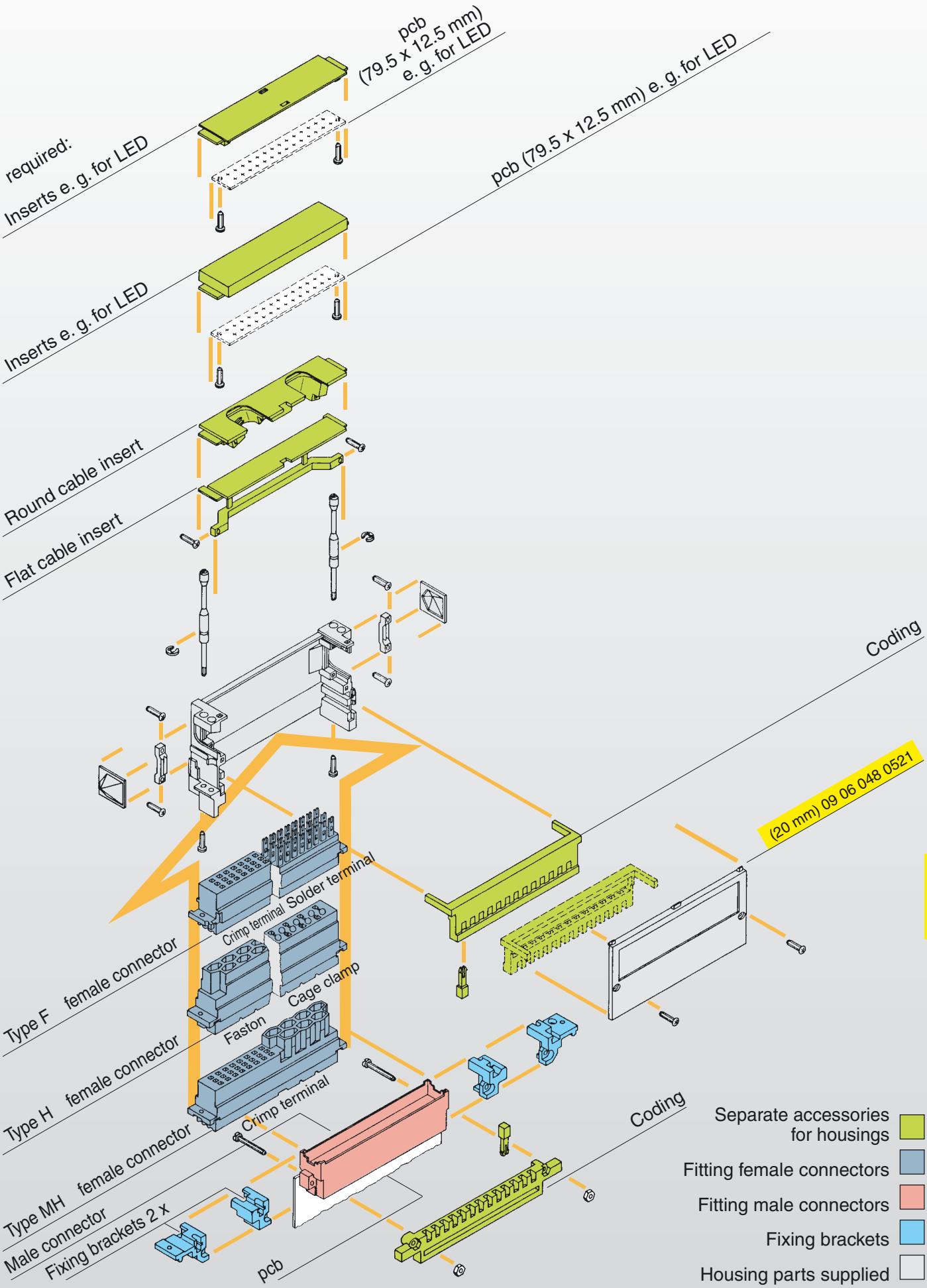
7 = performance level 3
6 = performance level 2
2 = performance level 1

Technical characteristics

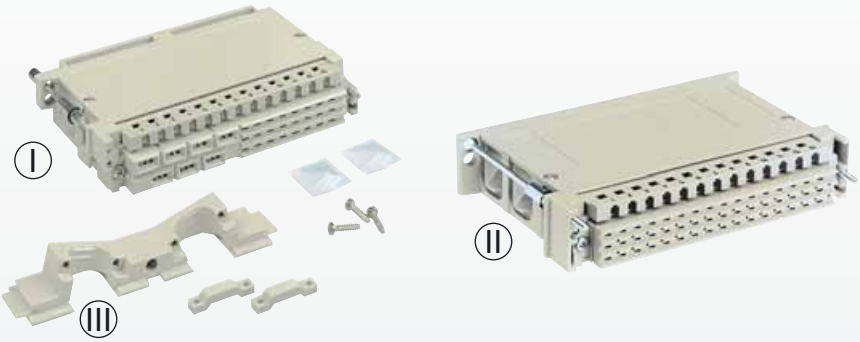
	D 20/2	D 20/2 metallised[1]	D 20/4	D 20/4 metallised[1]	D 20 metal	D 20 metal HF
Part No.	09 06 048 0521	09 06 948 0521	09 06 048 0522	09 06 948 0522	09 06 848 0521	09 06 848 1521
Material	Polycarbonate	Polycarbonate	Polycarbonate	Polycarbonate	Zinc alloy	Zinc alloy
Surface	none	nickel/copper	none	nickel/copper	none	nickel-plated[2]
Weight [g]	36	44	43	52	190	214
Cable entries	side (2 x), top round cable insert see page 20.19	side (2 x), top round cable insert see page 20.19	side (4 x)	side (4 x)	side (2 x), top	side (2 x) top
Protection	IP 20	IP 20	IP 20	IP 20	IP 20	IP 20

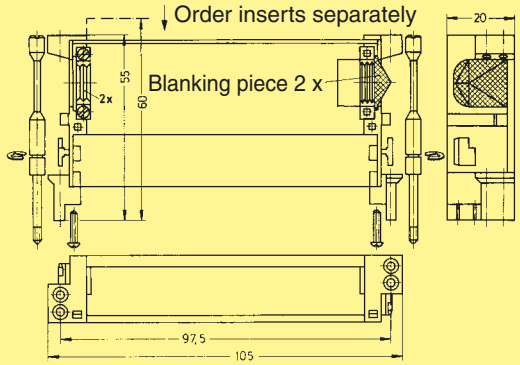
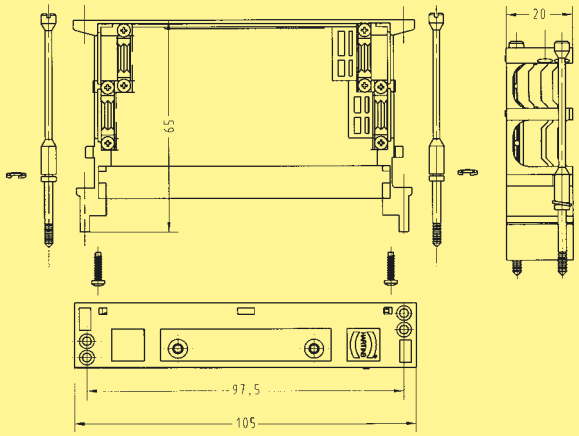
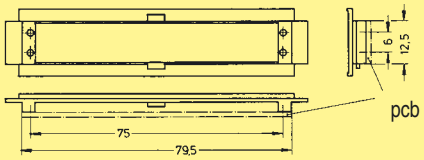
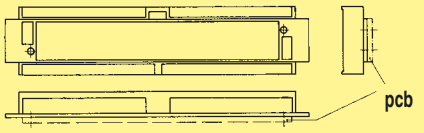
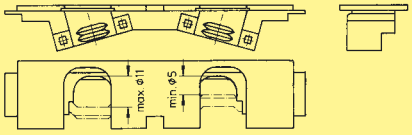
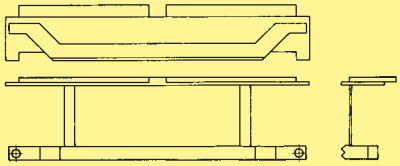
[1] upper temperature limit is +105 °C
[2] zinc-plated on request

Shell housing D 20/2 for types F, H and MH



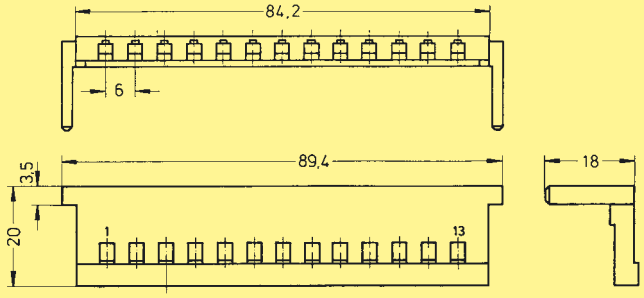
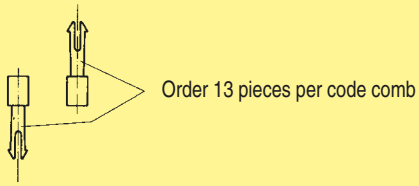
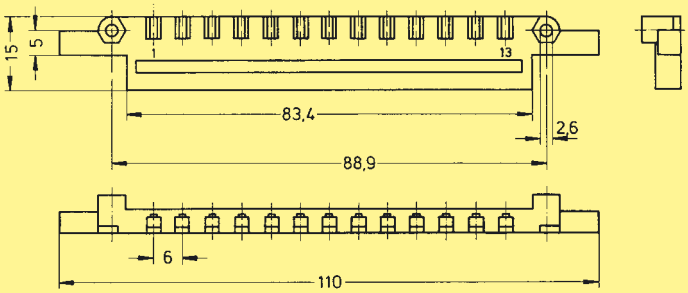
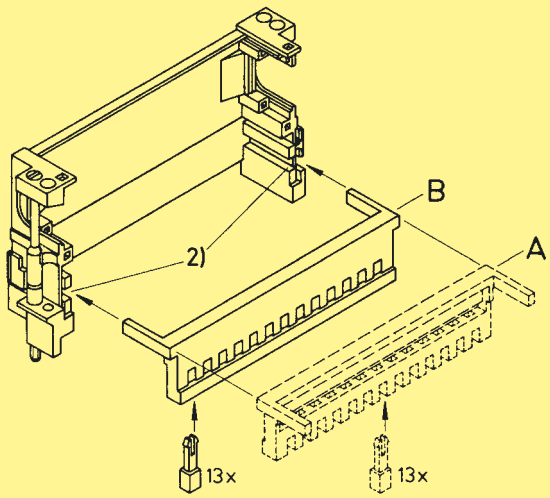
Shell housing D 20 for types F, H and MH



Identification	Part No.	Drawing	Dimensions in mm
Shell housing D 20/2 Two side cable entries I	20 mm 09 06 048 0521		
Shell housing D 20/4 Four side cable entries II	20 mm 09 06 048 0522		
Inserts e. g. for LED*			
for 55 mm height	09 06 000 9986		
for 60 mm height	09 06 000 9987		
Round cable insert* 2 x ø 11 III	09 06 000 9988		
Flat cable insert*	09 06 000 9989		

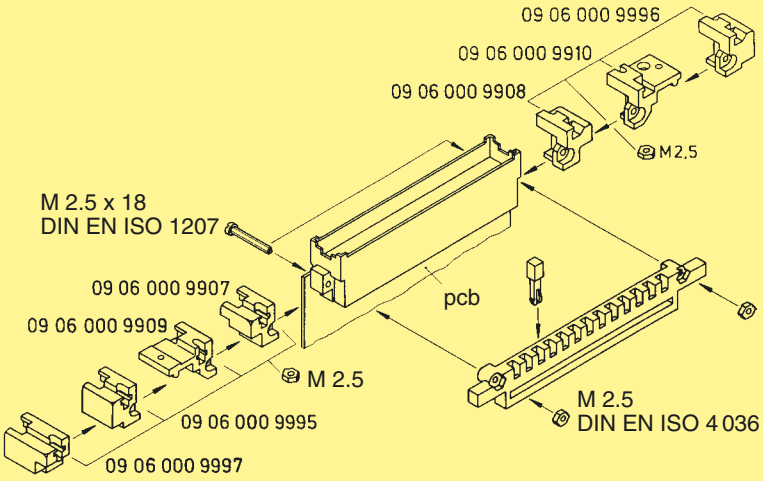
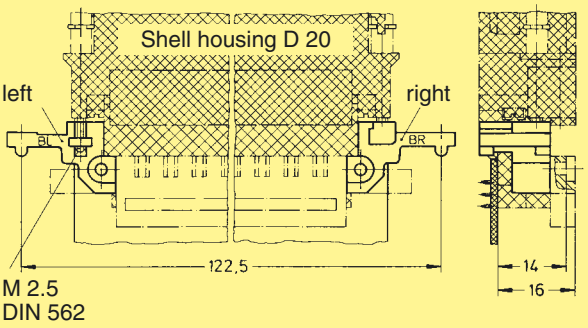
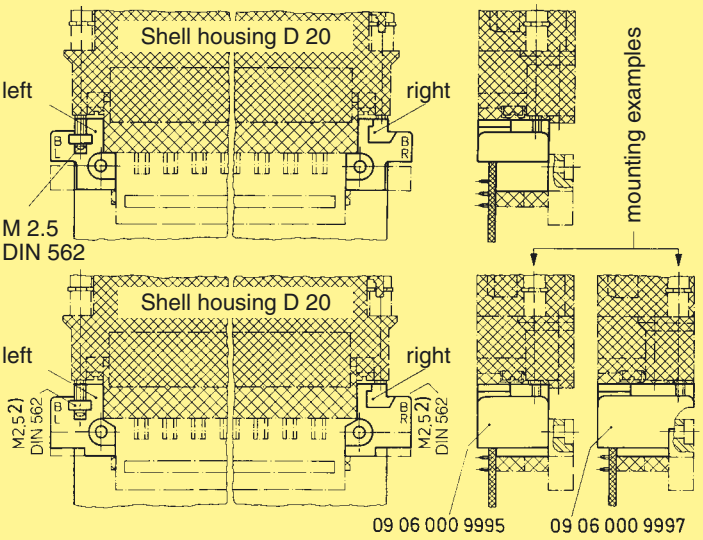
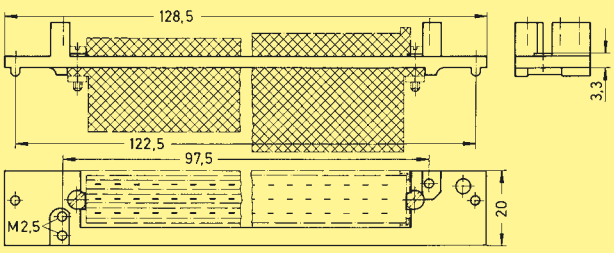
* Fits D 20/2

Coding

Identification	Part No.	Drawing	Dimensions in mm
Code comb for shell housing[3)] (can also be used as a blanking cover) (I)	09 06 000 9984		
Coding pin[3)] (II) [1)] Order 13 pieces per code comb	09 06 001 9905[1)]	 Order 13 pieces per code comb	
Code comb for male connectors[3)] (III)	09 06 000 9985		
Mounting possibilities for the code comb in the shell housing D 20/2		 [2)] Use the lower slot when coding the male connector with fixing brackets	

Mounting example **A** max. cable entry ø 14 mm to the top, see page 20.23
Mounting example **B** max. cable entry ø 14 mm to the bottom, see page 20.23

[3)] Fits D 20/2 and D 20/4

Identification	Part No.	Drawing	Dimensions in mm
Mounting possibilities for code comb at the male connector with fixing brackets			
Fixing brackets B for male connectors* for 19" racks according to DIN 41 494, sheet 5 **Single fixing*** without nut	left 09 06 000 9909 right 09 06 000 9910		
with nut M 2.5 DIN 562	left 09 06 001 9934 right 09 06 001 9935		
Multiple fixing* without coding at the fixing bracket without nut	left 09 06 000 9907 right 09 06 000 9908		
without coding at the fixing bracket with nut M 2.5 DIN 562	left 09 06 000 9966 right 09 06 000 9967		
with coding at fixing bracket[1] with nut M 2.5 DIN 562 15 mm 20 mm	left 09 06 000 9995 09 06 000 9997		
15 mm 20 mm	right 09 06 000 9996 09 06 000 9998		
		[2] supplied with fixing	
Protection and fixing strip* for 20 mm shell housing Single fixing fits female connectors and I element crimp	09 06 001 9909		

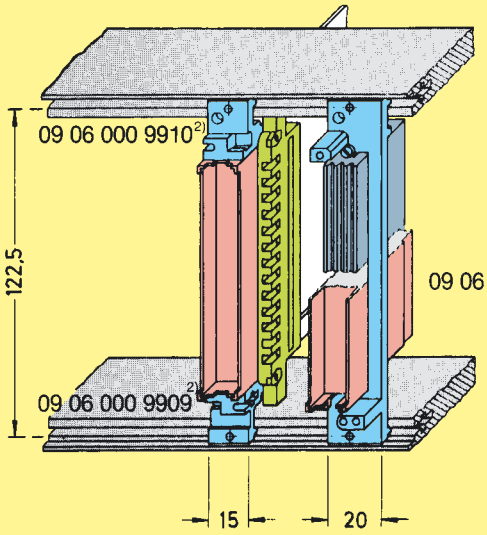
* Fits D 20/2 and D 20/4

[1] Specific coding between the fixing bracket and the pcb guiding rail.

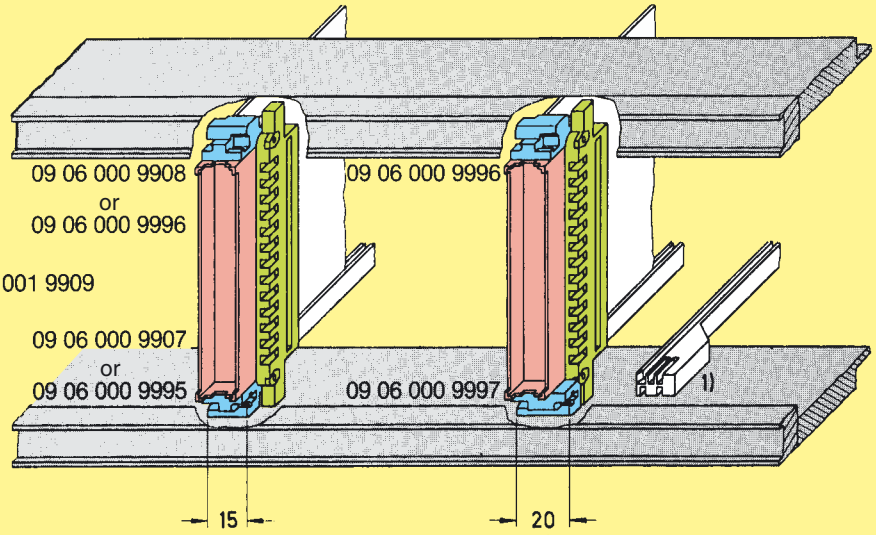
Mounting examples

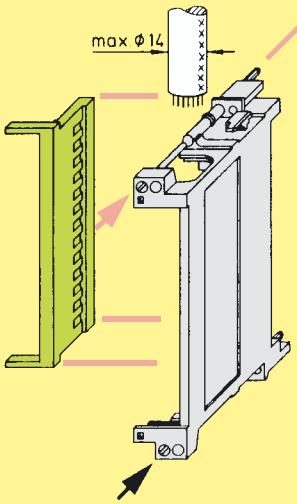
Dimensions in mm

Single fixing

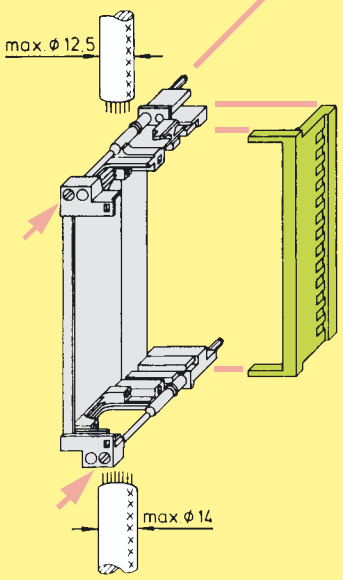


Multiple fixing





Mounting example A[2)]
max. cable entry to the top



Mounting example B
max. cable entry
to the bottom

Separate accessories for housings

Fitting female connectors

Fitting male connectors

Fixing brackets

Housing parts supplied

[1)] Specific coding between the fixing bracket and the pcb guiding rail

[2)] Max. cable entry (ø 14 mm) from the bottom with fixing brackets 09 06 901 9924/…9925 possible. See page 20.28.

EMC with HARTING connectors according to DIN 41 612

HARTING offers metallised D20 housings and full metal housings for EMC connectors according to DIN 41 612. Its strong EMI characteristics and metallised fixing elements offers optimal shielding and grounding.

The connection of the cable braid to different types of connector housings, as well as the influence of the connector itself on EMC characteristics of an instrument application, were analysed in regard to **the shielding effectiveness against electromagnetic radiation.** The shielded signal data lines of a railway application were carried via two eurocard pcb´s installed into a 19”-rack. The fixing of the cable braid was realised with different HARTING D20 housings.

The application including the connectors was then exposed to RF signals, transient bursts and electrostatic discharges.

The standard plastic housings showed minimal EMC performance. The EMC performance of metallised and full metal housings showed significant improvements.

One advantage of metallised housings is their reduced weight (40 grams compared to 200 grams of a full metal housing). Therefore, minimal interference is applied to the pcb in applications where strong vibration is occuring. The HARTING housings are comparatively light through the use of metallised plastic.

The main advantages of a full metal housing are improved cable braid fixing, easy mounting and robustness.

In general, one should keep in mind that an unshielded cable entry leads to loss of the shielding against electromagnetic interference.

“A high-resistance interruption of the cable shield (e.g. by using “pigtails” via twisted stranded wires of the cable shield) may affect the EMC performance and therefore cause unacceptable effects to the electromagnetic environment.”

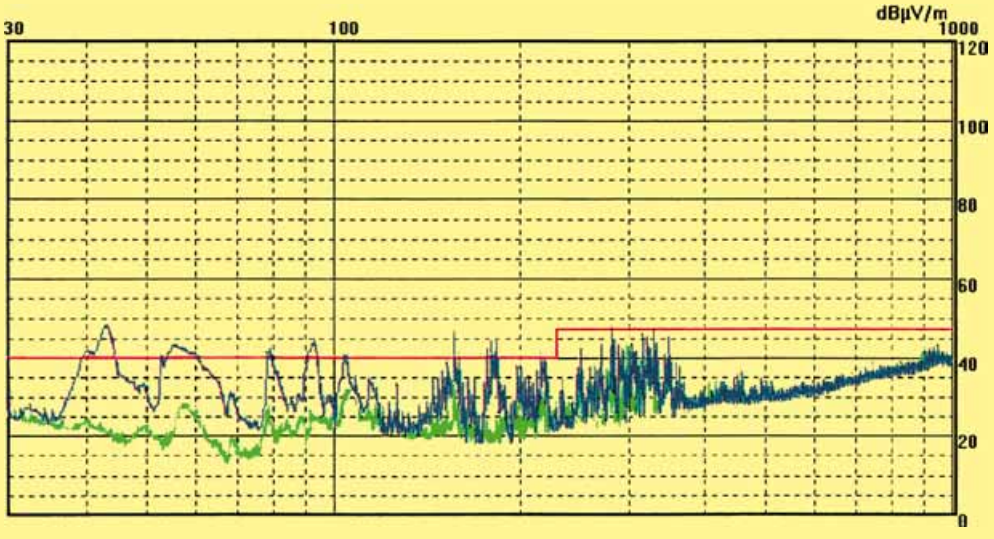


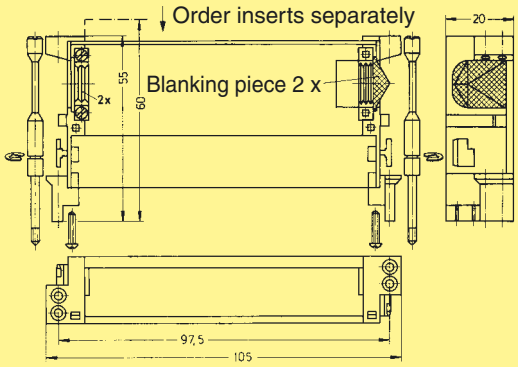
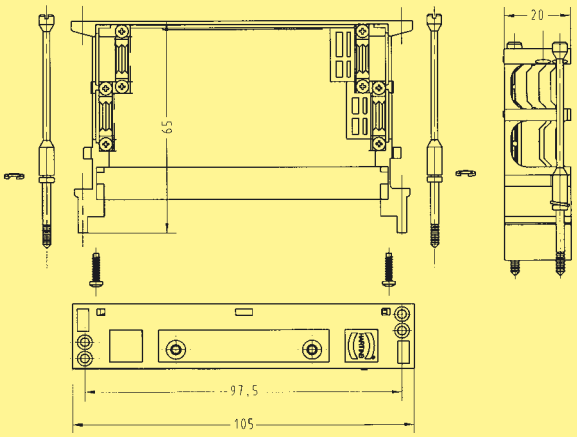
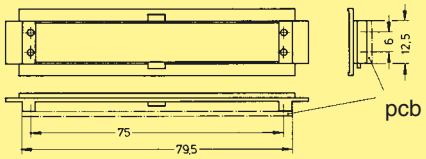
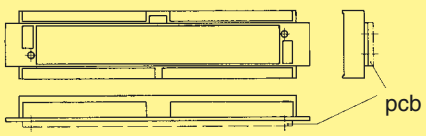
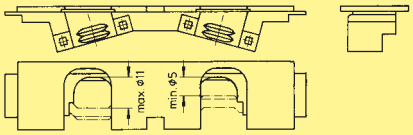
Diagram:
Radiated emission in the shilded chamber –
vertical antenna polarisation

Comparison:
D 20 housing metallised (green) and D 20 housing standard (blue)

Shell housing D 20 metallised for types F, H and MH

Ⓘ

Ⓘ

Identification	Part No.	Drawing	Dimensions in mm
Shell housing D 20/2 metallised with two side cable entries Ⓘ	20 mm 09 06 948 0521		
Shell housing D 20/4 metallised with four side cable entries Ⓘ	20 mm 09 06 948 0522		
Insert e. g. for LED*			
for 55 mm height	09 06 900 9986		
for 60 mm height	09 06 900 9987		
Round cable insert* 2 x ø 11	09 06 900 9988		

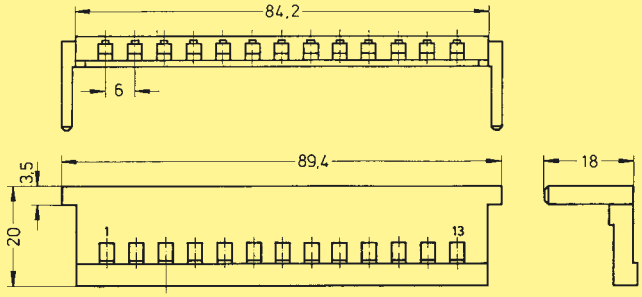
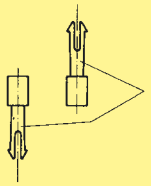
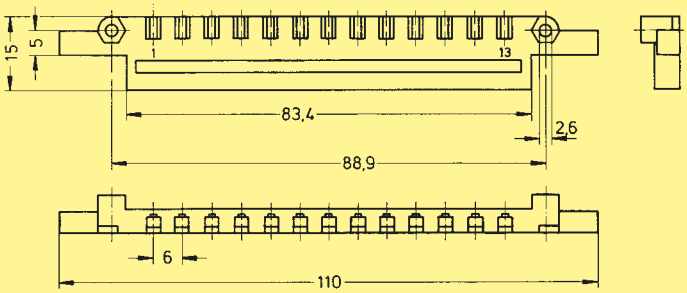
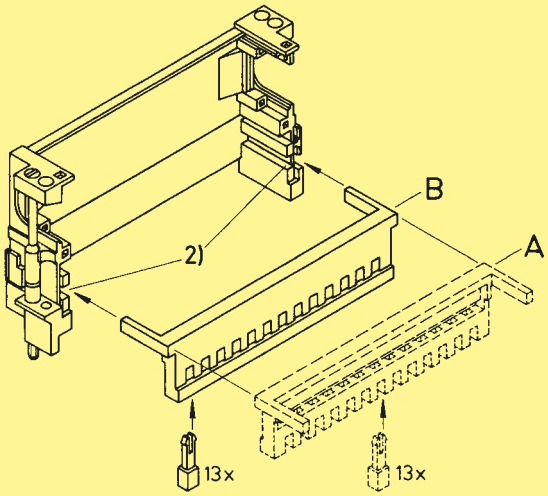
* Fits D 20/2 metallised

Shell housing D 20 metallised

Ⅰ

Ⅱ

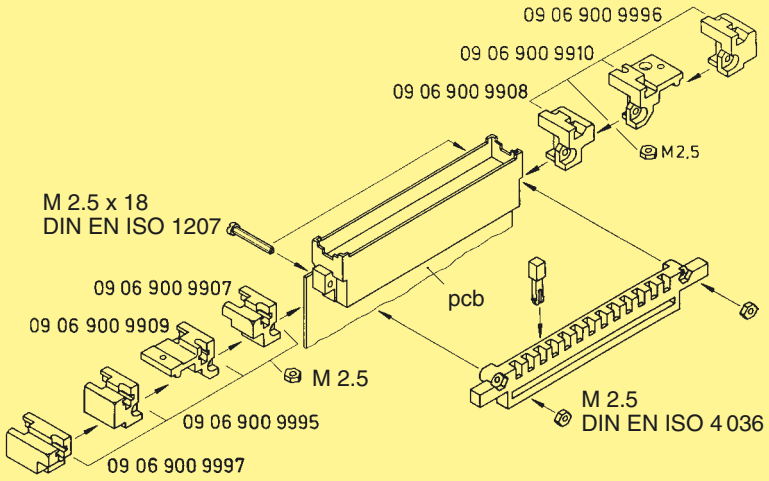
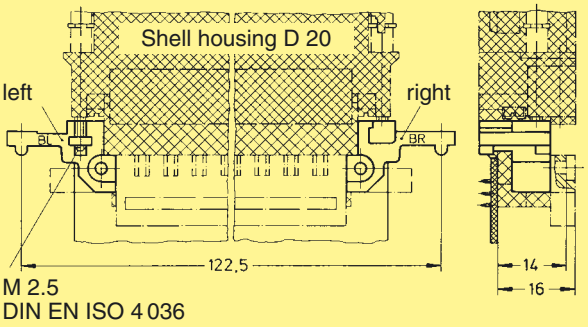
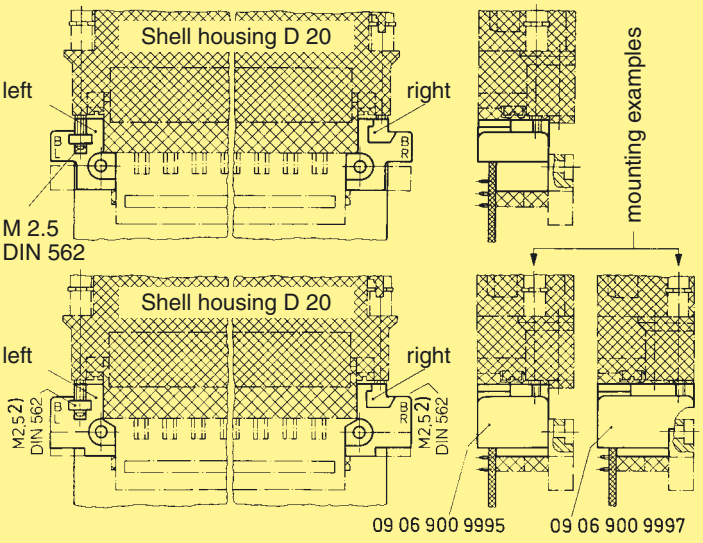
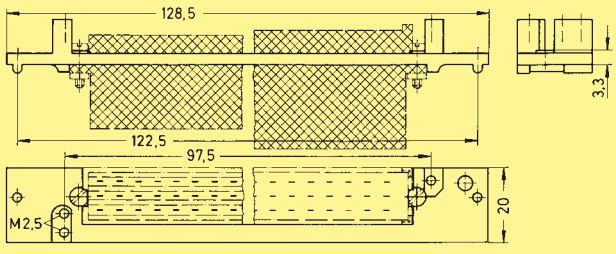
Coding

Identification	Part No.	Drawing	Dimensions in mm
Code comb for shell housing[3] (can also be used as blanking cover) Ⅰ	09 06 900 9984		
Code pin[3] [1] Order 13 pieces per code comb	09 06 001 9905[1]	 Order 13 pieces per code comb	
Code comb for male connector[3] Ⅱ	09 06 900 9985		
Mounting possibilities for the code comb in shell housing D 20/2 metallised			

[2] Use the lower slot when coding the male connector with fixing brackets

Mounting example **A** max. cable entry ø 14 mm to the top, see page 20.23
Mounting example **B** max. cable entry ø 14 mm to the bottom, see page 20.23

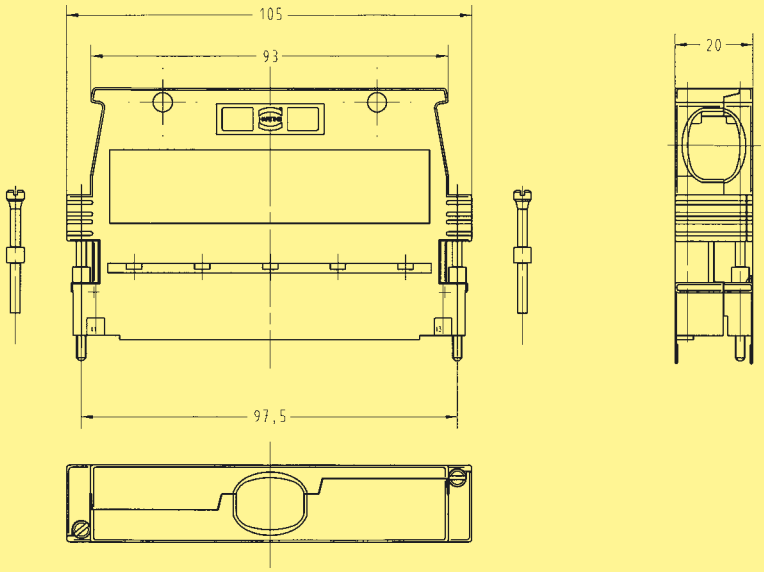
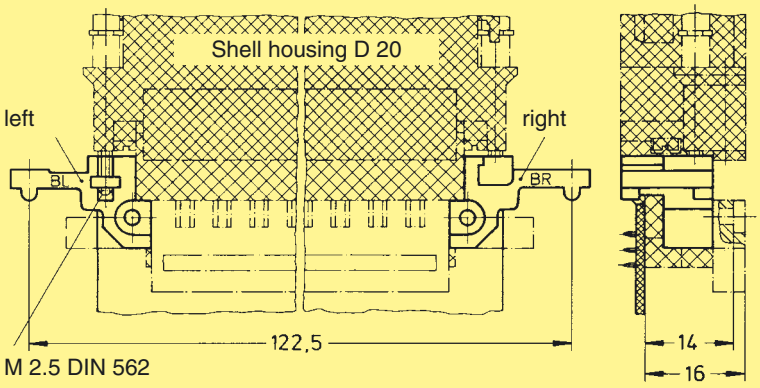
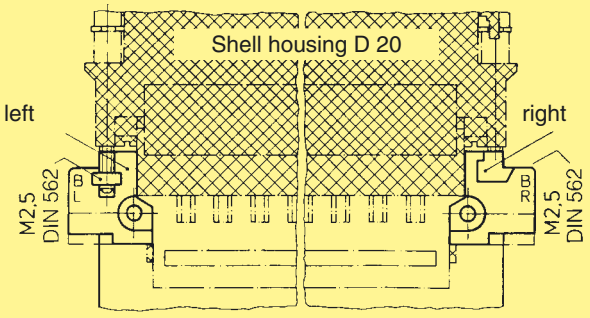
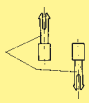
[3] Fits D 20/2 and D 20/4 metallised

Identification	Part No.	Drawing	Dimensions in mm
Mounting possibilities for coding at the male connector with fixing brackets			
Fixing brackets B metallised for male connectors* for 19" racks according to DIN 41 494, sheet 5 Single fixing* without nut	left 09 06 900 9909 right 09 06 900 9910		
with nut M 2.5 DIN EN ISO 4 036	left 09 06 901 9934 right 09 06 901 9935		
Multiple fixing* without coding at fixing bracket without nut	left 09 06 900 9907 right 09 06 900 9908		
without coding at fixing bracket with nut M 2.5 DIN 562	left 09 06 900 9966 right 09 06 900 9967		
with coding at fixing bracket[1] with nut M 2.5 DIN 562	left 15 mm 09 06 900 9995 20 mm 09 06 900 9997 right 15 mm 09 06 900 9996	2) supplied with fixing	
Protection and fixing* strip for 20 mm shell housing Single fixing fits female connectors and I element crimp	09 06 001 9909		

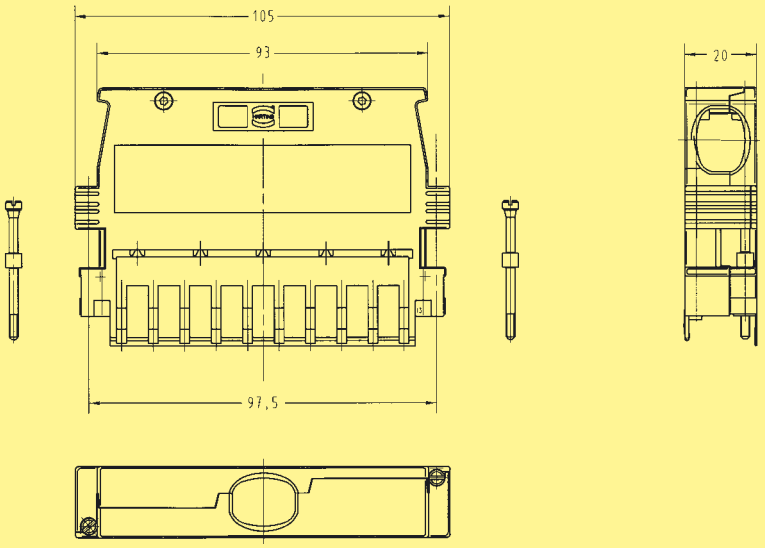
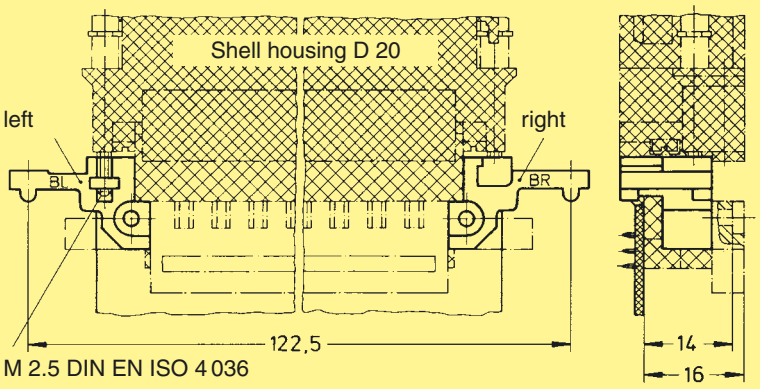
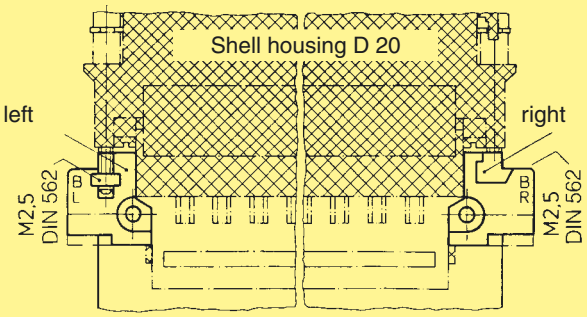
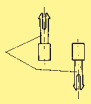
* Fits D 20/2 and D 20/4 metallised

[1] Specific coding between the fixing bracket and pcb guiding rail

Shell housing D 20 metal for types F, H and MH

Identification	Part No.	Drawing	Dimensions in mm
Shell housing D 20 metal (incl. cable clamp and coding)	09 06 848 0521		
Fixing brackets B metallised for male connectors for 19" racks according to DIN 41 494, sheet 5 **Single fixing** with nut M 2.5 DIN 562	left 20 mm 09 06 901 9924 right 20 mm 09 06 901 9925		
Multiple fixing with coding at fixing bracket with nut M 2.5 DIN 562	left 20 mm 09 06 900 9997 right 15 mm 09 06 900 9996		
Cable clamp	09 06 800 9992		
Code pin	09 06 001 9905	Order 13 pieces per code comb 	

Shell housing D 20 metal HF for types F, H and MH

Identification	Part No.	Drawing	Dimensions in mm
Shell housing D 20 metal HF with nickel-plated surface (incl. cable clamp, HF sealing spring, shielding plate and coding)	09 06 848 1521		
Fixing brackets B metallised for male connectors for 19" racks according to DIN 41 494, sheet 5 Single fixing with nut M 2.5 DIN EN ISO 4 036	left 20 mm 09 06 901 9924 right 20 mm 09 06 901 9925	 M 2.5 DIN EN ISO 4 036	
Multiple fixing with coding at fixing bracket with nut M 2.5 DIN 562	left 20 mm 09 06 900 9997 right 15 mm 09 06 900 9996		
Cable clamp	09 06 800 9992		
Code pin	09 06 001 9906	Order 13 pieces per code comb 	

Tooling

* See separate catalogue

Modular tooling system for starting connector press-in

The diversity of connector types with press-in terminations and varying termination styles make it necessary to have a simple, flexible tooling system that can be continuously updated.

The HARTING modular tooling system has significant advantages in terms of economic assembly of the many connector types with press-in terminations.
The basic modules of the tooling system which will always be required are:

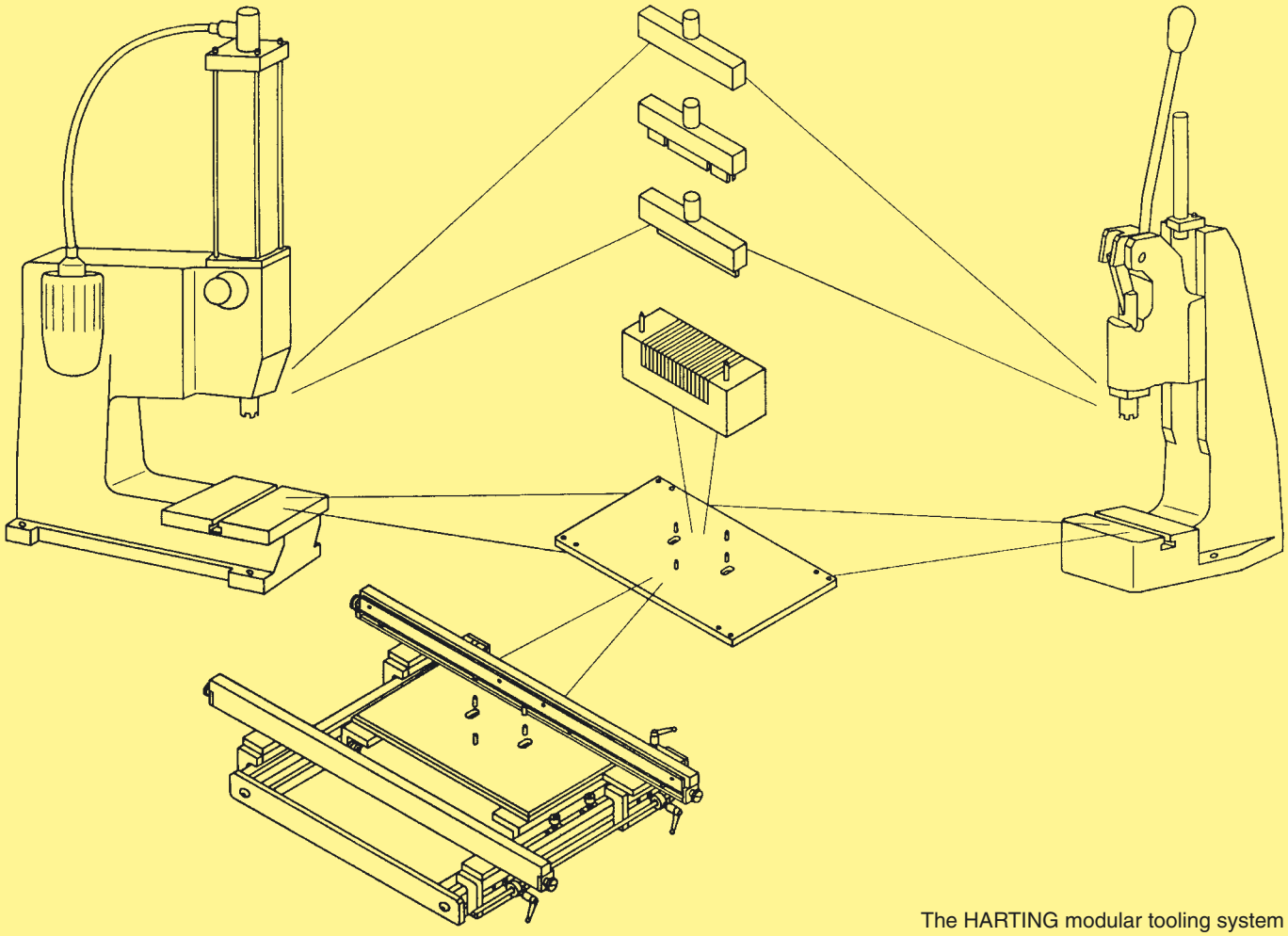
- Press
- Top tool
- Bottom tool
- Base plate

To increase automation and productivity the following modules may be added to the basic assembly:

- Guide frame with base plate
  for accurate positioning of the pcb
  up to a length of 600 mm

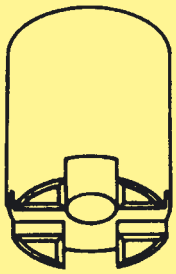
- Guide frame ”Standard“
  for hand bench press and pneumatic press
  and pcb height of 123.5 up to 309.5 mm

- Guide frame ”Long“
  for pneumatic press and
  pcb height of 123.5 up to 668.5 mm



The HARTING modular tooling system

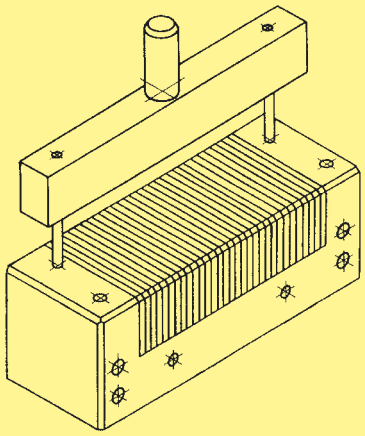
When setting up an assembly machine it is not necessary to set the working height of the press and adjust the base plate more than once. There is no need for further adjustments. All the other adaptations for various applications are performed efficiently and are reliant by various combinations of individual modules.



Ram with cross-shaped groove

Positioning the bottom tool in relation to the top tool

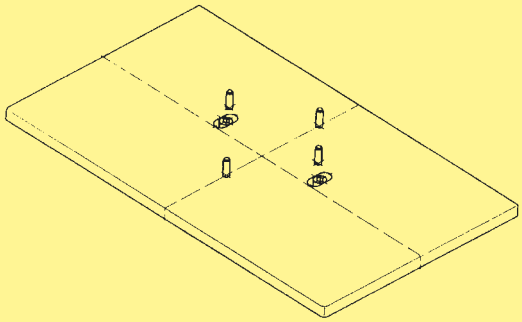
The ram of the HARTING press is generally provided with a cross-shaped groove which accurately positions the top tool in steps of 90°.



Positioning the bottom tool in relation to top tool

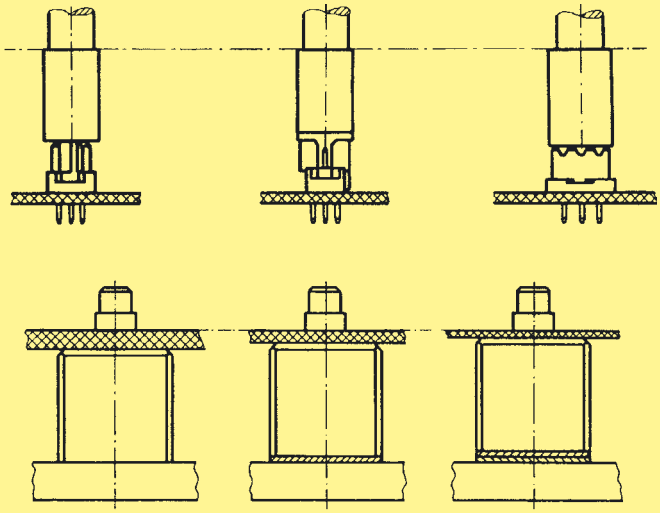
Two guide pins position the bottom tool in relation to the top tool simply and accurately.

These guide pins cannot be used for positioning the pcb or the connector!



Base plate with pairs of location pins at 90°

Two pairs of pins on the base plate locate the bottom tool in relation to the top tool in steps of 90°.



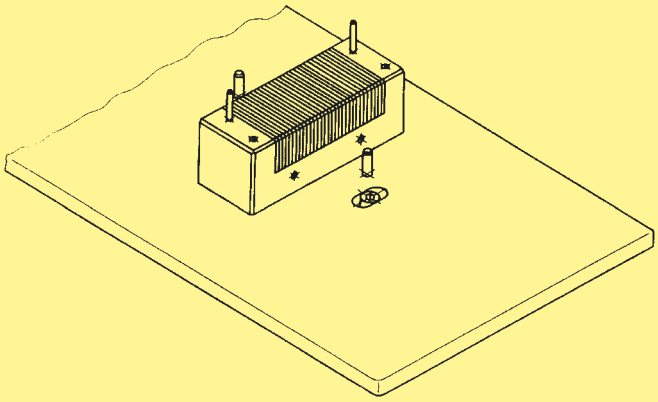
Height compensation

- Various overall heights of connectors are accommodated by type-specific top tools.
- Various pcb thicknesses are accommodated by the use of spacers between the bottom tool and base plate.

Range of applications for the bottom tool

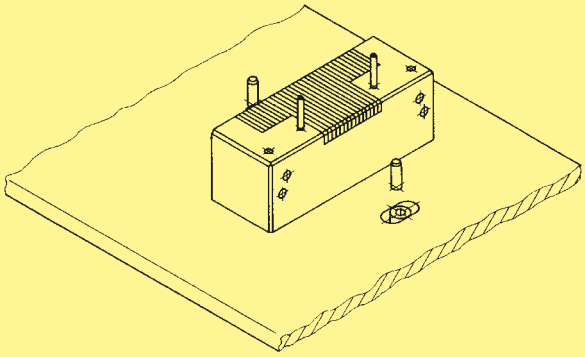
One bottom tool can be used to assemble connectors with straight or angled press-in terminations.

When pressing in the connectors with angled press-in terminations the positioning pins remain in the bottom tool and serve as guide pins for the connector.



Bottom tool set for assembling connectors with angled pins

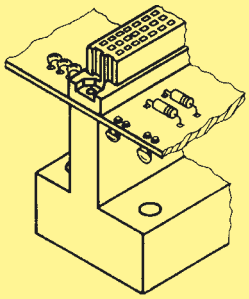
By rotating the bottom tool in steps of 90° and relocating the positioning pins it is possible to assemble half-length connectors with angled press-in terminations.



Bottom tool set for assembling half-length connectors with angled pins

Bottom tool (narrow version)

In addition to the square bottom tool with multi-functional properties, HARTING offers the alternative of a narrow bottom tool for assembling connectors with straight press-in terminations. This tool supports the pcb within the press-in connector zone and therefore makes it possible to assemble connectors where electronic components are to be placed in close proximity.



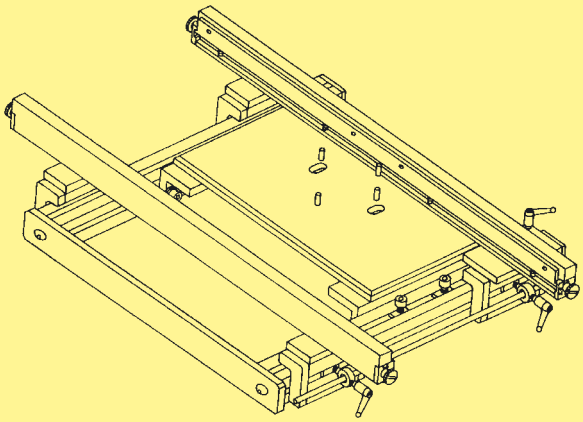
Narrow version of the bottom tool for special applications

Guide frame

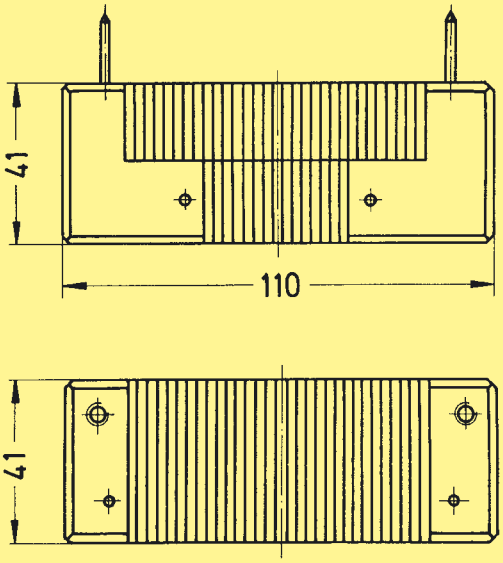
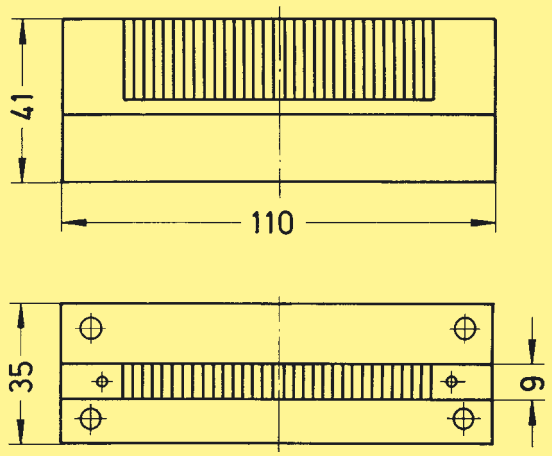
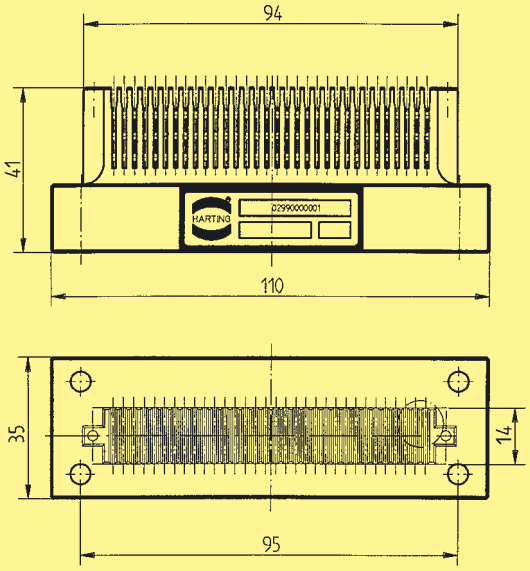
The guide frame screwed to the base plate ensures the correct positioning of the pcb in relation to the top and bottom tools and permits a much higher rate of assembly.

Both guide rails are adjustable to accommodate various pcb sizes.

A spring-loaded supporting rail lifts the pcb away from the bottom tool after the press-in operation ensuring that no damage occurs to the conductors as it passes through the machine.



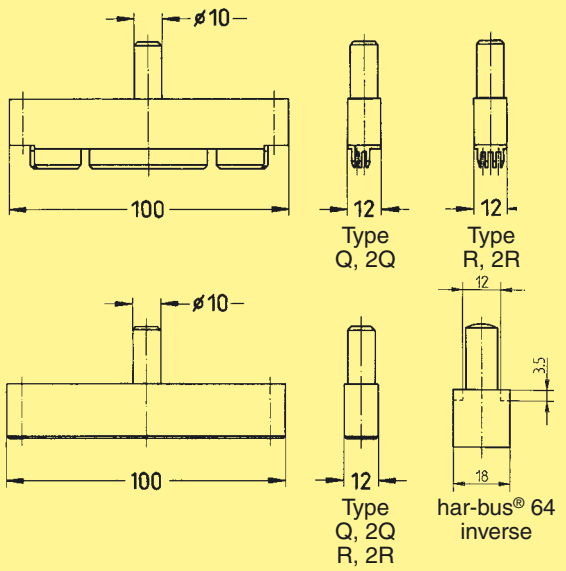
Guide frame for positioning the pcb in relation to the top and bottom tools

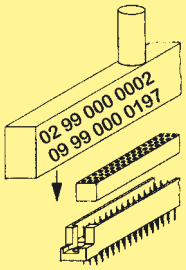
Identification	for use with	Part No.	Drawing	Dimensions in mm
Bottom tool Universal	**Male and female connectors** Type B, 2B C, 2C M Q, 2Q R, 2R E F har-bus® 64 har-bus® 64 inverse SEK 18*	09 99 000 0185		
Bottom tool Narrow	**Male connectors** Type Q, 2Q R, 2R SEK 18*	09 99 000 0256		
	Female connectors Type B, 2B C, 2C M F	09 99 000 0256		
Bottom tool Narrow	**Female connectors** har-bus® 64 **Male connectors** har-bus® 64 inverse	02 99 000 0001		

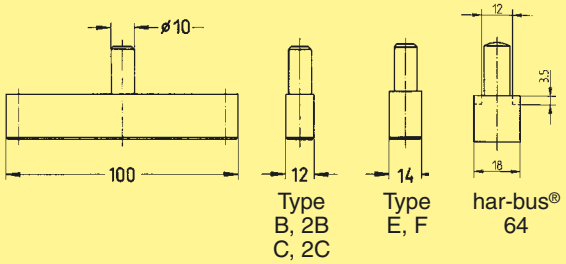
* Connectors see separate catalogue

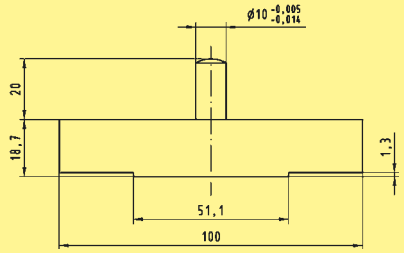
Top tools for male and female connectors

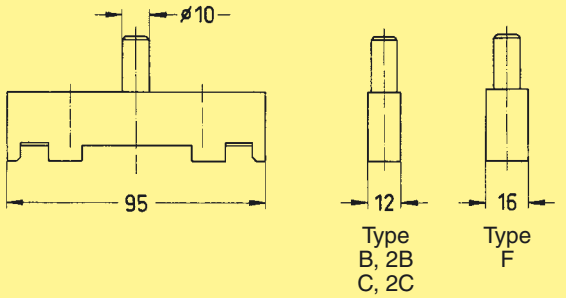
Identification	for use with	Part No.	Drawing	Dimensions in mm
Top tool	**Male connectors**			
without insert block				
	Type Q, 2Q	09 99 000 0181		
	R, 2R	09 99 000 0183		
	har-bus® 64 inverse	02 99 000 0012		
with insert block				
	Type Q, 2Q R, 2R	09 99 000 0197		
	har-bus® 64 invers	02 99 000 0002		
Insert blocks	**Male connectors**			
	Type Q	09 99 000 0275		
	2Q	09 99 000 0274		
	R	09 99 000 0277		
	2R	09 99 000 0276		
	har-bus® 64 inverse	02 99 000 0011		
	har-bus® 64 shroud	02 99 000 0012		
Top tool	**Female connectors**			
	Type B, 2B C, 2C D-Sub* SEK 18* har·mik*	09 99 000 0197		
	E F	09 99 000 0221		
	har-bus® 64	02 99 000 0002		
	Type M (24+8)	09 99 000 0269		
	M (42+6)	09 99 000 0270		
	M (60+4)	09 99 000 0271		
	M (78+2)	09 99 000 0272		
Top tool	**Female connectors**			
only for short posts and pcb thickness > 1.6 mm and without guide frame				
	Type B, 2B C, 2C	09 99 000 0228		
	F	09 99 000 0229		





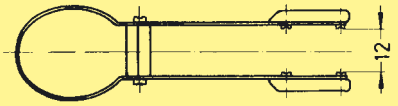
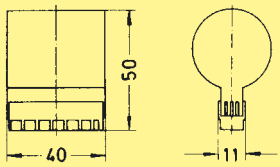
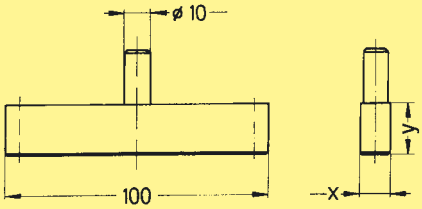
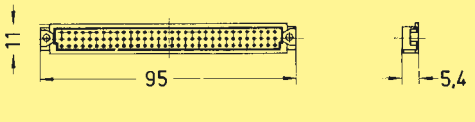
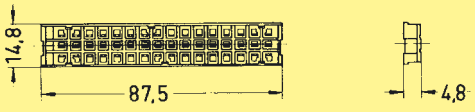
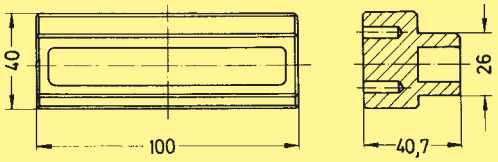






Tooling

* Connectors see separate catalogues

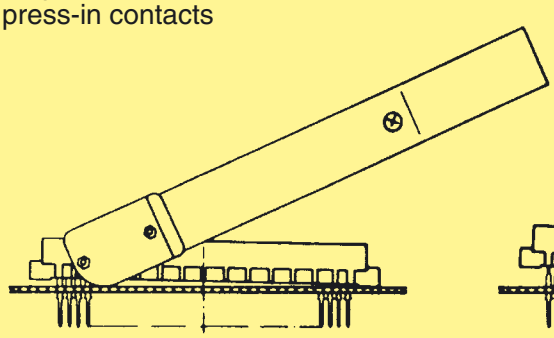
Identification	for use with	Part No.	Drawing	Dimensions in mm
Removal tool for moulding	**Male connectors** Type Q 2Q R 2R	09 99 000 0198		
Removal tool for single male contacts		09 99 000 0239		
Insertion tool for single male press-in contacts		09 99 000 0200		
Press-out tool	**Termination length** 17 mm 13 - 13.2 mm 11.5 mm 4.5 - 5.3 mm	09 99 000 0197 09 99 000 0219 09 99 000 0221 09 99 000 0220		
Termination support for protection against bending of 13 mm - 17 mm terminations	**Male connectors** Type Q, 2Q R, 2R **Female connectors** Type B, 2B C, 2C **Female connectors** Type F	09 99 000 0240 09 99 000 0241	 	
Support block	**Male connectors** Type Q, 2Q R, 2R SEK 18* **Female connectors** Type B, 2B C, 2C F	09 99 000 0218		

Termination length [mm]	x [mm]	y [mm]
17	12	18.7
13 - 13.2	12	22.7
11.5	14	20.1
4.5 - 5.3	12	30.2

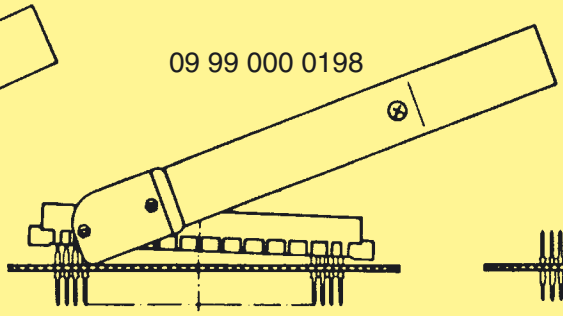
With the different dimension y no adjustment of hand bench press necessary.

* Connectors see separate catalogue

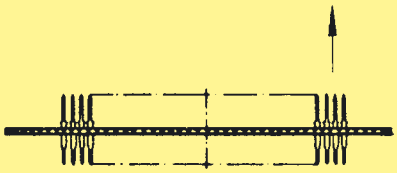
Replacement of single male press-in contacts



Lever up the moulding

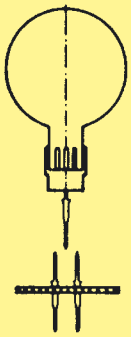


Remove the moulding

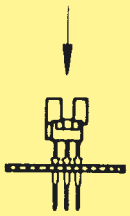


Pull out a single male contact

Insert the new contact
into the cavity of the contact
using insertion tool

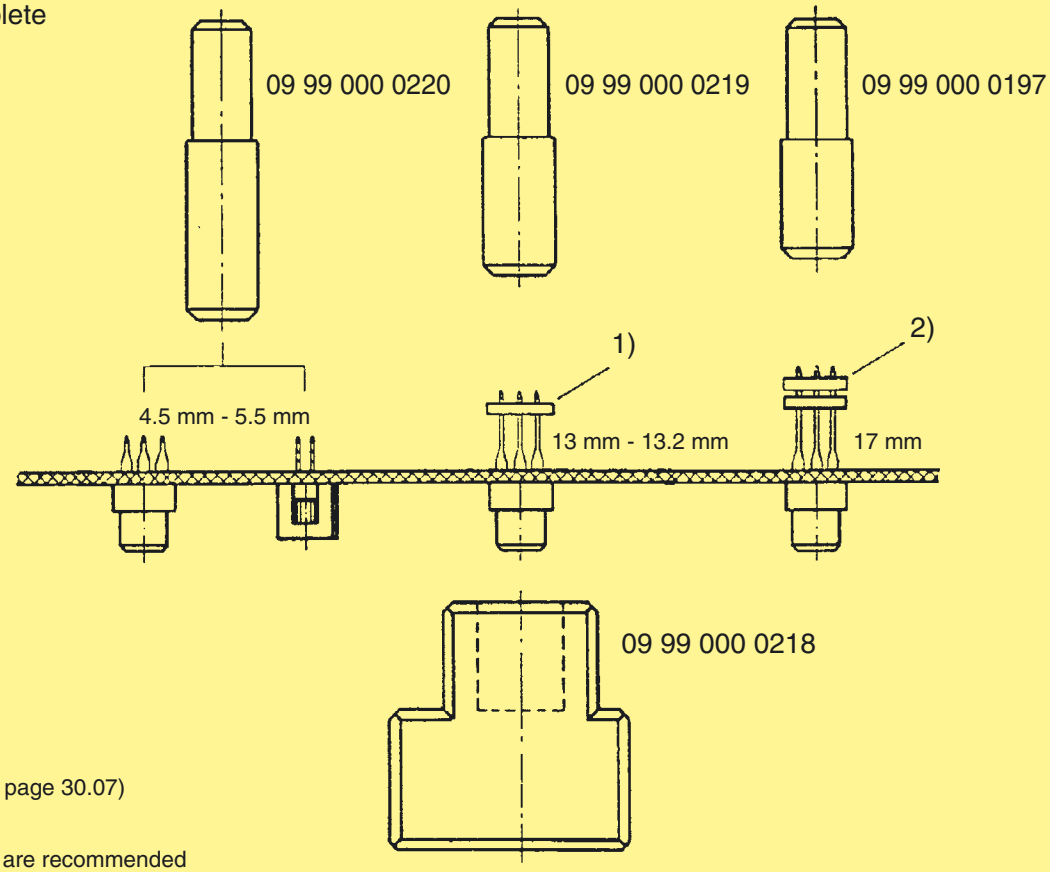


Correctly position
the new contact
and press-in by hand



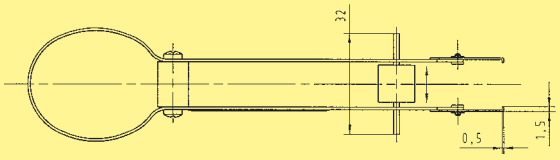
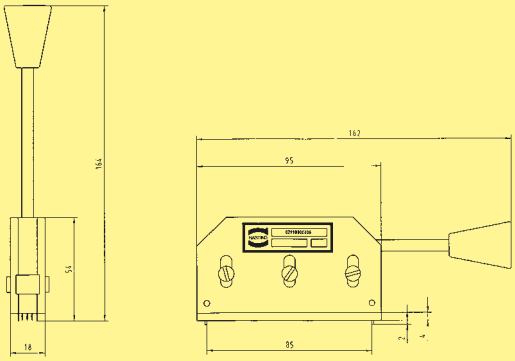
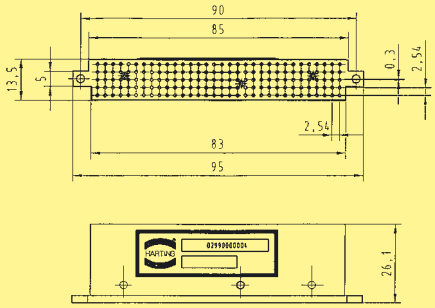
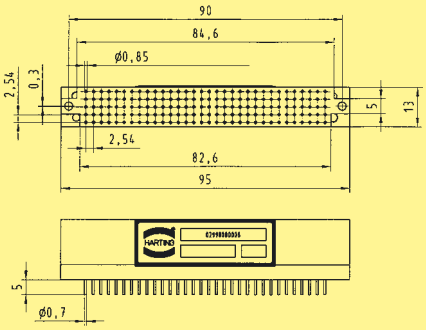
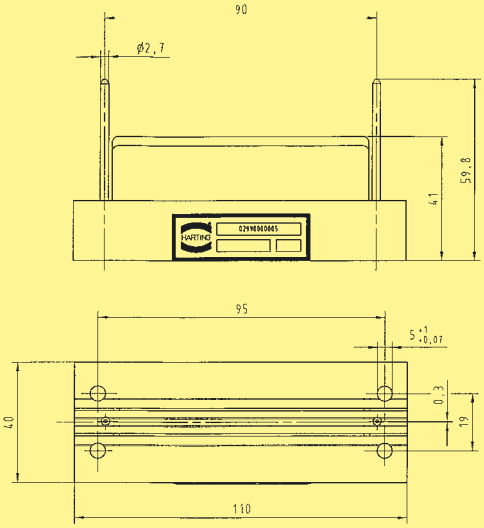
Set up the moulding
with the press

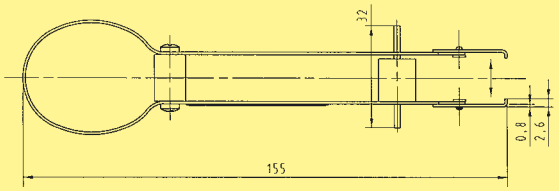
Replacement of complete press-in connectors



[1] Termination support (see page 30.07)

[2] for 17 mm wrap posts
two termination supports are recommended

Identification	for use with	Part No.	Drawing	Dimensions in mm
Removal tool for moulding	**Female connectors** har-bus® 64	02 99 000 0003		
Removal tool (heavy duty) for moulding	**Female connectors** har-bus® 64	02 99 000 0006		
Press-out tool for 17 mm terminations	**Female connectors** har-bus® 64	02 99 000 0004		
Press-out tool for 5 mm / 4.5 mm terminations	**Female connectors** har-bus® 64	02 99 000 0008		
Support block	**Female connectors** har-bus® 64	02 99 000 0005		

Identification	for use with	Part No.	Drawing	Dimensions in mm
Removal tool for shroud	**rear I/O shroud** har-bus® 64	02 99 000 0007		

Replacement of complete press-in connectors

Steps in detail

1. Lever up the moulding by using a removal tool

   a) The removal tool with Part No. 02 99 000 0003 is suitable for repairing small quantites. It can only be used if the adjacent components on the pcb are at least 2 mm apart from the moulding of the connector.

   b) The removal tool with Part No. 02 99 000 0006 is suitable for repairing large quantities. Due to its design it can also be used if components on the pcb are in close proximity to the moulding of the connector.

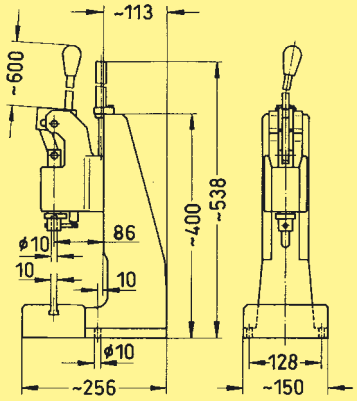
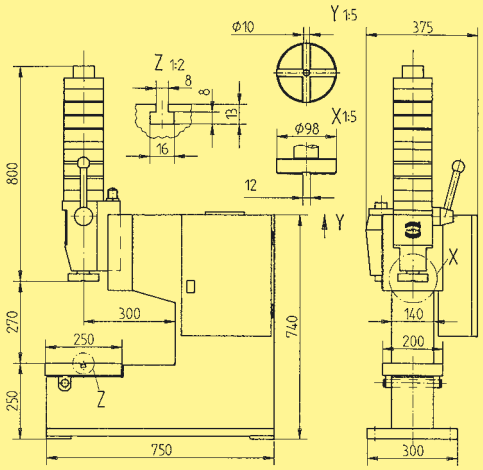
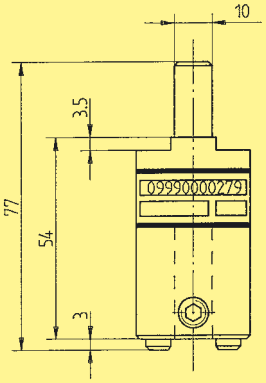
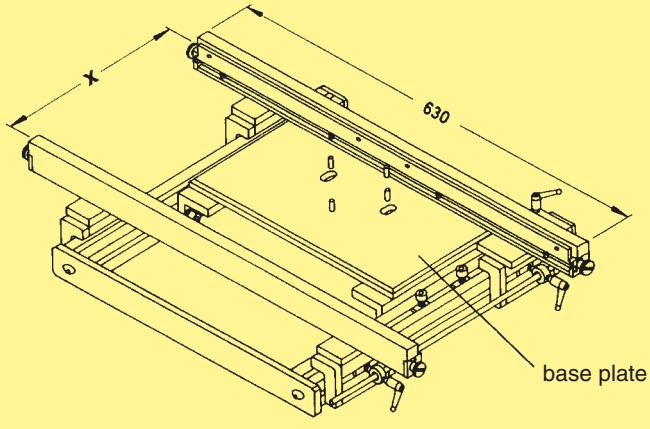
2. Lever up the rear I/O shroud with the removal tool 02 99 000 0007. This step is only required with 17 mm termination length.

3. Pull out the female contacts with the press-out tool

   a) for 17 mm termination length use Part No. 02 99 000 0004 and

   b) for 5 mm termination length use Part No. 02 99 000 0008.

   During this process the press-out tool replaces the top tool and the pcb is supported by the support block (Part No. 02 99 000 0005) from the bottom.

Identification	Part No.	Drawing	Dimensions in mm
Hand bench press	09 99 000 0201		Technical characteristics Working stroke 25 mm Press force 15 kN max. Hole ø in the ram ø 10 mm Net weight approx. 23 kg
Pneumatic press **40 kN**	09 99 000 0281		Technical characteristics Total stroke 48 mm Working stroke 0-6 mm Press force 40 kN max. Air pressure 6 bar Hole ø in the ram ø 10 mm Net weight approx. 320 kg
Adaptor for height compensation[1)]	09 99 000 0279		
Guide frame with base plate Standard type for pcb size x = 123,5 - 309,5 mm	09 99 000 0244		
Long type for pcb size x = 123,5 - 668,5 mm	09 99 000 0261[2)]		
Base plate	09 99 000 0255		

[1)] suitable for 09 99 000 0281 and all CPM machines (see page 30.12 pp.)
[2)] not suitable for hand bench press

CPM 2001/s - press-in machine with a graphical user interface

The CPM 2001/s is the latest state of the art press-in machine. Optimised for pressing-in components into both daughter cards and backplanes, the machine is fully programmable and offers greater flexibility with a shorter set up time.

Different component heights can be stored and recalled later by simply using the “go/press” button. A TFT flat screen with Windows™ based software continuously displays all relevant information to the operator (connector position on the pcb, press-in forces etc.), thus consequently eliminating errors. A barcode reader recognises all pcb data and corresponding process programmes. Companies with multiple manufacturing sites can continuously equip and update machines with the latest programmes developed by specialists at their headquarters. The reliable and unique press-in method „autosense“ offers outstanding security for processes, as pcb tolerances and connector types are recognised and taken into consideration automatically.

CPM 2001/s

Part No. **09 89 030 0000**

Technical characteristics

Drive	electromechanical
Press-in force	100 kN
max. pcb dimensions	600 x 1000 mm
Floor space	1200 x 960 mm
Height	2150 mm
Weight	950 kg
Power supply	380 / 400 / 415 V 3 phases, 16 A
Consumption	< 1 kW
Colour	RAL 7038

CPM 2001/s incl. PC, control software, barcode reader, keyboard, touch screen

Equipment:
- PC incl. Win95™ with control software to store and manage all programs and process data
- Barcode scanner for management ease of press-in programs
- Touch screen for a direct user interface

Process control:
- Continuous recording of press-in force and press-in distance data
- Press-in method “autosense”
- Automated recording and imaging of all process data, as well as process interruption at non compliant force values
- User guidance through pictures
- Clear assignment of pcb and process data

Options:
- Rotatable tool changer
- Insertion removal station

The **CPM *prestige*** press-in machine with a graphical user interface

The **CPM *prestige*** is a consequential development of the successful CPM 2001 press-in machines. The excellent design, supported by a wide range of tools presents a convenient, easy and comfortable way of populating backplanes and daughtercards. The machine is fully programmable and is supplied with a graphical user interface for control and visualisation of the complete process.

The use of a microprocessor control allows the recognition and storage of different component heights, so that the pressing-in of different components is initiated simultaneously with only one button.

The user-friendly touch-screen guides the user through the menu-orientated process controls. The visualisation of the entire press-in process (the position of the connector, press-in forces etc.) allows the rapid recognition and eradication of the possible error sources. With the addition of a barcode reader (1D and 2D) the parameters of every pcb layout can be stored, recalled and loaded into the automated press-in programme. The extensive operation monitor functions simplify the service and support of the machine.

The machine employs the automatic switch-off system “autosense”, known worldwide for its reliability. The different connector types and the tolerances of the pcb are automatically recognised and taken into consideration at the press-in operation, thus maximising the process security.

Part No.	**09 89 040 0000**
Technical characteristics	
Drive	electro-mechanical, servo
Press-in force	100 kN
max. pcb dimensions	600 x 1000 mm
Floor space	1200 x 1150 mm
Weight	980 kg
Power supply	208 / 380 / 400 / 415 V
Consumption	< 1 kW
Colour	on request

CPM *prestige*
(incl. PC, control software, barcode reader, keyboard, touch screen)

Features:

- Guiding rails for the secure positioning of the pcb
- Touch-screen and Industrial PC with UPS (uninterruptable power supply)
- Barcode reader for management ease of press-in programs
- All dimensions allow an easy integration into production lines

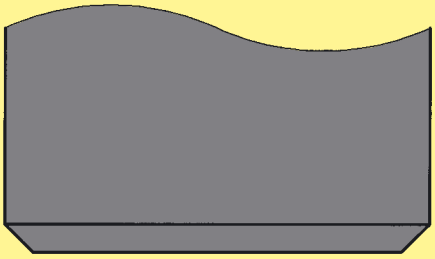
Process monitoring and quality assurance:

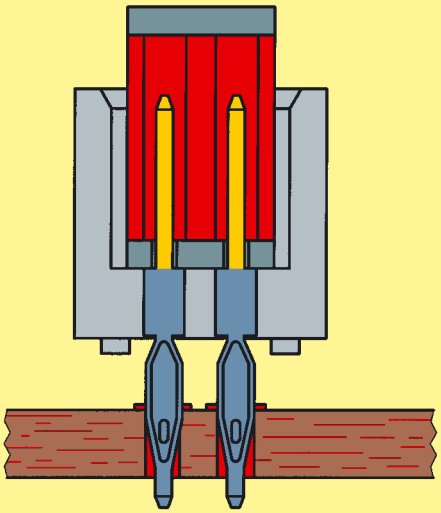
- Touch screen interface with graphical and verbal menus for all machine functions
- Autosense: automated press-in interruption at incorrect press-in forces
- Storage and validation of all press-in parameters via quality assurance software (press-in force tolerances)
- Continuous high-precision measurement and recording of press-in forces and distances
- Remote determination of errors and maintenance
- High flexibility through a modular tool range

Options:

- Rotatable tool changer
- Insertion removal station

Today nearly all female connectors are designed for flat rock tooling. For every type of male connector specific tooling and a high degree of X-Y-process accuracy is required. Therefore HARTING offers press-in insert blocks that transfer all well known assembling advantages from female connectors to male headers.



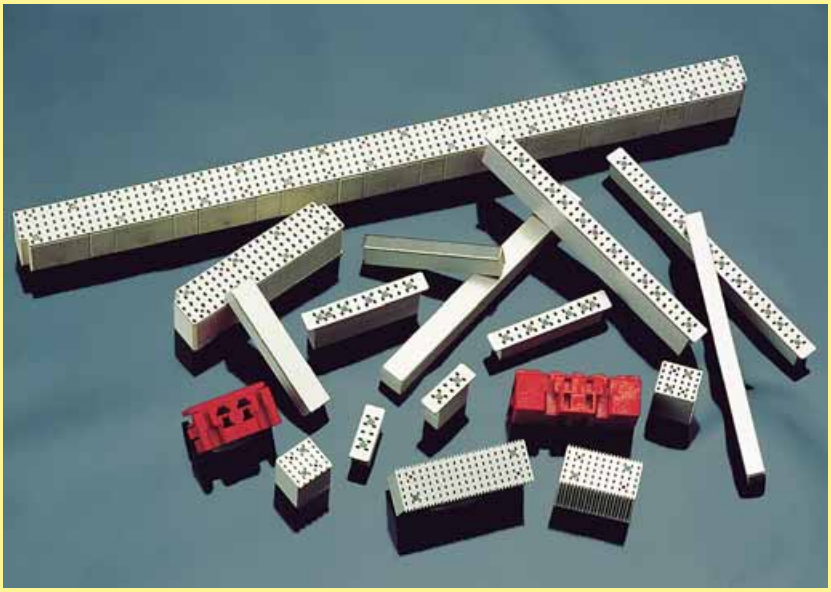


Advantages of press inserts

Robust tooling

No lateral force to pcb hole

No abrasion of the contact mating surface by the press tool



HARTING has already developed press-in inserts for all major male connector families on 2.54 mm, 2.5 mm and 2 mm.

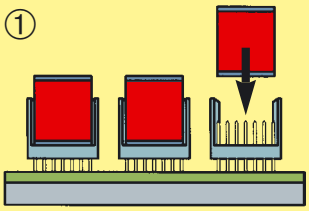
Inserts for any other special components can be developed on request.

The additional work step for inserting and removing the press-in inserts can be efficiently done with the insertion removal station. This station removes all press-in inserts with a magnetic plate in one operation and inserts them into the next pre-assembled pcb with the necessary precision. (Principle see page 30.15).

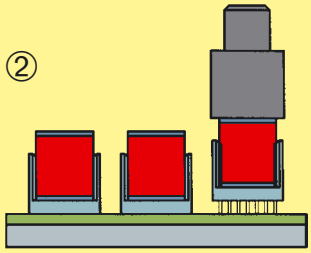
The cycle time for loading all headers is between 4 and 6 seconds, independent from the amount of press-in inserts.

To load the inserts automatically means also that connectors assembled in a wrong way will be recognised and errors consequently prevented.

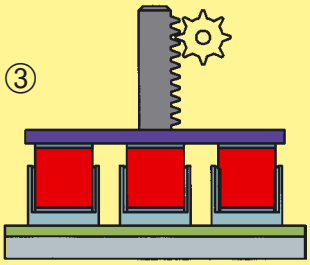
Principle:

① 

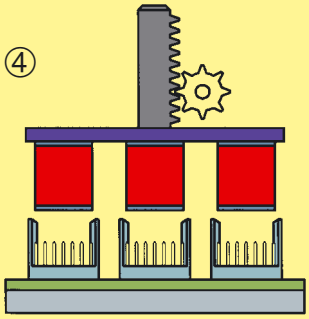
Load all headers with inserts **for <u>one</u> press-in cycle**

② 

Press-in all connectors with a flat die

③ 

Position the magnetic plate

④ 

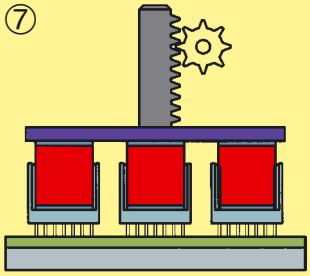
Remove all press-in inserts in one operation

Remove the processed pcb from the machine

⑤

⑥

Move the next pre-assembled pcb to the insert station

⑦ 

Load all headers in one operation

The insertion removal station has been developed both for the **CPM *prestige*** and the CPM 2001/s. It can additionally be used as stand alone equipment.

Insertion removal station

Power supply	220 V / 50 Hz
Air pressure	6 bar (15-16 l/min.)
Part No.	**09 89 020 0070**
	for pcb dimensions 710 mm x 540 mm
Part No.	**09 89 020 0060**
	for pcb dimensions 1000 mm x 600 mm

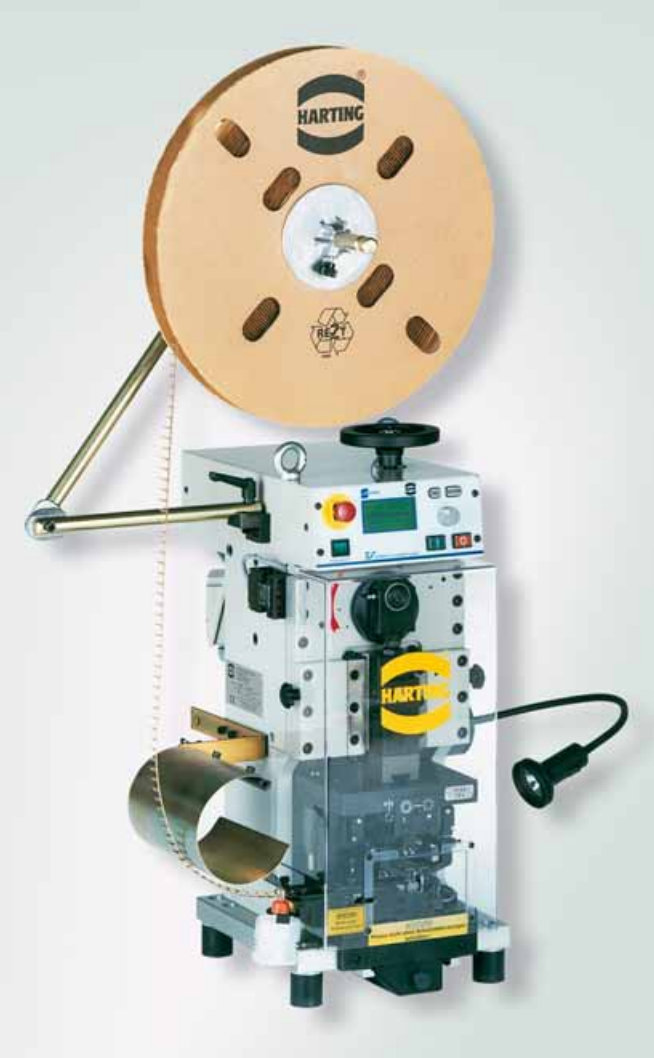
Bestseller **CPM 2001/s with insertion removal station**, adaptable to all HARTING press-in machines.

Identification	Part No.	Drawing	Dimensions in mm
HARTING crimping tool for individual contacts BC and FC	09 99 000 0620		
Crimping insert set for individual contacts each set contains locator and crimp insert top and bottom part		Order crimping inserts separately	
		Wire gauge	
BC / FC 1	09 99 000 0621	BC: 0.14 - 0.50 mm² FC 1: 0.09 - 0.25 mm²	
FC 2	09 99 000 0622	FC 2: 0.14 - 0.56 mm²	
FC 3	09 99 000 0623	FC 3: 0.50 - 1.50 mm²	
			
Positionierer			
BC	09 99 000 0630		
FC	09 99 000 0631		
Service case for crimping tool and 5 sets inserts, incl. screwdriver for insert change, without contents	09 99 000 0632		
HARTING crimping tool for bandoliered contacts (500 pieces) BC	09 99 000 0248	Wire gauge 0.09 - 0.5 mm²	
for bandoliered contacts (250 pieces)		Wire gauge	
FC 1	09 99 000 0247	0.09 - 0.25 mm²	
FC 2	09 99 000 0119	0.14 - 0.56 mm²	
FC 3	09 99 000 0120	0.50 - 1.50 mm²	
			
Crimping tool for individual contacts FC 1, FC 2 and FC 3 (Service tool)	09 99 000 0191	Wire gauge 0.14 - 1.5 mm²	
			
Insertion tool			
for contacts BC	09 99 000 0100		
for contacts FC 1, FC 2 and FC 3	09 99 000 0088		
Removal tool			
for contacts BC	09 99 000 0101		
for contacts FC 1, FC 2 and FC 3	09 99 000 0087		

Insertion and removal see chapter 02

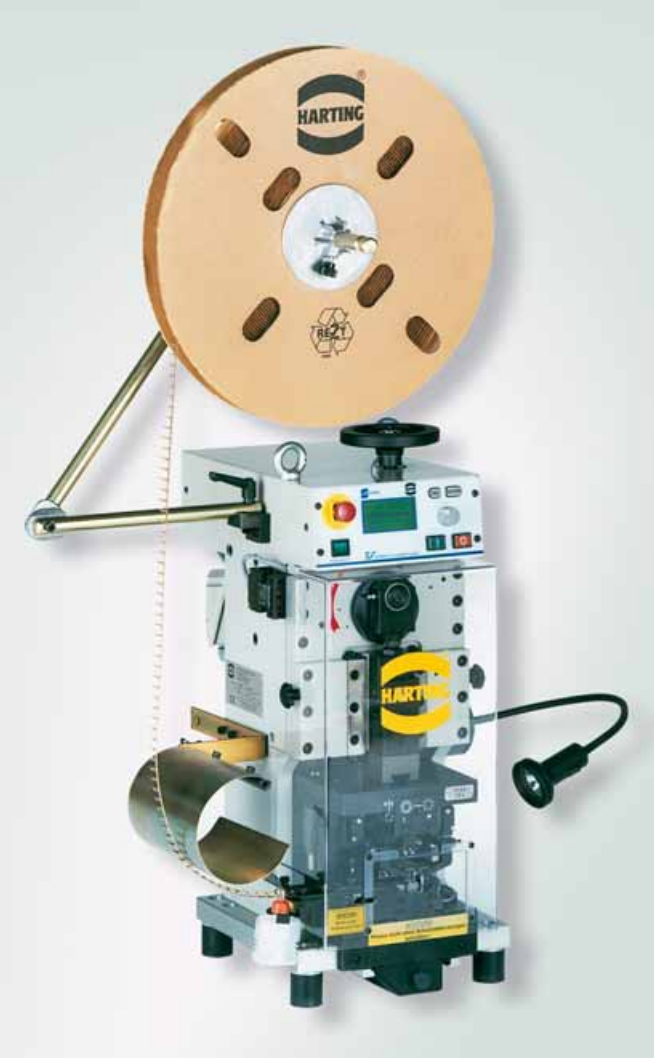
Identification	Part No.	Drawing	Dimensions in mm
HARTING semi-automatic crimping device Main drive, foot-operated 115/230 V – 50 Hz	09 99 000 0246	 Locator not necessary	
Crimping head for bandoliered contacts BC	09 99 000 0252	Wire gauge 0.09 - 0.25 mm² 	
FC1	09 99 000 0249	0.09 - 0.25 mm²	
FC2	09 99 000 0250	0.14 - 0.56 mm²	
FC3	09 99 000 0251	0.5 - 1.5 mm²	
Real holder for 2,500 contacts FC1, FC2 or FC3 and for 5,000 contacts BC	09 99 000 0158		

Automated crimping machine type BK



Part No.	**09 98 000 5000**
Technical Characteristics	
Dimensions	
Height	690 mm (1400 mm with a contact reel)
Width/Breite	350 mm
Depth/Tiefe	370 mm
Total weight	85 kg
Power supply	230 V, 50/60 Hz, 2.5 A
Consumption	0.75 kW
Motor speed	440 - 2000 rpm
Cable length	2 m incl. plug
Control	SPS
Work cycle trigger	Sensor
Work cycle	0.35 s for stripping and crimping
Illumination	Unolux F 230 V / 50 Hz / 20 W
Stroke counter	Daywise and fixed
Crimp force monitor	BB07 (optional)
Crimping tool	Pillar guided Cam controlled
Adjustable process parameters	Crimping heigth on wire Crimping heigth on insulation Depth of insulation stripping Length of insulation stripping Wire retainer position Wire position in the crimp contact Band thrust

Automated crimping machine type BK



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Crimp force monitor	BB07 (optional)
Crimping tool	Pillar guided Cam controlled
Adjustable process parameters	Crimping heigth on wire Crimping heigth on insulation Depth of insulation stripping Length of insulation stripping Wire retainer position Wire position in the crimp contact Band thrust

Identification	for use with	Part No.	Wire gauge [mm²]	AWG	Insulation [Ø mm]
Crimping tool					
for automated crimping machine type BK					
for DIN 41 612 connectors[1]	contacts BC	09 98 000 2004	0.09 - 0.56	28 - 20	0.7 - 1.6
	contacts				
	FC1	09 98 000 2005	0.09 - 0.25	28 - 24	0.7 - 1.6
	FC2	09 98 000 2006	0.14 - 0.56	26 - 20	0.8 - 2.3
	FC3	09 98 000 2007	0.50 - 1.50	20 - 16	1.6 - 2.8
for D-Sub connectors[2]					
		09 98 000 2008	0.09 - 0.25	28 - 24	0.7 - 1.4
		09 98 000 2009	0.25 - 0.50	24 - 20	0.9 - 1.7

Identification	conversion from	Part No.
Extension modules for FC crimping tools		
for automated crimping machine type BK		
	FC2 or FC3 to FC1	09 98 302 2621
	FC1 or FC3 to FC2	09 98 302 2622
	FC1 or FC2 to FC3	09 98 302 2623

[1] 3.5 + 0.5 mm of insulation is stripped from the wire to be crimped
[2] 2.5 + 0.5 mm of insulation is stripped from the wire to be crimped

Accessories

For applications where robust, high density, splash-proof connectors are required, e.g. in the automated control and industrial processing systems, HARTING have combined the proven reliability of DIN 41 612 connectors with standard Han® 24 B heavy duty hoods and housings, to bring forward a connector system with up to 96 ways and various contact plating thicknesses to suit the individual requirements.

Advantages

- The combination enhances design flexibility, as it permits an identical wiring interface between the standard 19“ racking systems and the peripheral equipment.
- Simplified stock-holding, identical operating tools.

Inserts

Female	2 x 48 way type F female connectors with crimp contact elements see chapter 02
Male	2 x 48 way type F interface connectors I with crimp contact elements see chapter 02

Hoods and housings

see catalogue "Heavy Duty Han® Connectors"

chapter 30
size 24 B

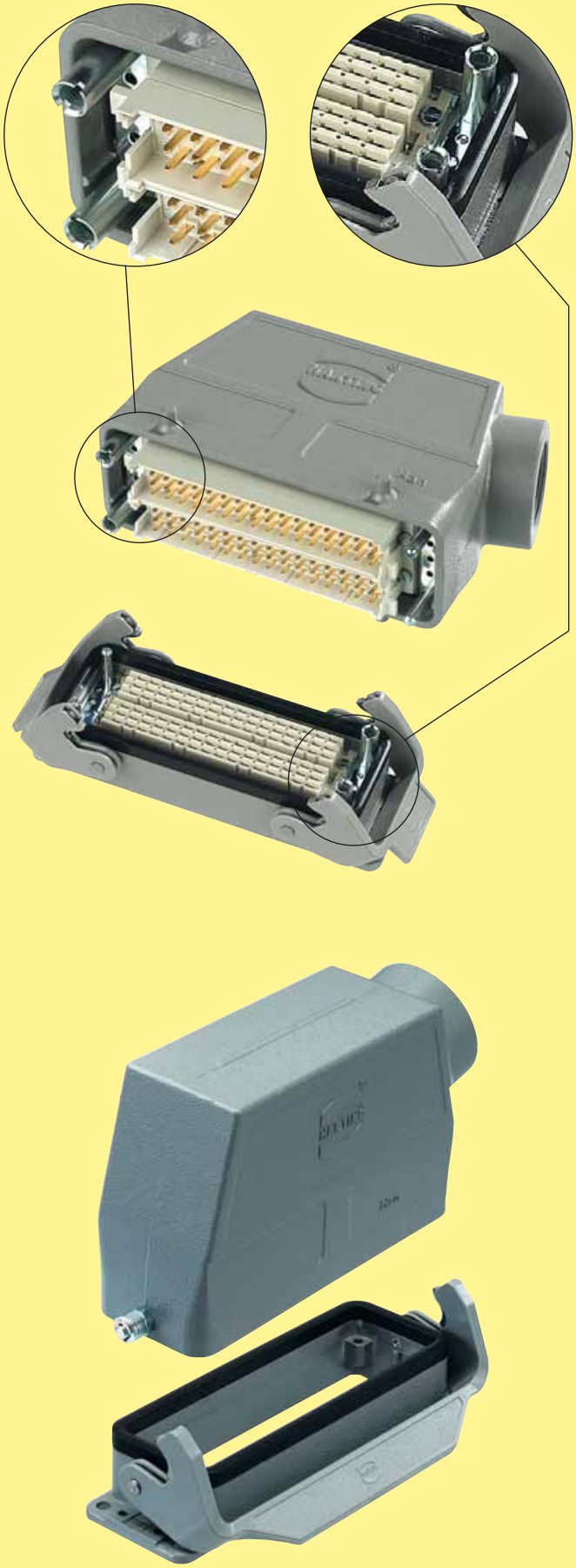
Degree of protection for hoods and housings: IP 65

Retaining frames

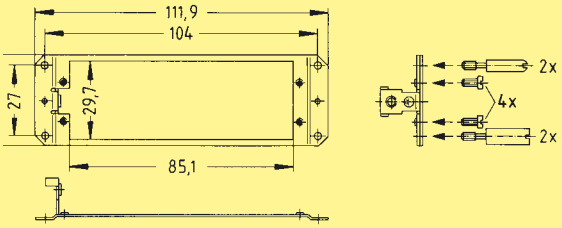
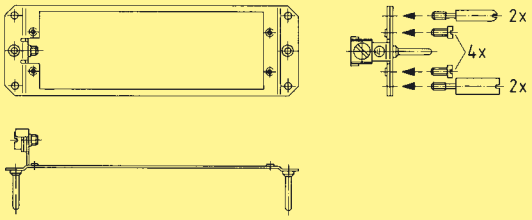
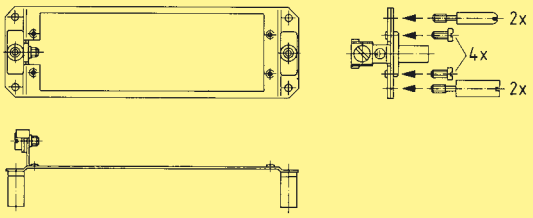
For fixing the inserts into the housing.

Alternative versions with pre-mating contacts and ground termination.

If the working voltages are in excess of 42 V (50 V) it is essential to use retaining frames which have pre-mating ground contacts.



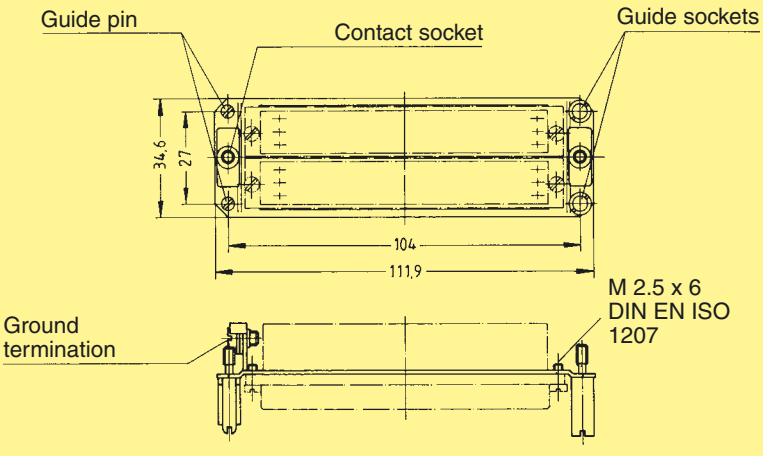
Retaining frames

Identification	Part No.	Drawing	Dimensions in mm
Retaining frame without contact elements I	09 06 001 9904		
Retaining frame with 2 contact pins and ground termination	09 06 001 9902		
Retaining frame with 2 contact sockets and ground termination II	09 06 001 9903		

Each retaining frame is supplied with 4 fixing screws for mounting the inserts and with 2 guide pins and sockets that provide mechanical protection for the contacts during mating and disconnection. These can also be used as a coding system to prevent cross plugging of adjacent connectors.

Mounting example

Connectors in the retaining frame with contact sockets



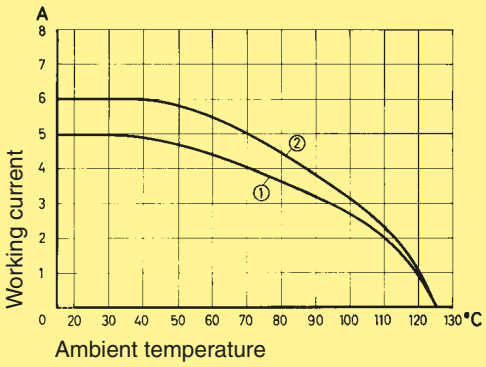
Retaining frame for types C and R is available with part no. 09 03 000 9911

Number of contacts	16, 32, 48
Working current	6 A max.
see current carrying capacity chart	
Clearance	
16 ways	≥ 1.6 mm
32, 48 ways	≥ 1.6 mm
Creepage	
16 ways	≥ 1.6 mm
32, 48 ways	≥ 3.0 mm
Working voltage	
The working voltage also depends on the clearance and creepage dimensions of the pcb itself and the associated wiring	according to the safety regulations of the equipment Explanations see chapter 00
Contact resistance	≤ 20 mΩ
Insulation resistance	≥ 10^{12} Ω
Termination	Crimp terminal 0.09-1.5 mm²
Materials	
Mouldings and hoods	Thermoplastic resin, glass-fibre filled
Contacts	Copper alloy
Contact finish	tinned

Current carrying capacity

The current carrying capacity is limited by maximum temperature of materials for inserts and contacts including terminals. The current capacity curve is valid for continuous, non interrupted current loaded contacts of connectors when simultaneous power on all contacts is given, without exceeding the maximum temperature.

Control and test procedures according to DIN IEC 60 512



① with shell housing ② without shell housing

Piggyback connectors for interfacing with DIN 41 612 female connectors with wrap posts 1 x 1 mm

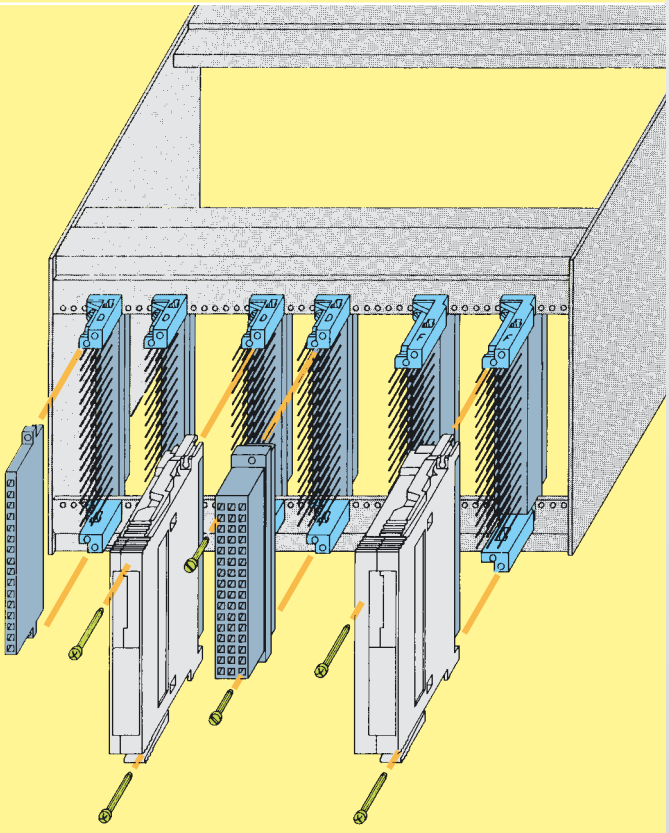
The problem of interfacing systems designed for the distribution or collection of electronic signals can be overcome by the use of piggyback connectors. Designed to be mounted on the rear of DIN 41 612 type wire wrap female connectors (1 x 1 mm posts) these piggyback elements can be used to terminate input and output cables.

Distance fixing brackets are fitted to provide either a latching or screw fixing facility over the two level wire wrap plane.

The contacts used in these versions are of the female crimp type and are tin-plated.

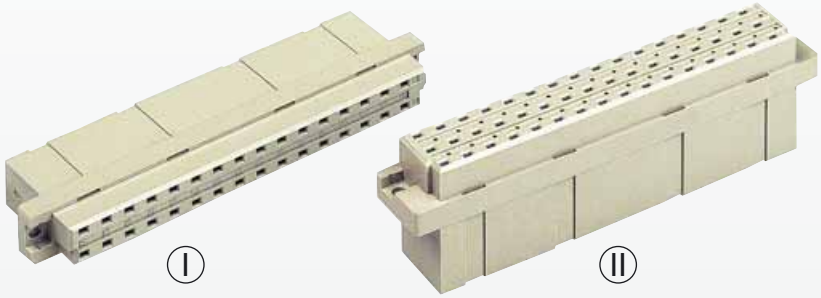
After crimping they can be easily inserted into the chambers of the connector body with the aid of an insertion tool. Insertion errors can be simply rectified with the use of a removal tool.

2 and 3 row piggyback connectors can be mounted in shell housings C and open hood G. Security is provided by either latches or screws to the distance fixing brackets.

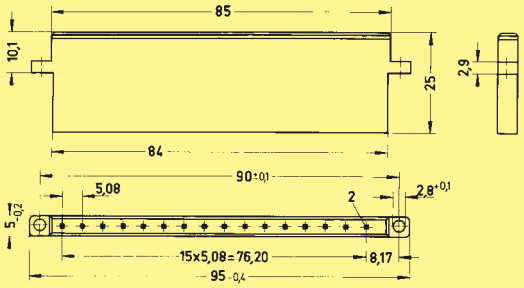
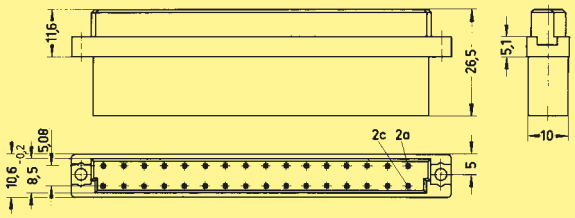
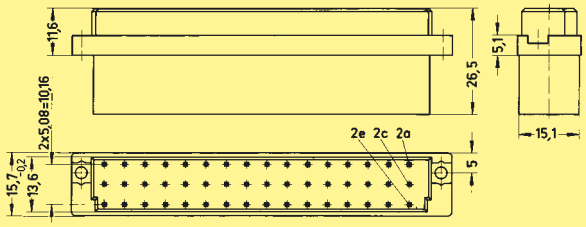
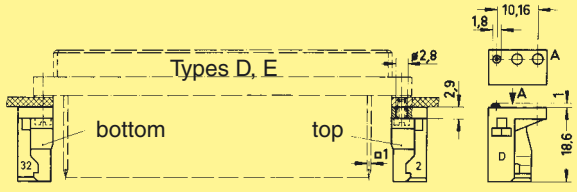
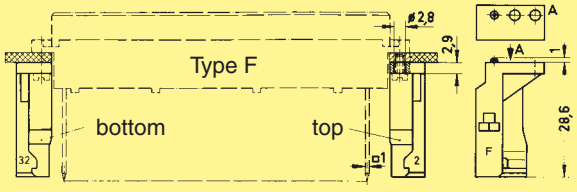


Number of contacts

max. 48



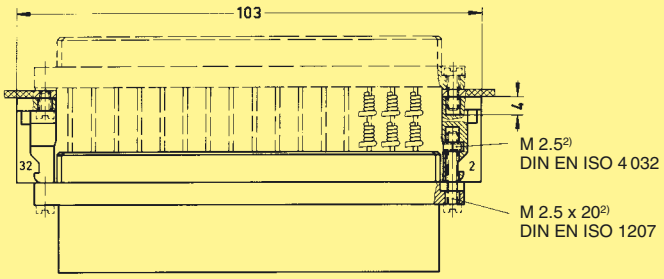
Piggyback connectors for 1 x 1 mm wrap posts

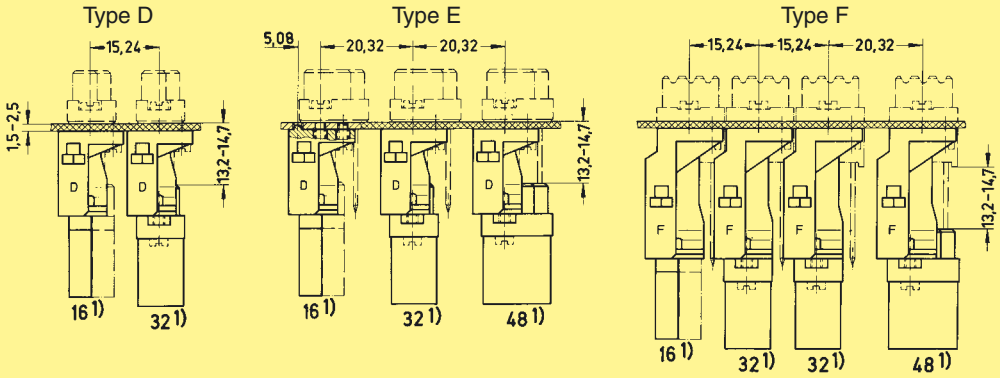
Identification	Number of contacts	Part No.	Drawing	Dimensions in mm
Piggyback connector for crimp contacts Order contacts separately	16	09 04 016 3201		
I	32	09 04 032 3215		
II	48	09 05 048 3204		
Female FC crimp contacts individual contacts FC1 FC2 FC3 Bandoliered contacts (approx. 2,500 pcs.) FC1 FC2 FC3		tin plated 09 06 000 6464 09 06 000 6461 09 06 000 6462 09 06 000 6454 09 06 000 6451 09 06 000 6452	Identification 	Identi-fication / Wire gauge mm² / AWG / Insulations ø mm 1 0.09-0.25 28-24 0.7-1.5 2 0.14-0.56 26-20 0.8-2.0 3 0.50-1.50 20-16 1.6-2.8 1 0.09-0.25 28-34 0.7-1.5 2 0.14-0.56 26-20 0.8-2.0 3 0.50-1.50 20-16 1.6-2.8 3.5 + 0.5 mm of insulation is stripped from the wires to be crimped. Crimping tools see chapter 30
Distance fixing brackets for female connectors Type D Type E		top (pos. 2) 09 04 000 9907 bottom (pos. 32) 09 04 000 9906		
Type F		top (pos. 2) 09 06 000 9936 bottom (pos. 32) 09 06 000 9937		

Identification	Drawing	Dimensions in mm

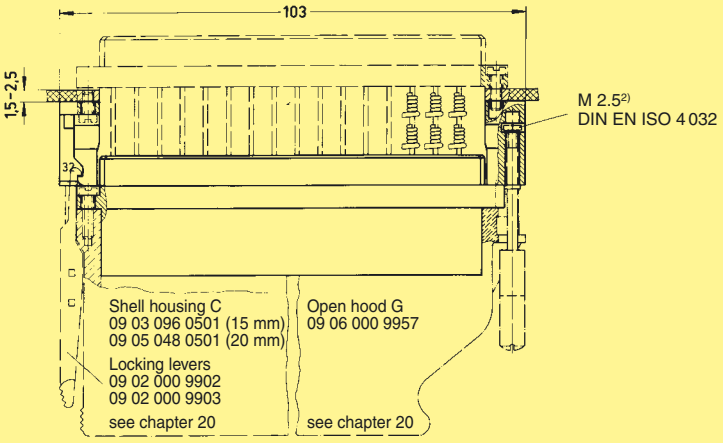
Mounting examples of piggyback connectors

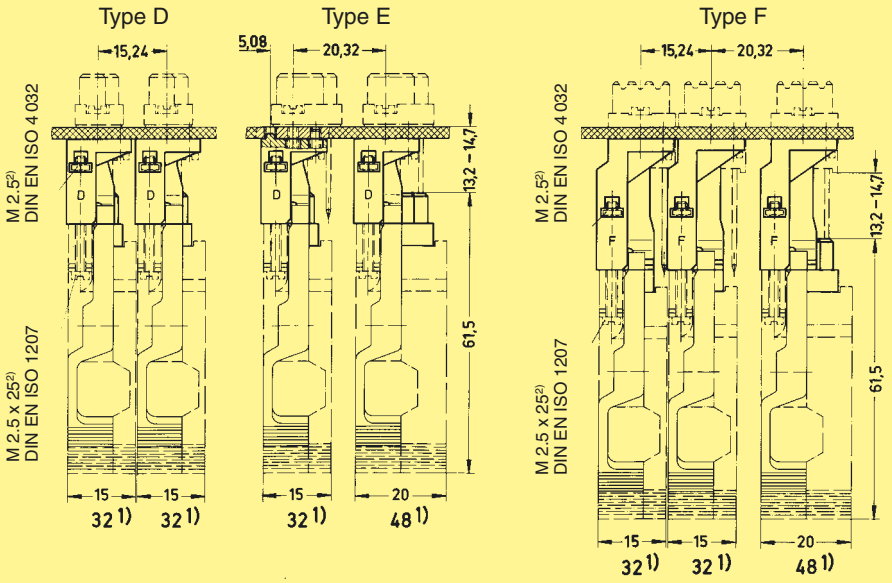
without housings





with housings





[1] Number of contacts piggyback connector
[2] Doesn't belong to the scope of supply

Identification	Part No.	Drawing	Dimensions in mm

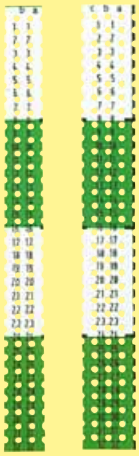
Identification strips for female connectors

When using female connectors with wrap posts in small and medium-sized quantities, the wiring on a fully automated wiring machine is not always justified. However, when working with a manual wiring device there may be a problem of identification of the correct terminal, especially when using a high packaging density.
Therefore HARTING has developed identification strips with green and white printed fields showing also the row letters and terminal numbers. These can be mounted on the female connectors before beginning the wiring operation.

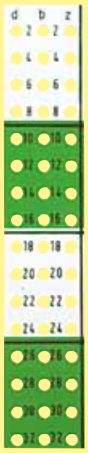
Colour of letters/figures: black
Colour of fields: white/green

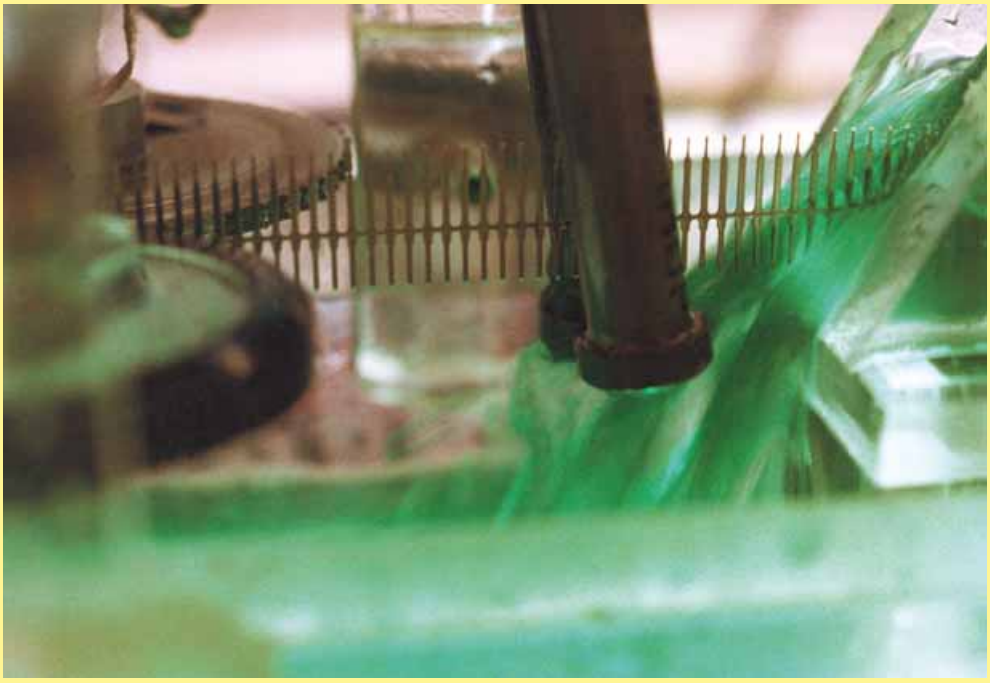
Type B
09 02 000 9939

Type C
09 03 000 9939



Type F
09 06 000 9939





High quality contact surfaces require expertise and latest technological equipment.

Technology at HARTING preserves natural resources thus improving the environment

List of part numbers

List of part numbers

List of part numbers

Production plants – worldwide

Espelkamp / Germany – Plant 1

Espelkamp / Germany – Plant 2

Espelkamp / Germany – Plant 3

Espelkamp / Germany – Plant 4

Espelkamp / Germany – Plant 5

Zhuhai / China

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